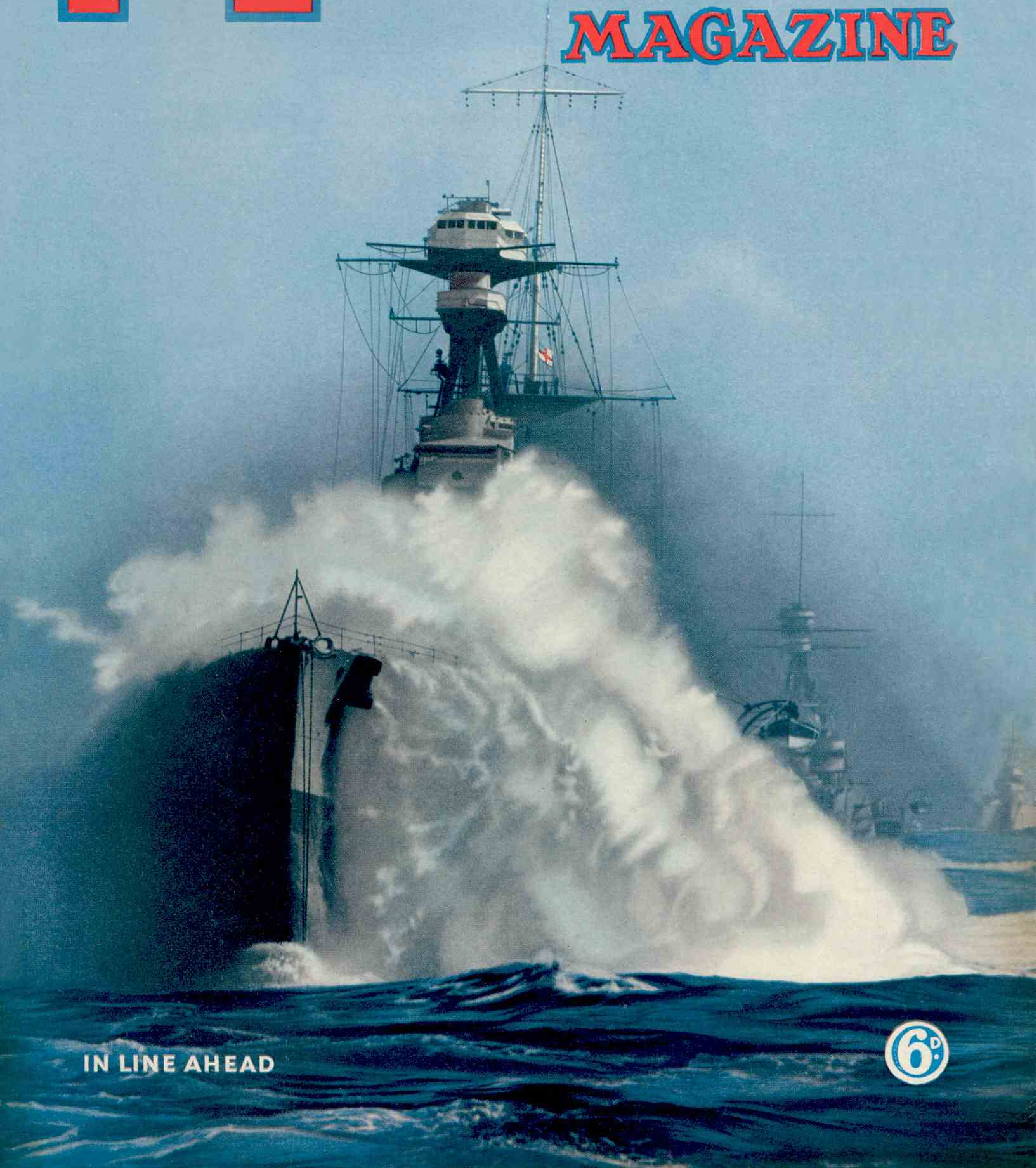
VOL. XXIV. No. 10
OCTOBER 1939

MECCANO MAGAZINE



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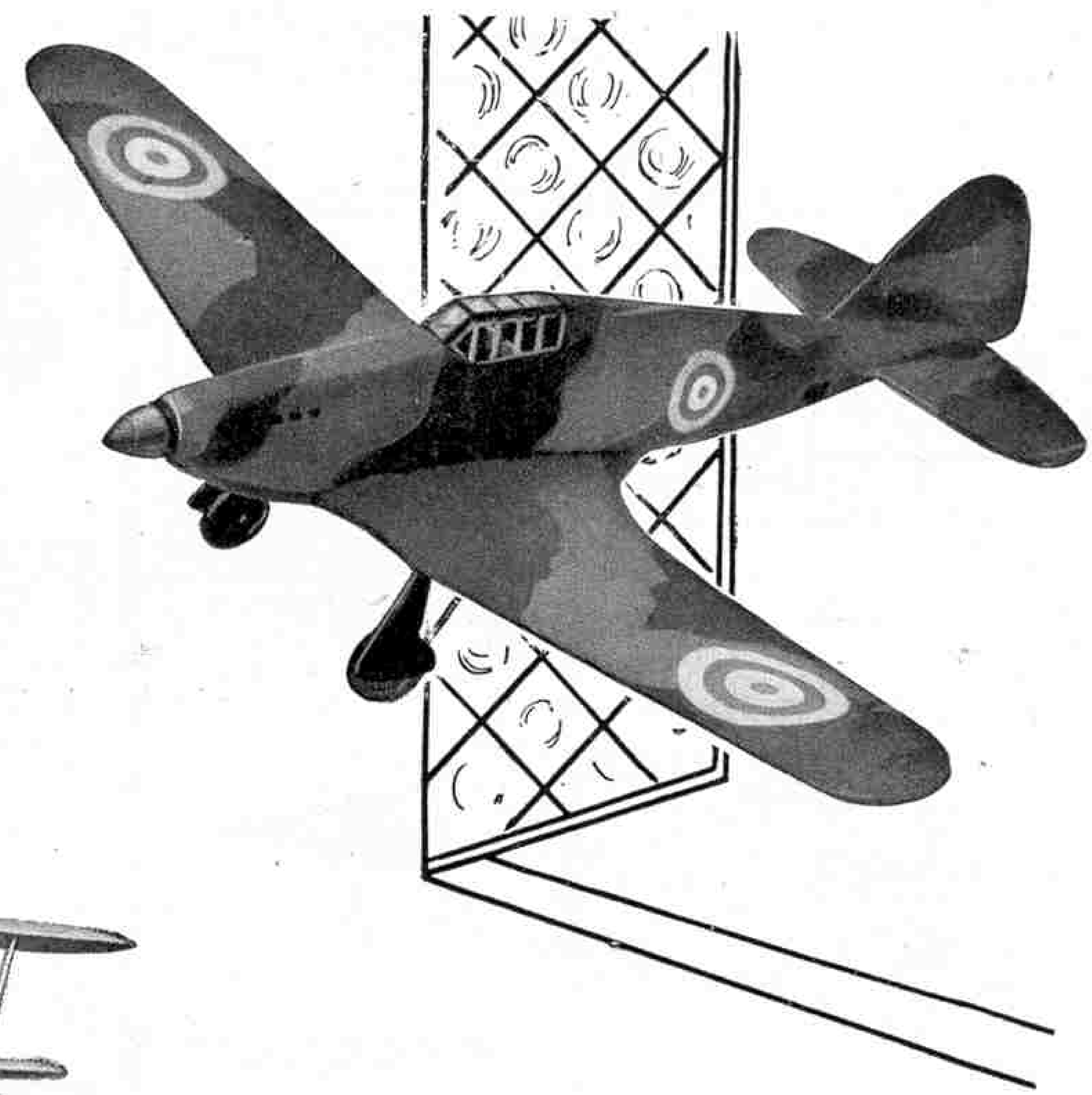

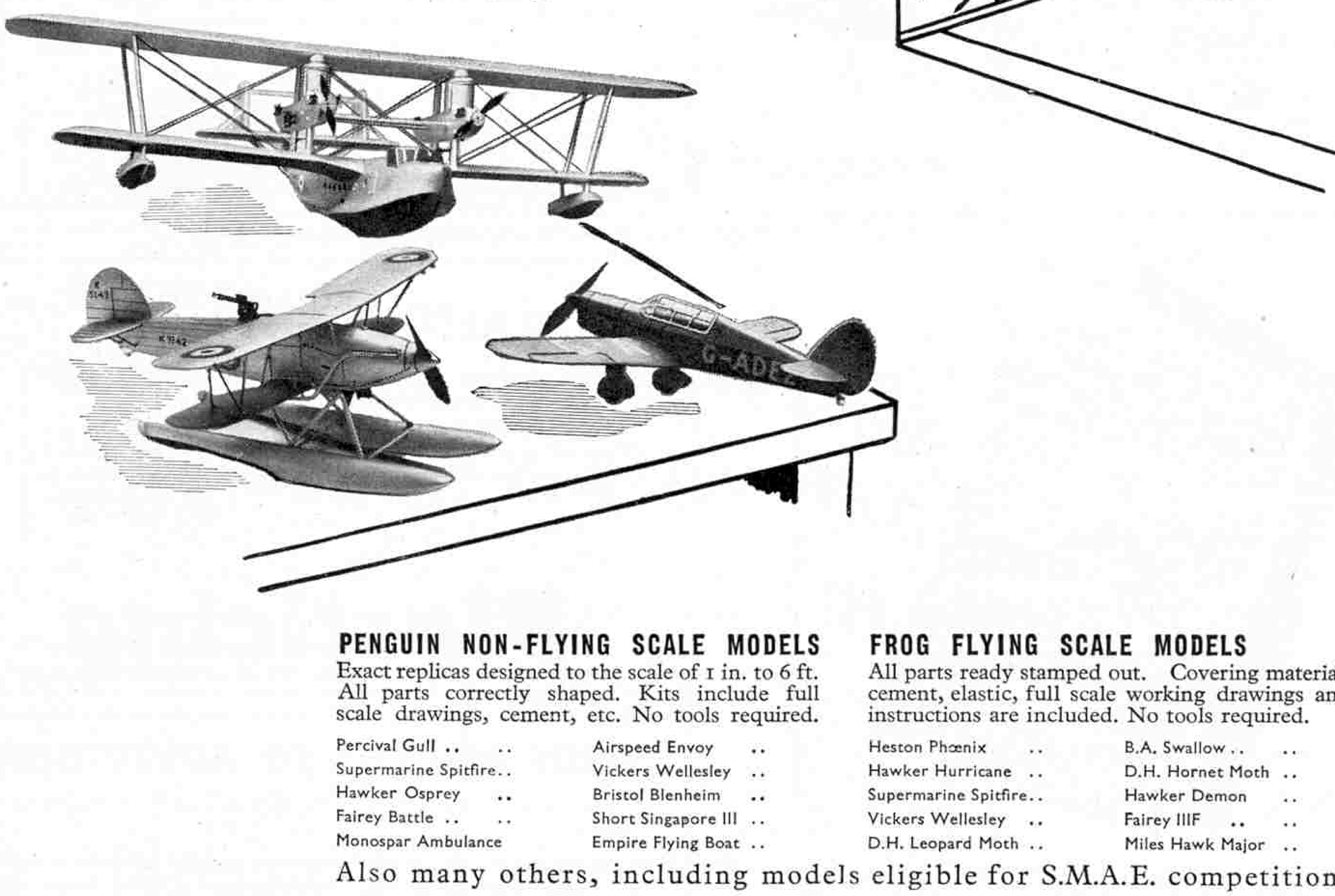

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OVER 300 VARIETIES

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Owing to rising costs of production, it has been found necessary to increase the prices of all Dinky Toys from 15th September 1939.

A new price list is now ready. Ask your dealer for a copy.

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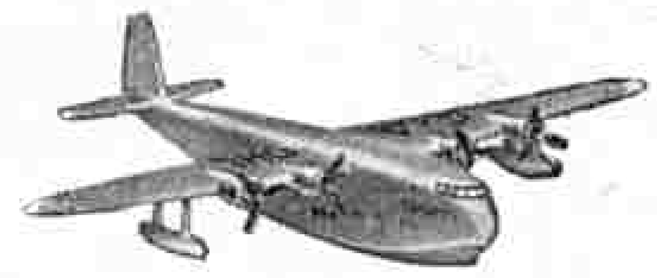

Dinky Toys No. 60r
Scale models of the famous Imperial Airways Liners. Twelve models available, named *"Caledonia," "Cambria," "Canopus," "Corsair," "Cordelia," "Camilla," "Capella," "Ceres," "Clio," "Calypso," "Corinna"* and *"Cheviot."*
Price **1/2** each

ATLANTIC FLYING BOAT
Dinky Toys No. 60x
Similar in type to Empire Flying Boat (No. 60r). Assorted colours, names and registrations.
Price **1/2** 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 **1/3** each

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Dinky Toys No. 62x
Similar in type to the Armstrong Whitworth "Ensign" air liner. Assorted colours.
Price **1/3** each

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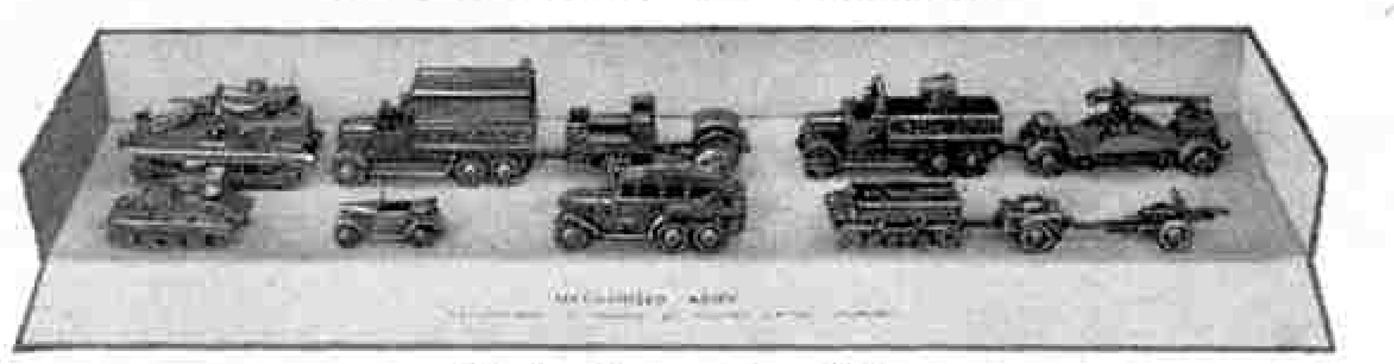
Dinky Toys No. 62g
Scale model of a famous American long-range bomber.
Price **1/2** each

BLOCH 220

Dinky Toys No. 64bz
The Bloch 220 is one of the fastest modern air liners. It has a top speed of 220 m.p.h. and carries 16 passengers and a crew of four. Air France have many of these twin-engined low wing monoplanes in regular service. (Made in the Meccano Factory in Paris.)
Price **10d.** each

NEW THIS MONTH!
MECHANISED ARMY



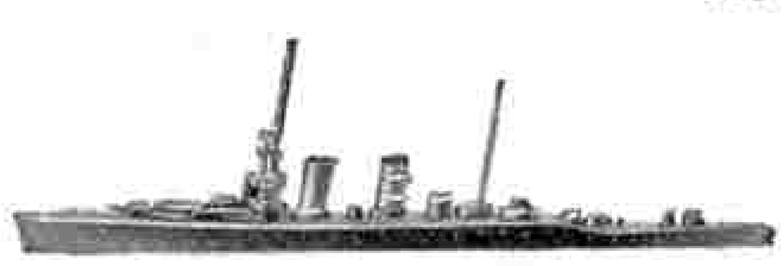
Dinky Toys No. 156
This fine set contains the principal units of a modern mechanised army. It includes the following items:
Royal Tank Corps Medium Tank Set (Dinky Toys No. 151) without driver.
Royal Tank Corps Light Tank Set (Dinky Toys No. 152) without driver.
Mobile Anti-Aircraft Unit (Dinky Toys No. 161).
18-Pounder Quick-Firing Field Gun Unit (Dinky Toys No. 162).
Price **12/6**

★ **SPECIAL NOTE—Production of Gardner's M.G. Record Car (Dinky Toys No. 23p) is suspended.**

SHIPS OF THE BRITISH NAVY

50A

50B



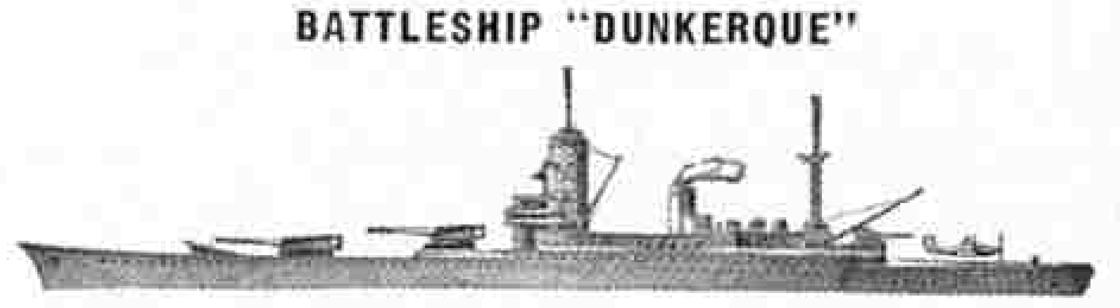
50C

50E

No. 50a	Battle Cruiser "Hood"	each **7d.**
No. 50b	Battleships, "Nelson" Class (2)	" **6d.**
No. 50c	Cruiser "Effingham"	" **5d.**
No. 50d	Cruiser "York"	" **5d.**
No. 50e	Cruiser "Delhi"	" **4d.**
No. 50f	Destroyers, "Broke" Class (3)	" **1½d.**
No. 50g	Submarine, "K" Class	" **1½d.**
No. 50h	Destroyers, "Amazon" Class (3)	" **1½d.**
No. 50k	Submarine, "X" Class	" **1½d.**

Price of complete set **3/6**

BATTLESHIP "DUNKERQUE"



Dinky Toys No. 53az
Scale model of the French 26,500 ton Battleship "Dunkerque," which has an overall length of 702 ft. 9 in., and a main armament of eight 13 in. guns. (Made in the Meccano Factory in Paris.)
Price **11d.** each

ARMSTRONG WHITWORTH "WHITLEY" BOMBER

Dinky Toys No. 60v
Scale model of the "Whitley" long-range heavy bomber adopted by the R.A.F.
Price **11d.** each

ARMSTRONG WHITWORTH "WHITLEY" BOMBER (Camouflaged)
Dinky Toys No. 62t
Similar to Dinky Toys No. 60v but with Air Ministry Camouflage. Price **1/-** each

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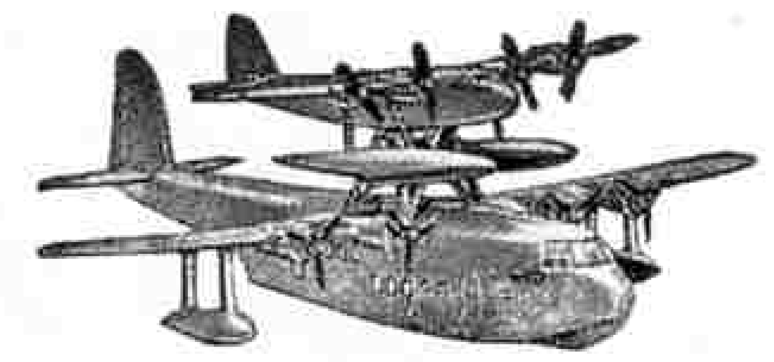
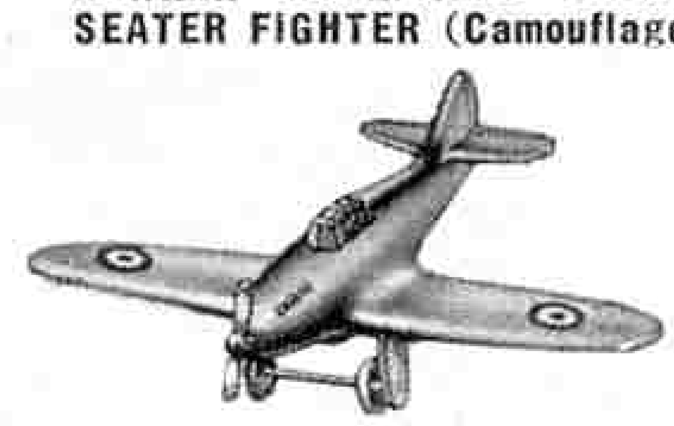


Dinky Toys No. 63
Scale model of the Mayo Composite Aircraft.
Price **2/4** each
The components of the above can be purchased separately.
No. 63a Flying Boat *"Maia"* ... **1/6** each
No. 63b Seaplane *"Mercury"* ... **11d.** each

HAWKER "HURRICANE" SINGLE-SEATER FIGHTER (Camouflaged)



Dinky Toys No. 62h
Scale model of the Hawker "Hurricane" single-seater Fighter extensively used by the R.A.F. Camouflaged.
Price **7d.** each

HAWKER "HURRICANE" SINGLE-SEATER FIGHTER (Aluminium Finish)
Dinky Toys No. 62s
Similar to Dinky Toys No. 62h but with Aluminium finish ... ... Price **7d.** each

AMIOT 370

Dinky Toys No. 64az
This high wing monoplane has been developed from the Amiot 340 long-range bomber. It is fitted with two 860 h.p. Hispano-Suiza liquid-cooled engines and is capable of the high speed of 310.5 m.p.h. When flying at 248.4 m.p.h. it has a maximum range of 4,350 miles. (Made in the Meccano Factory in Paris.)
Price **9d.** each

MECCANO LIMITED — BINNS ROAD — LIVERPOOL 13

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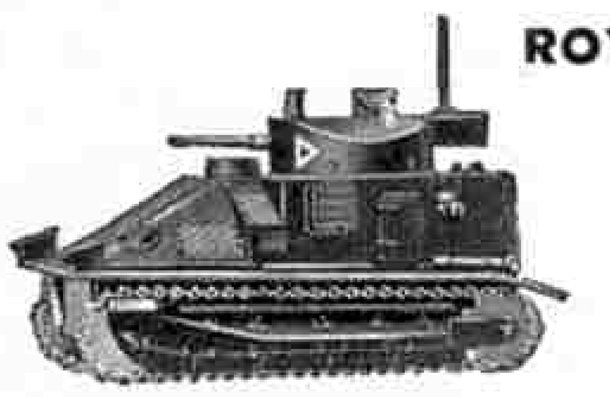
PERFECT SCALE MODELS

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, an 18-pounder Quick-Firing Field Gun Unit and Royal Artillery Personnel.

ROYAL TANK CORPS MEDIUM TANK SET



151A 151D 150D 151C

151B

Dinky Toys No. 151

No. 151a	Medium Tank	each 1/9
No. 151b	Transport Wagon ...	,, 1/2
No. 151c	Cooker Trailer	,, 7d.
No. 151d	Water Tank Trailer ...	,, 5d.
No. 150d	Driver	,, 2d.

Price of complete set **4/-**

ROYAL TANK CORPS LIGHT TANK SET

152a 150d 152b 152c

Dinky Toys No. 152

No. 152a	Light Tank ...	each 1/2
No. 152b	Reconnaissance Car	,, 1/2
No. 152c	Austin Seven Car	each 5d.
No. 150d	Driver ...	,, 2d.

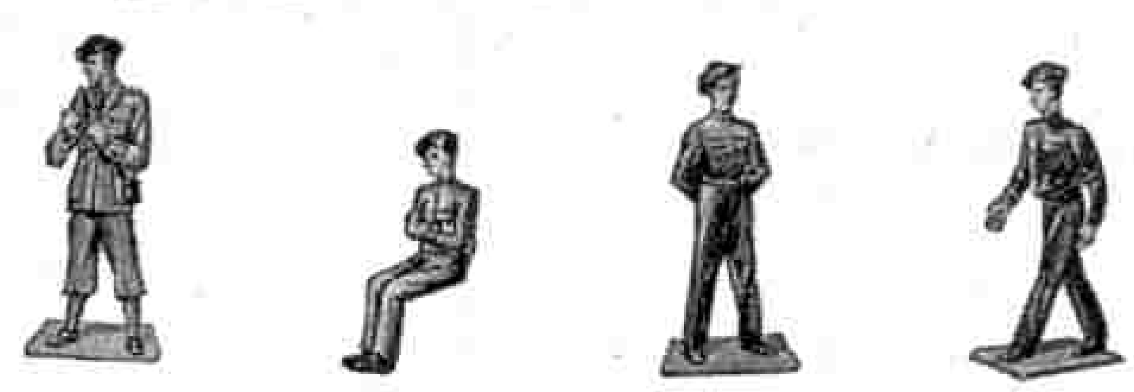
Price of complete set **2/11**

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 **2/6** per set

ROYAL TANK CORPS PERSONNEL



150a 150b 150c 150e

Dinky Toys No. 150

No. 150a	Officer	each 2½d.
No. 150b	Private, sitting (two in set)	,, 2d.
No. 150c	Private, standing (two in set) ...	,, 2d.
No. 150e	N.C.O.	,, 2d.

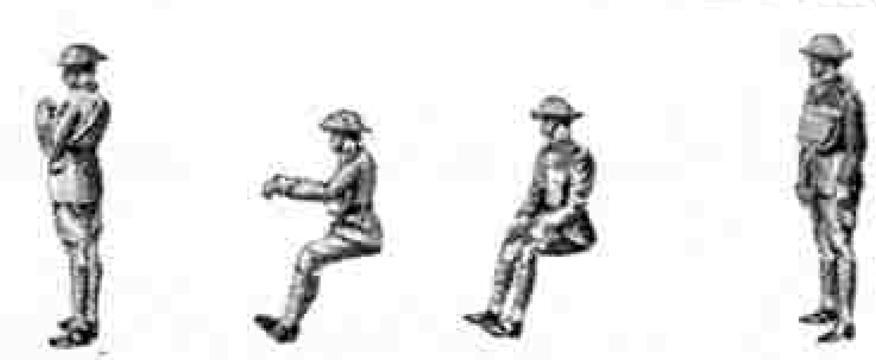
Price of complete set **1/-**

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 **3/6** per set

ROYAL ARTILLERY PERSONNEL



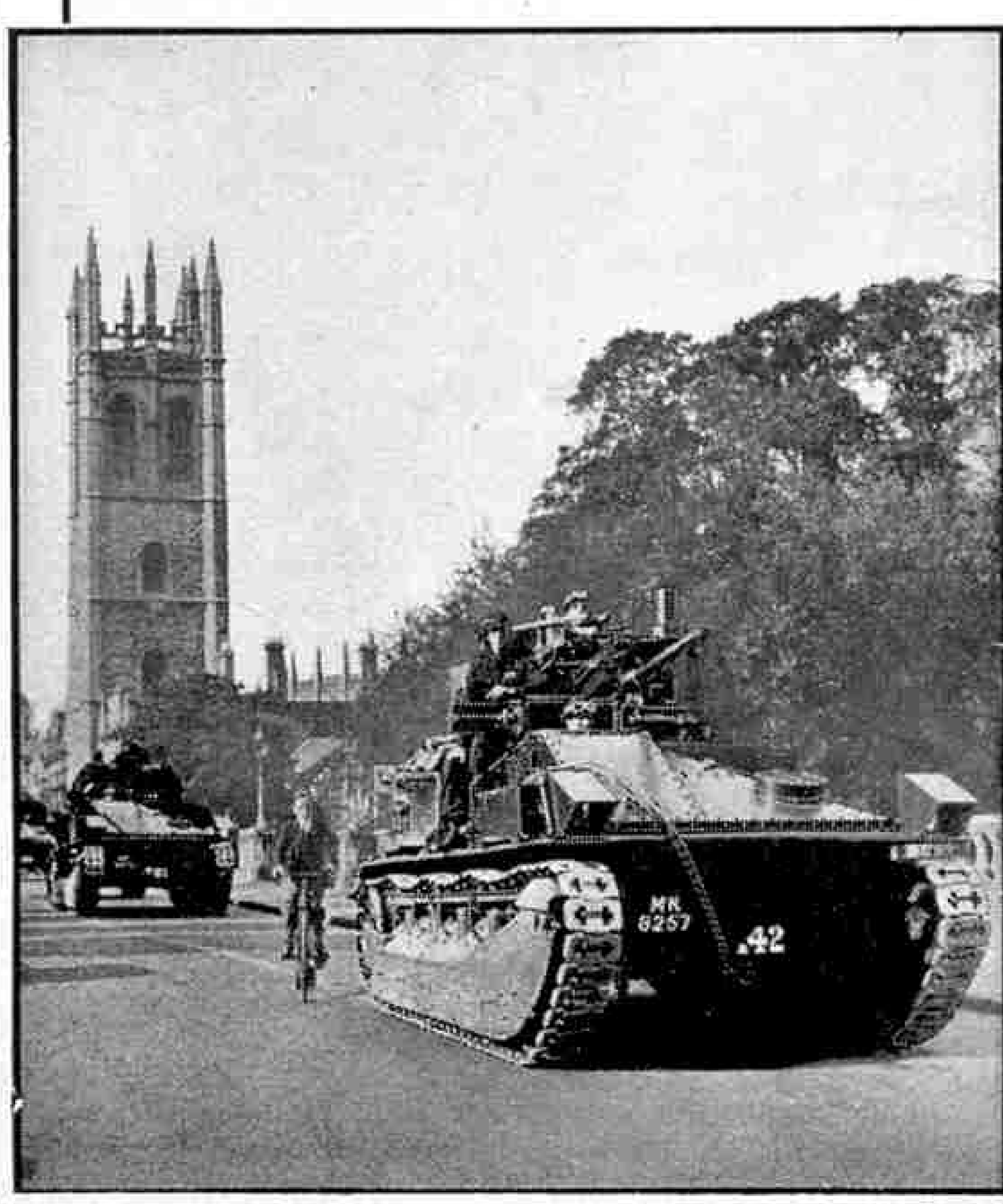
160A 160B 160C 160D

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 2½d.
No. 160b	Gunner, sitting (two in set) ,,	2d.
No. 160c	Gunlayer ... ... ,,	2d.
No. 160d	Gunner, standing (two in set) ,,	2d.

Price of complete set **1/-**



MECCANO MAGAZINE

Editorial Office: Binns Road, Liverpool 13 England

Vol. XXIV. No. 10
October 1939

With the Editor

The War and the "M.M."

By the time this issue reaches readers the war will have been in progress for almost a month. Now, as in 1914, Great Britain and France are fighting side by side to crush—not the German people—but the evil German system of government. The Nazi system of to-day, brought into being through the senseless ambition of one of the most unscrupulous men who have ever led a nation, is based on the brutal principle that might is right; so long as it exists there can be no peace in the world. I should like every reader to carry in his mind these words of Mr. Chamberlain—We are fighting against "brute force, bad faith, injustice, oppression and persecution."

And now what about the "*M.M.*"? Large numbers of readers have enquired anxiously as to its future, and I take this opportunity of making matters as clear as I can. The magazine will continue as long as it is possible to produce it. There will be difficulties, among which the greatest may be shortage of paper. My staff, too, is diminishing as one after another is called up for duty. But in spite of these and other troubles I feel confident that the "*M.M.*" will appear regularly; and I can assure readers that, although costs of production are rising, there will be no increase in price. Some reduction in the number of pages will, unfortunately, be inevitable. A further point is that, owing to transport difficulties, it may not be possible for the magazine always to be in the hands of readers on the first of each month as in the past. But the delay will never be more than a day or two. Readers who have any trouble in getting their "*M.M.*" should let me know at once.

General the Viscount Gort, V.C., Commander-in-Chief of the British Field Force.

Write to the Editor

Many of my older readers will already have joined the Forces, or undertaken some other kind of war work. I want all these readers to write to me from time to time and tell me how they are faring. I will gladly answer personally every letter, for I am very anxious that the personal touch that has existed for so many years between me and my readers should be maintained.

And you younger readers also; I want to hear from you. I want to know of your doings; of how the war has affected your home life, and of how you are keeping up your spirits in spite of the black nights and other disagreeable things. If you haven't time—or if you are too lazy!—to write a long letter, write a short one. If you haven't energy for even that, send a postcard! Anyway, write!

Leaders in the War

I. Viscount Gort

On this page I reproduce the first of a series of portraits of the great personalities of the Fighting Forces.

Viscount Gort was born in 1886, and educated at Harrow and Sandhurst. He joined the Grenadier Guards in 1905 and went overseas in 1914 when the Great War broke out. He served throughout the war, was wounded four times, and mentioned in dispatches on nine occasions. He was the only peer to win the V.C. in the Great War. He was awarded this as the result of conspicuous bravery when in command of the 1st Battalion Grenadier Guards.

In 1937 Lord Gort became Chief of the Imperial General Staff, and on the outbreak of the present war was appointed Commander-in-Chief of the British Field Force.

The latest and largest British flying boat, "Golden Hind," over the River Medway.

New British Flying Boats

The *"Golden Hind"* and the *"Sunderland"*

IT is 15 years since Short Brothers (Rochester and Bedford) Ltd., the famous British aircraft firm, built their first all-metal flying boat, the twin-engined *"Cockle."* In that time they have produced a succession of metal-built civil and military flying boats that have reflected the progress made in the design of this class of aircraft, and all of which have been noted for their reliability and efficiency.

On the commercial side the company have produced successive types of flying boats for Imperial Airways, beginning with the "Calcutta" class of three-engined, 12-seaters in 1928, and including the well-known "Scipio" type. Since 1936 the famous "C" class Empire flying boats and the new modified version of this class have appeared. The development of ocean air services has called for aircraft of greater range and payload capacity, and the Short company are now building for Imperial Airways three flying boats that are the largest ever produced in this country. They have a wing span of 134 ft., as compared with the 114 ft. span of the "C" class aircraft, and they are designed to have a gross weight of 73,500 lb. or $32\frac{3}{4}$ tons, as against the $21\frac{1}{2}$ tons of the modified "C" class aircraft.

The new boats will be the "G" class in the Imperial Airways fleet. The first of them, named *"Golden Hind,"* was launched at Rochester last June, and the illustrations of it on this page give a good idea of its massive proportions. It is expected that these new giants will be put into service next year on the North Atlantic air route, and, perhaps on the proposed British South Atlantic air service.

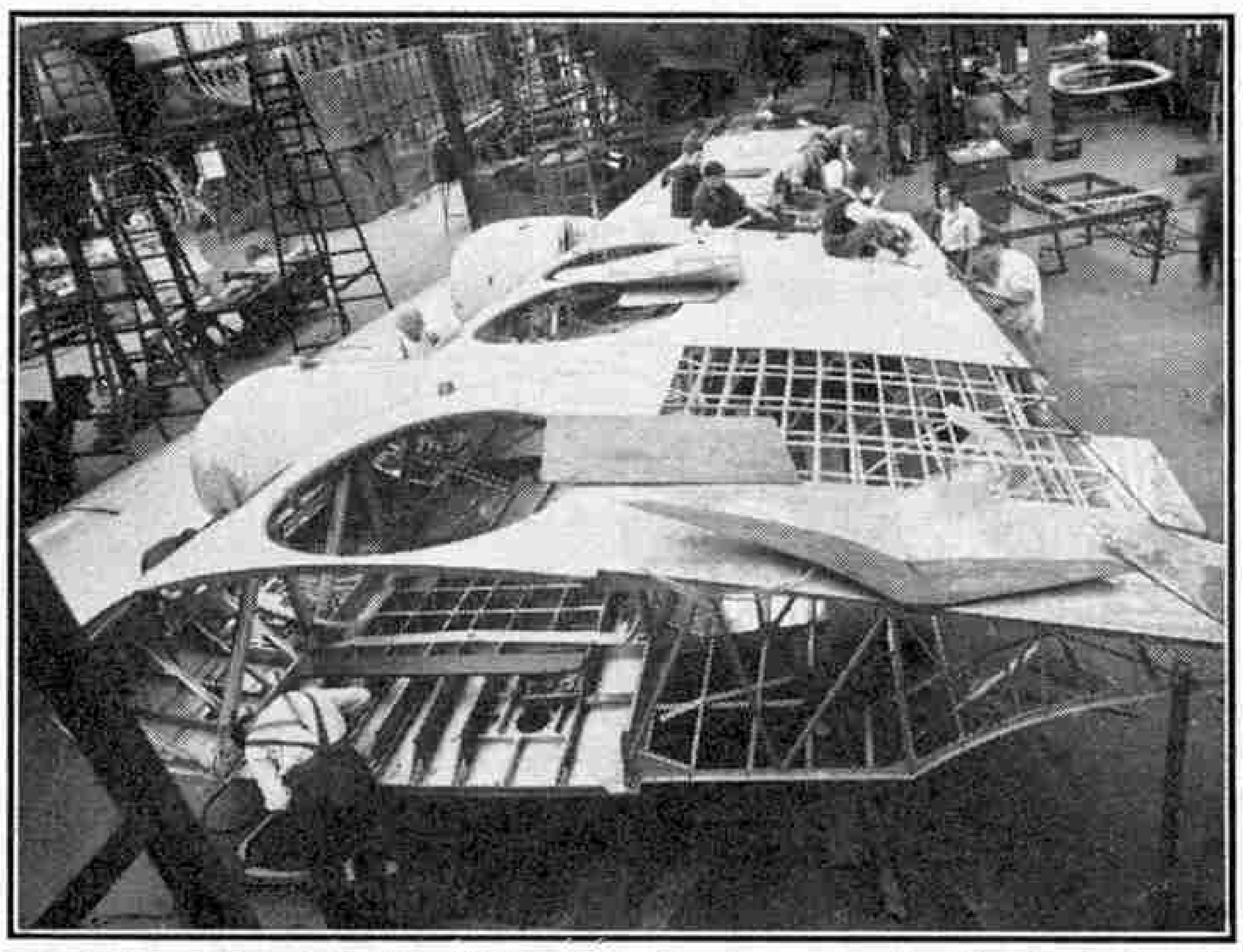
In design the "G" class flying boat has been developed from the "C" class one. The hull of the *"Golden Hind"* is built mainly of Alclad and is 103 ft. long, and the depth from the top of the wing to the keel is 19 ft. The greatest width, or beam, is 12 ft. On the bottom of the hull there is a single vee-shaped step with the point toward the stern, and aft of this step the bottom tapers to a vertical knife-edge. The vee-shaped step is designed to reduce drag when the aircraft is in flight, and it also improves the performance of the flying boat when on the water.

It is not intended to carry passengers in the *"Golden Hind."* The vast interior therefore is devoid of the customary luxurious furnishings, and the space they would occupy is available for mail. Bulkheads divide the hull into a series of big compartments, or mail holds. A compartment in the nose is used for stowing the mooring gear. The pilots' cabin is on the upper deck, and its situation a long way in front of the wing ensures an unobstructed view downward from the side windows of the cabin. In the forward part of the cabin there is side-by-side seating for the commander and first officer. The radio operator occupies a position behind them, and a little farther aft is the flight engineer, both on the port side of the cabin.

The control arrangements provide for the sharing of the responsibility of operating the flying boat between the pilot and the engineer. Only the essential engine controls are mounted on the dashboard in front of the pilot, and they give him full command of the engines and airscrews when the flying boat is taking off and alighting. The other instruments are mounted on the engineer's instrument panel, and he is responsible for the running of the engines while the flying boat is in the air.

A circular hatch in the roof of the hull, just in front of the wing, can be opened to permit a retractable, transparent dome to be raised so that the navigator can take celestial observations.

Four "Bristol" Hercules IV air-cooled, 14-cylinder, sleeve-valve engines are installed, and these develop a total of 5,520 h.p. for the take-off. D.H. 14 ft. 6 in. dia. three-bladed constant speed airscrews are fitted. The engines are mounted in the leading edges of the wings, two on each side of the hull, and short lengths of leading edge on either side of each engine nacelle can be lowered to form platforms for mechanics inspecting or repairing



One of the massive wings of the "Golden Hind" under construction. The illustrations to this article are reproduced by courtesy of Short Bros. (Rochester and Bedford) Limited.

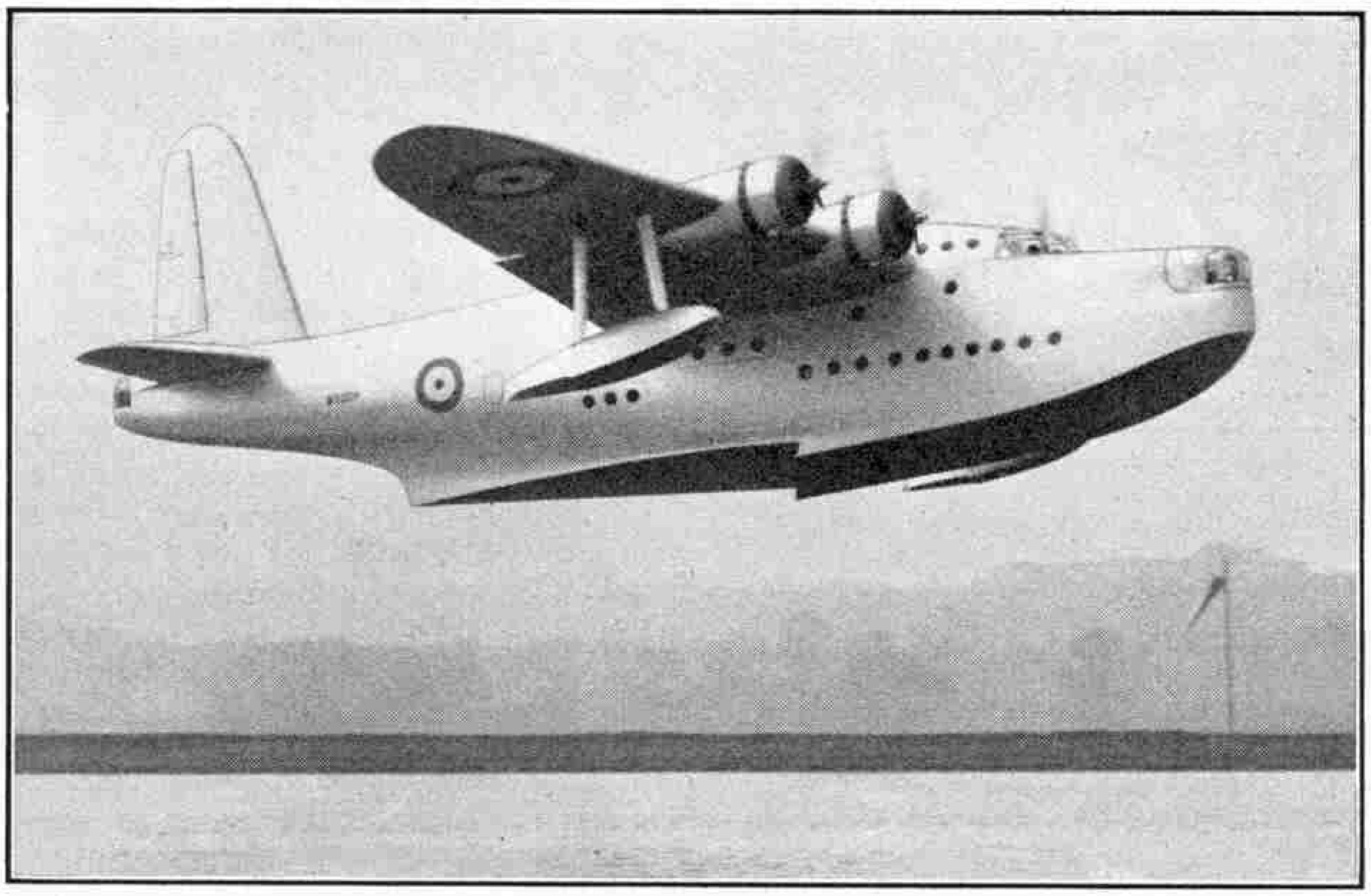
the engines. Doors in the top of the hull give access to the leading edges, and there are doors that lead into the main portion of the wing. The fuel tanks are situated in the wing, and are notable for their lightness. The weight of the largest tank works out at only .24 lb. per gall. of fuel.

It is estimated that the *"Golden Hind"* will prove capable of a top speed of 209 m.p.h. at 4,500 ft. A cruising speed of 175-180 m.p.h. at 5,000 ft. is anticipated, and at that speed and height and against a 40 m.p.h. headwind the flying boat will have a range of 2,500 miles, and this will be ample for a transatlantic flight.

For many years the equipment of the Royal Air Force has included flying boats produced by the Short Company. There have been the "Rangoon," "Singapore," and "Sarafand" types. Now the "Sunderland" has been introduced, and although only adopted last year by the R.A.F. it has effectively demonstrated its efficiency in service. It is designed for long-range reconnaissance, patrol, and bombing duties.

The accompanying illustrations show the "Sunderland" to be a near relative of the Empire flying boat. It was, in fact, the good performance and reliability of the commercial boat when first introduced by Imperial Airways that attracted the attention of the Air Ministry and led to the development of the military version of the aircraft.

The "Sunderland" resembles the Empire flying boat in essentials, but there are interesting minor differences. Probably the most obvious of these is the blunting of the bow and stern of the hull for the installation of gun turrets. The pilots' cabin is farther back than in the Empire flying boat, giving the "Sunderland" a long-nose effect, and the tail unit is slightly more forward. The hull bottom tapers to a vertical knife-edge near the stern, like that of the *"Golden Hind."*



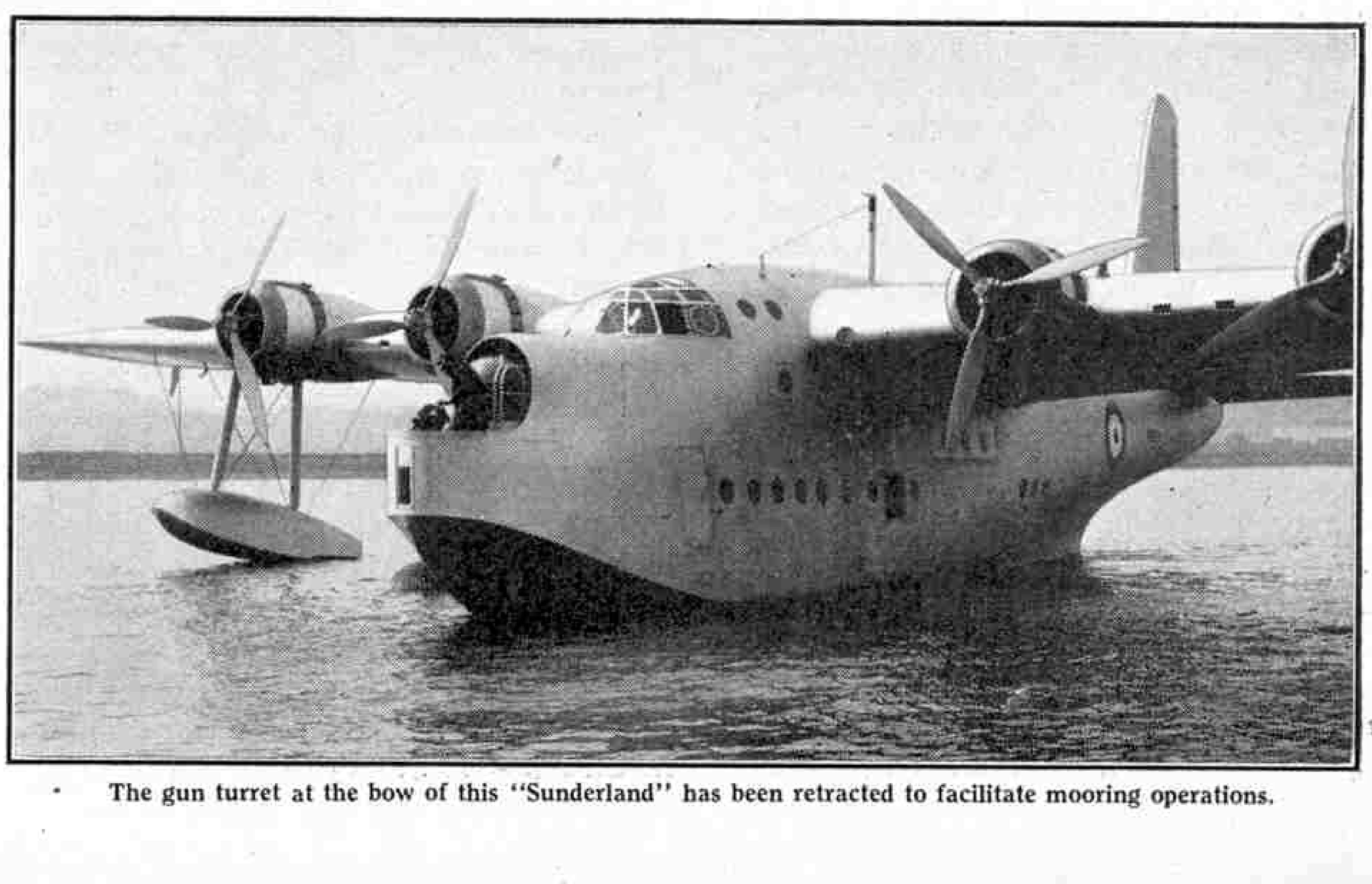
This view of a Short "Sunderland" flying boat in the air reveals the tapering hull bottom and the sweeping curve upward to the stern.

There are two decks. The upper one extends to just beyond the trailing edge of the wings, and on it is the control compartment. This room has seating and equipment for two pilots, and there is also an automatic pilot. A compass is fixed at knee level beside the port pilot, and one is similarly placed on the starboard side of the cabin. A third compass is fitted at the observation hatch, and a fourth one is on the upper deck.

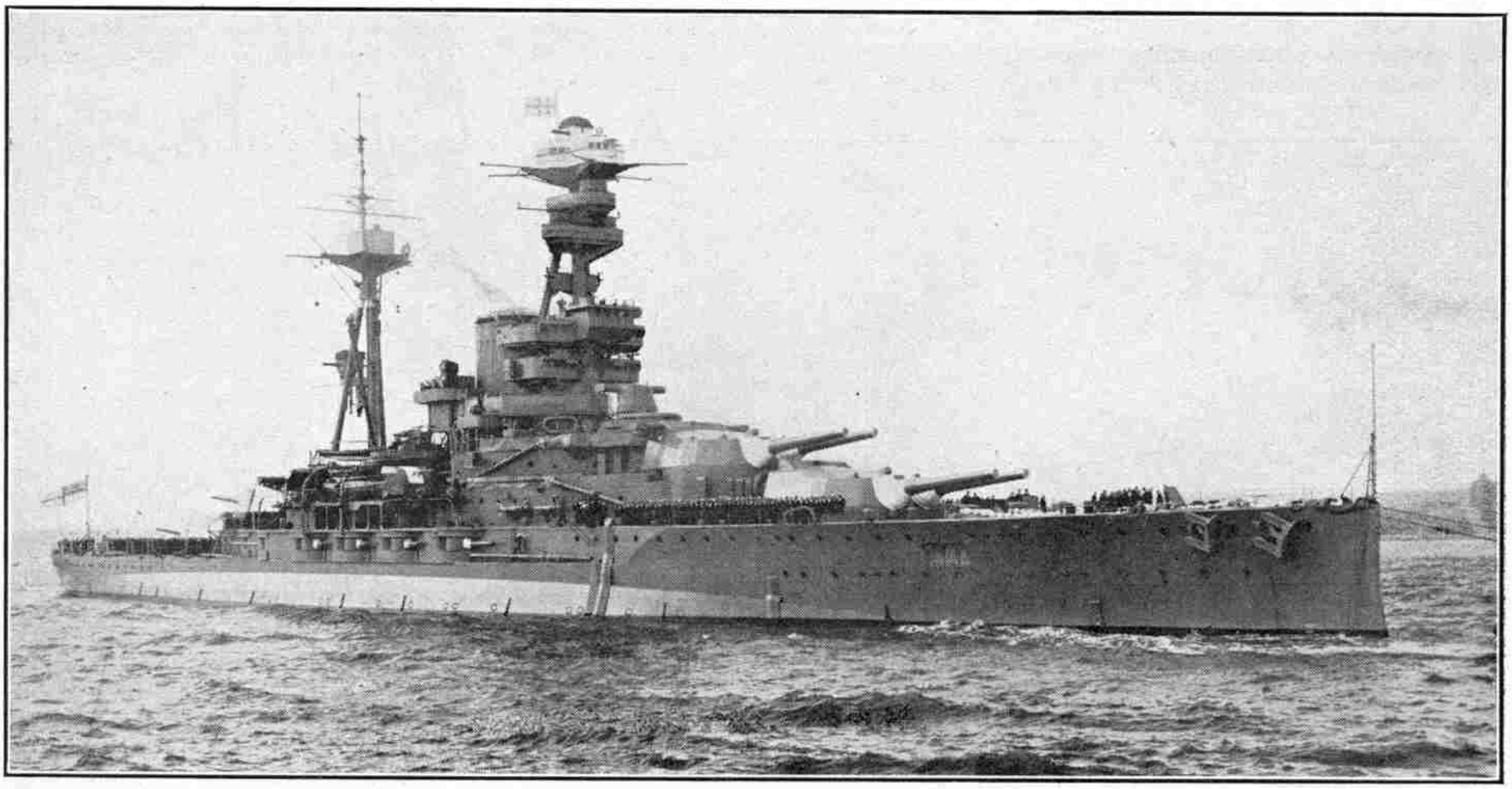
Aft of the curtain behind the pilots' seats is the navigator's station on the starboard side. Behind it is the flight engineer's compartment, and on the port side of the cabin is the radio operator's position. A small circular device is fitted to one of the windows in front of each pilot, in order that a portion of the windscreen can be cut out to provide a clear view in the event of the windscreen becoming iced up. On the lower deck are the mooring compartment, officers' and crew's quarters, equipped with bunks and folding tables, the galley, and aft of the wing a compartment in which is a fitter's work bench, a rack for flares, and a flare launching tube for use in emergency.

The bow of the hull is formed by a transparent vertical gun turret that can be revolved during gun action, and can be retracted by hand to facilitate mooring operations. Below this turret is the bomb aimer's position. A rotating turret in the extreme stern of the hull houses a second gunner. In addition there are two midships gun mountings, the gunners standing upon a bridge-like platform fitted transversely in the interior of the hull. They operate their guns through openings in the roof of the hull, one gun firing to port and the other to starboard. A heavy bomb load can be carried in the flying boat.

The four "Bristol" Pegasus XXII engines give the flying boat a top speed of 210 m.p.h. The normal range is 1,670 sea-miles. The dimensions of the "Sunderland" are span 112 ft. $9\frac{1}{2}$ in., and length 85 ft. 4 in.



The gun turret at the bow of this "Sunderland" has been retracted to facilitate mooring operations.



H.M.S. "Royal Oak." Photograph by B. and A. Feilden, Blundellsands, Liverpool 23.

The Navy and the Gyro Compass

By Lieut. Commander R. S. Young, R.N. (retd.)

STATIONKEEPING, that is to say the keeping of each individual ship in its correct position in the line, presents many difficulties at any time. The difficulties are, of course, much greater in a rough sea such as is seen in our cover, which shows the battle fleet steering in line ahead through a heavy seaway, *"Royal Oak"* in the foreground. The ship's speed has to be continuously altered; and steering has to be accurately maintained on the course set. The strain on the quartermaster under such circumstances is severe, and after a two-hour "trick" at the wheel he has had more than enough.

In the Royal Navy all ships, from destroyers and submarines to capital ships and aircraft carriers, are fitted with gyro compasses manufactured by the Sperry Gyroscope Company Ltd. The master compass itself is placed in some position well below armour, while there are many repeaters, worked from the master, in all parts of the vessel. These repeaters are used for all sorts of purposes. Amongst others they are essential for the control of the ship's heavy armament, of the anti-aircraft guns, of the searchlights, and torpedo equipment. One can indeed say that the gyro compass is the "nerve centre" of the modern warship.

It is perhaps of interest to recall how the gyro compass first came to be installed in the Royal Navy. It was not until the beginning of the present century that the need for anything different from the magnetic compass was felt. The latter had been used successfully through the ages; its application, and the necessary corrections for its use as a scientific instrument for accurate navigation were well understood.

With the development of the modern type of battleship and submarine, however, it soon became apparent that the ordinary magnetic compass was no longer a practical instrument.

The reasons were twofold. First of all it was found necessary to have compasses in various parts of the ship in addition to the compass on the navigating bridge. This became a requirement owing to the more complicated, and rapidly developing, gunnery and torpedo fire control systems. In 1906 electrical repeaters worked from the magnetic compass on the bridge were tried in H.M.S. *"Dreadnought,"* but for various reasons this was not found to be satisfactory. Secondly, owing to the ever-increasing amount of iron, steel, electrical and other machinery, it was not found possible to correct the magnetic compass with any degree of accuracy. Especially was this the case with a compass in a position below armour, or with those fitted in submarines.

As a result various scientists in different countries started designing a gyro compass. It was easy enough to produce the gyro wheel whose axis would remain pointing to a fixed object in space. Due, however, to the earth's rotation, such a gyro would appear to wander. The difficulty was to make the instrument "north seeking," one of the first properties of a compass. The obvious solution lay in the gravity-controlled gyroscope. The "north seeking" properties of the latter had been known long before the development of electric motors and high speed bearings, and these were now available to make the construction of such an instrument a practical proposition.

During 1914, 1915 and the later War years the Sperry compass was being gradually fitted to all capital ships, cruisers and submarines. After the War even destroyers were fitted with it as well, and indeed it is true to say that to-day the gyro compass is as essential a unit for all types of men-of-war as the guns themselves.

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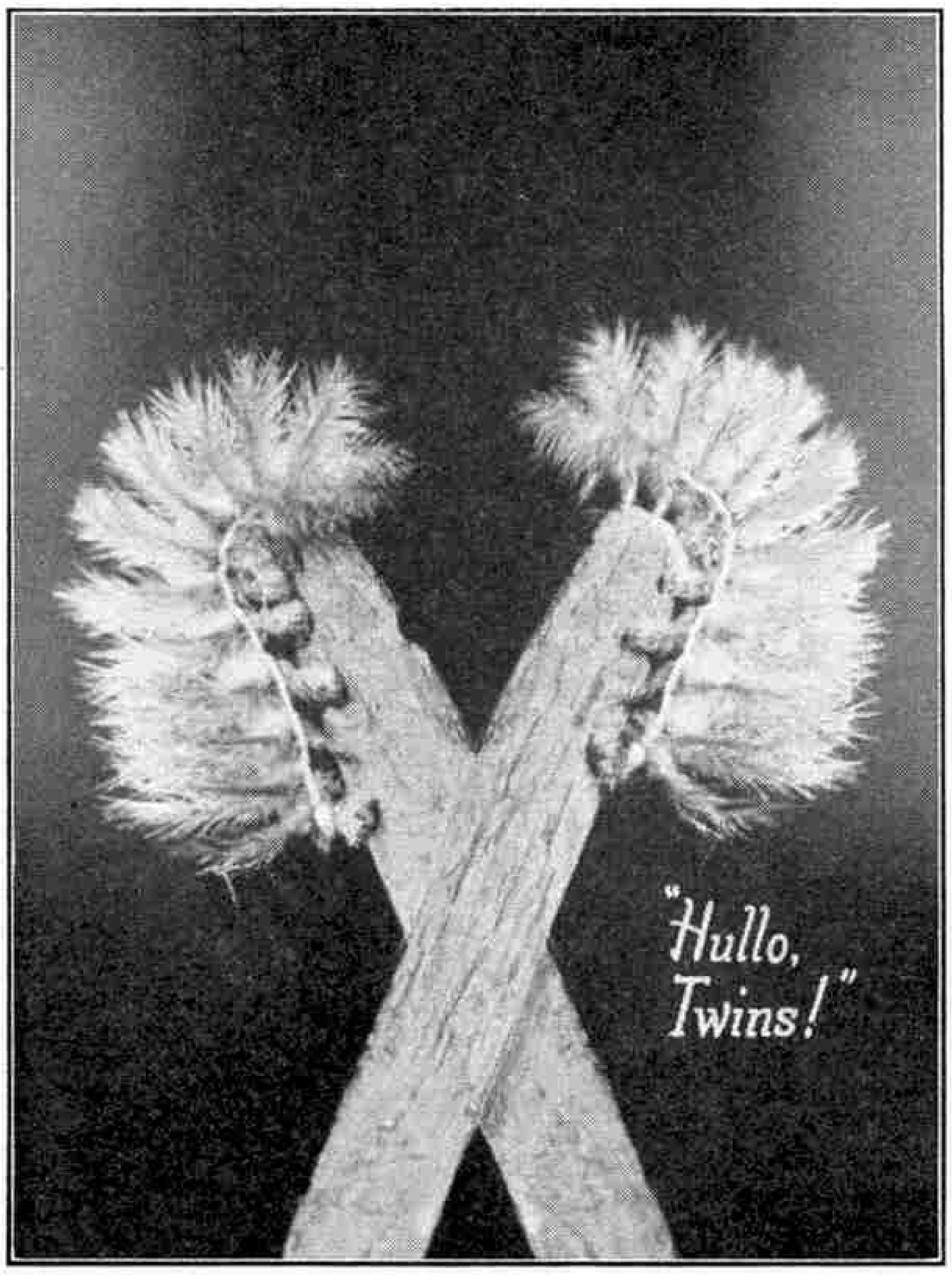


A.R.P. Caterpillars

By Pentland Hick

HAVE you ever seen caterpillars that are more prickly than a porcupine? Probably not, for the beauties I am going to tell you about have grown from eggs sent to me from Brazil, and nothing like them can be found in England. They are officially named *Automeris illustris*, but I call them A.R.P. caterpillars; you will soon see why.

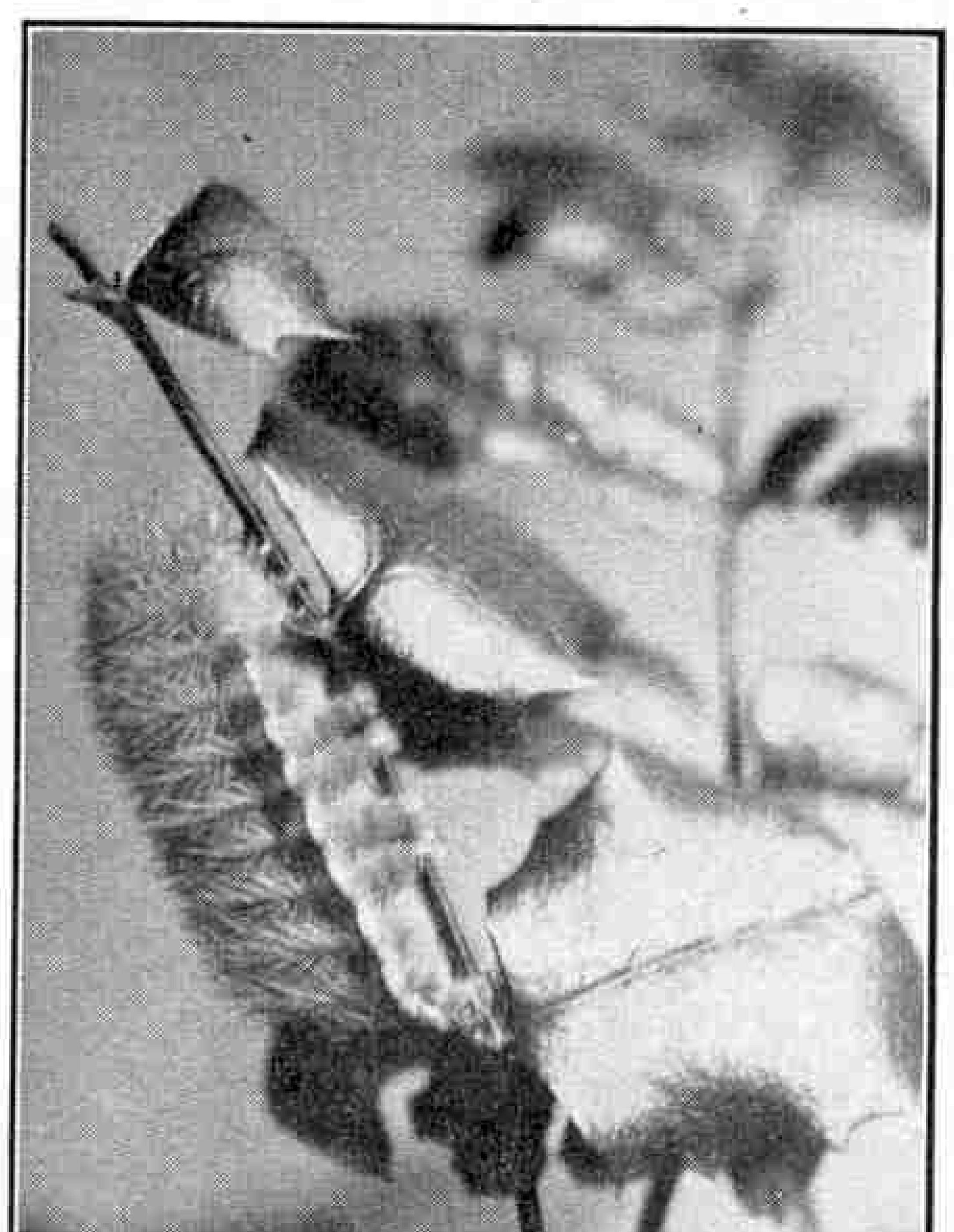
In the first place they are simply smothered in sharp spikes, which are made doubly dangerous by having a crop of shorter spines sprouting out all over them. As these armaments are longer than the caterpillars are thick, which is a good half inch, they must afford fine protection from "gangsters" of the dense jungle undergrowth where the caterpillars live.

The early bird might swallow one of these living pin-cushions, but it would undoubtedly give him a mighty sore throat, for the spines sting like nettles when they are touched. Birds are not their worst enemies, however, which is not really at all surprising! Instead some deadly little flies, which lay eggs on caterpillars so that their grubs may dine on them, are the menace of their jungle "underworld."

You might think such spiny creatures to be amply protected from these egg-laying air-raiders. Evidently where they come from they believe in safety first, however, for they make doubly sure of their A.R.P. by building themselves air-raid shelters, and edible ones at that! The caterpillar craftsman usually work in small families, making their shelters by fixing two leaves together in the shape of an inverted canoe. In here they lie side by side, often with a big one sheltering the baby, and show nothing but prickles to the outer world.

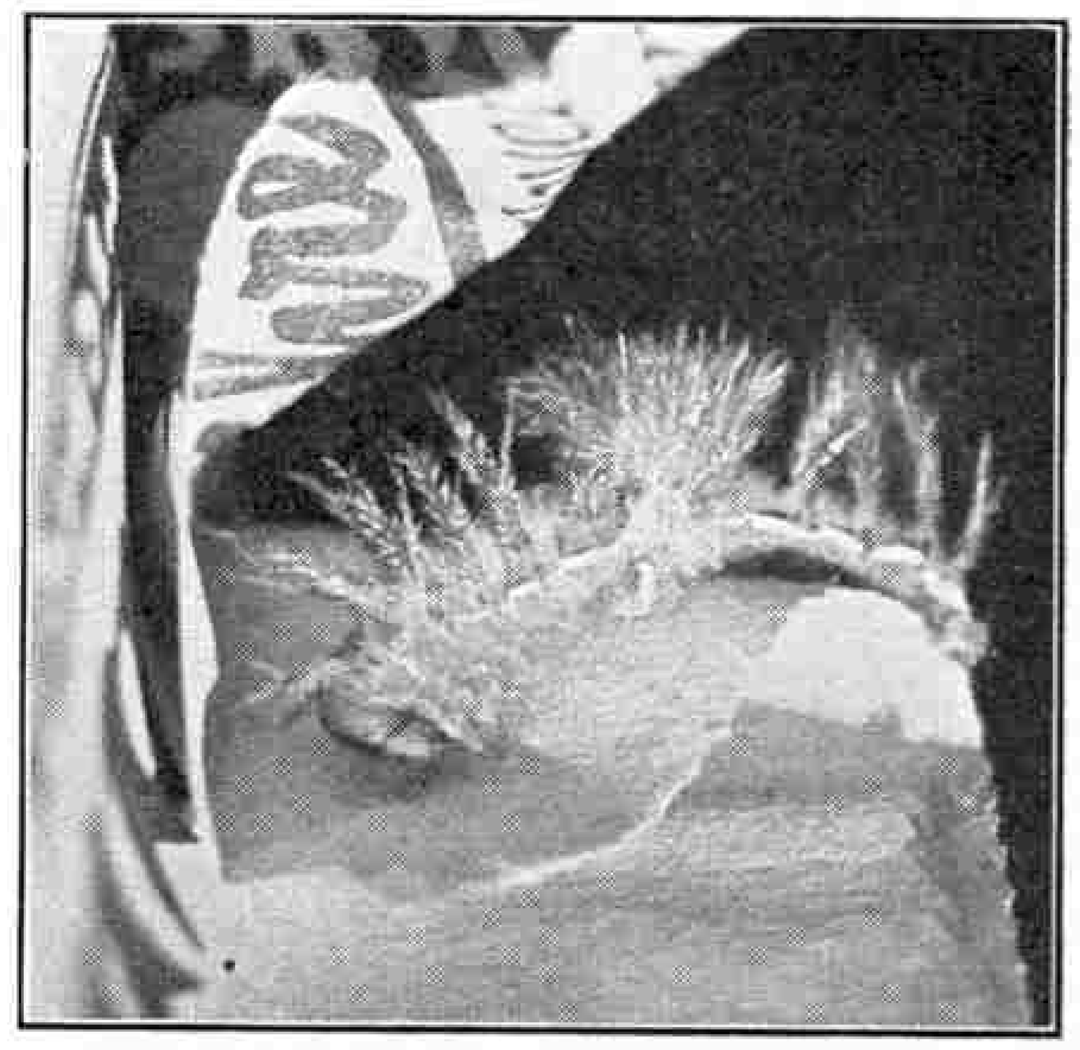
I have reared North American cousins of Illustris, and they, too, had their armaments in the shape of a splendid crop of stinging prickles that had knobs near the top, and looked like baby Belisha beacons. But the Brazilians win on points all right, for they achieve a much more rakish effect by going in for a kind of reverse streamline, as though they brushed their spines forward, from tail to head.

