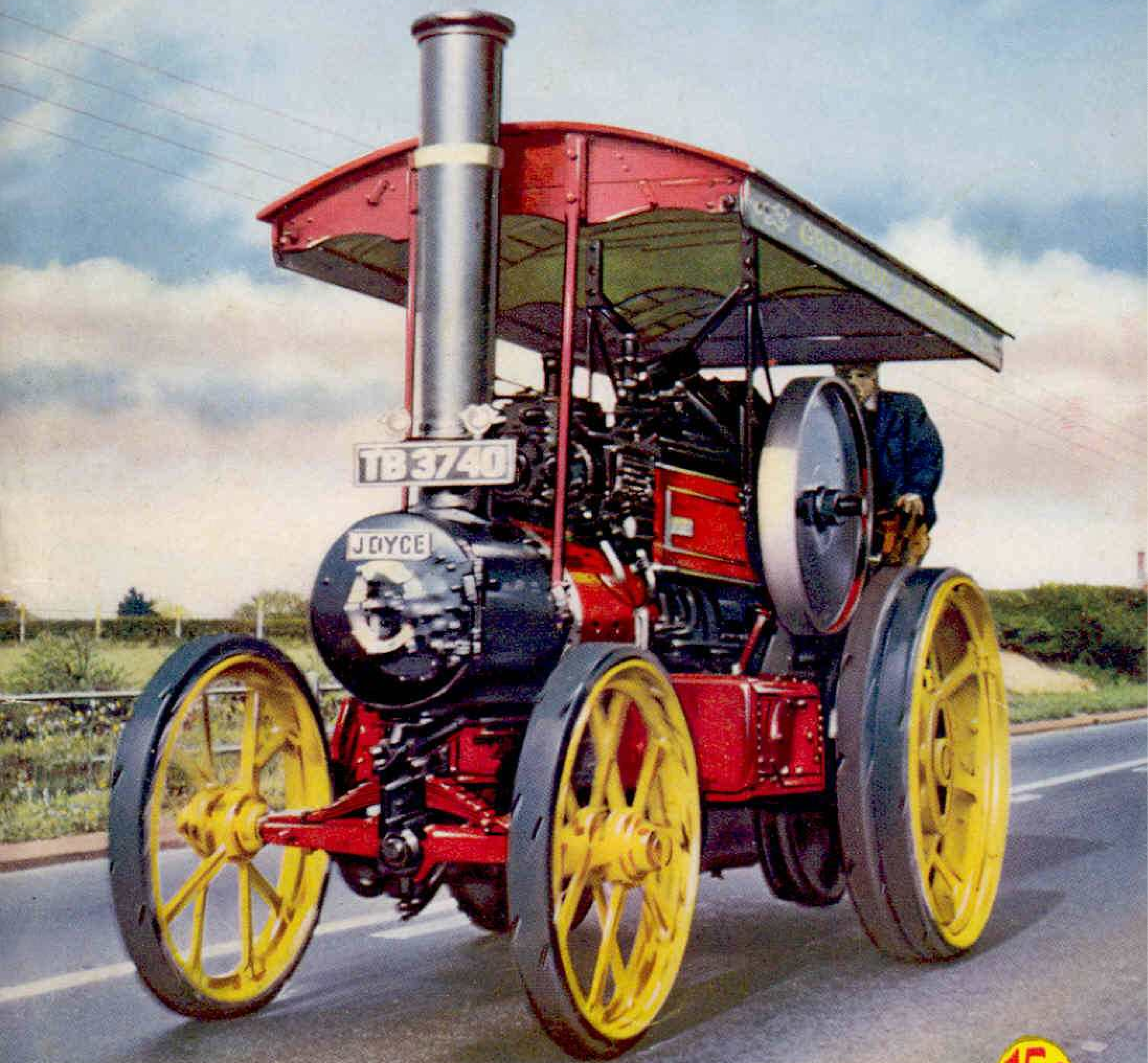
VOL. XLV. No 11 NOVEMBER 1960

MECCANO MAGAZINE



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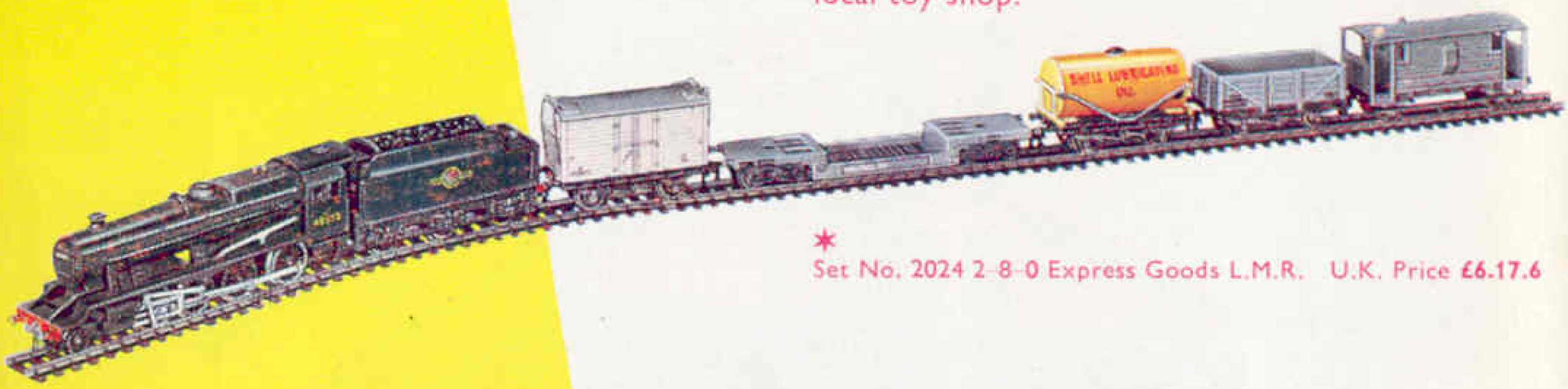

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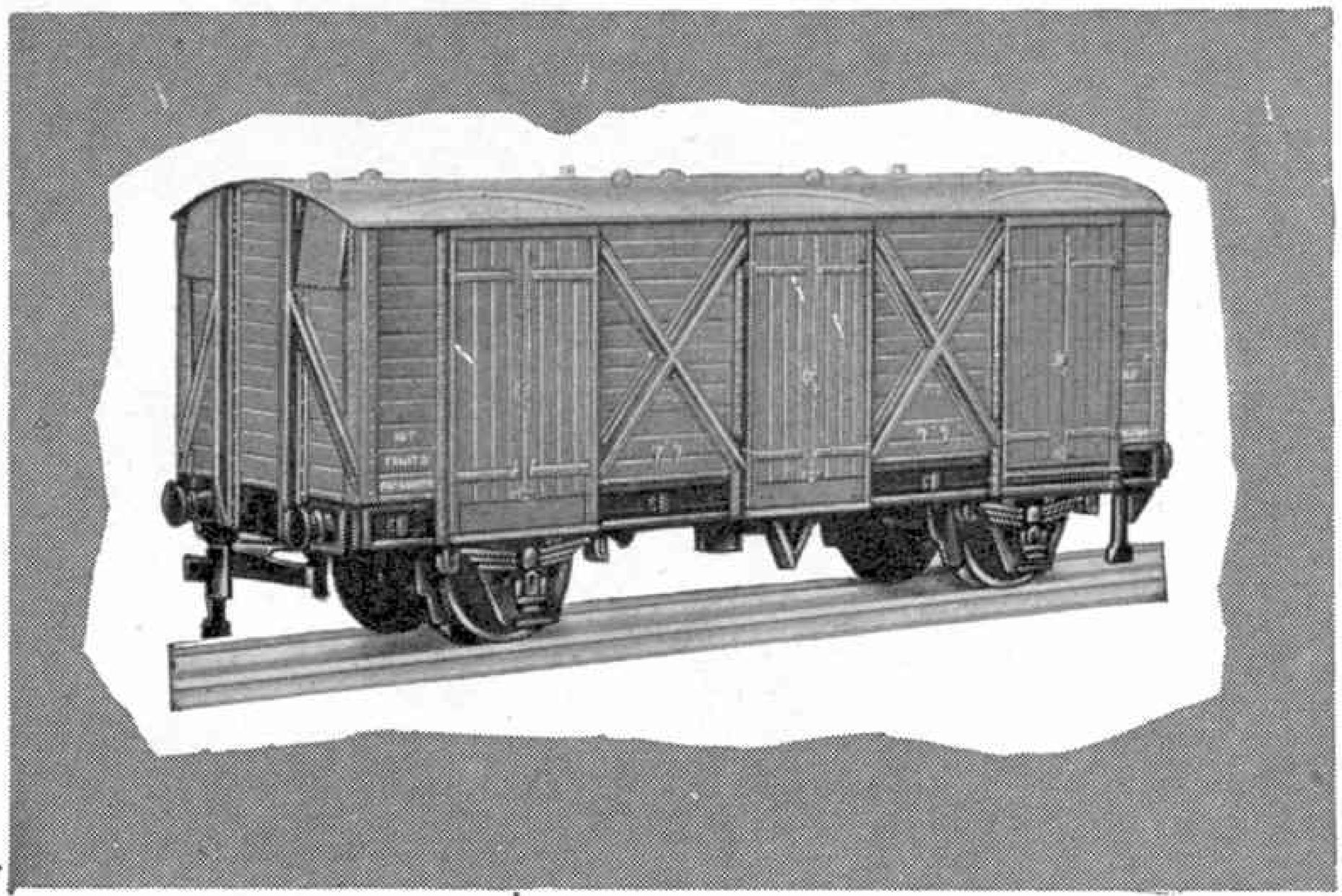

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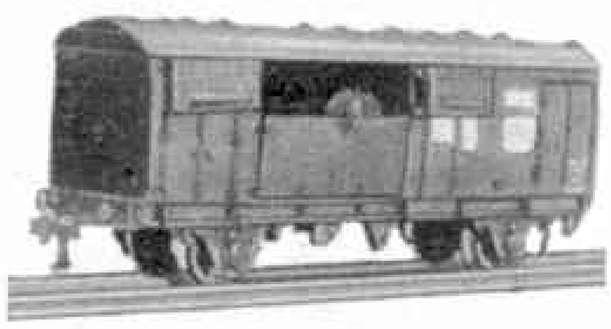

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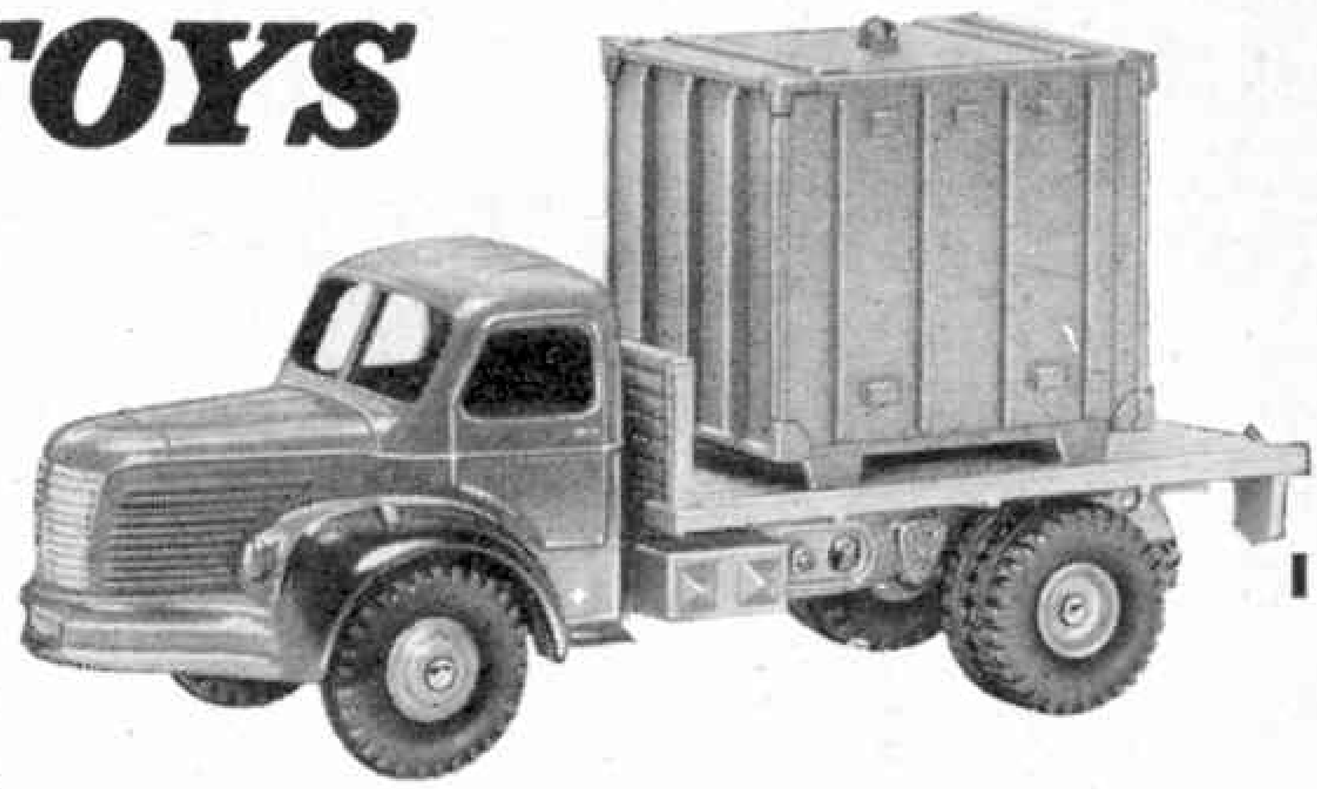
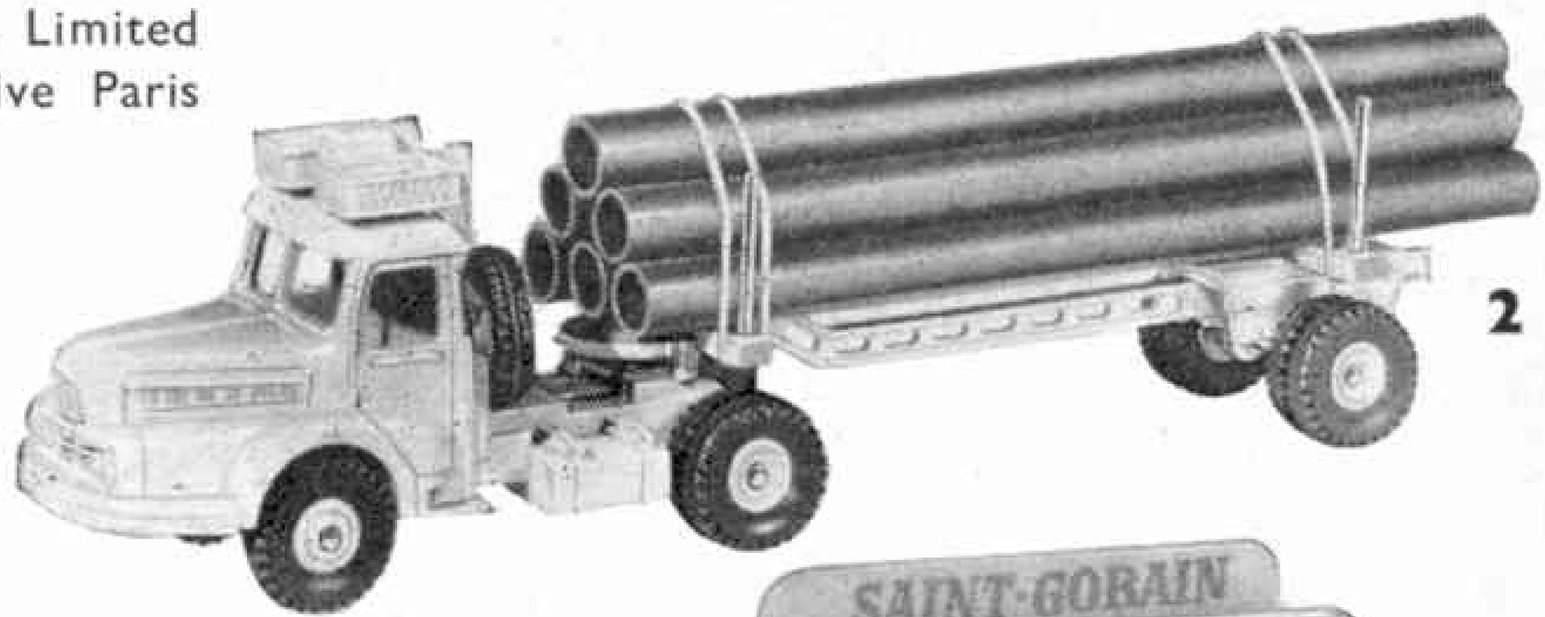


1

As readers may know, Meccano (France) Ltd., manufactures a separate range of Dinky Toys in Paris. Limited quantity of several attractive Paris models have been imported into the U.K., and these are available from Dinky Toys dealers throughout the country.



2

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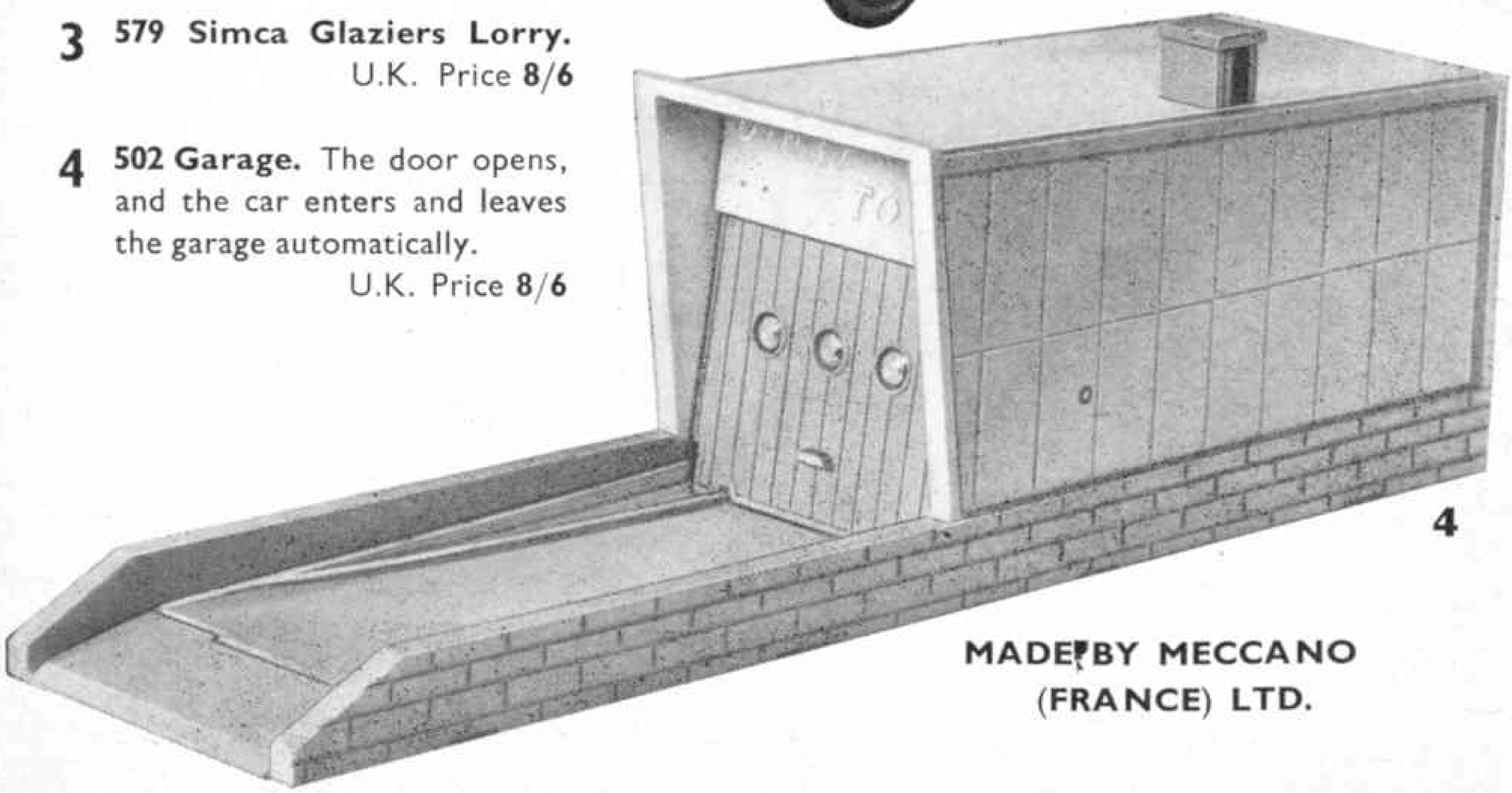

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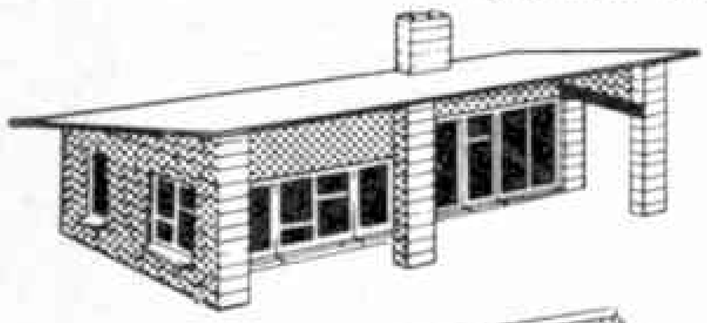

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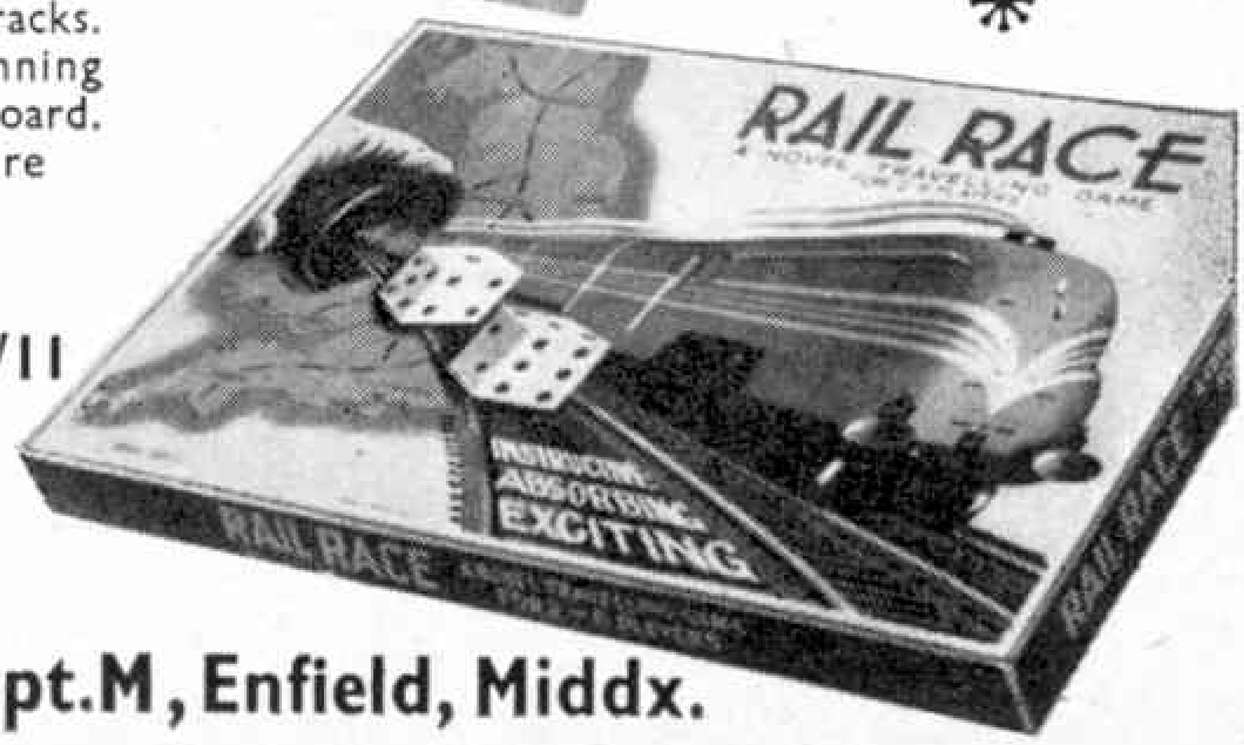

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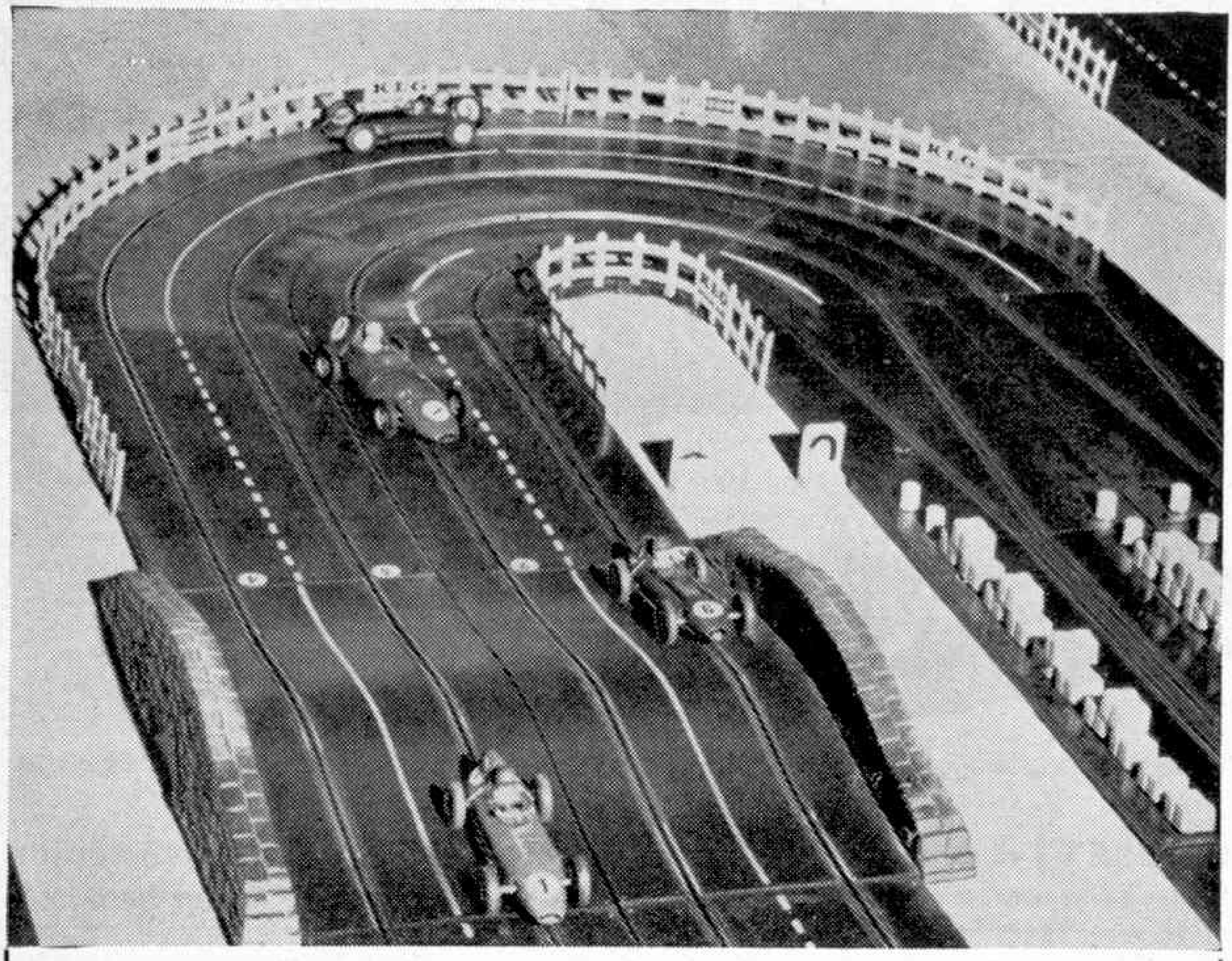

CORNERING . . .

Last time it was the start—now for cornering—and remember, like real cars, if you corner too fast they will skid off the road—so here's the drill—slow down as you approach—half-way round increase speed—then out at full throttle and down the straight. There will be more tips from the pits in the future—so keep a look out and learn to race the SCALEXTRIC way—the real way.

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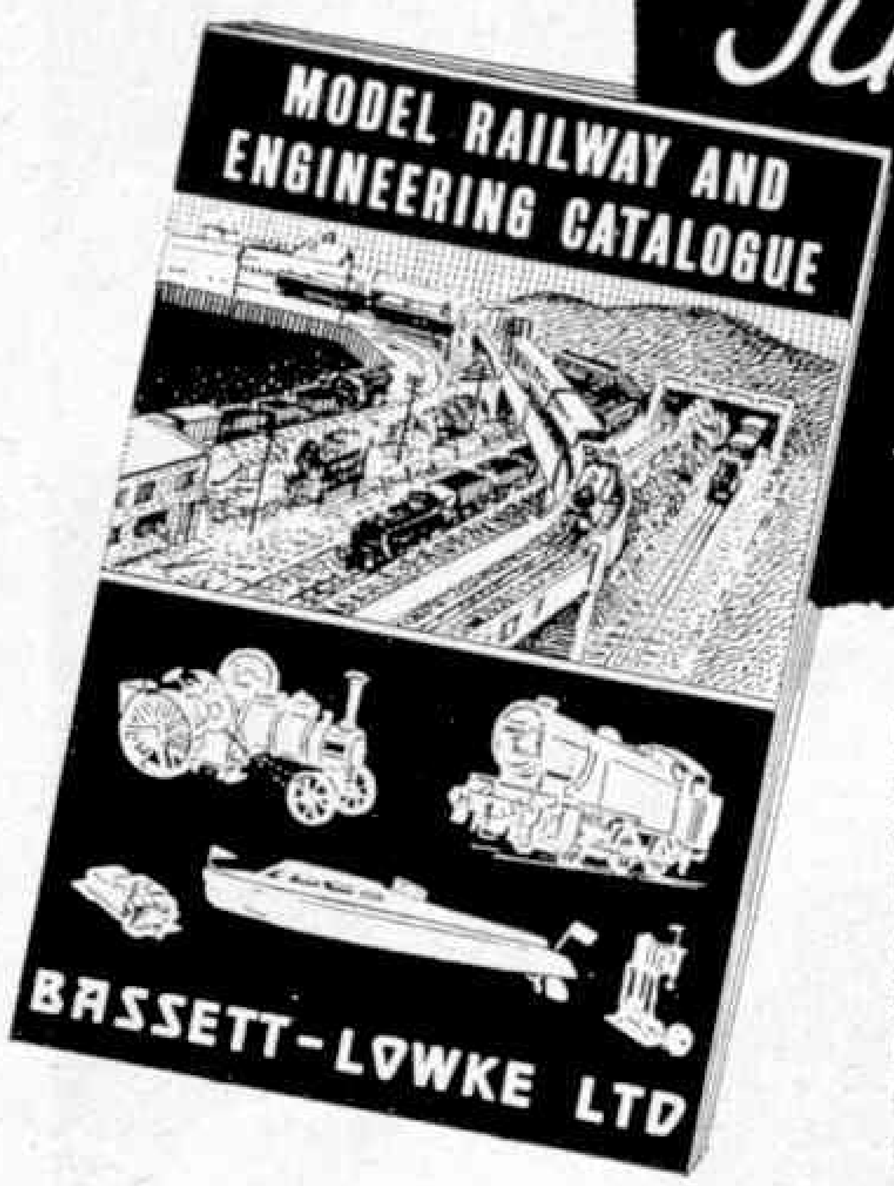

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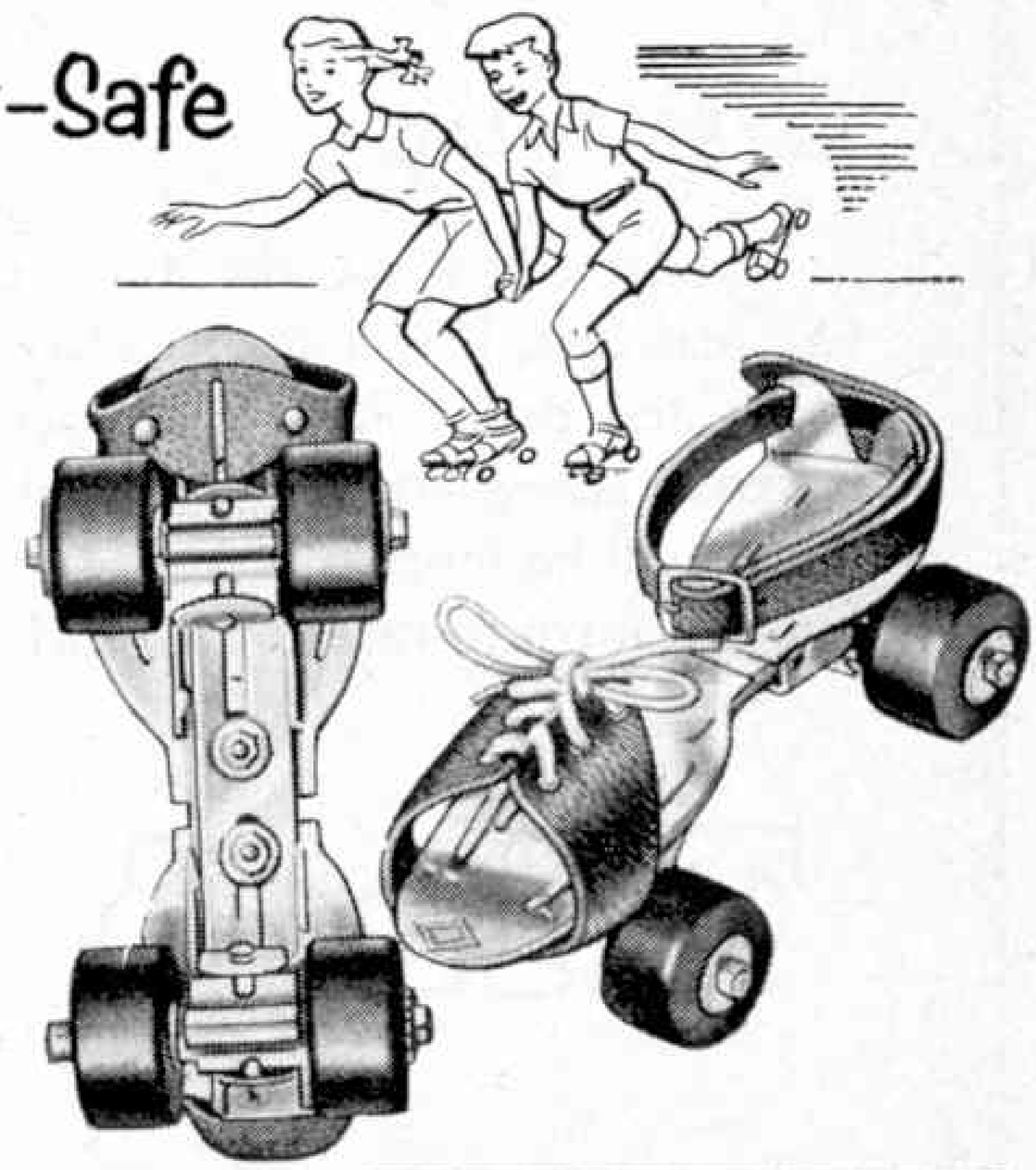

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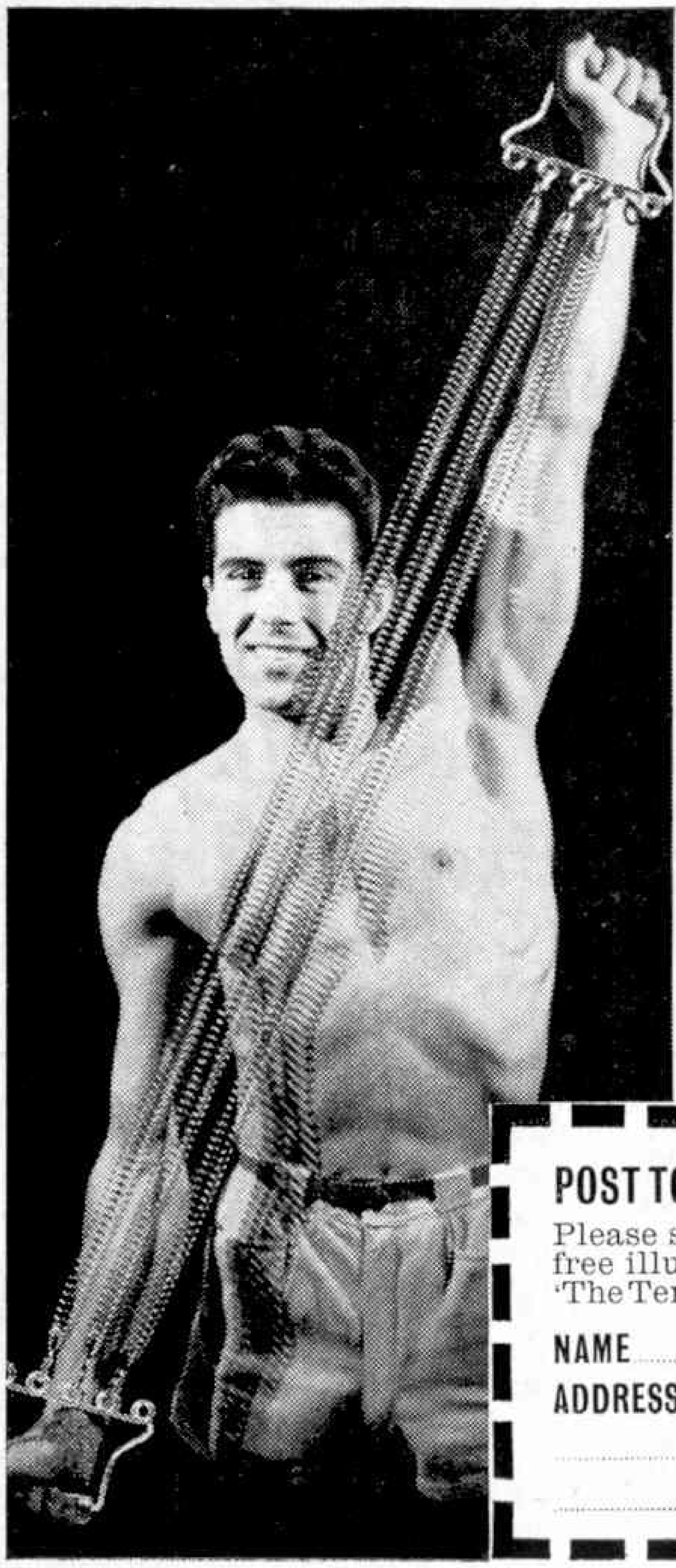

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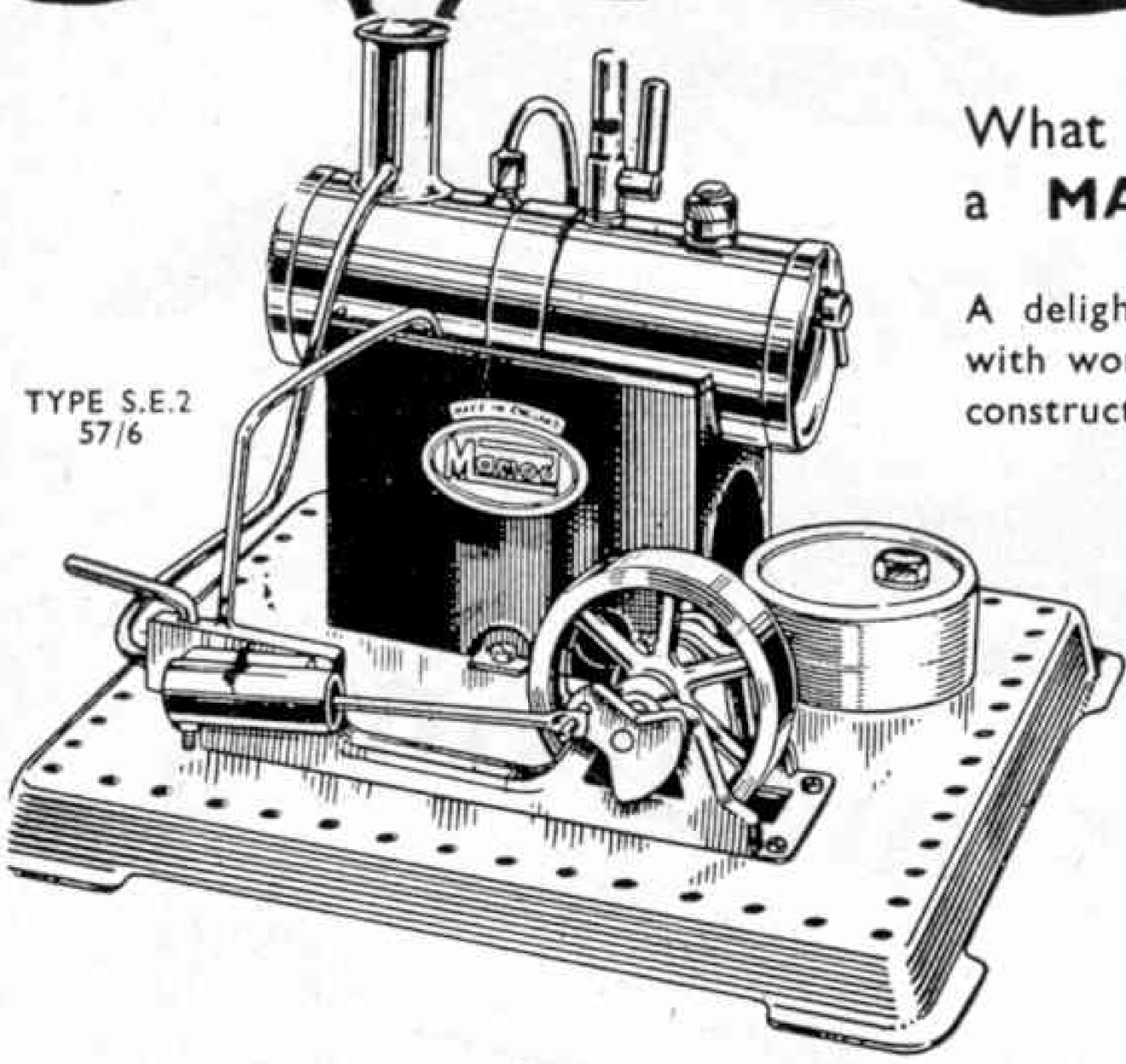

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Next Month: "DICKENSIAN ENGLAND" By Arthur Nettleton

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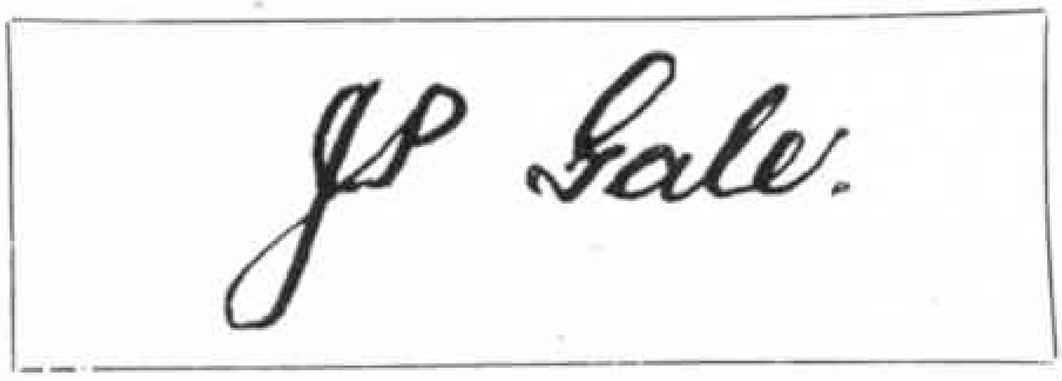
EDITOR: GEOFFREY BYROM
ASST. EDITOR: ERNEST MILLER

Vol. XLV
No. 11
November 1960

A Triumph for the Ring Field

TWO very important events concerning Meccano Limited demand mention this month. Firstly, your replies to the June questionnaire have helped to guide me to a decision regarding the future of the *Meccano Magazine*. This will appear in a new form, with enlarged pages, in January. Fuller details will be available next month, but I am sure the changes to be made are in accordance with the majority of wishes expressed in your answers to the questions put to you during summer. Incidentally, W. H. Smith and Son Ltd., the newsagents and booksellers, are offering to arrange subscriptions to the *Meccano Magazine* over periods of six to twelve months as a Christmas gift to boys and girls. You will find details elsewhere in this issue.

Secondly, I mention with great pride the outstanding success achieved by the new Hornby-Dublo Locomotive, fitted with a Ring Field Motor, on the test run in our London Showrooms. I referred to the test in last month's Editorial; now in the centre pages of this issue appears a full description of the event. The model was started on its run by Mr. John Gale, a senior British Railways driver, who also brought the train to a halt four days later. Our readers will regret to hear that Driver Gale died suddenly later in the month. I feel, however, that his part in this test run should be recorded in the Magazine, and just below you will see a facsimile of the signature which he attached to the certificate stating that he sealed and unsealed the glass case in which the train made its amazing journey. Driver Gale also appears in the photographs published as a permanent record of this historic event.



