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## MAGAZINE



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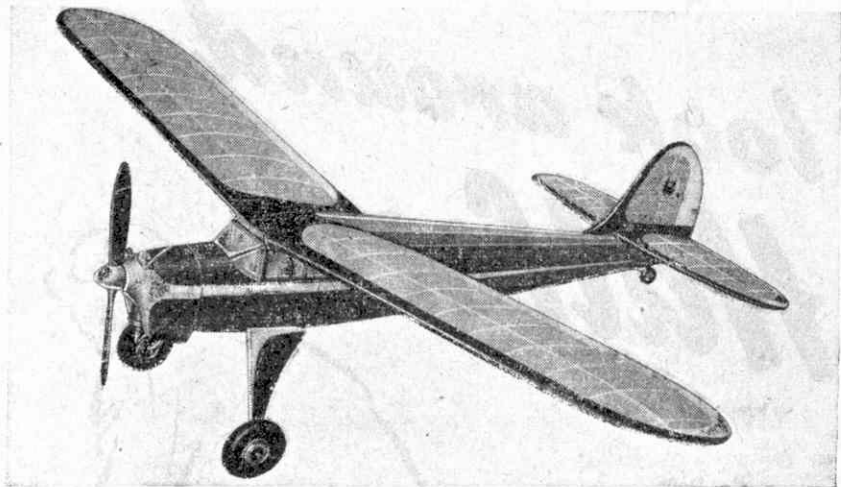
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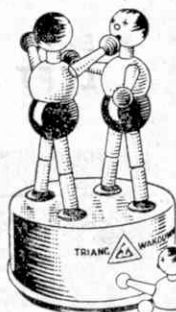
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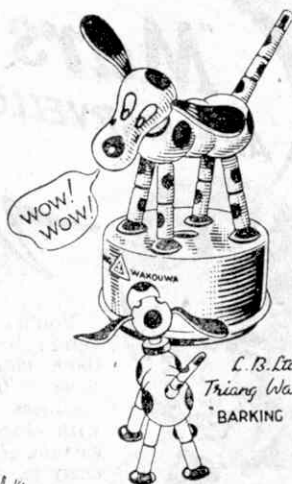
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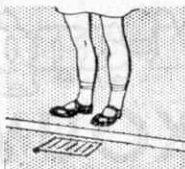
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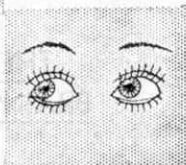
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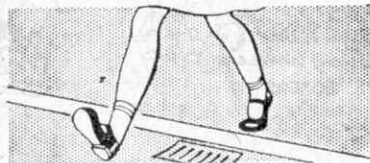
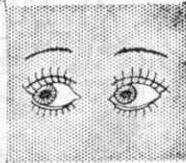
1 At the kerb  
**HALT**

2 Eyes  
**RIGHT**



3 Eyes  
**LEFT**

4 EYES  
**RIGHT  
AGAIN**  
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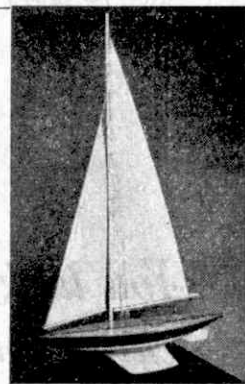
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Next Month: "NEW AND OLD IN THE AIR." By C. G. Grey

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## MAGAZINE

Vol. XXXII  
No. 9  
September 1947

With the Editor

### The Life-Boat Service, 1824-1947

I have been reading again the booklet issued by the R.N.L.I., reviewed on page 352, and I have been impressed with the amazing efficiency of the life-boat for her own particular job. First of all the boat must be enormously strong, and so into her structure go English oak, Canadian rock elm and red cedar, Burmese teak and Honduras mahogany—all woods with special qualities. She has to work in the worst weather, smothered in seas, her decks awash, her cockpits filled and perhaps even her engine room flooded; therefore everything mechanical on board must be water-tight.

Her engines will keep running even when under water; her radio set is water-tight and her searchlight would continue to shine even if dropped to the bottom of the sea. She has a gun that fires a steel rod carrying a line 80 yards instead of the bare 10 yards that was the range of a hand-thrown line; her loud hailer makes it possible for a man's voice to be heard 1,000 yards away as compared with the 50 yards of the ordinary megaphone. The R.N.L.I. have indeed travelled a long way since the days of the pulling and sailing life-boats.

Readers will be interested to hear that I have in preparation a long and well illustrated article on how a life-boat is built and equipped.

### The First Weather Ship

One of the most interesting events last month in the world of shipping was the sailing of the "*Weather Observer*" for her station in the North Atlantic west of Ireland. She is the first of the four weather ships to be provided by the Air Ministry under a recent international agreement.

This agreement, in which ten nations are taking part, provides for the maintenance of thirteen ships at stations in various parts of the Atlantic to record and transmit to a shore base a wide range of meteorological observations, to be made available for aircraft on the Atlantic services and for weather forecasting in general. In addition to this work the weather ships will provide assistance for aircraft in difficulties. It is intended that each ship shall spend twenty-seven days at sea followed by fifteen days in port. All the ships will be painted a vivid yellow.

The "*Weather Observer*" was formerly the "Flower" class corvette H.M.S. "*Marguerite*." Her crew of about fifty includes seven meteorological specialists and thirteen radio and radar experts. The home base for the four British weather ships will be Greenock.

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# The Caledonian Railway Centenary

By "North Western"

SEPTEMBER 1847 saw the opening of an important section of Scottish main line, for on the 10th of that month the Caledonian Railway began to work between Carlisle and Beattock. This month therefore marks the centenary of a route that since 1923 has been part of the great L.M.S. railway, into which the Caledonian was merged at grouping. This section of all but 40 miles long formed a notable link in the development of the West Coast Route between England and Scotland which reached completion from the south to Glasgow and to Edinburgh on 15th February 1848.

The Caledonian Railway Bill had not been authorised without a struggle. Two possible routes had been surveyed by Joseph Locke, one known as the Nithsdale route via Kilmarnock and Ayr, and the other via Beattock, known as the Annandale route; and both had become strongly supported by interested promoters. Then a Royal Commission appointed to report

and a stiff legal battle resulted, costing over

£70,000, but on 31st July 1845, in spite of strong opposition, the Caledonian route via Beattock was authorised.

So there came into being the first main line length of that popular system with its proud Scottish coat of arms; the "Caley" as so many travellers called it, a friendly nick-name that the company recognised and indeed used in its advertising. "Come by the Caley" its posters at one time encouraged us; and few who did so were disappointed, for the "Caley" did things well.

The Caledonian Railway ultimately provided a through route from the Border City to Aberdeen via Stirling and Perth. Main branches led to Glasgow and Edinburgh, and these two cities were also



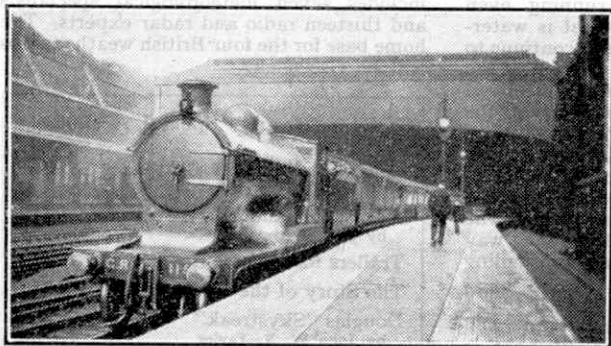
The Caledonian coat of arms.

joined direct and had in addition connections with the main line to the north. The Clyde Coast also was served, and farther north there were routes linking Oban with Dunblane via Callander and with Perth via Balquhiddier and Crieff.

Although the through rail route to Aberdeen was completed as early as 1850, the northern limit of Caledonian metals proper until 1865 was at Greenhill near Larbert, where the Scottish Central system was

joined. In 1865 the Caledonian took over the Scottish Central and so gained access to Perth, Dundee, Callander and Crieff. In 1866 the Scottish North Eastern Railway was amalgamated, and so the route through from Perth to Aberdeen with various branches came under Caledonian dominion.

In the neighbourhood of Glasgow itself, the city's oldest railway, the Glasgow



At Glasgow Central in 1919; Pickersgill 4-4-0 No. 115 on a London express. Photograph by O. S. Nock.

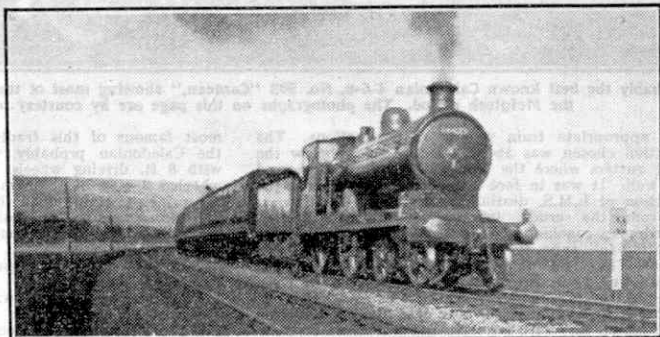
on the most advantageous route decided in favour of the Annandale scheme. By 1844 the title "Caledonian Railway" had already been adopted by the Annandale party, and preparations went ahead for the promotion of the necessary Parliamentary Bill to authorise construction. The rival Nithsdale party, as the Ayrshire, Dumfries and Carlisle Railway, also made ready for the Parliamentary proceedings,

and Garnkirk, had been opened in 1831, and through it and other local lines access to the north side of Glasgow was secured. For many years the chief terminal station in Glasgow was Buchanan Street, so all traffic to and from the north and main line trains to and from the south were dealt with there. In 1879, however, Glasgow Central with its bridge across the Clyde was opened, and this left Buchanan Street free to deal with the northern traffic while the southern, Clyde Coast and Edinburgh services were concentrated at "the Central." A later Caledonian development in the Glasgow area was the Glasgow Central low-level line. This afforded through connection between the company's lines on the east side and the extensions on the opposite side of the city. In addition this steam-worked underground system provided the means of dealing with a large volume of local traffic.

The Clyde coast traffic was an important Caledonian feature. In 1865 the Greenock and Wemyss Bay line, providing the shortest route between Glasgow and the lower reaches of the Clyde, was opened. Fierce competition for this traffic with the Glasgow and South Western Railway was ever the rule, and that company opened its line to Princes Pier, Greenock, in 1869. A later development was the opening of the Caledonian route to Gourock in 1889, and Ardrossan in 1890.

Probably the wildest section of the

Caledonian line was that running through the Pass of Leny, Glen Ogle and the Pass of Brander from Callander to Oban on the west coast. This was authorised in 1865 and reached Oban in 1880. The Ballachulish extension opened in 1903 necessitated the construction of Connel Ferry Bridge, a remarkable cantilever structure

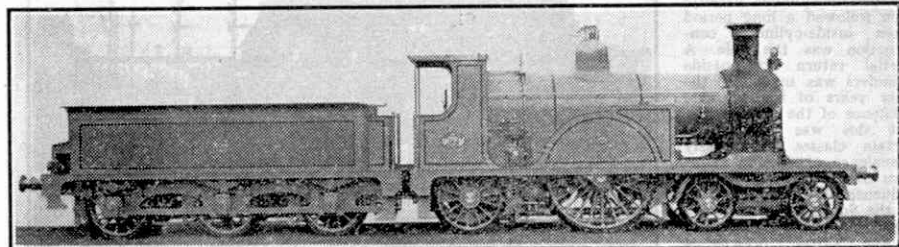


An L.M.S. Caledonian section train near Beattock hauled by 4-4-0 No. 14473. Photograph by J. M. Craig.

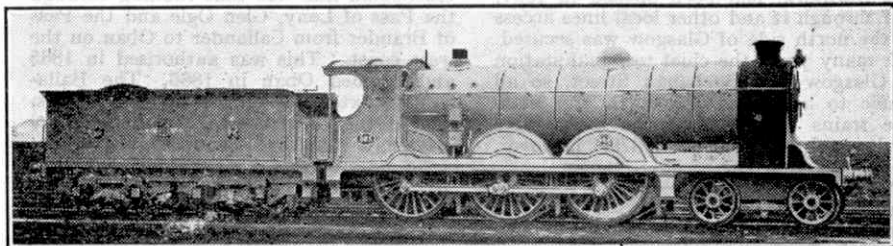
having a single span of 500 ft.

From the start the Caledonian worked in close association with its southern partner in the West Coast Route, the L.N.W.R., and the through trains provided between them linking Euston and the north were the forerunners of the well-known L.M.S. "Scot" family of trains of modern times.

Apart from these there were numerous services of note provided by the Caledonian for its own traffic. In later days many of these bore names such as the "Grampian Corridor," the "Strathearn," the "Tinto" expresses and others. An interesting detail peculiar to Caledonian practice was not only the reservation of special stock for particular services, but also the lettering of the vehicles themselves with



Caledonian 4-2-2 No. 123 in its original condition. Note the safety valves on the top of the dome. Photograph by courtesy of the North British Locomotive Co. Ltd.



Probably the best known Caledonian 4-6-0, No. 903 "Cardean," showing most of the features characteristic of the McIntosh period. The photographs on this page are by courtesy of the L.M.S.

the appropriate train names or destinations. The position chosen was above window level, below the roof gutters where the bold gilt inscriptions showed up well. It was in fact not very different from the position of L.M.S. destination boards to-day.

From the crude four-wheelers of early times, Caledonian coaching stock progressed to the splendid "Grampian" type of 12-wheelers first introduced in 1905. These set new standards in accommodation internally, while their external appearance in Caledonian crimson lake and white was very striking. Another development of note was the introduction of Pullman cars with refreshments on certain trains in 1914. These Scottish-titled vehicles did not run on the through restaurant expresses to and from the south for which West Coast Joint Stock cars of L.N.W.R. pattern were used. A notable Pullman unit was the special observation car "*Maid of Morven*" that ran on the scenic Oban line.

In spite of the difficult nature of much of the road, the Caledonian was long prominent in the matter of train speeds. In fact the first start-to-stop timing of over 60 m.p.h. was a Caledonian introduction during the late nineties, the 32½ miles from Perth to Forfar being booked in 32 min. at 60.9 m.p.h. Although spectacular, this was less difficult than the one-time 56.5 m.p.h. timing for the 117½ miles from Carlisle to Stirling. The latter included the arduous ascent of Beattock, nearly a 10-mile incline at an average gradient of 1 in 75, the summit of which is over 1,000 ft. above sea level.

The timings that demanded such energetic running round about the turn of the 19th century were gradually eased out in later years. With the growth of train loads the grades had lost none of their steepness, and in spite of the increase in locomotive capacity it was evidently considered more prudent to maintain the punctual working demanded by the Caledonian claim to be "*The True Line*," rather than adhere to bookings that could not always be achieved.

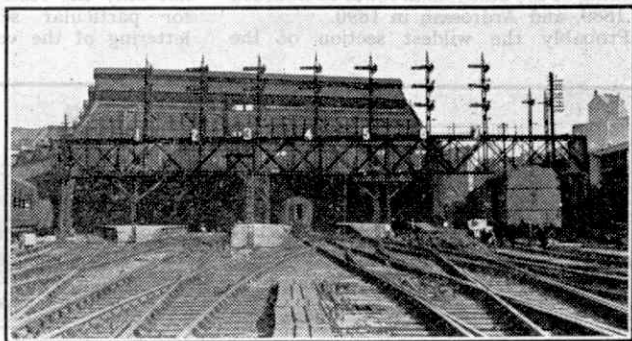
At one time Caledonian engines were almost all of the outside-cylinder variety; then followed a long period when inside-cylinder construction was the rule. A partial return to outside cylinders was made in the later years of the separate existence of the Caledonian, but this was confined to certain classes. The early prevalence of outside cylinders may be traced to the influence of Alexander Allan of the Scottish Central, who earlier had been the originator of the "Crewe" designs of 2-2-2 and 2-4-0, well known on many lines other than the L.N.W.R. for which they were first introduced. The

most famous of this traditional line of engines on the Caledonian probably were the Connor 2-2-2s with 8 ft. driving wheels. These with fairly large-wheeled 2-4-0s of the same general strain managed the principal trains until the more modern period of Caledonian locomotive design set in under the redoubtable Dugald Drummond. With him arrived the inside-cylinder 4-4-0 design from which all subsequent Caledonian engines of this wheel arrangement were derived.

The Caledonian 4-4-0 was developed under J. F. McIntosh, pioneer of the big boiler, in successive series of "Dunalastair" locomotives, so called from the name of the first one. His reign from 1895-1914 saw the Caledonian in the forefront of British locomotive practice. He introduced the 4-6-0 in several varieties of which the best known and the most elegant were the handful of large-wheeled express engines with their giant bogie tenders. The Caledonian 4-6-0s were relatively few in number and so were doomed early by the progress of L.M.S. standardisation. The only present survivors of the type are those of the outside-cylinder pattern first introduced by Pickersgill in 1916. Some of these were actually built in the early grouping days, before a really settled locomotive policy for the group had been decided upon.

At one time it was not unusual for the same engine to take the same train regularly, and the classic instance of this was the working day after day, literally for years, on the 2 p.m. for Euston from "the Central" to Carlisle of the big McIntosh 4-6-0 No. 903 "*Cardean*." The return was made the same evening on the corresponding down service, long known to the staff as "*The Corridor*," and the direct forerunner of the modern "*Midday Scot*."

An interesting Caledonian peculiarity was the fact that it did not observe the (Continued on page 382)



The approach to Edinburgh Princes Street showing typical Caledonian signals on the gantry. Note the lattice-type posts.



# A New Zealand Ferry Steamer

## The "Hinemoa" in Service

By J. P. Barrett

THE new ferry steamer "Hinemoa" of the Union Steam Ship Company of New Zealand arrived at Wellington on 26th January of this year, and went on the run between the North and South Islands on 10th February. When she reached Wellington there was a considerable crowd gathered on the Queens Wharf to welcome her. The day was brilliantly fine and hot, and in her attractive Company colours, green hull with a gold band and red boot-topping, with a red funnel and black top, she made a fine picture as she lay in the stream while the Customs officials cleared the passengers she had brought with her.

The "Hinemoa" is a twin-screw turbo-electric steamer of 6,900 tons gross. She has a raked stem and a cruiser stern, and a single funnel rises above her streamlined deck houses. Her two masts are well placed and her general outline is pleasing. She has a considerable flare at the bows, and is equipped with a bow rudder. There are six decks, and of these the promenade, upper and main decks have the full length of the ship. Ten transverse bulkheads are provided, fitted where necessary with sliding watertight doors operated electrically from the bridge.

The vessel was launched at the Barrow shipyard of Vickers Armstrongs Ltd. on 30th May of last year. Her length between perpendiculars is 400 ft., her breadth moulded 58 ft. and her depth moulded to the upper deck 29 ft. Her load draft is 17 ft. A crew of 113 is carried, and radar equipment is carried in addition to the usual navigational aids.

The service on which the "Hinemoa" is engaged is the ferry between Wellington,

in the North Island of New Zealand, and Lyttleton, in the South Island, a distance of 175 nautical miles the passage of which ordinarily occupies about nine hours. In this service she has joined the turbo-electric steamship "Rangatira," which also was built by Vickers Armstrongs Ltd. in 1931. The "Hinemoa" is built to accommodate 921 passengers in berths, and she can take 74 more when required in portable berths on the lower deck. Her accommodation is beautifully decorated and furnished

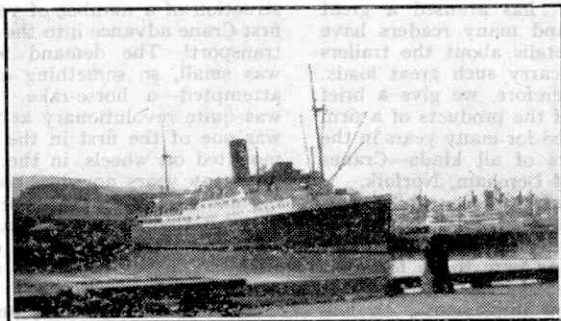
throughout, and radio-telephone equipment allows passengers to communicate with any telephone subscriber in New Zealand.

Provision is made for cargo in four holds and two 'tween-deck compartments.

Spaces are arranged for the transport of motor vehicles, and there are collapsible stalls for 48 horses. For handling cargo there are two 4-ton and eight 6½-ton steel derricks, with electric winches each driven by a 30 b.h.p. motor.

