VOL. XXI. No. 10 OCTOBER 1936

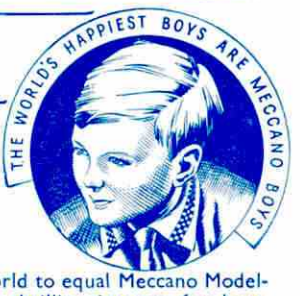
MECCANO MAGAZINE

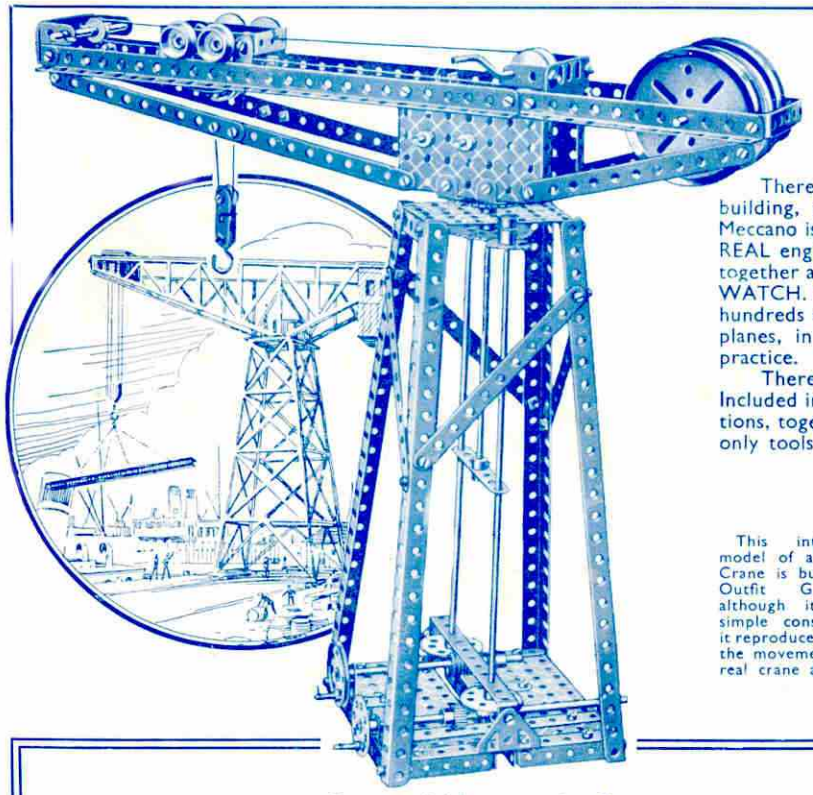
A VETERAN MAORI CHIEF

6D.

MECCANO

BOYS!—BUILD LIKE REAL ENGINEERS!





There is no other hobby in the world to equal Meccano Model-building, and none that is so full of thrilling interest for boys. Meccano is REAL engineering in miniature. The models are built with REAL engineering parts, accurately made of steel and brass, that fit together and work with the SMOOTHNESS AND PRECISION OF A WATCH. These parts can be used over and over again to make hundreds of different models—Cranes, Bridges, Motor Cars, Aeroplanes, in fact almost everything known in modern engineering practice.

There is nothing difficult about Meccano model-building. Included in every Outfit is a splendidly illustrated Manual of Instructions, together with a screwdriver and two spanners, which are the only tools needed. Any boy can start building at once.

This interesting model of a Girder Crane is built with Outfit G, and although it is of simple construction it reproduces exactly the movements of a real crane at work.

B Meccano Outfit. Price 7/6

Prices of Meccano Outfits

COMPLETE OUTFITS

O	Outfit	each	3/6
A	"	"	5/-
B	"	"	7/6
C	"	"	10/-
D	"	"	15/-
E	"	"	20/-
F	"	"	30/-
G	"	"	55/-
H	" (Carton)	"	72/6
Hw	" (Cabinet)	"	97/6
K	" (Carton)	"	132/6
Kw	" (Cabinet)	"	157/6
L	" (")	"	400/-

ACCESSORY OUTFITS

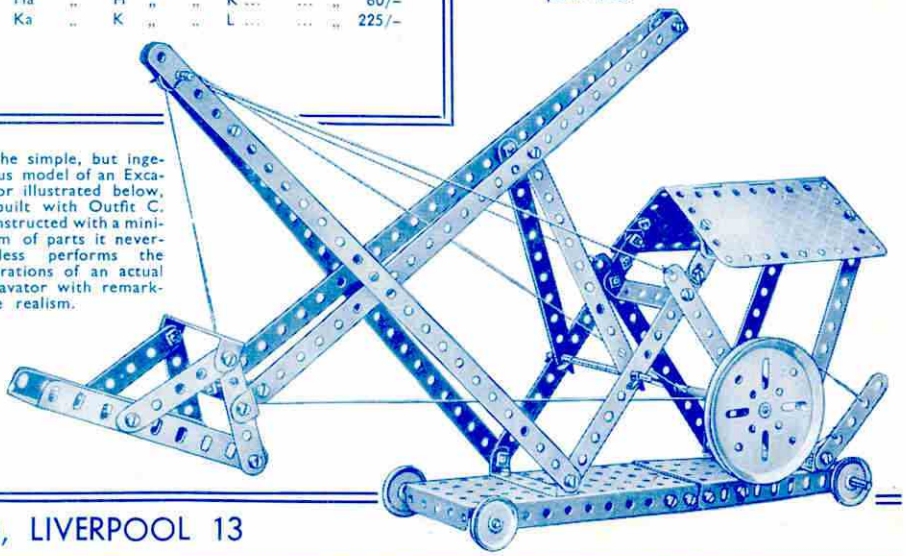
Oa	converts O Outfit into	A	... ...	each	1/6
Aa	" A " "	B	... ...	"	2/6
Ba	" B " "	C	... ...	"	3/-
Ca	" C " "	D	... ...	"	5/6
Da	" D " "	E	... ...	"	5/6
Ea	" E " "	F	... ...	"	11/-
Fa	" F " "	G	... ...	"	26/6
Ga	" G " "	H	... ...	"	17/6
Ha	" H " "	K	... ...	"	60/-
Ka	" K " "	L	... ...	"	225/-

MECCANO "STANDARD MECHANISMS"

This book contains illustrations of nearly 200 specially designed mechanisms made with Meccano parts, representing almost every movement used in engineering practice. Every Meccano enthusiast should get a copy from his dealer, price 1/- or direct from Meccano Limited, Binns Road, Liverpool 13, price 1/- post free.

E Meccano Outfit. Price 20/-

The simple, but ingenious model of an Excavator illustrated below, is built with Outfit C. Constructed with a minimum of parts it nevertheless performs the operations of an actual Excavator with remarkable realism.



MECCANO LTD., BINNS ROAD, LIVERPOOL 13

EXTRA SPECIAL EDITION

SPECIAL NEWS FOR HIKERS

Hamleys News

HAMLEY · BROTHERS · LTD · ESTABLISHED · 1760 ·

200-202, REGENT ST., LONDON, W.I. OUR ONLY ADDRESS

No. 43 October, 1936

MOVIES OF YOUR OWN!

GO TO THE MOVIES, FREE!

This Genuine Mickey Mouse Bingoscope Projector with variable resistance for all mains 100-250 volts, takes 30 ft. and 60 ft. 9.5 m.m. Films, and is complete with a 12-volt Lamp. Special offer to clear, but there's only a limited number.

Price each **15/-** Post 9d.
Usually 27/6.

DOT-DASH-DOT-DOT-DASH!

Special signalling lamp has special sliding apparatus to give green, red or white beam. Press On and Off Morse Button.

Price **3/6** Post 3d.

Night-Travelling made safe for Hikers!

Every hiker should carry a Sila hand lamp. Front reflector throws a powerful beam 60 ft. up road and red reflector behind shows clearly to following motorists. Complete with battery. Price is **9/6** Post 6d.

TRAFFIC LIGHTS IN YOUR OWN HOME!

Stop—caution. Go! True-to-scale traffic signals, complete with battery, work just like the real thing and create hours of fun and interest.

The price is **3/11** Post 4d.

THREE-COLOUR HAND TORCH

Everybody, Boy Scouts or Girl Guides, need one of these torches. Fitted with rotating colour slides to change light from white to red and red to green. Complete with battery in nickel-plated case.

each **6/6** Post 3d.

TORCH THROWS THREE BEAMS

Red, White and Green

This torch will delight every boy or girl. Simple mechanism allows three different-coloured beams to be thrown.

Price is only Complete with battery. **2/6** Post 3d.

A Garage for your "Dinky Toys"

Here's a garage to house your Dinky Toys, or any other models you have. Turn a switch, and lights go on.

Complete with battery. Each **1/6** Post 3d.

WALL AND DESK LIGHT

Beautifully made in strong material, this light throws a wide beam and is always useful.

each **2/6** Post 3d.

THE NAME Gamages GUARANTEES THE VALUE

GAMAGES

NATIONAL HEADQUARTERS FOR MECCANO, HORNBY TRAINS AND SPEED BOATS

As National Headquarters Gamages provide a COMPLETE service for Meccano and Hornby enthusiasts. Not only do Gamages stage specialised Meccano and Hornby displays, but they have the largest stocks of all outfits, models and spare parts in Britain. Wherever you are located Gamages can supply all your requirements promptly and efficiently.

A MICROSCOPE SET For the Young Scientist

A splendid outfit that will give hours of absorbing interest and study. It includes a small microscope on an inclinable stand, with an adjustable mirror. Focussing is done by a sliding tube. The rest of this fine set is comprised of slides, collection jar, needle, tweezers, etc. All packed in a neat, well-made wooden box. Astonishing value. COMPLETE **5/-**
Foreign. *Post 9d.*

THE FAMOUS "SCHUCO-STUDIO" CAR

Undoubtedly the cleverest mechanical toy ever put on the market. The ingenious, steerable, driving-school car with differential gear! Driving, steering and parking exercises may be carried out. Wheels and tyres can be changed; detachable steering wheel. Winding by crank lever or by friction wheel put under pressure on a backward movement.
No. 1 Set (Assembled Car), 3/6.
Set No. 2 comprises chassis, four wheels, tyres, steering lever, hubs, spanners, roller lifting jack and full instructions for assembly. **5/-**

VERTICAL STEAM ENGINES

A splendid steam engine at a remarkably low price. Fitted with safety valve, whistle, filler, can and lamp. Height 10½ in. **5/-**
Foreign. *Post 6d.*

THE GREATEST VALUE OF ITS KIND EVER OFFERED!
5 ft. OAK RAIL BILLIARD TABLE FOR ONLY 49/6

Truly wonderful value, because, until the advent of this offer, it has not been possible to produce an Oak Rail Billiard Table under 3 Gns. Perfectly modelled on the lines of a Standard Table. Best quality laminated bed, tested for accuracy and strongly battened to obviate warping. **Solid Oak Cushion Rails** in attractive heavy design, highly polished Dark colour. Solid Para rubber cushion, positioned to ensure maximum resiliency and billiard-table "angle" accuracy. Bed and cushions covered with splendid quality English woven cloth. Brassed pocket plates leather covered and fitted cord pocket nets. Adjustable rubber-shod feet for adjusting level of Table. Each Table is supplied complete with the following Accessories: **Set of 3 guaranteed turned composition 1⅞ in. Billiard Balls, two 4 ft. Cues, large Marking Board, fitted with brass runners and pointers, Chalk and Book of Rules.**

DELIVERED ON FIRST OF 6 MONTHLY PAYMENTS OF 9/-

'GAMAGE' SNOOKER SETS In view of the vastly increased popularity of Snooker, we strongly recommend the purchase of a Snooker Set with any of our Billiard Tables. **5 ft. Table, with 17 Ball Snooker Set, £3 6s., or 6 Monthly Payments of 12/-. Snooker Set (17 Balls) separately, 16/6.** *Post 9d.*

SMALLER SIZES:

Size of table	Length of cues	Diam. of balls	
4 ft.	3 ft. 6 in.	1⅝ in.	35/-
*3 ft. 6 in.	3 ft.	1½ in.	23/6
*3 ft.	3 ft.	1½ in.	19/6

**The last two tables have slightly cheaper quality cloth.*

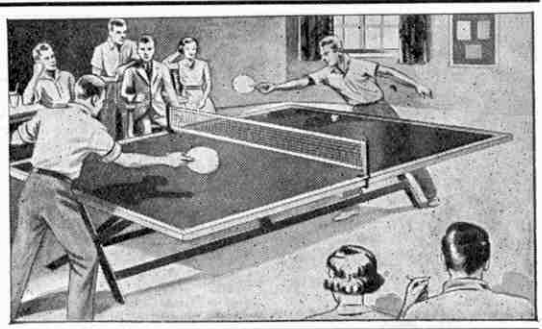
Carriage Paid on Billiard Tables to Nearest Railway Station, England and Wales.

TABLE TENNIS TOPS AT THE RIGHT PRICE

Constructed from selected ⅜ in. reinforced Birch, ensuring a perfect playing surface without **"dead spots"** (not to be confused with the cheaper plywood table tops). The under-battening is of 1½ in. by ⅝ in. material, entirely obviating warping. Made in two sections for folding. **The 30/- Table is Tournament size, finished in Green with Association ¾ in. White Line.**
If Top and Trestle ordered together we pay Carriage in U.K.

8 ft. by 4 ft. *Carriage 1/- Extra* **25/-** | 9 ft. by 5 ft. *Carriage 1/6 Extra* **30/-**

6 ft. 6 in. SUPERIOR TRESTLE, in one piece, folds flat, 17/6



A Marvellous Offer for the Young Woodworker

WOOD TURNING LATHES

If you are a keen woodworker think how thrilling it will be to turn your own jobs on this fine lathe. Although so low in price it is a first-class tool built for real work. 3 in. centres, 14 in. between centres, 1¾ in. diameter, bright tubular steel bed. Total length of bed, 24 in. Overall length, 26½ in. Headstock spindle fitted outside with washers and nut to take grinding or sanding wheel. Two-speed grooved pulley for ¼ in. or 5/16 in. belting. Inside diameters of pulleys 1⅜ in. and 2⅞ in. Outside diameters of pulleys 2⅛ in. and 3⅝ in. Screw Feed Tailstock. Weight 20 lb. **19/6**
Carriage 1/9 Extra Outside our Extensive Motor Delivery Area.

Controlled by Electric Magnetic Waves!

DOCKING THE "QUEEN MARY"

An entirely new and fascinating toy. Ships moving on the water may be sailed, steered, reversed, and docked by electric magnetic waves. Complete with models of R.M.S. "Queen Mary," coastal steamer, tug, and harbour. Magnetic control bar. Simple to operate and can be used on any table. **7/6**

GAMAGES HOLBORN, LONDON, E.C.1. *Telephone: HOLborn 8484.* *City Branch: 107, Cheapside, E.C.2*

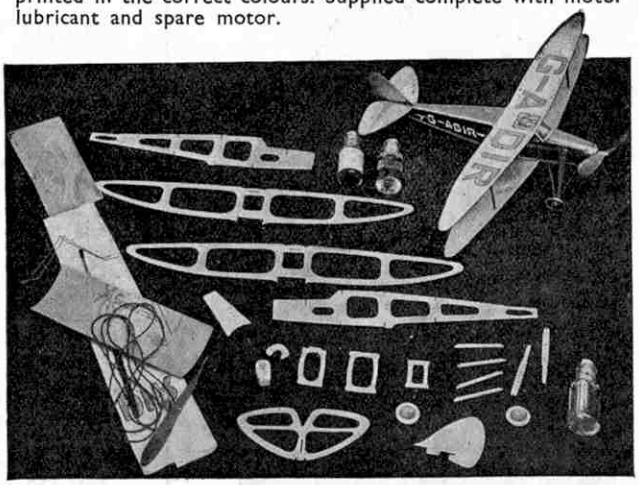
Build your own FLYING FROG

TRADE MARK REGD.

Three new scale model CONSTRUCTION KITS

NO TOOLS REQUIRED
ALL PARTS CUT TO SHAPE

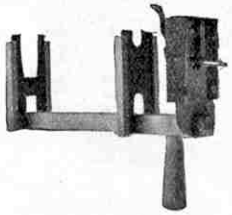
These construction kits enable the enthusiast to build his own Flying Scale Models. They are easy to build and no tools are required. All parts are blanked out and fit together perfectly, only needing to be glued. (This is supplied.) Wire parts are already bent to shape. No paint is required, all coverings are printed in the correct colours. Supplied complete with motor lubricant and spare motor.



De Havilland "LEOPARD MOTH" 2'6
Wing Span 12¼ ins. Length 9⅛ ins.

De Havilland "HORNET MOTH" 3'6
Wing Span 11 ins. Length 9⅛ ins.

Hawker "DEMON" 2-seater fighter 4'6
Wing Span 12¼ ins. Length 11 ins.



A constructional kit is now available for building a geared-up Universal Hand Winder for use with FROG scale model construction kits or any FROG model with a propeller not exceeding 5¼ ins. diameter. All parts cut ready to assemble. Price 1'-

The WAKEFIELD CUP WINNER—

International Model Aircraft Ltd. have purchased the exclusive World rights for marketing the winning aeroplane as a Super Construction Kit, built under the personal supervision of its designer-pilot, Mr. A. A. Judge, whose services have been secured for the purpose.

Every wood part in this Kit is shaped out ready to fit together, every wire part is formed to shape; the air-screw is carved out, requiring finishing only, and the famous free-wheel and rubber tensioner device are supplied complete. **Full size** drawings are, of course, included. Remember, this aeroplane has flown **for over 8 MINUTES.**

All FROG model aircraft are covered by World Patents granted and pending. Made in England by International Model Aircraft Ltd.

FREE FLIGHT INSTRUCTION

Lines Bros. will give free flight instruction by appointment on the Frog Aerodrome at Merton.

Telephone: Liberty 1041.

To Lines Bros. Ltd. (Dept. 5), Morden Road, London, S.W.19.

Please send me your **new** "Frog" coloured leaflet with particulars of the "Frog" Flying Club and of how to obtain handsome enamelled Air Force pilot Badges.

Name.....

Address.....

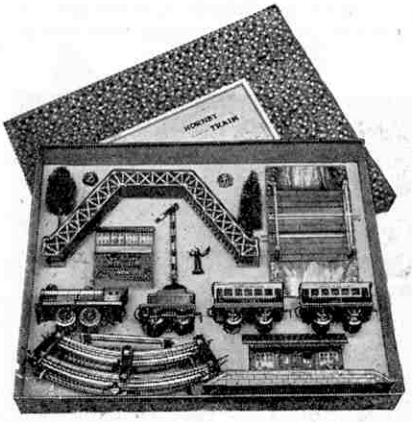
Please write in block letters. 10/36

COUPON

SOLE CONCESSIONAIRES:

LINES BROS. LTD., TRI-ANG WORKS, MORDEN ROAD, LONDON, S.W.19

M8 Complete Model Railway Set



M9 Complete Model Railway Set

M10 Complete Model Railway Set

HORNBY

COMPLETE MODEL RAILWAY SETS

Contain everything that is necessary for a complete miniature railway

PRICES FROM 9/6 TO 25/-

The Complete Model Railway Sets illustrated on this page are very popular, especially with the younger boys. Each Set includes an efficient clockwork Locomotive, various items of Rolling Stock, a Set of Rails, and Lineside Accessories.

All you have to do is to unpack the box, lay out the rails and accessories as shown in the illustration provided, place the locomotive and coaches or wagons on the track, and commence operating your own railway immediately. It's great fun!

M8 Complete Model Railway

This Model Railway Set consists of a non-reversing Locomotive, Tender and two Goods Wagons, Wayside Station, Footbridge, Signal, Signal Cabin, two Trees with Stands, Tunnel and Set of Rails. The complete Set is packed in a strong carton, as illustrated. Price 9/6

M9 Complete Model Railway

The M9 Complete Model Railway Set contains an extensive selection of material, consisting of an efficient non-reversing Locomotive, which can be braked from the track, Tender and two Passenger Coaches, Signal, Station, Footbridge, Signal Cabin, Level Crossing, Guard, Porter, two Trees with Stands, two Hikers, and Set of Rails. The complete Set is packed in a strong carton, as illustrated. Price 12/6

M10 Complete Model Railway

The contents of this splendid Railway Set comprise a non-reversing Locomotive, with a reliable mechanism that can be braked from the track, Tender, two Pullman Coaches, Set of Rails, Footbridge, two Stations, Signal Cabin, two Telegraph Poles, two Signals, Loading Gauge, Tunnel, Cutting, Level Crossing, three Trees with stands, and six die-cast Figures.

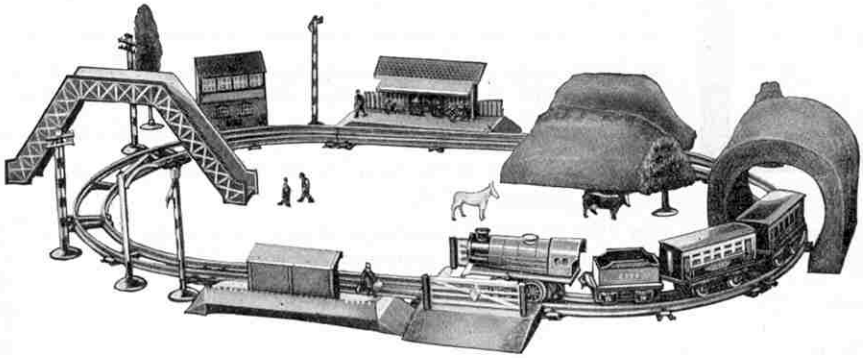
The complete Set is attractively packed in a special cabinet, as illustrated. Price 19/6

M11 Complete Model Railway

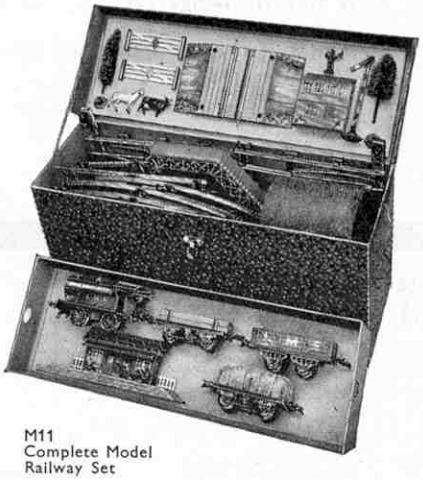
This complete Model Railway Set is the most popular and the most comprehensive in the series. It consists of a reversing Tank Locomotive, Fibre Wagon, Timber Wagon, Open Wagon, Tunnel, Station, Signal, Level Crossing, Signal Cabin, Footbridge, one Cow, one Horse, two Trees with Stands, Guard, and Set of Rails and Points. The complete Set is attractively packed in special cabinet, as illustrated. Price 25/-

Obtainable from all Meccano Dealers

Manufactured by
MECCANO LIMITED
BINNS RD., LIVERPOOL 13



This illustration shows a suitable arrangement of the M10 Complete Model Railway Set



M11 Complete Model Railway Set

Dinky Toys

DOLL'S HOUSE FURNITURE

A WONDERFUL SERIES OF ACTUAL SCALE MODELS

The extension of the range of Dinky Toys to include true-to-scale modern Furniture will be welcomed by all who know the charm of these perfect miniatures. Much care and thought have been given to the design, finish and presentation of every article of this Furniture series. Each piece is based on a typical example of modern design, and **all are actual scale models made to a scale of 7/16th of an inch to one foot.** There is a tone and individuality of style about Dinky Toys Doll's House Furniture which cannot fail to appeal. Among the most attractive features are the opening doors and drawers. This furniture is far superior to anything of its kind that has ever before been produced for the delight and pleasure of young people.

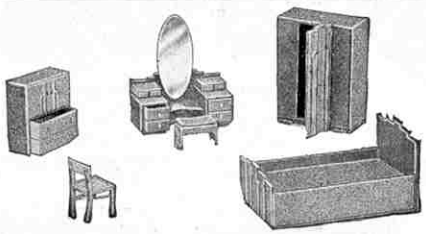
The Dinky Toys Furniture is now ready. See it at your dealer's.

DINING-ROOM FURNITURE
Dinky Toys No. 101

Price of complete set 2/3

No. 101a.	Table...	5d.	each
No. 101b.	Sideboard (Opening doors)	9d.	,,
No. 101c.	Carver Chairs (2) ...	3d.	,,
No. 101d.	Chairs ... (4) ...	2d.	,,

Supplied in walnut brown finish only.

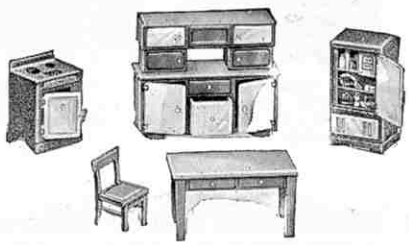


BEDROOM FURNITURE
Dinky Toys No. 102

Price of complete set 2/11

No. 102a.	Bed	6d.	each
No. 102b.	Wardrobe (Opening door) ...	9d.	,,
No. 102c.	Dressing Table (Opening drawers)	10d.	,,
No. 102d.	Dressing Chest (Opening drawers)	6d.	,,
No. 102e.	Dressing Table Stool	2d.	,,
No. 102f.	Chair	2d.	,,

Supplied in colour or walnut brown finish.

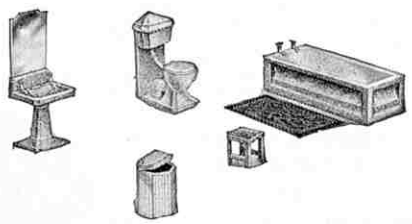


KITCHEN FURNITURE
Dinky Toys No. 103

Price of complete set 2/6

No. 103a.	Refrigerator (Opening Door)	8d.	each
No. 103b.	Kitchen Cabinet (Opening doors and drawer) ...	10d.	,,
No. 103c.	Electric Cooker (Opening door)	6d.	,,
No. 103d.	Table...	4d.	,,
No. 103e.	Chair...	2d.	,,

Supplied in two colour schemes—light blue and white; light green and cream.



BATHROOM FURNITURE
Dinky Toys No. 104

Price of complete set 2/–

No. 104a.	Bath	6d.	each
No. 104b.	Bath Mat	1d.	,,
No. 104c.	Pedestal Hand Basin ...	6d.	,,
No. 104d.	Stool...	2d.	,,
No. 104e.	Linen Basket (Opening lid)	4d.	,,
No. 104f.	Toilet (Lifting lid)	6d.	,,

Supplied in two colour schemes—pink and white; light green and white.

"Dolly Varden" Doll's House

THE LATEST FROM MECCANOLAND

The "Dolly Varden" Doll's House illustrated below has been specially designed for use with Dinky Toys Doll's House Furniture.

The house is collapsible and the exterior is designed to represent a half-timbered dwelling, while the interior decorations, which are printed in nine colours, are in an attractive modern style.

Reinforced leather board is the material of which the house is constructed, and when set up it is as strong as a wood structure. The container, which also is made of reinforced leather board, opens out to show a lovely garden with Tennis Lawn, Carriage Drive, and Rockery, providing an exquisite setting for play with Dinky Toys and Hornby Trees, Hedging, etc. Price 9/6

The Couch Hammock, Tennis Net, Garden Seats, Dinky Toys Garage, Motor Cars and Figures, and the Hornby Trees and Hedging featured in the illustration on the right are not included with the Doll's House and Garden.

DIMENSIONS

The following are the overall dimensions of the "Dolly Varden" Doll's House when built up ready for play. Length, 1 ft. 6¾ in. Depth, 10¼ in. Height, 1 ft. 6¾ in.

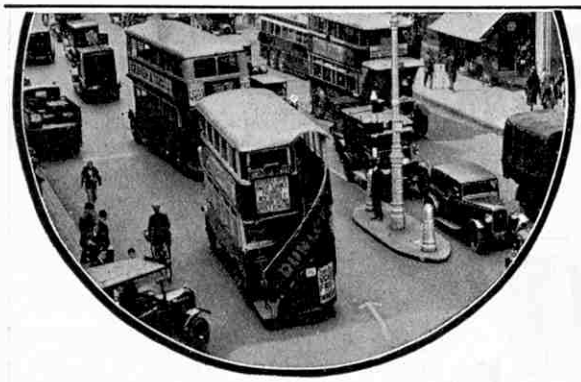
The open container on which the house stands measures 3 ft. 3½ in. by 2 ft. 5½ in.

When the house is dismantled and packed in the container, the overall dimensions of the parcel are ¾ in. x 1 ft. 7½ in. x 2 ft. 5½ in.

MECCANO LTD. BINNS ROAD - LIVERPOOL 13

DINKY TOYS

A CHARMING COLLECTING HOBBY

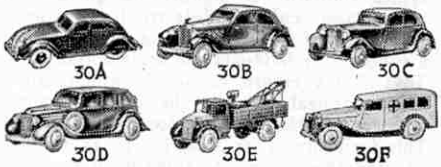


A FASCINATING COLLECTING HOBBY

Dinky Toys are the most realistic and the most attractive models in miniature ever produced. These wonderful toys are unique in their perfection of finish, and their range is so wide as to appeal to all tastes. A selection is illustrated on these pages and as will be seen trains, motor vehicles, aeroplanes, famous liners, etc., are already included in the range. Many other models of equal interest are in preparation.

ASK YOUR DEALER FOR A COPY OF THE DINKY TOYS FOLDER which gives illustrations and prices of the complete range.

STREAMLINE FIRE ENGINE
Dinky Toys No. 25h
Fitted with detachable rubber tyres. Price **9d.** each



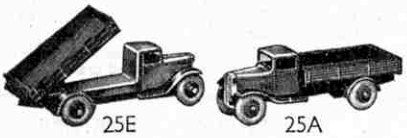
MOTOR VEHICLES Dinky Toys No. 30
Fitted with detachable rubber tyres and silver-plated radiators.

No. 30a	Chrysler Airflow Saloon	each	**9d.**
No. 30b	Rolls-Royce Car	,,	**9d.**
No. 30c	Daimler Car	,,	**9d.**
No. 30d	Vauxhall Car	,,	**9d.**
No. 30e	Breakdown Car	,,	**9d.**
No. 30f	Ambulance	,,	**9d.**

Price of complete set **4/6**

TRAM CAR
Dinky Toys No. 27
Assorted colours.
Price **3d.** each

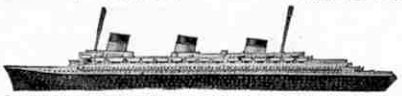
MOTOR BUS
Dinky Toys No. 29a
Assorted colours.
Price **4d.** each



COMMERCIAL MOTOR VEHICLES
Dinky Toys No. 25
Fitted with detachable rubber tyres and silver-plated radiators

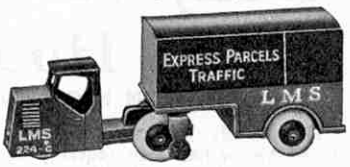
No. 25a	Wagon	each	**9d.**
No. 25b	Covered Van ...	,,	**9d.**
No. 25c	Flat Truck	,,	**9d.**
No. 25d	Petrol Tank Wagon	,,	**9d.**
No. 25e	Tipping Wagon ...	,,	**9d.**
No. 25f	Market Gardener's Van	,,	**9d.**

Price of complete set **4/6**



CUNARD WHITE STAR LINER "QUEEN MARY"
Dinky Toys No. 52a
Fitted with rollers and supplied in presentation box. Price **1/-** each
Dinky Toys No. 52m
Similar to No. 52a but not fitted with rollers, nor supplied in presentation box. Price **9d.** each

PILLAR LETTER BOX AIR MAIL
Dinky Toys No. 12b
Price **3d.** each



RAILWAY MECHANICAL HORSE AND TRAILER VAN
Dinky Toys No. 33R
Fitted with detachable rubber tyres.

No. 33Ra	Railway Mechanical Horse	each	**8d.**
No. 33Rd	Trailer Van...	,,	**10d.**

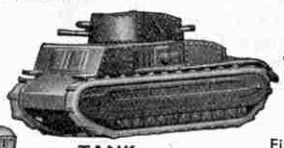
Price, complete, L.M.S.R., L.N.E.R., G.W.R. or S.R., **1/6**

STRONGLY MADE UNBREAKABLE MODELS

DELIVERY VANS
Dinky Toys No. 28/1
Fitted with detachable rubber tyres.

No. 28a	Golden Shred Van ...	each	**6d.**
No. 28b	Seccotine Van	,,	**6d.**
No. 28c	Manchester Guardian Van	,,	**6d.**
No. 28e	Firestone's Tyres Van ...	,,	**6d.**
No. 28f	Palethorpe's Sausage Van	,,	**6d.**
No. 28n	Atco Lawn Mowers Van ...	,,	**6d**

Price of complete set **3/-**



TANK
Dinky Toys No. 22f
Price **9d.** each

A realistic model of the latest type of streamline train.

"SILVER JUBILEE" TRAIN SET
Dinky Toys No. 16
Price **1/6** each

TRACTOR
Dinky Toys No. 22e
Price **9d.** each

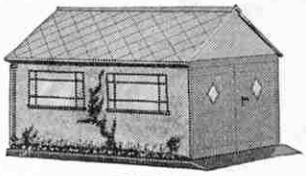
STREAMLINE SALOON
Dinky Toys No. 22h
Assorted colours. Fitted with detachable rubber tyres and silver-plated radiator. Price **6d.** each

G.W.R. RAIL CAR
Dinky Toys No. 26
Assorted colours. Price **4d.** each

R.A.C. BOX, MOTOR CYCLE PATROL AND GUIDES
Dinky Toys No. 43
This set is representative of the familiar personnel and road hut of the R.A.C. Each item is finished in correct colours.

No. 43a	R.A.C. Box	each	**6d.**
No. 43b	R.A.C. Motor Cycle Patrol	,,	**9d.**
No. 43c	R.A.C. Guide directing traffic	,,	**3d.**
No. 43d	R.A.C. Guide at the salute	,,	**3d.**

Price of complete set **1/9**



GARAGE
Dinky Toys No. 45
Fitted with opening double doors. Will accommodate any two Dinky Toy Motor Cars. Price **1/6** each

ROBOT TRAFFIC SIGNAL
Dinky Toys No. 47a (Four face) Price **3d.** each
No. 47b (Three face) Price **3d.** each
No. 47c (Two face) Price **3d.** each

POLICE BOX, MOTOR CYCLE PATROL AND POLICEMEN
Dinky Toys No. 42

No. 42a	Police Box	each	**6d.**
No. 42b	Motor Cycle Patrol	,,	**10d.**
No. 42c	Point Duty Policeman (in White Coat)	,,	**3d.**
No. 42d	Point Duty Policeman	,,	**4d.**

Price of complete set **1/11**

FINISHED IN RICH COLOURS

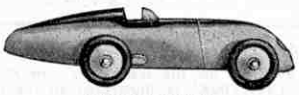
DINKY TOYS

SMALL CARS
Dinky Toys No. 35
Fitted with rubber tyres

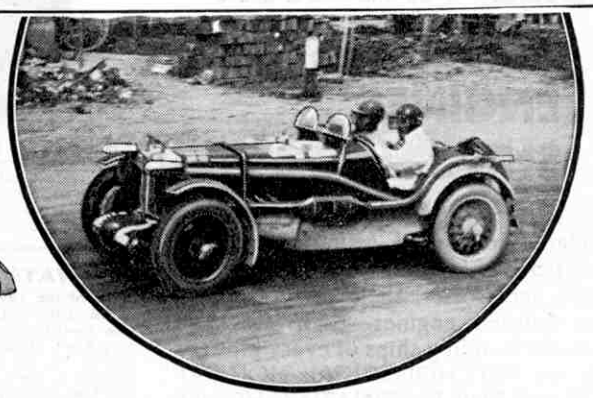
No. 35a	Saloon Car	each	3d.
No. 35b	Racer...	,,	3d.
No. 35c	"M.G." Sports Car	,,	3d.

Price of complete set **9d.**

HOTCHKISS RACING CAR
Dinky Toys No. 23b
Assorted colours. Fitted with detachable rubber tyres.
Price **6d.** each



RACING CAR
Dinky Toys No. 23a
Assorted colours. Fitted with detachable rubber tyres.
Price **4d.** each



49D 49A 49E 49B 49C

PETROL PUMPS Dinky Toys No. 49
Scale models fitted with rubber hose pipes. Realistically coloured.

No. 49a	Bowser Pump	each	4d.
No. 49b	Wayne Pump	,,	4d.
No. 49c	Theo Pump each **4d.** No. 49d Shell Pump	,,	4d.
No. 49e	Oil Bin (Pratts)	,,	3d.

Price of complete set **1/6**

STREAMLINE TOURER
Dinky Toys No. 22g
Assorted colours. Fitted with detachable rubber tyres.
Price **6d.** each

23e

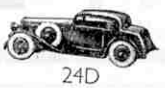
24E

24G

24F

24C

23d



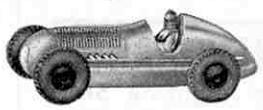
24D

24A

CARAVAN TRAILER
Dinky Toys No. 30g
For use with the Saloon Cars in Dinky Toys No. 24 and 30. Assorted colours. Fitted with detachable rubber tyres.
Price **6d.** each

PILLAR LETTER BOX G.P.O.
Dinky Toys No. 12a
Price **3d.** each

TRAILER
Dinky Toys No. 25g
For use with Dinky Toys No. 25 (Commercial Motor Vehicles). Fitted with detachable rubber tyres. Price **7d.** each



23c

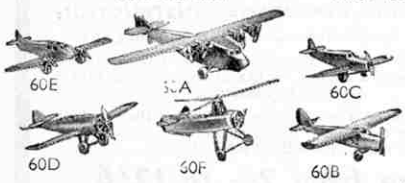
24H

24B

MOTOR CARS
Dinky Toys No. 24
Fitted with detachable rubber tyres and silver-plated radiators

No. 24a	Ambulance	each	9d.
No. 24b	Limousine	,,	9d.
No. 24c	Town Sedan ...	,,	9d.
No. 24d	Vogue Saloon ...	,,	9d.
No. 24e	Super Streamline Saloon	,,	9d.
No. 24f	Sportsman's Coupé	,,	9d.
No. 24g	Sports Tourer (4 seater)	,,	9d.
No. 24h	Sports Tourer (2 seater)	,,	9d.

Price of complete set **6/-**



60E 60A 60C 60D 60F 60B

AEROPLANES Dinky Toys No. 60

No. 60a	Imperial Airways Liner	each	9d.
No. 60b	D.H. "Leopard Moth"	,,	6d.
No. 60c	Percival "Gull" ...	,,	6d.
No. 60d	Low Wing Monoplane	,,	6d.
No. 60e	General "Monospar"	,,	6d.
No. 60f	Cierva "Autogiro" ...	,,	6d.

Price of complete set **3/-**

ROYAL AIR MAIL SERVICE CAR
Dinky Toys No. 34
In correct colours. Fitted with detachable rubber tyres.
Price **6d.** each

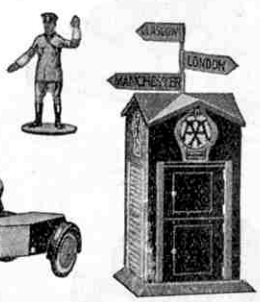
RACING CARS
Dinky Toys No. 23
Fitted with driver and detachable racing tyres. Assorted colours.

No. 23c	Mercedes-Benz Racing Car	each	8d.
No. 23d	Auto-Union Racing Car	,,	8d.
No. 23e	"Speed of the Wind" Racing Car	,,	8d.

Price of complete set **1/11**

MOTOR TRUCK
Dinky Toys No. 22c
Assorted colours. Fitted with detachable rubber tyres. Price **6d.** each

STREAMLINE BUS
Dinky Toys No. 29b
Fitted with rubber tyres.
Price **6d.** each



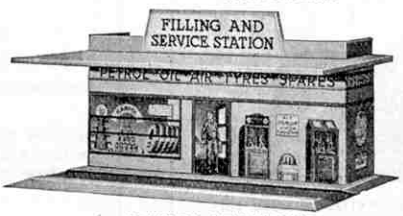
33A 33C 33F 33E 33B 33D

MECHANICAL HORSE AND FIVE ASSORTED TRAILERS
Dinky Toys No. 33
Fitted with detachable rubber tyres

No. 33a	Mechanical Horse ...	each	6d.
No. 33b	Flat Truck	,,	6d.
No. 33c	Open Wagon ...	,,	6d.
No. 33d	Box Van	,,	8d.
No. 33e	Dust Wagon ...	,,	8d.
No. 33f	Petrol Tank	,,	8d.

Price of complete set **3/6**

BEACON
Dinky Toys
No. 47d
Realistic model of a Belisha Safety Beacon.
Price **1d.** each



PETROL STATION
Dinky Toys No. 48
Accurate reproduction of a filling station. Tastefully printed in appropriate colours.
Price **1/6** each

A.A. BOX, MOTOR CYCLE, PATROL AND GUIDES
Dinky Toys No. 44
Collectors of Dinky Toys will find this new addition to the range of particular interest. Each item is finished in correct colours.

No. 44a	A.A. Box	each	8d.
No. 44b	A.A. Motor Cycle Patrol	,,	9d.
No. 44c	A.A. Guide directing traffic	,,	3d.
No. 44d	A.A. Guide at the salute	,,	3d.

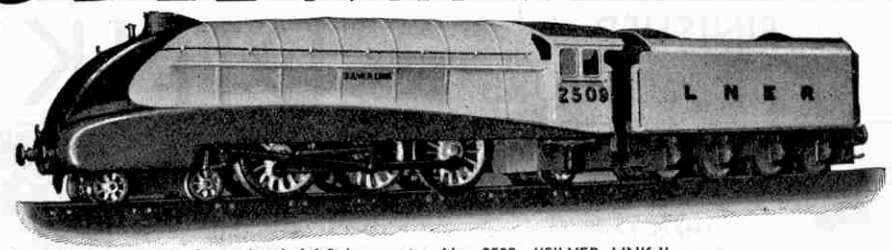
Price of complete set **1/11**

GET "MODEL-MINDED!"

BUILD AND RUN—
LOCOMOTIVES
ENGINES
SHIPS—

this is just the time of the year when model owners and makers get their new stock of locomotives, track, rolling stock, accessories, their castings, parts and finished engines—their sets and parts for building ships of every kind, so it's the PSYCHOLOGICAL MOMENT to START THIS FASCINATING HOBBY of MODELS!

Write to BASSETT-LOWKE LTD., at Northampton, for their large catalogues on the subject of models, and decide what you will have from thousands of interesting alternatives.



Scale Model L.N.E.R. Streamlined 4-6-2 locomotive No. 2509. "SILVER LINK."
Railway history has been made by the L.N.E.R. in the introduction of their "SILVER JUBILEE" Express between London and Newcastle. It is the first full streamlined train to run in Great Britain.
This fascinating model brings out all the salient points of its record-breaking prototype, and is a most interesting and unique addition to the model railway.
Price: Clockwork, electric d.c. 6-8 volts or a.c. 20 volts, £16 16s. 0d.

RAILWAYS

Some of the new lines for the season are now ready, including the "SILVER LINK" as illustrated, an inexpensive 4-4-0 locomotive of the 2P class No. 601, costing only 2 gns. clockwork, £2 7s. 0d. electric, d.c. 6-8 volts, and £2 14s. 0d. a.c. 20 volts, and also a splendid new addition to the goods rolling stock series, a new "ESSO" Oil Tank Wagon.

If your interest lies here get **A.17.** Model Railway Catalogue. Price 6d. post free.

ENGINES

For all model makers who go in for light engineering work, stationary engines, mill engines, or need small engineering parts, besides model parts, Bassett-Lowke have a special Engine Catalogue.

If your interest lies here get **B.17.** Model Engine Catalogue. Price 6d. post free.

SHIPS

If the romance of the sea fascinates you, all matters marine come into the ship catalogue of Bassett-Lowke, and among their new productions for this autumn is a splendid value set of parts for constructing the famous "Clipper Ship" CUTTY SARK, to a scale of 50 ft. to the inch, price **12/6.** Galleons, modern ocean grey hounds, all come alike within the scope of Bassett-Lowke's ship model work.

If your interest lies here get **S.17.** Model Ship Catalogue. Price 6d. post free.

Free folder LILLIPUTIAN POWER of Bassett-Lowke's most popular gauge "O" railway models, sent to those interested. Ask for **F.B.17.**
Special folder of the gauge "OO" Twin Train novelty, **T.T.17,** will be sent free and post free to those to whom "Table Railways" appeal.

BASSETT-LOWKE LTD. NORTHAMPTON

London: 112, High Holborn, W.C.1 Manchester: 28, Corporation Street

"WILCO'S" NEW RANGE
of Cycle Dynamo Lighting Sets

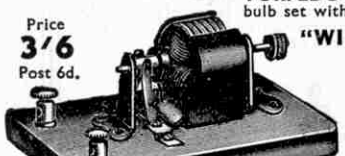
are known as "TORPEDO" types and include the famous tested and proved quality "Wilco" ball-bearing dynamo with automatic voltage regulation. This ensures brilliant light under all riding conditions.

TORPEDO LIGHTWEIGHT Set, as illustrated. **13/9**

TORPEDO STANDARD Set, with streamlined black and chromium 2 bulb headlamp and rear lamp. **18/9**

TORPEDO DE LUXE, all chromium 2 bulb set with rear lamp. **21/-**

Price **3/6** Post 6d.

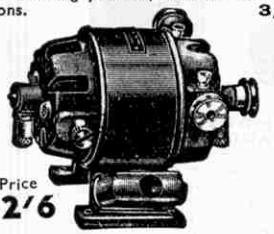


"WILCO" MOTORS AND DYNAMOS

A fine open-type Motor, will work from a 4-volt Flash Lamp Battery or Accumulator, can be supplied in parts for building yourself, with full instructions. **3/6**

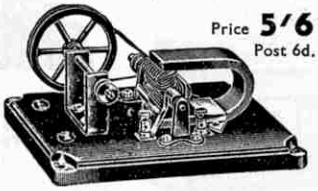
Price **14/6**

Our best Dynamo will light up your Models or Railway with SIX 3.5 volt Bulbs easily. Base 6¼ in. x 4¼ in. **14/6**



Price **12/6**

IRONCLAD GEARED MOTOR. 4-6-volt. This fine motor is very powerful indeed and will work off A.C. mains through a "Wilco" Transformer.



Price **5/6** Post 6d.

DRIVE YOUR MODELS with this New Powerful "Wilco" Permanent Magnet Motor. Fitted with toothed gear wheel. Special gearing gives increased power and allows heavy models to be worked. Motor works perfectly off 4-v. Battery or Accumulator. **5/6**

Leaflets of Cycle Sets free on request or Complete Catalogue "M.M." 3d. post free.
"Wilco" goods obtainable from all Dealers: if any difficulty order direct from:
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SKYBIRD LEAGUE

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These small Models have achieved a world-wide popularity; they include well-known Civil and Military types from the Great War up to the very latest British 300 m.p.h. **FAIREY "BATTLE."**

Prices ranging from 2/- to 12/6

There is also a large range of accessories.
Start your collection to-day. You will enjoy this Hobby.

THE VERY LATEST!

THE BLACKBURN "SHARK"
Complete with cast Torpedo.

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A MODEL OF GATWICK AIRPORT
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GROUND SHEET, 7 feet x 4½ feet 10/6

Also a model of the Southern Railway Airport Station suitable for O Gauge Railway Models (see October price list).

Join the SKYBIRD LEAGUE, and enter your model in the competitions. BRITISH CONTINENTAL AIRWAYS Ltd., offer a prize of a free return ticket to BRUSSELS, AMSTERDAM, OSTENDE, or LE ZOUTE.

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Send stamps 7d. for a copy of "THE AERO-MODELLER," the official organ of the SKYBIRD LEAGUE, which contains full particulars of this fascinating hobby to:

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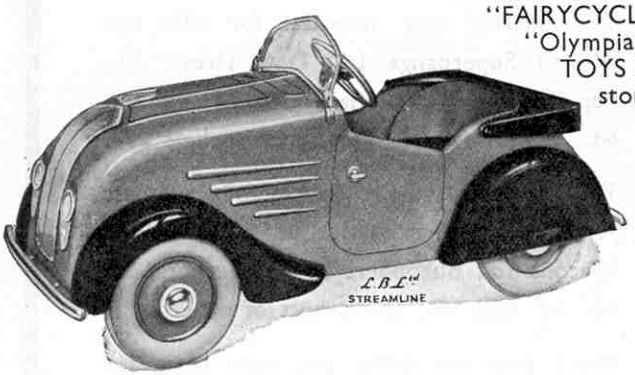
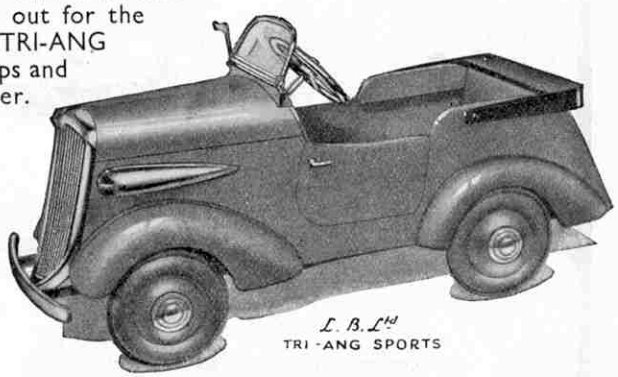
TRI-ANG

It's much more fun going around in one of these latest TRI-ANG CARS, or on your own TRI-ANG "FAIRYCYCLE," so watch out for the "Olympian" shows of TRI-ANG TOYS in the toy shops and stores this winter.

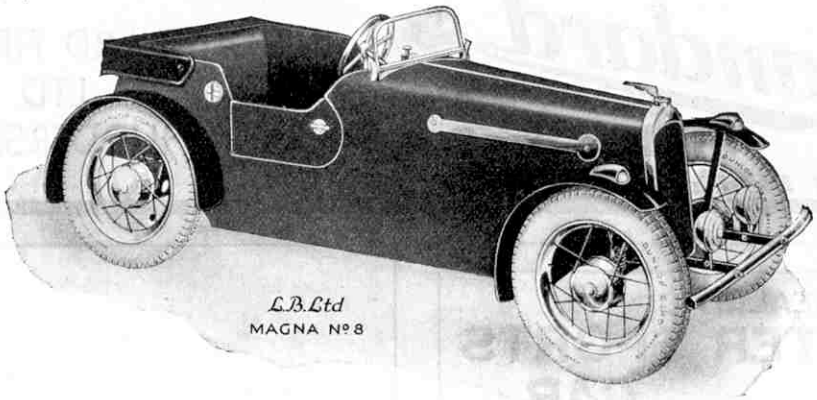


STREAMLINE
A real streamline body made of steel. Crank drive on ball-bearing back axle. Facsimile airflow radiator. Four dummy lamps. Tubular bumpers back and front. Windscreen and direction indicator. 9 in. Balloon disc wheels and ⅝ in. rubber tyres. Length 45 in. Price **55/-**



TRI-ANG SPORTS
Entirely new streamline model. All steel body, with luggage boot and opening side door. 8 in. balloon disc wheels, ½ in. rubber tyres. Plated bumper and streamline dummy side lamps. Windscreen, direction indicator and dummy hood. Length 41 in. Price **32/6**

Obtainable from all good toy shops and stores.



Ask your dealer for the 1936/37 coloured Tri-ang Toy Folder.

MAGNA No. 8
A magnificent new sporting car. Coach-built body. Fully sprung front axle. Ball-bearing back axle. Opening side door, windscreen, dummy hood and lamps. Tubular bumper. 12 x 2¼ in. Dunlop pneumatic tyres on tangent spoke wheels. All bright parts CHROMIUM-PLATED, including hubs and rims, louvres, bumper and streamline mascot. Length 54 in. Price **115/-**

L. BROS. LTD. LONDON BROS ENGLAND

REGD. TRADE MARK

TRI-ANG "FAIRYCYCLE" (Regd.) MODEL No. 2
Tubular frame. 14 in. wheels. 1¾ in. grey imitation pneumatic tyres. Ball-bearing pedals. Rim brake. Two coil saddle. Chain cover. Stand. CHROMIUM-PLATED FITTINGS. Black, blue or maroon. Price **39/6**

TRI-ANG TRICYCLE No. 5 (Regd. Trade Mark)
FITTED WITH REAR MUDGUARDS. Cycle chain drive with free-wheel. Frame best quality weldless cycle tubing. 14 in. wheels. 1¾ in. jointless sponge-rubber tyres. Rim brake. Coil-spring saddle. CHROMIUM FITTINGS. Black, blue or maroon. Price **59/6**

Made in England by

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MECCANO MAGAZINE

Editorial Office:
Binns Road, Liverpool 13
England

Vol. XXI. No. 10
October, 1936

With the Editor

The Indoor Hobbies Season

The long nights are with us again, and my readers will be turning their attention seriously to Meccano, Hornby railways and other indoor hobbies. It is always rather exciting to unearth boxes of material from cupboards and other places where they were hastily stowed on the approach of summer. Invariably some articles are missing. We are quite sure we put them away all right, and everybody else in the house denies having touched them; evidently the articles walked out of the box of their own accord! As a rule, however, the missing items are discovered hidden away in some unexpected corner, and operations then can be commenced in earnest.

Every year I am more impressed with the fact that the boys who get the greatest fun from their hobbies are those who adopt some sort of system. As regards Meccano, I think the best scheme is to decide upon building a series of models of one particular type—cranes, bridges, ships, motor vehicles, or whatever may be of most interest at the time. This is far better than just sitting down to play with an outfit without any particular object in view. The same thing applies to Hornby railways. It is not much fun running the same old layout that one had during the previous winter; a new scheme should be planned out and laid down bit by bit as new material can be obtained.

And here I want to remind all readers that, whatever their hobbies, I am always ready to help. Meccano enthusiasts who find difficulty in getting a particular model to work; Hornby railway owners who want suggestions for new layouts—I want these and all others to write to me without hesitation.

Photographs for Model-Building Contests

In order to enter one of the *"M.M."* model-building competitions it is necessary to send either a photograph or a drawing of the model to be submitted, and I find that this prevents many readers from taking part in these contests. I hear of many cases where a boy builds quite a good model and would like to enter it in a competition, but does not do so because he is no good at drawing and does not possess a camera. A satisfactory drawing of a model may be beyond the powers of many boys, but there should be no difficulty about a reasonably good photograph. I am sure that almost every reader either has a camera of his own, or has a friend who possesses one and could be induced to undertake the necessary photographic operations.

The main thing required in photographs of models is sharpness of focus, and this can be secured with any type of camera, even the very cheapest box form. I am anxious to encourage readers to tackle this photographic bogey and see how easily it can be overcome; and with this object in view I am preparing a helpful article, which I hope to include in next month's issue. In this article I shall deal only with the very simplest types of camera, and show how they can be made to produce really satisfactory photographs.

Readers often ask why it is that the models illustrated on the "Competition Results" page are in many cases not first-prize winners, but those that have been awarded second or third prizes. When this occurs the reason is that the photographs of the first-prize models are too poor to be reproduced. It is always a great disappointment to me to be unable to illustrate a really original model, and I hope that in future serious model-builders will take more care about their photography, with a view to their work appearing in the *"M.M."*

By the way, I am always glad to receive suggestions from readers for new competitions. In regard to such contests it is necessary to bear in mind that they must be of general interest and likely to appeal to the majority of Meccano model-builders. Another point is that they must be of such a nature that owners of small outfits can compete with a reasonable chance of success.

The Southampton to Capetown Record

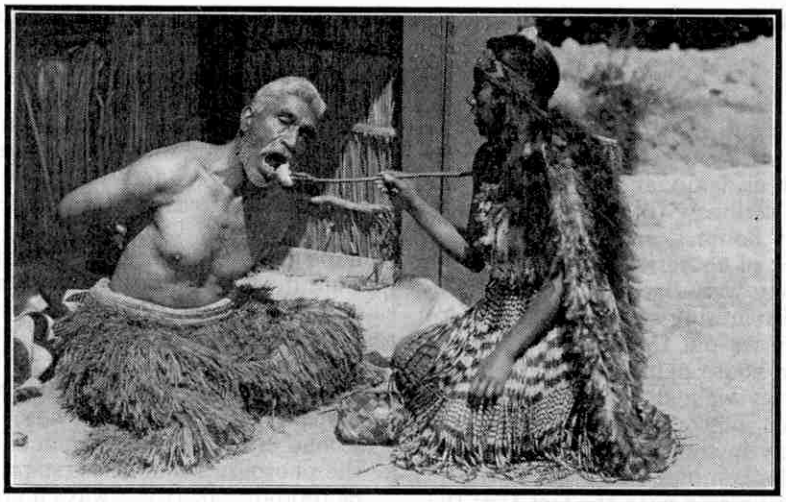
We are all delighted that the *"Queen Mary"* has recovered the "Blue Riband" of the Atlantic. In our enthusiasm for this wonderful ship, however, we are in danger of overlooking the extremely interesting feat of the Union-Castle liner *"Stirling Castle"* in completing the voyage from Southampton to Capetown in 13½ days, and thus breaking a record established 43 years ago by the Union Steamship Company's liner *"Scot."* The *"Scot's"* fastest time for the trip was 14 days 18 hrs. 57 min. This fine vessel was built in 1889 by Harland and Wolff Ltd., and six years later the firm carried out with complete success the task of lengthening her by 54 ft., thereby adding 1,000 tons to her tonnage.

The Union Castle Line came into existence in 1900, as the result of the amalgamation of the Union Steamship Co. Ltd. and the Castle Mail Packets Co. Ltd. The Castle Line commenced operations in 1872 with two small ships, and it is interesting to know that the postage rate to the Cape was then one shilling per half ounce, and the contract period for delivery was thirty-seven days! The *"Stirling Castle's"* time of 13½ days is to be the regular mail ship time under the new South African Government contract.

The Maoris of New Zealand

A Fine Race of Hunters and Warriors

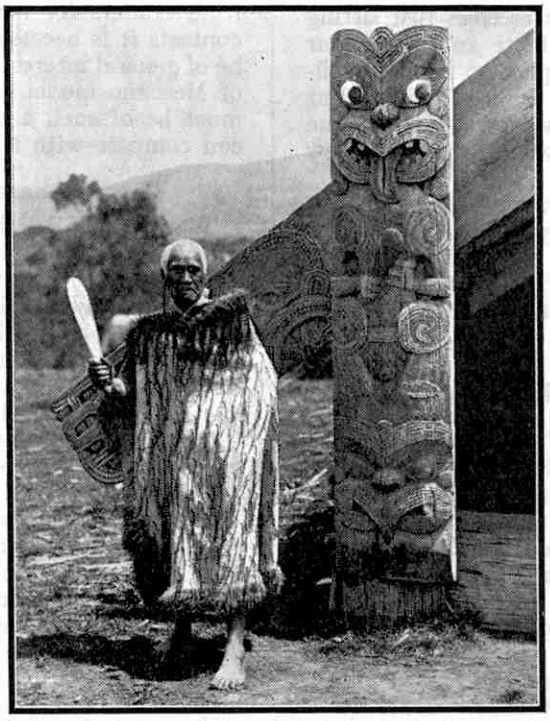
EXACTLY when or from where the Maoris came to New Zealand is uncertain. According to native legends their tribal ancestors discovered the islands 1,200 or 1,300 years ago, in the course of long canoe voyages. The Maoris did not invade the country until about 1350, however, when, their legends relate, they sailed from Rarotonga in a fleet of many canoes. Rarotonga is one of the Cook Islands, far out in the Pacific Ocean, and is about 2,250 miles from the North Island of New Zealand. With the help of the trade wind the emigrants probably accomplished the long voyage in about a month.



