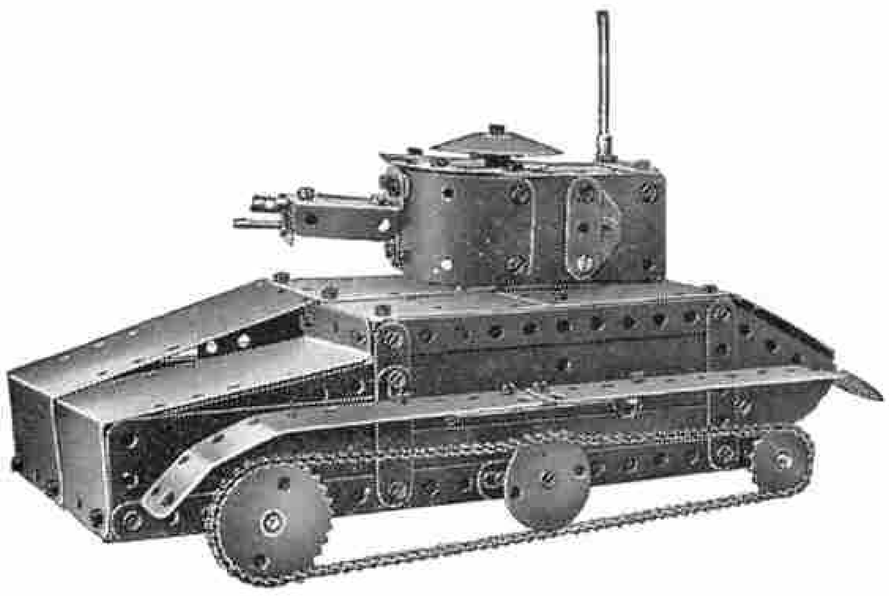
VOL. XXIV. No. 9. SEPTEMBER 1939

MECCANO MAGAZINE

MECCANO

The above illustration shows the new Meccano Mechanised Army Outfit. This consists of parts specially designed to construct models of the British Mechanised Army. The parts are enamelled in Service green and black and are interchangeable.



Typical Light Tank, with swivelling turret

MECHANISED ARMY OUTFIT

The rapid development of tanks, anti-aircraft guns, and mechanical transport of all kinds has revolutionised the Army of to-day.

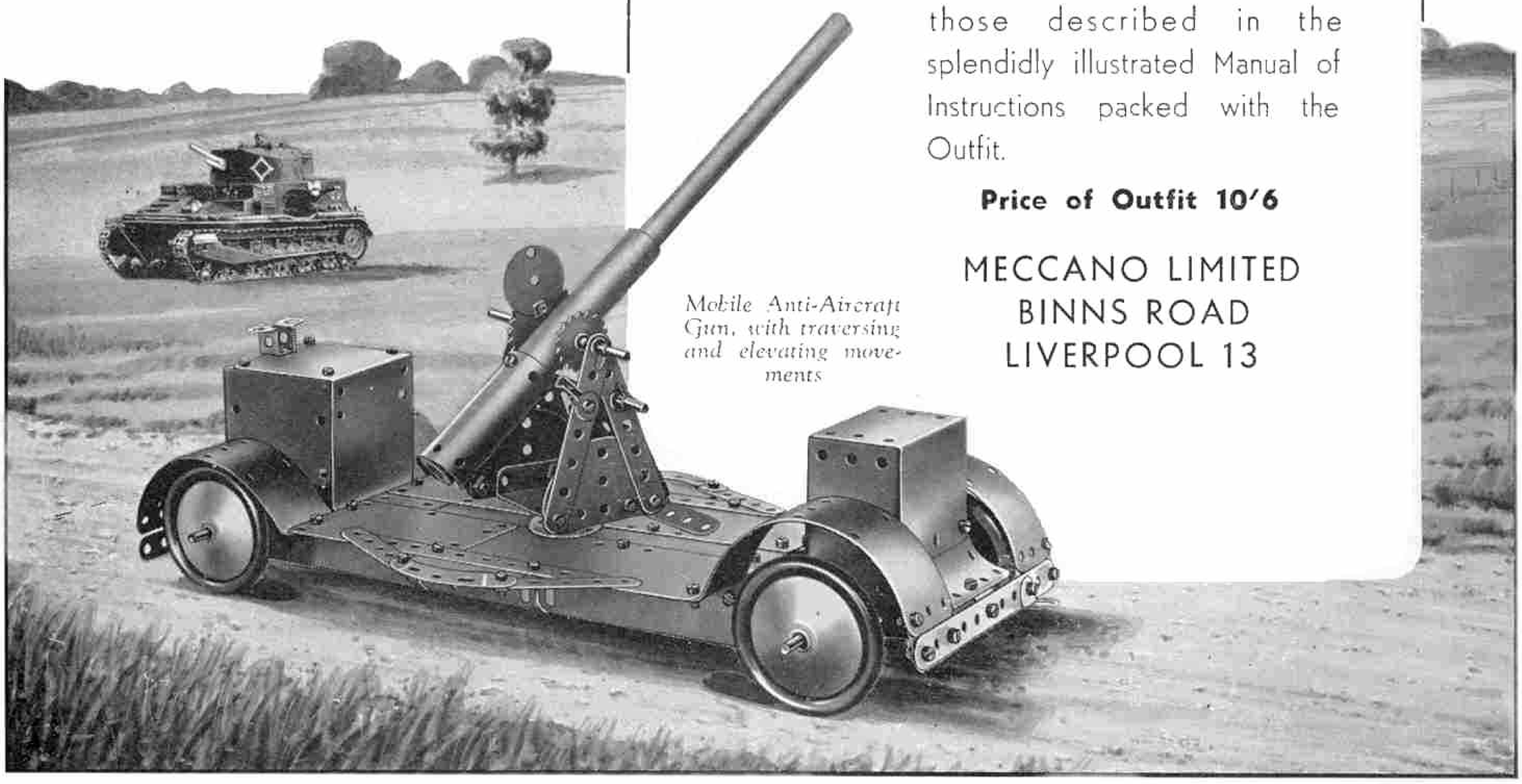
All boys are interested in the British Mechanised Units, and they will welcome the new Meccano Mechanised Army Outfit, with which can be built magnificent models of tanks, anti-aircraft and field guns, searchlights and transport vehicles, with a greater degree of realism than has ever before been possible.

The Outfit consists of a big assortment of specially designed parts, including Gun Barrels of different diameters, which can be used either singly or in combination.

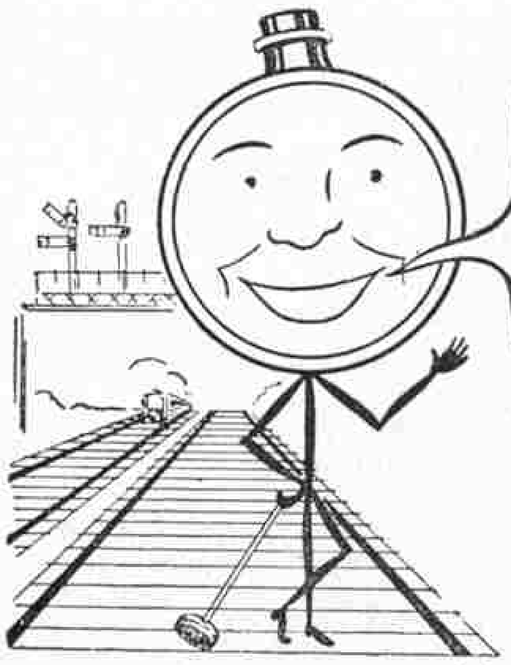
The fine models shown in the accompanying illustrations are two of those described in the splendidly illustrated Manual of Instructions packed with the Outfit.

Price of Outfit 10′6

MECCANO LIMITED
BINNS ROAD
LIVERPOOL 13



Mobile Anti-Aircraft Gun, with traversing and elevating movements



MILBRO TRACK PARTS FOR ACCURACY AND EASY FITTING

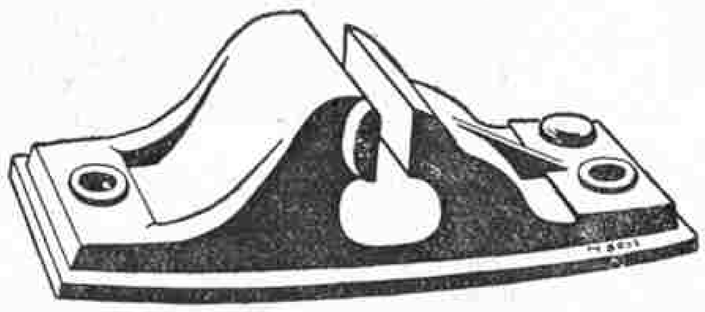
It's far more thrilling to watch a loco running over a track that you've built yourself! Every fitment on a real railway track has its Milbro counterpart! Send 6d. for our new 1939-40 Catalogue.

SEE OUR EXHIBIT
at the Model Engineer Exhibition at the Royal Horticultural Hall, London S.W.1, September 7th-16th.

Die-cast slide-on chair, accurate reproduction in miniature of the real thing. Gauge O, per 100 **1/6**

REDUCED PRICES

Steel Rails	**1/9**	per doz. yards
Brass Rails	**4/6**	" " "
Battens	**1/9**	" " "
Sleepers	**1/8**	" 100
Steel Fishplates	**4d.**	per doz.
Brass "	**5d.**	" "
Spikes "	**3d.**	" pkt.



MILBRO *TRUE-TO-SCALE replicas for reliability*

MILLS BROS. (Model Engineers) LTD., Dept. M.R., ST. MARY'S ROAD, SHEFFIELD.
London Showrooms: 2, Victoria Colonnade, Victoria House, Southampton Row, W.C.1.

TREVITA TUBA

NOW AVAILABLE
M.E.S. CAPPED

FOR THE CYCLE DYNAMO LAMPS HERE NAMED

For use with BEMO 450, 452, 456, 460 Bulb Ref. 861
For use with STAR-LITE 1103, 1105, 1107. Bulb Ref. 867
For use with IMPEX 40,531. Bulb Ref. 853
For use with Lucifer 12 Pole Bulb Ref. 859
For use with Mandaw M1, M3, M5, M6, M7 Bulb Ref. 855
Lucifer and Soubitez

New season's Catalogues just available give full details of the complete range of Tre Vita Bulbs for 1939/40

VITALITY BULBS LTD NEVILLE PLACE LONDON N.22

Bobby Repels Air Raid on Home

says "I was prepared"

BALLOON BARRAGE UNIT
This represents the latest type of captive balloons flown in the air at various heights as a check to attacking aeroplanes. The balloon can be raised or lowered at will by means of the winch on the lorry. Price **9/9.** Post 1/-

A.R.P. STRETCHER PARTY SQUAD
Decontaminator men with Gas Detector Sticks. These models are in Regulation Dress. 9 pieces. Price **1/9** Post 6d.

ANTI-AIRCRAFT 2-POUNDER
Mounted on Mobile screw jack chassis. This comprises a complete mobile gun unit. Price **2/-** Post 9d.

ANTI-AIRCRAFT UNIT
Comprehensive Box containing Searchlight Detachment with Sound Locator, Spotting Chairs, Tent, Searchlight and 10-wheeled Rubber Tyred Motor Tractor (illustrated on right). Price **9/-.** Post 1/-

Many other models can be obtained from our Soldier Department, Lower Ground Floor.

Hamleys Estd 1760 · HAMLEY · BROTHERS · LTD ·

By Appointment to H. M. Queen Mary

200-202, REGENT STREET, LONDON W.1 *(Our only address).* **Telephone: REGENT 3161**

START COLLECTING **DINKY TOYS** PERFECT SCALE MODELS

Nowadays everybody is interested in the Mechanised Units of the British Army, and among the most popular Dinky Toys models are the two Royal Tank Corps Sets which have been great favourites since their introduction into the Dinky Toys range in 1937. They have recently been followed by an accurately modelled Mobile Anti-Aircraft Unit and an 18-pounder Quick-Firing Field Gun Unit which promise to have even greater popularity. **NEW THIS MONTH—Royal Artillery Personnel (Dinky Toys No. 160) for use with Dinky Toys No. 161 Mobile Anti-Aircraft Unit and No. 162, 18-pounder Quick-Firing Field Gun Unit.**

ROYAL TANK CORPS MEDIUM TANK SET

151A 151D 150D 151C

151B

Dinky Toys No. 151

No. 151a	Medium Tank	each **1/6**
No. 151b	Transport Wagon ...	" **1/-**
No. 151c	Cooker Trailer	" **6d.**
No. 151d	Water Tank Trailer ...	" **4d.**
No. 150d	Driver	" **1½d.**

Price of complete set **3/6**

ROYAL TANK CORPS LIGHT TANK SET

152a 150d 152b 152c

Dinky Toys No. 152

No. 152a Light Tank ...	each **1/-**	No. 152c Austin Seven Car	each **4d.**
No. 152b Reconnaissance Car	" **1/-**	No. 150d Driver ...	" **1½d.**

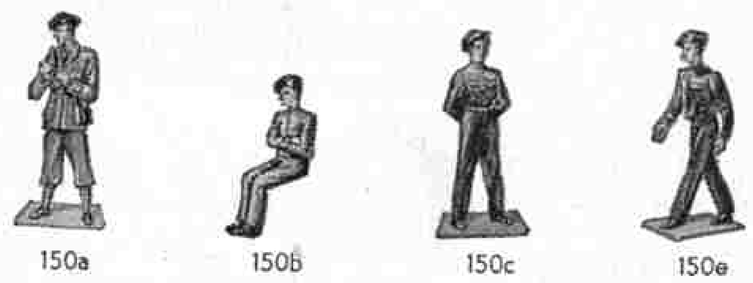
Price of complete set **2/6**

18-POUNDER QUICK-FIRING FIELD GUN UNIT

Dinky Toys No. 162

Comprises scale models of an 18-pounder Quick-Firing Field Gun, Trailer and "Light Dragon" Motor Tractor. Price **2/-** per set

ROYAL TANK CORPS PERSONNEL



150a 150b 150c 150e

Dinky Toys No. 150

No. 150a	Officer	each **2d.**
No. 150b	Private, sitting (two in set)	" **1½d.**
No. 150c	Private, standing (two in set) ...	" **1½d.**
No. 150e	N.C.O.	" **1½d.**

Price of complete set **10d.**

MOBILE ANTI-AIRCRAFT UNIT

Dinky Toys No. 161

Comprises scale models of a Quick-firing Anti-aircraft Gun mounted on a mobile platform and a Searchlight mounted on a lorry. Both Gun and Searchlight have elevating and traversing movements. Price **3/-** per set

ROYAL ARTILLERY PERSONNEL

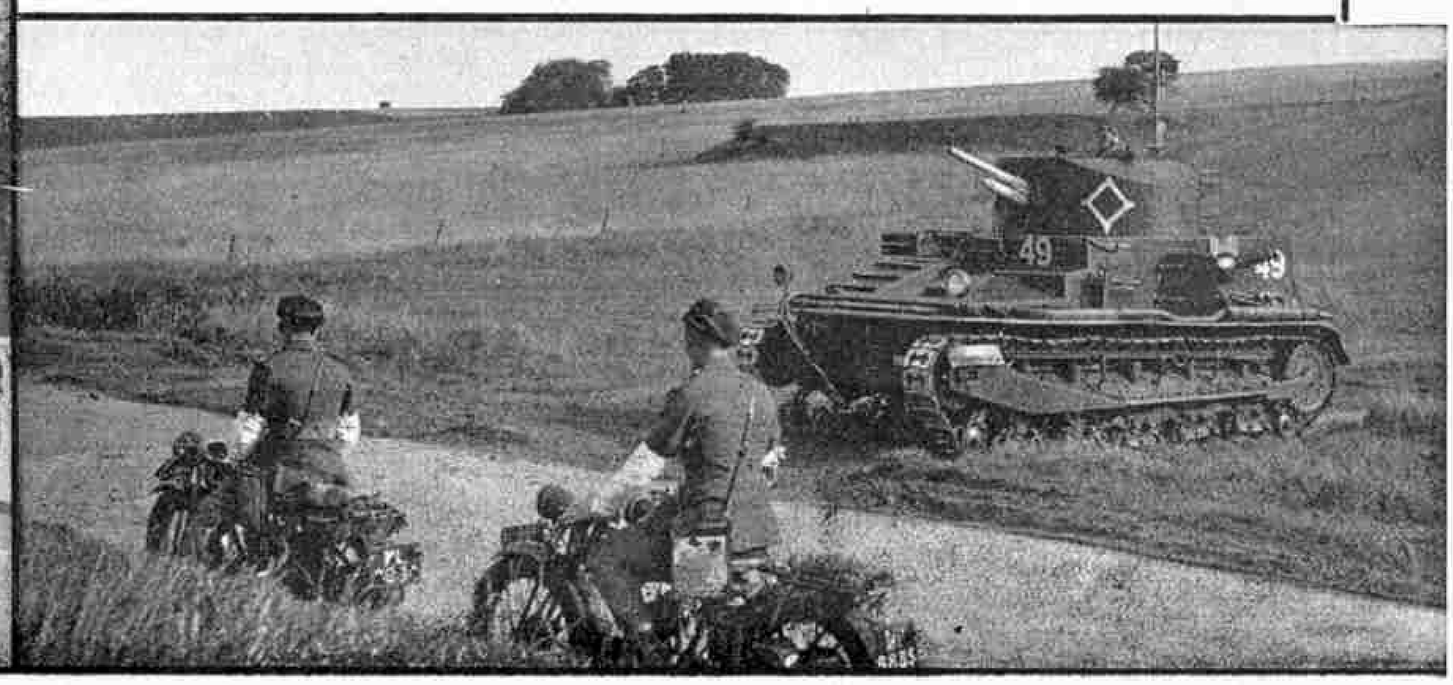
160A 160B 160C 160D

Dinky Toys No. 160

For use with Dinky Toys No. 161, Mobile Anti-Aircraft Unit and No. 162, 18-pounder Quick-Firing Field Gun Unit.

No. 160a	N.C.O.	each **2d.**
No. 160b	Gunner, sitting (two in set)	" **1½d.**
No. 160c	Gunlayer	" **1½d.**
No. 160d	Gunner, standing (two in set)	" **1½d.**

Price of complete set **10d.**



A FASCINATING COLLECTING HOBBY

DINKY TOYS

OVER 300 VARIETIES

Collecting Dinky Toys is one of the most fascinating of all hobbies. These realistic miniatures are unique in their rich colouring and perfection of design and finish, and their range is so wide as to appeal to all tastes. This season many new items have been introduced including wonderful scale models of the latest types of Aeroplanes and Motor Cars, and many others.

Every boy or girl who has not already done so should start this delightful collecting hobby to-day. All the models can be purchased separately and most of them also in complete sets.

EMPIRE FLYING BOAT

Dinky Toys No. 60r

Scale models of the famous Imperial Airways Liners. Twelve models available, named *"Caledonia," "Cambria," "Canopus," "Corsair," "Cordelia," "Camilla," "Capella," "Ceres," "Clio," "Calypso," "Corinna"* and *"Cheviot."*
Price **1/-** each

ATLANTIC FLYING BOAT

Dinky Toys No. 60x

Similar in type to Empire Flying Boat (No. 60r). Assorted colours, names and registrations.
Price **1/-** each

ARMSTRONG WHITWORTH "ENSIGN" AIR LINER

Dinky Toys No. 62p

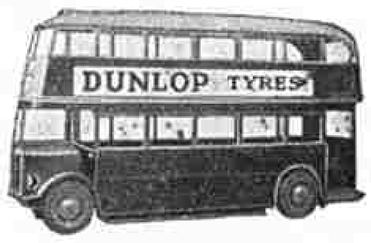
Scale model of the largest British air liner. Six models available, named *"Ensign," "Elsinore," "Explorer," "Echo," "Ettrick"* and *"Elysian."* Price **1/-** each

BRITISH 40-SEATER AIR LINER

Dinky Toys No. 62x

Similar in type to the Armstrong Whitworth "Ensign" air liner. Assorted colours.
Price **1/-** each

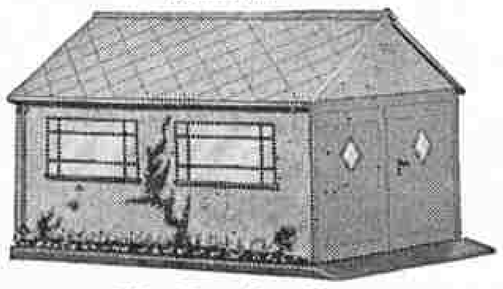
DOUBLE DECKER BUS



Dinky Toys No. 29c

Assorted colours. Fitted with detachable rubber tyres. Price **1/-** each

GARAGE

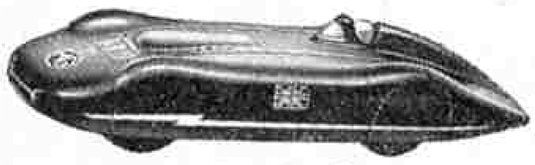


Dinky Toys No. 45

Fitted with opening double doors. Will accommodate any two Dinky Toys Motor Cars.
Price **1/3** each

NEW THIS MONTH!

GARDNER'S M.G. RECORD CAR



Dinky Toys No. 23p

A scale model of the car in which Major A. T. G. Gardner set up new world speed records for cars up to 1,100 c.c. on the Bitterfeld-Dessau Autobahn, Germany, in May, 1939. His speed for the flying kilometre was 203.7 m.p.h., and for the flying mile, 203.2 m.p.h.

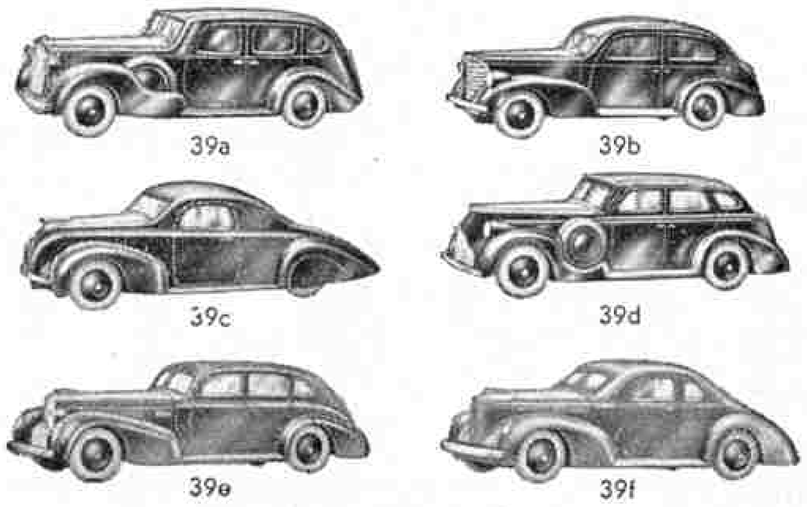
After having the engine rebored, Major Gardner set up new records for cars up to 1,500 c.c. over the flying kilometre, mile and five kilometres, with speeds of 204.2 m.p.h., 203.8 m.p.h. and 200.6 m.p.h. respectively.
Price **10d.** each

BOEING "FLYING FORTRESS" MONOPLANE

Dinky Toys No. 62g

Scale model of a famous American long-range bomber.
Price **1/-** each

SALOON CARS



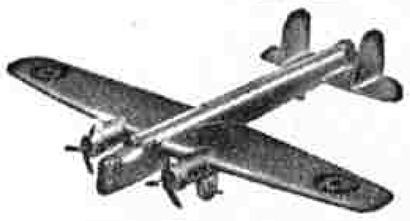
Dinky Toys No. 39

Fitted with detachable rubber tyres.

No. 39a Packard "Super 8" Touring Sedan Price **10d.** each
No. 39b Oldsmobile "Six" Sedan ... „ **10d.** „
No. 39c Lincoln "Zephyr" Coupé ... „ **10d.** „
No. 39d Buick "Viceroy" Saloon ... „ **10d.** „
No. 39e Chrysler "Royal" Sedan ... „ **10d.** „
No. 39f Studebaker "State Commander" Coupé ... ... „ **10d.**

Price of complete set **5/-**

ARMSTRONG WHITWORTH "WHITLEY" BOMBER



Dinky Toys No. 60v

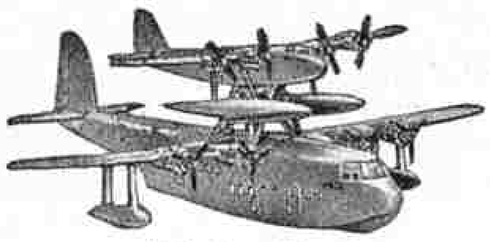
Scale model of the "Whitley" long-range heavy bomber adopted by the R.A.F.
Price **9d.** each

ARMSTRONG WHITWORTH "WHITLEY" BOMBER (Camouflaged)

Dinky Toys No. 62t

Similar to Dinky Toys No. 60v but with Air Ministry Camouflage. Price **11d.** each

MAYO COMPOSITE AIRCRAFT



Dinky Toys No. 63

Scale model of the Mayo Composite Aircraft.
Price **2/-** each

The components of the above can be purchased separately.

No. 63a Flying Boat *"Maia"* ... **1/3** each
No. 63b Seaplane *"Mercury"* ... **9d.** each

ROBOT TRAFFIC SIGNAL

Dinky Toys No. 47a (Four face) Price **2d.** each

No. 47b (Three face) Price **2d.** each

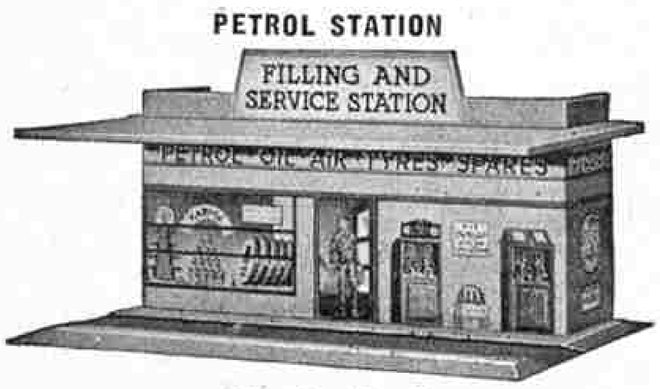
No. 47c (Two face) Right-angle or back-to-back. Price **2d.** each

BEACON

Dinky Toys No. 47d

Realistic model of the Belisha Safety Beacon.
Price **1d.** each

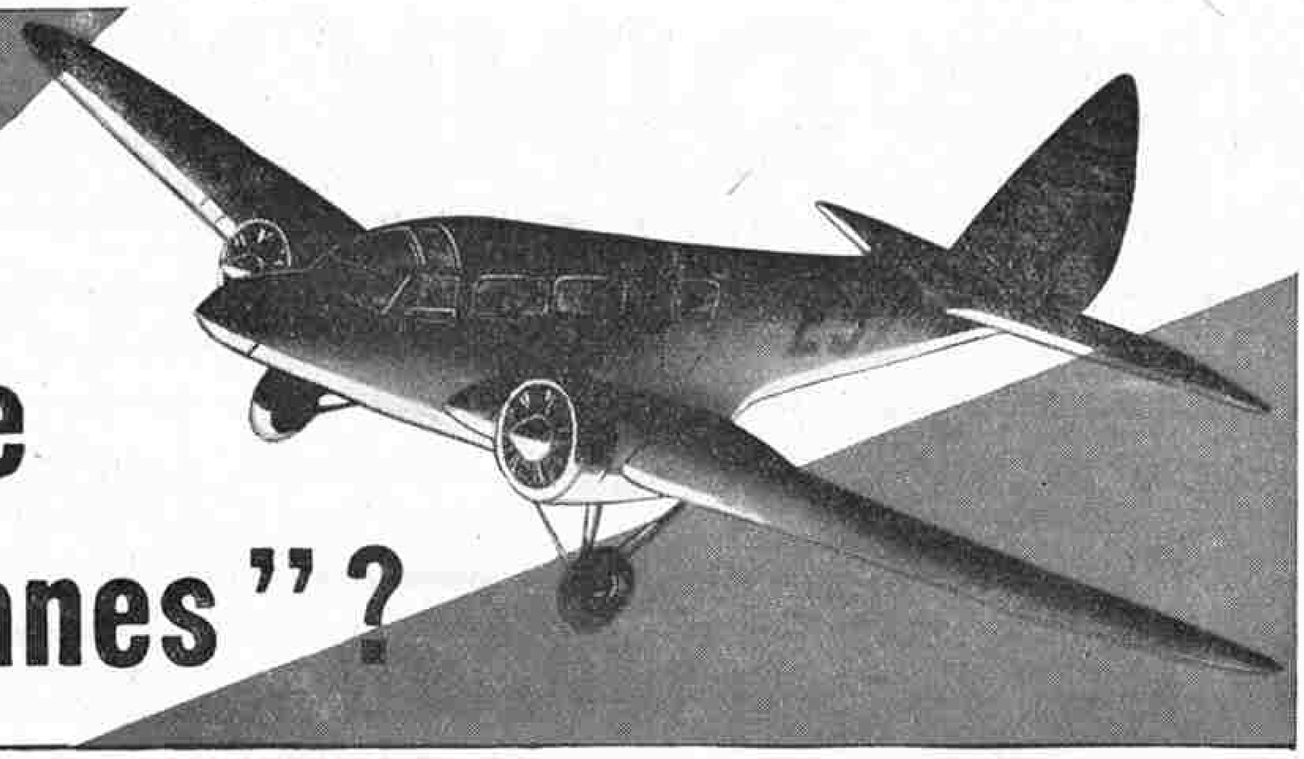
PETROL STATION



Dinky Toys No. 48

Accurate reproduction of a filling station.
Price **1/3** each

MECCANO LIMITED — BINNS ROAD — LIVERPOOL 13



Where are the "Q planes"?

The latest in glider models. They are exact replicas of the Airspeed Envoys used in the film and are sold in kit form. The cut out and moulded parts can be put together in a few hours. They must not be confused with the usual type of balsa wood glider, but are real scale models with balsa bulkheads, correctly shaped fuselage and engine nacelles and properly cambered hollow wings.

The only tool required is a pair of scissors for trimming a few parts to ensure exact fit. And how they Fly!

Take the thrills of the film story home with you. Your local model aeroplane stockist has the model and it costs only half-a-crown.

FROG TRADE MARK REGD.

THE FROG 'Q PLANE'

Complete kit of parts **2/6**

You'll find them at your local model aeroplane shop

★ *Some Other Astounding Performers*

It is fascinating to watch how a well constructed glider floats like a seagull on the air currents.

Good design and accurate rigging give this bird-like quality. The FROG Sailplane is a strongly-built balsa wood glider with fully cambered and accurately balanced wings. It has a wing span of 28 ins. and, with its beautiful finish, has an imposing appearance when in flight.

The FROG Sailplane may be launched by hand or by catapult for which elastic, thread, etc., are supplied. Hints on rigging and launching, and other information, are provided to help the owner to get the best results.

THE FROG SAILPLANE

Price **5/-** Complete

The Supermarine Spitfire is not only the fastest warplane in production, but it is probably the most graceful.

The FROG designers have produced a low-priced construction kit for building an interesting replica of this machine with the same graceful lines and an excellent performance.

All the parts are stamped out and everything necessary is supplied. The only tools required are a razor blade, a pair of scissors and a piece of sandpaper.

The kit gives hours of fun to build and fly. With the easy-to-follow instructions sheet included the difficulties of model building are avoided.

THE SUPERMARINE SPITFIRE

Complete **2/-** kit of parts

FROG MODEL AIRCRAFT *Covered by World Patents granted and pending. Made in England by International Model Aircraft Ltd.*

Sole Concessionaires: LINES BROS. LTD., Tri-ang Works, Morden Road, S.W.19

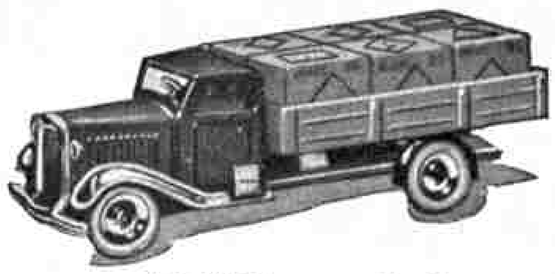
A CRANKSHAFT IS MORE THAN STEEL-
IT IS "MECHANICAL ENGINEERING"

This apparatus determines the exact composition of steel, by means of an electric arc directing rays from the part under test into the instrument.

WAKEFIELD PATENT
Castrol
MOTOR OIL
IS MORE THAN OIL
IT IS "FLUID ENGINEERING"

C. C. WAKEFIELD & CO. LTD., *All-British Firm*, Wakefield House, Cheapside, London, E.C.2

TRI-ANG TOYS



MINIC Lorry with Cases.
LENGTH 5½ ins. Price **1/6**

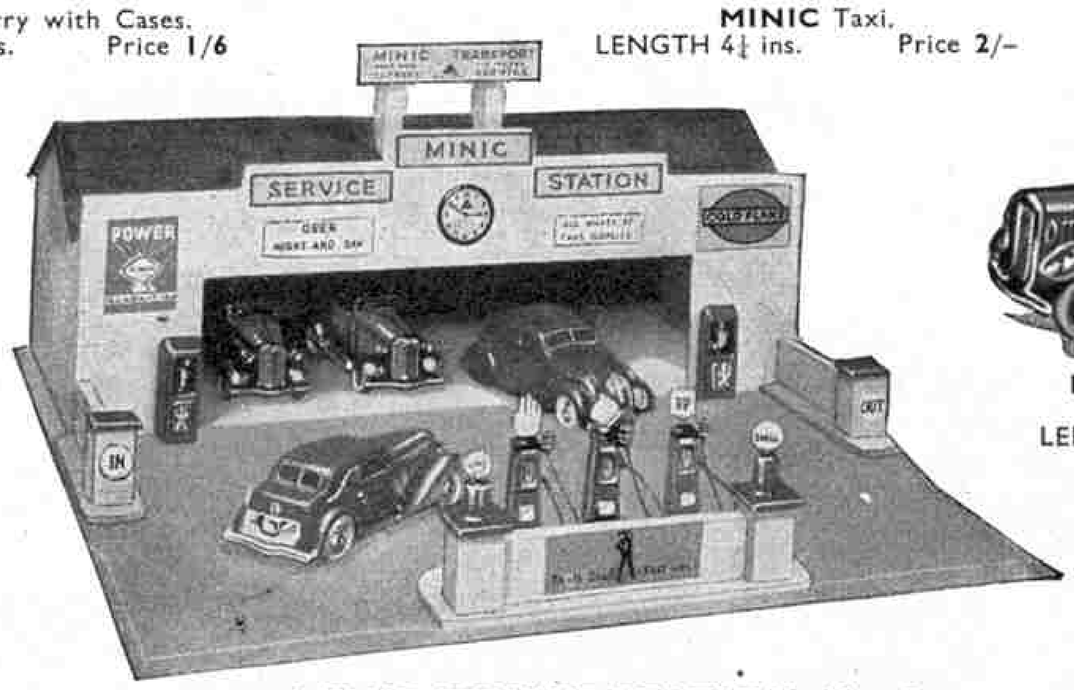
MINIC Taxi.
LENGTH 4¼ ins. Price **2/-**

MINIC Traffic Control Car.
LENGTH 5 ins. Price **1/6**

TRI-ANG GYRO CYCLE

British Patent 479,430

The gay little figure astride the saddle appears to balance himself as he pedals merrily all over the place, and with his flexible arms creates the illusion in the most realistic way that he is steering the Gyro Cycle by the handlebars. Price **5/-**



MINIC SERVICE STATION No. 3

Realistic design, imitation red tiled roof with sign, three petrol pumps, oil cabinet, two electric lights and battery, dummy clock face and other signs. Length 16 ins. Price **8/11**

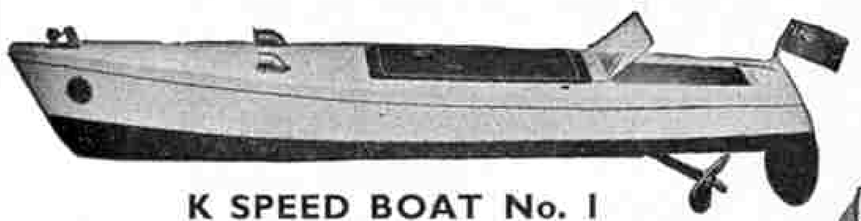
CARS NOT INCLUDED

Other models **1/11—29/6**

MINIC Breakdown Lorry with Mechanical Crane.
LENGTH 5½ ins. Price **3/6**

NEW MINIC MODELS

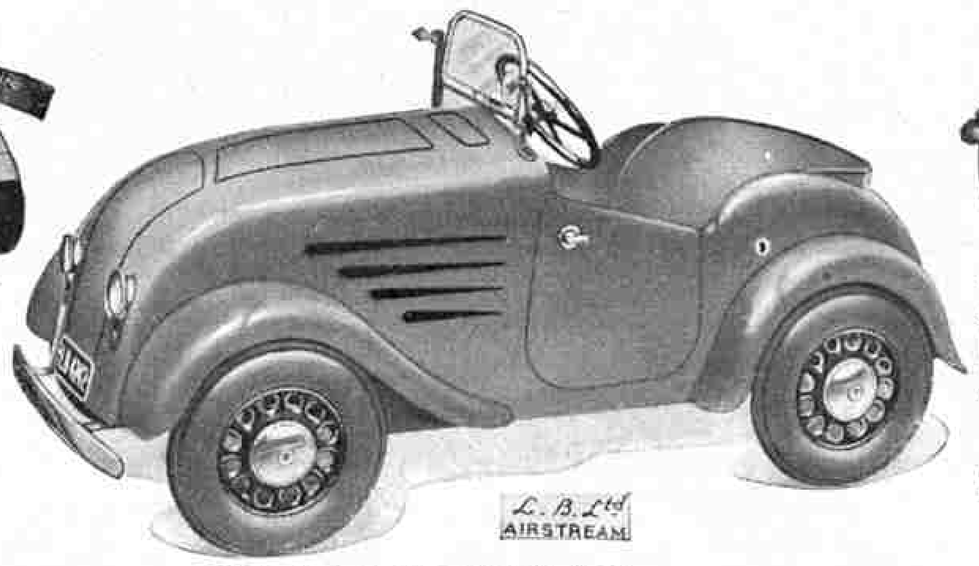
Barrage Balloon Wagon and Trailer, Log Lorry, Mechanical Horse and Milk Tanker, Cable Lorry, Coal Lorry, Timber Lorry, Six Wheel Army Lorry, Mechanical Horse and Lorry with Barrels, Farm Lorry, Ambulance, Canvas Tilt Lorry, Trolley Bus.



K SPEED BOAT No. 1

Fitted with powerful mechanism, windscreen, dummy ventilators, control lever and adjustable rudder. Hull 16 in. Price **6/6**

Other super models **7/11—42/-**



TRI-ANG AIRSTREAM

New model. Steel body with opening side door, upholstered seat. Adjustable wind-screen and direction indicators. 9 in. new type easy clean wheels with malleable hubs, ⅝ in. tyres. Hand brake. Length 44 in. Price **45/-**

TUG BOAT KIT

True to scale model. All parts moulded to shape. No tools required. Kit includes cement, paint and full plans for building this realistic model. The clockwork assembly is supplied complete. Length of hull 7½ ins. Price **3/11**

TUG BOAT

Also supplied as made-up model. Complete with strong clockwork motor. Price **7/6**

TRI-ANG TOYS

Obtainable at all good Toy Shops and Stores.

"FAIRYCYCLE" (Regd.) MODEL No. 2

Cycle tubular frame and forks. 14 in. wheels. 1⅛ in. jointless sponge-rubber tyres. Ball-bearing pedals. Roller lever brake. Two-coil saddle. Chain cover. Stand. CHROMIUM-PLATED FITTINGS. Black, blue or maroon. Price **39/6**

L. BROS. LTD. LONDON
B R O S.
ENGLAND

TRI-ANG

TRI-ANG TRICYCLE No. 5B (Regd. Trade Mark)

Cycle chain drive with free-wheel. Ball-bearings throughout. Frame best quality weldless cycle tubing. 16 in. front and rear wheels. 1⅛ in. jointless sponge-rubber tyres. Roller lever brake. Coil spring saddle. CHROMIUM FITTINGS. Black, blue or maroon. Price **59/6**

Made by LINES BROS. LTD., Tri-ang Works, LONDON S.W.19

MECCANO MAGAZINE

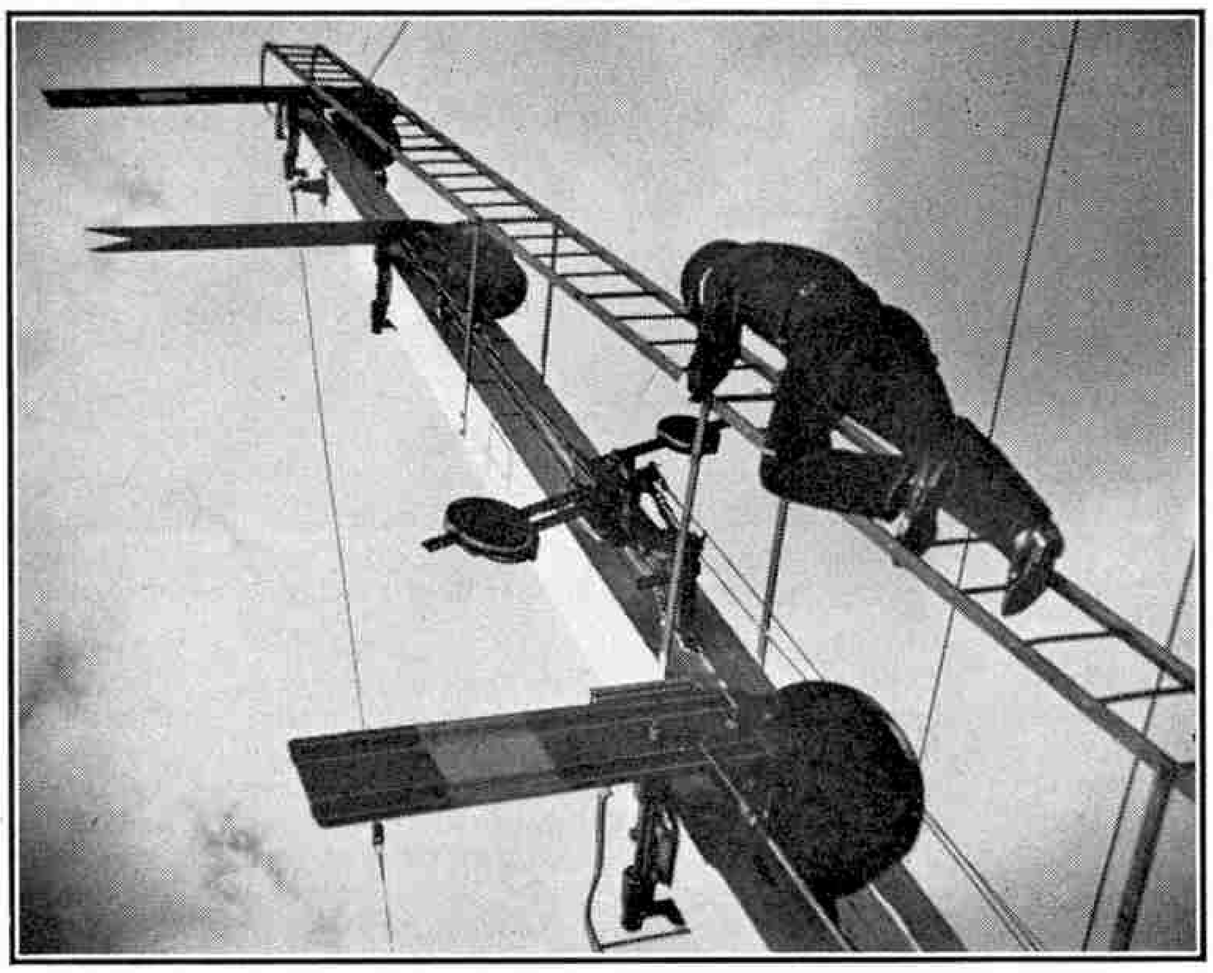
Editorial Office:
Binns Road, Liverpool 13
England

Vol. XXIV. No. 9
September 1939

With the Editor

Children's Railways in the U.S.S.R.

Many of the educational experiments now being tried out in the U.S.S.R. are of great ingenuity, and it will be extremely interesting to note how they work out in practice. The "*Railway Gazette*" gives an account of the children's railways that have been built during the past two or three years in various cities of the Soviet Union. Eleven of these are already completed, and three others are now under construction. "The first children's railway in the U.S.S.R. was built in 1935 at Tbilisi, the capital of Soviet Georgia, where there are now two, one run by steam and the other by electricity. The railways are correct miniatures of real railways, and are managed and operated entirely by school children between the ages of 12 and 16; the youngsters drive the engines, and act as guards, signalmen, and stationmasters. Through the medium of play the children are thus learning to become railwaymen." Last year the Soviet Government made a grant of 3,000,000 roubles for such railways.



"The Lamp Man." Photograph by S. Garbutt, Altrincham.

A Novel Sign Cleaner

There are now approximately 50,000 permanent Royal Automobile Club road signs in various parts of the country, guiding and directing traffic. One of the problems connected with these signs is that of keeping them all clean. An official of the R.A.C. was struck by the fact that one particular "Village" sign in Hampshire never seemed to need attention; it was always clean.

This state of affairs was decidedly uncanny, but it was not long before the mystery was solved. The sign is erected on the grass verge adjoining a gate leading into a farm. Each time the cows are driven in and out of the farmyard one of them bestows three or four hearty licks on the sign, thus keeping it almost perfectly clean.

The Signal Post Grows Downward

The illustration on this page prompts the thought that the towering signal posts that have so often formed quite prominent landmarks in days gone by may ultimately disappear. These giant posts originated in the days before trains were fitted with continuous brakes, when only the hand-brakes on the engine and the guard's van were available. Then it was essential that signals should be sighted by the enginemen as early as possible, so that there might be plenty of space in which to pull up if necessary. It was sometimes essential for the semaphores to be silhouetted against the sky, and this often involved their being of sufficient height to reach well above surrounding buildings or above features of the landscape such as trees.

Signal posts of this kind were often as tall as 70 or even 80 ft. Quite near to the Meccano Factory there are some very tall signal posts governing what is known as Edge Lane Junction on the L.M.S. Bootle branch line. The particular point about these signals is that they can be sighted over the numerous bridges that cross the line in this neighbourhood.

With the adoption of continuous brakes, the need for many of the extremely tall posts disappeared, and the final stage in the shortening of the signal post is found in many modern colour-light installations. Here posts of comparatively moderate height are in use, and there are even in certain special locations dwarf signals consisting of little more than a lamp case mounted on the ballast owing to the requirements of positioning and sighting. The penetrating beam of a colour-light signal is more easily sighted than a semaphore, and therefore the height of colour-signals can be reduced.

It is interesting to note that at Crewe, the hub of the L.M.S. Western Division, on which tall signal posts were a characteristic for many years, the existing electrically-operated semaphore signals will be replaced by the colour-light type, with route indicators.

How the C.P.R. Gets its Sleepers

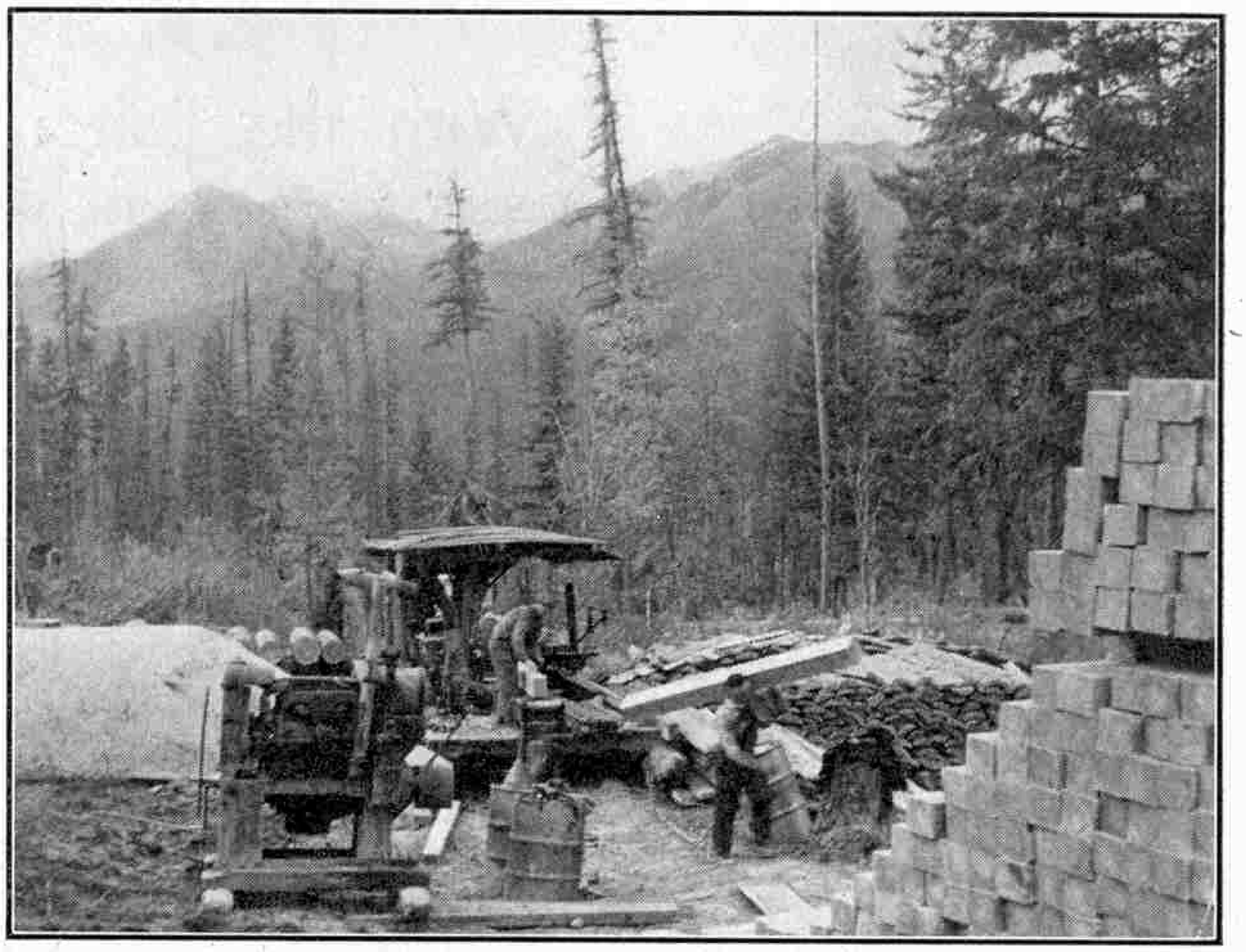
A Tie-Camp in the Rockies

By Alwin Gissing

DURING a trek across British Columbia last year I happened to camp one night near a Canadian Pacific Railway "tie-camp" in the Kootenay River valley on the west slope of the Rocky Mountains. A tie-camp, I should explain, is a form of lumber camp established in some well forested area for the purpose of cutting railroad sleepers, or ties as they are called in Canada. On the following morning the foreman very kindly showed me over the place, and I had an opportunity of seeing how the Canadian Pacific Railway obtains the hundreds of thousands of sleepers necessary each year for the maintenance of its thousands of miles of permanent-way.

This particular camp was called "Camp 6," and was one of a number of similar camps that had been operated in the Kootenay Valley in past years. About 80 men were employed at the time, most of them great husky Scandinavians, who were the hardest working gang I ever saw. As practically all the timber work was done "by the piece," this probably was the chief cause for their tremendous energy.

Although these camps are purely temporary affairs, the general impression is that of a freshly developed town-site. There is a number of well built log cabins as living quarters, a large central cookhouse and dining hall, a combined office and general store, and several large garages for housing cars and motor trucks. In the first place the camp is erected in the centre of a good stand of timber, and felling operations commence in the immediate neighbourhood. As the work moves farther afield the men are taken out in trucks and brought back at night. Even their mid-day meal, which is cooked at the central cookhouse, is taken out to them to save travelling time.



A portable mill cutting ties, or railway sleepers. The mill is in operation in a Canadian Pacific Railway tie-camp in the Kootenay River valley, on the west slope of the Rocky Mountains.

When the scene of operations gets beyond a distance of four or five miles, however, the camp is abandoned, and an entirely new establishment built nearer hand. I passed several of these derelict camps on my way up the Kootenay Valley. Already at Camp 6 the crew was working about four miles away along the banks of a tributary of the Kootenay called the White River, where there was a fairly good stand of Douglas fir and Tamarac, a species of larch.

All operations were done on a careful system, of course, to save as much time and labour as possible. On commencing a fresh stand of timber, the "fallers" went first, and picking their own trees, felled, trimmed, and finally cross-cut them into standard sleeper lengths. These men work in pairs, and to see them at it you would think their lives depended on every minute.

A bull-dozer ploughs its way through the forest to make a trail.

While the fallers were busy, trails were made into the section in readiness for portable "tie-mills" to be brought in, more of which in a moment. Until recently this trail-making was a long and arduous task with axe, pick and shovel. Now, however, they use a machine called a "bull-dozer," which can make a mile or so of good trail in a few hours. These bull-dozers are powerful caterpillar tractors with an enormous blade attachment in front, something like half a snow-plough. This blade can be raised or lowered by the driver, and when given a good hold tears and gouges out everything before it. Rocks, trees, great stumps and roots are heaved up and pushed to the side.

Sometimes the bull-dozer would come up against an exceptionally large stump that raised the whole machine into the air. The driver was quite unconcerned, however, and simply de-clutched so that the pressure in front forced the machine back on to the ground. Then he would take a bit deeper hold with the blade and have another shot. And so, gradually, the bull-dozer carved its way through the forest, leaving a comparatively good, hard trail behind it.

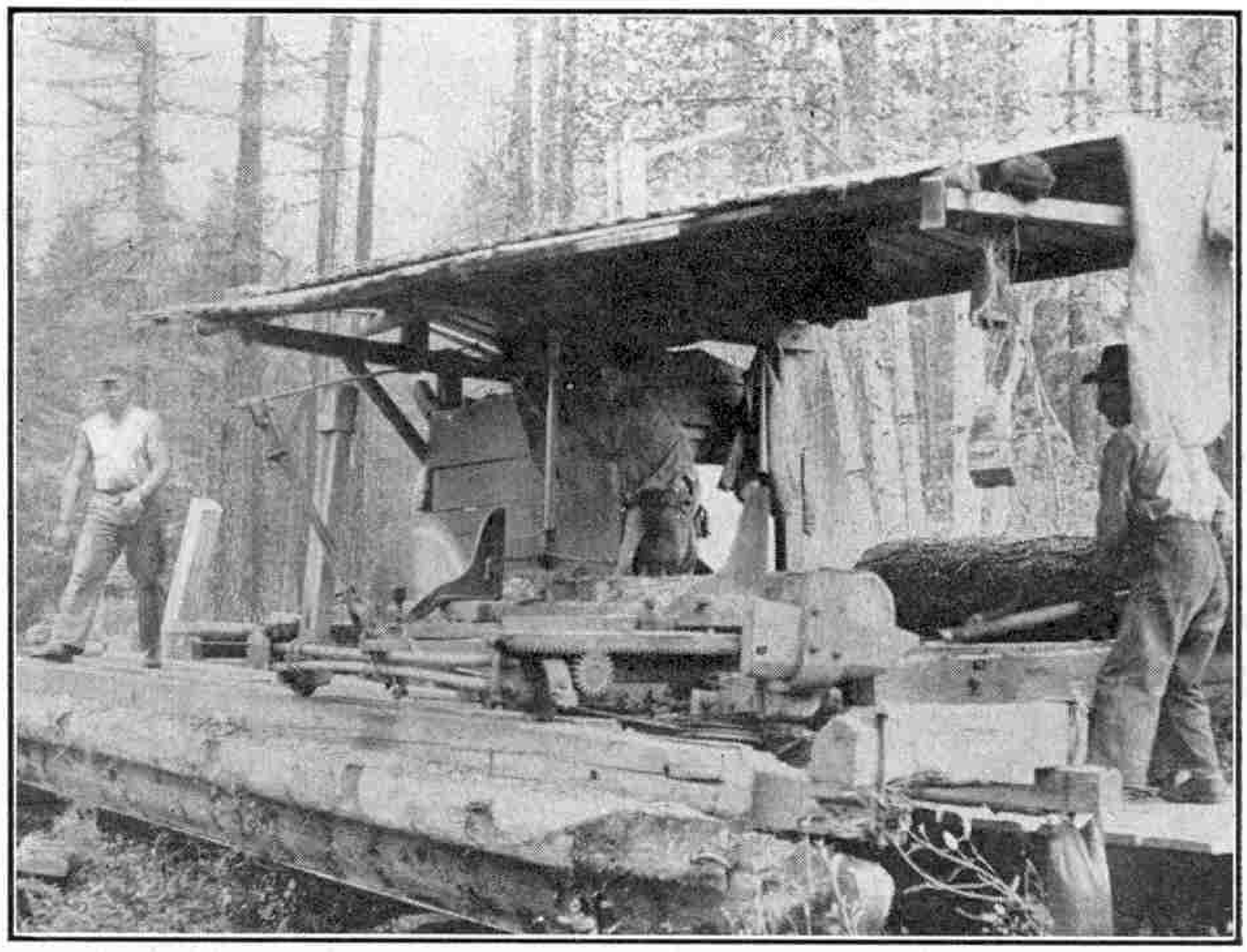
When a sufficient quantity of timber had been felled in the area to merit the start of sawing operations, a portable saw-mill, or tie-mill as it is called, was hauled in by tractor. These were ingenious contraptions, being a complete saw-mill even to a

covering roof built on two very large log skids. I saw one of these outfits brought in, set up, and working at top speed in the space of half an hour, which gives a good idea of the extraordinary handiness of these machines.

As soon as the tie-mill comes on the scene, teamsters, each with a pair of horses, start hauling, or snaking, the logs forward to a makeshift loading table made from stout logs. This table is so constructed that the logs roll slowly after each other on to the saw-bench as they are needed. Two men stand at this end of the machine to feed in, and one of them keeps a tally of every sleeper cut.

The chief sawyer who operates the saw is highly skilled at his job, and can tell at a glance exactly how many sleepers he can cut from one log with a minimum of waste. It was really fascinating to watch him. A log would roll on to the bench, and he would instantly adjust the width of cut with a quick to-and-fro motion of a lever in front of him. The log would then sweep along on the travelling bench and a slab of bark would drop off. Assisted by one of the feeders, the log was then slapped down on its flat side, the cut was re-adjusted, and off would fly another slab. Finally according to the size of the log, one, two, or perhaps three perfectly sized sleepers would be cut out, allowance being automatically made with each cut for necessary bark trimming.

Cutting was done so rapidly that it kept a man working as hard as he could at the other end of the machine to keep the bench clear of slabs and sleepers. The slabs were thrown into a heap, but the sleepers were carried away by two other men and stacked near the trail ready for loading on to motor trucks. All the sawdust from the machine was blown through a long adjustable pipe by a high-speed fan. This pipe, or funnel, was adjusted each day according to the direction of the wind, thus preventing the sawdust from blowing on to the work-crew.



The tie-mill in action, slicing up logs. It is built up on two huge log skids, on which it is hauled by tractor.

After leaving the "mill" the sleepers were hauled by truck to the nearest large river, in this case the White River, and stacked along the bank in readiness for the next log-drive. These log-drives usually take place in the high-water seasons of spring and early summer, when the sleepers can easily be floated down the river to the nearest shipping point. A few seasons ago upwards of two million sleepers were floated down from this one valley.

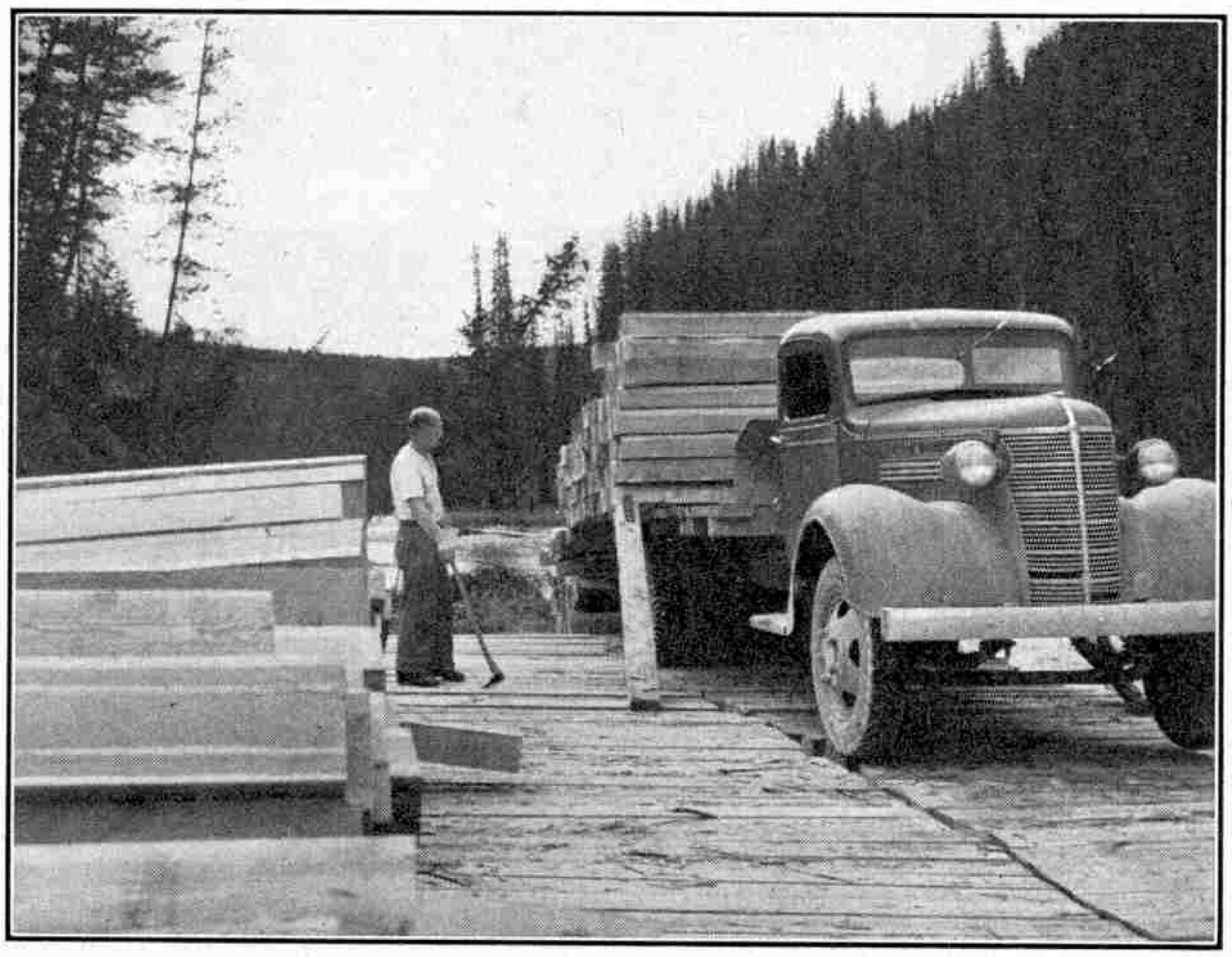
All the haulage trucks were fitted with flat bodies and the sleepers were loaded crosswise, their ends protruding over each side several inches, and then stacked up to about level with the top of the driver's cab. This constituted a good heavy load considering the steep hills that had to be negotiated on the way to the river. The worst part was down the river bank, where the gradient was so steep that loaded trucks had to go down in low gear, the same gear being used to come up empty.

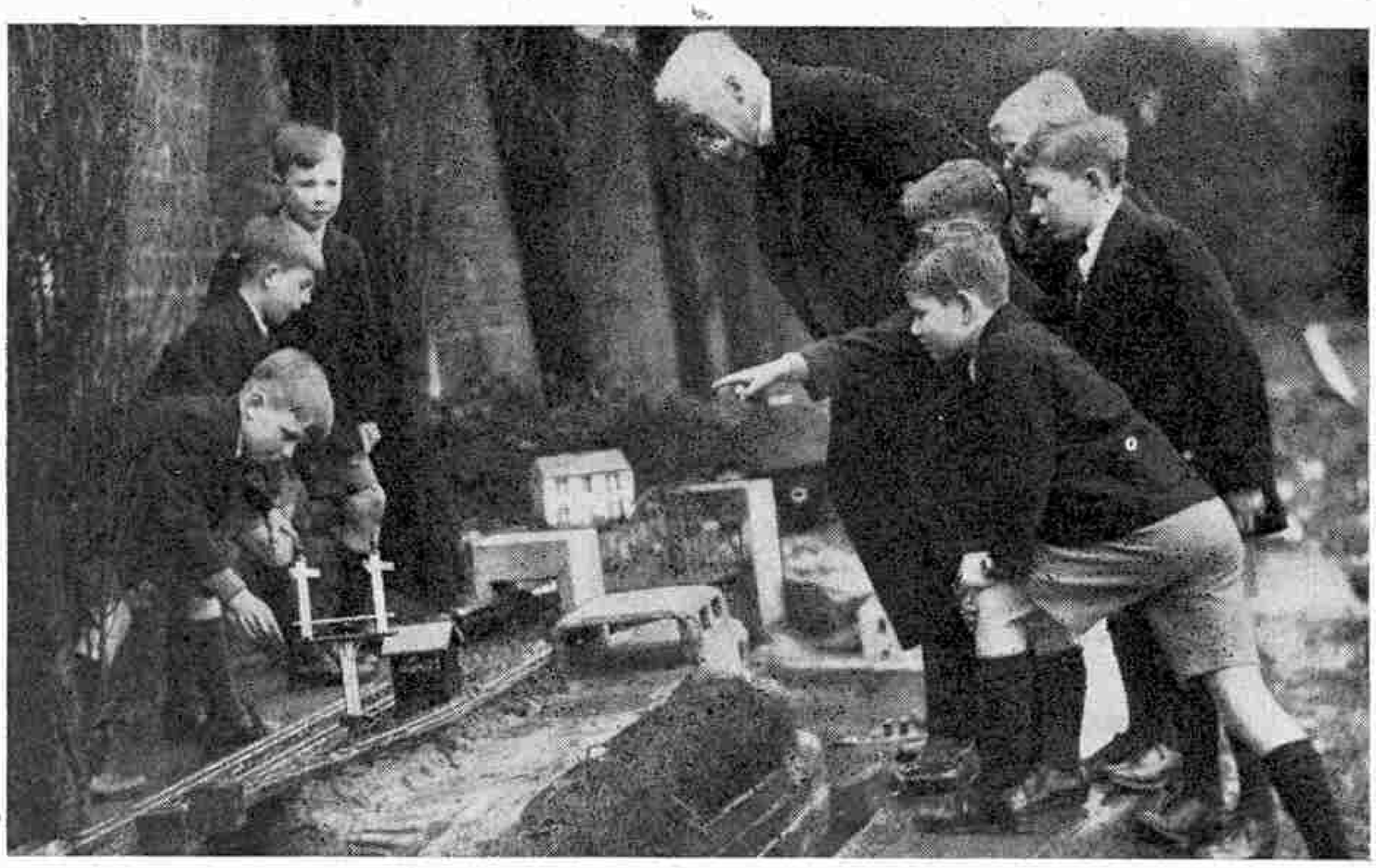
Beside the river the sleepers were methodically stacked in the form of an extensive level platform several feet high. When I was there the area of this was sufficiently large to allow the trucks to run up on to it and manœuvre round to any position required by the stackers. The stack, or platform, was so well built that it stood almost as a solid block, and the weight of heavy loads had no effect on it.

The method of unloading was rather novel. When the truck was in position, two stout poles about six feet long were placed in a slanting position against both sides of the front of the load. These poles were notched at one end to roughly fit the angular edge of the protruding ends of the lowest forward sleeper on the truck body, and pointed at the other to stick into the platform. The slant of these poles was arranged so as to exert a slightly upward and backward pressure on the load when the truck moved forward. When all was set, the driver started forward very gently, and if everything was right the entire load began to slide off. The truck bodies were always kept well oiled to help the loads to slip easily. Once the driver saw the load was moving, he accelerated, and three tons of sleepers rumbled off behind with a noise like distant thunder.

As soon as the truck was clear the stackers set to work on the rough pile, stacking the sleepers in an even and solid block. For this they used a type of small metal pick which they could handle with amazing dexterity. With a smart blow the sleeper was caught with the point, then slithered roughly into position, and with a final twist of the wrist set firmly against its neighbour in the stack. Frequently, with one mighty heave, they would shoot a sleeper for several feet into the exact place it was intended to occupy.

After leaving the mill the sleepers are hauled to the nearest river, on which later they are floated to the nearest shipping point.





Sir Neville Wilkinson, the well-known authority on miniature craftsmanship, at Huyton Hill Preparatory School, near Liverpool.

Fun with Cement

A Preparatory School Enjoys Itself

THE person who ended his Christmas appeal with the words "What we want is not abstract sympathy but concrete plum puddings" accidentally linked together two things of almost equal popularity with boys. Few of them can resist the temptation to fill up any available space in themselves with plum pudding or in their gardens with concrete.

In this letter we can set aside plum puddings as a purely holiday occupation, but concrete definitely comes within the scope of the Huyton Hill Preparatory School, although it was by accident that we discovered its use as a pastime for boys.

In the early days of the school we made some model-railway lines out of Venetian blind laths and, having a few bucketfuls of wet concrete left over from a job we were doing, we put it into a rough wooden mould to make a station platform. The success of this experiment led to a simple cottage, roads and bridges; but we little thought in those days that the time would come in 1938 when the Pathé News would spend a whole morning taking shots of the final result, or that year by year different boys would get hours of pleasure out of adding other cottages and houses, churches and country pubs, tunnels and stations, roads and canals, bridges and viaducts, a windmill and a castle and factory and all the other "amenities" of a strip of country-side stretching from east to west of the garden.

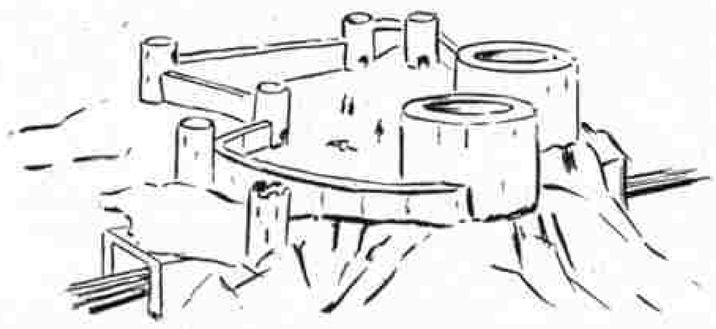
What fun it has all been!—the plans and experiments, the making of wooden moulds and extemporising bridge arches with toffee tins. And for each job there has been the paradisical process of mixing the concrete—the proud barrowing of sand by someone who can just manage a barrow, the noisy clank of the measuring bucket, the pale green cement powder, fine as icing sugar and with a feel almost of velvet; then its gradual leavening of the colour of the sand, the sand castle effect when the water is being added and the skilful damming of the streamlets that try to escape; finally the rather sudden transformation into the correct porridgey mass, so that the turning of it with the spade sounds like a "litter of piglets snuffling their swill," as it was appreciatively described by a boy who had spent his holidays on a farm!

Here are all the pleasures of sand castles and mud pies rolled into one; and, best of all, no tide to come and wreak destruction on the day's endeavours. There it is in the mould and in three days it will be set for ever. Then comes the excitement of extracting the screws and gingerly uncovering our masterpiece. This is followed by a chance for the painter to cover the walls and roof, and paint window frames and curtains on the recesses that represent the windows, thereby gradually learning to increase the proportion of paint he puts on his work compared with the amount that he puts on himself! Finally the model is ready to go into position on the miniature countryside and there is the fun of arranging fences and smoothing out spadefuls of cement into beautiful wide roads or narrow curling paths leading up to the doors of the buildings.