The "Hinemoa" has two independent turbo-electric units, each of 5,120 kW., and they supply current at 3,150 v. to two double-unit synchronous motors. Each motor develops 6,500 s.h.p. at 220 r.p.m. and is directly coupled to a propeller shaft, and the various controls are interlocked to ensure correct operation. Steam to drive the turbines is provided by four Yarrow oil-burning water-tube boilers at a pressure of 425 lb. per sq. in.

The designed speed of the ship is 21 knots, and on her trials she reached 22 knots. The voyage to New Zealand was made at 16½ knots as far as Fremantle, Western Australia, and 17½ knots from there onward.



The new Union Steam Ship Company of New Zealand turbo-electric ship "Hinemoa" at her berth at Lyttleton Wharf.

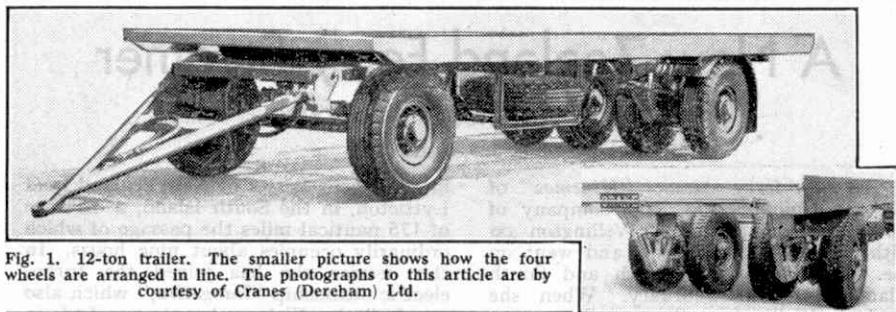


Fig. 1. 12-ton trailer. The smaller picture shows how the four wheels are arranged in line. The photographs to this article are by courtesy of Cranes (Dereham) Ltd.

## Trailers for Outsize Loads

THE article "Outsize Transport" in the April "M.M." has aroused a great deal of interest, and many readers have asked for more details about the trailers that are used to carry such great loads. In this article, therefore, we give a brief account of some of the products of a firm that have specialised for many years in the building of trailers of all kinds—Cranes (Dereham) Ltd., of Dereham, Norfolk.

In 1865 William Crane established a blacksmith's business at Great Fransham in the county of Norfolk. Although his primary occupations were to be for some years to come the shoeing of horses and the repair of farm implements, he had ambitions beyond this. One of his first departures from the normal rut of the

agricultural blacksmith was the construction of a number of velocipedes—the first Crane advance into the realms of road transport! The demand for velocipedes was small, so something else had to be attempted—a horse-rake. This machine was quite revolutionary at the time, as it was one of the first in the country to be mounted on wheels, in the manner which for many years now has been regarded as normal. Horse-rakes were in greater demand than velocipedes and William at one time was producing one per week with the assistance of his sole employee, a young boy.

As business increased, new trades were added—wheelwright, wagon builder, timber merchant. By 1900 the original smithy had become but an auxiliary to the wagon building and timber departments. The firm of William Crane felled and cut its own timber, forged its own iron components, made its own wheels and built wagons from these materials. Threshing machines were available for hire and there were several traction engines. From these small beginnings the present firm has grown.

Production of trailers as opposed to wagons or traction wagons began in 1920. The first vehicles in the trailer records book are six 5-ton trailer chassis without platforms, for export to Calcutta. They had pressed steel disc wheels with solid tyres. Band brakes were fitted to the rear wheels. In 1921 the first articulated attachment built by the firm was completed. This was somewhat similar in general details to the standard 4-wheeled vehicle. The firm was the first ever to produce an articulated tanker.

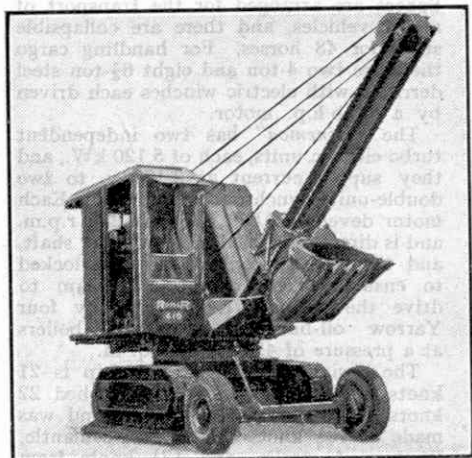


Fig. 2. Trailer designed to carry excavators.

In 1928 two 15-ton bogies were made for Messrs. Pickfords. These were to operate in tandem and were used primarily for carrying underground-railway coaches. The first trailer to be carried on pneumatic tyres was built in 1928. Early in the following year the fitting of pneumatic tyres became more and more popular and

on two short oscillating axles.

Fig. 2 shows a 1937 trailer designed to carry excavators.

Bertram Mills's circus moves on Crane trailers. The trailers carry equipment between circus site and railway, where they are loaded complete with their loads on flat railway trucks (Fig. 3).

There are very few vehicles in Britain, or indeed in the world, capable of carrying loads of 75 tons and above. Among them there are seven Crane trailers of five different designs. The first of these was built in 1929 for carrying loads up to 110 tons; it has carried 137 tons. In 1943 two trailers were ordered for transformer transport,

each having a capacity of 120 tons and capable of carrying 140 tons under good conditions.

A 120-ton trailer was completed in 1945 (Fig. 4). It comprises a flat frame mounted on two similar but not identical bogies. There are 16 wheels on each bogie mounted on eight axles. At each corner of the bogie is a casting, which carries a rocker beam, and at each end of each of the four rocker beams is an oscillating axle. Belleville disc springs carry the leading and trailing axles of each bogie but not the centre ones. The spring-mounted axles also steer, each axle pivoting about its mid-point.

The drawbar is attached to a steering bracket pivoted to the bogie frame, and from this bracket rods steer the pairs of wheels to lie approximately on their respective concentric

(Continued on page 382)

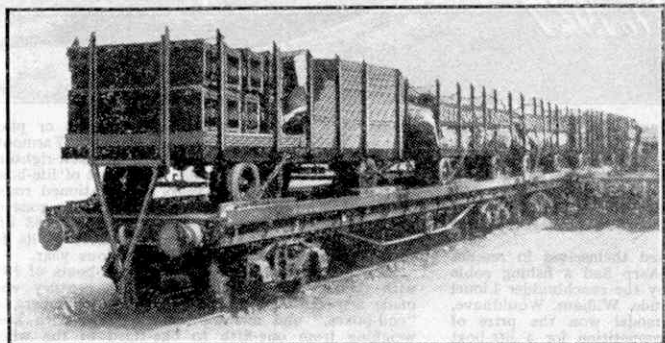


Fig. 3. Bertram Mills's circus moves on Crane trailers.

with startling rapidity the pneumatic established itself as standard.

We have not space to describe the development of the trailer during the next few years, so we will pass on to 1934 when the period of the modern trailer may be said to have begun. In that year an important design for six- or eight-wheeled trailers was introduced. The important features of this Crane design are that each pair of wheels is mounted on a short axle carried by a simple underslung spring of flat type, the ends of which are fitted into trunnions. The trunnions work in bushes carried in brackets beneath the trailer frame. The pivot point is well below the axis of the axle, resulting in better load distribution than is possible with a higher pivot. Fig. 1 shows a 12-ton trailer of this type, the smaller picture showing how the four wheels are arranged in line

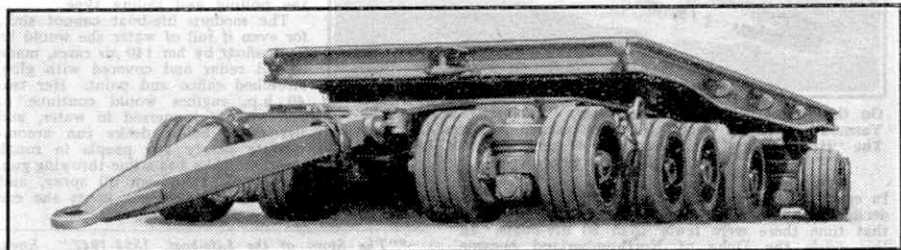


Fig. 4. A 120-ton 32-wheeled trailer.

# The Story of the R·N·L·I from 1824 to 1947



IT seems a long time since a wrecked ship was looked upon as a gift from the sea, to which the people of the coast flocked as hurriedly as possible. Those who live around our shores still hurry down to the sea when they have news of a wreck, but now their purpose is to try to save lives. Yet it was not until towards the end of the 18th century that this change of mind took place.

Many men have interested themselves in rescues at sea since Archdeacon Sharp had a fishing coble converted into a life-boat by the coachbuilder Lionel Lukin in 1786. They include William Wouldhave, the house-painter whose model won the prize of two guineas in the first competition for a life-boat design; Henry Greathead, who built the "Original," launched in 1789, and Sir William Hillary, the founder of the National Life-Boat service as we know it to-day.

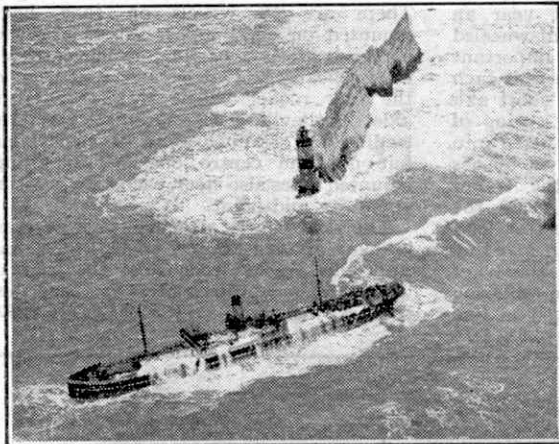
The story of the Institution that Sir William Hillary founded in 1824 is told in this year's booklet.\* The society soon added to the 39 life-boats already on our coasts, and in the course of its first 25 years it gave awards for the rescue of more than 6,000 lives.

model of a life-boat, and of 280 models or plans sent in, that of James Beeching of Great Yarmouth was successful. Beeching's life-boat was self-righting, and it was the pioneer of the great fleet of life-boats that during the next 40 years was stationed round our coasts. Since that time the service has gone on from strength to strength. There are now 155 life-boats in operation, and there were more calls for their help in 1946 than in any previous year.

It is interesting to compare the life-boats of 1849 with those of to-day. Those of last century were made self-righting by fitting high air chambers, or "end-boxes," and making them narrow, with keels weighing from one-fifth to one-third of the whole weight of the boat. Boats of this design were not easy to handle in heavy weather, and even when practically all British life-boats were self-righting there were life-boat men who would have preferred more stable vessels, trusting to their own skill to avoid capsizing. Because of this the self-righting life-boat eventually gave way to a type that does not possess this property, but has other advantages that counterbalance its loss. Only 25 of the present fleet are self-righting.

The maker of the modern life-boat fleet was George Lennox Watson, designer of the famous yacht "Britannia." He became consulting Naval Architect of the R.N.L.I. in 1887, when oars and sails were still in use, and in the following year the first steam life-boat went to the coast. This boat had no screws but was jet-propelled; her engine worked a pump that drew in water through the bottom of the boat and expelled it at the sides. Steam engines were too heavy to solve the problem of providing large boats with power, however; and for that we had to wait until petrol and oil engines were perfected. Between the two World Wars the replacement of pulling and sailing life-boats by a motor fleet was speedily carried out, and of the 155 life-boats now round our shores only three are of the pulling and sailing type.

The modern life-boat cannot sink, for even if full of water she would be kept afloat by her 140 air cases, made of red cedar and covered with glue, stretched calico and paint. Her two 40 h.p. engines would continue to run even if immersed in water, and her cabin below decks can accommodate nearly 100 people in rough weather. She has a line-throwing gun, a searchlight and an oil spray, and at her cruising speed of over eight knots she can travel 200 miles without refuelling.

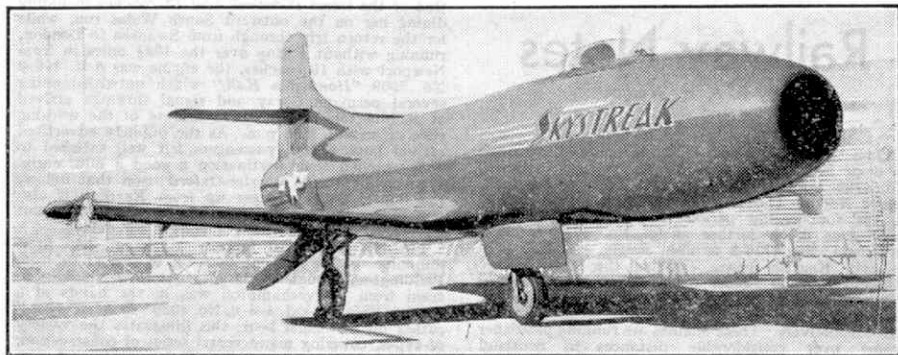


On the Needles. The Greek steamer, "Varvassi," from which the Yarmouth, Isle of Wight, life-boat rescued 37 lives last January. The "Henry Blogg," the latest type of cabin life-boat, is seen at the head of the page.

In spite of this fine beginning, public interest soon declined, and by 1849 had almost disappeared. By that time there were fewer than 20 life-boats. In this crisis the Duke of Northumberland became President and set about reviving interest. A new prize, this time of £100, was offered for the best

\*"The Story of the Life-boat, 1824-1947." Royal National Life-boat Institution, Life-boat House, 42, Grosvenor Gardens, London S.W.1. Price 1/- post free.





## The Douglas "Skystreak"

By John W. R. Taylor

APPROPRIATELY named "Skystreak," the new Douglas D-558 is the second of a series of aircraft being built in America to investigate the problems of flying at speeds in the region of the speed of sound—760 m.p.h. at sea level. At this speed, airflow over the aircraft sets up compressibility shock waves which tend to break it up, and designers must overcome this "sonic barrier" before very high speed flying can become practicable and safe.

The first of the American transonic research machines, the Bell XS-1 built for the USAAF, was described in the May "Air News" pages. The "Skystreak" has been built for the U.S. Navy and differs from the XS-1 in many important respects. To begin with, Douglas decided for safety's sake that all the high-speed test runs must be made in level flight and not in dives as in the past. Added to which the Navy asked for an aircraft that could take off, climb to its service ceiling, make speed runs of sufficient duration to obtain satisfactory test data and return to its starting point under its own power. The XS-1 on the other hand, because of the short endurance of its rocket-motor, has to be carried to about 35,000 ft. under a "Superfortress," climbed under its own power to an even greater height and then put into a full-power dive to reach its designed speed.

Because of the endurance requirements, a rocket-motor was out of the question for the "Skystreak," and so Douglas installed the most powerful jet engine available in America—the 4,000 lb. thrust General Electric TG-180. This, they hope,

will give the aircraft a speed of 760 m.p.h. Unencumbered by armament or other military load, it may well prove capable of such speeds.

The layout of this first prototype is quite conventional, as its designers believe that the best way of obtaining a lot of useful data in the shortest time is to use only design features that have been well-proved. The whole aircraft is very sturdy and its fuselage is little more than a heavy-gauge hollow tube containing the engine, the air for which is conducted from the nose round each side of the cockpit, past the engine and out at the tail. The 25 ft. span wings and the tail unit have the now customary very thin laminar flow aerofoil sections and, to enable them to be housed in the wings when retracted, the main wheels have special narrow tyres with an inflation pressure of 230 lb. per sq. in.—some eight times that of motor car tyres.

Everything possible has been done to ensure the safety of the "Skystreak's" pilot, and the problem of bailing out in an emergency was given a lot of thought. An ejector seat was considered impracticable as no pilot could withstand the shock of a bail-out at transonic speeds. The arrangement finally chosen enables the pilot to break the whole nose of the aircraft clear of the rest of the machine and then, after its speed has been reduced, to bail out in the normal way.

The "Skystreak" is already flying and tests with it will continue for several years, during which alternative features such as swept-back wings will be tried out.

# Railway Notes

By R. A. H. Weight

News from the L.M.S.

Class "5" 4-6-0 mixed traffic locomotives continue to come into service with further batches on order. No. 4789, built at Horwich, is allocated to 5A Shed, Crewe North. Those turned out from Crewe Works in the four-weekly period ending 14th June last have gone much farther afield: No. 4773 to 32A, Inverness, No. 4774-5 to 20A, Leeds, and No. 4776 to 14B, Kentish Town, London; the last two are Midland Division Sheds. New 4P 2-6-4Ts numbered 2273-4 have gone to Scotland, the first to Edinburgh, the second to Polmadie, Glasgow, Sheds 28B and 27A respectively. These engines are running passenger trains over considerable distances in Scotland on workings often monopolised in the past by "Dunalastair" or Compound 4-4-0 tender locomotives. No. 14762 "*Clan Campbell*" is another of the former Highland "Clan" 4-6-0s to be withdrawn.

The "Turbotomote" 4-6-2 No. 6202 recently returned to the Euston-Liverpool express service, painted in the new livery. Engines of the new 12xx light 2-6-2T type have been seen on London suburban trains running through the tunnels of the L.P.T.B. to Moorgate, though not fitted with condensing apparatus. The 64xx 2-6-0s are working on various routes. We understand that 20 larger "4P" 2-6-0 locomotives will be built at Horwich shortly, numbered 3000-19. "5XP" 3-cyl. "Jubilee" 4-6-0s work right through from York or Sheffield to Bristol by way of Derby and Birmingham, hauling cross-country main line trains with 11 or 12 corridor coaches, and if in good condition are capable of excellent performance. A reader writes that at 10A, Springs Branch Shed (Wigan, Western Div.), several L.N.W. 0-8-2Ts, are stationed, also two of the surviving Whale 19 in. 4-6-0 goods class locomotives numbered 8824, 8834.

## Great Western Tidings

Continuing construction of the standard pannier 0-6-0 tank type 57xx class, No. 6750-1 have been placed in service, having 200 lb. per sq. in. boiler pressure, 17½ in. by 24 in. cylinders and wheels 4 ft. 7½ in. diam., as part of an order for ten. Of the 94xx 0-6-0T series lately completed, Nos. 9401-7 and 9409 have been allocated to PDN., London, and No. 9408 to Stafford Rd., Wolverhampton. Further conversions to oil burning include "Halls" Nos. 4968 "*Shotton Hall*" and 5976 "*Ashwicke Hall*"; also 2-8-0s Nos. 2848, 3837. The latter are re-numbered 4807 and 4854 respectively.

The following nameplates have been affixed: No. 1008, "*County of Carigan*"; No. 6943 "*Farnley Hall*"; No. 6955, "*Lydcott Hall*"; No. 6960, "*Farningham Hall*"; No. 6964 "*Thornbridge Hall*" and No. 6969, "*Wraybury Hall*."

Reports have reached us of recent logged runs from Paddington to Swansea and Shrewsbury respectively and back, on which for the most part good time was kept by an interesting variety of engines.

One of the latest "Castles" had 13 coaches including dining car on the outward South Wales run, while for the return trip through from Swansea to London, running without a stop over the 133½ miles in from Newport with 10 coaches, the engine was 6 ft. 4-6-0 No. 5969 "*Honington Hall*," which notwithstanding several permanent way and signal slowings arrived at Paddington within half a minute of the working time of arrival, 8.56 p.m. As the publicly advertised arrival hour is 9.0, passengers felt well satisfied to have reached their destination a good 3 min. early! Incidentally the Worcester-Oxford train that follows the South Wales express up from Reading is also due in by the service time books at 9.1 p.m., but advertised as 9.5 to allow a margin for delays.

For the northward journey a "King" had little difficulty on the present booking of the 11.10 from Paddington, though on the return a 13-coach, 460-ton train from Wolverhampton was in the hands of a veteran "Star" 4-cyl. 4-6-0, No. 4050 "*Princess Alice*," rather off her usual beat; this illustrates the variety of types, covering many years' series of construction, able to handle present-day G.W.R. expresses. A new "County" had given a lively performance between Shrewsbury and Wolverhampton. "Star" No. 4019 "*Knight Templar*," looking as if it was a long while since she had received attention in works, was on the popular 8.20 a.m. Weston-Super-Mare to Bristol express, formed of the special rolling stock used for the



One of the shunting tank locomotives built in the U.S.A. recently taken into Southern stock. Photograph by G. O. P. Pearce.

pre-war "Bristolian" very fast London-Bristol service.

