VOL. XLIV. No. 2 FEBRUARY 1959

MECCANO MAGAZINE

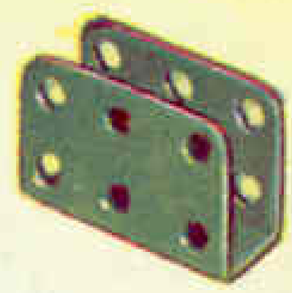
A FESTINIOG RAILWAY SCENE

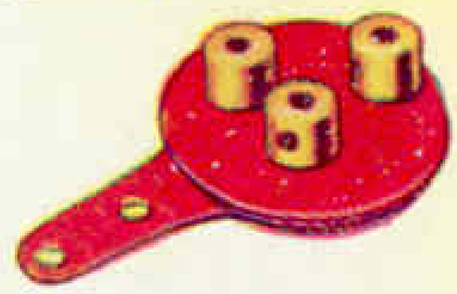
15c

MECCANO

ACCESSORY OUTFITS

Each Meccano complete or main Outfit can be converted into the one next larger by the addition of the appropriate Accessory Outfit. No matter with which main Outfit a boy begins, he can build it up by degrees until he has all the parts contained in the largest Outfit.





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2a	,,	2	,,	3	.. ..		14	11
3a	,,	3	,,	4	.. ..		17	11
4a	,,	4	,,	5	.. ..	1	3	11
5a	,,	5	,,	6	.. ..		19	0
6a	,,	6	,,	7	.. ..	1	18	6
7a	,,	7	,,	8	.. ..	4	7	6
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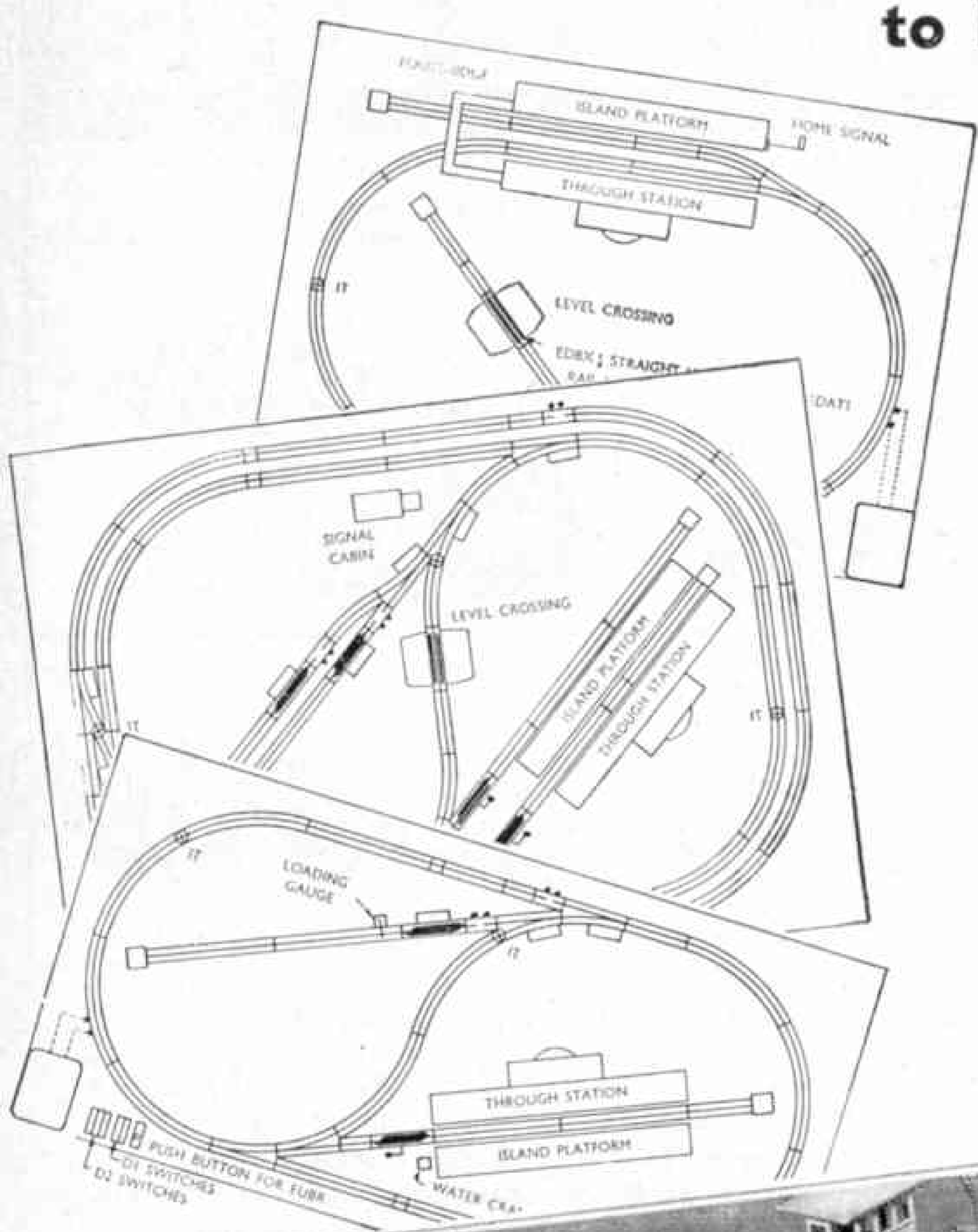