Now, a few words about our Christmas number. Most of the contributed articles have a seasonable air about them and should provide much interesting reading. Arthur Turner's article on oranges, for instance, tells us that the world crop of this fruit, so popular at Christmas, is nearly 200 million cases a year, and that a single case may contain more than 400 oranges. Did you know that?

THE EDITOR.

This Elizabethan bell, preserved in Hubberholme Church, Wharfedale, Yorkshire, bears the date 1601. Arthur Gaunt writes about the bells at Christmas in next month's issue of the "M.M."

A THREE-YEAR ENGINEERING FEAT

Manchester-Crewe Line Electrified

AN observer at Manchester London Road Station, now in the throes of vast reconstruction and renamed Piccadilly, could, during early September, have seen, side by side, a wide variety of trains. A Manchester–Sheffield line Co-Co electric locomotive, on the 1,500 volt D.C. system, for instance, with, beside it, a multiple unit train of E.R. design on the Glossop service. Then there were diesel multiple unit railcar sets. Alongside another platform would have been a steam locomotive, perhaps an

By J. W. Gahan

ex-L.M.S. 2–6–4 tank, bunker first at the buffers on empty stock work. Contrasting with this reminder of former times could have been one of the new main line electric locomotives, and finally one or more of the new multiple unit trains for the Crewe service.

The pre-grouping atmosphere of the London and North Western and Great Central railways, both of which shared this terminal station, has completely vanished, but it is brought to mind briefly by the occasional appearance of a J11 class 0–6–0 of G.C.R. design.

This variety of trains represents the changes now taking place on British Railways as part of the modernisation plan.

On September 12, 1960, the first stage of the huge electrification scheme between Manchester, Liverpool, Crewe, Birmingham, Stoke-on-Trent and London (Euston) was inaugurated. Although it extends for only a modest 31 miles, so far, it has nevertheless involved a tremendous amount of engineering and other work, which began three years ago. Electrifying a railway for all kinds of traffic is not only a matter of erecting masts and stringing wire (this is a gigantic task in itself), but the railway must be almost completely rebuilt.

The system adopted by British Railways for this scheme is the Continental 25,000 kV single phase industrial frequency taken from the national grid, which is economical in installation owing to the fact that lightweight structures and wiring can be used, and it obviates the need for sub stations. Owing, however, to the need for ample clearance between the contact wire

A special train which carried a Press party along the newly-electrified Manchester-Crewe route stands at the platform at Manchester (Piccadilly) Station. The photographs illustrating this article are by courtesy of British Railways (London Midland Region).

and the tunnels and bridges along the route, all such structures with insufficient clearance have had to be either modified or rebuilt. The track has likewise had to be reconstructed in order to raise the permissible speed limit from 79 to 90 m.p.h. This has necessitated the lifting, reballasting and formation renewal of 144 single track miles. About 330,000 tons of new ballast and 35 miles of new drainage have been laid.

Other works involved the complete resignalling of the route with colour lights, conversion of manual points to electro-pneumatic operation, installation of new telecommunication equipment to replace the original block telegraph and the laying of many miles of cables. There was also the erection of new signal cabins and construction of new stations, or reconstruction of existing ones.

On the line concerned three new all-electric signal boxes have replaced 29 manual cabins. In the new ones, the movement of a single switch can set up a route which might require a number of successive lever movements under the manual system, and so operation is speeded up and the frequency of trains increased.

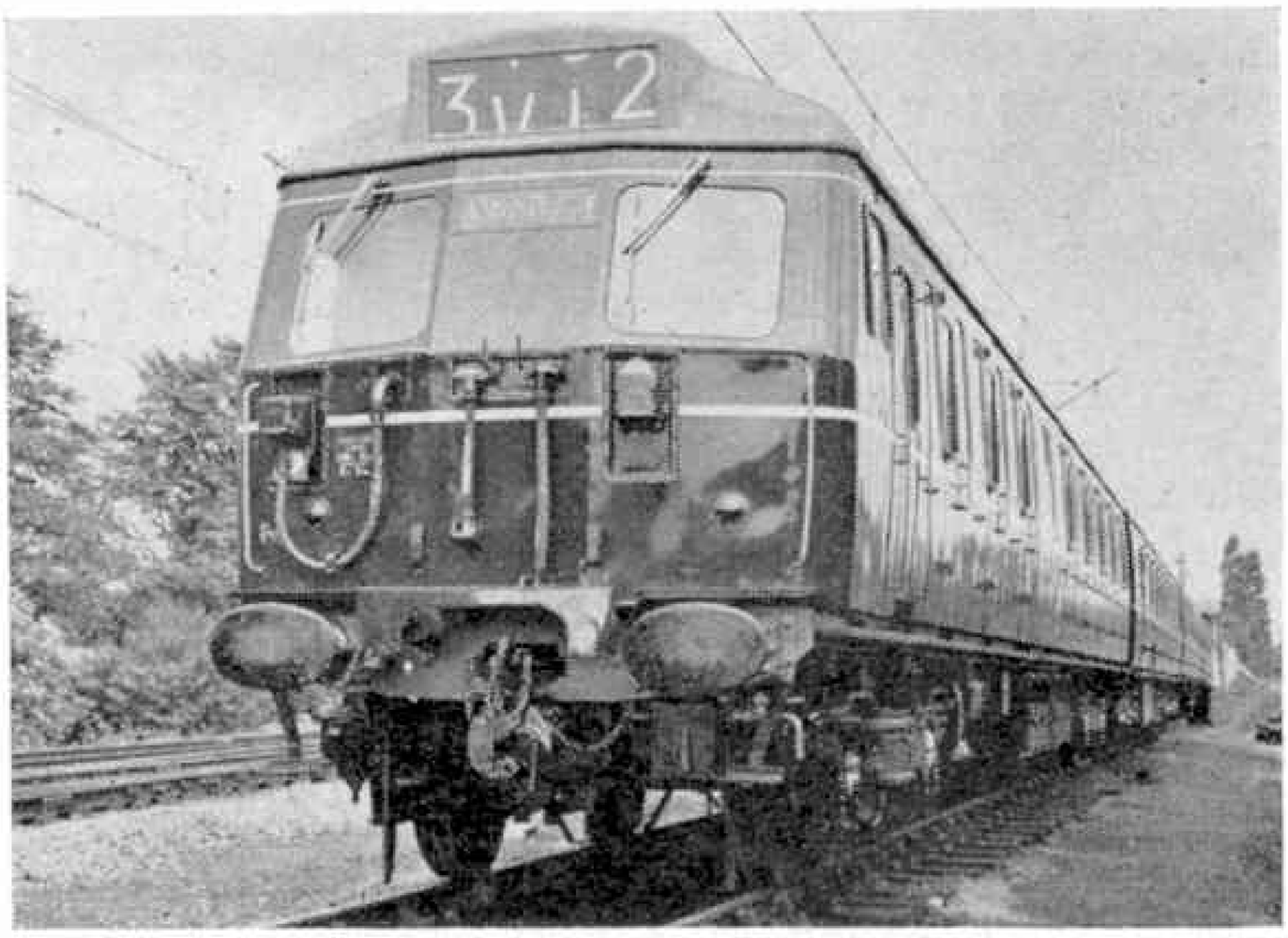
Three special trains

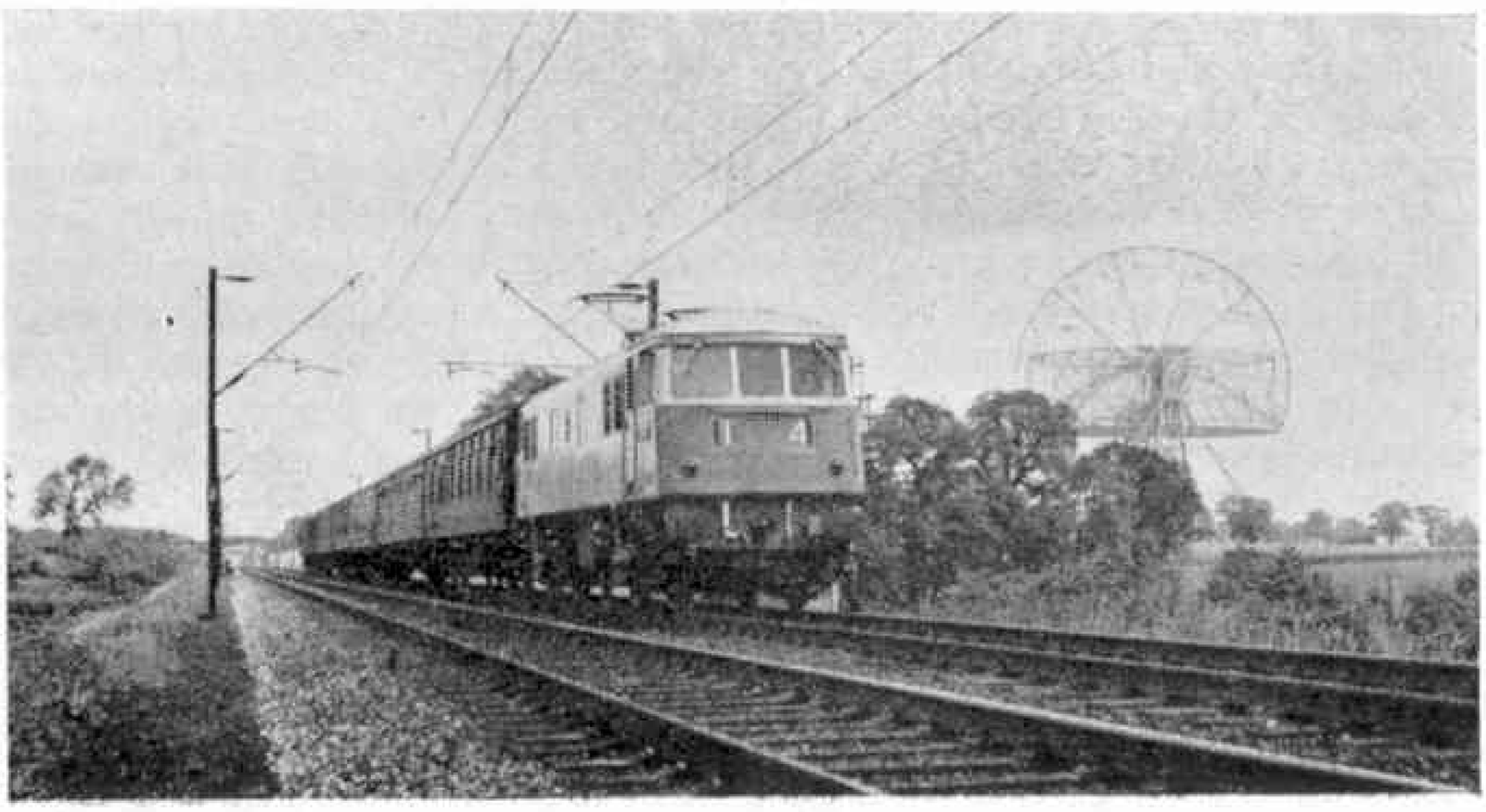
Erection of the masts for supporting the catenary was undertaken by a highly-mechanised means. Three special trains were involved. The first carried an auger borer which excavated the ground. This train was followed by one carrying masts, and a crane to lift them into position. Then came a concrete-mixing train with all the equipment required to mix the material and pour it round the base of the mast to secure it firmly in position. It would have been a much longer job if this work had been carried out entirely by manual means.

The maintenance of locomotives and multiple unit trains has had to be provided for. One new depot for such work has been built at Crewe, and another at Longsight. Light repairs and examinations will be the principal functions of these depots, but overhaul of the locomotives will be carried out at Crewe main locomotive works.

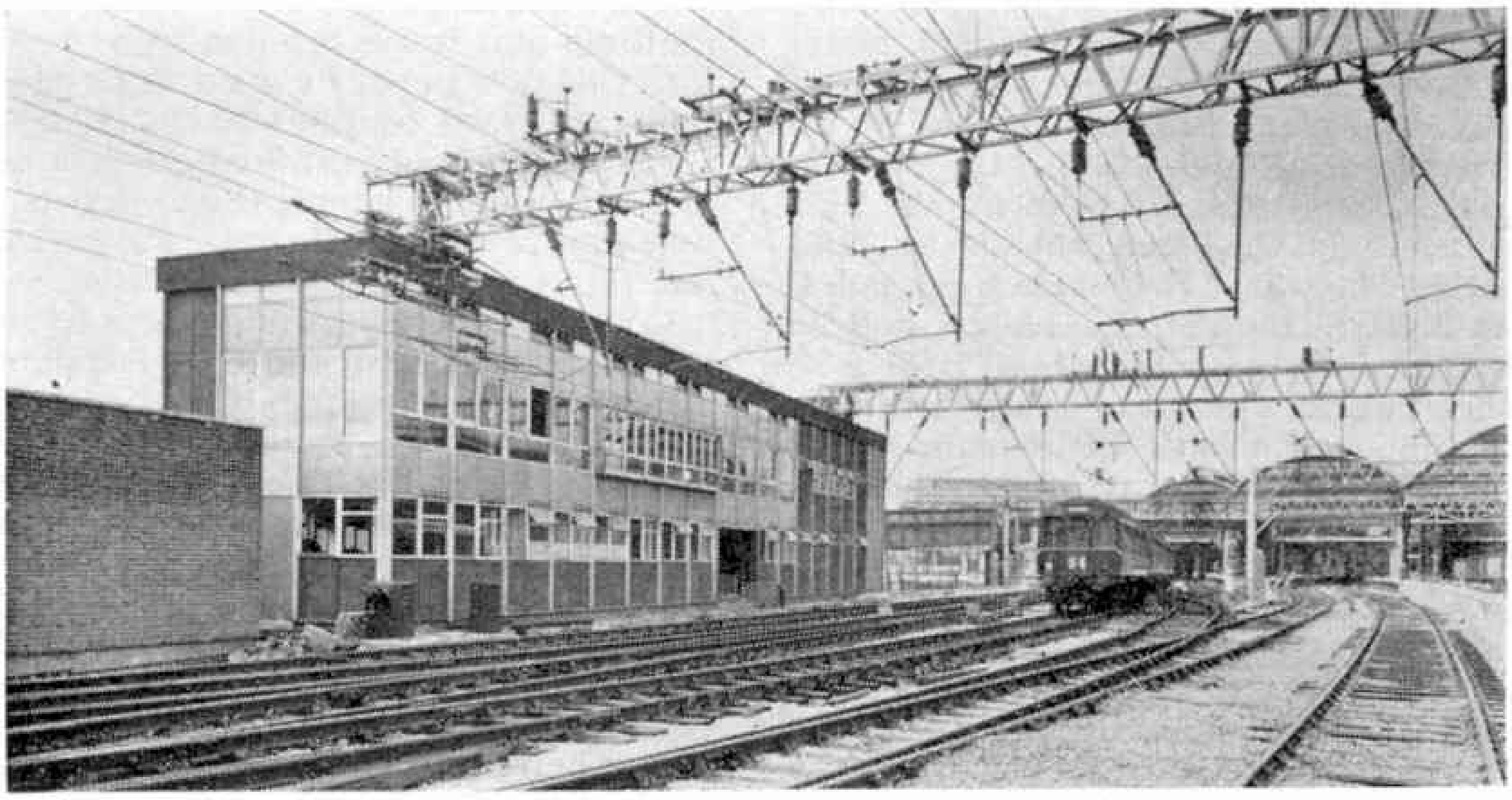
Construction depots and stores have also been built, at Crewe and East Didsbury, to accommodate the large variety of equipment used on the project. A fleet of 100 special vehicles has been assembled, many being converted London and North Western corridor coaches which once formed the best Anglo-Scottish trains on the West Coast main line. Some now have flat roofs to enable men to work on wire erection and there are also vehicles for carrying cable drums and many for other special purposes.

To provide the necessary training of drivers and guards the former Western Region gas turbine locomotive No. 18100 was converted to an electric machine and renumbered E1000, and this was used until





Above right: A striking head-on view of a multiple-unit train such as that now in use for local services on the new line. Below: A locomotive-hauled train on the new electric route passes the world-famous Jodrell Bank Radio Telescope.



The approach to Manchester Piccadilly, showing the overhead wire structure and new signal box.

production of the new standard locomotive was put in hand. This latter class consists of Type "A" 3,300 h.p. Bo-Bo machines for express passenger work, and Type "B" engines of the same type but with a different gear ratio which reduces their maximum speed yet makes them suitable for hauling heavy freight trains of up to 1,250 tons at 55 m.p.h. The Type "A" locomotives can reach more than 100 m.p.h. with passenger trains and 55 m.p.h. with freight trains of up to 950 tons in weight. The locomotives weigh 80 tons. Two pantographs of the Stone-Faiveley type are fitted. The locomotives are finished in a colour scheme of light blue and cream, the bogies and their associated equipment being black. A large train describer panel is carried at each end.

A number of multiple unit trains will handle the local services between Manchester and Crewe. These are arranged in sets of four cars each, as follows: battery driving trailer — motor brake coach — trailer — driving trailer brake. At busy periods two, or even three, sets can be joined to form an 8-car or 12-car train. A 4-car unit has a length of 266 feet, with a tare weight of 150 tons, and can reach a speed of 75 m.p.h. The stock has two kinds of accommodation —open and compartment—and each 4-car set can seat nineteen first-class and 344 second-class passengers.

The trains are powered by four axle-hung, nose-suspended traction motors on each motor coach, each motor being continuously rated at 194 horse power. The bogies have 40-inch diameter wheels and roller-bearings. Like the locomotives, they have the Stone-Faiveley pantograph and they can, of course, be driven from either end.

As can well be understood, enormous difficulties have had to be overcome in order to carry out all the varied aspects of the scheme without disrupting the normal heavy traffic more than was strictly necessary. While extensive reconstruction of the station and tracks was being carried out at Manchester Piccadilly and in the vicinity, trains were diverted to Victoria and Exchange Stations. Oxford Road and Mayfield Stations have also handled their share of extra work.

The changeover of running lines, signalling alterations, bridge and tunnel work and erection of overhead equipment have all had to be carried out while the railway continued to function, for traffic on British Railways never ceases. There are always trains on the move and the fitting in of such major works provides plenty of headaches for the people concerned.

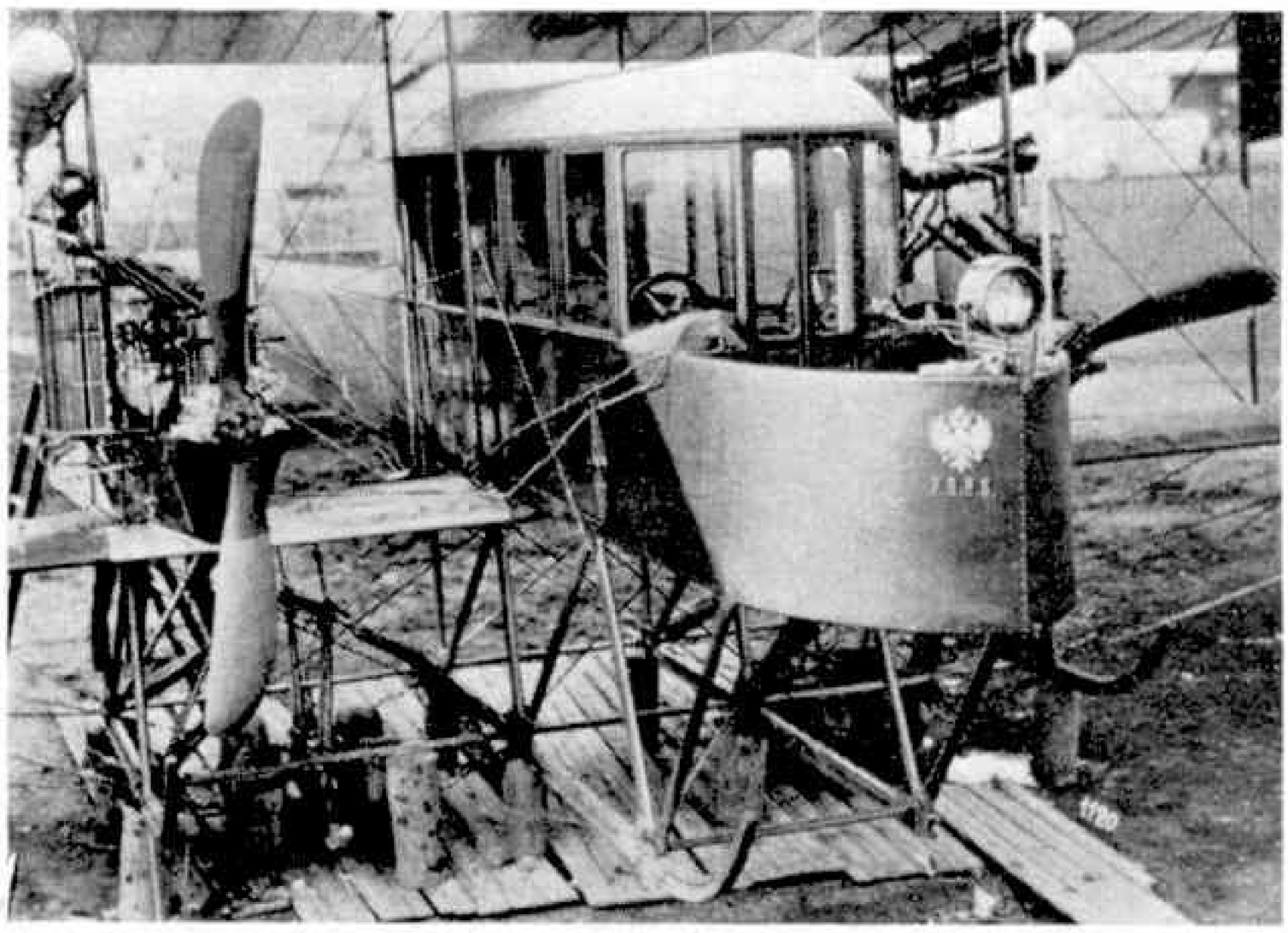
Stage One has, however, been brought to a successful conclusion. The next step is the completion of the Liverpool (Lime Street) to Crewe line which in itself is a further major operation on another busy section of railway, involving an enormous amount of planning and hard work. Electric train services on this section are scheduled to begin operation during 1961 and the whole scheme is expected to be complete by 1964.

For the time being, express passenger trains from London to Manchester are steam or diesel hauled as far as Crewe, where an electric locomotive takes over. Similarly, Manchester to London trains are electrically hauled to Crewe.

John W. R. Taylor tells readers the story of

"Mr. HELICOPTER"

FIFTY years ago, on June 3, 1910, in a field on the outskirts of Kiev in Russia, a young engineer named Igor Sikorsky clambered on board a 25 h.p. biplane he had built himself, and prepared to take off. It was a tense moment, for neither the man nor the aeroplane had ever before left the ground.



***Le Grand*, designed by Sikorsky, had a wing span of 92 ft. It was the first four-engined aircraft to fly.**

Three friends held the aeroplane back as Sikorsky opened the throttle. Satisfied that the Anzani engine was working well, he signalled to them to let go. The aeroplane bumped forward across the grass and he eased the joystick gently back as its speed increased. Suddenly, the bumping stopped . . . and he knew he was flying for the first time in his life.

He was airborne for just twelve seconds, during which he covered a distance of about 200 yards at a height of two to four feet. This may not seem much by modern standards, but we should remember that even in our own country there were no more than 56 qualified pilots by the end of 1910. The number in Russia was far smaller and none of the men who watched that first flight by Igor Sikorsky had ever before seen an aeroplane in the air.

The young designer had only one regret—he believed aeroplanes would never be completely safe and efficient until they could go straight up and down, and he had spent over a year trying to develop a successful helicopter.

Had definite ideas

The first one he built refused to leave the ground; the second would do so provided there was no pilot on board. Sikorsky realised he was wasting his time until more powerful engines were available, and switched to fixed-wing aeroplanes.

The S–2, on which he made that first flight, was quite ordinary in design, but he was already looking far beyond the stick-and-string aeroplanes of 1910 to the time when huge airliners would carry passengers in comfort across half the world. He had very definite ideas about such aircraft. They would need four engines, to avoid the dangers of a forced landing if one engine failed in flight, spare pilots and navigators would have to be carried to share the work on long journeys, and a large, comfortable enclosed cabin would be essential if the men were to do their job properly in the severe climate of Russia.

For a time, Sikorsky had to be content with building small aircraft. In one of them, which he called the S–6–A, he flew at about 70 m.p.h., carrying two passengers. This broke the speed record for an aeroplane with three people on board, and the S–6–A went on to win first prize at the Moscow aircraft exhibition in February 1912.

As a result of these successes, Sikorsky was taken on as designer and chief engineer of the aircraft division of the Russian Baltic Railroad Car Factory at Petrograd (now Leningrad). For them he produced the S–6–B, which won a military competition in September 1912 and was ordered in small numbers for the Imperial Air Services. Much more important and exciting was

that the company's chairman, Mr. Shidlowsky, said he could build his four-engined aeroplane.

No such machine had ever flown, and few of those who saw it taking shape in the Baltic company's factory shared Shidlowsky's confidence that it would work. Even Sikorsky was so worried after he had watched 20 men struggling to lift the huge fuselage that he went home and spent the whole of one night checking his calculations.

At last *Le Grand* ("the large one") was completed. It weighed just over four tons and had a wing span of 92 feet. The four water-cooled, four-cylinder Argus engines were mounted in tandem pairs on the lower wing near the fuselage, and the aircraft's great weight was supported by a 16-wheel undercarriage.

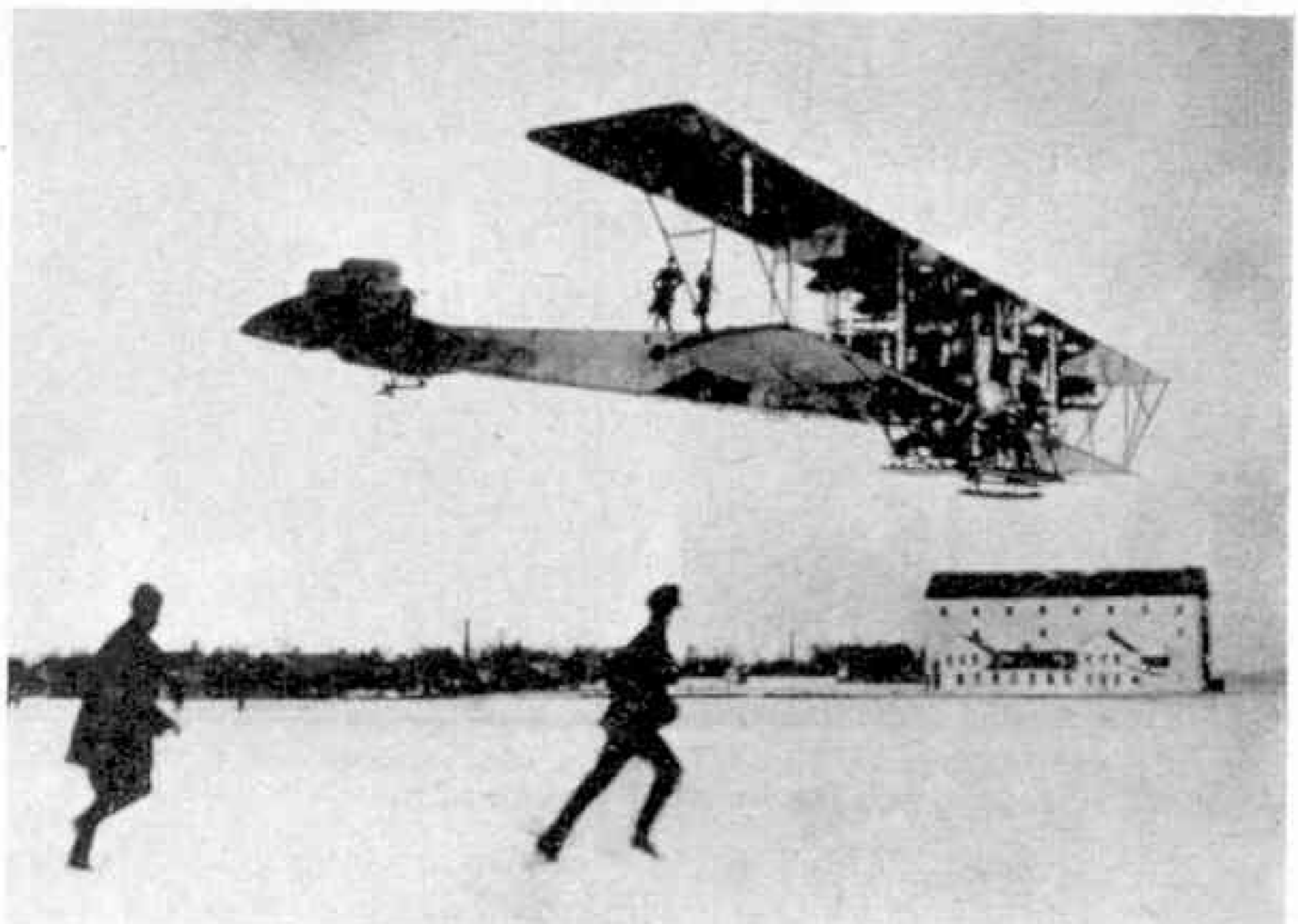
Row of windows

The front of the fuselage was occupied by a large balcony; next came an enclosed cabin for the pilots, with two seats and dual controls. A door at the rear opened into the passenger cabin, furnished luxuriously with four seats, a small sofa and a table. There was full standing room everywhere. A continuous row of large windows gave an excellent view from both cabins. In the rear was a washroom and a cabinet for clothing. Little wonder that so few people expected it to fly, for the four engines gave only 100 h.p. each. *Le Grand* had, in fact, less power than a modern Harvard or Provost two-seat trainer.

Being at a northerly latitude, Petrograd had what are called "white nights" in summer, when it never became entirely dark. So it was not too startling when Igor Sikorsky prepared to make the first flight test at ten o'clock in the evening of May 13, 1913. The co-pilot, Captain Alechnovich, took his seat in the passenger cabin, ready to dash forward or aft if the aircraft should prove nose or tail heavy. The flight mechanic stood on the balcony, where he was intended to stay throughout the flight.

The test itself was almost an anti-climax, because everything went smoothly. Sikorsky had no difficulty in making turns at a speed of about 60 m.p.h., at a height of 600 ft., and *Le Grand* continued to fly well even with one engine throttled right back. At the end of the flight it made a perfect landing.

From that moment there could no longer be any doubt that Igor Sikorsky was one of the world's greatest and most imaginative designers. Even the Czar of Russia, Nicholas II, asked to see *Le Grand*, and



Successor to *Le Grand* was the *Ilia Mourometz* (above right). Note the two men on the catwalk which ran along the top of the fuselage. The bottom picture shows inventor Sikorsky at the controls of the VS-300 helicopter during one of its early tests.

presented Sikorsky with a gold watch bearing the Imperial Eagle as a memento of the event.

The great biplane made 53 flights. Then one day the engine fell out of an aeroplane flying overhead and dropped on to *Le Grand*. The damage was so great that the decision was taken to build an improved four-engined aeroplane rather than to try to repair the damaged one.

The second machine was named the *Ilia Mourometz*, after a legendary Russian hero of the tenth century, and was even bigger than its predecessor, with a span of 102 feet and weight of 4½ tons.

As well as the main passenger cabin and washroom, it had a private cabin with sleeping berth. More remarkable still, there was a railed off platform on top of the fuselage, so that passengers could go for a walk in the fresh air during flight!

Ilia Mourometz was a tremendous success, and broke many records. On February 11, 1914, it flew with sixteen people on board, although it had only the same four 100 h.p. engines as *Le Grand*. A few months later Sikorsky flew it 1,600 miles from Petrograd to Kiev and back, surviving a spin in bad weather on the outward trip.

Soon afterwards the 1914–18 War began. An initial order for ten *Ilia Mourometz* bombers for the Imperial Air Services was followed by others, and eventually 75 of the big aircraft were delivered. As the "Squadron of Flying Ships" they made about 400 raids on the enemy for a loss of only one of their number in action.

Worked without pay

Then came the Bolshevik revolution. Shidlowsky was shot by the revolutionaries, as were many officers from the "Squadron of Flying Ships". Sikorsky escaped to France and went on to the United States after the war. Life was difficult, as nobody seemed to want an aircraft designer. At last, in 1923, he was able to raise enough money from friends like Serge Rachmaninoff, the great Russian composer, to start his own company.

Determined to build a worthwhile aeroplane, Sikorsky designed a big, twin-engined biplane which he called the S–29–A. Money was still scarce, so he had to fit a pair of none-too-reliable wartime engines, and the tyres were so bad that they burst even while the aircraft was standing still. Yet, such was the enthusiasm of his little band of helpers that they worked fourteen hours a day without any payment other than the food they ate.

Sikorsky engineers buckle their seat belts as they prepare for an experimental flight on an open platform carried by the Sikorsky S-60 crane helicopter. Igor Sikorsky is on the right (facing camera).

When the time came for the first flight, all the men who had worked so hard on the aeroplane crowded into its cabin. Sikorsky had not the heart to turn them off; but a load of nine men was too much for the old engines. After a short flight, the S–29–A made a forced landing and was badly damaged.

Determined not to be beaten after overcoming so many difficulties, Sikorsky called a meeting of his friends, locked them in an office and said he would not let them out until they had raised the 2,500 dollars needed to rebuild the S–29–A.

The S–29–A proved to be a fine aircraft. Fitted with new and more powerful engines, it was probably the first twin-engined aeroplane built in America that could fly with one motor stopped. It was followed by many more equally good machines, the greatest being the big four-engined S–42 *Clipper* flying-boats with which Pan American Airways pioneered airline flying over the Pacific and North Atlantic in 1935—37. (*Continued on page 587*)

Pinch Plasma Propulsion

SPACE NOTES

ONE method of using electricity in a space propulsion unit—the ion rocket—was described in Space Notes in the July *M.M.* Another method which is being very successfully experimented with by the Republic Aviation Corporation is the magnetic pinch plasma engine.

In this new type of engine an electrical current is passed through a gas such as oxygen or nitrogen. This raises the temperature of the gas and breaks the molecules down into electrons and positive ions—particles with negative and positive electrical charges. At the same time, a cylindrical magnetic field is created by means of coils outside the gas. Because this magnetic cylinder has a tendency to draw together at the centre it "pinches" the plasma together. This has the same effect as a nozzle in a conventional rocket motor in that it accelerates the plasma and shoots it out at high speed to produce a propulsive jet.

By
J. Humphries, B.Sc.(Eng.), A.M.I.Mech.E., A.F.R.Ae.S.

Results so far have been most encouraging, exhaust speeds of 30 miles a *second* and peak thrusts of over 4,000 lb. have been obtained. One drawback is the high plasma temperature, about 20,000 to 25,000°C. This means the unit cannot be run continuously, otherwise it would melt in a very short time. It is, in fact run for only a few thousandths of a second at a time and the run is repeated a number of times every second. The repetition frequency has not been disclosed but it has been announced that the average thrust obtained from the experimental unit is nearly two pounds.

The electrical power required would be obtained from a nuclear power plant and as such plants produce a lot of waste heat, a system of radiators would be needed to radiate outwards into space. The size of radiators that could be carried would limit the practical thrust that could be achieved.

The ion rocket is limited in the same way, and both types of engine could, in practice, only produce a few pounds of thrust continuously in space. Thus, both ion and pinch plasma engines will be suitable only for low-thrust orbits in space and will have to be boosted off from Earth by more conventional engines.

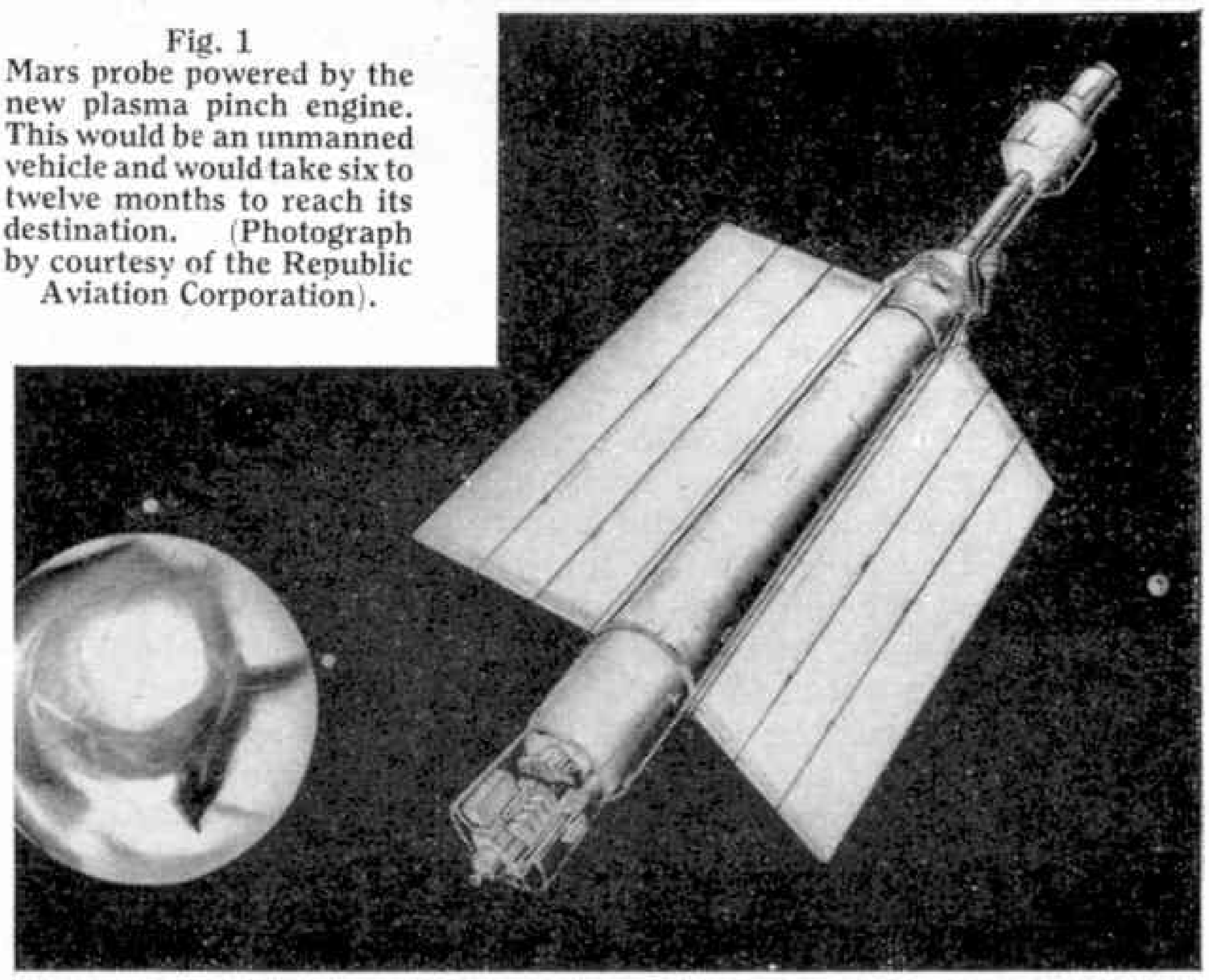


Fig. 1
Mars probe powered by the new plasma pinch engine. This would be an unmanned vehicle and would take six to twelve months to reach its destination. (Photograph by courtesy of the Republic Aviation Corporation).

A proposed Mars vehicle using a pinch plasma engine, designed by Republic, is shown in Fig. 1. The cabin is at the front, then come the propellent tanks with the engine at the rear. The "wings" are the radiators to get rid of the waste heat. The vehicle would weigh approximately 35,000 lb. Boosters to put it into orbit will be available in a few years' time.

Rocket injectors

The business end of a rocket, the combustion chamber, where the propellents are burned and accelerated up to form a high-

speed propulsive jet, is the most difficult part of a rocket engine to design. The temperature of the hot gases can be 3,000°C. and the pressure up to 500 lb. per square inch. Since the chamber is usually cooled by passing one of the propellents around the outside in a double-walled construction, it is advisable to keep the chamber as small as possible so that the cooling propellent does not boil. On the other hand, the chamber must not be so small that the propellents do not burn completely, otherwise the rocket is working inefficiently.

An important part

The propellent injector can be seen to play an important part in chamber design. It performs the function of introducing the propellents into the chamber in such a way as to promote rapid mixing and evaporation and efficient combustion. To accomplish this, the propellents are usually injected through a multiplicity of holes on the injector face in order to give the required speed of mixing and evenness of distribution.

It is an expensive business to test all injectors in a "hot" run, and techniques of "cold" testing have been developed. One of these is shown in Fig. 2. Water is forced through the injector and the resultant injection pattern can be examined in detail.

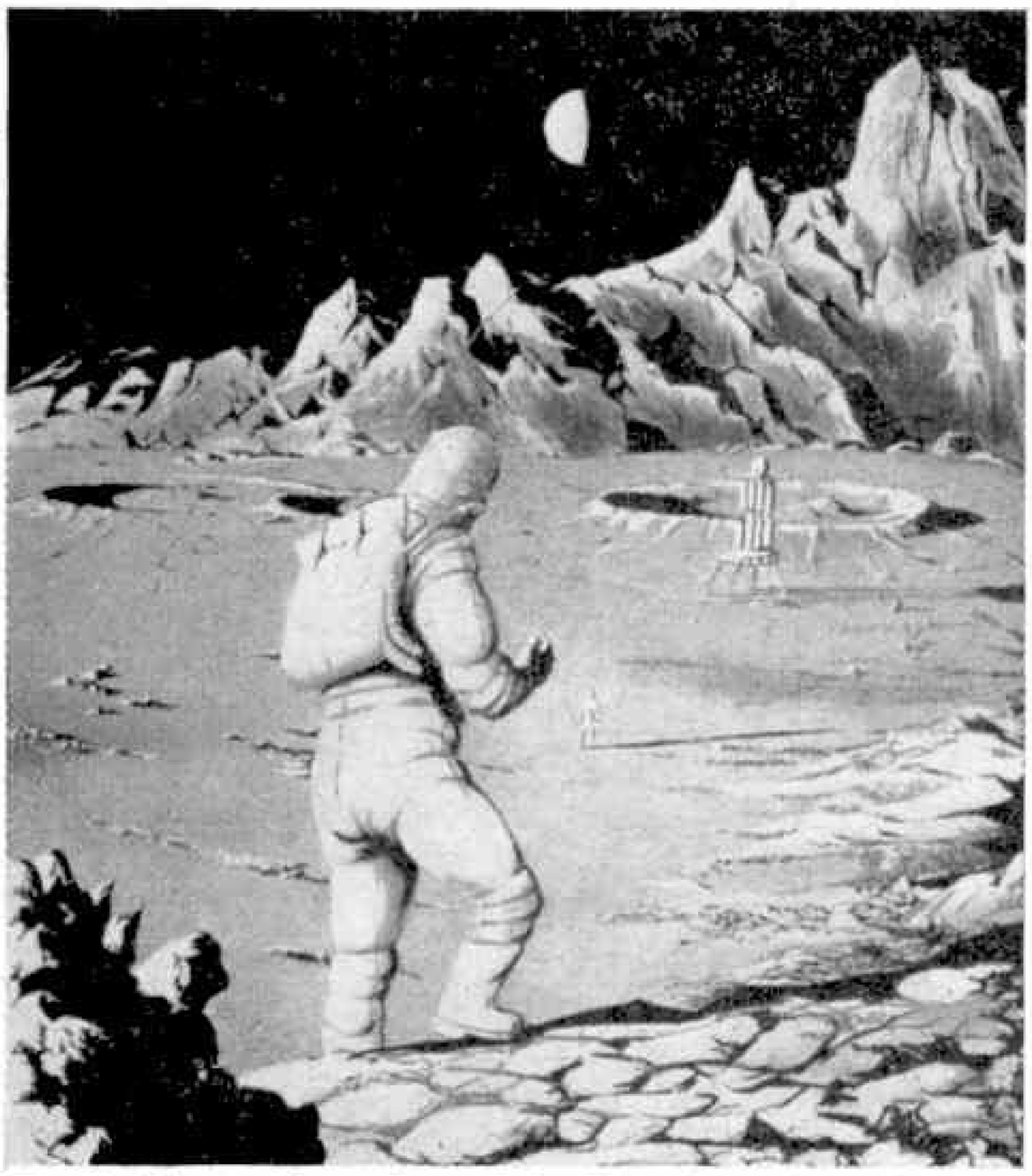


Fig. 3. Man on the surface of the Moon in a suit containing oxygen supply and equipment for removing water vapour. (Photograph by courtesy of Normalair, Ltd.)

Fig. 2. Technicians inspecting the pattern formed by water flowing through the multi-hole injector of a 20,000 lb. thrust rocket engine. (Picture: National Aeronautic and Space Administration.)

When, in a few years' time, the first men land on the Moon they will be completely dependent for their safety on their equipment. One of the most important items will be their space-suits for, although ground vehicles will undoubtedly be used to a great extent, there is also little doubt that the bulk of the exploration will be on foot. There is no air on the Moon and while, during the 14 Earth-day night, the temperature drops to minus 150°C. it rises during the day to 120°C. The skin temperature must be maintained at around its normal value of 33.5°C. regardless of external conditions.

Since it must be assumed that the man will be some way from his home base or vehicle, a complete supply of oxygen must be carried, as also must a system for removing the carbon dioxide and moisture produced. There seems little doubt that for a few hours' operation (six hours is probably the longest that will be needed) a lunar suit with its insulation and auxiliary equipment will be bulky but not, thanks to the Moon's low gravity, heavy.