On the Midehead branch from Taunton the traffic was being worked on the occasion of our last visit by 0-6-0 No. 2275, and 2-6-0 No. 6361. "Bulldog" 4-4-0s are still rendering useful service in Somerset and Devon. Some of the weekend long-distance West of England additional expresses call at Taunton, or near Westbury, to change engines, while stops have sometimes to be made at Newton Abbot to attach or detach the assistant engine required over the very steep gradients in the neighbourhood of Totnes and Brent.

## Northern Counties Committee, Ireland

We reproduce an interesting photograph submitted by a reader of one of the now little-used and diminished types of passenger engine on this railway, "B3" 4-4-0 No. 24, of which class two are left. There were several different small classes, some originating on the Belfast and Northern Counties Railway which was absorbed by the English Midland, thus coming into L.M.S. possession. Representatives of these, named 4-4-0s, are either withdrawn from service or standing by disused in sidings, as is the only "N" class 0-4-0T, No. 16. As usual in Ireland the main line gauge is 5 ft. 3 in. Modern 2-6-0 tender



The L.N.E.R. 5.25 p.m. Colchester-Edinburgh and 5.44 p.m. Colchester-Clacton trains at Colchester. Photograph by W. P. Conolly.

locomotives work most of the principal passenger traffic with the new 2-6-4T sharing to an increasing extent.

#### L.N.E.R. Notes

"There is an Anglo-Scottish train service that receives very little notice though providing a large number of useful connections," writes Mr. Philip Conolly, whose photograph of the 5.25 p.m. Colchester-Edinburgh train at the start of its journey we are glad to reproduce. It runs by way of Ipswich, Bury St. Edmunds and Peterborough, thence through the night along the East Coast route, calling at Doncaster, York and Newcastle; there is a corresponding service in the opposite direction that was much used by Services' personnel during the recent war. Eastern Section locomotives and men work between Colchester and Peterborough, and "Pacifics" or "Green Arrows" on the main line. Peterborough enginemasters have charge between that city and York, the locomotive going through to Newcastle, with similar rosters southbound. The train on the right in our illustration, ready to leave the bay platform, is for Clacton-on-Sea.

New "A2/3" 4-6-2 No. 522 is named "Straight Deal"; the next two are under construction at the time of writing at Doncaster, while at Darlington Works "B1" 4-6-0s from No. 1032 up are in hand. Numbers and names of others in that series lately completed are 1025 "Pallah," 1026 "Ourebi," 1027 "Maitoga" and 1029 "Chamois," the last named being stationed at King's Cross. Most of the 50 ordered from the Vulcan Foundry Ltd., numbered 1140-89, are in service fitted for electric lighting. As part of the second extensive order entrusted to the North British Locomotive Co. Ltd., green "B1" engines are coming into traffic numbered 1190 upward; Nos. 1200-9 were running early in July.

"A2/1" 4-6-2 No. 507, formerly 3696, has been named "Highland Chieftain," but retains black livery. "Sandringham" 4-6-0 No. 1607 "Blickling" has been rebuilt as a 2-cyl. "B2." Two more of the "Sir Sam Fay" large G.C. inside cylinder 4-6-0 class "B19," previously "B2," have been withdrawn, leaving one. Those scrapped are No. 1490 "Sir Sam Fay" and No. 1493 "City of Liverpool."

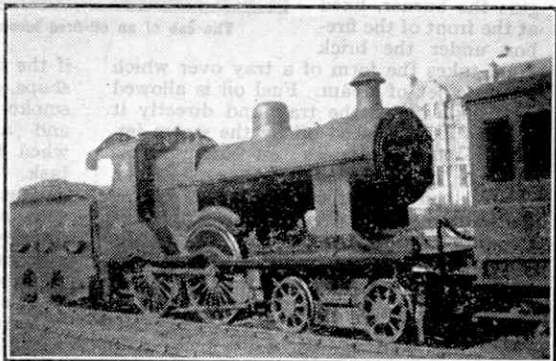
On the conclusion of the visit of the King and Queen to the Royal Agricultural Show at Lincoln, a non-stop special Royal Train to King's Cross was hauled by "A3" 4-6-2 No. 61 "Pretty Polly," painted apple green and polished for the occasion.

#### A Visit to the Romney, Hythe and Dymchurch Line

It was the writer's pleasure to revisit the fascinating Romney, Hythe and Dymchurch Railway in S.E. Kent during June, when passengers were numerous and considerable traffic activity was noted although the full summer season had hardly begun. The 4-8-2 locomotive that has not worked for some time, No. 6, "Samson," was away at a Sussex foundry, but the sister engine No. 5 "Hercules" was running. The Canadian type "Pacific"

No. 9 "Doctor Syn" was under repair in the well-equipped Littlestone shops. Our journey to Hythe was made behind the similar No. 10 "Black Prince," with some open-seated stock as well as comfortably upholstered bogies of the normal miniature type. At an intermediate station locomotive whistling was heard just as we were about to start. This was found to come from one of the Gresley type 4-6-2s coming up behind us as a light engine with the driver and another member of the staff waving and shouting "Stop him!" Some coaches were urgently needed for a party at Dymchurch, so the last three from our train were detached and taken back on the wrong line by "Green Goddess," which had been hastened up for the purpose. This was not exactly correct procedure according to main line railway regulations, though it was decidedly enterprising!

The return journey to Littlestone was made by the "Bluecoaster Limited" the company's crack train modelled on the pre-war L.N.E.R. flyer "Coronation," with a charming little glass-ended observation car on the rear. The locomotive was No. 7, "Typhoon," which went through to Dungeness, over a single line beyond Littlestone, as the second track had not yet been restored. No. 3, "Southern Maid," was not in traffic, but Nos. 2 and 8, "Northern Chief" and "Hurricane" were seen running painted green.



N.C.C. "B3" class 4-4-0 No. 24 "County Londonderry," just prior to departing with the 9.25 p.m. Portrush-Coleraine local. Photograph by J. D. Lemon, Londonderry.

# Have You Ever Thought About This?

## Oil Firing of Locomotives

By "Shed Superintendent"

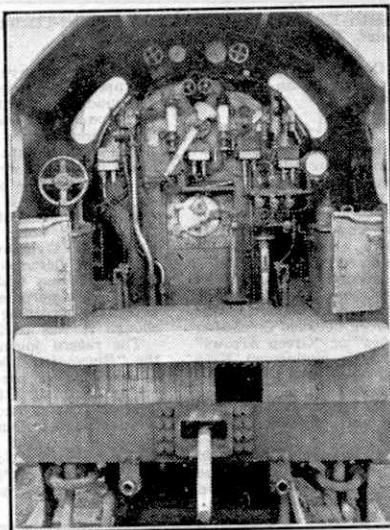
THE conversion of a number of locomotives to oil firing, as announced by British Railways last year, is not of course a difficult undertaking as far as the locomotives themselves are concerned, for this system of firing was in the experimental stage 50 years ago, and has since been perfected.

Fairly elaborate ground installations at the Locomotive Depots must, however, be completed before the locomotives can be brought into regular service. Fuel oil is a dark, treacherous substance that will only flow readily when warm. This means that the storage tanks and pipe lines must be heated and the fuel tanks on the tenders of the engines as well. At each Depot installation a stationary boiler is required, not only to heat the tanks but also to provide a supply of steam to each engine that requires to be lighted up from cold.

On an oil-fired engine the burner, fixed at the front of the firebox under the brick arch, takes the form of a tray over which passes a jet of steam. Fuel oil is allowed to trickle on to the tray and directly it does so it is whisked off by the steam jet, which then becomes an inflammable mixture of steam and oil mist. When ignited, this jet is a sheet of flame, roaring in the firebox like a giant blowlamp. The pressure of steam at the jet and the rate of flow of the oil are controlled by valves on the fireman's side of the footplate, and in the illustration the necessary fittings can be seen, on the right hand side. The oil control and damper control are both on pillars. Six small hand wheels adjust the steam supply to the burner, blower, tank warmer, etc.

The normal firehole door is locked, as it will be understood from the foregoing remarks that the flame jet is directed rearwards towards the firehole door, and it is not safe to open it while the jet is alight. A small mica window is fitted to the door, through which the engineman can observe the flame inside the firebox.

Control of the burner is a matter of training, although once the burner has been correctly proportioned to the design of engine proper combustion occurs pretty well throughout the range of oil adjustments, and on the road little more is necessary than to vary the oil supply with the rate that the engine is working. This needs considerable skill because the fireman must anticipate his driver's action all the time, turning on "the gas" well in advance of steam requirements and shutting down directly the throttle, or regulator, is closed. The fireman must also take care to avoid excessive smoke, but

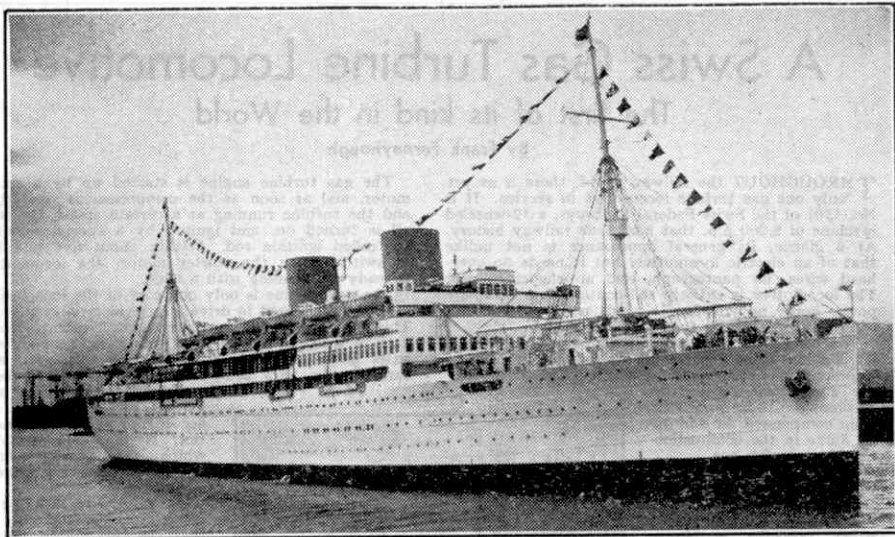


The cab of an oil-fired locomotive.

if the burner is correctly set in the workshops, and the dampers properly adjusted, smoke is barely perceptible at full load and any slight smoke will disappear when the engine has warmed up to its task. The consumption of oil is 5-6 gallons to the mile under load, and sufficient fuel is carried for a 250-mile journey, with the standard equipment now in process of fitting to main-line engines.

This consumption may appear heavy, but very little oil is used when idle whereas a coal-burning engine has a fire on the grate all the time. Other advantages include rapid refuelling and a complete absence of ashes in smoke-box or ashpan.





## The "Reina del Pacifico"

By Denis Rebbeck, M.A., M.Sc., B.Litt., A.M.I.C.E., A.M.I.Mech.E.

THE flagship of the Pacific Steam Navigation Company's fleet is a beautiful two-funnelled motor ship which looks very graceful in her sparkling white coat of paint, as will be seen in the photograph on this page. This 18,000-ton passenger liner has had a remarkable career during the second World War and last year returned to her birthplace at Belfast, where her builders, Harland and Wolff Ltd., will spend several months re-converting her from a transport into a luxury liner.

The "Reina del Pacifico" attracted a great deal of attention at the time of her completion in 1931, for she embodied much that was of interest to marine engineers. Few, if any, liners have had a more successful career than this ship, either during the years of peace or war, and some time ago the "Reina" passed the million-mile mark—a notable achievement.

No less than four propellers drive this big ship across the seas between this country and South America, and at the full output of the four 12-cylinder diesel engines a total of 22,000 b.h.p. can be developed. It is worth noting that this machinery is of the trunk-piston type, and

another significant feature is that the engines are pressure charged on the well-known Buchi system.

One of the many attractive items about the "Reina del Pacifico" is the fact that the ship's sides invariably look clean. There are no scuppers from which water can drain and leave disfiguring stains. All the fluid waste in the ship passes into a sewage ejector system. Two tanks, from which the sewage is ejected, are located in the main engine-room, and these deal with the waste from the after part of the ship; while another pair, in the auxiliary engine-room, takes the discharges from forward. The system is well worth mentioning, because it was installed to allow for 880 persons. During the war, when the vessel was troopng, the system had to deal with about 3,000 persons, and no trouble was experienced.

There is not space in this short article to detail the fine war record of this famous ship, but it is safe to say that she was a most valuable asset to the Allies on account of her speed and her capacity for troopng. She had many narrow escapes, one of the most "hair-raising" being when a 1,000 lb. German bomb missed the ship by only 20 feet.

# A Swiss Gas Turbine Locomotive

## The first of its kind in the World

By Frank Ferneyhough

THROUGHOUT the railway world, there is as yet only one gas turbine locomotive in service. It is No. 1101 of the Swiss Federal Railways, a 12-wheeled machine of 2,200 h.p. that has made railway history. At a glance, its general appearance is not unlike that of an electric locomotive, but it needs no overhead wires, no pantograph, and no electrified rail. The locomotive is entirely self-contained, a complete power house on wheels. It needs neither water nor coal, but runs on oil fuel.

The term "gas turbine" is perhaps somewhat misleading, for from it some people may infer that the locomotive runs on some form of coal gas. Actually the gases that rotate the turbines are those produced from compressed air and an oil flame in the combustion chamber, or fire-box.

Simple examples of a turbine movement may be seen when a piece of paper flaps in a draught, or a boy's paper propeller is blown round by the wind. Mount the paper on a rotatable spindle, and there we have a crude "turbine engine." Replace the paper with thin metal blades, and concentrate the air pressure through a pipe; then the spindle will rotate with some force.

Steam under pressure may be used for engine turbines, as with L.M.S. Turbomotive No. 6202, often referred to in the "M.M.," or with the Pennsylvania Railroad's No. 6200. Many sea-going vessels are propelled by steam turbines. There are also many turbines driven by water.

With the gas turbine locomotive, ordinary air from the atmosphere enters the compressor, which forces the air after compression through a pre-heater into the combustion chamber. Here there is a flame, produced by a continuous spray of fuel oil, and the firing creates the very high temperature of over 1,000 deg. F. The hot gas produced in this chamber is the actual driving agent. It passes through the turbine itself, rotating the blades on the main spindle or shaft at a tremendous speed.

After the gas has done its work, it becomes exhaust. But all its heat is not wasted; instead the exhaust is played on to the pre-heater so that it can do its part in heating up new air on the way to the combustion chamber. As the fuel oil flows into the combustion chamber, it has to be converted into a fine spray. This is done by a special pulverising apparatus. To assist this process, the oil is heated in the pre-heater to a temperature of about 212 deg. F. Hot oil sprays much better than cold. The process of spraying the oil into the combustion chamber of the gas turbine locomotive is broadly similar to the action of the atomiser used on oil-burning locomotives on British Railways, hundreds of which are being converted from coal-burning.

The gas turbine engine is started up by a small motor, and as soon as the compressor is operating and the turbine running at a certain speed, the fuel oil is turned on, and ignited by a special remote-controlled ignition rod. Within about five minutes of switching on the starter motor, the locomotive is ready for running with a train.

The gas turbine is only one part of the locomotive itself, for it is used to drive a large electric generator. This in turn yields power to drive four electric motors, each of which is geared to an axle. As there are six axles altogether, two of them, the end ones, are carrier axles. For comparative purposes, the wheel

arrangement may be regarded as 2-3-2, but in accordance with Swiss practice, it is called a 4/6, which means that four of the six axles are power-driven.

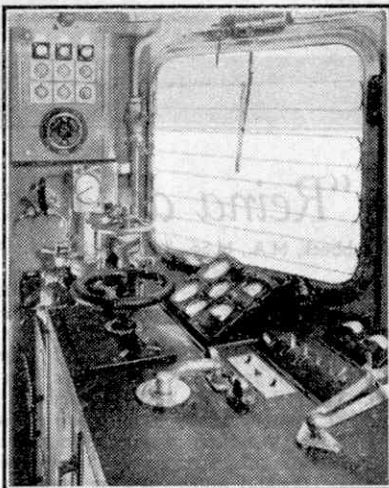
An unusual feature of the wheel arrangement also is that the two middle axles, both powered, are rigid with the locomotive main frame, while two end swivel-trucks take two axles each. A small snow-plough is fitted near each of the four end wheels.

In engineering circles, it is recognised that the principle and construction of the gas turbine engine is comparatively simple. In this it certainly has an advantage over the diesel-electric engine, and other advantages are that it is less costly than other types of locomotive, the fuel used is much cheaper than diesel oil, and its maintenance is inexpensive. The one great problem is the production of metal alloys able to withstand the intense heat that is generated; so far these have been found somewhat costly.

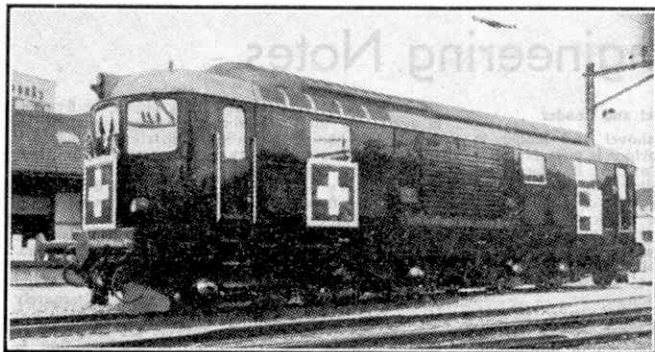
At 2,200 h.p. it compares well with the finest locomotives in the world. Its total weight is 80 tons, as heavy as many medium-sized British steam locomotives.

It was in 1941 that the Swiss gas turbine locomotive was built by the famous Swiss engineering firm of Brown-Boveri, after many years of experiment. In that year the firm celebrated the 50th anniversary of its foundation, and on this occasion the locomotive carried proudly a board lettered: "Erste Gasturbinen-Elektro-Lokomotive Der Welt," which means "The first gas turbine electric locomotive in the world." The Swiss national flag, a white cross on a bright red background, also was carried, as one of our illustrations of this locomotive shows.

It was part of the firm's contract that the new locomotive should do a year's service with trains before being taken over by the Swiss Federal Railways. In that year the locomotive covered 30,000 miles, operated for 1,600 hours and was started up 1,500 times. Never once during this experimental year did the locomotive have to be taken out of service due to breakdown or failure; a remarkable record.



In the driver's cab of the Swiss gas turbine locomotive. The illustrations to this article are reproduced by courtesy of British Brown Boveri Limited.



The Brown-Boveri gas turbine locomotive decorated on the occasion of the firm's jubilee.

After regular service in Switzerland, the owners of the locomotive, the Swiss Federal Railways, loaned it for further experimental running on the French National Railways. On the Basle-Strasbourg main line it pulled trains of 600 tons, heavier than nearly all British top class flyers. It is designed for a maximum speed of only 62 m.p.h. but it can do much higher speeds. On a run near Zurich it has touched nearly 80 m.p.h.

In the experimental running, every aspect of working had to be thoroughly tried out and tested. For instance, as the gas turbine locomotive used a lot of air, it was feared there might be difficulty in starting up again if it came to a stop in a single-line tunnel. Tests were actually made in the narrow St. Ursanne-Courgenay tunnel, and it was found there was absolutely no problem in re-starting. Tests also proved that the locomotive exhaust in a badly-ventilated narrow tunnel was not of the slightest danger to passengers.

Then there was the braking. Even with heavy trains over sharp Swiss gradients in mountainous country, the brakes proved remarkably efficient.

A glance at the photograph of the cab leads one to believe it must be a driver's nightmare! The numerous wheels, switches, handles and dials make it look simply formidable. And yet, in its arrangement everything has been planned for simplicity of driving, and is easy to understand and to operate from the driver's point of view. This is absolutely essential for railway operating, allowing the driver to give full attention to signals and the track.

Actually, just as with steam, electric and diesel-electric locomotives, the gas turbine engine has two main controls, the driving lever, or controller, and the brake. When the driver turns his controller lever up or down, fuel consumption, gas turbine, generator, motors are automatically synchronised. Various other switches and levers are for such apparatus as windscreen wiper, sanding pipes, lighting, reversing, siren and fuel. Dials indicate speed, engine pressure, oil supply and brake pressure.