Caterpillars have terrific appetites, but unfortunately their skins refuse to co-operate beyond a certain point. So several times in their lives they must pause long enough to cast off their tight jackets, revealing beneath baggy new suits, ready to be filled.



This photograph of a Brazilian caterpillar, as described in this article, shows the dense mass of stinging spikes with which it protects itself.

Once I was lucky enough to catch one of my spiny guests changing, and then I took the photograph that you see in this column. The caterpillar had covered a piece of newspaper with a fine silken carpet, and he was squatting with his claspers firmly fixed in its criss-cross threads, looking old and very wrinkled. Suddenly a split appeared behind his head, and the difficult business of skin-changing had begun.

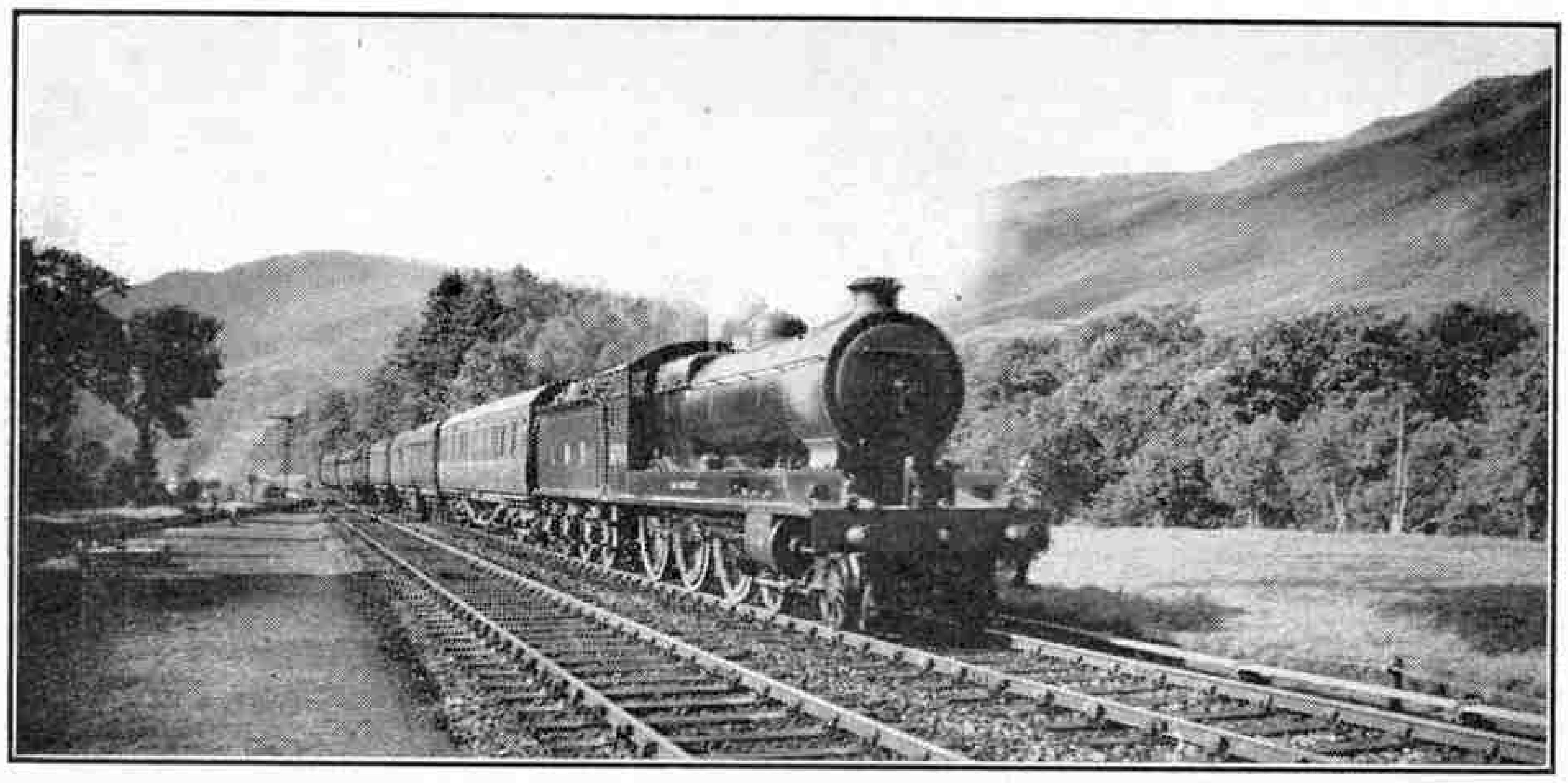


An A.R.P. caterpillar changes its jacket.

The new suit underneath was of a lighter, fresher colour, and the spines on it reminded me of damp fern-fronds. As he shuffled out of his skin the caterpillar had to pull these soft prickles "hand-from glove" fashion out of the moving ones. These were now like glistening tubes of glass, bunching gradually backwards as the caterpillar bulged out of his crumpling jacket.

I confiscated the empty skin, now dried to little more than a cluster of prickles, and showed it at a meeting of our Naturalists' Society a few nights later. "Most caterpillars eat their old clothes," said I, "but I defy the late owner of a garment like this even to nibble at it."

But the joke was on me. On returning home I discovered another caterpillar wearing a smart new skin and calmly browsing on the spikes of the old, which just goes to show that there is no accounting for taste, even in the insect world!



"Clan Mackenzie" hauling an Oban express at Strathyre.

Heavy Work on Scottish Mountain Grades

Oban to Callander on the Footplate

By a Railway Engineer

ONE naturally expects to find heavy gradients on railways running through the Highlands of Scotland, and I have written previously in the "*M.M.*" of the difficulties of train operation on the L.M.S. Highland main line, between Perth and Inverness, and also on the West Highland section of the L.N.E.R. The route of the former Caledonian Railway from Dunblane to Oban is even more mountainous, and includes many gruelling inclines graded at 1 in 50, or even steeper in places. Added to this, the popularity of Oban has made the route the busiest in the Highlands.

The locomotive workings on this line are of exceptional interest; it is only lately that the Stanier Class 5P5F 4–6–0s have penetrated this region, and until then the work was shared between the sturdy "Clan" class 4–6–0s of the former Highland Railway, and the ex-Caledonian 4–6–0s of Mr. W. Pickersgill's design. Occasionally earlier Highland 4–6–0 "Castles" are used.

Shortly before the introduction of the Stanier engines I was privileged to make a footplate trip on the 5-15 p.m. up from Oban, a trip that was of particular interest as featuring both types of 4–6–0s previously responsible for all the principal duties. This run was thoroughly typical of the strenuous work demanded by the summer traffic. During the late afternoon the Macbrayne motorship "*Lochearn*" had arrived from the Outer Hebrides bringing a crowd of home-going holiday makers, and with extra stock added the 5.15 p.m. train loaded up to a tare weight of 347 tons. With passengers and luggage the gross load behind the engines was 375 tons. The booked engine was No. 14767 "*Clan Mackinnon*," but with such a tonnage a pilot engine was essential, and just before starting time one of the Pickersgill 4–6–0s, No. 14624, came backing down to hook on in front.

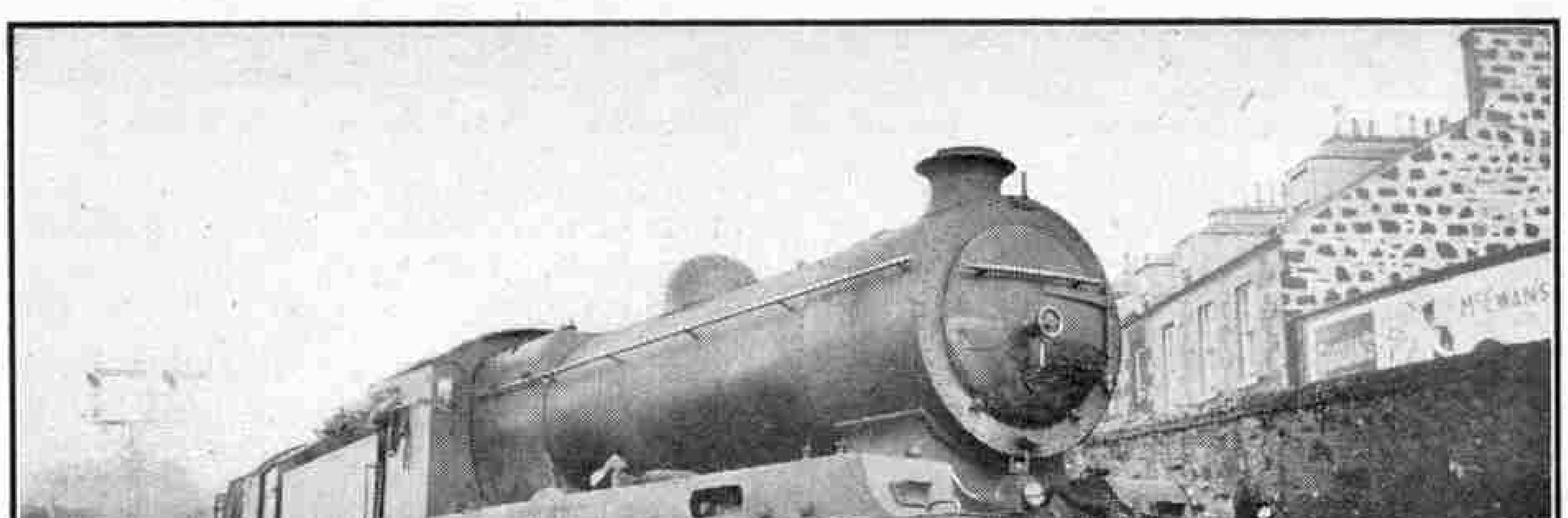
Although lighter and less powerful than the "Clans," the Pickersgill 4–6–0s are interesting engines. They were designed specially for the Oban line, and provided with a short rigid wheelbase in order to negotiate the many sharp curves on the route. At the time of their construction, 1923, weight restrictions were more severe than they are at present, and the engines were fitted with a comparatively small boiler, and were not superheated. A distinctly unusual feature, in locomotives built in comparatively recent years, is the use of slide valves.

I joined Driver Love and Fireman Matheson on the leading engine, and sharp on time we got the "*right away*." On this route there is no chance whatever for the engines to warm up to their work; a maximum effort is required at once, for about 200 yards from the platform end there begins a back-breaking ascent at 1 in 50, that continues for a solid 3$\frac{1}{4}$ miles. Both engines were soon opened well out and we made off in a seemingly frontal attack upon the ring of abrupt hills that encircle Oban; but quickly the line swings round in a full right-angle to the left, and begins to climb up the face of the hillside. By this time the combined vocal efforts of the two engines were deafening, and great clouds of exhaust steam went sailing high up into the still evening air.

As we gained height the view across the cab of No. 14624 opened out, and even from my perch on the right-hand side I could see a glorious vista, over Oban bay, over the island of Kerrera, to the Firth of Lorne and the big mountains of Mull. Up and up we toiled. On such a gradient our speed was hardly spectacular, yet the noise of the engines told more eloquently than any figures of the effort it needs to get a 375-ton load up a 1 in 50 bank. By fractions only the pace increased; 15 m.p.h.; then 15$\frac{3}{4}$, 16$\frac{1}{4}$, till we reached and held 17 m.p.h. So into the rock cutting and over the summit at Glencruitten crossing, this initial 3.3 miles from Oban having taken 11$\frac{1}{2}$ minutes.

In another moment we were coasting smoothly down an equally steep descent. While there was opening out ahead a Highland scene of the most appealing beauty—the Hills of Appin bathed in the evening sun, with the graceful cantilevers of Connel Ferry bridge stretching across the entrance to blue Loch Etive—what held my attention most was the astonishing riding of No. 14624. Many a time when travelling on the footplate I have likened the motion of a smooth-riding engine to that of a coach; such likenesses however have been merely comparative. On this Caledonian locomotive all the harshness and "cart-horse" touch were entirely absent, and she glided round the curves with a smoothness and buoyancy that was almost uncanny.

Speed was not allowed to exceed 45 m.p.h., and then, somewhat unexpectedly, we were brought to a stand at Connel Ferry Junction home signal instead of running into the platform. A coach had been derailed at the east end of the station and was lying foul of the up main line. A pilotman climbed up on the footplate of



The 5.15 p.m. up train at Oban with the train engine "Clan Mackinnon," before the arrival of the pilot.

No. 14624; he explained that "wrong road" working was in force, and authorised us to proceed past the home signal, at danger, into the down platform. I should mention that the whole route from Oban to Callander is single-tracked, with the usual up and down working at the crossing loops.

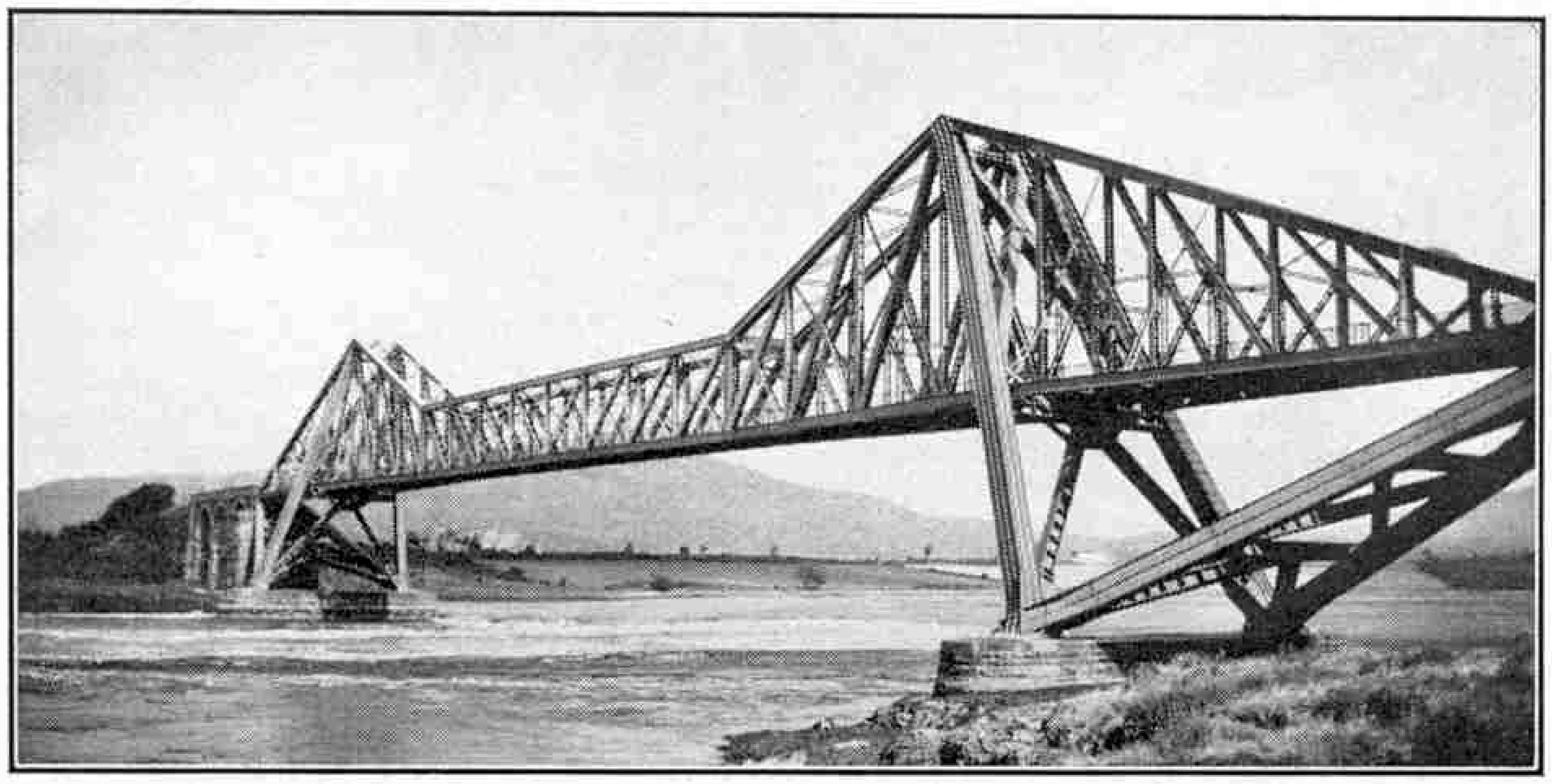
The next few miles are extraordinarily difficult. Never far from the south shore of Loch Etive, the line winds about in rough country; there are many short sharp rises at 1 in 50, equally sharp falls, and driving along here is an art quite different from that seen on a streamlined flyer. The mere times quoted in comparison with the mileages give really no impression of the locomotive work involved. Driver Love changed both regulator and reversing lever position frequently, and a surprisingly even pace was maintained in spite of the abrupt changes in gradient. We ran the 3.4 miles from Connel Ferry to Ach-na-Cloich in just 7 minutes, and the 3.8 miles onward to Taynuilt in exactly the same time, in both cases from start to stop.

On single-headed trains the locomotive usually takes water at Dalmally, but in our case, to save an abnormally long stop at the latter place, the pilot took water at Taynuilt. We then got away in fine style up the stiff rise into the Pass of Brander. The gradient here is about 1 in 80 on an average, and with speed steadily rising to 30, 35, and finally to 37 m.p.h., we crept in closer and closer under the slopes of the mighty Ben Cruachan.

Here the railway runs at the foot of wild barren screes, quite unprotected from falls of rock, and to guard against accident through any sudden blocking of the line interesting "automatic" signals are installed throughout the length of the danger zone. Each post has two arms, one facing in each direction of running, and both arms are usually seen at "all clear." They are not connected in any way with the block signalling. Some little distance up the slopes of Ben Cruachan is a fence of wires, and should any of these wires be broken by falling rock all the special automatic signals below would automatically be put to danger.

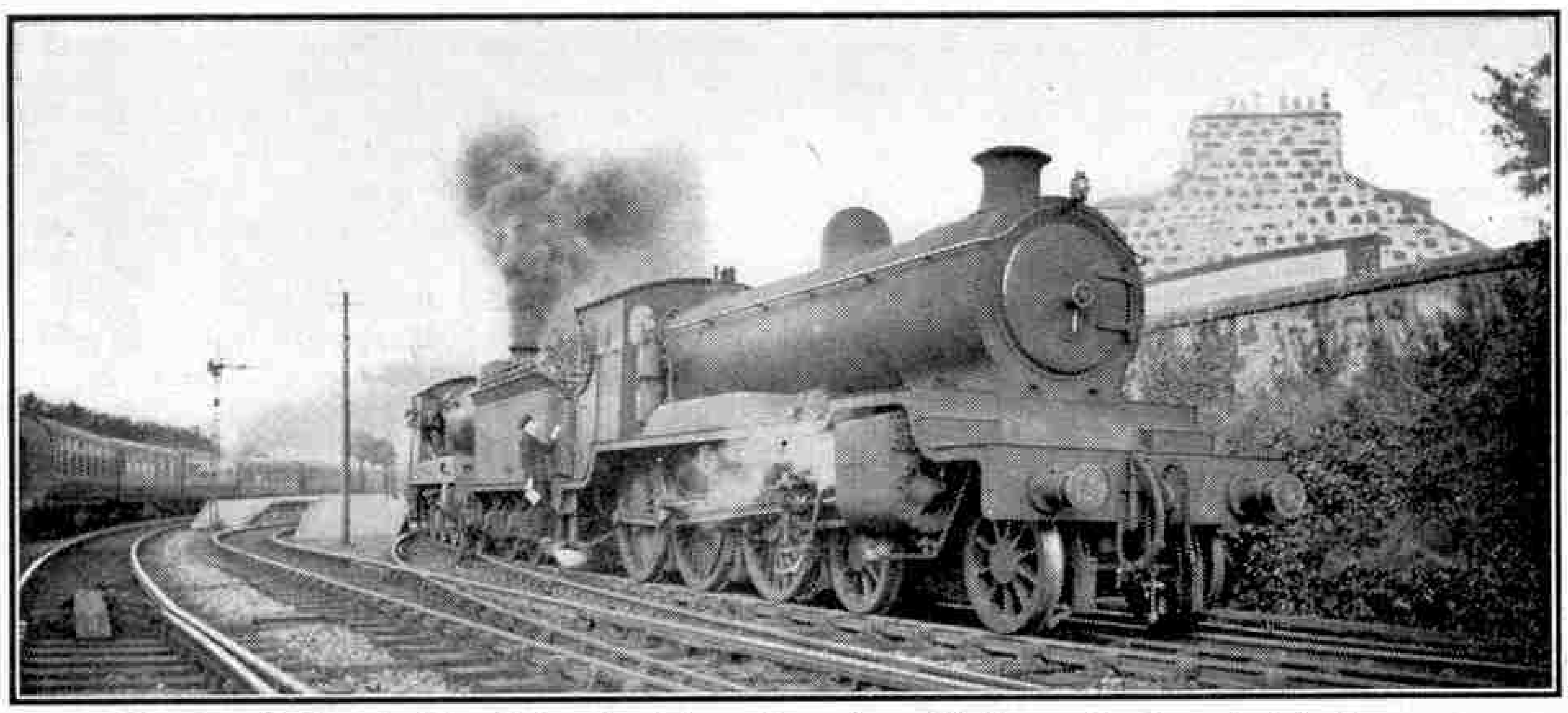
Before passing out of the avalanche zone the waters of beautiful Loch Awe were sparkling below us on the right; and after a brief halt at Loch Awe station, right on the water's edge, we got away again for a smart run round the head of the loch to Dalmally, 2.7 miles in 5¾ minutes.

"Clan Mackinnon" now took water, in readiness for the worst bank on the route. From Dalmally the railway finds a steep and winding track up Glen Lochy with the rugged mass of Ben Lui filling the view ahead through the cab glasses. For five miles the gradient averages 1 in 55, and after this test of strength a further five miles at rather easier grades have to be climbed before the summit is reached at the Argyll-Perth County March.



A striking view of Connel Ferry bridge, a cantilever structure that spans the entrance to Loch Etive.

Soon the two engines were rousing the echoes with a vengeance. The Pickersgill machine was being handled in the way best suited to non-superheater locomotives, with the valves well linked up, but with the regulator not fully open. The slight throttling of the steam, due to the restricted valve opening, tends to dry the steam. Behind us, the resonant bark of *"Clan Mackinnon's"* exhaust was a sure sign of a wide-open regulator, and in spite of the arduous conditions of working a small white feather from the safety valves showed that steam pressure was fully up, though not high enough to cause waste through blowing off.



After the attachment of the pilot engine. The author rode on this locomotive for part of the journey.

On the worst part of the bank speed was held at round about 20 m.p.h. but we picked up splendidly to 35 m.p.h. on the easier grades past Glenlochy crossing loop, and cleared the last bit of 1 in 54 ascent at the excellent rate of 31 m.p.h. After that, four minutes of welcome coasting brought us into Tyndrum, 12 miles from Dalmally, in 28½ minutes.

And now, with the West Highland line from Fort William in sight high up on the left-hand side of the broad strath, we spun merrily downhill, keeping mostly at about 45 m.p.h. A squall of rain veiled the vast gable of Ben More, which seemed to span the entire width of the valley ahead; and with streaming cab glasses we drove under the West Highland viaduct and into Crianlarich, a 5.2 mile run from Tyndrum, smartly run in just 8 minutes.

Here I transferred from the pilot to the train engine. A greater contrast could scarcely be imagined. Compared to the rather Spartan conditions on the Caledonian locomotive, the "Clans" have a well-sheltered cab with a roof that extends back over the leading end of the tender; the look-out ahead is somewhat restricted however by the straight vertical sides of the Belpaire fire-box, but Highland loading gauge considerations precluded a wider cab. Screw reversing gear is fitted, again in contrast to the notched lever of the Pickersgill 4–6–0. Easily the most arresting difference was in the riding, and amid the racket that developed on the footplate of *"Clan Mackinnon"* as we got under way again from Crianlarich, my vividly-clear impression of the pilot's light and airy tread marked her out as a positive phantom engine in comparison.

Alongside the brawling river Dochart, with great mountains lining the route on both sides, the two engines got rapidly into their stride for the fastest bit of running on the whole journey. The line is fairly level for a space and we sustained 53 m.p.h. until shutting off steam for the stop at Luib—6.3 miles from Crianlarich in 9¾ minutes. But such a respite is short-lived, and we got away to go pounding up the hillside on a 1 in 60 grade, the track ahead sometimes lost to view in wave upon wave of purple heather.

High up the slope, a mile or so on, was a ring of firs, prominent in their very isolation. Uphill we went, at a steady 26 m.p.h. and then as we drew nearer a little station was revealed inside the ring of trees. It was Killin Junction, miles from any village and serving the branch line that runs down to Killin and the head of Loch Tay. In 9¼ minutes from Luib, 3.6 miles away, we drew up in the station alongside the two-coach branch train. This latter was headed by a smart little 0–4–4 tank engine of Caledonian build.

Once again the *"right-away,"* but now we were indeed on the last piece of collar-work. Higher still we mounted—1 in 70 now—and from this lofty viewpoint the scene down on the left, with the head of Loch Tay, blue and serene beneath the age-old towering form of Ben Lawers, was in striking contrast to the increasingly desolate region into which *(Continued on page 619)*

RAILWAY NEWS

L.M.S. Centenaries

The centenary occurred recently of the public opening of the first part of the Ayr to Irvine section of what is now the L.M.S. between Glasgow and the Ayrshire Coast.

When the line was opened throughout, in August 1840, the journey of $41\frac{1}{2}$ miles took $1\frac{1}{2}$ hrs. as compared with the fastest time to-day of 45 min. Over half of the original line was laid on stone "sleepers," and at holiday times passengers were conveyed in horse-drawn trams. This line was used for one of the first experiments with locomotives in Scotland.

One of the earliest rate "wars" between British railways is recalled by the recent centenary of the public opening of the Birmingham and Derby Junction Railway.

For nearly a year the Birmingham and Derby Junction Railway, in conjunction with the London and Birmingham Railway, which it joined at Hampton-in-Arden, Warwickshire, afforded the only rail route between London and important Midland centres. The opening of the rival Midland Counties Railway from Derby and Leicester to Rugby on 1st July 1840 led to feverish competition for the through London traffic, however. The first class fare for through London passengers over the $38\frac{1}{2}$ miles from Derby to Hampton-in-Arden was cut down from 8/- to 2/- and the second class fare from 6/- to 1/-. The "war" ended in 1844 with the amalgamation of the rival lines, together with the North Midland Railway, to form the Midland Railway; all these lines are now part of the L.M.S. system.

"Green Arrow" Prowess

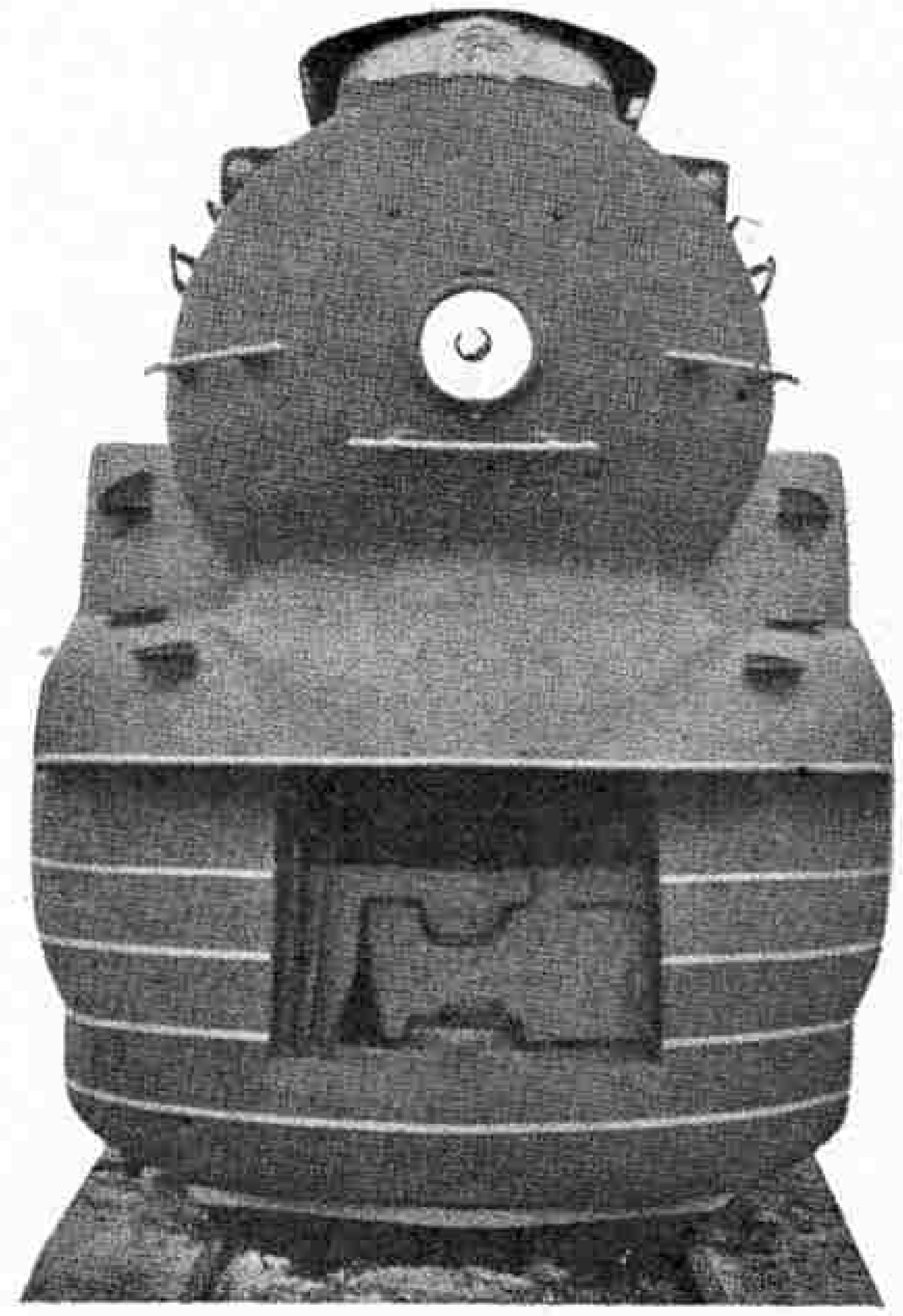
Mr. R. A. H. Weight reports some fine performances by L.N.E.R. "Green Arrows." On one occasion the 10.10 a.m. Sunday train from King's Cross to Doncaster was loaded up to 15 coaches weighing 476 tons tare, or about 500 tons loaded, and with engine No. 4802 ran the 12.2 miles from Peterborough to Essendine in one minute under the 18 min. allowed. On the restart up Stoke bank accelerations to $48\frac{1}{2}$, 52 and 48 m.p.h. were recorded, and without exceeding 63 m.p.h. on the descent to Grantham the station was reached in 22 min. 51 sec. compared with the 24 min. booked. A smart run to Newark followed with a maximum of 74 m.p.h. Exact time was kept on the next sharply scheduled section to Retford and the final 17.4 miles to Doncaster station were covered in half a minute under the 21-min. booking.

"Green Arrows" have been working some of the fastest ordinary expresses, such as *"The Yorkshire Pullman,"* over the G.N. section. As emergency deputies for "A4 Pacifics" the "Green Arrows" have hauled the *"West Riding Limited,"* which has to average 68 m.p.h. all the way from King's Cross to Leeds. On one occasion there was a loss of only a few minutes with this train. On another one of these engines worked the southbound *"Junior Scotsman,"* with its mile-a-minute timings, through from Newcastle to London regaining some 3 minutes.

* * * *

More than 10 million trains are operated annually over the railroads of the United States of America.

G.N. "Atlantic" No. 4443 on the turntable at King's Cross. Photograph by H. V. Norton, Barnet, Herts.



Front view of a Pennsylvania 4-6-2.

Splendid Running by a "Lord Nelson"

In the article *"Speed and the Locomotive Blastpipe"* published in the July *"M.M."* details were given of some remarkable runs by locomotives fitted with the Kylchap exhaust arrangements. A striking example of the work of the "Lord Nelson" class 4-6-0s fitted with the multiple-jet blastpipe, on the Lemaitre principle, is provided by a run that was made recently on the 6.40 p.m. express from Bournemouth to Waterloo.

On this run No. 862 *"Lord Collingwood"* was the engine and the load was one of 12 coaches, weighing 420 tons with passengers and luggage. Delays west of Bournemouth caused a loss of 6 min. at the start, and this provided the incentive to do work well above normal. Speed soon rose to $64\frac{1}{2}$ m.p.h. and Christchurch, 3.7 miles, was passed in $6\frac{1}{2}$ minutes. Then came an outstanding piece of hill-climbing. The Hinton Admiral bank, which is $3\frac{3}{4}$ miles long and finishes on a grade of 1 in 103, was mounted at an average speed of 56 m.p.h.! This was an excellent performance.

On gradients of 1 in 269, 202, 300 and 137 *"Lord Collingwood"* ran at 58 to 60 m.p.h., and even the stiff last mile did not bring speed below 53 m.p.h. Lyndhurst Road, 22.6 miles from Bournemouth, was passed in $24\frac{3}{4}$ minutes, and Southampton Central 28.7 miles, was reached in $33\frac{1}{4}$ min.

All but three minutes had now been regained. On the rise out to Eastleigh speed rose to 58 m.p.h. A bad signal check at Winchester Junction caused a loss of $4\frac{1}{2}$ minutes, so that only 45 min. remained for the 50.3 miles up to London. The next $22\frac{1}{4}$ miles on to Brookwood were reeled off in exactly 19 min., and there still seemed a good chance of a punctual arrival; but a second bad check robbed the driver of his opportunity to make up time. The arrival at Waterloo was five minutes late, but the net time up from Southampton was no more than 82 min. for the 79.3 miles, a gain of 8 min. on schedule and of 11 min. on the through run from Bournemouth.

This run was timed by Mr. O. S. Nock.

L.N.E.R. Electrification

The Liverpool Street and Shenfield scheme is progressing satisfactorily, and some two miles of overhead girders for carrying the electric transmission wires have been erected between Harold Wood and Brentwood. Ilford locomotive shed has been demolished, and the carriage sidings have been removed in preparation for the new layout of electric lines.

At Worship Street, just outside Liverpool Street Station, the construction of a new widened bridge has been taking place simultaneously with the demolition of the old one. During the work 1,264 trains ran without interruption.

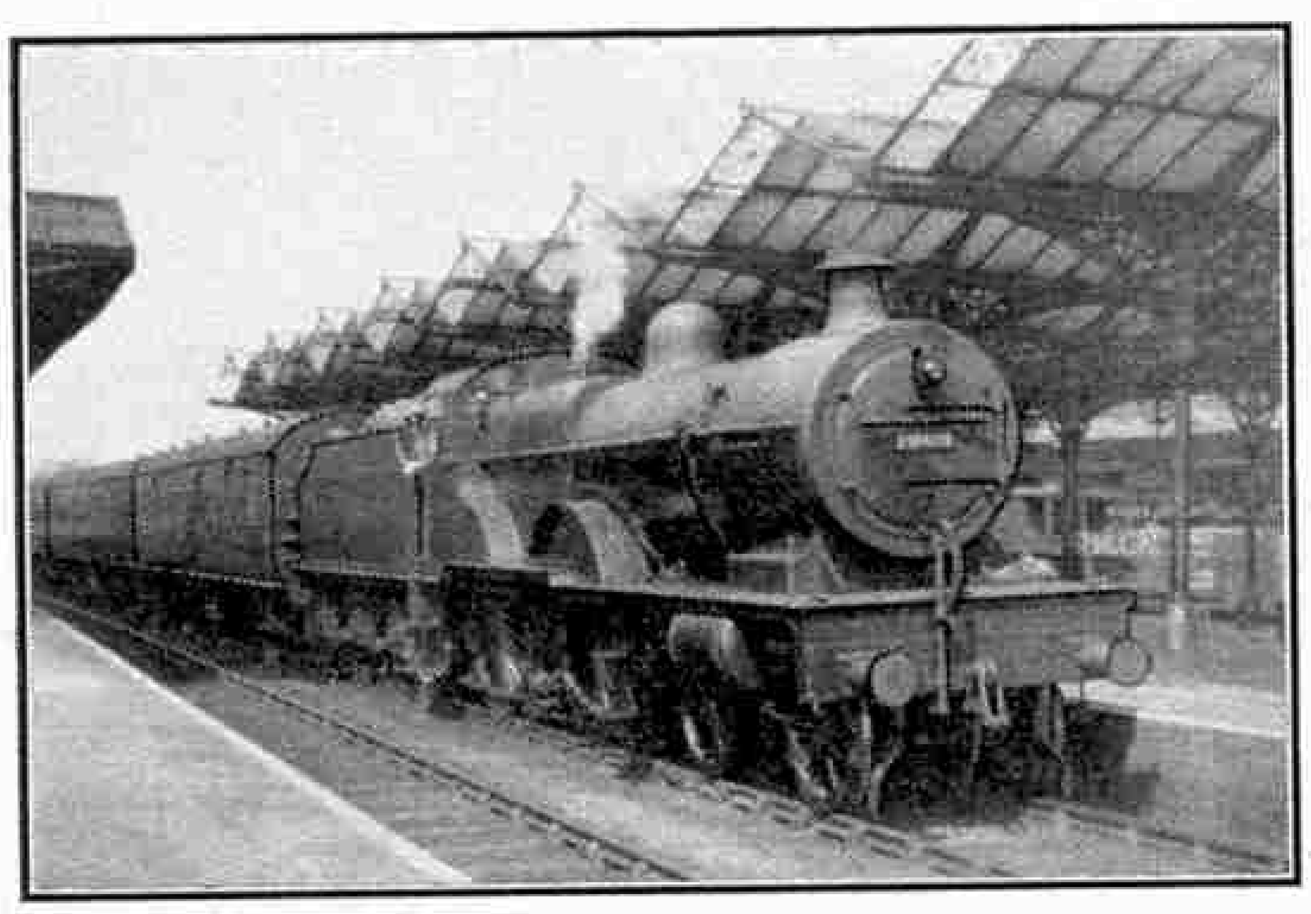
Overhead girders have also been erected for a distance of seven miles at Woodhead, Hadfield and Sheffield in connection with the Manchester and Sheffield main line electrification. Special overhead equipment is being provided in Woodhead tunnel, which is three miles long, the work being carried out mainly on Sundays.

At Darnall, work is proceeding rapidly on the first main line steam and electric locomotive depots in the country. The new steam locomotive shed is now in an advanced stage and a start has been made upon the shed for the electric locomotives. A new fly-over bridge to enable locomotives to run from the "up" side to the depot without crossing the main lines on the level has been completed.

Two Famous Signal Boxes to be Rebuilt

Two of the most famous signal boxes in the country, Crewe North and South Junctions, are to be rebuilt shortly on new sites. When the reconstruction is complete the existing electrically-operated semaphore signals will be replaced by the colour-light type, which, supplemented by route indicators, including the new standard junction type, will enable 274 signal arms to be reduced to 72 colour-light units. The junction indicators will be similar to those that have already been installed at Rugby.

The North and South Junction boxes at Crewe control the passage of express and other trains from London, Birmingham and the South, the Potteries and Central Wales to North Wales, Manchester, Liverpool, Scotland and the North generally. There are 266 levers in the North Junction box and 247 in the South Junction box. In addition to the many trains controlled, the boxes regulate 250 movements a day of locomotives passing to and from Crewe North and South engine sheds.



L.M.S. "Standard Compound" No. 1009 at the head of a stopping train.

The heaviest standard length steel rail in use on the railroads of the United States of America weighs nearly one ton.

L.M.S. Locomotive News

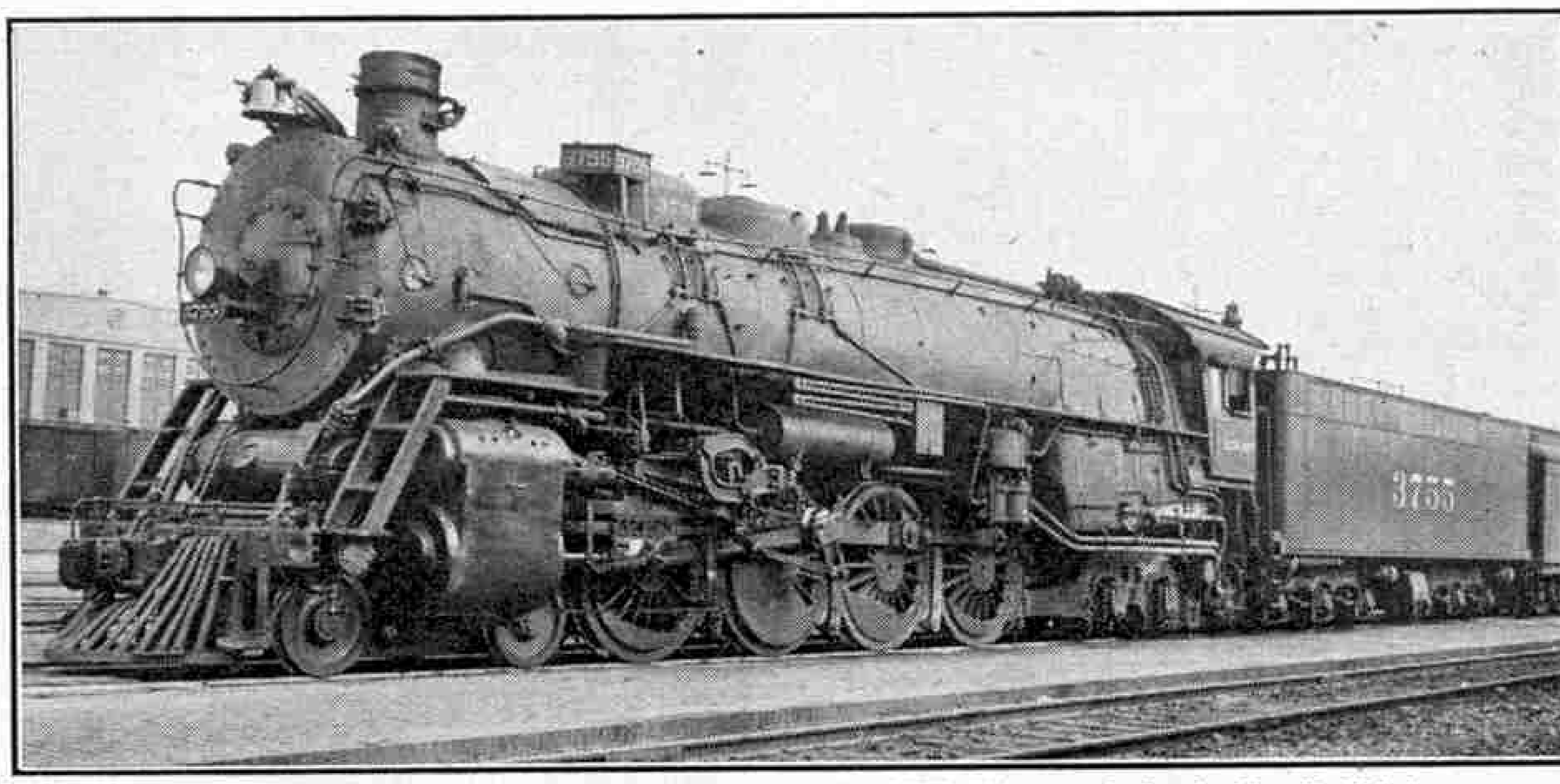
New engines in traffic include 4–6–2s Nos. 6236 *"City of Bradford"* and 6237 *"City of Bristol,"* and 0–6–0 freight tender engine No. 4584.

Among the engines condemned are L.N.W.R. "Prince of Wales" 4–6–0 No. 25798, "George the Fifth" 4–4–0s Nos. 25279 *"Sunbeam"* and 25310 *"Thunderer,"* and H.R. "Castle" class 4–6–0 No. 14675 *"Taymouth Castle."*

Taper-boiler "Royal Scot" No. 6170, *"British Legion"* has been returned once more from Longsight Depot to Crewe, and has been replaced by "Royal Scot" No. 6119 *"Lancashire Fusilier"* from Crewe.

Two New Coaches for L.M.S. Royal Train

A scheme has been prepared for the provision of two new saloon coaches for use on the L.M.S. Royal train. The internal arrangements of the new saloons have not yet been settled, nor has a detailed scheme of decoration been decided, but the coaches will be of the most modern type. The Royal train now in use is 36 years old and was built for King Edward VII.



Atchison, Topeka and Santa Fe Railroad 4-8-4 No. 3755. Photograph by A. Youell, U.S.A.

New L.N.E.R. Signalling Installation

Ten route miles of the L.N.E.R. line between Maryland Point and Gidea Park is to be resignalled. The new signalling will be four-aspect colour-light, with position light indicators at junctions. A capacity of 40 trains per hour will be catered for. This figure is only eclipsed in this country on the Inner Circle Line of London Transport, which handles 43 trains per hour.

New signal boxes of modern design will be provided and in them will be installed control panels for the signals, these panels showing the location and state of the signals controlled, and also the occupation of the track circuits. By this means signalmen will see at a glance the indications given by signals situated a long way from the box.

* * * *

Several signal boxes, warehouses and 293 L.N.E.R. passenger stations are being repainted and redecorated this year. Over eighty of these will be in the Scottish area.

* * * *

Contracts have been placed by the L.N.E.R. for the purchase of 8,000 sleepers and 6,600 tons of cast iron chairs.

Steam Oases in Sussex

An exceptional express working on the electrified Central Division of the S.R. normally handled by steam locomotives, has been that of the London (Victoria) and Newhaven boat services, twice daily in each direction in connection with Continental sailings. With loads frequently exceeding 400 tons, good work has long been done with these trains by the "Atlantic" or 4–4–2 engines designed after the famous Doncaster pattern by Mr. Earle Marsh, the first batch in 1905 and the second, superheated, in 1910. At holiday periods various 4–4–0 engines of the original constituent companies' types also work relief boat services to and from Newhaven, sometimes in pairs.

Other "steam oases" are found on the through passenger services from the G.W. and L.M.S. lines in the North and Midlands to Brighton, Eastbourne and Hastings. The G.W. train starting from Birkenhead reaches Central Division metals at Redhill, and the L.M.S. *"Sunny South Express"* is worked by S.R. locomotives from Willesden Junction, L.M.S., via the West London extension lines to Clapham Junction, and thence over the Brighton main line.

A run on the summer northbound *"Sunny South Express"* between Eastbourne and Brighton provided an interesting time-keeping log behind No. 2326, originally named *"Bessborough,"* one of the two ex-L.B.S.C. 4–6–2 express tanks having 6 ft. 7½ in. driving wheels and two outside cylinders 21 in. by 26 in. The train consisted of 10 L.M.S. corridor coaches, including an ex-L.N.W.R. 12-wheeled dining car, and weighed say 335 tons all found. The 15¾ miles to Lewes, including three service slacks and several undulations, took 22 min. or 1 min. under the tighter part of the schedule, with a maximum of 65 m.p.h. on the Glynde descent. Up the steep 1 in 88 to Falmer, which has to be tackled from a slow passage of Lewes, speed fell below 22 m.p.h. and 4½ miles occupied 12 min. Descending gently into Brighton, an arrival was secured just within the 40 min. fairly liberally allowed for 23¾ miles, though it is a decidedly difficult stretch with a heavy train. R. A. H. WEIGHT.

Modernising Old U.S.A. Locomotives

In 1920 The Minneapolis and St. Louis Railroad acquired 35 2–8–2 locomotives for fast freight trains. These engines have now been rebuilt with notable results, and both their hauling capacity and efficiency have been increased. At 19 years of age the engines have been given a new lease of life.

HOW THINGS ARE MADE:

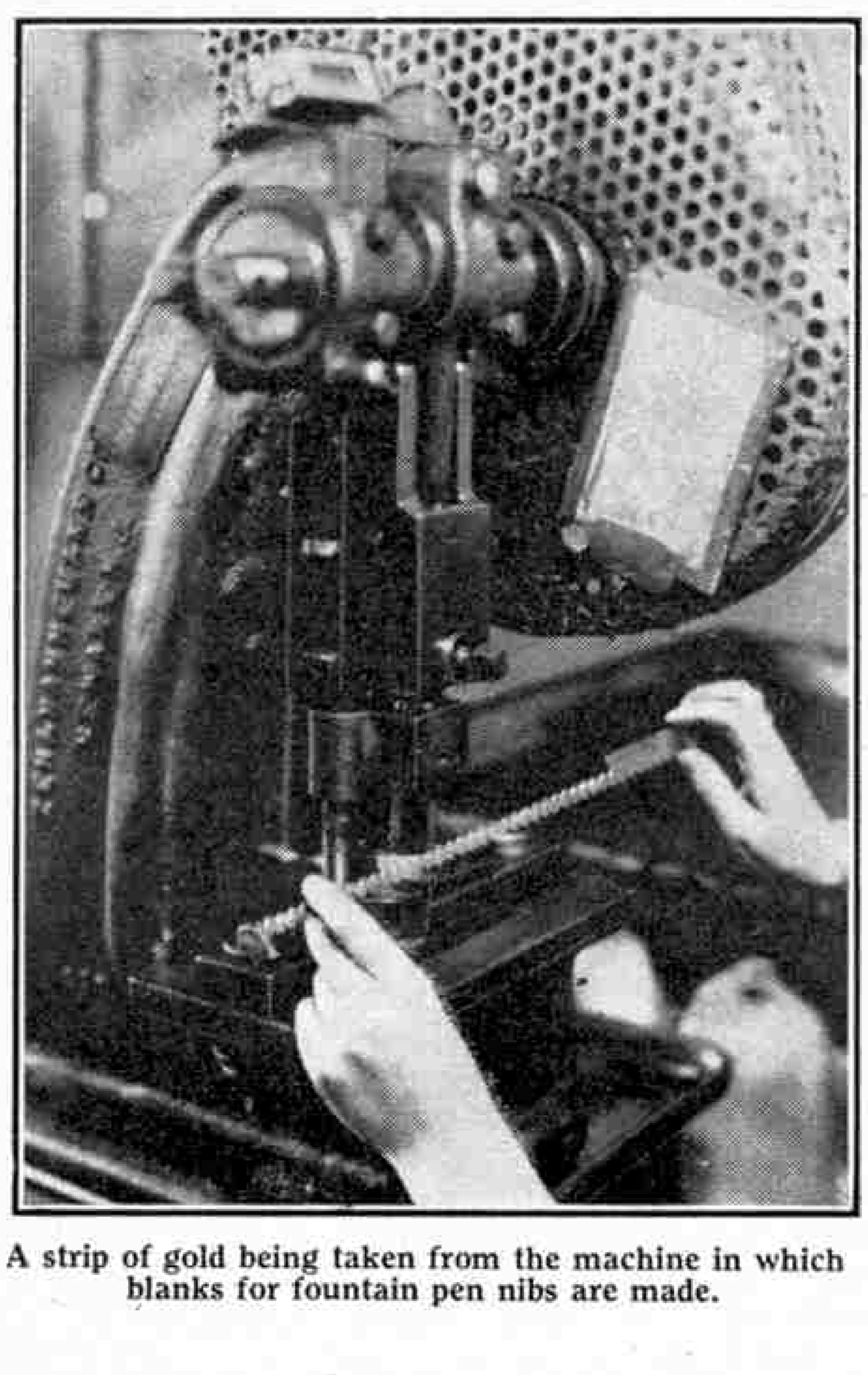
The Romance of your Fountain Pen

By Alan Williams, M.R.S.T.

OF all the inventions that have come to be looked upon as necessities to our civilised life one of the most romantic is the fountain pen. Its materials come from all parts of the world, its method of manufacture is fascinating throughout, and the history of its invention and improvement is one of constant though varied effort.

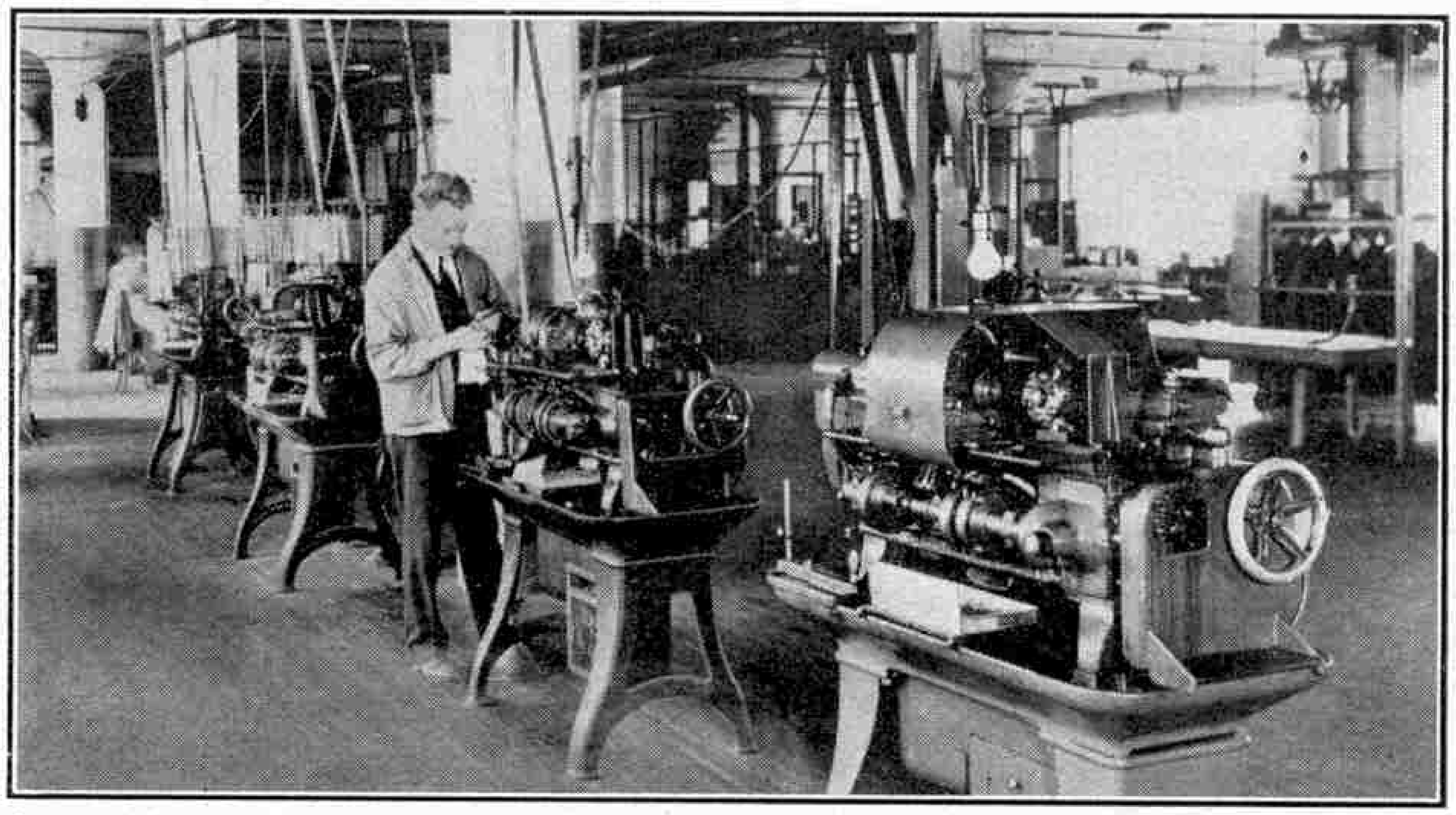
Everyone knows how a fountain pen is built. Apart from special devices and refinements, it consists of a barrel or, in the case of a "self-filling" pen, a rubber sac containing ink, a "feed" that helps to carry the ink to the nib and the nib itself. When the pen is being used for writing, gravity and capillary action cause the ink to flow into the feed and towards the point of the nib. In order to counteract the air pressure, which would otherwise keep the ink from flowing, a small hole is bored in the upper part of the nib and through this air enters to take the place of ink as it is used up.

Simple though the mechanics of the fountain pen appear, it took years of experiment to balance the various forces acting on the ink so as to produce an even and uninterrupted flow. Two examples only will be sufficient to illustrate this. In some pens there was an overflow of ink when writing was begun, so channels were cut on the underside of the "feed" to store the unwanted ink until it should be drained off by writing. Then it is well known that a liquid will flow by capillary attraction from the wide end of a V-shaped aperture to the narrow end, but not in the opposite direction. So there was a very erratic flow of ink until it was discovered how to cut the slit in the nib so that it was narrower towards the point.



A strip of gold being taken from the machine in which blanks for fountain pen nibs are made.

Before these refinements could be discovered, however, there had to be invented a nib that would withstand the corrosive action of ink. The idea of a reservoir consisting of a hollow tube over a fixed nib is well over 200 years old. In 1723 an English translation of a French work on mathematical instruments mentions such a pen, called the "plume sans fin" or endless pen, and translated "fountain pen." This was merely a metal tube, filled with ink, which had a quill nib screwed into one end.



A general view of the tool room at the fountain pen factory of the L. E. Waterman Company, New York, by courtesy of whom the illustrations to this article are reproduced.

At the other end of the tube was a screw stopper, which allowed no air to enter the upper part of the tube so as to balance air pressure and gravity in controlling the flow of ink. The directions regarding its use state that the pen should be shaken first to start the flow of ink. A good deal of shaking would have had to be done from time to time to ensure a constant supply of ink.

When metal nibs came to stay their very permanency gave an impetus to the fountain pen idea. But only non-corrosive metals were suitable for fountain pen nibs, as these would be constantly in contact with ink. It was found that gold alloyed with silver and copper, and thus reduced to 14-carat quality, was best for this purpose, except that it was so soft that writing wore away the nib in a very short time.

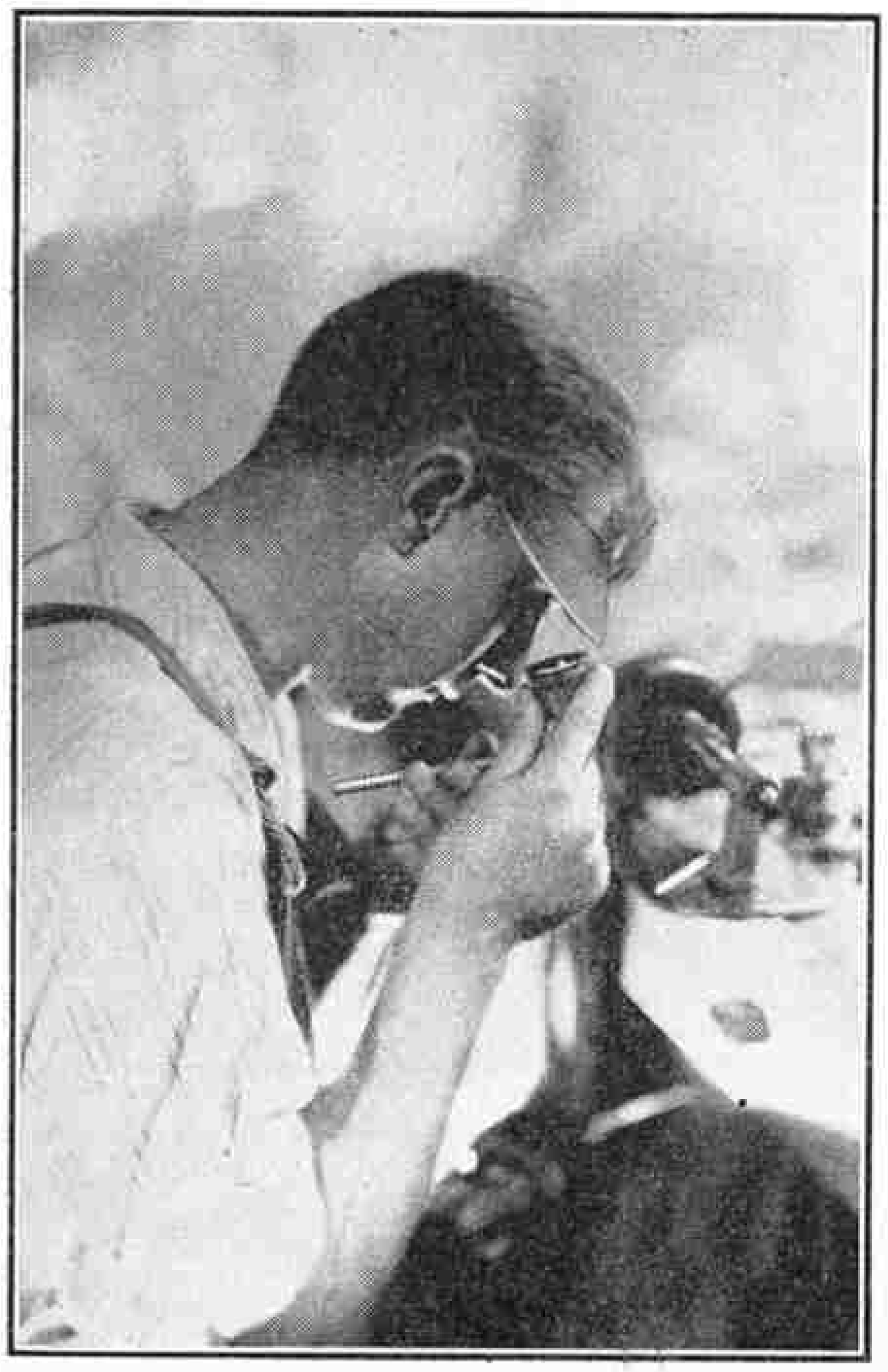
At the end of the 18th century John Isaac Hawkins, an English engineer, began experiments to try and find a suitable substance of durable quality with which to tip gold nibs. He tried first to fuse small rubies on to the nib point. When this plan proved unsuitable he cemented diamond dust on to quill points, with results that if anything were worse.

Not long before a metal similar to platinum had been discovered and named iridium. Its extreme hardness and non-corrosive properties suggested it as a suitable substance for making pen nibs. Unfortunately it had two disadvantages; it was extremely rare and costly, and there was no tool that could cut it satisfactorily. It was this last reason that caused a pen-maker called Robinson to fail in an attempt to make an iridium nib in the year 1822. Hawkins took up the challenge and made a high speed lathe, which turned a disc covered with diamond dust and oil that cut easily, if slowly, into the metal.

Hawkins decided to economise in his use of iridium because of its cost, and conceived the idea of fusing small pieces of the metal to the points of a gold nib, the plan he had previously tried with rubies. As iridium proved easily fusible the result was satisfactory, and the modern fountain pen nib was born. As we shall see, this method of nib-making is still in use to-day, with minor improvements due to the use of modern appliances.

Although the nib was there the pen itself had to be perfected. Already patents had been taken out for fountain pens with quill nibs, the earliest being in 1809, and since then there have been nearly 150 different patents. The chief difficulties that have had to be overcome have been uneven flow of ink and leakage of the reservoir. Many of the devices adopted in different patents to overcome these difficulties now seem amusing. Some pens were fitted with plungers in the barrel to force the ink to flow into the nib feed and nib; others had separate reservoirs for the ink in the form of glass bottles attached to the pen by rubber tubes, through which the ink flowed by syphon action.

The invention of the iridium-tipped gold nib gave a great impetus to the manufacture of fountain pens, and when a greater knowledge of the manufacture and preparation of rubber was obtained there were immense improvements in the barrels and fittings of the pens. Rubber hardened



Grinding a gold nib to finish the point.

with sulphur gives us vulcanite, which is easily turned and is impervious to the action of the acids in ink. Barrels had previously been made of non-corrosive metals like silver. The adoption of vulcanite for this purpose both quickened and cheapened the process of fountain pen manufacture.

In the modern self-filling models a rubber sac inside the barrel contains the ink, so that the barrel itself may be made of more decorative or colourful material than the usual black vulcanite. Cellulose acetate or other forms of celluloid are used for this purpose, but because they are susceptible to the action of ink the fittings of the pen that come into contact with ink, such as the "feed" are still made of vulcanite.

The latest improvement is to make barrels of a form of nitro-cellulose not affected by ink acids. This material has a grain like that of wood, so that to get the best looking pens a face grain rather than a side grain is needed. This is done by cutting the strips of the material from the face side and twisting them spirally so that the sides meet and are cemented together. A skilful worker can so match the grain that it is impossible to see the joins.

To make a modern fountain pen 210 distinct operations are necessary. To detail all these would not be possible here, but a glance at some of the major processes will give us an idea what care and precision go into the work. Take the nib first. The pure 24-carat gold is alloyed with silver and copper at a temperature of 1,900 degrees F. in the proportion of 14 parts of gold to 6 of copper and 4 of silver. The ingots are then of 14-carat quality, the most suitable for flexibility and endurance.

The ingots are next rolled out to a thickness of 11/500 in. and then stamped into "blanks," which are flat versions of the finished nib but are somewhat shorter and broader. The points of the blanks are recessed to hold the fragments of iridium, which are first cemented and then fused on to the gold blanks with a small blow-torch. The "blanks" now run through a series of machines, which again roll them, stamp them with the maker's name, and finally shape them.

The nib has next to be slit. Whereas Hawkins used a disc covered with oil and diamond dust this delicate operation is carried out to-day by a carborundum disc making 10,000 r.p.m. The point of the pen is now finally shaped by a trained worker, who watches the tricky operation, which cannot be followed with the naked eye, through a lens of high magnification.

Meanwhile the containers and caps have been moulded and turned from the materials mentioned earlier. These are now decorated with the chased designs common to most fountain pens, and the superior models are mounted with gold or silver. Self-filling levers are next fitted, and when the clips are put into place on the cap the pen is virtually finished. There follows a very comprehensive testing, including a special trial of the smoothness of the nib in writing.

Now during all these processes, especially while the nib is being ground into shape, there is considerable waste. There are 80 stages in the manufacture of the nibs alone, and the metal removed in these processes finds its way into many places such as the clothes, hands and faces of the workers, crevices of the machines, oil and waste. If it were not recovered it would mean a loss of thousands of pounds. Every care therefore is taken to recover the gold lost in this way. The water in which employees wash their hands and clothes is filtered for the gold it contains; and floor sweepings, rags and old clothes are burned in special furnaces that conserve the gold waste. By these means a modern fountain-pen factory can recover gold worth £25,000 in one year, so that it pays to take the trouble.

It is interesting to note how early attempts were made and successful ones at that, to put self-filling pens on the market. The earliest "self-filler" was a pen invented by Parker in 1832. This consisted of a hollow reservoir containing a piston. When the piston was drawn up ink entered the tube by suction, and that was that. Simple, you may imagine, but remember that these early pens leaked abominably.

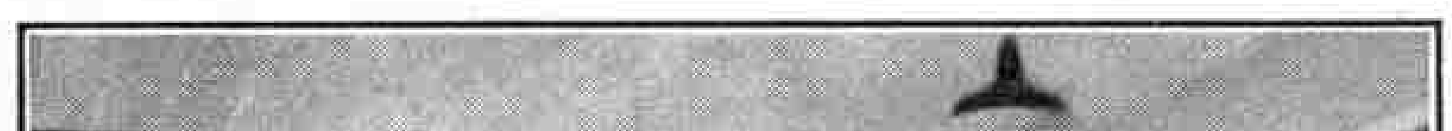
In 1859 Walter Mosley had the bright idea of making his reservoir a rubber sac, the first instance of this now universal device. The sac was attached to a screw cap, which was turned to twist the rubber tube and force the air out. The nib had then only to be dipped in ink, and the cap to be twisted in the opposite direction, for the ink to flow in and fill the reservoir. The trouble with this kind of filler, which was adopted several times during the last century, was that it played havoc with the rubber tube, which was constantly having to be replaced.

A method of compressing the rubber tube by a pressure bar, something like that of the modern "self-filler," was found in 1867. In this pen, instead of a lever at the side such as we have to-day, the bar was depressed by means of thumb-plates fixed at the end of the barrel. The first lever-compressed rubber reservoir appeared in 1882, but it was not until the beginning of the present century that this device was perfected. It has now practically superseded all other methods of self-filling.

Another modern device in fountain pens that is not so new as it would appear is the transparent reservoir, in which the amount of ink supply can be seen. In 1886 a glass barrelled pen was invented but it was totally encased in vulcanite. Three years later appeared the "Lacon" pen, in which the vulcanite outer cover was slotted in order to give a view of the glass tube and its contents. Of course glass barrelled pens always suffered the inconvenience of being frail, but this type of pen has received a new impetus with the invention of unbreakable cellulose materials of a transparent character, allowing manufacturers to produce "visible supply" barrels that have an indefinite durability.

An interesting fact that may be worth mentioning is that in France the law forbids the importation of any gold of less than 18-carat quality. All the best known makes of pen are imported into France, and therefore special nibs have to be made for that market. As these are of 18-carat gold they are of inferior quality regarded as pen nibs, although of course they are of higher value as gold.

In your fountain pen you see not only the result of years of effort on the part of many inventors in different countries, and the product of careful and skilful labour, but also representative products from all over the world. The humble fountain pen is, in short, a miracle of modern science that has enabled us to write with more convenience and speed.



Fitting clip caps in the assembly of fountain pens.

One complaint that is commonly made against the fountain pen is that it has resulted in poorer writing. It is probable that there is a certain amount of truth in this. It is at any rate certain that those of us who have used a fountain pen regularly for a long period find it almost impossible to write decently with an ordinary nib.

AIR NEWS

Pan American Airways Service to New Zealand

The Pan American Airways service between the United States and New Zealand, which was suspended after the loss of the flying boat *"Samoan Clipper"* near Pago Pago on 11th January 1938, may be resumed in the near future. The company have applied to the Civil Aeronautics Authority, at Washington, for authority to operate a regular passenger, mail and freight service between the two countries by a new route west of the one used in 1937–8.

The new route will be from San Francisco to Los Angeles, 365 miles, across the Pacific to Honolulu, a further 2,561 miles, on to Canton Island, 1,913 miles, and from there by way of the Fiji Islands to Noumea, in New Caledonia, 1,989 miles, and finally a 1,124-mile "hop" to Auckland, New Zealand, a total distance of 7,952 miles; and the flying time will be 49 hrs. A survey flight over the route has just been made by the *"California Clipper,"* one of the company's new Boeing flying boats. It is proposed to operate a fortnightly service.