Feeding the tohunga, or medicine man. A scene at Rotorua, North Island, New Zealand.

The Maoris are Polynesians of the same race as the Tahitians, Rarotongans, Nawaiians and other natives of the Eastern Pacific. They found New Zealand inhabited by a people, quite different from themselves, who probably were Melanesians from the Western Pacific. The exact fate of these inhabitants is unknown, but they were either exterminated by the Maoris or eventually absorbed by them.

In New Zealand the Maoris followed their natural pursuits of fishing, hunting, agriculture and fighting, and under the influence of the bracing climate they developed physically, and became one of the finest races in the world. They were of a warlike disposition, and conflicts between some of the many different tribes were always going on. As fighting was such a prominent feature of their life, it is not surprising that they were always as prepared against attacks as they were to be the aggressors. Their villages were protected by deep trenches and fortified by stockades, of which the Maoris were expert builders, and watch towers about 20 ft. high were built at points particularly open to attack. The storehouses were kept well stocked with food and weapons in case the villages were suddenly besieged, and the inhabitants were regularly practised in warlike exercises.



Te Keepa Puataata, an old Maori chief, standing beside a fine example of native wood carving.

Armed with hatchets and heavy wooden spears, the Maoris on the war-path were a formidable foe. Often the women followed the men into battle and by their indifference to danger increased the fervour of the warriors. Both sides fought hard, as one would expect of such a sturdy and militant people, and the vanquished were made the slaves of the victors or suffered the more horrible fate of being cooked and eaten.

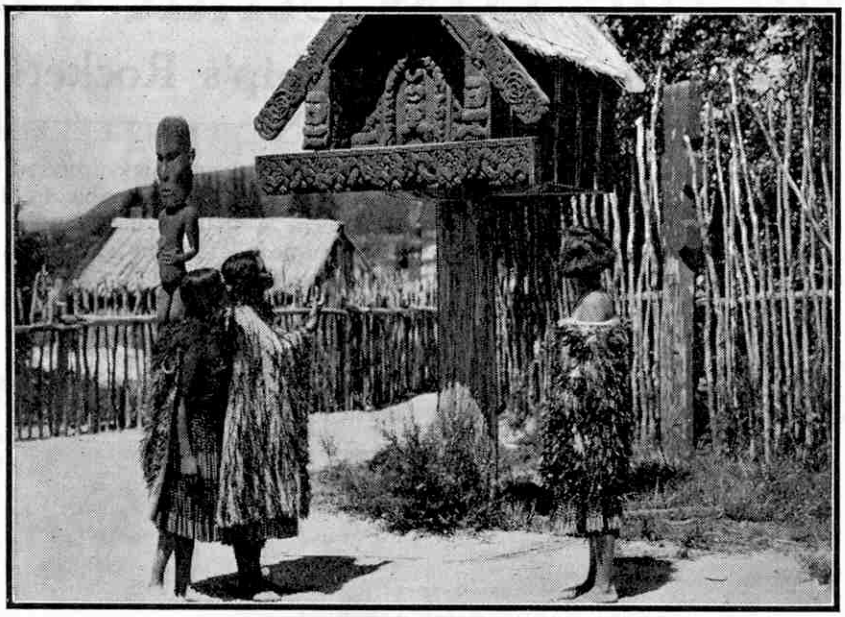
The whole of North Island and part of South Island were occupied by the Maoris, and the land was portioned out among the numerous tribes, who cultivated part of their territory. No stranger could settle on Maori land without the permission of the tribe to which it belonged, nor could he presume to claim any right to it. Even the tribal chief could not transfer any part of the land without the permission of his followers.

The establishment of whaling stations on the coast of New Zealand in the early part of the 19th century brought the first European settlers to that country. The Maoris received the newcomers hospitably, and from them gained a knowledge of metals. Hitherto all their implements and weapons had been of wood, stone, bone or shell. They also learned of the existence of firearms, and obtaining them by trading with the white men, they used them in their fierce tribal wars with deadly effect. The heavy casualties caused by this change in the method of warfare was one of the causes of a serious decline in the Maori population during the period 1769-1840.

Occasionally there were conflicts between the natives and the Europeans, arising out of disputes concerning the transfer of land bought by the latter, but in 1840 British rule was established in New Zealand by the Treaty of Waitangi, which was signed by an assembly of Maori chiefs at the Bay of Islands. In return for this submission the tribes were guaranteed possession of their lands and fisheries. Friction continued, however, and on two occasions flared up into serious

warfare, but since 1872 there has been peace.

The Maoris living in proximity to Europeans have adopted many Western ideas. They have shown themselves as capable intellectually as their white neighbours. Some of them have entered into professional life, and there are four Maori members in the House of Representatives. Modern tendencies are much less in evidence in the more remote districts of North Island, and the Maoris living there still maintain many of the customs of their ancestors.



Typical Maori costumes and carvings.

The Maoris are very artistic, and in the old days they adorned their principal houses, their tools, weapons, canoes, and ornaments with elaborate carvings. A particularly fine example of a Maori canoe with beautifully carved prow and stern pieces is in the Otago University Museum, Dunedin, New Zealand, and was described in the "*M.M.*" of January 1935. Some further interesting examples of this branch of native art are given in a special article on page 435 of the August 1936 issue.

Most Maori villages still have at least one principal house, with the posts, ridge pole, rafters and lattice walls richly adorned with carvings. The decorative work consists chiefly of black and red scroll work, with here and there grotesque heads with lolling tongues and leering mouths, and effigies of tribal heroes. These carved houses are used for village assemblies, entertainments, council gatherings and for accommodating important guests. The ordinary Maori houses, or "whares," have thatched roofs and walls built up of strong reeds bound together, but they are being superseded by more modern and less picturesque timber structures. The floors are covered with matting skilfully woven from the leaves of the New Zealand flax plant by the women. These leaves grow to a height of 5 ft. to 8 ft. Their fibres are considered to be the next strongest to manilla hemp. The laborious task of taking the best of them from each leaf by hand has now given place to the easier and swifter method of extracting them by machinery, and the fibres are made up into balls of twine for convenient use. Flax twine is used also for making clothes. The chief garments woven are a kind of kilt, which sometimes is the only apparel worn by the women, and a type of blanket shawl decorated with brightly-coloured feathers.

All smiles! Maori woman and child.

The Maoris have always been famous for their tattooing. The forehead, cheeks, nose and even the chin of a Maori chief were covered with finely tattooed curves and spirals, which gave him a barbaric dignity when he was decked out in his "war paint." The elaborate patterns used varied according to the family and rank of the warrior.

Rotorua, the chief town in the remarkable thermal springs region of North Island, is famous as a centre of Maori life, and only a few miles distant are two villages, Whakarewarewa and Ohinemutu, where the natives live in almost primitive state. The temperature of the volcanically-heated water that gushes up in the springs and geysers, and forms warm pools in cavities in the earth, ranges from 60°F. to over 200°F., and the Maoris use the water for cooking their food and washing their clothes. The mineral waters of these thermal springs are famous for their healing properties, and the State spas at Rotorua, Te Ahora and Hanmer are visited by people from many countries seeking relief from various ailments.

The Maoris long ago discovered the beneficial quality of the mineral waters. One of their many interesting legends relates that when the Moon "dies" each month she goes to the great Lake of Aewa to bathe in the Wai-ora-a-Tuna, or "Living Waters of Mankind." The Moon emerges from the lake renewed in life and strength, to traverse once more her familiar path through the heavens. According to Maori mythology Ruakimo, the seventh child of Rangi (Heaven) and Papa-tua-huku (Earth), is the deity personifying volcanoes and hot springs, and the thermal springs, geysers and pools are the breath of his nostrils.

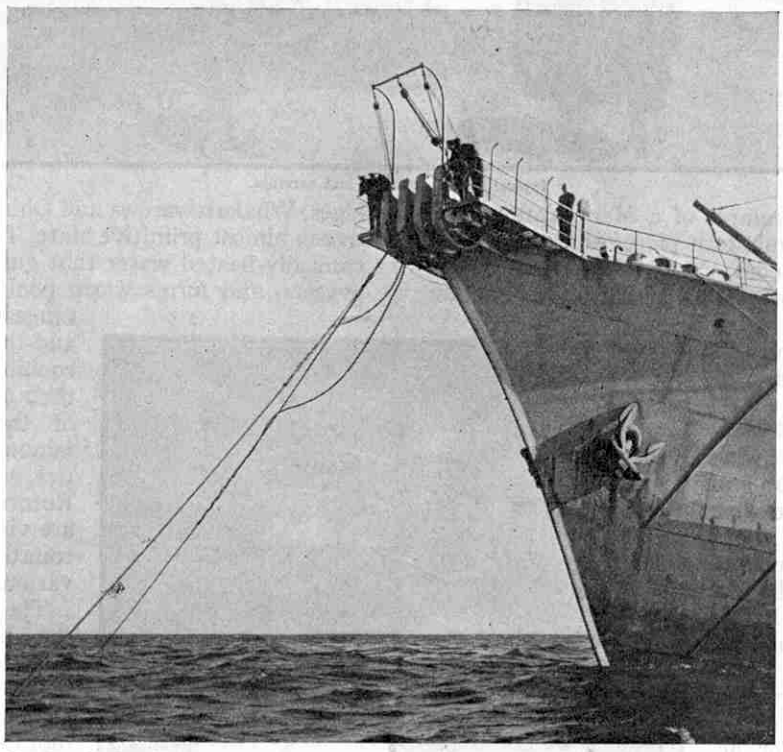
The extensive forests of giant kauri pine trees in North Island have provided the Maoris with a basis for some strange legends. According to one of these the trees themselves are the limbs of Tane-mahuta, the Maori deity personifying the trees and birds of the forest.

Laying the Bass Strait Cable

Shore Lines Landed by Ship's Rockets

IN November of last year a new submarine telephone cable 162 miles long was laid across the Bass Strait between Apollo Bay, on the Australian mainland, and Stanley, in Tasmania. By connecting the land lines of the Australian mainland with those of Tasmania, this provided the final link in telephonic communication between all the States of the Commonwealth, and it is connected with wireless services that enable subscribers in Tasmania and King Island to telephone through to Great Britain.

The cable was manufactured entirely at the Woolwich works of Siemens Brothers and Co., Ltd. It contains one conductor only, and is of outstanding interest on account of the fact that over this single wire it is possible to transmit at the same time at least five telephone conversations, a wireless broadcast programme, and seven high-speed telegraphic communications. In the past, 14 separate conductors would have been necessary to carry out all these services.



The Bass Strait cable and ropes hanging from the bow sheaves of the C.S. "Faraday" during the final splicing operation. For the illustrations to this article we are indebted to Siemens Brothers and Company, Ltd., London.

The central copper conductor of the cable is composed of a circular wire, 0.138 in. in diameter, on which six copper strips are wound spirally. Each strip is 0.077 in. in width and 0.015 in. in thickness, and the whole weighs 508 lb. per nautical mile. Around the central conductor is the paragutta insulation weighing 690 lb. per nautical mile, and over this is the return conductor, which consists of six copper strips each 0.336 in. wide and 0.018 in. thick, applied as nearly straight as possible.

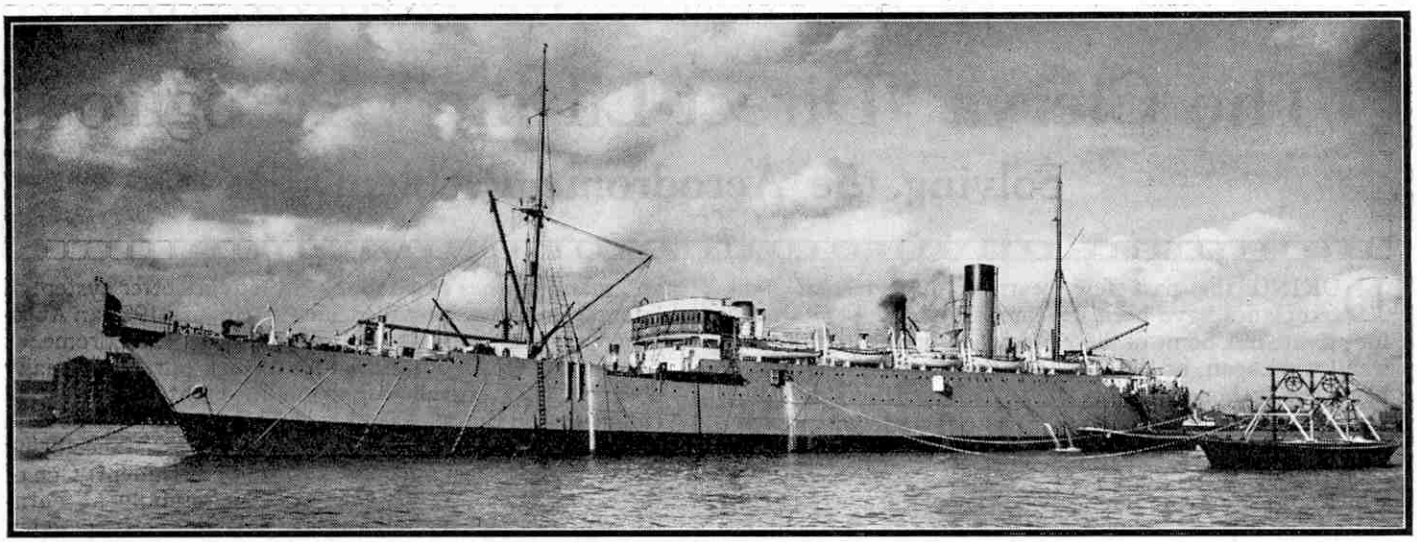
Each copper strip was shaped to form a segment of the circumference of a circle, so that when closed around the insulation the six strips formed a smooth tube, enclosing the centre conductor and weighing 852 lb. per nautical mile. As a protection against attacks by the teredo or ship worm, thin copper tape is applied with the edges overlapping immediately over the return conductor. The whole cable is armoured with steel wires embedded in jute to protect it from mechanical injury.

The cable crosses the Bass Strait in two sections divided at Sea Elephant Bay, King Island, which lies about midway across the Strait. The northern section is laid from the Island to Apollo Bay, Victoria, and from there communication is continued by means of overhead lines and underground cable to the trunk exchange at Melbourne, a distance of 127 miles. The southern section of the cable is laid from King Island to Perkins Bay near Stanley, on the northern coast of Tasmania, where connection is made to landlines running to the Launceston exchange, 139 miles away.

The completed cable weighed 1,395 tons. It was loaded into the tanks of the cable ship *"Faraday"* at her berth opposite the Woolwich Works, and the ship then sailed for Australia. The programme was to lay the northern portion of the cable in two parts, paying out from the shores towards the centre, and making a splice about half-way. The southern cable was then to be laid in a similar manner. As no tugs and lighters were available, the ship's own hauling gear was to be used for pulling the cable ashore and to the repeater station.

Work was begun at Apollo Bay. A strong south-westerly wind was blowing and a heavy surf was pounding on the beach, but a landing was made at the pier and two sand anchors were buried about 100 yds. apart. Heavy under-running sheaves were attached to the anchors by lengths of strong chain. By this time the weather had become so much worse that the ship's life-saving rockets had to be used to get a line ashore. Six attempts were necessary before this was done, and a 4-inch manila rope was then fastened to the rocket line and hauled ashore through the surf. A second landing rope was laid with the assistance of the local Life-Boat crew, who fired one of their large life-saving lines from the shore to the ship's cutter lying about 400 yds. out. The line was quickly picked up and made fast to a 4-in. manila rope, and to this a series of lengths of compound wire ropes were connected on board the ship. These were then hauled by the ship's cable gear through the two sheaves on shore and back to the ship, until the complete landing line consisted of the compound wire ropes.

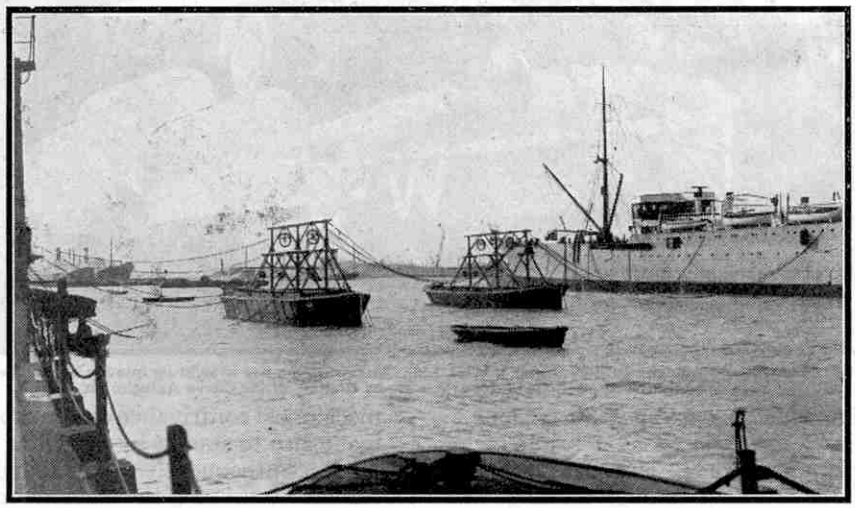
The end of the cable was then attached to the landing line and lashed to it over a length of about 75 yds., the distance from the water's edge up the shore trench into the repeater station. The cable was then hauled ashore,



with empty watertight steel oil barrels lashed to it at 12 yd. intervals. It was laid in the trench and rove through a duct under a road, and its end was connected in the repeater station. The oil barrels were then cut away to allow it to sink.

Next morning the "*Faraday*" weighed anchor and commenced paying out the cable over the stern sheave at a rate of about 5 knots. A perfect course was made in spite of a long swell to which the ship rolled heavily, and towards evening this section of the cable was paid out and the end safely buoyed.

The next two days were occupied in recovering the mark buoys and mooring them again in position for marking the line from Sea Elephant Bay, King Island, to the buoyed end of the Apollo Bay section. Preparations also were made for laying the shore end on the Island. The landing place there was much more sheltered than that at Apollo Bay and there was less surf to negotiate. The landing ropes therefore were taken ashore by the ship's cutters.



This illustration and that at the top of the page show the Bass Strait cable being loaded into the tanks of the C.S. "Faraday" at Woolwich, prior to leaving for Australia.

The laying of the second half of the northern section now began. As the cable was being paid out over the stern sheave, the "*Faraday*" was steered for a distance of 200 fathoms beyond the buoy attached to the Apollo Bay end of the cable. At this point the ship was stopped and the cable cut and buoyed. The ship was then turned round and a boat was lowered to pick up the buoy, after which the cable was brought in over the bow sheaves and coiled back into the tank as the ship slowly steamed up to the buoy marking the end of the Apollo Bay section of the cable. The end of this also was brought aboard and the final joint was made after electrical tests had given satisfactory results. The entire northern section of the new cable was then safely slipped and sank to the sea bed in 50 fathoms, or 300 ft., of water.

It remained now to lay the southern section of the cable, from King Island to Perkins Bay in Tasmania. Soundings taken by a local vessel after the original cable line had been decided upon showed that the sea bottom at one part of this section appeared to be rough and unsuitable. Further soundings and dragging operations were therefore carried out by the "*Faraday*," and in the end a new route was marked out by a line of buoys.

The ship then returned to Sea Elephant Bay, King Island, where the two ends of the landing rope were successfully taken ashore, joined together, rove through the sheaves, and buoyed off between the ship and the water's edge.

A strong wind and a choppy sea made the subsequent operation of heaving the cable ashore very difficult. Eventually however sufficient cable to connect with the repeater station was landed, and the laying of the first section from King Island to Perkins Bay then commenced. The weather gradually improved and when the last turn of the cable came out of the ship's tank, chain moorings were attached and the marking buoy slipped from the stern of the ship.

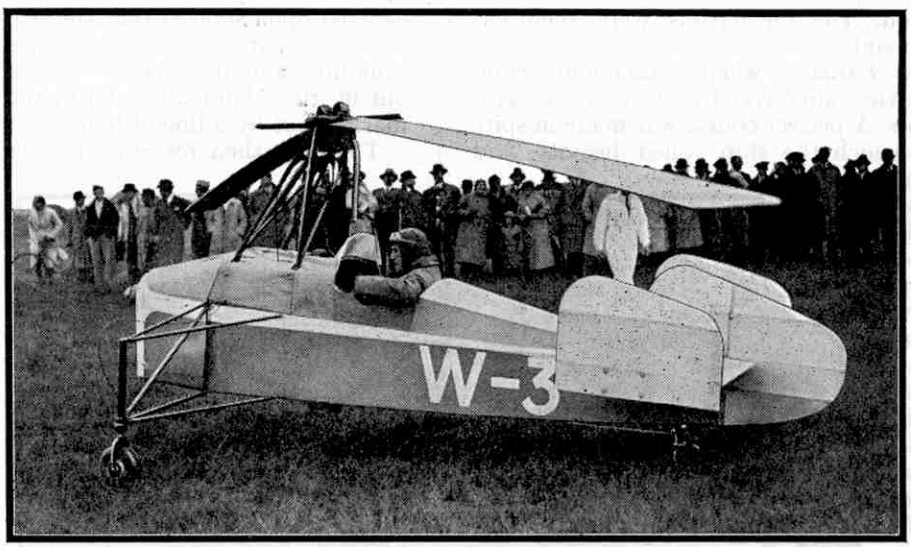
At the Tasmanian end, a 600 yd. length of cable from the Perkins Bay repeater station to the beach had already been laid, and the trench filled in. For three days the weather was too bad to attempt a landing, however. When conditions improved, the "*Faraday*" was manœuvred to within a distance of 1,565 yds. of the repeater station and anchored. The cable was then started on its way to the shore, where it was quickly placed in the trench and stoppered off.

The last stretch of cable was then laid, the ship steaming towards the buoyed end of the King Island section. The final splice was then made and after testing, the cable was lowered into the water.

The Cierva "Direct-Lifting" Autogiro

Solving the Aerodrome Problem

DURING the past few years many types of light aeroplanes have been developed of special suitability for private use. Some of these machines, on account of their small wing span, or the fact that the wings can be folded back, can be housed in hangars little larger than an ordinary garage for two motor cars. Unfortunately this compactness has been offset by the serious drawback that all such machines require a considerable amount of space in which to take off and land. For instance, the average light aeroplane requires room for a forward run of about 60 yards in order to take off safely. The result has been that even the smallest machines have had to be housed at aerodromes often at a considerable distance from the home of the owner. Recently a solution to the private owner's problem has been put forward in the shape of the direct-lifting Autogiro, the latest version of the interesting type of aircraft invented by Senor de la Cierva, a Spanish aircraft designer. This remarkable machine can both rise and descend vertically, and can be operated from any space sufficient to allow the rotor to turn, that is to say from a square piece of ground having sides each about 30 ft. long.



The "direct-lifting" Autogiro built by G. and J. Weir, Ltd., Glasgow. It can rise straight up into the air to a height of 25 ft. to 30 ft. The illustrations to this article are by courtesy of the Cierva Autogiro Co., Ltd.

The original Autogiro was produced as a result of an ordinary type of aeroplane that de la Cierva had designed for the Spanish Air Force crashing through stalling. The mishap convinced him that aeroplane flight in which safety depended upon speed was very unsatisfactory, and he began to consider carefully possible alternative methods of flight. This investigation led him to eliminate in turn all the known types of flying machines. Finally he decided that the solution lay in a machine having wings in the form of blades capable of rotating round a vertical axis, and early in 1920 he began experimenting with a view to producing such a machine.

Many varieties of revolving blades were devised and tested on various aircraft, but no practical result was obtained until he devised an Autogiro that embodied the principle of articulated blades; this eventually proved to be the main solution of the problem. It had a single rotor with four blades hinged at the root, so that they could move freely up and down in the vertical plane without any change in their angle to the airstream. Lateral control was provided for by tilting the axis to right or left, but this control proved to be too difficult for the pilot to operate, and many crashes resulted. Eventually a better system of lateral control was provided, and in January 1923 an Autogiro was completed that flew across the aerodrome at Getafe, Spain. It subsequently carried out an officially observed and controlled four-minute flight over a closed circuit at the Cuatro Vientos aerodrome, Madrid. Several other machines were produced after this, assistance being given to de la Cierva by the Spanish Government. One of these machines was demonstrated successfully at Farnborough, in England, and a similar machine constructed in 1925 by A. V. Roe and Co., Ltd., was demonstrated at the Hendon Air Pageant in 1926. The British Cierva Autogiro Co., Ltd., was formed in this country in that year, and since then 18 different types of Autogiros have been constructed.

In the earliest Autogiros the rotor was started to revolve by winding a rope round the axis and then setting six or eight men to haul on the rope. The machine then had to taxi round the field several times before the speed of the rotor became sufficient to lift it into the air. Later the rotor was started rather like a top by means of a mechanical contrivance on the ground; and an attempt was made also to start it by attaching rockets to the tips of the blades. Subsequently it was found that the rotor could be started by taxi-ing the machine round and round until the rotor was in operation, but this was a tedious business. Then the idea was conceived of constructing the tail plane and the elevator so that they could be brought together by the pilot to deflect the engine slipstream to the rotor while the machine was held stationary by means of wheel brakes.

This improvement was followed by a quite different and much more effective one, the adoption of a mechanical self-starter that derives its power direct from the engine crankshaft through a mechanically-operated clutch, and brings the rotor up to speed in less than 30 seconds. When the Autogiro is in flight the clutch is completely disengaged and has no connection whatever with the rotation of the blades, thus eliminating all the torque reaction found in helicopters. A simple braking arrangement similar to the familiar wheel brake stops the movements of the blades after the machine has landed.

The ability of the Autogiro to descend straight down and so slowly that it could land safely on even the roughest ground, or in any confined space large enough to permit

the blades to revolve, was recognised as a great advantage in the event of a forced landing being necessary. Critics pointed out, however, that under other circumstances it would be useless for the machine to land where conditions were too bad, or the space too small, for it to take off again. De la Cierva therefore sought to overcome this limitation to the usefulness of the Autogiro by devising one that could take off without requiring even the short forward run of the existing types, and in March 1934 he announced that he had accomplished this. Actually the first take-off without forward run took place in August 1933, but many months of further patient research and tests were necessary before the "direct-lifting" Autogiro was perfected. At present this machine can rise straight up into the air to a height of about 25 ft., but theoretically it will be able to rise to a height of 100 ft. or more when certain modifications have been carried out.

A C.30 Autogiro, converted to "direct-lifting," taking off without any forward run.

This remarkable development has been accomplished by sloping outwards the hitherto vertical hinges about which the blades of the rotor swing sideways. When the rotor is being driven, by the aero engine, the blades tend to lag behind, and as they swing backwards the angle of incidence is reduced to nil owing to the sloping position of the blade hinges. The elimination of this angle of incidence enables the blades to be speeded up very rapidly to 350 r.p.m., which is about 60 per cent. higher than their speed when the machine is in flight. The pilot then presses a release that declutches the driving shaft from the rotor. The blades swing forward and in doing so they resume their normal angle of incidence, and the lift generated by this movement is sufficient to raise the Autogiro 25 ft. to 30 ft. into the air before the rotor has slowed to the normal flying speed of 210 r.p.m. During the brief time that the rotor has been speeding up and lifting the machine off the ground, the airscrew has been running normally, and it now begins to exercise its proper function of driving the machine through the air.

The C.30 "direct control" Autogiro, which requires a short forward run when taking off, but can descend vertically.

One type of "direct-lifting" Autogiro has been built by G. and J. Weir, Ltd., of Cathcart, Glasgow, and is known as the W.3. In addition to being able to lift itself off the ground it can, like earlier Autogiros, descend vertically to earth.

It will be seen from the accompanying illustrations that it is a single-seater machine and that the fuselage does not differ greatly from that of the ordinary light aeroplane. Instead of wings it has a two-bladed rotor mounted on a pylon structure that meets above the cockpit. The blades are hinged at their attachments to the supporting pylon head to give them full freedom in both the vertical and the horizontal plane, and they provide the total lift of the machine when it is travelling at a high forward speed. Even if the controls are misused a stall or crash cannot result, and when the Autogiro has ceased to move forward, there are still forces acting on the blades that enable it to drop at less than the rate of descent of a parachute, and therefore so slow that a perfectly safe landing can be made.

The cockpit is equipped with all the usual navigating instruments and, in addition with certain controls special to the Autogiro. The controls for starting the rotor are mounted on the left wall of the cockpit and are arranged so that it is impossible for the pilot to operate them in the wrong order. The machine carries sufficient fuel for a flight lasting about 2½ hr. at a cruising speed of 80 m.p.h.

The safety and ease of operation of the Autogiro makes flying possible for many people who are unable to develop the necessary skill to pilot an ordinary aeroplane. The small space occupied by the machine, and its ability to lift itself off the ground, enable it, as we have said, to be entirely independent of aerodromes or specially prepared grounds. In addition to being ideal for the private owner and the flying club, the Autogiro can be used as a machine for reconnaissance work in co-operation with an army in mountainous country, or with a fleet, for it can take off from, and alight upon, the deck of an aircraft carrier or warship. The Autogiro has also proved practicable for directing traffic from the air, and a machine of this type has been used by the police at Epsom Downs on the occasion of the last two Derby Days.

Dublin to Belfast on the Footplate

High Speed by the "Limited Mail"

By a Railway Engineer

THE presence of one of Mr. Glover's superb-looking three-cylinder compounds at the head of the train would give a tremendous fillip to the very dreariest of journeys, but the line from Dublin to Belfast is no ordinary route. The Great Northern of Ireland holds a unique position among the railways of the British Empire in that it is to all intents and purposes an international line. The boundary between Northern Ireland and the Irish Free State is a frontier in every sense of the word, and crossing it involves all the formalities of passing from one country into another. Since the creation of the Irish Free State the distinction between North and South has become increasingly marked, so much so that the Great Northern Railway is one of the few remaining institutions common to both political divisions of the island. This interesting state of affairs, combined with the charm of the scenery and the excellence of the locomotive work, makes a journey from Dublin to Belfast a most exhilarating experience.

I was privileged to ride on the footplate of the compounds while working some of their hardest and fastest turns. Until recently these engines were painted black in common with all other G.N.R. locomotives, but, as recorded in the "Railway News" page of the *"M.M."* for August last, they are now resplendent in a brilliant blue finish very similar in shade to that of the former Caledonian Railway in pre-grouping days. The Irish compounds are fine-looking, amply-proportioned engines that would show up well in any colour, but in this new livery, which is maintained in spotless condition, they look really grand.

G.N.R. No. 85, "Merlin," one of the compound engines referred to in this article. In this photograph it is shown standing at Goraghwood station where the northbound "Limited Mail" stops for Customs examination.

My first run was on the 9 a.m. express from Dublin loaded to eight corridor coaches, 255 tons tare and 270 tons with passengers and luggage; the engine was No. 85, *"Merlin,"* in charge of Driver Batten and Fireman Burns of Dublin shed. These engines are in many ways an Irish counterpart of the standard L.M.S.R. Compounds, and although the footplate arrangements look very different, the methods of driving are exactly the same. The Great Northern engines have a fine roomy cab, and as the firebox is round-topped there is an excellent lookout ahead. An interesting fitting is a pressure gauge for the intermediate steam chest, or receiver as it is called, through which the steam passes to the low-pressure cylinders after being exhausted from the one central high-pressure cylinder. When the engine is working full compound this gauge tells the driver the pressure at which steam is entering the low-pressure cylinders.

Getting the "right-away" sharp on time, Driver Batten opened up only to the first port of the regulator. This admits boiler steam to all three cylinders and operates the engine as a "simple," but the port is only small, and the steam is so throttled that although the boiler pressure is 200 lb. per sq. in., it enters the three cylinders at about 100 lb. As in the L.M.S.R. Compounds, it is only used for starting up, and as such provides a very useful extra bit of tractive effort; on this run of mine the driver changed over to the main regulator, which gives full compound working, about a quarter of a mile out. The very characteristic sound of the Midland Compound exhaust is reproduced exactly in the Irish engines—a harsh staccato beat when working as a simple, softening into a tuneful "burr" immediately the regulator was opened to the full.

In the meantime we were getting away in fine style. The line rises high above the docks, and the extensive view of Dublin Bay extends far to the south-east, where the Holyhead mail boat could be seen steaming out of Dun Laoghaire harbour. The regulator was brought back to about three-quarters open, cut-off was 65 per cent. in the high-pressure cylinder and 54 in the low, and less than five miles out we were travelling at 60 m.p.h. Descending almost to sea level at Malahide we touched 66 m.p.h., and sweeping across a broad tidal inlet there was a glorious view of golden sands with the Hill of Howth jutting far out to sea. The line cuts inland after passing Donabate, and there are over three miles rising at 1 in 170; but without being opened out at all *"Merlin"* took the bank in her stride and speed never fell below 51 m.p.h.

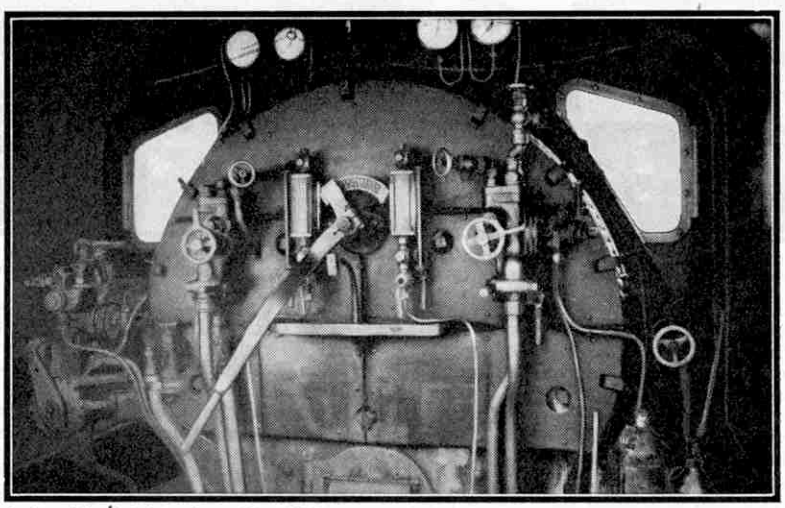
Soon after passing this summit the coast is approached again and the prospect was simply entrancing. After a night of rain the atmosphere was astonishingly clear, the fields sparkled a most vivid green in the sunshine, and the sea running high under a strong wind was the deepest blue. Far to the north, 40 miles away, were the Mountains of Mourne; clouds hung on their summits, and with their flanks of a blue that almost matched the sea, they made as splendid a picture as I have ever seen through the front glass of an engine cab. Flying through Skerries at 66, we then kept up a steady 69 to 70 m.p.h. along the sea shore; on past Balbriggan, where a picturesque stone jetty shelters a little fishing haven; and soon we were approaching Drogheda, our first stop. This initial 31¾-mile stretch was run exactly to time in 35 minutes, a smart average of 54.3 m.p.h.

A 15-ton van was added to the rear of the train, bringing the load up to 285 tons, and at 9.37 a.m. we were once more under way. Almost immediately the line leads on to the great viaduct over the River Boyne. Until recently this consisted of three lattice girder spans, the central one being 267 ft. long; but the rebuilding of this fine old structure, which had done duty for nearly 80 years, was completed in 1932, the wrought iron girders being replaced by modern steel spans. The original structure was designed for a double track, but now the viaduct carries the up and down roads in interlaced form, or gauntletted as it is usually known, thus avoiding the necessity of points at each end. Crossing the river 90 ft. above the water-line, to the west there is a magnificent view of country famed in every age of Irish history. Not only Ireland but the fate of all Europe was concerned when the Battle of the Boyne was fought in 1690, and centuries before this another battle, of a very different kind though equally momentous, was decided on the Hill of Tara. Here, in the very dawn of Christianity in these islands, St. Patrick met the Druids and utterly confuted them. Tara is indeed symbolical of the spirit of Ireland all down the ages.

From the Boyne valley the line rises at 1 in 177 for four miles, to Kellystown signal box. A little longer cut-off was used here, and *"Merlin,"* responding well, accelerated steadily to 43 m.p.h. at the summit. Then the regulator was closed to one-half and cut-off brought back to the 65 mark, and we were soon tearing down to Dunleer. "The're great engines for speed," the driver shouted across —75 m.p.h., 77, and then with a long shrill get-out-of-my-way sort

of scream on the whistle we roared through Dromin Junction at 79. There was a slight drop in speed on the level beyond, but on the continuation of the descent the engine raced away again and we flashed through Castlebellingham at 81 m.p.h. Despite the stiff initial rise to Kellystown, the 16.5 miles from Drogheda had been covered in 17¾ minutes. But a very long slowing for permanent way repairs spoiled this fine burst of speed, and eventually we took 27¼ minutes to complete the 22.6 miles from Drogheda to Dundalk; the net time was only 25 minutes, another very smart average of 54.2 m.p.h.

Here, although *"Merlin"* worked right through from Dublin to Belfast, enginemen were changed. I have rarely travelled with a more entertaining crew, and Driver Batten's farewell to me was characteristic. "Well," he said as he stepped down from the footplate at Dundalk, "It's wishin' ye always the height of good luck I am!" Driver Muckian and Fireman Rooney of Dundalk shed now took over, and by the detaching of the rear van and the Enniskillen through coach the load was reduced to one of 235 tons. This reduction is fortunate, for the hardest work of the whole run is required on the next stage, to Goraghwood.



A view of the footplate of one of the G.N.R. compounds showing the neat and convenient arrangement of the fittings. The wide cab and round-topped fire-box give the driver a good lookout ahead.

The line climbs into Northern Ireland amid the heights of County Armagh; these are really a westward continuation of the Mountains of Mourne, though separated from the main group by the deep fiord of Carlingford Lough. As we got away from Dundalk, dark majestic hills lay ahead; the rich farming country that had been so predominant a feature of the landscape up to now gave place to rougher pastures, and queer-shaped peaks rose against the western sky. We made a fine start out of Dundalk, attaining 45 m.p.h. on the first part of the ascent, but as the grade steepened and the scene grew more desolate speed fell off. Cut-off was increased to 72 per cent. in the high-pressure and 62 per cent. in the two low-pressure cylinders, and on the 1 in 100 gradient we sustained 33 m.p.h.

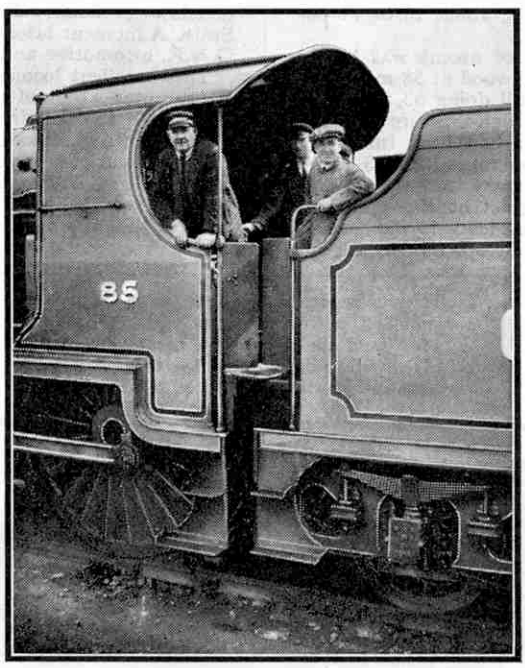
On the stiffest part of the bank we crossed the frontier, the exact point being marked by a white strip painted on the wall of a rock cutting. The setting is perfect; a wide expanse of purple moorlands, relieved by just a few reed-encircled pools that mirrored the towering mass of Slieve Gullion to the west. In such a setting the train itself was a striking picture. Seen from the footplate, the handsome varnished coaches winding round the curves behind us, and the portly blue boiler of the engine as seen through the front glass, made a fine colour-scheme. Soon after passing into Northern Ireland the grade eases; we worked quickly up to 52 m.p.h. past Adavoyle, and the final climb through deep rock cuttings to the summit of the line was taken under quite easy steam. Speed fell to 45 m.p.h., and the 11.2 miles from Dundalk had taken 18¼ minutes.

Down the steep descent that follows we were very soon travelling at a mile a minute. The view opened out on the right giving some delightful glimpses of the town of Newry lying far below, at the head of the Carlingford estuary, and right abreast of the line was the whole range of the Mourne mountains. Meanwhile we were careering downhill at ever-quickening speed; Bessbrook was passed at 75 m.p.h., and we had just reached 79 when the brakes went on for Goraghwood. With a smart stop we completed the 17.6 miles from Dundalk in 24½ minutes, a gain of 1½ minutes on schedule time.

Here the British Customs officials make their examination and a stop of ten minutes is scheduled for this purpose. This gives comfortable time to take water and also to pick up the through carriage from Warrenpoint to Belfast, the latter being attached "inside the engine." This queer-sounding phrase is quite commonly used among railwaymen to describe the operation of adding a coach or coaches to a train between the engine and what had been up to now the front coach. From Goraghwood onward to Belfast our load was 265 tons.

The restart is on steeply falling grades at first, and in two miles we were up to 67 m.p.h.; but there is a sharp curve through Poyntzpass station that entails slowing to 30 m.p.h., and speed has hardly recovered from this when there comes a similar curve at Scarva. After that we got going well, and sustained 64 m.p.h. until we were nearing Portadown. This is an important junction; a branch from Armagh and Cavan comes in from the south, the Londonderry route approaches from the west, and the main line swings round almost a complete right angle to run in a north-easterly direction thence to Belfast. We completed the 15.8 miles from Goraghwood in 19¾ minutes, quite a smart run considering the slacks at Poyntzpass and Scarva.

We were on the last stretch now, and Driver Muckian got the train away in first-class style. Despite a mile rising at 1 in 196 we were doing 53 m.p.h. at Boilie signal box, less than three miles out, but a long slowing for permanent way repairs followed right through Lurgan. Recovering splendidly on the 1 in 200 rise, and getting some splendid views of Lough Neagh to the west, we were up to 47 m.p.h. in two miles, and then once more *"Merlin"* began to gallop. Maze was passed at 68 m.p.h., there was a careful easing round the curve through Lisburn, and on the gentle final descent into Belfast we ran at a steady 66 m.p.h. Coasting through suburb after suburb, with the crags of Black Hill and Black Mount towering on the left, we drove right into the very heart of the city and reached Great Victoria St. station in 2 hrs. 35 min. from Dublin, 112.6 miles. On the last stage the 25 miles from Portadown had taken 31 minutes, a gain of a minute despite the bad check at Lurgan.

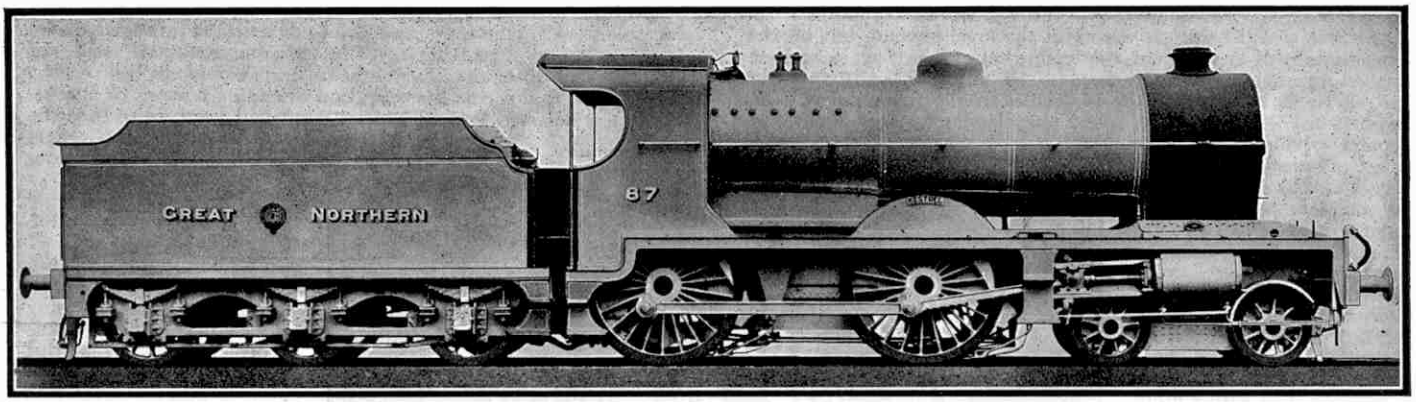


This photograph is specially interesting as it includes the author of the article, who is grasping the tender handrail. Driver Muckian is looking over the cab side.

Going south, I had a fine trip on the 5.40 p.m. up "Limited Mail." This train takes a very composite load out of Belfast, as in addition to the main portion for Dublin there is a through carriage and mail van for Dun Laoghaire pier, and through carriages for Cookstown and Warrenpoint. On this occasion the total load was nine coaches, 289 tons tare and 305 tons loaded; the engine was another compound, No. 84, *"Falcon,"* with Driver Kyle and Fireman Tweedie of Belfast shed in charge.

In spite of a heavy shower of rain that made the rails slippery we got away in good style up the rising gradients, passing Lisburn at 53 m.p.h., and on the gentle ups and downs from there on to Lurgan kept up a general average of a mile a minute. The next 4.9 miles on to Portadown are very sharply timed, in seven minutes start to stop. The driver quickly opened out to full regulator and *"Falcon,"* getting off the mark in brilliant style, was doing 53 m.p.h. two miles from the start. With a maximum speed of 57 we kept time exactly, a fine piece of work for a 4–4–0 engine hauling 305 tons.

The principal interest of this journey however lies in the next stage where the 33.4 miles from Portadown to Dundalk are allowed only 38 minutes; this section of course includes the tremendous climb to Adavoyle summit. Going south, the Customs examination



No. 87, "Kestrel," another of the 4-4-0 compounds of the G.N.R. of Ireland. This illustration gives a good idea of the handsome proportions of these engines, and shows how they were originally turned out, with the words "Great Northern" on the tender. The initials "G.N." only are now used, and the tender sides are higher and turn inwards.

takes place at Dundalk, and to avoid the necessity of stopping at Goraghwood the Warrenpoint coach used to be detached by slipping; but in recent years this practice has been discontinued and the through coach is now left behind at Portadown. So for this really stiff booking our load was reduced to seven coaches, 230 tons tare and 245 tons full; but there was a severe permanent way slack in store for us just beyond Adavoyle, and even with this load it was going to mean very hard running to maintain the booked average speed of 52.8 m.p.h. over this difficult road. But by dint of one of the most thrilling runs I have ever had in Ireland time was kept, with a minute and a quarter in hand.

"Falcon" roared heartily out of Portadown, but as we swung over the south junction, half a mile from the start, Kyle opened out to full regulator and compound working began. Accelerating in brilliant style on the level speed was up to 69 m.p.h. at Tanderagee, 5.7 miles out, and then came those hampering slacks through Scarva and Poyntzpass, but once through the latter station engine and crew got to work with a vengeance. There are just three miles in which to get a run at the big bank, and accelerating magnificently from the Poyntzpass slack we attained 68 m.p.h., and directly we came on to the rise Kyle increased cut-off from 60 to the 63 mark. The figures on the reversing rack refer to the high-pressure cylinder; the low-pressure cut-off is generally speaking about 10 or 11 per cent. lower.

The fall in speed in the first few miles of ascent was barely perceptible, and we stormed through Goraghwood at 58 m.p.h. At Bessbrook, 2¾ miles farther on, we were still doing 53, and here cut-off was advanced to 65 per cent. in the high-pressure cylinder; throughout from Poyntzpass the regulator had been full open. Now on the final stage, where the gradient averages 1 in 105, speed fell steadily off; the Mountains of Mourne away to the south-east looked magnificent in the evening light, great heather-clad hills rose ahead, and in the deep rock-cutting that leads to the summit speed fell to exactly 40 m.p.h. On this really splendid climb the complete 8½ miles of ascent had been covered at an average speed of 51.2 m.p.h., and without any increase in cut-off beyond the 65 mark; in simple engines such as the Southern Railway "Schools," or the L.N.E.R. "Shires" this would be equivalent to about 27 per cent.

Once over the summit the regulator was brought back to about two-fifths open, still retaining compound working, and we approached Adavoyle station at 66 m.p.h.; just beyond here the relaying slack was in force by which we lost over a minute of precious time. Directly we were clear of the affected length the engine was given full regulator once more and on the falling gradient the acceleration was electrifying; but as soon as we were doing 60 again the regulator was brought back to about two-fifths.

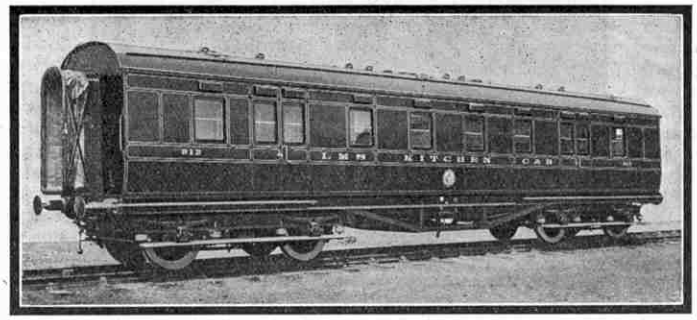
Well might the engine's name be *"Falcon,"* for his final thrilling swoop down to Dundalk was in the very best traditions of the species! At a distance of 2½ miles from the site of the relaying work we were doing 80 m.p.h.; a very gentle application of the brake was made to steady the train round the curve past Mount Pleasant, and this reduced speed to 75, and then once more we blazed away. With the regulator pulled right back, giving the cylinders the merest wisp of steam, *"Falcon"* worked up to 82 m.p.h. So we left the mountains behind; ahead was the sea and the brilliant green meadows of County Louth, and once more we were in the Free State. A moment later we were running into Dundalk, where the G.N.R. locomotive and carriage works are situated.

This excellent locomotive work brought us from Portadown in 36¾ minutes, a gain of a minute and a quarter despite the Adavoyle check, and the net time for the 33.4 miles was only 35½ minutes. This gave the remarkable average speed of 56.4 m.p.h. during which the train had been worked over the 522 ft. altitude of the summit just north of Adavoyle. At Dundalk Driver Kyle and Fireman Tweedie were relieved by a Free State crew to work the express onward, but for me, as well as the Belfast enginemen, Dundalk was journey's end.

Meals on Wheels

Catering plays an important part in express train operation, and over 600 restaurant cars and more than 50 buffet cars are operated by British railway companies to provide for the needs of travellers. A highly developed organisation is necessary in order to maintain the restaurant services, and to provide for all possible fluctuations in demand. It is one of the wonders of modern railway travel that it is possible to prepare and to serve, from a kitchen 10 ft. long and 6 ft. 6 in. wide, a complete luncheon for perhaps 250 people and then follow this up with possibly an equal number of teas. It is all the more remarkable when it is remembered that the cooking is all done on board the train, the dining car staff joining the train well before starting time in order to commence their preparations.

Sometimes the kitchen forms part of the complete dining car, but for services where there is a heavy demand on the restaurant facilities a separate kitchen car is run in conjunction with the actual dining cars. Cooking is done largely by means of gas that is stored in the familiar cylinders below the car, and the water required is carried in tanks in the roof. Cooking by electricity is a feature of L.N.E.R. practice, as is the application of the articulated principle to restaurant and kitchen car sets. The smoothness of riding so obtained is much appreciated by both diners and the crew.



An L.M.S.R. kitchen car. The complete equipment of these vehicles provides a full restaurant service for a whole train of passengers.

Current for electric cooking is obtained from accumulators while stationary, and from axle-driven generators when the train is in motion. On the G.N.R. of Ireland two interesting experiments are in progress. In one town gas that is stored at high pressure in removable cylinders is being used, and in the other scheme a special anthracite cooker is employed.

In recent years there has been a growing demand for the provision of facilities for light meals, especially on trains where the running of full restaurant services would not be justified. Thus after certain experimental introductions there has developed the modern buffet car. The L.M.S.R. has recently put into service four buffet cars of a new type in which light meals and refreshments can be obtained. Each car is 57 ft. long, and in addition to the service arrangements and kitchen there is space for chairs and tables accommodating 24 people. Wide and deep windows giving an unobstructed outlook are provided.

A Holiday in Iceland

A Land of Glaciers and Hot Springs

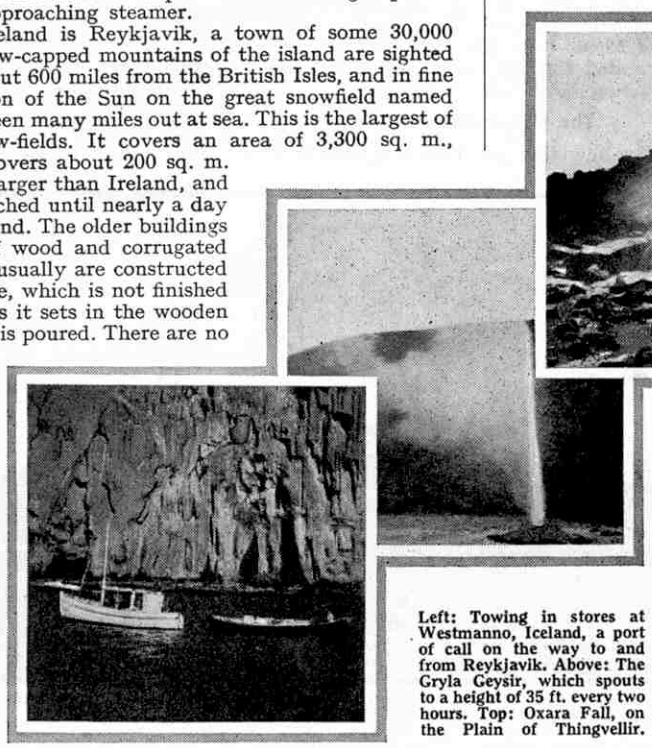
By E. D. Bailey

TO the average reader Iceland is best known as the home of the deep depressions, heralding unpleasant weather, with which wireless weather forecasts have made us familiar. The association is as unfortunate as the name of the island, which lends weight to the false impression that it is a country of snow and ice. Actually its climate is very temperate in summer, affording welcome relief to those who cannot withstand the effects of heat waves, and the island has many attractions as a holiday centre.

Iceland boasts of having the oldest Parliament in the world. It is called the Althing, and its first meetings were held in 930. The island was discovered by the Norsemen about 850, but the first settlers, Ingolf and Hjorleif, came about 25 years later. Their memory is immortalised by two headlands bearing their names that stand out from the south-east coast and provide the first glimpse of Iceland from the approaching steamer.

The capital of Iceland is Reykjavik, a town of some 30,000 inhabitants. The snow-capped mountains of the island are sighted after a voyage of about 600 miles from the British Isles, and in fine weather the reflection of the Sun on the great snowfield named Vatnajökull can be seen many miles out at sea. This is the largest of Iceland's many snow-fields. It covers an area of 3,300 sq. m., and a glacier in it covers about 200 sq. m.

Iceland is a little larger than Ireland, and Reykjavik is not reached until nearly a day after sighting the island. The older buildings in the capital are of wood and corrugated iron. New buildings usually are constructed of reinforced concrete, which is not finished off, but is left just as it sets in the wooden moulds into which it is poured. There are no brick buildings, but in a few of the larger structures stone or rock quarried locally is used. The town is very well equipped. The plentiful supply of water-power enables electricity to be generated cheaply, and the telephone service is well developed, and constitutes a boon not only to the town dwellers, but also to scattered farms in outlying districts where the lack of roads makes travel slow and painful.



Left: Towing in stores at Westmanno, Iceland, a port of call on the way to and from Reykjavik. Above: The Gryla Geysir, which spouts to a height of 35 ft. every two hours. Top: Oxara Fall, on the Plain of Thingvellir.

The chief attraction in Iceland undoubtedly is the magnificent scenery of the mountain regions, and the natural splendours of the falls, hot-springs and geysers that are found throughout the island. The Plain of Thingvellir is one of the places most favoured by tourists, mainly owing to its many historical connections. It was the scene of many struggles and feats of heroism, when arguments among the Norsemen culminated in pitched battles. At one spot there stands a large rectangular stone, bearing the word "Logberg," which means Law Stone. This marks the place where the "President" of the Althing or Parliament had his dais when presiding over the annual deliberations.

The Plain is reached after a 30-mile ascent over glorified cinder tracks, which form the only roads from the coastal lowlands on to the high plateau, and before descending into the Plain, wonderful views can be obtained from rocky promontories overlooking it. Tremendous fissures in the rocks remain as evidence of the violent subterranean subsidences of past ages. Towards the west the strip of water known as Thingvallavatn, 27 sq. m. in area, glistens in the sunlight, reflecting the most exquisite shades of the deepest blue. The road into the Plain crosses a narrow bridge spanning a rushing torrent flowing from the basin into which falls from a height of 150 ft. the beautiful cascade of Oxara. The water in the basin is crystal clear owing to its passage over rocks. Farther down on the actual Plain there is a large pool in which the water is 30 ft. deep. A legend says that the visitor who throws in a small coin will surely return to Iceland. The coins that have been dropped in can be discerned clearly, a testimony to the exceptional clarity of the water.

The largest and most impressive waterfall in Iceland, and indeed in Europe, is the Gullfoss, which is about 80 miles inland. It is difficult to describe this magnificent and awe-inspiring spectacle, which must be seen to be fully appreciated. The fall stands at an altitude of about 2,000 ft. above sea level on the White River, and its immense torrent plunges madly in two sheer drops into the depths of a narrow chasm almost 500 ft. deep. Enormous showers of spray shoot up to a height of 100 ft. above the surrounding banks, and provide indescribably beautiful rainbow effects when the sun is shining.

