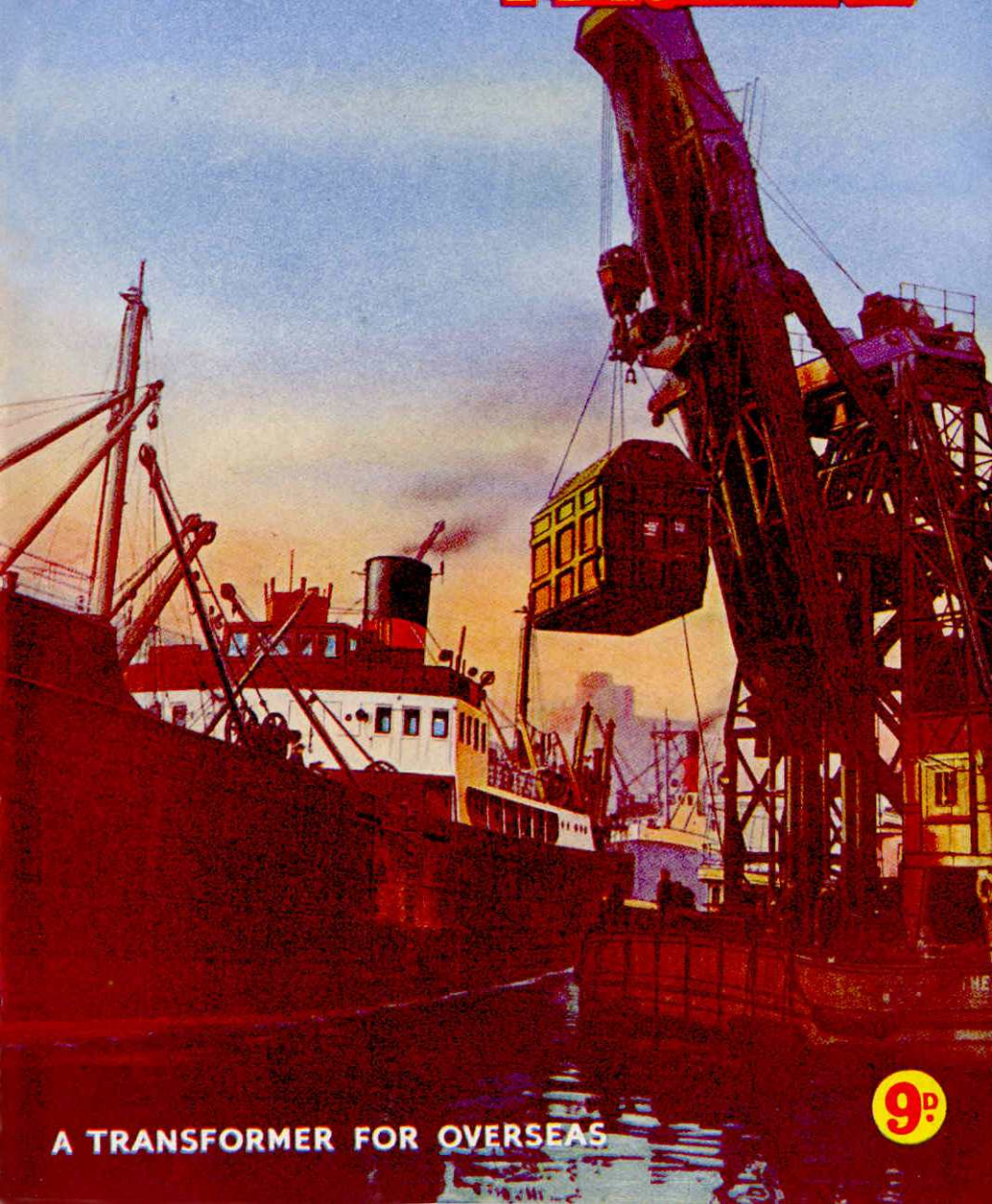
VOL. XXXV No. 10 OCTOBER 1950

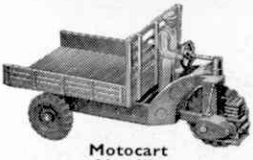
MECCANO MAGAZINE



A TRANSFORMER FOR OVERSEAS

9D.

DINKY TOYS



Motocart
No. 27g
Low loading three-wheeled truck. Tipping high-fronted body
Price **4/6** each

Rear Tipping Wagon
No. 30m
Has tipping body operated by lever, and hinged tailboard. On Dodge chassis
Price **2/11** each

Breakdown Lorry
No. 25x
This splendid model, on a Commer chassis, has a service van body and is fitted with a robust working crane
Price **5/6** each

Standard "Vanguard" Saloon, No. 40e
A fine reproduction of a successful modern car
Price **2/1** each

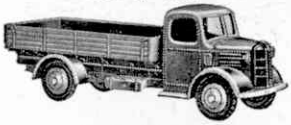
Hudson "Commodore" Sedan
No. 139b
A fine miniature of a sleek American car, attractively finished in two colours
Price **3/-** each

Estate Car
No. 27f
An attractive miniature of this popular general purpose vehicle
Price **3/-** each

Daimler Ambulance
No. 30h
A beautiful model finished in cream with red wheels and the Red Cross on each side
Price **3/-** each

Observation Coach
No. 29f
A handsome model of a motor coach with rear section raised to give passengers good views in all directions
Price **3/3** each

Bedford Refuse Wagon
No. 25v
Sliding covers, tipping mechanism, opening rear door
Price **5/9** each

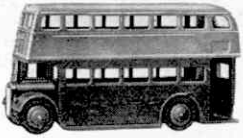


Austin Wagon
No. 30j
This handsome model has the characteristic lines of its well-known prototype
Price **2/4** each

Austin Covered Wagon
No. 30s
Similar to the Austin Wagon No. 30j, but fitted with a useful hood
Price **2/10** each

Land-Rover
No. 27d
A fine model of a vehicle designed to go anywhere and do anything
Price **3/11** each

Farm Produce Wagon
No. 30n
Attractive model of all-purpose farm wagon
Price **3/6** each



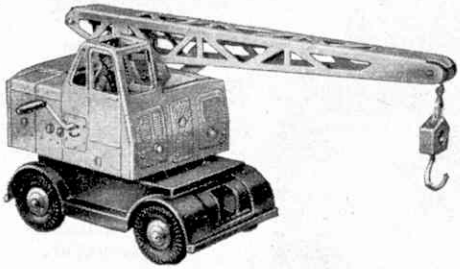
Double Deck Bus
No. 29c
Price **3/5** each

Bedford End Tipper
No. 25m
Price **4/11** each

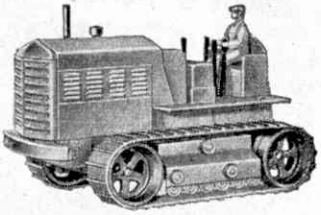
ALL THE ABOVE PRICES INCLUDE PURCHASE TAX

MADE IN ENGLAND BY MECCANO LIMITED

SUPERTOYS



Dinky Supertoys No. 571
Coles Mobile Crane
Hoisting, jib-raising and slewing movements
Price **9/11** each



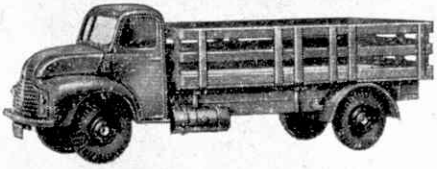
Dinky Supertoys No. 563
Heavy Tractor
Price **6/6** each

Dinky Supertoys No. 751
Lawn Mower
Price **5/9** each

Dinky Supertoys No. 504
Foden 14-ton Tanker
Price **9/3** each

Dinky Supertoys No. 511
Guy 4-ton Lorry
Price **4/11** each

Dinky Supertoys No. 562 Dumper Truck
Adjustable front wheels, tipping bucket, reversible driving seat
Price **7/-** each



Dinky Supertoys No. 531
Leyland 'Comet' Lorry
Price **5/4** each

Dinky Supertoys No. 514
Guy Van
Large capacity van body, with opening double doors at rear
Price **6/3** each

ALL PRICES INCLUDE PURCHASE TAX

MADE IN ENGLAND BY MECCANO LIMITED

Build this Charming Model Village with

BRICKPLAYER

Brick and Mortar Building Kit and Accessories

The Brickplayer Kit contains miniature bricks in all required shapes, mortar, roofing, metal windows and doors, plans and instruction booklet. All models are architect designed to "0" gauge scale. Buildings can be permanent or dismantled by merely soaking in water, and the bricks used again and again.

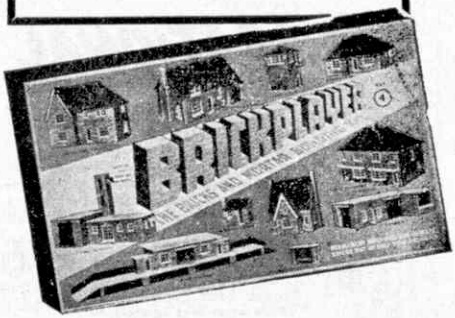
Brickplayer Kits at 25/- and 47/6 and Accessories are available from good toyshops and stores.

If your dealer cannot supply, write for address o nearest stockist to:

J. W. SPEAR & SONS LTD.
Dept. "M" • Enfield • Middlesex

ENTER FOR THE BRICKPLAYER COMPETITION

Prizes of £10 10s., £5 5s., and £3 3s. and a number of consolation prizes of Brickplayer Accessories will be awarded for winning models. Write for full details.

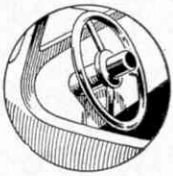


YOUR IDEAL CHRISTMAS GIFT

Tri-ang MINIC Toys

REGD TRADE MARK

MINIC No. 2 SPORTS CAR WITH HORN. Incorporating a horn operated from button on steering wheel, and "Ackerman type" steering. **7'6** *Inc. P.T.*



A BRAND NEW CAR FOR 7'6 !!

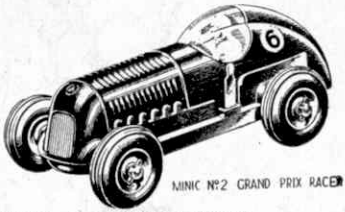
It's a fact—you can buy one of these wonderful MINIC Series II scale models right now for this amazingly low price! They are all true scale models of modern cars and have a "power-plus" performance that is unequalled by any other make. Their long runs at terrific speed are made possible by the exclusive Tri-ang motors—each of which is specially designed for the job.

Other features include the smooth, aero-styled bodies; the correctly tracking steering and the tough, treaded rubber tyres.

Look for the name MINIC on every carton - insist on MINICS - they're tops.

ASK TO SEE THESE, and the many other models AT YOUR LOCAL SHOP—we do not supply direct.

CLOCKWORK POWERED



MINIC Nº2 GRAND PRIX RACER

MINIC No. 2 GRAND PRIX RACER. Complete with "Ackerman type" steering, brake, forward and neutral gear and "knock-off" hub caps to wheels. **7'6** *Inc. P.T.*

L.B.LTD. MINIC Series II STOP-ON CAR

MINIC No. 2 STOP ON CAR. It never falls off the table as its mechanism makes it turn at the edge. **7'6** *Inc. P.T.*

L.B. LTD. MINIC Series II POLICE CAR

MINIC No. 2 POLICE CAR. A fine model of an American Police Car complete with dummy loud speakers and radio mast. **7'6** *Inc. P.T.*

LINES BROS. LTD., MERTON, LONDON S.W.19, ENGLAND

Next Month: "THE COUNTY DONEGAL RAILWAYS"

MECCANO MAGAZINE

Editorial Office:
Binns Road
Liverpool 13
England

Vol. XXXV
No. 10
October 1950

With the Editor

The Passing of B.O.A.C. Flying Boats

When B.O.A.C.'s new fleet of Handley Page "Hermes" air liners takes over the "*Springbok*" route to South Africa this month, in partnership with the "Constellations" of South African Airways, the last flying boats will disappear from B.O.A.C.'s network of Empire air routes. There have been many predictions that B.O.A.C. will regret their passing; certainly they will be missed by an untold number of air passengers who, for more than twenty years, have revelled in the comfort and luxury of British flying boat travel.

Our flying boats have not always been as fast as their landplane counterparts, but the fact that three out of four of the air-travelling public seem to prefer them is proof that, even to-day, mere speed is not everything. On the score of safety they are unrivalled.

The famous old fleet of Empire 'boats flew a total of more than 40,000,000 miles in peace and war, during which they established our Empire air routes and pioneered the Empire Air Mail Scheme, under which a letter could be sent by air to any part of the Empire for 1½d. The "Hythe" Class 'boats which followed them covered more than 5,000,000 miles a year in service with B.O.A.C., to the corners of the earth. Then came the "Plymouth" Class and the "Solents," magnificent proof of Britain's ability to produce safe, comfortable air liners at a period when our landplanes were having a lean time.

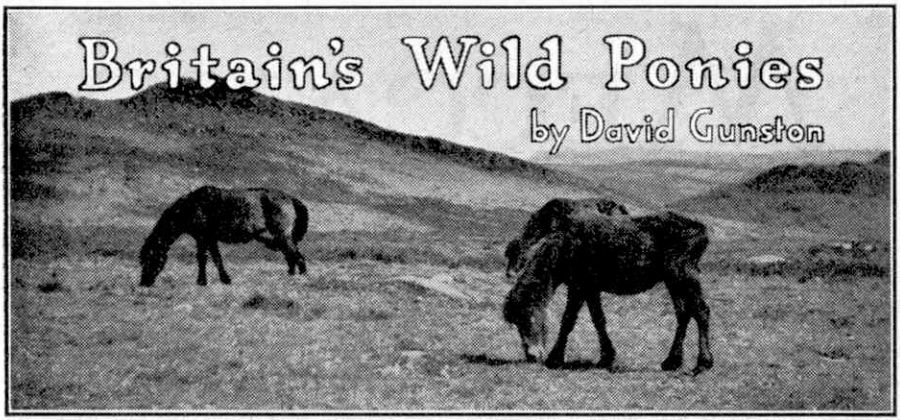
Now the "Solents" are being taken off, on the score of expense, despite the fact that, two years ago, the only airline in the whole B.O.A.C. Group which made a profit was Tasman Empire Airways—the only one using flying boats exclusively.

For the time being, the flag of British marine aviation will be carried from these islands only by privately-owned Aquila Airways, who operate a weekly service to the lovely Portuguese holiday island of Madeira with the ex-B.O.A.C. fleet of "Hythes." We must wish them well, and look forward to the time when these "Hythes" will be joined by the giant "Princess" flying boats being built for B.O.A.C. by Saunders-Roe at Cowes, Isle of Wight. These "Princesses" should one day lead the world on our skyways, just as the two British sea "*Queens*" rule the oceans over which they will fly.

This Month's Contents

Britain's Wild Ponies

by David Gunston



Dartmoor ponies.

PONIES have roamed wild over many parts of Great Britain for many hundreds of years, and it is rather remarkable that so many should still survive on favoured heaths and moors. With the exception of deer, all the larger animals that once made their homes here have become extinct. There are now no sabre-toothed tigers, woolly mammoths, wild boars and so on, but the wild ponies are still with us. They are getting fewer and fewer each year, but as they are all useful to man, and can be improved by horse breeding experts, they have never been allowed to die out. So if you go through the New Forest, over Exmoor or Dartmoor in the West Country, up in the Highlands of Scotland and the Western Isles, to the fell country of the North of England, or into the Welsh Hills, you will be sure to encounter little herds of ponies, sturdy, tough creatures with centuries of endurance behind them.

Strictly speaking, most of the ponies are semi-wild. They roam all round the year at will and never enter a stable, but they are periodically rounded up for branding, selling and controlled breeding, and sometimes they are supplied with food in hard weather, although normally they fend for themselves. Many descendants of these native ponies find themselves at work in the mines, pulling small traps, and even giving children rides on the sands at holiday resorts. But care is now taken that the original stock of ponies shall not be diminished, for they are quite irreplaceable.

A wild pony is not as so many people suppose, just a small horse. It is really a different creature, shorter in the leg and hardier. It is always able to ferret out food and to survive on such apparently unappetising fare as bracken, gorse, heather and brambles, constantly wandering, breeding in the open and knowing only natural shelter under trees and in thickets. It lives a nomadic communal life in small herds, as it has always done.

The best known of all British ponies is the New Forest pony, which still thrives in large numbers. At one time it was thought that these handsome grey-brown animals with the thick shaggy manes were descended from fiery Spanish horses that had been washed ashore when the Spanish Armada was wrecked off our south-west coast in Elizabethan times. That was an interesting story, but not true. New Forest ponies came from a colder land than Spain, probably from Wales, and by careful in-breeding with real pure-bred Arab horses they have been made taller and even more handsome. If you want a first-rate riding pony, you cannot do better than get a New Forest animal.

They are fairly tame, but seldom come close to people unless they know food is about to be offered. They roam all over the New Forest, grazing on the lush meadows and moors, and often walking right into the towns and villages, standing in the roadways and peering into shop doorways as if they owned the place. Certainly they lived there long before there were any villages and towns in the ancient feudal Forest, one day to be a National Park. They all belong to private owners, and although quite a few young animals are taken away every year, their numbers are well maintained. You seldom see a party of New Forest ponies without

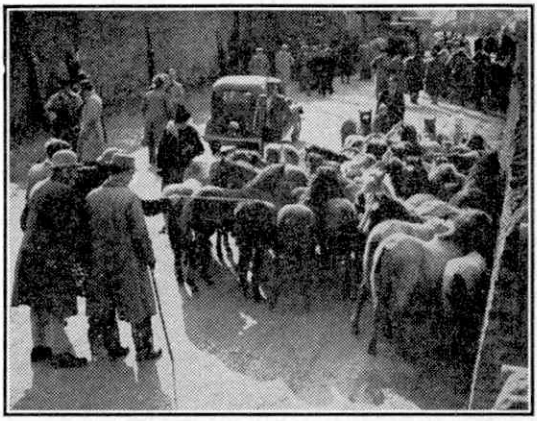
there being several pretty grey foals present.

Turning westward to the rounded hills of Exmoor, in Somerset, we come to the oldest and most attractive of all the English ponies. Exmoor ponies are doubtless the original creatures that roamed all over Britain in the very earliest times, and they have remained the least altered. They are quite short animals, and you can always tell one by its light mealy fawn muzzle, which makes it look as though it had just been nosing into a bran mash. They have similarly coloured rings round the eyes, which look like light spectacles, but the rest of the pony is brownish in colour. They are spirited on the run, but somehow are not as well off as New Forest or Dartmoor ponies; a few always die off in cold winters.

Looking at one, you would never think they would do half the jobs they can, and they appear too small for hard riding work. Yet years ago a 14 st. man rode 86 miles from Bristol to South Molton on one, beating the horse-drawn coach on the way. And they are still as tough to-day.

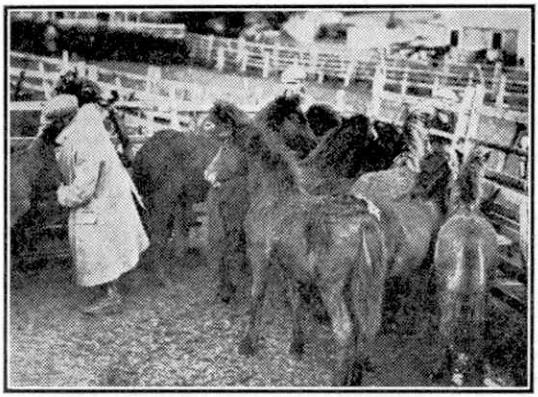
Dartmoor ponies are larger again, with longer legs and necks, and a general brown colour. The strain is still being improved, even though it is a very old one, by experts who fear that otherwise it will not last. These animals are extremely strong—they have to be to pick up a living on the bleak wastes of Dartmoor, especially in winter—and when broken in, numbers of them are sent to work in the pits.

True Welsh ponies scrambled on the slatey hills of Wales long before man ever lived in the place, and not many of the old race still survive. But modern Welsh ponies, handsome, long-haired animals, make spirited and hardy riders, and they are still in demand for that purpose. By introducing Arab horse blood into the strain the best features of the fast horse are merged with the toughness of the little ponies.



Cotswold ponies at the annual street sale at Stow-on-the-Wold.

In Scotland two kinds of ponies still thrive, and are likely to do so for many years to come. First there is what is called the Fell pony, a big strong animal that spends most of its life being harnessed to the carts of the Highland crofters, for in the hard bleak parts of Scotland the people cannot afford to see useful ponies wandering about idle in a wild state. The steep hill farms, with the rough tracks, present no difficulty to the Fell ponies. On some of the islands, especially those that give them their name, Shetland ponies serve for drawing carts and for riding, and these little woolly-haired ponies are the ones you see used for pleasure riding on the seashore and also in circuses. The largest are only 3 ft. 6 in. high but are immensely strong.

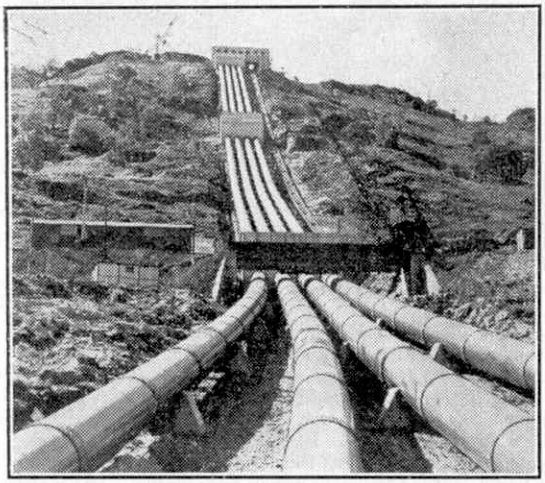


Exmoor ponies rounded up in North Devon.

Pipelines for Power

By J. W. Smith

IN a hydro-electric project, the pipeline serves a similar purpose to the permanent way of a railway system, and similarly it tends to be overlooked in a description of the scheme as a whole. We are more readily impressed by giant locomotives than by rails, and by massive dams and powerful turbo-alternators than by pipes.



The Loch Sloy pipeline, through which water from the Loch reaches the power house 900 ft. below.

Yet in the design of a hydro-electric power station the importance of the pipeline is such that the whole performance and efficiency depends on the care with which it has been designed and manufactured. It is not just the job of a titanic plumber, but a carefully calculated achievement. The controlling factor in its design is the amount of water that can be drawn off from the reservoir economically. This settles the maximum size and power of the water turbines, and this in turn decides the design of the pipeline.

An interesting example of modern pipeline engineering is that of the Loch Sloy project. In this case the water has to be carried from Loch Sloy to a power station on the banks of Loch Lomond, near Inveruglas. The difference in level of the power house and the reservoir is approximately 900 ft. Loch Sloy itself has an area of about 6½ sq. m., but is fed from a total catchment area of 32 sq. m. This extra catchment area is obtained from the surrounding mountains, the water being conveyed to the reservoir by aqueducts and tunnels. A large dam has been built at one end of the loch, thus increasing the capacity of the reservoir and incidentally increasing the head of water available for driving the turbines.

Water from the reservoir begins its journey to the turbines in the power station by passing through a tunnel bored through solid rock in the heart of Ben Vorlich. The length of this tunnel is about two miles and its diameter is 15 ft. 6 in. It is lined with concrete to provide a smooth surface for the flow of water, and this concrete is reinforced by steel hoops at places where the rock cover has not been considered sufficient to prevent bursting. These hoops are formed from 1½″ in. diameter steel bar.

While still underground the main tunnel divides to form two 10-ft. diameter steel lined tunnels. These smaller tunnels emerge from the side of the hill as steel pipes, which themselves bifurcate to form 7 ft. pipes before entering the valve house which can be seen at the top of the photograph on this page. From there the four pipes plunge steeply down to the power station, a further drop of about 700 ft.