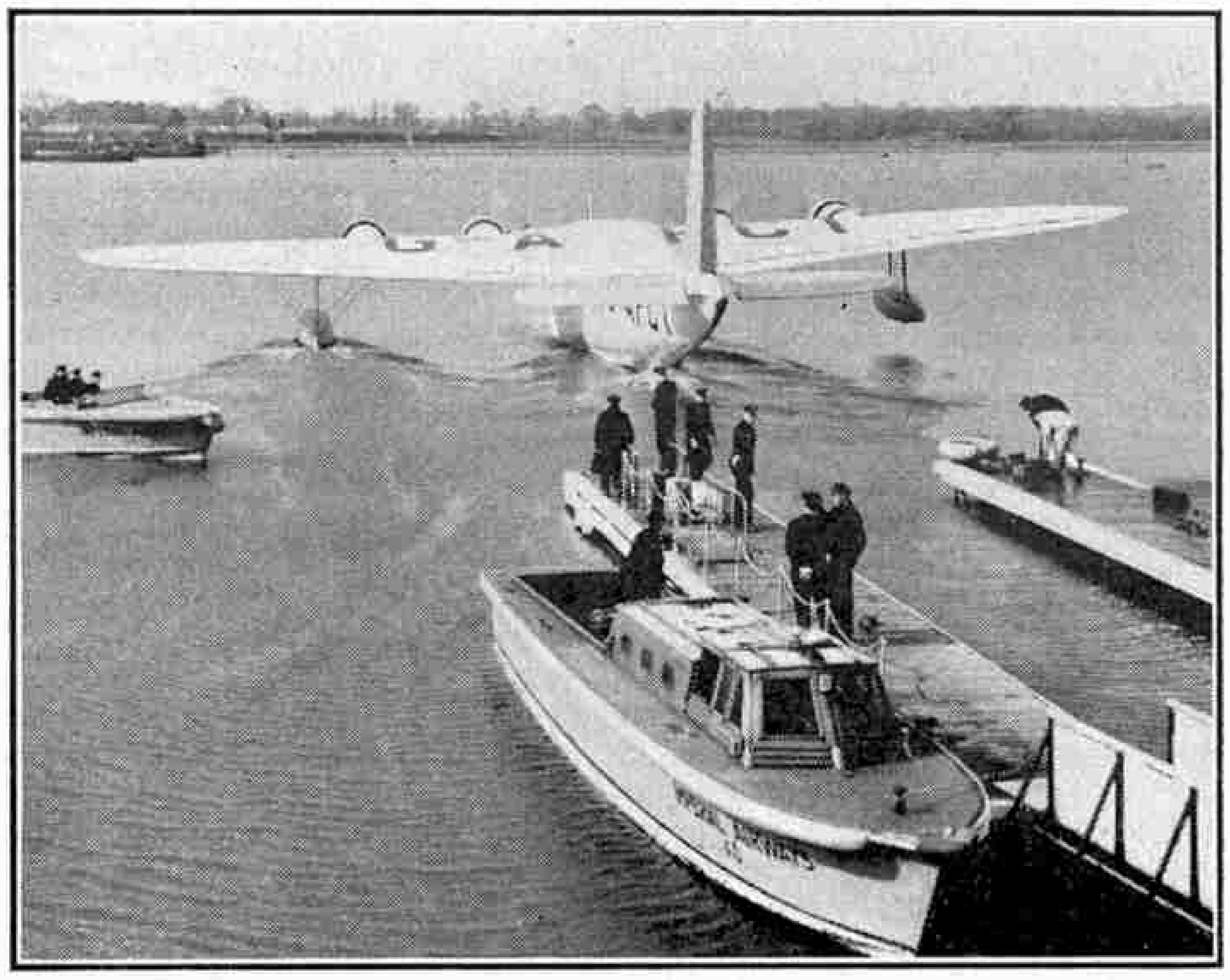
First D.H. "Flamingo" in Service

The first D.H. "Flamingo" air liner was purchased and put into service by Jersey Airways Ltd. On its first flight from Heston to the Channel Islands it was piloted by Capt. W. B. Caldwell, chief pilot of the company, who made the first flight to Jersey when the service began on 11th December 1933. A D.H. "Dragon" was used on that occasion, and eight machines of this type were used during 1934. In 1935 the "Dragons" were replaced by six D.H. 86s and two "Dragon Rapides." The service has been remarkably successful from the beginning. In 1935 a total of 19,761 passengers were carried, and by last year the figure had increased to 33,875.

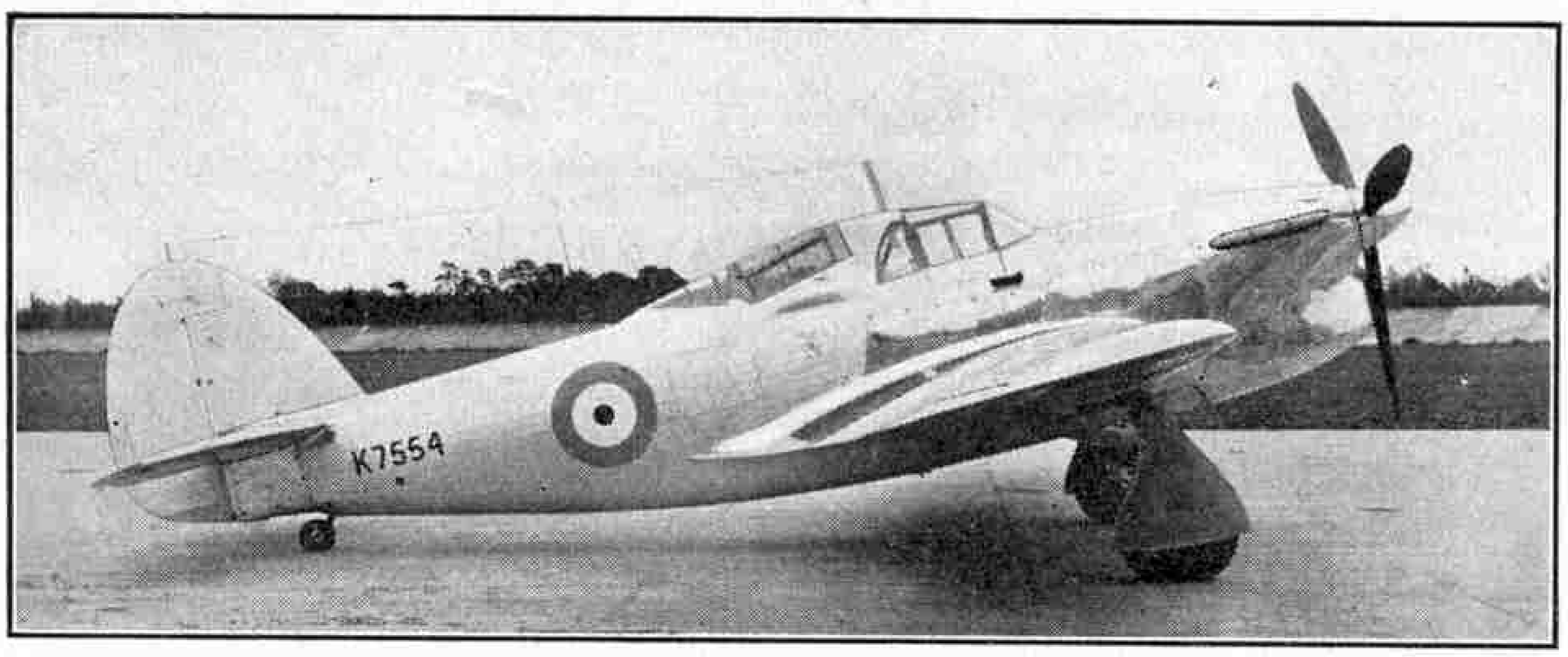
Successful Flight Test of "Bristol" Hercules Engine

A very strenuous series of flight tests was completed recently by one of the new "Bristol" Hercules 1,375 b.h.p. engines, the first type of double-row radial aero engine in the world to have sleeve valves.

For the flight tests the Hercules was fitted in the special all-metal monoplane used by the Bristol Aeroplane Co. Ltd. as a "flying test-bed." The trials lasted over 170 hrs., the equivalent of about 38,000 miles' flight. During almost half of the time the engine was run at the maximum rated cruising speed, and for over 60 hrs. it operated under severe economical cruising conditions, with weak fuel mixtures and correspondingly high flame temperatures in the cylinders. In addition 14 full-throttle climbs to 16,000 ft. were made, many in very adverse weather. In spite of the severity of these tests the final check showed an appreciable general increase of power output. This excellent result confirms the makers' claim that sleeve valves tend to acquire an even more perfect finish after prolonged running, instead of deteriorating as do poppet valves. Examination of the tested Hercules showed that the sleeves and cylinders were still in faultless condition.



The flying boat "Champion" being warped into the twin pontoons at Berth 108, Southampton. Photograph reproduced by courtesy of Imperial Airways Limited.



The Hawker "Henley," a target-towing monoplane that can be quickly converted into a bomber. It is a two-seater with a top speed of 272 m.p.h. Photograph by courtesy of Hawker Aircraft Limited.

Fast American Military Machine

An interesting experimental two-seater military monoplane built by the Military Aircraft Corporation, of Springfield, U.S.A., and known as Military Model HM-1, is said to have a top speed of 365 m.p.h. at 8,000 ft. With a cruising speed of 320 m.p.h. it has a range of 950 miles.

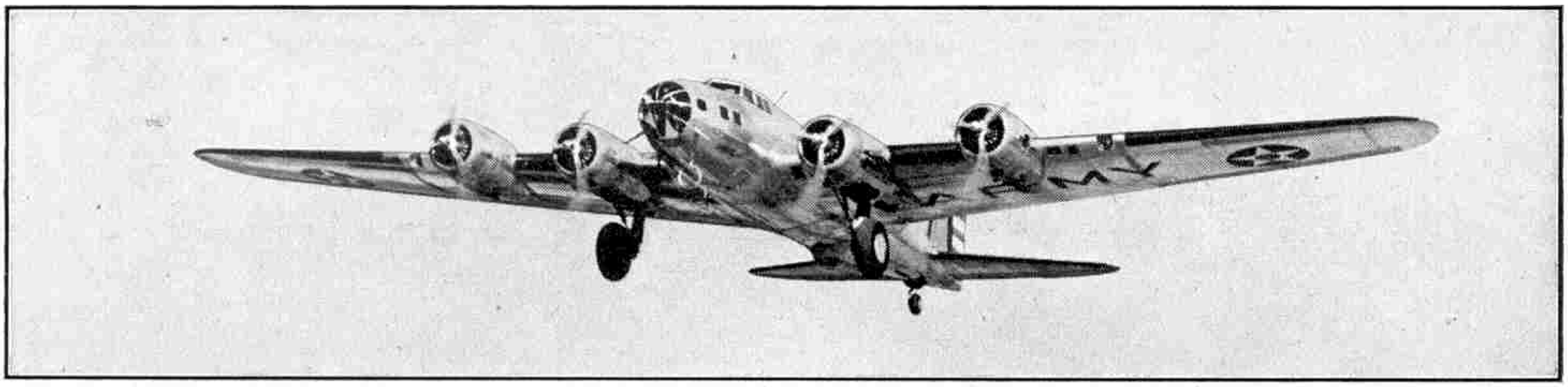
The aircraft has a fully-retracting electrically-operated undercarriage and a constant-speed airscrew. The wings, with a span of 31 ft., are of wood with mahogany plywood covering, and the fuselage is of welded steel tube with light alloy and plywood covering. The initial rate of climb is 6,000 ft. per minute, and the service ceiling 32,000 ft. One 900 h.p. Pratt and Whitney "Twin Wasp" engine is fitted.

Improved Lockheed "Hudsons" for Australia

The 50 Lockheed "Hudson" reconnaissance aeroplanes ordered for the Royal Australian Air Force will have the new 1,000 h.p. Pratt and Whitney G3-5 "Twin Wasp" engines, and will be capable of a better performance than the "Hudsons" used by the Royal Air Force in this country. These G3-5 engines will require overhauling every 600 hrs. The new "Hudsons" will have Hamilton Hydromatic airscrews, and it is claimed that if an aero engine fitted with this type of airscrew ever fails during flight, the airscrew can be stopped within 10 sec., thus averting vibration.

French Speed Record

The world speed record for aircraft flying over a closed circuit of 6,150 miles has been raised several times this year. It was taken from Japan on 13th July last when a German Heinkel 116 monoplane covered the prescribed distance at an average speed of 135 m.p.h. The same day the record was lost to an Italian Savoia-Marchetti S.M.75 three-engined machine, which flew 6,150 miles in a closed circuit at an average speed of 147.5 m.p.h. The latest record is 195 m.p.h., a substantial advance. It was achieved by a French Amiot 351 bomber flown by Commandant Rossi, with M. Emont aboard as radio operator. The circuit flight was carried out from Istres, in Damascus, and took 32 hrs. 17 min.



The first of a fleet of Boeing B-17B "Flying Fortress" bombers for the United States Army Air Corps in flight. Photograph by courtesy of Boeing Aircraft Company, U.S.A.

Fine Delivery Flight by New "Flying Fortress"

A very fine long-distance delivery flight was accomplished on 1st August last by the first of a fleet of Boeing B-17B advanced type "Flying Fortress" bombers for the United States Army Air Corps. A photograph of this machine in flight appears at the top of this page. Major S. M. Umstead, chief of the Flying Branch of the Army Air Corps Material Division, was in command, aided by a crew of three.

After taking delivery of the bomber at Seattle, Major Umstead flew it to Burbank, California. From there he flew non-stop across the United States to New York, covering the 2,500 miles in 9 hrs. 14 min., which is only 1 hr. 46 min. more than the time taken by Howard Hughes on his record coast-to-coast flight in a specially designed monoplane. On the long flight the "Flying Fortress" never descended lower than 20,000 ft., and the greatest altitude reached was 33,000 ft. which is 6,000 ft. higher than that attained by any previous bomber of the United States Army Air Corps. The occupants of the bomber did not experience any discomfort during this high flying, as they wore special lightweight suits and oxygen masks, and the cabin was heated.

In the neighbourhood of Ohio the new aeroplane attained the very high speed of 376 m.p.h., and the average for the flight was about 260 m.p.h.

The "Flying Fortress" is a striking contrast to the first aeroplane acquired by the Corps, a single-engined Wright Bros. biplane delivered in 1909. The Boeing machine is 55 times heavier and 160 times more powerful than the Wright biplane, and its gross weight is about 22 short tons, as compared with the 800 lb. of the earlier machine. The four-cylinder water-cooled engine in the biplane developed only 25 h.p., whereas the four powerful Wright "Cyclones" of the new bomber develop a total of 4,000 h.p.

New Fairey Aircraft for Fleet Air Arm

The Fairey "Albacore," a new type of torpedo-spotter-reconnaissance aeroplane is now in production for the Fleet Air Arm. It is a single-engined biplane of 50 ft. span, and carries a crew of three. Either a fixed undercarriage for take-offs from the deck of an aircraft-carrier, or twin floats to convert the machine into a seaplane can be fitted.

* * * *

A test house for airscrews that is believed to be the first of its kind in this country has been erected at the de Havilland aircraft company's works at Hatfield. In this building full-scale tests of Hydromatic full-feathering airscrews fitted to Bristol "Mercury" and Rolls-Royce engines have been carried out.

Railway Air Services Pass Fifth Birthday

On 19th August last Railway Air Services completed five years' working of their services between England, Scotland and Northern Ireland. Since the introduction of these services the company's aircraft have flown 2,000,000 miles and have carried 25,000 passengers without a single injury, and in addition have transported over 750 tons of mail and freight.

One of the best known R.A.S. pilots, Capt. R. H. Soundy, has done about 3,000 flying hrs. with the company. He has had an adventurous career, and has been in turn farmer, power station operator and flying instructor. He has served with the Royal Canadian Air Force, and, in his own words, "whether flying in the frozen North of Canada in a plane fitted with skis or making my now regular journeys between London and Glasgow, I'm never happier than when I'm in the air."

Lockheed Complete Trans-Canada Contract

The Lockheed Aircraft Corporation, of California, U.S.A., have completed delivery of the aircraft ordered by Trans-Canada Air Lines and costing a total of £100,000. There are now 15 Lockheed 14 type monoplanes in service over the Trans-Canada air route. At present this passenger-carrying line extends only from Vancouver to Winnipeg, but it will shortly reach to Moncton, N.B. It will then be 2,839 miles long and will cross seven Canadian provinces.

* * * *

A giant six-engined air liner to carry 64 passengers and a crew of eight has been built in Soviet Russia.

Douglas DC-4 Air Liners Ordered

After testing very thoroughly the prototype Douglas DC-4 air liner, United Air Lines, a big American air transport company have ordered six of these huge aircraft. They are to be of the 52-seater sleeper type, with supercharged cabins for high flying, and they will be flown at 15,000 ft. at a cruising speed of 191 m.p.h.

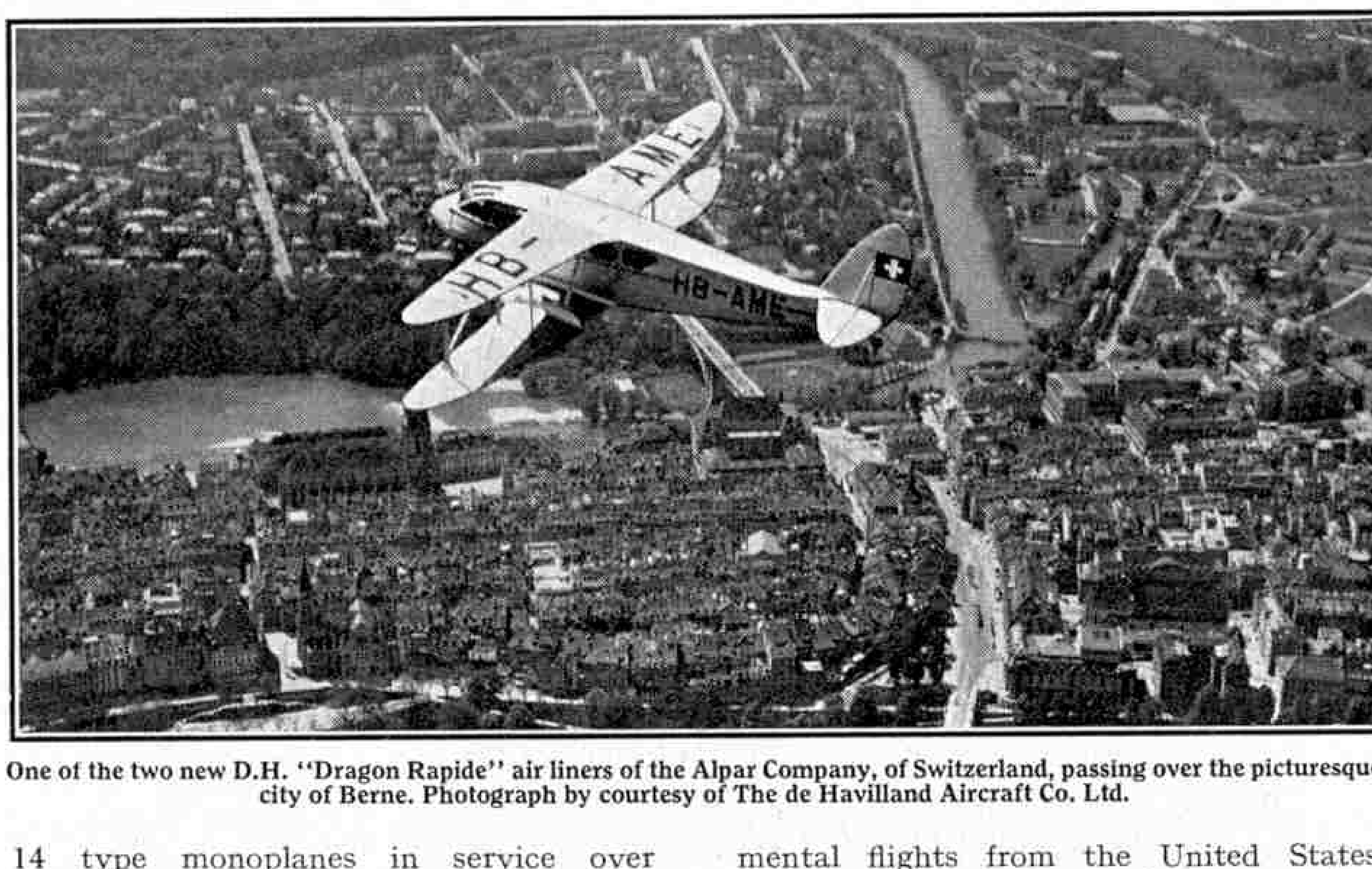
The first Douglas DC-4 built has been bought by the Japan Air Transport Line. This machine is the day version, with seating for 42 passengers.

An American Altitude Record

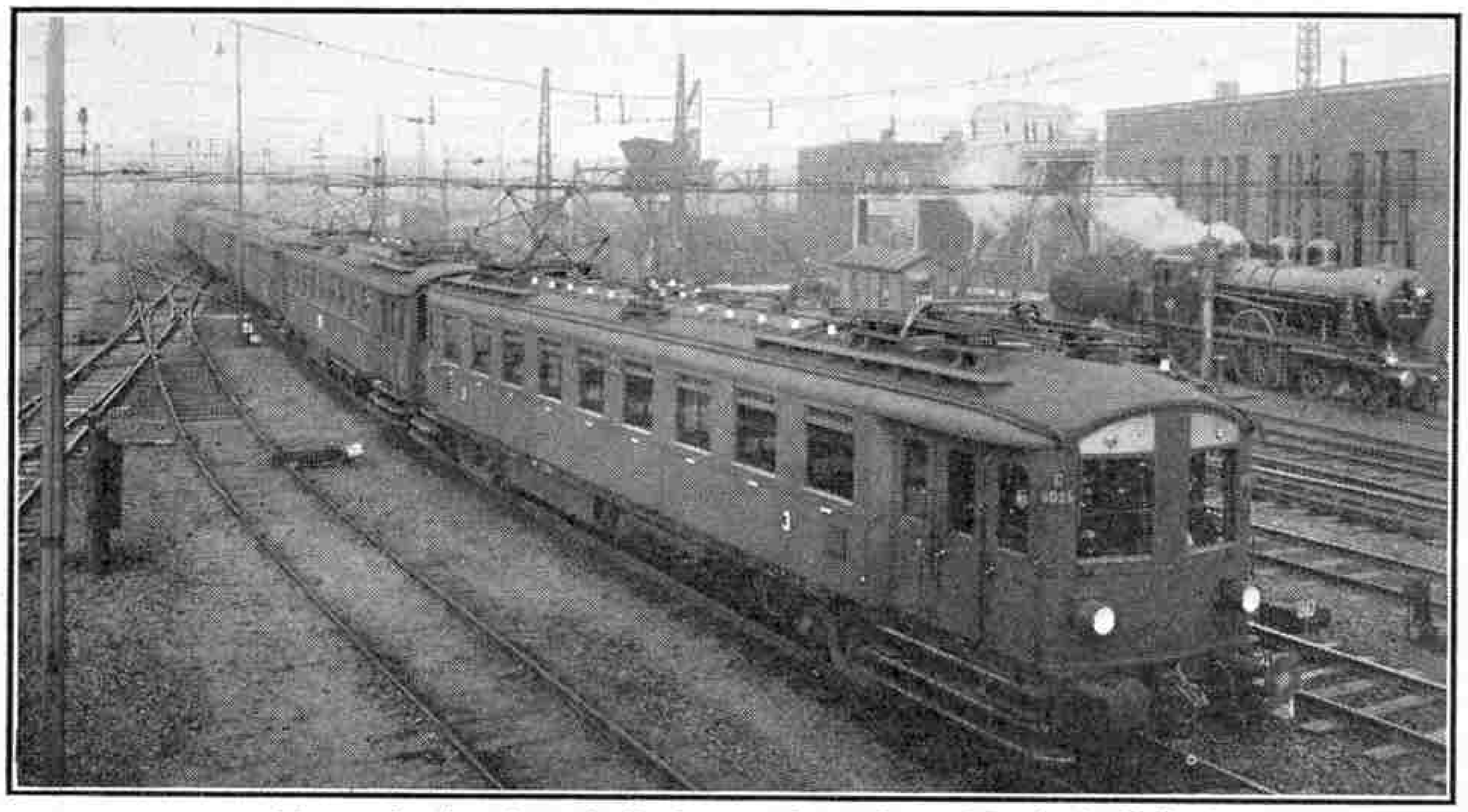
During the International Soaring Contest held on Harris Hill, Elmina, U.S.A., this summer, a new American altitude record was achieved by Lieut. R. Stanley. Flying in his sailplane "*Nomad*" he climbed to a height of 17,264 ft. The "*Nomad*" is of metal, stressed-skin construction, with the two halves of the wide tailplane canted upward about 45 deg. The elevators, operating through differential control, act as both elevators and rudders.

* * * *

During July last American Export Air Lines Inc., carried out three experimental flights from the United States to Europe and back, in preparation for their proposed transatlantic service. The flights were made with the Consolidated twin-engined flying boat purchased earlier in the year. This 15-ton high wing aircraft is the first of its type to be built for commercial service. It has a top speed of over 200 m.p.h. at a height of 8,000 ft., and has a range of 4,000 miles, with full load.



One of the two new D.H. "Dragon Rapide" air liners of the Alpar Company, of Switzerland, passing over the picturesque city of Berne. Photograph by courtesy of The de Havilland Aircraft Co. Ltd.



A heavy electric train on the line between Amsterdam and Dordrecht, Holland.

A Hundred Years of Railways in Holland

By J. I. Dorgelo

IN spite of the relatively frequent occurrence just now of railway centenaries special interest is attached to the celebration of 100 years' service of the railways of Holland. The first train in that country ran between Amsterdam and Haarlem on Friday, 20th September 1839, but before that event the pioneer Holland Iron Railway Company had had very many difficulties to overcome. Even the King of Holland enquired "Why a railway when a good canal connects these two cities?" In spite of this, and other troubles, the company in 1836 obtained a concession for operating a railway between Amsterdam and Haarlem, and after three years of hard work everything was ready.

The line was opened with great festivities. At one o'clock the authorities arrived at the decorated station at Amsterdam, and after a short time the train departed. This consisted of nine coaches, hauled by two engines named respectively "*Snelheid*," which means speed, and "*Arend*," or eagle. In one of the coaches was a military band that played several numbers during the trip. Haarlem was reached after a journey of half an hour, so that the average speed over the distance of about 10 miles was 20 m.p.h. The military band that had played several numbers during the trip then gave a short concert, after which the return began. This journey also took half an hour, and on their arrival at Amsterdam the passengers were entertained to the usual lunch. So the first railway in Holland was opened. Public use of this new method of transport did not commence until some days later, but people must have liked the first experience, for the trains consisted of 24 coaches each and were hauled by two locomotives.

The heaviest engine in service on the railways of Holland.

The watchword of the Dutch railways has always been "*Safety First*." On the Holland Railway were 21 watchmen, one of whose duties was to prevent children from playing on the line. In the statutes of the company one could read: "The watchmen are obliged to be on their post at least an hour before the departure of the first train, and they may only leave it a quarter of an hour after the passage of the last train. For every broken rail, not advised to headquarters, they will get no pay for eight days if no accident happens by their neglect; should an accident occur, they will get a punishment directly proportional to the result of the accident."

In 1840 the company obtained a concession to extend the track to Rotterdam. This task was carried out in three parts, and the last section was ready in 1847. The completion of this extension was made very difficult by the bad condition of the ground. As an instance, an embankment raised to correct level in the evening had by the next morning sunk many feet. Another difficulty was that many landowners were unwilling to sell their land to the railway company, although after much discussion most of them consented. A certain van der Gaag remained obstinate; so the company made the track with a curve around his property and the line was completed. The trains had been running for four days, when van der Gaag came to the company and said "I want to sell my fields." That very night the track was laid over his ground!

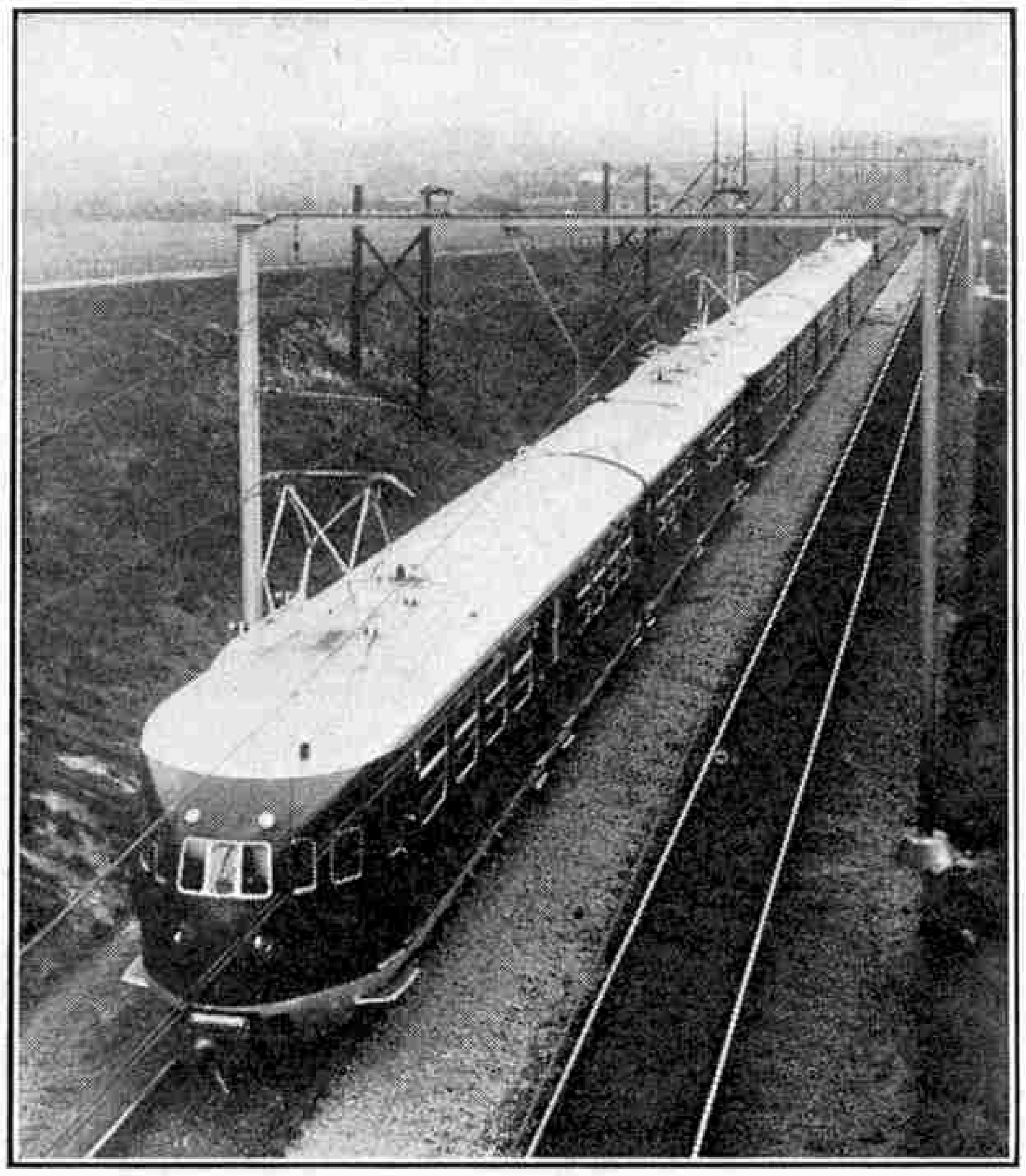
In the beginning freight was not carried. In a book written in these early railway days appeared the sentence: "It is very difficult in Holland to place the stations in such situations that they cannot be reached by any ship, but the projector has performed this masterpiece." This sentence proves how great was the antipathy to the carriage of freight by rail, but in 1853 the company decided to try freight-train running. This first attempt did not succeed, but the trials were continued, and now the freight trains are very important. Holland is the only country in the world where the passenger-carrying business surpasses the freight transport.

Expansion continued for the first 50 years or so of the existence of Dutch railways, but after 1889 little more could be done in this direction because Holland was too small! In that year the railway to Zandvoort, a well-known bathing-place, was completed. Various little extensions have been made since that date, but the principal connections were finished in 1889.

The success of the Holland Railway Company prompted the formation of other systems. The first of these was the "*Rhynspoor*," or Dutch Rhenish Railway, which has a strong English backing and exploited the Amsterdam-Utrecht-Arnhem route. The lines of both these companies were originally of broad gauge, but were converted to standard gauge, the track of the Holland Railway in 1864–6 and that of the Dutch Rhenish Railway earlier, in the 1850s. In 1863 two more railway companies were formed. These were the Maatschappy tot Exploitie van Staatsspoorwegen or Company for Working the Dutch State Railways, and the Nederlandsche Centraal Spoorweg Maatschappy, or Netherlands Central Railway Company. Connection with Germany was made via Boxtel, Wesel and Emmerich by the North Brabant German Railway, a line that was promoted with the idea of providing a shorter route via Flushing into Germany for mail traffic from England than was afforded by the Ostend route. The first section was opened in 1873 and the Zeeland Steamship Company steamers commenced running between Flushing and Queenborough in 1878, the last section of the line being completed in the same year.

In 1921 the different companies were combined in one concern under the title Nederlandsche Spoorwegen, or Netherlands Railways. All engines, which up to then had been finished in different colours, brown, green, blue and so on, were then painted in the same colour, green. At the present time engines, coaches, vans and electric trains are green.

In the beginning the trains ran only slowly and they followed each other at fairly long intervals, so that it was not necessary to use mechanically operated signals. Flags and lamps handled by men were then considered sufficient. They were used to warn the watchmen previously referred to, and the staffs at level-crossings, when a train was approaching. About 1860 the electric telegraph and electric bells were introduced, so the flags and lamps were abolished. Soon trains began to run faster and more frequently, and it became necessary to have a good system of signals for them. Between 1860 and 1863 signals were placed along the railways. Each company had different signals; some had discs that were turned round, and one had signals of the kind used in England. They were of course provided with lamps for night working.



One of the streamlined electric trains introduced into service in 1938.

At present all signals are uniform. The home signals have a straight arm with a disc formed on the outer end; one side is painted red, the other side black and white. The semaphores are horizontal when in the "danger" position; in the "line clear" position they move upward in the usual manner of upper-quadrant signals. The distant signals have no disc on the arm and in the "warning" position the arm slopes downward like a lower-quadrant signal, but moves upward to show "line clear." In a sense therefore they represent a combination of upper-quadrant and lower-quadrant ideas. At night a red light indicates "danger" and green means "line clear." A distant signal in the "warning" position displays a yellow light; originally this was green and the "line clear" indication on both types of signal was shown by a white light. As the trains in Holland usually keep to the right the signals are on the right hand side of the line.

Locomotive progress in Holland has been very interesting. The first engines on the Holland Railway were of the type shown in the lower illustration on this page. A reproduction of the *"Arend"* was prepared recently for a film made in connection with the centenary, and also was shown in the special centenary exhibition during September. The first engines were British-built, but for many years locomotives made in Germany were the rule on the Holland line.

British locomotive traditions flourished on the State and Rhenish lines, however, and are still in evidence to-day. The copper-capped chimney once so popular, and, even more rare, the polished brass dome cover, are both still to be found in Holland. Locomotive building in the country itself started as early as 1840 and in more recent times the "Werkspoor" concern at Amsterdam has become well known for its locomotive products.

From the single-wheeler 2–2–2 of the early days, design progressed through the 2–4–0 and 4–4–0 stages to the 4–4–2, the latter rather remarkably with inside cylinders and outside frames and cranks, and to the modern 4–6–0 with four cylinders, all driving on the leading coupled axle. The latest engines, which first appeared in 1929, represent a development of an earlier series built from 1911 to 1913. These are the heaviest passenger locomotives in service and they deal with the fast long-distance trains, particularly those of an international character.

Engines of the 2–8–0 type and some 4–8–4 tanks for freight work have also been introduced since the formation of the Netherlands Railways. They are particularly associated with the Limburg coal traffic and can haul very heavy trains. Some years ago six of the 4–6–0 engines were provided with streamlined casings and results of this experiment have been very favourable. For shunting small "locomotors" powered by a Diesel engine are in use.

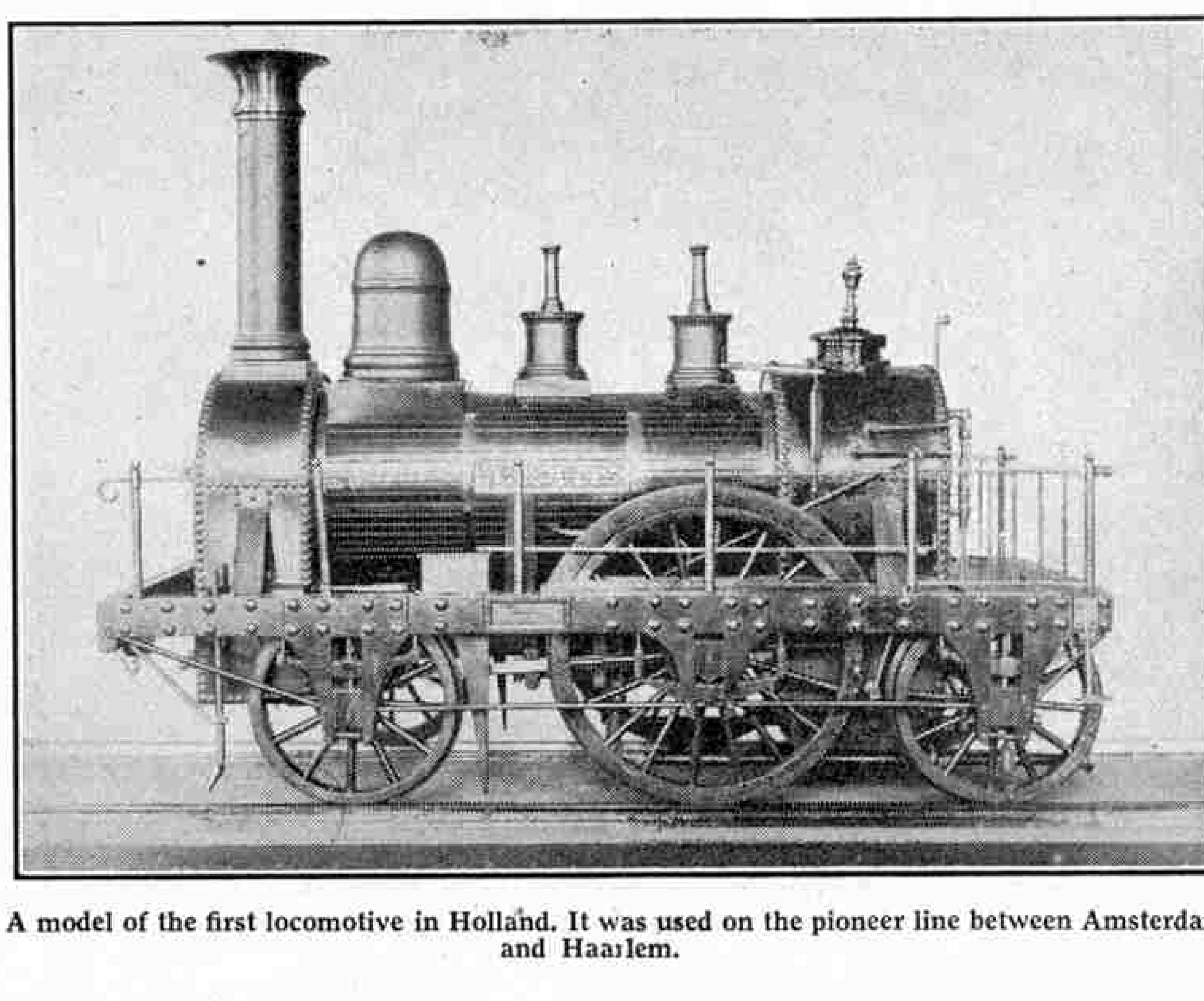
Electrification has progressed in Holland, as elsewhere, and early in the present century the line between The Hague and Rotterdam was electrified. All electric railways in Holland use the overhead wire system. This first electric railway was equipped with quite modern material, but the trains could not run at their top speed, because the earth formation below the line was much too soft.

About 12 years ago the track between Amsterdam and Rotterdam was electrified, and this was followed by the electrification of the connections between Amsterdam and Alkmaar, Rotterdam and Dordrecht, and Rotterdam and the Hook of Holland, the boat train centre for English traffic. Last year all the connections from Utrecht to the principal towns, that is The Hague, Rotterdam, Eindhoven, Arnhem and Amsterdam, were electrified.

The trains on these routes are not hauled by electric locomotives. They are arranged on the "multiple-unit" system, with one or more cars fitted with motor bogies, controlled from either end of the train. The earlier electric trains are rather heavy, but they are suitable for the very intensive passenger transport on the Amsterdam–Dordrecht line. They are too heavy and slow for the longer lines with less heavy traffic, however, and in 1935 the company therefore put lighter and faster streamlined trains into service on the Rotterdam-Hook of Holland line. These trains each have four 225 h.p. motors. They were found satisfactory, so much so that in 1938 the newly-electrified sections of the railways were equipped with them. Two formations are used, some units consisting of two coaches and others of three coaches.

The three-coach units are about 245 ft. long and accommodate 292 passengers. The two-coach units carry 200 persons. The units are rarely seen alone; almost always trains consist of both kinds coupled together. The coaches have been constructed entirely of metal, and in service their maximum speed is about 63 m.p.h. There is a large reserve of power, so that there is a fair chance of time lost by slacks and signal checks being made up. At each end of the train there is a motorman's compartment, in which are all the usual instruments and handles for controlling the train. Among the devices is a pilot lamp, which shows a light whenever a bogie is braked. The main controller is provided with a "dead man's handle."

A reader's article and a further photograph dealing with this centenary appear on page 589.



A model of the first locomotive in Holland. It was used on the pioneer line between Amsterdam and Haarlem.

SHIPPING NEWS

First British Oil-Burning Trawler

The illustration at the foot of this page shows the steam trawler *"Akita,"* built by Cochrane and Sons Ltd., at Selby, for Neale and West Ltd., Cardiff. The *"Akita"* burns oil fuel, and is said to be the first trawler built or owned in this country to have this feature. She has the characteristic lines of fishing vessels of her type, with a raised forecastle, slightly raised quarter-deck, raked stem, cruiser stern and tubular steel masts. Forward is the fish room, which is insulated by compressed cork slabs, while the machinery is installed aft.

The length between perpendiculars is 127½ ft., and the displacement 464 tons. Propelling machinery of the triple-expansion type is fitted, steam being supplied by a multi-tube boiler working at a pressure of 200 lb. per sq. in. The Wallsend-Howden pressure system of oil burning is used, and the oil fuel is carried in three separate tanks of 145 tons total capacity.

The *"Akita"* attained a speed of 11½ knots when on trial in June.

America's Largest Liner Launched

A new United States Lines' transatlantic passenger liner is being built by the Newport News Shipbuilding and Dry Dock Co. She was launched on 31st August and named *"America."*

The *"America"* is the largest liner so far constructed in the United States, having a length of 723 ft., a beam of 93 ft. 3 in., and a displacement of about 34,000 tons. Accommodation will be provided for 1,219 passengers, and a crew of 639 will be carried. Every precaution has been taken as regards general safety and fire-prevention, and extensive air-conditioning equipment is being installed.

The vessel is expected to be ready next spring, when she will join the *"Manhattan"* and *"Washington"* on the run between New York, Cobh, Plymouth or Southampton, Havre and Hamburg.

"Queen Elizabeth" in Service

Fitting out work on the Cunard White Star liner *"Queen Elizabeth"* is well up to schedule, and possibly in advance of it, and the vessel may be ready to leave the yard of John Brown and Co. Ltd. at Clydebank in February next year to run her trials, instead of in March as originally intended.

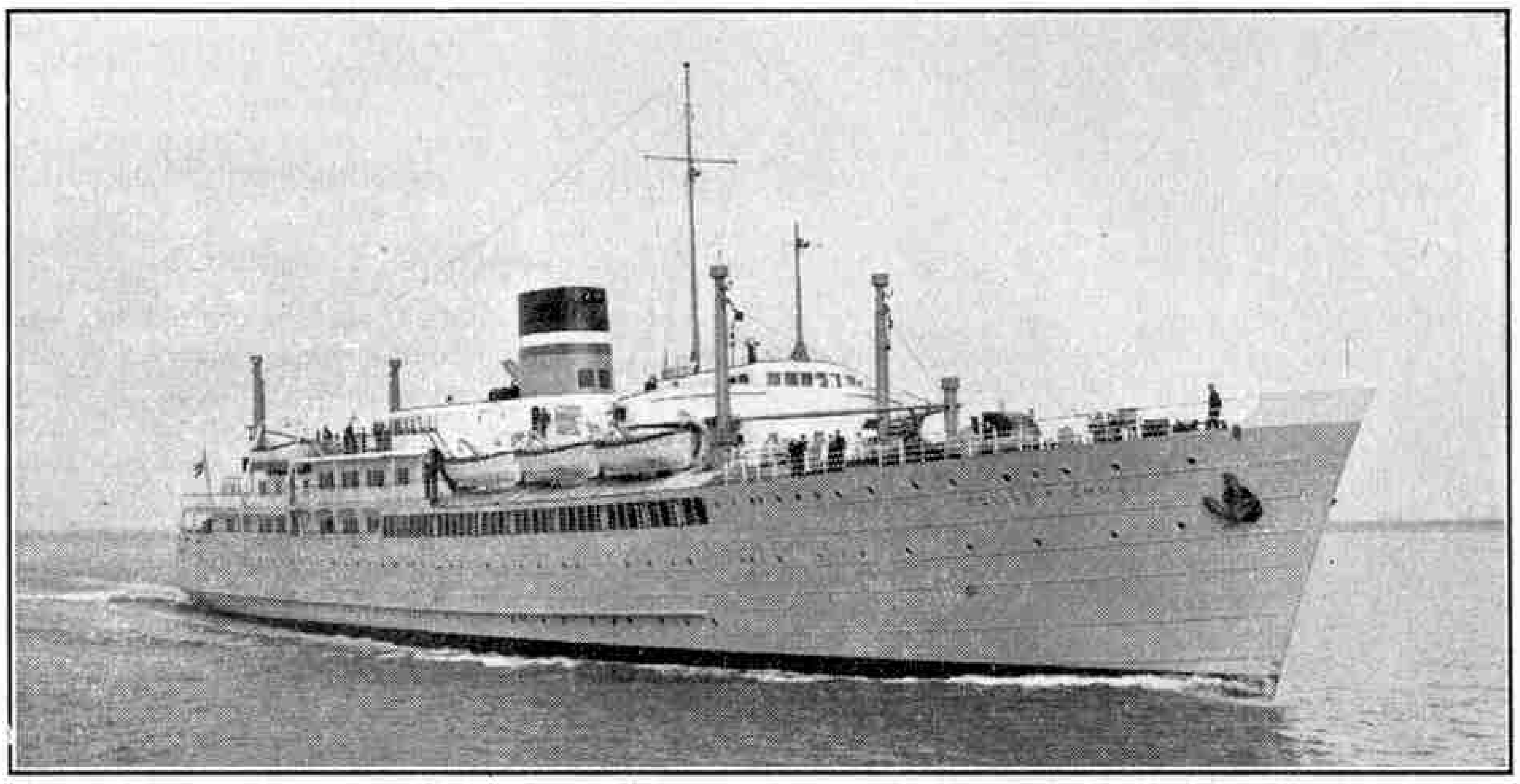
There seems to be no reason why the *"Queen Elizabeth"* should not pass safely out into the Firth in the earlier month, as during both February and March the highest tides of the spring will be recorded. The navigation channel between Clydebank and Port Glasgow has been dredged and widened since the *"Queen Mary"* was taken down the river in 1936, and extensive dredging operations are in progress on the lower reaches. A survey of the channel is now being made.

The *"Queen Elizabeth"* will sail from Southampton on 24th April.

Streamlined Cross-Channel Ships

Two interesting additions to the fleet of the Zeeland Steamship Company, who operate services between this country and Holland, are the sister-motorships *"Koningin Emma"* and *"Prinses Beatrix,"* the former of which is shown in the upper illustration on this page. These smart vessels have been specially designed and built for the Flushing–Harwich service by N. V. Koninklijke Maatschappij "De Schelde," of Vlissingen, and they are also suitable for summer cruises in European Waters.

As both vessels are similar we give a description of the one illustrated. The *"Koningin Emma"* will be seen to be extensively streamlined, giving an appearance widely differing from that of other cross-Channel ships, but an important saving in the power required for propulsion has resulted. The overall length of the vessel is 380 ft., and the gross tonnage is 4,135. A total of about 1,800 passengers can be carried, and garage space for 25 cars is provided, while further space can be allotted if required. The propelling machinery comprises two sets of Schelde-Sulzer single-acting, two-stroke engines, which have a total shaft horse-power of 12,500, and give the vessel a speed of about 23 knots.

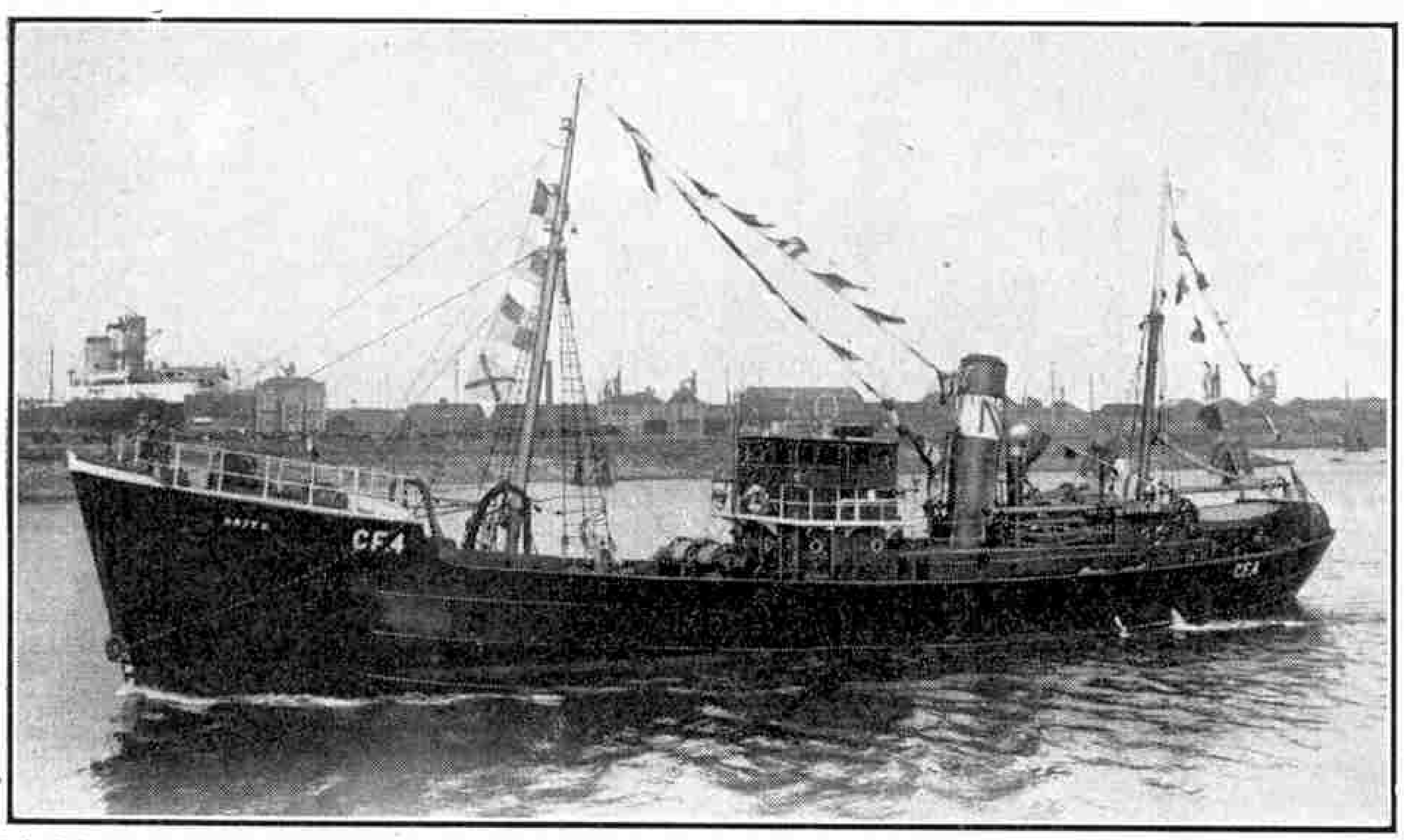


The twin-screw motorship "Koningin Emma," built for the passenger service between Flushing and Harwich. Photograph by courtesy of the builders, N. V. Koninklijke Maatschappij "De Schelde," Vlissingen, Holland.

British Warship Construction

The British Admiralty has placed orders for eight destroyers of the "L" class to be built under the 1939 Programme. Three firms on the Clyde—Scott's Shipbuilding and Engineering Co. Ltd., of Greenock, Alexander Stephen and Sons Ltd., of Linthouse, Govan, and the Fairfield Shipbuilding and Engineering Company Ltd., also of Govan—are each responsible for two vessels, while the Parsons Marine Steam Turbine Company Ltd. are to provide the machinery and equipment for the remaining two ships, the hulls being constructed by Vickers-Armstrongs Ltd., at their naval yard at High Walker-on-Tyne.

The "L" class destroyers are the largest under construction for the Royal Navy, for their displacement of 1,950 tons is some 100 tons greater than those of the "Tribal" class. The propelling machinery will consist of geared turbines taking steam from high-pressure Admiralty-type boilers, and the designed output will be about 45,000 s.h.p., which should give the vessels a maximum speed of over 36 knots.



Britain's first oil-fired trawler, the steamship "Akita," built at Selby by Cochrane and Sons Ltd., by courtesy of whom this photograph is reproduced.

Cruiser Launched on the Mersey

The lower illustration on this page shows the cruiser H.M.S. *"Dido"* being towed to the fitting-out berth after her launch at the Birkenhead yard of Cammell Laird and Co. Ltd. on 18th July. The naming ceremony was performed by Lady Caird. The *"Dido"* is now alongside the battleship *"Prince of Wales"* in the wet basin. An unusual feature of construction was the fitting of the funnel prior to the launch.

H.M.S. *"Dido"* is leader of a new class of cruiser comprising five vessels, the remaining four being under construction in other British yards. The standard displacement is 5,450 tons, and 5.25 in. guns will be carried. All vessels of this class were laid down in October 1937.

Sir Malcolm Does It Again!

For the third year in succession Sir Malcolm Campbell has broken the world's water speed record. In September 1937 on Lake Locarno he increased Gar Wood's record of five year's standing by nearly 5 m.p.h. to 129.5 m.p.h. Last year Lake Hallwill was the scene of record runs at a mean speed of 130.93 m.p.h. After trying various continental waters for his record-breaking attempts, Sir Malcolm this year decided to stay at home. Bala Lake in Wales was considered, but eventually Coniston Water in the Lake District was chosen for the attempts, and a new record speed of 141.74 m.p.h. was attained.

A new hydroplane named *"Bluebird II"* was built by Vosper Ltd., Portsmouth, for the effort after the design had been carefully tested in tank and wind tunnel. The hull bottom is concave, and instead of the usual step, a hollow stabiliser is built on to the hull on each side, thus increasing the overall beam by several feet. A metal fin on the inner edge of each gives a better grip on the water. When planing at speed the boat rests on the two fins, thus presenting much less surface resistance to the water than would be the case with a step running right across the beam. Aft of the stabilisers the hull is narrowed down at the bottom to a bevelled chine, the actual after planing surface thus being reduced.

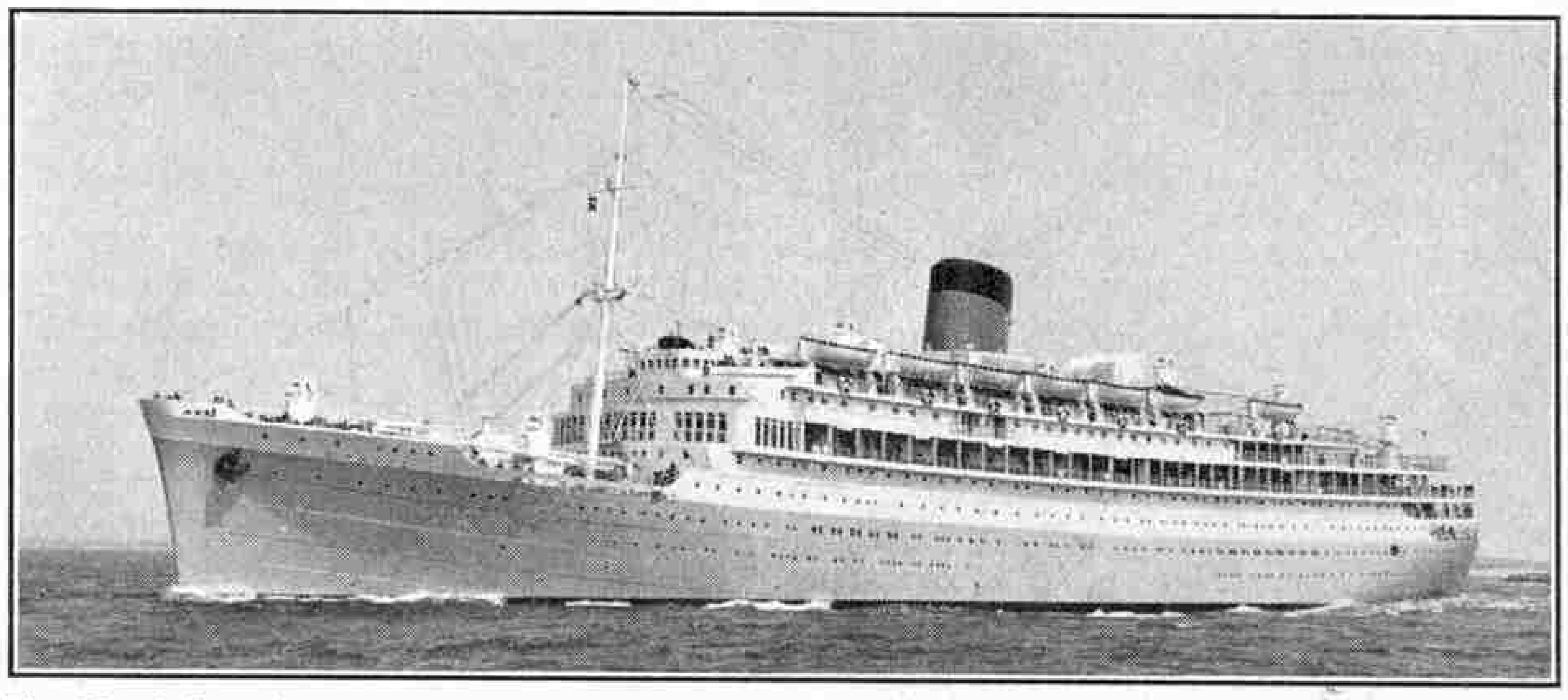
"Bluebird II" is 27 ft. long, 4 ft. more than her predecessor. Two engines were taken to Coniston Water, one a 12-year old Rolls-Royce engine of 1,760 h.p. intended for practice purposes, and the other a Rolls-Royce unit of the 12-cylinder Schneider Trophy type, which develops over 2,000 h.p. at 3,200 r.p.m., with a corresponding propeller speed of about 9,000 r.p.m. The total weight of the boat is about 2¼ tons, and she is painted a light blue.

The new boat arrived at Coniston Water on 14th August. In practice runs a maximum speed of about 110 m.p.h. was attained, and in a full rehearsal, one run was completed at 134 m.p.h. Sir Malcolm then signalled to be towed in, and improvements were made to the cooling system, which had not been working satisfactorily.

Shortly after 8 a.m. on Saturday, 19th August, *"Bluebird II"* was out ready for a real attempt. Her performance had been so good with the practice engine that this was left in. Skimming north over the measured mile, hardly seeming to touch the water, so lightly did she ride, a time of 25.2 sec. was clocked, equivalent to a speed of 142.857 m.p.h. It seemed certain then that the record would go, and there was great excitement as *"Bluebird II"* quickly turned round and in a few seconds shot back to her starting point. Her southward run took 25.6 sec., at a speed of 140.625 m.p.h., giving a mean speed of 141.74 m.p.h., the record thus being increased by nearly 11 m.p.h.

Record Speed Claimed for New Liner

The new motorship *"Oranje,"* shown in the upper illustration on this page, completed highly successful trials in August, and left on her maiden voyage on 6th September. She made 20 runs over the measured mile off St. Abb's Head, south of the Firth of Forth, and her average maximum speed was 26.3 knots, which is considerably in excess of the contract speed of 21 knots, and is stated to be a record for motor passenger liners.

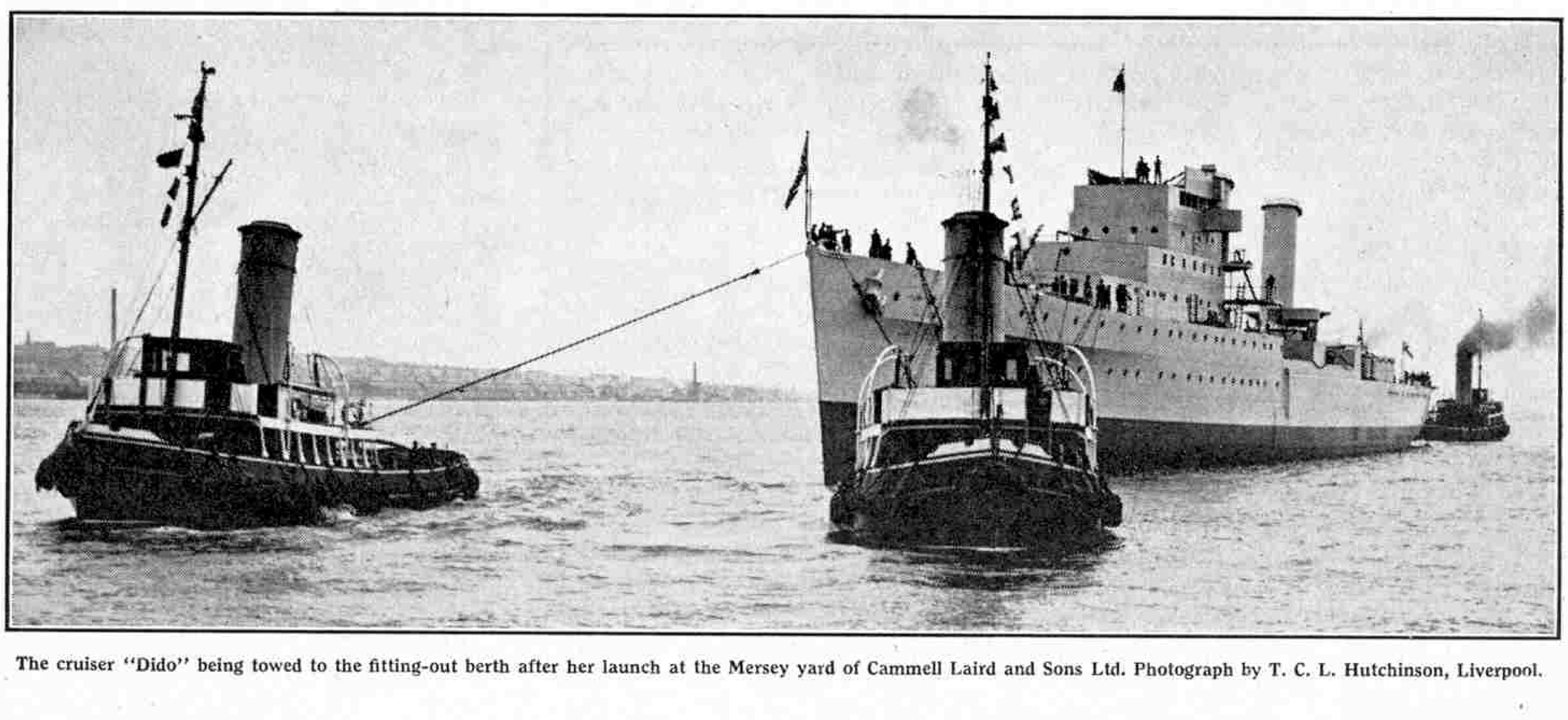


The "Oranje," the largest liner yet built at Amsterdam. This fine motorship was launched by Queen Wilhelmina. Photograph by courtesy of the Netherlands Shipbuilding Company, Amsterdam, who constructed the "Oranje."

The *"Oranje"* was constructed by the Netherlands Shipbuilding Company for the Nederland Line–Royal Dutch Mail. She is the largest vessel yet built in Amsterdam, and at her launch in September 1938 she was named by Queen Wilhelmina.

The vessel has a very pleasing appearance, the hull being painted silver-grey and the superstructure white. Her length is 656 ft., with a beam of 83½ ft., and a gross register tonnage of about 20,000. Three Sulzer Diesel engines are installed, each with an output of 12,500 b.h.p. at 145 r.p.m., and there are also five Sulzer auxiliary engines, each of 1,800 b.h.p., driving electric generators.

As the *"Oranje"* is operating on the Dutch East Indies service, on which tropical conditions are encountered, a Sulzer refrigerating plant has been installed.



The cruiser "Dido" being towed to the fitting-out berth after her launch at the Mersey yard of Cammell Laird and Sons Ltd. Photograph by T. C. L. Hutchinson, Liverpool.

The Mining of Asbestos

How this Fireproof Mineral is Produced

Drilling deep holes for blasting in an asbestos mine.

ALTHOUGH asbestos became recognised as being of industrial value only a little over 70 years ago, it was by no means unknown in ancient times. It is mentioned in Greek literature as "asbestus" meaning "indestructible," and also by Pliny, the celebrated Roman author and naturalist, and it was used in the weaving of cremation cloths, lamp wicks and other things. During Marco Polo's travels in the 13th century, he came across a fibrous substance that the natives in Siberia wove into cloth, which they whitened by putting it into a fire for an hour or so. They also cleansed the cloth in a similar manner.

Interest in this substance lapsed, and was revived again in Russia in the first half of the 18th century, but so few uses for asbestos were then known that its exploitation again became inactive until the 19th century, when mining revived both in Italy and in Quebec, Canada. Since then the asbestos industry has steadily expanded. Canada led the way in building it up, so much so, that mines in Quebec were supplying 85 per cent. of the world's requirements in 1920. Since then asbestos production has steadily increased, for the material that as late as 1860 was regarded as somewhat of a curiosity, has to-day become a major industrial necessity.

When we speak of asbestos, we refer collectively to a group of minerals which, owing to a combination of special properties, are fitted by nature to play a most important part in our everyday life. One of these properties is the heat-resisting power of the material. Another is that owing to its silky fibrous structure and, in most cases, its high tensile strength, it can be spun into thread and woven into cloth. In addition it does not decompose.

Actually there are several minerals of different chemical composition which come under the heading of "Asbestos." Of these three are specially important. One is the blue asbestos, so called on account of its colour, which is due to the presence of a high percentage of ferrous iron. The second, light-brownish to straw in colour, is known as amosite. The third is chrysotile, and it is with this that we will concern ourselves in this article. It occurs in the rock known as serpentine, and is of the same chemical composition as the rock, but is chrystallised out in the form of a beautiful silky fibrous structure.

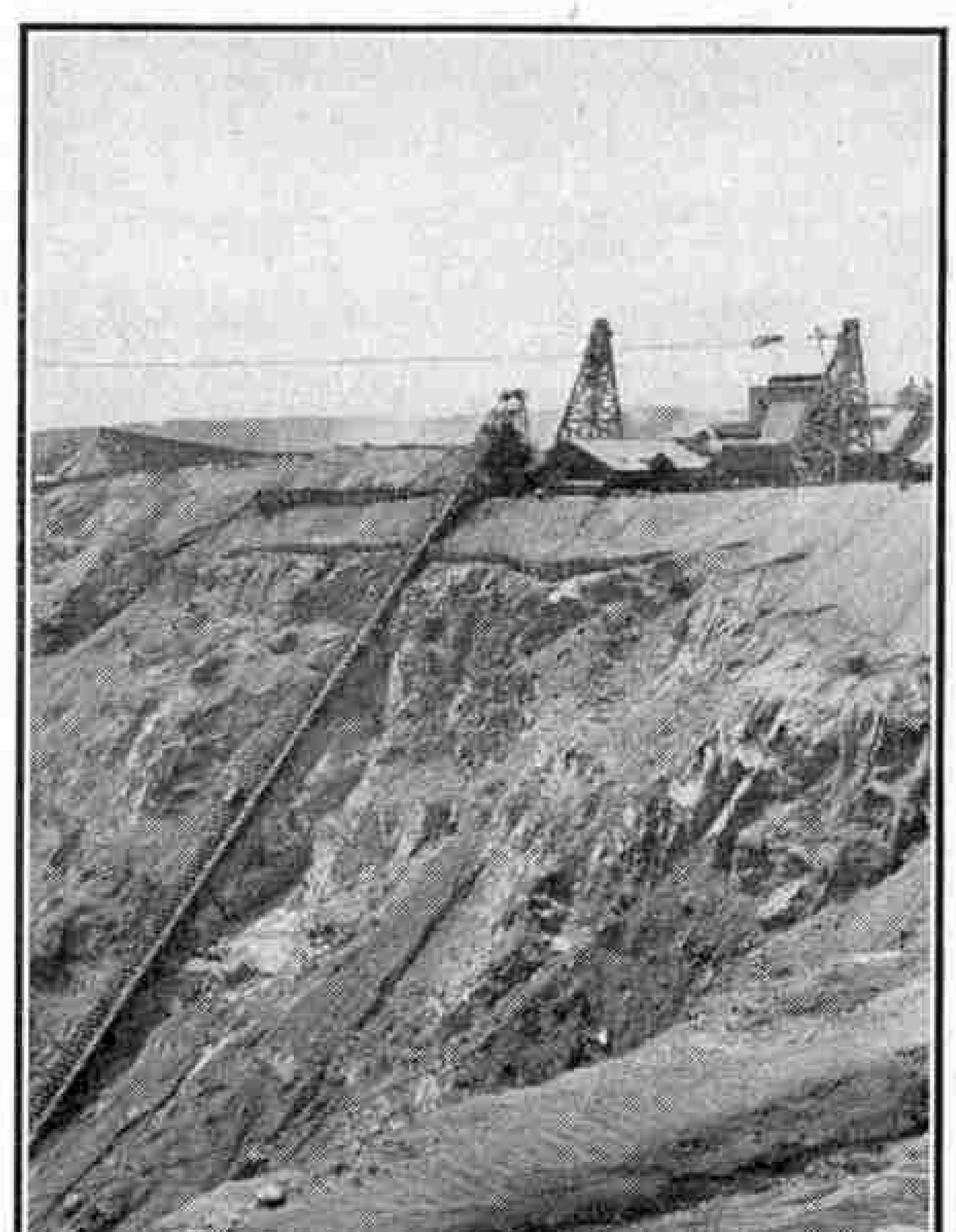
Chrysotile occurs in the form of vein fibre or slip fibre. The first has its individual fibres running at right angles to the enclosing rock walls, and ranges in width from being hardly visible to 4 in. or 5 in. Collections of these veins occur either in the form of "ribbon rock," meaning a collection of veins of varying width, running parallel with each other and spaced by serpentine rock measuring in width from $\frac{1}{8}$ in. to 12 in. or more between each layer, or in an indiscriminate collection of veins running in all directions, and either curved or straight.

