VOL. XLI. No. 7 JULY 1956

MECCANO MAGAZINE

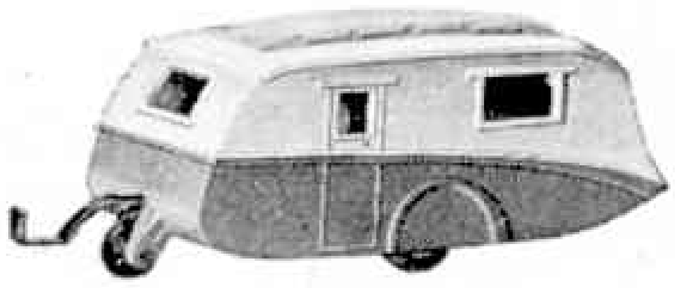
A VOICE FOR THE ENGINE

1/-

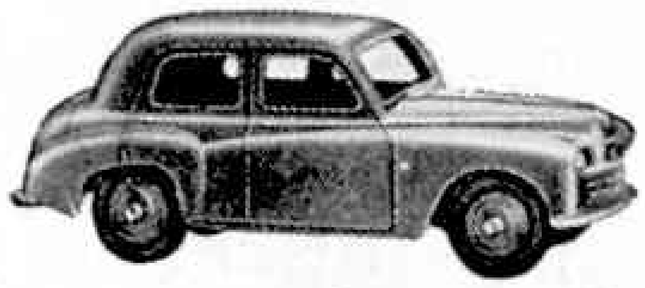
DINKY TOYS

TRADE MARK REGD.

No. 131
Cadillac Eldorado Tourer
Length $4\frac{11}{16}$ in. **4/6**

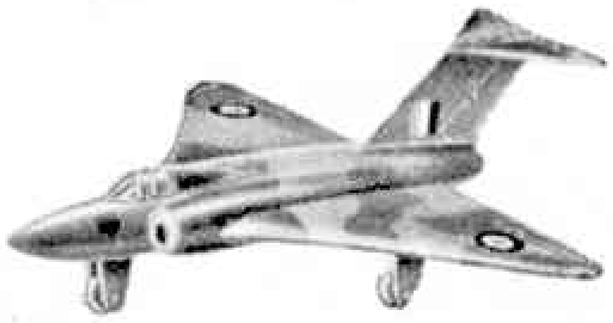


No. 190
Caravan
Length $4\frac{3}{4}$ in. **3/11**

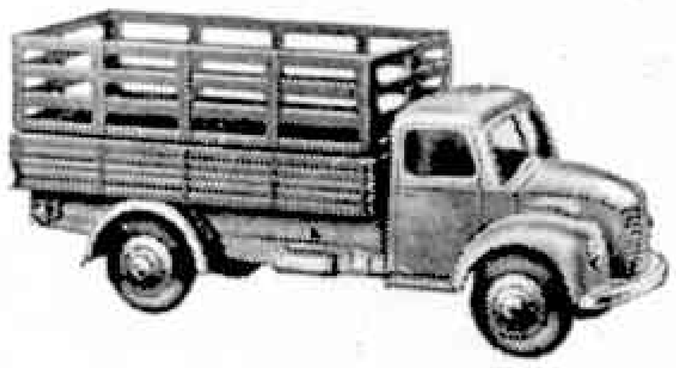


No. 154
Hillman Minx
Length $3\frac{1}{2}$ in. **2/6**

No. 110
Aston Martin DB3
Length $3\frac{7}{16}$ in. **3/6**



No. 735
Gloster Javelin Delta Wing Fighter
Wing Span $3\frac{1}{4}$ in. **2/11**

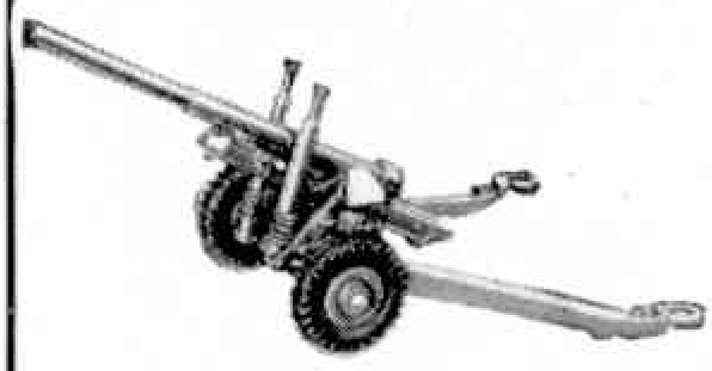


No. 343
Farm Produce Wagon
Length $4\frac{1}{4}$ in. **3/9**

No. 171
Hudson Commodore Sedan
Length $4\frac{3}{8}$ in. **3/-**

No. 132
Packard Convertible
Length $4\frac{1}{2}$ in. **4/6**

No. 159
Morris Oxford Saloon
Length $3\frac{5}{8}$ in. **2/9**

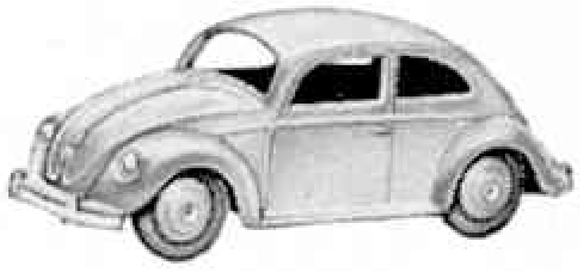


No. 692
5.5 Medium Gun
Length $5\frac{1}{8}$ in. **3/4**

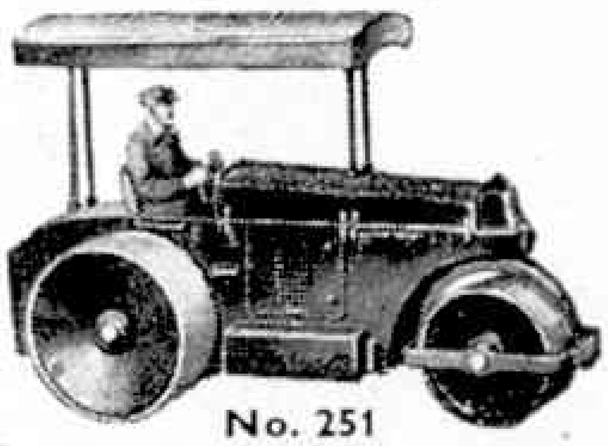
No. 260
Royal Mail Van
Length $3\frac{1}{8}$ in. **3/-**

No. 253
Daimler Ambulance
Length $3\frac{3}{4}$ in. **3/-**

No. 109
Austin-Healey 100 Sports
Length $3\frac{3}{8}$ in. **3/6**



No. 181
Volkswagon
Length $3\frac{9}{16}$ in. **2/6**



No. 251
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Length $4\frac{3}{8}$ in. **4/6**

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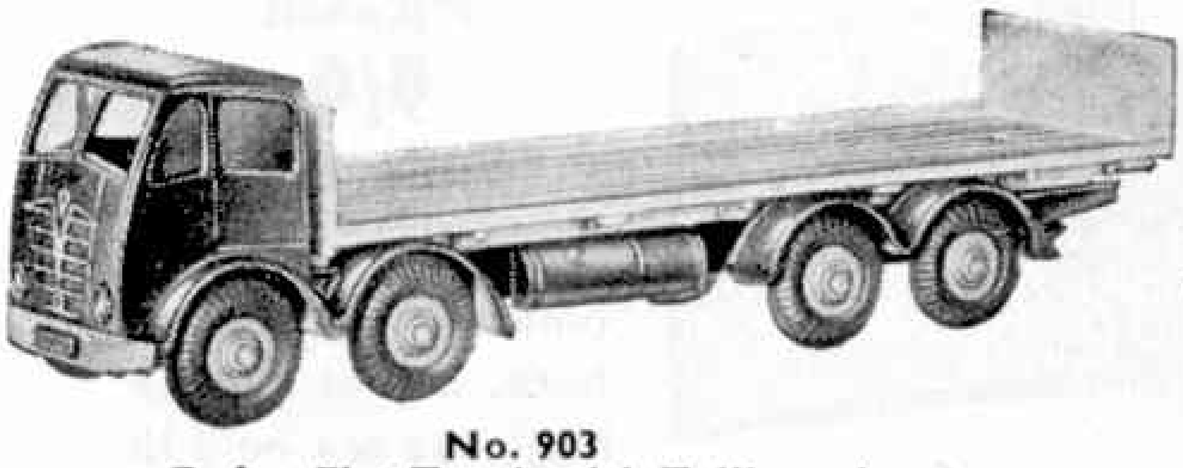
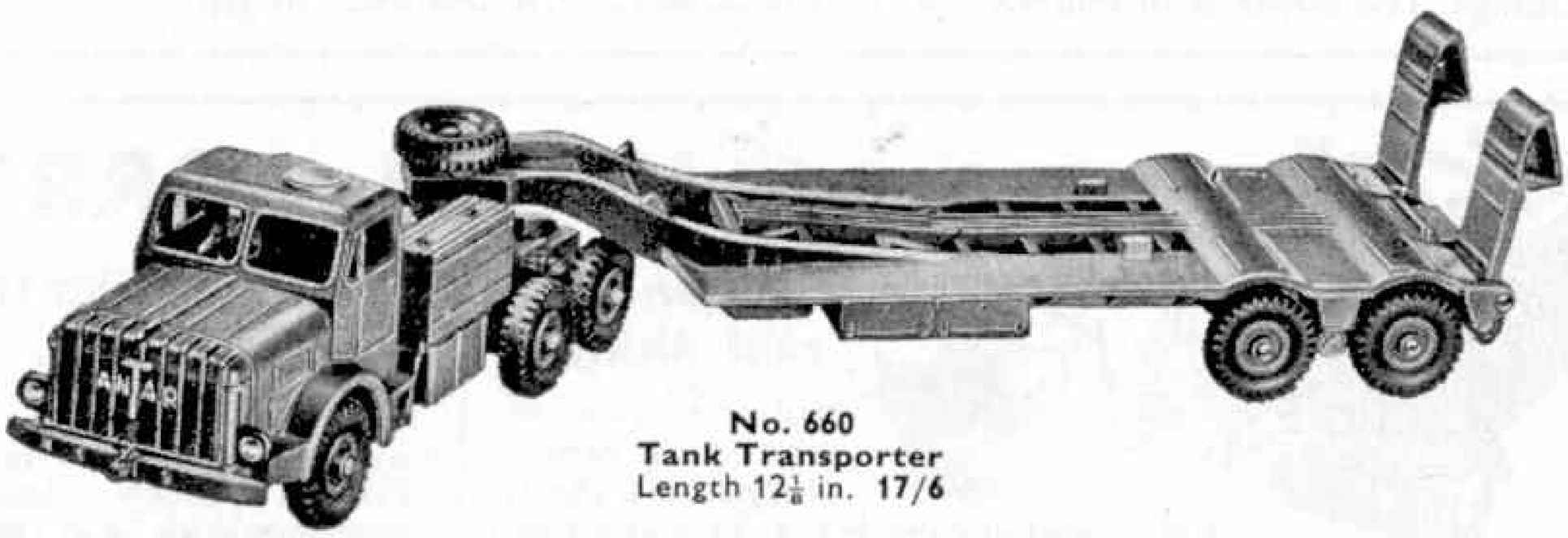


No. 903
Foden Flat Truck with Tailboard
Length $7\frac{3}{8}$ in. **7/9**

No. 999
D.H. Comet Airliner
Wing Span $7\frac{1}{4}$ in. **6/3**



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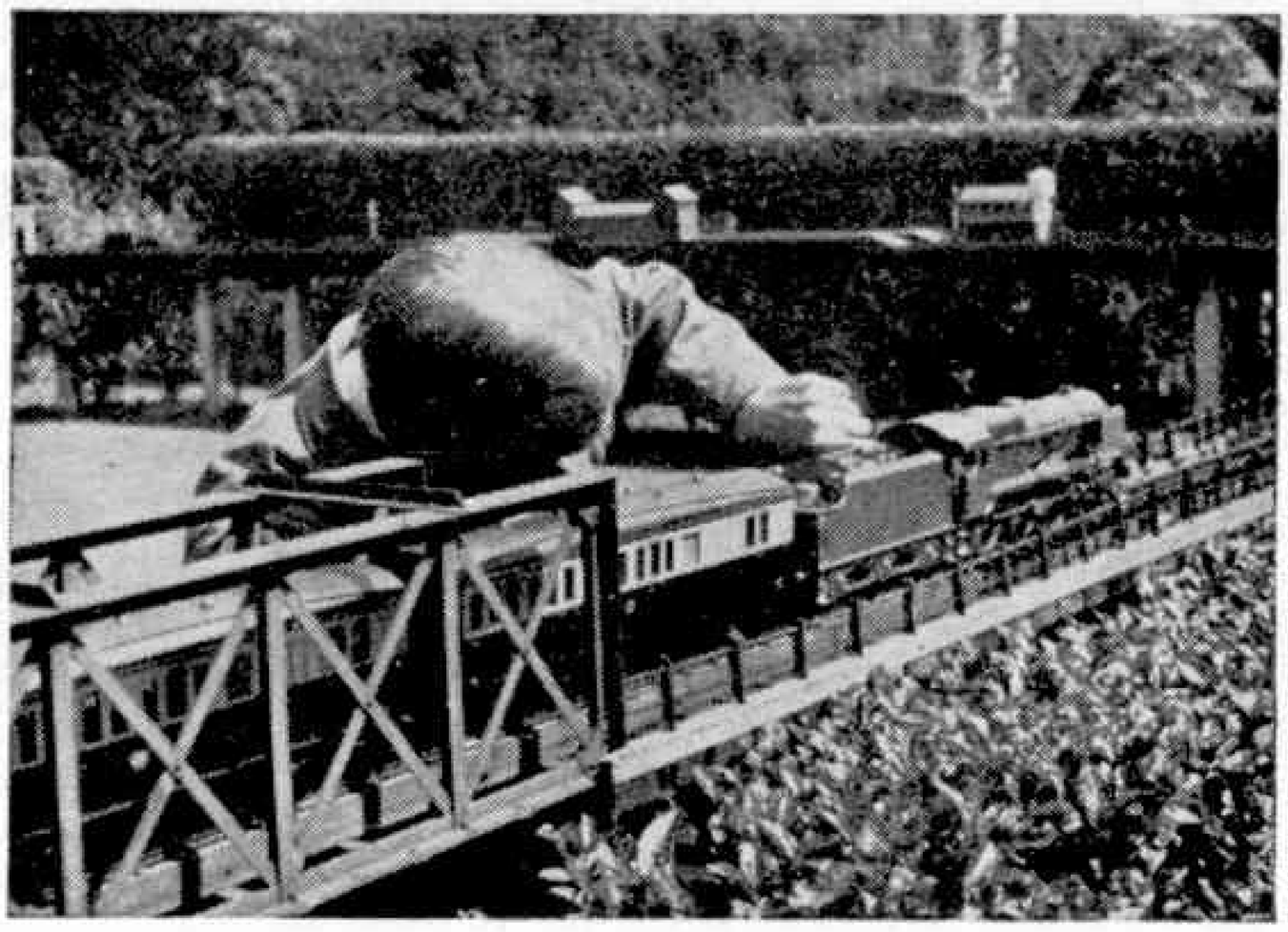

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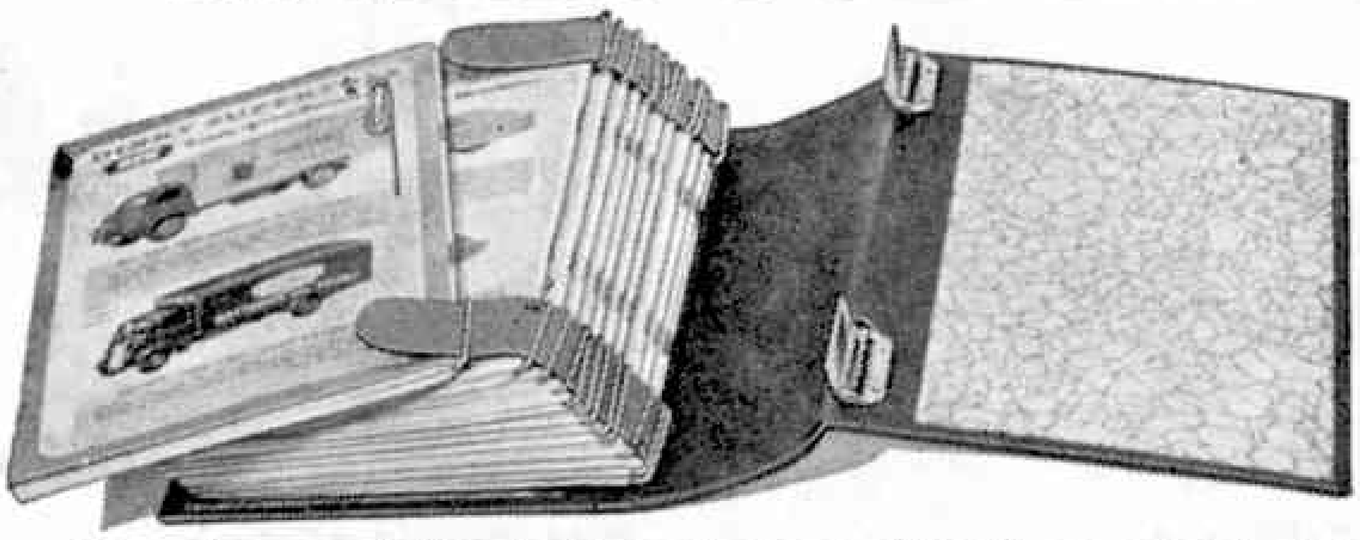

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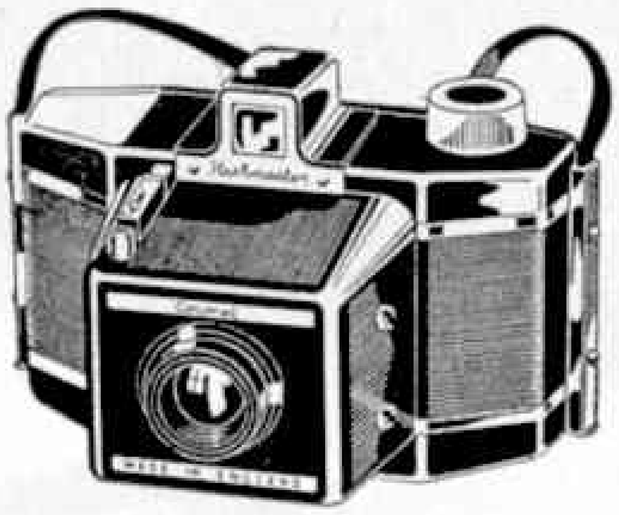

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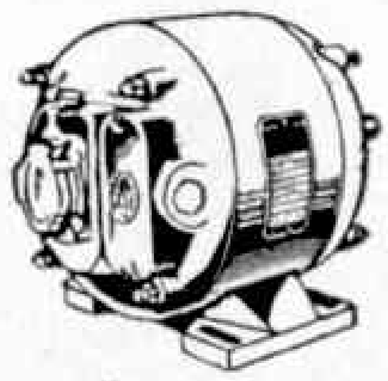

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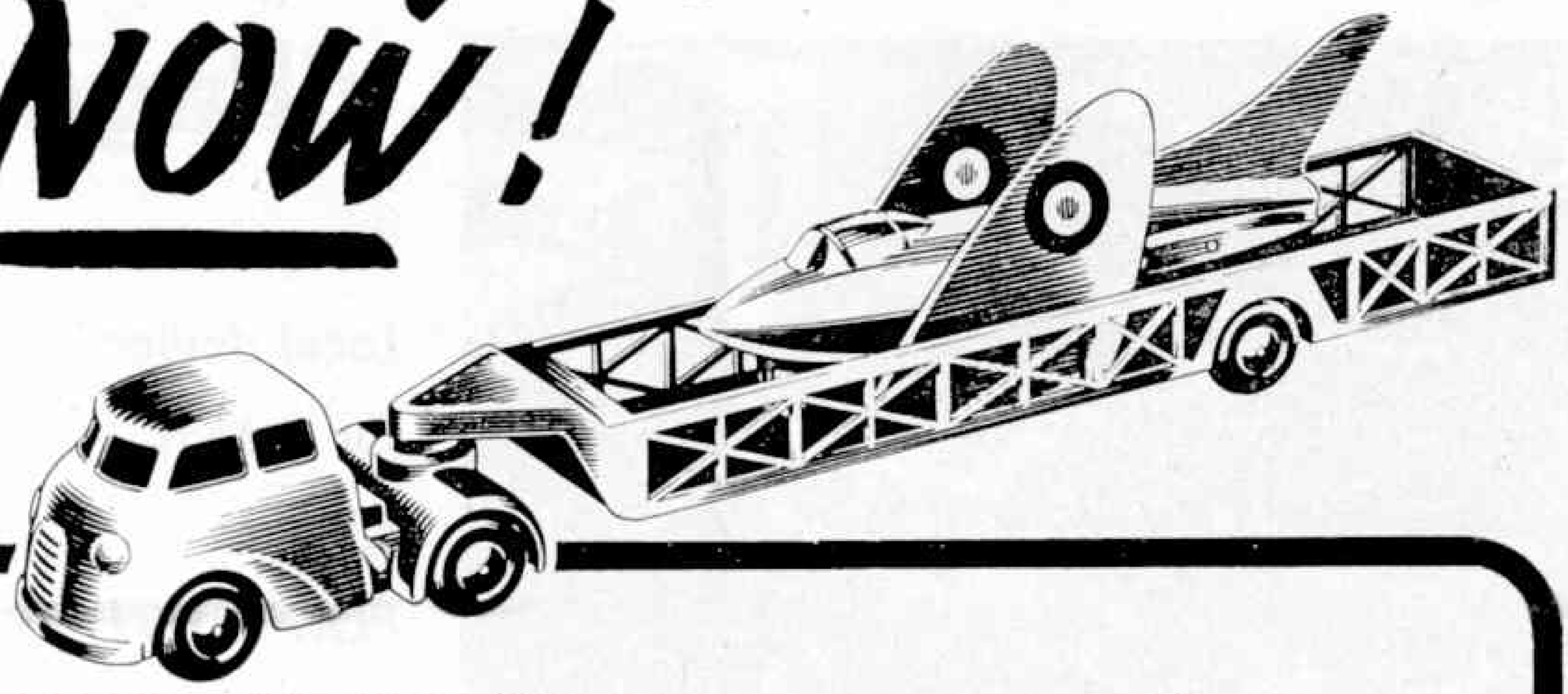

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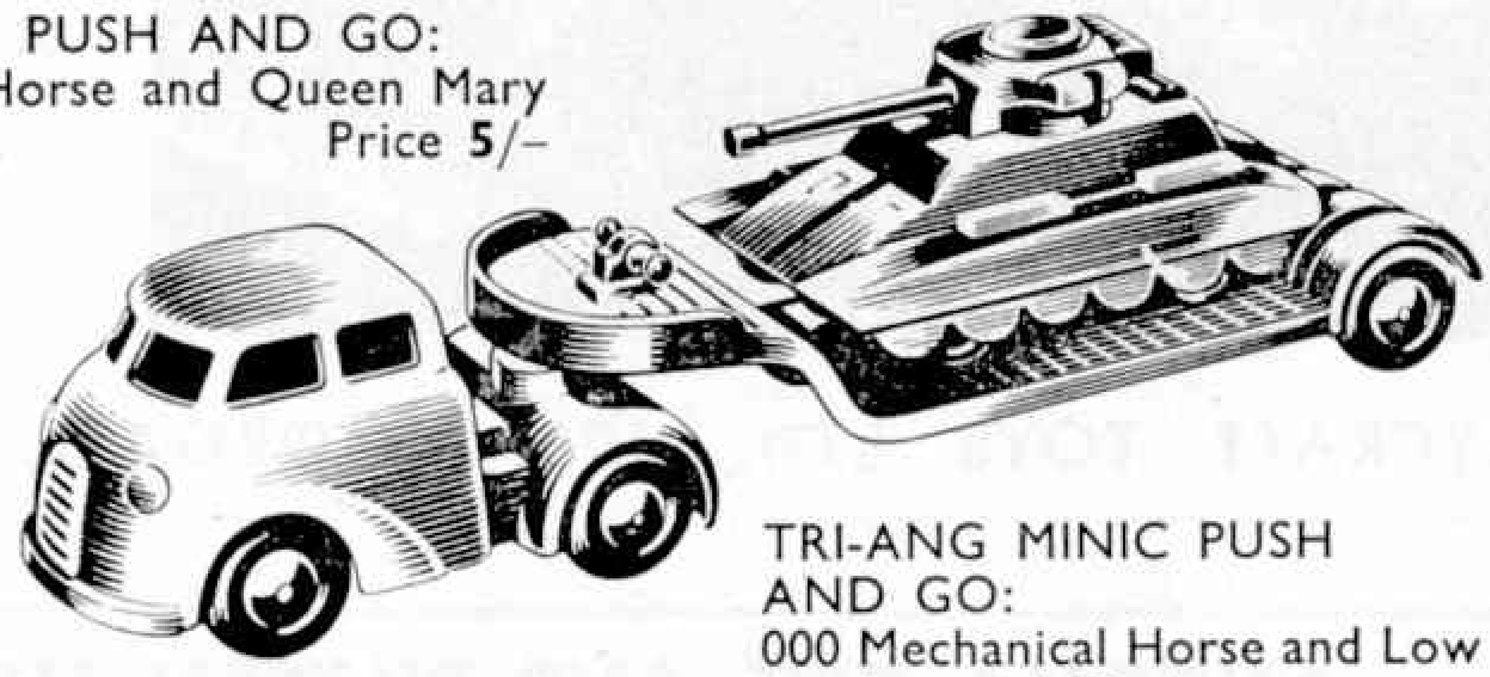

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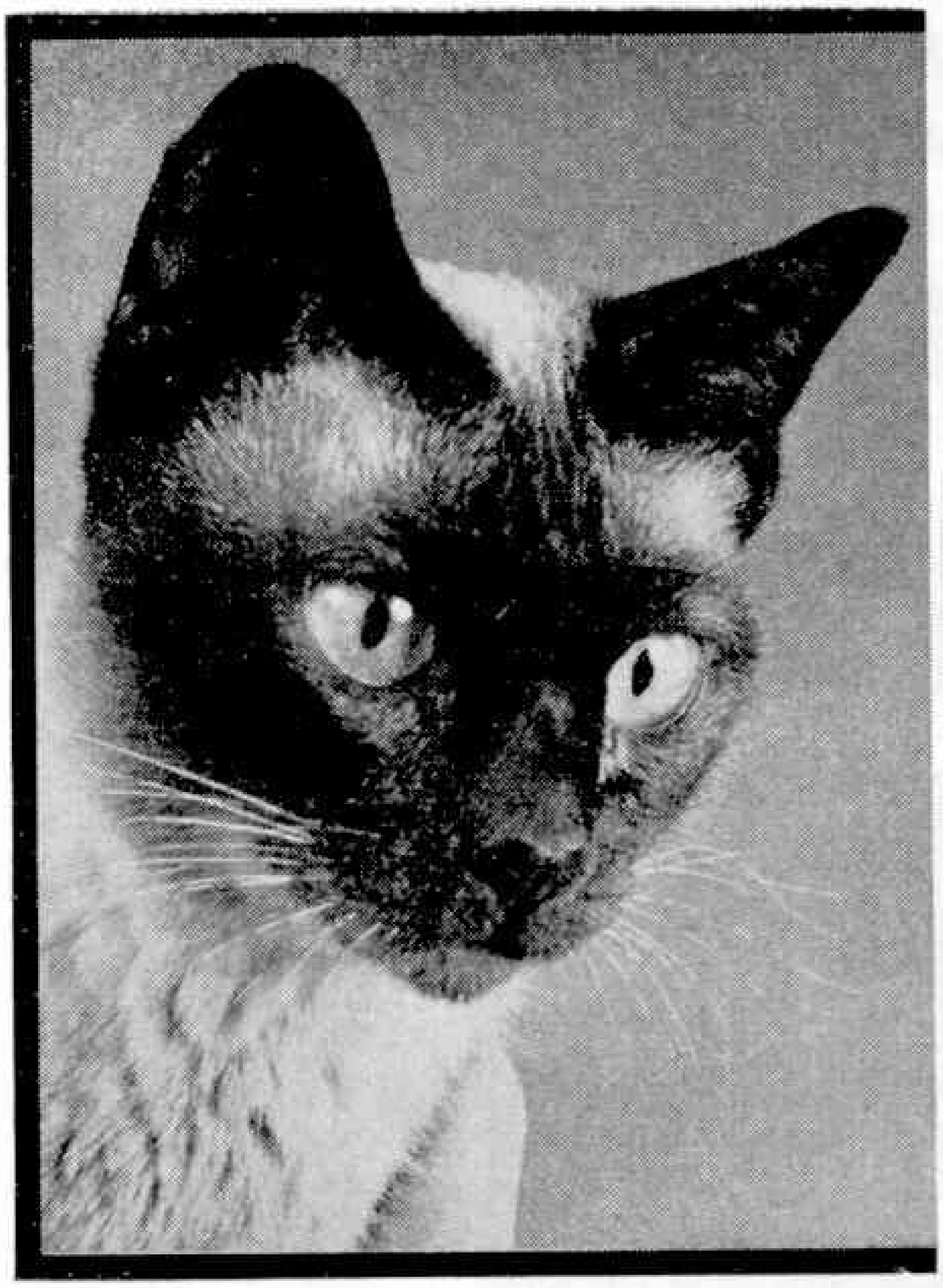

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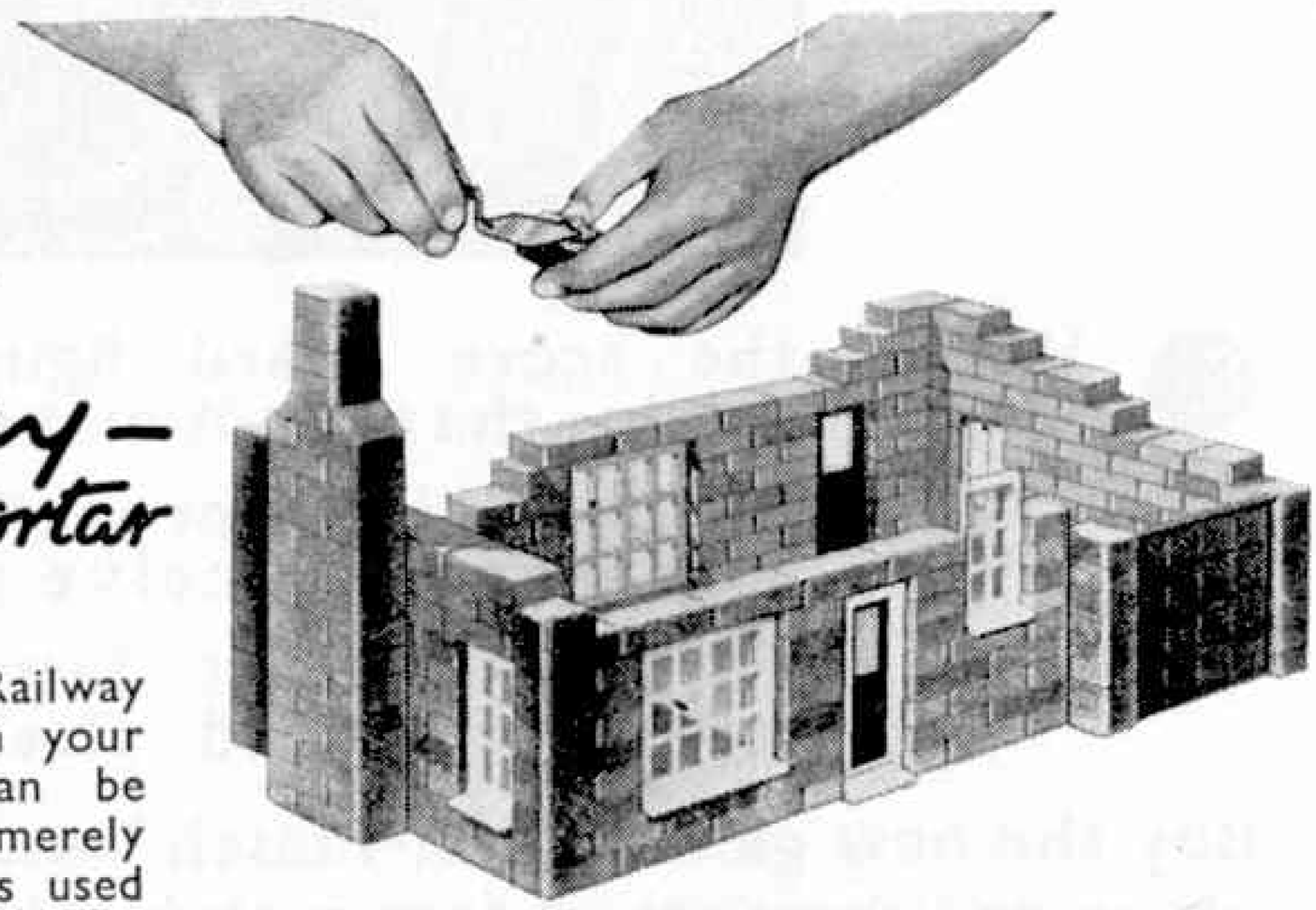

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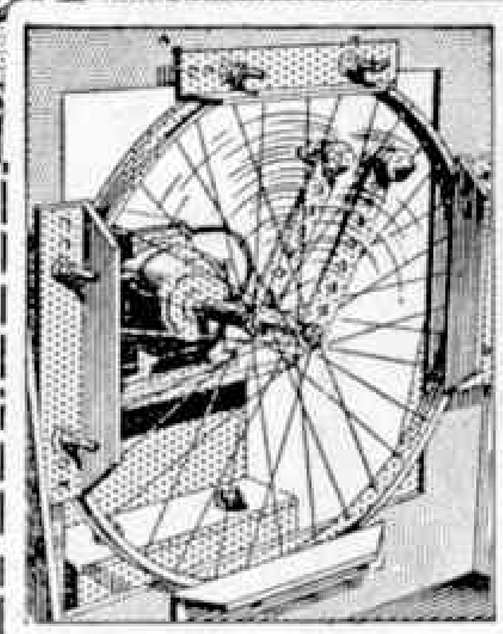
Spinning a Spindle

In this marathon test, the spindle of a Triumph wheel was rotated under pressure continuously at high speed for an equivalent 'distance' of 75,000 miles! After the test the bearings were found to be in perfect condition.

The Bicycle Boffins

The credit for the world's most scientifically planned bicycle must go to Triumph designers, scientists and technicians. It is science that has produced, in Triumph, all those extra qualities which make it more–much more—than just another bicycle.



This is the machine which rotated a Triumph spindle at 30 m.p.h. until it had 'travelled' three times round the world!

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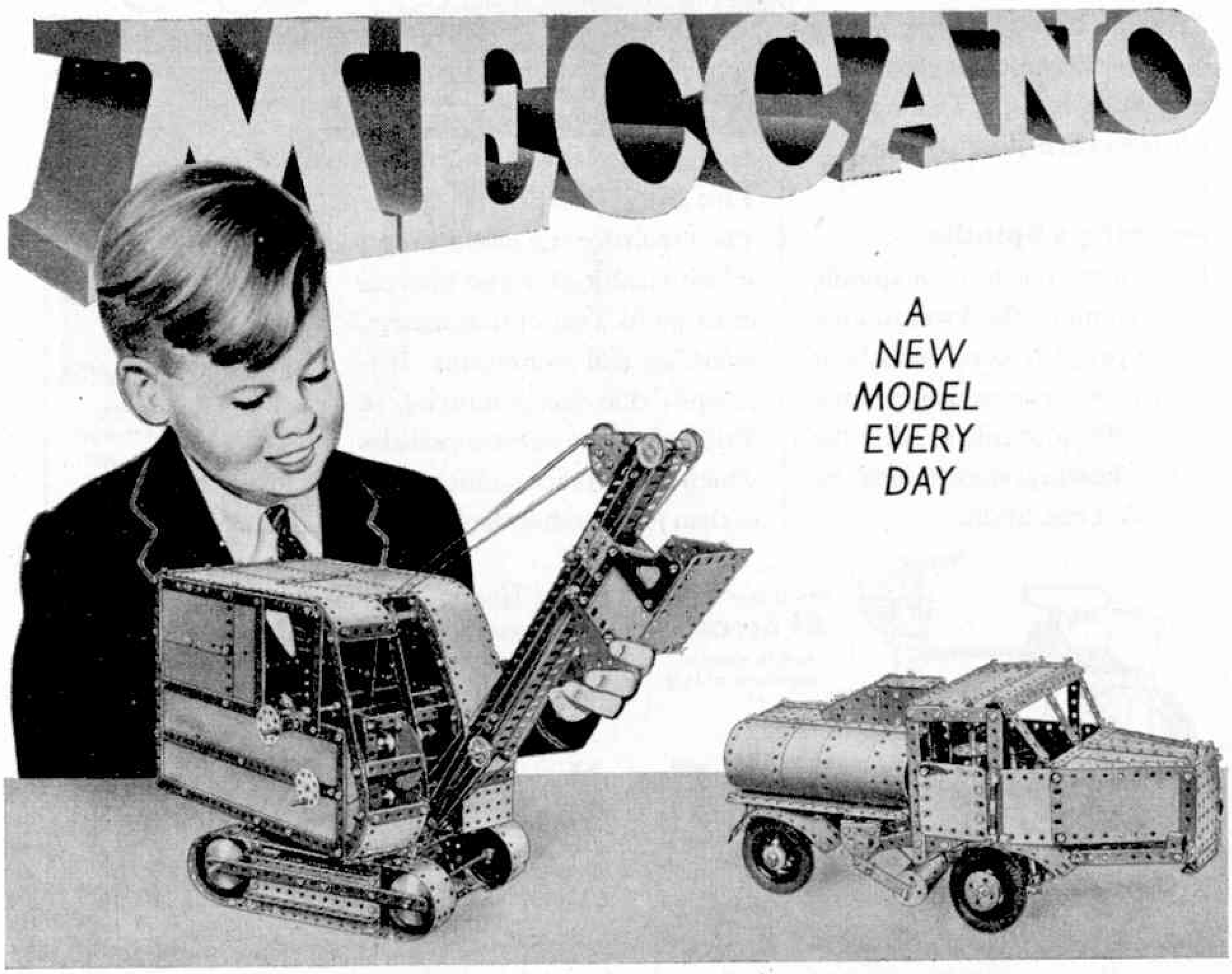
The Toy that grows with the Boy

Every boy revels in building models with the skilfully-designed parts in a Meccano outfit. These are similar to the basic parts used by real engineers. They can be used over and over again to build one new model after another—a new model every day, if desired. The attraction and scope of Meccano grow steadily over the years, as the equipment is increased and bigger and better models can be built.



Next Month: THE C.P.R. LINER "EMPRESS OF BRITAIN"

MECCANO MAGAZINE

Editorial Office:
Binns Road
Liverpool 13
England

EDITOR : FRANK RILEY, B.Sc.

Vol. XLI
No. 7
July 1956

A Step to Space Travel?

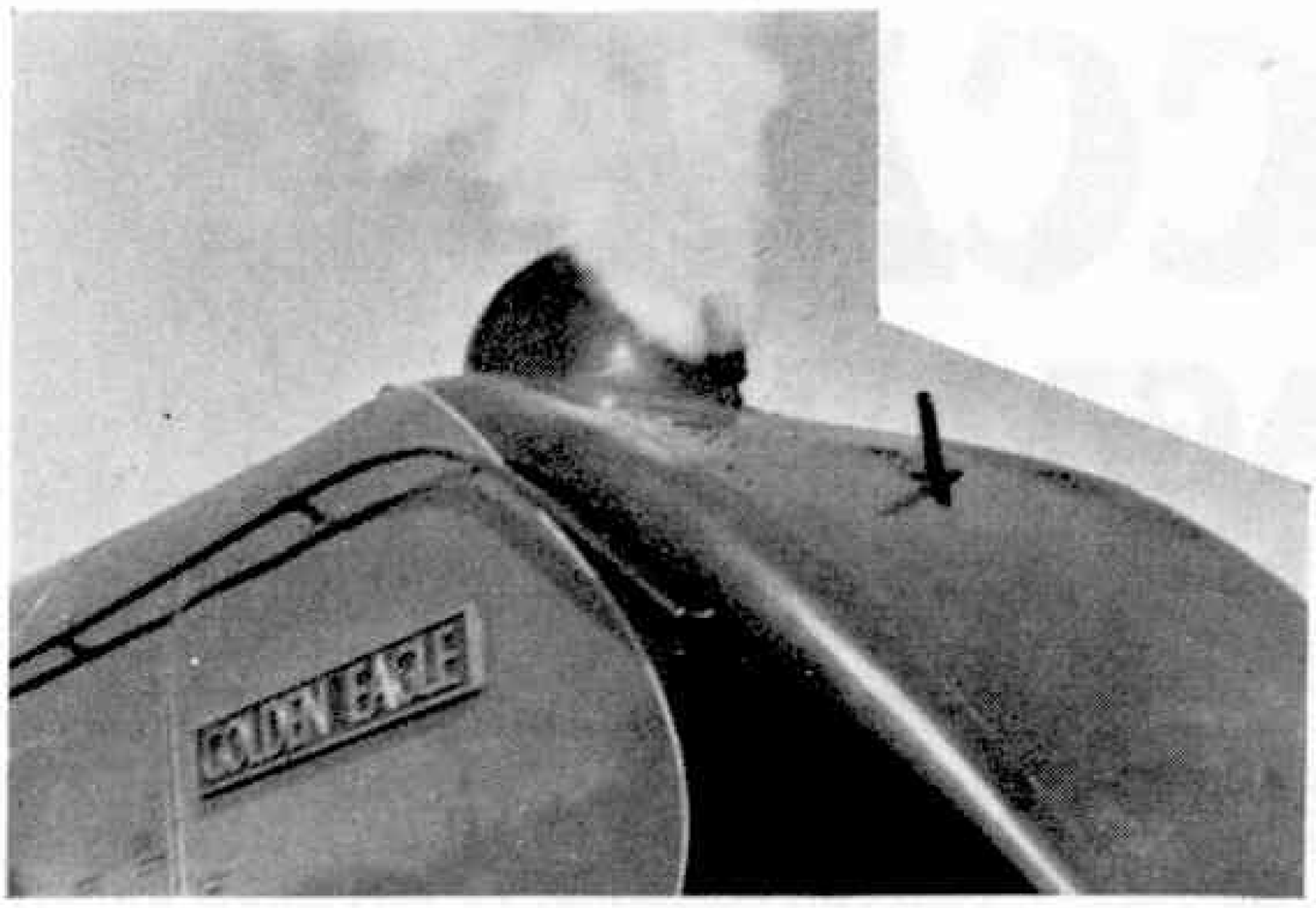
Next year will see the start of what can fairly be described as a rocket year, for so many rockets will be fired in it that it will almost seem like a jubilation year for rocket enthusiasts. And the rockets will not be mere Fifth of November fireworks; they will be gigantic travellers soaring hundreds of miles into the sky.

What is this? A new type of locomotive? A clue to the answer is given by the road registration on the right and the T sign to the left of it. The photograph is that of a steam locomotive on a trailer for road transport, and was taken by S. Harvey, London E.11.

The occasion will be the Geophysical Year, beginning in July 1957, during which scientists will try to discover as much as possible about the Earth itself, its shape and size, its atmosphere and so on. Exploration parties now in the Antarctic, or to go there shortly, are part of the programme arranged. The United States will figure very largely in all this, and particularly in the rocket programme. The 600 or so rockets that will be fired will include Rockoons, which climb to a height of 60 miles, and Aerobees, which can attain an altitude of 200 miles. Most of these will be fired from Churchill, on the shores of Hudson's Bay, and there will also be small rockets fired from aeroplanes.

But the record of farthest from the Earth will be created by the eagerly expected artificial satellite. It now seems that there will be not one, but twelve satellites, all of them spheres little more than 2 ft. across, and they will be sent up at intervals from an American Air Force base in Florida. Each will weigh about 21½ lb. This does not sound very great, but a stupendous effort has to be made to raise even that weight to the height of about 300 miles where it is to start its career. There will be three rocket stages involved in this, and in the end each satellite will be shot off on its path round the Earth at such a speed that it will encircle us in about 90 min., the orbit ranging from 200 to 800 miles above the Earth.

The Editor



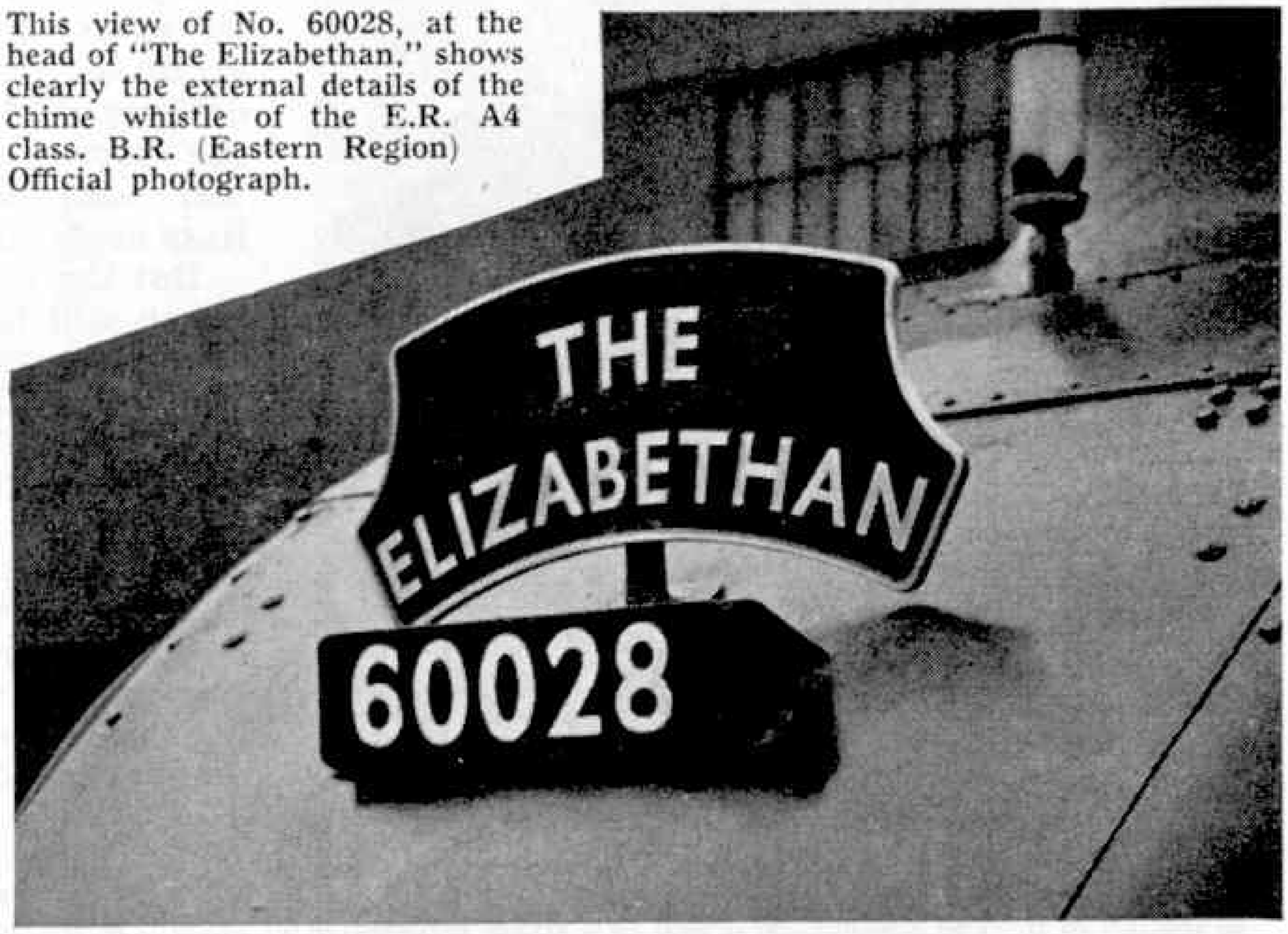
Warning Whistle

By the Editor

LOOKING at the picture above, of the chime whistle of *Golden Eagle*, one can almost hear the familiar engine call of the British railway scene. The whistle of the steam locomotive is indeed one of the best known of railway sounds, whether it is the long commanding "keep clear" blast of an express approaching a station or tunnel mouth, or the indignant protest sounded by an engine approaching an adverse signal that seems obstinately to refuse to come off. The acknowledging "pop" to the signalman when the signal does change is a more cheerful sound, signifying that all is well.