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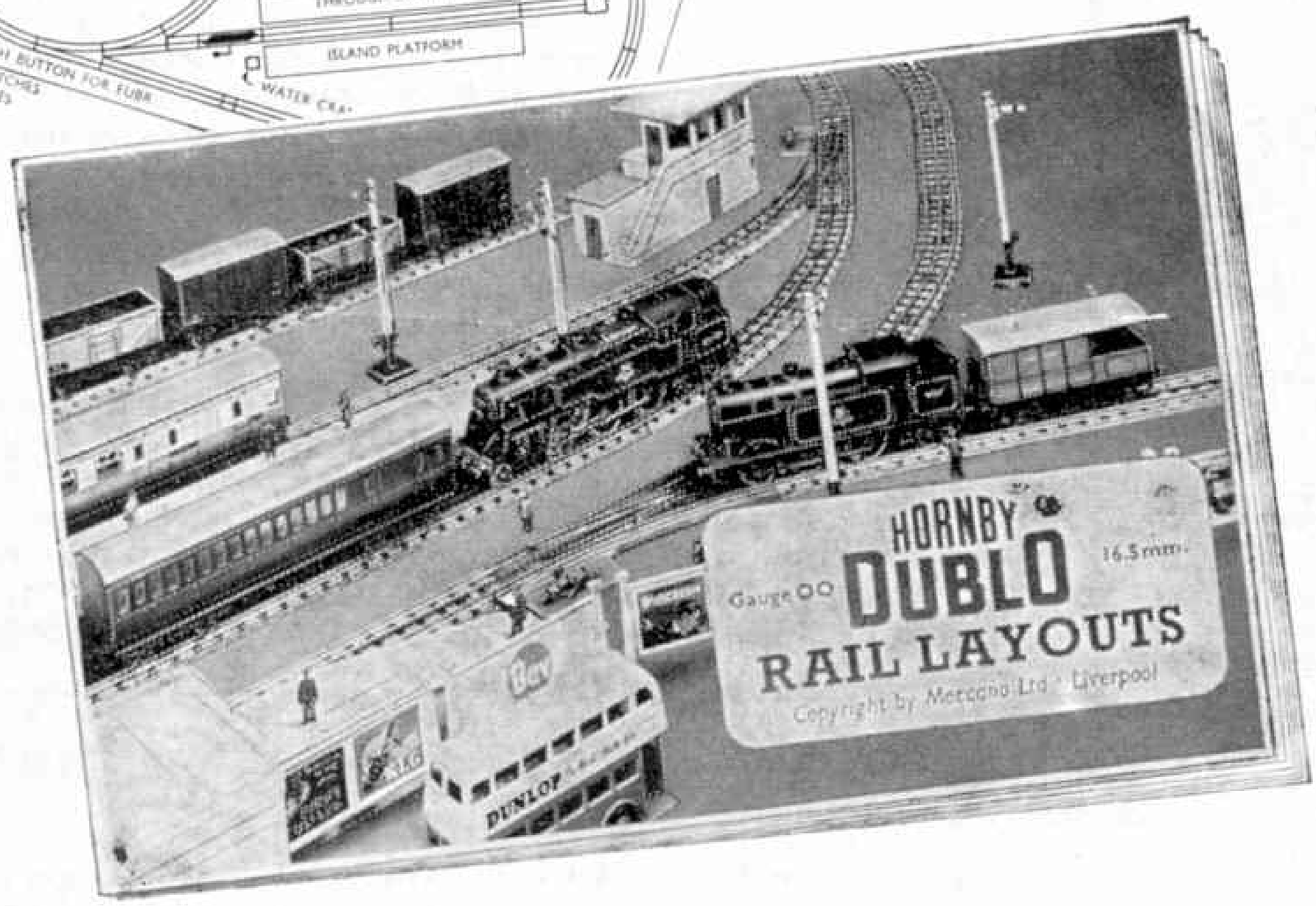

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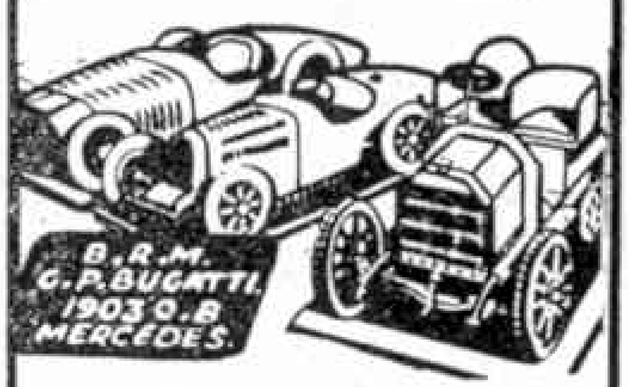

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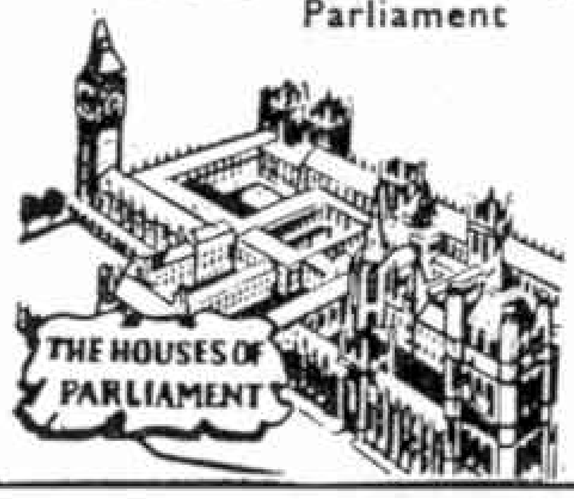

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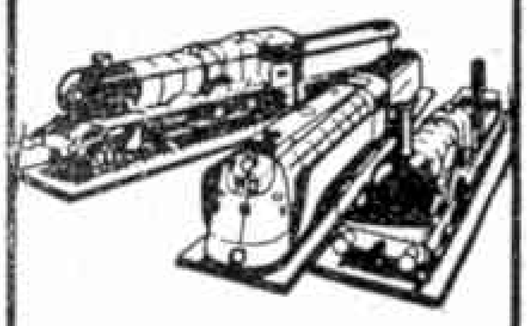

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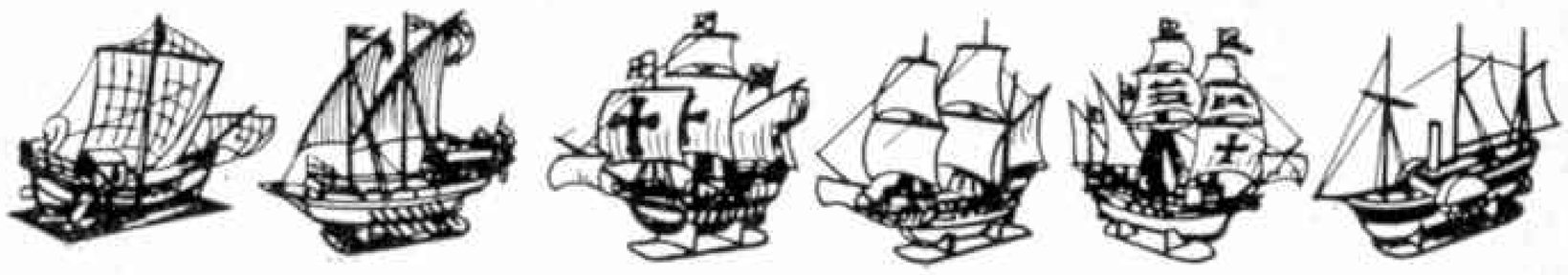

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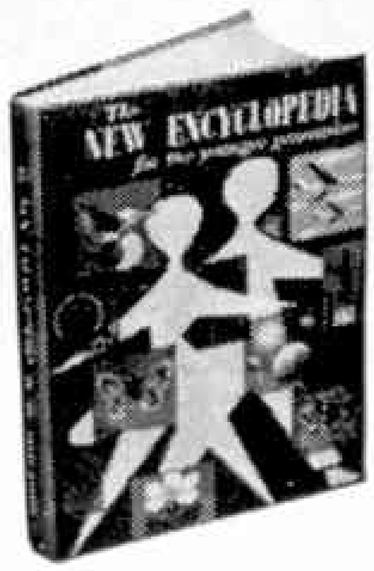

