VOL. XXXVI No. 4 APRIL 1951

MECCANO MAGAZINE

A MODERN CAPE LINER

9D.

DINKY TOYS

Electric Dairy Van
No. 30v
Price 3/6 each

Luxury Coach
No. 29g
Price 3/1 each

Disc Harrow
No. 27h
Price 2/6 each

Observation Coach
No. 29f
Price 3/5 each

Guy 4-ton Lorry
No. 511
Price 5/7 each

Fordson 'Thames' Flat Truck
No. 30r
Price 2/6 each

Double Deck Bus
No. 29c
Price 4/- each

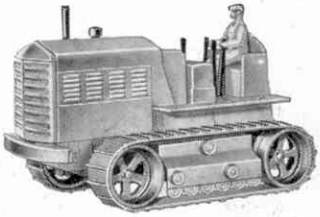
Rear Tipping Wagon
No. 30m
Price 3/5 each

Rover 75 Saloon
No. 140b
Price 3/2 each

Massey-Harris Tractor
No. 27a
Price 4/- each

Austin 'Atlantic' Convertible
No. 140a
Price 3/4 each

Coles Mobile Crane
No. 571
Price 10/6 each



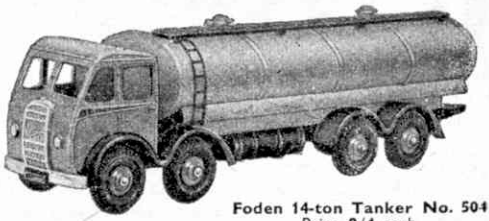
Heavy Tractor
No. 563
Price 8/4 each

ALL PRICES INCLUDE PURCHASE TAX

MADE IN ENGLAND BY MECCANO LIMITED

DINKY TOYS

Austin Covered Wagon
No. 30s
Price 3/- each

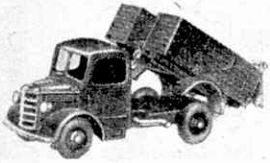


Foden 14-ton Tanker No. 504
Price 9/4 each

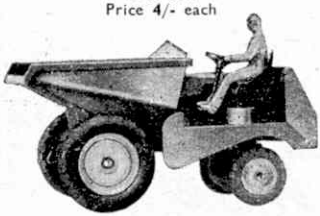
Hillman Minx Saloon
No. 40f
Price 2/6 each

Farm Produce Wagon
No. 30n
Price 4/- each

Estate Car
No. 27f
Price 3/1 each



Bedford End Tipper
No. 25m
Price 5/3 each



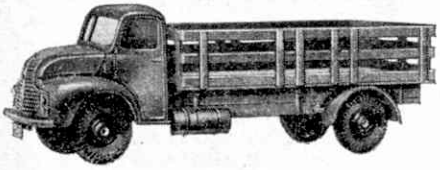
Dumper Truck No. 562
Price 7/5 each

Land-Rover
No. 27d
Price 4/- each

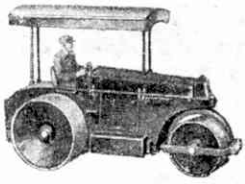
The Standard "Vanguard"
Saloon, No. 40e
Price 2/6 each

Trojan 15 cwt. Van "Esso"
No. 31a
Price 2/6 each

Breakdown Lorry
No. 25x
Price 5/7 each



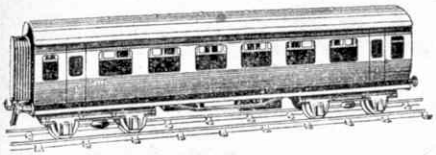
Leyland 'Comet' Lorry
No. 531
Price 5/3 each



Aveling-Barford Diesel Roller
No. 25p
Price 3/9 each

ALL PRICES INCLUDE PURCHASE TAX

MADE IN ENGLAND BY MECCANO LIMITED



PASSENGER COACHES & ACCESSORIES

for your Gauge '0' Model Railway

BRITISH RAILWAYS PASSENGER COACHES First or third class corridor and third class composite brakes, finished in B.R. colours. A new design compensating bogie is fitted and the vehicles are supplied with corridor connections. These low-priced Gauge '0' passenger coaches will be an attractive feature of your railway system. Price each £2 . 4 . 0 including Purchase Tax

In addition to the above, we have now introduced three L.M.S. type steel goods vans ranging in price from 7/6 to 10/-, plus P.T.
Other accessories include Signals, Colour Light Signals, Loading Gauge, etc. For full details of these and our famous Gauge '0' Locomotives, write for our illustrated catalogue "Gauge '0' Model Railways," Ref. GO/17, Price 1/- or call at our London or Manchester Showrooms.

BASSETT-LOWKE LTD.

Head Office and Works:
NORTHAMPTON
LONDON: 112, High Holborn, W.C.1
MANCHESTER: 28, Corporation Street

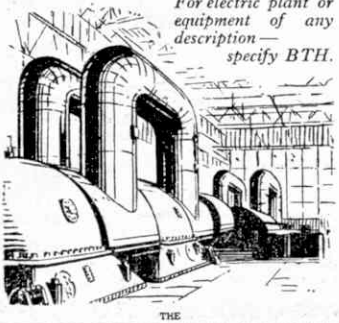
Generating Plant

by

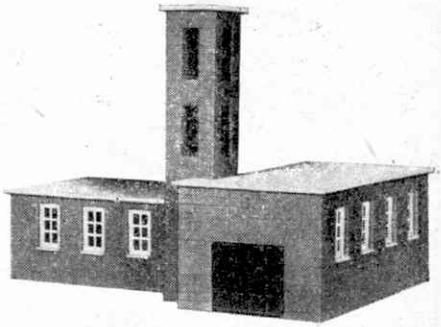
B T-H

Whatever the size or duty, BTH generating plant of exceptional reliability and proved performance can be supplied.

For electric plant or equipment of any description— specify BTH.



THE
BRITISH THOMSON-HOUSTON
COMPANY LIMITED. RUGBY, ENGLAND. A4264



YOU can build this FIRE STATION

WITH

BRICKPLAYER

BRICK & MORTAR BUILDING KIT

It enables you to build Garages, Houses, Railway Stations, Signal Boxes, or from your own imagination. All railway models will fit 'O' gauge scale. Buildings can be permanent, or dismantled by merely soaking in water and the bricks used again and again.

BRICKPLAYER KITS AT 26/6 AND 49/6 ARE AVAILABLE FROM GOOD TOYSHOPS, HOBBY SHOPS, AND DEPARTMENTAL STORES.

ACCESSORY PACKS

No.	Contents	Price
100	100 Full size Bricks	2/9
101	52 ¾-Bricks and 72 ½-Bricks	2/9
102	Gable and Peak Bricks	2/9
111	Capping and Roof Tiles	2/3
112	Concrete Roofing	2/3
114	Bag of Brickplayer Cement	1/3
115	Roofing Cement	7d.
8107	2 Bay Windows with 31 Splay Bricks ..	3/9

METAL WINDOW AND DOOR FRAMES

F1	F2	F3	F4	F6	F8	F10
8½d.	6½d.	7½d.	5d.	4d.	6d.	7½d.

8108 Sheets of Glazing, 1⅜ in. x 6 in. (Plastic) 1½d.

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

J. W. SPEAR & SONS LTD.
DEPT. M • ENFIELD • MIDDLESEX

Next Month: "LONG RANGE WEATHER FORECASTS." By D. Bowen

MECCANO MAGAZINE

Editorial Office:
Binns Road
Liverpool 13
England

Vol. XXXVI
No. 4
April 1951

With the Editor

British Railways Containers

I was surprised and interested to learn from a recent official communication that British Railways operate more containers than any other European railway system. The number of containers running on B.R. lines is actually about 22,000.

An International Container Exhibition is to be held at Zurich from the 14th to 23rd of this month. The exhibition has been arranged by the Swiss Federal Railways on behalf of the Association of Traffic Experts of Switzerland. The announcement says that six types of B.R. containers are to be shown, and this was a further surprise to me. The containers we see on our travels all look so much alike that we are apt to forget that they are not necessarily alike inside. The six to go to Switzerland are the 2½-ton covered container for general goods; the special-purpose type "AF," which is highly insulated for the conveyance of quick-frozen foods and refrigerated goods; the "FM" type insulated container with hooks and bars for frozen or chilled meat or fish; type "BC," which has special racks for the carriage of bicycles, an awkward item of freight to carry in the ordinary way; and two other types, one with hinged bottom doors for the conveyance of cement in bulk, and the other for bricks, tiles and small earthenware.

These six types do not exhaust the container range, for there are ventilated vehicles for foodstuffs and special types for furniture, glassware and other freights.

As containers can readily be transferred by crane from road to rail and vice versa with their loads intact, they avoid individual transhipment and the handling necessary with separate consignments. They provide literally a door-to-door service from factory or warehouse to store or shop. The container principle is far from new, but as we know it to-day it was first applied on a really large scale by the former L.M.S., which in 1927 had 492 containers in use. In ten years this number had grown to 7,516, and during the same period the other companies had been quick to follow this pioneer lead.

* * * *

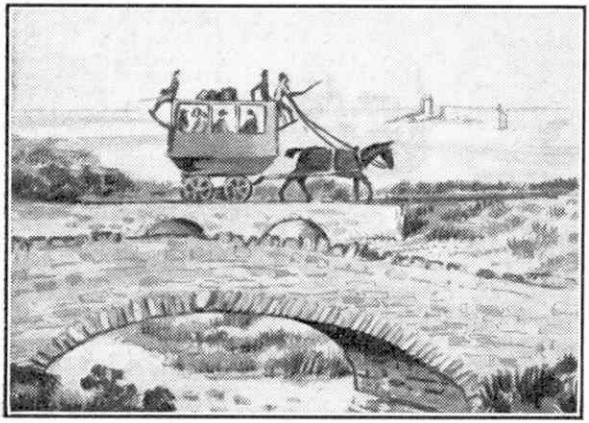
In January last a reader of the "*M.M.*," responding to an advertisement in the Readers' Sales column of the January issue, purchased a Hornby Train Set from Mr. G. P. T. Whurr, Edinburgh. This reader is asked to communicate as soon as possible with Mr. Whurr, or with the Editor.

This Month's Contents Page

The Swansea and Mumbles Railway

The First Passenger Line

THE Swansea and Mumbles Railway, still in active operation after a career of nearly 150 years, is not a railway in the main line sense of the word. The Act of Parliament incorporating the company in 1804 referred to it as the "Oystermouth Railway or Tramroad Company." The name Oystermouth arose from the fact that the original outer terminal was in the parish of Oystermouth. Railway or tramway, the Mumbles line is remarkable for its pioneer character and length of service, and also from the fact that its traffic has been worked successively by horse traction, steam power, and more recently electricity.



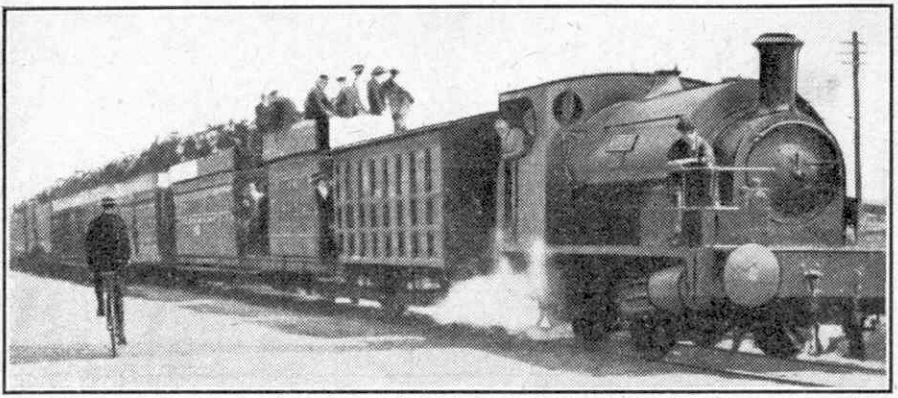
A horse-drawn car on the Oystermouth Tramroad crossing Black Pill bridge about 1825.
For the information on which this article is based, and for the illustrations, we are indebted to the South Wales Transport Co. Ltd., one of the British Electric Traction group of companies.

Track laying appears to have begun about September 1805. A publication in that year, referring to the line as a "rail-way," describes it as "following closely to the seashore, for about 7½ miles in length in the County of Glamorgan, in South Wales; its object is the carrying of lime-stone, lime and coals." The original permanent way was formed of short lengths of angle iron spiked to granite blocks, and thus followed the type of construction that was extensively in use at the time on the plateways of South Wales. The vehicles running on the line therefore had unflanged wheels. Passenger traffic began on 25th March 1807, the service being provided by a contractor who offered the company a fixed sum "for permission to run a waggon or waggons on the Tram road for the year . . . . . for the conveyance of passengers." This was an important event, for it was the first public passenger service by rail in this country. The distinction of providing this is often credited to the Stockton and Darlington Railway, but this was anticipated by nearly 20 years by the Mumbles line. The Stockton and Darlington service was the first to be steam hauled.

Evidently the Oystermouth passenger traffic was a profitable venture, for in the next year the same contractor and two others jointly offered a greater sum for the renewal of the contract. In a published reference in 1808 a Miss Spence describes "a carriage of singular construction. This car contains twelve persons and is constructed chiefly of iron, its four wheels run on an iron railway by the aid of one horse and it is an easy and light vehicle." On the other hand a writer in 1814 mentions "the tram car" and compares the noise of its running to that of 20 sledge hammers in full play.

The service carried on until about 1826. In that year a road was constructed between Swansea and Oystermouth and the rail passenger service appears to have been discontinued shortly afterwards in favour of a road service.

Eventually the line passed to George Byng Morris, of a family connected with the line in the beginning. In 1855 part of the tramway was relaid with edge rails for the passage of vehicles having flanged wheels. Five years later Morris began a horse-drawn passenger service between Swansea and Black Pill, and during the same year, 1860, that part of the track from Black Pill to Oystermouth also was



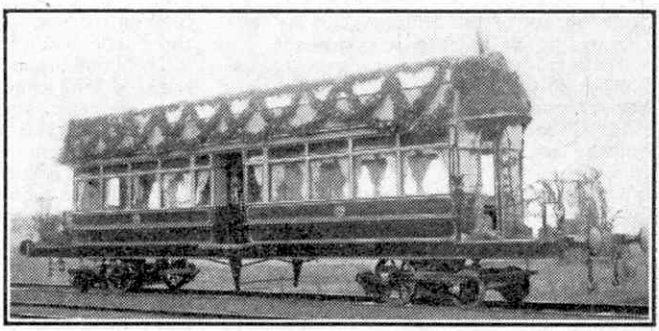
A typical steam traction scene on the Swansea and Mumbles line, showing the double-deck tramcar-type vehicles hauled by a saddle tank engine.

relaid with edge rails. The passenger service was then extended through to Oystermouth from Swansea. Since then, November 1860, passenger services over the route have been continuous.

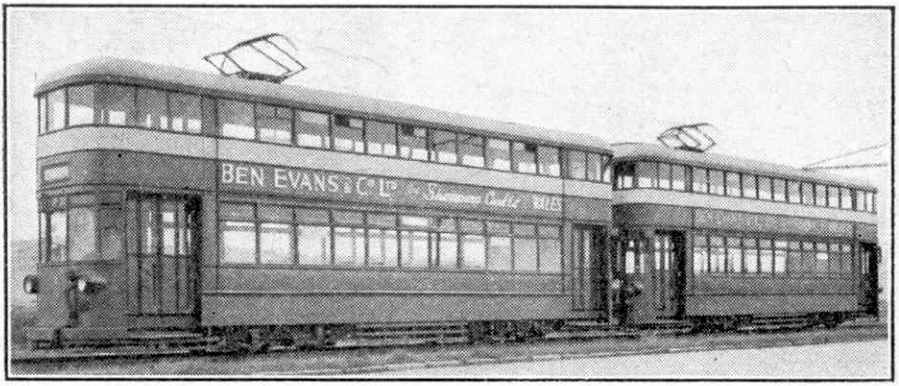
The next development of interest was the introduction of steam traction, which took place as the result of the formation of the Swansea Improvements and Tramways Company to lay down a system of horse tramways in the Swansea streets. Morris made an agreement with this company allowing them to work and use the Oystermouth Railway for a period of 21 years. The Railway was then operating passenger services between Rutland street station in Swansea and the Mumbles terminus, now called Oystermouth, a distance of five miles, and there were six intermediate stations. Each train, taking 43 minutes for the journey, consisted of one or more vehicles. It was proposed to introduce new rolling stock, for hitherto passengers had been conveyed in "carriages of rough and rude construction." Steam locomotive haulage power also was suggested, but for the time being horse power continued in use. Regular steam haulage began on 17th August 1877.

At the end of October 1877 the Swansea and Mumbles Railway was sold by auction, the buyers being friends of a railway contractor named John Dickson, who had been interested in it in 1865 as part of a larger scheme, but had not been able to complete the purchase. There was friction between Dickson and the Tramways Company straight away. Dickson put on a steam service between Rutland Street and Oystermouth and the steam services of the Tramways Company had to be withdrawn, although their horse-drawn trams continued working until October 1878. Dickson did all he could to keep the Tramways Company from working over his line, which was incorporated as the Swansea and Mumbles Railway Company Ltd., in March 1879.

In 1884 the Mumbles Railway came under new control and the Tramways Company were invited to work the line by steam. During the period of this arrangement the company maintained the steam services between Rutland Street



A Mumbles bogie car specially decorated for the conveyance of King Edward VII at the opening of the King's Dock, Swansea.



Two of the 106-seater cars introduced when the Mumbles line was electrified in 1929. Unlike most British tramcars, both entrances are on the same side.

and Oystermouth and also ran horse cars through the Swansea streets. When this arrangement expired there was some disagreement between the Mumbles and the Tramways companies, but finally it was arranged that the running powers of the Tramways Company over the Mumbles Railway should be suspended for 21 years from 1st April 1896. In actual fact that was the end of horse traction on the Mumbles line.

In the meantime a new company known as the Mumbles Railway and Pier Company had been formed to build a new railway from Oystermouth to Mumbles as an extension of the old one, and to construct a pier at Mumbles. Next, both undertakings were leased through the Swansea Improvements and Tramways Company from 1st July 1899, although the Tramways Company had come under the control of the British Electric Traction Company Ltd., early in 1898. This concern brought about the electrification of the Swansea street tramways in 1900 so that the electrification of the Mumbles line as well appeared to be a foregone conclusion.

Remarkably enough, it was nearly another 30 years before this electrification was carried out. The company now owning and operating the Mumbles Railway is the South Wales Transport Company Ltd. The Mumbles Railway and Pier Company still exists, and owns the land on which the railway runs, and the Mumbles Pier. The land and pier are leased by this company for 999 years.

We have seen that the original passenger service ceased in 1826 or so. When it was resumed in 1860 the vehicles used resembled a very early side-door compartment railway coach, with the addition of longitudinal seats placed back to back on the roof. Access to these was gained by means of open stairways which led off the ends of a wide footboard at about axle height and finished at a sort of landing projecting from the coach body at each end. If old illustrations are to be trusted, single-deck vehicles completely open were also used about the same time.

The tramway type locomotive that inaugurated the steam era on the Mumbles line was a quaint looking boxed-in affair resembling a small tramcar externally. Dickson's steam service that followed was run by 0–4–0 saddle tank locomotives that had no cabs but only a bent-over weatherboard for protection of the crew. The wheels and motion were enclosed. These engines were later sold and replaced by others, also of the 0–4–0 saddle tank type. These in turn were followed by 0–6–0 side tanks, although further saddle tanks were acquired later, one being an 0–4–0, and the other an 0–6–0 obtained second-hand. All the engines carried a warning bell on account of their use alongside the public road.

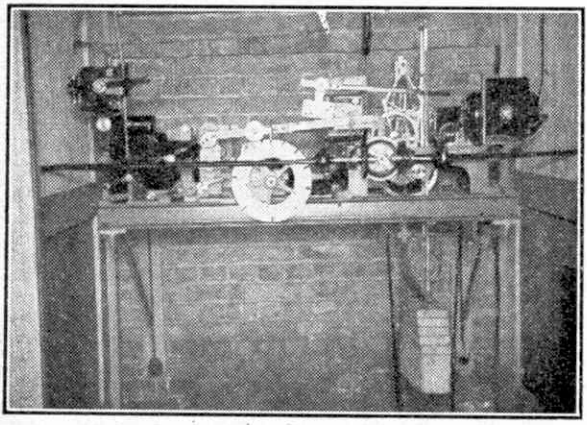
The contemporary rolling stock, which lasted a long time, consisted of tramway type vehicles with open upper decks. Quite long trains of these were the rule, and a procession of 18 or 20 cars, crowded with some 1,800 passengers on highdays and holidays made a truly remarkable sight. There were two classes of accommodation; the first-class cars ran on bogies but the second-class vehicles were four-wheelers. There were no continuous brakes on the trains but most vehicles had a hand-brake. An unusual feature for tramcars was that the end entrances were both on one side;

(*Continued on page 190*)

A Self-winding Tower Clock

By T. R. Robinson, F.B.H.I.

EVER since the first large tower clocks were made, many centuries ago, the power to drive their wheelwork has been obtained from the slow descent of heavy weights. Even to-day weights still provide the best form of drive for a large clock. At the same time, clock weights of the usual kind are not only cumbersome and dangerous, but also provide a lot of hard work for the clockwinder. Now electric motors are being used to wind such clocks up automatically.



The movement of the War Memorial Clock, All Saint's Church, Tooting, the driving weight of which is wound up automatically by the electric motor seen on the right.

Most modern tower clocks are made on this "self-winding" principle, and an example of particular interest has recently been installed in the tower of All Saints Church, Tooting, London S.W., where it forms the War Memorial of the parish. This has been constructed to operate the hands of two 6 ft. dials, but has sufficient power in reserve to deal with a third dial that is to be added later. It strikes the hours on the large tenor bell of the church. The striking part of the clock is of the direct motor-driven type, and therefore requires no driving weight.

The new clock is of unit construction, and consists of two main portions, the timekeeping and striking mechanisms. The former resembles that of the usual hand-wound clock, and has the normal train of wheels and pinions, except that the large "main-wheel," the barrel on which the weight line is coiled and the winding ratchet assembly are omitted. Instead the driving weight, which is relatively small and light, drives what would usually be the second spindle of the train. This weight is hung on one loop of an endless length of Renold chain that engages with a sprocket attached to the spindle, and also with another sprocket that can be rotated by an electric motor operating through a worm-reduction gear.

The operation of the winding motor switch is controlled by a vertically mounted trip-bar, which slides vertically in guides attached to the clock frame. This bar is attached at its lower end to the sheave of the driving weight sprocket, and so rises and falls with the weight. At set points on the trip-bar are two small rollers, and between them is the end of a lever attached to a rocker actuating the switch. When the going of the clock allows the weight to descend to its lowest normal position the upper roller depresses the rocker-lever and trips the switch, so starting the winding motor. This raises the weight, and with it the trip-bar. After a preset interval the lower roller is brought up against the underside of the lever, which is moved upward, switching off the motor at the point where the weight is fully wound. The arrangement of the endless chain allows the winding action to proceed without in any way affecting the going of the timekeeping part of the clock.

The design of the dials and hands was given special care, for the clock can be seen for a considerable distance. The numerals were kept narrow, and the hands were made heavy, but of sharply contrasting form. The result has been particularly successful.

The clock was constructed and erected in the tower by Chas. H. Potts, Leeds, and the consulting architect was Leslie T. Moore, F.R.I.B.A. Since it was set going, it has proved itself very accurate.