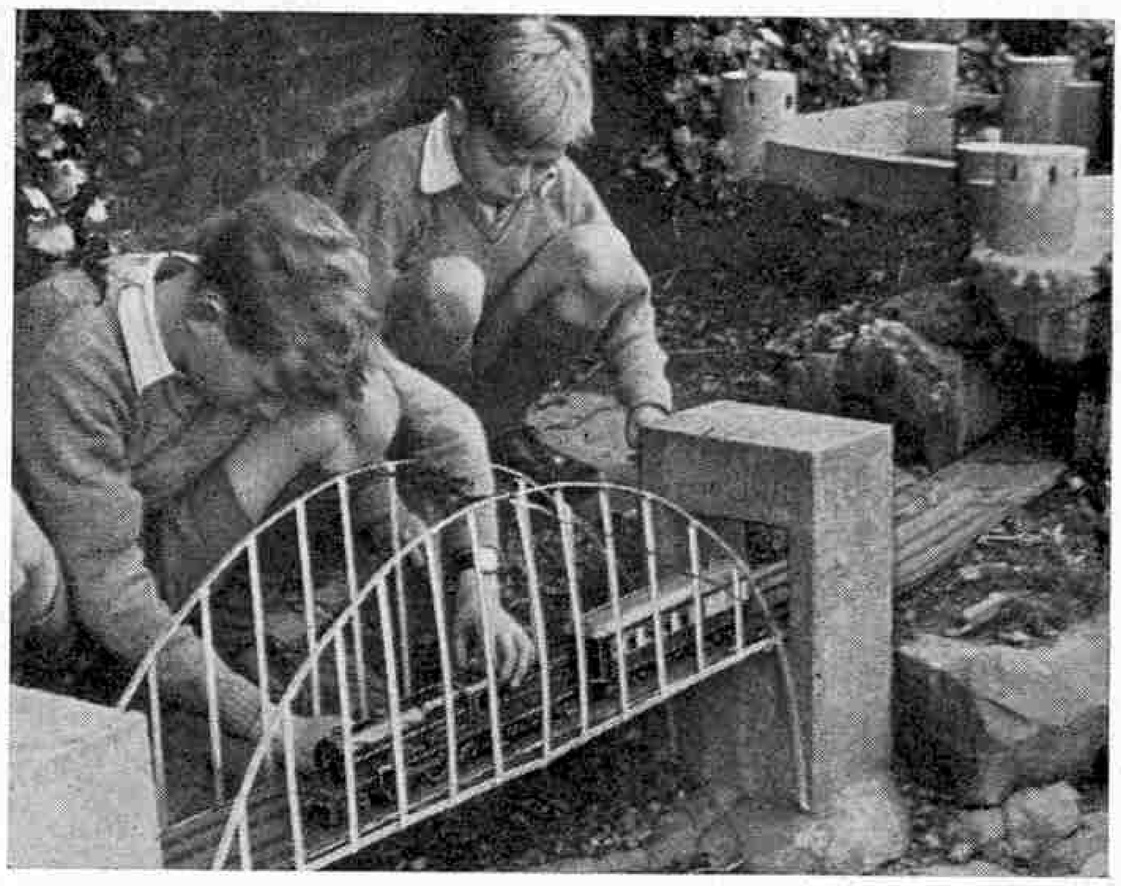
There was also plenty of fun as well as hard work on the bigger jobs such as the Model Boat Pond (into the bottom of which, in the early days of our amateurish enthusiasm, we shovelled as much concrete as would have made deep bomb proof shelters!), also the 40 ft. long steps beside the Swimming Bath and the big south terrace which has proved such a convenient stage for our summer entertainments. In these jobs there was the added pleasure of throwing in a mass of wreckage from demolished walls and greenhouses, broken bricks, old mortar, crumbling iron girders, and a lot of other "hideosities," and watching all gradually disappear under the smooth casing of concrete.

At this point it is hoped that any male reader who has not played about with concrete will immediately grab the telephone and order five bags of cement and a ton of sand. Next weekend will find him making something—even if it is only a mess—in that corner of the garden (a corner is safer for the first experiments!) whose fate has been under discussion for so long. If by chance he should grow weary of mixing before he has completed the Serpentine that he had planned, there is really no need to worry. Rain and Time will take the matter in hand and present him with an ideal basic material for a rockery, a truly primeval chunk of matter like a piece of hard-boiled chaos.

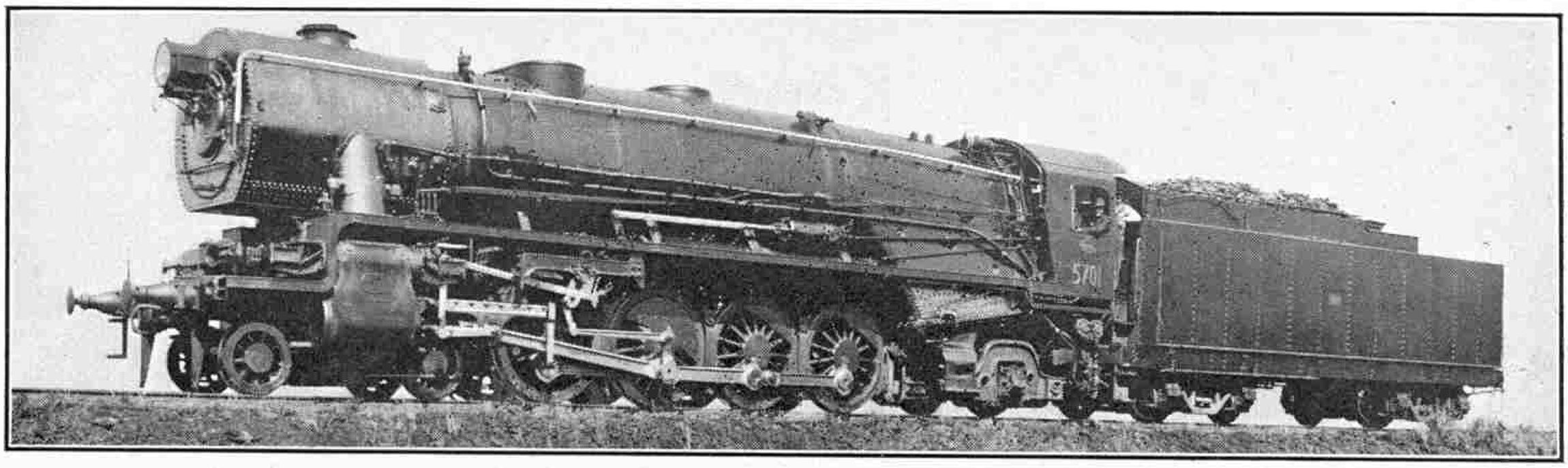
The pond, or whatever it is, can wait to be made by his son during the holidays.



This article is reproduced from a "News Letter" of Huyton Hill Preparatory School, by kind permission of the Headmaster, to whom we are indebted for our illustrations.



Sempill Castle and Viaduct on the model railway at Huyton Hill Preparatory School.



Giant "Mountains" on New South Wales Railways

By Maurice E. Underwood

THE striking cover to this issue of the "*M.M.*," prepared from a photograph by permission of the "*Sydney Morning Herald*," shows one of the "D57" class engines of the New South Wales Government Railways, the largest and most powerful locomotives in the State, and a view of one of these giants is seen at the head of this page. They are three-cylinder locomotives of the "Mountain" or 4–8–2 type, and were introduced to handle the ever-increasing freight traffic to and from Sydney over the Blue Mountains and Southern Highlands sections of the New South Wales lines. There are 25 of them in service, Nos. 5701-25, and they were built in 1930 to the designs of Mr. E. E. Lucy, who was then the Chief Mechanical Engineer of the N.S.W. system and is well known "down under."

The first time I saw one of these monsters I was in a train that was slowing to stop at Moss Vale. We were passing a stationary goods train, at the head of which was No. 5702. When my train came to rest, my compartment was just a little in front of this engine. I only had time to note that the whole engine had an air of enormous size.

The next time I saw a "D57" I was at Parramatta, 14 miles west of Sydney, and I was able to make a personal inspection as I made friends with the driver and requested him to show me his charge. This engine was No. 5707, and from the platform it looked very fine indeed. The boiler is something like that of an L.N.E.R. "Pacific," and has a slightly inclined top, on which is the almost flat dome cover. The whistle is behind the chimney and behind it again, where the top line is lowest, the sand-box is placed, mainly to provide plenty of head for the sand.

The driver showed me the arrangement of the whistle. He told me that as it is placed so far forward, the designer has run its steam pipe to the cab, where it enters the boiler. Then we mounted to the cab and I was shown the accessible position of the whistle valve; an absolutely deafening roar answered its manipulation. The driver showed me the various controls, which are so placed that he can reach or see them at once from his position on the left-hand side.

The reversing gear is power-operated by means of a steam cylinder mounted on the left-hand running plate. The reversing lever is attached to the piston in this cylinder, and the driver has on the footplate the control operating the slide valve of the power cylinder and that of the steam inlet valve. When the piston is set at one end of the cylinder it holds the valve gear in forward gear, and when it moves to the other end it reverses the engine.

Behind me rose a mountain of coal. The driver told me the tender, which is mounted on two four-wheeled bogies, has a capacity of 14 tons of crushed coal and 9,000 gallons of water. He then showed me the mechanical stoker, which relieves the fireman of his job of feeding the huge grate by hand. This stoker consists of a conveyor screw reaching from the coal space to the fire-box and is revolved by an engine under the footplate. The screw is automatically fed and so brings the fine coal forward to the engine where a steam jet blows it evenly over the grate.

The total heating surface of the huge boiler is 4,163 sq. ft. and the working pressure 200 lb. per sq. in. The three cylinders each have a diameter of 23¼ in. and a stroke of 28 in. The driving wheels are 5 ft. in diameter. Following modern American practice, the main bed-frame of the engine consists of a single casting, weighing 16 tons.

The "D57" engines are fitted with the Westinghouse brake, as all N.S.W. goods vehicles are so fitted. All large Australian locomotives are fitted with electric searchlights, which enable the driver to see the track ahead for a long distance, and the "Pyle-National" system is employed in the "D57" class. This makes use of a small turbine-dynamo unit fixed on the boiler, supplying current to the headlamp.

I was now able to examine the valve gear more closely. Each of the two outside cylinders has a set of Walschaerts gear. Above the front buffer beam is a big lever pivoted in the centre of the locomotive frame. The right-hand end of this lever is fixed to a forward extension of the right-hand cylinder valve rod. The left-hand end is forked, and forms the fulcrum of a smaller lever, the ends of which are connected to the valve rods of the centre and left-hand cylinders. This gear, which is similar to that employed on all the Gresley three-cylinder engines of the L.N.E.R., can be seen in the cover illustration.

The first engine of this class, No. 5701, when on test hauled a train load of 2,000 tons at 60 m.p.h. on the level. Ordinarily, owing to the heavy load of 22½ tons imposed on the driving axles, the speed of these locomotives is restricted to 40 m.p.h.

The New South Wales Government Railways cover over 6,114 route miles of line reaching to the northern, western and southern boundaries of the State.

The cab end of a "D57." For the photographs on this page and for assistance in the preparation of this article, and of the cover to this issue, we are indebted to the Agent-General for New South Wales.

Kapok

A Gift from Nature's Treasure House

By M. Ralph Horne

A RAPID succession of amazing inventions has characterised the 20th century, but however ingenious man may prove himself, Nature keeps revealing that she has not exhausted her treasure store, and that some of the most simple things she produces are of inestimable benefit if only we learn how to use them. Kapok is an important example of this. This wonderful fibre has been known for many years in the East, for it is just 300 years since the kapok tree, *Ceiba Pentandra*, from which it comes, was discovered in Java; but only in comparatively recent years has its true value been realised.

Javanese natives removing the contents of kapok pods, which contain seeds as well as fibre.

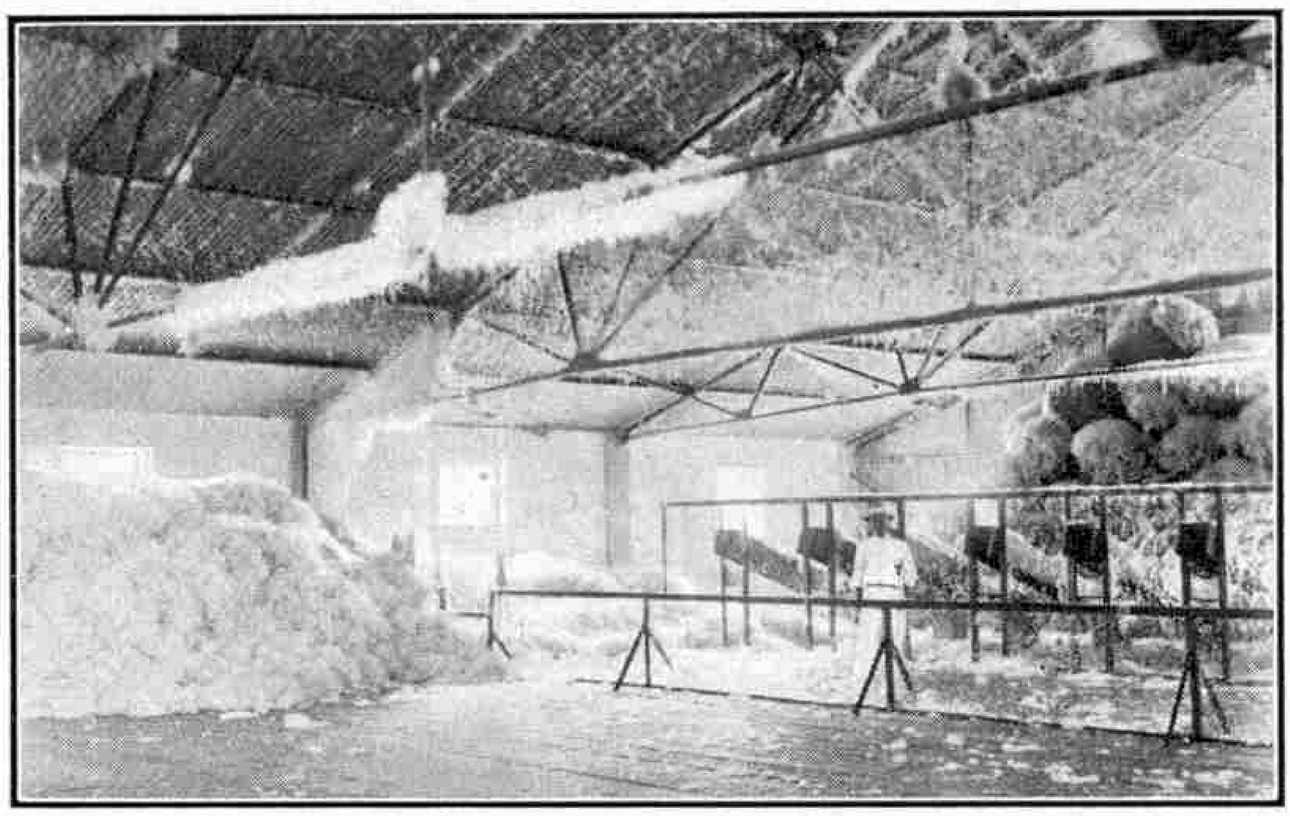
Kapok is an extremely fine silky fibre, which on examination under the microscope is seen to be tubular and made up of air-filled cells, the outer surface being coated with a waxy substance. Its most outstanding quality is its buoyancy. The best grade of kapok is equal to the task of carrying a load of at least 30 times its weight in water, so that in this respect it far surpasses reindeer hair, which will support 11 times its own weight in water, or nearly twice as much as an equal quantity of cork will keep afloat.

Life-boatmen are safeguarded in large measure by kapok-filled life-jackets, which are less cumbersome and far more buoyant than the old regulation cork jacket, and also are comfortable and warm. Kapok indeed is specified by the Royal National Life-boat Institution for this purpose, and also for use in making lifebuoys. There are several reasons for this. One is that a kapok-filled lifebuoy weighs only 5 lb. 6 oz., and can be thrown much farther than one of the same size made of cork, which is heavier. In addition there is no risk of injuring the person or persons whom it is desired to aid; this a cork-filled belt might easily do if it should strike them on the head.

For practical purposes the weight of an average man in salt water is estimated to be 9 lb., and as the standard kapok-filled lifebuoy can support 35 lb. for a minimum period of 24 hours, it has ample reserves of buoyancy. Most materials required for purposes of this kind deteriorate rapidly on submersion, but in this respect kapok is most satisfactory, for it shows a decrease in efficiency of only about 10 per cent. after being in water continuously for 30 days.

The best kapok comes from the East Indies, and from the island of Java in particular, although various forms of the fibre, which usually have a much lower factor of buoyancy, are grown in other parts of the world. It is due largely to the interesting climatic conditions prevailing in Java that this region is so specially suited to its cultivation. The island lies beneath an almost vertical tropical Sun, so that its days and nights are of nearly equal length. It is also between two large bodies of land, Asia and Australia, and two gigantic stretches of water, the Pacific and Indian Oceans, with the result that the range of temperature is small, varying from about 77 deg. F. to 84 deg. F. In other words, there is continuous summer on the lower parts of the island, at least as far as temperature is concerned; and in addition the rainy seasons are well balanced.

A large proportion of the kapok trees grow wild, but there are many plantations in which they are cultivated. The trees are unmistakable, for they have a rather barren appearance and the branches grow more or less at right angles from the trunk. The fibre is contained in the fruits or pods, which are about 6 in. in length. Apart from their colour, which is light brown, the pods are distinctly reminiscent of small cucumbers or gherkins. As the trees bloom two or three times in the beginning of the dry season the pods do not all ripen at the same time, and therefore they must be harvested with the greatest care in order to avoid picking unripe fruits, the use of which



Not a snow factory in the tropics, but a room in which kapok is "blown" to clean it.

would give kapok of inferior quality.

The ripe pods are carefully shaken off the branches of the trees by expert climbers, each of whom is equipped with a long bamboo pole that has a hook at the end; and are then put into the sacks in readiness for their journey to the drying compounds. Occasionally one sees a modern motor vehicle ladened with these sacks, but the old-fashioned bullock cart still carries most of the kapok harvest.

A hydraulic press in a kapok exporter's "godown," or warehouse, in Java.

The first process in the preparation of kapok is one of examination, all unripe or damaged pods being removed. The outer shell is then broken open by hand, and the fibre, together with the seeds, is removed for drying. The compounds in which this process takes place under the heat of a blazing Sun are enclosed by wire netting, for the fibre is so light that very little wind is sufficient to waft it away. Natives wielding bamboo forks continually turn the fibre, a pile of which looks like a great snowdrift and is not damaged by walking on it, for it is amazingly resilient. By turning it over not only is drying facilitated, but clumps of fibre are broken up and a considerable proportion of the seeds fall to the floor.

When drying is sufficiently advanced, girls feed the silky heaps into machines that open out the kapok more, and at the same time remove dirt and practically all the remaining seeds by centrifugal action. The fibre is then caught up in a stream of compressed air and blown over a certain distance into a netted compound. The result of this process of air flotation, which ensures that no seeds are left in the fibre, is seen in the lower illustration on the opposite page, which shows a room in which it is carried out.

It is necessary to bale the kapok in order to reduce its bulk, and to this end it is forked into temporary containers beneath presses, which are usually of the manually operated screw type. Before the pressure is released hessian or grass mats are sewn around the compacted fibre, for the production of every pound of which about 1,000 pods have been needed. As freightage charges on material of this kind are calculated on bulk rather than weight, it is usual for the kapok to be hydraulically pressed and re-baled before shipment. They are transported to the exporter's establishment for this further pressing, travelling by water in native boats called prahu, or by railway, and are then stored in large godowns, or warehouses, to await despatch. The bales are shipped all over the world. When they reach their ultimate destination and the bands are cut, the kapok springs up in a manner strongly reminiscent of a Jack-in-the-box.

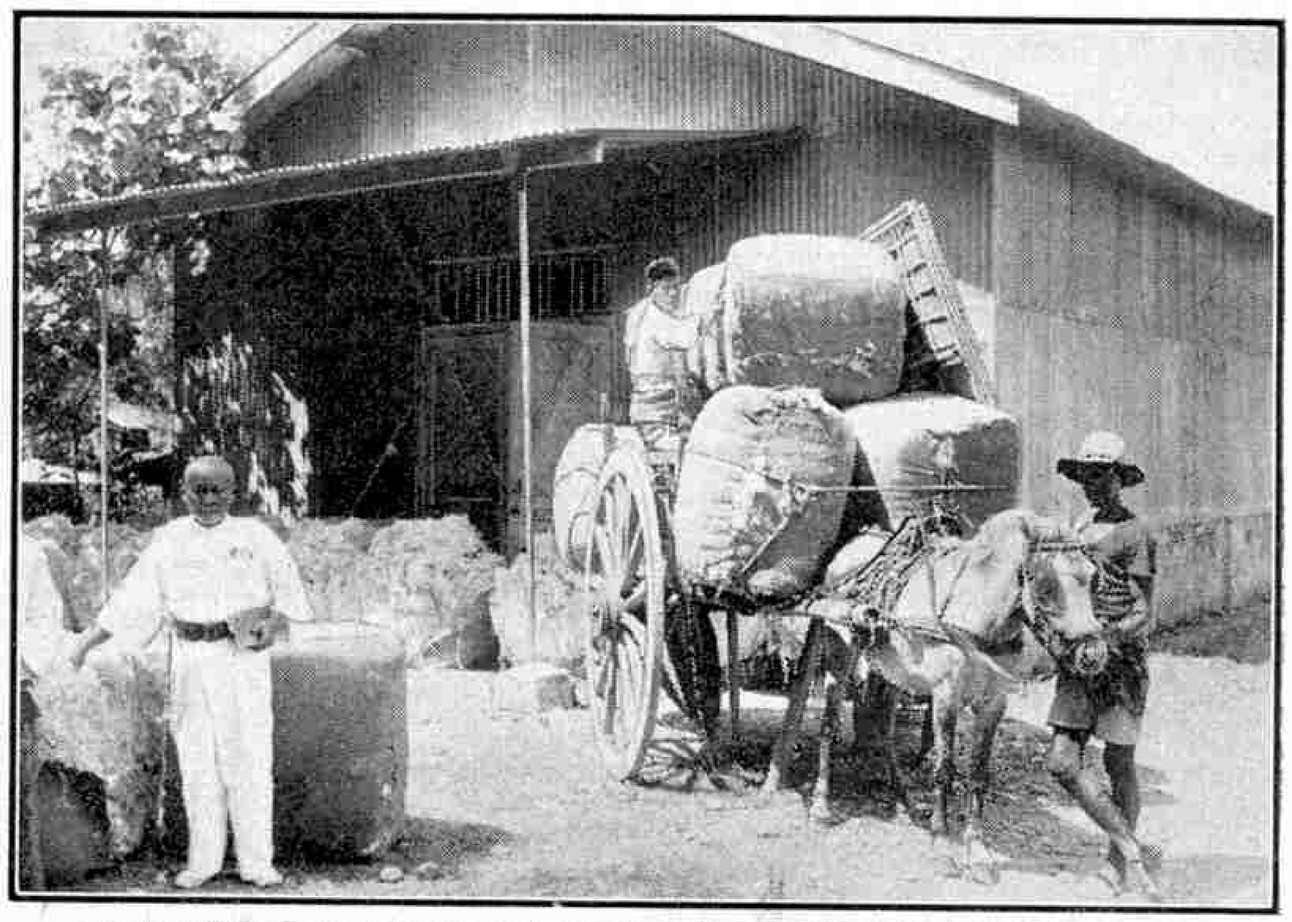
In passing it is of interest to record that the kapok seeds, which are removed with such care, are by no means valueless, for when they are pressed they produce a yellow, non-drying oil with a pleasant taste. For this there is a certain demand in connection with the preparation of foodstuffs, but the bulk of the material is used in the manufacture of soap.

Kapok owes its high degree of resiliency and its buoyancy to its air-filled cells, each acting as a perfect little air cushion. As it is not a foodstuff it is always free from vermin, and the waxy substance on the outside of its cells makes it impenetrable by moisture. Thus it is a perfectly clean light material for which many uses have been found besides those already mentioned.

Kapok is applied in the production of mattresses, cushions, pillions and upholstery of all kinds. It is a heat insulator, and this property, with its immunity to moisture and its light weight, make it invaluable for use in refrigerators, food carriers, fireless cookers or even the humble tea-cosy. It is also a sound insulator, and the fact that air liners are now becoming so quiet that passengers do not need to raise their voices in order to carry on a conversation is often due to the application of kapok insulation, which adds little to the weight. The fibre is used for similar purposes in motor cars, radio studios and theatres, and in the sound film industry.

Other uses for kapok include the making of sleeping bags, lining clothing and padding quilts. One of its most unexpected applications is in the treatment and dressing of wounds, for kapok is impervious to bacteria and can readily be sterilized by heat.

It is said that a fortune awaits anyone who can discover a process whereby kapok can be converted into a fabric. Its fibres are relatively short and have little or no tendency to combine in the form of yarn or thread.



Bales of kapok transported in carts from the railway station to the exporter's godown.

We are indebted to the British Chamber of Commerce for the Netherlands East Indies (Inc.), Shell-Mex House, Strand, W.C.2, for the information contained in this article and for our illustrations.

AIR NEWS

British Transatlantic Air Mail Service Begun

The British transatlantic air mail service was inaugurated successfully last month when the Imperial Airways long-range flying boat *"Caribou"* flew from this country to Canada and the United States, with almost half a ton of mail on board. *"Caribou,"* piloted by Capt. J. C. Kelly Rogers, took off from Southampton on 5th August. The aircraft was given a good send-off by a large crowd of people, and was accompanied as far as Foynes by the flying boat *"Maia"* with Sir Francis Shelmerdine, Director-General of Civil Aviation, and other high aviation officials on board. At Foynes *"Caribou"* was welcomed by a large crowd that included Mr. de Valera, Prime Minister of Eire, who later watched from the *"Maia"* the mid-air refuelling of the flying boat by a tanker aircraft.

The ocean crossing to Botwood, Newfoundland, took 19½ hr., as headwinds were encountered. After a halt of just over 2 hr. at Botwood, *"Caribou"* flew on to Boucherville, nine miles from Montreal. The last lap of the 3,580 mile flight from England was accomplished without mishap, and *"Caribou"* landed at Port Washington, Long Island, on 7th August. The total flying time for the flight was 30 hr. 20 min.

* * *

The Swedish Government have ordered 15 Seversky fighters. Other foreign aircraft on order for Sweden are American Northrop 8A.1 single-engined bombers and German Junkers Ju 86K twin-engined bombers.

New British Flying Boats for R.A.F.

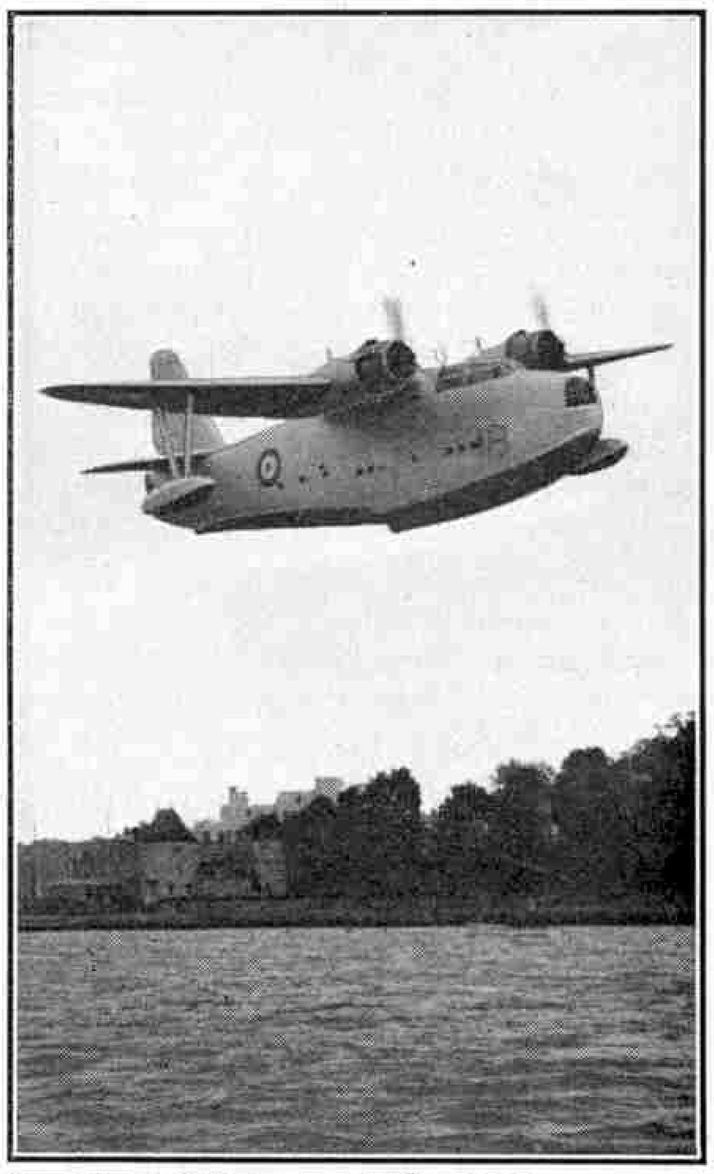
The upper illustration on this page shows the Saro "Lerwick" flying boat. The builders of this aircraft, Saunders-Roe Ltd. of Cowes, Isle of Wight, state that the order they now have in hand for this aircraft is the largest ever placed by the British Air Ministry in respect of flying boats. The "Lerwick" is a new type of general-purpose aircraft, and is fitted with two "Bristol" Hercules medium supercharged engines and D.H. constant speed airscrews. The range and the performance figures are still secret, but they are known to be considerably in advance of those of the flying boats at present in service.

The "Lerwick" is a high wing flying boat, with a wing span of 81 ft., length 63 ft. and height 20 ft. The wing float chassis is a departure from normal practice, and each float is mounted on two struts which, whilst being flexible for shock absorbing, are equal in strength to the more normally braced type. The aircraft is equipped with three power-operated gun turrets.

The Fairey Company's First Civil Machine

The Fairey Aviation Co. Ltd. are now working on their first commercial aeroplane, the Fairey C.1. This will be a substratosphere machine of all-metal construction, with accommodation for 30 passengers. Its designed top speed is 275 m.p.h., and its cruising speed 220 m.p.h.

The machine will probably be powered by four "Bristol" Taurus sleeve-valve engines with a total of over 4,000 h.p., and will be fitted with retractable wings, known as Youngman flaps, to assist landing and taking off. Both passenger cabin and pilots' cockpit will be supercharged for flying at high altitudes.



The "Lerwick" flying boat in the air. Photograph by courtesy of Saunders-Roe Ltd.

R.A.F. Flights to France

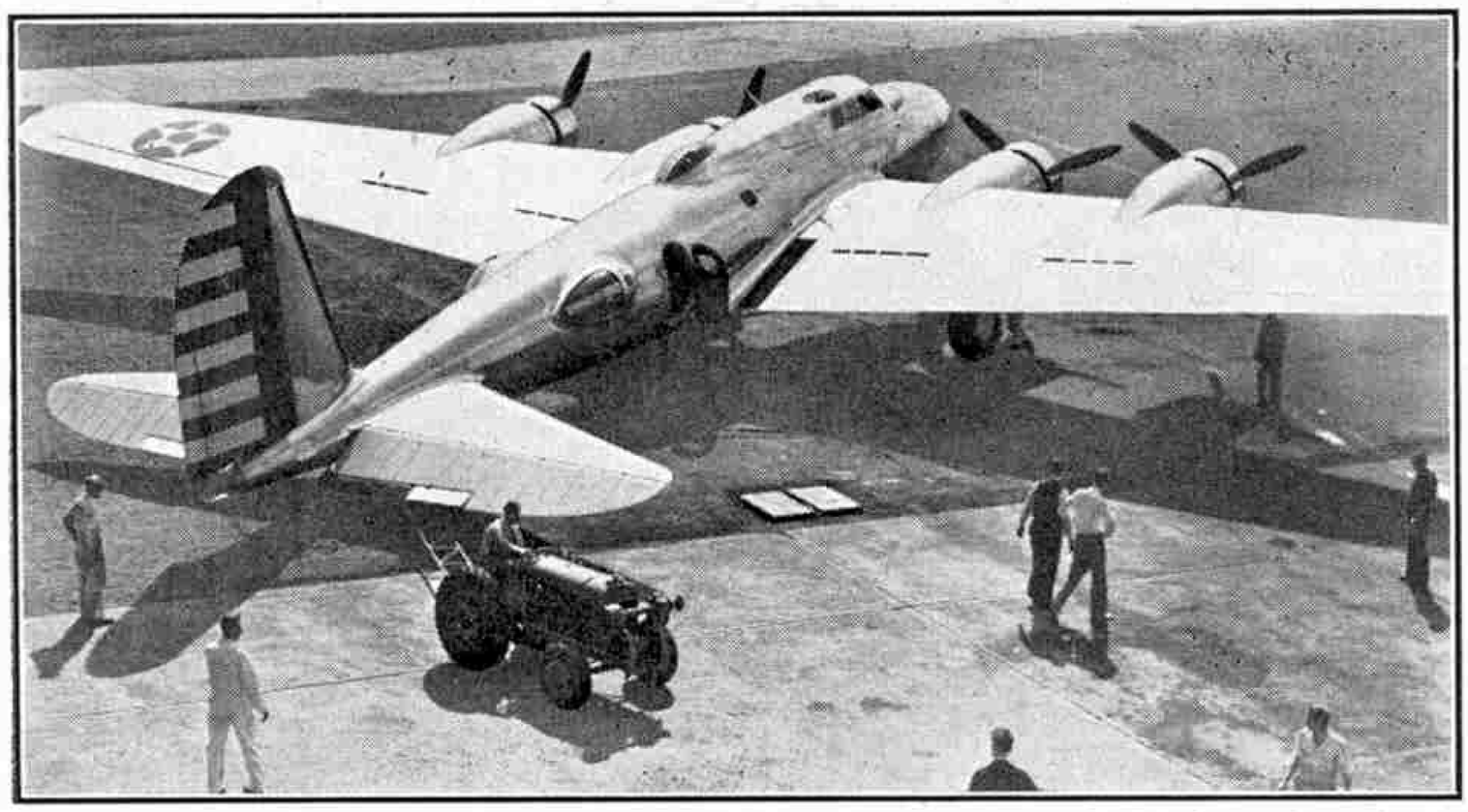
A new and important step in R.A.F. training flights is the extension of these exercises to include non-stop flights to France and back. The third of these exercises, and at the time the most extensive, was carried out on 25th July last when 243 bombers, including "Hampdens," "Blenheims," "Whitleys," "Battles" and "Wellingtons" took part. The aircraft were manned by 1,200 officers and other ranks, and flew in formations that took off at various times between 7.30 a.m. and 11.15 a.m. Units of the French Air Force ascended to intercept the "raiders," but no mock air battle was attempted, and the R.A.F. machines did not break formation. The distances flown ranged from 800 to 1,600 miles.

In France this flight was regarded partly as a tribute to the memory of the late M. Blériot, who 30 years ago accomplished the first cross-channel flight.

Largest British Flying Boat

The latest and largest commercial flying boat built in this country was launched in June last from the Rochester works of Short Bros. (Rochester & Bedford) Ltd. This aircraft is the *"Golden Hind,"* the first of three "G" class flying boats for Imperial Airways. The other two will be named *"Grenadier"* and *"Grenville."* The span of the "G" class flying boat is 134 ft. 4 in., and its overall length 103 ft. 2 in. It is fitted with four "Bristol" Hercules engines, which are capable of developing a total of 5,500 h.p. for the take-off and give the aircraft a top speed of over 200 m.p.h. and a cruising speed of 180-190 m.p.h. The all-up weight is about 31½ tons.

As a contrast to the speed and power of the *"Golden Hind,"* it may be recalled that the first of Britain's commercial flying boats was driven by a 450 h.p. motor, and flew at about 80 m.p.h. This was the little *"Sea Eagle,"* which was operated 20 years ago on a pioneer marine air route between Southampton and the Channel Islands.



The first of a fleet of Boeing B-17B bombers for the United States Army Air Corps. The B-17B is an advanced type "Flying Fortress," for high altitude flying. Photograph by courtesy of Boeing Aircraft Corporation, U.S.A.

Quick Repair of a Damaged "Flamingo"

A minor accident to the prototype D.H. "Flamingo" recently provided an unexpected opportunity of demonstrating the facility with which this type of aircraft can be repaired, owing to the minimising of double-curvature metal sheets in its skin and the fact that it is made in small units.

The "Flamingo" was being prepared for take-off and the engines were running-up smoothly, when a mishap caused the aeroplane to swing round and the tail unit hit a motor vehicle parked nearby. The rear-end bulkhead to which the tail unit is fixed was torn out completely and the panelling on the port side, and four of the internal former rigs were damaged. The port tailplane leading edge was demolished, the port fin stoved in, and the bottom of the port rudder was crumpled beyond repair. The elevator leading edge also was stoved in, and the aeroplane was a sorry sight, but exactly a week later it was completely repaired and again in service.

Successful Test of Improved "Flying Fortress"

The initial test flight of the Boeing B-17B bomber, the first of a fleet of advanced-type "Flying Fortresses" being built for the U.S. Army Air Corps, was carried out recently. Major J. D. Corkille, Army Air Corps representative at the Boeing factory, was at the controls of the monoplane as chief test pilot.

The important improvements carried out in the new "Flying Fortress" include the provision of a special supercharging system for peak performance at high altitudes. These superchargers enable the approximate power output of the engines to be maintained at high altitudes in spite of the decreased density of the air. They are exhaust-driven and supply air to the engines at approximately constant sea-level density although the aircraft may be flying as high as 20,000 ft., or higher. After the rarefied air is thus compressed to sea-level density it is cooled by radiators before it enters the carburetters.

Putting the finishing touches to the repaired tail unit of the first "Flamingo" monoplane. Photograph by courtesy of The de Havilland Aircraft Co. Ltd., Hatfield.

Across the Channel in Seven Minutes

When "*Fiona*," one of the "Frobisher" class air liners operating on the London-Paris route, left Le Bourget at 8.45 a.m. on 25th July last, she followed a course that took her directly over Calais to Dover. This was the tribute of Imperial Airways to the achievement of Louis Blériot who on 25th July 1909 flew from the sand dunes at Les Baraqus, about three miles from Calais, to a field immediately behind Dover Castle.

Blériot's historic flight, from the take-off at Les Baraqus to the landing behind Dover Castle, took him about 70 min. "*Fiona*," commanded by Captain B. H. Youell, took 7 min. M. Blériot strove against unexpected winds. He was unable to fly a straight course, and for about 10 min. when he could not see the coasts of France or England, he was lost. He even lost sight of the "*Escopette*," the French torpedo destroyer which was racing towards Dover at a speed of about 21 knots. Blériot believed that his top speed was about 42½ m.p.h. "*Fiona*" crossed the Channel at a speed of 180 m.p.h. and flew low. Bleriot's monoplane, however, did not rise above 250 ft. throughout the flight.

The Boeing B-17B is a streamlined middle wing, all-metal monoplane, and is fitted with four 1,000 h.p. Wright "Cyclone" engines and full-feathering airscrews. There are five machine gun positions, one in the fuselage nose, and four others in the form of streamlined "blisters" on the top, bottom, and sides of the fuselage, like those of the B-17 "Flying Fortress."

New Aeronautical Laboratories at Ottawa

The National Research Council of Canada has secured a site of about 100 acres adjoining the Ottawa-Rockcliffe Aerodrome, for the extension of their aeronautical laboratories. There will also be room for special laboratories that may be needed in the future, and for outdoor investigations for which at present the Council has no facilities. The total cost of the proposed new buildings is estimated at £291,979, and construction will take two years.

The aeronautical facilities to be installed in the extension will include an aerodynamic laboratory with large and small wind tunnels. The large wind tunnel will have about twice the capacity of the present 9 ft. diameter, 160 m.p.h. one. There will also be a model-testing basin 600 ft. long and 25 ft. wide, for testing model aircraft floats and hulls, and models of hulls of vessels. Another feature of the new laboratory will be a vertical tunnel for studying the spinning characteristics of aircraft, and it will be the first of its kind in Canada.

Fifty Million Letters in Three Months

Imperial Airways air liners this year have carried an average total every three months of over a 1,250,000 lb. of mail, or approximately 50,000,000 letters. This is over twice as much as that carried in the corresponding period last year. On the average each letter travelled some 4,750 miles.

During a recent period of three months about 10,000 passengers travelled by Imperial Airways, an increase of about 3,000 on last year's figures for a quarter. The general freight carried by air has been remarkably varied, and has included a birthday cake, a pair of boots, an old book, a bottle of medicine, a bag containing 3,000 sovereigns, and valuable oil paintings.

South Atlantic Mail Service

According to provisional arrangements a British air mail service to South America will be inaugurated in November, and it is expected that its postal charges will be lower than those of the Air France and German Condor Syndicate services at present carrying much British mail across the South Atlantic. The new route will start at Southampton. From there aircraft will fly to Lisbon, then probably to Sierra Leone in West Africa, across the ocean to Natal, in Brazil, and down the coast to Rio de Janeiro, Montevideo, and Buenos Aires. An extension across the Andes to Santiago is contemplated. It is planned to use for the new service modified Empire flying boats similar to those employed on the Australian route, but strengthened to carry a greater payload.

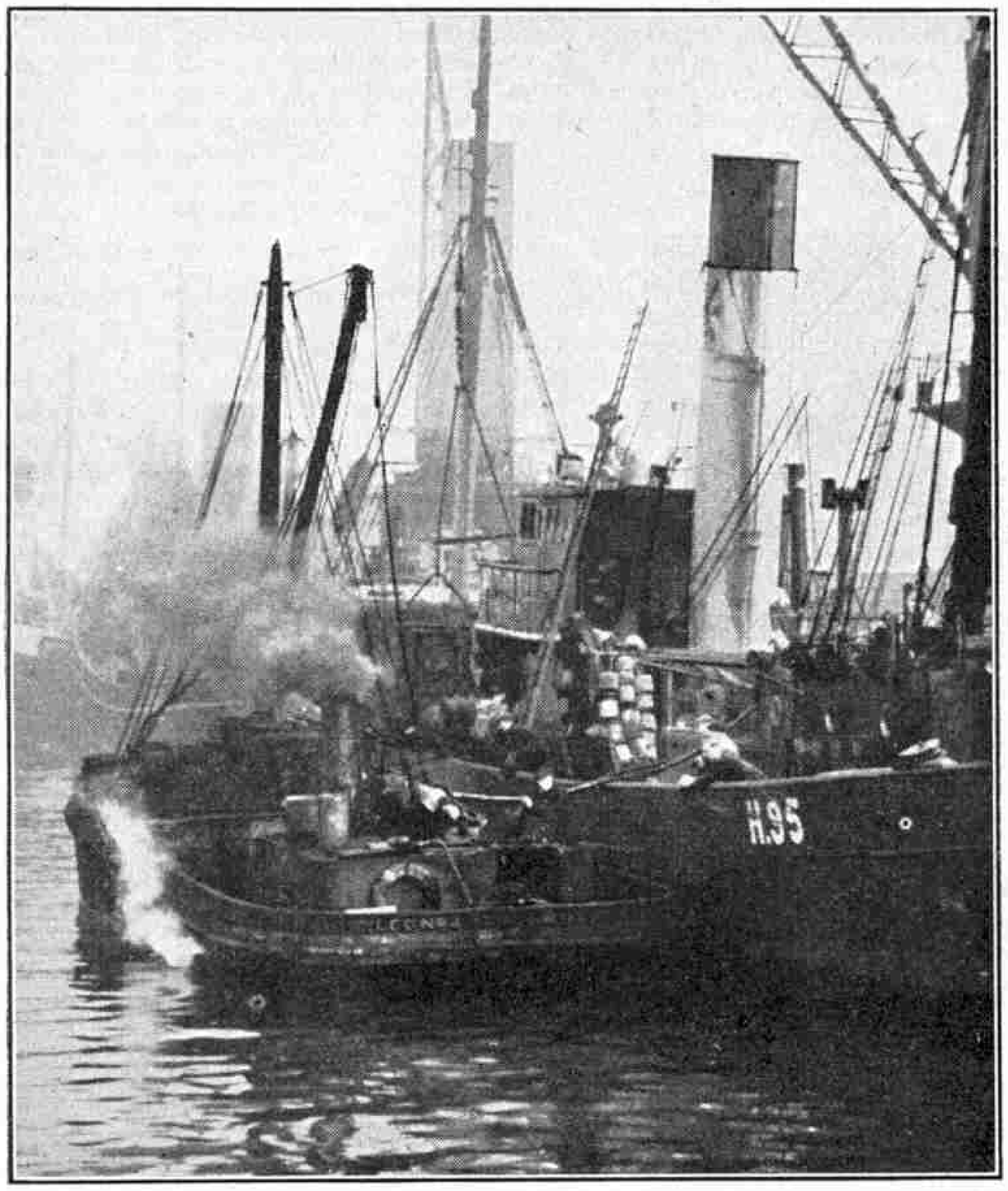
A Dornier-Merkur high-wing monoplane built in 1926. It was the most economical transport aeroplane of that time, and the machine illustrated flew 6,214,000 miles in the service of Deutsche Lufthansa up to 1932. Photograph by courtesy of Dornier-Werke G.m.b.H., Germany

Cod Liver Oil Without Tears

A New Enterprise at Hull

By J. D. Horgan

IN the past, cod liver oil was the pet aversion of most children. They just "couldn't take it," and many tears have been shed before juvenile patients could be persuaded to face up to its unpalatable taste and smell and



Oil boat taking crude cod liver oil from a trawler's tank.

"get it over." To-day, as a result of the enterprise of a number of the Hull trawler owners, this is now but a nightmare of the past, and at the refinery of the British Cod Liver Oil Producers Ltd. the unpalatable taste and smell associated with this oil have been entirely eliminated. It was found that the unpleasant qualities were not inherent in cod liver oil, but were merely present as a result of inferior methods of production. The Hull product comes from the refinery as a pure oil, almost devoid of any taste or smell, and what slight suggestion of taste there may be is pleasant and not in the least fishy or nasty. "Seven Seas" is the first palatable cod liver oil, and its outstanding qualities are its high potency of Vitamins A and D.

The history of its production is linked up with that of the romantic progress and development of the Hull fishing industry. This would capture the imagination of any reader, for it is packed with romance and heroism. The gathering of the harvest of the sea has not been without its tragedies, and many readers will recollect the broadcast version of the epic story of the loss of the trawler "*Howe*" on the north coast of Bear Island, and the heroic rescue of the crew from a hopeless position by the crews of Hull trawlers. This broadcast was strictly in accordance with the facts.

Many acts of bravery have been recognised by the Royal Humane Society and by foreign Governments, and some accounts of these are not lacking in humour. On the occasion of the presentation of the Royal Humane Society's parchment and medal for life-saving to a fisherman who had dived overboard from a trawler to effect a rescue in Arctic waters in mid-winter, he was asked what thought was uppermost in his mind when he plunged overboard. He replied that he remembered the man in the sea had borrowed his braces the previous day, and he himself would need them to go ashore in Hull!

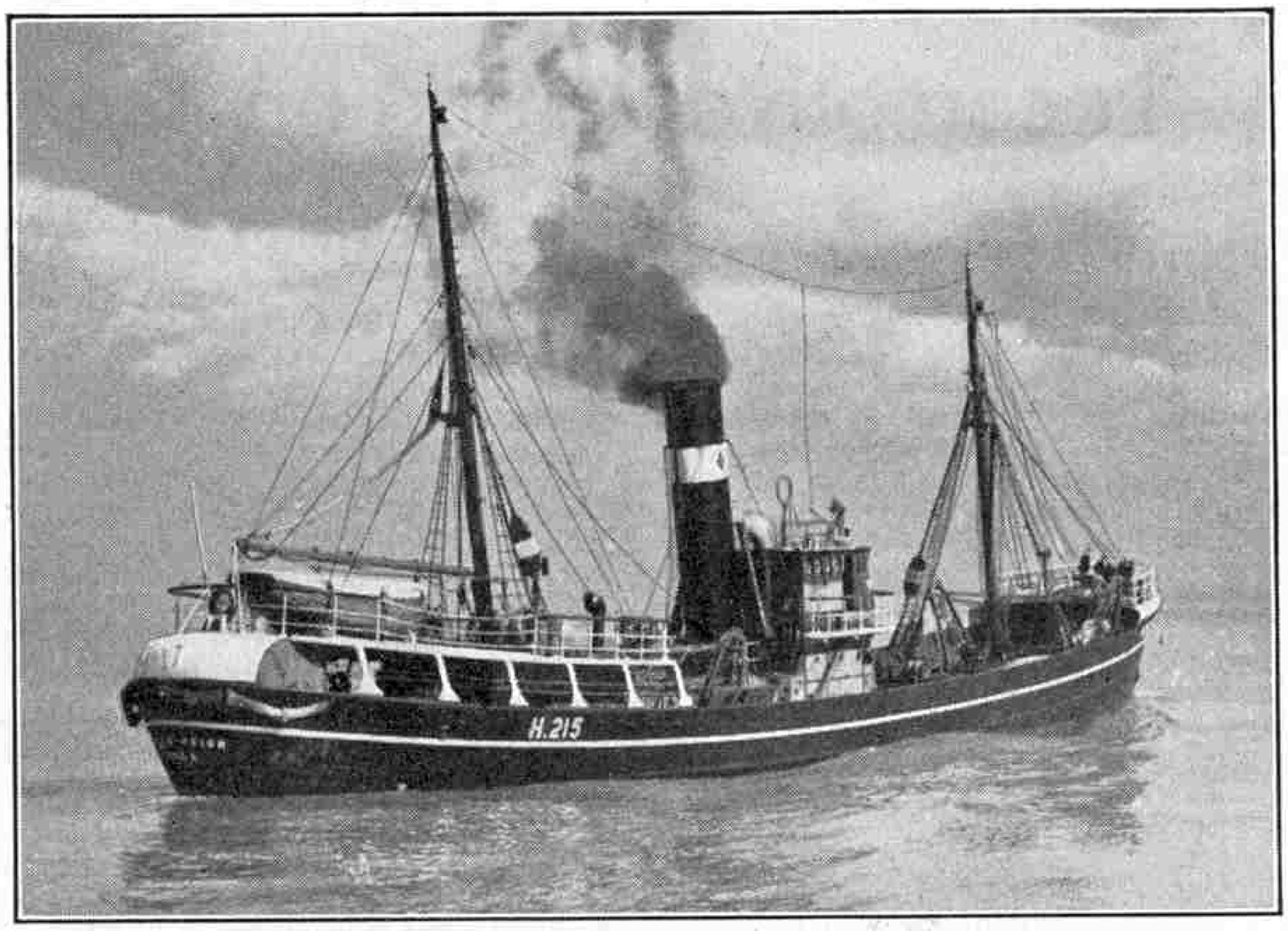
It was early in the last century that fishing smacks from Brixham discovered the prolific fishing grounds off the Dogger Bank and decided to settle on the Humber; and to-day most of the outstanding men in the industry bear the names of the courageous families who laid the foundations of this great enterprise 80 to 90 years ago.

By 1872 there were 313 fishing smacks belonging to Hull, and about 1880 the introduction of the steam trawler marked the commencement of a further epoch in development. The number of smacks gradually decreased until at the beginning of the present century only a few remained, while between 400 and 500 steam trawlers were fishing out of the port. The steam trawlers began to venture into more distant waters where fish was more plentiful, and in later years, with the increase in size and range of the more modern vessels, an increasing number have gone to the far North, to Iceland and well into the Arctic Circle and the waters around Bear Island, the White Sea, the Murmansk Coast, Nova Zembla, and also up the east coast of Greenland, the Davis Straits and Newfoundland. A voyage to Bear Island and back takes between 16 and 21 days, and to the Murmansk Coast about 24 to 25 days—nearly 4,000 miles there and back. To-day Hull is one of the greatest fishing ports and possesses one of the finest fleets and some of the finest fishermen in the world. In 1937, six and a half million cwt. of fish were landed at Hull, nearly 45 per cent. of the total weight landed at all ports in England and Wales.

A modern trawler costs more than £30,000, carries 300 tons of bunker coal, 100 tons of ice, and gear worth more than £1,000, and is equipped with all the latest conveniences, including bathroom accommodation for the crew. These vessels can bring home between 30,000 and 40,000 stones of fish, and on a normally busy day at St. Andrew's Dock nearly a quarter of a million stones of fish are landed.

When the fishing grounds are reached the trawl is lowered and there commences what is for the crew a

period of continuous activity from the time the first haul is swung in-board. As soon as the cod-end or bag of the net is released the fish tumble on to the deck and are straightaway sorted, and the livers are extracted and taken immediately to the specially constructed liver boiling plant that each of these vessels carries. In bygone days the livers were brought home to be boiled, but in the production of cod liver oil time is a vital factor, and if the process is delayed the result is a rancid taste in the oil. The boiling is timed and the oil then drawn off and placed into tanks. On arrival home at St. Andrew's Dock a small tender, the oil boat, goes alongside the trawler, and the oil is pumped out from the tanks and taken across the dock. It is then pumped through a pipe line to the No. 1 factory, where in its crude state it is treated and subjected to chemical tests in readiness for transport in specially constructed tank-vehicles to the modern refinery situated at Marfleet, on the outskirts of Hull.



A Hull trawler leaving St. Andrew's Dock for the fishing grounds.

The refinery, an imposing set of buildings of pleasing modern design, is fitted with plant and equipment representing the very latest scientific knowledge in this particular business. It was opened in 1935, and represents a capital expenditure of more than £90,000. The staff of 200 includes scientists, chemists and numerous people of technical skill. Separators occupy one of the sections, and through these the tested oil collected from the tanks of the trawlers is treated and moisture, liver tissue and other extraneous matter are removed. In this form it is a veterinary cod liver oil that is rapidly becoming familiar to poultry-keepers and dairy-farmers. After this process the oil is drawn off into huge storage tanks, one of which has a capacity of 250 tons.

Subsequent stages of treatment are blending according to potency, clarification, cooling and removal of stearine. Nothing is wasted, and the stearine is subjected to a further process in order to remove all traces of oil, leaving a residue of white textile stearine that is particularly suitable for use in the manufacture of cosmetics and soap.

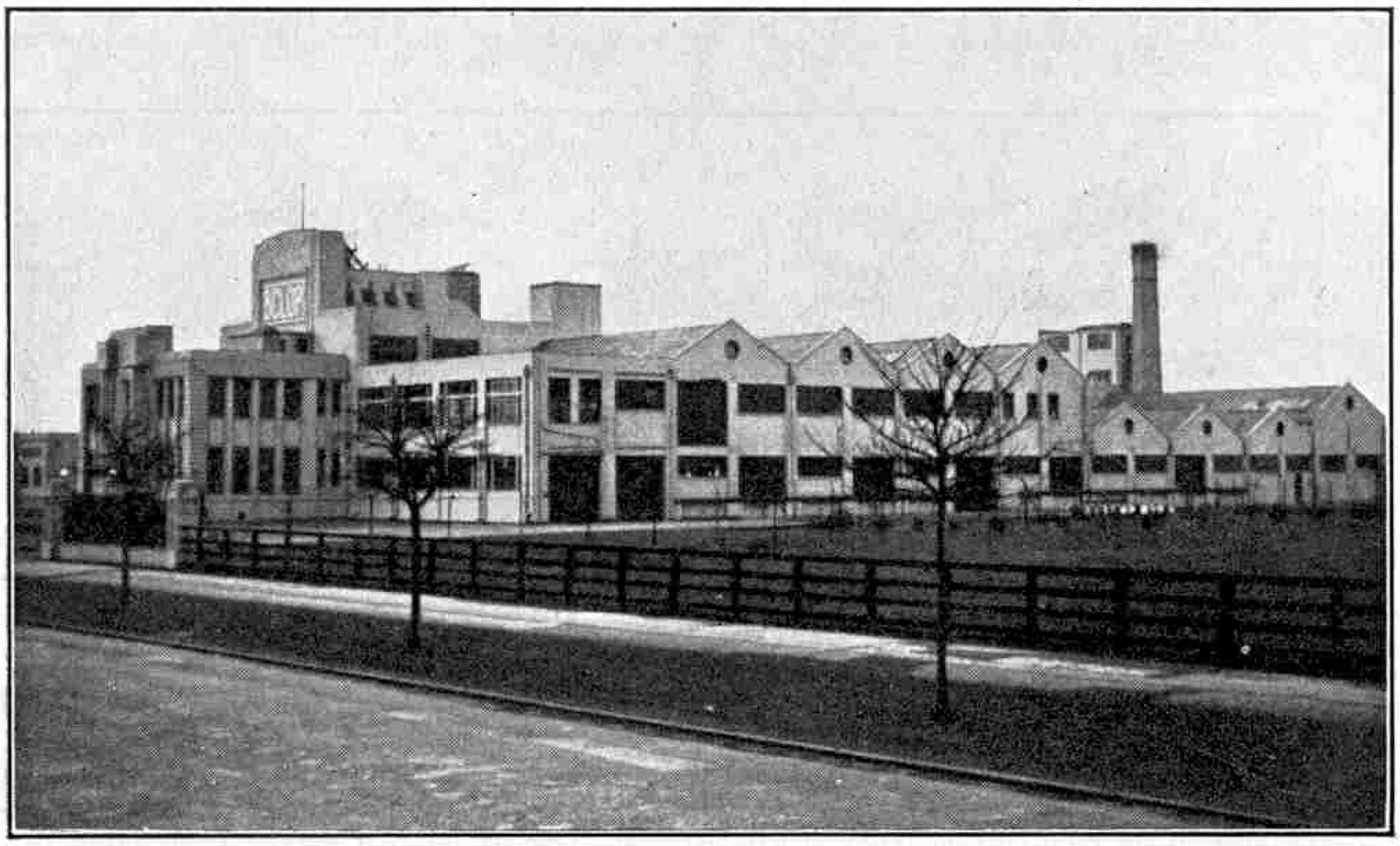
In its refined state the oil is clear and pale yellow in colour. This is an important indication of quality, and is only present in oil produced by treatment of perfectly fresh livers; hence the reason for boiling these at sea immediately after the fish are caught.

In the refinery's laboratories there is a bewildering array of costly and delicate scientific apparatus, by means of which the oil is subjected to tests at each stage of production. Finally the potency of the Vitamins A and D it contains are ascertained.

There are large biological research laboratories in which experiments are carried out on chickens and white rats to demonstrate the food and medicinal values of cod liver oil in poultry and animal diet. Thousands of birds, reared indoors on a first-class diet, rapidly develop rickets and lose vitality, but as soon as their food is supplemented by minute doses of cod liver oil they quickly recover, and thrive even better than farmyard poultry. These birds attain an amazing quality, and subsequently command the best prices when sent to the London markets. At the same time the egg-laying qualities of pullets are very much improved. Rats on an ordinary diet also develop rickets and become so weak as to be unable to walk. Again, with the introduction of fractional doses of cod liver oil into the diet, there is immediate recovery.

In 1938 the refinery produced nearly 10,000 tons of cod liver oil, and it is certain that the output will increase year by year as will, undoubtedly, the demand. Large supplies have recently been sent to China and to Spain.

This article and the illustrations are reproduced from the "London and North Eastern Railway Magazine" by courtesy of the Editor.

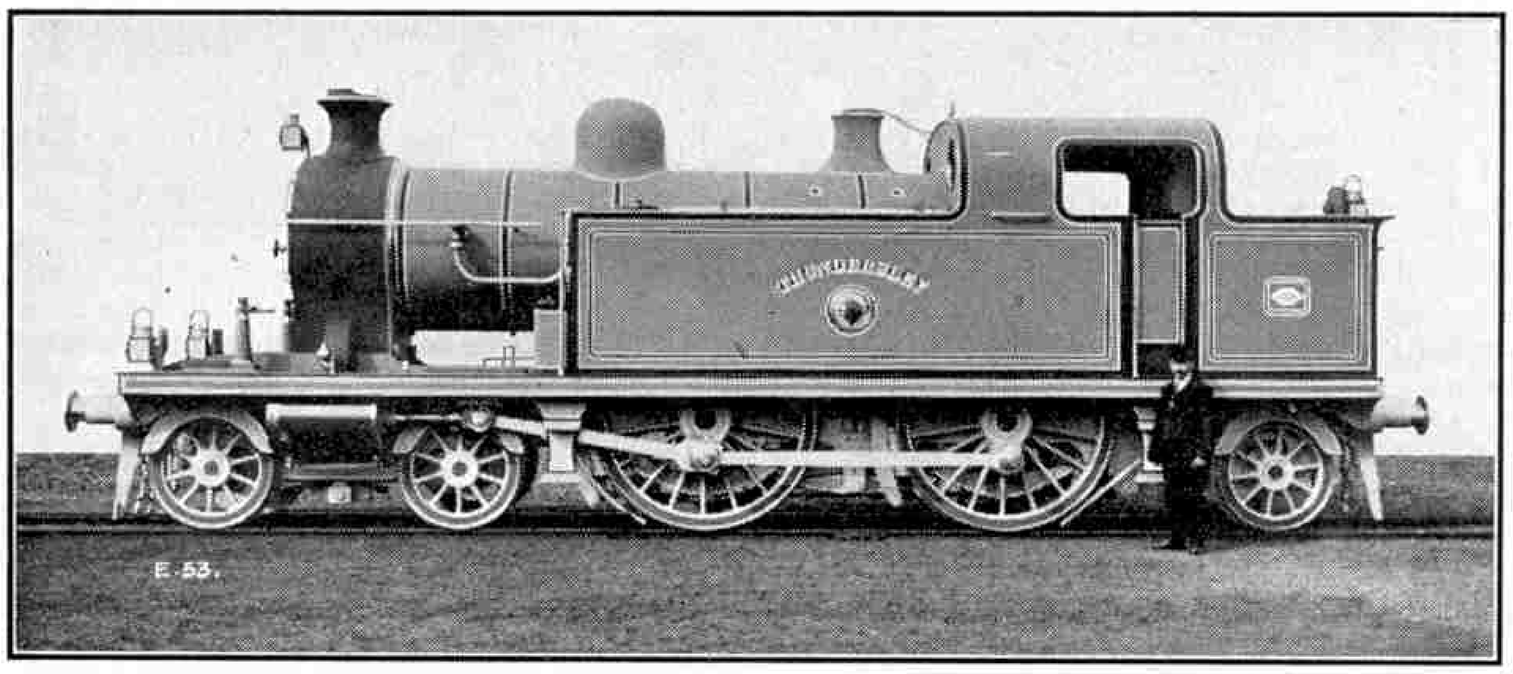

Hull's modern cod liver oil refinery, the most up-to-date factory of its kind in the world.

Locomotive Work on the "Tilbury" Line

Cleaning and Firing 30 Years Ago

By E. J. Lee

IN the late spring or early summer of 1904 I started work as an engine cleaner at the Locomotive Depot of the former London, Tilbury and Southend Railway at Shoeburyness, Essex. Mr. Robert Undrill was the Foreman there in those days and was later succeeded by Mr. Perry, who can be seen at the rear end of the engine in the lower illustration on this page.



No. 80 "Thundersley," one of the large "Tilbury" 4-4-2 tank locomotives built in 1909. This illustration is reproduced by courtesy of Robert Stephenson and Hawthorn's Ltd., Darlington.

There was a great shortage of cleaners at that time. Many started the job and stuck to it only a night or two, but a few stayed on, although wages were small then, and the work was quite hard, as the engines really had to be clean! When we had finished the engines were inspected, both sides of the wheels actually being examined in order to make sure we had done our work properly! The bogies, driving and trailing wheels had to be gone over three times, and so also had the frames in between them as well as the springs. First a paraffin swab was used, then the surface was wiped off and finally polished.

When I started on old No. 27 "*Whitechapel*," of the original "Tilbury" 4–4–2T class, its coat was nearly black in colour instead of light green, the engine being due for the shops. Soon after that No. 47 "*Stratford*" came out, newly-painted after a general overhaul, and the foreman of the cleaners allocated it as "my" engine. The driver's name "H. Townsend" was painted up in the cab.

I have always liked railway engines and took great pride in shining them up. We used to be allowed a pint of paraffin, a big chunk of tallow, some bath-brick and a bundle of waste, with emery paper for the steel, a torch lamp and some stuff for the wicks. We used to have to clean and polish all the brass-work, such as oil cups, cylinder cups, the ornamental band round the boiler barrel where it joined the smoke-box, and the cab window frames. We used to wipe the boiler off well and then rub the tallow all over it to leave a "skin" that could be wiped off clean next night. When the boiler was warm it would shine in the sun; our engines were a pleasure to look at, on a bright summer morning particularly.

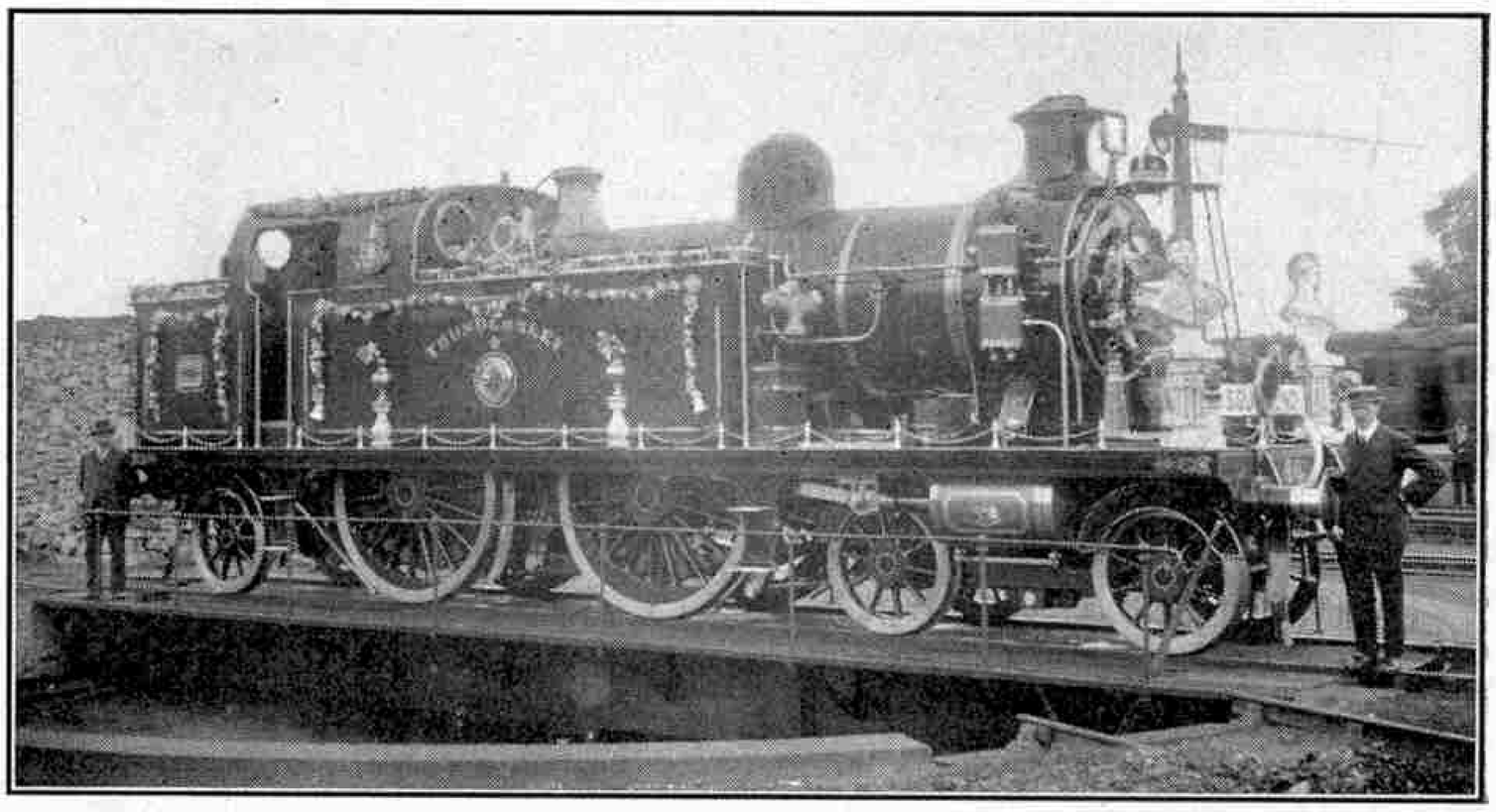
There used to be lots of fun at times with new cleaners starting, because they had to be "initiated," as we called it, with oily swabs. They had their torches knocked over and all kinds of tricks played on them, so that many did not come back after the first night or two, but if a man took it all in good part the old hands soon left him alone. I was just over two years in the shed. After I had been cleaning No. 47 nearly a year an engineman from Plaistow had my engine, and in putting her away for the night, after the usual examination, he told my foreman that she was the cleanest engine he had seen for one that had been out of the shops so long.

When I was certified as a spare fireman I had engines to light up on Sunday evenings, as most of them had their fires thrown out on Saturday nights. This was quite a job, carrying fire and wood for lighting up, climbing onto the footplates and tending the fires while steam was getting up. Then there were days too when I had to go on the coal stage, and help in coaling engines.

As spare firemen we took our turns on the footplate whenever a regular fireman did not turn up. I well remember my first trip, which was to London, at night! I think we travelled from Shoeburyness on the 2.5 p.m. train, and got to Plaistow about 3.30 or so, and there we found our engine. I was with Driver Collins, and our engine turned out to be 4–4–2T No. 45 "*Burdett Road*." We had an empty train from Plaistow to Fenchurch Street, and then we had to take the 7.20 p.m. down to Southend and Shoeburyness.

It was dark when we left London and with the glare from the fire nearly blinding me every time I fired, I couldn't tell what steam pressure we had, but I could see the water in the gauge glass. It was all so new and exciting, out at night on a fast train on my first trip, with all the footplate noises, rattling over points, through stations and out in the darkness again. All this combined with the roar and the shaking of the engine, the watching for signals and then firing every minute or two was an experience I will never forget.

The next step was being appointed as regular fireman with Charlie Ellis, an old driver, on No. 16 "*Low Street*," one of the small 4–4–2 tanks, to Southend for shunting. I was at that work some months and received a good recommendation to the Locomotive Foreman from Driver Ellis. Then I was with Driver Burrills on No. 74 "*Orsett*," one of our 0–6–2 tank goods engines on the "Southend Goods," one week on the day shift and the next on the night shift. A typical day's work would involve booking on at 9.35 a.m., sometimes earlier; we were due away from Shoeburyness at 10.10 a.m. We picked up and put off wagons at all stations on the route via Upminster, did a considerable amount of



"Thundersley" decorated for the 1911 Coronation. Mr. Robert Whitelegg, then Locomotive Superintendent of the "Tilbury" Line, is standing at the front of the engine. Illustration by courtesy of the "L.M.S. Magazine."

shunting and "placing" wagons and so on at different places. Sometimes we would get all the way to Plaistow before our relief crew came on the 4.55 p.m. from Shoeburyness. They got off at any station where they happened to find us and then we took the first train for home that came along and booked off at the shed.

When we were on the relief turn we travelled up on the 4.55 p.m. from Shoeburyness. After picking up our train, and getting the *"right away"* we proceeded to Dagenham Docks, where we waited for another engine that was bringing a goods train down from Commercial Road. We attached its train to ours and ran non-stop to Grays, where we commenced shunting our train, and then on to Tilbury Docks. Then we went on putting off or picking up wagons at most stations towards Southend.