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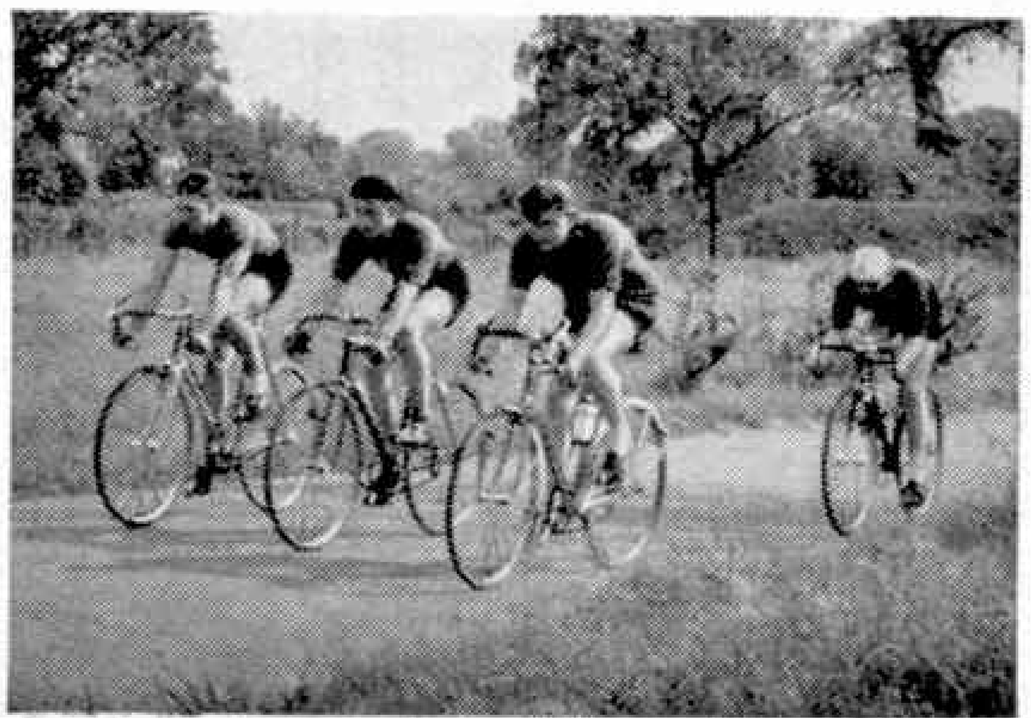

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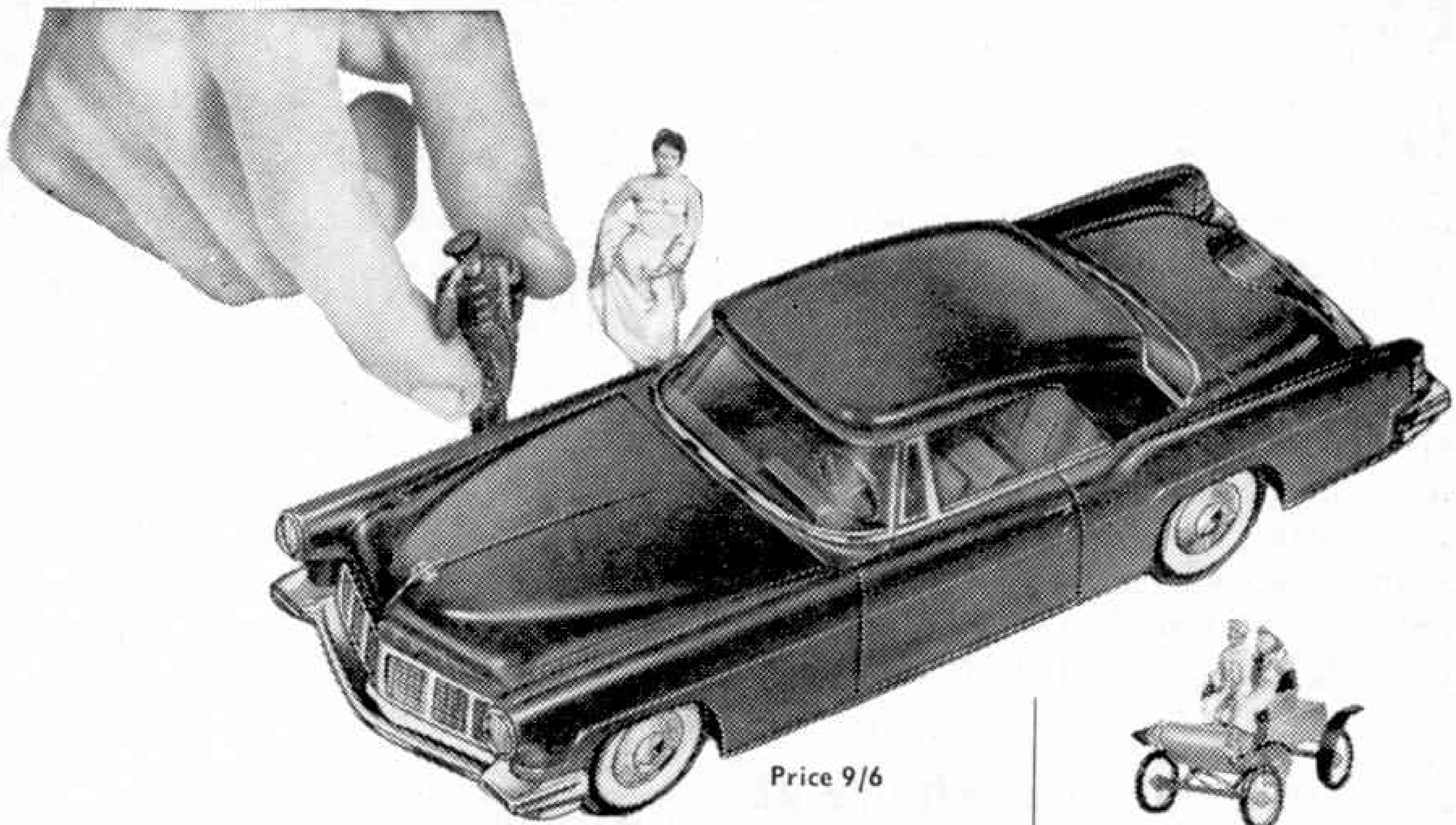