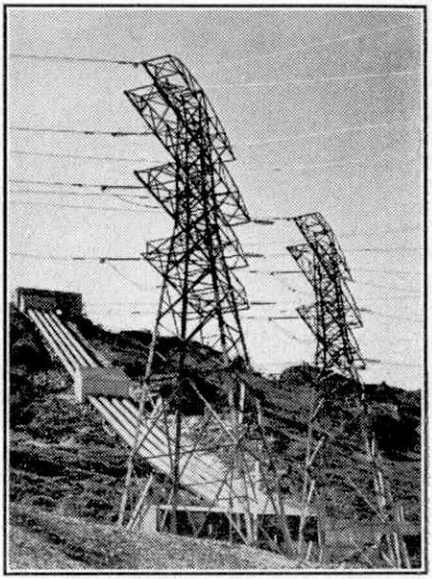
On full load, the four turbo-alternators in the power house are capable of aggregating 130,000 kW. To achieve this the pipelines have to convey 220,000 tons of water an hour. As the pressure of the water increases with depth it was necessary to increase the thickness of the steel of which the pipes are made. Just below the valve house this is $\frac{11}{16}$ in. thick, but at the station itself the thickness is $1\frac{9}{16}$ in. Massive concrete anchor blocks are provided to maintain rigidity, and below each of the three upper blocks expansion joints are incorporated in the pipeline to prevent distortion due to fluctuations in temperature. At the bottom, where the four pipes gradually spread out to align themselves with their respective turbines, special supporting piers were designed

to resist the considerable side thrust which is set up.

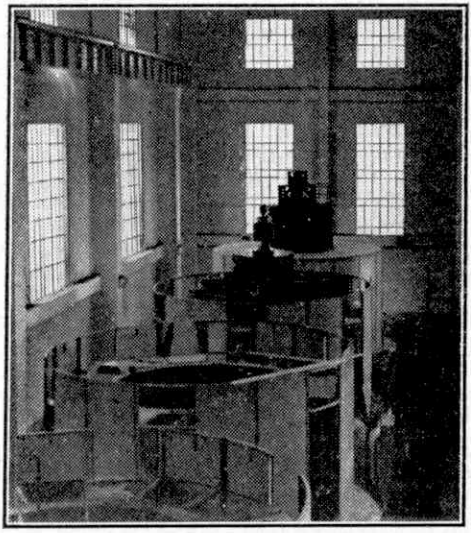
A point that is often overlooked by people unfamiliar with hydraulic engineering is the necessity for providing a safety device for the piping system. As the head of water in the reservoir remains reasonably constant it would appear that the pressure in the pipeline will also remain constant. While this is perfectly true if the water is static, or is moving at a uniform rate, it is not true if the motion of the water is suddenly arrested in any way. A state of affairs can easily arise when it might be necessary to close down the station quickly, for instance, the failure of the electrical transmission lines.

In such an emergency we are faced with the difficulty of bringing to rest a column of water moving rapidly, and weighing something like two hundred thousand tons. If the valves in the power house were closed quickly and there was no safety device in the pipeline, the water hammer that would be set up would disintegrate the steel pipes as though they were cardboard tubes and the station itself would probably be swept into Loch Lomond.

The device to alleviate this danger is known as a surge shaft, and in the Sloy scheme it takes the form of a gigantic expansion chamber 26 ft. in diameter and having a height of 275 ft. The main tunnel passes through the bottom of this shaft, and in the event of a sudden close down the energy of the massive column of water would be largely dissipated in filling the shaft. The surge shaft is inside Ben Vorlich, about 1,000 ft. back from the valve house.



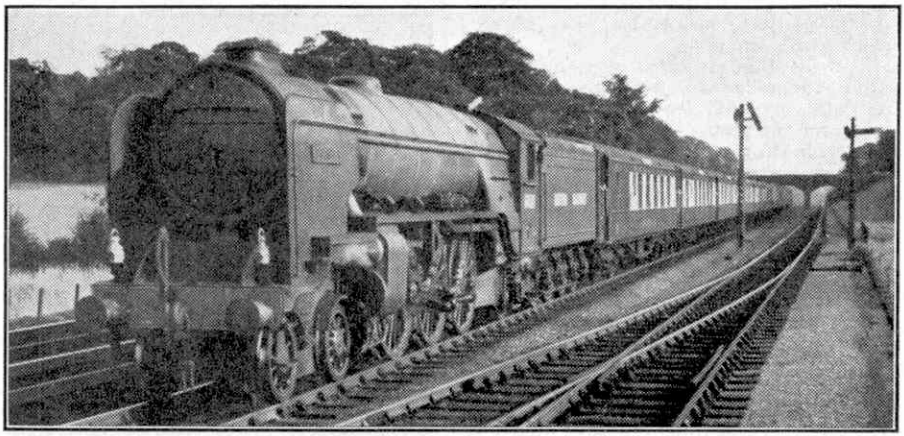
Gleaming cables carry away in a new form the power of the water in the four giant pipelines.



The four turbo-alternators supplied by the Loch Sloy pipeline. The one at the far end of the line is already supplying power to the grid at peak load periods; the others are seen in construction.

The valves in the valve house are of the butterfly type and are used only in cases of emergency, such as the examination of a defective pipe while the other three pipes continue to function. The actual control of the turbines is achieved by cylindrically balanced valves situated in the power house itself. This means that the four pipelines in the illustration are always under full water pressure ready for immediate starting. This is a point of some importance when it is remembered that Loch Sloy is a "peak load" station only, which means that it is designed to run for a comparatively short period each day. Indeed the quantity of available water governs the running time to a few hours per day.

With other hydro-electric schemes Loch Sloy will help to ease the considerable strain under which our electrical power resources are at present labouring.



Railway Working Timetables

By R. A. H. Weight

MOST readers are probably familiar with some of the public timetables issued by British Railways. How these are prepared was described in a recent article in the *"M.M."* There are the complete books covering a whole Region; sectional and suburban booklets or folders; and sheet or poster timetables giving the service applicable to the station or area in which they are displayed. They are the successors of the more individualistic publications produced by the separate companies in years gone by, many of which were of great interest and really deserve an article to themselves. Such tables show only the public passenger trains and the stations at which they stop for passengers. There are, however, many other kinds of regular trains. There is also a great deal more detail which it is necessary to provide for the train crews and operating folk; hence the regular issue, for staff use only, of bulky volumes known as Working or Service Timetables.

The picture above shows the down "Queen of Scots" Pullman passing Hadley Woods. The "Pacific" engine is A2/3 No. 60513 "Dante." This and the lower photograph on the opposite page are by Mr. C. R. L. Coles.

The *"Working Books"* as they are often called, give exact mileages from principal starting points or junctions; the times at which non-stop trains should pass important points; the class of each train, such as Express Passenger, Ordinary Passenger, Empty Coaches, Express Fish, Parcels or Vans, various kinds of Freight and so on. Quite a lot of such trains do not appear at all in public timetables, but they all have to be carefully scheduled and fitted in. Notes are included about one train passing another, about regular diversions to loop or slow tracks, the class of traffic or vehicles conveyed, limits of load and other directions. On some lines all trains are numbered in the working book, such descriptive numeration being used for operating instructions or reporting to Control Offices.

Some extracts from the working books of 1949 may be quoted. First, Section A, Eastern Region, 124 pages, covers the whole of the former G.N. main line from King's Cross to Doncaster, but excludes London suburban services. It does include through timings to and from York, N.E. Region, together with certain branch or junction lines, and much subsidiary information as usual in each book. London-Peterborough tables are separate from Peterborough-York, each occupying a group of pages with headings and foot notes. The northbound *"Flying Scotsman"* is train No. 50, headed *"R.C. E.P.,"* which means *"Restaurant Car, Express Passenger"* leaving King's Cross at 10.0 a.m. The first passing time shown is at Greenwood Signal Box, 10 miles, mostly uphill, at 10.17; Hatfield pass 10.27, Hitchin 10.42. Huntingdon, 11.7, Peterborough 11.25,

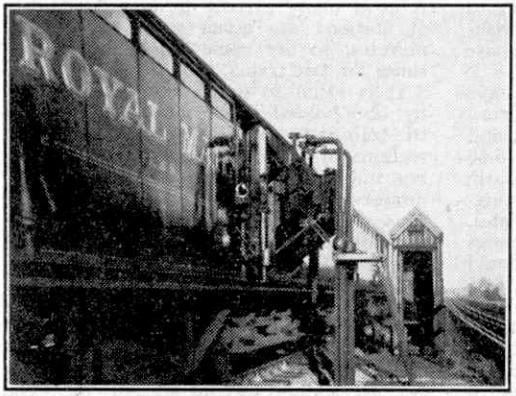
having averaged about 60 m.p.h. for more than 50 miles.

Turning to the second group of pages we find *"No. 50 Down"* again, passing Peterborough at 11.25 and arriving at Grantham, where engines were changed at 12 noon. Departing at 12.6 p.m. for a 162¾ mile non-stop run to Newcastle, this famous express is timed to pass among other places Doncaster at 1.11, York at 1.47. All that appears in the public timetables between London and Newcastle is: Grantham, Dep. 12.6 p.m., taking up passengers only. The *"Junior Scotsman"* following closely behind, calling at Peterborough and York, is No. 52 Down. Even numbers are now allotted to northbound trains on this line; southbound trains having odd ones.

Train movements are supervised from and reported to the Control Offices, such as the one shown here at Crewe. British Railways Official Photograph.

At 10.30 a.m. from King's Cross Goods Station departs an express fish empties train for Grimsby, No. 1126, which runs without a stop to New England Sidings, Peterborough, in just over 1¾ hours, including some average speeds of 50 m.p.h. or more. There was another similar one, No. 260 Down, bound for Scotland, starting at 11.55; that is after No. 58, the *"Queen of Scots Pullman"* has left the main station at 11.45. No. 260 is passed while at Peterborough by the down *"Northumbrian,"* departing from King's Cross at 12.0; later when standing in Doncaster Yard it is passed by the 12.45 and 1.20 p.m. expresses from London. No. 102, express parcels train from King's Cross at 7.10 p.m., runs without a halt over the 156 miles to Doncaster, being followed later by fast goods trains and passing several slower ones. All have their details with timings in the Working Book.

In L.M.R. Passenger Working Timetable, Section 5, covering Crewe-London, Birmingham and branches, we find that odd numbers apply to principal northbound trains, and even to southbound. Fifteen intermediate passing times are allotted to trains running non-stop between Euston and Crewe, including Willesden, Watford, Tring, Bletchley, Rugby, Lichfield, Stafford, Norton Bridge. Some expresses run further than that without a halt and so have no stop shown in this book apart from Euston, but only passing times.



Mail pouches suspended from the ground standards at Harrow (L.M. Region) being picked up by the 8.30 p.m. ex-Euston "West Coast Postal."

The working detail of the famous West Coast Postal Trains is of interest. The southbound one is due away from Crewe at 12.37 a.m. passing Stafford at 1.7, Rugeley 1.17, then calling to load and unload from 1.32 to 1.44 a.m. at Tamworth, and from 2.17 to 2.25 at Rugby, reaching Euston at 4.0 a.m. Mails are delivered to the lineside apparatus at seven points, including Stafford and Nuneaton where bags are picked up as well. The 8.30 p.m. northbound service from London is similar. The reporting numbers are 148 and 157 respectively. The

usual passing time allowance for northbound expresses is 24 min. to Watford from Euston; 41 to Tring, 55 to Bletchley, 71 to Blisworth, 92 to Rugby (93 if stopping); then, if continuing without stop, 129 min. to Lichfield, 147 to Stafford, and about 3 hr. to Crewe.

The Western Region Service Timetables, including all types of train, are spread over 16 books. No. 1, for instance, covers London, Reading, Didcot, Oxford, Wycombe, Banbury, with main line timings to Swindon, also various branches. There is an intensive passenger service operated from Paddington for many destinations on a variety of main routes, together with numerous milk, freight or similar train workings traversing all or part of the district. It is therefore not surprising that 240 pages of smaller size than other Regions use are devoted to the down or up, weekday or Sunday, main line traffic, with very full detail. Except for selected expresses, or on summer Saturdays, train numbers are not used. Somewhat similarly to other Regions, trains towards London are described in the headings in this way: 1.22 p.m. Taunton, 12.30 p.m. Wolverhampton; 4.46 p.m. Aldermaston, Staff Train (forming 5.50 p.m. Hayes to Paddington); 8.48 a.m. Fishguard Perishable; 2.0 p.m. Kingham Freight. These are starting times.

Sixteen down trains are booked to leave Paddington, including suburban platforms, on ordinary weekdays between 5.40 and 6.40 p.m., among them being the 5.55 for South Wales, 6.0 for Weymouth, 6.5 for Oxford and Kingham, 6.10 Birmingham and Wolverhampton, 6.30 Bristol. There are also "paths," that is timings available for use if necessary, should relief portions have to be run of the 5.55 or 6.10 express departures.

A feature of branch or local working on the W.R. is the steam push-and-pull trains described as "Autos," also the diesel passenger and parcel railcars, some of which run considerable distances. Lists of signal boxes, crossovers from main to relief lines or vice-versa, engine loadings and restrictions on various routes, together with many other facts and figures, make these W.R. volumes rather a fascinating mine of information.

The Southern Region issues separate Service Books for each Division, passenger timetables being distinct from freight. The passenger working timetables for each of the sections based on London-Western, Central and Eastern, are bulky in view of the heavy suburban traffic and frequent electric trains. In some cases separate working books are issued covering the purely suburban services. Electric trains are indicated by the head code, either number or letter which each one carries being printed at the head of the column. A good many arrival or departure times at stations are given precisely in half-minutes; so are some main line passing times for fast trains, thus: 5.56½.

L.N.E.R. 2-6-0 No. 120 of class K3 in charge of "No. 552 Up" express freight from Scotland to King's Cross (Goods). Photograph by C. R. L. Coles.

It is usual to indicate in the columns by abbreviated signs the line on which the train is to travel over multiple-tracked sections or in certain cases the platform line it is to use. Trains are normally not numbered but described by their starting time and place. There are however numbered timings which constitute "paths" for Continental Boat expresses from Dover or Folkestone to London. In the event of a ship arriving late, or Customs examination, etc., not being completed in time for a start reasonably near booked time, the train runs in the next available path, say No. 56 timing instead of No. 52. The inward *"Golden Arrow"* Pullman express in the winter

(*Continued on page 478*)

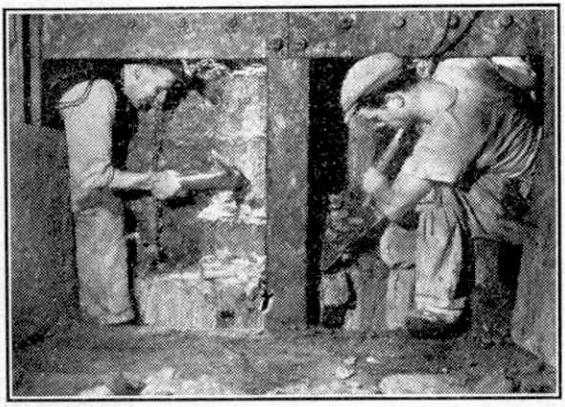
Tapping the Thames by Tunnel

Cooling Water for Great Oil Refinery

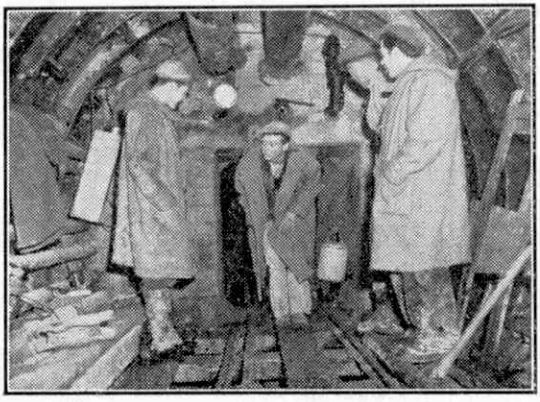
THE building in Great Britain of large plants for refining crude oil is an interesting development, designed to increase the refining capacity of the country from 2½ million tons a year in 1947 to 19½ million by the end of 1953. The Shell Petroleum Co. is taking a great share in this expansion. Its programme now in hand involves extensions of its plants at Shell Haven near Southend, and Stanlow, Cheshire, that will increase their combined capacities from nearly two million to more than five million tons a year, and will cost about £25 million.

The construction of a large refinery involves considerably more than the erection of the distilling plant required, as the Shell Haven extension shows. For instance, enormous quantities of water are required. At Shell Haven the daily consumption will be about 350,000 gallons a day. To supply this it has been necessary to extend the local main pipeline system to a point about two miles away, and thence to lay down a 16 in. diameter welded pipe leading to storage tanks.

Even larger quantities of water are required for cooling purposes, and to bring this to the plant a tunnel 900 ft. long and 9 ft. in diameter was bored. This begins below the Thames, where an intake shaft 18 ft. in diameter has been sunk. From this the tunnel has been driven through the soft ground to a large pumphouse 30 ft. below ground level. The tunnel was bored in exactly the same manner as the London tubes and other tunnels driven through clay, a tunnel shield being pushed steadily forward in stages. To prevent water from flooding the workings compressed air was pumped into the tunnel. Miners excavated at the face of the shield, and behind them cast iron segments were bolted together to form the lining. Cement grout was pumped into the clay behind the segments to protect and strengthen the huge tube, which was finally lined with concrete.



Miners at the shield face during the construction of the tunnel bringing cooling water from the Thames to the Shell Haven refinery. Illustrations by courtesy of Shell Petroleum Co. Ltd.



Miners coming out of the entrance air lock after finishing an 8-hr. shift in the pressurised tunnel.

Water from the river is pumped through the tunnel and circulated through the cooling towers and other parts of the plant, after which it returns through a second similar tunnel.

Transformers for Home and Overseas

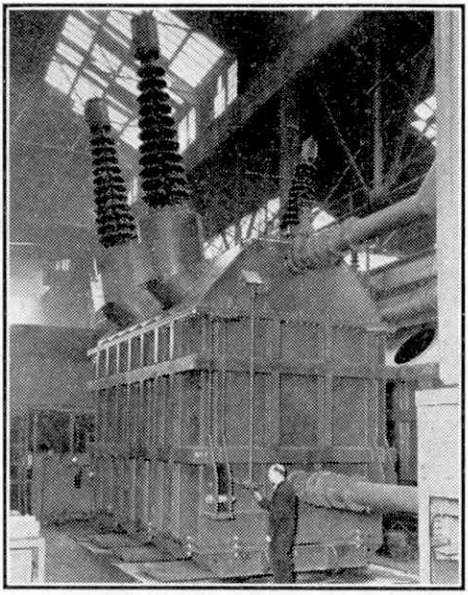
TRANSFORMERS play a very important part in the supply of electric power. Between the generating station and the ultimate user in the home, the street, or the factory, electricity passes through at least three, and sometimes many more, transformers.

The function of the transformer is to change a high voltage to a low voltage, or a low voltage to a high voltage, to give the most convenient voltage pressure for the application concerned. A simple example of the use of transformers is in the supply of electricity to model electric trains. In very many houses in the civilised world alternating current (A.C.) electricity is supplied at a pressure around 230 volts, but the majority of model railways are built to work on a low pressure, such as the 12 volts used to operate Hornby-Dublo trains. A transformer is therefore required to reduce the mains voltage.

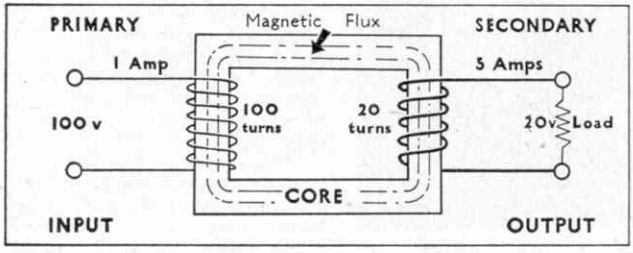
The principle of operation of the transformer is shown in the accompanying diagram. The input alternating current passes through a coil, called the primary, which is wound round one limb of a laminated steel core, and induces magnetism, or a magnetic flux as it is called, in the core. The strength of this flux is proportional to the number of turns in the primary coil and to the voltage applied. A second coil, called the secondary, is wound round the other limb of the core, and the magnetic flux induces an alternating electric current in this coil. As in the case of the primary, the voltage of the secondary coil is proportional to the number of turns. The voltage ratio of the transformer is the ratio of the number of primary turns to the number of secondary turns.

So, with a pressure of 100 volts and with 100 turns on the primary coil, an output voltage of 20 volts can be obtained by having a secondary coil with only 20 turns. (Neglecting losses of about 2%).

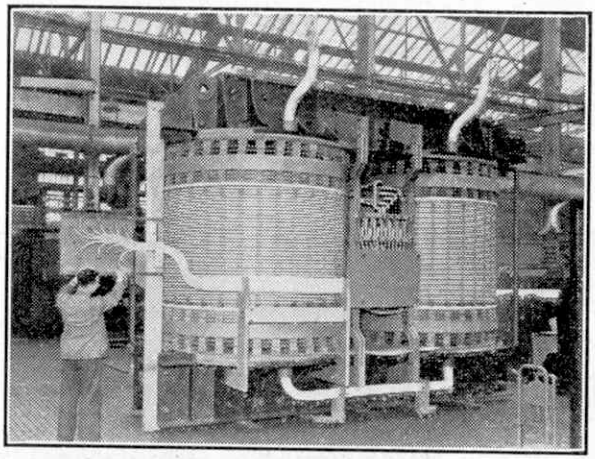
After generating electricity in the power station, the engineer has the problem of distributing it to the many users; and to do this he employs transformers. The main object in transmitting at high voltages is to keep the current (amperes) to a reasonable value, and so also the cross-sectional area of the conductors required to carry it, thus reducing the cost of the transmission lines. This often necessitates working with very high voltages if large bulk of power is to be transmitted. In the United Kingdom at the present time power is transmitted from the



Part of a 100,000-kVA, 220/150-kV British transformer for Holland. For the illustrations to this article, and for the photograph on which our cover picture is based, we are indebted to Metropolitan-Vickers Electrical Co. Ltd.



The principle of the transformer.



This interesting picture gives a good impression of the core and windings for a 100,000-kVA, 220/150-kV transformer that is installed at Lutterade in Holland.

generating stations to the main distribution points, via the National Grid system, at 132,000 volts (132-kV). This high voltage power is carried along wires suspended from the tall trellis-like pylons that can be seen in almost every part of the country.

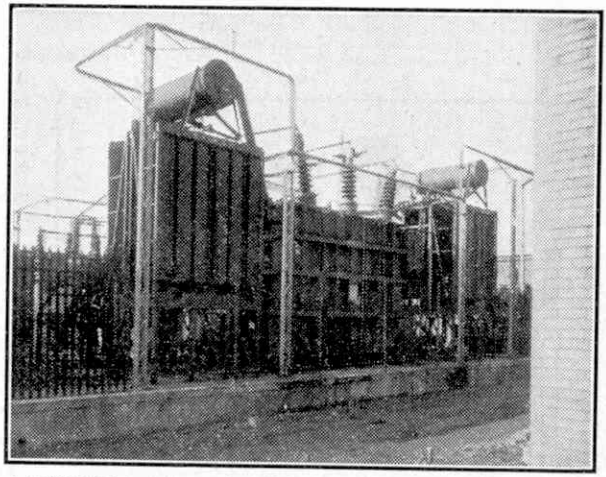
Higher transmission voltages are in prospect. At the moment, arrangements are in hand for a 275,000-volt super-tension grid system; and in the years to come it is expected that 400,000-volt systems will be common.

In Continental countries, for example Spain, Germany and Norway, where electricity has to be transmitted over much greater distances than in Britain, 220,000-volt systems are already in operation. The photograph on the previous page shows part of a 100,000-kVA capacity transformer built by Metropolitan-Vickers Electrical Co. Ltd., which now connects the 150,000-volt Dutch grid system to the 220,000-volt Ruhr network. The upper picture on this page shows the core and windings for this transformer.

At various points on the British Grid, main distribution stations are built to house step-down transformers which transform the voltage from 132,000 volts to 33,000 volts, or sometimes to 11,000 volts. These main distribution stations are usually situated on the fringe of large towns. Underground cables then carry the power to a series of smaller sub-stations where it passes through more step-down transformers. The sub-stations are situated within the town, and from here the electricity is distributed to houses, shops and factories, possibly passing through more step-down transformers on the way.

Our final photograph shows a 75,000-kVA transformer installed at a station of the British Electricity Authority. The structures on the left and right of the photograph are radiator banks for cooling purposes. The transformer itself is immersed in oil; the heat that is generated in the transformer windings is absorbed by the oil, which is circulating continuously through the transformer tank and the radiators.

For the information contained in this article we are indebted to the Metropolitan-Vickers Electrical Co. Ltd.



A 75,000-kVA transformer installed at a British main distribution station for stepping down from the 132-kV National Grid system, to 33,000 volts.