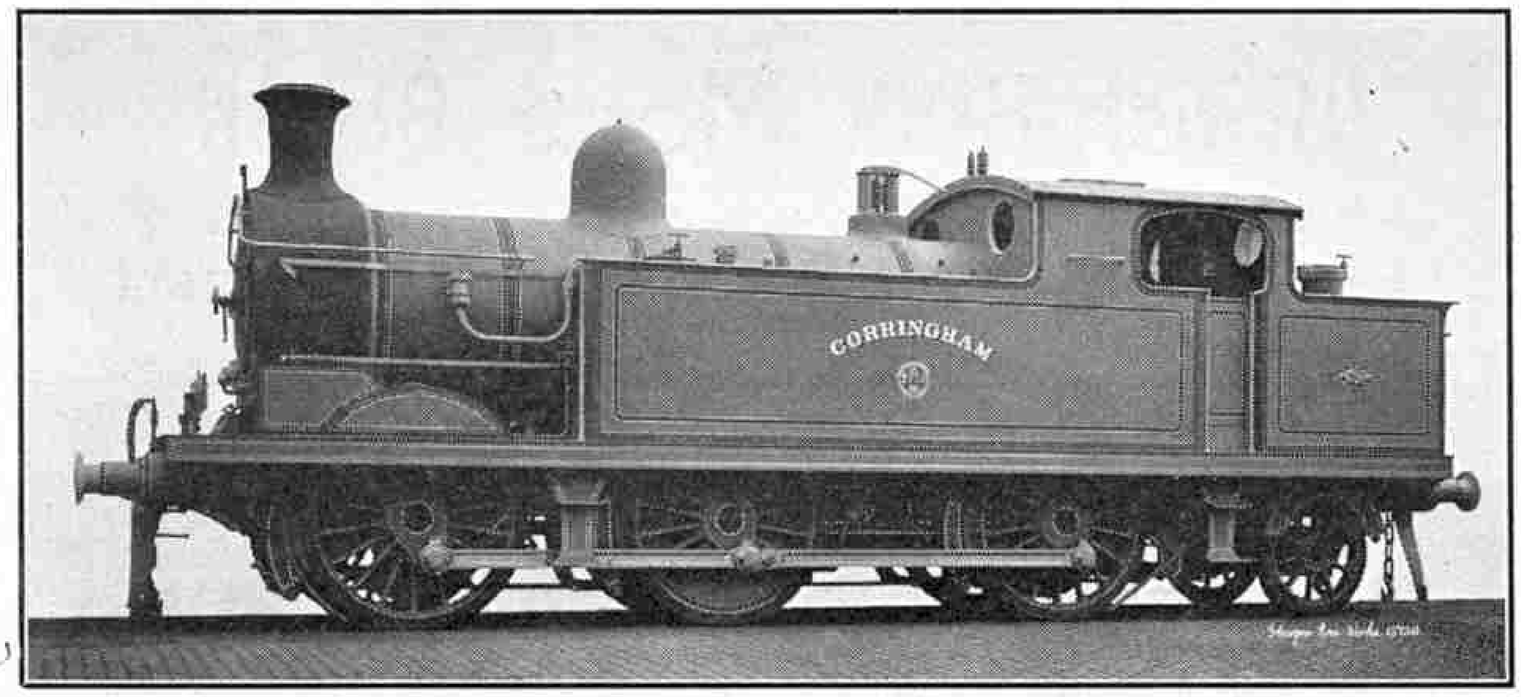
After arriving at Shoeburyness anywhere between 2 a.m. and 5 a.m. we had the fire to clean, the smoke-box to empty, the ashpan to rake out and the sand-boxes to fill before booking off! We were allowed 30 minutes to put an engine away, but often we had valve spindle glands to pack. This had to be done very frequently on the six-coupled engines and it was always the fireman's job. It used almost always to take at least an hour to put an engine away. On Saturdays, if we were on the "back shift," as the afternoon turn is called, we got a spare engine at Plaistow.

It meant hard work in those days to be a fireman, especially as the coal we used was very poor in quality, small and dusty. On fast trains we used to be allowed from 5 cwt. to a ton of hard coal, and the engines that worked through trains in and out of St. Pancras always coaled up with hard coal.

Driver Burrills was a most pleasant man to work with and after some months with him on the goods I was put on back-shift passenger train working. This meant travelling up by the 2.5 p.m. from Shoeburyness and getting our engine at Plaistow. Then we had to work down one of the evening expresses from Fenchurch Street.

In those days some of the older men were always on day work and the newer ones always on the back shift, but a change was made later when the engines were nearly all double-manned and the men then worked on day or night work in alternate weeks. I spent some time on the back shift and was then appointed on one of the regular morning shifts with Driver Mitchell on No. 66 *"Earl's Court."*

One day a week was "shed day" for sweeping the tubes and washing the boiler out, for we had to wash our own engines out then. After taking the plugs out of the boiler we used long steel rods among the tubes and flushed water from a hose all through the boiler to wash the scale out. This was the most disagreeable job of all. The boiler too was inspected every shed day. We were allowed six hours for washing out and then went home and cleaned up a bit after this very dirty wet job; but we returned to take an engine "light" to Barking and work the rear portion of a train divided there down to Shoeburyness, where we booked off.



"Corringham," one of the 0-6-2 goods tanks of the old "Tilbury" line. This engine was of the same class as No. 74 "Orsett," on which the author was once fireman.

"Earl's Court" did not steam too well and after shed days we usually had the 7.30 a.m. from Shoeburyness to Fenchurch Street, the turn we dreaded most! It had a stiff schedule and was always a very heavy train, loaded often to 13 bogies and a six-wheeler. Once on a very windy day with working hard to keep time the smoke-box door of No. 66 got burned very badly. I remember Mitchell was very worried about it and I think he had to report it.

Next I was put with Driver Sewell on No. 63 *"Mansion House."* I put in my longest day's work with him on this engine. One Sunday morning we were to take an up train, and come back home round Tilbury, I think. That day the British Fleet visited Southend, however, and such crowds from London went down to see it that every train and coach, every engine and all the men were called out. We made three trips into Fenchurch Street that day and could not be relieved till about 3 a.m. on the Monday! I think we got nearly three days' pay for that.

Once while I was with Sewell we had the down Southend express with the engine bunker first. We were expecting to work a stopping train down, when there was a derailment of some wagons that put us all out of turn. So I found myself coupling up our engine to the crack 5.5 p.m. express while No. 80 *"Thundersley,"* a big new engine that should have worked it, was waiting for the next train, a light one that should have been ours!

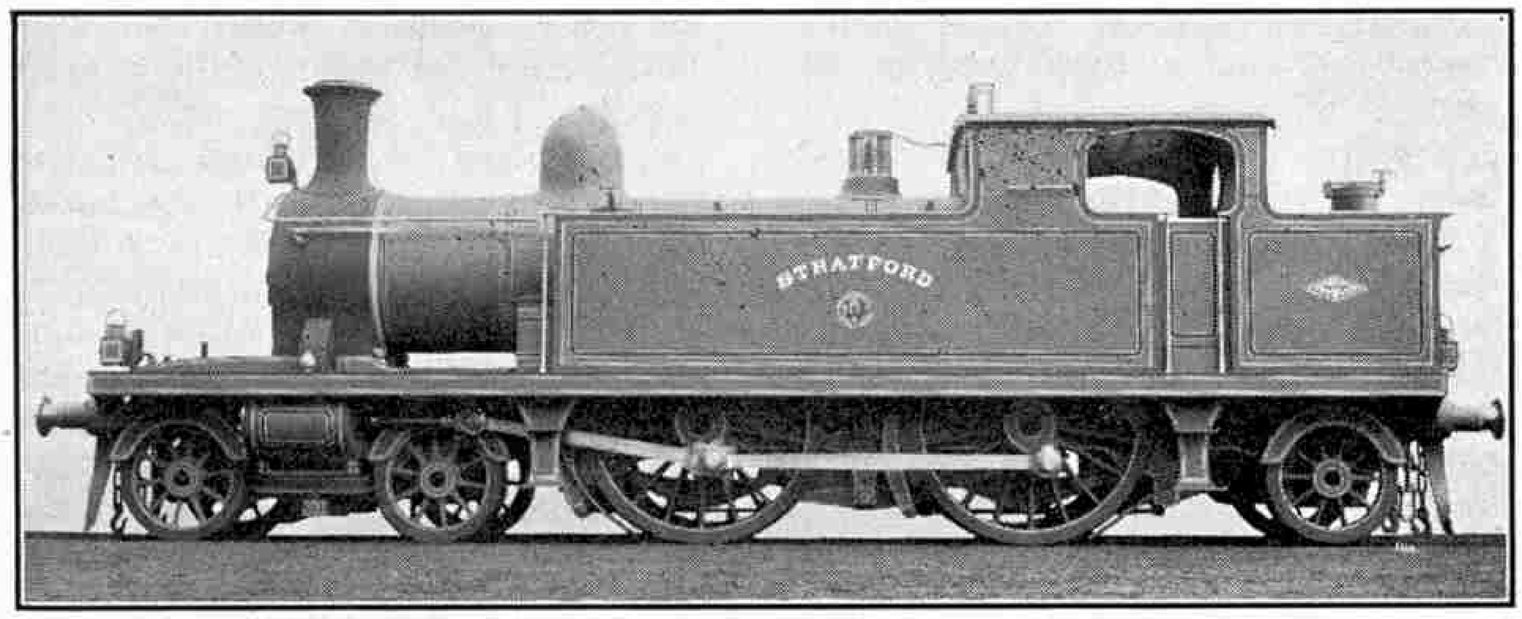
We got the *"right away"* and started out with a train of 13 or 14 bogies well filled. It must have weighed 400 tons or close to it. It was not a comfortable trip for us. The coal was small and the coal dust blew around in the cab, and we lost some time, but we heard nothing about it.

I spent some time firing with Driver Squires, who came to us from the Midland Railway. Squires was a fine fellow to work with, and he did some of the firing to help me out. During the time I was with him, we used to be on the Southend to St. Pancras trains and so I learnt the road into St. Pancras.

While I was with Driver Squires, there occurred the only occasion I remember on which I had to "stop and blow up," as drivers say, to get steam on a passenger train. We had No. 60 *"Highgate Road,"* and we worked a fast up train, 7.15 a.m. from Shoeburyness running from Westcliff to Burdett Road without a stop. We managed the up train all right, but on the return bunker first with 13 bogies and a six-wheeler we began to get short of steam. We had clinker all over the firebars and couldn't get any draught through. Squires nursed the engine as much as possible, but when we arrived at Leigh-on-Sea we had to take 10 minutes to get up steam again.

Soon after this I was put with Harry Thompson on No. 79 *"Rippleside,"* another of the big new engines with 19 in. cylinders and a large boiler. She was a free-running engine and we never had very much trouble to keep time with her. When the rebuilds of the "Woodgrange" class began to come out, with big boilers and cylinders like the "Rippleside" class, they were masters of the trains. Thompson received the newly-rebuilt No. 46 *"Southchurch"* and I went with him on this engine.

It was during this time that I was suspended for a day. It happened in this way; we had a fast and heavy up train and No. 46 had been working hard. Approaching Barking Junction we had to reduce speed to 30 m.p.h. and Harry shut off steam. I had one injector working, but before I could get the second one on, the engine started blowing off, and was still doing so as we went through the Junction. An inspector who saw us reported it, for it was against the rules to allow an engine to blow off, and I received a "day off" for wasting coal and water!



L.T.S.R. No. 47 "Stratford," the engine allocated to the author when a cleaner. The two illustrations on this page are reproduced by courtesy of the North British Locomotive Co. Ltd., Glasgow.

British-Built Motor Boats

Fast Launches for Portuguese Government

A 39-ft. motor launch built for the Portuguese Government by John I. Thornycroft and Co. Ltd., London, by courtesy of whom the illustrations on this page are reproduced.

IN recent years British-built motor boats for use in the Navy have established a high reputation for reliability and speed. The speeding-up process has led to equally satisfactory developments in the design and construction of commercial craft of this kind, and orders for such vessels from foreign governments replacing existing boats by up-to-date high-speed launches are reaching Great Britain in considerable numbers. One of the countries to place orders of this kind is Portugal, for whom John I. Thornycroft and Co. Ltd., have completed two fast launches, 39 ft. and 40 ft. in length respectively, together with an 18 ft. motor dinghy for carrying fuel supplies for aircraft.

Two of these fine vessels are illustrated on this page. One is the 39 ft. launch, and the other is the refuelling dinghy. On completion the launches were shipped to St. Vincent, in the Cape Verde Islands, an important coaling station on the South Atlantic route, where they were used during an official visit by the President of Portugal. Afterwards the 40-ft. launch was taken to Bolama in Portuguese Guinea, West Africa, and is now in service at the airport there as a passenger and control launch. The refuelling dinghy was taken straight to Bolama on completion.

The two larger craft are of the hard chine type of construction, and have double skin planking on sawn frames with intermediate steamed timbers between each frame. The hull is protected up to above the waterline by a sheathing of Muntz metal, an alloy of copper and zinc. Each has a beam of 9 ft., and a draught of about 2 ft. 6 in.

The 39-footer is fitted with two Thornycroft-Ford V8 engines, each developing a maximum of 69 b.h.p. and together they give the launch a top speed of over 20 knots. The engines are installed in separate compartments in a cockpit amidships, and each is fitted with an oil cooler and water-cooled silencer. They are controlled by an engineer, who receives instructions by telegraph from the helmsman in the forward steering position. This is enclosed, and is entered by means of a drop window and sliding hatch on the port side. Forward of the steering position is a short deck under which the anchor, lamps, cable and other gear can be stowed. The engine casings are lined with material to ensure maximum silence.

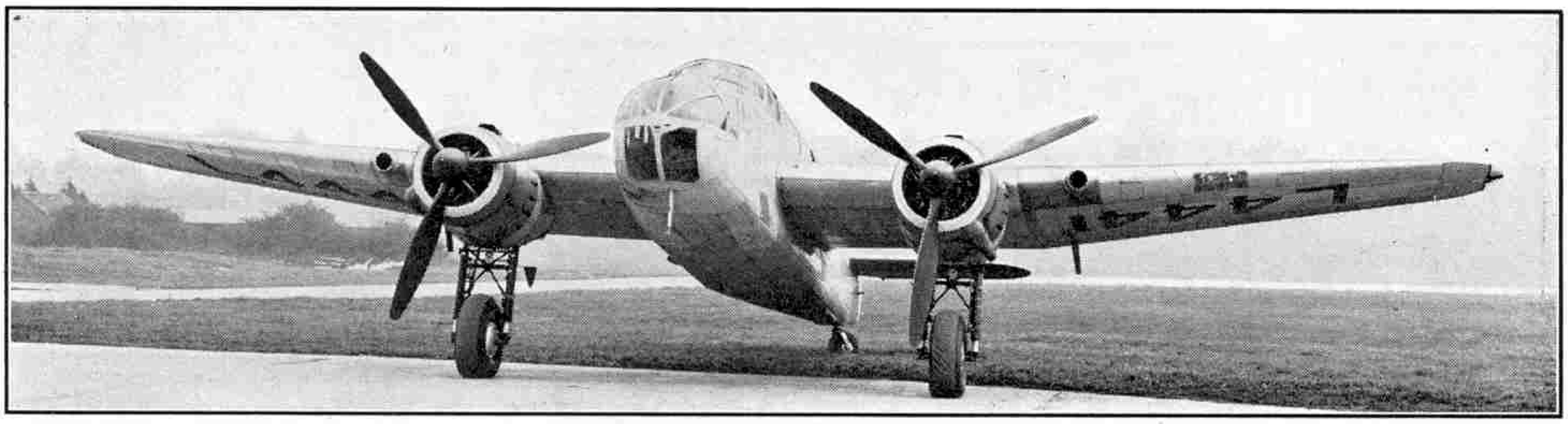
The main cabin has upholstered seats on either side, and comfort is assured by large windows and roof ventilators. Sliding doors lead to the engine cockpit, the power units being enclosed in casings that form platforms for use when boarding the craft. An after cabin, smaller than that forward, is similarly furnished. The comprehensive equipment includes a searchlight and signalling lamp, and electric light is fitted throughout. The two fuel tanks have a total capacity of 120 gallons.

The 40-ft. launch has three Thornycroft-Ford V8 engines fitted at the after end of the cabin; and these give her a speed of about 26 knots. In this craft the engine controls are forward alongside the steersman, who thus has complete control. Aft is a large cockpit for the carriage of baggage and other gear. The boat would be used for salvage purposes in emergency, and the settees in the cabin therefore have been made of sufficient width to accommodate stretchers if necessary.

The 18-ft. refuelling dinghy is fitted with two tanks, one forward and one aft, of 125 and 175 gallons capacity respectively. She is driven when loaded at a speed of about 7 knots by a Thornycroft-Ford 26 b.h.p. unit. A pump transfers petrol from the tanks to the aircraft supplied, and gauges show both the quantity being transferred and the amount remaining in the tanks.

John I. Thornycroft and Co. Ltd., are building for overseas governments a number of other motor boats of widely differing types. These include 70 ft. motor torpedo boats for the Estonian and other foreign governments, 55-ft. torpedo boats for the Philippine Government, together with a number of 25-ft. launches and cutters for Brazil.

An 18-ft. motor dinghy now in service for refuelling aircraft at Boloma, in Portuguese Guinea, West Africa.



The "Bristol" Beaufort.

New "Bristol" Bombers

"BRISTOL" type aircraft have been noted for the excellence of their design and workmanship since the early days of aviation. The first order for military aircraft ever placed by the British Government was for the "Bristol" Military Biplane, and since that time many excellent designs have been evolved and outstanding types produced at the Bristol company's Filton Works. The "Bristol" Fighter and the "Bristol" Bulldog were two types that won universal recognition and adoption. To-day "Bristol" type machines are still in the front rank of new types of aircraft, and the "Blenheim" and "Bombay" bombers and the "Beaufort" general-purpose aeroplane are outstanding for their high performance. The "Blenheim" has already been illustrated and described in the "*M.M.*" and in this article we deal with the two other types just mentioned. Both are on the Part-Publication List of the Air Ministry, so that details of their performance are not at present available.

The "Bristol" Bombay bomber-transport is a high-performance aircraft that is now in quantity production for the Royal Air Force for regular service. It is a large twin-engined, high-wing monoplane of all-metal construction and is fitted with two "Bristol" Pegasus XXII engines mounted in nacelles carried on the leading edges of the wings. These units drive two three-bladed variable-pitch airscrews of "Rotol" design and construction, and have an enormous reserve of more than 2,000 b.h.p. available for take-off, giving the machine a high performance that is quite outstanding in its class.

As a long-range bomber of great striking power the "Bombay" carries a crew of four, consisting of pilot, navigator, wireless operator and gunner; and the bomb load, which is a great proportion of the total weight, can be varied over a wide range both as to size and type of bombs. There are gun turrets in the nose and tail, with auxiliary armament amidships.

When used as a troop-carrier, the "Bombay" accommodates 24 fully-armed men with all their equipment, in addition to a crew of three. It can also be adapted for use as an air ambulance, fitted-up to take a number of stretcher cases. As a transport, the only limits to the load permissible are those of size and weight. The general design of the fuselage provides a large open compartment in the centre, and the fuselage framing is arranged to give a larger entrance when required for the loading of bulky or heavy goods. A wide choice of goods or passenger arrangements can be made.

The "Bombay" is 66 ft. 9 in. long and 16 ft. high, and has a wing span of 96 ft. Its total weight is approximately 19,000 lb., but in spite of its enormous size, its lines and proportions make it one of the most graceful aeroplanes in existence at the present time. The fuselage is of monocoque design, with all the advantages of a clean interior, with a riveted, stressed skin, sheet-metal covering; all in light alloy. The wings also are constructed throughout of metal, with stressed-skin light alloy covering, and the general design and construction is on completely modern lines, the external surfaces of the wings and fuselage being free from excresences. The tail unit provides a monoplane tail and elevators with twin fins and rudders, and there is a fully-castoring tail wheel.

The flying controls are designed on normal lines, and the aircraft "handles" with remarkable ease in the air owing largely to the well-balanced control system; pilots have remarked that it has the feel of a small machine rather than a huge transport bomber.

The "Bristol" Beaufort, shown in the upper illustration on this page, is an entirely new design capable of fulfilling many duties. It is officially described as a "combined bomber, general-reconnaissance, torpedo-bomber, and general-purpose landplane," and its outstanding speed has again put a "Bristol" machine in the lead as the world's fastest bomber, with a performance that sets a new standard.

The "Beaufort" is of the mid-wing type, and is fitted with two "Bristol" Taurus double-row sleeve valve engines, developing over 1,000 h.p. each. The wing span is 57 ft. 10 in., the length 44 ft. 2 in. and the height 14 ft. 3 in. No further figures of size or performance are available for publication, but from its appearance the "Beaufort" is one of the most formidable fighting aircraft that has yet been produced.

The "Bristol" Bombay, a large twin-engined bomber-transport. The illustrations on this page are reproduced by courtesy of the Bristol Aeroplane Co. Ltd.

A Famous Racing Driver

Prince Birabongse of Siam, better known to racing enthusiasts as "B. Bira," is one of the most popular and successful drivers in British motor racing at the present time. He only started serious racing in

Prince Birabongse of Siam, better known as "B. Bira," the famous racing motorist. Photograph reproduced by courtesy of "The Autocar."

1935, but quickly climbed to first rank, and for the last three years in succession he has won the coveted Gold Star awarded by the British Racing Drivers' Club to the most successful driver in road racing events. This is a "hat-trick" that no other driver has performed.

"Bira" has been victorious in many of the principal events held in this country this year, his outstanding successes including wins in the International Trophy, Sydenham Trophy and Sydenham Plate, and the Crystal Palace Cup. In addition he won the Nuffield Trophy Race at Donington for the second year in succession.

An Interesting Steam-Driven Car

Three engineers are busily engaged in a small workshop in the United States completing a modernised version of the steam car. Their object is to produce a steam-driven power unit that can be readily mounted in any standard car chassis. An experimental car equipped with an engine of this kind has already been developed.

The engine is of the double-acting reversible type, and consists of four two-cylinder units geared to a main-shaft. It will develop about 60 h.p. and is designed to run without vibration.

Steam is supplied by a compact water-tube boiler housed under the bonnet and fired by an electrically-operated fuel-oil burner of special design, which is capable of generating full steam pressure in three or four minutes. The burner is lighted simply by turning a switch. The auxiliary equipment includes special regulation valves that maintain a constant steam pressure and water level at all times, so that the driver can concentrate on the actual driving controls. The latter are quite simple and consist of three pedals, one for putting the engine in reverse, one for operating the brakes and one for controlling the steam throttle.

Disasters in the German Grand Prix

A Continental race that always attracts great attention is the German Grand Prix, which for many years has been run on the famous Nürburg Ring. This year the race was won by R. Carraciola, in a Mercedes-Benz, this being the sixth occasion on which this famous driver has been the victor.

A remarkable feature of the race was the ill-luck that fell to the German Mercedes-Benz and Auto Union teams. Seven out of nine of these cars that started met with trouble in one form or another and had to retire. Among them were cars driven by Nuvolari, von Brauchitsch, Lang and Stuck, and the retirement of these famous drivers naturally robbed the race of much of its usual excitement and interest. Italian Maseratis driven by Villoresi and Pietsch started off very well and at one time were actually challengers for the lead although they never succeeded in obtaining it. Carraciola won easily, his only serious rival after the early stages being H. Muller's Auto-Union, which finished second. Pietsch's Maserati was third.

Electric Discharge from Motor Vehicles

It is reported from the United States that receivers of toll at the Golden Gate Bridge, San Francisco, and other large American structures suffer slight electric shocks on touching coins handed to them by drivers of cars. These shocks are due to the discharge of static electricity accumulated on the vehicles, which are insulated from the earth by their rubber tyres.

Various methods have been adopted in order to eliminate the trouble. In some cases "earthed" wire brushes about 1 ft. in length, and somewhat similar to the collectors of a Wimshurst machine, have been installed immediately before the toll gates in such positions that cars as they pass are relieved of their accumulated charges. Another method is to spray a jet of water on the wheels of approaching cars for the same purpose.

Pre-Selector Gear Change for Motor Cycles

Although considerable attention has been given to the problem of simplifying gear changing on motor cars, comparatively little has been done in this direction so far as motor cycles are concerned. Now however an engineer has invented a pre-selector gear box that he claims can be adapted to any motor cycle equipped with ordinary hand changing. The essential feature of the mechanism is a short sloping rod attached to a pre-selector pointer. When the pointer is moved to a position ready for the next gear change a coil spring at one end of the rod is compressed, and on releasing the clutch this spring and a second one at the other end of the pre-selector rod move the gear lever to give the desired change.

New Tyre that does not "Whine"

A new tyre that does not "whine" was introduced recently by the Dunlop Rubber Co. Ltd. This noise has been cut out by a new arrangement of the studs, which are now of different lengths and are set irregularly. This prevents the steady rhythmic drumming on the road that produces a regular high pitched note when

An incident during the Empire Trophy Race this year. Photograph by courtesy of the Austin Motor Co. Ltd.

a car is running at speed.

The new Dunlop Standard was tested first for 16 months over 400,000 miles of roads of every type in the British Isles, often at night and in the early morning, when the test cars could be run at an average speed of 45 m.p.h.

It was then tried out for a further 400,000 miles under considerable overload in the Test House at Fort Dunlop.

Detecting Noise in Motor Car Bodywork

Constant efforts are being made by motor car manufacturers to render their vehicles as silent as possible when running, and various ingenious methods of detecting body squeaks and rattles have been devised. In order to ascertain with certainty the portions of panelling and bodywork on a motor car that are liable to be troublesome in these respects, the engineers of Wolseley Motors Ltd., have developed a noise detector consisting of a high-sensitivity microphone enclosed in rubber and connected to an indicator dial. Cars are tested while running at an equivalent speed of 70 m.p.h. on revolving drums let into the floor, and any noise generated is immediately indicated on the dial. When excessive noise is detected the portion of the coachwork concerned is re-insulated with a "noise trap."

Plastic Materials for Motor Cars

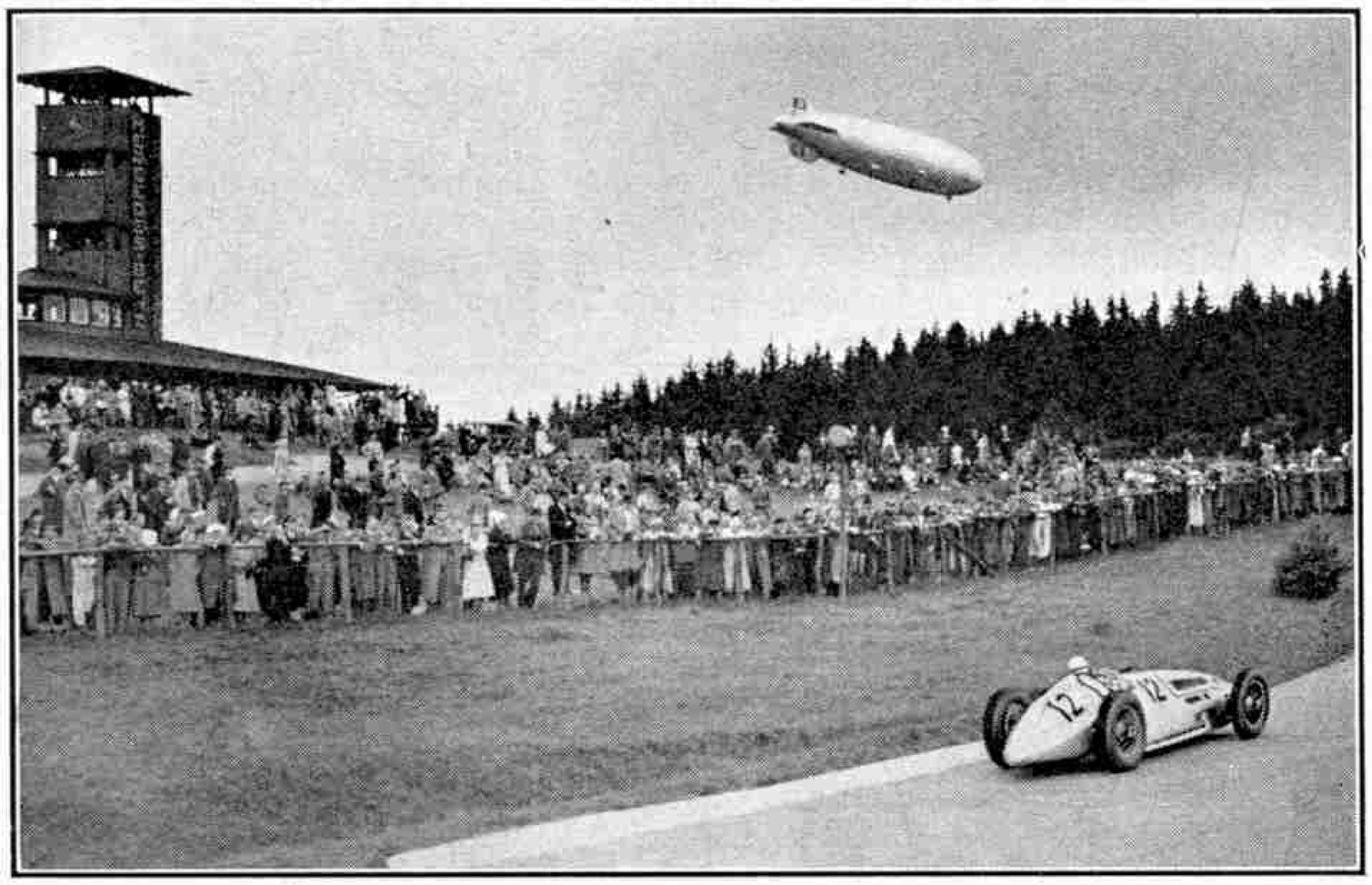
Motor car manufacturers are experimenting with various kinds of lightweight synthetic plastic materials, with the object of making them of sufficient strength to allow of their use for body construction. The use of such materials for this purpose would not only effect a considerable saving in weight, but as the material could be produced in any desired colours the need for a separate external finish such as cellulose, would be eliminated, the plastic only requiring to be polished.

* * * *

Nearly 1,000 electric vehicles operated by batteries were placed in service in this country last year. Dairymen and bakers find them a particularly useful type of vehicle and they are also specially suitable as tower wagons for overhead tram or trolley bus wire and street lamp maintenance.

How the Tourist Trophy Race will be Run

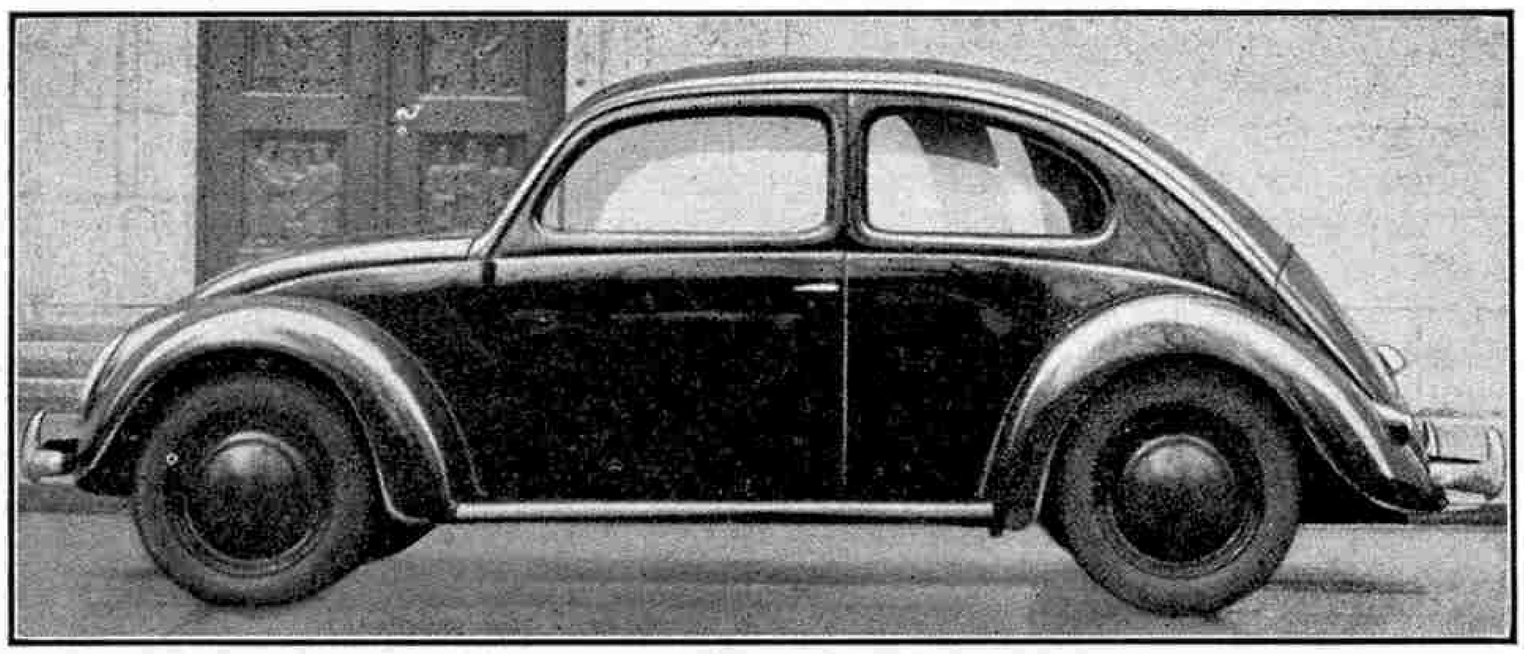
The main British motor racing event this month is the R.A.C. Tourist Trophy, which will be run at Donington on the 2nd. For most British motor-racing enthusiasts this is the greatest event in the year's programme and it is always witnessed by large and enthusiastic crowds. The race is for cars of the sports type, and is the only International event run in this country for cars of this classification. Each car must be equipped with a self-starter and an electric lighting set, including a dynamo, and provision for all of these must have been made in the original design of the chassis. The car need not represent a type that has been offered for sale to the public, however, and manufacturers therefore can enter experimental models. In order to prevent the entry of camouflaged racing cars several additional restrictions are imposed, and all cars must use ordinary pump fuel. Superchargers are not permitted and not more than one carburetter is allowed for each pair of engine cylinders.



Carraciola in a Mercedes-Benz winning the 1939 German Grand Prix, on the famous Nürburg Ring. Hovering overhead is the Zeppelin L Z 130. Photograph by courtesy of Daimler-Benz, A.-G., Stuttgart.

Competing cars are grouped in five classes according to the power of their engines and the race is run on handicap over a distance of 300 miles. Each car is required to carry sufficient fuel to enable it to complete the number of laps laid down for its class without replenishment. The winner becomes the holder of the Tourist Trophy, and there are cash prizes for the first, second and third in the principal race, and for first and second in each of the five classes, the prize money amounting in all to £750. The distance of the race for the scratch cars is 100 laps of the Donington Circuit.

Amongst those who will appear in this year's race is last year's winner, Louis Gerard, who will drive a Delage, T. A. S. O. Mathieson with a Darracq that put up a good performance at Le Mans this year, Stanley Woods, the "crack" motor cycle racer in a Morgan, St. J. Horsfall with an Aston Martin that ran well in last year's T.T., and H. J. Aldington and A. F. P. Fane on Frazer Nash-B.M.W. cars, A. Gordini will drive a Simca Fiat. There will also be two lady competitors, Mrs. E. M. Thomas, who will drive a Frazer Nash-B.M.W., and Miss Stanley Turner with an M.G.



The German "Peoples Car," which is described on this page. It has a four-cylinder engine and accommodates up to five persons.

The German "People's Car"

The lower illustration on this page shows the German "People's Car," of which much has been heard since it was first announced in 1934, although up to now very little progress seems to have been made with the mass production of the car.

The streamlined bodywork accommodates up to five passengers, and is made in pressed steel with rounded joining surfaces. The engine is housed under a large and readily accessible bonnet at the rear of the vehicle, and good use is made of the space available at the front of the chassis for providing comfort for the passengers, with good visibility in all directions.

The chassis consists of a central tubular backbone, which carries at its front end two cross tubes that house torsion rods for the individual springing of the front wheels.

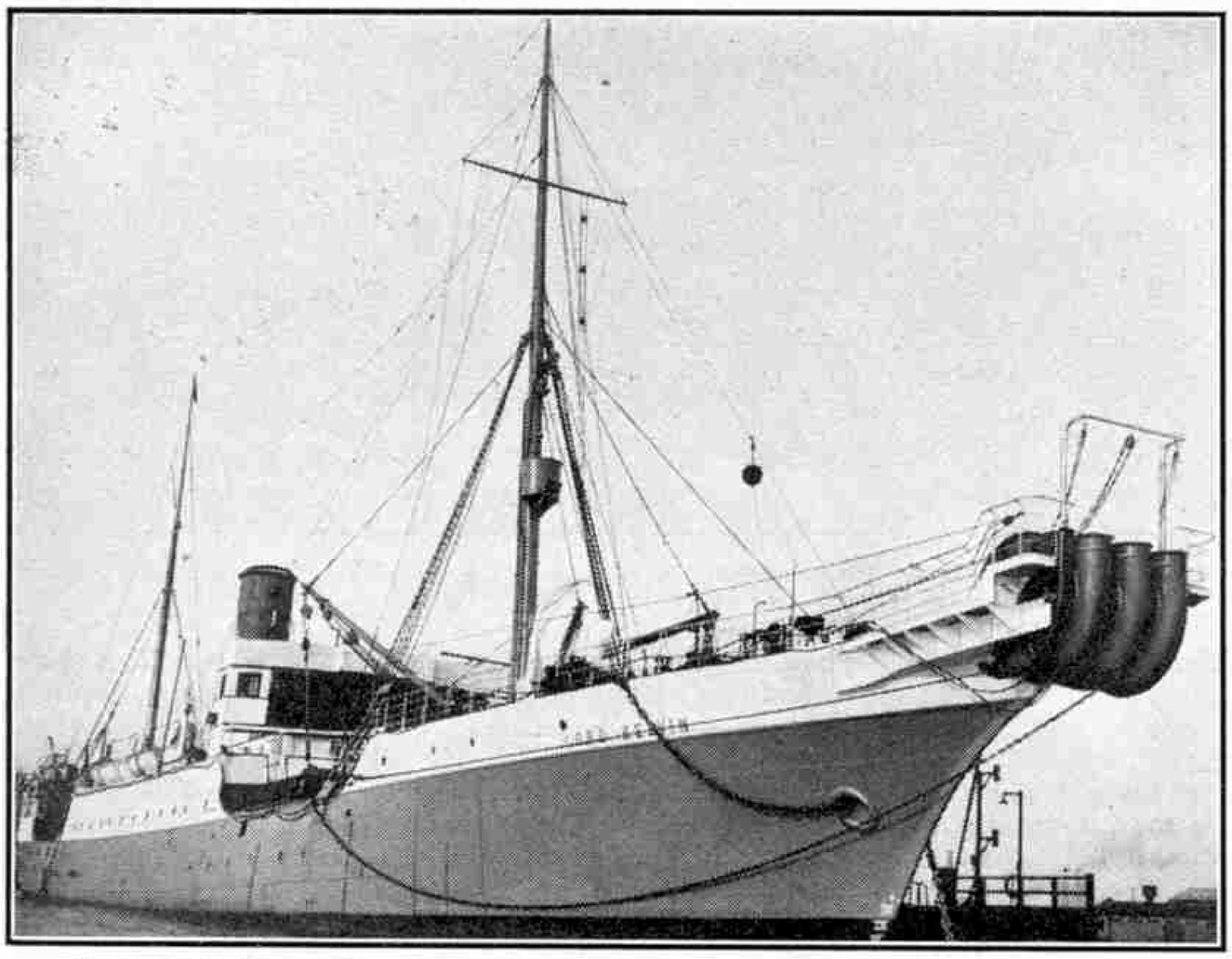
The engine has four air-cooled horizontally-opposed cylinders, with a designed power output of 23.5 h.p. The cylinders are mounted two at each side, each pair having a common detachable head with overhead valves operated by push rods and rockers. In front of the engine, and in one unit with it, is a four-speed gear-box and the final drive gear. Alongside the gear-box there is an electric starting motor, which engages with the engine fly-wheel. The car has an overall length of about 13 ft. 9 in. with a wheel base of 7 ft. 10 in.

Ploughing Furrows in the Ocean Bed

Submarine Cables Buried for Protection

By Robert Polendine

IT has been estimated that every year the combined cable systems of the world suffer damage to the extent of about £100,000 through delay and the cost of repairs occasioned by the otterboards of trawlers hooking and damaging exposed submarine cables on the sea-bed. Several years ago the Western Union Telegraph Company decided that their own repair bill was sufficient to justify an exhaustive investigation of the problem with a view to securing complete protection for their communications, and in 1934 their cable ship, the *"Lord Kelvin"* began experiments that paved the way for an ambitious scheme of ploughing furrows across the Atlantic sea-bed. Last year two of the company's cables were safely buried in these transatlantic trenches, the operation being conducted by an unique system of remote control in depths varying from 85 to 450 fathoms, that is from 510 to 2,700 ft.



The "Lord Kelvin," the submarine ploughing ship of the Western Union Telegraph Company. This vessel is employed to bury cables in the ocean bed, safe from injury by trawler's gear. The illustrations to this article are reproduced by courtesy of the "Daily Herald."

The plough used by the *"Lord Kelvin"* was specially designed for its task, which called not only for great structural strength but for extreme sensitiveness of adjustment. In order to be effective it had to plough a furrow and bury the cable in an unexplored sea-bed whose characteristics were known only by elaborate electrical recording instruments, some of which were incorporated in the plough itself.

This apparatus, resembling a huge sleigh with a curved superstructure, is 20 ft. long, 8 ft. 6 in. wide and 7 ft. high. It weighs nine tons, a burden which, apart from the resistance caused by the ploughing operation, presented a problem in itself. A steel cable equal to the task of towing the plough would have been too stiff and unmanageable for the complicated tension controlling equipment employed by the cable ship. The nickel steel chain that was eventually designed for this purpose is the longest and weightiest single length ever constructed. It is 4,200 ft. long, weighs nearly 20 tons and is capable of withstanding a strain of 29 tons.

The cutting mechanism on the plough consists of a central platform carrying a spring-loaded share, trunkway and sheave. Four heavy helical springs hold the share in its lowest position for operation under normal conditions. The share rises when the towing stress reaches a very high level, owing to the toughness of the ground, and the spring control permits a shallower trench to be ploughed, the standard depth being resumed over less resistant surface. The share has a hard "stellite" tip, and a guard similarly treated allows boulders or other obstructions to be thrust aside or avoided without damage to the cutting tool. The curved superstructure ensures that the plough will right itself if it is accidentally overturned during the launching process or in some under-water collision.

This is the actual digging mechanism of the plough. Although it is frequently buried under 400 fathoms of water every inch of its submarine journey is recorded graphically for those on board the cable ship by means of electrical instruments. A feeler device on the plough measures the angle at which the cable enters the forward bell-mouth of the feeding mechanism and a pendulum measures the fore-and-aft inclination of the plough deck, and indicates the slope of the ground over which it is passing. Another device measures the depth to which the share penetrates, and a fourth, linked to a dynamometer, records the tension in the cable immediately before it passes through the trunkway. Although no part of the actual laying process can be witnessed, this sensitive feeler mechanism reproduces for the benefit of the engineers on board the cable ship a complete picture of the plough's path.

Before ploughing operations start, the nature of the sea bottom along the proposed course must be ascertained in order to avoid difficult obstructions and uneven ground. A preliminary survey is made by the plough itself, utilising the recording instruments to check the information obtained by two special pieces of apparatus, the sounding tube and clinometer. The former, a weight-loaded tube which is driven into the sea-bed to scoop up a sample of deposit, is used to analyse the composition of the ground that it is proposed to plough; the clinometer indicates gradient and surface irregularities by means of pendulums.

Cable laying begins after the route has been surveyed and buoyed. The plough is unshipped and lowered overboard by a special winch and derrick. The messenger

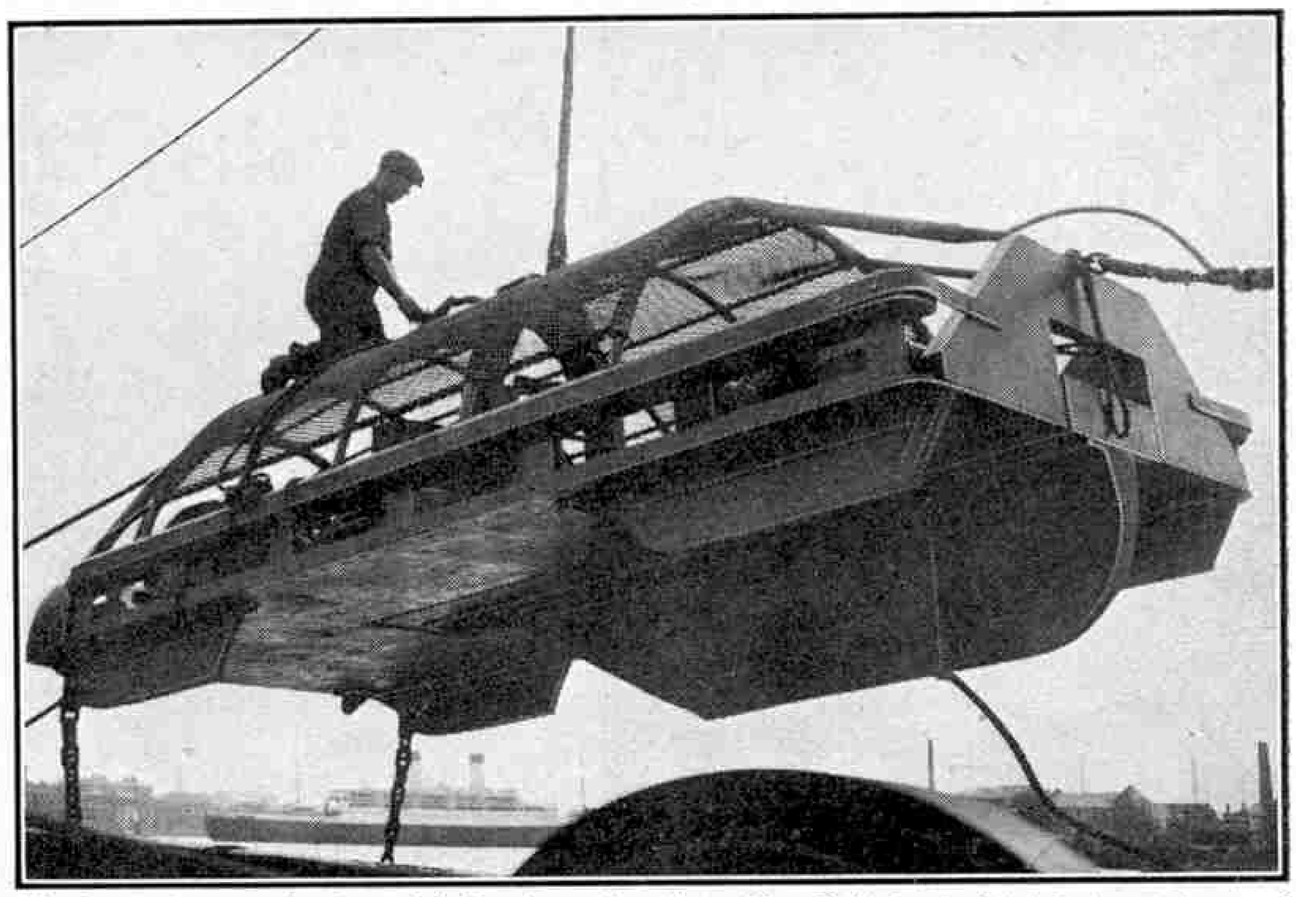
cable, which links the plough's measuring instruments with the parent ship, is connected, the massive towing chain is shackled on and the cable rope, which acts as a pilot for the cable itself, is paid out through the trunkway. The whole equipment is then passed forward to the bowsheaves and lowered to the bottom, where the lowering rope is automatically released. These operations demand skill and long practice, as does the manœuvring of the cable ship to maintain suitable degrees of tension in the towing chain, cable rope, messenger cable and lowering gear in order to avoid fouling.

When the plough is safely under way the cable ship proceeds slowly on her course at between one and three knots, the cable being paid out over one bowsheave and the towing chain passing over the other from a windlass below deck, where it is hauled in, held or paid out according to the depth of the water and stresses encountered. After the cable has been laid in its trough the plough is hauled aboard and stowed, and the cable is tested for electrical continuity and insulation.

This does not complete the operation. Before the newly-buried length can be put into circuit with the cable system its depth below the surface of the sea-bed at as many points as possible must be ascertained. This is done by means of an instrument known as a cable depthometer, another toboggan-like device carrying a series of coils wired up to sensitive galvanometers on board the cable ship. The survey is carried out along a course at right angles to the cable, the depthometer making a series of U turns across the cable path.

This instrument makes use of the protective steel armour plating surrounding ocean cables, which is slightly magnetized by the earth's field. A minute current is induced in the depthometer coils as they intercept the field due to the submerged cable casing, and this is transmitted to the cable-ship, amplified and recorded on a clockwork-driven graph. The signal strength depends directly upon the speed at which the field is crossed by the moving coils. It also varies with the distance between the depthometer and the cable, being reduced to a quarter when this distance is doubled. After long experiment, the operator is able to read the values of signals at various distances between the depthometer and cable, and by making due allowance for the speed he can measure within very fine limits the actual depth of the buried cable. It is interesting to note that the amplifying unit employed increases the signal strength roughly 10,000 million times!

After ascertaining the depth of the cable and making conduction and insulation tests, a short length of the existing cable is diverted and the newly-buried portion is spliced into circuit. It is then as safe as man's ingenuity can make it. At present the average depth of the ploughed-in cable beneath the surface of the sea-bed is approximately 20 in., but it is hoped, as the experiment is extended, to increase this to 3 ft.

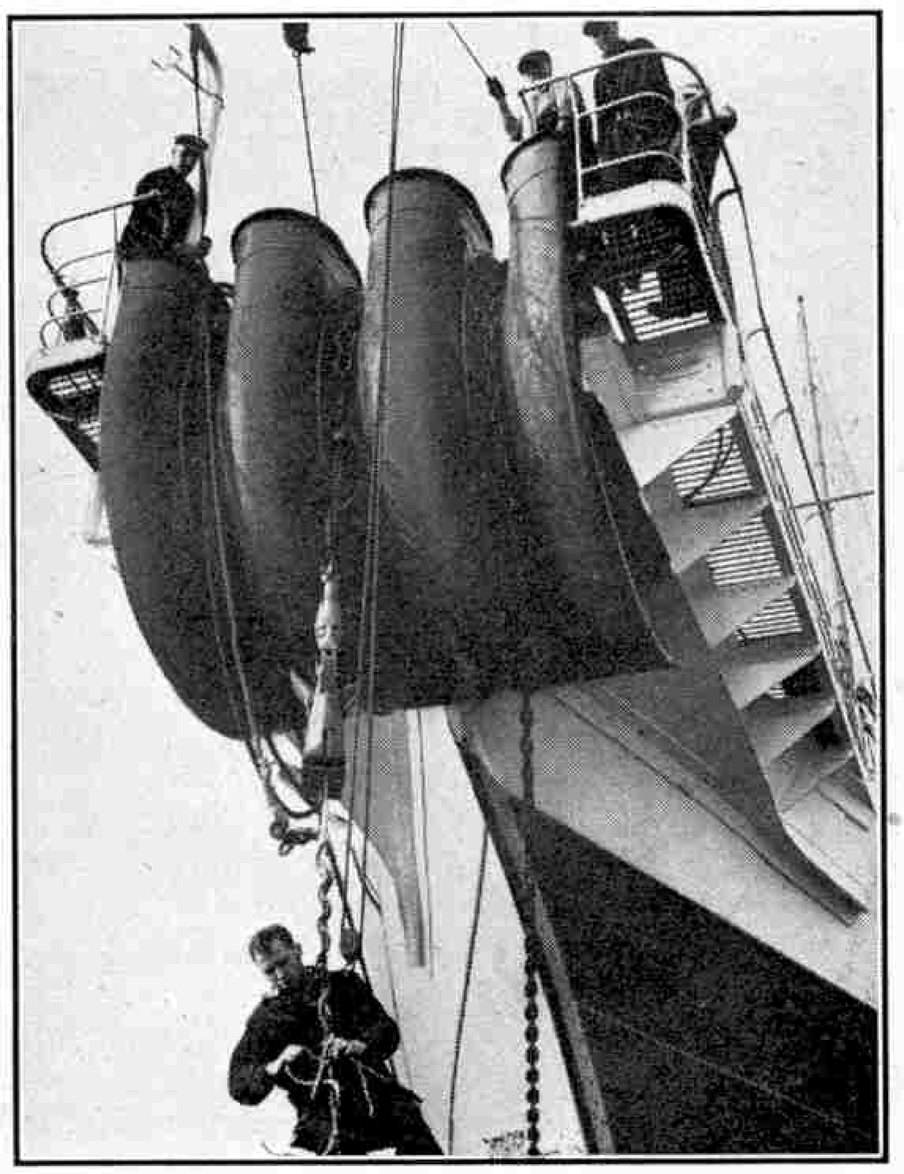


The huge nine-ton plough used in burying submarine cables. Delicate electrical instruments record its progress along the floor of the ocean as it lays its cable.

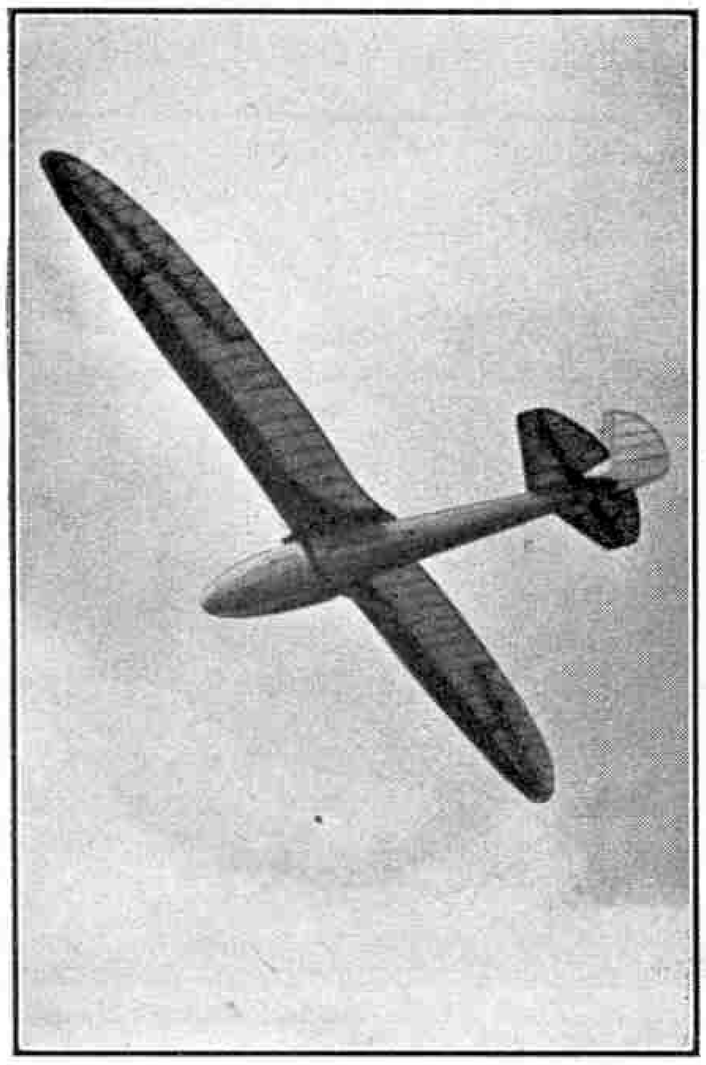
The unusual difficulties presented by the task demanded painstaking initial preparation. Mention has already been made of the abnormally heavy towing loads encountered during the ploughing process, and these necessitated modifications to the paying-out gear as well as prolonged research into the tensile strength of towing lines. Normally the water-cooled band brakes of the paying-out drum rarely have to deal with loads in excess of two tons, but the ploughing operations impose stresses in the neighbourhood of 30 tons. The 4,200-ft. chain, specially constructed for the purpose by the Baldt Anchor Chain and Forge Corporation, of Chester, Philadelphia, is nearly 500 times as long as the standard maximum single length of marine chain. Each of its 12,500 nickel steel links, weighing $3\frac{1}{2}$ lb., was drop forged and subjected to a certified proof load before assembly.

The *"Lord Kelvin,"* the vessel chosen to carry out the experiment, is the flagship of the Western Union Telegraph Company's fleet of cable ships. She is one of about 30 cable maintenance vessels in the world, and although she has to carry out arduous duties in Atlantic waters is of only 2,641 tons, with a speed of 12 knots. For the purpose of the operations described, her rate of progress rarely exceeded 2 knots, and the ploughing-in of the two cables over the principal hake fishing grounds took just over four years.

This new departure in submarine engineering, the first part of which was completed in the 80th year of transatlantic cable-laying, is a tribute not only to research technicians, but also to the skill and patience of the officers and men of the *"Lord Kelvin."*



The peculiar bows of the "Lord Kelvin." The cable passes over one of the sheaves, another of which accommodates the towing chain.



A "Kirby Kite" sailplane in flight.

The Birth of a Sailplane

Making Gliders in a Yorkshire Factory

By Sydney Moorhouse, F.R.G.S.

TO the average visitor the North Yorkshire village of Kirby Moorside is just a typical country place, and very few people realise that it is the home of what seems destined to be quite a thriving industry. This is the making of gliders, or sailplanes, and it is in this village that the famous Slingsby Sailplanes are designed and made at the premises of Slingsby, Russell and Brown Ltd. It is some four years since Mr. F. N. Slingsby commenced activities in glider making at Kirby Moorside. What was originally little more than a flight of fancy has grown into a flourishing concern, and when I visited the place the other day I found workmen busy with orders from South Africa and Australia.

Gliding as a pastime has increased greatly in popularity during the past few years, and to-day there are some 30 gliding clubs in Great Britain. Many of these have only just been established, but for some time it has been possible to visit such places as Sutton Bank in Yorkshire, Lancing in Sussex, Long Mynd near Church Stretton in Shropshire, and Dunstable in Bedfordshire on nearly any fine weekend and see these enthusiasts travelling through the air in their noiseless, bird-like machines.

There is something incredibly fascinating about this modern method of riding the wind, and ever since bird-like flights were introduced to these islands by Herr Kronfeld and Herr Maggersupp, the two German pioneers, less than 10 years ago, gliding has captivated the adventurous British mind to no small degree.

"I never anticipated such a huge demand for sailplanes as we are experiencing just now," said Mr. Slingsby as he conducted me round the Kirby Moorside works, "and we just can't turn out the machines fast enough."

Mr. Slingsby led the way across a small yard to a single-storied building, where I found about 30 men busy working on different parts of gliders. "That machine is going to South Africa," my guide announced, and pointed to a slender and somewhat frail looking craft in the making; "and that one will have a wing-span of 51 ft. when completed. We call it a Hjordis model and it was designed by Squadron Leader Buxton. He hit upon this name while travelling in the East."

"What kind of wood do you use?" I asked.

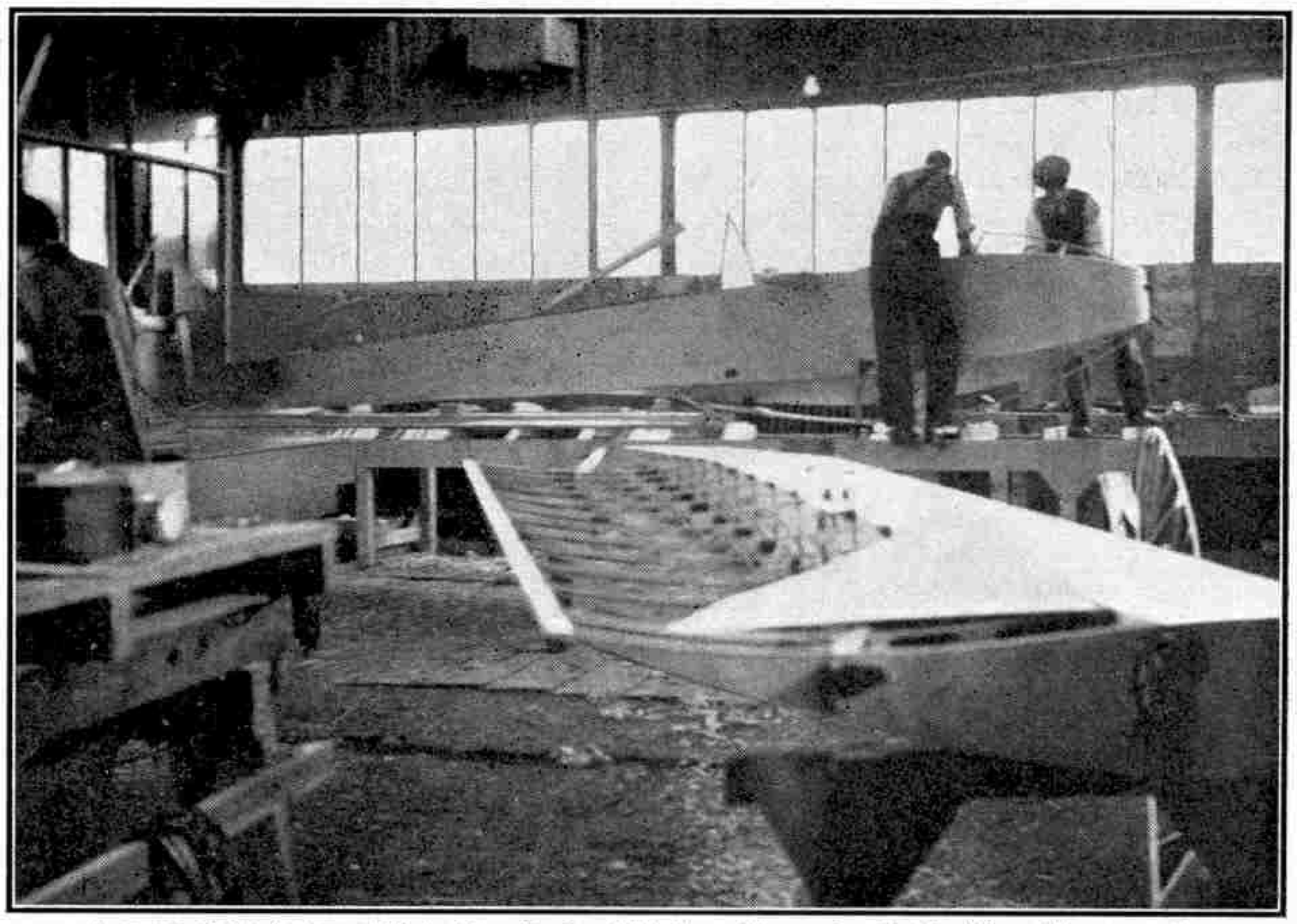
"Practically every part of the glider is made out of Canadian silver spruce. The fabric for the wings is made from Egyptian cotton. You'll notice that we work on entirely up-to-date lines. One man will do nothing but bulkheads, another only spars, another struts, and so on; and we have men occupied on nothing else but repair work."

I went over to where a couple of men were engaged in constructing a huge wing and were carefully testing the ribs to ensure that they were in complete alignment. "There are 48 ribs in this wing," one of them told me, "and any bad fit might be responsible for the loss of a man's life."

"How do you get all those graceful curves?" I asked my guide.

"Oh, we use jigs for that purpose, and we have to make our own. There is not a sufficient market to induce manufacturers to turn out special tools and fittings for sailplane making, so we have not only to invent our own but we have to make them too.

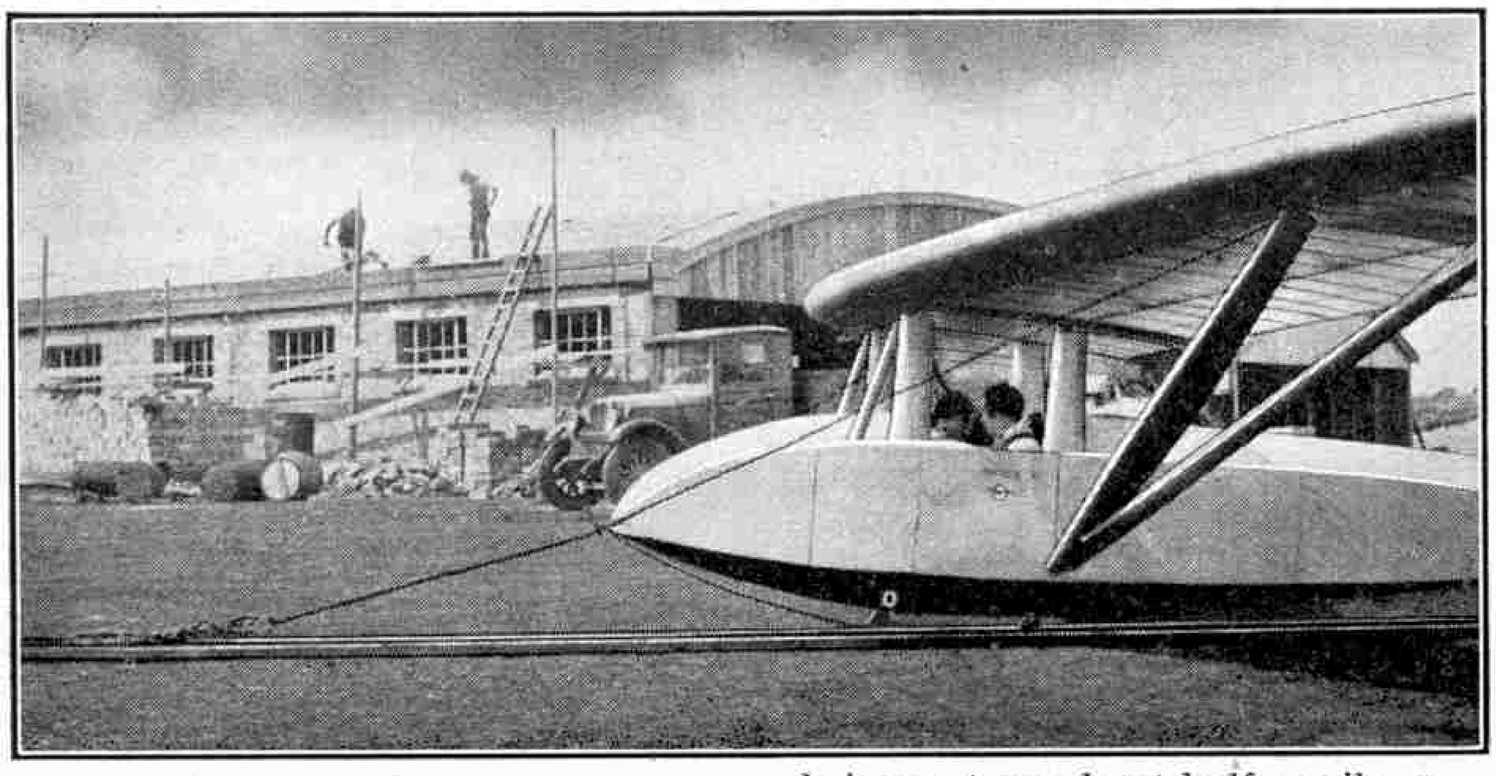
"You'll notice that there's not a single nail used anywhere. A nail would weaken the entire structure. Every joint is secured by glue, and you would open your eyes if you saw



A corner of the factory at Kirby Moorside in which the sailplanes described in this article are made.

how many pounds of glue were used in this factory every week!"

I moved on to another bench where a youth was busy covering the framework on the wings with pieces of thin birch plywood. These, however, were only used at the junction of the wing and body, and the remainder of the span was covered with fabric.



A "Falcon III" two-seater glider about to be launched at Sutton Bank, Yorkshire.

As I wandered about I noticed how every part of the sailplane received the same minute attention to detail—nose, rudder, bulkhead and body all being given the same meticulous care in order to ensure that no accident can ever arise through faulty workmanship. Notwithstanding all these precautions, inspection by an official of the Air Ministry is an important item of the life of every glider. He is called in as soon as the timber framework is completed, and has to pass the model as being in order before any further work is done. Later on he makes another test of the finished glider.

Every machine constructed at Kirby Moorside has its flying capabilities tested by Mr. Slingsby, who is one of the leading gliding experts in the country. Sometimes these trial flights take place at Sutton Bank, a few miles to the west of the works, but many of them are held at a private aerodrome close to the works.

From the main shed I was taken into the "daub shop," as my guide facetiously called that part of the factory where the almost finished models are enamelled. Grey and cream are the principal colours used, although I did hear of one client who ordered an all-black machine!

The transport of the gliders is important, and all those going to British clients are delivered by road. The machines are both delicate and fragile, and special containers are made for the purpose of transit. These of course are constructed on the premises, and I found workers whose sole occupation was the making of these most important accessories.

After I had visited every department I saw a new factory that is being put up about half a mile or so away from the existing works. This is a great concrete erection, built on the most up-to-date lines and with outside sheds and offices.

Now for some information about the sailplanes that are being made at Kirby Moorside which, I feel sure, will fascinate all who are interested in this new sport of the skies. The most popular model is the "Gull," which has a wing-span of 50 ft. and weighs 318 lb. When flying at a speed of 37 m.p.h. it has a gliding angle of 1 in 23. This was specially designed by Mr. Slingsby himself, and possesses a low landing speed and good speed range. It is suitable for either light or strong wind conditions, and is quite safe for all normal aerobatics and cloud flying. The pilot is totally enclosed in order to give better shape to the fuselage and prevent eddies during flight. The "Gull" has undergone extensive tests at the hands of its designer, and has been proved capable of undergoing such aerobatics as "spins," "stall turns," "loops," and circling with "hands off."

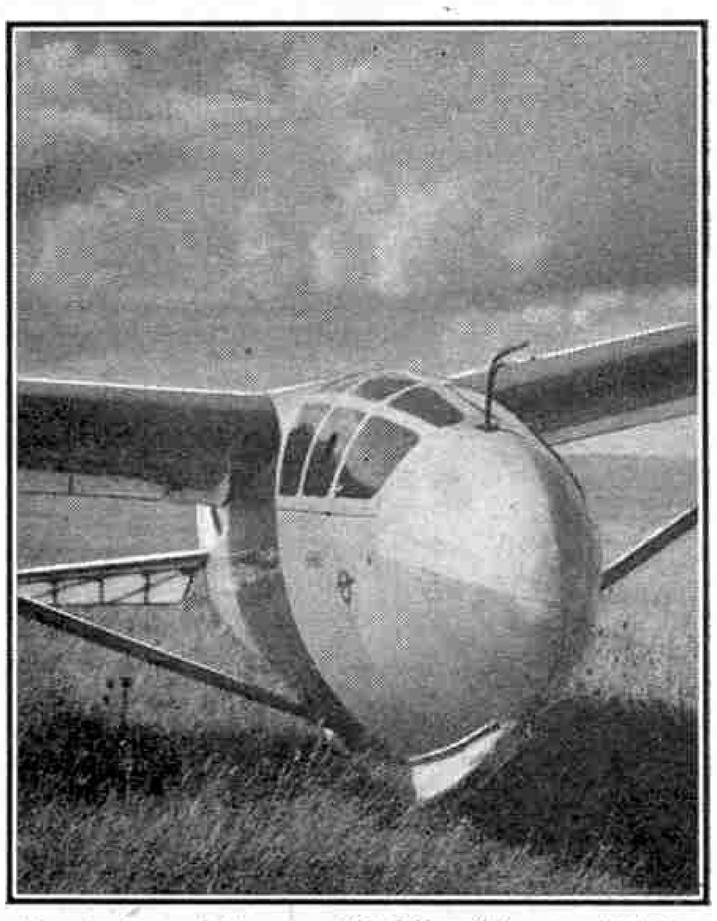
Another model of which Mr. Slingsby is justly proud is his "Falcon III" side-by-side dual control two-seater seaplane, which has a wing-span of 58 ft. and weighs 500 lb. This is capable of attaining a flying speed of 34 m.p.h. It was a machine of this type that put up the world's duration record flight in July 1938, of 22½ hours. This machine has been specially designed for instructional purposes, and the seating arrangement enables both instructor and pupil to work on the same set of instruments, verbal instruction being given without effort. This machine can also be flown solo.