Slip fibre is chrysotile asbestos lying along slip planes in the massive serpentine. It probably was vein fibre originally, and has been flattened out and matted by rock movement. Slip fibre has not the strength of the vein fibre, and is not so valuable.

Of the Canadian asbestos deposits in the Province of Quebec, the most valuable enrichments are found at Thetford Mines, 76 miles east of the historic city of Quebec, and also at East Broughton, 14 miles west of Thetford Mines, and Black Lake and Coleraine, a few miles east of Thetford Mines. There the vein fibre and slip fibre occur in different zones along the same belt of serpentine and are about 14 miles distant from each other.

As is the case in all mining history, asbestos in Canada was first discovered in surface outcroppings. These outcrops were very extensive and in some cases ran along the side of a hill, and the method of mining naturally resorted to therefore was either by quarrying or open cast pits. The rock was drilled and blasted in the same manner as is done in metalliferous mining, and the broken rock was loaded into ore carts and taken to the mills.

Later on the operations became more extensive and the mills of greater capacity. Power shovels and ore trains then replaced men and carts in the quarries, and as the open cast pits increased in depth, derrick towers had to be installed to hoist ore boxes out of the pits and convey them to the crusher buildings. The boxes were loaded either by hand or by power shovels, according to the size of operations. As an alternative

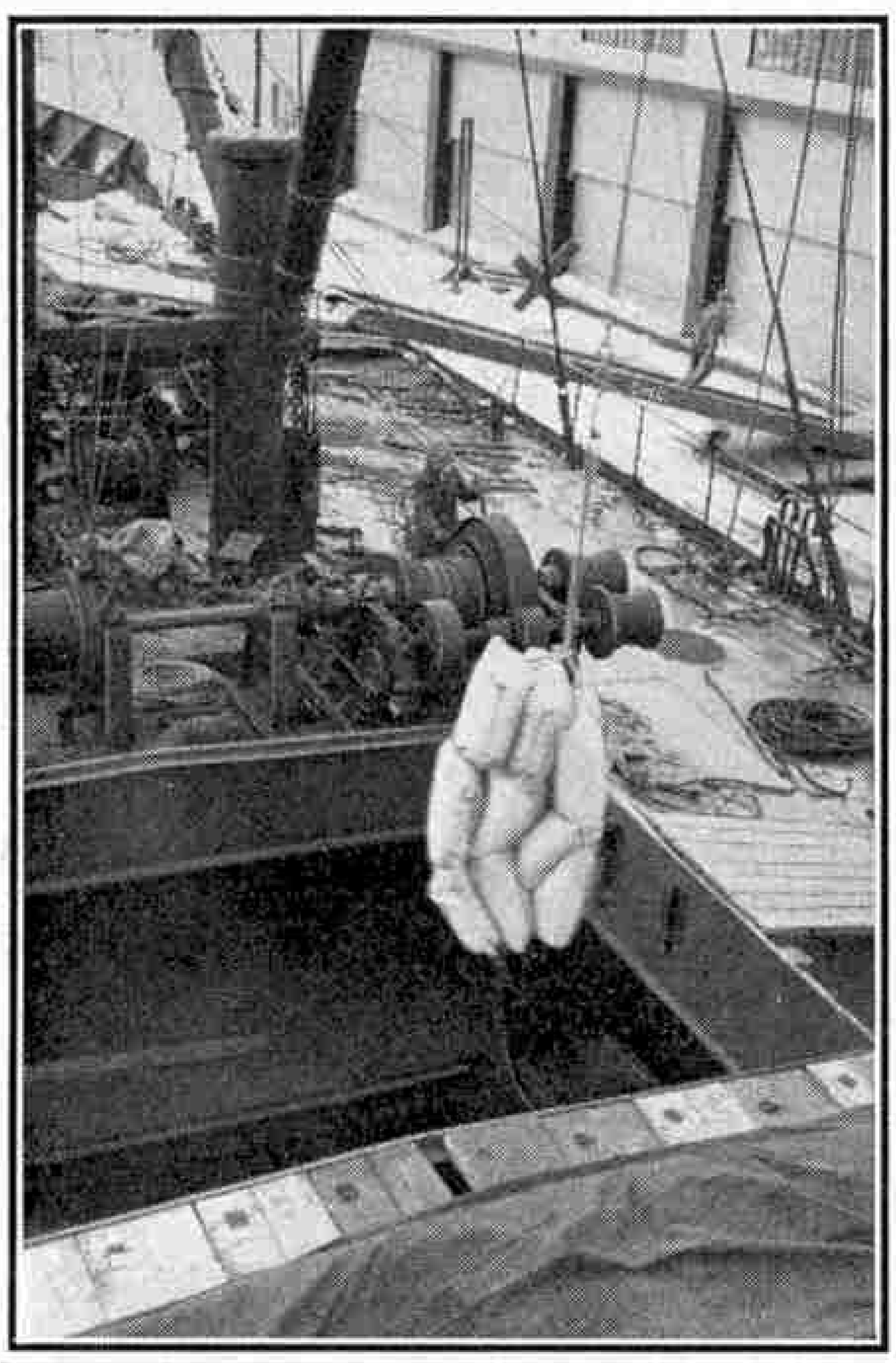


The inclined skipway that leads to the shaft of the King Asbestos Mine, Thetford, Canada. The shaft is at the bottom of an open pit 350 ft. deep.

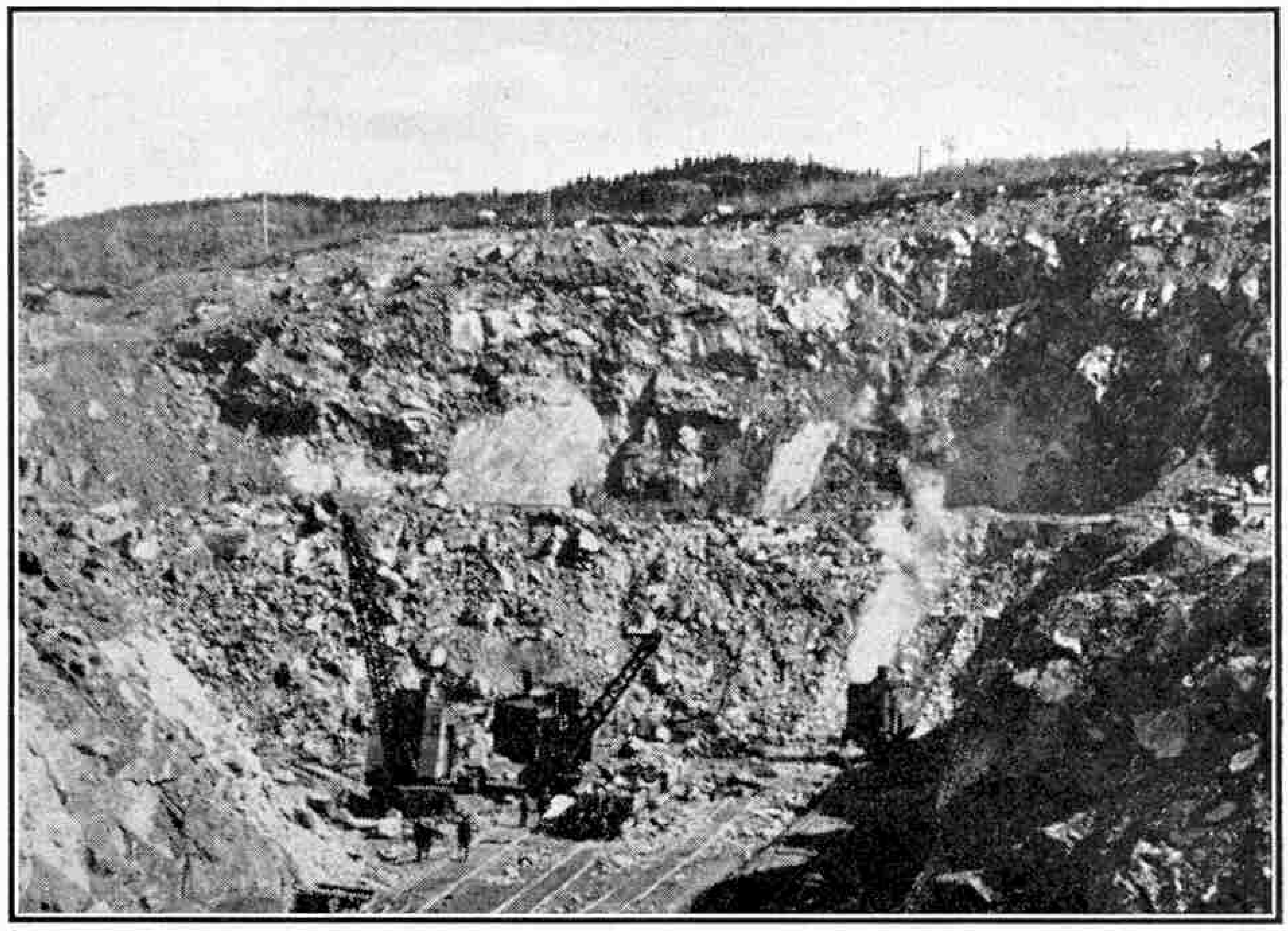
to the derrick hoists, some mines had an inclined track to the surface, built either on a trestleway or carried through an inclined tunnel, and the mine cars were pulled to the surface by winding engines.

When the depth of these open cast pits became too great, then underground methods had to be resorted to. At the King Mine, Thetford, belonging to the Asbestos Corporation Limited, the open cast pits had reached a depth of 350 ft. before underground mining was resorted to, and there to-day one can take a walk of about 15 miles in the underground galleries. The broken rock is loaded from chutes into mine cars, and the trains of these are drawn by an electric engine to the shaft station, where they automatically dump the asbestos-bearing rock into what is called the shaft loading pocket. From this pocket, skips are automatically loaded and drawn up the shaft to the crusher hoppers at the surface, where they dump the ore automatically.

An interesting feature in these underground workings is that no wood of any kind is used underground. All railway ties, timbering loading chutes, etc., are of steel, and even matches are forbidden underground, special lighters being provided at convenient intervals in the main gallery for the use of the men. The reason for these elaborate precautions is that even a small piece of wool getting into the rock would break up into small splinters during the crushing and milling processes, and finally would get into the extracted asbestos fibre, from which it could not be separated. Wood splinters in the fibre would cause considerable damage to manufactured asbestos products.



Loading bags of asbestos into the hold of a ship in the port of Quebec.



Quarrying and loading cars with asbestos ore in an open Canadian mine.

After the broken rock reaches the surface, whether from mine, open cast pit or quarry, the rock goes through a preliminary crushing, and is reduced to a maximum size of about 7 in. It is then fed on to a wide slow-moving endless conveyor belt, and the "crude," that is vein fibre of ½ in. or over in length, is picked off by experts. This crude, which is still adhering to the rock, is conveyed to sheds where the rock is broken away from it, and after a final cleaning treatment is bagged. It is the most valuable grade of asbestos.

After passing the crude pickers the rock undergoes a further crushing, when it is reduced to a maximum size of 2 in. and it is then passed through either tower dryers or revolving dryers similar to those used in cement works, in order to eliminate all surface moisture. The rock then passes into huge dry rock storage bins, and is now ready for the extraction of asbestos in the mills. A belt conveyor takes it from the storage bins over an ingenious electric weighing device which records the total tonnage of rock fed to the mill and the rate of feed in tons per hour, and so on to the top of the mill, where it works down by gravity, through the several extraction processes.

Asbestos is lighter than the serpentine rock from which it has been separated, and thus lends itself to air separation. The rock reaching the mill already has a certain amount of freed fibre, which is collected by suction hoods hung over shaking tables over which the ore passes. The rock is heavier and passes on through sets of disintegrating machines that break it down, thus freeing more asbestos, which is collected over the shaking tables, this double process continuing until no more asbestos is left in the rock.

The suction hoods are connected through collectors to powerful exhaust fans, which create a partial vacuum in the collectors, so that the hoods act like vacuum cleaners. The asbestos is lifted off the table and carried into what is known as the cyclone, in which the air sweeps round at lower speed while the asbestos settles to the bottom and is discharged on to a conveyor belt.

The asbestos passes on to the cleaning tables, where the very short fibre is screened away. It is then graded according to length, the different grades going to bins from which it is automatically bagged and weighed, finally passing on to asbestos storage sheds.

The longer grades of asbestos are mostly used in asbestos textile works, where it is transformed into woven brake linings and asbestos cloth.

We are indebted to the Asbestos Corporation, Quebec, Canada, for the information in this article and for our illustrations.

"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.

Cockatoo Island

At the head of the Paramatta River, nearly 3 miles from Sydney Harbour Bridge, lies Cockatoo Island, the largest, best-equipped and most up-to-date shipbuilding and maintenance undertaking south of the Equator. This small island in its original well-wooded state was habited by birds, and the predominance of the cockatoo, or bileola, as the local aboriginal tribes called this bird, gave rise to the name by which the island is now universally known.

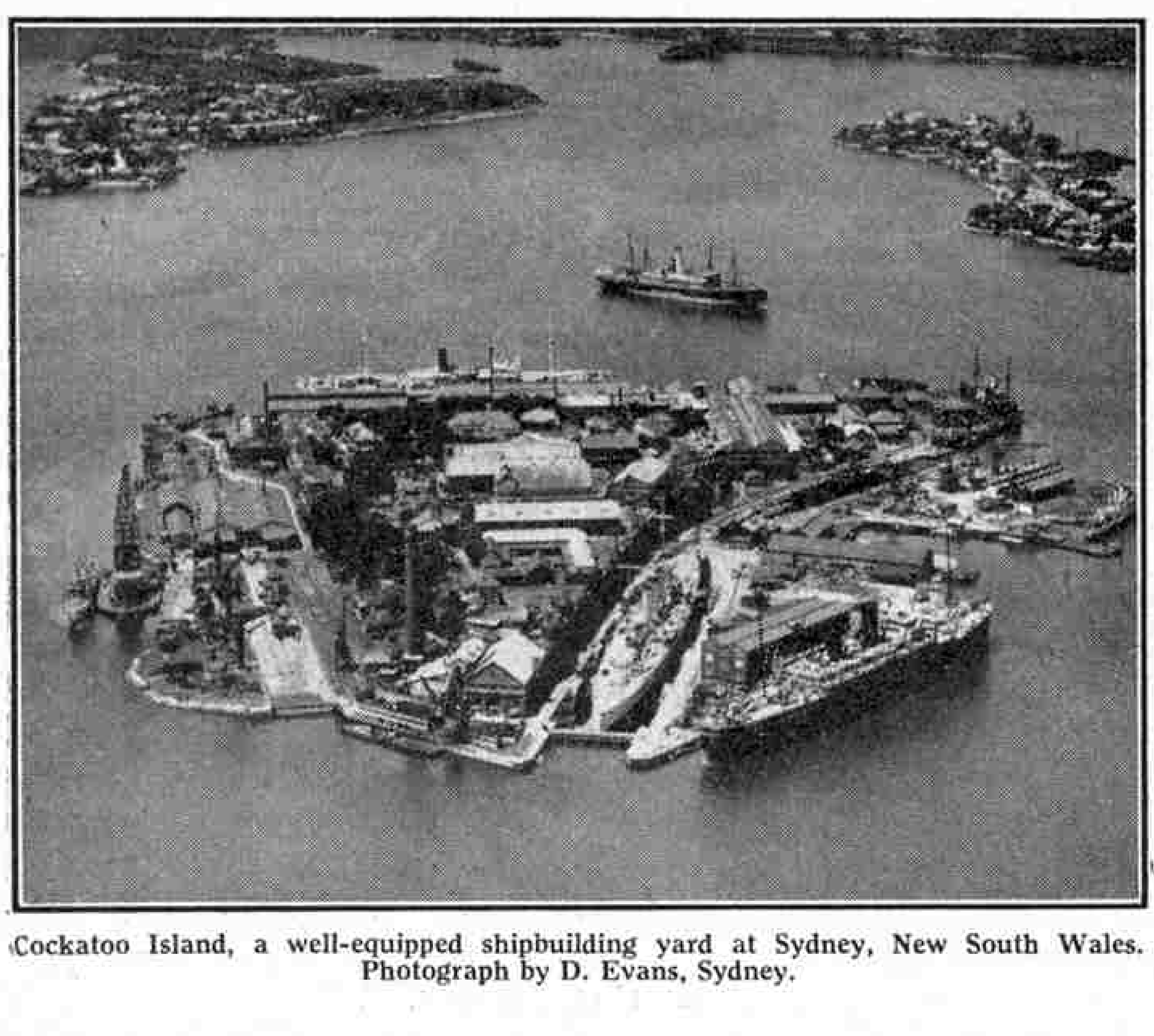
Following a suggestion made in 1845 by Governor Sir George Gipps, plans were made for the construction on the island of a dock for shipping, and the excavation work from solid rock was undertaken with convict labour in 1847. The keystone of the dock was laid in 1853, and H.M. Surveying Brig *"Herald"* was the first vessel to enter, in December 1858. When larger ships were acquired by the Colonial Government, the dock was extended, and it now has a clear length of 478 ft. with the caisson at the inner sill, and of 500 ft. with the caisson at the outer sill. The breadth at the top is 58 ft. and the depth of water 21 ft.

To keep pace with the rapid progress of the shipping industry, the construction of a larger dock was begun in 1884 and this was completed in 1890. It is known as No. 1 Dock, and has a total length of 720 ft. There is an entrance 88 ft. wide and the depth of water over the sill at high tide is about 32 ft. Both docks are equipped with electrically-driven centrifugal pumps that are capable of discharging 20,000 tons of water in an hour.

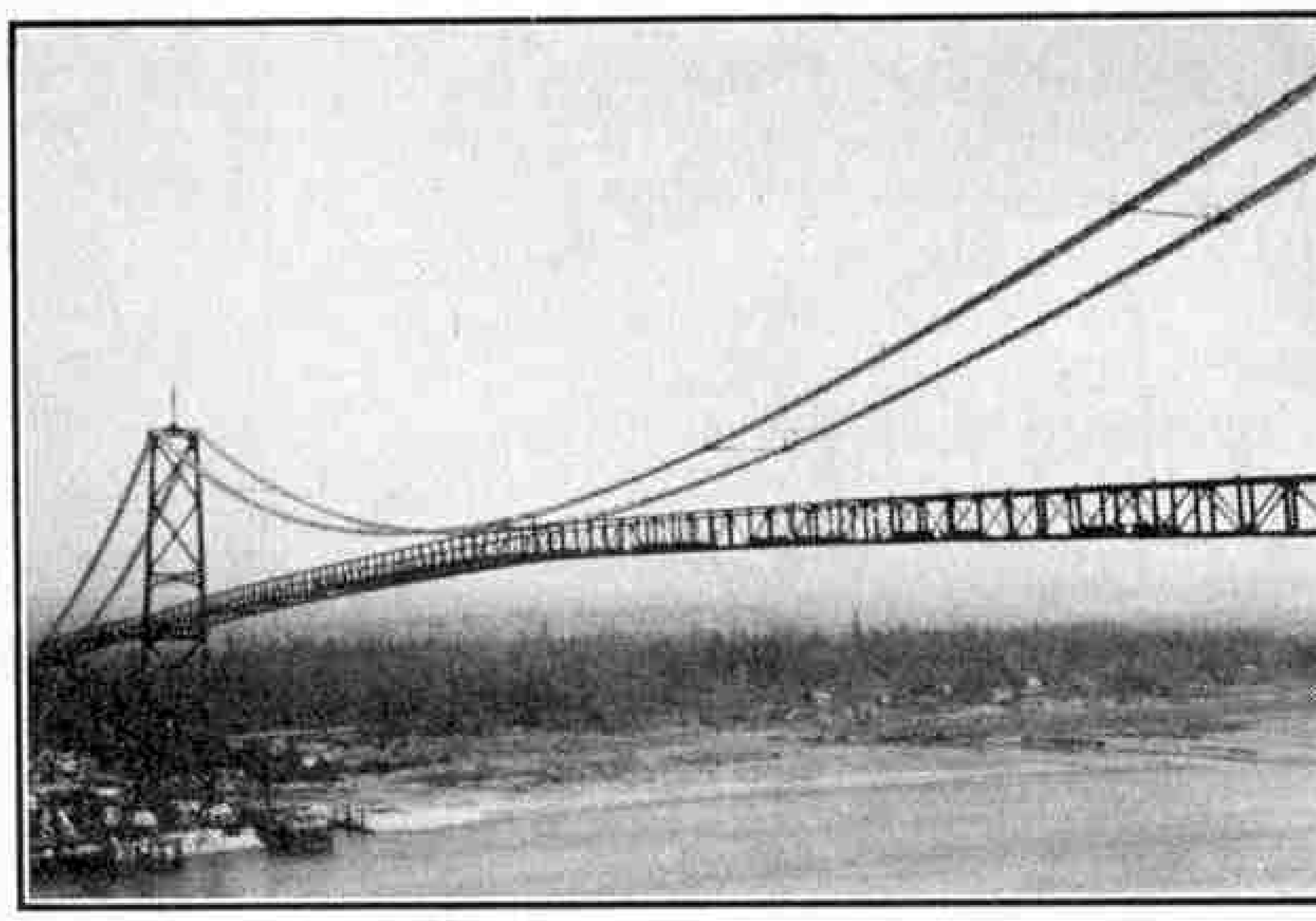
The Island became Commonwealth property in 1913, but since 1933 it has been successfully operated by private enterprise. The engineering workshops are equipped for the production of all types of machinery and structural works, and there is also a floating crane known as the *"Titan."* This has a lifting capacity of 150 tons at a radius of 90 ft., and is the largest and most powerful of its kind in the southern hemisphere.

Long ago Cockatoo Island was a convict settlement. Troops were stationed there as early as 1813, while by 1833 some 500 convicts were settled there. Although strongly guarded, one prisoner, a notorious bushranger known as "Thunderbolt," who had terrorised the Colony for years, escaped from the island in 1863, but was soon re-captured. In 1872 the island became an exclusive reformatory for women convicts, and its days as a penal settlement were finally brought to a close in the year 1908.

K. N. Allen (Oatley, N.S.W.).



Cockatoo Island, a well-equipped shipbuilding yard at Sydney, New South Wales. Photograph by D. Evans, Sydney.



The central span of the Lion's Gate Bridge, which has a length of 1,550 ft. and is the longest suspension bridge in the British Empire. Photograph by W. Grant, North Vancouver.

Empire's Longest Suspension Bridge

Late last year the First Narrows or Lion's Gate Bridge, Vancouver, the longest suspension bridge in the British Empire, was opened to traffic. It is a 10,000-ton structure, which took some $2\frac{1}{2}$ years to build, and it spans the beautiful entrance to the port of Vancouver. This entrance is known as the "Lion's Gate," because twin mountain peaks closely resembling crouching lions overlook the harbour and the city. Another name for it is the First Narrows, for at this point the shores converge.

The new suspension bridge links the northern and southern shores. On the southern side Prospect Point, a rocky cliff that towers above the giant liners that pass by it, provided a natural and solid approach. On the opposite shore is a level plain that proved sandy and unstable, however, and it was a considerable time before a solid foundation could be found. A long steel ramp had to be built on this shore, with at least 10 steel upright supports, in order to provide an easy gradient for the approach.

The towers of the bridge are 324 ft. high and the central span is 1,550 ft. long. The total length of the bridge with approaches is 5,981 ft. The roadway is 29 ft. wide, allowing for three traffic lanes, and two 4-ft. wide walks bring the total width to 37 ft. G. E. Dale (Vancouver, B.C.).

A Century of Netherlands Railways

The 100th anniversary of the first railway in Holland, from Amsterdam to Haarlem, a distance of about 22½ miles, was celebrated on 20th September. The building of this line was the beginning of a struggle against difficulties that lasted till the early years of this century, but in the last decade remarkable progress has been made.

The official celebrations of the company were centred at Amsterdam, and to mark this milestone in the railway company's annals new and improved services and important constructional works were put into operation for the first time.

The difficulties of the railway engineers' job in Holland can be understood when one realises the physical features of the country. The soil itself will not hold up buildings, which have to be founded on piles driven deep into the soil. Many strangers cannot be convinced that the great Central Station at Amsterdam is built entirely on an artificial island. The many waterways in the land also present great difficulties, and the line between Amsterdam and Rotterdam alone passes over 89 bridges and viaducts. Owing to the size of the country long-distance runs are unknown, but the trains seldom fail to keep to schedule.

Since 1908 great strides have been made with electrification, but there are still many steam locomotives doing yeoman service. The chief of these are 32 Beyer-Peacock 4–6–0s, built in 1927 and each weighing 84 tons without tender. These are the fastest locomotives possessed by the company, which also has 2,815 passenger-carrying vehicles and about 26,000 goods vans.

In 1908 an electrified line was opened between Amsterdam and the coastal resort of Scheveningen, the overhead system of collecting current being used. These trains are still in service, but the rolling stock has been entirely remodelled.

The illustration below shows one of the modern streamlined electric trains, consisting of two units, each of two coaches. There are 57 of these in service, and half-hourly services are maintained on most lines, with extra trains during rush hours in the early morning and evening. The run from Amsterdam to Rotterdam, 86 km. or about 53 miles, is covered in 69 minutes, including five stops.

The present streamlined trains were introduced as an experiment in 1936, and have been highly successful. They are beautifully appointed, and look very smart with their green-painted sides and aluminium roofs and undersides. They have centre corridors and the air is changed every three minutes.

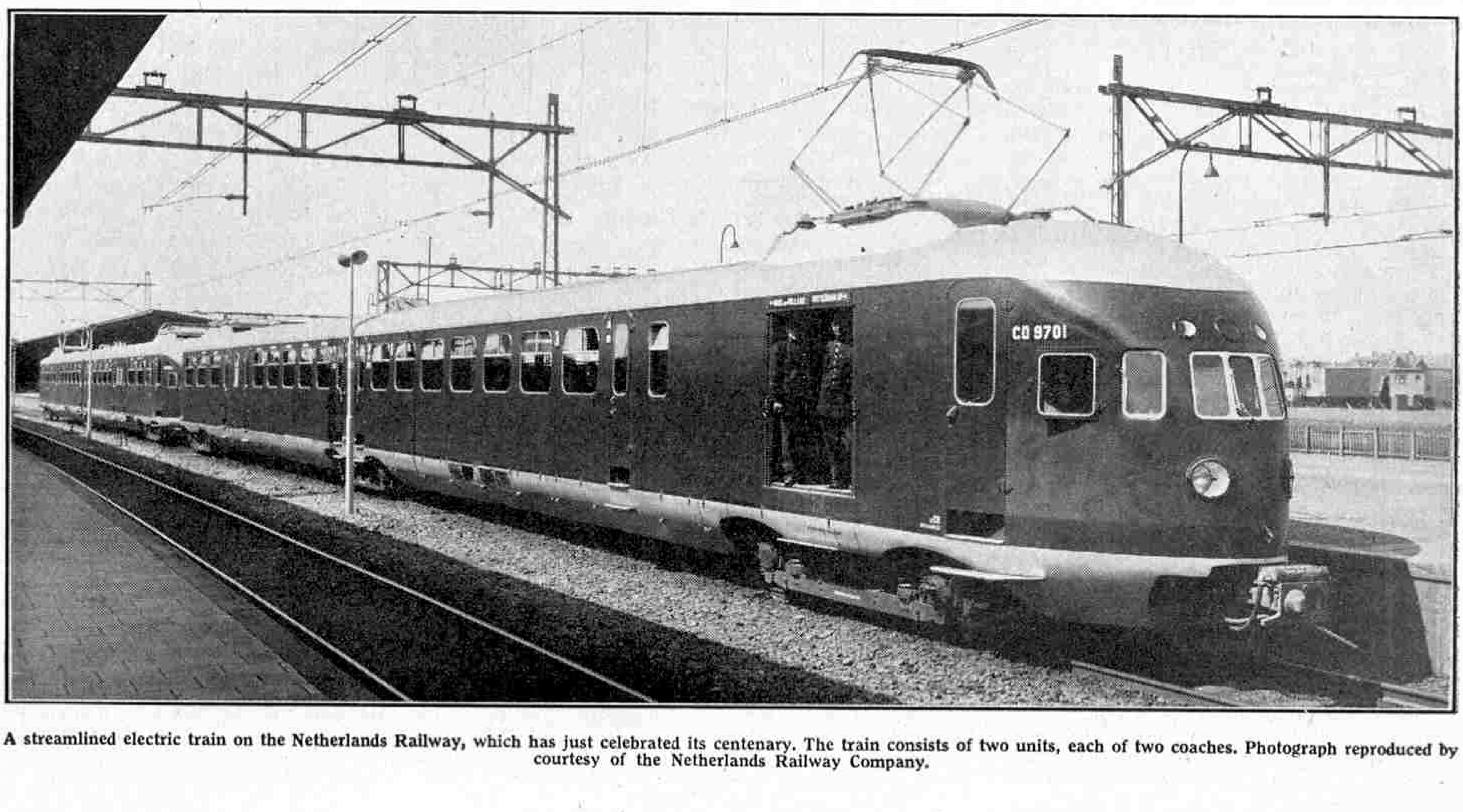
W. F. Bladergroen (The Hague).

Coaling at Brixham

I recently had the interesting experience of inspecting the collier *"London City,"* which is permanently moored in the outer harbour at Brixham. I went out on a tug, and boarded the collier to find the ship *"Nephrite"* just arriving to take coal aboard. One man was in charge of the furnaces, keeping them alight to provide steam from the boilers to work the winches and the donkey engine used for pumping water out of the bilges. This man showed me the engine room and the stokehold. The brass in the engine room is kept polished, although the ship has not been to sea for more than 20 years. Another man showed me the pilot's cabin in the stern of the vessel. I also saw the buckets used for coaling, each of which holds a ton.

The collier is connected to the shore by an underwater cable that carries a telephone wire. The *"London City"* is of about 1,000 tons, and ships up to 10,000 tons of all nationalities come alongside. When a ship is coming in to coal, the pilot is informed by telephone from either Plymouth or Southampton. An average of about 40 ships come alongside the collier each week. Once a month a ship from Newcastle or Cardiff comes to re-load her with coal, and this takes about two or three days.

G. R. McGinity (Bath).



A streamlined electric train on the Netherlands Railway, which has just celebrated its centenary. The train consists of two units, each of two coaches. Photograph reproduced by courtesy of the Netherlands Railway Company.

Engineering News

A big transport job. The illustration shows a Foden Diesel hauling a 70-ft. boat weighing 43 tons. Photograph reproduced by courtesy of Fodens Ltd., Sandbach.

A Decontamination Lorry

The lower illustration on the opposite page shows a new Morris-Commercial Sigmund decontamination vehicle and street-washer designed for use in air raid defence. It is fitted with a gasproof cab, in which the operators remain throughout the time they are carrying out decontamination and street flushing. The cab is equipped with a fan and filter, and the controls for the equipment, which are of a special quick-acting type, are placed conveniently near at hand. Independent engines are provided for propelling the vehicle and for operating the pumps, and the water tank, which has a capacity of 900 gallons, is partitioned to prevent surging of the liquid when the lorry is in motion.

Decontamination can be carried out either by water alone or by a bleaching powder mixture. In the case of roads decontamination is effected by spraying the solution from jets in front of the radiator. Walls can be effectively sprayed from an adjustable jet at the rear of the vehicle, which sprays fan-wise, while roofs of buildings can be decontaminated by spraying from hoses attached to conveniently placed couplings. For fire fighting the vehicle is fitted with a Sigma type pump having an output of 120 to 180 galls. per min. An auxiliary hand pump is also fitted for use in case of emergency.

The vehicle has a splendid range for decontamination, and is quick, safe and efficient; it sprays with astonishing force from front, sides and back and at all conceivable angles.

Unusual Electric Railway Coach

The French National Railways now have in service in the Bordeaux district an electrically-driven motor coach, the motor of which takes current directly off 1,500-v. D.C. overhead contact wires, or from a generator driven by a Diesel engine. At present the new coach is being used between Bordeaux and Perigueux, a route that is electrified only for part of the distance, and the change from one system to the other is quickly made on passing to or from the electrified section.

British Carillon for San Francisco

Carillons are becoming very popular in the United States of America and a large number of these instruments are now to be found in various American cities. The latest to be erected is a large British-built instrument of 44 bells, which has been constructed for Grace Cathedral, San Francisco. It has been temporarily erected in the "Tower of the Sun" at the Golden Gate International Exhibition at San Francisco, and is of special interest on account of its electro-pneumatic operating mechanism and the novel automatic ringing attachment applied to its 5½-ton Bourdon bell.

The instrument is shown in the lower illustration on this page, and from this it will be seen that the main framework is built up of steel girders, arranged to form a rectangular structure of great strength. The grouping of the bells is somewhat unusual, for the trebles are mounted in the middle of the frame, with the larger bells above and below in two groups. This method of hanging was adopted to give an equal volume of sound from all the bells and to suit the architectural design of the Cathedral tower.

The bells are all cast and tuned on scientific lines to ensure that their various harmonics blend perfectly and are free from any discord. Their clappers are operated by an electro-pneumatic mechanism consisting of a series of cylinders and pistons, each piston being coupled through draw-wires and cranks to the clapper of its appropriate bell.

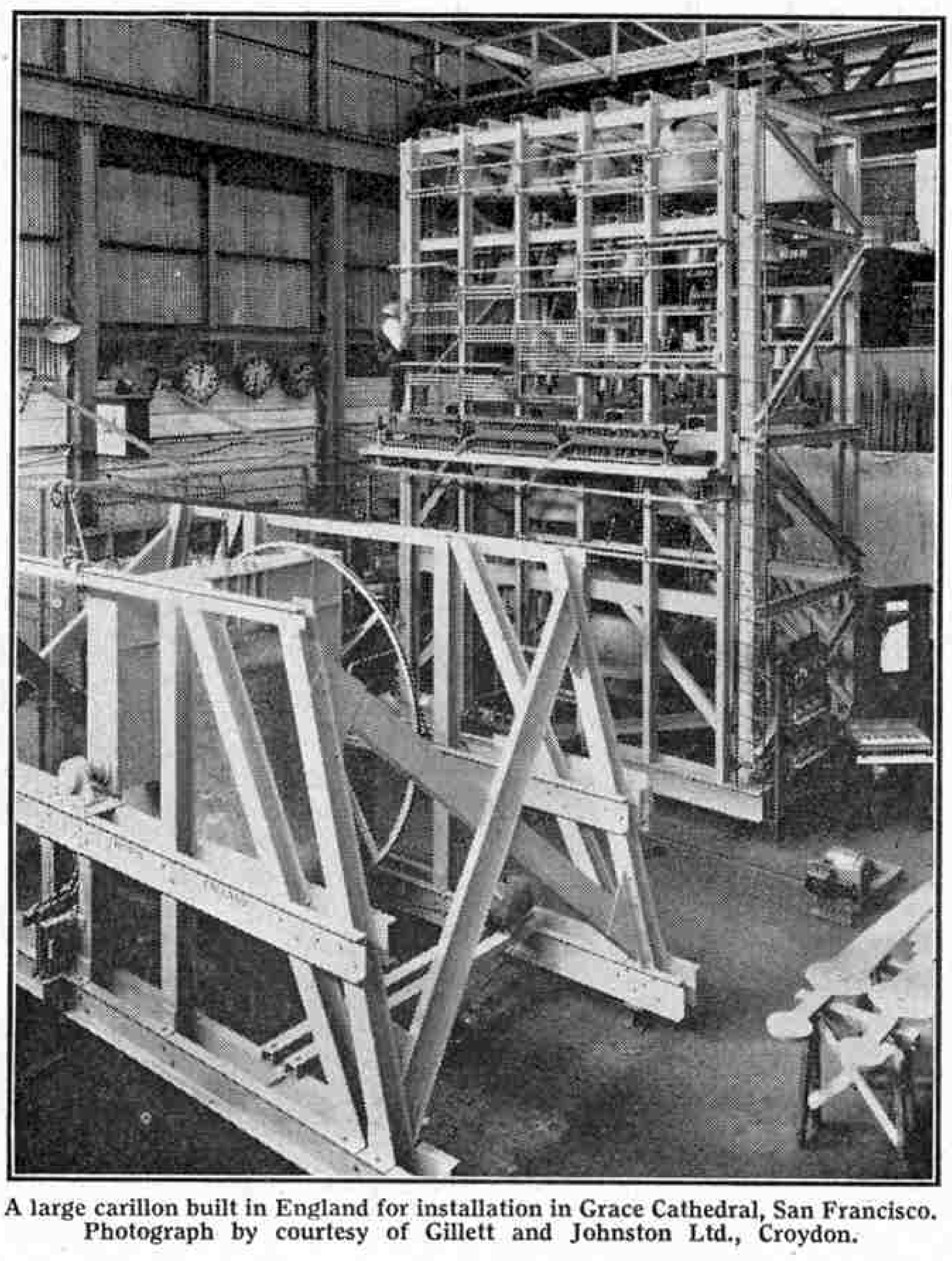
Compressed-air from a storage reservoir fed by a compressor is admitted to any desired cylinder by an electro-pneumatic valve, controlled either from a small keyboard or from an automatic playing machine. The keyboard somewhat resembles that of a piano or organ, and each key, when depressed, closes an electric circuit that trips a relay on a central control panel. This, in turn, closes further contacts and operates the air-valve of the appropriate cylinder.

In the playing machine a paper band running on a drum provided with sprocket teeth insulates a series of contact fingers from a metal roller. Holes pierced in the band enable the fingers to make contacts in any desired sequence, and so complete the relay circuits necessary for the playing of the melody.

The automatic ringing attachment of the Bourdon bell enables it to be sounded in very much the same way as a church bell is rung, but without the need for any ringer to pull the rope.

The total weight of the bells is about 18 tons, and the total for the whole installation is about 34 tons. It is the gift of Dr. Nathaniel Thomas Coulson, a resident in California, who was born in Penzance, Cornwall. The carillon was cast and built by Gillett and Johnston Ltd., of Croydon.

T. R. Robinson.



A large carillon built in England for installation in Grace Cathedral, San Francisco. Photograph by courtesy of Gillett and Johnston Ltd., Croydon.

Motor Cars Fitted with Diesel Engines

Nash motor cars fitted with Perkins "P6" six-cylinder lightweight Diesel engines are shortly to be placed on the market. The engine has been chosen after very exhaustive tests on the Continent and over rough territory in the Sahara and in Australia, and one car with an engine of this type has already covered 40,000 miles on actual road test.

Largest of their Kind

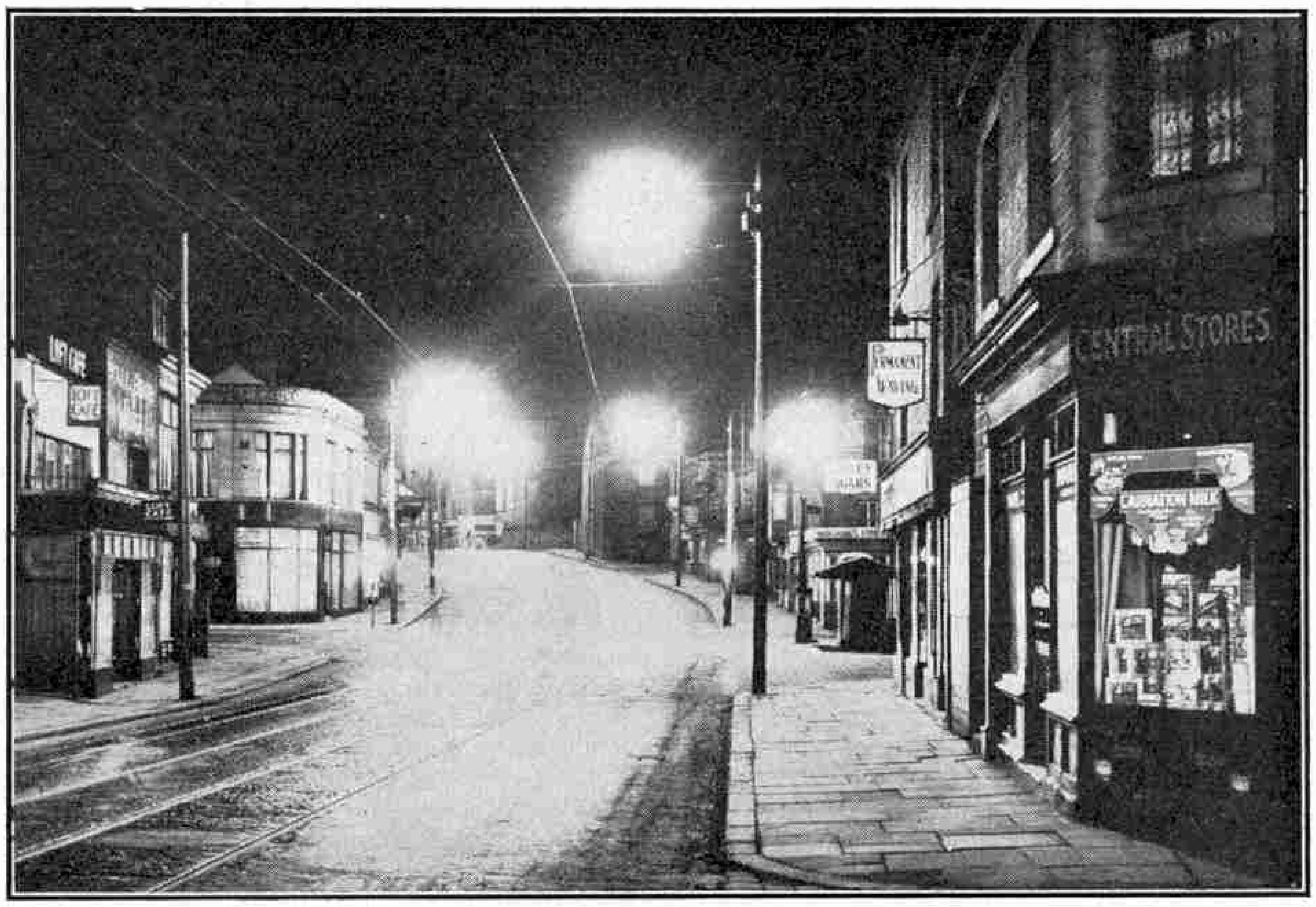
Anything that is claimed to be either the largest or smallest of its kind is always regarded with a higher degree of respect than is paid to similar objects of more normal size. Two recently-erected structures in this country that are said to be the largest of their kind are a great blast furnace that has recently been put into service at the works of the Appleby-Frodingham Steel Co. Ltd., Scunthorpe, and a brick-built chimney at the Hams Hall Power Station, Birmingham. The new furnace is 200 ft. high and is capable of producing 3,500 tons of pig iron a week. A second similar furnace is to be placed in commission shortly. The chimney at the Hams Hall power station will be 400 ft. from the top to ground level, 22 ft. internal diameter, and will have foundations about 27 ft. deep.

A new 5,000-ton extrusion press which is in service at the Banbury works of the Northern Aluminium Company Ltd., is another recently completed structure that is stated to be one of the biggest of its type in the world. It is capable of extruding billets weighing nearly half a ton and with a cross-section of about 16 in. diameter, and makes possible the production of special shapes, angles and channels of lengths up to 70 ft. without joints. Decorative mouldings can be made for the covering of building piers or columns in sections up to 12 in. which, in addition to being entirely free from joints, may in many cases be produced in medium-strength alloys and so contribute to the strength of the completed structure.

Water Spray for Fighting Oil Fires

A new type of water nozzle that is specially suitable for use in fighting fires in oil and high-voltage electrical equipment has been introduced by the American-La France-Foamite Corporation, New York. The device is known as the Poweron nozzle, and it discharges water in a discontinuous spray that is specially effective for fire-fighting purposes and does not conduct electricity.

This form of spray, besides being more effective than a solid stream of water, acts as a water curtain between the operator and the blaze. Tests have shown that with this nozzle water can be safely sprayed on burning electrical equipment carrying current at voltages as high as 250,000. It cannot be adjusted to throw a solid jet.



A photograph, taken at night, showing the fluorescent discharge street lamps at Bingley, Yorkshire, which are referred to on this page. Photograph by courtesy of Metropolitan-Vickers Electrical Co. Ltd., Manchester.

A Novel Air Raid Shelter

Concrete pipes 6 ft. in diameter have been used in the construction of an air-raid shelter at a large works in this country. The pipes were supplied by Stanton Ironworks Company, and are inserted in a disused slag heap. In building the shelters one pipe was placed on wooden runners with its end against the base of the slag heap, and about 1 ft. of material in front of it was then excavated. Jacks were then used to push the pipe forward as far as it would go and the operations were repeated until it was completely buried. Another pipe was then inserted behind it and jacked forward in the same way, being followed by further pipes until a shelter having a total length of 32 ft. was completed. A second shelter parallel with the first was then built and the two were joined up at their inner ends, their outer ends being closed by concrete slabs having steel doors. Shelters of this kind may be fitted with seats, lighting and other conveniences, and they do not take up useful industrial ground.

Solving a Street Lighting Problem

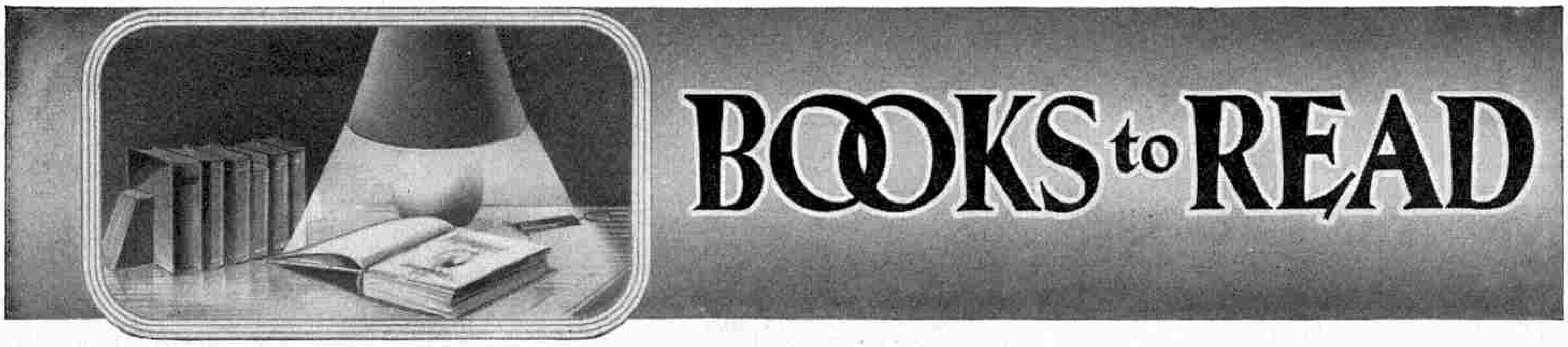
One of the difficulties of street lighting by means of discharge lamps is that the peculiar light emitted by these lamps tends to distort or change colours. This applies especially to coloured posters, and cartons and articles in shop windows, with the result that they lose their attraction and publicity value. The upper illustration on this page shows an interesting street lighting installation at Bingley, Yorkshire, in which this difficulty does not arise. In this case the discharge lamps used are of a special type manufactured by Metropolitan-Vickers Electrical Co. Ltd., and known as Metrovick 150-400 watt Fluorescent Mercury Units. They are fully colour-corrected. A committee set up by the British Advertising Association to investigate the best means of overcoming colour distortion by discharge lamps inspected the installation at Bingley and afterwards reported that the light from it distorts colours no more than does that from ordinary lamps with tungsten filaments.

Electric Power Line 1,000 Miles Long

One of the world's longest electric power transmission systems was set in operation in Sweden recently, when the South and North and Central Swedish electric power networks were linked up at Nassjo. This connection was affected by the completion of a 200-mile transmission line from Horndal, in central Sweden, to the town of Nassjo, which is in the southern part of the country. Submarine cables carry current across the Sound separating Sweden from Denmark, so that power generated by the great hydraulic stations in the north of Sweden now reaches as far southward as Copenhagen. The total length of the line from the most northerly of the Swedish stations to Copenhagen is 1,000 miles.

The purpose of this great system is to obtain a more even seasonal distribution. The melting of the northern snows proceeds until far into the summer, at which time rivers in the south are at low water. When winter freezes the northern rivers the autumn rains commence in the south.

A Morris-Commercial Sigmund decontamination lorry in action. A description of the lorry is given on the previous page. Photograph reproduced by courtesy of Sigmund Pumps (Great Britain) Ltd., Gateshead-on-Tyne.



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

"The Conquest of the Arctic"

By Louis Segal. (Harrap. 10/6 net)

The story of Polar exploration has always been one to stir the mind of a boy who revels in the thrills of dangerous journeys by sledge over bleak snow-covered lands and across frozen seas. To-day the aeroplane is speeding up the conquest of the Arctic, and great ice-breakers penetrate far into the frozen ocean. These newer ways of exploring and developing are just as exciting and hazardous as the old ones, and here in one book we have the stories of the hardy pioneers and of the modern scientific adventurers, making a complete survey of the fascinating lands and seas at the top of the world.

The first two chapters tell the story of the earliest phase of Arctic exploration, with its tragedies and successes, up to the discovery of the Pole by Peary and the last expedition of Amundsen. Then we turn to the achievements of the Russian explorers of the past five years, and the average reader will be astonished to discover how much they have done with tenacity and courage equal to that of Polar explorers of the past. A particularly thrilling section describes the life on the ice floes of the 100 or more members of the crew of the ice-breaker *"Chelyuskin,"* which was trapped and crushed in the ice; and of the heroic deeds of the airmen who rescued them all in spite of blizzards and other dangers. The full story also is told of the famous camp established by Russians on an ice floe at the North Pole, and of their historic drift down the coast of Greenland on the ice and ultimate rescue by air. Finally come chapters on the Eskimos and other less known peoples who live in the far North, on flying in the Arctic, and on the wealth that northern lands and seas have to give us. Arctic lands are rich in mineral wealth, including coal, iron and copper, and their animal life too is rich and varied.

Readers of the *"M.M."* will find the whole story one of absorbing interest, for the author has succeeded well in his task of showing how the secrets of the Arctic are being unveiled. The book contains two excellent maps in addition to a large number of splendid half-tone illustrations.

A Nenets nomad of northern Siberia with his reindeer. From "The Conquest of the Arctic," reviewed on this page.

"What Engineers Do"

By Walter D. Binger
(Faber and Faber. 8/6 net)

Every reader of the Magazine will enjoy this revised and enlarged edition of a book that helps people to understand what civil engineers do and how they do it. It deals with the materials the engineer uses, explains how he makes his plans and puts them into operation, and at the same time shows how life is made cleaner, easier and better by the great work that the engineer does. Mr. Binger writes simply and well, giving his readers very clear ideas of the processes and methods dealt with, and the many drawings that form the illustrations are particularly good.

A book such as this is particularly useful to-day, when giant dams are being built either for storage of water or for the generation of electricity by water power; huge bridges are being erected, and engineers generally are showing their powers by providing us with magnificent roads, improving our railways, and making every part of the Earth more readily accessible.

After showing how the civil engineer has helped to build up civilisation, we learn what materials he uses, from sun-baked bricks of mud to stone, wood, steel and concrete. How the foundations of engineering structures are laid, and the methods of working under water, are the next topics dealt with, and then we are told how the engineer surveys and measures to ensure the marvellous accuracy of his achievements. The rest of the book is concerned with the actual structures that the civil engineer builds, starting with bridges, buildings and highways, and ending with his schemes for keeping water pure and land clean. At every stage we can see exactly what he tries to do and how his men carry out his intentions, and a final chapter tells us about the mechanics and labourers who actually make his dreams come true.

This is a fine book.

"Unsolved Problems of Science"

By A. W. Haslett. (The Scientific Book Club. 2/6)

This book was reviewed in the *"M.M."* on its first appearance in 1935, and in this new edition is available to members of the Scientific Book Club at the low price of 2/6. For this sum it is magnificent value for older *"M.M."* readers who want to know something of the discoveries that scientists have made and who are not afraid to delve into new things and to think about them.

It is impossible in a short review to give details of the immense range of scientific problems with which Mr. Haslett deals. The creation of the Universe, the possibility that other worlds are inhabited, and the wonderful changes that take place within the Earth itself and in its atmosphere, give a splendid start. From these we turn to Man himself, seeing how the marvellous machinery of his body works and following his development from prehistoric times to modern civilisation. Then we come to a discussion of atoms, electrons and other particles that form the bricks of which the Universe is built, and to the wonderful revelations that X-rays have brought us.

"The Evolution of Physics"

By A. Einstein and L. Infeld
(The Scientific Book Club. 2/6)

Here is another splendid book that is now available to members of the Scientific Book Club. The first of the two authors is the famous originator of the theory of relativity, which has created so much stir in scientific circles during the last 20 years. The book is not easy reading, as it deals with the special problems in which Professor Einstein is interested. We read how scientists have built up pictures of our world, only to find that these are incomplete and have to be discarded for new ones. Thus we pass from the mechanical ideas of Galileo and Newton to the theories of Faraday and others, and so come to relativity and modern principles in physics.

The book is written very simply, with no mathematics, and every point is illustrated by simple applications and examples. There are three full page plates and a very large number of useful diagrams.

At 100 m.p.h. on salt water. Mr. H. Scott-Paine in "Miss Britain III." From "The High Seas," reviewed on this page.

"The Railway," "The Highway" and "The High Seas"

By Edgar B. Schieldrop, C.E., D.Sc.
(Hutchinson. 5/– net each)

These three books form part of a series dealing with the conquest of space and time, which is to be completed by a fourth volume dealing with the air. They are not specially intended for boys, but they deal with topics that are of the greatest interest to all "*M.M.*" readers, and are so good and so full of information that their owners will turn to them time and again for details of developments in various quarters and in order to gain some idea of the direction of future developments.

The first of the three volumes tells the story of the coming of the railway, its early struggles and its steady growth up to the present time. Special attention is given throughout to the efforts of engineers to overcome the obstacles imposed by Nature, and we read how great tunnels have been bored through mountain ranges, huge embankments raised, and giant bridges thrown across rivers and estuaries. The railway engineer's conflict with the elements makes an inspiring chapter, and full accounts are given of mountain tracks of various types and of spectacular aerial cableways.

Modern trains of all kinds are then dealt with in full. Representative locomotives in use in various countries to-day are described and illustrated, as are unusual types such as the "Turbomotive" of the L.M.S., the Swiss Winterthur high-pressure locomotive, and a German turbine-driven engine.

A complete chapter is devoted to the electric locomotive, but a little more might have been said of Diesel engines. The sections on passenger comfort and safety-first, including various signalling arrangements and automatic train control systems, cover important topics. Underground railways are considered separately, and in the final chapter the possibilities of future development in rail travel are discussed.

The second of Dr. Schieldrop's volumes is of special interest in view of the wonderful developments in road transport during the present century. His story is a fascinating one. After dealing with the pioneers of road travel he turns to the engine and to the anatomy of the motor car itself, dealing in a remarkably thorough manner with every point of construction and working. How cars are built is then dealt with in a chapter that gives a good idea of the drastic tests undergone by modern cars; and then we turn to the roads themselves, the realm of the motor car, and learn how man is conquering all difficulties, whether due to deserts, mountain ranges, rivers or estuaries, in the construction of roads along which cars can run swiftly and safely. Speed is the theme of the next chapter, which describes in very graphic manner how the struggle to attain it has been carried on unceasingly since the motor car was invented.

"*The High Seas*" begins with the fascinating story of the building of a ship, and a splendid account of the monster engines installed in great liners and other vessels. The results of the efforts of the ship-builder and the engineer are then described in a section dealing with the giants of the ocean. The fight for the Blue Riband of the Atlantic is the next topic, after which safety methods at sea are dealt with in a long chapter in which it is shown that the unlimited care that has been given to this problem has caused the sea to lose most of its terrors. Lastly there is a special account of shipping and engineering progress in which we read of recent inventions such as the automatic pilot, the stabilising gyroscope and various new forms of propellers and rudders.

Each volume ends with interesting tables of information that will help readers to fix firmly in their minds many of the chief features of the three topics dealt with. Useful diagrams are included where these are necessary to explain matters in the text, and in each volume there are in addition about 140 half-tone illustrations together with a frontispiece in colour.

"Peter and the Wanderlust"

By Ursula Morby Williams
(Harrap. 5/–)

This is an unusual story in which readers become more and more absorbed as they read on. The plot itself is interesting, telling of the efforts of an impostor to gain possession of a treasured relic of the earliest days of motoring; and the owners of the car and their associates are good people with whom to make friends.

Peter, the chief character in the story, is the son of a delightfully impractical but lovable artist. They discovered a 1902 motor car of a famous make buried in hay and straw in an old barn, and after putting it in working order gave it the name "*Wanderlust.*" It then earned fame in the London to Brighton "Old Crock's" run, and took part with equal success in a Land's End reliability trial. Finally Peter and his friends went to Wales in it for a holiday, and there the gang of crooks got hold of it. How Peter foiled them in the end makes a fine story.

There is a coloured frontispiece, with many other illustrations.

"The Story of Buffalo Bill"

By Shannon Garst. (Harrap. 5/– net)

Bill Cody, or Buffalo Bill to give him the name by which he is best known, is one of the greatest of boys' heroes. To them he is the outstanding representative of the great Wild West days, when the buffalo still roamed the prairies, and Indians and outlaws made life dangerous and exciting. Here for the first time is the life story of the famous scout written specially for boys.

Buffalo Bill early showed his amazing quickness and bravery in the face of danger. He took over the care of his family when he was only 11 years old, doing a man's work with the bullock wagon teams that then crossed the prairies; and when he grew up he joined the famous Pony Express, the most picturesque mail service that the world has ever known. Pony Express riders never lacked thrills. Throughout their rides there was scarcely a minute when their lives were not in peril, and in the book there are stirring stories of the hairbreadth escapes of Buffalo Bill himself. Then he became a scout in wars with Indians, such as the Sioux under their famous chief Sitting Bull. Many are the thrilling stories of his exploits, in which he earned fame by the greatest daring and resource as well as skill. Later he earned the name by which he is best known by hunting buffalo to provide food for the men who built the railways across the North American continent.

When peace came to the prairie, and Buffalo Bill's scouting days were over, he had the brilliant idea of organising a show to give a living picture of the real frontier days in which he had played so great a part. He carried this out on a magnificent scale. His Wild West Show travelled in Europe as well as in America, and his picturesque figure became familiar to many thousands who had read eagerly the stories of his exploits.

This is a book that will delight every boy, for it is full of thrills and true adventure. It contains a frontispiece and 10 other full page illustrations.

A motor car parking place built like a skyscraper. From "The Highway," reviewed on this page.

HORNBY DUBLO

A Real Railw

The new Hornby-Dublo System, ...
and realistic railway on your dining ...

Hornby-Dublo Locomotives are ...
reliability never before achieved i...
—starting, stopping, reversing and ...

Hornby-Dublo Electric Trains c...
either from **Alternating Current** ...
No. 1, or from a 12-volt accumulator ...
designed for these Trains; no other ...

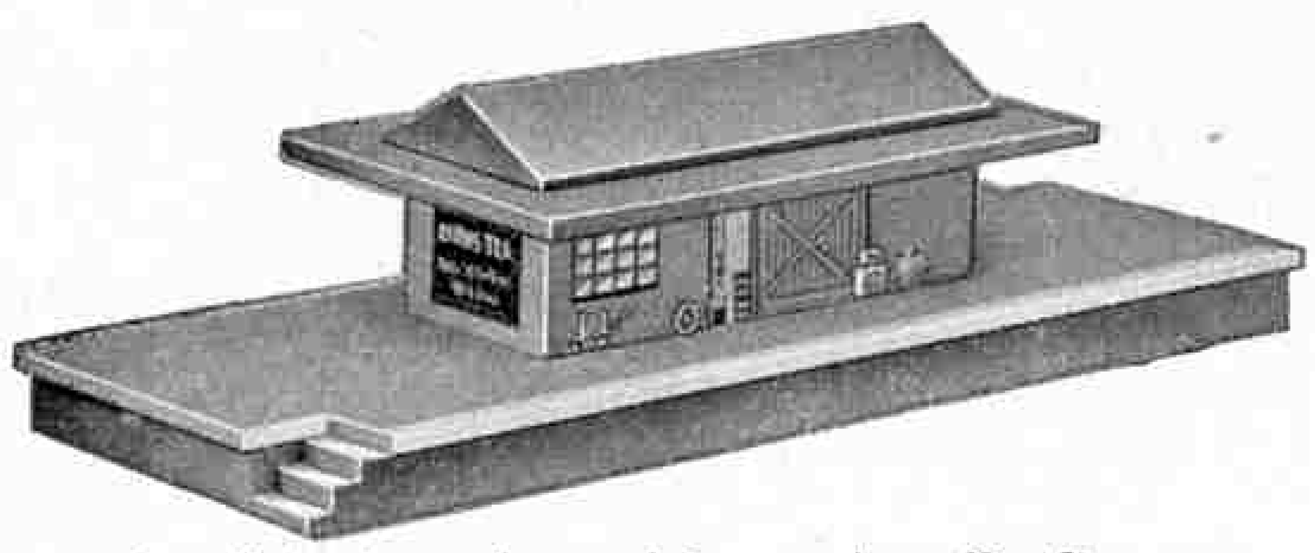
The current required by a ...
run for 100 hours for the cost ...

Write to Meccano Ltd., Dept. D...
details of the Hornby-Dublo Railwa...

PETROL TANK WAGON "ESSO"

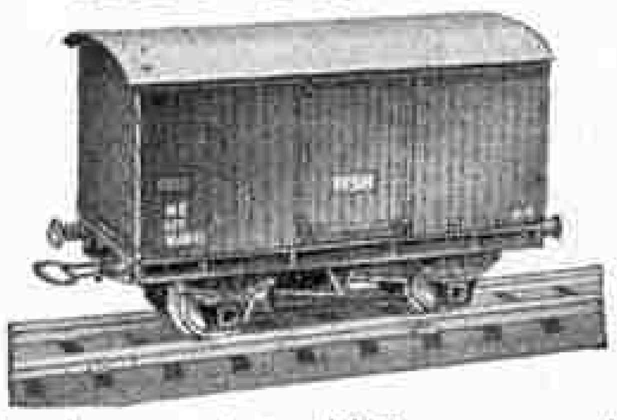
Finished in buff with bright blue lettering. Price **2/6**

GOODS DEPOT



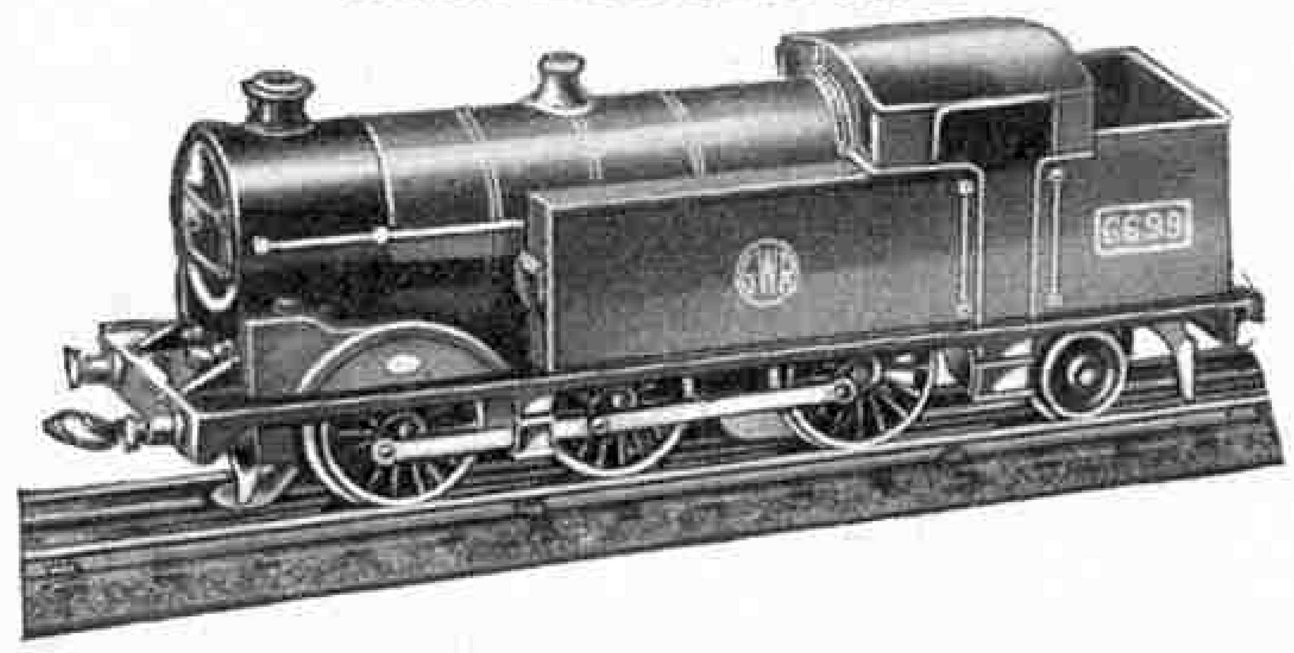
A realistic depot in wood for goods traffic. Size: Length 12 in., width 4 in., height $2\frac{7}{8}$ in. Price **4/–**

FISH VAN N.E.



A characteristic N.E. van used for perishable traffic. Finished in red-brown with white roof and lettering. Price **1/6**

TANK LOCOMOTIVE

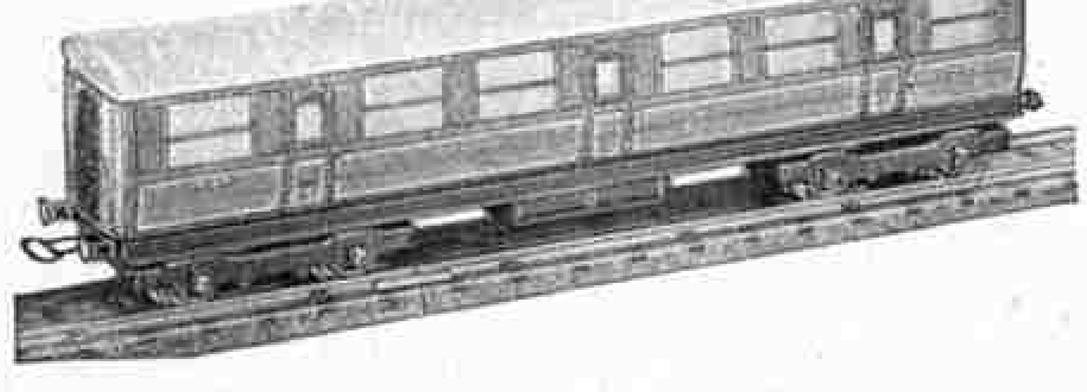


Hornby-Dublo Electric Tank Locomotive (Automatic Reversing). Available in L.M.S., L.N.E., G.W. or S.R. colours. Price **17/6**

CATTLE TRUCK L.M.S. and G.W.R.

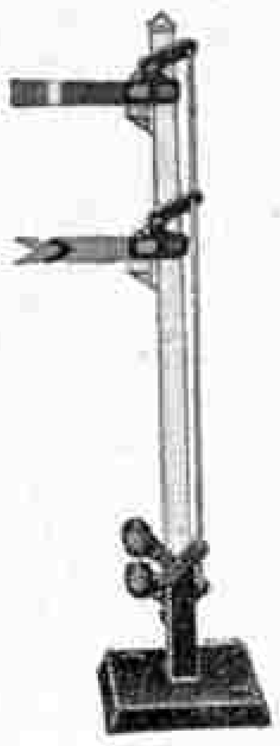
An attractive vehicle, fully detailed and typical of up-to-date practice of the two companies. Price **1/6**

CORRIDOR COACH L.N.E.R.



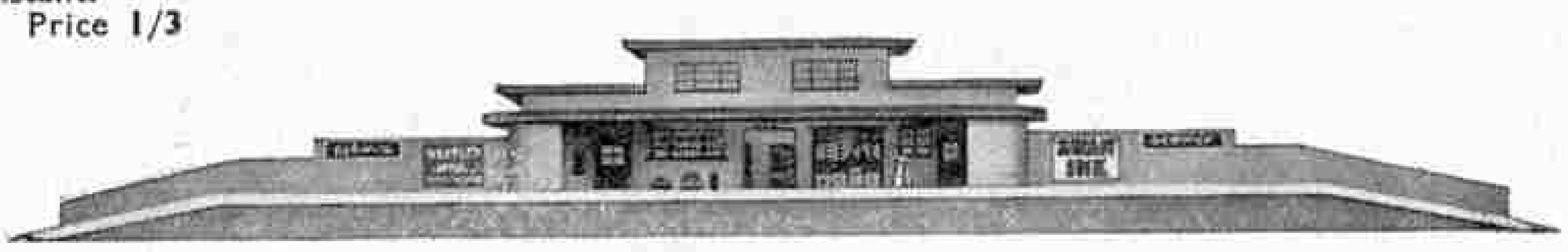
An accurately detailed model of a standard L.N.E.R. teak-finished Corridor Coach. Price **3/6**

SIGNAL



Double Arm "Home" and "Distant." Price **1/3**

MAIN LINE STATION



A particularly fine model in wood of a modern-style station. It is long enough to accommodate a three-coach train, and is supplied with printed gummed slips giving a choice of four names—"Berwick" (L.N.E.R.), "Penrith" (L.M.S.), "Truro" (G.W.R.) and "Ashford" (S.R.). Size: Length 24 in., width $4\frac{1}{8}$ in., height $3\frac{5}{16}$ in. Price **6/9**

HORNBY-DUBLO EL...