Air News

By John W. R. Taylor

Another B.E.A. "First"

British European Airways showed once again their spirit of enterprise and progress on 29th July last, when they introduced the prototype Vickers "Viscount" on their normal return passenger services to Paris from Northolt, the first time a jet aircraft had ever been used in airline service. The outward journey took 57 min. compared with a normal scheduled time of 77 minutes.

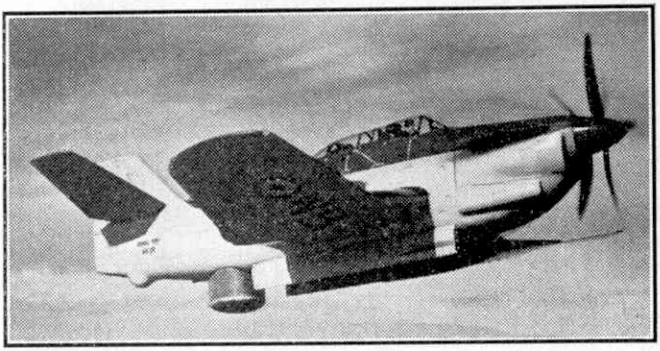
Piloted by Capt. Richard Rymer, the "Viscount" carried among its 26 passengers a party of V.I.P.s, including Sir Frank Whittle, British jet pioneer; Mr. George Edwards, designer of the "Viscount"; Mr. Peter Masefield, B.E.A.'s Chief Executive; and Sir Alec Coryton, then Controller of Supplies (Air) at the Ministry of Supply.

Anti-Submarine News

The Blackburn Y.A.5, shown here, has been designed to the same Naval specification as the Fairey "17," which was illustrated in the April 1950 *"Air News."* This particular prototype is powered by a Rolls-Royce "Griffon" piston engine, but a later version, designated the Y.B.1, has an Armstrong-Siddeley "Double Mamba" propjet power plant, like its Fairey counterpart.

The "Double Mamba" is one of the most important aero engine developments of recent years. It consists basically of two ordinary "Mambas" mounted side by side, driving a single set of co-axial, contra-rotating propellers, and thus combines the aerodynamic advantages of a single installation with the performance and safety characteristics of twin engines. In the case of the new anti-submarine bombers, it provides full twin-engine power for carrier deck take-off or in combat, while allowing the pilot to stop one engine in flight to improve cruising range.

Other features of the two new British anti-submarine bombers are their large bomb bays and retractable radar scanners, which are seen to advantage in the photograph below of the Y.A.5. This aircraft has a wing span of 44 ft. 2 in. and is 42 ft. 5 in. long. Corresponding dimensions for the Fairey "17" are 54 ft. 4 in. and 43 ft.



The Blackburn Y.A.5 Naval anti-submarine aircraft. Photograph by courtesy of Blackburn and General Aircraft Ltd.

"Hermes" in Service

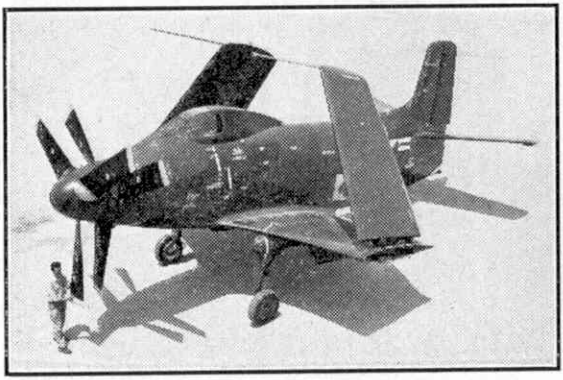
B.O.A.C. plan to introduce their new fleet of Handley Page "Hermes" four-motor air liners on their *"Springbok"* service to South Africa during this month, operating three times weekly in each direction between London and Johannesburg, via Tripoli, Kano, Leopoldville and Livingstone (Victoria Falls). "Hermes" aircraft have already replaced the "Solent" flying boats on B.O.A.C.'s service between London and Nairobi and "York" services to Kano, Lagos and Accra.

The new service will be run in partnership with South African Airways, who are also operating three times weekly in each direction, via Nairobi, Khartoum and Rome, using Lockheed "Constellations."

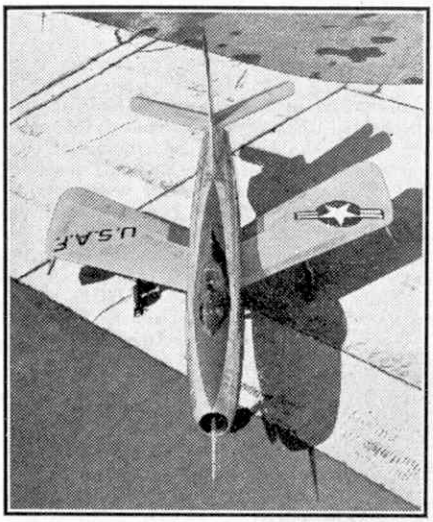
"Skyshark"

The vicious-looking aircraft shown at the bottom of this page is the single-seat Douglas XA2D "Skyshark," the latest addition to the U.S. Navy's carrier-based strike power. It has been developed from the well-known "Skyraider," and is fitted with the new Allison T-40 coupled propjet power plant, which works on the same principle as the British "Double Mamba" but develops much more power. New-type Aeroproducts contra-propellers enable the "Skyshark" to operate efficiently at speeds comparable with those achieved by many operational jet fighters.

Douglas claim that the "Skyshark's" ability to cruise on one half of its power plant enables it to carry a greater payload than any known jet bomber or fighter for the same expenditure of fuel—an important asset. At the other extreme, its high speed when operating at full power allows it to take off from carrier deck or short landing fields in combat areas, and to operate without jet fighter escort. Its offensive load of rockets, bombs or torpedoes is carried externally under its wings.



Douglas XA2D "Skyshark," the U.S. Navy's latest carrier-based aircraft. Photograph by courtesy of Douglas Aircraft Co. Inc., U.S.A.



Looking down on the Republic XF-91 high-altitude interceptor fighter. Photograph by courtesy of Republic Aviation Corp., U.S.A.

Republic's Latest

The new Republic XF-91, illustrated above, is a successor to the famed "Thunderbolt" and "Thunderjet" fighters. The most noticeable of its several advanced features is the inverse taper of its wings, which means that they are wider at the wing tips than at the root end. The XF-91 is the first aircraft ever to utilise inverse taper, which is claimed to improve the handling characteristics of sweptwing machines. Its tricycle undercarriage is also unorthodox, as each of the main units has two wheels in tandem, to reduce the thickness of each unit for retraction into the razor-thin wings.

The XF-91 is powered by a single 5,000 lb. thrust General Electric J-47 jet engine, but its tail end is extended above and below the jet tail-pipe to accommodate also a pair of rocket-motors, which will be used to accelerate take-off and climb and to give it additional speed at extreme altitudes.

Apart from its span of about 30 ft. and length of "over 45 ft.," no further details of the XF-91 may be given yet. Its possibilities as a rapid-climbing, target-defence interceptor, however, are quite apparent.

Improved Link Trainer

Most readers will be familiar with the standard Link Trainer, a stumpy, aircraft-shaped contraption centred around a fully-equipped cockpit, in which a pupil pilot can be completely enclosed for flying and navigation instruction, and which will bank, "climb" and "dive" in response to his control movements.

A new and improved type Link Trainer now going into service with the U.S.A.F. has been developed to teach jet pilots everything from handling their aircraft and engine to radio navigation. By means of a special control panel, the instructor can simulate icing conditions, reduce his pupil's visibility to a few yards, make him "fly" through bumpy air and variable winds, confront him with an engine failure or a wide variety of other circumstances. It is bigger than the old Link, with a weight of some 32 cwt., but its wider variety of party tricks should make it extremely popular, except perhaps with nervy pupils!

"Flying Taxi" Trips to Paris

Mr. L. Wightman, a London taxi-driver, has started running week-end "flying taxi" trips from London to Paris with the co-operation of Silver City Airways.

His cabs drive from Marble Arch to Lympne every Friday, and are there loaded aboard Bristol "Freighter" car-ferry aircraft and flown across the Channel to Le Touquet. After passing through Customs, they set out on the 140-mile run to Paris, arriving late in the evening. Hotel accommodation in the French capital is arranged in advance, and taxi and driver are at the passengers' disposal until they return to London on the Monday.

A British Airship

The first airship built in this country for many years is being completed by a recently formed Airship Club, with headquarters at Hurn Airport. The 'ship's' envelope was fitted out by the R.F.D. Company at Godalming, and has already been air-tested at R.A.F. Cardington.

The President of the Airship Club is Major-General Sir John Capper, K.C.B., K.C.V.O., who commanded the Balloon Section and School of the Royal Engineers from 1906 to 1910, and who piloted all the Army's early airships. New members are welcome, and anybody interested can obtain full details of the Club from Mr. A. C. Leith, 1, Lystra Road, Moordown, Bournemouth.

Air-Minded Australia

Australia's Acting Minister for Civil Aviation, the Rt. Hon. R. G. Casey, has given statistics proving that his country leads the world in the amount of flying done per head of population. Furthermore, in the total number of passenger-kilometres flown Australia is second only to America, and the total annual distance flown by her air liners is exceeded only in the United States and Britain. They carried 1,470,816 domestic passengers during 1949, despite the fact that the total population of Australia is only 8,000,000.

D.H. 113 "Vampire" night fighter. (See special article on page 456). Photograph by courtesy of de Havilland Enterprise.

Pelorus Jack

FOR many generations before the coming of the white man, the Maoris of New Zealand claimed to have known of a certain fish which had inhabited Cook Strait, and had safely guided their war canoes through those narrow waters between the North and South Islands of New Zealand.

Whether this was true or not, such a fish was certainly well known to Europeans from the year 1870, and for nearly fifty years was a very definite centre of attraction. Many passengers made the trip through the Strait for the express purpose of seeing this strange, friendly fish. In official circles he was classified as a dolphin, and yet, unlike those of his species, he was never seen in the company of other dolphins. He was described by the authorities of his time as being about 14 ft. long, of a bluish-white colour tinged with purple and yellow, and having flippers dark in hue and mottled in grey. His haunt was Pelorus Sound, on the South Island coast of Cook Strait, and from this he was given the name of Pelorus Jack.

Pelorus Jack, the only fish in the world ever protected as an individual by a Government Order.

By some extraordinary instinct, Pelorus Jack would meet the passenger steamers, whether by night or day, and, like a pilot, accompany them for many miles on their journies between Wellington and Nelson, but strictly confining his "beat" within certain limits. For instance, he never entered French Pass, the narrow tide-swept passage to the west of Pelorus Sound, though he often waited at its eastern end to pick up a vessel leaving it. Then he would repeat his gambols until the vessel left him behind, or he had reached a sufficient distance from his home waters.

His regular attendance must have proved a source of income to liners and photographers. Conversely, that inherent instinct of the so-called sportsman of the genus that is reputed to say: "It's a fine day, let's go out and shoot something," at one time became so pronounced that the life of this poor harmless friend of tramp and liner alike was undoubtedly in peril. But Pelorus Jack found a friend in court in the Rev. D. C. Bates, who on becoming an official of the Tourist Department in 1904 at once proposed to the New Zealand Government that the killing or capture of this fish should be prohibited. Accordingly, under a general Act of Parliament, the Cabinet of New Zealand made an Order in Council imposing a fine, with a maximum of £100, upon anyone guilty of trying to interfere with this denizen of the deep.

The order, extended in 1911, was evidently respected, for Pelorus Jack continued to be a source of considerable interest to all those bound through the Strait, and he no doubt revelled in the company that gave him such freedom and protection.

Alas, all good things come to an end. In 1917 it was noted that Pelorus Jack failed to greet the many steamers and pilot them through the tortuous channels. Whalers were accused of causing his death, which they denied. In any case, the carcase of a white grampus was washed ashore badly gashed, and authorities sent to investigate were convinced it was that of their old friend, Pelorus Jack, who had met with an untimely death, killed probably by the propeller of a twin-screw ship that had caught him as he played about her.

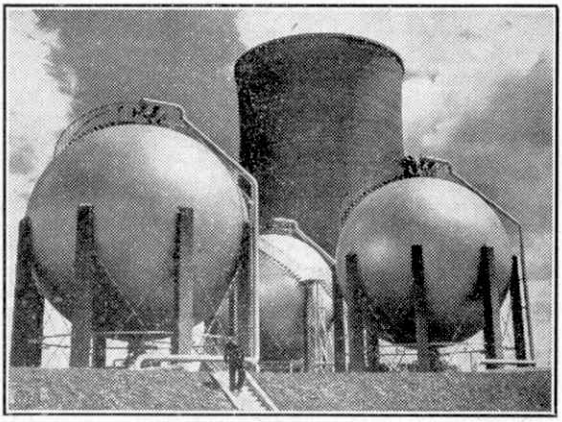
This article and the accompanying photograph are reproduced by courtesy of the Editor of "The P. D. Review."

Engineering Notes

The World's Largest Concrete Cooling Tower

The world's largest concrete cooling tower has been built at Ellesmere Port, on the Manchester Ship Canal, where it forms part of the new Stanlow Refinery of the Shell Petroleum Co. Ltd. In shape it is like a giant milk bottle. It rises to a height of 341 ft. 6 in., only 24 ft. less than the height of the cross of St. Paul's Cathedral, and its base is 272 ft. in diameter. It narrows to a width of 168 ft. and widens again to 177 ft. across at the top.

The total weight of the tower is more than 20,000 tons, and in it there are over 500 tons of reinforcing steel. Through it 5,000,000 gallons of water will circulate every hour, all of which will be used for cooling purposes in the various processes carried out in the refinery, where a wide range of chemicals is now being manufactured from petroleum.



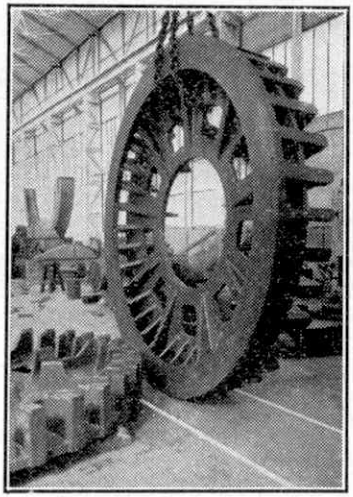
Spherical storage tanks for butane gas at the new Shell refinery at Stanlow, Ellesmere Port. They are 35 ft. in diameter. Behind them is the new concrete cooling tower, the largest in the world. Photograph by courtesy of the Shell Petroleum Co. Ltd.

As our illustration shows, huge spherical tanks also are a striking feature of the Stanlow enterprise. These are used for storing butane, a gas that is obtained during the cracking or distillation of petroleum and is used in the manufacture of certain chemical products.

Rotor Cast in Steel

The large rotors of water-driven alternators installed in hydro-electric power stations are normally built up, using many hundred components in the process. When David Brown-Jackson Ltd., Salford, were called upon to construct a 28-ton rotor for service in a New Zealand power station, they decided to attempt to cast this in steel, a process that promised many advantages. In their first trial they cast the rotor disc in four sections. Two of these were then welded to form each half of the rotor, and the halves were bolted together to give the complete rotor casting.

The finished rotor was rigidly inspected in order to judge the value of the new method employed in its construction, and as a result of the experience gained in making and examining the casting it was decided that an even more satisfactory result could be obtained by casting in two sections and welding these together. The illustration on this page shows the two castings that were then made, after they had been machined and made ready for the final process, which consists in welding them together to form the rotor. When completed this was 14 ft. 8 in. in diameter and 3 ft. 6⅛ in. in width. Radiographs showed that it was superior to a normal built-up structure, and indicated the inherent strength of the casting arising from its uniformity.



The two halves of the rotor of an electric generator, machined and ready for assembly by welding. Photograph by courtesy of David Brown-Jackson Ltd., Salford.

Collisions at Sea

By Frank C. Bowen

TO most people it seems that there is so much room in the sea, or even in the big rivers, that it is absurd for ships to collide with one another. Yet in spite of all the care of the officers, and all the regulations that have been made to avoid them, collisions are still one of the most frequent causes of accident to shipping. The regulations for their prevention, agreed by practically every country, are most precise and cover what seems to be every possible cause of accident. The sea is such an uncertain factor however that it proves impossible to cover them all, and even the regulations demand that the shipmaster should do what he thinks best to avoid a collision at the last moment. It is realised that a ship cannot grip the water as a motor car grips the road.

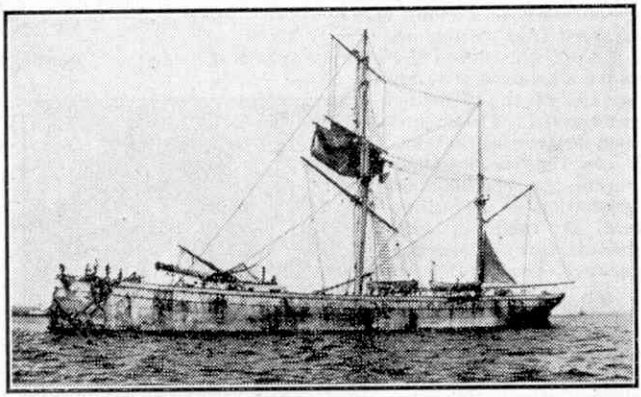
When the earliest regulations were framed is unknown, but there are suggestions that they go back to very early days. It is unlikely that ships would have sailed in convoy, as they generally did as a precaution against pirates, without some measures being taken to prevent their getting into one another's way.

The earliest rules appear to have been to lay down which sailing ship should give way when two met. But rules were lightly regarded in those days, and even in the early part of the 19th century it was very difficult to get them obeyed, while if the case came up for judgment the witnesses on both sides would perjure themselves unblushingly.

When steamers were introduced it was obvious to every thinking seaman that new regulations would be necessary, but the authorities took a long time to make up their minds. Admiralty judges were more businesslike and laid down precedents. One of the earliest cases occurred in 1828, when the sailing ship *"British Union"* and the steamer *"Shannon"* collided off Beachy Head. The Court immediately found for the former, the judge remarking: "The steam vessel, being more under command and manifestly having seen the other vessel, was to blame. The advantages which belong to steam-boats distinguish this from an ordinary case of collision and the general rules of navigation could not justify a vessel, having the power, in standing upon its privilege if harm might follow." Ever since then a ship under power has had to give way to a ship under sail.

A chaotic collection of regulations, customs and legal precedents were consolidated in 1840 when Trinity House issued a set of regulations in default of Government action. It took another six years for the authorities to move and to give these regulations statutory force by the Steam Navigation Act of 1846. That laid it down definitely that steamers should pass one another port to port side, leaving as much room as possible.

The same admirable Act of Parliament made navigating lights compulsory for all steamers and arranged a uniform system; until then they had been carried voluntarily by many careful shipowners, but each one followed the fashion which appealed to his taste so that they were apt to be most confusing to another ship. The suggestion to make them compulsory and uniform met with strong opposition from a number of economical owners; whereupon the Government spokesman suggested that lights should not be compulsory, but



This sailing ship, the "Esmeralda," lost her foremast by the shock of collision and the parting of the stays. The illustrations to this article are by the Nautical Photo Agency.

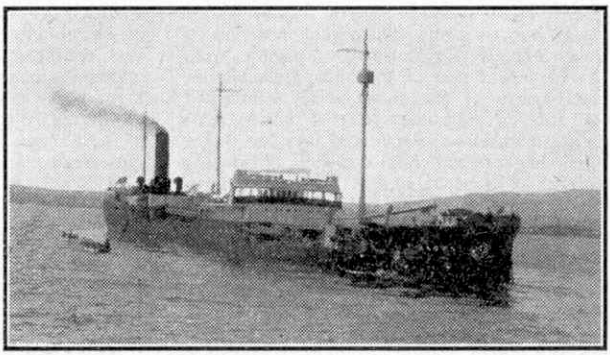
The bow of the American liner "St. Paul" torn by her collision with H.M.S. "Gladiator."

that when a collision occurred between a ship carrying lights and one which did not, the latter should be automatically to blame and liable for the damage, no matter what other circumstances there might be. That killed the opposition at once, and within a year all steamers were following the fashion, which had been voluntarily started by the Cunard Line, of carrying a green light on the starboard side, a red light on the port, and a white light at the masthead.

In 1851 another Act ordered sailing ships to show a bright white light in the best position to be seen between sunset and sunrise, but it was not until the Act of 1862, which transferred the power of making the regulations from the Admiralty to the Board of Trade, that sailing vessels were made to carry the red and green side lights but not the white masthead light. The side lights had to be screened to prevent them showing across the bow of the ship and causing confusion, and the Act contained a number of minor regulations to make the rules more effective.

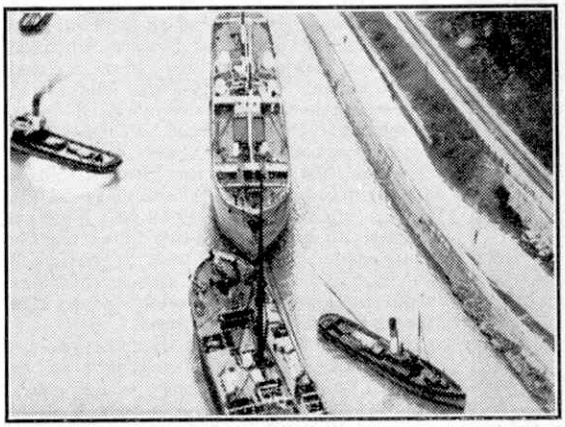
It was high time that measures were taken, for the 57 collisions involving wreck or casualty in 1852, and 73 in 1853, had grown to 301 in 1858 and 349 in 1859. The regulations laid down under the Act of 1862 were soon found to be faulty on many minor points and were amended six years later, but they were a great improvement on anything that had preceded them and were adopted by a number of other countries. Perhaps their biggest virtue was that they appreciated the fact that fog was the greatest danger and demanded that all steamers should have a whistle and sailing ships a fog-horn worked by hand, the latter being usually quite inadequate. Both were to ring a bell at intervals while at anchor, but the regulations were very sketchy as to how sound signals should be used.

It was not until later that the present system of indicating the course to be steered by the steam whistle was adopted, in 1884 if the individual master thought fit, and 12 years later compulsorily. One short blast still means that the ship is steering a course to starboard, two that she is steering to port, and three that her engines are going full speed astern. These are used by night or day, in thick weather or clear, and have had an immense influence in reducing the number of collisions. In addition to this code, which applies to the ships of all nations, there are local signals in different areas.



The tanker "Paulsboro" making Gibraltar with a rent in her side. All men not needed on board are in the life-boats alongside.

While this progress was being made in framing regulations to prevent collisions occurring, the naval architects and shipbuilders were making great strides in limiting the damage that might be done when they did occur. Watertight bulkheads now divide every ship into a number of compartments. They were first introduced in steamers, one before and one abaft the machinery only, to limit the spread of a fire; but when iron ships came into fashion the bulkheads could divide them really effectively and many owners had voluntarily adopted a stout bulkhead, as watertight as the sides of the ship, a short distance from the bow. That came to be called the collision bulkhead, its purpose being to avoid flooding more than a short proportion of the ship's length right forward where it would not cause her to sink. The exact position is now officially laid down, varying with the type and size of the ship, to minimise the chance of the bow being telescoped for such a distance that it carries the collision bulkhead away and lets the water into the forward hold. Other bulkheads now have to be fitted for the entire length of the ship.



An inter-action collision in the River Avon in spite of the tugs' efforts to keep the ships apart.

In the general regulations a further big step forward was taken in 1889 when an international conference was held at Washington on the Rule of the Road at Sea, with the idea of deciding which country had the best regulations and making them universal. The conference also dealt with other aspects, and especially with regulations which might cause confusion. In 1880, for instance, H.M. five-masted ironclad *"Minotaur"* was steaming slowly down channel at night when the German barque *"Hoffnung"* mistook her for two sailing ships and tried to pass between them, hitting the warship on her five-inch iron armour belt and coming off second best.

So the regulations improved as more experience was gained, and the code framed in 1910 is still in force in all its essentials. There were then still a considerable number of sailing ships afloat, and existing rules for their protection were embodied in the new code.

Although collisions occur in all sorts of conditions, some of which would appear to make them impossible, the three worst are fog, meeting in narrow channels, and navigation under war-time conditions. In fog the regulations lay down that ships must be navigated at "moderate speed," but it is impossible to define that term exactly. What is a moderate speed for a tramp would not give a fast liner steering way and she would be absolutely unmanageable, to the danger of all other ships. A ship hearing a fog-horn ahead is bound to take her way off immediately and to lie stationary until conditions are ascertained; but at sea in fog it is often very difficult or impossible to discover whether a ship is absolutely stationary or still moving ahead very slowly, although it may make a big difference in the Admiralty Court. The fog-horn has to be sounded at regular intervals, the nature of the blasts conveying information like the course signals; but the manner in which fog makes it very difficult to judge from what direction the sound is coming adds greatly to the danger and strain.