The Development of the Rotorplane

Jules Verne's Idea Seventy Years Ago

By C. G. Grey
Founder of "The Aeroplane" in 1911, Editor till 1939
Editor of "All the World's Aircraft" 1915-1941

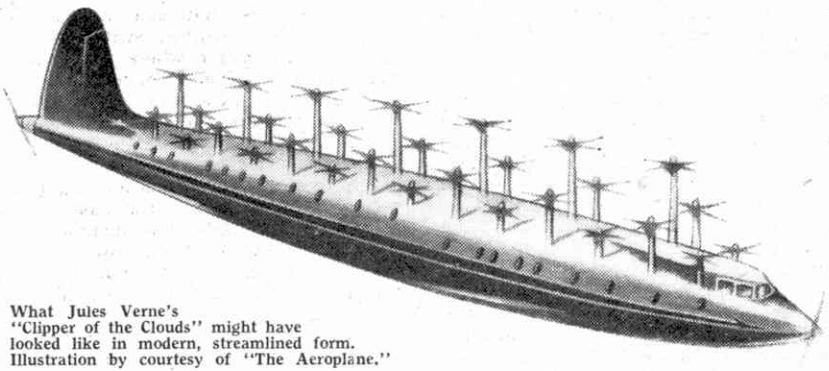
EVERYBODY who understands the needs and the possibilities of Air Transport will agree that it cannot achieve its best results, or its highest efficiency, until the Rotorplane is fully developed, more especially in the form of the Rotorbus and the Rotortaxi. Nobody expects jet driven air liners, travelling in the ordinary way at 600 m.p.h. or more, to land in the middle of a town, any more than one expects an express train running on a line which passes one's door to stop and let one out. The train goes on to the terminus and one takes a taxi or a bus back to one's destination. And even then one may have to walk to or back from the bus-stop.

The present air transport regulations make even a worse job of it than that. One arrives at the airport, which may be 10 or 15 miles from the airline terminal in the city. One gets into an airline bus which takes one to the airline office, and even if the bus passes one's door the driver is not allowed, by the police, to stop and let one get down, because an airline bus is not a hackney carriage. A friend of mine who flies a lot habitually gets taken from London Airport past his house to Airways House, by Victoria Station, and has to take a train or a bus back over the same route.

People who live on (or under) an air route, as I do, if they go by air see their own town or village passing under them, then have the journey from the airport to the airline terminus, and then have the journey by rail or road perhaps 25 or 100 miles to get home. That is all wrong.

What we need are rotorbuses from the main airports to small landing grounds at any town within 100 or 150 miles, and rotortaxis for those who can afford them. And the law must allow people to club together for these rotortaxi fares. Do you know that if two or three people agree to share the cost of hiring an aeroplane, or a hackney carriage on the road, or even a taxi, the Law can prosecute them, *and has done so*, because each one is hiring a *part* of the vehicle from the other without a license "to ply for hire or reward"? And the Law can pursue the driver and owner too, for sub-letting the vehicle without license. Truly the Law is an Ass.

Then there is the problem of producing rotorplanes which are fit to carry a load of passengers safely over thickly inhabited (built-up) areas. Many aeroplanes have flown over built-up areas in the past and few have come down on buildings. Still more wonderful is that when crews of warplanes (in all countries) have baled



What Jules Verne's "Clipper of the Clouds" might have looked like in modern, streamlined form. Illustration by courtesy of "The Aeroplane."

out by parachute, and left the machines to crash, so few have smashed houses. But when we develop our rotorplanes we shall need to be still more careful—because an aeroplane is so much faster that the pilot, unless compelled by fire or breakage to bale out, can generally "stretch his glide" to an open space.

In the early days of aeroplanes, and I was in the earliest, we could see what aeroplanes would be able to do, and would have to do, years ahead. We talked of gas turbines at Brooklands in 1910, but knew that there was as yet no metal to make turbine-blades to stand up to the heat. And we talked of 250 miles an hour. As early as 1914 a German aeroplane had flown for 24 hours non-stop, and another had flown 1,000 miles non-stop with a passenger. So you see, we were looking ahead, just as to-day we must look ahead in the development of rotorplanes.

Here I plead for the common use of the words rotorplane, rotorbus, rotortaxi, rotorcar, instead of the pseudo-scientific word helicopter. So long as we used the words "automobile" and "horseless carriage" we were struggling with elementary problems. When we came to plain "car" or "motor" we knew we had developed the vehicle we wanted. Likewise, while we talked of "flying machines" and "aerocars" and other queer names we were only starting the flying game. But when we got to "aircraft" and "aeroplane" and "biplane" and "monoplane" we knew we were getting near our object. So, when we habitually talk of a rotorbus, as we do of a motorbus, we shall know that the rotorplane has arrived.

What shape is it going to take? Obviously it will not have only one engine, any more than we would be satisfied with one cylinder in a car, or one engine in an airliner. There was a time when we carried 10 or 12 passengers across the Channel and over mountains with one engine. But the twin-engined bombers of the War 1914–18 soon showed the folly of one engine. And the four-engined bombers of 1939–45 showed how a big machine could lose an engine or two and still get home.

Much the same line of development must take place in rotorplanes. The existing rotors, which "feather" their blades so that the pilot can bring them down safely like the old Autogyro if the engine stops, are most ingeniously designed. I discussed this some years ago with Dan Kellett, who is one of the leading authorities on rotorplanes in the U.S.A. He said: "We have all the aerodynamics of it whipped. It is now (for the next 10 years) an engineering problem." And one fact that engineers have to face is that the best of design and material breaks, at some time or another. And they have to provide against it.

"Above the deck rose thirty-seven vertical axes." From "The Clipper of the Clouds" by Jules Verne, published by Sampson Low, Marston and Co. Ltd. Illustration by courtesy of "The Aeroplane."

Airscrews (propellers) fly off aeroplanes, but seldom do much damage, and the machine glides down on its wings. If a blade flies off a rotor, or if the whole rotor goes, there is nothing to hold the machine up. So what? Quite simply the answer is—Have more rotors.

But how? Rotors cover a lot of space. Two, one above the other, don't help much. If one goes it will probably take the other with it.

Putting one rotor at each end of a long hull cannot help, because if one goes, the other cannot hold the machine up by one end. Arranging the rotors on a triangular or quadrilateral frame can hardly be right, for if one rotor or its shaft breaks that corner must drop.

So the only sound method seems to be to have four, or (Continued on page 190)

How the Oil Pipeline Grew

By T. Holloway

THE news that the £50-million, 1,067-mile pipeline linking the Saudi Arabian oilfields with the Mediterranean will shortly come into operation serves to remind us of the tremendous advances made in pipeline transportation of oil during the present century.

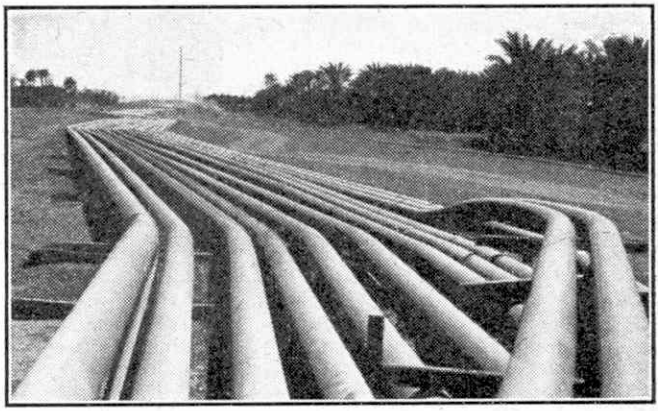
Actually, pipelines are nothing new, for 7,000 years ago the inventive Chinese were operating pipelines of bamboo or coiled grass to carry the natural gas given off from their brine wells. In the year B.C. 525 the first trans-desert pipeline made of sewn oxhides was built to the order of Cambyses, King of Persia, to supply water to his army invading Egypt. Greeks, Romans, Assyrians and Egyptians of early times all made use of pipes of clay or hollowed rock for conveying water.

Later, as the value of pipelines for preventing evaporation and contamination became more widely appreciated, pipes of stone, lead and hollowed-out tree trunks came into use. From the 16th century onward, when primitive types of pumping engines were developed, increasing use was made of pipes, so that by the 19th century pumped water pipelines were common practice.

What is believed to have been the first oil pipeline used by the oil industry was constructed in Pennsylvania in 1861, only two years after the successful completion of "Colonel" Drake's historic well. It was a 4-in. diameter pipe made of wood and extended for about six miles. Its construction was a remarkable engineering feat for those days. The first really successful pipeline, made of cast iron and about five miles long and 2 in. in diameter, was laid in the same oilfield in 1865. Steam pumps were employed to deliver about 250 tons of crude oil a day through this pipe.

Early pipelines were all *gathering* lines, conveying oil from a number of wells to a neighbouring refinery or railhead. In 1874 came a major development. This was the construction of the first trunk line, 60 miles in length, connecting the oilfields of Pennsylvania to Pittsburgh. Four years later another line over 100 miles in length was completed; this carried oil over the Alleghany Mountains.

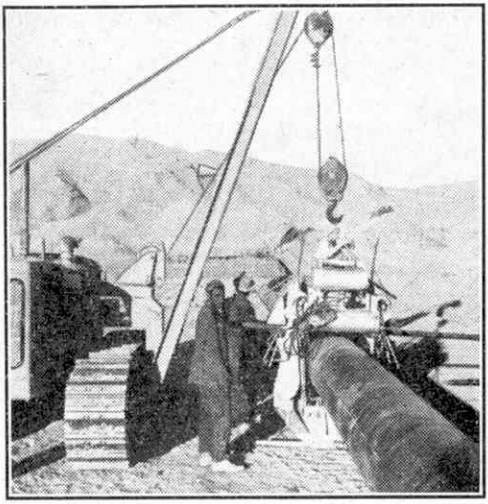
From then on progress was steady, and by 1900 about 18,000 miles of pipe, chiefly of cast iron, were in use in the United States. Ten years later, by which time steel had begun to replace iron, the total had risen to 40,000, and to-day America has something like 170,000 miles of oil pipelines, or sufficient to girdle the earth six times, as well as 250,000 miles used for conveying natural gas.



Pipelines from various oilfields entering the Abadan refinery area, Iran. The illustrations to this article are reproduced by courtesy of the Petroleum Information Bureau.

The planning of a long-distance trunk line is a gigantic undertaking, and often it is necessary to obtain concessions to build and operate from several governments. This has been the case with the Saudi Arabian line mentioned at the beginning of this article, for successive lengths of it lie in the countries of Saudi Arabia, Jordan, Syria and Lebanon.

In surveying the proposed route much use is now made of aerial photography to supplement ground survey methods. Natural obstacles are avoided as far as



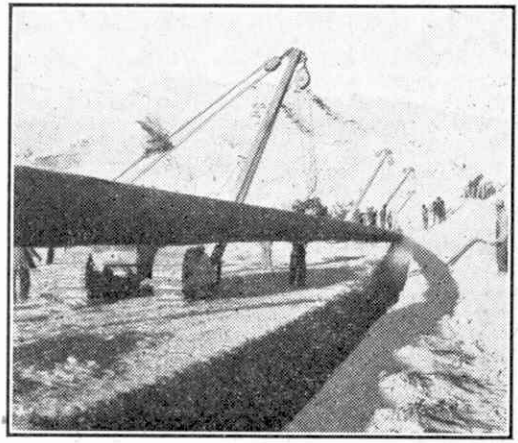
Special machines are used to clean, coat and prime the pipes. One of these is shown in action on a section of a pipeline in the Middle East.

possible, and to facilitate construction and maintenance the line is frequently laid alongside a main road. Where oilfields have been developed in isolated areas, such as Eastern Venezuela and New Guinea, the oil company is often faced with the task of constructing the road as well.

Modern pipelines are almost invariably constructed of steel and consist of a number of lengths of pipe, usually 30 to 40 ft. in length and varying in diameter from less than 6 in. to over 30 in. In the early days these lengths were taken to the site by horse transport and laboriously joined by tightening screwed joints with tongs before they were lowered into a hand-dug ditch. To-day the majority of pipes are welded together on the spot, an infinitely stronger, speedier and cheaper technique. When a new line was being laid recently, however, a new method was tried. The sections of pipe were assembled in dumps along the route and there welded into lengths of up to 480 ft. These lengths, each weighing 12 tons, were then towed to their final position by tractor and successively welded on to the existing line. It was found that this pre-fabrication method not only saved a great deal of time, but also enabled much of the work to be done by less experienced welders acting under supervision.

Pipelines are generally buried for convenience, although this is not always possible, and unless precautions are taken a line very soon becomes badly corroded. This results from the pipe being at an electrical potential different from that of the neighbouring soil. Where the soil is especially corrosive what is called "cathodic" protection may be resorted to. In this method a larger electrical current is passed in the reverse direction, so that the corrosive current is counteracted and the chemical reaction ceases. Other measures include wrapping the pipe in moisture-proof material, usually including a coating of bitumen or coal tar and one or more wrappings of bitumenised felt or glass fibre. The problem of corrosion is far from being completely solved, however, and at least one oil company has set up an experimental centre for its study.

One serious constructional problem that has had to be overcome is that of making allowance for the expansion and contraction of pipelines in those regions where temperatures fluctuate to a marked degree. "Staggering" is a method which is much in use. This means laying the line in a zig-zag formation, each straight section 200 ft. long being connected by a bend to the next. This gives alternate offsets of 6 ft. on either side of the centre line, a system that takes the rigidity out of



Lowering a pipeline into its trench.

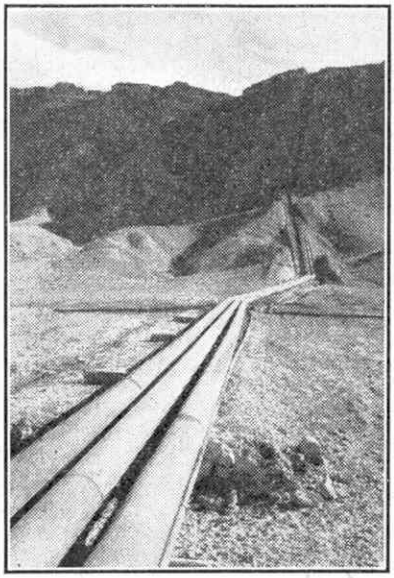
the pipe and permits expansion and contraction without excessive stress on joints.

During recent years great advances have been made in the mechanisation of pipeline construction. Special vehicles have been developed for transporting the pipe and handling it, for cutting the ditch into which it is to be lowered, for cleaning, bending and priming it, and for back-filling the completed ditch. This mechanisation has made possible constructional speeds of from one to two miles a day, even when pipes up to 30 in. in diameter are being laid. Some lines, up to 1,000 miles in length and including up to 20 pumping stations, have been completed in as little as two or three years.

One of the most recent constructional innovations was the laying of experimental pipelines of aluminium, weighing only a third as much as a steel pipe of the same size. Short lengths of this type of pipe have actually been strung from the air by means of a helicopter.

Although sometimes oil will flow through a pipe under the action of gravity alone, it normally requires "boosting" to keep it moving. The great trunk lines of America, as intricate as any freight railway network, are serviced by pumping stations where controls are as numerous as those of a main-line signal box. The power used for pumping may be steam, electric, diesel or gas turbines, depending upon local conditions.

In these stations operators manipulate valves to regulate the oil streaming through hundreds of miles of pipe, and to divert it to storage tank "farms," refineries or ports, in much the same way that a signalman switches a train to whatever siding, track or marshalling yard it is to go. Different consignments of different oils follow each other through the trunk routes like so many wagons in a goods train, but the pumping station operators can ensure delivery of each consignment as though it had a pipeline to itself.



A pipeline descends a steep ridge in Iran.

It is not generally known that as many as six different types of oil may be in transit along one pipe at the same time, each type following immediately behind its predecessor with no barrier interposed between them. Provided that oils are moved at a certain minimum speed, contamination of types is only very slight in comparison with the enormous quantity delivered. Most crude oils differ in gravity and the arrival of a new consignment at the delivery terminal can be detected by a change in the gravity of the flowing oil. In recent experiments, separate batches of oil have been successfully marked by inserting a radioactive tracing material between them, thus allowing rapid switching at the receiving end.

Many pumping stations also serve as bases for the pipeline repair crews, some even being equipped with their own swimming pools and other surprising amenities. The repair crews act as "flying squads" to give instant attention to any leak or fault in their section of the line, though actually serious leaks are rare occurrences these days.

Formerly all pipeline routes were patrolled entirely by "walkers," but to-day low-flying aircraft are being increasingly used to watch for discoloured ground, dying vegetation, and other tell-tale signs of oil leaks. Efficient communications all along the routes are essential in case of emergency or for routine operation. Where adequate telephonic communications do not exist, short-wave radio, including "walkie-talkie" sets, have been installed.

What are the capacities of pipelines? A 6-in. pipe can transport about half a million tons of oil a year, a 12-in. pipe about three million tons, and a 30-in. pipe about 24 million tons. The planned initial capacity of the new Trans-Arabian project is 15 million metric tons annually. This is equal to over 60 tankers of 16,765 deadweight tons in continual operation from the Persian Gulf to the Eastern Mediterranean.

R.M.S. "Pretoria Castle"

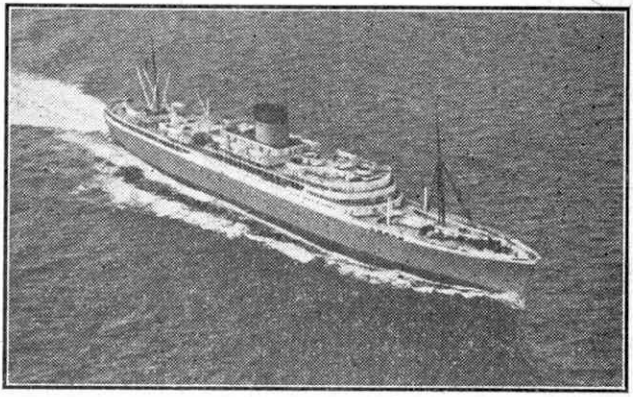
THE fine vessel seen on our cover this month is the Mail Steamship *"Pretoria Castle."* This is one of two sister vessels built and engined for the Union Castle Line by Harland and Wolf Ltd. in their yards at Belfast. She was launched in 1947, and her sister vessel *"Edinburgh Castle"* appeared in the following year. An interesting feature of the launch of the *"Pretoria Castle"* was that this was accomplished by radio by Mrs. Smuts, the wife of the late Field-Marshal Smuts, from her home at Irene, near Pretoria.

The Union Castle line was formed in 1900 by the amalgamation of the Union and Castle Lines. The first of these had been founded 47 years earlier under the title Union Steam Collier Company. It began modestly with a fleet of small steamers that later were employed as transports during the Crimean War, and afterwards ran for a time to Brazilian ports. Then the Company changed its name and secured a mail contract to the Cape. In the meantime the Castle Line had been founded by Sir Donald Currie, as he afterwards became. It first ran a service of sailing ships between Liverpool and Calcutta. Later steamers were built and with them it was decided to enter the South African business. These vessels were given the names of Castles and the practice has been followed since that time.

In more recent years the Union Castle Line has turned its attention to motor ships, and has produced many notable vessels of this type. The construction of *"Pretoria Castle"* and her sister ship marked a break in this policy, for both are fitted with Parsons geared steam turbine engines. They are twin screw vessels of over 28,000 tons, with an overall length of 749 ft. and a moulded breadth of 83 ft. 6 in.

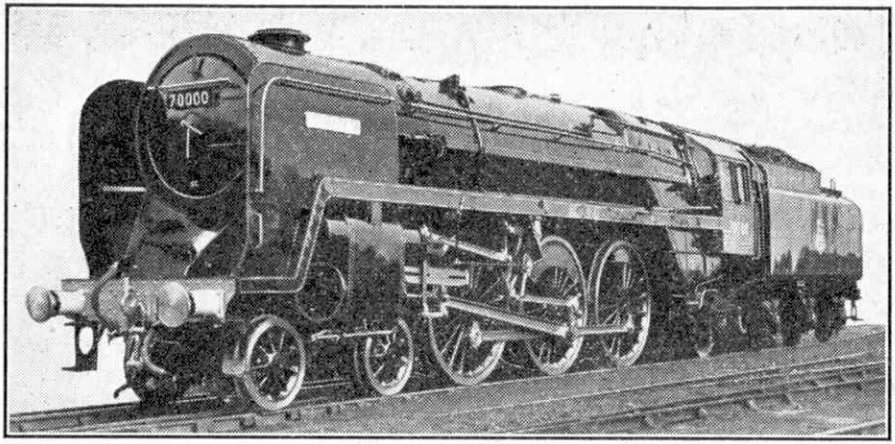
As our cover and the illustration of *"Pretoria Castle"* on this page show, this vessel is a handsome one, with a curved stem, a cruiser stern and a rounded bridge structure. She has two masts, and one feature that readily distinguishes her from the motor vessels of the fleet is her taller and more fully streamlined funnel. She has spacious and comfortable accommodation for 227 first class and 478 cabin class passengers. Her crew's quarters are in accord with the latest requirements, including a library, a recreation room and canteens. Electric heating has been installed throughout, and every member of the crew is provided with an interior spring mattress.

The twin screws of *"Pretoria Castle"* are driven by means of a two-shaft arrangement of Parsons triple expansion double reduction geared turbines. The ahead turbines are of all-reaction design, while the high pressure and intermediate pressure astern turbines are of the impulse type. Steam for the engines is given by three oil-fired Babcock and Wilcox boilers, each of which gives an output of 80,000 lb. of steam an hour, for a ship speed of 21 knots. The working pressure in the steam drum is 650 lb. per square inch, and the final pressure and temperature of the steam at the superheater outlet are 600 lb. per square inch and 850 deg. F.



The Union Castle liner "Pretoria Castle" seen from above. This handsome oil-burning vessel is propelled by Parsons steam turbines.

We are indebted to The Union Castle Steamship Co. Ltd. for the information contained in this article, and for assistance in the preparation of the cover illustration of this issue.



The First British Standard Locomotive

THE photograph on this page shows the first of the eagerly-awaited British Railways standard locomotives, No. 70000, appropriately named *"Britannia."* This represents one of the six standard types to be introduced this year as a step towards the reduction of the total number of locomotive designs in use. Existing steam locomotives in B.R. service—nearly 20,000 of them—cover a range of some 400 different designs, each developed to suit the particular needs of its former owners. It is proposed ultimately to provide a total of some 12 standard designs embodying the latest progress in locomotive practice which will do the same or heavier work at less cost, and be capable of being used on a much greater range of duties.

LEADING DIMENSIONS OF B.R. 4-6-2 "BRITANNIA"

Cylinders (2)	20 in. by 28 in.
Coupled Wheel diameter	6 ft. 2 in.
Heating Surface—	
Tubes	2,264 sq. ft.
Fire-box	210 sq. ft.
Superheater	718 sq. ft.
Grate area	42 sq. ft.
Working pressure	250 lb. per sq. in.
Tractive effort	32,150 lb.
Engine weight in working order	94 tons
Tender weight in working order	47 tons 4 cwts.
Coal capacity of tender	7 tons
Water capacity	4,250 gallons

No. 70000, an imposing "Pacific" or 4–6–2 for main line express passenger or fast freight service, represents a composite effort on the part of the various Regional drawing offices. Derby has been the parent establishment of the design and the engine was built at Crewe; but important sections were designed at Brighton, Doncaster and Swindon respectively. Twenty-five of the "Britannia" class are to be built this year, the first 15 for Eastern Region duties and the remainder for Western service. The regular running of "Pacifics" on Western Region metals will be something of a novelty, for, apart from the one and only Swindon "Pacific" No. 111 *"The Great Bear,"* long since converted to a "Castle," 4–6–0s have been the mainstay for Western passenger and fast freight duties for many years.

In the design special attention has been paid to simplicity and to the accessibility of all parts, thus making the locomotive as easy as possible to construct, maintain and repair. Although simple and straightforward, *"Britannia"* has escaped stark utility in her outlines and looks well in her green livery. The engine has two outside cylinders only, unlike all previous British "Pacific" tender engines which have been of three- or four-cylinder types. Piston valves of large diameter, with a long travel for efficient working,

control the steam distribution, and these are operated by means of Walschaerts valve motion.

The main frames are of the usual British plate type, substantially braced, and they are set closer together than has been the usual practice hitherto. The axlebox guides are welded to the frame plates. All axleboxes of engine and tender are of the rolling bearing pattern.

The boiler is large and in its two-ring barrel resembles that of the large Gresley engines of the former L.N.E.R., as the first ring has parallel sides but the second ring is coned. A Belpaire type of fire-box with a wide grate is provided and the fire-box backplate resembles that of a Bullied Southern "Pacific" with its pronounced degree of slope. The front of the fire-box is extended into the barrel to form a combustion chamber.