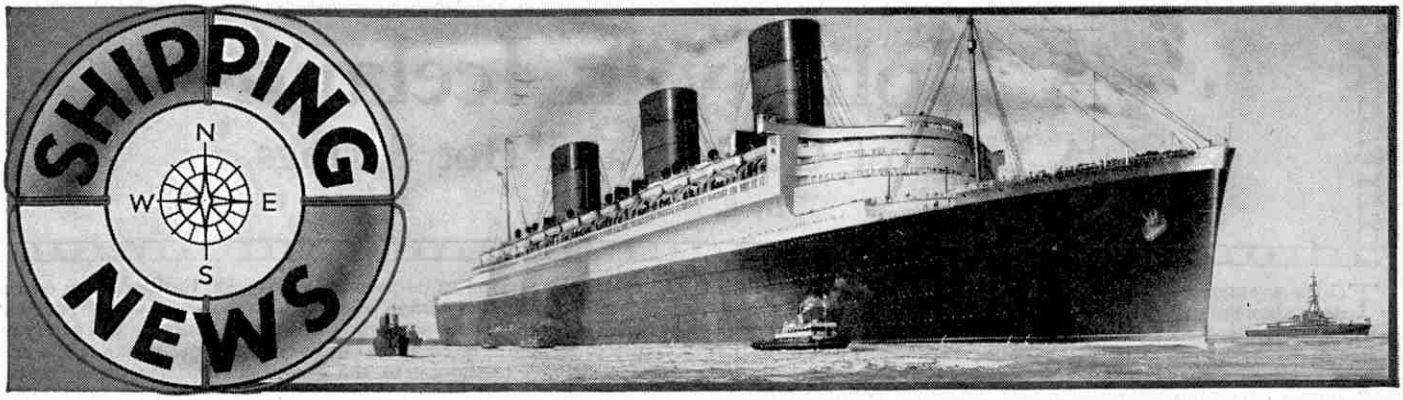
Gryla Geysir, which can be visited en route to Gullfoss, is evidence of the violent subterranean eruptions that are still proceeding in Iceland. With the regularity of a clock, a huge column of boiling water spouts from an underground reservoir every two hours, rising to a height of about 35 ft. Its appearance is heralded by rumblings that are heard for about half an hour previously before the outbreak, and the display lasts for eight minutes, ceasing as suddenly as it begins. The surrounding ground is warm and it is said that snow never lies at this spot for this reason.

There are many hot-springs in the hills, and columns of steam rise perpetually at a dozen different points, demonstrating the forces of nature more spectacularly than in other more settled regions of the world. The boiling water in the hot-springs, or "hver," has a sulphurous taste and the whole atmosphere has the smell of sulphur in it.

The streams from the hot springs that abound in Iceland are harnessed for domestic use. Near Reykjavik the finest flowers are cultivated in conservatories heated by them, and they provide a constant supply of hot water for the municipal wash-houses and baths of the capital. Some consolation is due for the privations forced upon the people by the barren nature of the land. Dairy farming and fishing are the main occupations. The drying and salting of fish provides work for many girls and women, in the coastal towns and villages. The fish are hung up in the sun to dry after preparation, and are then stored in huge stacks with alternate layers of salt and fish awaiting export, mainly to Continental countries.

In mid-June the sun sets only for about 15 min. at this time of the year, so that to all intents and purposes there is no night. The summer is short, however, and in the winter there can only be about three or four hours of daylight, which on dull days, of which there are many, is reduced to a twilight. The weather is normally very variable, and although one day may be brilliant, by the next morning a depression may have formed, accompanied by a cyclonic wind whipping up the dust from the loose surfaced roads, to alter the whole aspect.

In Iceland the school holidays extend from May to October. In the former month scholars congregated in the towns return to their homes in the country and stay there until the arrival of the dark days, when they once more make their way to the towns to continue their studies. Even then, school hours are confined to the morning, the afternoon and most of the evening being given over to private study and "prep."



"*Queen Mary*" Wins Blue Riband

Once more the coveted "Blue Riband" of the Atlantic is held by a British ship, having been wrested from the "*Normandie*," record holder since June 1935, by the "*Queen Mary*." The last British ship to hold the record for the Atlantic crossing was the "*Mauretania*," which enjoyed 22 years of supremacy before the "*Bremen*" beat her time in 1929. Four years later the Italian liner "*Rex*" crossed at a new record average speed of 28.92 knots, only to give way last year to the "*Normandie*."

On the round voyage during which the record was made, the "*Queen Mary*" left Southampton on Wednesday, 19th August, and arrived at New York on the following Monday, having made the passage from Bishop Rock to Ambrose Lightship, a steaming distance of 2,907 miles, in 4 days 27 minutes, at an average speed of 30.14 knots. On her return eastward the "*Queen Mary*" took the shortest time ever recorded for a voyage between the two points, taking only 3 days 23 hrs. 57 min. for the passage. Her average speed over the distance of 2,939 miles was 30.63 knots, compared with the "*Normandie's*" 30.31 knots for the previous record passage of 3,015 miles. The difference in the distances covered by the two vessels is due to their following different courses across the Atlantic.

Faster Voyages to South Africa

The acceleration of the England–South Africa mail service, referred to in the August "*M.M.*," took effect on Friday, 21st August. The Union-Castle liner "*Stirling Castle*" sailed from Southampton on that day, and accomplished the fastest passage to Capetown ever made, completing the voyage in 13½ days. This is now the regular mail ship time under the Union-Castle Line's new contract with the South African Government.

The "*Stirling Castle*" surpassed a record established 43 years ago by the Union liner "*Scot*," which in 1893 completed the trip from Southampton to Capetown in 14 days 18 hours 57 minutes.

A third new vessel for the South African mail service of the Union-Castle line recently laid down at the Belfast yard of Harland and Wolff is to be larger than either the "*Stirling Castle*" or her sister ship the "*Athlone Castle*." She will be 6 ft. to 8 ft. longer, and is expected to be of 26,000 tons or more. The "*Stirling Castle*" is of 25,500 tons. The name that has been suggested for the vessel now under construction is "*Glamis Castle*."

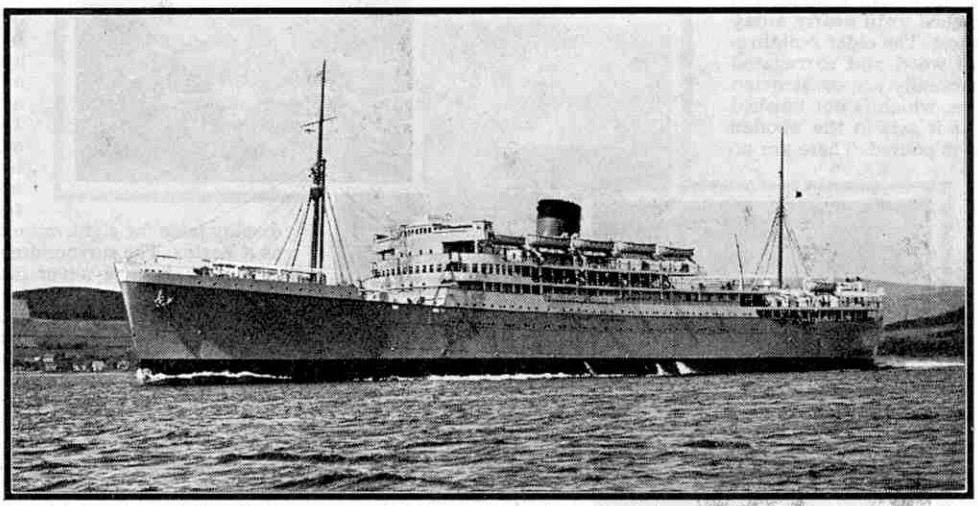
The "*Dunnottar Castle*"

The liner illustrated on this page is the "*Dunnottar Castle*," a new ship built this year for the Union-Castle Mail Steamship Co. Ltd. by Harland and Wolff Ltd., Belfast, and now in the London, South and East African service. She is a twin screw vessel with a gross tonnage of 15,007, an overall length of about 560 ft., and a moulded breadth of 71 ft. 6 in. She is based on modern designs, and has a well-raked rounded stem and a cruiser stern, two masts and a single low type streamlined funnel. The hull is divided into 10 watertight compartments, and there is a continuous double bottom for the carrying of fresh water, water ballast and oil fuel. A streamlined semi-balanced rudder is fitted, which is operated by electro-hydraulic steering gear.

The two main engines of the "*Dunnottar Castle*" are of the well-known Harland-Burmeister and Wain type, each having nine cylinders with a bore of 450 m.m. and a stroke of 1,200 m.m. The electric supply is taken from four 350 kw generators, driven by Harland-Burmeister and Wain Diesel engines running at 330 r.p.m. All the deck and engine room auxiliaries are electrically operated, the motors ranging from 2 h.p. to 90 h.p., and totalling over 800 b.h.p.

The lifebuoys on the vessel can be electrically released from the Captain's bridge, or locally for the prompt rescue of anyone falling overboard.

The "*Dunvegan Castle*," a sister ship of the "*Dunnottar Castle*," also has been built at Belfast by Harland and Wolff Ltd. This vessel had her trials in August, and recently ran her maiden voyage on the South African service.



The "Dunnottar Castle," a twin-screw vessel of 15,007 tons at present operating between England and South and East Africa. Photograph by courtesy of Harland and Wolff Ltd., Belfast.

Lifeboat Launched Like a Torpedo

Davits from which to launch the lifeboats of vessels in distress have been the subject of many inventions. These have been intended to make launching speedy and safe, and to overcome the difficulties encountered when a vessel is sinking, or has a heavy list. In a novel scheme suggested by an American inventor the lifeboat actually is shot from the deck of a vessel into the sea. The lifeboat designed for this purpose is shaped like a torpedo and is closed in. A liquefied gas is used for launching purposes. This is stored in a container in the lifeboat itself, and when it is released by opening a control valve the pressure developed on stationary plungers in the launching device shoots the lifeboat outward.

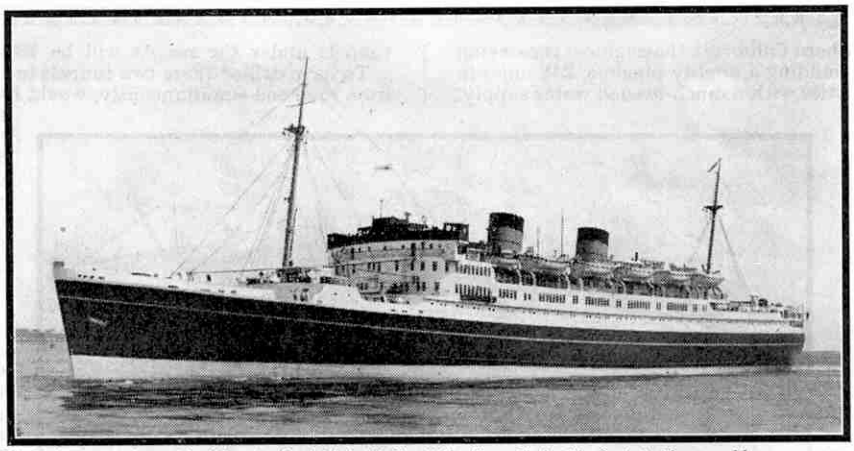
Cross-Channel Services

The cross-Channel fleet operating between England and France during 1935 comprised 37 vessels, including three train ferries. On all routes last year these vessels made 9,106 single trips, conveying 1,106,782 passengers and 191,727 tons of cargo. In addition, 38,044 passengers travelled by the Jersey–St. Malo service, and 39,373 by other routes, mainly between Jersey and Guernsey. For the maintenance of connection between the mainland and the Isle of Wight, twelve vessels were employed. Nine of these were paddle steamers, while the other three had motor propulsion.

New Zealand's Speediest Steamship

The fastest ship owned by any company registered in New Zealand or Australia is the twin-screw passenger steamship *"Awatea"* of the Union Steamship Company of New Zealand Ltd. This vessel is shown in the upper illustration on this page. She was built and engined by Vickers-Armstrongs Ltd., at their Naval Construction Works, Barrow-in-Furness, and is the second vessel to be built there for the Union Steamship Company. She recently completed successful trials in the Firth of Clyde before being handed over to her owners.

The length overall of the *"Awatea"* is 545 ft., the breadth moulded is 74 ft., and her displacement is about 16,000 tons. Her hull is divided into watertight compartments by eight transverse bulkheads, and in the usual double bottom there are tanks for fresh water, water ballast, feed water and fuel oil.



The twin-screw steamship "Awatea," which holds the distinction of being the fastest ship owned by a company registered in New Zealand or Australia. Photograph courtesy of Vickers-Armstrongs Ltd., Barrow-in-Furness.

The vessel is propelled by twin screws driven by two sets of Parsons' turbines through single reduction gearing. The four-bladed manganese bronze propellers run at about 125 revolutions per minute on services when developing 20,000 s.h.p. On trial the two sets of turbines developed 22,500 s.h.p. at 130 r.p.m. Steam is generated by six Yarrow high-pressure boilers using oil fuel, and constructed for a blow-off pressure of 450 lb. per sq. in. at the safety valve.

Though primarily a passenger vessel, the *"Awatea"* has accommodation for a certain amount of cargo, including holds for carrying mails, livestock and motor cars; and insulated space is provided for the storage of provisions and fruit cargoes. The steering gear fitted is of the latest four-cylinder electro-hydraulic design of Brown Brothers and Co. Ltd., and operates a semi-balanced rudder. Two pumps are incorporated, and with one pump unit and four cylinders in operation the rudder may be turned through 70 degrees in about 30 seconds with the vessel steaming full speed ahead. The same manœuvre can be accomplished in 18 seconds if both pumps are used simultaneously.

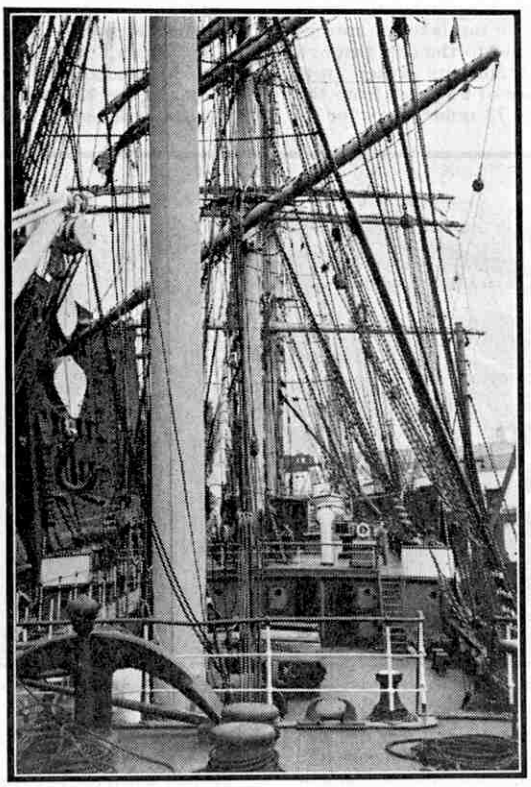
The life-saving equipment includes 10 lifeboats, each to hold 80 persons, and two 22-ft. emergency boats. The boats are constructed of Birmabright corrosion-resisting alloy, and buoyancy tanks have been built into the hulls, dividing each into six watertight compartments.

Submarines Launched at Barrow

Two submarines were recently launched at Barrow-in-Furness, at the Naval Construction Yards of Vickers-Armstrongs Ltd., who built the vessels. The two vessels, which are named *"Lembit"* and *"Kalev,"* entered the water in that order at an interval of 15 minutes. They are identical in construction and design, and after fitting out will be handed over to the Estonian Naval Authorities for whom they have been built.

The *"Lembit"* and *"Kalev"* were ordered in 1935, and each has a surface displacement of 620 tons. Their length is 190 ft., with a breadth of 24 ft., and a depth of 11 ft. Diesel engines developing 1,200 b.h.p. are fitted, giving the vessels a surface speed of 13.5 knots, and a submerged speed of 8.5 knots. The *"Lembit"* and the *"Kalev"* are respectively the 168th and 169th submarines launched at the Barrow Yard.

Another submarine recently launched at the Barrow Yard was named H.M.S. *"Rorqual."* This vessel is of the "Porpoise" class, and it has a length of 271 ft. 6 in., a breadth of 25 ft. 6 in., and a surface displacement of 1,520 tons. The craft was laid down in May 1935 under the Admiralty's 1934 programme. The propelling machinery is estimated to develop 3,300 h.p., giving a surface speed of 16 knots.



The deck of the four-masted barque "Pamir" in the East Float, Birkenhead. This vessel is one of the fleet of sailing ships owned by Captain Erikson, Mariehamn, and in 1932 was the leader in the unofficial Australian grain ship race. Photograph by courtesy of A. F. Burr, Mill Hill, London.

The Institute of Marine Engineers

Arrangements are now being made for the next annual examination for admission to the student class of membership of the Institute of Marine Engineers, which will be held in June 1937 in London and other centres. The examination for admission to Associate Membership to the Institute is to be held on 16th–19th November next. Full particulars of these examinations and of any exemptions that are allowed may be obtained on application to the Secretary, the Institute of Marine Engineers, the Minories, London, E.C.3.

All apprentices and students who wish to become marine engineers should endeavour to qualify for membership of the Institute of Marine Engineers. The first step is to become a Student Member of the Institute, which can only be done as a result of examination. Applicants for admission to the Student Section must be under 25 years of age and have completed at least one year of attendance at day or evening classes at an approved educational institution, as part of a regular course of training in the science of engineering or naval architecture. The possession of certain degrees or diplomas exempts the holder from sitting for the preliminary examination.

The Australian Grain Fleet Race

Every year the end of an unofficial race is heralded by the arrival at Falmouth or Queenstown of the earliest of a fleet of sailing vessels bringing wheat from Australia. These vessels include most of the sailing ships yet afloat, and make the voyage round the Horn or by way of the Cape of Good Hope. The passage home occupies about 85 to 125 days, and the earliest arrival usually is in April. Most of the vessels now employed in this trade are owned by Captain Gustaf Erikson, of Mariehamn, in the Åland Isles of the Baltic Sea.

One of the most famous of the grain fleet was the *"Herzogin Cecilie,"* which was the first to arrive in home waters this year, but went ashore near Salcombe. This ship won the unofficial race in 1927, 1928 and 1931.

The *"Pamir,"* a fine deck view of which is shown on this page, led the grain fleet home in 1932. She is a steel four-masted barque built in 1905 by Blohm and Voss at Hamburg. She has a length of 316 ft. and a tonnage of 3,020, and was formerly owned by a Hamburg merchant, who in 1931 sold her to Captain Erikson.

Motor Vessel for Lake Windermere

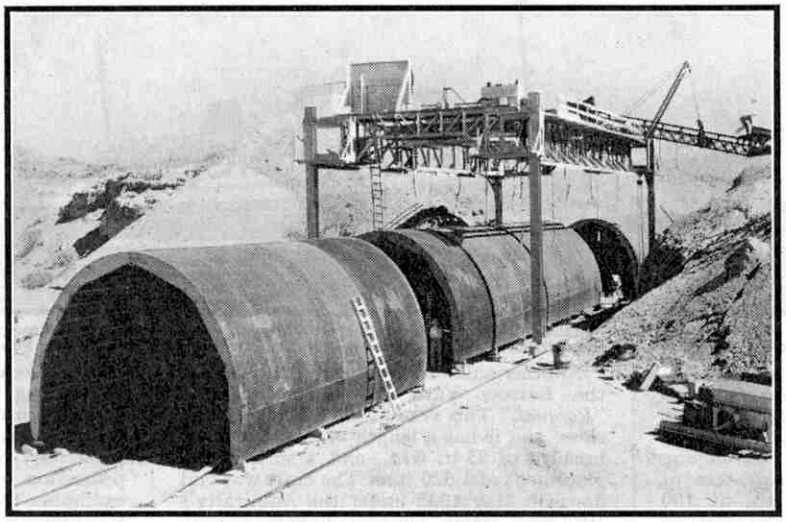
The twin screw motor vessel *"Teal"* recently entered the L.M.S.R. passenger service on Lake Windermere. The vessel was built by Vickers-Armstrongs Ltd. at Barrow-in-Furness, and taken in sections by rail to Lakeside and re-assembled there. The *"Teal"* has a length of 141 ft. 9 in., and a displacement of 230 tons. Two 8-cylinder Gleniffer Diesel engines are installed.

Pipeline 248 Miles in Length

Giant Tube with Streamlined Sides

By H. J. Shepstone, F.R.G.S.

OUT in the deserts of Southern California the engineer is carrying out a daring feat. He is building a mighty pipeline, 248 miles in length, to supply famished cities with a much-needed water supply. This line covers a distance equal to that from London to Cornwall, and on its way crosses vast stretches of desert and pierces many mighty mountains, in tunnelling through which the men at work on it have had narrow escapes from drowning. Unforeseen difficulties were encountered in the laying out of the canals and conduits and in the erection of the great siphons, and all the skill and ingenuity of the engineer were required to overcome them. Not the least of these difficulties is that the interior surface of the great tube has to be finished throughout to the smoothness of steel, with no sharp curves or rough places, in order to give a steady and easy flow of water; in other words, the pipeline has to be constructed and finished in perfect streamline form throughout its entire length of 248 miles.



Building the great pipeline from the Colorado River to the Californian coast. Our photograph shows the steel forms around which concrete is cast to form the arch of the 16-ft. tube.

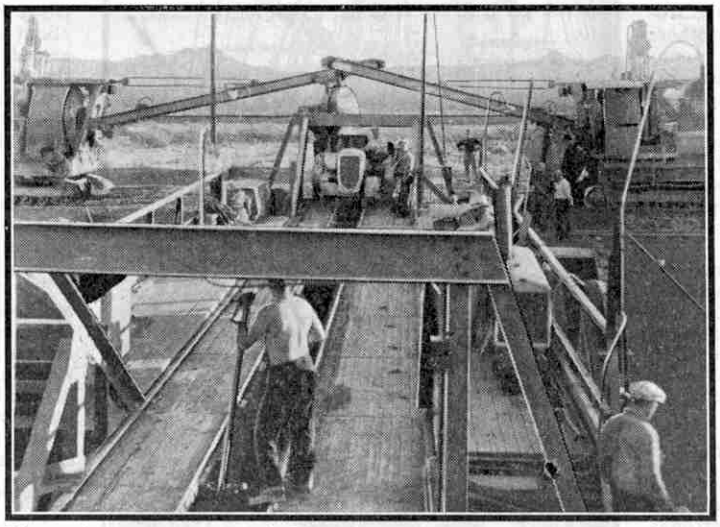
Supplying large cities with water is one of the great problems of the engineer to-day. To do this he often has to tap lakes or springs many miles away and bring the precious liquid to the city through huge tubes. Manchester, for example, obtains its water from Thirlmere, in the Lake District, at a distance of 96 miles from the city, and Birmingham relies on Welsh lakes 73 miles away for its supply. The great pipes required in these cases were rightly regarded as clever engineering achievements, but they pale into insignificance when compared with the great project now in progress in California. This is evident when it is realised that it will be six years before the American scheme is completed, and an expenditure of £44,000,000 will be necessary.

Through this colossus of pipelines a million million gallons of water will flow daily to 13 different cities. This vast quantity of water is being taken from the Colorado River at a point some 150 miles below the great Boulder Dam, the construction of which was described in articles in the issues of the "*M.M.*" for February, March and September, 1934. At that point another barrier, known as the Parker Dam, is now in course of erection. This alone will cost £2,600,000, and it will create what engineers call an intake, or reservoir, from which the water will flow into the pipe, wriggling its way like a gigantic snake across the desert and through tunnels under the mountains. Each of these tunnels will be 16 ft. in diameter, or large enough to accommodate a modern locomotive. There will be 29 of them altogether, with a total length of 92 miles, and the two longest will penetrate the East Coachella and San Jacinto Mountains. The lengths of the tunnels under the ranges will be 18 and 13 miles respectively.

To have drilled these two tunnels in the ordinary manner, that is from each end simultaneously, would have taken too long. From 15 to 20 years would have been required for the one that is 18 miles long. So the engineers have attacked the mountains not only from each end, but also from the sides and from the top, in each case sinking shafts down to the tunnel level and driving borings from them into the very heart of the mountain. The East Coachella tunnel is being bored from eight different points simultaneously, and that through the San Jacinto Mountains has six working faces.

The very latest types of machinery and labour-saving devices are being employed in driving the tunnels. The great drill carriages mount as many as four to eight pneumatic drills, and with these machines from 20 to 60 holes, each from 6 ft. to 12 ft. deep, are drilled in the hard rock at the same time. The holes are loaded with explosives and fired, and after the blast the shattered rock is loaded into waiting cars and hauled out to the dump. The "muck," as the shattered rock is termed, is lifted into the cars by electrically-operated dippers.

Boring the 13-mile tunnel through San Jacinto Mountain is proving a particularly tricky proposition. To facilitate a more rapid completion of the boring, two shafts were sunk into the mountain to the tunnel level, one 246 ft. and the other 796 ft. in depth, and water was unexpectedly encountered in drillings from these borings. Every day enough water pours into the tunnels, drenching men and equipment, to supply a city of 100,000 inhabitants.



The canal concrete paver at work. The concrete is poured through the slot into position at the bottom of the canal.

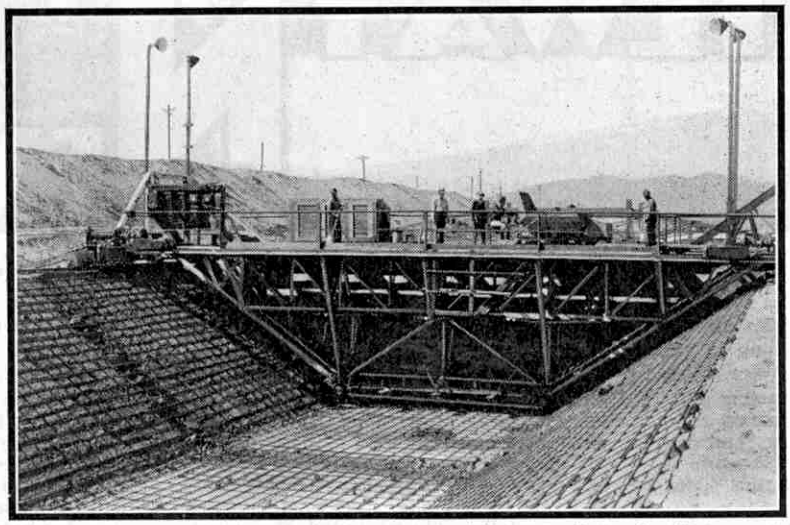
To cope with this rush of water it was found necessary to blast away the rock at the bottom of the shafts and instal powerful pumping stations, each as large as a small bungalow. These stations are guarded by massive steel doors that are never opened except for delivery or removal of machinery, and attendants enter them through tiny openings inside the doors, each scarcely large enough for a man to crawl through. By means of the pumps installed in them the engineers are locking large quantities of water within the mountain, and removing the vast volume that pours into the tunnel.

Before the pumping plants were installed the men had several narrow escapes. On one occasion a blast resulted in a cave-in, releasing a vast quantity of pent-up water into the tunnel. The men had no option but to down tools, hurry to the shaft, and make for the top as fast as they could. The water climbed the shaft to a height of 647 ft. and many of the workers barely escaped with their lives in

their frantic climb to a height of 800 ft., beyond its reach. On another occasion the tunnel filled with water, and only after months of pumping was it dry enough for the drillers to proceed with their hazardous job.

Every safety device and method known to mining stands ready to guard the lives of the 600 men toiling in the tunnels. At the shafts special hoists have been installed so that the men can be brought to the surface quickly. Huge ventilator pipes carry 50 cu. ft. of air per man down the long bore every minute. After blasting, the system is reversed, and sucks out the poisonous and acrid fumes.

When treacherous ground is encountered holes are drilled 36 ft. ahead. This is done in order to ascertain the nature of the rock and what lies beyond. If water is tapped, precautions can be taken to deal with it. Where the tunnel passes through moving or "soft" ground, it is lined with timber and given a thick coat of concrete, and in faulty or fractured rock its walls and roof are strengthened with ribbed steel bent to fit them.



Another view of the concrete paver, which forms a moving bridge across the canal and lays concrete on the bottom and sides at the rate of a foot a minute.

Work in the tunnels has to be constantly checked, as the slightest deviation in grade or angle might prove serious. The surveyors found it difficult to get sufficient light to enable them to read their delicate instruments. This trouble was got over by the introduction of a powerful lamp allowing only a fine vertical beam of light to escape, and transit men are able to sight upon this slender beam from great distances down the tunnel. For other types of observation, pocket flashlamps are suspended from the roof of the tunnel.

Tunnel driving is by no means the only important phase of the undertaking. In addition to the 92 miles of tunnels that are being bored through mountains, there are 62 miles of canals, 55 miles of conduits and 29 miles of siphons. Then at five different points elaborate pumping machinery is being installed. By the aid of these pumps the water that will pass through the pipeline will be raised 1,539 ft. during the first 130 miles of its journey. At the fifth point, known as Hatfield Lift, it will be forced nearly straight up through a height of 440 ft., and from there the water will flow by gravity to its destination, through tunnels, siphons and conduits.

The siphons, the largest ever designed, are built of reinforced concrete many yards in thickness. Their work is to help the water across declivities in the desert terrain. The name "siphon" is actually a misnomer, as they do not exert any siphonic action. In design they resemble the letter "U" on an immense scale. The water flows down one side and rushes up the other to just below its own level, and the siphons have to be made very strong in order to withstand its great pressure.

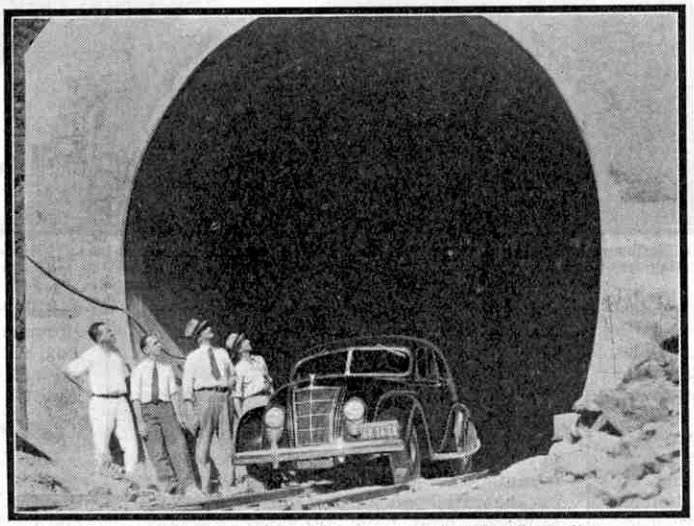
It is necessary for the siphons, conduits, tunnels and canals to be finished as smooth as glass. There must be no sharp curves, projections or rough spots, for these would greatly retard and consequently reduce the flow of water. If the tunnels were left in the "rough" to cope with the proposed flow, they would need to be 18 ft. in diameter instead of 16 ft. Special machines were designed for the construction of the canals in order to ensure this streamlike effect. One of the most interesting of these is the trimming machine, which straddles the 60 ft. canals and moves on rails. After a canal is "roughed out" by a drag-line shovel, the trimming machine swings into operation. As it runs backward and forward, a series of knives slice away thin sections of earth, and an endless chain dumps the "shavings" along the banks. When the canal has been cut to the desired depth of 11 ft. 7 in., with a width at the top of 60 ft., its sides and bottom are quite smooth. Steel reinforcing rods are then laid down and all is ready to receive the concrete.

In the past the bottom of a canal was paved after it had been smoothed by hand, and the concrete then was laboriously set on the sides by hand. Now all this is accomplished in a single operation by means of an ingenious mechanical device known as a paver, which not only lays the concrete, but spreads it evenly and tamps it down. In design the paver resembles a huge rolling bridge mounted on trucks running on rails laid parallel to the canal banks. It is a colossal piece of machinery weighing some 48 tons, and is formed to the shape of the finished canal.

Concrete is supplied from a giant mixer mounted on creeper tracks that allow it to follow the paver as this moves along. The concrete runs down through special hoppers on to the floor of the canal. As it emerges from the machine, a series of revolving steel rods are brought into play, and these spread the concrete over the ground evenly, and also tamp it down firmly, giving to it a finish as smooth as glass. The concrete for the canal sides is delivered through a number of small apartments, or pockets. There another series of revolving rods come into play, and these are so designed that they not only distribute the concrete evenly, but also prevent the plastic material from moving sideways down the slopes. As the machine progresses, finishers follow behind, and from framed wooden "jumbos," or movable scaffolds mounted on rails, they work over the surface of the concrete with hand trowels to produce the desired hard finish.

When moving at a speed of about 1 ft. per min. one of these machines paves approximately 500 ft., placing over 700 cu. yd. in position during one eight-hour shift, whereas the abandoned hand-placing method could only account for an advance of 200 ft., during which only 282 cu. yd. could be laid.

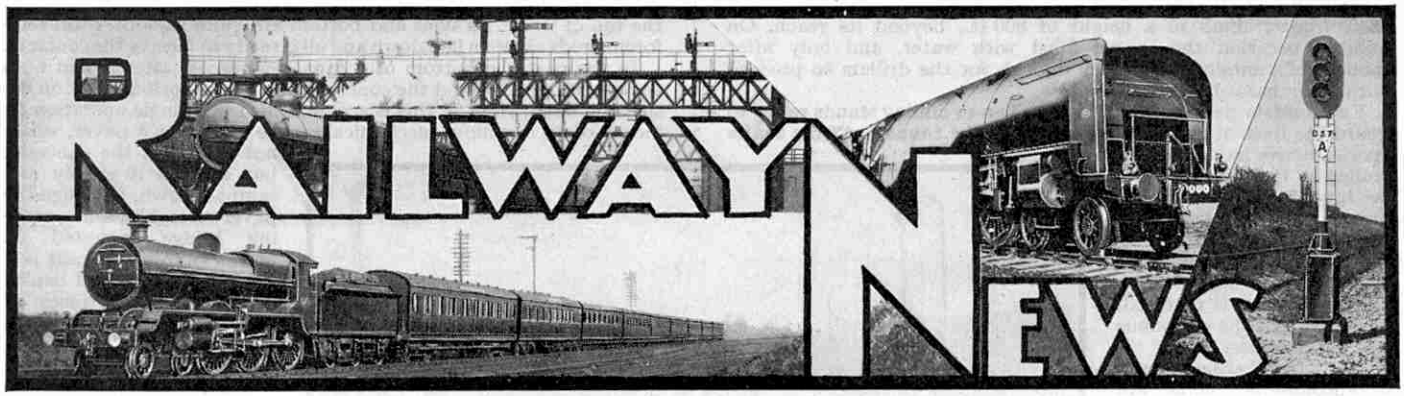
Within the tunnels, conduits and siphons, workmen grind down inequalities, particularly at joints, with high-speed emery wheels; and finally the concrete is rubbed to a high lustre. Nowhere throughout the length of this 248-mile winding tube, whether in the desert or in the heart of the great mountains, is there a sharp corner. Thus friction will be reduced to a minimum, and water will flow through the great pipe with little restraint.



The horse-shoe arch of one of the tunnels of the 248-mile pipeline.

Before work could be started on the undertaking surveying parties spent two whole years in the desert and among the mountains mapping the course of the pipeline. It proved arduous and trying work. All supplies, including provisions, water and tools, had to be carried with them. In the desert the thermometer often registered 130 deg. F. in the shade, and on the mountain tops the party had to force a path through deep snowdrifts at a temperature far below zero. Then came the making of hundreds of miles of surface highways over which men and heavy machinery and material could be conveyed to the construction camps scattered along the route. Water is carried to these camps from 22 wells drilled in the desert, and the electric power used for operating the machinery in the tunnels is brought a distance of 450 miles.

At the various construction camps an army of 4,400 men is now at work. The tunnels are being driven at the rate of 3½ miles per month, and the pipeline is to be completed within six years. Water will then flow through the 248-mile channel into a great reservoir, from which it will be distributed through 144 miles of distribution mains to 13 cities in Southern California.



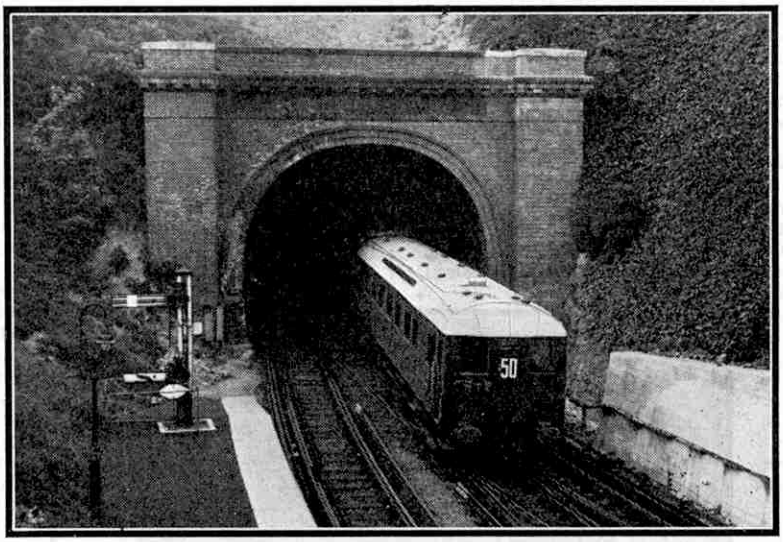
Hard Work on the G.W.R. in South Devon

The G.W.R. West of England main line between Newton Abbot and Plymouth has some of the most severe grading in the British Isles. Engines of up expresses have a particularly severe task in starting practically "cold" up the 1 in 41 ascent from Plympton to Hemerdon siding, and the kind of running made over this route is well illustrated by two recent runs timed by Mr. O. S. Nock.

On one of these trips, with a train weighing 365 tons gross, the engine was No. 5053, *"Bishop's Castle,"* one of the newest "Castles," but with this load a pilot was necessary, the limit for "Castles" in this direction being 350 tons. The pilot was No. 3342, *"Bonaventure,"* an old "Bulldog" class 4–4–0 with 5 ft. 8½ in. driving wheels. On the second trip, No. 6007, *"King William III,"* had to tackle 390 tons without assistance, although 385 tons is the limit for this class. Both trains ran very gently down the incline from Plymouth to Laira Junction and Plympton, the foot of the Hemerdon bank, was passed at 48 m.p.h. by the "Castle" and his pilot, and at 50 m.p.h. by the "King." The latter engine fell right down to 17¼ m.p.h. on the two miles at 1 in 41, but even the double-headed train dropped to 22. Beyond Hemerdon the line continues to rise but at much easier grades; speed rose to just over 50 m.p.h. on both runs, and Wrangaton summit 14.1 miles from Plymouth was passed in 22¼ min. by the "Castle" and "Bulldog" together, and in 24½ min. by the "King."

On the descent to Totnes, as steep as 1 in 60 in places, the speeds did not exceed 67 and 64½ m.p.h. respectively, and on passing through the station the double-headed train had slightly increased its lead. Then came the climb to Dainton tunnel, 4¾ miles of continuous rise, the last mile of which is at 1 in 37! The "King" did remarkably well to cover this length in 6½ min., speed falling to 22¼ at the summit, but the "Castle" and his pilot made a most exceptional effort, taking only 5½ min., and did not fall below 30½ m.p.h. These two engines had now taken 37 min. to cover the 28 miles from Plymouth to Dainton; the "King" took 40¼ min. So the double-headed train reached Newton Abbot, 31.8 miles, in 42 min., a gain of 4 min. on schedule from the Plymouth start.

The "King," which was working the up *"Cornish Riviera Limited,"* passed through Newton Abbot at reduced speed in 45¼ min., but then was badly delayed by signals and permanent way operations all the way to Exeter. On the other run the load was made up to no less than 505 tons, but on the level grades along the sea shore a pilot was no longer needed, and *"Bishop's Castle"* ran the 20¼ miles to Exeter in 25¾ min. start to stop. Speed was carefully reduced round the curves on the winding stretch between Teignmouth and Dawlish and then rose to 60 m.p.h. on the level at Exminster.



An S.R. Eastbourne express entering Lewes station. The starting signal shown on the left incorporates a shunting arm below the main semaphore, the purpose of this being indicated by the letter "S" shown attached to the arm. (H.R.C. prize-winning photograph.)

Motor Cars by Rail

With the rapid development of the motor industry there has been a great increase in the number of new motor vehicles conveyed by rail. Motor vehicle agents and manufacturers are more and more entrusting the initial transport of motor cars to the railways, who have provided specially-designed covered vans for the transport of this traffic. Some of the special motor car trucks are capable of carrying two standard type cars. They are equipped with vacuum brakes for express freight train running, and end doors to expedite loading and unloading. In some instances, where numbers of cars are to be conveyed at the same time, they are driven through the length of a whole train of covered motor car vans, the end doors and tread plates fitted to the vehicles making this possible.

New Fast Freight Locomotives for the S.R.

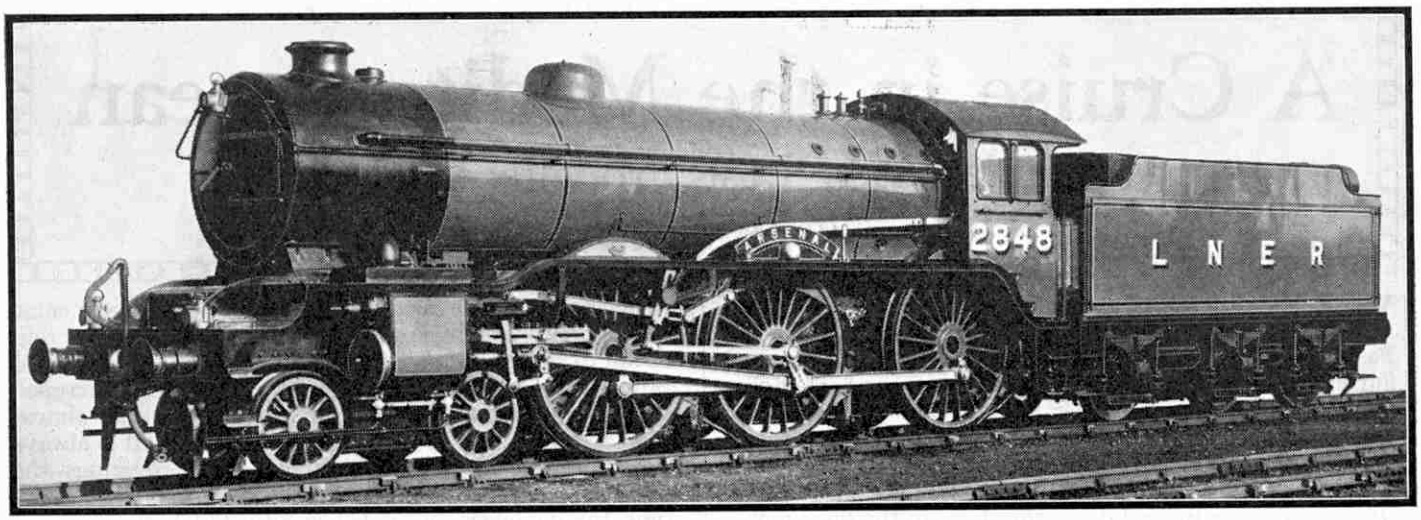
The S.R. have put into service 10 further 4–6–0 locomotives of class "S.15" for fast freight and mixed traffic working. These are Nos. 838–847 and differ only in details from the previous engines of the class, Nos. 823–837, which were built in 1927. The first five of the new batch have large flat-sided bogie tenders similar to those provided for some of the "Nelson" class express passenger engines. The latest tenders however have tanks built up by electric welding and run on disc wheels. They carry 5,000 gallons of water and five tons of coal. The other five engines have 4,000 gallon six-wheeled tenders taken from certain of the "King Arthur" class passenger locomotives, the latter receiving new bogie tenders in exchange. The six-wheeled tenders had been provided in order that these "King Arthurs" might work over the Central Section of the S.R., and they have now been transferred to the "S.15" engines for the same reason.

These new locomotives have been built in the Company's Works at Eastleigh to the design of Mr. R. E. L. Maunsell, the Chief Mechanical Engineer. The 1927 batch of the same class also were built at Eastleigh. They were developed from the original 20 "S.15" mixed traffic engines built in 1920 by R. W. Urie for the former L.S.W.R., but incorporated various improvements in motion design and smoke-box arrangements and had a higher boiler pressure, being in fact practically "King Arthurs" with smaller driving wheels.

Speedier Anglo-Scottish Services

The fastest journey time that has ever applied by rail between Glasgow and London has been instituted by the L.M.S.R. by the acceleration of the up *"Royal Scot"* from Glasgow to a schedule of 7 hrs. 25 min. This represents a saving of 15 min. over the corresponding allowance last winter. A departure time of 10 a.m. is still maintained for this train at both Glasgow (Central) and Edinburgh (Princes Street), but the arrival at Euston is now made at 5.25 p.m.

On the East Coast Route the up *"Flying Scotsman"* now observes a similar timing from Edinburgh, this also showing a saving of 15 min. on former running times. In the down direction the allowance has been cut by 25 min. to 7 hr. 20 min.

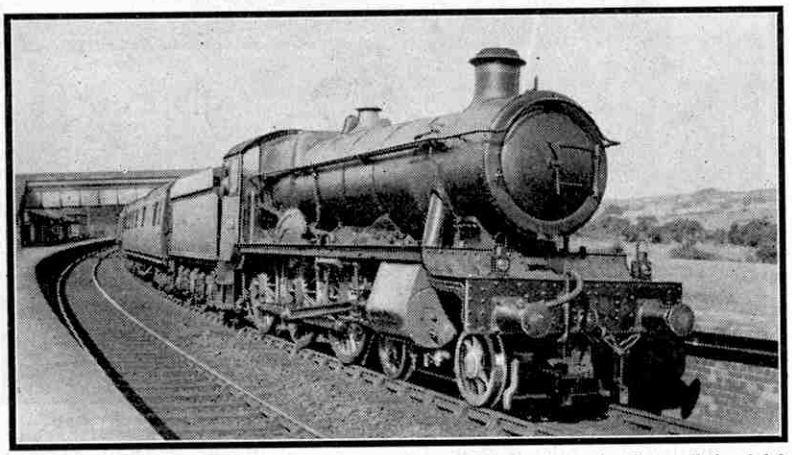


L.N.E.R. "Football Club" Engines

At the time of writing 13 three-cylinder 4–6–0 locomotives named after famous football clubs have been put into service on the L.N.E.R. Each of these engines carries on the centre splashers the representation of a football and in addition the colours of the club after which the engine is named. The miniature football is shown in the upper illustration on this page.

The numbers and names of the engines are as follows: No. 2848, *"Arsenal"*; No. 2849, *"Sheffield United"*; No. 2850, *"Grimsby Town"*; No. 2851, *"Derby County"*; No. 2852, *"Darlington"*; No. 2853, *"Huddersfield Town"*; No. 2854, *"Sunderland"*; No. 2855, *"Middlesbrough"*; No. 2856, *"Leeds United"*; No. 2857, *"Doncaster Rovers"*; No. 2859, *"Norwich City"*; No. 2860, *"Hull City"*; and No. 2861, *"Sheffield Wednesday."*

It will be noted that No. 2858 is missing from this list. This locomotive has been named *"The Essex Regiment,"* so that although it belongs numerically to the above series it is not a "Football Club" engine. Nos. 2848-61 were built at the Darlington Works of the L.N.E.R. Another batch is on order from Robert Stephenson and Co. Ltd., but none of these has yet appeared in service.



The upper illustration, reproduced by courtesy of the L.N.E.R., shows the three-cylinder 4-6-0 locomotive No. 2848, "Arsenal," the first of the "Football Club" series of the "Sandringham" class. In the lower photograph a G.W.R. Penzance-Shrewsbury train is seen at Chacewater in charge of No. 4966 "Shakenhurst Hall." (H.R.C. prize-winning photograph.)

Further G.E.R. type "B12" class 4–6–0 locomotives rebuilt with larger boilers and round-topped fireboxes include Nos. 8541, 8550, 8559, and 8566. Two of the "E4" class 2–4–0 mixed traffic locomotives of the former G.E.R., Nos. 7411 and 7478, have been provided with enlarged cabs having side windows. This is to afford better protection for the enginemen when working over the exposed route between Darlington and Tebay to which these engines have now migrated. A short article describing this class of locomotives appeared in the July 1935 *"M.M."*

L.M.S.R. Locomotive and Rolling Stock Developments

The L.M.S.R. construction programme for 1937 provides for 105 new locomotives, 751 carriages, and 12,105 wagons. Included among the locomotives will be five more of the 4–6–2 "Princess Royal" class; these will be built at Crewe Works. For the most part the new stock will be built in the Company's shops, but orders have been placed with private firms for 2,195 wagons. The majority of the new carriages will be of main line vestibule and corridor types. In addition 17 new restaurant cars will be added to complete a scheme that has been in progress for some years to improve and increase the travelling restaurant facilities on the L.M.S.R.

Four engines of the "5X" "Jubilee" class Nos. 5739-42 that will be turned out towards the end of this year will be named respectively *"Ulster,"* *"Munster,"* *"Leinster,"* and *"Connaught."* The new series of class "5P5F" mixed traffic 4–6–0 locomotives numbered in the 5200s are being delivered from Sir W. G. Armstrong Whitworth and Co. Ltd., and are being put into traffic, as are the 2–8–0 mineral engines of the "8000" series on order from the Vulcan Foundry Ltd. New passenger tank locomotives of the 2–6–4 type continue to appear, both from the North British Locomotive Co. Ltd., and from Derby Works.

With the commissioning of so much new motive power the disappearance of many of the locomotives of pre-grouping days continues rapidly. L.N.W.R. "Princes" recently scrapped include No. 25627, *"Lewis Carroll"*; No. 25660, *"Kestrel"*; and No. 25685, *"Persia"*; No. 25697, *"Richard Cobden"*; and Nos. 25721, 25726 and 25796, which had no names. Among the 4–4–0s of L.N.W.R. design now broken up was No. 5278, *"Precursor,"* the first of a well-known class originated by Mr. G. Whale in 1904. The non-superheated engines of this class as originally built became obsolete last year, but No. 5278 was one of those that had been provided with superheating equipment and assimilated to the "George The Fifth" class, which were the superheated development of the "Precursors." "Georges" now withdrawn include No. 5337, *"T. J. Hare"*; No. 5349, *"British Empire"*; No. 5353, *"Staghound"*; No. 5355, *"South Africa"*; No. 5385, *"William Froude"*; No. 5399, *"Lord Stalbridge"*; and No. 5394, *"Phaeton."* Superheated "Precursors" also withdrawn are No. 5309, *"Fame"*; No. 5316, *"Viscount"*; and No. 25207, *"Eglinton."*

The M.R. "Kirtley" 2-4-0s of the old "800" class with outside frames are now obsolete, the last survivor No. 20060 having been withdrawn.

G.W.R. Notes

The 25 G.W.R. "Castle" locomotives built this year are Nos. 5043–5067 inclusive, and the names selected for them appeared in these pages last March. No. 5053, which was to have been named *"Hatherop Castle,"* was turned out as *"Bishop's Castle"* instead.

Recent withdrawals include No. 3255, *"Excalibur,"* and No. 3271, *"Eddystone,"* of the 4–4–0 "Duke" class, and No. 2678, one of the 2–6–0 inside-cylinder "Aberdares."

Winter train services came into operation on the G.W.R. on 28th September. A notable feature is that almost all the services operated by the 17 streamlined railcars are retained. These, including the parcels railcar referred to in *"Railway News"* in the June issue, will cover a mileage of 3,584 as compared with the corresponding figure of 1,235 last year. Four trips are now made daily, except on Saturdays and Sundays, by a streamlined railcar between Bristol and Cardiff, via the Severn Tunnel. This is the first regular railcar service to be operated through the Tunnel.

The non-stop run of the *"Cornish Riviera Limited"* to Plymouth is now cut short by a stop at Exeter to detach a coach for Kingsbridge. Slip coaches again serve Weymouth, Taunton, Minehead and Ilfracombe.

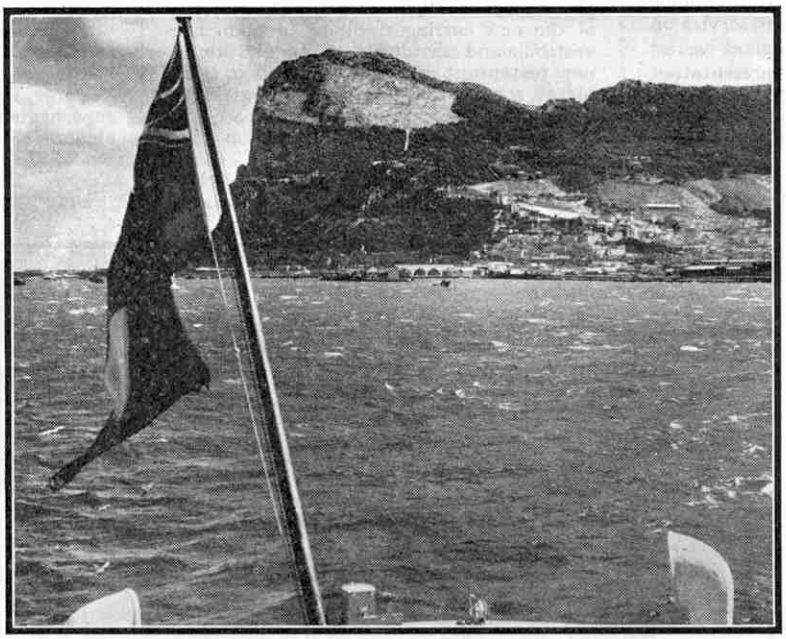
A Cruise in the Mediterranean

Replacing a Lost Propeller Blade

By Harold Elwell

WE boarded the gleaming white cruising liner at the Liverpool Landing Stage on a Saturday afternoon. Passengers and friends were hurrying on board, bunting fluttered gaily from the masthead and everyone had a holiday feeling, except the seamen working at top speed hauling trunks and stores aboard. The interest of the cruise began immediately, for the Mersey was full of shipping of all kinds, from great liners lying at anchor and cargo steamers passing up and down the river, to the busy ferry vessels and the fussy tugs, some of which were hovering round the cruising ship.

Gradually the winches stopped chugging. The bell boys cried "All visitors ashore, please," the gangway was raised after the inevitable last passenger had rushed aboard, and amid the hooting of sirens and farewells from our friends the tugs carefully nosed the vessel out against the tide downstream. The engineers on watch below kept a careful eye on the engine room telegraphs as the pilot rang down from the navigating bridge "Half Speed Ahead," and not until we had negotiated the difficult Mersey channels did they receive the order "Full Ahead." Early in the evening off the Welsh Coast the pilot boat hailed us, and we slowed down for the cutter to "pick up the pilot." This was rather thrilling to watch, as the pilot clambers down a swinging rope ladder, and more often than not he has to make a leap for the cutter as it draws alongside.



The rock of Gibraltar seen from a cruising liner, with the town resting on its lower slopes.

Now we were for the open sea, and when all had found their bearings there was life-boat drill, which all had to attend, wearing lifebelts. About noon on Sunday we had the Scilly Isles abeam and passed the "first and last English lighthouse," that on the lonely Bishop Rock. By nightfall a slight roll warned us that we were in the Bay of Biscay, the troubled stretch of water bounded by the west coast of France and the north coast of Spain. Our course lay in a south-westerly direction, but even so we did not miss the swell, the tail-end of an Atlantic storm many hundreds of miles away, which made our otherwise steady ship pitch forward in uneven jerks.

Now and again the stern rose out of the sea and hit each wave tremulously. Seamen say "She's catching the short ones," when this happens. Just after one of these "short ones" the ship lurched, and instead of the steady throb of the engines and the even spin of the propellers there came an irregular bumping felt all over the ship. An engineer told us not to worry. "She's only dropped a fin off her starboard prop," he said, meaning that one of the blades had snapped off a propeller. Instead of both shafts keeping an almost even speed of, say, 78 r.p.m.—actually one shaft is always a little slower to prevent kick and erratic steering—the damaged propeller now raced unevenly. In a very short time the engineers down below adjusted both port and starboard engines, however, and we proceeded at about half speed. No sooner was the excitement over than the Bay also seemed to have calmed down. This was all to the good, for we had to make for Lisbon, the nearest port, for repairs.

Although every big ship must carry a spare propeller blade, not every port has a dry dock large enough to accommodate a ship of our size. Portuguese officials boarded us as we neared Lisbon, and after much gesticulating and arm waving they decided to allow the Captain and Chief Engineer to manœuvre the ship into DOCA No. 1. The reason for the officials' anxiety was that the dock was really too small to allow the vessel to settle properly on keel chocks on the bottom. She just managed to get in, however, and passengers were then able to enjoy unexpected tours of Lisbon, or visits to the Casino at Estoril.

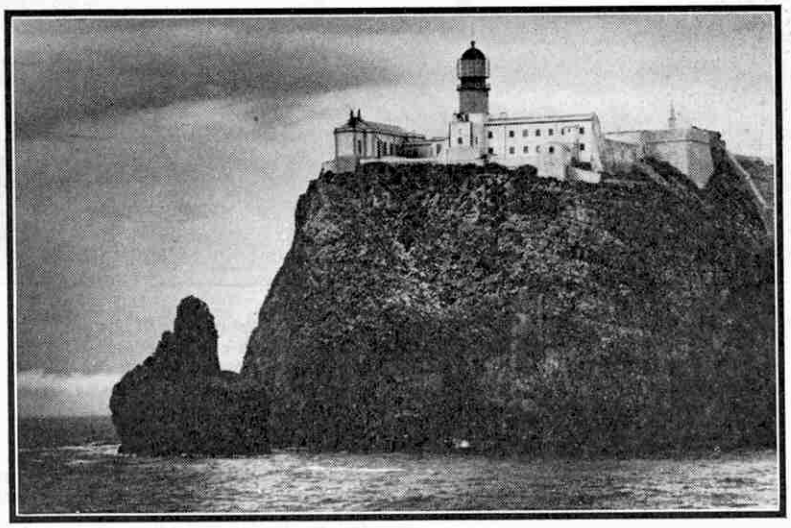
The ship was lightened by emptying ballast tanks, and trimmed by pumping the fuel oil from the after into the forward tanks. This left her down by the head and with her stern higher, and the propeller shafts came into sight when part of the water in the dock had been pumped out.

Dock workers floated pontoons in position under the ship's stern, and engineers went down to examine the damage. Unfortunately the blade had snapped off at an awkward place just on the boss, and the massive bolts that still held the remnant in position had to be drilled out of the shaft. This meant extra work and delay, but after fitters had worked all through the night, early morning saw the shaft clear. The new blade, made of phosphor bronze alloy and costing £200, was then lowered ready to be bolted on. This took only an hour or so, and all tackle then was cleared away, the pontoons were hauled up, and gradually the dock was filled again with water.

An unusual feature of the dock in which this work was

carried on is that the gate is hollow and does not swing on pintles or hinges, but is sunk in position with its ends fitting in sockets in the walls by pumping water into it. The sides of both the dock and the gate are inclined, and thus a water-tight joint is formed. When the dock is to be opened the water is pumped out of the gate, which rises free of its sockets and is hauled out of the way by man power.

Two powerful tugs were waiting in the River Tagus to ease the ship out of the dock as she was pulled out inch by inch. Shore workers dropped fenders between the wall and the ship's side, and we cleared the entrance by a small margin. By the afternoon we were out to sea again, everyone marvelling at the rapidity with which such a ticklish job was effected.



The lighthouse at Cape St. Vincent, on the coast of Portugal. The light, which is tended by monks, is 232 ft. above high water.

It was full speed ahead now in an endeavour to make up for some of our lost time. On our way southward we passed within a mile or so of Cape St. Vincent, the scene of a great British naval victory, in which Nelson played a great part, nearly 150 years ago. The lighthouse on top of the cliff is tended by the monks of a monastery established there. It is not easy to secure a photograph of it from the sea, owing to the height of the cliff. The one reproduced on this page was taken with the aid of a high-power telephoto lens on a film about the size of a postage stamp, and only the central portion was enlarged.