Pressure suits for the first man in orbit are now being made and from these will develop the first lunar suits looking, perhaps, like the one in Fig. 3.

Moonquakes

One of the instruments that may be landed with the first (*Continued on page 587*)

Turtlin' Off The Caymans

● Trapping the huge turtles of the Caribbean calls for cunningly-laid snares—and courage. Here is the story of this exciting and unusual occupation.

By
Sidney Allinson

The giant turtles, caught off the coast of South America, are brought to the island city of Key West by colourful fishing boats.

THE foot of the Margaret Street wharf in Key West was where I first came upon the Caribbean turtle-trapping fleet. I stood in the warm sunshine of a Florida winter, watching the crew of a schooner unload enormous green turtles. A tallyman with a clipboard was checking the brands cut into the soft undershell, before each reptile was slipped down into the crawlpen where it would be fed until ready for sale.

Snapping bear-trap jaws and waving huge flippers, the turtles, each weighing more than 300 lb., were more than a handful. But the stalwart seamen hauled them ashore almost effortlessly, their bronzed skins cording with muscle.

Contrasting with the speech of the group of watchers on the quay—tourists, leathery-looking dockers and white-uniformed U.S. Navy men—that of the half-naked Cayman Islanders was soft and oddly English in this tropical setting.

Little-known story

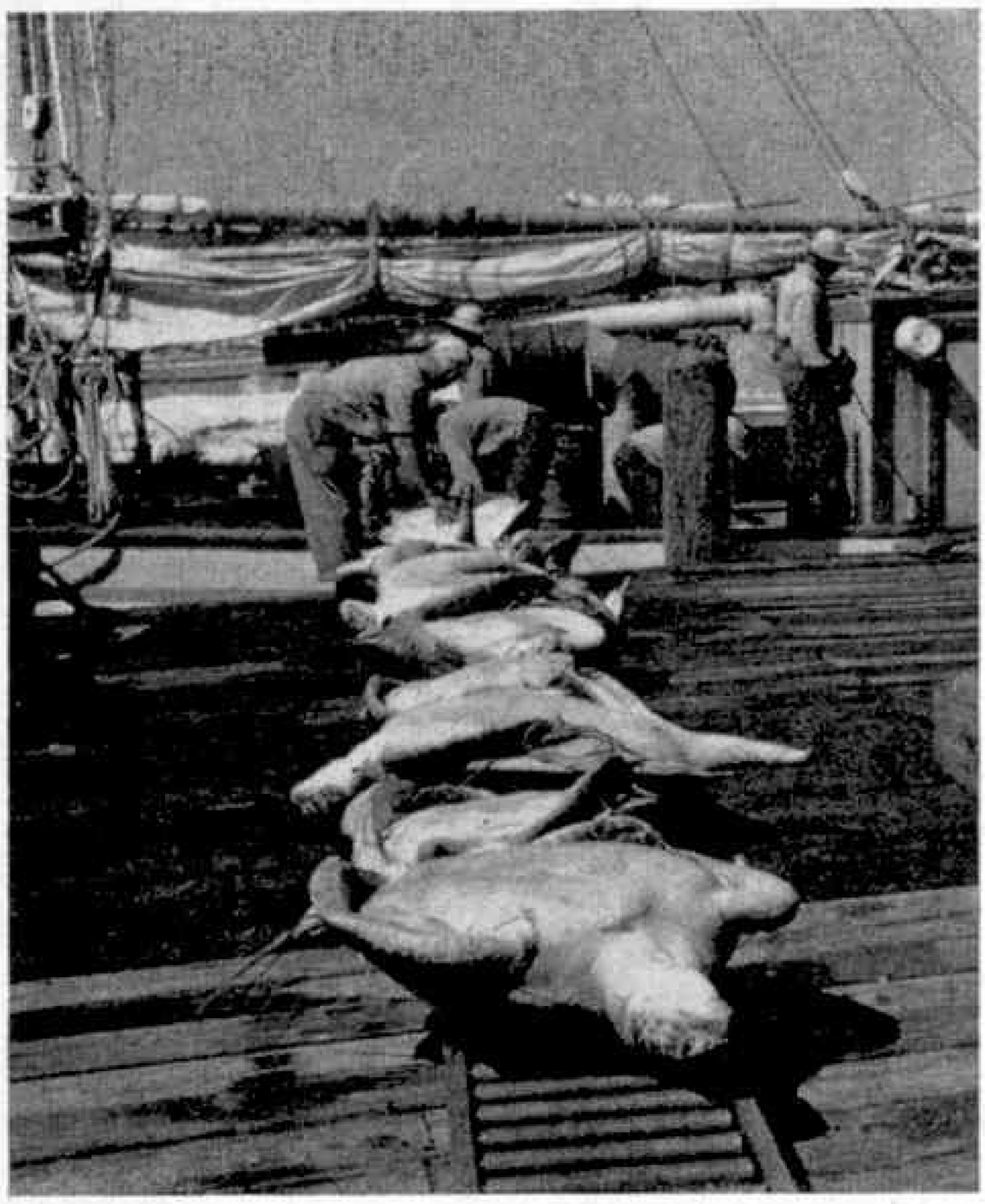
After the unloading, I fell into conversation with one of the crew as we sat on the wharf. He was a towering young man with a trace of negroid ancestry in his strong, dark features. As he chatted to me in an accent his buccaneer forefathers might have used, he introduced me to a little-known chapter of man's braving the sea in the pursuit of his livelihood.

Swarming in various areas of the Caribbean the green turtle has been prized as a delicacy for centuries past. The hunting of turtles has become a commercial proposition only during the last 50 years, following on the improvement of transportation facilities to urban centres. Captured from their haunts along the Caribbean shore, the turtles are taken to Key West for shipping to plants where they are processed into delicious steaks and soups.

The bulk of this strange fishing is done by men of the Cayman Islands, a sandy paradise dependency of Jamaica. Only brief home visits are enjoyed by these fishermen during their span of following the turtles. It has become traditional among boys of the islands to join the turtlin' fleet as soon as they are old enough to repair a net or hold a wheel.

Sailing in a fleet from the Grand Cayman port of Georgetown, the turtlers split up along the coast to look for likely spots. A sharp eye is kept for eelgrass—the fibrous weed that forms what is called the Sargasso Sea. This Zostera grass floats in vast watery meadows and is the staple food of the turtle. It grows in lagoons and shallows along the coast and small islands. Good trapping is assured while the reptiles are grazing on it.

Ranging along the coast of Costa Rica and Nicaragua, the schooner captain knows where to pursue his quarry through the rotation of seasons. The haunts are never changed, yet, in spite of constant trapping, these turtles show little sign of decreasing in number.



Turtles, unloaded from a fishing vessel, move along a conveyor and are then hauled away by rope.

The mangrove islets of Nicaragua's Mosquito Coast have the thickest turtle population and here the trapping begins in earnest. As a schooner cruises slowly through the coral-studded channels, a look-out aloft calls down directions to four crews who are at the stern with a supply of cork markers. These weighted floats are thrown overboard at a shouted command from the eagle-eyed watcher when he spots a likely lair beneath the surface.

This search and marking is carried on for most of the day, the vessel gradually doubling back on the course. Shortly before dark, when the sun is low on the horizon, two dories put out from the anchored schooner. Any type of trapping is defeated if the prey realises it is being stalked. Sharp-eyed during the brightness of day, the turtle has difficulty in seeing what is going on above the surface when the sun is low.

As each marker is reached, one of the dorymen fastens a turtle net to the weighted line. Playing out the rolled net behind the boat, the oarsman rows until the net is extended to its full 50 feet and has become opened out in the water. Fastening a coloured float to the other end, he leaves the mesh on the surface—a 10ft.-wide trap.

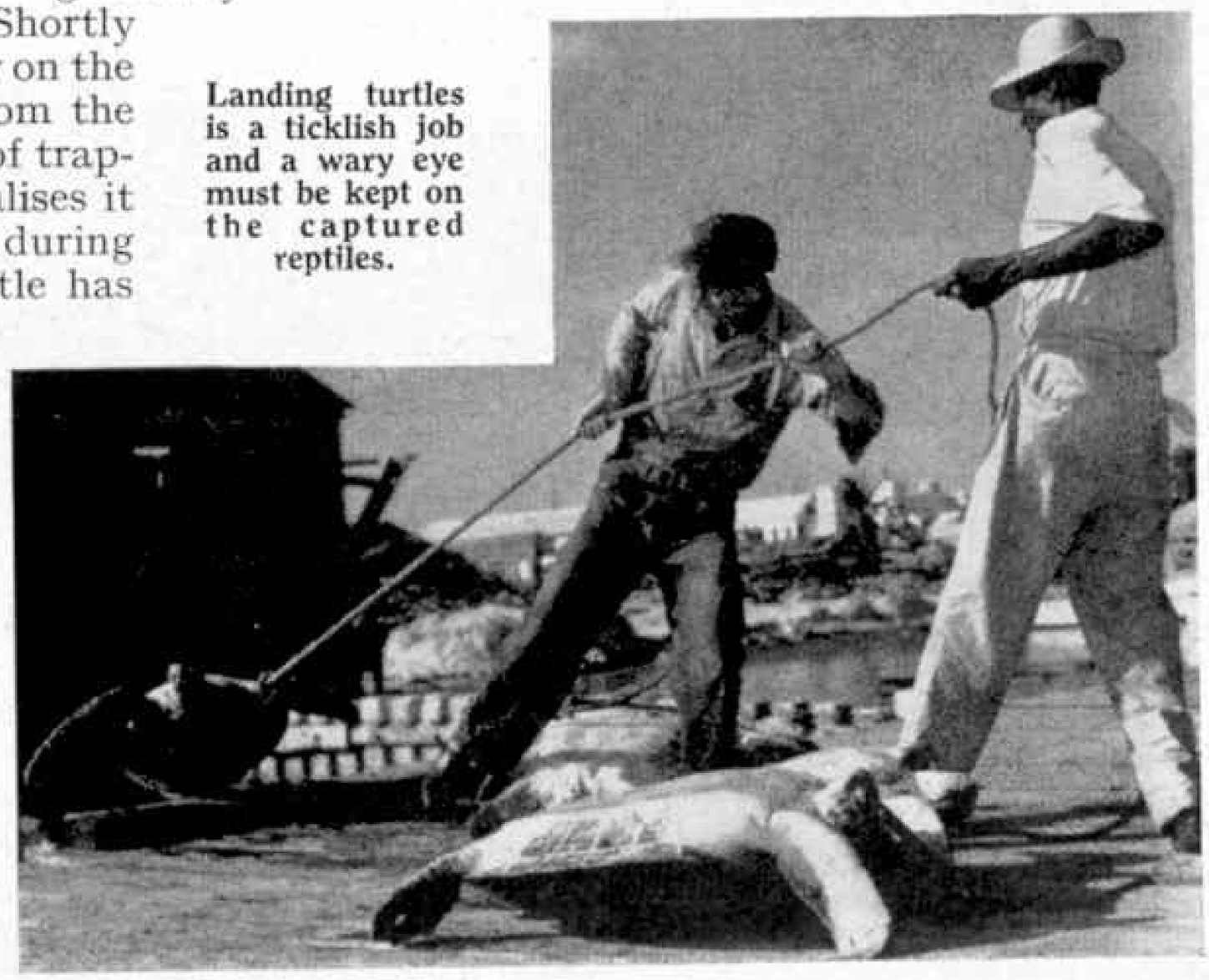
The roaming sharks

It is only at night that the turtles come to the surface in any numbers and the cunningly-laid snares are soon alive with struggling victims. These struggles often attract the sharks that roam in the shallows, for a turtle steak is apparently as appetising to a shark as it is to a gourmet. It is to cheat these scavengers that the Cayman Islanders are at the nets long before first light. Wherever frothing water indicates a reptile caught by the flippers or by its neck, the dory is rowed alongside and the dangerous job of capturing the turtle begins.

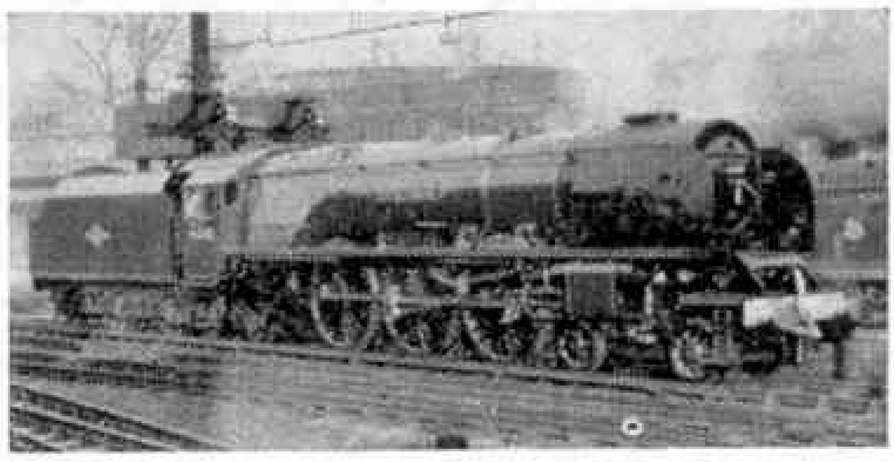
The frenzied struggle of a monster weighing several hundred pounds provides a great deal of peril. One swipe from a clawed flipper could kill or maim a man. Should the trapped beast be a Hawksbill turtle, then the savage snapping of razor-sharp jaws becomes the main threat.

Four men handle the ticklish job of landing the reptile. One sailor's responsibility is to keep the boat on an even keel. When two men have a firm grip under the edge of a turtle's shell, a rope of tarred hemp is passed over the creature's head and the crew take a few moments breather before rolling the catch into the boat. When the turtle is rolled over on its back most of the danger is past, but the crew keep a wary eye on the reptile during the trip back to the schooner.

A cargo-net run out from a yard is lowered from the schooner and soon the indignant turtle is lying in (*Continued on page 587*)



Landing turtles is a ticklish job and a wary eye must be kept on the captured reptiles.



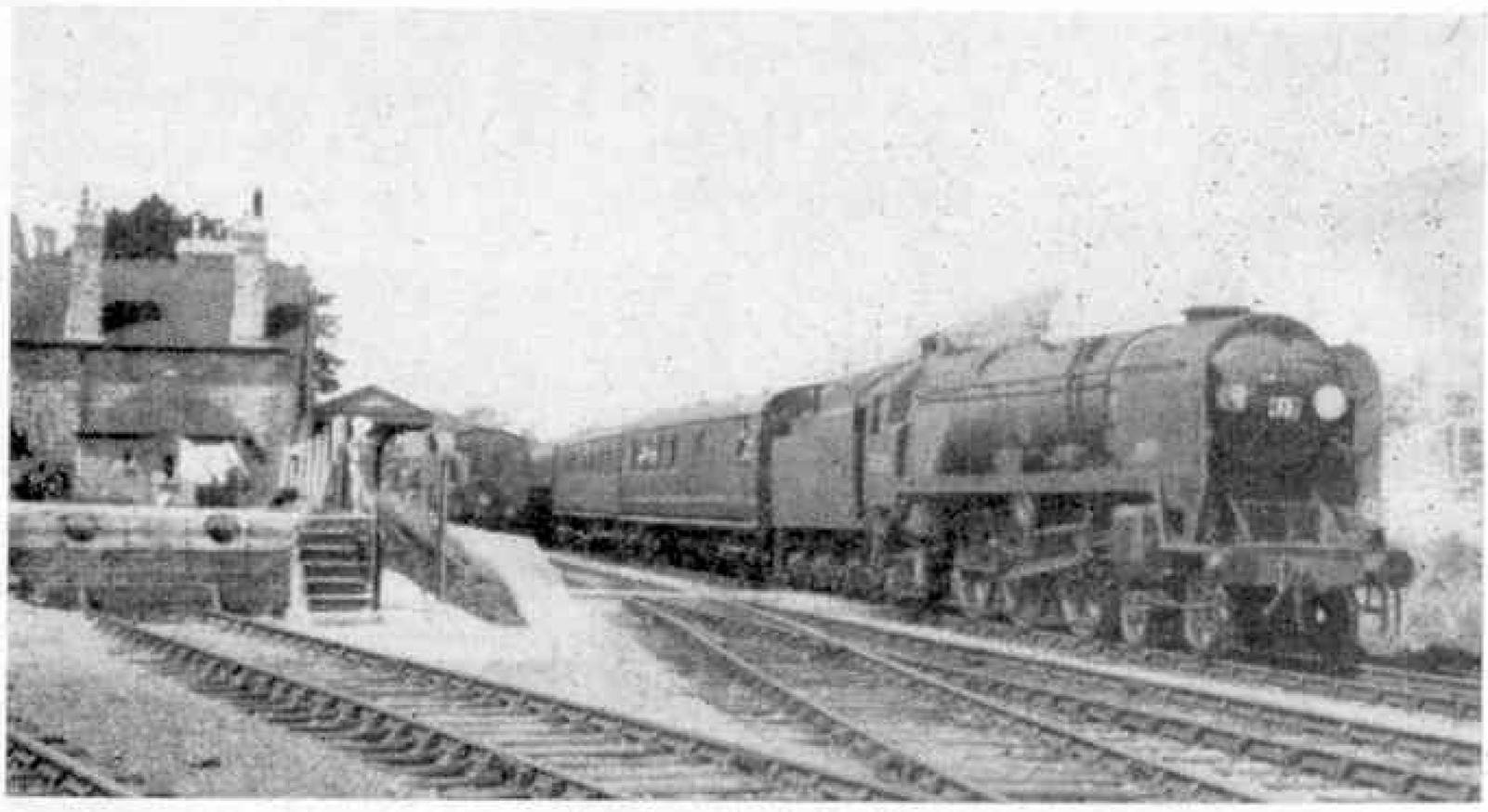
Railway Notes

By R. A. H. Weight

Aboard the "Atlantic Coast Express"

THE *ACE*, as it is often called in striking abbreviated form, is one of the few regular named expresses on the Southern, apart from the all-Pullman variety. It provides in each direction the quickest service between London, Waterloo, and Plymouth via Salisbury and Exeter, Central; Ilfracombe and Okehampton, as well as other resorts or towns in Devon and North Cornwall.

When I went westward last August, the busy-season daily duplication was in force over the London-Exeter main line, so that the unique total of nine different portions or through carriages normally conveyed when running as one train was spread over the two sections. The first part, running to the normal 11 a.m. timing, consisted of portions for Ilfracombe, Bideford–Torrington, and the Exeter portion, including restaurant and buffet cars. The Exmouth and Sidmouth section was detached at Sidmouth Junction, first stop after Salisbury.



S.R. No. 34029 "Lundy" is here leaving Corfe Castle on a train from Waterloo to Swanage. Photograph by G. O. P. Pearce

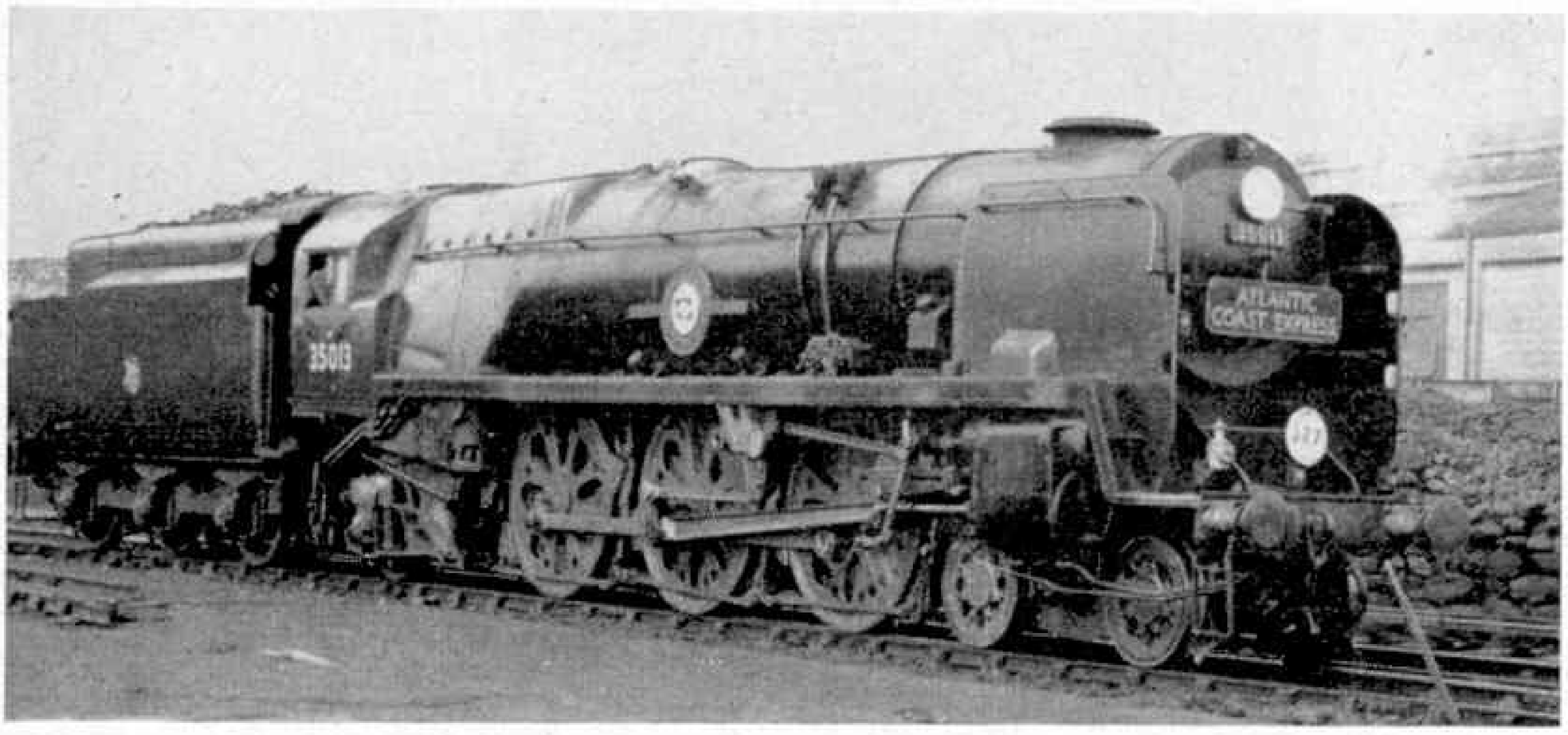
The last Merchant Navy 4–6–2, No. 35030, *Elder Dempster Lines*, with a moderate 10-coach, 345-ton gross load, and no delay of any kind, made light of the S.R. fastest schedule of a mile-a-minute down to Salisbury and, as it happened, provided the quickest run I had logged during many years from Waterloo to Basingstoke or beyond, without need for the very high speeds sometimes forthcoming. Over fairly easy ups and downs in grading, for 56 miles from the London outskirts at New Malden to Andover (Hants), 70 m.p.h. was averaged with never less than 64, and a maximum of 80. Basingstoke, 47¾ miles, was passed uphill at over 70 m.p.h. in 46½ minutes, Andover, 66½ miles, in 62 minutes. During a heavy shower there was a drop to 58 up the Grateley rise at 1 in 165, followed by downhill travel at 76–78 m.p.h. and a gentle finish to the Salisbury stop. Arriving a good three minutes early in no more than 79¾ minutes for 83¾ miles overall we were there at 11.20!

Stiffer proposition

I went on from Salisbury in the second train, consisting of restaurant cars for Exeter and through portions for Plymouth, Bude and Padstow. As the load was "11" and the gradients are more severe over this section, it was a much stiffer proposition for the light Pacific, No. 34063, *229 Squadron*, which had arrived punctually (with 12 coaches) from London on an easier, 87-minute timing.

As we left Salisbury, passing the combined S.R. and W.R. Motive Power Depot with impressive views of Britain's tallest spire surmounting the beautiful cathedral, there was a track repair slowing adding to

an always difficult uphill start. When well under way speeds varied from 49 m.p.h. up 1 in 145 and 46 up 1 in 80, to 76 downhill near Sherborne through increasingly fine scenery, culminating in a maximum of 85 past Chard Junction down the long broken descent in an endeavour to save every second possible before arrival at Axminster, 61 miles, reached in 66 minutes or just a little longer than the tight schedule allows. There I left the train.



No. 35013 "Blue Funnel" with headboard and discs in position stands ready to take the up "Atlantic Coast Express" from Exeter. Photograph by A. R. Grierson.

A grand vista

Fascinating indeed is the 6¾-mile winding and climbing single track connecting Axminster (Devon) with Lyme Regis in Dorset. The long views, hills and woodland, are grand. From the vicinity of the little terminal station at Lyme Regis, well up the hills that rise sharply from the shore, I enjoyed a grand vista in clear sunshine over the town, miles of blue sea, and cliffs. Added to this was the novelty of travelling behind a quaint 4–4–2T No. 30582 of about 1885 vintage, so far found best for the job in spite of various trials with other types over the years, with friendly people making one's gratification complete!

The usual train consists of one or two corridor carriages. The imposing through portion from London featured in one of this month's illustrations is a summer Saturday event requiring two of the three veteran 4–4–2T locomotives, as some of the gradients are as steep as 1 in 40. There is a diminutive intermediate station at Combpyne, with a parked camping coach let to visitors.

Further east, in Dorset, the Swanage branch—connecting with the Bournemouth and Weymouth main line at Wareham—does a bigger holiday business at summer weekends and then has complete through trains to and from Waterloo, as well as regular through carriage workings. The former, as photographed by G. O. P. Pearce, are in some cases hauled by West Country Pacifics and avoid Bournemouth by travelling between Poole and Southampton by way of Wimborne and Ringwood. Corfe Castle, a historic ruin, is a prominent landmark near the Swanage branch.

Eastbound trains from the Ringwood direction, on double track, join the main Bournemouth–London route at Lymington Junction, not far from Brockenhurst in the New Forest, at the same point as the single line from Lymington links in from the south. Along that branch in September, as well as in main line trains hauled respectively by *Lord Nelson* and B.R. class 5 4–6–0s, I travelled across miles and miles of heather-clad moorland which provides a striking contrast with the big-town and extensive maritime activities of Southampton, not far away. The two-coach, pull-and-push train operated by M7 Drummond 0–4–4T, No. 30029 ran from Brockenhurst to Lymington Town, thence across a bridge over the fairly wide and twisting river estuary of the same name to the Pier Station terminal. Here a modern S.R. motor-ferry ship, also conveying passengers and miscellaneous packages, was ready for the short crossing to the Isle of Wight. This branch also sees through Waterloo services in the summer season.

Not far east of Portsmouth, another single-line bridge over salt water, with very strict weight limitations, is traversed by Havant-Hayling Island branch trains worked by the very old and tiny Alx

A pair of Adams 4-4-2 "Radial" Tanks double-head the through Lyme Regis portion of the 10.45 from Waterloo. They were photographed between Axminster and Combpyne by S. C. Nash.

"Terrier" 0–6–0Ts of the one-time London, Brighton and South Coast Railway. When things are busy and extra carriages needed, one of those little engines is attached at each end of the train!

Intensive Saturday variety

So many main lines and holiday lines are at their busiest on summer Saturdays, providing a great deal of interest to the locomotive and traffic or rolling stock enthusiasts. During observations at Basingstoke (Hants) on the London side of Worting Junction, where the all-steam Bournemouth and Exeter, etc., routes unite, express and main line trains were passing or calling for hours at an average of one every six minutes, with two together on several occasions. Those in the same direction were following one another as closely as signals would allow; also at times there would be one on the fast and one on the local line going the same way.

Northbound trains to the Midlands via W.R., hauled in some cases by S.R. engines as far as Oxford, leave or enter the main line at Basingstoke East. Some W.R. Hall 4–6–0s went through to Portsmouth, via Eastleigh; others changed with W.R. locomotives at Basingstoke.

Locomotive and other news

Here or at Woking later (where frequent fast Portsmouth electric trains join or leave the Waterloo trunk route stream) I noted 15 different Merchant Navy and 19 light Pacifics recently; 12 King Arthur, 4 Lord Nelson, 13 standard and 4 S.R. mixed traffic, 4–6–0s; 2 "Schools", also several types of 2–6–0, an "L" 4–4–0, etc. References to various services and through carriages in previous paragraphs give an idea of numerous destinations served.

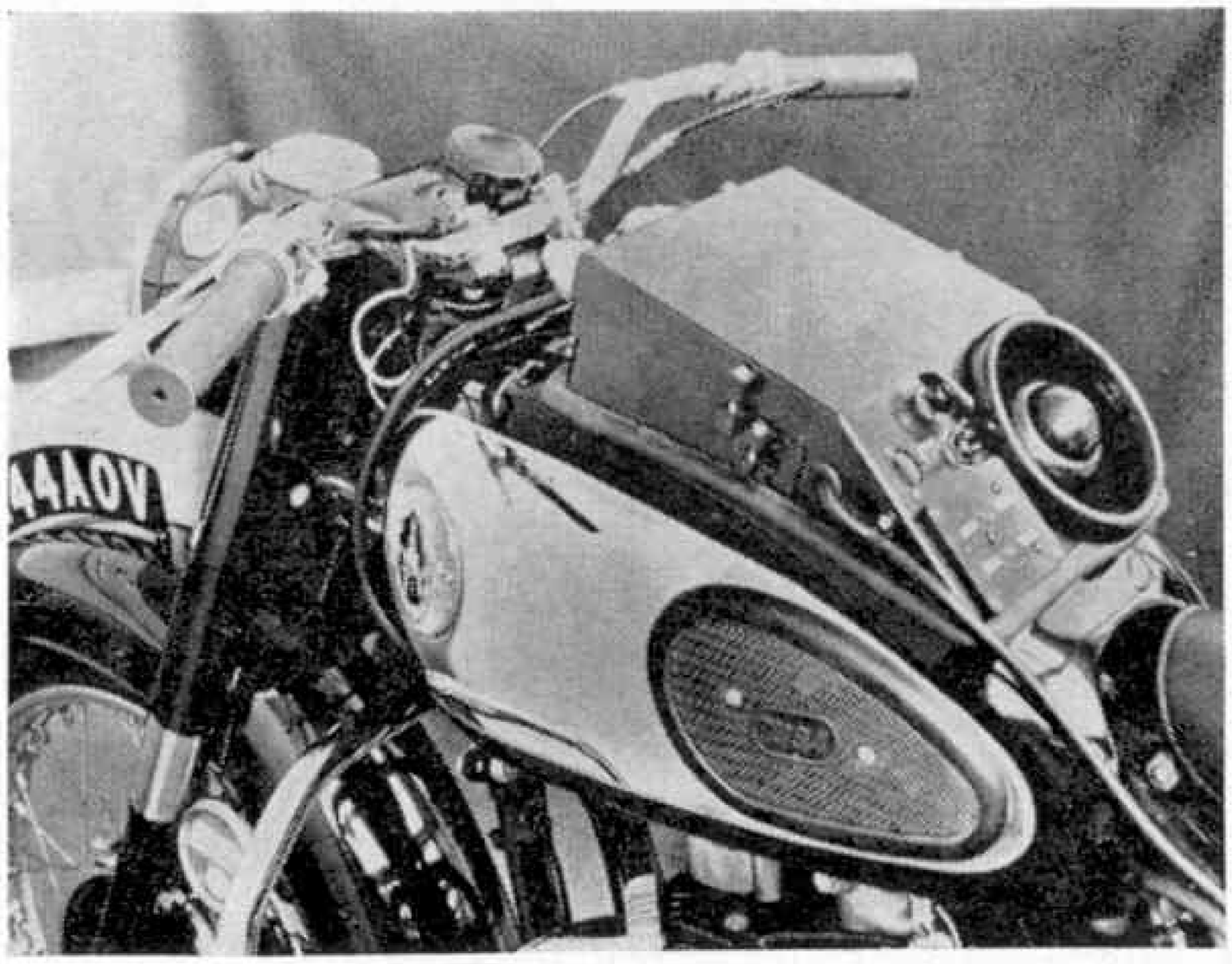
B-B diesel-hydraulic Warship class locomotives have been added to stock as follows: Nos. D824–6 named respectively: *Highflyer, Intrepid, Jupiter;* D834–5, *Pathfinder, Pegasus*. A new more powerful series will begin at No. D1000. It is understood that the numbers for the Deltic type 5 units now building or being completed for the East Coast route have been amended. Further type 4 diesel-electric locomotives for main line duty ready or on order will be numbered within the ranges D1–199, D200–399, D1500–13, it is announced; of type 3, as now coming into S.R. service, there will be Nos. D6520–97, D.6700–78 etc.

All A8 4–6–2T (formerly 4–4–4 N.E.R.) engines have been withdrawn. Double chimneys have been fitted to all the King and County W.R. 4–6–0s, also to more than 40 Castles as well as some of the class 9 2–10–0s. The specially-embellished last one built, *Evening Star*, has been reported on some expresses, although more regularly on Cardiff–Bristol–Salisbury trains. The pioneer ex-G.W.R. Castle, No. 4073, *Caerphilly Castle*, has been proposed for preservation on public view in London following withdrawal. It is hoped that representatives of other famous and long-lasting steam locomotive classes will also be retained and exhibited.

The Ravenglass and Eskdale 15 in. gauge tourist railway in Cumberland, which was threatened with closure, is to be retained for service by new owners.

A section of the abandoned S.R. "Bluebell Line" between Horsted Keynes and Sheffield Park, Sussex, leased by a Society of enthusiasts recently, began week-end passenger train running with two small ex-S.R. tank locomotives and two coaches.

Of General Interest



The tank-mounted section of the new-type radio. The transmit button is just by the left-hand grip.

A NEW type of two-way V.H.F. frequency modulated radio which enables motor-cycle police to transmit or receive while travelling at speeds up to 70 m.p.h. is being supplied to the Lancashire County Police.

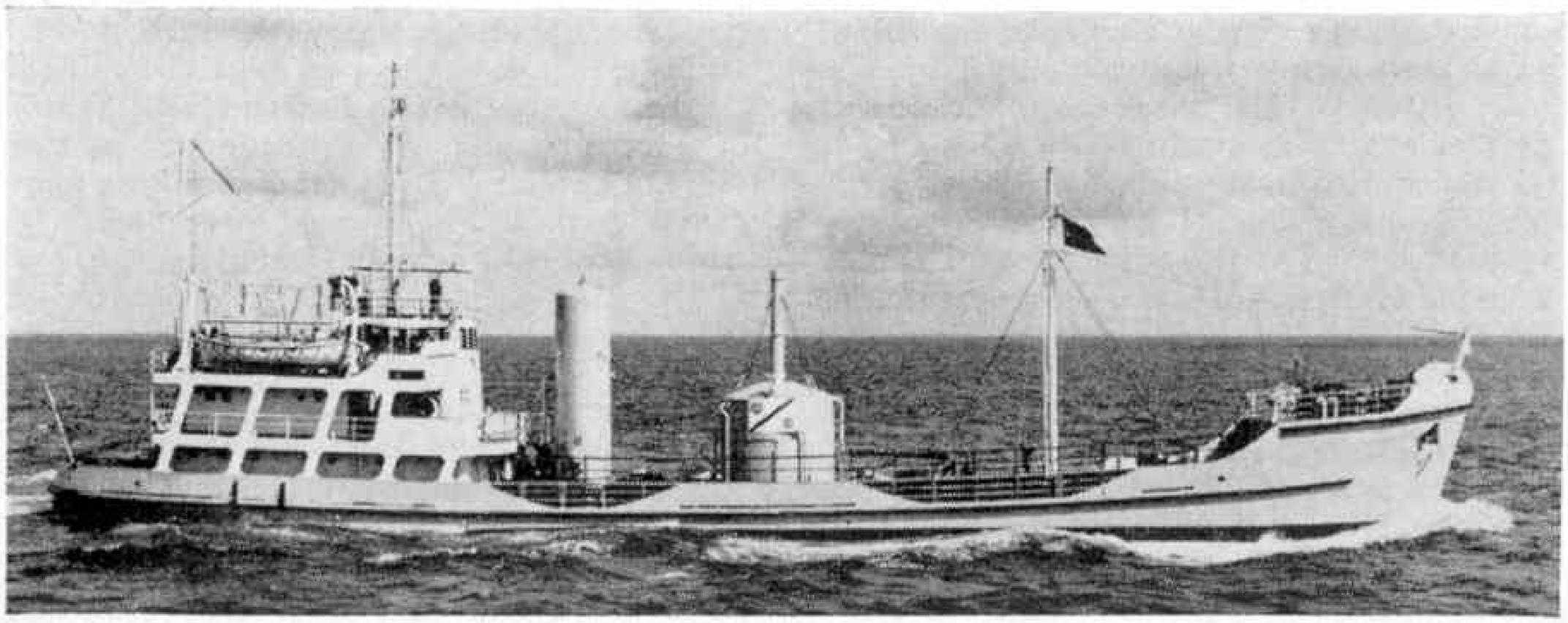
Unique, since they can be used by the patrolman while the motor-cycle is moving, these radios operate in the frequency range 80–100 Mc/s and are being made by the General Electric Co. Ltd., to the design of the Lancashire County Police Laboratories. The company also supplied the fixed station equipment used with the sets.

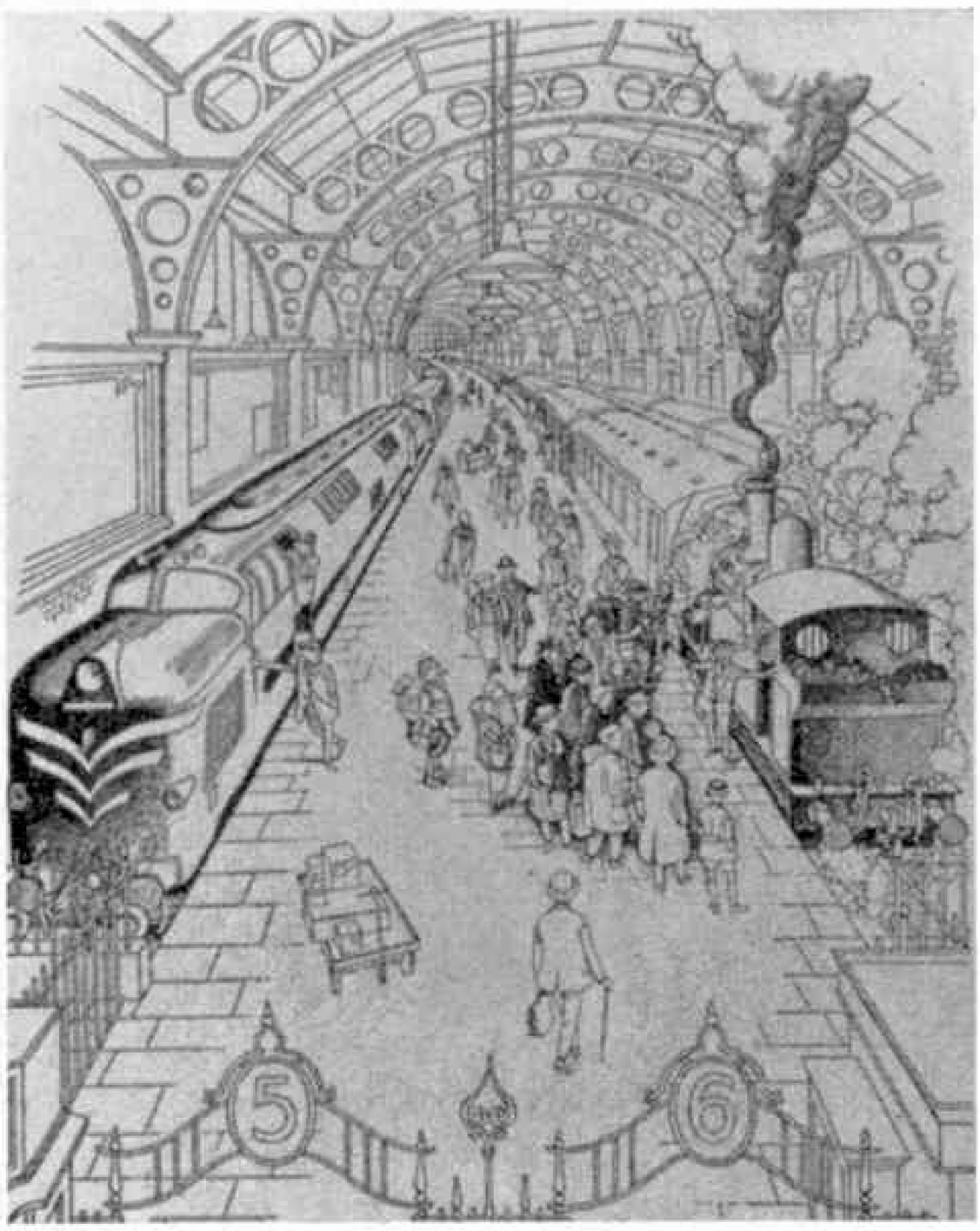
The revolutionary method of operation enables the motor-cyclist to use the radio without moving his hands from the handlebars, ensuring perfect control of the machine at all speeds. The set is switched on to receive in the normal manner but, to transmit, all the rider has to do is to press a button by the left-hand grip.

A special microphone-earpiece incorporates a moving coil microphone—shielded to avoid extraneous sound interference—and one earpiece in a light, padded frame. The unit slips under the crash-hat strap with stud-fixing. Connected to the tank unit by a magnetic snatch system, it is located by small studs. Any sudden jerk which might occur in an accident, or because the rider had forgotten to disconnect it, would immediately release the connection. The whole radio unit, which is completely watertight and dustproof, weighs only about 31 lbs.

Pictured below is the "Muthmirah", designed by BP Tanker Company engineering small craft department for Abu Dhabi Marine Areas Ltd. (jointly owned by the British Petroleum Company and Compagnie Francaise des Petroles).

Built at Cleland's (Successors) Ltd., at Wallsend-on-Tyne, she measures 180 feet overall and has a deadweight of 810 tons. She was designed to test the crude oil from wells drilled in the Persian Gulf.





This drawing by Ionicus for a British Transport Commission Christmas card is a humorous reflection on the enthusiasm bestowed on steam locomotives whatever their size.

As a forerunner to the festive season the "M.M." introduces . . .

CHRISTMAS CARD CAVALCADE

AS Christmas approaches once again the G.P.O. prepares to recruit about 150,000 extra staff to handle the 820 million or so letters and cards carrying greetings from one point on the globe to another.

Last year, more than 545 million Christmas cards were posted in Great Britain and manufacturers confidently predict that this figure will be exceeded this Christmas. Yet, despite the introduction of gimmick cards, the variety of subjects available, and

By I. Broadhead

changing tastes, transport motifs remain as popular as ever. In fact, next to the robin, the stage-coach—preferably buried in a snow drift—is still a favourite choice of Christmas card designers.

The practice of sending Christmas cards began in 1843 when John Calcott Norsley designed a card at the suggestion of Henry (later Sir Henry) Cole. This was printed in lithograph by Messrs. Jobbins of Holborn and hand-coloured by a professional artist. According to the publishers many copies were sold, but possibly not more than 1,000. The price was a shilling a copy.

This was the era of the stage-coach and it is not surprising to find that these vehicles became a subject for decorating Christmas cards. Although coach travel had many discomforts about which people bitterly complained, the late nineteenth century, and modern, Christmas card idea of coaching in by-gone days is based on the warm sentimentalism expressed in Washington Irving's *Old Stage Coach*.

"In the course of a December tour of Yorkshire," he wrote, "I rode a long distance in one of the public coaches, on the day preceding Christmas. The coach was crowded, both inside and out, with passengers who, by their talk, seemed principally bound to the mansions of relatives or friends, to eat the Christmas dinner. It was loaded also with hampers of game, baskets and boxes of delicacies; and hares dangling their long ears about the coachman's box, presents from distant friends for the impending feast."

A different picture

It was this sort of picture which was portrayed on Christmas cards in the 1880's, sometimes being contrasted with stage-coaches of Christmas past. For example, "*Old Times*" showed a coach bogged down in a snowdrift and extra horses trying to pull it out, helped by the passengers. The coach is shown coated with snow and ice and the whole scene portrays the difficulties of travel in 1828. But the "*Old Times*" of 1882 presents a very different picture. Here, a similar coach is shown rolling along at high speed, on a good road, with the passengers comfortably seated.

Coaching scenes even figured in Christmas cards sent by members of the Royal Family. Queen Mary received one in 1934 from our present Queen, then only eight years old. Dedicated "To Granny from Lilibet," it was hand-coloured with crayons by the young Princess and showed an old-time coachman holding the reins and a whip covered in brightly-coloured ribbons. Be-

side him sat a gay young girl in cape and bonnet, holding a box of presents in her hands.

But, although we may picture our ancestors coaching off to participate in Christmas festivities, in fact most of the jollities date back no further than the early years of Queen Victoria's time, when most of the coaches had been forced off the roads through the advent of railways. And before the railways came the majority of the people never travelled anywhere, simply because it was too expensive.

As railways were no longer a novelty, designers started to use the steam engine to signify Christmas greetings, and other forms of transport, such as bicycles, began to make their appearance on Christmas cards.

A typical example showed a boy, representing the New Year, riding a steam engine with a Christmas tree loaded with presents and decorations. Surrounding this were hampers of toys, gifts, and even bottles of champagne.