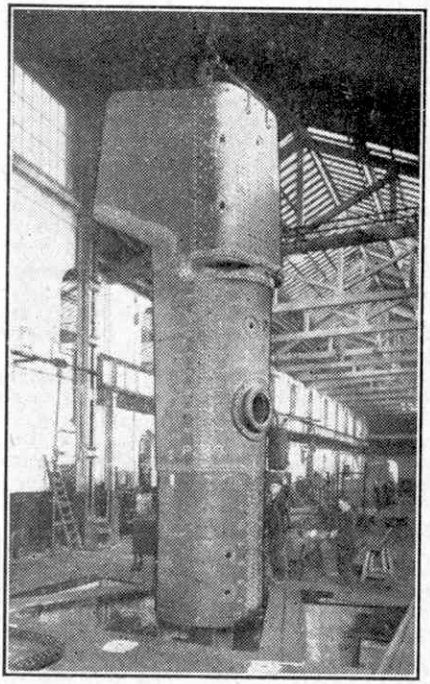
Steam is taken from the dome, which contains a centrifugal dryer to separate the water from the steam before it enters the steam pipe. This increases the dryness of the steam before it passes to the 40-element superheater. A multiple-valve regulator is located in the superheater header in the smoke-box. The regulator valves are worked from the cab through external rodding carried along the boiler above the handrail.

Water enters the boiler through two separate clack valves placed approximately 30 degrees on each side of the vertical centre line of the boiler. One of these clacks is shown in the photograph on page 156. A steam manifold supplying steam for various fittings is placed on top of the fire-box in front of the cab and is provided with a shut-off cock to each steam supply pipe leading from it. There is in addition a main shut-off valve that is operated from inside the cab. Two direct-loaded safety valves are mounted on the boiler barrel immediately behind the dome.

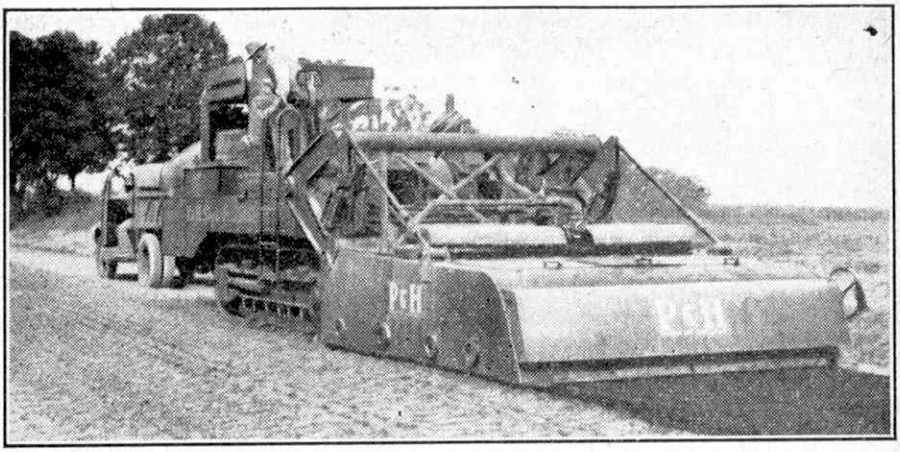
A rocking grate is provided and it is so arranged that it can be used for dropping the fire over the ashpit, or for shaking it up in order to disturb any clinker or ash when the engine is on the road. The ashpan has three hoppers with bottom doors that can be operated by a lever at ground level. The front dampers on each hopper are operated from a hand wheel in the cab which allows fine adjustment to the air opening to be obtained.

The smoke-box, which is flanked externally by smoke deflector plates carrying the engine's name, is of the self-cleaning type. Inside are plates and a wire mesh grid to prevent the accumulation of ash in the smoke-box when the engine is working. On the outside of the smoke-box on the right-hand side is mounted the chime whistle operated from the cab by flexible cable running through the handrail.

The cab arrangement has been the subject of special study, and readers will no doubt recall the "mock-up" cab, constructed late in 1949, on which criticisms and suggestions were invited from locomotive men in order to discover the best possible layout. The cab is not carried on the main frames but by supports attached to the fire-box backplate and by a diaphragm plate at the drag box. This allows full freedom for the cab to move with the boiler as expansion of the latter takes place when in steam. Similarly all boiler fittings and pipes are kept free from the main frames in order to avoid differences in expansion and possible fractures. The cab footplate is carried right back to the tender front. There is thus a solid floor for the enginemen to work on, there (*Continued on page 190*)



The boiler of "Britannia" in course of riveting. British Railways Official Photographs.



The P. and H. Single Pass Stabiliser, which converts a soil track into a road in one operation. Photograph by courtesy of the Harnischfeger Corporation, Milwaukee, and Benson and Partners Ltd., London.

A Giant Road Making Machine

By J. Salter

THE huge machine shown in the illustration at the head of this page has been introduced in the United States for making roads by mixing cement or some other stabilising agent with the soil over which it runs. It digs out the soil, adds the necessary proportion of cement or other stabilising agent employed, mixes the two and places the mixture in position on the road. All this is done in one combined operation by the giant machine as it rolls along, and because of this it is known as the Single Pass Stabiliser.

Quite passable roads can be formed of most types of soil in this way. It has been found that the amount of moisture in the soil plays an important part in deciding whether a road formed from it will stand up to traffic. Some soils require to be in a very dry state to be stable. On the other hand such a material as sand must be in a damp state to form a good surface, for it will not support the weight of a man when it is very dry.

To stabilise soil, and to keep its water content at the most suitable value when making roads of the kind under consideration, asphalt, bitumen or cement is added to it. These agents act in different ways. Thus cement forms a new material known as soil cement, while bitumen has a waterproofing effect, but possesses no binding properties. In all cases a wearing coat must be applied to take the friction of car wheels. This may take the form of tar spraying.

For this method of forming reasonably good roads a whole range of special road making machinery has been introduced. The P. and H. Single Pass Stabiliser illustrated is by far the most interesting of these, for it combines most of the operations previously carried out by different machines and yet is controlled by one man.

The mixing chamber, which can be raised and lowered hydraulically, is hauled by a crawler track vehicle. A cutting rotor immediately behind the track cuts out the soil to any desired depth and throws it backward while the liquid stabiliser is injected into it from above. Behind the blending rotor are two rotating pug mills. The blades of these turn in opposite directions, so that the material is thoroughly rubbed and squeezed together before it is laid down again. An adjustable gate is fitted so that the stabilised soil can be laid down at the desired level. All that remains then is consolidation by rolling.

Cement is not a liquid, so that when it is used as a stabiliser it cannot be sprayed into the soil in the machine. In this case therefore the stabiliser is added by simply spreading it to the required thickness over the area that is to be converted, and the liquid added in the machine is just water.

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.

"THE BOOK OF FLAGS"

By Vice-Admiral Gordon Campbell, V.C., D.S.O.
and
I. O. Evans, F.R.G.S.
(Oxford University Press. 15/-)

We are all interested in flags. We fly them to express our pleasure in victories, our loyalty and sense of patriotic duty, and generally when we wish to mark some important event or to give expression to our feelings.

A piece of coloured cloth fluttering in the beeeze is always impressive and stirring, so it is not surprising that the use of flags for purposes of this kind is as old as history. Streamers with images and badges borne on poles were used by the peoples of ancient civilisations, and in the thousands of years since they were introduced a vast amount of tradition has gathered around the design and use of flags.

Whole books indeed have been written about flags, and here is an excellent one that combines clear descriptions and illustrations of them with much of their romance. It is concisely written, but nevertheless is entertaining as well as instructive. A subject of this kind clearly requires ample illustration in colour as well as in black and white, and the authors have seen to it that their account is not lacking in this respect, for there are 15 full page colour plates and hundreds of illustrations in black and white in the text.

The book begins with a chapter on flags and their meaning, and then turns to the flags themselves. Naturally the Royal Standard takes the lead, and the full story is told of the development of this magnificent flag, the King's official banner, which flies above any building he enters or any ship he boards. Then we turn to the national flags of the British Isles, those of the Services and the Merchant Navy, official flags, and those of our counties, cities and towns.

From our islands we go farther afield, turning first to the flags of the Empire and their history. The book is completed by the stories of the flags of the United States and of other countries of the world, and of those used in signalling and for international purposes. Appendices give the days on which flags should be flown on Government buildings and the rules for hoisting them.

"BRITISH RAILWAYS LOCOMOTIVE REFERENCE" (1-39999)

(Christian and Sykes. 2/-)

This is the second edition of a useful reference book covering chiefly locomotive stock of the Western and Southern Regions of British Railways. Complete classified lists of the engines are given, together with the depots to which they are attached. The details generally are correct up to November 1950 and, as usual with British Locomotive Society publications, space is left for notes by purchasers. Named engines of the Regions concerned are listed separately, class by class. Also included are odd named engines of both Regions, such as the Southern Dock tanks and certain Western engines of Welsh origin.

The range covered by the book means that numbers of diesel, gas-turbine and electric locomotives of all Regions as well as diesel railcars are to be found here. In addition, electric multiple-unit motor vehicles of the various Eastern, London Midland and Southern electrifications in different districts find their place in the book, and there is a list of depots where electric trains are stabled and serviced.

Copies of the book can be obtained for 2/3, including postage, from Mr. R. P. Sykes, 42, Coombe Road, Handsworth, Birmingham 20.

"THE NATURE LOVER'S COMPANION"

(Odhams Press. 10/6)

Five authors have combined to produce this delightful boys' nature book, and they have had the help of many artists in producing the very large number of illustrations, many of them in colour, that introduce the reader to life in the British countryside. The story is told clearly, and wherever he turns in the book the reader will find accurate and concise information of the greatest interest on its soil, the trees and plants that grow in it and the wild creatures of field and forest.

The book is of large size, with over 250 pages, and is well arranged. It begins with the story of nature and the landscape, in which we learn how we have got our soil, and how the efforts of cultivators since the days of the Romans have transformed the country into one of the richest farming areas in the World. Then we turn to birds and their nests, a section that is full of fascinating details of the lives and habits of both land and sea birds.

Our wild animals come next, followed by our trees and wild flowers. There is an attractive article on work on the farm, which for many readers will throw new light on the varied activities of our countryside; and then in turn we read about insect life, butterflies and moths, and the teeming life of ponds and rivers. Excellent accounts of the help clouds can give us in foretelling weather, and of the strange forms of life to be seen on the seashore, complete a handsome volume. A good index enables readers to look up notes on plants or animals in which they may be interested at any moment.

"DANGEROUS ASSIGNMENT"

By Peter Blythe (Hennel Locke. 6/-)

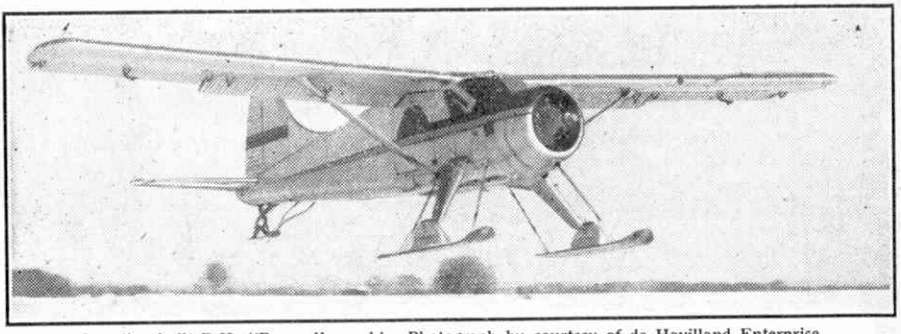
The scene of this story of adventure is the Middle East. Its heroes are in Cairo, waiting to begin a motor car trip to Cape Town, when by accident they rescue a boy who has been kidnapped. This leads them right into the middle of an intense struggle between Secret Service agents and crooks who are trying to bring about civil war in the Middle East for their own personal advantage. An exciting chase follows, first to Alexandria and then to Haifa and wild country in Israel. Our heroes are often in difficulties, from which they extricate themselves by their courage and ingenuity, and in the end the schemes of the plotters are foiled.

"BRITISH MOTOR CYCLES"

Edited by J. B. Ashby and D. J. Angier
(Pentagon Publications. 7/6)

This complete picture of British motor cycle production, the first that has appeared since the war, will be given a cordial welcome. In it the ranges of models produced by some 33 manufacturers are described and illustrated, with notes on their history and in many cases on racing achievements in the Isle of Man or on the Continent. Ample use is made of illustrations, reproduced from nearly 100 photographs of the latest models, and the greatest care has been taken throughout to make certain that every detail is authentic.

The machines are dealt with in alphabetical order, beginning with the A.J.S. and finishing with the production of the Vincent H.R.D. Co., makers of the fastest standard motor cycle in the World. All the great names of motor cycling are well represented, among them B.S.A., Douglas, Matchless, Norton, Scott, Triumph and Velocette, and there are also details of the modern low powered machines that have become so popular in recent years.



Canadian-built D.H. "Beaver" on skis. Photograph by courtesy of de Havilland Enterprise.

Air News

By John W. R. Taylor

"Beavers" for the U.S. Air Force

The U.S. Air Force have bought two Canadian-built de Havilland "Beavers" for operation in Alaska. To do so they had to use emergency provisions to overcome the 1933 "Buy American Act," which provides that the U.S. Government should purchase for public use only products manufactured in the United States from U.S. raw materials. The U.S. Army too is interested in the "Beaver," one of which has been entered in their competition for a new liaison aircraft, and it is reported that they have already ordered an initial batch of four "Beavers" in anticipation of the result.

More than 100 "Beavers" have been built so far by de Havilland (Canada) Ltd. Designed originally for Canadian "bush" operations, they are in service from the Arctic to Africa, where they are doing good work with Central African Airways. With a full load of seven passengers, they can take off in only 795 ft., and can be operated on wheels, skis or floats.

America's First Jet Liner

Britain's 2½-year lead in the development of jet-propelled air liners was challenged by America for the first time on 29th December last, when the new Allison "Turbo-liner" made its first flight at San Diego, California. Exactly five months earlier, the Vickers "Viscount" propjet-powered air liner had been introduced experimentally on B.E.A.'s passenger service to Paris; but it is important to bear in mind that the "Viscount" is not due to enter regular service with B.E.A. until mid-1952. As the "Turbo-liner" is simply a propjet-powered version of the "Convairliner" it too could probably be pressed into service by then.

As can be seen in the illustration below, the installation of two 2,750 h.p. Allison 501 propjets has enhanced the already fine lines of the "Convairliner," and the extra 700 h.p. should ensure a corresponding improvement in performance. But these benefits will not yet be experienced by American passengers. The "Turbo-liner" has been modified by the Allison Division of General Motors purely as a research aircraft to test their jet engines, and is equipped as a cargo 'plane, with only eight passenger seats in the forward part of its cabin. If it fulfils expectations, however, there seems little reason why the 200 "Convairliners" in service with 15 U.S. and foreign airlines should not be converted into "Turbo-liners."

Saunders-Roe to Build Helicopters

Saunders-Roe Ltd. have taken over development of all current types of Cierva helicopters, including the giant single and twin-engined "Air Horse" and the little two-seat "Skeeter." A number of Cierva design, engineering and flight personnel have transferred to Saunders-Roe, but the Cierva Autogiro Company itself will continue on helicopter research.

* * * *

Under the defence programme, the Bristol Aeroplane Company are building de Havilland "Venom" jet fighters, in addition to their long-term work on guided missiles. The Bristol Engine Division is to build Rolls-Royce "Avon" engines for use in "Canberra" bombers.

* * * *

To hasten re-equipment of the Belgian Air Force, Gloster Aircraft have licensed Fairey's to start immediate production of the "Meteor" 8 in the Avions Fairey works at Gosselies, near Charleroi, Belgium.

The "Turbo-liner," first U.S. jet air liner. Photograph by courtesy of Consolidated Vultee Aircraft Corp., U.S.A.

The four-jet Avro "Ashton," designed as a flying laboratory for high-speed, high-altitude flight research. Photograph by courtesy of A. V. Roe and Co. Ltd.

Another Car Ferry

Following the success of Silver City Airways' cross-Channel car ferry service between Lympne and Le Touquet, Air Malta Ltd. have inaugurated similar services from Malta to Tunis and Sicily. Like the British company, they are using a Bristol "Freighter" for the job.

The first car to fly on the Tunisian service, which is operated on a charter basis, was an urgently needed military vehicle, which reached Tunis 105 min. after take-off at Luqa Airport, Malta. It could easily have taken a month by sea. The ferry service to Sicily is run regularly once a week, on Saturdays, the fare of £36 for the 120-mile trip covering transport of the car and four passengers. Between times, the "Freighter" is used for cargo and passenger work, with up to 45 seats, between Malta, Catania, Tunis, Palermo, Naples and Rome.

The Avro "Ashton"

The big four-jet Avro "Ashton," illustrated above, has been designed specifically as a flying laboratory to study the problems of high-speed, high-altitude flying. In the past such research has had to be done mainly with jet fighters, in which it is impossible to instal and inspect a very wide range of flight record instruments. The "Ashton," on the other hand, is large enough to hold all the instruments likely to be needed, and its pressurised cabin makes it possible for engineers to stay aloft for long periods in comfort.

The "Ashton" is a development of the "Tudor," powered by four Rolls-Royce "Nene" turbojets, and has a wing span of 120 ft. The Ministry of Supply have ordered six, and undoubtedly they will play a major part in guiding future trends in jet air liner and bomber design.

Bombing at 500 m.p.h.

Heavy bombs have been dropped safely and accurately at speeds over 500 m.p.h. for the first time, from a North American B-45 "Tornado" four-jet medium bomber of the U.S.A.F. Prior to these tests the highest speeds at which bombs had been dropped successfully from an operational aircraft were the 350 to 400 m.p.h. standards of World War II.

The problem of air turbulence, which causes bombs to climb and tumble, was overcome in the B-45 by folding or overlapping bomb bay doors, which slide upward inside the 'plane and so permit the bombs to fall almost directly into the airstream. As many as 27 bombs were dropped at a time, and the tests proved that whereas small bombs tumbled and fell erratically at speeds exceeding 350 m.p.h., heavy bombs weighing from 500 to 4,000 lb. can be dropped successfully at over 500 m.p.h. and at altitudes up to 20,000 ft.

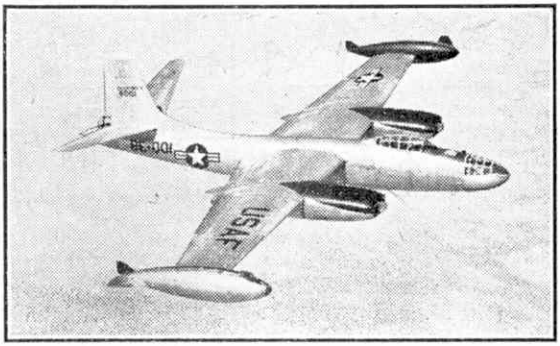
The B-45 will carry over 10 tons of bombs, has a service ceiling of over 40,000 ft. and a combat radius of more than 800 miles, which can be extended by the use of external drop tanks as shown in the lower illustration on this page. Each of these tanks is as big as a large saloon car.

Seeding by Air

The U.S. Government have started seeding grass from the air over 15,000 acres of land in the "dust bowl" of Kansas, in an effort to reclaim it for agricultural use. Overall cost per acre is just over $1, which covers the cost of the aircraft, seed, labour and roughing up the land to kill sagebush and weeds and provide a bed for seeding.

The Canadian-built "Sabre"

The first Canadian-built "Sabre" jet fighter came off the assembly line at Canadair's Montreal factory on 21st January last. This particular machine has an American engine, but future Canadian production "Sabres" will be powered by Avro Canada "Orenda" turbojets, which are among the most powerful in the world. Some R.A.F. squadrons may be re-equipped with "Orenda-Sabres" as a stop-gap until powerful new British fighters, now secret, are ready for service.

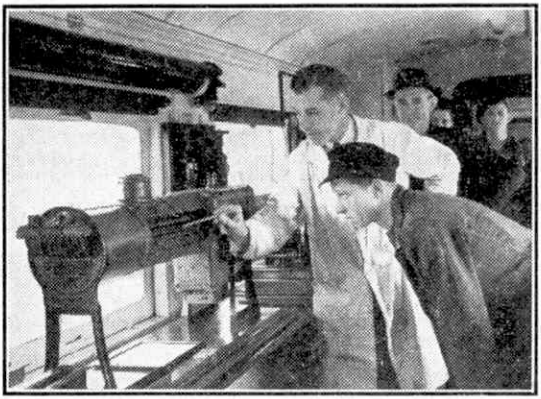


B-45C "Tornado" four-jet medium bomber of the U.S.A.F. It is a "wing tip tank" version of the B-45. Photograph by courtesy of North American Aviation, Inc., U.S.A.

B.R. Locomotive Instruction Trains

By C. H. Hewison, A.M.I.C.E.

MOST "*M.M.*" readers know that many years of experience are necessary before a man can become an engine driver. The men entrusted with the driving of locomotives start their careers when about sixteen as engine cleaners, being promoted to firemen, and after years of firing, to drivers, provided they pass the necessary tests.



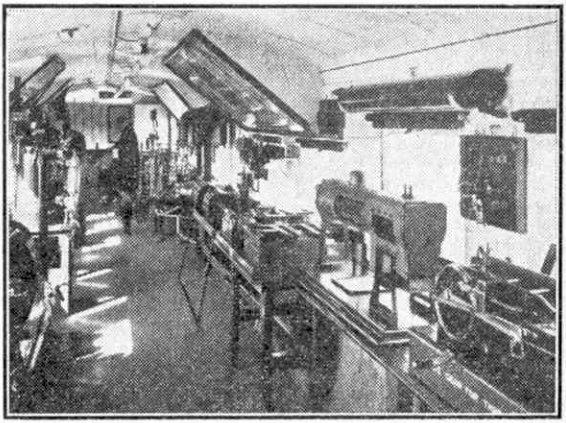
An Eastern Region Locomotive Instructor showing how the superheater flues and element tubes are arranged in the special cut-away model of a locomotive boiler and fire-box. British Railways Official Photographs.

A driver has to be familiar with every part of the various types of engines he is likely to have to work. He has to know all the rules about signals, shunting and the management of engines, and he has a vast number of instructions to bear constantly in mind.

To help engine drivers and firemen to refresh their knowledge special Instruction Trains are sent from one motive power depot to another, and the photographs show what these British Railways Instruction Trains look like inside. The train employed in the Eastern and North Eastern Regions consists of two large coaches filled with models and specimens of locomotive fittings. There is hardly a part of a locomotive that is not represented.

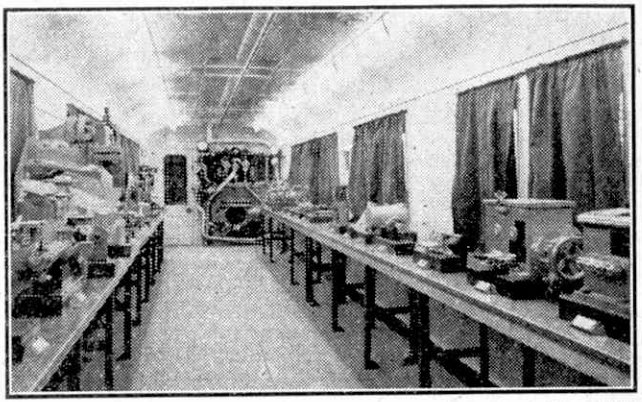
One coach is arranged as a lecture room where about 30 men can be seated to hear lectures given by an Instructor thoroughly experienced in locomotive work. Arranged along the sides of this coach is a display of engine lubricators and all kinds of boiler fittings and mountings. There are many different types of lubricators, consisting usually of containers or vessels which are filled up with oil and feed it gradually to the steam chests, cylinders, axleboxes and other parts.