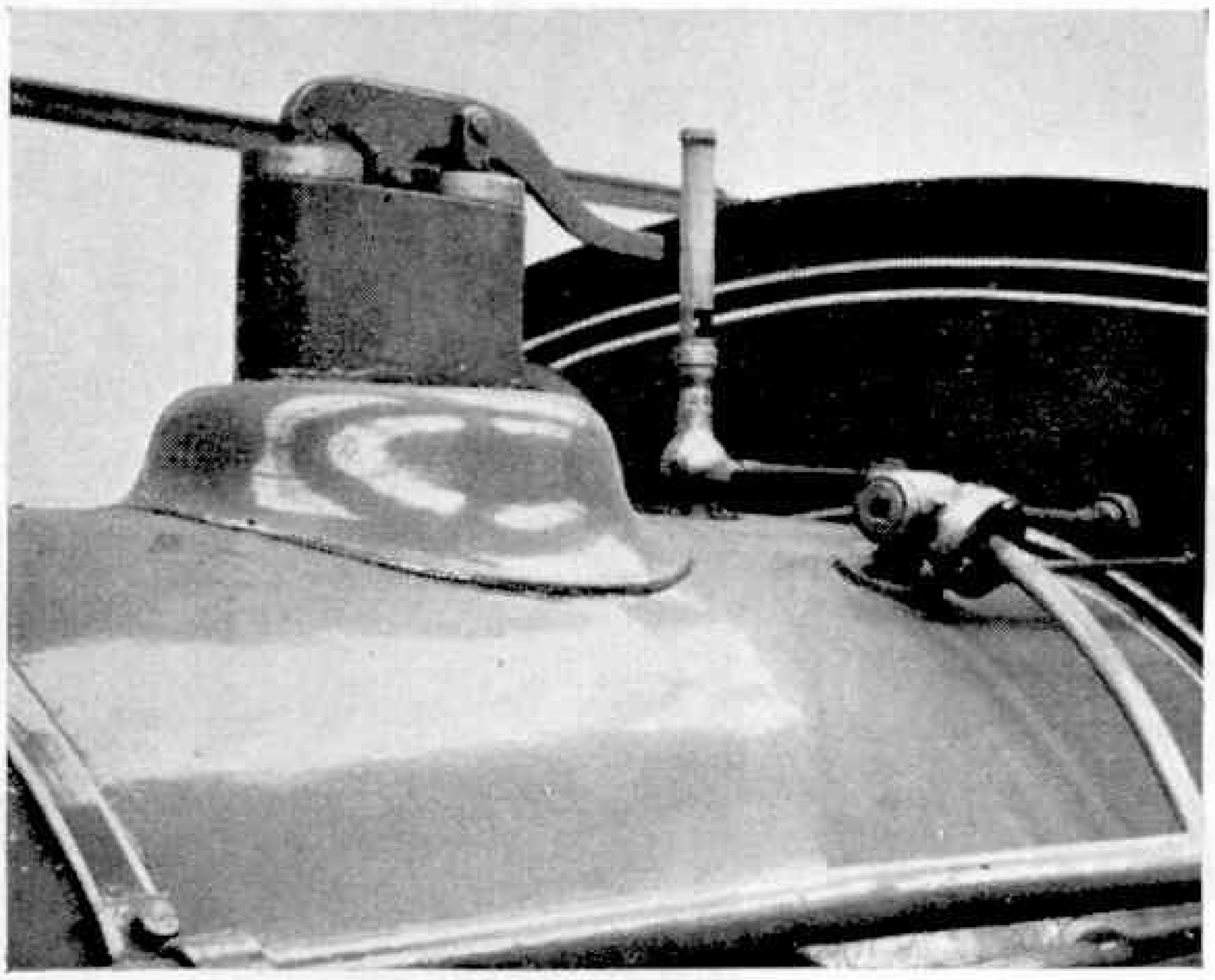
Sometimes the whistle seems to be sounded for no very apparent reason. Signals are off, the road is clear, but the driver sounds the whistle as the train approaches a signal box. Probably the whistle is sounded in a particular manner and those who hear it may wonder why. Such a whistle call will usually be a recognised message to the man in the box as to the route the train requires at a junction further on. This message helps to identify the train and to make certain that it is correctly dealt with.

The engine whistle indeed is not just a warning device. It is also used for signalling purposes, in the sense that it gives a message from the train to the signalman and other staff concerned according to the way it is blown. A driver noticing something irregular, perhaps wagons not under control during shunting, will "pop" his whistle, that is to say, give a series of short sharp blasts to let the yard staff know that something is amiss. The popping of the whistle, fortunately rarely heard in this connection, may also herald the runaway approach of an engine or train perhaps down an incline into a terminal station, and is an effective warning.



This view of No. 60028, at the head of "The Elizabethan," shows clearly the external details of the chime whistle of the E.R. A4 class. B.R. (Eastern Region) Official photograph.

Whistles vary in type, sound and in position, so that although the most familiar place for them is at the cab end of the engine, they are in some instances found elsewhere on modern engines. For instance, the fine cover to this issue, which is based on a B.R. (Midland Region) official



The tube-like hooter carried by the preserved 4-2-2 No. 123 is typical of Caledonian practice. B.R. (Scottish Region) official photograph.

photograph, shows a pipe-like tri-tone or "chime" whistle being fitted on the side of the smoke-box of a Britannia 4–6–2. This kind of whistle gives a pleasing sound that, like the chime whistle on the smoke-box front that distinguishes the A4 Pacifics of L.N.E.R. origin, has a call quite different from the sharper note of the ordinary bell type.

Generally speaking the bell type whistle, which looks something like an egg in an egg cup, although individual shapes vary, has been the recognised standard in British practice. An exception was the "organ-pipe" form of whistle of the former Caledonian Railway. Its hooting note has become familiar in more modern times on most Stanier and later engines of L.M.S. origin, on some of the bigger of which it is mounted horizontally above the fire-box, owing to its height.

Engines of G.W.R. type are fitted with two whistles and most of them boast a refinement in the shape of a scoop-like shield behind the two whistles. The idea of this is to keep whistle steam from blinding the cab look-out windows.

The fitting of the two whistles at Swindon dates back well over a century. The one ordinarily used is smaller than the other, this larger one being known as the brake whistle because it was used in the days of hand brakes to tell the guard that he should apply his brakes. It could also be operated from the train by passengers as an alarm in the case of emergency, by means of a cord which ran the length of the train. This system of communication passed with the introduction of the type of alarm system used today, but the so-called brake whistle is still retained for emergency purposes.

Although a tri-tone whistle is used on the larger B.R. Standard Locomotives, the G.W.R. type of whistle has been adopted for the other standard classes. It has a pleasing mellow tone, as have the whistles carried by engines of the former Midland and Lancashire and Yorkshire Railways. Strongly contrasting with these are the shrill whistles of former L.N.W.R. and G.N.R. locomotives, the latter type also being fitted to many L.N.E.R.-built engines.

The wild shriek of the Doncaster whistle seems a little out of keeping with the dignity of such

(*Continued on page 386*)

A fine view of a bell whistle mounted above the cab of a former G.N.R. Atlantic, with the pull rod passing down through the roof. B.R. (Eastern Region) official photograph.

THE BANANA BOATS ARE IN!

By David Williams

FEW more pleasant commercial spectacles can be witnessed than the arrival in Liverpool of banana boats from the British Cameroons. No sooner are the cargoes unloaded than the bunches of bananas are taken to special chambers for ripening prior to being auctioned at the Fruit Exchange.

About six and a half million tons of bananas are imported into the United Kingdom in a year—a fact that illustrates the huge demand for the fruit in this country.

Liverpool's connection with the banana industry began with Sir Alfred Lewis Jones, then a sea captain. After his first trip to West Africa, he encouraged the Liverpool agents of an African steamship company to take him into their employ. The firm became known as Fletcher and Parr, and Jones remained in its service from 1860 until 1875, when it lost the agency.

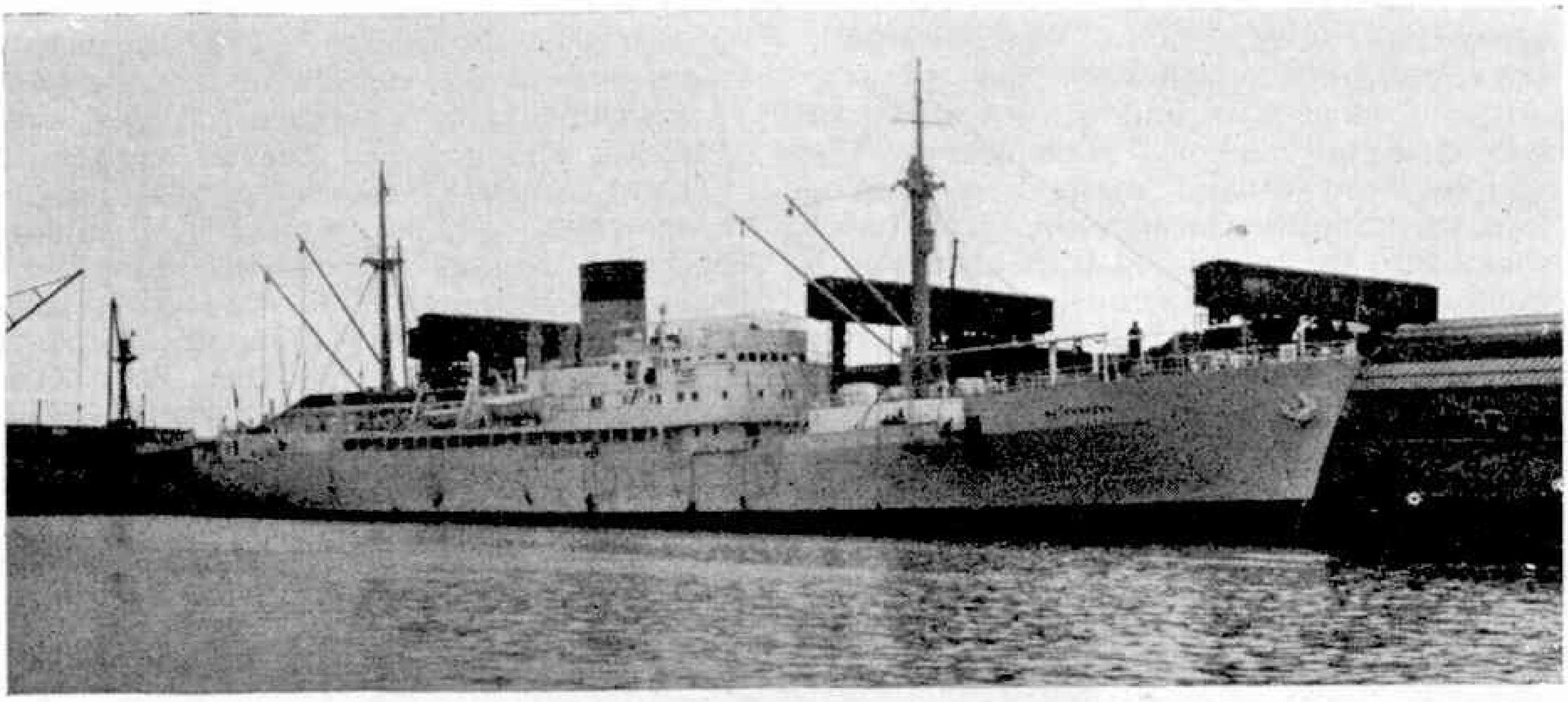
Sir Alfred then began business on his own account as an insurance broker. In addition to chartering several small commercial vessels, he eventually became partner, and finally head, of the Elder Dempster Line Ltd.

Well over 6,000,000 tons of bananas are imported into Great Britain every year, from many different parts of the world. One source of the fruit today is the British Cameroons in West Africa, and the picture at the head of the page shows banana harvesting in progress there.

In 1884 Sir Alfred visited the Canary Islands on coaling business. Despite the country's protracted period of depression, he encouraged the natives to grow bananas. The first consignment came to Messrs. Hudson and Fyffe—known all over the world today as Elders and Fyffes Ltd.—and the bananas were sold in a shop at the entrance to Lime Street Station.

Soon, the newly constructed steamers of the Elder Dempster line were equipped with well-ventilated fruit chambers and temperature appliances, so that the fruit would not become over ripe on the voyage. Today, thanks to the genius of Sir Alfred, the vessels of the Fyffes Line are equipped with the most modern refrigerating machinery for preserving fruit cargoes in transit.

Of the fifteen ships that the firm at present possesses, the *Reventazon* is perhaps the most interesting. Originally she was a German cargo ship, plying between Bremen and Hamburg. During the Second World War she became a naval cadet ship—the pride of the German fleet. She was handed over to us after the war, and has made innumerable voyages to the



The motorship "Reventazon" at Garston Docks, Liverpool, ready to discharge a cargo of bananas. Photograph by courtesy of Elders and Fyffes Ltd.

British Cameroons, which formerly was a German colony.

Tiki, twenty miles from the beautiful coastal port of Victoria, is the centre of the Cameroons banana industry, and aboard a banana boat made fast to the improvised wharf, the reception chambers are brought to the required temperature of 53 deg. F. Hatches are already open and stevedores stand by the winches to work the derricks. A Superintendent of Elders and Fyffes is ready to direct the native workmen on the wharf, which is connected by railway with the plantations, some miles away.

Shore organisation at Tiko is swift but methodical, and no hitch must occur if the fruit is to reach the markets in perfect condition. Indeed, so smoothly is the whole process conducted that it is not unusual for a ship to load a cargo of 90,000 stems of bananas in 36 hours from a plantation 30 or 40 miles from the quayside.

The elevators and automatic conveyors dip deeply into the ship's holds, filling up the sections of cargo space quickly. The natives break into a rhythmical chant as they pass the stems of bananas on to the conveyor belt.

Away from the wharf, on the banana plantation itself, reaping is done by a gang of cutters, while other workmen convey the bananas to the nearest tramlines. Transport ranges from the simple process of carrying banana bunches on the shoulders to loading them on to the backs of donkeys carrying them to the railway that takes them to the wharfside.

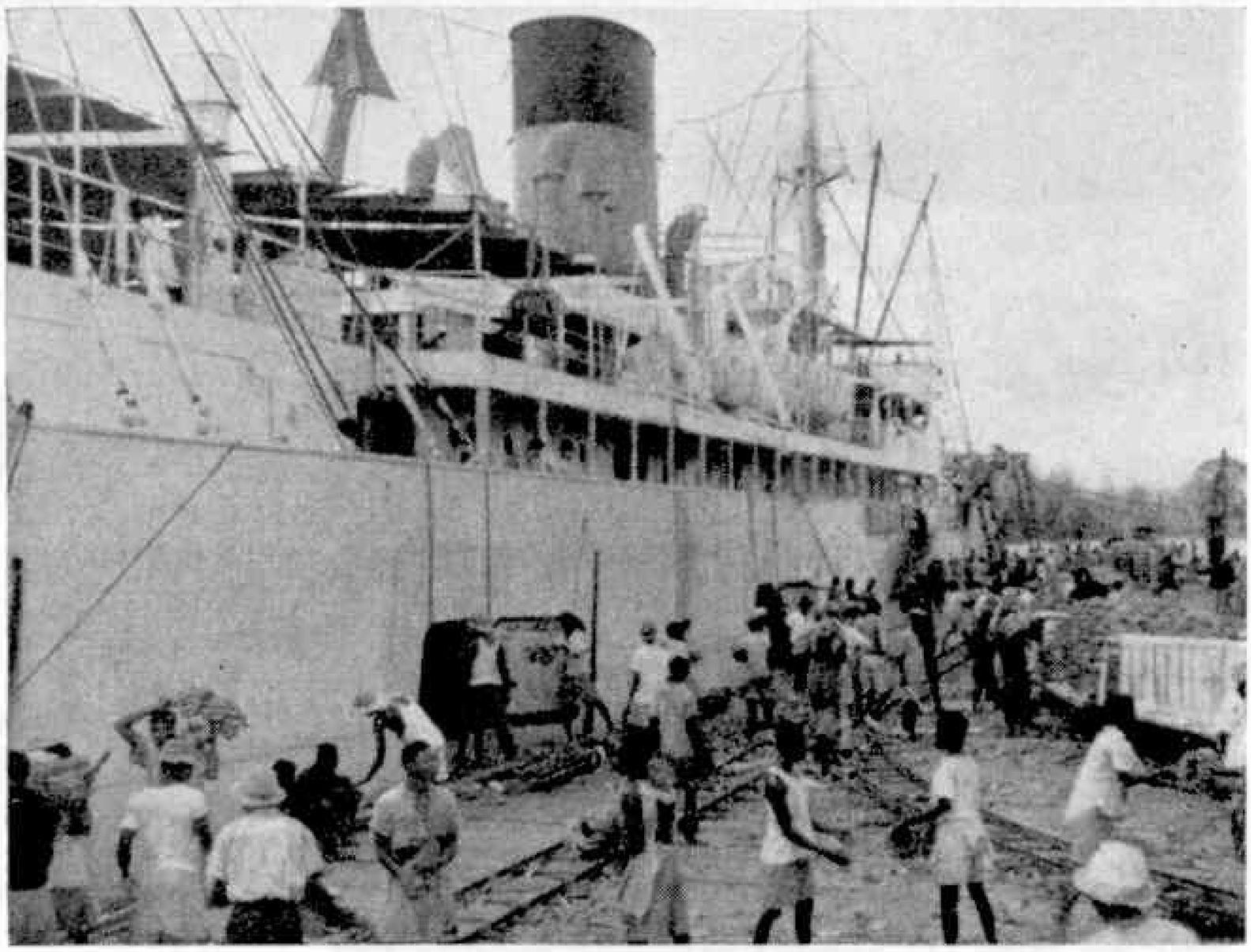
During the final loading of a banana ship the scene becomes both hectic and colourful. Innumerable launches from the plantation some distance away chug to the starboard side. Work is accelerated

Few of those who enjoy bananas have seen the flowers from which the fruit develops, shown in this photograph.

almost to fever pitch. The automatic conveyors are constantly fed by the Africans amidships, and the forward part too is equally swiftly replenished. The simple hand-to-hand method of passing bananas directly through the outer hatch doors into the ventilated fruit chambers is conducted no less vigorously aft.

Each train load of bananas that arrives is protected by banana leaves, known as "trash," to minimise bruising. Damaged fruit is immediately rejected by officials on the quayside. The bananas must be carefully protected. Changes of weather, particularly during the dreaded hurricane season, can cause untold damage.

With the advent of the Second World War, banana production decreased considerably and it has still not fully recovered. However, experiments are being conducted not only to combat diseases, but also to produce a banana that is immune to all weather conditions.



Loading bananas in the British Cameroons Photograph by courtesy of the Rubber and Mining Agencies Ltd.

Today, the Cameroons Development Corporation, established in 1946 to develop the areas that once came under German jurisdiction, is forging ahead with full-scale production.

The two main banana estates in the Cameroons are that of Fyffes and one looked after by the C.D.C. Though quite separate concerns, they work closely together in the cultivation of bananas, rubber and oil palms. Soil surveys and the introduction of nitrogenous fertilisers have brought about a great improvement in growth, especially of young banana trees. In this way, production is kept reasonably high, despite the vagaries of the weather.

In addition to the British Cameroons, Jamaica and the low coastal regions of Central America, whose tropical jungles have given way to hundreds of square miles of banana plantations, now send regular shipments of this all-food fruit to Britain. Since the first shipment of bananas from Jamaica, which reached Bristol on board the *Port Morant* in March, 1901, Elders and Fyffes Ltd. have maintained an unbroken connection with the banana industry of the West Indies.

During World War II the whole steamer fleet of the Fyffes Line was assigned to other duties, and out of a complement of 21 vessels, no less than 14 were lost through enemy action. The seven that remained were augmented by a further eight, and since the cessation of hostilities have maintained a regular service, bringing fruit chiefly to Liverpool and Bristol. Today, the Fyffes Line bring bananas from the Cameroons at approximately four or five day intervals, and the ex-German vessels now owned by the Line carry over 90,000 stems on each individual run.

The Duck-Billed Platypus—(*Continued from next page*)

noise of traffic and their antics have been observed frequently by those who know where to look.

The early settlers discovered that the "water-mole," as the platypus was then called, excavated nesting burrows along the river banks. These were usually about 15 in. below the surface and followed the slope of the bank, their lengths varying from 10 to over 30 feet.

When occupied, a burrow is completely blocked in places, perhaps to keep the nest secure. Sometimes it has two outlets, one below water and the original one above water. If the female leaves the eggs the plugs are dug through and replaced for warmth and against invaders when she returns. Gum leaves, couch grass and reeds are used for the nest. Two eggs are laid in the normal course of things, though occasionally there is a third and sometimes only one, pigeon-size, losing their whiteness very quickly.

The Duck-Billed Platypus

By L. Hunt

THE duck-billed platypus is surely the strangest and most wonderful of all land animals. Before the actual discovery of one in 1797, near the Hawkesbury River, in New South Wales, scientific circles had regarded the animal as a "fake," comparing it with the Chinese trick of attaching fish-tails to mummified monkeys and selling them as mermaids! The arrival in England of a platypus preserved in spirits, together with some dried skins, caused the sensation of the century and in 1802 it was "accepted" by the Royal Society. Not until 1884 was the egg-laying question settled beyond doubt, however, though aborigines had long called the female platypus a "mallangong," after observing that she laid and hatched eggs like a mother bird. Following extensive research and search, traces of the fossil platypus dating back some five million years were found at King's Creek, Pilton, Queensland.

The duck-billed platypus, illustrated at the head of this page, has been seen by few people living outside Australia and Tasmania, for it is only there that this strange and lovable animal, formerly slaughtered for its beautiful fur, lives and breeds. Efforts to transport it overseas have not been successful so far. This may be possible some day, but until then most of us will only know it from pictures and descriptions in books, and from films.

Victoria must be regarded as the most fortunate State, and Australia the most envied country of the known world, since here live and breed these incredible mammals, once persecuted and now protected. Happily they are on the increase, following years of systematic destruction in which as many as 40 or more of these little animals went into one rug.

Fully-grown, a platypus is about 22 in. from bill-tip to tail and weighs about 4 lb. The females are an inch or so less and both sexes mature at about 2½ years. The fur varies from reddish-brown to black, the females and young having the lighter colourings.

The famous "bill" is, surprisingly, soft, partly rubbery and partly kid. Horny ridges take the place of teeth, which disappear with age. In their natural state the main diet of the platypus consists of worms and grubs, but for those in captivity tadpoles and eggs are added—and enjoyed! It is of interest to note that Splash, a platypus in captivity for over four years, ate a pound of worms and grubs each day, with two pulped eggs at night.

At the Sir Colin Mackenzie Sanctuary, Healesville, in Victoria, lives the only platypus to be born in captivity, and every afternoon, when the sanctuary is open, it is possible to witness a fine display of swimming and to examine this wonderful animal at close quarters. It is not surprising that this animal has lived so happily, since Healesville has long been a headquarters for the platypus, due to the fact that the streams thereabouts permit a settlement of foods in the muddy beds and deep pools.

Those of us who have been fortunate enough to see these wonderful creatures have been more than repaid for a test of patience. They dive, swim, climb out of the water and sun themselves, but will return to the stream and disappear if any attempt is made to go too close to them. At Upwey, quite near the main road, a pair of platypus made a burrow despite the

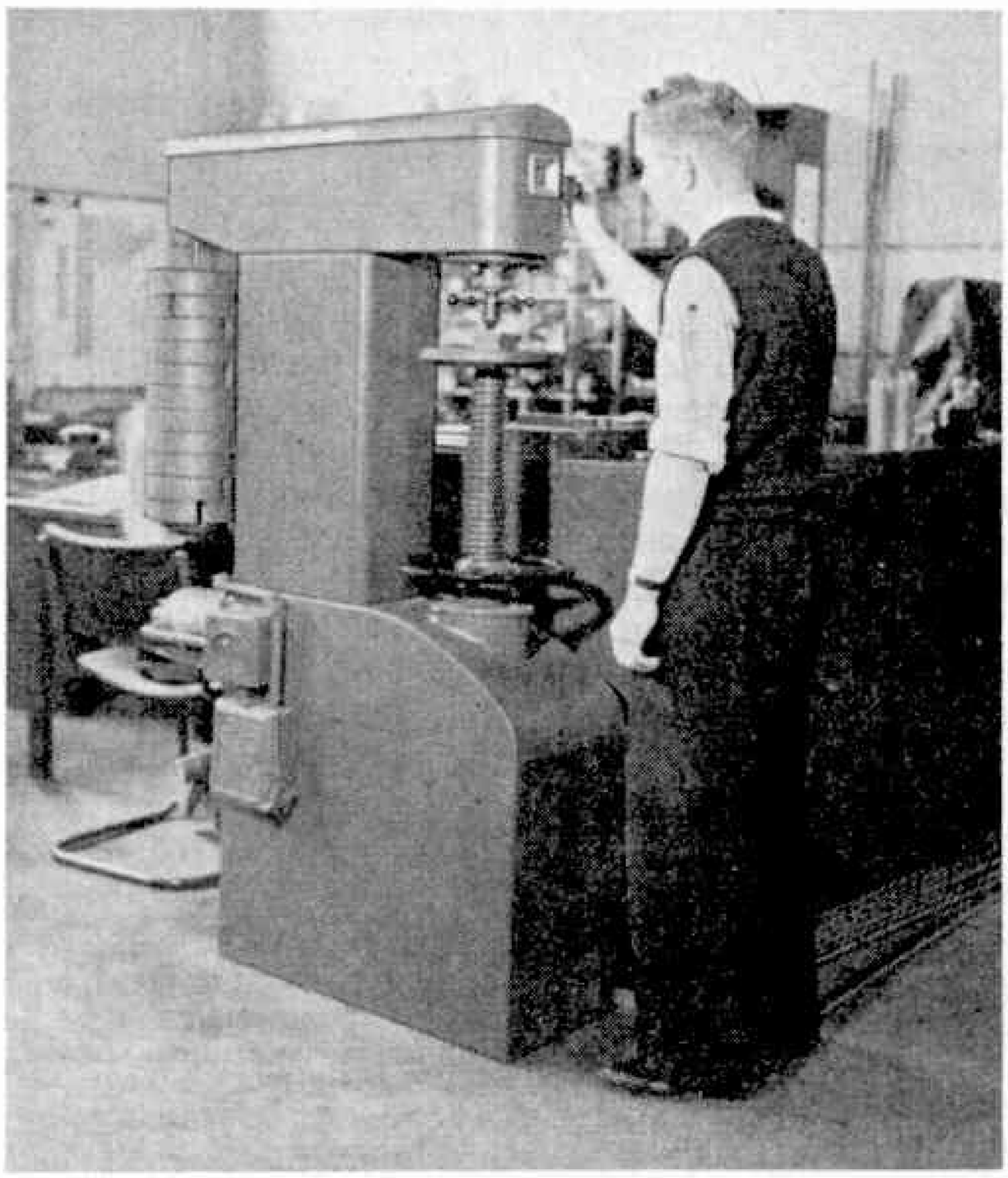
(*Continued at foot of previous page*)

How Metals are Tested

By A. B. Thornton

YOU have all seen in the comings and goings of everyday life the use to which metals are put. You travel by train, bus, and car or, if you are lucky, by aeroplane, and when you do I am sure you have not failed to notice that for the most part they are made of metal. Have you ever thought of the quality of the rails that carry the weight of trains, and sustain the hammering of their wheels? Or of the strength of the connecting rods and couplings of the engine at speed? What about the strength of the aluminium alloys which form a large part of our modern jet aircraft, hurtling through the sky at 600 miles an hour?

From these few examples you will realise that the strength of metals is all important. The designers of these complicated machines take every care to ensure that the materials used in manufacture are sound, and are capable of bearing the stresses to which they are subjected.



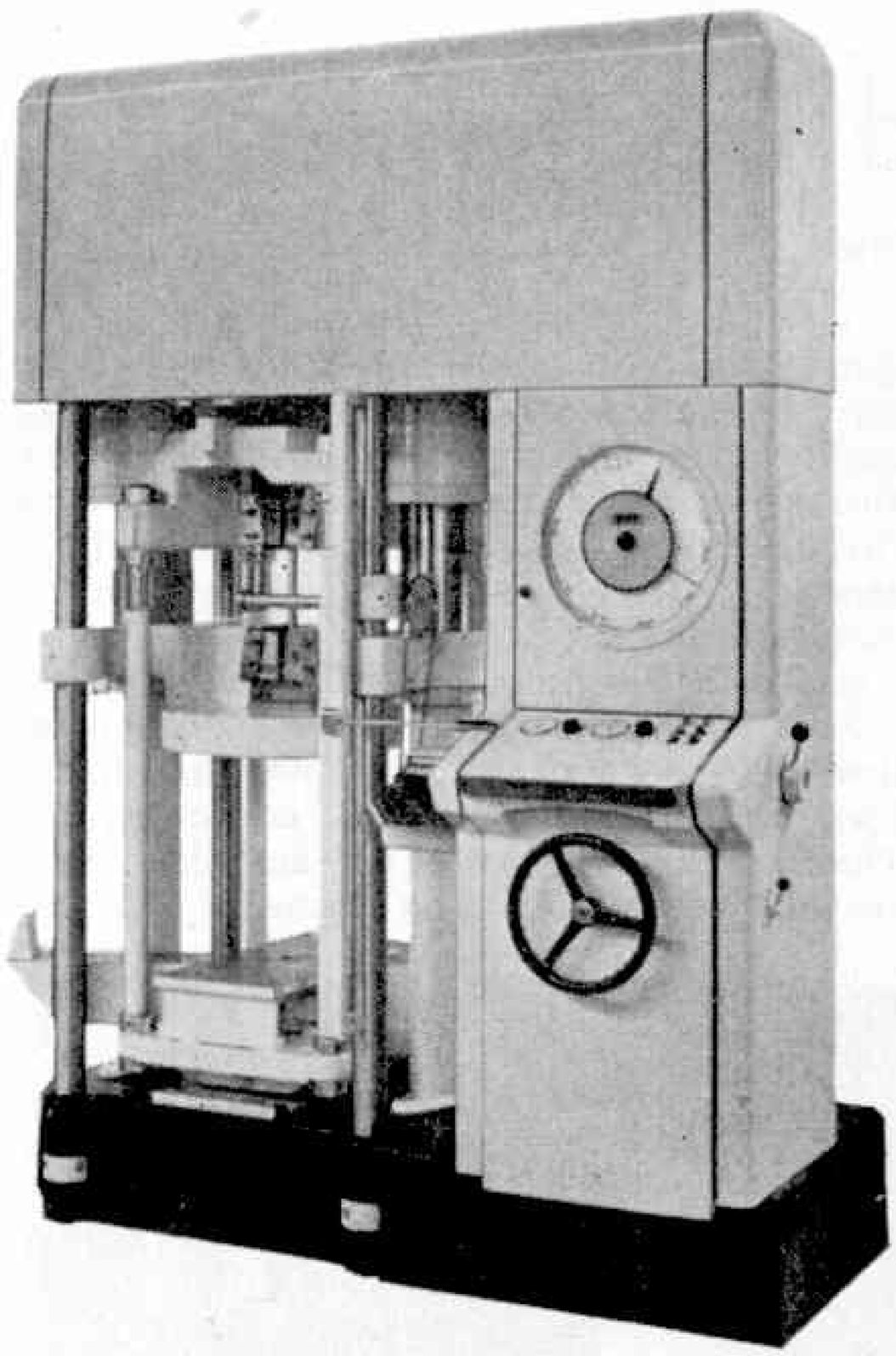
Making a test of hardness with a power-operated Brinell testing machine. Photograph by courtesy of W. T. Avery Ltd.

Mechanical testing, which is the name given to the determination of the strength properties of materials, is an essential part of engineering. Such testing is applied to most things metallic, from the humble razor blade to the intricate parts needed for huge aircraft, massive locomotives and enormous machines of all kinds.

The most widely used measure of strength is what is known as the tensile test. A pair of tug of war teams pulling at opposite ends of a length of rope gives some idea of this method. Even simpler is an experiment you can do yourselves. Take a piece of wool in both hands, and while gripping the ends firmly, pull slowly until it breaks. You have then carried out a tensile test, and by applying it to other materials, taking care to use pieces of similar size, you can tell roughly whether one is stronger than another. For instance, compare the wool with a piece of wire of the same diameter.

The tensile testing of metals is done in the same way, but of course powerful machines are necessary. It is also essential to measure the load applied in some way and to find the greatest load the metal will sustain before breaking. If a square bar having sides measuring one inch, so that the area of the cross-section is one square inch, can carry a maximum load of 20 tons in this test, it is said to have a tensile strength of 20 tons per square inch. It is therefore possible to determine the tensile strength of materials by this method, no matter what the size of the test piece, which renders comparison easy.

It may sound unbelievable that a metal is elastic up to a certain load which is characteristic of the metal itself, not as elastic as the rubber of your catapult, but still elastic, although to a lesser extent. In the same way that a rubber band stretches to a certain degree and will return to its original size when released, so a metal, if subject to load below its elastic limit, will resume its normal size when the load is removed.



This 50-ton self-indicating universal machine is used for making tests in tension, compression, hardness and other properties of metals. Photograph by courtesy of Saml. Denison and Son Ltd.

This is a remarkable fact, and one of which full use is made by the designer. He is less interested in maximum load, because with this the metal is near to breaking, and he does not want his machines to be deformed or to fail. His aim is to design the machine so that the working load is within the elastic limit of the metal. If the load in service does become excessive—it is usually allowed for by the use of safety factors—then no great harm is done.

You might wonder what is the advantage of knowing the maximum load if it is not used. The answer is, because it is so easy to determine—the elastic limit is much more difficult—and it serves to indicate whether a metal is up to standard, before carrying out further tests. It is very useful after a metal's strength has been altered by heat treatment.

The tensile test, although mainly used for the determination of strength, is capable of yielding other useful information. When a test piece is pulled it stretches, a little at first, but gradually more and more as the test proceeds. The greatest stretching occurs after the maximum load has been reached, and just before fracture, when the metal thickness or diameter becomes reduced. Measuring the area before and after test gives the reduction in area.

This indicates the ease with which a metal may be worked or deformed, for example by rolling or wire-drawing. The greater the reduction in area, the more workable is the metal. The amount of stretch also indicates the ease of working. If it is large the metal is ductile, or easily worked. If small the metal is brittle, and the test piece will break without any marked reduction in area.

Another useful test is that for hardness. Hardness is difficult to define adequately, but is taken as the resistance a metal offers to indentation. The Brinell test, so called after the engineer who invented it, is widely used. A hard steel ball is forced into the metal under a standard pressure, and the size of the impression formed is measured. From this the hardness is calculated. A hard material under test resists the penetration of the ball more than a soft one. Therefore a hard metal will show a small impression, and a soft metal a larger one.

The method is valuable since it is easily carried out, and from the result it is possible to obtain a fairly accurate value for the ultimate tensile strength of the metal, particularly if it is steel.

Another form of hardness test, known as the Vickers test, uses an accurately cut

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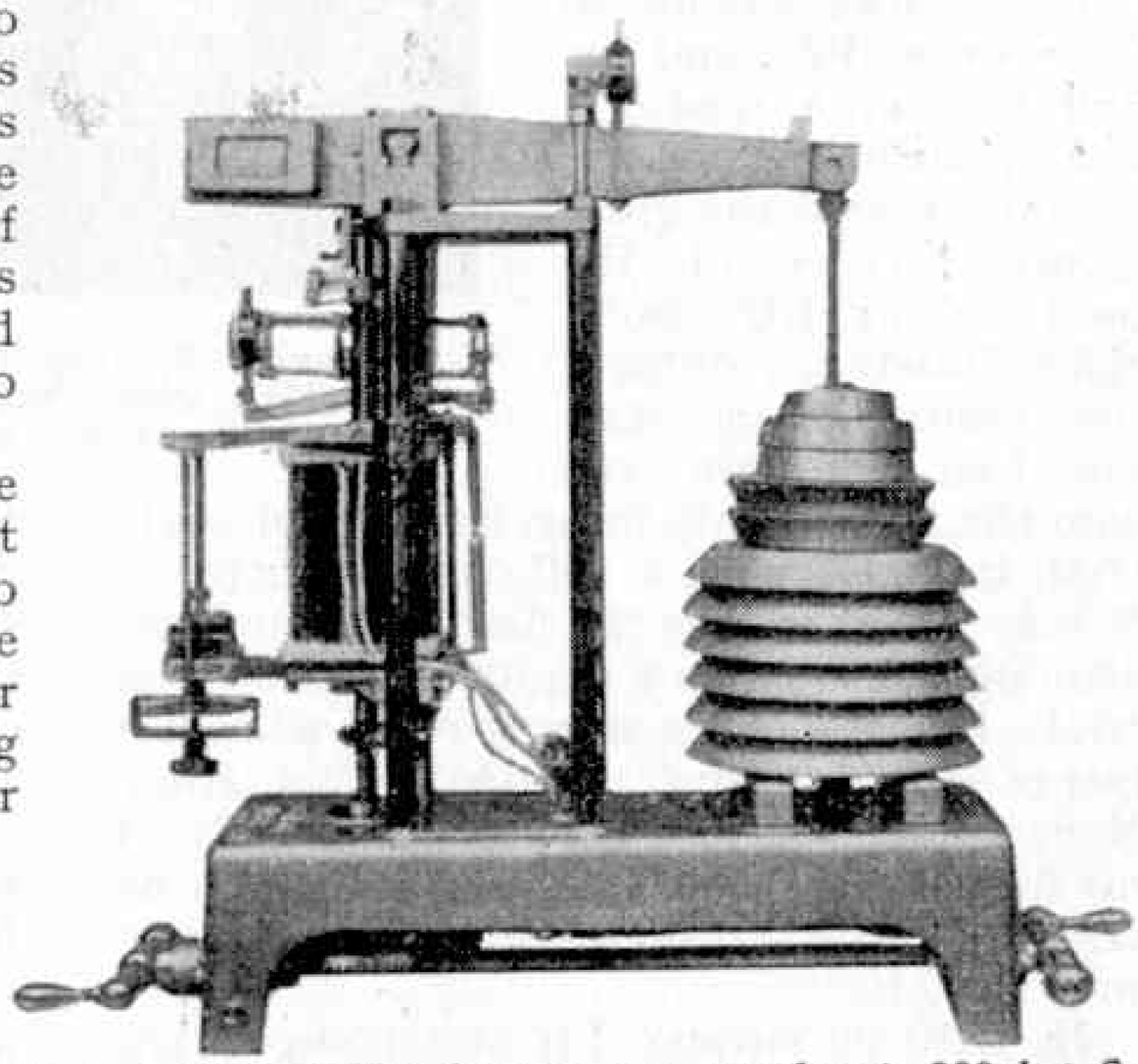

Creep testing machine for temperatures of up to 900 deg. C. with furnace, temperature controller and a special extensometer to measure changes in dimensions. Photograph by courtesy of Saml. Denison and Son Ltd.

Road and Track

By Peter Lewis

AT Silverstone, in the British Grand Prix, we shall see the three finest drivers in the world fighting for Championship points; Stirling Moss, Mike Hawthorn and Juan Fangio. The courageous and highly impressive way Hawthorn has handled the B.R.M. this season, coping with a series of trials and tribulations, is in itself worthy of the best quality of Farina, Ascari and Fangio at the height of their World Championship form.

The spotlight, which was quite rightly trained on Moss during his season with Mercedes, left Hawthorn somewhat in the shadows, and people forget that at the age of 23, and after only two full racing seasons, he became the first Englishman since Richard Seaman (who drove for Mercedes before the war) to drive for a crack Continental *equipe*. He then proceeded to win the classic French G.P., after a tremendous duel with Fangio, thus becoming the first Englishman to do so since 1928, and the first to win a post-war Championship event.

Like some of the great racing drivers of the past, Yorkshire-born Mike Hawthorn entered the motor-racing game via two wheelers and won the Novice Cup in his first motor cycle trial, in 1947, with a 350 c.c. Competition B.S.A. Hawthorn is the first to admit that although he became a regular competitor in trials he breathed a sigh of relief when his father bought him a 1930 Riley Nine. Nevertheless he still talks affectionately of his first "mount," a 1927 Norton which he bought for thirty shillings and subsequently sold for £10.

In 1950 he entered his first competition and won the 1,100 c.c. class at Brighton Speed Trials in a Riley Imp. The following year, at Gamston, he won his first race—a 20 mile 1,100 c.c. event. But it was during the 1952 season, at the wheel of the astonishing Cooper-Bristol, that Hawthorn really made his presence felt. After the Dutch G.P. his father had a long talk with the Ferrari team-manager, Ugolini, accepting an invitation for his son to "try a Ferrari."

At Modena—home of the Italian marques—Hawthorn lapped the G.P. circuit several times in a Ferrari, and then switched to his Cooper-Bristol—with dire consequences. The braking points for the two cars were very different. He took a corner too fast and ended up in Modena Hospital with cracked ribs. A few days later a surprised Hawthorn, dismally certain that Ferrari would not want him now, was offered a contract for 1953 by Ugolini. In the eight World Championship events he was to score one first, two thirds, three fourths, a fifth and a sixth; a fine record for his first season.

G. A. Vandervell briefs Stirling Moss on the Formula 1 Vanwall at Silverstone, on 5th May, where Moss won the "Daily Express" Trophy race with an average speed of 100.47 m.p.h. Photograph by courtesy of "Motor Racing."

Hawthorn had more than his share of bad luck during his second season with Ferrari. Magnificent driving in the rain at Buenos Aires was followed by his disqualification when he spun and was push-started. At Syracuse he crashed and

was dragged to safety by Gonzalez while flames destroyed his car. But he was badly burned and prevented from racing again until the Belgian G.P., in June, when he was almost asphyxiated in the cockpit of his Ferrari by a leaking exhaust. He was lifted out semi-conscious.

Mike Hawthorn.

At the very end of the season Mike Hawthorn secured a victory, following a run of three Mercedes championship successes, that put fresh heart in the Ferrari organisation for the 1955 season. He won another World Championship event, the Spanish G.P., once again beating Fangio in a straight fight.

The 1955 season was a disappointing one for Hawthorn in the Grand Prix field. In the five championship events in which he took part his cars retired him from four, the Ferrari twice and the British Vanwall twice.

It was in a D Type Jaguar that Hawthorn put up his best performance during 1955. Victory at Sebring was followed by a display of grit and determination after the terrible accident at Le Mans, which will always be remembered by chroniclers of great British achievements. He told me in London after the race that during his tremendous duel with Fangio he was determined not to let the Mercedes get away. "I have never been so determined about anything in my life."

Then there was the T.T. and Hawthorn, sharing a lone "works" Jaguar with Titterington, fighting it out for the entire race with the Mercedes team. On the last lap, when lying securely second, the engine of the Jaguar locked solid. What wretched luck, but what a wonderful drive! I hope it will not be too long before the six foot youngster with blond hair and a boyish face—you may have noticed that he looks years older hunched in the cockpit of a car—is once more in the forefront of the Grand Prix field.

The Vanwall

A man who, in his own way, has those same qualities of determination and the will to win as Hawthorn is Mr. G. A. (Tony) Vandervell, the power behind the Vanwall. His interest in speed dates back to the early 1920's, when he raced a Norton motor-cycle in the Isle of Man T.T. races. His hobby, as it was then, has become an all-out effort to build a British G.P. car capable of beating the world on the gruelling championship circuits, in those races that carry maximum prestige value.

Mr. Vandervell was associated with the B.R.M. project after the war, but broke away and was soon challenging his former colleagues and their 1½ litre supercharged cars with the remarkable 12 cylinder

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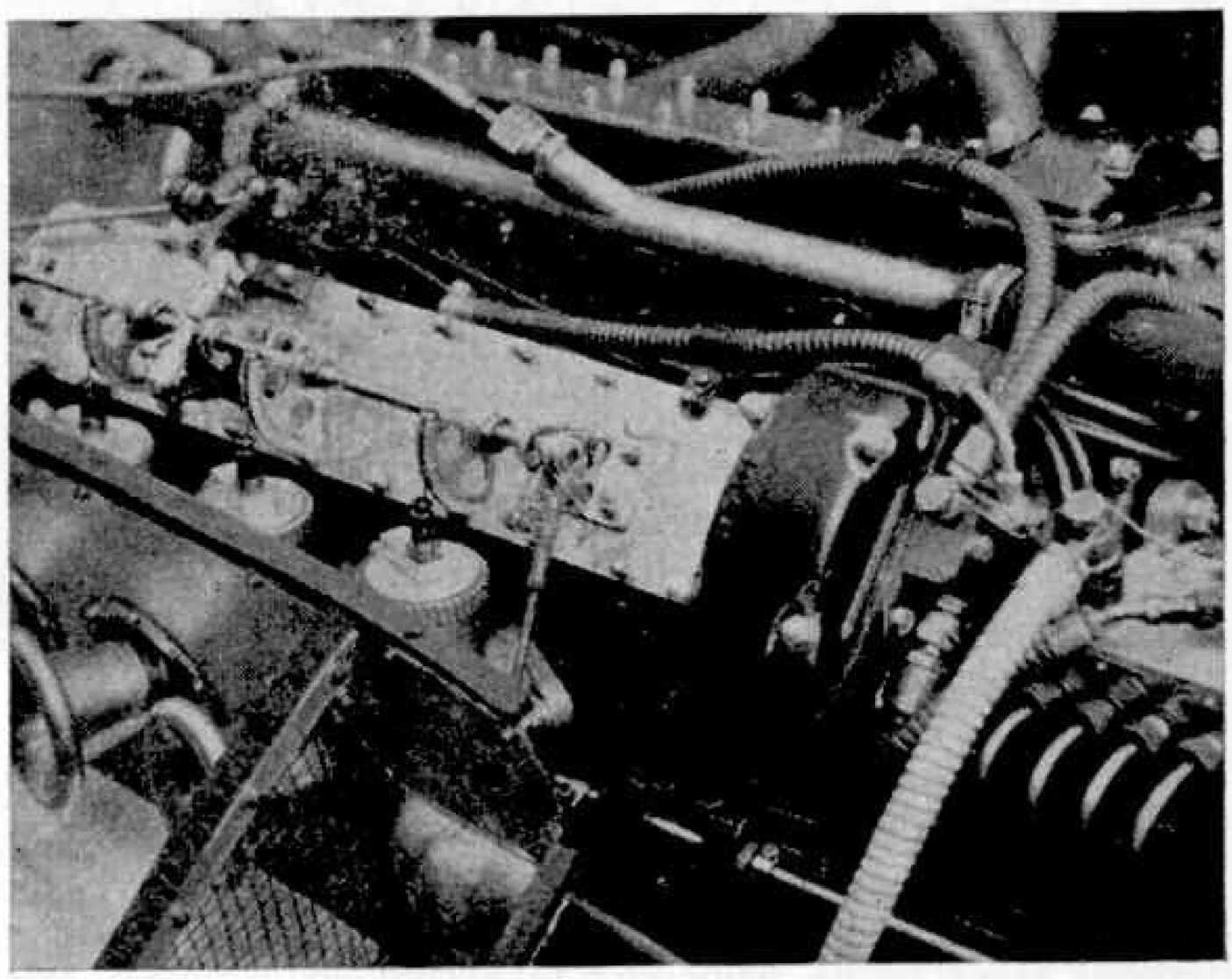


The four-cylinder engine of the Vanwall has twin overhead camshafts and two sparking plugs for each cylinder, with direct injection for the fuel. It develops over 290 b.h.p., a fantastic figure for a 2½ litre unsupercharged unit. Photograph by courtesy of "Motor Racing."

The Clyde Puffers

Fleet of Sturdy Little Cargo Vessels

By G. H. Robin

FROM the early days of steamboat travelling down to the present day, the Firth of Clyde has been famous for the popularity of its passenger services and cruises on a Firth and sea lochs world famous for their scenic attractions. The heights of popularity of these services were from the last decades of the Victorian era practically to the beginning of the first World War, when competing companies strove against each other for the fastest times from Glasgow to the coast resorts; and again in grouped railway days, when the former L.M.S. and L.N.E.R. sacrificed speed for comfort.

These were the show services of the Clyde, in addition to which were those of one or two private companies that competed for the islands traffic west of the mainland, including that of the famous Royal Mail Route to Oban, Fort William, etc., so much favoured by Queen Victoria. But all the while, completely void of glory, glamour or publicity, all these places were being served by a splendid fleet of fussy little cargo boats known as puffers. These small ships derived their name from the fact that in their earliest forms the steam from their engines was exhausted through the funnel in the same manner as a railway engine, with the accompanying "puff-puff." Although these soon gave way to condensing engines, the name has survived.

"Glencloy" beached, with a lorry alongside to receive cargo.

Neil Munro, the famous Scottish humorous writer, created his famous character, Para Handy, as skipper of one of these boats, while the film *Maggie* brought an even more vivid picture of puffer life to the public at large.