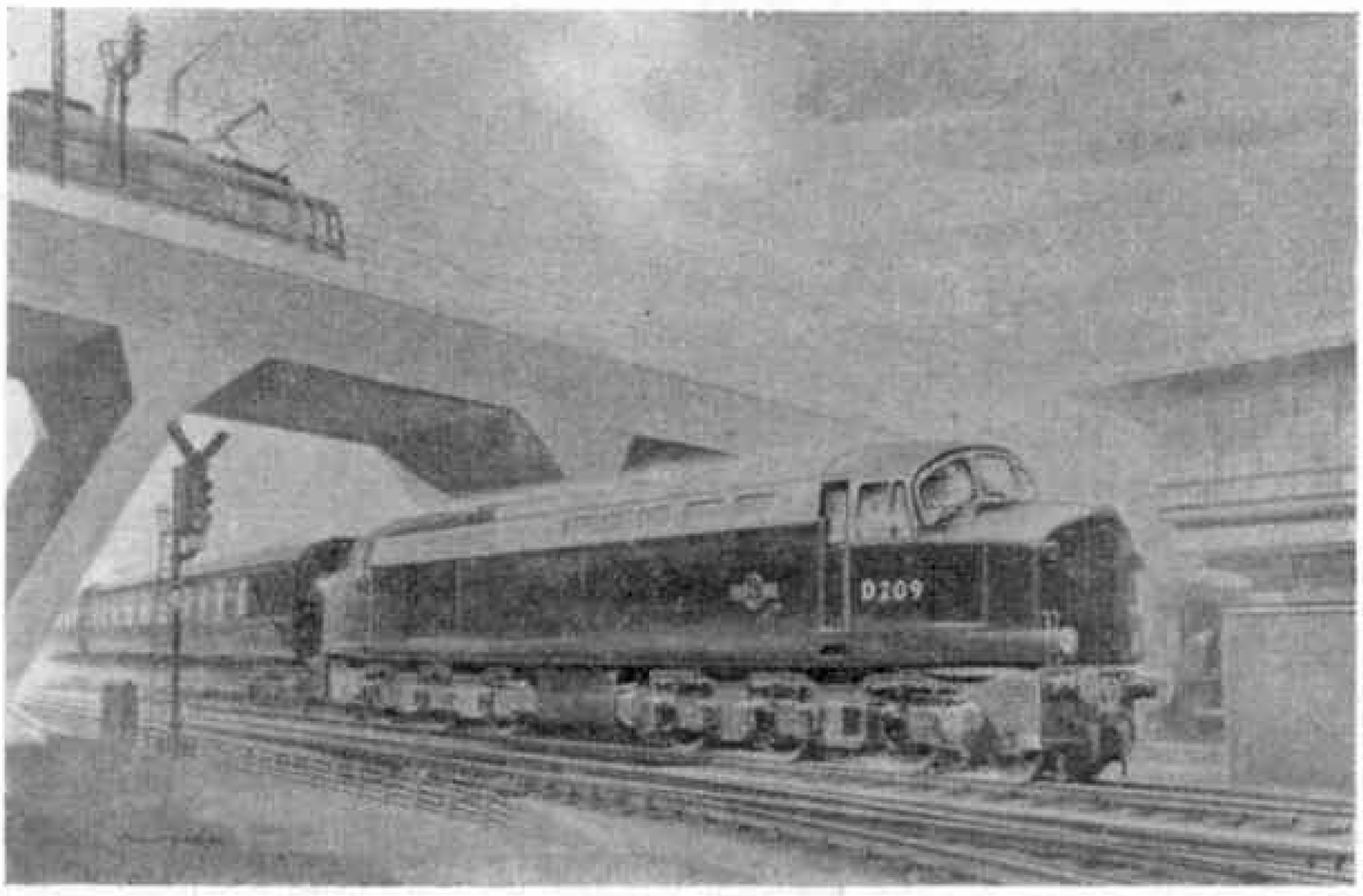
Another railway-type Christmas card appeared in the 1870's. This in addition to the popular boy on a locomotive, carried the message, "With lots of good cheer, and plenty of toys, for both girls and boys." A railway scene, too, formed the theme of a card sent to Queen Mary in 1912 by the Duchess of Connaught when she was in Ottawa.

The "new monstrosity from France," the "auto-car", the "automobile," or, as it was finally called, "the motor," joined the ranks of regular transport in the 1890's and provided a new motif for Christmas card decoration. After the initial distrust and malice had been overcome, the motor, complete with chain-driven rear axle, gear box, countershaft, alarm bell and a maximum speed of 12 m.p.h. began to oust other motifs.

Scattered milk churns

In 1897, the first year when the red flag was no longer compulsory on the Queen's highways, Sir Frank Lockwood sketched a car as his personal Christmas card. An "ultra-modern" design showing a motor car travelling at full speed was chosen by the celebrated painter, Professor Herkomer, in 1903 to mark the replacement of the 12 m.p.h. speed limit by one of 20 m.p.h., while the message, "Merrily speed the hours" accompanied a print of a contemporary touring vehicle on another card of that era.

A moving comment on the advent of the motor car appeared as a Christmas card in 1909. It showed a pleasant seaside resort with a racing car of the day controlled by two helmeted and padded drivers. In contrast, horses and riders, as well as sailing boats, provided the background. Illustrating the quiet harmony which the car interrupted, a terrified horse was shown with its milkmaid driver flung off balance and milk churns scattered as the cart was about to overturn—a scene only too common on the roads (*Continued on page 587*)



Top right: The Transport Ferry Service card referred to in the article and (below) the greetings card "The Shape of Things to Come?"

The Canadair Forty Four

Swing-Tail Transport

By
John W. R. Taylor

AS you can see in the illustration at the top of this page the entire tail of the latest version of the Canadair Forty Four transport is hinged, so that it can swing to one side. This enables bulky freight and vehicles to be loaded quickly and easily into the rear of the cabin.

Some engineers said the swing-tail idea would not work when they first heard of it. Earlier, they had said the same thing about the engines of the Caravelle airliner, which are mounted on the sides of the rear fuselage. Now, rear-mounted engines are becoming almost the rule on jet airliners, and we can expect the swing-tail to prove equally popular.

Most important is that it does not create a lot of extra drag, and so cut down performance, like the more usual twin tail-booms or sharply upswept tail with built-in loading ramp. In fact, the CL–44D4 version of the Forty Four will cruise at 394 m.p.h. and will carry its full payload of nearly 30 tons for 3,050 miles.

The Forty Four is a completely redesigned development of the Bristol Britannia airliner, powered by four 5,730 h.p. Rolls-Royce Tyne turboprops. The R.C.A.F. is having twelve of the original CL–44 version without a swing-tail. Seventeen CL–44D4's have been ordered by the Flying Tiger Line, Seaboard & Western Airlines and Slick Airways, America's three leading air freight carriers.

Named and ordered

Two of Britain's outstanding new aeroplanes were given names a few weeks ago. The Blackburn NA.39 naval strike aircraft, designed to sneak in "under the radar" at around the speed of sound, carrying atomic weapons, is now the Buccaneer. The de Havilland three-jet D.H. 121 airliner, of which 24 are being built for B.E.A., is to be the Trident.

AIR NEWS

Good news, announced at about the same time, is that orders are at last beginning to come in for Handley Page's splendid little Herald 48/56-seat turboprop airliner. Jersey Airlines are to operate six on services between the Channel Islands, Paris and destinations in the U.K., and even bigger contracts are expected from South American operators. The R.A.F. has increased its order for the Armstrong Whitworth Argosy transport from 40 to 56 aircraft and another seven are expected to be bought by Riddle Airlines, in America. R.A.F. Transport Command is also to get five Comet 4C jetliners, while the Army has placed a big order for the P.531/2 Mk.1 helicopter built by the Saunders-Roe Division of Westland.

The P.531/2 Mk.1 is one of the most useful small helicopters in the world. It carries five or six people and is powered by an 885 h.p. Blackburn Nimbus shaft-turbine, derated to 650 h.p. This derating enables

the helicopter to maintain its full sea-level performance even at high altitudes and in hot climates. As an air ambulance, it will carry two standard Army stretchers across the rear of the cabin.

Bell helicopter is A1

Through the years, each new type of aircraft ordered for service with the Royal Australian Air Force has been allocated a number prefixed with the letter "A". The earliest serial number still in use is A13, which refers to the Link Trainer. There is then a big jump to A65, the Douglas Dakota transport.

For the past year many people have been wondering what aeroplane would become the hundredth type used by the R.A.A.F., and whether it would be followed by A101 or a return to A1. Both questions have now been answered.

The "race" to be A100 has been won by the de Havilland (Canada) Otter, two of which have been bought by the Department of Supply for use at the Weapons Research Establishment, Woomera. Contrary to expectations, the R.A.A.F.'s new supersonic fighter, still to be chosen, will not be the A1, as this designation has been given to the Bell 47G–2 helicopter. One of the reasons for reverting to No. 1 was that there is insufficient room on the tail of this little machine to paint on a three-figure number.

Flew with wings folded

According to the U.S. Navy, one of its pilots took off from Naples in an F8U Crusader jet fighter on August 2, climbed to 5,000 feet, flew around for 24 minutes and then made a smooth landing back at his base with the aircraft's wings folded up carrier-deck fashion

It seems the pilot failed to notice that the outer 6 ft. 7 in. of each wing was pointing skywards until he was well on his way and discovered that a considerable amount of "forward stick" was needed to control the aircraft. He then decided that, as he was up safely, he might just as well find out how the Crusader handled in this form. Careful not to let his speed build up beyond 200 m.p.h., he cruised around gently, before dumping his fuel and coming down.

This was not the first occasion on which a naval aircraft took off with its wings folded. Soon after the war, a Douglas Skyraider did the same thing at the naval air station at Charleston, Rhode Island, U.S.A. The pilot was able to get his aeroplane 250 feet into the air, literally hanging on its four-blade propeller, before it stalled and crashed.

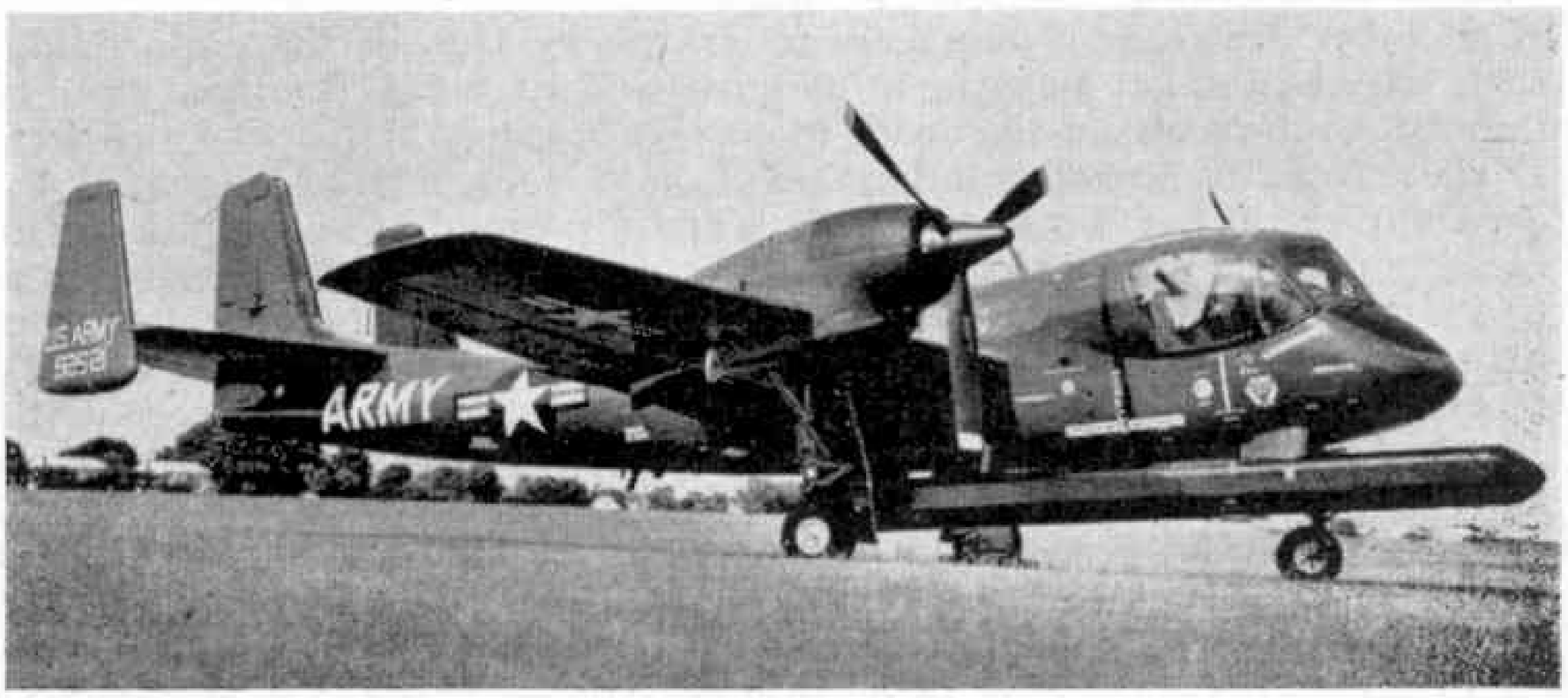
Record parachute drop in Kenya

Herds of wildebeest scattered in alarm when Army and R.A.F. men made 300 parachute jumps on to a 6,000 ft. plateau in Kenya, during summer. It was the first time a drop of this size had been made at such a high spot, and the combination of altitude and hot climate had the effect of accelerating the parachutists' rate of descent by 2–3 feet a second.

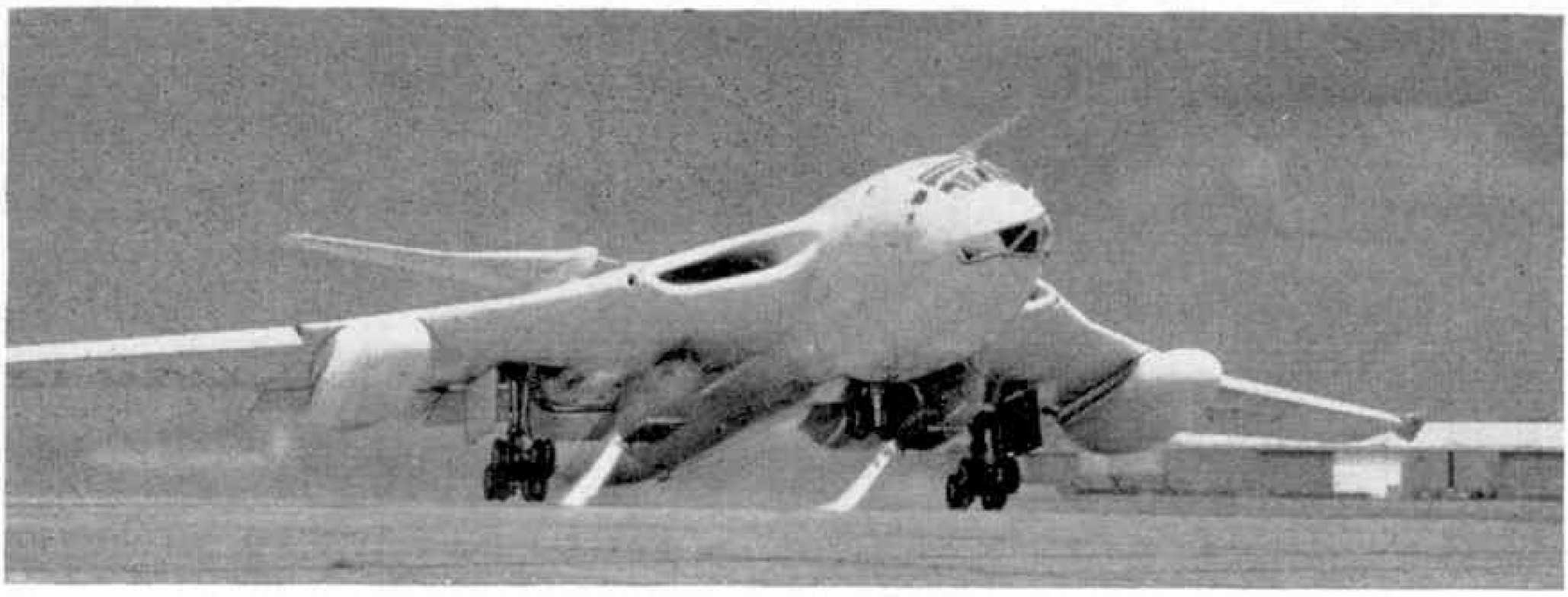
The jumps were made from Beverley transports of No. 30 Squadron, flying at a height of 1,000 feet over the plateau. To add to the excitement, the drop zone was ringed by hundreds of garishly-dressed Masai warriors, who left a forest of spears stuck in the ground at a safe distance and grinned delightedly as they watched the twentieth century fighting men plummeting down towards them.

Map-making Mohawk

The torpedo-like object slung under the fuselage of the Grumman Mohawk two-seat observation aircraft in the picture below is a SLAR (side-looking airborne radar) installation, which provides a permanent radar map of the terrain on each side of the aircraft's flight path. It takes its photographs on either 4 × 5 in. cut film or 70 mm. film strip, and includes an in-flight processor so



The Grumman Mohawk two-seater aircraft showing the SLARequipment.



that the observer can inspect developed photographs within seconds after the film has been exposed.

In addition to SLAR gear, the Mohawk carries normal cameras for battlefield reconnaissance work and promises to be an extremely valuable addition to the U.S. Army's air arm. Two 1,005 h.p. Lycoming T53–L–3 turboprops give it a top speed of 322 m.p.h. and it has a range of over 1,400 miles. The first of nine prototypes flew on April 14, 1959, and a total of 77 production AO–1 Mohawks are now being built for the Army. The type may also be used by the U.S. Navy.

Above: Thousands of pounds of thrust blast a Victor off the ground. Two Spectre rockets add their contribution to the aircraft's own power. Below: A Boulton Paul model of the high-speed airliner of the future.

Rockets for V-Bombers

One of the most spectacular events of this year's S.B.A.C. Flying Display at Farnborough was the "scramble" by R.A.F. V-Bombers. Each day, four Valiants, Victors or Vulcans from a different squadron of Bomber Command managed to start their engines and get airborne in under two minutes from receiving the order to go.

There could be no better indication of the capabilities of our bomber force, which could get off the ground and be on its way to a target with nuclear weapons long before a rocket fired from the target area could reach its airfields. No less important is Bomber Command's ability to disperse its squadrons to airfields all over the world.

Few runways are too short for use by even the huge Victor and Vulcan, especially when their take-off is assisted by de Havilland Spectre rocket packs of the kind shown under the wings of the Victor illustrated on this page. Under the combined thrust of its four mighty turbojets and two 8,000 lb. thrust Spectres, this particular Victor left the ground in only 550 yards.

Airliner of the future

One of the pictures above show a model of what Boulton Paul believe the short-range high-speed airliner of the future may look like. Designated P.146, this aircraft would be able to take off and land vertically and carry 96 passengers up to 500 miles.

Its vertical take-off capability results from the use of four banks of small lifting engines at the tips of its wings and foreplanes. The thrust of each bank of jets would be varied to provide control during take-off and landing. In forward flight, the lifting engines would be enclosed within their pods by hinged doors.

Britannia No. 70009 "Alfred the Great" hurries through rural Essex with a Yarmouth-Liverpool Street express. Photograph by R. F. Roberts.

Spotlight on the Great Eastern Line

By
R. A. H. Weight

NEARLY 100 years ago the Great Eastern Railway was constituted by the amalgamation of the Eastern Counties Railway with smaller country lines that had begun operations some 20 years sooner. In 1874 Liverpool Street terminus was opened, later to be enlarged to accommodate eighteen platforms and become by far the biggest station within the City area of London. In recent years, with its huge suburban passenger traffic, it has had to handle on average well over 100 passengers a minute with three train movements every four minutes and, at busy times, the arrival of as many as 60 trains in one hour.

From the Southend-on-Sea–Shenfield–Chelmsford–Ilford directions overhead electric traction is now employed and the services are exceedingly speedy. Preparations are well advanced toward the early electrification of part of the Cambridge main line as far as Bishop's Stortford, including the Churchbury loop on the northern outskirts of London, and the Broxbourne–Hertford branch.

Included in the scheme similarly are the shorter, densely-populated Chingford and Enfield (Town) branches. Over these routes in 1919–1920 the G.E.R. instituted "the most intensive steam-operated train service in the world"—trains on each track every two and a half minutes, with a seating capacity around 20,000 an hour! Trains were also frequent from early morning until after midnight, with a few all-night trains on the Chingford line as well, and so matters still continue. Each route is about ten miles long.

Some of my early boyhood memories are of the Chingford line. This was prior to the stepping-up period mentioned, but the line was very busy morning and evening and the long local trains formed of close-coupled 1st, 2nd and 3rd-class four-wheeled sets of 14–17 vehicles were far from luxurious. The engines worked hard and made their numerous very rapid stops with the aid of Westinghouse air brakes. They were of the diminutive 0–6–0 type, more recently classed J69 etc. and nicknamed "Bucks" because, when starting with the regulator pushed sharply right over, they seemed to make a visible jump or leap as they accelerated quickly away! There were also 2–4–2 and 0–4–4T locomotives. Now, as long as required, the G.E.–L.N.E.R. N7 0–6–2Ts of considerably greater power continue to maintain the services, as they have for a good many years, hauling articulated bogie coaches, 2nd class only. But electrics will soon be superseding them.

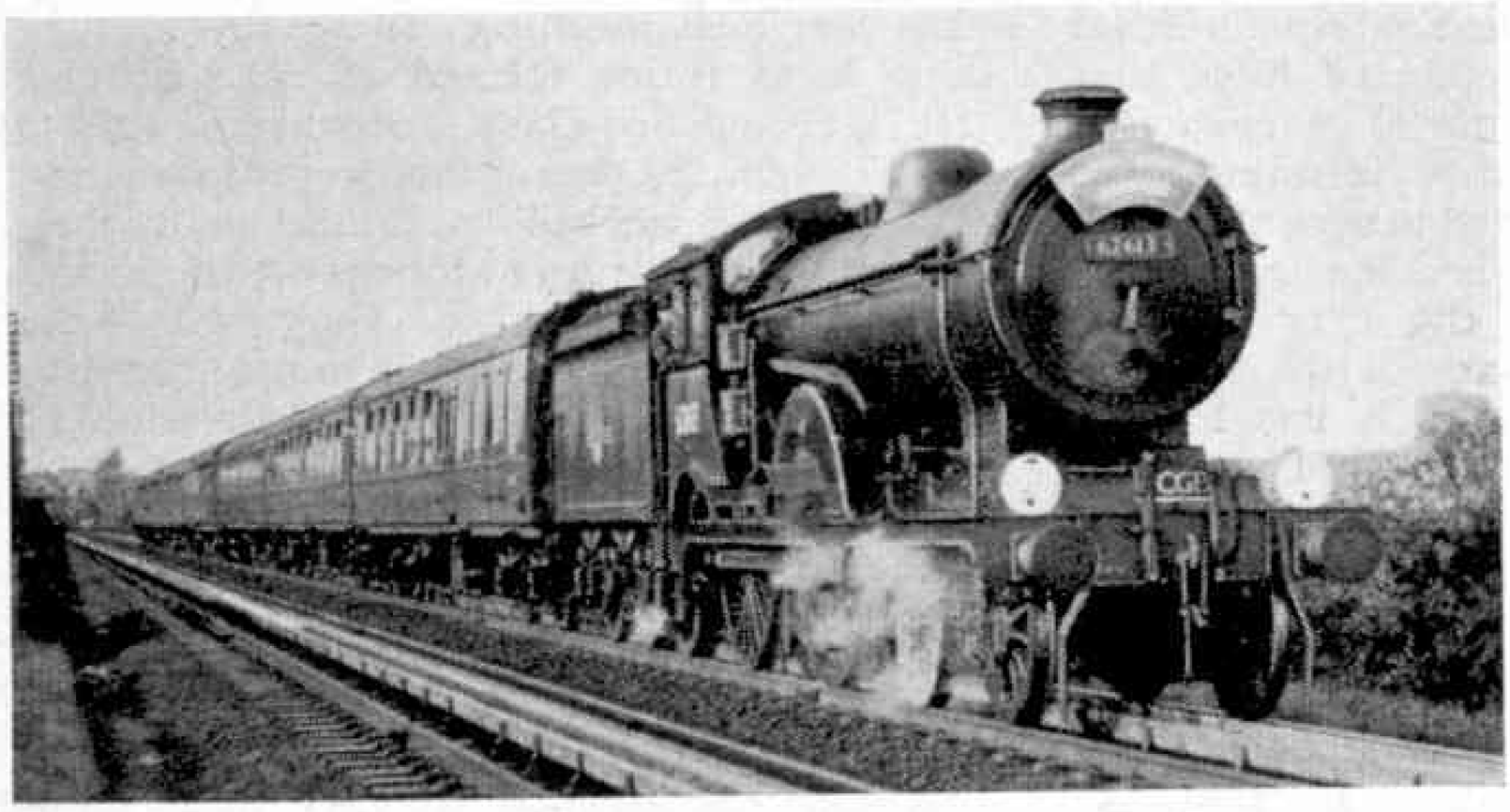
Livery changes

In 1923 the G.E.R. was merged into the L.N.E.R. Group, and, in 1948, into the Eastern Region of British Railways. Since 1957—and possessing a considerable degree of independent administration—it has been known as the Great Eastern Line. The old G.E.R. had royal blue engines, with plenty of red paint and brasswork. Then later they

were black, or grey, but the L.N.E.R. and its successors have favoured green for principal types, and now more and more green diesel locomotives or multiple unit sets and electric sets are appearing. Two station pilot, stand-by, tank locomotives, often to be seen at Liverpool Street, Nos. 69614, N7, and 68619, J69, are resplendent in the old G.E.R. blue livery.

At the moment of writing one each only remains of the B12 4-6-0 and D16 4-4-0 classes of express locomotives, so long a mainstay of principal East Anglian services through Essex, Hertfordshire, Cambridgeshire, Suffolk and Norfolk, over many changing gradients. The former surviving B12, No. 61572, is the last inside-cylinder 4-6-0 in Britain, and probably in the world. The one D16, also rebuilt and modernised, belongs to the later "Super-Claud" series, the development of the "Claud Hamilton" design. The 3-cylinder B17 Sandringham 4-6-0s were the most powerful main line type introduced to G.E. metals by the L.N.E.R., but few of these remain, having been supplanted by the B.R. Britannia Pacifics and, to a greater extent since, by diesel-electric locomotives of the 2,000 h.p. D200 class, or the much more numerous Brush 1,365 h.p. and other type 2 examples.

The G.E. line as we see it today, lively and much improved, although still in the throes of further modernisation, serves by rail, almost alone, the whole of East Anglia by means of its London–Ipswich–Norwich main line carrying hourly express or principal-station trains, leading also via secondary or branch tracks to Clacton, Harwich Bury St. Edmunds, the East Suffolk–Lowestoft–Yarmouth area, Cromer, etc. Over the Bishop's Stortford–Cambridge trunk route it goes to Ely, March, King's Lynn and Norwich via Thetford, and there are various connecting links within its area as well as with other systems in the Midlands. Regular-interval services are featured; and there are many country or inter-town journeys, and important freight, Continental passenger and train-ferry merchandise services, too.



Engines of characteristic Great Eastern outline appear in these two pictures. In the upper one, by R. F. Roberts, is a N7 0-6-2T No. 69665. In the lower view, Super-Claud No. 62613 is shown on a special organised by the Locomotive Club of Great Britain. Photograph by H. N. James.

During 1959, the G.E. line was the first to introduce for regular operation a 25,000 volts A.C. 50-cycle overhead electric installation between Colchester and Clacton-on-Sea, and Walton-on-Naze, soon to be extended, or substituted for a number of E.R. train services, and to be standard for the L.M.R. main line electrification now in hand.

I travelled last autumn from Clacton to Colchester in one of the new trains. It rolled a bit, attained 60 m.p.h. between stops but was most comfortable. Its bright

lights contrasted strongly with some oil-lit intermediate stations. At the moment there is a gap of 22 miles along the main line towards London between this (branch) electrified section and the outer end of the suburban system at Chelmsford.

As the G.E. Line serves so many large and small coast resorts, from Essex right round Norfolk to Cromer and Hunstanton, etc., its main line and provincial services are vastly increased and altered on summer Saturdays to cater for the volume of outward or return holiday passengers. I watched some four hours of peak working in August 1959, at Colchester, 51¾ miles from Liverpool Street, where there is a speed restriction for the station rebuilding and improvement scheme. Numerous Clacton and Walton steam or diesel-hauled London trains diverge at present over a flat junction to the north-east, the signalmen having an arduous task. In fact, I saw 25 either-way Clacton line trains, six more than shown in the public timetable, sixteen being scheduled non-stop or with one stop to and from Liverpool Street. There were twelve others northbound to Norwich, Yarmouth, Harwich, etc., and things were similarly busy in the opposite direction. Some trains stopped at Colchester, some did not; few were seriously late or delayed.

Type 4 diesel-electric locomotive No. D204 descending Brentwood bank with an up express from Norwich. Steam, diesel and electric trains traverse this stretch of main line, the overhead wire supporting structures being clearly shown. Photograph by S. Creer.

Some cross-country trains and engine-changing operations were observed and there were diesel sets and Clacton electrics to and from their bay platform. Locomotives included thirteen different type-2 diesels; and three of type 4. Steam locomotives included six Britannia Pacifics; thirteen B1 and ten B17 4–6–0s; with nine K3 2–6–0s. Today, there are considerably more type 2 diesels; and the B17 "Sandringhams" have, alas, disappeared, after giving invaluable service for many years.

East Anglia is highly popular with Midlands and Northern folk for holidays and it is another vast business to carry them, largely at week-ends, in through trains from, for example, Birmingham and Leicester, L.M.R., Manchester, Sheffield, Doncaster and other centres by E.R. routes, with Yarmouth as one of the main destinations; and then to bring them back again. Since the closure of the alternative M. & G. N. Joint route by way of S. Lynn–Melton Constable, all such trains, as well as regular and local ones, converge on the focal junctions at March, and all but a few holiday ones between Peterborough and Hunstanton, traversing part of the west-end triangle, are routed through March, whether stopping or not.

Eastbound, one group comes by various routes off the L.M.R. through Peterborough East, passing beneath the East Coast main line and, in some cases on the level outside the North (G.N. Line) station. On a Birmingham–Clacton train I used locally, the L.M.R. class 5 4–6–0 went through to Ely; in two other instances I observed that similar engines were replaced outside March station by K3 2–6–0s. Locomotive changes also took place just before reaching the station on trains from the north or north-west approaching from the Spalding–Lincoln direction, hauled to that point by V2 and B1 etc. engines.

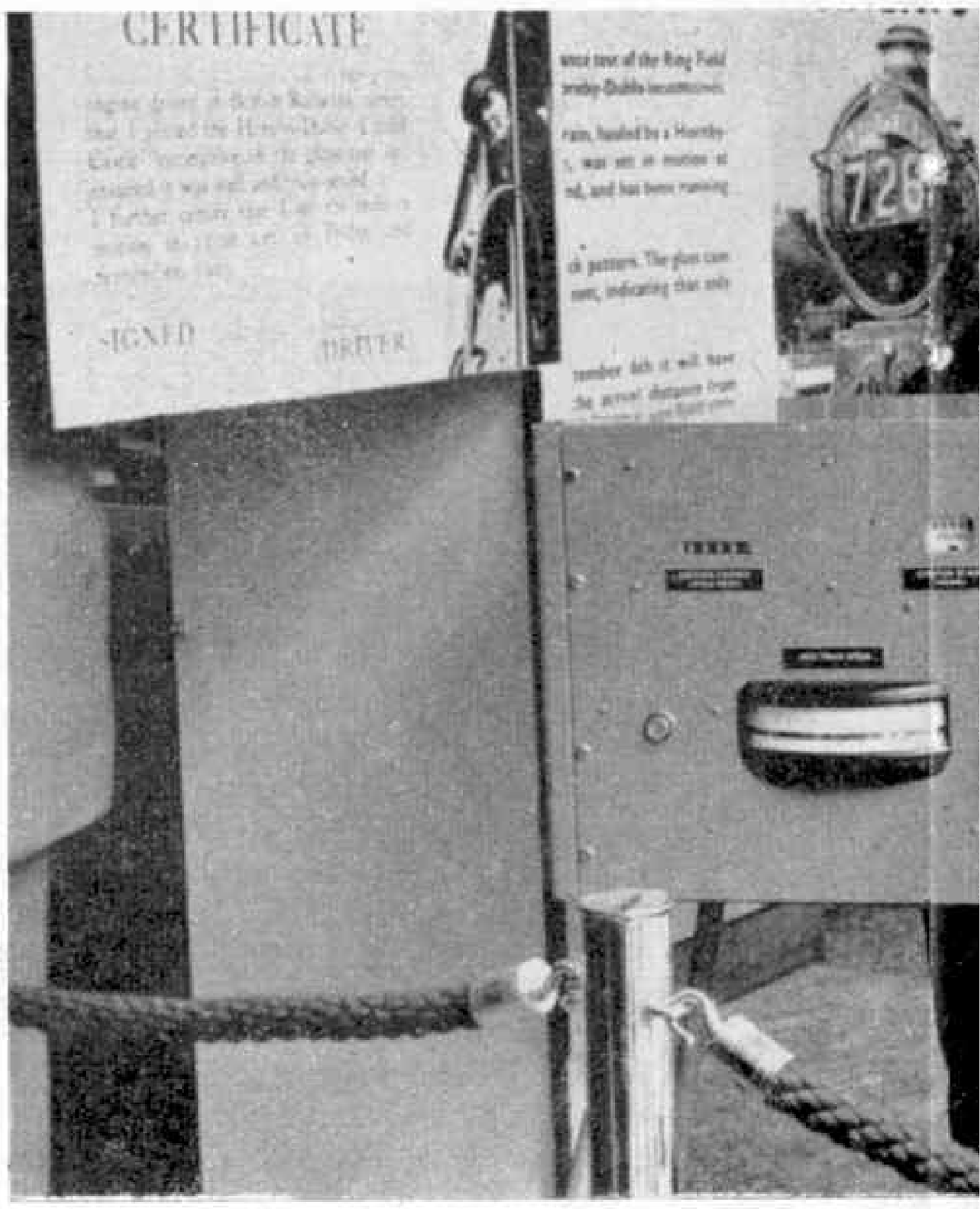
The locomotive depot is near the triangle lines to the west, while not far away northward is Whitemoor Marshalling Yard. I visited this nearly 30 years ago when it was a recently-opened "Wonder of the Age", with its first British mechanically and electrically operated hump, retarders and other safer, quicker aids to shunting and reforming freight (*Continued on page 587*)

Hornby-Dublo "Castle's"

TRAVELS 153 ACTUAL MILES IN FOUR DAYS

THE Hornby-Dublo Electric Locomotive fitted with the new Ring Field Motor, which formed the subject of the Editorial in last month's *Meccano Magazine*, has come through its endurance test in magnificent fashion.

You will doubtless remember that the locomotive, a Castle Class engine, travelling on a sealed layout in the Meccano Showrooms in Berkeley Square, London, was asked to haul six standard Corridor Coaches of the type regularly included in Hornby-Dublo Train Sets over a distance which, in actual mileage, is equal to that between London (Paddington) and Cardiff —just over 145 miles.



This picture was taken in the Lon

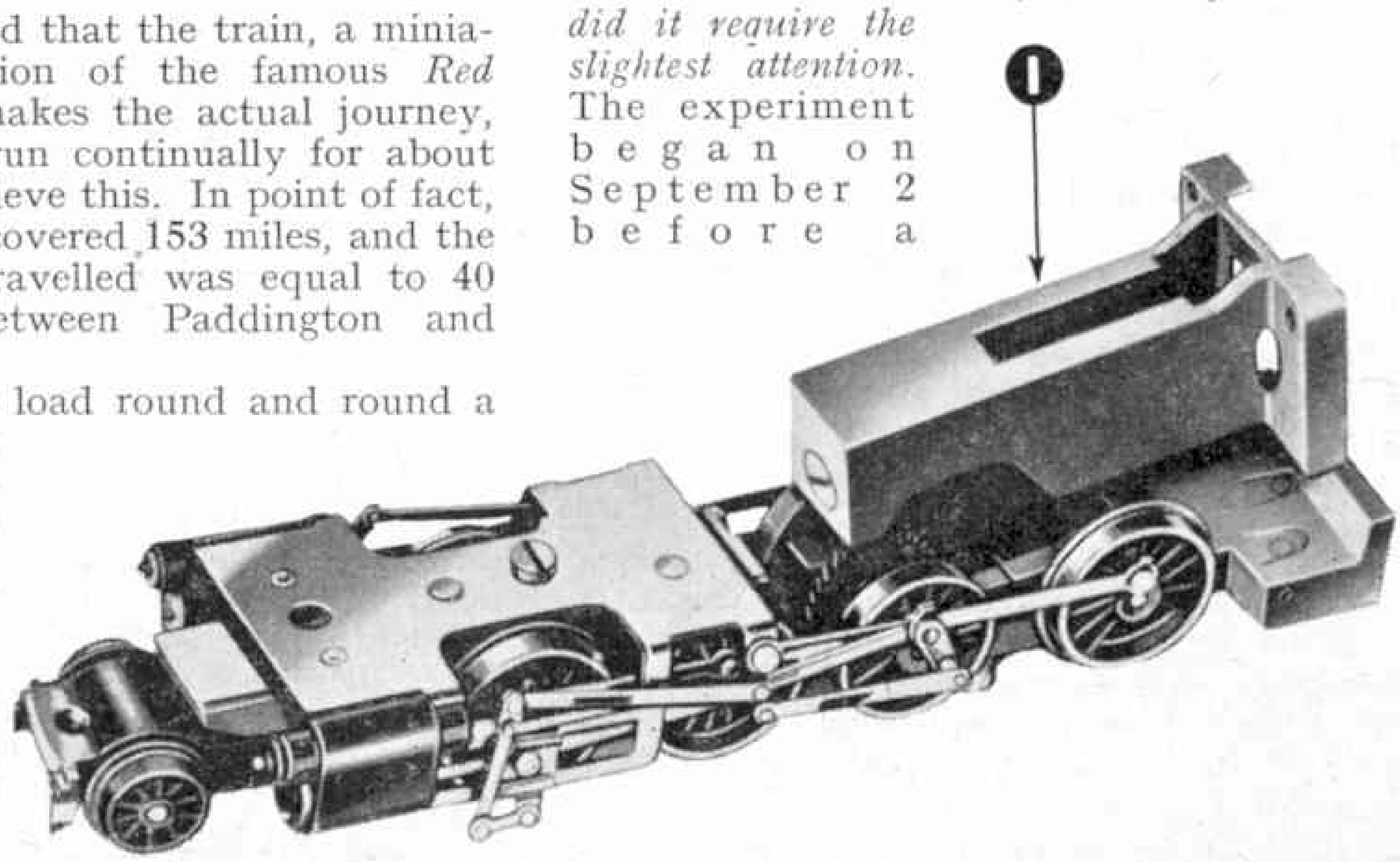
HORNBY RAILWAY COMPANY

By the Secretary

It was expected that the train, a miniature representation of the famous *Red Dragon* which makes the actual journey, would have to run continually for about 100 hours to achieve this. In point of fact, this locomotive covered 153 miles, and the scale distance travelled was equal to 40 return trips between Paddington and Cardiff.

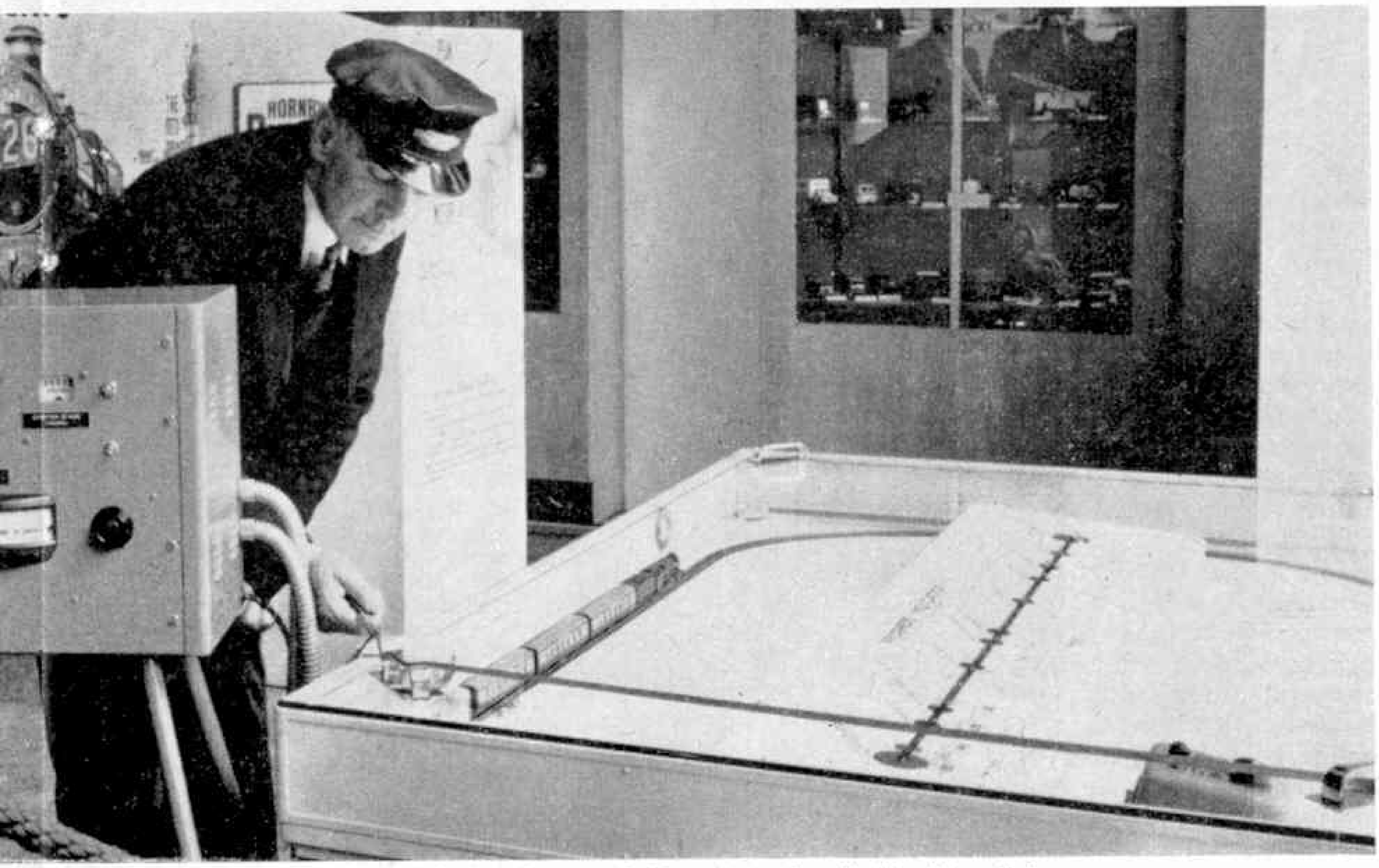
In hauling its load round and round a 6 ft. × 4 ft. test board, the Locomotive—*Cardiff Castle* — did, in fact, make 46,000 circuits and the average scale speed over the entire run was 123·9 miles an hour.

In the whole of this four-day marathon of non-stop running the Ring Field Motor, which is to be fitted to several Hornby-Dublo Locomotives this season, did not falter nor did it require the slightest attention. The experiment began on September 2 before a



The Ring Field Motor: a view of the chassis. Details of parts are listed on the opposite page.