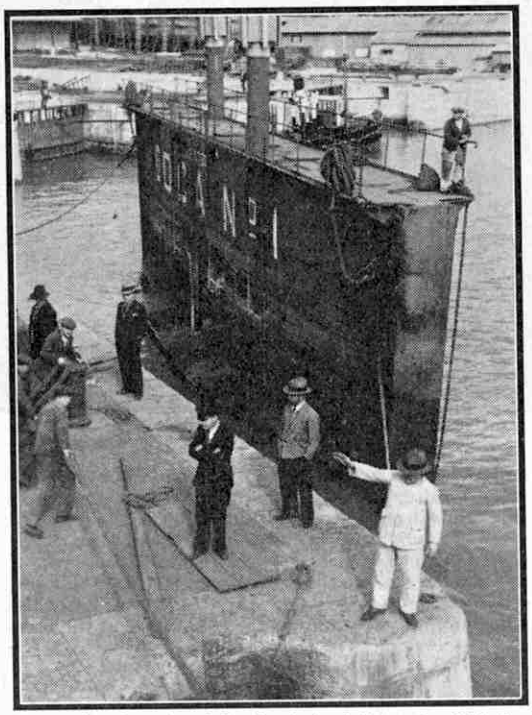
We reached the Strait of Gibraltar early in the morning, and by breakfast time the Rock loomed above us, making the naval vessels and our own liner appear like toy ships. We went ashore by tender, and were taken up the narrow winding streets by horse carriage to see some of the fortifications and the huge reservoir for storing rain water.

Naples was our next port of call, and after skirting the southern coast of Spain we cut right across the Mediterranean between the islands of Corsica and Sardinia. We steamed into the Bay of Naples in blazing sunshine. On our right, or starboard side, Mount Vesuvius stood out boldly, belching out great puffs of steam and flames at regular intervals. The cloud assumes curious shapes according to the weather. Sometimes it is like a great mushroom; at others it trails out seaward in a perfectly straight line for hundreds of miles.

We had two or three days' stay in Naples to enable us to explore the remains of the ancient city of Pompeii, which was overwhelmed in 79 A.D. by showers of hot ashes from Vesuvius. Some of the bolder ones among us ascended to the summit of the volcano itself by the funicular railway, which takes them within 150 yds. of the crater, and there looked down into a boiling inferno of sulphurous smoke with great pools of bubbling molten lava.

After leaving Naples we passed another interesting volcano at night time. This was Stromboli, the only European volcano that is continuously active. Its summit showed a reddish glare, which fully justified its name of the Lighthouse of the Mediterranean. The volcano is about 2,000 ft. high, and in spite of its activity peasants live on the sheltered side of the small island on which it stands.

Passing through the Straits of Messina, where it generally is very windy, and under the heel of Italy across the mouth of the Adriatic Sea, we arrived within sight of Athens four days after leaving Naples. The beauties of the Acropolis, an ancient walled Greek city set on a hill, which later became the shrine of Athena the patron goddess of Athens, are world famed, and we all went ashore to see them. One of the most famous of the buildings of the Acropolis was the Parthenon, the Athenian treasure house in ancient times. It was used by the Turks as a powder magazine during a siege of the city by the Venetians in 1687, and was then blown up by a violent explosion that damaged it severely.



Manœuvring the gate of the dry dock at Lisbon in which the cruising liner's lost propeller blade was replaced.

Then followed a long run from Athens to Ceuta in North Africa. The name of this town is pronounced "Soota." It shelters under a rocky hill that forms one of the "Pillars of Hercules" guarding the entrance to the Mediterranean Sea. The other Pillar of course is Gibraltar. From Ceuta we went inland to see the Moorish town of Tetuan, at the foothills of the Atlas mountains. Tetuan is a maze of twisting passages, and it was almost impossible to find our own way around without a native guide.

When we arrived back on board ship in the evening, we found native vendors making last minute sales of leather bags and trinkets to passengers anxious for souvenirs of their tour abroad. In the meantime the engineers had been busy taking in hundreds of tons of oil by pipeline, and at midnight we left our last port of call and turned homeward. This time we found the Bay of Biscay as calm as the proverbial millpond, and we arrived in Liverpool on schedule time in spite of the delay due to the loss of a propeller blade.

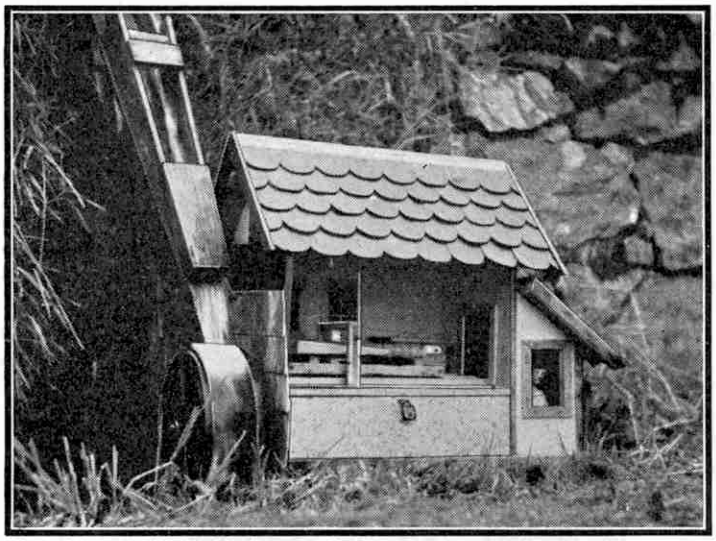
A New Colour Photography Process

A film for colour photography that has been introduced by Ilford Ltd. can be used with ordinary cameras and gives coloured transparencies of high quality, reproducing the full brilliancy of colouring of the subjects photographed.

In the Dufaycolor process, as the new method is called, colour is introduced by means of a fine transparent pattern of alternating blue and green squares and red lines that is printed on the sensitive emulsion of the film. This is called the "reseau." It is formed by printing parallel blue and green lines, which are so thin that there are 508 of each to the inch, and across these and at right angles to them even narrower red lines are placed.

Before light can fall upon the emulsion it must pass through the reseau. Only red light can penetrate the red lines, and blue and green light therefore do not affect the emulsion beneath them. The squares of blue and green act in a similar manner, so that the emulsion on development gives a record in black and white of the intensities of the coloured lights falling upon the tiny areas beneath the coloured pattern. On development the film forms a transparency. The picture is seen on holding it up to the light with the reseau nearer the eye, with the result that the light passing through the film is given its appropriate colour.

Roll films and film packs in addition to cinematograph films are now available for colour photography by this process. Cameras are loaded in complete darkness, and special filters are employed to adapt the film for use with daylight or any artificial light, but the transparency only gives correct colour when viewed in daylight, unless a special viewing filter is used. Focussing must be very sharp, but there is good latitude in exposure, and the new film is not slow, the exposure required in daylight being only about twice that of ordinary Selo roll film. The transparencies can be viewed by holding them in front of a diffused light, preferably in a box that cuts off stray light on the side from which they are seen, or projected on to a screen either as stills or moving pictures.



The model saw mill in the Black Forest, Germany, described in the article on page 606. It is driven by water power. Photograph by J. M. S. Risk.

Bull Transformed into a Unicorn

For centuries the unicorn has been regarded as the typical mythical animal, and there has been much speculation as to how the belief in its existence sprang up. So far as we can tell, no creature of this kind with a single horn set in the middle of its forehead has ever existed, and it has been suggested that the error began with confusion with the rhinoceros, which has a single horn and great strength, but in other respects has no claim to the powers and characteristics of a unicorn.

In view of this it is very interesting to find that a "unicorn" actually has been produced in the United States. This amazing creature is an Ayrshire bull that was transformed by an operation carried out when it was a calf a day old. The knots of tissue that normally develop into a pair of horns were then cut out and placed together at the middle of the calf's forehead. They grew into a single horn, and the change seems to have endowed the bull with many of the characteristics of the fabled unicorn, for it has a regal carriage and appears to rule over the cattle with which it associates, but is not aggressive. This is remarkable, for the unicorn of tradition was always represented as combining nobility and even docility with strength and power.

The biologist who carried out this operation is inclined to believe that unicorns actually were produced in ancient times by an operation similar to the one that he has carried out.

Fighting Fire with Fog

Artificial mist is now used in America for extinguishing fires. It is produced by means of two jets of water at high pressure which are made to collide, when the streams are broken up into tiny particles. The mist begins near the jet and extends 15 ft. away. A fireman holding the nozzle producing it stands this distance from the fire to be extinguished, and convection currents then suck in the mist and carry it through the fire.

Fog for fire fighting has the further advantage that it is effective with chemical fires, against which water is practically powerless. In one case a tank of blazing petroleum, from which flames and smoke were rising hundreds of feet into the air, was extinguished in eight seconds by means of a single fog-making nozzle, and another fire that had continued to rage for hours when fought by ordinary methods was put out in 10 min. by the new process.

An extraordinary feature of the use of fog is the small quantity of water required. It is said that a nozzle delivering one gallon of water a minute as mist is as effective as hoses pouring 250 times as much water in the form of streams. Most of the damage caused by a fire usually is directly due to the water used in extinguishing it. This is avoided when the new method is used, for only a slight deposit of dew remains on walls and furniture, and this can easily be wiped off.

The cause of the remarkable efficiency of fog or mist in fire fighting is believed to be the cooling effect that it produces.

Safety Razor Blades of Glass

Safety razor blades have now been made of glass. The introduction of these solves the old problem of what to do with discarded blades, for they can simply be crushed to powder under foot and then are harmless.

Many astonishing uses for glass continue to be found. Gramophone discs of glass were described in the August "*M.M.*," and this useful material also has been made into a kind of wool and fibres of it have actually been woven into fabrics. Even bricks have been made of glass. These are very strong and as they are transparent, buildings erected with them require no windows. A block of offices built of glass bricks was exhibited recently in America.

Timing Watches by Electricity

A clever instrument that will enable watchmakers to time and regulate a watch in a very few minutes has recently been produced by the Western Electric Company. The regulation of a watch has always been the longest process in both manufacture and repair, the chief reason being that after each adjustment the watch has to be run for some hours before its error can be checked. The "Watch Rate Recorder," as the new instrument is called, is shown in the lower illustration on this page. It dispenses with this trial and error method, the timekeeping of the watch being shown directly by a line on ruled paper that reveals at once the number of seconds a watch gained or lost per hour.

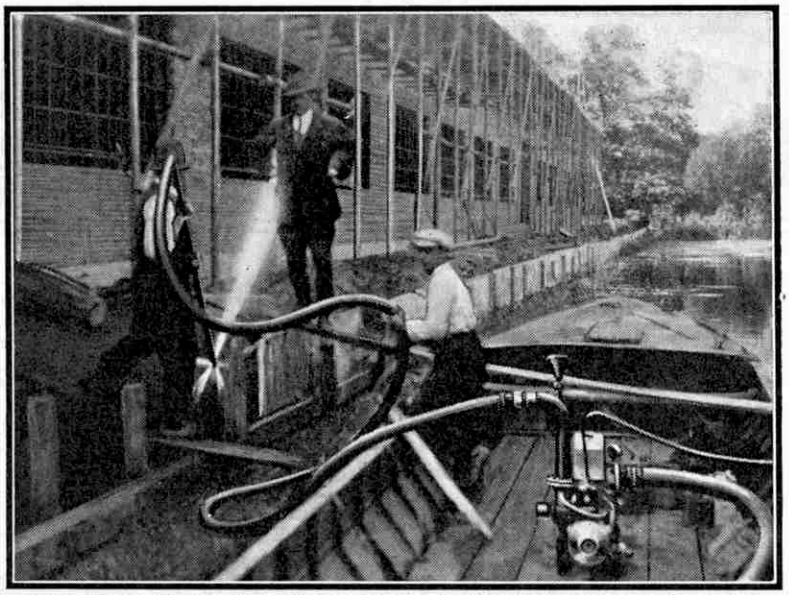
The main part of the instrument is a special electric motor, which is kept rotating at an exact speed in synchronism with a vibrating tuning fork. The fork is used to generate an alternating current, which is amplified by valves similar to those used for radio sets, and the amplified current operates the motor. The motor drives a drum round which the ruled paper is wrapped. The watch itself is mounted in a clamp, seen on the right in the illustration, and listened to by a microphone, the current from which also is amplified and used to control a marker or stylus fitted just below the drum.

Most modern watches have an "18,000 train," which means that they beat 18,000 times per hour, or five times per second. The drum is rotated at this speed, and the mechanism is so constructed that the paper is marked at each beat. If the watch is keeping time, its beats are in step with the revolutions of the drum, and as the marker is moved slightly along the drum after each beat, the dots form a straight line across the paper. If the watch is losing, so that each beat comes a little later than it should, a sloping line of dots is produced and the angle this makes with the straight line of an exact timekeeper reveals the degree of error. The beats of a watch that is gaining occur too soon, and a watch with an error of this kind produces a line sloping in the opposite direction when tested by this instrument.

A watch with an irregular action gives an uneven line, and defective parts or incorrect adjustments can be traced in this way. Those familiar with the instrument can even determine the incorrect part or the nature of the faulty adjustment of a watch by the type of line it draws, and this makes examination of damaged watches much easier.

The microphone clamp in which the watch is mounted for testing is movable, enabling watches to be tested in several positions. The paper is ingeniously stored inside the drum so that it can be pulled out and clipped in place rapidly and easily, and the chart for each watch can be cut off and stored as a permanent record of its performance.

T. R. ROBINSON.



Concrete sheet piling placed in position by a new method in embankment work. The ground to receive the piles is washed out by high pressure jets of water.

Street Name-plate in the Kerb

An experimental installation of a novel form of street name-plate has recently been made by the Corporation of Kingston-on-Thames. In conformity with the present day trend towards locating road signs as near the surface of the carriage way as possible, this street name is actually placed in the kerb, a kerb-stone having been removed and the name plate assembly put in its place. The name appears on an oblong panel of plate glass in black letters on a translucent yellow ground, and behind it is a tubular filament lamp. The period of illumination is controlled by a suitable time-switch. A second transparent glass plate serves as additional protection, and guards against the entry of water from the gutter. The bottom and sides of the plates are sealed in, but a small space is left open at the top for ventilation and for the escape of air expanded by the heat of the lamp.

A heavy steel plate, level with the top of the adjoining kerb stones, covers the assembly, and this is secured by bolts that allow it to be removed to give access to the lamps for adjustment or renewal.

The visibility of the name-plate is distinctly good. The bright bar of light located in the kerb attracts attention from both vehicular and foot passengers, and the name can be read from a considerable distance. A further advantage of the name-plate is that drivers of vehicles need not take their eyes from the road in an endeavour to find out the name of a street. In addition, it is a useful aid in locating the position of the kerb in foggy weather.

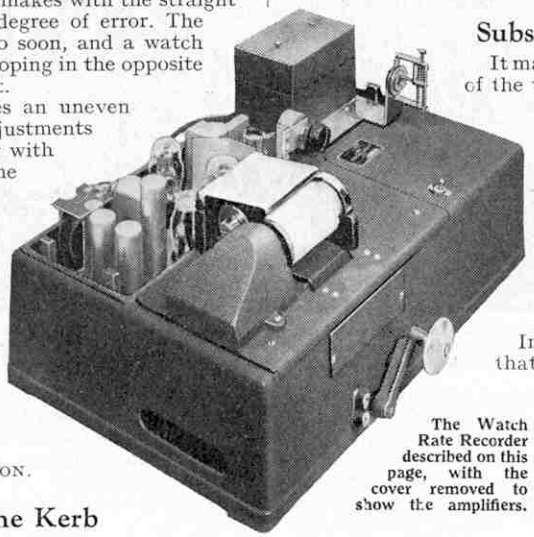
T. R. ROBINSON.

Sheet Piling Without Pile Driving

In a new method developed in Germany, concrete sheet piling is put down without digging or driving, the ground in which it is to be placed being simply washed out by jets of water at high pressure. Only a quarter of the time required for ordinary pile-driving operations is required in the new system, which also is less costly and arduous.

The upper illustration on this page shows ground being prepared for the insertion of concrete piles by this method. The pump used has an output with a free discharge of up to 15,500 gallons per hr. When working at a pressure three times that of the atmosphere, and with a $\frac{3}{4}$ in. nozzle, the rate of discharge is 4,700 gal. per hr. The pump is driven by a two-stroke heavy oil engine of $5\frac{1}{2}$" h.p. and at the high pressure developed the jets of water quickly make way for the piles.

H. F. KUTSCHBACH.



The Watch Rate Recorder described on this page, with the cover removed to show the amplifiers.

Substitutes for Rubber and Petrol

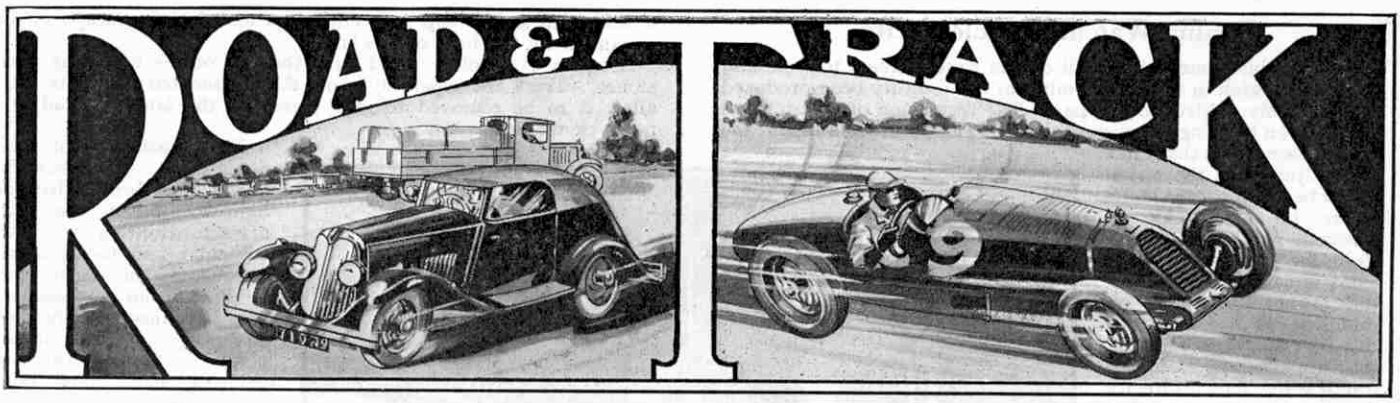
It may not be long before we shall be independent of the two natural products that in the past have been essential in making and running motor cars. These are rubber and petrol, without which cars could not have been developed to their present pitch of efficiency and comfort.

A fuel entirely suitable for use in motor cars is now being produced in quantities from coal in both Great Britain and Germany, and the success that has been achieved in the plant erected for this purpose at Billingham by Imperial Chemical Industries Ltd. suggests that the time is coming when we shall be independent of overseas supplies, brought over in huge tankers.

Another possibility is that alcohol also will be developed into a fuel for internal combustion engines. There are many sources of this liquid, for many vegetable products yield alcohol by various fermentation processes, and if these were carried out on a large scale they would give immense quantities of comparatively cheap fuel. The liquid also is a by-product in the distilling industry, and a petrol mixture containing it is already in use.

Turning now to the other important natural product, the search for synthetic rubber has been carried on for many years with more or less success. It is claimed that artificial rubber has already been produced in Germany, and in the United States there is a factory producing a material of this kind at the rate of more than 400 tons an hour. It is claimed that this synthetic rubber is better in many respects than the natural product.

One curious feature is that its base is a compound of acetylene that was discovered by Father Nieuland, of the University of Notre Dame.



Riley Success in the T.T.

For the second year in succession the International Tourist Trophy Race, organised by the R.A.C. and held on the Ards Circuit in Northern Ireland, resulted in a win for a Riley car. This year's race was run on 5th September, and the winning machine was driven for more than half the distance by F. W. Dixon, and for the final laps by his reserve driver C. J. Dodson. E. R. Hall's Bentley was second for the third successive year, and A. F. P. Fane's Frazer Nash B.M.W. was third. The average speed of the winner was 78.01 m.p.h.

Several lap records were made and broken during the race. In the early stages Fane made a record lap of 75.65 m.p.h. for the 1,500 c.c. to 2,000 c.c. class. Shortly afterwards Prince Birabongse of Siam, who races in the name of B. Bira, in his little Frazer Nash B.M.W. broke Fane's record by covering a lap at an average speed of 78.81 m.p.h.; but Fane soon recaptured the record by covering a lap in 10 min. 23 sec., which gave him an average speed of 78.93 m.p.h. Two laps later the same driver beat his own record by raising the average to 79.57 m.p.h.

As the race was nearing its close, L. Lebeque, the French driver of a Delahaye, in a terrific burst of speed completed a lap at an average speed of 85.52 m.p.h., which is the highest ever attained on the course.

Three trophies won by Riley cars in the R.A.C. Tourist Trophy Race in 1932. On the left is the Wakefield Trophy for the winner of class G, for cars with engines of up to 1,100 c.c. capacity. In the centre is the Tourist Trophy, and on the right is the Team Prize. Photograph by courtesy of Riley Record Limited.

World's Fastest Motor Cycle Race

The outstanding feature of this year's Ulster Grand Prix, which is claimed to be the world's fastest motor cycle road race, was the amazing high speeds set up by the winners. The race is run in three groups, for 500 c.c., 350 c.c. and 250 c.c. machines respectively. The 500 c.c. race resulted in a runaway victory for F. L. Frith, who on a 499 Norton achieved an average speed of 92 m.p.h., more than a mile an hour above that of last year's winner. Frith probably would have improved on this if there had been any serious challenge for leading place in the closing stages, but his nearest rivals were so far behind that he was able to reduce speed towards the end. Second and third places were obtained by J. W. Breevers and W. G. Wright respectively, also on Nortons.

The race for 350 c.c. machines was won by E. R. Thomas, riding a Velocette, who completed the course at an average speed of 86.81 m.p.h. In the 250 c.c. group there was a very close finish between S. Woods and H. R. Foster, both on New Imperials. Woods finished first, his average speed being 78.76 m.p.h.

An Auto-Union Wins German Grand Prix

The race for the German Grand Prix, which was run over the Nürburg Ring at Eifel, ended in a magnificent victory for Auto-Union cars. Last year the race was won by Nuvolari's Alfa-Romeo, and the Germans were keen to avenge the defeat then suffered. In addition, the prospect for this year's race was made particularly interesting by the fact that in six previous important races the three leading makes of Grand Prix cars, the German Auto-Union and Mercedes-Benz and the Italian Alfa-Romeo, had each scored two victories.

After a hard and fast race Auto-Union cars came in first, second and fourth. The winning car was driven at an average speed of 81.75 m.p.h. by Rosemeyer, whose skilful and daring driving was an outstanding feature of the race. A long way behind was the second Auto-Union, driven by von Stuck, who in turn held an even longer lead over an Alfa-Romeo driven by Brivio. The Auto-Union placed fourth was driven by G. Hasse.

183 m.p.h. in Acerbo Cup Race

Following his success in the German Grand Prix, Rosemeyer in his Auto-Union competed in the famous Acerbo Cup race, at Pescara, Italy, and again won the day after a terrific battle with Nuvolari's Alfa-Romeo. Two other Auto-Unions piloted by E. von Delius and A. Varzi came in second and third.

During the sixth lap Rosemeyer flashed past the pits at 170 m.p.h., and overtook first Varzi and then Nuvolari to take the lead. Nuvolari's Alfa-Romeo continued to press hotly behind, however, and in a final endeavour to overhaul the leader Varzi accelerated to 183.64 m.p.h. So hot was the pace that shortly afterwards the engine of Nuvolari's car gave trouble and he had to retire, an event that robbed the race of what had promised to be a very thrilling finish.

In the class for cars not exceeding 1,500 c.c. R. J. B. Seaman, driving his famous Delage, repeated the victory of last year by defeating several Maseratis and three E.R.A.'s driven by "B. Bira," Embiricos and Tongue.

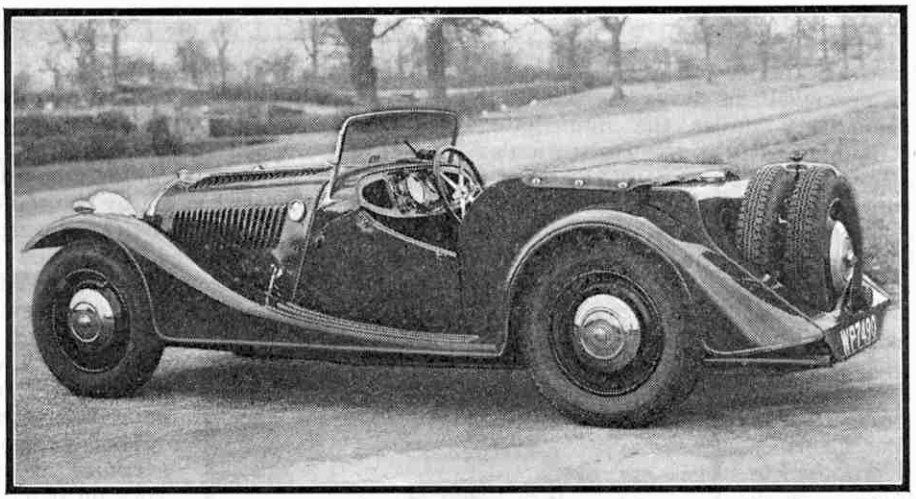
Racing Car Wheel Lost at 125 m.p.h.

After an exciting duel with Earl Howe, R. J. B. Seaman scored a further success with his Delage, when he won the historic 200-Miles Race organised by the Junior Car Club, at a speed of 69.28 m.p.h. Earl Howe's E.R.A. was second, and an E.R.A. driven by D. L. Briault and K. D. Evans was third. The race was run at Donnington Park, near Derby, and the winner completed the course without a single stop.

Austin Dobson had a remarkable escape from disaster when one of the front wheels of his Alfa-Romeo flew off while he was travelling at a speed of 125 m.p.h. The wheel with the tyre still intact on it, leaped over a fence crowded with spectators, bounded over the pits, and finally fell on the road in front of several oncoming competitors.

A Four-Wheeled Morgan

One of the most distinctive British small cars introduced this year is the attractive "Morgan 4-4" two-seater shown in the upper illustration on this page. The car is unusually low in build and has a graceful sporty bonnet and a tail streamlined to match the contour of the rear wings. Independent front wheel springing based on that used in the Morgan three-wheeled car, the Stevenson jacking system, and Girling brakes are other features of the chassis. The engine is a 9.8 h.p. Coventry Climax water-cooled unit fitted with overhead valves, and transmits its power through a single-plate clutch and an enclosed shaft to a four-speed gear-box, with syncromesh for easy changing on third and top gears. The car has a wheelbase length of 7 ft. 8 in. and an overall length of 11 ft. 8 in.



The distinctive "Morgan 4-4" sports car referred to on this page. Photograph by courtesy of The Morgan Motor Co., Ltd., Malvern Link.

Britain's Great Motor Industry

We are so accustomed to the sight and use of motor vehicles that perhaps few of us realise the enormous part the motor car manufacturing industry plays in the life of the country. Nearly 500,000 workpeople are employed in the actual manufacture of motor vehicles, and if others engaged in the driving and repair of vehicles and in allied engineering and body-building trades also are taken into account, the number of employees connected with the industry reaches well over a million.

The value of the motor products manufactured in England during 1935 was over £15,000,000. Last year 311,544 cars were produced, and it is anticipated that during the present year this number will be exceeded by over 50,000.

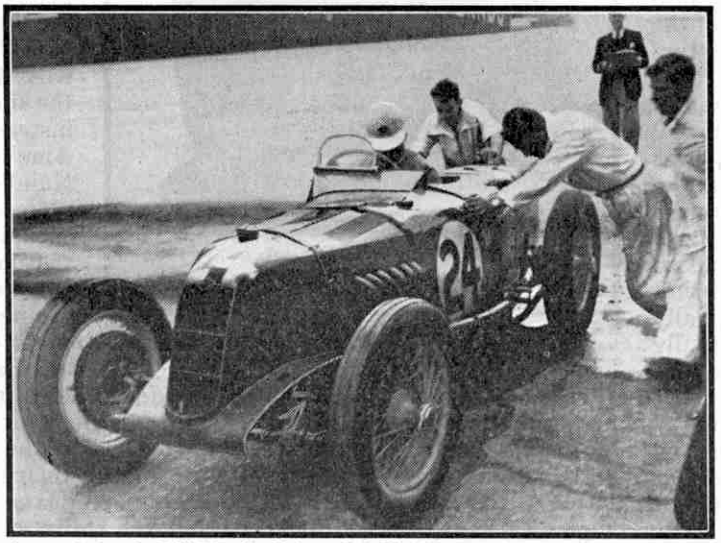
New Racing Track in South Africa

Preparations are now being made for a great motor race that is to be held in South Africa on 16th January next year. Drivers from England are being invited to enter, and the race will be run over a new track, now under construction at Muizenberg, near Capetown, which will be one of the finest of its kind in the world. It will include ample pits and a road racing circuit with interesting bends and corners, and there will be accommodation for many thousands of spectators.

Racing at Donnington Park

Very soon now the motor racing season will be ended, and the exhausts of cars flat out on road or track circuits will not be heard again until next spring. A few important fixtures still remain to be decided, however, and of these probably the most interesting is the International Grand Prix, which is likely to provide plenty of excitement for spectators at Donnington Park on 3rd October. Both supercharged or unsupercharged cars are eligible for this race, provided that they have suitable types of open bodies, four wheels and fulfil all essential racing requirements. The race will be run over 120 laps of the Donnington Park course, which is about 2½ miles in length, thus making a total distance of 300 miles; and a prize of £250 is offered to the winner. Last year the race was won by R. O. Shuttleworth, who drove an Alfa-Romeo. His average speed was 63.97 m.p.h., and he was closely followed by a Bugatti driven by Lord Howe.

As the race is open to foreign racing drivers, it is hoped that some of the famous Continental "aces" will take part in this year's event.



A scene during the British Racing Drivers Club 500-Miles Race last year. A Riley that was second in the race being started from the pits after refuelling. Photograph by courtesy of Riley Record Limited.

The Manx Grand Prix Races

The Manx Grand Prix Junior and Senior races, which are run over a 226 mile course in the Isle of Man, never fail to provide thrills for the thousands of spectators who line the course. The outstanding feature of this year's races was the remarkable riding of Austin Munks, an engineer of Boston, Lincolnshire, who won both the Junior and the Senior events. This is the first time the two races have been won by the same competitor since E. N. Lea accomplished the feat in 1929, and Munks's great performance is made all the more remarkable by the fact that he has the sight of only one eye. In the Junior Grand Prix he rode a Velocette and completed the 226 miles in 3 hrs. 3 mins. 47 secs. at an average speed of 73.92 m.p.h. Only seven seconds behind him was J. H. Blyth on a Norton, who averaged 73.88 m.p.h.

Simultaneously with the Junior Grand Prix a light-weight race was run for a trophy presented by relatives of D. J. Petrie, who was killed in a T.T. race last year, and this was won by D. Parkinson at a speed of 65.68 m.p.h., his machine being an Excelsior.

In the Senior Grand Prix Munks rode a 490 c.c. Norton, and the race was a keen duel between him and J. H. Blyth, also on a 490 c.c. Norton. Munks covered the six laps of the 226 miles course in 2 hrs. 52 mins. 14 secs., at an average speed of 78.88 m.p.h. Blyth finished 10 secs. later, his time and speed being 2 hrs. 52 mins. 24 secs. and 78.80 m.p.h. respectively.

K. Bills on a Norton, the fourth rider to start, was the first to complete the first lap, which he covered in 4 secs. under 29 mins., at an average speed of nearly 79 m.p.h. When Munks came roaring past the grandstand his time was six seconds more than that of Bills, who thus held the lead, but in his second lap Blyth averaged 78.85 m.p.h., and became 6 secs. ahead of Bills. During this lap Munks was even faster than Blyth, however, and his riding thrilled the crowds as he took corners at a tremendous speed. He finished his second lap 7 secs. ahead of Blyth, and then maintained the lead until the end of the race.

There was considerable excitement in the closing stages when it was learned that Munks' petrol tank developed a leak while he was on his fifth lap, and he had to stop to refuel. By the time he had restarted Blyth and several other riders had finished the course, and there was a thunderous cheer from the crowd when the red light over Munks' number on the score board showed that he had reached Governor's Bridge, less than a quarter of a mile from the finish. He had scarcely flashed past the finishing line before the timekeepers had worked out their calculations, to show that Munks had won by 10 seconds from Blyth. It was revealed after the race that there was less than a quart of petrol in the tank of the winner's machine when he reached the end of the course.

Ancient Tombs in Central America

Remains of Maya Civilisation

LAST March the Carnegie Institution of Washington announced that its specialists in Maya archæology, working near Guatemala City under the immediate direction of Dr. A. V. Kidder, head of the Institution's Division of Historical Research, were excavating a buried, stucco-covered structure of pyramidal form, the first of its kind ever to have been discovered in the highland region of Guatemala. The mound marking the site, located just outside Guatemala City, is one of a group of 100 mounds, large and small, dotting an area about 1½ miles in length and half a mile in width. The site has hitherto been known generally as Miraflores, or Miraflores-Arevalo, from the names of two of the principal farms or "fincas," but it is now proposed to call it "Kaminaljuyu," which means in the Quiche Indian tongue, freely translated, "Hills of the Dead."

The mound was brought to special notice through the laying out of a football field. A site between two mounds had been selected, but the distance was not sufficient, so a portion was cut from each to make room for the two sets of goal-posts. Upon digging into the edge of the westernmost of the two mounds, the corner of a structure was revealed which was faced with a hard, cement-like substance, and covered with fine white stucco.

The Carnegie Institution was invited to undertake excavation. As the digging progressed, pyramid after pyramid was revealed, until it is now certain that instead of there being three such superimposed structures, as originally announced, at least four actually exist. Owing to the destructive effect of torrential summer rains and of the penetration of the roots of trees, the outermost of these structures has been almost completely destroyed. By careful work, however, it was learned that originally it had been a large pyramid with steps and sloping lower walls, the latter having been constructed of blocks of pumice-stone, or tufa, laid in mud-mortar. The few blocks that remained were cleaned, noted, photographed, and stripped away, laying bare an older structure, also of pyramidal type.

This second pyramid was found to be in excellent condition in respect to its basal step and first terrace. Its upper walls, however, had been despoiled of their facing of cut stone, presumably by the builders of the outermost pyramid. By great good luck a small section remained, and this bit yielded invaluable information as to the nature and position of the missing portions, showing that the pyramid rose steeply in three levels to a surmounting platform.

A figurine of baked pottery discovered in a Maya tomb. The illustrations to this article are reproduced by courtesy of the Carnegie Institution of Washington.

The frontal stairway of this pyramid had also been torn down in ancient times, a loss which greatly distressed the excavators when it was discovered, but which led indirectly to the making of their most important finds. For example, the gap caused by the removal of the stairway permitted a trench to be run inward without damaging the beautifully finished basal slope of the pyramid. And this trench had been pushed but a few feet when it encountered the wall of another pyramid—Pyramid No. 2, counting from the innermost outward—which was in an even better state of preservation, inasmuch as its stairway was intact.

This pyramid has only been partially excavated, but enough work on it has been done to show that it differs from the two outer ones in that it rises to its summit platform in a single slope, which carries a balustraded stairway of 12 very steep steps. There is definite indication, moreover, that this pyramid, in turn, was built around yet another pyramidal structure, but the remainder of the mound will have to be excavated before detailed information about the latter can be obtained.

While puzzling over the reasons why the ancient builders removed the stairway of Pyramid Number 3 instead of covering it up, as was done with the stairway of Pyramid Number 2, the archæologists noticed that in the space originally occupied by the stairway the fill of the outermost pyramid ran somewhat deeper than elsewhere. Following this clue, the investigators sank through the floor of their original trench and found themselves coming down into a great square pit which proved to be a tomb. Fearing that they had overlooked other pits of similar nature, the workers recleaned and re-examined the floor of their trench, whereupon two more tombs were found. At a later time, a fourth tomb, located directly below the stairway of Pyramid Number 2, was also discovered, but it was not possible to enter it before work was brought to a close by the onset of the rains. It awaits excavation during the coming season.

The first tomb to be cleared, Tomb I, was a vertically-sided pit, dug into hard, volcanic deposit, 12 ft. square and 12 ft. deep. Originally it had been roofed with logs which had rotted away, long since, letting down stones and earth upon the contents. The pit was found to have been lined with rush matting, and its floor covered with a half-inch layer of brilliant red paint.

The personage who had been interred had apparently

been placed in a sitting position in the middle of the floor. In close association with the skeleton were 13 pottery vessels, nine beautiful obsidian spear-heads, several obsidian knives, a slate-backed mirror faced with iron pyrites, jade beads, a carved jade pendant, and what had evidently been two jade mosaic ornaments, perhaps ear-plugs. On three sides of the skeleton lay single human skulls and on the fourth, the skull of a jaguar.

A partially excavated mound that was found to consist of four pyramids. The stairway led to the summit of the second of these pyramids.

The second tomb to be opened, Tomb III, was both larger and deeper than the first. Like the first it had been roofed with logs and lined with matting made of rushes. Its excavation yielded a wealth of information regarding the burial practices of the period among the ancient people of this highland region.

The principal skeleton in it was that of a middle-aged male, presumably a priest or ruler. Apparently the body had been placed in the middle of the tomb in a sitting position with legs crossed. Also, when the body was interred it had evidently been loaded with ornaments: shells, crystals, ear-plugs, plaques inlaid with iron pyrites, beads of jade, and beautifully carved pendants, likewise of jade.

At the side of the skeleton was a heap of pottery in which two human effigies of clay were found. One of these represents a richly clothed personage, perhaps a deity, who is beating a ceremonial drum. At the feet of the skeleton lay the bones of a young woman, also vessels for serving food, and a milling stone for grinding corn —utensils evidently intended for use of the master in his home in the hereafter. And in a corner of the tomb reposed the bones of a small dog.

The third and last tomb to have been opened, Tomb II, is located at a point that was covered by the edge of the outermost pyramid, the one first discovered. In this connection an extract from a letter which Dr. Kidder sent to Dr. Merriam, President of the Carnegie Institution, is of interest, not only because of the information which it gives about the tomb and its contents, but also for the side light which it throws upon the work of "dirt archæologists."

A Maya incense burner from a tomb in Guatemala. The smoke issued from the mouth and armpits of the figure.

"In some ways Tomb II is the most interesting of all. It contained many unique pieces of pottery—a fish-effigy, a double-spouted jar with a carved serpent, wonderfully executed, a human effigy with a beard like that of the Tuxtla statuette—and much other material. Everything was in rather better condition than in Tomb III, so it was possible to get fuller data regarding the position of the principal skeleton and those of the two other persons, presumably slaves, who were buried with him. All three had been in sitting positions, cross-legged, facing the south.

"The laboratory is full of the material from the three tombs. Of pottery there are upward of 60 pieces; there are strings of jade beads, sheaves of obsidian flake-knives, chipped implements and many other objects.

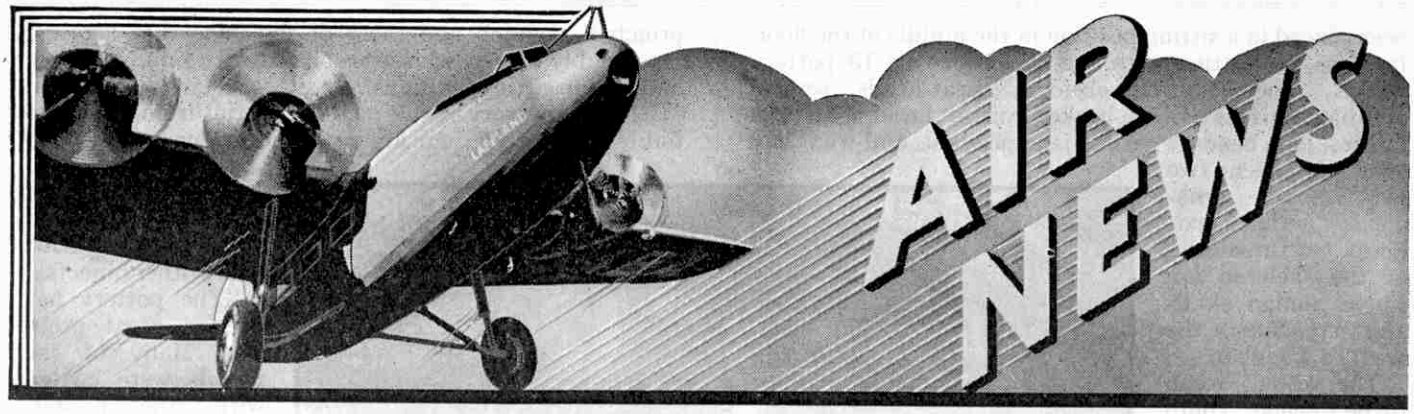
"The pottery has been a great problem. Many of the vessels were coated with fine plaster, upon which were painted, figures apparently of priests or rulers or gods, performing what appear to be ceremonial acts. But these pots were wedged in among rocks fallen from the roof of the tomb; many were broken into small pieces or even crushed flat. . .

"We removed the vessels, as a rule, by undercutting them and raising the whole lump of earth, nesting the lump in a basket and transferring it to the laboratory, where the cleaning was done bit by bit and the plaster set in place by spraying it with a preservative solution. At the same time Tejeda, the artist, made colour notes, for the painting fades upon drying.

"It will take months to get the collection into exhibition shape, but it will prove a tremendous addition to our knowledge of Maya life, ceremony, dress, and art. The mound itself has been sectioned by deep, narrow trenches, in order not to destroy the outer constructions. So the data are recorded principally by plans and sections, while the photographs are mostly of details of masonry, stratification and such. If the rains will only hold off! Fortunately they did not come before the tombs were finished. A good hard shower, at some stages of the work, would have been calamitous."

From the position of the tombs in this mound in relation to the several pyramids, comes the suggestion of a possible explanation of the puzzling practice, common throughout the Maya area, of erecting successive pyramidal structures on and around one another in superimposed manner. Hitherto the procedure has been thought to be linked somehow with the termination of important periods, but the location of the tombs suggests the possibility that upon the death of a priest-ruler his body was interred towards the east and the pyramid with which he was associated, and which indeed he may have built, sealed by enclosing it within a new one.

We are indebted to the Carnegie Institution of Washington for the information in this article.

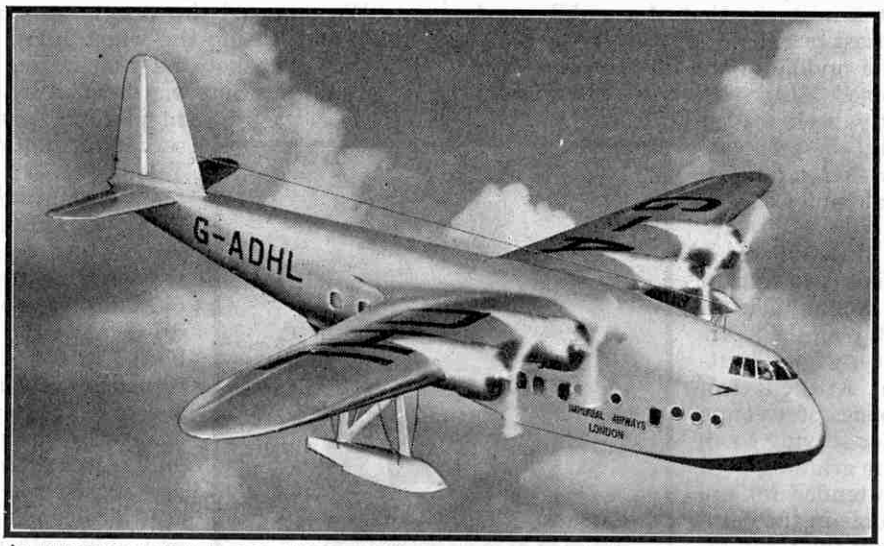


The Empire Flying Boats

The illustration on this page is an artist's impression of *"Canopus,"* the first of the Empire flying boats for Imperial Airways, in the air. This machine has completed the necessary trial flights and is now being fitted with the cabin equipment that will make it the most luxurious air liner in the world. Short Bros. (Rochester and Bedford) Ltd. are building 29 of these vessels.

A detailed description of this new class of flying boat will be published in an early issue of the *"M.M."* It will be seen from the photograph that the machines are of the high wing monoplane type, with four engines carried in streamlined nacelles faired into the leading edge of the great wing. There are two decks in the massive hull, an upper one for the crew and a lower one for the passengers, and sleeping accommodation will be available for passengers travelling long distances.

Imperial Airways have announced that the following registration letters and names will be given to the first 14 of the Empire flying boats: G-ADHL *"Canopus"*; G-ADHM *"Caledonia"*; G-ADUT *"Cavalier"*; G-ADUU *"Centaurus"*; G-ADUV *"Cambria"*; G.ADUW *"Castor"*; G-ADUX *"Cassiopeia"*; G-ADUY *"Capella"*; G-ADUZ *"Cygnus"*; G-ADVA *"Capricornus"*; G-ADVB *"Corsair"*; G-ADVC *"Courtier"*; G-ADVD *"Challenger"*; G-ADVE *"Centurion."*



An artist's impression of "Canopus," the first of the Empire flying boats for Imperial Airways. Twenty-nine of these are being built by Short Bros. (Rochester and Bedford) Ltd. Photograph courtesy of Imperial Airways Ltd.

Aero Engine Developments at Coventry

Coventry is destined to become an important centre for the manufacture of aero engines and aircraft. A large aero engine factory that will cost at least £500,000 is under construction there for the Daimler Co. Ltd., who will run it in co-operation with the Air Ministry. The factory will adjoin the present Daimler motor car works at Radford, and will provide employment for about 1,000 people. Other Coventry firms are joining in the Air Ministry scheme. The Standard Motor Co. Ltd., have begun construction of a large factory, and the Humber-Hillman Company and Rover Co. Ltd. are expected to do so shortly.

The Latest Douglas Air Liner

Details are now available of the latest type of Douglas air liner. It is called the DC.3 and is a slightly larger machine than the DC.2 described and illustrated in the *"M.M."* of September 1935. The span is 95 ft., the length 64 ft. 5 in. and the height 15 ft. It is similar in construction to the DC.2, and aluminium alloys have been used extensively for the structural parts. The undercarriage is retractable and can be raised or lowered in about 25 seconds.

The pilots' cockpit forward of the long cabin gives an unobstructed outlook, and behind it are two mail and cargo compartments with a total capacity of 146 cu. ft. These are separated by a narrow central gangway that leads to the passenger cabin, a soundproof structure 23 ft. long and 6 ft. 6 in. in height. The cabin can be converted into a sleeper for 14 passengers when the machine is required for night flying. It is then divided into seven compartments, each accommodating two passengers in upper and lower berths respectively. The compartments are ranged three on one side of a central passage and four on the other.

A Giant Russian Airport

Work has begun on the construction of a new commercial airport at Tuchino, near Moscow. This has been planned on similar lines to that at Gatwick in this country. It will be 1,400 acres in extent, and will be capable of dealing with 1,000 passengers a day. The construction of the airport is not likely to be completed until early in 1939.

R.A.F. Vacancies for Aircrafthands

The Air Ministry announce that owing to the expansion of the Royal Air Force 500 new aircrafthands will be required each month until further notice. Of these 150 will be entered for training as armourers and wireless operators. The age limit for these branches is 17 to 32 years, and the period of service is six years. Previous trade experience is not necessary, but applicants must have received a good general education. The other 350 will be entered for general duties as aircrafthands, the age limits in this case being 18 to 26 years. Applicants selected will have an opportunity, after about a year's service, to be trained in one of a number of trades, such as storekeeper, motor driver, fabric worker, or fitter's mate. Aircrafthands (general duties) are enlisted for seven years, and those selected for trade instruction are required to extend their engagement to nine years on completion of their training.

Detailed particulars of entry can be obtained from the R.A.F. Recruiting Depot, Victoria House, Kingsway, London, W.C.2, or from the provincial recruiting depots at Glasgow, Birmingham, Liverpool, Manchester, Newcastle, Leeds, Belfast, Plymouth and Cardiff.

Seaplane Channel at Singapore

At Singapore Harbour a special seaplane channel is to be provided to enable the new Empire flying boats of Imperial Airways to alight and taxi across the water to the slipways and hangars. The channel will be about a mile in length, and it will be clearly marked and protected by booms and kept clear of junks and other small native craft. Considerable quantities of reinforced concrete piling will be used in making the approach channel and anchorage, and this work will shortly be put in hand. Rapid progress has already been made in the construction of the seaplane slipways and of the hangars.

The whole scheme will be completed early in the coming year, and the event may be celebrated by an air race between Singapore and London.

Record Atlantic Flights

After an interval of about a year the North Atlantic has again been crossed by air, two record flights having been accomplished last month. The first was a west-to-east flight by Mr. Harry Richman, of New York, and Mr. Dick Merrill, the chief pilot of Eastern American Airways, who had been granted a month's leave to enable him to take part in the adventure. They took off from New York in their low wing monoplane "*Lady Peace*" on 2nd September, with the intention of flying non-stop to Croydon, and flew practically all the way to England at a height of 11,000 ft. Severe storms were encountered, and lightning put their wireless equipment out of action when they were about 500 miles from Ireland. Visibility was bad, and they flew through almost continuous cloud and rain, never sighting the Atlantic for more than an hour at a time. They did not see Ireland at all, and lacking this valuable check on their course they got lost. After anxiously circling around for 1½ hrs. they were forced to descend owing to their fuel supply being almost exhausted, and they landed safely in a field at Llandilo, a village in Carmarthenshire. Their flight from New York to Great Britain had been accomplished in the record time of 18 hrs. 8 min., at an average speed of 210 m.p.h.

The second ocean flight was made in the reverse direction by Mrs. Beryl Markham, who took off from Abingdon aerodrome, in Berkshire, on the 4th September in a Percival "Vega Gull" monoplane named "*Messenger*," and reached Baleine Cove, Cape Breton Island, where the machine was badly damaged on landing.

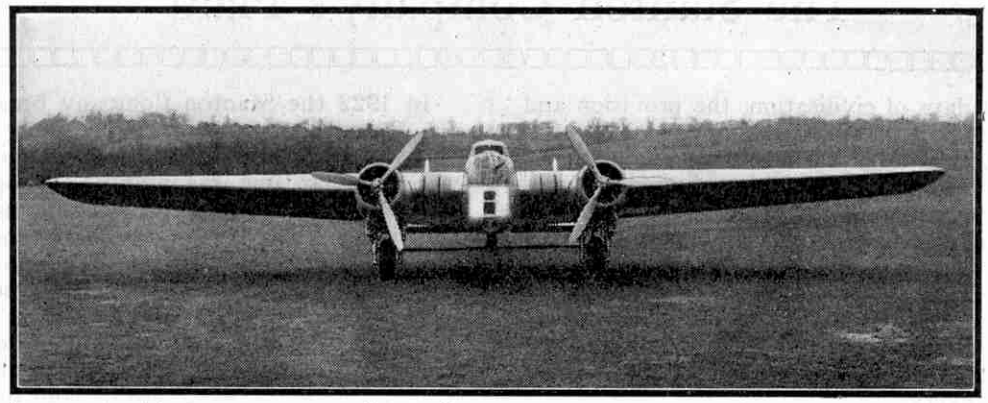
Mrs. Markham is thus the first woman to fly solo across the North Atlantic in an east-to-west direction. Since the above was written Richman and Merrill have accomplished the return flight. They made a forced landing near Musgrave Harbour, Newfoundland.

New High Speed Monospar Aeroplane

The latest addition to the range of Monospar aircraft is a twin-engined low wing cabin monoplane with a top speed of 203 m.p.h. It is 59 ft. 6 in. in span and 43 ft. 3 in. in length, and the cabin has seating for 10 passengers. There is an armchair with adjustable back for each passenger, and above each seat is a reading lamp. The pilot's cabin is situated well forward in a raised position, giving a good outlook in three directions, and has dual control.

Heston Air Traffic

The growing importance of Heston Airport is borne out by the latest traffic figures. During the first half of this year 7,072 passengers passed through the Customs, an increase of 4,116 over the corresponding period last year. There were 19,900 aircraft arrivals and departures during the normal working hours of the airport, and this figure does not take into account the activities of the flying school machines.



This front view of the Armstrong Whitworth "Whitley" bomber shows the great thickness of the huge wing and the totally enclosed gun turret in the nose of the fuselage. Photograph by courtesy of Sir W. G. Armstrong Whitworth Aircraft Ltd.

French Airman's Altitude Record

The world's aeroplane height record of 47,350 ft. achieved by Commandant Donati, of Italy, in April 1934, was exceeded on 17th August last by M. Georges Detre, a French airman, who reached a height of 48,600 ft. He flew a Potez 50 machine fitted with a Gnôme-Rhône K.14 engine, and made the record flight from Villacoublay aerodrome. M. Detre would probably have climbed to an even greater height but for the fact that his oxygen supply became almost exhausted and he wisely decided to descend.

From 1932 until Commandant Donati's success in 1934 the record stood at 43,956 ft. and was held by England, having been won for this country by Capt. C. F. Uwins, the chief test pilot of the Bristol Aeroplane Co. Ltd. It will be interesting therefore to see how long the new record is held by France, as an attempt to regain it for England may be made shortly with a new low wing monoplane that has just been built by the Bristol Company for the Air Ministry, for research in flying at great heights.

More Machines for U.S. Army

The large number of new aircraft ordered this year by the United States Government include 85 Seversky P.35 single-seater fighters. This is a new Seversky type of military machine, and most details about it are withheld. It is known, however, that it has a retractable undercarriage and a Pratt and Whitney "twin-Wasp" engine of 1,000 h.p., and is capable of a top speed of 315 m.p.h.

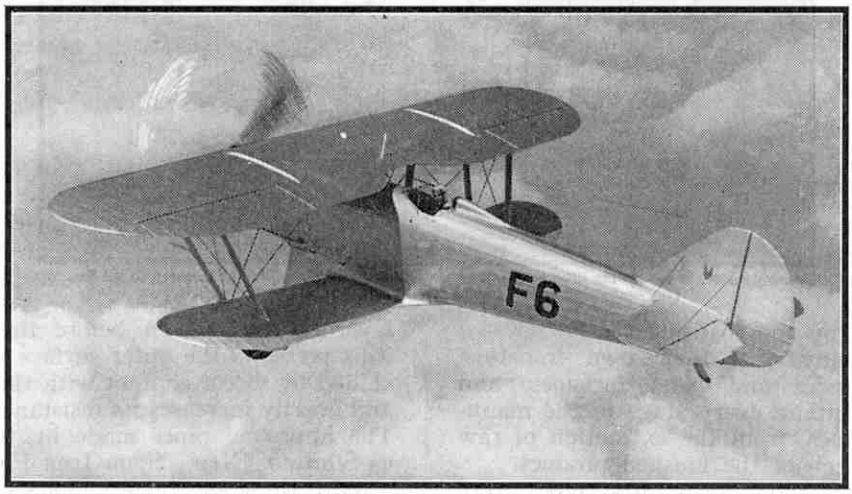
Karachi Airport Progress

Good progress is being made with the important developments and improvements being carried out at Karachi Airport, and the huge new hangar is practically completed. The installation of the airport night lighting equipment is well in hand, and when it is ready the movement of a few switches at the control points will bring the entire lighting into use. The new airport, with its extensive landing area, roads and buildings, will cover a total area of about four square miles.

Preparing for North Atlantic Air Service

In preparation for establishing the North Atlantic air route, observations of upper-air conditions have been made in Newfoundland and above the mouth of the St. Lawrence. In these observations the British Air Ministry, and the Canadian and Newfoundland authorities have been working in conjunction with Imperial Airways. Pilots and aircraft have been stationed in Newfoundland since the autumn of 1934, and a Canadian Government meteorologist has been conducting the upper air investigations, the aircraft being flown by Imperial Airways pilots.

Fog reporting stations have been established in Newfoundland, both round the coast and inland. All-year observations indicate that although conditions rendering flying difficult are apt to persist in areas round St. John's, there is a central zone in Newfoundland where fog is much less prevalent. It is considered that some place in this more favourable area will be chosen for the island's airport on the trans-Atlantic service.



A fine picture of a Fairey "Fantome" in flight, taken from another machine. This type of modern single-seater fighter was described in the "M.M." for July 1936. Photograph by courtesy of "The Aeroplane."

A Flying Laboratory

The Bristol "Pegasus"-engined Vickers "Viastra" cabin monoplane formerly owned by the King has been fitted up as a laboratory for use in elaborate experiments in connection with wireless and direction finding. This has been done at the request of the Aeronautical Research Committee.

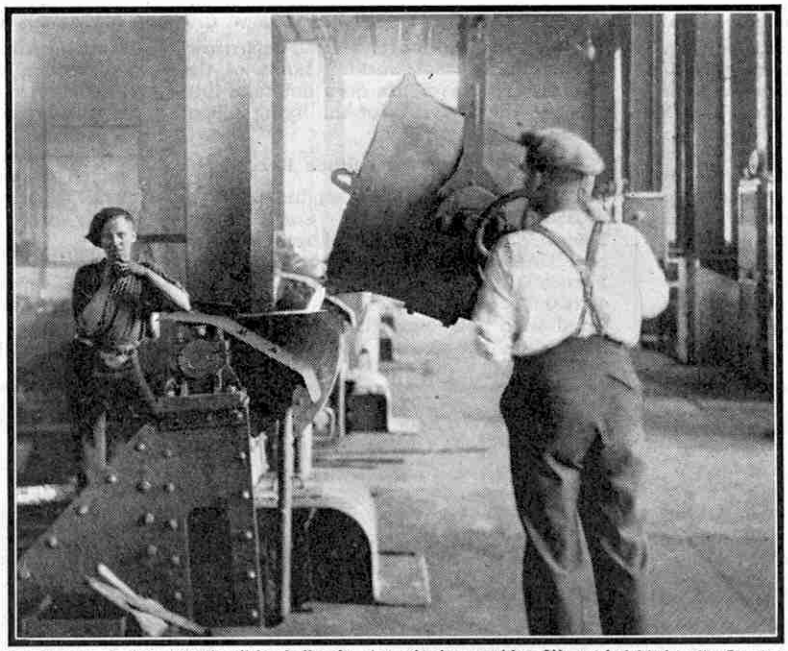
HOW THINGS ARE MADE:

Spun Iron and Concrete Pipes

The Stanton Company's Plant

SINCE the first days of civilisation, the provision and maintenance of adequate water supplies has been one of the most important tasks of the engineer. At various periods of history, water was supplied through pipes of clay, terra-cotta, wood, lead and stone. For well over a hundred years, however, cast iron pipes have been generally used for the conveyance of both water and gas. Their great strength and durability is established by the fact that large numbers of cast iron pipes more than a century old are still in use. Cast iron is a material in which engineers place great faith, and to-day every civilised community depends for essential services on underground networks of cast iron gas, water and sewage mains.