The "Kirby Kite" sailplanes is yet another Kirby Moorside product and has the distinction of being the first British sailplane to be fitted with the "gull" type of wing. It has a span of 47 ft., weighs only 260 lb., and is capable of speeds of 32 m.p.h. This sailplane was the first machine to attain a height of 4,500 ft. above start, and covered a distance of 54 miles on its first soaring test.

There are, of course, many other types of sailplanes designed and constructed at this Yorkshire factory, including the Slingsby Primary Training Glider, which is accepted by all the British clubs as the standard type for the first stages of gliding instruction, and improvements are constantly being made.

Gliding undoubtedly is a sport that has come to stay, and it is indeed pleasing to find a British firm now to the fore in producing machines and making a great success of a venture that until a few years ago was almost the exclusive prerogative of the Germans.

This enterprise is in keeping with the increasing public interest in gliding. The 30 or so gliding clubs of Great Britain are affiliated to the British Gliding Association, which each summer organises a National Gliding Contest. The Contests provide a fine opportunity for enthusiastic gliders to test their skill, and invariably new records are made.



Front view of the new "Gull" sailplane, which has been produced for high performance flights.

RAILWAY NEWS

French Etat streamlined 4-6-0 No. 800. This type of engine is used for hauling light high-speed trains.

The "*Torbay Express*"

Of several journeys made by the "*Torbay Express*" between London and Exeter without a stop, an up run with No. 6015, "*King Richard III*" and 11 heavy cars, equal to a gross load of 395 tons behind the tender, was decidedly the best. On this run Exeter was left 1½ min. late, but good progress was made at the start and speeds of 56, 63 and 64 m.p.h. were recorded before Tiverton Junction.

Whiteball bank, which concludes with two miles at 1 in 115, was climbed without speed falling below 40 m.p.h., and after a steady run up the steep Wellington incline, the rate of travel rose to almost 80 m.p.h. on the more moderately falling grades to Norton Fitzwarren. Speed was maintained at 70½–73 m.p.h. through Taunton, rising to 76½ before Cogload Junction, where the old Bristol route is left. The first 36 miles had been covered in 36¾ min.

Near Athelney a slack to 15 m.p.h. had to be observed over an underline bridge that was under reconstruction. This prevented the driver from making a rush at the 4 mile-climb, mainly at 1 in 264, to Somerton Tunnel, but in spite of the slack speed did not drop below 54 m.p.h.

Over the undulations to the Weymouth line Junction at Castle Cary speed ranged from 62½–70 m.p.h.; then the nasty 4½ miles rise at 1 in 90 up to Brewham Box brought the rate down only to 43 m.p.h. A maximum of 74 m.p.h. was recorded down to the Frome avoiding line, and then came another short p.w. slack to 20 m.p.h., just before the 30 m.p.h. passage through Westbury station.

Later "*King Richard III*" worked up to 71½ m.p.h. on the level, went up the long 1 in 122 climb before Patney at a minimum of 55 m.p.h. and then accelerated to 64–60 m.p.h. over the broken rise on to Savernake. Down the long gentle descent to the Kennet valley, a speed of 73.8 m.p.h. was averaged for 20 miles, with a maximum of 78 m.p.h. so that after Midgham "even time" was attained—128 miles in 128 minutes actual, or about 123 minutes nett. Though by no means a maximum effort it was a bright performance with good uphill work. R. A. H. WEIGHT.

G.W.R. Locomotive News

Among the engines turned out from Swindon are "Castles" Nos. 5078, "*Lamphey Castle*"; 5079, "*Lydford Castle*"; 5080, "*Ogmore Castle*"; 5081, "*Penrice Castle*"; 5082, "*Powis Castle*"; 5093, "*Upton Castle*"; 5094, "*Tretower Castle*"; 5095, "*Barbury Castle.*" Other new engines are 6873, "*Caradoc Grange*"; 6874, "*Haughton Grange*"; 6875, "*Hindford Grange*"; 6876, "*Kingsland Grange*"; 6877, "*Llanfair Grange*"; 6878, "*Longford Grange*"; 6879, "*Overton Grange*" and 5090, "*Neath Abbey.*"

Bank Holiday Traffic

The L.M.S. ran more than 1,000 special trains during the August Bank Holiday weekend. On the Friday preceding the holiday, 33 additional trains left Euston and St. Pancras and "*The Royal Scot,*" "*The Irish Mail,*" "*The Lakes Express,*" "*The Mancunian,*" "*The Lancastrian,*" "*The Merseyside Express,*" "*The Royal Highlander,*" "*The Night Scot*" and "*The Palatine*" were all run in duplicate. Traffic reached its peak in the late afternoon when 18 main line trains left Euston between 3.45 and 6.15, an average of a train every eight minutes.

Blackpool had its usual quota of trains, while for Southend seating accommodation was provided for 80,000 passengers in 70 trains.

The G.W.R. ran 28,000 passenger trains during the holiday, the peak period being between Friday evening and Saturday evening, when 115 expresses carrying over 70,000 passengers were despatched. On these two days the "*Cornish Riviera Limited*" ran in three and four parts respectively.

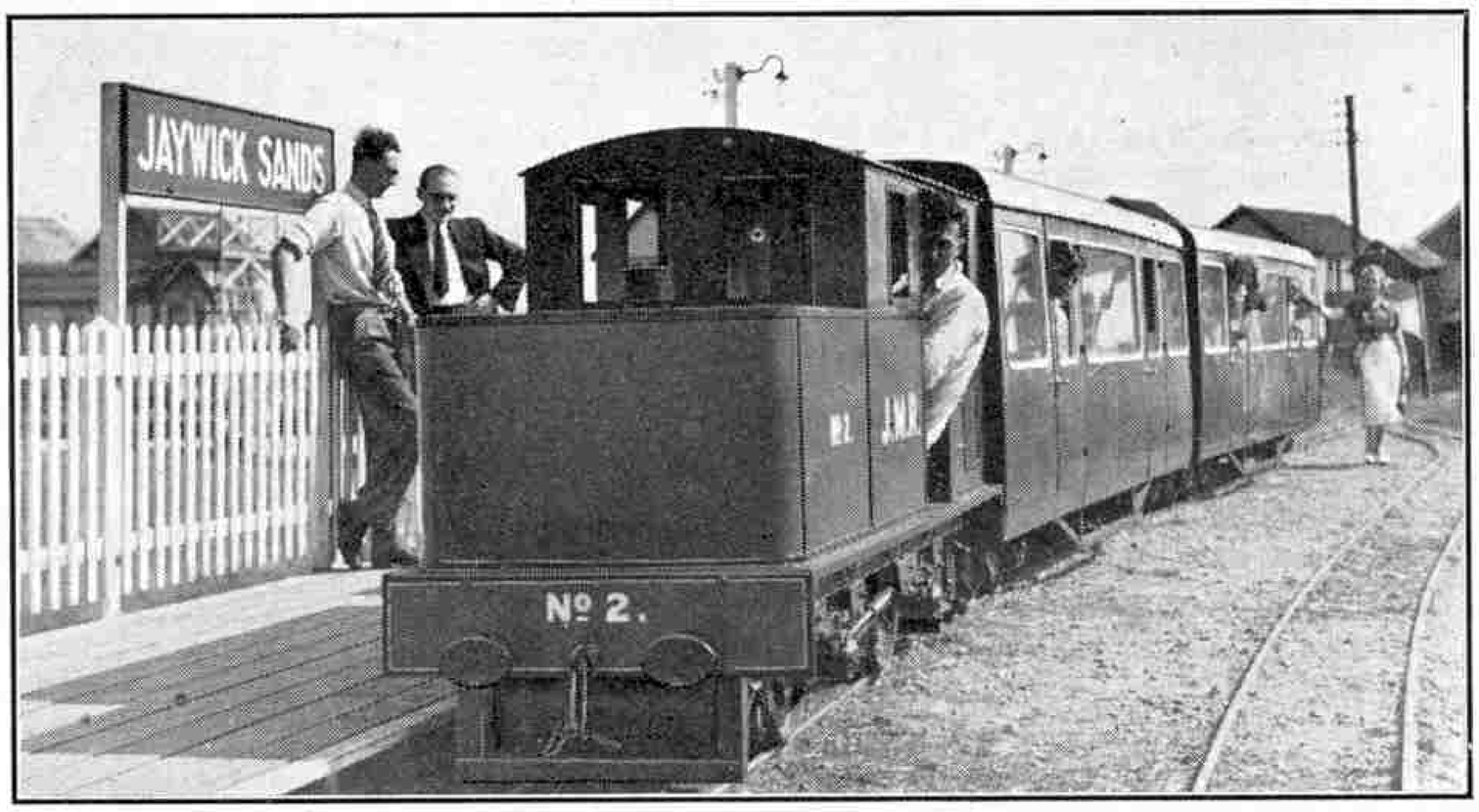
The L.N.E.R. ran 1,800 extra trains. Scarborough, the popular Yorkshire coast resort was served by 40 additional trains carrying 20,000 passengers, while farther north 100,000 holidaymakers travelled to the Tyne Coast resorts necessitating an intensified electric service.

The famous L.N.E.R. expresses "*Coronation,*" "*The Silver Jubilee*" and the "*West Riding Limited*" were not run on the Friday and Monday on account of the volume of other traffic, but "*The Flying Scotsman*" ran as usual.

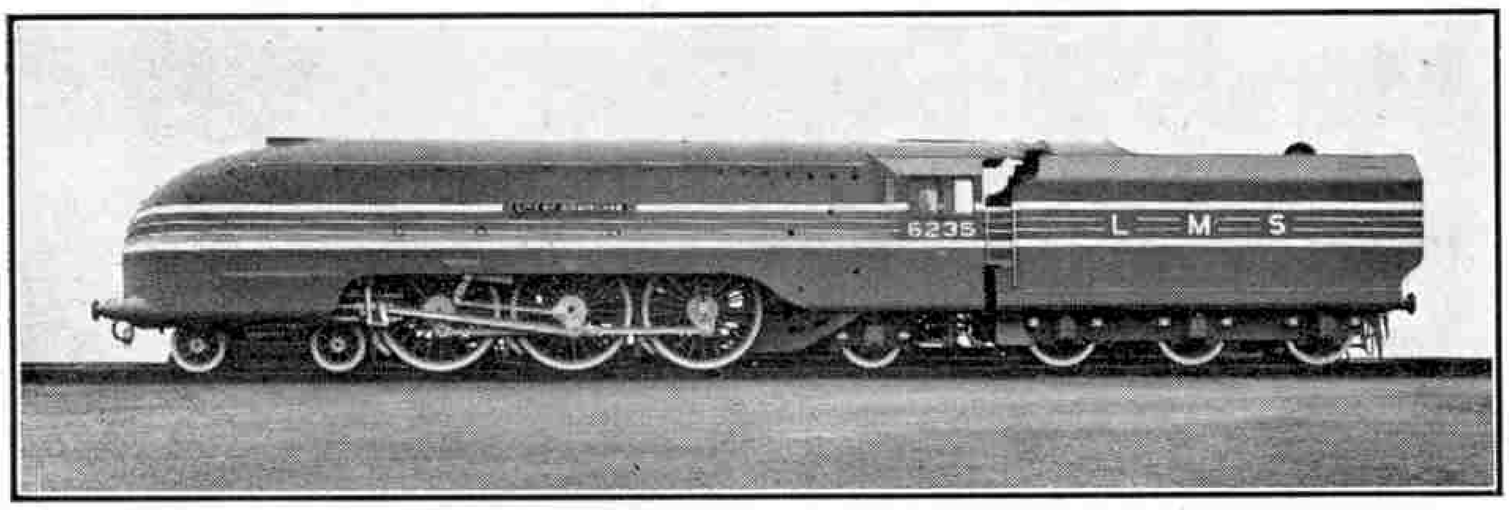
Southern Railway arrangements covered the running of 250 extra trains from London terminal stations including 108 additional Boat Expresses, 19 extra trains to Bournemouth and Weymouth, 13 extra trains to Devon and Cornwall, 80 extra electric expresses to Kent, Thanet and South Coast resorts. Noteworthy traffics were additional boat expresses for the Dover and Dunkerque nightly Train Ferry Service between London and Paris.

* * * *

The L.N.E.R. has placed contracts for the purchase of over 1,400,000 gallons of creosote oil. The oil is principally required for the preservation of sleepers, telegraph poles and other railway timber subject to weather conditions.



Model "Sentinel" locomotive used on the Jaywick Miniature Railway. Photograph by courtesy of The Miniature Railway and Specialists Engineering Co. Ltd., Eastbourne.



New L.M.S. streamlined 4-6-2, No. 6235 "City of Birmingham." Photograph by courtesy of the L.M.S.

Brighter Coaches

The G.W.R. have recently adopted new standard colour schemes for the interior decoration of their carriages. In first-class corridor compartments, the colour scheme will be cream and blue; in first-class non-corridor compartments, cream and brown; and in third-class corridor and non-corridor compartments, the combination will be cream and green.

Curtains, blinds, carpets and linoleum will match the patterned upholstery, while the woodwork will be in polished teak. All new coaches built at Swindon in future will incorporate the new colour scheme and a start has already been made on some of the coaches passing through the shops for repair.

New German Speed Record

For some time Germany has held the authentic speed record for a Diesel railway vehicle with a speed of 127.2 m.p.h. attained by one of the three-car articulated trains of the Reichsbahn. It is now reported this record has been broken on the Berlin–Hamburg line by an experimental three-car train which, it is said, has attained a maximum speed of 133.6 m.p.h., and maintained 124.3 m.p.h. for a considerable distance.

The Imperturbable Horse

At some small stations where a shunting engine would not be an economical proposition horses are used to draw railway wagons when required. These horses become quite accustomed to the noises around them, and the accompanying illustration shows "Tom" a shunt horse at Welwyn North. He stands quite unmoved on the down main line while a Cambridge to King's Cross express roars past on the adjacent track.

Incidently the engine on this train is one used for hauling the Royal Train, and is kept in excellent condition, as can be realised from the illustration.

W. S. GARTH.

Colour-Lights at Victoria, London

Colour-light signalling has been installed by the Southern Railway at Victoria Station, and a new all-electric signal box 73 ft. long and 27 ft. wide replacing five manually-operated boxes, has been brought into operation. This has taken 18 months to complete and replaces five manually operated boxes.

The new cabin contains three signal lever frames, one 23 ft. long and two 13 ft. long, and the total number of working levers is 225, of which 199 are at present in use, 148 for signals and 51 for points. An electrically-illuminated diagram of the whole area controlled is mounted above each frame, and on it are recorded the movements of all trains at the station.

L.M.S. Locomotive News

A scheme of partial renumbering of certain locomotive classes is being carried out by the L.M.S. Two former L.N.W.R. Class 2–0–6–0T engines Nos. 8128/9 become Nos. 28128/9; 14 0–6–2 "Tilbury" tanks Nos. 2220–2233 will be renumbered 2180–2193; 10 standard 0–6–0s Nos. 7100–7109 become 7160–7169 and 5 "Sentinel" locomotives Nos. 7160–7164 will take Nos. 7180–7184. D. S. BARRIE.

Two "Princess Royal" 4–6–2s have been transferred to Longsight depot to work *"The Mancunian," "The Lancastrian"* and *"The Comet"* expresses. These are the first engines of this type to be stationed in the Manchester area and they have been transferred there from Camden. One of the two is No. 6201 *"Princess Elizabeth,"* which in 1936 made the world's record long-distance steam run from London to Glasgow and back, a total distance of 802.8 miles at an average speed of 69 m.p.h. The other is No. 6209, *"Princess Beatrice."*

When the Royal Train travelled to Balmoral recently 4–6–2 No. 6225 *"Duchess of Gloucester"* was used from Euston to Carlisle. Standard Compounds Nos. 1135 and 1147 took over to Perth, and Nos. 938 and 1133 completed the journey to Aberdeen.

Class 8 standard 2–8–0 tender engine No. 8125 is in traffic, as are new streamlined 4–6–2s Nos. 6235, *"City of Birmingham"* and 6236, *"City of Bradford"* painted red with gold bands. Derby Locomotive Works have completed 0–6–0s Nos. 4583 and 4584.

Among the engines condemned is 4–6–0 No. 14678 *"Gordon Castle"* of the former Highland Railway.

Interesting Facts About American Railways

Dining cars on American railways serve 25 million meals a year. These cars use in one year about 24 million eggs, nine million pounds of potatoes, two million pounds of butter, 15,000 barrels of apples, 3½ million quarts of milk and cream and one million loaves of bread.

In one year American railroads carry some 500 million passengers, a number that is almost equal to the combined populations of North and South America, the United Kingdom, France, Italy, Poland, Spain and Germany.

The building of a standard locomotive provides employment equivalent to the work of 50 men for one year, and requires more than 7,500 parts from 119 manufacturing plants.

It is estimated that in the United States a train is either starting or ending a trip every five seconds.

The Sleeping Car is 80 Years Old

The first railway sleeping car appeared on the Chicago and Alton Railroad in the United States in August 1859, 80 years ago. Some years later the Pullman Palace Car Co. was formed and thus began the era of sleeping car travel.

The first European sleeping car train was introduced in May 1873 between Paris and Vienna via Strasbourg and on 1st September in the same year, on what is now the East Coast main line of the L.N.E.R., there appeared the first British sleeping car.

These pioneer British sleeping cars ran between King's Cross and Glasgow. Three beds were provided in each compartment, and were brought into use by pulling down the backs of the seats.

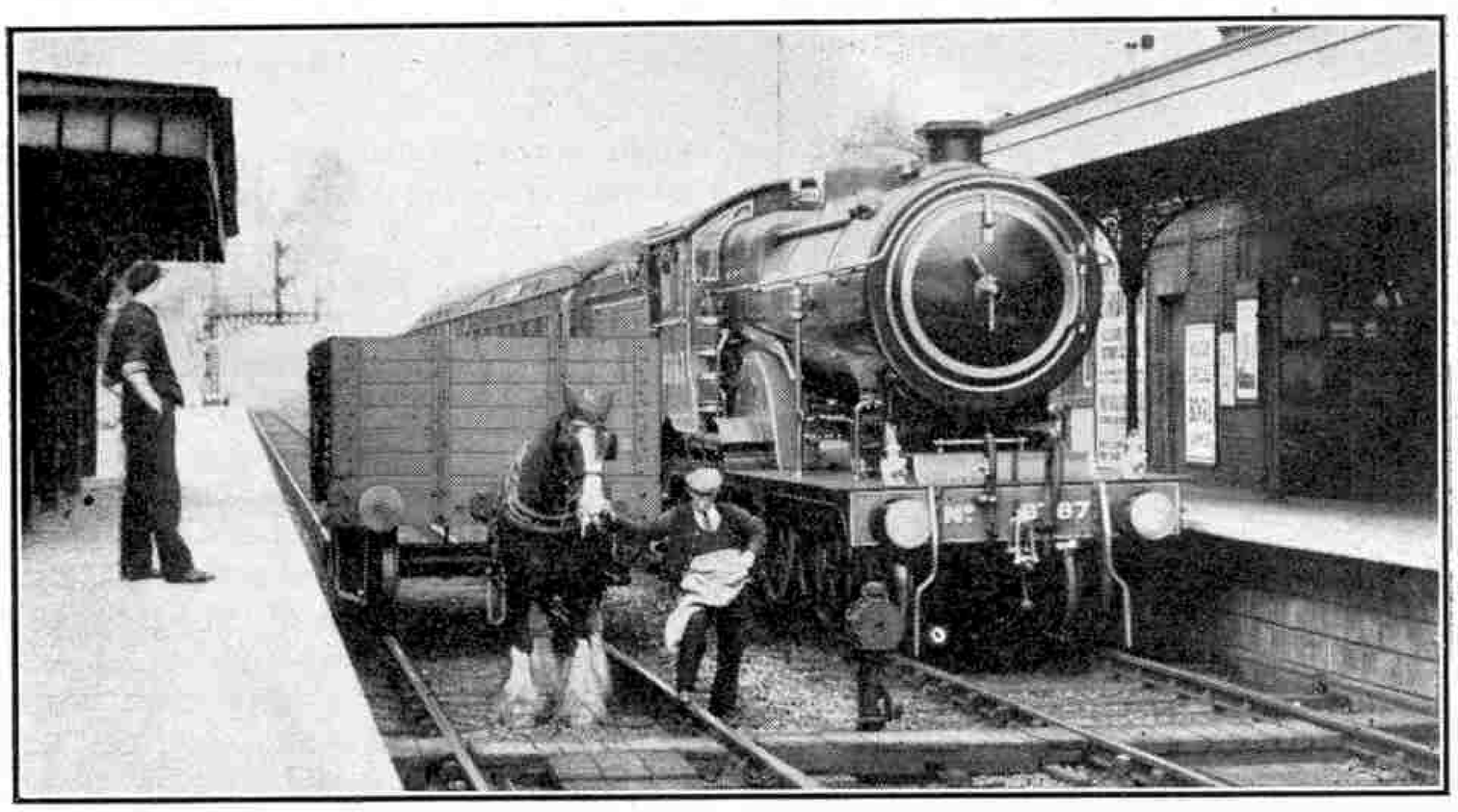
To-day the L.N.E.R. run 129 sleeping cars and their equipment includes air-conditioning, electrically-heated corridors, and shower baths. Many of these cars are arranged as twin articulated units, with first and third class accommodation.

* * * *

The L.M.S. and G.W.R. announce the opening of a new halt at Upton-by-Chester, between Chester and Mollington on the Chester–Birkenhead Joint Line, for passenger traffic.

* * * *

In order to serve an important developing area, the L.M.S. are to provide a new passenger station, to be known as Brindley Heath, between Hednesford and Rugeley Town stations.



"Tom" the L.N.E.R. shunting horse at work at Welwyn North. Photograph by W. S. Garth.

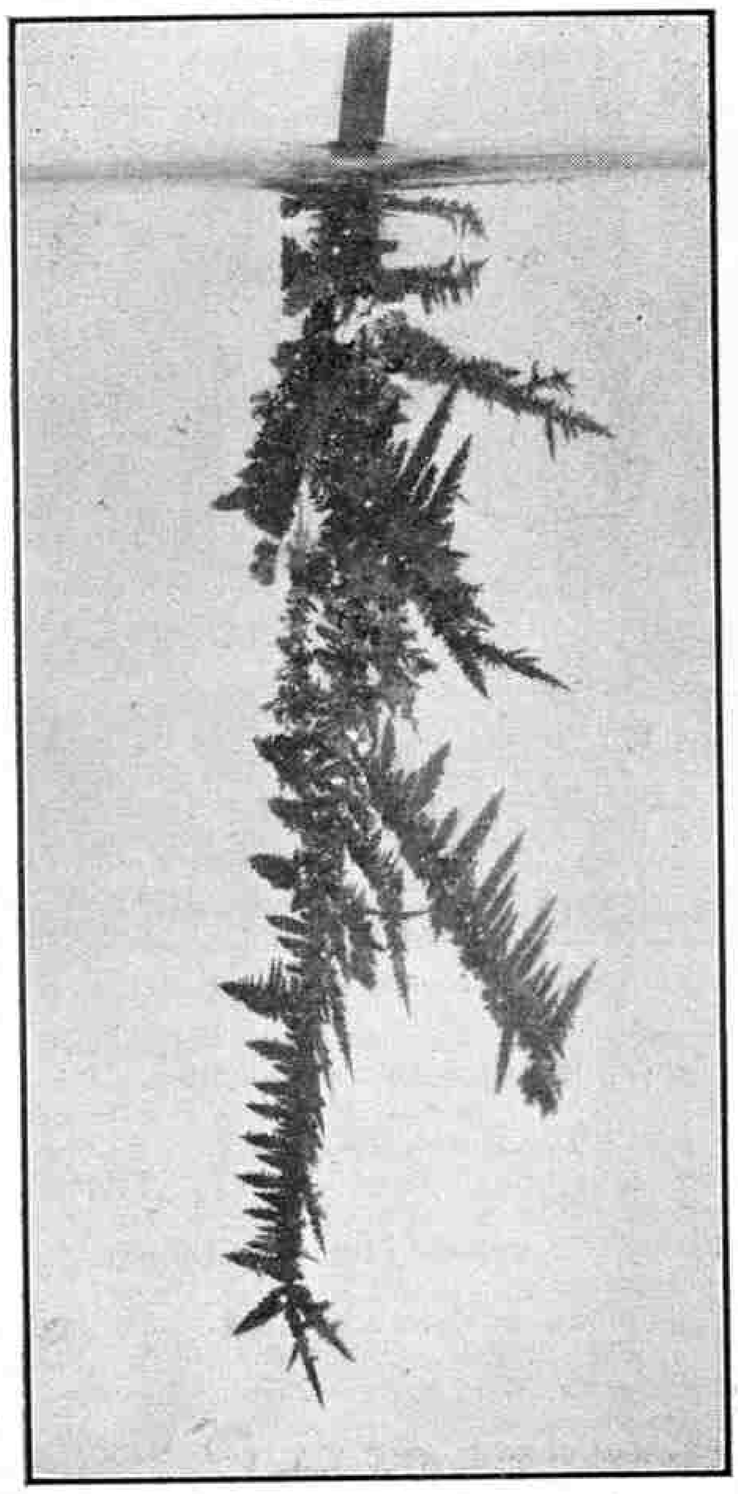
Why Metals Grow Tired

Strange Secrets of their Crystalline Structure

By J. F. Stirling, M.Sc., A.I.C.

ANY one who has happened to break a piece of cast-iron and has glanced, even momentarily, at the fractured surfaces cannot fail to have noticed that the broken area has a crystalline appearance. The individual crystals are too minute to be distinguished by merely looking at the break, but when this is examined under even a low-power magnifying glass an enormous number of tiny greyish crystals can be seen. Some metals show this crystalline structure better than cast-iron. For instance, a stick of antimony, bismuth or tellurium when snapped across discloses the presence of crystals that can be recognised by the unaided eye. All metals indeed are crystalline in nature, and large pieces of them are really masses of exceedingly tiny crystals that have been very closely compacted, like the crystals in a lump of sugar.

How this "tree" of lead crystals is obtained is explained in this article.



Metals had been used for thousands of years before their inherent crystalline structure was recognised. This was brought to light in 1864, when a mineralogist named Henry Clifton Sorby began to examine metals under his microscope. For this purpose he polished their surfaces until they formed excellent mirrors and then dipped them in weak acid. This had the effect of etching the metal, that is of eating into its surface. The acid attack is not regular, some portions being eaten away by the acid more than others; and when the etched surface of a highly polished metal is washed, dried and examined under the microscope, a sort of mosaic appearance is disclosed. It did not take Sorby long to realise that the closely-patterned appearance of his specimens was characteristic of a cut across a mass of metal crystals. The acid etching solution had chiefly attacked the metal crystals at their boundaries, and thus had rendered their sectional outlines visible under the microscope. With this discovery came a flood of light upon many problems that had hitherto perplexed and vexed engineers, mechanics and metal users generally.

Nearly every known pure metal can be obtained in individual crystals by appropriate methods. For example, crystals of lead can be made by electrolysing a moderately strong solution of lead acetate or lead nitrate, using a strip of zinc or an iron nail as the negative electrode. Lead is deposited on this electrode in the form of beautiful shining tree-like crystals, which grow until they reach the bottom and sides of the electrolysing vessel. A similar "lead tree," as this characteristic crystalline formation is called, can be obtained without the aid of any electrical circuit by merely suspending a strip of well-cleaned zinc in a strong solution of lead acetate or nitrate. Its formation by this method is slower and less striking than by the electrolytic one, however.

A rod of antimony, on the left, compared with one of tin. The former has the coarser crystals and is more easily broken.

Another way of obtaining characteristic metal crystals is illustrated by melting a quantity of bismuth by heating it to a temperature of 268 deg. in a porcelain basin or crucible. The liquid is allowed to cool slowly until just after its surface has solidified, when its solid crust is pierced with a pointed instrument and the still molten metal inside is poured out. Beautiful needle-like crystals of metallic bismuth are left in the crucible. The perfection of their formation depends upon the slowness of the cooling of the metal, and the rapidity with which the remaining molten metal is poured away after the solidified surface has been punctured.

When we know that a metal consists of a mass of closely compacted crystals, we are in a position to understand what happens inside it when it becomes "tired," and when, ultimately, it fractures. Suppose that a metal bar is firmly fixed at one end, and has a heavy weight suspended from it at the other end. As the weight is increased the bar sags more and more, and finally breaks. If the weight were taken off the end of the bar as soon as bending took place, the bar would remain intact for an indefinite period. Applying the weight and removing it in quick

A flaw in iron revealed by the microscope. The lighter and weaker portion contains an excess of carbon.

succession for a sufficient number of times would cause the bar to break, however, in spite of the fact that it could sustain the steady weight for an indefinite time.

This simple experiment, which has been performed countless times in mechanical and engineering laboratories, imitates to a very large degree the conditions in which a metal becomes "tired" and breaks. A metal member will withstand a relatively enormous steady strain for an indefinite time without breaking; but often enough the same metal component will withstand only a very slight intermittent strain without fracture, the metal becoming "shocked," or "fatigued," in these conditions.

Now for the explanation of these effects. We have already seen that all metals consist of closely compacted masses of crystals, and when a weight is applied to a metal rod the crystals in it, which are built up layer upon layer, begin to slip over each other, just as books placed in a row slip when they are pushed to one side.

The slipping ceases if the weight is removed from the metal rod at the beginning of this slipping process, and in some instances the crystals may even return to their original situations. When the load is applied, released and then re-applied in intermittent succession, the amount of slip inside the metal rod increases to such an extent that the crystal layers become loosened. The faces of the crystals themselves also wear, and the units lose their flexibility and resiliency, or become "fatigued," as engineers say. With severe stresses one or two groups or units of crystals may begin to disintegrate, and a fault or fissure in the metal is created by them. This fault grows and passes from crystal to crystal inside the metal, until eventually the layers can no longer hold together and the metal breaks.

A metal composed of extremely fine crystals shows much less tendency to break when subjected to strain than one whose component crystals are large. For instance, a bar of bismuth or antimony breaks easily under any strain because these metals usually form comparatively large crystals. Cast-iron breaks less easily, yet can be fractured readily because its crystals are fairly large. When we come to the "alloy steels," including chrome-steel and vanadium, nickel and molybdeneum steels, and to phosphor-bronze and other finely-grained alloys, we find that they are extremely tough and resistant to mechanical shock, largely because the crystals of which they are made up are very minute. Such metals therefore are employed for vital engine and machinery parts, and for structures that are continually being submitted to intermittent stresses.

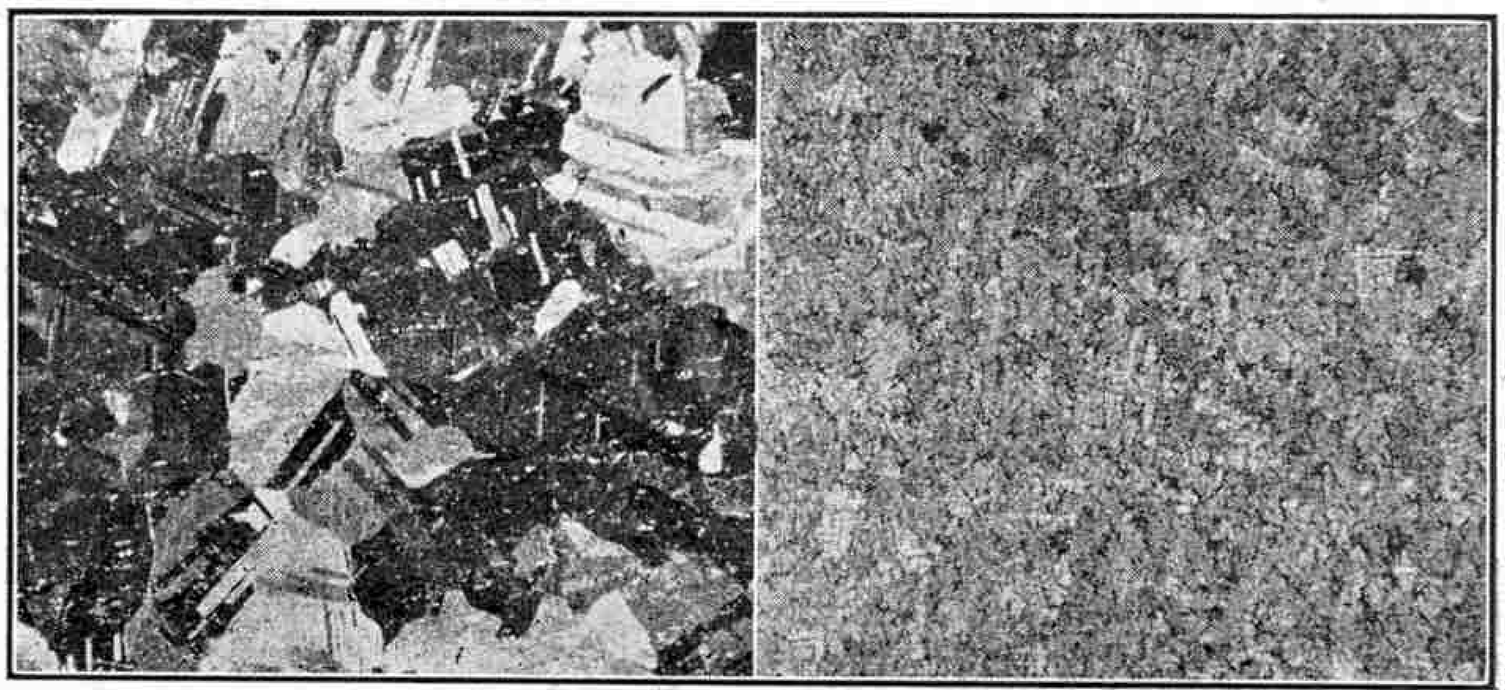
Some metals, particularly copper, can readily be drawn into wire because of a peculiar inner crystal formation they possess. During such a process the crystal layers of the metal slide regularly over each other without undergoing disintegration, just as the various sections of a telescope tube slide out from one another. If a copper bar is subjected to undue intermittent stress, its crystal layers will undergo deformation, however, just like those of any other common metal of moderate-sized crystalline make-up, and as a result the metal will fracture.

Finely-grained metals, such as the alloy steels, are exceedingly hard as well as of high tensile strength. This because their component crystals, being extremely small, cannot be torn away easily from the surface of the metal. On the other hand, soft metals such as copper and gold, which have relatively large crystals, allow the latter to be pulled away from their surfaces when an abrasive material is rubbed over them.

Metals of the highest strength and reliability must be the same in composition throughout, and free from all impurities. A metal bar in which is a localised area that is different in composition from the remainder of the metal will tend to develop a fault there. The fault may lie dormant throughout the life of the article made from the metal, but if the article is subjected to any stress or strain, interior disintegration will begin at this area and will spread until fracture takes place.

A whole article could be written easily on the effect that even small traces of impurities have on the properties of metals. For instance, to the zinc manufacturer cobalt is a curse. If zinc contains more than 15 parts of cobalt to 1,000,000 parts of zinc it becomes powdery and useless for commercial purposes. Again, the electrical resistance of copper of less than 99.998 per cent. purity increases out of all comparison with the proportion of foreign matter present. Aluminium must be kept free from silicon and iron, otherwise it becomes brittle and crumbly. Lead that contains even the smallest trace of silver is useless for making accumulators. Sulphur and phosphorus are deadly enemies to steel, one part of phosphorus, and even less than one part of sulphur, in 1,000 parts of steel, being sufficient to ruin it for engineering purposes.

The precise effect of traces of impurities is not completely understood. In some mysterious way they weaken a metal by upsetting its regular crystalline structure.



Copper and phosphor-bronze seen under the microscope after polishing and etching. The crystals of phosphor-bronze are finer than those of copper, and in consequence the former metal is tough and highly resistant to wear.

The Manufacture of Pottery

One of the World's Oldest Crafts

THE story of pottery is almost as old as the story of mankind. In fact, the only knowledge we have of some primitive civilisations is that deduced from the pottery remains found on the sites of their settlements. How Man first came to shape clay into vessels for food and drink is largely a matter of surmise. One theory is that he originally made baskets from wicker and osiers, and lined these with clay to make them watertight. Possibly one of these baskets fell into a fire, where a meal was being cooked. The fire would destroy the wicker, but leave the clay lining intact and hard. The fact that the markings on some of the ancient vessels suggest basket-work tends to confirm this theory.

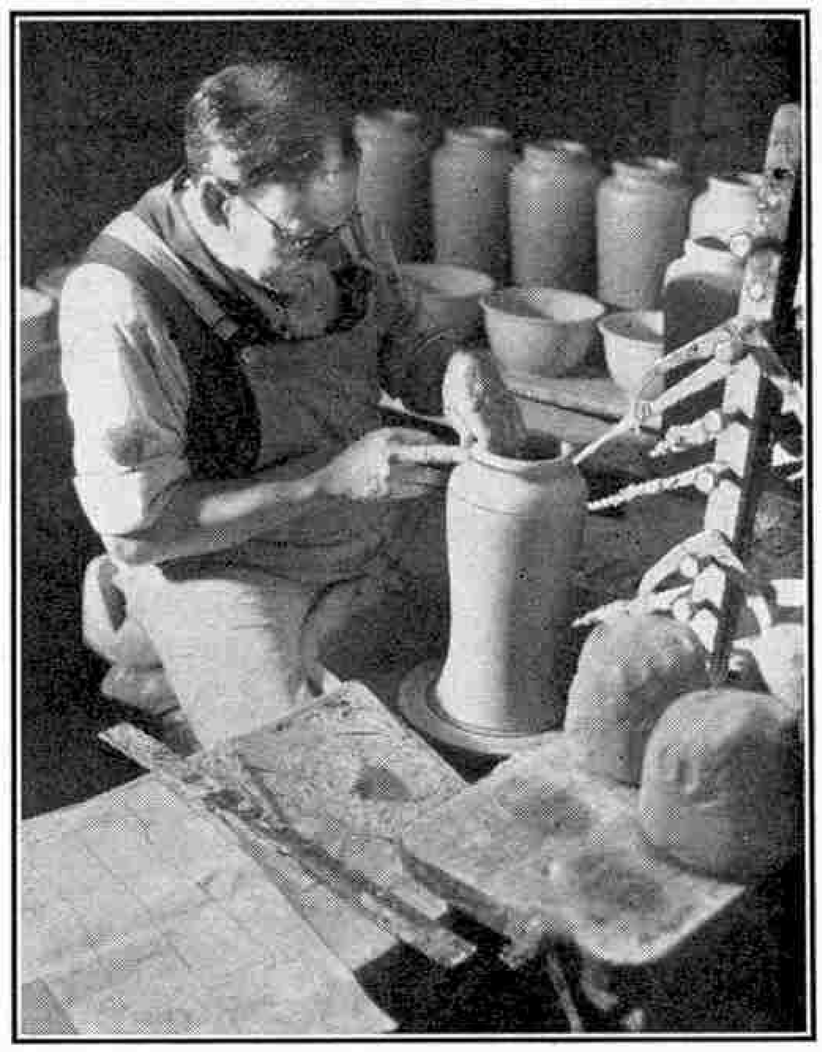
Later, more enterprising primitive potters probably learnt how to build up vessels, layer by layer or in coils, from the clay alone, without any wicker-shape as a guide. In tropical countries, such as certain parts of Africa and South America, shapes were copied from coco-nuts, gourds, and other tropical fruits. Often the ware was not baked in an oven or kiln at all, but simply dried in the sun. In certain eastern countries this practice is still followed, particularly in the making of bricks.

One of the most far-reaching discoveries in pottery-making was the use of the wheel, which made it possible to build up a symmetrical shape with a considerable degree of accuracy. To what epoch the potter's wheel actually dates back is not known, but it is certain that it was used by the ancient Persians. The Hebrews also used it, as we know from the Bible, and actual drawings of potters forming vases and other shapes on the wheels have been found in Egyptian tombs.

At first the wheel was turned with one hand and the ware shaped with the other, but later a wheel was evolved that could be worked by the feet. There was little change in the design of the potter's wheel until about the middle of last century, when Henry Doulton, one of the most famous potters of our age, applied steam power to drive the wheel. This was an important advance, as it left the craftsman free to concentrate all his attention on the work of his hands. To-day electrically-driven wheels are also in use.

Opening the ball of clay after it has been placed on the wheel.

Doulton began his career at the age of 15, when he entered his father's pottery works at Lambeth. He spent several years at the potter's wheel, and became an expert "thrower." Aided by this practical experience he turned his attention to improving the firm's products and to increasing their range, and one of his early successes was the production of good enamel glazes. In 1846 he introduced stoneware pipes for sewage and drainage as an improvement upon the flat-bottomed brick drains then common, and a special factory was established at Lambeth to develop this new branch of pottery manufacture. Doulton is remembered chiefly for the great part he played in reviving the production of art pottery. The beautifully decorated wares made at his factories set a high standard for such products, and he gained many awards. In 1870 he was made a Chevalier of the Legion of Honour, and in 1885 he was awarded the Albert Medal. Doulton was knighted in 1887, the year of Queen Victoria's Jubilee.



"Throwing" a vase on a potter's wheel at the Lambeth pottery works of Doulton and Co. Ltd., by whose courtesy the illustrations to this article are reproduced.

The clay upon which the expert "thrower" in a pottery works exercises his skill is a cleansed version of the hard, lumpy material obtained from the earth. At the pottery works the clay and other raw materials are thoroughly mixed with water in a large container, and reduced by mechanical means to the consistency of a creamy paste called "slip." The slip is passed through sieves and filter presses to rid it of water and foreign substances such as grit, and the resulting clay mass is then passed through a machine that renders it uniform in thickness and free from "air pockets." The clay reaches the thrower in lumps or blocks of convenient size.

The upper illustration on this page shows a thrower at work in the Royal Doulton Potteries at Lambeth, a district that has been associated with pottery-making for hundreds of years. The potter throws the lump of

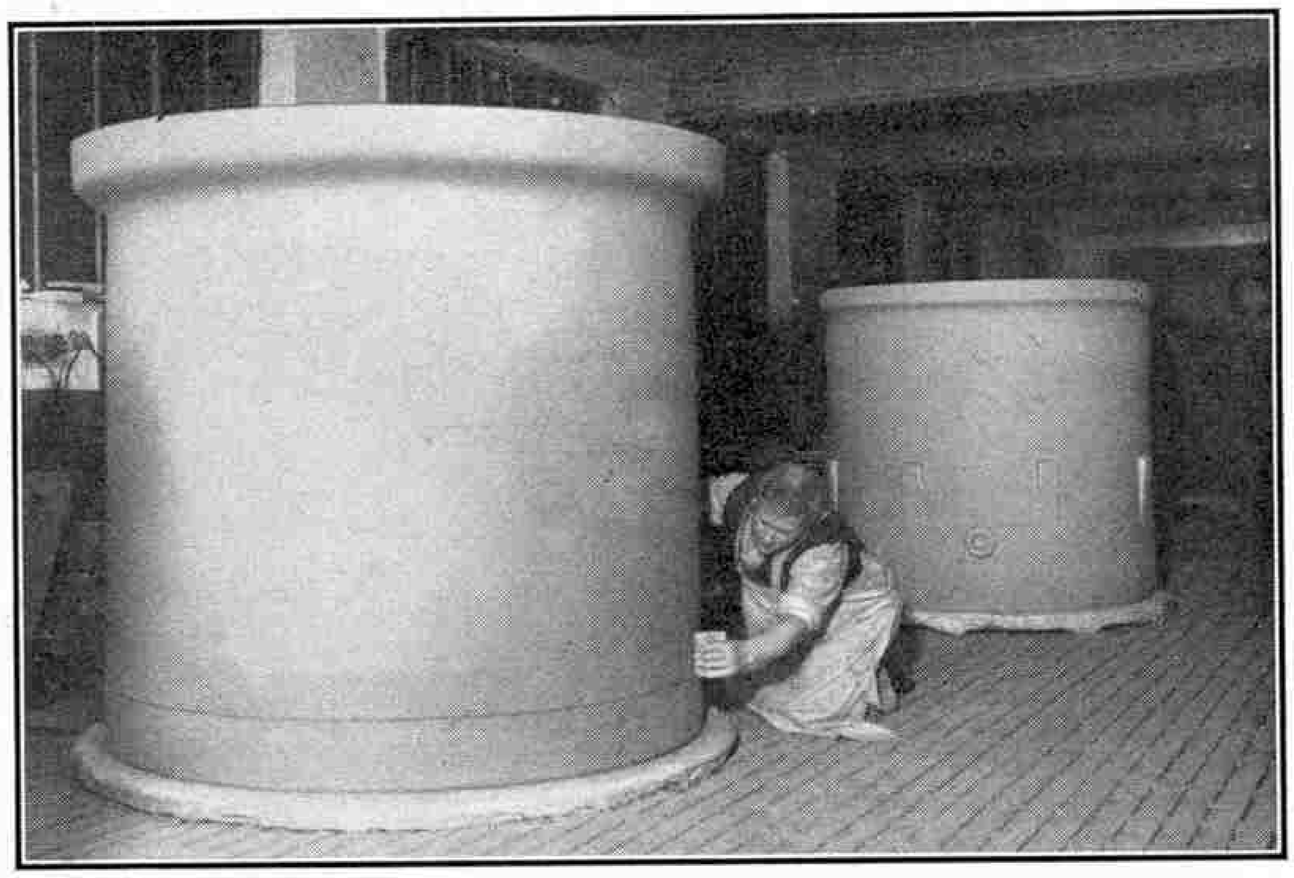
clay on to the centre of the disc or table of his potter's wheel, and sets this rotating mechanically, the speed at which the disc goes round being controlled by a brake. The thrown clay clings to the disc and as it is carried round the potter begins to "work" or mould it, sometimes with tools for the purpose, but often with his expert hands. He begins at the base and works upward, and gradually the lump of clay takes the desired shape. It is difficult to convey in words the fascination of watching such a craftsman build up from a shapeless lump of clay a beautiful vase or bowl which, after it has been decorated and "fired" or baked, will find a worthy place in some modern home.

Many kinds of pottery are shaped in moulds, instead of on the potter's wheel. After being dried to a "leather hard" condition they are placed in a lathe and turned and smoothed. The articles, whether hand or mould-shaped, are then ready for glazing.

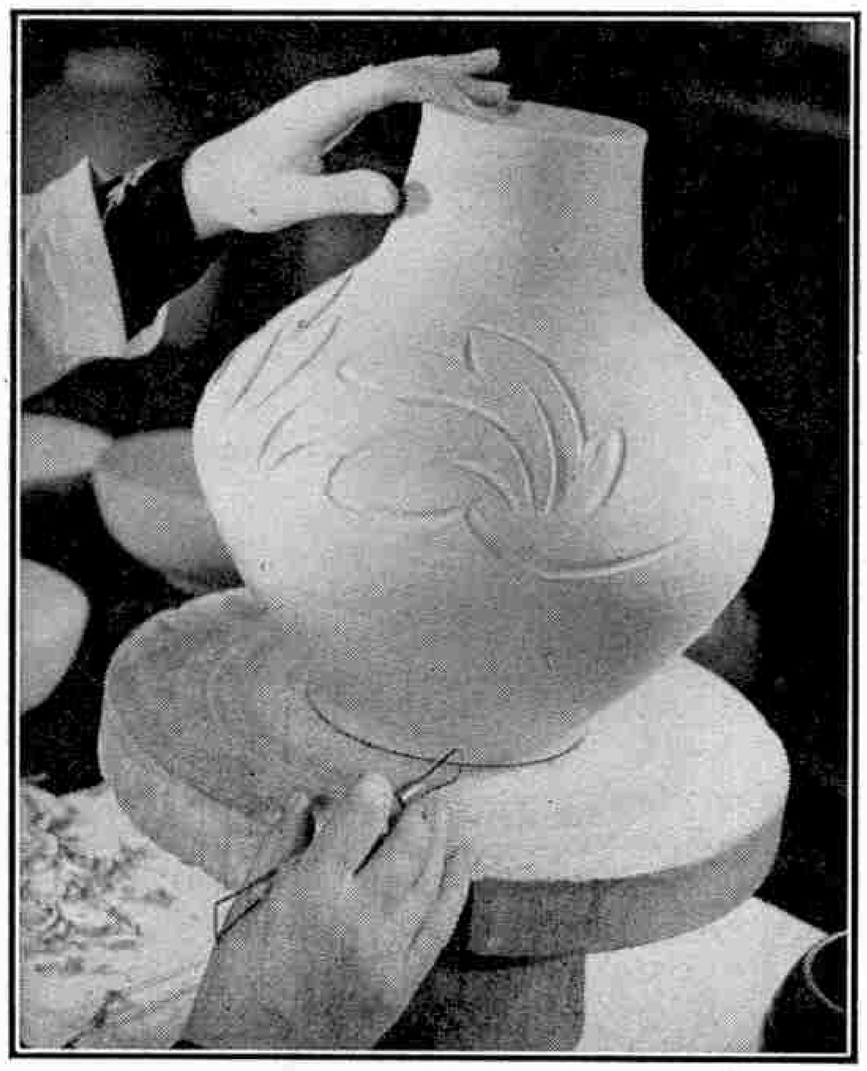
The decoration of pottery is an art in itself, and takes many different forms. Sometimes the design is incised or cut into the clay, in other cases it is applied in relief, or again coloured glazes alone may be relied upon to give the final effect. As far as the beauty of colour is concerned the glazes of the old Chinese potters of the Sung dynasty set a standard which has scarcely been excelled in the whole history of pottery-making.

An interesting point in connection with glazing is that the colour of the applied glaze is usually quite different before the ware is "fired" from what it becomes afterwards. The pottery artist, unlike the ordinary painter, therefore has to visualise the final effect of a combination of colours, instead of being able to have them actually before him as he works. This, of course, is just a question of experience, but it always puzzles visitors to a pottery to be told, for instance, that a certain greyish-green glaze will become a rich blue after firing.

All pottery, whether decorated or plain, is "tried in the fire," sometimes at a temperature that would reduce even metals to a molten mass. This process of firing, or baking, is perhaps the most important of all. Several factors have to be judged to a nicety. For instance, different types of articles have to be placed in special parts of the kiln. The actual firing must be stopped at just the right time, and the contents of the kiln then left to cool for the right period of time before the kiln is opened. The stacking of the ware in the kiln is an art in itself, as every inch of room must be used to the best advantage, without allowing any of the pottery wares to touch one another, as otherwise they would be fused together by the intense heat. The correct proportion of air required for firing must be judged accurately, as if there is too much or too little air the colour of the glazes will be affected. To-day the traditional coal-fired kiln is gradually giving place to kilns operated by gas or electricity, which minimise the risks of firing, although craftsmen potters complain that they take away much of the interest and excitement every potter experiences when the kiln is opened and the results of his labours are revealed.



Large pieces of chemical stoneware being made at the Doulton Company's Erith Works.



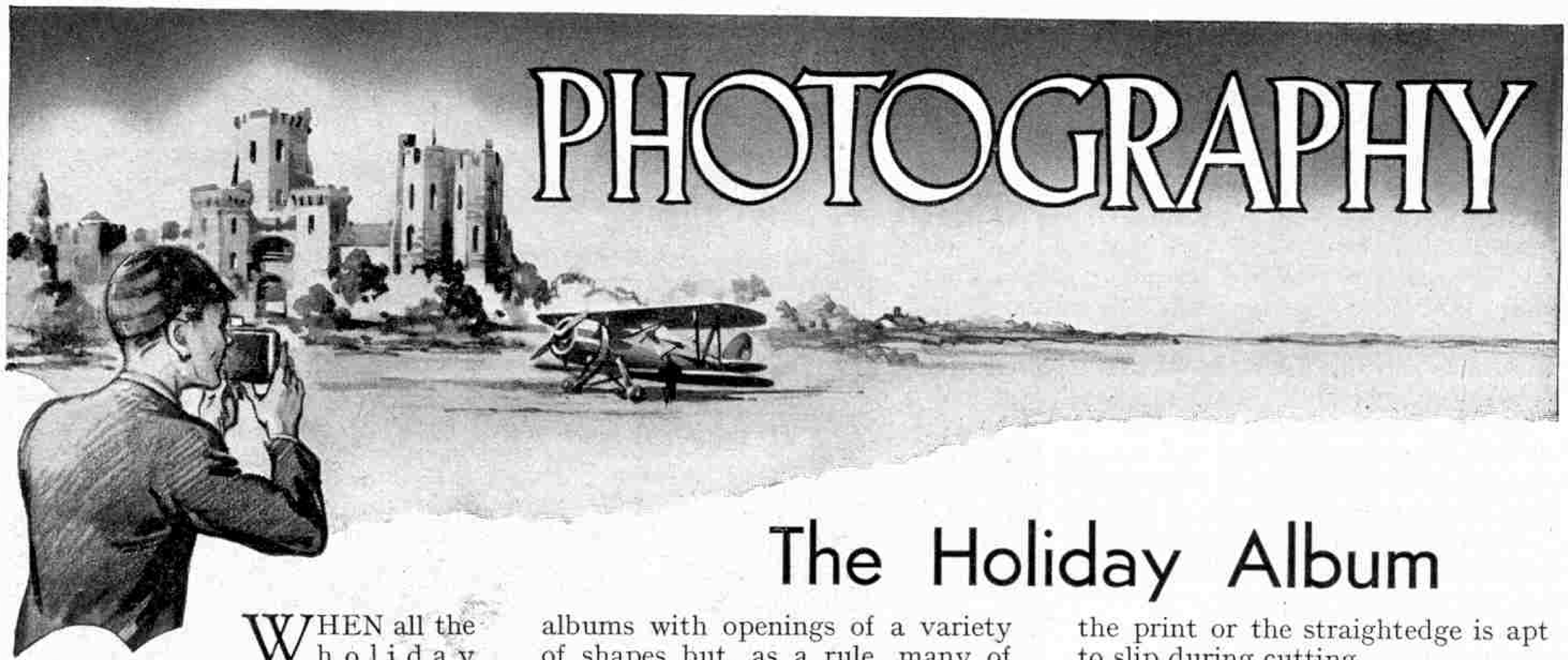
At work upon the delicate task of decorating a vase.

The making of pottery is, none the less, both an art and a craft. Machinery and modern devices have done much to eliminate the more laborious processes in pottery-making, but craftsmanship is still the all-important factor.

When one speaks of "pottery" one generally thinks of decorative ware, such as vases, bowls, delicate china figures, or tableware. There is, however, also a vast range of undecorated ware produced by the modern pottery. Some examples that immediately come to mind are porcelain insulators, laboratory fittings, kitchen sinks, roofing tiles and chimney pots, and glazed terra-cotta facings for modern buildings. In fact there is hardly any aspect of our daily life in which clay products do not play some important part.

Hidden several feet underground are literally thousands of miles of pottery drainpipes, on the efficient functioning of which depend the health and well-being of our vast modern communities. Conduits of the same material carry and protect the electrical supplies and telephone services. Pottery, in the form of chemical stoneware, is almost the only material that will resist the attacks of all acids in all concentrations, with the single exception of hydrofluoric acid, and for this reason chemical stoneware is used on a vast scale in the chemical industries. It is also used extensively in paper-mills, dye-works, printing and engraving works, and in many other branches of modern industry.

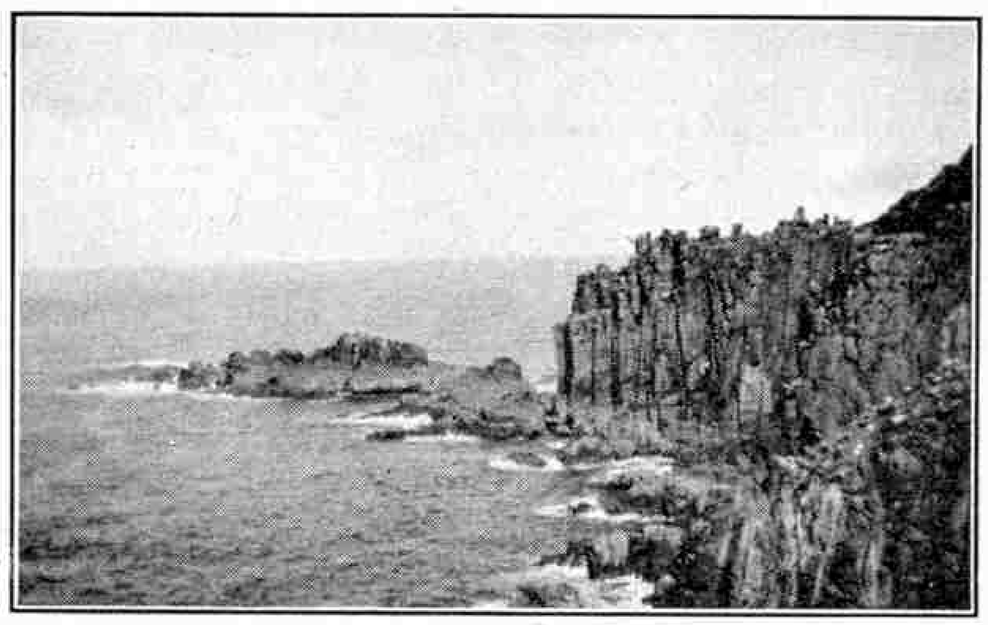
For information contained in this article we are indebted to Doulton and Co. Ltd., Lambeth.



The Holiday Album

WHEN all the holiday snapshots have been developed and the failures picked out, the next job is to collect the remainder together in an album. This should be done straight away. If it is not, one gets into the habit of carrying around loose prints in an envelope and showing them to a variety of friends, with the result that they—the prints not the friends—become dirty and crumpled. The only safe way is to tackle the album before giving any prints away, and before showing them, except to "the family."

The next point is to decide on the album. There are, of course, big albums and small ones, expensive ones and cheap ones; but they fall generally into two classes, "slip-in" and "paste-on." The "slip-in" kind are easier to fill, but they have the drawback that the prints usually must be all of the same shape and size. It is possible to buy "slip-in" albums with openings of a variety of shapes but, as a rule, many of these shapes are circular and oval and useless for the vast majority of prints. The "paste-on" album allows us to trim our prints to any size or shape we like, and this is a very great advantage. Almost every print is improved by taking off a strip above or below or to right or to left. Many prints indeed are all the better for being cut down by half or more, and this is particularly the case where the print shows a big stretch of blank sky or of uninteresting and unwanted foreground. My advice is to plump straight away for the "paste-on" album.

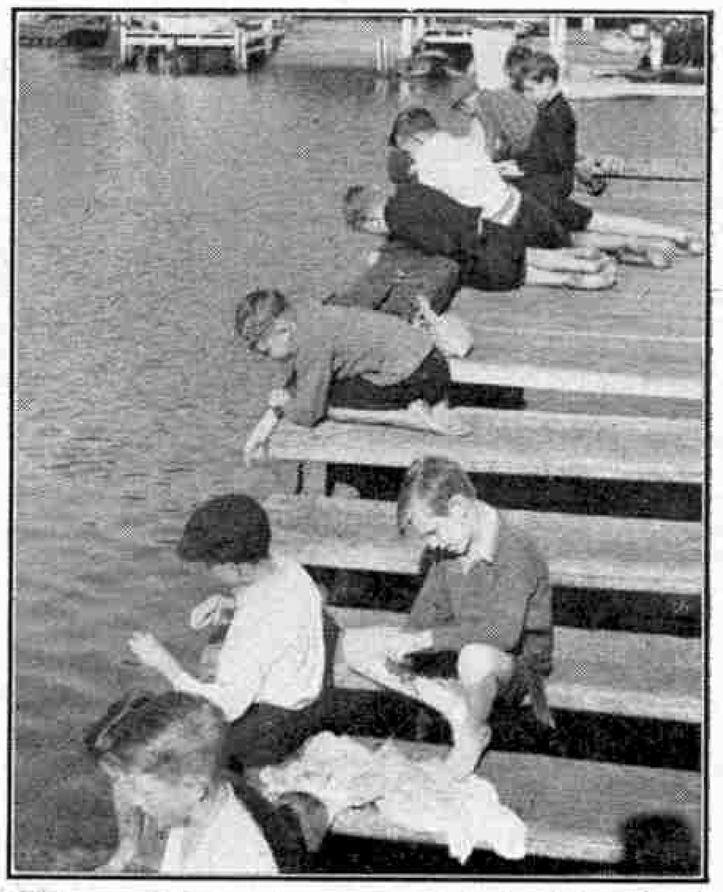


"Land's End," a typical seaside holiday picture by D. W. Preston, Manchester 14.

Barry Homer, Birmingham 8, snapped these young holiday-makers enjoying a Punch and Judy Show on the sands at Whitby.

Trimming should not be done with scissors, because of the impossibility of obtaining with them a perfectly straight edge. If a proper trimmer is not available the best plan is to do the job with a sharp pocket knife—a really sharp one—guided by a steel straightedge. The best material for cutting on is a piece of old linoleum or thick cardboard. A sheet of glass is often recommended for this purpose, but it quickly turns the edge of the knife, and unless great care is taken the print or the straightedge is apt to slip during cutting.

An old and useful device to help in deciding how much to trim off a print consists of two pieces of cardboard cut to the shape of the letter "L." These are slid over one another so as to enclose a rectangular space, and this is moved about and varied in size until the best portion of the print is found. In trimming, care should be taken that the edge of the print is parallel with the horizon, or with any buildings that happen to be in the picture. Nothing looks worse than a seascape with the horizon running uphill, yet one often sees quite good prints ruined by this defect. Prints should not be trimmed

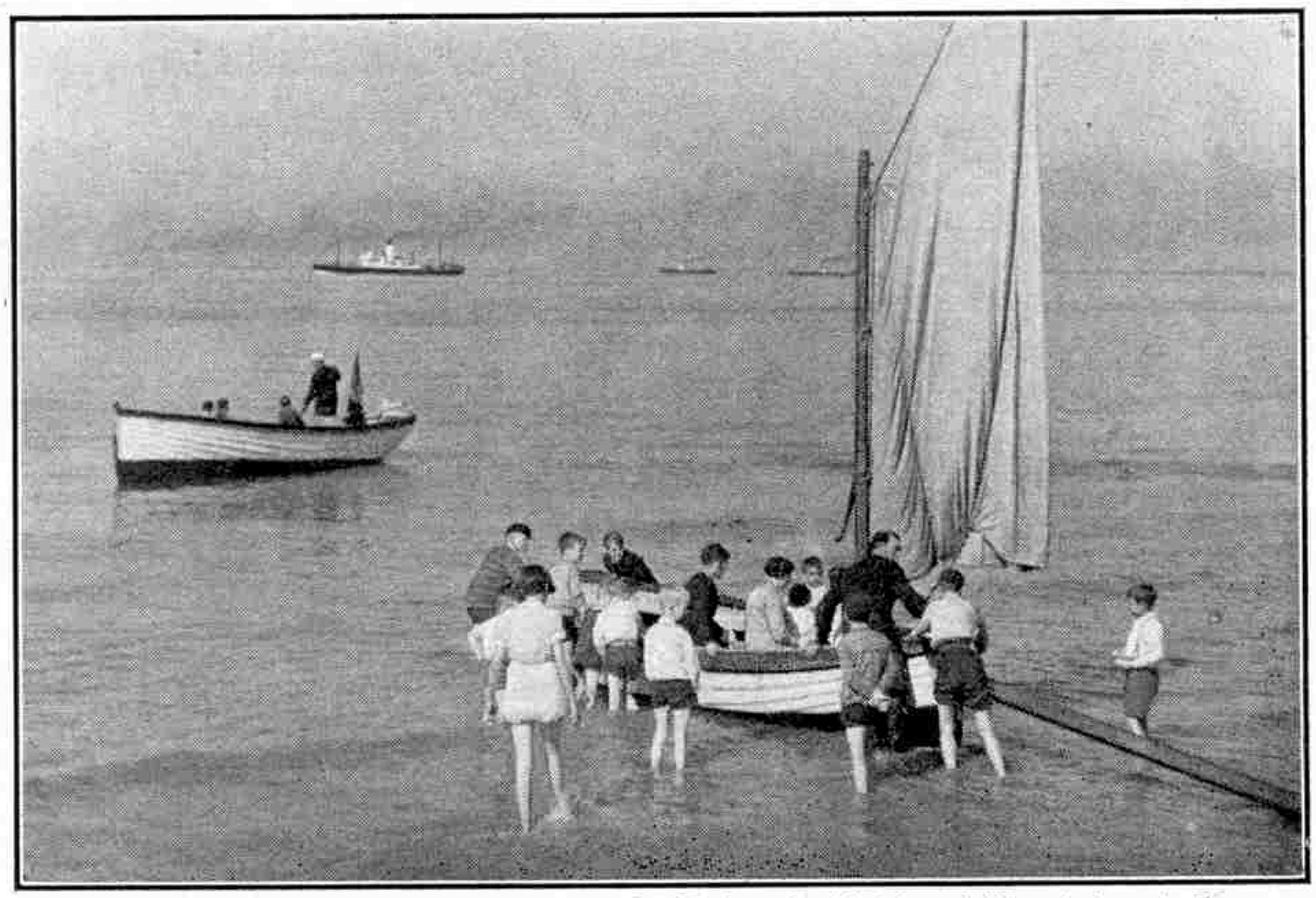


These youthful anglers were much too interested in their sport to be disturbed by the presence of the photographer, J. A. Early, Vaucluse, New South Wales.

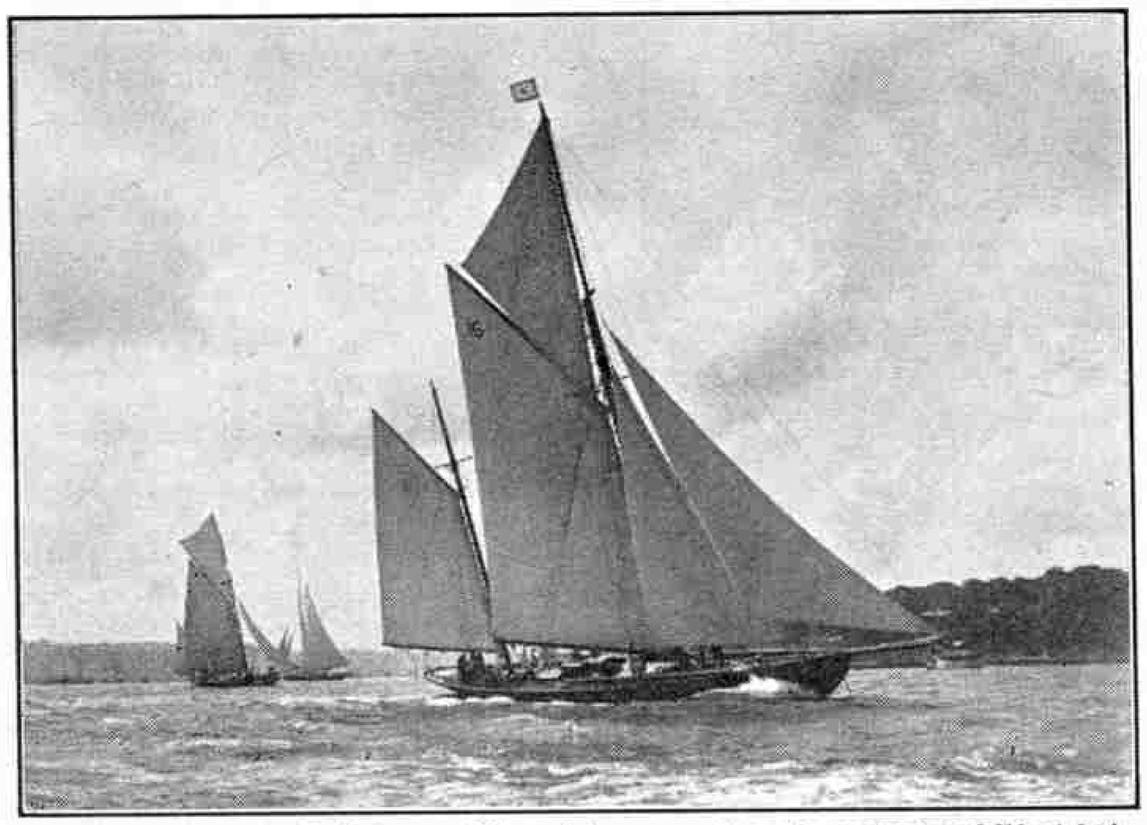
until they are quite dry, or they will tear in the process.

Photographic books and magazines give all kinds of recipes for making paste for mounting. My advice, based on long experience, some of it painful, is to ignore these recipes entirely, and to buy one of the ready-made mountants obtainable from any photographic chemist. These mountants are specially made for the job, and contain no impurities that in time will cause the print to fade or become stained. Most important of all, when the print is mounted with one of these preparations it stays put.

The print should be pasted face downward on a sheet of newspaper, and the mountant spread over its back with the finger tip. Every portion of the print should be covered thinly and evenly, care being taken not to leave any excess mountant at the edges. The print is then placed in position on the page of the album and pressed firmly into contact with a piece of blotting paper. Any mountant that has oozed out at the edges of the print should be wiped off immediately with a piece of clean rag or a ball of moist cotton wool. When all the prints that are to be mounted at one time are finished, the album should be placed under light pressure, such as that of a few books.



"Helping with the Boat," by A. G. Dell, London S.E.27. A good subject for a holiday photograph album.



"Heeling to the breeze." A fine yachting picture reproduced by courtesy of Ilford Ltd.

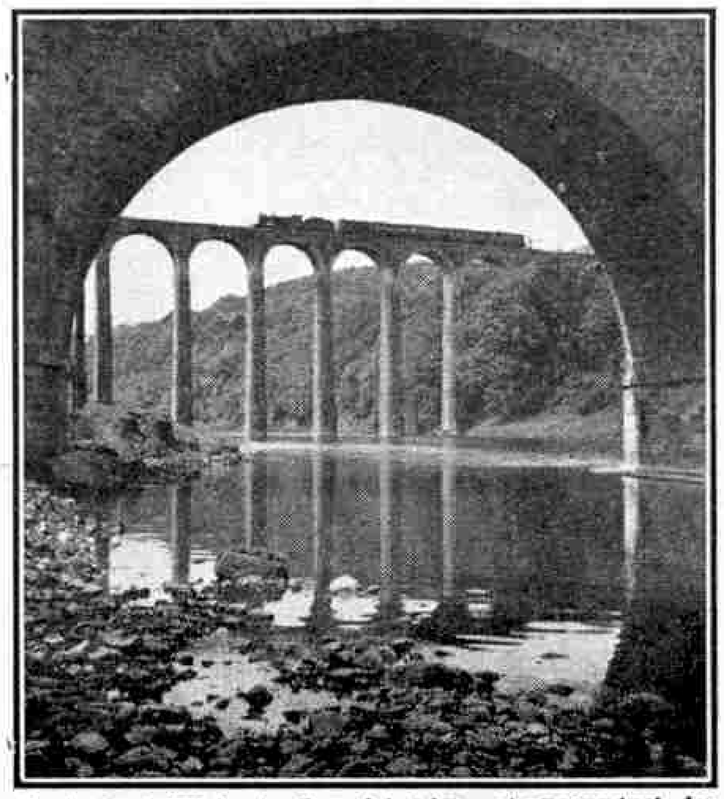
Alternative ways of mounting prints are "mounting corners" or "mounting stamps," which can be obtained from any photographic dealer. The former are small pockets that fit over the corners of the print and have gummed backs so that they can be stuck in place. Mounting stamps are gummed on both sides and thus adhere to the back of the print and to the album page. After the mounting operations are complete, the album should be placed under a heavy weight and left undisturbed for about a day.