The boiler fittings include water gauges for telling the engine driver how full his boiler is, about ten different types of injectors, and two full-size engine regulator valves. Injectors are for refilling the engine boiler while steam is up; they are worked by steam and certain types can, when the engine is running, use exhaust steam that would otherwise go up the chimney. The regulator valve which controls the flow of steam from the boiler to the cylinders is fitted, as a rule, inside the boiler dome and is controlled by the driver who operates the regulator handle



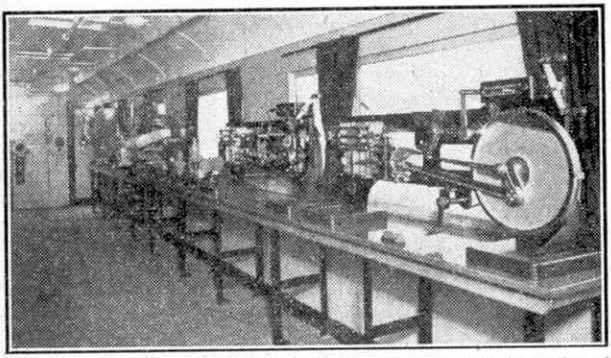
A typical instruction coach scene showing the variety of models and actual appliances displayed.

situated in the cab. There are several scale models of different types of valve gear. Valve gears are the rather complicated systems of rods and levers between the frames under the locomotive boilers or else outside the wheels. They control the flow of steam in and out of the cylinders and determine the direction of the engine, forward or backward. Valve gears are studied very closely by engine drivers, as no engine runs well with faulty or inaccurate valves.



A boiler end with cab fittings is a feature at the far end of this L.M.R. instruction car.

Most of the exhibits in the second coach illustrate the vacuum, Westinghouse and steam brakes that are fitted to engines and rolling stock. Brakes are worked by pistons inside cylinders and the principle of the vacuum brake system is that the air is extracted from the entire cylinder and the brake put on by allowing the air to flow back under the piston and push it up. The Westinghouse brake is worked by compressed air flowing into the cylinder and pushing the piston down. Many modern engines have steam brakes, those which work passenger trains also having equipment for controlling the vacuum brakes on the carriages.



Locomotive valve gear models such as those shown here allow the action of the motion at different positions of the reversing screw to be studied.

Various types of vacuum ejectors, the fittings drivers use to control the brakes, are to be seen in the Train, several brake cylinders and a variety of smaller details. There are also working demonstration outfits of both types of air brakes, and drivers can be shown how the movement of the application handles in their cabs puts the brakes on and releases them, and how defects that sometimes occur can be overcome.

Other exhibits include a scale model boiler, used chiefly for showing young firemen how boilers are constructed and put together, and a pair of model carriage frames with buffers and automatic couplers.

The models are painted in vivid colours with brass parts kept brightly polished and most of them are sectioned or have parts cut away so that internal details can be clearly seen.

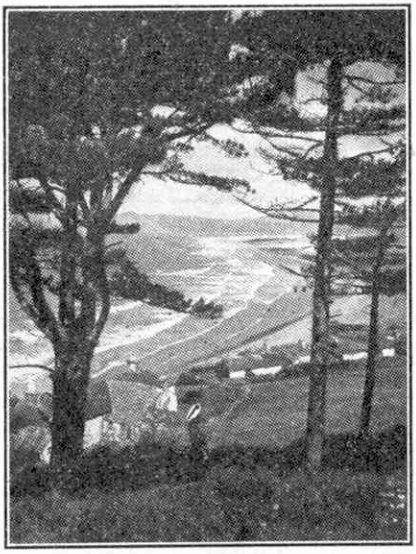
There is a small office on the Train where the Instructor can prepare his lectures and make drawings and diagrams. When the Train arrives at a motive power depot a convenient siding is found for it, steps are put down and the staff can then inspect and study the exhibits, ask the Instructor practical questions and attend the lectures given during the day. At a small depot the Train may remain two or three days, at large places nearly a fortnight. The district toured by the Train described extends from London to Berwick-on-Tweed.

Wild Life in South-Western Ireland

By L. Hugh Newman, F.R.E.S.

SOUTH-WESTERN Ireland is wild and beautiful, but its soil is poor and shallow. The few emerald fields of grain are precious indeed, their bright spring green surrounded by thick walls of grey stone in a landscape that is bleak and brown close at hand, and tones of purple, blue and pearly grey in the distance. The Atlantic bays stretch far inland and form wonderful natural harbours between the rolling mountains. The coast is rocky and steep, with broken cliffs of splintering shale or sandstone hollowed and honeycombed by the breakers. Here and there are almost inaccessible caves, where the seals come in to rest.

Gorse grows everywhere, shining golden against the brown hills in April and May, and springing up quickly in fields that are no longer cultivated and between the sleepers of disused railway lines. Some farmers cut it as bedding for their cattle, but one cannot help thinking that it must make a very uncomfortable couch. Holly too is extremely common, not as a shrub only, but as a large tree. Interspersed with ash, oak and beech, it gives a green tone to the woodlands even in winter. Birches grow everywhere, and dense thickets of rhododendrons fill many narrow valleys. In Kerry the strawberry tree is common in some localities, and on the coast I came across several instances of Scots pines and eucalyptus trees growing side by side. Heaths and heather and bilberries thrive in the acid soil, and regiments of wild iris spoil the grazing on the low-lying undrained fields.



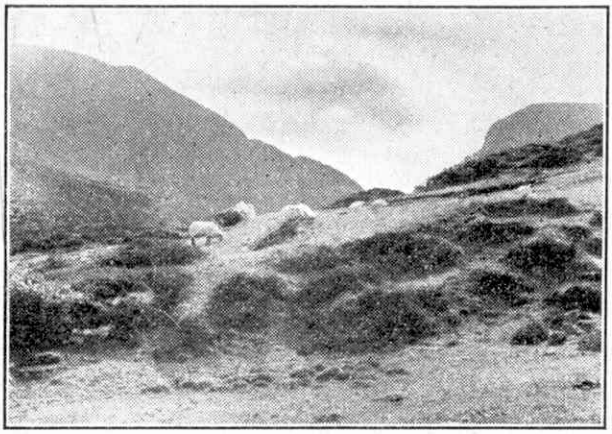
A beautiful scene at Rossbeigh, in Dingle Bay, Co. Kerry. Photograph, Irish Tourist Association.

Almost every coastal inlet hides the mouth of a river or mountain stream that has come tumbling and foaming from the high tops, rushing shallow over stones and boulders through the valleys and finally plunging in to meet the tide. Salmon and sea trout work their way upstream in the spring and in the deep pools you can see river trout facing the current. Many of the mountain lochs, so high and isolated that one wonders how the fish ever got there, have fine red trout, but the famous Black Loch in the Gap of Dunloe has nothing to offer the fisherman. Legend tells that it was here St. Patrick drowned the last snake in Ireland, and since that day no fish can live in the water.

The landscape is typical adder country, but snakes are non-existent; the common toad is absent too, while the natterjack is found in one small area of Kerry only. Some people say it has been introduced from Spain, and as Southern Ireland and Spain have had close connections over centuries that is quite possible. Even Spanish place names crop up, and I found I did not have to cross the Bay of Biscay to reach Valencia—the Irish Sea was enough. Ireland has only one lizard, the common lizard, which is very numerous in some localities on the coast, and also only one newt.

The mole is entirely absent, and I found myself scanning the fields for mole hills and finding none. The innumerable streams and the many sheltered bays are ideal hunting grounds for the otter, and the wild, stony hills and steep valleys shelter many foxes. Rabbits are everywhere, and the Irish hare, more stockily built than the British brown hare, and with shorter ears, is also fairly common. An interesting mammal is the pine marten, which still holds out precariously in Western Ireland.

Many times at low tide I noticed grey herons standing motionless on the seaweed covered rocks. They were quite



Sheep grazing in the Gap of Dunloe, a wild mountain pass in the Killarney area.

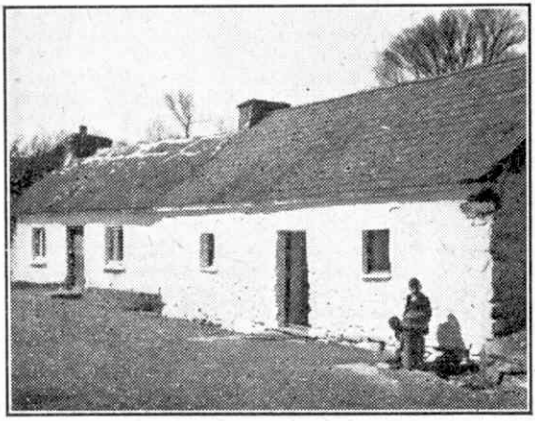
unconcerned at my approach. Curlews were calling to each other over the bogs during my visit in April and wheeled in pairs across the grey skies. I noticed a number of hooded crows, and a quite astonishing quantity of robins. In the peaceful surroundings I noticed for the first time how rich and varied is their song. The males were singing loudly, each in his own high tree, and they appeared to be answering and repeating each other's phrases.

I was shown steep mountain sides where eagles used to nest, but actually I did not see a single bird of prey throughout my stay. The swans were easily the most conspicuous of the birds. Odd pairs were on almost every loch and inlet, and in many places several dozens could be seen together. On a small lake at Barley Cove I counted nearly a hundred birds, most of them eagerly searching for food, with only their tails sticking out of the water! I saw a few mallard and teal on the lakes and lone cormorants fishing in the streams and bays, but on the whole water fowl did not appear to be very numerous.

There are surprising gaps in the butterfly population in Ireland, not only in the south-west of the country, but all over the island. The three Whites are represented, the Large, Small and Green-veined, and curiously enough the Irish race of the last named has been called sub-species *Britannicus*, although it does not occur in Britain at all! The Wood White is a distinctly different form from that found in England, being much darker greenish-grey on the undersurface of its wings, and it has been given the sub-specific name of *juvernica*. Other butterflies that have local race names include the Marsh Fritillary, the the Common Blue, the Orange-tip, the Large Heath and the Meadow Brown. In my opinion the Greyling too deserves to be distinguished from the British form. It is one of the commonest insects in the summer months, flying over the boulder-strewn hillsides, and has an unusually rich orange tint.

The Large Heath only breeds in Britain in the bogs and mosses in the Midlands and the North, and in Scotland; but in Ireland it occurs throughout the country. It is always local, however, and seldom very plentiful. The Irish form is somewhere between the typical English and Scotch races, and is therefore particularly interesting. Local colonies are sometimes exterminated by the cutting of turf for fuel.

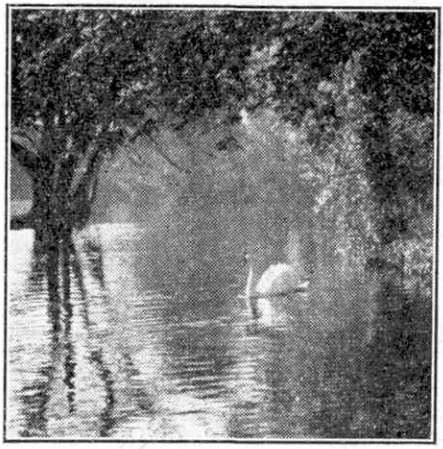
All but two of the Browns occur in Ireland, but there are only three Fritillaries, the Silver-washed, Dark Green and



Typical whitewashed cottages in South-western Ireland.

Pearl-bordered, against nine common to Britain. The Large Tortoiseshell, the Comma, the Purple Emperor and White Admiral do not occur in Ireland, and neither does the Duke of Burgundy. There is only one Skipper out of the total eight over here. Only three Blues may be seen, the Common, Holly and Small, and only three of the Hairstreaks, the Green, Purple and Brown; and the migrant butterflies are not seen nearly as frequently as over here.

Domestic poultry are very much in evidence. Every farm has numbers of chickens and little companies of ducks rout in the ditches, waddle along the roads and search for snails beneath the stone walls. Many of them are very conspicuously marked in brown and white, or black and white. Guinea fowls and turkeys are common too, and one day I came across a guinea fowl sitting on a garden wall trying valiantly to drown the noise of a stone-crushing machine across the road.



Swans are common on the lakes of the region.

The Black Kerry cows are attractive beasts, so small and compact that they look quite dwarfed among the mountains. They are very hardy, can manage on poor grazing, and yield a milk that is surprisingly high in butter-fat content. The Kerry bullocks make good beef on land that looks as if it could hardly keep them alive. Among the pure black beasts one sees quite a number of grey ones, and here and there a few of a creamy-white colour; but brown cattle are not nearly so common. Most of the horses are grey or creamy too, and the donkeys that pull the small milk carts between the farms and villages are of every shade from "donkey brown" to silvery grey. The black-faced mountain sheep, with curled horns and long flowing fleeces, take no notice at all of cars, and lie calmly on the road while motorists swerve to avoid them.

The typical farmstead in south-west Ireland is small and whitewashed, the dwelling house with a chimney rising above each gable, two small windows and a door in the centre, which is nearly always made in two halves. Even in cold and gusty weather the top half is left open, while the lower portion is closed to keep the hens and pigs out of the house. Practically all the houses are built of local stone, which is so abundant that sufficient for a whole farmstead could be picked off an acre of ground. The floor is of stone, or in some of the poorer cottages simply earth, and the roofing varies from slate and straw to corrugated iron. An Irish homestead has none of the prettiness that one associates with an English cottage. Honeysuckle and roses round the door are not encouraged. The Irish farmer prefers the simplicity of shining whitewash, which makes his home visible for many miles across the valley. He will plant fuchsia hedges along the roads, and perhaps a few pines or spruces for shelter and sometimes a couple of Irish yews; but the "garden" is the potato patch and nothing more. Irish farmers are not gardeners, and apart from potatoes the only vegetable grown, at least in this part of the country, is cabbage.

The spades used on the farms are of quite a different design from English ones. The blade is sharply pointed and triangular in shape; the handle is bent at the base and is then long and straight like the handle of a hoe. Sometimes there is a wooden crosspiece a few inches above the blade on which to rest the foot when digging, but you cannot put pressure on the spade by leaning on the handle. The pointed blade is specially adapted for use on stony ground, where a square spade would be unable to penetrate.

The farm carts too are of a special type. The shafts are thick and straight and extend backward, so that two pieces like the handles of a stretcher stick out at the back of the cart. No doubt this would be useful in case the cart became bogged on a sodden road.

From Our Readers

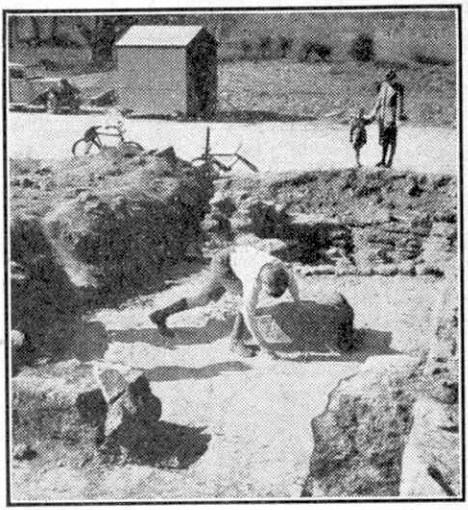
This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs 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.

BRISTOL'S MOST IMPORTANT ROMAN REMAINS

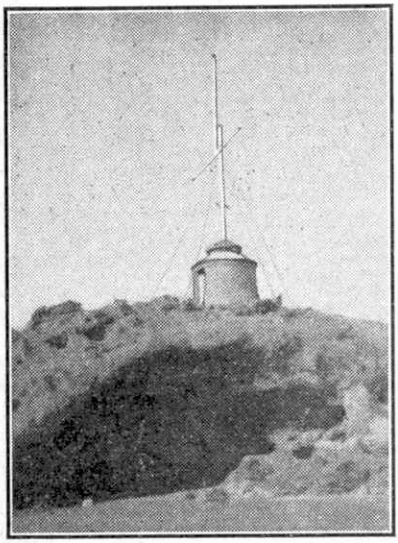
Through excavation work in connection with a new Bristol Corporation housing site at Lawrence Weston, a Roman villa 250 ft. in length has been disclosed. Five chambers have been uncovered, two beautifully tessellated pavements, a small room paved with flagstones, a large cold water bath, and the hypocaust system. The skeleton of a girl, believed to be that of a Roman slave, also was found. It was in a crouching position facing east, the traditional way. It has been established that the villa was a self-contained unit, the home of a prosperous and well-to-do Romano-Briton of the 4th century.

The excavation work has been voluntary and schoolchildren did much of it. Mr. B. G. O'Neill, Chief Inspector of Ancient Monuments, was much impressed on his visit and as a result of his report the Director of Bristol Museum requested the Housing Committee to allow further excavation. The site shows a remarkable contrast, for the low walls of the villa stand beside a rough road, surrounded by contractors' equipment. Post-war permanent houses of unlovely appearance stretch away in the middle distance, and above it all on the brow of the hill is Kingsweston House, a huge Georgian mansion built by Vanbrugh in 1710, a relic of a more dignified age.

Local archæologists were much excited at the discovery, which is a much more important local link with the Roman era than the smaller discovery at nearby Sea Mills. R. Winstone (Bristol).



Brushing sand off a tesselated pavement in the Roman villa discovered on a new Corporation housing site in Bristol. Photograph by R. Winstone, Bristol.



Cave Rock, Sumner, Christchurch, a former ship signal station. Photograph by A. P. Holcroft, Invercargill, New Zealand.

A PIONEER SIGNAL STATION

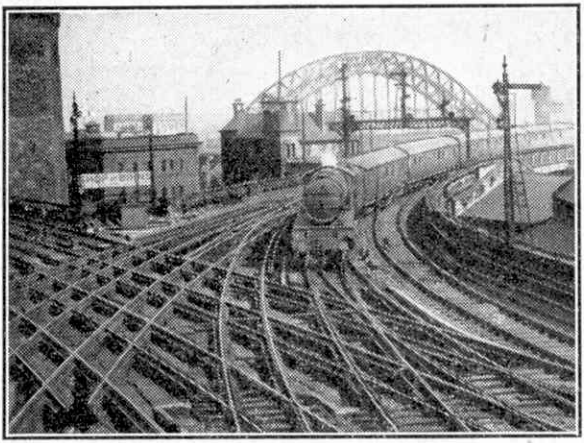
On the sands at Sumner, Christchurch, New Zealand, is a large rock, hollowed out by the action of the sea. This is known as Cave Rock, and on its top there is still to be seen a signal station. This is a relic of the days when small paddle-steamers and ketches trading between Port Lyttelton and Christchurch had to cross the treacherous Sumner Bar.

Before 1867, when the railway tunnel on the line between Lyttelton to Christchurch was opened, goods from deep water ships had to be loaded into small, shallow draught vessels. These were able to sail round to Sumner, on up to the wharf near the mouth of the Heathcote River, and from there to the wharf at Woolston. Sometimes they even went on as far as the Barbadoes Street Bridge, in Christchurch itself, to unload. A memorial tablet at that spot records this fact.

The trade between Lyttelton and Christchurch carried on by these small craft was very considerable and important. Because of the treacherous nature of the bar, expert seamanship was needed. To help the boats cross safely, the signal station was built on the top of Cave Rock. A Captain Day was put in charge, and from the mast and yard signals were flown indicating the state of the bar. As a result of its changing nature there was often much delay. The little steamers sometimes had to wait three weeks to get across, and sailing craft often took six weeks. At one time as many as 23 vessels were held up waiting for an opportunity to cross.

Even with help from the signal station there were many accidents and losses, as shown by the remains of wrecked vessels still to be seen at low tide, on the seaward side of Cave Rock. They, and the signal station, are all that remain to tell of the once busy trade carried on in those waters.

A. P. Holcroft (Invercargill, N.Z.).



This North Eastern Region express from the South has passed over the High-Level Bridge at Newcastle and is about to negotiate part of the remarkable crossing outside Newcastle Central. Photograph by C. E. Willets.

Railway Notes

By R. A. H. Weight

National Developments

It might be a great advantage at large stations where passengers wait for long-distance trains and connections which may be running late or diverted to an unusual platform, if suitable loudspeaker announcements were "laid on" to the refreshment and dining rooms. As an experiment loudspeaker equipment is being installed in the refreshment rooms at Edinburgh (Waverley), Crewe, Preston, Swindon and Bristol with the object of ascertaining whether it can be employed without causing too much disturbance to passengers taking meals; and doubtless to see if the idea meets with approval.

The "Green Arrow" Registered Transits Service by freight train has been restored for full wagon loads of traffic intended for export. Under this scheme a consignment is specially labelled, notified by telegram or telephone to every junction or contact point, and generally hustled along; an additional charge being made for this service.

During the 1930's, before the outbreak of war, it was possible by extra payment to secure such special attention for certain goods traffic on a wider basis under this "Green Arrow" scheme. It was this service after which the pioneer Gresley "V2" 2-6-2 mixed-traffic engine was named in 1936.

Railwaymen and women are invited to submit suggestions relative to improving or effecting economies, better methods of working and so on, in the various departments in which they are engaged. During twelve months over 6,500 suggestions were received covering a wide range of railway activities. Awards of from two to twenty-five guineas were made to 585 people whose suggestions were considered the most effective.

Speedier disembarkation at Holyhead from the London Midland vessels maintaining the mail and passenger service with Eire will shortly be assured when electrically-operated steel platforms and staircases are brought into use that can be adjusted to tide level. Passengers will then disembark along level instead of sloping gangways somewhat in the same way as at the new Ocean Terminal in Southampton Docks. An improved Customs Hall is in use at Holyhead where, it is estimated, 1,000 persons per hour can be handled from either of the two new motor ships, "*Cambria*" and "*Hibernia*."

B.R. Locomotives for Festival of Britain

During the Festival of Britain this summer three new British Railways locomotives are to be exhibited at the South end of Charing Cross Railway Bridge, London, accessible from the grounds on the South Bank. The steam locomotive will be one of the latest 70000 class 4-6-2 mixed-traffic type; the electric one will be of the 0-6-6-0 main line "26xxx" series now under construction for the Sheffield-Manchester service or undergoing trial between Ilford and Shenfield; the third will be the 1,600 h.p. 2-6-6-2 diesel-electric mixed traffic or express engine, No. 10201, with English Electric Company's equipment, built at Ashford and recently engaged in test runs on the Eastern Section of the Southern Region and on the Midland main line of the L.M.R. This engine will be described in an early issue of the "*M.M.*"

Scottish Regional News

Another of the former Caledonian type outside-cylinder 4-6-0s has been withdrawn as No. 54630, class "4MT," which was built in 1925 by the L.M.S. as one of a series with slightly modified dimensions compared with the original C.R. "60" class design of 1916. Former Caledonian engines of classes less in size are still considerably in evidence, such as the Drummond "Jumbo" 0-6-0s on general service branch or similar duties; Pickersgill 4-6-2Ts and 0-4-4Ts banking trains up the steep hill to Beattock summit; and some of the "Dunalastair" or later 4-4-0s spread over a wide area. Three more "K2" G.N. type 2-cylinder 2-6-0s have been transferred from the Eastern Region to Eastfield Shed which provides power for a number of West Highland line trains. Two were later at Parkhead.

A good deal of intermingling of former L.M.S. and L.N.E.R. engines continues to provide interest. Class "5" L.M. type 4-6-0s have been noted working between Waverley and Perth, also assisting an "A4" on a very heavy express southward from Aberdeen. "B1" 4-6-0s and "K3" 2-6-0s have been seen in Buchanan Street station, Glasgow. Three "A1s," Nos. 60152 and 60160-1, were transferred to 66A, Polmadie, West Coast main line shed in January.

Locomotive Power Classifications Raised

In addition to the classifying of L.M.R. 4-6-2s as "8P" and the "Royal Scots" as "7P," mentioned last month, it is now announced that ex-L.N.E.R. "A1" and "A4" classes are "8P." The converted L.M.R. "Jubilees" Nos. 45735-6, and the "Patriots" Nos. 45512, 45514, 45521-3, 45525-32, 45534-6, 45540 and 45545, which have been similarly rebuilt with new boilers, have been raised from "6P" to "7P." The unaltered "Patriots" and "Jubilees" are now class "6" instead of "5X." Some other changes are under consideration.

Eastern and North Eastern Regions

"Claud Hamilton" 4-4-0s often work from Cambridge through Bletchley to Oxford, while light Holden G.E. 0-6-0s are seen on the former Midland

branch between Cambridge and Kettering, as the locomotive workings at Cambridge have been merged under one depot. "Claud Hamiltons" and "L1" 2–6–4Ts have been noted bringing the 1.40 p.m. Cambridge buffet express punctually into King's Cross.

The new 4–6–2 No. 70000 "*Britannia*" began work on the "*Norfolkman*" Liverpool Street - Norwich express, being stationed at Stratford a day or two after the naming ceremony. Some initial mechanical troubles caused temporary withdrawals from service.