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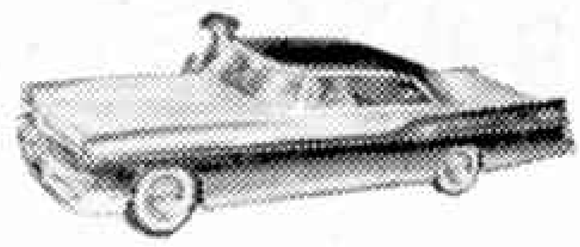
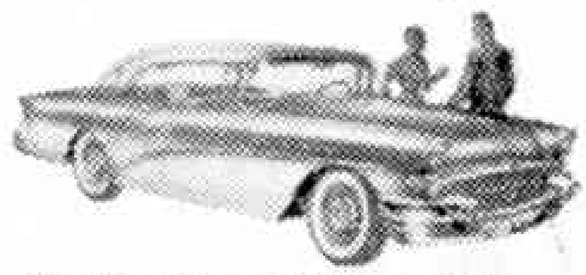


Chrysler New Yorker **9/6**

Ford Pick-up Truck **8/6**



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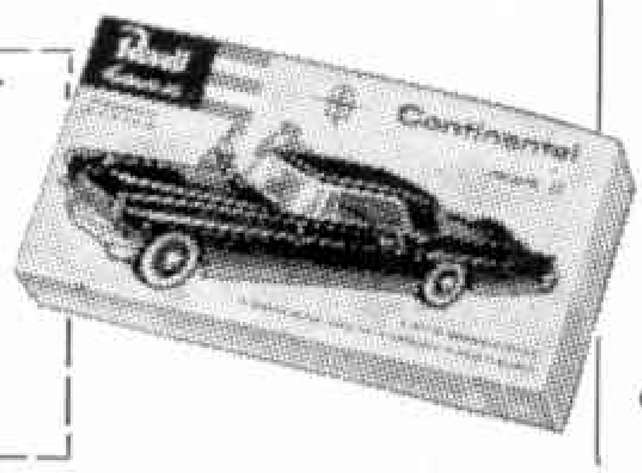

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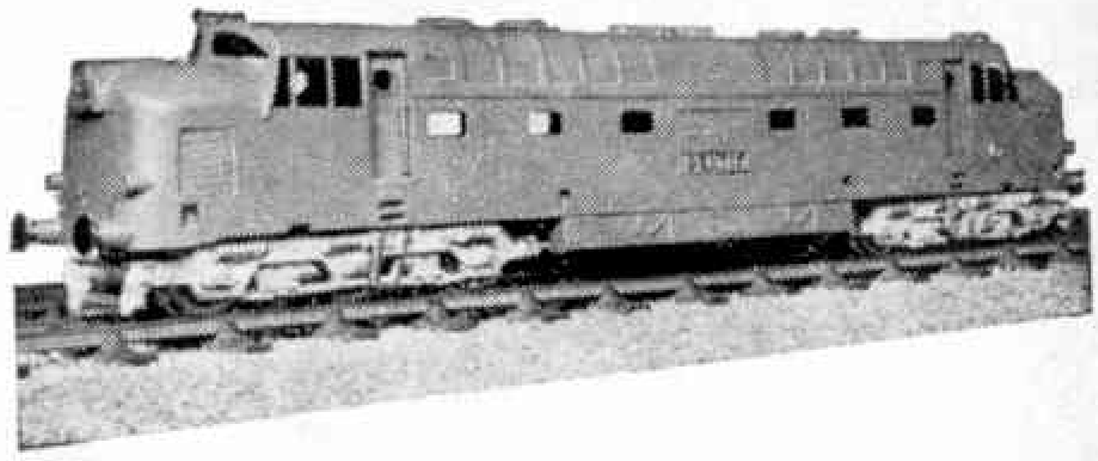

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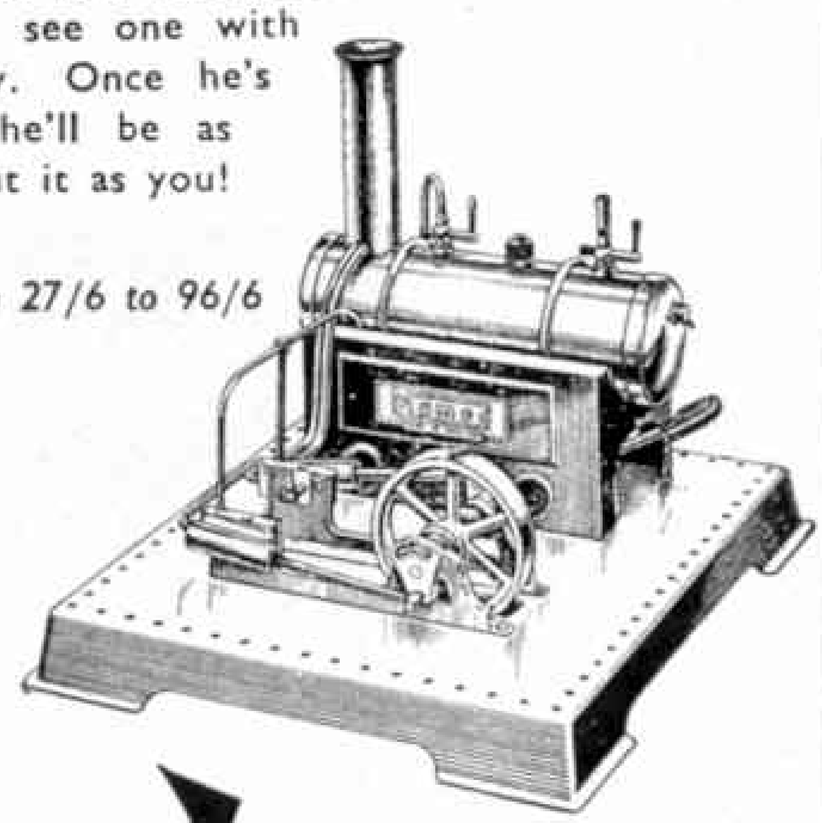