's" Fine Endurance Run



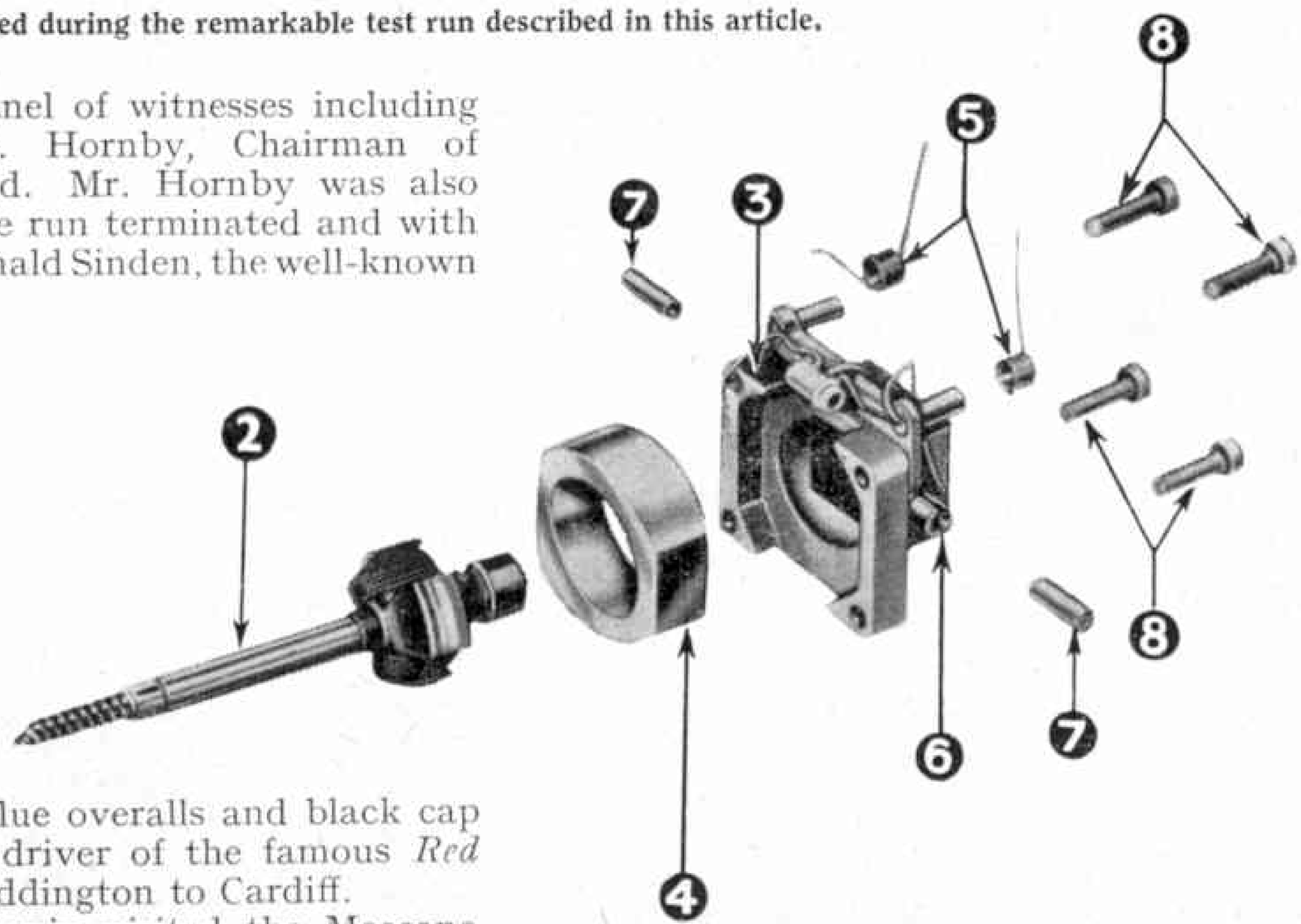
the London Office of Meccano Limited during the remarkable test run described in this article.

distinguished panel of witnesses including Mr. Roland G. Hornby, Chairman of Meccano Limited. Mr. Hornby was also present when the run terminated and with him were Mr. Donald Sinden, the well-known screen actor, and one of his two sons.

The train was set in motion at 11 a.m. by Driver John Gale of Acton, London, who was dressed in the blue overalls and black cap he wore as the driver of the famous *Red Dragon* from Paddington to Cardiff.

Driver Gale again visited the Meccano Showrooms on September 6 and, precisely at 11 a.m., brought the model to a halt.

When he was told that the Hornby-Dublo engine had, in scale terms, covered 11,600 miles Driver Gale, who had driven the Royal Train and many famous expresses,



KEY TO PARTS:

1. Main casting
2. Armature and shaft
3. Commutator housing
4. Ring Field magnet
5. Brush springs
6. Brush holder
7. Brushes
8. Securing screws

said it was the first time a locomotive under his charge had ever covered such a vast mileage non-stop!

For the purpose of the actual test the board on which the train ran was enclosed by a sheet glass cover capable of being sealed, the seals being affixed and broken by Driver Gale.

It was necessary, of course, to record accurately the total hours run, the total scale miles covered, and the average track speed at any moment. This was done by instruments housed in a separate control panel which also contained various interlocking relays. All these instruments relied for their working on the locomotive itself operating suitably-disposed relays by direct track switching. In other words, the locomotive was responsible for all the information fed back to the control panel. Mileage covered was shown very clearly on a large illuminated chart which represented the run from Paddington to Cardiff and on which some 20 intermediate stations were clearly marked.

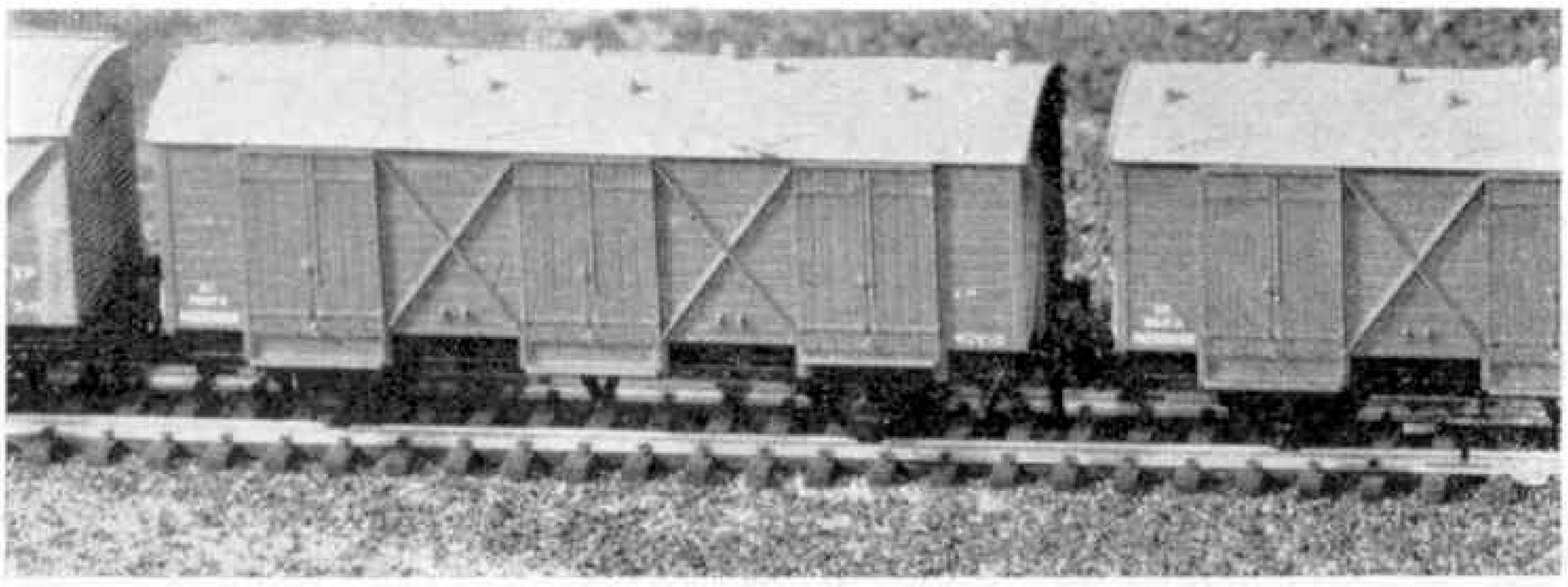
Mr. Roland G. Hornby, Chairman of Meccano Limited, is seen in this photograph with Mr. Donald Sinden, the film star, and his son. Also in the photograph is Mr. R. C. Wyborn, Chief Electrical Engineer, Meccano Limited, Liverpool.

The motor described

Meccano Magazine readers will, of course, be interested in the details of the Ring Field Motor. One of its virtues is that it is robust and simple in construction. The body castings are diecast to precision limits and they provide an accurate location for the motor in the main chassis casting by means of dowels, the motor being held in position by a single screw. The forward bearing is adjustable to control accurately the end float on the armature shaft. End thrust on the latter is received by precision steel balls which are housed in oil-retaining bronze bearings. The Ring Field magnet itself is precision ground on all faces to give accurate alignment and to maintain constant air gap.

Two-Start Worm

A two-start worm is machined as an integral part of the armature shaft and engages with a manganese bronze worm gear. The brush gear is of a special form to provide constant pressure throughout the life of the brushes and to accurately locate the brushes relative to the commutator to afford perfect commutation at all speeds. Current is conveyed to the brushes independently of the brush springs, and brush life, under normal running conditions, should exceed 200 hours.



A close up view of the new Hornby-Dublo Passenger Fruit Van.

DINKY TOYS NEWS

By THE TOYMAN

Petrol Station To Enhance Your Layout

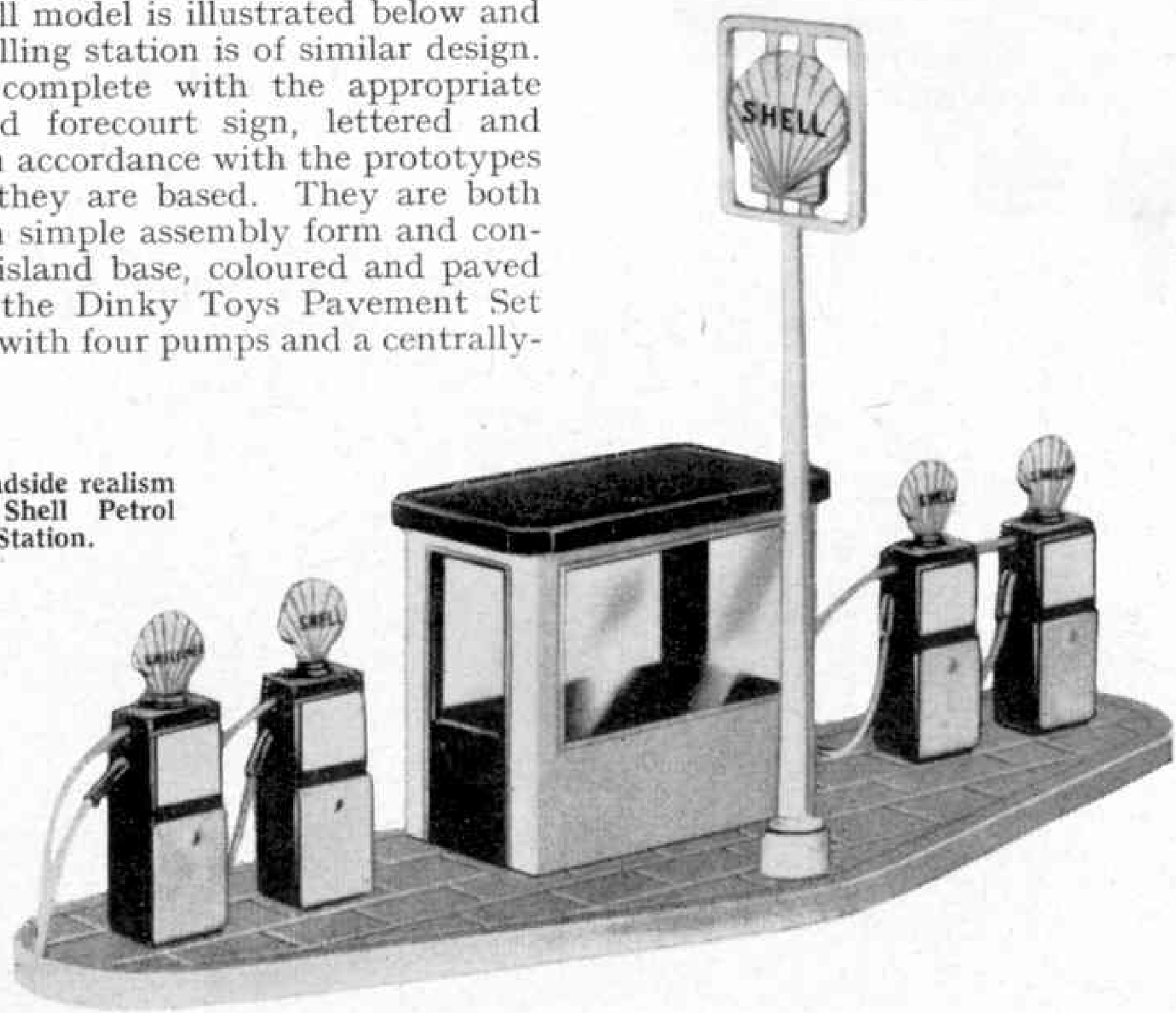
AND A FINE NEW AIRCRAFT MODEL

WHEN, some months ago, the range of accessories for use with Dinky Toys layouts began to expand, the arrival of each new item was greeted with great enthusiasm by our collectors. There was the neat and colourful Road Hoarding; then came the Single and Double Arm Lamp Standards, the Service Station and the pleasing green and yellow Tyre Rack. Now, two more attractive models appear in this section of the Dinky Toys range. They are Shell and B.P. Petrol Pump Stations and both are beautifully designed in the modern manner.

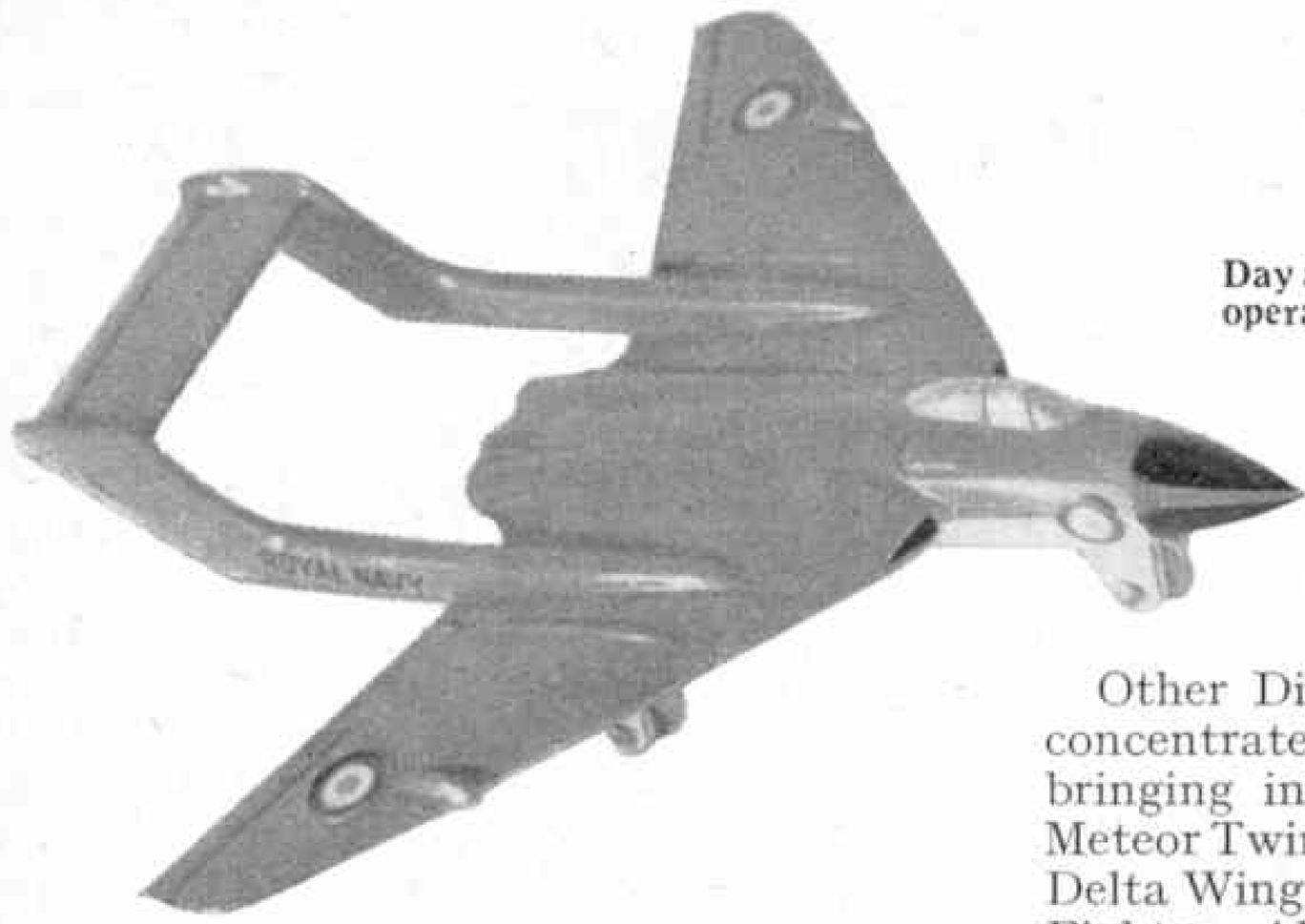
The Shell model is illustrated below and the B.P. filling station is of similar design. Both are complete with the appropriate pumps and forecourt sign, lettered and coloured in accordance with the prototypes on which they are based. They are both supplied in simple assembly form and consist of an island base, coloured and paved to match the Dinky Toys Pavement Set (No. 754), with four pumps and a centrally-mounted pay box or office which is fitted with windows. The base, pay-box and forecourt sign are moulded; the pumps are of metal and are interchangeable, being hollowed at the base to fit over small locating projections on the island pavement. In the case of the Shell filling station, the pumps are labelled Shell and Shell-Mex (two of each kind) and the B.P. station has B.P. Super and B.P. Super Plus pumps. Both are priced 7s. 6d. and their numbers in the Dinky Toys list are: Petrol Pump Station Shell, No. 782; Petrol Pump Station B.P., No. 783.

For those who like their Dinky Toys displays to look as close to actuality as possible, these two filling stations will be a great aid to realism.

While the modelling of what might be described as road layouts pure and simple appeals to a number of our collectors, there



An aid to roadside realism —the new Shell Petrol Pump Station.



Day and night fighter for carrier-based operations—the de Havilland Sea Vixen.

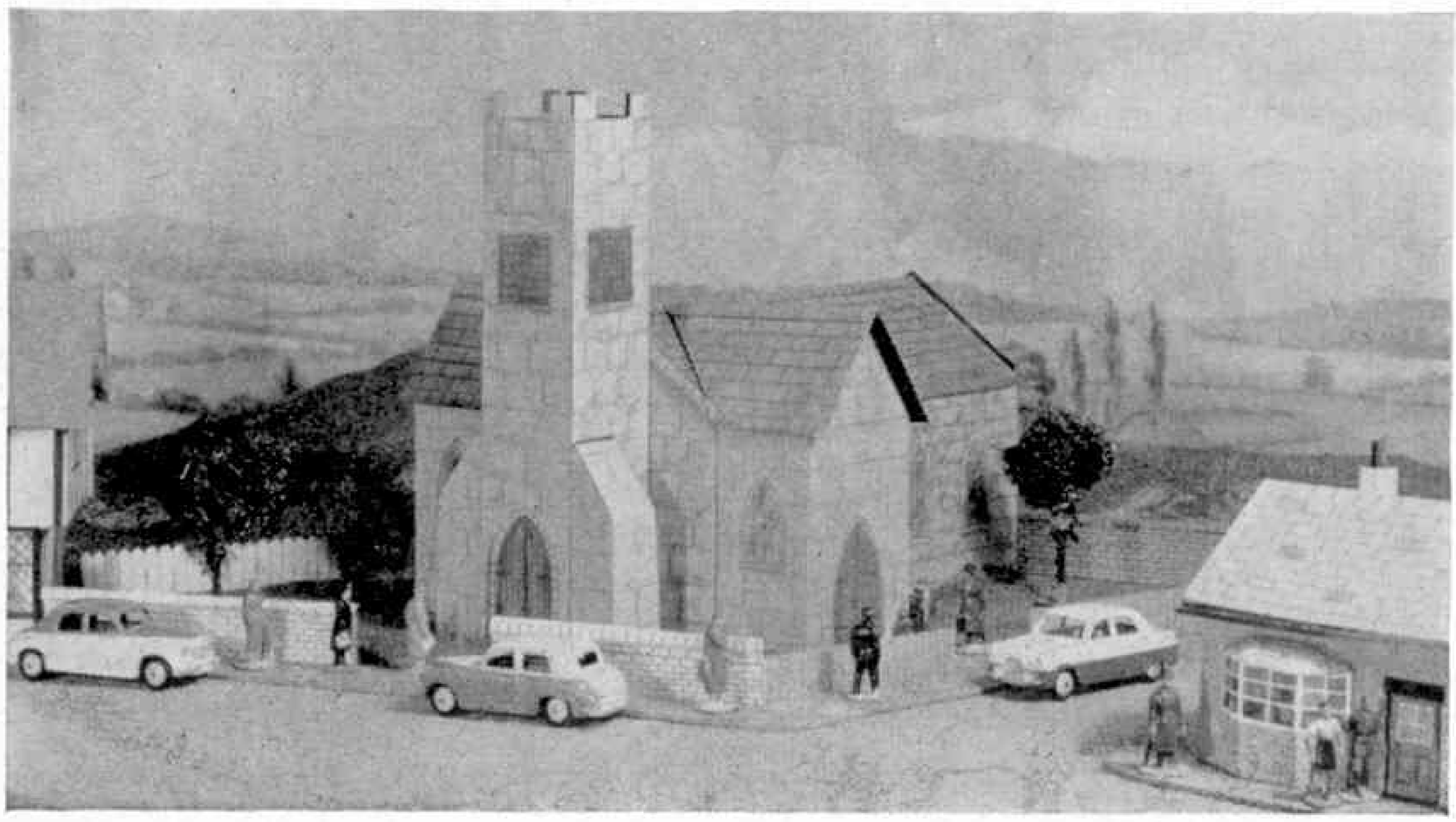
are none the less many others who like to take a wider field for their activities, and who plan their layouts to work in with Hornby Clockwork and Dublo-Electric Trains, and to include such items as docks, railway termini and airfields. I am quite sure that in this country and overseas there are many homes where, even as I write these notes, sons (and fathers) are busily creating scenes where Dinky Toys No. 283, B.O.A.C. Coach, No. 282, Duple Roadmaster Coach and other popular passenger-carrying vehicles are depicted moving along busy roads to modern airports where models of the Vickers Viscount airliner, or the Bristol Britannia, are ready to take on board their complements of travellers on business trips or holiday flights.

Other Dinky Toys enthusiasts, I know, concentrate on building up military airfields, bringing into service such models as the Meteor Twin Jet Fighter, the Gloster Javelin Delta Wing aircraft and the P.1B Lightning Fighter. All such air-minded collectors will be particularly interested in Dinky Toys second release this month—a fine representation of the de Havilland 110 Sea Vixen, which is illustrated above.

The Sea Vixen is, as many of you may know, a carrier-based aircraft now in service with the Fleet Air Arm. Possessing a wing span of 50 feet, it is 53 ft. 6½ in. in length and is powered by two Rolls-Royce Avon engines that give it an operational capacity which previously was only possible in land-based machines. It is capable of carrying de Havilland "Firestreak" guided weapons and is used by the Royal Navy as a trans-sonic, two-seat, all-weather day and night jet fighter.

The Dinky Toys model of this magnificent 'plane is painted dark sea grey on top, with white undersection and black radome. It carries the words "Royal Navy" on each of the twin booms and has the usual roundels

"Sunday in a country village": an unusual study in which use has been made of Dinky Toys.



You might call this Chaos Corner. How many errors can you spot?

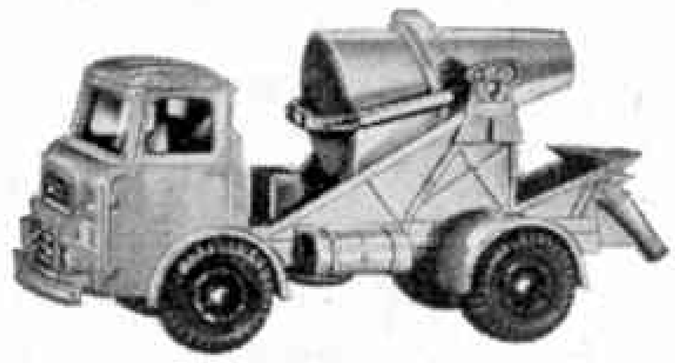
on the upper surface of the wings and on the fuselage just forward of the cockpit cover. Numbered 738 on the Dinky Toys list, the Sea Vixen costs 2s. 11d.

And now, since I know so many of you are interested in the scenes we present for you in these pages from month to month, I want you to study the photograph at the foot of page 568, which is based on the theme "Sunday in a country village." People from outlying areas, as well as churchgoers in the village, are attending Service and, as you see, there are a number of cars drawn up outside. Here, the constructor has made the scene very realistic by using some of the older models. He did this because brand-new cars are not likely to be seen in such a small community; it is much more likely that they would be older cars which had given sound and faithful service. This is not to say, of course, that country folk do not have new cars, but I think I agree with the creator of this scene that the cars he has used are probably more appropriate than newer models.

Finally, I draw your attention to the picture at the top of this page. Even a cursory glance will reveal that it is not exactly a normal scene; on closer inspection you will find it to be a mass of mistakes. These errors have, of course, been made deliberately to test your sense of observation, and the picture forms the subject of a competition in which all readers in this country may take part. What you have to do is to compile a list of all the mistakes you can find on this picture and post it to "The Toyman", Meccano Ltd., Binns Road, Liverpool 13 to reach here not later than November 30. A number of prizes will be given for the best entries and neatness and presentation will be taken into account in choosing the winners.

DINKY RHYMES

No. 960 Lorry-Mounted Cement Mixer



The barrel turns with gentle hum,
Now watch for the transition;
Cement and sand in time become
A concrete proposition,

Easy Model-Building

"Spanner's" Special Section for Juniors

Sand Yacht

The chassis frame of the Sand Yacht, which is shown in Fig. 1, is built up from two 5½″ Strips joined at one end by a Flat Trunnion 4 and at the other by two 2½″ Double Angle Strips 1 placed together. The lugs of one of the Double Angle Strips form the bearing for the front axle, which is a 3½″ Axle Rod carrying two 1″ Pulleys fitted with Tyres. Two Trunnions bolted to the other ends of the 5½″ Strips form the bearings for the other axle which is a 2″ Axle Rod held in place by Spring Clips and fitted with an 8-hole Bush Wheel.

The mast is a 5½″ Strip fixed by an Angle Bracket to a 2½″ Strip to one end of which is bolted a Fishplate held by bolt 2, the Fishplate in turn being bolted to one of the 5½″ Strips forming the frame. The other end of the 2½″ Strip is bolted to the second 5½″ Strip.

The sail is a piece of paper or cloth and is edged by a 2½″ Strip and a 5½″ Strip, which is connected to the Flat Trunnion at the rear by an Angle Bracket. Two Curved Stepped Strips are bolted to the extended 2½″ Strip as shown in the photograph.

A Flat Trunnion 3 is bolted through its apex hole to the Double Angle Strips at the front to form a small deck.

Parts required to build the Sand Yacht:- 4 of No. 2; 2 of No. 5; 1 of No. 10; 2 of No. 12; 1 of No. 16; 1 of No. 17; 2 of No. 22; 1 of No. 24; 2 of No. 35; 16 of No. 37a; 16 of No. 37b; 2 of No. 48a; 2 of No. 90a; 2 of No. 126; 2 of No. 126a.

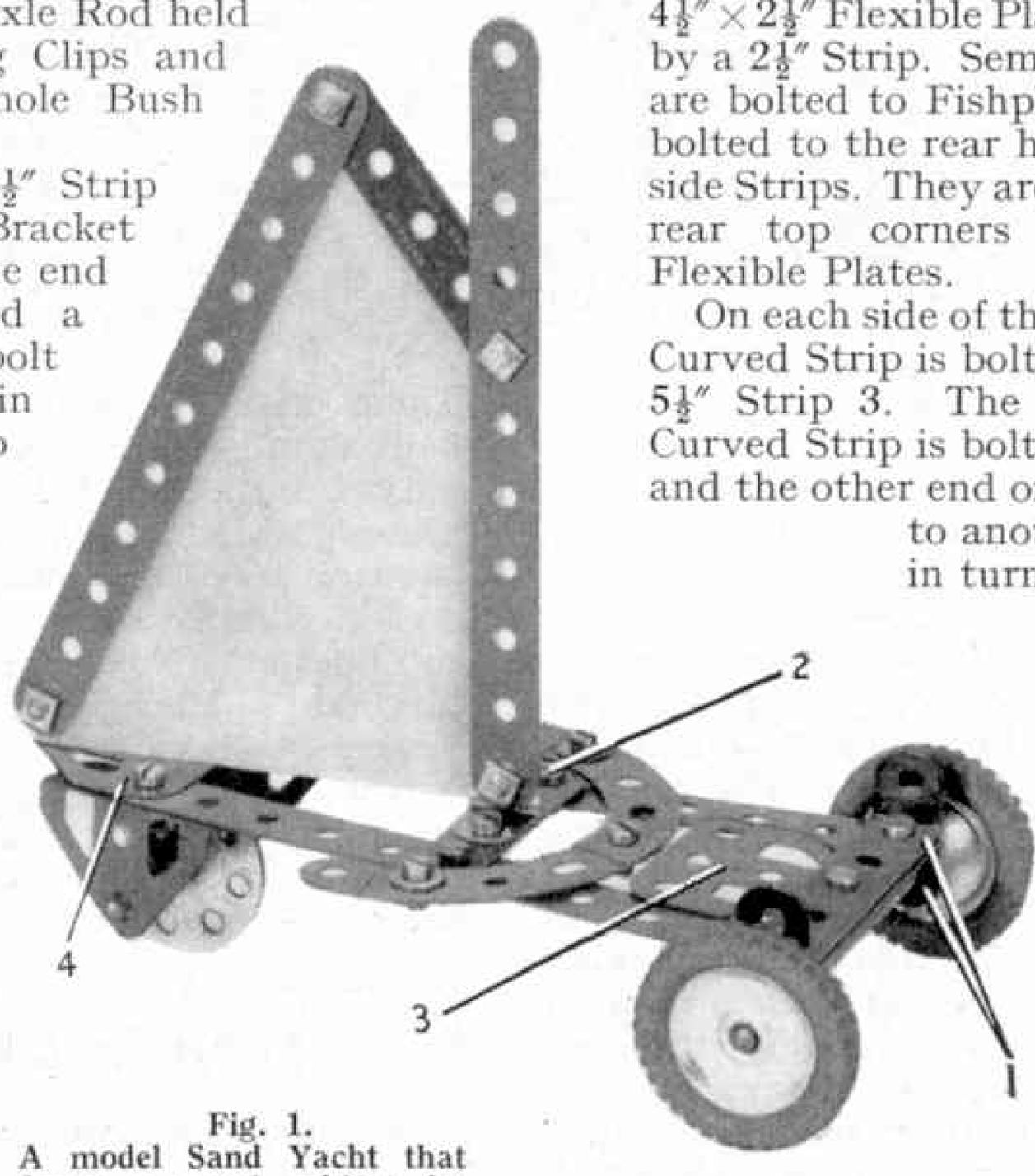


Fig. 1.
A model Sand Yacht that forms a novel subject for young model-builders.

Saloon Car

The attractive Saloon Car, shown in Fig. 2, can be built from parts in Outfit No. 3. The chassis is a 5½″ × 2½″ Flanged Plate, to each side of which two 5½″ Strips are bolted overhanging it by four holes at the rear and three holes at the front. These Strips hold a 5½″ × 1½″ Flexible Plate 1 in position. The sides of the chassis are joined together at the rear end by a 4½″ × 2½″ Flexible Plate bolted to Angle Brackets fixed to the side Strips. The lower edge of the 4½″ × 2½″ Flexible Plate is strengthened by a 2½″ Strip. Semi-Circular Plates 2 are bolted to Fishplates that are also bolted to the rear holes of the chassis side Strips. They are also bolted to the rear top corners of the 5½″ × 1½″ Flexible Plates.

On each side of the model a Stepped Curved Strip is bolted at one end to a 5½″ Strip 3. The other end of the Curved Strip is bolted to a 2½″ Strip 4 and the other end of this Strip is fixed to another 2½″ Strip that in turn is bolted to Strip 3. The sides of the body are joined together by a 2½″ × ½″ Double Angle Strip 5. The top of the windscreen consists of a 2½″ Strip bolted to two Angle Brackets. The roof is a 2½″ × 2½″ Flexible Plate bolted to Angle Brackets, while the curved back portion is a 2½″ × 4½″ Plate curved slightly and bolted to the same Angle Brackets.

The top of the bonnet is formed by two 2½″ × 1½″ Triangular Flexible Plates overlaid by a 2½″ Strip and bolted to the 2½″ Double Angle Strip 5. The sides of the bonnet are 2½″ × 1½″ Flexible Plates bolted to the Double Angle Strip 5 and to the 5½″ × 1½″ Flexible Plates by the bolt 6. The radiator consists of a Flat Trunnion and a Trunnion bolted to a Wheel Disc. The

Trunnion is bolted, together with the front ends of the $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Triangular Flexible Plates, to Angle Brackets bolted to the sides of the bonnet.

The built up side strips of the chassis are connected at the front by a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 7, in the centre hole of which a Formed Slotted Strip, shaped to form a bumper, is attached. The mudguards also are Formed Slotted Strips, with sides made up of Curved Stepped Strips.

Two $3\frac{1}{2}''$ Axle Rods, journalled in the second holes from the front and third holes from the rear of the chassis sides, carry 1" Pulleys with Rubber Rings to form the road wheels. The rear wheels are fixed to the Axle Rod while the front ones are free to rotate independently, but each of them is held in place by a Spring Clip.

The steering wheel is a Wheel Disc that is bolted through the end hole of a Formed Slotted Strip 8. The other end of this Strip is bolted to the Flanged Plate. The seat is a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate. It is bolted to a Reversed Angle Bracket, that in turn is fixed to the Flanged Plate. *Parts required to build the Saloon Car:* 6 of No. 2; 9 of No. 5; 2 of No. 10; 2 of No. 11; 8 of No. 12; 2 of No. 16; 4 of No. 22; 2 of No. 24a; 2 of No. 35; 47 of No. 37a; 46 of No. 37b; 11 of No. 38; 2 of No. 48a; 1 of No. 52; 4 of No. 90a; 1 of No. 111c; 1 of No. 125; 1 of No. 126; 1 of No. 126a; 4 of No. 155; 2 of No. 188; 2 of No. 189; 1 of No. 190; 1 of No. 191; 1 of No. 199; 1 of No. 200; 2 of No. 214; 4 of No. 215; 2 of No. 221.

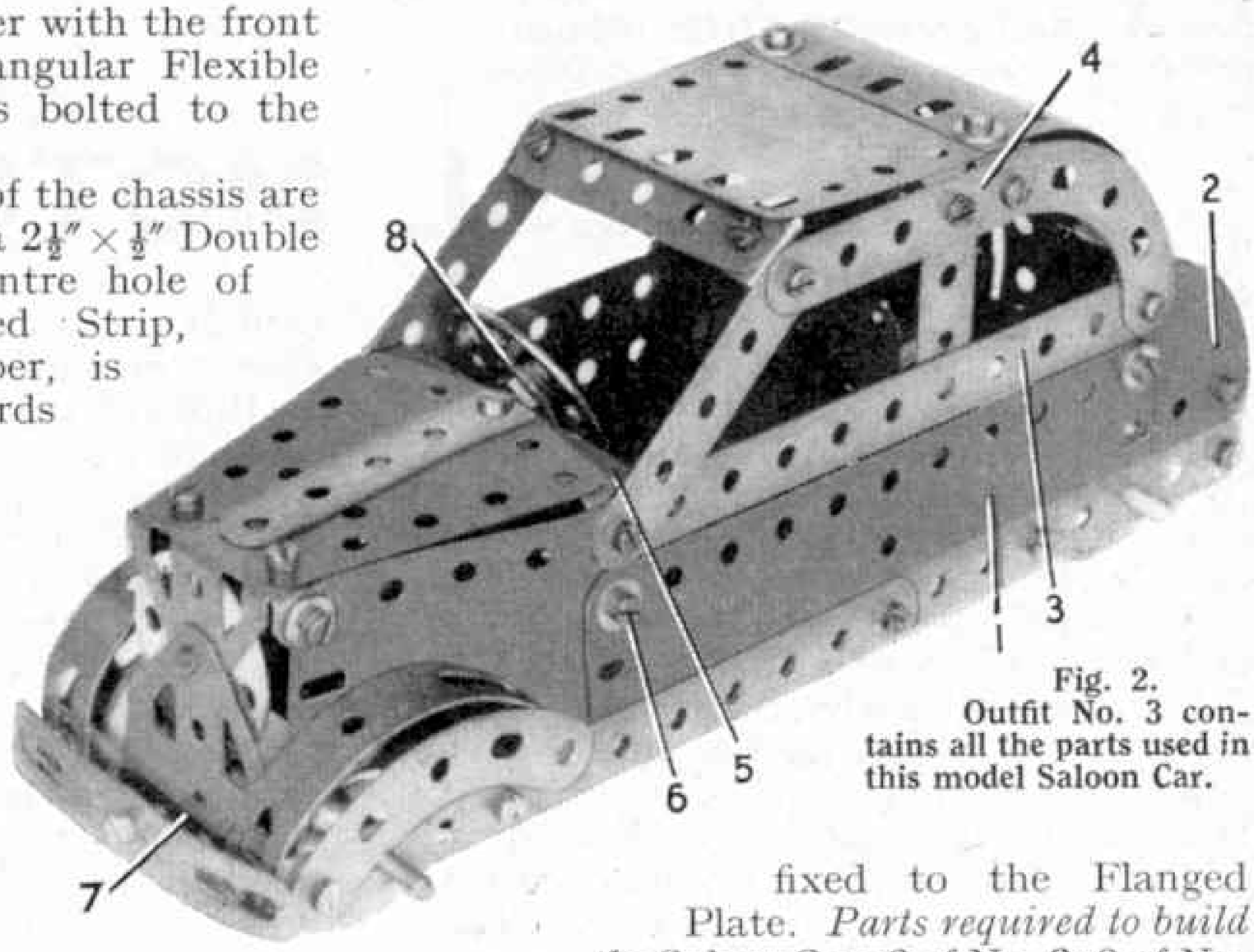


Fig. 2. Outfit No. 3 contains all the parts used in this model Saloon Car.

A Competition Reminder

In the September *M.M.* we announced details of the Autumn Model-Building Competition, now open to model-builders of all ages in any part of the world. Since then a steady stream of entries has been arriving at our Binns Road Office. Is yours among them? Now the days are getting shorter this Competition provides readers with an excellent pastime for a cosy evening indoors. In addition to the pleasure obtained from actually building models for entry in the Contest, there is the further incentive of striving for one of the many prizes offered.

The rules of the Competition are as follows: All models submitted must be original; that is, they must be designed and built by the competitor himself without assistance from anyone else. After the model is completed the next step is to obtain a photograph of it, but if this is not possible, a good sketch of the model should be prepared. The sketch or photograph need not be the competitor's own work. The next thing is to write your age, name and address in *Block* letters on the back of each photograph or sketch, and finally write a short description of the model, mentioning its principal features. Enclose this, together with the photograph or sketch, in an envelope addressed "Autumn Model-Building Competition, Meccano Ltd., Binns Road, Liverpool 13." *Please note that under no circumstances must the actual model be sent.*

The Competition is open to readers of all ages, living in any part of the world, and entries will be divided into two sections as follows: A, for competitors under 14 years of age on December 31 next; B, for competitors aged 14 or over on that date.

THE PRIZES

The following prizes will be awarded in each of the Sections A and B.

First Prize — Cheque for £4 4s. 0d.
Second Prize — Cheque for £2 2s. 0d.
Third Prize — Cheque for £1 1s. 0d.
Five Prizes each of 10/6d.
Five Prizes each of 5/-d.

Certificates of Merit also will be awarded.

Closing Date: December 31, 1960.

Ian S. Balderstone writes about:

FUEL CELL MOTORING

ELECTRIC motoring on fuel cells or missile-type batteries may become a reality within the next generation, according to engineers of the De Soto Division of the Chrysler Corporation. The division has incorporated fuel cells in its experimental car, the De Soto Cella 1. A three-eighths scale model of this vehicle was recently unveiled in Chicago.

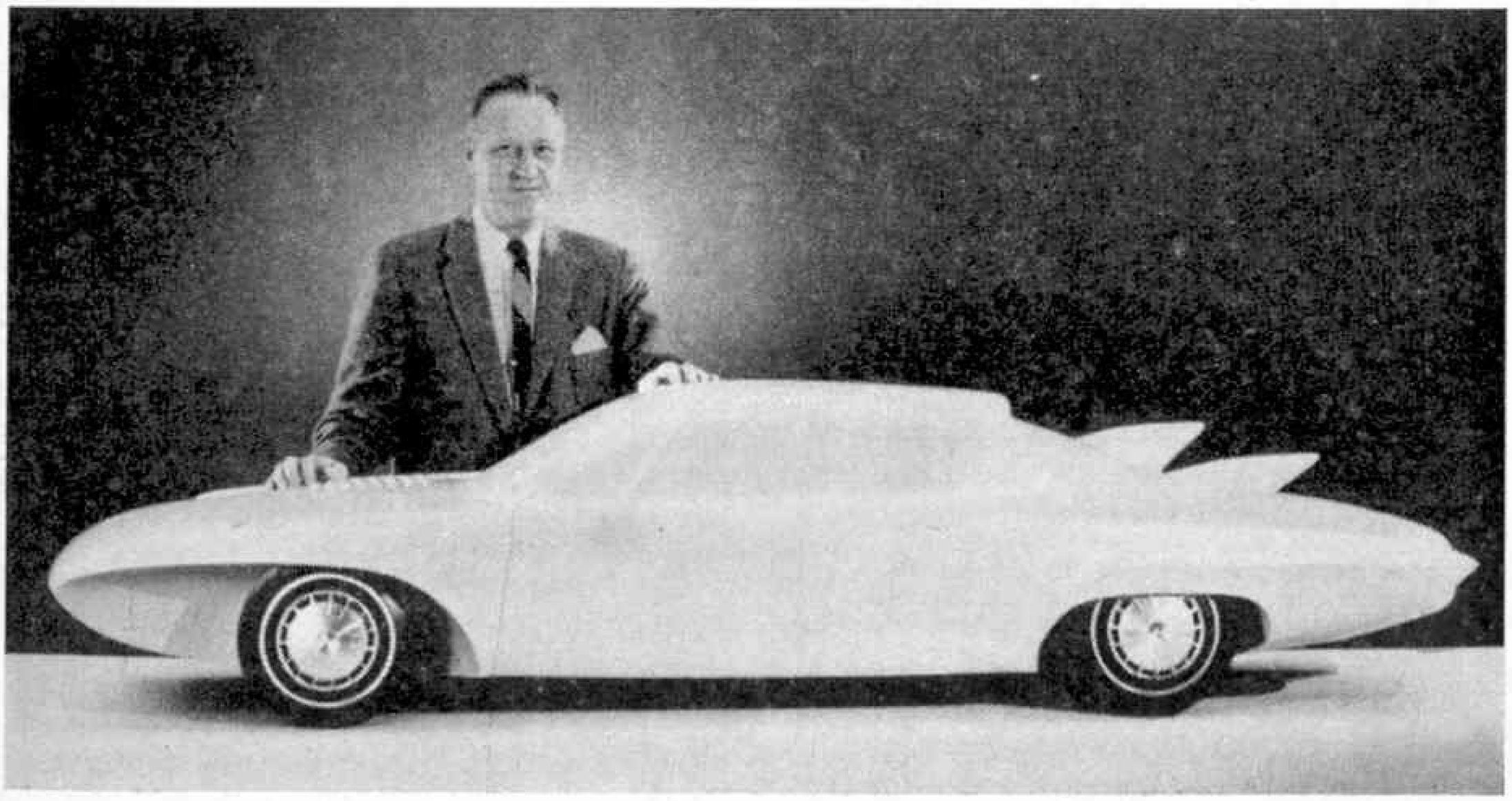
The fuel cell, which operates from a supply of hydrogen and oxygen, consists of two electrodes immersed in an electrolyte. When hydrogen is fed to one electrode and oxygen to the other, a chemical reaction takes place which produces an electric current. Less technical, but equally revolutionary, features in the Cella 1 are a television receiver with finger-tip controls and a tape recorder with a recorded library of music. Stereophonic speakers would be located in the roof of the car.

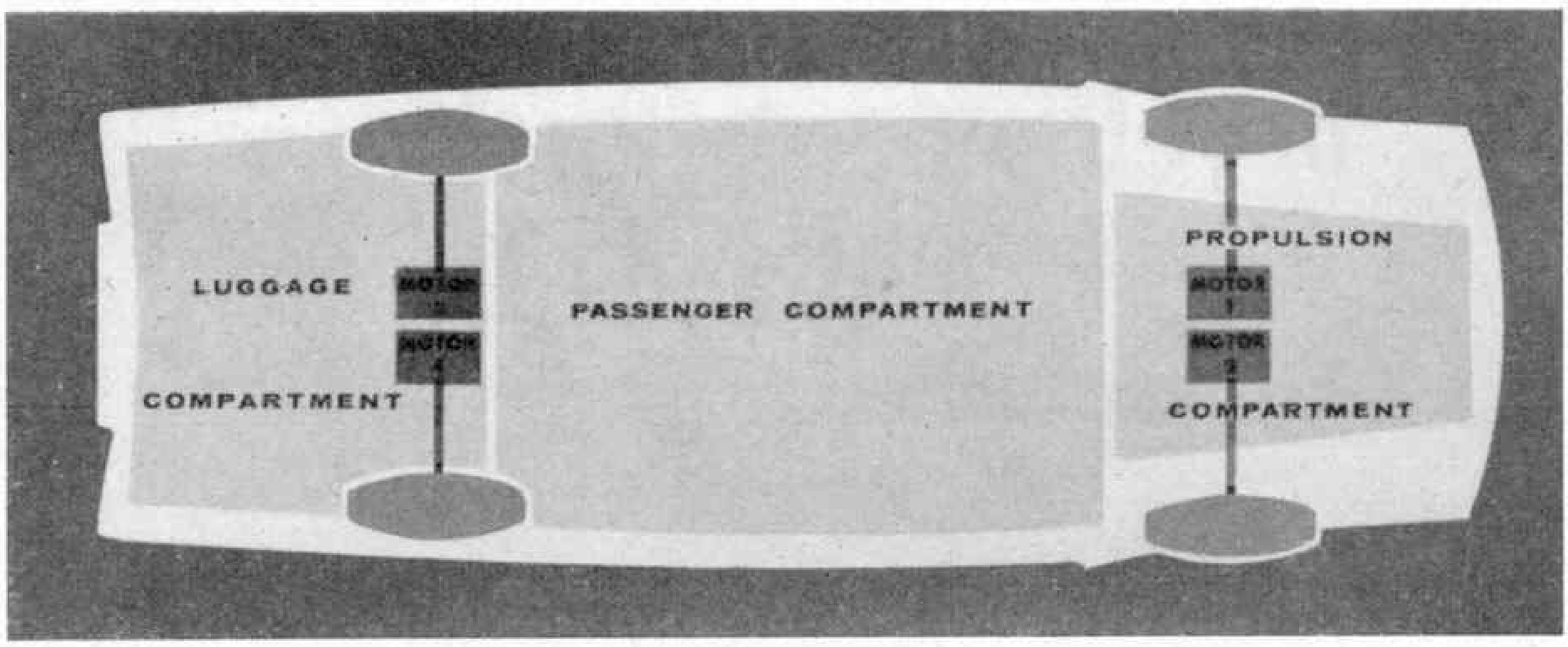
Light-weight motors

Four high-speed, light-weight electric motors, one geared directly to each wheel, would be used to power the Cella 1. In announcing details of the car, De Soto's chief engineer revealed that already in the development stage is a fuel cell which will make it possible to produce as much power as is now obtained from conventional piston engines. Whereas a normal car battery contains active materials inside its case, the electrochemical fuel cell is stored outside. In this way components of the cell are not consumed, and electrical energy is generated instantaneously as long as the hydrogen and oxygen fuels are fed into the cell. To make the best use of the fuel cell's electrical output, the theory of the Cella 1 incorporates light-weight reserve batteries of high specific output.