Sturdy little ships the puffers are too. They are direct descendants of steam driven canal barges and the main thought in their design was to provide hold space, which grudgingly had to be limited to accommodate the machinery now necessary to propel them. Any odd space was adapted to provide a minimum of accommodation and comfort for the crews required.

The earlier boats were limited to 66 ft. in length by the locks on the Forth and Clyde Canal, but very few are built to this limitation nowadays. Their sturdy appearance emanates from the fact that they have to be flat-bottomed and heavily plated for beaching, in order to discharge cargo at small habitations where no piers, etc., are provided. And they have frequently to battle with heavy seas, wind and tides when venturing to some of the small islands actually situated in the Atlantic Ocean.

These open sea boats vary in size, but in order to be able to pass through the Crinan Canal in Kintyre they are limited to 88 ft. in length, a beam of 20 ft. and a draught of 9 ft. 6 in. The largest, of about 190 tons deadweight capacity and carrying approximately 175 tons of cargo, are known as five-handed ships and carry a master, engineer, mate, fireman and cook-deckhand.

All boats over 100 gross tons require a Clyde Navigation Pilot between the Tail of the Bank, at Greenock, and Glasgow, but most masters on the large puffers hold a

Clyde Trust Pilot Certificate themselves. Those under 100 tons require a crew of four only and do not carry a fireman, while on three-handed vessels, usually not sailing beyond the Firth of Clyde, the master, engineer and mate have to man the puffer without any further assistance.

Puffers are single screw craft, powered by compound condensing engines of about 120 h.p. drawing steam from upright boilers working at 110/140 lb. per sq. in. The earlier ones had tillers, but these soon gave way to steering wheels situated over the engine room, where the Master stood exposed to all weathers and controlled the throttle and the reversing gear as well as attending to steering. By now all puffers have a proper wheelhouse, with sliding windows.

With the exception of the two latest models the crews' quarters are all in the forecastle, which is heated by a small stove on which all food is cooked, thus further cramping their combined sleeping and messing space. The Captain's cabin is aft, next the wheelhouse, and provides a little more comfort for the occupant. Today much more is being done to make the pufferman's job more comfortable and attractive, and many puffers have radio transmitting and receiving sets.

An effort to improve conditions was made after the last war, when Messrs. Ross and Marshall of Greenock had built for them a steam puffer, the *Moonlight*, with crew accommodation aft and several conveniences hitherto unheard of in this class of ship.

Although a fleet of motor puffers was in service about 1910 the venture was not continued, and so it was not until 1951 that Messrs. G. and G. Hamilton Ltd. of Glasgow, in conjunction with the builders, Messrs. Scott and Sons of Bowling, designed the first modern one, which made its maiden voyage in February 1953.

This modern cargo looking ship complies with the maximum limits of the Crinan Canal. Its smaller engine and fuel space has resulted not only in increased cargo space, but has enabled the owners to provide a modern cabin with running water for the master and a single berth one for the engineer, and tier bunks, with one spare, entirely separate from the messroom, are provided for the other members of the crew.

This ship has a Polar Atlas engine of 270 h.p., and can cruise at 8 knots. The galley has an oil stove combining a water boiler, which provides hot water for a bath of the sit-in type, a luxury hitherto unknown on a puffer. In addition there is a separate boiler for central heating, and the refinement of a refrigerator.

The illustration at the head of the page shows a puffer loading coal at Rothesay Dock, Clydebank, for transport down the Clyde to the Western Isles. The vessel again is Messrs. G. and G. Hamilton's "Glencloy," seen unloading on the beach on the opposite page.

Generally speaking, puffers carry bulk cargoes, that is full loads of one commodity. Coal, coke, etc., are the most numerous, sand, gravel, timber, etc., being other material offering full loads, while seaweed and diatomite are also carried. Sand and gravel are usually grabbed close inshore and frequently screened.

It is unlikely that anyone making a trip across the Firth of Clyde, especially in the upper reaches, will miss seeing at least one of these boats, usually with a long trail of black smoke in its wake, though in the case of a following wind of more than 6 knots the smoke will be blown ahead of the vessel. And few visitors to Clyde resorts or to the islands will fail to notice with much

interest the puffers tied up alongside the solid masonry jetties, built low on the beach to accommodate them. During the day they are usually noisily discharging coal by means of the ship's gear, raising and lowering a steel bucket capable of holding 5 to 7 cwts., while on fine days black dust settles all around.

Where no piers or jetties are available discharging has to be done by beaching the puffer, and then carts or lorries run alongside to receive the cargo. Beaching calls for the utmost care and is not the easy business one might imagine. The selected part of the beach has to be cleared of big stones likely to damage the boat before the vessel is driven slowly on at high tide, when she will come to rest on her flat bottom.

The puffer "Invercloy" on the beach at Stein.

If the whole cargo is to be unloaded the vessel is certain to float at the next high tide, but if only part of the cargo has to be transferred the master must be sure that his boat will not be left too low in the water to be refloated. The master's skill and anticipation of weather conditions are most highly tested when owing to variations in the rise and fall of tides, which even a change of wind may effect, he must be careful not to miss a spring tide and so strand his ship for about ten days until the next suitable tide.

This beach discharging accounts for the sight of these blunt vessels lying high and dry on sandy beaches with, at night, not a living soul in sight.

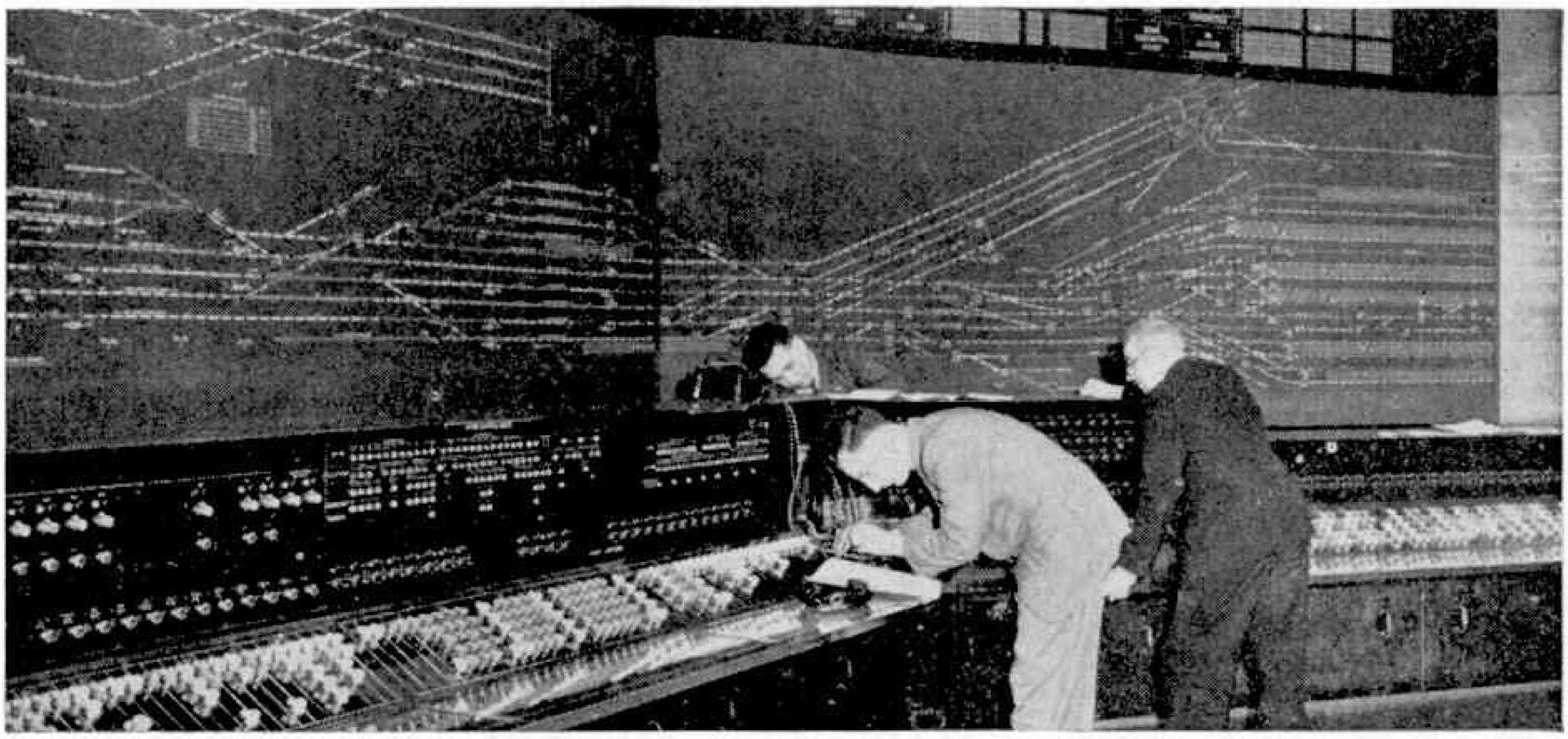
Although they are not adapted for carrying passengers a trip on one of these little ships would be most interesting, especially if the Crinan Canal be used en route to one of the islands off the West Coast. This canal, 9 miles long between Ardrishaig on Loch Fyne and Crinan on the Atlantic shores, was constructed in the days of sail in order to save ships the voyage round the Mull of Kintyre. Off this promontory boats often encountered very wild weather, with perhaps fast running tides, and a combination of these conditions could add many hazardous or weary hours to a voyage. The construction of the canal across the narrow isthmus was begun in 1793 before the days of mechanical excavators etc. and so the route selected is somewhat tortuous and undulating, requiring fifteen locks to take the water over the summit at Cairnbaan, 64 ft. above sea level.

Once through here the voyage could be to one of the nearer islands, *e.g.* Mull, or it could be up the coast via the Sounds to Oban, Mallaig, Skye, or to the isolated villages on the rugged and almost deserted West Coast of Ross-shire, or even further West and North-West to the Outer Hebrides.

On occasions puffers may travel via the Minch as far North as the Orkney Islands, though the one example based at Shapinsay, on these islands, favours the Caledonian Canal route to the West and Glasgow.

The names borne by the puffers can delight the most fastidious. One three handed vessel operating from Millport carries the noble name *Saxon*. One firm favours "lights," such as *Stormlight*, *Warlight* and *Starlight*. Messrs. G. and G. Hamilton Ltd., at one time favoured "Cloys," such as *Rivercloy*, *Glencloy* and *Invercloy*, while another firm has chosen Warriors such as *Spartan*, *Chindit*, *Kaffir*, *Turk* and *Zulu*.

Despite unavoidable changes brought about by the ever advancing world of science, the Clyde puffer is today indispensable, fussing about the Firth, through the Canal and in and out the islands. There they may yet be seen high and dry on a sandy beach, or alongside an island pier where they may be forced to cease work upon the approach of a passenger steamer, to cast off and heave to until passenger priority has been served.



Railway Signalling

An Attractive Engineering Career

By the Editor

THE railway signal engineer is responsible for the signalling and interlocking equipment, both mechanical and electrical, that provides for the safety of train operation. He has to see that this equipment is properly installed and maintained, and he is also concerned with such things as the telephone exchanges, teleprinters, radio equipment, overhead and cable communication circuits and public address equipment now used on our railways. Signal engineering indeed can be described briefly as a form of light electrical engineering where mechanical knowledge also is required.

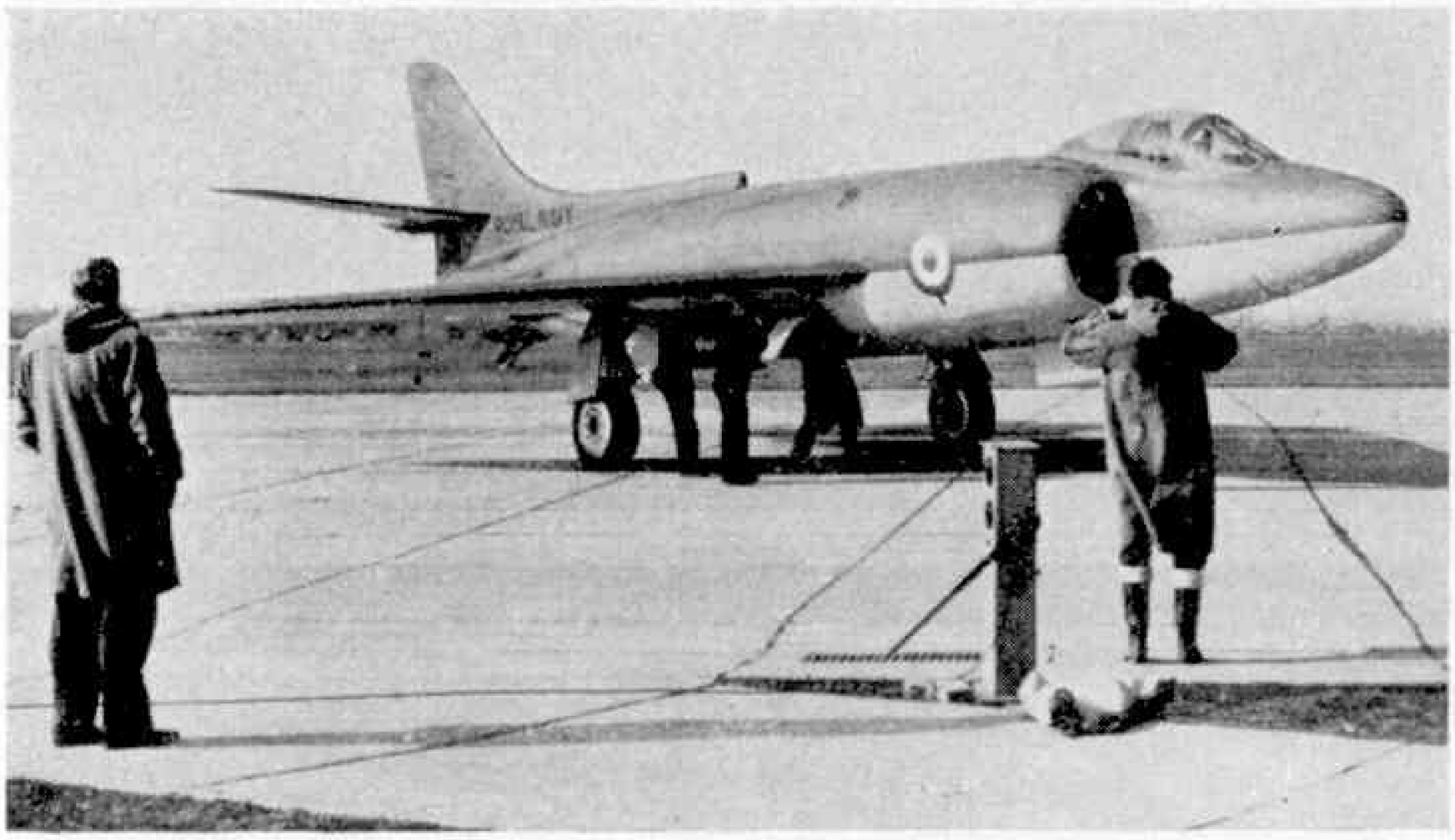
The work of the signalling departments of the various regions of British Railways has expanded very largely during recent years. It will continue to do so, and with further technical advances, including the development of electronic methods of control, for example, for measuring the speeds of vehicles and controlling them automatically, it will provide more and more work of a varied and interesting character. And a large proportion of this work must be carried on out of doors, a feature that will add very largely to its attraction as a career.

The railway signal engineer has to be an electrical engineer with mechanical knowledge, as he is concerned with a wide range of modern equipment in signal boxes, along the lines and in stations. Some idea of the extent and complexity of his work is given by the picture at the top of the page, which shows the switches of a signal box control panel being tested.

How does a young man become a railway signal engineer? There are three ways, each suited to a particular age and educational attainment. There are training schemes for university graduates in engineering, and for signal engineering students, that is youths possessing a suitable educational background and complying with certain requirements. The training course for signal engineering graduates extends over two or three years, while that for signal engineering students is one of five years duration. In both cases the courses lead to appointments on the technical staffs of the signal engineering departments.

The third way is by direct entry to the technical staff. There is no obligation on the part of the railways to arrange a training course for those who secure appointments directly in this way, but they may be transferred to different sections to widen their experience and to qualify them for more responsible positions.

All this is explained in a special booklet issued by British Railways under the title of *Railway Signal Engineering as a Career*. Any *M.M.* reader who is qualified for entry and is definitely interested can obtain further details by writing to me.



The Supermarine N.113 Naval Fighter undergoing trials at the Royal Aircraft Establishment, Bedford. Its arrester gear was tested by landing the aircraft on a runway fitted with wires similar to those on an aircraft carrier's deck.

Air News

By John W. R. Taylor

Naval Fighter's Deck Trials

Both the de Havilland D.H.110 two-seat, all-weather fighter and the Supermarine N.113 single-seat fighter-bomber have completed deck-landing trials on board H.M.S. *Ark Royal* and are cleared for full production. As a result, the Fleet Air Arm will have by 1958 aircraft with a better all-round performance than those of the R.A.F.

The N.113 made its first flight on 20th January this year, only three months before the deck trials, which followed a series of dummy deck landings at the Royal Aircraft Establishment, Bedford, on a runway fitted with arrester wires similar to those of a carrier. This fighter-bomber has two Rolls-Royce Avon engines and is capable of carrying atomic bombs. Later versions will be armed with guided missiles, in addition to the fixed armament of 30 mm. cannon.

Higher Still

Not to be outdone by the North American X-15 research aircraft, which is being built to fly at a height of 528,000 ft., Douglas aircraft are planning a rocket-plane that will reach 750,000 ft. (140 miles). At that height, the air is as thin as a laboratory vacuum and ordinary control surfaces would be useless. So the aircraft will be fitted with a ring of small rockets, set at an angle around its fuselage, to "steer" it in space.

It will have a speed of about 3,500 m.p.h. and an endurance of up to 20 min., during which it will cover a horizontal distance of about 500 miles. Douglas believe this performance possible with existing rocket-motors and metals; but it may be necessary to fit the aircraft with a second skin, just outside the first, which will be melted away as it re-enters the atmosphere, to save the aircraft overheating and burning up. Combined with a touch-down speed of 250 m.p.h., these ideas promise the pilot an interesting ride!

Aircraft for the German Navy

Although the new *Luftwaffe* will be equipped largely with American fighters, it seems certain that the German Navy will have British aircraft. For anti-submarine duties it is expected to use a shore-based version of the Fairey Gannet, with Hawker Sea Hawk jet fighters for airfield defence.

The Sea Hawks will be built by Armstrong Whitworth, who recently received a United States Navy Off-shore Procurement contract worth nearly $6½ million to build aircraft of this type for the Royal Netherlands Navy.

New Helicopter Service

The B.E.A. helicopter service between London Airport and Waterloo Air Terminal ended on 31st May, and the Westland Whirlwinds with which it was operated have been switched to new routes in the Midlands. Due to start on the 1st of this month, they will link Nottingham and Leicester with Birmingham Airport, where there will be connections with B.E.A.'s main-line services to London and the Continent.

The helicopters will operate from rotor stations within two miles of the centres of Nottingham and Leicester, and as the inter-city fares will range from only 11s. to 29s. it seems a very cheap way for anybody to sample the thrills of a first helicopter trip.

Wind Tunnel TV

Models under test in the Aircraft Research Association's new £1½ million high-speed wind tunnel at Bedford, which was opened by the Duke of Edinburgh last May, are kept under observation by Pye Television equipment. The design of the tunnel prevents use of the usual plate-glass observation windows.

The tunnel is the most modern of its kind in the world, and its 25,000 h.p. electric motor makes possible the testing of large models at speeds up to 1,000 m.p.h. At this speed about 1¾ tons of air are blown through the 9 ft. × 8 ft. test section every second, and a "lift" of 3,000 lb. might be produced on a model with a span of 3 ft. As a result, the models have to be very strong, with solid steel wings.

Recognising the need for equipment able to give accurate performance data at around the speed of sound, 14 of the leading British aircraft and engine designers clubbed together to build the tunnel, which will be joined soon by a much smaller transonic tunnel and a Mach 3.4 (2,500 m.p.h.) supersonic tunnel with a 2¼ ft. × 2½ ft. working section.

Orders for the Friendship

The graceful little Friendship air liner, with which the great Dutch Fokker company is re-entering the civil aviation market, seems to be achieving its object of meeting the requirements of airlines that want a short-range replacement for their ageing DC-3 Dakotas. In addition to production in Fokker's own factory at Schiphol Airport, Amsterdam, it is being built by Fairchild in America and will probably be built by

A night photograph of the Convair-340 bought by Messrs. D. Napier & Son, showing it equipped with Napier Eland turboprops in place of its original Pratt and Whitney piston engines.

Breguet in France. A picture of the Fokker Friendship appeared in *Air News* last April.

Within a few months of its first flight on 24th November, 1955, orders have been announced from K.L.M. (2), Trans-Australia Airlines (6), Aer Lingus (4) and three U.S. local operators—Frontier Airlines (6), West Coast Airlines and Mackay Airlines.

It is significant that the first three companies are, or will be, Viscount operators as, like this British aircraft, the Friendship has Rolls-Royce Dart turboprops. It will carry 32 passengers and 280 cu. ft. of freight for 300 miles at 275 m.p.h.

New Power for Convairs

The Convair-340 G-ANVP, illustrated above, looks little different from the hundreds of other Convair-liners in service throughout the world. But, instead of the usual 2,400 h.p. Pratt and Whitney R-2800 piston engines, it has two Napier Eland turboprops inside its smooth engine nacelles.

Napier's bought the aircraft in November 1954 and designed the conversion in the hope of persuading Convair owners to switch to turboprop power. To keep costs as low as possible, they made hardly any changes to the aircraft's structure and controls, and even put the Elands into the existing nacelles, although they are much slimmer than the piston-engines. The re-engined air liner first flew on 9th February this year.

Test flights have already proved the advantages of the changeover, and Napier's claim that any airline could re-engine its Convair-340 and 440 Metropolitan aircraft with Elands in a few weeks. They plan to sell conversion kits for this purpose, based on the 3,500 h.p. Eland N.El.6, which would give a total increase of 2,200 h.p. compared with the piston engines, whilst weighing 2,200 lb. less.

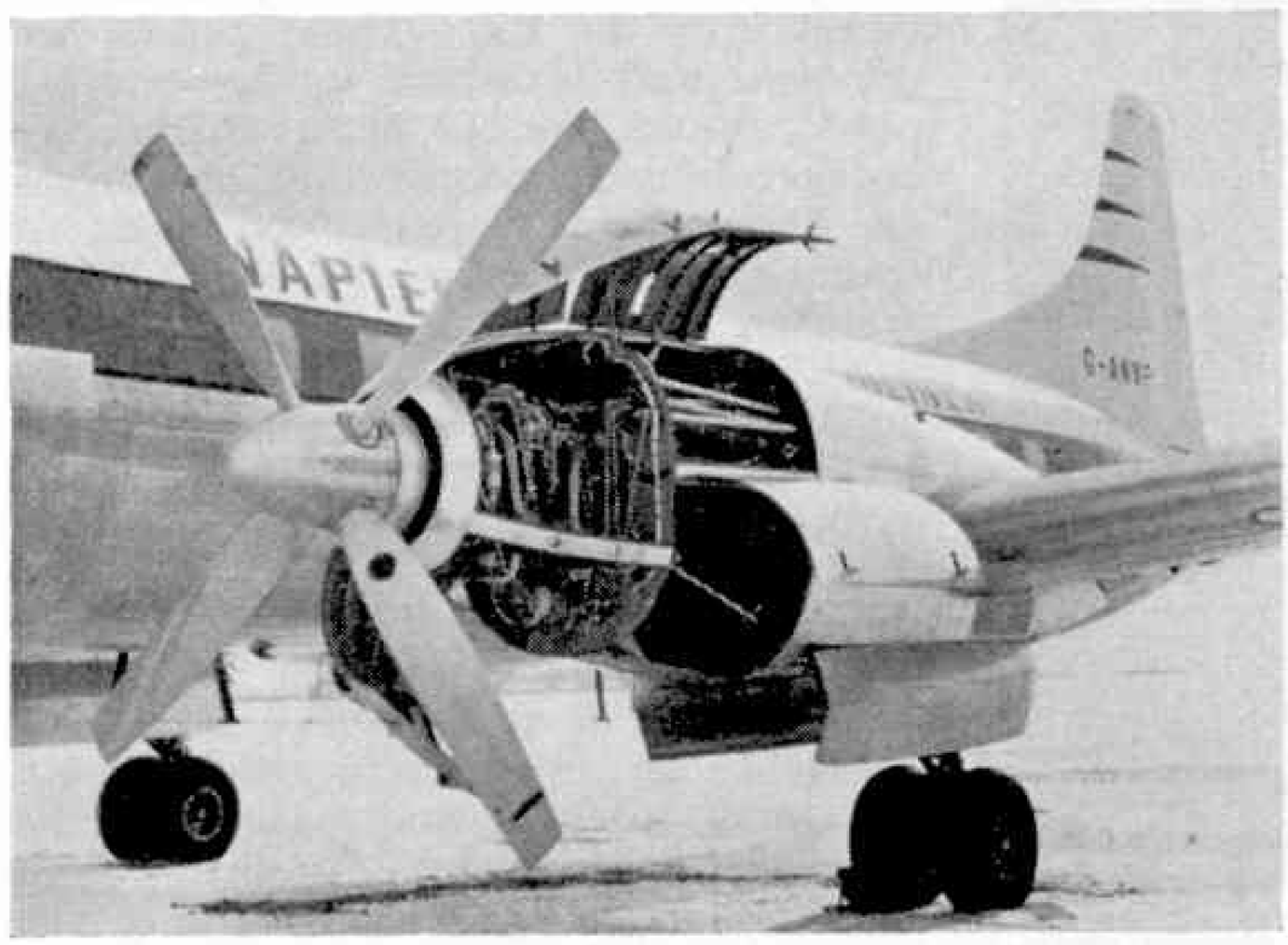
Cruising speed would be increased by 45 m.p.h. and the Eland-Convair would, for example, carry a full payload of 44 passengers and freight for 1,220 miles instead of 290 miles for the piston-engined version. Passengers would also notice the difference, for there would be almost no vibration in flight, and the noise level both inside and outside the cabin would be greatly reduced.

Napier's enterprise should earn Britain quite a lot of export orders, especially as the Douglas DC-6 and Martin 404 air liners could be re-engined with Elands just as easily as Convair-liners.

Royal Aircraft

The three Viking air liners which have served with the Queen's Flight for many years are to be replaced with two more de Havilland Herons. The Flight already has one Heron, which is often piloted by the Duke of Edinburgh, and will be equipped with two Westland Whirlwind helicopters for short-range journeys. Long-distance flights by the Royal Family will continue to be made in aircraft of B.E.A. and B.O.A.C.

The King of Saudi Arabia has also bought a 10-seat Whirlwind, which he will use for private hunting trips. It will be operated and maintained by Saudi Arabian Airlines.



This view of the port Eland turboprop in the Napier-owned Convair-340 shows the ease of access to the engines.

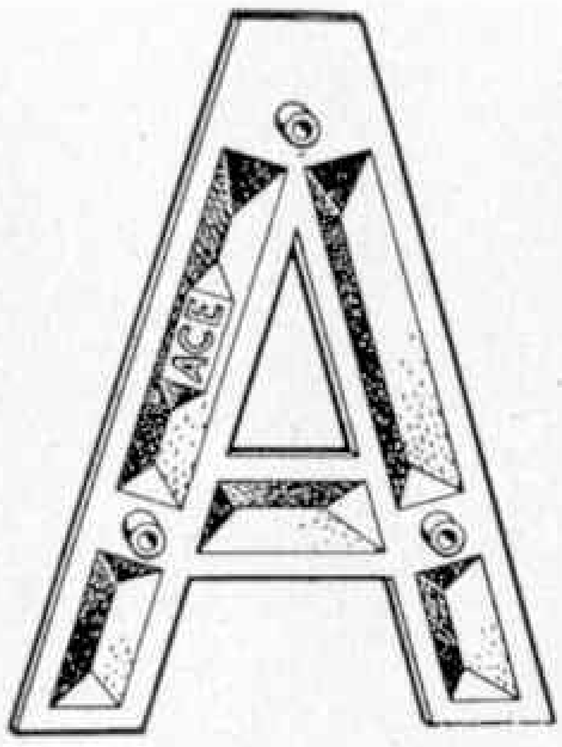
400 m.p.h. Viscount

Level speeds of around 400 m.p.h. have been achieved with the prototype Viscount 700 air liner G-AMAV, as part of the development programme for later versions of the Viscount and the 100-seat Vanguard, which will cruise at this speed.

Special permission was given for the aircraft's four Dart 510 turboprops to be run for short periods at nearly twice their normal cruising power, and it was flown at a weight of 51,000 lb., which is 9,000 lb. less than its usual loaded weight. The test runs were made at 25,000 ft., and showed that the Viscount handled quite normally at high speed.

The first production 400 m.p.h. Viscount 840's are due for delivery in 1958, and many operators are expected to convert their earlier Viscounts to 840 standard.

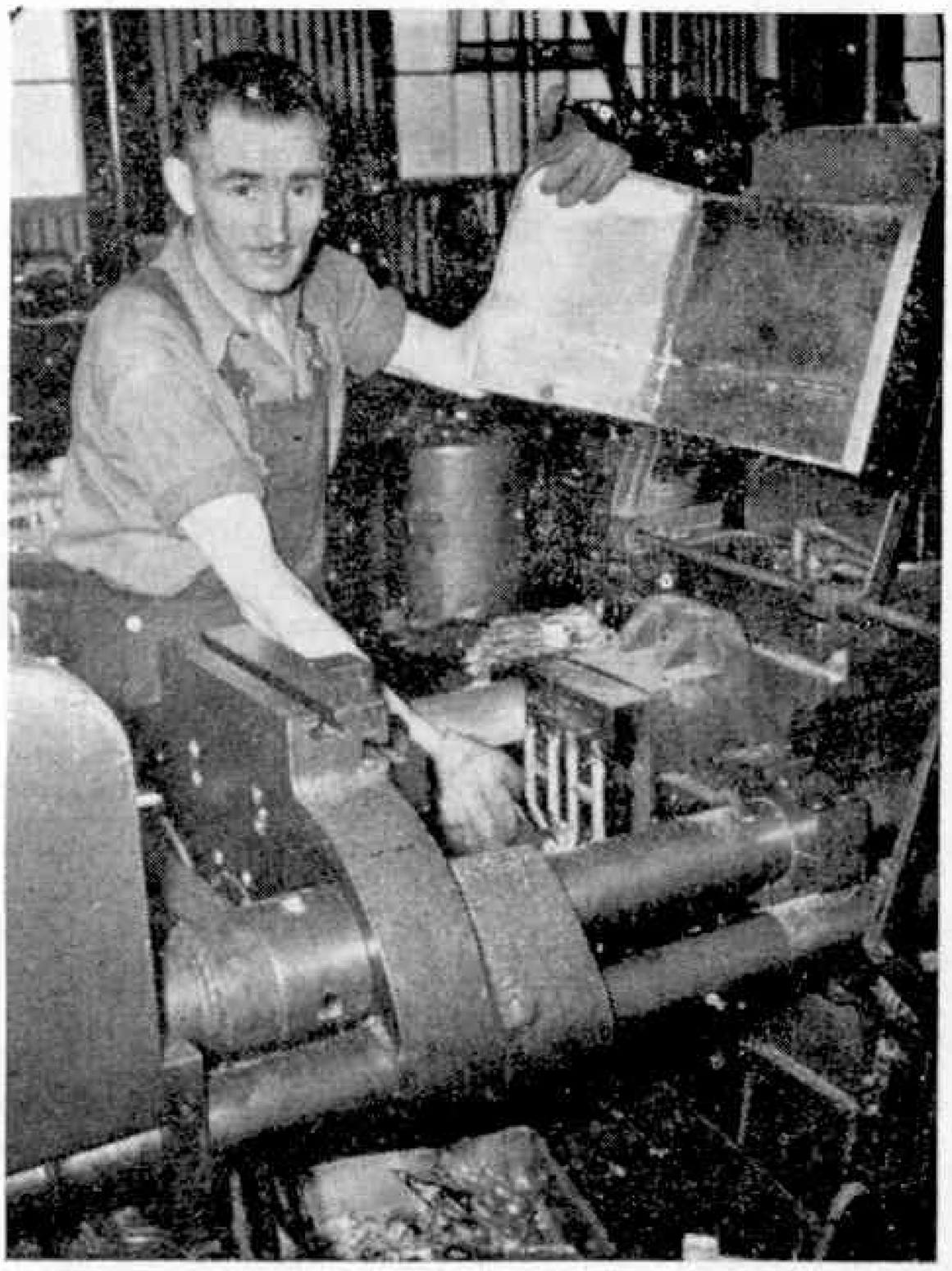
How Car Number Plates are Made



EVERY engine-driven road vehicle in the United Kingdom and in most countries overseas must be registered with the licensing authorities, who then allot a registration number by which the vehicle can in future be recognised. Incidentally, in the United Kingdom registration started with "A1" some 53 years ago and this number, transferred in the meantime from car to car, is still in use, now on the car of a well-known Midlands business man.

The registration number of a vehicle must be shown at the front and rear in letters and figures of a stipulated size—3½ in. high by 2½ in. wide for cars, lorries, buses, etc., and even the strokes of the characters must be of regulation width. Just because these are essentials, they need not be unattractive, and in fact such plates as the "Silver Peak" and "White Peak" products of Cornercroft Ltd., who make the well-known ACE plates, actually enhance the appearance of a motor car.

A great deal of thought and care certainly goes into the making of these plates. The letters and figures of ACE number plates are made of aluminium, die-cast in machines like that shown in the illustration on this page. Each die casts two characters at a time. It is constructed in two halves, one fixed to the machine and the other to a hydraulic ram that at the beginning of the casting cycle presses the two halves of the die together. The operator then charges the die with a pre-determined quantity of molten aluminium, which runs through channels to the two letters or figures. Another ram then comes into operation to squeeze the metal into the die, and so to ensure a non-porous casting with a very clean finish. There is a short pause while the metal solidifies, and the die is then opened, the characters are removed and the faces of the die cleaned. This cycle is repeated until a sufficient quantity of the pair of characters has been made.



Casting the double letter H for use on car number plates. The illustrations to this article are reproduced by courtesy of Cornercroft Ltd.

The pairs so made are connected by an unwanted strip of metal aluminium, known as a "riser," and a large, circular piece of the metal aluminium called the "sprue," which is formed at the end of the piston stroke when it presses the metal into the die. These pieces are removed and returned to the melting pot for re-use. The characters themselves are carefully inspected and the edges are then cleaned, partly on belts of emery cloth and partly by hand. They are then ready for the "finishing" stage.

ACE characters are supplied in two finishes—"Silver Peak," with a satin-silver anodic finish, and "White Peak," with a durable coat of high-gloss white enamel.

The "Silver Peak" characters are polished on revolving "mops" until they have a smooth surface free from any blemishes or undulations, then again inspected, washed, and passed to the Anodising Department. Anodising is an electro-chemical process involving the immersion of the characters in a solution of sulphuric acid. This rapidly oxidises

A tray of "White Peak" characters in the spraying booth in which they are coated with paint.

the surface of the aluminium and imparts a satin non-glare finish that is hard, permanent and impervious to all weather conditions.

"White Peak" characters are not polished, but are pyluminised, a process in which they are treated with an alkaline chromate solution. They are then placed on large wire-mesh trays and sprayed with undercoating or primer paint. They are dried in ovens and afterwards are sprayed with a heavy coat of specially formulated white enamel paint, after which the trays are transferred to an endless conveyor that passes through an infra-red stoving oven, where the paint is dried and hardened. The characters are then sorted and packed in cartons for distribution to the official ACE Number Plate Assemblers all over the country.

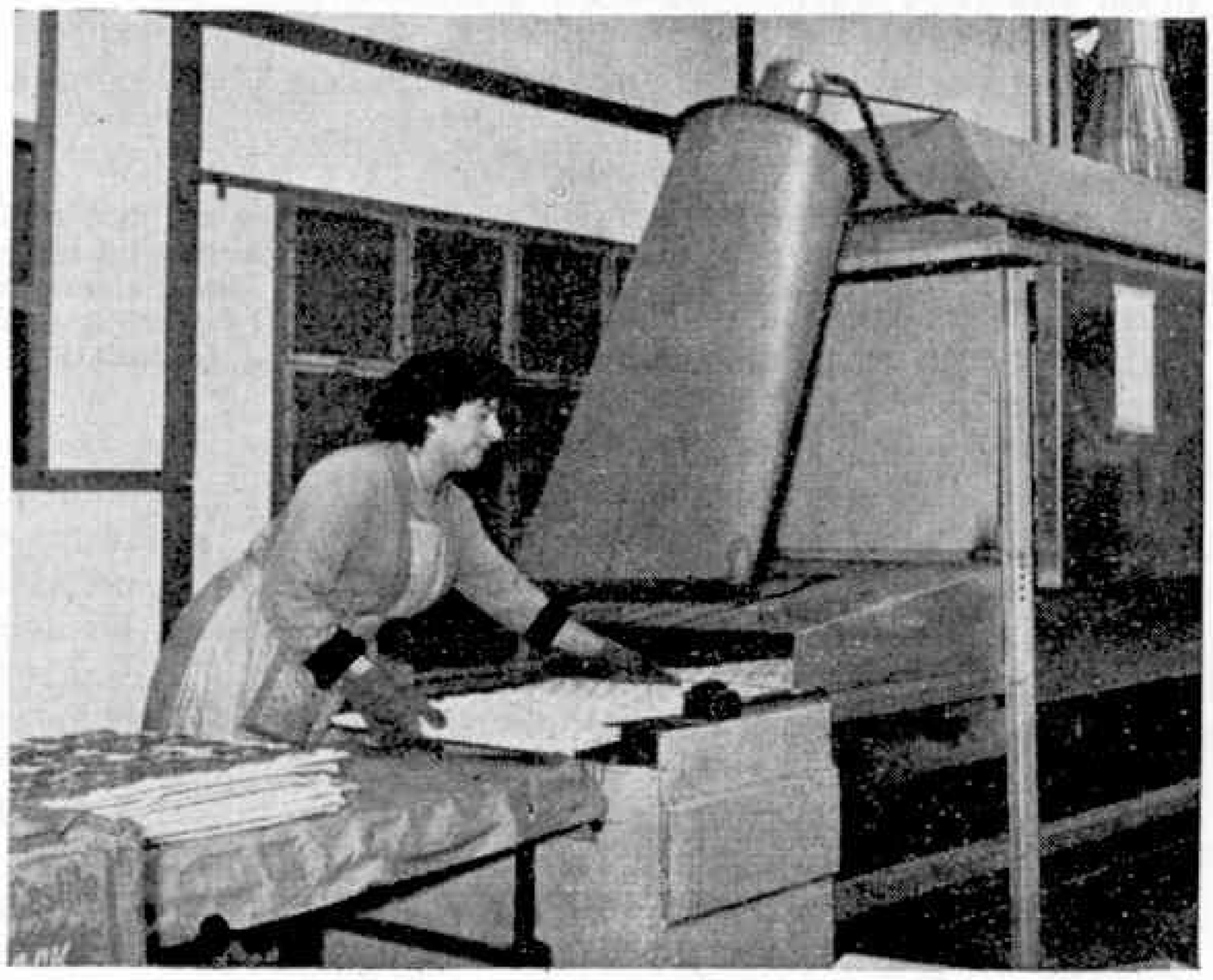
The car manufacturer provides spaces for the number plates on the car, but as the sizes and shapes of these spaces differ from car to car, some 40 or more different types of plates must be provided by the number plate manufacturer to cater for all makes. ACE plates are cut from large sheets of aluminium and punched, pressed and trimmed, according to whether they are to have holes for rear lights, boot handles, starting handles, etc., or are to have rounded corners, bevelled edges, etc. After degreasing and chemical treatment—pyluminising—to provide a good "key" for the paint, which would otherwise peel-off, they are ready for their coat of black synthetic paint.

A special plant has been constructed to deal with the very large number of ACE plates manufactured, which have a durable matt finish of consistent thickness and pleasing appearance. The plant is housed in an enclosed room, and every precaution is taken to eliminate dust, as this would spoil the finish if it settled on the paint. Even the paint must occasionally be filtered to remove any impurities, and special air-filters are fitted into the room walls to keep the room dust-free.

The plates travel through the paint room on a continually moving overhead conveyor, which emerges at the loading and unloading bench. At this bench they are hooked on to the conveyor as the hooks move past the operator and take the plates away into the paint room.

Immediately the plates enter this room, the conveyor dips downwards and plunges them into a large vat of black synthetic paint. The conveyor then rises and takes

(*Continued on page 386*)



Trays of "White Peak" characters emerging from the infra-red paint stoving oven. The toothpaste tube arrangement provides a blast of air to cool the characters.

Desert Airlift

By John W. R. Taylor

YOU would hardly expect to find a busy airfield in the heart of an Arabian desert, miles from the nearest town or roads; and the little group of fierce, ragged tribesmen who watched aircraft of all shapes and sizes landing and taking off day after day must have shaken their heads and muttered that white men are indeed quite mad.

To them, the great domed rock of Jebal Fahud (the hill of the lions) is merely a landmark in the otherwise flat and desolate desert. They may not even know it has a name. Certainly there are no lions there now, and it would be difficult to imagine a less interesting place—except for oil-men. The shape and structure of the long low hill told them long ago that it probably stands over an underground sea of oil and they waited years for a chance to prove this.

Unfortunately, even a test drilling cannot be made without thousands of tons of equipment and a small army of men; and the position of Fahud could not be less helpful. To the West is the great Rub' al Khali desert; to the east the Jebal Akhdhar mountains, rising to more than 10,000 ft.; to the north more desert, the Buraimi Oasis trouble spot and some very unfriendly local tribes. Only to the south is there a possible route from the coast, over 350 miles of desert, with steep escarpments and soft sand-filled wadis, and this is the way the oil-men decided a few years ago to move in to Fahud.

Ships began leaving the well-equipped base port of Umm Said, in northern Arabia, on the long 900-mile journey round the coast of the Persian Gulf and the Arabian Sea to the bay of Duqm in the south. Even this was not easy, because Duqm has no deep water harbour and can be used only between October and March. It proved difficult and dangerous to trans-ship the heavier pieces of equipment from ship to landing barges. So, after a time, it was decided to load them directly on to lorries at Umm Said and ferry the lorries round to Duqm on military-type landing craft, which could go straight ashore through the surf.

At best the combined sea-land journey took two weeks, even when the specially-designed lorries did not get bogged down in wadis on the way. When they did, it added just one more item to the bill for delay, damage and loss.

In contrast, an air supply service had been started quickly and easily by clearing the loose stones off a stretch of desert, installing a short-range radio beacon as a navigation aid and calling in some of Britain's independent airlines. By the late autumn of 1954, Fahud began to look like London Airport in miniature, as Dakotas of Hunting-Clan Air Transport and Bristol Freighters of Silver City Airways flew a shuttle service over the 365-mile route from Umm Said, carrying sections of "pre-fabs" and tents to house the men at the drilling site, and all manner of other equipment.

In addition, four-motor York transports of Air Liban brought in fresh vegetables,

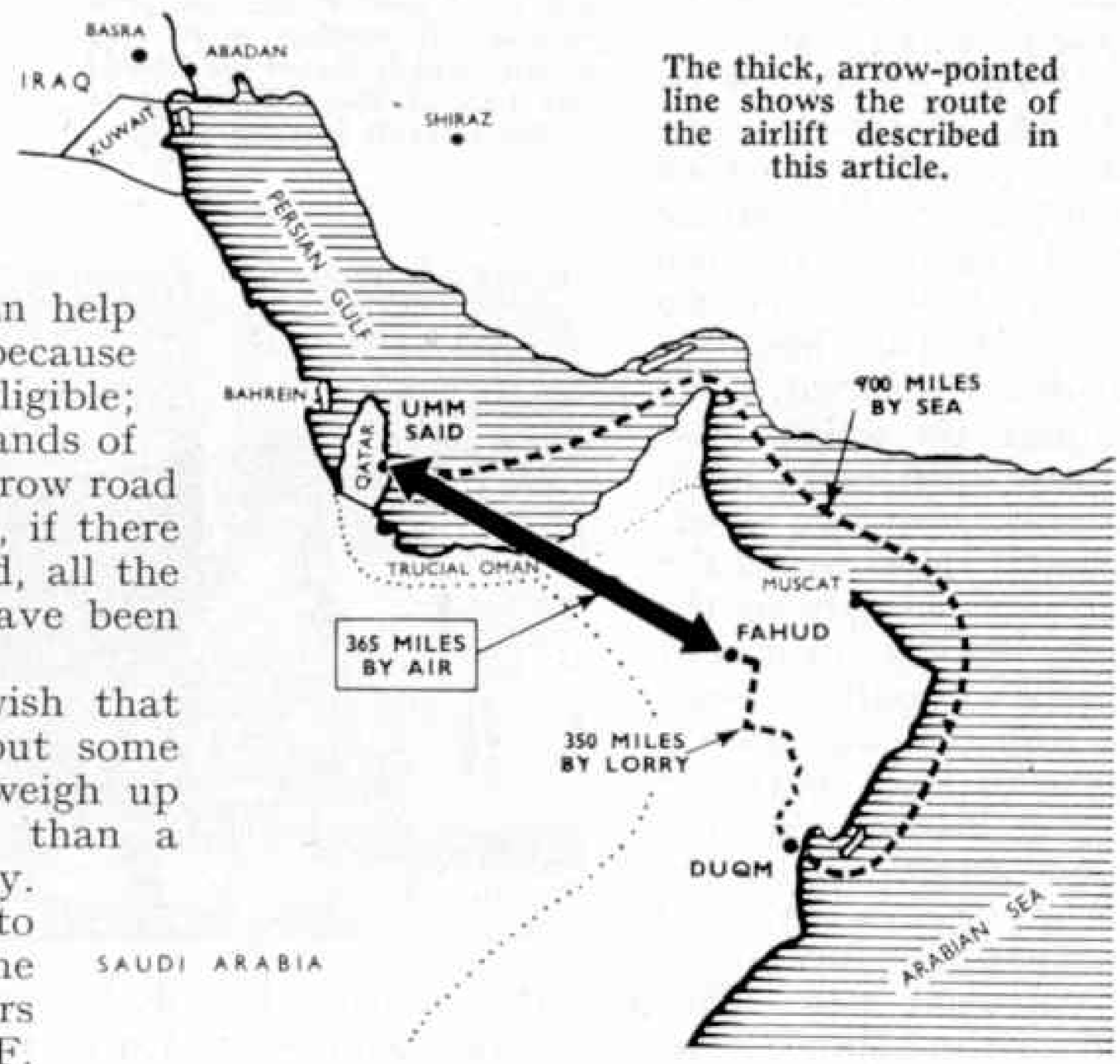
The picture at the head of this page shows the Blackburn Universal taxying up to the loading area at Umm Said. The illustrations to this article are reproduced by courtesy of Blackburn and General Aircraft Ltd.

food and supplies, and the oil company's own Dove communications aircraft flitted to and fro; while lorries hauled in the heavy machinery the hard way from Duqm.

There had never been a better example of how air transport can help to open up an undeveloped area, because the cost of Fahud's airfield was negligible; whereas it would have cost thousands of pounds a mile to build even a narrow road across the desert. And, of course, if there had proved to be no oil at Fahud, all the money spent on a road would have been wasted.

The oil-men soon began to wish that everything could be flown in; but some pieces of oil-drilling machinery weigh up to 20 tons, which is far more than a Freighter or Dakota can carry. Then someone suggested trying to borrow for a week or two one of the giant Blackburn Beverley freighters that are being built for R.A.F. Transport Command. There seemed little doubt that it would be able to lift even the heaviest pieces of equipment inside its cargo hold, which is 40 ft. long, 10 ft. high and 10 ft. wide; but there were other problems, because the Beverley is a military aeroplane, without a Certificate of Airworthiness for civil operation.