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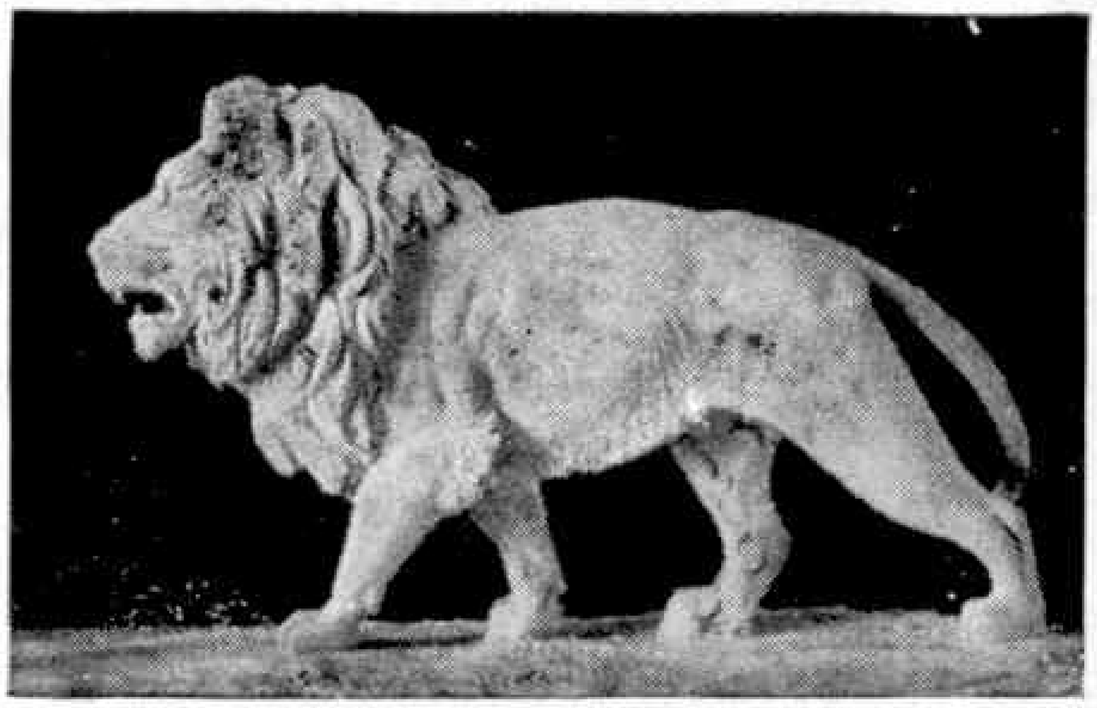

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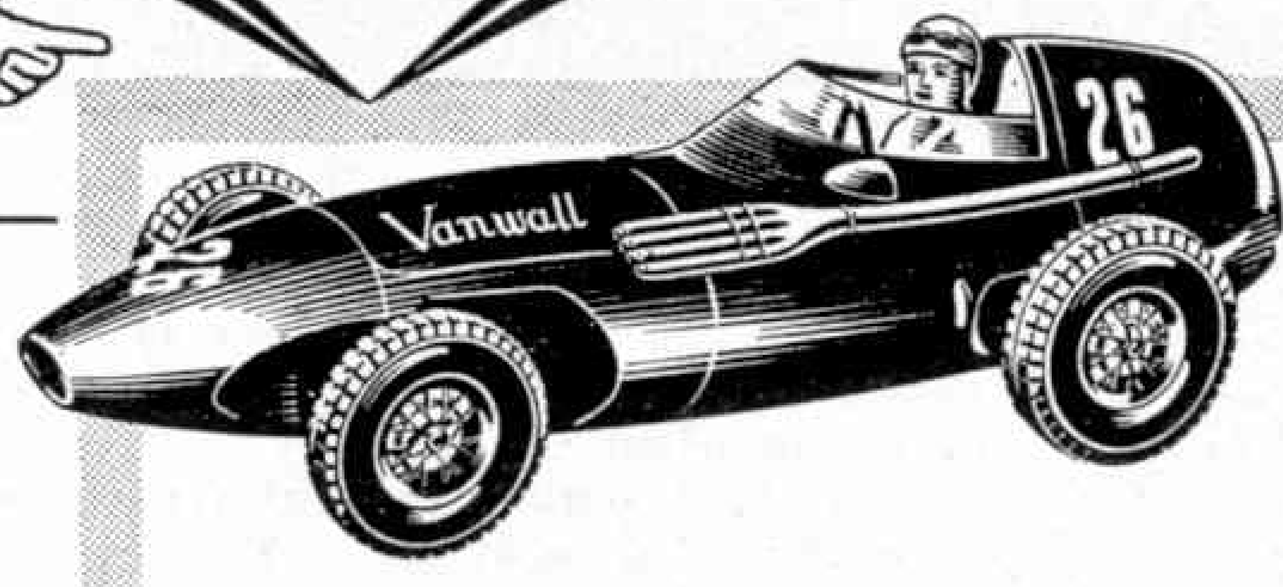

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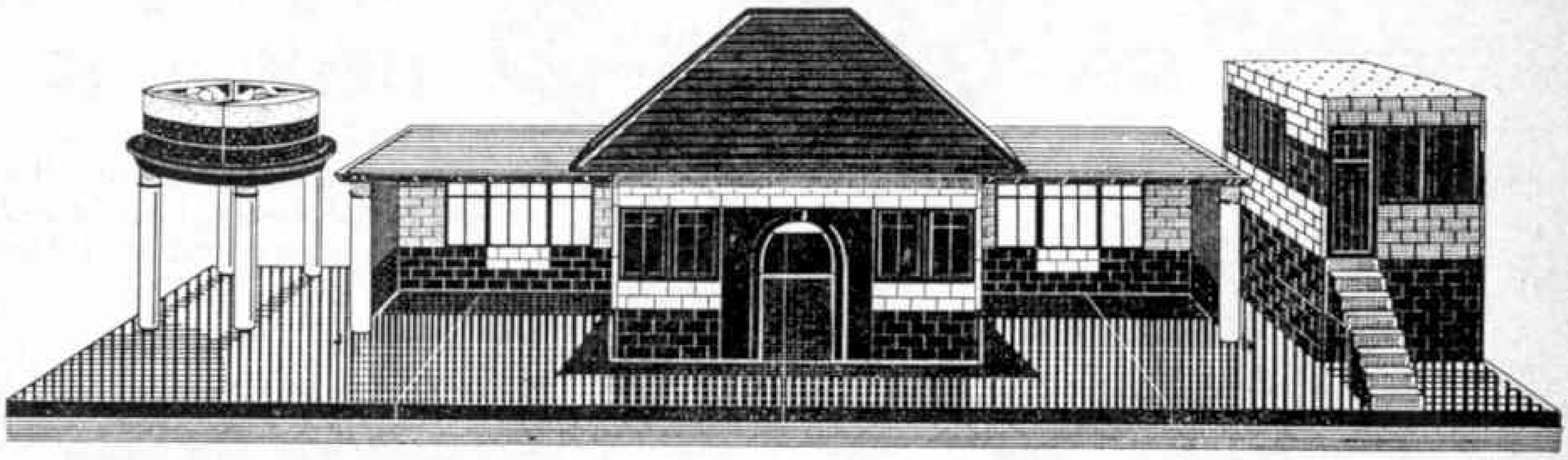