This locomotive is particularly suitable for high speeds and heavy trains. In fact, it will soon be competing with other established forms of locomotion. All rotating parts are of light weight, and run at high speeds, making it suitable for high powers. As all the motion of its power generating plant is entirely rotary, with no "reciprocating" parts such as pistons,

the locomotive runs almost without vibration. This means much less wear and tear to the locomotive itself, to the trains it pulls, and to the track on which it travels.

The builders are now prepared to build gas turbines of any power desired, for any railway in the world, and already have many plans for different countries' possible requirements. They have plans, for instance, for a three-unit gas turbine locomotive of 7,500 h.p., running on 24 wheels and equipped with 12 electric traction motors, one for each wheel. That makes every wheel a driving wheel. The maximum speed of this engine would be about 112 m.p.h. A locomotive such as this would compare favourably with any diesel-electric engine yet produced in the U.S.A., with the special advantages of lower cost, comparatively low maintenance, and a cheaper fuel.

The Americans have their own gas turbine locomotive plans, but instead of using oil as fuel, they intend using first of all pulverised coal. So far have U.S.A. experiments progressed that two gas turbine locomotives have been ordered for construction. These will burn coal which, before entering the combustion chamber, will be reduced to a fine powder by special coal atomisers. As with the Swiss gas turbine, a generator will be operated, supplying power to electric motors geared to the axles.

It looks as though the G.W.R. will be the first British railway to run a gas turbine locomotive, for that company have recently ordered two. These will be of 2,500 h.p., with a speed of up to 90 m.p.h., and will weigh about 113 tons. In appearance they



The gas turbine locomotive at the Gare de l'Est, Paris, on loan for experimental running on the French National Railways.

will be similar to the Swiss locomotive No. 1101, but they will be slightly larger. They will in fact be almost as long as the well-known "King" and "Castle" class of G.W.R. express steam locomotives.

When these new turbines eventually turn out in service on the G.W.R., it certainly will be a great day for spotters!

The G.W.R. gas turbines, incidentally, will be so constructed as to allow of combustion temperatures of about 1,100 deg. F.; when it is borne in mind that the boiling point of water is only 212 deg. F., this will be realised to be pretty hot. Actually some of the air from the compressor will be used for preventing temperatures

(Continued on page 382)

## Engineering Notes

### Novel Mechanical Shovel and Loader

An interesting mechanical shovel and loader is illustrated on this page. The machine is manufactured by the Chaseside Engineering Co. Ltd., Hertford, and among its many features are ability to excavate below tyre level, and to handle either loose or consolidated material. It is fitted with a four-cylinder petrol engine, and the scoop and boom operating mechanism is driven by a friction-type winch with a double friction drum, which is chain driven from the engine. It can speedily be converted to serve as a crane with a lifting capacity of one ton.

### An Aluminium Moving Span Bridge

A moving span bridge constructed of aluminium alloy is being built by Head, Wrightson and Co. Ltd., Thornaby-on-Tees, for the River Wear Commissioners. It is the first of its kind in the world, and although less than half the weight of a similar bridge built of steel, it will be able to withstand corrosion better. Less powerful machinery will be necessary to operate the opening span.

### The Tyne Tunnel

The construction of a tunnel under the Tyne to link Jarrow and Wallsend was begun on 4th June. Three separate tunnels are planned, one for vehicles and others for cyclists and foot passengers respectively. It is the two smaller tunnels that are now to be driven, and it is expected that the work will be complete in about two years; the main road tunnel will be constructed later.

Each of the two bores now under construction is about 900 ft. long. The tunnel for cyclists is to have a diameter of 12 ft., and that for pedestrians one of 10 ft. 6 in. Both will be lined with cast iron and finished with concrete and glazed tiling. Twin escalators will be provided at the approaches, and there will also be lifts. The escalators will be the first ever installed for the use of cyclists in Great Britain. Similar provision in tunnels at Rotterdam and Antwerp has proved successful, and thousands of passengers, both cyclists and pedestrians, have been carried by the escalators in those tunnels.

An interesting point is that cyclists will not be faced with long inclines as they are in the Mersey Tunnel, and giving them a separate tunnel will make their passage safer than if they were compelled to mix with fast traffic in the main tunnel.

The main tunnel, to be constructed at some future date, will have a roadway 22 ft. in width, and the approach roads will be about four miles long. These will be planned to make use of a second tunnel if one is eventually found necessary.

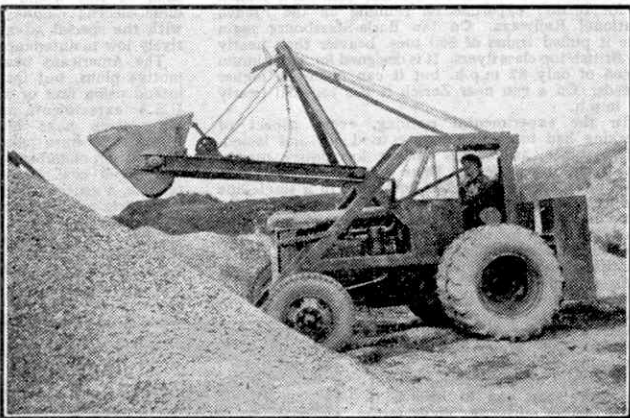
### A Novel Rail Car Drive

An interesting experimental vehicle that has recently been demonstrated in Switzerland makes use of the energy stored in a rotating flywheel. This is driven up to a speed of 2,000 r.p.m. before the vehicle moves off, after which the energy of the flywheel is used to drive a generator supplying electric power to

the motors. At convenient halting places the flywheel is again run up to its top speed by connecting its driving mechanism to ordinary distribution mains.

The idea is to develop a transport system in which no overhead conductors or live rails are necessary and no heavy batteries of accumulators have to be carried. The flywheel is mounted with its axis vertical, on heavy ball-bearings, and is enclosed in an atmosphere of hydrogen in order to keep down friction. When it is running idle it takes from 10 to 15 hrs. to come to rest from top speed. One machine serves to drive it and to generate the current that its energy produces when the vehicle is running, acting alternately as a motor and a generator.

In practice the charging stations are arranged at such distances that the speed of the flywheel is reduced to half before re-charging from the mains. Tests suggest that a flywheel weighing about a ton would drive a rail car weighing 10 tons a distance of 6 to 10 miles between stops.



A Chaseside mechanical shovel working in granite chips. The scoop is full and the machine is backing out prior to running the load to the discharging point. Photograph by courtesy of Chaseside Engineering Co. Ltd., Hertford.

### U.S. Reservoirs Avert Flood Dangers

In order to protect life and property from flood waters in many low-lying developed areas of the United States, great reservoirs are being built. In their unsettled and undeveloped state these areas were available for natural flooding, but as they are now populated measures have had to be taken to deal with the problem.

Many of these reservoirs are of the "multiple purpose" class, providing water for irrigation and hydro-electric power development, but when floods come the reservoirs need to be nearly empty in order to hold or detain the excess water. For example, on the Tennessee Valley system there are 26 dams, all of them of the multiple purpose class.

Floods are very severe in winter and spring, moderate in late spring and summer, and light in autumn. During the first season, the water in the reservoirs is drawn down to the lower level by about January, and by May or June the maximum amount of water is in storage. To provide the necessary holding capacity the stored water is gradually withdrawn during the summer and autumn until the minimum elevation is reached, thus completing the cycle of operations.



# BOOKS TO READ

Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members, and certain others that will be indicated, these should be ordered through a bookseller.

## "SWINDON WORKS, G.W.R."

(G.W.R. 2/6)

Swindon Works, the principal mechanical centre on the G.W.R., and its products and workmanship have a deservedly high reputation in the railway world. "Swindon" indeed is a magic word to the G.W.R. enthusiast, and the book under review goes a long way towards explaining its spell. It begins attractively with details of the history of the "engine establishment," as Swindon was first called, the development of the G.W.R. system, and the facilities afforded for the technical education of the Works personnel. Further chapters deal respectively with the organisation of the Works in general, equipment and war production, the Locomotive Department with its different shops and the Carriage and Wagon Department with its own specialised activities.

Illustrations are plentiful and they are well reproduced on good paper. Some of the spectacular and fascinating operations connected with locomotive building are shown and there are various intimate studies of G.W.R. engines in different stages of building or repair. Among other subjects the old broad gauge flyers are not forgotten, and portraits of Locomotive Superintendents and Chief Mechanical Engineers of former days are included as well as those of the principal Officers of the present time.

A large folding plan shows the layout of the whole Works, with different departments marked to correspond with sections of the text.

Copies of the book can be obtained from the G.W.R., Paddington Station, London W.2, price 2/9 post free.

## "SOUTHWARD BOUND"

By GUY DEMPSTER

(Lutterworth Press. 6/- net)

A fine sea trip with a queer cargo, a shipwreck and surprises on an apparently deserted island are the chief components of this excellent story. In it we meet once more Guy Lawrence and Tony Carlisle, two cheerful sub-lieutenants, who have figured in previous yarns by the author. They join an old shipmate who is setting off to South America in the "Jane" with a cargo of farm machinery, seeds and live stock, but are driven ashore in a storm, which happily they survive. While they are salvaging what they can they are astonished by the sudden appearance of a boy and girl, who prove to be members of a German family who had fled from the Nazis before the war. At length a hurricane miraculously sets the "Jane" free of the rocks on which she had been driven and the goods are delivered.

The book has action, comedy and danger in it, with a tang of the sea.

## "THE RAILWAYMEN'S YEAR BOOK, 1947-48"

(Edited by G. MORRIS. 2/6)

This is the second annual issue of "The Railwaymen's Year Book," the first of which was reviewed in the July 1946 "M.M." The present edition maintains and indeed improves on the high standard set by the first. It is intended primarily for railwaymen and railway-women, and it provides a handy and useful reference of work on many points connected with railways in general and also on numerous matters that concern the railwayman regarding his job. It is not a mere collection of statistics, however, for unlike most reference works it includes various illustrations from photographs. There is a good index.

The book is available from the distributing agents, "The Railwaymen's Year Book," 5-6, Red Lion Square, London W.C.1, price 2/9 post free.

## "BRITISH RAILWAY STATIONS ILLUSTRATED"

Book 1. Devon, Cornwall and Somerset

(Railway and Technical Press. 3/4)

This is the first of a new series of booklets containing reproductions of selected photographs of British Railway Stations. The series is to be completed by 11 other volumes, and altogether some 600 stations will be covered.

Most of the photographs in the present booklet are very good. Many of them were taken before the railway grouping of 1923 and show stations that have since been altered or completely rebuilt, so that they provide a record of these stations in their early days that is of considerable interest to railway enthusiasts. The old time locomotives and rolling stock that also appear in these photographs add to this interest.

The booklet can be obtained from the Railway and Technical Press, 185, Nutfield Road, South Merstham, Surrey, price 3/6 post free.

## "THE A.B.C. OF BRITISH CARS"

By GRAEME L. GREENWOOD (Ian Allan. 3/6)

This second edition of the British car "A.B.C." will be found of absorbing interest by all who are attracted by road vehicles and wish to know more about the many makes that they see on the road. In it there are details and illustrations of 34 cars, brought up to date at the time of publication. In each case there is a good photograph of the car described, together with a brief description that is adequate without including technical detail, and a brief account of the origin of the firm concerned and of its subsequent history adds greatly to the interest. The booklet is handy in size and presents a wealth of information in compact form.

## "LONDON, TILBURY AND SOUTHEND LOCOMOTIVES, 1880-1946"

By C. LANGLEY ALDRICH

The first edition of Mr. Aldrich's story of the Tilbury line was reviewed in the "M.M." in September 1945. Its author correctly claimed it to be a "brief descriptive illustrated souvenir" of the types of engines that have worked London, Tilbury and Southend services from 1880 up to the present day. In the second edition now published the matter has been revised and brought up to date, and a new section has been added giving details of the L.M.S. standard types of locomotives now used on the route. Tables giving full and useful information on locomotive details complete a booklet that will appeal to the railway enthusiast, who will also find pleasure in the many fine full-page illustrations.

Copies are obtainable from the publisher, Mr. E. V. Aldrich, 104, Grove Crescent, Kingsbury, London N.W.9. Price 4/10 post free.

## "COLLECTING FOR PLEASURE AND PROFIT"

By ARTHUR GAUNT, F.R.G.S.

(Southern Editorial Syndicate. 5/- net)

Collecting is ingrained in all of us from our very early days, and there is practically no limit to the number of different things that can be used to give scope for this passion. Mr. Gaunt first gives valuable general advice and then takes up various collecting subjects, explaining the best methods of finding the items required and referring those interested to specialist books on the subjects concerned. What he has to say will help both the beginner and the more advanced collector. There are six full page plates and several drawings in the text itself.



# Aircraft Parts Pressed by Rubber

## Hydraulic Presses of 8,000 Tons Thrust

By C. Monday

THE streamlined shape of modern metal aircraft, much as it may be admired for its efficiency and appearance, presents the manufacturer with considerable problems. For example, the fuselage frames, usually of channel section and spaced fore and aft along the machine, may look much alike, but actually they are different in dimensions, and separate tools are required to produce each one. This applies also to other parts such as wing and tail ribs.

Normal press tools used for this type of work are expensive. They take a long time to make, are heavy to handle and need a lot of room for storage when not in use. Further, in comparison with cars, refrigerators or most other products formed from sheet metal, the numbers of any particular type of aircraft required are limited, and do not justify heavy tool costs.

Until recent years the only alternative to the use of expensive tools was to make the parts by hand, cutting them to shape and then hammering over the flanges on simple formers. This process is suitable where only a few parts are required, but it is slow and wasteful of labour, and can play no large part in modern production. What was wanted was a quick and easy way of cutting duralumin and other light alloy parts, and a simple method of pressing out flanged shapes by machinery without expensive tools. These requirements have been largely met by the routing and rubber pressing processes.

A router is a machine for cutting materials to required shapes. Modern high-speed routers are similar in principle

to the spindling machines used for many years in the woodworking industry. There are two types, the fixed head and movable head; the former is used for small parts, and the latter for larger components.

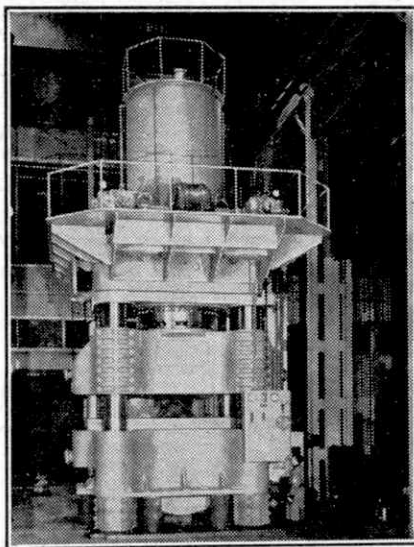
The fixed head router has a cutter of about  $\frac{1}{4}$  in. diam., directly driven by an electric motor rotating at 24,000 r.p.m. Below this is the work table supporting a

wood or metal frame, which carries the blank sheet to be cut above it, and the template, which is a replica in steel of the required shape, below. Mounted in the work table, directly below the cutter, is a fixed guide pin, and the frame is moved around this so that the template is in contact with the pin, the cutter meanwhile reproducing the shape in the light alloy blank.

The movable head router has a similar motor and cutter, but in this machine they are mounted on the end of an arm which is free to slide in, and rotate about, the base. The set-up

in this case is different. The template is clamped on top of the blank laid on the work table and the cutter head is guided round the template, contact with it being made by a hardened bush above the cutter.

The components cut out by a router are shaped by rubber pressing, a process of comparatively recent development. A hydraulic press is used, generally in capacities of 2,500 tons and upward. It consists of a heavy bed, above which is a vertically acting ram carried by massive side members and forced down by one or more hydraulic cylinders. Attached to the ram is a cast steel box enclosing a



A 5,000 ton H.P.M. hydraulic rubber pad forming press. Photograph by courtesy of A. C. Wickman Ltd.

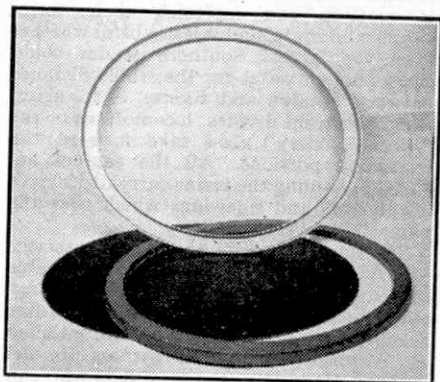
rubber pad about 10 in. thick, the bottom face alone being left open.

The components, previously routed to shape, are located by pins on simple metal or plastic bonded plywood formers, which are laid on the press bed. When the rubber pad descends, the rubber flows over the parts and forces them into the shape of the formers under a pressure of from  $\frac{3}{4}$  to  $1\frac{1}{2}$  tons per sq. in. The rubber press can be used also for blanking parts to size if sharp edged metal dies are used.

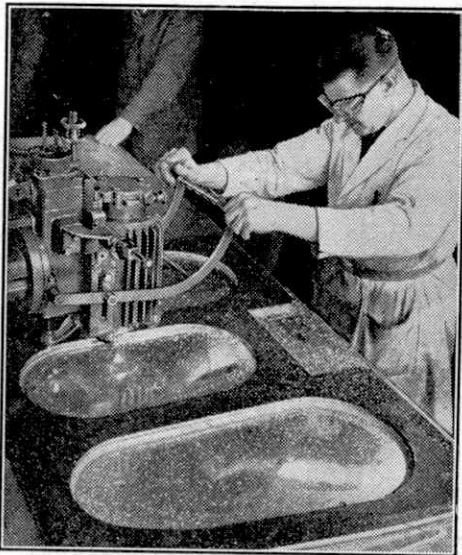
Two simple experiments can easily be made that illustrate these processes. If you take a coin, lay a piece of silver paper over it, and then press down on the paper with a soft pencil eraser, it will be found that a perfect reproduction of the coin has been pressed into the paper, and that the edges have been flanged over the rim. This demonstrates the forming process. To illustrate blanking, lay the eraser flat, with a piece of silver paper over it, and then press down with some sharp faced metal object. You will find that the shape has been cut out of the paper; even a fairly intricate pattern such as the face of a  $\frac{1}{4}$  in. dia. Meccano Pinion can be reproduced with a reasonable degree of accuracy.

In the full scale process ordinary soft rubber is not used, as special grades have been developed specially for it. For instance, a synthetic rubber capable of hot forming metals at temperatures up to 450°F. is available, and is used on some classes of magnesium alloys.

The modern hydraulic rubber pad press is a fascinating machine to watch. Its



Circular fuselage frame with rubber press former, and master drill template for drilling locating holes.

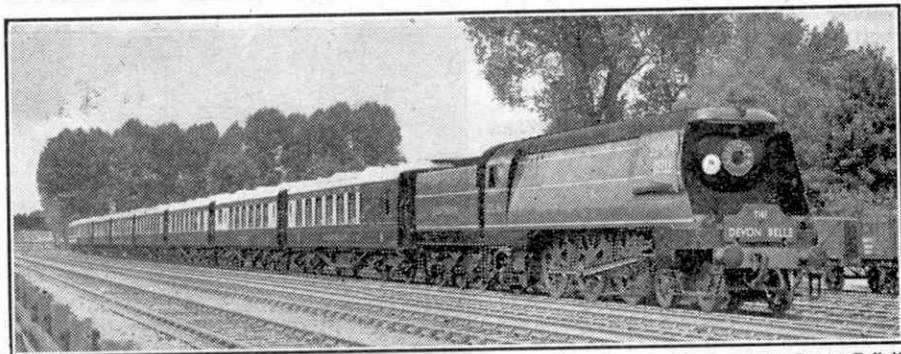


Moving head router cutting out light alloy aircraft parts. Photograph by courtesy of Wadkin Ltd.

size, if of 5,000 or 8,000 tons capacity, completely dwarfs the operator. It is entirely self contained, powered by electric motors that drive radial pumps providing the hydraulic pressure. The fluid used is invariably oil, and it is contained in a closed circuit system, the same oil circulating continually. There is little noise, and all the working parts except the ram are out of sight. The control panel contains only a few press buttons, a small hand lever, and a dial registering pressure. The operator pulls over the control handle and the ram begins to descend. No pressure is registered on this approach, which is made at a fairly high speed until the rubber makes contact with the bed, when it automatically slows to working speed. Now the dial begins to register the pressure, its hand moving over a face graduated in thousands of tons, and in a few seconds a load equivalent to the weight of a medium sized cargo ship is being applied to the rubber pad.