Hornby-Dublo Electric Passenger Train Set, L.N.E.R. ...
Coach Articulated Unit, Dublo Controller No. 1, ...
former, not included in Set.)

Where the mains supply is D.C., or there is no s...
Electric Passenger Train Set, L.N.E.R. (With Dublo ...

Clockwork Passenger Train Set, L.N.E.R. Contains ...
Unit, eight Curved Rails and two Straight Rails.

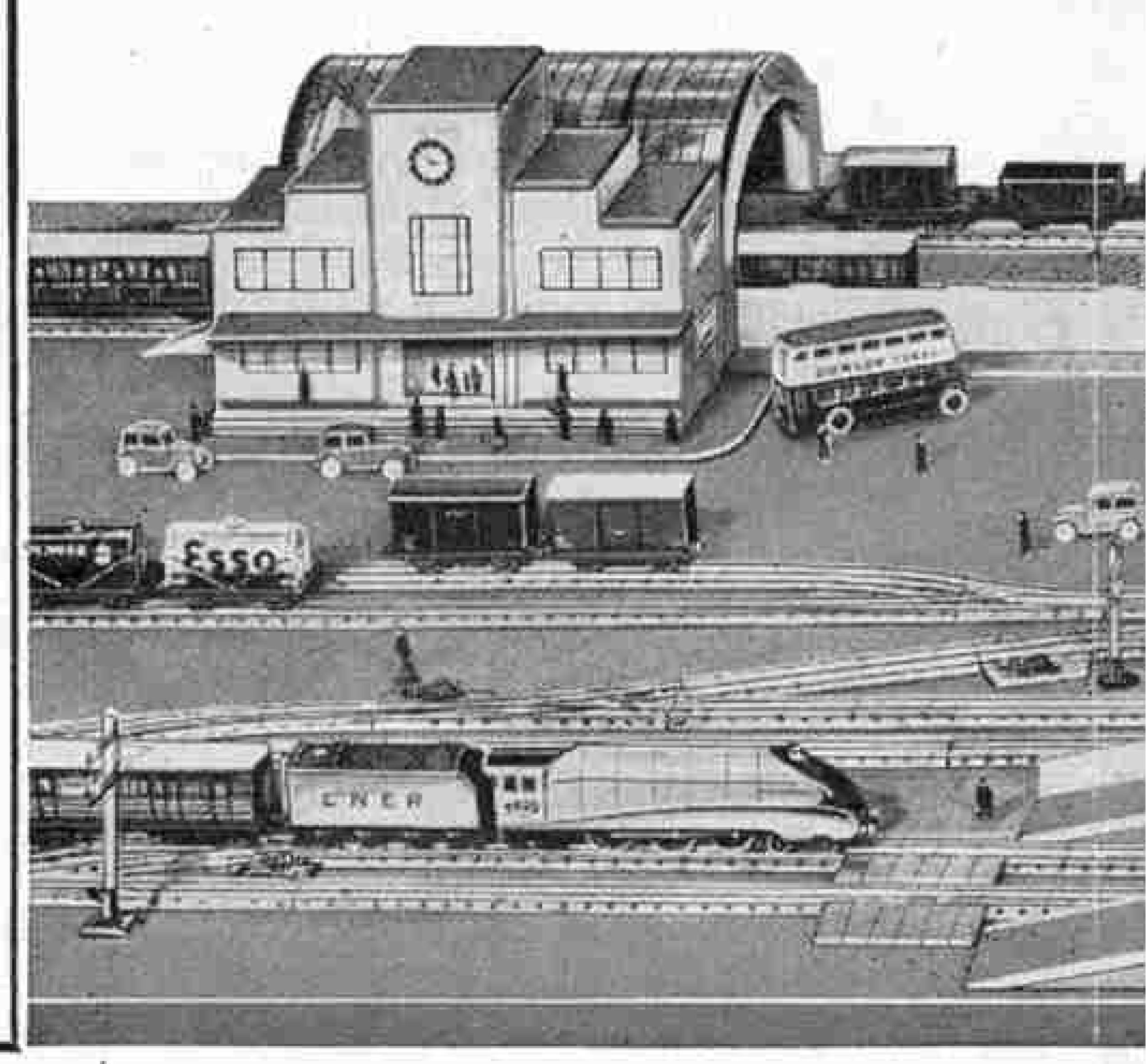
HORNBY-DUBLO ELE...

Electric Tank Goods Train Set, L.M.S., L.N.E.R., G. ...
Van, Goods Brake Van, Dublo Controller No. 1, ...
Transformer, not included in Set.)

Where the mains supply is D.C., or there is no sup...
Electric Tank Goods Train Set. (With Dublo Control...

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

HORNBY-DUBLO TRAINS AR...



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ystem, Gauge 00, provides the ideal home railway. You can lay out a complete dining-table!

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rains operate on **Direct Current** at 12 volts. This current may be obtained **rrent Mains Supply** through a Dublo Transformer and a Dublo Controller nulator and a Dublo Controller No. 1a. The Dublo Transformers are specially others should be used.

by a Hornby-Dublo Electric Railway is very small. A Train can be cost of one unit!

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.O ELECTRIC & CLOCKWORK PASSENGER TRAIN SETS

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L.N.E.R. Contains Streamlined Six-coupled Locomotive **"Sir Nigel Gresley"** (Automatic Reversing), Tender, Two- No. 1, seven Curved Rails, one Curved Terminal Rail and two Straight Rails. (To be operated from a Dublo Trans- Price **70/-**

re is no supply, the above Set is available with Dublo Controller No. 1a (for use with 12-volt accumulators) as follows: h Dublo Controller No. 1a.) Price **61/6**

CLOCKWORK

Contains Streamlined Six-coupled Locomotive **"Sir Nigel Gresley"** (Reversing), Tender, Two-Coach Articulated ails. Price **39/6**

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ELECTRIC

I.E.R., G.W.R. or S.R. Contains Six-coupled Tank Locomotive (Automatic Reversing), Open Goods Wagon, Goods r No. 1, seven Curved Rails, one Curved Terminal Rail and two Straight Rails. (To be operated from a Dublo Price **55/-**

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CLOCKWORK

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

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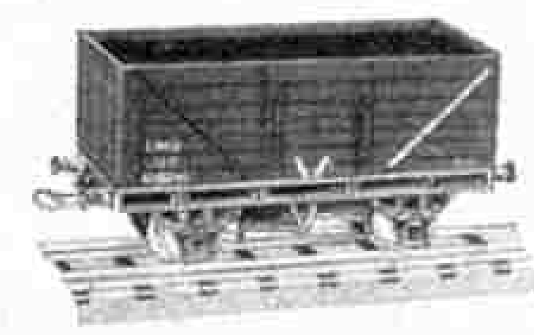
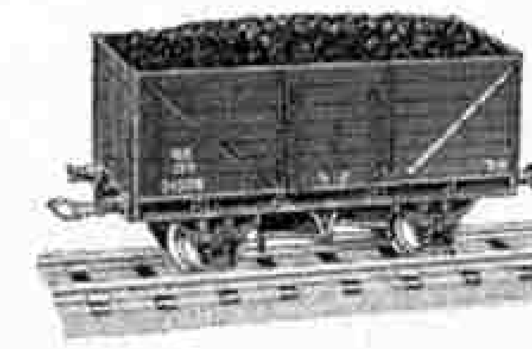
HIGH-SIDED WAGON
L.M.S. and N.E.



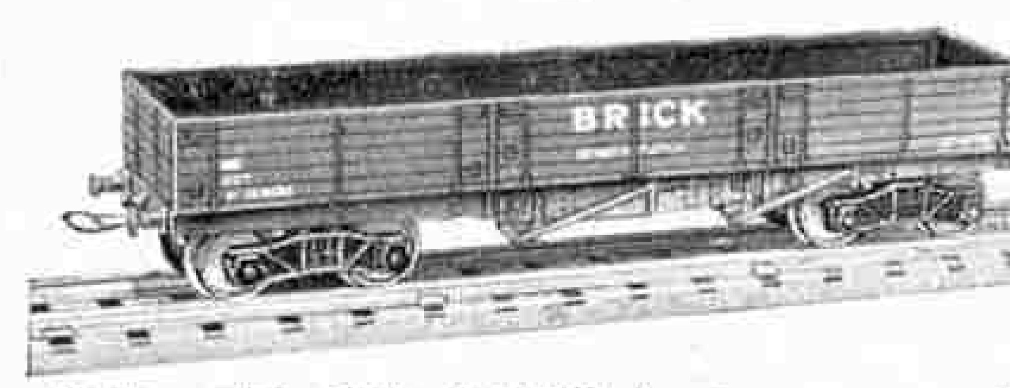
Represents the standard mineral wagon with high sides. Finished L.M.S. Bauxite brown or N.E. grey with diagonal white stripe. Price **1/6**

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

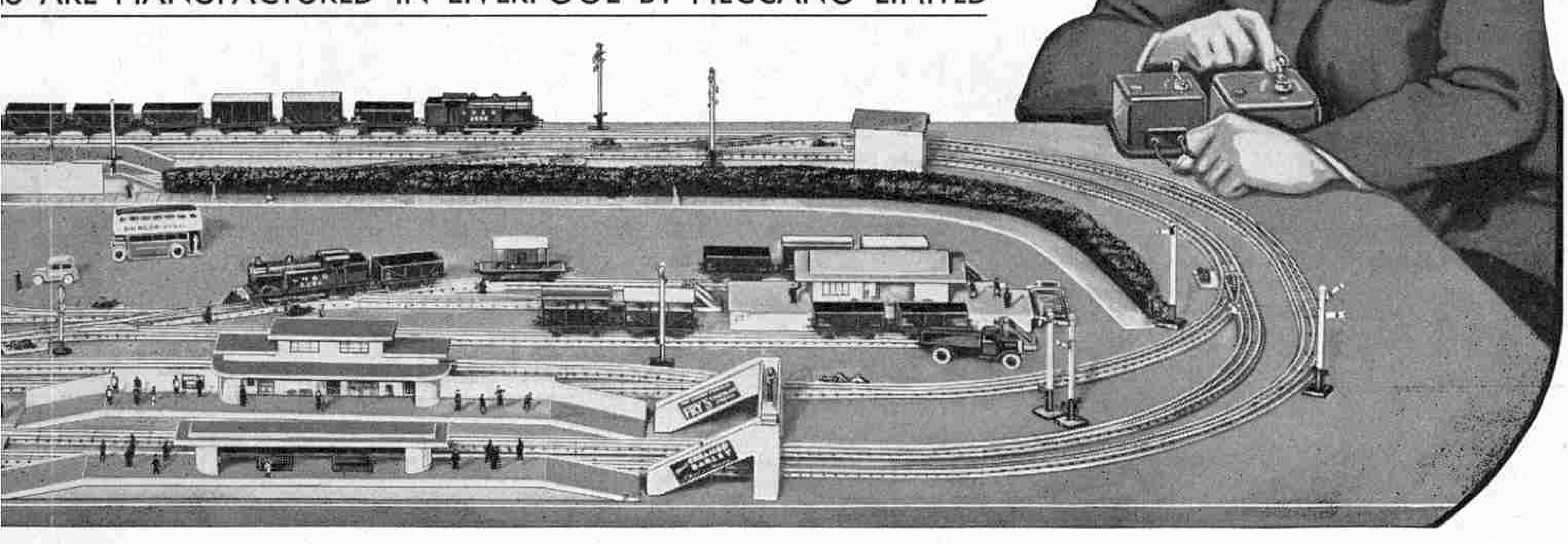


A model of the standard type of high-sided mineral wagon, with a realistic load of coal. Price **1/9**

HIGH-CAPACITY WAGON
N.E.



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



Activity on the Line

Making Hornby-Dublo Layouts Life-like

AN atmosphere of life and activity is essential to a miniature railway if it is to look at all like the real thing. The illustration on this page gives a good idea of what can be done with Hornby-Dublo Miniature Figures and Dinky Toys to bring about this result. They are correct in scale for Hornby-Dublo layouts, and their range allows a varied choice to meet the wishes of miniature railway owners. The Miniature Figures are specially valuable in giving life to a station or miniature roadway by suggesting a reason for the existence of buses and other vehicles, as well as the railway itself. To place them down anyhow is useless, however. Their positions should be thought out carefully, to make them look just what they are meant to represent—everyday human beings going about their daily business. In this article we make suggestions that will be of value to all miniature railway enthusiasts.

There are two Sets of Miniature Figures in the Hornby-Dublo range, and each contains six persons. One Set consists of railwaymen, and the other of passengers, all in realistic and lifelike attitudes. The bases necessary to support these tiny folk are small and neat, but they are substantial enough to prevent the figures from being knocked over easily.

The most important of the figures included in the Miniature Railway Staff D1 is the Stationmaster, who has a smart appearance in his service cap and long coat. The Porter wears the usual sleeved waistcoat of his grade, and he is modelled walking briskly along carrying a bag in each hand. Passengers will not complain of the slackness of porters at any station on a Hornby-Dublo railway! The Ticket Collector also is full of life and realism. He is shown with his left hand outstretched in the act of taking a ticket. This position makes him suitable also for placing in other positions, and owners of Hornby-Dublo layouts who exercise a little imagination will be able to find plenty of jobs for him to do.

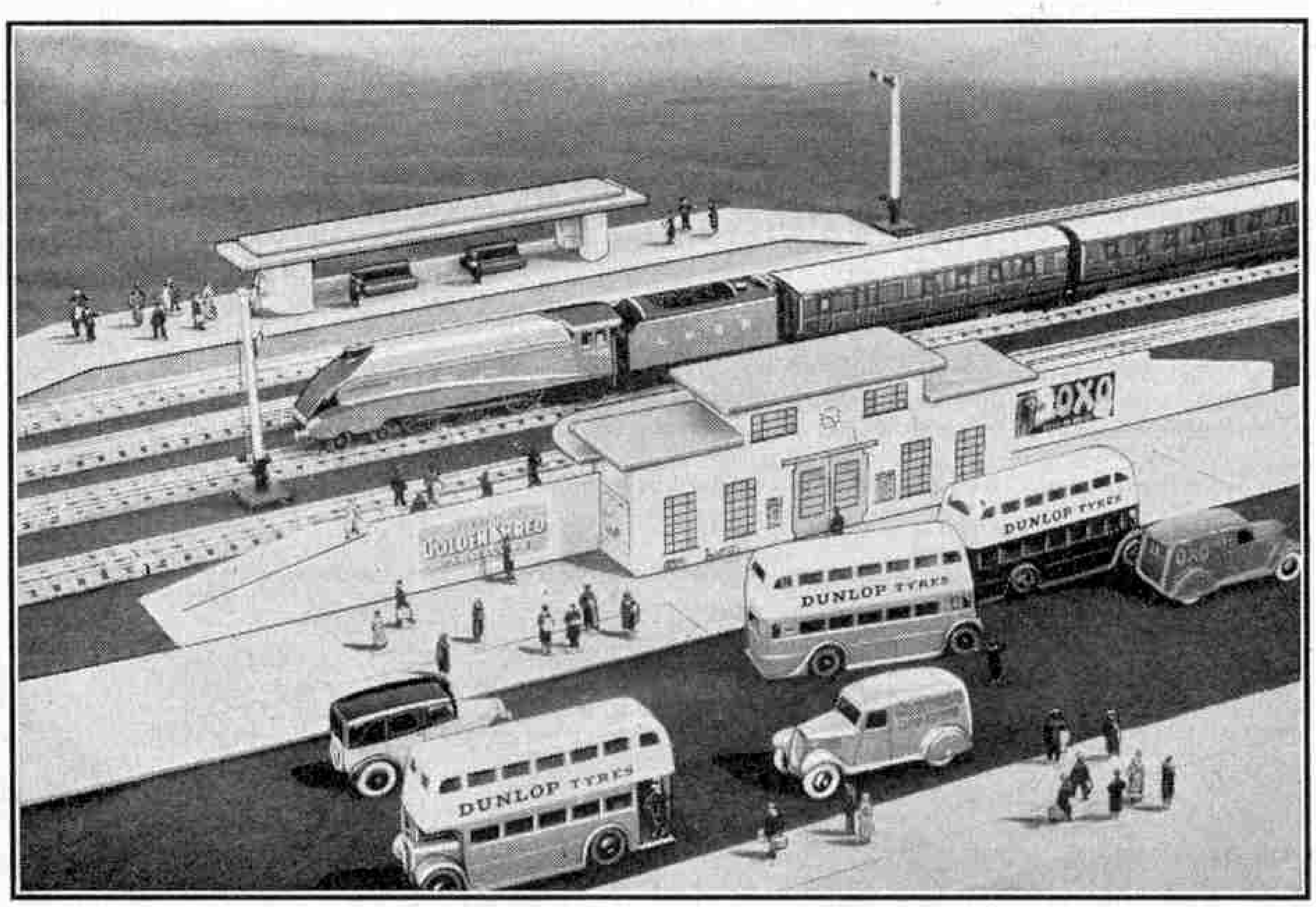
There can be no train without a Guard, and his representative in this Set is a very effective figure. He is neatly uniformed, and is in the act of giving the "Right away" by waving the familiar green flag. He gives a most realistic aspect to the platform at the moment of departure of a train. The Locomotive Driver, also essential, is a typical figure in overall coat and trousers; and last comes the Shunter, who will be perfectly at home in the goods yard.

The set of Miniature Passengers D2 consists of six figures, three men and three women. They are typical of the people to be found every day on station platforms. Among them are a Business Man carrying his raincoat and another man reading a newspaper. The variety usually seen in the character of railway passengers is provided by a Golfer in characteristic pose and three Women Travellers, one carrying a rug and two in walking and standing positions respectively.

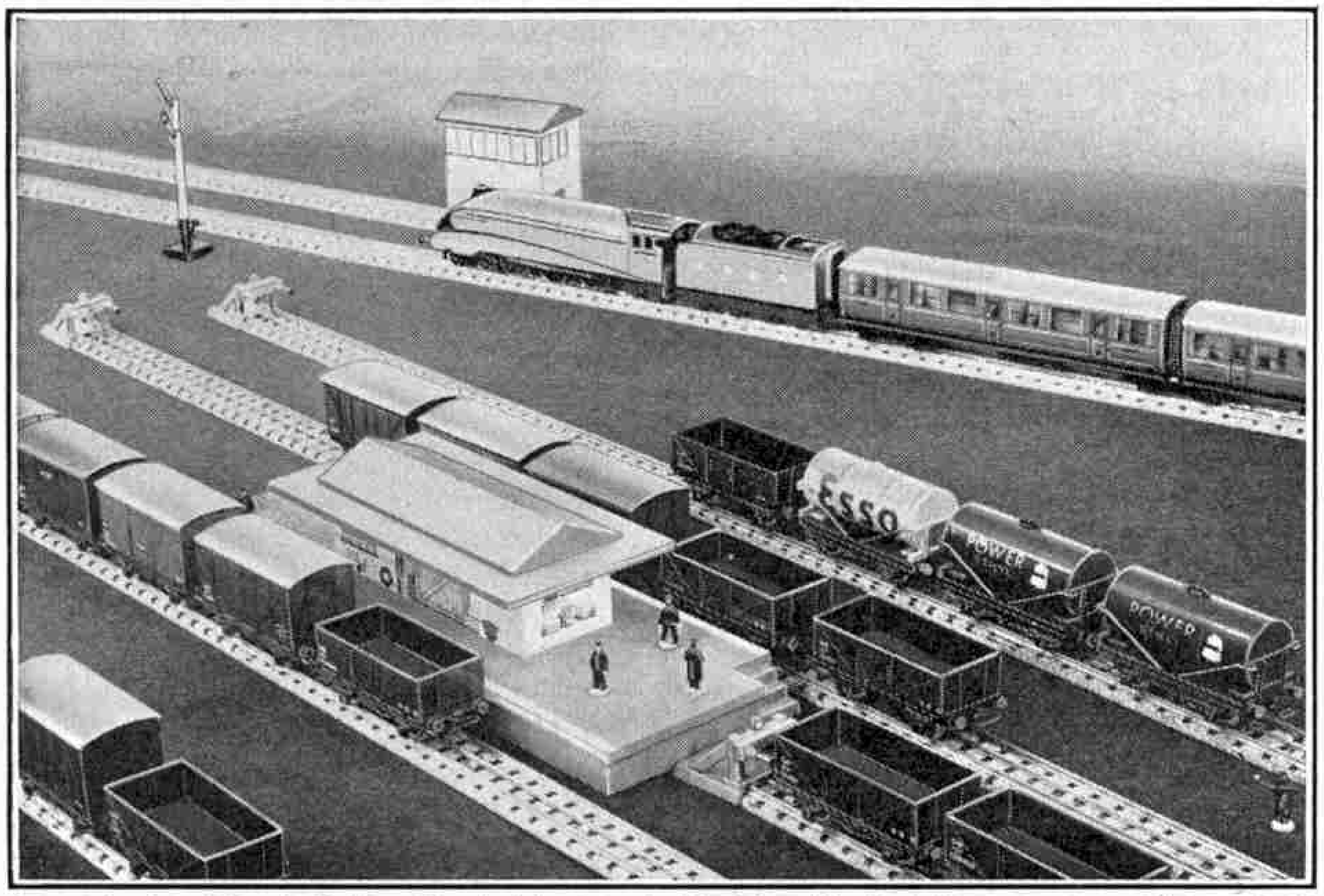
In addition to providing railway staff and passengers, some evidence of road activities at or near the station must be given. It is possible to do a great deal in this direction with the aid of Meccano Dinky Toys, and some really good fun can be had in the working of road traffic in conjunction with the railway operations.

One of the most successful Dinky Toys for use with a Gauge 00 railway is the Double Decker Bus. Two or three of these realistic vehicles will allow a good service to be provided, and a regular "bus stop" can be instituted outside the Main Line Station. The Pavement Sections are most useful in the construction of a roadway. In addition there is a wide variety of Dinky Toys motor cars and commercial road vehicles. The careful placing of a selection of these on the roads associated with a layout gives the air of activity that every model railway owner wishes to see.

Hornby-Dublo Railway owners who are fortunate enough to possess more Dinky Toys Motor Cars than there is room for on the roadways of their stations can make effective use of the surplus in a car park near the Main Line Station. Careful "parking" will give a pleasing result that certainly will be realistic. The Ticket Collector out of the Hornby-Dublo Miniature Railway Staff Set D1 can then be used as the attendant, for which his attitude is ideal. Further realism can be added to the road scenes, and to the model railway itself by making use of the many "Road Signs," "Robot Traffic Signals" and of course the "Belisha Beacon." All these are available in the Meccano Dinky Toys range, and we need scarcely say that they are perfect models of the real things.



The careful placing of the Dinky Toy Buses and the Hornby-Dublo Miniature Figures make a lifelike scene.



A fine selection of Hornby-Dublo rolling stock is shown in this picture. The Tank Wagons are among the new items added this season that are included in the layout shown.

Hornby-Dublo Rolling Stock

Extending the Range of Goods Wagons

THE Hornby-Dublo System has now entered on its second season. Its appearance created the greatest enthusiasm among miniature railway enthusiasts, and interest in it has continued to increase by the additions that have been made from time to time both to the rolling stock and to the accessories of all kinds. In this article we review the rolling stock that is used in making up the trains.

The first additions to the original range of Hornby-Dublo rolling stock were the Petrol and Oil Tank Wagons. The tanks of these are mounted on the standard Hornby-Dublo Wagon base, which has aroused the greatest interest among scale model enthusiasts because of its remarkable realism. This base is produced by pressure die-casting to allow as much detail as possible to be included, and the buffers, solebars, brake-gear, axle-boxes and springs are among the features of real railway wagons that are represented faithfully and admirably

Tanks with sealed ends are usually very difficult to reproduce on model railways, especially on so small a scale as Gauge 00; but the Hornby-Dublo Tank Wagons have scored a remarkable success in this respect. The circular ends of the tanks of these Wagons are die-cast in one piece with the upright girders and horizontal cross pieces. These die castings fit perfectly into the ends of the tank body.

An attractive new Wagon introduced at the same time as the Tank Wagons was the Coal Wagon, a model that is proving very popular indeed. This is of the standard 12-ton open type seen every day on real railways. The body, like that of all other Hornby-Dublo Wagons and Vans, is tin-printed, and all essential features such as the horizontal boarding, corner plates and strappings are faithfully reproduced. A feature that makes the Wagon doubly interesting is the realistic representation of its load of coal.

Immediately after the introduction of the first batch of new wagons there followed the splendid Meat and Fish Vans, Cattle Trucks and Horse Box. All are remarkable for the amount of external detail represented, the boarding, strapping, hinges and handles and other small parts being well shown.

The two new Meat Vans are excellent representations of their originals. The design of one of them is based on the real L.M.S. meat vans, which are of the ventilated type for fresh meat traffic. The model is finished in the now familiar Bauxite brown and has a grey roof. The second model is based on the S.R. Van and is very different in outward appearance from the L.M.S. Van, its sides and ends being coloured the peculiar shade of buff commonly used by the S.R. The external arrangement of both vans is unusual in presenting a combination of planking and strapping in conjunction with various areas of plain sheet metal.

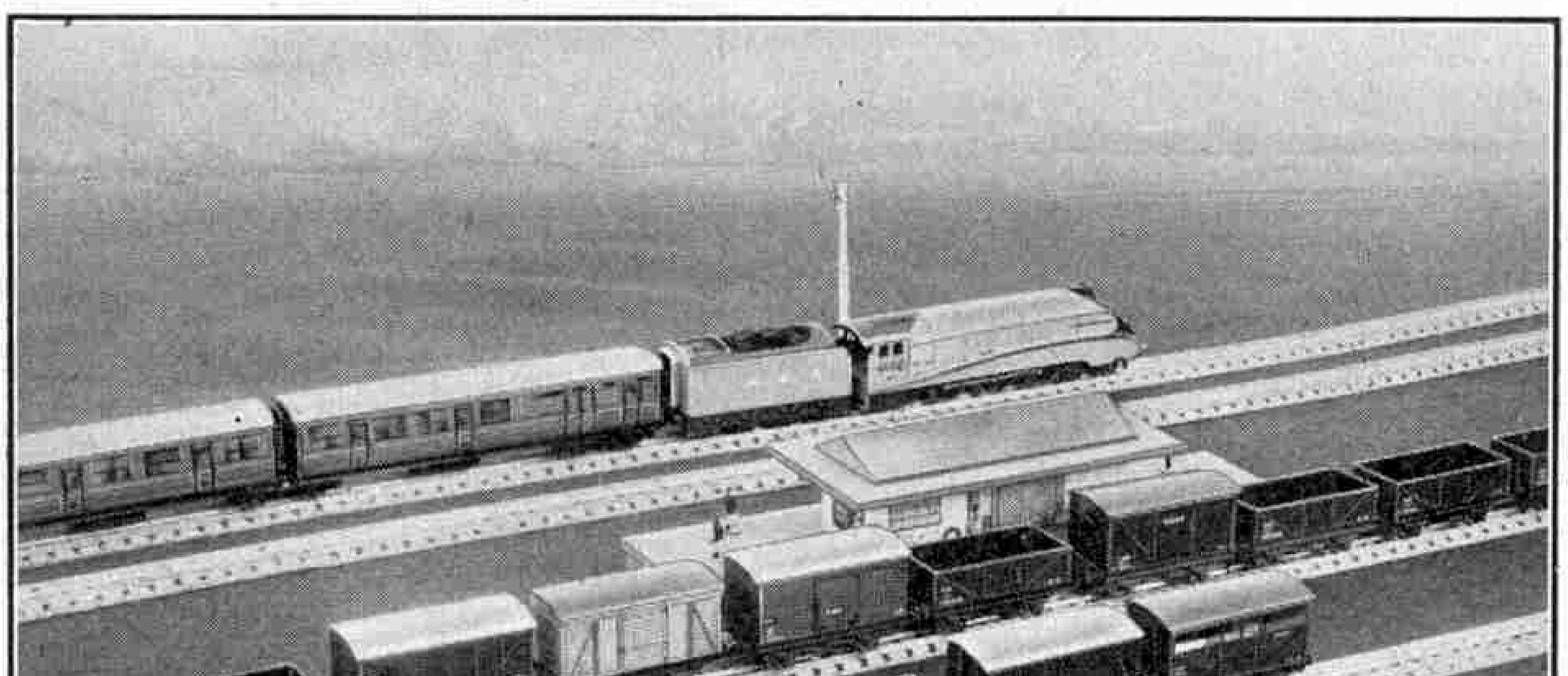
The two Cattle Trucks, one G.W.R. and the other L.M.S., are particularly interesting because their sides are pierced to represent the familiar openings of real cattle trucks. The L.M.S. model is finished in Bauxite brown and the G.W.R. in dark grey, and both are detailed correctly. The G.W. model has a white roof and white lettering, and the L.M.S. Truck a grey roof and white lettering.

The Fish Van is finished in the characteristic shade of red-brown used by the L.N.E.R. for freight vehicles fitted with automatic brakes. The vertical boarding, the ends strengthened by vertical iron work, and the name "Fish" in a panel, are all faithfully reproduced in the model. Other details include the wagon's number and tare weight, and the letters "N.E." in the bottom left-hand corner.

The Horse Box is a fine model. The bodywork is finished in teak brown and the lettering is white. The detail of this Van is perfect, the attendants' portion being correctly finished with realistic windows. Other details shown include the horizontal end boards and steam pipes.

These introductions were followed by the latest Hornby-Dublo Wagons, the 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. These were fully described in last month's "*M.M.*," and are splendid realistic additions that have been given an enthusiastic welcome.

The introduction into the Hornby-Dublo System of all these items has greatly increased the fun of railway operation.



Another miniature railway view that gives a good idea of the variety of wagons and vans now available in the Hornby-Dublo range.

Cocoa and Chocolate

Their Story from Pod to Packet

By Garry Hogg

THE basis of all chocolate is the cacao bean, more usually known as the cocoa bean. This grows in a pod produced by the cacao tree, which is cultivated on a belt of land within 15 or 20 degrees of the Equator, notably in Brazil, Trinidad, Java and on the Gold Coast, West Africa, which is by far the greatest producer to-day. The pods grow not only from the branches, but also from the trunk itself. They are harvested twice yearly by natives armed with a "goulet," which is much like a steel hand, or with a machete, a cutlass used for pods growing within easy reach. A pod may contain 30 or 40 beans, enveloped in a juicy pulp that has to be removed before the beans can be dried in the sun.

Opening cacao pods and extracting the beans in Trinidad, British West Indies. For the illustrations to this article we are indebted to Cadbury Bros. Ltd., Bournville.

After the drying process not more than about 1½ oz. of bean will be the yield of a pod that may have weighed 1 lb. or more. From the plantations sacks of the dried cocoa bean are brought to the coast, sometimes by head-carriers, but more often nowadays by lorry and train, and there they are loaded into cargo boats for shipment to England.

The first process in the making of chocolate is roasting. The ovens are heated by coke fires, gas jets, or superheated steam, and long experience is necessary to make sure that the heat shall be adequate without exceeding the limit beyond which the flavour of the bean might be spoiled. From the oven the bean passes to a set of rollers that crack it into what are called "nibs," which are particles of the kernel about the size of rice grains. The husk is simultaneously winnowed from the nibs, and is itself of value to manufacturers of cattle-cake.

The nib contains about 55 per cent. of cocoa butter. This proportion must be reduced considerably if pure cocoa is required, and a grinding mill generating heat extrudes the requisite proportion of the butter, which is afterwards refined. Hydraulic pressure that may reach 6,000 lb. per sq. in. is then exerted, and the treated nibs are consolidated into "press-cakes." These are subsequently broken and put through a further series of rollers until the resultant powder will pass through a silk gauze of 13,000 meshes to the square inch, after which the fine powder is stored in a

Harvesting cacao pods in West Africa.

battery of immense hoppers immediately above the filling machines.

Meanwhile most ingenious machines are turning out canisters at the rate of 300 each a minute. Sheets of tin plate are fed into each machine, and the plates are cut, rolled into cylindrical shape, joined, fitted with bottoms, checked, and conveyed automatically to the next process. Here two rolls of paper, one white and the other printed in coupons, are mounted on more machines. Steel fingers and thumbs fold and twist the white paper with unbelievable rapidity, and thrust the completed paper bag into each tin in turn, leaving an inch or so protruding, to be folded in when the tin has been filled.

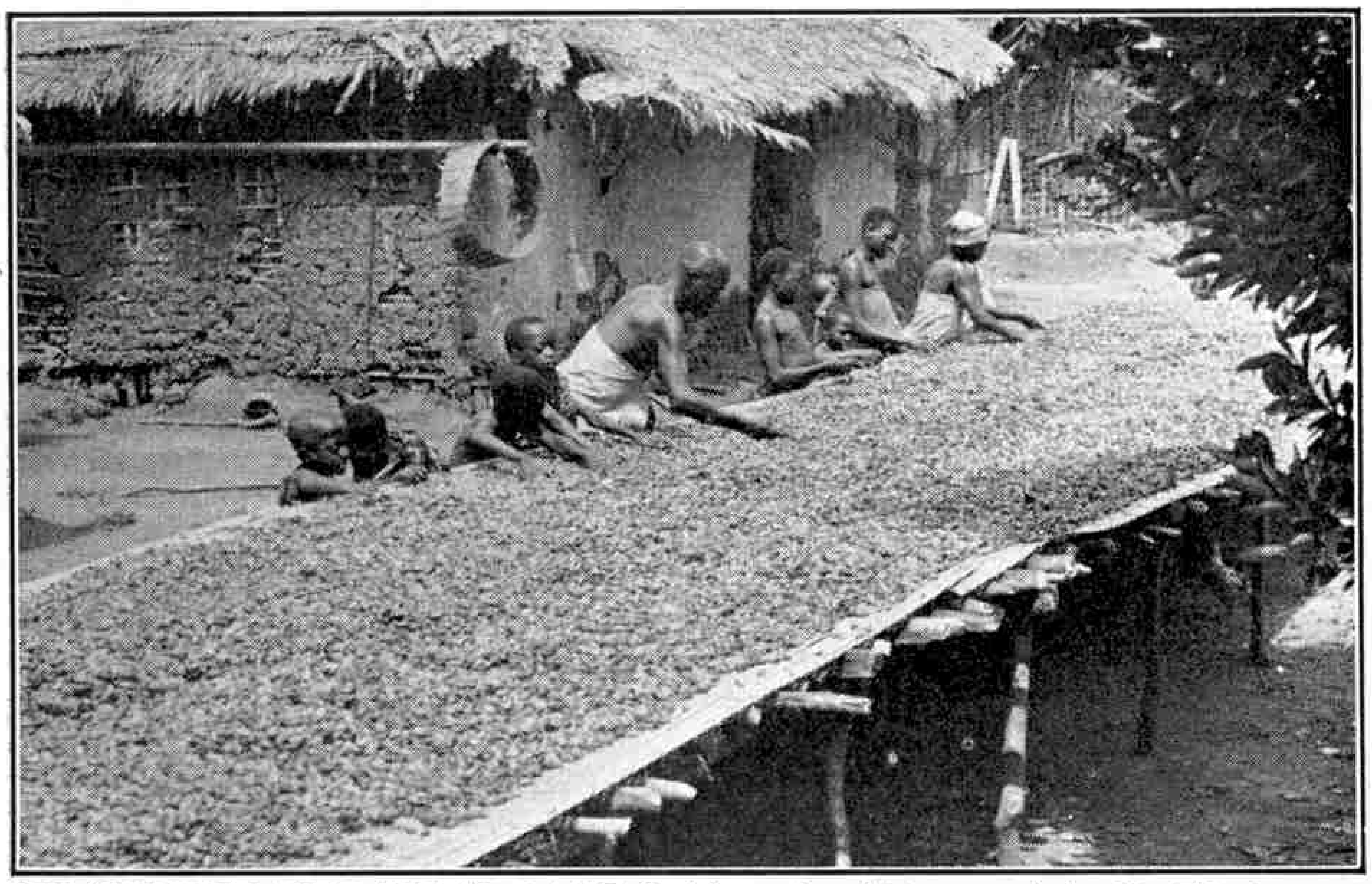
This department has an elaborate system of elevated tracks. Tins of the three stock sizes, to hold 1 lb., ½ lb., and ¼ lb. respectively, are travelling continuously overhead, up and down chutes and in and out of machines, and the effect is all the more uncanny because there is no visible motive power. The secret is that most of the movement is due to gravity, and the switchback-like tracks keep the tins in steady motion, checked at strategic points by sharp-eyed girls.

Filling the paper-lined tins is really a continuation of the above processes. The hoppers referred to are cone-shaped and at the base of each is an ingenious device in the form of a scoop actuated by balance weights. As soon as the scoop holds exactly the right quantity the balance is disturbed, and the waiting tin is filled automatically. Since the tins are passing at the rate of five a second it is a miracle of timing. Each paper-lining machine deals with 27,000 tins in every eight hours; each labelling-machine handles double that number in the same period, and the yearly output of the factory of Cadbury Bros. Ltd., where I saw these processes in operation, is 50 million tins made, filled, labelled and packed.

Cocoa powder for chocolate is basically the same, though the butter content is higher. Other ingredients are added, the principal of which is sugar. Sugar for making chocolate has to be extremely fine in order to produce the "velvety" texture on which the firm prides itself. So fine, indeed, is the sugar used that 1,000 of its crystals are insufficient to cover a pin's head. Milk too is a very important ingredient, as is indicated by the yearly consumption of 24 million gallons of milk. This comes from 1,500 farms, and its supply necessarily calls for elaborate organisation.

Whatever the ingredients it is essential that they shall be perfectly blended, so that any one batch of chocolates will be identical in consistency and purity with any other. Mixing and grinding are combined in one powerful machine, called a "melangeur," and a further process in the refining is called "conching," which is a form of kneading that may last for three or four days. The resultant chocolate mixture becomes the base of either moulded chocolate, the kind bought in bars or blocks, or of confectionery chocolate. The first type is mass-produced in so far as the molten chocolate is automatically moulded, cooled, tapped out and wrapped in successive layers of transparent, silver and printed paper before being packed swiftly into cartons. The second type means centres of creme, nut, toffee, caramel, marzipan, etc., coated with chocolate.

Bars and blocks are wrapped and weighed mechanically at the rate of 85 a minute; the individual chocolate is produced more slowly, and calls for real artistry. Hard centres are easy to handle, creme centres are produced by an ingenious machine, of which an integral part is a sequence of cornflour moulds previously shaped by glass wedges. Into the cornflour mould the creme is poured from a number of nozzles. The creme sets lightly, and can then be separated from the mould, which can be used over and over again after it has been sifted.



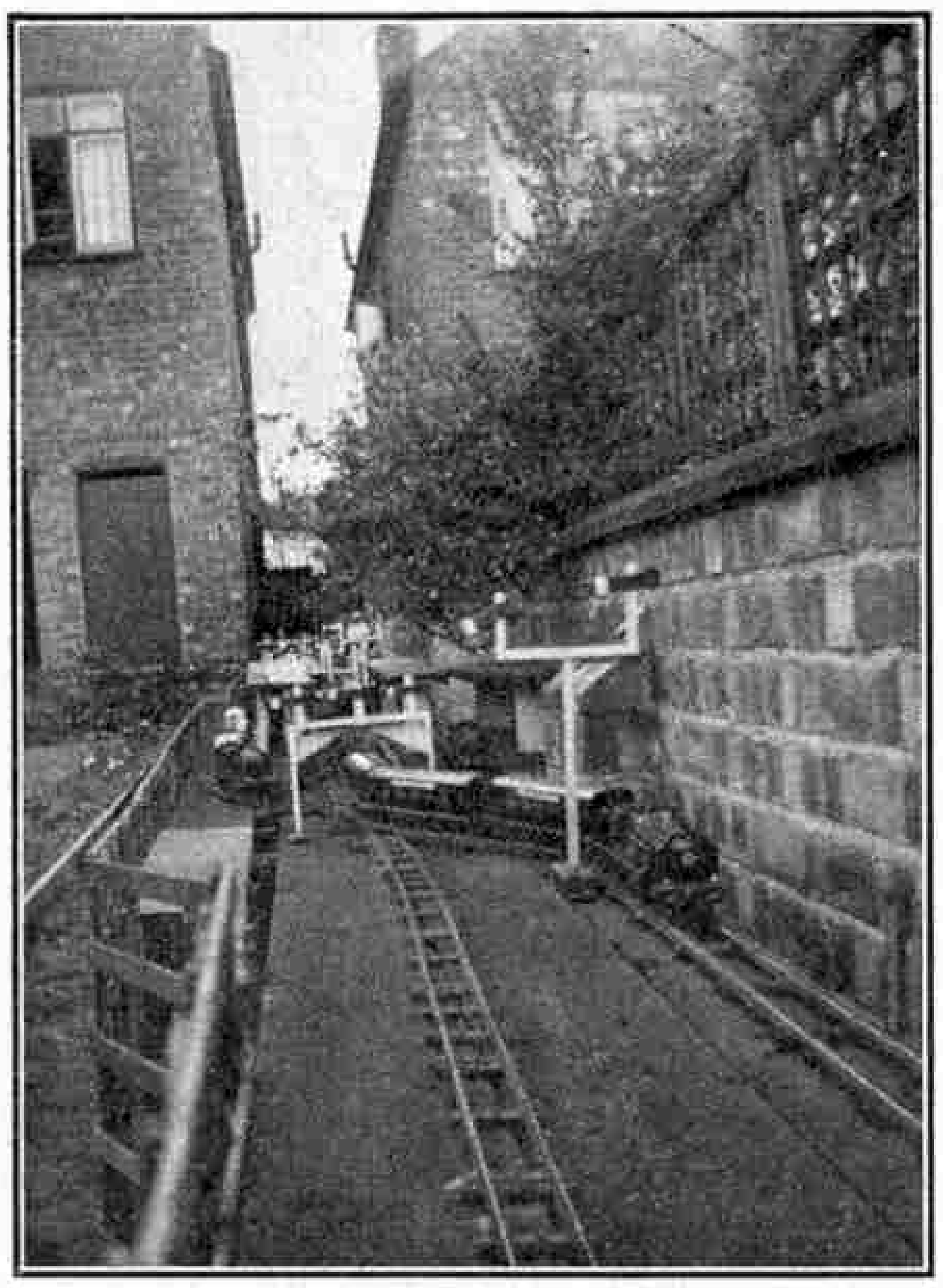
Cacao beans spread out to dry before shipment to England for use in making cocoa and chocolate. This photograph and the upper one on the opposite page are by P. B. Redmayne, A.R.P.S.

In the next department the centres have been distributed among a number of highly skilled workers, each of whom sits in front of a shallow bowl of slightly warmed chocolate, and has a battery of wire forks with two or three prongs. The speed at which these girls pick up a centre, dip and twirl it in the chocolate and deposit it on a sheet of embossed paper is amazing. The coated centres then pass to further tables at which the most highly skilled workers are to be found. Each holds a small paper syringe filled with chocolate of exactly the right consistency. The trays of chocolates lie in front of them, and with astonishing speed the girls adorn each chocolate with the three-line, scroll, spiral, or other design by which the purchaser will recognise the different varieties. And meanwhile, because the paper tray on which the chocolate stood while it cooled was embossed with the name of the firm in reverse, each has been autographed underneath.

The packing room gives an impression of chaos at first, but in reality all is a miracle of organisation. Trays of finished chocolates are being brought up by elevators from the department below and conveyed to their respective tables. Each packer has her own supply of crinkly paper, cups, corrugated paper, and boxes, and mounted in front of her is a chart, which she has long committed to memory, that indicates the exact position of each chocolate in the box she is to pack. A test against a set of scales proves that not one box in a thousand has been wrongly filled even to the extent of one chocolate.

To-day, when we can buy chocolate for a few pence, it is interesting to look back to the time when, just three hundred years ago, chocolate might cost anything up to fifteen shillings a pound, and was a luxury for the wealthy. It is only comparatively recently that it has come within the reach of everyone, and some idea of the increase in cocoa and chocolate production can be gleaned from the fact that 60 years ago the firm referred to in this article employed only 230 people, while to-day its workers in England alone number between 10,000 and 11,000. As a result, figures of production reach almost astronomical proportions. For instance, 30 million boxes are made on the premises yearly, and 6,000 miles of cord and ribbon are used for tying them. The journey from pod to packet is indeed an elaborate one.

Weighing cocoa automatically into tins.



The first and second portions of "The Irish Mail" passing one another.

"Irish Mails" in Miniature

An Interesting Hornby Garden Railway

ONE of the most interesting layouts described in the "*M.M.*" is that operated by W. Southwell, H.R.C. No. 43323, and his father, Mr. J. Southwell, H.R.C. No. 53918, who is no less enthusiastic than himself. The layout was dealt with in the "*M.M.*" for November 1937, when it was operated in the garden of Mr. Southwell's house in Holyhead. It has since been transferred to his new home in Northampton, where it has again been laid out in the open and in ideal surroundings for the purpose.

The layout still retains its old form. It will be recalled by readers that it is a non-continuous line representing the L.M.S. main line from "Euston" to "Holyhead." The geography of the real L.M.S. system is not copied exactly, and the layout has been modified to allow a variety of really interesting main line and branch operations. The track is laid out in the shape of a horseshoe, or letter "U," with "Holyhead" and "Euston" as its termini; and there are various branch lines connecting "Liverpool," "Manchester," "Shrewsbury," "Northampton" and "Swansea" with the main line.

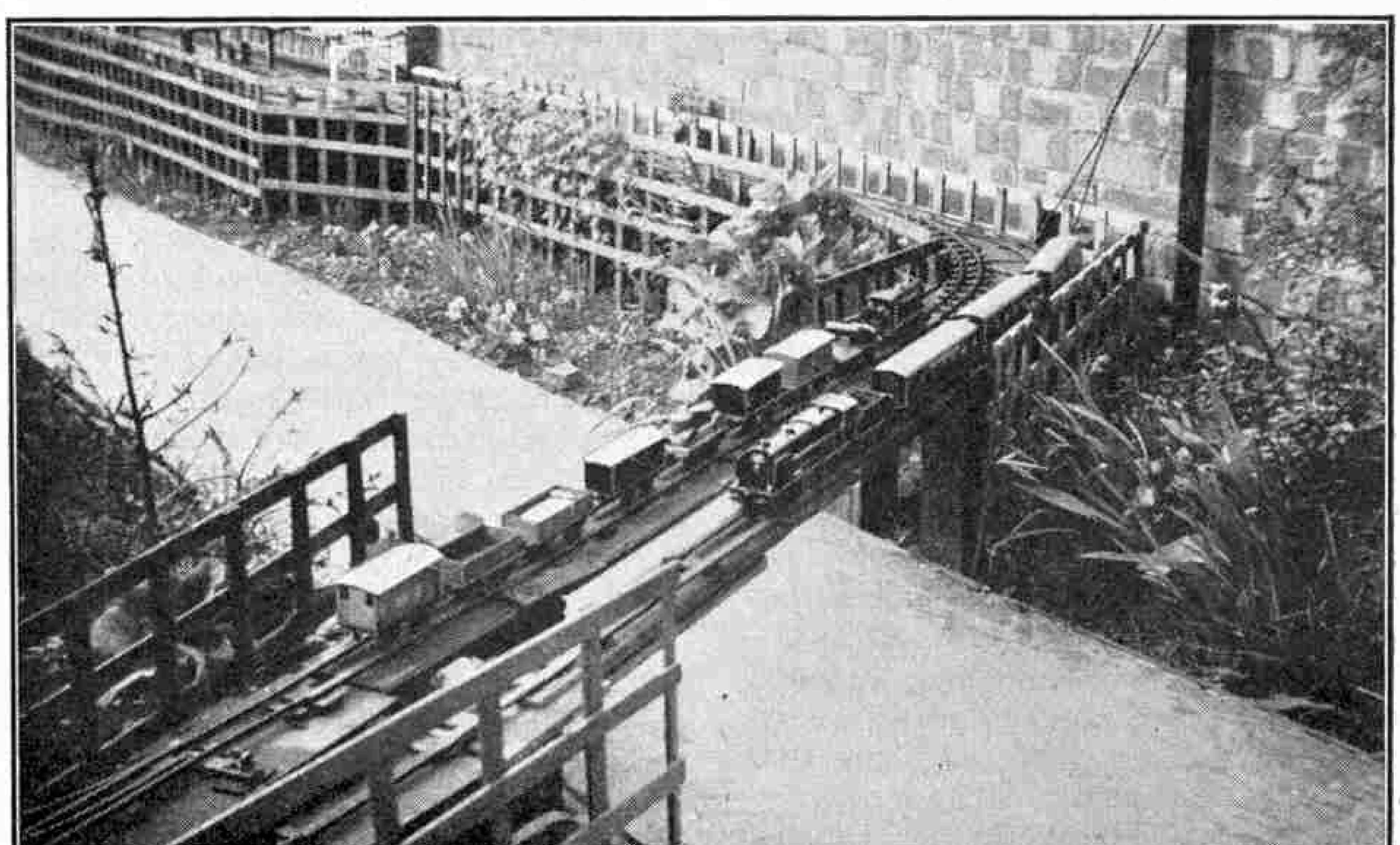
This fascinating layout is in continuous operation from April to October each year, and during this period it is a permanent fixture out of doors. Sheds are available for the protection of the locomotives and rolling stock during the short periods in which the trains are not actually being run. One of the features of the line is a representation of Kilsby Tunnel, which is on the main L.M.S. line near Northampton. The miniature tunnel has been fitted with doors at each end, so that it can be used as a store for rolling stock.

Although traffic working is the main consideration of the owner of the line, its engineering features have by no means been neglected. For convenience the tracks are raised on a wooden structure, most of which is hidden during the summer months by foliage. The rails used are mostly of the standard Hornby Tinplate type, and have been made weather-proof as far as possible by coating them with black stove enamel. This was a very tedious job on account of the large number of rails used on the layout, but the labour has been found to be well worth while, as the treatment has been entirely successful.

The winter months are not a time of idleness on the Southwell railway, for it is then that any reconstruction work that may be necessary is carried out, and alterations are made in the light of experience gained during the running season. Extensive changes that have been planned and carried out in winter have led to greatly improved services. For instance, "Shrewsbury" station was entirely rebuilt. It now has five platforms, three of which are 8 ft. 6 in. long; and in addition there are two bays each 4 ft. 6 in. long. All the station offices and buildings, including booking offices, refreshment rooms, waiting rooms and a bookstall, are concentrated on one platform.

Like its counterpart on the L.M.S. system, "Crewe" Station is a busy junction where the Liverpool branch diverges from the Holyhead line. The station consists of three platforms, all of which are covered in. Each platform is 7 ft. long; two of them are main line platforms, and the third is used for branch line connections and local trains to "Shrewsbury" and "Manchester."

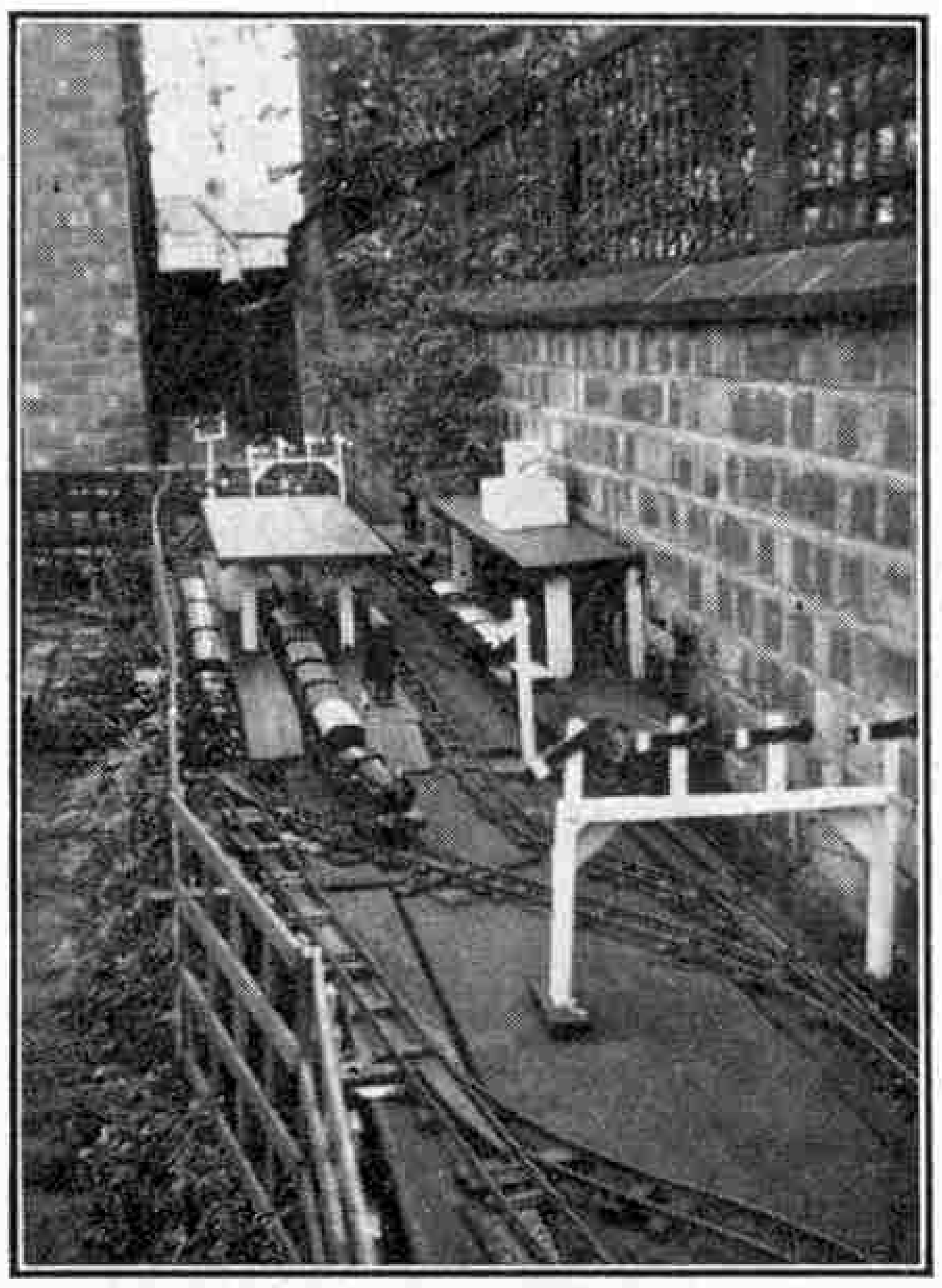
Improvements have been effected also at "Holyhead," which was completely rebuilt in order to represent fairly accurately the layout of the real station. There are two covered platforms 9 ft. in length, one on each side of the harbour, as in actual practice. The baseboard between the quays is painted blue to represent the water, and on it are operated specially constructed models of the L.M.S. mail steamers "*Hibernia*" and "*Cambria*." A scheme is on foot to install a tank here, so that in future the cross-channel steamers will operate on real water instead of on a painted sea!



A fine lift bridge on the layout of Mr. Southwell, Northampton, which is described in this article. It carries the main line over the garden path.

The model ships *"Hibernia"* and *"Cambria"* are fitted with Meccano Ships Funnels. These Funnels have been repainted buff, with black tops, the colours of the L.M.S. The "fleet" includes also the *"Slieve More,"* a cargo steamer. The realism with which railway operations on this garden layout are carried out is extended to the operations at sea. The boats are run as in actual practice, and relief boats are operated when traffic is heavy.

All trains are run strictly to a timetable based as nearly as possible on that in force on the real L.M.S. line represented. This means intensive running, and careful preparation is necessary when planning services on such a scale. Complete working timetables are devised for a whole season, and from these it is possible to tell the position of every locomotive and each piece of rolling stock at any given time throughout the whole of the running period! The completed timetable and working arrangements are set down in a notebook, which is a very useful record and guide when the arrangements for another season are put in hand.



Station activity. A local train is seen departing from the platform.

An account of the locomotive stud and rolling stock in service on this layout makes very interesting reading. Three Hornby No. 3C "Royal Scots" undertake the hardest duties, which is very appropriate in view of the employment of the "Royal Scots" on *"The Irish Mail"* trains of the L.M.S. These engines are well supported by two No. 2 Special "Compounds," which undertake some of the lighter but none the less important duties of the line. Other engines include a No. 2 Special Tank Locomotive, a No. 1 Special Tank Engine, an M3 Tank Engine and a No. 1 Tank Engine, all of which are useful for operating the various branch line and connecting services that form an important feature of the working of the line.

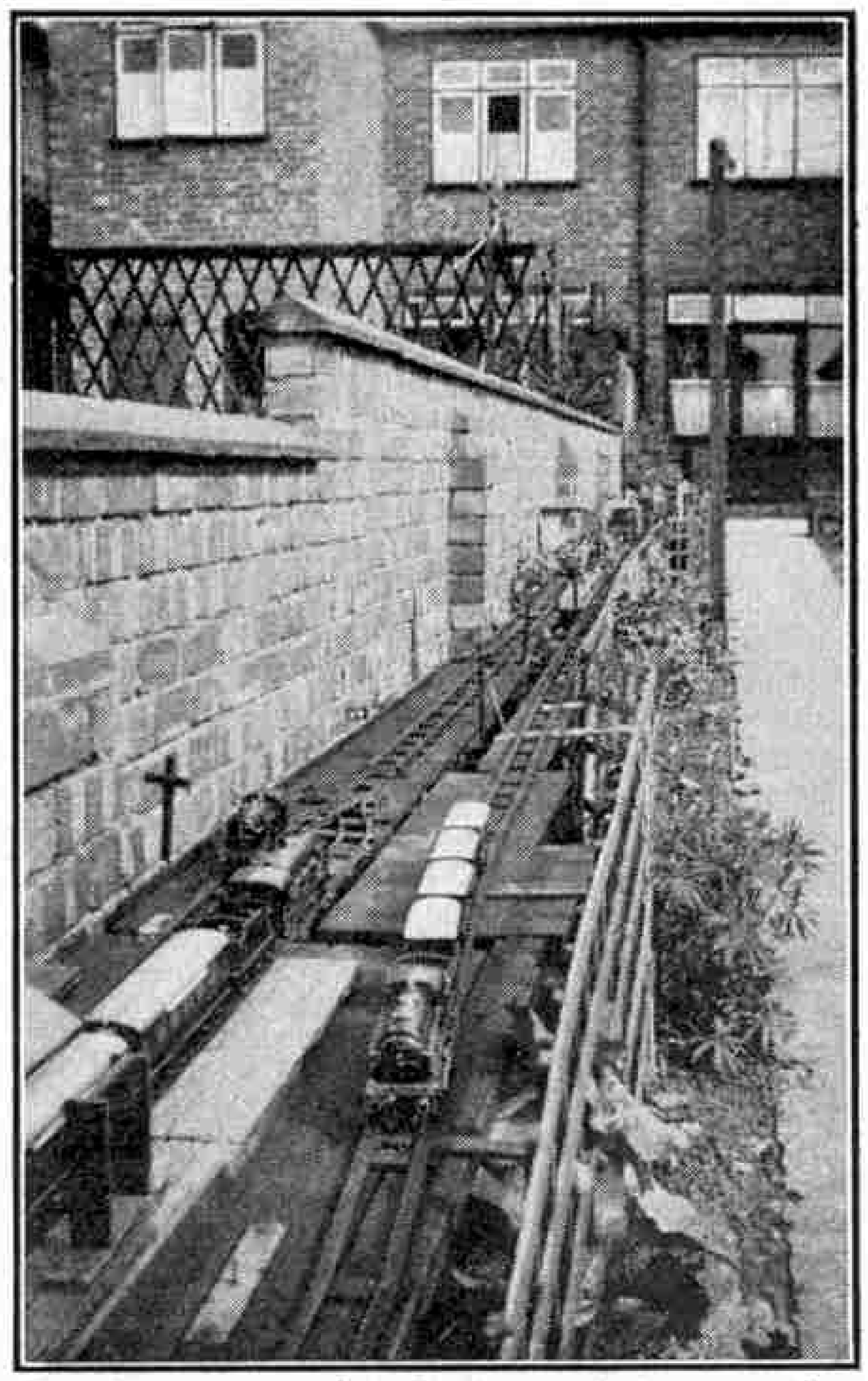
For the passenger services extensive use is made of Hornby No. 1 Coaches and Guard's Vans and No. 0 Pullman Coaches. These short four-wheeled vehicles fit in with the general scheme better than bogie stock, for they allow a greater number of through coaches to be worked. There are four Corridor Coaches in use, however. An interesting development in connection with the mail services has been the repainting of two of the No. 1 vehicles to represent mail stowage vans. There are no less than 50 coaches on the line, with 10 goods vehicles of various kinds. These include the four Corridor Coaches, 15 No. 1 Coaches and 22 No. 0 Pullman Coaches that have been repainted in L.M.S. colours.

"The Irish Mail" trains are the most important of those run on the layout, and as much as possible of the L.M.S. timetable for the real services is included in the miniature timetable that has been drawn up. During the summer months *"The Irish Mail"* trains are run in four parts. The first portion from "Euston" is the stopping train, which is overtaken en route by the second portion that runs non-stop from "Euston" to "Holyhead." In the peak periods the train services are augmented as in actual practice, and boat traffic is busier in consequence. With the exception of the Scottish services all the main trains on the Euston-Crewe line are run, and in addition to the usual day services the night services also are operated in both directions.

Besides the main line passenger services there are several goods trains, the paths of which have to be plotted along with those for the passenger trains.

When the layout is being operated no running is commenced that cannot be completed. For instance, if at any time only 10 minutes remained to carry out a scheme that would take, say, 20 min. or half an hour, that scheme would not be started.

Four different kinds of services are run, representing respectively



Running into the station. The local train is approaching while the main line express is about to start its journey.

winter and summer week-day services and the corresponding Sunday services for both seasons. For each kind of service there are various different groups of workings, which form what the owners describe as "episodes." An "episode" consists of a complete operation of one or more main line trains, with connecting trains and through coach services.

Another Interesting Layout

An interesting example of a line that has been carefully planned to represent a section of a real railway is that of John Kirkby, H.R.C. No. 59600. This layout is electric and represents the S.R. main line between Victoria and Dover Marine, over which boat trains run. Passenger trains between "Victoria" and "Dover Marine" on Kirkby's layout are hauled by an E420 *"Eton."* At times this takes six coaches, and then is given banking assistance up a steep incline soon after leaving "Dover."

The scale of the layout is shown by the fact that a large signal cabin outside "Victoria" contains 13 levers, all controlling points. The signals for the entire system are controlled from a special frame of 38 levers. All operations are carried out to timetable and the running of boat trains, together with that of other passenger expresses and freight trains provides realistic railway working.

NEWS FROM H.R.C BRANCHES

First Norwich.—Good progress is being made by this recently incorporated Branch. Regular weekly meetings are being held. The layout has been enlarged, and electric and clockwork trains have been run to timetable. Games have been played at the close of each meeting. The laying of an outdoor track is under consideration. Secretary: K. Fanthorpe, 132, Magdalen Street, Norwich.

Acton.—An attractive programme is being followed by this well-established Branch, whose arrangements in some cases are made as much as a year ahead so that a full prospectus of activities is available beforehand. The relaying of the track has been completed, and the construction of stations and other buildings and equipment for the layout is in hand. Timetable train running has been carried out regularly, a special buzzer code being used to control train movements. Rolling stock and locomotives have been thoroughly overhauled. Two short Talks by members dealt with the Romney, Hythe and Dymchurch Railway and the Hammersmith and Chiswick Branch of the L.M.S. respectively. A Branch Library has been formed and a Magazine started. Visits have been paid to railway depots and other places of railway interest. Secretary: S. W. Simmons, 7, Alfred Road, Acton, London W.3.

Everglades (Cosham).—Improvements to the Branch layout have included the lengthening of steel track at one terminal station to allow main line expresses to run right alongside the platform. The arrangement of the tinplate track in the goods yard has been changed to facilitate shunting. A Visit to the Model Railway Exhibition at London was greatly enjoyed. A non-continuous outdoor track was laid down for use during the Summer Session. Secretary: P. D. Stuart, 7, Lodge Avenue, Cosham, Hants.

Islandmagee.—Outdoor meetings have been held whenever possible throughout the Summer Session, with meetings in the club rooms when the weather was bad. The chief activities have included treasure hunts, paperchases and picnics, with cricket as a diversion, and enthusiastic preparations have been made for the football season. Secretary: S. McCready, "Hillmount," Islandmagee, Co. Antrim.

St. Luke's (Battersea).—Following a visit to the Model Railway Exhibition, many interesting suggestions for improving the Branch layout were made by members. All proposals were fully discussed and some have been adopted. The summer programme included many good rambles. All equipment has been thoroughly overhauled, and members are looking forward to successful operations during the Winter Sessions. Secretary: W. C. Hill, 29, Eswyn Road, Tooting, London S.W.17.

Purley County School.—A Lantern Lecture open to all boys of the School was well attended, and five new members were enrolled. Track meetings have been held, and electric and clockwork layouts operated. Examinations and holidays prevented meetings for a short time, but the programme for the Winter Session is now in full swing. Secretary: D. J. Hardwick, "Woodcroft," Beech Drive, Kingswood, Surrey.

Saltash Model Engineering Club.—Satisfactory progress is being made by the Track Building Section, and extensions are made from time to time on the layout. Trestles to support the layout have been constructed. The steel track section has been linked with the brass track, and interesting train running has been carried out on the large combined layout. Goods trains of 20 wagons are a regular feature, and a Hornby No. 2 Special Tank makes light work of them on a 1 in 60 gradient. More posters have been obtained to decorate the club room. The Branch displayed work at the recent Exhibition of the Plymouth M.C. Preparations are in hand for the Branch Exhibition in November. Secretary: B. R. J. Braund, 9, Homer Park, Saltash.

South West Hounslow. — Regular meetings have been held, and the adoption of steel track is under consideration. Electric signalling has been introduced, resulting in more realistic train running. Games Evenings have been enjoyed, and other activities include a Visit to Frimley and Camberley and a Debate. Secretary: A. E. Foot, 5, Linden Avenue, Hounslow, Middlesex.

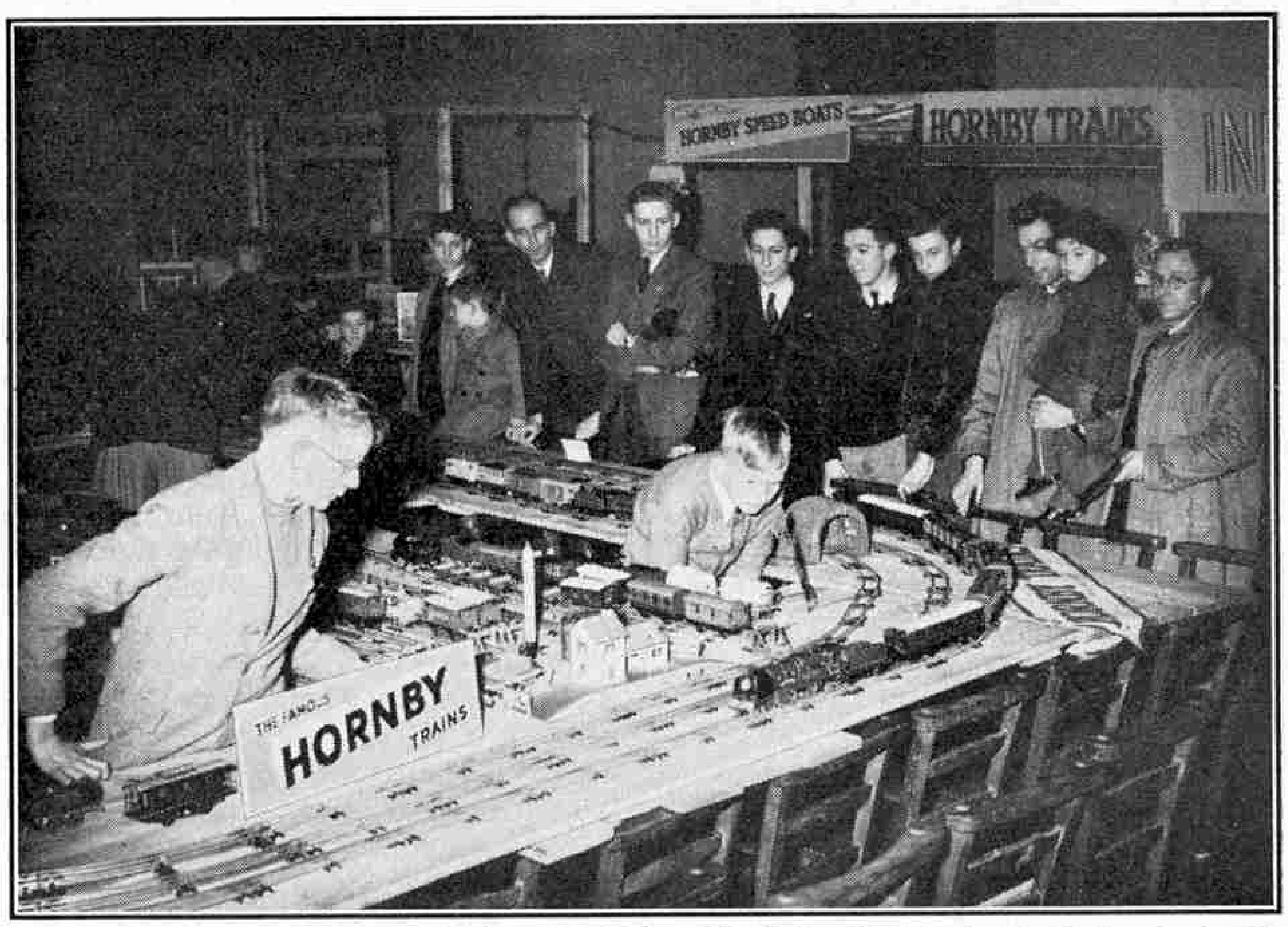
NEW ZEALAND

Wellington West. — Model railway activities continue to be followed with great enthusiasm, and an excellent double-track layout has been built up in the new club rooms. The stations on this represent Euston, Carlisle and Glasgow, with large marshalling yards at each terminus, and 14 locomotives of various types are in use. Trains run include many correctly-formed freight and stock trains in addition to passenger locals and expresses. The recently-formed Meccano Section is very popular, and a special evening each week has been set aside for meetings. A General Knowledge Competition, a Mock Trial and a Draughts Tournament have been held. Talks on "*The Royal Air Force*" have been given by members. A vigorous recruiting campaign has been inaugurated. Secretary: K. R. Cassells, 26, Sugarloaf Road, Brooklyn, Wellington.