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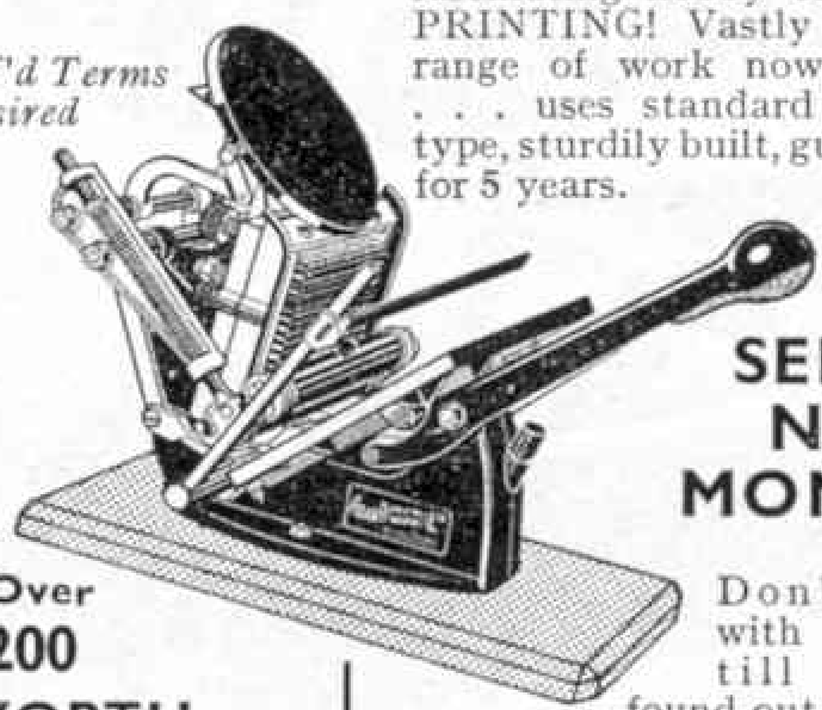

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EDITOR : FRANK RILEY, BSc.

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Space Race

EXCITING things have happened since *Space Notes* on page 64 of this issue were written. During the past year or so many rockets have been fired upward into the sky. All these efforts have been very fine and many of them, including some that apparently were failures because they did not go high enough, have given us much useful information. Now Russian scientists have suddenly shot one of their rockets much farther afield—and have made a new planet.

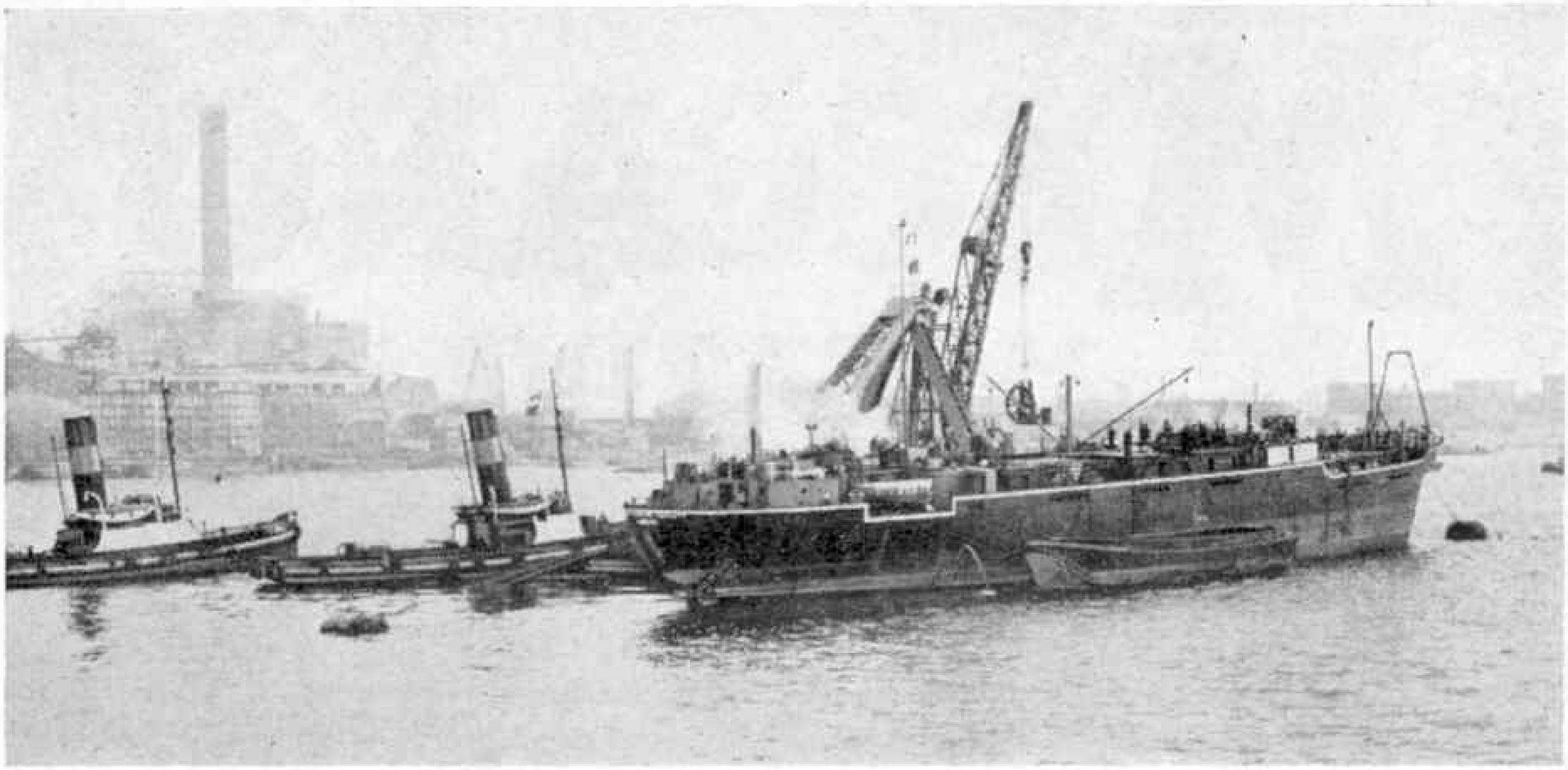
This achievement undoubtedly is a great one. Only careful calculation and very accurate work will place a rocket in the vicinity of the Moon, as was done in this case. When fired the vehicle sailed away at a tremendous speed and came within 4,000 miles of the Moon, although this itself was travelling at a speed of more than 2,000 m.p.h. and was almost a quarter of a million miles away. Then it sailed out into space, and presumably will now settle down to centuries, and perhaps more, of travelling round the Sun in a gigantic ellipse.

The first new Leyland 78-seater Atlantean rear-engined front-entrance bus to go into service, at Seacombe, Wallasey. Photograph by courtesy of Leyland Motors Ltd.

What will be the end of all this? Well, probably we shall find ways of placing men on the Moon itself, and we may even hope to get them back again. Space travel is perhaps even nearer than many of us think.

And my picture this month? It seems rather slow, doesn't it? But the days of *adventure for all in the skies* are still remote and we can continue to take interest in such earthly vehicles as the interesting bus shown in it. The picture too is a sort of combination of land and sea, for the gangway up which passengers walk to the front entrance of the bus had been made by members of the staff of the Wallasey ferries, familiar to all who have visited Merseyside.