Some presses have movable tables that can be loaded and unloaded externally, being run in on to the press by power feed when required. This allows the press to be operated continuously, and 20,000 or more parts a week can be processed by one large unit.

The motor industry has been quick to take advantage of the rubber pad press.



"The Devon Belle"

## A New Southern All-Pullman Train

By "Observer"

THE services of the railways for the present summer season contain little in the way of novelty or development. The Government's austerity restrictions and the general shortages call for reductions rather than increases. It is pleasing to find, however, that the G.W.R.'s famous train, the "*Cornish Riviera Limited*," is running again; more notable still, the Southern Railway, with commendable enterprise, have added one more to the "titled trains" of Britain. It is known as "*The Devon Belle*," and like "*The Golden Arrow*," "*The Bournemouth Belle*" and "*The Brighton Belle*," is composed of Pullman cars. No new coaches have been built for this train, but in view of the lack of rolling stock the S.R. decided to make use of some available Pullman cars that otherwise would be out of service. Two sets of cars have therefore been reconditioned or skillfully converted to give a predominance of third-class accommodation. A new and welcome feature is the addition of a special Observation Car at the rear of the train. This is available for both first and third class passengers and will enable them to enjoy to the full the beautiful scenery of Devon and the other counties through which the train makes its progress.

"*The Devon Belle*" runs from Fridays to Mondays, leaving London (Waterloo) at 12 noon. It serves both North and South Devon, including the Sidmouth area, Exeter, Plymouth, Barnstaple, and Ilfracombe. At Exeter the train divides and the first portion proceeds by the picturesque Tavy and Tamar valleys to Plymouth.

The other portion, including the observation car, traverses the lovely Taw valley to Barnstaple and Ilfracombe, where the terminus of the journey is reached at 5.32 p.m. In the reverse direction the departure time from Ilfracombe is also at 12 noon and at 11.30 a.m. from Plymouth, Waterloo arrival time being 5.20 p.m. The speeds required fall far short of the usual Southern timings of pre-war days, but they are the best that present restrictions will allow.

Locomotives of the "Merchant Navy" class are employed on the journey to and from Exeter. Although not shown in the public time-tables, a stop is made outside Salisbury station and engines are changed. This is done because there are no track-troughs on the S.R. from which the locomotives can replenish their water supplies en route, and it is doubtful whether even the largest Southern tender could carry enough water for the whole distance between London and Exeter. At Exeter, when the train divides, locomotives of the "West Country" class take forward the respective portions. All the engines engaged in hauling the trains carry distinctive headboards and sidewings which bear the name "*The Devon Belle*."

The new train entered on public service on Friday, 20th June, when a considerable company of Southern officials and railway enthusiasts—including the present writer as representing the "*M.M.*"—were gathered at Waterloo station to witness its departure. Happy are the travellers who can make their journeys in the luxury of "*The Devon Belle*."

# Road and Track

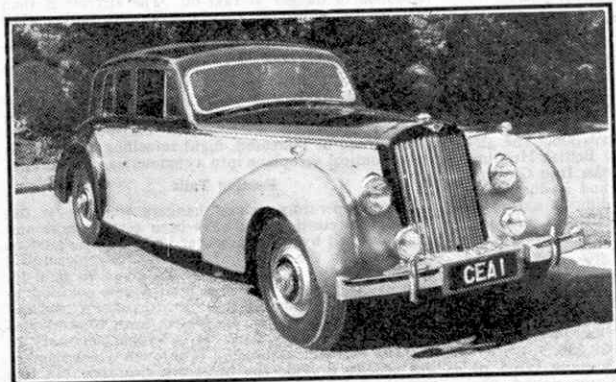
## European Grand Prix

This year's European Grand Prix held at Spa, Belgium, resulted in a great win for the 1½ litre Alfa-Romeos. Wimille, Varzi and Count Trossi, all driving Alfa-Romeos, finished first, second and third respectively. An E.R.A. driven by Gerard and Harrison finished fourth. The ever popular Bira unfortunately had to withdraw from the race as a result of engine trouble during practice.

In grand weather, with a large crowd of spectators gathered around the course, the cars streaked away to a good start with the exception of Kautz who stalled the engine of his Maserati. Varzi led on the first four laps, closely followed by Sommer in his Maserati, but at the end of lap five, Wimille by brilliant driving had forged ahead to take a narrow lead, just 3 seconds in front of Varzi with Sommer third.

When Varzi made his first pit stop only 35 seconds were taken to change both rear tyres and re-fuel his Alfa-Romeo. Sommer retired on the twelfth lap, leaving Varzi and Wimille to establish their supremacy, first one leading then the other. With half the distance covered Wimille was in front, while Sanesi, also in an Alfa-Romeo and travelling very fast, now occupied third position. During Varzi's last pit stop, Sanesi moved up to second place behind Wimille, holding this position for several laps but he failed to complete the final lap, and this allowed Varzi, who had been lying very close behind him, to finish second.

Wimille, who won the race in magnificent style at an average speed of 94.9 m.p.h., commenced motor racing in 1931 and was a member of the Bugatti team until last year. He has already won several important events, including the 1936 French Grand Prix, when it was a sports car event, and the Grand d'Endurance in 1937 and 1939, and was first in this year's Swiss Grand Prix, when Varzi and Trossi followed in 2nd and 3rd places respectively. In the 1947 Nice Grand Prix Wimille, this time in a Simca-Gordini, finished second.



An imposing view of the Jensen Straight Eight. Photograph by courtesy of Jensen Motors Ltd.

## The Jensen Straight Eight

The impressive post war 4 litre Jensen Saloon is a car of entirely new design. It is long and low built, and has a new 3,860 c.c. eight cylinder engine with a bore and stroke of 85 m.m., developing 130 b.h.p. at 4,300 r.p.m. Other details of this powerful Jensen engine, which was developed and built in collaboration with H. Meadows Ltd., include inclined overhead valves, high camshaft, detachable aluminium alloy cylinder heads in blocks of four, and zero lash self adjusting hydraulic tappets. There are two horizontal



A typical traffic scene in Hyderabad, India, showing an Albion CX19 "Venturer" double decker bus owned by the Nizam of Hyderabad's State Railway, alongside a native bullock cart. Photograph by courtesy of C. C. Wakefield and Co. Ltd.

S.U. carburettors with air silencers.

One notable innovation is an electric immersion heater unit built into the cylinder block, which allows easy starting in cold weather.

## Record Breaking Tyres

Some interesting facts concerning the Dunlop tyres fitted to John Cobb's "Railton Mobil Special" land speed record car have recently been made known by the Dunlop Rubber Co. The duration time for each tyre is approximately four

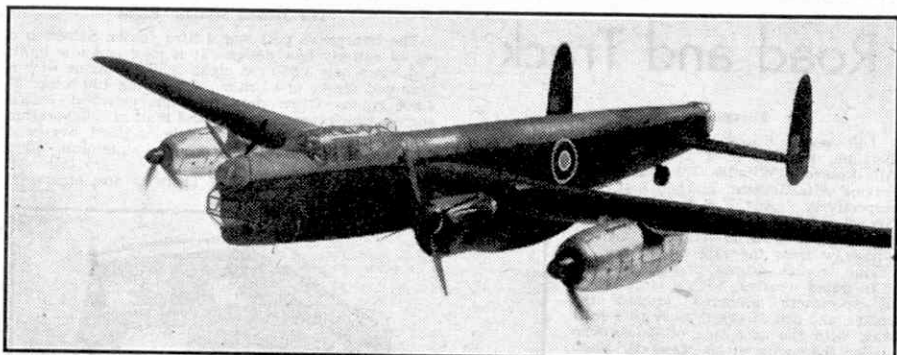
minutes for any single run, and they are then changed as a precautionary measure before any further runs are made. Fifty tyres have been completed of size 7 in. by 31 in., with smooth rubber treads and a cross section that is more round than that of a normal car tyre.

The thickness of the tread of the tyre is only 1/50 in., and the casing beneath the tread also is comparatively thin, being only about 1/4 in.

## Royal Daimler Cars

Two Straight Eight Daimler cars with Hooper coachwork were delivered to the King on his return from South Africa.

Normally Royal cars do not have registration numbers, but one for the personal use of Princess Elizabeth has been given the number H.R.H.I.



Avro "Lincoln" Bomber with two of its four Rolls-Royce "Merlin" engines replaced by Bristol "Theseus" props. Photograph by courtesy of A. V. Roe and Co. Ltd.

## Air News

By John W. R. Taylor

### Propjet Test-Bed

In my article on the Avro "Tudor" in last month's "M.M." I referred to an Avro "Lincoln" bomber which has been fitted experimentally with two Bristol "Theseus" propjets in place of its outboard "Merlin" 85s. The "Lincoln" thus re-equipped flew for the first time on 17th February last, after extensive bench-tests had proved the reliability of the "Theseus" engine. The installation is very neat, as can be seen in the illustration above, and the aircraft has completed a highly successful flight test programme. In developing the "Theseus," Bristols have aimed at an economical jet engine suitable for those types of military and civil aircraft in which a long range is as important as a comparatively high speed. For instance, the present heavy fuel consumption of pure jet engines naturally makes them unsuitable for long-range passenger transports.

Only two of the "Lincoln's" engines were changed to save time, but eventually the machine may be modified to take four "Theseus" units. As a result of this test programme, it is hoped that the prototype Handley Page "Hermes" V air liner, powered by four of these engines, will be flying next year.

### River Tigris Air Survey

As a preliminary to the projected scheme for controlling the flood waters of the River Tigris, a vast area of 2,554 square miles is being surveyed by air. The work is in connection with a proposed reservoir to hold the flood waters of the river so that they can be released during the dry season to bring millions of acres of barren desert under cultivation. The air-mapping is being carried out by the British Hunting Aerosurveys Company on behalf of the Iraq Government. It was started in June last and is due to be completed this month, whereas the difficult nature of much of the ground to be surveyed and mapped would involve a year or more of hard work by means other than flying.

### "Vampires" for Switzerland

Switzerland, determined to build up a modern, efficient air force, has made a first big step by placing an order with de Havillands for 75 "Vampire" single-seat jet fighters, at a cost of £3,088,235.

After comprehensive tests with various types of fighter aircraft, the Swiss Air Force found the "Vampire" ideal even under the most difficult operational conditions. Because of the mountainous

country, aerodromes often consist of little more than a single runway at the foot of a valley; this calls for lively take-off and the ability to land reasonably slowly. In addition, a high rate-of-climb and good manoeuvrability are decided assets when a pilot has a lot of mountains staring him in the face on every side. Reliability and ease of maintenance are, of course, taken for granted in British military aircraft.

### Flight Refuelling Tests

During the last three months a series of flight-refuelling tests have been carried out over the Atlantic, sponsored by the Ministry of Civil Aviation. The first tests were made at the end of May by Air Vice-Marshal D. C. T. Bennett, chief executive of B.S.A.A., in the course of two transatlantic flights totalling some 8,000 miles. On the non-stop outward journey to Bermuda, his "Lancastrian" was refuelled by a special tanker aircraft as it flew over the Azores, and the process was repeated on the return flight, a total of 3,400 gall. of petrol passing between the aircraft on the two trips.

These completely successful tests are a tribute to years of experiment and development work by the British company Flight Refuelling Limited, of which the well-known airman Sir Alan Cobham is managing director. Simple in principle, the system enables an aircraft to take off with less fuel than it needs for the journey, with a consequent increase in payload and reduction of danger at take-off. The aircraft is then met on its route by a radar-equipped tanker that can locate its target in any weather, the two being connected by a hose in a few moments.

Not only does the system save time that would be spent on the ground at refuelling stops—a wide application along a number of air routes would remove the present necessity of keeping large maintenance staffs at intermediate bases. Since the payload can be increased, flight refuelling can turn an uneconomical aeroplane into a commercial proposition.

### Folding Tails

Airline operators, whose hangars were never designed with elastic roofs, have been getting more and more alarmed by the skyscraper tails on some modern air liners. In the case of the Boeing "Stratocruiser," for instance, its fin and rudder are some 38 ft. 3 in. high. Boeing have now presented a new solution to the problem by hinging the "Stratocruiser's" fin and rudder so that they can be folded down to starboard by means of a screw-jack. It is seldom necessary to fold the tail flat, as hinging it through a few degrees will usually provide the necessary clearance. In this way the height of the "Stratocruiser" can be reduced to 26 ft. 7 in.—less than that of any other single-tail four-engined transport in production to-day.



### U.S. Navy Jet Fighters

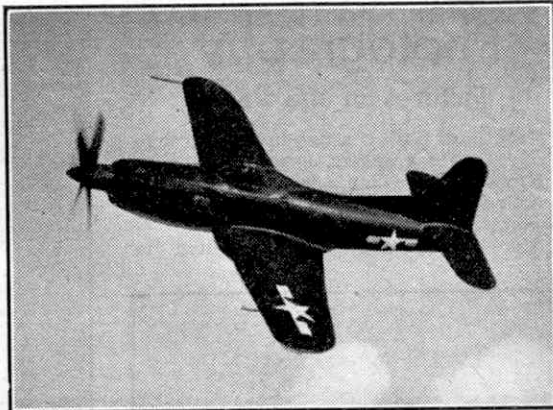
The American fighter aircraft illustrated at the top of this page is one of the fastest and smallest "twins" ever built. Designated XF2R-1, it was designed by the Ryan Aeronautical Company of San Diego, U.S.A., and has been developed from their FR-1 "Fireball" fighter shown in the lower photograph. The FR-1 was designed in 1944, when American jet engines were still very new and none too reliable. Compared with piston engines they developed little power at low altitudes and also consumed fuel at an alarming rate—facts that made them useless for carrier-based aircraft, which need a short take-off run and a long range for patrol work. On the other hand their tremendous power at high altitudes was obviously invaluable for combat.

Ben Salmon, Ryan's chief designer, got over the difficulty by using a standard 1,350 h.p. Wright "Cyclone" engine in the nose of the "Fireball" and mounting a General Electric I-16 jet engine in the rear fuselage. The air for the jet is led through ducts in the wing leading edge and is exhausted at the tail. For take-off, climb and patrol the fighter operates on its "Cyclone" alone, saving the power of the jet for combat use. On both engines the "Fireball" will fly at 410 m.p.h., and can climb like a rocket for five minutes at 5,000 ft./min. Several squadrons are already in service with the U.S. Navy. The "Fireball" has a span of 40 ft. and a loaded weight of 9,800 lb. It is armed with four .50 in. machine-guns and either two 1,000 lb. bombs or a number of rocket projectiles. Maximum range is 1,500 miles, carrying an underwing drop fuel tank.

The XF2R-1 is basically a "Fireball" airframe, but is 4 ft. longer as it has one of the new General Electric TG-100 "propjets" in its nose. A large dorsal fin has also been added to compensate for the longer nose.

### Russian Jet Aircraft

Some details are available of the first Russian jet aircraft, designed by Sergei Lavochkin. It is a neat-looking single-seat, mid-wing monoplane, powered by two German B.M.W. 003A jet engines. It is of fairly orthodox general layout, except that its engines are mounted side by side in the fuselage nose, under the cockpit, and exhaust under the wing trailing edge. The underside of the rear fuselage is concave on each side, rather like a flying boat hull, to clear the hot gases. Several squadrons of the Red Air Force are believed to be already equipped with a fighter version of this aircraft.



Ryan XF2R-1 propjet engine fighter, developed from the FR-1 illustrated below. The photographs on this page are by courtesy of the Ryan Aeronautical Company, U.S.A.

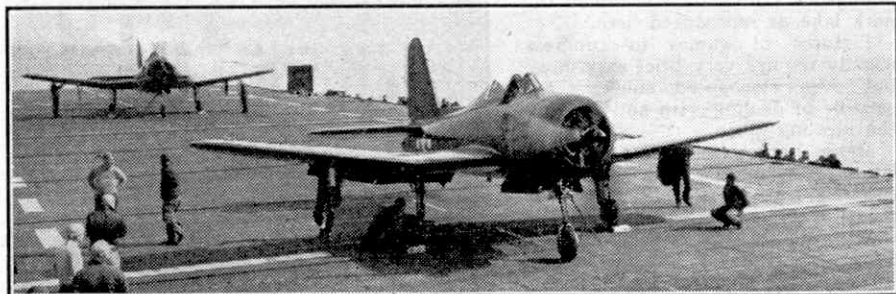
### Flying Dentist

The well-known "Flying Doctor" service which has been operating in Australia for many years has been supplemented by a "Flying Dentist" service. This has been started by Dr. J. C. Homewood, until recently an R.A.A.F. Dental Officer, in partnership with a former R.A.A.F. pilot. They visit outlying areas in New South Wales in a D.H. "Moth" that once belonged to the late Charles Ulm, partner of Sir Charles Kingsford Smith on many historic flights.

### K.L.M. "Connies"

K.L.M. (Royal Dutch Airlines), who are already operating Lockheed "Constellations" on their transatlantic service, have decided that the "Constellations" still to be delivered shall be fitted with "Speedpak" external freight carriers. These increase the payload by 8,000 lb. at a reduction of only 3 per cent. in performance. As a result K.L.M. will in effect possess two fleets of these popular air liners. One fleet will be for fast, luxury travel with ample fuel for long non-stop flights. The optional fleet, using the "Speedpak" for heavy-duty, high payload operation, permits a greater use of the "Constellation's" weight-carrying capacity for shorter operations, with no sacrifice of passenger luxury features.

Conversion of the double duty fleet from one type of service to another can be completed in two minutes—the time needed to remove or attach a "Speedpak."



The Ryan FR-1 "Fireball" fighter. It has a standard Wright "Cyclone" engine in the nose and a General Electric jet engine in the rear fuselage.

# Photography

## Pictures in the Park

THE local park is a fine hunting ground for photographers, especially at this time of the year, and a few hours spent in wandering around will usually produce several interesting subjects.

For the photographer interested in

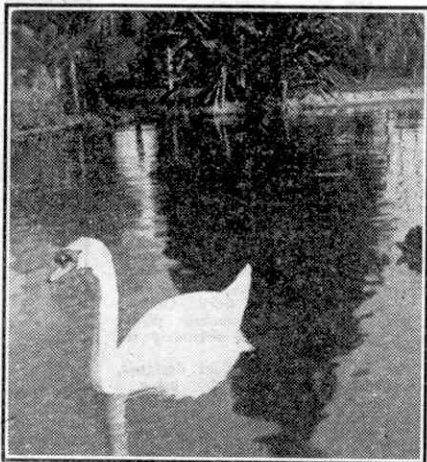


Yacht Sailing on the Round Pond. Photograph by J. M. Demanuele, Malta, G.C.

children, there are few places where pictures can be secured so easily as in the children's playground that is usually a feature of large parks. As a rule children are quite pleased to act as models, but to get really natural pictures it is best to make the exposure without their knowledge. A good picture of this kind, showing youngsters sailing their yacht on the park lake, is reproduced here.

Pictures of games in progress usually require very brief exposures, but even slow-speed shutters are capable of dealing with activities on the bowling green.

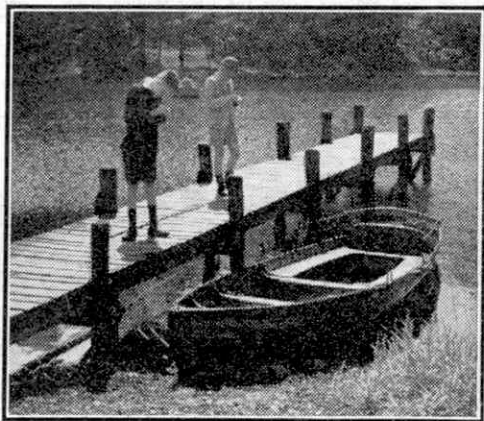
Many parks contain ornamental lakes on which at least a pair of swans are to be found. From the point of view of the photographer these birds are very pleasing and are quite easy to take. Care should be taken not to over-expose, however, as this will destroy the details of the plumage, thus detracting considerably



The Swan Dreams. Photograph by K. Milne, Hawkes Bay, New Zealand.

from the interest of the picture. It is not possible to lay down hard and fast rules for exposure, but generally for pictures in which the birds are from nine to 12 ft. from the camera on a sunny day,  $1/100$ th of a second at  $f/8$  will be about right, using a fairly rapid panchromatic film.