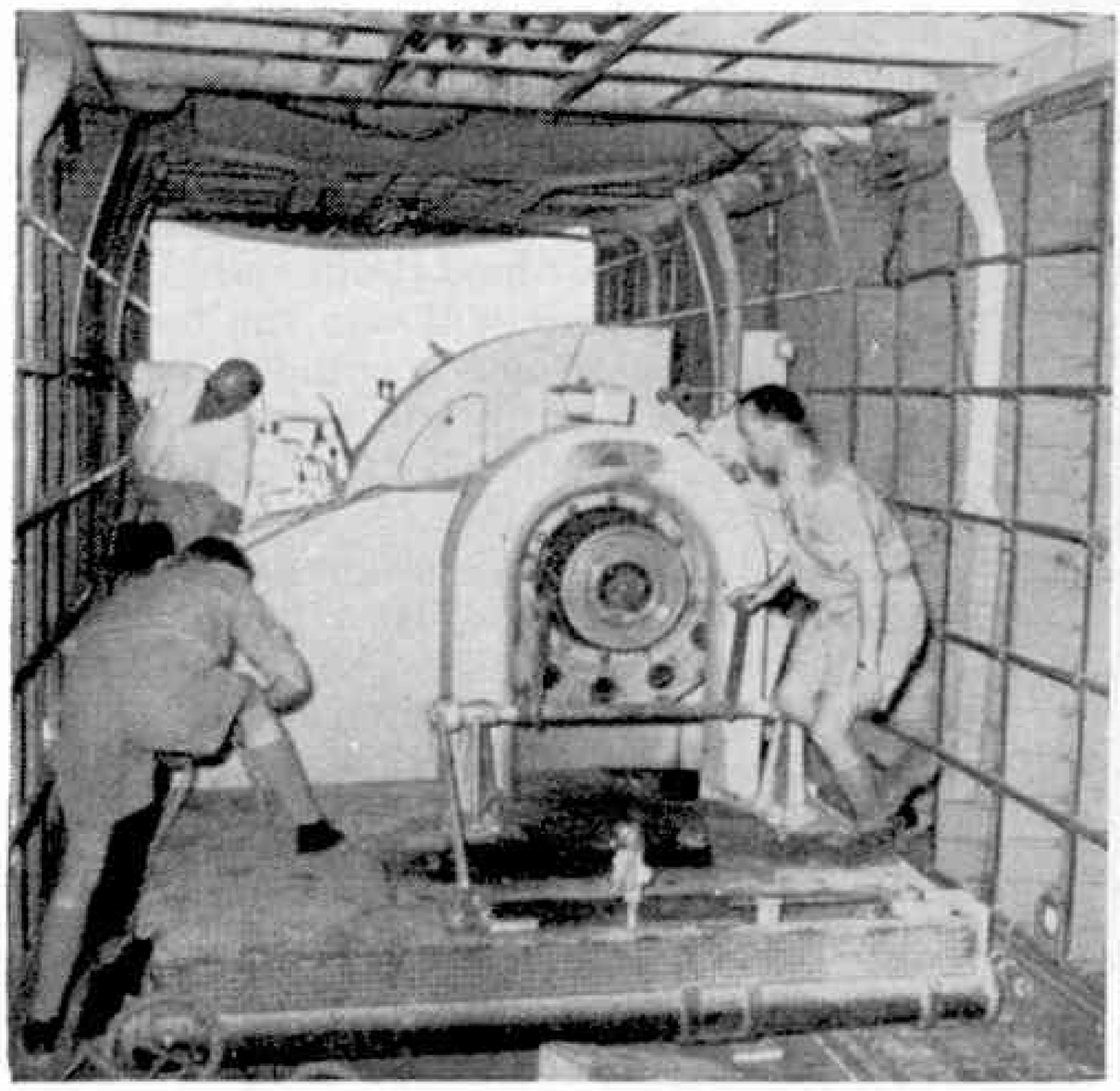
Fortunately, everyone proved co-operative. The Air Ministry said that one of their aircraft could be used, provided they were not expected to fly it. The Ministry of Supply agreed that valuable experience would be gained by operating the aircraft on a regular job in such a hot country; and the Air Registration Board issued a limited Certificate of Airworthiness to the second production Beverley for just the one operation, in its civil name of "Universal" freighter.



The thick, arrow-pointed line shows the route of the airlift described in this article.

So, on 3rd November, 1955, this great aircraft rumbled in to the airfield at Umm Said, carrying 20 men and 74 cases of spares and equipment, including even a spare engine. This was important, because its makers wanted to prove that it could be flown anywhere at a moment's notice, to do a job, without any of the huge airfields and costly, complicated ground equipment that are essential for modern air liner operation.

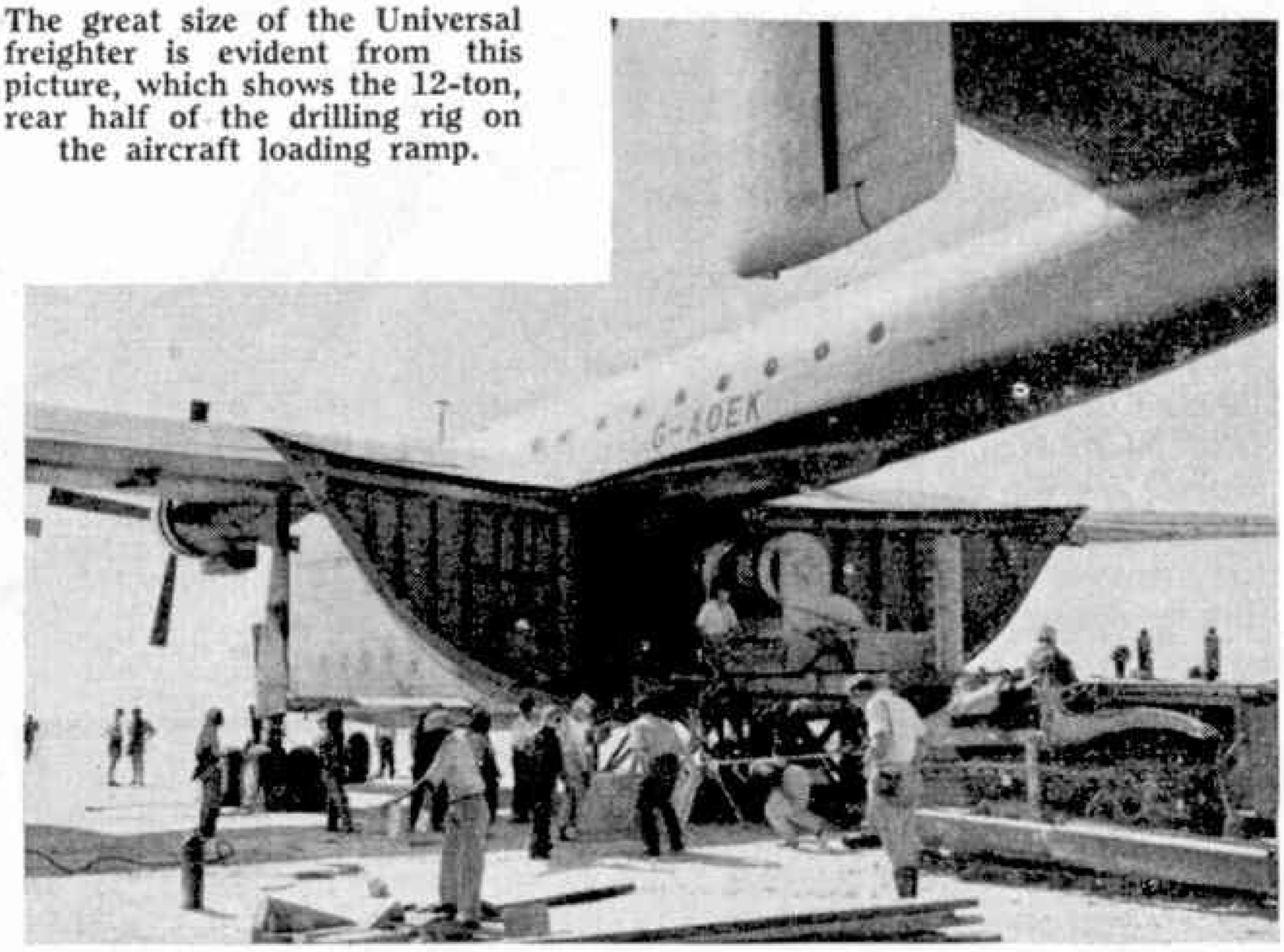
The only items it did not take with it were the ramps used for loading and unloading heavy equipment at Umm Said and Fahud. These were welded up locally from odd pieces of drill pipe, and were viewed with considerable misgivings by the crew of the Universal when they saw the size and weight of some of the loads that the oil men had collected for them to carry. Four Paxman diesel engines, weighing over eight tons each and more than 21 ft. long, were mere toys compared with a 16½-ton section of the drilling-rig, and a great steel



The heaviest load carried by air was the 16½-ton front section of the drilling rig, here seen in the hold of the Universal aircraft.

tank measuring 28 ft. long and 8½ ft. wide.

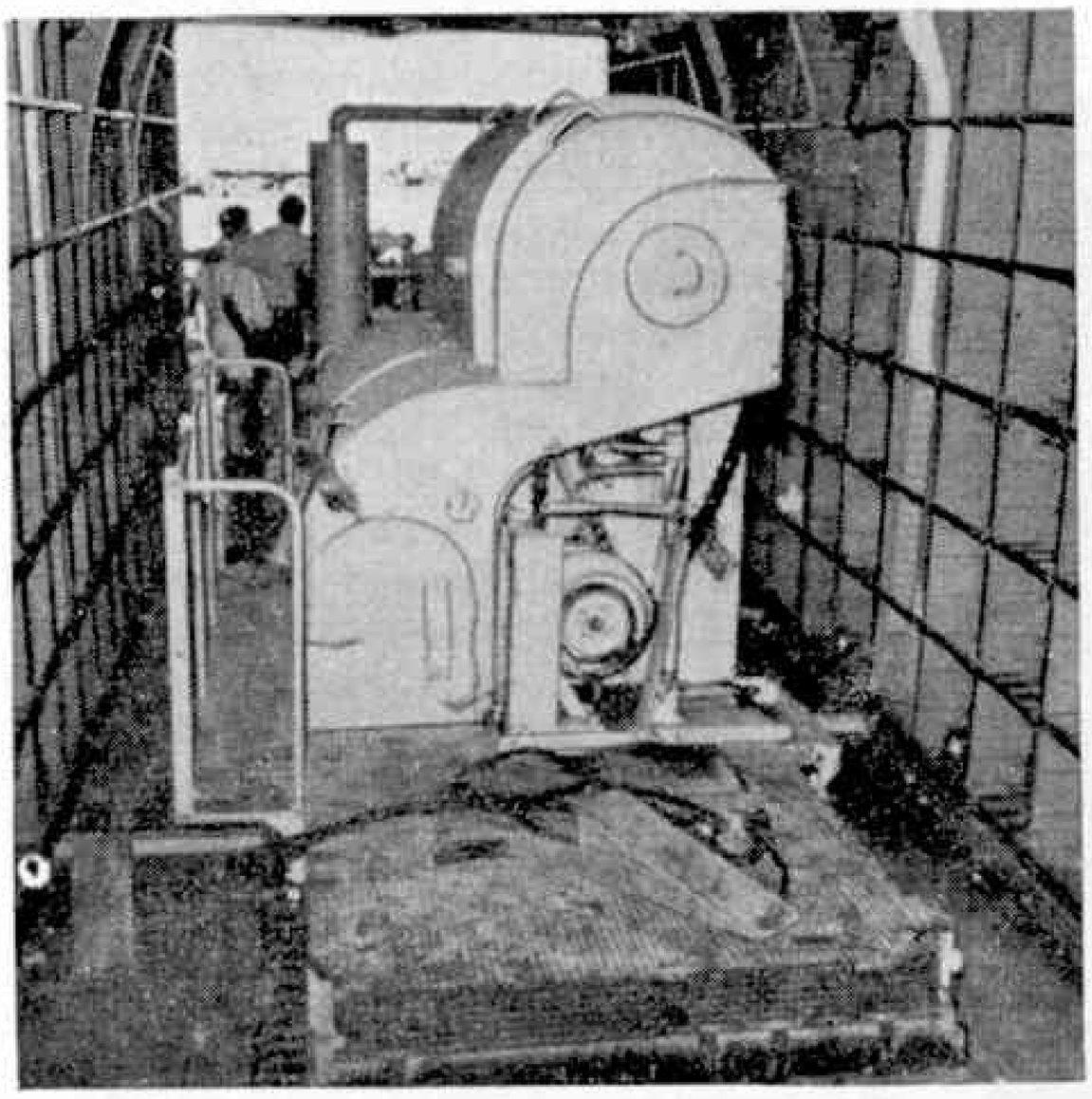
Would the ramps be strong enough to take the weight of such equipment? Would the hard surface of the desert be able to support the heavily-loaded Universal, even though its weight was spread over eight main wheels and two nose-wheels? How would the aircraft perform in the hot, dusty climate? There was only one way to find out, and soon a gang of local workmen began loading the first diesel engine under the supervision of oil company engineers.



The great size of the Universal freighter is evident from this picture, which shows the 12-ton, rear half of the drilling rig on the aircraft loading ramp.

All went well. The aircraft was towed up to the ramp. A tow-line was fastened to a tractor behind the ramp, passed round a pulley at the front of the freight-hold and tied to the diesel engine. The tractor moved away, hauling the heavy engine smoothly off the roller conveyor on top of the ramp onto another roller conveyor in the aircraft's hold, and soon all was ready for take-off.

Because Blackburn's are aircraft builders and not airline operators, they had asked Hunting-Clan to operate the Universal for them. The Hunting crews had never before flown anything so big; but found the Universal easier to handle than many smaller aircraft. Despite its load, it climbed quickly away from the desert air strip and took an average time of 2¼ hours for the 365-mile flight.



The rear half of the drilling rig in position in the hold and ready for lashing down.

Altogether, it made nine return trips to Fahud in ten days, carrying in 129 tons of equipment which was too big to go in the smaller aircraft. The only trouble encountered was when a stone thrown up by the wheels during take-off made a hole in one of the undercarriage fairings; and this was soon repaired. As a result, only five cases of airframe and engine spares had to be opened during the operation.

A total of 129 tons of freight may not sound a very high proportion of the 10,000 tons needed to start drilling at Fahud; but the oil-men were more than satisfied, because they received quickly and safely vital sections of the drill-rig which might have held them up for weeks.

More important still was the fact that the Universal proved it could have flown in to Fahud any of the loads that had been carried on the sea-land route before its arrival. The largest of these—two 20-ton slush pumps—might have had to be stripped down a little more, as the aircraft's four 2,850 h.p. Centaurus engines cannot give their full power in hot climates. But the pumps *would* have gone into its cabin, and the Fahud airlift showed that the Universal—and, hence, the R.A.F. Beverley—can operate from any place used by the smaller Dakotas and Freighters, carrying three times their payload.

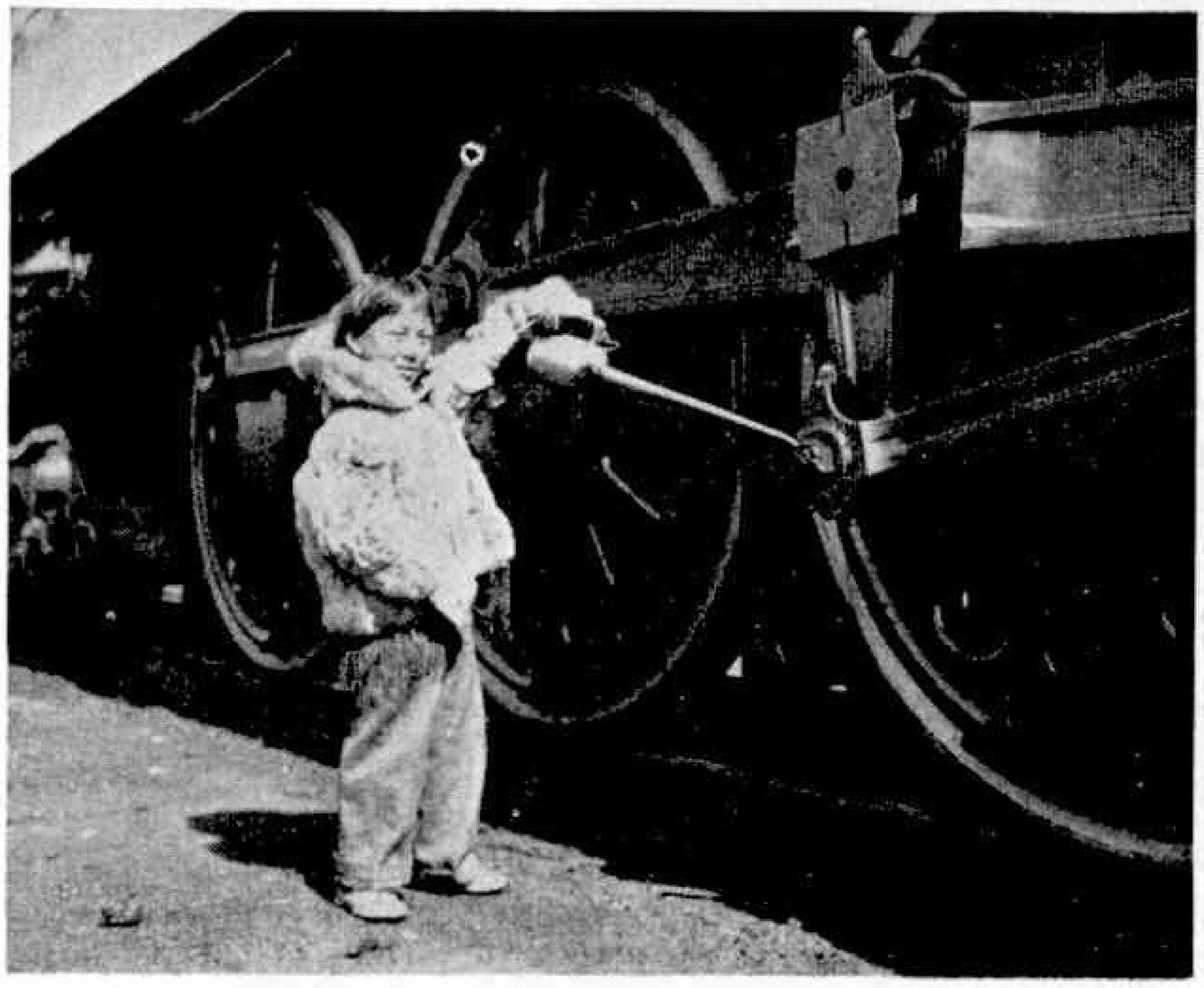
MECCANO MAGAZINE

Junior Section

When Peter Webb, of Warlingham, Surrey, builds Meccano models, his cat Portley follows his progress with kindly interest.

DO animals have hobbies of their own? Perhaps they have, but it is certain that some of them like to share in the hobbies of their boy friends. I remember a budgerigar that rode on his owner's Hornby-Dublo Train, and there have been dogs, and even rabbits, that have looked in wonderment at trains running round Hornby or Hornby-Dublo tracks. But the cat seen in the picture on the right is the first I have known to be interested in Meccano model-building. Portley, as she is called, is watching keenly from her comfortable armchair, giving the impression that she is ready at any moment to give Peter Webb some very useful advice.

Every summer Eskimos living in the country to the west of Hudson's Bay travel south to Churchill for their summer trading. When they do this they take great delight in visiting the station there to see the trains, and that explains why Muktok, the Eskimo boy seen in the lower picture on this page, came to be oiling a big Canadian National steam locomotive. An amusing feature is that although it was near mid-summer, Muktok never dreamed for a moment of shedding the wonderful fur coat that he was wearing.



Muktok, in fur coat although it was near mid-summer when this photograph was taken, has the unusual pleasure of oiling a big Canadian National Railways locomotive.

Easy Model-Building

Spanner's Special Section for Juniors

Elevator Loader

CONSTRUCTION of this attractive working model should be begun with the wheeled base or chassis. Bolt a 5½″ Strip 1 to each side of a 5½″ × 2½″ Flanged Plate so that the Strip overhangs one end of the Plate by three clear holes. The Road Wheels should be fixed in pairs on 3½″ Rods supported as shown in Fig. 3. The engine housing 2 is made by bolting a 2½″ × 1½″ Flanged Plate 3 to the base.

Fix a 2½″ × ½″ Double Angle Strip 4 to each upper corner of the Plate 3 and bolt a 2½″ × 2½″ Flexible Plate to each Double Angle Strip. One of the Flexible Plates is connected to the base by a Fishplate, the bolt used for this purpose being used also to attach a Double Bracket 5. Two 3½″ Strips 6 should be fixed between the Double Angle Strips and the base, and two 2½″ × 1½″ Triangular Flexible Plates should be bolted to the Flanged Plate 3 and to Angle Brackets supported by the Strips 6.

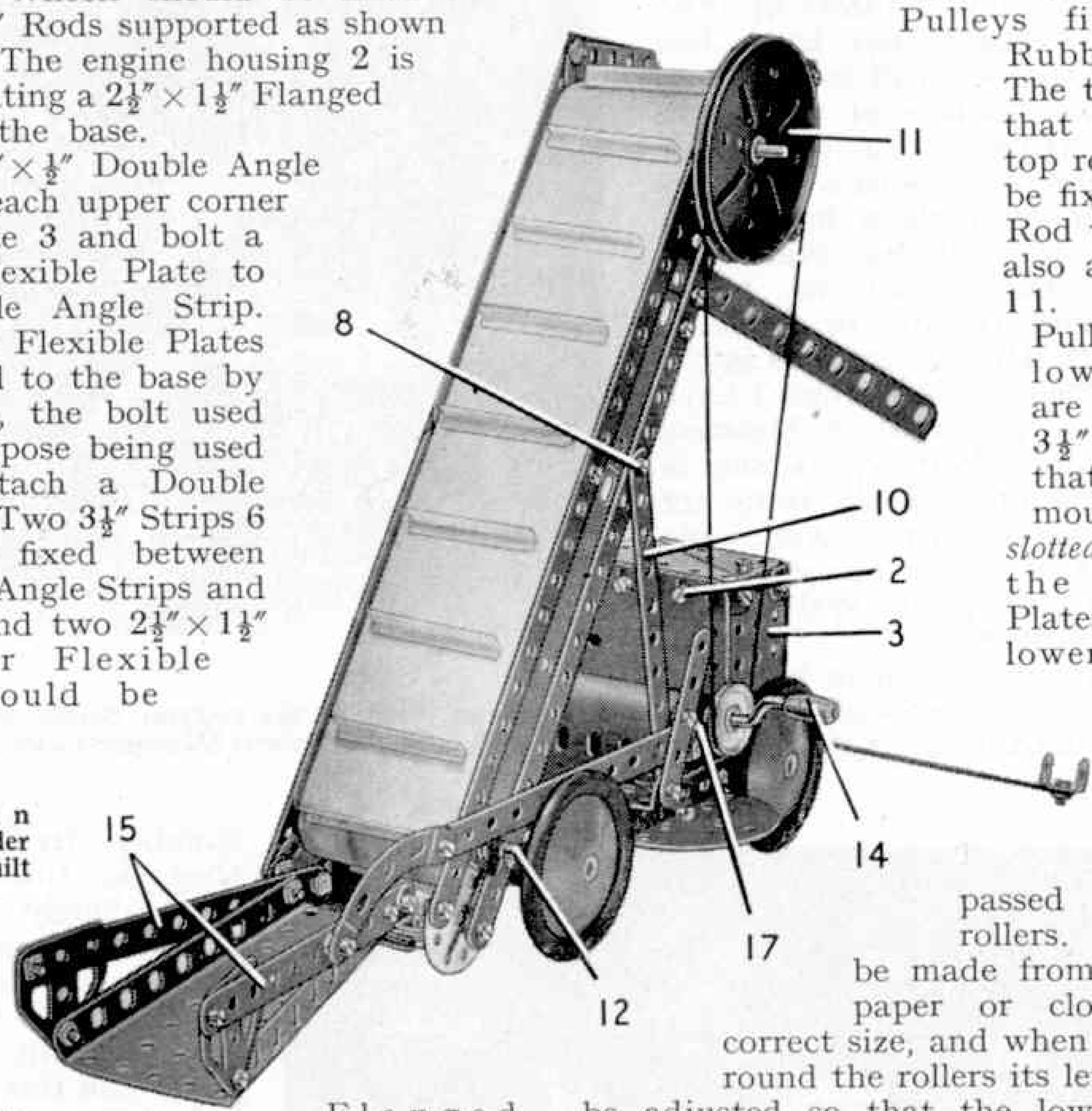


Fig. 1. An Elevator Loader that can be built from parts in Meccano Outfit No. 4

The next step is to make the frame that supports the conveyor belt. Each side of this frame consists of a 5½″ × 1½″ Flexible Plate, a 2½″ × 1½″ Flexible Plate, a 2½″ × 1½″ Triangular Flexible Plate 7 and a Wheel Disc bolted between two 12½″ Strips. At their upper ends the Strips should be bolted to a 2½″ × 2½″ Flexible Plate, which is edged by three 2½″ Strips. The sides of the frame can now be connected, using two 2½″ × ½″ Double Angle Strips. One of these Double Angle Strips is held by bolts 8 and the other can be seen at 9 (Fig. 2). The lower end of the frame should be connected to the Strips 1 of the base by Fishplates, while at the centre it is supported by a 5½″ Strip 10 on each side.

The rollers that carry the conveyor belt are made from 1″ Pulleys fitted with Rubber Rings. The two Pulleys that form the top roller should be fixed on a 4″ Rod that carries also a 3″ Pulley 11. The two Pulleys of the lower roller are fixed on a 3½″ Rod 12 that must be mounted in the *slotted* holes of the Flexible Plates at the lower end of the conveyor frame.

The belt can now be passed round the rollers. It should be made from a strip of paper or cloth of the correct size, and when it is passed round the rollers its length should be adjusted so that the lower roller is pulled to the upper limits of the slotted holes in the Flexible Plates. The ends of the belt can be glued or stitched together, and small strips of cardboard can be glued across the belt as shown. The belt should be just wide enough to pass between the sides of the conveyor frame, and the height of the pieces of cardboard glued to the belt should be adjusted so that they clear the ends of the loading hopper and the unloading chute.

To keep the belt tight a special tensioning device 13 is used. This consists of a 2½″ Driving Band to which two short pieces of Cord are tied. Each piece of Cord

should be passed through a hole in one of the Wheel Discs and looped round the end of the Rod 12. The Cords should be adjusted until the Driving Band is stretched, so that the Band tends to pull Rod 12 down the slotted holes of the Flexible Plates, and thus tightens the conveyor belt. Care should be taken to ensure that the conveyor belt is pulled as tight as possible before the lengths of Cord are passed over the Rod.

The driving mechanism is provided by a Crank Handle 14 mounted in two Trunnions bolted to the base. A 1″ Pulley on the Crank Handle is connected by a Cord belt to the 3″ Pulley 11. A cover over the shaft of the Crank Handle is provided by a $1\frac{11}{16}$″ radius Curved Plate attached to the base by Angle Brackets.

The loading hopper is formed by a Flanged Sector Plate fitted at each side with a $5\frac{1}{2}$″ Strip 15 and a Flat Trunnion. An Angle Bracket should be lock-nutted to the inner end of each of the Strips 15, and these Angle Brackets are bolted to a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 16 fixed to the conveyor frame. The unloading chute is a Flanged Sector Plate with a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip bolted across its wide end. This Double Angle Strip is then lock-nutted to the Double Angle Strip 9, so that the chute can be turned from side to side.

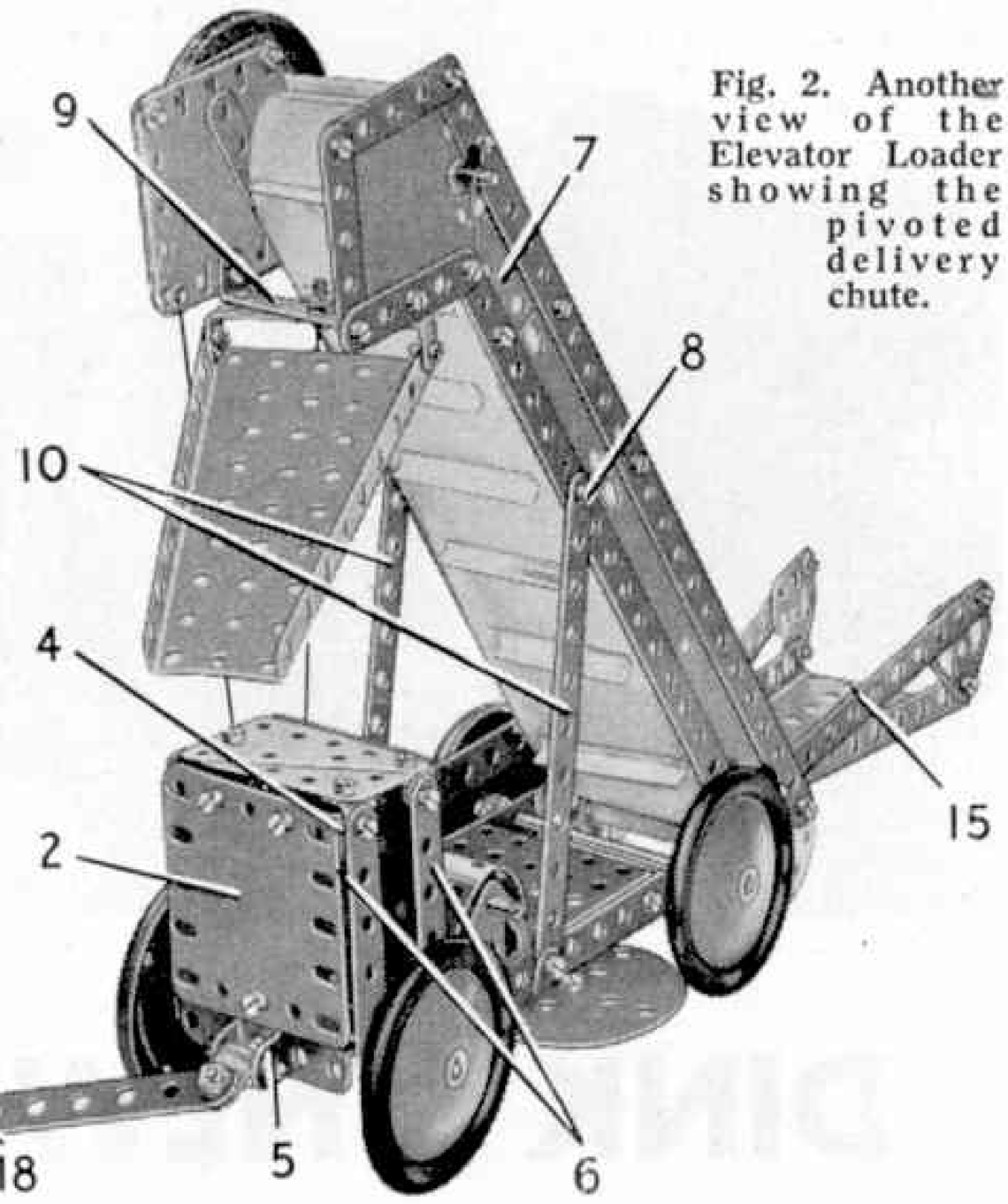


Fig. 2. Another view of the Elevator Loader showing the pivoted delivery chute.

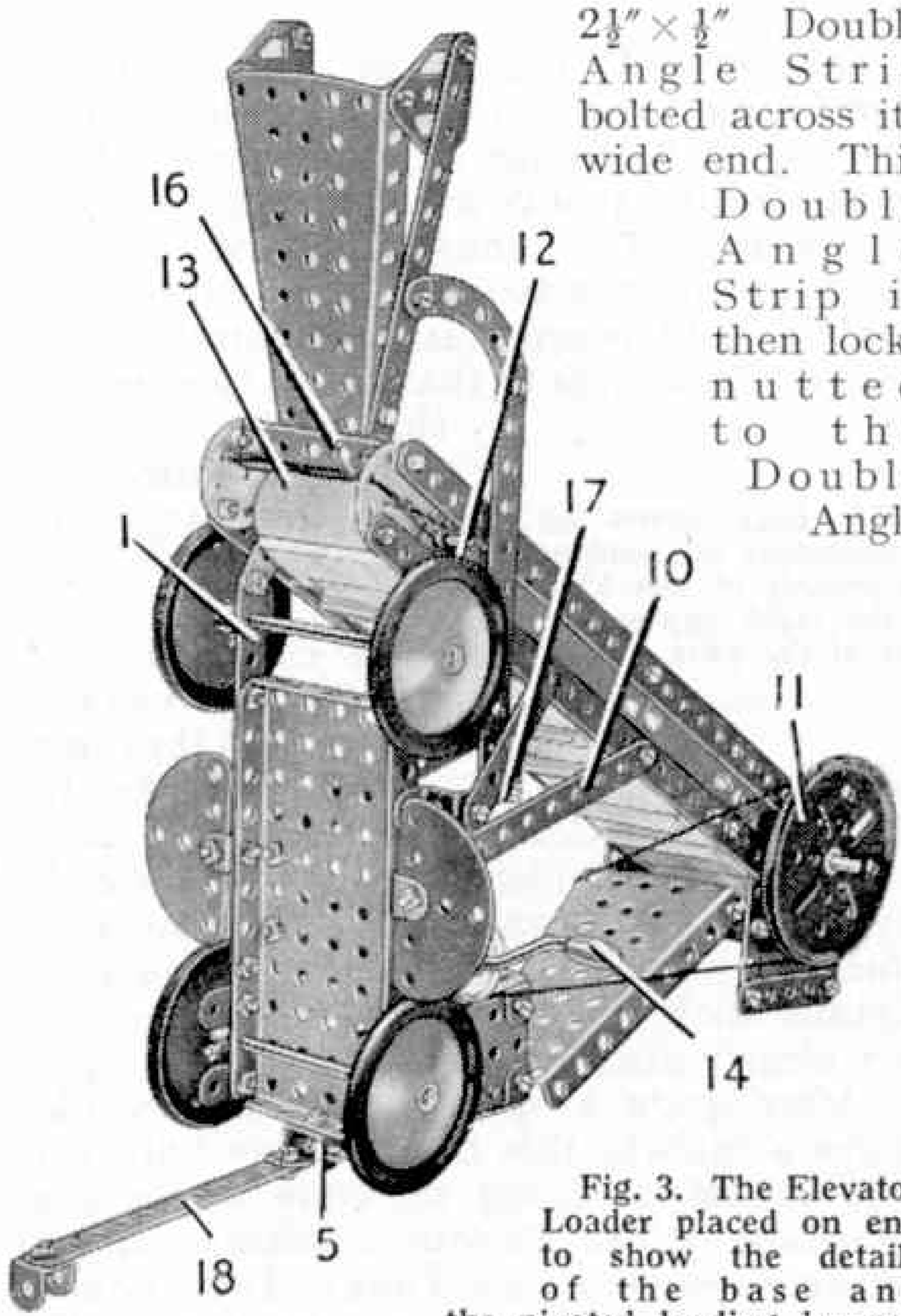
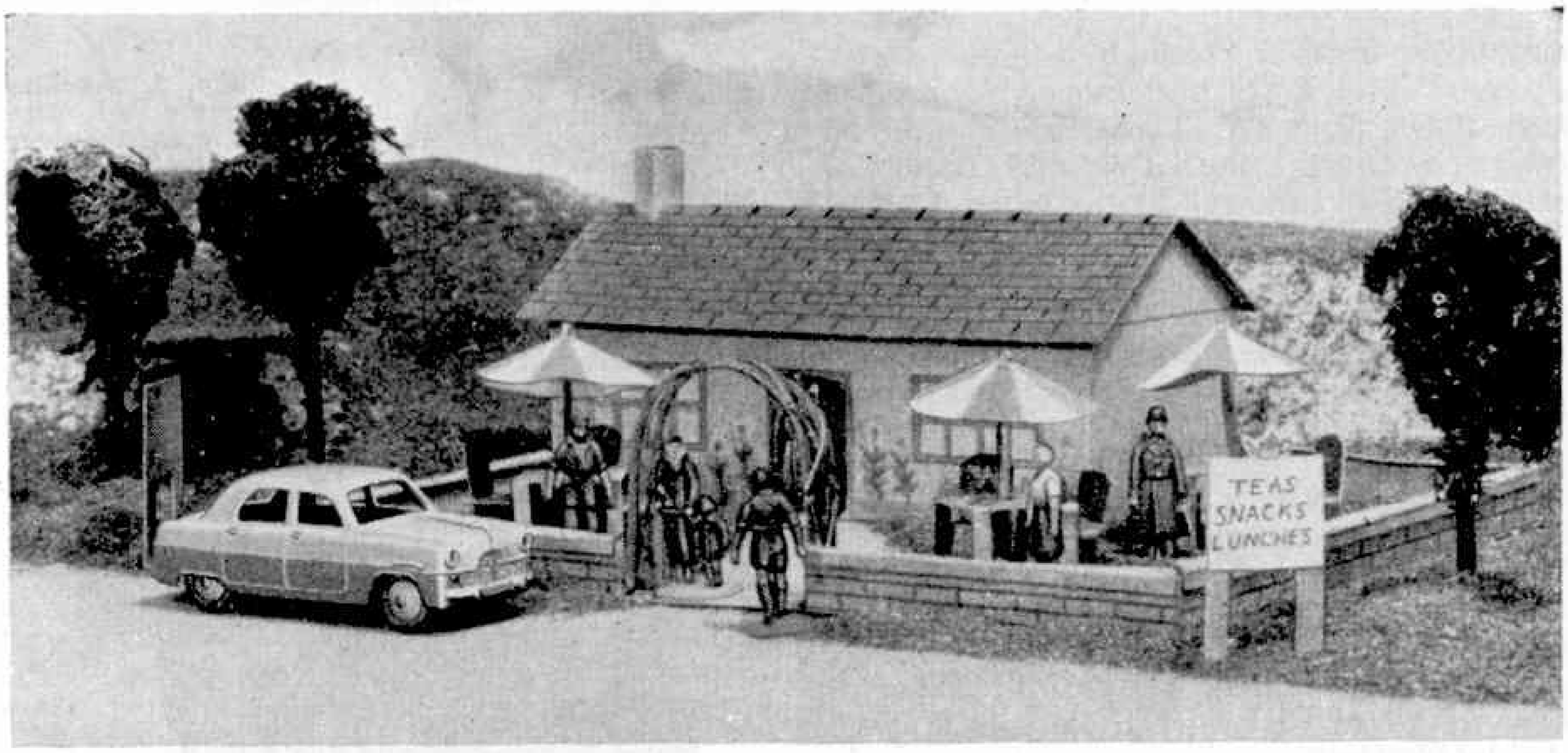


Fig. 3. The Elevator Loader placed on end to show the details of the base and the pivoted loading hopper.

The handle that controls the movement of the loading hopper is a $2\frac{1}{2}$″ Strip, and this is lock-nutted to a $\frac{1}{2}$″ Reversed Angle Bracket bolted to the base. A Fishplate 17 is fixed tightly to the Strip in such a way that it points downward at an angle. A $5\frac{1}{2}$″ Strip is lock-nutted to the Fishplate and is extended by a $2\frac{1}{2}$″ Curved Strip that pivots on a $\frac{3}{8}$″ Bolt fixed to the side of the hopper by two nuts. An operating platform on each side consists of a Semi-Circular Plate bolted to an Angle Bracket.

The model is completed by adding a towing bar 18. This is a $5\frac{1}{2}$″ Strip to which is lock-nutted a Right Angle Rod and Strip Connector. The towing bar is placed between the lugs of the Double Bracket 5 and a 1″ Rod is pushed through the parts.

Parts required to build the Elevator Loader: 4 of No. 1; 8 of No. 2; 2 of No. 3; 7 of No. 5; 4 of No. 10; 2 of No. 11; 2 of No. 12; 1 of No. 15b; 3 of No. 16; 1 of No. 18b; 1 of No. 19b; 1 of No. 19g; 5 of No. 22; 2 of No. 24a; 4 of No. 35; 86 of No. 37a; 76 of No. 37b; 14 of No. 38; 1 of No. 40; 6 of No. 48a; 1 of No. 51; 1 of No. 52; 2 of No. 54; 1 of No. 90a; 3 of No. 111c; 1 of No. 125; 2 of No. 126; 2 of No. 126a; 4 of No. 155; 1 of No. 186; 4 of No. 187; 2 of No. 188; 2 of No. 189; 4 of No. 190; 1 of No. 199; 1 of No. 212a; 2 of No. 214; 4 of No. 221.



DINKY NEWS

In the Countryside

By **THE TOYMAN**

THIS month I am able to give you news of an important addition to the range of Dinky Toys sports cars. The name Bristol has been famous for a long time in the field of aeronautics, and most boys will be familiar with the outstanding aircraft produced by the Bristol Aeroplane Co. Ltd. Now, however, the name has become associated also with road transport and for some years Bristol cars have held an enviable reputation in motoring circles. Our new model this month is based on one of the splendid sporting cars produced by the Car Division of the Bristol Aeroplane Co. Ltd.—the Bristol 450 Sports Coupé, Dinky Toys No. 163.

Bristol cars have achieved some notable successes in post-war motoring events and the Sports Coupé is a worthy addition to the extensive range of sports cars already included in the Dinky Toys series. You can see for yourself the smooth aerodynamic lines of the car from the picture on the next page and the illustration in full colour on the back cover, but this streamlined shape of the Bristol is not just an eye-catching selling point. As might be expected of the product of a famous aeroplane firm, the loss of power due to air resistance has been reduced to the minimum, and the aerodynamic lines of Bristol cars are the result of extensive research using wind tunnels.

The Bristol 450 is an exceptionally interesting design and all its main features are copied faithfully in the model. The most striking points are the sharply raked windscreen, the unusual shape of the windows and the twin fins that extend the roof line and sweep gracefully into the rear wings. Other points that catch the eye are the striking design of the radiator cowl, and the large air scoop on top of the bonnet.

Teatime! The picture on this page shows an attractive arrangement for a miniature tea garden. Planning a scene to include models of this kind gives a Dinky Toys layout the right appearance for the holiday season of the year.

In common with previous introductions to the range of sports cars, the new Dinky Toys Bristol 450 Sports Coupé is marked with competition numbers, ready for use in miniature rallies and races. The model is finished in green, and of course all the usual details such as doors, bonnet panels, etc., are clearly and accurately marked.

After quite a spell of two new Dinky Toys a month, this time I have only this one model to bring to your notice and therefore I can devote a little space to other aspects of the Dinky Toys hobby. First, let me draw your attention to the

This young Dinky Toys collector is absorbed in handling one of the models in his busy garage scene.

attractive little scene in the picture at the top of the previous page. I expect all of you have made a fairly lengthy road journey at some time or other, either by car or in a coach, and you know how eagerly passengers look forward to a short stop for tea and a chance to stretch their legs. In this country at least road passengers are well catered for in this respect, and for my scene this month I have attempted to capture the impression of a typical small, but well kept roadside tea garden.

Making the model was quite easy. A simple building on the lines of a country cottage is the principal feature, and following my usual methods I made this from fairly stiff cardboard. When the cottage was completed I glued it to a sheet of cardboard cut to the size and shape of the garden. Low walls round the base and a simple trellis archway made from strips of cardboard were added, and then I made a few cardboard tables and chairs and glued them in position. The typical striped sunshades over the tables were made from paper and I supported them on stout cardboard strips glued into holes in the tops of the tables. Finally I painted the model in bright colours and arranged it in a convenient spot alongside one of the roads leading into a miniature village layout.

Now look at the picture on this page of the attractive miniature garage operated by an overseas Dinky Toys enthusiast, C. V. V. Eijs, Rotterdam, Holland. The garage is a large building with plenty of space for storing models inside the main structure and in a roomy parking place on the flat roof, which is reached by a ramp at one side of the building. This young collector has an extensive range of Dinky Toys, and I am sure he finds his garage useful not only in his play schemes but also as a means of storing the models safely and neatly when they are not in use.

The garage is stoutly built and a special feature to note, and to follow, is that the height of the building is sufficient to allow the operator to use his hands freely to manœuvre the cars and lorries parked inside.

A striking picture of the latest Dinky Toys sports car, the Bristol 450 Sports Coupé, No. 163.

Don't Get Mixed Up!

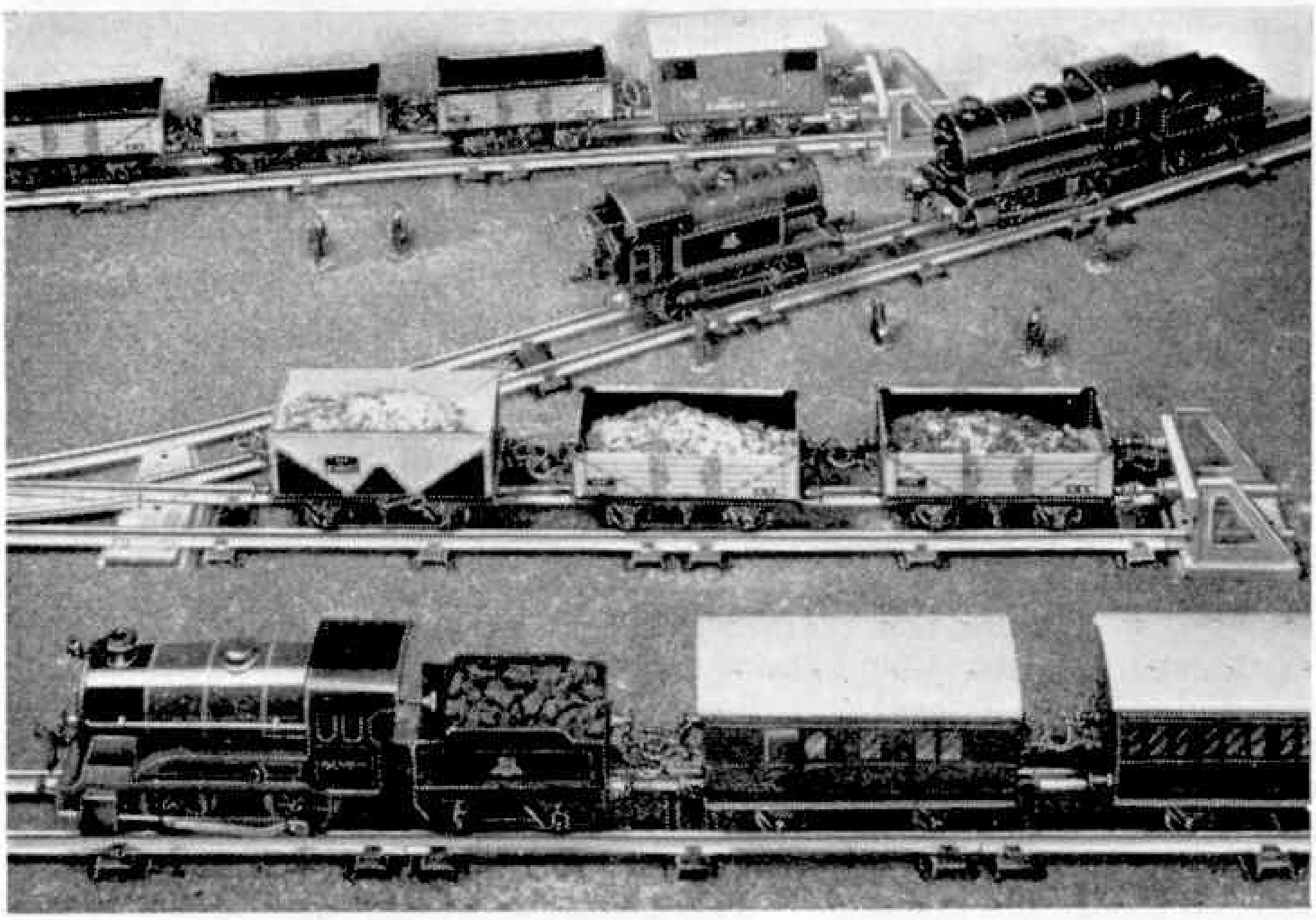
By "Tommy Dodd"

A LONG time ago an experienced miniature railwayman offered a very good piece of advice to fellow enthusiasts. *Don't crowd* was his motto and a very good one it still is too, even if many layouts nowadays have to be less spacious than those in former days.

Some of us get the idea, in the early stages of our railwaying at least, that the more complicated a layout is, the better. But really, involved systems, particularly in restricted places, are difficult to work. Train running on them becomes a succession of awkward operations instead of being a fairly straightforward business that can be thoroughly enjoyed.

I know from the letters I receive that most of you try to include as much main line as possible in your layout. This is only natural, and it is quite right, because the main line is the place for running. And when it includes as much straight track as the space will allow, your Hornby Clockwork engines have a better chance of performing well than if they have to run on layouts with curves all over them. Curves are necessary, of course, but there is no need for the snaky arrangements that appear in some track diagrams that I have had sent to me. Have a reverse curve where needed, by all means, but do not be tempted to include a succession of them for no real reason.