Proposed Branches

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

Dudley—P. G. Norton, "Fairfield," 13, Selbourne Road, Dudley.
Glasgow—D. Mabon, 63, Stonyhurst Street, Possilpark, Glasgow.
Hawick—J. Murray, 18, Minto Place, Hawick.
Hounslow—D. Cook, 16, Ivanhoe Road, Hounslow.



Some of the 800 visitors to the recent joint Annual Exhibition of the St. Oswalds (Thornton Heath) Branch, No. 340, and the associated Meccano Club. Keen interest was shown in the running of express trains on the fine Branch layout, on which extensive track operations covering many types of traffic were reproduced with the aid of 18 model locomotives. The St. Oswalds Branch was incorporated in February 1938, and under the able guidance of Mr. W. Jaques it has been very successful.

Barnard Castle School.—The Summer Session has been particularly enjoyable, and co-operation amongst members has resulted in good progress being made. Timetable train running has been carried out on the Branch layout, and bus services and taxis also were operated in conjunction with these, using Dinky Toys. Outdoor games have been held regularly, and a number of cycle runs organised. Secretary: A. Coates, The School, Barnard Castle.

Branches Recently Incorporated

377. Monkstown—Mr. R. F. Pierce, 20, Monkstown Road, Monkstown, Co. Dublin.
378. Australia—Mr. L. H. Rye, M.A., 15, Stuart Street, Manly, New South Wales.
379. Hounslow—Mr. W. Jones, 70, Great South West Road, Hounslow, Middlesex.

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

HORNBY RAILWAY COMPANY COMPETITION PAGE

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

A RAILWAY NAMES PUZZLE

The keen interest of members of the H.R.C. in the railway problems set before them month by month is shown by the steady increase in the number of entries in the competitions announced on this page. Word-building and word-finding problems in which entrants have to exercise both their ingenuity and general railway knowledge are always popular, and this month we announce a puzzle of this type.

In the panel in the centre of this page are 16 names of truly alarming appearance. It seems almost incredible that such extraordinary collections of letters can be arranged to make real words, but actually they hide the names, consisting of one, two or three words, of four locomotives, four British railway stations, four famous trains and four locomotive parts. Competitors are asked to discover these names, or as many of them as possible, and to write them down in the order in which they appear in the panel. Short descriptions of the purpose of each of the locomotive parts should be given, and the stations should be further identified by giving the initials of the railway company or companies on whose lines they are. With the names of the trains represented in the list their starting points and destinations should be given.

JERTCONI	**WWSNTRAO**
KKRRTTIIAADHEC	**KETRNAUCRRN**
MALRTCNIHA	**RXBEUCAIL**
TGWEAABNLECHI	**KUNINLONI**
NOLIBTRSHEAIT	**SSSEEPXRNHEPITE**
DITOMNIBELA	**LBLBEEEEORUHTOUMTHN**
GSINSKEBOAT	**TUMMSREEAS**
TFYSAEHHGOORRRUCBLE	**TLITLILOLNAASCE**

The Contest is open to all H.R.C. members and is divided into two sections, for Home and Overseas readers respectively, and prizes consisting of Hornby Train material (or Meccano products if preferred) to the value of 15/–, 10/6 and 5/– respectively will be awarded to the senders of the three best solutions received in each. In the case of a tie for any prize, preference will be given to the entry that is neatest, or is presented in the most novel or ingenious manner. Envelopes containing entries must be clearly marked *"H.R.C. October Mixed Names Contest"* in the top left-hand corner and posted to reach Headquarters at Meccano Limited, Binns Road, Liverpool 13, on or before the 31st October. The Overseas Section closing date is 31st January 1940. It should be remembered that entries should bear the sender's name, full address, membership number and age.

Layout Planning Contest

By this time of the year nearly all miniature railway enthusiasts will have once more brought their indoor railways into operation, possibly after a holiday from model railway affairs, or after working an outdoor layout during the summer months. In almost every case changes in layout will be contemplated in order to increase the fun and realism of operations. We are greatly interested in the ideas of H.R.C. members for improvements of this kind, and in the layouts that will be the result, and this month we offer prizes in a special "Layout Planning Contest" for which every H.R.C. member can enter.

For this contest competitors must submit a design for a layout incorporating two terminal stations, one of which must include "run round" loops and direct access to an engine shed and turntable. The arrangement of the other terminal station and of the line generally is left to the competitor's own judgment. An intermediate station with a small goods yard also must be shown. It should be remembered that layouts will be judged on their possibilities for railway working and not in accordance with the amount of material employed. Drawings should, as far as possible, be made to a definite scale, and we suggest 1 in. to 1 ft. as a suitable one. The space to be occupied must not exceed 15 ft. by 10 ft., and competitors should note that the layout plan submitted, must be one that can be built up with standard Hornby Tinplate Rails.

The contest will be divided into two sections: Home and Overseas. Prizes consisting of any Meccano products to the value of 21/–, 15/– and 10/6 respectively will be awarded to the senders of the three best entries. A number of consolation prizes will also be awarded. A similar set of prizes will be reserved for Overseas Competitors.

Envelopes containing entries should be clearly marked *"H.R.C. Layout Planning Contest"* and posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, by 31st October. The closing date for the Overseas members is 31st January 1940.

Competition Solution April Locomotive Contest

WHEELS: Leading bogie, "A4" "Pacific" L.N.E.R., Driving wheels, "Duchess," L.M.S., Rear bogie, 2–10–4 Chesapeake and Ohio R.R., Tender frames and wheels, Johnson Midland Compound.

LOCOMOTIVE BODY: Boiler, Footplate and Cab, "A4," L.N.E.R., Bulbous front and cowcatcher, 4–6–4 A.T. and S.Fe.R.R., Cab roof and windows, "Duchess" L.M.S., Bell and Headlamp, *"Coronation,"* L.M.S.

TENDER: Body, "Duchess" L.M.S., Top, "A4," "Pacific" L.N.E.R.

COMPETITION RESULTS

HOME

July "Jumbled Sentences Contest" (Junior Section) — First: R. ASHWORTH (59406), Norton, Sheffield. Second: G. W. EDMANDS (46574), Merton Park, London S.W.19. Third: B. WARBURTON (62904), St. Annes-on-Sea, Lancs. Consolation Prize: A. J. HAWKINS (60839), Wellingborough, Northants; P. N. WILLIAMS (62267), Bromley, Kent; JOHN NORTHCOTT (65446), Taunton, Som.

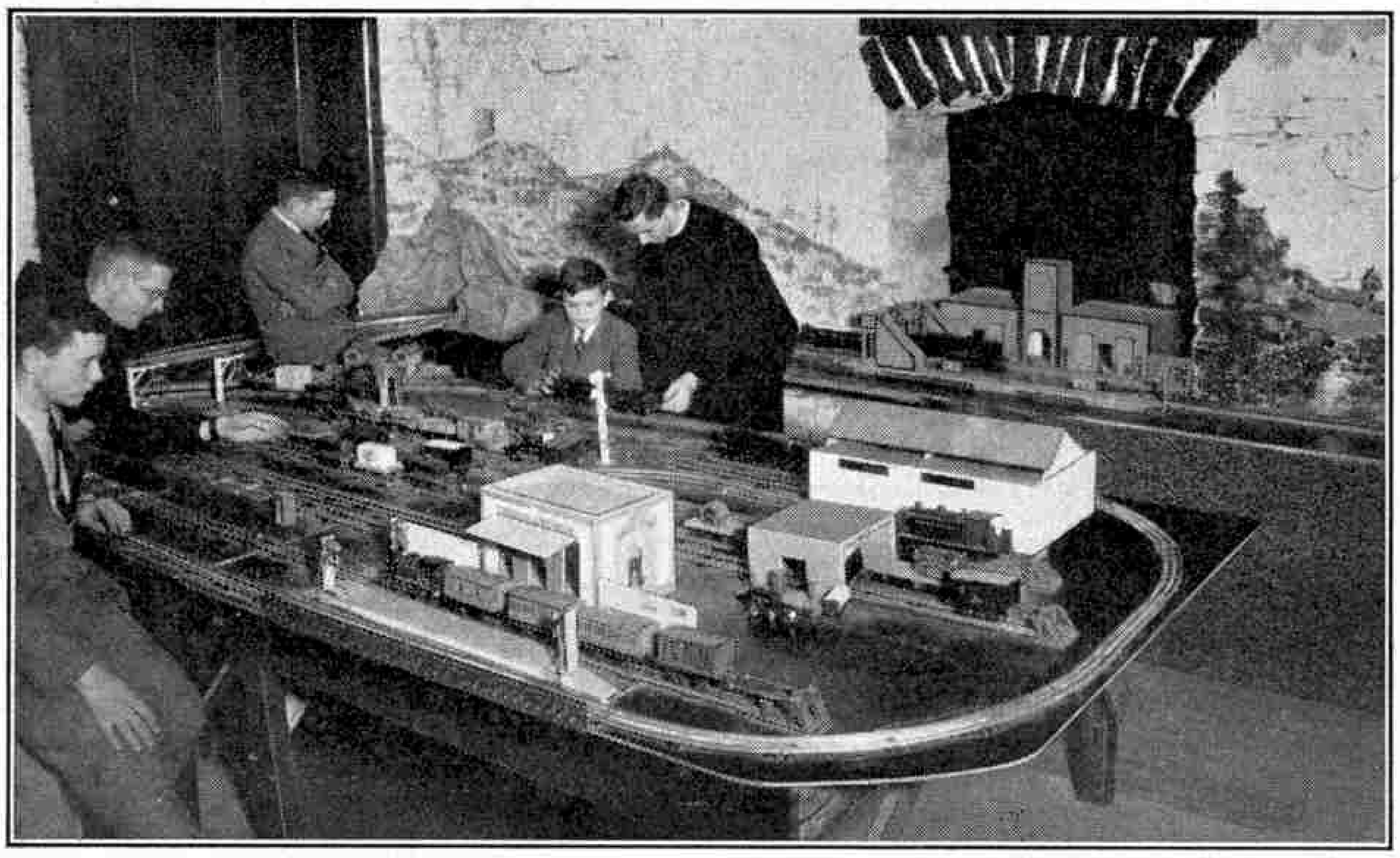
July "Puzzle Contest" (Senior Section).—First: D. G. COAKHAM (28368), Upper Rathmines, Dublin. Second: M. HOSKINS (16653), Exeter, Devon. Third: J. T. FRASER (2267), Exeter, Devon. Consolation Prize: R. LUCAS (9439), New Barnet, Herts.; V. D. CRAWLEY (62829), King's Langley, Herts.; R. J. NELSON (63116), St. Annes-on-Sea, Lancs.; G. HARRISON (62767), Betchworth, Surrey; D. GLEN (59468), Barking, Essex; J. H. NORRIS (61349), Rednal, Nr. Birmingham.

July "Photo Contest No. 4."—First: T. FLETCHER (6057), Birmingham 20. Second: A. F. COOK (218), Doncaster. Third: R. K. JEFFERIES (52700), Southall, Middlesex. Consolation Prize: S. GARBUTT (30122), Timperley, Cheshire; J. TURLEY (18853), Tunbridge Wells, Kent; L. K. M. MASTERS (55301), Bletchley, Bucks.; J. TREE (59960), Bishopstone, Nr. Seaford; C. O'FARRELLY (64383), Dublin; E. A. SMITH (18407), Liverpool 7.

OVERSEAS

April "Loco Composite Contest."—First: W. C. COLES (63881), Woodville, South Australia. Second: D. MURISON (37642), Buenos Aires, South America. Third: W. S. EAGLE (31779), Bombay, India. Consolation Prize: R. PEARSON (29199), Victoria, Australia.

April "Photo Contest No. 1."—First: R. B. MCMILLAN (9592), New South Wales, Australia. Second: H. BENNETT (10615), Auckland S.W.1, New Zealand. Third: R. PEARSON (29199), Victoria, Australia. Consolation Prize: B. SCHMIDT (53854), Wellington, New Zealand; R. MYBURGH (37538), Cape Province, South Africa; K. R. CASSELLS (39510), Wellington, New Zealand; G. C. TAYLOR (59265), New South Wales, Australia; P. F. SMITH (54173), Medindie Gardens, South Australia; P. MACDONALD (43305), Toronto, Canada.



A portion of the interesting layout described in this article.

Hornby Trains at Belmont Abbey School

THERE is a large and flourishing Model Railway Club at the Belmont Abbey School, Hereford. Its extensive track is laid in two adjacent cellars of the Abbey buildings, and ingenious use has been made of the surroundings to add to the interest of train running. The members are very proud of their miniature railway, on which an extensive service of Hornby Trains of all kinds is run with due regard to the reality of operations. The Director of the club is the Rev. C. M. Wolf, O.S.B., to whom we are indebted for our information and illustrations.

The layout occupies two rooms. In the main room there is a double track, raised some three to four feet from the floor, running close to the walls. Both lines are connected to a loop-line about 30 ft. in length, and in one corner they pass through a tunnel bored through a wall 18 in. in thickness and wind their way through to the second room. There they pass under an archway at the far end, and finish at a large terminal station in an annexe. The track consists almost entirely of steel rail. Its total length is approximately 250 ft., and it includes some 36 points.

Both goods and passenger trains are run, the latter to carefully worked out plans. Hornby locomotives and rolling stock are prominent in these operations, as our illustrations show. Among the Hornby locomotives of which good use is made are a Riviera "Blue" and two No. 1 Special Tank Locomotives, all of which can be seen in our upper illustration. The rolling stock includes Corridor Passenger Coaches for passenger traffic, and Hornby Tank Wagons, Vans, Open Wagons, and Lumber Wagons. Meccano parts have been ingeniously applied in the construction of a special breakdown crane, which is seen in the illustration at the foot of the page.

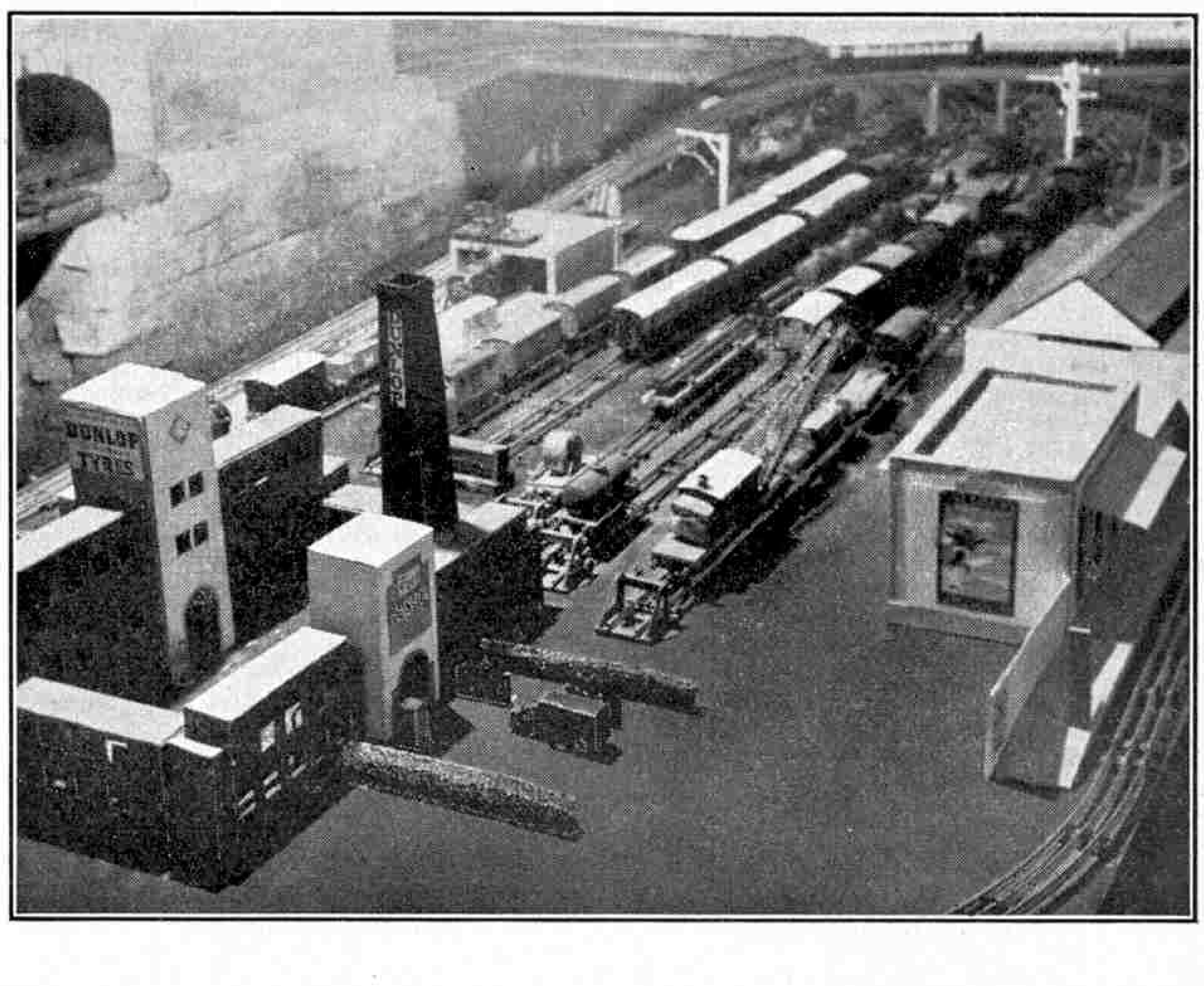
A track as extensive and complicated as this necessitated careful signalling to ensure the successful running of the trains. The signalling scheme has not yet been completed, but the greater part is now in operation. Colour-light signals are used almost exclusively; they consist of small wooden signal standards, to each of which have been screwed two miniature bulb-holders. Some idea of the extent of the scheme is shown by the fact that approximately 600 ft. of wire and 80 two-and-a-half volt bulbs have already been used in its installation.

The platform and distant signals are controlled from a signal box large enough to hold two "signalmen," and this occupies a specially advantageous position in a corner of the main cellar. Inside the cabin is a chart of the whole track, and on it the positions of all important points are automatically registered by means of lights shining through paper. The chart plays an important part in operations, as all points are controlled solely by pointsmen at the track side. This is a departure from real railway practice, but it has the advantage of providing occupations for all members during running operations.

In addition to showing the positions of points, the chart registers the movements of trains along some of the main lines, more especially along those lines in the second room and near the terminal station that are not in sight of the occupants of the signal cabin. A further help is that communication is maintained by a simple home-made telephone between the signal cabin and the terminal station and goods depot in the second room. In addition there is communication by means of bells to each of the stations.

Almost directly opposite the cabin is a second chart, on which further coloured lights register the positions of points on a small portion of the track that is complicated by the presence of 14 points. The purpose of this is to assist in carrying out operations in the goods yard, from which trains do not always run according to any fixed timetable. In other more open places small lights similar to those used on the station platforms have been placed near the points to allow the position of all points on the track to be seen at a glance from any part of the room.

Scenic effects are as yet in their early stages, but sketches in paint and crayons on the whitewashed walls of the rooms have proved quite effective. Splendid progress has been made with lineside structures, as the lower illustration on this page shows. All the buildings on the layout have been made by members out of cardboard.



Realistic lineside buildings on the layout of the Belmont Abbey School Model Railway Club.

With the Model-Builders

A NOVEL DISPLAY OF MECCANO WORKING MECHANISMS

On this page is illustrated a novel Meccano display designed by two Canadian readers of the "*M.M.*" The display was intended to demonstrate as many mechanical movements as possible, including various types of belt, chain and gear drives as well as different forms of levers. All the mechanisms are driven from one Electric Motor, and an explanatory note below each explains its practical applications and method of operation.

The mechanism display was exhibited at a children's fair in Ocean Falls, and Mr. Barry tells us that it was a great success, attracting considerable attention from the young visitors to the fair.

MECCANO MOTORS AND DRY BATTERIES

We receive a large number of queries regarding the suitability of dry batteries as a source of current for the Meccano 6-volt Electric Motors. Most of these queries come from model-builders who wish to incorporate their Motor in a model boat, or whose home is not supplied by alternating current mains, thus eliminating the possibility of using a Transformer. Like all motors of their type, Meccano Motors have fairly high current consumptions, and although dry batteries would operate them for a short time they would very soon become exhausted and would then be useless. The best source of current for these Motors, where it is not possible to operate them from a Transformer, is a 6-volt accumulator of about 20 amp. hr. actual capacity. When the Motor is to be used to propel a model boat one of the miniature dry type accumulators, of which there are several excellent makes, is suitable.

HORNBY SPEED BOAT DIVES OVER WATERFALL

Recently we received a letter from Master R. Payne, Sturminster Newton, in which he told us of a remarkable incident that happened to his Hornby Speed Boat "*Venture.*" Payne was sailing his boat on a river close to a waterfall near his home after a period of heavy rain. While travelling across the river the boat was caught by the unusually strong current and was swept over the falls before it could be rescued. It disappeared for some time, but finally was discovered entangled in a bush in the middle of the pond below the waterfall and well out of reach. Later the currents washed the boat on to the bank and examination then showed that it had suffered no damage in spite of its rough passage. Even the paint was unscratched, and although water had entered the hull, the Clockwork Motor was in perfect condition!

This is certainly an excellent testimony to the strength of Hornby Speed Boats, but we feel sure that Master Payne will not be keen on allowing a repetition of the incident.

A MECCANO FLUID COUPLING

An American Meccano enthusiast, R. Hittick, Cleveland Heights, Ohio, tells us of a novel form of drive he has discovered. Most model-builders know of the fluid drives and couplings used in motor and marine engineering for transmitting the power from the engine to the road wheels or propellers. These couplings, which absorb shocks in the transmission, consist essentially of two sets of vanes mounted in a casing filled with special oil. One set is driven by the engine and transmits its motion through the oil to the second member, which is connected to the propeller shaft. Hittick's system is very similar. He makes use of two Meccano Fans (Part No. 157), the blades of which are bent so that each can be accommodated in a Boiler End, the holes in which are blocked with Bolts or cardboard discs. It is a good plan to bolt Bush Wheels outside the Boiler Ends to reinforce the bearing surfaces.

The next step is to butt the Boiler Ends together to form the casing, and to bind them together with insulating tape, which serves also to block the remaining holes in the rims. One hole is left open so that some thick oil can be poured into the interior of the casing, and is then sealed.

When the driving member is rotated at high speed it will be found that the coupling will transmit a fairly strong drive. The scheme is a very ingenious and unusual one, and no doubt some of our enterprising model-builders will try it.

A NEW BOMBING GAME

Model-builders will have read of the novel air gun targets made by some Meccano enthusiasts, which were mentioned on this page in the August "*M.M.*" They will be interested therefore to learn of the exciting bombing game devised by L. Lord, Coventry, for a model aeroplane meeting. The device consists of a large box-shaped structure made from Angle Girders, and is open at the top. Rails are fitted to the upper edges of the sides and along them travels a gantry made from Meccano parts. A crab also travels on rails in the gantry so that by moving either gantry or crab in combination any point on the floor of the box can be covered. The crab is fitted with a bomb release, which may be of the mechanical or electro-magnetic type.

At the bottom of the box is an endless belt carrying a map and it is traversed slowly by a Clockwork Motor. A board under the map takes the impact of the "bombs," which are small darts.

In use the map is set in motion and the "bomber" is told which point he must hit. He then operates the gantry and crab until it is in line with the objective and releases the "bomb" when it approaches. A game of this kind is essentially a game of skill and needs accurate use of the controls to ensure a "direct hit."

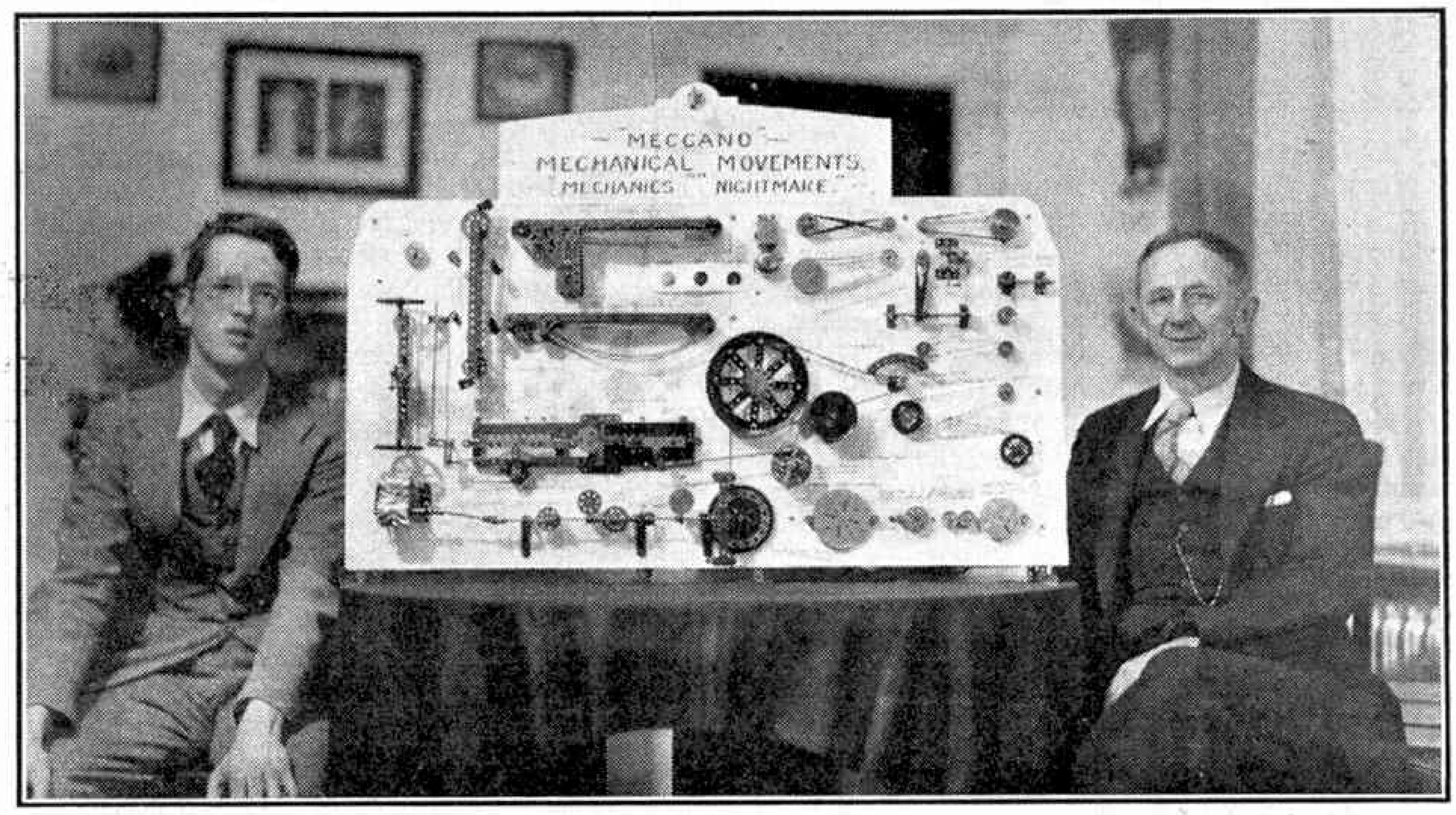
FLEXIBLE PIPES IN MECCANO

It is essential to fit many engineering models, especially those of engines, with representations of the steel pipes or hose that on the actual machine are used for either steam, oil or water. Various Meccano parts are particularly suitable for this kind of work. For example, Spring Cord makes excellent miniature armoured or flexible hose, which can be used on model petrol or steam engines, while Rods or Springs can be used for piping. If necessary the diameter of pipes made of Rods can be increased by placing Washers over them, and Springs can be used with good effect at bends in the line.

In model fire-engines it is a good plan to use lengths of Kemex Rubber Tubing (Kemex Part No. K47) for the hoses. Suitable nozzles can be made from Washers and Spring Buffer bodies. Tubing is supplied in lengths of 3 ft. and can be used for many other purposes, such as making tyres for large wheels, as mentioned on this page in the August "*M.M.*"

Turbine plants and petrol engines usually have large induction pipes for delivering steam or petrol vapour, and in cases like this it is necessary to use Sleeve Pieces, Cylinders or Boilers for the pipes. These can be joined together internally by Strips to form a continuous tube. Bends in pipes built up in this way are quite easy to make. Boiler Ends threaded on to Spring Cord can be used to make bends of almost any radius in pipes of large diameter made from Boilers, while Chimney Adaptors similarly treated can be used in conjunction with Sleeve Pieces. Flanged Wheels can also be used with 2½" Cylinders.

Flexible Plates can be employed to advantage for making tubes of large diameter, or in positions for which existing parts are unsuitable.



A fine display of various working mechanisms, built in Meccano by F. W. and G. S. Barry, Ocean Falls, Canada.

CAMERA TRIPOD BUILT OF MECCANO PARTS

With the approach of winter the amateur photographer turns his attention to indoor work, such as table-top photography and portraiture. For activities of this kind it is essential to support the camera on an adjustable stand so that the best viewpoint can be obtained. Readers who do not already possess a tripod can readily assemble one from a few Meccano parts, and the following description of a simple piece of apparatus of this kind designed by L. Shiel, Glasgow, will indicate the line on which to work.

The legs of Shiel's tripod are 24½" Angle Girders bolted together to form U-section girders, and further similar girders are arranged to slide in the first set. The length of the legs can thus be adjusted by sliding the girders in or out, the girders being held in the desired position by short Rods pushed through them. The legs are pivotally attached at their upper ends to a triangular frame on which is bolted a 3" Pulley. A second Pulley is arranged to swivel on the top of the first one so that the camera can be slewed round, and on this is fitted a platform to hold the camera. This platform can be tilted by a screw movement and consists of a 2½"×1½" Flanged Plate hinged at one end.

The camera is mounted as follows. A ¼" Whitworth bolt is obtained and its shank is cut to a length of about ⅜" to ½". It is then pushed through a hole specially drilled for it in the Flanged Plate. This bolt is screwed into the tripod adaptor on the camera, which it fixes to the Flanged Plate. A suitable bolt may be obtained from any tool shop. To complete the tripod pieces of rubber can be fixed over the ends of the tripod legs and a piece of felt glued to the 2½"×1½" Flanged Plate.

We shall be glad to receive details of any other interesting photographic apparatus designed by readers.

A SIMPLE PENNY-IN-THE-SLOT MACHINE MECHANISM

Penny-in-the-slot automatic mechanisms are always fascinating, and there are so many different methods by which the desired end can be obtained. A device incorporated in a slot machine for selling matches that was designed by B. Sage, Sheffield 8, will interest Meccano enthusiasts who are building models of this kind.

The mechanism consists essentially of a Pawl carried on a pivoted Strip, the Pawl engaging with a Ratchet Wheel that rotates when the drawer is opened after the penny is inserted. The drawer is fitted with a Rack Strip engaging with a ¾" Pinion on the same shaft as the Ratchet Wheel, but the Pawl prevents the latter from rotating. One end of the pivoted Strip carrying the Pawl is slightly heavier than the other, and the free end is in line with the chute down which the pennies drop. The coin strikes the end of the Strip, which is knocked into a vertical position, allowing the drawer to be opened. When the drawer is closed it returns the Strip to its original position, so that the Pawl again engages the Ratchet Wheel.

A NOVEL WATCH STAND

A watch stand is a handy piece of equipment for the bedroom, and it is quite an easy matter to design one from a few Meccano parts. H. Perry, Newcastle-on-Tyne, made himself a really fine stand, in which a lamp, battery, and button switch are incorporated. On pressing the button, the lamp lights up the face of the watch so that the time can easily be seen.

The base of the stand is a 3½"×2½" Flanged Plate, and the sides are 2½"×1½" and 5½"×1½" Flexible Plates. A clip made from a Strip holds the battery in place. The watch is hung on a ⅜" Bolt lock-nutted to a vertical Plate, and a 1"×1" Angle Bracket bolted to a Flanged Plate forms the support for a Headlamp taken from a Meccano Lighting Set. One wire from the Headlamp is taken to a terminal of the battery while the other is connected to the Flanged Plate. A Pivot Bolt fitted with a Compression Spring is passed through the Plate near the second terminal of the battery and is fitted with lock-nuts. When the Pivot Bolt is pressed, it lights the lamp.

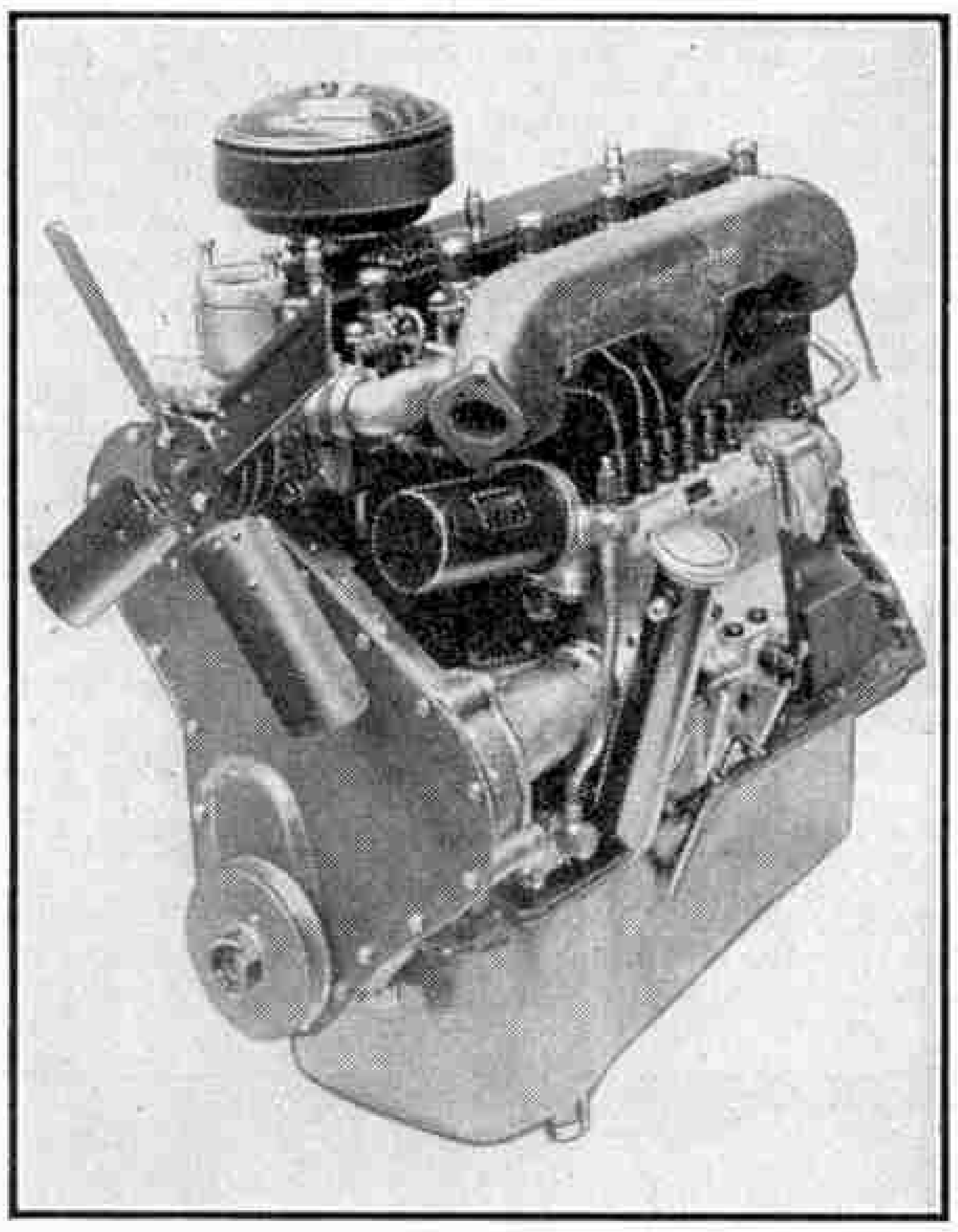
MINIATURE CAR RACING

Judging from our correspondence, building and racing miniature cars driven by *Magic* Motors is a popular pastime with many model-builders. Model-building of this kind is well within the scope of owners of small Outfits and some really interesting designs have been produced. Experiments with different drives encourage model-builders to get the best performance from their Motors and certainly provides useful experience that can be applied to other models.

The Story of the Diesel Engine

The World's Most Efficient Power Unit

By L. W. J. Hancock



A typical high-speed Diesel engine.

THE Diesel engine, or to give it its proper name, the compression ignition engine, has always been one of the most misunderstood types of power units known. The average lay opinion of it is that it is a power unit with disadvantages of weight, unwieldliness, and slow speed. Actually, however, in respect of weight per brake horse power developed, size and maximum speed, it is comparable with modern petrol engines, and in some respects it records better figures.

The Diesel engine has progressed so extraordinarily well in the last few years that a description of this development will be of particular interest to readers of the "*M.M.*" To-day one hears of Diesel engines being applied to power requirements of all kinds. Diesels for use in lorries and private motor cars, for main propulsion, for slow and fast moving motor boats, for motor ships, for electric generators, for compressors, welding sets, excavators, cranes, for all types of belt driven applications, for taxi work, and for railcars and locomotives are just a few of these applications.

It would appear that we have approached a Diesel era in respect of mechanical power, following the earlier eras of steam and petrol. An inevitable question is "Why should the Diesel engine tend to replace steam engines and petrol engines?" The answer to this is the greater efficiency of the Diesel engine compared with its competitors. Not only is the Diesel engine more efficient, but it is much more simple, more easily cared for, and so very much more reliable.

The majority of the world's power units are what is known basically as heat engines, and are, in effect, merely a means of bringing about certain chemical changes to release the stored energy in substances from the Earth's crust, such as coal and oil. All substances expand with rise in temperature. When we cause this chemical action, or in other words, burning, to take place, a large quantity of heat is given out, giving us expansion of gases, and we must arrange to build our engine to take advantage of this expansion.

Certain heat engines have these processes separated. In the case of the steam engine, for instance, with its fire-box and boiler, using coal as a fuel, the heat is converted to work through the medium of water and steam in the expansion chamber or cylinder. In the internal combustion engine, of which the petrol and Diesel engines are the two main types, the entire process from the burning of the fuel to the production of power takes place in the engine cylinder.

All heat engines, however, are very wasteful, as only a small amount of the heat given off by the fuel can be changed into useful work. The rest is lost externally in mechanical noise, and friction, by transference to the engine itself, the cooling water and the exhaust, and it is these losses that engineers are continually striving to reduce. In the case of the steam engine approximately nine tenths of the heat in the fuel is wasted. The petrol engine is nearly twice as efficient as the steam engine, but it can be said that the Diesel has a thermal efficiency almost double that of the petrol engine.

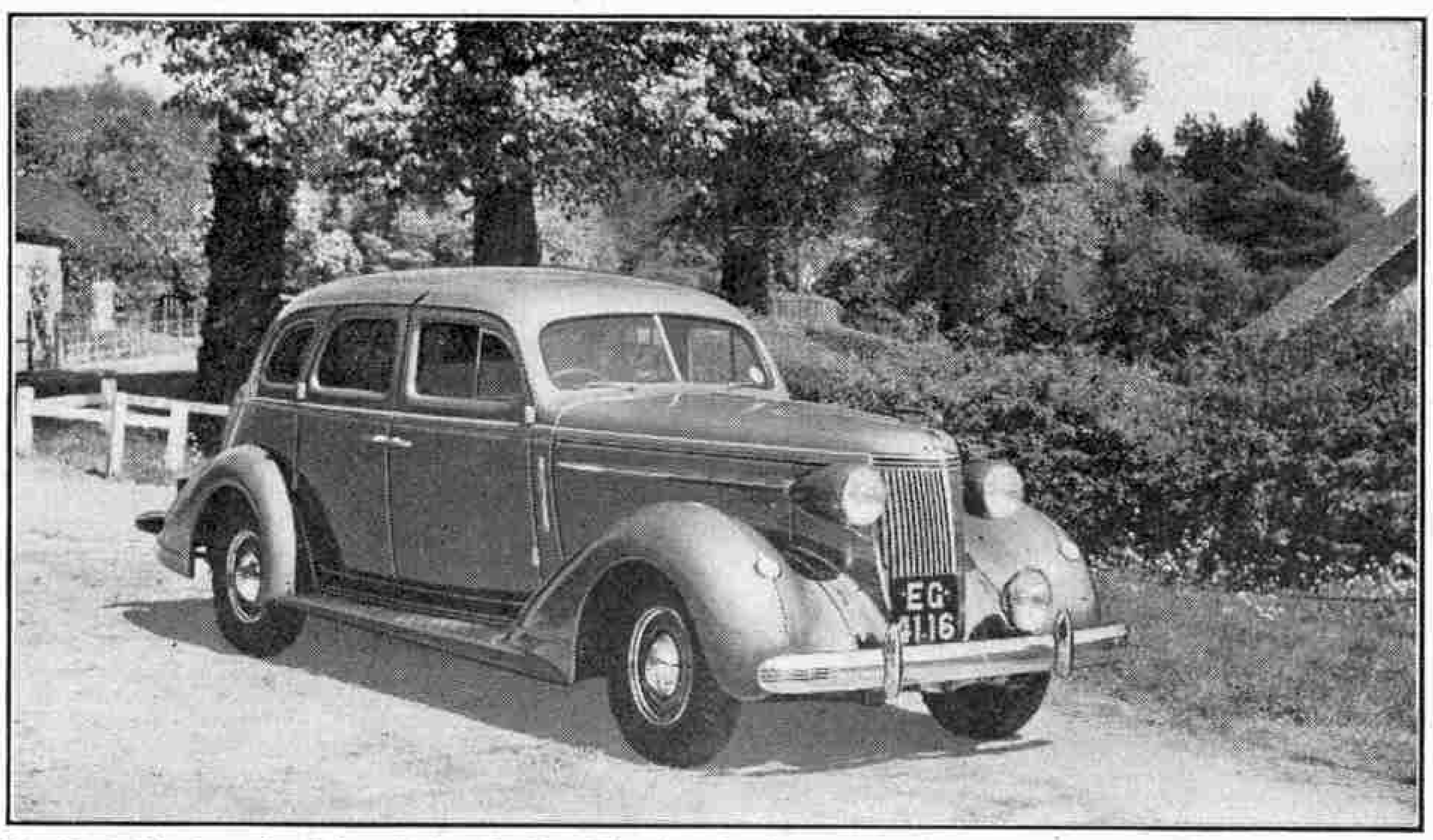
The diagram on the opposite page illustrates the comparative heat losses of the Diesel and petrol engines, assuming that both engines use a similar quantity of fuel, which in the case of the Diesel engine is fuel oil. The lower half of the diagram shows approximately how the heat in the fuel is used. In the case of the Diesel engine less fuel heat is wasted in the exhaust and cooling water, and consequently considerably more fuel is converted to useful work than in the case of the petrol engine.

Most internal combustion engines work on the four-stroke cycle, the successive operations of which are suction, compression, working and exhaust. Now if we consider each stroke and what happens inside the engine in both a petrol and the Diesel engine, it will be readily appreciated where lies the main differences between these two units.

During the suction stroke the piston of a vertical engine is moving downward and is drawing in a mixture of air and petrol in the case of the petrol engine. A similar operation is taking place in the case of the Diesel engine, but here lies the first difference, for the Diesel engine draws in only pure air. The compression stroke follows. This is commenced when the piston commences to rise, compressing the mixture of petrol and air in the cylinder of the petrol engine, and the pure air in that of the Diesel engine.

A very important point is that the air in the cylinder of the Diesel engine is heated by this compression. Anyone who has had to pump up a bicycle tyre must have noticed that by the time the tyre is inflated the pump barrel has become appreciably warm. This is because the air in the pump has been compressed. Similarly, when the air is compressed in an engine cylinder, the temperature is raised in accordance with the compression ratio or, in other words, with the extent to which the volume of the air is reduced.

Next comes the working stroke. Just before the piston of the petrol engine has reached its highest point in the cylinder, a magneto or coil causes an electric spark across the points of a plug inside the cylinder, and this spark causes the mixture of air and petrol, which is under compression, to explode. In the case of the Diesel engine, which by this time has compressed the air, the fuel is injected into the cylinder at approximately the same point as ignition takes place in the petrol engine. This fuel is injected into the compressed air by means of what is called an atomiser, which breaks up the fuel into very small particles, which commence to burn when they come into contact with the hot compressed air in the cylinder.



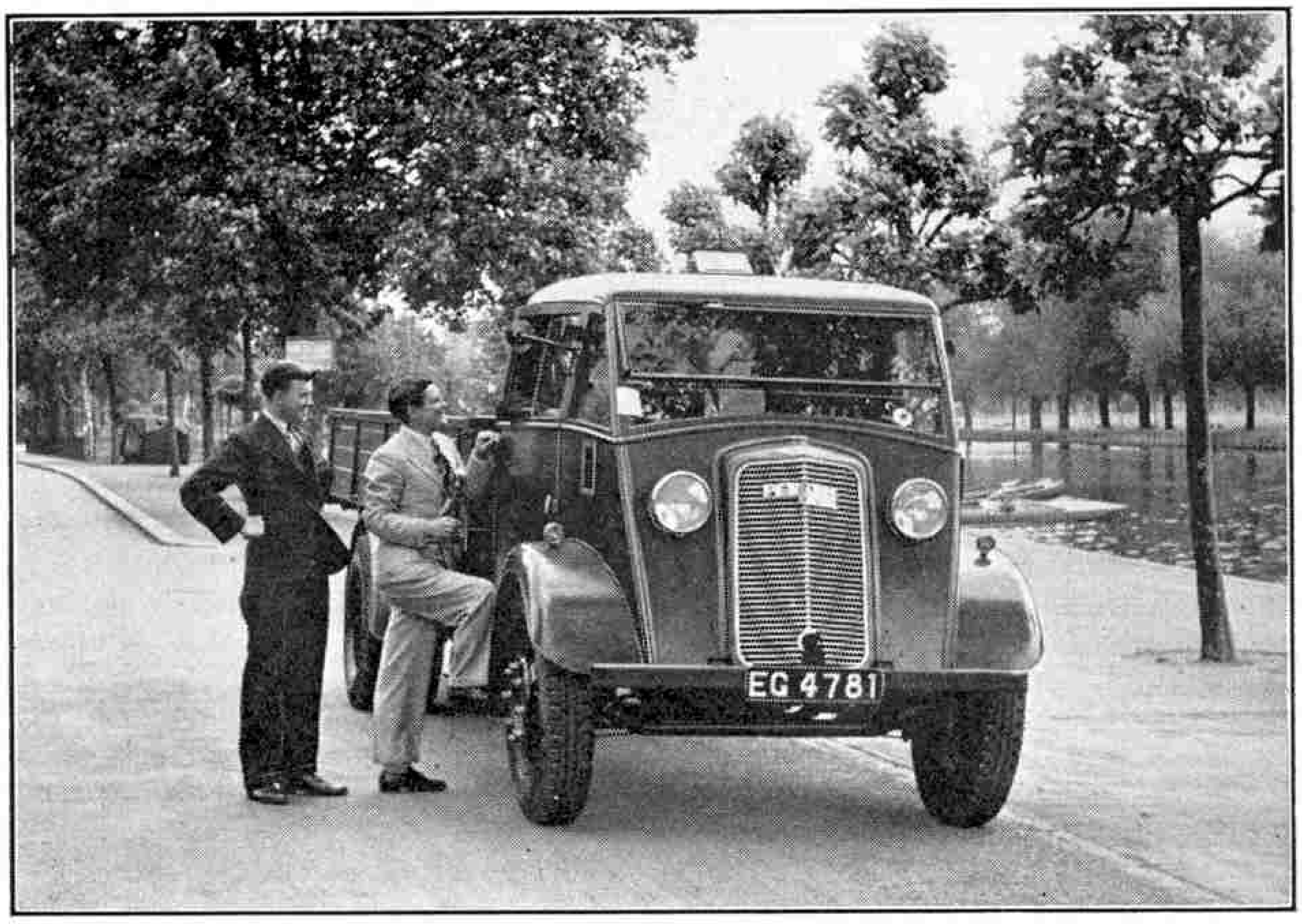
The Nash "Ambassador," in which a Perkins Diesel engine is fitted. The car's maximum speed is 90 m.p.h. The illustrations to this article are reproduced by courtesy of F. Perkins Ltd., Peterborough.

We have now reached the point where the petrol in one engine has been ignited, and in the other the fuel has been injected into the hot air. Thus combustion takes place in both engines, giving us the working or power stroke.

Following the working stroke in both types of engines, the piston again rises and pushes out all the burnt gases through the exhaust valves. We are then ready to repeat the cycle of operations.

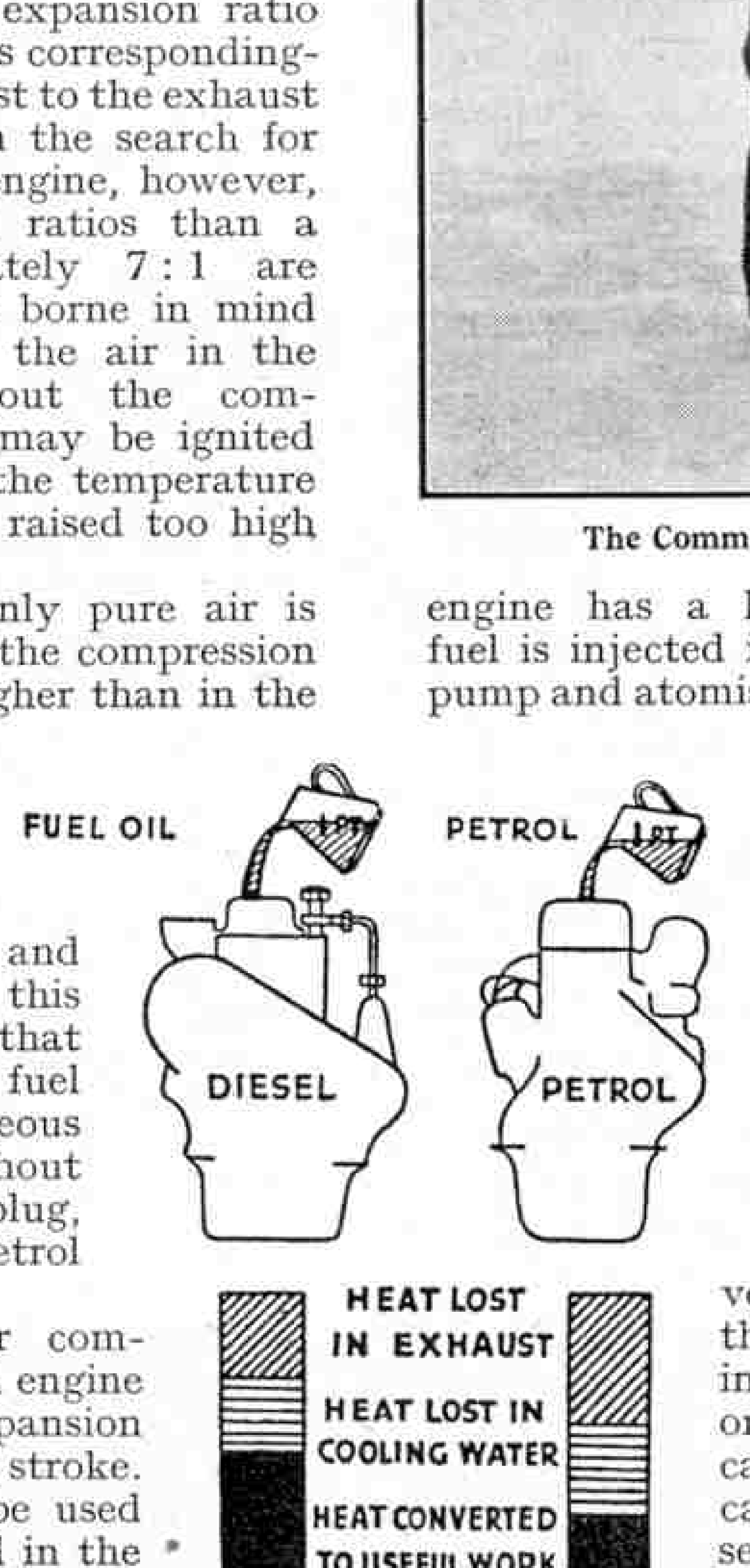
A further point in which Diesel engines differ from petrol engines is in the compression ratio, which is the proportion of the volume of the chamber into which the air is compressed by the piston at the top of the compression stroke, to the volume that the piston displaces in its travel from top dead centre to bottom dead centre.

The higher the compression ratio used with a petrol or spark ignition engine, the greater the efficiency and economy. This is due to the fact that the expansion ratio during the working stroke is correspondingly higher, and less heat is lost to the exhaust gas. A point is reached in the search for economy with the petrol engine, however, when higher compression ratios than a maximum of approximately 7 : 1 are impracticable. It must be borne in mind that petrol is present in the air in the engine cylinder throughout the compression stroke, and this may be ignited before the proper time if the temperature of the petrol-laden fuel is raised too high by compression.



The Commer "Q" type Diesel-engined lorry, which has been designed round the Diesel engine.

In the Diesel engine only pure air is compressed. Consequently the compression ratio can be very much higher than in the petrol engine, and it is usually in the region of 17 to 1. With this ratio the compression pressure of the Diesel engine will be probably between 500 and 600 lb. per sq. in. and at this pressure the air is so hot that when the finely atomised fuel is injected into it spontaneous combustion takes place without the use of the sparking plug, as in the case of the petrol engine.



Because of this higher compression ratio, in the Diesel engine there is a much greater expansion of gas during the working stroke. More heat therefore can be used for work and less is wasted in the exhaust gas, giving the Diesel engine a much higher thermal efficiency than any other type of internal combustion engine.

To sum up, these are the main differences between the two engines. The Diesel engine has a higher compression ratio; fuel is injected into it by means of a fuel pump and atomiser instead of a carburetter, which is necessary in the case of a petrol engine; combustion in the petrol engine is caused by a spark from a magneto or coil and a plug, whereas in the Diesel engine combustion is caused by the fuel being injected into very hot air.

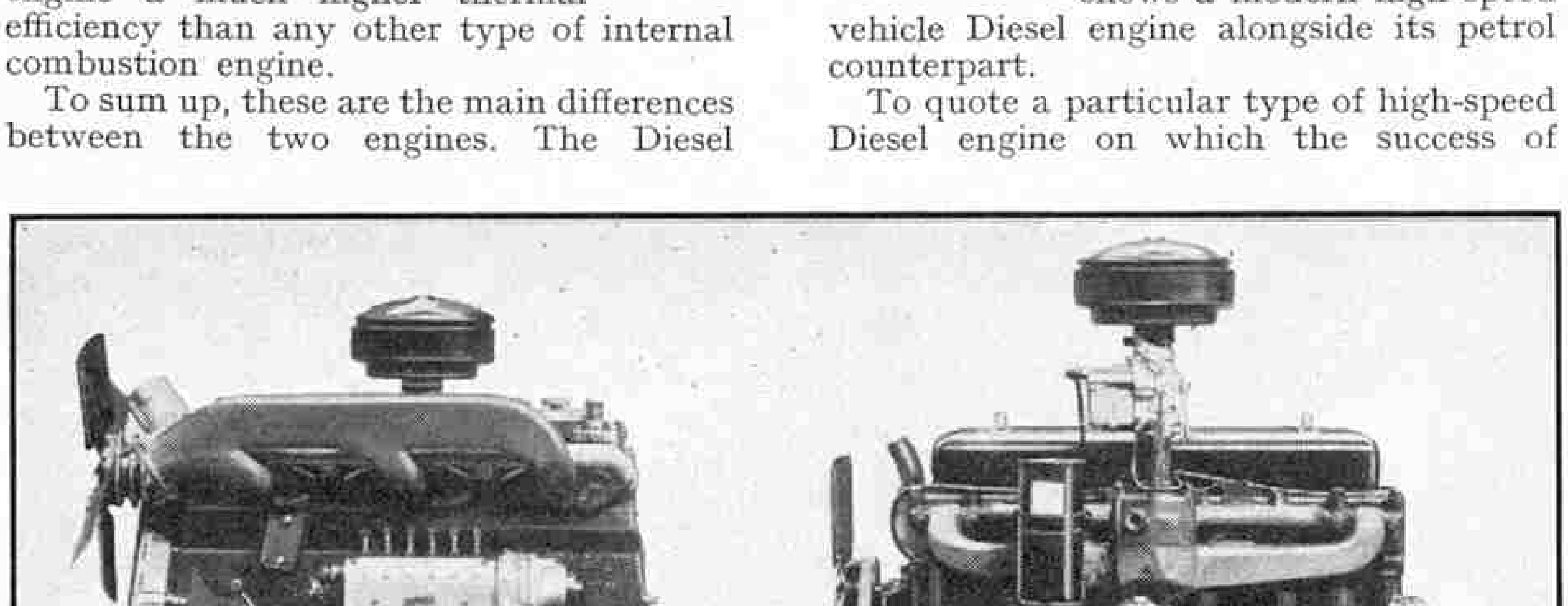
In construction the two types of engine are very similar, apart from the substitution of the fuel injection pump and sprayers, or atomisers, for the electrical ignition equipment and carburetter. This will be seen from the illustration at the foot of this page, which shows a modern high speed vehicle Diesel engine alongside its petrol counterpart.

To quote a particular type of high-speed Diesel engine on which the success of modern Diesels is really based, we would refer to the "P" series engines produced by F. Perkins Ltd., Peterborough. In respect of weight these engines are lighter than competitive petrol engines of comparative power. They are designed for speeds well in excess of 4,000 r.p.m., and are as quiet in operation and just as flexible in use as petrol engines.

It is not so many years since the Diesel engine was regarded as experimental for road vehicles, even for goods transport, but recent developments have shown that there is every likelihood of the use of engines of this type for private cars also. Recent announcements by an American motor car company, and their intention to offer their cars fitted with British Perkins Diesel engines, show the state of perfection to which this type has been brought.

The main disadvantages of the earlier Diesel engines were their exceptional weight, mechanical noise, vibration and smell. All these disadvantages have been overcome by improved combustion arrangements, and added experience in mechanical construction and the use of materials. In the early nineteen-thirties the engines built were of the slow running variety, and speeds of over 1,500 r.p.m. were considered exceptional; in 1935 a racing car fitted with a 2.73 litre Perkins "Wolf" Diesel engine set up a world record, and a speed of over 100 m.p.h. was attained. When one considers the minuteness of the particles of fuel introduced into the cylinder at the end of each compression stroke, and the infinitesimal time for which fuel is injected, it is a striking tribute to British engineering that burning should be so complete with engine speeds of 4,000 r.p.m. Now that mechanisation has developed to a marked degree, and road transport is of such vital importance, there is every likelihood that the Diesel, an engine essentially reliable, and one that will run on a large variety of fuels if called upon to do so, will enjoy increasing popularity.

In a further article I hope to go more fully into the principle of the Diesel engine, and to outline some of the difficulties that designere have overcome in bringing it to its present state of efficiency.



A 6-cylinder petrol engine, on the right, compared with the Perkins "P" type Diesel engine. The latter is lighter than a petrol engine of equal power output.

New Meccano Models

Cranes—Searchlight—Rickshaw

CRANES are fascinating mechanisms to the Meccano boy, who takes the greatest delight in building working models of them, and using these for lifting actual loads. Two new models of this kind are among those that we are describing this month. The first is of the pontoon or floating type of crane and is shown in Fig. 4, while the other is a small but powerful travelling or locomotive crane. In addition to these we are describing a model searchlight fitted with elevating and traversing movements. This is shown in Fig. 1, and is a model of real interest at the present time. Lastly comes a model of a rickshaw, the curious Eastern vehicle in which passengers are hauled by coolies. This is illustrated in Fig. 3.

The first model to be dealt with is the pontoon crane shown in Fig. 4. This can be built from the contents of Outfit No. 5, with the addition of a few parts. The pontoon itself is the first part of the model to be constructed. The sides of this are built up from $12\frac{1}{2}''$ Angle Girders, which are cross-braced four holes from the ends by $12\frac{1}{2}'' \times 2\frac{1}{2}''$ Plates, one of which is made up from two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates and two $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates. Each of these $12\frac{1}{2}''$ Plates is made rigid by bolting a $12\frac{1}{2}''$ Strip along one of its edges. Two $12\frac{1}{2}''$ Angle Girders 1 are bolted parallel to the cross bracings in the positions shown, and a $3''$ Pulley is fixed to them.

The base of the crane consists of two $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates 3, and to these two $12\frac{1}{2}''$ Angle Girders and two $12\frac{1}{2}''$ Strips are bolted. Two $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates are bolted to the sides of the base, and the middle part of the tower is enclosed by $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates and $5'' \times 2\frac{1}{2}''$ Plates made from $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Plates and $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Plates overlapped. The upper corners of the vertical members are joined by Strips and Angle Brackets.

The pulley block casing consists of two Flat Trunnions connected at their pointed ends by a Double Bracket. A $3''$ Pulley is fixed under the base of the tower by attaching it to two $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plates bolted underneath the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates. A $1''$ Rod held in the boss of the $3''$ Pulley fixed to the pontoon forms the pivot for the crane. The $3''$ Pulley fixed to the base of the tower is passed over the projecting end of the $1''$ Rod. Luffing of the jib is carried out by three separate Cords, which are first tied to the end of the jib and then attached to a compound Axle Rod that holds a Bush Wheel 5. The Bush Wheel carries two

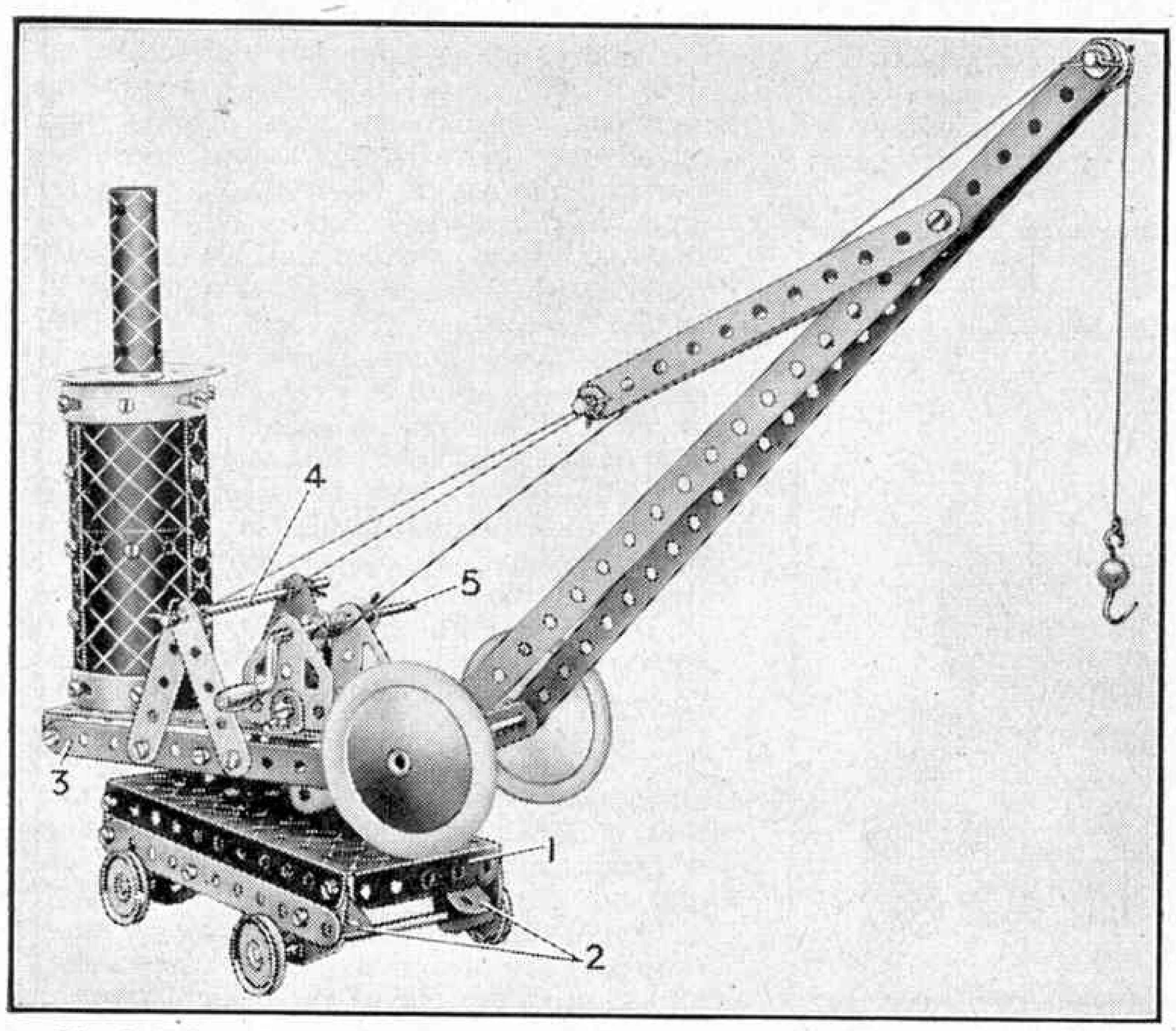


Fig. 2. This well-designed model locomotive crane can be built with Outfit No. 3.

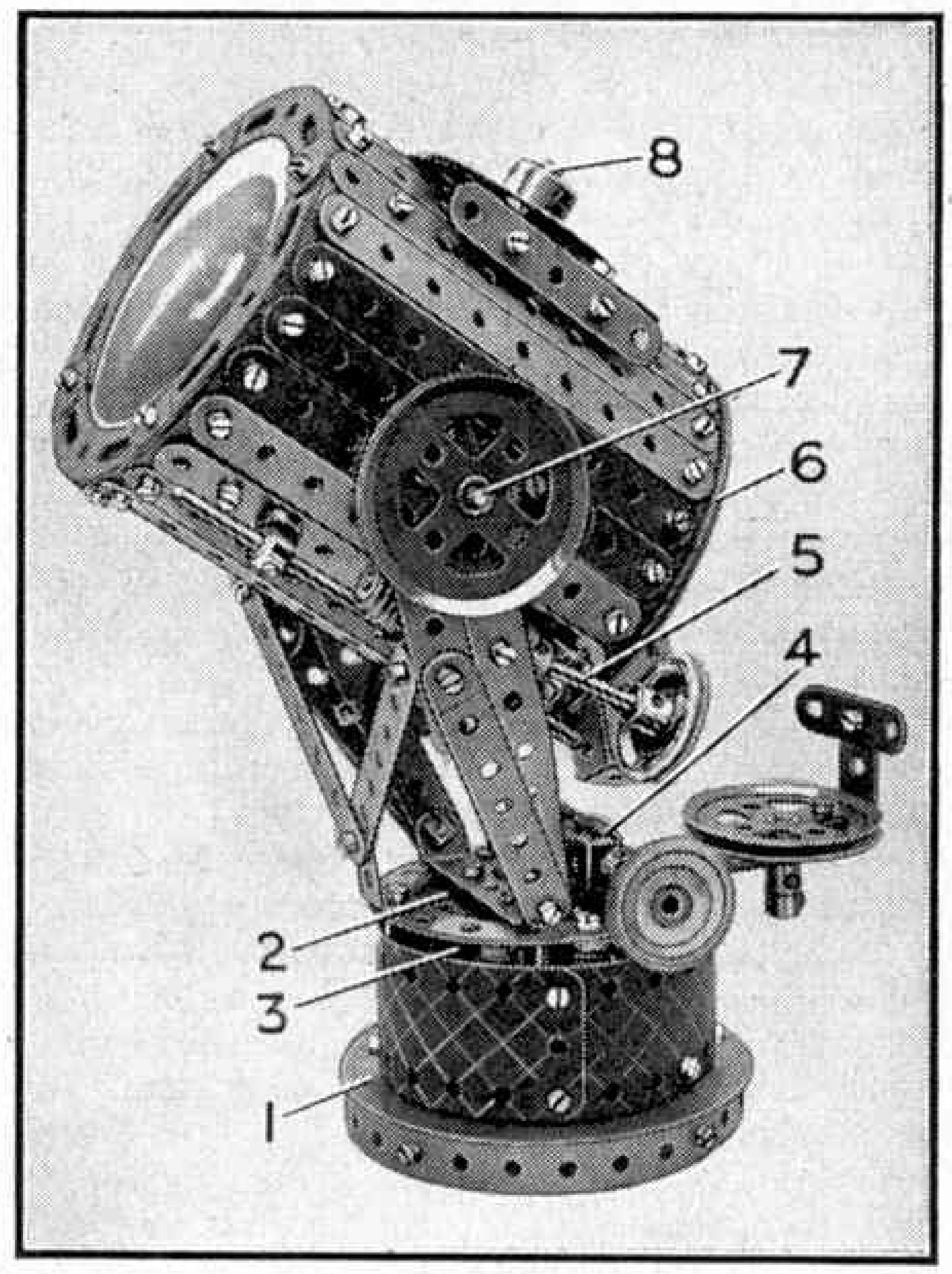


Fig. 1. A realistic model of an Army searchlight, built from the contents of a No. 8 Outfit and a few extra parts.

bolts in reversed positions as shown. One of the bolts acts as a handle and the other as a "push-in" brake. The two hoisting Cords are first attached to a Double Angle Bracket that joins the lower members of the jib and then passed over the two Pulleys at the jib head and then over a second pair at the top of the structure which guide the cords to the winding handle 6.