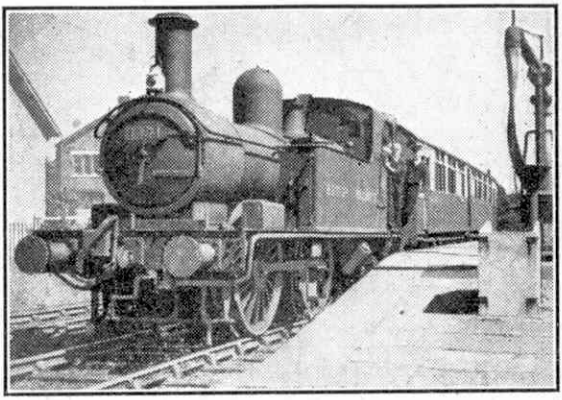
Nameplates lately affixed to "A1" 4–6–2s include: No. 60125, "*Scottish Union*"; No. 60128, "*Bongrace*"; No. 60132, "*Marmion*"; No. 60136, "*Alcazar*"; No. 60144, "*King's Courier*"; No. 60146, "*Peregrine*"; No. 60148, "*Aboyeur*" and No. 60149, "*Amadis*." No. 60125 has a rimmed double-chimney like that on No. 60158, which improves the appearance. No. 60156, one of the roller-bearing "Pacifics" of this class shedded at King's Cross, recently ran 11,600 train miles in four weeks.

These engines are often kept hard at work on long runs between King's Cross and Newcastle or Leeds, between Leeds or York and Edinburgh, or on similar turns involving 300-500 miles per day. They have achieved some very fine hill climbing performances with heavy trains when making up lost time, and have attained speeds up to 90 m.p.h. on the level north of York. Excellent runs are still recorded at times, as always, behind the older "A3" and "A4" 4–6–2s.

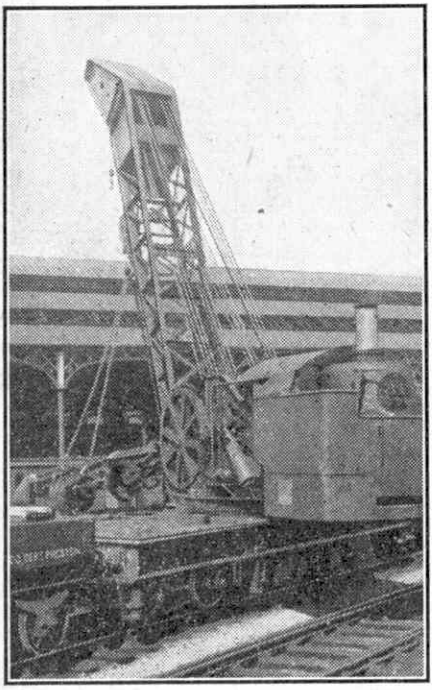
The last "D1" 4–4–0 of the final G.N. Ivatt superheated type has been withdrawn as No. 2209. Very few G.N. 4–4–0s remain and there is now no "Atlantic" on the active list.

A considerable number of class "4" L.M. type 2–6–0s built at Doncaster or Darlington, and fitted with single chimney and tablet catchers for use on single track sections, have been allocated to Peterborough or South Lynn, for M. and G.N. line workings. No. 43096 of this class is now reported to be stationed at Selby, 50c.

New "B1" 4–6–0s from the North British Locomotive Company's Works, Nos. 61370–3 are allocated to the Lincoln district. Up to No. 61399 will be built, completing 410 engines of the class.



Western Region pull-and-push unit for Penygraig, at Llantrisant. The engine is one of the 0-4-2 tanks specially developed for pull-and-push working. Photograph by J. D. Mills.



An interesting view of a breakdown crane at work at Preston. Photograph by W. S. Garth.

Southern Tidings

After long delay, the last light "Pacific" of the "Battle of Britain" class, No. 34110, "*66 Squadron*," was completed and running-in from Brighton early this year. At the same time class "4" 2–6–4Ts had been completed up to No. 42081, with others well in hand. The present series will finish with No. 42095.

New diesel-electric shunting engines of the 0–6–0, 350 h.p. type are coming into service from Ashford numbered 15226 up. No. 15211, the first of the previous series, was lately working at Eastleigh.

Nameplates

Presumably with a view to standardizing the treatment of nameplates, together with the W.R. metal numberplates, certain W.R. engines had the backgrounds of their plates painted brown and others red. It has now been decided to continue the red plates on black engines only. For green and blue engines a black background will be used, with orange and white linings respectively. Incidentally, some front number-plates were also painted red.

It will be recalled that on the W.R. in 1948 dark blue engines, and at first some of the light green ones, had their plates painted in the colours of the liveries.

So far the S.R. have continued to paint all nameplate backgrounds red, except the "Battle of Britain" class, which have R.A.F. blue. The nameplates of "Pacifics" 21C101–120 did not have red backgrounds when these locomotives first appeared. The celebrated brass numberplates and "Southern" plates of Nos. 21C1/2 "*Channel Packet*" and "*Union Castle*," have lately been removed on the repainting and renumbering of these engines.

R. P. WALFORD.

"The Flying Kangaroo"

By John W. R. Taylor

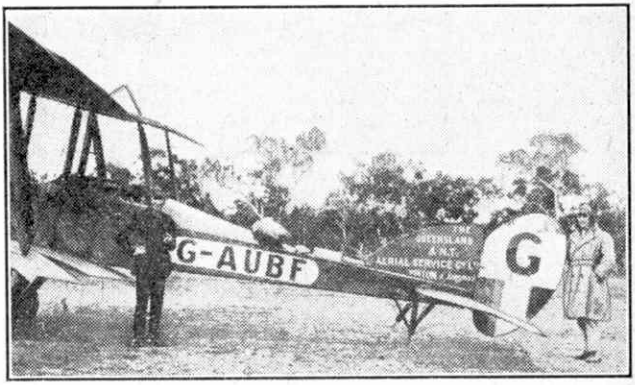
THERE is probably no more romantic story in commercial aviation than that of the Australian Qantas Empire Airways. Yet there might well have been no Qantas at all had not a motor car got stuck in the sandy bed of the Cloncurry River in Queensland 32 years ago.

There were no regular airlines then, although a few courageous companies were due to begin operations in Europe soon afterwards. In addition, several ex-Service pilots who spent their gratuities on war-surplus aeroplanes were "barnstorming" the countryside, giving joy-rides and demonstration flights anywhere they could be sure of a handful of prospective passengers. Few made their fortunes, but they helped to "sell" aviation to the public, while some of their colleagues earned newspaper headlines and knighthoods with pioneer flights that laid the foundations of the great trunk air routes of to-day.

In June 1919 the Atlantic was conquered non-stop for the first time by Alcock and Whitten Brown; and the Australian Government offered a new prize of £10,000 to the first Australian airman who could link Britain with Australia. In case anyone were lucky enough or skilful enough to do so, the Australian Government commissioned two young ex-A.F.C. pilots named Hudson Fysh and P. J. McGuinness to survey possible landing sites between Longreach in Queensland and Darwin. They set out in a very ancient Model T Ford—one of the original Tin Lizzies—and it was not long before they realised the immense possibilities for an air service in Western Queensland. The few railways that ran inland from the coast formed no proper network, and many farmers were several days' journey from the nearest town.

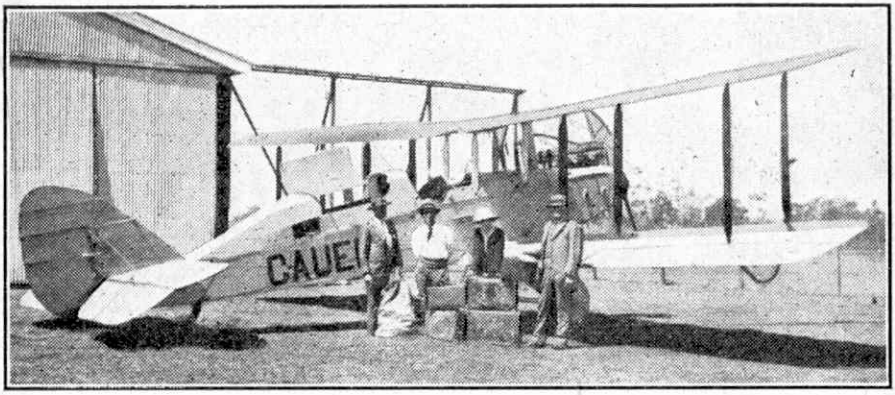
So, as they travelled cross-country, Fysh and McGuinness began to work out plans for a regular air service linking all the townships and railway stations in the district. Unfortunately, it costs far more to start an airline than to plan one, and it might well have remained a dream but for the fact that the motor car which they helped to extract from the Cloncurry River belonged to a farmer named Fergus McMaster, who had the gift of recognising a good idea when it came his way. When McGuinness talked enthusiastically about the proposed airline, McMaster at once recognised what a boon it would be to farmers like himself, and the first capital was soon "in the kitty."

With McMaster's help, Fysh and McGuinness collected enough cash to register in November 1920 a company named Queensland and Northern Territory Aerial Services Ltd. This was soon, and forever afterwards, unofficially abbreviated to Qantas.



Qantas' first two aircraft were ex-Service machines, the B.E.2E shown here and an Avro 504. The illustrations to this article are reproduced by courtesy of Qantas Empire Airways.

Having got their airline and two aircraft—an Avro 504 and a B.E.2E, both ex-Service and with a cruising speed of about 60 m.p.h.—the next thing was to get customers and some more money. So, for nearly two years, the two pilots went barnstorming, landing wherever they saw a likely-looking farm to give joy-rides and sell shares in their new company. Most farmers were sympathetic, but dubious of its chances of success; some even made it clear that they regarded their cheques as donations rather than investments.



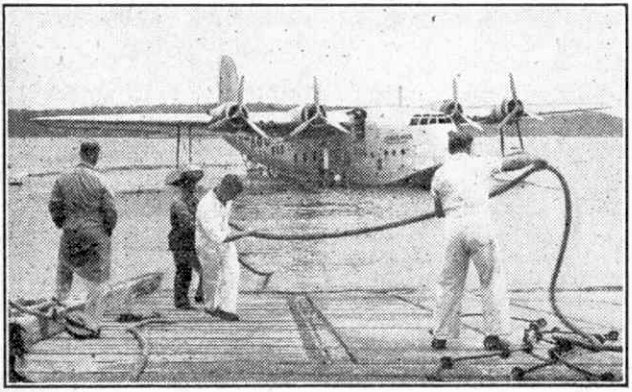
The arrival of the first D.H.9C, a 4-seater machine, at Charleville in 1923.

Nevertheless, 871 joy-ride passengers were carried during 1921 and 1922 at £3 3s. 0d. a head, and 79 proper air taxi flights were made, ranging from an urgent "flying ambulance" mission to Australia's first aerial turkey-shooting expedition.

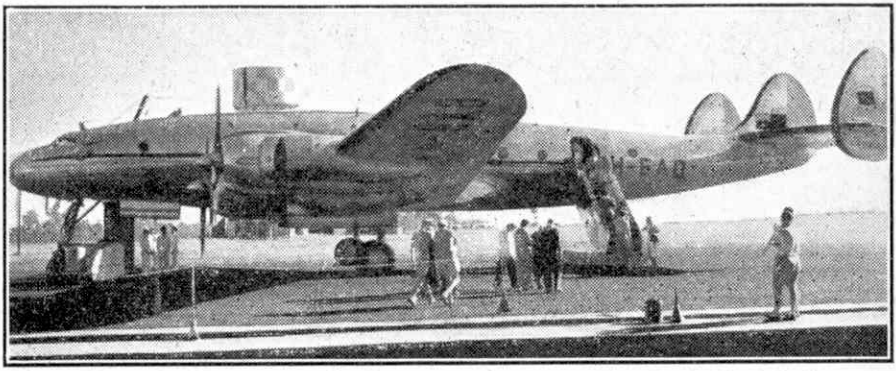
As might be expected, these operations were not without incident, and the smooth dry clay-pans of Queensland often came in very useful for forced landings. But such things as radiator leaks were soon put right with a blob of chewing gum and, most important of all, nobody was ever hurt.

Despite their varied activities at this period, Qantas' finances were seldom healthy, and it was not until Fergus McMaster, the company's Chairman for 25 years, persuaded the Government to subsidise a regular weekly passenger and mail service between Charleville and Cloncurry, that things began to improve. It was a modest start, but even this 577-mile route had to be flown in stages by two aircraft, with a night stop at Longreach, because of the unfortunate effect of the inland heat on the none-too-reliable engines of Qantas' fleet of "air liners," which by then included two Armstrong-Whitworth FK-8 three-seaters. A payload of 400 lb. was normally carried, and the average speed over the route was about 67 m.p.h.

First passenger carried on the service was 85-year-old Alexander Kennedy, the great Australian pioneer whose story has been told so well by Hudson Fysh in his book *"Taming the North"* (Angus and Robertson). This was most appropriate, for the country over which Fysh and Kennedy flew had first been crossed by the pioneer in a bullock-dray 53 years before, when he had taken eight months to complete the journey through territory inhabited only by the savage Kalkadoon aborigines. The old man revelled in the new experience, despite the fact that at one stage his goggles slipped and he could see nothing, and he remained a staunch supporter, shareholder and passenger of Qantas until he died in 1936.



"Coriolanus," the last of Q.E.A.'s Empire flying boats, being beached for the last time. She "retired" on 8th January, 1948, after ten years' service.



Passengers embarking on a Q.E.A. "Constellation" at Darwin Airport. These fine Lockheed air liners were introduced on the Sydney-London "Kangaroo" service in December 1947.

Throughout their first year of operation on the new service, the company never had an empty seat. As a result they were able to improve and increase their fleet, first with a D.H.4 and then with two D.H.9Cs. The latter proved really popular, as two of the passengers were able to travel in an enclosed cabin behind the pilot. It lacked the luxury of a modern air liner cabin, being merely a cockpit with a lid, but passengers no longer had to wear helmet and goggles.

The first real air liner used by Qantas was the four-passenger D.H.50, which gave a new lease of life to Australian commercial aviation. Passengers cheerfully paid £21 for a 577-mile trip in its comfortable cabin, and history was made in November 1924 when the Prime Minister of Australia (now Viscount Bruce) flew in the D.H.50 from Winton to Longreach, the first time an Australian Prime Minister had flown within the Commonwealth.

After that Qantas progressed by leaps and bounds. In 1925 they extended their service to Camooweal, bringing their weekly mileage on regular services up to 1,650, and also began pioneer experiments with ground-to-air radio communications. Next year, under licence to de Havillands, they started to build their own D.H.50s at Longreach, and imported the first "Moths" seen in Queensland to equip a flying school which they opened at Brisbane in 1927. The D.H.50 production programme was the first of its kind in Australia and the flying school was the first in Queensland to offer organised pilot training.

The famous Flying Doctor Service, which Qantas began to operate in 1928 under the auspices of the Australian Inland Mission, was the first in the world. Based on Cloncurry, it brought skilled medical attention and quick, comfortable ambulance service to even the most remote farms in the district. It went on to save countless lives in the next 23 years, becoming an example to the world of how aviation could be used to preserve life rather than to destroy it. Nearly all of the aircraft used have been de Havilland types, starting with the D.H.50, followed by the splendid old "Dragon" and now by the three-engined D.H. (Australia) "Drover." The service has been operated by Trans-Australia Airlines since 1949.

By January 1930, at the start of their 10th year of operations, Qantas had flown their first million miles, but it was not until 1934 that the company really grew from a happy band of bush-flyers into a major international airline. Three years earlier, they had carried the first experimental official air mail on the last part of the journey from London to Brisbane; now Imperial Airways planned to start a regular passenger and mail service along that route and wanted an experienced Australian company to operate the final stage between Darwin (later Singapore) and Brisbane. Qantas got the job and were transformed into a big new company named Qantas Empire Airways, in which Imperial Airways, later B.O.A.C., had a half-interest until 1947, when Q.E.A. were nationalised.

By introducing 10-seat D.H.86s on the route, Q.E.A. became the first airline in Australia to use four-engined liners, and covered millions of miles with them, without ever injuring a passenger, until 1938. Then the D.H.86s were replaced by some of the new Empire flying boats, which had already made Imperials the most-envied airline *(Continued on page 190)*

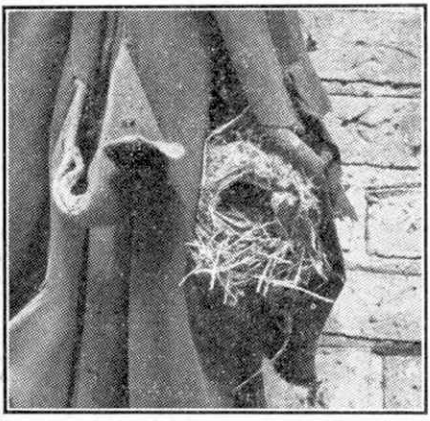
Photography

Birds' Nests

By E. E. Steele

APRIL is the great month of bird-song, and sees the peak of nesting activities. This brings a new and fascinating subject for the camera. It is easy to find the nests of many of the commoner birds and just as much fun in photographing them, unless one is a specialist seeking records of the rarer species only, but most of these have now been photographed repeatedly by the many experts.

There is one rarity, however, which you alone may discover. Each year a few birds seem to experiment and build their nests in the most unusual places. I know of a bluetit who builds her nest down a rusty length of drain-pipe, which is propped up in the corner of a coal-yard, and it is difficult to see how the young birds get out of such a narrow pipe when ready for flight.



Nest of wren in old overcoat pocket.

Other birds build their nests in the most unlikely spots, and lots of newspapers print stories about them. There was the bird which built its nest on a motor-vehicle which daily made a journey of some miles, the parent bird following and feeding its young! One lovely picture of a blackbird's nest was made by famous photographer Eric Hosking, and shows the nest built in a roll of wire-netting. Only last year an uncle of mine took me to see a nest at a deserted farm-house. In one of the out-houses was hanging a musty old coat, and a wren had neatly built its nest in one of the pockets. The same year there were reports in Country magazines of other wrens building their nests in pockets, evidently a cosy and practical site.

Water-hens' nests are usually built in patches of reeds in ponds and streams, but one year I found a nest built on the end of an oil drum, which someone had thrown into a pond. Unfortunately this proved to be unwise as the boys were able to drag the drum to the side and take the eggs not long after the photograph was made. The easiest nests to photograph are the water-hens, and those built in the open, or in low-lying shrubs and bramble, where the nests of whitethroat and many small birds may be found by watching for the bird darting out when disturbed.

Sister examines smallest and largest eggs, the long-tailed tit and swan. The illustrations to this article are by the author.

In order to make snaps of the actual birds at the nests it is necessary to construct a "hide" of poles and sacking, or similar material, moving this a little nearer to the nest each day so that the bird is not scared away. However, this is really an expert's job, but would be an interesting experiment for the school holidays, as its success depends on having plenty of time.

Nest of whitethroat.

Using the Meccano Gears Outfit "A"

A Derrick Crane Built with Outfit No. 4

THE derrick crane that forms the subject of our model this month is built from the parts in Outfit No. 4 and a Gears Outfit "A."

The base of the crane consists of two Flanged Sector Plates joined by a 3" Pulley 1. A Rod is fixed in the Pulley and forms the pivot for the cab.

The cab base is a 5½" × 2½" Flanged Plate. The sides are strengthened by 5½" Strips 2 at the front and by compound 4" strips 3 at the rear. Two 5½" Strips 4 and 5 are bolted to each side, and Strips 2 are extended by further 5½" Strips 6 overlapped five holes. Strips 6 are connected at their upper ends by a 1½" × ½" Double Angle Strip, and extended by Flat Trunnions 7. Strips 5 are linked by a 2½" × 1½" Flanged Plate and by two 2½" × ½" Double Angle Strips.

A 3" Pulley 8 is bolted to Reversed Angle Brackets attached to the base of the cab, and the assembly is then passed over the Rod fixed in Pulley 1 and held in position by a ¾" Sprocket. A 1½" Contrate 9 is fixed on the upper end of the Rod and it meshes with a ½" Pinion on a Rod mounted in the sides of the cab.

A *Magic* Clockwork Motor is attached to Angle Brackets bolted to the rear of the cab, and drives a 1" Pulley on a Rod 10. The Rod carries a ¾" Pinion 11, a ¾" Contrate 12, and a ½" Pinion 13, and is arranged to slide about ¼" in its bearings. The sliding movement is controlled by a 3½" Strip 14, lock-nutted to a 2½" × ½" Double Angle Strip bolted across the cab. A ⅜" Bolt in the end hole of the 3½" Strip engages between Contrate 12 and Pinion 13.

Pinion 11 can be moved into mesh with a 50-tooth Gear 15, and similarly Pinion 13 with a 57-tooth Gear 16. These Gears are fixed on 1½" Rods mounted in the sides of the cab and in two 2½" × ½" Double Angle Strips 17 bolted together and to the cab base. These Rods form the winding shafts. Ratchet brakes are fitted to the shafts and consist of Angle Brackets 18 that engage the teeth of the Gears. The Angle Brackets are fixed to compound strips 19 lock-nutted to the rear of the cab.

The jib consists of four 12½" Strips overlapped three holes. They are joined at their lower ends by a Double Bracket, and at the jib head by a Stepped Bent Strip. The jib pivots on a 1" Rod passed through a Double Bracket at the front of the cab. Luffing is operated by a Cord from the Rod of Gear 16. The Cord passes over a 1" Pulley on Rod 20, round a similar Pulley on Rod 21 and again round a 1" Pulley on Rod 20. It is then taken over a 1" Pulley on Rod 21 and tied to one of the Flat Trunnions 7.

Cord tied to the Rod of Gear 15 is taken round a ½" fixed Pulley on Rod 20, round a ½" loose Pulley at the jib head, and is fitted with a small Loaded Hook.

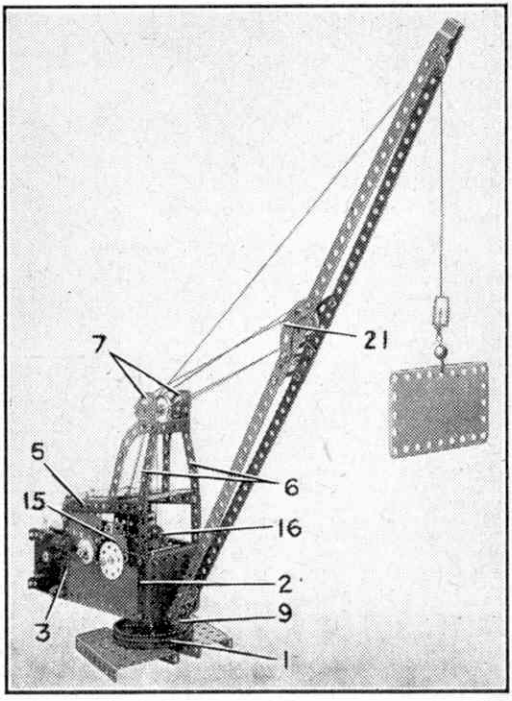


Fig. 1. A Magic Motor is used to drive this simple derrick crane, which is built from parts in an Outfit No. 4 and a Gears Outfit "A."

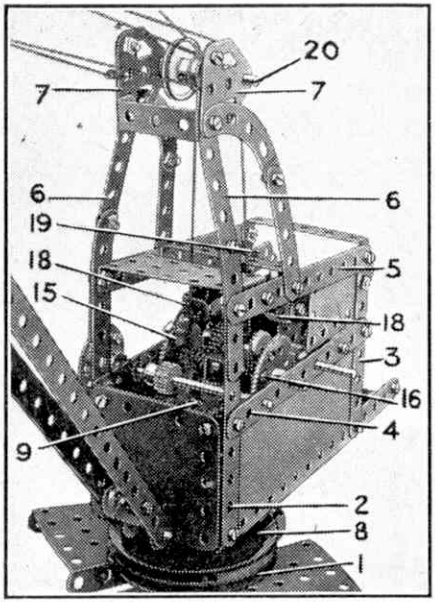


Fig. 2. The cab and operating mechanism of the derrick crane seen from the front.

The $\frac{1}{2}$" fixed Pulley is supplied with the *Magic* Motor. The $\frac{1}{2}$" loose Pulley is free to turn on a $\frac{3}{8}$" Bolt attached to the jib by two nuts.