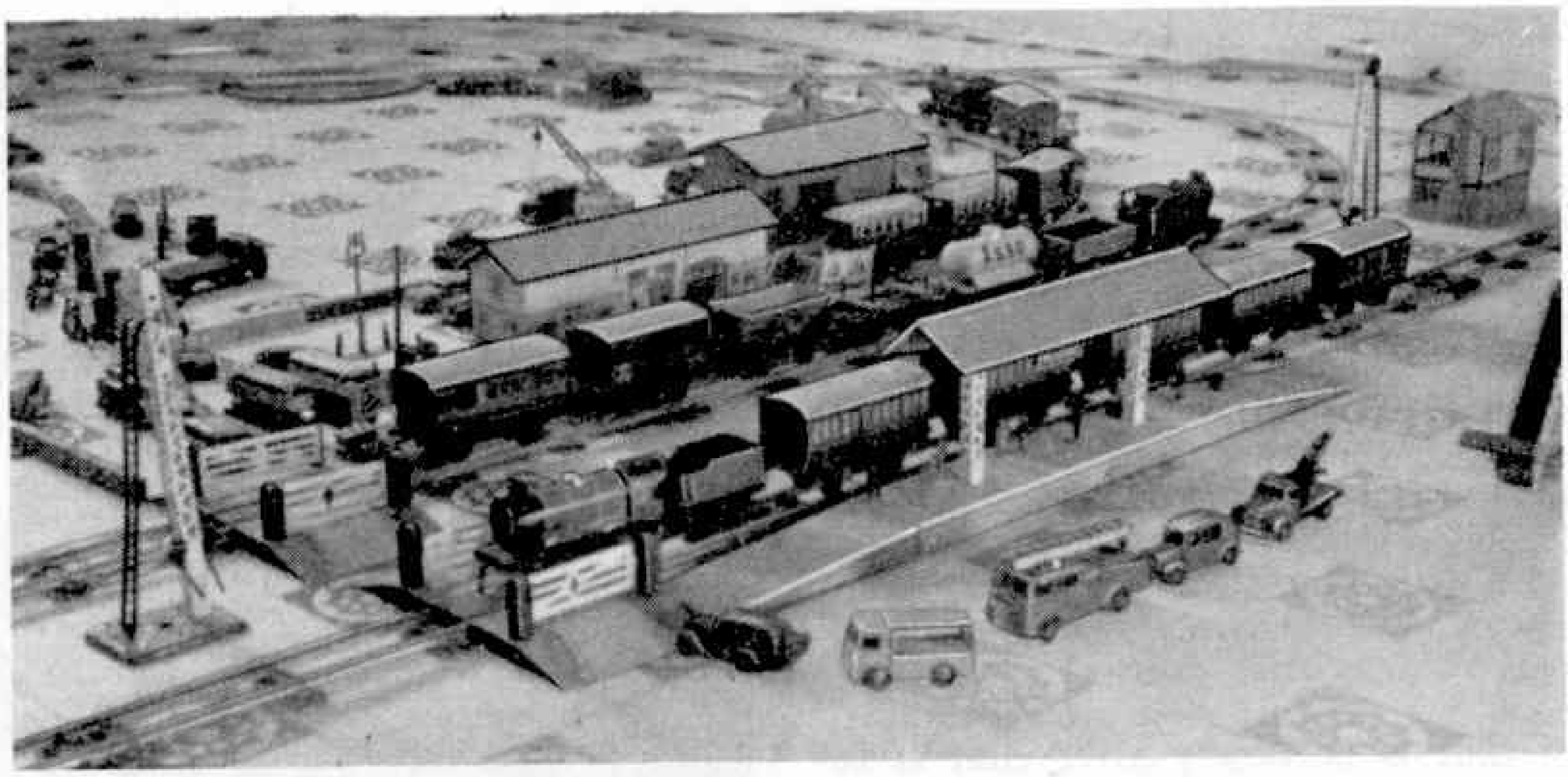
The "overlapping" of different parts of the line is another thing that should be watched. When a layout grows from simple beginnings, one sometimes is unwilling to disturb some favourite arrangement at one particular point. There is something to be said for keeping a well-tried scheme in being, but where general improvements would result from some revision of ideas, it is usually wise to make a change.



A simple siding arrangement forming a small locomotive yard on a Hornby layout. The Wagons on the spur beyond the main line are used for "ashes."

You should try to keep the different departments, as it were, of the railway more or less separate from one another. For instance, the track used by engines waiting for their next duty should not be confused with a track forming part of the goods yard. Engines *do* sometimes wait on roads where wagons are standing, but not for long as a rule and only as a matter of working convenience. Again, wagons *are* found on tracks near where the engines live, but they are either connected with the coal supply or with the disposal of the ashes, which of course accumulate in large quantities in engine yards. You can see wagons of "ashes" in the picture on this page.

Even the odd wagon standing up to the Buffer Stops almost anywhere on the layout can have quite an effective look about it. Notice how often this sort of thing can be seen the next time you



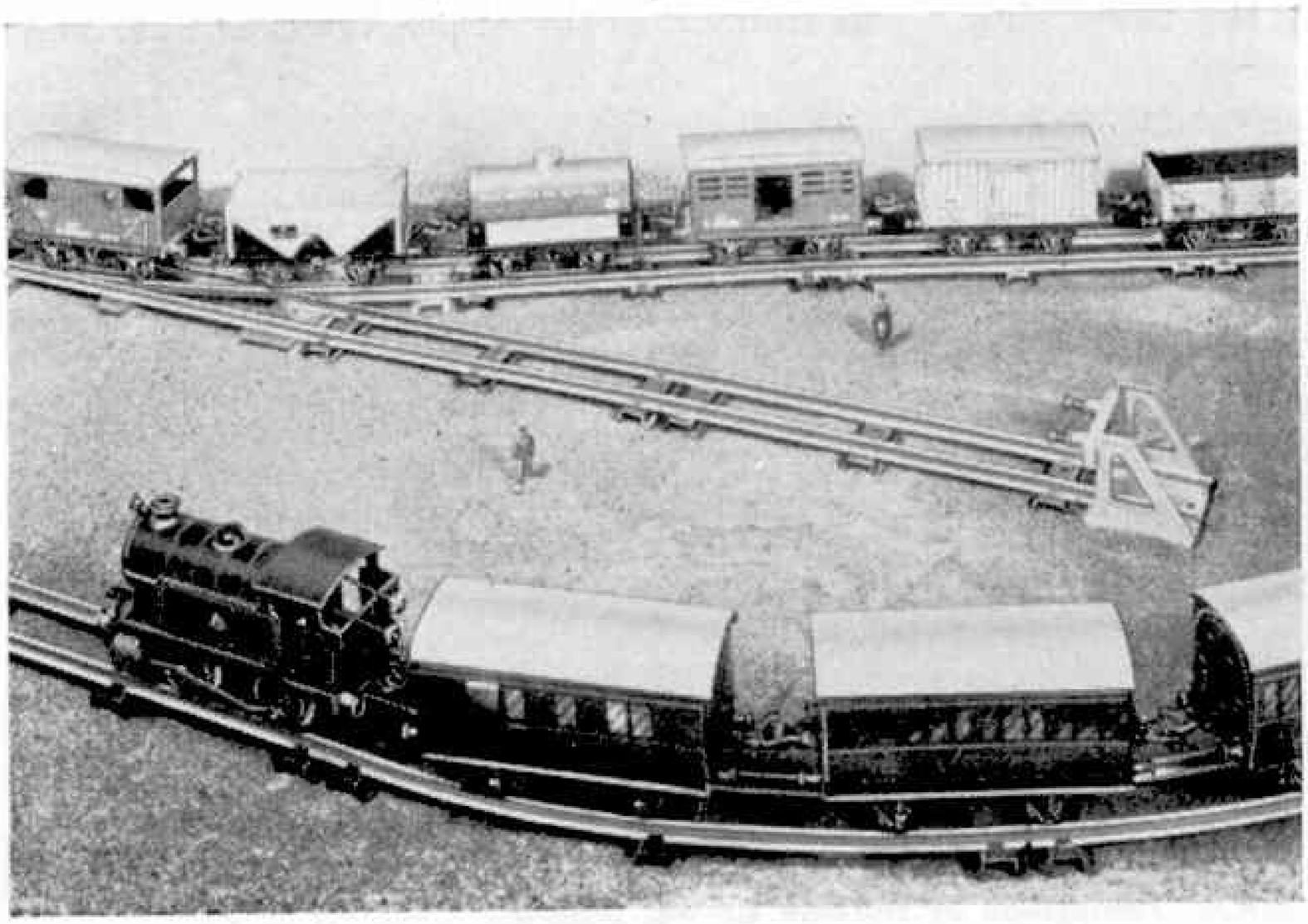
A fine view of the Hornby Clockwork railway operated by Mr. H. J. Holt and his family. The line is extensive and makes the fullest use of the generous floor space available.

make a journey. Perhaps the wagon on a short spur by your station holds the station coal supply, or it may be there simply to collect refuse. The Wagon may have to be left at the end of a long siding and, if so, trains entering the siding will have to be stopped clear of the standing Wagon, which should display a tail lamp as a warning that for the time being it marks the end of the track. Normally you can put a lamp on your Buffer Stops for this purpose, as is done in real practice.

Distinction between the different parts of the line is a feature of the layout shown in the upper picture on this page. The railway itself was referred to in the *M.M.* in June 1954, being that operated by Mr. H. J. Holt and his family, when in Damascus. The picture shows the possibilities of a good floor as a railway site.

The main line of this railway is extensive and the Station shown in the picture is complete with the necessary Goods Station and sidings for freight traffic. The main running lines are some distance apart where they pass through the Station, owing to the arrangement of the Points connecting them. This has led to an unusual level crossing situation, which is plainly shown in the picture. There are two separate sets of Crossing gates, one pair for each track, a standard No. 1 Level Crossing in fact being used for each line. Unusual arrangements like this are found sometimes in actual practice, and I expect that many of you will know at least of one of them.

Of course it is quite a business to open all the Gates for road traffic when the main lines are clear, and you will see that there is a fair amount of road traffic on this layout, not only as ordinary road transport, but also in connection with the handling of merchandise at the Goods Station. I expect that most of you have at least one Level Crossing among your Hornby Railway equipment.



A stopping train on a Hornby layout, headed by a No. 40 Tank, rounds the curve in front of the camera.

Of General Interest

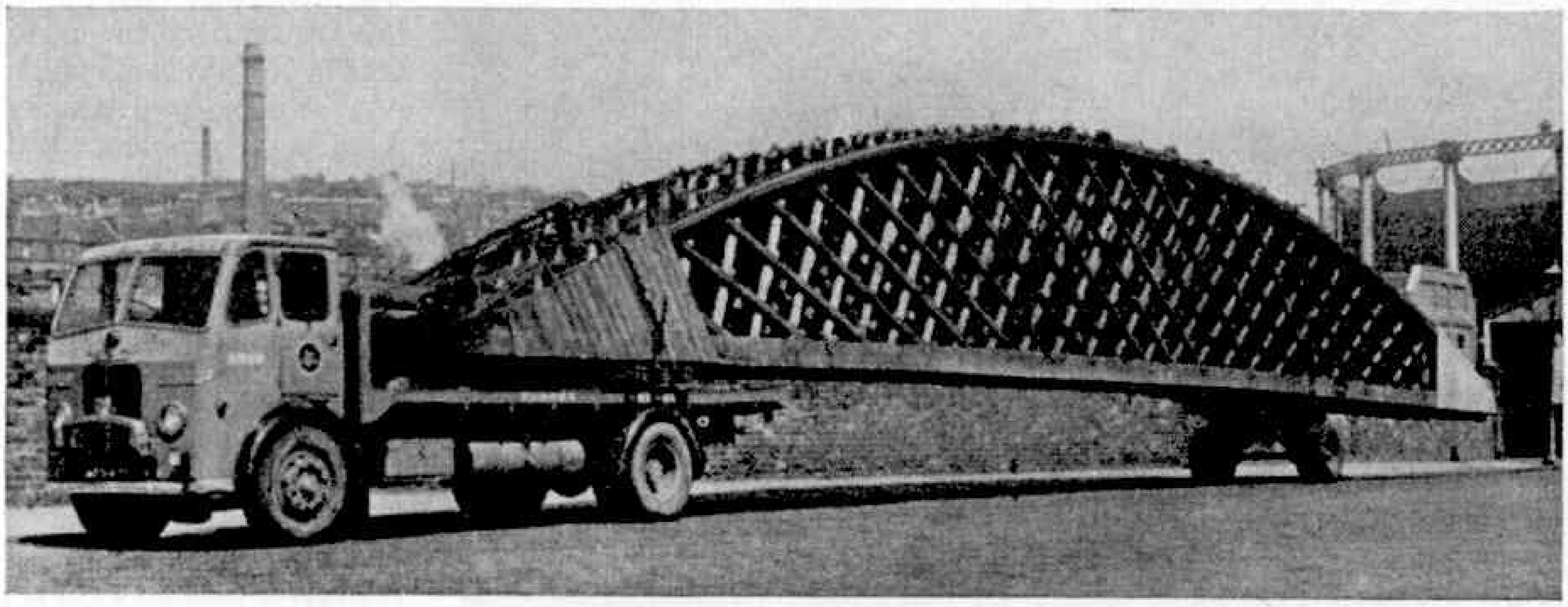
HAVE you ever watched a mushroom grow? It would call for a lot of patience to sit alongside one for this purpose, but there is an easier way, or perhaps I should say a way that wastes considerably less time. A mushroom becomes a fifth of an inch or so high before the stalk can clearly be distinguished from the head. Then little dots of a red dye can be placed on it at measured intervals, and all that is necessary after that is to take photographs at intervals. The red dots will remain roughly the same distance apart where the stalk is not growing, but where it is, the distance between them increases.

Experiments such as this show that the place where the stalk is growing most is just under the head.

A mushroom feels soft, and is easily broken, but there have been many instances of mushrooms breaking through ashphalt surfaces, like those of footpaths and little used roads, and actually lifting this covering material. The same thing happens with toadstools and other fungoid plants of this type.

If you place some mushroom spawn in one spot on a lawn or a grass field, mushrooms will grow there, provided that conditions remain favourable. In later years mushrooms will grow in a ring round the edges of the central original spot, and not on the spot itself. This will continue, year after year, the fairy ring, as it is sometimes called, widening out continuously at a rate of up to nearly 20 in. a year. There are fairy mushroom rings 500 years old or so, and aerial photographs have revealed great rings surrounding Stonehenge, the great historic monument of the Stone Age near Salisbury.

High up in the world! This painter is 900 ft. up on the Eiffel Tower, a position in which he was photographed by Flt. Lt. Hunt, Leigh-on-Sea.



This looks like a bridge travelling by road. It is one of a number of 2½ ton roof trusses, each 114 ft. long, forming part of an old seaplane hangar at Dundee, that were moved to a new site by a Leyland Beaver lorry operated by B.R.S. Photograph by Norman Brown, Dundee.

Starfighter

By John W. R. Taylor

WHEN a group of pressmen and other guests were shepherded into a large hangar at the Lockheed company's Palmdale, California, factory on 17th April last, they were confronted by a curtain bearing the notice: "Behind this drape is the hottest shape in the U.S. Air Force."

Even Hollywood could not have created an atmosphere of greater tension and excitement, because the "shape" that was revealed when General Otto Weyland, head of the U.S.A.F. Tactical Air Command, pushed a button to open the curtain, was the Lockheed F-104A Starfighter, the fastest warplane in the world.

The first prototype XF-104 had flown more than two years earlier, on 7th February, 1954; but the U.S.A.F. considered it so much in advance of other fighters that they refused to allow any photographs or details to be published. Even when all 17 prototypes had been flown, the ban continued and it was not until production F-104A's began to stream off the assembly lines this year that the first pictures were released. Even now, the shape of the air intakes on production aircraft is a close secret, and the Starfighter revealed to the press had streamlined covers over its intakes, as shown in the picture on this page.

The picture above shows one of the Lockheed F-104A "Starfighter" jet fighters, now in production for the U.S. Air Force.

Production F-104A's have General Electric J79 engines, which give so much power (over 16,000 lb. thrust with afterburner) that the little fighter will reach around 1,200 m.p.h. in level or climbing flight and has a service ceiling of about 70,000 ft.

Everything about it is new and interesting. To start with, it weighs and costs only half as much as other interceptors in its class, but is not "stripped down," merely simplified for quick production. It is sturdy and has full equipment, including an ejector seat that goes out through the bottom of the cockpit in an emergency, and a radar gunsight. Armament consists of the revolutionary Vulcan gun, with several revolving barrels that throw out 20 mm. shells at a fantastic rate. The F-104 can also carry rockets and even tactical atomic bombs or reconnaissance cameras.

Its wings are the thinnest ever fitted to a piloted aeroplane, and the leading edges are so sharp that they have to be fitted with felt covers on the ground to protect the servicing crews. Each wing extends only 7½ ft. from the fuselage to tip and is downswept by 10 degrees. Sweepback is unnecessary at high supersonic speeds; so the wings and high-mounted tailplane are "straight."

The result is an extremely fast and formidable fighter; and although the Starfighter's tiny wings must, inevitably, make it a "hot" aeroplane, with a high landing speed, the U.S.A.F. feel quite happy about letting their ordinary squadron pilots fly it. As *Flight* magazine commented—they may find it a little frightening, but enemy pilots would find it much more so!

The wing span of the Lockheed F-104A is 21 ft. 11 in. without tip tanks; length, 54 ft. 9 in. and height, 13 ft. 6 in. The loaded weight is about 15,000 lb.

Railway Notes

By R. A. H. Weight

Further schemes have been recently decided upon or are already in hand as part of British Railways' extensive plan to effect many improvements in services, equipment and structures. These include additional bridge renewals, pushing forward with the tunnel construction and widening to enable two more tracks to be brought into use between Potters Bar and New Barnet on the East Coast main line, and the provision of quadruple trackage where it is now lacking at certain other points further north along the same route.

New colour-light signalling installations at Manchester, Victoria, at Birmingham, Snow Hill, and at several junctions or smaller stations also are planned, with preparations for electrification along sections of the Eastern and Southern Regions and the construction of thousands of passenger carriages, vans and freight or mineral wagons, many of which will have greater carrying capacity than hitherto.

Eventually all freight trains will be fitted with continuous brakes under the control of the driver, and the automatic vacuum style of brake has been decided upon for universal use in Britain.

Although various forms of diesel locomotive figure largely in current building programmes, there are still a good many steam, tender and tank engines of standard pattern on the order books, at any rate for 1956–7.

Preparing L.M.R. No. 46225 "Duchess of Gloucester" in March last at Skipton before a special run to Carlisle with dynamometer car and mobile test units. Photograph by W. Hubert Foster.

Locomotive Stock Changes

W.R. 0–6–0T built by contract, No. 3405, has been added to stock.

Diesel shunting locomotives of the larger six-wheeled type having electric transmission lately completed include No. 13216, allocated to 65B, St. Rollox, Glasgow, and No. 13303, to 30A, Stratford. Diesel-mechanical 200 h.p. shunters numbered 11154–6 were to be stationed respectively at 40B, Immingham, 34A, King's Cross, and 35A, Peterborough. Four-wheeled diesel-mechanical type added were Nos. 11506–7, respectively shedded at Stratford and Immingham.

Class R1 S.R. 0–4–4T becomes extinct on withdrawal of No. 31704, which was the last engine in service of former London, Chatham and Dover Railway design.

Wardour Castle 4–6–0 No. 5066 has been renamed *Sir Felix Pole* at a ceremony at Paddington in memory of a one-time distinguished General Manager of the Great Western. This locomotive is stationed at Old Oak Common and was noted last spring hauling a Royal special to Cheltenham, and also an important ordinary train through to Birkenhead, avoiding Chester station, both in connection with race meetings.

Stirring B.R. Class 5 Performance

The ability of the many 4–6–0 mixed traffic engines turned out by the former London Midland and Scottish, London and North Eastern and Great Western companies to perform express passenger, fast freight and many other intermediate duties over wide areas is well known. They form an essential part of the motive power set-up. In the same class 5 power category there are now well over 100 newer standard 4–6–0s numbered from 73000 upward, having driving wheels 6 ft. 2 in. diameter, a number of which are proving extremely fast and lively performers.

The 73080 batch stationed at Stewarts Lane, London, S.R., for example, have largely supplanted King Arthurs and have proved capable of considerable time gaining over a hard route with Victoria-Kent coast trains making a number of stops. When I was behind No. 73089, in the keen hands of Driver Gingell and Fireman Williams, on the 3.35 p.m. from Victoria with an 8-coach load, rather lighter than usual, the acceleration from starts was remarkable. This was especially so up the steep rise from Bromley South, on which we worked up to 43 m.p.h., followed on comparatively short downhill stretches by maxima over 85 m.p.h. near Farningham Road, and then 81 near Sole Street, which would have been higher but for a signal slowing. After careful negotiation of Rochester curves and bridge the arrival at Chatham was decidedly before time. Speeds well over 60 m.p.h. were attained afterwards on the comparatively short start-to-stop stretches over undulating gradients on to Faversham, Whitstable, etc.

Several brilliant runs have also been recorded in the opposite direction, with speeds fully equalling the highest logged behind Pacifics.

These locomotives will doubtless be seen on Continental expresses again this summer, as well as on various trains to or from Waterloo; further north they are active on various sections of the L.M.R. and proving their worth in Scotland. I am obliged to Mr. D. S. M. Barrie for a note on quite a sprightly run by No. 73107, with an Eastfield crew in charge, on the westbound *Queen of Scots*, loaded to 7 Pullmans and van or 320 tons full. The 47¼ miles from Edinburgh, Waverley, to Glasgow, Queen Street, favourably graded for the most part, were run non-stop in exactly the 59 mins. allowed, though including two track repair slacks and slight signal delays. Maximum speeds were 63 m.p.h. at Linlithgow and 68 at Lenzie Junction.

London Midland News

Britannia or Clan Pacifics stationed in Scotland

B.R. Standard Class 5 4-6-0 No. 73089 climbing past Bickley on the 3.35 p.m. from Victoria. Photograph by B. C. Bending.

have been noted sometimes on expresses between Carlisle and Leeds. A Scottish Britannia and a Scot 4-6-0, probably while running-in after repair at Crewe, have made special runs via Stalybridge to Leeds and York. A Jubilee or "Black 5" 4-6-0 from Manchester has been regularly working through from Manchester to Newcastle on an early morning newspaper and parcels train, returning on the N.E.R. double-heading the 6.56 a.m. Newcastle-York, sometimes coupled to a Heaton Pacific or V2.

On account of heavier loads and arduous gradients, class 2 4-4-0s from time to time assist Scots on the southbound *Thames-Clyde Express* from Carlisle to Leeds, or Jubilees to or from St. Pancras-Leicester, etc. 2-10-0s stationed at Toton or Wellingborough have been working through to the outskirts of Bristol, over the former Midland Railway route, from Bletchley to Oxford, and to other fairly far-flung destinations.

While round about Coventry recently, and travelling over the short secondary line thence to Leamington Spa, I saw quite a variety of locomotive classes. Those represented included Stanier Mogul (5MT 2-6-0), 4-6-0 "Black 5" with Caprotti valve gear and roller bearings, 0-8-0, 0-6-0 Midland class 4 type, B.R. light 2-6-0 No. 78029, 2-6-2Ts, classes 2 and 3, and Stanier 2P 0-4-4T. Diesel railcars made up in four-coach sets had begun to work between Rugby and Birmingham, one being a through working from Peterborough.

Rebuilt "Merchant Navy" Performance

Mr. Norman Harvey was recently aboard the *Bournemouth Belle* made up to 11 Pullmans and van, weighing in all about 480 tons. The train was headed, as was frequently the case at the time of writing, by No. 35018, *British India Line*, manned by Driver Thompson and Fireman Legge of Nine Elms. Time was easily kept, the first 50 miles from Waterloo, a good deal of which is gradually "against the collar," being covered in 54½ min., with several maximum speeds round about 65-68 m.p.h., followed by a top 81 down the straight descent towards Winchester, where there was a slowing down to 44 m.p.h. The Southampton stop made in 86¾ min. compared with the 88 allowed and all seemed to go very smoothly. No. 35020 *Bibby Line* has been similarly modified; others will probably be put in hand.

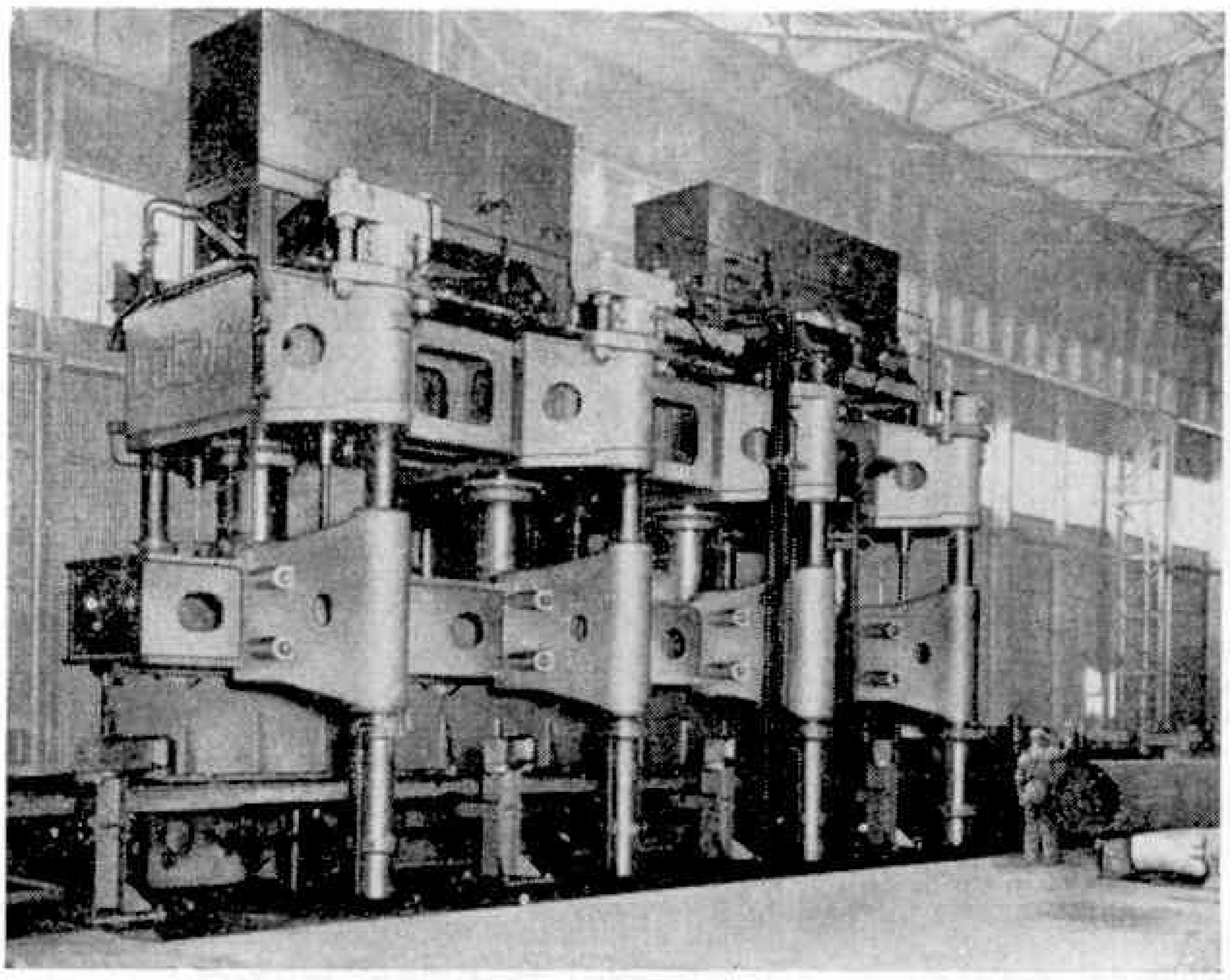
Summer Time Tables in Force

July sees the commencement of the high season for holiday and peak express services. With additions during the busiest period, B.R. summer time tables now operating until about the middle of September show 57 trains timed to make start-to-stop runs on most days of the week, at an average of 60-67 m.p.h. In this category the quickest continues to be the *Bristolian*. The longest run in each direction is made by the *Elizabethan* over the 393 miles between King's Cross and Edinburgh.

There are more cross-country holiday trains avoiding changes at busy junctions, and extra expresses on the Waterloo-Southampton-Bournemouth run, the fastest down being the new 8.20 a.m. from London. Among W.R. accelerations a part-way speeding up has been effected of the 11.30 a.m. Paddington-Penzance train, and there is an extra Friday fast restaurant car service from Paddington to Devon at 7.30 p.m.

Improved services at regular intervals are running over Scottish main lines between Glasgow (Buchanan Street), Perth, Dundee and Aberdeen. Other improved services are on S.R. steam secondary lines between Tonbridge, Tunbridge Wells and Brighton or Eastbourne. Seat reservation or advance booking is essential for certain trains and stations in order to avoid overcrowding.

The rebuilt Merchant Navy No. 35018 "British India Line" passing Pokesdown with the Bournemouth Belle. Photograph by M. A. Arnold.



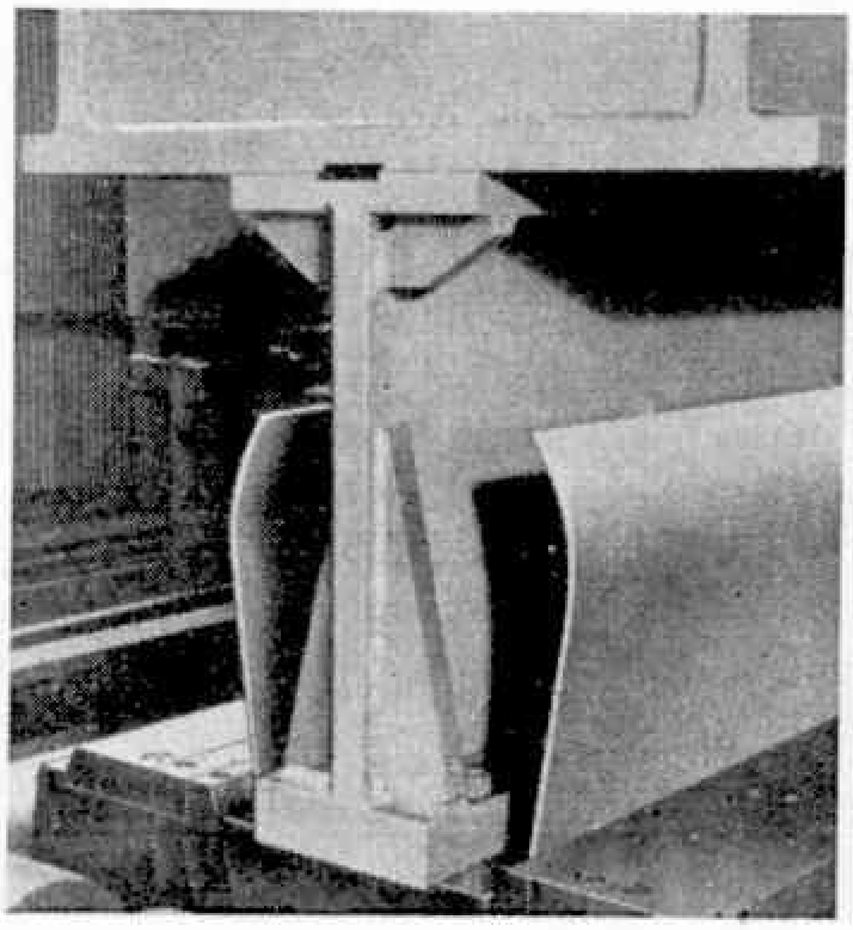
This 3,600 ton hydraulic press gives the prepared steel plate the U form seen in the picture at the foot of the page. The illustrations to this article are reproduced by courtesy of the South Durham Steel and Iron Company Ltd.

From Steel Plate to Welded Pipe

By the Editor

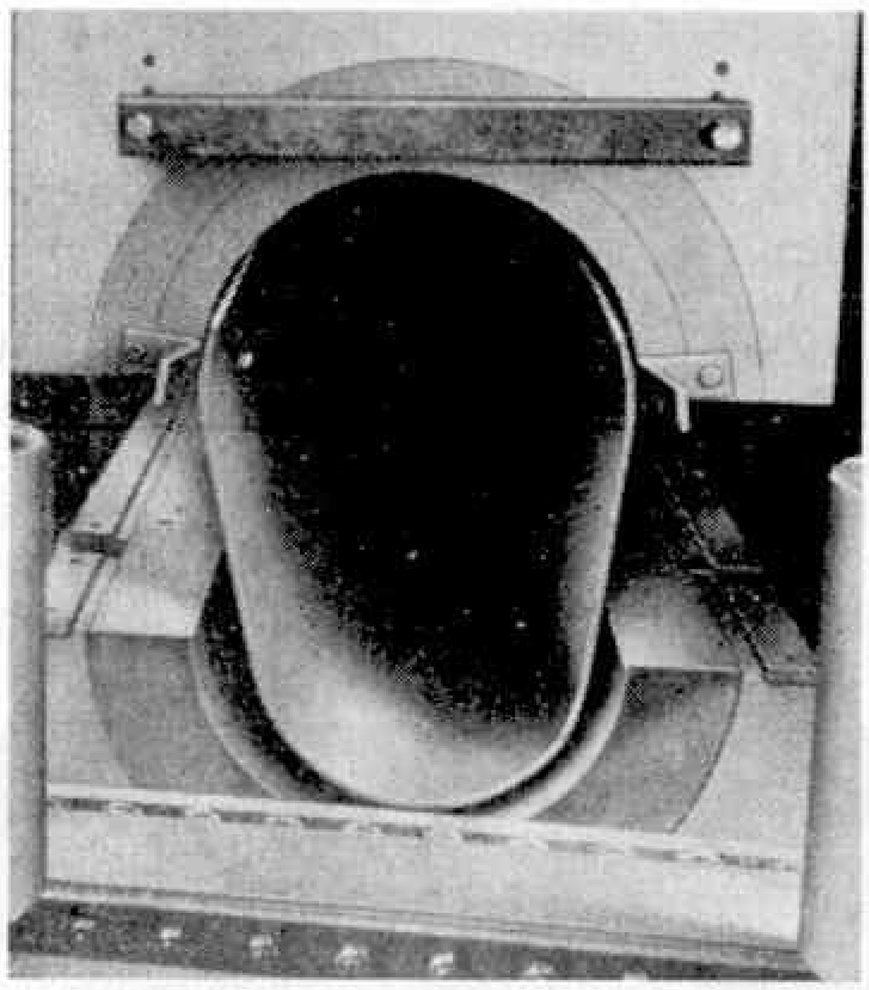
LARGE steel pipes are used on an enormous scale today. They are employed in the distribution of water, a good example being the great new pipeline bringing water from the Lake District to Manchester that was described and illustrated in the *M.M.* for November of last year. In hydro-electric schemes they are used in the making of the giant penstocks through which water from a storage reservoir flows down to the turbines in the powerhouse; and a spectacular application is in the transport of oil over the long distances that often intervene between oil wells and refineries, or the places where the oil is to be used, or shipped overseas.

The way in which large steel pipes of the kind required for these purposes are now made is very interesting indeed, as can be realised from a glance at the illustrations on the following pages. These show parts of a large steel pipe making plant recently installed by the South Durham Steel and Iron Company Limited at their works in Stockton-on-Tees. This came into commercial production last year, and its addition to existing plant gives South Durham pride of place as the largest producing area in the United Kingdom and Europe.



The South Durham Steel and Iron Company has been concerned with the making of steel pipes of large diameter since 1926. The increasing demand and more stringent requirements led to the decision to build this modern plant, which is designed for the continuous flow production in large quantities of welded steel pipes from 16 in. up to 40 in. in diameter, in lengths up to 40 ft. and with plate thicknesses from $\frac{1}{4}$ in. to $\frac{5}{8}$ in.

The production of steel pipes begins with steel plate, and all the steel plate required for the new plant is rolled at the West Hartlepool works of the company. The plates, up to 40 ft. in length, are carried to Stockton chiefly by rail, but road transport also can be used if necessary. The stock gantry in which the plates are stored has an electrically driven overhead travelling magnetic crane that lifts the plates and places them on a roller conveyor track mounted on a turntable. On the turntable they are then swung round so that each is ready to begin its progress on a motorised roller conveyor through



The dies of a 16,000 ton press, known as the 0 form press, closing to press the U form, in one operation, into a complete circle.

the long line of machines that transforms it into a length of steel tube.

The first step is to prepare the long edges of the plate. As it travels along the roller conveyor these edges are successively planed by the use of two edge planers, one on each side. In each case the plate is run out sideways from the roller conveyor to the planing machine on three magnetic trolleys, which are moved as required by the operator to place it correctly in the planing machine. There is a slight bevel on each edge when the operation is completed. This is to allow for leaving a small groove when at a later stage the plate is bent into the form of a pipe.

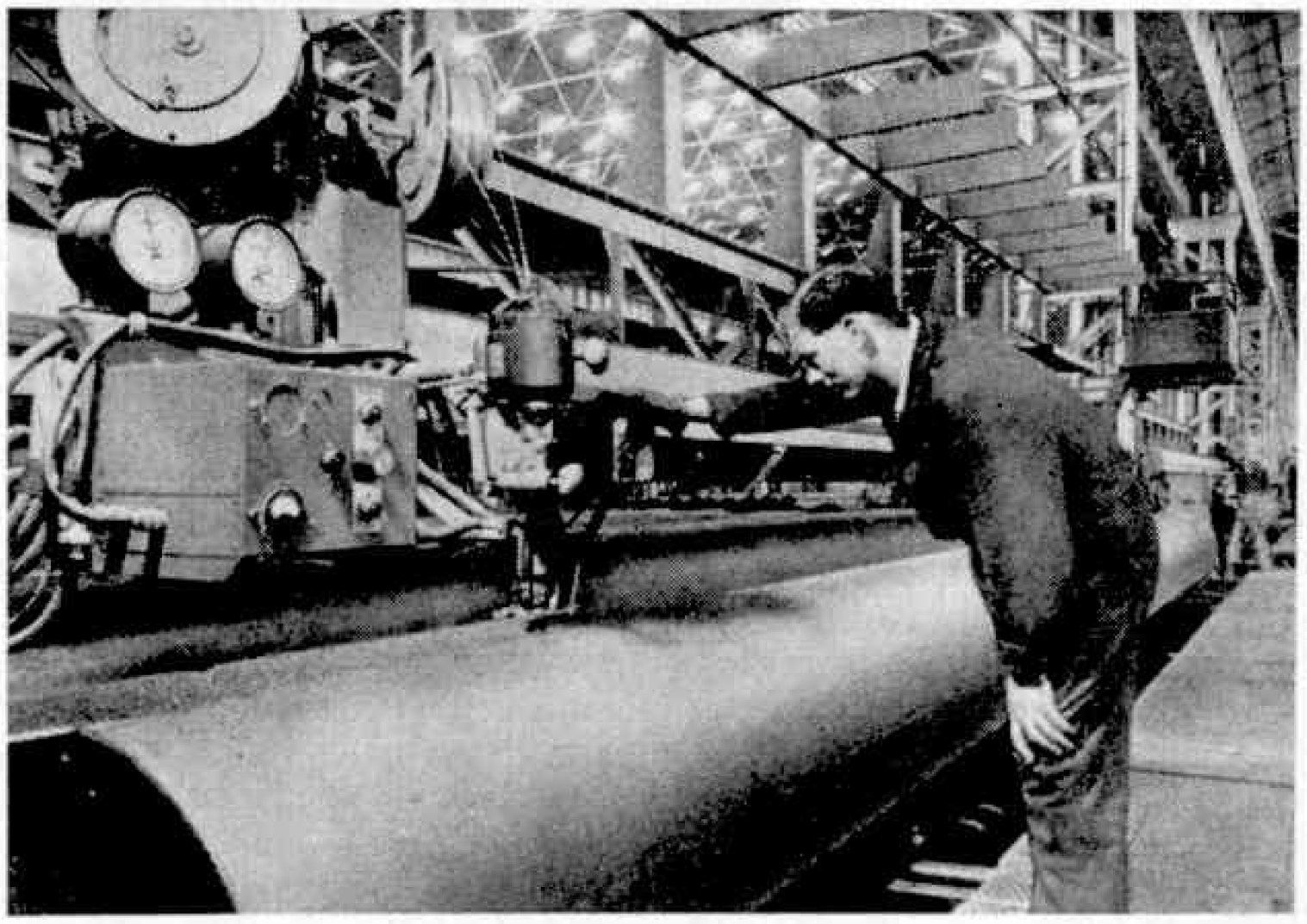
The beginning of this shaping, completed in three stages, is the next operation, which is carried out on two edge setting machines, as they are called. These again are in tandem and deal with the opposite edges of the sheet. What happens here is that the edges that have just been planed are curled up slightly, in special hydraulic presses of the company's own design.

Then follows the second of the three stages of pipe forming. This too is carried out in a powerful press, which can exert a maximum pressure of 3,600 tons. It is called a U press because the ends of the plate roughly take up the shape of a capital letter U, as in the lower illustration on the previous page, which shows one end of a plate in the press and in which the curves already given to the two edges also can be seen clearly. The press on which this operation is carried out is pictured at the head of that page. It can be used for the various sizes of pipe required, sets of interchangeable press tools, or dies, providing for this.

In its U-form the plate is now known, in accordance with local custom, as skelp. For the third pipe forming operation it is automatically carried to another large press, in which the U-shape is changed into an O. The upper illustration on this page shows how this is done, the dies under powerful hydraulic pressure closing on the U and bending the plate into the necessary O shape.

When this shape has been achieved the two edges of the plate are closely butted into each other, ready for the final closing, which is carried out by arc welding on large and ingenious machines. In preparation for this, hand welding is used to tack the two edges at points along the length of the joint itself, a process known as tack welding. In addition pieces of plate are hand welded to the skelp at the ends, to form a run on and off for the welding head that actually completes the welding process.

There are two stages in welding the edges together. In the first the welding is carried out inside the pipe, which is moved along under a welding head carried on a cantilever arm. Different welding speeds can be used as required, and the return movement of the pipe to disengage it after it has passed over



The twin-arc automatic electric welding machine in operation, welding the outside seam of a pipe.

the welding head throughout its full length is much quicker than its forward movement. Ahead of the welding head an air blast cleans away any loose dust that may be present, and flux is spread from a hopper on the welding head. Any flux not used is recovered by a vacuum cleaner.

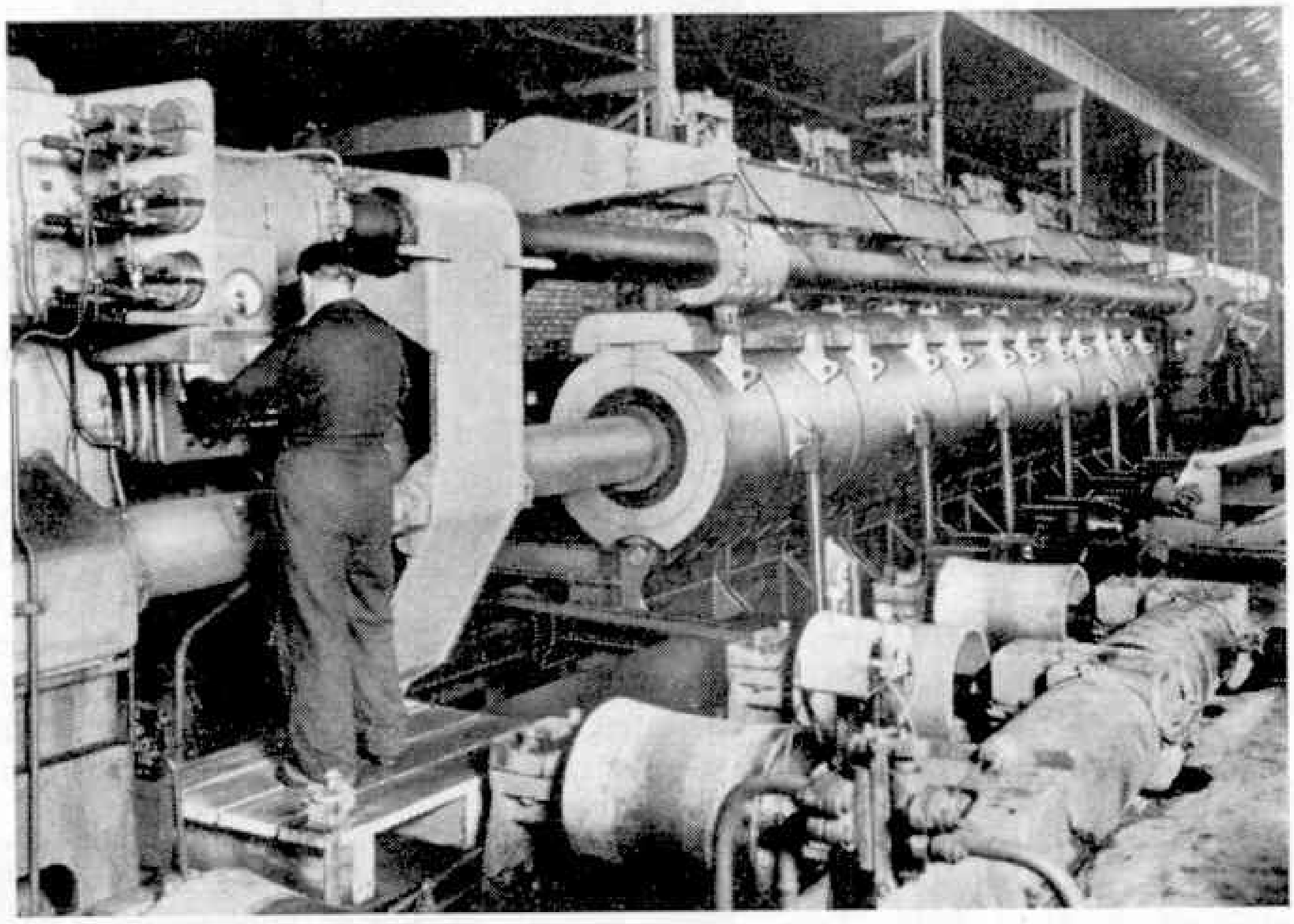
After this internal welding has been carried out the product is no longer a skelp. It is now a partly finished pipe, which is passed on to the machine in which the joint is welded on the outside to complete the operation. This is seen in progress in the lower illustration on the previous page, in which the passage of the welding head along the seam can readily be traced. A covering of flux material is laid along the join, ahead of the travelling welding head, and here again any flux that is not actually used in the process is afterwards picked up by a vacuum cleaner.

Reference has already been made to the groove between the slightly bevelled edges of the plate after these have been planed. It is in this groove that the welding head is guided in its passage along the pipe. Another interesting point is that external welding can be carried out more quickly than internal, so to keep up the uniform flow of the pipes, with no waiting, four internal welding machines are used with three for outside welding.

The covering of fused flux on the welds is removed, and the complete weld is closely examined by an inspector to make sure that it is perfect before allowing the pipe to pass on for the next operation. It is a comparatively simple matter to inspect the external welding; to examine the internal work the inspector lies face downward on a special trolley or cradle that carries him through the pipe, using a powerful torch to illuminate the joint beneath him.

The steel pipes that are used for conveying oil, water or gas are all perfectly round, and the next operation is to give the pipe its final shape and size. First its ends are faced square. Then it passes to one of the two machines that complete this process. Arms acting automatically lift it into line between two plungers on this machine, and the plungers move towards the ends of the pipe and enter them, so as to support it. Each plunger has a sealing arrangement, and immediately all is ready water flows into the pipe through one of them.

This is done at low pressure, and while the water is entering, two dies, or mantles, pivoted underneath are closing round the pipe, pushed up by hydraulic power. As soon as the two dies meet at the top, a locking clamp is lowered on to them, as can be seen in the illustration of this machine on this page. Then, with the pipe full of water and the dies closed, the pressure of the water is increased until the pipe is expanded to take the shape of the dies. As it expands the pipe is reduced slightly in length, but the two plunger carrying heads move inward to compensate for this.



Expanding a pipe to correct circular form and size by hydraulic pressure. After expansion the dies are opened and the pipe tested, again by raising the pressure of the water in it.

Once the pipe has been given its final shape the hydraulic pressure is reduced and the dies are opened, so that the pipe alone is taking whatever water pressure there is inside. This is now raised until it reaches the figure specified for testing the pipes, to make sure that they have adequate strength for the purpose for which they are to be used. While under this pressure the weld is again very carefully examined. There is careful inspection at every stage indeed, and pipes can even be taken off the line for testing by X-rays.