It is surprising how soon one forgets the name of a place where a particular snapshot was made. For this reason a title, however short, should be written beneath each print, giving at least the place and date concerned. Special white writing ink can be bought for this purpose and it stands out well against grey or dark album leaves. For those who are too lazy to do this, or too doubtful of their ability to write neatly, an alternative is to number each print and form an index of the prints on a separate page at the back of the album. I have seen this index page done on a typewriter and it looks quite well.

A holiday album of carefully selected prints prepared in this way will prove a lasting source of pleasure both to its owner and his friends.

When the album has been completed the photographs should be considered with a view to their suitability as entries in the photographic competitions announced each month in the *"M.M."* and other periodicals. The advice already given regarding trimming and mounting for the album applies equally in preparing prints for competitions; but more attention should be given to the selection of a suitable title. Generally, a short "snappy" title is best, and if it is aptly chosen and expresses the spirit of the photograph it will add greatly to the prize-winning possibilities of a print. A good title will not make a poor print into a good one, but it will certainly help when the print is being considered among others of equal standard.

In most competitions it is not absolutely necessary that prints should be mounted, but if this is not done a piece of stiff cardboard a little larger than the print should be included in the envelope to protect the edges of the print from damage in the post.



Craigsford Viaduct, Berwickshire, photographed by H. Auger, Lincoln.

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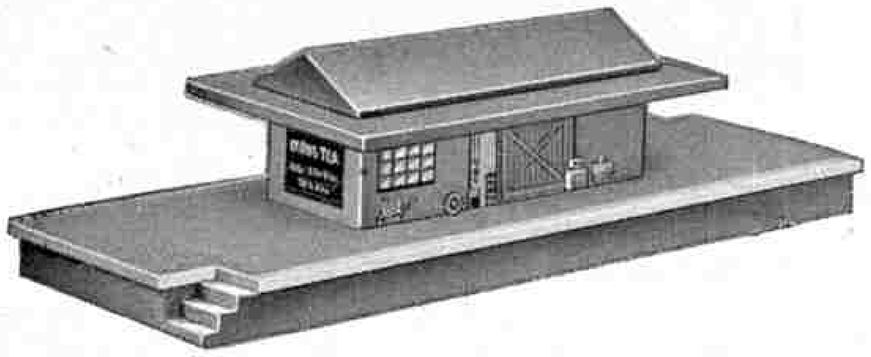

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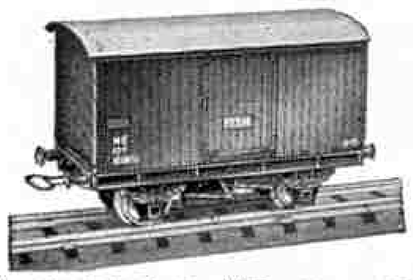

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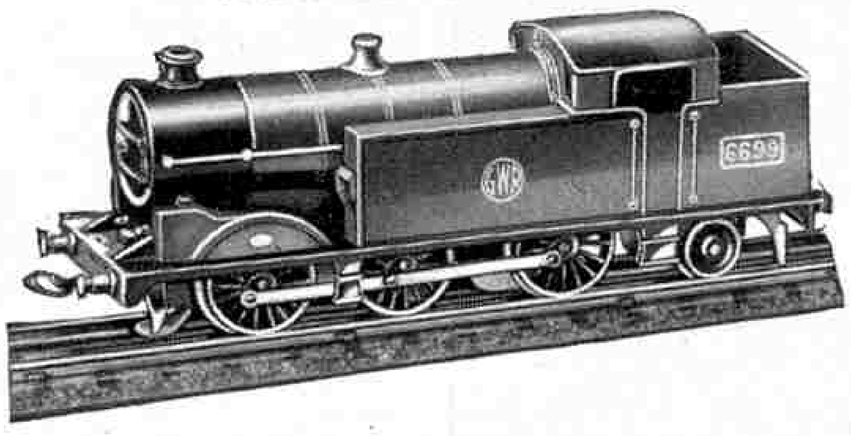

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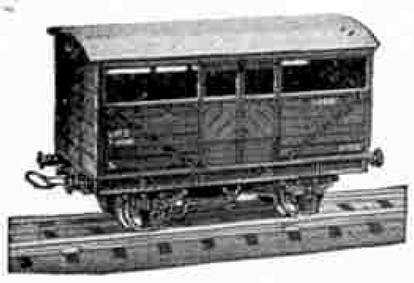

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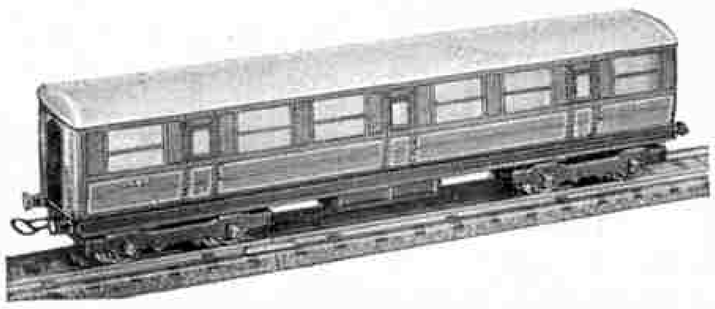

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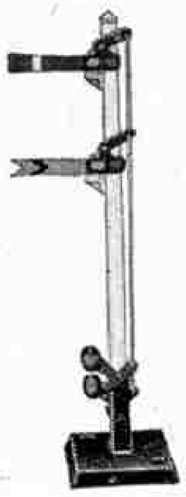

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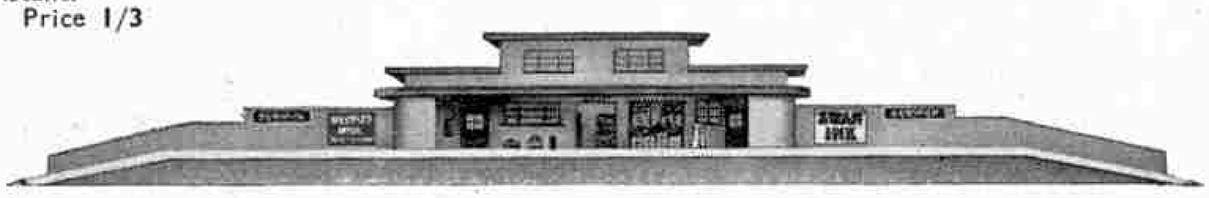

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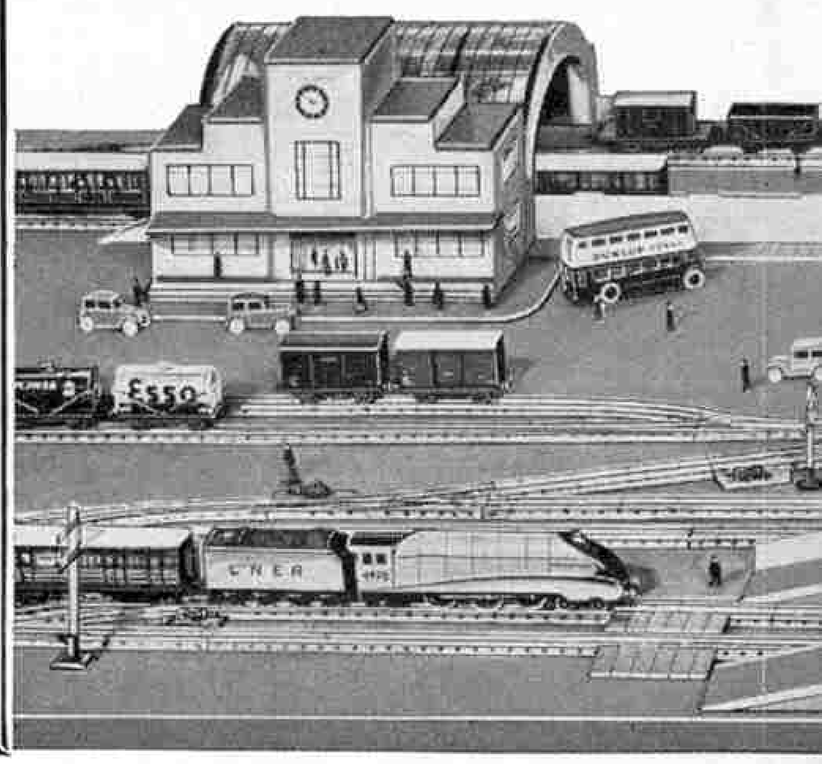
Clockwork Tank Goods Train Set, L.M.S., L.N.E.R.
Brake Van, eight Curved Rails, and two Straight R

HORNBY-DUBLO TRAINS AI



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ler No. 1, seven Curved Rails, one Curved Terminal Rail and two Straight Rails. (To be operated from a Dublo
Price **55/–**

e is no supply, the above Set is available with Dublo Controller No. 1a (for use with 12-volt accumulators) as follows:
blo Controller No. 1a.) Price **46/6**

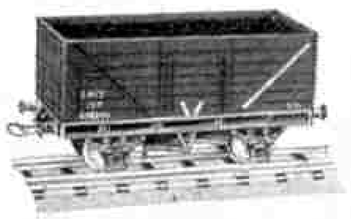
CLOCKWORK

., L.N.E.R., G.W.R. or S.R. Contains Six-coupled Tank Locomotive (Reversing), Open Goods Wagon, Goods Van, Goods
Straight Rails. Price **27/6**

NS ARE MANUFACTURED IN LIVERPOOL BY MECCANO LIMITED

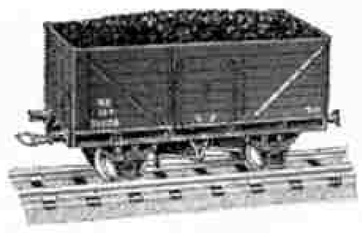
NEW THIS MONTH

HIGH-SIDED WAGON L.M.S. and N.E.



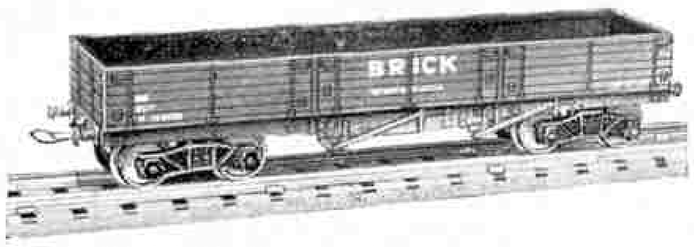
Represents the standard mineral wagon with high sides. Finished L.M.S. Bauxite brown or N.E. grey with diagonal white stripe. Price **1/6**

HIGH-SIDED COAL WAGON L.M.S. and N.E.



A model of the standard type of high-sided mineral wagon, with a realistic load of coal. Price **1/9**

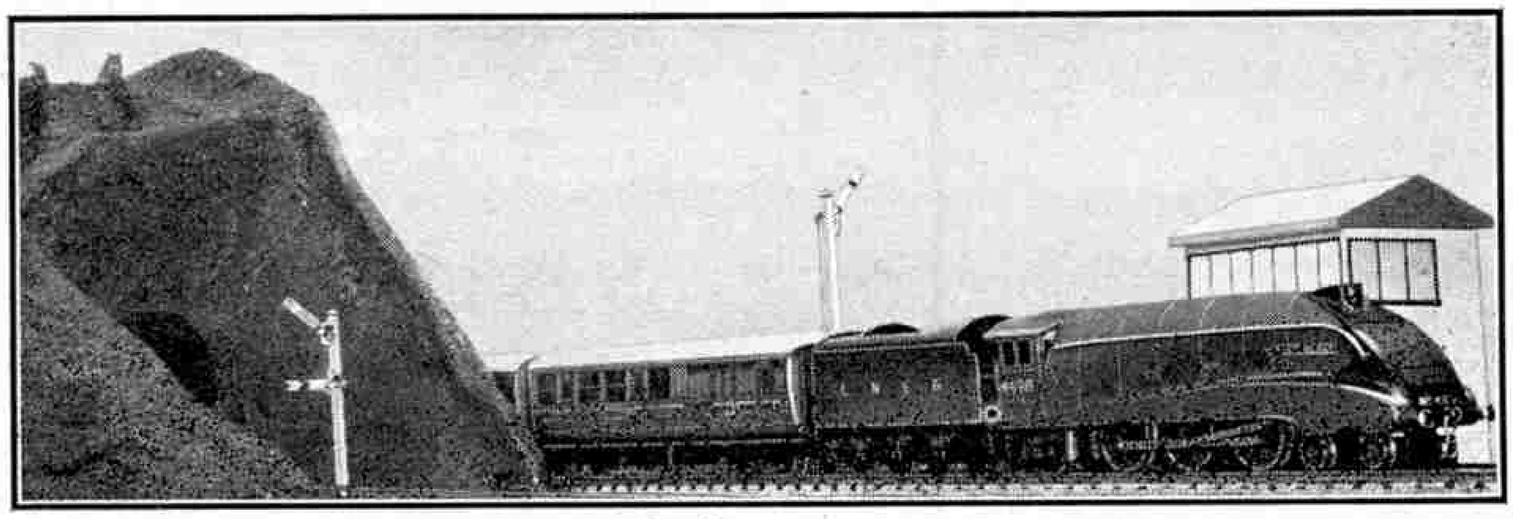
HIGH-CAPACITY WAGON N.E.



Scale model of the L.N.E.R. bogie wagons used for brick traffic. Price **3/6**

Developing a Hornby-Dublo Railway

Hints on Installing a Satisfactory System



A striking view of a Hornby-Dublo express emerging from a tunnel. The up and down tracks pass through separate bores, and the mouth of the further tunnel is hidden by the outcrop of "rock" between the tracks.

OWNERS of Hornby-Dublo railways will be thinking of possible expansions of their systems to be carried out during the coming months. Those who are starting a layout now or intend to have one shortly are sure to have the desire to build this up gradually, and will already be considering different schemes of development. It will therefore be interesting to work out some of the ways in which a Hornby-Dublo system can be extended to advantage.

In the actual installation of a Hornby-Dublo railway there are various points to be weighed up. The line can be arranged on a table, for the Hornby-Dublo System is the ideal table railway, and if this can be set aside for miniature railway purposes the track can be laid directly on it and left more or less permanently in position.

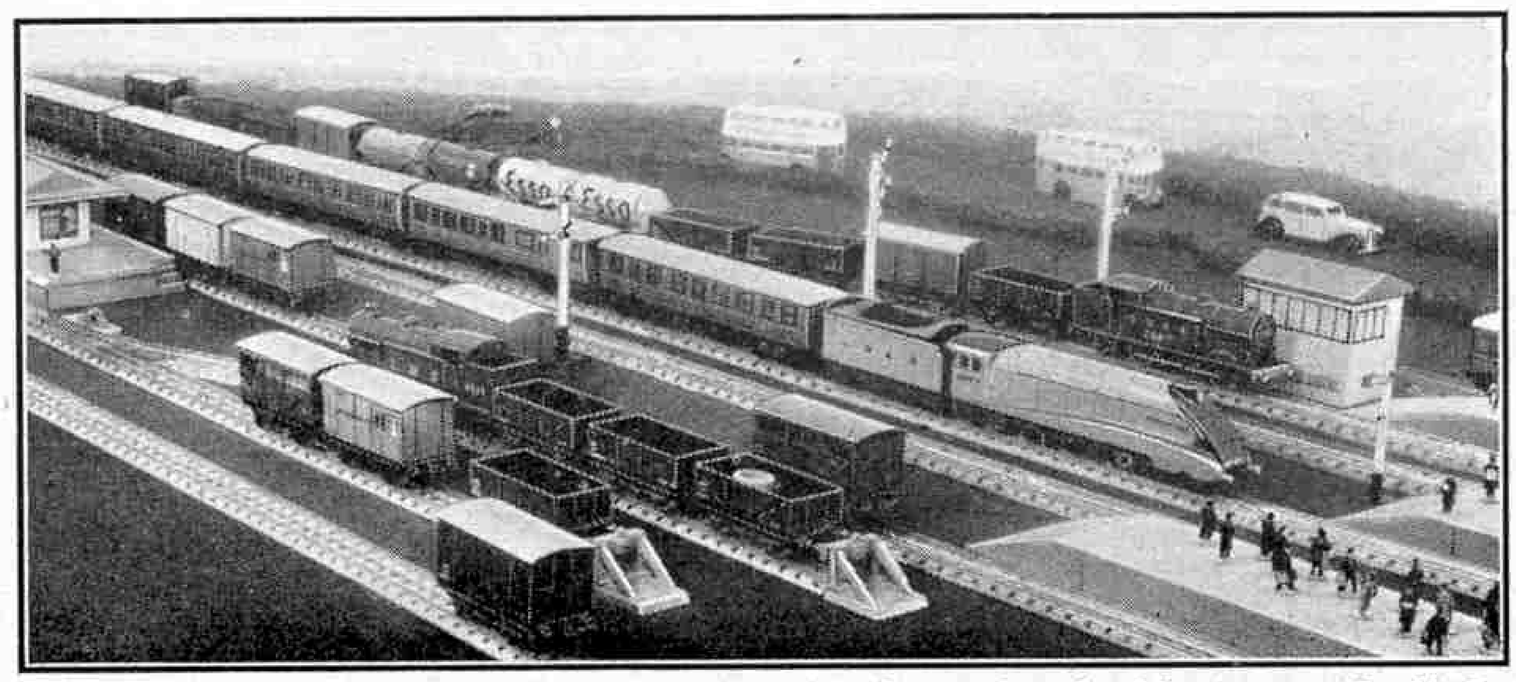
In most cases the railway has to be put down and taken up again each time it is used when a table forms the baseboard. An improvement on this arrangement that is very popular is to use as a support for the railway one of the special Hornby-Dublo boards. These are available in three sizes, 6 ft. by 3 ft., 6 ft. by 4 ft. and 8 ft. by 4 ft. Details of these boards are contained in the special folder *"Suggestions for Hornby-Dublo Rail Layouts"* that can be obtained free from any Meccano dealer. The boards can be used for any track formation that is favoured by the miniature railway engineer, and for the guidance of the Hornby-Dublo owner the folder referred to includes plans of six different formations for the different sizes of boards, with details of the rails and accessories required.

If the track is laid permanently by being screwed down on a board of this kind the railway can be brought into use instantly, the board itself being supported on the table. When the railway is not in use the board can be conveniently stored away with the track on it, the accessories and other items being removed and kept in their own boxes. The boards are made of special material and are extremely attractive in appearance. Although light in weight they are stiff enough to allow of their being stored by standing on edge against the wall. Thus the railway equipment will not take up much space when not in use, an important consideration in many homes.

The next step from a semi-permanent railway of this kind is the installation of a permanent miniature railway. This of course is only possible where a room, or part of one, can be set aside for the purpose and we hope to deal specially with the arrangement of permanent Hornby-Dublo systems later on. In the meantime we should like to hear all about the railways of readers who have in use permanent systems, such as that of Mr. V. J. Martin, Newcastle, which was described in the *"M.M."* in February last, or that of N. A. Sharples, also of Newcastle, described in July, and invite them to write to us.

Although Hornby-Dublo railways can be arranged on the floor this scheme is not very successful, for the trains cannot then be seen to the best advantage and much of the thrill of their operation is missing when it is seen from a more or less aerial view. Apart from that it may be difficult to secure satisfactory levels and perfect alignment of the track, for the rails are naturally more affected by differences in level caused by the line passing from carpet to lino and so on than is the case with Gauge 0 equipment. It is much better therefore to raise the railway on a table, or on some other suitable support.

The beauty of this arrangement is that operators can "get round" the line so easily. With the layout laid on the floor they always seem to be climbing over one another! On the other hand, with a table railway it is possible for the operators to sit on opposite sides of the table or at all events at convenient spots, without getting in one another's way.



Part of a complete Hornby-Dublo layout, showing the main line with a goods yard and depot on one side of it. On the far side is a loop line used by slow passenger and goods trains.

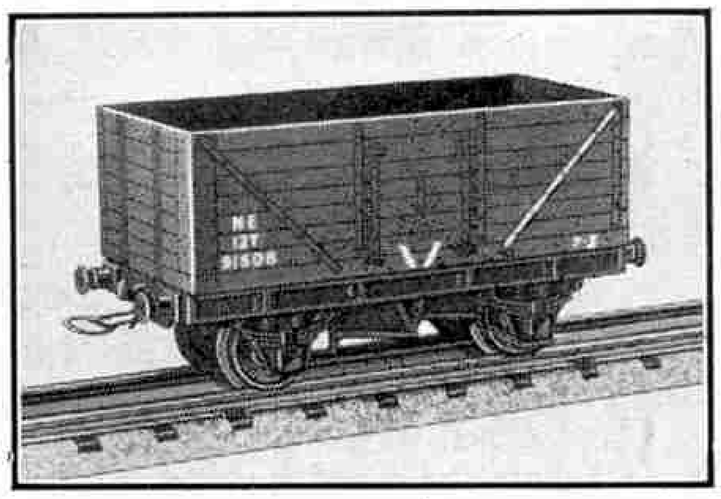
More New Hornby-Dublo Wagons

Rolling Stock for Brick and Coal Traffic

IN the April and May issues of the "*M.M.*" the first of the new season's Hornby-Dublo Wagons and Vans were described. These included the "Esso" and "Power Ethyl" Petrol Tank Wagons and the "Royal Daylight" Oil Tank Wagon, a loaded Coal Wagon and a selection of well-known types of vans. Now another series of interesting wagons is ready. These wagons are an L.N.E.R. High-capacity Brick Wagon, L.M.S. and L.N.E.R. High-sided Open Wagons and L.M.S. and L.N.E.R. High-sided 12-ton Coal Wagons supplied complete with a realistic load of coal. Three of these new items are shown in the accompanying illustrations, which demonstrate their attractive and realistic appearance.

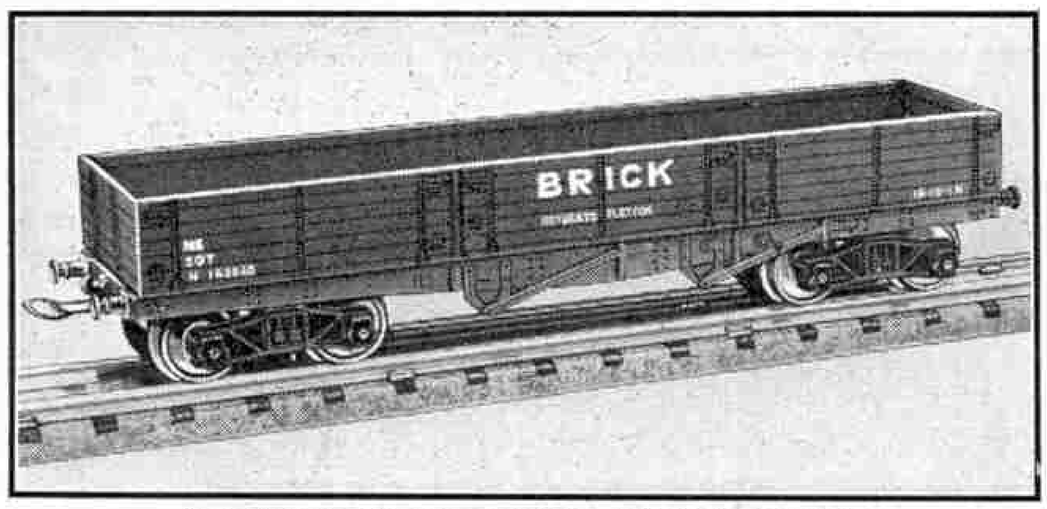
Like all other Hornby-Dublo rolling stock, the latest wagons are fitted with automatic couplings. Their bodies are built on the standard Hornby-Dublo wagon base, and are finished and detailed by the tinprinting processes used with such excellent effect for all other Hornby-Dublo rolling stock. The base is manufactured by pressure die-casting so as to permit as much detail as possible to be included in its design, including springs, brake handles and other items.

The Hornby-Dublo High-capacity Wagon represents the well-known timber-bodied 50-ton wagons used



Scale model of a high-sided 12-ton mineral wagon.

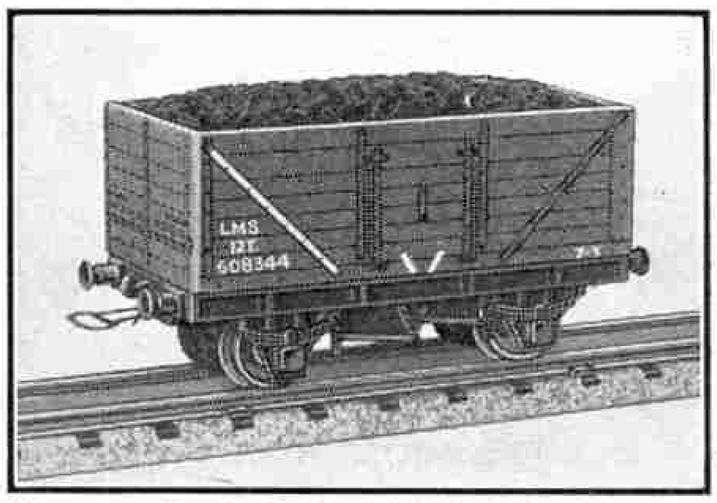
by the L.N.E.R., which are capable of carrying a load of some 20,000 bricks. These wagons are particularly associated with the brick traffic conveyed from the famous brickfields of the Peterborough district to King's Cross and other parts of the system. Many of them are fitted with automatic brakes and can therefore be run at express speeds, and indeed an up "brick express" is operated regularly from Peterborough. The main purpose of the wagons is clearly indicated by the word "Brick" that appears prominently on their sides, but they can be used for other goods requiring a vehicle of 50 tons capacity or with a greater length than is normal.



A realistic model of an L.N.E.R. 50-ton brick wagon.

On the prototype the sides are divided into three sections, each section being arranged to open downward in a similar manner to the drop side doors of an ordinary railway goods wagon, and the necessary support between the adjacent ends of these sections is obtained by pressed steel stanchions attached to the underframe. The representation of these features has been carried out very well in the tinprinted design on the new Hornby-Dublo wagon. There are also stop plates on each of the door sections, with corresponding fittings on the solebars, the purpose of these in actual practice being to prevent damage to the doors when they let down.

The lettering and similar items of the real wagons are completely carried out on the miniature, the Company's initials "N.E." being shown in the bottom left-hand corner of the vehicle, together with the running number and the capacity of the vehicle, exactly as in actual practice. The tare weight is shown in the bottom right-hand corner, and



The new Hornby-Dublo High-sided Coal Wagon.

the wagon is finished in the correct colours of the prototype, a red-brown shade used by the L.N.E.R. for brake-fitted and "piped" freight vehicles.

The long base of the Hornby-Dublo Brick Wagon is die-cast in one piece and all its essential detail is accurately represented. The bogies also are die-cast, and they are exact replicas of the real diamond framed bogies used for these wagons.

Another attractive new wagon just introduced is the High-sided 12-ton Coal Wagon, which is a scale model of the standard type seen every day on real railways. The wagon body is built on the standard Hornby-Dublo chassis. It is tin-printed and has all essential features, including a white diagonal line indicating that the wagon has an end door as well as the usual side doors. The horizontal boarding, corner plates and strappings are faithfully reproduced. The owning railway company, wagon number and its capacity are correctly indicated in the bottom left-hand corner.

Coal trains are common on practically all railways, and the new Hornby-Dublo High-sided Coal Wagons are ideal for making up this type of train. The Low-sided 12-ton Hornby-Dublo Coal Wagons already included in the series can be used in the same train as the new High-sided Wagons and between them they make a very fine coal train. The new wagons are available in the now familiar Bauxite brown of the L.M.S. and the grey of the L.N.E.R. They can be used very effectively for "Loco Coal Only" wagons and two or three of them standing in the locomotive yard add greatly to the realism of the scene. The end door tipping characteristic makes wagons of this kind ideal for conveying coal for shipment or bunkering or for any purpose where it is necessary to tip the coal by means of a special coal-handling plant.

"From Our Readers"

These pages are 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.

How I Drove My First Locomotive

A little while ago I made my first journey as driver of a steam locomotive. This was not a full-sized engine, but one of the two splendid "Atlantics" of the 15-in. gauge Lakeside Miniature Railway at Southport shown in the lower illustration on this page; and the run was from Pleasureland Station to the Pier, about half a mile and back.

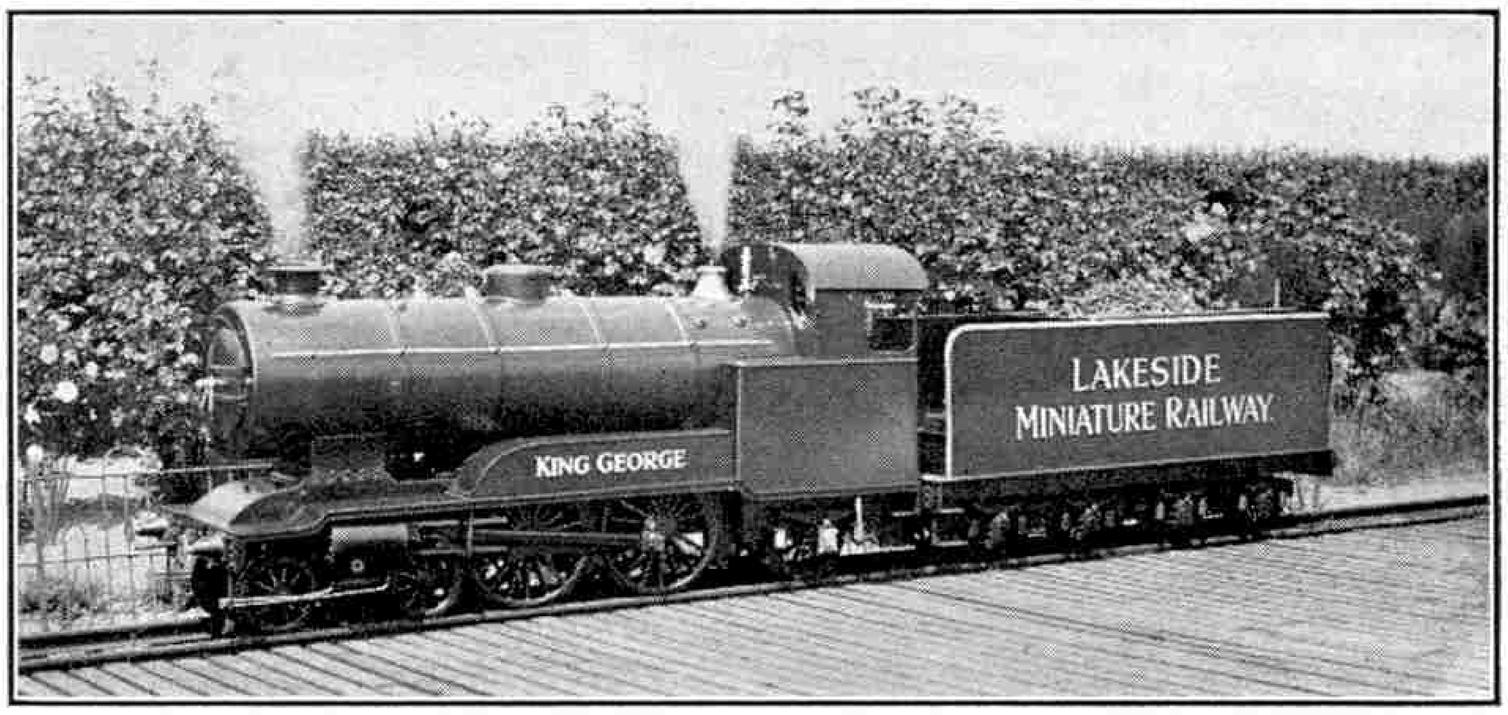
These two engines are well designed and built, and have many features that make them attractive to the locomotive enthusiast. For instance, their wheels are tyred just like those of real engines, each wheel centre being a separate steel casting with the tyre shrunk on and further secured by a retaining ring. Superheaters are provided, and to look after the lubrication of the valves and pistons a special miniature version of the mechanical lubricators used in actual practice is fitted to each engine. At the front end the pipes from the cylinder cocks are led forward and clipped to a stay attached to the buffer beam.

After inspecting the engine, in company with its enthusiastic owner, Mr. H. N. Barlow, I was invited to mount the "footplate." Actually the driver sits on a comfortable seat at the forward end of the large bogie tender, and from this position I found that a good look-out ahead was afforded, and all the cab fittings shown in the upper illustration on this page were easily reached.

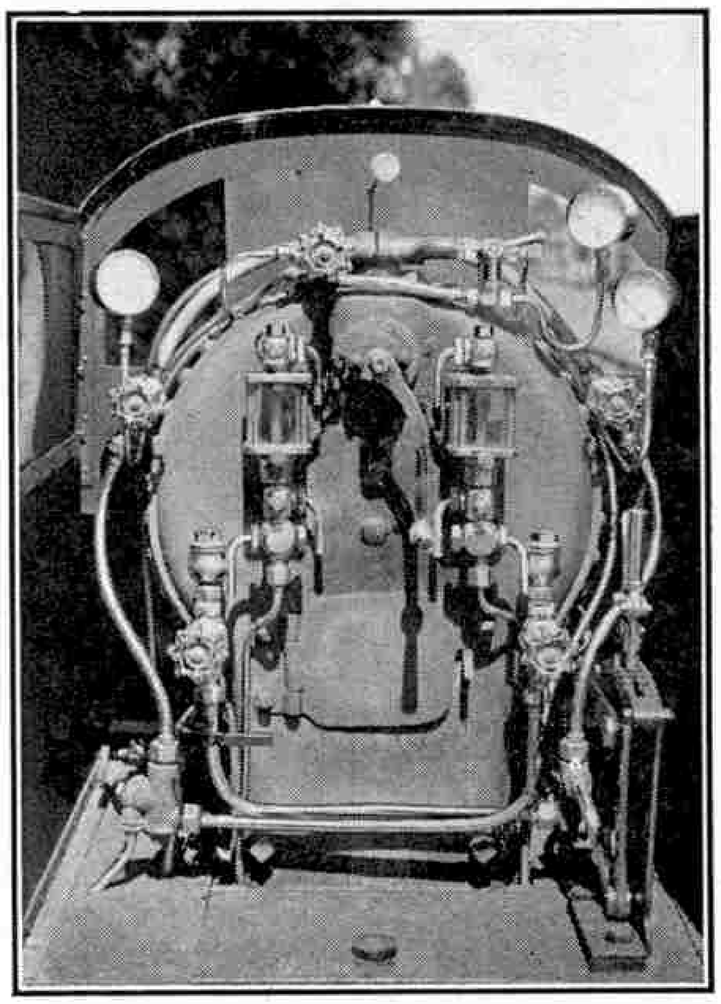
The engine had brought in the train at Pleasureland Station from the Pier, and my first run was made with the engine pushing its train, as there is no "run-round" arrangement. I did not "know the road," and in addition permanent way operations were in progress along the line, so Mr. Barlow perched himself up on the tender top and acted as "pilot."

When I took over, the pressure gauge and water gauge readings were satisfactory. The regulator was closed, the reverse lever in mid-gear, and the cylinder cocks were open. I released the hand brake on the tender, and at a sign from my pilot put the reverse lever into backward gear and gently patted open the regulator handle. It was a distinct thrill to feel the engine begin to move with sharp well-timed exhausts from the chimney. After the first few revolutions I shut the cylinder cocks, and as we were now on the main line straight I was able to open the regulator a little wider.

So we progressed backward until, at a short distance from the Pier end of the track, my guide instructed me to shut off steam. By manipulation of the brake I was able to make quite a fairly respectable stop. The reverse lever was now put back into mid-gear and the cylinder cocks were opened once more.



This "Atlantic" engine of the Lakeside Miniature Railway, Southport, was driven by our contributor L.C.N. on the journey described on this page. The illustrations on this page are reproduced by courtesy of H. N. Barlow, Southport.



The "footplate" and cab fittings of the miniature "Atlantic."

A little later we made the return journey, and as the engine was now leading it was from my point of view a more satisfactory run. I released the brake and opened up as before, and after the engine had got into its stride I was delighted to find that the motion could be "notched-up" in the orthodox manner, for the reverse lever is mounted on a proper notched quadrant plate. I enthusiastically whistled our approach to the plate-laying gang, and as their work did not necessitate a reduction of speed we were able to sweep by them in good style.

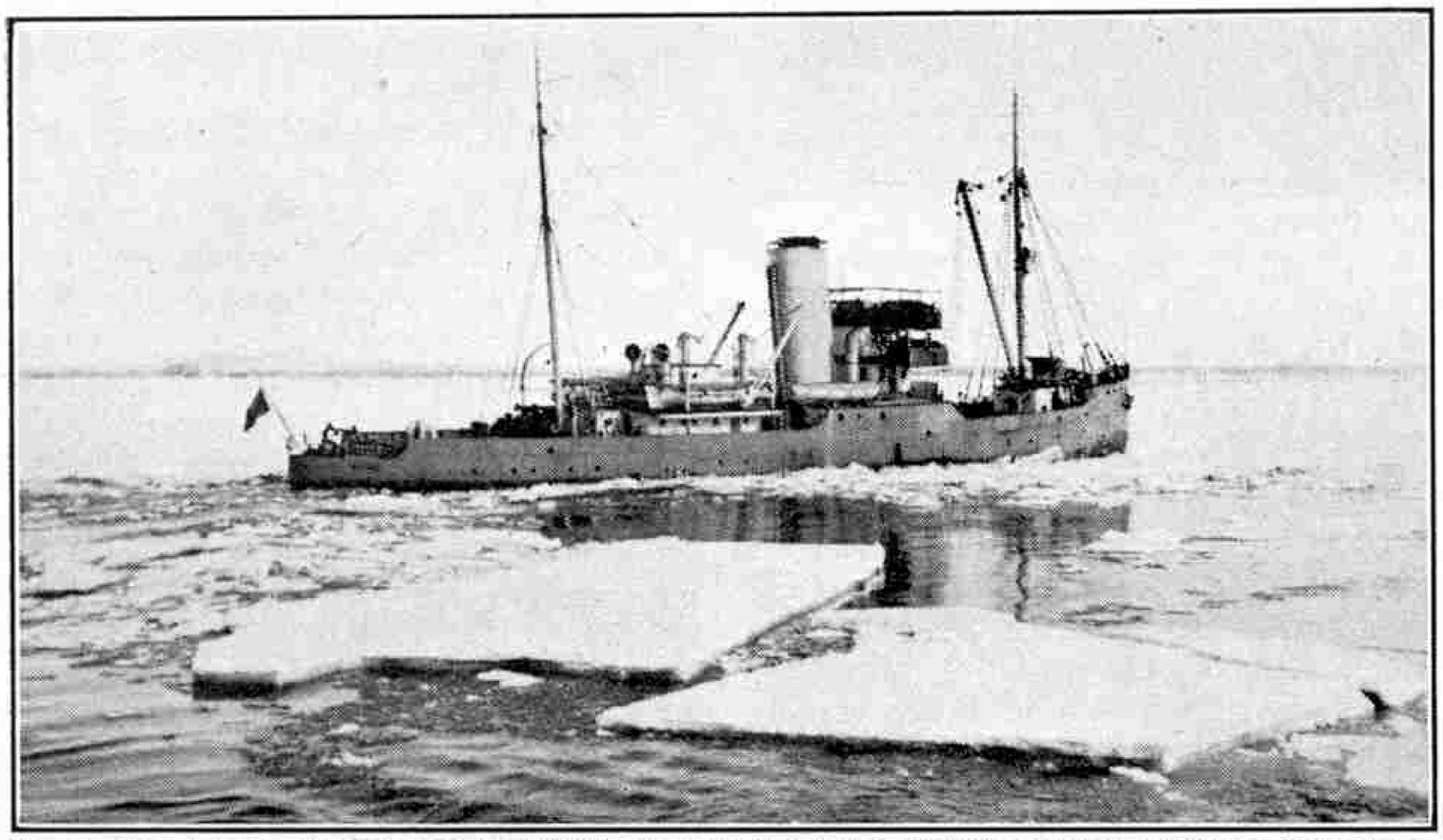
All too soon we approached the points which, I was instructed, form a mark for shutting off steam. Almost regretfully, it seemed, the little engine ceased puffing, and I eased the train alongside the platform, making quite a "professional" stop with the aid of the brake. I was really sorry to have to leave the splendid "Atlantic" on which, for a short time at least, I had been a "real engine driver." L.C.N.

Aboard a Canadian Ice Breaker

The first glimpse I got of the ice breaker was on arrival at the Imperial Oil Wharf at the east end of the Island of Montreal. She was the "*N.B. McLean*," flagship of the ice-breaking fleet, a plump, snub-nosed ship, drawing about 40 in. Her waterline was scarred, evidence of many heroic battles with the cold demon of the North.

Soon after I boarded her she slid away from the wharf, and an air of expectancy arose on the foredeck as all peered ahead at the nearing edge of the field of ice and snow that stretched as far as the eye could see. Great pieces of ice drifted past us as the *"Saurel,"* which accompanies the *"N.B. McLean,"* worked a short distance ahead.

We were now speeding ahead at 16 knots towards the icefield. Nearer . . . nearer . . . then we hit! There was a crunching sound, and we came to a sudden stop. Peering over the side I saw the bow settling down on the ice, sending out fissures 150 ft. long, just like a miniature earthquake. As the cracks grew pieces of ice broke off and sailed away downstream.



The Canadian ice breaker "N.B. McLean" clearing a passage through an icefield on the St. Lawrence River. Photograph by J. A. Rodriguez, Montreal.

With the bow resting 100 ft. up on the ice, the command "full speed astern" was given. The ship trembled like a horse at the starting gate as the Diesel engine turned the twin screws in an effort to free the ship. More pieces of ice broke off as the backwash hit the ice, and they could be seen bobbing and dancing up and down in the eddies. Slowly the great hull eased off the ice, and when free we withdrew a quarter-mile downstream, dodging pieces of ice by judicious use of port or starboard propeller.

Then once more we steamed ahead, and the keen prow drove head-on to meet the formidable white foe, accompanied by cheers from the thousands of spectators who line the shore.

Eventually, as the sun sank behind Mount Royal, we turned about and made for the Wharf, after having smashed our way steadily for two miles through ice from 13 in. to 30 in. thick.

J. A. RODRIGUEZ (Montreal).

A Bridge that Eiffel Built

Oporto, Portugal, is rightly famous for its bridge, Ponte de dom Luis Premeiro, which spans the River Douro at a height of 235 ft. above the water in one graceful arch of 525 ft. It has two roadways, the lower one 35 ft. above the river, and the second one 200 ft. higher.

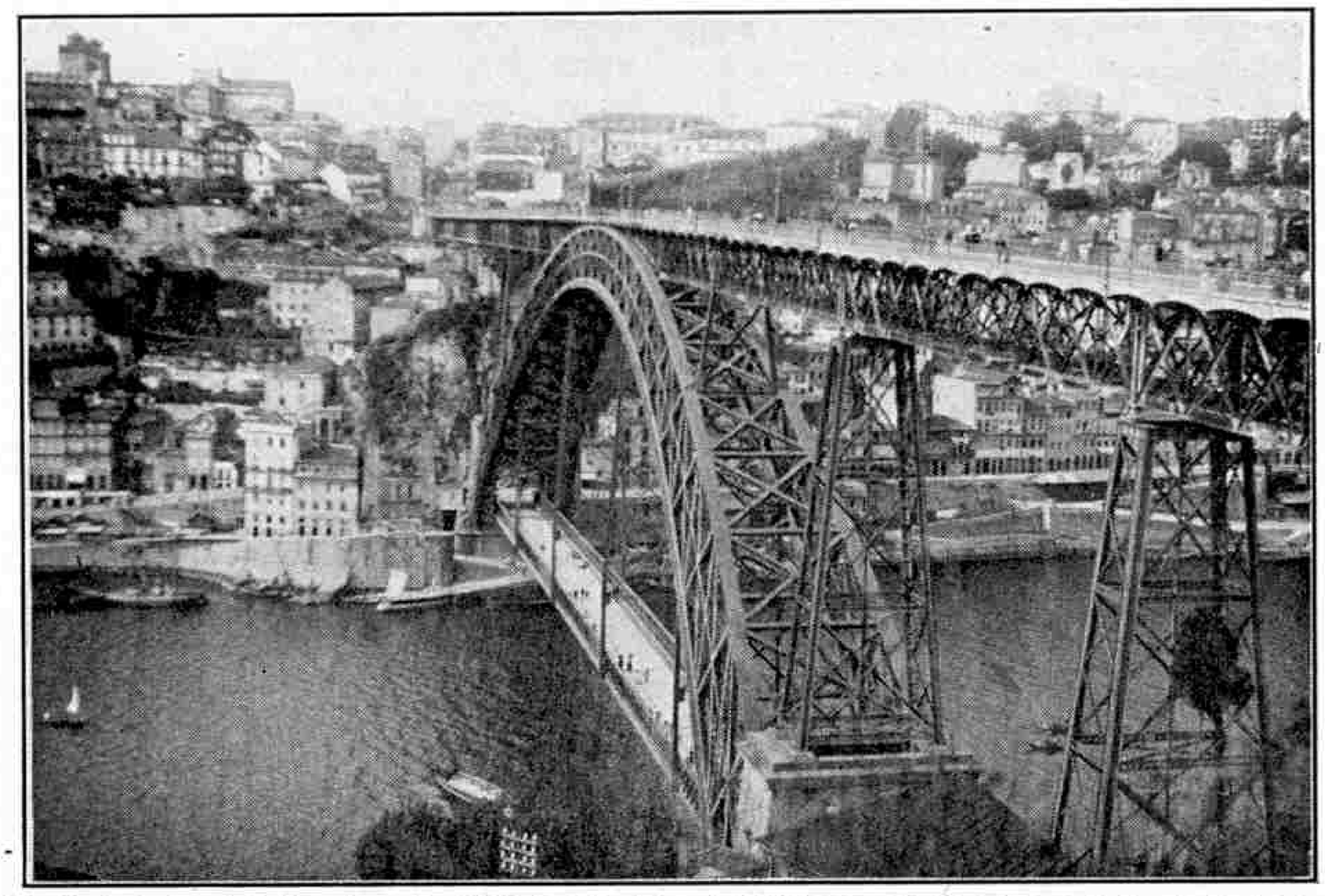
When in Oporto recently I crossed the upper deck of this bridge, from which a wonderful panorama presented itself. The view downstream gave me a busy picture of riverside activity, for on the left bank runs a long line of port wine warehouses; and looking down I saw a white-sailed wine boat making its way against the stream, a truly splendid sight. On one side of the gorge is a pile of colour-washed cottages, with red-tiled roofs, presenting a fine display of colour, as though they had been stuck on the face of the cliff.

The Ponte de dom Luis Premeiro was one of the first outstanding engineering achievements of Alexandre Eiffel, and was built in 1876. Eiffel of course is most famous for the great 984-ft. Tower that he built in Paris during the years 1887-9. A task that he undertook that is not so well known was the building of the framework for Bartholdi's colossal Statue of Liberty at New York. H. R. BAND (Glossop).

A Famous Observatory

In July I visited the observatory on Salcombe Hill, near Sidmouth, founded in 1913 by Sir Norman Lockyer, K.C.B., F.R.S. There are three domes. One is 20 ft. in diameter and contains a twin telescope with object glasses of 10 in. and 12 in. The latter has a camera attachment for photographing the spectra of the fainter stars. The Mond Photographic Equatorial Dome is used purely for photographing stars and comets, and there are four cameras mounted in the telescope. The Kensington dome contains a twin telescope for visual and photographic purposes.

B. E. KINGDON (London).



The Ponte de dom Luis Premeiro, a fine bridge built by Alexandre Eiffel across the River Douro, in Oporto, Portugal. Photograph by H. R. Band, Glossop.

Painting the heraldic lions of the English quarterings of the Royal Standard.

Flags for all Nations

By G. Bernard Wood

THE gay business of providing flags for all nations is one in which 20 men and girls at a Leeds factory have a share. Flag-making is a means of livelihood that brings them into daily contact with the pageantry of nations, and from one end of the year to the other they are kept busy making flags that go to all parts of the world. One day the aborigines, alligator and cones of the Jamaican flag may pass through their hands; another day they may be dealing with the strange flags of some Indian prince or of an African chief; the rest of the week perhaps may be taken up with the elephant and temple of Ceylon, the salmon and thistle of Nova Scotia, or the familiar heraldic devices that comprise the British Royal Standard.

Behind the flying of flags there is a vast and ceaseless industry. In this particular factory, one of the oldest in the trade, bunting is used exclusively in making flags because of its light weight, strength and durability. Some of the devices are printed on the bunting, others are painted in oils; while others again are simply cut out and later sewn into the flag.

Let us glance inside the printing room. Surrounded by huge stacks of bunting there is a long, narrow table at which the printer works with his comparatively simple equipment. A length of bunting of the required ground-shade is secured to the table by means of steel pins, and the printer then brings into use the appropriate block. Each block, made by his own hands, is of wood, and bears some national or provincial device such as a cross, crown, or a bar. The block is dipped in the dye and then applied to the bunting, the smaller designs being repeated several times.

The various colours have first to undergo a rigorous test. They must conform to the recognised standard shades, and they are submitted to the Manchester Testing House where the bright light of a fadometer is cast upon them for 364 hrs. in order to prove that they are really "fast."

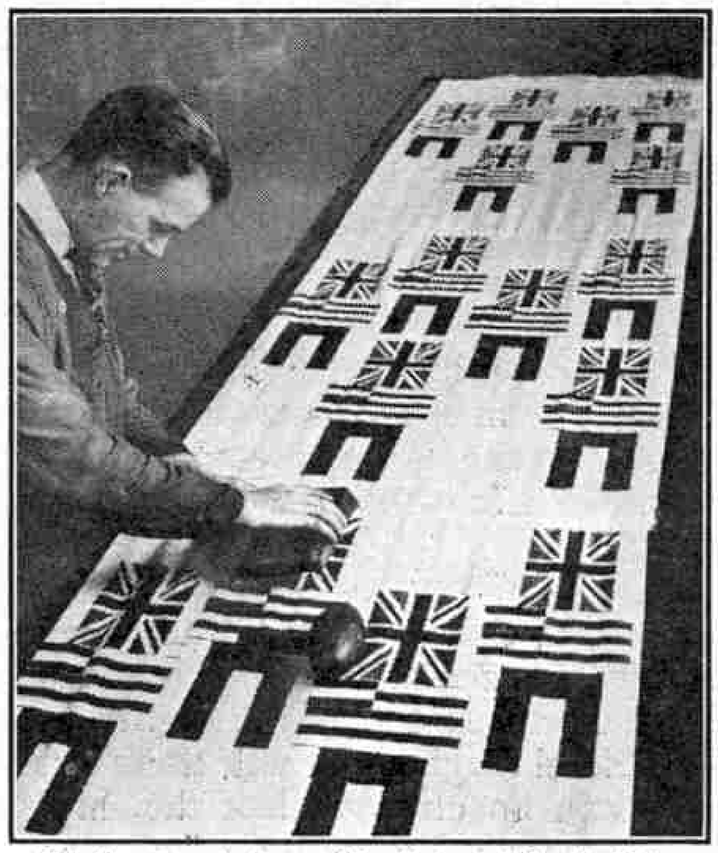
After being washed, steamed and washed again in the printing room, the incipient flags are taken to the machine room, where each section is cut out and sewn into the appropriate position on the ensign, banner or standard.

Consulates in most countries of the world get their flags from this source. Other flags are supplied in huge quantities to the British Admiralty, the War Office and the Air Ministry. And then there are the British Royal Standards, and the flags flown by every member of the royal family, each a heraldic joy to the beholder and a source of pride to the makers in this northern factory.

Many of the flags used in shipping have to be dispatched to some port on the ship's route, where they are picked up later by the captain. While en route he will have sent word that some of his flags are out of repair and need replacement. For example, during one of the *"Queen Mary's"* trips flags from Leeds were sent out direct to meet the ship on her arrival at a certain American port.

The range of flag designs is almost unlimited, and there is no fear of boredom among these flag-makers. For instance, consider the animal designs. There are the bison of Manitoba, the tusked lions of Rhodesia, the tortoises of the Seychelles, the antelopes of Somaliland, the elephants of Siam, the peacocks of Burma, and the black swans of Western Australia.

Trade designs are exceedingly entertaining. A set of wood-cutter's tools are displayed for the timber industry of British Honduras, the prairie and ears of wheat for the agriculture of Manitoba, an elephant and a palm tree for the ivory and palm-oil industries of Gambia and Gold Coast. Historical scenes, landscapes, colonial adventures, ancient



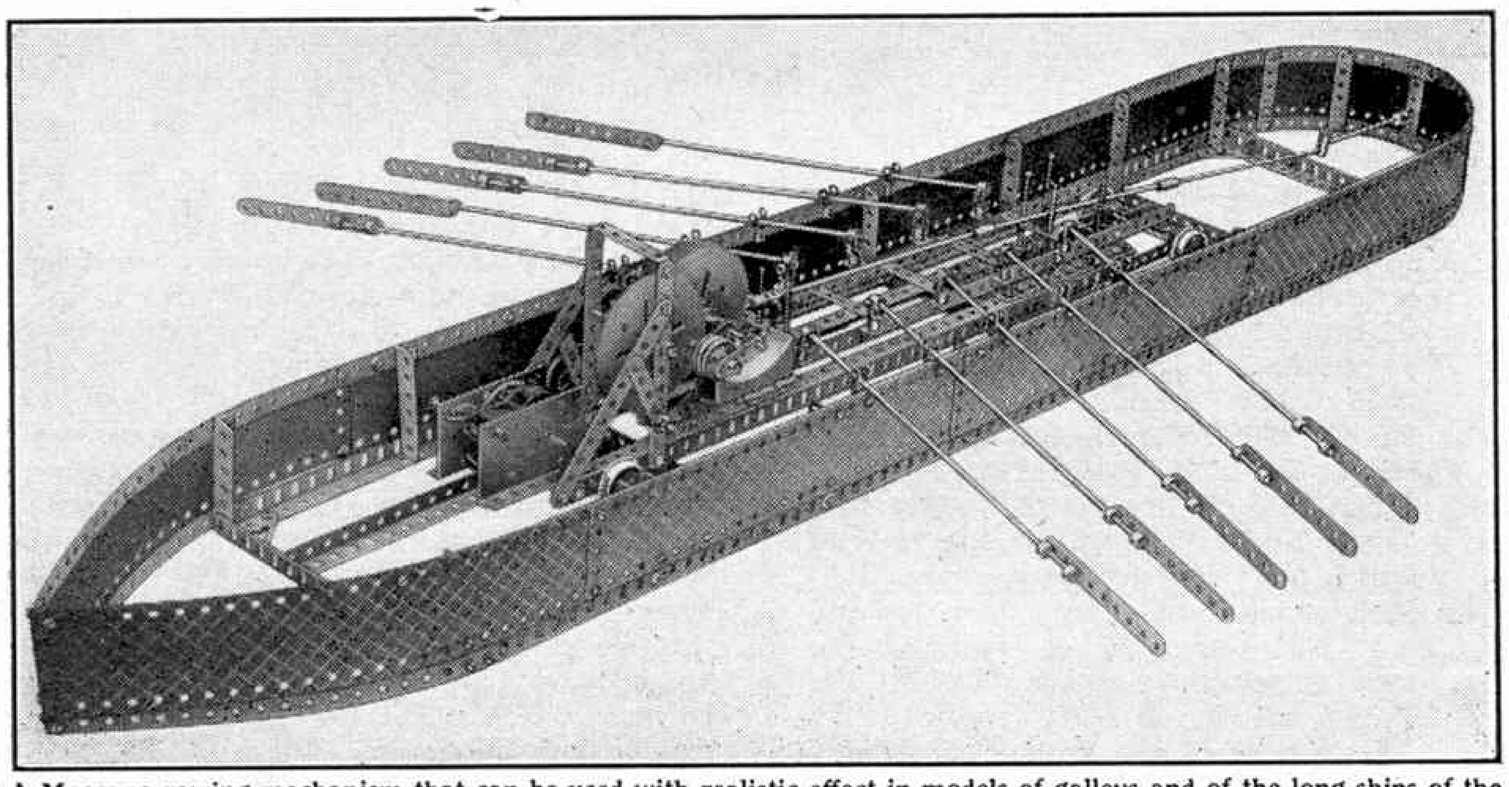
Printing flag designs of the Union of South Africa.

symbols—these and many other subjects make flag-making a reward in itself. Even the ubiquitous Union Jack can provide a sensation, as when, for instance, the firm makes its smallest copy, measuring 3 in. by 2 in., or its largest, measuring 27 yds. by 13½ yds., a monster flag that was ordered for an American skyscraper.

One of the strangest orders ever received came from an African chief. It was for a flag intended to illustrate practices from which his tribe had been freed, and portrayed a number of savages sitting round a camp-fire over which a stew-pot boiled—with a man inside!

A Meccano Rowing Mechanism

Realism in Galley and Viking Ship Models



A Meccano rowing mechanism that can be used with realistic effect in models of galleys and of the long ships of the Vikings.

THE Meccano Clockwork and Electric Motors form splendid power units for boat and ship models, whether these are built of Meccano parts or constructed of wood or metal and intended for actual service on water. Models representing modern steamships and power boats can be driven by propellers geared to the motors, and even miniatures of rowing boats, galleys and Viking ships, in which oars are employed, can be propelled in a most realistic manner by means of the ingenious mechanism described on this page. This has been designed by Mr. D. Cary Field, an Edgbaston model-builder, who after many experiments has produced a practical and interesting rowing mechanism.

Mr. Field's design is shown in the lower illustration on this page, and in the upper one it is seen mounted in a Meccano framework equipped with rowlocks to show how it is applied in practice. The blades of the oars in the model are made of Meccano Strips, but they can be equally well constructed of wood and then act exactly like normal oars when they are mounted in a suitable vessel, flashing backward through the air just above the surface of the water and then dipping for the return power stroke, giving a splendidly realistic effect while driving the boat forward.

The mechanism is simple to build and exact in operation. The hafts, or looms, of the oars are attached to a carriage that slides backward and forward in the boat, driven through gearing by a Meccano Motor. As the carriage moves towards the bows the blades of the oars dip into the water, and at the end of the stroke the framework to which the oars are attached is pressed downward so that the blades are raised from the water. Mr. Field installed his mechanism in a heavy boat, and then found that the very useful rate of striking of 28 to the minute was achieved.

The carriage to which the oar hafts are attached is mounted on four wheels that run in grooves at the bottom of the model boat in which the mechanism is installed. The frame of the carriage consists of side members, each built from two $12\frac{1}{2}''$ Angle Girders 1 overlapped seven holes, which are connected at one end by a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plate and at the other by a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plate. The Electric Motor 2 is bolted in position at one end, and two small Shafting Standards are bolted to the $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plate. Two $5\frac{1}{2}''$ Strips are fixed to the Girders 1, which are braced with further $5\frac{1}{2}''$ Strips and a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Double Angle Strip. The illustration shows how to construct the framework for the gearing.

The Pulley on the armature shaft of the Motor drives a 2″ Pulley 3 mounted on a $3\frac{1}{2}''$ Rod, on which is a $\frac{1}{2}''$ Pinion that in turn transmits the drive to the $3\frac{1}{2}''$ Gear 4 on another $3\frac{1}{2}''$ Rod. Two $\frac{1}{2}''$ Pinions on this Rod turn the two $3\frac{1}{2}''$ Gears 5, each of which is mounted on a $2\frac{1}{2}''$ Rod journalled in the Shafting Standards. A $\frac{3}{4}''$ Bolt fixed by lock-nuts in the outer circles of holes in the Gears 5 forms a crank-pin on which the Rod 6 is pivoted by means of a Coupling.

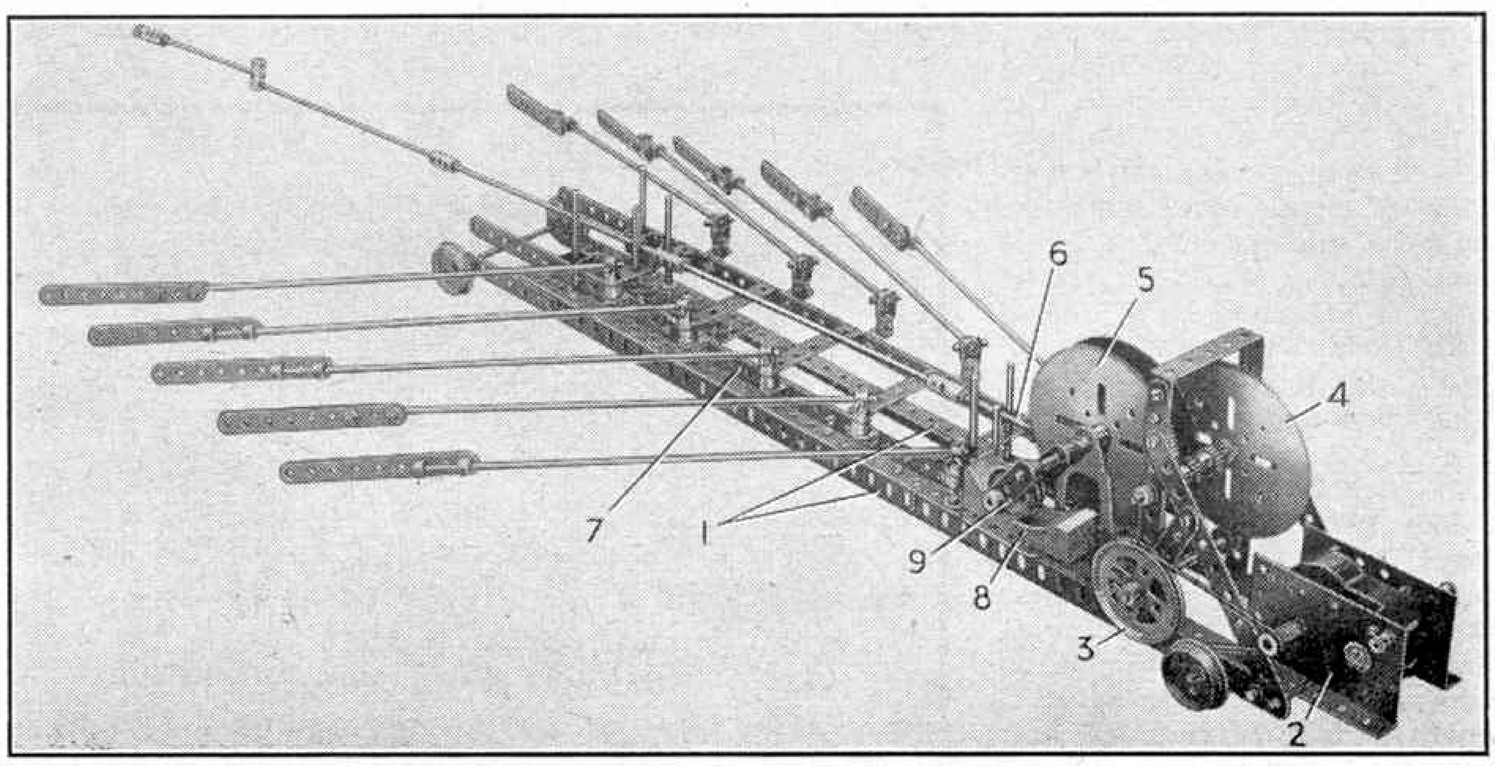
The next step is to make the frame 7, which transmits the motion to the oars. This consists of two side-members built up of $12\frac{1}{2}''$ Strips and connected with $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips. At one end Girder Brackets are fixed to the $12\frac{1}{2}''$ Strips and on them are screwed wooden blocks 8. These measure $2\frac{1}{2}$ in. long and are 1 in. wide. The top of each block is cut to a curve with a radius of $1\frac{1}{2}$ in. The frame is free to slide up and down on four Rods, which are fixed at their lower ends in Rod Sockets. The Rods pass through holes in the end Double Angle Strips that connect the side members of the frame. The rollers 9, one on each side of the mechanism, consist of 1″ Pulleys mounted on $1\frac{1}{2}''$ Rods journalled in the end holes of two Cranks. The Cranks are fixed on the Rods that carry the Gears 5. A compound rod 6 passes through the slotted hole of an Angle Bracket fixed to the Double Angle Strip remote from the Electric Motor.

When mounting the entire mechanism in a boat the compound rod 6, which has a screw adjustment, is anchored to a bracket in the stern.

The operation is as follows. The Electric Motor rotates the Gears 5 which cause the carriage 1 to move backwards and forward along the bottom of the boat. When the carriage is moving towards the bows, the oars enter the water and make the power stroke. At the end of the pulling stroke the rollers 9 bear on the blocks 8 and the frame 7 is then forced downwards on the upright guide Rods, with the result that the oars are lifted from the water. They are drawn back as the carriage moves towards the stern, and enter the water once more when the rollers allow the frame 7 to rise. The blades of the oars should be sufficiently heavy to make them fall and raise the frame 7 when this is released.

This novel mechanism can be put to good use in a great variety of models, for, as Mr. Field suggests, a Meccano boat could be mounted on wheels and on setting the rowing mechanism in motion the model would propel itself across the ground by the oars. The mechanism is so simple that it can readily be designed to accommodate a greater or smaller number of oars, and by altering the gearing the rate of striking can be adjusted to suit the particular boat in which it is incorporated.

We shall be glad to give further information to model-builders who would like to make use of this interesting mechanism in boats of their own.



The rowing mechanism removed from the boat to show the Electric Motor and operating gear.

Meccano Suggestions Section

By "Spanner"

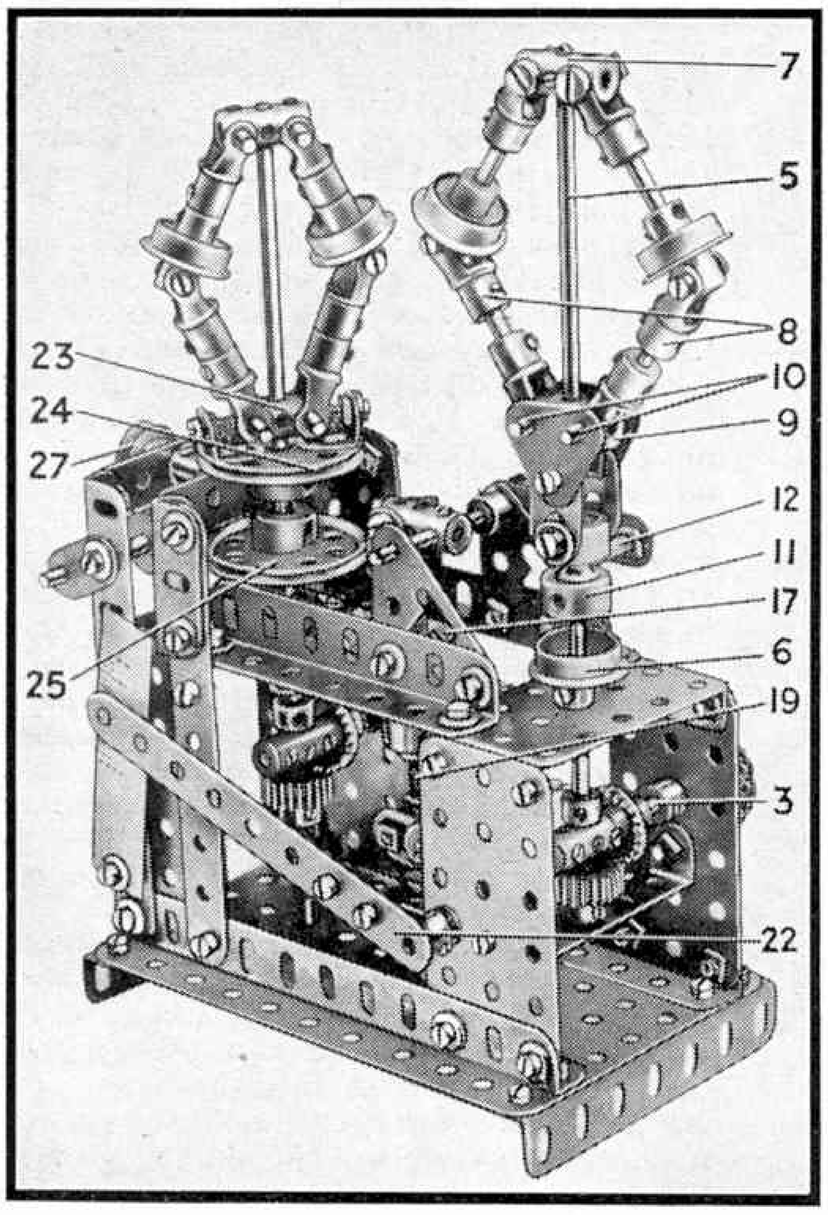


Fig. 447

(447) Knowle's Supplementary Governor

The mechanism shown in Fig. 447 is a reproduction in Meccano of Knowles's Supplementary Governor, a device that regulates the speed of a steam engine when the steam pressure falls below a certain value or there is a correspondingly unwanted increase. It really consists of two separate governors, known as the primary and supplementary governors, which operate in conjunction with each other. The two governors are driven by a Crank 1, Fig. 447a. Shafts 2 and 3 are connected by Sprocket Chain, and shaft 3 carries a ¾″ Contrate that drives a ¾″ Pinion on the vertical 8″ Rod 5. This Rod is journalled at its lower end in a 2½″ × ½″ Double Angle Strip and also in a 2½″ × 1½″ Flanged Plate, a ¾″ Flanged Wheel 6 is fitted to the Rod and immediately above this is secured the primary governor proper.

Two Small Fork Pieces are pivotally secured to a Coupling 7 by means of Pivot Bolts, and in the bosses of the Fork Pieces are gripped 1½″ Rods. Each Rod carries a ½″ fast Pulley and a ¾″ Flanged Wheel to form a weight. In the tapped holes of the Flanged Wheel two special set-screws removed from Swivel Bearings, are fixed, and these form pivots for a Small Fork Piece 8. The latter is attached to a second Fork Piece by means of a 1″ Rod, the fork of the second Fork Piece being fitted over the Coupling 9, where it is held in place by a Rod 10.

The two Rods 10 support two 1″ Triangular Plates, to the lower corners of which Flat Brackets are bolted. The Flat Brackets are also attached as shown to a Socket Coupling 11, which is free to slide up and down the Rod 5.

The groove in the Socket Coupling 11 accommodates one end of the Threaded Pin 12, which is locked in the end hole of a 2″ Strip bolted to a Crank. The Crank is secured on a 2″ Rod 13 that carries a Coupling 14, as shown in Fig. 447a. The end plain hole of this Coupling is fitted with a Pivot Bolt, on each end of which is supported a Flat Bracket. The two Flat Brackets are bolted rigidly to a Small Fork Piece 15, in the boss of which a 1″ Rod is free to turn. This Rod is held in place by a Collar 16 and a 1″ fast Pulley 17, a Washer being used for spacing purposes between the Pulley and Small Fork Piece.

The boss of the Pulley 17, which projects downwards, is gripped in one end of a Socket Coupling 18. The other end of this latter part is fitted with a Threaded Boss, into which is screwed the Threaded Rod 19. The unoccupied end of the Threaded Rod is fixed by means of a nut in one of the threaded holes of a Collar, which is secured by a Pivot Bolt to a 2″ Strip 20. A Crank, to which this Strip is fixed transmits the vertical movement of the Socket Coupling 18 to the Rod 21, on the end of which is secured the pointer 22. This pointer is fitted in place of the throttle lever of the actual mechanism, in order to indicate the amount of correction made by the supplementary governor.

The second or supplementary governor, which is shown on the left in Fig. 447, is driven in a similar manner to the primary governor, and its construction is almost identical. The Coupling 23 is attached by two ⅜″ Bolts and Angle Brackets to a 1½″ Pulley 24. A Socket Coupling connects this Pulley to a similar part 25.