The extension of these cast iron mains, and their frequent replacement by others of larger diameter, is responsible for a continuous demand for cast iron pipes. In this country the Stanton Ironworks Co., Ltd., of Stanton, near Nottingham, each week produce many miles of cast iron mains. No doubt most readers will have seen the company's pipes, bearing the word "Stanton" in white letters, lying ready to be laid down in trenches excavated by the roadside.



Fouring molten iron into the tilting ladle of a pipe spinning machine. We are indebted to the Stanton Ironworks Company Limited for the illustrations to this article.

The Stanton Company own their own ironstone mines, limestone quarries and blast furnaces, and are thus able to superintend every stage in the manufacture of cast iron pipes, from the extraction of raw materials to the despatch of the finished product.

Until about 15 years ago all cast iron pipes were cast in sand moulds contained in metal boxes, which were arranged vertically around the walls of a pit. This was a slow and arduous process, however, in which a great deal was left to the individual skill of the workmen. For example, if the "core," or inner part of the mould, were allowed to shift slightly, the wall of the resultant pipe would be thicker in one place than in another. Great care had to be exercised also to keep the surface of the mould free from flaws, dirt or other foreign matter that would produce faults in the finished pipe. Owing to the lengthy preparation of the moulds, and the slow cooling of the metal, production was naturally slow.

In 1922 the Stanton Company became interested in the Delavaud system of pipe-casting invented by M. Sensaud de Lavaud, a Brazilian engineer. This method, which at that time was in an undeveloped stage, utilises centrifugal force to dispense with the use of sand moulds and inner cores. Sufficient molten metal to make a single pipe is introduced into a revolving cylindrical mould, against the sides of which it is held by centrifugal force. The metal cools rapidly, and as soon as the pipe has been withdrawn the mould is ready to be used again. In this manner continuous production is secured and overhead costs are greatly reduced.

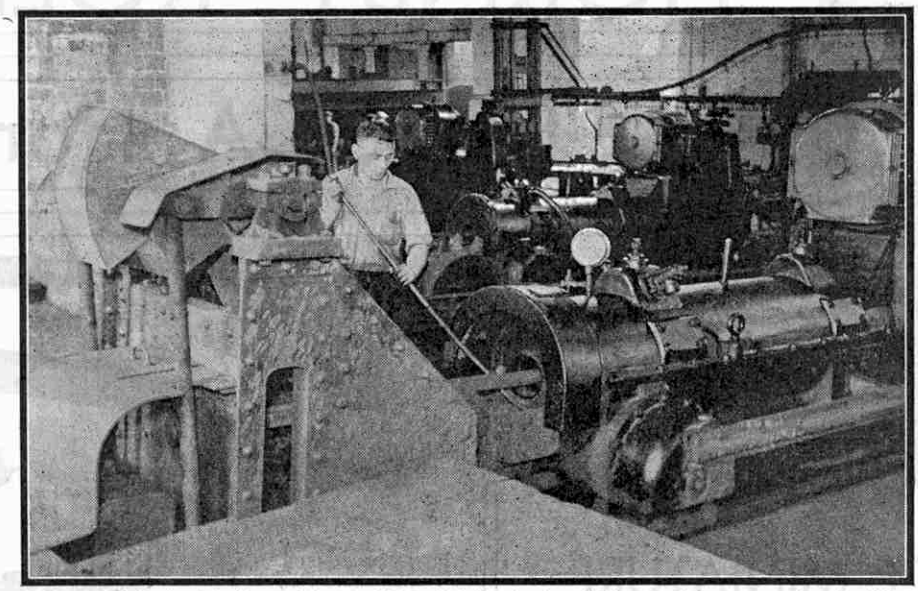
Even more important than these manufacturing improvements is the great advance that centrifugal casting has made in the technical properties of the pipes. The process has none of the disadvantages of that involving the use of sand moulds, to which reference has already been made, and the centrifugal action gives the metal a dense, close-grained structure that greatly increases its tensile strength.

Recently the Stanton Company have introduced an additional operation known as the Mairy process, in which the revolving mould is provided with a thin layer of ferro-silicon before the metal is introduced. This prevents the outer surface of the pipe from being chilled by direct contact with the surface of the mould, and greatly increases its resistance to shock and impact. The improved pipes made by this process are known as Stanton "New" Spun Iron Pipes.

With these general principles in mind, the reader will be better able to appreciate the following more detailed description of the spun plant at Stanton.

The pig iron used for the manufacture of the pipes is graded in concrete bunkers according to its silicon content. Hoists transfer it to cupolas in which it is heated, the molten iron attaining a temperature of 1,400 deg. C. It is then tapped into 1½-ton casting ladles, which are conveyed by telpher cranes to the spinning machines in the casting shops. There are 20 spinning machines, in which the pipes are made in lengths of 4 yds. and 6 yds., and in diameters ranging from 3 in. to 21 in. Pipes are made also in metric sizes for export to foreign countries using metric standards.

At the head of each machine is a casting ladle, into which the molten metal is poured. The ladle is tilted, and the metal runs down a cantilever trough into a revolving cylindrical mould, which has been coated with powdered ferro-silicon. As the mould revolves, it commences to move away from the spout of the trough, so that the metal flowing into it is deposited over its surface in the form of an even spiral, which knits together and so forms the pipe.



Molten metal flowing into the revolving mould in which the pipe is cast. The mould moves away from the tilting ladle as the pipe is formed.

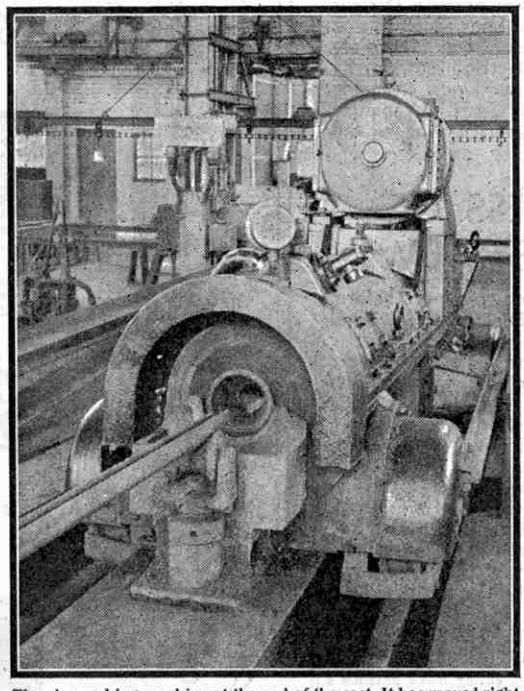
The pipe solidifies in a few seconds, and is secured by internal grips. The mould then moves back to its original position, leaving the red-hot pipe behind it. The pipe is then transferred to gantries, and rolls slowly through a gas-heated normalising furnace. This serves to relieve casting strains and improves the structure of the metal. On emerging from the furnace the pipe is cleaned, and coated, while still hot, with tar solution. Water pipes are coated both internally and externally, but only the outside surfaces of gas pipes are covered.

Before leaving the works each pipe is tested hydraulically to approximately double its normal working pressure.

To enable the pipes to be jointed, one end is provided with a bell-shaped socket; the plain end is known as the spigot. When the spigot is entered into the socket, a narrow space is left between the outside of the spigot and the inside of the socket. Into this space is introduced molten lead or lead wool, which makes a leaktight joint.

The rigidity of the lead joint is a disadvantage where the pipes are to be laid in subsoil affected by heavy traffic vibration, or where ground subsidence is likely to occur. To meet such conditions, the Stanton Company have introduced a flexible type of joint known as the Stanton-Wilson Self-adjusting Joint. In place of lead, this joint employs a lead-tipped rubber ring, which enables the joints to be deflected without leakage under pressure.

The extent to which spun iron pipes are used is indicated by the fact that the Stanton Company have produced sufficient to make a giant tube over 18,000 miles in length. More than 1,000 miles of this piping has been fitted with the flexible Stanton-Wilson Joint.



The pipe making machine at the end of the cast. It has moved right back, leaving the metal pouring trough behind it.

Iron is not the only material that lends itself to the manufacture of pipes by this ingenious method. For sewage conveyance, and also for the supply of water under moderate pressures, concrete pipes are widely used, and these are made at Stanton by a process based on the centrifugal principle utilised in the manufacture of spun iron pipes.

The concrete is made from British Portland cement, clean-washed sharp sand, and Leicestershire granite. These materials are stored in damp-proof concrete bunkers, and are mixed in automatic travelling mixers. The wet concrete is introduced by hand, or fed automatically, into revolving moulds, and the centrifugal action not only flings it against the sides of the mould, and holds it there, but also greatly increases its density, and therefore its strength. During spinning, all surplus water is expelled from the concrete into the centre of the mould. After spinning, the concrete pipes are matured in stockyards for at least one month before they are allowed to leave the works.

Until a few years ago, concrete pipes were usually "grouted," or jointed, with cement. To-day, however, a proportion of Stanton concrete pipes are supplied with the Stanton Cornelius Flexible Joint, in which grout is replaced by a joint-ring made of special rubber. By the use of this joint concrete mains can be deflected without leakage, and thus accommodate themselves to the ground movements caused by traffic vibration or subsidence.

For the conveyance of certain types of water it is advisable to use iron pipes that have been provided with a thin lining of concrete. At Stanton, iron pipes are lined with concrete by the centrifugal process, the concrete being fed into the bore of the revolving pipes.

In addition to centrifugally-made iron and concrete pipes, the Stanton Company also make large diameter cast iron pipes by the sand-cast process. Cast iron mains require not only straight pipes, but also bends, tees, angle branches, and other "specials," as such castings are called. These are produced in a mechanised foundry, in which as many operations as possible are carried out by mechanical means, thereby eliminating the various defects that are due to unsystematic production.

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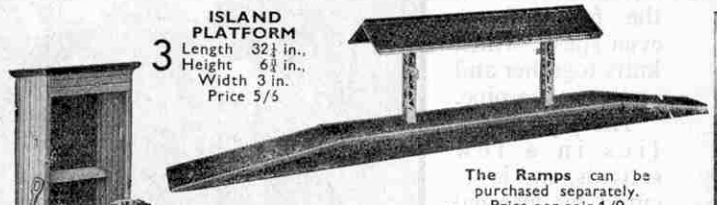

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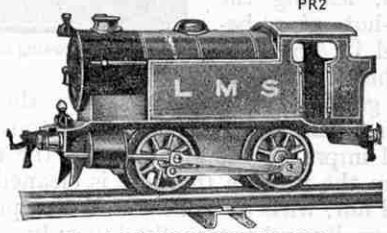

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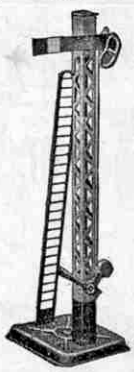

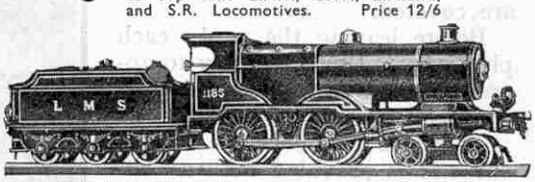

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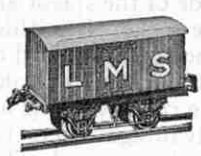

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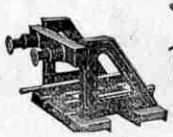

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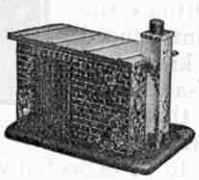

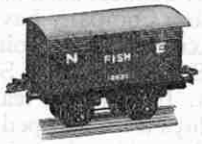

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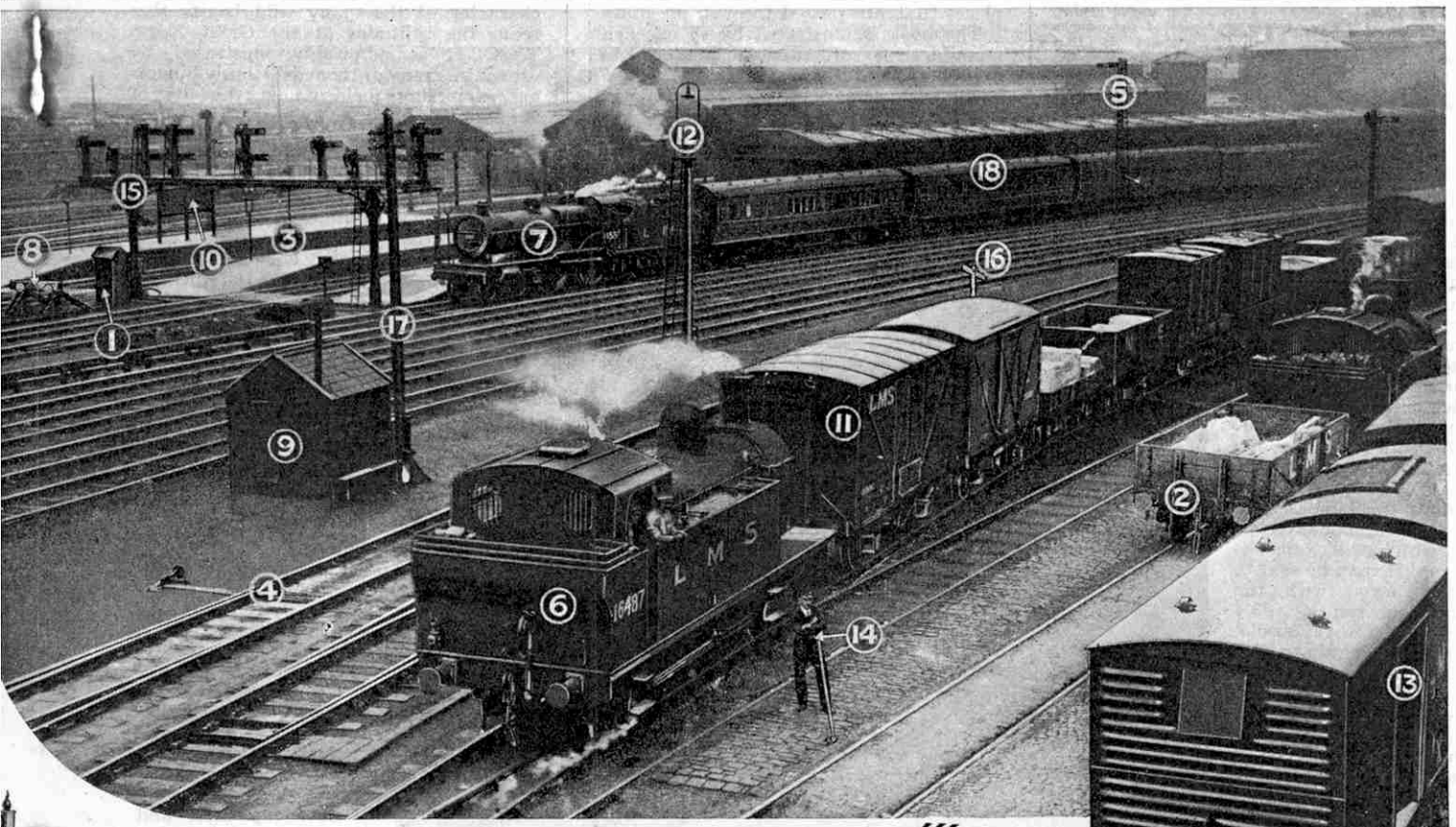

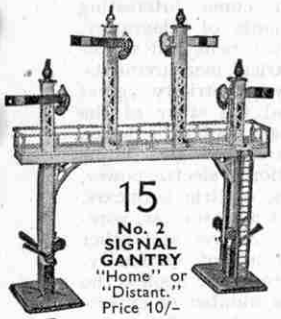

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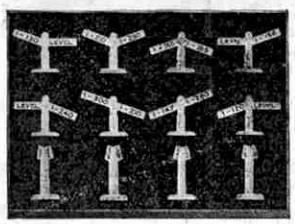

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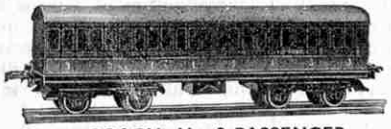

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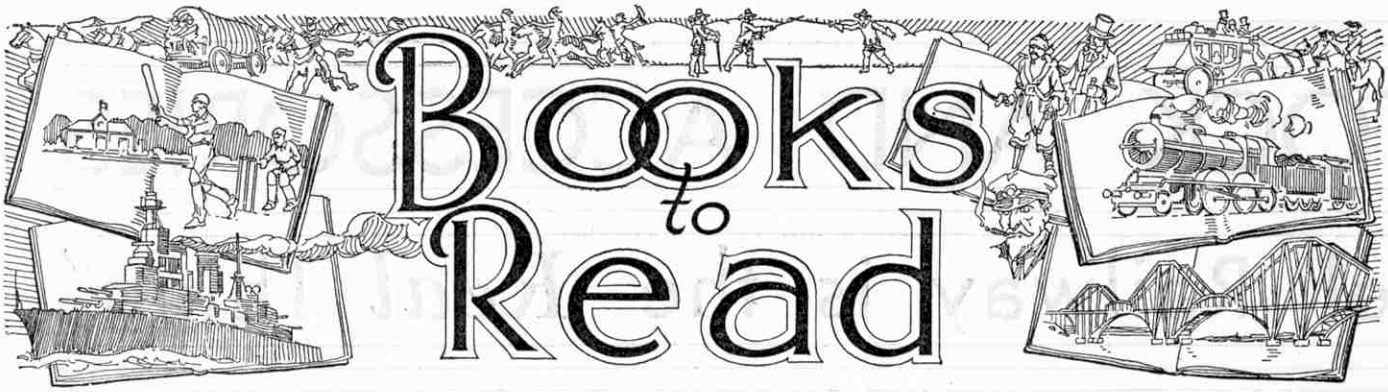


Here we review books of interest and of use to readers of the "M.M." We can supply copies of these books to readers who cannot obtain them through the usual channels. Order from Book Dept., Meccano Limited, Binns Road, Liverpool 13, adding 1/- for postage to the price. Postage on different books varies, but any balance remaining will be refunded.

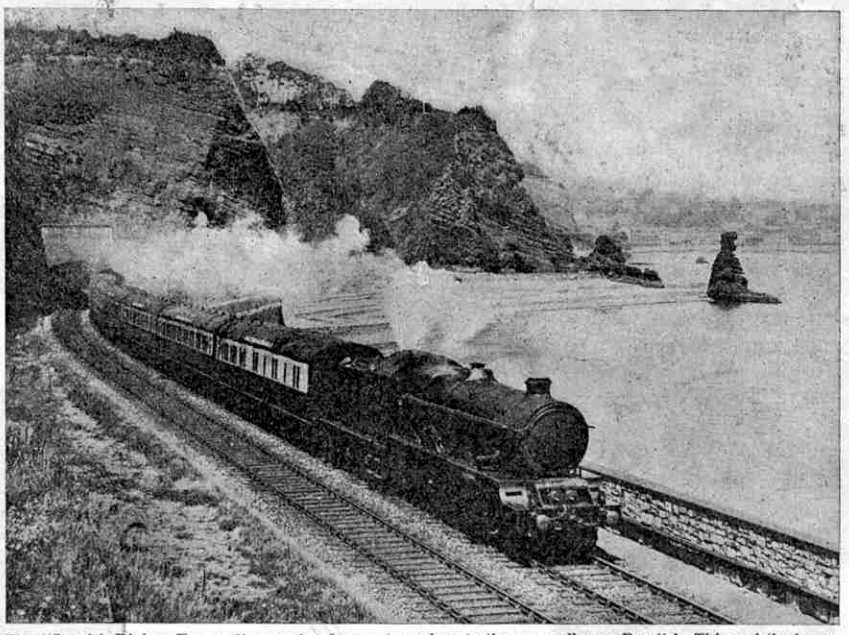
"By 'Cornish Riviera Limited' "

By W. G. CHAPMAN. (Routledge. 5/- net)

Mr. Chapman is well known as the writer of the G.W.R. series of booklets on railway matters "For Boys Of All Ages," and in this volume he sets out to explain many of the interesting features of modern railway working by means of an imaginary journey by rail. The G.W.R. *"Cornish Reviera Limited"* is the train selected for this purpose, and on the run westward under Mr. Chapman's guidance the reader learns how the regular and safe operation of this famous train is ensured. The interesting story of its origin is given. It may be said to have begun with the non-stop run at 63.4 m.p.h. of a Royal Special from Paddington to Plymouth 33 years ago, and it is amusing to learn that the high speed of this and other trains of that time caused great alarm in certain quarters.

The chapters dealing with the modern train begin with an account of the preparation of the locomotive and rolling stock for their long run. Then the author turns to the actual journey, and there is little in connection with train operation in general, and with the working of the *"Cornish Riviera Limited"* in particular, that he does not describe in an entertaining and satisfactory manner. He shows his readers how the track is laid and how signals work, and explains the G.W.R. system of automatic train control, which repeats signals in the cab and makes it impossible to run past adverse signals, even in fog. Track water troughs, slip coaches and the vacuum brake are among other topics that receive attention. Most of the story of course refers to passenger express working, but other types of trains that may be met in the course of the journey are not overlooked. In addition, a glimpse is given of the driver and fireman at work on the footplate of the locomotive, and throughout Mr. Chapman finds time to point out interesting lineside features and to refer to famous or important places that are passed through en route.

The book is illustrated by 47 excellent reproductions of railway photographs, chiefly of the *"Cornish Riviera Limited"* itself, with a map of the route followed and several explanatory diagrams.



The "Cornish Riviera Express" emerging from a tunnel on to the sea wall near Dawlish. This and the lower illustration on the opposite page are from "By Cornish Riviera Limited," reviewed on this page.

"Muskwa The Trail Maker"

By H. MORTIMER BATTEN. (Moray Press. 5/- net)

Muskwa, the hero of Mr. Mortimer Batten's story, was a Canadian black bear in the Great North West of Canada, a country that the author knows and loves. We begin with Muskwa in his cub-hood days, following his mother on the bear trails, continually getting into trouble, and from time to time being soundly cuffed for insolence and disobedience, but all the time learning how a bear should live. The terror of an immense forest fire in which his mother loses her life while protecting him brings Muskwa into contact with human beings for the first time, and when he has grown up he joins forces with a youthful Indian hunter in a fierce midnight struggle for life with a hungry pack of wolves. Finally we see him as a grim and grizzled veteran of the mountain solitudes, and he ends his life, taking with him half a pack of wolves, in a heroic plunge from the top of a cliff on to the ice of a frozen lake in a desperate effort to shield his mate.

The story is vividly written and is a fascinating romance of animal life, marked by sympathetic insight into the character of the many wild beasts that roam the solitudes of the Great North West. It is admirably illustrated by drawings, many of them deliciously humorous, depicting incidents in the life of Muskwa.

"A First Electrical Book for Boys"

By A. MORGAN and C. L. BOLTZ, B.Sc. (Harrap, 5/- net)

All keen boys desire to know something about electricity, and in recent years many books have been written to tell them of its uses and wonders. Some of these books have shown a tendency to become overcrowded and too technical. The authors of this volume have avoided this error, and have produced an excellent introduction to electricity for boys of 10 to 13 years of age. It covers a wide range, but the matter is carefully selected and the explanations are simple and easily followed, and well calculated to develop keen interest to learn more.

The opening chapters deal with frictional electricity, magnets and electric batteries. The relation between electricity and magnetism is next explained, and then come interesting accounts of telegraphy, electric bells and simple electrical measurements. How electricity gives us heat and light and the story of the telephone are the next subjects taken up, and these are followed by simple accounts of the generation of electric power, and its use in motors, electric tramcars, the electrical system of a motor car, wireless, electric furnaces, X-rays and other miscellaneous applications of electricity.

An interesting feature of the book is the introduction of a large number of experiments that can be made with simple apparatus that is always at hand or is easily obtainable. The illustrations include nine full page plates in addition to 138 drawings in the text. Excellent use is made of diagrams illustrating the construction of the apparatus required for the experiments, and in addition there are many ingenious pictorial illustrations of the meaning of the electrical terms and units in common use.

This is a practical book that can be thoroughly recommended.

"Airdays"

By JOHN F. LEEMING. (Harrap. 7/6 net)

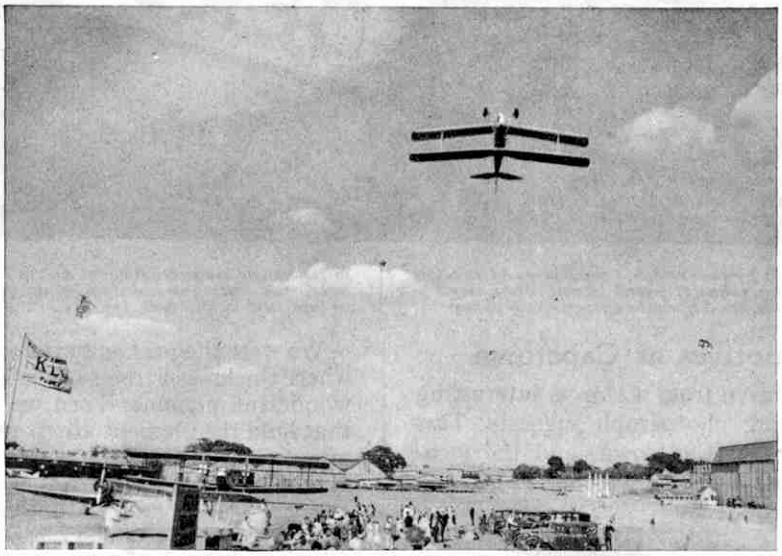
Mr. Leeming is one of the pioneers of gliding and light aeroplane flying, and in this book he relates the story of his many interesting and often thrilling experiences in the air. His first four gliders crashed after very brief hops, but in 1922 he began another on a more ambitious scale, in the construction of which he was helped by a small group of enthusiasts who eventually formed a gliding and flying club.

From this small beginning sprang the Lancashire Aeroplane Club, of which Mr. Leeming was Chairman for four years. The struggle of the new organisation for public recognition was very severe, and the anxiety of those responsible for it was increased by crashes and other untoward events during club flying and at the air pageants they organised. Some of these mishaps had their humorous side, however. The gallant struggle was continued until the club gained public recognition and was firmly established.

One of the schemes adopted to draw attention to the club and its work was a landing on the summit of Helvellyn. Bert Hinkler, the famous Australian pilot, joined Mr. Leeming in this enterprise, which was carried out under great difficulties. The first attempt was thwarted by a severe storm, but a further effort was successful, to the astonishment of a solitary climber encountered on the summit of the mountain, and the author gives a thrilling account of this remarkable feat.

When Mr. Leeming retired from the club he formed an Air Lines Company. In addition to flying on regular air routes, the Company organised joy-riding and pageants for which novel events and stunts were devised, and in all these activities the author played an important part. He tells the story of his adventures in this connection with great gusto. Unfortunately the company was not successful and was compelled to close down.

This joyously written book will be of the greatest interest to all who wish to obtain a glimpse from the inside of the difficulties that beset the early days of civil aviation in this country. It is illustrated by 20 photographs, chiefly of machines and adventures described in the text.



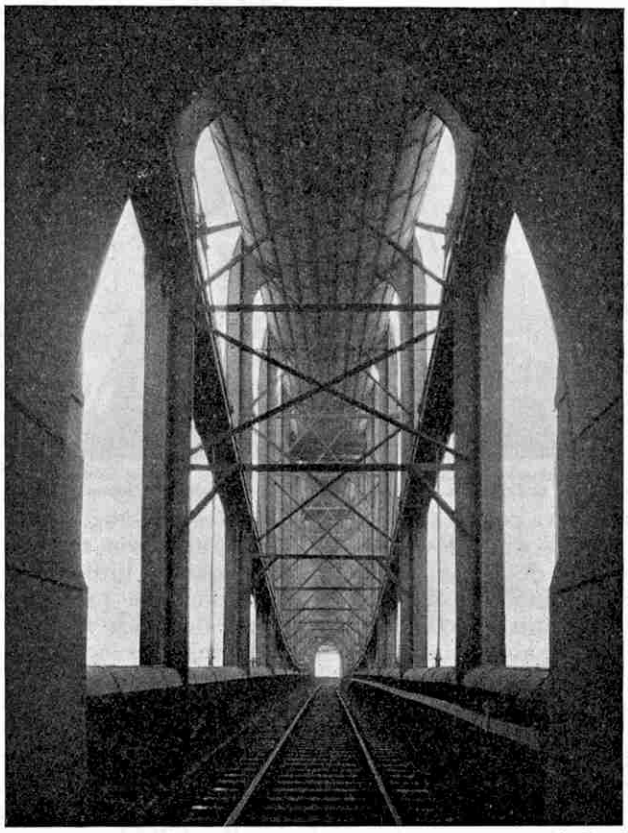
Upside-down flying at an air pageant. From "Airdays," reviewed on this page.

"Trooper Useless"

By PATRICK GREENE. (Harrap. 5/- net)

This is a book of adventure in Rhodesia that is based on the author's own experiences. The hero, whose real name is Ouless, is an English boy who distinguished himself at games, but otherwise was the despair of his masters. He solved the difficulty of finding a career by enlisting as a trooper in the British South African Police. We follow his progress as he is schooled in the ways of animals and men, and watch him change from an ignorant recruit, continually making himself a laughing stock to his comrades, into a keen trooper who shows himself capable of dealing with difficult problems affecting both natives and white men. Eventually he achieves a reputation by a patrol in an area that has been prescribed because of an outbreak of a dreaded cattle disease, during which he outwits a cunning white man who attempts to run a herd of cattle under his very nose. The story of this and of other adventures is brilliantly told, and reproductions of the maps that Useless himself draws adds greatly to the clarity and interest of the narrative.

The character of Useless and of his comrades, white and black, is admirably developed, and the background of the story gives evidence throughout of the author's knowledge of the scenes in which these actions take place. There is an excellent coloured frontispiece, and spirited drawings in line illustrate the chief events in the development of Useless into a keen "duty" trooper.



An unusual view looking through one of the main trusses of Brunel's Royal Albert Bridge, Saltash, joining Devon and Cornwall.

"Elementary Seamanship"

By PETER CLISSOLD (Brown, Son and Ferguson Ltd. 3/6 net)

Mr. Clissold's book is intended chiefly for apprentices and boys about to go to sea. In it he explains the elements of the seaman's art, so far as they can be dealt with in writing, and he does so in very simple language that makes the book suitable also for amateurs who sail for pleasure. He deals thoroughly with every phase of life at sea, from work with anchors, cables and boats and the stowing of cargo to steering, signalling and ships' engines and boilers. A full and excellent glossary of sea terms is included, and there are 28 useful diagrams in addition to a coloured plate of flags and signals.

"The Air Dope Hunters"
"The Desert Air Raider"
"The Air Spies"

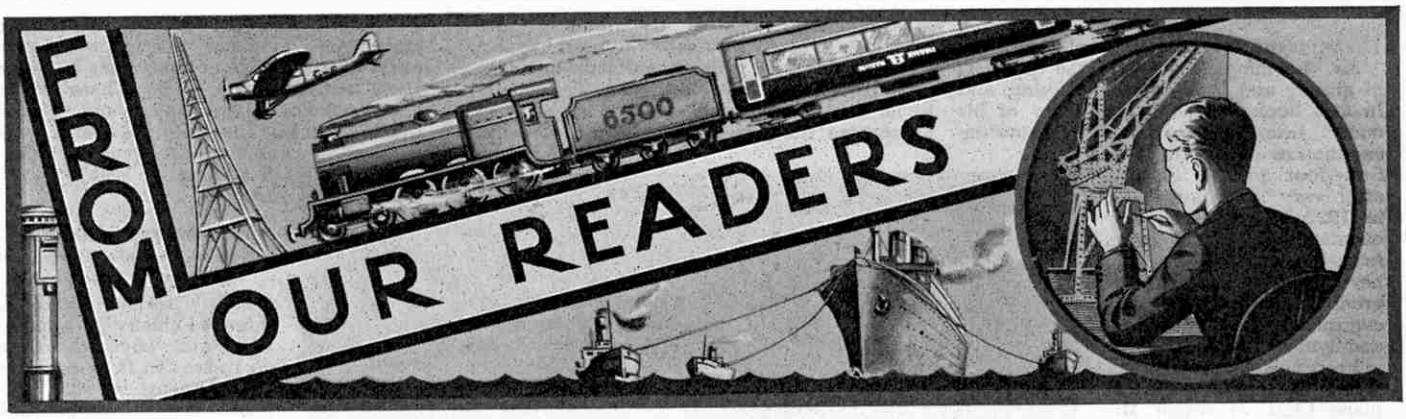
By JACK HEMING
(A. and C. Black Ltd. 3/6 each net)

These three stories from the publishers' "Air Adventure Series" are well-written, exciting yarns that will appeal to every boy. *"The Air Dope Hunters"* tells the story of a detective and his youthful assistant engaged in tracking down a desperate gang of dope runners. *"The Desert Air Raider"* concerns the exploits of a young Assistant Consul who learns of a vast scheme to overthrow the power of the white man in the East, and, after a succession of flights, fights and escapes, outwits his enemies and ruins their plans. A long and thrilling struggle against international spies who are threatening England is described in *"The Air Spies."* The descriptions of actual flying in this story are particularly good, and excitement piles up rapidly. All three books have black-and-white illustrations by Alfred Sindall.

"Tips for Turners"

By W. F. WATSON. (The Manual Press. 2/6)

The centre lathe designed 150 years ago by Maudeslay is still the key machine of industry, in spite of the introduction of such marvels of ingenuity as automatic and turret lathes, and skill in its use is one of the hall-marks of the complete mechanic. The full instructions and hints given by Mr. Watson, a practical turner with 30 years' experience of his craft, will help to give complete mastery over this universal tool. Every operation that can be carried out on a centre lathe is dealt with, and the text is illustrated by a series of well-chosen and clearly reproduced diagrams.



These pages are reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of general interest. These should be written neatly on one side of the paper only, and they may be accompanied by photographs or sketches for use as illustrations. Articles that are published will be paid for at our usual rates. Statements contained in articles submitted for these pages are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

Unloading Locomotives at Capetown

Unloading a big locomotive from a ship is interesting work, as the accompanying photograph suggests. This was taken in the harbour at Capetown, and the locomotive of which the chassis is shown was one of a batch of 20 of the 4–8–2 type built by Robert Stephenson and Co., Ltd., Darlington, for the South African Railways.

The vessel in which these engines had been brought to Capetown was the *"City of Exeter."* The task of unloading the sections of the engine shown was slow, for the hatch through which each part had to be passed was small in comparison with the lengths of the chassis and the huge boiler. The lifting was carried out by means of a floating crane, capable of bearing a load of about 60 tons, which was manœuvred into position by a tug before operations could be commenced. The chassis gave most difficulty, and it had to be raised and lowered several times before it could be manœuvred through the hatchway.

D. V. SEVENOAKS (Eastbourne).

Unloading the chassis of a locomotive from the "City of Exeter" at Capetown. Photograph by D. V. Sevenoaks, Eastbourne.

How Electric Lamps are Made

I had the good fortune recently to be one of a party taken on a tour of the "NOX" Electric Lamp Factory, Leeds. The first department we passed through was the furnace room in which the bulbs were blown. We looked into the furnace through small doors, and could see the molten glass used. A sufficient quantity of this is picked up on the end of a long rod while it is in a condition similar to that of a jelly, and is swung about until it is cool enough to be placed in a mould. The moulds normally are sunk into the floor of the room and are covered with water when not actually in use. They are raised by means of a foot pedal, and the lump of glass on the end of the rod is then inserted and rotated as the bulb is blown. After about half a minute the correctly-shaped bulb can be taken out of the mould.

We were then taken to the upper storey of the building, where the brass fittings of the lamps were being made by a wonderful machine. Then we were shown how the arms that hold the filament are fixed. The filament actually is a minute coil of wire, the wire itself being so thin that it is almost invisible when stretched out in a straight line. At a later stage we saw the coils being made. For this purpose the thin wire is wound round a thicker one, which is then dissolved out by means of chemicals that do not affect the filament.

Fitting the filament with its supports into the bulb of the lamp is a process that is carried out with almost uncanny speed by another remarkable machine. After watching this in operation for some time, we passed on to see how the bulbs are exhausted of air and filled with a special inert gas. The first lighting test follows, and we saw the lamps that passed this being fitted with their metal tops.

B. C. WARD (Leeds).

Loading Logs at Vancouver

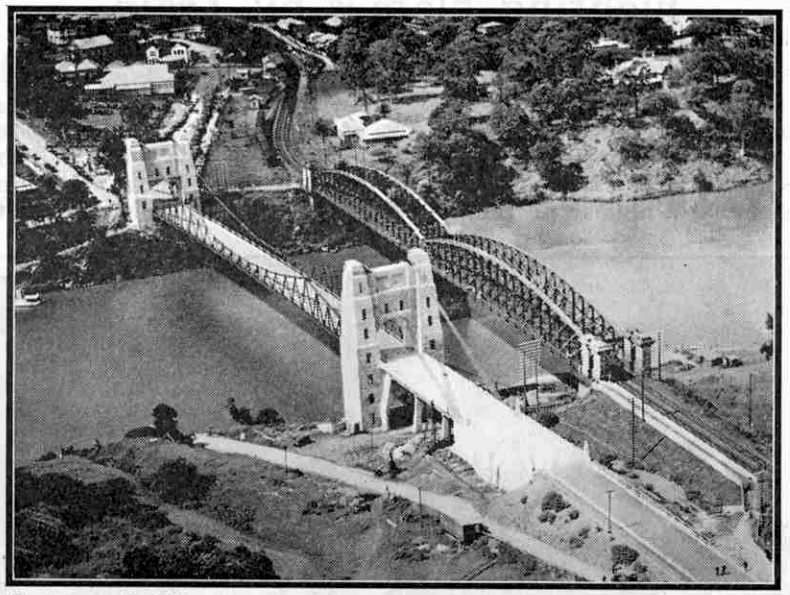
The boat on which I left Vancouver took on board a load of Douglas fir logs. These lay in great booms in the harbour below, and on them men maintained what seemed a precarious balance with the aid of spiked poles. The work was carried on at night, brilliant arc lights illuminating the scene. The logs averaged five tons each in weight, and each was lifted over the ship's side by means of huge cables and lowered into its place in the hold. It was necessary to take care to preserve the balance of the ship, and when the holds were a third full, the remainder of the logs were swung on deck to be chained down. One rolled threateningly across the deck, but swift work with the hoisting cable retrieved the situation.

At last a large part of the deck space was filled with the logs, and we were able to depart. Very soon all that we could see of the country we were leaving was the dark shapes of great pine trees on the hillsides.

I. PENNIE (London, N.W.7).

A New Australian Bridge

The suspension bridge shown in the upper illustration on this page connects Indooroopily and Chelmer, near Brisbane, and replaces a ferry that offered only slow and restricted means of crossing the Brisbane River, which flows between them. It cost about £85,000 to build, and was opened in February of this year. The span of the bridge is 600 ft. and is the longest in Queensland. The structure actually is the largest suspension bridge in Australia, and is second in span only to the Sydney Harbour Bridge. The cables used weigh 144 tons, and altogether about 1,000 tons of steel and 18,000 tons of concrete were required in the construction of the bridge.



The Indooroopily Bridge across the Brisbane River, Queensland. This fine suspension bridge was opened in February last. Photograph by courtesy of "The Telegraph," Brisbane.

The pylons supporting the cables are impressive in size and appearance. The Chelmer pylon, seen in the foreground of the photograph, is 126 ft. high and is built on 168 piles, each consisting of a slab of concrete 4 ft. thick. Its walls vary from 3 ft. 6 in. to 5 ft. 6 in. in thickness, and in constructing it more than 4,000 tons of concrete and 62 tons of steel reinforcement were used. G. MILNE (Brisbane).

Touring Rhodesia

I saw many things of great interest during a recent tour in Southern Rhodesia. Among these was the Khami Dam, behind which the water supply of Bulawayo is impounded. The Dam can be raised 4 ft. by means of steel sections. Each section is about 20 ft. long, and all are connected by levers to a main shaft that is turned to raise or lower them.

My tour extended to the Victoria Falls of the Zambesi River, where I was interested to see the great arch bridge, 400 ft. above the water in the gorge into which the river is precipitated. The accompanying photograph shows the main fall, with the mist that gave rise to the native name of "Mist That Thunders" for the Falls. I had to wait nearly 15 minutes before the mist subsided sufficiently to enable me to take a photograph.

The Victoria Falls of the Zambesi River, Rhodesia. Photograph by E. R. Füsslein, Zululand.

In the Matopo Hills, the last resting place of Cecil Rhodes, I saw the memorial to Allan Wilson and the men under his command who were ambushed and practically annihilated during the Matabele War of 1893. The stone of the memorial is of granite and was quarried on the hillside about 100 yds. away. Carved on it are reliefs depicting scenes that occurred during the expedition that ended so disastrously, and afterwards were described by the few survivors.

On my outward journey by rail I travelled 1,540 miles in 71 hours running time. Leaving my home at 8 o'clock on Friday morning I arrived at the Falls at 6 o'clock on the following Tuesday, after spending a day each in Johannesburg and Bulawayo. On my return, the train on which I travelled from the latter place to Mafeking consisted of 17 coaches.

E. R. FÜSSLEIN (Zululand).

A Visit to a Fish Preserving Factory

I have often seen Iceland cod being unloaded from trawlers, and sold by auction in the Aberdeen market, and was very pleased when I was able to visit one of the many large preserving factories and to learn what happens to the fish after they are bought. They are cleaned as soon as they are taken from the nets, and on reaching the factory are put into a machine worked by hand that removes the head. The men engaged in this work are so expert that they seldom miss a stroke. Splitting and boning follow, and I noticed that the men who do this wear gloves on their left hands to prevent cuts from the sharp bones. The fish are passed to girls, who finish the cleaning.

The actual curing then begins. The fish are thickly salted and piled in cupboards. There they are left for a certain period, and are then removed, slightly sprinkled with salt, and again placed in piles. Next they are washed in a machine in which they pass between revolving brushes, coming out clean and free from the salt that covers them on entry. Salting makes them so hard that a circular saw has to be used to cut them when the curing is finished.

After washing, the fish are hung up in a huge oven-like place through which hot air passes. There they are partially dried before they are piled up and pressed by means of heavy weights. They are hung up to dry a second time in a long room heated by means of coke fires, and I was surprised to learn that the room in which I saw this process being carried out contained nearly 10,000 cod. Finally the fish are packed in boxes and barrels for export. Each of these containers holds several hundred cod, and in the few days just before my visit to the factory 950 boxes had been sent to South America.

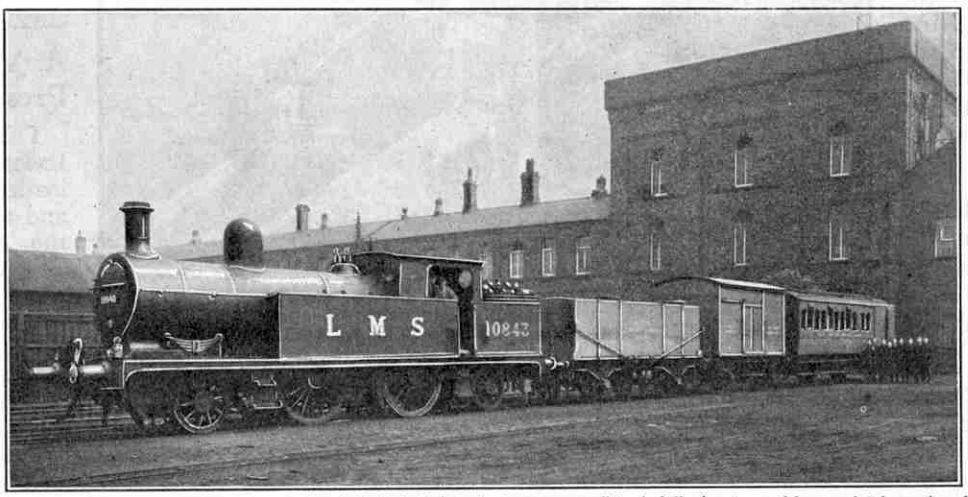
G. GARDINER (Aberdeen).

L.M.S.R. Works Fire Brigades

Fighting Flames by Train

IN common with most owners of large properties, the L.M.S.R. maintain fire brigades composed of members of the staff at their more important premises, including passenger stations, goods depots, large blocks of offices and workshops, in the belief that a fireman on the job is worth two in the fire station.

At the locomotive, carriage and wagon works, with their large and multifarious risks, a greater degree of efficiency on the part of the fire brigade is necessary than is usually expected in staff brigades. The training and performance of the members is comparable with that of many municipal brigades maintained by quite important townships—in fact, in two instances the works fire brigades act as the town brigades in their area. These works, each covering many acres with buildings housing expensive plant, machinery and materials, represent a not inconsiderable portion of the company's assets and provide employment for many thousands. The fire risks are many and varied, and a fire not checked in its incipient stages might easily entail the loss of thousands of pounds, delay the output of important work, and cause days or weeks of unemployment for the shop staff.

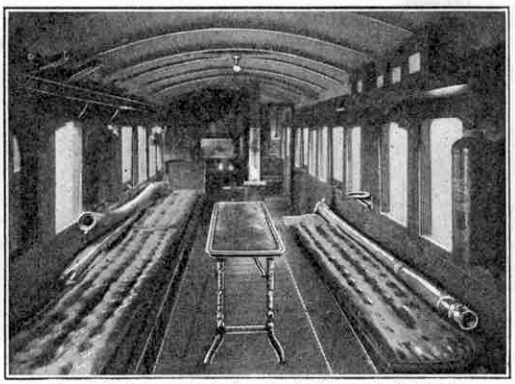


The fire train at the Horwich Works of the L.M.S.R. This train includes a rail tank full of water and is completely equipped with fire-fighting apparatus.

There is no more effectual means of destruction than fire, and while great care is taken by the management and the local staff in guarding against risk of fire, even those who have not the opportunity of visiting such works will readily realise that by their very nature some of the operations carried on constitute potential fire risks. Some of the risks called to mind are oil-fired furnaces, cellulose spray-painting, welding and cutting by electricity and oxy-acetylene, and the storage of large stocks of timber, highly inflammable liquids, calcium carbide and fabrics.

The fire protection arrangements in a large works are mainly centred in the works fire brigade, recruited from the works staff, and in many cases captained by a whole-time fire brigade officer operating under the direct control of the fire superintendent of the area. The members of the brigade are instructed in the principles of fire prevention, with special reference to the risks applicable to the individual works concerned. They are trained in the use of fire-extinguishing apparatus, and make themselves familiar with the whole of the premises, the positions of the fire appliances provided, and hydrants and other water supplies, and the manipulation of power pumps. Generally they are capable of acting singly in an emergency, or as a unit in a brigade. They assist in the upkeep of the appliances and the testing of fire alarms, hydrants and sprinkler systems, try out the stationary pumps driven by electricity or steam, and the petrol driven portable fire pumps. In some cases they carry out the duty of auxiliary watchmen.

The firemen reside in close proximity to the works, and in the majority of cases are provided with full fire brigade uniform, including helmets and jack boots. They drill regularly with the appliances, such drills ranging from the fixing up methodically but speedily of a single line of hose from a hydrant, to major operations with pumps, escapes, and life lines. In the latter case the evolutions carried out are such as might be necessary in dealing with a fire, say, in a large building; and in addition to training the firemen these regular drills provide necessary tests for the equipment and ensure that it is properly maintained and ready for instant use whenever required.



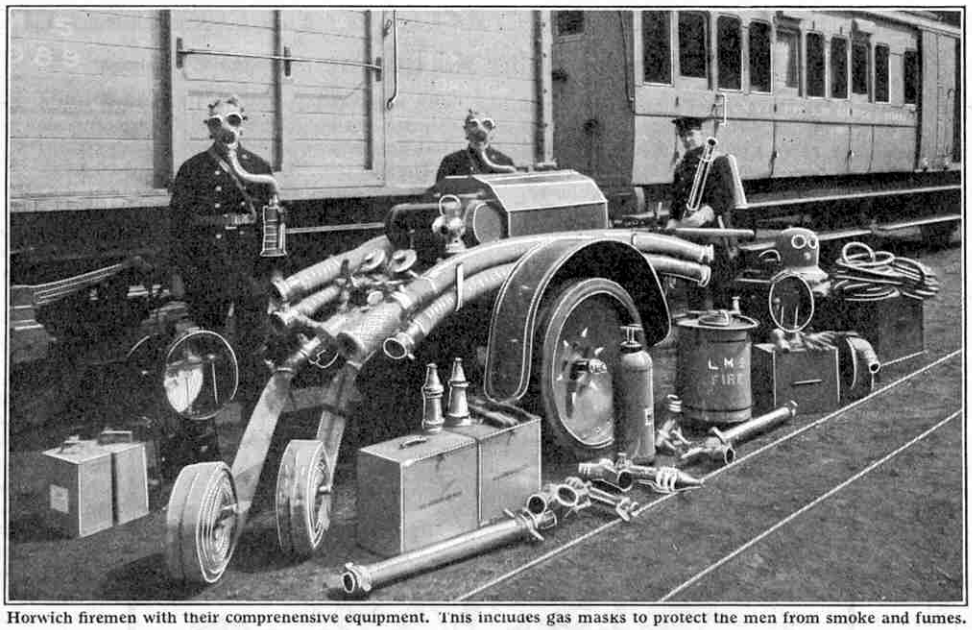
Travelling accommodation on the Horwich fire train.

Most of the works are equipped with some system of fire alarm, the one most frequently met with being on the lines of the well-known street fire alarm, the calls being received at some central point in the works from which the firemen can be summoned. For this purpose either loud-sounding bells in the shops or the works hooter may be used, in conjunction with electric bells in the firemen's houses.

On an alarm of fire the members of the brigade quickly assemble at the recognised "fire station," where they are informed of the position of the fire together with any

other details available, and take action accordingly. Often, when a fire is discovered in its early stages, it is only necessary for the firemen to use the nearest available hose and appliances, such equipment being provided at numerous points throughout the works. In other cases it may be necessary to bring the fire pumps and other equipment from the fire station into operation; but whatever the nature of the fire or equipment required to be used the members of the brigade know the particular part they have to play and immediately get to work.

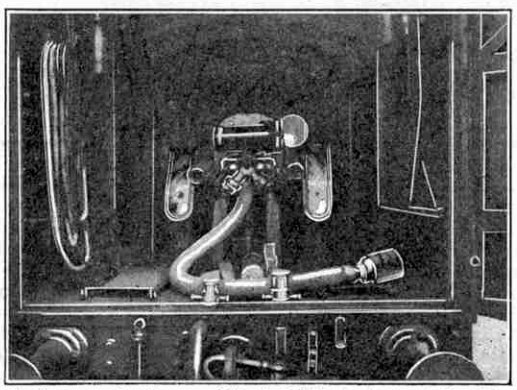
When a fire has been extinguished it is often necessary for one or more firemen to remain to cool down the debris, or assist in salvage operations; while the captain of the brigade, after assuring himself that all is safe, is required to report on the fire, having ascertained, if at all possible, the cause of the outbreak.



Horwich firemen with their comprenensive equipment. This includes gas masks to protect the men from smoke and fumes.

Generally speaking, the main water supply for fire-fighting purposes is piped throughout the works with hydrants fixed at suitable points. In some cases the pressure is augmented by means of stationary pumps that can be immediately operated in the case of fire, while at five of the works petrol-driven pumps of the trailer type form part of the fire brigade equipment. These pumps can be readily taken by tractor or by man-handling to any point in the works, and obtain water either from the hydrant supply or from any other source available, such as tanks and canals.

Horwich and Wolverton are the two places where the works fire brigades act also as the fire brigades for their respective towns. At Horwich the town authority has provided a motor-driven fire engine, complete with escape and appliances, and also a motor-driven tender. The latter, it is understood is to be substituted shortly by a new motor-driven tender with an auxiliary pump. At Wolverton the fire engine, motor tender and trailer pump belonging to the company are used, the town authority recompensing the company for their use. In both cases the services of the men called to fires in the town are paid for by the respective Councils, and although fires in these towns are not very frequent it may be accepted that the arrangements are to the mutual advantage of the company and the Councils concerned. Each of the local authorities has the services of a well-trained fire brigade at a comparatively nominal cost, while the company have a brigade whose members gain more actual fire experience than would be the case if their activities were confined to the works.



The fire pump in the van of the L.M.S.R. fire train at Horwich.

In addition, at three of the works, namely Crewe, Derby and Horwich, equipment is available to transport firemen, together with a petrol-driven fire pump, a rail tank of water and a large assortment of useful appliances, by rail to fires which may occur within a reasonable distance of the works.

These fire trains, as they are called, have on many occasions proved extremely valuable, particularly in dealing with fires on the line not readily accessible to a local authority's brigade. The procedure is for the District Control Office to call out the fire train concerned when it is considered assistance is necessary, and on receipt of such a call at the works the first locomotive in steam available is coupled to the fire train, by which time the firemen have generally assembled. Usually the train is on the way within a few minutes, and so far as practicable is given a clear road. On arrival at the fire, even if it be in an isolated position, the firemen are able to get to work immediately, without searching for a convenient water supply, as the tank which forms part of the train carries several thousand gallons, and by means of a simple connection between tank and pump this water can be immediately projected on the fire.

On several occasions a fire train has been called to a fire among wagons forming part of a train, and through being able to run right alongside with pump and water has enabled the line to be cleared in a comparatively short time. In other cases the blazing wagons have been taken off the main line to a convenient siding to be dealt with. These fire trains of course are called out to all manner of fires, including stations, goods sheds and viaducts, and on several occasions their assistance has been requested by local authorities' brigades, and by owners of private property, where premises adjoining the railway have been on fire.

With the exception of watchmen, who are generally required to be members of the brigade, all works firemen are volunteers and chosen for their interest in the work and physical fitness for it.

We are indebted to the Editor of the *"L.M.S. Magazine"* for permission to reproduce this article, and for the accompanying illustrations.

Meccano Suggestions Section

By "Spanner"

(361)—Four-Cylinder Solenoid Engine (A. Lockhowe, Edinburgh)

In the June issue of the "*M.M.*" there appeared a fine model of a five-cylinder radial engine built up with Elektron Magnet Coils and Cores. This model created a considerable amount of interest, and many model-builders have since sent in suggestions for other types of engines built on similar lines. Among these was A. Lockhowe, Edinburgh, who submitted the model 4-cylinder V-type engine illustrated in Fig. 361 on this page.

The bottom of the crankcase consists of a 2½″×1½″ Flanged Plate, each flange of which carries a Flat Trunnion. One of these Flat Trunnions is indicated at 2. Four ½″×½″ Angle Brackets are also secured to the Flanged Plate, two on each side, and to them are attached Flat Girders 1. Two 2″ Angle Girders 2a are fitted to the upper edges of the Flat Girders by means of Obtuse Angle Brackets. The 2″ Angle Girders carry the Girder Brackets 3, which are secured to them by ½″ Bolts, and on the shanks are Collars for spacing purposes.

Before proceeding further with the frame of the model the crankshaft must be made and fitted. Two Couplings are attached to each other, side by side, by means of two 1″ Threaded Rods. The Threaded Rods must protrude on opposite sides of the pair of Couplings to form the cranks, and they are locked in position by means of nuts. Each Threaded Rod is passed through the end holes of two 1½″ Strips, forming connecting rods, and when these are in position a second nut is screwed part-way on to each. This nut is followed by a Coupling 4, the Threaded Rod being screwed into the end threaded hole of this. The centre plain hole of the Coupling 4 accommodates a Rod 5. This construction is duplicated at the opposite end of the crankshaft, and both Rods are journalled in the centre holes of the Flat Trunnions fitted to the crankcase.

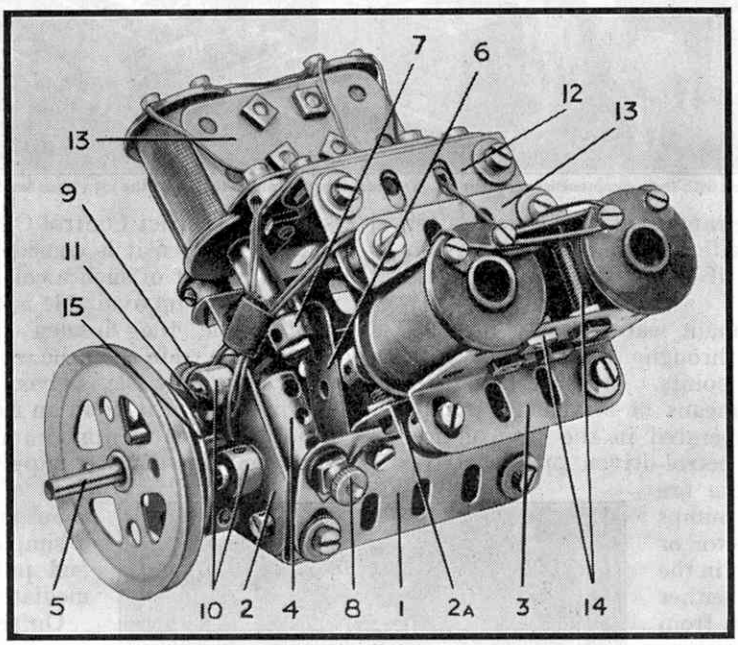


Fig. 361

The Magnet Coils are now fitted. A second Girder Bracket 13 is secured to each Girder Bracket 3 by means of four 1″ Threaded Rods, shown at 14, double nuts being used to lock each end in position. Before the Rods are tightened permanently, the Magnet Coils are placed between the pairs of Girder Brackets. When the four Coils are in position the Flat Girders 12, forming the top of the crankcase, must be attached to the Girder Brackets 13 by means of ½″ Bolts. A Collar is passed on to the shank of each Bolt for spacing purposes, and the two Flat Girders 12 are joined together at their upper edges by means of a 2″ Angle Girder.

Everything is now ready for inserting the "pistons." These consist of Magnet Cores (Elektron Parts No. 1539) on the threaded portions of which are carried Collars, indicated at 7. Each Collar is locked in position on its Magnet Core by the 6BA Nut supplied with the Core, and the free end of the 1½″ Strip 6 is linked to the Collar by means of a bolt. Great care must be taken to see that all connecting rods and pistons move freely, and that the crankshaft does not turn unevenly. Strict attention must be given to these points before continuing with the construction.

The distributor, shown at the near end of the engine, is now added. Four Collars, two of which are shown at 10, are each mounted on a 6 B.A. Bolt, by means of which they are secured to the Flat Trunnion 2. Each Bolt also carries on its shank an Insulating Bush and Washer, by means of which it is insulated from the metal of the engine. A Bush Wheel 15, clamped on the Rod 5, has mounted on it a Pendulum Connection 11 that is bent slightly so that it acts as a brush, making light contact with each of the Collars 10 in turn when the engine rotates in a counter-clockwise direction. The Rod 5 also carries a light flywheel that consists of a 2″ Pulley.