Meccano "Realism" Competition

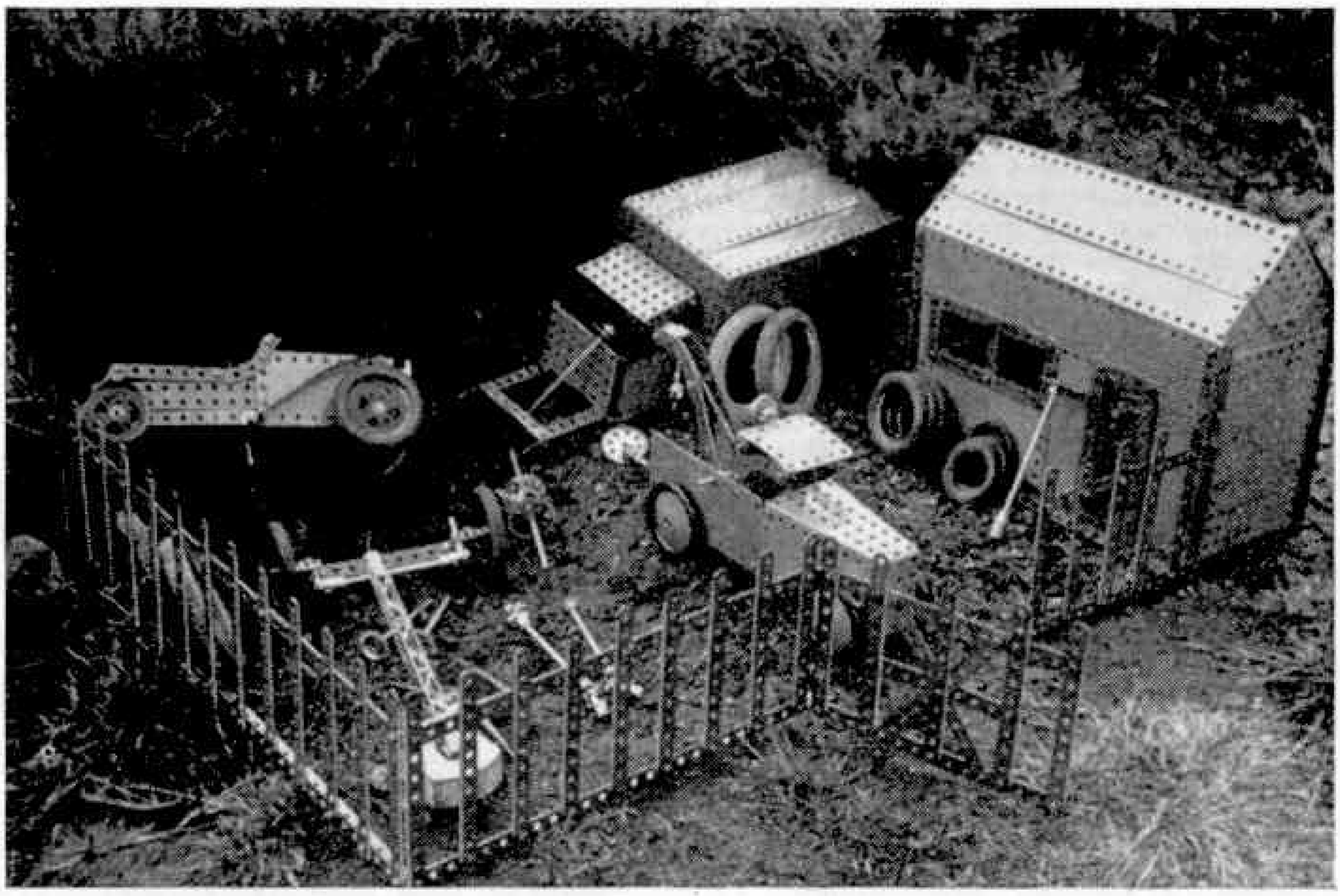
Prizes for Models in Realistic Surroundings

THE picture on this page is a good example of the type of entry suitable for the novel "Realism" Contest we have arranged for the summer months. This effective scene shows a car breaker's yard, complete with a wrecked car, old tyres, rear axles and other examples of the kind of scrap usually found in a junk yard.

The scene won a prize for its builder, F. E. Jackson, Halifax, in an earlier "Realism" competition, and its effectiveness is due more to careful arrangement and ingenuity than to the amount of actual model-building required to prepare the entry.

The limited time required to build a model for this kind of contest is one reason why we have chosen a "Realism" Competition for the summer months, when even the most ardent Meccano enthusiast likes to spend as much time as possible out of doors. Once a suitable model has been built, the rest of the entry can be prepared outdoors. Actually, it is not even necessary to build a new model if a suitable subject is already available, or is under construction. There must be at least one model in the picture, of course, but the main thing is to arrange it in surroundings as realistic and as natural as you can devise.

The accompanying illustration is just one example of the type of model suitable for the contest, and there are many others to choose from. Bridges, ships, locomotives and excavators can be arranged just as easily in realistic settings.



"A car breaker's yard." This novel subject was thought up by F. E. Jackson, Halifax, and won a prize in a previous "Realism" Competition.

We realise that weather conditions in some Overseas countries will not be so suitable just now for outdoor work and competitors living in those countries may, if they wish, arrange their scenes indoors.

For a competition of this kind photographs are preferable, but drawings will do if good clear photographs are not easily obtainable. Each drawing or photograph must carry on the back the name, address and age of the competitor.

There are two Sections in the competition: Section A is for competitors under twelve years of age on 30th September, 1956, and Section B is for competitors aged twelve or over on that date. Details of the prizes to be awarded in each Section are given in the panel on this page.

Entries must be addressed *Meccano "Realism" Competition, Meccano Ltd., Binns Road, Liverpool 13,* and they must reach this Office not later than 30th September, 1956. Entries received after that date cannot be considered.

THE PRIZES

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

	£	s.	d.
First Prize, Cheque for	4	4	0
Second Prize, Cheque for	2	2	0
Third Prize, Cheque for	1	1	0
Ten Prizes, each of		10	0
Ten Prizes, each of		5	0

Among the Model-Builders

By "Spanner"

REVERSING MECHANISM

Fig. 1 illustrates an unusual type of reversing mechanism designed by Mr. F. Richardson, Surbiton. The device is similar in general arrangement to the reversing gear fitted to the Meccano No. 1 Clockwork Motor, and its main advantage is that a smooth change in the direction of the drive can be obtained while the mechanism is in operation. An interesting feature is that the carrier for the gears makes excellent use of the Six Hole Wheel Disc (Part No. 24c).

The gear carrier is assembled from two Six Hole Wheel Discs connected by two 2" Screwed Rods 1 and fixed in position by nuts on the Screwed Rods. The input or driving shaft 2 is supported in a suitable framework and the gear carrier is mounted freely on the shaft. The input shaft carries a ½" diameter, ¼" face Pinion 3, and this drives a ½" diameter, ½" face Pinion 4. Pinion 4 is fixed on a 2" Rod held in the Wheel Discs by Collars, and it is in constant mesh with a ½" diameter, ¼" face Pinion 5. Pinion 5 is fixed on a second 2" Rod and this also is held in the Wheel Discs by Collars. It should be noted that Pinion 5 must be just clear of the Pinion 3, but both the Pinions 5 and 3 must be in constant mesh with the Pinion 4.

The output shaft is a Rod 6 that carries a ½" diameter, ¼" face Pinion 7. The latter Pinion is positioned so that it can be meshed with either the Pinion 4 or the Pinion 5 simply by rotating the gear carrier. When Pinion 4 is in mesh with Pinion 7 the drive is transmitted through the Pinions 3, 4 and 7. If the gear carrier is turned to bring Pinion 5 into mesh with Pinion 7 the drive is taken through Pinions 3, 4, 5 and 7, and the additional stage of gearing in the latter case results in a drive in the reverse direction. The movement of the carrier is controlled by a lever formed by a 2½" Stepped Curved Strip bolted to one of the Wheel Discs.

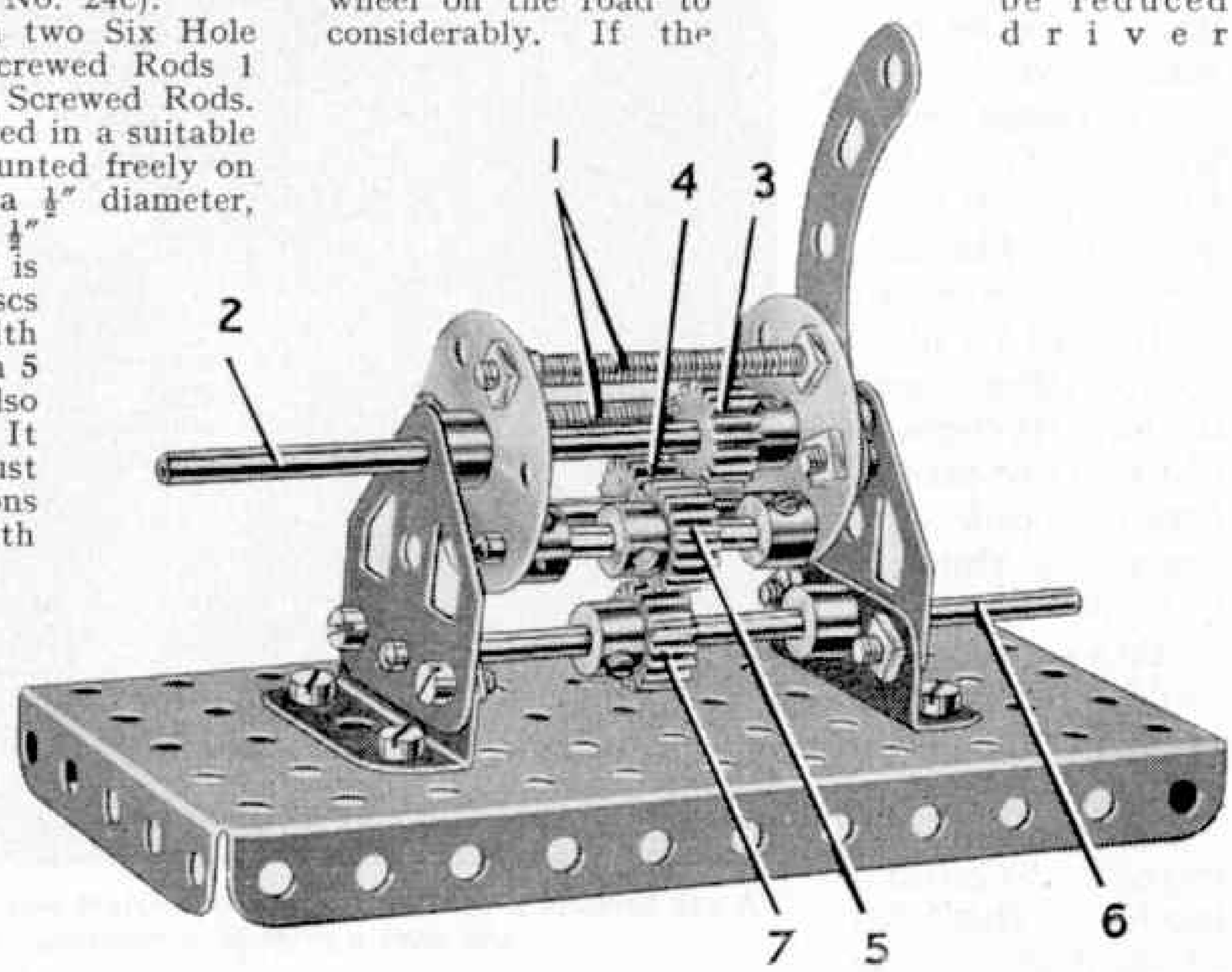


Fig. 1. This reversing mechanism is notable for the novel use it makes of the Wheel Disc, Part No. 24c, with six holes.

LIMITED SLIP DIFFERENTIAL

Some time ago I received a letter from an enthusiastic model-builder, Mr. G. W. A. Fogarty, Portadown, N. Ireland, enclosing a sketch and details of an interesting differential mechanism he had made. The sketch is reproduced as Fig. 2. As can be seen the actual differential is of the usual type, using Contrate Wheels and ¾" Pinions. It is practically identical with similar mechanisms I have described on previous occasions, but differs from them in being of a special type known as a limited slip differential, developed for use in racing cars.

When a racing car turns a corner at high speed the action of centrifugal force causes the grip of the inner wheel on the road to be reduced considerably. If the driver accelerates in these conditions in a car fitted with an ordinary differential mechanism the inner wheel will slip and spin violently, and a good deal of power will be lost. With a limited slip differential, however, the differential automatically becomes inoperative when the speed of the slipping wheel exceeds that of the other wheel by a predetermined amount. In actual practice the difference in speeds is usually limited to about 15 per cent., but in the model the gearing used allows a difference of 50 per cent.

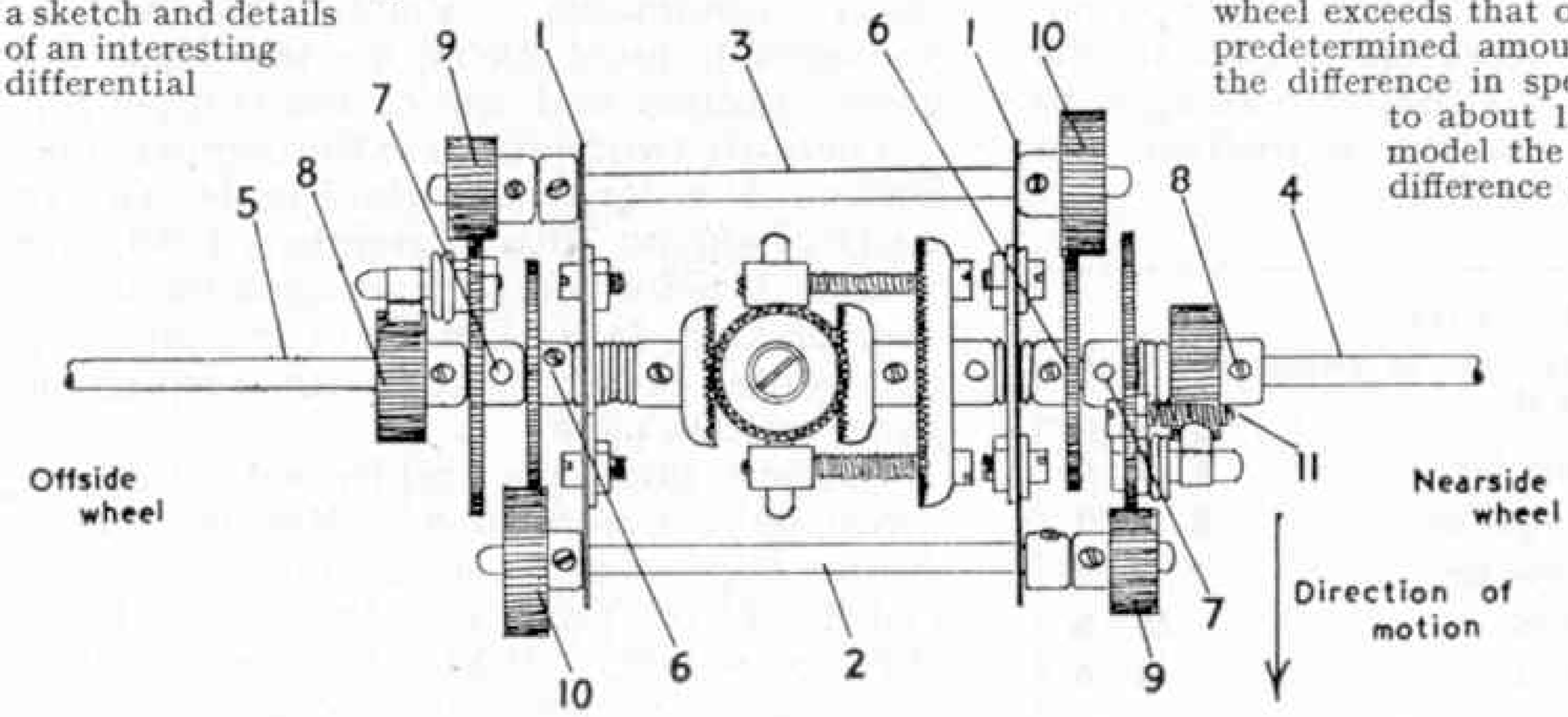


Fig. 2. A Meccano limited slip differential, based on the type of mechanism used in racing cars.

A. M. C. Dobbin, Nottingham, an enthusiastic Meccano model-builder, is seen here examining with critical eye a model aeroplane he has built.

As already mentioned, the actual differential follows the usual pattern in Meccano and I do not propose to describe its construction in detail. The general arrangement will be clear from the sketch. The housing consists simply of two Wheel Discs (eight holes) and these should be suitably connected by 2½" Double Angle Strips (not shown in the sketch). A 2½" Strip 1 should be bolted at an angle to the horizontal across the outer face of each Wheel Disc. These Strips provide bearings for 3½" Rods 2 and 3, and the angle of the Strips is necessary in order to allow the driving shaft and Pinion to clear the Rod 2.

Each of the half shafts 4 and 5 carries a 50-tooth Gear 6 fixed in place, a 57-tooth Gear 7 loose on the shaft and a Ratchet Wheel 8 fixed by its Grub Screw. The 50 and 57-tooth Gears mesh with ½" Pinions 9 and ¾" Pinions 10 held on the Rods 2 and 3. A Threaded Pin is fixed in each of the Gears 7 and on it is placed a Spring Clip, one lug of which engages the Ratchet Wheel. The other lug bears against a ½" Bolt, which also is fixed in the Gear 7.

The action of the mechanism is as follows. Suppose the nearside wheel is turning at 10 r.p.m. when the offside wheel starts to spin. When the offside wheel reaches 15 r.p.m. the gearing 6 and 10 drives shaft 2 at 30 r.p.m. Through the 3 : 1 reduction gearing 9 and 7 57-tooth Gear 7 turns at 10 r.p.m., exactly the same as the Ratchet on half shaft 4. If the offside wheel exceeds 15 r.p.m. however, the speed of Gear 7 is increased proportionately and the ratchet mechanism attached to it steps up the speed of the half shaft 4.

It will be appreciated that due to the action of the ratchets the differential is effective in forward gear only. For reverse gear therefore, the movement of the gear lever should be arranged to slide shaft 2 to disengage Pinion 10 from the Gear 6. The differential will then operate in the usual way.

FISHING REEL

Two Face Plates are connected as shown in Fig. 3 by three 1½" × ½" Double Angle Strips and are lined up very carefully so that a Rod mounted in their bosses is able to rotate freely. The winding barrel for the fishing line is made by clamping a Chimney Adaptor 1 tightly between two Bush Wheels fixed on the Rod, and a ½" Pinion 2 and a Crank 3 are also fixed on the Rod outside one of the Face Plates. A handle is attached to the Crank and consists of a Rod Connector placed over a 1⅛" Bolt, which is then fixed in place by a nut.

The Rod is prevented from turning in one direction by a Pawl 4 freely mounted on a ¾" Bolt, which is fixed in one of the Face Plates by two nuts. The Pawl engages the teeth of the Pinion 2. A handle to release the ratchet mechanism when necessary is provided by a Threaded Pin fitted with three Washers then screwed into the boss of the Pawl. A 2½" Driving Band is looped round the Threaded Pin and is bolted to one of the Face Plates. This serves to keep the ratchet mechanism engaged until the release handle is operated.

A USEFUL HINT FOR YOUNG MODEL-BUILDERS

Several times recently I have been asked by young model-builders for advice on the design of bearings for small model cranes. Generally the bearing used in these models consists simply of a short Rod passed through the crane cab and the base, with Washers or Wheel Discs placed on the Rod to form the actual bearing surfaces. Usually the cab and the base can be held together by fixing Pulleys or Collars on the Rod, but sometimes in a model built with a small Outfit these parts are not available as they have already been used in other parts of the crane. Spring Clips can be used, but these have a tendency to slip along the Rod if a heavy load is raised. A useful tip is to make use of a Cord Anchoring Spring, a Rod Connector or a Rod and Strip Connector, as these parts grip the Rod firmly and will be found to take the place of Collars or Pulleys very satisfactorily.

Incidentally an easy way of sliding a Rod Connector or a Rod and Strip Connector off a Rod is to place two Pulleys on it. The Pulley next to the part to be removed should be loose and the second Pulley should be fixed. Now grip the fixed Pulley and slide the loose one away from it and the Rod Connector will slip off easily.

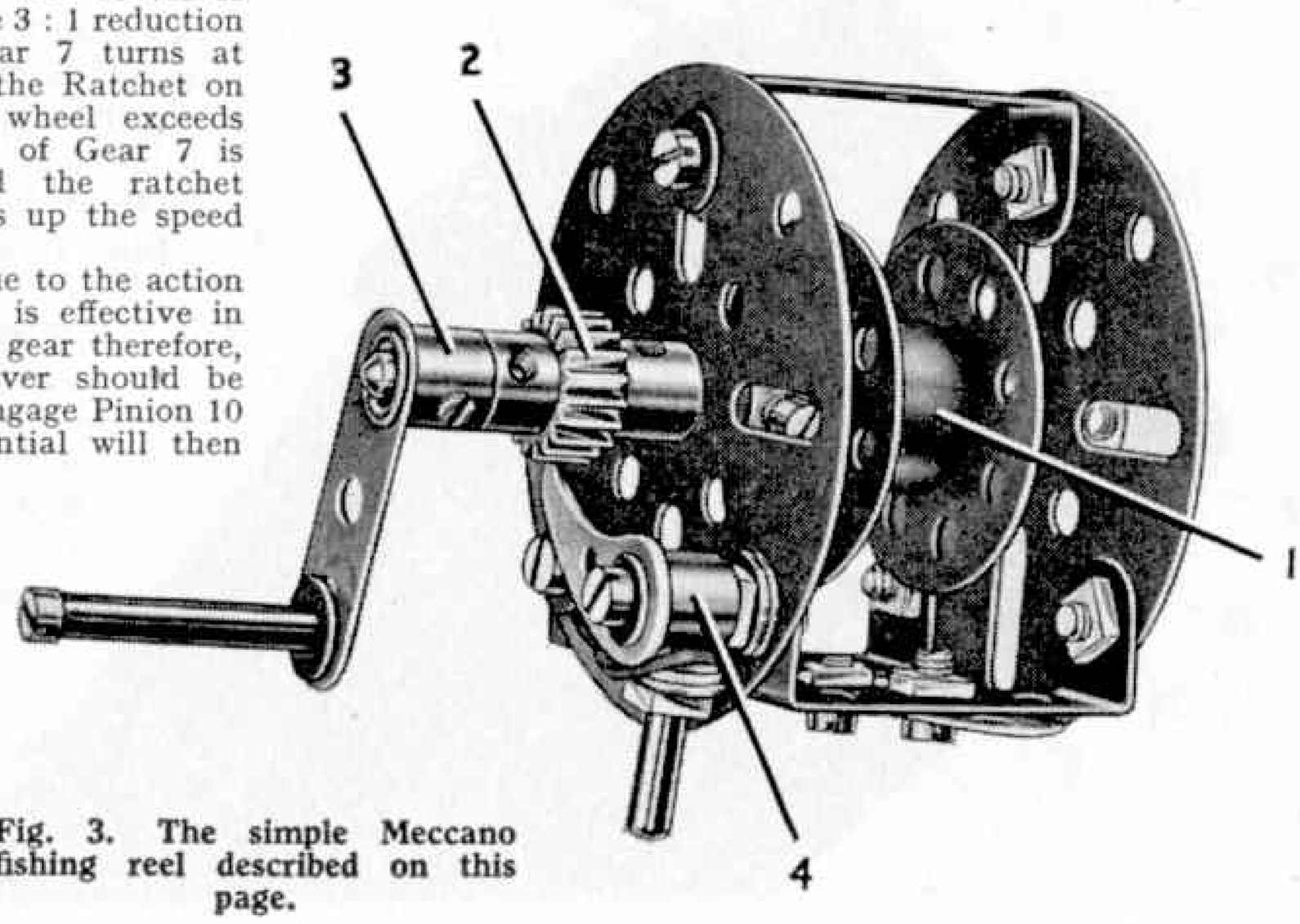


Fig. 3. The simple Meccano fishing reel described on this page.

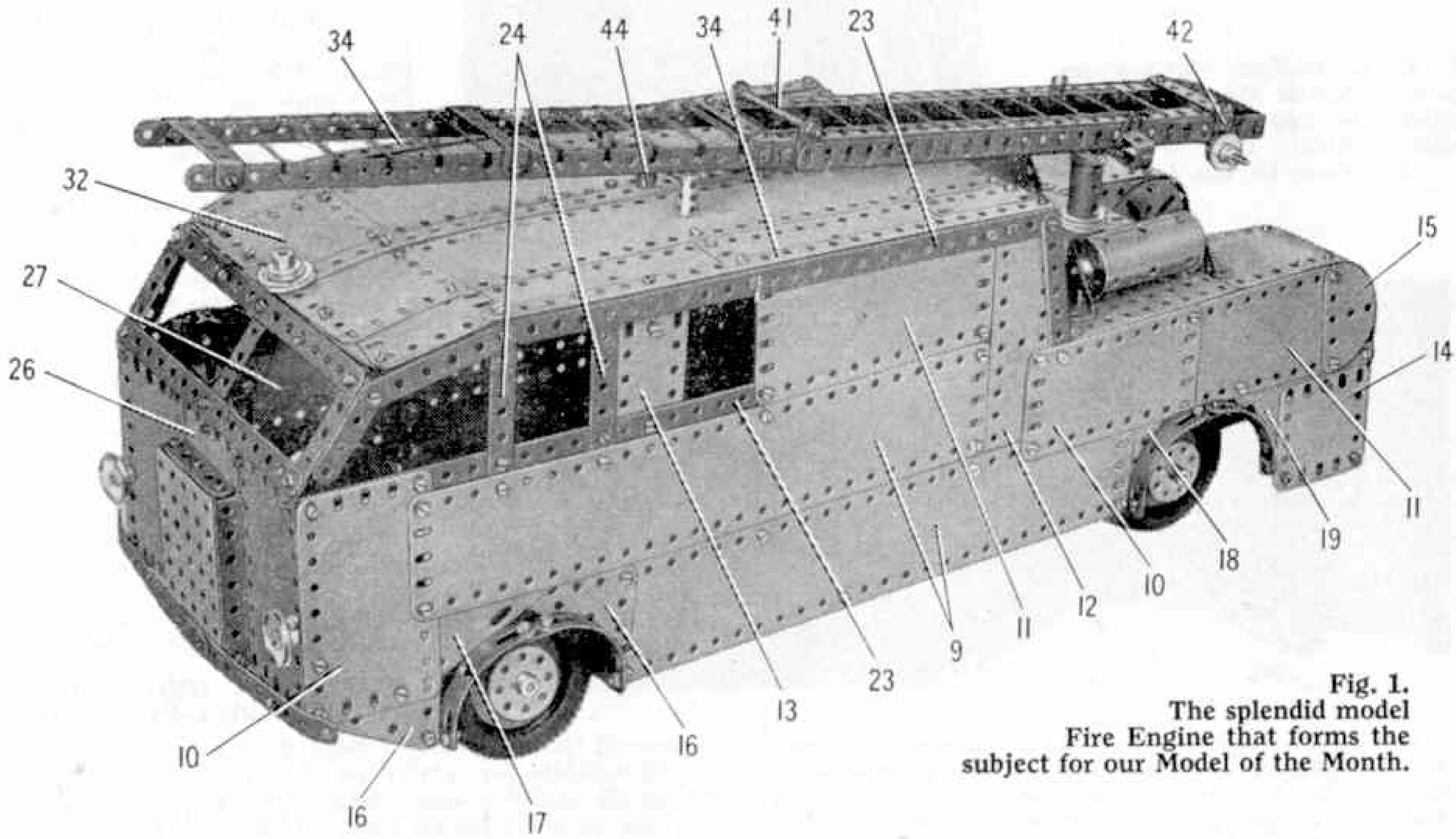


Fig. 1. The splendid model Fire Engine that forms the subject for our Model of the Month.

MODEL OF THE MONTH: Fire Engine

OUR model this month is one that will appeal to every Meccano enthusiast who likes to build models of vehicles. Modern fire-fighting appliances, usually painted a glistening red and with gleaming brass fittings, present a thrilling sight as they speed along on their way to an outbreak of fire. These powerful vehicles attract young and old alike, and on this score alone it is no wonder that fire engines are among the most popular subjects for Meccano models.

Apart from this fascination however, fire-fighting appliances appeal particularly to the model-builder who delights in building models with plenty of mechanical details. In addition to the steering gear and other mechanisms usually fitted to model vehicles, with a fire engine there is almost unlimited scope for model-builders to use their skill in building extending ladders, pumps and other pieces of fire-fighting equipment.

The design of fire-fighting appliances has been developed considerably to meet the exacting requirements of modern life, and the latest machines are a far cry from the earliest horse-drawn engines with hand-operated pumps. Many present-day appliances have

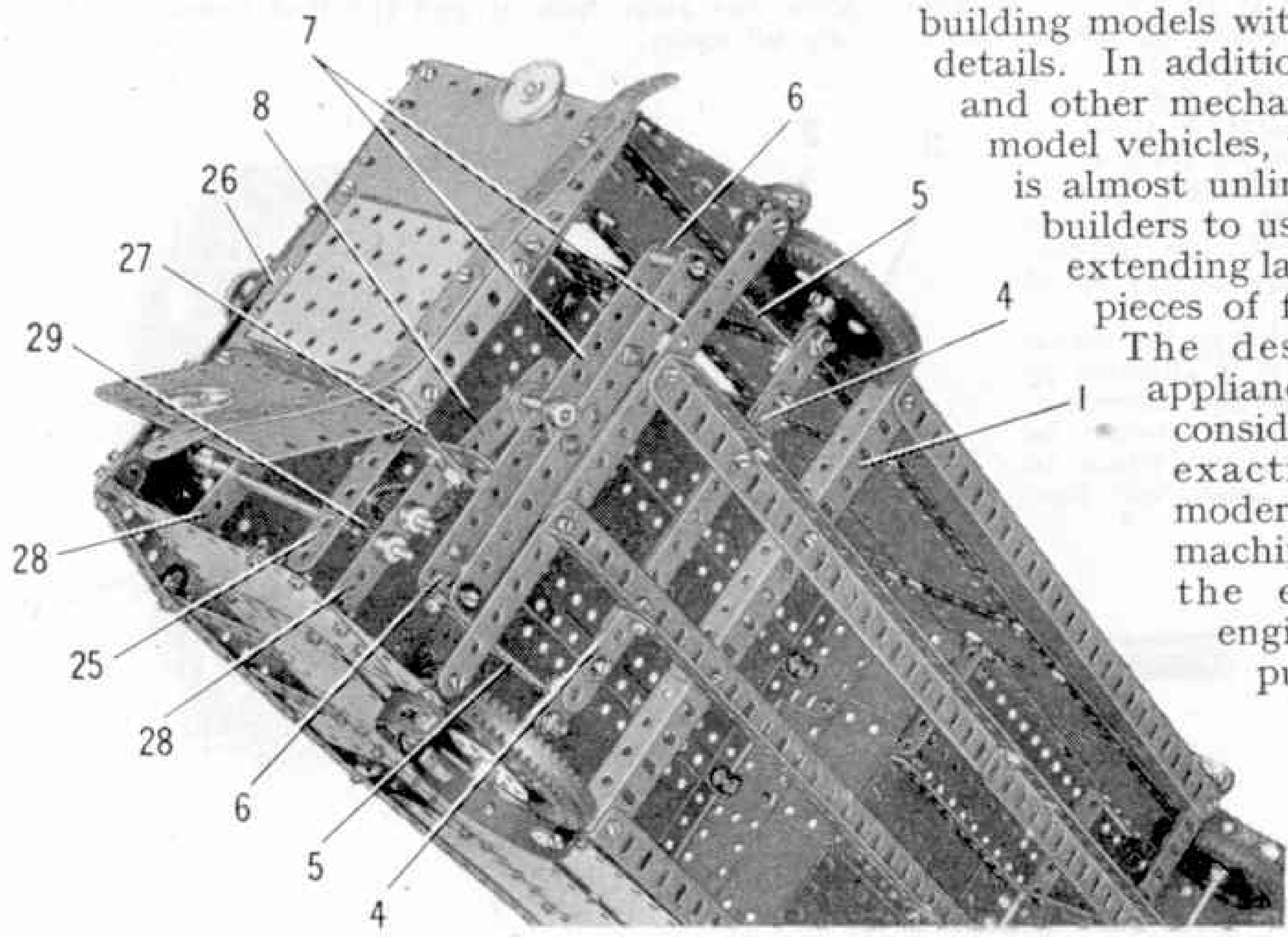


Fig. 2. This view of the Fire Engine shows the arrangement of the steering mechanism.

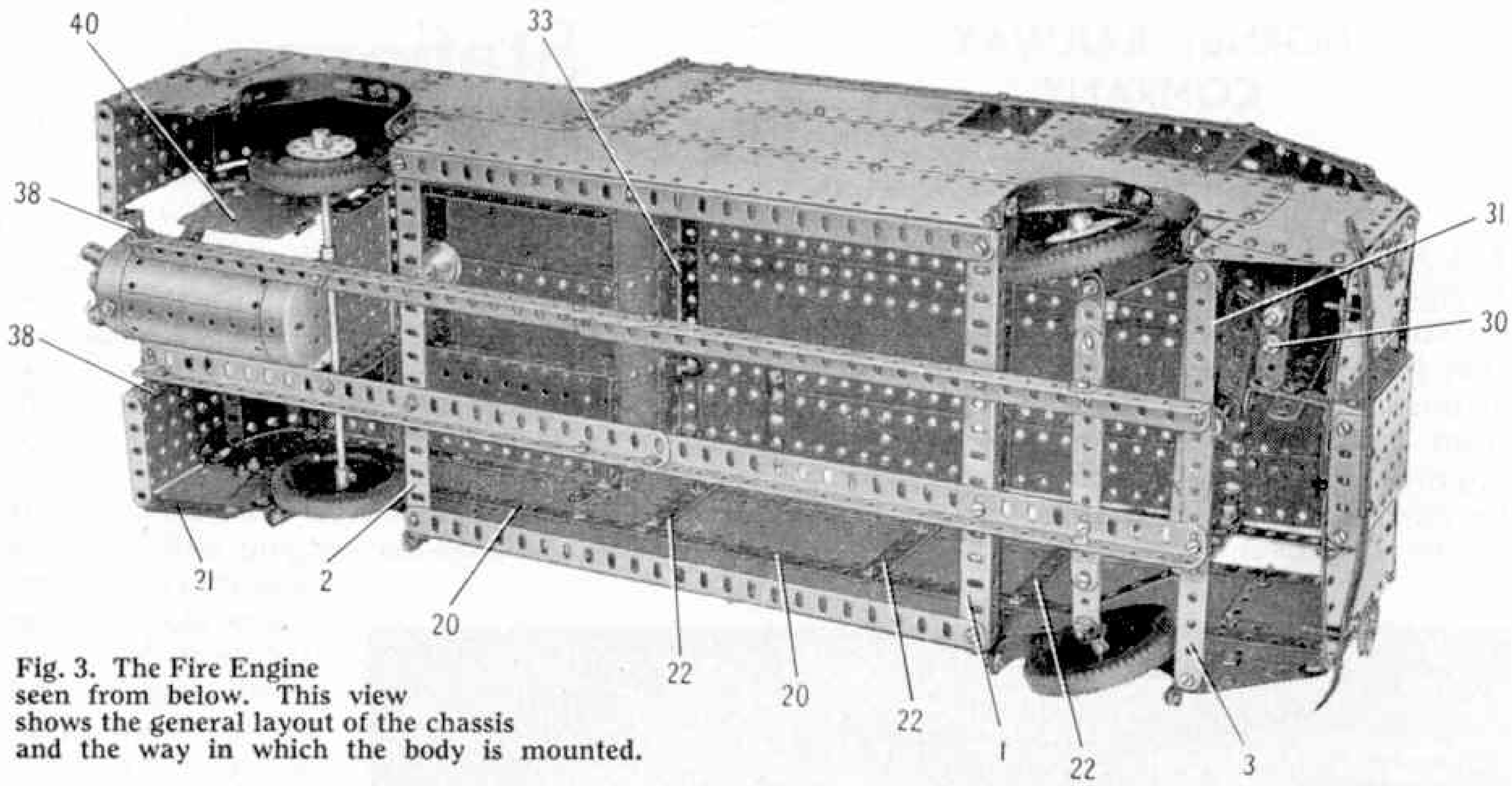


Fig. 3. The Fire Engine seen from below. This view shows the general layout of the chassis and the way in which the body is mounted.

powerful motor pumps capable of delivering thousands of gallons of water at high pressure, foam equipment for fighting petrol and oil fires, and storage lockers for the hoses and other necessary articles.

The Meccano model is based on a modern streamlined fire engine with enclosed accommodation for the firemen. It is fitted with a detachable extending ladder, which is located on the vehicle by special supports. The ladder can be removed easily and will reach to a height of approximately 2 feet 9 inches when extended. The model is fitted with a simple but effective steering mechanism.

The rear end of the fire engine carries fittings that represent the pump, hose connections and control wheels. The back of the model is shaped specially to accommodate these fittings, and good use is made of Flexible Plates and Triangular Flexible Plates.

The chassis of the model can be built as a unit, complete with the rear axle mounting and the main sections of the steering mechanism. The body is built directly on supporting Girders and Strips attached to the chassis, and the steering column is mounted in bearings fixed to the body. The model is over 2 ft. long and is approximately 9 in. wide.

The fire engine is designed for construction with parts in a No. 8 Outfit, and model-builders can obtain full constructional details and a list of the parts required by writing to the Editor, sending a 2d. stamp to cover return postage.

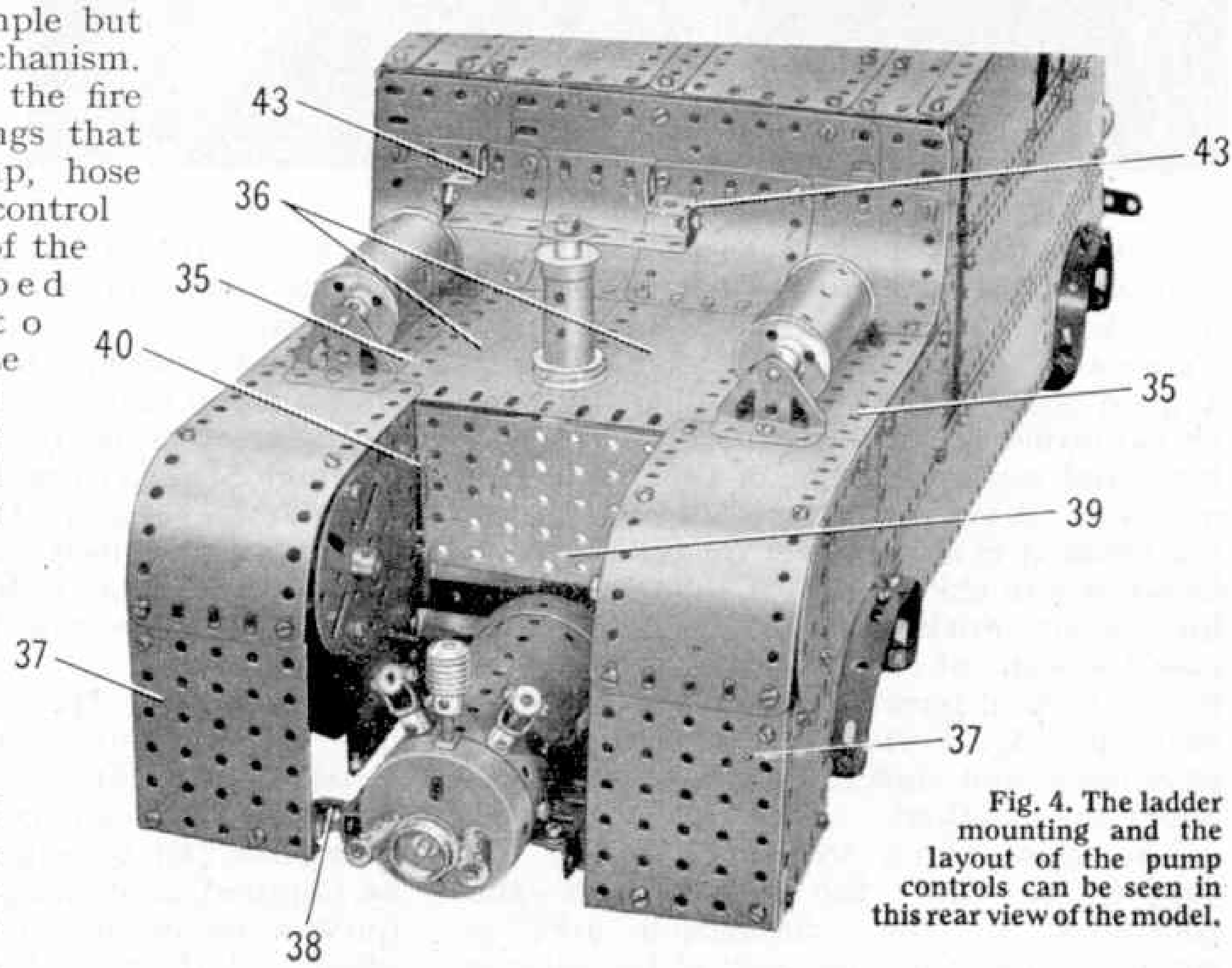


Fig. 4. The ladder mounting and the layout of the pump controls can be seen in this rear view of the model.

HORNBY RAILWAY COMPANY

By the Secretary

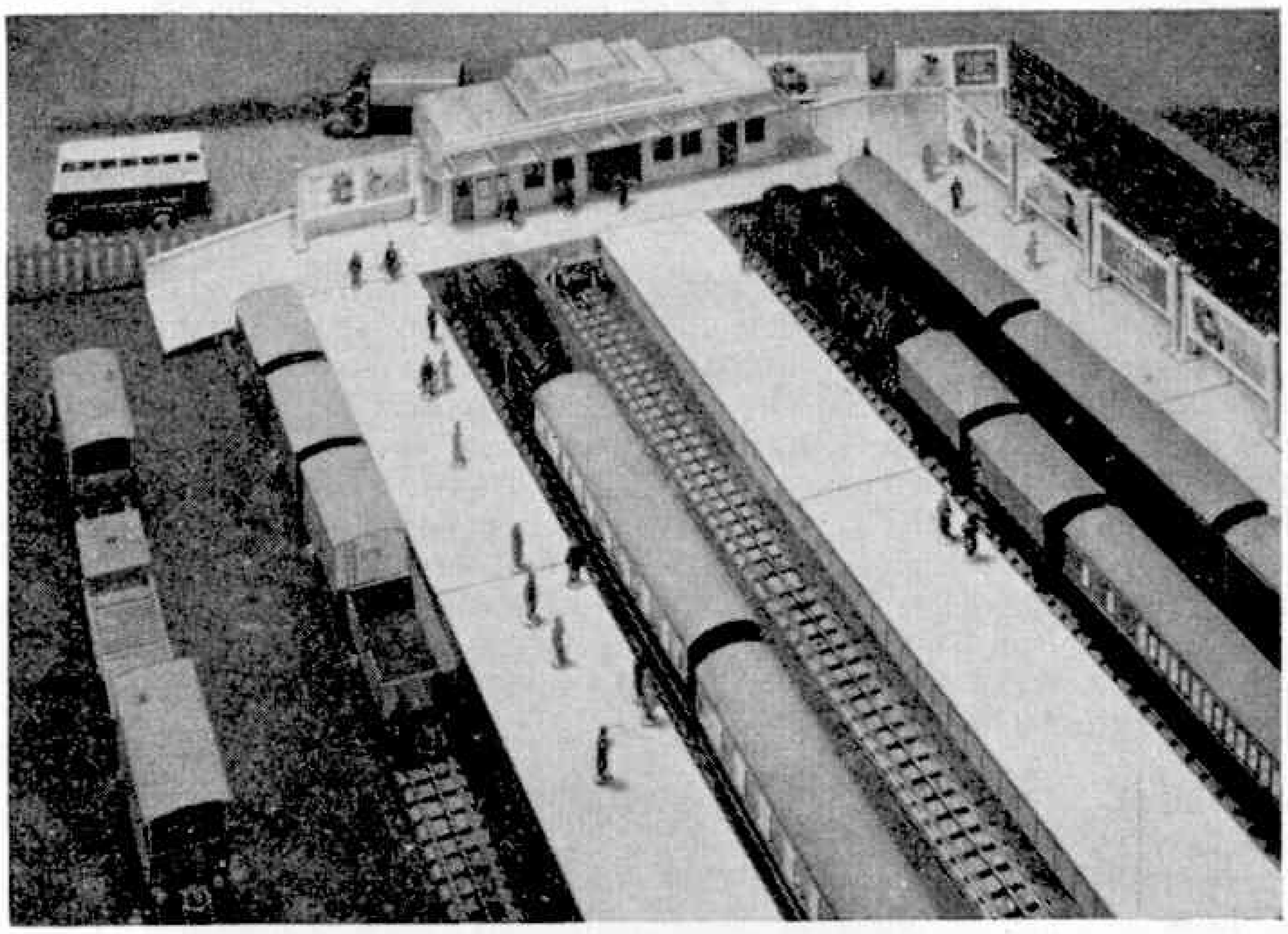
Stations and a Tunnel

I KNOW that many of you have welcomed the arrival of the Platform Extensions for Hornby-Dublo Stations, if only because they have allowed you to vary your station arrangements. After all, stations do differ from each other in type, and in their approaches, and on a miniature layout it becomes a bit boring if they all look alike.

The Platform Extensions can easily be used to *build up* new kinds of station as well as just lengthening those already in use. Look, for instance, at the station shown in the picture on this page. This is a good arrangement where the Hornby-Dublo owner requires a station of terminal type, but not necessarily of the all-roofed-over sort. A point to note is that with open platforms it is much easier for the operator to see where the trains are and to manage his station working accordingly. In any case the sight of several trains and engines in and around terminal platforms is always very pleasing. Fortunately, Hornby-Dublo passengers and staff do not have to worry about the weather!

The chief thing to notice about the station is that the main part—the concourse, or the "circulation area"—running across the inner ends of the various platforms, consists of the standard Hornby-Dublo Through Station. The ramps fitted in the usual way at each end of its centre section lead down to track level for the benefit of railwaymen, while for passengers there is the usual entrance through the central building.

The train platforms of course are Island Platform Extensions, as you will all have seen for yourselves. These can reach as far as is required, or allowed, by the space available, and these individual lengths can be locked together by means of the locking studs fitted on their ends. The outer ends of the platforms are of course finished off with the standard ramps as used for the Island Platform.



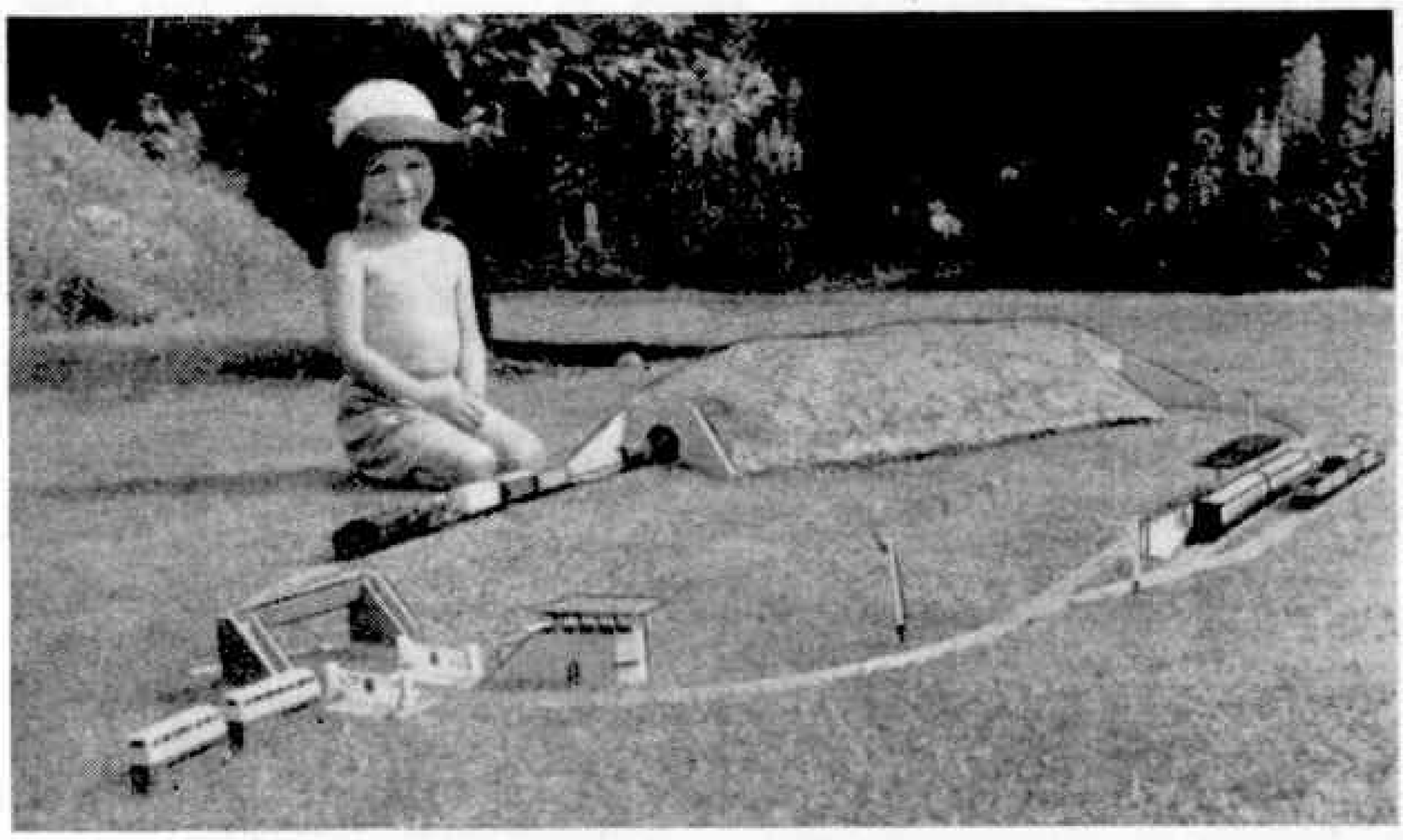
An effective terminal arrangement made up by the use of the Hornby-Dublo Through Station, Platform Extensions and other standard components. Good use is made of the Station Hoardings, which are, strictly speaking, Hornby Gauge 0 Accessories.