Parts required to build model of pontoon crane: 7 of No. 1; 13 of No. 2; 2 of No. 3; 10 of No. 5; 2 of No. 6; 8 of No. 8; 1 of No. 11; 12 of No. 12; 2 of No. 12a; 1 of No. 15a; 2 of No. 16; 2 of No. 19b; 1 of No. 19g; 5 of No. 22; 2 of No. 22a; 1 of No. 24; 8 of No. 35; 112 of No. 37a; 111 of No. 37b; 14 of No. 38; 2 of No. 40; 1 of No. 45; 7 of No. 48a; 2 of No. 51; 2 of No. 52; 1 of No. 54a; 1 of No. 57b; 2 of No. 90; 2 of No. 111; 2 of No. 126; 2 of No. 126a; 2 of No. 188; 2 of No. 189; 2 of No. 190; 2 of No. 191; 4 of No. 192; 1 of No. 197.

The model locomotive crane illustrated in Fig. 2 is an excellent subject for a No. 3 Outfit. A $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate is used to represent the base and two $5\frac{1}{2}''$ Strips are attached to its side flanges by Flat Brackets. Two Trunnions 2 form the bearings for the front axle, the rear axle being supported in the centre holes of two $2\frac{1}{2}''$ Curved Strips. The axles are $3\frac{1}{2}''$ Rods and the four wheels are $1''$ Pulleys. The swivelling platform is built up from a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate mounted on three Double Angle Strips, which are joined to two $5\frac{1}{2}''$ Strips 3. The centre one of the three Double Angle Strips is built up from a $2\frac{1}{2}''$ Strip and Angle Brackets. A Bush Wheel is bolted at the centre of the compound Double Angle Strip and holds in its boss a $2''$ Rod, which is passed through the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate of the base as shown, and is held in place by Spring Clips. The boss of the Bush Wheel is spaced from the Plate by two $\frac{3}{4}''$ Discs and two

Washers, which are placed on the Rod.

The boiler is made from a compound plate built up from six $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible and Curved Plates. Each end of the boiler is encircled by two Formed Slotted Strips, and is enclosed at the top by two Semi-Circular Plates. The funnel, built of two $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates, is attached to the top of the boiler by means of an Angle Bracket.

The outer end of the jib carries a 1″ loose Pulley mounted on a 1″ Rod, which is held in place by Spring Clips. The inner end holes of two $5\frac{1}{2}''$

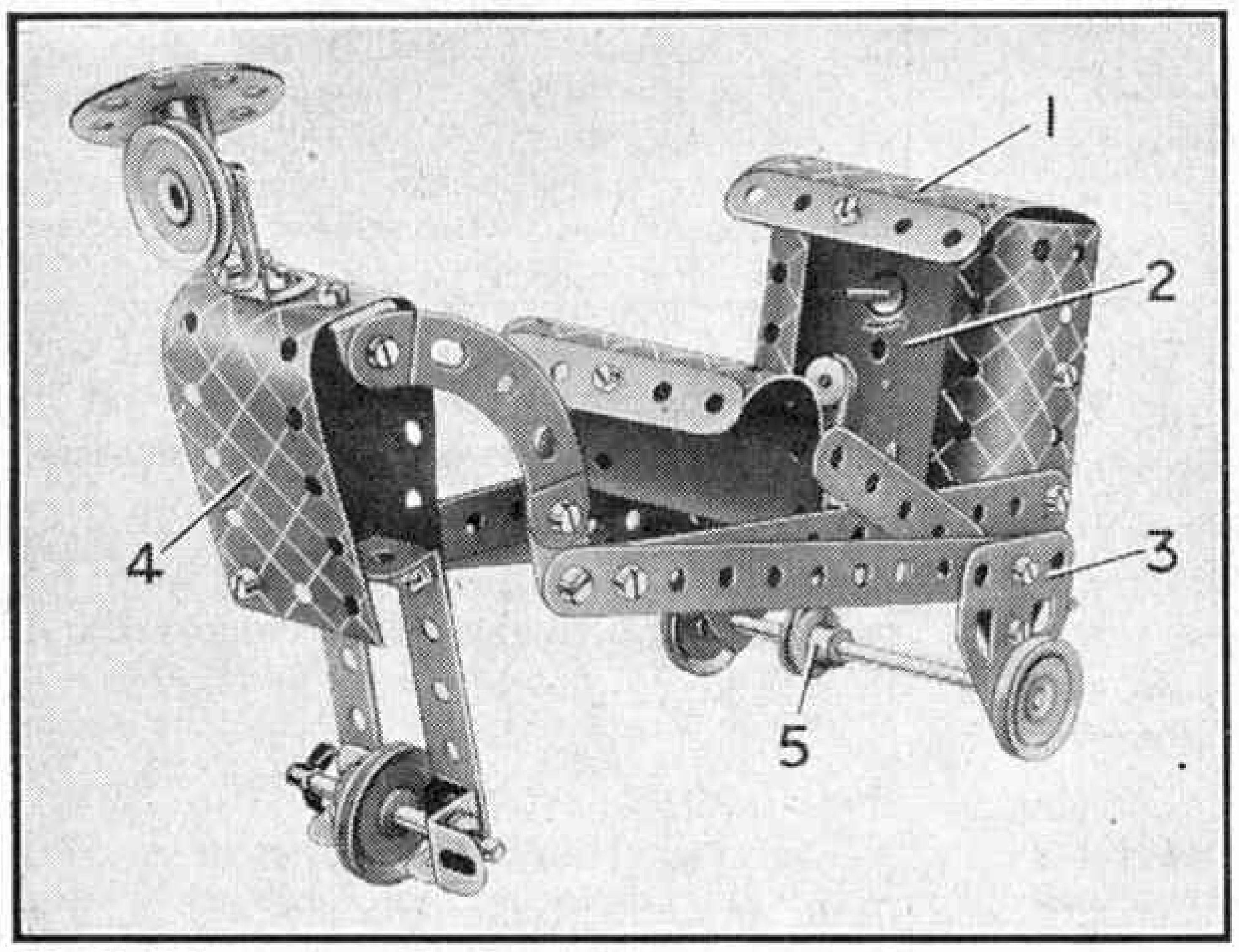


Fig. 3. This novel model of a coolie and rickshaw forms a jolly subject for Outfit No. 3.

Strips pivoted to the jib carry a 2″ Rod to which is tied two separate pieces of Cord. The other ends of the Cords are tied to a $3\frac{1}{2}''$ Rod 4 mounted in four $2\frac{1}{2}''$ Strips.

Parts required to build model of locomotive crane: 2 of No. 1; 6 of No. 2; 7 of No. 5; 4 of No. 10; 8 of No. 12; 1 of No. 15b; 3 of No. 16; 2 of No. 17; 1 of No. 18b; 1 of No. 19s; 4 of No. 22; 1 of No. 23; 1 of No. 24; 9 of No. 35; 58 of No. 37a; 58 of No. 37b; 1 of No. 40; 1 of No. 52; 2 of No. 90a; 2 of No. 126; 2 of No. 126a; 2 of No. 187; 2 of No. 190; 2 of No. 192; 2 of No. 214; 4 of No. 215.

The snappy model of a rickshaw and coolie shown in Fig. 3 is propelled by a concealed *Magic* Motor, and it forms an unusual and interesting model for readers who possess an Outfit No. 3. The model will travel a considerable distance on one winding of the Motor and moves along the ground in a very realistic manner.

The body of the rickshaw is first built up around a *Magic* Motor. A $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate is bolted to one side of the Motor to form the back of the cab. The sides are $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates shaped in the manner shown in the illustration. The roof is a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate braced at the front by a $2\frac{1}{2}''$ Strip. It is bent at right angles at the back and is bolted to the $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate. Two $5\frac{1}{2}''$ Strips comprise each shaft and they are connected in a "staggered" manner, the inner Strip extending one hole farther to the rear than the outer Strip. They are sandwiched between the Trunnions bolted to the sides of the body and the Flat Trunnions that form the bearings for the axle.

The body of the coolie consists of a $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate bent into the shape of the capital letter U, the ends being joined together by an Angle Bracket bolted to the body and to the end of one of the two Double Angle Strips that form the legs. A 1″ Pulley is free on a 2″ Rod journalled in an Angle Bracket and a Reversed Angle Bracket is fixed at the lower ends of the legs. The arms, two $2\frac{1}{2}''$ Curved Strips, are attached to the shafts with Flat Brackets and to the coolie's shoulders with Angle Brackets.

Parts required to build model rickshaw: 4 of No. 2; 4 of No. 5; 3 of No. 10; 8 of No. 12; 1 of No. 16; 1 of No. 17; 4 of No. 22; 1 of No. 24; 2 of No. 35; 35 of No. 37a; 36 of No. 37b; 2 of No. 48a; 2 of No. 90a; 1 of No. 125; 2 of No. 126; 2 of No. 126a; 2 of No. 188; 1 of No. 189; 2 of No. 190; 1 of No. 192. 1 *Magic* Motor (not included with Outfit).

Most of the essential mechanisms of a modern searchlight are incorporated in the fine model shown in Fig. 1. It is not fitted with a lamp, but readers who possess the necessary parts will find it an easy matter to mount two or three bulbs at the back of the lamphouse by means of Meccano Lamp Holders.

The platform that carries the lamphouse swivels on a Rod that carries a $\frac{1}{2}''$ Pinion Wheel. The latter engages a Worm 4 mounted on a Rod journalled in bearings fixed to the platform.

The lamphouse is made up from $4\frac{1}{2}''$ Strips and compound strips bolted to two circular frames built up from Formed Slotted Strips. It is strengthened by means of 3″ Cranked Curved Strips, the arrangement of which can be seen from the illustration. A ventilator is formed by a Wheel Disc 8 and $2\frac{1}{2}''$ Strips.

The lamphouse is pivoted on a Rod 7, which is journalled in Strips arranged as shown. A 57-teeth Gear Wheel journalled on the Rod 7 and bolted to the side of the lamphouse engages with a Worm Gear that is attached to the Rod 5. The latter Rod is held in a Double Bracket fixed to the Strips in which the axle of the lamphouse is mounted. A 1″ Pulley fitted with a Rubber Ring and locked on the Rod 5 serves as a handwheel to control the movement of the lamphouse through the vertical plane.

The operator's seat is a 2″ Pulley fitted with a back rest formed by a $1\frac{1}{2}''$ Strip bolted to a $1'' \times 1''$ Angle Bracket. The Pulley is mounted on a 1″ Rod gripped in the boss of a Crank, the latter being bolted to the circle of Curved Strips supporting the lamphouse.

Parts required to build the model searchlight: 1 of No. 1; 2 of No. 2; 26 of No. 2a; 5 of No. 3; 2 of No. 4; 2 of No. 5; 2 of No. 6a; 6 of No. 10; 1 of No. 11; 10 of No. 12; 2 of No. 12a; 5 of No. 12b; 4 of No. 12c; 2 of No. 15b; 2 of No. 16; 1 of No. 16a; 2 of No. 18a; 1 of No. 18b; 2 of No. 19b; 3 of No. 20a; 2 of No. 22; 1 of No. 24; 1 of No. 26; 2 of No. 27a; 2 of No. 32; 65 of No. 37a; 84 of No. 37b; 20 of No. 38; 1 of No. 48a; 9 of No. 59; 1 of No. 62; 1 of No. 72; 4 of No. 89a; 4 of No. 90; 1 of No. 109; 5 of No. 111; 8 of No. 111c; 2 of No. 146a; 1 of No. 154a; 1 of No. 154b; 2 of No. 155a; 2 of No. 160; 1 of No. 164; 1 of No. 168a; 2 of No. 189; 10 of No. 215; 1 of No. 219.

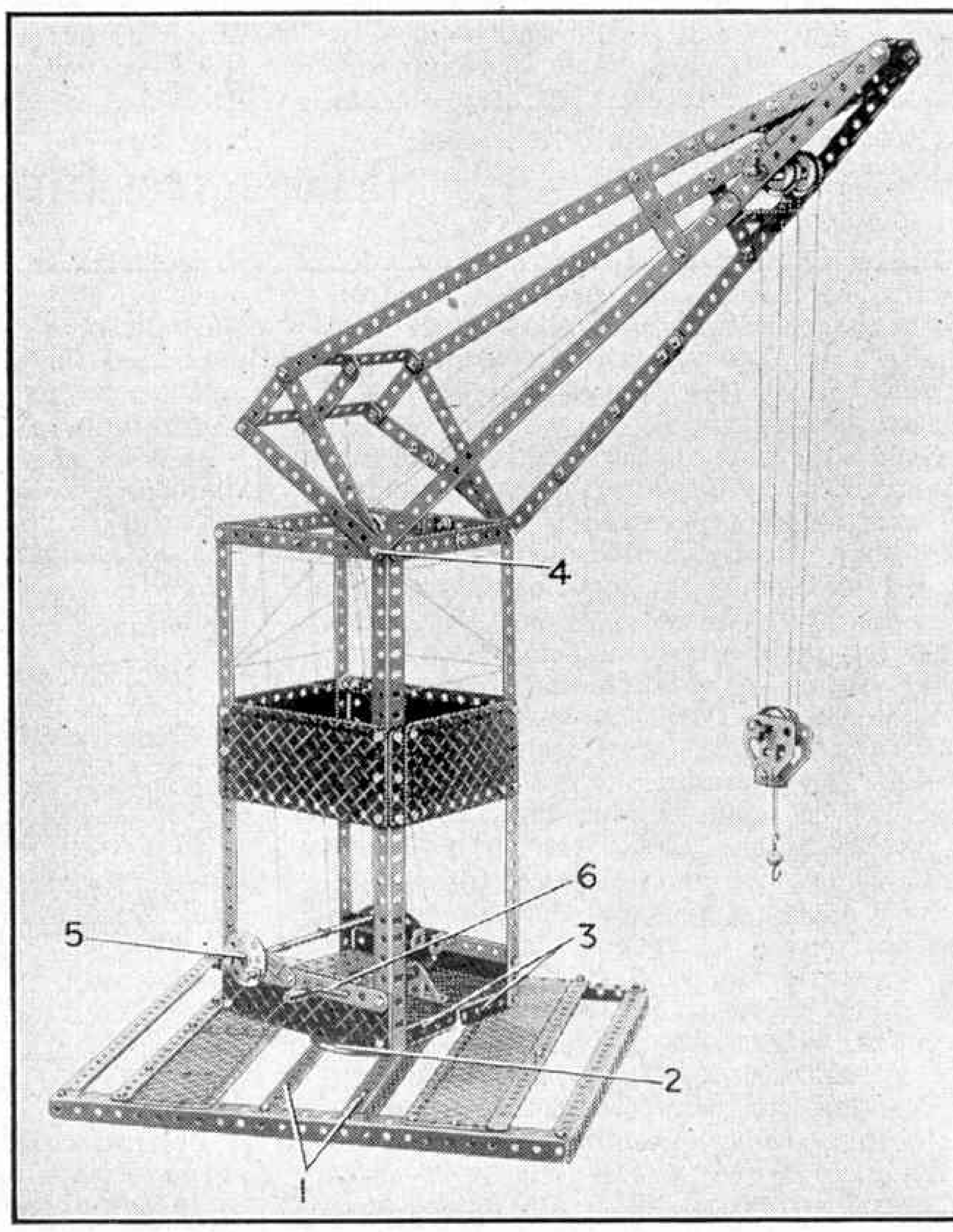


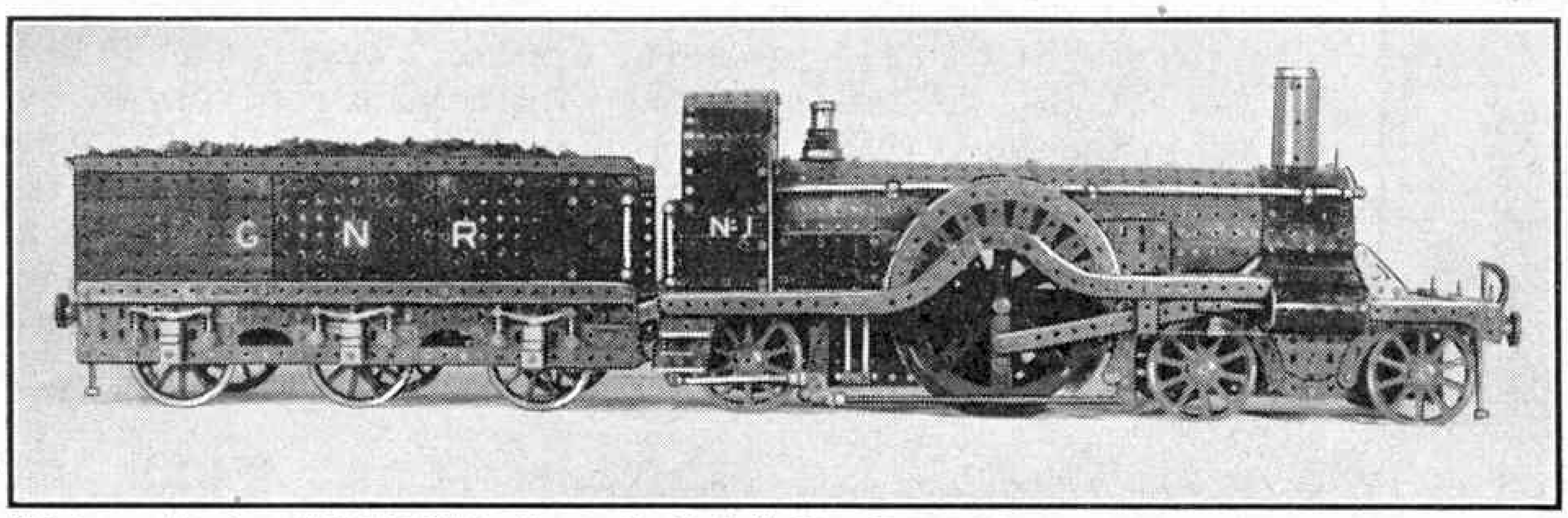
Fig. 4. A neat model pontoon crane that can be assembled from Outfit No. 5 and a few additional parts.

"Autumn" Competition for Meccano Models of all Kinds

A Chance to Win a Big Cheque

In last month's *"M.M."* we published details of the "Autumn" Model-Building Competition, in which cash and other valuable prizes are offered for the best models submitted. The closing date of the Contest is 30th November, and as there is still plenty of time for readers to send in their entries we are again giving full details of how these should be prepared and submitted. All that competitors have to do is to build a Meccano model to their own ideas. This may be of any type, and the only condition is that it must be the entrant's unaided work.

All readers and Meccano Outfit owners are eligible to compete in this Contest, no matter where they live or what age they may be. Any size of Outfit may be used in building models, but good workmanship and constructional details that show the builder to be familiar with the best uses for Meccano parts will attract the attention of the judges far more than mere size. These qualities are often much easier to attain in a simple model than in a more complicated structure, so that owners of small Outfits possess splendid chances of winning a good prize. Competitors should look for something really novel as their subjects; originality will weigh heavily in a model's favour, and there are thousands of interesting objects that have never yet been reproduced in Meccano.



This fine model of an old G.N.R. Stirling locomotive, by Julio Giese, Buenos Aires, won a prize in an "M.M." competition.

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. The entrant's age, name and address should be given on the back of the photograph or drawing, which should then be enclosed, together with a brief description of the model, 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 as follows: 1st Prize, Cheque for £5/5/–; 2nd, Meccano or Hornby products value £3/3/–; 3rd, products value £2/2/–; 10 Prizes of Meccano or Hornby products value 10/6 and 10 Prizes of Meccano or Hornby products value 5/–.

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.

Prizes for Meccano "Suggestions"

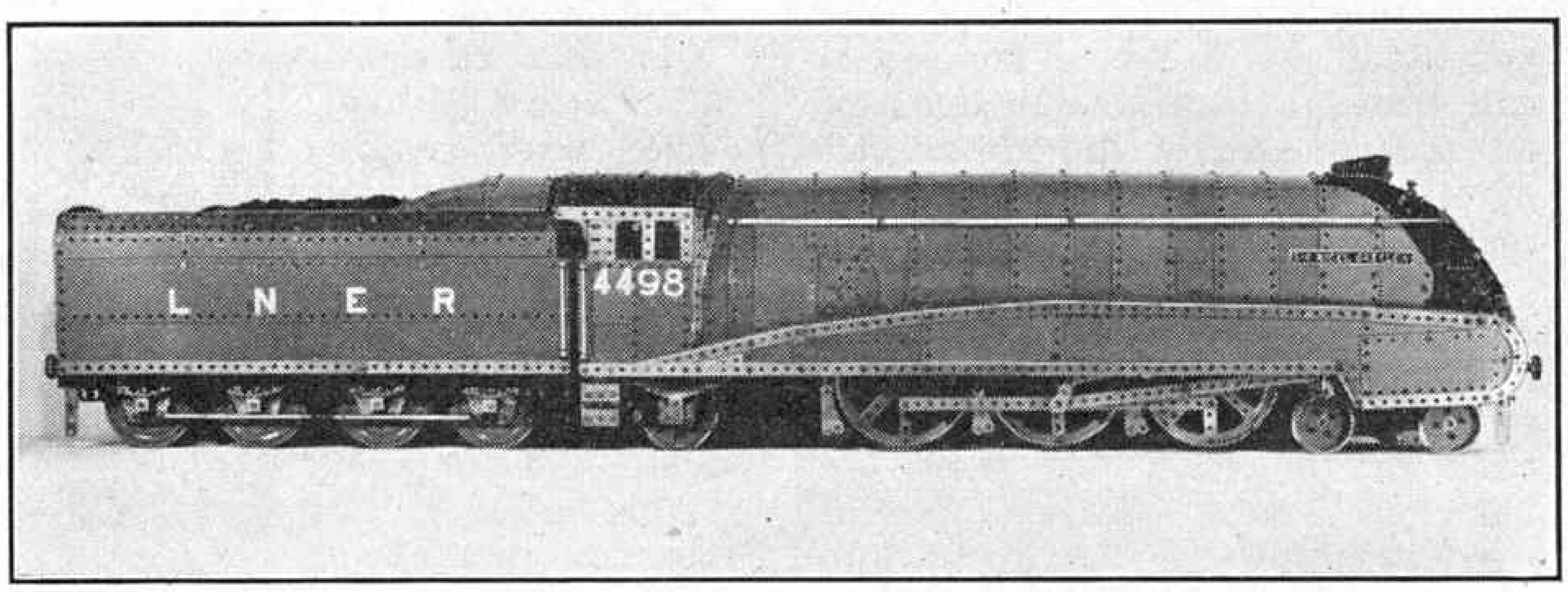
In this Contest we are offering prizes for details of novel and original Meccano mechanisms, workshop gadgets, or devices of any kind that are suitable for inclusion in the *"Suggestions Section"* pages of the *"Meccano Magazine."*

Good examples of what are required are miniature brake and steering arrangements suitable for incorporating in small model motor cars, electric timing mechanisms and an automatic opening and closing grab for a crane. New gear-boxes of all kinds, reversing devices and ingenious and unusual forms of ratchet and free wheel mechanisms also will be welcome. Many readers no doubt have ideas for novel uses for Meccano parts, or for various tools that can be made in Meccano and would be useful in the home workshop. These also will provide good subjects for entries in this Contest. A glance at the *"Suggestions Section"* pages of recent *"M.M.'s"* will show exactly the kind of thing required, and it will be seen that there is very wide scope for original ideas.

It should be noted that it is not necessary to design a complete model. For example if the suggestion to be submitted is a brake mechanism for a motor car it is only necessary to design the actual brake gear itself; a complete chassis is not required.

Competitors should send details of their suggestions to *"Suggestions Competition,"* Meccano Ltd., Binns Road, Liverpool 13. The mechanism or other device should be explained as fully and clearly as possible, and if necessary, should be illustrated with photographs or drawings. Entries must be posted so as to reach Liverpool not later than 30th November.

It is not absolutely necessary for the competitor to build up the device in Meccano before submitting his entry. Many devices that would form suitable entries can easily be described without actually constructing them. There is no reason therefore why readers who do not possess Meccano Outfits should not take part in this Contest.



"Sir Nigel Gresley." Another fine example of locomotive model-building by Julio Giese.

The prizes to be awarded for the best suggestions submitted are: First, Meccano or Hornby products value £3/3/–; Second, products value £2/2/–; Third, products value £1/1/–.

Entries in this competition must be original. Suggestions similar to mechanisms already dealt with in the *"M.M."* will not be considered.

Model-Building Competition Results

By "Spanner"

"Birds and Beasts" Contest

The lists of prize-winners in the Home and Overseas Sections of the novel "*Birds and Beasts*" Contest, which was announced in the April issue of the "*M.M.*" are as follows:

Home Section
1st Prize, Meccano or Hornby products value £2/2/-: P. Wickham, Leicester. 2nd, products value £1/1/-: J. Devereux, Dublin. 3rd, products value 10/6: T. Stoker, Liverpool 19.

Overseas Section
1st Prize, Meccano or Hornby products value £2/2/-: P. T. Hysing, Nanset, Norway, 2nd, products value £1/1/-: E. Feit, Johannesburg. 3rd, products value 10/6: E. Tapper, South Perth, W. Australia.

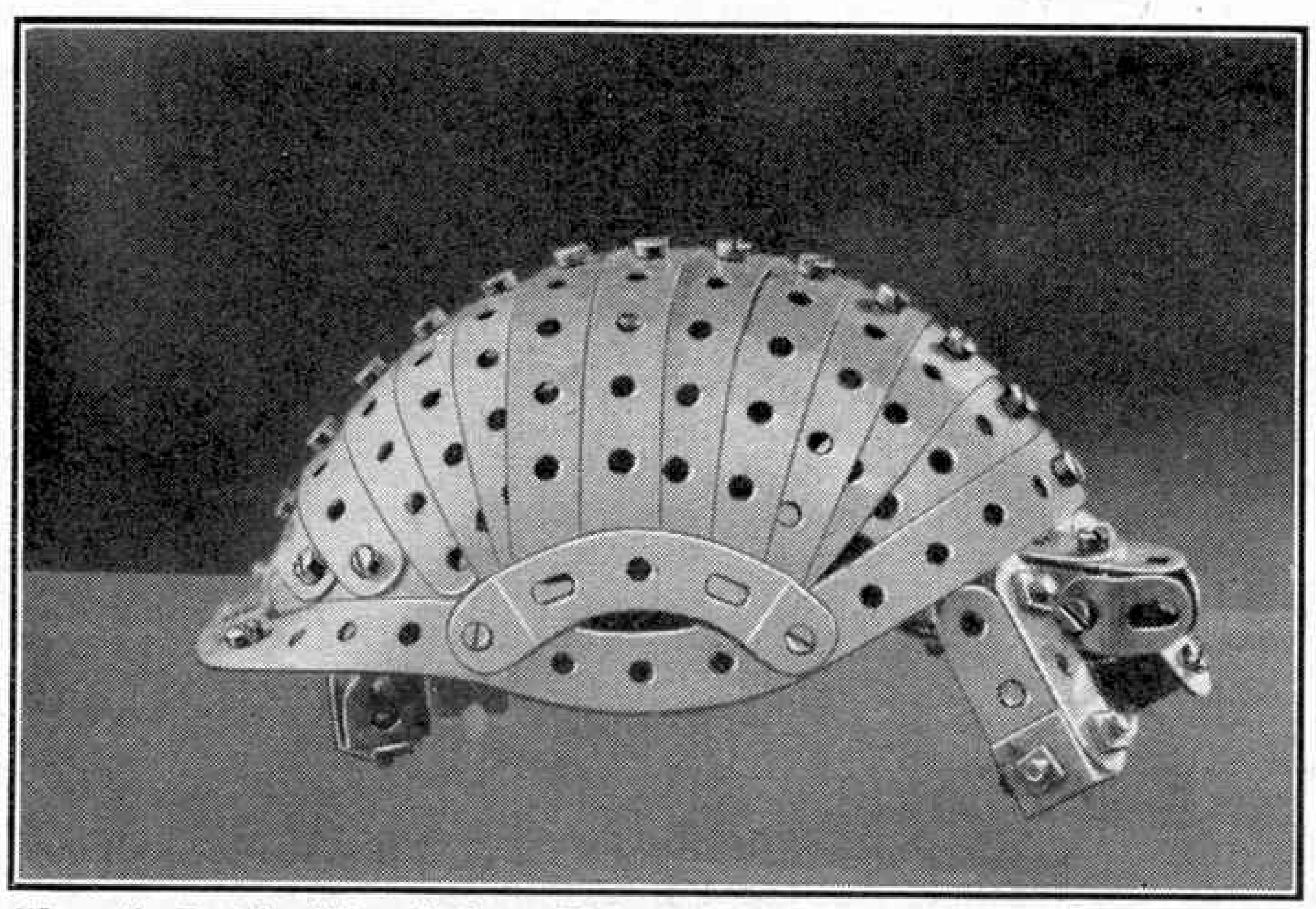
In this competition model-builders were asked to build Meccano models of birds or animals, and the remarkable ingenuity and skill displayed in both the Home and the Overseas entries made the task of the judges a very difficult one. Some of the entries were amusing caricatures made with a few simple parts, while other competitors took great pains to reproduce the characteristic outlines of the actual animal or bird. It was a model of the latter kind that won First Prize in the Home Section for P. Wickham. This competitor portrayed in a very realistic manner a peacock with its glorious tail opened out to display the scores of "eyes" that are its outstanding feature. The body of the bird is built from Flexible Plates bent to form a cylinder, and the neck is a $2\frac{1}{2}''$ Cylinder built into the body with Flexible Plates. The bird's head, which is turned to one side, is formed from two $\frac{1}{2}''$ Pulleys with a Pawl for the beak, and by a very skilful arrangement of these Wickham has managed to give his model the dignified appearance that is characteristic of these graceful birds.

The most ingenious and impressive part of the model is the fan-like tail built up of Strips radiating outward and connected together at various points by Curved Strips. The "eyes" are $\frac{3}{4}''$ and $1\frac{1}{8}''$ Discs, Pulleys and Wheel Discs bolted to the Strips, and the ends of the "feathers" terminate in pairs of Flat Brackets. The complete bird is mounted on a heavy base.

Second Prize was awarded to J. Devereux, Dublin, for the model of a tortoise shown in the lower illustration on this page. The most outstanding feature of the model is the construction of the shell, for it is made entirely from Strips bent into semi-circular shape. The head is built from Flat Brackets and Obtuse Angle Brackets, and the legs are $1\frac{1}{2}''$ Strips joined by Double Brackets. Simplicity is the keynote of this original model and Devereux is to be congratulated on his novel choice of subject and skilful work in rendering it in Meccano.

A novel group of animals formed the subject of T. Stoker's entry for this competition and he was awarded Third Prize. The animals included two horses, a dog, a giraffe and an ostrich. All are built in the simplest possible manner, and a feature that greatly pleased the judges was the obvious care that had been taken in selecting the parts used. For example, the body of the model ostrich is a $2\frac{1}{2}''$ Cylinder capped by $1\frac{1}{8}''$ Flanged Wheels, and the long neck and head are formed by a Screwed Rod surmounted by a Coupling. The tail feathers are $1\frac{1}{2}''$ Strips bolted to the rear Flanged Wheel and splayed out fanwise. The legs consist of $2\frac{1}{2}''$ Rods held by Spring Clips in a Double Bent Strip, which is fixed to the cylinder.

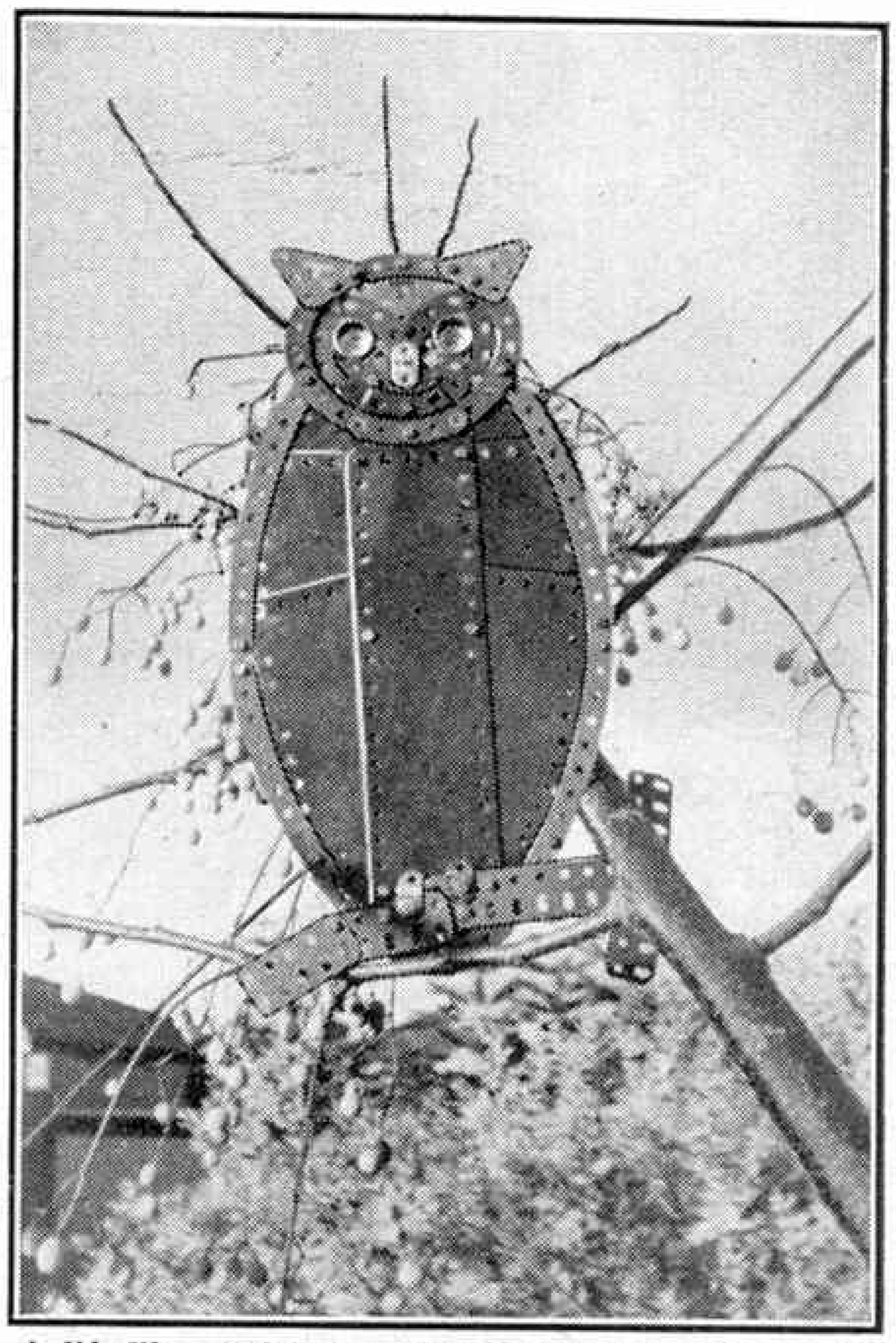
The bodies of the giraffe and horses are made from U-section Curved Plates fitted with Strips for legs. The horses' heads are Couplings fixed to Reversed Angle Brackets and that of the giraffe is a Buffer fixed on a Strip. The dog is very small, its body being formed by a Coupling with bolts to form the legs and head.



"Jerry the Tortoise." A realistic model that won Second Prize in the "Birds and Beasts" Contest for John Devereux, Dublin.

First Prize in the Overseas Section was awarded to P. Hysing, Larvik, Norway, for a fine model of a hart. Although only a few parts are used in construction of the model, this gives a fine impression of the actual animal, for the limbs and head are arranged as though it is at bay. The body and neck are made from Strips and Flexible Plates, with Flat Brackets and $1\frac{1}{2}''$ Strips for the head. The antlers are represented by Strips and Flat Brackets, and these parts are also used to form the legs.

E. Feit, Johannesburg, the winner of the Second Prize in this Section, evidently was not satisfied with the range of animals produced by Nature, so he decided to design one of his own! He calls it the "Nitwitsaurus" on account of its very small brain, and it appears to be a mixture of various prehistoric animals!



A life-like model owl, arranged in a realistic setting, which won a prize for E. P. Tapper, South Perth, Western Australia.

"Humorous Horse and Jockey" Contest (Home Section)

This Contest was announced in the May issue of the "*M.M.*," and was designed to give readers an opportunity of enjoying real fun with their Outfits. In it they were asked to build models of a horse and jockey and to arrange them in as amusing a manner as possible. Entries included both amusing "stills" and working models, the latter being particularly interesting, as when set in motion they carry out the most amusing evolutions.

The prizes offered for the funniest efforts submitted were awarded as follows:

1st Prize, Meccano or Hornby products value £2/2/-: R. Balmer, Worthing; 2nd, products value £1/1/-: H. Coleman, Leicester; 3rd, products value 10/6: Miss L. Slater, Portsmouth.

R. Balmer, Worthing, sent a funny model of a horse and rider arranged so that when a Rod is pulled to one side the horse throws up its hind legs and projects its unfortunate rider over a fence! The model is mounted on a base consisting of a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate, and to one side of this a fence consisting of $2\frac{1}{2}''$ Strips is fixed. The horse's body is a U-section Curved Plate, with $2\frac{1}{2}''$ Strips and Curved Strips bolted to its corners to represent the fore and hind legs respectively. The neck comprises two $2\frac{1}{2}''$ Curved Strips, and Flat Brackets are used for the head and ears. The fore legs of the horse are pivoted to Angle Brackets, and an elastic band is tied to its head, taken through a hole in the base and then fixed to a suitable bolt. The hind legs of the horse are held to the base by passing a $1\frac{1}{2}''$ Rod journalled in a Double Bracket, through one of the holes in the legs. The Double Bracket is attached to the base by an Obtuse Angle Bracket. When the Rod is withdrawn the elastic causes the hind legs to fly up sharply and throw the rider.

Second Prize was awarded to H. Coleman, Leicester, for an amusing racing cartoon pictured with Meccano parts. The model shows a race-horse lying beside an abnormally high fence, while the jockey is rushing to the scene with a ladder!

Meccano Guild

With the Secretary

The Guild's Twentieth Birthday

The Meccano Guild is now 20 years of age. The first announcement of its formation appeared in the issue of the *"M.M."* for September–October 1919. During the 20 years of its existence it has helped tens of thousands of Meccano boys in all parts of the world, and there is no doubt whatever that the organisation fills a real need.

The formation of the Guild was due to repeated requests from Meccano boys themselves. What they wanted was an organisation that would provide means whereby every boy who took up the Meccano hobby could be helped to make the most of it, both as a pastime and as a help in developing his own resource and initiative. Of the success of the scheme there was no doubt from the very start. Meccano enthusiasts enrolled in thousands, and new members have flowed in ever since, with the result that now there have been well over 100,000 enrolments, and the little triangular badge has penetrated into practically every country in the World.

Club Progress

Side by side with the growth of the Guild has gone the steady progress made by Meccano clubs. It is in club membership that a Meccano enthusiast has the best opportunity of realising the Guild's aims, for at meetings in the club room he enjoys model-building and other hobbies along with boys of similar tastes, and at the same time he learns to exercise the qualities that the aims of the Guild are intended to build up. Some clubs indeed are older than the Guild itself. Others were formed soon after the announcement of 1919, and since then clubs have sprung into existence everywhere.

The world-wide nature of the club movement is as striking as that of the Guild itself. A glance through back numbers of the Magazine proves this, for portraits and club group photographs from Australia, Canada, India, New Zealand and South Africa have appeared in these pages, in addition to others from many European countries, Egypt, China and elsewhere. There is no distinction of race or class in either the Guild or the club movement, and the firmest friendships have been established between members living in entirely different surroundings thousands of miles distant from each other.

A Great Recruiting Campaign

In the issue of the *"M.M."* for January last I drew attention to the coming of the club's 20th birthday during the present year, and asked all members to help me to make 1939 a record. They have responded splendidly. There has been great enthusiasm and enterprise in the clubs, which have increased membership and extended activities, and individual members have kept in touch with me by correspondence and have done their utmost to find new members among their friends. There is no doubt that this year would have been the best in the history of the Guild if it had reached its end in peace.

The outbreak of war, with the disturbances that it will bring, may hinder further developments to some extent. This perhaps is all the more reason for determination on the part of members to do their utmost on behalf of the Guild.

How to Enrol Your Friends

The first step in extending the influence of the Guild is to increase membership. There are many boys now enjoying the Meccano hobby who have yet to learn the advantages of this great organisation, and from now until the end of the year I want every member to take his part in a general recruiting campaign. With this in mind I will send supplies of application forms to any member who writes to me for them, so that he can enrol all his friends who are qualified for membership. When these forms are being distributed the name of the member who passes them on should be written on the back so that I can recognise his recruits. The reason for this is that those who are successful in obtaining three new members are entitled to the award of the Recruiting Medallion, and on obtaining three further recruits within three months the medallion awarded is engraved on the back with the name of the successful member and the words "Special Award."

I will send full details of the Recruiting Campaign to any member who would like to have them. While working in this way to extend the Meccano Guild into new fields every member should also keep in mind his own duties. He should always have before him the aims and objects of the Guild, and in particular should always take care to wear his badge of membership. He should write to me regularly to give me news of his activities, and encourage his own friends to do the same. If every member does this, and at the same time keeps a keen lookout for possible recruits, then a sure foundation will be laid for a great step forward in 1940, the year in which the Guild will come of age.

Write to Headquarters Regularly

In times like these, when lighting and other restrictions add to the difficulties of holding meetings of clubs or H.R.C. Branches, and may prevent excursions and visits to places of interest, it is doubly important that every member of the Guild should keep in touch with Headquarters. I am always delighted to exchange correspondence with any member on the models that he wishes to build, and to give him information in regard to the best way of getting the most fun from Meccano or Hornby Train products of all kinds.

Apart from this I am ready to enter into the daily lives of members, to encourage them in their ambitions, and generally to learn something of what they and their friends are doing and to give them what help I can to do things in the best possible way. Whatever the circumstances then,

Meccano Club Leaders
No. 99. Mr. A. Singh

Mr. A. Singh, Leader of the Ranjit (Lahore) M.C. This club was affiliated in October 1931. In the programme a special feature is made of visits and excursions, and photography also is a popular club activity. Meccano model-building is keenly pursued and interest in it is increasing.

every Guild member should make up his mind that he will write regularly to the Headquarters of the great organisation to which he belongs. Old Guild members know well what interest I take in them and their doings. New members have only to write once to discover that I answer all letters myself, and enter whole-heartedly into the task of keeping up a friendly relationship with members and helping them to fulfil the aims of the Guild itself.

Better Club Reports

This advice to write to Headquarters regularly applies also to Leaders and secretaries of clubs. Every endeavour should be made to keep boys' clubs of all kinds in full swing, subject to any restrictions that may be necessary in the interests of safety. Full reports sent in regularly will play a great part in keeping things going, for reading on the *"Club Notes"* page what other clubs are doing will encourage every official and member in their own tasks, and rouse them to greater activity. Without good reports I cannot keep the activities of a club before Guild members generally, and this would mean that recruits would be lost. Every possible detail of club life should be included, for some little event that shows the desires of members may point the way to new ideas for club programmes.

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.

BRADFORD—E. Lightowler, 4, Brook Street, Woodlands, Oakenshaw, Nr. Bradford.
HUDDERSFIELD—F. Sleight, 73, Towngate, Newsome.
NEW ZEALAND—M. Roche, 4, Huia Street, Lower Hutt, Wellington.

CLUB NOTES

York M.C.—Model-building competitions have been held and there has been a notable improvement in the standard of construction. A Derrick Crane was awarded First Prize, and other good models were a Motor Chassis, a Bus and a Lorry. Each successful model was photographed. Excellent progress marks the work of the Hornby Train Section. Many additions have been made to the layout, including level crossings and a bridge, while a station and engine shed are being constructed. Other accessories added include a crane, and the signal housings are being steadily developed. Club roll: 12. *Secretary:* G. Hodgson, 1, Sunnyside, Heslington Lane, Fulford.

Folkestone M.C.—At a model flying meeting interesting flights took place under good conditions. Further accessories have been fitted to the model motor launch "*Southern Queen III*" that is being built by members, and after the motor had been installed trials were carried out on a local pond. Club roll: 6. *Secretary:* W. F. Cotter, 68, Linden Crescent, Folkestone.

Islandmagee M.C.—Four enthusiasts joined the club during August as "holiday" members. The club has been presented with a number of model gliders and several games, and enjoyable hours have been spent flying the gliders. Cricket matches have been played on light evenings. A paperchase was arranged, but bad weather prevented this, and games were played in the club room. The latest issue of the club magazine, "*The Gazette*," sold out very quickly. Members are preparing for their Annual Concert. Club roll: 25. *Secretary:* S. McCready, "Hillmount," Islandmagee, Co. Antrim.

Sid Vale (Sidmouth) M.C.—Several enjoyable rambles have taken place, a particularly successful one being over Salcombe Hill to Salcombe Regis, where members enjoyed refreshments before returning home. Club roll: 12. *Secretary:* L. R. I. Gliddon, "Sheffield House," Sidmouth.

The Schoolboy Model Club (Edinburgh).—A number of members recently paid a visit to the Meccano Factory. The model railway is being rewired and a new switchboard installed. Activities introduced during the last Session are a Film Guild, schoolboy choir, gymnastics, and A.R.P. work. A Centenary Stamp Exhibition is to be held next May. A recent model aeroplane exhibition was an outstanding success, the judges being Lord Nigel Douglas-Hamilton, the club President, Mr. Norman Campbell, of "Skybird" fame, and Squadron-Leader Kirkpatrick, of the Air Cadets. *Leader:* R. Croall, 19, South St. David Street, Edinburgh 2.

Hornsea M.C.—Woodwork has been continued, and members of the Junior and Senior Sections have completed many useful and well-built articles and models. Games Evenings have been held. On one evening a microphone was employed for broadcasting purposes, members thoroughly enjoying participation "at both ends of the wire." Club roll: 14. *Secretary:* P. Richardson, "Summerleigh," Esplanade North, Hornsea.

Barking M.C.—During the Summer Session members have played cricket, rounders and various other open-air games. On one Saturday afternoon there was a successful cycle expedition, in which a tour was made of the Essex countryside. Club roll: 34. *Secretary:* F. K. Whitehead, 60, Devon Road, Barking.

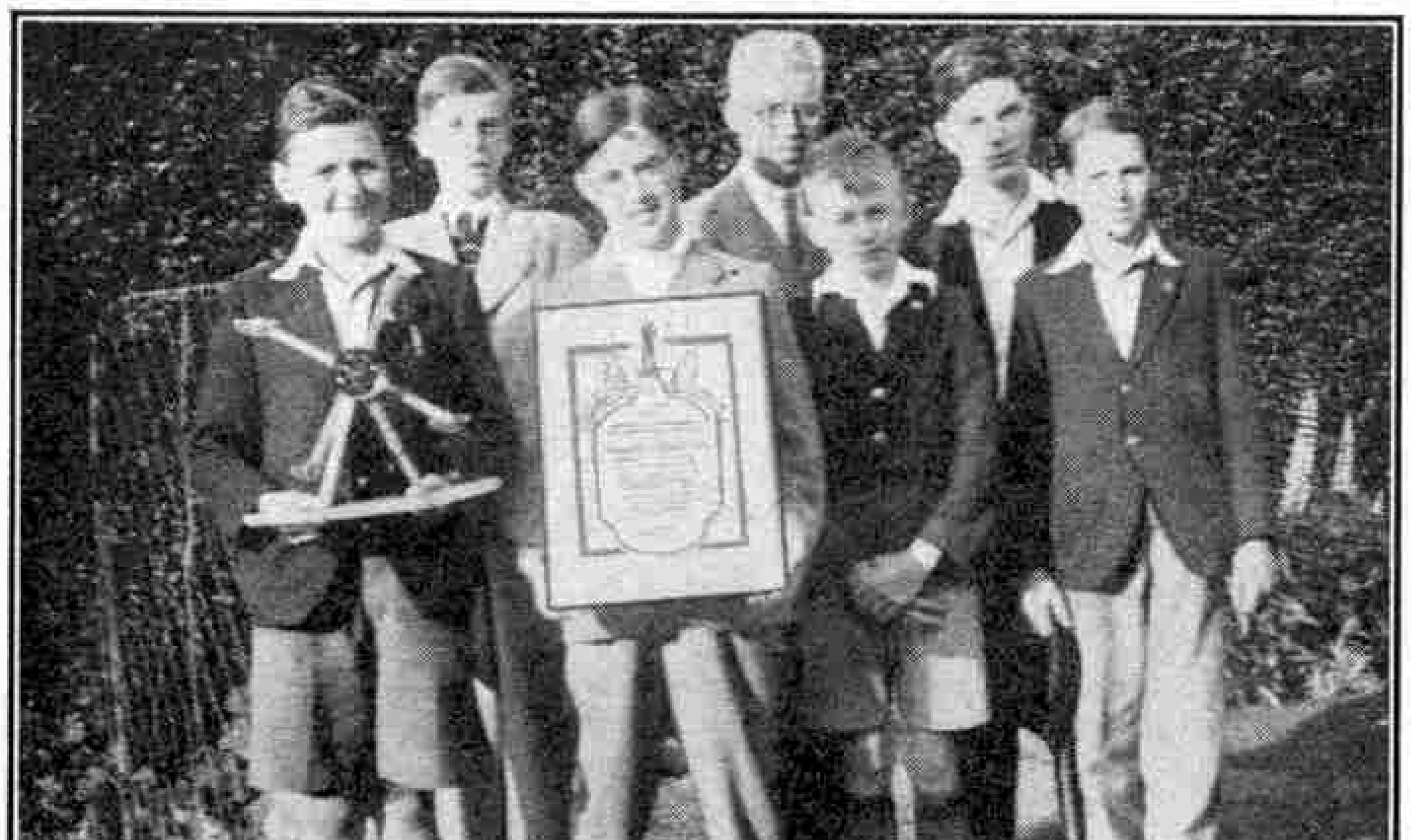
Saltash Model Engineering Club.—In the Meccano Section the model horizontal steam engine under construction is nearing completion, the piston and governor now being in place. In the Model-building Section the coal depot has been completed, and suitably finished with brick paper. The model dock also is nearly ready and has been painted, and work is progressing on the overhead signal box. Preparations are being made for the Annual Exhibition. Club roll: 7. *Secretary:* B. R. J. Braund, 9, Homer Park, Saltash.

Winchmore Hill Collegiate School M.C.—Members recently went to Portsmouth Naval Docks by motor coach, and there inspected the "*Victory*" and H.M.S. "*Enterprise*," a cruiser at that time being refitted. Other places of interest were visited, the outing being a great success. Outdoor meetings have been held for sports and games. Early preparations are being made for the Annual Exhibition and Variety Show. Club roll: 23. *Secretary:* K. C. Stringer, 52, Queens Avenue, Winchmore Hill, London N.21.

Exeter M.C.—Indoor and outdoor programmes for the Winter Session have been drawn up, the latter chiefly comprising football. Three club teams are being run, and captains, committees, and league delegates have been elected. The Corinthian Football Competition has been resumed after a break for the holidays. There has been little model-building activity, but work is gradually regaining its former standard. Over 20 new members have been enrolled. Club roll: 40. *Secretary:* J. T. H. Fenwick, 45, Calthorpe Club roll: 40. *Secretary:* E. Edworthy, 23, May Street, Exeter.

St. Stephens (Saltash) M.C.—The club has met regularly for tennis during the Summer Session, and many enjoyable games have been played. Indoor meetings have now been resumed, and among the models under construction are representations of St. Paul's Cathedral and the Royal Albert Bridge, together with aeroplanes and an aerodrome. Club roll: 16. *Secretary:* A. J. Summerfield, Castle View Farm, Saltash.

Acton M.C.—A very full programme has been followed. At the regular monthly business meetings new ideas and suggestions have been discussed, and it was decided to issue a club magazine, the second number of which is to appear this month. Several meetings have been devoted to train running on the fine model railway layout. Improvements in the design of the track have resulted in greatly improved working, and the use of the buzzer code for train control has made operations most realistic. Experimental running of electric trains has proved very successful, and the electrification of the layout is being continued. The club rooms have been completely redecorated by members in preparation for the Winter Session, and Meccano and Hornby Train posters have been put up round the walls. A number of Visits have been paid, including an interesting one to the Model Engineering Exhibition. Club roll: 15. *Secretary:* S. W. Simmons, 7, Alfred Road, Acton, London W.3.



Members of the Malone (Belfast) M.C., with their Leader, Mr. A. S. Courtney. The secretary is A. A. Courtney. This club was affiliated in October 1938, and during the past twelve months many enjoyable meetings have been held. Most of these have been devoted to Meccano model-building, with occasional Lectures.

AUSTRALIA

Carnegie Methodist M.C.—Meetings have been held regularly, and a Senior Model-building Competition was won by a fine model horizontal steam engine built by R. Bone. On Model Railway Nights clockwork and electric train running have been enjoyed. Games were played in the club room on one evening. Members have paid a visit to the Central Telephone Exchange, where they saw manually-operated switchboards and automatic telephones, and then inspected underground cable tunnels. An interesting Lecture by Mr. Archer dealt with "*The 18-Pounder Gun.*" *Secretary:* J. S. Churchward, 46, Truganini Road, Carnegie S.E.9, Victoria.

Maylands M.C.—Model motor car speed trials have been held. A Blindfold Model-building Contest is in progress. Interesting exhibitions have been staged by the various Factions. The Green and Gold Faction have produced a realistic model of the phosphate conveyor at Nauru, and another setting entitled "*Road-making*," all models being built to scale. The "Red and Blues" have displayed a model aerodrome, in the presentation of which the services of officials from a nearby aerodrome were recruited, and aviation literature was available. A full-size aircraft propeller also was on show. A Cinematograph Show was attended by a number of members from the Perth H.R.C. Branch. Club roll: 25. *Secretary:* W. Petersen, 1, Warne Street, Maylands, Perth, Western Australia.

Thebarton M.C.—A party of members visited the Osborne Electric Power Station, which supplies the electricity for Adelaide. A Visit also has been paid to the Tweedale woollen mills at Lobethal, this proving a very interesting experience. It is hoped to arrange visits to the South Australian Railway Workshops at Islington, and Holden's Motor Body Builders at Woodville, as at both places there is machinery of exceptional interest. A club photograph has been taken. Club roll: 55. *Secretary:* G. W. Croft, 50, Old Port Road, New Queenstown, South Australia.

MALTA

The Lasallian M.C.—This recently-affiliated club is making good progress and membership is increasing. A good number of Meccano models are under construction. Suggestions for competitions are being considered, and a Model-building Competition has been held. Model railway working has been greatly enjoyed at some meetings. Tennis also has been popular. Club roll: 19. *Secretary:* C. Ciantar, 49, Vincent Bugeja Street, Hamrun.

NEW ZEALAND

Ashburton M.C.—A party of members attended the three-day birthday celebrations of the Christchurch M.C. The first of the two competitions for the Inter-Club Shield was held, Ashburton coming out on top in model-building and recruiting, with Christchurch leading for attendance. Arrangements are being made for the Annual Mystery Outing in October. An inter-club Debate was held recently. Further visits have been paid to the Sumner Deaf and Dumb School, and films of the North and South Islands were shown. Club roll: 50. *Secretary:* E. Lewis, 120, Havelock Street, Ashburton, New Zealand.

Christchurch M.C.—Meccano and Hornby Section leaders have been elected, and each is responsible for the programme for the meetings of his Section. Games and Talks are alternated with the above meetings. During a recent demonstration the Hornby "*Princess Elizabeth*" Locomotive hauled 60 goods wagons, including several of the double-bogie type, on the new Hornby Steel Track. A Debate with the Ashburton M.C. was on the motion "*Is Modern Feminine Fashion a Thing of Beauty*," the proceedings occasioning much laughter. Talks have been given on A.R.P. and photo-enlarging. Club roll: 41. *Secretary:* D. Pratt, 102, Kerrs Road, Christchurch N.E.1.

SOUTH AFRICA

Malvern M.C.—Members have staged an exhibition at a nearby school. Over 30 Meccano models were built, and these, together with a Hornby Railway and a display of cardboard models, badges and cigarette cards, provided an attractive show. A Visitors' Book kept in the club room now contains over 500 signatures. An Exhibition and Sale of Work is to be held in October. At a very successful club Dance the equipment for operating the coloured lighting was built entirely from Meccano Parts. Monthly "News Strips" are being issued, giving details of club activities. Club roll: 65. *Secretary:* D. Hean, P.O. Box 8, Cleveland, South Africa.

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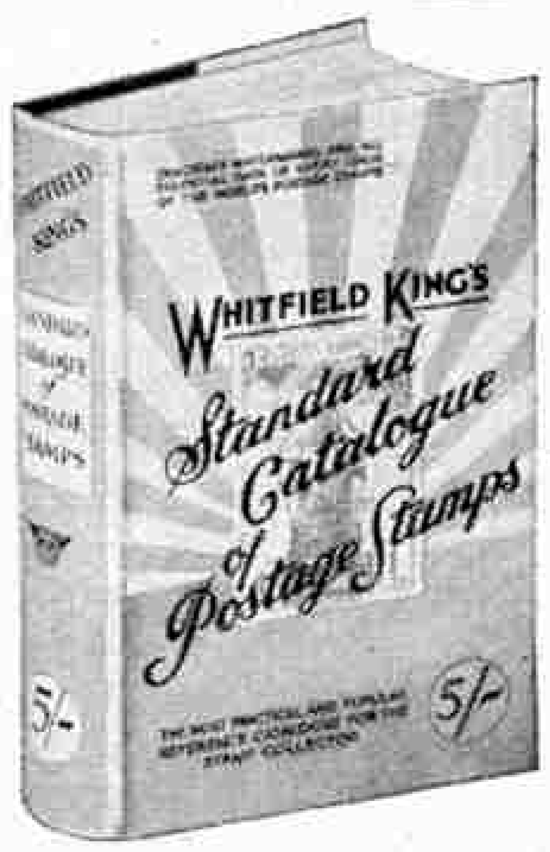

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Stamp Collecting

The New Zealand Centenary Issue

The most important of forthcoming stamp events is the issue of a complete series of commemorative stamps to celebrate 100 years of European settlement in New Zealand. The stamps are to be issued on 2nd January and they will be accompanied by a special brochure, providing full details of each design, which will be given free to all who purchase a complete set. The designs are reproduced here in advance by courtesy of the High Commissioner for New Zealand in London.

The stamps reveal the whole story of the development of New Zealand in a most entrancing manner, and the beauty of the designs makes the set worthy of inclusion in every young collector's album. The story opens with the ½d. value, the design for which shows an idea of the scene on the arrival of the main body of Maoris in the islands in 1350. The Maoris are part of the great body of native races that spread originally from India across the whole South Pacific Ocean. They landed on the North Island at a point now known as the Bay of Plenty, and the stamp design depicts vividly their extreme physical exhaustion following the long voyage across the sea in open canoes.

The canoe shown in the design is of the common Polynesian type, consisting of two hulls lashed together and surmounted by a central staging. This form of construction gave great stability under heavy sail.

The stamp is framed by a typical Maori spiral design, as are most of the stamps in the set, but the most interesting features of the border are the *tewhatewhas*, or Maori axes, one on each side. These axes were primarily weapons carried by tribal leaders and were made of carefully selected hardwood or bone. The feathers dangling from the lower edges of the blades were typical ornaments.

The 1d. value shows a portrait of Captain Cook, his naval barque *"Endeavour"* and a map of the islands, the whole design being symbolic of Captain Cook's re-discovery of New Zealand in 1759. The 1½d. value bears portraits of the five sovereigns who have reigned over the British Empire during the last 100 years. These are Queen Victoria, King Edward VII, King George V, King Edward VIII and King George VI. The portrait of our present King is placed centrally and surmounted by a crown. The Union Jack and the New Zealand national flag hang to the left and right of the stamp respectively, symbolising New Zealand's membership of the British Commonwealth.

The design of the 2d. value takes us back into earlier history, to Tasman's re-discovery of New Zealand in 1642. It shows a portrait of Tasman, his ship, and a chart of the west coast of New Zealand showing the route of Tasman's voyage down the coast.

The 3d. stamp marks the next stage in the development of New Zealand, showing the scene at Petone Beach on 22nd January 1840, when the main body of European immigrants landed. In the right foreground, leaders of the immigrants are shown in correct town attire, wearing frock coats and tall beaver hats, conferring with native chiefs garbed only in gaily coloured blankets.

A few weeks later, on 6th February, representatives of Britain met the native chiefs at Waitangi and concluded a treaty under which the native population gave their allegiance to the British Crown in return for a guarantee of their lands and possessions, with full protection and status as British subjects. The 2½d. stamp depicts the scene at the signing of the treaty.

The 5d. stamp shows the hoisting of the British flag at Akaroa on 11th August 1840 to mark formally the re-assertion of British sovereignty over the islands.

Progress in New Zealand was rapid from this point and the development of transport and its importance in the Islands' industrial and agricultural developments is symbolised in the design of the 4d. stamp. In the early days, wagons drawn by slow-moving teams of oxen or by horses provided the only means of moving goods. To-day the islands are served by up-to-date railway services, by fast mail steamers, and by regular air mail services that link New Zealand with the Empire "all-up" mail service, and enable correspondence to reach London within 12 days of posting in the remotest towns in the islands. The old picturesque forms of haulage and transport are still in use to some extent in rough back-block country, however.

From the earliest days of its development, New Zealand has relied for its prosperity mainly upon dairy, fruit and sheep farming. Readers will recall the very striking designs in the New Zealand

Chamber of Commerce issue of October 1936, all five designs from which featured various aspects of the working of these industries. The 6d. value of the new series provides an interesting link with the Chamber of Commerce set. The design shows a map of the world, and on it is marked the route taken by the first shipments of frozen mutton to Britain from Port Chalmers on 15th February 1882. The voyage was made by way of Cape Horn.

The 7d. stamp symbolises the strikingly happy association of Maori culture and the British way of life, which have gone on side by side in almost complete harmony. Among the many tribal customs that still flourish, the building of a Sacred House whenever a tribe settles in a new place is one of the most interesting. This House becomes the centre of

(Continued on page 616)

New Zealand Centenary Issue—

(*Continued from page 615*)

village life, and all tribal councils are held within its shadow. The stamp design show a Maori council in session before a Sacred House and, although the reproduction is on a very tiny scale, the strikingly elaborate carved decorations are plainly to be seen.

Some of our older readers will recall a splendid example of a Maori Sacred House on view at the British Empire Exhibition at Wembley in 1924-5. This building, known as *Mata Atua*, was erected in 1874 by Maoris on the east coast of New Zealand and was presented to the British Government in 1881. It was 79 ft. 6 in. in length, 41 ft. in breadth, and 22 ft. in height.

The carved statue visible in the background of this stamp design is another example of Maori art. Many of these statues were actually cast in wooden moulds, the medium being molten lava or volcanic earth taken from the sides of volcanoes and mixed with sea water. Such material sets as hard as granite.

The 9d. stamp also is symbolic, illustrating the development of the gold winning industry. The twin vignettes show a couple of old-time prospectors "panning" the bed of a stream, and a modern gold dredger at work on a river bed.

The most interesting stamp of all is the 1/– stamp, the highest denomination of the series, which shows *Tane Mahuta*, a giant Kauri pine, in the Waipona Forest reserve in the North Auckland district. This great tree, 42 ft. in circumference at the base and 80 ft. in height to its first branch, is believed to have been standing at the time of the Roman Conquest of Britain. Its presence among the stamp designs provides a striking symbolisation of the whole period of New Zealand's history prior to existing records.

The name *Tane Mahuta* is Maori in origin, *Tane* being the name of the Maori god of vegetation or of the forest. All trees were regarded by the Maoris as sacred because they were the children of *Tane*, and many important ceremonies were observed whenever it was necessary to fell a tree for canoe making or house building. *Tane* is also the second name of the Sun, the promoter of all growth. *Mahuta* means to jump, to land from a boat, or to rise, and a free translation of the name *Tane Mahuta* may be taken to mean, therefore, the Sun jumping or rising at daybreak.

The small scale of the stamp illustration makes it very difficult to appreciate the great bulk of this ancient tree but this can be realised from the photograph reproduced on page 615.

Stamp Gossip

and Notes on New Issues

South African Huguenot Commemoratives

South Africa recently issued three stamps to commemorate the 250th anniversary of the arrival of the Huguenots in South Africa in 1688, following upon the revocation in France of the Edict of Nantes in 1685. As anniversary stamps they are therefore a year late in appearing.

The $\frac{1}{2}$d. + $\frac{1}{2}$d. shows the Old Vicarage at Paarl, the headquarters of the Huguenot settlement, which are to be restored and used as a Huguenot Museum, and a fleurs-de-lis in the design recalls the French origin of the settlers. The rising Sun and a cross on the 1d. + 1d. stamp are symbolical of the Reformation and of the sacrifices made by the Huguenots for their cause. On a scroll below is inscribed *"Post Tenebras Lux"* which means *"After the darkness, light."* The 1$\frac{1}{2}$d. + 1$\frac{1}{2}$d. stamp shows a scene in the Drakenstein Mountain Valley, the original home of the Huguenot refugees. The view includes a picturesque house, surrounded by a vineyard, that is typical of the 18th century Huguenot dwelling.

An American Art Series

The arts, crafts and sciences are to be honoured by the United States in a new series of stamps bearing the portraits of 32 men and three women who have made important contributions to American culture. The new series will consist of a total of 35 stamps divided into seven groups of five each, under the titles artists, authors, composers, educators, inventors, poets and scientists. Each group will contain stamps of five denominations from 1c. to 5c., and it is anticipated that the first of the new series will be issued during the closing weeks of the current year or early in 1940.

There is not space here to list all the names to be included in this big issue. The most prominent are James Whistler, the painter; Samuel Langhorne Clemens, the humorist novelist, who will be more readily recognised under his pen name Mark Twain; James Fenimore Cooper, writer of boys' stories; Stephen Collins Foster, composer of *"My Old Kentucky Home"*; Ethelbert Nevin, composer of *"The Rosary"*; Alexander Graham Bell, inventor of the telephone; Samuel Morse, "father" of modern telegraphy.

"Stanley Gibbons' Priced Catalogue of the Postage Stamps of the World."

1940 (Stamp Centenary) Edition. Price 16/– net
(Stanley Gibbons Ltd., 391 Strand, London W.C.2)

Great Britain issued the World's first postage stamp in May 1840, and until 1843 the British 1d. and 2d. issues were the only ones in existence. How the number of stamps has increased in the 100 years that have elapsed since that time is shown by the Stamp Centenary Edition of Stanley Gibbons' well-known catalogue. This contains 1,999 pages, 75 more than last year, and gives descriptions of more than 100,000 stamps, of which 2,973 are new ones issued during the last 12 months alone. The new issues include stamps from such interesting countries as Carpatho-Ukraine, Slovakia, the Sudetenland and the Hatay, formerly known as Alexandretta. There is a newcomer to the catalogue in Greenland, stamps for that Arctic land appearing for the first time. As might have been expected, the design of one of the two stamps issued by that country shows a Polar bear.

The catalogue contains a special illustrated feature describing the development of the postage stamp since 1840. With interest centred on Great Britain as the first stamp centenarian, collectors will find the improved list of stamps of this country particularly attractive, for it gives much additional explanatory information. Other revision has included the rewriting of the list for Sweden, and partly rewriting of the lists for Tasmania and Guadeloupe.

Price variations have made necessary 27,446 alterations, almost a record number.

"Stanley Gibbons Simplified Stamp Catalogue"

1940. Price 5/– net
(Stanley Gibbons, 391 Strand, London, W.C.2)

This catalogue, now in its eighth edition, differs from the larger Gibbons in not giving varieties of paper, perforations, shade and watermark. Yet it contains 1,208 pages with a total of 61,132 stamps and 8,238 illustrations. At the price of 5/– it is one of the wonders of the stamp world. The new issues listed are particularly interesting. There are 2,099 of them, and they help to show how stamps illustrate recent history, including as they do such stamps as the first marking the Italian occupation of Albania.

Competition Corner

What Form of Sport Do You Prefer?