A platform below the *Magic* Motor is formed by a $2\frac{1}{2}$"×$2\frac{1}{2}$" Flexible Plate edged by Strips.

Parts required to build model Derrick Crane: 4 of No. 1; 8 of No. 2; 2 of No. 3; 9 of No. 5; 2 of No. 10; 2 of No. 11; 5 of No. 12; 1 of No. 15b; 2 of No. 16; 2 of No. 17; 2 of No. 18a; 1 of No. 18b; 2 of No. 19b; 5 of No. 22; 1 of No. 23; 5 of No. 35; 64 of No. 37; 12 of No. 37a; 6 of No. 38; 1 of No. 44; 1 of No. 48; 6 of No. 48a; 1 of No. 51; 1 of No. 52; 2 of No. 54a; 1 of No. 57c; 4 of No. 90a; 1 of No. 96; 6 of No. 111c; 2 of No. 125; 2 of No. 126; 2 of No. 126a; 1 of No. 186a; 2 of No. 188; 4 of No. 190; 2 of No. 192; 1 *Magic* Motor; 1 Gears Outfit "A."

Spring Model-Building Competition

TRANSPORT—PAST AND PRESENT

There have been many rapid and surprising changes in methods of transport within the last 100 years. If it were possible for a boy of say 1851 to see a modern motor car or bus, a great ocean liner of to-day, driven by oil or electricity, or a giant streamlined locomotive, he would find it difficult to realise that these have grown out of the comparatively crude pioneer road vehicles, small ships and locomotives with which he was familiar. An equally startling comparison is a jet-engined fighter 'plane with the Wright biplane that was the forerunner of modern aviation. To us to-day it is equally interesting to look back over the years and to compare say a modern motor car with one of the clumsy, noisy and lumbering vehicles that were known to our grandparents in their younger days.

It occurs to us that a good model-building competition can be based on this theme, and this month therefore we announce details of such a contest in which every model-builder may compete. In it fine prizes are offered for the most interesting and best-built Meccano models representing some method of transport, either in its obsolete or its present-day form. Models of obsolete ox-wagons, bullock carts, bicycles, aircraft or ships will be just as suitable as more elaborate structures featuring modern vehicles, ships or other present day modes of transport.

To enter this contest it is only necessary to send in either a photograph or a good drawing of a model. The actual model is not required. Also models need not be specially built for this contest. Any suitable model already constructed may be entered, provided that it has not previously been awarded a prize in any "*Meccano Magazine*" Competition.

Entries will be divided into two Sections. A, for readers of all ages living in the British Isles, and B, for readers of all ages living Overseas. Section A will close on 31st May, 1951, and Section B on 31st August, 1951.

The following prizes will be awarded in each Section: First, Cheque for £3/3/–; Second, Cheque for £2/2/–; Third, Cheque for £1/1/–. In addition there will be a number of Consolation Prizes of 10/– and 5/– each.

Entries should be addressed: "*Transport—Past and Present Competition, Meccano Ltd., Binns Road, Liverpool 13.*"

We are constantly receiving requests from model-builders for competition entry forms. It should be understood that entry forms are not required for this contest or any of the monthly "*M.M.*" competitions.

Photographs or drawings of prize-winning models become the property of Meccano Ltd., but unsuccessful entries will be returned if a stamped addressed envelope is enclosed for that purpose.

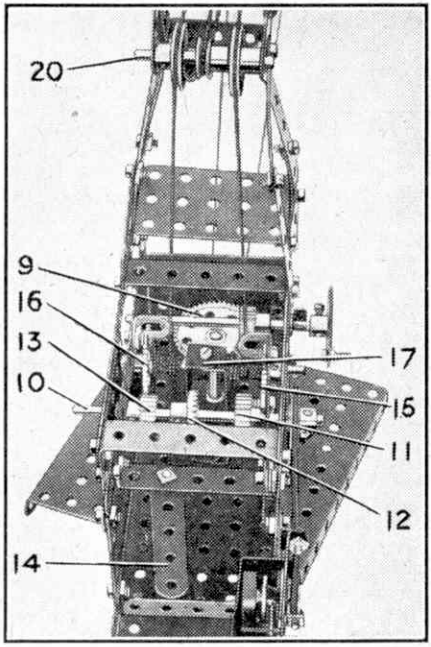


Fig. 3. A rear view of the derrick cab and mechanism.

New Meccano Model

By "Spanner"

Fishing Trawler

IT is many months since a ship formed the subject of a new "*M.M.*" model and I have received so many requests for a model of this kind that I feel it is only fair to the many model-builders interested in ships that I should devote this month's article to a model of this type. I have chosen as the prototype a typical trawler, and sufficient detail is included in the model not only to make it an interesting subject to construct, but to give it a most realistic and businesslike appearance.

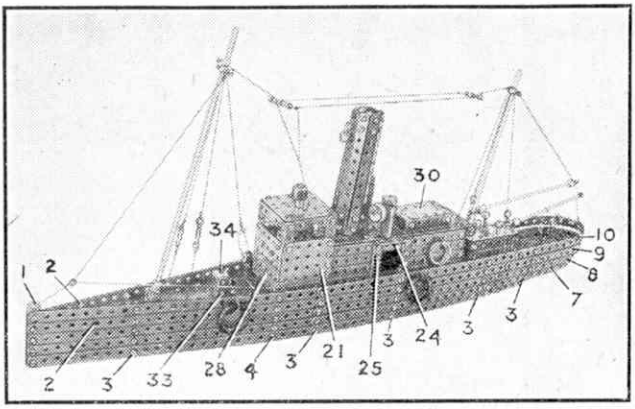


Fig. 1. A realistic trawler that provides a good subject for model-builders interested in ships.

In building ships it is generally best to begin construction with the hull, starting at the bows. The stem is formed by a 3" Strip 1, to which are bolted on each side five 12½" Strips 2. These Strips are each extended towards the stern by another 12½" Strip, and the sides thus formed are braced by five 2½" Strips held by the vertical rows of bolts 3 on each side of the model. A 3" Strip held by the row of bolts 4 is also fixed in place on each side.

Construction of the stern is begun by bolting a 3" Strip 5, bent as shown in Fig. 2, to each of the lower 12½" Strips on each side of the hull. A 1½" Double Angle Strip 6 is held by the same bolts. The 3" Strips are bolted together at their ends. The remainder of the shaped stern is formed by four 9½" Strips 7, 8, 9, 10, curved and arranged in staggered formation as shown.

The after deck is filled in at the stern by a Semi-Circular Plate 11, which is bolted to a 2½" Double Angle Strip 12. Five 7½" Strips are also bolted to the Double Angle Strip 12, and their other ends are fixed to a 3½" Double Angle Strip held by the bolts 13 (Figs. 3 and 4) on each side of the model. The bolts that hold the 7½" Strips to the Double Angle Strips also fix in place two 4½"×2½" Flat Plates 14 (Fig. 2) overlapped and extended by two similar Plates 15.

The remaining part of the deck consists of two 2½"×2½" Flexible Plates 16 and two 5½"×1½" Flexible Plates 17. Above

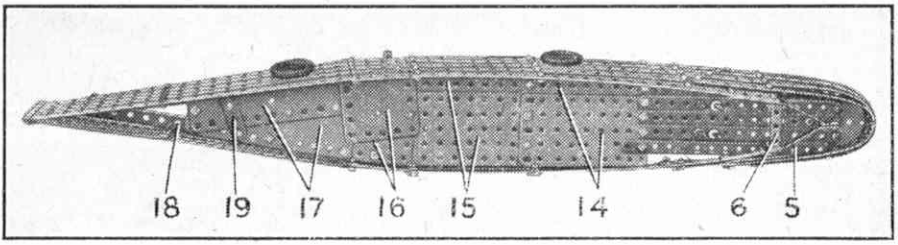


Fig. 2. Interior view of the trawler hull.

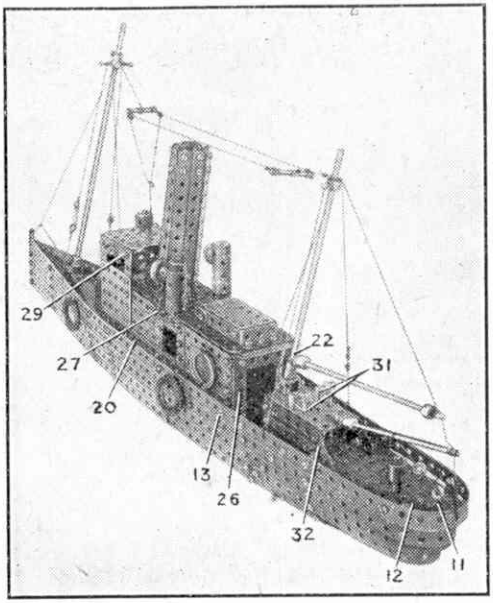


Fig. 3. The trawler seen from the stern.

the latter are two $9\frac{1}{2}$" Strips along each side of the bows (one can be seen at 18, Fig. 2). The after ends of these Strips are bolted to the $2\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plates. A 2" Strip 19, (Fig. 2) is also bolted to the $9\frac{1}{2}$" Strips underneath the deck, for the purpose of holding the $5\frac{1}{2}" \times 1\frac{1}{2}"$ Flexible Plates firmly in place.

The main deck superstructure on each side consists of a $9\frac{1}{2}$" Angle Girder 20, which is bolted to $2\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips fixed to the deck. A $2\frac{1}{2}" \times 2\frac{1}{2}"$ Flat Plate is bolted to one of the Angle Girders, and this supports on the starboard side three horizontal $7\frac{1}{2}$" Strips, the after ends of which are bolted to a 2" Angle Girder 22 (Fig. 3) that is fixed at the lower end to the $9\frac{1}{2}$" Angle Girder. On the port side the Flat Plate 21 serves to support one $7\frac{1}{2}$" Strip 24 and two 3" Strips. The other ends of the 3" Strips are fixed to a 2" Strip 25 and the aft end of the $7\frac{1}{2}$" Strip is bolted to a 2" Angle Girder 26 (Fig. 3) fixed at its lower end in a similar manner to the Girder 22 on the other side of the ship. A 2" Angle Girder 27 is fixed over the engine room doorway.

The front of the deck house is a $2\frac{1}{2}" \times 2\frac{1}{2}"$ Flat Plate 28, fixed to Angle Brackets attached to a second similar Plate that forms the floor of the bridge. Four $1\frac{1}{2}$" Angle Girders support the roof of the bridge, which is another $2\frac{1}{2}" \times 2\frac{1}{2}"$ Flat Plate, bolted to a $2\frac{1}{2}$" Angle Girder 29 on each side.

The smokestack consists of eight $5\frac{1}{2}$" Strips joined together by Obtuse Angle Brackets at the top and bottom, and it is attached to the superstructure roof, formed from five $7\frac{1}{2}$" Strips, by two Angle Brackets. The sides of the skylight 30 over the engine room consist of two $1\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips, to which are bolted two $2\frac{1}{2}$" Strips. The cover is a $2\frac{1}{2}" \times 1\frac{1}{2}"$ Flexible Plate, which is fixed in place by two $\frac{3}{4}$" Bolts passed right through the $7\frac{1}{2}$" Strips forming the roof of the superstructure. The ventilators are Sleeve Pieces fixed to Chimney Adaptors bolted to the superstructure, and each carries a $\frac{3}{4}$" Flanged Wheel to form a cowl.

The aft deck house is made as a unit and fixed in place by two Screwed Rods passed right through the deck. Each Rod has a Threaded Boss 31 on its upper end and a nut on its lower end under the deck. Each side of the deck house itself consists of two 3" Strips bolted to the ends of $1\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips that form the forward end. The after ends of the Strips are bolted to small Corner Brackets 32. The roof is

(*Continued on page 190*)

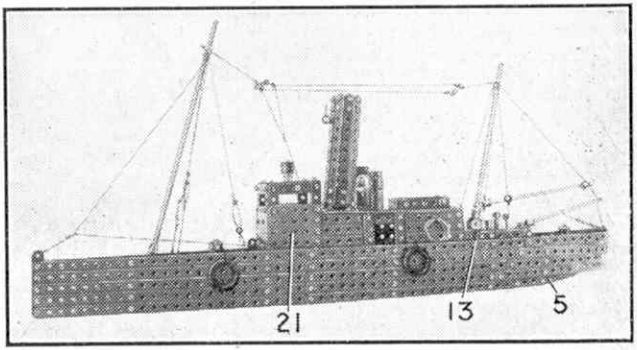


Fig. 4. Another view of the port side.

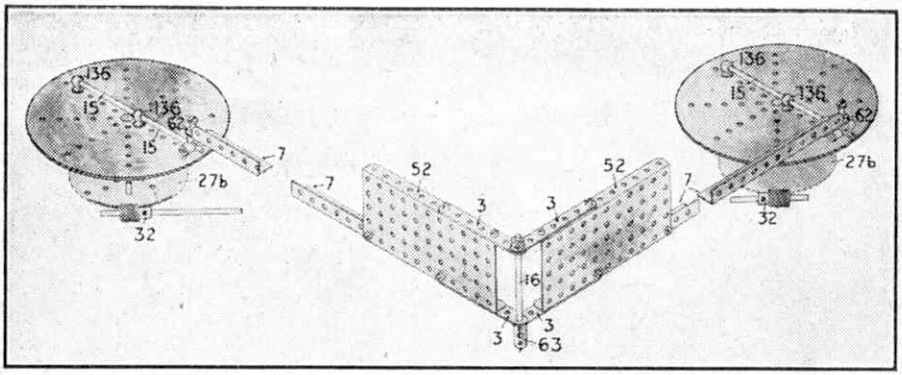


Fig. 1. The Meccano Ellipsograph designed by Commdr. H. F. Lane, R.N.

Simple Elliptic Compasses

By Commdr. H. F. Lane, R.N. (Retd.)

AFTER the circle the regular curve that we see or need to draw most often is the oval, or ellipse. It is easy to draw a circle with the aid of a pair of compasses, but drawing an ellipse is another matter altogether. Draughtsmen have one way of doing this, using compasses. They often need an ellipse to represent a circle seen in isometric, or "picture" drawings, and they produce one by drawing an arc of small radius for each end of the ellipse and joining these by two arcs of larger radius. The result is only approximate, and a very ugly approximation too.

One simple solution to the problem is probably known by most boys. It is to fix two pins in the paper or card on which the oval is to be drawn, and to tie the ends of a piece of string of suitable length to them. The string is then stretched out by a pencil point and half the ellipse is drawn by sliding the pencil along with the string fully extended. The rest of the ellipse is then drawn by bringing the thread over to the other side of the pins, which lie on its larger, or major axis.

An ellipse drawn in this way is faulty unless the string is evenly stretched, and it is less easy to make sure of this than might be thought. The method too is really unsuitable for lining in a finished drawing in ink.

In this article an instrument is described that can be used for drawing an ellipse that is more satisfactory than one produced by either of the two methods already mentioned. It is constructed from (comparatively few) standard parts. It draws a smooth and graceful curve, of very nearly mathematical accuracy provided the ellipses are small in relation to the lengths of the two links. With an instrument of the size described in this article, ellipses with a major axis of 3 or 4 inches can be drawn with sufficient accuracy for all practical purposes. Above this, the angularity of the links will introduce errors, unless the links themselves are lengthened by introducing additional girders.

The instrument consists essentially of a pair of links, one end of each of which is hinged on a vertical shaft, an extension of which carries the pencil or pen, and the other end is connected to one of two turntables which are caused to rotate together in the same direction and at the same speed.

The two links are identical, each consisting of a 24½" Angle Girder 7, which at one end carries a Crank 62 by which it is connected to one of the turntables, and at the other end is overlapped seven holes and bolted to the lower flange of a vertical Flanged Plate 52. At the other end of the Plate, there is bolted to each flange a 3½" Strip 3, through the outer end holes of which passes a 3½" Axle Rod 16 that serves as a hinge-pin. On one Flanged Plate only, Washers are inserted between the flanges and the 3½" Strips, top and bottom, to enable the Strips to pass outside the Strips

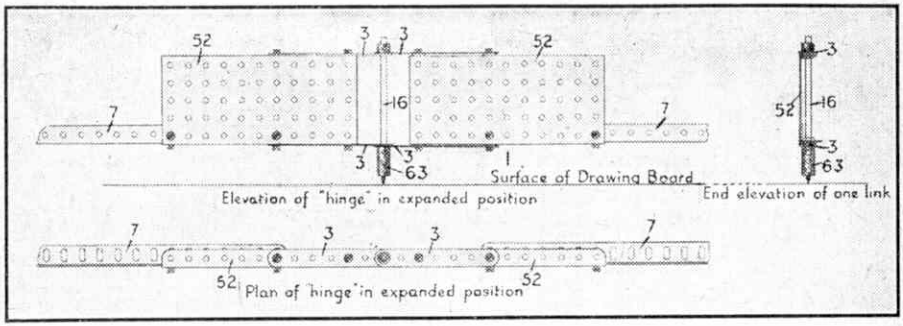


Fig. 2.

on the other Flanged Plate where they meet on the hinge.

The Axle Rod 16, after passing through the lower pair of Strips, is inserted halfway in a Coupling 63 and secured with a grub screw. The other half of the Coupling holds the pencil point, also secured with a grub screw. A refill lead for a propelling pencil is suitable. In order to fit the lead in the Coupling snugly, a short length of rubber bicycle valve tubing is slipped over it.

The two turntables are also identical. Each consists of a 6" Circular Plate, to the underside of which is bolted centrally a Bush Wheel. On the upper face of each are bolted two Handrail Supports 136, and fixed in them is a 5" Axle Rod 15. At its other end, each of these Rods carries a Coupling which can be secured at whatever distance from the centre is desired. Mounted vertically in this Coupling, and also serving to secure it on the Rod is a ½" Bolt which when passed through Crank 62 forms the pivot for the link connected to that particular turntable.

The Bush Wheel under the turntable already referred to is secured to a 2" Axle Rod 17. This Rod passes through two Bush Wheels sunk in the upper and lower surfaces of the drawing board to form a bearing. Two complete such bearings are required one for each turntable, and it is important that they should be the correct distance apart. This distance is the whole length of either link, from pivot to hinge, multiplied by $\sqrt{2}$, *i.e.*, 1.4142. In the instrument shown, the length of each link is 27½ inches, and the bearings must therefore be approximately 39 inches apart.

The axle of each turntable carries below the drawing board, a 3½" Gear Wheel 27b, engaging with a Worm Wheel 32 mounted on a Rod that passes through suitable bearings secured to the underside of the drawing board and has at its other end a second Worm similarly connected to the other turntable. The Worm shaft can be driven by an Electric Motor but a more simple arrangement is to rotate one turntable by hand, the other being caused to follow by (*Continued on page 190*)

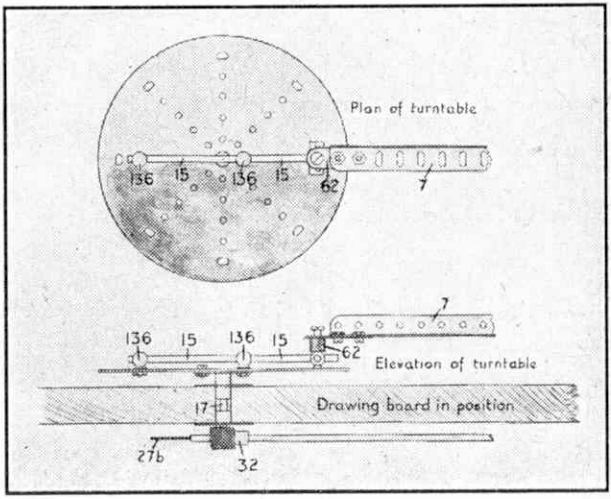


Fig. 3.

Club and Branch News

WITH THE SECRETARY

LONG LIFE FOR MECCANO CLUBS

What is the best way to ensure a long and successful career for a Meccano Club or H.R.C. Branch? There is a clue to the answer in the illustration on this page. The Maylands M.C., members of which are seen in the picture, is a splendid example of a Club that has been successful over a long term of years, and to-day is as flourishing as ever, with excellent prospects ahead of it. Only a small proportion of the present members are seen in the illustration, but on examination it is easy to see that their ages cover a wide range.

Here then is the secret. To be continuously successful a Club must make certain of recruits, and the best newcomers to any Club are the younger boys, many of them newcomers also to the Meccano hobby. In such a Club as that led by Mr. Malmgreen these recruits have the encouragement of the older members. Naturally they set out to emulate the veterans, and as a result of the splendid co-operation between old and new members a good Club spirit develops. Recruits and veterans alike combine to bring prosperity to the organisation to which they belong.

In the Maylands M.C. members are grouped in Factions, each of which includes boys and young men of different ages. This means that in each section young and old work together, those who are older helping the younger ones to develop along the right lines, and to do all they can to bring distinction to the Faction to which they belong. In other Clubs special Junior Sections are formed, under the care and control of older members, who act as Assistant Leaders. No doubt there are other ways of introducing recruits to Club life and of making sure that they become keen and valuable members, but the two indicated are certain to give good results and can be adopted in any organisation.

CLUB NOTES

NEWTOWN SCHOOL (WATERFORD) M.C.—Excellent progress is being made and good model-building is carried on. Competitions are arranged regularly, with set subjects, a recent one being bridges. This aroused the greatest interest. Club roll: 17. *Secretary:* D. S. Gibson, Newtown School, Waterford, Eire.

BELGRAVE UNION (LEICESTER) M.C. — Special Model-building has been carried on in preparation for an Exhibition. Models planned and partly built at meetings have been completed at home by members, who are keen to make a really good show. Members were invited to a splendid New Year Party kindly given by Mr. F. S. North, President. Club roll: 38. *Secretary:* C. G. Smith, 20, Aveford Road, Leicester.

AUSTRALIA

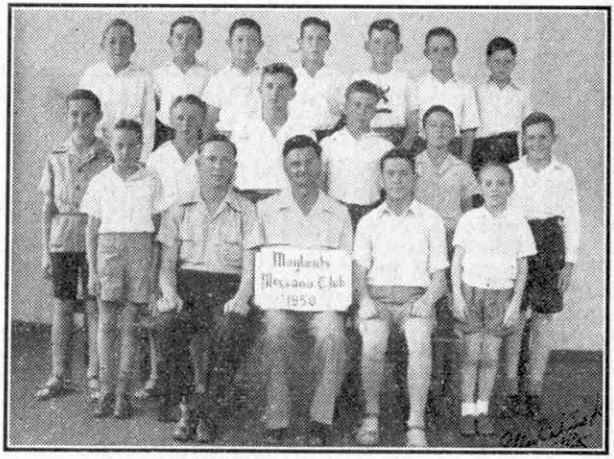
THEBARTON BOYS' TECHNICAL SCHOOL M.C. — Most meetings have been devoted to constructional work, including a model-building competition, in which first and second places were won by an excellent model of a lathe and an interesting semi-trailer unit. Talkie Films have been displayed, and another interesting event was an outdoor demonstration by a group of members of working model locomotives. Visits to local engineering works continue. Club roll: 40. *Secretary:* K. Amos, Thebarton Boys' Technical School, Ashley Street, Thebarton, South Australia.

BRANCH NEWS

RYDAL SCHOOL—Good progress has been made with the layout. Sidings have been completed, a control panel constructed and the track generally made more secure. A signalling system has been introduced and buildings of modern design now grace the platforms of the Central Station. The result of this good work was seen at a very successful Exhibition. *Secretaries:* R. L. Paton and A. Hughes, Rydal School, Colwyn Bay, North Wales.

HIGHGATE JUNIOR SCHOOL—New members have joined and the Branch is now running smoothly. Scenery has improved the appearance of the track, and operations are carried out with real enthusiasm. A visit to the Zoo has been included in the programme. *Secretary:* J. L. Stretton, 23, Seaforth Gardens, Winchmore Hill, London N.21.

STALYBRIDGE—The non-continuous track previously used has been dismantled and a continuous one installed in its place. More Rolling Stock has been acquired, and operations are being extended. More members have been enrolled. *Secretary:* B. Jones, 27, Hague Place, Stalybridge.