The electrical connections are now made. All the inner terminals of the Magnet Coils are first joined together, and connected to an insulated Terminal 8 mounted on the Flat Girder 1. The top Collar 10 is now connected to the remaining terminal of the nearer Magnet Coil on the right, and the bottom Collar is connected to the remaining terminal of the adjacent Magnet Coil. The left-hand Collar, not shown in the illustration, is connected to the free terminal of the nearer Magnet Coil of the second pair, and the unwired terminal of the fourth Magnet Coil is similarly connected to the last of the four Collars.

A Terminal 9 is fitted on the second Flat Girder 1, and is in electrical contact with the frame of the model. Wires from the source of supply are connected to the two terminals. The current passes from Terminal 9 through the frame of the model to the brush 11, and from this is distributed to the Collars 10 as the crankshaft rotates. After passing through each Coil in turn the current returns to the source of supply by way of the Terminal 8.

It is important to set the "timing" of the engine accurately in order that it may work efficiently. This is carried out by loosening the Bush Wheel 15 on its Rod 5, and rotating both the Bush Wheel and the Rod until the brush makes contact with the top Collar 10 when the piston of the near right-hand Coil is commencing its upward movement. The Bush Wheel is then locked in position.

Before setting the model in motion all the moving parts must be oiled, and a little vaseline smeared on the rubbing surface of the brush 11. Only Meccano oil or other high-grade light oil must be used for lubricating this model.

The Magnet Coils are designed to work on voltages not higher than four. If a Meccano T6 Transformer or other 6-volt Transformer is used for operating this model, the control lever therefore must never be moved beyond the third stud from the "minimum" position.

The engine as shown in Fig. 361 can be considerably improved by constructing the framework to represent a motor car or aeroplane engine. This is a simple matter and entails very little alteration to the existing model. The switch gear must be first covered in by means of 1″×1″ Angle Brackets, so that it has the appearance of a gear-box or supercharger, according to the type of engine required. A Boiler End can be employed with good effect as a supercharger. The addition of end covering pieces for the crank-case, imitation cam-shaft covers, magneto and dynamo, will give the model a very realistic appearance.

Photographic Devices

In the Suggestions Section of the August "*M.M.*" there appeared two interesting photographic devices submitted by R. M. Smith, Stanmore, and L. P. Storey, Bristol. Unfortunately the names were transposed by error. The builder of the model shown in Fig. 356 actually was R. M. Smith, and that shown in Fig. 357 was built by L. P. Storey.

(362)—Four-Wheel Steering Mechanism (J. Brown, Dundee, and S. Crane, Hull)

Many small Outfit owners have been deterred from building models of eight-wheeled lorries because of the comparatively complicated front wheel steering movement required. In these large lorries all four front wheels are controlled from the steering column, and as each must be able to turn independently, the fitting of the connecting links is fairly complicated. Two model-builders, J. Brown, Dundee, and S. Crane, Hull, have submitted simple wheel mountings suitable for small models, however, and they should prove useful to constructors of Meccano lorries.

The first of these, by J. Brown, is illustrated in Fig. 362, and is shown wrong way up for the sake of clearness. The underside of the model lorry is represented by a $5\frac{1}{2}'' \times 3\frac{1}{2}''$ Flat Plate, and to the ends of this are bolted two $4\frac{1}{2}''$ Strips. The outside holes of these Strips accommodate $\frac{3}{8}''$ Bolts, on the shanks of which are secured three Cranks 5 and one Boss Bell Crank 5a. The ends of the Cranks are linked in pairs, as shown, by $4\frac{1}{2}''$ Strips 1, the connection in each case being made by means of a lock-nutted bolt. Two Simple Bell Cranks 2 and 3 are now added, and these are attached rigidly to each other by a 3″ Strip 4. It will now be seen that the three Cranks will all turn on their pivots when the free arm of the Bell Crank 5a is moved.

The road wheels, 2″ Pulleys and Dunlop Tyres, are free to rotate on the shanks of $\frac{3}{4}''$ Bolts screwed in the tapped holes in the bosses of the Cranks, and two lock-nuts are used to hold each of them in position. If the road wheels do not lie parallel to each other it will be necessary to turn the bosses of the Cranks slightly.

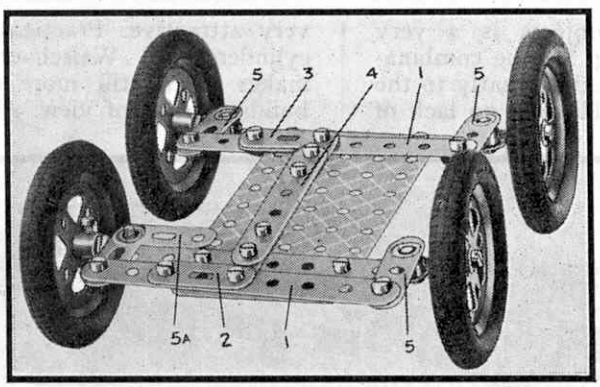


Fig. 362

The second suggestion, by S. Crane, is somewhat simpler than that already described, but is more suitable for smaller models. The Cranks 5 and the Boss Bell Crank 5a, Fig. 362, are replaced by 1″ Pulleys, and these are connected together by a single length of Cord passed round each Pulley twice.

(363)—Automatic Drag-Line Bucket (M. Bysouth, Manchester)

In the August issue of the "*M.M.*" there appeared a description of a cableway drag-line excavator used chiefly in the brown coalfields of Germany. M. Bysouth, Manchester, has submitted a neat model of the bucket used in this drag-line excavator, and he has employed it successfully in connection with a simple model cableway of his own design.

The bottom of the bucket consists of a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plate fitted on each side with a $5\frac{1}{2}''$ Angle Girder. These Girders carry $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates 2 as shown, and a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate, placed across the ends of these, is held in position by means of two $1\frac{1}{2}''$ Angle Girders secured vertically in the corners of the bucket. To the centre of the end Flexible Plate is bolted the Flat Bracket 4. The front edge of the Strip Plate forming the bottom of the bucket carries three $1\frac{1}{2}''$ Strips representing the digging teeth, and to the front edge of the Plates 2 are bolted two vertical $2\frac{1}{2}''$ Strips. These are bent slightly at their upper ends and are bridged by a curved 3″ Strip 5.

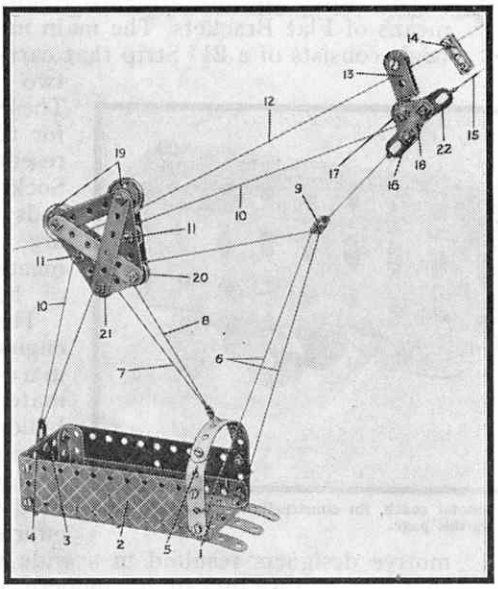


Fig. 363

The traveller from which the bucket is hung is next constructed. The two Pulleys 19 are mounted on $\frac{3}{4}''$ Bolts between two $2\frac{1}{2}''$ Strips. Each $\frac{3}{4}''$ Bolt also supports a 3″ Strip and a $2\frac{1}{2}''$ Strip on each side of the Pulley, and lock-nuts are added at their outer ends. The 3″ Strips form bracing members of the traveller, and their lower ends, together with the lower ends of the $2\frac{1}{2}''$ Strips, are fitted on $\frac{3}{4}''$ Bolts carrying $\frac{1}{2}''$ Pulleys 20 and 21. These Bolts are joined by two $1\frac{1}{2}''$ Strips, as shown. The centre holes of the $2\frac{1}{2}''$ Strips carry further $\frac{3}{4}''$ Bolts 11, on the shanks of which are $\frac{1}{2}''$ loose Pulleys, which are free to rotate.

The small pulley frame is built up from two 1″ Corner Brackets 18, held together by a $\frac{1}{2}''$ Bolt on which is mounted a $\frac{1}{2}''$ loose Pulley 17. Two further $\frac{1}{2}''$ Bolts are added to form supports for the Flat Brackets 16 and 22. A Single Bent Strip 13, in the outer holes of which is a $\frac{1}{2}''$ Bolt, carries a $\frac{1}{2}''$ loose Pulley that is free to turn, and is held in position by lock-nuts. The $\frac{1}{2}''$ Pulley runs on the rope 12, on which a Strip Coupling 14 is clamped by means of two set-screws to act as a stop.

(364)—Simple Free Wheel

(F. Anthony, Venice)

Many suggestions for free wheels built with Meccano parts have been submitted from time to time, and the best of these have been described and illustrated in the Suggestions Section. An exceptionally neat and efficient mechanism of this kind, devised by F. Anthony, Venice, is shown in Fig. 364. It is shown built on a 2″ Sprocket Wheel, but it will fit equally well on a Bush Wheel or 57-teeth Gear.

A Rod, free to turn in the boss of the Sprocket Wheel, carries a Ratchet Wheel, and this is held in contact with the face of the Sprocket Wheel by means of a Collar on the opposite end of the Rod. The Pawls are formed by mounting two Spring Clips on $\frac{3}{8}''$ Bolts in opposite holes of the Sprocket Wheel. The Spring Clips are so adjusted that the ends of their lugs press lightly against the teeth of the Ratchet Wheel, and drop into the gaps between the teeth when the gear is turned slowly. They are then fixed rigidly in position by tightening the Nuts on the $\frac{3}{8}''$ Bolts.

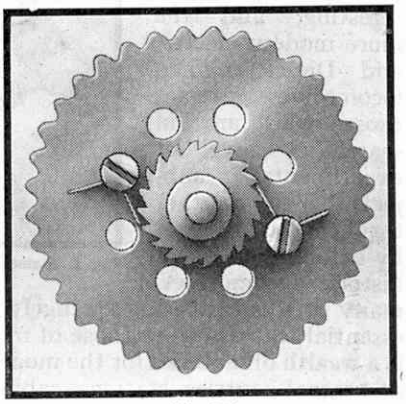


Fig. 364

(*Continued from previous column*)

The cable rope 12, a length of Meccano Cord, on which run the large pulley frame and bracket 13, is between two fixed points at an angle of about 30°, the lower section of the rope being arranged to bring the drag bucket into contact with the ground. The operating cord 15, the distant end of which in the complete cableway is passed round a hoisting drum operated by the main engine, is secured to the Flat Bracket 22, and a second hoisting and tipping cord 10 is attached to the Single Bent Strip. The rope 10 passes round the underside of the Pulley 17, over the two Pulleys mounted on the Bolts 11, and finally is fastened to the Flat Bracket 4. From this point a second cord 7 passes over the Pulley 21 and down to the bridge 5. The cord 8, which is attached to the same point as 7, passes over the Pulley 20 and is tied finally to the Flat Bracket 16. A Washer 9, carried on this rope, in the position shown, forms a point of connection for the cords 6, the bottom ends of which support the drag bucket.

When first attaching the various cords, it is a good plan to secure them only temporarily in place until they are all fitted. The bucket can then be suspended from the rope 12 and the cords adjusted in length until the bucket takes up the position shown in the photograph. The cord 15 is later fastened at its free end to the winding barrel.

In Search of New Models

Unusual Locomotives and Railway Signals

THE reproduction of railway subjects is a very attractive form of model-building, for the combination of two hobbies that it provides adds greatly to the fascination of constructional work. There is no lack of individual subjects of all kinds. Great express locomotives convey a stirring idea of power and energy; powerful goods engines and the fussy little tank engines used for shunting purposes are equally interesting; and the more modern electric and Diesel engined locomotives attract those who are in search of novel or experimental subjects. Yet another thrill can be obtained by building models of historic locomotives, many of them differing strangely in appearance and in essential features from those of modern times; and there is a wealth of material for the model-builder in the signals and signal gantries, stations, cabins, bridges and lineside structures of all kinds that are to be seen on any railway.

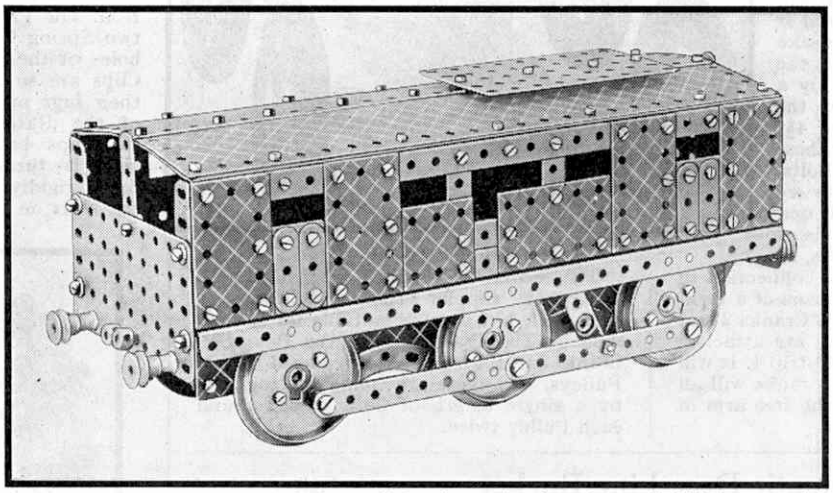


Fig. 1. A clockwork driven model of a heavy-oil shunting engine, the prototype of which is a converted steam 0-6-0 tank locomotive.

The examples of railway models described and illustrated in this article do not cover every aspect of so vast a subject. They will give inspiration to enterprising model-builders, however, and in particular they show what can be done by the owners of small Outfits. It is easy to construct new models if a large selection of parts is available, for the field of possible subjects is very wide. Those who have to rely upon a limited number of parts must make greater use of their imagination, and show their skill and ingenuity in making the best possible use of every individual part at the builder's disposal.

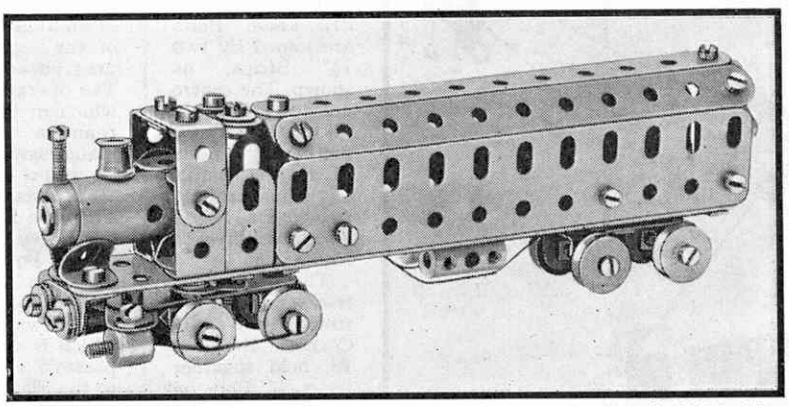


Fig. 2. A simple but attractive model of a rail-motor coach, the construction of which is fully described on this page.

A realistic model of a rail-motor vehicle of the combined engine and coach type is shown in Fig. 2. Vehicles of this kind are now seldom seen, except on small local lines, but they are excellent prototypes for interesting Meccano models. That shown in Fig. 2 is extremely simple, but ingenious, and the larger and more complete reproductions that can be built are very attractive. Practically all are fitted with outside cylinders and Walschaerts' valve motion, and this makes them still more interesting from the model-building point of view. An excellent photograph of an L.M.S.R. rail-motor vehicle appeared in the September issue of the *"M.M."*

The main frame of the model shown in Fig. 2 consists of two $7\frac{1}{2}$" Strips connected by Flat Brackets. The boiler is clamped in position on this frame by means of Angle Brackets, two of which are bent to the shape shown to represent the saddle. The steam dome consists of the shank of a Spring Buffer, and the chimney is a $\frac{1}{2}$" Bolt partially screwed into the threaded hole at one end of a Socket Coupling. Gas cylinders under the coach are represented by Couplings held in position by two bolts each, and the underframe stays consist of short lengths of 22 gauge copper wire.

The two bogies are attached rigidly to the model by means of Flat Brackets. The main member of the front bogie consists of a $2\frac{1}{2}$" Strip that carries at its front end two Flat Brackets. These form supports for the cylinders, represented by two Rod Sockets. Connecting rods and piston rods are reproduced by means of short lengths of heavy gauge wire.

The early days of engineering provide much attractive material for model-builders, and no better example of this is to be found than in locomotive engineering. The efforts of pioneer locomotive designers resulted in a wide variety of engines that are freaks, judged by modern standards, and no hunter after new ideas should miss any opportunity of searching through old railway books and periodicals for illustrations or drawings of these almost forgotten oddities.

In Fig. 4 is shown a model of a very early attempt at constructing an articulated locomotive. This was

one of four built in 1832 by an American, Horatio Allen, for use on the South Carolina Railway, and was known as the *"South Carolina."* To all intents and purposes it consisted of two engines placed back to back, and its many remarkable features included four separate boiler barrels, joined at their inner ends by the fire-box and at their outer ends by the smoke-boxes. The fire-box door was at one side, where the fireman stood, and the driver's position was at the other. Four-wheel bogies were carried on substantial pivots, mounted directly beneath the boilers, and the connecting rods from the cylinders were provided with spherical bearings to allow for swivelling. An illustration of this remarkable engine appeared in the October 1932 issue of the *"M.M."*

The model is extremely simple, and its construction is commenced by building the fire-box. The top of this is a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate carrying two $2\frac{1}{2}''$ Angle Girders, to the projecting flanges of which are bolted $2\frac{1}{2}''$ Flat Girders. $1\frac{1}{2}''$ Flat Girders are bolted to the ends of the fire-box, and these are secured at their centre holes to the $2\frac{1}{2}''$ Flat Girders by means of $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets. Each boiler barrel is built up from two Sleeve Pieces, and two Chimney Adaptors, down the centres of which is passed a $3\frac{1}{2}''$ Threaded Rod. This Rod, which carries a $1\frac{1}{2}''$ Strip at its outer end, as shown in the illustration, forms the connection between the boiler and the fire-box. The bogies are built up of short Strips, and each is pivotally secured to a $1\frac{1}{2}''$ Strip fixed beneath the boiler by a $\frac{3}{8}''$ Bolt. The axle supporting the small wheels is mounted in a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip, and Couplings are used for carrying the Pivot Bolts of the large wheels.

Two unusual railway subjects have been chosen for the models shown in Fig. 3. These are ground signals, and their construction is very simple. The signal arms are Meccano Parts No. 158b, reduced in length by one inch and with a white band and edging added, as shown. The white edging is continued round both spectacle glasses. If desired, these signals can be adapted for use in conjunction with a built-up signal cabin and lever frame by incorporating, at the rear of each signal arm, a series of cranks that can be made to operate in the same way as those fitted to Hornby Signals.

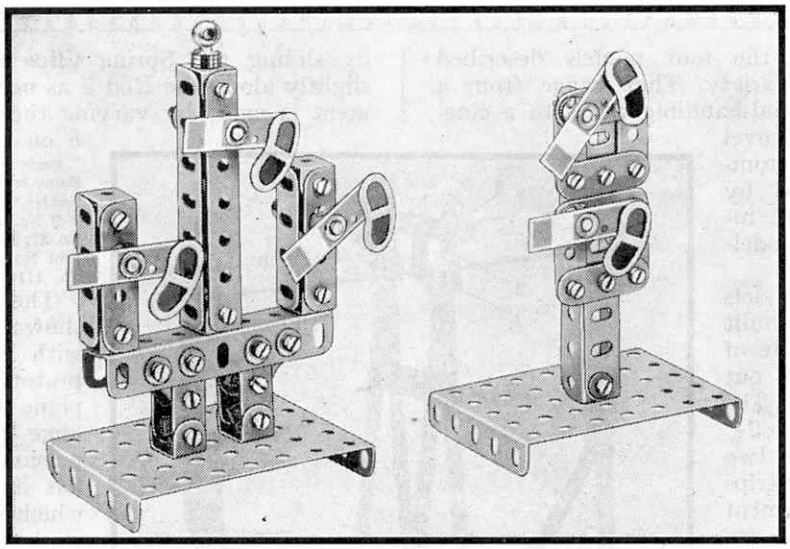


Fig. 3. Ground signals are excellent subjects for models incorporating a limited number of parts. Two good examples are shown in this illustration.

Larger and more detailed working models of full-size signals and gantries are very attractive. Visits to the lineside, especially at busy and complicated junctions, will give the model-builder all the information necessary for many models of different types of signalling apparatus.

The many changes that are taking place on modern railways, especially in connection with rolling stock, provide a never-ending source of fresh inspiration. New types of coaches, streamlined locomotives, heavy-oil engines of all types and many other novelties also give ample material, and those who are interested in railway affairs need never be at a loss for interesting subjects. The heavy oil units now in regular use include many that are admirably suited for reproduction in Meccano. Fig. 1 shows an excellent example of a model of this kind. It is a scale reproduction of an old 0–6–0 tank locomotive that has been re-constructed and fitted with a heavy-oil engine. The Meccano model shows the typical square appearance of its prototype. It is powered with a No. 2 Clockwork Motor that drives two cranks, set one on each side of the locomotive between the wheels, and these are coupled up to the connecting rods by means of Threaded Pins.

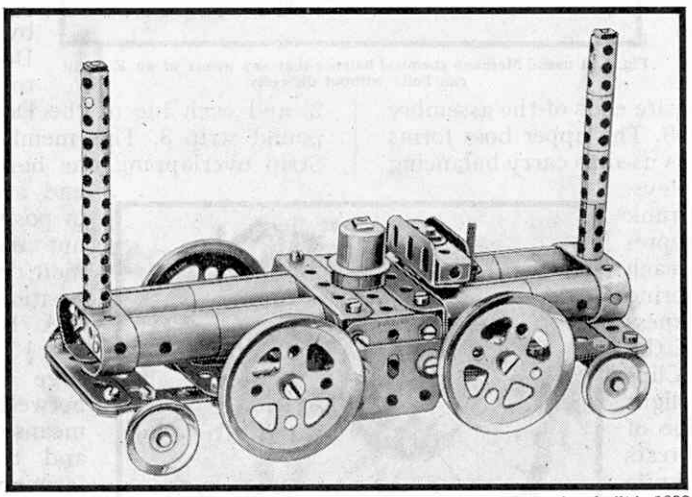


Fig. 4. A model of the "South Carolina," one of four articulated locomotives built in 1832 for use on the South Carolina Railway. These were the first locomotives of this type.

The Clockwork Motor is attached, in an inverted position, to the front end of the main frames of the model by $\frac{1}{2}''$ Reversed Angle Brackets and $1'' \times \frac{1}{2}''$ Angle Brackets. A $\frac{3}{4}''$ Sprocket Wheel on the driving spindle of the Motor is connected by Sprocket Chain to a $1\frac{1}{2}''$ Sprocket locked on a 3" Rod. This Rod is mounted in bearings formed from two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates, one being bolted to each main frame.

The 3" Rod also carries a $\frac{1}{2}''$ Pinion meshing with a 57-teeth Gear that is mounted on a second 3" Rod together with a $\frac{3}{4}''$ Sprocket Wheel. By means of a short length of Sprocket Chain this $\frac{3}{4}''$ Sprocket drives a 1" Sprocket on the Rod carrying the main driving cranks.

The controls are arranged in the following manner. The brake lever has mounted on it a 2" Strip at right-angles and this carries a Collar. A 2" Rod is locked in this Collar, and protrudes from the front of the locomotive, a second Collar being fitted to it as shown in Fig. 1. The reversing lever is arranged similarly.

New Outfit Models

A Chemical Balance and an Unusual Aeroplane

THE chief feature of the four models described this month is their variety. They range from a chemical balance and a coal-handling crane to a cinematograph camera and a novel aeroplane in which the customary propeller is replaced by paddle wheels, and should interest a wide circle of model-building enthusiasts.

The first of the four models is the chemical balance, built with Outfit E. This will be of use to many who carry out experiments in chemistry. The base of the model, a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate, carries two $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips that form points of attachment for four $12\frac{1}{2}''$ Strips. These are connected at their tops, in pairs, by two $\frac{3}{8}''$ Bolts that carry the $1''$ loose Pulleys 1 on their shanks. Two $2\frac{1}{2}''$ Strips are bolted to the $12\frac{1}{2}''$ Strip for strengthening purposes.

A $2\frac{1}{2}''$ Strip 2 has attached to it at each end a Flat Bracket 3, and the bottom edges of these Flat Brackets are filed so that they are able to rest in the grooves of the Pulleys 1. The centre of the $2\frac{1}{2}''$ Strip 2 is clamped between two Cranks, placed with their bosses at opposite ends of the assembly and held together by the Bolt 6. The upper boss forms a support for the Rod 4, which is used to carry balancing weights consisting of $1''$ fast Pulleys.

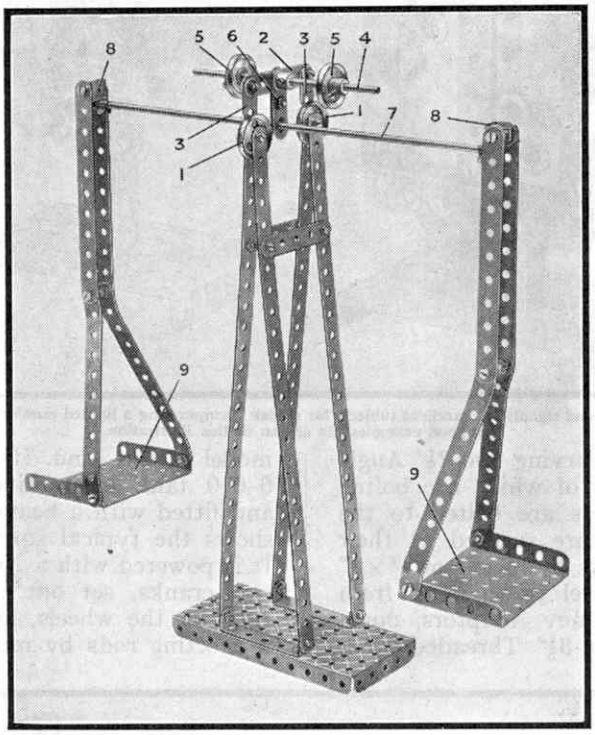


Fig. 1. A useful Meccano chemical balance that any owner of an E Outfit can build without difficulty.

The boss of the second Crank carries the $11\frac{1}{2}''$ Rod 7 that represents the balance arm, and at each end of this are fixed two Spring Clips spaced apart the thickness of a Meccano Strip. In each of the spaces between the Spring Clips rests a Double Bracket 8. A slight nick is made in the lower edge of the Double Bracket where it rests on the Rod 7, and a sharp knife edge is formed there by filing, as in the case of the Flat Brackets 3. Each Double Bracket has secured to it two $5\frac{1}{2}''$ Strips, and these are disposed vertically as shown. To the bottom of each $5\frac{1}{2}''$ Strip two further Strips are bolted, and these are bent slightly so that their free ends can be attached to the $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate 9. The two Plates 9 form the scale pans.

When the model has been assembled it is balanced by sliding the Spring Clips and Double Brackets 8 slightly along the Rod 7 as necessary. The final adjustment is made by varying the positions of the Pulleys 5 on the Rod 4.

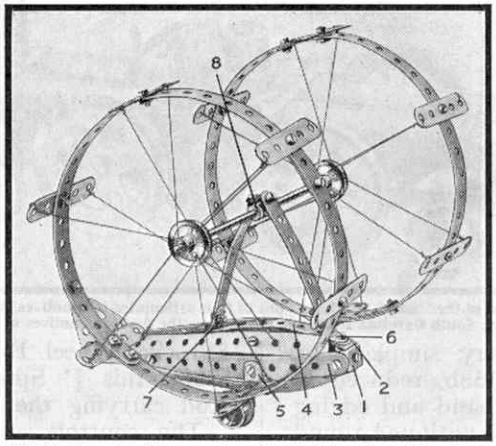


Fig. 2. A model of an aeroplane that is driven by paddle wheels instead of a propeller.

Parts required to build the model Chemical Balance: 4 of No. 1; 8 of No. 2; 3 of No. 5; 2 of No. 10; 2 of No. 11; 1 of No. 13; 1 of No. 15; 2 of No. 22; 2 of No. 22a; 4 of No. 35; 27 of No. 37; 2 of No. 37a; 2 of No. 38; 2 of No. 48a; 1 of No. 52; 2 of No. 53; 2 of No. 62; 2 of No. 111c.

The strange looking model shown in Fig. 2 also is built with E Outfit, and has as its prototype a new form of aeroplane that makes use of two huge paddle wheels for propulsion purposes. This machine has an orthodox fuselage, on which is mounted a tall framework supporting a horizontal shaft that carries at each end a large wheel with paddles placed at equal intervals round its rim. The cross section of each paddle is similar to that of an aeroplane wing, and the assemblage is driven by an engine mounted in the fuselage.

The construction of the Meccano model is commenced by building the fuselage. A Double Bracket 1 has secured to it a $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Bracket 2, and each lug of the Double Bracket carries a compound strip 3. This member consists of a $5\frac{1}{2}''$ and $3\frac{1}{2}''$ Strip overlapping one hole and the $3\frac{1}{2}''$ Strips at the end are drawn together and held in position by a nut and bolt. This nut and bolt also secures a Trunnion, representing the rudder, in position.

A Bush Wheel carrying seven $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets round its edge is now fitted in position between the two members 3 by means of two of the Angle Brackets, and the four curved $5\frac{1}{2}''$ Strips forming the body of the fuselage are similarly attached, two above and two below the compound Strips 3. The rear end of these Strips are held in position by short lengths of Cord that pass through suitable holes in the rear $3\frac{1}{2}''$ Strips. A further $5\frac{1}{2}''$ Strip 4 is attached by means of two Nuts and Bolts, one of which passes through one of the Angle Brackets of the Bush Wheel and the other through the Angle Bracket 2 on the Double Bracket 1.

Obtuse Angle Brackets 6 and 7 carry two 3½″ Strips that are fixed at their upper ends to a Coupling 8. The centre longitudinal hole of the Coupling carries the inner ends of two 3½″ Rods that support the paddle wheels. The construction of these wheels is shown in the photograph.

The undercarriage is formed from two Reversed Angle Brackets 5 that carry two ⅜″ Bolts, and on these are mounted two ¾″ Flanged Wheels that represent the landing wheels of the actual aeroplane.

Parts required to build the model Paddle Aeroplane: 4 of No. 1; 7 of No. 2; 4 of No. 3; 12 of No. 5; 1 of No. 11; 8 of No. 12; 2 of No. 12c; 2 of No. 16; 2 of No. 20b; 2 of No. 22a; 1 of No. 24; 45 of No. 37; 3 of No. 37b; 4 of No. 59; 1 of No. 63; 3 of No. 111c; 2 of No. 125; 1 of No. 126a; 7 ft. of Copper Wire.

In Fig. 3 is shown a fine model cinematograph camera built with Outfit D. This of course is not a working model, but its remarkably realistic appearance makes it well worth building. The body of the model is built up of Flexible Plates, each side comprising one 2½″ × 2½″ and one 2½″ × 1½″ Flexible Plate. The four corners of each side carry ½″ × ½″ Angle Brackets, and to these are attached 2½″ × 1½″ Flexible Plates forming the ends, one of which is shown at 1.

The side plates are bridged by a 1½″ × ½″ Double Angle Strip indicated at 2, and this carries two 3½″ Strips and two Trunnions 3. The 3½″ Strips form two thirds of the top of the camera, the remaining one third consisting of the flanges of the Trunnions 3 and two 1½″ Strips. Four Flat Brackets are secured across the ends of all the Strips forming the top. The side of the model not seen in the photograph carries two 2½″ Strips, portions of which are shown at 4. The upper ends of these support the 3″ Pulleys that are used to represent the reels, a notable feature of actual cinematograph cameras. The connections between the Pulleys and Strips 4 consist of ⅜″ Bolts, and four Washers are used on each for spacing purposes.

On the side of the camera visible in the illustration is an imitation casing built up from three 2½″ × ½″ Double Angle Strips carrying at their ends ½″ × ½″ Angle Brackets by means of which the unit is attached to the camera. Before fitting this part of the model in position a ⅜″ Bolt is passed through the second hole of the centre Double Angle Strip, counting from the rear. This ⅜″ Bolt carries a Crank 6 that on its outer end has a second ⅜″ Bolt held in position by a nut, and forms the operating handle. The hood is made from black cardboard, and is fixed by two nuts and bolts to a Double Bent Strip 9.

Two Flat Trunnions 7 are now added, the lower ends of which carry ½″ × ½″ Angle Brackets. These form points of attachment for a bent 5½″ × 1½″ Flexible Plate 8, and a Bush Wheel 10. The boss of this Bush Wheel is free to turn about a pivot consisting of a Threaded Pin that is locked in the centre hole of a 2½″ Strip 11. The ends of this Strip are bolted to two further 2½″ Strips, and these are carried on a circle of 2½″ small radius Curved Strips 12. Two 1″ × 1″ Angle Brackets, bolted to the underside of the circle 12, carry three 2½″ × ½″ Double Angle Strips joined by Obtuse Angle Brackets and to these are attached the legs of the tripod, the construction of which is clear from the illustration.

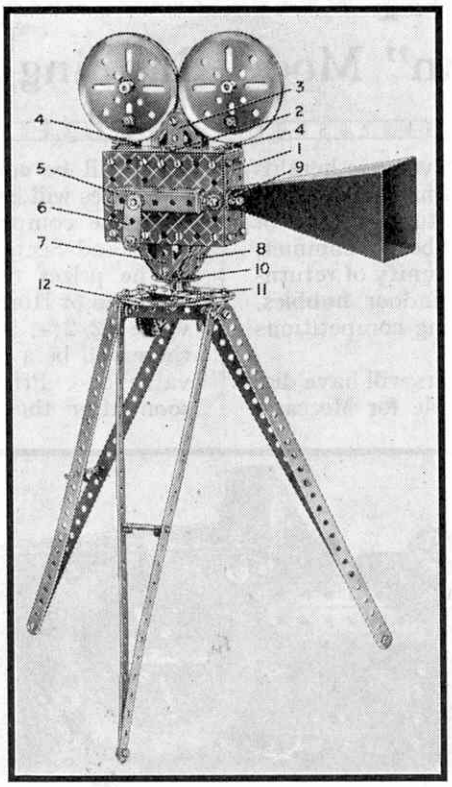


Fig. 3. A splendid model of a cinematograph camera built with Outfit D.

Parts required to build the model Cinematograph Camera: 6 of No. 1; 2 of No. 3; 5 of No. 5; 2 of No. 6a; 4 of No. 10; 2 of No. 11; 12 of No. 12; 2 of No. 12a; 3 of No. 12c; 3 of No. 18a; 2 of No. 19b; 1 of No. 22; 1 of No. 23; 1 of No. 24; 6 of No. 35; 7 of No. 37; 4 of No. 37a; 12 of No. 38; 1 of No. 45; 1 of No. 48; 6 of No. 48a; 1 of No. 62; 4 of No. 90a; 6 of No. 111c; 1 of No. 115; 2 of No. 126; 2 of No. 126a; 2 of No. 188; 1 of No. 189; 4 of No. 190; 1 piece of black cardboard 10″ × 6″.

The fourth of this varied selection of models is a coal-handling crane, built with Outfit C. The base of the rotating superstructure is built on a 2½″ × 1½″ Flanged Plate that is secured, together with a 2½″ × ½″ Double Angle Strip to a 3″ Pulley 1. Each upturned flange of the Plate 2 and Double Angle Strip carries a 4½″ × 2½″ Flexible Plate 3 and three Strips, two of which are 2½″ long and one is the 5½″ Strip 4. Two Sector Plates 5 are now added in the manner shown, and the upper flanges of these carry two 2½″ × 2½″ Strip Plates forming the roof.

The jib consists of four main members, formed from 12½″ Strips and these are all secured together at their upper ends by means of a Double Bracket. Each side pair of 12½″ Strips is braced together as shown by two 2½″ Strips. A 3½″ Crank Handle is now journalled in two holes at the front edges of the Sector Plates 5, and this has mounted on it, between the Plates, a Spring Clip and an Anchoring Spring. Outside the Plates a Bush Wheel is secured in position and a 3½″ Strip presses lightly against the periphery of this. Thus a light, constant braking effort is applied to the Crank Handle.

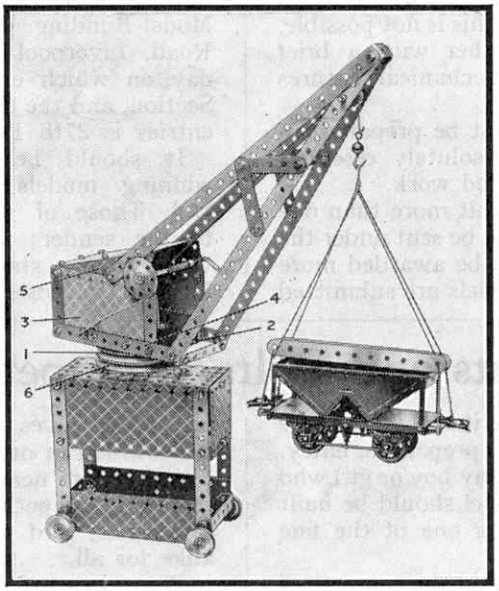


Fig. 4. An effective Meccano coal-handling crane that can be built easily with parts included in Outfit C.

The hoisting cord, which is fixed at one end to the Anchoring Spring on the Crank Handle, passes over a ½″ loose Pulley situated at the upper end of the jib. It carries a Small Loaded Hook and from this are suspended the four lifting cords that are held apart, as shown in Fig. 4, by two 5½″ Strips. The bottom ends of the lifting cords are attached to the buffers of the truck to be lifted.

The 3″ Pulley 1, upon which the superstructure is built, rests on a second 3″ Pulley 6 that is connected to a 5½″ × 2½″ Flanged Plate in the base by means of two ½″ Reversed Angle Brackets. A short Rod passes through the centres of both Pulleys.

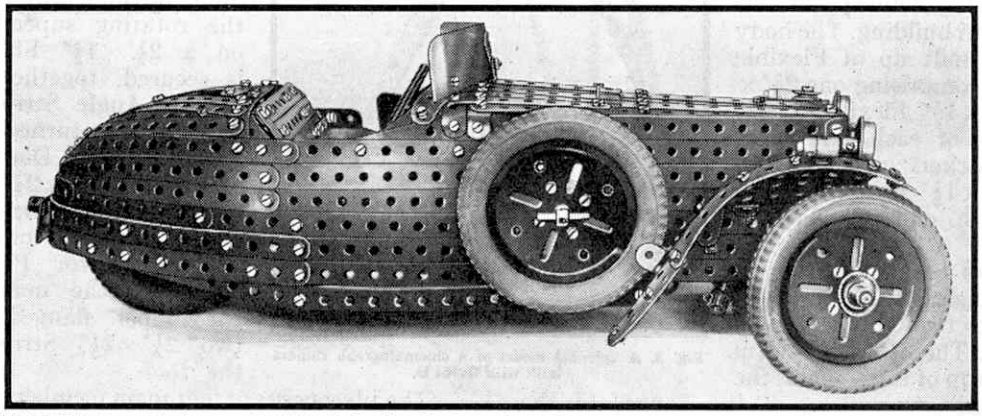
Parts required to build the model Crane: 4 of No. 1; 8 of No. 2; 1 of No. 3; 9 of No. 5; 1 of No. 11; 5 of No. 12; 2 of No. 16; 2 of No. 18a; 1 of No. 19s; 2 of No. 19b; 4 of No. 22; 1 of No. 23; 1 of No. 24; 4 of No. 35; 61 of No. 37; 8 of No. 38; 1 of No. 40; 6 of No. 48a; 1 of No. 51; 1 of No. 52; 2 of No. 54a; 1 of No. 57c; 2 of No. 125; 1 of No. 176; 2 of No. 188; 2 of No. 189; 4 of No. 190; 2 of No. 191; 2 of No. 192.

Meccano Competitions for All Readers

"Autumn" Model-Building Contest

The coming of October and the dark evenings heralds the start of the great Meccano model-building season, and although many of us will regret the storing away of cricket bats, tennis rackets and other symbols of summer, all Meccano boys will welcome the opportunity of returning once again to the greatest of all indoor hobbies, and of participating in the model-building competitions announced every month in the *"M.M."*

During the summer many model-builders will have discovered new subjects of all kinds suitable for Meccano models and they will wish to put their ideas into practical form at the first opportunity. This month's competition therefore is open for models of any kind whatever, and the competitor is not limited to any particular size of Outfit or number of parts. He may use just those parts that he finds necessary to make his model as perfect as possible.



This B.S.A. three-wheel car was built by M. Powley, Sunderland, and forms the subject of the novel "Nuts and Bolts" Competition announced on this page.

Actual models must not be sent. It is only necessary to submit either a clear photograph or, if this is not possible, a good drawing of the model, together with a brief explanation of any constructional or mechanical features that are not shown in the illustration.

The photograph or drawing need not be prepared by the competitor himself, but it is absolutely essential that the model itself is his own unaided work.

Competitors may, if they wish, submit more than one model, but in this event all entries must be sent under the same cover. No single competitor will be awarded more than one prize, and if two or more models are submitted they will be considered on their joint merits.

Entries will be divided into two sections. Section A will comprise competitors of all ages living in the British Isles, and Section B those of all ages living Overseas.

The prizes to be awarded in each section are: 1st, Meccano or Hornby products value £3/3/–; 2nd, products value £2/2/–; 3rd, products value £1/1/–. In addition, there will be a number of consolation prizes of products value 5/–. Prizewinners will be notified by letter as soon after the closing dates as possible, and will be allowed to choose any goods they like from current Meccano price lists to the value of the prizes awarded to them.

The competitor's name, age and address must be written clearly in block letters on the back of each photograph or drawing sent in, together with letter A or B to indicate the section for which the entry is eligible. Envelopes containing entries should be addressed "Autumn" General Model-Building Competition, Meccano Ltd., Binns Road, Liverpool 13. December 31st, 1936, is the last day on which entries will be received in the Home Section, and the closing date for the Section for Overseas entries is 27th February, 1937.

It should be noted that photographs of prize-winning models become the property of Meccano Ltd. Those of unsuccessful entries will be returned to the senders after the close of the contest, provided that a stamped addressed envelope is enclosed for that purpose.

"Nuts and Bolts" Competition

This contest is open to all readers and it is not necessary to possess a Meccano Outfit in order to prepare an entry. There is no model-building to do, and any boy or girl who has a good idea of how a Meccano model should be built stands an excellent chance of winning one of the fine prizes to be awarded.

All it is necessary to do is to estimate the number of nuts and bolts used in building the model three-wheel car shown on this page. This is really a much easier task than may at first appear, for although some of the nuts and bolts cannot be seen in the illustration, the method of construction of the model provides clues to the number of bolts used in the portions that are out of sight. If no reader gives the correct number, the prizes will be awarded in order of merit to the competitors whose estimates are nearest correct. It should be remembered that all competitors have to work under the same difficulties, and the chances of success are therefore alike for all.

The prizes to be awarded are as follows: 1st, Meccano or Hornby products value £2/2/–; 2nd, products value £1/1/–; 3rd, products value 10/6.

Entries, which must be by postcard only, should be addressed "Nuts and Bolts" Competition, Meccano Ltd., Binns Road, Liverpool 13, and should be posted in time to reach Liverpool on or before 31st December, 1936.

Model-Building Competition Results

By Frank Hornby

An Ingenious Clock Mechanism

March "Piston Mechanism" Contest

On page 172 of the "*M.M.*" for March last appeared a diagram showing two pistons A and B working in a single cylinder. Piston A had a stroke of 3 in., and competitors in this contest were asked to design in Meccano suitable coupling gear to connect the two pistons so that each stroke of the piston rod attached to piston A would cause piston B to move through a distance of 14 in., but in an opposite direction to piston A.

The most interesting and ingenious entries were submitted by the competitors named in the following list, and they have received prizes as indicated.

1st Prize, Meccano or Hornby products value £2/2/–: D. R. Heeramaneck, Bombay. 2nd, products value £1/1/–: E. Armitage, Liverpool; 3rd, products value 10/6: A. C. Tipper, Exeter.

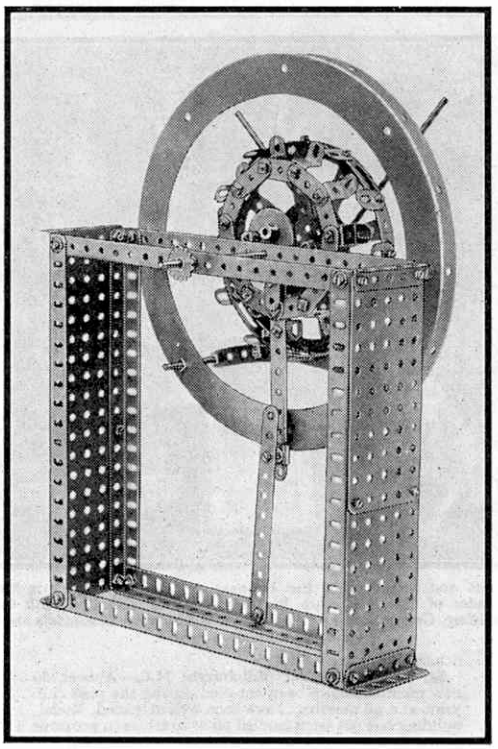
D. Heeramaneck's model is built up on a strong base plate, 9½ in. wide and 5 ft. 2½ in. long, constructed with Flat Girders and Angle Girders. At one end of the base are two rigid bearings made from 2½" Triangular Plates held in place by 2½" Angle Girders, and these support a triple-throw crankshaft, consisting of four large wheels, the centres of which are Hub Discs and the spokes and rims Strips bent as required. To one spoke of each wheel is fixed a Double Arm Crank so placed that its boss is 7 in. from the centre of the wheel, and 1" Rods secured in the bosses of the Cranks connect the wheels together in pairs. A further Double Arm Crank is bolted to the outside of each pair of wheels with its boss 1½ in. from the axis of the crankshaft, and these are then joined by a 2½" Rod.

The cylinder, which is 22½" long, is built up from five Boilers, and Boiler Ends are used for the pistons. As nuts and bolts would project inside the cylinder and prevent the piston from sliding, the builder experienced some difficulty in fixing the Boilers in position. He eventually overcame the trouble by clamping them in place with straps made from Flat Girders and Strips. A Rod is secured at one end to one of the pistons and its other end is connected to a crosshead, which is made from two pairs of Eye Pieces connected by 1" Rods that carry Couplings. The 1" Rod farther from the cylinder carries also a small Fork Piece, and this is coupled up by a Rod to the centre pin of the crankshaft.

Long Rods mounted on the two outer pins of the crankshaft are coupled to crossheads that move backward and forward on slides situated on each side of the cylinder. The slides are 18½" Angle Girders, and each crosshead is each made from four 2½" Angle Girders joined in pairs, one inside the other, by bolts passed through their elongated holes. These holes enable a slot for the crosshead guides to be formed, and the bolts hold Double Arm Cranks joined by 1" Rods provided with Couplings that are attached to the connecting rods. The rod of the piston that has a 14 in. stroke carries at its outer end a large crosshead made from two Girder Frames. This is fixed to the piston rod by Handrail Supports, and the small side crossheads are coupled to its ends by long compound rods.

When the crankshaft is rotated, its centre pin causes the piston it operates to move through a distance of 3 in., and the two outer crank pins operate the other piston through a stroke of 14 in. As the crank pins of each piston are placed on opposite sides of the centre axis of the crankshaft the pistons move simultaneously but in opposite directions.

An interesting feature of the contest was the ingenious manner in which many entrants constructed their mechanisms to scale.



An ingenious gear mechanism that has a ratio of 12 : 1, and consists of only two built-up Meccano gears. It was designed by D. Berkin, of Ki, China, and won Second Prize in the "Clock Mechanism" Competition.

"Clock Mechanism" Contest

In spite of the difficult nature of the subject, the "Clock Mechanism" Competition that was announced in the April issue of the "*M.M.*" attracted a considerable number of entries, many of which are most interesting and ingenious. The entry that won First Prize is a particularly good example of neat and compact construction, but unfortunately the photograph submitted is not sufficiently clear to enable me to reproduce it.

The chief prizewinners in the competition are as follows:

1st Prize, Meccano or Hornby products value £3/3/–: D. J. Hofsommer, The Hague, Holland; 2nd, products value £2/2/–: D. Berkin, Ki, China; 3rd, products value £1/1/–: J. Westhead, Brinnington, Stockport.

Competitors were invited to try their skill in reproducing the gearing illustrated on page 232 of the April "*M.M.*," by means of which a ratio of 12 : 1 can be obtained by the use of only two gears. The reproduction had to be built up from Strips, Angle Brackets or other Meccano parts, and the illustration on this page shows the mechanism for this purpose that was designed by D. Berkin and was awarded Second Prize. It incorporates an 11-tooth gear consisting of a ring of eleven 1½" Strips, with ½"×½" Reversed Angle Brackets at each connecting point. A 2" Slotted Strip and a 4½" Strip are attached to the ring so that the 4½" Strip projects outside the gear and the Slotted Strip inside. A Triple-Throw Eccentric is bolted to the Slotted Strip, the slot enabling it to be centred easily. Through the Eccentric boss marked "¾" throw" a 6½" Rod is passed, and this runs in bearings in the framework, as shown in the illustration.

The other gear has 12 teeth and is made up from a Hub Disc, which is fitted with a Face Plate at its centre and 12 equally spaced Flat Brackets round its rim. The Hub Disc runs freely on the 6½" Rod, but is spaced from the 11-teeth gear by a Collar, so that the teeth of both just engage.

A Socket Coupling attached to the boss of the larger gear is provided with a 3½" Screwed Rod to form the hour hand of the clock, and the minute hand is a 6½" Screwed Rod held in a Collar on the end of the Rod on which the Hub Disc is mounted. The 4½" Strip that is bolted to the 11-teeth gear slides in an Eye Piece that is fixed to the framework.

If the 6½" Rod is rotated 12 times, the 12-teeth gear is made to rotate once so that the mechanism is suitable for use as the gearing between the minute and hour hands of a clock. If the mechanism were built into a clock, a cardboard face could be bolted to the Ring Frame shown in the illustration.

Most of the other prizewinning entries follow similar methods of construction, the chief variations being in the selection of parts used for reproducing the two gear wheels and in the carrying out of minor details.

"Ingenuity" Model-Building Competition

The following is a complete list of the prizewinners in Section B of the "Ingenuity" Competition:

1st Prize, Meccano or Hornby products value £3/3/–: J. Oleaga, Buenos Aires. 2nd, products value £2/2/–: L. Linder, Stockholm. 3rd, products value £1/1/–: J. Carter, Capetown.

Products value 10/6: H. Dressler, Breslau X, Germany; F. Barry, Ocean Falls, Canada; P. Kett, Melbourne; P. Giese, Buenos Aires; J. Nie, Shanghai.

Products value 5/–: G. Philpott, Rangiora, N.Z.; D. McLeod, Natal; J. Hulley, Nantes; D. Murison, Buenos Aires; J. Capelli, Buenos Aires.

Regent Street Central School (Heywood) M.C.—This year the annual excursion took the form of a trip to Port Sunlight and Chester. Lectures have been well attended, and included one on "*The North of Spain*" by a gentleman who has lived there, and others on "*Jerusalem*" and "*The Railways of Germany*," both of which were excellently illustrated. Model-building has been chiefly in connection with a Display arranged for Parents' Day. An intensive recruiting campaign is to be carried out early in the next school term. Club roll: 150. *Secretary:* R. Nobbs, 6, Broadfield Street, Heywood.

Kendal M.C.—A delightful outing to Lake Windermere was thoroughly enjoyed. A sail on the Lake was followed by tea, and afterwards a round of miniature golf was played, during which the Leader was heavily defeated! A club-room has not yet been obtained, but enquiries are still being made, and it is hoped that suitable premises will be obtained shortly. Club roll: 10. *Secretary:* L. Haslam, Middleton, Kirkby Lonsdale, Carnforth.

Wednesbury M.C.—At the quarterly meeting of officials, the President expressed his pleasure at the continued good progress of the club. Recent activities have included enjoyable games of cricket. A small party of senior members joined with the Kidderminster Model Railway Branch in a tour of the "*Birmingham Gazette*" printing works. Mr. F. J. Inns, Vice-President of the club, has kindly presented a fretwork machine, and as a result there will be considerable activity in the Fretwork section during the forthcoming winter session. The Aeroplane section have purchased a stock of balsa wood and other requirements, and the construction of many interesting and efficient model aeroplanes is being planned. It is probable that an Exhibition will be held late in the autumn. Club roll: 20. *Secretary:* A. L. Morgan, 17, Cobden Street, Fallings Heath, Wednesbury.

Islington M.C.—The varied programme carried out has included model-building, games and a visit to Southend. Interesting talks have been given on "*How Goods Traffic Works at Night*," and on the Exhibition to be held this month, Club roll: 10. *Secretary:* K.V. Vines, 70, Thornhill Road, Barnsbury, London, N.1.

South Parade Modern School (Cleckheaton) M.C.—The club Exhibition on the School Open Day was a great success. The excellent display of models built by the members was supplemented by models of a Horizontal Engine and o Watt's Beam Engine, kindly loaned by Headquarters, and which were much admired by the many visitors. An attractive programme is being drawn up for the winter sessions, and it is hoped to recruit many new members. Club roll: 24. *Secretary:* R. Ellis, 2, Tennyson Place, Cleckheaton.

St. Stephen's (Saltash) M.C.—Cricket and baseball have been the main occupations of the members during outdoor meetings. Model-building has been continued on other occasions, and when the subject chosen was "*Familiar Objects*" one member built an excellent reproduction of an organ and another a dog kennel. A fleet of model battleships is being constructed with the help of the Leader. A prize is to be offered for the best attendance during the present half-year. Club roll: 9. *Secretary:* B. Braund, 9, Homer Park, Saltash.

Old Charlton M.C.—A recent Model-building Evening was spent in devising simple models, and one of the best constructed was a grindstone that consisted of only 17 Meccano parts. A very enjoyable visit has been paid to Croydon Airport. Recent talks have included an amusing one by the Leader on "*How to be witty*," and one on "*Patents*" that was followed by an interesting discussion, during which several members suggested types of humane rabbit traps that were subjected to criticism. A General Knowledge evening dealt with such questions as "*What is the gear ratio between a worm and a ½ in. pinion?*" and "*What wheels should be used for running on rails?*" Afterwards, Mr. Leverett, the new Vice-Leader, showed the members an illuminated map dial he is making for his wireless set, and explained how he proposed to work it. Future plans include a Debate on "*Are Big Ships Worth While?*", a talk about Boats by Mr. Fish, and a Table Tennis Tournament. Club roll: 25. *Secretary:* W. Jaques, 60, Gurdon Road, London, S.E.7.

Fraserburgh M.C.—The models for the club Exhibition have been completed and painted. A considerable length of new track has been acquired for the Hornby layout, and a tunnel and a bridge, both wide enough for double track, are being made from plywood. Club roll: 28. *Secretary:* W. J. Dawson, Phingask, Fraserburgh.

Bryntirion School M.C.—The club has developed an international character, as it now includes members from Peru, Belgium and New Zealand. Some excellent models have been built during recent meetings. Members hope to arrange an Exhibition during the autumn. Club roll: 22. *Secretary:* H. Williams, Bryntirion School, Bridgend, Glam.

A group of officials and members of the Hornsea M.C. In the centre is Mr. R. W. Shooter, who has been Leader of the club since its formation and affiliation with the Meccano Guild in 1928. Model-building, Games, and Lectures upon a wide variety of subjects are the chief features of the club programme.

St. Giles' Cathedral (Edinburgh) M.C.—Almost 50 new members have been enrolled during the past club year, and all meetings have been well attended. Model-building has not been carried on as much as in previous years, but is to be a prominent feature during the coming winter. The railway layout has been partly electrified and considerable experience gained in the working of it. The senior members deserve special mention for their part in this improvement. Club roll: 180. *Secretary:* H. W. Govan, 18, Revelston Park, Edinburgh, 4.

Hornsea M.C.—During the summer meetings have been devoted almost entirely to games. Cricket and bowls have been the most popular out-of-doors, while mah-jong is the favourite indoor game. Lectures continue to be given periodically, and the varied and interesting subjects dealt with recently have included "*The Automatic Telephone Exchange*," "*Australia*," "*The Army Rifle*," "*Aeroplanes*" and "*The Lake District*." Other activities included a day's outing to Swine, which proved very enjoyable. Club roll: 15. *Secretary:*. Mr. P. Thom, 5, Alexandra Road, Hornsea.

AUSTRALIA

Nhill Xlcr M.C.—The club has been divided into Senior and School (Junior) Sections. Excellent recruiting has been accomplished by the secretary and treasurer, each of whom has enrolled nine new Guild members. A new club-room has been obtained. It is equipped with electric light, and has two rows of shelves along each wall. The stock of nickelled Meccano parts has been enamelled, and a Meccano Electric Motor has been added to the equipment. Club roll: 16. *Secretary:* F. Haustorfer, Leahy Street, Nhill, Victoria.

Maylands (Perth) M.C.—An election has been held to elect a new President and a Vice-President. Several of the members are competing in a Meccano model-building competition organised by a local dealer. A Debate on "*Is War Worth While?*" aroused great interest, and some excellent speeches were made. Club roll: 23. *Secretary:* M. Thomson, 13, Kennedy Street, Maylands, Perth.

CANADA

Rosemount (Regina) M.C.—Very favourable reports of the club's Annual Exhibition appeared in the local press. The fine display of models included a Dutch windmill, log saw, loom that weaved ties and hat bands, reproduction of George Washington Bridge and stage coaches. A further attraction was an electrically operated model railway layout. Club roll: 16. *Secretary:* J. Watson, 974, Athol Street, Regina, Sask.

EGYPT

Zagazig M.C.—A pleasantly varied programme has been carried out, the chief features of which have been fretwork, games and talks. Lectures on "*Electricity*" and "*Benjamin Franklin*" were appreciated. A special silver Medallion and a Merit Diploma have been awarded to the Zagazig and Cairo M.C.s for the very fine joint display of models that they staged at the recent Exhibition of Egyptian Industry. Club roll: 18. *Secretary:* A. Yousig, Gannabiet Sikka Hadid Avenue, Zagazig.

NEW ZEALAND

Christchurch M.C.—At one meeting two Lectures loaned from Headquarters were read and were much enjoyed. Further visits have been paid to Eric Broomfield, the invalid friend of the club mentioned in earlier reports. A "Surprise Outing" provided much fun, the route followed leading to a coffee stall for refreshments. This unexpected climax proved immensely popular, and it is probable that another mysterious outing will be arranged during the winter. The President recently gave a Lantern Lecture describing a tour through New Zealand, and illustrated by a set of beautiful slides, kindly loaned by the New Zealand Government Tourist Bureau. A Debate on the controversial subject "*Should Boys and Girls be Educated Together?*" proved exceptionally interesting, and the arguments for and against the motion were very well thought out. Members have been busy in connection with a Fete the club are organising to help the Epworth Homes. Club roll: 23. *Secretary:* L. W. Best, 28, Circuit Street, Strowan, Christchurch.