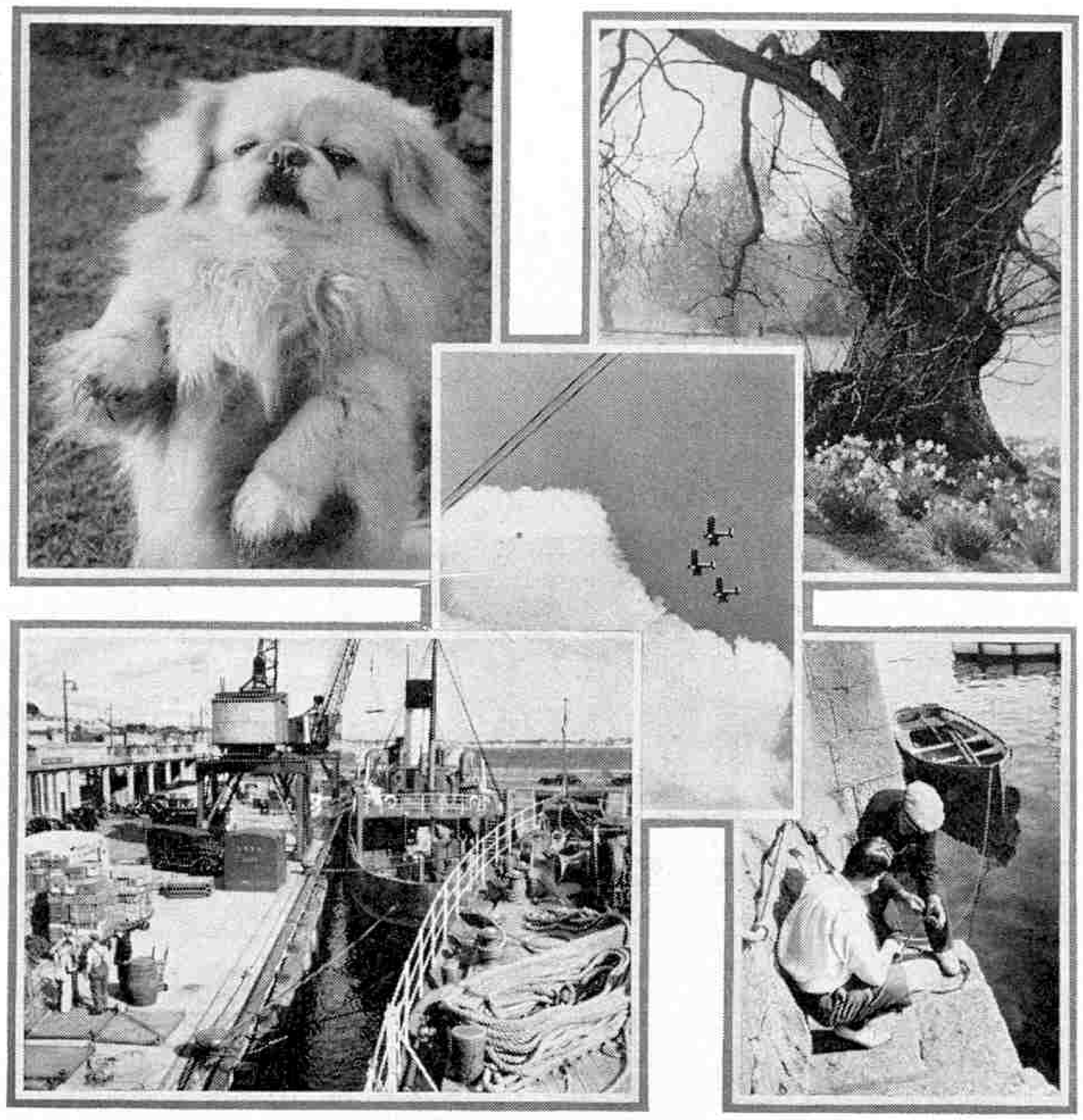
October is one of the most interesting months of the year for boys who are keen on sports. The summer season is then still fresh in mind, and winter sports are with us, so that there is ample opportunity for comparing sports of different kinds. We have therefore arranged a competition with a sporting interest, and this takes the form of a voting contest. Contests of this type are popular with our readers, and a record entry is looked for. A special welcome is given to new readers, who will have every chance of winning good prizes in these and subsequent *"M.M."* competitions.

This competition is an easy one in which every reader can take part and for which no special preparations are necessary. We give below a list of 15 popular sports, and entrants are asked to write on a postcard A, which of these they like best, and B, the 10 that they think will prove most popular with readers. The sports chosen must be arranged in a list showing what the competitor believes will prove to be their order of popularity as shown by the votes of all competitors.

The 15 sports from which to make a selection are: Association Football, Boxing, Cycling, Cricket, Gymnastics, Hockey, Motor Racing, Rowing, Rugby Football, Running, Swimming, Tennis, Table Tennis, Walking and Wrestling. If any reader prefers some other form of sport, outdoor or indoor, he is at liberty to name this as his choice, but he is reminded that it is scarcely likely to figure prominently in readers' lists.

In the event of a tie for any of the prizes, the judges will make their awards on the basis of neatness or novelty of presentation. Entries should be addressed *"Sports Voting Contest, Meccano Magazine, Binns Road, Liverpool 13,"* and must be sent to reach this office not later than 30th October.

Overseas readers are specially invited to take part in this competition. The prizes in this section will be of the same value as those in the Home section, and entries in it must arrive not later than 31st January 1940.



A selection of prize-winning photographs from the 1939 Photographic Contests. Top left, "The Perfect Sitter" (D. Tod Boyd, London). Top right, "Youth and Age" (Miss D. A. Attrill, Bristol). Centre, "Winged Warriors" (A. de Boeck, Belgium). Bottom left, "Cargo" (R. D. Proundlock, Bedford). Bottom right, "A Lesson in Knot Tying" (L. F. Smith, West Wickham).

Winter Drawing Contests

This month we re-introduce the series of Drawing Competitions that have enjoyed so much popularity with our readers in past years. Once again we follow the popular plan of leaving the choice of subjects to our readers. There is no restriction on the size of the entry, which may be in pencil, pen and ink, or colour, and the judges will award the prizes on merit, irrespective of the medium chosen, so that plain drawings will have every chance of winning.

Each month the entries will be divided into two sections "A" for readers age 16 and over, and "B" for readers under 16, and prizes of Meccano products to the value of 21/- and 10/6 respectively will be awarded in each section. There will be special sections for Overseas readers, in which prizes to the same amount as in the Home section will be awarded.

The entries to this month's contest must be addressed *"October Drawing Contest, Meccano Magazine, Binns Road, Liverpool 13,"* and must arrive not later than 31st October. Overseas closing date 31st January 1940.

Intending competitors are reminded that each drawing submitted must bear the competitor's name, age and address on the back. Unsuccessful entries will be returned if a suitable stamped addressed cover is sent with the entry. Overseas readers desiring the return of their entries may send loose postage stamps of their own country, or International Reply Coupons, equivalent in value to the cost of return postage. Prize-winning entries are retained by the Editor.

COMPETITION RESULTS

HOME

July Photo Contest.—First Prizes: Section A, A. G. Dell (London S.E. 27); Section B, D. T. Boyd (London S.W.13). Second Prizes: Section A, A. Webb (Manchester 18); Section B, P. G. Lund (Birstall, Leicester). Consolation Prizes: B. C. Akehurst (Beckenham); F. L. Atkins (St. Leonards-on-Sea); R. Green (Leeds 12); D. Griffiths (Mold); J. Hampson (Edgware); Miss A. Roe (Sheffield); L. F. Smith (West Wickham).

July "Point Words" Contest.—1. L. W. Chitty (London S.W.20). 2. E. Moss (Church, Lancs.). 3. J. Robinson (Whalley). 4. T. Holden (Whalley).

OVERSEAS

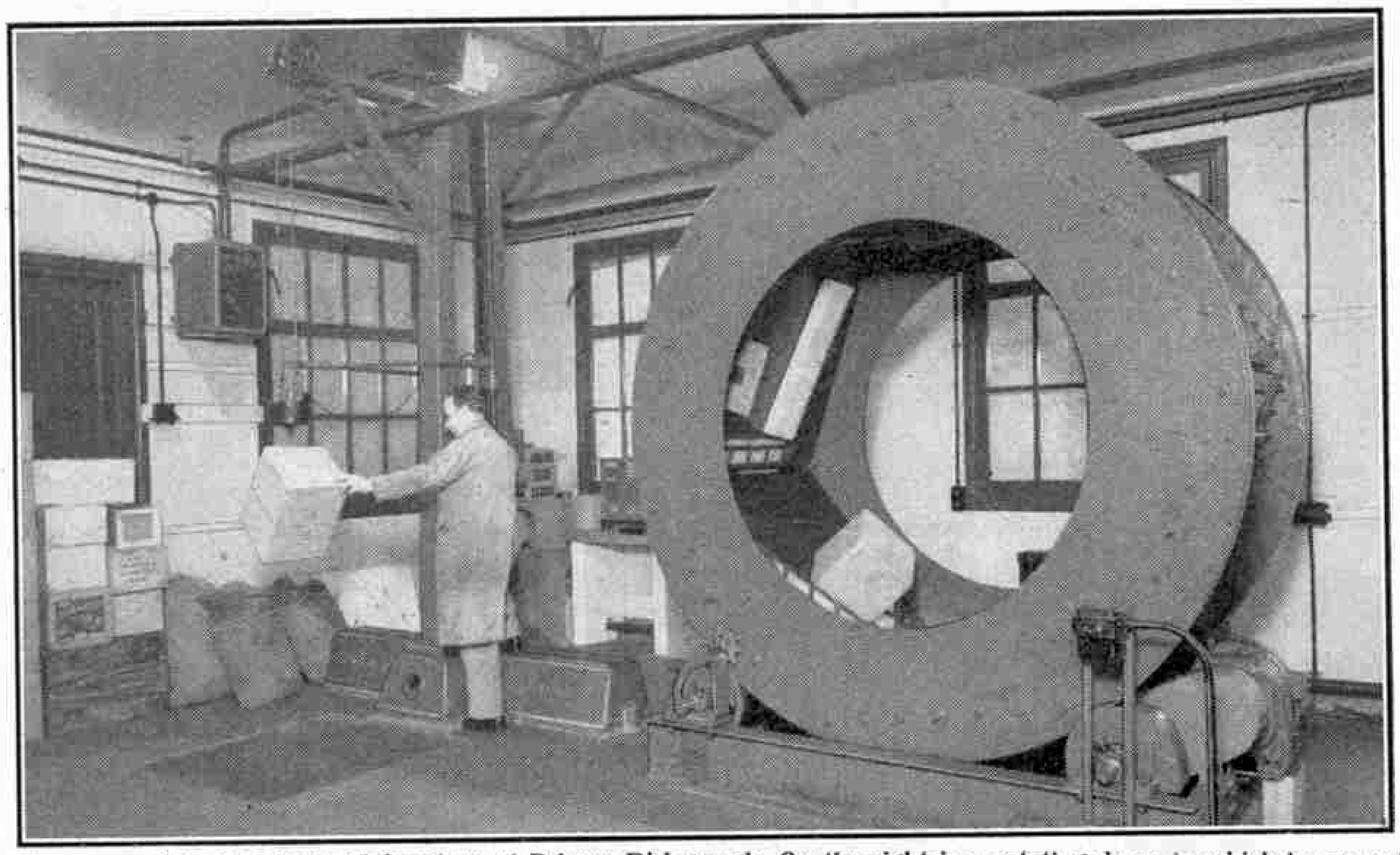
April Photo Contest.—First Prizes: Section A, A. de Boeck (Muizen/Mechelen, Belgium); Section B, C. R. Anderson (Christchurch, N.Z.). Second Prizes: Section A, J. S. Manduca (Sliema, Malta); Section B, C. O. Ekwensi (Ibadan, W. Africa).

April Crossword Puzzle.—1. E. A. Hamilton (Dunedin, N.Z.). 2. K. J. Orams (Christchurch, N.Z.). 3. G. E. McKinnon (North Sydney, N.S.W.). 4. R. W. Roddick (Buenos Aires).

Rough Treatment for Boxes

Laboratory in which Containers are Tested

By A. J. Foord



A corner of the box-testing laboratory at Princes Risborough. On the right is a rotating drum in which boxes and containers fall repeatedly over ledges to test their resistance to rough treatment; on the left, an apparatus that drops boxes from various heights. The illustrations to this article are reproduced by courtesy of the Director, Forest Products Research Laboratory, Princes Risborough.

THE object of the box-testing laboratory at the Forest Products Research Laboratory, Princes Risborough, is to test methods of packaging. Tests based on actual transport have been common practice for a long time, but as the treatment received by goods in transit varies, these trials are costly in both time and material if a sufficient number of consignments to give a reliable answer are sent. In the laboratory, however, a few tests made in a short time generally give the information required.

The problem often is one of comparison, as when an existing pack, that is a complete package including box, internal fittings and wrappings, and goods, has been used for a considerable period, and it is required to know if some other pack of different material or design is likely to prove equally satisfactory. In this case it is only necessary to reproduce in the laboratory the rough handling that the existing packs have received in order to establish a standard, with which to compare other packs. On the other hand it may be that a new pack has been introduced, and has been found in practice to give insufficient protection to the contents. In this case the severity of the test is adjusted to produce the same damage to the packs. Changes in design are then made until under these conditions no damage is obtained.

One of the tests applied in the laboratory shows whether a complete pack possesses endurance, and is carried out in a hexagonal drum 8 ft. in diameter that turns round once a minute. On the inner faces of the drum are projections over which the boxes fall. These are so arranged that for each box the falls over a particular projection are of the same type and of equal severity, so that a direct comparison can be made between one box and another. Differences in protection due to small changes in the thickness of the materials used in making the inner fitments of a container can be detected by the use of this drum.

When the contents are not so fragile, as for example with canned goods, the failure of a pack may be due to breakdown of the outer container. The test of the efficiency of the pack is then the amount of damage that enables pilfering of the contents to be possible.

The drum test is not always suitable in cases where severe damage to contents is required in experiments, and the drop test is then applied. For this test the container is suspended from an electro-magnet, from which it can be released and allowed to fall. The advantages of this test lie in the fact that the conditions can be varied over a very wide range, and that the container can be dropped flat, on a corner, or on an edge. An interesting application of this test was to compare the suitability of different forms of stitching used in the construction of containers. In a particular instance it was found that the stitches pulled through the material when the pack was dropped on to its edge from a height of 2 ft. A modification of the type of stitch was completely successful in eliminating this weakness.

Tests to determine the resistance of containers to superimposed loads are carried out in the crushing machine, in which the container, with the necessary internal fittings but without actual contents, is subjected to a steadily increasing crushing load. A device fitted to the machine automatically shows the crushing that occurs as the load is applied. This test does not, however, indicate whether containers can be "stacked," since this property in the case of fibreboard containers is also related to the flatness of the pack. To ensure that a pack would be satisfactory in this respect, actual stacks are set up and any movement over a period of time observed.

In addition to tests on complete boxes, tests are made on the materials used in their manufacture. For instance tests to determine the resistance of fibreboard to bursting and tearing, or of that of plywood or solid wood to bending, impact, nail pulling and splitting are carried out. The influence of the moisture content of the material also has to be taken into account. This is dependent on the relative humidity or dampness of the atmosphere. At high humidities the general tendency is for both boxes and the materials used in their construction to be weakened. It is necessary therefore to maintain a standard condition of relative humidity for all tests, in order that the effects of differing moisture content can be avoided. For special investigations a separate room is available in which the temperature and relative humidity can be rapidly adjusted.

Another corner of the laboratory. On the right is a machine that tests the resistance of boxes to weights placed on them.

New Dinky Toys

This month's addition to the range of Dinky Toys is the fine Mechanised Army (Dinky Toys No. 156) announced on page iv. The new set provides realistic miniatures of the principal units of Britain's Mechanised Forces, each modelled to correct scale. It includes all the items—except the drivers—from the existing Royal Tank Corps Medium Tank Set (Dinky Toys No. 151) and the Royal Tank Corps Light Tank Set (Dinky Toys No. 152); the Mobile Anti-Aircraft Unit (Dinky Toys No. 161), and the 18-pounder Quick-Firing Field Gun Unit (Dinky Toys No. 162). This is the finest miniature Mechanised Army ever produced, and it provides endless fun and excitement. Every reader should ask his dealer for it.

Inventions that were Forgotten

Who invented the white line down the middle of the road that has added so much to the safety of our highways? It was believed that this device was due to Mr. E. N. Hines, Detroit, to whom a plaque was presented after careful investigation had been made by the B. F. Goodrich Company. There is no reason to doubt Mr. Hines' invention of the idea, but it has now been discovered that a highway built in Mexico from 350 to 400 years ago has the same central dividing white line. This old road is built of stone, and many sections of it are in use to-day, chiefly by pedestrians and light vehicles. The white line is marked by means of lighter stones, and probably divided the road for streams of traffic in opposite directions.

Another example of an invention that is older than is usually believed is the rotary printing press. A rotary machine for printing newspapers was invented as long ago as 1835 by Sir Rowland Hill of penny post fame. It gave excellent results, but at that time it was necessary to affix a stamp to every sheet of newspaper printed, and the Government would not allow the stamps to be impressed on the paper as it passed through the rotary machine. For this reason the machine never came into use and was more or less forgotten. It is ironical that a machine invented by Sir Rowland Hill, the man who introduced the penny post, could not be used owing to the necessity for fixing stamps on the printed matter it produced.

Hill's press is now to be seen at the Science Museum, South Kensington. Movable types were used and these were specially made with shanks that tapered so that they could be assembled directly on a curved composing stick and then placed in position, column by column, on the surface of the printing cylinder. The inking arrangements were very elaborate, and in one form of the machine the paper could be printed on both sides as it passed through one machine. One great advantage was that late news arriving after printing had commenced could be inserted in a stop press section. When the rotary press was re-invented in later years the art of casting curved plates for use on the printing rollers had been perfected. The paper moulds that made this possible were not introduced until 1848.

A Dolmen in Ceylon

By S. L. Abeysingha

On reading the article on *"British Stone Circles,"* which appeared in the April issue of the *"M.M.,"* I remembered a visit I paid to a dolmen near Rambukkana, Ceylon. It is in the heart of a village about four miles to the north of Rambukkana and looks like the table of some giant of the good old days. It belongs to a period before history came to be written, and is the only example known to exist in Ceylon of structural work by Stone Age man.

The dolmen consists of solid blocks of granite roughly fashioned into rectangular shape. The left upright and the roof or table have cracked right across owing to a soft vein in the rock. Each of the two uprights measures 14 ft. by 5 ft. 10 in. and is 1 ft. 3 in. in thickness. They weigh well over 10,000 lb., but the heaviest slab by far is the table stone. It is 18 ft. long and 15 ft. wide, and is of the same thickness as the upright but is three times heavier, and it is interesting to speculate how men using stone tools were able to lift this immense mass into position.

A slab smaller in dimensions than either upright serves as the back of the dolmen. It is not long enough to fit right across the space between the uprights, which are 6 ft. 6 in. apart, but it seems to have been bigger originally. Possibly a crack loosened one portion and this was removed later. The whole structure seems to have been almost air-tight originally, with one slab in front and another behind. Grooves more than 1 ft. in breadth are cut at the ends of each upright so that the slabs could be fitted to seal the whole effectively.

IMPORTANT TO EVERY READER

The outbreak of war has brought with it rises in the costs of manufacture of Meccano products, notably in regard to raw materials. It has been found necessary to increase the prices of Dinky Toys (see page iv), and the full revised price list is now available. It is our intention to maintain the present prices of other Meccano products unless circumstances force us to make a change, but if increases become necessary they will be announced in the "M.M." In the meantime every reader should keep in touch with his dealer.

A New Lead Alloy

The addition of a small percentage of metallic lead to steel gives a metal that can be worked so easily that the life of tools employed in machining is doubled. The name of the new alloy is Ledloy, and its easy working appears to depend on the lubricating effect of the lead.

One of the difficulties of producing an alloy such as this is that lead begins to change into vapour at the temperature of molten steel. In making it the lead therefore is added in powder form, when some of it is changed into vapour but a sufficient proportion is absorbed by the steel. The lead that is retained is found to be distributed evenly throughout the mass of the alloy on cooling.

Heavy Work on Scottish Mountain Grades—

(Continued from page 575)

we were climbing. So to the tune of a noisy full-throated duet from their exhausts the two engines thundered up the last mile to the highest summit point on the Oban line, Glenoglehead. At this lonely crossing place, 941 ft. above sea level, we waited for the 5.12 p.m. express from Glasgow to Oban. With these two trains the crossing is of more than usual importance, for they exchange enginemen, and Driver Smith and Fireman McKinney, who had worked our train engine from Oban, were now preparing to transfer to the down express.

In the still air at the head of the pass the strident tones of a locomotive exhaust were already clear some distance down the glen, and presently the train came into view, headed by a Pickersgill 4-6-0 very much "in full cry." She stopped exactly abreast of *"Clan Mackinnon,"* and in a moment the Glasgow men had taken over and we were waving a farewell to the Oban crew. With many a gentle application of the brakes we coasted down Glen Ogle. The track follows a hair-raising ledge cut in a precipitous hillside, but soon the hills begin to open out on the left side of the glen, and little by little there was revealed an exquisite bird's eye view of Loch Earn.

In 5¼ miles from the summit we came to Balquhidder, where our pilot engine was detached. Over the favourable grades remaining *"Clan Mackinnon"* made short work of its 375-ton load. We ran smartly down to Strathyre, 2.9 miles, in 4¾ minutes start to stop, and although there was a permanent way slack on the level stretch alongside lovely Loch Lubnaig the last stage into Callander was completed to time, 8.8 miles in 15 minutes. So ended an interesting and impressive run.

Houses Without Walls

The ideal house or building probably is one without walls or roof, for this would admit full sunlight, including the health-giving ultra-violet rays.

This ideal is not perhaps so ridiculous as it sounds. A house without walls or roof could give shelter from the winds and probably from the rain by the use of devices similar to that used in providing the drivers of certain French locomotives with a better outlook than can be obtained through glass. The driver of an engine so fitted is protected by blasts of air that shoot across his line of vision. The blasts are produced by leading the wind due to the speed of the train through narrow openings, in which its speed is increased, and they blow aside not only the wind itself but also rain and snow, leaving the driver with a clear space through which to look.

Heating the ideal house of the kind suggested clearly would be a more difficult matter, but special clothing in conjunction with heated side and floor panels probably would solve even this problem. There would be other difficulties not so easy to overcome, however, notably the lack of privacy, and the house without walls or roof must remain a dream.

THIN

The big Indian brave stopped at a modern sandwich shop in Yuma and ordered a sandwich. When it came he bit into it, then stared curiously at its make up. He said to the man behind the counter:

"You slice 'im ham?"

"Sure," said the waiter, "why?"

"Ugh!" exclaimed the brave. "You know you very near miss 'im."

* * * *

Teacher: "Can you find Rome on the map?"

Ten-year-Old: "No, sir, but I can on the wireless."

* * * *

Pupil: "What's the date, please?"

Teacher: "Never mind the date. The examination's more important."

Pupil: "Well, I want to have something right on my paper."

* * * *

Grandfather: "Well, my young man, how are you getting on at school?"

Bill: "Fine. I'm centre forward in the football team."

Grandfather: "And your lessons?"

Bill: "Oh, I'm right back at them."

* * * *

Mary had a little car,
'Twas painted white as snow,
And everywhere that Mary went
That car would never go.

* * * *

A man working on the top of a high chimney called down to his mate below:

"Bill, come up here and listen."

Bill made the long and laborious climb to the top of the chimney. He listened intently for a long time, and then remarked:

"I can't hear anything."

"That's right," replied his pal. "Isn't it quiet."

* * * *

Boss: "What are you doing here? Didn't I give you the sack yesterday?"

Office Boy: "Yes, and don't do it again. Mother didn't half kick up a row about it when I got home last night."

* * * *

Retailer: "Leave your sample case at the door."

Traveller: "Why?"

Retailer: "Otherwise I shall have to throw it out as well."

* * * *

Vicar (benevolently): "And what is your name, my little man?"

Small Boy: "Well, if that isn't the limit! Why, you christened me!"

* * * *

Jones: "It is very kind of you to lend me a fiver. I feel I can never repay you."

Smith: "Eh? What's that? Why on earth didn't you tell me before?"

* * * *

BOYS OF ALL AGES

Yesterday I passed a shop where there is a toy electric train and railway on exhibition. Gazing raptly into the window was a man of about seventy with an equally elderly companion.

"You know, James," I overheard the old gentleman say, wistfully, "I shouldn't mind somebody buying me one of those for my birthday."

A SLIGHT MISTAKE

Diner: "Hi, waiter, there's a caterpillar in my dinner."

Waiter: "Pardon me, sir, that's the sausage."

* * * *

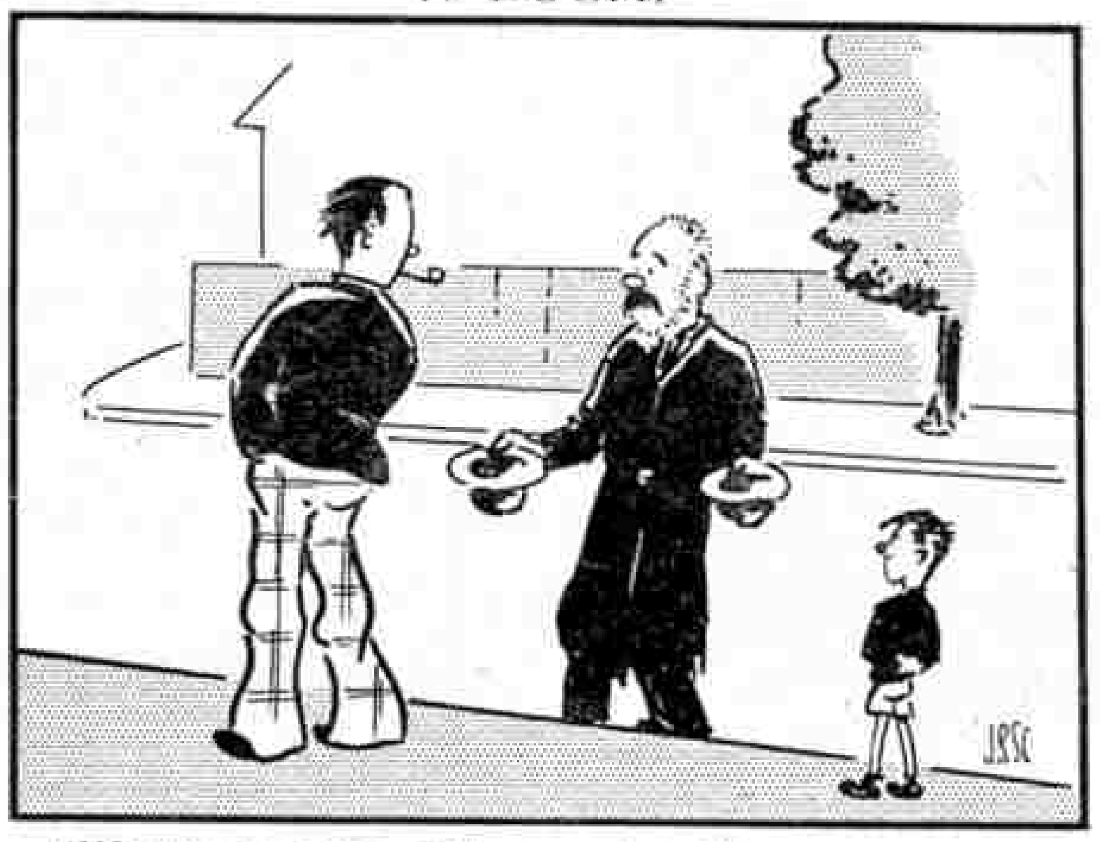
"Will you buy two sixpenny tickets?"

"What for?"

"A shilling, of course."

* * * *

A BOOM!



"What's the idea of the two hats?"

"Well, business is so good that I have had to open a branch."

* * * *

Film Director: "The star wants £500 to play the part of the Indian in our new film."

Manager: "Give him £250. He's only got to be a half-breed."

* * * *

Bailie McTavish: "An' so ye leave Glesca on Saturday. What are ye daein' the morrow nicht?"

Mr. Jarvis: "To-morrow—Thursday? I've no engagement."

"And the next nicht?"

"I'm free then, too."

"And what will ye be daein' on Saturday?"

"On Saturday, I dine with the Buchanans."

"Mon, that's a peety. I wanted ye to tak' dinner wi' us on Saturday."

* * * *

"Now boys," said the teacher, "tell me the signs of the Zodiac. You first, Thomas."

"Taurus, the Bull."

"Right. Now, you, Harold, another one."

"Cancer, the Crab."

"Right again. And now it's your turn, Albert."

The boy looked puzzled, hesitated a moment and then blurted out: "Mickey, the Mouse."

* * * *

Old Gent.: "You seem rather fond of your dog, my boy."

Billy: "Rather! He's just chewed up the slipper Pa spanks me with."

* * * *

"I feel sore all over. You see, I was trying to reach a shelf by standing on some dictionaries and they gave way."

"I see—words failed you."

* * * *

Boy: "Can a person be punished for what he has not done?"

Teacher: "Of course not."

Boy: "Please, sir, I have not done my arithmetic."

* * * *

Walking along with his nose in a book
Johnny was reading of bold Captain Hook.
"Dive, lads, with me!" What a plunge Captain took,
So did poor Johnny, with a splash in the brook!

* * * *

A doctor had an urgent 'phone call from a man, saying that his small son had swallowed his fountain-pen.

"All right! I'll come at once!" replied the doctor. "What are you doing in the meantime?"

"Using a pencil."

* * * *

THIS MONTH'S HOWLER

Nitrous oxide is used as an athletic in minor operations.

A SOFT JOB

Pat was obviously pleased with life. Later he met Mike. "Well," said his friend, "how do you like your new job?"

"It's the finest I've ever known."

"And what do you have to do?"

"I've nothing to do at all. I just carries a load of bricks up the ladder to the bricklayer, and he does all the work."

* * * *

The road was "up" and so was the foreman's temper.

"Now then, be careful!" he shouted at a navvy. "What do you think I'm here for?"

"Lumme!" was the reply. "Don't you even know?"

* * * *

An Englishman and an American were watching Vesuvius in eruption.

"Well, my friend," said the Englishman, "I don't think you have anything in your country to equal that."

"Perhaps not," was the reply. "But we have a fire brigade in New York that could put it out."

* * * *

A Scot was engaged in an argument with a conductor as to whether the fare was a ½d. or a 1d. Finally the disgusted conductor picked up the Scotman's suitcase and tossed it off the tram just as they passed over a bridge. It landed with a splash.

"Mon," screamed Sandy. "Isn't it enough to try and overcharge me, but now you try to drown my little boy?"

* * * *

In a mental home an inmate was trying to drive a nail in a wall head end first.

"The man who made this nail has put the head on the wrong end," he complained.

"Oh, no," said another inmate. "That nail was made for the wall on the other side of the room."

* * * *

Prison Governor (addressing convicts): "I've let you have radio, given you concerts, let you play football and smoke, and still you grumble. What is it you want?"

Old lag: "How about a cross-country run?"

* * * *

Jim: "What's the matter, Sonny?"

Sonny: "Nothin'—just thinkin'."

Jim: "What about?"

Sonny: "Thinkin' how silly trees are to take off their clothes in winter and put em' on in summer."

* * * *

Mistress: "I've asked Mr. and Mrs. Smith to dinner at seven, Mary, but I think we'll give them a quarter of an hour's grace."

Mary: "Well, ma'am, I'm religious myself, but I think that's rather over-doin' it."

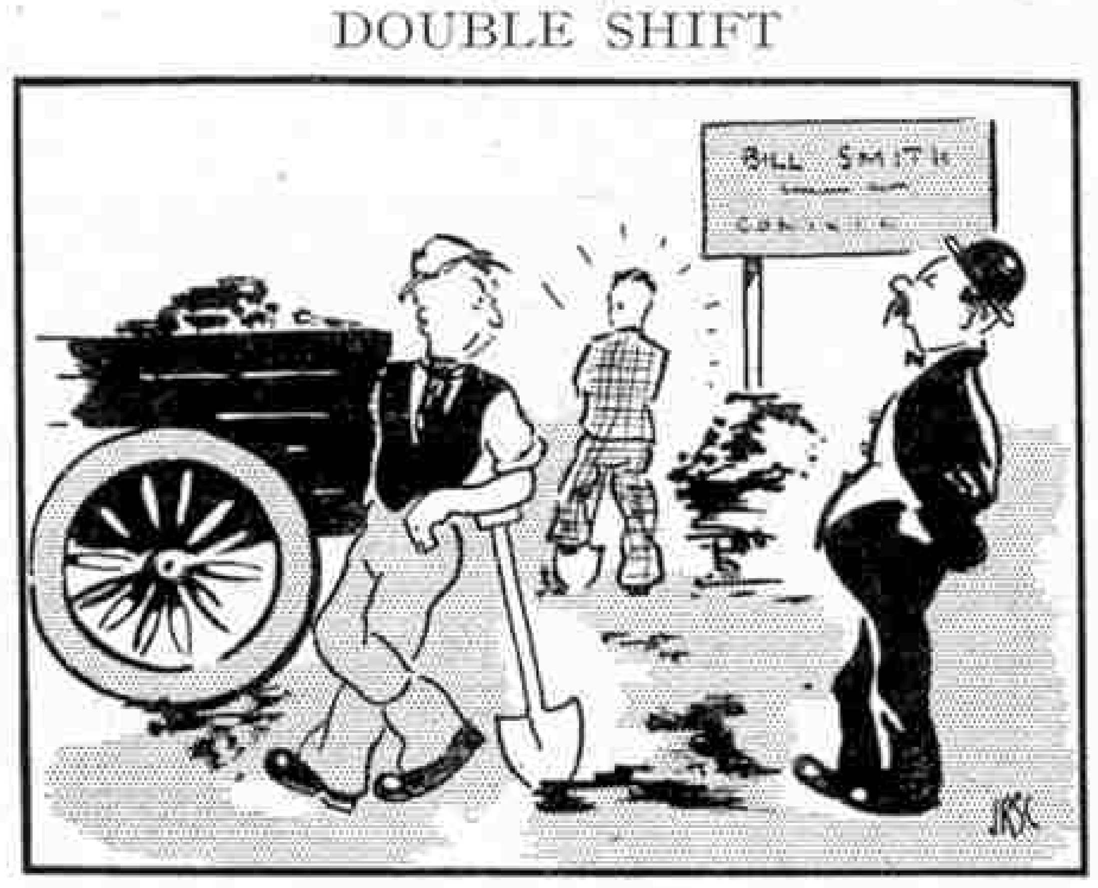
* * * *

Boss: "I wish you wouldn't whistle at your work, Brown."

Office Boy: "That's O.K., sir. I wasn't working!"

* * * *

DOUBLE SHIFT



Foreman: "Say, Murphy, what's wrong? Your mate is putting two shovelfuls of clay into the cart to your one."

Murphy: "Sure an' don't I know. He was doing it all day yesterday as well."

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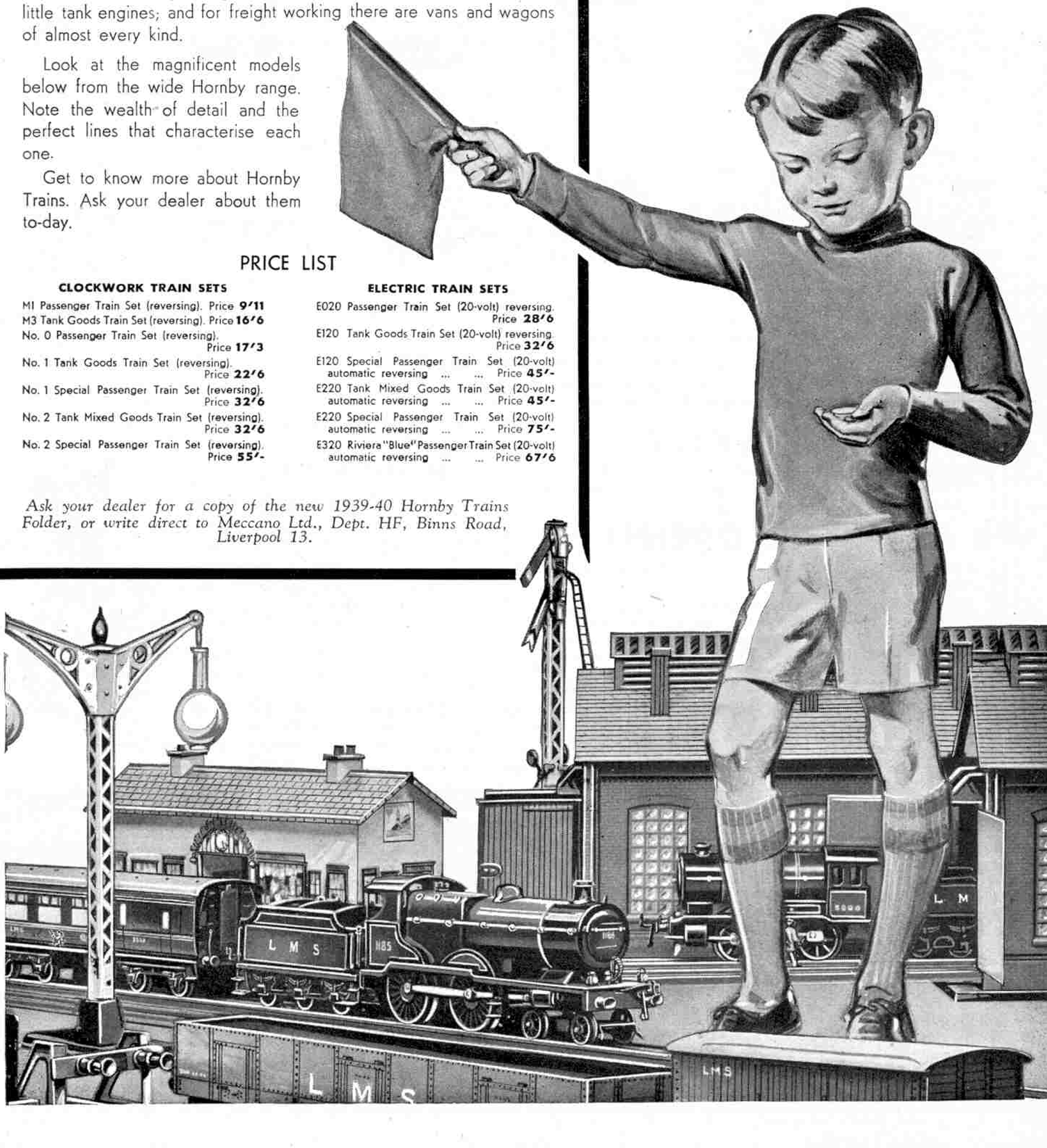

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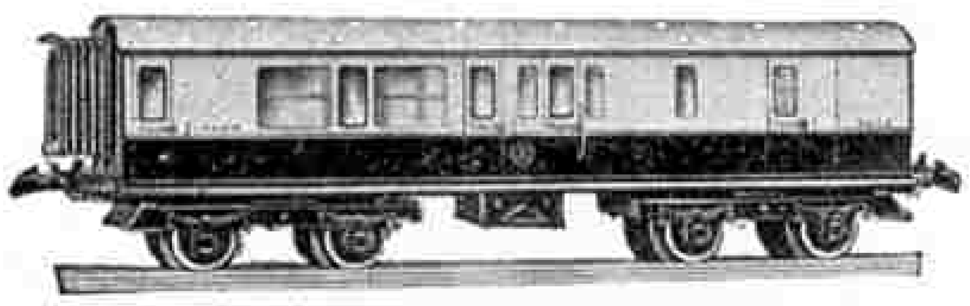

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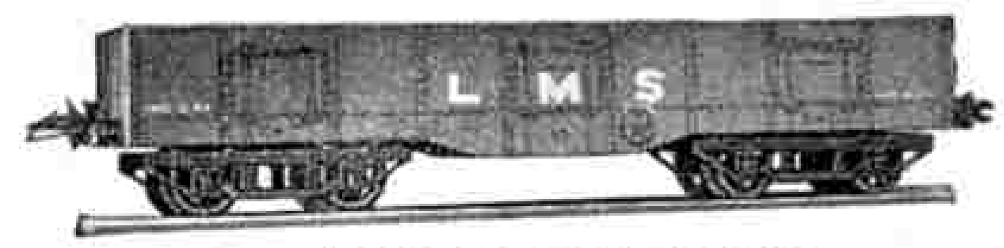

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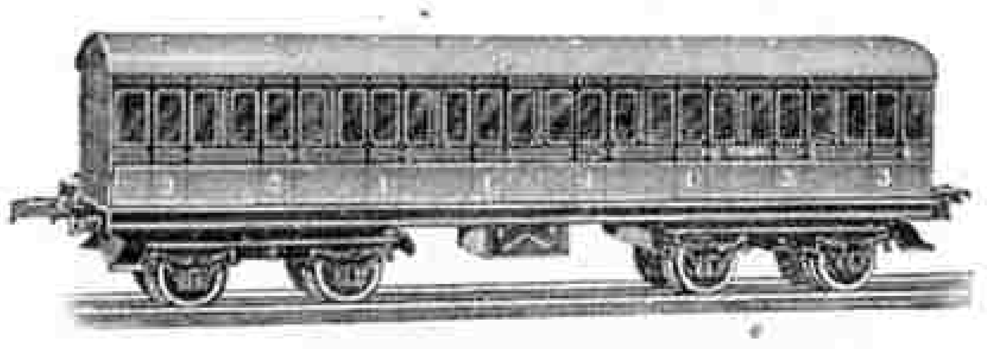

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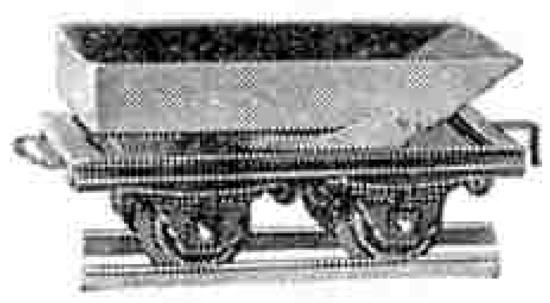

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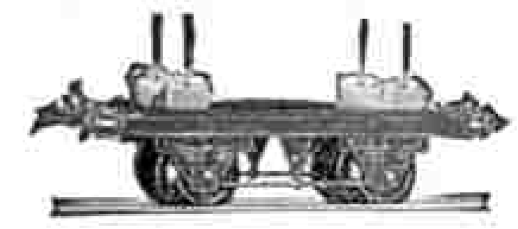

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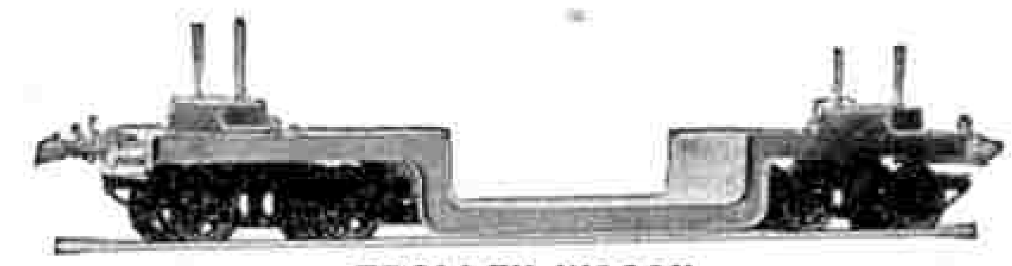

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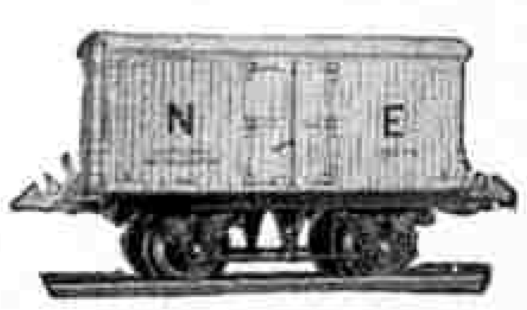

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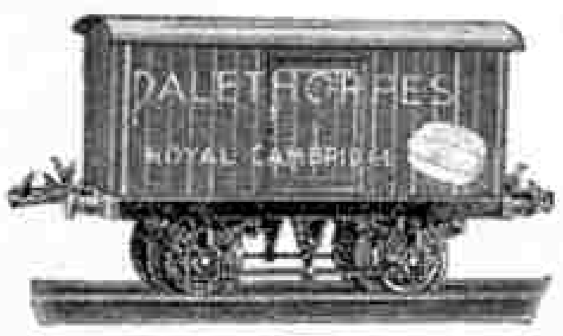

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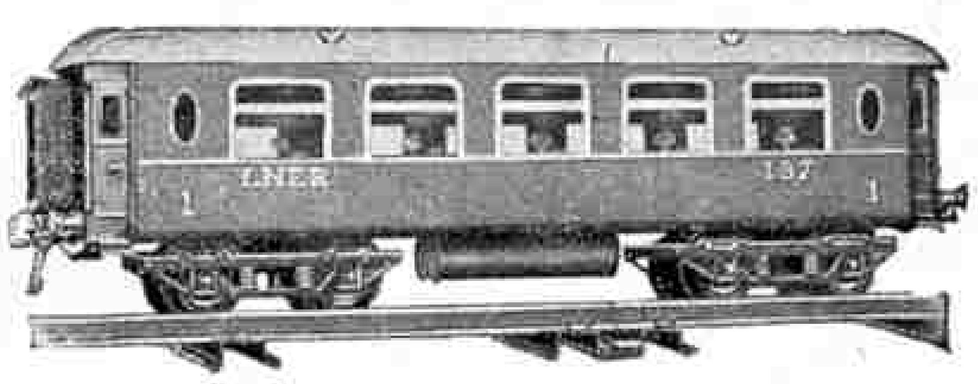

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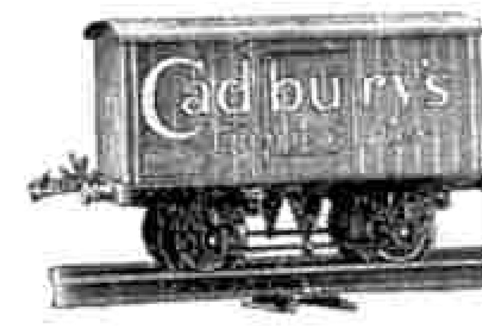

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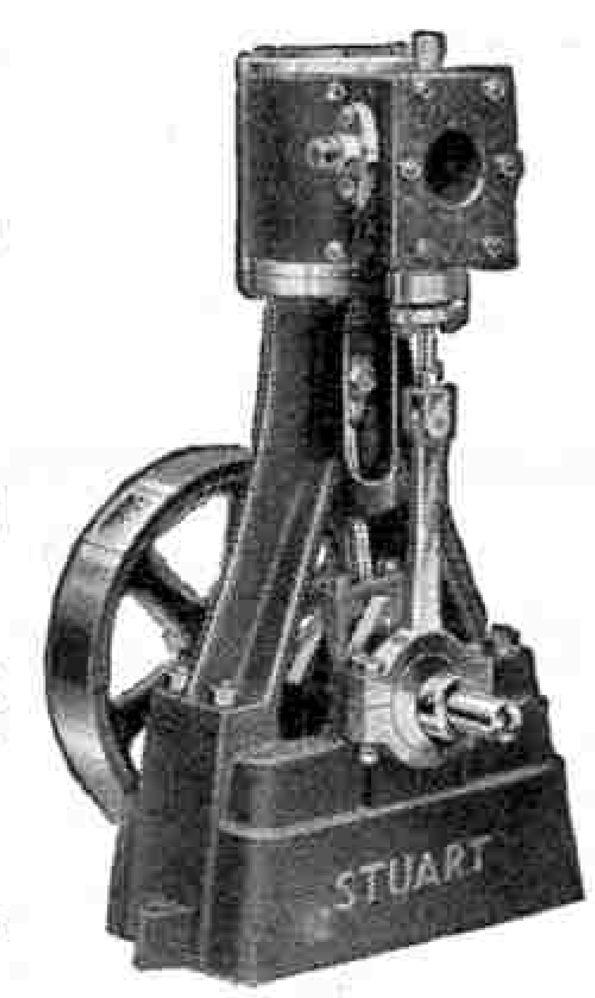

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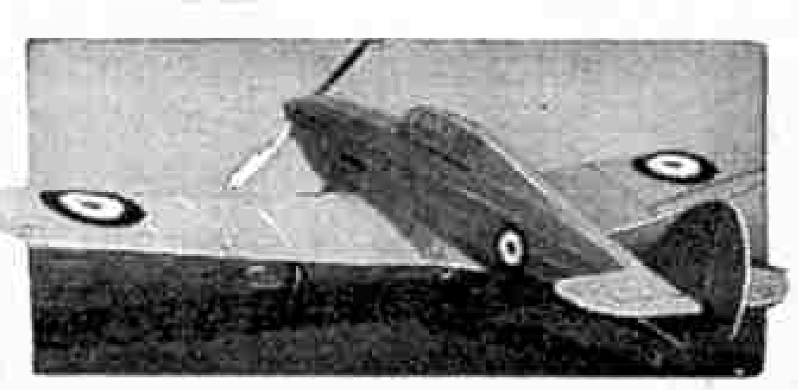

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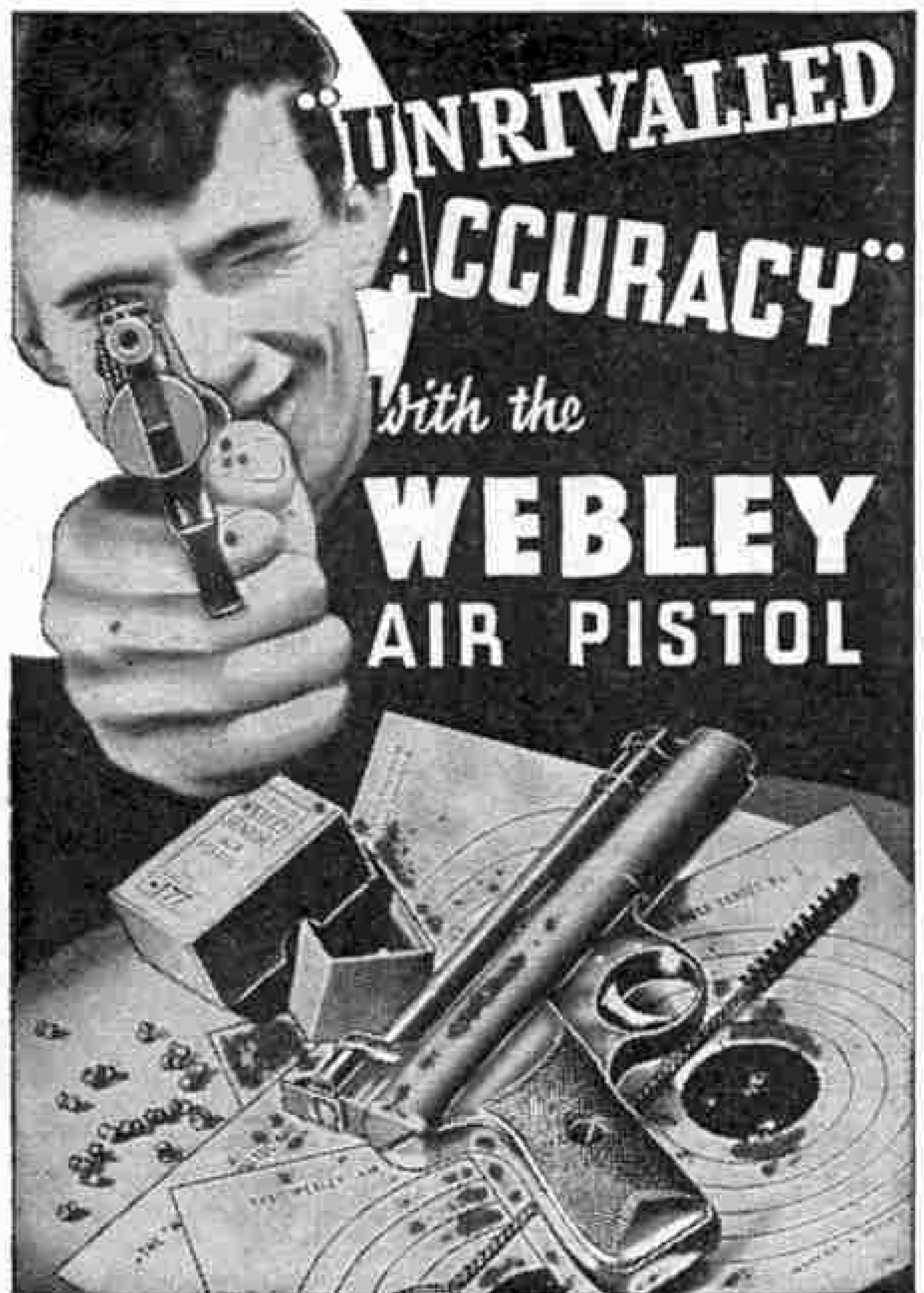

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Binding cases for back numbers of the Magazine may be obtained from Messrs. O. H. Bateman and Co., 23, Hanover Street, Liverpool. These are supplied in two sizes (1) for six copies price 3/3 and (2) for twelve copies price 4/9, post free in each case. The binding cases are supplied in what is known as "Quarter Basil, full cloth"—that is to say three-quarters of the sides are dark crimson cloth and the back and a quarter of the sides are dark crimson leather as shown here. The case is tastefully embossed in gold with the name "Meccano Magazine," and on the back is the name and volume number.

Binding 6 and 12 copies. These binding cases are supplied so that readers may have their Magazines bound locally, but where desired, the firm mentioned above will bind Meccano Magazines at a charge of 5/9 for six issues or 7/6 for twelve issues, including the cost of the binding and also return carriage. The covers of the Magazines may be included or omitted as required, but in the absence of any instructions to the contrary they will be included.

Whilst the binding of the twelve Magazines is quite satisfactory, they form a rather bulky volume and for that reason arrangements have been made to bind six months' Magazines where so desired, as explained above. Back numbers for any volume can be bound and the case will be embossed with the volume number.

This is Fighting Talk

If You're Lazy you won't read far in this talk. If you're not—if you have the courage to face facts—you will want to know what special effort on your part will enable you to get on.

If You're a Shirker you'll always wish for success but never do anything about it. The earth is cluttered with that kind of man.

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I.C.S.

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.

"New Pictorial Atlas of the World." Worth Guinea. Send for list. Offers?—Hayes, Marguerite Hospital, Thorp Arch, Yorks.

Sale. L.M.C. Coaches, 3/9; Points, 2/- each, etc.—Briars, 17, Rectory Close, Newbury, Berks.

Bargains. "K.B." 2 Valve Radio, with Speaker, 12/6; Hockey Stick, 7/6. Both as new.—94, Queens Road, Bury St. Edmunds.

For Sale. Two 6-volt Electric Engines costing 30/- each. Will take 7/6 for each. Radius 2 ft. Apply—S. Gould, 7, Chester Road, Northwood, Middlesex.

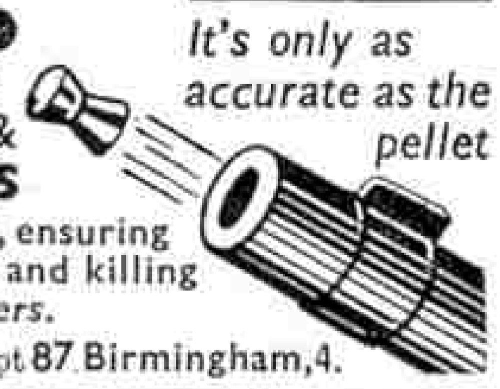
Collection 1,200 fine Stamps. Loose-leaf Album. 25/-.—Harris, 62, Lewis Road, Neath.

Quick sale. "M.M.," 1930/3. "Health and Strength," 1934/5. "World Radio," 1932/9. Any offer considered.—E. Lower, 15, Dobella Avenue, Rawcliffe, Nr. Goole.

For Sale. B.S.A. 45/- Air Gun, bore perfect, 30/-. £6 Red-Green Meccano, £2.—R. D. Dean, 20, South Park Road, Wimbledon, S.W.19.

Films 16 mm. (few 100 ft.), also 9.5 mm. (30 ft. and 60 ft.) Particulars—Rob Hobbs, 83, Curling Crescent, King's Park, Glasgow.

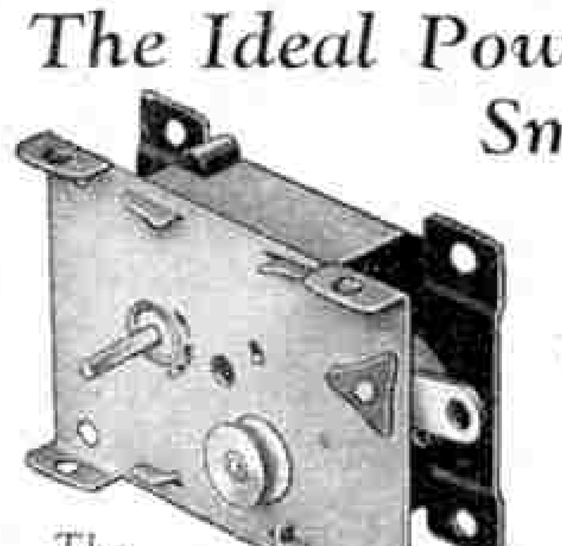
DOES *your* GUN SHOOT STRAIGHT? *It's only as accurate as the pellet*



WEBLEY Air Rifle & Air Pistol **PELLETS** are accurate to 1/1000th inch, ensuring maximum accuracy, velocity and killing power. *Stocked by all dealers.*

WEBLEY & SCOTT Ltd., Dept 87 Birmingham, 4.

The Ideal Power Unit for Small Models



The Magic Motor

This is the Meccano Clockwork *Magic* Motor – a sturdy, efficient mechanism specially designed for driving smaller Meccano Models. Non-reversing.

Price 2/-

Meccano Ltd., Liverpool 13

MECCANO LUBRICATING OIL

Before commencing to operate a Meccano model, or to run a Hornby Train, all gears and bearings should be oiled thoroughly with Meccano Lubricating Oil. This oil is specially prepared and is of the right consistency for the purpose. Price per bottle 6d.

Meccano Ltd., Binns Road, Liverpool 13.

"MECCANO MAGAZINE" SPRING BACK BINDER

There is no better way of keeping your Magazines clean and tidy than by binding them in one of the special binders we supply.

These binders have strong stiff backs, covered with black imitation leather, tastefully tooled, and are lettered in gold. The large binder holds 12 Magazines — price 3/6 post free. The small binder holds 6 Magazines — price 2/6 post free.

MECCANO LTD. BINNS ROAD, LIVERPOOL 13

This Month's Special Articles

SOMETHING NEW IN RAILWAY PHOTOS.

Over 700 new negatives in our list of 2,500 titles. Send 4d. for list and specimen card.
REAL PHOTOGRAPHS CO.
(Dept. M.M.), COOPER'S BUILDINGS, LIVERPOOL 1.

SIMPLE. CHEAP. Model Petrol Motors and Castings. ½ h.p. sets with cylinder bored. Only 9/9. Fractional h.p. Aero Sets from 4/11. Dynamos 18/6. Fractional Cat. 3d. Madison Butler, Aero Works, Littleover, Derby.

ENGINE NAMES AND NUMBERS. Complete list of names, numbers, types and classes of locomotives of Great Britain and Ireland, with alterations to stock during 1938. All in "Locomotive Stock Book 1939"—70 pages, 55 illustrations. Price 2/6 from R. Pollock, 102, Disraeli Road, Putney, London.

VISI INK FOUNTAIN PEN

with new Dual-Tipped Nib for 1/6 post paid. Worth 2/-. Fine, Medium or Broad Nibs. For this special offer send crossed P.O. to:
GENNERS, 19, Oakleigh Avenue, Edgware, Middlesex.
Send for illustrated list of latest Toys.

This Space is set to ½ inch s.c. and costs 8/- per month. The sum is the 50th of £20, the price of a whole page advertisement. Over 200,000 boys and parents read the "*Meccano Magazine*" each month. You can therefore reach this exclusive public for less than a half-penny a thousand.

OIL CAN No. 2 ("K" Type)

In Polished Copper

Every Meccano and Hornby Train enthusiast should add a miniature "K" type oil can to his equipment for the purpose of oiling Meccano models, Hornby Trains, etc. The oil is ejected drop by drop by depressing the valve, as in the full-sized model, and in all other respects the oiler is perfect. Price 3/6

Meccano Ltd., Binns Road, Liverpool 13.

MECCANO MAGAZINE

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

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

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To Contributors. The Editor will consider articles and photographs of general interest and payment will be made for those published. Whilst every care will be taken of articles, etc., submitted, the Editor cannot accept responsibility for any loss or damage. A stamped addressed envelope of the requisite size should be sent where the contribution is to be returned if unacceptable.

Readers' Sales and Wants. Private advertisements (i.e., not trade) are charged 1d. per word, minimum 1/-. Cash with order. Editorial and Advertising matters should not be dealt with on the same sheet of paper.

Small Advertisements. 1/6 per line (average seven words to the line), or 16/- per inch (average 12 lines to the inch). Cash with order.

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

Press Day, etc. Copy should be sent as early in the month as possible for insertion in following issue. We usually close for press on or before 6th of each month for following issue. Half-tone blocks up to 100 screen.

Proofs of advertisements will be sent when possible for space bookings of not less than half-an-inch.

Voucher copies. Sent free to advertisers booking one inch or over. Other advertisers desiring vouchers should add 8d. to their remittance and should order voucher copy at same time.

Remittances. Postal Orders and Cheques should be made payable to Meccano Ltd.

Ordering the "M.M." Overseas

Readers Overseas and in foreign countries may order the "*Meccano Magazine*" from regular Meccano dealers or direct from this office. The price and subscription rates are as above, except in the cases of Australia, where the price is 1/2 per copy (postage extra), and the subscription rates 8/- for six months and 16/- for 12 months (post free), Canada, where the price is 10c. per copy, and the subscription rates 65c. for six months, and $1.25 for 12 months (post paid).

The U.S.A. price is 15c. per copy, and the subscription rates $1 and $2 for 6 and 12 months respectively (post free).

Overseas readers are reminded that the prices shown throughout the "*M.M.*" are those relating to the United Kingdom and Northern Ireland. Current Overseas Price Lists of Meccano Products will be mailed free on request to any of the undermentioned agencies. Prices of other goods advertised may be obtained direct from the firms concerned.

CANADA: Meccano Ltd., 187-189, Church St., Toronto.

UNITED STATES: Meccano Co. of America Inc., New Haven, Conn., Meccano Co. of America Inc., 200, Fifth Av., New York.

AUSTRALIA: Messrs. E. G. Page & Co., 52, Clarence Street, Sydney, N.S.W.

NEW ZEALAND: Models Limited, Third Floor, Paykel's Buildings, 9, Anzac Avenue (P.O. Box 129), Auckland, C.1.

SOUTH AFRICA: Mr. A. E. Harris (P.O. Box 1199), 142, Market Street, Johannesburg.

INDIA: Karachi: Daryanamal and Bros., Elphinstone Street. Bombay; Bombay Sports Depot, Dhobi Talao. Calcutta; Bombay Sports Depot, 2, Lindsay Street. Madras; Bombay Sports Depot, 162, Mount Road.

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HORNBY LOCOMOTIVE PART-EXCHANGE COUPON

Complete this Coupon, and hand it, with your old Locomotive, to your Meccano dealer, who will allow you from the price of a new Hornby Locomotive, or Hornby-Dublo Locomotive and Controller, the amount shown in the official list published in the June "*Meccano Magazine*."

Type of Hornby Locomotive Returned:— .... *New Hornby Locomotive Purchased:—* ....

Please register my name to receive details of future Hornby and Hornby-Dublo developments.

(Signed)..

Address..

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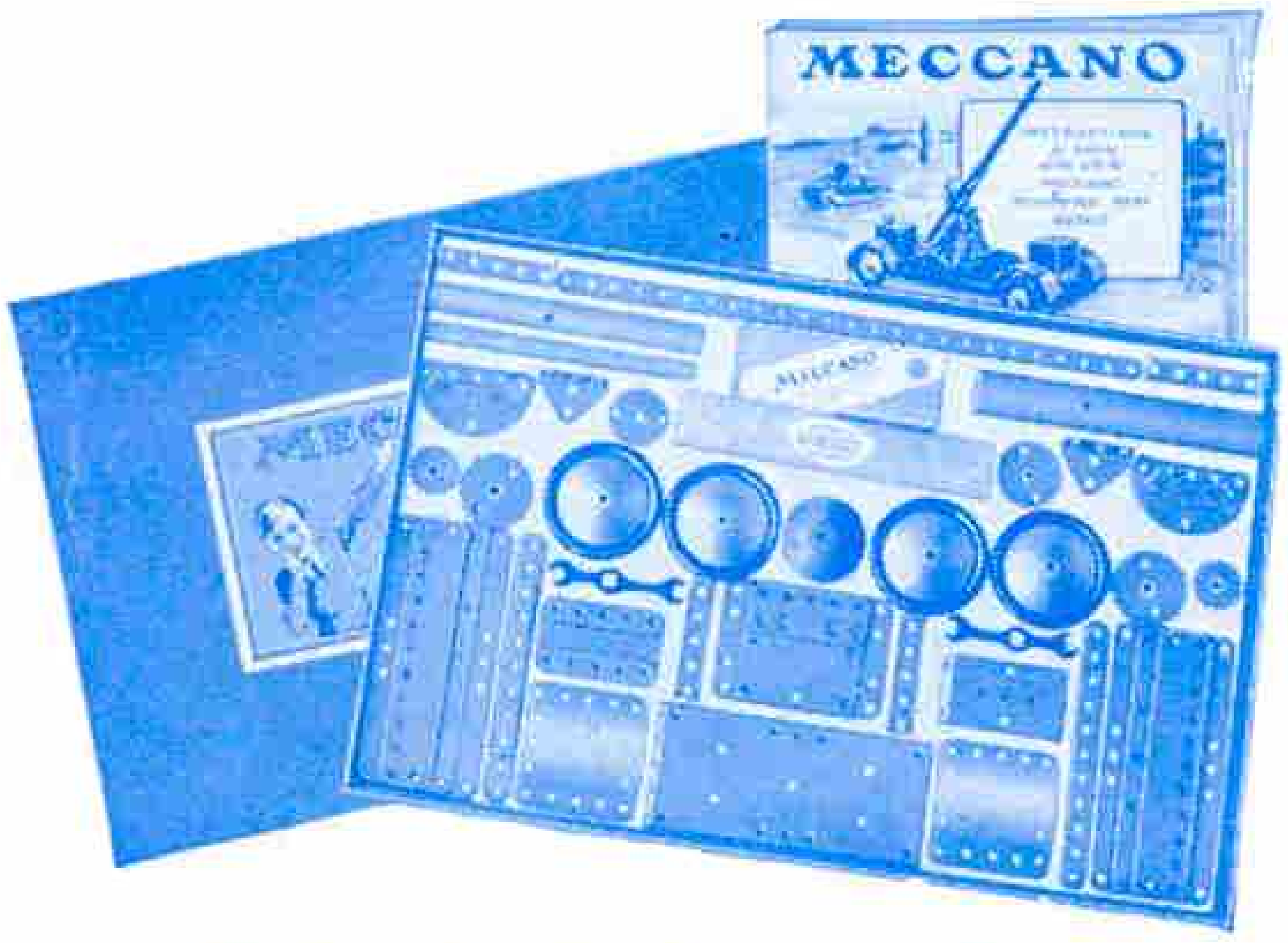
CERTIFICATE

The above exchange has been effected in accordance with the terms of the Hornby Part-Exchange Scheme.

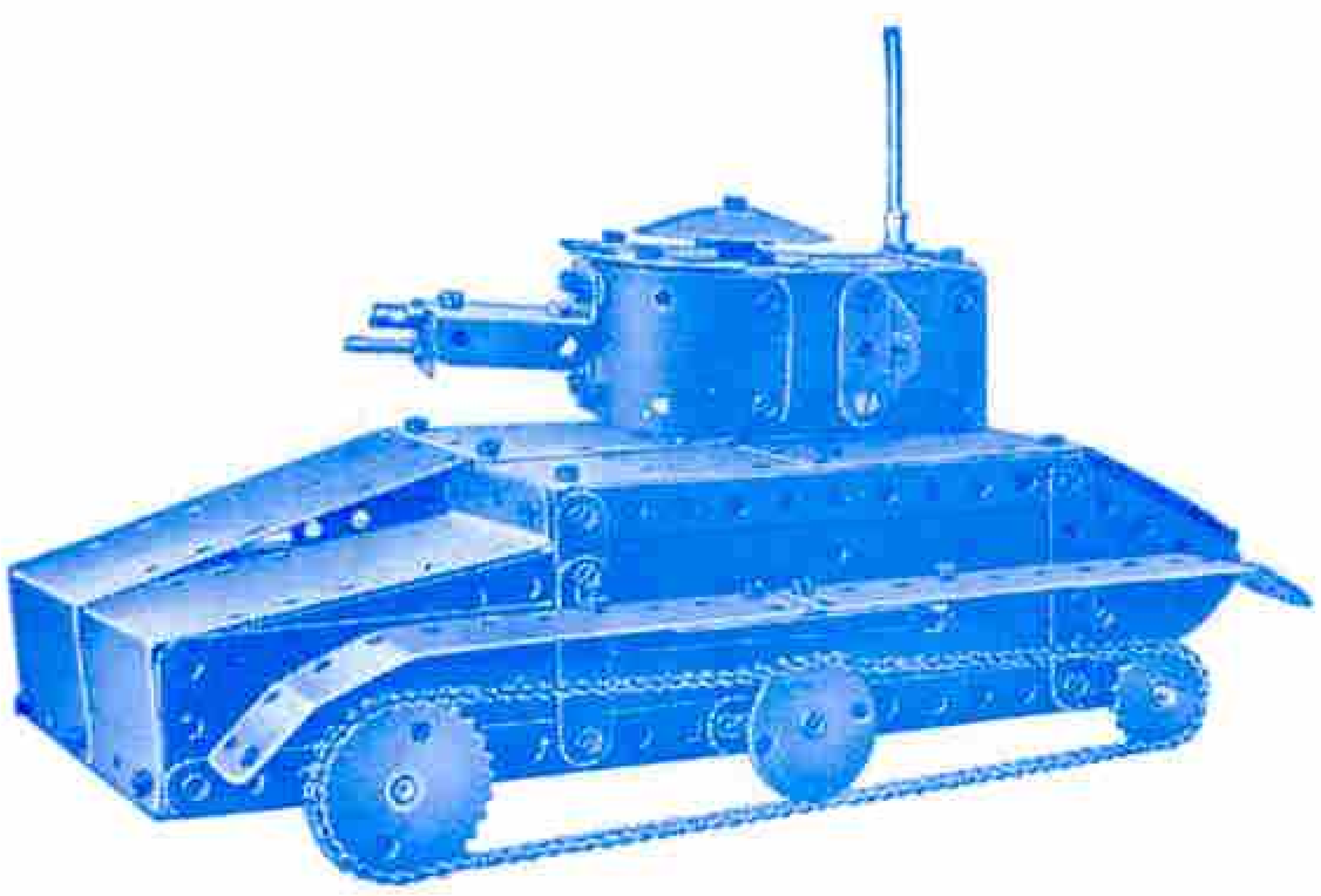
(Signed).. *Meccano Dealer*

Address..

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

Published by MECCANO Ltd., Binns Road, Liverpool 13, England
Printed by John Waddington Ltd., Leeds and London