These batteries, now made in limited capacities for missile and other specialised uses, would store energy recovered from the momentum of the car each time it is slowed down. Such energy is discarded in the form of heat in the brakes and engine cooling systems of conventional cars. It would be recovered by the dynamic or regenerative braking of the traction motors whenever the car slowed down, even in ordinary traffic. As long as the batteries had more than a minimum charge, their "free" energy would be used to augment the electrical energy generated in the fuel cell, thereby saving fuel. This, of course, would minimise wheel-spin and loss of traction and would also assist in checking wheel-locking and subsequent skidding when braking. It would further prevent unnecessary tyre wear on cornering.

This model shows the novel and distinctive lines of the De Soto Cella 1.





Under-section of the experimental car showing space for the four high-speed motors and the luggage, passenger and propulsion compartments.

The four light-weight, high-speed geared motors would be positioned close to the wheels where they would drive through short, universal-jointed shafts to independently suspended wheels.

The designer has said that if ultimate weight reductions are realised, it may even be possible to consider mounting the motors directly to the wheels. However, at the moment it is planned to arrange the motors in pairs, with appropriate controls for operation either in series or parallel, so utilising their optimum characteristics for acceleration or high speed, as required. The inherent high torque or propelling force of this type of drive would provide excellent low speed performance.

The main advantages of this new method of propulsion are:–

1. Maximum traction and acceleration potential.
2. Smoother operation and absence of motor noise.
3. Exceptional braking, with nearly 100 per cent. power recovery, with consequent fuel economy and reduction in brake weight.
4. Simple provision for reversing motion by reversing the field current flow in the drive motors.
5. Long fuel cell life-components not being consumed through use.
6. Level passenger compartment floor, made possible by the absence of transmission, differential, drive shaft and rear axle.
7. Simple maintenance because of relatively few moving parts.

The time factor within which an experimental research car employing this new power system could be developed would depend on overcoming three major research problems—the development of a high output, light-weight cell, new technology to store and supply hydrogen and oxygen gases to the fuel cell, and the development of a high capacity, light-weight battery. Intensive research is already under way and the American Armed Forces and their industrial contractors are working on these problems involving rocket and space technology. So far, the progress has certainly been intriguing.

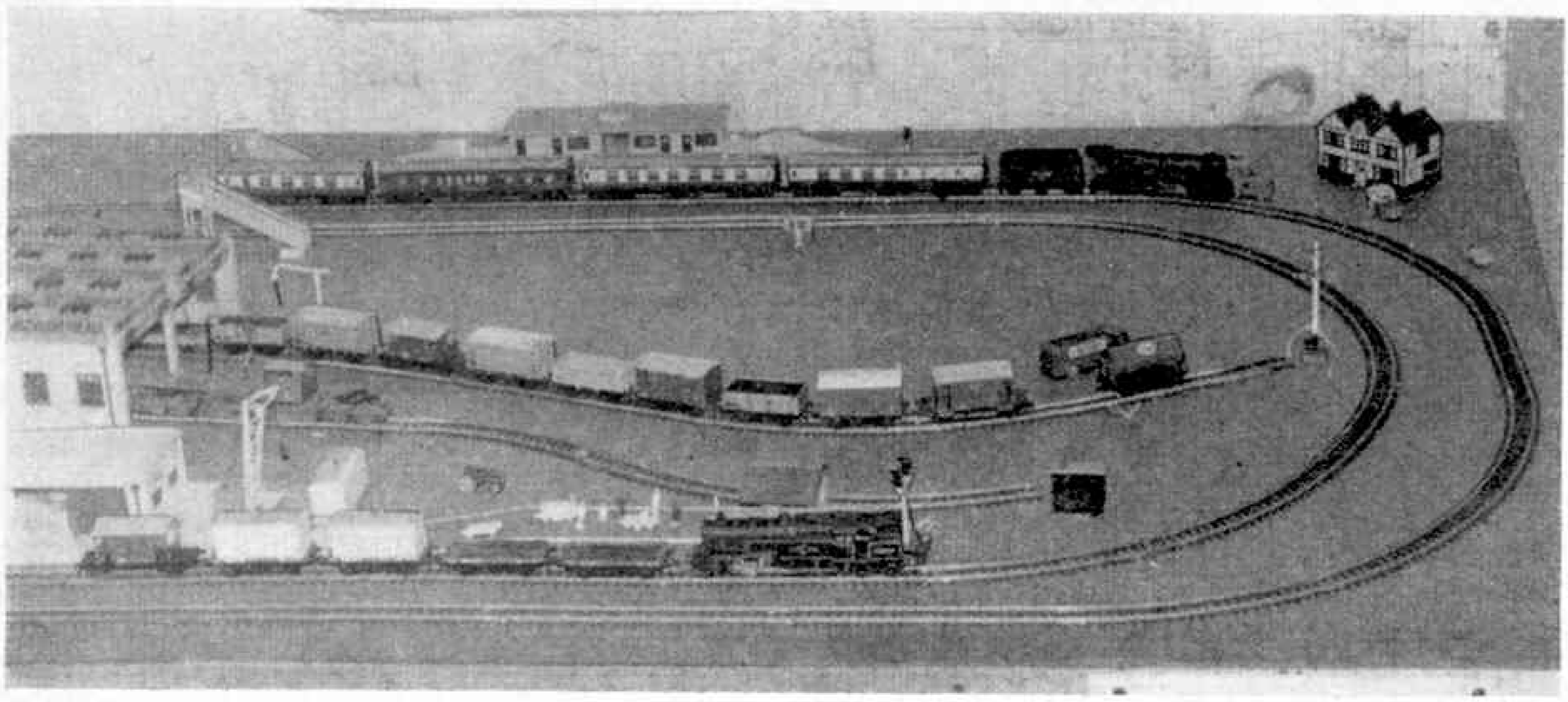
In this country, the Central Electricity Generating Board is embarking on an extensive research and development programme to investigate and perfect fuel cell application in the field of industrial power generation, using gas produced from coal as the fuel. The first fuel cell vehicle was, in fact, the Allis-Chalmers tractor which is still being used as an experimental test vehicle. The tractor contains no fewer than 1,008 fuel cells, each one-quarter of an inch thick, but it produces a total electric output of 15 kilowatts. This is fed into a 20 h.p. direct current electric motor to produce 3,000 lbs. drawbar pull, or more than enough power to pull a multiple share plough through hard dry ground under vigorous test conditions.

Apart from the great interest in the Cella 1's proposed power plant, the design features have also aroused much comment. The vehicle has an exterior design giving extremely low air resistance and using vertical fin stabilisers to give outstanding directional stability. It also features integral aluminium wheels and brake drums for faster, safer stops.

A canopy-type roof would lift up, allowing passengers maximum entrance room; a periscope rear view mirror would give unobstructed vision and eliminate the need for a rear window, providing greater structural strength.

(*Continued on page 587*)

Developments On A Midlands Layout



MECCANO MAGAZINE reader C. M. Bolton, of Gedling, Nottinghamshire, has been a Hornby-Dublo enthusiast for quite a long time. Before starting the Hornby-Dublo Two-Rail layout part of which you can see in the picture above, he operated a Three-Rail system for some five years. The present layout has been in existence since Christmas last year, a popular time for starting a miniature railway of any kind for obvious reasons.

By "Layout Man"

As is the case with many miniature railways, the layout is still unfinished. It is right that a miniature railway should be in a more or less permanent state of development and the system we are talking about is no exception. At the same time, train running is readily possible, and has been from the first. The main line consists of two separate ovals, the two forming the up and down tracks respectively of a double track system, so that regular main line running can be enjoyed. In addition, there are two extensions in course of development in the central area of the layout board. These additional tracks within the main oval of the layout, are incomplete, as is fairly evident from the view at the top of the page.

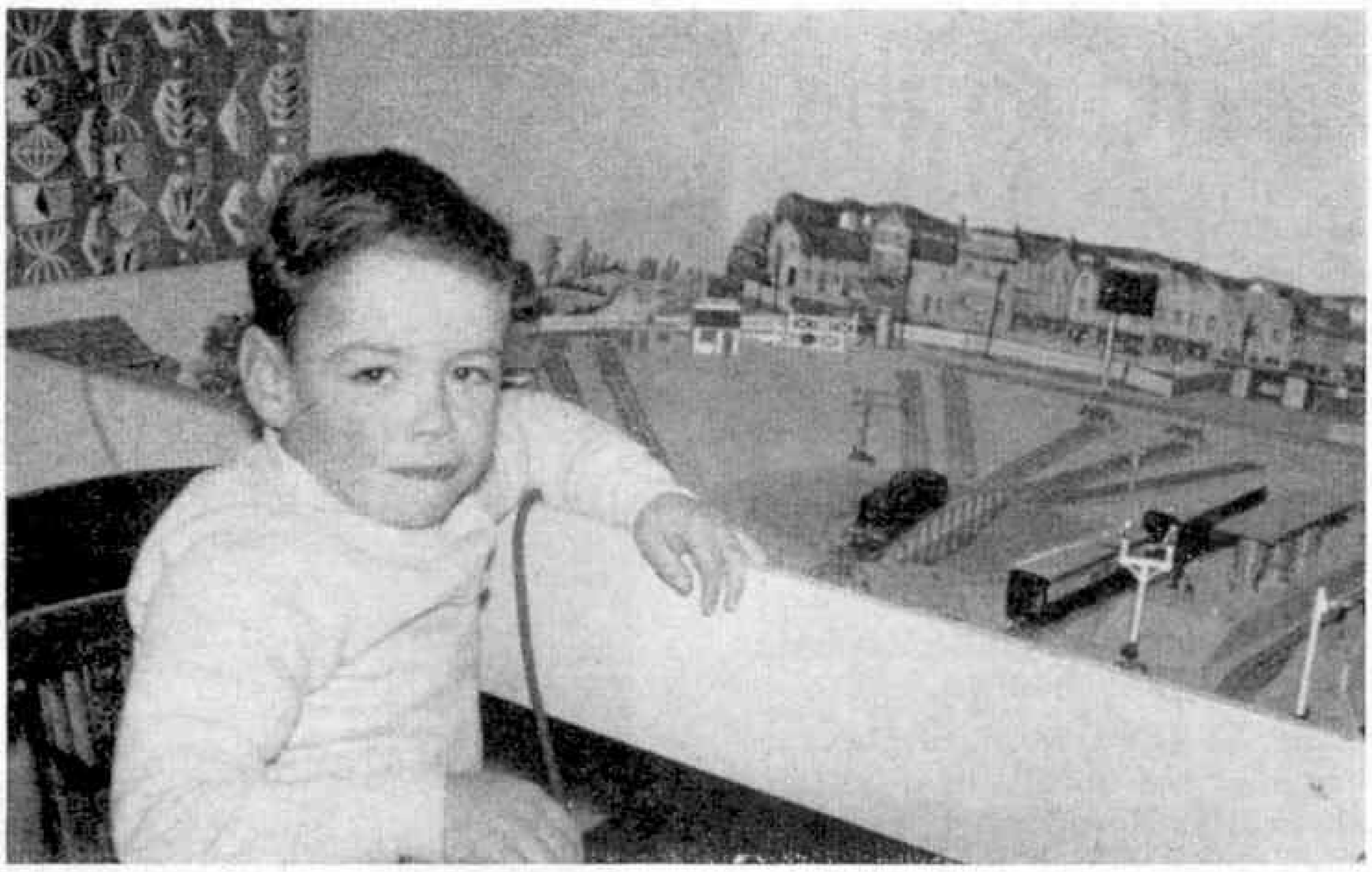
Special attention is being paid to signalling, so that it is not surprising to learn that many of the Signals are the fascinating and attractive Hornby-Dublo Colour Lights. At the moment of forwarding the notes on which this description is based, the owner stated that motive power on the line consisted of a *Denbigh Castle* for the more important main line trains and a 2-6-4 Tank for all other duties.

Present schemes for future extension include a Terminal Station to be built up on an additional section of baseboard, and a goods yard that will improve the facilities for traffic working.

At the head of this page is part of the Hornby-Dublo Two-Rail layout of C. M. Bolton. This is a promising system, still in a state of development.

A Family Railway

Next we have a Hornby-Dublo Three-Rail layout. This belongs to Trevor Wilson, whom you see in the upper picture on the next page. Although he is only five Trevor is already an experienced Hornby-Dublo railwayman, controlling his locomotives, and working Points and Signals with practised assurance. I have to thank Mrs. Ray Wilson, Trevor's mother, for the details forwarded about the layout, and the manner in which it is described makes it quite clear that here we have a railway that is truly a



Here is Trevor Wilson with his Hornby-Dublo railway. The picture below shows the station, Turntable, sidings, main line, and scenic background.

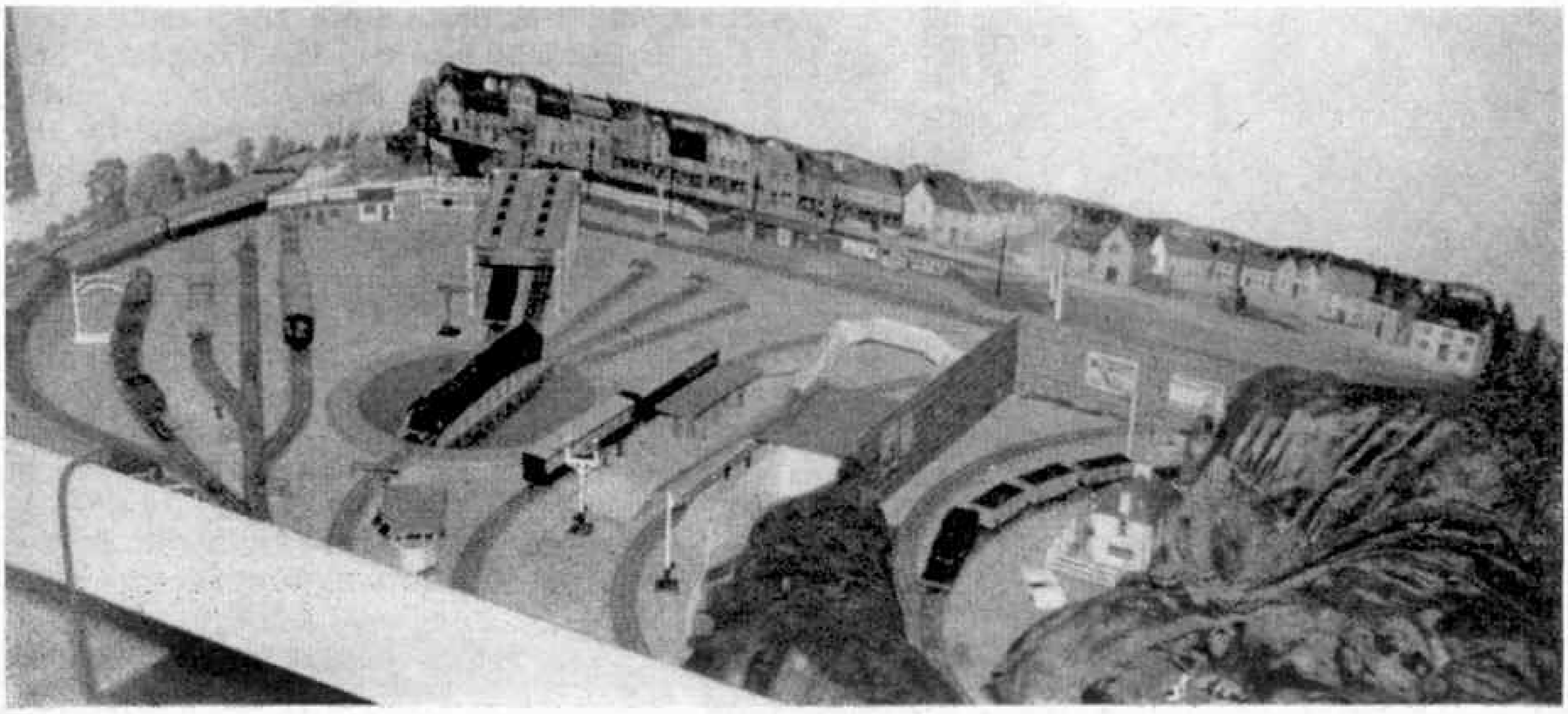
family affair. I cannot do better than quote the following passages from the letter:

"This, by the way, is his Mum writing, who does the design and maintenance, Daddy does the hard work like making the base and screwing things down. When our friends see it they make the usual remark about Daddy spending his free time here, but it's Mum who looks sheepish and has to confess that it's she who spends all her time playing with it instead of getting on with the housework.

"The whole layout is on an 8 ft. by 4 ft. board with 6 in. boards round the sides and the whole thing is hinged to the wall and folded back up to the wall when we have occasion to use the room. The underneath of the board is painted to match the wall and when folded back looks just like a bed-head when the divan is underneath it.

"We have two controllers and at the moment four engines, a Diesel, two small Tanks and the *Duchess of Montrose*, and there is a lot more we want, but for a five-year-old boy, enough we think.

"The rails are all screwed to the board and we have kept the layout to one level for easy maintenance, and tried to keep to an easy working trouble-free layout. The main line consists of single track of basic oval form, one end of the oval being narrowed in to accommodate the control gear for the management of the trains, Points and so on. Points within easy reach of the control site are hand-operated, those on the opposite side of the board being electrically-operated, so that Trevor does not have to move from his seat when working the railway. There is an intermediate track connecting the two sides of the main oval. In addition there is another separate track running within the smaller oval thus formed and giving to this part of the layout the appearance of double (*Continued on page 587*)



Among the Model-Builders

By "Spanner"

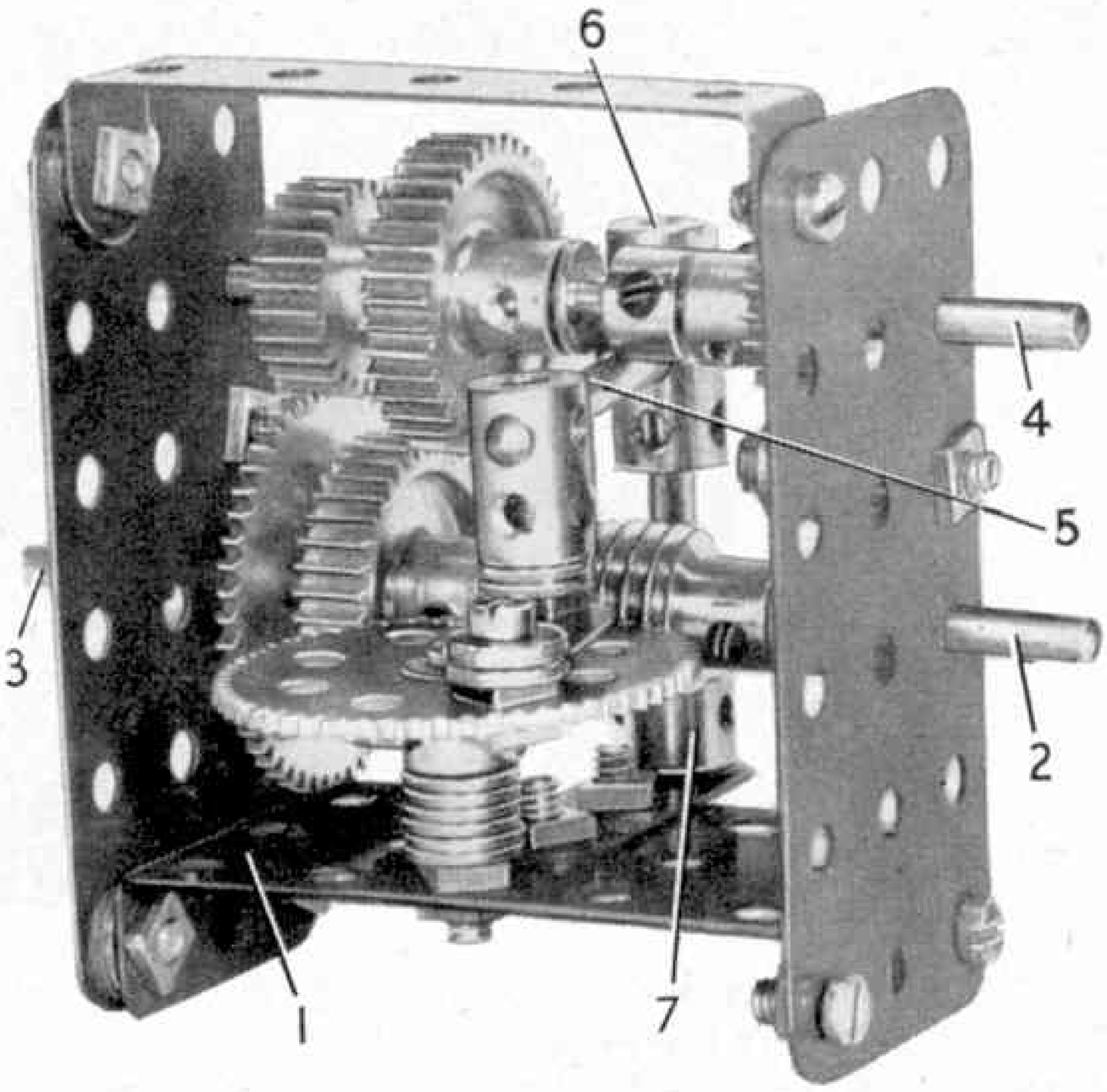


Fig. 1. The Compact Automatic Reversing Mechanism described on this page. It was designed by L. J. Pattison, Sheerness.

A Compact Automatic Reversing Mechanism

Mr. L. J. Pattison, of Sheerness, has sent me details of a compact, automatically-operated reversing mechanism which is illustrated in Figs. 1 and 2 on this page. A useful feature of the arrangement shown is that the input and the output shafts are mounted directly in line.

The framework for the mechanism consists of two 3″ × 1½″ Flat Plates connected by a 2½″ × 1½″ Flanged Plate 1 and a 2½″ × ½″ Double Angle Strip. One of the Flat Plates is spaced from the Flanged Plate and Double Angle Strip by two Washers on each bolt. The input shaft 2 carries a ½″ Pinion, a Worm Gear and a 1″ Gear, but it projects only half-way into the boss of the 1″ Gear. The remaining portion of the boss of this Gear supports the inner end of the output shaft 3, which is mounted in a Double Arm Crank bolted to one of the Flat Plates and carries a 50-tooth Gear in the position indicated. An idler ½″ Pinion, free to turn on a ¾″ Bolt, is in constant mesh with the ½″ Pinion on the input shaft. The ¾″ Bolt is held by two nuts in one of the Flat Plates.

The sliding shaft 4 carries a ½″ Pinion, a Collar, a Washer, a 1″ Gear and a ¾″ Pinion. The ¾″ Pinion must remain in mesh with the 50-tooth Gear irrespective of the position of the sliding shaft.

The Worm Gear drives a 57-tooth Gear that is mounted freely on a Threaded Pin attached to the Flanged Plate. The Gear is spaced by six Washers on the Threaded Pin, and a Fishplate is fixed tightly to the Gear by a ⅜″ Bolt, with a Washer and a nut to space the Fishplate from the Gear. A ½″ Bolt is fixed by a nut in the Fishplate, and is arranged so that it is slightly inside the circle formed by the holes in the Gear. Two Washers and a Short Coupling are placed on the Bolt and a 2½″ Rod 5 is fixed in the Short Coupling. The Rod slides freely in the centre hole of a Coupling 6, which is free to turn on a 1½″ Rod held in a Crank 7 bolted to the Flanged Plate. A ¾″ Bolt held by a nut in the Coupling 6 engages between

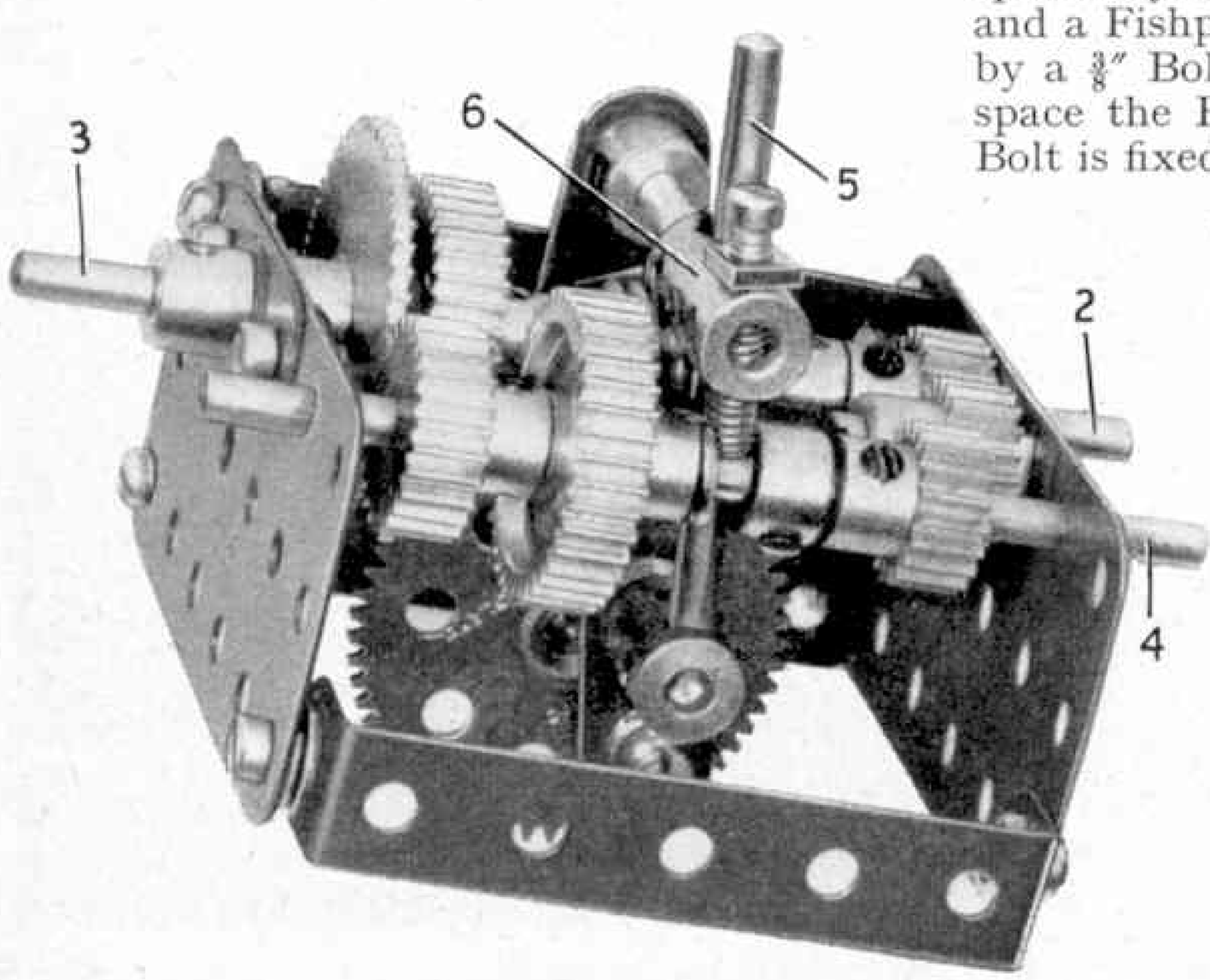


Fig. 2. Another view of the Automatic Reversing Mechanism.

the Collar and the Washer on the sliding shaft 4.

Torsion Bar Suspension for Vehicles

Practically all modern cars are now fitted with independent front wheel suspension. This system allows one road wheel to be deflected by irregularities of the road surface without affecting the other wheel. The general use of independent suspension has resulted in almost complete disappearance from the fronts of modern cars of the once familiar axle beams and leaf springs, and their replacement by coil springs or torsion bars. Coil spring suspension units have been described in the *Meccano Magazine* from time to time, and their construction is quite simple. The torsion bar system is rather more difficult, however, as this arrangement depends for its springing effect on the resistance to twisting set up in a steel bar. Therefore, in response to many requests, I am illustrating in Figs. 3 and 4 a method of constructing such a unit that was sent to me some time ago by W. A. Johnstone, of Liverpool.

An 8″ Screwed Rod 1 is fixed firmly to each side of the chassis by two Threaded Bosses 2, which are attached to the chassis by Bolts spaced by Washers. The Rod must be held tight enough to prevent it from turning.

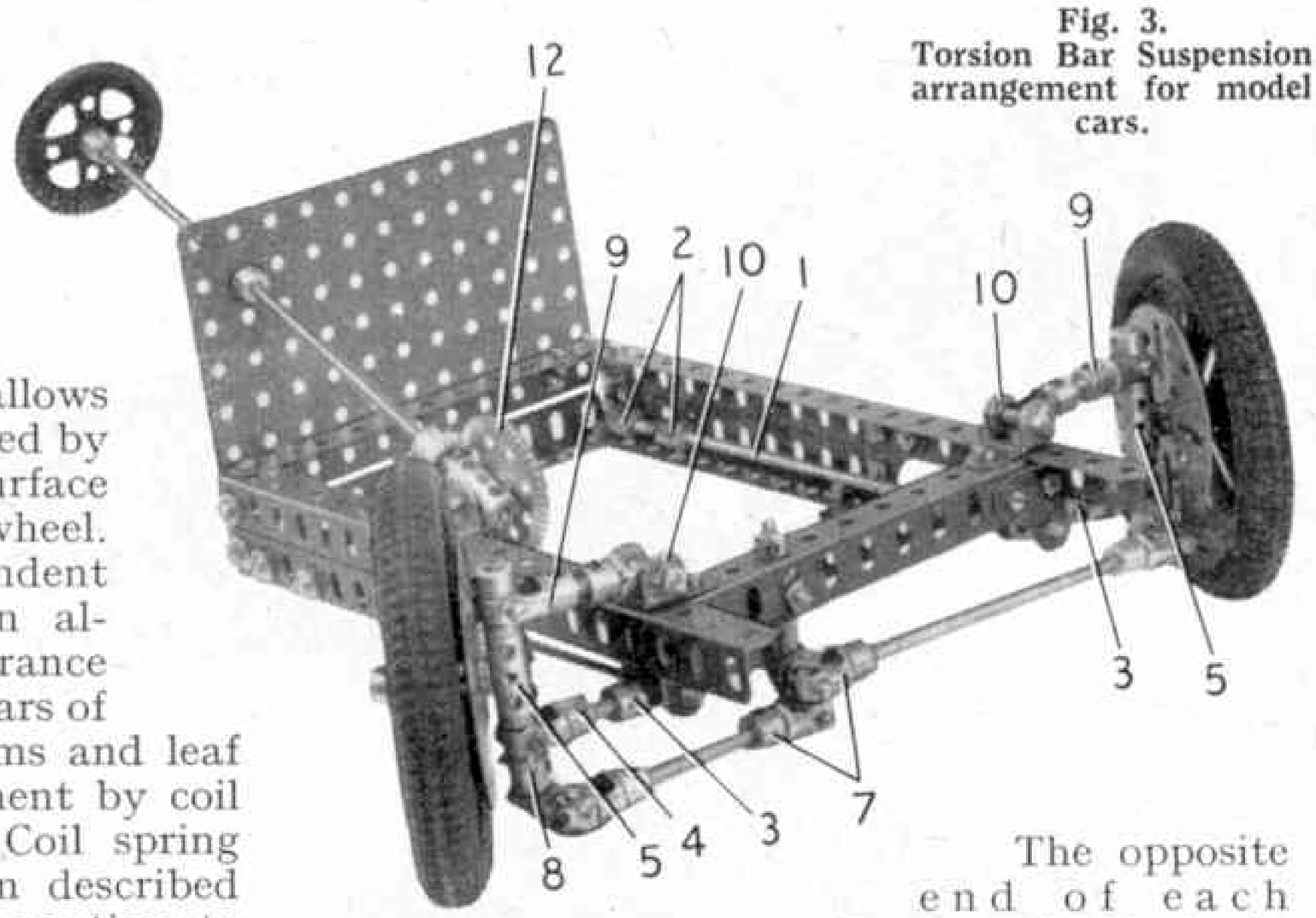


Fig. 3. Torsion Bar Suspension arrangement for model cars.

The opposite end of each Screwed Rod is mounted in two 1″ Corner Brackets and carries a Coupling 3. The Coupling is also fixed on the Screwed Rod by nuts, and it carries a 1″ Rod fitted with a Swivel Bearing 4. A second 1″ Rod fixed in a Coupling 5 is free to turn in the "spider" of the Swivel Bearing, and is fitted with a Crank 8. The Coupling 5 carries also a further 1″ Rod that is free to turn in the "spider" of a Swivel Bearing 9. The Rod is held in position by a Collar, and the Swivel Bearing is connected by a 1″ Rod and a small Fork Piece to a Double Bracket 10. The stub axles are 1½″ Rods fixed in the Coupling 5. The links on each side are braced by radius Rods 11.

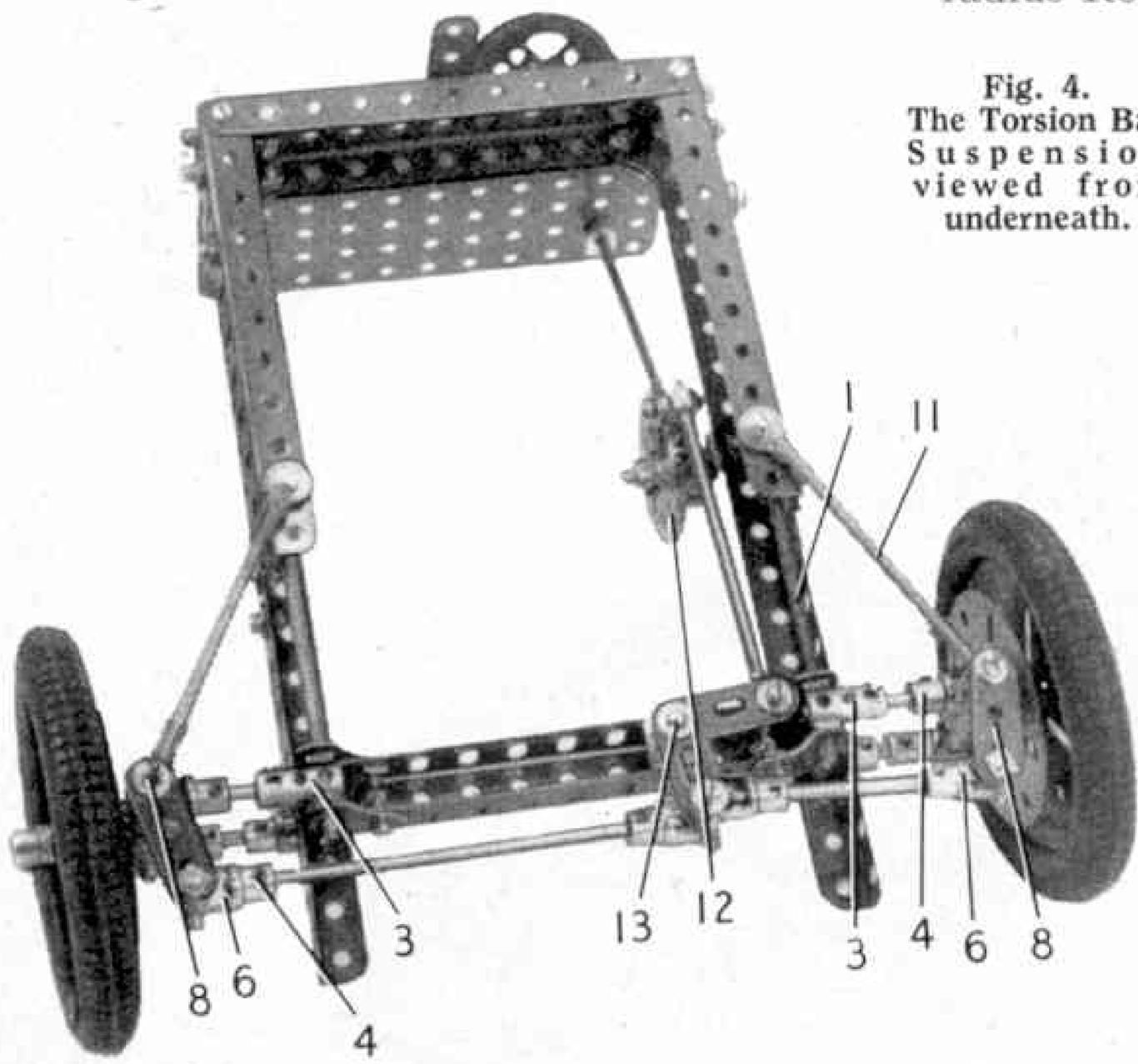


Fig. 4. The Torsion Bar Suspension viewed from underneath.

Movement of the road wheel is controlled by a drop arm consisting of a Fishplate bolted to a 1½″ Bevel Gear 12. The Fishplate is connected by a Rod and Collars to one arm of a Bell Crank with boss 13. The other arm is linked to the Cranks 8 by Rods and Swivel Bearings 6 and 7.

Invitation to Model-Builders

Many model-builders during the course of their experiments design and develop novel mechanisms of one kind or another. Probably you have had some success in this direction. If so, why not send me details of your mechanism so that I can include it, if suitable, in a future *Among the Model-Builders?* All contributions used will be paid for at our usual rates.

MODEL OF THE MONTH

By "Spanner"

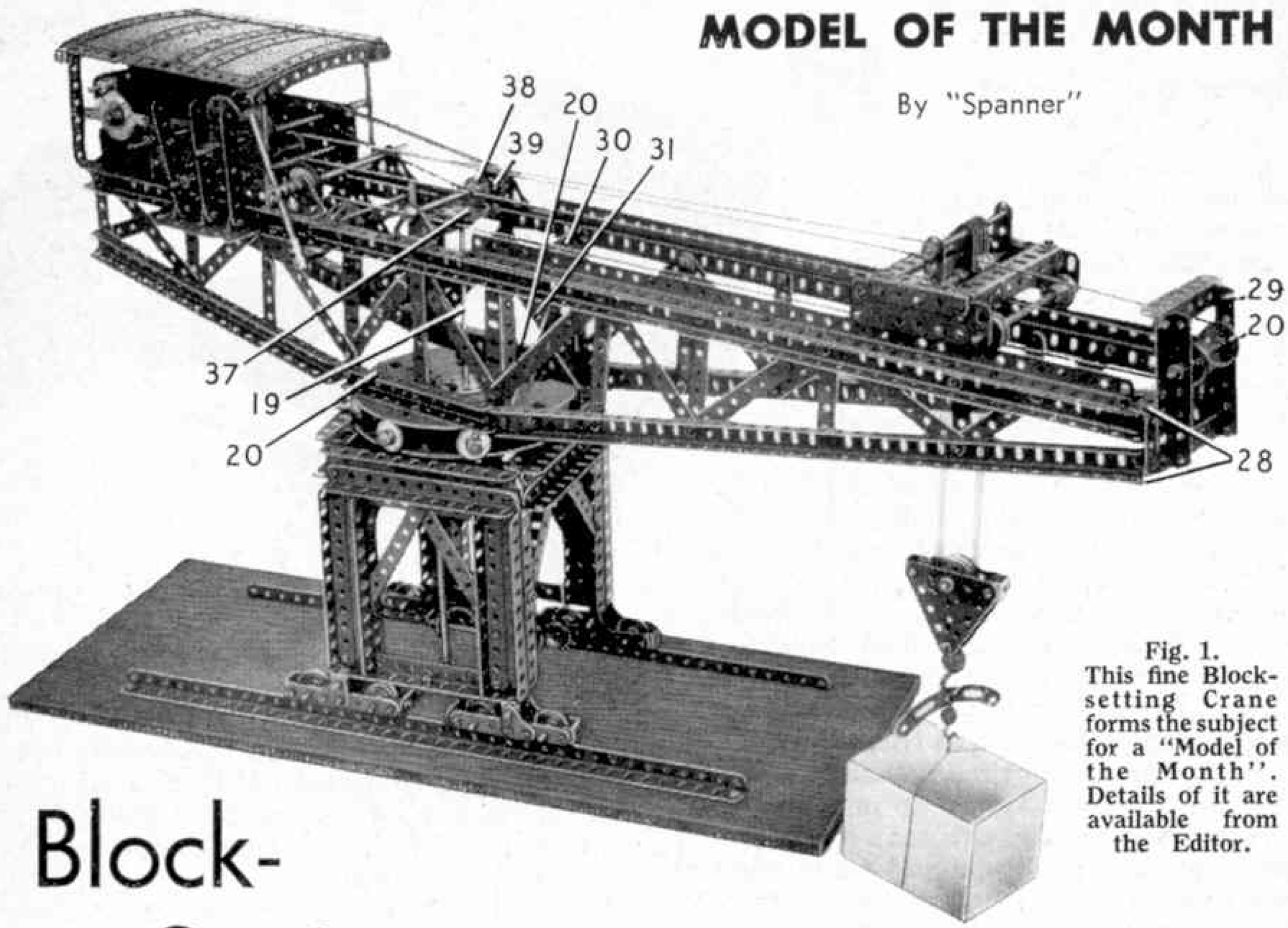


Fig. 1.
This fine Block-setting Crane forms the subject for a "Model of the Month". Details of it are available from the Editor.

Block-Setting Crane

IF a census were taken among Meccano model-builders on the question of their favourite subjects for models I am sure the vast majority would plump for cranes. It has always been so in the past and I have no reason to suppose that their popularity is in any way diminished in this age of rockets, space-ships and other marvels of modern science and engineering. One reason for this popularity is the realism with which it is possible to reproduce the details of an actual crane with Meccano parts; another is the fact that most model-builders prefer modelling subjects that contain gearing and other mechanisms. All of us like "to watch the wheels go round" and a really good model crane offers plenty of opportunity in this direction. In view of all this I have chosen a crane as

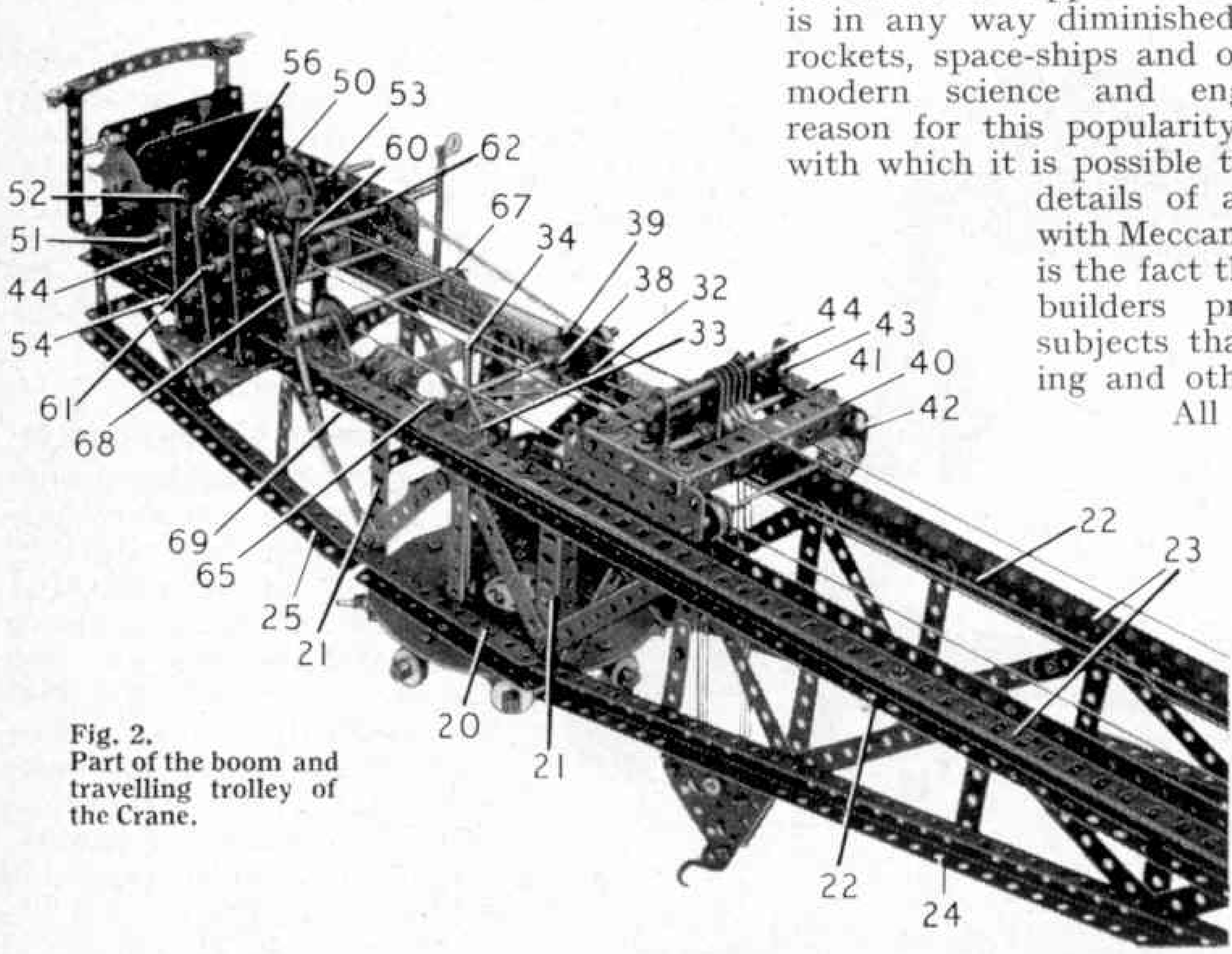


Fig. 2.
Part of the boom and travelling trolley of the Crane.

the subject for a "Model of the Month". It is a rather special type known as a Block-setting Crane, and it is shown in Fig. 1. It is based on a real crane employed for lifting and setting giant concrete blocks used in the building of breakwaters and harbour walls, etc.