Radar can be a great help, but, as an American wreck commissioner put it: "It is a very good walking stick but a poor crutch." Many collisions have occurred through too much trust being put in the Radar and the officer neglecting to take frequent careful bearings of the object shown on the screen; the knowledge that there is some vessel ahead is not sufficient to avoid a collision.

The danger of ships hitting one another when they meet in narrow channels is obvious, particularly (*Continued on page 478*)

BOOKS TO READ

Here we review books of interest and of use to readers of the "M.M." With certain exceptions, which will be indicated, these should be ordered through a bookseller.

"WEST HIGHLAND STEAMERS"

By C. L. D. Duckworth and D. E. Langmuir
(Tilling. 15/-)

The first edition of this excellent book was reviewed in the "*M.M.*" for October 1935, and the appearance of a second edition with substantial additions is very gratifying, both to lovers of the West Highlands and to coastal steamer enthusiasts. What has happened during the past 15 years is well described, and information that has come to light in the interval is included throughout the book. In addition the authors now trace the ancestry of the MacBrayne fleet from its beginnings instead of starting their story in 1851.

In one interesting respect no change is made. This is the distinction accorded to the "*Columba*" of appearing in colour as the frontispiece. This wonderful veteran entered service in 1878, and endeared herself to thousands of regular travellers and holiday-makers, who protested so strongly when in 1929 she was painted grey instead of the accustomed black that the colour always associated with her had to be restored.

A surprising number of notable vessels have been engaged on the West Highlands service, and the authors tell the stories of all of these right down to the newest member of the fleet, un-named and indeed not yet in service at the time when the book was written. The intricacies of the companies that at various times have run boats in the West Highlands are carefully traced; and the book is undoubtedly a mine of authentic information on a passenger and cargo service that has been of outstanding interest ever since 1819, when the "*Comet*," Henry Bell's famous pioneer steamship, started a service to Fort William via Crinan after an extensive overhaul. Unfortunately this, the first West Highlands steamer, was wrecked in December of the following year.

The book is well provided with reproductions of photographs of famous vessels of the West Highlands service, and comprehensive fleet lists, with a good index, complete a very fine volume.

"THE WORLD'S AIRWAYS AND HOW THEY WORK"

(Odhams Press Ltd. 8/6 net)

Here is the "how and why" of airline operation told in 12 fascinating chapters, each by an author of wide experience in his particular branch of the subject, and preceded by a foreword by Sir William P. Hildred, C.B., O.B.E., M.A., Director General of the International Air Transport Association.

For readers who are new to aviation there is a chapter explaining how an aeroplane flies, and describing the purpose and working of the chief instruments upon which the pilot relies for information essential to safe flying. Having grasped these fundamentals, the reader can turn to the main purpose of the book, and learn how great airlines are planned and organised; of the design and production of the big transport aircraft employed on them; and of the tasks and equipment of the aircrews who fly these machines. Other chapters deal with the work of the maintenance engineer, air traffic control, aircraft landing systems and the work of the meteorologists, whose forecasts are of such vital importance to airline operation. The test flying of new types of aircraft and the development of jet propulsion are also dealt with, and finally there is a chapter on aircraft of the future.

An outstanding feature of the book is the wealth of explanatory illustration. There are nearly 300 photographs of airline features and many drawings.

"NEW LIGHT ON THE LOCOMOTIVE EXCHANGES"

By Cecil J. Allen, M.Inst.T.
(Ian Allan Ltd. 3/6)

As the title indicates, the book is complementary to the same writer's "*Locomotive Exchanges*," which was reviewed in the August 1949 "*M.M.*" It is in fact a detailed analysis of the voluminous official report of the Railway Executive, but is written in the readable and informative manner that "C.J.A." has made his own.

In the earlier book the times and speeds as noted by the author from the trains concerned formed the main records. Now the reader is taken behind the scenes, as it were, for details afforded by the official dynamometer car records are included. The author first considers the official report, and then turns to the special Western Region tests, which were made after the exchanges proper in order to obtain results with Swindon engines burning Welsh coal, the fuel for which they were designed, instead of the hard Yorkshire used throughout the exchanges.

The freight engine tests have a chapter to themselves, as the only records available, those of the dynamometer car, could not be included in the earlier publication. Dimensions of the engines involved and details of their coal and water consumption are followed by a discussion of the methods of handling express, mixed traffic and freight locomotives, and here there are fascinating comparisons, with some surprises. Sections on maximum horse-power output and the vexed question of slipping and adhesion bring us to the conclusion.

The edition at 3/6 is in paper covers, but a cloth-bound version is available at 5/-. Copies can be obtained from booksellers, or direct from A.B.C. Books Mail Order Department, 33, Knollys Road, Streatham, London S.W.16, postage 4d. extra.

"EVERYDAY ISLAND"

By M. E. Allan (Museum Press. 6/- net)

Younger girl readers of the "*M.M.*" will enjoy this book, a story of a summer on a small island in the Outer Hebrides on which there are two groups of children, one of them enjoying a holiday. Misunderstandings develop because of the intrusion of another girl, who remains a mystery until nearly the end of the story, by which time the rivalry between the two groups has been ended. The climax comes with a desperate row across a tempestuous rock strewn sea to Alvanaig (the real name of Everyday Island) to bring help for the mystery girl, who has contracted pneumonia after exposure to a gale.

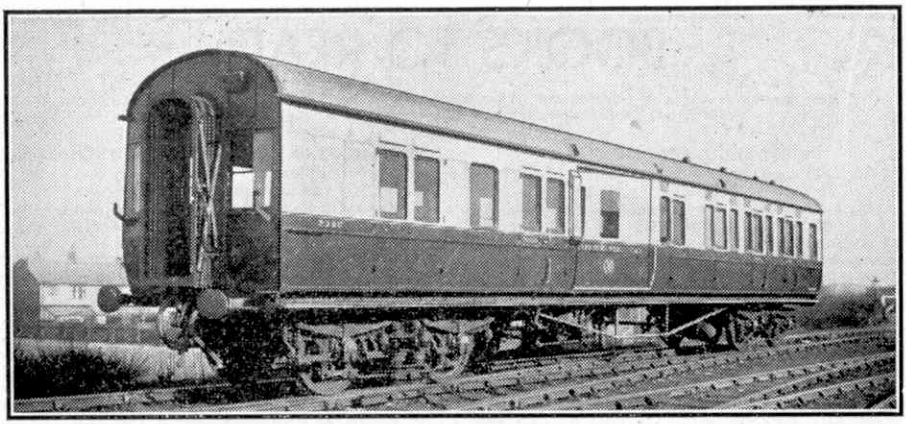
There is a coloured frontispiece.

"BRITISH RAILWAYS LOCOMOTIVE REFERENCE (60001 - 90774)"

(The British Locomotive Society. 3/-)

This is a companion volume to the L.M. Region Locomotive Reference Book reviewed in the "*M.M.*" in August last. It presents a classified list of British Railways locomotive stock between Nos. 60001 and 90774, and so covers steam locomotives of the former L.N.E.R. and the 2-8-0 and 2-10-0 Ministry of Supply "Austerity" designs produced during the last war, with shed allocations and names where these have been given. In addition there are details of former L.N.E.R. diesel, electric and petrol-driven locomotives. Room is left on each page for additional notes, and a useful feature is a list of the locomotive sheds of all Regions.

Copies of the book are obtainable from Mr. R. P. Sykes, 42, Coombe Road, Handsworth, Birmingham 32, the price including postage.

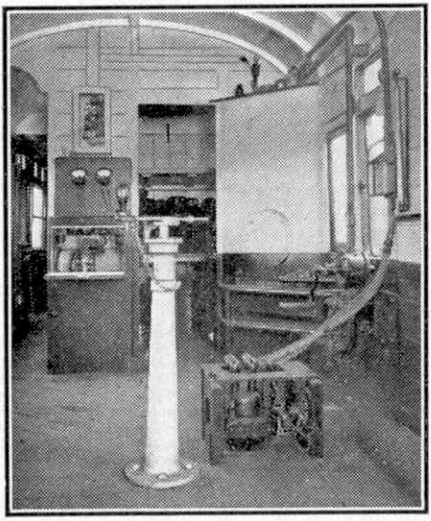


The "Whitewash Coach"

By T. R. Robinson

THOSE who travel on the Western Region of British Railways may have seen a special coach bearing the words "Experimental Car" at the tail end of a fast train.

This car is familiarly known to Western Region staff as the "Whitewash Coach." It is equipped with instruments and mechanisms that not only give a detailed record of the track conditions on any route over which the coach journeys, but also mark with whitewash the location of any definite faults.



The Western Region coach shown at the head of the page marks defective places in the track with whitewash. Our lower illustration shows the mechanism by which this is done. Photographs by courtesy of British Railways.

The original purpose of the coach was to test the riding qualities of various types of bogies, but as the tests progressed they revealed the existence of various bad places on the permanent way, and it was decided that these should be marked by dropping whitewash from the coach as it passed over the defective sections. At first, this was done by hand, a hand-operated flap-valve being opened by the staff on the coach whenever a bad place was encountered, but now an electro-mechanical system that is both ingenious and highly efficient is used.

The principle used is to cause the movement of a bogie of the coach to generate an induced electric current as it passes over a fault on the track, and to employ this current to trip a series of relays, the last of which closes the circuit operating the valve that releases the whitewash. Two coils, mounted one within the other, are used for generating the induced current. The outer, or primary, coil is attached to the bolster of the underframe, and kept continuously energised by the 24 v. current supplied by the coach lighting batteries. The inner, or secondary, coil can move within the primary, and is linked, by means of a rod provided with universal joints, to the frame of the bogie.

While no movement of the bogie takes place this secondary coil does not carry any current, but when one of the track defects causes the inner coil to move, the action is rather like that of a tiny dynamo, and a small current is generated in the secondary coil. It is this current that passes to the relays, the last of which operates the whitewash dropping mechanism, which is open for at least one second. About a quart of whitewash is released each time the valve is opened. The wash used is made by mixing zinc white and bentonite with water.

The final outlet of the whitewash on to the track consists of a four-inch pipe, which clears the track level by about eight inches, and is cut away on the trailing side to prevent the rush of air from hindering the flow of whitewash at high speeds. A horn is sounded to give an audible warning to the staff every time the track is marked.

A Hallade recorder also is fitted in the experimental coach for giving a graphic record of the track conditions. This is separate from the track marking apparatus, but a special pen, connected to the whitewash valve, marks a small hump in a line on the chart whenever track marking takes place.

From Our Readers

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

THE DARTMOUTH BRIDGE

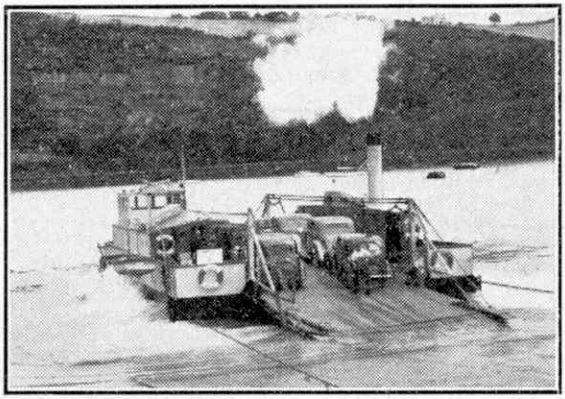
For many years there has been talk of building a bridge for vehicular traffic over the lovely River Dart at some point near Dartmouth, but still the blue waters of the Dart flow unbridged for approximately 12 miles from Totnes to Dartmouth, where it enters the English Channel. To overcome this lack of a road bridge, the road on the Kingswear side of the river is linked by a "floating bridge" to a similar road on the Dartmouth side.

The "floating bridge," a picture of which is reproduced on this page, is a steam-driven paddle float. It is fitted at each end with a movable ramp, which can be lowered to meet the concrete ramps that run from the main roads to the water's edge, thus providing easy movement on to and off the floating bridge.

The Dart is at times fast flowing, and to keep the bridge on its course it is secured to two wire cables, which drop to the river bed as the crossing is made. This dropping of the cable is necessary because of the amount of shipping moving on the River.

It is not unusual to see motor coaches, cars, motor cycles, bicycles and pedestrians all making the crossing at the same time. There are very lovely views both up and down the River, and it is very interesting to note the reactions of strangers to the district, when they drive on to the bridge in motor coaches, and sit quietly listening to the clanking of the paddles and feel the gentle rise and fall of the bridge.

J. Hobbs (Dartmouth).



The floating bridge between Dartmouth and Kingswear, on the Dart. Photograph by J. Hobbs, Dartmouth.

WALL OF STONE RAILWAY SLEEPERS

The other day, when stopping at the top of Wishing Gate Hill, Storeton, to admire the view of the fields of the Wirral Peninsula from this fine vantage point, I noticed near by a stone wall with curious small holes in it. Closer examination revealed that part of the wall was actually made up of old-time stone railway sleepers, which probably came from the so-called "Storeton Tramway," constructed in 1837.

This old railway track has now disappeared, except for a small section preserved close to Lower Bebington Church. As I explained in a contribution in the "*M.M.*" of February 1949, it was particularly interesting owing to the fact that the fish-bellied rails used were originally from the Liverpool and Manchester Railway, and over them the "*Rocket*" once ran.

Cyril R. Rowson (Liverpool).

Stone sleepers that probably were used on the former Storeton Tramway. Photograph by C. R. Rowson, Liverpool.

AN EARLY WIND-DRIVEN DYNAMO

I read the article "*Electricity from the Wind*" in the "*M.M.*" for March last with great interest, as over 40 years ago I saw a windmill in Harleston, Norfolk, that was used for this purpose. My uncle built the mill. It was on the lines of a Norfolk grinding mill, a four-sail type with vanes to open and shut. The shaft was connected to a crown wheel and pinion, and the drive taken thence to pulley wheels, and finally by a belt to a dynamo. Strong winds produced a good output of current at 50 v., which was stored in batteries, and these supplied three private dwellinghouses. This was the very first electricity supply in our small town of Harleston.

The plant operated from 1907 to 1912 and was considered a great achievement. A gale that wrecked the whole upper structure brought disaster to the venture, and in place of sails an oil engine was installed to drive the dynamo.

L. Feaviour (Ealing).

The Smallest State in the World

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

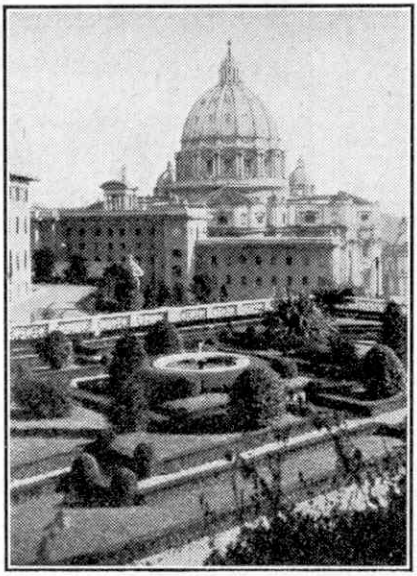
SCATTERED about Europe there are a number of very small states enjoying more or less complete independence. In the South of France there is Monaco with its famous casino at Monte Carlo. It is about 3 miles long and 1½ miles broad, and in it are three cities, Monte Carlo being the best known. It has a population of just over 10,000, but is visited every year by some 50,000 tourists. In Spain we have Andorra, with an area of 175 square miles and a total population of 5,500. But the smallest sovereign state in Europe, and indeed in the world, is Vatican City in Rome.

As this is Holy Year there is special interest in Vatican City. Pilgrims from all over the world are flocking to St. Peter's to take part in the various ceremonies. The lower crypt of the great church is being thrown open so that pilgrims may see the actual tomb where St. Peter was buried. Until now the crypt was inaccessible to the general public.

Vatican City is but 108 acres in extent, no larger than a generous 18-hole golf course. You could walk the whole length of it in eight minutes, but it would take a lifetime to inspect all its treasures. It was created a couple of decades ago. From 1870, the year of the unification of Italy, to May 1929, the Pope was only a guest in his own household and a voluntary prisoner who never left the Vatican. The latter was the property of the Italian Government, which merely granted the use of it.

By the Lateran Treaty all this was changed. The Pope was given absolute power and sovereign jurisdiction over the newly-created state of Vatican City, and now the Italian Government cannot intervene in any way in its affairs. As compensation for the losses inflicted upon the church in 1870 the Vatican received about £18,000,000 in cash and Italian Government Bonds. This is really a comparatively small payment as an indemnity for the losses the church sustained.

Since Vatican City was created many new buildings have been added and a special form of government to meet the peculiar needs of the state evolved. It has its own police force as well as an army, railway station, powerful radio plant, a law court, jail, post office, newspaper plant, motor garages, shops and various industries. It issues its own stamps and has its own coinage.

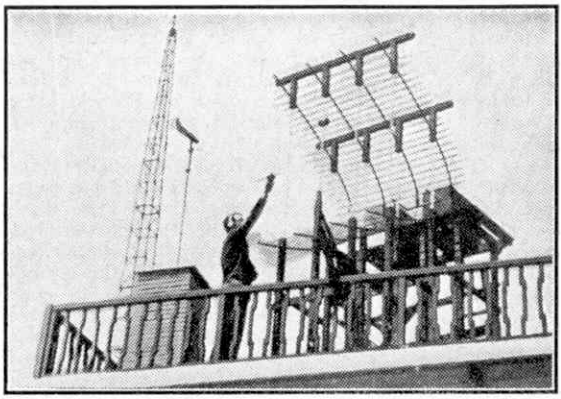


The Pope's private garden in Vatican City, with the dome of St. Peter's in the background.

Although Vatican City lies within the city of Rome it is entirely surrounded by a wall except at the entrance to St. Peter's Square. The Basilica of St. Peter, the largest church in the world, capable of seating 40,000 worshippers and the Papal Palace, with its 10,000 rooms, are included within the area of the State. The main entrance to this unique sovereignty is by Santa Anna's Gate, a little way to the north of St. Peter's Square. Here the visitor is given a special permit and receives a kindly welcome from one of the Swiss Guards. No passports are required and there are no custom or immigration officers to satisfy.

You quickly discover that the environment is unusual. The atmosphere is distinctly ecclesiastical and mediæval, yet tinged with a touch of modernity. There is a jail, containing as I write a solitary occupant, an erstwhile Vatican Library book-keeper charged with embezzlement. Since the jail was built only some score

of persons have been brought to trial under the Pontifical Penal Code. The police force numbers 100 men, all Italians, whose principal duty is the policing of the



Vatican City has a radio station from which the Pope himself broadcasts.

Vatican Gardens. The Swiss Guards, the personal bodyguard of the Pope, number 110 men and 10 officers. They hail from Switzerland and speak German. Their uniform is a striking combination of red, yellow and blue.

Vatican City has two newspapers the "*Acta Apostolicae Sedis*" and the "*Osservatore Romano.*" The first named is the official news organ of the Pope, publishing bulls, encyclicals and other papal announcements. It has a circulation of about 10,000 copies and is published weekly, with most of its text printed in Latin. The "*Osservatore Romano*" is the city newspaper and is printed in Italian. It gives ordinary international news as well as the proceedings of the Papal Court. It is issued daily and enjoys a circulation of some 50,000 copies.

There is a commercial atmosphere about the post office, with its stamp cancelling machines and modern cages for the sale of stamps. Vatican stamps are much in demand as souvenirs. The post office also serves as a telegraph and telephone office, with long distance as well as local telephone service. The Pope himself uses a solid gold telephone embossed with the Papal arms and images of the four Evangelists. It was presented to him when the telephone service was first installed. In the telephone book the Holy Father's number is listed as "One O One." The State possesses one of the most powerful broadcasting stations in the world. Over it the Pope has made many broadcasts on church, social and international questions.

Near the "frontier," reached by a double track, is the railway station. It was built by American engineers. Their most trying job was tearing down the ancient wall, which is fourteen feet thick. Huge bronze gates close this aperture, through which the tracks pass, and they are opened only upon the infrequent arrival of trains. The railway is used principally by State personages on formal visits. The usual method of transport to and from Rome is by motor car. There are garages within the State and the Pope's car bears the licence plate "Vatican City 1."

While one encounters cars within the boundaries of the city there are no lights, not even on "Main Street," as Via Delle Fondements is called. It traverses the rear end of the Basilica and is about a mile in length. Yet a Vatican inhabitant can procure all he needs from the central grocery and provision store. There is also a pharmacy and a welfare centre where free milk is distributed to the babies of the poor. There are no hotels within the State if we except the Governor's Palace, where there are (*Continued on page 478*)

Nuns repairing a priceless Gobelin in the Vatican City tapestry shop.

Thirty Years of Enterprise

By John W. R. Taylor

BEHIND the fine modern office buildings belonging to the de Havilland Aircraft Company, at Hatfield in Hertfordshire, stands a small wooden hut, dwarfed by the giant hangars and workshops which surround it, and yet possessing a kind of quiet dignity that prevents its seeming out of place among acres of towering steel and concrete. Perhaps this is not altogether surprising, for it was in this hut that "de Havillands" made their modest start just 30 years ago.

It stood on Stag Lane aerodrome then, off the Edgware Road; and if you had visited that aerodrome during the first week of October 1920 you would have seen a group of workmen getting the little hut ready for occupation by Capt. (now Sir) Geoffrey de Havilland and his small staff. Near by, two larger sheds formed the "works," in which about 30 people were soon busy on the new company's first job—the completion of two half-built D.H.18s for the Air Ministry.

The D.H.1, from which was developed the famous D.H.2 "pusher" fighter of 1916. Photograph "Flight" Copyright.

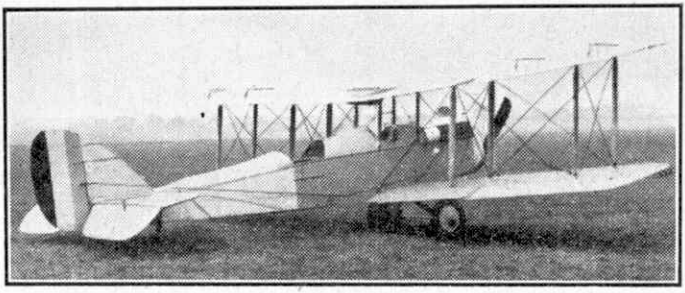
In case it seems strange that the first aircraft built by the company were D.H.18s and not D.H.1s or 2s, it is perhaps as well to explain that the de Havilland story really began 12 years earlier, in 1908, when a young motor engineer named Geoffrey de Havilland asked his grandfather if he would help him with some cash to build a flying machine. The old gentleman did so, despite the fact that no Englishman had ever flown in a powered aeroplane up to that time, and after nearly two years' hard work the first de Havilland aeroplane—a pusher "boxkite" biplane powered by a 45 h.p. de Havilland engine—was ready for a test. Unfortunately, the first flight of both the aircraft and its designer very nearly proved to be the last, for after climbing steeply for some 35 yards the aircraft suddenly crumpled up and crashed.

Undaunted, de Havilland collected the wreckage and proceeded to build a stronger and simpler machine around the same engine. This time his efforts were rewarded, for the new aircraft was a success from the moment it first left the ground in the summer of 1910, and "D.H." soon taught himself to stay up in it for whole minutes at a time and to make circular flights, which was quite an achievement in those days.

Most of his money had gone by then, but fortunately for the future of British aviation the Army Balloon Factory (later Royal Aircraft Factory) at Farnborough wanted an aeroplane. As de Havilland's machine seemed promising, they offered him £400 for it, and a job in their drawing office and as a pilot. Needless to say he accepted, and in the next three years designed some of the finest aeroplanes ever produced by the much-maligned "Factory," including the F.E.1, F.E.2, B.E.1, and the famous B.E.2 in which he broke the British altitude record in 1912.

Developments of the F.E.2 and B.E.2 served well in the first World War, but before this started de Havilland had left the "nationalised" Royal Aircraft Factory to become chief designer to the Aircraft Manufacturing Company (Airco) in a one-time bus garage at Hendon. It was at this stage that the initials "D.H." began to mean something in the aeronautical world, for Airco's first product, the D.H.1 two-seat "pusher" fighter, was followed by the similar but smaller and more spritely D.H.2, which did more than any other machine to save the Royal Flying Corps from the "Fokker Scourge" of 1915–16.