Ashburton M.C.—Many interesting outings have been held, including a visit by eight of the members to Christchurch M.C., to participate in the Birthday Night celebrations of that club. The Model-Building section entered 11 models in the Models contest at the local annual Winter Show, and five of them were awarded prizes. Club roll: 25. *Secretary:* Miss P. Kruse, Cameron Street, East, Ashburton.

SOUTH AFRICA

Malvern M.C.—Excellent super models are being built for the club display at a forthcoming Fete. Meetings are well attended, and good progress is being made in establishing a Junior section. Club roll: 85. *Secretary:* B. Saunders, P.O. Box 8, Cleveland, Johannesburg.

Pioneer (Pietermaritzburg) M.C.—The club staged a display totalling 15 models at the Maritzburg Horticultural Society's show. The Correspondence section continues to flourish, and two evenings each week are devoted to Boys' Brigade work. Club roll: 11. *Secretary:* A. H. Alley, 461, Burgers Street, Pietermaritzburg, Natal.

Club Not Yet Affiliated

Charters Towers M.C.—A copy of the club rules has been hung in the club-room. Two very interesting models recently completed were a merry-go-round and a steam engine. *Secretary:* R. C. McLean, Marion Street, Charters Towers, Queensland, Australia.

Producing a Club Magazine

I am a firm believer in the value of the club magazine, and therefore I am always very pleased to receive copies of such publications. One most interesting club magazine that reaches me regularly is *"The Gear Box,"* the official organ of the Plymouth M.C. It is a quarterly magazine started several years ago, and is notable for the variety and high standard of its contents. Every issue contains a summary of recent club events, pages of notes concerning local railway, tram and bus activities, a page of shipping news and, by way of lighter fare, a clever "home-made" crossword puzzle. In addition to these regular features, there are always one or more special articles, chiefly of engineering interest.

I should like to see a magazine started in every established club. Actual production offers little difficulty, although in most cases printed magazines are out of the question. Satisfactory reproduction can be obtained by the use of stencils cut on a typewriter, and copies taken from these with the aid of a duplicator have a very neat appearance and can be read with ease. A jellygraph also may be employed. The results are not so good as those given by the method already described, but with care they are satisfactory, and the system has the great merit of being inexpensive.

Attractive Features

It is impossible to lay down definite rules in regard to the contents of a club magazine, for the character of these depends on the tastes of members themselves—and also on their capacity for providing the editor with contributions. Apart from items of club news and the general articles of an attractive type that should always be included, special attention should be paid to features of local or topical interest, and in this respect the railway, tram and bus notes of *"The Gear Box"* might well be imitated.

If it proves difficult to maintain the interest of the members in running a club magazine, the less ambitious plan of issuing a monthly Bulletin should be adopted. This may include short reports of recent events, together with a programme of meetings to be held the following month, and it also should contain comments on any features of interest in connection with club work. A regular production of this kind is more satisfactory than a magazine that is excellent one month and dull the next. Copies should be distributed as widely as possible in order to keep members and friends of the club in touch with progress, and it may be enlarged into a regular magazine when a suitable opportunity arises.

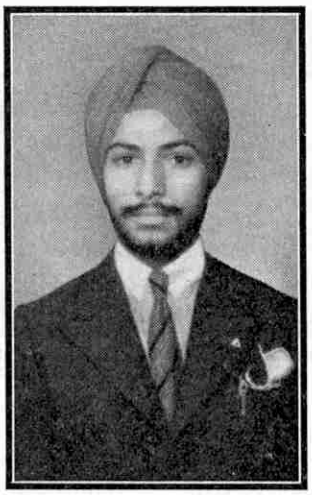
Membership Cards and Report Forms

This is the time to replenish the stock of club literature, and I shall be glad to forward membership and subscription cards to all secretaries who are in need of them. Report forms also are necessary. I am sending supplies to all affiliated clubs, and any secretary who has not already received his copies, or does not receive them during the next few days, should write to me immediately.

I have several times mentioned the great advantages of submitting regular club reports, and I must again emphasise that I cannot give satisfaction to club members by accounts of their work in the *"Club Notes"* page unless I receive sufficient and regular information from secretaries. Another point is that good reports help members to feel they belong to an important club, and so stimulate their enthusiasm. They also attract other Meccano boys, some of whom may possess gifts for model-building or organising powers that can be turned to good account in club life.

Meccano Club Leaders

No. 85. A. Singh



Mr. A. Singh is Leader of the Ranjit (Lahore) M.C. This Indian club was affiliated in October 1931. Its members are keen model builders, and recently displayed an excellent selection of large working models during the Jubilee celebrations of their school.

Forming New Clubs

One interesting feature of my correspondence during the past summer has been the steady flow of enquiries from new members of the Guild for details of the nearest available Meccano club. I have given the required information wherever possible, but there have been several instances in which no suitable club existed. For this reason I strongly urge all members of the Guild who live in populous districts where no club has been established to give serious thought to the possibility of forming one. It is almost certain that in the same neighbourhood will be other Meccano boys in similar positions, and it is only necessary for these to be brought into contact to enable a successful club to be formed. The present is an ideal time to take this step.

I am always very pleased to help any enterprise of this kind by publishing the details in these columns, and so bringing them to the notice of boys who wish to enjoy Meccano club life, but at present have not the opportunity of doing so. Even if only small clubs that are not qualified for affiliation are possible at first, there is no need to be discouraged, for many of the largest and most successful Meccano clubs have grown from very humble beginnings.

New Lantern Lectures

From the British Railways Press Office I have received news of three interesting lantern lectures that are now available on loan. These are entitled *"The Railways of Great Britain," "British Railway Locomotives,"* and *"Railway Wonders of Great Britain"* respectively. The first set of slides illustrates the many and varied activities of the railways; and the second deals with the development of the locomotive down to modern times. The third set is particularly interesting. It includes slides of famous locomotives, interiors of railway workshops, signal boxes, control rooms, marshalling yards, famous railway bridges and tunnels and train ferries, and 12 of these are coloured.

A descriptive booklet is supplied with the slides to enable the lecturer to give an interesting running commentary upon them. Leaders who wish to obtain the loan of the lectures should apply to the British Railways Press Office, 35, Parliament Street, Westminster, London, S.W.1. There is certain to be a great demand for them, and application should be made well in advance of the date for which they are required.

Proposed Clubs

Attempts are being made to establish Meccano Clubs in the following places, and boys interested should communicate with the promoters whose names and addresses are given below:

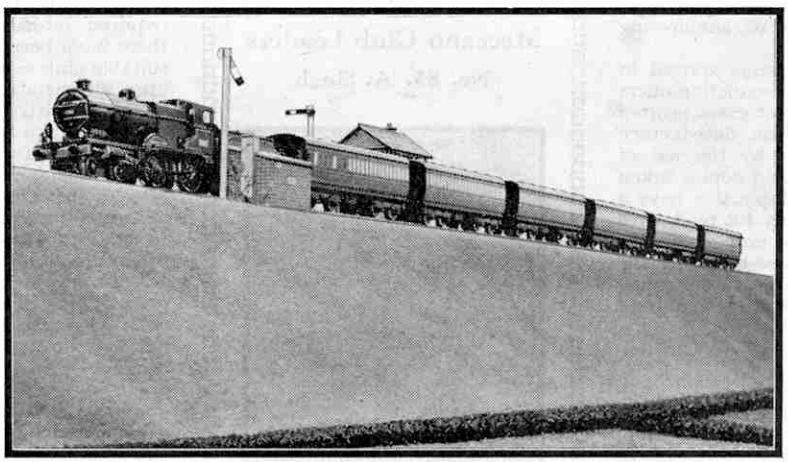
GREENFORD—H. Smith, 63, Halsbury Road, W., Northold Park.
INDIA—Mr. N. S. Narang, Shish Mahal Road, Lahore.

Preparing for Winter Activities

Cleaning and Oiling Locomotives

ABOUT this time of the year Hornby Railway owners turn with renewed interest to their layouts, and become busy with plans for extensions, and improvements, or for running more intensive services. Before putting these into operation, the equipment should be examined in order to ensure that it will give satisfaction in the busy times ahead.

On any layout successful operation depends primarily on a good track. The rails therefore should be carefully examined, whether they are laid down permanently or are put down only from time to time when required. On a permanent layout inspection of the rails is easy to carry out. They probably will not require any adjustment of level, but should be tested for truth to gauge, a very important point. For this the combined Rail Gauge, Screwdriver and Spanner packed with all Hornby Electric Locomotives must be pressed into service on an electric layout, and the winding key handle of Hornby Clockwork Locomotives form a rail gauge for the tracks on which they are used. By sliding either of these along between the rails of Hornby Track, defective places can be detected immediately, and the rails should be eased apart gently where they are tight. A portable layout should be tested in a similar manner. It is much easier and quicker to make an examination of a track in position than to test numerous separate rails; so the track components of such a layout should be set out and then tested.



A Hornby express on a miniature L.M.S.R. system passing along a high embankment. The train is formed of Hornby No. 2 Coaches and the Locomotive is an L.M.S.R. No. 2 Special "Standard Compound."

The process of laying down the line in this manner will bring to notice another item of importance, the loss of any of the connecting pins fitted at the ends of the rails. Where these are loose they should be tightened up by pinching the rail head with a pair of pliers. Any missing pins should be replaced by new ones, which can be obtained separately, and are far better than the match sticks that are sometimes used for the purpose. The hollow rail heads for receiving the pins also should be inspected. The frequent assembly and disassembly of the track of portable layouts is liable to cause them to open out. They should be closed up carefully with a small pair of pliers, a spare pin being inserted in the rail head to prevent it being distorted while the pliers are being used.

The rails that have been out of use for some time may be dirty, their heads showing traces of a black deposit due to the action of the wheels rolling over the oil that sometimes finds its way on to the rails, followed by the settlement on it of dust. As this prevents satisfactory running it should be removed from the rails, and of course from all wheels, by wiping with a rag that has been soaked with a small quantity of petrol. Paraffin is of no use for this purpose, as its more oily nature tends to start the whole process again, apart from the wheel slip that it causes.

Where electric locomotives are in use axles, gears, coupling rods and wheels should be cleaned of any dirt that may have collected on them, particular attention being paid to the wheel treads and collector shoes. After cleaning up, engines should be tested and any slight defects dealt with according to the instructions packed with each Hornby Electric Locomotive.

The connections to the line from the power supply should be examined, and any loose contacts tightened. Plug connections that may have become loose in their sockets can be tightened up, after being withdrawn from the sockets, by placing the blade of a penknife or thin screwdriver in the longitudinal slot in the plug in order to separate slightly the two sections of the fittings. Any connections made by means of terminals should be examined and tightened up if necessary. Terminal Connecting Plates may require their fuses renewed, and it is very important that the appropriate fuse wire should be used as specified in the instructions packed with the Locomotive and the Transformer.

On clockwork railways the mechanism of the locomotive should be washed out with petrol in order to remove any old oil that may be in it, together with any accumulated dust that would tend to clog the mechanism and prevent the free working of the engine. Operations involving the use of petrol always should be performed out of doors. Petrol can be introduced into the mechanism in the same way as lubrication is carried out, that is from a small oil can kept specially for the purpose. When all dirt has been removed the engine should be allowed to stand until the petrol has evaporated, leaving the mechanism clean and dry. Lubrication of the various spindles, bearings and gear wheels with Meccano Oil should then be undertaken, and Meccano Graphite Grease applied between the coils of the spring.

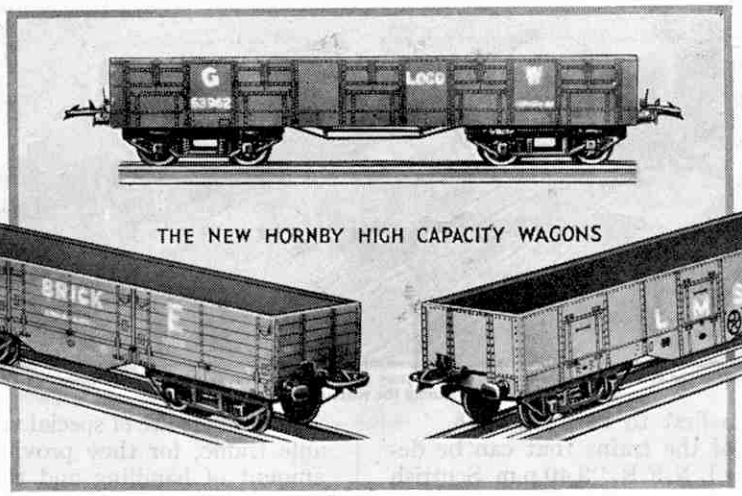
The cleaning and examining of rolling stock and accessories is equally important if the best results are to be obtained. A little cleaning here, a little adjustment there, and a spot of Meccano Oil or Graphite Grease on the bearings frequently work wonders with a wagon or signal that does not move easily. Operations such as those briefly detailed above will be found interesting, and the results will repay the miniature railway owner for his trouble.

New Hornby High Capacity Wagons

By "Tommy Dodd"

THREE exceptionally interesting No. 2 High Capacity Wagons have been added to the range of bogie goods vehicles in the Hornby Series. The new vehicles will be very popular with Hornby Railway owners, for they are extremely realistic in appearance, incorporating several features that have not previously been included in the design of Hornby No. 2 Goods Stock, and their use will enable attractive features of modern goods practice to be reproduced in running operations.

The new Wagons are finished by means of the tin-printing process, which allows the reproduction of so much of the detail that appears on real wagons, and are handsome in appearance. The accuracy in detail of these new vehicles indeed reaches a very high standard, as the illustration on this page shows. The bogies fitted are of the usual No. 2 type, but these have been improved by the addition of axle-boxes and by the provision of die-cast spoked wagon wheels. These two features in conjunction add considerably to the ease and steadiness of running of the Wagons. Hornby Automatic Couplings of course are fitted, and the underframe equipment of the new Wagons is completed by standard oval-headed buffers, as frequently used on bogie stock of this kind.



The L.N.E.R. vehicle represents the well-known L.N.E.R. timber-bodied 50-ton brick wagon. Its main purpose is clearly indicated by the word "Brick" that appears prominently on the sides, although the wagons also can be used for road metal, iron-stone and other heavy traffic. On the prototype the sides are divided into three sections, each section being arranged to drop in a similar manner to the side doors of an ordinary wagon, and the necessary support between the adjacent ends of these sections is obtained by pressed steel stanchions attached to the underframe. The representation of this feature has been carried out very well in the printed design on the miniature Wagon, the three sections with the stanchions, hinges and strapping details all being shown. The necessary bolt heads also are included, and even such minute details as the pins and chains for securing the hinged sections in place are shown. There also are stop plates on each of the door sections, with corresponding fittings on the solebars, the purpose of these in actual practice being to prevent the doors being damaged when let down.

The lettering and similar items are completely carried out, the Company's initials "N.E." being shown in large characters, together with the running number, tare weight and the capacity of the vehicle. The latter, 50 tons, represents the respectable load of some 20,000 bricks.

These wagons are particularly associated with the brick traffic conveyed by the L.N.E.R. from the Peterborough district, where there are numerous brickfields, to King's Cross and other parts of the system. Many of the wagons are fitted with automatic brakes and can therefore be run at express speeds. An up "brick express" is in fact operated regularly from Peterborough.

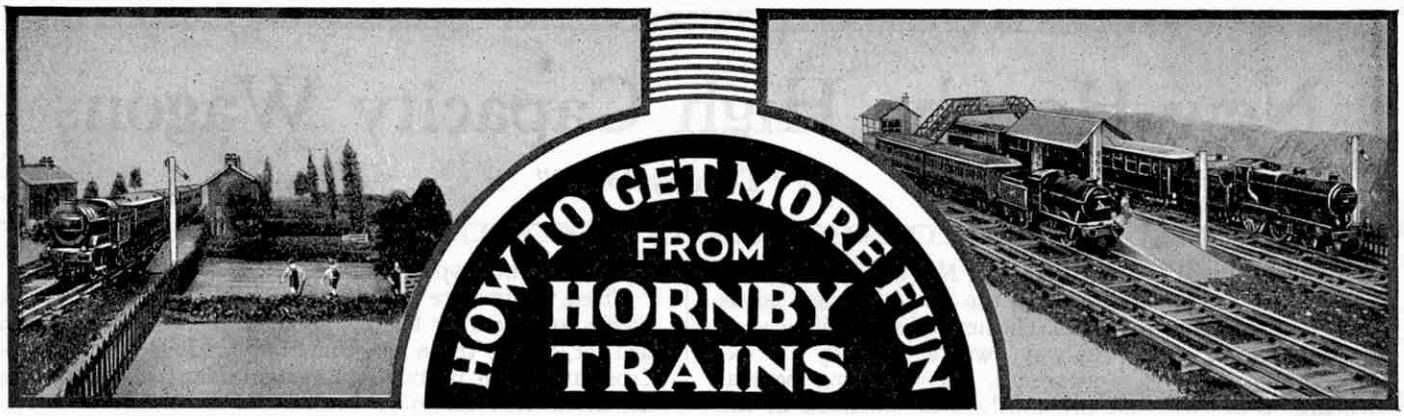
The Hornby L.N.E.R. High Capacity Wagon is finished in the correct colours of the prototype, the red-brown shade used on the L.N.E.R. for brake-fitted and "piped" freight vehicles.

The Hornby G.W.R. High Capacity Wagon represents the all-steel 40-ton wagon used for the conveyance of the Company's locomotive coal. It is interesting to note that in the sides of this wagon there are five openings, each fitted with a drop door to the lower part and double doors opening sideways above it. The addition of the upper doors is a comparatively recent feature, so that the Hornby Wagon represents the G.W.R. 40-ton "loco coal" vehicle in its most recent form.

Although this Hornby Wagon is similar in outline and construction to the L.N.E.R. Brick Wagon, its design includes the underframe stays that are a prominent feature of the real G.W.R. vehicle. These fittings are not incorporated in the Hornby High Capacity L.M.S.R. and L.N.E.R. Wagons, the underframes of which are made deeper between the bogies.

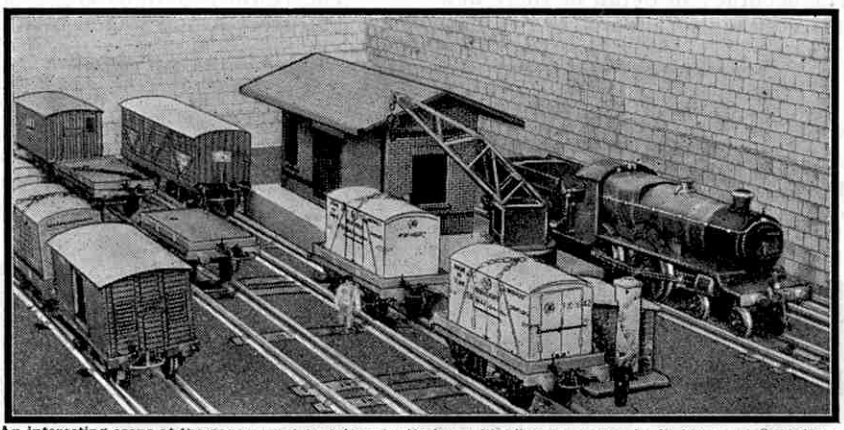
On the Hornby G.W.R. Wagon the various details characteristic of Swindon practice are all reproduced. The hinges and other door fittings, together with the rivets that secure the various parts, are all shown, and altogether the effect is very convincing, especially as the Wagon is finished in the dark shade of grey used for G.W.R. goods stock. The familiar initials "G.W." appear on each side, together with the tare weight, the running number, and the word "Loco," an abbreviation that suggests the purpose of the vehicle.

The Hornby L.M.S.R. High Capacity Wagon represents another variation of the same general type, having three drop doors on each side. The prototype is the 30-ton all-steel wagon developed for the conveyance of locomotive coal and similar duties, on the Midland Division. The strapping, corner plates and other details are shown, and the whole of the tinprinted features show up well on a background of light grey, as used for L.M.S.R. freight vehicles. A striking feature that adds greatly to the realism is the reproduction on each side of the wheel for the use of shunters in setting or releasing the hand brake.



CONTAINER TRAFFIC ON HORNBY RAILWAYS

IN the "*M.M.*" last month "Tommy Dodd" described in detail four new Containers that have recently been added to the Hornby Series, giving also brief suggestions for their use. In this article other ways in which Container traffic on Hornby Railways can be operated are explained and illustrated. The use of containers in actual practice has developed to a surprising extent in recent years, particularly in connection with the numerous fast freight services that are operated by our railways, and the reproduction on a miniature scale of services of this kind is the first to be dealt with.



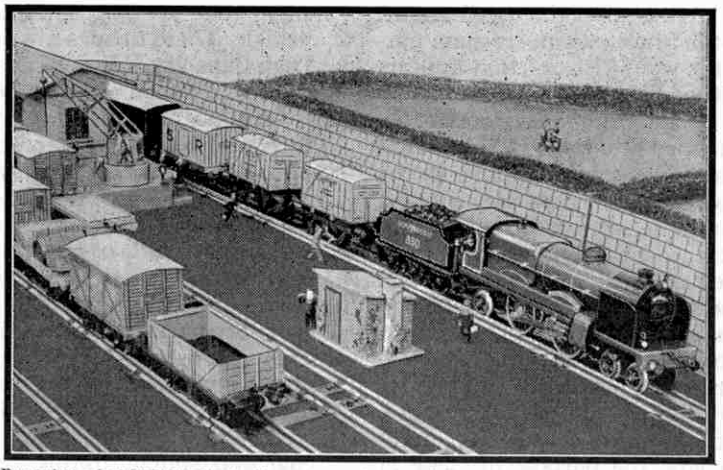
An interesting scene at the goods depot on a Hornby Railway. Flat Trucks with G.W.R. Insulated Containers are prominent among the various items of rolling stock.

Among the best known of the trains that can be described as freight flyers is the L.N.E.R. "3.40 p.m. Scottish Braked Goods." This provides a rapid service between London, intermediate stations, and Scottish destinations, delivering its freight in Edinburgh and Glasgow early on the morning following its departure from King's Cross. It has long been one of the fastest freight trains in the world and therefore is worthy of reproduction on a miniature L.N.E.R. system.

In making up a "3.40 Scotsman," as this train is often called, on a Hornby Railway, L.N.E.R. Containers loaded on the appropriate Flat Trucks should be prominent. The rest of the train may consist of various vans, with perhaps on ordinary Wagon or Open Wagon B with its load shrouded in a Hornby Wagon Tarpaulin, the whole being completed by an N.E. Brake Van.

Motive power will depend on the resources of the system; on larger layouts an E320 or E220 Locomotive can be used, the latter in particular representing the standard practice of the L.N.E.R. Passenger locomotives are being used to an increasing extent to-day on fast freight services and this is a matter of great convenience on a miniature railway. The E120 Special Locomotive is a very suitable one for fast freight work, and in fact for mixed traffic duties of every kind. It can be used therefore to represent the "K.3" 2-6-0s of actual practice, or the 2-6-2 "Green Arrow" locomotive that forms the latest development on the L.N.E.R. for this kind of duty.

Containers are of special value in the transport of perishable traffic, for they provide conveyance with the least amount of handling and this avoids delay and possible damage. The Containers of the Hornby Series include two of the kinds used for perishables; these are the S.R. Ventilated Container, and the G.W.R. Insulated Container. The former is particularly well-known in connection with the various fast trains that come up nightly from the West Country bearing their perishable freight for the London markets.

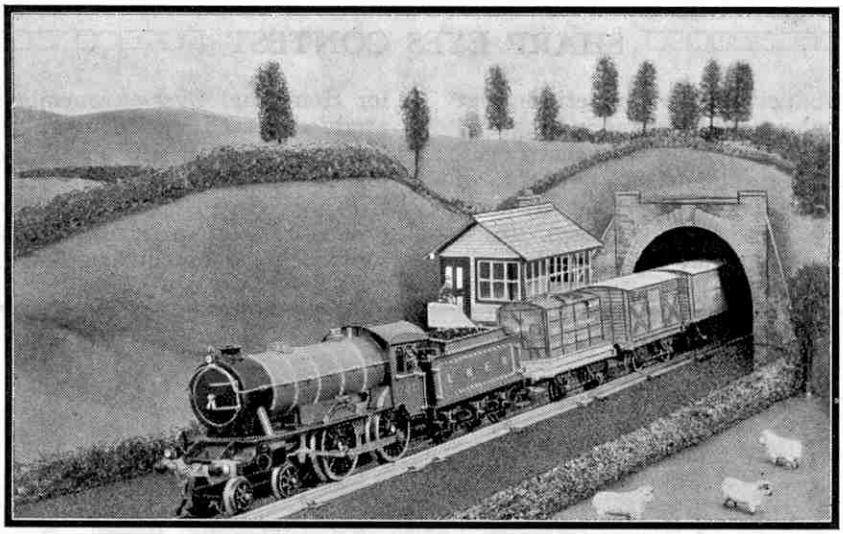


Preparing a fast freight train for its run on a miniature S.R. system. The train represents one of the numerous express goods services that are run for the conveyance of perishable traffic.

Readers will no doubt remember the run described by "*A Railway Engineer*" in the article "*On the Footplate of a Night Goods*" that appeared in the "*M.M.*" for January, 1935. This was on the 7.38 p.m. from Exeter, the chief train for London market traffic, which has connections from most of the Western stations. It stops at Templecombe for connections from East Devon and from the Somerset and Dorset Joint Line, and at Salisbury; thence it runs to Nine Elms, the chief S.R. depot in London for West Country freight traffic. The rostered load

is 55 vehicles, 15 of which fitted with continuous brakes are next to the engine.

A "Market" freight flyer in miniature would be an interesting train to operate on a Hornby layout representing the S.R. The chief freight of the real "Market" train is fresh meat. S.R. Ventilated Containers on Flat Trucks are exactly what is required for this traffic, with perhaps an S.R. Refrigerator Van in its characteristic pink colour. An S.R. Luggage Van also can be made use of, either the No. 2 bogie type or the four-wheeled No. 1. On this, as on other trains of this kind, the Open Wagon "B" or an ordinary No. 1 Wagon covered with a tarpaulin will be quite suitable and realistic.



The L.N.E.R. "3.40 Scottish Braked Goods" in miniature. A Flat Truck carrying one of the new Hornby L.N.E.R. Goods Containers is attached next to the engine.

Perhaps the most suitable locomotive of the Hornby Series for these S.R. West Country "Market" trains are the E320 and No. 3C types according to whether the layout is electric or clockwork. This type of engine can be used very well to represent on a Hornby layout the big "S.15" and "H.15" fast freight engines of actual practice. The handy 2–6–0s of various classes also take a part in the working of S.R. express goods trains, and on Hornby layouts these engines can be represented by the E120 or No. 1 Special Locomotives.

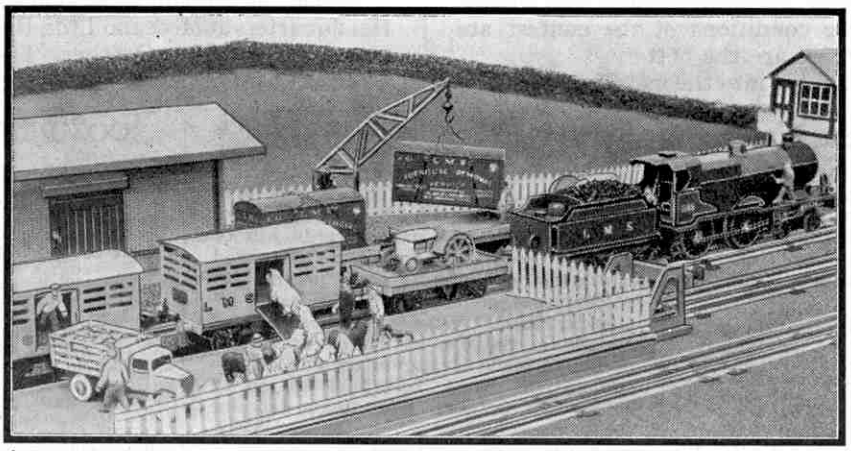
The G.W.R. insulated container is particularly intended for the conveyance of frozen meat imported from abroad, and similar traffic. A complete train of Flat Trucks carrying Hornby G.W.R. Insulated Containers would be an interesting sight on a miniature railway. Alternatively a train consisting partly of these, and partly of the well-known Hornby Refrigerator Vans with G.W.R. lettering, could be assembled to form a miniature "Meat Special." The G.W.R. is well-known for its custom of bestowing names not only on its special types of vehicles, but on its freight trains also. Thus there is *"The Meat,"* the purpose of which is indicated by its title, that runs regularly from Birkenhead to Smithfield.

For such trains in miniature a Hornby G.W.R. Insulated Container is specially suitable and the inclusion of a named freight train in the working timetables of a miniature layout would add considerably to the interest of operations. The G.W.R. code name for refrigerator vans incidentally is "Mica. B," the word "Mica" being suggestive of the insulated construction of these vehicles.

"Hall" class engines are particularly associated with these duties on the G.W.R., but other 4–6–0 classes, and of course the "Moguls," also are to be seen on such trains. On Hornby layouts the E320 and E220 Specials or the corresponding clockwork Locomotives can be used to represent the named classes, with the E120 or No. 1 Special as the counterparts in miniature of the "Moguls."

The Hornby L.M.S.R. Furniture Container makes possible various operations of a particularly interesting kind. Mounted on an L.M.S.R. Flat Truck it can of course be conveyed by passenger or freight train as required in the ordinary course of traffic. Alternatively several of them can form a "special" for the conveyance of a large consignment; the imagination of Hornby Railway owners will enable them to devise various reasons for the running of trains of this kind.

Perhaps the most interesting uses of the furniture container are in connection with the "removal in bulk" of the whole of the stock and equipment of a farm or estate. By means of container transport, in conjunction with suitable rail and road vehicles, such removals can be made practically from one end of the country to the other with little difficulty, provided that arrangements for feeding and watering farm stock on the way are made. On a Hornby layout some very good fun can be had carrying out in miniature wholesale removals of this kind, and the lower illustration on this page shows typical loading operations for a "farm removal" in progress. Hornby Furniture Containers will be required to carry the "household effects," and they will invariably be loaded on to Flat Trucks intended for their conveyance. This type of Wagon also will be useful for carrying such items as the Tractor, Dinky Toys No. 22E. When loading operations are completed, the load on a Wagon of this kind should be covered with a Hornby Wagon Tarpaulin.



A farm removal on a Hornby Railway. L.M.S.R. Furniture Containers are employed for the "household effects," while the live stock and equipment are provided with appropriate vehicles.

The use of the Farmyard Animals of Dinky Toys Set No. 2 and of the components of the Shepherd Set, Dinky Toys No. 6, is an obvious suggestion for representing the farm stock. These can be loaded into Hornby No. 1 or No. 2 Cattle Trucks.

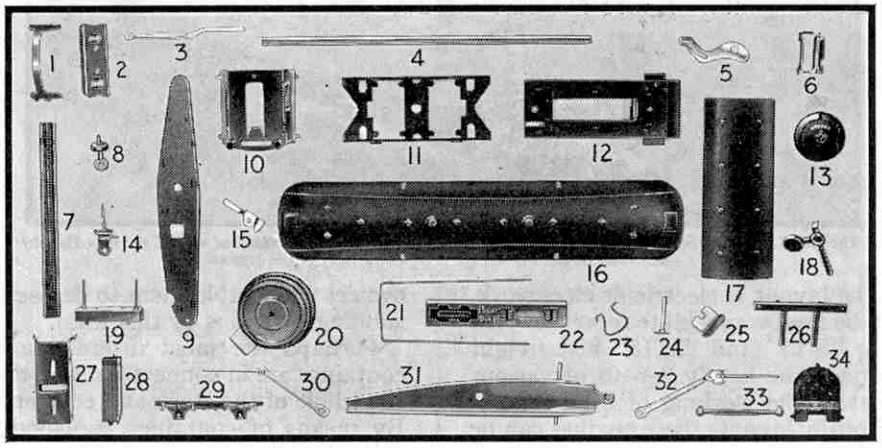
Join the Hornby Railway Company and become eligible for the competitions announced on this page.

H.R.C. COMPETITION PAGE

Join the Hornby Railway Company and become eligible for the competitions announced on this page.

SHARP EYES CONTEST

This month we are introducing a new competition that we are sure H.R.C. members will find fascinating and enjoyable. It is not difficult, requiring only sharp eyes, combined with a reasonable amount of knowledge of Hornby Trains. In the illustration on this page, 34 parts used in making Hornby Products are shown. These should be recognised without difficulty by Hornby Train enthusiasts, and competitors are invited to discover the identity of each part illustrated, to give its name, and to state on which locomotive, coach or other component in the Hornby Series it is to be found.



When a competitor has discovered what each figure represents, or has identified as many as possible, he should make a list of them in numerical order on a postcard, giving with each the name and other information required. No descriptive matter is required, and solutions should be brief, containing only the details asked for. Provided the conditions of the contest are observed, the shorter these are the better.

The Contest will be divided into the usual two Sections for Home and Overseas members. Three prizes will be awarded in each Section, and in each case those to whom they are awarded will be able to choose any products manufactured by Meccano Ltd. to the value of 21/–, 15/– and 10/6 respectively. In addition, there will be several consolation prizes, and these will be awarded to competitors whose entries show merit, but do not quite reach the standard attained by the winners of the chief awards. In the event of a tie for any prize, neatness and style in setting out solutions will be taken into consideration by the judges when making their final decision.

Postcards on which solutions have been written, or envelopes containing entries, must be marked *"H.R.C. October Sharp Eyes Contest"* in the top left-hand corner. Each entry must have the name and full address of its sender clearly marked on it.

Entries in the Home Section must be posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, on or before 31st October. The closing date in the Overseas Section is 30th January, 1937.

Questions Contest No. 8

This contest is the eighth of a popular series in which questions on railway matters have been set. The questions are 12 in number, and form a simple test of the knowledge of H.R.C. members of interesting features of railways and railway working.

(1) On which railways in the British Isles are Pullman Cars run? (2) Some wagons are fitted with red brake pipes instead of black. What is indicated by this? (3) What does a diamond-shaped sign attached to a signal post mean? (4) What does a white diagonal painted on a wagon side indicate? (5) What is a sand-drag? (6) The levers in a signal box are usually painted different colours. What are they, and what type of lever does each colour represent? (7) Between which two towns does the L.N.E.R. operate the longest through coach journey, and what is the distance covered? (8) In what year was the Severn Tunnel opened for traffic? (9) What are catch points for? (10) What is a "Tommy Dodd"? (11) Which railway or railways operate slip coaches? (12) Who are the owners of the Forth Bridge?

There are two sections in the contest—Home and Overseas—and to the senders of the three best sets of answers received in each will be awarded Meccano or Hornby Train products to the value of 21/–, 15/– and 10/6 respectively.

Answers should be written on one side of paper only, on the back of which must appear the competitor's name, full address and his H.R.C. membership number. It is not necessary to go into great detail; provided the conditions are satisfied, the shorter the answers are the better. If more than one competitor sends in an all-correct set of answers, the prize awards will be made to those whose entries are submitted in the nestest or most novel manner.

Envelopes containing entries must be marked *"H.R.C. October Questions Contest No. 8"* in the top left-hand corner and posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, on or before 31st October. The closing date for the Overseas Section is 30th January, 1937.

COMPETITION SOLUTION
"June Dream Journey Contest"

This contest aroused much interest among H.R.C. members. It also left us with no doubt that they are wide awake, for between them the competitors tracked down every error in the story reproduced in the June issue, in spite of the fact that many of these were cunningly concealed. In the space at our disposal it is impossible to give a detailed list of the errors, but it is of interest to mention that the winner of the first prize, J. C. Button (10335), Crewe, succeeded in discovering 79 mistakes.

COMPETITION RESULTS

HOME

August "Mystery Stations Contest."—First: W. Lobb (11765), Broadley, Rochdale. Second: D. H. Wakely (17486), Cheam, Surrey. Third: O. J. Otway (48585), Farnham, Surrey. Consolation Prizes: D. D'Arcy (34560), Padiham, Nr. Burnley; J. C. Button (10335), Crewe, Ches.; C. W. Lex (14033), Kingston-on-Thames; R. H. Sedgwick (39165), Cricklewood, London, N.W.2.

August "Railway Photo Contest."—First: C. Spencer (44179), Sheffield, 6. Second: D. Fear (18477), Taunton, Somerset. Third: E. W. Oglethorpe (46851), Harrow, Middlesex. Consolation Prizes: A. Banwell (33434), Oxhey, Watford, Herts.; H. W. West (99), Newport, Mon.; V. L. Breeze (2134), Lewes.

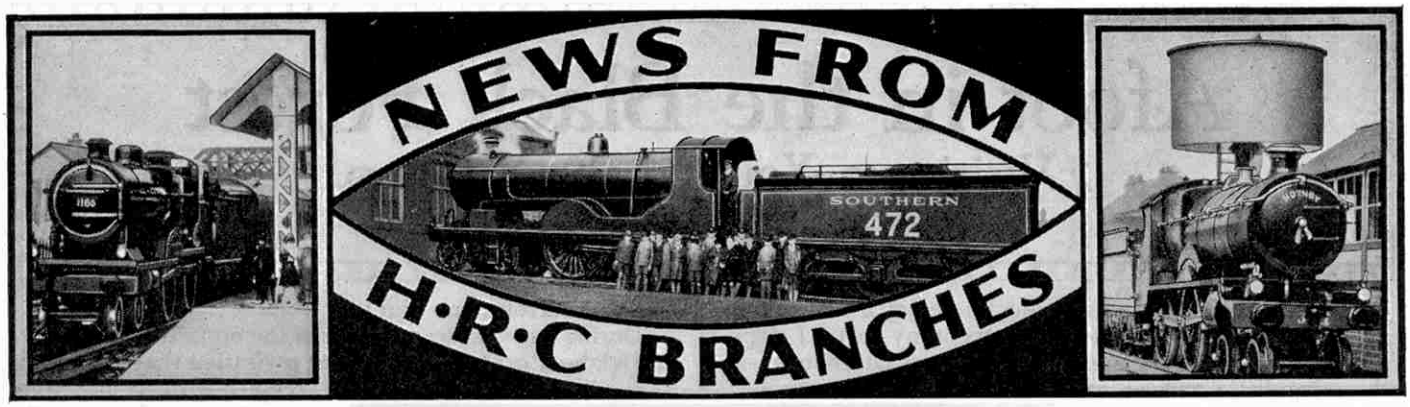
OVERSEAS

April "Signalling Contest."—First: H. R. Hondelink (25394), Nada-Ku, Kobe, Japan. Second: G. E. Schulz (15425), Coromby, Victoria, Australia. Third: H. C. Key (24764), Calcutta, India.

April "Railway Photo Contest."—First: R. Pearson (29199), Richmond, E.1, Victoria, Australia. Second: P. N. Roy, Calcutta, India. Third: W. S. Eagle (31779), Bombay, India.

May "Locomotive Shadows Contest."—First: R. A. Wragg (7913), Bandikui, Rajputana, India. Second: W. B. Moore (20918), Toronto, Canada. Third: I. Brough (9112), Preston, Australia. Consolation Prizes: D. Parker (38595), Brussels, Ontario, Canada; A. McIntyre (30925), Winnipeg, Canada; H. Bennett (10615), Auckland, New Zealand.

May "Railway Photo Contest."—First: R. B. McMillan (9592), Melbourne, Australia. Second: F. D. Aria (12362), Tardeo, Bombay, India. Third: H. Bennett (10615), Auckland, New Zealand. Consolation Prizes: J. Jasper (42664), Manly, Queensland, Australia; G. E. Schulz (15425), Coromby, Victoria, Australia; A. A. Boult, Wellington, New Zealand; R. Myburgh (37538), Claremont, Cape Province, South Africa.



Branch News

SUTTON COLDFIELD.—During the Summer months Hornby Speed Boat meetings were popular and some interesting events were held. These meetings are being continued, although with the commencement of the miniature railway "season" the operation of Hornby trains forms the chief interest. Future arrangements conform to the regular programme that has proved so satisfactory in the past. Secretary: G. C. Low, 272, Boldmere Road, Erdington, Birmingham.

ST. STEPHENS (SALTASH).—Further outdoor games meetings have been held. At the indoor meetings the reconstruction of the track has made good progress, the old formation being entirely taken up and the rails relaid to a new design. This has necessitated the rebuilding of the baseboard in certain places. Members have indulged in Table Tennis and other games at recent meetings, and attendance continues to be satisfactory. Secretary: B. Braund, 9, Homer Park, Saltash.

WATERLOO (DUBLIN).—The progress of the Branch generally and the operation of the Branch layout continue to be satisfactory. An interesting development has been the installation of a single line branch in connection with the main line system. This is laid out in a similar manner to the real Kent and East Sussex Railway between Headcorn and Robertsbridge. Several locomotives have been allocated to operate the miniature branch line, and these bear names taken from suitable prototypes of actual practice. The passenger and goods rolling stock provided for the branch system are kept separate from the stock used in main line running. Secretary: S. B. Carse, 38, Oakley Road, Ranelagh, Dublin.

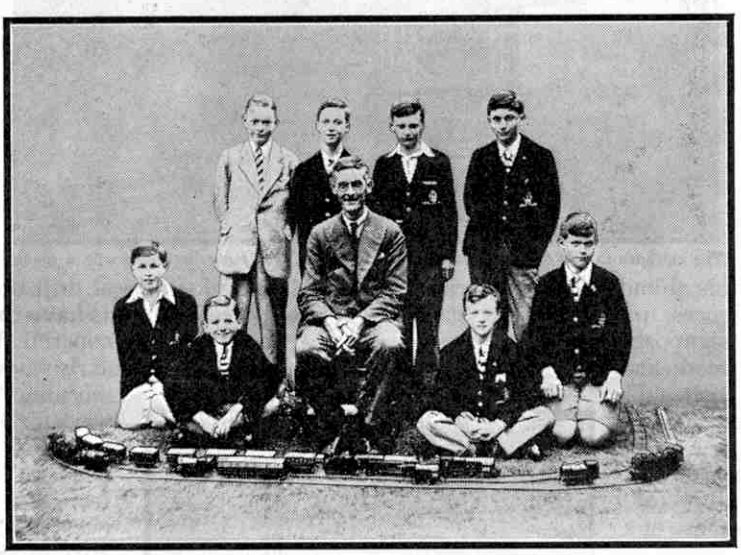
THE PRIORY (HIGH WYCOMBE).—A new layout plan has been developed that differs slightly from the arrangement previously in use. The doubling of the track in one section has added considerably to the convenience of operation. Great attention is paid to scenic and other details, and a feature of one of the terminal stations is the provision of a row of Dinky Toys Telephone Call Boxes. The first stage of electrification has been completed with satisfactory results. Timetable working is carried out successfully, and it has been found that other methods of operation tend to cause congestion on the line. Several members made a tour during August of the North Eastern Area of the L.N.E.R. The operating practice in various centres was observed with keen interest. Train working at local stations in the neighbourhood of the Branch premises is regularly watched. Secretary: J. T. Cosgrove, 54, Priory Road, High Wycombe, Bucks.

NEWTON ABBOT.—Good progress is being made in recruiting. A Branch Library is being formed, and members are busily engaged in collecting suitable interesting literature for it. Owing to its situation the Branch takes special interest in G.W.R. matters, and it is proposed to compile an engine book for the use of Branch members giving details of all G.W.R. locomotives from 1895 up to date. It is hoped to visit the Newton Abbot locomotive sheds and marshalling yard of the G.W.R. in the near future. Secretary: H. W. Tompkins, 15, Union Street, Newton Abbot, South Devon.

ARDSLEY.—The Branch layout now incorporates about 135 ft. of main line track. Considerable interest is shown in the operation of joint L.M.S.R. and L.N.E.R. services. A refinement of interest has been the fitting of suitable clips to all goods rolling stock in which small labels can be fitted showing the destination of the individual vehicles. Passenger trains are operated to timetables and their actual arrival times are entered up, together with explanations of any undue delays. Younger members of the Branch undertake duties as shunters and have also formed the breakdown gang. Future arrangements include the provision of block telegraph instruments and telephones on the L.M.S.R. section of the layout, and it is proposed also to introduce a motor train for shuttle services between Sheffield and Barnsley. Secretary: G. Etherington, 3, Oxford Street, Ardsley, Barnsley.

WHITGIFT SCHOOL.—In a novel competition held recently, about 30 types of locomotives had their names, numbers and group lettering covered up and competitors had to identify the locomotives and to give as many important particulars as possible. Several meetings have been devoted to railway operations, and have included timetable working. A visit has been paid to the works of Metal Propellers Ltd., Croydon, where the party had a most interesting time. Secretary: J. A. Watson, 23, Addiscombe Avenue, Croydon, Surrey.

NORTHAMPTON.—Visits enjoyed by the Branch recently have included one to the factory of Bassett-Lowke Ltd., where the firm's showroom and the special department dealing with ship models were inspected. The L.M.S.R. Motive Power Depot at Wellingborough also has been visited, and members were conducted through the running sheds, fitting and repair shops and the forge, and inspected the coaling stage and water softening plant. The footplates of several locomotives were examined with great interest, particularly those of two of the "Garratt" articulated locomotives stationed at the depot for use on heavy main line coal trains. Secretary: D. K. Adams, 8, Cedar Road, Northampton.



Members of Sutton Coldfield H.R.C. Branch No. 303 with their Chairman, Mr. G. Harper; Secretary, C. C. Low. This Branch was incorporated in February of this year and is making satisfactory progress. Track meetings provide the chief interest of indoor meetings, and outdoor meetings for the running of Hornby Speed Boats also are held.

Branches in Course of Formation

The following new Branches of the Hornby Railway Company are at present in process of formation, and any boys who are interested and desirous of linking up with this unique organisation should communicate with the promoters, whose names and addresses are given below.

LEICESTER—J. E. Duggan, 4, Belton Close, Park Estate, Leicester.

NORTHWICH—H. Tomlinson, 44, Northway, Winnington, Northwich, Ches.

WEST HADDON—M. Bush, "Stonelea," West Haddon, Nr. Rugby.

Branch Recently Incorporated

312. SWAN (KIDDERMINSTER)—A. Hamblin, Black Bull Hotel, Swan Street, Kidderminster.

Afoot in the Black Forest

Visiting a Youth Labour Camp

By J. M. S. Risk, B. Com.

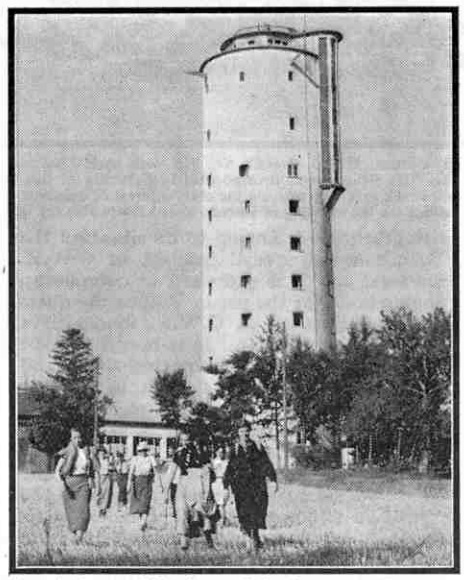
LAST year I was fortunate enough to enjoy a tour of the Black Forest. With other members of my party, I stepped out of a train one sunny afternoon at Ottenhofen, a charming little village in the Northern Black Forest, and with our rücksacks on our backs we made a short day's walk up to Mummelsee, a lake that occupies the crater of an extinct volcano.

The days that followed were full of interest. As we tramped along we would see picturesque carts drawn by oxen moving slowly up a narrow road to some upland farm; then we would pass a party of Hitler youth, complete with Nazi emblems and short bayonets. The people we met wore quaint costumes and had many pleasing customs. Living as they do, surrounded by trees, they are adepts at utilising this abundant raw material in countless different ways. Fences, paths, bridges, gates, houses, carts, water troughs, signposts, clocks, farm implements—all are made from wood; and the people have a happy knack of exercising their skill for the benefit of the visitor. An attractive little saw mill we came upon near Todtnauberg was evidence of this. It is only about 2 ft. high, and its mill wheel revolving under the impulse of a jet of water from above drives a vertical saw blade for cutting up miniature logs.

The entrance to a Work Camp in Southern Germany. The sentry is armed with a spade.

We left the Black Forest by way of the Feldberg, or "field-mountain," its highest point. As its name implies, this mountain is completely covered with grass, although it is over 450 ft. higher than Ben Nevis, the highest mountain in Great Britain. At its summit there is a restaurant.

The second part of our trip was spent at Staad, where there is a water tower from which the higher parts of Constance are supplied with water. We passed two nights in this tower, for its seven lower storeys form a most excellent youth hostel. From the seventh floor an external spiral staircase, shown in the lower illustration on this page, leads to the top of the tower. There is no lift, but energetic visitors who climb up to the summit are amply repaid by a magnificent view of Lake Constance and the surrounding country.



A water tower at Staad, near Lake Constance. The lower portion is used as a youth hostel.

During our visit we were given the opportunity of visiting a labour camp for youths, an invitation that we readily accepted. All young Germans now spend six months in such a camp doing manual labour, followed by their army service. We were shown through their barracks, at the gate of which there stood a sentry with a spade over his shoulder. We noticed that there was barbed wire round about the building. The rooms themselves appeared to be spacious, and on the walls of the living room were to be seen team slogans, such as "Struggle," "Faith" and "Justice."

According to a notice in the hall reveille is at five o'clock, but we were told later by members of the camp that in reality it was at 4.30 a.m. Physical drill occupies the first 20 min., and before breakfast beds have to be made and a visit paid to the wash room, the concrete floors of which do not impress one as being particularly inviting so early on a cold winter morning. Second breakfast comes after work for 3½ hrs., and at 1 p.m. all return to camp in time for dinner at two o'clock. The members are free for the rest of the day, with the proviso that everyone has to be in bed not later than 10 p.m. Saturday afternoon and the whole of Sunday also are free time. Board and lodging of course are provided, and in addition a nominal payment of about threepence a day is made. Bathing parades are held twice weekly on the shores of Lake Constance.

The members of this camp, about 150 in number, were engaged on the preparation of a piece of waste ground for a housing scheme. This involved the construction of roads and drains, and later houses for the accommodation of working class people were to be built on the site. The youths worked in groups under the direction of qualified artisans, and all seemed to be quite content with their lot. New members pass through a preliminary period during which their hours of work are gradually raised from two to the full number.

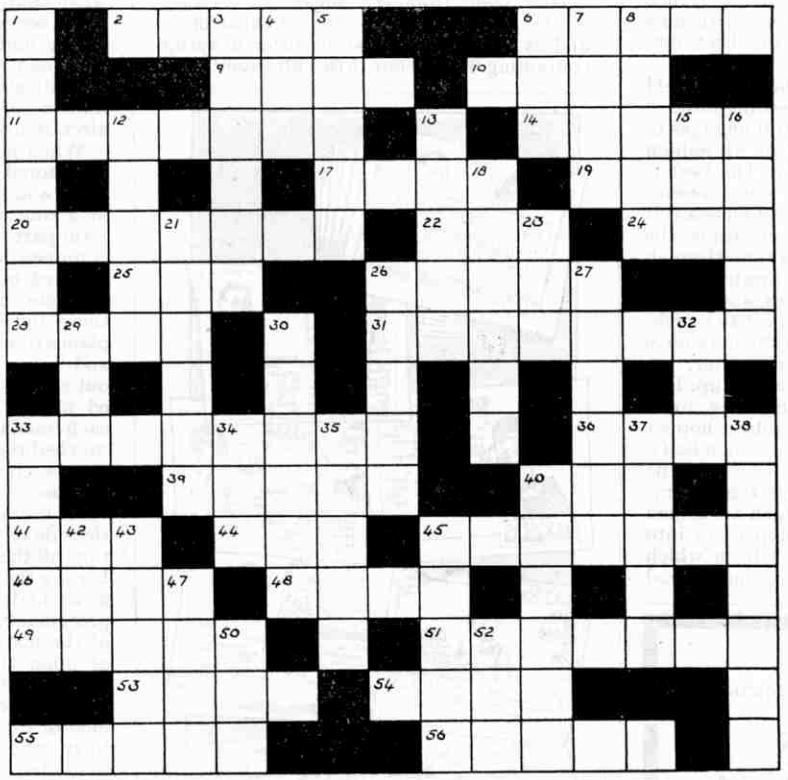
From Constance we sailed up the lake to Friedrichshafen, where the Zeppelin airships are built.

Competition Corner

OCTOBER CROSSWORD PUZZLE

CLUES ACROSS

2. Reason
6. Sea
9. Burden
10. Gift
11. Rushing stream
14. Poisons
17. Point of the compass
19. Lake
20. Seaman
22. Beverage
24. Shade of brown
25. Beast of burden
26. Discovers
28. Lofty
31. Shoot out
33. Conspirator
36. Gasp
39. Prepare
40. High mountain
41. Liable
44. Consume
45. Withhold
46. Claw
48. Solitary
49. Penetrate
51. Supplement
53. Retreat
54. Excuse
55. Incline
56. Country house



CLUES DOWN

1. Endeavour
3. Gathers
4. Cathode
5. To provide
6. Marsh
7. Wander
8. Implant
12. Rustic
13. In motion
15. Period
16. Understanding
18. Occupant
21. Isolated mass
23. Total
26. Alarms
27. Elementary
29. Past
30. Disclose
32. Metal
33. Machine
34. Rage
35. Bar
37. Article of clothing
38. Disloyalty
40. Receptacle for ashes
42. Domestic utensil
43. Ownership
45. Kingdom
47. Incline
50. Remove
52. Climbing annual herb

All "*M.M.*" crossword puzzles have enjoyed exceptional popularity, principally, no doubt, because they are set for amusement rather than strenuous competitive effort. This month's puzzle will be found to follow the lines of those set in previous issues in that it is fair and interesting. The clues are all perfectly straightforward, and every word used can be found in Chambers' or any other standard dictionary. The rules that govern the solution of crossword puzzles are so well known that it is unnecessary to give any further explanation of the requirements of the competition.

Cash prizes of 21/–, 15/–, 10/6 and 5/– respectively will be awarded in order of merit to the senders of the four correct solutions that are neatest or most novel in presentation. The prizes will be duplicated for the Overseas section, which is open to all readers living outside Great Britain, Ireland, and the Channel Islands.

Entries should be addressed "October Crossword Puzzle, Meccano Magazine, Binns Road, Liverpool 13," and must be sent to reach this office not later than 31st October. Overseas closing date 30th January.

October Drawing Contest

Our artist readers will have been awaiting with eager anticipation the first of our new season's series of drawing and painting competitions. For the benefit of new readers, we must explain that each month throughout the coming winter we shall feature a drawing or painting competition that will provide every reader with an opportunity of displaying his artistic skill. No special subjects will be set, and the monthly prizes will be offered simply for the best drawings or paintings submitted during the month.

The entries each month will be divided into the usual two sections, A for readers aged 16 and over and B for those under 16, and cash prizes of 21/– and 10/6 will be awarded in each section. A separate set of prizes will be reserved in the Overseas section.

Entries to the October competition must be addressed "October Drawing Contest, Meccano Magazine, Binns Road, Liverpool 13," and must arrive not later than 31st October. Overseas closing date, 30th January, 1937.

Competition Closing Dates

HOME

October Crossword Puzzle ...	31st October
October Drawing Contest ...	31st October

OVERSEAS

July Sketchogram Contest ...	31st October
July Photo Contest	31st October
August Crossword Puzzle ...	30th November
August Photo Contest... ...	30th November
September Point Words Contest	31st December
September Photo Contest ...	31st December
October Crossword Puzzle ...	30th January
October Drawing Contest ...	30th January

Watch the Closing Dates:

Competitors, both Home and Overseas, are particularly requested to make a careful note of the closing dates of the competitions.

In sending entries to competitions that are divided into age groups, competitors should take particular care to mark their ages clearly on the back of the entry. It is not sufficient merely to indicate the age group, as age allowances are given to ensure equality of opportunity for the younger competitors.

COMPETITION RESULTS

HOME

August Crossword Puzzle.—1. J. K. Robinson (Dunton Bassett). 2. D. Morley Davies (Maesteg). 3. B. Hardie (Bristol 9). 4. E. Hooper (Exeter). Consolation Prize: R. Richards (London, E.5).

August Photo Contest.—The standard of entries to this competition was probably the highest that we have ever experienced and the judges had considerable difficulty in deciding the destination of the prizes. The work generally showed considerable interest of subject and high technical quality. The awards were as follows: First Prizes: Section A, A. B. Bishop (Bristol 4); Section B, R. F. Y. Randall (Oxford). Second Prizes: Section A, J. R. Tottle (Taunton); Section B, R. Bowler (London, W.4.). Consolation Prize: V. L. Breeze (Lewes).

OVERSEAS

May Photo Contest.—First Prizes: Section A, F. D. Aria (Bombay 7); Section B, E. W. Honey (Palmerston North, N.Z.). Second Prizes: Section A, K. J. Orams (Wellington, N.Z.); Section B, E. Azzopardi (Sliema, Malta).

May Crossword Puzzle.—1. J. R. Dingle (Halifax, N.S., Canada). 2. H. W. Galea (Alexandria, Egypt). 3. G. E. McKinnon (N. Sydney, N.S.W.). 4. J. A. Rodriguez (Montreal, Canada).

NOTICE TO INTENDING COMPETITORS: Entrants to drawing and similar competitions are asked to note that unsuccessful entries can only be returned if a stamped addressed cover is sent with the entry.

How Sugar is Extracted from Beet

By R. Cox

In recent years the sugar beet industry has been greatly developed in this country, and I was very pleased to have an opportunity of seeing how sugar is produced at the Felsted Factory. The beet is stored in silos of 1,000 tons capacity, and at this particular factory there are 10 of these stores. Each silo consists of a very long trough, perhaps 20 ft. in depth, along the bottom of which runs a narrow trench about 3 ft. deep. A stream of water rushing through the trench carries the beet into the factory.

On reaching the factory the beet is held up by grilles, the water proceeding onward to the filtration plant, whither it emerges to be used once more. A total of 8½ million gallons of water is used daily. The beet is lifted from the stream by a wheel, resembling a waterwheel, that scoops it on to a belt conveyor leading to a washer inside the factory. This consists of a long tank through which passes a swift stream of water that is whipped into fury by steel arms, and from it another conveyor carries the beet to a picking table, where skilled workmen remove any stones and other foreign matter.

The beet is now ready for cutting up. It is carried to the top of the building by a bucket conveyor and tipped into a hopper that automatically inverts itself when half a ton of beet is inside. This measures the amount of beet passing through the factory. The roots drop into slicers, which are armed with whirling knives that chop them into shreds, known as "cossettes," from which the sugar is dissolved out in longitudinal tanks fitted with stirring gear and filled with boiling water. The exhausted cossettes still contain 2 per cent. sugar. They are taken to another part of the building, where they are dried in ovens for use as cattle food.