A Coupling 26, Fig. 447a, carries a Dinky Toys Motor Tyre, and as the governor rises and falls the Tyre is rotated by one or the other of the Pulleys 24 and 25. This turning movement is transmitted to the 1″ fast Pulley 17 by a length of light cord or cotton, which passes around the fast Pulley 27 and the loose Pulleys 28. The operation of a governor of this kind is as follows. If the load on the engine to which it is fitted suddenly falls, or the steam pressure rises beyond normal, the supplementary governor rotates the Pulley 17 in an anti-clockwise direction. This movement unscrews the Threaded Rod 19 from its Threaded Boss and partially closes the throttle, thus cutting down the steam supply and adjusting the speed of the engine to its normal value. Control is then taken up again by the primary governor. If the load on the engine is increased or the steam pressure falls, the reverse action takes place.

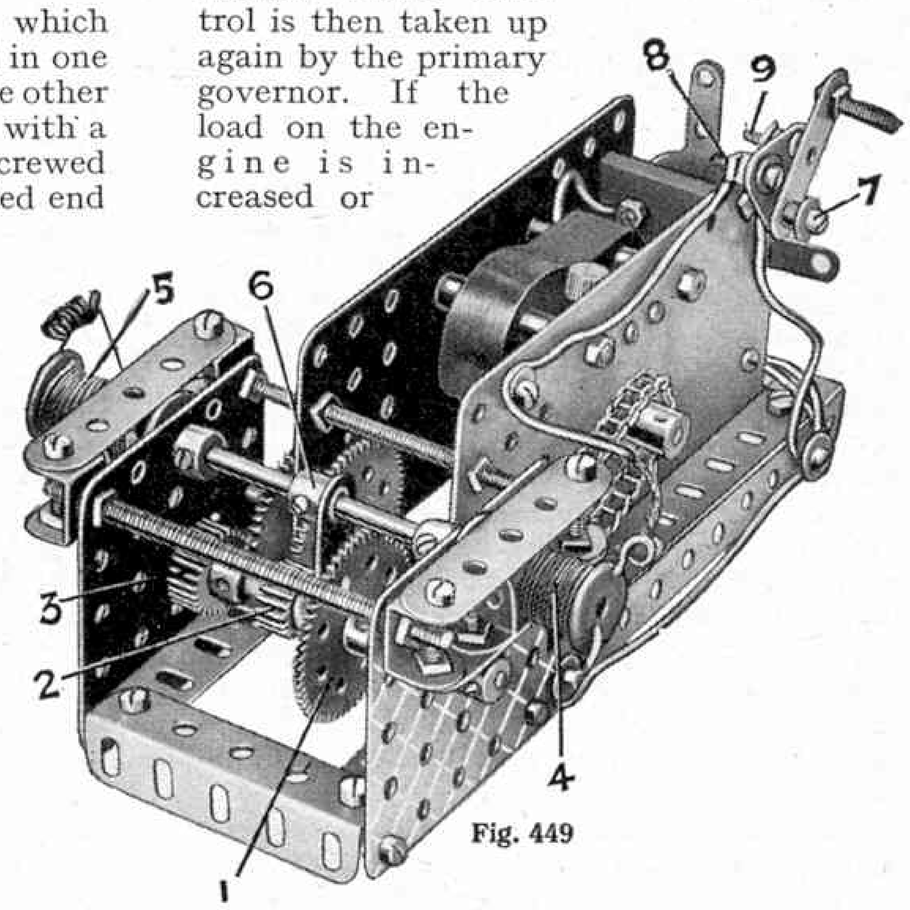


Fig. 449

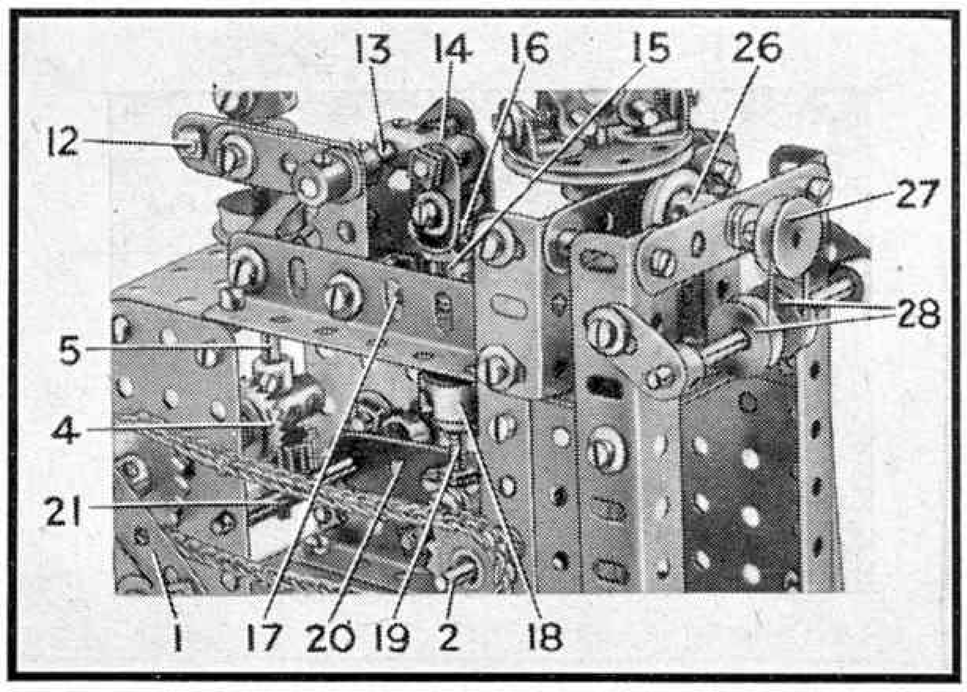


Fig. 447a

(448) Axle Springing

(W. Henry, Toronto, Canada)

The attention paid by car designers to suspension systems has aroused the interest of the Meccano enthusiast, for he too is concerned with the inclusion of a complete true-to-type suspension system in his model vehicle.

Fig. 448, on the opposite page, shows a suspension of the swinging axle type that is suitable for heavy model carts or motor cars. The axles are mounted on a beam consisting of two 3½″ Strips spaced apart by Double Brackets, and fitted in the middle with two Flat Trunnions. The axles, 2½″ Strips spaced by Double Brackets, are pivotally mounted on a 1″ Rod that passes through the Flat Trunnions and are connected to the beam by 1½″ Rods 1, on which are fitted Compression Springs. An Aeroplane Collar is fixed on each end of the Rods. The bolts holding the Double Brackets carry two washers under their heads, so that the Collars have free movement.

(449) Remote Control for Gear-Box

(L. F. Atkinson, Croydon)

The remote controller for an Electric Motor described in *"Suggestions Section"* for July 1939 aroused much interest and Fig. 449 shows another device for this purpose. The mechanism is intended for operating a two-speed gear-box from a distance, and in a model with several movements it will be necessary to fit a controller for each movement.

The two-speed gear-box shown in the illustration is mounted between $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates and the Motor side plates. The drive from the armature shaft of the Motor is conveyed through Sprocket gearing to a $1\frac{1}{2}''$ Rod journalled between one of the Motor side plates and a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plate. The Rod carries a $\frac{1}{2}''$ Pinion that is constantly in mesh with the Gear 1 on a sliding $3\frac{1}{2}''$ Rod, which carries also a $\frac{1}{2}''$ Pinion 2 and a $\frac{3}{4}''$ Pinion 3. A Collar at each end limits its longitudinal movement. The final driven shaft consists of a further $1\frac{1}{2}''$ Rod journalled co-axially with the first in the opposite Motor side plate and Flat Plate. The two Rods must be in proper alignment.

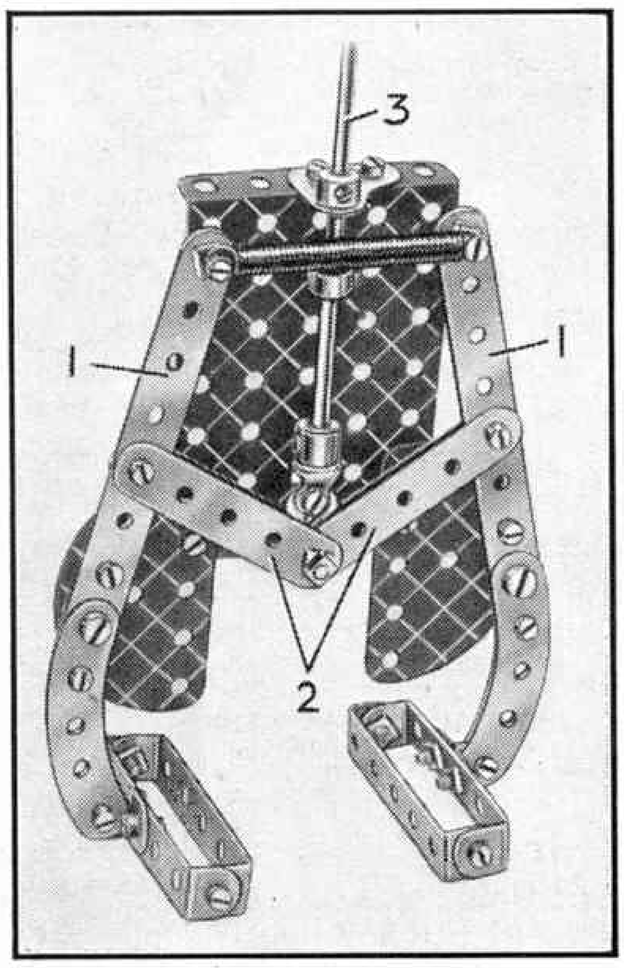


Fig. 450

The selector consists of a Crank 6 the web of which fits between the Gear 1 and Pinion 2. It is spaced from the Gear by Washers. The boss of the Crank is fixed on a sliding Rod, the ends of which project beyond the Plates and are inserted in the solenoids 4 and 5. These are made from Meccano Bobbins wound with 23 SWG. copper wire and are clamped in position by $2\frac{1}{2}''$ Strips secured at each end to Double Brackets. The lower Strips carry Angle Brackets centering the solenoids.

The gear control switch is shown near the Motor reversing switch for convenience, but can be taken to any position. A 1" Triangular Plate is held on a $\frac{3}{4}''$ Bolt 7 by two nuts, and two further nuts hold it in position on the Motor. Two 6 B.A. Bolts 8 and 9 are insulated from the Triangular Plates and form studs for the contact arm, made from a $1\frac{1}{2}''$ Strip, which is mounted on the Bolt 7, and held against the heads of the 6 B.A. Bolts by a Compression Spring. The Bolt 8 is connected to one end of the wire of the solenoid 4, the other end of which is connected to one of the Motor terminals. The same Motor terminal is connected to the solenoid 5, which is wired to the Bolt 9.

One of the wires from the Transformer is connected to the remaining Motor terminal and the other is "earthed" by fixing it to the frame of the mechanism. With the lever as shown the solenoid 5 is in series with the Motor and causes the Crank 6 to bring the Pinion 2 into mesh with the 57-teeth Gear, at the same time throwing the Pinion 3 out of engagement with its respective Gear. The solenoid 4 is energised when the control lever is moved to the left to make contact with the Bolt 8 and this causes the Pinion 3 to engage with its Gear Wheel. The mechanism works only when the Motor is in operation.

(450) Bicycle Brake

(L. Dean, Northampton)

The model shown in Fig. 450 demonstrates the action of a simple form of bicycle brake, and if suitably strengthened could be put to practical use in model-building. It is easy to build and consists essentially of the two levers 1, which carry the brake blocks. These levers are built up of $4\frac{1}{2}''$ Strips, duplicated for strength and lengthened with $2\frac{1}{2}''$ Curved Strips, and they are pivoted by means of Pivot Bolts to a back-plate consisting of a $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate and two Semi-Circular Plates. The back plate forms a support for the mechanism.

The brake blocks, which are represented by $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips, are held apart by a Spring, but are forced into contact with the wheel rim by the two short levers 2, made from $2\frac{1}{2}''$ Strips. The Rod 3 represents Bowden wire used in an actual brake of this kind, and when it is pulled up the resistance of the spring is overcome and the brakes applied. Bowden cable could be used instead of the Rod 3, or a substitute could easily be made by threading wire through a length of Spring Cord.

(451) A Simple Centrifugal Governor (J. Rolfe, Ruabon)

A centrifugal governor is often very useful to limit the speed of the driving motor of a model to a certain value, especially in such models as roundabouts and big wheels. Model-builders therefore will be interested in details of a simple governor of this type used in small Clockwork Motors recently sent by J. Rolfe, Ruabon. In this the weight consists of a Rod Socket fitted with Washers fastened on the end of a $1\frac{1}{2}''$ Rod. The Rod passes through a Coupling and carries at its other end a Compression Spring and Collar. The Coupling is fixed on a Rod driven by the driving motor, and a Boiler End is fixed to a framework so that the $1\frac{1}{2}''$ Rod is housed inside it. In action the weighted end of the Rod swings outward by centrifugal force when the speed is too high and friction with the rim of the Boiler End then reduces the speed of the Motor.

An alternative scheme for controlling the speed of a Clockwork Motor is to use a fan brake. The fan consists of a Flexible Plate of suitable size fixed at its centre to an End Bearing. The latter is fastened on a Rod journalled in the Motor side plates and driven through a step-up gearing of 3 : 1. The air resistance to the fan is sufficient to keep the speed within the required limits.

Miscellaneous Suggestions

Under this heading "Spanner" replies to readers who submit interesting suggestions regarding new Meccano models or movements that he is unable to deal with more fully elsewhere. On occasion he offers comments and technical criticisms that, he trusts, will be accepted in the same spirit of mutual help in which they are advanced.

M.215. The Meccano Worm is intended primarily for use in gear trains to give a slow-speed drive, and its thread is cut to the pitch best suited for this purpose. Consequently it is not very suitable for operating steering mechanisms, as it requires a large number of turns to operate the wheels through a complete lock. A Worm with a greater pitch than the present one therefore is suggested by P. Johnson, Exeter, and others, but I think the constructional difficulty can be overcome by arranging for the Worm to turn a $\frac{1}{2}''$ Pinion on a short Rod that carries also a Crank fitted with a $1\frac{1}{2}''$ Strip to form the drop arm. The latter is connected in the usual way to the steering arm.

M.216. R. Jones, Cardiff, points out that Float Tie-Rods, Aeroplane Constructor Part No. P57, make excellent tie-rods for bracing small Meccano structures such as bridges. The idea is a good one and no doubt other model-builders would like to try it out in practice.

M.217. Pivot Bolts fitted with cardboard discs at each end and wound with 26-SWG. S.C.C. copper wire make excellent miniature solenoids for operating relays and similar small electro-magnetic mechanisms. The scheme is suggested by N. Adams, Buxton.

M.218. When building small models to scale it is sometimes found that the Meccano Rods are too large in diameter to form neat handrails. Neat handrails can be made from Spring Cord, through the centre of which is passed a length of stiff wire such as the Elektron Connection Wire (Part No. 1566). Rails made in this way can be supported on $\frac{3}{4}''$ Bolts and may be bent to any desired shape. The idea is suggested by J. Phillips, Birmingham.

M.219. A compact and simple form of friction gearing used by H. Roberts, Warrington, consists of a 1" Pulley fitted with a 1" Rubber Ring arranged to engage with the inside rim of a Wheel Flange. A ratio of approximately 1.6 : 1 is obtained.

M.220. Meccano Rods can be used in conjunction with Elektron Magnet Coils if the diameter of the Rods is increased by fitting them with Aeroplane Collars (Part No. P52), which are a sliding fit in the bores of the Magnet Coils. Model-builders who use Magnet Coils in conjunction with Meccano parts will find this scheme very useful.

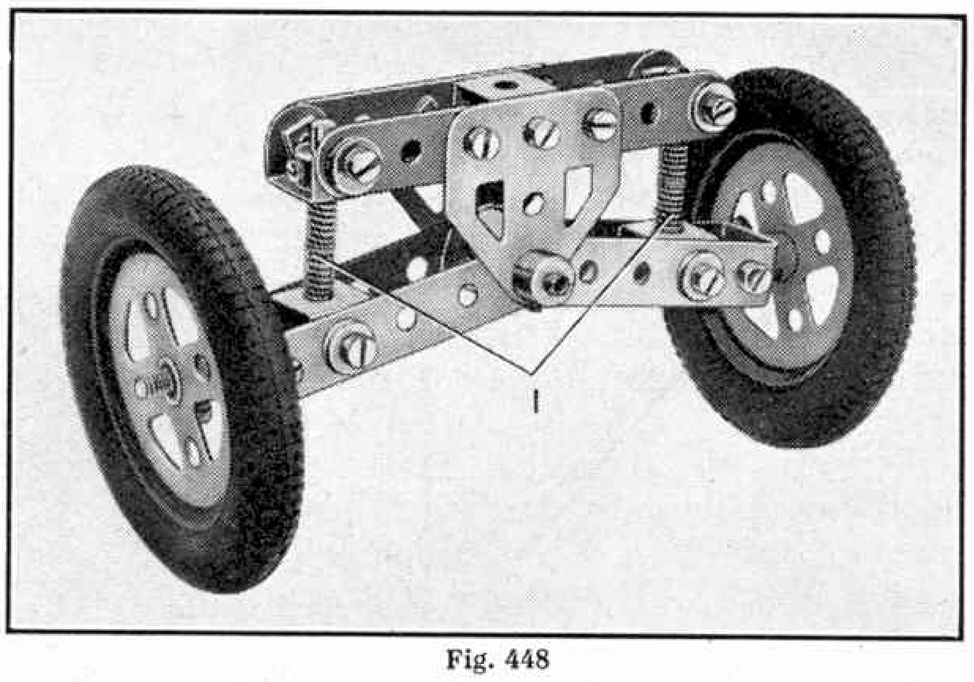


Fig. 448

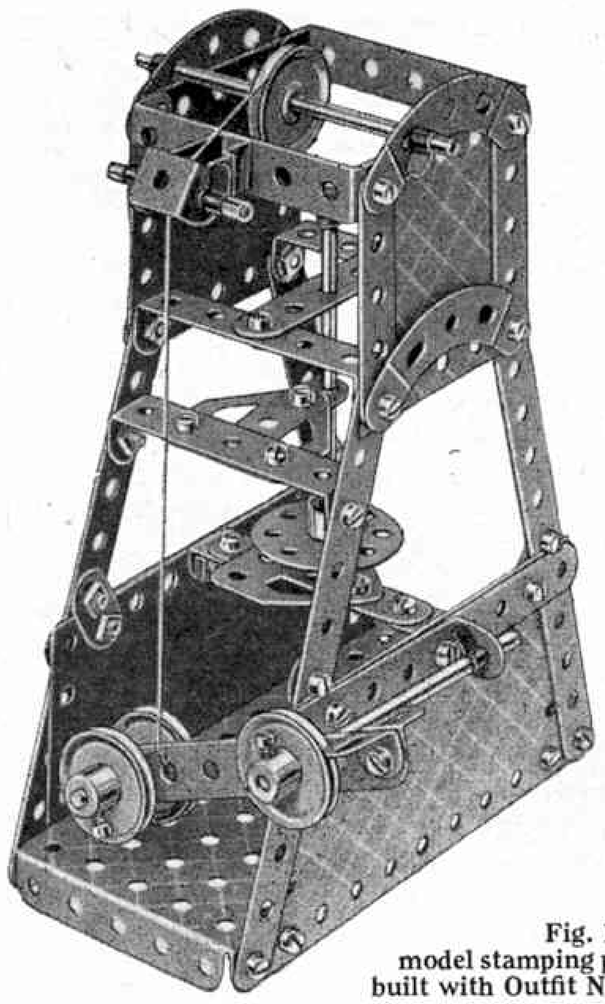


Fig. 1. A model stamping press built with Outfit No. 3.

New Outfit Models

Fine Subjects for Small Outfits

THE five models described and illustrated this month are all simple, but very interesting, and four of them are working models, driven by the *Magic* Motor or set in motion by hand. They are remarkably varied in type. Two are humorous models, two others represent engineering subjects and the fifth is a handsome motor cabin cruiser model. The humorous models show a surf rider and a charioteer ready for a race in the arena, and are built with Outfits Nos. 1 and 2 respectively. The engineering subjects are a mechanical hacksaw and a foot-operated stamping press, each built with Outfit No. 3, and for the motor cabin cruiser Outfit No. 4 is required.

The model surf rider, shown in Fig. 5 on the opposite page, is easy to build, and looks impressive when in motion, especially if the mechanism is concealed by paper or some other material arranged in wavy form in front of it to represent water. A $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate fitted with two $2\frac{1}{2}''$ Curved Strips forms the surf board. The body of the rider consists of two Flat Trunnions; $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips represent his legs, and $2\frac{1}{2}''$ Strips attached to his body by an Angle Bracket form his arms.

Beneath the Flanged Plate are fixed two Trunnions that form bearings for a 2″ Rod 1, on which a 1″ Pulley is fixed. The *Magic* Motor is then bolted under the Flanged Plate, and the $3\frac{1}{2}''$ Rod 2, which carries two 1″ Pulleys, is journalled in the lugs on its side plates.

The model runs on the two 1″ Pulleys, the drive being taken through a small Driving Band from the small pulley of the Motor direct to the $3\frac{1}{2}''$ Rod.

Parts required to build the model surf rider: 2 of No. 5; 1 of No. 10; 4 of No. 12; 1 of No. 16; 1 of No. 17; 4 of No. 22; 2 of No. 35; 18 of No. 37a; 18 of No. 37b; 2 of No. 38; 2 of No. 48a; 1 of No. 52; 2 of No. 90a; 1 of No. 111c; 2 of No. 126; 2 of No. 126a; 1 *Magic* Motor (not included in Outfit).

The first part to build in constructing the amusing model of a horse and chariot shown in Fig. 4 is the chariot. For this two Trunnions 3 are bolted at the ends of a $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate, which is curved to form a semi-circle, and the Trunnions are connected by a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip. The lower holes of the Trunnions form the bearings for a $3\frac{1}{2}''$ Rod, on each end of which is fixed a 1″ Pulley. The shafts are fixed to the sides of the chariot by the bolts that hold the Trunnions 3.

The horse comes next. Its body is a *Magic* Motor, and one of the shafts of the chariot is bolted directly to it, the other being attached by means of an Angle Bracket. The two front legs are $2\frac{1}{2}''$ Strips, the lower holes of which form the bearings for a 2″ Rod 1, which carries a 1″ Pulley Wheel between the two Strips. A $\frac{1}{2}''$ Pulley is fixed on one end of the Rod and is connected by a Driving Band to the small pulley of the Motor. The horse's head is a Flat Trunnion mounted on a $2\frac{1}{2}''$ Curved Strip that forms the neck.

The body of the charioteer is made by bolting a Flat Trunnion to a Bush Wheel 2. A $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip and a $2\frac{1}{2}''$ Strip represent legs and are bolted to the Bush Wheel. An Angle Bracket connects the $2\frac{1}{2}''$ Strip to the Double Angle Strip forming the floor of the chariot. The left arm, a $2\frac{1}{2}''$ Curved Strip, is attached to the body by an Angle Bracket, and a length of Cord representing the reins is passed through the end hole in the Curved Strip and tied to the horse's head. The upraised right arm is a $2\frac{1}{2}''$ Strip fixed to the body by an Angle Bracket and it holds a 2″ Rod, which is held in place by Spring Clips in an Angle Bracket. A Cord Anchoring Spring carries a piece of wire curled to represent the whip lash. The figure's head is a 1″ Pulley attached by a $\frac{3}{8}''$ Bolt to a Flat Bracket bolted to the body.

Parts required to build model horse and chariot 2 of No. 2; 5 of No. 5; 1 of No. 10; 7 of No. 12; 1 of No. 16; 1 of No. 17; 4 of No. 22; 1 of No. 24; 2 of No. 35; 24 of No. 37a; 24 of No. 37b; 1 of No. 40; 2 of No. 48a; 2 of No. 90a; 1 of No. 111c; 2 of No. 126; 2 of No. 126a; 1 of No. 176; 1 of No. 189; 1 *Magic* Motor (not included in Outfit).

Fig. 2 shows a fine model of a large motor cruiser. Construction is commenced by building the sides of the hull. The side not shown in the illustration comprises two $5\frac{1}{2}'' \times 2\frac{1}{2}''$ and two $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates, while the visible side consists of two $4\frac{1}{2}'' \times 2\frac{1}{2}''$ and one $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate. A $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate

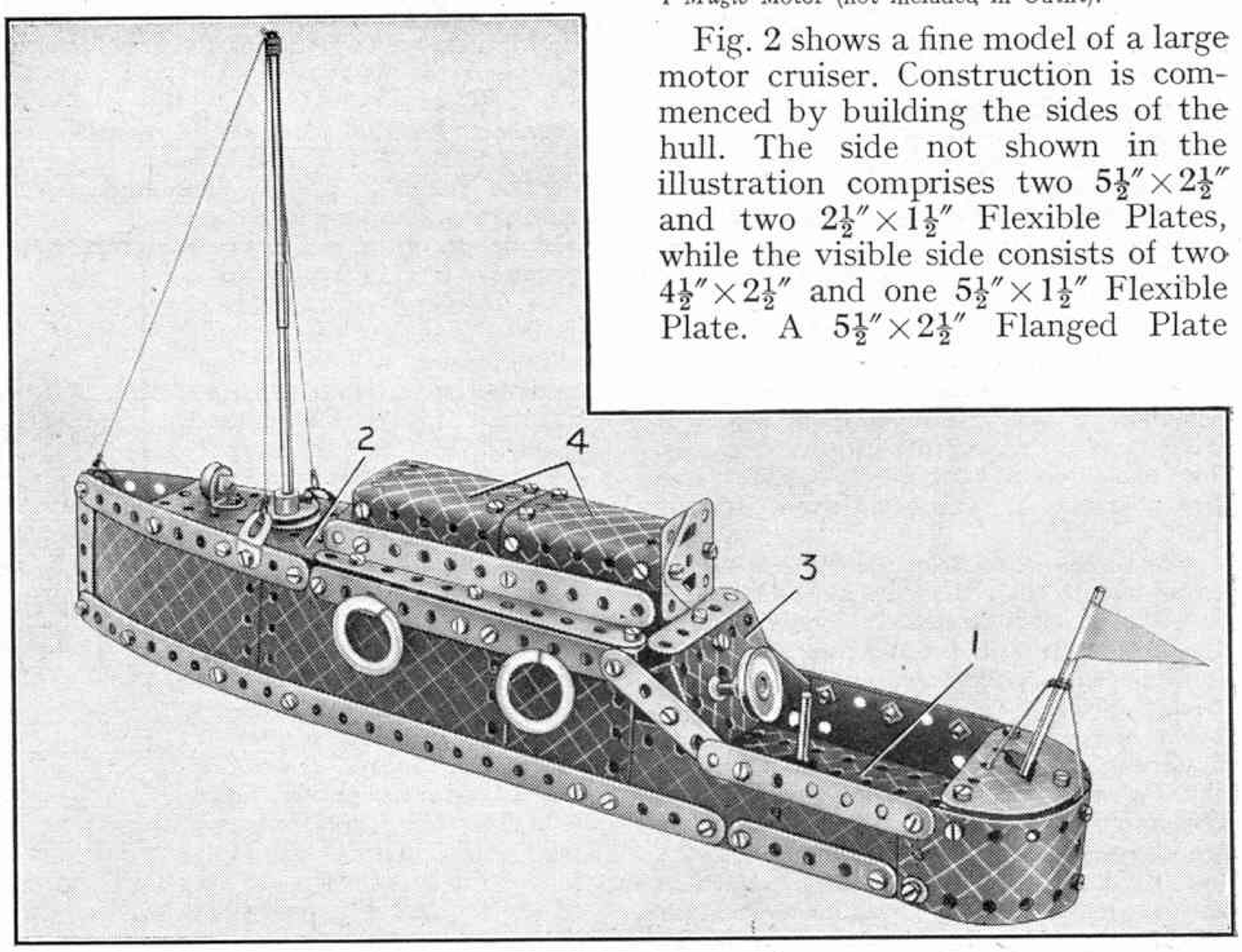


Fig. 2. A fine model motor cruiser. It is built with Outfit No. 4.

connects the sides at the rear and forms the well deck, and a Flanged Sector Plate 2 and a similar part directly below connect the sides near the bows, Angle Brackets serving a similar purpose at the bows. A $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate forms the stern, and the sides are edged round with Strips as shown.

The cabin skylight is constructed of two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates 4 connected by Flat Brackets and Trunnions to $5\frac{1}{2}''$ Strips, and at its after end it is connected to a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip by means of a Cranked Bent Strip and a Double Bracket. The Flat Trunnions are held in place by Angle Brackets.

A $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate 3 is fixed by its flanges to $2\frac{1}{2}''$ Strips and the wheel, a 1″ Pulley fixed on a 2″ Rod, is held in place by Spring Clips. A $1\frac{1}{2}''$ Rod forming the reverse lever is held in one of the holes of Flanged Plate 1 by Spring Clips. The mast consists of two 4″ Rods joined by a Rod Connector, and is held in a vertical position by two 1″ Pulleys, one above and one below Flanged Plate 2.

Parts required to build the model motor cruiser: 2 of No. 1; 8 of No. 2; 2 of No. 3; 7 of No. 5; 2 of No. 10; 1 of No. 11; 8 of No. 12; 2 of No. 12a; 2 of No. 15b; 1 of No. 16; 1 of No. 17; 1 of No. 18a; 3 of No. 22; 1 of No. 23; 1 of No. 24; 6 of No. 35; 71 of No. 37a; 70 of No. 37b; 4 of No. 38; 1 of No. 40; 1 of No. 44; 1 of No. 48a; 1 of No. 51; 1 of No. 52; 1 of No. 54a; 1 of No. 111c; 2 of No. 126; 2 of No. 126a; 4 of No. 155a; 1 of No. 176; 2 of No. 188; 2 of No. 189; 3 of No. 190; 2 of No. 191; 2 of No. 192; 1 of No. 212; 1 of No. 214; 2 of No. 215.

In building the model mechanical hacksaw illustrated in Fig. 3 two $2\frac{1}{2}''$ Strips are first bolted to the ends of the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate that forms the base. Their upper ends are connected by a $5\frac{1}{2}''$ Strip and Angle Brackets. The next step is to bolt a Double Bracket, a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip and a Flat Trunnion to the $5\frac{1}{2}''$ Strip, the bolts holding the Flat Trunnion being fitted with an Angle Bracket and a Flat Bracket. The Double Angle Strip is fitted with a Cranked Bent Strip and the Double Bracket forms bearings for a 2″ Rod that carries a 1″ Pulley and a Bush Wheel.

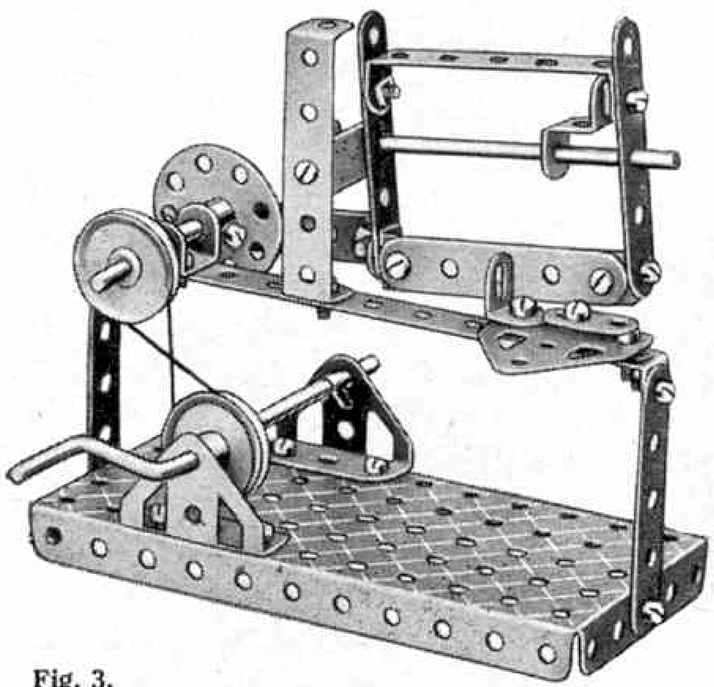


Fig. 3.
A well-designed mechanical hacksaw.

The frame of the hacksaw is built up of two $2\frac{1}{2}''$ Strips connected by a Double Angle Strip, the right-hand securing bolt holding also a Reversed Angle Bracket. A $3\frac{1}{2}''$ Rod passes through the $2\frac{1}{2}''$ Strips and the Reversed Angle Bracket. The hacksaw "blade" is a $2\frac{1}{2}''$ Strip attached to the frame at one end by an Angle Bracket, and at the other end by a reversed Angle Bracket that is pivotally connected by a lock-nutted bolt to a $2\frac{1}{2}''$ Strip. The other end of the $2\frac{1}{2}''$ Strip is pivotally attached to the Bush Wheel. The end of the $3\frac{1}{2}''$ Rod is passed through the holes in the Cranked Bent Strip and forms a guide for the hacksaw frame.

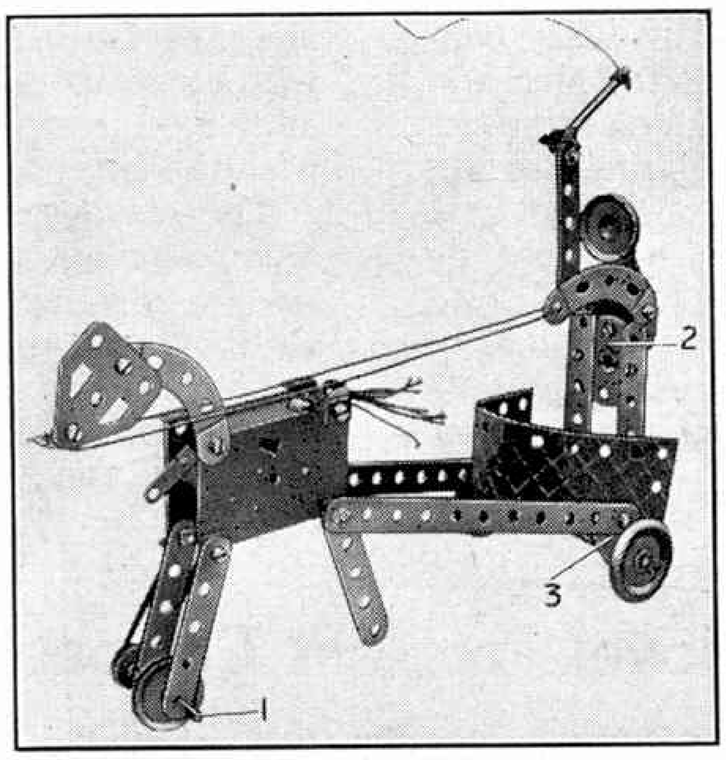


Fig. 4. An amusing working model of a horse and chariot. It is built with Outfit No. 2.

In order to drive the saw, two Trunnions are bolted to the base plate to form bearings for a small Crank Handle. The latter carries a 1″ Pulley which is connected by a Driving Band to the first 1″ Pulley. Those who wish to do so can operate this model by means of a Meccano *Magic* Motor. The Motor should be bolted to the base and arranged to drive the $\frac{1}{2}''$ fast Pulley, supplied with the Motor, which should be fixed on the Crank Handle.

Parts required to build the model mechanical hacksaw: 1 of No. 2; 6 of No. 5; 1 of No. 10; 1 of No. 11; 4 of No. 12; 1 of No. 16; 1 of No. 17; 1 of No. 19g; 2 of No. 22; 1 of No. 24; 1 of No. 35; 25 of No. 37a; 21 of No. 37b; 4 of No. 38; 1 of No. 44; 2 of No. 48a; 1 of No. 52; 2 of No. 111c; 2 of No. 125; 2 of No. 126; 1 of No. 126a; 1 of No. 186.

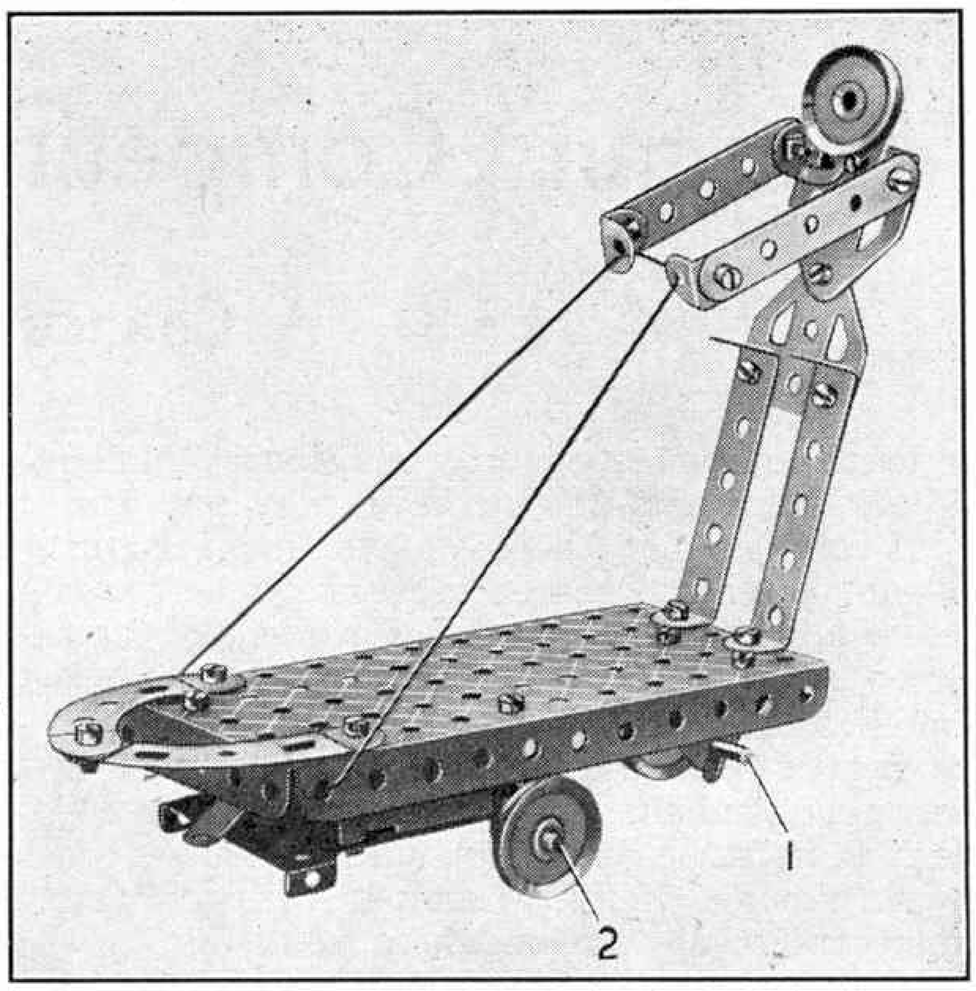


Fig. 5. A neat model of a surf rider built with Outfit No. 1.

The last of our working models is the stamping press shown in Fig. 1. In practice treadle-operated machines of this kind are used for stamping out small parts from sheet metal. Construction is commenced by bolting four $5\frac{1}{2}''$ Strips to the corners of a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate and $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates along the sides. The Plates are connected to the $5\frac{1}{2}''$ Strips by Flat Brackets and the bolts holding also horizontal $5\frac{1}{2}''$ Strips.

The edges of two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates are then strengthened with $2\frac{1}{2}''$ Strips and $2\frac{1}{2}''$ Curved Strips, the corners of the Plates being connected by $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips. The unit thus formed is then attached to the upper ends of the $5\frac{1}{2}''$ Strips. The work-table is made by connecting the $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates with a $2\frac{1}{2}''$ Strip and Angle Brackets, and then fixing a Flat Trunnion to the centre of the Strip. A $3\frac{1}{2}''$ Rod fitted with a Bush Wheel forms the "tup," that is the moving part of the press, and guides for it are provided by a $2\frac{1}{2}''$ Strip bolted between the lower pair of Double Angle Strips, and a Flat Bracket fixed to a Flat Trunnion. The latter in turn is bolted to a Double Angle Strip as shown. A foot lever for operating the tup is now fitted. It consists of a $3\frac{1}{2}''$ compound strip made from two $2\frac{1}{2}''$ Strips, and at one end it is weighted by two 1″ Pulleys while the other end is fitted with two Angle Brackets to form a foot pedal. The Strip is pivoted in the third hole from one end.

Parts required to build the model stamping press: 6 of No. 2; 8 of No. 5; 5 of No. 10; 1 of No. 11; 4 of No. 12; 3 of No. 16; 2 of No. 18a; 4 of No. 22; 1 of No. 24; 5 of No. 35; 40 of No. 37a; 40 of No. 37b; 6 of No. 38; 1 of No. 40; 1 of No. 44; 6 of No. 48a; 1 of No. 52; 4 of No. 90a; 2 of No. 126a; 1 of No. 176; 2 of No. 190; 2 of No. 191.

"Autumn" Competition for Models of All Kinds

A Chance to Win a Cash Prize

Have you ever won a prize in a Model-building Contest? If not, why not? If you have, why not win another?

If you have not, there is all the more reason why you should enter the contest announced here, for there is every possibility that you may win one of the fine prizes listed in the panel on this page. All you have to do is to build a Meccano model entirely from your own ideas. This may be of any type, and the only condition is that it must be your own unaided work. You are eligible to compete in this contest no matter where you live or what age you may be, and as entries will be accepted up to 30th November, there is ample time in which to find an interesting and original subject and then build it in Meccano.

Any size of Outfit may be used in building models, but good workmanship and constructional details that show ingenious uses for Meccano parts will attract the attention of the judges far more than the mere size of your model. These qualities are often much easier to attain in a simple model than in a more complicated structure, so that you need not be discouraged if you possess only a small Outfit. Try to find something really original as your subject. Originality in your entry will weigh heavily in your favour, and there are thousands of interesting objects that have never yet been reproduced in Meccano.

After the model is built, the next job is to obtain a suitable illustration of it. This may be either a good photograph or a drawing, but a clear photograph is best if it is possible to obtain one. Write your age, name and address on the back of the photograph or drawing and enclose it, together with a brief description, in an envelope addressed *"Autumn General Model-building Contest,"* Meccano Ltd., Binns Road, Liverpool 13.

Entries for both Home and Overseas readers will be grouped into one section, but a competitor's age will be taken into consideration when assessing the merits of his work. The full list of prizes to be awarded for the best and most interesting models received is given in the accompanying panel.

It should be noted that successful entries become the property of Meccano Ltd., but photographs of unsuccessful models will be returned to senders provided that a stamped addressed envelope of the necessary size is enclosed with the entry for that purpose.

The closing date for entries from both Home and Overseas readers is 30th November, but entries should be posted as soon as they are ready and not kept until the closing date approaches. All prize-winners will be notified by letter and a full list of the awards, together with illustrations of some of the best models, will be published in the *"M.M."* as soon as possible after the closing date.

THE PRIZES

"Autumn" General Model-Building Contest

CLOSING DATE: 30th NOVEMBER, 1939

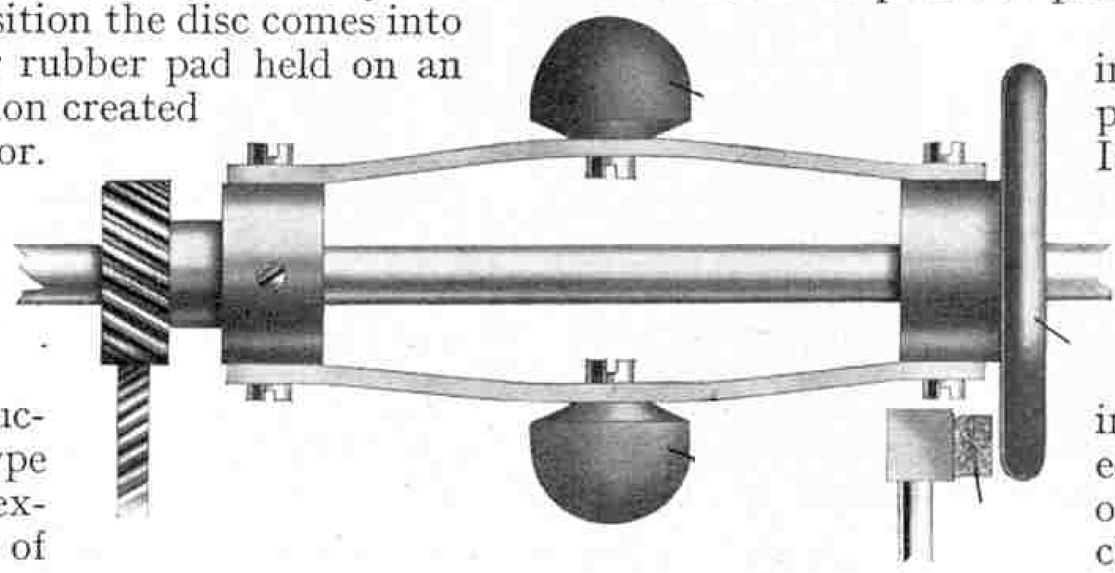
1st Prize, Cheque for £5/5/–.
2nd Prize, Meccano or Hornby products value £3/3/–.
3rd Prize, Meccano or Hornby products value £2/2/–.
10 Prizes of Meccano or Hornby products value 10/6.
10 Prizes of Meccano or Hornby products value 5/–.

A Novel Problem Competition

The accompanying illustration shows a spring type centrifugal governor of the kind used for regulating the speed of clockwork mechanisms. The device consists essentially of two collars connected together by thin strips of springy metal, one collar being fixed to a rod, while the other is free to slide up and down on the rod and carries a metal disc. To the centre of each spring strip a heavy lead weight is attached, and when the whole is rotated by means of the gears shown, the weights tend to fly outward through centrifugal force, and in doing so move the slidable collar and its disc longitudinally on the rod. On reaching a certain position the disc comes into contact with a small fibre or rubber pad held on an adjustable arm, and the friction created limits the speed of the motor.

It has always been claimed that every movement known in mechanical engineering can be reproduced with Meccano parts, and it occurs to us that the construction of a governor of the type illustrated would form an excellent test of the ingenuity of model-builders. We are therefore organising a special "Centrifugal Governor" Competition, in which prizes are offered for the best models of this kind submitted to us. Models must be designed on similar lines to the governor illustrated here, but competitors may use any Meccano parts they prefer in building them.

The following prizes will be awarded for the neatest and most efficient governors submitted. First, Meccano or Hornby products value £2/2/–. Second, products value £1/1/–. Third, products value 10/6d. There will be also five prizes of products value 5/–.



The Contest will be divided into two sections; A, for competitors living in the British Isles; B, for competitors living Overseas. Entries should be addressed *"Governor Competition,"* Meccano Ltd., Binns Road, Liverpool 13, and those from competitors in the British Isles must be posted in time to reach Liverpool on or before 31st October. Overseas closing date is 30th November.

Model-Building Competition Results

By "Spanner"

"Aeroplane Constructor Outfit" Contest

The prize-winners in the Home and Overseas Sections of the "Aeroplane Constructor Outfits" Competition, details of which were published in the *"M.M."* for March last, are as follows:

Home Section

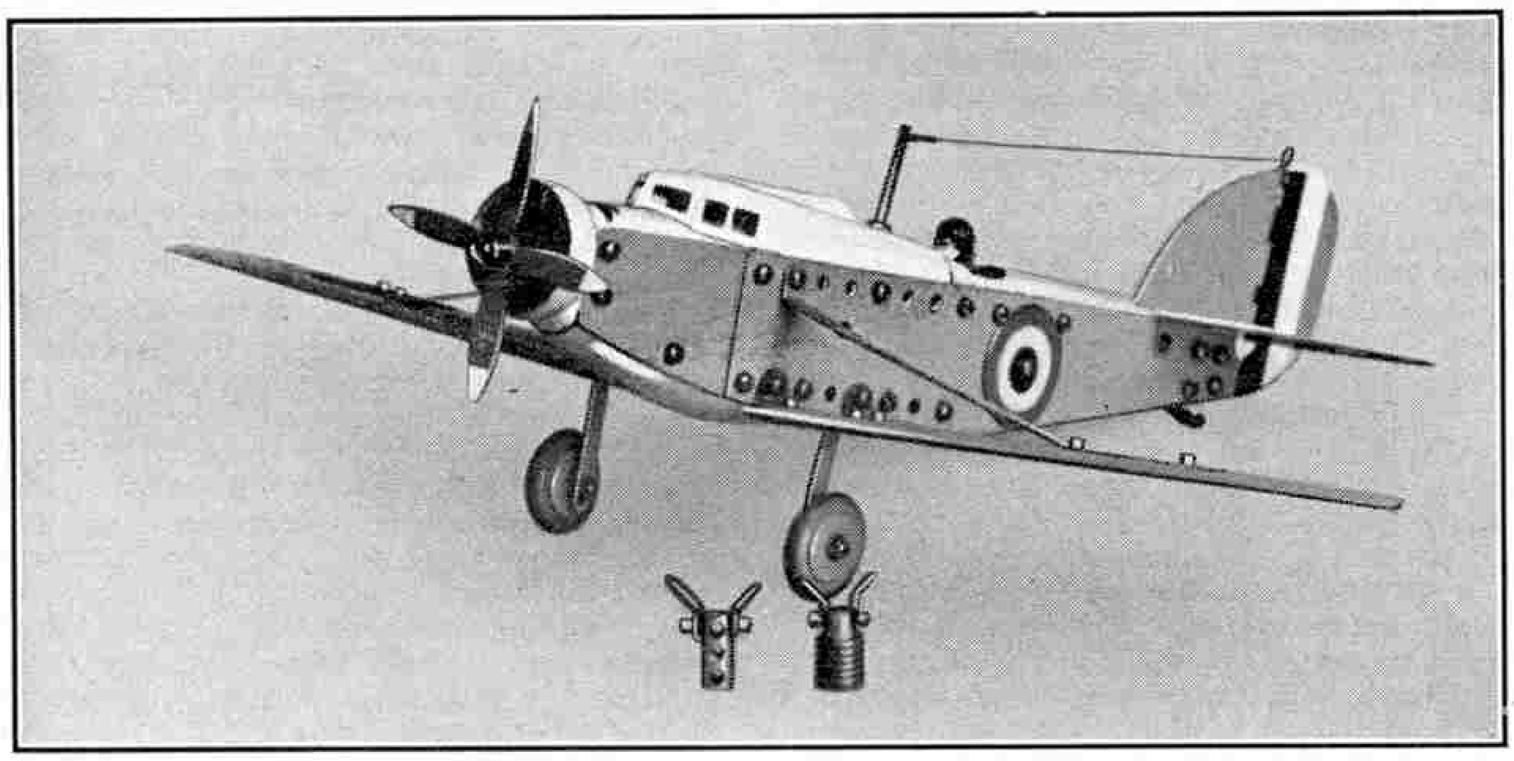
1st Prize, Meccano or Hornby products value £3/3/–: R. Walford, Newton Abbot, Devon. 2nd, products value £2/2/–: A. Featherstone, Widnes. 3rd, products value £1/1/–: Miss L. Slater, Portsmouth.

Products value 5/–: S. Rowland, Liverpool 11; B. Firth, Dorking; N. Towler, Preston; R. Gibson, Maryport; W. Gilmour, London S.W.19.

Overseas Section

1st Prize, Meccano or Hornby products value £3/3/–: R. van Berkum, Fenwick, Canada; 2nd, products value £2/2/–: D. Boulanger, L'Aigle Orne, France; 3rd, products value £1/1/–: W. Petersen, Maylands, W. Australia.

Products value 5/–: G. Parkinson, Vancouver; A. Roberts, Calcutta; V. di Sambuy, Turin, Italy; R. Hunter, Cairo; G. Hughes, Bombay.



A model of the high-speed bomber monoplane that won second prize for A. V. Featherstone in the "Aeroplane Constructor Outfit" Model-Building Competition, the results of which we announce on this page.

This Contest proved to be very popular with owners of Meccano Aeroplane Constructor Outfits, and although many competitors based their models on actual aircraft others preferred to do a little free-hand designing.

First Prize in the home section was awarded to R. Walford, Newton Abbot, who entered three fine models. The award was based on the collective merits of the entry and I congratulate Walford on the high standard of his work. One of the models represents an Armstrong Whitworth "Whitley" bomber. Its general lines follow closely those of the prototype, and an interesting constructional feature is the reproduction of the gun turret fitted in the nose. A standard long fuselage is employed, but the fuselage side front sections are bolted in position upside down and are butted against the previous sections instead of overlapping them. In this way they extend beyond the fuselage top and leave an opening in which a turret is fixed.

Walford's second model is a reproduction of the Short R24/31 Flying Boat, which was introduced a few years ago and was distinguished by the unusual wings which were shaped like those of a gull in order to give the necessary clearance for the propellers above the water. The remaining model is a reproduction of the Airspeed "Ferry," an illustration of which appears in the Special Aeroplane Constructor Outfit Manual. The model is built from the parts in a No. 2 Aeroplane Constructor Outfit, and is similar in general design to Model No. 21, but is equipped with three Engine Casings. The petrol tank fitted above the central engine is represented by a U-Section Curved Plate.

A. Featherstone, Widnes, was awarded Second Prize for the interesting model of a modern bomber illustrated on this page. It is based on the Vickers "Wellesley," which recently made a record long-distance flight of 7,159 miles from Egypt to Australia. Although the model is based on an actual machine, Featherstone has included one or two original modifications of his own design. The model is a three-seater, the two forward cockpits being enclosed by a Cabin Head while the rear one is open, and it is fitted with a four-bladed propeller made by fixing two Propellers on the same shaft. An interesting feature is the undercarriage, which is of the single-leg type found on most aeroplanes with retractable undercarriages, each leg being formed by a Centre Section Strut.

Miss L. J. Slater, Portsmouth, who was awarded third prize for a fine model of a Fokker D.23.

A. V. Featherstone, Widnes, winner of the second prize in the "Aeroplane Constructor Outfit" Competition.

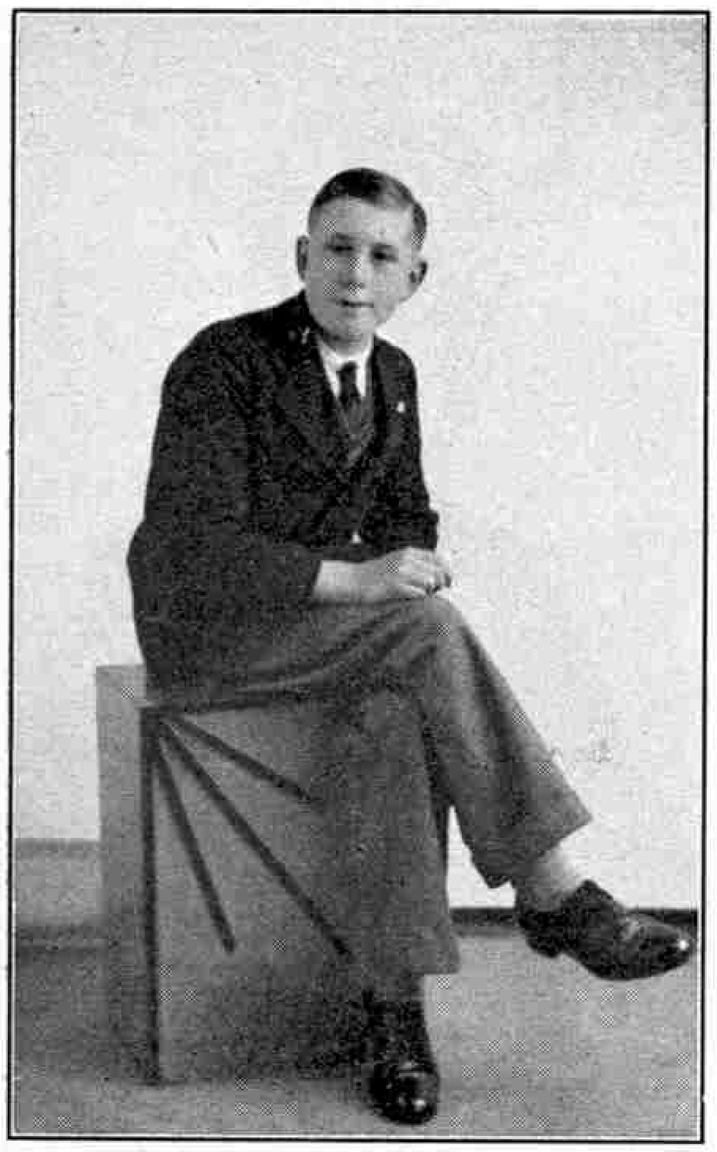
Third Prize went to Miss L. Slater, Portsmouth, for a fine model of a Fokker D. 23, an unusual type of fighter aeroplane. The fuselage of the actual machine has an engine mounted at each end, the pilot's cockpit being situated between them. The tail unit is carried on twin booms connected to the wing. In the model, two fuselage noses are built up and are connected by Fuselage Sides. Each wing is made by fixing two Mainplanes together to reproduce the proper wing section, and Meccano 12½" Strips are used to build up the tail booms. The retractable nose wheel of the tricycle undercarriage is a 1" Pulley supported by 2½" Strips.

In the Overseas Section First Prize was awarded to R. van Berkum, Ontario, who earned his success with a splendid little model built from a No. 0 Aeroplane Constructor Outfit. It represents a flying boat similar to the Supermarine "Walrus." In building it the fuselage was first constructed and the lower wings fixed in position near its top. The upper wings are supported by Interplane Struts. The propeller is lock-nutted to the Propeller Bracket, which is then clamped to the upper wing by a Centre Section Strut. The model is very neatly built, and Berkum is to be commended on his originality.

Second Prize was awarded for an original model built by a French reader, D. Boulanger, L'Aigle Orne, France. It is a model of a light single-seater aeroplane, and each wing is made from two Main Planes with their lower surfaces placed together to reproduce a cambered wing.

W. Petersen, a member of the Maylands Meccano Club, Australia, submitted a really fine model of a twin-engined air liner of the high wing type with the engines slung from the wings and fuselage with struts. This entry well deserved the Third Prize awarded for it.

G. Parkinson, Vancouver, was awarded a prize for two fine models, one of which represents a modern interceptor fighter while the other is based on a low wing racing monoplane.



G. H. Howard is secre ary of the St. James (Grimsby) M.C., Leader, Mr. H. V. Hayman, which was affiliated in November 1934, and has had a very successful career. An excellent club room is provided for members, whose interests include Meccano and general model-building, model railway working, carpentry and fretwork.

Meccano Guild

With the Secretary

Happy Days of the Indoor Season

For Meccano Club members happy days return when September comes. They thoroughly enjoy the outdoor season, with its games, hikes, cycling runs and other outdoor recreations, but are at their best in the clubroom when they are giving full rein to their love of hobbies and in particular to their keenness for designing and building Meccano models.

I suggested last month that preliminary steps are advisable in order to make sure of a really good start for the indoor season, and I urge all Leaders who have not made arrangements along these lines to do so at once. "The More the Merrier" is a slogan to be adopted, for without plenty of members the full fun and enjoyment of meeting together cannot be realised. So special efforts should be made to increase membership by visiting boys whose names are given as willing to join the club or likely to make good recruits. Ordinary members themselves can play an important part in this personal work, for they all have friends and it is up to them to see that these friends join them in the clubrooms.

Club Reports and Photographs

The beginning of the indoor season is a good time to draw attention to the necessity for full and regular reports. Members like to see their activities recorded on the *"Club Notes"* page and this cannot be done unless good reports reach me. I hope therefore that every Leader will make sure that his secretary is supplied with information and has sufficient time in which to write lively and adequate accounts of club proceedings, with the fun as well as the serious business of club proceedings in them. If the club is a large one, and the secretary already has plenty of work, then another member should be appointed for the special purpose of keeping minutes and writing reports for Magazine purposes.

Members also like to see group photographs of their club in the *"M.M."* There are many clubs that have not yet been distinguished in that way, and I hope that in these the necessary arrangements will be made as soon as possible. I shall be very pleased indeed to make use of any good photograph that is sent to me.

Correspondence Between Club Leaders

An interesting development of recent months has been the beginning of correspondence between Leaders of various clubs in parts of the world far distant from each other. This is a practice that might well be extended, for there is much more in such letters than the exchange of courtesies and news. Every Leader of an established club has his own methods of meeting the problems that continually arise in club work and of planning a programme that will appeal to his members and meet their needs to the greatest advantage. When two Leaders correspond therefore they learn something of each other's methods, and as a result both clubs concerned are carried on more brightly and efficiently. This correspondence is particularly valuable when one of the Leaders taking part is an experienced campaigner, while the other has charge of a small and newly-formed club and is eager to learn what other Leaders have done.

I should like Leaders who wish to take up such correspondence to write and let me know as soon as possible, so that I can put them into touch with each other. In doing so I should of course try to satisfy any wishes that might be expressed for correspondents in particular countries or districts.

I do not think that any great amount of extra work would be involved in correspondence of this kind. If a Leader is too busy, owing to other calls on his time, to take it up himself he should appoint a senior member as correspondent, giving him an official position in this capacity. He would then suggest the topics on which to write, and would look over and perhaps amplify the correspondent's letters before they are despatched.

Coming Events

Two interesting Exhibitions are to be held in October. One of these is the 8th Annual Exhibition of the Old Charlton M.C., which will be held in the Assembly Rooms, Charlton Village, on Saturday, 14th October. The Mayor of Greenwich will open the display, further details of which I shall give in next month's issue.

The second of these two October events is the Exhibition and Sale of Work of the Malvern M.C., the well-known Johannesburg club. The displays arranged by this enterprising South African club are always comprehensive and interesting, and all Guild members and Meccano enthusiasts in Johannesburg and district should make a point of being present. An interesting feature is that the Exhibition is being arranged in aid of the Christmas Cheer Fund organised by the club.

Autumn Exhibition Notes

Many other clubs will arrange Exhibitions between now and Christmas and it is not too soon to begin to make plans and preparations for them. A decision should be made as soon as possible in regard to the kinds of models to be submitted in the Model-building Contests arranged in connection with the display, so that members will have ample time in which to design and construct their entries. If a Hornby Railway is to be on view this should be made ready as soon as possible in order that practice may be obtained in the conduct of operations, a necessity if little accidents and mishaps are to be avoided, and other matters to be considered are the general arrangement of the Exhibition room, the nature of any side shows and other attractions to be presented, and how to make the event known so as to ensure a large attendance.

One thing that should not be overlooked is the inclusion of a note in the Magazine. I am always glad to insert details in these pages of any Exhibition or other function organised by a Meccano club or H.R.C. Branch. For this purpose full information should be in my possession as early as possible, preferably not later than the first day of the month preceding that in which the Exhibition is to be held. The details given should include the place, day and time of the display, together with notes on the general attractions and the charges to be made for admission.

* * * *

I should like to remind secretaries that they should look over their stocks of report forms and other Club literature, so as to make sure that they are fully prepared for the extra demands for these at the present time of the year. I shall be very glad to send supplies to any secretary who lets me know what he needs.

Merit Medallion nominations for the Summer Session also should reach me as soon as possible. This session offers a splendid opportunity for recognising work of an unusual kind, since most of the meetings are held out of doors. Any kind of good work that is to the advantage of the Club or of the Guild can be recognised by the presentation of this award.

Proposed Clubs

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

DEVIZES—D. Batchelor, The "White Bear," Devizes, Wilts.

MANCHESTER—G. J. Holt, 49, Church Street, Stretford.

YORK—E. R. Swalwell, 28, Horner Street, Burton Stone Lane.

Club Notes

Pettits' Senior Boys' School M.C.—Meetings have been mainly devoted to preparations for a forthcoming Exhibition, and many fine Meccano models have been constructed. A neat frame has been constructed for the Guild Affiliation Certificate, and an attractive club notice board also has been made. A Photography Section is to be formed. Club roll: 20. *Secretary:* A. Dawson, Pettits' Senior Boys' School, Romford, Essex.

St. Stephens (Saltash) M.C.—Recent meetings have been held out of doors, and tennis has featured prominently in the programme. Plans for the coming Session are now under consideration, and indoor meetings for model-building are being arranged. Club roll: 16. *Secretary:* A. J. Summerfield, Castle View Farm, Saltash.

Exeter M.C.—A few Meccano models have been built, and Hornby Railway working has been popular. G. Shorland won the Corinthians Football Competition for the second time. Special clips have been fitted to the club notice board in place of drawing pins. Club correspondence with boys overseas is progressing, and letters are exchanged regularly with friends in Berlin, Toronto and Karlshamn, Sweden. Excellent models have been built, including a realistic action model of a batsman making a powerful stroke. Three football teams are to be run this season, and the club has been affiliated to the F.A. Club roll: 40. *Secretary:* J. T. H. Fenwick, 45, Calthorpe Road, Exeter.

Saltash Model Engineering Club.—Regular meetings have been held, and in the Meccano Section work has progressed satisfactorily on a large model of a horizontal steam engine. A model of a coal depot has been completed, and appropriately finished with black paint and "brick" paper. A model cattle dock also is well advanced. Club roll: 6. *Secretary:* B. R. J. Braund, 9, Homer Park, Saltash.

Hornsea M.C.—The introduction of woodwork has been enthusiastically greeted by members, and some excellent models and articles have been made. Hornby Railway meetings have been held in the open, and excellent train running enjoyed. Bowls has been played on a number of occasions, and Monopoly has been a welcome diversion when weather conditions prevented outdoor meetings. The youngest members of the club were interested in a useful Talk on "*Meccano Standard Mechanisms.*" An outing to Beverley has been arranged. Club roll: 14. *Secretary:* P. Richardson, "Summerleigh," Esplanade North, Hornsea.

Beeches (Jersey) M.C.—There has been an improvement in Meccano model-building, and more models have been built recently. Cricket has been played at meetings and proved very popular. Merit Medallions have been awarded to two members. An enjoyable picnic has been held. Club roll: 25. *Secretary:* H. Dubras, 57, King Street, St. Heliers, Jersey, C.I.

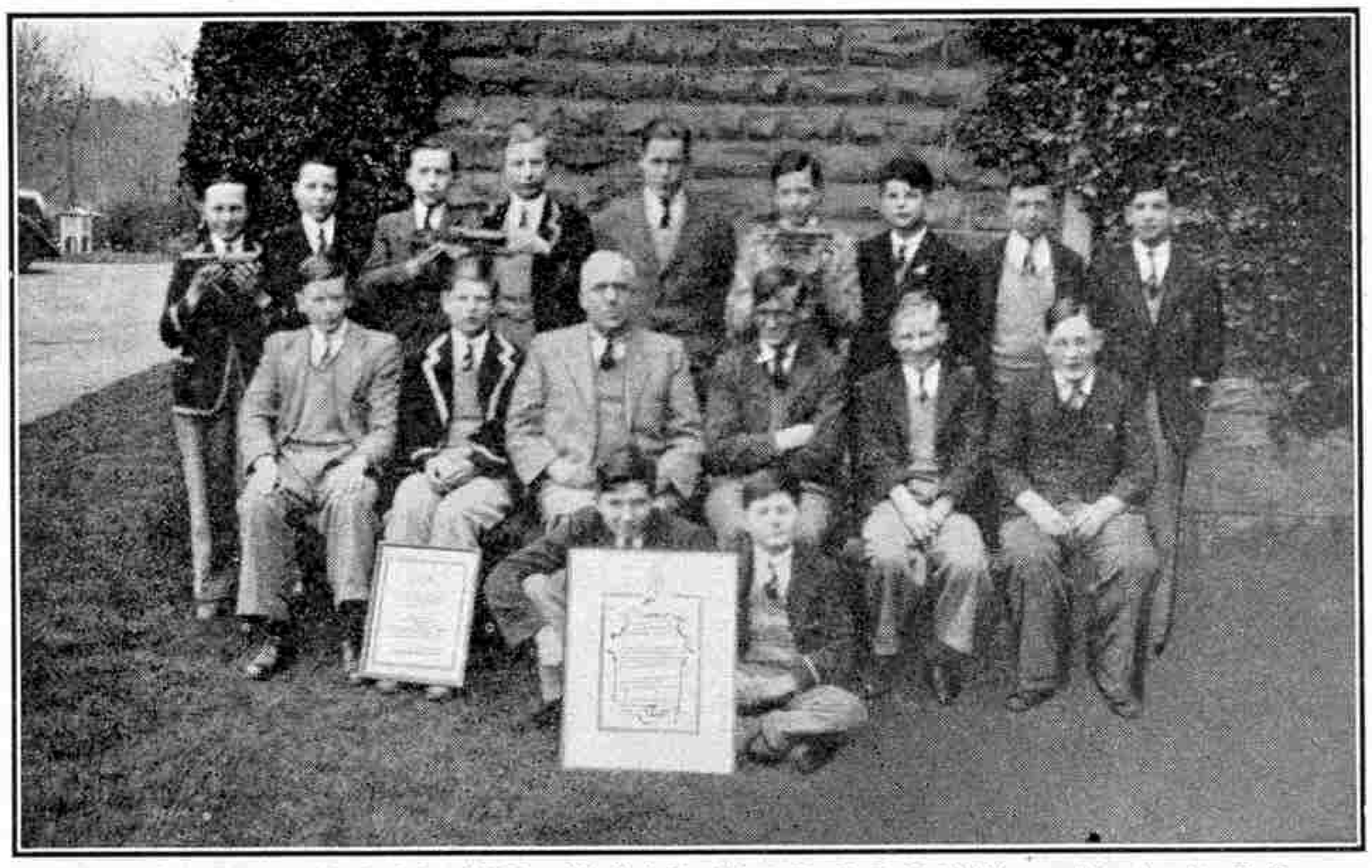
Old Charlton M.C.—At one meeting models of agricultural implements were built, the best models being two combine harvesters. A lively Debate was held on the relative merits of "*Steam or Electricity on Railways,*" the vote being in favour of the former. A number of Hornby Evenings have been held. Short Talks given by members have dealt with such varied subjects as "*Patents*" and "*Tricks Played on Schoolmasters*"! A number of interesting Lectures have been given. Outdoor meetings have been arranged, and plans are being made for a forthcoming Exhibition. Senior members have held special meetings to discuss technical subjects, such as the flight of aeroplanes, cranes, marine engines and petrol and oil engines. Club roll: 23. *Secretary:* D. C. Lambert, 23, Charlton Lane, Charlton, London S.E.7.

Folkestone M.C.—Meccano parts are being used in building a flyover junction for the club's Hornby layout. A model motor launch has been completed, and named "*Southern Queen III.*" This has run successful trials on a local pool. Model aeroplanes have been flown regularly, and a model flying meeting has been held. Club roll: 7. *Secretary:* W. F. Cotter, 68, Linden Crescent, Folkestone.

Islandmagee M.C.—A six-aside football tournament between members was very successful, prizes being awarded to the winning team. Baseball matches also have proved popular. In a paperchase over 2½ miles B. McCready was first home. F. McKee and B. Ross have been awarded Merit Medallions. The club magazine "*The Gazette*" has been enlarged to 16 pages, and 100 copies of a recent issue were printed. The Junior Football Team has played three matches recently, winning two and drawing one. Club roll: 23. *Secretary:* S. McCready, "Hillmount," Islandmagee, Co. Antrim.

St. Oswalds (Thornton Heath) M.C.—Summer activities included Cricket and Swimming. An outdoor Treasure Hunt was held, successive hidden clues leading to the "treasure" itself, which was the Leader's Guild Badge. Prizes were awarded to the three winners. The club enjoyed the use of a private camping site in the country, where good climbing was available in a disused chalk pit. Club roll: 25. *Leader:* Mr. W. Jaques, 5, Ingram Road, Thornton Heath, Surrey.

Plymouth M.C.—The club suffered an unfortunate loss of funds owing to a burglary on the club premises. A Concert and Exhibition were arranged to raise funds to replace those stolen, and these were very successful, proceeds amounting to more than £4. The models exhibited included a mountain railway train, a tramcar, cranes, ships and aeroplanes, and splendid entertainment at the Concert was provided by the Leader and other officials. Enjoyable motor coach outings have been held in addition to good rambles. *Secretary:* A. E. Miller, 21, Hamilton Gardens, Mutley, Plymouth.