But the machines which really made de Havilland's name were the famous D.H.4 and D.H.9 day bombers. They were the "Mosquitoes" of the 1914–18 War, faster than most fighters of their day, and were responsible for much of the daylight bombing of German industry towards the end of that war.



The D.H.4 was the finest day bomber of the first world war.

At the time of the Armistice, Airco were building nearly 300 aeroplanes a month, out of a total British monthly production of 3,000. Furthermore, a third of the entire Allied air strength and 95 per cent. of the American production were machines of de Havilland design!

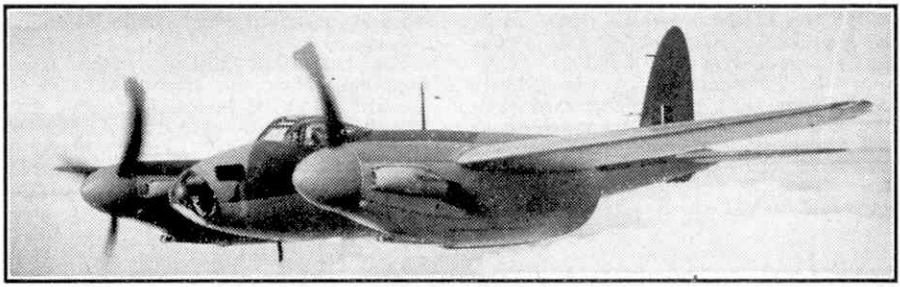
The post-war slump, following cancellation of all military contracts, forced Airco out of the aviation business. But Capt. de Havilland still believed in the future of civil flying, and with the help of a few friends he formed the de Havilland Aircraft Company on 25th September 1920, with a working capital of £1,875. From that tiny nucleus has grown the world-wide de Havilland Enterprise of to-day, and with much the same men at its helm, for de Havilland was particularly happy in his choice of "lieutenants" in those early days.

To-day, in the little wooden hut in which the whole thing started, one can trace the entire 30 years' growth of the Enterprise, for it has been made into a museum, containing photographs and models of all the leading D.H. types, log books of famous flights and scores of fascinating relics of important events in de Havilland history.

The beautifully-finished models range from old "stick and string" biplanes to the little D.H.108 tailless jet 'plane, first British aircraft to exceed the speed of sound. There is the popular D.H.34 of the Daimler Air Line, and the four-passenger D.H.50 which won the 1924 King's Cup Air Race and was used by Sir Alan Cobham for his epic return flights from this country to Rangoon, Capetown, and Australia. Here too are models of the little D.H.53 "Humming Bird," powered by a Blackburne motor-cycle engine, and of course the superb D.H.60 "Moth" of 1925, which changed the company's fortunes and started a new phase of world aviation history. It was the first aeroplane to bring the thrills of private or club flying within the reach of the average person.

In 1926 a "Moth" won the King's Cup Race, and two others mahe the first light aeroplane flight from England to India. Next year, the de Havilland Aircraft Pty. of Australia was formed to build "Moths" in that Dominion. Companies in Canada, India, South Africa, Rhodesia and New Zealand followed, and in 1930 the home Aircraft Division began its move to Hatfield. The Engine Division remained at Stag Lane, where the

The D.H.82 "Tiger Moth" trainer, first produced in 1931. Photograph by courtesy of "The Aeroplane."



D.H.98 "Mosquito," as famous in the second world war as the D.H.4 was a quarter of a century earlier.

airfield rapidly disappeared below housing estates.

The 1927 and 1928 King's Cup Races in turn were won by "Moths" and an era of famous flights followed. In 1930 Amy Johnson flew solo from Britain to Australia in a "Moth" in 19½ days. In the following year Jim Mollison flew a "Moth" from Australia to England in eight days, 21 hours.

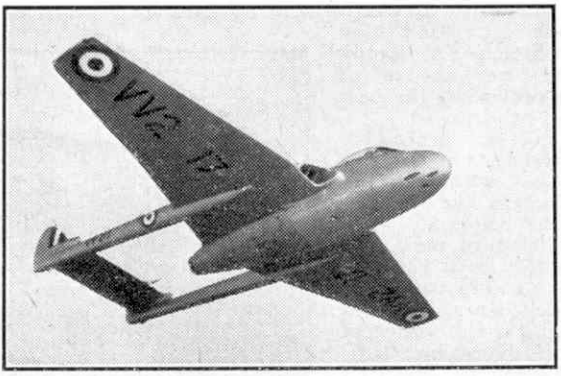
Meanwhile the little "Gipsy"-powered D.H.71 "Tiger Moth" monoplane racer, piloted by Hubert Broad, had raised the World Speed Record for light 'planes to 187 m.p.h., and paved the way for the D.H.82 "Tiger Moth" biplane of 1931, more than 10,000 of which were built in the next 14 years. Thousands of pilots made their first solo in these little trainers, including almost all those who fought and won the Battle of Britain.

Other outstanding civil types followed. First came the little D.H.80 "Puss Moth" cabin monoplane, which carried three people at 105 m.p.h. and did 20 miles to the gallon. Then appeared the 5-seat D.H.83 "Fox Moth," which quickly became popular as a "bush transport" in Canada; the D.H.85 "Leopard Moth" in which Capt. de Havilland won the 1933 King's Cup Race; the D.H.87 "Hornet Moth" of 1934, and the little 90 h.p. "Moth Minor" two-seater of 1937, which sold for £575.

In the bigger class the twin-engined D.H.84 "Dragon" had appeared in 1932 as a sort of scaled-up "Moth" able to carry up to 10 passengers. It was followed by the larger four-engined D.H.86, designed originally for Qantas; the D.H.89 "Dragon Rapide," still unsurpassed as a feeder-line transport, and the somewhat similar D.H.90 "Dragonfly," which sacrificed payload for slightly improved speed and looks.

De Havillands realised that, good as these aircraft were, the days of the biplane were numbered. Unfortunately, no customer seemed able to afford the development costs of new and advanced commercial monoplanes; but the brilliant de Havilland victory in the 1934 MacRobertson Air Race from England to Melbourne changed all that. Three two-seat D.H.88 "Comet" racing machines, each powered by two "Gipsy Six" engines, were specially built for the contest, and one of them, piloted by C. W. A. Scott and T. Campbell Black, won it, taking 71 hrs. to fly half-way round the world on only 400 h.p.

The Air Ministry were eventually persuaded to order two experimental long-range mailplanes on the same advanced lines, which resulted in the beautiful D.H.91 "Albatross" four-motor air liner. Five "Albatrosses" were ordered by Imperial Airways, and (*Continued on page 478*)



The D.H.100 "Vampire" Fighter, in service with 12 Air Forces. Photograph by courtesy of de Havilland Enterprise.

Camera Work in October

Ponds and Streams

By John J. Curtis, A.R.P.S.

SOMEWHERE in your neighbourhood there is a pond, stream, canal or other water where it might be well worth your while to spend a few minutes, or even longer, with your camera, for it is surprising what a great help a little water can be in the making of a picture. If you examine a collection of landscapes you will notice that in a large proportion of them the artists have included a patch of water in some form or another.

In the ordinary way a canal does not suggest itself as an attribute to picture making, but if it is banked by trees and one or two old cottages, or its rough natural banks are broken by reeds, or by a couple of anglers, and, if luck favours you with one of those picturesque barges, then surely there is the possibility of one or two good snaps. The canal may be running through a busy section of a town with factory chimneys pouring out smoke; even so, the lighting may prove ideal for a picture.

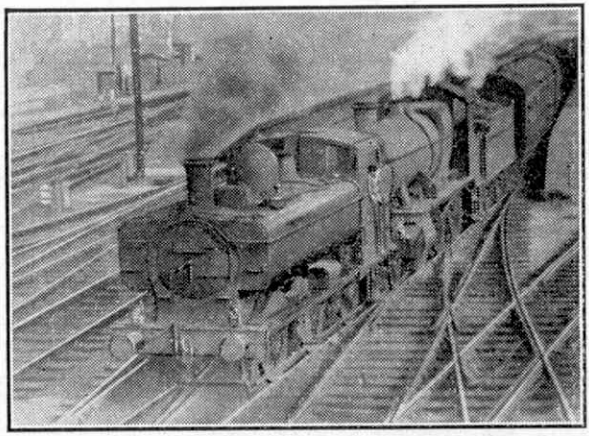
A stream or lake may have a greater appeal, and at this time of the year, when the trees are not too full of leaf, some charming studies are obtainable. In selecting suitable spots do try to avoid artificial work on the banks; I mean made-up paths, or stonework erected to prevent the bank being washed away. Choose a section where all straight lines can be avoided; if the water is very still then pitch a stone into it just before making the exposure, the bigger the stone the more pronounced the ripples. If the reflections from the opposite bank are too definite I would suggest it is better to break them up with another stone. If the Model Yacht Club is present, stand by with the camera ready for the start of a race, but stoop down so as to be on the level with the boats.

A canal-side cottage. The photographs on this page are by the author.

A village pond may at first sight be only a muddy affair, but make a closer survey. What about that five-barred gate leading into the garden of a white-washed cottage? If you moved to the other side the muddy pond might reflect those objects, and a white cloud give you quite a finished picture. The painter Constable was rather fond of village ponds.

In calculating exposure times remember to allow for reflection from any water, especially if there is a clear sky or any white clouds about. Such conditions tend to increase the value of the light and to reduce the exposure time.

The village pond at Overy Staithes, Norfolk.



An unusual locomotive combination; a Western Region 0-6-0 tank displaying express train headlamps, piloting a 2-6-0 on a passenger train. Photograph by J. D. Mills, Weston-Super-Mare.

Railway Notes

By R. A. H. Weight

Scottish Locomotive News

Recently completed class "2" light 2–6–0s from Crewe Works have been allocated to former L.N.E.R. sheds as follows: Nos. 46460–2, 64A, St. Margaret's; and Nos. 46463–4, 62B, Dundee. "A3" 4–6–2s transferred to 64B, Haymarket, shed from Doncaster or King's Cross recently were Nos. 60090 "*Grand Parade*," 60096, "*Papyrus*" and 60097, "*Humorist*," these being "super-Pacifics" built as such, having left-hand drive, which is preferred in Scotland. Three right-hand drive engines, rebuilt from Gresley "A1" which had always been stationed in Scotland, have moved south in exchange. They are Nos. 60065 "*Knight of Thistle*" and 60067 "*Ladas*" to 34A, King's Cross; and No. 60064 "*Tagalie*" to 36A, Doncaster. Intermediately the latter locomotive worked temporarily from Heaton depot, Newcastle, 52B. Class "5" 4–6–0 L.M.S. type mixed traffic engines Nos. 4879, 5118–9, 45007 and 45011 have been transferred to 63A, Perth. "B1" new Thompson 4–6–0s constructed at Darlington, numbered 61400–4, are stationed at 61A, Kittybrewster.

More instances have been reported of interchange locomotive workings between various sections or trains of the former L.M.S. and L.N.E.R. and, as in England, holiday traffic has been very heavy at times.

Railway Civil Engineering Exhibition

A most interesting exhibition, jointly presented by the Institution of Civil Engineers and the Railway Executive, was recently held in London. It emphasised the great importance of the civil engineering side of railway work, not only in planning and original construction, but in maintenance and repair under all conditions of weather, location or traffic, of tracks, tunnels, bridges and buildings.

There are over 60,000 underline or overline bridges on British Railways. The longest is the Tay Bridge, 11,653 ft., and the Forth Bridge, also near the East Coast of Scotland, has the longest spans, two, each having a clear length of 1,650 ft. Photographs and models were displayed illustrating the tremendous progress made by the Permanent Way Engineers as regards formation and layout of tracks, the strength and wear-resisting powers of the steel rail, mechanised relaying methods, and so on.

Eastern and North Eastern Regions

At a locomotive naming ceremony at Doncaster on 13th July last, Mr. H. G. Ivatt, Mechanical and Electrical Engineer, London Midland Region, unveiled nameplates on three modern "A1" 4–6–2s. These were No. 60123, named in memory of his father who was from 1896 to 1911 the eminent Locomotive Engineer of the former Great Northern Railway, "*H. A. Ivatt*"; and Nos. 60118–9, named respectively "*Archibald Sturrock*" and "*Patrick Stirling*." Mr. Sturrock was the first permanent locomotive engineer of the G.N.R., holding office from 1850 to 1866, being succeeded by Patrick Stirling from 1866 to 1895. Mr. Stirling is remembered chiefly for his famous "eight-footer" and other "single-wheeled" engines, while Mr. Ivatt's most notable contribution to G.N.R. locomotive stock was probably the remarkable large "Atlantic" design.

This commemorative occasion anticipated by only a week or two the centenary of the opening of the Great Northern Railway as a through route between London and Doncaster, connecting to York, Newcastle and Scotland. This event was celebrated by the running of an excellently organised day excursion from King's Cross to York and back, which traversed the exact route used by the first trains in 1850, before the complete line as now known was completed. Between Peterborough and Retford the original route was by way of Boston and Lincoln; between Doncaster and York through Knottingley and Church Fenton. On the return journey the special train used the present-day main route through Selby and Grantham. Rebuilt "A1/1" 4–6–2, No. 60113, "*Great Northern*" made the complete 398-mile trip, carrying a special centenary headboard. Much interest was displayed throughout the journeys.

Other names recently affixed to "A1" engines include Nos. 60117 "*Bois Roussel*"; 60121 "*Silurian*"; 60122 "*Curlew*"; 60126 "*Sir Vincent Raven*"; 60130 "*Kestrel*"; 60131 "*Osprey*"; 60137 "*Redgauntlet*"; 60139 "*Sea Eagle*"; and 60140 "*Balmoral.*"

New "B1" 4–6–0s, completing the Darlington construction of that series, are Nos. 61407–9, at 40B, Immingham. Lately completed "L1" 2–6–4Ts numbered 67790–3 are working in the King's Cross-Hitchin district, with others coming into service at Norwich, 32A, and elsewhere.

"A4" streamlined "Pacific" No. 60009, *Union of South Africa*," ran the non-stop "*Capitals Limited*" between King's Cross and Edinburgh continuously for more than a month, being stationed at Haymarket, 64B. The engines sharing in the running from the Edinburgh end and afterwards during the season were Nos. 60011 "*Empire of India*," and 60031 "*Golden Plover*." From the King's Cross end up to the time of writing the two "A4" locomotives nearly always alternating on that world record run were either No. 60003 "*Andrew K. McKosh*," or No. 60006 "*Sir Ralph Wedgwood*." Another engine of this class, No. 60008 "*Dwight D. Eisenhower*," stationed at King's Cross, worked the Royal train from there to Retford in July, later hauling the "*Capitals*."

"Green Arrow" 2–6–2s are generally ready for anything, so it is not surprising that many of those "V2" engines were seen on heavy expresses during the holiday season in turn with the different classes of 4–6–2. Built at Doncaster, class "4" 2–6–0s Nos.

43050–1 were noted "running-in" during August; a further batch is under construction, as are Nos. 43070 upward at Darlington.

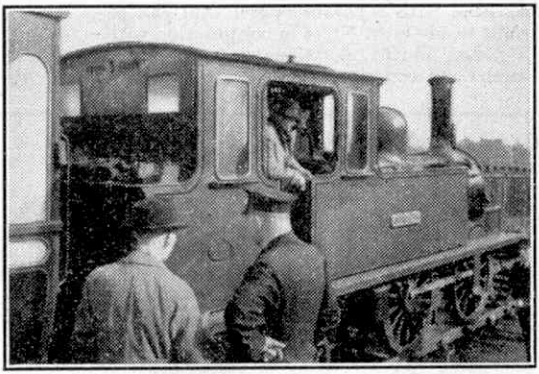
Although a number of gantry and single signals of the G.N.R. "somersault" type have by now been replaced by modern upper-quadrant type semaphores, or by colour-light signals, there are still many of that distinctive old pattern to be noted along the main and other lines of the Eastern Region.

"Dunrobin's" Last Journey

Until the formation of British Railways the Duke of Sutherland had the right to run his own special train. The third Duke built at his own expense in 1870–1 the 17¼ miles of line between Golspie and Helmsdale. When in 1884 he sold the line to the Highland Railway the Duke retained running powers for his own engine and private saloon.

The engine was named "*Dunrobin*," after the Duke's castle, which was served by a private station two miles north of Golspie. It was replaced by a more powerful engine of the same name built in Glasgow in 1895. This was a 0–4–4T and like the original engine it was painted dark green with black hands and yellow lining.

Soon after nationalisation the engine and the two saloon cars, one eight-wheeled and the other four-wheeled specially built for private traffic, were sold. Arrangements were made for the engine and the smaller saloon to be exhibited by the Romney, Hythe and Dymchurch Railway at New Romney. "*Dunrobin*" and its small saloon therefore headed south, and they must have made an interesting sight as they pottered along the main line. South of Carlisle the engine and its saloon were conveyed as part of an L.M.R. freight train.



"Dunrobin," formerly the private 0-4-4 tank engine of the Duke of Sutherland, photographed at Beattock on the way south with its special saloon. Photograph by R. D. Henderson, Beattock.

Southern Tidings

A notable feature of the recent summer weekend locomotive rosters on the Eastern Division has been the through round trip workings without reversal, usually with one crew, for "King Arthur" or "Schools" engines, from Victoria to Ramsgate, returning from Deal via Folkestone to Charing Cross, or vice versa. Locomotives and men had a rest interval at Deal, the journey between Ramsgate and Deal being made with empty coaches, which could also come through.

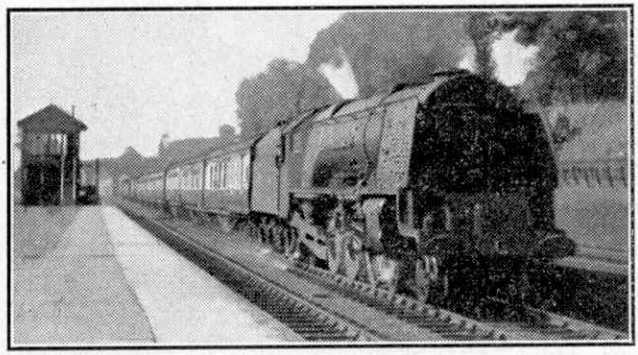
Among names recently noted were "Merchant Navy" 4–6–2s Nos. 35027 "*Port Line*" and 35030 "*Elder Dempster Line*," and "West Country" No. 34104 "*Bere Alston*," the latter completing the series built at Eastleigh. "Merchant Navy" No. 35019 "*French Line, C.G.T.*," last summer worked a Royal train from Waterloo to Sherborne, Dorset, without stop, over 118¼ miles; this is an exceptional distance on the Southern Region, which has no water troughs. No. 35005 "*Canadian Pacific*" was again fitted with mechanical stoker for further trials in July.

"T9" superheated Drummond 4–4–0s still perform a considerable amount of passenger work; a good many former L. and S.W.R. 4–4–0s are stored, others are gradually being withdrawn.

No further breaking up of old locomotives is taking place at Horley, Surrey. The 69-year old Stroudley "D" 0–4–2T No. 2252, in faded Southern Railway green, was still working merrily from Horsham to Guildford or Brighton at the time of writing. Several "D3" 0–4–4Ts have received general overhauls and new paint at Ashford; the veteran "Terrier" No. 32636 has been equally well treated at Brighton and returned to Newhaven.

Among the "Atlantics" noted on heavy boat trains or through Midlands and Brighton-West of England expresses recently was No. 32426 "*St. Albans Head*," which lately received general repair and new B.R. livery at Eastleigh. Added to the long list of different locomotive types used on the Central Division over one section or another for hauling through Midlands steam trains, which were quite numerous on the busiest days of last summer, were former L.B.S.C. 4–6–2T No. 32325, new "class 4" 2–6–4T No. 42096, and "R1" old Chatham and Dover 0–4–4T, "Q" and "Q1" 0–6–0; and "B4x" 4–4–0.

Several engines of the last-named rebuilt type were brought out of store for summer duty, including the haulage of trains borrowed from the G.E. Section, E.R., to form specials on the occasion of the R.A.F. Air Pageant at Farnborough, on which duty "H2" 4–4–2s and "K" class Brighton 2–6–0s also were seen.



A London Midland down express passing Bushey. The engine is 4-6-2 No. 46231 "Duchess of Atholl." Photograph by G. R. Mortimer, Manningtree.

Using the Meccano Gears Outfit "A"

Farm Tractor and Implements

IN Fig. 1 we show a model farm tractor fitted with a potato reaper that can be built from Outfit No. 4 in conjunction with a Gears Outfit A. Construction of the model is commenced with the bonnet

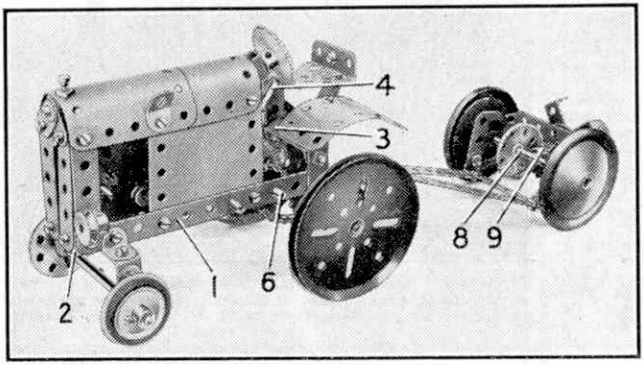


Fig. 1. A farm tractor and potato reaper designed for construction from Outfit No. 4 and a Gears Outfit "A."

of the tractor, one side of which consists of a 2½" × 2½" Flexible Plate, and the other of two of these Plates overlapped. The Plates are bolted along their bottom edges to two 5½" Strips 1, and are connected at the top edges by two 1 11/16" radius U-section Curved Plates. A *Magic* Motor is bolted inside the bonnet with its winding shaft opposite the space left in the side. The front is filled by two 2½" Strips attached to the 5½" Strips 1 by an Angle Bracket and a Double Bracket 2, which is also used to secure the Motor. The 2½" Strips are extended by Fishplates and attached to the top of the bonnet by an Angle Bracket. Two 2½" × ½" Double Angle Strips are bolted to the other end of Strips 1, and are connected by a 1½" × ½" Double Angle Strip 3.

The brake lever is represented by a 1½" Rod 4, and is attached to the brake of the Motor by a Rod and Strip Connector and two Fishplates.

A Driving Band takes the drive from the Motor to a 1" Pulley fixed on a 2" Rod that also carries a ½" Pinion 5. The Pinion meshes with a 57-tooth Gear Wheel on 2" Rod 6, and from here the drive is taken by ¾" Sprockets and Chain to the 4" Rod forming the rear axle. The steering wheel is formed by a 50-tooth Gear fixed to a Stepped Bent Strip, which is bolted to one side of the bonnet and connected to the other by a Double Bracket. A Trunnion representing the driving seat is attached to the Double Angle Strip 3 by a 2½" Strip. A hook for coupling implements to the tractor is made by joining two 2½" Curved Strips by a ⅜" Bolt 7.

The front axle is carried in Fishplates bolted to a 2½" × ½" Double Angle Strip, which is attached to one of the 5½" Strips by an Angle Bracket. The wheels are fixed on a 4" Rod, and each consists of a 1" Pulley and a Wheel Disc held together by Spring Clips.

The potato reaper shown in Fig. 1 is built by first bolting two Flat Trunnions to a 2½" × 1½" Flanged Plate. Then they are joined by a 2½" × ½" Double Angle Strip, to which two 5½" Strips representing the coupling shafts are bolted. Two Road

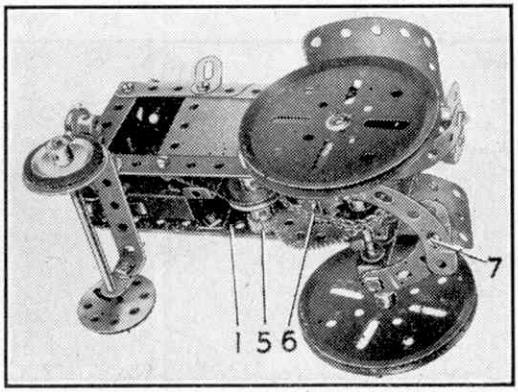


Fig. 2. The underside of the tractor unit.