Overhanging trees also provide delightful opportunities for picture-making, and the photographer on the look-out for "off the beaten track" effects will do well to turn this fact to account. Even the most ordinary scene when viewed under an archway of overhanging trees looks somehow more interesting.



Young Anglers. Photograph by S. Pollard, Weaverham.



# Club and Branch News



## WITH THE SECRETARY

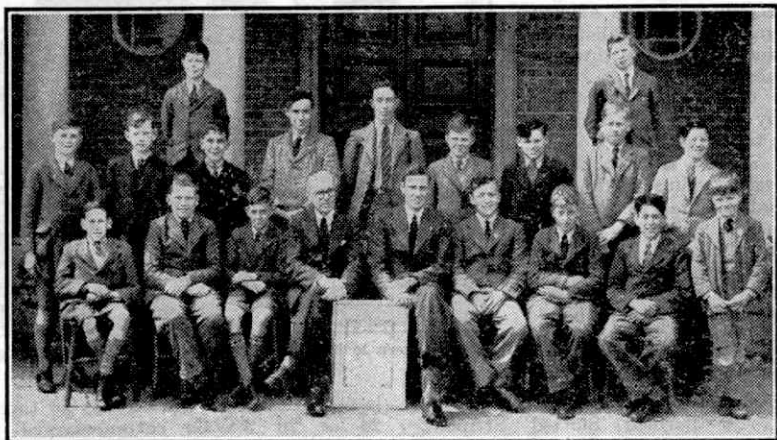
### FINDING NEW MEMBERS

While the chief thing to be kept in mind at the moment is the programme for the indoor sessions that will commence shortly, Leaders should also take whatever steps are necessary to improve the strength of the Club by recruiting new members. I have often made it clear that a Club can only be successful if it

at Olympia. Club roll: 30. *Secretary:* J. Bartholomew, Collegiate School, Winchmore Hill, London N.21.

**HUNTINGDON M.C.**—Summer meetings have been devoted chiefly to Cricket. Members and parents spent an enjoyable day at Clacton-on-Sea. Displays of models built by the members have been made at various functions. An attractive series of Visits also has been enjoyed. Club roll: 40. *Secretary:* F. Saddington, 9, Avenue Road, Huntingdon.

**MINEHEAD GRAMMAR SCHOOL M.C.**—Many excellent



Members of the Minehead Grammar School M.C. Mr. A. Hill, Leader, is in the centre of the front row, with Mr. C. T. F. Gibbs, M.A., LL.B. (Cantab), President, on his right. B. Watts, Secretary, is on the Leader's left. This newly-affiliated Club has already made good progress with interesting original model-building on a large scale and visits to local railway centres have been enjoyed.

continually introduces new blood in the form of younger members. Recruits of the right kind are valuable in themselves, and with the experience they gain they make splendid officials when they grow up. Finding such members indeed is so important that I think a special point should be made of it at the general meeting usually held at this time of the year.

The best recruiting agent is a keen and satisfied member. All who are now in a Club therefore should be asked to look round among their friends in order to see if there are among them enthusiasts who would make useful members. These efforts should be followed up by Leaders or other senior officials, and it is an excellent plan to visit the parents of boys who are likely to join in order to give them an account of the idea and aims of the Club.

The Perse School (Cambridge) M.C. is holding an Exhibition at the Perse School, Hills Road, on 27th September. The Exhibition will be opened at 3 p.m., and all interested are invited to be present.

### CLUB NOTES

**WINCHMORE HILL COLLEGIATE SCHOOL M.C.**—Interest is so great that members who are leaving school wish to continue. The Club stock has been greatly enlarged and Model-building, Hornby Train operation, and other activities have continued on an impressive scale. Outings have included Visits to the Kenview Model Railway and the Royal Tournament

models have been built by members, making use of the Club's No. 1 electric motor. Plans have been made for the construction of a very large crane. Visits have been made to the Minehead Signal Box and the Locomotive Shed at Taunton. Club roll: 20. *Secretary:* B. Watts, Corfax Cottage, Old Clever, Watchet, Som.

### BRANCH NEWS

**WIDNES AND DISTRICT**—A new Branch Room has been secured and track meetings continue to be satisfactory. Various layouts are arranged and trains are operated on them after a definite scheme has been worked out in discussion. Members are becoming expert in timetable management. *Secretary:* R. Hindley, 146, Peelhouse Lane, Widnes, Lancashire.

**DAWSON PRIMARY BOYS' SCHOOL (DAGENHAM)**—An excellent layout with 114 ft. of running track has been built up. It was opened by the Chairman of the Barking Education Committee, who drove the first train. Visit to Plaistow Motive Power Depot; Lectures on "Experiences of an Engine Driver," by Mr. D. Martindale, and "British Railways," by Mr. C. Wilkins. *Secretary:* J. Brooks, Dawson School, Ellerton Road, Dagenham, Essex.

**RYDAL SCHOOL (COLWYN BAY)**—The Branch is to occupy a large, well-equipped room in which a good electric layout on trestles will be constructed. Enjoyable operations are anticipated, as members are keen and are well supported. *Secretary:* B. B. Heywood, Barbarians, Rydal School, Colwyn Bay, N. Wales.

# Among the Model-Builders

By "Spanner"

## A Crankshaft for a Large Model

Steam engines of all types make excellent subjects for model-building, but when large models are being constructed care must be taken to ensure that the crankshaft is in keeping with the general scale of construction. A method of assembling such a large crank is shown in Fig. 2 and this will be found efficient in operation and realistic in appearance. It has a throw of six inches.

Each of the crank webs is made by bolting two 3" Angle Girders to a Face Plate. A 5½" Slotted Strip 1 is then curved to the same radius as the Face Plate and is bolted to the Angle Girders. A 2½" x 1½" Flexible Plate is used to fill in the centre of the web.

The big-end bearings are provided by Bush Wheels bolted to the Angle Girders. The connecting rod pivots on a short Rod locked in the Bush Wheels, and is spaced from the webs by Collars. A Formed Slotted Strip 2 fastened to the Angle Girders completes the construction.

## A Magnetised Screwdriver

A nut or bolt falling into a complicated mechanism such as a gear-box often is the source of much annoyance to model-

builders. When such an accident does occur, however, the nut or bolt can readily be removed by means of a magnetised screwdriver, and it is useful to have one of these handy tools always available. To make a magnetic screwdriver all that



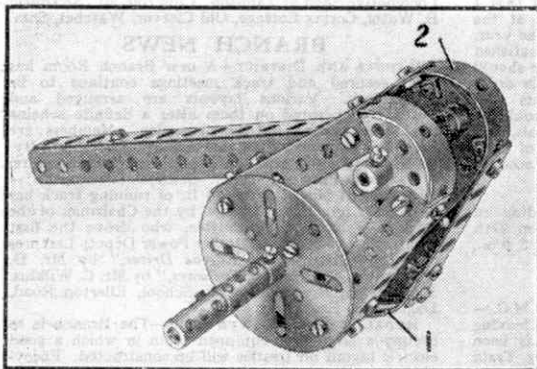
"Getting down to it." Meccano engineers at work. Photograph by C. Ponting, Pangbourne.

is necessary is to wind about 50 turns of 24 or 26 S.W.G. cotton-covered wire around the shaft of a Meccano screwdriver and then connect the ends of the wire to the terminals of an accumulator for a few minutes. When the coil of wire is removed the screwdriver will be found to be magnetised quite strongly.

## Readers' Suggestions for New Parts

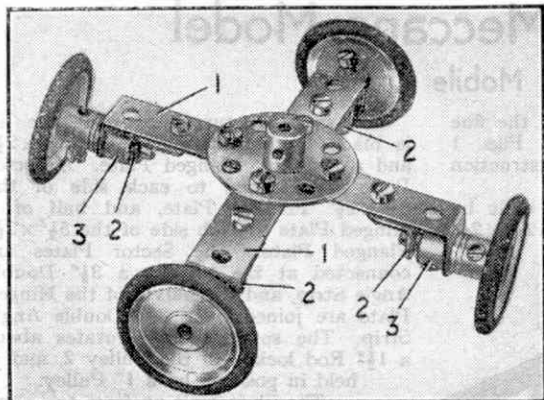
Among the many interesting letters I receive each day from enthusiastic model-builders are some containing suggestions for new Meccano parts. Many of the ideas put forward are impracticable, but others are quite interesting and helpful.

G. Fallowfield, Southwick, thinks that T and X-shaped couplings would be useful. I fully agree with him, but I do not think that such couplings are required sufficiently often to justify their introduction at present, while many of the more widely used parts are still unavailable.



A built-up crank suitable for a large model.





A sturdy rotary bearing suitable for many different types of models.

Meccano users who enjoy building model locomotives may be interested in an idea mentioned by E. J. Freeman, Clapham Park, who experiences difficulty in connecting up Strips for track-making purposes. His idea enables a smooth connection to be made so as to eliminate

the danger of derailing at the joints. The connection is made by means of a Fishplate, which is fixed to the end of the Strip used to represent the rail but held away from it by a nut on the shank of the bolt. Another nut is then used to lock the Fishplate in place. This process is repeated to attach the other hole of the Fishplate to the next length of rail.

#### A Useful Rotary Bearing

A useful rotary bearing designed by E. A. Catchpole, Clapton, is illustrated on this page. This arrangement is excellent for use in a model crane as it will rotate freely when supporting a considerable load.

The bearing is constructed by bolting two  $3\frac{1}{2} \times \frac{1}{2}$  Double Angle Strips 1 across the face of a Bush Wheel. Angle Brackets 2 are fastened in position as shown and in these and the Double Angle Strips 1" Rods are journalled. These Rods carry 1" Pulleys and are held by Collars 3.

## Special "Outfits" Competition

This month we announce the second Meccano "Outfit" model-building contest. In this contest prizes will be offered for the best models made entirely from the parts contained in Outfit No. 4. Readers who possess larger Outfits may of course enter, provided that they use only parts that are contained in the Outfit No. 4. It is not necessary to use all the parts contained in the Outfit.

Competitors may build any kind of model they like, and the more original the subject the better will be its chance of winning a prize.

Entries will be divided into two Sections, as follows: Section A, for models built by competitors living in the British Isles. Section B, for models built by competitors living Overseas. Each Section is open to readers of all ages.

Competitors must send either a good photograph or sketch of their models, and each illustration submitted must bear the competitor's age, name and address on the back. Each competitor must enclose with his entry a complete list of the parts required to build the model.

Envelopes containing entries should be addressed: "Meccano Outfit No. 4 Contest, Meccano Limited, Old Swan, Liverpool 13."

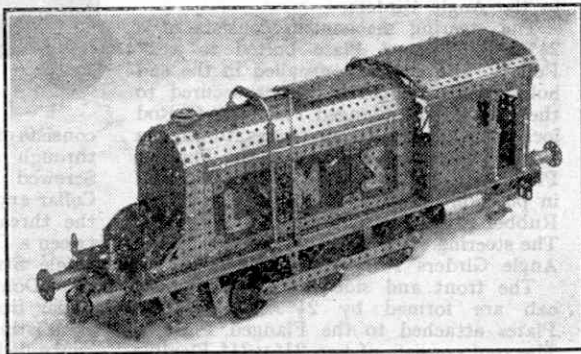
The closing dates for this competition are as follows: Home Section, 31st October; Overseas Section, 28th February next.

The following prizes will be awarded in each Section. First, Cheque for £2/2/-; Second, P.O.

for £1/1/-; Third, P.O. for 10/6. There will be also five consolation awards of 5/- in each Section, and Certificates of Merit.

The photographs or drawings of unsuccessful models will be returned to the sender provided that a stamped addressed envelope of the necessary size is sent with the entry.

All prize-winners will be notified by post as soon after the closing date as possible, and a selection of the best models will be illustrated when possible in the "M.M." Models that already appear in any of the Meccano publications are not eligible.



This fine model of a diesel shunting locomotive won a prize for J. Matthews, Fillongley, in a recent "M.M." Competition.



# New Meccano Model

## Mobile Crane

THIS month's Outfit model is the fine Mobile Crane illustrated in Figs. 1 and 2. All the parts used in its construction are contained in Outfit No. 6.

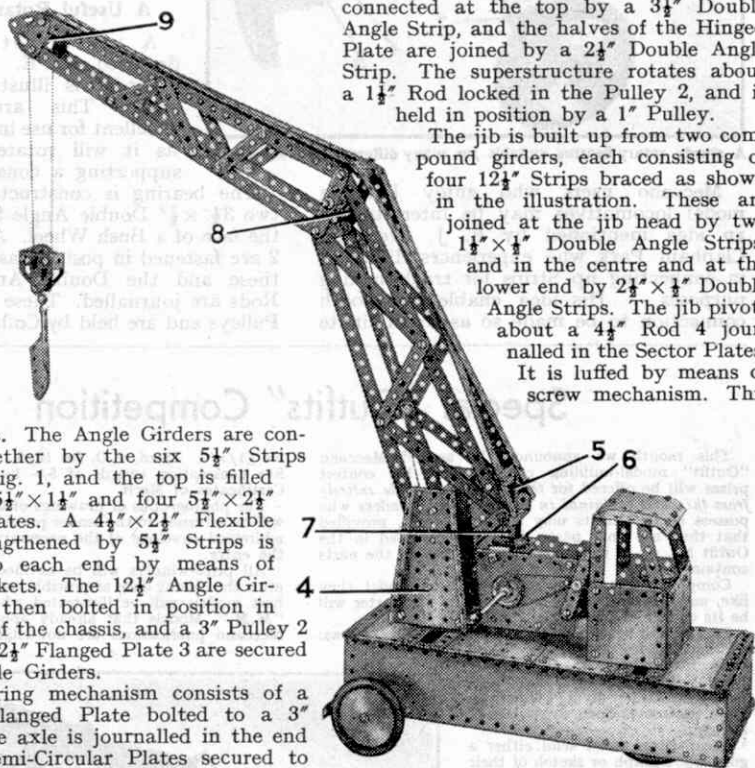
The chassis of the model is built by bolting  $12\frac{1}{2}$ " Angle Girders to  $12\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ "

The superstructure supporting the jib is made by bolting together a  $5\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " and a  $3\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flanged Plate. A Sector Plate is attached to each side of the  $3\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flanged Plate, and half of a Hinged Plate to each side of the  $5\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flanged Plate. The Sector Plates are connected at the top by a  $3\frac{1}{2}$ " Double Angle Strip, and the halves of the Hinged Plate are joined by a  $2\frac{1}{2}$ " Double Angle Strip. The superstructure rotates about a  $1\frac{1}{2}$ " Rod locked in the Pulley 2, and is held in position by a 1" Pulley.

The jib is built up from two compound girders, each consisting of four  $12\frac{1}{2}$ " Strips braced as shown in the illustration. These are joined at the jib head by two  $1\frac{1}{2}$ "  $\times$   $1\frac{1}{2}$ " Double Angle Strips, and in the centre and at the lower end by  $2\frac{1}{2}$ "  $\times$   $1\frac{1}{2}$ " Double Angle Strips. The jib pivots about a  $4\frac{1}{2}$ " Rod 4 journalled in the Sector Plates.

It is luffed by means of screw mechanism. This

Fig. 1. All the parts required to build this mobile crane are contained in Outfit No. 6.



Strip Plates. The Angle Girders are connected together by the six  $5\frac{1}{2}$ " Strips shown in Fig. 1, and the top is filled in by one  $5\frac{1}{2}$ "  $\times$   $1\frac{1}{2}$ " and four  $5\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flexible Plates. A  $4\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flexible Plate, strengthened by  $5\frac{1}{2}$ " Strips is attached to each end by means of Angle Brackets. The  $12\frac{1}{2}$ " Angle Girders 1 are then bolted in position in the centre of the chassis, and a 3" Pulley 2 and a  $3\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flanged Plate 3 are secured to the Angle Girders.

The steering mechanism consists of a  $2\frac{1}{2}$ "  $\times$   $1\frac{1}{2}$ " Flanged Plate bolted to a 3" Pulley. The axle is journalled in the end holes of Semi-Circular Plates secured to the sides of the Flanged Plate. A 4" Rod locked in the 3" Pulley passes through a Bush Wheel that is bolted to the Flanged Plate 3. A Collar is used to hold the Rod in position and a 1" Pulley fitted with a Rubber Ring represents the steering wheel. The steering castor unit is spaced from the Angle Girders 1 by a  $\frac{1}{2}$ " Pulley.

The front and sides of the operator's cab are formed by  $2\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flexible Plates attached to the Flanged Plate 3. The roof consists of two  $2\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flexible Plates and is supported by four  $2\frac{1}{2}$ " Strips.

consists of a 3" Screwed Rod 5, which passes through a Double Angle Strip 6. The Screwed Rod is retained in place by a Collar and a 1" Pulley, and passes through the threaded holes of a Collar held between a Double Bent Strip 7 and a Double Angle Strip. A bolt in the side hole of the Double Bent Strip prevents the Collar from turning.

Hoisting and lowering of the load is controlled by a Crank Handle journalled in the centre holes of the Hinged Plate.

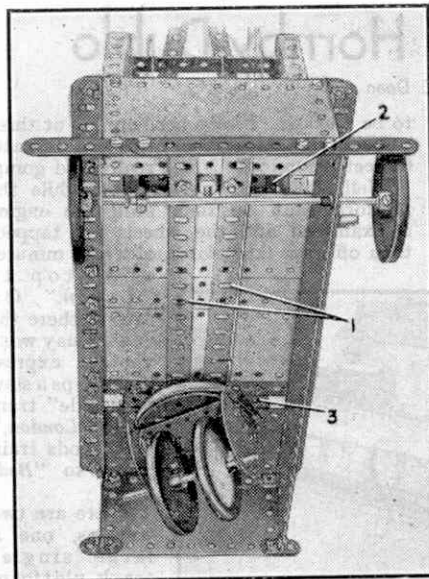


Fig. 2. An underneath view of the mobile crane chassis.

A simple brake is fitted. This comprises a Driving Band passed around a 1" Pulley on the Crank Handle and attached to a 2½" Strip lock-nutted to the Plate. A length of Cord is fastened to a Cord Anchoring Spring on the Crank Handle. It passes over Pulleys 8 and 9 and around a 1" loose Pulley in the pulley block, and is finally secured to the Double Angle Strip in the jib head.

The pulley block is made from two Flat Trunnions bolted to Double Brackets, and the Pulley is free on a 1" Rod held in place by Spring Clips.

Parts required to build the Mobile Crane: 12 of No. 1; 12 of No. 2; 4 of No. 3; 2 of No. 4; 13 of No. 5; 4 of No. 8; 2 of No. 11; 14 of No. 12; 2 of No. 12c; 1 of No. 14; 1 of No. 15a; 3 of No. 16; 1 of No. 17; 2 of No. 18a; 1 of No. 19g; 2 of No. 19b; 5 of No. 22; 2 of No. 22a; 1 of No. 23; 1 of No. 23a; 1 of No. 24; 10 of No. 35; 100 of No. 37; 6 of No. 37a; 10 of No. 38; 1 of No. 40; 1 of No. 45; 2 of No. 48; 8 of No. 48a; 2 of No. 48b; 1 of No. 51; 1 of No. 52; 2 of No. 53; 2 of No. 54; 1 of No. 57c; 4 of No. 59; 1 of No. 80c; 2 of No. 111; 6 of No. 111c; 4 of No. 126a; 1 of No. 155; 1 of No. 176; 1 of No. 186; 4 of No. 187; 4 of No. 188; 1 of No. 189; 6 of No. 190; 2 of No. 191; 4 of No. 192; 2 of No. 197; 1 of No. 198; 2 of No. 214.