Members of the Barnard Castle School M.C., with their President, Mr. S. R. E. Phillips, and Leader, Mr. R. Seaman. The secretary is A. Coates. This successful club was affiliated in March 1936, and meetings are mainly devoted to Meccano model-building, Hornby Train working and Dinky Toys activities. An Exhibition was held early this year.

Barking M.C.—Members greatly enjoyed the summer programme, which included cricket and other games in the open air. A particularly attractive item was a cycling expedition in which a 40-mile tour of the Essex countryside was made. Club roll: 34. *Secretary:* F. K. Whitehead, 60, Devon Road, Barking.

Heath Grammar School (Halifax) M.C.—The summer months were devoted to excursions and outdoor meetings. A Kite-Flying Section was formed and its meetings were well attended. Flying was very successful, for the situation of Halifax ensures that there is no lack of wind. A visit was paid to the Great Yorkshire Show by kind invitation from the Organising Manager. Club roll: 53. *Secretary:* M. W. Bottomley, Heath Grammar School, Halifax.

Acton M.C.—A club magazine is to be issued and a cupboard for use in storing a club Library has been obtained. Special interest is taken in the running of Hornby Trains, operations being controlled with the aid of a buzzer code. The layout has been improved in several respects in order to increase the ease of operation. The track is to be electrified, and experimental running has already proved successful. Visits have been paid to the Model Engineering Exhibition and to the Willesden Motive Power Depot of the L.M.S. Preparations are being made for a special recruiting campaign during the month of October. Letters of invitation are being sent out, and other means of advertising tried. Any Meccano enthusiasts in the district who would like to learn more about the Branch are invited to attend meetings at which they will be heartily welcomed. Club roll: 15. *Secretary:* S. W. Simmons, 7, Alfred Road, Acton, London W.3.

AUSTRALIA

Maylands M.C.—A new section has been formed for members interested in electricity and radio. Many visitors were present at a recent Exhibition, the exhibits of the three Factions representing "Coral Island Engineering," an aerodrome and a harbour respectively. The Leader's Programmes continue to be very popular. Interesting Meccano models built recently have included an automatic ship coaler, the Eiffel Tower, and a penny-in-the-slot machine. On one evening members of the various Factions gave lectures, songs and plays, and various competitions were held, Green and Gold Factions gaining the most points. A bicycle run to National Park was greatly enjoyed. A Cinematograph Show depicting a tour of the Eastern States proved very entertaining. Football has been enjoyed on a number of afternoons. The club magazine has been restarted. Club roll: 25. *Secretary:* W. Petersen, 1, Warne Street, Maylands, Perth, Western Australia.

Thebarton Junior Technical School M.C.—The weekly meetings have been devoted alternately to Model-building Competitions, Talks and general activities. Two interesting Talks by the Leader have dealt with "*Electric Clocks*" and "*Musical Boxes.*" A number of excursions have been enjoyed, and the Electric Light and Gas Company works, a nearby observatory, and an automatic telephone exchange are among the places visited. Club roll: 55. *Secretary:* G. W. Croft, 50, Old Port Road, New Queenstown, via Alberton, South Australia.

INDIA

Egons (Calcutta) M.C.—Membership is increasing rapidly. Many Meccano models have been built, outstanding being an automatic crane. A fine bookshelf has been made by the fretwork section. Stamp collecting activities have been continued. A most enjoyable picnic has been held at Diamond Harbour, some 30 miles from Calcutta. Club roll: 39. *Leader:* S. Harbhajan, The Aluminium Manufacturing Co. Ltd., Dum Dum, India.

MALTA

Lasallian M.C.—This club, established at the Stella Maris College under the leadership of Rev. Brother Anthony, F.S.C., has now been affiliated. A special Concert was arranged to celebrate the event, when badges and certificates were distributed to members, and Rev. Brother Augustine, F.S.C., Director of the College and President of the club, gave a talk on the duties of the members. Sections have been formed for Stamp Collecting, Photography and other activities. Outdoor games, including Tennis, are played, and preparations have been made for visits to factories. Club roll: 16. *Secretary:* C. Ciantar, 49, Bugeja Street, Hamrun, Malta.

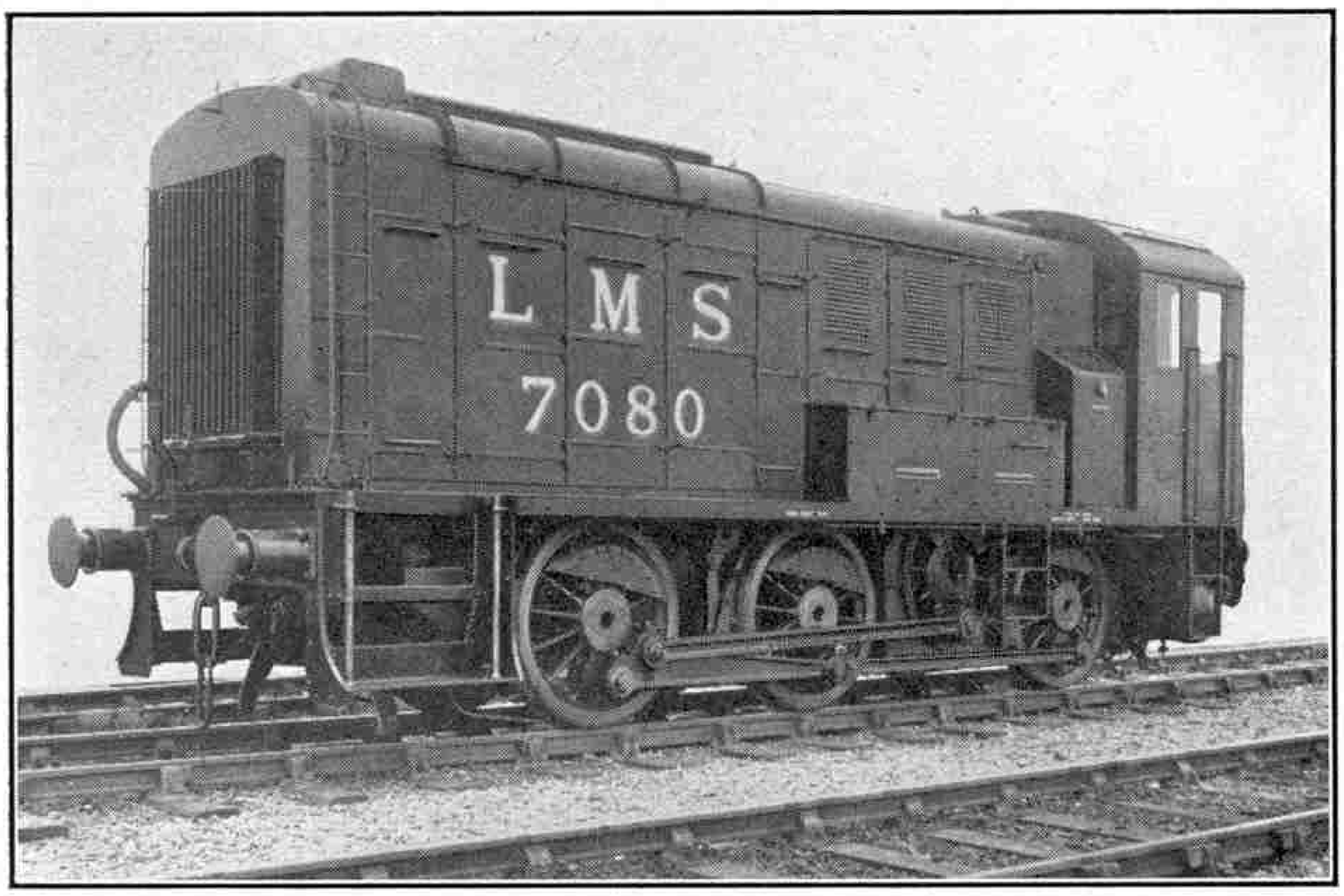
NEW ZEALAND

Ashburton M.C.—Model-building contests have been well supported, and excellent models of a variety of subjects have been built. Competitive Games Evenings have been held regularly. An informative Talk dealt with "*Gold Sluicing in Southland.*" A Cinematograph Show was held on one evening. A model motor car race meeting and hill climb has been a novel feature of the programme. Presentations were made to Mr. Taylor, for seven years Leader of the Ashburton club, and to his wife, when they left the district recently. Club roll: 50. *Secretary:* E. Lewis, 120, Havelock Street, Ashburton.

Christchurch M.C.—New club rooms have been secured, and a number of new members have been enrolled. The programme has included Meccano and Hornby Nights, and Talks have been given on the "*Queen Mary*" and "*A Tour of Europe.*" Games Evenings also have been held. A lively Debate has been held in conjunction with the Ashburton M.C. A Social was held on the club's 10th Birthday, when a fine birthday cake was quickly demolished! The Annual Parents Night attracted some 150 visitors, who were greatly interested in a display of Meccano models and Hornby Train working. Visits to the Sumner School for the Deaf have been continued. A joint outing with the Ashburton M.C. proved very enjoyable. Club roll: 41. *Secretary:* D. Pratt, 102, Kerrs Road, Christchurch N.E.1, New Zealand.

SOUTH AFRICA

Malvern M.C.—Excellent progress is being made, a splendid spirit of co-operation prevailing. An outstanding recent event was an Exhibition of models and Hornby railways arranged by the club at the Kensington Ridge School. The models on view were chiefly cranes and aeroplanes, and there was a very fine large blocksetting crane, while the club's electric railway was a great attraction to visitors, who thoroughly appreciated the explanations of its working given by the club members. Another section of the Exhibition consisted of elaborate castles, mills and chateaux built of coloured card. A club magazine has been started, and the first issues are very promising, containing good club news and announcements. Club roll: 65. *Secretary:* D. Hean, P.O. Box 8, Cleveland, South Africa.



One of the L.M.S. Diesel-electric shunting engines described on this page. Photographs by courtesy of the L.M.S.

New L.M.S. Shunting Engines

Diesel-Electric Locomotives for Toton Sidings

THE L.M.S. are mechanising the down sidings at Toton, in Derbyshire, where the great coal trains for London and the south are made up, and are building 20 Diesel-electric shunting locomotives for working in the yards there. These are being constructed at Derby and some have already been delivered. They are six-coupled engines of remarkable appearance, as the upper illustration on this page shows. Their driving wheels are 4 ft. 3 in. in diameter, and they are capable of a maximum speed of 20 m.p.h. They have a small wheelbase of only 15 ft. 3 in., and in addition the middle pair of driving wheels is arranged with a side play of ½ in., so that they have no difficulty in rounding sharp curves.

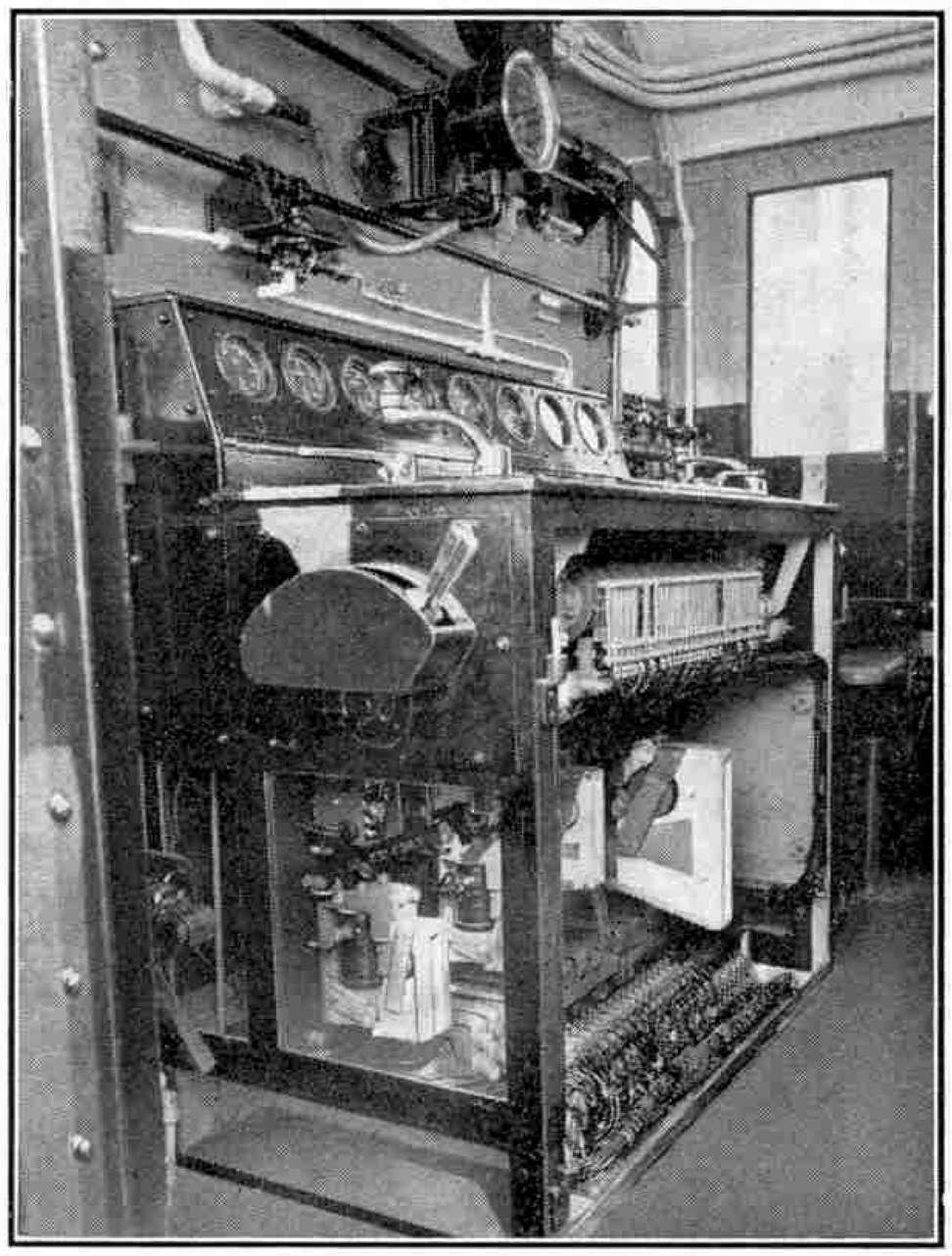
Each of these locomotives is fitted with a six-cylinder four-stroke Diesel engine, and this drives a D.C. generator, connected directly to it, which supplies current to the motor, which has a tractive effort of 3,500 lb. and drives the locomotive through double-reduction spur gearing. As the master controller is "notched up," the speed of the traction motor increases with successive increases in the voltage of the main generator, and on the master controller there is a second control lever that enables a fine variation of speed to be made on each main notch. A mechanical governor keeps the speed of the engine down when it is handling only light loads, and with heavy loads a special arrangement of the electrical control system limits the power taken by the main generator from the engine, thus preventing overloading. The Diesel engine is cooled by water circulated through a radiator by means of a pump. Behind the radiator is a belt-driven fan.

Batteries are used to supply current for various purposes, one of the chief of these being to provide a means of starting the Diesel engine. This is carried out by connecting the battery across the main generator, causing it to run as a motor and turn the engine over until firing commences. The batteries also supply the control system and the lights, and in addition are used for exciting the main generator field. They are charged automatically from the main generator when the engine is running at idling speed. Push-buttons are provided so that the engine can be started and stopped from the driving cab or from the engine room.

The main fuel tank which is situated between the engine cab and the housing for the generator has a capacity of 586 gal. of oil. There is a second tank known as a service tank; this has a capacity of 75 gal. and from it the fuel oil is led to the injector pumps.

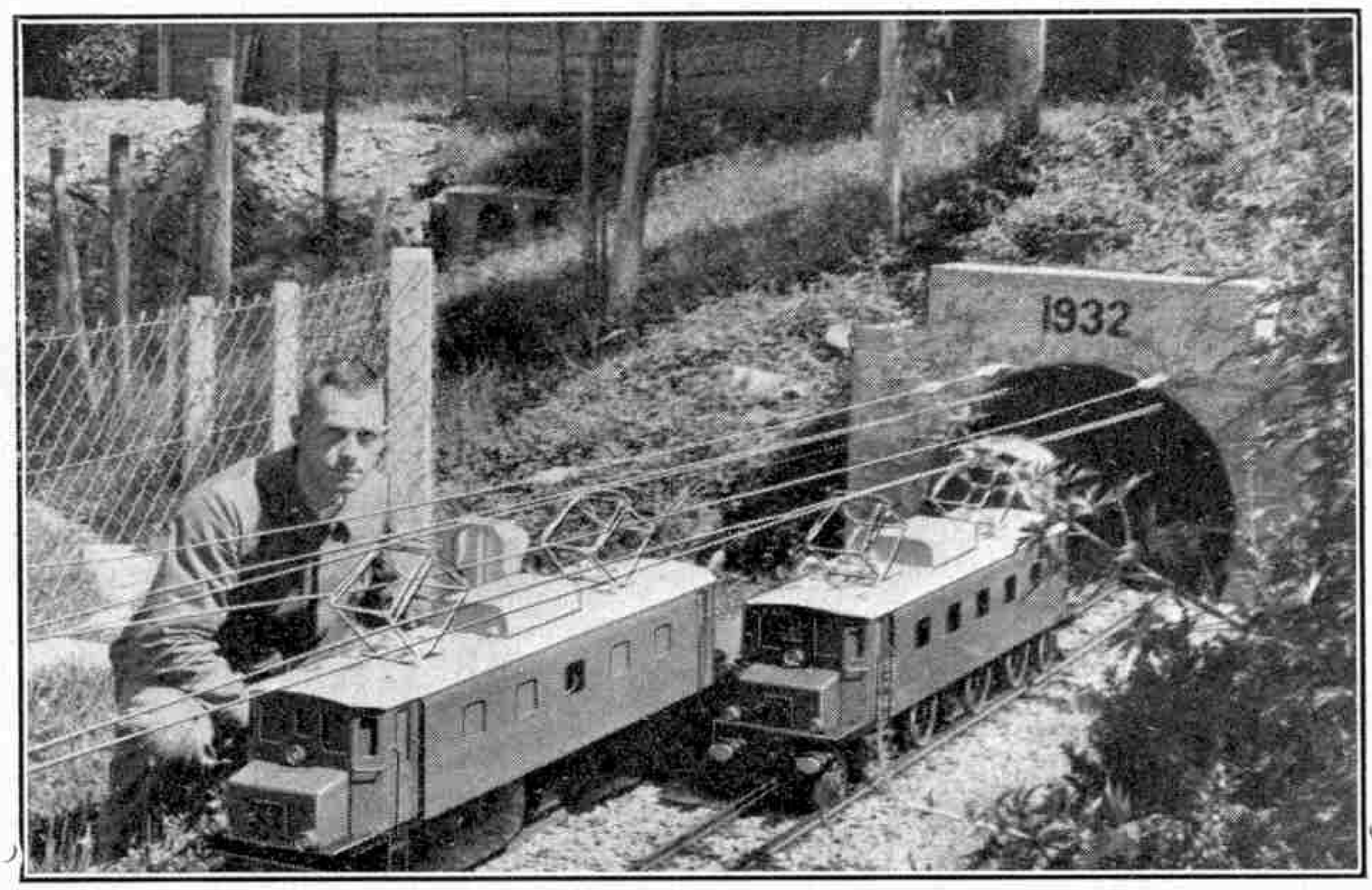
The desk in the cab from which the driver controls the locomotive is shown in the lower illustration. There are two control handles and two for the brakes, which are operated by compressed air. The cab also contains the hand screw brake, the heater, an electric food cooker and a speedometer. On each side are adjustable tip-up seats. Drop windows are provided, and there are inspection doors on each side of the housing, with a sliding roof provided over the engine in order to facilitate inspection of the cylinder heads and pistons. An interesting point is that the whistle of the locomotive is worked by compressed air, which also is used for blowing sand on to the rails when necessary. The sand is carried in sand boxes that are situated in front of the leading and behind the trailing wheels.

Cab view showing duplicated controls.



A Swiss Engineer's Model Electric Railway

By R. M. Waugh



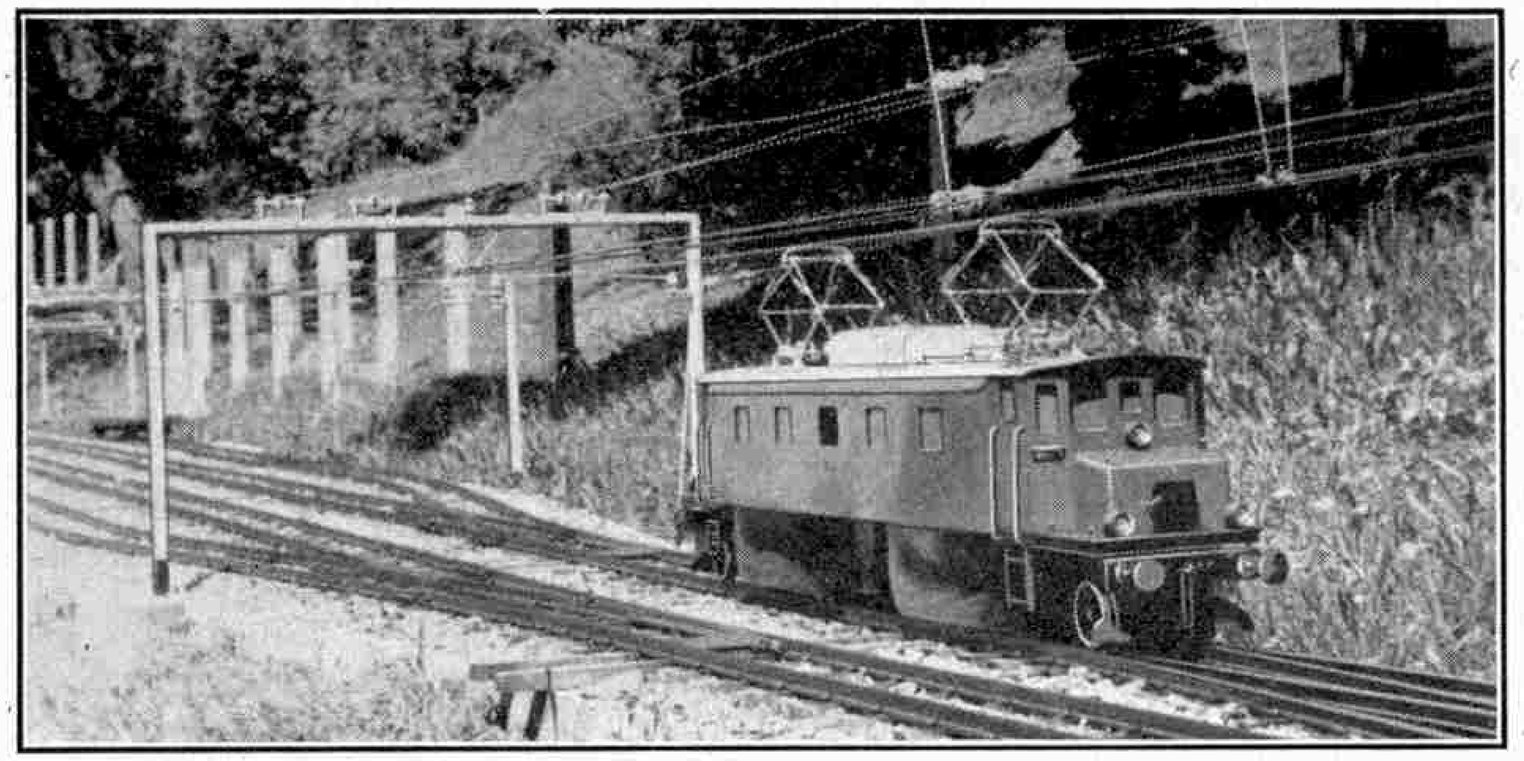
Herr Oswald, the builder of the unique railway described on this page, with two of his locomotives. The arrangement of the overhead conductors is well shown in this photograph.

IN no country of the world have railway engineers attained greater triumphs than in Switzerland. Extraordinary skill has been displayed in overcoming the many natural obstacles of that mountainous country. For instance, an exceptional amount of tunnelling has been found necessary. Two of the tunnels, the St. Gotthard and the Lötschberg, have each a length of over 9 miles; and the Simplon, which is partly in Switzerland and partly in Italy, is over 12 miles long and is the longest tunnel in the world. Switzerland is notable too for the amount of large-scale electrification that has been carried out, over 3,000 track miles being so equipped. Engineers have taken advantage of the water power available to generate current and the use of the overhead conductor system is characteristic of Swiss railways.

The chief features of Swiss railway practice are reproduced in a remarkable electric miniature railway that has been built and is operated by a young Swiss engineer, Herr Arther Oswald. Herr Oswald, who obtained his Engineering Diploma at the Zürich Polytechnic, lives at Dietschiberg, 1,000 ft. above Lake Lucerne, and it is there that his line is situated.

The railway is extensive, with a track 1,300 ft. in length. It is built to a scale of approximately $1\frac{1}{4}$ in. to the foot. Construction was commenced in 1932, so that it has taken several years to build up the line at present in operation. The total weight of the track is $1\frac{1}{2}$ tons, and over 3,000 sleepers have been laid.

The method employed for the laying of the track is interesting. First of all the ground was levelled and surplus earth used to form a small embankment alongside the track. Concrete was then mixed and spread over the track bed to a depth of 6 in. The rails which are flat-bottomed, were then laid down on timber sleepers and the track ballasted with granite chippings. Gutters were built into the concrete for draining rain or flood water. The sleepers are manufactured in Herr Oswald's workshop, where he has all the necessary equipment for building and repairing the various components of his railway system.

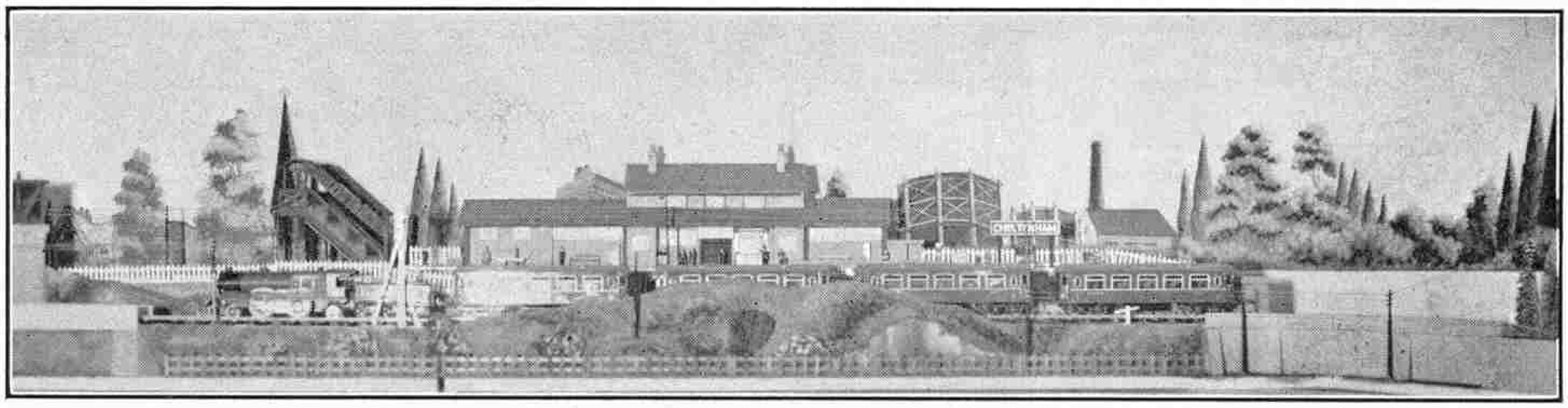


A high-speed express locomotive. This illustration gives a good idea of the general construction of the track and the gantries for the overhead wires.

Three locomotives are in use on the railway, two being goods engines and the other being used for express work. They are modelled on the efficient electric locomotives used by the Swiss Federal Railways, and are excellent reproductions that portray the character of their prototypes very closely, as is evident from the illustrations on this page. The two goods locomotives weigh 350 lb. each and have motors of 2 h.p., while the express engine has a 3 h.p. motor and weighs 440 lb. With this engine a speed of 30 m.p.h. is attained on level track, and severe gradients can be negotiated at 9 m.p.h.

The entire system is operated by remote control and current for the locomotive motors is obtained from an overhead wire system. Pantograph pick-up gear, which is a feature of the real locomotives, is used on these model engines, and the joints are hinged to allow strong springs to keep the collector "bows" in contact with the overhead wires. When not in use the pantographs can be folded down on to the roof, exactly as in real practice. Power is supplied from the house mains and is distributed to the track after passing through the main control apparatus. The poles and gantries supporting the overhead wires have been set into the concrete track bed, thus ensuring absolute rigidity.

Rolling stock for both goods and passenger work is in use and new items are continually being added.



A Miniature Railway in an Hotel

Round the World by Train

HOTELS are invariably associated with travel and a novel method of supplying the "travel" atmosphere has been adopted by Mr. E. A. Moore, of The Red House Hotel at Great Yarmouth, who has installed a miniature railway system in one of the principal rooms. Apart from its unusual purpose the railway itself has various special features and the following account will interest all "*M.M.*" readers.

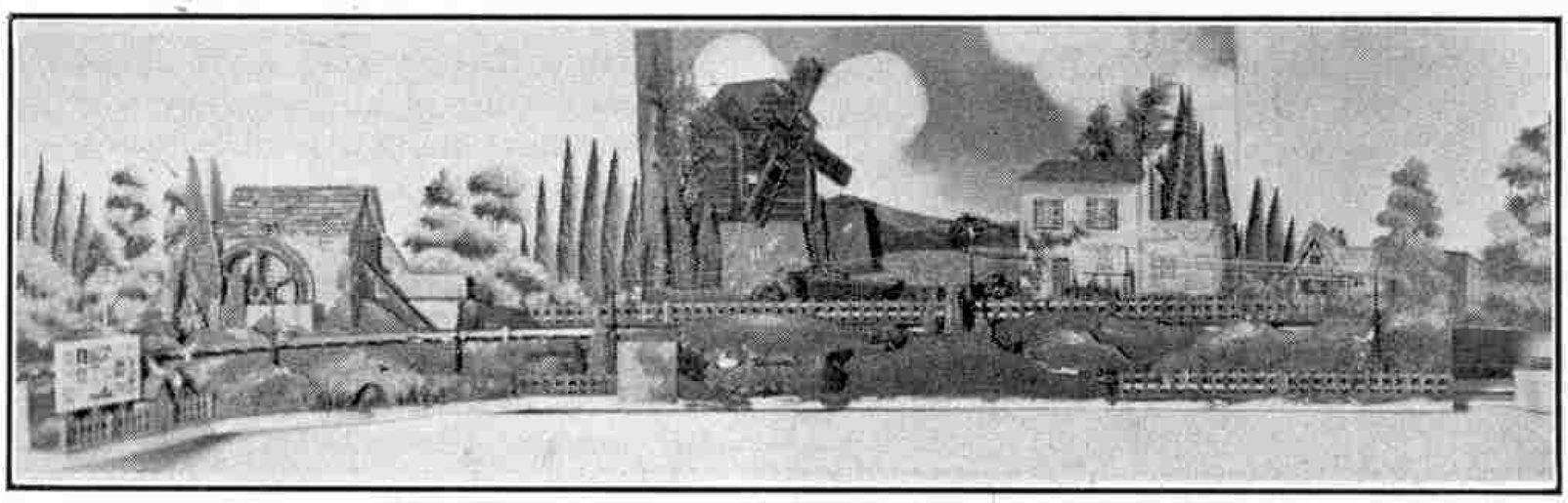
The room in which the railway is situated is some 28 ft. by 15 ft. in size, and it has been fitted up and furnished to represent all the usual offices and features of a railway station. Although the room is large there were many difficulties to be overcome in arranging the railway. In order not to take up any space in the room that would interfere with its normal use it was essential that the railway should be close to the walls and that there should be full clearance at all times for the opening of the doors. So the railway with all its effects had to be fitted up at a height of eight feet from the floor.

The track of the railway, which is laid to the standard Gauge 0, is composed of rails of the drawn steel type, with chairs and sleepers, and was built to fit the various angles of the room. It is carried round the room on a wide ledge, the edge of which is finished in the same manner as the ornamental facings of station awnings. Rail level is 3½ in. above the actual ledge. This makes it possible to give the appearance of an embankment at certain points. Where required, slopes and hills in front of the line give the effect of the railway passing through a cutting.

The line passes across the deep recesses of the windows in the room and advantage has been taken of these recesses to make the scheme as topical as possible. Various set-pieces are arranged in them, representing different countries through which the train passes, and by this device the best possible use is made of the space available.

The train, which is set in motion by a "penny in the slot" mechanism, is composed of a Hornby "*Flying Scotsman*" Locomotive and Hornby No. 2 Saloon Coaches that have been fitted up with electric light. It commences its journey from the 6 ft. model of a typical English country station that is shown in the upper illustration on this page. Readers will notice many Hornby Accessories, including Fencing, Passengers, Railway Staff, and Posters and so on. On its run the train passes an automatically illuminated signal, and enters the "Switzerland" set piece, which is represented by a tableau of winter sports. Illuminated hotels and chalets, backed by snow-covered fir trees and slopes, give a very fascinating effect, and model toboggans, sledges, and skiers travel down the mountain slopes, while miniature skaters go round on an ice rink in front of the principal hotel.

"America" is next approached. This is represented by an illuminated miniature of New York's skyline, in which the main features are reproductions of the "Empire State" and "Chrysler" Buildings. It is interesting to know that this model contains well over 5,000 windows! The next "port of call" is "Egypt." Here are the sand hills of the desert, with the three well-known pyramids in the background, and the figure of the Sphinx rising up on one side. Camel trains wend their ways through the palm trees and across the desert, while the train passes on to the 14 ft. model of "London," shown in the lower illustration on the opposite page. All the model buildings and the street lamps on the Thames Embankment are illuminated, various river craft move slowly up and down stream, and road traffic speeds



This section of the miniature railway system described in these pages represents Holland. The windmill and water wheel are working models powered by a Meccano electric motor.

along the Embankment itself. All the buildings in this particular model are complete in themselves, and are removable.

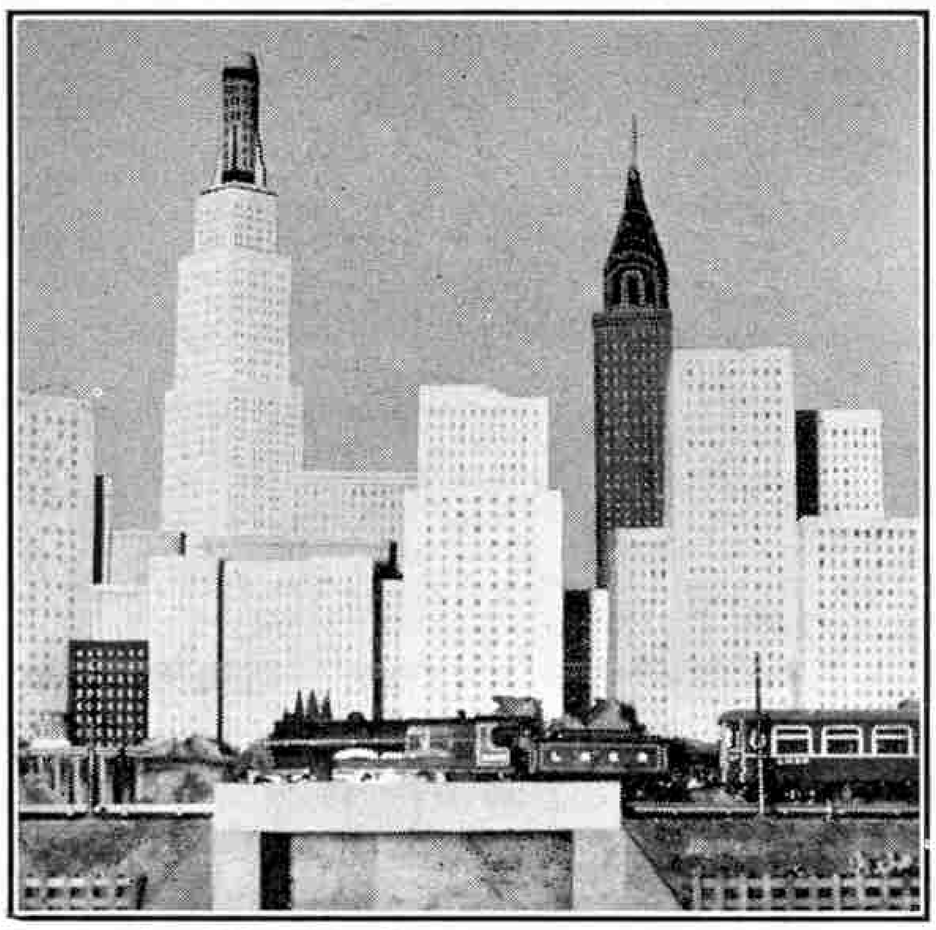
From "London" the train next makes its way through "Germany," which is represented by a fortress bristling with guns and bayonets. The balcony of the fortress, which is draped with the Nazi flag, is illuminated to reveal the figure of Herr Hitler, standing at his characteristic salute, reviewing regiments of troops, which are marching to and fro in the courtyard below. The railway line in this section is heavily protected with miniature barbed wire, trenches, and sandbags.

Passing through a tunnel and mountain scenery, the line then enters "Holland." Here there is a typical Dutch scene, which includes a working water wheel, the inevitable windmill, and swans swimming along a dyke. An old Dutch barge drawn up in the river beside the mill is seen against a characteristic background of tulip fields.

Now comes the conclusion of the journey, the train drawing up at the station from which it started, having made one complete circuit of the room. Up to the time of writing, the train has travelled nearly 40 miles; it will be very interesting to see how long the "*Scotsman*" will stand up to this steady test, as it is possible to keep check on the distance travelled.

Movement for the various models incorporated in the set pieces is obtained from six Meccano E020 Electric Motors. These work well and have proved very reliable, and fully equal to the test of daily use. Gears and pulleys transmit the drive to the different items at the correct proportionate speeds according to their character. All the moving figures and the road and river traffic components are attached to endless belts, and the wide range of Meccano Pulleys and Accessories has proved most useful for the quite complicated fittings required for these.

Special treatment of the room itself helps to suggest the "station" effect that was aimed at. Thus there is suspended from the ceiling, and covering the whole room, a "station roof" made to represent the usual awning. Included in the effects round the "walls" of the station is a "Cloakroom," containing imitation luggage of all varieties, and foreign travel leaflets. The familiar "Booking Office" also is represented and on the small ticket counter is situated the slot mechanism whereby the train and the models are set in motion. Incidentally, when a penny is inserted in the slot the main lights in the room or, rather, the "station," go out and all the model parts of the scheme become illuminated and animated.



The Hornby E320 "Flying Scotsman" passes "New York," with its characteristic skyline and buildings.

A tobacconist's kiosk is complete with windows properly dressed, and a realistic bookstall contains all up-to-date periodicals, papers, and magazines. The newspaper contents sheets on the front are changed daily. There is also a large timetable and poster board, which contains current timetables of the real railways, and various posters advertising Continental travel. Among other things, a special London "Underground" display board, containing the "Underground Map for the Central Area" and various poster and advertising boards go to complete the "walls."

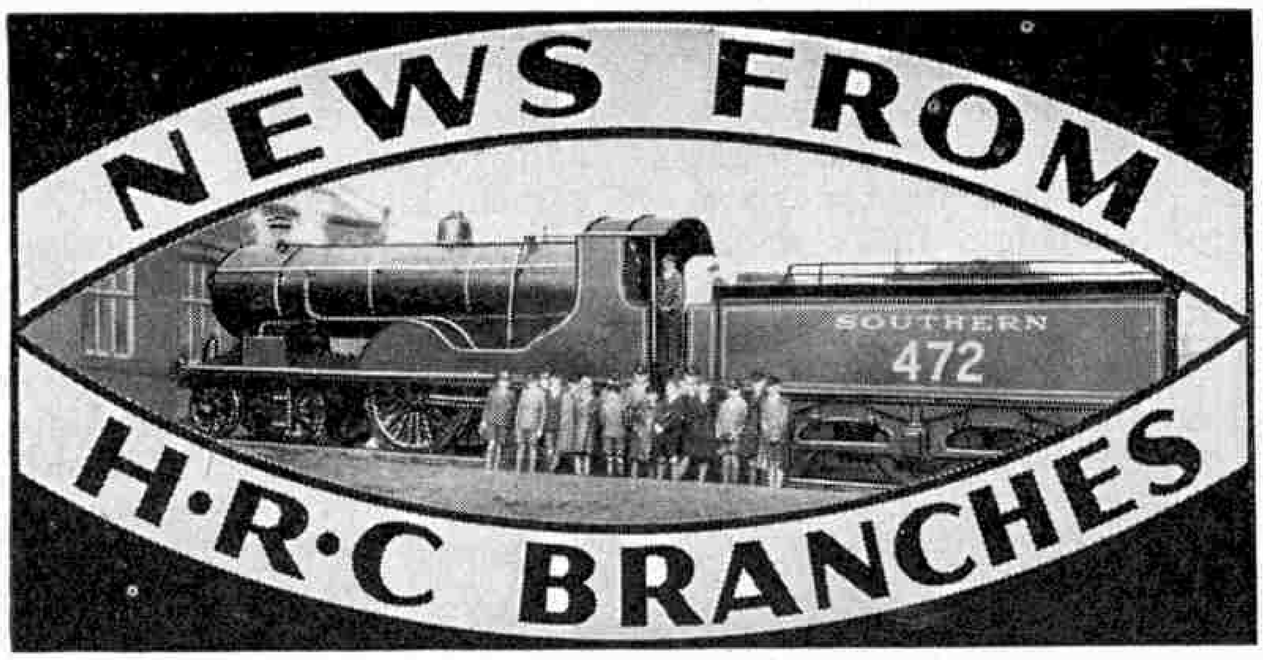
All these rise to a height of 8 ft. from the floor, and this leaves between the tops of the "walls" and the ceiling a space of 2 ft. 3 in. in which the model railway is situated.

All the foregoing fixtures are given depth and a realistic appearance by being let into the various windows which surround the room. Thus they do not take up any valuable space from the floor. The various features are all properly built of wood, and are grained and varnished, or enamelled, according to their particular requirements.

In view of the very central position of "The Red House" it was decided to name the station "*Yarmouth Central*" and this name appears on the imitation cast iron name plates, which are fixed to the backs of the long seats that are placed around the walls. The letters were cut out separately and applied to a base of wood, and with their red and black enamel finish they look quite realistic.

The entire display, including the "penny in the slot" apparatus, was carried out on the premises, in a small workshop 14 ft. by 8 ft., and took 22 weeks to construct and erect. Mr. Moore was ably assisted by two or three friends who are interested in this kind of work, and their keenness and help was very valuable.

The model representing London from the Houses of Parliament on the left to the Tower Bridge on the right. The various vessels shown move slowly along the 'river.'



NORWOOD AND DISTRICT.—Regular Track Meetings have been held. In a "Questions Contest" members were set railway problems, and prizes of Dinky Toys were awarded to the winners. Meccano Evenings have been held and special interest was taken in a Meccano trolleybus system, in which the vehicles were supplied with current from overhead wires. An exciting "Grand Monopoly Contest" lasted five hours. The London terminal stations of the S.R. have been visited, and other enjoyable outings have been arranged. Chairman: Mr. B. W. Jordan, Flat 2, 99, Central Hill, Upper Norwood, S.E.19.

ULVERSTON.—A branch line has been constructed from "Mayville" to "Somerville," and scenic effects added to the layout, of which flashlight photographs have been taken. Experiments have also been carried out with electrification, and electrical signalling devices are under construction. Cycle excursions have been enjoyed. After a tour made by the secretary it was decided that Hincaster Junction was the best place for members to see L.M.S. main line expresses. Secretary: J. H. Pursey, "Withersden," Rakehead, Ulverston.

NORTH BRITISH MODEL SOCIETY.—The construction of the indoor model railway is now well advanced, and a start has been made on an outdoor layout. The Library has been improved, and now contains a variety of technical books that are of great use in model-making. A Visit to a local L.N.E.R. Locomotive Shed proved very interesting. Locomotives of various types were inspected, and the repair and maintenance departments were visited. Members also had a look over a new high-speed locomotive coaler. Assistant secretary: W. G. Bald, 323, Kingsway, Dundee.

HURST HOUSE (CROYDON).—The track has been screwed down on trestle tables, and most of the wiring has been fastened to the underside of these with staples. At the end of each section all wires are led to a three-pin plug that fits into a socket on the next section. The sections are numbered, and the layout can be assembled very quickly in readiness for train running. Colour-light signalling has been introduced and a scheme devised whereby a locomotive cannot pass a signal at danger. Secretary: J. C. Moss, Hurst House, Hurst Road, Croydon.

EDGBASTON.—Train running has been enthusiastically carried out at all meetings, and general efficiency in control has improved. A number of new books have been added to the Library. A Visit has been arranged to Derby Locomotive Works. Secretary: R. L. Teare, 531, City Road, Edgbaston, Birmingham 17.

ISLINGTON.—Interesting track operations have been carried out on the new steel-track layout, which consists of an elevated line and one at low-level, with sidings and a two-track terminus. The secretary has given an interesting Talk on his visit to Croydon Airport. The division of members into Junior and Senior Sections for railway working is proving very successful. Several Saturday afternoons have been devoted to model yachting. Other activities included fretwork and model aeroplane construction. Secretary: F. Warren, 48, Leigh Road, Highbury, London N.5.

FIRST SHEFFIELD.—Work on the new model railway progresses, and the supports for the baseboard are well advanced. The track has been laid on the floor to the design that will eventually be employed when it is raised, and experiments are being carried out to ensure that the best possible design is obtained. The use of Hornby Steel Track has resulted in much smoother train running. Secretary: W. B. Hutchinson, 11, Sharrow View, Sheffield 7.

ROSEDALE (KIDDERMINSTER).—Track-circuiting has been adopted for the Branch layout, and colour-light signalling also has been introduced. The layout was recently taken down and overhauled before reassembly. An interesting afternoon has been spent at a large power station at Stourport-on-Severn; particular interest was taken in the electric battery locomotives used for shunting in the yards. A party was held on the occasion of the treasurer's birthday. A Model Flying Section has been commenced. Secretary: A. D. Hamblin, 19, Katherine Road, Bearwood, Birmingham.

LOUGHTON.—Model railway working was abandoned for the summer months, and outdoor activities have formed the programme. A visit to King's Cross Running Sheds proved instructive as well as interesting. Several model aeroplanes have been built and flown. Secretary: G. W. Ruffell, 10, Elmhurst Way, Avondale Drive, Loughton.

ROCKPORT SCHOOL.—The usual train running has been continued, and at one meeting members were pleased to welcome their parents, as visitors. The layout has now been completed, and the trestles on which it rests have been painted. A generous gift of track and rolling stock has made possible more ambitious train running. Morse Code instruments are used by members to send messages from the different control points on the line. Secretary: P. C. L. Cosgrave, "Rockport," Craigavad, Co. Down, Northern Ireland.

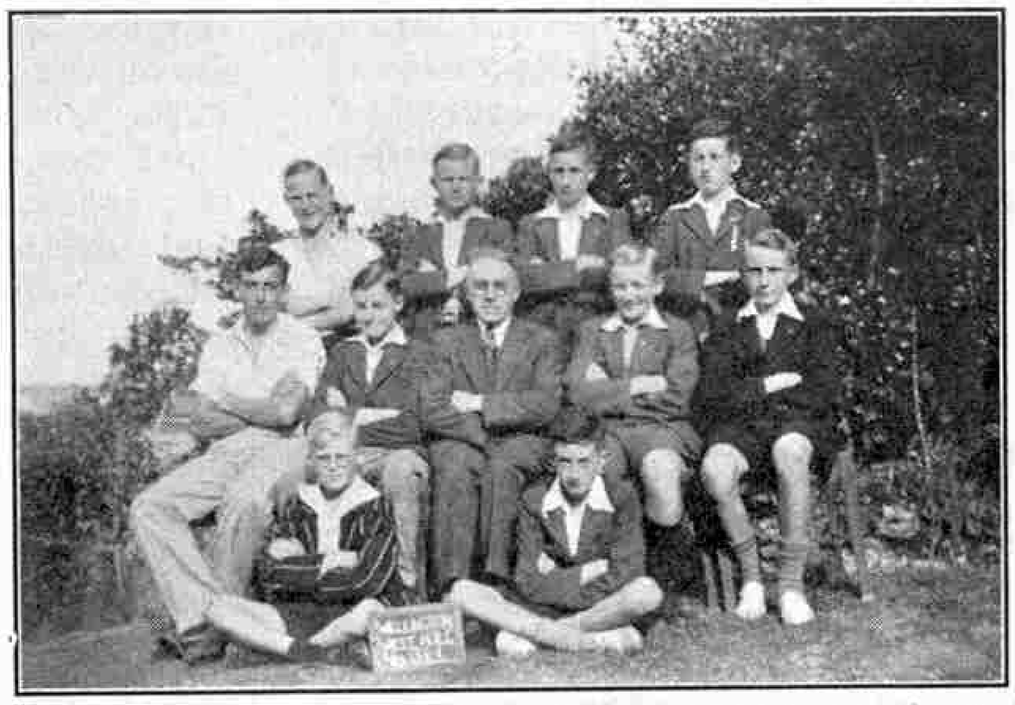
WEST HADDON DISTRICT.—Track laying has been continued, and experiments have been made to test the proposed designs. Games have been played out of doors on fine evenings. The members of a section of the Branch that is known as "Associated Industries" have arranged a series of Visits, chiefly to places concerned with the manufacture of foodstuffs. The first visit was to a dairy and was very interesting. Secretary: D. G. Bush, "Stonelea," West Haddon, Nr. Rugby.

NORTHAMPTON.—At the final meeting of the 1938-9 sessions, the Inter-Station Shield was presented to the section representing "Stafford," who narrowly beat the "Liverpool" section. Tennis and Cricket have been played and a visit paid to London. Secretary: D. J. Rushton, 40, The Vale, Northampton.

Proposed Branches

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

ABERDARE—W. G. John, 11, Park Lane.
BUXTON—M. Strange, 4, George Mansions.
COLCHESTER—A. J. Blaxill, St. Marthas, Braiswick.
DEVIZES—D. Batchelor, The "White Bear."
GRASSINGTON—D. and M. Scales, 1, The Avenue.
LONDON—G. Packington, 15, Valleyfield Road, Streatham, S.W.16.
MONKSTOWN—D. Pierce, 20, Monkstown Road.
OLD HILL—H. S. A. Sherratt, Victoria Hotel, Old Hill, Staffs.
SOUTHPORT—P. H. Smith, Barry Court, Argyle Road.



Members of the Wellington West (New Zealand) H.R.C. Branch No. 361, with their Chairman, Mr. T. Cassells. On his right is K. R. Cassells, secretary. This Branch was incorporated in December last, and now has a well-planned layout representing the main line of the L.M.S., on which the "Royal Scot" and other services between Euston and Glasgow are faithfully reproduced.

Branches Recently Incorporated

373. MANCHESTER—Mr. J. H. Birchall, St. Bede's College, Manchester.
374. BLACKPOOL—Mr. N. C. Irvine, 8, Dudley Avenue, Blackpool.
375. LEIGH-ON-SEA—Mr. W. Brown, 47, Henry Drive, Leigh-on-Sea.
376. FARNBOROUGH—Mr. N. F. Godfrey, Bassets, Farnborough.

HORNBY RAILWAY COMPANY COMPETITION PAGE

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

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

READ THIS FIRST

Competitors entering for contests on this page should note that there are two main contests, one for the Senior Section members of the H.R.C. and the other for Junior Section members. The Senior contest is open to members who are 12 years of age and over, and the Junior contest to members under 12 years. On no account must members of the Senior Section enter the Junior Section contest, or vice versa. The Railway Photographic Contest No. 6, which is also announced on this page is open to all H.R.C. members irrespective of sections.

Senior Section

For this month's Senior Contest we have decided to return to a type of competition that has not been included in this page for some time. This takes the form of a series of questions on railway matters. Competitions of this kind have always proved popular with members of the H.R.C. The questions set are not unfair or too difficult. Actually the greater part of the information required in answering them has been given in the "*M.M.*," and it will be good fun to find the rest by enquiry from railway experts, from observation or from some other source.

The questions which competitors are required to answer are as follows:

1. **In reference to a locomotive, what is meant by priming?**
2. **What message is conveyed to the driver when a signalman waves a green light slowly from side to side?**
3. **What is an exhaust injector?**
4. **Some tank wagons have a bright red horizontal band round the centre. What does this indicate?**
5. **What are the distinctive marks on an L.M.S. shock-absorbing wagon?**
6. **(a) Are any British locomotives owned by one main line company driven by the men of another main line company?**
   (b) Are there any signal boxes in this country owned by one company and operated by men of another?
7. **How many flags must a driver have with him on his engine, and what are their colours?**
8. **Which side of a train is regarded as the "off" side?**
9. **How many snow sheds are there on British railways, and where are they?**
10. **"Princess Royal" and "Princess Elizabeth" are names borne by both coaches and locomotives in this country. Which companies own the engines and which the coaches?**
11. **Where is the longest tunnel in the British Isles? What is its length, and on which railway is it?**
12. **Give, in not more than 150 words, your own idea of the advantages of a 4-6-2 type locomotive over one of the 4-6-0 type.**

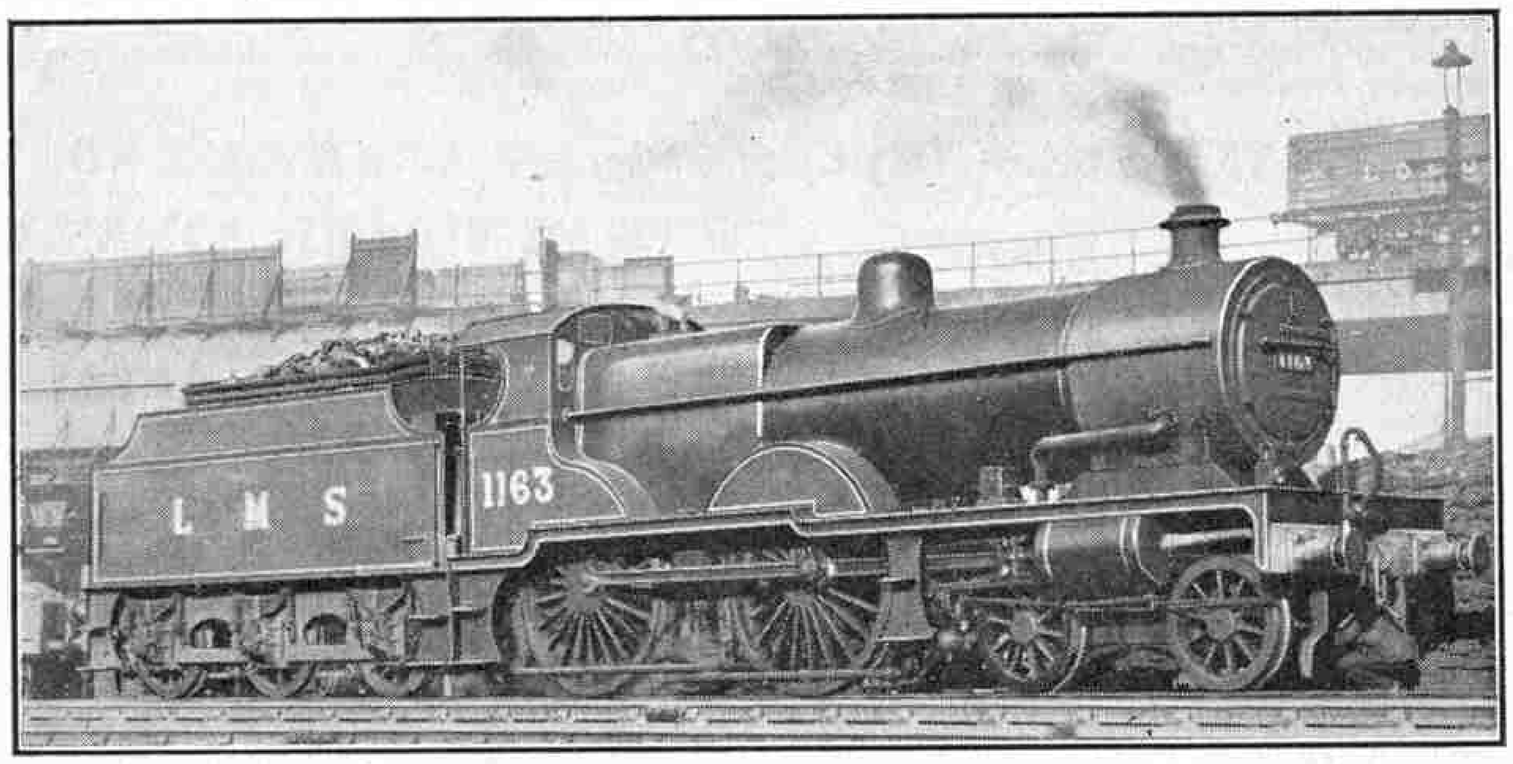
There are two sections in the contest, Home and Overseas, and to the senders of the three best sets of answers received in each of these sections will be awarded Meccano or Hornby Train products to the value of 15/–, 10/6 and 5/– respectively.

Answers should be written on one side of the paper only, on the back of which must appear the competitor's name, full address and H.R.C. membership number.

Envelopes containing entries must be marked "*H.R.C. Questions Contest (Senior Section)*" in the top left-hand corner and posted to reach Headquarters at Meccano Limited, Binns Road, Liverpool 13, on or before 30th September. The closing date for entries in the Overseas section is 30th December.

Junior Section

An interesting Drawing Contest is provided for Junior Section members this month. The Drawing Contests that are announced from time to time on this page are always very well received and the entries in them are of an exceedingly high standard. We have decided that in the present one competitors shall be asked to draw a definite locomotive, and we have reproduced on this page a photograph of one of the "Standard Compound" locomotives which are in use throughout the whole of the L.M.S. System. It is this they are asked to draw.



The engine shown is No. 1163, which is exactly similar to "Compound" No. 1185, the prototype of one of the Hornby E220 Special Locomotives, and those who enter the contest can make use of other photographs of this and other engines of the class to guide them in regard to detail.

Drawings submitted should be roughly twice the size of the photograph and can be coloured if members desire. It does not necessarily follow that a coloured drawing will take preference over a pencil or ink drawing. Good drawing will be preferred to striking colour effects in efforts that otherwise are poor.

The Contest will be divided into the usual sections for Home and Overseas members, and in each of these will be prizes consisting of any products manufactured by Meccano Ltd., to the respective value of 15/–, 10/6 and 5/–. Several consolation prizes will be awarded to members whose entries do not come up to prizewinning standard, but are nevertheless worthy of an award.

Entries should be marked "*H.R.C. Drawing Contest (Junior Section)*" and posted to reach Meccano Limited, Binns Road, Liverpool 13, on or before 30th September. The latest date on which entries in the Overseas section can be received is 30th December.

Railway Photographic Contest No. 6

September may be said to herald the approach of the end of the photographic season, for then the days are shortening and the light generally is not too good. This month's photographic contest therefore is the last of the present series. In it we offer prizes for the best photographs of "*Any Railway Subject,*" leaving members free to exercise their own preference for particular aspects of railway working. As in previous contests the only restriction is that each exposure must have been made by the competitor, but the developing and printing may be the work of a professional.

Entrants may submit as many prints as they desire but no competitor can receive more than one prize. It is important that every print submitted should have on the back the name of the competitor, his full address and his H.R.C. membership number, and the omission of any of these details will result in disqualification.

The contest will be divided as usual into two sections—Home and Overseas—and prizes of 21/–, 15/– and 10/6 respectively will be awarded in each section.

Envelopes containing entries should be clearly marked "*H.R.C. Photo Contest No. 6*" and posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, on or before 30th September. The closing date for the Overseas Section is 30th December. Entries received after the announced closing dates will be disqualified and will not be passed on to the judges.

H.R.C. COMPETITION RESULTS

HOME

June "Photo Contest No. 3."—First: T. F. Fletcher (6057), Perry Bar, Birmingham 20. Second: D. F. Forbes (14092), Leith, Edinburgh 6. Third: J. Loughran (65146), Greencastle, Belfast.

June "Marshalling Contest."—First: E. Oldham (43390), Hyde, Cheshire. Second: R. H. D. Hoyle (63668), Oakwood, Leeds 8. Third: A. F. Cook (218), Doncaster.

OVERSEAS

March "Silhouettes Contest."—First: B. Schmidt (53854), Wellington, New Zealand. Second: R. A. Wragg (7913), Rajputana, India. Third: K. R. Cassells (39510), Wellington, New Zealand.

March "Articles Contest."—First: W. C. Coles (63881), Cheltenham, S. Australia. Second: B. Freeman (59990), Wellington, New Zealand. Third: C. Coleman (64306), Buenos Aires, South America.

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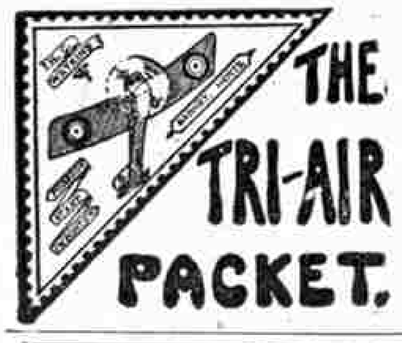

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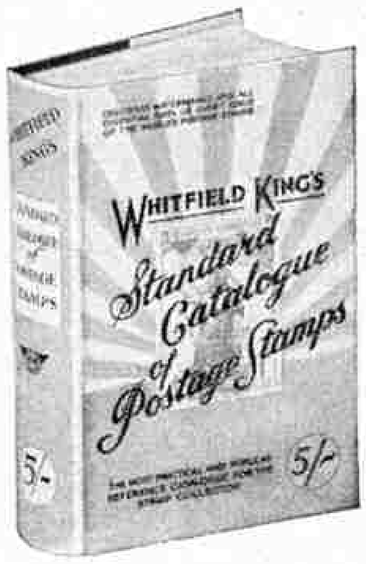

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STAMP COLLECTING

Arranging a Perfect Collection

THE coming of autumn is regarded as marking the commencement of the new stamp collecting season, and in addition many of our readers will take up the hobby for the first time during the next few weeks. This month therefore is the best time to discuss how a stamp collection should be laid out to secure the maximum interest and effect.

A well laid out collection is not merely a joy to its owner; it is also a source of interest to all who see it. Furthermore, if for any reason it is necessary to sell the collection it will be far more readily marketed than would be possible were the stamps just stuck on the pages in higgledy-piggledy fashion.

Mozambique Company, May, 1937.
Design shows white rhinoceros.
Perf. 12½.

The first points to be considered are the stamps to be collected and the album in which to place them. Few young collectors have absolute control of the first of these points. They are almost entirely dependent upon gifts from relatives and friends for additions to their collections, and most of the stamps they receive are in used condition, having been taken from office correspondence. Some unused stamps of course will come along, and it would be well to make it a rule not to mix used and unused stamps on the same album page. Stamps that are torn or damaged, and those that are so heavily postmarked as to be unsightly, should be rigidly excluded from the collection. This may seem a harsh line to take, but it is necessary if the collection is to be attractive to others.

The choice of album is very important and we favour one of the loose-leaf type. It is slightly more costly than a fixed-leaf album, but it is a great advantage to be able to add more leaves as desired, and the perfect display of one issue does not create difficulty in housing the remaining issues of the same country. Further there is no waste space devoted to countries that are not represented in the collection.

In choosing the album heavily glossed or very rough papers should be avoided. A good plan is to test a sample sheet and to reject any paper that will not take writing in ink or that tears badly when a stamp mount is detached from it.

The size of the page is not an important matter. There are several standard sizes about 11 in. by 9½ in. for which additional leaves can be purchased at reasonable cost without difficulty. These pages are usually printed with a decorative border and a series of very fine small squares, known as the "quadrille," to serve as guides in arranging the positions of the stamps. Printed slips bearing the names of countries can be obtained for pasting at the heads of the sheets.

Each collector must decide for himself how he will lay out his stamps upon the album pages, but there are certain general rules that must be followed. It is in his adaptation of these rules to his own needs and ideas that the collector has the opportunity to infuse his own personality into the display.

Mozambique Company, May, 1937.
Design shows crocodile.
Perf. 12½.

First of all, the collector must decide the number of stamps that he will place on each page. The idea is to avoid overcrowding, so that each individual stamp can be studied as a stamp and not merely as one of a bunch. In ordinary circumstances 12 to 16 stamps to an 11 in. × 9½ in. page is the ideal, because this permits each stamp to be given a surround equal to its own width and depth. We suggest that figure merely as a working basis that we ourselves have found satisfactory, but there may be occasions when it may be necessary and desirable to exceed that number; in others it may be found necessary to reduce it.

Usually it is best not to allow stamps from different series to appear on the same page, but there may be rare occasions when the number of stamps in an issue is more than can be accommodated satisfactorily on one page but insufficient to fill two pages. In such cases the stamps surplus to the first page should be placed at the *bottom* of the second page, and the upper half of the second page used to accommodate a short set from the same country.

The layout of the stamps must be varied page by page to avoid monotony of arrangement, so that as each page is turned over the eye alights upon something different from the immediately preceding page. No two successive rows of stamps on one page should contain the same number. They should be alternately odd and even. It may be impossible to avoid a certain amount of repetition of layout styles in a large collection, of course, and in such cases pages with similar arrangements should be kept well apart from one another. The centre point of the page is the focal point and the general rule should be that the stamps should radiate from this point if it is occupied by a stamp, or circle round it if the space is left clear.

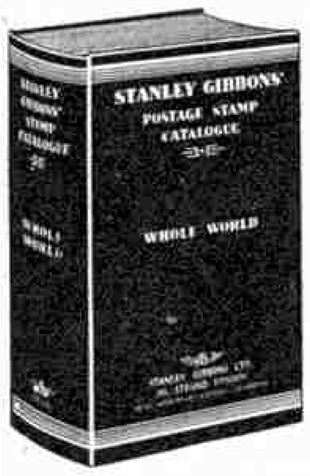
French Somali Coast, 17th November, 1938.
View shows Port of Djibouti.
Perf. 12½.

The next step in the building of the perfect collection is "writing up," for there is nothing that adds so much to the interest of a collection as really good descriptive matter.

The extent of the descriptive matter can vary widely from a brief statement of essentials such as issue date, watermark and perforation, to a full description of all the circumstances of the issue, including details of the design and philatelic history of the country concerned. It is essential that the collector should decide in advance just how far he is prepared to go in writing up his stamps, and in doing so he would be well advised to err on the side of brevity. The writing up must be consistent throughout the collection, and a consistent standard can be maintained by limiting the range of data to be given.

We have indicated what are considered to be the bare essentials, the date of issue, the watermark and the perforation. If more is to be given, this should take the form of specially interesting points peculiar to the stamp itself and why was it issued? How long was it in use? How many copies were printed? How many were sold? What happened to the remainder? What printing process was employed? Was more than one die or plate used? What was the type of the printing paper? Each of these points also could be elaborated if desired, but this suggestion of the (Continued on page 563)

Spain, 1938.
Commemorating 150th anniversary of Constitution of United States of America.
Perf. 12.



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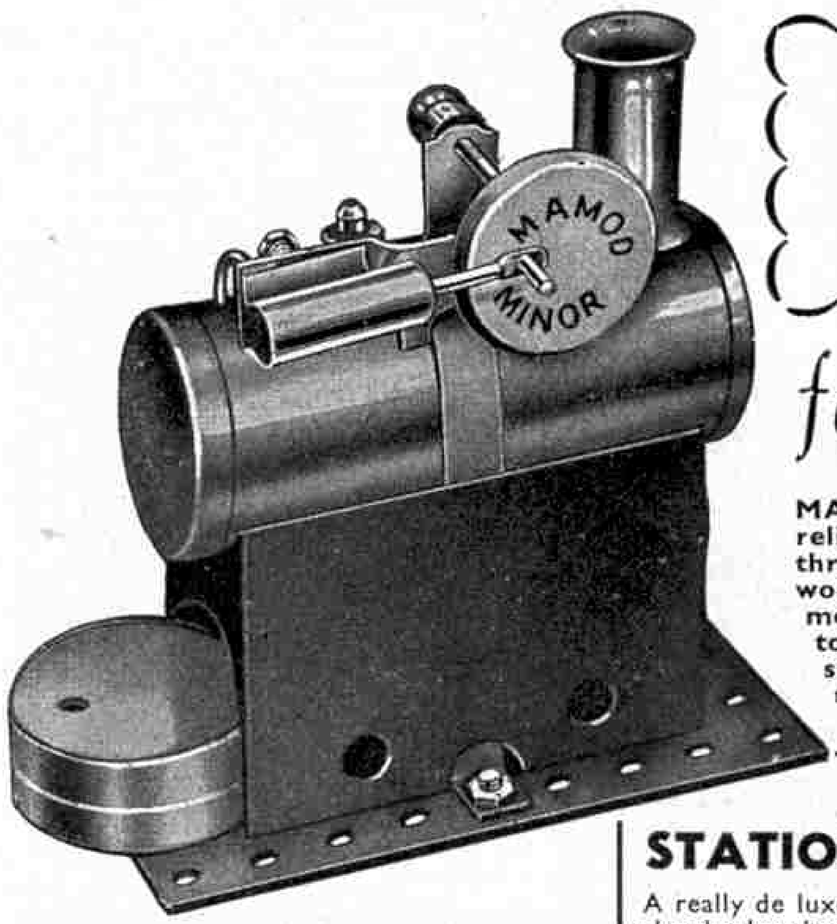

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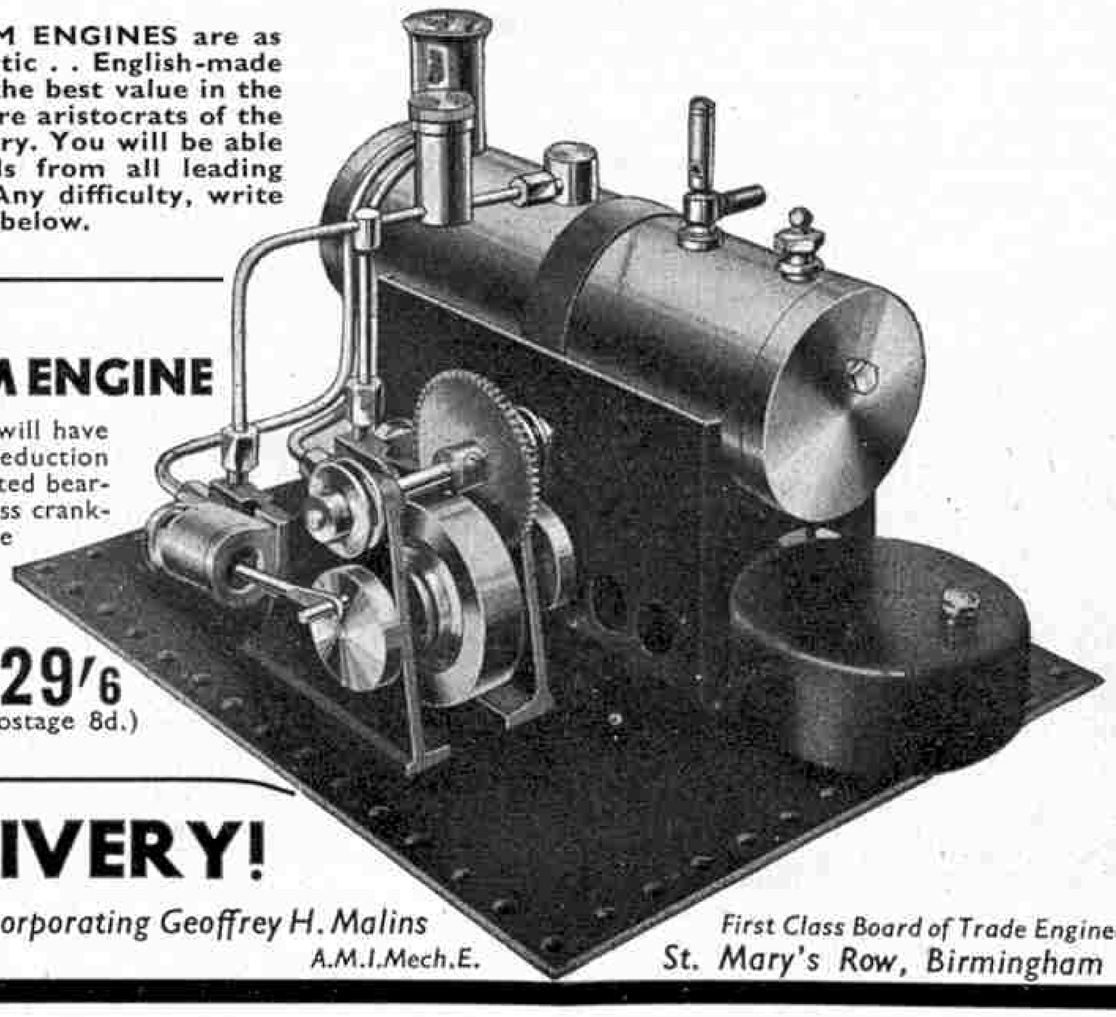

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Stamp Collecting—(*Continued from page 561*)

extent to which writing up could be carried shows how important it is to set a limit.