The only drawback to this scheme, and that a small one, is that the inner ends of the platforms cannot be locked to the Through Station forming the concourse, but in practice the platform sections butt together quite nicely. The spacing apart of the platforms can be carried out so that the approach tracks can be laid down quite satisfactorily.

Almost every Hornby-Dublo owner has his own special ideas on station arrangements, and variations from this basic scheme can be made. Individual platforms can be lengthened or shortened as required, and altogether you will have quite a lot of fun in trying out different ideas. Platform and track arrangements

are closely related to one another, and I shall be glad to hear of any particularly interesting schemes that you may devise for your own systems.

This sounds rather like work for some of you, so in order to cheer you up I am including the accompanying picture of a young Hornby-Dublo owner obviously enjoying himself in the open with his layout. He is Richard Herington, of Birmingham, and for him his father has developed a good system that has been mounted on a firm baseboard since the photograph was taken.



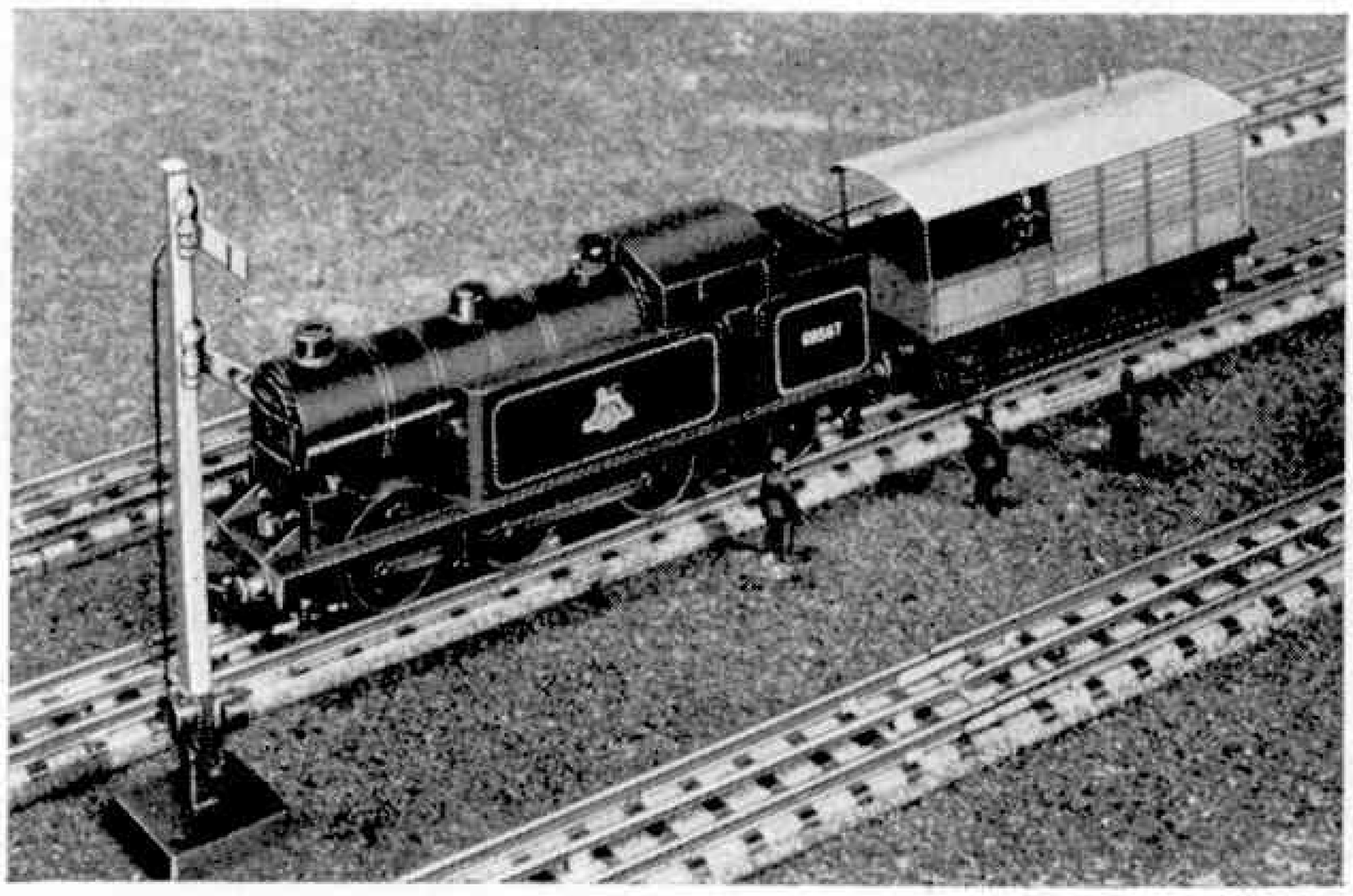
A happy Hornby-Dublo owner, Richard Herington, busy with his railway in the garden. He certainly has a fine tunnel through which to run his trains.

The railway boasts a tunnel, as all good railways should, and I was amused to hear that it was considered very necessary by Richard that the inside of the tunnel should be really dark. This was managed by making it cover a fair length of track and by putting it at one corner of the layout, so that it was impossible to look right through it.

Apart from this, a corner is always a good place for a tunnel anyway, as most of you know. This example was simply built, a rough wooden framework being covered with wire netting, over which papier-mache was spread, the whole being given a good coat of green paint when dry. It is easy to make both straight and curved tunnels this way.

Don't forget to provide good entrances for your tunnel. There are some good, if somewhat grubby, examples to be found on most main lines. Those of you who wish to follow up this sort of thing will most likely find some suitable design by searching through your railway books, many of which probably include one or two tunnel mouth views. If you live somewhere near a good tunnel, so much the better, as you will then be able to make a few sketches of it as a guide for your modelling in card or wood. Of course tunnels, or tunnel end cut-outs, can be bought at some model shops, but it is quite good fun to make your own. Remember the smudge of soot above the track!

The rolling stock specialists among you will be glad to hear of a new Tank Wagon that is being added to the Hornby-Dublo System. This is an Oil Tank and is lettered *Mobil*, in large letters, and underneath them *Oil Company Limited*. I expect that some of you will already have seen this about, but in case you have not it is something new to look for. The Tank itself is coloured red and the *Mobil* lettering is flanked by the well known *Mobiloil* and *Mobilgas* "flying horse" motifs.



A Hornby-Dublo 0-6-2 Tank and a W.R. Goods Brake Van, on their way to pick up wagons down the line, wait at a double-arm Signal.

The "Sowerby Bridge" Line

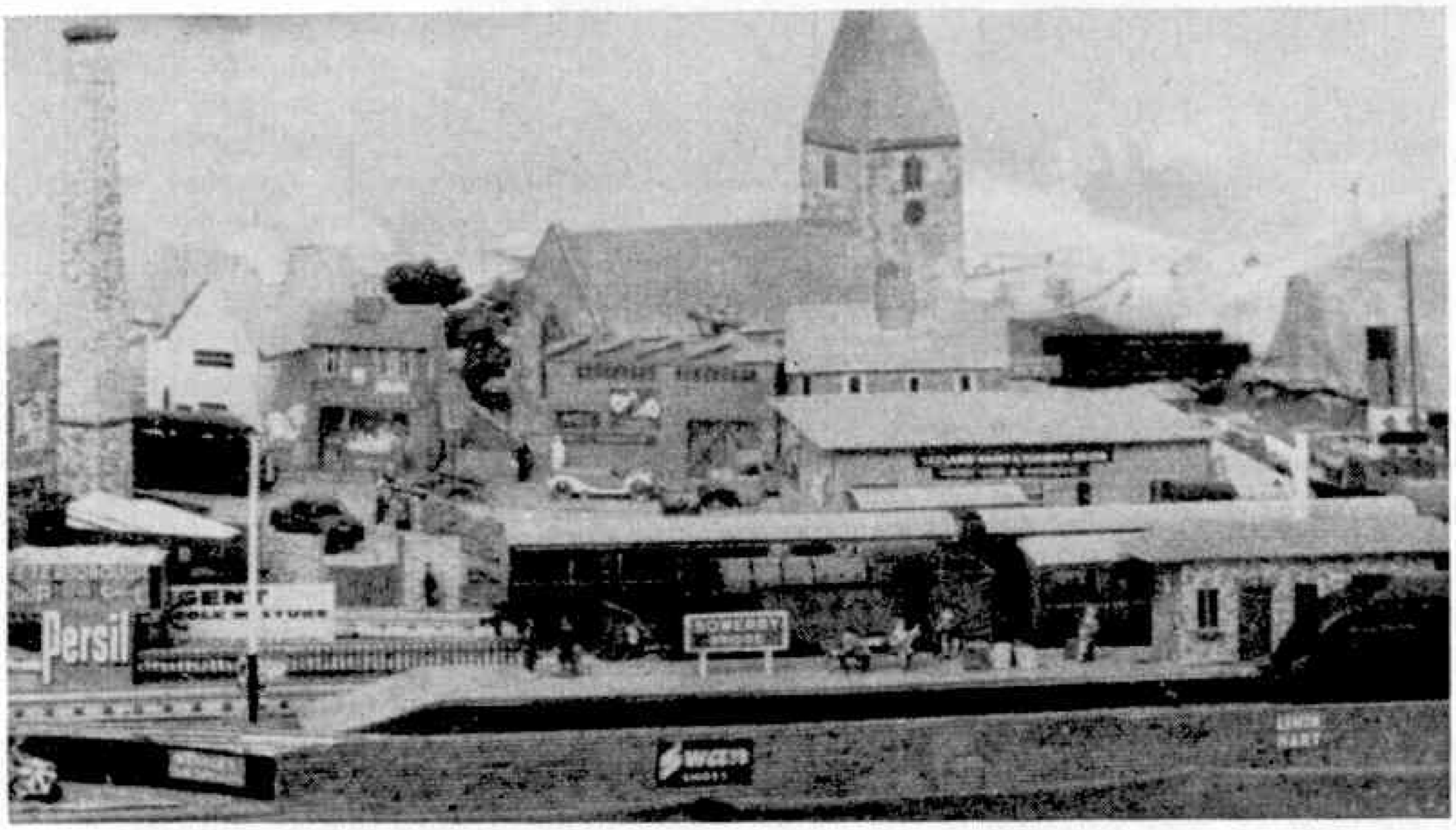
THE railway shown in the illustrations on this and the following page is quite literally a table-top affair, for the baseboard on which it is laid is actually an old kitchen table. But the original railway had to be expanded, as should happen to all good lines. So the table too had to grow, and by degrees it has reached its present dimensions of 7 ft. 6 in. by 3 ft. 6 in.

Now this is a fairly generous amount of space. But the Rev. P. H. Heath, of Chesterfield, has made no effort to fill it with main line effects. Instead he has preferred to develop a fairly simple system, with effective surroundings, and the result is excellent.

The line is supposed to serve an area somewhere on the old Lancashire and Yorkshire system, but although the main station bears the name *Sowerby Bridge* it bears no resemblance to the actual station of that name, nor is it intended to. Apparently, too, the former L.N.E.R. has running powers over part of the system, for a Gresley Pacific appears at the head of some trains, as the pictures reveal.

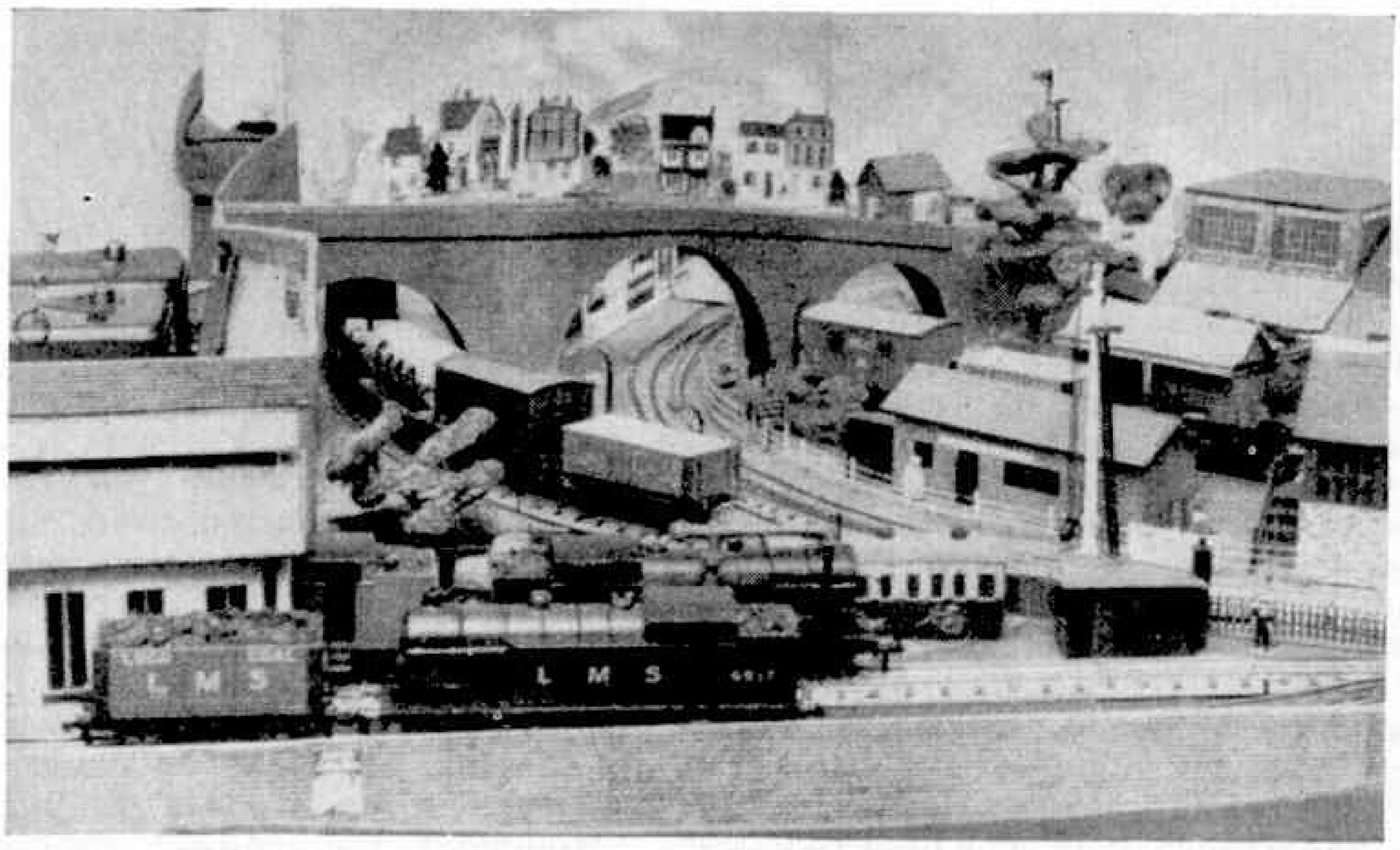
The miniature *Sowerby Bridge*, parts of which are shown in two of our pictures, has a passing loop so that, although the main track is principally single line, trains can work in either direction as required, one waiting at the station while the other runs round. From this it will be apparent that the main track is continuous, but the "round and round" effect is not apparent because of the inclusion of a fairly long tunnel, which fits in well with the scenic work.

Opposite the main station and inside the main line is the goods yard, the two tracks forming this extending to the right and to the left of the crossover connections with the inner main track. This arrangement makes it possible for the yard to receive and despatch traffic in connection with trains running in either direction on the main line. There is a goods depot and a separate warehouse alongside the yard tracks, and an enterprising miniature factory is served by its own siding.



"Sowerby Bridge" station on the attractive Hornby-Dublo layout of the Rev. P. H. Heath. The pictures of the layout are from photographs by Mr. C. F. Cooper.

The outer loop track is extended to give access to an engine shed at one end of the baseboard and to reach the wharf of a small dock, which has been moved to its present position outside the track from that shown in the lower illustration on the opposite page, which represents an earlier stage. The dock "water" is a sheet of glass painted on the underside in dark brown streaked with dark green. This looks remarkably like dock water, which is apt to be dark and gloomy in appearance.



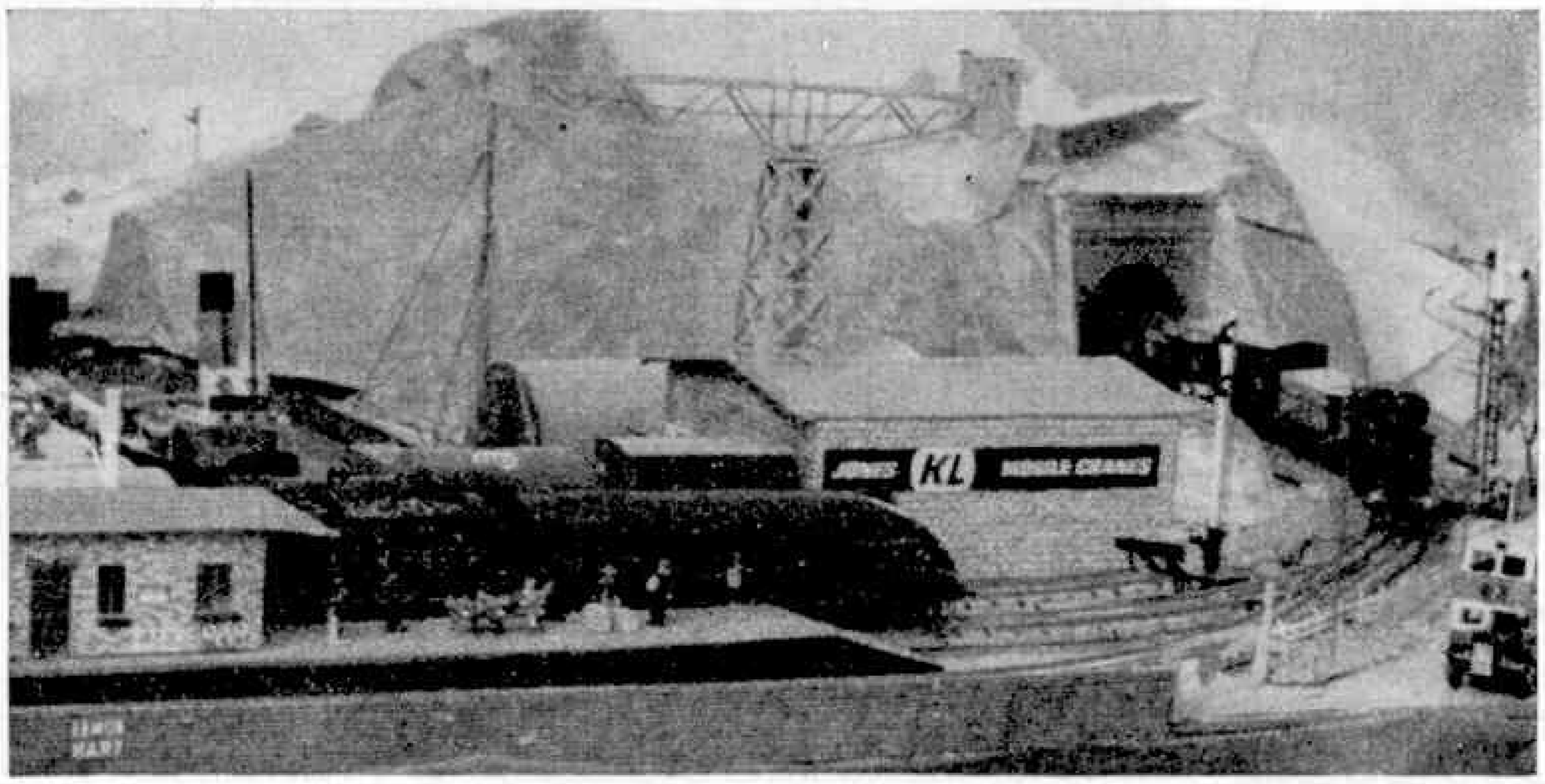
As the main station has an island platform, passengers have to reach it by a level crossing on the outer loop track. The position of this crossing, close to the Points and to the road overbridge connecting the dock with the miniature township inside the main line is unusual, but it makes this particular section of the layout quite a busy one.

The overbridge referred to joins up with a road passing over the tunnel, and with what may be described as the main road through the township. This leads across the layout to a further level crossing on the opposite side of the system from the main station and by this second crossing is a small halt, or platform.

On this page are further views of the railway. The upper one shows the effective arrangement of overbridge and scenery at one end of the line, and in the illustration below, road, rail and water transport are all represented in miniature.

The illustrations show that scenic and similar effects have been given plenty of attention, and readers will be interested to note that much of the building work has been carried out in cardboard. Good use has been made of commercially produced building sheets, brick paper and so on. The cartons, containers and so on usually to be found in a household have been fully exploited, and at least two of the buildings are, basically, tin boxes of suitable shape covered with brick paper.

Since the photographs were taken, the tunnel has been extended in area, and a road with cottages has been constructed over the top. Hedges are either cotton wool or cut from sponge, painted green.



The Odd Branch Line

SOMETIMES miniature railway layouts consist of practically nothing else but railway, with tracks reaching here there and almost everywhere in the space available. Purely from the point of view of train working this cannot really be considered a serious fault, so long as we use the different sidings, loops and branches with a definite purpose in the general scheme of things and not merely as stretches of track on which spare rolling stock is put. This can happen; we all do it, sometimes.

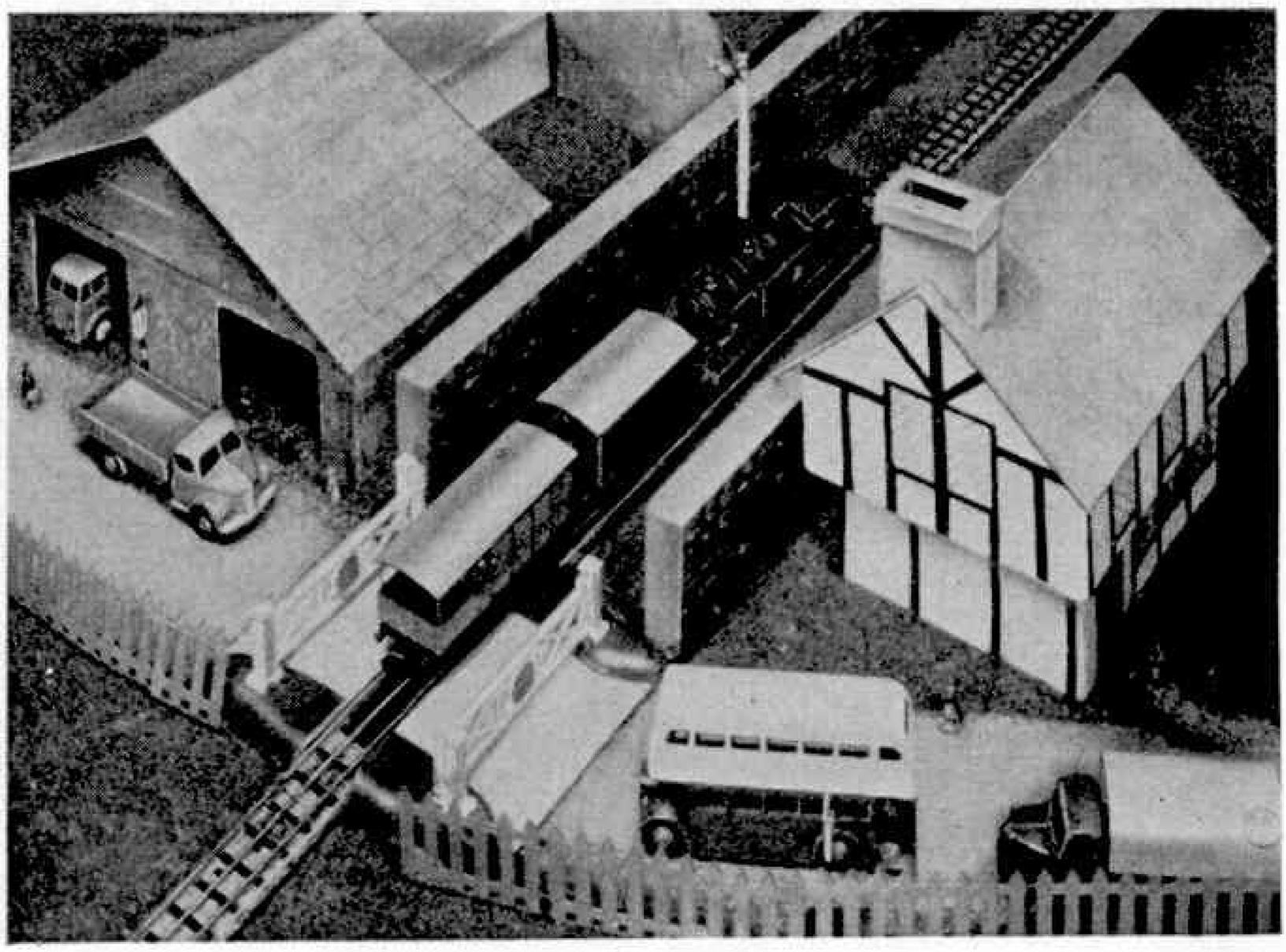
It is better, naturally, that trains should do their job in the proper setting. Here the remote control afforded by Hornby-Dublo is an advantage, as there is no need to leave the lineside more or less bare in places so that the operator can get at the trains. These, as well as the Electrically-Operated Uncoupling Rails, Signals and Points do everything that the operator from his control position wants them to.

So, many of the railways that appear in the *M.M.* include plenty of scenic features, not only the permanent systems laid on baseboards, but even the temporary lines as well. On the latter the lineside effects have to be more or less portable and so buildings and such things as fencing and trees are widely used. They can be self-contained and therefore movable, so their positions can be changed to suit a new layout, whereas cuttings and embankments are not so easily arranged in this way.

It is this kind of built-up, but not permanent, layout that appears in the picture on this page. This is the sort of situation that is found in many places in actual practice, on a branch track leading perhaps to some industrial plant, warehouse or storage depot. Alternatively, it may make its way to a river or canal basin, or a harbour. Such real lines have a knack of turning up in the oddest places and the Hornby-Dublo owner will find it easy to make his line quite convincing.

Although a dock or harbour may exist merely on the scenic background, the branch line wandering along to it among the houses or other premises, possibly for a stretch even along the roadway, will have quite a pleasing effect. Where the line does run along the roadway it may be possible to raise the surface of the latter to rail level so that the track itself is "sunk" below the surface. Even if this is not possible throughout, the roadway simply *must* be built up to rail level where the line happens to cross another road, and at such a crossing the EDBX½ Rail will be necessary.

Special precautions have to be taken to halt conflicting road traffic when a train is to pass the crossing, and the Guard or Shunter, with arm outstretched, of the Set of Station Staff for Hornby-Dublo railways, Dinky Toys No. 051, will make a suitable figure for controlling the traffic. If the Guard is used, the colour of his green flag will have to be changed to red. This simple painting job will not cause you any difficulty. Where the branch crosses a town or village main street, a gated level crossing should be provided. The Hornby-Dublo Level Crossing is just right for this purpose.



A Hornby-Dublo branch line makes its way between the walls separating it from the miniature township, passing over the road by means of a Level Crossing.

Club and Branch News

WITH THE SECRETARY

MAKE KNOWN YOUR GOOD WORK

Not many Clubs or Branches in this country send me an annual summary as well as their monthly reports, but such a yearly survey is very useful. I have just been reading a most interesting long-term report of this kind received from Mr. V. Malmgreen, Leader of the Maylands M.C., New Zealand. In it he summarises the many and varied activities of the Club during the period under review, and includes a list of awards and a balance sheet showing how the funds have been used and what remains.

Such a report is first-rate publicity material, and a shortened version covering the main activities and achievements of the Club or Branch could be displayed —by permission of course—in the nearest Meccano dealer's window or shop. It would be certain to attract attention. If more members are needed, the summary should end with an invitation to join the Club or Branch, and the name and address of the Secretary should be given.

H.R.C. BRANCH RECENTLY INCORPORATED

No. 560, Kidderminster Model Club—*Chairman:* Mr. C. P. Harris, *Annandale*, 35 Larches Road, Kidderminster, Worcs.

CLUB NOTES

Mile End (Portsmouth) M.C.—The sixth anniversary party was most enjoyable. Mr. P. Leggatt, a former Leader, spoke on the origin of the Club, and the secretary, Mr. A. J. Nicholson, described ways in which the Club and its associate H.R.C. Branch raise funds. Mr. Leggatt and Mr. Hooker, the Branch Secretary, cut the birthday cake. During the summer a series of Open Nights are being held in conjunction with the H.R.C. Branch. Club roll: 30. *Secretary:* Mr. A. J. Nicholson, 213 Sultan Road, Buckland, Portsmouth.

St. Thomas (Exeter) M.C.—Models recently constructed include a projector, breakdown lorry, partitioned money box, and an agricultural tractor drawing a roller. Club roll: 15. *Secretary:* B. Madge, 42 Duckworth Road, St. Thomas, Exeter.

Parks County Secondary School (Belper) M.C.—The main activity of this recently-affiliated Club has been work on a model village. Several buildings have been completed, a large tunnel is being made, and the track for the permanent way has been marked out. The roads also have been marked out, and the pavements constructed and painted. Club roll: 26. *Secretary:* C. R. Charlton, *Overdale*, Mount Pleasant Drive, Belper, Derbyshire.

SOUTH AFRICA

Cape Peninsula M.C.—During the autumn school holidays, a visit was paid to the new Austin assembly plant at Blackheath, about 12 miles from Cape Town. There the party divided into two groups, and were conducted through the workshops by two officials of the company. The tour proved most interesting. *Leader:* Mr. Z. A. de Beer, *Royston*, No. 3 Stanford Road, Rondebosch, Cape, South Africa.

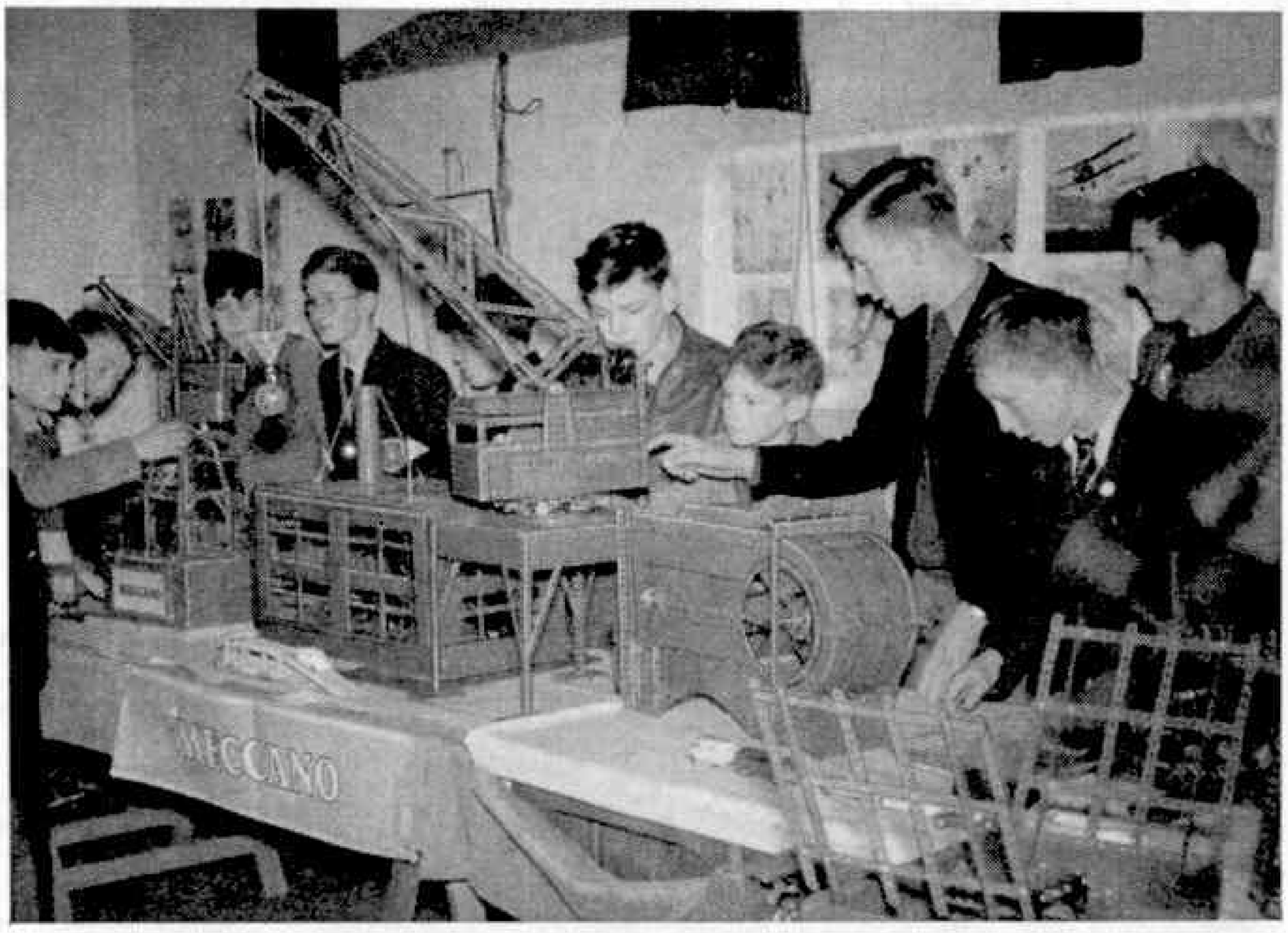
BRANCH NEWS

Coombe Hall School (East Grinstead)—The nine members of this recently incorporated Branch control it in turn, on Tuesday and Thursday nights. Plans are in hand for a visit to Brighton. *Secretary:* J. Cairns, Coombe Hall School, Coombe Hill Road, East Grinstead, Sussex.

Mile End (Portsmouth)—A Hornby-Dublo layout is now a semi-permanent fixture on Branch nights, and a portable 0 gauge layout is also in use. The Branch birthday party was a great success. A visit to the B.R. Eastleigh sheds and carriage works is being arranged. *Secretary:* D. C. Hooker, 37 Gatcombe Avenue, Copnor, Portsmouth, Hants.

Droylsden County Secondary School—Work on a new Exhibition layout has been keeping members busy. This layout will be about 30 ft. long, of dumb-bell shape, and will have about two scale miles of double track. It is hoped to have the layout in operation by next November. *Secretary:* J. Lawton, 43 Corporation Road, Audenshaw, Droylsden.

Abbeyfield Road (Sheffield)—This Branch recently completed its first year as an incorporated Branch of the Hornby Railway Company. Work has begun on a model village for the layout. An outing to Liverpool, and the Meccano factory, has been arranged. *Secretary:* R. North, 132 Abbeyfield Road, Sheffield 4.



In the "M.M." last April we reproduced a picture of part of the recent second annual Exhibition of the Launceston M.C. Above is another view, this time showing some of the excellent Meccano models—to say nothing of the usual crowd of keenly interested visitors.

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For other Stamp Advertisements see also pages 384 and xviii

Stamp Collectors' Corner

By F. E. Metcalfe

SELLING STAMPS

THERE comes a time to practically all collectors, be they those who only own a few stamps, stuck in a tiny printed album, or owners of big expensive collections, when they want to sell some stamps. Alas, I am afraid that they very often experience disappointment. It frequently happens that this experience sets them against the hobby altogether, to their own loss and that of others, for the more collectors there are the more the hobby flourishes.

This question of selling stamps is a rather delicate one, which is the reason why writers on philatelic matters generally try to dodge the subject. But recently I have had three letters from *M.M.* readers, all dealing with selling experiences, that have decided me this month to devote some of my precious space to what is quite evidently a topical matter.

One of the letters I have referred to came from a young lady in Buckinghamshire. In passing, I would like to congratulate her on her beautiful handwriting. It was a pleasure to read her letter, and to answer it, particularly as she had kindly enclosed a stamped addressed envelope, a little courtesy that I am afraid not all attend to. After dealing with several matters she came to the question at issue. "Is it possible to sell a single stamp? A friend of mine has one worth £3, and he wanted to sell it to . . . . in London, but they would not buy. Why not?"

Now although my correspondent does not say so, she is evidently a bit disgusted, as well as bewildered. So let us examine the problem. First of all what she means is that the stamp is priced in Gibbon's Catalogue at this figure, which is quite another thing.

Gibbon's catalogues are their price lists, and what they may value stamps at may have little relation to what other dealers are asking, as a glance at the advertisements in the various stamp magazines will show. Some stamps cannot be obtained at full catalogue price, for in fairness it must be remembered that stamps can go up after a catalogue is published and very often do. On the other hand, it is no uncommon thing to be able to buy stamps at up to a twentieth part of what the catalogue says they are worth.

From all this it will be seen that, as I have already stated, a catalogue price is all too often no criterion of

what a stamp will fetch if one wants to sell. All this shows what an anomaly collectors have created for themselves, when they treat a declared price list as a catalogue in the full meaning of the word.

Fortunately for collectors, they are gradually learning sense in this respect. New catalogues are being published. The Commonwealth is one here at home, which deals with KGVI and QEII colonial stamps, and there are several published on the Continent dealing with other groups of stamps, where the aim of the editors is to give actual market values as distinct from what the publishers may want for the stamps. And, better still, collectors are learning just what general market values are, and then they are ignoring any catalogue prices that may differ from these selling prices.

The next point to be taken into consideration is the question of condition. More and more collectors are demanding stamps, if they are used, with light and neat cancellations, and if mint, with full gum and without a lot of bits of mounts stuck behind. In two words, they want perfect stamps. If stamps do not satisfy this description then they suffer in value.

Finally, as far as this £3 stamp is concerned, the firm asked to buy might have had already all the stock they wanted of it. If in good condition, a stamp catalogued £3 could generally be sold to some dealer; so in this case it should be offered elsewhere.

Now I will deal with another letter. A Scottish collector tells me that a few years ago he was given a large printed album that cost almost £2, with a large packet of mixed stamps that cost £1/10/-. He carefully mounted the stamps and spent several pounds filling gaps. He then decided to dispose of his collection, and go in for modern stamps only. In his letter he said "I expected to obtain enough for my old collection to enable me to buy a nice album with loose leaves, and perhaps a few of the new stamps that interested me. But after trying several people, including dealers, all I got was 12/6 from a private person. No dealer would buy."

To be quite candid, I could have told that correspondent how he would get on before he started, for his is a common experience, and that is why I am so much against general collections, mounted in printed albums. Sooner or later, if a collector is to continue with the hobby, he will get tired of making no progress to any goal, and will want to concentrate on a group of stamps, or just those of one or two countries. He may have spent pounds on his general collection, but unless he has had the luck to pick up one or two good stamps, to a dealer his collection will not be worth the stripping from the album.

The moral to all this is, beware forming one of the small nondescript collections, built up on the basis of a mixed packet, and do not accept the prices that you may see in a general catalogue as necessarily representing real market values. If you ignore this advice, you will have the same experience as my Scottish correspondent when you follow his example and try to sell the stamps you don't want.

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For other Stamp Advertisements see also pages 382 and xviii

Stamp Gossip

ICELAND

WE don't usually associate that tight little country Iceland with outdoor diving and swimming, but as the stamp that is being illustrated shows, Icelanders can and do have their outdoor water sports, just like anyone else. In fact, I understand that it can get pretty warm up there at times, but I suppose the name of the country makes us think that the climate is worse than it really is. Anyhow Iceland's stamps are topical, if not tropical, and this one showing the diver and swimmers is quite a popular little item with thematic collectors, as are many more of Iceland's stamps.

THEMATICS

We cannot get away from this subject, even if we wanted to—and we don't, for this is a method of collecting that provides so much fun for so many.

I mentioned recently that stamps showing flowers are the most popular thematics in the U.S.A., as they probably are here in Britain. But a French collector tells me that in his country birds are as popular a theme as any, and he has sent me a stamp from Madagascar, showing a pair of birds, which could not help but contribute to this popularity.

DESIGNS

I was recently asked to select the three best designs of British Commonwealth stamps issued during the present reign, in connection with a competition held to raise funds for the rebuilding of what is to be the R.A.F. church in the Strand.

Now I am rather against the inclusion of a medallion with a portrait included in a design, for it is not a dignified way of showing a likeness, and moreover it all too often upsets the design. As I see it, the method adopted by Australia and Canada is the best. They show the Queen's portrait only on some of the values in greatest demand, and leave the other stamps for purely pictorial designs.

Anyhow, I ruled out those pictorial stamps with the portrait added and selected three outside that range. Next month I will mention the three I picked. In the meanwhile think out what would have been your choice. Not an easy task!

SIMPLON

I cannot say that I am particularly fond of the productions of the Swiss firm of stamp printers, Courvoisier, for while they are colourful enough, the designs are generally too modernistic for my taste. Moreover the stamps lack that something—one can hardly use the word personality in connection with a postage stamp—which the engraved stamps turned out by our own British printers have.

Yet no one can deny the popularity of Swiss stamps, and they deserve that popularity too. They are generally quite easy to obtain.

The one illustrated depicts a subject which will be familiar to many. It is a stamp which will be wanted for several types of thematic collections.

POSTMASTERS

Recently a collector who had heard about the big stamp auction of Postmasters in New York by the firm of Harmers wanted to know what these fabulous stamps really were. They brought the fantastic sum of over a quarter of a million dollars and one stamp alone sold for $14,000 or about £5,000.

Well, they are simply stamps issued by Postmasters for local use. Those of the U.S.A. were issued before the introduction of government stamps, and as can be judged from the prices they bring, on covers, they are mostly rare.

But do not be deceived if someone offers you what appears to be mint copies. You do not see them so often now-a-days, but once upon a time they were frequent. They are only reprints or just fakes, and of course of little value.

The Postmasters that were sold recently formed part of a huge collection formed in the U.S.A. by a rich man. They will take a year or two to dispose of, and it is expected that about a million pounds will be realized. We are never likely to see again such a conglomeration of rarities gathered together by one man.

At the same time, it is surely a good thing that the stamps are being sold to collectors and not interred in some museum, as one writer has put it. For museums are no places for postage stamps, as can be seen by the way the collections are housed in our own British Museum. There is not the room to display the stamps in such a manner that they can be thoroughly examined. And of course items worth thousands of pounds have to be very carefully guarded.

GOOD-BYE SUDAN!

This is a valedictory note from a collector of British Commonwealth stamps to a country the issues of which have no longer any connection with Commonwealth Catalogues or Gibbons Part 1. For Sudan has moved right outside our British orbit. That country's first stamps were issued as recently as 1897. To celebrate the severance Sudan has now issued a special set of three stamps.

THE MONTH'S TIP

Zanzibar issued a set of five stamps in 1954 in honour of their Sultan's 75th birthday. I think it will get much scarcer as time goes on, so buy it now.

Warning Whistle—(*Continued from page 337*)

large engines as the Gresley A3 Pacifics, however much it may have suited the lusty bustling Atlantics of Great Northern days. The deep and dignified tones of Great Central and North Eastern whistles are still to be heard, and engines of Caledonian origin still carry the pipe-like hooter favoured by their company. And now we have to add to the list the sound of the hunting horn heard on the multiple unit lightweight diesel trains spreading over the country.

We are so used to steam locomotives having whistles that we may tend to think that they have always had them. It is difficult to decide precisely when the first steam whistle was fitted to a railway locomotive, but it seems to be generally agreed that it was introduced about 1833 by Adrian Stephens, a Cornishman who was engineer with the Dowlais Iron Company, South Wales.

I. Broadhead, of East Ardsley, Wakefield, the reader of the *M.M.* who suggested this month's cover, reminds me of a better-known, but unreliable story, tracing it back to the introduction of what was then called a steam trumpet on the Leicester and Swannington Railway. The tale goes that on 4th May 1833 a train hauled by the new engine *Samson* collided at the level crossing on the Thornton-Bagworth road with a cart load of agricultural produce that a farmer was taking to market. The farmer himself escaped serious injury and claimed compensation for the loss of his produce, including 960 eggs. The court awarded him damages and ordered the railway company to pay.

The need for trains to give unmistakable, audible warning of their approach was obvious. A director of the railway approached George Stephenson with the problem. Stephenson then asked a Leicester musical instrument maker to provide brass steam trumpets for the engines, and so, says the story, the railway engine whistle was born.

How Metals are Tested—(*Continued from page 343*)

diamond instead of a ball. Otherwise the test is similar to Brinell's method, but it has one very important advantage over the ball test. Diamond is the hardest known material, therefore it does not suffer distortion compared with a steel ball, especially when used on hard metals. The Vickers hardness test is suitable for all materials, whereas the Brinell method is only really applicable to those that are soft and medium hard.

From research work carried out on some types of steel, it has been found that although strong enough when tested in tension, they are liable to show lack of toughness when given a sharp knock. The measure of toughness of a metal can be obtained by the Izod impact test. For this a test piece in which a standard notch has been cut is held vertically in a vice, and a heavy pendulum is allowed to swing from a known height to strike the top of the projecting specimen, bending or breaking it at the notch. The more easily a metal breaks, the lower its toughness. The test is most useful for work which has been heat treated.

Metals if kept hot for long periods of time "creep," which means that they change their dimensions. It is hardly surprising therefore that the life of a jet engine is short when you consider that the operating temperature is about 850 deg. C. Creep testing is done by subjecting a test piece to a known load at a constant temperature, and observing the change in length over a long period of time. Testing at different temperatures and with varying loads will produce a set of graphs for a given metal, from which the creep properties may be deduced.

Road and Track—(*Continued from page 345*)

Ferrari Thin Wall Special, a test bed for the new Formula I Vanwall. Mr. Vandervell describes the Thin Wall as a relic in motor racing today, but nevertheless the powerful green car provided valuable data about disc brakes, tyres, gear-box and suspension, as well as delighting the crowds, as it battled with the B.R.M.

The first Vanwall appeared at Silverstone, in 2 litre form, in May 1954, and it was noticeable how closely the car resembled the Thin Wall, except for the engine. This was entirely new, with four cylinders with twin overhead camshafts and a capacity of 1,998 c.c. In the final the car retired after 18 laps when an oil pipe broke, but the 2 litre engine had impressed with its power. When it next appeared, at the British G.P. in the hands of Peter Collins, it had an entirely new engine, following the original design, of 2.3 litres, while yet another engine, of full 2½ litre capacity, was being built.

Collins did very well for seventeen laps and then a cracked cylinder head put the impressive Vanwall out of action. Next the car was entered for the gruelling Italian G.P., where it was to finish sixth. When the new 2½ litre engine was damaged on test prior to the race, Mr. Vandervell immediately substituted the 2.3 litre engine and carried on with his plans. Once he has made a decision of this nature no stone must be left unturned to implement it. In fact he gets what he wants—and quickly. He not only finances the Vanwall *equipe*, but is the power behind race organisation as well as team control. He is indeed "Mr. Vanwall."

The 1955 season was not a very successful one. Although the Vanwall had serious engine trouble only once during the season, it was most unsatisfactory in other ways, disappointing in fact after the promise it had shown in 1954. But I have an idea that Mr. Vandervell has put a lot of things right during the winter months and although the regular Vanwall drivers, Schell and M. Trintignant, are not up to the standard of Moss, Hawthorn and Fangio, it could be that at last we have the car to win the sort of races that really matter, and the British G.P. is one of them.