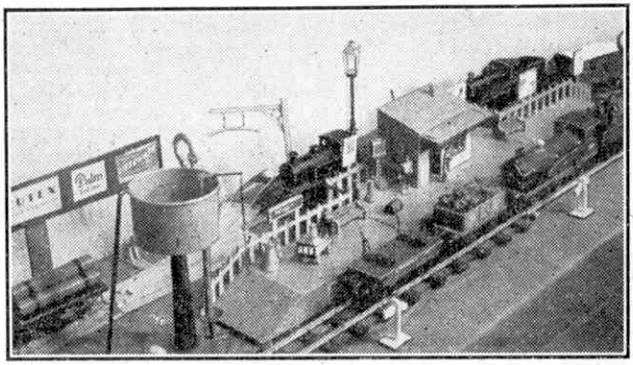
A group photograph of some of the members of the Maylands M.C., with their Leader, Mr. V. Malmgreen. On his right is E. Lewis, and second from the right in the back row is I. Davies, both recent winners of the Merit Medallion, the Blue Riband of the Club movement. The members of this Western Australian Club, which was founded by Mr. Malmgreen in 1936, are distinguished for their large scale model-building, and their many fine efforts have aroused the greatest admiration when displayed at Club and other Exhibitions in the Perth district.

The Care of Hornby Rolling Stock

WHEN our Hornby Rolling Stock is new there is nothing much to be done to it except to lubricate the axle bearings and to make sure that the wheel frames are not pressing inward on any of the wheels. If these items are not attended to it is hardly fair to expect the engine to put up a good performance, as stiffly running stock will retard the best of engines.

It is of advantage to ease the couplings slightly on their pivots and if necessary apply the slightest drop of oil to them. This will ensure that the couplings move freely sideways, as they have to when the train is rounding a curve. Couplings that do not pivot freely may even cause derailments in extreme cases. The coupling loops should be free to move so that they work properly or part of the train may become detached during a run.

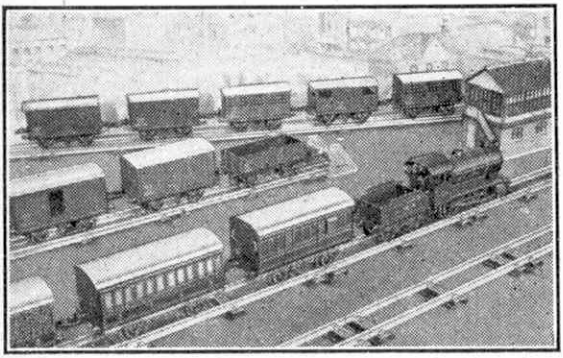
Once we have seen to these items and the different vehicles are in a good free-running condition, nothing much in addition will need to be done to them for some time, as long as they are carefully used. After a time the coaches or wagons eventually assume that kind of "grubby" appearance that is the result of much handling. In addition, as a result of the "mileage" they have covered the wheels will pick up a certain amount of the oily deposit that forms on the rails after a period of running. If this is allowed to accumulate it causes woolly and unsatisfactory running. The axles too will have become a little "fluffy," especially if the railway is used on the carpet.



"Winby" Station on the layout of Mr. G. M. Davies, Bristol. The engines shown include, on the near track, a 30 year old Hornby 4-4-0 that is still in good working order.

To deal with this we remove the wheels and axles from the underframes by easing the frames slightly apart and thus releasing the axles. Wheels and axles can now be separated and it is best to put them into a tin lid or something similar so that no parts get lost. Now each wheel and axle can be wiped clean.

The vehicle bodies and the roofs of covered stock will need cleaning up. A clean rag moistened with the smallest possible amount of soap will probably deal with the roofs best. For the bodywork a dry wipe followed by the use of a very little wax polish of good quality will smarten things up considerably and get rid of those finger marks. Other details such as the wheel frames, coach footboards and buffers will probably need merely a wipe, or dusting with an old toothbrush or something similar.

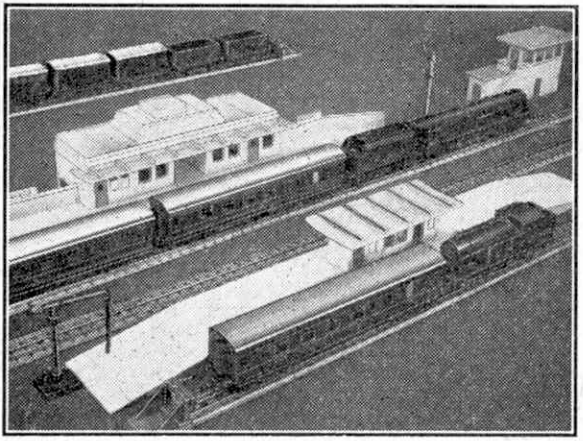


A passenger train in charge of a Hornby No. 501 locomotive passes the sidings in which various items of rolling stock are standing.

More Mixed Traffic in Hornby-Dublo

LAST month's article *"Mixed Traffic in Hornby-Dublo"* dealt with a variety of trains that can be run with the Hornby-Dublo Tank Locomotive. This month we give some further examples of tank engine duties, and we deal also with the types of trains on which the express engines *"Duchess of Atholl"* and *"Sir Nigel Gresley"* can be used.

For branch line working, instead of a standard train of two or three coaches it is quite an attractive scheme to run a one-coach "push-pull" unit. One of the standard brake third Coaches can form the passenger part of this and the Hornby-Dublo Tank will supply the motive power.



Hornby-Dublo "Duchess of Atholl" heads an express through the station. In the foreground is a branch line train.

With this type of train the engine pulls its load in one direction, but on the return journey the coach is pushed by the engine. In actual practice, when the coach is leading the driver rides in a special compartment at what has become the head of the train and he controls the starting and stopping of the engine from there. Special arrangements are made for this remote control and the fireman remains on the engine footplate in the usual way.

Our first picture shows a branch line push-pull train alongside a main line junction platform on a Hornby-Dublo system. An advantage of this method of train working that is specially valuable in miniature is that no running round is necessary for the locomotive at each end of the journey. This means that a loop line and its points are not required, so that the branch line equipment and layout can be of the simplest character.

In addition to such branch line working the push-pull train can be used to supplement the normal stopping train services. Its inclusion in the running scheme in between trains of normal type will certainly add to the interest of operations.

When not occupied with local passenger or goods working a Hornby-Dublo Tank Locomotive need not be idle. It can carry out the assembly of main line passenger trains and bring these to the main station ready for one of the express engines to take over. Similarly where the main line engine does not dispose of its train after the journey is over, the Tank engine is needed again. On a layout where the train service is frequent the working of empty stock trains has to be managed rather carefully to avoid delays.

Operations of the kind just described, in which changes of engines occur, will involve the use of Hornby-Dublo Isolating Rails and Uncoupling Rails. As noted last month in connection with certain station operations then described, the positions of these rails need to be worked out carefully in order to provide for the operations that the Hornby-Dublo railway owner intends to carry out.

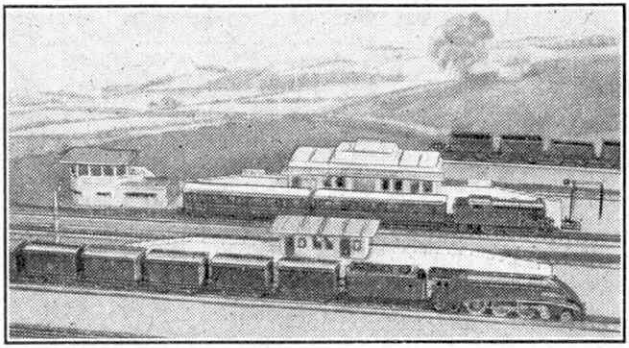
Express train running on a Hornby-Dublo layout usually involves either the components of the *"Duchess of Atholl"* Train Set or those of the *"Sir Nigel Gresley"* Set, sometimes with additional stock so that a three-coach or four-coach train becomes a possibility. With engine, track and stock in good order, the loads that can be hauled comfortably depend to a great extent on the amount of straight run that is available on the layout. With a fair stretch of straight track greater loads can be taken than when the system

is nearly all curves; the latter add to train resistance and so to the work demanded of the engine.

If the Hornby-Dublo owner has extra vehicles over and above those in the Train Set he should try to arrange the formation of his expresses so that the brake third vehicles are marshalled at each end of the train, with their guard's brake and luggage sections outermost. This gives a pleasing, tidy effect. Where trains take up extra vehicles on the way it may not be possible always to observe this practice, but long-distance trains running through with unchanged formation always look better with their brake ends at head and tail respectively. Thus arranged they provide worthy loads for either the "*Duchess of Atholl*" or "*Sir Nigel Gresley*."

In addition to working through expresses of this kind either of these engines can be used effectively on trains of a main line character that make fairly numerous stops. There are many real trains that do a lot of useful roadside work. In miniature they can convey additional vehicles, either Vans or "through" Coaches, from point to point at different stages of their journey. They can make connections with the branch line "push-pull" unit mentioned previously; or they can make a stop or two, supposedly in the outer suburban area, to connect with the shorter-distance "all stations" trains.

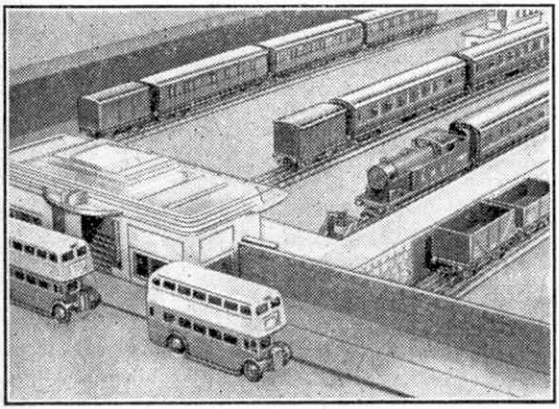
To complete their duties the Hornby-Dublo 4–6–2s are used on many layouts to haul long-distance fast freight trains.



A long-distance train of Hornby-Dublo Vans in charge of "Sir Nigel Gresley" hurries through a suburban station. Note the stopping passenger train at the platform.

One of these engines looks quite impressive on a train of Vans, as the upper picture on this page shows. Hornby-Dublo Fish or Meat Vans, Cattle Trucks and the standard goods Vans can all appear in trains of this kind, the rear end being completed by the necessary Goods Brake Van.

Such real trains often hurry through to destination with their make-up unchanged, calling only at one or two intermediate points for examination or locomotive purposes. Side tracking a Hornby-Dublo Van train in a station or yard loop in this way can be quite thrilling, especially if the loop can be isolated electrically. Then another train, possibly an express, can pass by on the main track while the Van train undergoes examination and the engine "takes water" from a Hornby-Dublo Water Crane. The position of the latter should be chosen with care, so that longest trains can get comfortably in the loop when the engine's tender is alongside the Crane. Bringing the train to a stand so that the tender is within easy reach of the Crane will need careful engine driving.



Dinky Toys motor buses wait outside the station. A Hornby-Dublo Tank is alongside the platform with an empty train.

For other Stamp Advertisements see also pages 186 and xvi.

Stamp Collecting

A New Dominion

By F. Riley, B.Sc.

AFTER the end of the war three new Dominions were created within the framework of the British Empire, and in each case this was the beginning of a new series of stamps. One of the new Dominions was Ceylon, and the first anniversary of the independence of this beautiful island was commemorated in February 1949 by the appearance of four stamps, in two designs that no doubt immediately became familiar to readers of the "*M.M.*" One of the designs portrayed Dr. Senanayake, the Prime Minister of Ceylon, and the other showed the Lion Flag of the new Dominion.

A really interesting change was introduced with these stamps. The watermark of the paper on which previous stamps of Ceylon were printed was the usual colonial one known as Multiple Script CA. Paper with this watermark was used for the earliest issue of the independence stamps, which comprised the 4c. and 5c. values. Two months later came the 15c. and 25c. values, with the same two designs, but now with a different watermark, for in place of the CA and Crown we had a formal representation of the lotus flower and the character Sri from the Singhalese alphabet. This characteristic watermark has been a feature of all the stamps that have since been issued in Ceylon.

The next opportunity for the new Dominion was provided by the 75th anniversary of the Universal Postal Union. Ceylon celebrated the event with a set of three values, each with its own design. These were similar, the central feature of each being a globe showing the Old World side of the Earth, a view that quite naturally brings Ceylon almost into the centre of the hemisphere. Background views of trains, ships, aeroplanes and scenes in sunny Ceylon were included in all three.

Excellent pictorial sets appeared in Ceylon when it was a colonial possession, and the first definitive issue of the new Dominion was a splendid continuation. This came out just over a year ago. It included six stamps, four of which are reproduced on this page. The first thing that strikes the collector is that the King's head does not appear, as it did on all issues prior to the grant of independence.

Ceylon is a beautiful island, with a remarkable history. Both aspects are represented in this set, with chief emphasis on the historical side. The 4c. value gives an excellent start. It shows a Kandyan dancer. Kandy was long the capital of the country and the Kandyans maintained their independence for centuries after the lower lands around the coasts had been occupied by Europeans. The ancient city is famous for its "Perahera."

a great religious procession in which elephants and Kandyan dancers appear, and it is the home of the Palace of the Tooth, in which is kept a single tooth believed to be that of Buddha himself, a sacred relic that cures all ills.

The 5c. value is the only stamp of the issue to appear in one colour, green. The building on it is the Kiri Vehera, a temple in the ruined city of Polonnaruwa. Nearly 1,000 years ago this was the capital of Ceylon. Then it faded quite out of sight, and its rescue from the jungle that had overgrown it came only during the present century.

With the 15c. value we leave the historical side of Ceylon for a moment, for it shows us an orchid that is peculiar to Ceylon and blooms freely in midsummer in the jungles surrounding Adam's Peak. To orchid experts it is the Dendrobium Macarthiae, but the Singhalese call it the Vesak Mala or Orchid because the time when it blooms, May and June, is in the Singhalese month of Vesak.

Even here we do not entirely get away from the remarkable history of Ceylon, which is rich in beautiful legends, for in the background of the stamp the famous mountain known to us as Adam's Peak can be seen. This is not the highest in Ceylon, but on its summit is a cleft in the rock that is claimed as a footmark left by Buddha. Mohammedans and Hindus also lay claim to this mark, however. The former say that when Adam was expelled from the Garden of Eden he stood for 1,000 years on one foot on the Peak by way of penance, while Hindus say that the footprint, which is about 5 ft. long, is that of their Goddess Siva. The relic is protected by a pavilion built over it, and is revered by millions.

The 30c. value presents us with another representation of a Ceylonese stamp feature, the Sigiriya or Lion's Rock. As the design shows, this rises almost vertically to a height of about 600 ft. above the surrounding plain and on it was an ancient fortress. The ruins of an ancient religious establishment are shown upon the one rupee value, but the remaining stamp, 75c., is more modern in design. It provides publicity for Air Ceylon, a Government enterprise that maintains air services locally and to Great Britain and Australia as well. A large passenger aircraft symbolises this, and the Library of ancient books at the Temple of the Tooth in Kandy also is shown on the stamp.

Enough has been said to suggest that Ceylon is a good country to choose for a special collection. The beginner may not be able to include the earlier portrait stamps, particularly those with values in pence, for these are costly, but even if he begins only with the Silver Jubilee issue he will soon have an attractive display.

For other Stamp Advertisements see also pages 184 and xvi.

Stamp Gossip

and Notes on New Issues

By F. E. Metcalfe

A COLLECTOR was asking recently what Egypt was doing in the way of new stamps. Not long after that she did something in a big way, for in one day she brought out three commemorative stamps, which were to celebrate three different events. Two of these are reproduced here. One is the 10 mil stamp issued in honour of the King Fouad 1st Desert Institute, which was opened actually in 1950.

The second stamp was one of 22m. which commemorated the 25th Anniversary of the King Fouad 1st University, and the third of 30m. value commemorates the 75th Anniversary of the Royal Egyptian Geographical Society—a very important society by the way. Let it be said at once, that while the designs are attractive enough, the colours—all three are bi-coloured—are rather horrid, clashing in a way that occurs with some of our Northern Rhodesia stamps.

There was a time when Egyptian stamps were exceedingly popular with British collectors. That was when they were catalogued with our colonial stamps, but after they had been there for many years, and dealers and collectors had thereby taken them along with their colonial section, they were suddenly removed and put—well, not too many collectors knew or know in which section they were put. In any event, it meant buying another catalogue, if one was going to keep track of them, so gradually the interest died down, until to-day these colourful commemoratives come and go, but not much notice is taken of them. This is rather a pity, for without a doubt Egyptian stamps make a magnificent show.

India has provided us with a really handsome commemorative stamp, for on 13th January a large 2a. stamp was emitted to commemorate the centenary of the Geological Survey of India. This stamp is illustrated here, and the two animals shown are said to be of an extinct species of the Indian elephant, their zoological name being *Stegodon Ganesa*. The design was adopted from a picture that appeared in one of the publications of the American Natural History Museum. Although the issue is said to be of a limited nature, copies both mint and used are not very hard to come by.

The Swiss Post Office recently released some figures that will be of interest to collectors, for it shows what a lot of money is spent on stamps. During 1950 the sales of Swiss Charity stamps amounted to the fantastic sum of 2,126,000 francs. When those of us who have spent a holiday in Switzerland, where we had to think carefully before spending a single franc, ponder over that figure, how it makes one's mouth water.

But even that figure is made to look as nothing beside the one provided by our Crown Agents. During 1949 they sold through the London Agency 27,021,416 colonial stamps, with a face value of £1,074,670. That's real money, that is!

Another stamp that has caused quite a bit of discussion is the new 1 dol. stamp of Canada, which was placed on sale on 1st February. Apparently Canada is going all modern in its stamp designs. The writer of these notes thought that the 10c. stamp, the wigwam design, was really attractive, but this as well as the newer 1 dol. stamp is coming in for a lot of criticism. There is no more important country philatelically than Canada, so every new stamp it brings out is news. As many are scheduled for release this year, Canada looks like being very much in the stamp collector's eye.

Apparently our own country is going to do some big things in the way of new stamps too. The set to be issued in honour of the London Exhibition is going to be one that will be of interest to collectors all over the world, if our Postmaster General is to be believed. For the time being the only comment called for is that the set will have to be very different from anything our post office has emitted up to now, for not a single commemorative set issued by the British Post Office is anything but a dull, trite, unimaginative affair.

A collector says that he has a couple of stamps of Papua and one or two of British New Guinea, and he wants to know why such a high price is charged for these when they must only be current. The answer is that they are not current at all, for these two countries have been joined up for administrative purposes, and at present they are using Australian stamps. However, it is said that a new set of stamps is in preparation and these will be placed on sale before the end of 1951.

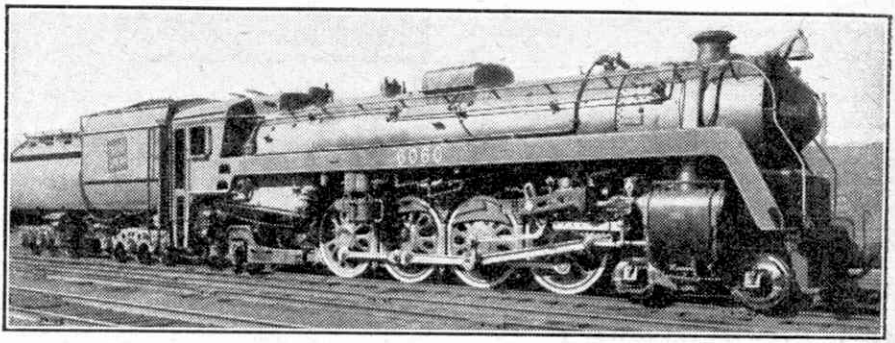
Another collector points out that he has a block of four of an early Argentina stamp. He would like to break it up, to use three for swops, but has heard that many of these old stamps are quite scarce in block form, and what about it? Without seeing the stamp, it is not possible to say if it is a scarce stamp in a block, and the probability is that it is not particularly scarce; but if a single has a fairly high catalogue value, it will be better to get expert opinion before any separating is done. For instance, the large blue stamp of Argentine, 50c. Mitre, is not particularly scarce mint, as a single, but in block form it is quite rare and worth many times the single price.

Many collectors are fond of shades, but seem to ignore those of G.B. There is one, of the current 6d., a reddish-purple, and well worth looking for. A mint copy is best.

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.

North American Locomotive Features



There must be few readers of the "*M.M.*" who cannot distinguish practically at once between a locomotive designed and built in North America and one produced in Great Britain. For instance, the headlight set in the coned smoke-box door is a familiar feature of many streamlined American locomotives. There are many other features that are definitely characteristic of the locomotives of Canada and the United States, and often where particular items are similar on both sides of the Atlantic they occupy different places.

Our competition this month is based on these differences. What readers are asked to do is to make a list of the special North American features of the C.N.R. 4–8–2 locomotive illustrated on this page, with those common in Great Britain that occupy characteristically different positions on the engines of those countries. In each case the feature discovered in the illustration must be clearly named, and a short note added on its purpose.

As usual the competition will be divided into two sections, for Home and Overseas readers respectively and in each of these there will be prizes of 21/–, 15/– and 10/6. Consolation prizes will be awarded for other deserving efforts, and in the event of a tie the judges will take neatness and novelty into account.

Entries should be addressed to "*April Locomotive Features Contest, Meccano Magazine, Binns Road, Liverpool 13.*" Closing dates: Home Section, 31st May; Overseas Section, 31st August.

Meccano Parts Names Doublets

An interesting game that has formed the basis of popular "*M.M.*" Contests in the past is that of changing one word into another, letter by letter. The rules of this game are simple. Every link between the two words must itself be a recognised word that can be found in any dictionary, and the names of people or places are not allowed.

Here is an example that will show exactly how the game is played. Let us begin with the word LOAD. Through the three links LORD, CORD, CARD this becomes CART.

This word game provides us with an interesting competition this month. The words used in it are either the names of Meccano Parts or are included in Part names, but of course the links need not be names connected in any way with the Meccano hobby. Here they are, 10 changes in all:

1.	Change	PAWL	to	RACE.
2.	and	BOLT	to	HANK.
3.	A	WASHER	needs a	BOILER.
4.	Can a	WORM	get the	SACK?
5.	Place	BOSS	on	HOOK!
6.	A	PLATE	for a	CRANK.
7.	Let	GIRDER	run on	ROLLER.
8.	Fit	CORD	on	GEAR.
9.	Change	SCREW	to	STRIP.
10.	and	STRIP	to	SHAFT.

The aim is to complete the changes with as small a number of links as possible. It is important to remember that the first solution arrived at is not necessarily the shortest.

In judging the entries the 10 examples will be considered as one contest. There will be the usual sections for Home and Overseas readers respectively. In each prizes of the value of 21/–, 15/– and 10/6 will be awarded to the senders of the solutions having the lowest total number of links, and this number must be clearly stated on each entry. In the event of a tie for any of the prizes preference will be given to the neatest or most novel arrangement.

Entries should be addressed "*April Doublets Contest, Meccano Magazine, Binns Road, Liverpool 13.*" Closing dates: Home Section, 31st May; Overseas Section, 31st August.

April Photographic Contest

The fourth of our 1951 series of photographic contests is a general one, in which we invite readers to send in prints of any subject. 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 section prizes of 21/–, 15/– and 10/6 will be awarded. Entries should be addressed "*April Photographic Contest, Meccano Magazine, Binns Road, Liverpool 13.*" Closing dates, Home Section: 30th April; Overseas Section, 31st July.

Competition Results

HOME

OCTOBER 1950 CITY SQUARE CONTEST

1st Prize: S. L. Dow, Cupar, Fife. 2nd Prize: J. B. Muir, Freuchie, Fife. 3rd Prize: C. Dawson, Stratford-on-Avon. Consolation Prizes: G. Targett, Shirley; N. S. Ormerod, Stretford; G. J. Mills, Birmingham 31; P. Alker, Ormskirk.

OCTOBER 1950 WAGON PARTS CONTEST

1st Prize: F. Steele, Birmingham 30. 2nd Prize: J. Dyson, Langwith Junction, nr. Mansfield. 3rd Prize: R. P. Walford, Newton Abbot. Consolation Prizes: P. D. Bowen, Gowerton; J. M. Parker, Stalybridge; H. J. Buckingham, East Kirkby; A. Darlow, Sheffield 5.