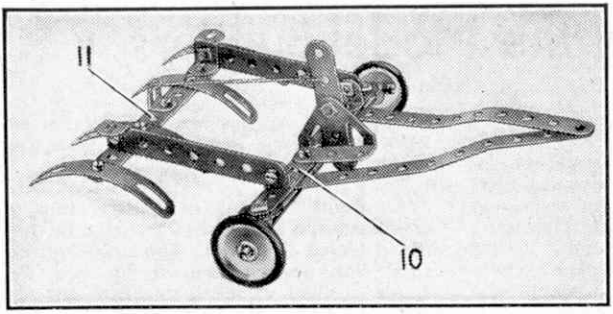


Fig. 3. A harrow for use with the tractor unit as an alternative to the potato reaper.

Wheels are fixed on a 3½" Rod 8 and spaced from the Flat Trunnions by two Washers. A 1½" Contrate Wheel fixed on Rod 8 engages with a ½" Pinion 9. This Pinion is fast on a 1" Rod mounted in the Flanged Plate, and it carries also the reaper, which is made by bolting two 2½"×½" Double Angle Strips to a Bush Wheel.

Construction of the second implement, the harrow seen in Fig. 3, is quite simple and no difficulty should arise in building it if the illustration is studied carefully.

October General Model-Building Contest

This month keen Meccano enthusiasts will be making preparations for the start of the winter model-building season and no doubt some of them will be eagerly looking forward to making Meccano models of interesting machines and other devices they have come across during the summer months. In order to give these model-builders encouragement in their activities, we are announcing this month the first of the general model-building competitions that are always popular at this time of the year.

Models for entry in this contest may be built with any number of parts, and there is no restriction of any kind on the choice of subject. The only conditions are that models must be built entirely with standard Meccano parts, and must be the result of the competitor's own unaided work.

After the model is completed all that is necessary is to obtain a good photograph or make a clear sketch of it, and to send this to *"October General Model-Building Contest, Meccano Ltd., Binns Road, Liverpool 13."* A few notes covering any specially interesting points or any features of the model not readily apparent from the illustration should be added, and the competitor's age, name and address must be written clearly on the back of each entry.

The competition will be divided into two sections: A, for readers living in the British Isles; B, for Overseas readers. The following prizes will be awarded for the best models submitted in each section. First, **Cheque for £3 3s. 0d.;** Second, **Cheque for £2 2s. 0d.;** Third, **Cheque for £1 1s. 0d.;** In addition there will be five prizes consisting of Postal Orders for 10/6, and five awards of Postal Orders for 5/–. The closing dates are: Home Section, 30th November; Overseas Section, 31st March, 1951.

Model-Building Competition Results

APRIL "GENERAL" CONTEST (HOME SECTION)

First Prize, Cheque for £3 3s. 0d.: A. D. Craven, Bradford. Second Prize, Cheque for £2 2s. 0d.: A. C. Langham, Bassett, Southampton. Third Prize, Cheque for £1 1s. 0d.: J. E. Bridger, Hastings, Sussex.

Five Prizes each of 10/–: M. L. Murdoch, Hoole, Chester; P. W. Dawson, Broadway, Lincoln; H. Tothill, Hove 4, Sussex; T. Watts, Northampton; D. A. Green, Halifax.

Five Prizes each of 5/–: H. M. Forth, London, S.E.12; D. Barber, Warrington; R. C. Adams, Seaford, Sussex; J. McMay-Russell, Coventry; W. J. Ashby, London, N.8.

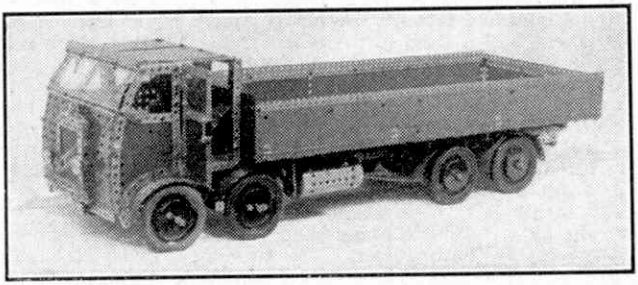


Fig. 4. A good example of a prize-winning model. This sturdy 8-wheeled lorry is the work of R. W. Hearn, Annesley, Notts.

Among the Model-Builders

By "Spanner"

Twin Rear Axle Drive

I have received many requests for details of suitable driving arrangements for model vehicles fitted with twin rear axles, and to meet these I am illustrating in Fig. 1 one method of assembling such a mechanism. In this example the twin rear axles are carried by a single leaf spring on each side as shown in Fig. 1. Each spring consists of one $7\frac{1}{2}$", two $5\frac{1}{2}$", one $4\frac{1}{2}$", two $3\frac{1}{2}$" and two $2\frac{1}{2}$" Strips. They are bolted at their centres to a $1\frac{1}{2}$" Angle Girder that can be lock-nutted to the chassis.

Each of the axles is identical in construction. The casing consists of halves, formed by two $2\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips bolted between a Face Plate and a Bush Wheel. The halves are joined by two $2\frac{1}{2}" \times 1"$ Double Angle Strips, and a $4\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plate is curved to shape and bolted in position.

The differential crown wheel is a 57-tooth Gear 1, which is free to turn on a Rod mounted in one half of the axle casing. The Rod passes into a Coupling 2, and a $\frac{1}{2}"$ Bevel Gear is fixed between the Gear 1 and the Coupling. A second Bevel 3 is fixed on a Rod mounted in the other half of the axle casing and passed into Coupling 2.

Two $1" \times \frac{1}{2}"$ Angle Brackets are attached by $\frac{3}{8}"$ Bolts to the Gear 1, but they are spaced from it by four Washers on each Bolt. A 2" Rod 4 is passed through the $1" \times \frac{1}{2}"$ Angle Brackets, and is fixed in the centre transverse hole of Coupling 2. A $\frac{1}{2}"$ Bevel Gear on each side of the Coupling is free to turn on Rod 4. Fishplates are used to centre the Rod in the slotted holes of the $1" \times \frac{1}{2}"$ Angle Brackets.

The drive to the crown wheel is through a Worm fixed on a $3\frac{1}{2}"$ Rod mounted in $1\frac{1}{2}"$ Strips 5. These Strips are bolted to the $2\frac{1}{2}" \times 1"$ Double Angle Strips placed between the Face Plates. The driving Rod of the trailing axle is linked to that of the leading axle by two Universal Couplings and a 1" Rod.

The axle casings are completed by $2\frac{1}{2}" \times 1\frac{1}{2}"$ Flexible Plates curved to shape.

Crosshead and Slide Bars for Engines

A useful method of constructing a crosshead and slide bars for engine models is illustrated in Fig. 2. The slide bars on each side are represented by two $7\frac{1}{2}"$ Angle Girders attached together by $1\frac{1}{2}"$ Strips. They are connected by two $2\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips at one end, and by two $2\frac{1}{2}" \times 1"$ Double Angle Strips at the other.

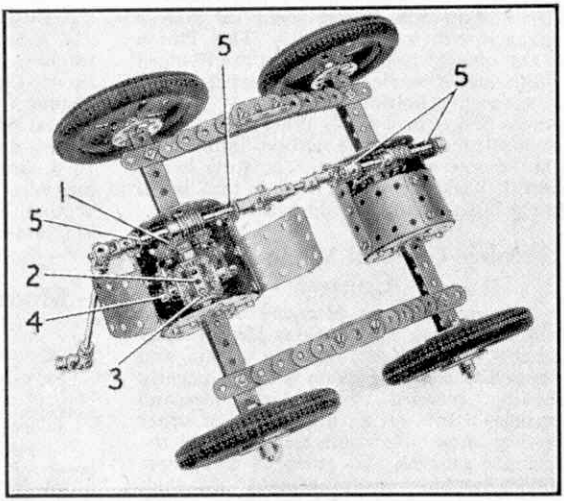


Fig. 1. A drive transmission arrangement suitable for a lorry fitted with twin rear axles.

The piston rod is attached to a Coupling 2 by a Rod Socket 3, and the Coupling is connected to a similar part by two 1" Rods which rest in the groove of a Socket Coupling 1. A $2\frac{1}{2}"$ Rod is passed through the Socket Coupling and is held in place by Collars. The ends of this Rod are free to move between the slide bars. At the other end the piston rod is passed through a Wheel Disc 4.

Simple Gear-Box for Cranes

Most model-builders are interested in gear-boxes as these provide so much scope for ingenuity in building them compactly from the parts available.

The gear-box shown in Fig. 3 is specially

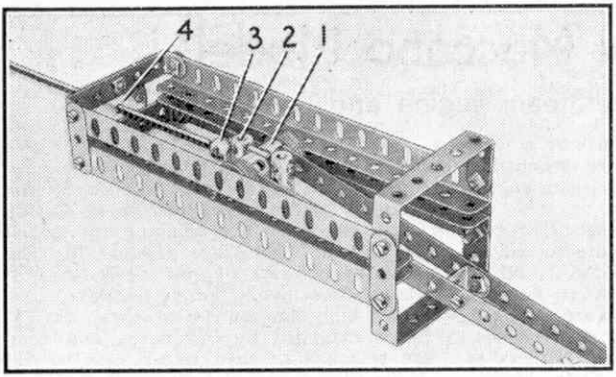


Fig. 2. One of many methods of constructing a crosshead and slide bars for a model steam engine.

designed for use in models such as mobile cranes, where a single motor mounted in the chassis is used to operate the luffing and hoisting movements as well as the movements of the crane itself. The drive to the gear-box is transmitted from the motor through a Rod mounted in the centre of the bearing that supports the crane.

The mechanism is housed in a framework formed by two $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates and two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates. These are bolted to $1'' \times \frac{1}{2}''$ Angle Brackets fixed to $7\frac{1}{2}''$ Angle Girders 1, which are then attached to the sides of the crane cab. A Ball Race Flanged Disc 2 is also fixed to the Angle Girders, and forms the upper member of the crane bearing.

The input shaft is mounted in the Ball Race Flanged Disc and in a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip fixed between the sides of the framework. The shaft carries a $\frac{3}{4}''$ Contrate 3, and two $\frac{3}{4}''$ Pinions 4 are fixed on a shaft 5 so that either can be moved into mesh with the Contrate to provide forward and reverse drives. Movement of the shaft is controlled by a lever 6 that engages between a $\frac{1}{2}''$ Pulley and a Collar on shaft 5.

Rod 7 forms the hoisting drum and it carries a 1" Pulley 8 and a 50-tooth Gear 9. The Cord winds between the Pulley and the Gear. A lever 10 carries a $\frac{1}{2}''$ Bolt that engages between 1" Pulleys on Rod 7, so that by operating the lever the Gear 9 is moved into mesh with its $\frac{3}{4}''$ Pinion. A $\frac{3}{8}''$ Bolt screwed in Pulley 8 engages a Bolt in the housing when the Gear is disengaged and provides an automatic brake.

The luffing drum is identical to the hoisting drum in arrangement and operation. The levers controlling all the movements are pivoted on a common shaft 11 which is mounted in Flat Trunnions bolted to Girders 1.

Bending and Using Flexible Plates

The Flexible Plates of various sizes that are included in Meccano Outfits are very useful for filling-in purposes in built-up structures. The Plates can be bent quite easily with the fingers, but right angles should be avoided whenever possible. If a complete cylinder is required the Plate or Plates should be rolled around a wooden former of suitable diameter, or shaped gradually between the fingers, care being taken to avoid sharp angles at the edges of the Plate adjacent to the holes.

After use the Plate can be re-straightened first with the fingers, and then placed between two flat pieces of wood and tapped gently with a mallet.

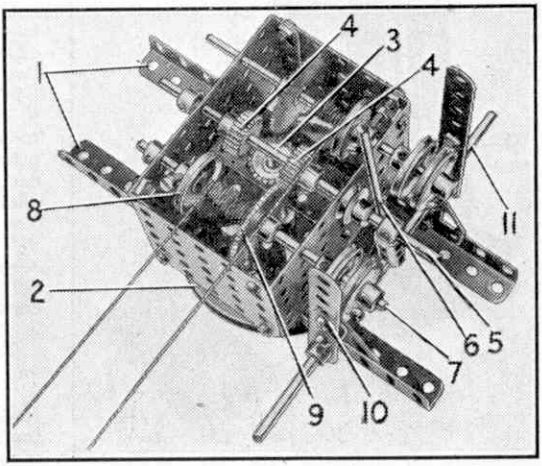


Fig. 3. A simple gear-box suitable for transmitting a drive to the chassis of a mobile crane and also operating the hoisting movements.

New Meccano Model

Vertical Steam Engine and Dynamo

OUR new model this month is a neat reproduction of an electric generating unit, consisting of a vertical steam engine coupled to a dynamo.

The base of the unit consists of two 18½" Angle Girders, which are joined at one end by a 9½" Angle Girder 1, and at the other end by two 9½" Angle Girders 2 and 3. The Girders 2 and 3 are attached to 4½" Angle Girders bolted to the sides, and the space between these Girders is filled in by two 9½"×2½" Strip Plates. The engine bed is made by bolting a 9½"×2½" Strip Plate vertically to each of the 18½" Angle Girders. The Strip Plates are braced along their upper edges by 9½" Angle Girders, and at each end by a vertical 2½" Angle Girder. The sides of the engine bed are connected by a 9½" Angle Girder at each end.

Supports for the crankshaft bearings are provided by five 9½" Angle Girders. Two of these Girders are arranged to form a central T-section girder 4, and the others as shown at 5, 6 and 7.

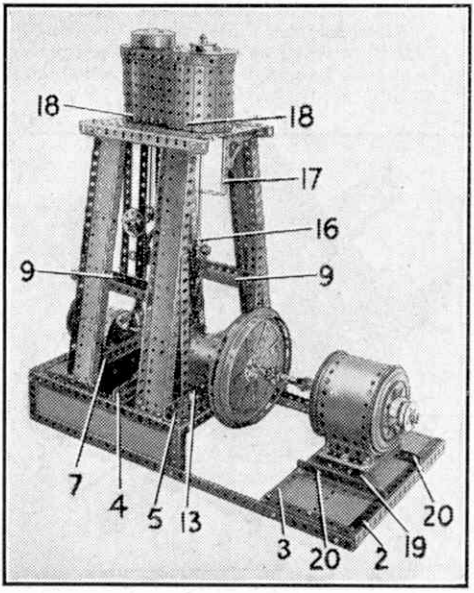


Fig. 1. A model of a vertical steam engine coupled to a dynamo that is interesting to construct and operate.

Each of the columns consists of two 12½" Angle Girders joined by 5½"×2½" Flexible Plates, and is attached to the platform at its upper end by a Corner Angle Bracket. The columns are braced by vertical 7½" Angle Girders 8. The platform consists of two 5½"×3½" Flat Plates edged by 7½" Angle Girders.

The slide bars for the crosshead are 7½" Strips extended by Fishplates, and they are attached at their upper ends to 5½" Angle Girders bolted underneath the platform. The Fishplates at the lower ends of the 7½" Strips are attached by ½" Bolts to 7½" Angle Girders 9. The slide bars are spaced from these Girders by ten 1½" Strips on each side, and the Girders are connected by 7½" Flat Girders to further 7½" Angle Girders that are bolted to Girders 8. The crosshead is a 3½" Rod fitted at each end with a Bush Wheel 10 and a Wheel Disc 11, placed one on each side of the slide bars. The 3½" Rod carries at its centre a large Fork Piece 12 held in position by Collars, and the piston rod is fixed in the Fork Piece. The connecting rod is formed by two 5½" and two 2½" Strips, which are shaped as shown and pivoted on ½" Bolts screwed into the boss of the Fork Piece. A Collar and a Washer are placed on each Bolt.

The crankshaft is carried in three bearings. The centre bearing consists of a Semi-Circular Plate attached to two 2½" Flat Girders that are bolted to Girders 4. Four Wheel Discs are fixed to each side of the Semi-Circular Plate to increase the bearing surface. The other two bearings are identical, and each consists of two Semi-Circular Plates fitted with four Wheel Discs. The Semi-Circular Plates **a** **e** bolted to 2½" Angle Girders that are connected together by further 2½" Angle Girders bolted to the Girders 13. A cover plate consisting of a 5½"×1½" Flexible Plate is also bolted to Girders 13.

The crankshaft is in two sections, and consists of a 3½" Rod 14 and a 6½" Rod 15. The inner ends of these Rods are fitted with Cranks, and further Cranks bolted to them are connected by a 2" Rod. The connecting rod pivots about the 2" Rod. A Triple Throw Eccentric is fixed on the 6½"

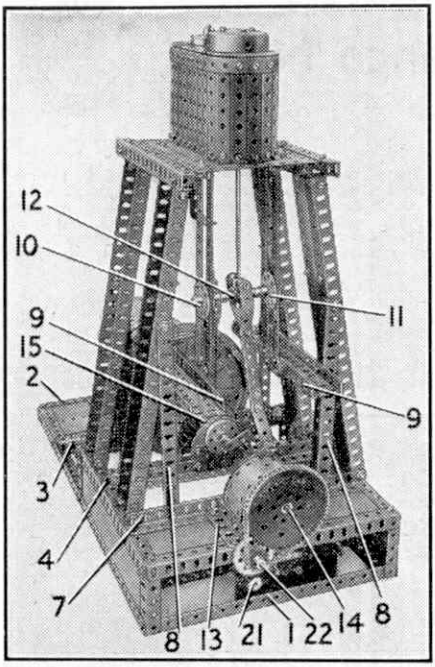


Fig. 2. The engine and dynamo, showing the cross-head and guides and the arrangement of the driving motor.

Rod between the bearings, and is extended by two 4½" Strips bent as shown in Fig. 2. These Strips are passed over a 1½" Rod held in a large Fork Piece 16, Fig. 1, by Collars, and the valve rod is fixed in the boss of the Fork Piece. The valve rod is mounted in the platform, and a guide is provided by passing it through a 3"×1½" Double Angle Strip 17.

The cylinder block consists of vertical 3½" Strips bolted to a framework formed by 5½" and 3½" Strips curved to shape. The lower edges of the block are connected by two 2½"×½" Double Angle Strips held by bolts 18 on each side, the Double Angle Strips being bolted to the platform. The top of the block is filled in by a 4½"×2½" Flat Plate fitted at each end with a Semi-Circular Plate, and a Boiler End and a 1½" Flanged Wheel form the cylinder and valve covers respectively. A 5½"×½" Double Angle Strip is bolted lengthways across the top of the block, and the Flat Plate is fixed by two nuts to a ¾" Bolt fixed in the Double Angle Strip by a nut. The base of the generator unit consists of a 3½"×2½" Flanged Plate edged by 3½" Angle Girders, and it is fixed to 2½" Flat Girders 19 attached to 4½" Angle Girders 20. The ends of the generator consist of a Ball Race Flanged Disc fixed to a 4" Circular Plate. The two ends are joined by 2½"×1" Double Angle Strip. A 9½"×2½" Strip Plate is curved to shape and attached to two 2½" Angle Girders fixed to the platform. A Rod passed through the generator is connected by two Universal Couplings to the Rod 15.

A ½" Pinion on the shaft of the Motor engages a 57-tooth Gear on a Rod carrying Pinion 21. This Pinion engages a 57-tooth Gear on Rod 22, from which Sprockets take the drive to Rod 14.

Parts required to build model Vertical Steam Engine and Dynamo: 4 of No. 1b; 4 of No. 2; 4 of No. 2a; 30 of No. 3; 6 of No. 5; 1 of No. 6; 17 of No. 6a; 2 of No. 7a; 8 of No. 8; 14 of No. 8a; 10 of No. 8b; 2 of No. 9; 6 of No. 9a; 2 of No. 9b; 17 of No. 9d, 2 of No. 9e; 1 of No. 9f; 4 of No. 10; 3 of No. 11; 1 of No. 13a; 2 of No. 14; 1 of No. 15; 3 of No. 16; 1 of No. 16b; 1 of No. 17; 1 of No. 18a; 1 of No. 18b; 2 of No. 20, 3 of No. 24; 2 of No. 26; 2 of No. 27a; 225 of No. 37; 78 of No. 37a; 90 of No. 38; 1 of No. 47a; 6 of No. 48; 5 of No. 48a; 1 of No. 48d; 2 of No. 52a; 1 of No. 53; 1 of No. 53a; 16 of No. 59; 4 of No. 62; 10 of No. 94; 1 of No. 95b; 1 of No. 96a; 6 of No. 103f; 4 of No. 103k; 1 of No. 108; 10 of No. 111; 19 of No. 111a; 40 of No. 111c; 4 of No. 111d; 2 of No. 116; 1 of No. 116a; 2 of No. 118; 1 of No. 130; 3 of No. 133; 1 of No. 140; 1 of No. 146; 2 of No. 146a; 2 of No. 154a; 2 of No. 154b; 1 of No. 162a; 1 of No. 165; 3 of No. 168a; 14 of No. 189; 1 of No. 191; 6 of No. 196; 7 of No. 214; 35 of No. 219; 1 E20R Electric Motor.

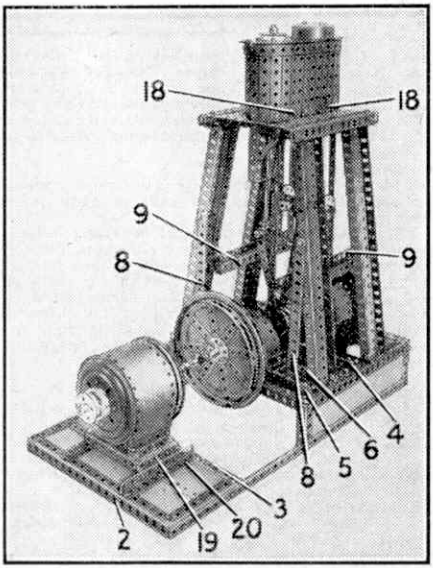


Fig. 3. Another view of the completed engine and dynamo.

Club and Branch News

WITH THE SECRETARY

AN AID TO PROGRESS

It is remarkable how often Meccano Clubs and H.R.C. Branches are invited to contribute displays of models at Exhibitions and celebrations of various kinds. A recent example can be seen in the report on this page from the New Road Model Railway Branch, which was asked to arrange a display of Hornby Trains for Chingford Day, an annual fête. Another is a contribution that the Mile End M.C. made to the attractions of a garden party arranged by the Portsmouth branch of the British Sailors Society Guild.

Mr. J. C. Deaves, Leader of the Huntingdon M.C., has often been asked to organise displays at local functions, and the repeated invitations he has received are evidence of the high value placed on efforts of the members of this Club. Another instance comes from Vancouver, where members of the Kimount M.C. made such a good impression with models entered in various hobby shows that special invitations are now extended to them. In addition many Clubs and Branches have taken part in road safety efforts, and the Dinky Toys layouts they have prepared for these occasions have always been centres of attraction.

It is good to read of events of this kind, which demonstrate not only the interest and adaptability of our great hobbies, but also the enterprise and skill of those who follow them.

It is not necessary to wait for an invitation to take part in such a scheme before arranging a display and the officials of every Club and Branch indeed should keep in mind the great advantages of showing what their members can do. The present session is an excellent one for efforts of this kind and wherever possible a display, whether just an Open Night or an elaborate and well-staged Exhibition, should be arranged before its end.

BRANCHES RECENTLY INCORPORATED

B.521—Chinley Methodist—J. G. Harris, Lee End, Chinley, Cheshire.

B.522—Eastcote, Ruislip and District—B. Staples, 1, St. Martins Approach, Ruislip.

B.523—Carmel College—J. Ewart, Carmel College, Greenham, Newbury, Berks.

B.524—Highgate Junior School—H. F. R. Miller, Highgate Junior School, Bishopswood Road, Highgate, N.6.

B.525—Sefton Park (Liverpool)—Max J. Lazarus, 78, Langdale Road, Liverpool 15.

B.526—Shepshed Secondary Modern School—E. A. Garratt, Shepshed.

CLUB NOTES

Bury Grammar School M.C.—During the summer meetings were held fortnightly. Earlier the Club held a very successful Exhibition of models in great variety with a Hornby Railway as an additional attraction. Mr. R. L. Chambers, President, presented prizes for model-building. Club roll: 34. *Secretary:* J. C. Hart, "Hilldrop," 2, Belgrave Road, Hr. Crumpsall, Manchester 8.

Greaves Methodist Church (Lancaster) M.C.—Meetings continue to be greatly enjoyed. Outdoors tracking meetings are popular and Visits have been paid to Glasson Dock. Indoors a games evening has been held and a wet evening was made enjoyable by a special model-building programme. Club roll: 9. *Secretary:* T. Starr, "Derwent, Scotforth Road, Lancaster.