One thing is certain. The dynamic Mr. Vandervell is meeting the continental challenge with all the vast resources at his disposal and Stirling Moss told me on his return from Monaco "I consider the Vanwall the most formidable car in G.P. racing."

I shall be very surprised if Stirling Moss is not leading the Vanwall team next year.

How Car Number Plates are Made—(*Cont. from page 353*)

the plate on a slow journey round the room to allow the paint to spread evenly before the plate enters a tunnel in an infra-red stoving oven built by The General Electric Co. Ltd., where the paint is dried and hardened by radiation. The length of the oven and speed of travel are regulated to ensure that the paint is baked hard in the allotted time. Similarly, there is sufficient distance between the oven and the unloading bench to allow the plate to cool before it is removed from the conveyor and packed for distribution.

Twelve characters are used on most cars so the reader will appreciate that very large quantities are required for the thousands of new cars registered every year. The output of this plant alone runs into millions each year.

The characters are fixed on to the plates by a very positive means to ensure that, whatever the conditions, even if the plate should be bent, they will not drop-off or work loose. This consists of two or three securing spigots or rivets cast on the back when the characters are made, as shown in the picture of the back of an "A" at the head of page 352. The number plate assembler places the selected plate into a jig and on this mounts drilling templates, which are pieces of metal drilled with holes to accord with the rivet positions of the appropriate characters. He then drills through the holes in these templates and removes the plate from the jig. Next he places each character on the plate in turn, pressing the rivets through the holes in the plate, and squeezes the rivets in a special press giving them a mushroom-shaped head that keeps the characters securely fixed on to the plate.

You will probably notice that on ACE number plates there is always a little oval tag in the top left corner, bearing the ACE trade mark.

From Our Readers

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

The Clock Tower of Rothenburg

When on holiday in Germany last year, I visited the lovely old town of Rothenburg, in Upper Bavaria, described as the most perfect example of a medieval city in Europe. Every single building is picturesque, and nearly all the houses are covered with vines and flowering plants.

The Clock Tower of Rothenburg. Photograph by P. Moss, London, N.W.6.

During the Thirty Years War, the Catholic forces under Tilly took the town and threatened to destroy it. Finally Tilly ordered the Burgomaster and the senators to be put to death. But later he agreed to spare everybody if one of the senators could swallow a certain goblet of wine in one gulp. Undaunted by a goblet holding 3½ quarts, the Burgomaster promptly swallowed the lot in one breath. This valiant effort is commemorated by two mechanical figures in the clock-tower of the Drinking Hall, who each day at noon re-enact the episode.

But Rothenburg is not kept just as a historic museum-piece. Nevertheless the inhabitants have always tried to keep it unspoiled. That is why the railway station is over a mile away from its boundary.

P. Moss (London N.W.6)

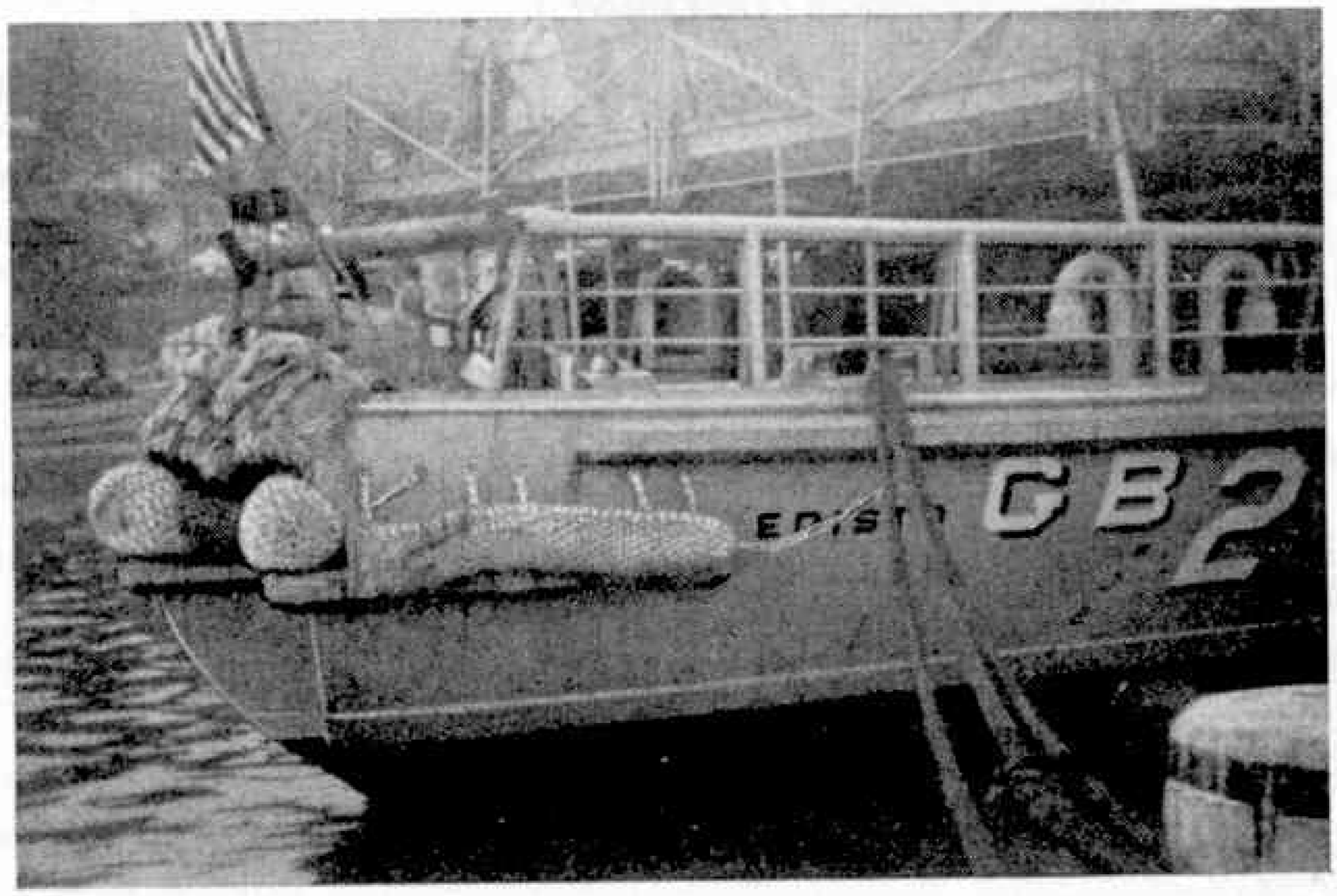
Icebreaker in the Antarctic

The accompanying photograph of the U.S. Navy icebreaker *Edisto* was taken two days before the ship left for the Antarctic, to take part in the United States expedition.

At the aft end of the ship there is a small flight deck for a Sikorsky S-55 helicopter. When the photograph was taken there were also two oil barges in Lyttelton, each carrying 250,000 gallons of aviation fuel.

About two miles from where I live in Riccarton, there is the R.N.Z.A.F. Station Wigram. Most of the American Antarctic expedition's 43 planes were stationed there. They were 2 Grumman VF-1 "triphibian" Albatrosses, 2 Douglas DC-4 Skymasters, 2 Lockheed Neptunes and 2 Douglas DC-3 Dakotas. The planes had a 2,500-mile trip to the Antarctic ahead of them.

M. J. MACKINTOSH
(Christchurch, New Zealand).

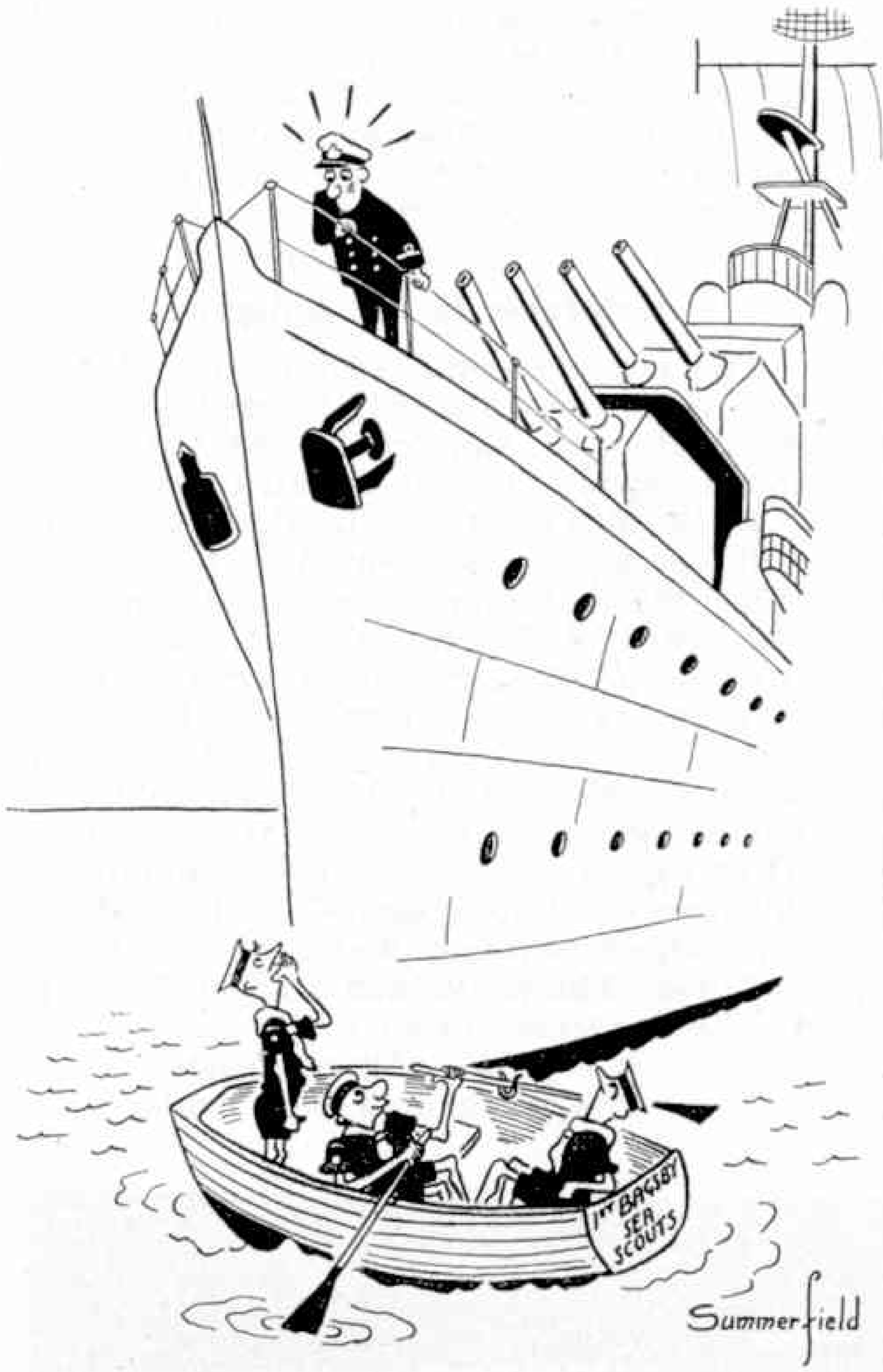


The U.S. Navy icebreaker Edisto. Photograph by M. J. Mackintosh, Christchurch, New Zealand.

Fireside Fun

Customer: "I want a couple of pillow cases."
Sales girl: "What size?"
Customer: "I don't know, but I wear a size seven hat."

* * * *



"Portsmouth? Certainly—just follow us."

* * * *

Customer: "This steak isn't fit for a dog to eat, waiter!"
Waiter: "I'm sorry sir. If you wait a little I'll get you one that is."

* * * *

Angry visitor: "This is a downright fraud. Your sign outside says: 'Come and see the most remarkable dwarf in the world,' and here he is five feet tall."
Showman: "That's what is most remarkable about him. He is the tallest dwarf on record."

* * * *

Son (doing homework): "What is a square root, father?"
Father: "Er, possibly a bulb that has been knocked out of shape."

* * * *

Woman, cleaning fish at sink, to angler husband: "Why can't you be like the rest of the men? They never catch anything."

Magician: (to interrupter): "Do you want to know a trick?"
Man: "Yes."
Magician: "Well, take a bath in petrol and strike a match."
Man: "Where's the trick?"
Magician: "Then try to light a second match."

* * * *

"It must be awful to be a debt collector. You must be unwelcome wherever you go."
"Not at all. Practically everyone asks me to call again."

* * * *

Doctor: "How do you feel today, sonny?"
Wee Angus: "The same as usual—with my hands."

* * * *

A famous astronomer had spent the night observing the stars, and came in for breakfast feeling well pleased with himself.
"Congratulate me, dear," he said to his wife. "I've discovered a star of unheard of density, and I've decided to name it after you!"

* * * *

BRAIN TEASERS

WHAT TIME IS IT?

What hour, summer time, is as long before midnight, real time, as three o'clock, summer time, is after midnight, real time?

* * * *

THE UNTIDY BOY AND HIS SOCKS

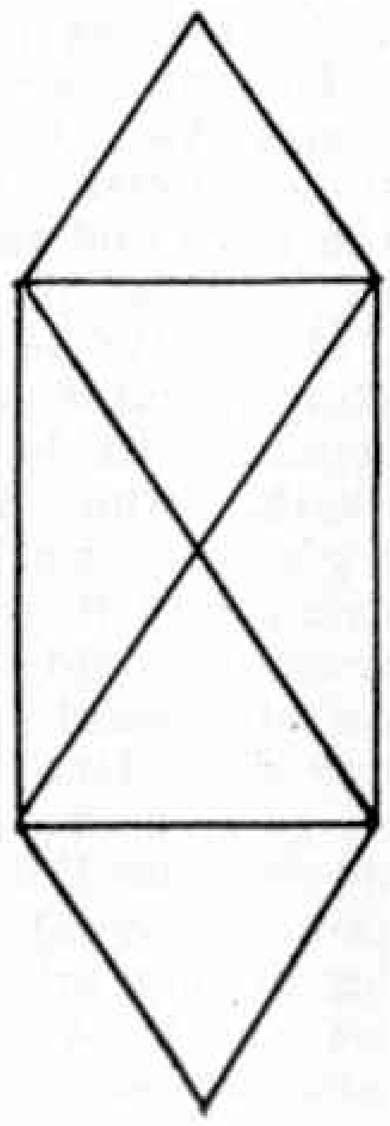
A boy has six pairs of socks in his drawer, three pairs being blue and the others white. He is an untidy boy and all the socks are mixed up. If he went into the room in the dark, how many socks would he have to take out of the drawer in order to be sure of getting a pair of the same colour, and how many would he have to take to be certain of getting a pair of blue ones?

* * * *

TRY THIS

Can you trace with a pencil each line of the diagram below, completely covering the diagram without going over any line more than once and without lifting the pencil from the paper?

* * * *



ANSWERS TO LAST MONTH'S PUZZLES

A Translation Test

The queer jumble of letters can be translated to read "A little darkie (dark "e") in bed with nothing (O) over him."

* * * *

The Book Worm

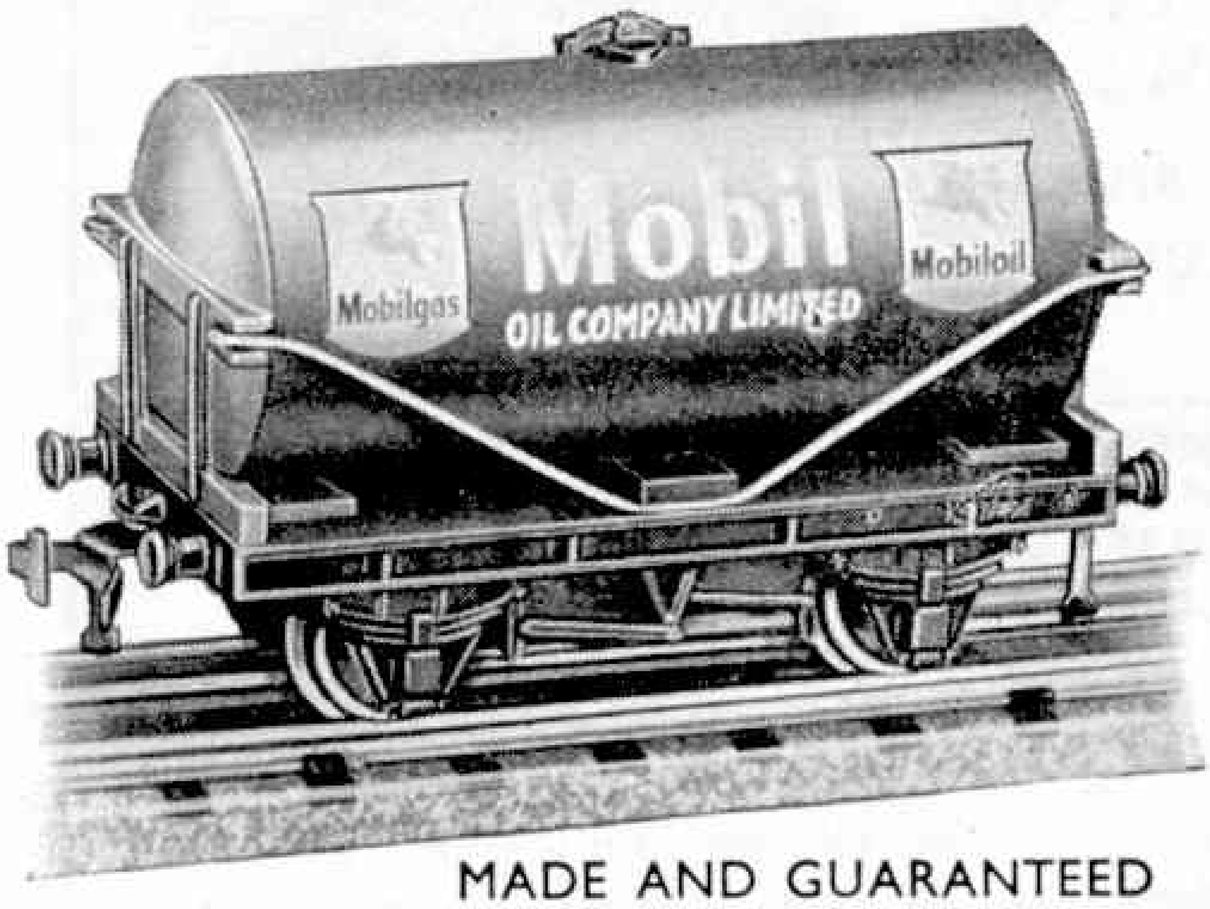
The answer to the book worm problem is 3 in. He would eat through the 2 in. width of the middle book and through four ¼ in. thick covers. If you don't believe this, examine three equal size books on your own bookshelf!

* * * *

How Big was the Family?

Five. A mother and her two married daughters. One daughter had a son and the other a daughter.

The up-to-date version of a popular model



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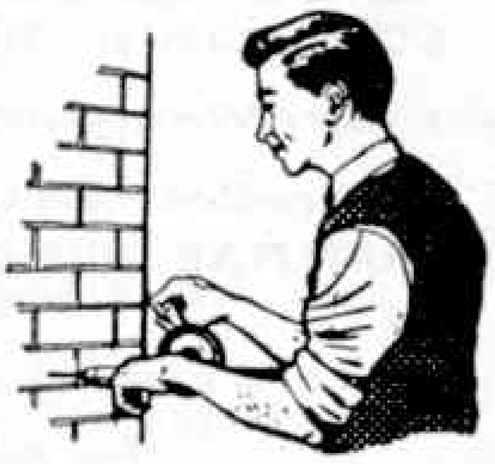

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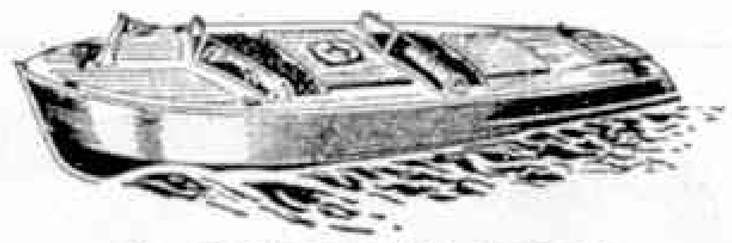

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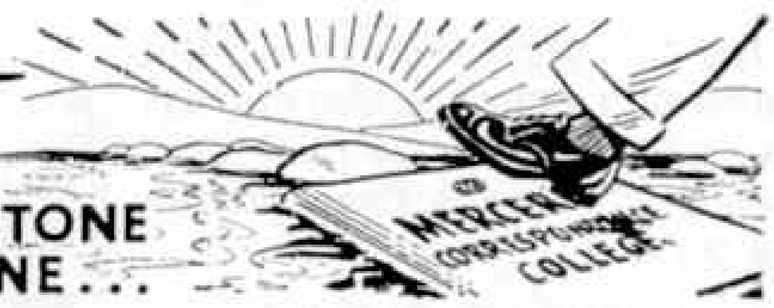

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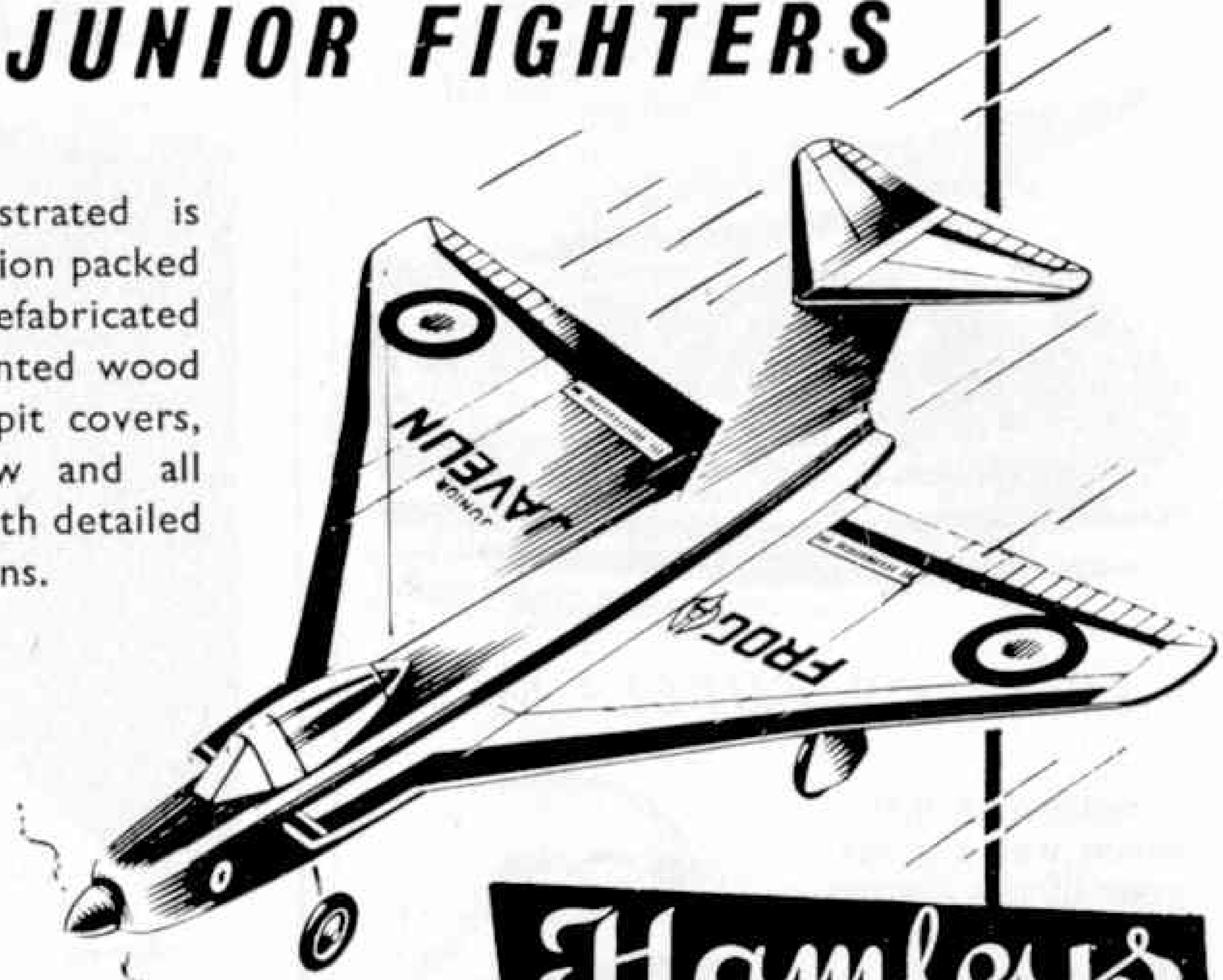

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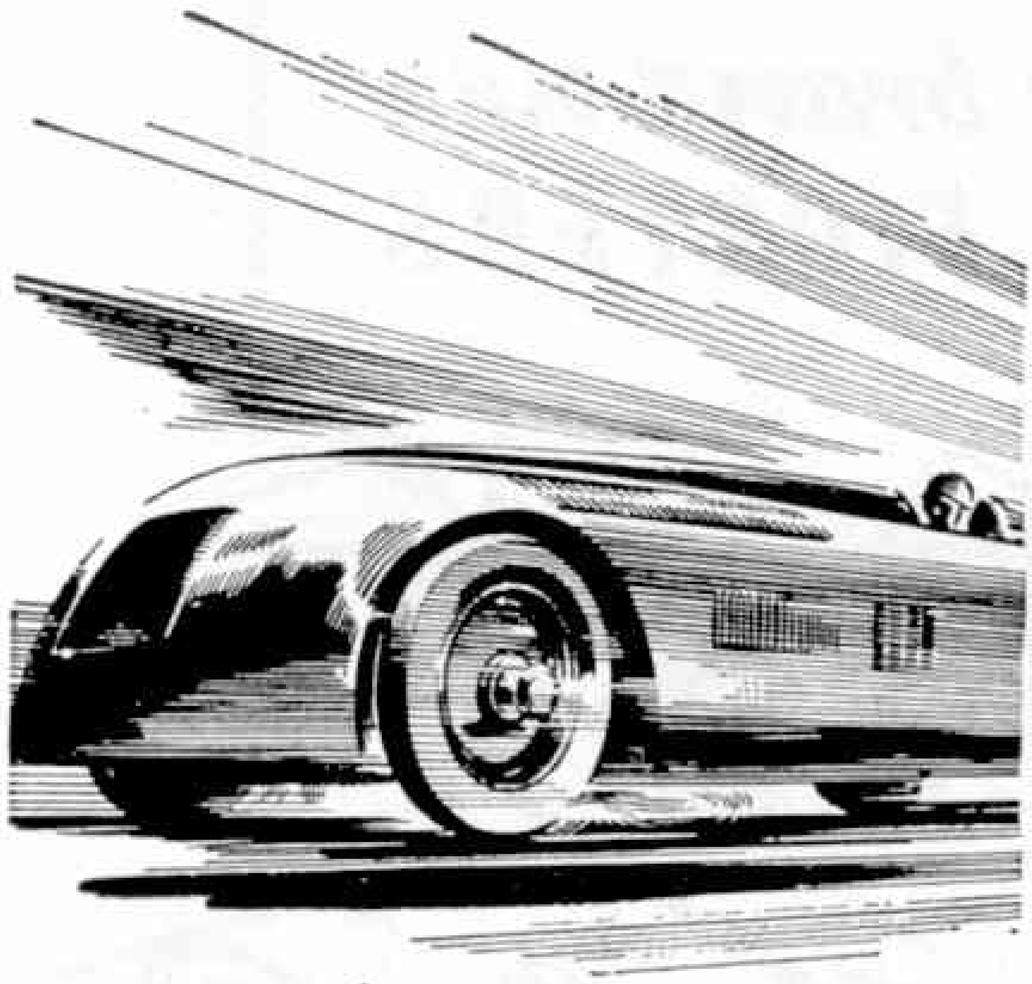

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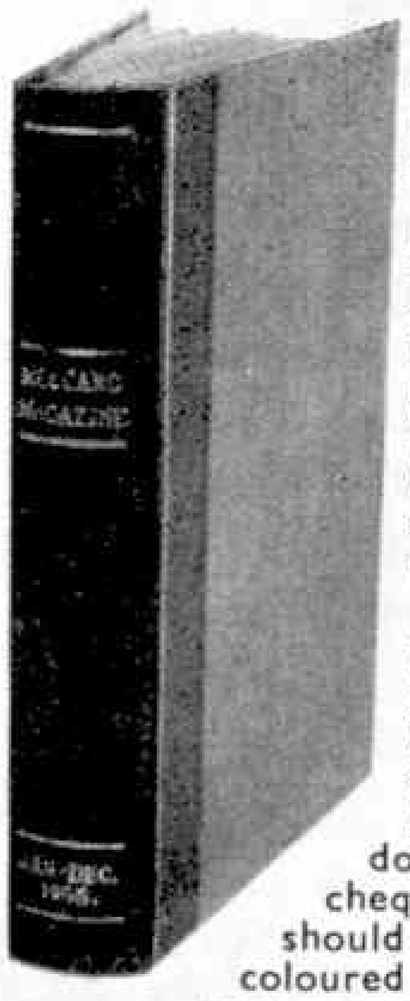

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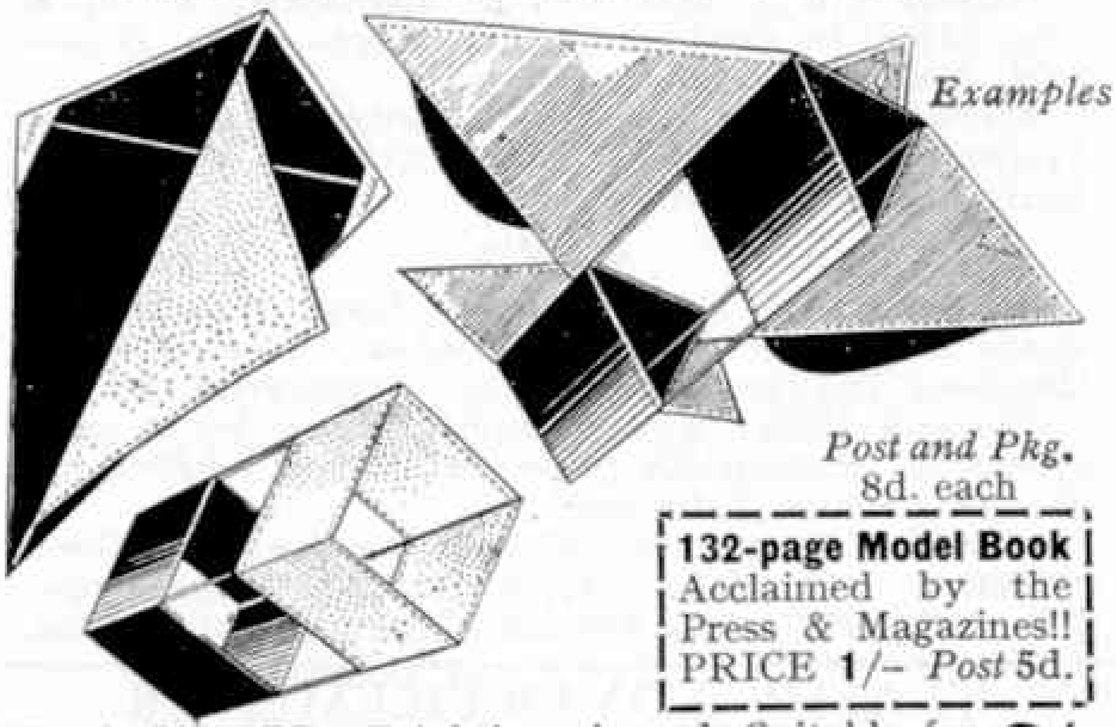

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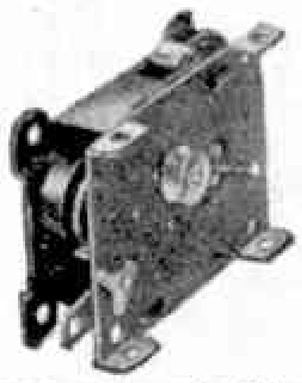

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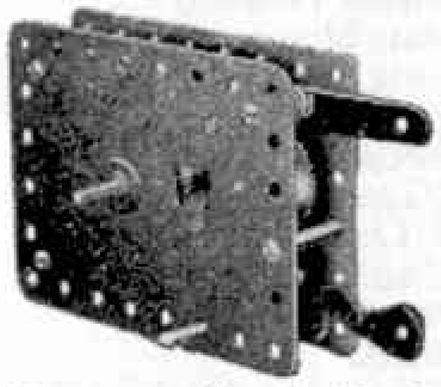

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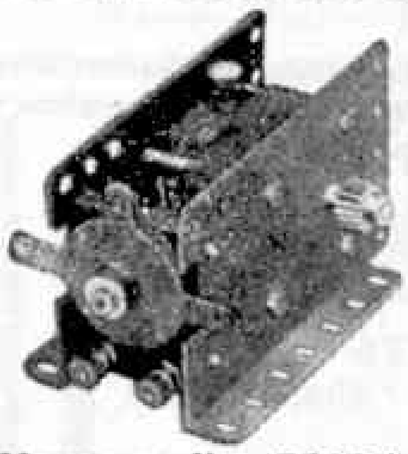

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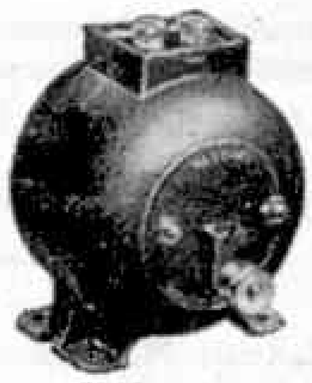

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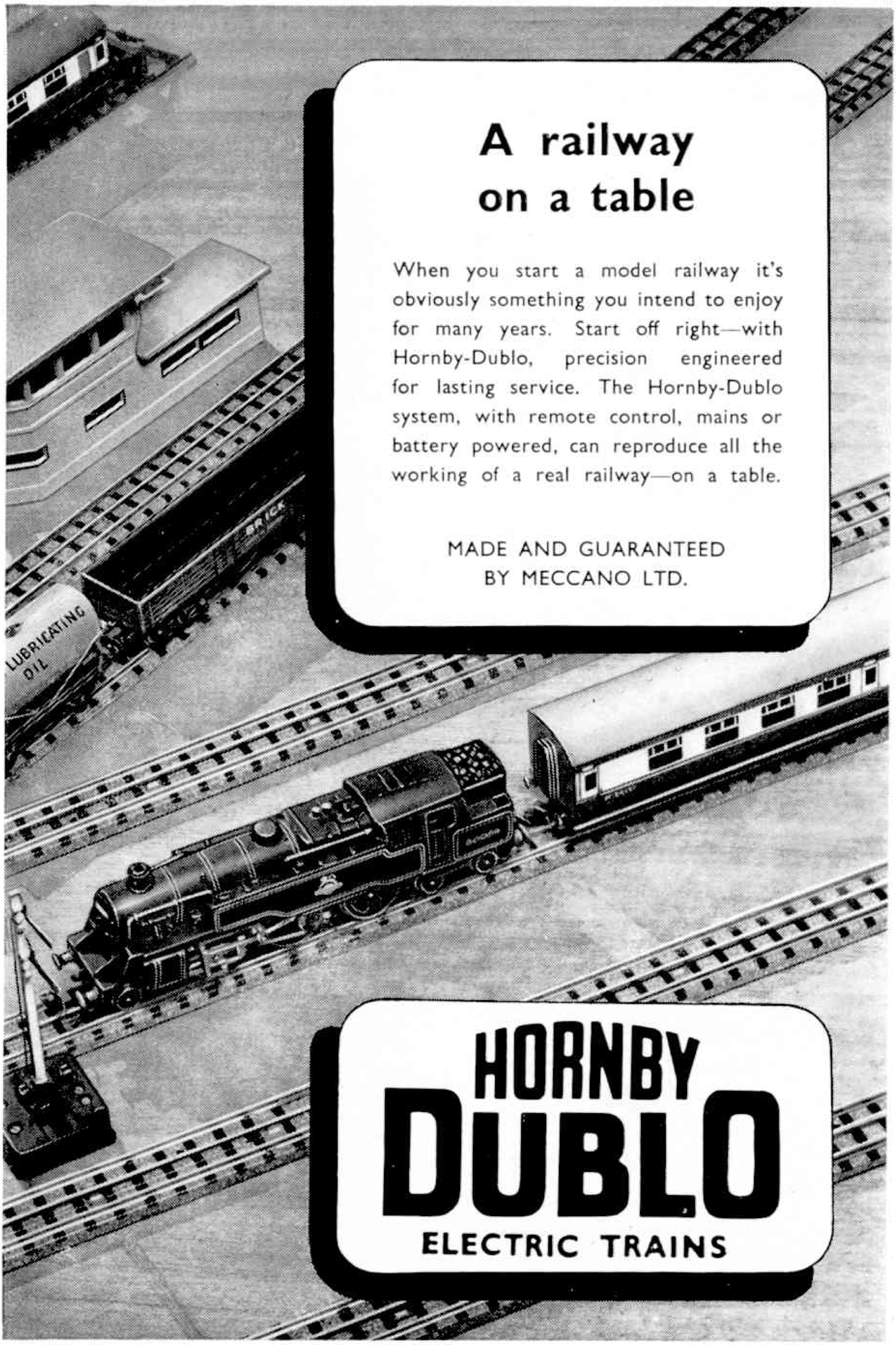
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MODEL OF THE MONTH

FIRE ENGINE

Constructional details of the model Fire Engine illustrated in the Meccano Magazine for July 1956.

Construction of the Chassis.

Each girder of the chassis is formed by two 12½" Angle Girders overlapped four holes. The Girders are connected by two built-up angle girders 1 and 2 and a built-up strip 3. The girders 1 and 2 are each made from two 5½" Angle Girders overlapped five holes, and the strip 3 consists of two 5½" Strips similarly overlapped.

The rear wheels are fixed on an 8" Rod supported in Double Brackets bolted to the chassis. A Conical Disc is fitted to each wheel and is held in place by a Bush Wheel.

The front axle beam is formed by two 5½" Strips overlapped eight holes and bolted across the chassis. At each end it is strengthened by a 1" x ½" Angle Bracket 4. Each of the front wheels is fixed on a 2" Rod supported in a Double Bracket that is lock-nutted to the end of the axle beam. A Conical Disc and a Wheel Disc are held on the Rod by a Collar, and a 2½" Strip 5 is pivoted on the inner end of the Rod and is also kept in position by a Collar. The other ends of these Strips are fitted with ⅜" Bolts screwed tightly into the centre threaded holes of Couplings 6. Two built-up strips 7 are pivotally connected to the ends of the Couplings by ⅜" Bolts gripped in the Couplings by their Grub Screws. One of the Strips 7 consists of a 4½" and a 3" Strip, and the other is made from a 5½" and a 3" Strip. A 1" Triangular Plate is bolted to the centre of each of the Strips 7 as shown. A 1½" Rod is held in the Triangular Plates by Collars, and a 3" Strip 8 is pivoted on the Rod.

The Sides of the Body.

Each side of the body consists of two 12½" x 2½" Strip Plates 9, two 4½" x 2½" Flexible Plates 10, two 5½" x 2½" Flexible Plates 11, a 5½" x 1½" Flexible Plate 12, a 2½" x 1½" Flexible Plate 13, a 2½" x 2½" Flexible Plate 14 and a Semi-Circular Plate 15. The front wheel arch is formed by two 2½" x 1½" Triangular Flexible Plates 16 and a 3½" x 2" Triangular Flexible Plate 17. The rear wheel arch is filled in by a 2½" x 2" Triangular Flexible Plate 18 and a 2½" x 2½" Triangular Flexible Plate 19.

The Plates of each side are bolted together as shown and are strengthened on the inside by two 12½" Strips 20, a 2½" Strip 21 and three 5½" Strips 22. On the outside the Plates are edged by two 12½" Strips 23. The window divisions are made with two 3½" Strips 24, a 3" Strip and a 2" Strip.

The completed sides are fixed to 12½" Angle Girders bolted to the ends of the girders 1 and 2, and are connected to the strip 3 by Angle Brackets. The mudguards are each made from two Formed Slotted Strips joined by a Fishplate and attached to the sides by Angle Brackets.

The Front of the Cab and the Radiator.

Each side of the front of the cab is a $4\frac{1}{2}$" x $2\frac{1}{2}$" Flexible Plate, bolted at its lower end to a $3\frac{1}{2}$" Strip 25 and connected at the top by a $5\frac{1}{2}$" x $1\frac{1}{2}$" Flexible Plate 26. The $4\frac{1}{2}$" x $2\frac{1}{2}$" Flexible Plates are attached to the cab sides by Angle Brackets. The radiator is a $3\frac{1}{2}$" x $2\frac{1}{2}$" Flanged Plate, edged by $3\frac{1}{2}$" x $\frac{1}{2}$" Double Angle Strips, and it is connected to the front of the cab by three Angle Brackets.

The top edge of the windscreen consists of two $5\frac{1}{2}$" Strips overlapped seven holes, and the lower edge is made from two $4\frac{1}{2}$" Strips overlapped three holes. These Strips are connected by three $2\frac{1}{2}$" Strips. The windscreen is attached to the front of the cab by three Obtuse Angle Brackets, and to the 3" Strips at the top of the cab sides by Angle Brackets.

The front bumper is made from two $5\frac{1}{2}$" Strips overlapped three holes and bolted to the radiator. The bumper is connected also to the front of the cab by $\frac{3}{4}$" Bolts, but is spaced from it by a Spring Clip on each bolt.

Steering Assembly.

Two $1\frac{1}{2}$" x $\frac{1}{2}$" Double Angle Strips 27 are bolted to the front of the cab, and these are connected to the side by two $2\frac{1}{2}$" x $\frac{1}{2}$" Double Angle Strips 28. The steering column is a 5" Rod held in the Double Angle Strips 28 by a $\frac{1}{2}$" Pinion 29 and a Collar. The Pinion 29 engages a second $\frac{1}{2}$" Pinion on a $1\frac{1}{2}$" Rod 30, and this Rod is fitted also with a Crank 31 lock-nutted to the Strip 8.

Cab Roof.

The roof consists of two $12\frac{1}{2}$" x $2\frac{1}{2}$" Strip Plates bolted at the front to a $5\frac{1}{2}$" x $2\frac{1}{2}$" Flexible Plate 32 and spaced apart by a $12\frac{1}{2}$" Strip extended by a 3" Strip. To the front end of the roof is bolted a built-up strip made from a $5\frac{1}{2}$" x $\frac{1}{2}$" Double Angle Strip extended at each end by a $2\frac{1}{2}$" Strip overlapped three holes. To the rear of the roof is bolted a built-up Strip 33 made from a $5\frac{1}{2}$" and a $4\frac{1}{2}$" Strip overlapped three holes, and at the centre the roof is braced by two $5\frac{1}{2}$" Strips overlapped five holes. The roof is extended at each side by two $5\frac{1}{2}$" x $1\frac{1}{2}$", two $2\frac{1}{2}$" x $1\frac{1}{2}$" and two $2\frac{1}{2}$" x $2\frac{1}{2}$" Flexible Plates. These are bolted to the three built-up strips already mentioned, and are strengthened along their outer edges by a $12\frac{1}{2}$" Strip 34.

The Roof is connected to the top of the windscreen by three Obtuse Angle Brackets, and to each side of the cab by three $\frac{1}{2}$" x $\frac{1}{2}$" Angle Brackets and a 1" x 1" Angle Bracket. The bell at the front of the roof is represented by a 1" loose Pulley and a $\frac{1}{2}$" fixed Pulley mounted on a Threaded Pin.

Rear Platform and Pump Assemby.

To each side of the body is bolted a $5\frac{1}{2}$" x $2\frac{1}{2}$" Flanged Plate 35, and these are connected by two $5\frac{1}{2}$" x $2\frac{1}{2}$" Flexible Plates 36. A further $5\frac{1}{2}$" x $2\frac{1}{2}$" Flexible Plate is bolted to each Flanged Plate, and these are curved as shown and fixed to $3\frac{1}{2}$" x $2\frac{1}{2}$" Flanged Plates 37. A $2\frac{1}{2}$" x $\frac{1}{2}$" Double Angle Strip is attached to the lower end of each of the Plates 37. The Double Angle Strips are secured by their lugs to the

sides of the body and to $\frac{1}{2}$" Reversed Angle Brackets 38 bolted to the chassis.

A $3\frac{1}{2}$" x $2\frac{1}{2}$" Flanged Plate 39 is bolted between the Flanged Plates 35, and a Face Plate and one half of a Hinged Flat Plate 40 are fixed to the inner lug of a $2\frac{1}{2}$" x $\frac{1}{2}$" Double Angle Strip attached to each side of the body.

Four 1 11/16" radius Curved Plates are bolted to the front ends of the Plates 35 and 36, and are extended upward by one $5\frac{1}{2}$" x $1\frac{1}{2}$" and two $2\frac{1}{2}$" x $1\frac{1}{2}$" Flexible Plates. The last mentioned Plates are connected to the rear end of the roof by three Angle Brackets.

Each hose reel is a cylinder fitted with two $1\frac{1}{8}$" Flanged Wheels. It is mounted on a $3\frac{1}{2}$" Rod supported in Trunnions.

A Boiler is bolted to Angle Brackets fixed to the rear end of the chassis, and is provided with the fittings shown. Two Couplings and a $\frac{3}{4}$" Flanged Wheel are fixed on $\frac{3}{8}$" Bolts passed through the Boiler End, and the Swivel Bearings are secured on Pivot Bolts. The Worm is fixed to the end of a Screwed Rod passed through the Boiler and held in place by nuts.

Construction of the Extending Ladder.

The lower section of the ladder consists of two $12\frac{1}{2}$" Angle Girders joined at their ends by $2\frac{1}{2}$" x 1" Double Angle Strips, 1 of which is fitted with a Screwed Rod 41. The sliding section is formed by two $12\frac{1}{2}$" Angle Girders connected by $2\frac{1}{2}$" Strips, and fitted at one end with two 1" x 1" Angle Brackets 42. These Angle Brackets support a 4" Rod, which is held in place by $\frac{3}{4}$" Flanged Wheels.

The sliding section is extended by $12\frac{1}{2}$" Strips connected by two $2\frac{1}{2}$" x $\frac{1}{2}$" Double Angle Strips, and the two sections are fitted together as shown. The ladder rungs are represented by Cord.

The rear ladder support is formed by two 1" loose Pulleys, a Sleeve Piece, a $\frac{3}{4}$" Flanged Wheel, a $3\frac{1}{2}$" x $\frac{1}{2}$" Double Angle Strip and a $\frac{3}{4}$" Washer clamped by nuts on a Screwed Rod passed through the Flexible Plates 36.

The ladder is located by two $\frac{1}{2}$" Reversed Angle Brackets 43.

The front ladder support is made by fixing a large Fork Piece 44 to the roof by means of a $\frac{1}{2}$" Bolt. A $3\frac{1}{2}$" Rod, fitted with two Couplings, is held in the Fork Piece by Spring Clips.

Parts required to build the Fire Engine:- 13 of No. 1; 21 of No. 2; 6 of No. 2a; 6 of No, 3; 6 of No. 4; 12 of No. 5; 2 of No. 6; 10 of No. 8; 4 of No. 9; 8 of No. 10; 4 of No. 11; 32 of No. 12; 4 of No. 12a; 2 of No. 12b; 6 of No. 12c; 1 of No. 13a; 1 of No. 15; 1 of No. 15a; 3 of No. 16; 2 of No. 17; 2 of No. 18a; 4 of No. 20; 4 of No. 20a; 4 of No. 20b; 3 of No. 22; 3 of No. 22a; 1 of No. 23a; 2 of No. 24; 2 of No. 24a; 2 of No. 26; 1 of No. 32; 4 of No. 35; 278 of No. 37a; 260 of No. 37b; 10 of No. 38; 2 of No. 38d; 1 of No. 40; 2 of No. 46; 2 of No. 48; 8 of No. 48a; 3 of No. 48b; 1 of No. 48d; 2 of No. 52; 4 of No. 53; 10 of No. 59; 1 of No. 62; 6 of No. 63; 2 of No. 77; 1 of No. 80a; 2 of No. 80c; 2 of No. 109; 1 of No. 111; 6 of No. 111a; 6 of No. 111c; 1 of No. 115; 4 of No. 125; 4 of No. 126; 4 of No. 142a; 2 of No. 147b; 1 of No. 162; 1 of No. 163; 2 of No. 165; 1 of No. 185; 4 of No. 187a; 8 of No. 188; 8 of No. 189; 2 of No. 190; 6 of No. 191; 9 of No. 192; 6 of No. 197; 1 of No. 198; 4 of No. 200; 2 of No. 214; 8 of No. 215; 2 of No. 216; 4 of No. 221; 2 of No. 222; 2 of No. 223; 2 of No. 225.