## MODEL-BUILDING COMPETITION RESULTS By "SPANNER" MARCH "GENERAL" CONTEST

The prize-winners in the Home Section of the March General Model-Building Contest are as follows: 1st, Cheque for £2/2/-: W. Picken, Gainsborough; 2nd, Cheque for £1/1/-: J. E. Meggitt, Ipswich; 3rd, Postal Order for 10/6: A. Reeve, Melton Mowbray. Consolation Prizes of 5/-: J. M. Seeley, Rochdale; G. Wyeth, Four Marks, Nr. Alton; A. J. B. Fluck, Swindon; J. E. Matthews, Fillongley; D. P. Devereux, Dublin.

First Prize was awarded to W. Picken, Gainsborough, for a fine model of a 5-ton lorry. The most striking features of this were its realistic proportions and neat finish. Many of the smallest details of the original were reproduced in the model and the realistic appearance of the cab was most pleasing. The front wheel steering was designed on the Ackermann principle and a good positive lock was obtained. The drive for the rear wheels was provided by a 6-volt Electric Motor operating through a differential on the rear axle.

J. E. Meggitt was successful in winning Second Prize with a model of a Ransomes and Rapier mobile crane. Even such devices as a self-starter and an electro-magnetic overhoist protection circuit were incorporated in this ingenious model. An E20B Electric Motor provided the driving power, and an ignition key was fitted to control the current supply. The overhoist protection device ensured that should the Pulley block be raised too far the coil of the electro-magnetic switch was short circuited, thus releasing the armature to the "off" position.

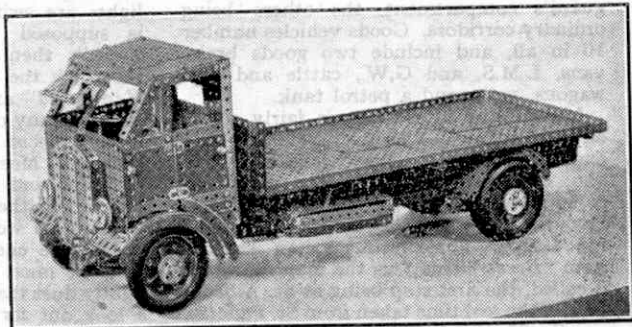
A well-designed model of a Pacific Locomotive and Tender won Third Prize. This striking model was built by A. Reeve, Melton Mowbray. The driving wheels were 3" Pulleys and the front bogie was mounted on 2" diam. Pulley Wheels. The tender ran on Wheel Flanges bolted to Face Plates and the whole model had a most impressive appearance.

Among the consolation prize-winners was a sturdy looking model of Lt.-Col. Gardner's M.G. Record Car, which was built by J. M. Seeley. The main feature of this entry was a simple steering mechanism built up from Bush Wheels, Strips and Rods.

Another interesting model was a sports car built by D. P. Devereux. The layout was exceptionally neat and produced a very pleasing appearance.

## JUNE "SIMPLICITY" CONTEST OVERSEAS

The principal prize-winners are as follows: 1st Prize, Cheque for £2/2/-: J. Malan Jordaan, Pretoria, South Africa. 2nd, Cheque for £1/1/-: R. Rowson, Colombo. 3rd P.O. for 10/6: L. Thompson, Vancouver, Canada.



A motor lorry that won First Prize for W. Picken, Gainsborough, in the March "General" Model-Building Contest.

# My Methods in Hornby-Dublo

By C. C. Dean

READERS of the "M.M." enjoy many interesting and instructive articles from the Editor's pen; here are a few notes from a very satisfied owner of a Hornby-Dublo electric railway.

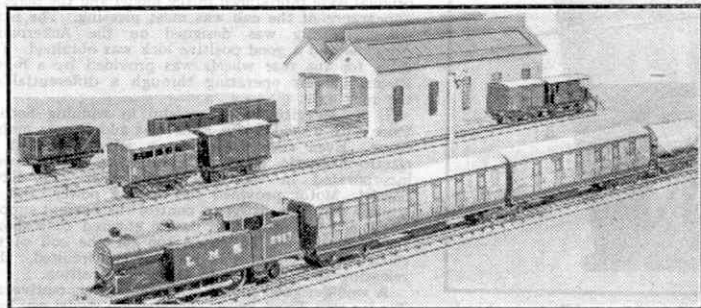
My main line is an oval giving a run of 15 ft. to a circuit. There are two sidings,

to be reached. I keep her running at three to four circuits of the track per minute; 60 feet per minute is not really bad going.

Well, the train arrives, and while the platform staff do their stuff the engine is examined and the wheels are tapped; then off once more for another 30 minutes

non-stop to "Luton." On arrival there the engine may work another express or perhaps a slow "roadside" train up to "London," or a goods train down to "Bedford."

There are two stations, one a large single-track platform with awning capable of taking a four-coach



A passenger train on a typical Hornby-Dublo layout such as that described in this article. Note the Tank Wagon in the rear representing a milk tank vehicle.

one for coal and general goods, the other forming a spare carriage road. There is also an engine shed running off the general goods siding. Motive power consists of one L.M.S. 0-6-2 Dublo Tank Engine. This little engine has been working hard nearly every day since January 1941 and has given me every satisfaction; it is still as good as the day I bought it.

Passenger stock is varied. There are three L.N.E.R. Hornby-Dublo Coaches, two of them articulated together as one unit, and three L.M.S. corridor coaches of another make, one a composite with guard's compartment, the others being ordinary corridors. Goods vehicles number 10 in all, and include two goods brake vans, L.M.S. and G.W., cattle and coal wagons, vans, and a petrol tank.

My method of working is fairly rough on the engine. The average main line express consists of four coaches and one van; quite a heavy pull. The main line is supposed to follow the route of my favourite railway, the Midland route of the L.M.S. I require, say, an express from "Border Road," as the main terminal is called, the first stop being at St. Albans. I allow the real time taken from St. Pancras, usually 30 minutes, and once the train is away from "Border Road" she keeps pegging away until St. Albans is supposed

to be reached. There is one small wayside station in the middle of a village of flat cardboard houses. Signals are of upper-quadrant and ordinary semaphore type worked by hand. Distant, home and starting signals are installed.

My method of working means running through the stations every time round. This doesn't conform to regular practice so I have each station illuminated with lamps taken from an accumulator under the baseboard, and I only count it as a station while it is illuminated. So, when the train leaves on the down run the lights are switched off, until the time it is supposed to pass through "Kentish Town"; then after so many circuits of the track the lights are put on for "West Hampstead" and so on.

Like many other Hornby-Dublo owners, I have to cut my layout to fit the size of the room. Most of my track and equipment is second and third hand and it is a great tribute to the makers that it keeps on working so well.

The one enemy of the system is dust, and one must keep a soft cloth handy to lightly dust the track at intervals, and keep a look out for joints working loose.

Yes, my system is still running well due to careful handling and to following the instructive articles in the "M.M."

# Looking After Your Hornby Engine

ON any miniature railway system much of the interest of the owner is centred on the engines. Such attention is natural, for unless the engines are in good working order the trains cannot be run satisfactorily and the fun of using the railway is spoiled. It is specially important on a "one-engine" line to look after the engine properly, as all train working, shunting and any other movements depend on it.

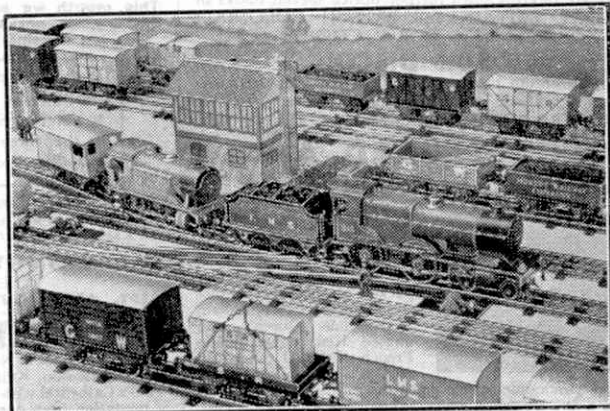
A little regular attention to the engine is better than simply making a big job of it once in a way. Hornby locomotives give a surprising length of service if they are properly looked after. Lubrication and cleaning are the main things to attend to, but it is a mistake to over-do the oiling part of the business. Once the oil finds its way to the working surfaces it is effective for some time. A little oil goes a long way, and an excess of it simply makes a mess, causes slippery wheels and dirty tracks and encourages dust to collect. Over-oiling therefore is something to avoid.

It is important to use a suitable grade of lubricant. Fine oil of sewing machine quality is just right, and it should be applied by means of a wire dipper or sharpened matchstick to the various working parts. An ordinary oil can should not be used for this purpose as it gives too much oil at a time. Thick oil should never be used as it has a clogging effect. In addition to the spindles, gears and spring of the clockwork mechanism, the axle bearings, crank pins and piston rods should have a small drop of oil applied.

Most Hornby railway owners clean the housing or body-work of their engines but not so many give the necessary attention to the "works." Wheel treads should be wiped from time to time to remove any trace of the greasy film that tends to collect on them. This should never be allowed to build up until it forms the kind of "mud" one sometimes sees, for this causes sluggish and uneven run-

ning and in extreme cases it can cause derailments.

The nature of the dust that tends to collect in time in the working parts will depend to some extent on the surface on which the lines are laid. It is a good plan to make a practice of looking over the mechanism fairly frequently for any grit, fluff or "whiskers" that get round the axles, behind the wheels and elsewhere. Usually a rag, a matchstick or a "mop" paint brush kept for the purpose will do all that is necessary. If the dirt is obstinate or the engine has not been used for some time, moistening the brush with petrol



Two Hornby locomotives arriving at a goods yard to begin work. The tank engine has a brake van coupled to it ready for a local trip.

will help. This should be done in the open for preference, and in any case well away from any fire or flame. Normally it is not necessary to remove the mechanism from the engine.

A wipe over the housing of the engine with a clean rag to remove dust or oily smears will usually do all that is necessary to keep the appearance good. For the more easily get-at-able surfaces such as the boiler, cab and tanks, a small quantity of a good quality wax polish will help to preserve the finish.

In order to reach the more awkward parts of the engine housing, such as under the boiler or between frames and splashers, a matchstick sharpened almost to a point and a small piece of cloth wrapped on the end will be found most effective in removing the dust and grit.



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# Stamp Collecting

## From Farthest South

By F. Riley, B.Sc.

A BRITISH colony that is becoming increasingly popular with stamp collectors is the Falkland Islands, which with its dependencies forms the most southerly part of the British Empire. The two main islands of the Falklands are as far south of the Equator as Middlesex is north of it, but they are more equable in temperature. It will interest those who revise the climate of Great Britain to learn that there is rain in the Falklands on about 250 days every year, but this is not heavy; it takes the form of drizzle, with frequent showers, and mists are frequent. In spite of this the colony seems to be remarkably healthy.

For a general survey of the islands the pictorial issue of January 1938 will serve, and a close study of the 12 designs included in it is certainly worth

while. One of these shows the arms of the colony, emblematic of the sea activities of its peoples. Of the remainder,

two feature ships, both Royal Research vessels, the property of the Falkland Islands Government, engaged in the collection of information on the habits and movements of whales in Antarctic seas.

There are three bird designs in the series, showing respectively the upland goose, the black-necked swan and the gentoo penguin. The goose is a small one and has the peculiarity that the male is black and white and the female brown and white; usually with geese there is no difference in colour between the sexes. The black-necked swan is larger than the swan with which we are familiar. Except on its neck its plumage is white, and another striking feature is a bright red nasal knob. The gentoo is one of four kinds of penguin that nest in the Falkland Islands; another, the king penguin, was illustrated on the 5/- stamp of the earlier pictorial issue of 1933. The stamp story of life in the Falklands is completed by the sea lion of the 5/- stamp, and the sheep of the 2½d. stamp. There were 624,000 sheep on the island in 1941.

Dependencies of the Falklands provide designs for the 1/- and 10/- values. On the first is a picture of Mount Sugar Top in South Georgia, a snow-capped peak that is a landmark for whalers making use of the whaling station at Grytviiken on the island. Deception Island, pictured on the 10/- stamp, is in the South Shetlands. The four dependencies had separate issues of stamps in this series in 1944, with the names of the dependencies themselves overprinted. Graham Land, one of the four, lies on the Antarctic Circle, which passes roughly between its two main islands, and it has the distinction of being the southernmost land that has had its own regular issue of stamps.

The whaling industry generally finds a memorial on the 1d. stamp, on which is seen the monument built up of whale jaw bones at Port Stanley, the

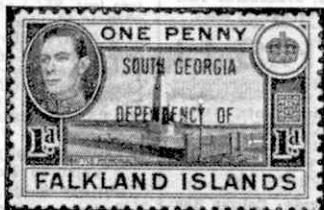


Coronel, in the South Pacific and then rounded Cape Horn to make a descent on the Falkland Islands. Fortunately a British fleet sent out to avenge the disaster of Coronel had just reached the islands, and in the battle that followed von Spee's ships were sunk, with the exception of a light cruiser, which was hunted out later and destroyed. The battle took place on 8th December 1914.

The Falkland Islands have seen many changes since they were discovered by Davis 454 years ago. The French were the first to establish a colony there, but they were expelled by the Spaniards a few years later. Next an English fleet took possession, and their doing so almost led to war with Spain. In the end the islands were recognised as British, but in 1820 the then new republic of Buenos Aires claimed the group and actually formed a settlement there, which lasted until 1831. Two years later the British flag was again hoisted. The British claim is not acknowledged by the Argentine Republic, however, and to mark their belief that the islands are their own property the Argentines issued a special stamp in January 1936. The design took the form of a map of South America, with the Argentine Republic clearly marked and including the Falkland Islands.

Apparently the claim is still pursued, although nothing came of the gesture of 14 years ago, for now the Argentine Government has issued yet another map stamp with the same idea behind it. This illustrates on stamps a new development, for a wedge-shaped section of the Antarctic continent extending to the South Pole is marked in deeper tint, presumably to indicate the extent of the claim of the South American Republic to lands in the far South. In the issue of a map stamp of Antarctic regions the Argentine Republic has been forestalled by the Falklands, and Chile also has issued a map stamp featuring Antarctic claims that overlap those of Great Britain and the Argentine. The South American stamps are labelled "Sector Antartico Argentino" and "Antartica Chilena" respectively.

It will be interesting to see if there are further developments in the use of stamps to point territorial claims in the Antarctic.





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4d. ea. 299, 406, 507, 629, 844, 847, 859B, 860, 871, 885, 886, 889, 890, 891, 895, 902, 903, 943, 962, 963, 975, 983, 984, 1043, 1044, 1068, 1072A, E23, P4, P6.

6d. ea. 65, 267, 411, 432, 441, 465, 468, 523, 563, 576, 883, 853, 854, 864, 874, 884, 888, 893, 894, 909, 964, 965, 978, 981, 996, 997, 1001, 1002, 1006, 1007, 1011, 1012, 1016, 1017, 1021, 1022, 1026, 1027, 1029, 1041, 1048, EA2, Pkt. 125 Commens. f1.

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# Stamp Gossip

## and Notes on New Issues

By F. E. Metcalfe

THIS month we illustrate one of the new Netherlands stamps. To most collectors there must seem something very familiar about it, which isn't surprising, seeing that the design is almost identical with that of our old friend the "Penny Black."

Canada's new "Citizen" stamp is causing quite a stir over on the other side, for it has been noted that the right hand of the man depicted has only got three fingers. If our illustration comes out clear enough the defect will be easy to see, for it is obvious enough on the stamp itself, and the "error" may cause an early withdrawal, so collectors should take care



to get their copies as soon as possible. As Canada is outside the sterling area dealers cannot import Canadian stamps direct, but they may barter, providing that they do not use current "colonials," and as many will be doing so, supplies of the "Citizen" stamp will be available for a short time.

Incidentally the recently issued "Bell" stamp of Canada has been off sale in the Ottawa Philatelic Bureau since early June. As many

British collectors did not get their copies at the time, this stamp looks like being quite a scarce item, and we are making it our tip for September. It would appear that Canada is no longer keeping supplies of new stamps on sale for such a long time as used to be the case with the older issues. This is rather unfortunate for British collectors, who now have some difficulty in getting stamps from countries outside the sterling area.

In this respect things are getting worse instead of better, for both Egypt and Sudan have recently left our currency fold, and in future there is going to be some fun keeping one's Egyptian collection up to date. Fortunately the new long air set has now been completed and dealers were able to get all values before the embargo. We are illustrating one of this handsome set, and we will have to leave future issues to take care of themselves. As our dealers will be able to barter with Egypt as well as Sudan, no doubt they will show enough enterprise to get all that comes out in future, but collectors will have to be on their toes and snap up first time anything they see being offered at reasonable prices.

Sudan's new set is said to be nearly ready, and it is one of the strangest coincidences of stamp collecting, with so many hawk eyes about, that an error in the design of the piastre values should have gone unnoticed for so many years. It was an American professor of the Smithsonian Institute



who noticed that the word piastre, in Arabic, was being used, instead of piastres. Collectors with copies of the "Palm" set can see how the word should have been written, for it was only in the old "Camel" set



that the error had been made.

News is coming in thick and fast from India regarding new issues for that

vast country, and by the time these words appear current Indian stamps may have come out over-printed for use in Pakistan. India itself proposes to have a set of air stamps as well as postage, and also a yearly set of "Health" stamps, similar to the annual set of New Zealand. Without a doubt India of the future is going to be a much bigger drain on collector's pockets than she has been in the past. The worst of it is that for the average collector such high values as 25 r. etc. are too much of a good thing.

Burma also is in the philatelic news, for on 1st September the present set of stamps is to be over-printed "Provisional Government" in Burmese. Collectors will be wise to get their sets as soon as offered.

Many collectors have wondered what is going on in Papua and New Guinea. As is generally known Australian stamps are in use there, and both these territories have been joined

up. Postmarks show both Papua and New Guinea, and we are illustrating one of these in view of the general interest. It will probably be some time before special stamps are again on sale, as Australia has announced that she is waiting for a new decision regarding the mandate.

Another country which seems to have dropped out of the stamp world is Maldivé Islands. In the past dealers were able to buy the stamps from Ceylon, but since the war all cash has been returned, and what kind of stamps, if any, are in use now nobody seems to know. Perhaps some reader in Ceylon or India can tell us.

The long awaited "Constitution" set of Ceylon may be on sale by the time these words appear. The set was apparently held up, owing to the delay in the formation of the new government, and that apparently was held up owing to the lack of voting papers, which in turn seem to have been held up owing to lack of coal which held up the printers, and so on and so forth.

There is news that Australia is to issue a new commemorative set in September. The event to be honoured is the 150th anniversary of the discovery of the estuary of the Hunter River. It is here that the Australian city of Newcastle stands. Three stamps are to be issued, with a total face value of 1½d., and as usual there should be enough for all. This is one of the good points about Australian "Commemoratives." Everybody has a chance to buy sets at current rates.

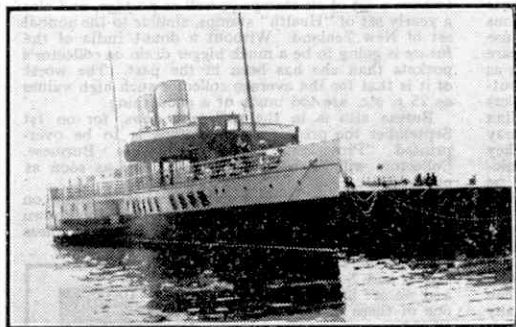


## From Our Readers

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.

### A NEW CLYDE STEAMER

The first ship built for service on the Clyde since the war was put into commission by the L.N.E.R. on 14th June of this year. She is the new "Waverley" and is based on Craigendoran, the company's pier on



The new "Waverley," of the L.N.E.R. Clyde steamer fleet, at Craigendoran pier. Photograph by D. Robertson, Glasgow.

the Clyde. As may be gathered from the accompanying photograph, which shows her lying at Craigendoran, she is a handsome vessel embodying many of the better features of the "Talisman" and the "Jeannie Deans," two of the company's other Clyde vessels. She is of very modern appearance, with cruiser stern and a raked stem, both of which give promise that she will produce her designed speed of 17 knots easily. She has a black hull with cream upperworks, and her funnel is red, with a white band and a black top, the standard colours of the L.N.E.R. Clyde fleet.

The new vessel was built by A. and J. Inglis Ltd., of Pointhouse, Glasgow. She cost £160,000 and has capacity for 1,350 passengers.