Members of the Thebarton School M.C., Leader, Mr. Lloyd Gare, Secretray, Kevin Amos. This South Australian Club was affiliated in December 1928. Half its meetings are devoted to construction projects, with members working in groups. At other meetings members give talks and demonstrations on special working models or personal hobbies, films are shown and distinguished visitors discuss engineering and applied science topics. Visits to factories, power houses and railway workshops also are a feature of the programme.

Crypt Grammar School M.C.—A fine display was made at the Crypt Parents' Association garden party. In addition to large Meccano models there were Hornby Gauge 0 and Hornby Dublo Layouts in continuous operation. Visitors were greatly impressed. Club roll: 40. *Secretary:* D. H. Gettings, 17, Riversley Road, Gloucester.

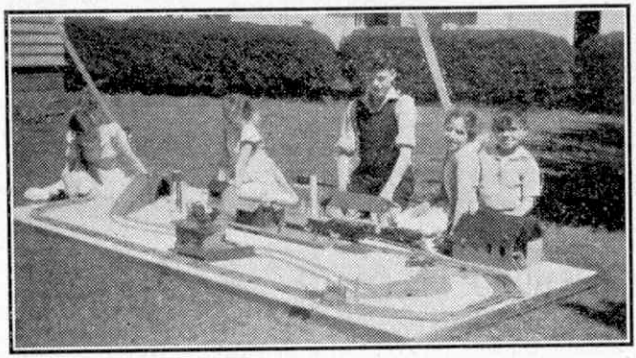
BRANCH NEWS

New Road Model Railway (South Chingford)—The Branch was invited to contribute to an Exhibition on Chingford Day. A completely electrified layout was designed and constructed by members, with interesting accessories, and this was operated throughout the Exhibition, with excellent results. Previously the Branch had organised an Exhibition of its own, and a Visit had been paid to the Electric Power Station, Leyton. *Secretary:* T. Hinton, 109, Hall Lane, S. Chingford, London E.4.

Slough—Track work has continued and members also have engaged in constructional work, including the making of an ingenious crossover. A Visit was paid by a group of members to the Mars works, which naturally proved interesting. *Secretary:* W. Eisele, 335, Farnham Road, Slough, Bucks.

New Zealand Hornby Train Layouts

THIS month we give details of two Hornby Clockwork layouts developed by New Zealand enthusiasts. One system is portable and is the work of David Carter, of Wellington, N.Z., who is shown alongside the line with his brother and sisters in the upper illustration.



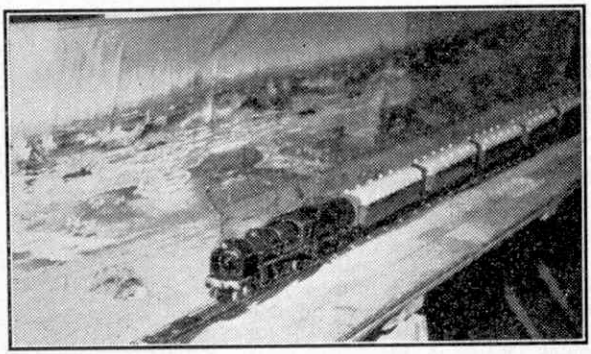
The layout of David Carter, New Zealand, showing the attractive arrangement of his Hornby railway and home-made accessories. Roads and other lineside features are included on the baseboard.

"The stations, signal box, water tanks, engine shed and overhead bridge I have made myself," writes David. "I have also made a colour-light signal working off a three-way switch. I am still trying to devise some means of making the lights flash alternately for a road crossing I made. The stations and other buildings have all got lights in, and there is a switchboard at the side of the railway.

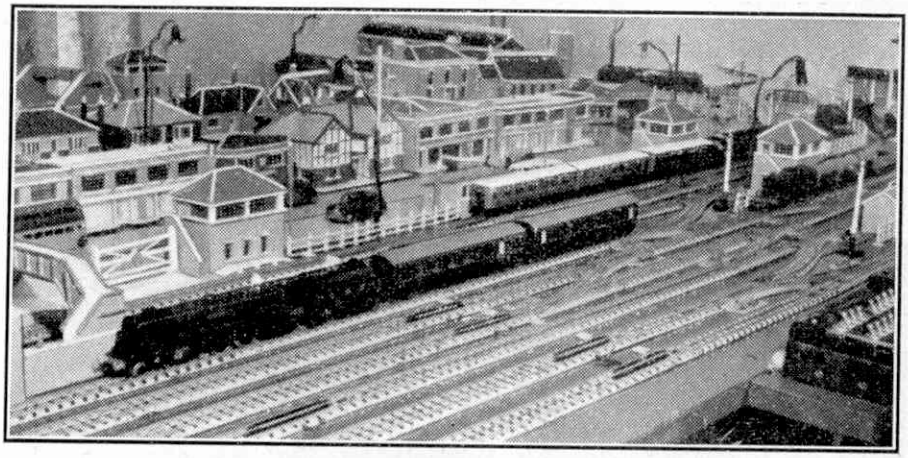
"The rails are screwed to the baseboard, but the stations and other items can be lifted off so that the board can be leaned up against the side of the garage when the railway is not in use. When the buildings are placed on the board the wires to the different things are connected up, the 6-volt batteries hooked on, and the line is ready to work. So far there is only one Clockwork engine, but I hope to make an electric engine and it will greatly help the working of goods and passenger traffic."

The second layout, part of which is shown in the lower picture, has been built up by Mr. S. W. Booth of Invercargill, N.Z., for his son. This had its beginnings with a Hornby No. 201 Tank Goods Train and has been developed into a more or less permanent indoor system incorporating a scenic background. The railway in fact is now privileged to run through several rooms in the house, a facility that less fortunate Hornby owners may well envy.

A certain amount of Hornby pre-war stock, of types not now available, has been obtained second-hand to supplement the original equipment. There are now eight coaches and 35 wagons and vans to carry the traffic. Some of the older stock has been modified to represent New Zealand prototypes and the system has been operated successfully with its Hornby Clockwork engines as part of a local Exhibition, where it aroused considerable interest. Mixed trains as well as passenger and goods services were run. A passing loop allowed trains in opposite directions to cross one another correctly, the main line being single track.



A pre-war Hornby locomotive and train belonging to Mr. Booth, Invercargill, N.Z. The train, of a type not now available, has been modified to reproduce New Zealand practice. Photograph by Elmswood Studios, Invercargill.



A Hornby-Dublo "Town" Railway

THE main line of a Hornby-Dublo layout is usually continuous, and as a rule any sidings or goods yards are included within the main oval. This is necessary for space reasons, in order to provide as much length as possible for the main line run. An exception to this arrangement is the Hornby-Dublo layout of which parts are shown on this page. This is the system of Mr. T. H. Cornish of Gowerton, Swansea, a keen *"M.M."* reader and Hornby-Dublo train operator.

The development of this layout has gone on at the same time as the building up of the miniature township that is included within the double main line. This gives a realistic air to the whole system, as the photographs show. The buildings are electrically lit from a source of power separate from the train driving circuit.

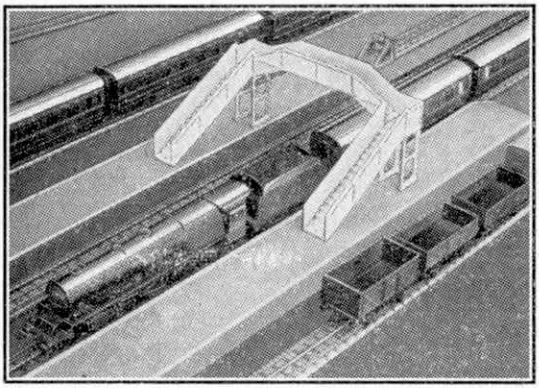
The layout is built up on a special table 12 ft. 6 in. by 6 ft. 6 in. The extensive sidings consist of a series of parallel tracks laid down for the whole length of the layout at one side of the main oval. Between the outer main line and the sidings runs a loop road, which is extended in one direction to form a dead-end siding, while in the other it is developed into a track curving round one end of the main oval to the engine shed. All the sidings are connected by crossover points, and the position of Isolating Rails and Uncoupling Rails makes possible a great variety of movements.

Main line passenger trains are handled by two of each of the Hornby-Dublo types of express engines, L.M.S. and L.N.E.R. respectively, and the useful standard Hornby-Dublo Tanks look after the mixed-traffic duties. Altogether the layout has a busy and realistic appearance, which is helped considerably by the Dinky Toys motor traffic on the roads.

Views of the Hornby-Dublo layout of Mr. T. H. Cornish, Swansea, are shown on this page. Note the extensive sidings with their Uncoupling Rails at strategic points.

Hornby-Dublo Locomotives at Work

ON the simplest miniature railway layout there is only one locomotive, and this has to be used for all different kinds of traffic that may be operated. As the railway develops, the need for a further engine becomes pressing, and Hornby-Dublo owners usually hope to have one or other of the 4–6–2 express locomotives, *"Duchess of Atholl"* or *"Sir Nigel Gresley,"* and a standard 0–6–2 Hornby-Dublo Tank, as the minimum stock with which to run the system. The locomotive requirements of many Hornby-Dublo layouts can be met by such a combination.

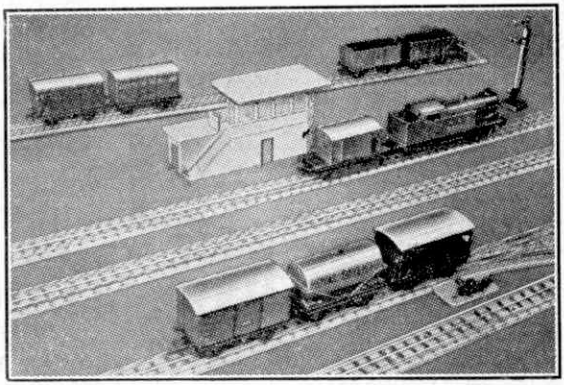


Hornby-Dublo "Duchess of Atholl" speeding through a station with a miniature express, the type of train to which this class of engine is most suited.

The Hornby-Dublo Tank locomotive is the ideal mixed-traffic engine for the short-distance work. At the start of operations on a layout it can bring the empty stock from the carriage sidings to the main station ready for the express engine to take it on a journey. While this run is being made, the Tank Engine can be busy in the yard or siding making up a goods train to be taken along the main line later when the express has finished its run. Alternatively, while the express train is standing at an intermediate stopping place the Tank may be required to move an additional coach, or possibly a goods van, on to the tail of the train. Careful placing of Isolating and Uncoupling Rails is necessary for this operation and we have previously given some hints in this direction.

Another job that the Hornby-Dublo Tank performs very well is the haulage of local passenger trains. To represent the latter the standard Hornby-Dublo corridor stock will have to be used. Corridor coaches frequently appear in local trains in actual practice. Main line stopping trains of the long-distance type can be hauled by either of the Hornby-Dublo express 4–6–2s. Such big engines sometimes take even quite ordinary trains in real life, but the work for which *"Duchess of Atholl"* or *"Sir Nigel Gresley"* is most suitable is the running of express passenger trains. There are many important trains between London and the North, the running of which in miniature will add to the interest of operations.

Fast goods trains, consisting principally of goods vans, can be handled at times by the Hornby-Dublo 4–6–2s. On several layouts we know this type of work is a regular part of their duty. Real "Pacifics," especially ex-L.N.E.R., are often used in this way, so there is ample reason for the practice in miniature.



The Hornby-Dublo Tank Locomotive ready to take a Brake Van down the line to pick up its train.

For other Stamp Advertisements see also pages 474 and xv.

Stamp Collecting

New Issues on Photogravure

By F. Riley, B.Sc.

THE new issues for Mauritius and North Borneo provide us with examples of stamp printing by photogravure. They are not the first Commonwealth stamps to be printed by this process, which indeed will be familiar to every reader, for it has been used for British stamps since the Silver Jubilee issue of 1935. As far as colonial stamps are concerned photogravure has not been very largely used so far. The outstanding example was the very fine Seychelles issue of 1938. The two new issues are by no means as good as that, and their colours are not uniformly pleasing. They are indeed disappointing, and it is to be hoped that if further photogravure issues are planned for the colonies brighter and better results will be attained.

Photogravure printing is really a development of recess printing, the process to which I referred to in the July "*M.M.*" In this a master die is engraved by hand and hardened. A roller of soft steel is then rocked to and fro across until it has been given an impression in reverse. The roller in turn is hardened and used for producing the design on the actual printing plate, which is a replica of the master die. In photogravure the design is photographed on a sensitised plate through a screen of very fine lines that breaks it up into myriads of tiny dots. After fixing, the plate is etched in acid, with the result that the squares between the lines of the screen are resolved into tiny pockets, varying in depth in accordance with the depth of tone of the parts of the subject giving rise to them.

When this plate is used for printing it is inked in the usual way and its surface is wiped clean. The paper is then pressed into contact with it, with the result that tiny dots varying in tone are printed on the paper. These make up the picture, as inspection of a photogravure stamp under a powerful magnifying glass will reveal. The dots are so small that they cannot be distinguished without this aid.

Although the Mauritius and North Borneo stamps are not particularly good they will make colourful pages in the album. The North Borneo set is the better of the two. Its 8c. value is a map stamp showing, not very accurately, a few details of North Borneo itself and marking its position relative to Brunei and Sarawak. No such aid is given by the rather vague map on one of the Mauritius stamps. Perhaps collectors are supposed to know that the island is in the Indian Ocean, 2,094 miles from Colombo in Ceylon and 1,552 miles from Durban, Natal. Some of them will know that the latitude 21 deg. 30 min. on the map should be 20 deg. 30 min.

The designs of the North Borneo issue show scenes in the colony, picture some of its natives and illustrate its industries, but not always with success. For instance, the 1c. value gives a sketchy view of Mount Kinabulu, the highest peak in the colony, and indeed in South East Asia, but it is difficult to realise from it that the mountain is almost 14,000 ft. in height. A coconut grove, hemp fibre drying on racks and a log storage pond on the 3c., 4c. and 10c. values respectively illustrate important products, and on the 2c. value a native woman is seen with a musical instrument strange to Western eyes.

Apart from the horses of two natives shown on the $1 stamp there is only one animal pictured in this issue, the bull seen on the 5c. value. Previous North Borneo pictorials have shown us many interesting creatures, such as the Malay stag, the argus pheasant, the honey bear, the tapir, the orang utan and so on, and it seems a pity to have played down this interesting side of life in the colony in the present issue. In this respect we are better off with the Mauritius set. The star turn here of course is the dodo, seen on the 12c. value, a weird bird that could not fly and very soon became extinct when Europeans reached Mauritius. Its companion in this set is the Mauritius deer, shown on the 1r. value, which was introduced from Batavia a little more than 300 years ago and of which there are now some 20,000 in the wooded and mountainous districts of the island.

The sugar industry contributes designs for two values, and four others are reminders that Mauritius has some of the finest scenery in the world. The 4c. value showing the Tamarind Falls, is disappointing as a representation of the series of seven cascades into which this river breaks. The Rempart Mountain, 2,500 ft. in height, and the Pieter Botte Mountain, the apex of which is a sharp cone with a large rock balanced on it, are pictured more effectively on the 5c. and 50c. values, and there is a beach scene on the 5r. value. Other interesting designs show a bay in the South East of the island, Port Louis, the capital, and the statue of Labourdonnais, its most famous governor when it was a French colony.

For other Stamp Advertisements see also pages 472 and xv.

Stamp Gossip

and Notes on New Issues

By F. E. Metcalfe

THE North Borneo set, mentioned last month, had not long been out when it was noted that the name Jesselton had been wrongly spelt Jessleton on the 50c. value, although it is given correctly on the 8c. stamp of the issue. Trust stamp collectors to find anything wrong about a design; stamp printers must at times bless their hawk eyes!

There has been a rush to secure copies of this error before a change is made. News from the colony is that the Chinese there have bought every copy they could get hold of and over four times face is being paid, but here at home, as there were fairly ample supplies at the Crown Agents, not much over face is being charged at the time these words are being written. Collectors should be able to get a spare block, if they want one, at not much more than the usual rate for a current stamp. It is quite a nice little variety, but a collector will be very silly if he pays a high price.

Australia keeps at it, and the latest value is of a new denomination altogether. A copy of the 8½d. is just to hand from a friendly collector in Australia, and the writer of these notes would like to say to him and to other Australian readers that their country is getting together a really nice set of stamps. These regular issues are not of an elaborate character, like those of some small country that produces stamps to sell to collectors, for Australia, like Great Britain, Canada and New Zealand, produces stamps for use but Australia is showing that while her issues are of necessity of a utilitarian character, they can also be of interest. Well done, Australia!

New Zealand also has a delightful little set when all is taken into consideration, and if the writer of these notes had to keep his expenditure on stamps down to a few coppers a week, he could still enjoy the fun of collecting and get together a nice little collection, over the years, by keeping away from expensive colonials and sticking to the modern used issues of the Dominions. As a matter of fact quite a few collectors follow these lines, but there is one rule to remember, or rather two. First buy as good an album as you can afford and don't crowd the pages; and above all collect only really fine used copies. With a little care, a good copy of any modern Dominion stamp can be obtained as cheaply as one rendered unsightly by a heavy postmark, or an off-centred copy, which looks almost as bad. These latter should be avoided like a plague.

Another set which we cannot overlook is that which consists of four overprinted values issued to commemorate the new constitution of Gibraltar. This was a great surprise, and as Gibraltar is a very popular country, there has been quite a run on the set. Fortunately the face value is moderate, so most collectors can buy a set. Don't miss yours, for it will cost more later on, and as it is a De La Rue printing we may see perforation changes before it goes obsolete.

The set for Malta, to commemorate the visit to that island by Princess Elizabeth will also be popular, but at the time of writing there is no fixed date of issue.

Now we jump to the other side of the world and illustrate the new stamp for Fiji. This 1/6 stamp, issued to take care of air mail letters weighing under half an ounce, may have a short life indeed, for if and when Australia changes the rate of its pound, Fiji will probably follow suit. In fact it is not outside the range of possibility that this will have happened by the time you are reading these notes. There was a scare in June, when every day a change was expected, but nothing happened then.

And now a few words about new issues, and new issue services. First of all we will be realistic and examine the problem of collecting fairly and squarely. Stamp collecting is one of the finest of indoor hobbies, which is the reason for its great popularity all over the world. In fact it becomes so interesting that one is apt to spend more cash on stamps than one can afford to throw away on a hobby, so it is necessary to see that our expenditure is made wisely, in case the collection has to be sold later.

Happy is the collector who has modest tastes in stamps, so that the small sum he or she spends does not matter. That's the ideal situation, but alas most of us are not in that class. Anyhow, if you have decided that K.G. VI colonial stamps are the best for you to collect, and the majority nowadays do decide thus, then you should join a good new issue service. Fortunately there are many good services, so there will be no difficulty about finding one to suit you.

The next problem is how much does it cost to be in such a service? Naturally it all depends to what face value you want to go, but here are one or two figures. Generally speaking you can take all colonial stamps up to 1/– for about £1 a month, and if you want to go up to £1, well it will not cost you much above a pound a week. The figures vary slightly, but over a period the sums mentioned will suffice. But if you join a new issue service don't be tempted to buy a block of this or that extra, unless you have the cash to spare, for once one starts these mild flutters, it is surprising how quickly the money goes. And after all to be buying stamps purely for profit is not exactly collecting, and such a lot of fun can be missed that way. There is no harm in buying a few stamps extra if one's collection is not going to suffer, but don't forget the collection first, for that is where the enjoyment lies.

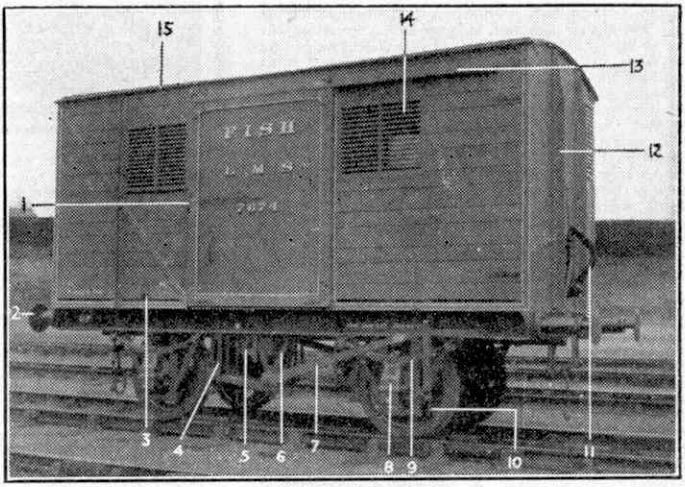
Finally, if you have not bought that new album, don't delay; they are likely to go up in price shortly.

Competitions! Open To All Readers

Prize-winning entries in "M.M." competitions become the property of Meccano Ltd. Unsuccessful entries in photographic, drawing and similar contests will be returned if suitable stamped addressed envelopes or wrappers are enclosed with them.

Name These Railway Wagon Parts

A fish van may not appear so romantic as a giant locomotive, but to all railway enthusiasts it is attractive and it certainly possesses some very interesting features. Its design requires careful thought in order to make it suitable for its purpose. The illustration on this page shows a fish van, and selected parts of this have been numbered and indicated by arrows. Readers are asked to say what these parts are and to explain their purpose briefly.



Entries in this contest should be written on one side of the paper only. Each part should be referred to by its number. Competitors must not forget to put their names and addresses in full on each sheet.

In each of the two sections, for Home and Overseas readers respectively, prizes of 21/–, 15/– and 10/6 will be awarded for the three best entries in order of merit, with Consolation Prizes for other good efforts. In the event of a tie the judges will take neatness or novelty into consideration.

Entries in this competition must be addressed *"Wagon Parts Contest, Meccano Magazine, Binns Road, Liverpool 13."* Closing dates: Home Section, 30th November; Overseas Section, 28th February 1951.

A City or Town Square Puzzle

Below is a city or town square, in which the only name inserted is Worcester, which forms the diagonal from left to right. Asterisks indicate the missing letters, and what is wanted is a series of nine city or town names to complete the horizontal lines. The name required for the first line obviously begins with W, that for the second line has O as its second letter, and so on.

```
W * * * * * * * *
* O * * * * * * *
* * R * * * * * *
* * * C * * * * *
* * * * E * * * *
* * * * * S * * *
* * * * * * T * *
* * * * * * * E *
* * * * * * * * R
```

When the square is complete it should be written out or printed, and sent to *"October City Square Contest, Meccano Magazine, Binns Road, Liverpool 13."* There will be the usual two Sections, for Home and Overseas readers respectively, and in each of these prizes of 21/–, 15/– and 10/6 will be awarded for the best entries in order of merit. If necessary the judges will take neatness and novelty into consideration.

Closing Dates: Home Section, 30th November; Overseas Section, 28th February 1951.

October Photographic Contest

In this contest we invite readers to send in portraits of members of their families or friends. Set portraits are not essential. Pictures showing the subjects at work on some task or hobby, or at play on holiday, will be suitable, so long as there is a central figure. Apart from this there are only two conditions—1, that the photograph must have been taken by the competitor, and 2, that on the back of each print must be stated exactly what the photograph represents.

The competition will be in two sections, A for readers aged 16 and over, and B for those under 16. Each competitor must state in which section his photograph is entered. There will be separate Overseas Sections, and in each, prizes of 21/–, 15/– and 10/6 will be awarded. Entries should be addressed *"October Photographic Contest, Meccano Magazine, Binns Road, Liverpool 13."* Closing dates: Home Section, 31st October; Overseas Section, 31st January 1951.

Competition Results and Solutions

HOME

MAY 1950 KNIGHT'S TOUR CONTEST

1st Prize: J. Poland, Liverpool 22. 2nd Prize: A. W. Nicol, Ulverston. 3rd Prize: A Porter, Sheffield. Consolation Prizes: J. E. Dykes, Plymouth; J. A. Rowlands, Hoylake; K. A. Wells, Sanderstead; C. S. Fowler, Slough.

MAY 1950 ADVERTISEMENT CONTEST

1st Prize: J. K. Tunstall, Leeds 6. 2nd Prize: G. J. Brannam, London E.7. 3rd Prize: H. Allen, East Kirby. Consolation Prizes: W. Patterson, Newcastle-on-Tyne 6; H. C. Truslow, Ilford: H. Whitehouse, West Bromwich.