The Editor



Electricity Across the Sea

The Cross-Channel Power Cable

By Arthur Turner

AFTER more than seven years of discussion between the electricity authorities of England and France, an epoch-making scheme is now nearing fruition. By the winter of 1960, if the present plans progress satisfactorily, the electric power systems of the two countries will be joined by Cross-Channel cables, enabling each nation to draw on the electrical resources of the other.

The purpose of the enterprise is to increase the amount of current available at peak periods without extending existing power stations or building new ones. It is thus an economy measure of benefit to both countries.

This article is concerned with plans for connecting the electric power systems of Great Britain and France. The scheme requires two submarine cables to be laid simultaneously between the two countries, and in the picture at the head of the page page the "Dame Caroline Haslett" is seen being fitted with special gear for trials in the English Channel.

To understand the workings of the scheme it is necessary to remember that the demand for electricity varies considerably, more current being consumed at certain times of day than at others. Power stations with enough capacity must therefore be provided to meet the peak demand, though at other times of day they do not need to run full out. Money is thus wasted on the erection of plant that is in full use for only short periods.

Now for a number of years electrical engineers studying consumption tables have noticed that the daily peak period in France occurs about an hour before that in Britain. French households, it seems, have different habits from English ones, so far as their use of electricity is concerned. And their time is an hour ahead of Greenwich, anyway.

The Cross-Channel Cable Scheme is intended to make use of this discovery. Power stations in Britain will be linked to those in France, and will supply electricity to meet the peak demand there when it occurs. The French stations will do the same for those in Britain when the demand approaches its peak over here.

Making the necessary cable link has presented problems, some of them peculiar to this particular project. What would be the best method of laying such a submarine power line, and how could it be repaired quickly if it were severed? What would be its effect upon the compasses of ships passing over it, and can any interference with them be obviated?

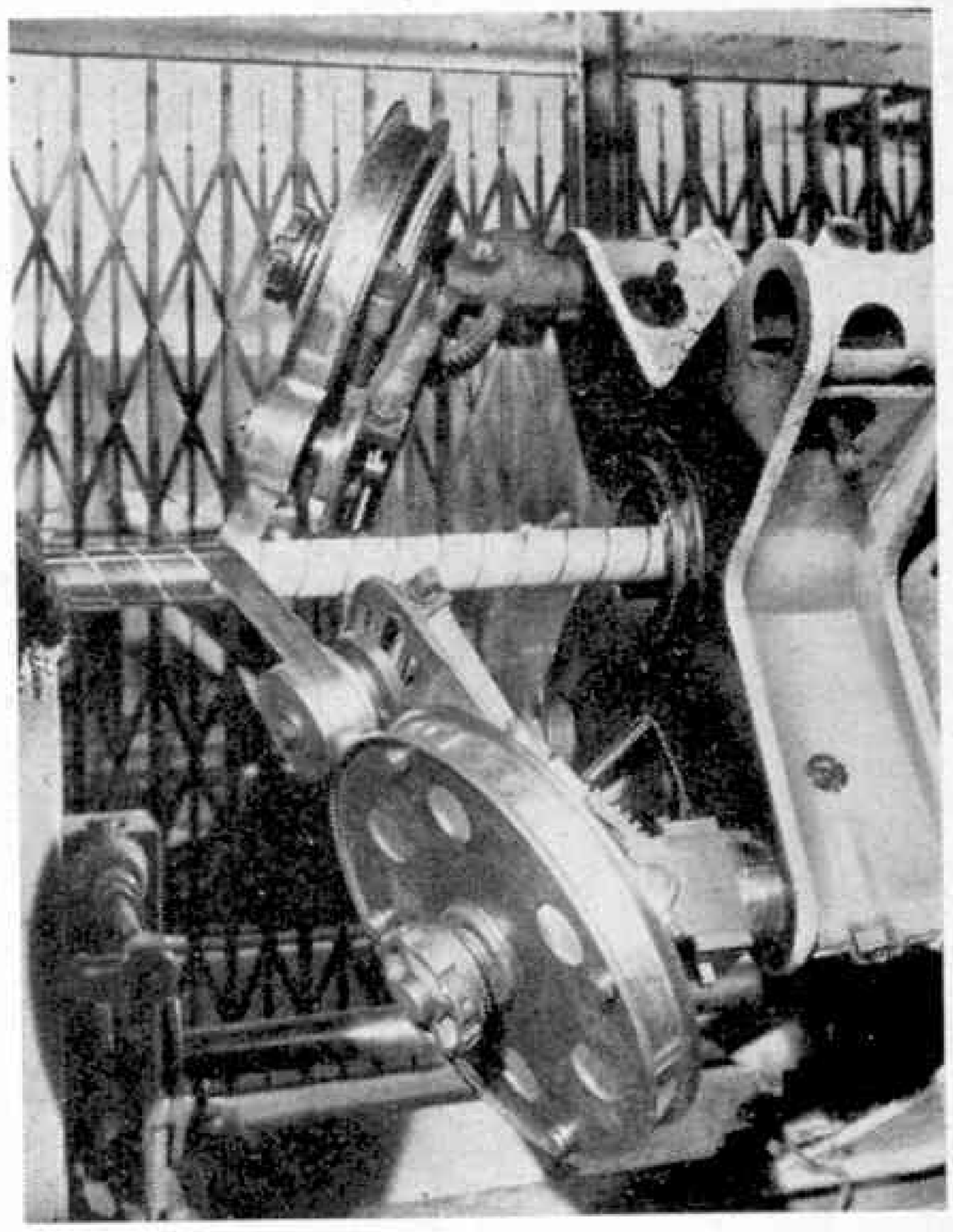
These matters have been undergoing investigation, and answers have been found. Last September two British companies, British Insulated Callender's Cables Ltd. and Siemens Edison Swan Ltd., carried out

sea trials in the English Channel by arrangement with the Central Electricity Generating Board. The laying of a power cable was rehearsed with two half-mile lengths, and repair techniques were tested by breaking the laid cables so that extra 200-yard lengths could be spliced between the breaks. The additional cables were then submerged with the original lengths for testing, and finally the whole of the cable was recovered for further tests ashore.

Taking part in these experiments was the 2,700-ton motor ship *Dame Caroline Haslett*, a Central Electricity Generating Board collier specially equipped for the job. A French midget submarine helped in the trials, and explosive charges to sever the cables on the sea bed were laid by French skin divers.

Sea tests were necessary because two cables running side by side will be needed, and laying two cables simultaneously on the bed of the sea had never been done before. Moreover, it is essential that the ones ultimately installed should be no more than 10 feet apart at the greatest depth, otherwise interference with the compasses of passing ships would arise when the current was switched on.