General details common to all the stamps of an issue should be placed at the head of the page devoted to the issue, while matter relating to the individual stamps, such as descriptions of design, should appear immediately above or alongside the stamps themselves. The exact notes to

Turkey, 2nd November, 1938. Commemorating 10th anniversary of introduction of Latin alphabet to Turkey. Perf. 11¾.

be written on the album page should be roughed out before a single word is committed to the page, for alterations would spoil the effect.

If a collector feels capable of making a really good show in an ornate style, by all means let him do so. Our preference is for the simple form of lettering and writing, with decorative lettering at the head of the page. For preference we use a good black ink, but two or three colours may be employed if desired. It is best to be sparing with the secondary colours, however. The stamps themselves provide all the colour essential to brightness of the page.

An ordinary fine-nibbed mapping pen is best for the simple data but broad and medium pens produce better results for heading and any necessary sub-titles.

In the space of this article it is impossible to cover the whole ground in close detail and we would like it to be understood that we are concerned here only to indicate the general principles to be followed. We shall be very happy to advise young collectors in settling their individual problems if they care to lay them before the Editor.

Postal Centenary Exhibition

We understand that the British Post Office plans to hold a Stamp Centenary Exhibition of its own coincident with the exhibition organised by the Royal Philatelic Society, in London next year.

Details of the exhibition are not yet available but it is understood that it will be concerned mainly to display the development of postal services over the 100 years that have passed from the introduction of the postal reforms advocated by Rowland Hill down to the inauguration of the "ALL-UP" Empire Air Mail Service.

In announcing this forthcoming exhibition, "*Stamp Collecting*" expresses the hope, which will be echoed by all philatelists, that it may be possible to arrange for the G.P.O. and the R.P.S. Exhibitions to be displayed simultaneously under the same roof.

Stamp Gossip

and Notes on New Issues

Interesting New South African Stamps

We illustrate on this page the designs of South Africa's new series commemorating the 250th anniversary of the arrival of the French Huguenots in South Africa.

There are three stamps in the series, ½d., 1d. and 1½d. values, each selling at a premium equal to its face value. The premium is devoted to a National Commemorative Fund, one aim of which is to restore and endow as a Huguenot museum the Ou Pastorie (Old Vicarage) in Paarl, which was the headquarters of the Huguenot Settlement in the 18th century.

The designs of the stamps are as follows: ½d., the Ou Pastorie; 1d., a sun rising on a darkened world, with a glowing cross in the sky; 1½d., a view from the Drakenstein Mountain looking over the country in which the Huguenots first settled, with a farmhouse surrounded by a vineyard in the foreground.

Barbados Tercentenary Issue

The 300th anniversary of the foundation of the Barbados Colonial Assembly, the equivalent of our British Houses of Parliament, is being celebrated this year, and a special series of five stamps, ½d. to 3d. values, has been issued to commemorate the occasion. A single design, illustrated on this page, is employed for all the stamps. This shows a view of the Assembly Chamber, with portraits of King Charles I and King George VI on the left and right respectively. The Mace of the House of Assembly appears at the foot of the design. The stamps will remain on sale for a period of 12 months, and should prove a highly popular set with collectors.

Belgian Charity Issue for Art

The Rubens tercentenary issue from Belgium, mentioned in our Stamp Gossip last month, is one of the most striking stamp series yet produced.

Six of the eight stamps bear reproductions of famous paintings by Rubens, including self-portraits on the 1f.50c. and 1f.75c. values. The remaining two designs show views of Rubens' house at Antwerp, which is to be restored and converted into a national museum. The most striking stamp in the issue is the 5 fr. value bearing a reproduction of "Descent from the Cross," one of Rubens' most famous pictures.

Simultaneously Belgium has issued a 75c. stamp to commemorate an exhibition of Memling's painting now being held in Bruges. The design, illustrated here, shows a portrait by Memling.

* * * *

We illustrate here the design of the new charity stamp recently issued in France in aid of funds for the relief of the dependents of mariners lost at sea. The design shows a monument shortly to be unveiled at Boulogne.

The Whitfield King 1940 Catalogue

Every year, on publication of the new season's stamp catalogues, we are the more amazed at the striking compactness of the volumes. The number of stamps listed in the new Whitfield King Catalogue is 2,479 more than last year, giving a total of 69,109, and still the volume retains its handy size!

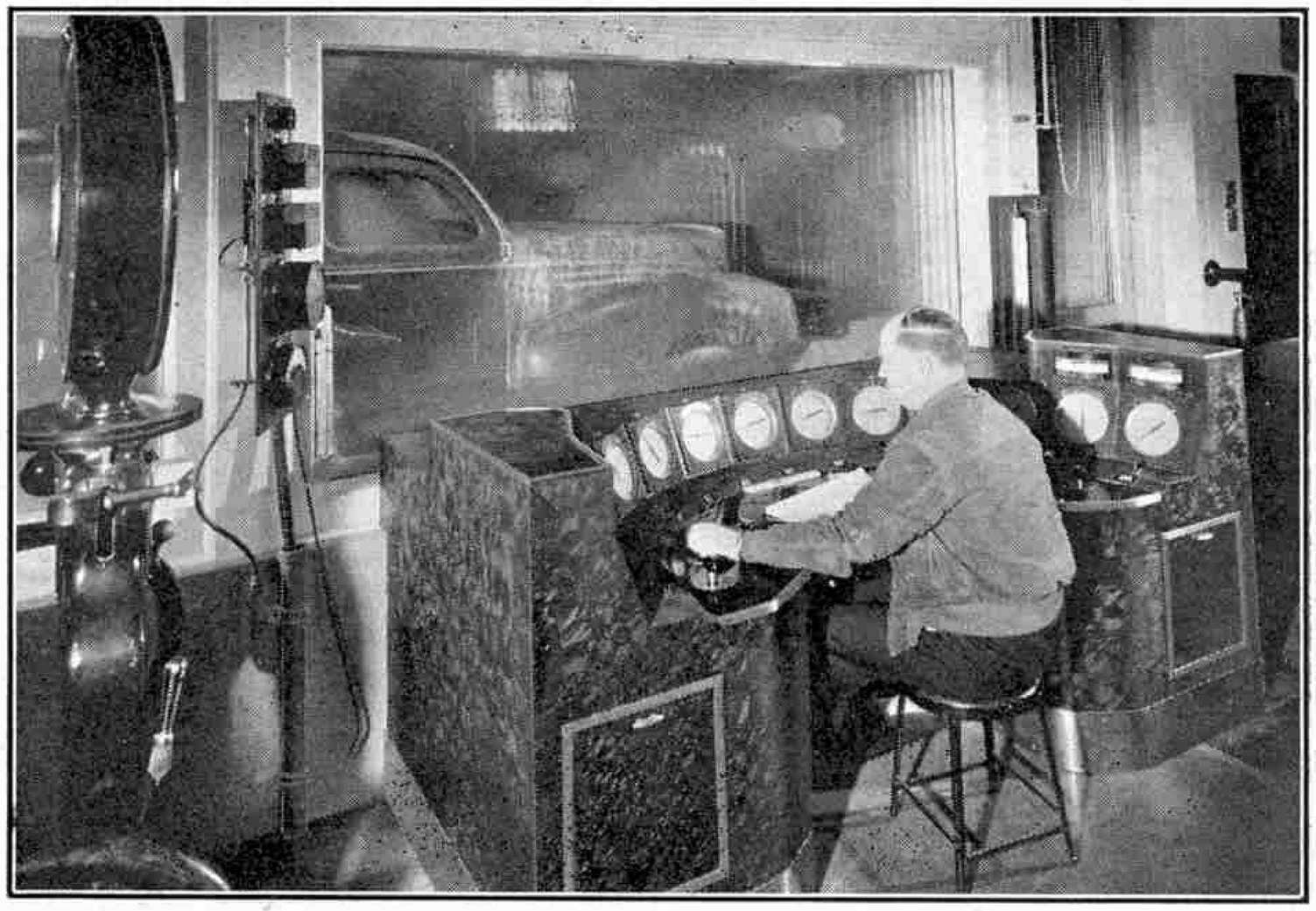
The publishers tell us that European issues account for 971 of the 2,479 new stamps, making a grand total of 22,296 for Europe; Africa comes next with 511 new issues and a total of 15,043, followed by America 471 new issues (total 12,169), West Indies 64 (3,941) and Oceania 80 (3,327).

Whitfield King's list only major varieties in this catalogue and is an ideal guide for the young collector. It can be obtained from any stamp dealer, price 5/-, or from Whitfield King and Company, Ipswich, price **5/6, post** paid (Overseas 6/-).

We thank Stanley Gibbons Ltd. for their courtesy in loaning the stamps from which the illustrations for our stamp pages have been made.

Artificial Weather Tests for Motor Cars

By T. R. Robinson



The control panel of the Ford weather tunnel, in which a car undergoing test can be seen through the four-ply windows. This illustration and the one below are reproduced by courtesy of the Ford Motor Co. Ltd., London.

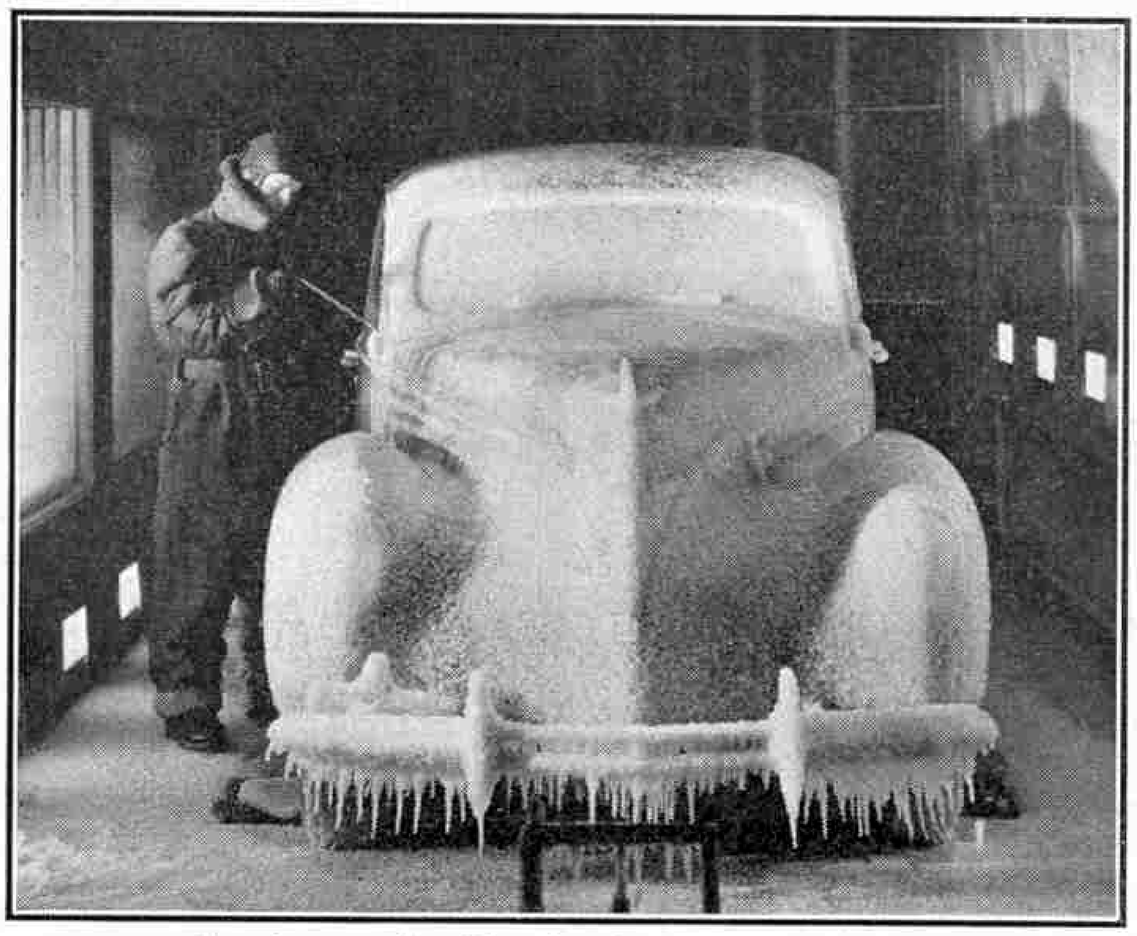
THE Ford Motor Company have built a special "weather tunnel" at their testing station at Dearborn, Michigan, in the United States, and in this specimen cars are subjected to every kind of artificial "climate," ranging from an 85 m.p.h. blizzard of sleet and snow to baking tropical heat accompanied by a dust or sand storm. All the while the car itself can be run at any pace, from a first-gear "tick-over" to the highest speed of which it is capable, and its performance is shown to the tiniest detail by accurate instruments.

The weather tunnel is in the form of an endless rectangular passage, in one gallery of which is mounted a three-bladed aeroplane propeller driven by a 300 h.p. electric motor. The propeller is inside the tunnel, but the driving motor is located outside the walls, and is connected to the propeller by a shaft. An accurate speed control on the motor allows the production of every kind of wind, from a light breeze to a hurricane, and the direction can be reversed so that the car under test can be made to perform against a head wind, or with one blowing behind it, as desired.

In an island position at the opposite end to the propeller is a bank of coils connected to a large refrigerator. These coils are capable of sending the temperature in the tunnel down to 20 deg. F. below zero if so desired, and the opposite extreme is provided by a bank of heater coils, mounted against the wall at the propeller end of the tunnel, with which the temperature can be raised to 150 deg. F. Rain is made by a spray device fitted in the roof of the tunnel, and anything from a slight shower to a tremendous downpour can be reproduced, the rain becoming sleet and snow if the refrigerating plant is used at the same time.

Dust and sand storms are created by forcing suitable materials up through a jet in the tunnel floor, and lamps fixed in the walls, roof and even the floor of the testing chamber provide brilliant artificial sunlight far more intense than that of a summer day. The effect of high altitudes is reproduced by reducing the air-pressure and cutting down the proportion of oxygen in the air, and other climatic conditions, such as mist, frost, and steamy damp, also can be copied faithfully.

The walls of the tunnel are lined with metal sheets to reduce the wastage of energy due to air friction, and an anemometer mounted close to the car under test gives a reading of the air speed at the actual vehicle. Other instruments fitted to the tunnel give the temperature, the barometric pressure, and the proportion of moisture present. These readings are separate from those obtained from instruments connected to the car, and give the necessary information on the tunnel conditions as distinct from those within the vehicle itself.



A car frozen-up by a blizzard test in the Ford weather tunnel.

The car undergoing test is alongside a large window and just outside this is a control desk from which it can be kept under constant observation. Each component, such as the radiator, carburetter, electrical circuit network, and so on, is provided with an appropriate instrument that gives a reading of its performance on a dial on the control desk, and thermometers and gauges placed where necessary in the bodywork and in various parts of the chassis show how these behave under test.

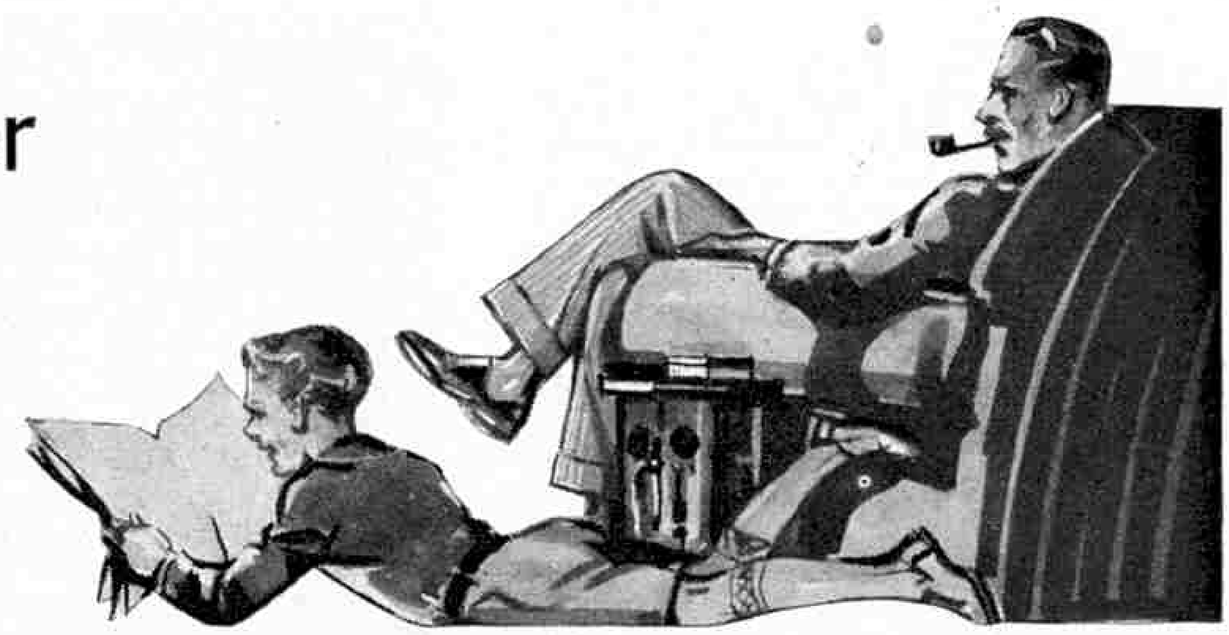
Artificial loads can be applied to give the effect of an uphill climb or a "coast" downhill. As temperature or humidity is varied, any changes in performance can be seen at once, and those that are out of proportion to the external conditions can soon be traced home. By mounting the car on a special aerodynamic balance, the amount of "drag" brought about by wind pressures at various speeds can be found, and the results obtained often suggest how a reduction in air resistance can be obtained by a change in the design of the body or accessories.

Nearly 100 different readings can be taken simultaneously, the forest of instruments mounted on the car being connected by a multi-wire cable with dials on the semi-circular panel of the test desk. Counters and meters also are mounted on the desk, together with switches and controls for putting the load on the car, and for varying the temperature and other "weather" conditions, so that the engineer in charge can rapidly produce any changes he desires in the tunnel.

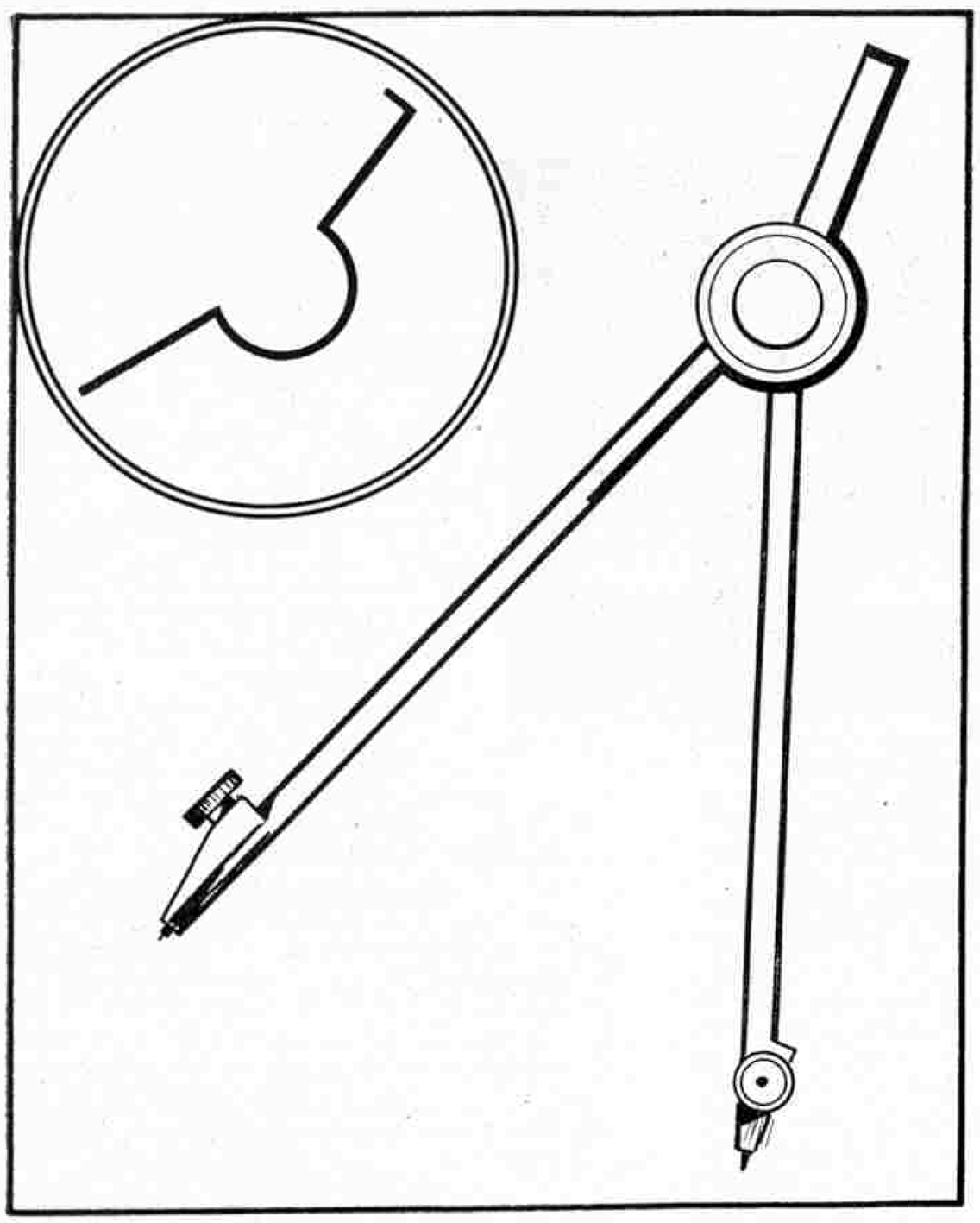
How severe are the tests imposed on cars can be seen by the condition of the vehicles when they emerge. After undergoing a sand or dust storm test a car is literally covered with fine grit, which is caught in every crevice and corner, and a blizzard test coats the whole car with a thick layer of hard ice. At the same time the excellent appearance of the cars after a clean-off shows that their finish and efficiency remain undamaged in most cases.

This Ford "weather tunnel" is said to be the only one of its kind so far in operation, and that it is a massive structure is shown by its dimensions. It is 124 ft. in length, 35 ft. wide and 14 ft. high, and the refrigerating plant alone weighs some 500 tons! Although it is a bulky and expensive piece of laboratory equipment, it is of the highest value, for the information that it gives in a few hours or days could only be obtained otherwise by sending cars all over the world, and perhaps waiting for months in order to get weather conditions of sufficient severity to make a test.

Competition Corner



September SKETCHOGRAM Contest



The Sketchogram Contest held in the June "*M.M.*" proved so exceptionally popular that we think many of our readers will welcome another, particularly as a means of enlivening the darker evening hours that will come later this month.

For the benefit of new readers we must explain that a Sketchogram Contest, although in the nature of a drawing contest, does not involve any special skill. All that competitors are required to do is to make a sketch embodying the simple line shown in the top left corner of the accompanying illustration. This line is known as the "sketchogram," and it must form an essential part of the outline of each sketch submitted. The idea is shown in our illustration, where the sketchogram has been drawn in heavily to indicate its position in the handle and legs of the compass.

The sketchogram may appear in the sketch as many times as the competitor likes, and it may be tilted to any angle, or turned upside down or completely round to face the opposite way. Our illustration of course must not be copied, but there are no other restrictions as to the subject or nature of the drawing.

It should be emphasised that a bold and simple drawing in which the sketchogram appears only once, and is immediately obvious, will stand a better chance of success than a complicated drawing in which it appears several times merely as a minor feature.

In order to secure for our younger readers an equal opportunity with the older ones of gaining prizes the entries will be divided into two sections, A for readers aged 16 and over, B for those under 16. Prizes of Meccano products value 21/- and 10/6 respectively, will be awarded in each section.

Entries must be addressed "*Sketchograms,*" Meccano Magazine, Binns Road, Liverpool 13, and must arrive not later than 30th September. Overseas closing date, 30th December.

September Photo Contest

This month's photographic contest is the last of the 1939 series, and we hope that every reader who has not yet taken part will send at least one photograph this month. The conditions of the contest are very simple. The prizes are offered simply for the best photographs submitted during the month, the only restriction being that the exposure must be the work of the competitor and that each print must bear a title. Pictorial photographs based upon scenic views or figure studies should also bear a note indicating where the photograph was taken. This information frequently is of extreme value as, for example, when an otherwise unsuccessful print is suitable for reproduction with a general article in the magazine.

Photographs may be of any size and may be mounted or unmounted.

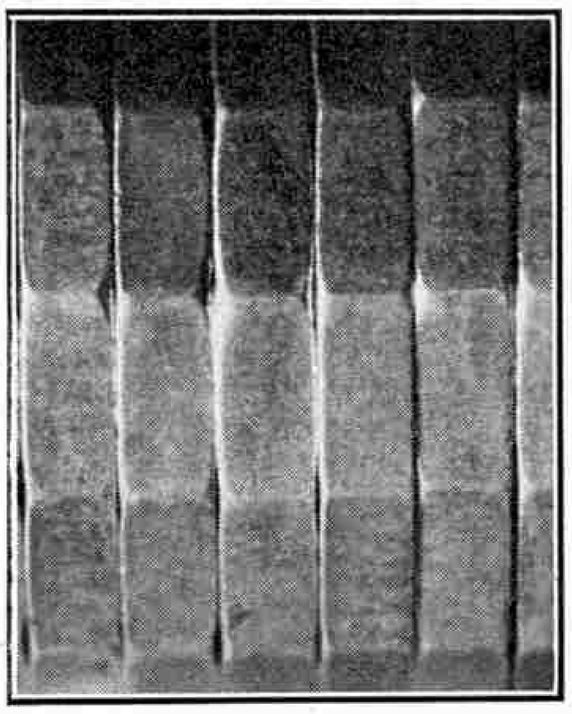
The entries will be divided into two sections, A for readers aged 16 and over, B for those under 16, and prizes of Meccano products or photographic material, as chosen by the winners, to the value of 21/- and 10/6 will be awarded in each section.

Entries must be addressed "*September Photo Contest,*" Meccano Magazine, Binns Road, Liverpool 13, and must arrive not later than 30th September. Overseas closing date, 30th December.

Unsuccessful entries will be returned if a stamped cover is sent for the purpose.

The sixth and last of the series of Mystery Pictures that commenced in the April "M.M." is reproduced in the adjoining column. The picture represents a common object photographed in an unusual way, and competitors must send in their solutions on postcards marked "Mystery Picture No. 6," to arrive not later than 30th September.

WHATEVER IS IT?



New Dinky Toys

The most notable addition this month to the range of Dinky Toys is a splendid scale model (Dinky Toys No. 23p) of the car in which Major A. T. G. Gardner set up new world speed records for cars up to 1,100 c.c. on the Bitterfeld-Dessau Autobahn, Germany, in May 1939. His speed for the flying kilometre was 203.7 m.p.h., and for the flying mile, 203.2 m.p.h. After having the engine rebored to increase its capacity, Major Gardner set up new records for cars up to 1,500 c.c. over the flying kilometre, mile and five kilometres, with speeds of 204.2 m.p.h., 203.8 m.p.h., and 200.6 m.p.h. respectively.

The car has many interesting features. Its beautifully streamlined body is 16 ft. 5 in. long overall, and 5 ft. 3 in. wide, and except for a small space around the driver's head and slots to allow the tyres to make contact with the ground, is totally enclosed. The engine and driver's cockpit are placed off the centre line of the chassis to allow the driver to sit well down between the off-side chassis frame member and the propeller shaft. Owing to the shallow depth of the body the driving seat is inclined at an angle of 45 degrees, so that the driver lies in a reclining position.

Another interesting new item is the Royal Artillery Personnel Set (Dinky Toys No. 160). This is intended for use with the Mobile Anti-Aircraft Unit (Dinky Toys No. 161), and the 18-pounder Quick-Firing Field Gun Unit (Dinky Toys No. 162). The set consists of an N.C.O., two Gunners sitting, two Gunners standing, and a Gunlayer.

Radio for High Speed Power Boats

An interesting radio equipment has just been specially designed by the British Power Boat Company for use on high speed motor boats. Radio equipment for this purpose has to be of low weight and to occupy little space; in addition it must be simple to operate, and capable of withstanding the severe shocks that may be sustained by a power boat driven at high speed in bad weather conditions.

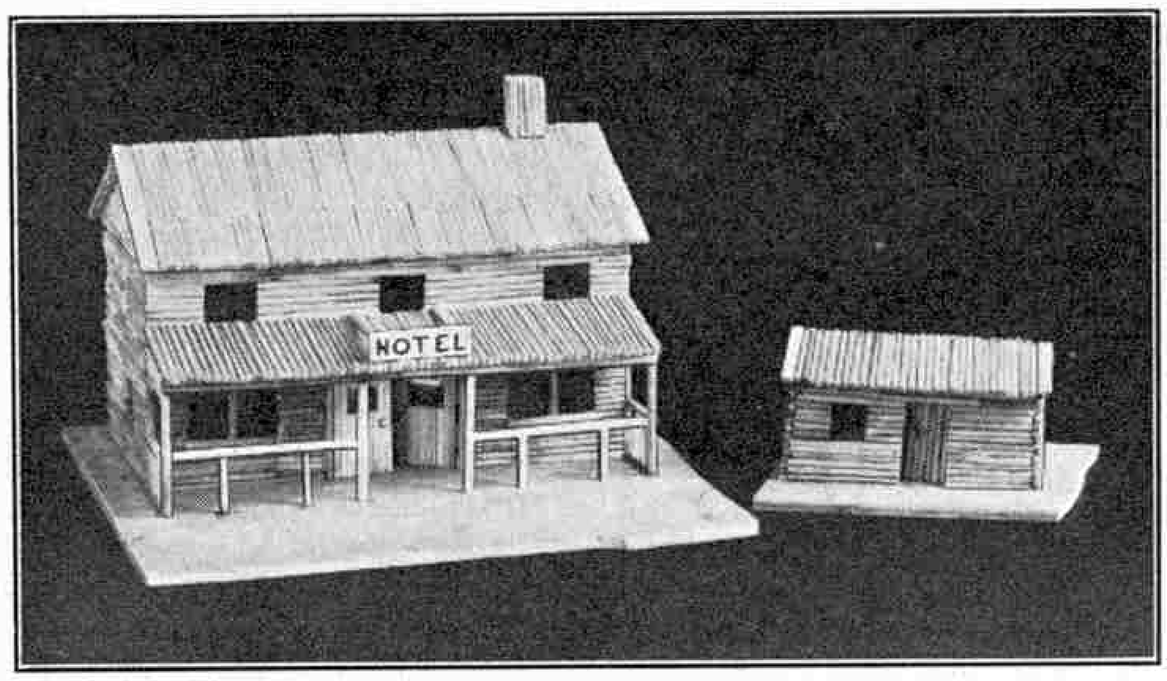
The Type 660 "Power-Gambrell" Radio equipment, as the new installation is called, has been designed with as few units as possible so that it is simple to fit and operate. It is housed in a water-tight box made of a light-weight alloy that resists corrosion by salt water, and is suitably finished for use in tropical conditions. The units are fitted with doors at the front, and opening the door of the transmitting unit automatically cuts off the high tension supply, thus avoiding the possibility of shock or of fire. The equipment is specially constructed for either 12-volt or 24-volt D.C. and therefore can be run from the batteries of vessels in which it is fitted. High tension current is provided by a silent vibrator unit.

The wave bands covered by the transmitter are 100-200 m. and 500-600 m., only the first of which is used for telephony; the receiver covers wave bands of 100-200 m. and 1000-2000 m. The working range depends on the type of aerial, but with one of normal dimensions telephony has been achieved at distances up to 100 miles in normal sea-going conditions.

Models Built of Matchsticks

The illustration on this page shows remarkable models of an hotel and a log hut that are built entirely of matchsticks. The models rest on plywood bases and the total number of matchsticks used in constructing them is 1,733, of which number 1,533 were required for the hotel alone.

These splendid models were built with great skill and patience by Mr. W. Thompson of Sheffield, a Meccano enthusiast and keen reader of the Magazine, during a stay of nearly three years in hospital. The roof of the hotel is in one piece and can be lifted off, when the staircase, handrail and landing and the three rooms upstairs and the two on the ground floor can be inspected. Every item inside is complete and finished in as much detail as the outside of the model. The windows are of cellophane, and the model presents a splendid appearance when it is lighted up by means of a flashlamp battery and a bulb out of its constructor's Hornby Motor Car Lighting Set.



Models built of matchsticks by W. Thompson, a Sheffield reader. How they were made is explained in an article on this page.

The matchsticks of which the models were built were used ones, and each had to be scraped clean, a task that was carried out with the aid of a safety razor blade mounted in a handle built of Meccano Parts. The method followed was to fasten the first matchsticks to the plywood base, and the structure was then built up on this foundation, Seccotine being used as the adhesive. Some of the matchsticks had to be interlocked, and the beams supporting the roof were morticed.

Bond's "Model and Experimental Engineering Handbook"

The 1939–1940 edition of the catalogue of Bond's O'Euston Road Ltd. thoroughly deserves its title of "*Model and Experimental Engineering Handbook*." It contains over 200 pages packed with details of the immense range of this famous firm's products, including finished models of all kinds, castings, parts and raw materials needed by the model engineer, and it is lavishly illustrated so that the model-maker and experimenter knows exactly what he will obtain when he orders material from it. In addition there is a section giving valuable hints on both electric and clockwork model railway work, and on workshop operations.

It is impossible in a short space to give an adequate survey of the contents of this comprehensive catalogue. The model railway section is particularly interesting, covering all requirements for Gauge 0, Gauge 00 and Gauge H0 railways, from complete locomotives to whistles and buffers. The range has been extended by many attractive new items, including ½-inch scale finished locomotive parts, wood for building coaches and a large gear box. In the engineering section many new features are included, among them tools, castings, model petrol engines and lathes. Ship and aeroplane models and parts for constructing them occupy many pages, and there are also details of complete sets of drawings and kits for various purposes.

The catalogue is obtainable, price 6d. post free, from Bond's O' Euston Road Ltd., 357, Euston Road, N.W.1.

Billiards in the Home

The need for diversion on winter evenings is met admirably by home billiards, a pastime that gives pleasure to every member of a family, old or young. For years the firm of E. J. Riley Ltd., Accrington, have specialised in the manufacture of billiard tables suitable for private houses. These are not mere toys, but perfect replicas of those of full size.

There are five different models of Riley's "Home" Billiard Tables, so that any size of home can be equipped. Each rests comfortably on an ordinary dining table and can be put away when not in use. Another outstanding model in the Riley range is the "Combine" Billiard and Dining Table, which can be transformed in two minutes from a luxurious dining table to a perfect billiard table. This is made in various attractive designs and sizes, ranging in price from £22/10/- upward. Other larger models include the Medium Size "Club" and "Institute" tables, and there are also the famous Riley Full Size Tables in use all over the World. Every accessory for the game is included in the range of Riley products, and the firm undertakes repairs, recovering of tables and similar work.

An attractive Art List of Riley Billiard Tables will be sent to any reader of the "*M.M.*" who writes to E. J. Riley Ltd., Deal Works, Accrington, or 46/47, Newgate Street, London E.C.1.

Reliable Miniature Steam Engines

The steam model enthusiast who is looking for a reliable British-made steam engine will find special interest in the Mamod engines advertised on page 562. These models have been designed in a variety of types and sizes. They are realistic in appearance, and their makers claim that each is perfect for its purpose.

All the standard Mamod models have boilers of solid drawn brass tubing guaranteed to a pressure of 100 lb. per sq. in., and are mounted on steel base plates drilled to fit in with the Meccano system of equidistant perforations. A full range of spares is available. Working models for use with the Mamod engines include lineshafts of four and six pulleys, power hammers and presses, and polishing spindles, bases of which are drilled at the edges to fit in the same manner as those of the engines.

Malins (Engineers) Ltd., St. Mary's Row, Birmingham 4, the makers of these engines, will send an illustrated leaflet and further details to any "*M.M.*" reader who makes application to them.

A New Plastic Material for Model-Builders

Readers who are interested in modelling scenery, cuttings and embankments, and other lineside features for their model railways will find a lot of fun in working with Plastic-Crete, advertised in our pages for the first time this month.

Plastic-Crete has been invented specially for model builders as a means of copying modern concrete and stone constructions. It is clay-like material that is clean and easy to use, and has no smell. It sets hard to form a durable mass possessing exceptional strength, and as it is adhesive it can be used to modernise wooden and metal models by applying a thin layer over the existing surface. Model bridges, buildings, chimney stacks, miniature houses and villages are among the many things that can be made from it. It can be decorated when set with oil paints or water colours, a feature that makes it particularly suitable for modelling miniature loads of merchandise to be hauled on model railways.

Our advertiser Mr. H. Brown, 15, Lower Queen Street, Sutton Coldfield, will gladly send an explanatory leaflet free of charge to any reader who writes mentioning the "*M.M.*"

Real Photographs Co. Supplementary List No. 17a

Locomotive enthusiasts will welcome the list of postcards just issued by Real Photographs Co. of Liverpool. This is intended to supplement the main list, No. 17, and contains details of numerous additional interesting subjects. There is no concentration on the principal types of locomotives, although these are well represented, and little-known and unusual engines are included that will add to the interest and completeness of any collection of locomotive postcards. For instance, there is in the L.N.E.R. section a 2-2-4 tank locomotive of the former North Eastern Railway used for inspection work; and a tramway locomotive of the type employed on certain light railways. Locomotive standardisation on the L.M.S., with its drastic scrapping of various old favourites, makes the addition of cards showing such engines as L.N.W.R. "Jumbos," "George the Fifths" and "Experiments" of special interest.

Similarly, in the G.W.R. section there are some interesting additions from the South Wales lines. Locomotives of the S.R. Brighton section and of Irish and continental lines are well represented.

HOW HE KNEW

A Scottish professor was conducting some experiments in chemistry. Before him was a vessel containing boiling liquid. The professor turned to a bright-looking lad in the class and asked:

"If I drop this silver coin in the liquid, will it dissolve?"

"Of course it wont," replied the lad quickly. "If it would you wouldn't drop it in."

* * * *

Willie: "Daddy, are flies flies because they fly?"
Daddy: "I suppose so."
"Are fleas fleas because they flee?"
"Sure. What of it?"
"I told teacher bees are bees because they be."

* * * *

Farmer: "Who's in that henhouse?"
Silence.
Farmer: "I'll give you one more chance before I shoot! Who's in there?"
Tramp: "Only us hens!"

* * * *

"Say, Dad, how soon will I be old enough to do just as I please?"

"I don't know, son, nobody has ever lived that long."

* * * *

Negro Circus Hand: "Here is a telegram from de master in Africa saying he am sending us some lions' tails."

Owner's Wife: "Lions' tails! What are you talking about?"

Negro: "Well, read it yourself, ma'am. It says plain: 'Captured two lions; sending details by mail!' "

* * * *

Small Boy: "Grannie, what is a racketeer?"
Grannie: "I suppose one of these tennis professionals."

* * * *

Mr. I. M. Broke: "Say, you remind me of a bird."
Collector: "How so?"
Mr. I. M. Broke: "Because you're always sticking your bill in my face."

* * * *

"My hollyhocks did very well last year. In fact, they were so tall that I had to use a step-ladder to tie them up."

"You were lucky. Most of mine were ruined by passing aeroplanes."

* * * *

Farmer McDab had fallen into the well. Treading water vigorously, he shouted for his wife.

"Haud on," she cried, "I'll ca' the men frae the field!"

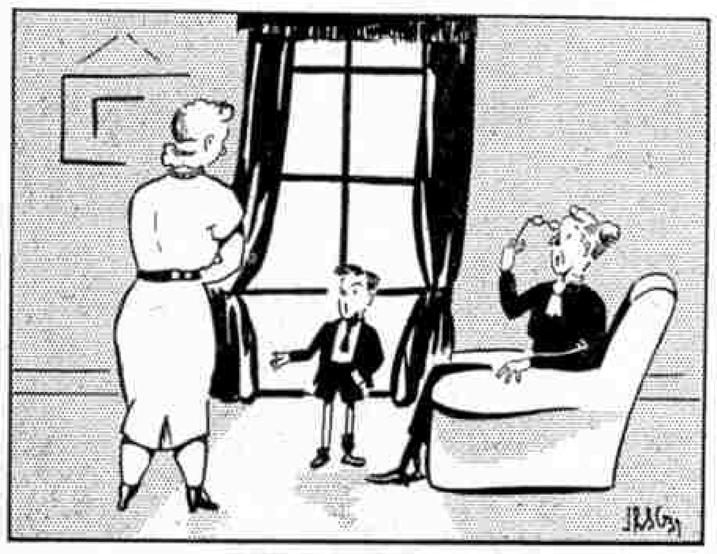
"What's the time?" he shouted.

"Eleven-thirty."

"Then bide a wee. I'll swim roon' till their dinner-time."

* * * *

NOT WHAT SHE MEANT



Little Cuthbert: "I want to go to the Zoo to see the monkeys, ma."

Mother: "The idea! Fancy wanting to go to the Zoo to see the monkeys when your Aunt Isabel is here!"

MISTAKEN IDENTITY!

A bus passenger, anxious not to pass her destination, poked the conductor with her umbrella.

"Is that the First National Bank?"

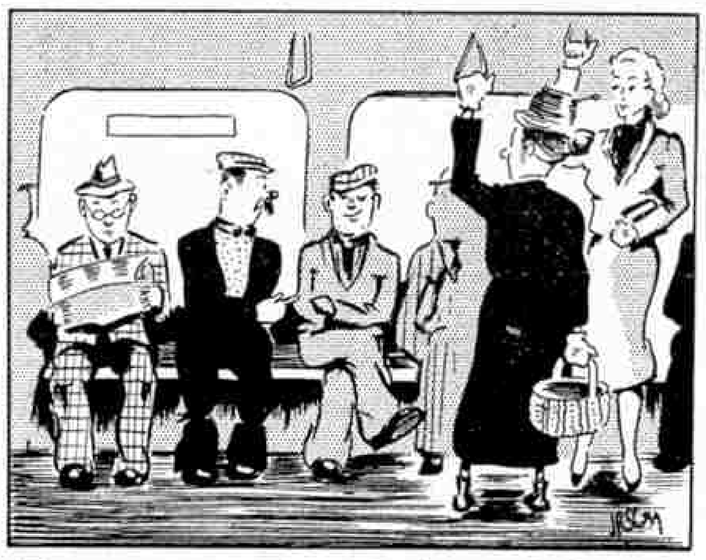
"No, mum," answered the conductor. "That is my stomach!"

* * * *

Teacher: "Tommy, why did you not comb your hair this morning?"
Tommy: "No comb, sir."
Teacher: "Why did you not borrow a comb from your father?"
Tommy: "No hair."

* * * *

GALLANT



Two men were seated together in a crowded tram car. One of them noticed that the other had his eyes closed.

"Wassamatter, Bill," he asked, "feeling ill?"

"I'm all right," answered Bill, "but I hate to see ladies standing."

* * * *

A Scotsman and a Yorkshireman were talking in a railway carriage. The Scot bragged so much about what he could do that at last the Yorkshireman grew exasperated.

"Tha's been opening thi mouth wide," he said, "about what tha can do. Tha can do this and tha can do that. Now tell us summat tha' can't do and ah'll do it for thee."

"Weel," replied the Scot, "Ah canna pay ma fare."

* * * *

Johnny: "What is a brick hod used for, Daddy?"
Father: "Why, for carrying bricks. You should know that. It explains itself."
Johnny (after a moment's silence): "Then I suppose a tripod is used for carrying tripe?"

* * * *

Jim: "Why did the boss fire you?"
Tim: "Everybody took me for the boss. He was one of those guys who stood around and watched everybody else work."

* * * *

"Tommy, dear," said the stern mother, as her small boy came in from playing, "this is bath night, you know."

"Then I think," answered her son, "I'll go out and get a little dirtier."

* * * *

Mike, badly injured in an accident was rushed to hospital. His friend soon followed, and was taken to the ward. There was a sheet over the patient's body, and the surgeon said to him, "Pat, your friend is dead."

A voice from under the sheet said, "No, I'm not."

Pat replied, "Hush, Mike, the doctor knows best."

* * * *

THIS MONTH'S HOWLER

The Minister of War is the clergyman who preaches to the soldiers in barracks.

DRINKING IN MUSIC

Negro Patient: "Doctor! doctor! I was playing de mouth organ an' swallowed it!"

Doctor: "Keep calm, sir, and be thankful you were not playing the piano."

* * * *

"Aren't you going to have a ride on the roundabouts, Rastus?"

"No, suh," replied Rastus. "I jus' seen Massa Johnson stay on them roundabouts till he'd spent as much as one dollar—and then get off at the same place as he got on. 'Massa Johnson,' I ses to him, 'you'se spent your money, but where you been?' "

* * * *

"Fadder, I've saved tuppence to-day, I ran all de way to school behind a tram."

"For vy didn't you save a shilling by running behind a taxi?"

* * * *

Lady Customer (angrily to greengrocer): "I ordered a dozen oranges this morning, and you have only sent eleven."

Greengrocer: "Quite right, lady, but one was bad, so I didn't trouble to send it."

* * * *

"Oh, boy! I'd like to be on that boat bound for London."

"You'd be a mighty unpopular passenger."

"How so?"

"Because everyone else on board wants to go to Brazil."

* * * *

"Sandy, I saw you put a button in the collection last Sunday for the heathens."

"Och, weel, the heathens'll no ken the deeference."

* * * *

Rufus was proudly sporting a new shirt, when a friend asked: "How many yards does it take to make a shirt like that, Rufus?"

"Well, suh," replied Rufus, "Ah got two shirts like this out'n one yard last night."

* * * *

Father: "Why are you in a hurry to go to school this morning, Tom?"

Tom: "The history master said he'd give us dates this morning."

* * * *

An American was talking of the terrible storms he had encountered. He had seen hailstones the size of a penny.

"Shure, that's nothing to the great storm in Cork years ago," said an Irishman. "The hailstones there varied in size from a shilling to eighteenpence."

* * * *

Librarian: "Who's making that frightful din?"
Secretary: "The caretaker, sir. He's putting up a 'Silence' notice."

* * * *

Master: "What does quartz consist of?"
Pupil: "Pints, Sir."

* * * *

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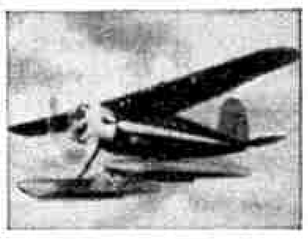

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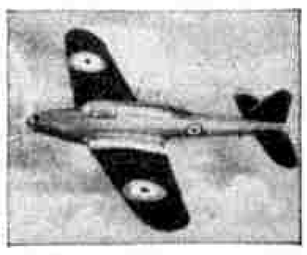

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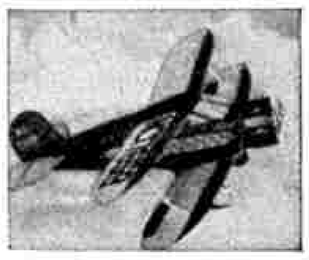

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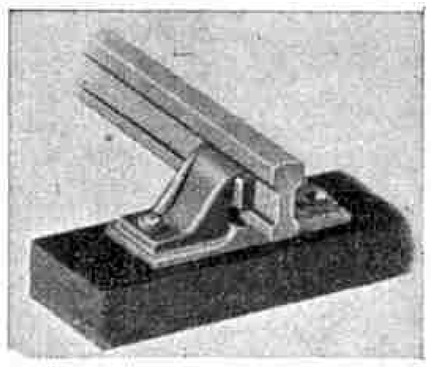

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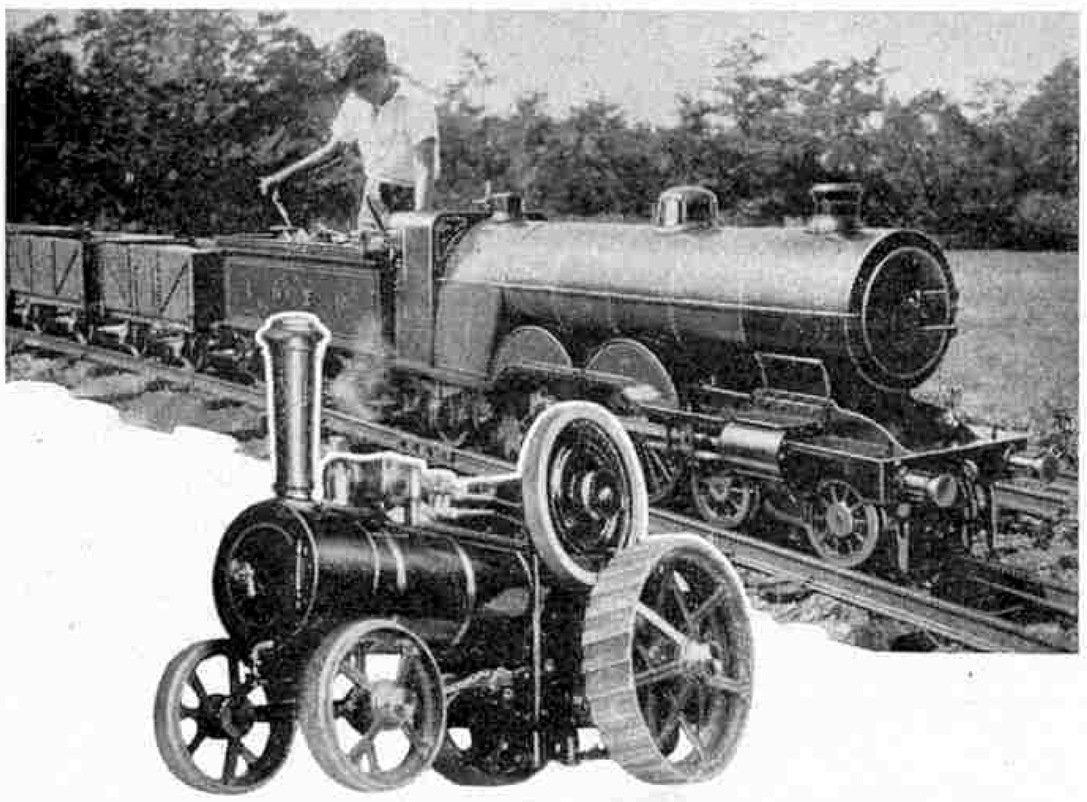

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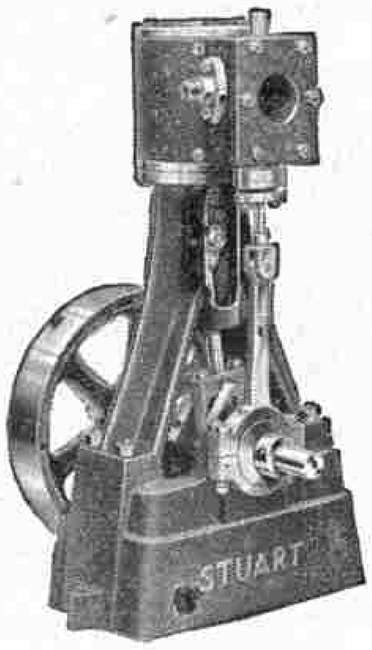

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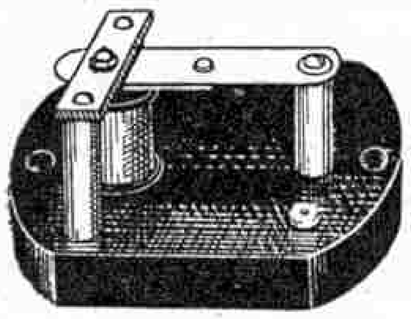

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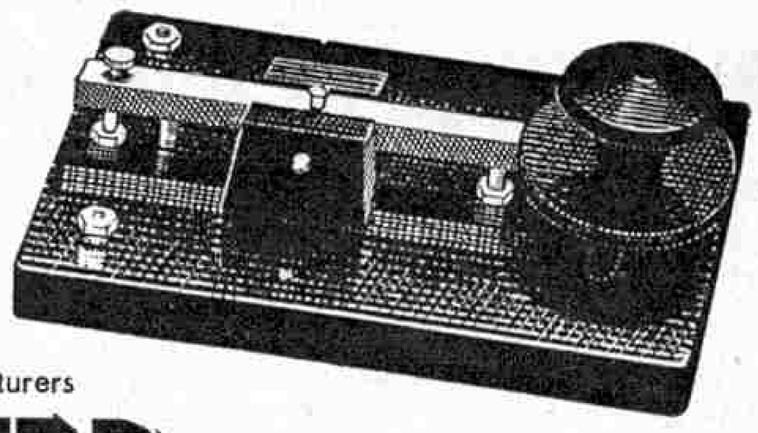

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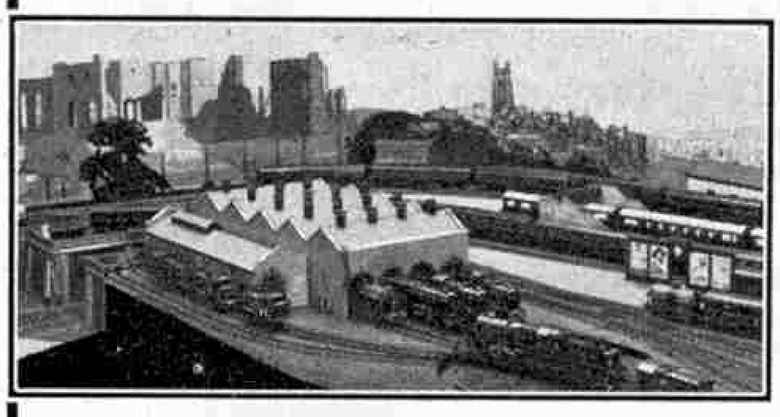

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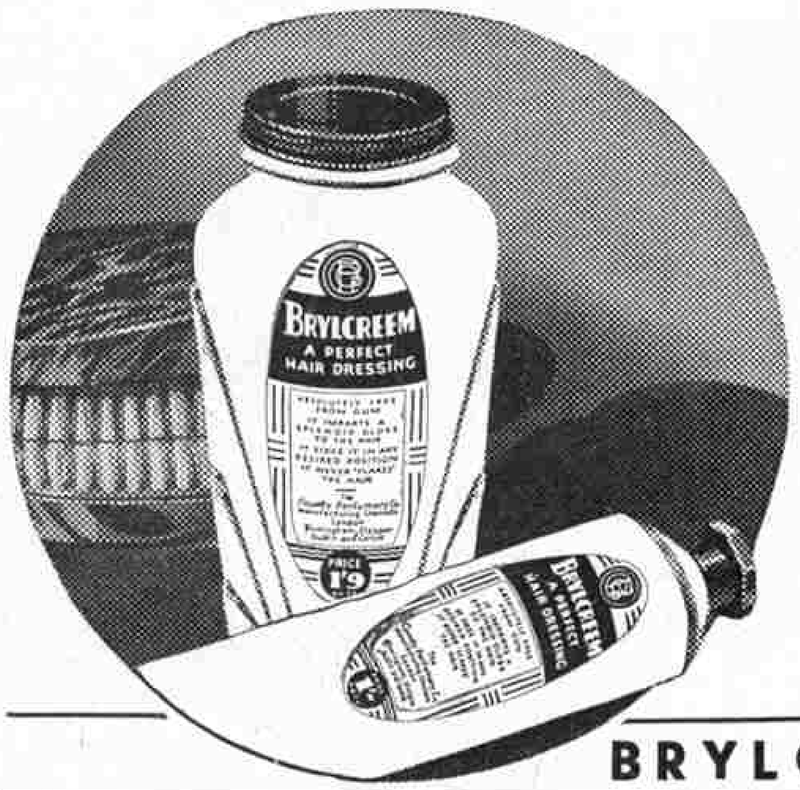

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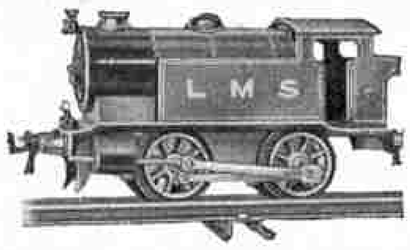

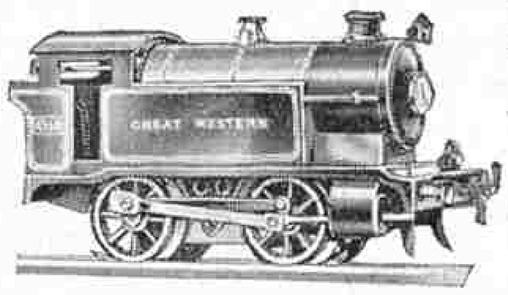

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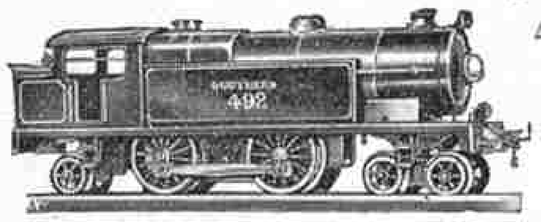

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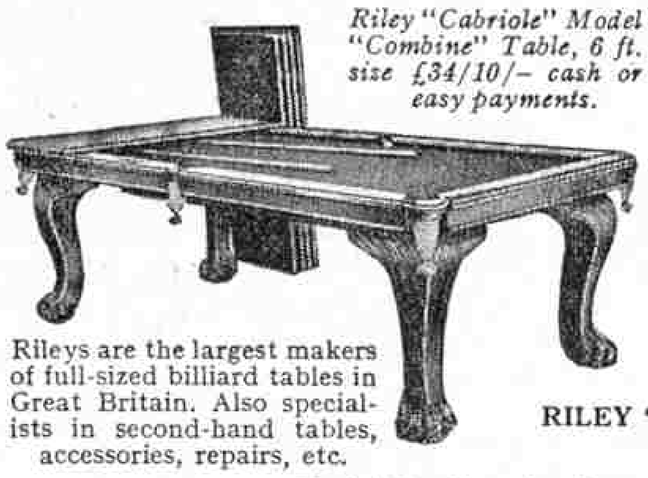

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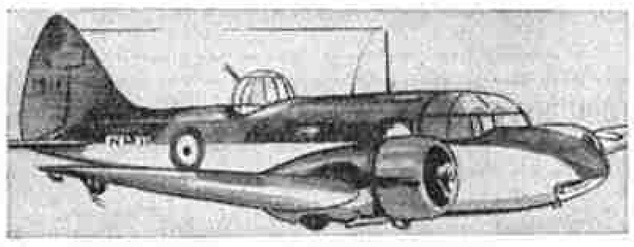

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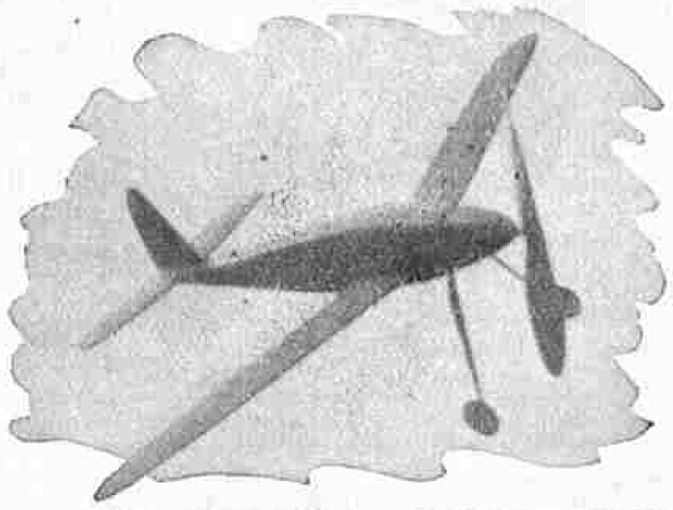

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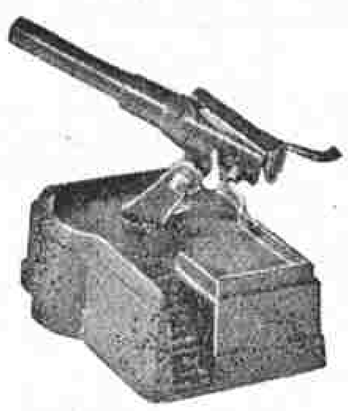

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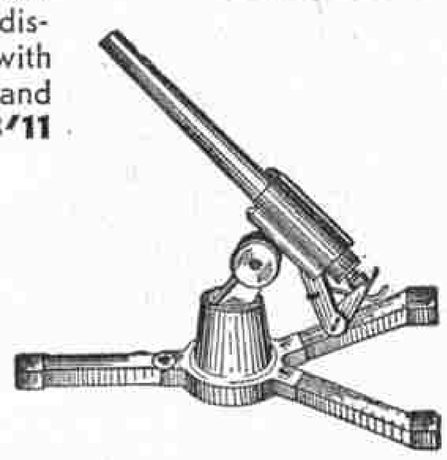

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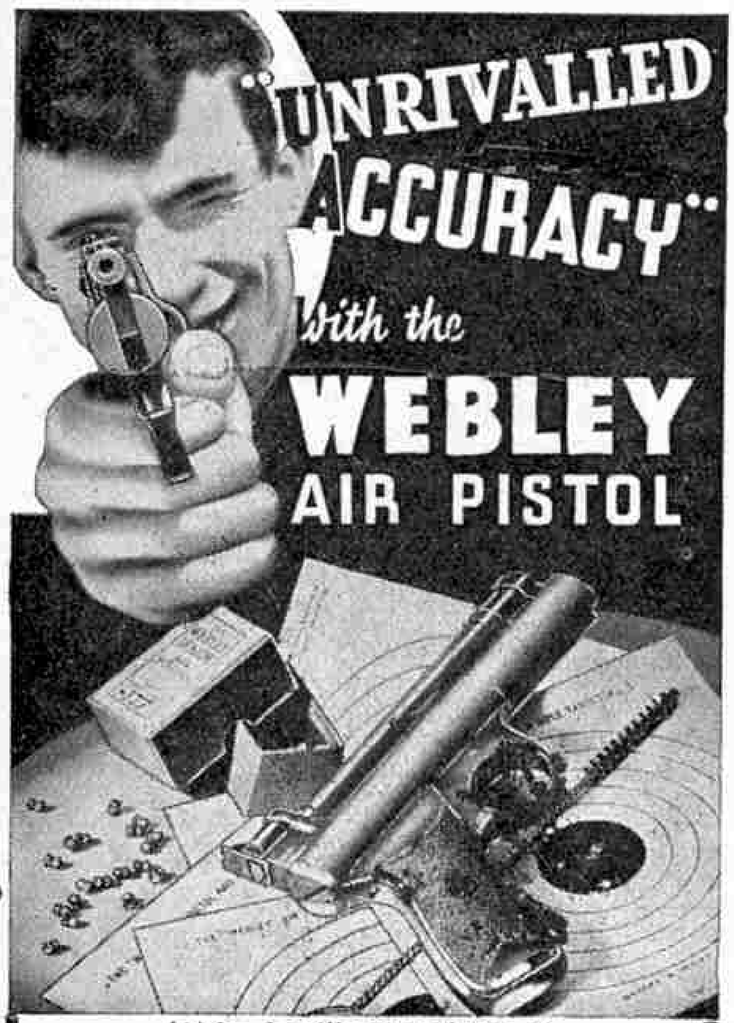

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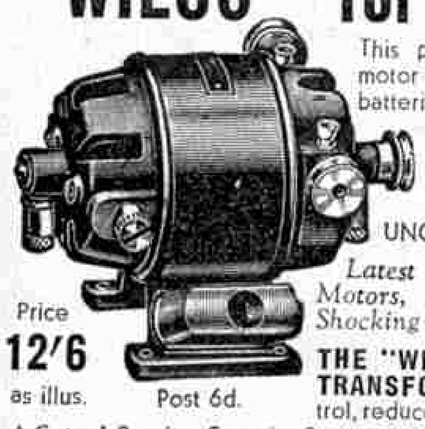

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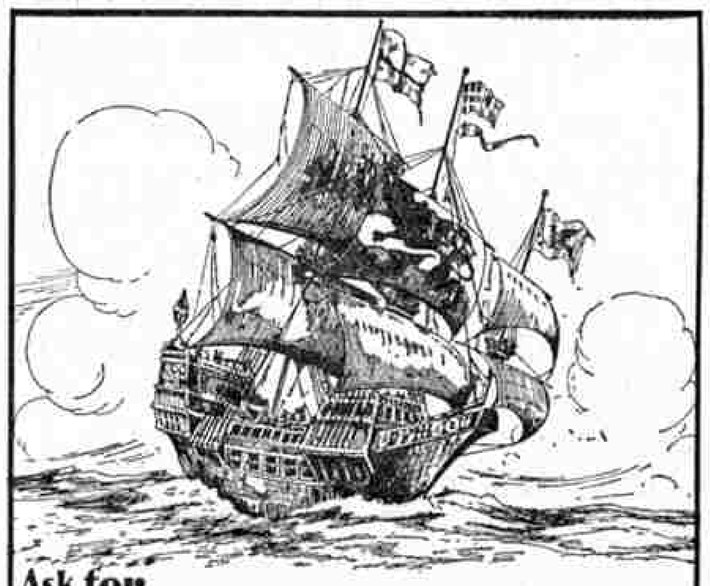

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READERS' SALES AND WANTS

Readers should note that all advertisements of Hornby Trains and other Meccano products included in this column relate to items no longer featured in the catalogue. Advertisements of current products cannot be accepted for this column.

Stamps. Will any private collector send 50 or 100, all different, in exchange similar number.—"K," 7, Sheengate Gardens, S.W.14.

Sale. 1930–1931 "M.M.'s," bound quarter Basil, good condition, 15/–.—Fowler, 40, Twyford Avenue, Shirley, Southampton.

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Bargain!!! 1939 "P.I.C." Engineer-Commerce Slide Rule, No. 4865, as new. Cost 36/–, accept 16/–. Complete instructions.—Cowie, 21, Uxbridge Road, Kingston, Surrey.

For Sale. "M.M.'s" March 1932 to July 1938, good condition; accept 12/6.—10, Copse Edge Avenue, Epsom, Surrey.

For Sale. "Meccano Magazines," July 1931 to December 1936, 5½ years. Excellent condition. Cheap.—Durrant, 185, Maidstone Road, Felixstowe, Suffolk.

Sale. "Meccano Magazines." Jan. 1924 to Dec. 1932, inclusive. 1927 bound. Offers.—Slater, 65, Ashbrow Road, Huddersfield.

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Send fourpence (halfpenny stamps) for copy of September issue of "Literary Herald"—twenty page printed amateur monthly magazine, published by Lewis Edwards, 23, Croxteth Road, Liverpool.

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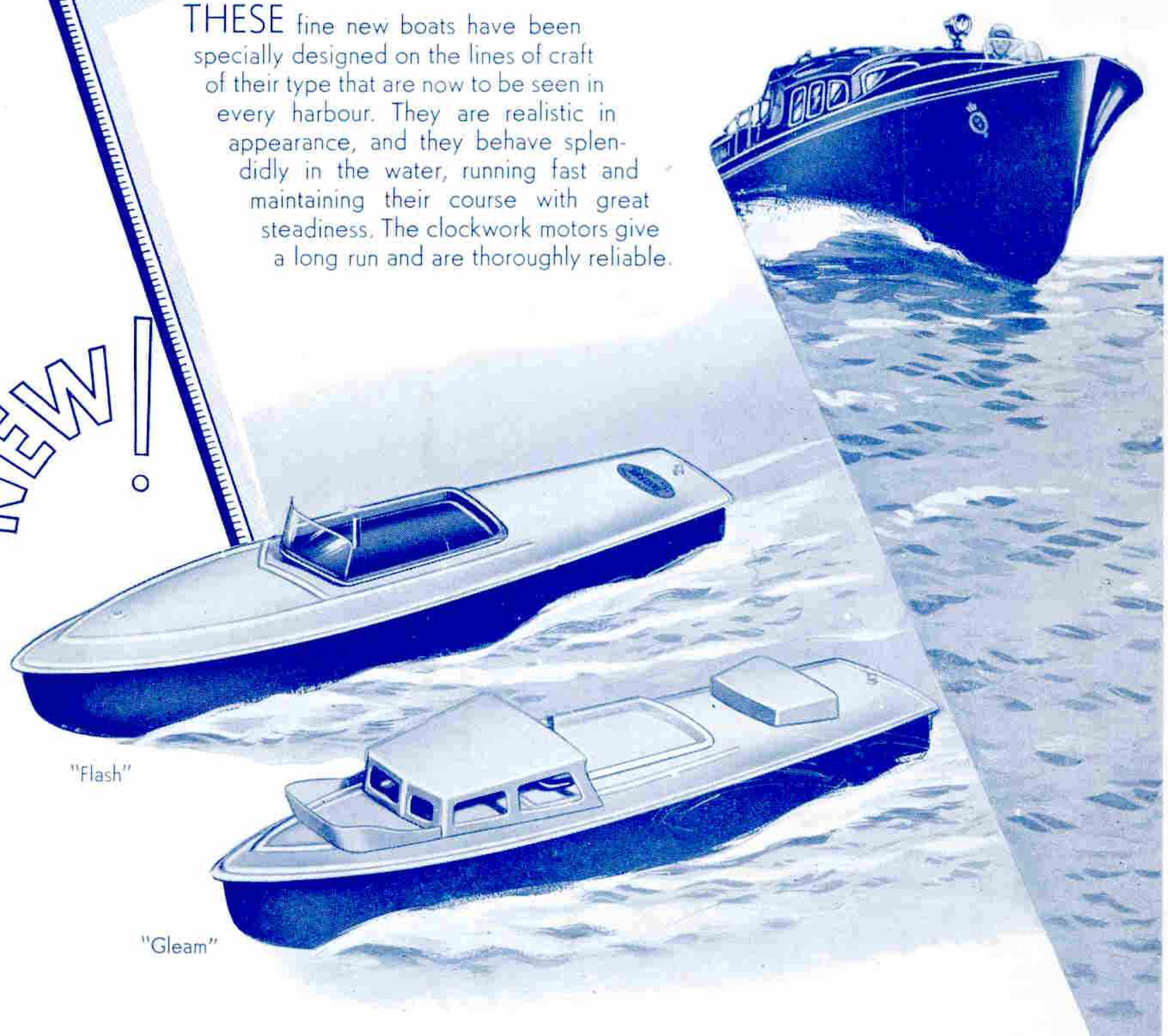

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