MAY 1950 PHOTOGRAPHIC CONTEST

1st Prize, Section A: H. W. D. Hughes, Bexleyheath; Section B: J. Murray, Wishaw. 2nd Prize, Section A: H. North, F.R.G.S., Nottingham; Section B: B. Fuggle, Helston. 3rd Prize, Section A: H. D. Martineau, Woodhall Spa; Section B: C. G. Lennox Jones, Okehampton. Consolation Prizes, Section A: W. E. Turnbull, Edinburgh 7; D. Mills, Cannock; P. Clifton, Bromley; G. Ogilvie, Edinburgh; Section B: M. H. Butler, Bletchley; D. F. Clark, Southsea; B. J. Procter, London S.E.3.

JUNE 1950 PHOTOGRAPHIC CONTEST

1st Prize, Section A: H. J. Edwards, Tunbridge Wells; Section B: R. S. Hall, London S.W.7. 2nd Prize, Section A: P. Lambert, Harrogate; Section B: F. Henry, Banbridge. 3rd Prize, Section A: G. Oglivie, Edinburgh 4; Section B: P. J. Store, Calstock. Consolation Prizes, Section A: A. E. Moat, London N.9; J. D. Doyle, Manchester 21; S. J. N. Wright, Loughton; Section B: R. L. Thomas, London N.22; P. H. Rutherford, Newcastle-on-Tyne 6; I. Philip, Sedbergh.

OVERSEAS

JANUARY 1950 DRAWING CONTEST

1st Prize, Section A: T. Ramsden, Masterton, N.Z.; Section B: W. B. Walker, Durban, S. Africa. 2nd Prize, Section A: Miss E. Loundes-Yates, Calgary, Canada; Section B: N. S. Dawson, Petone, N.Z. 3rd Prize, Section A: Miss P. Granadurai, Trichinopoly, S. India; Section B: J. Gordon, W. Pretoria, S. Africa. Consolation Prizes: M. Johnson, Concord, Canada; G. Noble, Pretoria, S. Africa; L. Reynolds, Melbourne.

JANUARY 1950 COVER-VOTING CONTEST

1st Prize: J. C. Carter, Stellenbosch, S. Africa. 2nd Prize: I. Phillips, Gatooma, S. Rhodesia. 3rd Prize: G. M. Reoch, Gadzema, S. Rhodesia. Consolation Prizes: J. B. Williams, Wellington, N.Z.; R. G. Wood, Invercargill, N.Z.; C. Findley, Napier, N.Z.

JANUARY 1950 PHOTOGRAPHIC CONTEST

1st Prize, Section A: S. T. Williams, Montreal 4, Canada; Section B: C. Hartmann, Pietermaritzburg, S. Africa. 2nd Prize, Section A: J. K. Rogers, Melbourne, Australia; Section B: D. Swart, Brooklyn, S. Africa. 3rd Prize: Section A: J. Skelhorn, Calcutta, India; Section B: G. Elmsly, New Brighton, N.Z. Consolation Prizes: R. N. Satayamurthy, Mysore, India; A. Marthy, Wynberg, S. Africa; H. Baudach, Transkei, S. Africa; K. Flowers, Geraldine, N.Z.

SOLUTIONS

APRIL 1950 THRILLS CONTEST

1st, No. 7; 2nd, No. 5; 3rd, No. 11; 4th, No. 4; 5th, No. 1; 6th, No. 2; 7th, No. 8; 8th, No. 12; 9th, No. 3; 10th, No. 6; 11th, No. 9; 12th, No. 10.

APRIL 1950 ENGINE PARTS CONTEST

1. Fire-box. 2. Cylinder. 3. Buffer. 4. Sand Box or Sanding Gear. 5. Injector. 6. Vacuum Cylinder or Vacuum Pipe. 7. Regulator or Throttle. 8. Safety Valves. 9. Dome. 10. Bogie.

MAY 1950 KNIGHT'S TOUR CONTEST

Paragraph taken from "Electricity Makes Time Fly," page 208.

"*I am now able to describe these other jobs, after five years of study and ten years of work as an engineer. I have never yet joined cables in the street, nor am I likely to, but I could tell the jointer what size cables to use, and where they must be laid, which is often more difficult than actually joining the cables together.*"

The words *electrical* and *much* have been omitted from the original paragraph. Other alterations are *work* and *an*, substituted for *experience* and *a professional* respectively.

MAY 1950 ADVERTISEMENT CONTEST

No. 1. G. L. Wright, The Code Stamp Club, page 232.

No. 2. Meccano Ltd., Dinky Builder Parts, inside rear cover.

No. 3. Signalling Equipment Ltd., Induction Coils and Electrical Outfits, page vi, or Bond's O'Euston Road Ltd., Electric Chairs, page x.

No. 4. B.S.A. Cycles Ltd., Golden Wings Bicycle, page viii.

No. 5. N. Johnson, Triangular Stamps, page xv.

No. 6. Stymit, Kaleidoscopes, page xv.

No. 7. Highstone Utilities, Meter Movements, page xiii; E.H.W. Ltd., List of 500 Series, page xiv; Hand, 500 Different Stamps, page xv; Bearne, 500 Whole World Stamps, page xv, or Heywoods, 500 Different Stamps, page 232.

No. 8. Val Isherwood, Mk I and II Glenbur Submarines, page ii.

No. 9. County Perfumery Co. Ltd., Brylcreem, page iii.

No. 10. Frederick Warne & Co. Ltd., Coloured Illustrations and Photographics, page xiv.

A Zulu War Dance. This interesting photograph by C. Hartmann of Pietermaritzburg, S. Africa, was awarded 1st Prize in the January 1950 Overseas Photographic Contest, Section B.

Railway Working Timetables—(*Cont. from page 440*)

working leaves Dover at 4.55 p.m. in timing No. 44, being booked to pass Ashford at 5.22, Tonbridge at 5.46½, Orpington, 6.7, Bickley Junction 6.10½, and to arrive at Victoria 6.30 p.m.

Passing times on the Western Division main line are applied to certain junction signal boxes, not stations; for example: Hampton Court Junction, 13¼ miles from Waterloo between Surbiton and Esher; Woking Junction, just west of the station; Worting Junction Box, West of Basingstoke, a little more than 50 miles from London, where the Bournemouth and Salisbury main lines bifurcate; Winchester Junction, a rather lonely spot two miles north of the station of that name, close to mile post 64½ from Waterloo.

These brief notes will give some idea of the enormous amount of planning and timing that goes on behind the railway scenes. Late running and the frequent necessity for special trains of all kinds, or some sort of mishap may involve deviations from the published timings, such changes being arranged on the spot or by the District Control Office. Changes, amendments or additional workings are notified in periodical Supplementary Notices to the staff. So many "specials" are run, together with incidental alterations to rolling stock rostering, ordinary train timings and so on over main lines at holiday times that the weekly Special Traffic Notices for various Regions are bulky volumes in themselves.

The Smallest State in the World—(*Cont. from p. 455*)

several suites set aside for the personal use of distinguished guests.

The population of the State is just over 1,000, most of whom are employed in the Papal service. Recently, however, a number of industries have been established. An important one is that devoted to mosaics. The perfection this art has reached is evident in the imitative reproduction of renowned paintings in St. Peter's, where almost all the altars are so adorned. The studio possesses a carefully catalogued set of more than 11,000 different coloured glass pastes. As gifts to royalty and rulers, the Pope occasionally selects particular beautiful mosaics, like the lovely reproduction of Guido Reni's famous picture of St. Peter.

Another industry is that of manuscript repairing and book-binding. The very latest scientific methods to preserve faded parchment and paper manuscripts from the corroding influence of ink are used. There is a special board whose business it is to utilise every discovery that can contribute to the preservation of these priceless documents. As a result valuable historic and Biblical manuscripts are being safeguarded. Tapestry making is another industry. The unpretentious workshop is operated by nuns whose patience is often taxed, but never conquered, in the effort to restore priceless hangings.

Vatican City, being a complete sovereignty and internationally recognised as such, enjoys full diplomatic privileges. At present some 38 countries send diplomatic representatives to the Holy See. Many of them, however, reside in Rome and not within the boundaries of the State. Though living on Italian soil the treaty guarantees them, even in time of war, the same status as is due to diplomatic representatives according to the provisions of international law.

Collisions at Sea—(*Continued from page 450*)

as such stretches of water are liable to currents which will throw a vessel off her course, and the formation of shoals which make it difficult to keep to her proper side of the channel to pass port-to-port. Small vessels generally give big ones the part of the channel with most water, irrespective of the exact rules; and there are various local regulations in parts where there would be a special danger if the International regulations were carried out. Finally there is what is called inter-action, by which a big ship with very little water under her will drag a smaller one to her as though she were a magnet.

In war-time, steaming without lights and in convoy offers a great measure of safety from the enemy, but it greatly increases the risk of collision. There is always likely to be question as to which should come first, the ordinary rule of the road or the naval orders regarding convoy, and the judges are always inclined to favour the former.

The subject is incomplete without mention of the part played by the Admiralty Court, dreaded by all seamen. Quick decisions taken in a moment of extreme danger may not seem so sound when they are the subject of questions by counsel who have studied them for months, with the knowledge that the judge is ruled by the strict letter of the regulations, although he has the assistance of nautical assessors. These are generally Elder Brethren of Trinity House or experienced ship-masters, who guide him in matters of seamanship and warn him when strict adherence to the regulations would lead to disaster. When collisions come before the Admiralty Court it is by means of a civil case, with one or both parties claiming damages, and the judge decides whether neither ship is to blame—seldom in peace-time—both ships equally, or in some proportion such as three-quarters and one-quarter.

To save time and money many cases are settled by arbitration and minor ones in the County Court; but the Admiralty Court is then a Court of Appeal and it is a very high tribute to its reputation for sound judgment and absolute impartiality that any number of cases come before it which do not concern British ships or British waters at all, but are the result of foreign shipowners choosing it as the finest tribunal to hear their case.

Thirty Years of Enterprise—(*Cont. from page 458*)

they reduced the London - Paris time to within the hour.

Shortly afterwards the company built their first all-metal air liner, the twin-engined D.H.95 "Flamingo"; but just after the first one went into service on the London-Jersey route war broke out once more. A few "Flamingos" were built for the R.A.F. as "Hertfordshire" 22-seat troop transports.

Meanwhile, despite official disinterest, de Havillands pressed on with the design of a light, unarmed wooden bomber in the tradition of the D.H.4 and D.H.9 of the first World War—one that would be fast enough to elude enemy fighters. When the prototype eventually flew as the D.H.98 "Mosquito," lack of interest changed to a demand for unlimited production and the "Mossie" became one of the war's great aeroplanes.

The rest of the de Havilland story is too well known to need recounting in detail. When it was apparent that jets would supersede piston engines in fighter aircraft, the company designed not only a revolutionary jet aeroplane but, under the leadership of Frank Halford, the engine to power it. The result was the "Goblin"-powered D.H.100 "Spidercrab," later re-named "Vampire," the first jet to exceed 500 m.p.h. by a handsome margin. Still the R.A.F.'s standard jet fighter, it has also been developed into the D.H.113 Night Fighter and the R.A.F.'s new D.H.112 "Venom" fighter. Simultaneously de Havillands developed the world's fastest piston-engined fighter, the twin-engined D.H.103 "Hornet," and, after the war, the fine D.H.104 "Dover" and D.H.114 "Heron" feeder-liners, and the world's first pure-jet air liner, the magnificent D.H.106 "Comet."

It is difficult to pay adequate tribute to such an organisation in a few pages, but the fact that there are probably more de Havilland types in production and in service than any other make of aircraft in the world is the finest tribute that could possibly be paid to the British Enterprise which started so modestly in a little wooden hut just thirty years ago.

Fireside Fun

"Yes, I never eat meat. I've lived on vegetables for years."

"That's nothing to boast about. I've lived on earth all my life."

* * * *

"Stop the bus! A man's fallen off."

"That's all right. He's paid his fare!"

* * * *

"It was very wicked to pull pussy's tail like that. No wonder he scratched you."

"But I didn't. It was pussy who pulled. I only held his tail."

* * * *

"I say, Mac, what's the idea of stripping off the wallpaper so carefully? Why don't you just scrape it off."

"We're not re-papering the room. We're removing."

* * * *

"What did the Editor think of the drawings you showed him?"

"Oh, he clapped his hands———"

"Delighted, eh?"

"Not exactly. He clapped them over his eyes."

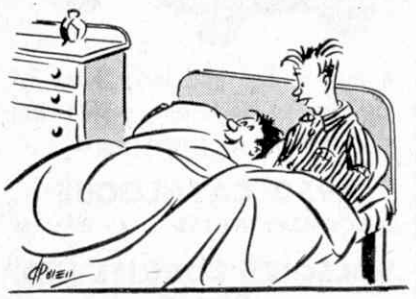
* * * *

"Yes, Jones was fired with zeal and energy."

"Then why doesn't he work here now?"

"He was too lazy. I did the firing."

* * * *



"You know you're only entitled to half the bed, Fred."

"Well, I've only got half—the middle half!"

BRAIN TEASERS

NUMBERING GONE CRAZY

With four sevens make 21 sevens; with three sixes make 12 sixes; and with two fives make eleven fives.

* * * *

MORE UNIFORMITY

Fill in this number square using each of the numbers from 1 to 25 once, so that the numbers in each line, each column and each diagonal add up to the same total. The numbers 1 and 25 must appear in the positions shown.

		1		
		25		

D.P.K.

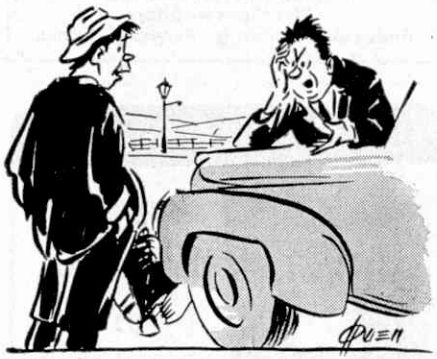
* * * *

GUESS WHAT!

My first is a sporting insect; my second is a weapon; my third is something associated with the British Railways; my fourth is a boat; my fifth is a Spanish wine; my sixth is a famous Judge; my seventh is in a bus; my eighth is a bird which sounds like a colour going to begin; and my ninth is a natural magnet.

All this gives one word, formed by the first letter in the first clue, the second in the second clue and so on. The word is the name of something used every day. What is it? K.J.B.

* * * *



"Don't stand there gaping—go for a doctor!"

"I can't. That's him you've run over."

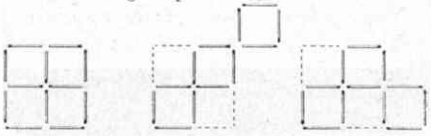
* * * *

SOLUTIONS TO LAST MONTH'S PUZZLES

The six incomplete words of our first puzzle last month were SCATTER, PRATTLE, CAMELLIA, CLASSES, POTTERY and SPIGOT.

To solve our second puzzle move the first counter along the line from 1 to 4. The trick then is to fill up the beginning of each line in turn. The second counter therefore is entered at 6 and moved to 1, the third counter is entered at 3 and moved to 6, and so on.

The solution of our squaring up puzzle is shown in the diagrams below, in which the dotted lines indicate the original positions of matches moved.



STAMP ADVERTISEMENTS

(See also pages 472 and 474)

FREE—4 S.W. AFRICAN PICTORIALS

The above scarce stamps will be given free to all genuine applicants for our famous ONE PENNY APPROVAL BOOKLETS of BRIT. COLONIALS. These Booklets abound with JUBILEES, PEACE, CORONATIONS, SILVER WEDDINGS and U.P.U. as well as the latest K.G. VI stamps. Many Bargains as usual. N.B.—Enclose 2½d. stamp for Postage.

S. FENLEY LTD., 250, Charminster Rd., Bournemouth

100 DIFFERENT STAMPS FREE

(including TRIANGULAR and PICTORIALS)

To Approval Applicants enclosing 2½d. postage.

N. JOHNSON (Dept. M.M.), 19, Hillside, Slough, Bucks.

FREE 100 **STAMPS ALL DIFFERENT** including Jet Bomber, Skymaster Plane, Steam Locomotive and many other Pictorials. Request Discount Bargain Approvals enclosing 4d. for postage, etc.

A. HUGHES, 34, LOCHALINE STREET, LONDON W.6

RAILWAY PACKET FREE

This packet contains Mint and Used Stamps showing **ENGINES OLD & MODERN**, and is absolutely **FREE.** Simply request Approvals and enclose 2½d. stamp.

JOHN H. ABEL, 3, Alder Close, Sturminster Newton, Dorset

ONE THOUSAND DIFFERENT—SEVEN SHILLINGS

My 6 page list of packets, etc., includes the following offers. All Different: 50 Airmails 3/–; 50 Paraguay 4/–; 100 Portugal 3/6; 100 Switzerland 2/8. Postage 3d. extra. Packet of stamps cat. 10/– free to Approval Applicants.

R. A. KNOWLES (M.M.), 19, Victoria Road, Whitehaven

BEGINNER'S PARADISE! 500 Collectors, Duplicates 2/6, Post extra. Amazing variety. Many repeat orders for this packet. 13 Italian Pictorials Free to applicants for our famous approvals. 3d. postage.

Belfield's Stamp Service, Stour Hill, Quarry Bank, Staffs.

STAMPS PAY THE P. & L. WAY

We offer a generous discount to all those sending a 2½d. stamp for our

BRITISH COLONIAL APPROVALS

P. & L. Philatelists, 10, Tynemouth Rd., Mitcham, Surrey

CIGARETTE CARDS

Send 3d. for BARGAIN LIST of 600 series. 100's of sets available from 1/– to 2/6 each. ALBUMS to hold 200 cards 1/6, for 100 cards, 1/–. Subject packets 20/25 cards each on AEROPLANES, BUTTERFLIES, CRICKET, DOGS, BIRDS, FOOTBALL, BOXING, SHIPS, SOLDIERS, RAILWAYS and WILD ANIMALS 1/–. ALL ABOVE POSTAGE EXTRA. SPECIAL OFFER: 100 different cards and album to hold them 3/–

E.H.W. Ltd., Dept, "M," 42, Victoria St., London S.W.1

MORE "OO" LINESIDE BUILDING PLANS!

A.W. 120H, Village School, 2/6; A.W. 121H, Block of Modern Flats, 2/6; A.W. 122H, Old Style Tenement Flats, 2/6; A.W. 123H, Fire Station, 2/–; A.W. 124H, Town Hall, 2/6; A.W. 125H, Half Model of Terrace House Backs, 2/6. Note! These are ONLY available for "OO" Models.

Send 6d. for our 9th Edition Catalogue, including all new drawings to date.

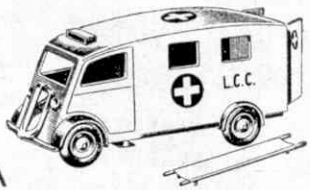
JOHN E. SKINLEY, M.J.Inst.E., 132, High Street, Southend-on-Sea, Essex

Crystal Set Kits 15/- Complete with instructions. Endless entertainment and no further expense. Ideal for School or College. Lightweight Headphones **15/-.** All post free.

W. Buckle, (Dept. M), 77, Horringer Rd., Bury St. Edmunds

Learn Shorthand by 1st Nov. (1 hour's study nightly). 1st lesson 2½d. stamp. **Duttons (Dept. MO), 92, Gt. Russell St., W.C.1**

YOU MUST HAVE A MINIC AMBULANCE!



MINIC AMBULANCE

You're really missing something if you haven't got a Minic ambulance in your scale model collection. It's a modern streamlined ambulance, sparkling white with red markings. The back doors open to reveal a removable stretcher and two bunks. Five inches long, with a long-running clockwork engine and silent rubber tyres — this is a fine model to stand out among your cars.

Price 4/6. Packing and postage 9d. extra.

Write now for Hamley's new illustrated Christmas Catalogue.

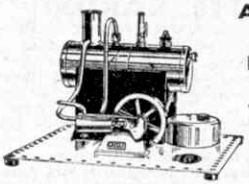
Hamleys
Estd 1760
HAMLEY BROTHERS LTD

200-202, REGENT ST., LONDON W.1

(Our only address) Tel.: REGent 3161

Mamod

MODEL S.E.2 STEAM ENGINE



A magnificent miniature power plant for driving your models

48/2 inc. Purchase Tax

This splendid model is fitted with seamless highly polished brass tube boiler 5" long, **speed regulator, whistle,** 2" diameter red spoked-brass flywheel and safety valve, beautifully finished in red, green and black, and complete with filler funnel, three burner spirit lamp and full instructions.

MAMOD MINOR No. 1 STEAM ENGINE **21/3** inc. Tax
MAMOD MINOR No. 2 STEAM ENGINE **29/5** inc. Tax
MAMOD S.E.1 STEAM ENGINE ... **39/9** inc. Tax

ALL MAMOD ENGINES AND WORKING MODELS FIT MECCANO AND ARE 100% GUARANTEED

Be sure to ask your dealer to show you this famous range.

MALINS (ENGINEERS) LIMITED
25-31, CAMDEN STREET, BIRMINGHAM 1

MECCANO MAGAZINE

Registered at the G.P.O., London, for transmission by Canadian Magazine Post.

EDITORIAL AND ADVERTISING OFFICES:
LIVERPOOL 13, ENGLAND.
Telegrams: "Meccano, Liverpool."

Readers' Sales and Wants. Private advertisements (i.e., not trade) are charged 1d. per word, minimum 1/-. Cash with order. Readers' advertisements are published as soon as possible; inclusion in the first issue after receiving them cannot be guaranteed.

READERS' SALES AND WANTS

SALES

Hornby Clockwork 101 Tank Engine, Rolling Stock, Points, Rails (1 ft. and 2 ft. Radius). Also MO Goods Set. Good condition, reasonable.—Brown, 21, Windsor Drive, Grappenhall, Nr. Warrington.

Hornby Electric Train, Gauge 0; one Circle Track, three Coaches, two Engines needing slight attention. What offers? Also large collection of Meccano. Approximately Outfit Nos. 9-10 plus extras; five Motors; nearly 100 Wheels and Gears. Well over 1,400 pieces. Good condition, nearest £10.—M. Mellor, 1, Jarvis Crescent, Oldbury, Worcs.

WANTS

"*Magic Motor*" and No. 3A Meccano Outfit. Must be in good condition. State price when replying to—M. MacCarthy, New Street, Bantry, Co. Cork, Eire.

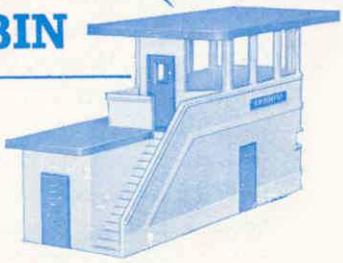
Super-model Leaflets, particularly Nos. 1, 1a, 4, 6, 24, 27 and 29. Must be in good condition. State price.—Box "M.M." No. 40.

Geared Roller Bearings No. 167; E020 Electric Motor. State price.—Box "M.M." No. 41.

Have you seen the NEW HORNBY-DUBLO ACCESSORIES ?

These splendid die-cast aluminium Accessories are now available from your Meccano Dealer who will tell you their prices.

D1 SIGNAL CABIN

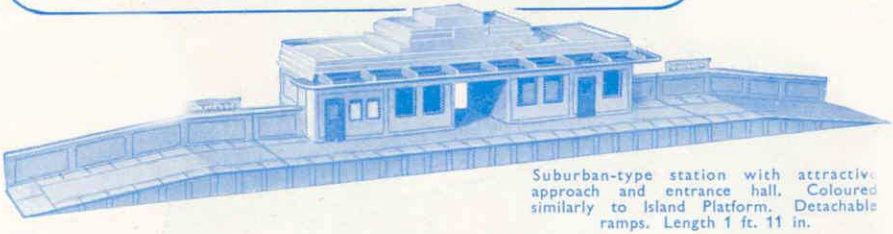


Finished to represent concrete, with orange roofs and green doors. Height 3 in. Length 6¾ in.

D1 ISLAND PLATFORM

Stone coloured platform and building, with orange roof and green doors. Detachable ramps. Length 1 ft. 11 in.

D1 THROUGH STATION



Suburban-type station with attractive approach and entrance hall. Coloured similarly to Island Platform. Detachable ramps. Length 1 ft. 11 in.

MECCANO LIMITED • BINNS ROAD • LIVERPOOL 13

PUBLISHED BY MECCANO LTD., BINNS ROAD, LIVERPOOL 13, ENGLAND.
Printed by John Waddington Ltd., Leeds and London.