OCTOBER 1950 PHOTOGRAPHIC CONTEST

1st Prize, Section A: C. E. Willits, North Shields; Section B: B. Waller, Loughton. 2nd Prize, Section A: C. R. Davis, Upton; Section B: A. Hobbs, Dartmouth. 3rd Prize, Section A: G. S. Garratt, Horsforth; Section B: I. W. Duckles, Snaith. Consolation Prizes, Section A: S. Duff, Belfast; C. Jones, Keynsham; P. R. Starbuck, Gravesend; H. O. Thomas, Aldershot; C. H. Thomas, Southampton; Section B: J. Morton, Manchester 8; N. W. Cross, Aylesbury; E. March, Upminster; I. J. Philip, Sedburgh.

NOVEMBER 1950 FIGUREWORD CONTEST

1st Prize: M. Waller, Stonehouse. 2nd Prize: D. Whalley, Blackpool. 3rd Prize: W. N. Phillips, Colchester. Consolation Prizes: A. H. Gregory, Harpenden; J. M. J. Hodgson, London N.20; C. S. Slater, Orpington; W. J. Stoddart, Milton Bridge; J. W. Browning, London W.13.

NOVEMBER 1950 LOCOMOTIVE NAMES CONTEST

1st Prize: A. W. Burges, New Malden. 2nd Prize: J. H. Mynard, Honiton. 3rd Prize: I. Johnston, Burnley. Consolation Prizes: B. Lockey, Luton; J. H. Horner, Kempston; M. J. Baxter, King's Lynn.

NOVEMBER 1950 PHOTOGRAPHIC CONTEST

1st Prize, Section A: W. Forsch, Stoke-on-Trent; Section B: T. Rickard, Lymington. 2nd Prize, Section A: D. Jenkinson, Leeds; Section B: N. Riley, Hebden Bridge. 3rd Prize, Section A: A. W. Sansom, Bristol 6. Section B: N. H. Hughes, London W.13. Consolation Prizes, Section A: T. Mahoney, Dundee; F. Arden, Runcorn; A. Anderson, Hounslow; M. B. Wightwick, West Wickham; J. H. Boyes, Wylam. Section B: R. Thatcher, Slough; R. Albon, London N.14; L. Wilkinson, Preston; E. Eustance, Liverpool 18; A. J. W. Dance, Hoylake; J. Lenanton, Soham.

DECEMBER 1950 PHOTOGRAPHIC CONTEST

1st Prize, Section A: P. Lambert, Harrogate; Section B: R. Soper, Gateshead 9. 2nd Prize, Section A: I. Hudson, London S.W.16; Section B: A. L. Pugh, London S.W.16. 3rd Prize, Section A: J. R. Hill, Liverpool 23; Section B: J. Prior, Nottingham. Consolation Prizes, Section A: J. B. Alker, Wigan; D. Mills, Caernarvon; G. H. Sanders, Birmingham 27. Section B: C. J. Dufton, Bradford; D. G. Fifer, Peterborough; B. Brian Heap, Furness Vale; J. Hayward, Bagshot; N. E. Leighton, Wolverton.

OVERSEAS

JULY 1950 CROSS NUMBER PUZZLE

1st Prize: J. P. Foulah, Alexandria, Egypt. 2nd Prize: K. Hooker, Madras, India. 3rd Prize: I. N. Coomer, Little Rock, U.S.A. Consolation Prize: D. G. Monteith, Hamilton, N.Z.

JULY 1950 DRAWING CONTEST

1st Prize, Section A: G. N. Ackroyd, Temperley; Argentina; Section B: N. Dawson, Petone, N.Z. 2nd Prize, Section A: S. A. Brown, Cape Town, S. Africa; Section B: R. Grant, M.E.L.F. 13. 3rd Prize, Section A: A. E. Hamilton, Dunedin, S.W.1., N.Z. Section B: T. Cudby, Wellington, N.Z. Consolation Prizes, Section A: J. Bowler, Tasmania, Australia; G. Keuck, Bellville, S. Africa; K. Brooks, Dunsany, Eire. Section B: K. Shaab, Lower Hutt, N.Z. R. Shaab, Lower Hutt, N.Z.

AUGUST 1950 CROSSWORD PUZZLE

1st Prize: G. E. McKinnon, North Sydney, Australia. 2nd Prize: D. E. Cooper, Bombay, India. 3rd Prize: J. Manduca, Malta, G.C. Consolation Prizes: N. Gottlob, Hjortekaer, Denmark; W. M. Van Derlee, Donnybrook, Eire; B. K. Bhargava, Mathura, U.P., India.

AUGUST 1950 LOCOMOTIVE CONTEST

1st Prize: J. McGuire, Waterford, Eire. 2nd Prize: S. F. Lockyard, Perth, Australia. 3rd Prize: T. Busby, Berne, Switzerland. Consolation Prizes: J. A. Gomes, Bombay 20, India; P. P. Singh, Dehra Dun, U.P., India.

AUGUST 1950 PHOTOGRAPHIC CONTEST

1st Prize, Section A: P. K. Buttock, Bombay, India; Section B: R. Rogers, Vancouver, Canada. 2nd Prize, Section A: H. De Silva, Quelimane, Mozambique; Section B: J. A. Ellice, Port Elizabeth, S. Africa. 3rd Prize, Section A: V. Privitera, Gzira, Malta, G.C. Section B: L. Vineyard, Auckland, N.Z. Consolation Prizes: P. N. Bland, Portarlington, Eire; O. Rudden, Dublin, Eire.

"Job Ashore." An 86 year old Whitby fisherman sorting cod lines in his back yard. Photograph by C. E. Willets, North Shields. Awarded 1st Prize in the October 1950 Sec. A. Photographic Contest.

Swansea and Mumbles Railway—(*Cont. from p. 148*)

this was because all station platforms were on the same side of the line.

Such then was the typical Swansea and Mumbles train of the spacious days of steam, puffing its way along at the 4 m.p.h. to which speed was restricted in the Swansea streets. On the open stretches speed might go up to 20 m.p.h.

Although steam haulage lasted until 1929, electrification had been a possibility on several occasions. When it did come about it provided passengers with very large bogie double-deck tramcars, the upper decks being of course covered in. They are in fact the largest tramcars built for service in this country. Instead of the usual trolley pole for current collection from the overhead wire system, pantograph collectors are used. As in earlier stock both entrances are on the same side of each car, and two cars can be run coupled together and controlled as one unit. Air brakes are provided and the safety devices include the usual dead-man's handle type of control.

Until the electrification there was no system of signalling, but to-day colour-light signals control the passage of the cars in such a way that no more than one of them, or one train of them, can be in the same single line section at once.

Development of the Rotorplane—(*Cont. from p. 151*)

better still six, rotors in line, along a hull like that of a ship. Then, if one goes, the others can still keep the ship on an even keel. But, you object, rotors are so large in diameter that you will need an enormously long hull. The answer to that seems to be to build your rotors as biplanes or triplanes—running the same way on each shaft, but perhaps opposite ways on different shafts—and so cut the diameter of their circles by half or two-thirds.

Have any of you heard of or seen Jules Verne's "*Clipper of the Clouds*"? He had the right idea about 70 years ago. Although there were no motors in those days to drive his rotors, he imagined a mysterious power to do so.

Jules Verne also imagined submarines and other strange things that have now come to pass, though not just as he thought. Let us therefore think ahead about our rotorplanes, because, till we get them Air Transport will still be where railways were when there were no wayside stations, or where motor transport was when there were no roadside garages. We need landing grounds everywhere for our rotorplanes. But we need our rotorbuses and rotorcars first.

The First British Standard Locomotive—(*Continued from page 157*)

being no tender footplate as such and the usual hinged drop plate between the engine and tender is dispensed with. All controls are grouped for easy access and operation.

Other footplate amenities include an upholstered seat with back rest for the driver and side windscreens outside the cab for both men. Locker accommodation on the tender front includes a food cupboard fitted with detachable stainless steel lining.

The tender is characterised by a set-in bunker on similar lines to the tenders of recent London Midland 2-6-0s. This arrangement provides a good view to the rear for tender-first running. A tender cab is not provided but the engine cab roof comes well back and the tender front has a sort of spectacle plate for protection of the men when travelling backward. The tender tank is welded and has large-radius corners to facilitate construction. The water sieves through which the feed passes to the injectors are arranged externally. The sieve portion is easily withdrawn for cleaning or renewal purposes, this arrangement avoiding many an unpleasant "tank job" on the shed.

The tender runs on six wheels that are of smaller diameter than has been usual up to now in this country. This has simplified the tank construction for it avoids the recesses that often have to be provided in the tank when large-diameter wheels are used. Water pick-up apparatus is provided and access to the tender water-filling hole is gained by means of a ladder running up the rear of the tank.

Simple Elliptic Compasses—(*Continued from page 179*)

any suitable means. One suggested alternative is a pair of Sprocket Wheels, connected by an endless Sprocket Chain.

The lining up for ellipses is that the Axle Rods 15 must start parallel, and remain so while the curve is being drawn. The link pivot of one turntable is set out from the centre a distance equal to the semi-major axis of the required ellipse, that of the other to the semi-minor axis. If both are set out at the same distance, the resultant curve will be a circle.

In Figs. 1 and 3 it will be seen that one of the Handrail Supports is shown on the same side of the centre of the turntable as the Coupling holding the link pivot, so that the latter cannot be moved in to a very small radius. Should this be required both Handrail Supports should be mounted on the disc on the opposite side of the centre to the link pivot.

If one of the Axle Rods 15, instead of being parallel to the other, is set at varying angles in advance or in rear of it, a variety of interesting curves will result.

"The Flying Kangaroo"—(*Continued from page 172*)

in the world. Never before had passengers or crews travelled in such luxury; full meals could be served in flight and there was sleeping accommodation for 14 passengers. For two years, Q.E.A. plied between Singapore and Sydney with these magnificent boats, and then came the war.

The wartime achievements of the merchant airmen of Qantas are as glorious as any in the history of aviation, and would fill a book ten times the size of the "*M.M.*" For a time they carried the Empire service through to Karachi, until Japanese aggression made this impossible. They supplied Singapore and the Dutch Indies under the barrels of Japanese guns, until ordered away or until their flying boats were shot out of the sky. Then, when the Allies began the long, grim struggle that was destined to end in Tokyo Bay, Q.E.A. flew reinforcements and supplies to the battle areas of New Guinea, and flew out casualties. They restored communications with India by flying a 3,513-mile service between Perth and Ceylon with "Catalinas"—the longest non-stop regular service in airline history. And when the war was over they helped B.O.A.C. re-open the London-Sydney route with "Lancastrians" and "Hythes," bringing the extremities of the Empire within three days of each other.

To-day, Qantas Empire Airways operate over 33,000 route miles and employ a staff of 4,000. At the head, as always, is Hudson Fysh. Only K.L.M. can claim a longer history of service than Qantas; none can claim a finer one.

New Meccano Model—(*Continued from page 177*)

a 3" × 1½" Flat Plate.

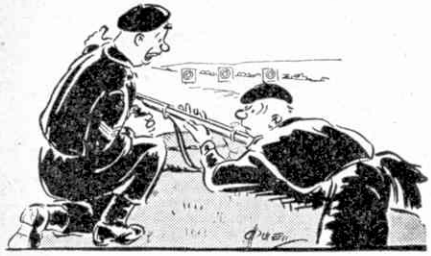
A small hatchway 33 (Fig. 1 page 176) consists of two small Corner Brackets bolted to three Double Brackets. It is fixed in place by a 1½" Bolt 34. The foremast is an 11½" Rod mounted in a Double Bracket and carries at its lower end a small Fork Piece that pivots on a Bolt ¾" passed through the Double Bracket. The aft mast is an 8" Rod fitted at its lower end with a large Fork Piece that pivots on a ¾" Bolt passed through a Double Bracket. The port and starboard navigation lights are Collars held on ½" Bolts.

Details of the other small deck fittings, rigging and wireless aerial will be clear from the illustrations.

Fireside Fun

"Now, Smith, what is the formula for water?"
"H, I, J, K, L, M, N, O, sir."
"Rubbish. That isn't a formula at all. Where did you get that idea?"
"Please sir, you said water was H to O."

* * * *



"You've hit the bull, Griffin!"
"That's good shooting, sarge!"
"Good shootin'! Wait till the farmer hears . . . the animal was half a mile from the target."

* * * *

"No you can't have another piece of cake."
"But, mum, if you don't give me the chance to practise I shall never learn to eat nicely, as you want me to."

* * * *

"I say, Bill, your two hens aren't laying now. They're lying."
"What on earth do you mean?"
"I've just run over them."

* * * *

"How do I get to Puddleham from here?"
"You go down the road, an' turn to the right, an—but no, you'd get lost that way."
"Well, then, which way should I go?"
"Let me see now. Go up the road, take the second turn to the left—but that's complicated too. Really I think you'd better not start from here at all."

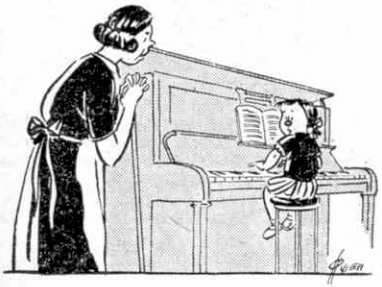
* * * *

Foreman: "And don't forget! I'll have no clock watchers here."
New boy: "I'm not one of them, sir. Look, I've got a watch of my own."

* * * *

"Are tents pitched and boats tarred with the same brush?"
"Of course, and some guys pitch wickets with it too."

* * * *



"Molly, I told you to wash your hands before playing."
"But I'm only touching the black notes, Mummy!"

BRAIN TEASERS

START AT THE END

Those who tried the multiplication problem in last month's "*M.M.*," whether they succeeded in solving it or not, should tackle this division sum. They should find it easier.

```
N Q) O P M S (U Q R
   R O
   ---
     T M
     Q M
     ---
     N S S
       M N
       ---
         M
         -
```

* * *

HEAD ON

On a single track two trains meet each other at a passing loop. One train, A, consists of the engine and 11 wagons, the other, B, of engine and five wagons. Unfortunately the passing loop can only hold either one engine and two wagons, or three wagons. Can the trains pass each other, and if so, how?

* * * *

"Will you boys stop fighting if I give you sixpence each?"
"Make it a bob for the winner, mister!"

* * * *

TOO EASY

It is remarkable what can be done with numbers. For instance, take the number 2, or rather take three twos, and with them form three different groups, the second of which is twice the first and half the third.

* * * *

PIECE THE PIECES TOGETHER

While walking through the Park Smith saw pieces of a torn sheet of paper on the ground by one of the seats. As he was a tidy boy he started to pick them up and then noticed that each bit had letters on it. Out of curiosity he examined them carefully and found the following letters on the 12 fragments: ER, D, TON, SER, HA, CAR, H, UT, EY, RRI, MERC, BE and S.

Suddenly he realised that these scraps made up the names of men famous in sport and counted five of these. What were the names?

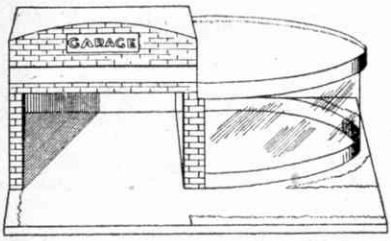
* * * *

SOLUTIONS TO LAST MONTH'S PUZZLES

The firm well-known in the gramophone world referred to in our first puzzle last month is DECCA. It is easy to see that C must represent the figure 1, and then step by step the sum is found to consist of the multiplication of 2076 by 41.

The five aircraft hidden in the long lines of letters in our second puzzle are:

STRATOCRUISER, CONSTELLATION, SKYMASTER, BRABAZON and COMET.



GARAGES FOR DINKY TOYS!

SHOWROOM TYPE (illustrated) 16" x 13½" ..	23/6
BRICK TYPE 15" x 11"	12/6
OVAL TYPE 2 floors 19" x 7½"	19/3

Free List—Trade Supplied

GEORGE BRADSHAW
5 and 6, WESTERN ROAD
HOVE, SUSSEX

HIGHSTONE UTILITIES

Meters. 15 v., 2½ in., m/c, **9/6**; 150 v., 2 in., m/c, **10/–**; 15/600 v., 2 in., m/c, D.R., **8/–**; 100 m/a., 2 in., m/c, **7/6**; 3.5 amp., 2 in. T.C., **5/–**; 4 amp., 2½ in. T.C., in case with switch, **7/6**; Meter Movements, 2 in. size with magnet and case (500 microamp), **2/6**. Units containing two movements, **5/–**. All post extra.
Bell Transformers. These guaranteed transformers work from any A.C. Mains, giving 3, 5, or 8 volts output at 1 amp., operate bulb, buzzer or bell. Will supply light in bedroom or larder, etc. Price **8/–**, post **6d.** BELLS, **6/–**.
Ex-R.A.F. 2-valve (2-volt) Microphone Amplifiers as used in plane inter-com., in self-contained metal case; can be used to make up a deaf aid outfit, intercommunication system, or with crystal set, complete with valves, **20/–**, post 1/6. Ditto, less valves, **10/–**. **Hand Microphones,** with switch in handle, and lead, **4/–**. Similar instrument, moving coil, **7/6**, post **6d.**
Mike Buttons (carbon), **2/–**. **Moving Coil, 4/6; Transformers, 5/–**. All post **4d.** each.
Soldering Irons. Our new streamlined Iron is supplied with two interchangeable bits, one each straight and curved; 200/250 v. 50 watts, **10/–**. **Standard Iron** with adjustable bit, 200/250 v., 60 watts, **11/–**. **Heavy Duty Iron,** 150 watts, **14/6**, all post **6d. Crystal Sets.** Our latest Model is a real radio receiver, fitted with a permanent crystal detector, **10/6**, post **6d.** De Luxe Receiver in polished cabinet, **18/6**, post **1/–**. Spare Permanent Detectors, **2/–** each. When ordered separately, **2/6**, with clips and screws, **2/10**, post **3d.** Headphones, brand new, S. G. Brown, G.E.C., etc., **15/–**, **23/–**, and super-sensitive, **30/–**, post **8d. New Headphones, 10/–**. Balanced armature type (very sensitive), **12/6**. Both post **8d.** New **Single Earpieces, 3/6**. Bal. armature type, **4/6**; ex-R.A.F. earpiece, **2/–**, post **4d. Headphones,** in good order, **4/6** and **5/6** (better quality, **7/6**), all post **8d.** Letters only. Money refunded if not completely satisfied.

58, New Wanstead, London E.11
Illustrated List sent on request with 1d. stamp and S.A.E.

You'll never meet REG HARRIS...

riding anything but

DUNLOP

50H/357

READERS' SALES AND WANTS

SALES

"M.M.s" May 1941 to March 1946. Excellent condition; 17/- or nearest offer.—P. Yelland, Grove, Nr. Retford, Notts.

Johnsons' size 20 Developing Tank (new 21/-), 15/-; S.E.L. Motor with Reversing Switch (No. 1260/R.S.), 12/6, and Dynamo (new 15/-), 11/-.—Lees, Aideevin, Chapel-en-le-Frith, Derbyshire.

No. 2 Meccano Outfit; Model Triang Yacht; both good condition. Model Field-Gun, fires Caps and Small Shells; 22 Dinky Toys; Two 'Planes; Seven Supertoys; all as new. Over 30 Books. Send for list.—Whippey, Stonecliffe, Horbury, Wakefield.

Two Gauge 0 Hornby 0-4-0 Locomotives, 40 Straight Rails (Two Brake Rails), 37 Curved Rails, Six Straight Half Rails, Six Straight Quarter Rails, Three R.H. Points, Two L.H. Points, Six No. 1 Buffers, CA 2 Crossing, Turntable, One Hornby Station (two extra lengths), One other Station; Four No. 1 Coaches, One Bk. Coach, One Crane Truck, One Goods and One Side Tipping Wagon, Two Gas Cylinder Wagons, Two Flat Trucks, One No. 1 Wagon, One Brake Van. Offers for lot to—R. S. O'Keefe, 18, Harrington Gardens, London S.W.7.

Burnac Steam Engine (copper boiler), in perfect running order; price £2.—Moorhouse, 330, Horbury Road, Lupset, Wakefield.

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.

Small Advertisements. 3/- per line (average seven words to the line), or 36/- per inch (average 12 lines to the inch). Cash with order.

Display. Quotations for space bookings, and latest net sale figures, will be sent on request.

Hornby Locomotives, Rolling Stock Gauge 0, Electric Track 1/3d. length. Marklin 00 Gauge Accessories. Send S.A.E.—Wheeler, 21, Adelaide Avenue, London S.E.4.

Hornby-Dublo Electric Train Set, almost new, also Goods and Passenger Locomotives, Points, Uncoupling Rails, etc., in new condition. — H. Halton, 16, Staplands Road, Broadgreen, Liverpool.

Hornby-Dublo Tank Goods Set with Transformer and Trix Carriage. Many extra Rails and Points. Details—Barton, 86, Emmanuel Road, London S.W.12.

Hornby 501 Locomotive and Tender. Also 101 Tank Locomotive, 43 ft. Track, 18 Accessories, Rolling Stock, Eight Points, Four Buffer Stops. Several other items. Complete £10, or offers. Good condition.—148, Tyburn Road, Erdington, Birmingham 24.

Yacht, good condition, 20 in. long, 4 in. beam; what offers? 1,000 Cigarette Cards and Four Albums. Reasonable condition.—P. Picton, Dilkush, Colwall, nr. Malvern.

"M.M.s" August 1946-May 1949 (October 1948 missing) and others, 5d. each. 1,807 Cigarette Cards; best offer over 30/-. Postage extra.—Girling, "Kelowna," London Road, Twyford, Berkshire.

No. 6 Meccano Outfit and "*Magic*" Motor, excellent condition, as new, £2/10/- or nearest offer.—K. Moore, 11, Oak Street, Derby.

"M.M.s" 1945-1949 inclusive, complete and in good condition, 15/-.—Derek Love, Sandiway, Northwich, Cheshire.

Twenty-three Dinky Toys for sale. Good condition. £2 the lot or separately. S.A.E. list.—Freeman, 15, Etta Street, London S.E.8.

WANTS

"Meccano Magazines," any copies prior to 1935. Bound in publishers' bindings or unbound. Must be clean and in good condition. All offers acknowledged. Write stating issues available and price required to—F. Palin, 42, Bedford Road, Kempston, Bedford.

Two Corridor Coaches No. 2 L.N.E.R. or L.M.S. Write—N. Bowers, 96, Hunter Street, Burton-on-Trent, Staffs.

Bound Volumes of the following "Meccano Magazines": 1925, 1927, 1928, 1929 and 1930. Must be in good condition.—Box No. MM18.

"M.M.s" October 1943, December 1943, January 1944. Must be clean condition. State price.—M. Clegg, Green Lane, Hollingworth, Manchester.

Hornby Gauge 0 Bogie Coaches and Bassett-Lowke Corridor Coaches; good condition.—M. Kennedy, 15, Greenbank Park, Edinburgh.

Hornby Clockwork 101 Locomotive (Tank); G.W.R. preferred, good condition; state price. Also Hornby large No. 2 Turntable.—J. Bradford, 17, Collins Road, Wednesbury, Staffs.

Meccano Super Model Leaflets, Nos. 13, 14, 16, 16a, 19a, 27, 28, 30, 37. Also Part No. 167 (complete), Geared Roller Bearings. Please quote prices.—Castle, 116, St. John's Hill, Sevenoaks, Kent.

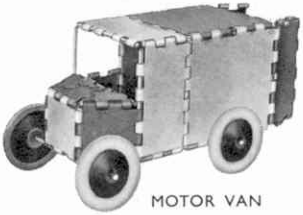
DINKY BUILDER

The SIMPLE Building Toy

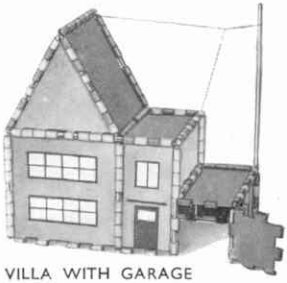
Simplicity is the keynote of this fascinating building system. With Dinky Builder hinged plates and rods the youngest children can build all kinds of models with the greatest ease—Furniture, Buildings, Windmills, Wheel Toys and scores of others.

The parts are beautifully enamelled in blue and yellow. They can be used over and over again. Nuts and bolts are not used in this system.

	Price, incl. Tax
No. 1 Dinky Builder Outfit	12/1
No. 2 Dinky Builder Outfit	22/11



MOTOR VAN



VILLA WITH GARAGE

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