Actual cranes of this type are among the biggest in the world, and some are capable of lifting and setting huge concrete blocks weighing anything up to 50 or more tons. In actual practice, special block-lifting and setting tackle is generally used with the crane for the purpose of setting the blocks at an angle, or on what is technically termed "on the inclined bond", as in this way the breakwater is made much stronger than it would be if the blocks were set horizontally, in similar manner to the bricks of an ordinary wall. This special setting tackle is not included in this model, but otherwise the model is a very good representation of its prototype.

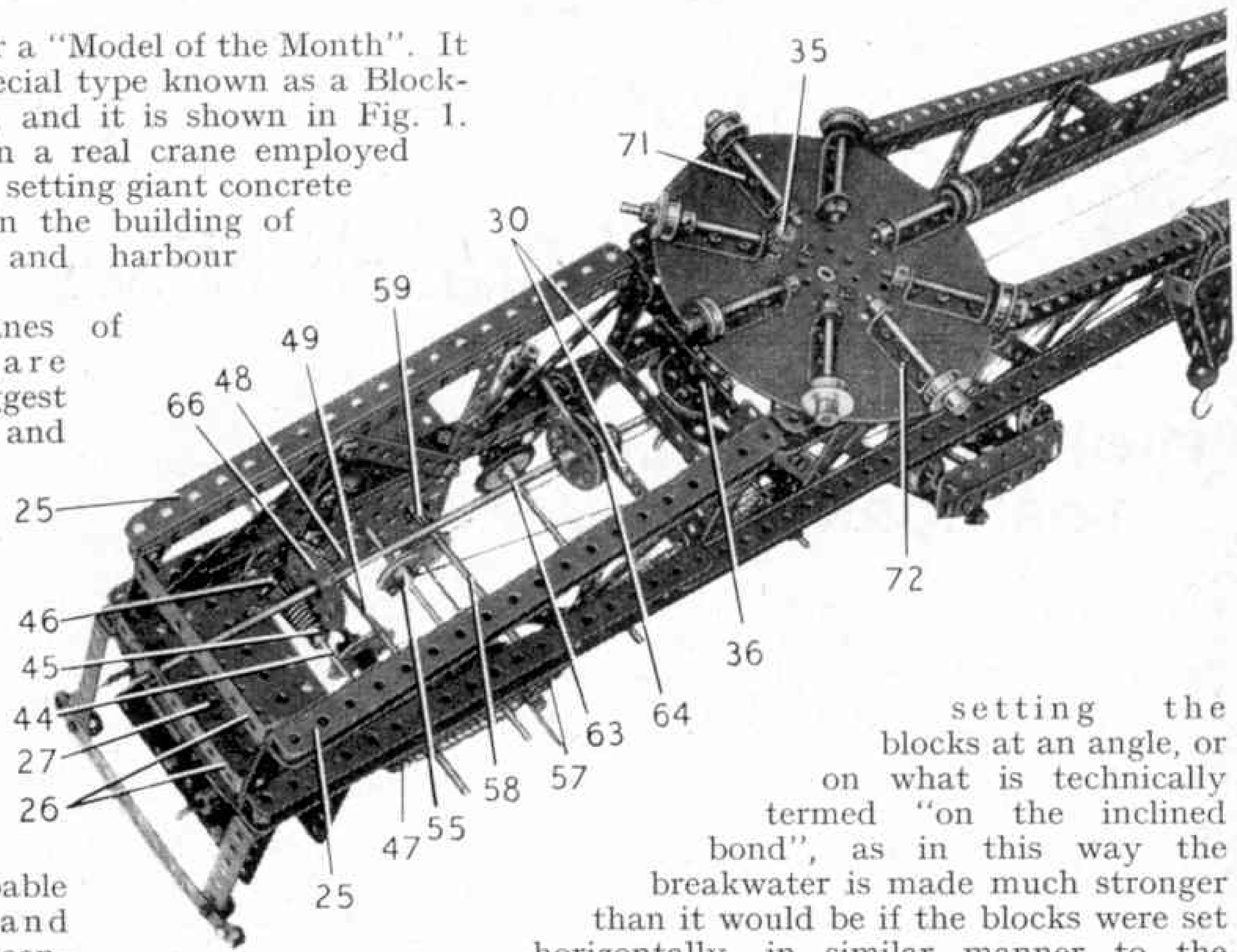


Fig. 3
The rear end of the boom seen from underneath and showing details of the roller bearing and cab mechanism.

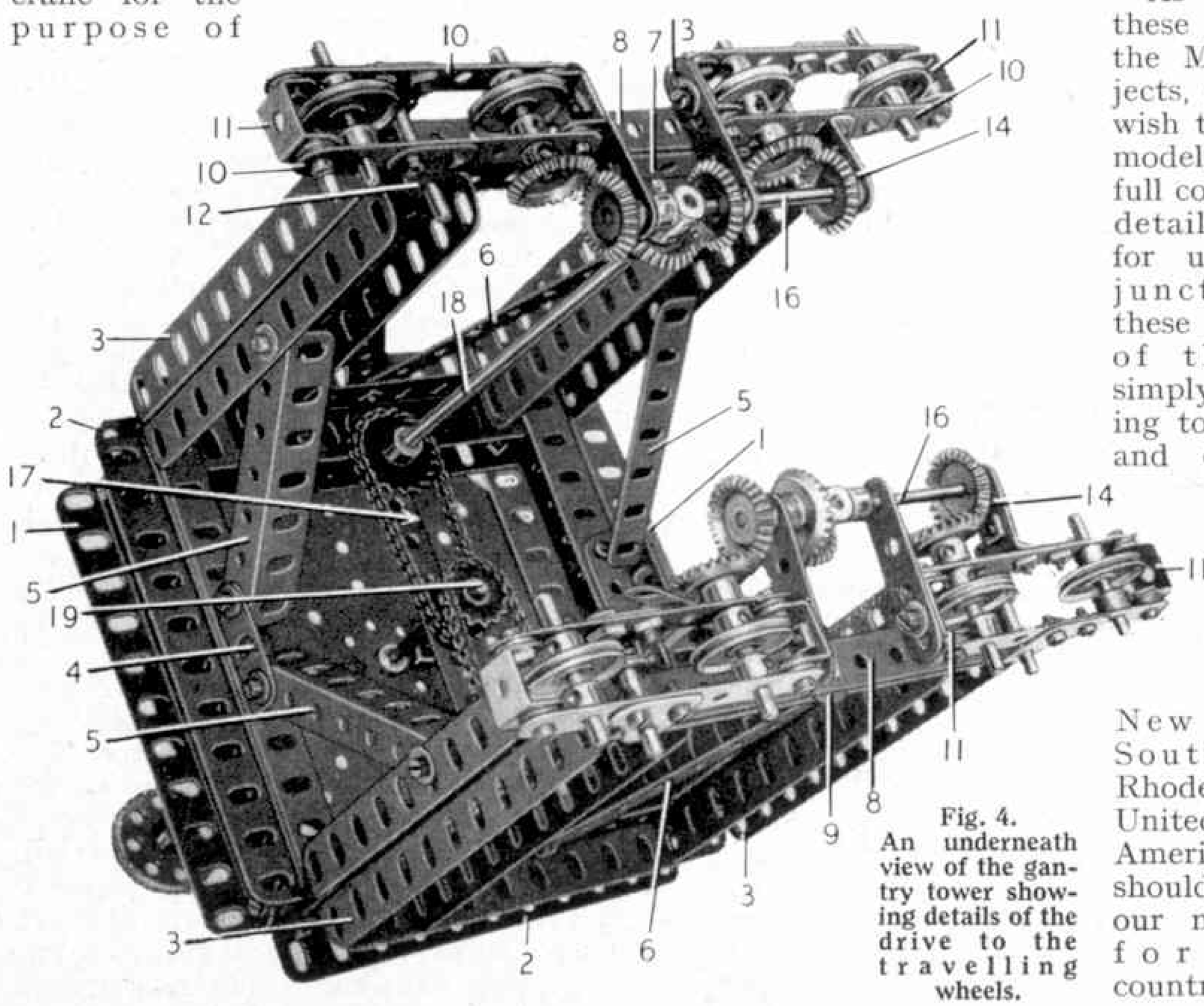


Fig. 4.
An underneath view of the gantry tower showing details of the drive to the travelling wheels.

As usual with these "Model of the Month" subjects, readers who wish to build this model, can obtain full constructional details, prepared for use in conjunction with these illustrations of the model simply by applying to the Editor and enclosing a 2d. stamp for return postage. Readers living in Canada, Australia, New Zealand, South Africa, Rhodesia, Ceylon, United States of America and Italy should apply to our main agents for those countries.

WITH THE SECRETARY

Club and Branch News

PROPOSED NEW CLUB FOR CORNWALL

IT has been quite obvious to me during recent visits to Meccano Clubs and to Branches of the Hornby Railway Company that in spite of the allure of television and similar activities there is still room in the lives of many modern youths for the intriguing entertainment which can be obtained from Meccano and from Hornby-Dublo Electric Trains.

Enthusiasm among the members of the Meccano Clubs particularly is very keen, and I have received queries from places up and down the country about the starting of new Meccano Clubs. I do want all readers of the *Meccano Magazine* to appreciate that if someone wishes to start a Club of this nature, and wants any help or advice, they have only to write to me and I will be delighted to supply it.

One new Club which it is hoped will shortly be starting is in Cornwall. Mr. Esmond H. L. Roden of 4 Gloweth Villas, Truro writes to tell me that it is desired to start a Meccano Club in Cornwall for people of 21 years of age and upwards. I gladly mention this in these columns and I hope that anyone who is interested will get in touch with Mr. Roden at the address given.

Mr. Roden tells me that meetings will be held as centrally as possible in that rather lengthy county, and that they have cars available for holding the meetings at various places.

Should this senior Club, if I may call it that, prove to be successful then it is hoped that later a junior Club might also be formed to cover the areas of Camborne, Redruth, Falmouth and Truro.

FOSTERING THE TEAM SPIRIT

In some of the older Meccano Clubs it has long been the practice to divide the members into groups for model-building, games and so on. I have been glad to note that some of the new Clubs which have come into the picture during the past year or two also have adopted this system. It has much to commend it, as while enabling the members to obtain the greater enjoyment from their hobby that comes from sharing it with others it also develops a friendly rivalry between the groups. This rivalry is further encouraged by model-building and other competitions in which points are awarded to each group according to merit, the group achieving the highest number of points during the session or Club year receiving a prize.

Some Clubs divide into junior and senior groups, the former beginning the session with simple models and working their way up to more ambitious projects, while the older members concentrate on more complicated models throughout the session. Other Clubs have several groups, each consisting of a few junior members under a senior who is termed the Group Leader, as in the excellent Meccano Club run by the Gindiri Boys' Secondary School in Nigeria. The Group Leader helps the younger members to improve their model-building and to become familiar with the basic engineering principles upon which the Meccano system is based. In time these junior model-builders become expert, and in turn are able to coach new, younger members.

Some Clubs which do not adopt the group system for their general model-building meetings do so for the construction of really large and complicated models for display at Exhibitions or on Parents' Nights. In these instances, each group is given the job of constructing a particular part of the model, and eventually the several sections are assembled to make the complete model; a joint enterprise in which each member is rightly proud to have had a part.

H.R.C. Branches, too, often find it profitable to adopt a form of grouping. In large Branches it is obviously impossible for all the members to operate trains on the Branch layout at the same time. So in some instances the members are divided into two groups on Track Nights, one group operating the trains while the other group are busy modelling scenery, having a railway quiz, or engaging in some other alternative

The fascination of model railways is clearly evident in this interesting picture taken at an Exhibition organised by the Norbury Transport and Model Railway Club, Norbury, London.

railwaylike activity. At "half-time" the two groups change over, so that every member gets a fair share of track operations.

CLUB NOTES

INDIA

MYSORE M.C.—Outdoor activities have included excursions by car to Somanathpur, famous for its ancient temple and the carvings in it, and Sivasamudram where there is the oldest hydro-electric power station in the East. *Secretary:* M. N. Radhakrishna, 16 Mothikhana Building, Santhepet, Mysore.

SOUTH AFRICA

CAPE PENINSULA M.C.—Arrangements have been made for the Club to put on an excellent display at the annual Hobbies Fair. At the Annual General Meeting several new Club officials were elected. *Secretary:* Mr. A. Ritchie, "Elderet", Crescent Road, Kenilworth, Cape Province.

BOOK REVIEWS

"British Trains of Yesteryear"

C. Hamilton Ellis
(Ian Allan, price 25/-)

As might be expected from its title, railway scenes of bygone days are recalled in the remarkable selection of photographs reproduced in this book. The youthful reader may well be amazed by many of the views presented, showing for the most part immaculately-groomed engines and usually a selection of pleasantly varied rolling stock.

Truly the golden age of British railways is recalled by the different pictures. Not the least interesting feature of many of the scenes is the lineside and other equipment, which is often of a character as individual as that of the trains themselves.

Many of the sites chosen by the photographers concerned will be familiar to older railway readers, and the same vantage points are sometimes employed today although the character of the scene may well have changed in the meantime.

Not only are the activities of proud trunk lines shown, but smaller railways are not neglected. All the scenes are aptly summed up in the captions by C. Hamilton Ellis, an authority on historical railway equipment.

Commonwealth Q.E.II Catalogue, 1961

This interesting catalogue, again revised for the 1961 edition, has not only been brought up to date as far as possible in regard to new stamps, but also contains much new data appertaining to stamps previously released. Features include new listings of the current set of Singapore (where two types of printing have been used for several values), and the current Postage Dues of Australia. In the latter case new centre plates were recently brought into use, and a number of illustrations show how they differ materially. These two listings should prove of great interest to collectors as the stamps will be relatively easy to come by, once it is known just what to look for.

The catalogue, from stamp dealers, costs 7/6d. It may be obtained direct from The Commonwealth Stamp Company, Leather Lane, Liverpool 2, price 8/2d. including postage.

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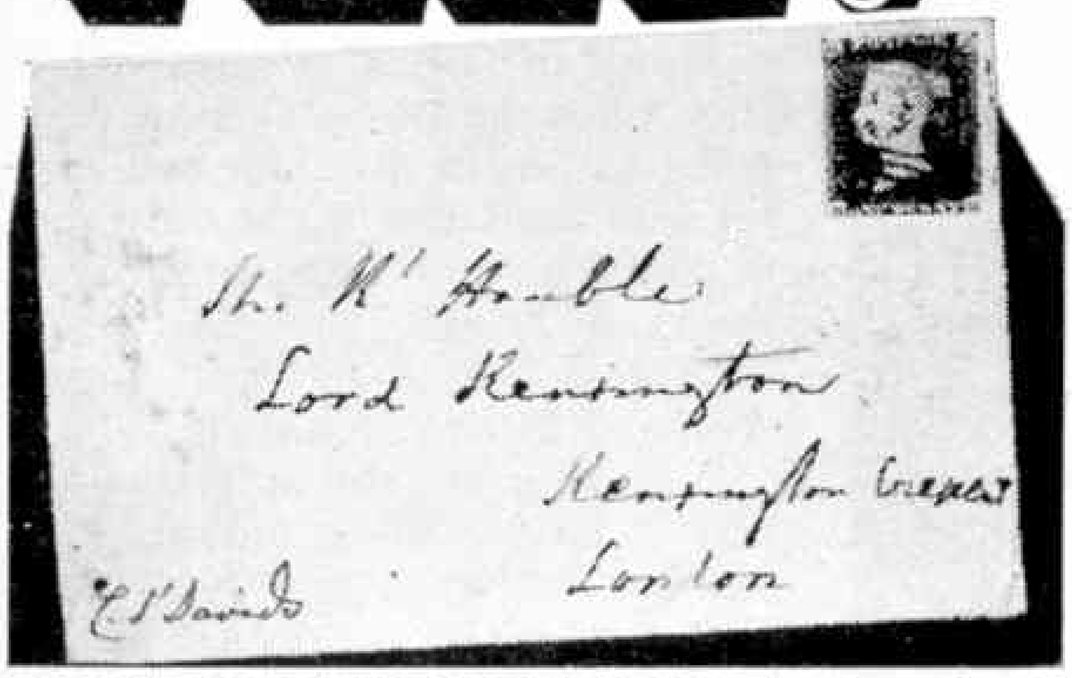

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For Stamp Enthusiasts

Cigar Island

By F. E. Metcalfe

A YOUNG collector once remarked to me that although Mr. So and So was anything but a rich man he spent an awful lot on stamps. How could he afford to do it, he asked. Well, I happen to know the man referred to very well and I also know how, on a very moderate income, he can spend so much cash on his hobby. He is, in fact, rather typical of many enthusiasts who, through knowledge and foresight, manage to make the hobby pay for itself. Their plan is to choose a country which is not very popular as far as its stamps are concerned—which means that the stamps can be bought cheaply—and after they have completed their collection as far as they can, they are able, on the nice showing they can make, at least to sell out without loss; often, in fact, they make a slight profit.

Which are the countries in this category that might appeal to *Meccano Magazine* stamp collectors who want to take up a new group? Well one of them, as far as Great Britain is concerned, is Cuba, the country which has been so much in the news lately. I don't know how things are now, but Cuba's stamps used to be quite widely collected in the United States. Yet I have never come across many British collectors who were particularly keen on the issues of this, the largest island in the West Indies.

Leaving politics aside, as they have nothing to do with us, Cuba itself is, I believe, a most attractive country. I was once offered a job in Havana, and set off to take it up, but when I got to Barbados I decided to have a tour of the other British islands, and I never got to Cuba. If I had, I would have found an attractive and thriving country of 44,164 square miles, where the people speak Spanish (when they do not speak English, which is very often). It has a range of mountains three times as high as anything we have in Great Britain.

Cuba was discovered in 1492 by Colon, or Columbus as we call him. The Spaniards, in 1511, were the first to make a settlement there, and slavery flourished from 1854 to 1886. In 1895 there was an insurrection, the U.S.A. stepped in and after the defeat of the Spaniards Cuba became a free nation in 1898.

Cuba is, of course, only one of many countries whose stamps are worth taking up. It is a pity that so many stamps are being issued nowadays that it is quite impossible to collect, seriously, all countries as used to be the general rule in my early collecting days. Collections of stamps such as those of Cuba can have great charm, however, and if you spend precious pocket money on them, it need not all be lost when a change is contemplated—a point to remember.

Now I am going to more or less ignore the stamps in use in Cuba during the Spanish occupation, as unless you are a dyed-in-the-wool philatelist you would find them very dull, consisting as they do only of stamps bearing the heads of Spanish monarchs. To start with, Cuba shared with Puerto Rico, in 1855, her first issue, and the philatelic collaboration with the sister colony continued until 1873 when Cuba had stamps all to herself. These head-type stamps were once common, and if you want to go in for them you can gather quite a few for a small sum (they are occasionally to be found in packets) but, as I have already said, they are a dull-looking lot, hardly to the taste of young collectors of today who are accustomed to the wonderful designs produced by modern postal administrations.

So we will start with what you might call Cuba proper, and (*Continued on page 586*)

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For other Stamp Advertisements see also pages 582 and 586

Stamp Gossip

REFUGEE YEAR

SOME time ago I received a letter from an American collector who expressed regret that Great Britain, which had done so much for refugees, had not issued any "Refugee" stamps, as more than 70 other countries have done. I do feel that this was one set which our G.P.O. might have issued. At least it would have been more suitable than the "General Letter Office" issue, which commemorated the wrong date. It was the the Cromwellian Act of 1657 which should have received the notice, and not what was merely a re-enactment of that law three years later, when Charles II, after declaring that all laws brought in during the Commonwealth were not valid, had to eat his words, as it were, so that he could get his hands on the revenue which the Post Office, put on a sound footing, would yield him. However, to get back to the "Refugee" stamps, many readers would see in the newspapers that "Iron Curtain" countries were refusing to deliver correspondence bearing some of these stamps, and probably the design which caused the most annoyance was the one illustrated here.

AMERICA AND JAPAN

The fuss which was made in Japan when Mr. Eisenhower, the U.S. President, proposed a friendly visit there will be fresh in most memories. Because of disturbances the visit did not take place. The odd thing is that while all the trouble was on Japan was issuing two postage stamps to commemorate the centenary of the Japanese–American Treaty. One, illustrated on this page, actually shows the then American President Buchanan receiving the Japanese delegates, or envoys. And I am sure that the Americans, in line with their far-famed hospitality, gave them a right royal time. The other value shows the vessel *Kanrin Maru*, which took the Japanese to the

United States, and if the design of the stamp is anything to go by they deserved a warm welcome, as apparently the passage could not have been worse. Leaving world politics out of it, this issue is quite a delight.

THE MALDIVE ISLANDS

It is hard to keep away from geography this month, but as our hobby is reckoned to be a great aid to that branch of learning perhaps occasional small doses will not be out of place! Anyhow, many collectors, when they heard that the Maldive Islands were to bring out three sets of stamps in as many weeks, probably wondered where these islands were. For many years very few stamps from that part of the world ever came one's way, although it is over 50 years (1906) since the first issue appeared. This consisted of six stamps of Ceylon —of which it was a kind of dependency—merely overprinted Maldives. Three years later four more stamps were issued, showing the Minaret of the Juma Mosque in the capital, Malé, and it was not until ten years ago that a further set appeared. Throughout this time it was very difficult to obtain Maldive stamps. Dealers would send cash, but sometimes it was returned. A couple of new stamps were issued in 1952, to be followed in 1956 by the set just replaced. Fortunately, the Crown Agents took over the handling of Maldive stamps, and from then on there was no trouble about getting them.

Now there has been a further change. A New York agency has been given the concession, and the first move is the issue of three new sets all at once consisting of as many stamps as the Maldives had previously put out in the whole 54 years of its (*Continued on next page*)

Stamp Gossip—

(*Continued from page 585*)

philatelic history. The Maldive Archipelago, which consists of hundreds of islets and atolls, is in the Indian Ocean and on the map you will find it just below Ceylon Although it has never actually formed part of the British Commonwealth (I have the authority of the Ministry of Commonwealth Relations for saying this) "the United Kingdom is responsible for the conduct of the political relations of the Maldivian Government with other countries."
In other words, we run its foreign relations, which I suppose brings the stamps in question within the scope (if you wish) of a Commonwealth collection.

THE NEW SEASON

While the old hands collect stamps all the year round, younger collectors like to give the hobby a bit of a rest in summer so that they can enjoy the open air. By the time these lines appear in print, however, young and old will be hard at it again, and many will be thinking of new albums, and of buying the new catalogues. Regarding the former, if you want your album to do you good service—if it is one of the loose-leaf type—do not add extra leaves. To do so will put such a strain on the springs that they may sag and the leaves become loose and untidy. As to catalogues, general collectors will find *Gibbons Simplified Catalogue* a great help, and for the many collectors of British Commonwealth "QE" stamps the new edition of the Commonwealth Catalogue of Queen Elizabeth stamps (price 7/6d.) is out, with much new information.

THE TIP OF THE MONTH

I have frequently referred to Indian Stamps, because those issued since India obtained her freedom are attractive and, in consequence, very popular. Recently, India issued two stamps (as mentioned at the time) in honour of her poet Kalidasa, and while this pair of stamps will never be rarities they are very much worth buying, used. The 1.03 np value in particular is not likely to be plentiful.

For Stamp Enthusiasts—(*Continued from page 583*)

kicking off with the recess printed stamps of 1899 we are soon among issue after issue, some showing portraits of presidents, etc., but many are pictorials which have often been a feature of Cuban issues. There are many air stamps, too. For instance, in 1931 a set was brought out which ran from 5c. (as illustrated) to 1 peso. I notice that the lowest catalogue price for any of this issue (used) is 3d. and the top price is 1/9d. for the peso value. But the scarce stamp in this set is the 15c. carmine. This one is quite difficult. But you will be able to buy most of these air stamps at much below catalogue price.

And here a word of warning about Cuban stamps. The cancellations are often very heavy and, also, you see a lot of off-centred stamps about. Do not have anything to do with these, no matter how cheaply they may be priced. A used collection of Cuban stamps can be made to look very attractive if the stamps are well centred and bear nice postmarks, but if yours are poor copies they will not interest your non-collecting friends a bit. Not all Cuban stamps are badly centred, of course, for the British firm of Waterlows have printed a couple of issues for that country which were all right in this respect. But, to repeat, Cuban stamps have, in the main, the off-centre weakness; so look out.

Countries like Australia, and now New Zealand, have entered the Christmas stamps stakes, but Cuba has been producing such issues for some years past, and jolly stamps they are. Readers may remember that last December one was illustrated in the *M.M.* showing a Father Christmas; another depicted a fine fat turkey —and, incidentally, there may be wild turkeys in Cuba, as they originated in Mexico, which is not so far away. One of these Christmas stamps, with a most appropriate design, is illustrated on this page. I wish there was room to show more, but—and this is one of the main reasons why I am suggesting this country—you will be able to pick up copies for very little, as there are plenty about. Most of Cuba's Christmas stamps have looked very Christmassy from our point of view, but there was one issued in 1958, which depicted an orchid.

Anyhow, if you are a thematic collector and go in for birds or flowers, or aviation or architecture, etc., Cuba will provide you with interesting specimens for your collections. There is even a stamp showing boxers, and a baseball player, for Cuba is one of the few countries outside the United States where that game has taken on.

Well that's enough to start you off with an interesting country as far as its stamps are concerned. I hope you find a nice big selection cheap, as a good start.

FREE

Another fine surprise packet. Nice modern set and good world stamps. All Different to new applicants for my splendid approvals.
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The Secretary,
The Nook, Bolton-le-Sands, Carnforth, Lancs.
(Please tell your parents)

(*For other Stamp Advertisements see also pages 582 and 584*)

"Mr. Helicopter"—(*Continued from page 547*)

During all these years, Igor Sikorsky never lost his early belief that the future of flying lay in vertical take-off and landing. In 1931 he patented a design for a helicopter. Seven years later, after his company had been taken over by the United Aircraft Corporation, he persuaded its management to let him build this aircraft. The result was the VS-300, with a 75 h.p. engine and rotor of 28 ft. diameter, which flew for the first time on September 14, 1939.

Up to that time, the only successful helicopters had been heavy, twin-rotor affairs, able to do little more than lift their own weight and that of a pilot. The VS-300, with its single main rotor, was different, and from it have been evolved a high proportion of the helicopters which perform such astonishing feats all over the world today.

Igor Sikorsky's dream has come true and his name is the greatest in the whole history of helicopters. Now, at the age of 71, he has retired: but this does not mean he has lost any of his interest in the aircraft that continue to bear his name.

Last year, he watched patiently while the big S-60 Skycrane was fitted with a simple platform and made to carry everything from oil drums to a concrete mixer. Afterwards he said "Let's put some seats on the platform and see what it's like".

Four seats were bolted in position. Sikorsky strapped himself into one of them and invited three of the company's senior engineers to join him. The original idea was to hover just above the ground. This felt so good that the men decided to try a trip "just once round the field". Before long they were cruising at 80 m.p.h. at a height of 1,500 feet over the surrounding countryside.

Perhaps it was that promenade deck on the *Ilia Mourometz* that gave Igor Sikorsky the idea. Anyway, he suddenly unbuckled his safety belt and went for a stroll round the platform, testing the action of its flexible suspension and the force of the wind at various points. This time nobody joined him, and before the S-60 flew again a safety rail was fitted to the platform!

Space Notes—(*Continued from page 549*)

instrumented lunar rocket is a moonquake recorder now being developed for the National Aeronautics and Space Administration. It is intended to provide answers to such questions as: Does the Moon have a crust or core like the Earth? Are its rocks related to those of the Earth? Is any radioactive heat being generated inside the Moon?

Many of our current ideas on the Earth's structure are derived from earthquake recorders. Earthquake waves are changed as they go through various types of rock, and recordings thus give valuable information on the Earth's crust and core. Even if no moonquakes were recorded this would tell us that there is no internal radioactivity disturbing the interior of the Moon, and that the Moon is, indeed, cold and dead.

Christmas Card Cavalcade—(*Continued from page 557*)

in the days when the countryside was first invaded by motorists.

Three years later, some amusing scenes appeared on Christmas cards. One showed motorists stranded short of "a little drop of oil," while another depicted youngsters, taking advantage of a hold-up caused by road repairs, begging for cigarette cards.

As mechanical vehicles became more commonplace on the roads, the novelty value, which for a while made the motor a subject for card decoration, gradually decreased and more topical items were substituted. Airships, aeroplanes, and even rockets among others, gained in temporary popularity.

But cards portraying methods of land transport continue to be firm favourites. Manufacturers, transport operators, and enthusiasts, persist in sending cards with a transport message. A benevolent Santa Claus driving a rickety old car off a roll-on-roll-off ship was the motif of the Transport Ferry Service card recently, and a Glasgow locomotive manufacturer selected a colourful sketch of the Engine House at Swindon, over a century ago, for a card in 1957. A striking impression of diesel and electric traction on our railways and entitled "The Shape of Things to Come?" was the colourful card sent by the North Eastern Area Board of the British Transport Commission, in 1956.

In America, three billion cards will be sold this Christmastime and manufacturers are confident that on both sides of the Atlantic the sale of greeting cards will be setting new records. As before, many of these cards will be illustrated with a transport scene, reflecting the interest taken in travel, perhaps subconsciously, as the means also by which loved ones and friends may be united during the festive season.

Turtlin' Off the Caymans—(*Continued from page 551*)

the hold. It is literally turned turtle, with its flippers drooping on the deck, and a hollowed wooden pillow is wedged under its scaly neck to ensure safe arrival at Key West.

The wide hold is soon carpeted with snorting turtles ready to be sold in Florida at fifteen dollars each.

The captain goes down below and carves his brand, usually an initial, on the soft creamy undershell of the turtles. This will establish his share of profit when the fleet's catch is sold in Key West.

Individual ships of the fleet all rendezvous at a chosen islet and set sail for the north, very often having to run before one of the hurricanes that rip across the Caribbean.

These gallant crews, survivors of a dying breed of men, having sold their dangerous catch, soon sail south for a brief visit to their homes among the islands. Long before their harvest reaches the cannery they are back at Mosquito Key in their dories, braving sharks, reptiles, thirst and the sea.

Next time you have turtle soup, think of the Cayman Islanders.

Spotlight on the Great Eastern Line

—(*Continued from page 563*)

trains, features, which in more modern form, have been lately introduced at other traffic centres.

While at March on an early summer Saturday this year, or while travelling from there to Brandon, Suffolk, on the Norwich line, and back I saw fifteen different Brush A 1 A–A 1 A, and six Bo–Bo D5000 class, type 2 diesels on trains along G.E. Lines. There were only comparatively few steam locomotives, of classes K1 and K3 2–6–0; B1 4–6–0; the single D16 4–4–0 illustrated on page 562, plus one or two goods types. A few L.M.R. class 5 engines as well as class 4 2–6–0 and 2–6–4T representatives were seen. Jubilee 4–6–0 No. 45650, *Blake*, was at Peterborough, and some class 4 0–6–0s. There were also diesel multiple-unit sets.

Altogether it was another busy and fascinating look round!

Fuel Cell Motoring—(*Continued from page 573*)

There are, in addition, a number of interesting safety features about the Cella 1. It is proposed, for instance, to fit a telescopic instrument panel which would slide forward in the event of bodily impact. Swivel front seats and rear seats facing backwards would also be incorporated. All seats would be form-fitting and safety belts or harness would be standard equipment.

Developments on a Midland Layout

—(*Continued from page 575*)

track. This inner oval also incorporates a circular section, passing through built-up scenery and traversing a tunnel.

"This built-up scenic portion consists of an old green velvet dress with crumpled newspaper underneath, and we have splashed paint on the velvet. The tunnel and wall are made of hardboard covered with a grey stone effect paper. The other section of raised scenery is covered with brown fleecy material and tree bark. The scenery at the back and sides is of paper, and we have painted the board in colours to match the scenery and to give it a more life-like appearance. For instance, we have carried a 'stream' from the paper on to the board and across one corner, with a bridge over it."

From Our Readers

KINGS NORTON STOP LOCK

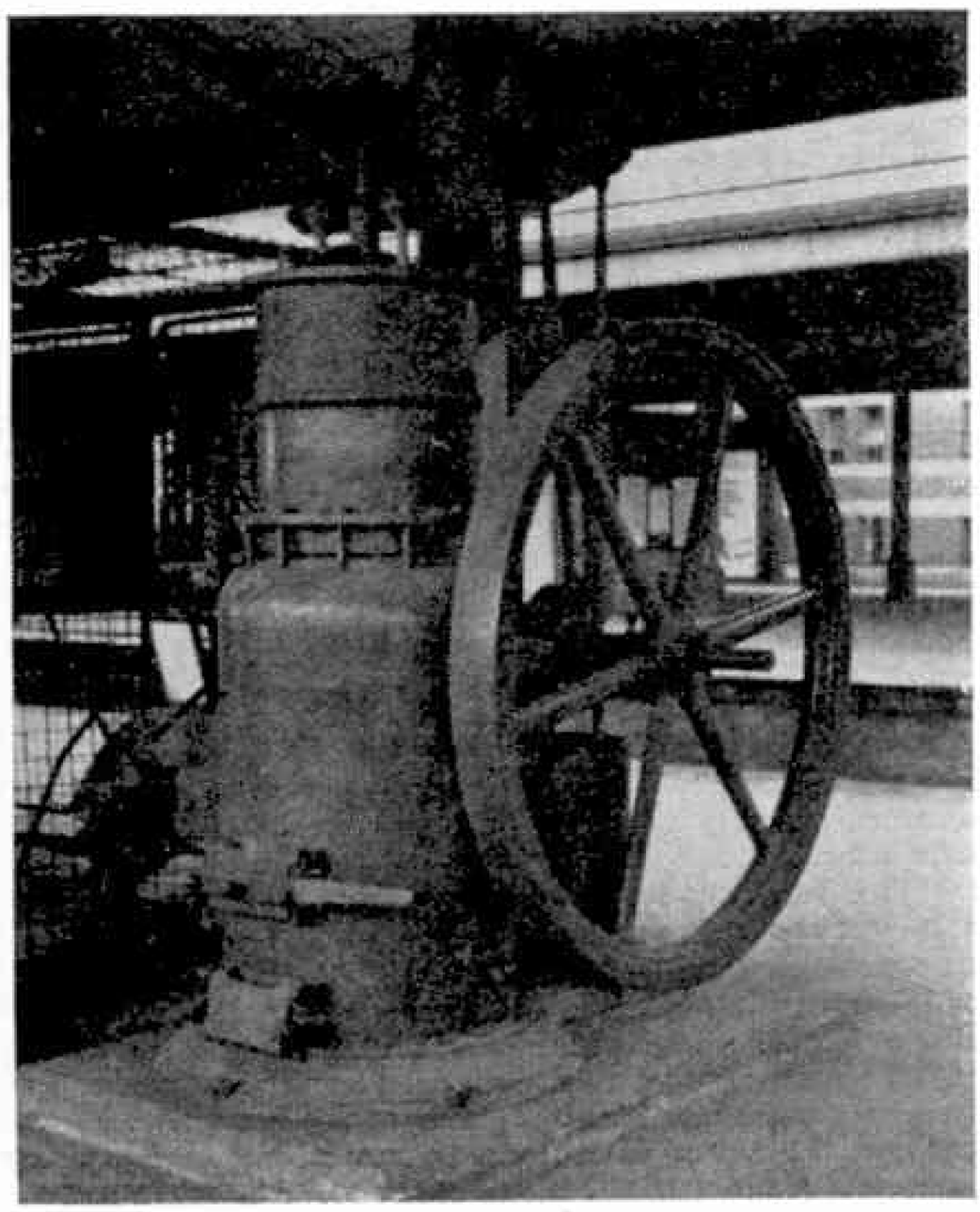
AT the northern end of the Stratford-on-Avon Canal, a few yards from its junction with the Worcester and Birmingham Canal at Kings Norton, is a stop lock remarkable in that it has guillotine gates—which are raised vertically when open—instead of normal swinging gates.

Stop locks were built at canal junctions, not always to overcome a permanent change of level in one direction, but often to prevent water running from one canal to the other should the level of either drop for any reason. Since the flow through a stop lock might be either way, two sets of conventional gates are required, opening in opposite directions. With guillotine gates, which are held in vertical grooves and pulled upwards, it does not matter on which side the pressure is greater. In fact, at the time the photograph was taken, both gates were open.

The only other gates of this type to be built on the British canal system were on the Old Shropshire Canal at Hadley—now derelict. Much more recently, however, large steel guillotine gates were installed on the River Nene for the control of water level and flooding.

A. M. JENKINSON (Bromley, Kent).

Guillotine gates on the stop lock at Kings Norton.



A relic of the last century—the hot air engine at Newton Abbot.

OLD HOT AIR ENGINE

A hot air engine built more than 90 years ago still exists as an interesting reminder of the old Bristol and Exeter Railway. Anyone visiting Newton Abbot, Devon, can readily examine this relic, for it forms a permanent exhibit on the station platform, quite close to the old broad gauge engine *Tiny* shown on page 198 of the April 1960 edition of the *M.M.* A framed description on the engine gives the following details:

"This engine, which is one of seven taken over from the old Bristol and Exeter Railway in 1876, was built by Messrs Fox, Walker & Co. in 1869–70.

"It was used to drive a three-throw pump of about 5″ dia. × 8″ stroke, by means of a belt, and was capable of delivering about 2,000 gallons of water per hour when working at its normal speed of about 72 r.p.m. A similar engine was at work at Chard until 1937.

"This type of engine takes about one hour to start up, and the fuel consumption is about one bucket of anthracite every two hours. Each working stroke is made with a fresh charge of hot air, the exhaust passing out to the atmosphere with the return stroke of the piston.

"This engine was exhibited at Darlington in connection with the Railway Centenary Celebrations in 1925."

CYRIL E. WRAYFORD (Bovey Tracey).

Fireside Fun

Two of the three partners in a cinema-theatre were discussing measures to improve attendance. "We ought to make the seats more inviting" said one. "I think we should cover them with mohair."

"I think they need re-upholstering, too," said the second partner. "But they should be covered with red leather." Then they asked the third partner.

"I think we should cut the prices of admission," he declared, "and cover the seats with people."

"Personally I love the outdoor life—athletics, swimming, bird-watching, farming, nature study—I spend every minute of my spare time watching them on T.V.!

When the chicken had been served, little Janet found herself with a wing. She nibbled at it for a while and then called to her father: "Daddy, may I have a different piece? This one is all hinges."

* * * *

Mr. Jones was thanking his friend for a race tip. "You said it was a great horse and it was. It took eleven other horses to beat that one."

* * * *

"How far is it to the nearest town?" asked the motorist.

"Five miles, as the crow flies."

"And how far if the crow has to walk, carrying an empty petrol can?"

* * * *

Archie had been waiting almost fifteen minutes to cross the street, and still the traffic flowed on in a steady stream. Spotting a man on the other side, Archie managed to shout to him over the din of the traffic: "How the dickens did you get across?" "Me?" shouted back the man, "I was born here."

* * * *

During a hurricane a woman was terribly upset and could not sleep a wink. But her husband was sleeping as if nothing were happening.

"Darling, this house is rocking as if it were going to blow away," she said, shaking him.

"Oh, go to sleep," he said, "we're only renting it."

* * * *

A fidgety lady boarded a bus and asked the conductor not to pass High Street without letting her alight there. Every few minutes she nervously reminded him not to take her past her destination. Finally, she capped her fidgeting by poking him with her umbrella. "Isn't that High Street?" she demanded.

"No, Ma'am," replied the furious conductor. "That's my ribs!"

* * * *

THIS MONTH'S BRAIN TEASER

Two boys stood near a clock tower to find out which of them could hold his breath the longer. The first held his breath from the first stroke of 12 to the sixth, and the other from the sixth stroke to the twelfth. The first boy therefore claimed a draw. Was he correct? If not who won?

* * * *

Solution to Last Month's Crossword

The solution of the Five Minute Crossword that appeared in the "Fireside Fun" page last month is shown on the right.

1 M	A	G	I	C
■	N	■	G	■
4 O	V	A	L	S
■	I	■	O	■
5 A	L	L	O	T

BUCCANEER IS BACK!

"BUCCANEER"

one of the most popular and well loved of pre-war board games, is, as its name implies, a swashbuckling, adventurous game full of interest, fun, and ingenuity. Produced to Waddington's own standards of high quality, "Buccaneer" contains all the thrills of voyages to Treasure Island, and bringing home the treasure . . . including realistic looking diamonds, rubies, bars of gold, pearls, and barrels of rum!

Equally valuable cargoes can be captured on the High Seas . . . or you can trade for cargo at a foreign port.

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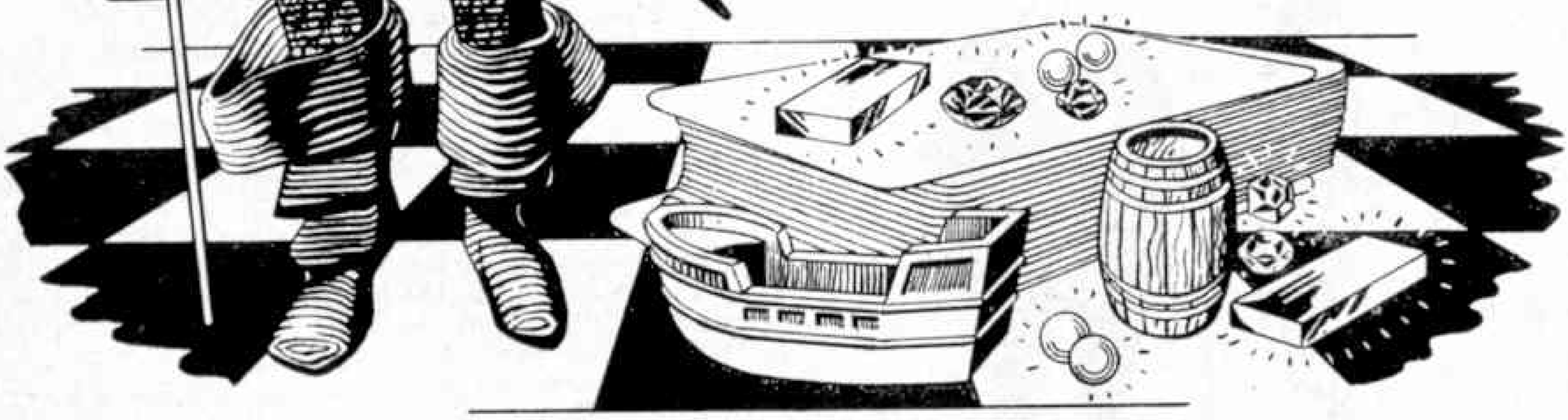

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Look! the latest

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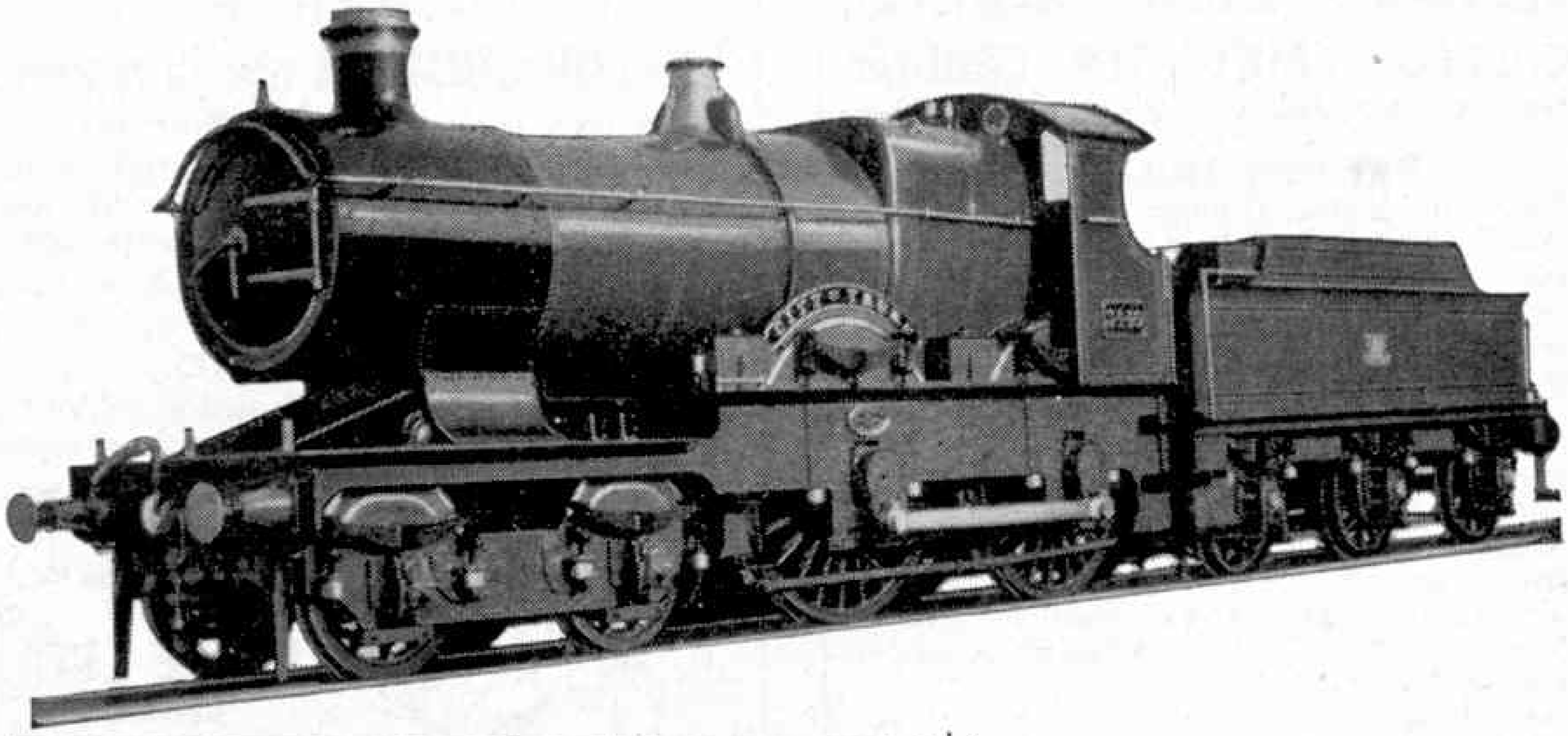

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✳ LOOK OUT FOR NEXT MONTH'S NEW MODEL!