The sugar solution is run into tanks. Lime is added, and carbon dioxide is then passed in until a precipitate is formed. The carbonated juice is then filtered, and the material removed by the filtration is called lime-cake. This process is repeated three times, and its purpose is to remove any earthy taste from the sugar.

The juice has 15 per cent. of sugar in it, and is next evaporated to form a syrup containing 60 per cent. After filtering this is transferred to the sugar boilers where it is boiled until the sugar crystallises out. Along with the crystals is a thick syrup. The mixture is whirled round at high speed in centrifugal machines, which separate out the best crystals of white sugar and free them from molasses and small crystals. These are taken back to the boilers, and further treatment there, followed by centrifuging, give brown sugar crystals. The final residue of the process is molasses.

After crystallising the sugar is sent to the refinery. The quantity of beet treated daily in the factory at the time of my visit was 2,000 tons. This yielded 325 tons of sugar and 150 tons of pulp, and in the season 450 men were employed in three shifts for 100 days.

According to the most recent figures the world's production of sugar from beet is about 9,000,000 tons, of which the United Kingdom produced 600,000 tons.

Aboard H.M. Aircraft Carrier "Glorious"

By E. Azzopardi

The first thing that impressed me when I visited H.M. aircraft carrier *"Glorious,"* off Malta last year, was the vastness of the decks. There are two decks, and the upper one is wider than the lower one. It has three white lines painted along its full length, one in the middle and two at the sides. These lines are to guide the aeroplanes when landing upon the deck. I was interested to see a jet of steam rising from a hole in the middle line, and I learnt from the lieutenant who was my guide that it served to indicate the direction of the wind, a matter of great importance when the aircraft aboard are about to take-off.

When not engaged in flying the aircraft are stored in vast hangars on the lower deck, and they are taken down to these one at a time by two lifts, the floors of which form part of the top deck of the ship. Fully equipped aircraft repair shops are also situated on the lower deck.

While the lieutenant was explaining these and other things to me several aeroplanes from the ship were droning overhead, and I was permitted to watch them carry out certain exercises. I was greatly interested in the landing practice, during which each machine flew so low that it almost touched the deck, but did not actually land; then each machine landed three times in succession. Special palisades consisting of wires carried on bars extend outward from the side of the ship so that if an aeroplane runs off the deck it does not fall into the sea. During the exercises a destroyer, referred to as a "finder," followed the aircraft carrier, presumably to give aid in the event of any of the machines landing in the sea instead of upon the ship.

Immediately each aeroplane touched the deck at the conclusion of the exercises, the men of the special handling party assigned to it, who had been waiting alongside the palisades, got hold of the machine and pushed it on to one of the lifts. The wheel chocks were quickly put in place, the wings folded back, and the aeroplane taken below. When the elevator ascended again a signal was given for the next machine to land; and this process was repeated until each machine was safely housed below.

The Vogue of the Miniature Camera

An old Chinese proverb says: "One picture is worth ten thousand words," and certainly holiday-makers seem to be realising the truth of this saying if one may judge by the eager way in which snaps are shown to friends. The most remarkable thing about cameras is the way in which they have decreased in size. The modern high-class camera, weighing only a few ounces and producing a negative measuring no more than 1 in. by 1½ in., is so remarkably efficient and so easy to use as to make larger instruments unnecessary except for certain special purposes.

The Zeiss Ikon Contax is a prominent example of this type of miniature camera. For this beautiful little instrument a series of 13 interchangeable lenses have been specially constructed at the famous optical works of Carl Zeiss, Jena. One of these lenses is so rapid—f/1.5—that with it instantaneous pictures can be obtained of such subjects as express trains travelling through stations at night, acrobats performing at the circus, or machinery at work in factories, all with the ordinary artificial lighting. The definition given by these lenses is amazingly keen. At a recent exhibition of enlargements one picture measured 6 ft. by 4 ft., 1,370 times larger than the original negative, and the definition was practically perfect.

The best miniature cameras of this type, fitted with very rapid shutters, are necessarily expensive, but a Zeiss Ikon miniature camera, with many of the advantages of more expensive instruments, can be obtained for as little as 18/6. This camera will take first-class photographs within its limitations, and it is constructed with the same excellent workmanship that distinguishes all Zeiss Ikon cameras, full details of which can be obtained from Zeiss-Ikon Ltd., 46, Mortimer House, Mortimer Street, London, W.1.

FIRESIDE FUN

NOT WHAT SHE WANTED

Tommy: "Mother, here is a parcel marked C.O.D."
Mother: "Tell the postman to take it back, I ordered herrings."

* * * *

Pupil: "Please teacher, I ain't got a pencil."
Teacher: "How many more times must I tell you not to say that? Listen: I haven't one, you haven't one, we haven't one, they haven't one."
Pupil: "But teacher, ain't nobody got one?"

* * * *

A young Naval officer was showing a lady friend over the ship.
"Awfully interesting," she said, "but tell me, do you close the portholes when the tide rises?"

* * * *

Mother was reproving her small son.
"You really must be more contented," she said. "You are always wishing for something you haven't got."
"Well, Mummie," pleaded young hopeful, "what else can I wish for?"

* * * *

Pat and Mike were walking along an old road in Ireland when they came to a gibbet. "Now, Pat," said Mike, "if that gibbet had its due, where would you be?"
"Arrah," replied Pat, "I'd be walking home by myself."

* * * *

Billy: "Dad, I'm going to be a detective. Can you tell me a good disguise?"
Dad: "Yes, wash your face."

* * * *

Irish motorist, puzzling over his petrol indicator. "It's at the half-way mark and I can't remember if that means half-full or half-empty."

* * * *

Little Jimmy (to old lady newly arrived, and whom he had never seen before): "So you're my grandmother, are you?"
Old Lady: "Yes, on your father's side."
Jimmy: "Well, you're on the wrong side; I can tell you that right now."

* * * *

Constable: "Stop; both your tyres are flat."
Cyclist: "I know; I let them down because the saddle was too high for me."

* * * *

Servant (to lion tamer in cage): "That grocer is here again demanding payment of his bill."
Lion Tamer: "Send him in."

* * * *

George: "Mother, may I go out in the street? Dad says there is going to be an eclipse of the sun."
Mother: "Yes, but don't get too close."

* * * *

THE CLUE

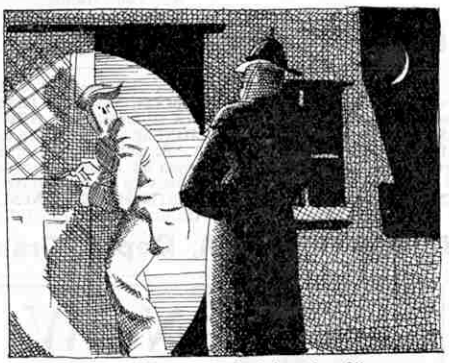
"Name of a dog," said the foreigner fiercely, as a porter dropped a trunk on his toes.
"Ow many letters?" replied the porter, who was a cross-word puzzle enthusiast.

PAST THE MARK

Lady: "You said you were so weak from hunger that you did not feel equal to work. Now that I have given you such a good dinner, surely you feel equal to doing some work in return?"
Tramp: "Madam, after your excellent repast I feel more than equal to work. I feel superior to it."

* * * *

A TALL STORY



Constable: "What are you doing there?"
Burglar: "A fortnight ago I picked up a front-door key, and now I'm trying to find out which house it fits so that I can give it back to the owner."

* * * *

Gentleman (at railway booking-office): "One first return—quick!"
Clerk: "Return to where, sir?"
Gentleman: "Why, here, you ass!"

* * * *

Little Girl: "Packet of pink dye, please."
Grocer: "For woollen or cotton goods?"
Little Girl: "It's for mother's indigestion. The doctor says she's to diet, and pink is her favourite colour."

* * * *

Dick: "Does your watch keep the correct time, old man?"
Jim: "Well, it did until I began to compare it with the radio broadcasts!"

* * * *

MacTavish: "I see ye're advertisin' life-size enlargements for 5/–."
Photographer: "Yes, sir!"
MacTavish: "Well, ah've brought along ma snap of the *'Queen Mary.'* "

* * * *

The village grocer was interviewing applicants for the post of messenger boy, and to each one he put questions to test his intelligence. "Well, my lad," he said to one bright-looking youth, "what would you do with a thousand pounds?"
The lad scratched his head thoughtfully. "I don't know, sir," he replied. "I didn't expect so much for a start."

* * * *

Workman (using pneumatic road drill): "I wish you'd stop humming, Harold. You get on my nerves."

* * * *

Speed Fiend (slowing down): "Gosh! Don't you feel glad you're alive!"
Timid Passenger: "'Glad' isn't the word—I'm amazed."

* * * *

Mother (preparing dinner): "Whatever have you done with the jelly, Tommy."
Tommy: "It was shivering, so I put it in front of the fire."

* * * *

"Won't you have a fork?"
"No, thanks, I never use forks; they leak so bad that they ain't no use."

* * * *

Old Lady: "Isn't it wonderful how these garage people know exactly where to set up a pump and get petrol!"

OF COURSE

Tom was rather inattentive, so the teacher asked him a test question. "Where was Solomon's temple?"
"On the side of his head, sir, the same as mine," replied Tom.

* * * *

Scotchman: "Doctor, what can I do to prevent seasickness?"
Doctor: "Have you a sixpence?"
Scotchman: "Yes, sir."
Doctor: "Well, hold it between your teeth."

* * * *

Bill: "I hear you are looking for work, Tom."
Tom: "Not necessarily; but I'd like a job."

* * * *

"If I'd been offered a plate wi' twa cakes on it, I'd have taken th' smaller."
"Weel, an' ye've got it," replied Jessie's greedy little brother, "so what's a' th' fuss aboot?"

* * * *

A little girl accompanied her mother into the Post Office, and thoughtfully surveyed the lady clerks behind the counter grille. "Mummy," she said after a while, "do all the people who have to go to prison come here?"

* * * *

Rastus: "Say, Sambo, what time in your life does yo' think yo' was scared de wust?"
Sambo: "Once when ah wuz callin' on a hen-house an' de farmer come in an' caught me. Boy, wuz ah scared!"
Rastus: "How are yo' shuah dat wuz de worstest yo' evah been scared?"
Sambo: "Cause de farmer grab me by de shoulder an 'say, 'White boy, wha' yo' doin' heah?' "

* * * *

The labourer at the top of the high building shouted down to his mate at the bottom, "I say, Jim. Come up here and listen!"
Slowly his mate climbed the ladder, and arrived at the top breathless. "What is it?" he panted. "I can't 'ear nothing."
"No," said the first. "Ain't it wonnerful quiet?"

* * * *

1st Girl: "Look at these cows, aren't they lambs?"
2nd Girl: "Yes, perfect ducks."

* * * *

"Terribly rough," said the lawyer on board the ocean liner.
"Well," said the farmer, "it wouldn't be near so rough if the captain would only keep in the furrows."

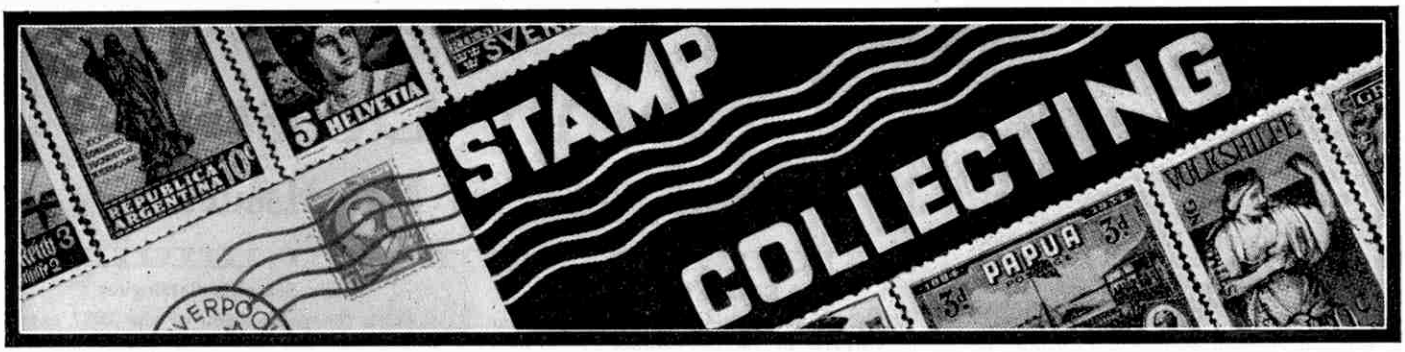
* * * *

Thomas had called on his tailor. "Isn't this bill rather steep?" he said.
"You should know best, sir," said the tailor, "for it was run up by you."

* * * *

P–LEASE C–ONSTABLE!

Small boy: "Will you go in there for me, Mister?"
Constable: "What for?"
Small boy: "I want a catalogue and the advert. said 'send a P.C.'"



THE HISTORICAL SIDE OF STAMP COLLECTING

ALL stamp collectors, whether beginners or experts, realise that the history of the civilised world since the introduction of stamps can be traced in their collections. Until 1914 this historical interest was largely confined to changes of monarchy, the accession of a new king or emperor naturally being followed by the issue of new stamps; but on rarer occasions there were also sudden changes or revolutions that led to the production of new and interesting stamps.

A French war orphan charity issue of 1917.

All previous records of this kind have been surpassed during the years since the outbreak of the Great War, and a complete collection of stamps issued since 1914 would be very extensive. An album containing it would be a guide book to history, for it would remind its owner of practically every event of importance and also of many minor happenings that now are almost forgotten. For instance, how many people still remember that in 1918 a Siamese Expeditionary Force left for Europe? Collectors who possess a Siamese stamp specially overprinted at that time with a Geneva Red Cross are almost the only people who have not forgotten this interesting event, of which they also are reminded by the existence of a series of stamps of the same country over which the word *"Victory"* is printed. The overprint is in English and Siamese.

Overprinting has always been a favourite device for devoting a stamp issue to special purposes. Readers no doubt are familiar with stamps of British colonies and dominions on which the words *"War Tax"* or *"War Stamp"* have been overprinted. This draws their attention to the practice followed during the War in many countries of increasing postal charges in order to bring in extra revenue. An excellent example is the green 1 cent Canadian stamp illustrated on this page. The presence of stamps of this class in collectors' albums helps to bring home the fact that wars are luxuries that must be paid for.

Another reminder of the difficulties caused by the War is given by the numerous charity stamps issued by European States in which distress was rampant. A very interesting example of a stamp of this kind is illustrated on this page. It is a brown 60 filler Hungarian stamp, and the inscription at the bottom shows that on it there was a premium of two korona. The purpose to which the extra charge was to be devoted is well indicated by the pathetic picture on the face of the stamp of prisoners of war behind a formidable barbed wire fence.

The first definitive issue produced by the Irish Free State.

An interesting issue of charity stamps was made in France in 1926, and one of these is the 50c. stamp illustrated on this page. The premium of 10c. was collected for the support of French war orphans.

Several existing countries were broken up and new states were created as the result of the Great War, and these changes can easily be traced by a careful examination of stamps issued during that period. A good example is the change from the Imperial Russian Empire to the Union of Soviet Socialist Republics. The last Czarist stamps were overprinted on the back in order to make them legal currency when ordinary coins were scarce, and many of them were issued by the first Revolutionary Government. A new stamp issue also was planned in order to mark the changed conditions, but before it was introduced a further revolution brought the Bolsheviks into power.

An early Soviet Russian issue.

From 1918 to 1921 no stamps of any kind were produced, the Soviet Government having abolished them in order to make the posts free. Since 1921, however, an extensive series of stamps of all kinds has appeared. These include charitable and commemorative stamps, in addition to those designed for ordinary postal use. From a historical point of view the most interesting are those on which appears the portrait of Lenin, the founder of modern Russia. The violet 5,000 rouble stamp illustrated is not one of these, but is typically Russian. It was issued in 1922 and is symbolic in character, the design being suggestive of the crafts and industries of a modern state.

A curious feature of this stamp is its large nominal value. A similar stamp issued at the same time actually had the nominal value of 22,500 roubles. At pre-war rates this would have been equivalent to about £2,400 sterling. This did not mean that the stamp was very valuable, but that the rouble was practically worthless for international exchange purposes.

A Hungarian stamp issued in 1920 to raise funds for prisoners of war in Siberia.

Perhaps the most interesting of the new States that came into existence as a result of the Great War is Czecho-Slovakia, one of the countries carved out of the old Austrian empire. The orange 60 heller stamp illustrated is a typical Czecho-Slovakian stamp. It appeared in 1919, only six months after the revolutionary Committee of Prague had issued the first Czecho-Slovakian stamp.

One of the early issues of Czecho-Slovakia.

In many respects the history of Italy after the War is as interesting as that of any country. The 5 lire Italian stamp illustrated on the next page is one of a special issue that appeared in 1923 in commemoration of the triumph of Mussolini the Fascist leader. It is bold in design, and leaves no doubt of its origin, for on each side are shown the bundles of rods, or fasces, bound round an axe, from which the name of the modern movement was taken. These rods were carried before the higher magistrates of ancient Rome as a symbol of authority.

Changes due to conquest also may be traced by means of stamps. Thus during the War British, Belgian and Portuguese troops took part in the attack on German East Africa, and overprinted stamps of all three countries were used during the campaign. Similarly, the postal changes made as the British advanced and the Turks retired in Mesopotamia form an accurate record of events in this theatre of the War.

A very interesting case occurred in the Marshall Islands in the Pacific Ocean. These were German possessions until 1914, when they were taken by the

(*Continued on next page*)

A special Canadian War Tax issue of 1915.

Stamp Collecting—*(Continued from previous page)*

Japanese and handed over to Australia. The first stamps issued after the change took place actually were German in origin and were overprinted "G.R.I." to indicate British ownership!

Nearer home than either Italy or Russia, an event that to us is of equal importance led to the introduction of an entirely new issue of stamps. This was the creation of the Irish Free State, and we illustrate one of the stamps to which the change gave rise. This is the 1d. carmine stamp, issued in 1922, the immediate successor of a series of British stamps overprinted in Gaelic characters for use in the newly created state.

The 5L. value of Italy's 1923 issue, commemorating the establishment of the Fascist Regime.

The post war stamps of Turkey and particularly the issues of 1926 are illustrative of one of the most astonishing revivals in history. At the close of the War, Turkey appeared to be at the last gasp. It seemed quite certain that no scrap of European territory would remain to her, and later she was faced with the prospect of the loss of more of her territory, this time in Asia. The genius of one man not only prevented the break-up of the country, but enabled Turkey to take effective possession of the little that remained to her of her former possessions in Europe. Through his efforts Turkey is now well governed, and is going ahead rapidly in regard to industry and to social conditions.

The higher values of the 1926 issue bear the portrait of Mustapha Kemal Pasha, the dictator who has led Turkey back into the forefront of near Eastern nations. A point of interest is that the portrait shows the present ruler of Turkey in European dress, and at the foot of the stamp there is a value inscription in Roman characters. These two features were significant of the change from the old Ottoman Regime to modern progressive methods.

Incidentally it is possible to trace in the 1926 issue an interesting compliment to the quality of British printing. The Turkish issue of 1913 was engraved and printed in London by Messrs. Bradbury, Wilkinson and Company. During the war the Turks necessarily had to go to their Austrian allies for fresh supplies of stamps. With the cessation of hostilities and the resumption of friendly trading relations between Britain and Turkey, the Turkish Government again placed their stamp printing contracts with the British firm.

In the space at our disposal in this article it is impossible to deal with more than a few of the interesting historical stories and developments that are portrayed in stamp issues. Almost every country can provide such a story, however, and readers who follow up the illustrations we have given will find a wealth of fascinating material.

Stamp Gossip

and Notes on New Issues

King Edward VIII Stamps

The whole philatelical world was taken by surprise by the appearance of the new King Edward VIII stamps on 1st September. Only five days' warning were given by the Post Office, and previously only a few Post Office officials and the printers had the slightest inkling that the stamps were ready.

The design of the new stamp is reproduced on this page. Three values only, ½d., 1½d. and 2½d., each using this design, were issued experimentally on 1st September and were available generally for five days. Subsequently supplies were obtainable on demand. A penny value followed on 14th September. Three thousand million of the stamps have been printed, which supply should be sufficient to last until the New Year.

The outstanding feature of the stamp is its simplicity. This was achieved by using the head of a specially posed photograph taken by the Hugh Cecil Studios. All the scrolls and curls of the King George and King Edward VII issues have been swept away, and the stamp relies for its attractiveness upon its simple dignity and the rich colour achieved by the photogravure process.

Another point of special interest in the stamp is that the paper bears the new Royal cipher *E 8 R* followed by a crown. The watermark runs throughout the paper and several portions of separate watermarks will be found in each stamp.

There has been much criticism of the design in quarters where the photographic basis of the stamp was not appreciated, but an official announcement made a few days after the appearance of the stamps showed that public opinion was overwhelmingly favourable.

A London Stamp Exhibition

Readers within easy reach of London will be interested to learn of the Stamp Exhibition that is being staged at the Dorland Hall in Lower Regent Street from 17th to 24th October.

Many fascinating exhibits have been arranged, including a demonstration of stamp printing and a model Post Office at which special cancellation marks will be applied to all correspondence posted at the Exhibition. Competitions will be held for the best displayed and written-up set of pictorial or commemorative stamps laid out on not more than three sheets.

Particulars of the competition and free invitation tickets of admission to the Exhibition can be obtained by *"M.M."* readers from Mr. T. Todd, Organising Secretary, 36, Camomile Street, London, E.C.3.

We thank Stanley Gibbons Ltd. for their courtesy in loaning the stamps from which the illustrations for our stamp pages have been made.

New Season's Catalogues

With the publication of the 1937 catalogues, the popular stamp season may be said to have opened officially, and those collectors who have neglected their stamps throughout the summer must make a special effort if they are to make up leeway.

As a result of the heavy demand for stamps of all varieties since the Silver Jubilee issues started, the greatest boom stamp collecting has ever known, the new large Gibbons' Catalogue shows 22,000 price alterations, affecting common and rare varieties alike. The most interesting of the new pricings are the figures quoted for Silver Jubilee stamps. These will startle the laggards who have delayed completing their sets in the hope that a dying boom would bring easier prices.

The large Gibbons' Catalogue, or, to give it its correct title, Gibbons' Priced Catalogue of the Stamps of the World, is the standard philatelical reference book. Although it now contains 1,816 pages, the price remains unaltered at 15/–.

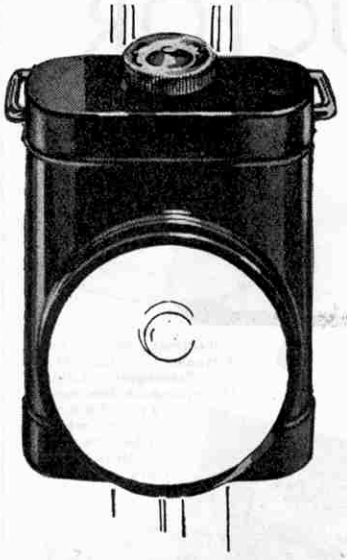
The 1937 edition of the Gibbons' Simplified Catalogue appears simultaneously with the larger one. This publication has achieved an amazing success, and has reached its fifth edition in 2½ years. The secret of its success is that it caters for the average collector, who does not wish to be bothered with minor differences of shade, perforation or watermark. The present edition comprises 1,046 pages and lists 55,376 different stamps. The price remains unaltered at 5/–.

Both of the Gibbons catalogues may be obtained from any stamp dealer or direct from the publishers, Stanley Gibbons Ltd., 391, Strand, London, W.C.2.

The new edition of the old favourite catalogue of young collectors, the Whitfield King Standard Catalogue, was published on 1st September. It retains all its familiar features, and now includes an index that will prove a popular innovation. It includes all important watermark and perforation details, but avoids the minor varieties that so frequently confuse beginners.

The total number of stamps listed in this catalogue is 62,155, of which 1,380 are new varieties. Europe heads the list with 19,727 stamps, of which 517 are new issues, and Africa comes next with 13,657 stamps, including 242 new varieties. Then follow Asia, 11,280 stamps and 127 new varieties, America, 10,822 and 371, West Indies, 3,594 and 81, and Oceania, 3,075 and 42.

The Whitfield King catalogue can be obtained from any stamp dealer price 5/–, or direct from Whitfield King and Co., Ipswich, price 5/6 post paid.



ALWAYS IN FRONT

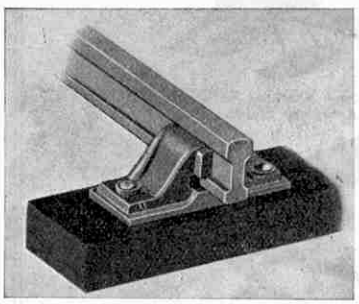
This 'Ever Ready' *electric* cycle lamp gives 18 hours of light for 8d. A twist of a switch and a clear 150 foot beam stabs the darkness ahead. There is no fuss, no mess, no blowouts with 'Ever Ready' electric lamps—they're *matchless*. Type 2036 as illustrated in stoved black enamel with nickel fittings. **2/6**

Obtainable everywhere.

EVER READY
REGD. TRADE MARK

ELECTRIC CYCLE LAMPS

THE EVER READY CO. (GREAT BRITAIN) LTD., HERCULES PLACE, LONDON, N.7



Actual Photograph of Bond's British Permanent Way.

THE CHEAPEST SUPER DETAIL PERMANENT WAY . . . .

IN ALL GAUGES FROM "OO" TO ¾" SCALE.

We illustrate above an ACTUAL PHOTOGRAPH of Bond's Super Detail Permanent Way; this is not an Artist's Impression, but a Photograph of the Model Rail and Chairs which Bond's supply. The Rail Sections faithfully reproduce the outline of the Full Size Rails, also the Model Chair—that of the Latest Standard Chair as standardised by the British Railway Companies.
If you want Super Detail for your Model Permanent Way, you can only get this with Bond's Super Detail Permanent Way Parts.

PRICES
STANDARD GAUGE "O" PARTS

Steel Rail, sheradised	per yd. **2d.**, **1/6** doz. yds.
Brass Rail	per yd. **4d.**, **3/9** doz. yds.
Cast Chairs, slide-on fit	per 100 **1/2**.
Cast Chairs, for wooden keys	per 100 **1/2**.
Keys	per 100 **6d.**
Fishplates	per doz. **3d.**
Sleepers, stained correct colour	per 100 **2/–**.
Battens, ½" × ⅜" section	per yd. **2d.**, **1/9** doz. yds.
Pins, approx. 1,000	**6d.** packet.
Track Gauge, special, with elec. chair jig ...	**9d.** each.

All Prices Plus Postage. For Prices of Gauge "OO," "1," ½" Scale and ¾" Scale, see 1936-37 General Catalogue, Price 6d. post free. It contains 198 pages, which illustrate all the requirements of the Model-maker, including a complete list of Tools and Materials.

BOND'S O' EUSTON RD. LTD.

254, EUSTON ROAD, LONDON, N.W.1

Telephone: Museum 7137 **Established 1887**

---

3 great news items for boys

1 You can now be a painter and decorator as well as a builder

BUILDEC

A fine new idea that will appeal to boys of **all** ages. You build your models with uncoloured bricks and then paint them, with special Buildec paints, to any colour scheme you like. No special skill is required and the colours can be washed off for painting again and again. You can paint your railway buildings in proper company's colours and by periodical redecoration make sure they are always bright and clean.

Box 1, plans for	12	models,	4	paints	and	brush	... ...	3/6
,, 2, ,, ,,	24	,,	6	,,		,,	... ...	6/–
,, 3, ,, ,,	36	,,	8	,,		,,	... ...	10/6

2 More realistic Tudor buildings and better value

NEW TUDOR BLOCKS

A new series of bricks with charming half-timbered designs, quaint brickwork and lattice windows, to build fascinating and realistic cottages, manors, etc., in true Tudor style. Better buildings and plans for more models!

Box 1,	18 models	... ...	...	2/6
,, 2,	36 ,,	... ...	...	5/–
,, 3,	54 ,,	... ...	...	7/6

and up to Box 6, 96 models **21/–**

3 Other reductions in Lott's Bricks prices

NEW REDUCED PRICES

LOTT'S BRICKS Original Series

Box O,	6 models	... ...	...	...	1/6
,, 1,	30 ,,	... ...	...	...	3/11
,, 2,	48 ,,	... ...	...	...	7/11

also larger Sets at **15/–, 21/–, 27/6**

LODOMO with windows, doors and bonded brickwork

Box 1,	18 models	... ...	...	...	3/–
,, 2,	50 ,,	... ...	...	...	6/6
,, 3,	72 ,,	... ...	...	...	10/6

AND don't forget these for the winter months

LOTT'S CHEMISTRY

A "home laboratory" with real apparatus and chemicals, **3/6, 6/–, 10/6, 42/–** and up to **105/–**. All spares for which are obtainable.

LOTT'S ELECTRICITY

Apparatus and instructions for carrying out many fascinating experiments, **6/–, 12/6** and **21/–**.

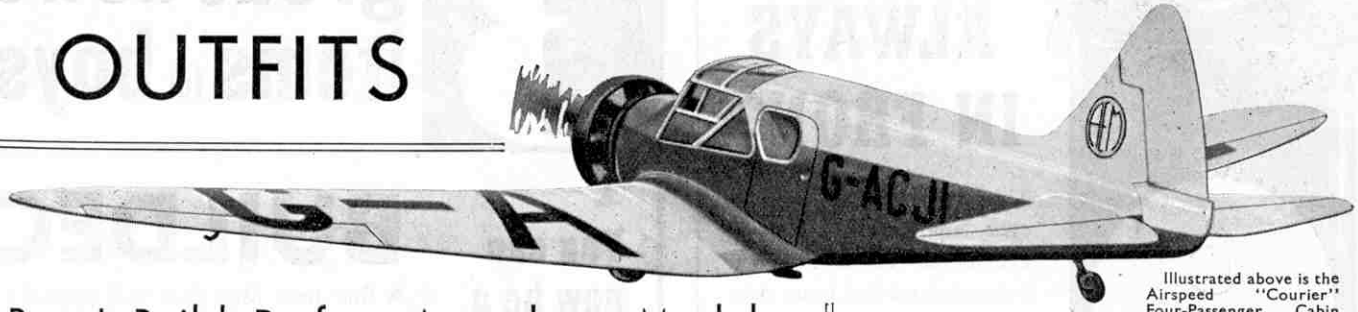
Write for full list of all Lott's Products to

Lott's Bricks Ltd. Watford, Herts.

(1d. stamp on p.c. or 1½d. stamp on letters please.)

LOTT'S BRICKS

AEROPLANE CONSTRUCTOR OUTFITS



Illustrated above is the Airspeed "Courier" Four-Passenger Cabin Monoplane—a low wing cantilever machine which has become very popular in recent years.

Boys! Build Perfect Aeroplane Models

Every boy should know how aeroplanes are designed and constructed, and should be able to recognise the different types of machines at a glance. These fine Constructor Outfits contain a range of aeroplane parts by means of which boys are able to design and build their own Aeroplanes quite easily.

The illustrated Manual of Instructions included in each Outfit shows how to build wonderful models of high and low wing Monoplanes, Biplanes, Seaplanes and many other interesting types.

PRICE LIST

STANDARD SERIES

No. OO AEROPLANE OUTFIT

This excellent new Outfit contains a good selection of Aeroplane Parts, with which realistic models of aeroplanes can be built. Price **3/3**

No. O AEROPLANE OUTFIT

An interesting range of models can be built with this Outfit, including high and low wing monoplanes. Price **4/6**

No. 1 AEROPLANE OUTFIT

Magnificent models of high and low wing monoplanes, and interesting model biplanes can be built with this fine Outfit. Price **7/6**

Aeroplane Constructor Accessory Outfit No. 1a, costing 6/–, will convert a No. 1 Outfit into a No. 2.

No. 2 AEROPLANE OUTFIT

The parts contained in this Outfit make possible a splendid range of models, including triple-engined monoplanes and biplanes and a racing seaplane. Price **12/6**

SPECIAL SERIES

No. 1 SPECIAL AEROPLANE OUTFIT

The parts in this Super Aeroplane Outfit will build over 20 realistic models of different types of aircraft. Price **12/6**

A No. 1a Special Aeroplane Accessory Outfit, Price 10/–, will convert a No. 1 Special Aeroplane Constructor Outfit into a No. 2 Special.

No. 2 SPECIAL AEROPLANE OUTFIT

This is the finest Aeroplane Constructor Outfit on the market. It contains a big range of aircraft parts, with which numerous models of practically any type of machine may be built—44 examples are shown in the Manual of Instructions that is included. Price **21/–**

All the Aeroplane Outfits are available in two different colour combinations—Red and Cream and Blue and White.

No. 1 AERO CLOCKWORK MOTOR

This long-running Motor fits into the fuselage of models made with No. 1, No. 2, No. 1 Special or No. 2 Special Aeroplane Outfits. It will rotate the propeller at high speed. Price **1/9**

No. 2 AERO CLOCKWORK MOTOR

In addition to rotating the propeller this powerful motor also drives the landing wheels of No. 1, No. 2, No. 1 Special or No. 2 Special Aeroplane Outfit models, making the machines taxi along the floor in a most realistic manner. Price **3/6**

No. 1 Aeroplane Constructor Outfit. Price 7/6

Model of a Racing Seaplane built with No. 2 Aeroplane Outfit.

Model of a Commercial Monoplane built with No. 2 Special Aeroplane Outfit.

No. 2 Special Aeroplane Outfit. Price 21/–

PRODUCT OF

MECCANO LTD. -- BINNS ROAD -- LIVERPOOL 13

MOTOR CAR CONSTRUCTOR OUTFITS

Perfect Miniature Motor Cars!

Every model-building enthusiast will be keen to have one of these fine Motor Car Constructor Outfits. Sports four-seaters, coupés, speed cars, and other perfect miniature reproductions of many different types of cars can be built with the special parts contained in them. All the models are driven by means of a powerful Clockwork Motor (included in the Outfit), giving a long, speedy and realistic run on each winding.

The motor car parts are finished in rich enamel, nickel-plate and chromium, the complete Outfits being masterpieces of miniature automobile craftsmanship.

No. 1 Motor Car Constructor Outfit.

MOTOR CAR LIGHTING SET

With this Lighting Set the headlamps of Motor Car models built with the No. 2 Motor Car Outfit can be electrically lighted. Price **2/6**

The Lighting Set contains everything necessary for equipping No. 2 Motor Car models with electric lighting, excepting a dry battery. This should be of the 3-volt type, size 1¼" x 2½" x ¾", and can be obtained from any dealer in electrical supplies.

MOTOR CAR GARAGE

The Meccano Motor Car Garage provides accommodation for any Meccano model Motor Car or other car of suitable size. It is strongly built, with imitation rough-cast finish. Inside dimensions: Height 5". Length 13". Width 7¾". Price **5/6**

No. 2 Motor Car Constructor Outfit.

No. 1 MOTOR CAR OUTFIT

The motor car models that can be built with this Outfit are perfect examples of miniature automobile construction. Think of the fine fun you could have building these wonderful models, each one of which faithfully resembles its prototype.

No. 1 Outfit is supplied with the parts finished in a delightful colour combination of red and light blue.

A powerful and long running Clockwork Motor is included.

Price **10/–**

No. 2 MOTOR CAR OUTFIT

Larger models of a superior type can be built with No. 2 Motor Car Outfit. They are all perfectly designed, beautifully finished, and the most attractive examples of constructional engineering ever produced.

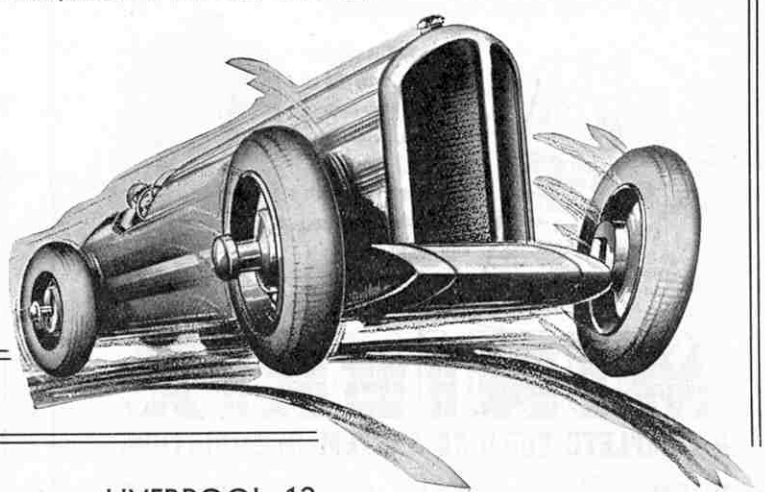
The parts in this Outfit are richly finished in red and light blue, a combination that gives a charming effect to the completed models.

A powerful Clockwork Motor giving a run of 150 feet on one winding is included in the Outfit.

Price **20/–**

Built-up models of any of the Motor Cars that can be made with No. 2 Outfit are available. Price **20/–**

IMPORTANT.—It should be noted that the No. 1 Motor Car Outfit parts cannot be used in conjunction with those of the No. 2 Outfit.



PRODUCT OF

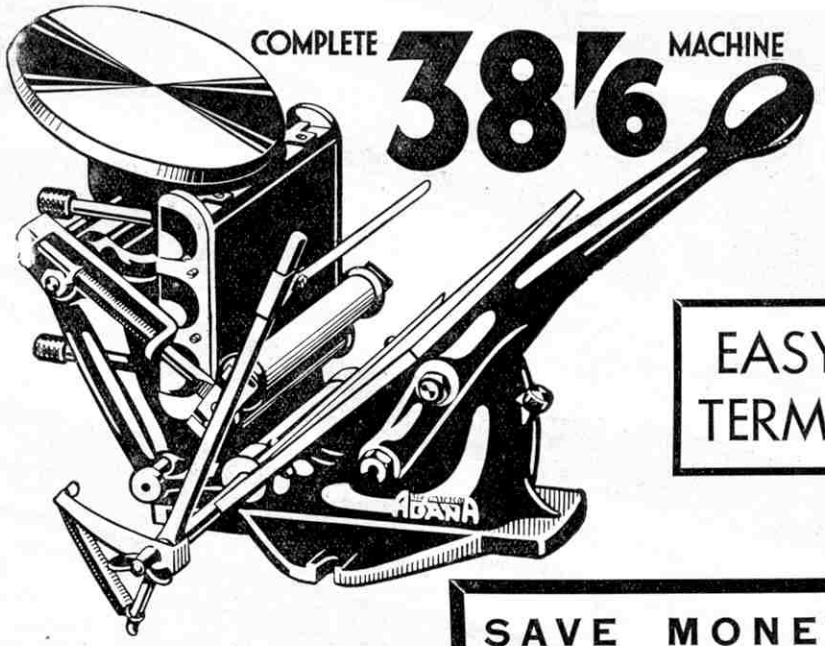
MECCANO LTD. -- BINNS ROAD -- LIVERPOOL 13

BOYS!!! MAKE PRINTING YOUR HOBBY

Big Businesses Built from Small Beginnings

FASCINATING PASTIME
LUCRATIVE HOBBY

There are more ways of making money with an efficient printing machine than by any other mechanical device. The outstanding methods below have stood the test of time and prove this without question. Saying nothing of the boom that will shortly develop for small printing in view of the forthcoming Coronation of our King.



COMPLETE **38/6** MACHINE

EASY TERMS

START A PRINTING BUSINESS

Making big profits by starting a small printing business and getting your friends and acquaintances to give you their work and to introduce others. Since the introduction of Adana Patented printing machines 14 years ago, thousands have built up fine businesses from small beginnings. A big printing business occupying important premises in one of the main streets of Liverpool was started by small early efforts with an Adana. A retired employee from the London District Railway organised a well-conducted printing business seven years ago at the age of sixty-five, and is still going strong. Full particulars of both these wonderfully successful efforts and many others are described in the literature waiting your request. In order to provide the utmost assistance to all purchasers it has been decided to present free of charge a copy of a 2s. 6d. book, 85 *Ways of Making Money*. This book contains over 100 pages and is fully illustrated. It gives advice to beginners and describes in detail 85 ways of profit-earning from print.

FOOTBALL COMPETITION PRINTING

Sweepstakes, Draws, Sports Competitions, such as Football and Racing Doubles, Pontoon Cards, Stop-Watch Competitions, etc., may be run under certain conditions as specified in the Betting and Lotteries Aot of 1934. A Publication issued by D. A. Adana, relating to Gaming and Betting, by Leslie Kark, M.A. (Oxon.), Barrister-at-Law, is published free on request. D. A. Adana has always been fully alive to the wants of the sports printer. Special cards, type and all the necessary accessories of the very latest design have always been available for Adana users at very low prices.

CLUB PRINTING

Programme

Clubs of every description can save considerable money by employing an Adana Machine. Club Notices, Fixture Cards, Admission Cards, Rule Books, and, in fact, every variety of this type of Printing comes within easy scope of an Adana. Many Churches also and other organisations find that an Adana Machine saves its cost over and over again in next to no time.

PRINT BOOKS

Printing and Publishing books that have a definite market value. There are thousands of people who have certain acquired knowledge who could easily write and print small publications that would probably have a very considerable sale at 6*d*. or 1*s*.

Large sums of money are made by printing and selling publications. In this side of small print there exists records of Great Romances of the World. Individuals who have written and printed entirely themselves books of no small size; stories of these great efforts would fill many volumes. There is not room here to give an account of these, but one of considerable current interest is the marvellous efforts of Mr. James Richards, who wrote to Mr. Adana some little while ago, stating: *I am enclosing a bit of my own production; it may be of interest to you.* It was actually a translation of the New Testament Epistle of St. James in the Sussex dialect. Mr. Adana, who read the book, was tremendously impressed by the printing of it, not only by the excellent quality of the writing, but by the sheer craftsmanship of the production. In response to a letter Mr. Adana sent to Mr. Richards at his home at Tunbridge Wells, it brought back another parcel containing yet six more books and a letter explaining the circumstances under which they had been produced. Mr. Richards revealed that not only was he the printer of these books, but also the author. He hides his identity under the pen-name of Jim Cladpole. Of the six books, five were written in Sussex dialect. There have been many fine achievements on the part of users of Adana Machines, but we have yet to discover the like of James Richards' accomplishments. Think of it, in his translation of the Gospel according to St. Mark there are 80 pages.

XMAS PRIVATE GREETING CARDS

Christmas Private Greeting Cards—one of the most lucrative sidelines of the small printer. Not only are profits great, but the market is tremendous. D. A. Adana caters for the printer to a very great extent in this business (see special illustrated literature). A very fine selection of the highest quality cards are held in stock right into December **ALL COMPLETELY PRINTED, LEAVING JUST THE SPACE FOR THE NAME AND ADDRESS TO BE INSERTED BY THE PRINTER.** In the case of the folded cards, fifteen blank inserts are also included with every dozen cards for special greetings where necessary. Nicely bound blank albums are also available for a few pence for the purpose of making up specimen books.

SAVE MONEY BY DOING YOUR OWN PRINTING

Make money indirectly by doing your own printing and thus save pounds. A printing Machine in the hands of the smallest or biggest industrial concern can be a great asset. *The following well-known Businesses have not only purchased an Adana Automatic Printing Machine, but have actually purchased more Machines after having given the first a trial:*

Messrs. Courtaulds Ltd.
Messrs. Guest, Keen & Nettlefolds Ltd.
Messrs. The Gramophone Co. Ltd.
Messrs. W. H. Smith & Sons Ltd.
Messrs. United Africa Co. Ltd.
Messrs. Ruston Bucryus Ltd.
Messrs. Pullum & Metcalfe Ltd.
Messrs. Archibald Turner & Co. Ltd.
Messrs. British Drug Houses Ltd.
Messrs. Telegraph Condenser Co. Ltd.
Messrs. Telephone Manufacturing Co. Ltd.
Messrs. Lincolnshire Canners Ltd.
The Crown Agents for the Colonies
The Co-operative Wholesale Society
London County Council Education Authorities
Church Missionary Society
Middlesbrough Education Committee

His Majesty's Government are one of the biggest users of Adana Automatic Printing Machines.

FREE BOOK

Send at once for a most fascinating Book, **'POUNDS FROM PRINT,'** together with illustrated literature and samples of work.

D. A. ADANA

(Dept. M.C.17),
17/18, CHURCH ST., TWICKENHAM

London Depot: 1, Ludgate House, Fleet Street, E.C.4
Manchester Depot: 60, Oldham Street, Manchester

How to obtain the "M.M."

The "*M.M.*" may be ordered from all Meccano dealers, or from any newsagent or bookstall. Price 6d. per copy. Direct subscriptions to this office will be at the rate of 4/- for six, or 8/- for twelve issues. As a rule, back numbers cannot be supplied, because we print only sufficient copies to fill our standing orders. To prevent disappointment, therefore, place a regular order either with your dealer, newsagent, or direct with this office.

Meccano Magazine, Binns Road, Liverpool 13.

"Meccano Parts and How to Use Them"

Every keen Meccano enthusiast wishes to carry out his model-building operations in accordance with correct engineering principles. In order to do this he must know the special functions of each of the parts that comprise the Meccano System, and to assist him in acquiring this knowledge there is published a manual entitled "*Meccano Parts and How to Use Them.*" In this manual all the parts in the system are listed and classified, and the uses of each individual part are described in detail. The descriptions are assisted by half-tone illustrations and sectional diagrams showing the parts actually in use in Meccano structures and mechanisms.

Ideal for the Model-Builder

An important section of the book is devoted to the various forms of Meccano motive power, and gives much useful information regarding the use of the Meccano Electric and Clockwork Motors. This manual forms an ideal constructor's guide and book of reference, and should be in the possession of every Meccano boy.

"*Meccano Parts and How to Use Them*" can be obtained, price 6d., from any Meccano dealer, or direct from Meccano Ltd., Binns Road, Liverpool 13, price 7d. post free.

READERS' SALES

Readers should note that all advertisements of Hornby Trains and other Meccano products included in this column relate to items no longer featured in the catalogue. Advertisements of current products cannot be accepted for this column.

Sale. "M.M.'s" July 1930–July 1936, 21/-.—22, Hesketh Avenue, Bispham, Blackpool.

"M.M.'s" complete: Jan. 1929–August 1934. Excellent condition. What offers? Write—H. Tweedy, Miserden, Stroud, Glos.

Wireless Bargains: 2-Valve Set, 8/-; 2-Valve Kit, 9/6; very powerful 3-Valve Set, 15/-; Headphones, 3/6; Valves, 1/9. All perfect. Stamp list. Must clear.—Experimenter, 60, Avenue Approach, Bury St. Edmunds.

Bowman Loco and Tender. Good condition. Cost 37/6, used once. Sell 24/6 or nearest.—Shaw, 306, Barnsley Road, Sheffield 4.

Magic Lantern, Appliances, Slides. Enquiries, stamped envelope.—"Lanternist," 1–106, Brighton Road, Birmingham 12.

For Sale. 100 "Modern Boys," 5/-, 50 for 3/-. Also 100 different stamps, 6d., 200, 1/6. Breaking up collection.—Kimberley, 36, Wycliffe Road, Coventry.

"Meccano Magazines." July 1930-March 1934. Perfect condition. Offers?—Turville, 10, Littleover Avenue, Hall Green, Birmingham.

Wanted, 9.5 mm. Films. Send particulars to—Humphrey, Peacock, Welford, Rugby.

Sale. Hornby Railway Accessories; Non-flying Aeroplane (1/72 scale). Stamp for lists.—Box No. 1001.

Sale. 135 Hobbies Weekly, 6/-; 100 Fretwork Designs, 7/6. Both for 12/- post free.—36, Rotherham Road, Coventry.

Wanted "M.M.'s" January–September 1934.—D. J. Hofsommer, 21, Bentinckstraat, The Hague, Holland.

Sale. 15" Aeroplane, 5/-; 13 "Popular Flying," 3/11; 10 "Flights," 2/11; 5 "Newnes Practical Mechanics," 1/5; and 3 "Popular Science Educators," 1/-. What offers?—Capel, 40, Beaumont Street, Oxford.

Sale. Two "20" Constructors and Microscope extras, £1; Bing 00 Railway, 15/-; Speed Boat, 2/6.—Williams, 57, Liverpool Road, Chester.

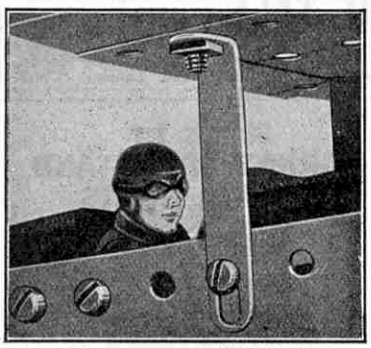
Wanted. Old Hornby 4–4–4 Tank Loco, preferably L.M.S. Red. Clockwork.—Cowles, 3, Church Road, Goudhurst, Kent.

Sale. "Meccano Magazines," January 1929–May 1932. Perfect condition, 8/6.—Claydon, 261, St. Saviour's Road, Saltney, Birmingham.

"Dekko" F1.9 10/18/6 Model Cine Camera. (Shop soiled bargain), £8. Imp Projector (motor drive and super attach.) £5. (Appro.)—Maxwell, Optician, Scunthorpe.

MINIATURE AEROPLANE PILOTS

Aeroplane Parts Nos. P99 and P100



Miniature Pilots are now available for fitting to all open cockpit machines built with the Nos. 00, 0, 1, 2, 1 Special and 2 Special Aeroplane Constructor Outfits. These attractive little figures, which add a wonderful touch of realism, are supplied with green coat and orange cap, blue coat and red cap, or red coat and green cap. Aero Part No. P99, which is suitable for fitting to the Nos. OO and O Outfit models, is fixed to a special bracket that takes the place of the Propeller Shaft Bracket in the Outfit. The special bracket is secured by passing bolts through the sides of the fuselage into the threaded holes in the bracket. The Propeller Shaft rests in the bearing socket formed in the Pilot's body.

Part No. P100 (illustrated above) is used in Nos. 1, 2, 1 Special and 2 Special Outfit models. The Pilot is fixed to a double angle bracket ready for bolting to the sides of the fuselage.

Prices:

P99 Aeroplane Pilot ... ... each 4d.
P100 „ „ ... ... „ 4d.

Meccano Ltd., Binns Road, Liverpool 13

This Month's Special Articles

SPLENDID PHOTOGRAPHS R.M.S. "QUEEN MARY"

Four views of the world's fastest liner now available. Send 3d. for specimen postcard and illustrated list of over 700 different photographs of Liners, Freighters, Cunard-White Star, Harrison, Blue Funnel, Anchor, Blue Star, etc., 2d. each, 2/- per doz. postage free.

B. & A. FEILDEN (M.12),
12, Harlech Road, Blundellsands, Liverpool, 23.
(Trade Enquiries Invited.)

To Overseas Readers. Specially Cyprus and Ceylon. Wanted. Used Stamps. Will buy or exchange for mixed Stamps. Variety not necessary.—A. F. McQuarrie, 83, Cliff Road, Wallasey.

NEW ZEALAND
Chamber of Commerce Commemorative set on issue October only, ½d., 1d., 2½d., 4d., 6d. Complete set for 2/6.
First day Registered Covers, 3/6 each.
By Reg. Post 4d. extra. English P.O.'s only.
L. J. AYRE, Dept. M., Pahau Street, Thames, N.Z.

Beginners' Bargains. 2,000 diff. 12/6. Smaller packets. Country lots.—Allport, Newborough, Burton-on-Trent.

CASTING MOULDS

Make your own lead soldiers, animals, Indians, etc. Sample Mould, 2/9. Catalogue Free.
Industries, 13, Gordon Av., Twickenham.

Home Cinematographs, Mains or Battery. Standard Films cheap. Lists.—"Pictures," 109, Kenlor, Tooting, London.

MECCANO WRITING PADS are supplied in two sizes, each consisting of 50 printed sheets of tinted paper with cover. Price—Large, 1/- each, and small, 6d. each (post free).
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MECCANO MAGAZINE

Registered at G.P.O., London, for transmission by Canadian Magazine Post.

EDITORIAL AND ADVERTISING OFFICE:—
LIVERPOOL 13, ENGLAND.
Telegrams: "Meccano, Liverpool."

Publication Date. The "*M.M.*" is published on the 1st of each month and may be ordered from any Meccano dealer, or from any bookstall or newsagent, price 6d. per copy. It will be mailed direct from this office, 4/- for six issues and 8/- for twelve issues.

To Contributors. The Editor will consider articles and photographs of general interest and payment will be made for those published. Whilst every care will be taken of articles, etc., submitted, the Editor cannot accept responsibility for any loss or damage. A stamped addressed envelope of the requisite size should be sent where the contribution is to be returned if unacceptable.

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A fascinating building hobby for boys and girls

Simplicity is the keynote of this new building system, by means of which the youngest children can build all kinds of models with the greatest of ease—Towers, Bridges, Coaches, Houses, Wheel Toys, Windmills and scores of others.

The parts are beautifully enamelled in striking colours, giving a charm and distinction to the models that is outstandingly attractive.

Dinky Builder Plates are hinged on all sides, with intervening spaces so that when two are placed side by side the hinged part of one Plate fits into the corresponding space in the other. The two plates are then locked by inserting a rod. Nuts and bolts are not required.

No. O DINKY BUILDER OUTFIT

This Outfit contains a good assortment of Dinky Builder parts (including two road wheels), with which a splendid range of models can be built. The Instruction Folder included gives examples of 40 models, but many others of an original character may be constructed by the inventive boy or girl.

Price **2/6**

No. O Dinky Builder Outfit

Price 2/6

No. 1 DINKY BUILDER OUTFIT

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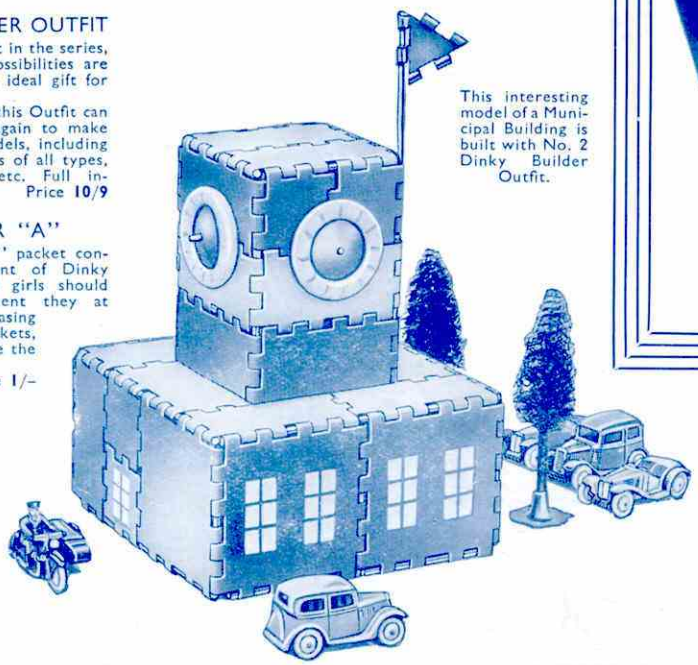
Price 10/9

DINKY BUILDER "A"

The Dinky Builder "A" packet contains a useful assortment of Dinky Builder Parts. Boys and girls should supplement the equipment they at present possess by purchasing one or more of these packets, which will greatly increase the scope of their Outfits.

Price **1/-**



This interesting model of a Municipal Building is built with No. 2 Dinky Builder Outfit.

PRODUCT of MECCANO LIMITED LIVERPOOL

The addition of Dinky Toys Motor Cars, Animals, Figures, Trees, etc., greatly increase the realism and attractiveness of Dinky Builder Models, and increase the fun tremendously.

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The performance and durability of the Hornby Electric Trains place them in a class entirely their own. Each locomotive is fitted with a powerful motor that will pull heavy loads at high speeds, always under perfect control.

Hornby Clockwork Trains are hauled by the longest-running spring-driven locomotives in existence. The motors fitted are of the highest quality, being perfect mechanisms with accurately-cut gears that ensure smooth running.

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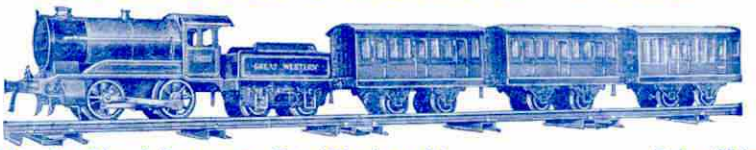

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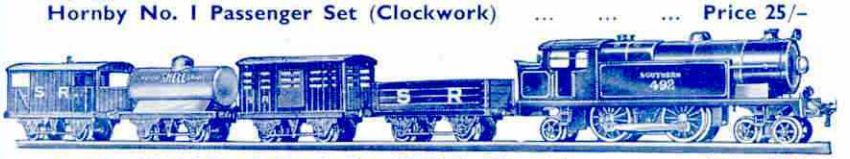

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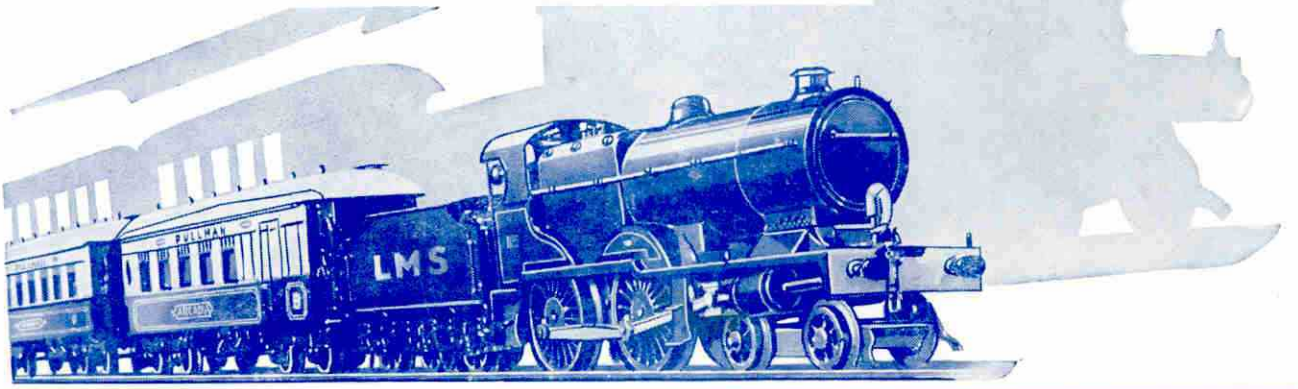
No. 2 Special Locomotive (reversing) Price **27**/**6**

The illustration below shows Hornby No. 2 Special Pullman Train Set with its true-to-type model of the L.M.S.R. "Standard Compound" class Locomotive bearing the number "1185."



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MECCANO LTD. -- BINNS ROAD -- LIVERPOOL 13

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