The new boat has been placed on the service formerly carried out by her predecessor of the same name. This is the "Three Lochs Tour," which before the war was the company's most popular trip from Glasgow. It includes a sail up Loch Lomond on one of the Loch steamers, and a sail down Loch Long and Loch Goil in the "Waverley."

The former vessel of this name was one of the most popular ships of the L.N.E.R. Clyde steam fleet before the war. She was a paddle steamer with a speed of nearly 20 knots, built on the Clyde, and in her prime she had many exciting races with her rivals on the Firth of Clyde services. Several times she was the winner of the Bute Blue Ribbon Cup, presented annually to the Clyde steamer that showed the best timetable performance for the season. The only veteran from this vessel on the new "Waverley" is the Captain, who said good-bye to his old ship at Dunkirk where she was sunk by a bomb.

D. ROBERTSON (Glasgow).

### THE ROYAL TRAIN ENGINES AT DE AAR

Two brand-new 15Fs which were to haul the Royal and Pilot Trains from Kimberley to De Aar during the Royal Tour early this year arrived at De Aar at the beginning of April. The Royal Train was scheduled to pass through De Aar on the evening

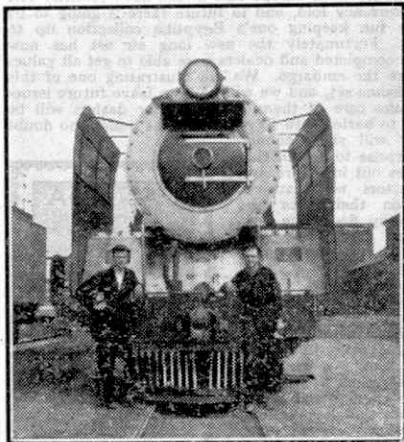
of 18th April, and No. 3046 was to be the engine, while No. 3040 was to haul the Pilot Train. On Monday 14th April the engines stopped working trips and were shunted on to a loop line at the De Aar Locomotive Sheds. Apprentice Fitter J. Jakobsen, a keen "M.M." reader and Hornby Train enthusiast, was assigned to the overhaul of the engines. The drivers and firemen worked for eight hours a day shining the interior of the cab and getting small faults corrected, while a swarm of cleaners polished the engines from buffer to buffer and every detail was checked.

On Thursday afternoon, when the engines left for Kimberley, the fruits of four days' labour were very evident. The engines emerged into the bright South African sunshine a pleasure to the engineering eye, the glittering brass pipes and fittings forming a beautiful contrast with the shiny black boiler and smoke deflectors.

At Kimberley No. 3046 was coupled up to the Royal Train, the Royal Coat-of-Arms was fitted to the smoke-box lid and the journey of journeys started. When the train steamed into De Aar station, every man who had worked on the engine must have increased his chest measurements by several inches. For the engine was indeed a driver's dream; not a joint was leaking, not a nut was loose, and only the soft "foop-foop" of her beats were audible.

The 15Fs are the latest S.A.R. locomotive class. They are 4-8-2s with a tractive effort of 47,980 lb. at 85 per cent. boiler pressure, and were built by the North British Locomotive Co. Ltd.

T. JAKOBSEN (South Africa).



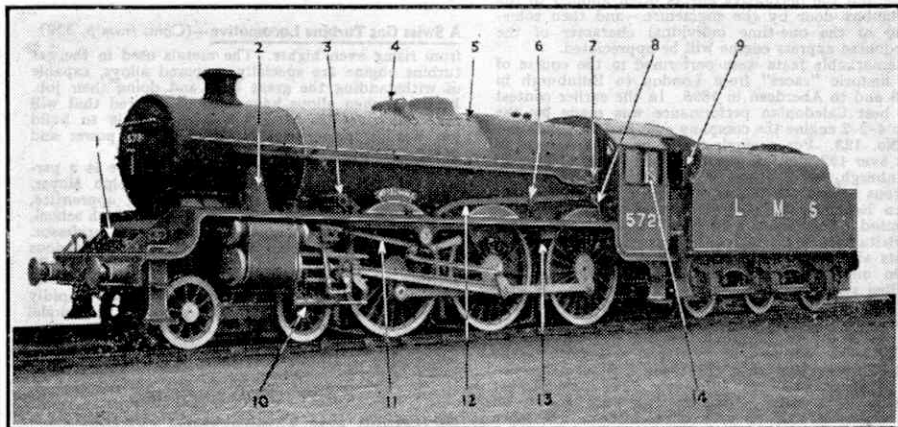
One of the South African Railway locomotives that hauled the Royal Train during the recent tour of their Majesties the King and Queen. Apprentice Fitter J. Jakobsen, an "M.M." reader who took part in her preparation for this duty, is seen in front of the engine. Photograph by T. Jakobsen.



# 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.

## What Engine Parts are These?



Here is a chance for the locomotive enthusiasts among our readers—and they are many—to distinguish themselves. The photograph on this page shows one of the well-known L.M.S. "Jubilee" class. Various parts of this engine have been numbered, and competitors this month are required to name the parts indicated and also to describe briefly the purpose of each.

Entries should have the parts listed in numerical order, and should be on one side of the paper only. Each sheet should bear the full name and address of the competitor.

## Join in this Bargain Hunt

This month we are giving our stamp enthusiasts an opportunity of taking part in a competition, but this is open to all, and entries from any reader will be welcomed, whether he is actually a collector or not. It takes the form of a simple bargain hunt. All that is necessary is to look through the stamp advertisements in this issue and mark down the six offers that present what the competitor thinks are the greatest bargains, arranging these in order, the greatest bargain first, the next best second, and so on. The name, address and age of the competitor are all that is then required to complete the entry.

As usual, there will be two sections in the contest, for Home and Overseas readers respectively, and in each there will be prizes of 21/-, 15/- and 10/6 for the entries in which the list corresponds most nearly to the general order of voting as shown by the first choices of entrants. Entries must be addressed "September Stamp Bargain Contest, Meccano Magazine,

The contest will be divided into the usual two sections, for Home and Overseas readers respectively, and in each there will be prizes to the value of 21/-, 15/- and 10/6, with a number of consolation prizes. The judges will take neatness and originality into consideration in the event of a tie for any prize.

Entries should be addressed "September Locomotive Parts Contest, Meccano Magazine, Binns Road, Liverpool 13." The closing date in the Home Section will be 31st October, and that for Overseas 30th April 1948.

Binns Road, Liverpool 13." Closing dates: Home Section, 31st October; Overseas Section, 30th April 1948.

## September Photographic Contest

This month's contest is the 9th of our 1947 series, and in it, as usual, prizes are offered for the best photographs of any kind submitted. There are two conditions—1, that the photograph must have been taken by the competitor, and 2, that on the back of the print must be stated exactly what the photograph represents. A fancy title may be added if desired.

Entries will be divided into two sections, A for readers aged 16 and over, and B for those under 16. They should be addressed "September Photographic Contest, Meccano Magazine, Binns Road, Liverpool 13." There will be separate sections for Overseas readers, and in each section prizes of 21/-, 15/- and 10/6 will be awarded. Closing dates: Home Section, 30th September; Overseas Section, 31st March 1948.

**The Caledonian Railway Centenary—**

(Continued from page 348)

standard headlamp code. Instead, green or white lamps or discs set in brackets on the engine cab side below the roof served the same purpose. There was also the novel route indicator of semaphore pattern with movable arms that was displayed in front of the chimney in the daytime. Add to this the characteristic hooter used instead of a whistle; the single-link coupling at the front end and brake hoses fitted below running plate level; the widely spaced guard irons attached to the front of the bogie frames; the spotless blue paint and elaborate lining and the decorative effects often applied to the smoke-box door by the enginemen—and then something of the one-time individual character of the Caledonian express engine will be appreciated.

Remarkable feats were performed in the course of the historic "races" from London to Edinburgh in 1888 and to Aberdeen in 1895. In the earlier contest the best Caledonian performance was made by the only 4-2-2 engine the company ever had, long familiar as No. 123. For a single-driver to make a time of just over 102 min. for the 100½ miles from Carlisle to Edinburgh, an average of 58.94 m.p.h., even with 76 tons behind the tender, was quite an achievement when Beattock and Cobbinshaw summits are borne in mind. This fine old engine, the last single-driver in Britain to work in regular passenger service, still exists although no longer in use.

On one occasion in the 1895 race the Carlisle-Stirling stretch was covered by a 4-4-0 No. 78 with 70½ tons in 113 min. The run from Perth to Aberdeen was twice made by the same engine, No. 17, at an average speed of 67 m.p.h. for the 89½ miles.

The real conquest of Beattock was left to the L.M.S. to achieve with the Class 7 Stanier 4-6-2s. On a special test in 1939 No. 6234 "*Duchess of Abercorn*," a sister engine to No. 6231 shown on the cover of this issue, worked without assistance a 610-ton 20-vehicle train between Crewe and Glasgow in a remarkable manner. The timings laid down were those applying to the pre-war "Royal Scot" service on which the load limit for Class 7 engines was 420 tons. Some years earlier too there was the sterling effort of No. 6201 "*Princess Elizabeth*" in the course of 400-mile non-stop journeys between London and Glasgow, which led directly to the running of the pre-war "*Coronation Scot*."

Caledonian signals, which followed orthodox lower quadrant practice, were characteristic with their lattice posts, bold ball-and-spike finials and high-pitched balance weights. The enlargement of Glasgow Central station in the early 1900s was accompanied by a new electro-pneumatic signalling installation notable as the first of its kind in Scotland. It was reserved, however, for the Oban route to necessitate an unusual signalling scheme. Possible danger from falling rocks in the mountainous territory traversed caused the installation in places of wire screens at the lineside connected to special signals. These normally stood at "line clear," but were put to "stop" in the event of the wire screen being broken by tumbling rocks. Alarm bells in adjacent signal cabins and watchmen's houses were also provided.

The Caledonian was proud of its stations and besides notable structures of its own such as Glasgow Central, Edinburgh Princes Street, Wemyss Bay and Oban, it shared in the working and management of such well-known joint stations as Carlisle, Perth and Aberdeen.

In addition to normal railway business, the Caledonian had also considerable marine interests. As early as 1852 it had its own ships built for the Clyde coast traffic. Development was rapid and by the 1890s the company had a fine fleet of steamers, paddle ships with rakish twin funnels, that long provided the pattern for later constructions. Dock and harbour interests formed an important Caledonian activity; the harbour at Grangemouth, on the Forth, and its associated waterways, having been taken over as early as 1867.

**Trailers for Outsize Loads—(Cont. from page 351)**

arcs of turning. Connection between front and rear bogies for steering purposes is by telescopic drawbars. Steering of the rear bogie can be carried out by hand from a wheel at the rear, when the steering drawbar is disconnected. The frame and bogies are of welded construction. The Girling brakes are pressure operated. Brakes are fitted to all wheels, but hand operation only applies half the number.

In addition to the trailers referred to, and among many others of various types, the Crane firm have produced a large variety of trailers for the Services, particularly for the Army. These include some specially interesting Tank transporters.

**A Swiss Gas Turbine Locomotive—(Cont. from p. 359)**

from rising even higher. The metals used in the gas turbine engine are specially prepared alloys, capable of withstanding the great heat and doing their job. In time, when alloys have been discovered that will take much greater heat, it will be possible to build gas turbine locomotives of much greater power and speed.

Behind the gas turbine locomotive there is a personality. He is the Swiss inventor, Adolph Meyer. He started his career as an engineering apprentice, and attended classes at a Zurich technical high school, where later he held the position of assistant professor. After that, he worked as an engineer for various important firms in different countries, eventually settling with Brown-Boveri, the Swiss engineers. It was here that his work with gas turbines rapidly progressed, and by 1930 he had built his first model gas turbine locomotive. And by 1941, after another long period of hard work, the world's first gas turbine locomotive was put into railway service.

**COMPETITION SOLUTIONS****NOVEMBER 1946 ENGINE CLASS CONTEST**

Stanier, 2 Cylinder, Mixed Traffic, Class 5, L.M.S.; Highland Railway, "Clan" class, 4-6-0; L.N.W.R., "George the Fifth," 4-4-0; Gresley "Pacific," 4-6-2, L.N.E.R.; "Green Arrow," 2-6-2, L.N.E.R.; D.9, 4-4-0, Ex Great Central; "Royal Scot," 3 Cylinder, 4-6-0, GP; "Princess Royal," 4-6-2; "King," 4-6-0, G.W.R.; "Castle," 4-6-0, G.W.R.; "West Country," 4-6-2, S.R.; "Lord Nelson," 4-6-0, S.R.

**DECEMBER 1946 RAILWAY QUIZ**

1. Liverpool Street Suburban services, L.N.E.R. 2. Liverpool Overhead Railway. 3. Bristol Temple Meads, G.W.R. 4. Well wagon for transporting Army Tanks. 5. Standard Gauge 4 ft. 8½ inches. 6. Chicago, U.S.A. 7. 2-8-2 "MacArthur" type. 8. At Danger or Caution. 9. Through freight train with full load right through to destination with no wagons for intermediate stations. 10. A locomotive which uses steam in both high and low pressure cylinders before exhausting. 11. Mersey Railway, 3rd May, 1903. 12. An invariable train formation or set of coaches which are seldom uncoupled from each other. 13. Signals are not in use. 14. Water trough indicator.

**DECEMBER 1946 JIG-SAW CONTEST**

Astra-Pharos Ltd., G. D. Campbell, Wolsey Hall, W. & G. Foye Ltd., Electradix Radios, Duttons Shortland, Meccano Ltd., Vitality Bulbs Ltd., A. N. Beck Ltd., B.S.A. Cycles Ltd., International Model Aircraft Ltd., Bassett-Lowke Ltd., Lines Bros. Ltd., Signalling Equipment Ltd., I.C.S. Ltd., Hamley Bros. Ltd., Modelcraft Ltd., Johnson and Sons Manufacturing Chemists Ltd., Mars Confections Ltd., Dunlop Rubber Co. Ltd., E. Sharp and Sons Ltd., Hercules Cycle and Motor Co. Ltd., Selfridges Ltd., Hobbies Ltd., Harbutts Plasticine Ltd., G. L. Wright, Errington and Martin, Windsor Stamp Co., Birkdale Stamp Co., P. J. Dyke, Capt. M. Campbell and Co., J. H. Gaze, Commonwealth Stamp Co., Letts and Co., L. E. Thompson, S. Fenley Ltd., A.B.C. Locomotive Series.

# Fireside Fun

"Now what would you like me to talk to you about to-night, boys?" said the cheery youth leader at the boy's club.

"Oh, about two and a half minutes," growled a voice from the back of the room.

"Miss the train?" said the sympathetic porter to the perspiring passenger who was just too late.

"Not much. I never really had time to get attached to it."

The lesson was to include a demonstration of a model of the steam engine.

"Now here is a small can into which I put some water," said the teacher. "Can any boy tell me how from that I can generate a surprising speed and power?"

"Yes, sir," replied the brightest boy in the class.

"Well, how would you do it?"

"Tie it to a dog's tail, sir."

"Yes, sir," said the hotel porter.

"A poor business man always gives better tips than a rich one."

"Strange! What's the reason?"

"That's easy. The rich business man doesn't want anybody to know he's rich, and the poor business man doesn't want anybody to know he's poor."

Teacher: "How is sawdust made, Jones?"

Jones: "Please, miss, . . . er . . ."

Teacher: "Hurry up, now. Use your head."

"Who do you think is our most popular general?"

"Oh, general holiday, of course."

"Yes, when I was in Africa I shot a man-eating lion."

"That was a silly thing to do. Why shouldn't the man eat a lion if he wanted to?"

## THIS MONTH'S HOWLER

A chopstick is a Chinese lumberman.



"This essay on 'Our Dog' is word for word the same as your brother's."

"Yes, miss. It's the same dog!"



"What's the meaning of this; there's a fly in my cup."  
"I couldn't say, sir. I'm a waitress, not a fortune teller."

## BRAIN TEASERS START AT THE BOTTOM

Here is an inverted number pyramid, in which each figure represents a certain letter. Can you replace the figures by letters to form a word pyramid?

```

1   2   3   4   5
3   2   1   4   5
5   2   2   3
      2   5
          M.H.K.I.
    
```

## HARD WORK

Place 10 matches in a row, spacing them apart about the length of each match. Then move five matches, one at a time, to join up with the other five to make five crosses. At each move the match picked up must be passed over two matches. For instance, the first match can be passed over the second and third to form a cross with the fourth. Moves may be made either to right or left, and a cross of course continues to count as two matches. D.B.

## QRQBQ GUVF

For a change, can you make sense of this bewildering combination of letters?

QBAG CHYV GUR PBZZHAVPNGVBA PBEQ VA  
GUR FRIEA GHAARY

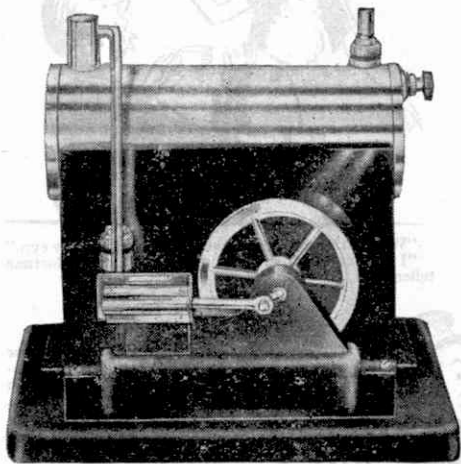
It is the result of changing a sentence of nine words by means of a code in which one letter is substituted for another. The code is a very simple one, as those who discover it will realise. B.I.N.

## SOLUTION TO LAST MONTH'S PUZZLE

The square of the brain teaser in the August "M.M." becomes a magic one when it is cut into four pieces and these are rearranged as shown in the accompanying diagram.

1	11	6	16
8	14	3	9
15	5	12	2
10	4	13	7

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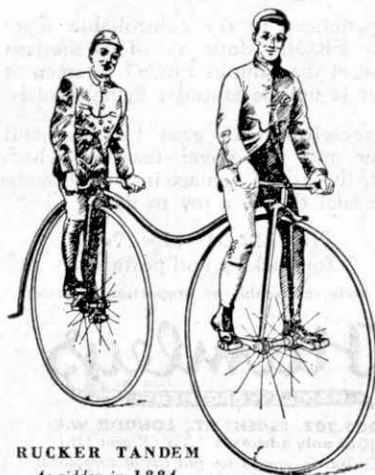
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REDUCER sufficient for 8-oz. ...	.. ..	7½d. "
BLUE TONER for making 10-oz. ...	.. ..	9d. "
SEPIA TONER to make up 8-oz. ...	.. ..	10½d. "
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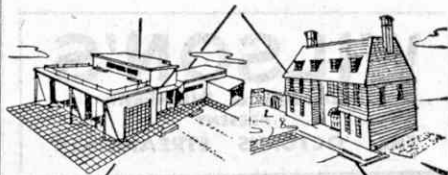
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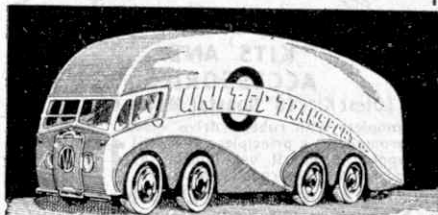
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Draughtsmanship	Steam Engineering
(State which branch)	Structural Steelwork
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Electrical Engineering	(State which branch)
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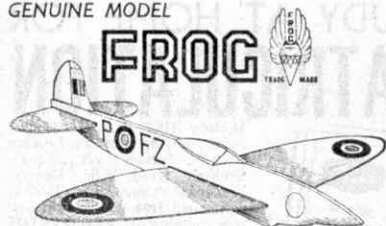
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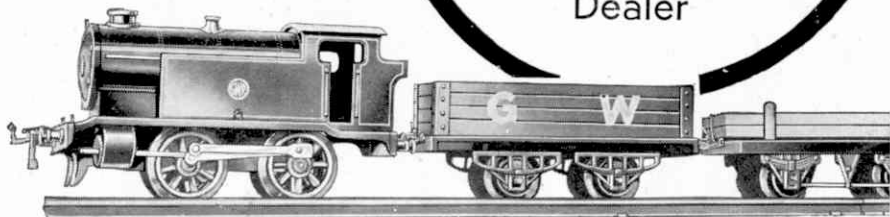
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