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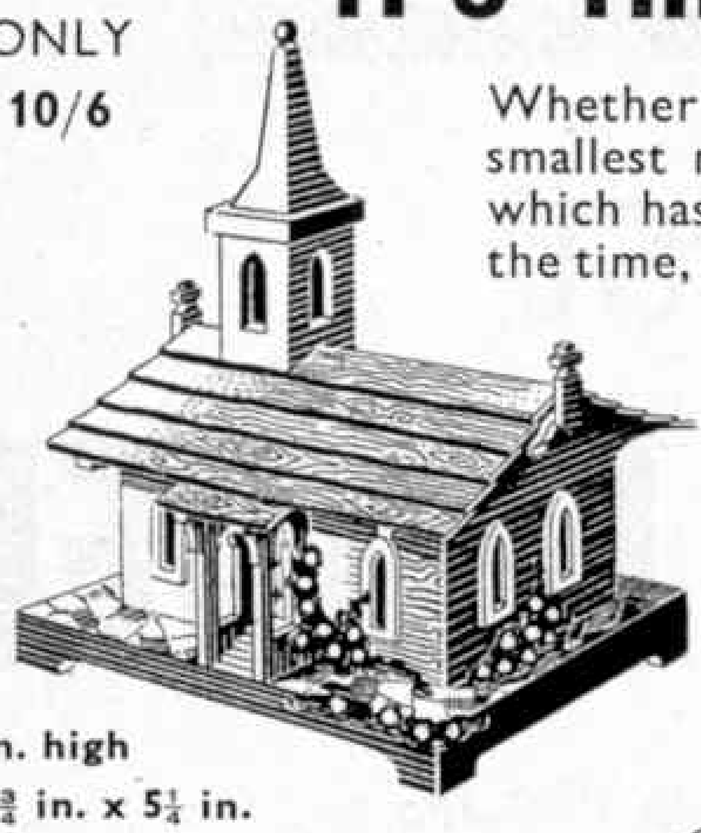

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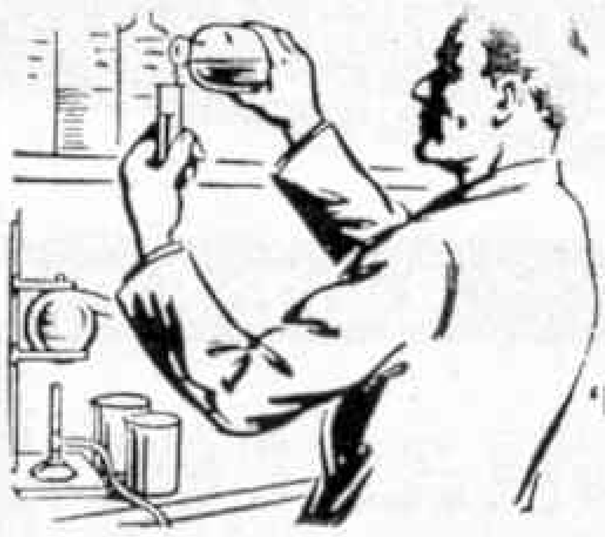

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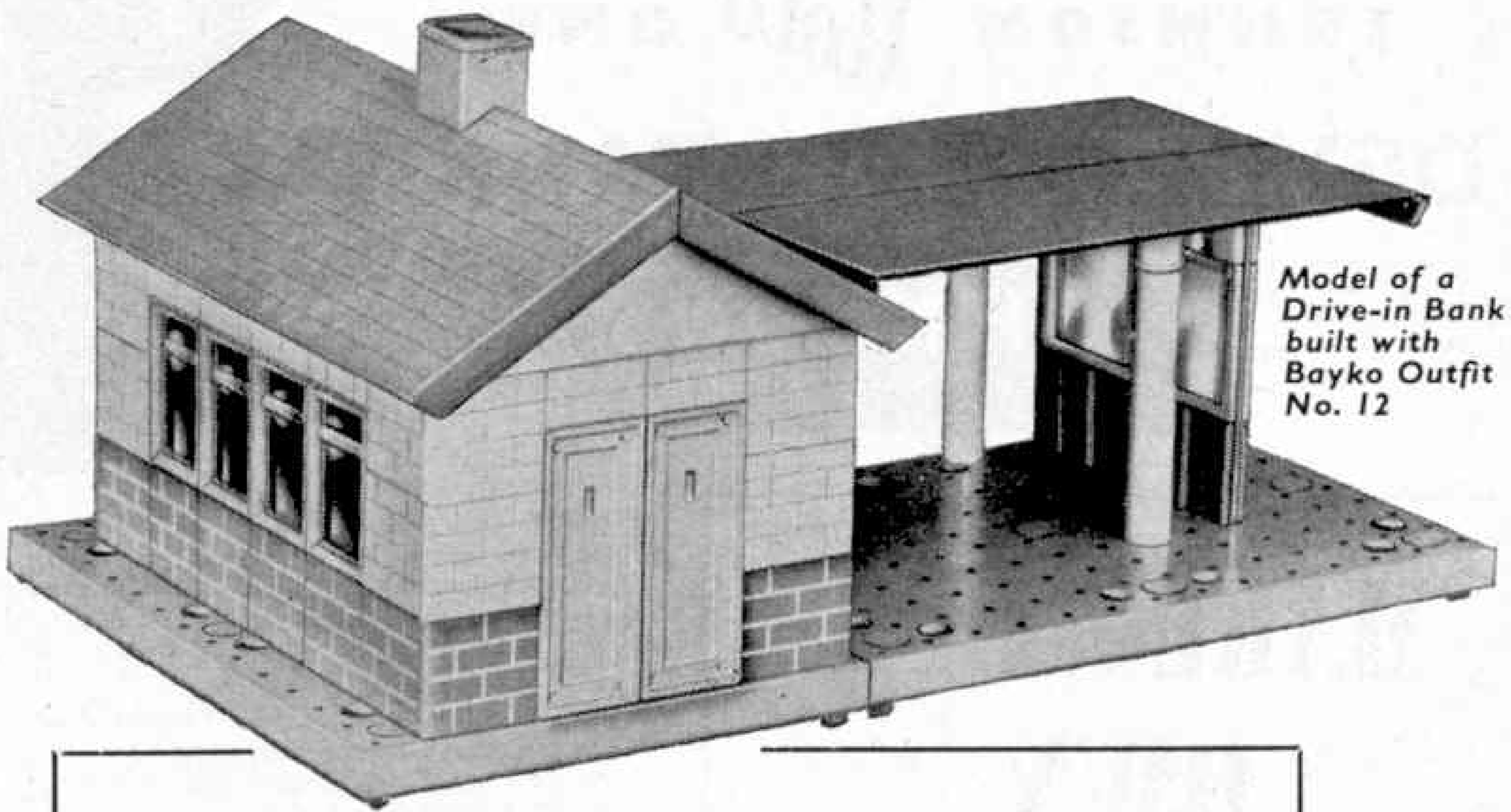

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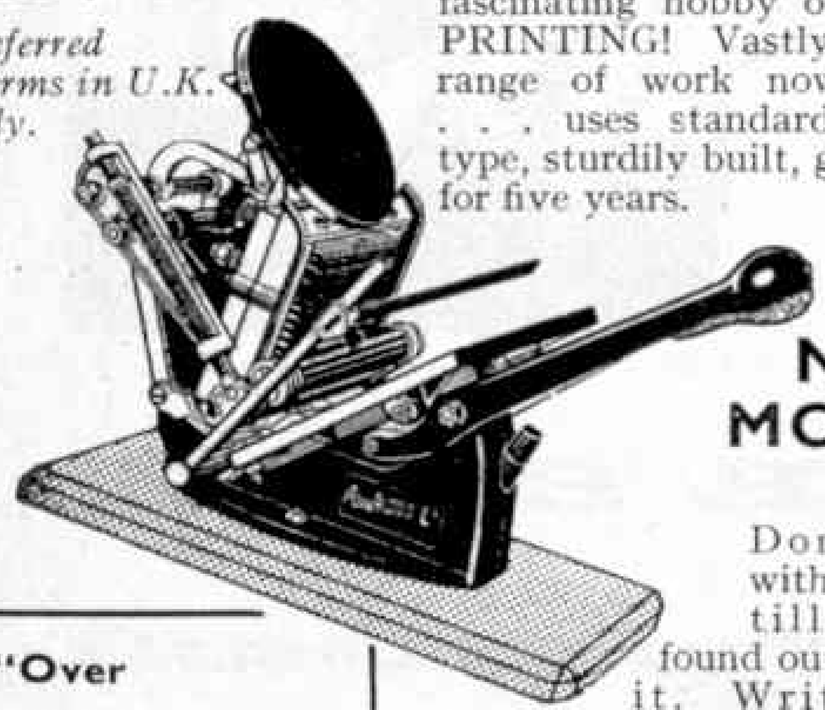

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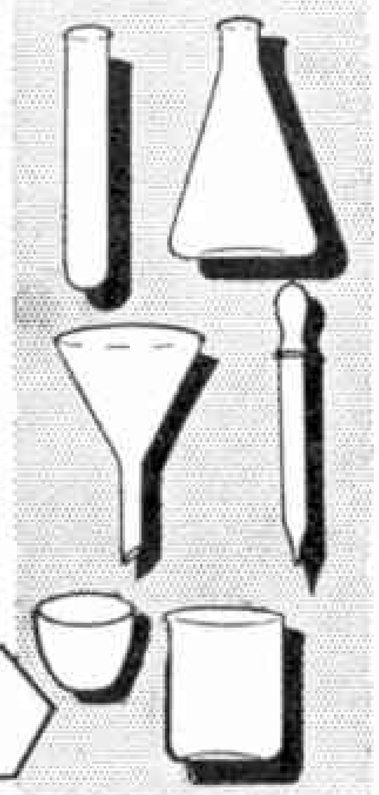

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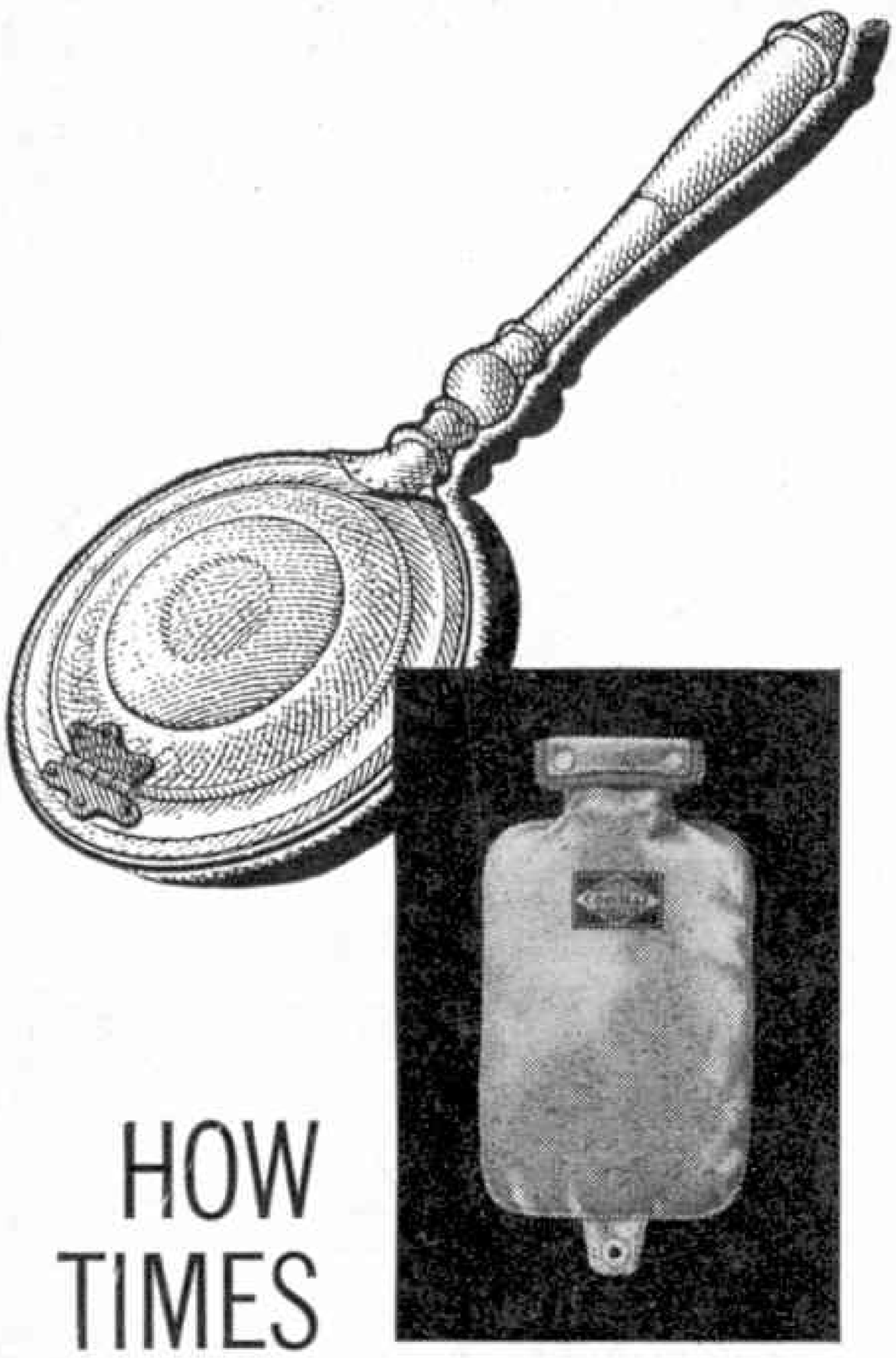

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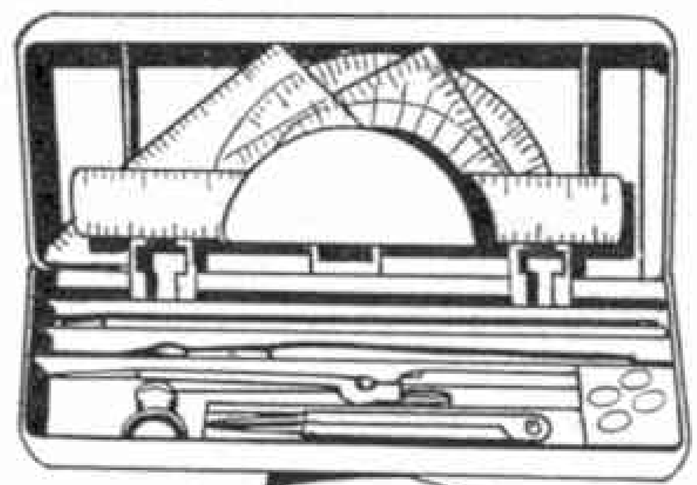

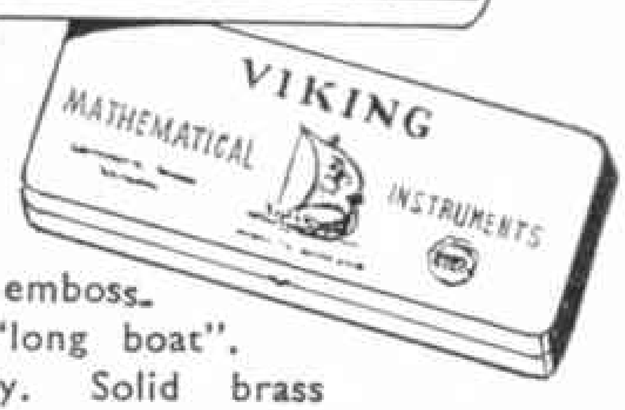

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As announced on this month's Editorial page, the *Meccano Magazine* is to appear in brighter form, with bigger page area, from January 1961.

What a wonderful gift a year's subscription for this new enlarged *Meccano Magazine* will make for your friends. They will enjoy the magazine's distinctive features and month by month each new issue will remind them of your good wishes.

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TRADE MARK REGISTERED

NEW

Add this new fighter to your collection

DINKY TOYS No. 738
DH 110 SEA VIXEN FIGHTER

A fine new model of the two-seater Sea Vixen, a carrier-based fighter in service with the Royal Navy. The prototype is powered by two Rolls-Royce Avon turbojets. Armament is normally four Firestreak missiles, and 28 2-inch rockets. For the record, the Sea Vixen is 53 ft. 6½ in. long with 50 ft. wing span. U.K. Price **2/11**
Wing span of model 3 $\frac{3}{16}$ in.

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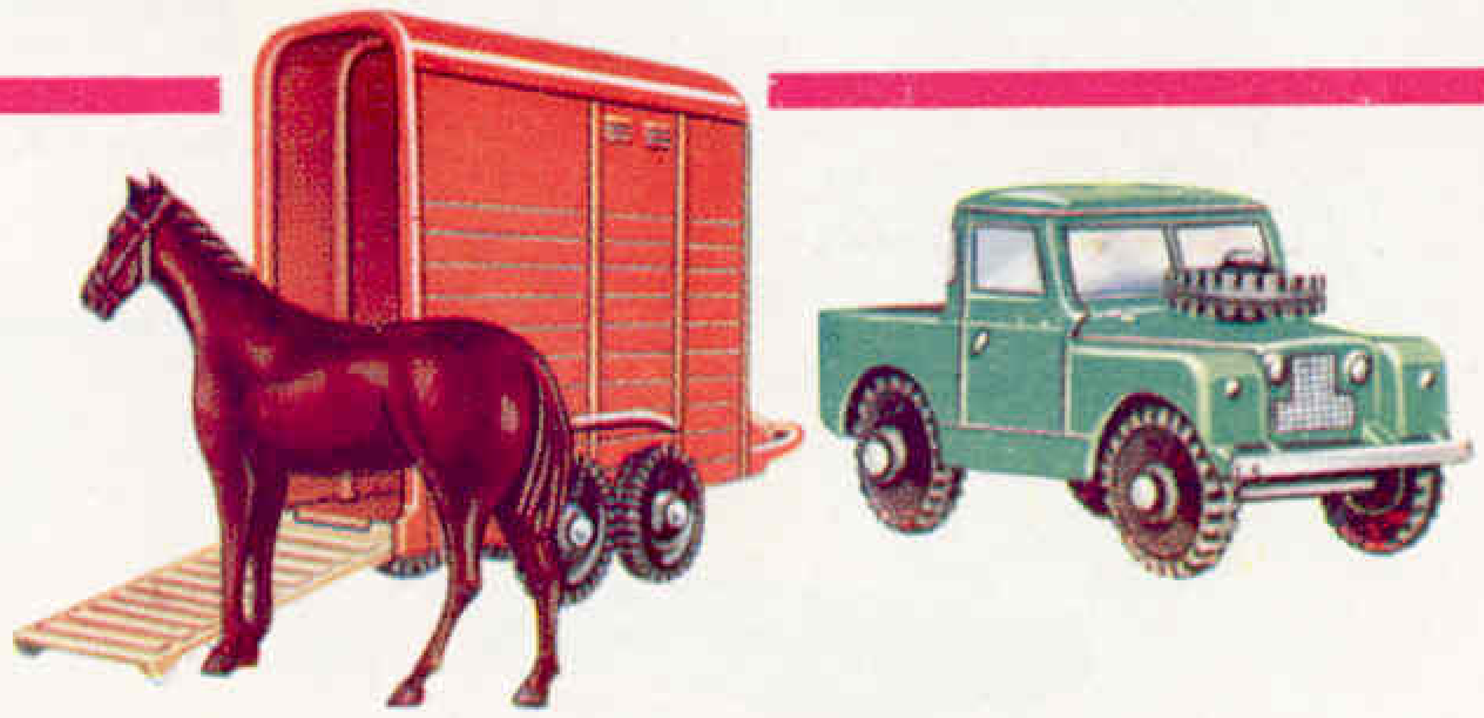

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No. 073 LAND-ROVER (with windows) and HORSE TRAILER (with horse)

Here's a fine Dublo Dinky Toy to associate with Hornby-Dublo railway scenes: the Horse Trailer, used to transport the horse from stable to showground or racecourse. Land-Rover (with windows) and Horse Trailer (with horse), No. 073 complete.
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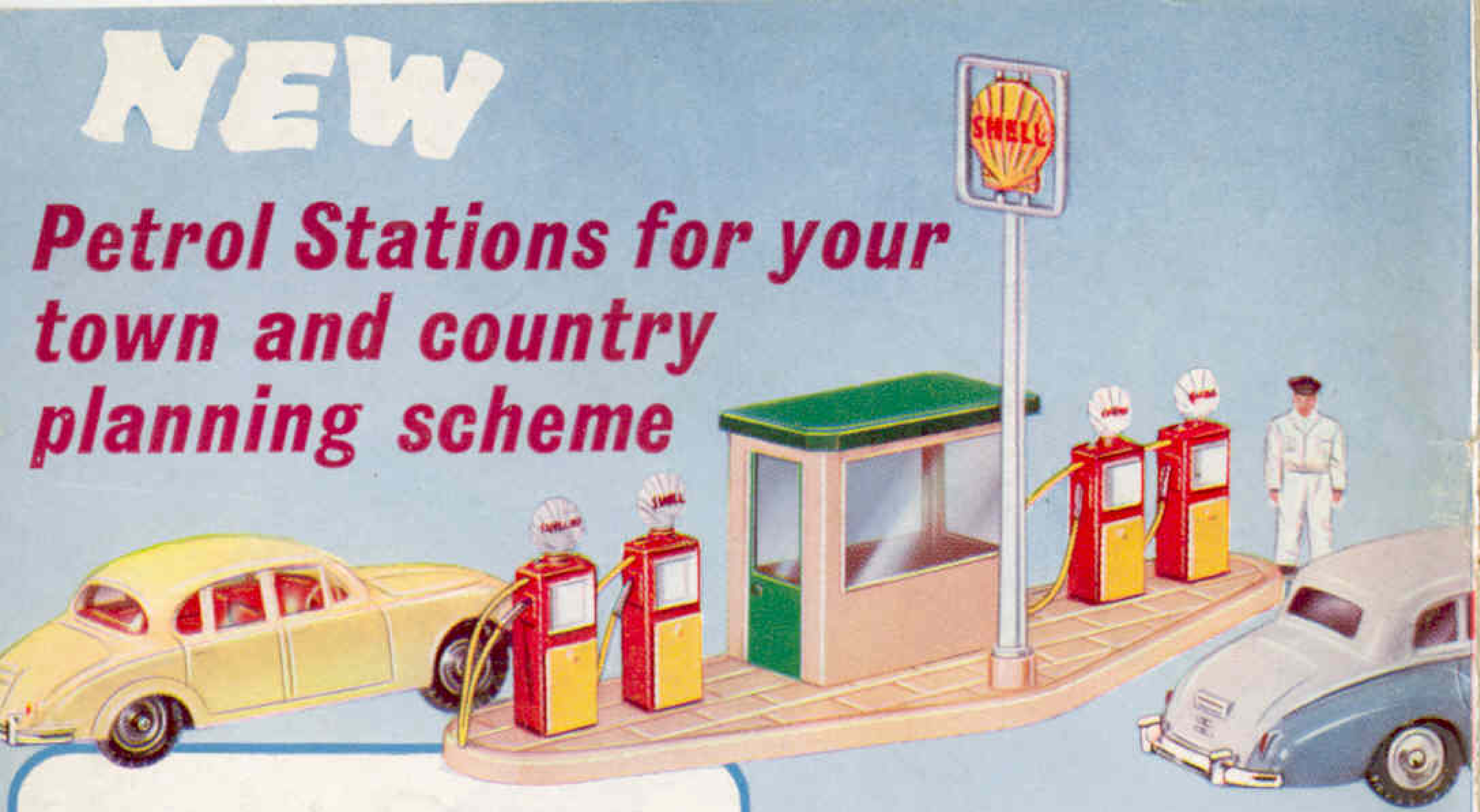
NEW

Petrol Stations for your town and country planning scheme



DINKY TOYS No. 782 PETROL PUMP STATION SHELL

This is a fine model of a typical petrol pump station. Two of the petrol pumps represent the type for Shell standard grade, and the other two Shell-Mex spirit. The centrally-positioned pay-box is fitted with windows, and although these illustrations show the base to be in stone colour, it is naturally grey to match the components of the Dinky Toys Pavement Set.

The models illustrated will be recognised as Dinky Toys No. 195 Jaguar 3.4 Mark II and Dinky Toys No. 150 Rolls-Royce Silver Wraith.

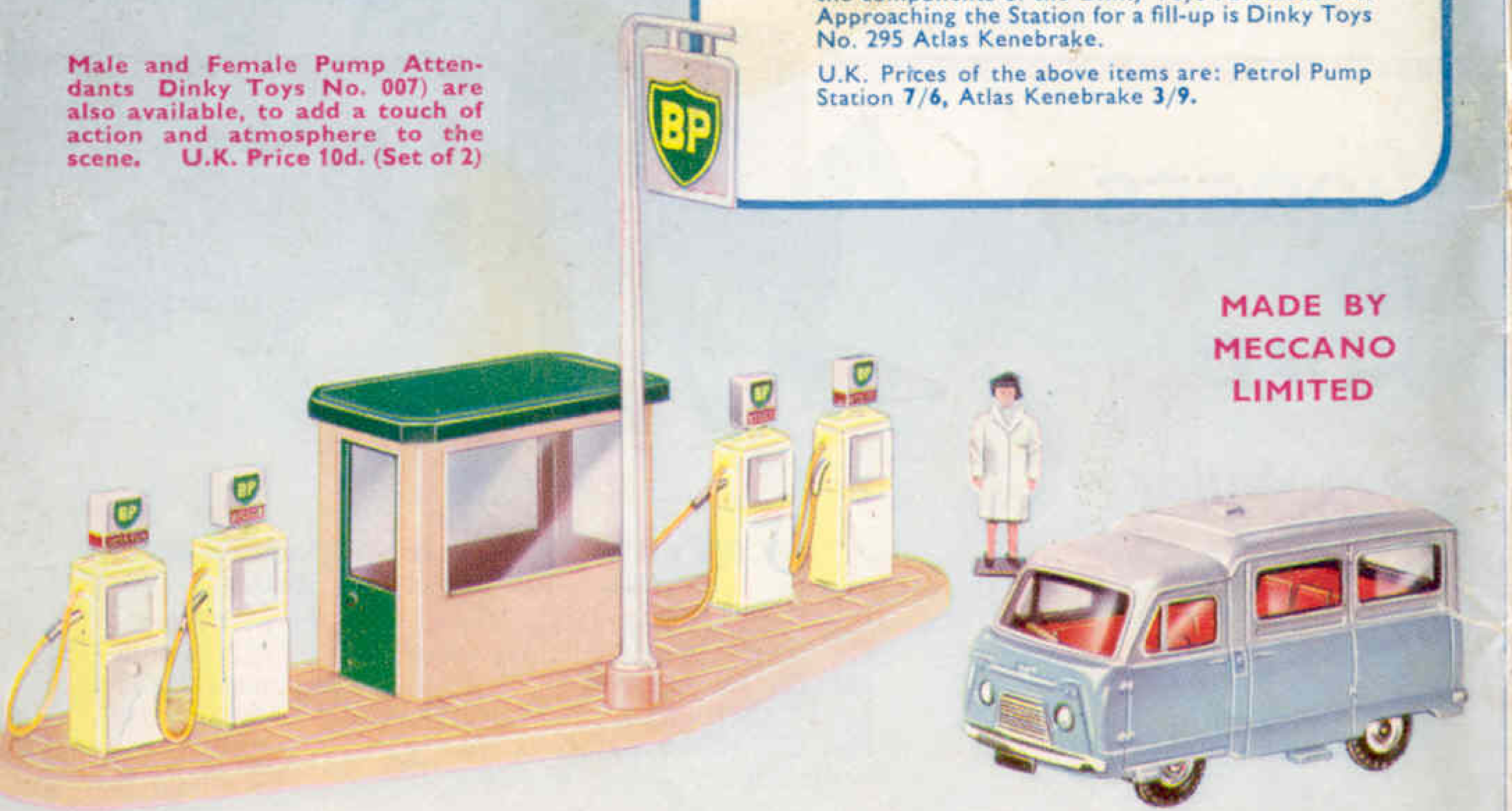
U.K. Prices of all the above items are:
Petrol Pump Station **7/6**, Jaguar 3.4 Mark II **3/11** and Rolls-Royce Silver Wraith **5/4**.

DINKY TOYS No. 783 PETROL PUMP STATION B.P.

This set is similar, but modelled on the B.P. pattern, with a standard carrying the familiar brand sign. In our illustration, the base is shown as stone, but the models are being supplied with grey bases to match the components of the Dinky Toys Pavement Set. Approaching the Station for a fill-up is Dinky Toys No. 295 Atlas Kenebrake.

U.K. Prices of the above items are: Petrol Pump Station **7/6**, Atlas Kenebrake **3/9**.

Male and Female Pump Attendants Dinky Toys No. 007) are also available, to add a touch of action and atmosphere to the scene. U.K. Price 10d. (Set of 2)



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DINKY TOYS

TRADE MARK REGISTERED

MODEL OF THE MONTH.

Block-setting Crane.

Illustrated in the November, 1960, issue of the Meccano Magazine.

Top of Gantry.

First build two H-section Girders 1, each consisting of two $5\frac{1}{2}$" Angle Girders bolted to each side of a $5\frac{1}{2}$" Flat Girder. Another two H-section Girders 2 are made in a similar manner but with two $5\frac{1}{2}$" Flat Girders, one with its elongated holes pointing towards the base. These four H-section Girders are bolted together at each upper corner to form a rectangle.

The Sides of the Gantry.

At each corner of the gantry top four more H-section Girders 3 are secured to the protruding $5\frac{1}{2}$" Flat Girders to form the gantry legs. Two $1\frac{1}{2}$" Angle Girders 4 are fixed to the Angle Girders 1, to support the Angle Girders 3, with a $3\frac{1}{2}$" Angle Girder 5, and two $4\frac{1}{2}$" Strips 6 are bolted to the $5\frac{1}{2}$" Flat Girders and attached to the H-section Girders 3. A $5\frac{1}{2}$" Angle Girder 7 is bolted to the lower ends of each pair of H-section Girders as shown. Two Double Brackets with a $5\frac{1}{2}$" Strip 8 between their lugs, are bolted to the lower ends of each of the tower legs 3 to support the bogies. In the centre hole of the $5\frac{1}{2}$" Strip 8, a 2" Slotted Strip 9 is secured.

The Bogies.

There are four bogies, each of which is made from two $3\frac{1}{2}$" Strips 10, bolted to two Double Brackets 11, with two Washers between each lug and the Strips. To each Strip a 1" Corner Bracket 12 is bolted and this is used to attach the bogie to the Double Brackets on the tower legs. Two 1" Pulleys are placed in position on $1\frac{1}{2}$" Rods held in the $3\frac{1}{2}$" Strips by Collars.

One of the $1\frac{1}{2}$" Rods in each bogie also has a $\frac{7}{8}$" Bevel Wheel secured to it as shown. To the inner Double Bracket 11 of each bogie a 2" Slotted Strip 13 is bolted. A Fishplate 14 is attached to a $\frac{1}{2}$" x 1" Angle Bracket bolted to the $3\frac{1}{2}$" Strip 10. The bogies are fastened to the Gantry legs by passing a $1\frac{1}{2}$" Rod through the 1" Corner Brackets and the Double Brackets, a Collar being used to hold the Rod in place. A $3\frac{1}{2}$" Rod 16 journalled in each of the bogies as shown carries three Bevel Wheels, a Collar, and a Short Coupling. A $5\frac{1}{2}$" Strip 17 is bolted between the

H-section Girders 2. The drive to the bogies on each side of the model is taken through a $6\frac{1}{2}$" Rod 18 on which is fixed a Bevel Wheel and a 1" Sprocket Wheel at its upper end. The Rod is journalled in a hole of the $5\frac{1}{2}$" Strip 17 and in the bore of the Short Coupling.

Now bolt a 6" Circular Plate to the H-section Girders 1 and 2, using Washers where required to level up. A 60-tooth Gear Wheel is secured in the centre of the Circular Plate, each of the securing bolts having two Washers on its shank, and this provides a bearing for an 8" Rod 19 that carries two $\frac{3}{4}$" Sprocket Wheels. Sprocket Chain connects each of these Sprockets with the Sprockets on the Rods 18 as shown.

The Roller Bearing.

To make the roller bearing bolt eight $1\frac{1}{2}$" x $\frac{1}{2}$" Double Angle Strips to a 6" Circular Plate, spacing them away from it with two Washers on each Bolt. A $2\frac{1}{2}$" Rod is passed through the lugs of each Double Angle Strip and is fitted with a $\frac{3}{4}$" Flanged Wheel at its outer end and a Collar to hold it in place at its inner end. One of the Rods has the retaining Collar between the lugs of the Double Angle Strip to allow for a 7/16" Pinion 35. The Flanged Wheels ride on the rim of the Circular Plate, which has a Wheel Disc bolted to its centre on the other side.

Two $5\frac{1}{2}$" Angle Girders 20, forming a U-section Girder are secured to each side of the Circular Plate by the Bolts 71 and 72. The bearing can now be placed in position on the Rod 19.

Details of the Boom.

To each of the compound angle girders 20, bolt four upright $4\frac{1}{2}$" Angle Girders 21, and along the upper edge extend a pair of U-section channel Girders 22, each composed of two $24\frac{1}{2}$" and two $9\frac{1}{2}$" Angle Girders overlapped two holes. The trolley rails 23 are $18\frac{1}{2}$" Angle Girders bolted to the $24\frac{1}{2}$" Angle Girders 22. The Girders forming the lower member of the boom are similarly constructed, the forward portion consisting of $18\frac{1}{2}$" Angle Girders 24 attached to the Angle Girders 20 by a $2\frac{1}{2}$" Curved Strip, and the rear portion of Angle Girders 25, attached with a 2" Strip. The upper and lower members are braced together by Strips of various lengths arranged as shown. The rear Angle Girders 25 are joined together by two $3\frac{1}{2}$" x $\frac{1}{2}$" Double Angle Strips 26 and a $4\frac{1}{2}$"

$2\frac{1}{2}$" Flat Plate 27. Two $5\frac{1}{2}$" Angle Girders 28 and two $1\frac{1}{2}$" Strips connect the upper and lower members of the boom at the front. Two $3\frac{1}{2}$" Angle Girders 29 are bolted to the Angle Girders 28, and another $3\frac{1}{2}$" Angle Girder joins them at the top. The upright Angle Girders 21 are supported by three $3\frac{1}{2}$" Strips 30 and two crossed $5\frac{1}{2}$" Strips 31 at the front. A $3\frac{1}{2}$" x $\frac{1}{2}$" Double Angle Strip 32 is bolted between the Angle Girders 22, with two Trunnions 33 secured to the top of the Girders. A $1\frac{1}{2}$" and a $2\frac{1}{2}$" Strip are bolted to the Double Angle Strip 32 to provide a bearing for the upper end of the $6\frac{1}{2}$" Rod 34, which carries a $1\frac{1}{2}$" Contrate Wheel 36 and a 7/16" Pinion 35 (see illustration of roller bearing). The 8" Rod 19 has a $1\frac{1}{2}$" Contrate Wheel secured to its upper end, and this engages a $\frac{3}{4}$" Pinion 38 on a $4\frac{1}{2}$" Rod, that carries also a 1" Sprocket Wheel 39. The Rod is journalled as indicated in the general view of the completed model.

The Crane Trolley.

The trolley is designed to travel along the rails 23. Two $4\frac{1}{2}$" Angle Girders 40, together with two $2\frac{1}{2}$" Angle Girders 41 form a rectangular frame. To the $2\frac{1}{2}$" Angle Girders are bolted $3\frac{1}{2}$" Flat Plates 42. The trolley runs on $\frac{3}{4}$" Flanged Wheels fixed on two 5" Rods held in position by Collars. Two $\frac{1}{2}$" x 1" Angle Brackets 43 are bolted to the Girders 41. Four 1" loose Pulleys are placed on a 5" Rod, with 2" Strips between them. The Strips are held on another 4" Rod 44 journalled in the $\frac{1}{2}$" x 1" Angle Brackets 43 bolted to the side girders of the trolley.

The Drive Mechanism.

Bolt a $4\frac{1}{2}$" x $2\frac{1}{2}$" Flat Plate 50 to each side of the Angle Girders 22 . An E20RS or E15R Electric Motor is now bolted to a Flat Plate 27 fixed across the end of the boom as shown. The Motor shaft carries a Worm so as to engage with a 1" Gear Wheel (not shown) on a $4\frac{1}{2}$" Rod 44. Another Worm 45, a $\frac{1}{2}$" Pinion 46, and a $\frac{3}{4}$" Sprocket Wheel 47 are also fixed on the Rod. The $\frac{1}{2}$" Pinion 46 drives a 57-tooth Gear 48 on the Rod 49, which carries a $\frac{3}{4}$" Pinion. Both the Gear and the Pinion have their bosses against the Flat Plates 50. The winding drum is formed from two Bush Wheels fixed to a $6\frac{1}{2}$" Rod 51 about $\frac{3}{4}$" apart. A $\frac{1}{2}$" Pinion is fixed on this Rod 51, and is adjusted so that when the lever 52 is moved the Pinion engages with the

Cont'd./

Gear Wheel 48 and at the same time a $\frac{3}{8}$" Bolt fitted in a Collar 53 disengages a $\frac{3}{8}$" Bolt fixed in the Flat Plate 50. The lever is attached to a loose Collar by a nut and bolt and placed between two fixed Collars.

All the three Control levers are similar, and are pivotted to Angle Brackets fixed to a 3" x $1\frac{1}{2}$" Flat Plate, that is secured to the bottom edge of the Angle Girders 22. A $6\frac{1}{2}$" Rod 54 carries two 1" Pulleys 55 and a 50-tooth Gear Wheel. By operating lever 56 the Gear can be engaged with a $\frac{3}{4}$" Pinion on Rod 49.

A $\frac{3}{4}$" Sprocket Wheel 57 and a $\frac{1}{2}$" Pinion 59 are fixed on a $4\frac{1}{2}$" Rod 58. Connect the $\frac{3}{4}$" Sprocket Wheels 47 and 57 by a length of Chain. The Pinion 59 drives a 57-tooth Gear Wheel 60 on a $6\frac{1}{2}$" Rod 61 carrying a $\frac{3}{4}$" Sprocket Wheel 62, which is connected by Chain to the Sprocket Wheel 39.

A 1" Corner Bracket is bolted to the top Double Angle Strip 26 and also to the top $3\frac{1}{2}$" Strip 30. An $11\frac{1}{2}$" Rod 63, with two Bush Wheels 64, and a 60-tooth Gear Wheel is placed in the 1" Corner Brackets. Two Trunnions 67 are bolted to the Angle Girders 22. In these is placed a 5" Rod which carries a 1" Pulley fitted with a Rubber Ring and is held in place by Collars. On one end of the Rod is a Coupling which holds a $3\frac{1}{2}$" Rod 68. Rod 68 in turn carries at its lower end another Coupling in which is fixed a 2" Rod 69 that protrudes between the Bush Wheel 64. When the Rod 68 is moved over it brings the $\frac{1}{2}$" Pinion 65 into mesh with the Contrate Wheel 36 and the 60-tooth Gear Wheel 66 into mesh with the Worm Wheel 45. Two 1" loose Pulleys 70 are placed on a Rod mounted at the front of the boom as shown in the general view of the model. Two lengths of cord are attached to the front and rear Angle Girders of the trolley passed around the Pulleys 70 and those on the Rod 54, and then attached to the trolley again.

<u>Pulley Block.</u>

Two $2\frac{1}{2}$" Triangular Plates are joined together by two Double Brackets, and three 1" loose Pulleys, spaced with Washers are placed between the Triangular Plates on a $1\frac{1}{2}$" Rod held by Collars. A large Loaded Hook is carried on a 1" Screwed Rod passed through the apex holes of the Triangular Plates. The cord for raising and lowering the load hook is first tied to the Rod 51 between the Bush Wheels, and it is passed in turn around the four 1" loose Pulleys of the trolley and the three similar Pulleys that form the sheaves of the load pulley block. The end of the cord is then secured to the Angle Girder 28 at the front of the boom.

Finally a cover, formed from three $5\frac{1}{2}$" x $2\frac{1}{2}$" and one $5\frac{1}{2}$" x $1\frac{1}{2}$" Flexible

Plates edged with Strips, is fixed in position over the gear-box by means of two $3\frac{1}{2}$" x $\frac{1}{2}$" Double Angle Strips and two $3\frac{1}{2}$" Screwed Rods.

The Rod 68 controls the swivelling movement of the boom, and the lever operating the Rod 61 controls the travelling motion. The other levers control the traversing movement of the trolley and the hoisting and lowering of the load hook.

Parts required to build the Block-setting Crane:- 2 of No. 1b; 9 of No. 2; 18 of No. 2a; 21 of No. 3; 4 of No. 4; 13 of No. 5; 9 of No. 6; 3 of No. 6a; 4 of No. 7; 8 of No. 7a; 8 of No. 8a; 38 of No. 9; 8 of No. 9a; 7 of No. 9b; 2 of No. 9d; 2 of No. 9f; 2 of No. 10; 14 of No. 11; 9 of No. 12; 4 of No. 12b; 1 of No. 13; 1 of No. 13a; 6 of No. 14; 4 of No. 15; 4 of No. 15a; 2 of No. 15b; 3 of No. 16; 8 of No. 16a; 1 of No. 17; 13 of No. 18a; 12 of No. 20b; 11 of No. 22; 9 of No. 22a; 4 of No. 24; 1 of No. 24a; 2 of No. 25; 4 of No. 26; 1 of No. 26c; 1 of No. 27; 2 of No. 27a; 2 of No. 27d; 2 of No. 28; 12 of No. 30; 1 of No. 31; 2 of No. 32; 2 of No. 35; 316 of No. 37a; 268 of No. 37b; 166 of No. 38; 2 of No. 40; 8 of No. 48; 6 of No. 48b; 3 of No. 53a; 14 of No. 55a; 1 of No. 57b; 2 of No. 57c; 53 of No. 59; 2 of No. 63; 2 of No. 63d; 1 of No. 73; 2 of No. 76; 2 of No. 77; 2 of No. 80a; 1 of No. 82; 2 of No. 89; 1 of No. 89a; 2 of No. 90; 1 of No. 94; 3 of No. 96; 5 of No. 96a; 10 of No. 103; 2 of No. 103d; 31 of No. 111c; 4 of No. 126; 8 of No. 133a; 2 of No. 146; 1 of No. 155; 1 of No. 173a; 1 of No. 189; 3 of No. 192; 1 E15R or E20RS Electric Motor; 1 Block of Wood; 1 Baseboard and 4 Wood Screws.