The total cost of the scheme will be more than £4,500,000, but the bulk of the expenses will go in the provision of equipment to convert the current from alternating current to direct current for its transmission along the cable. It may be wondered why the power is not to be transmitted by alternating current all the way, if the cost of the conversion equipment is so high. The electrical systems of both England and France operate on alternating current, so why convert it for transmission between the two countries?



This picture shows how reinforcing tapes are applied to a submarine power cable. The winding also plays a part in preventing water penetrating to the cable itself.

Work in progress on the "Dame Caroline Haslett" during the fitting of gear for paying out twin cables.

The short answer is that much more costly cables would be needed for alternating current. They would have to be more heavily insulated, and three cables would be required instead of the two needed for transmitting direct current. Loss of current in the cable is also much less with the latter.

Equally important in deciding between direct and alternating current for the Cross-Channel power scheme is the fact that, if alternating current were used, the speeds of the generators in England and France would have to be synchronised.

A few years ago, in fact, it would have been impossible to link the English and French electricity systems in the way now being carried out. Only recently have the wizards of (*Continued on page 104*)

The Preston By-Pass

Britain's First Road for Motor Traffic Only

J. Thomas, M.A., Ph.D., F.R.S.A.

ON 5th December last, the Prime Minister officially opened the Preston by-pass motorway. This, the first part of what eventually will be the north and south motorway through Lancashire, is only 8¼ miles long, but it is important as being the first stretch of motorway to be brought into use in Great Britain. Experience with it will be a guide in planning further motorways, and in deciding on such matters as allowable speeds and the code to be followed by drivers using it.

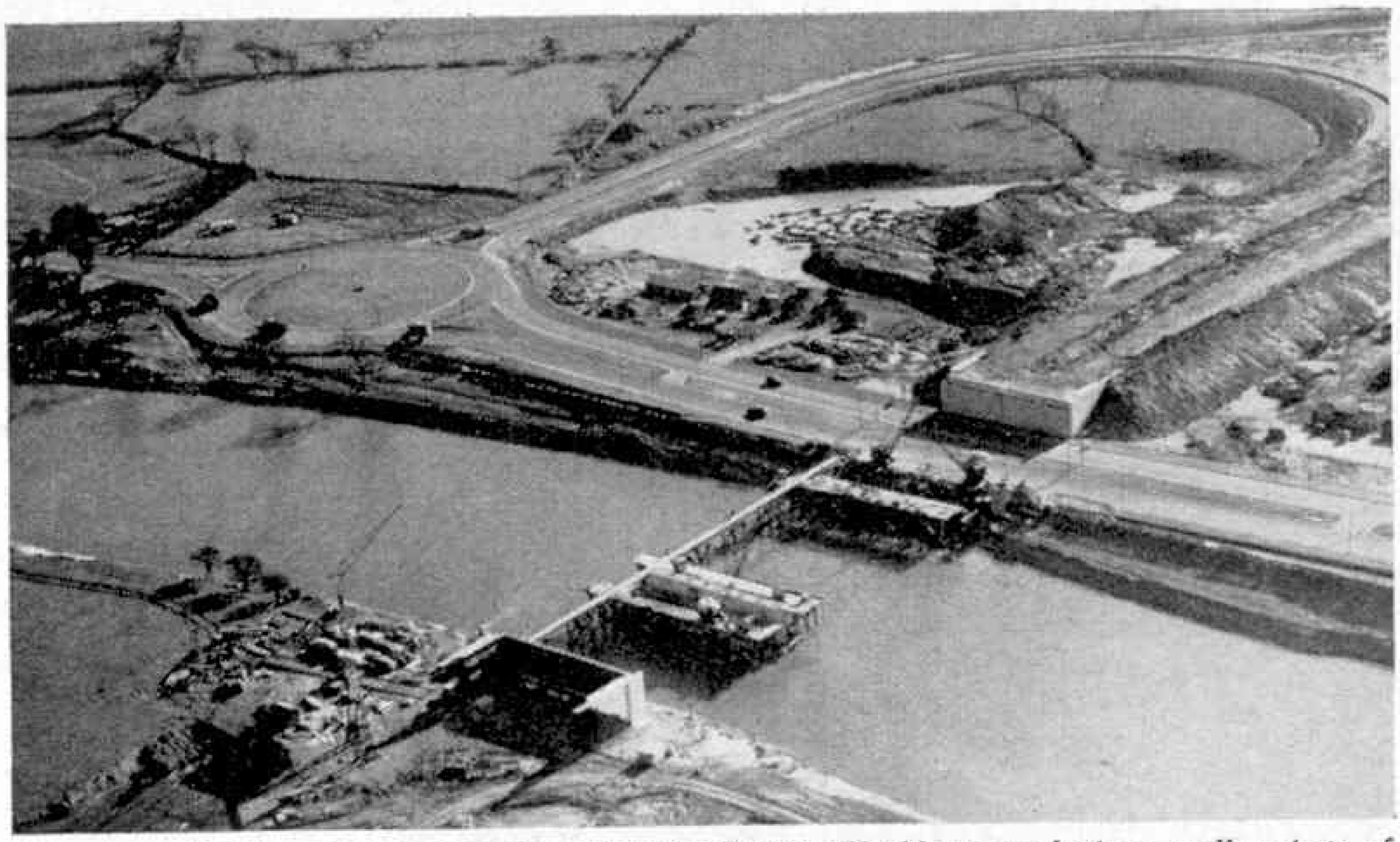
On this motorway no speed limit applies, and motorists using it must be prepared to travel fast, keep in lanes and keep moving. There are no cyclists, and pedestrians too are absent, so there are no zebra crossings. No other roads cross it, so traffic lights also are absent. Access to the motorway can only be gained at its ends and at Salmesbury, about halfway along it, where special provision has been made, both entry and exit being effected without crossing other traffic lines.

The picture at the head of the page shows Salmesbury Bridge, which carries Britain's first motorway across the Ribble, approaching completion. At its southern end, on the right, it strides across the Preston-Blackburn road, to which the motorway is connected by a U-junction, with roundabouts.

When making a new road, railways, rivers, canals and other roadways as a rule have to be crossed. In the past road junctions have been usual, but the new motorway differs in having none. Its unobstructed dual carriageways are each 24 ft. across, with contrasting marginal strips of 1 ft. on each side, making an effective width of 26 ft. The outer verges are 14 ft. wide, and a width of 8 ft. of these, adjacent to the carriageway, is constructed to form a hard shoulder, on which vehicles that for any reason come to a stop have to be placed. There is also a central reservation 32 ft. wide.

An interesting point is that on embankments the general overall width between the tops of the slopes on each side is 118 ft., 6 ft. more than the standard width of 112 ft. This is to allow for the planting of hedges on each side.

The southern end of the motorway is at Bamber Bridge on the A6 road, here running northward through Manchester to Preston



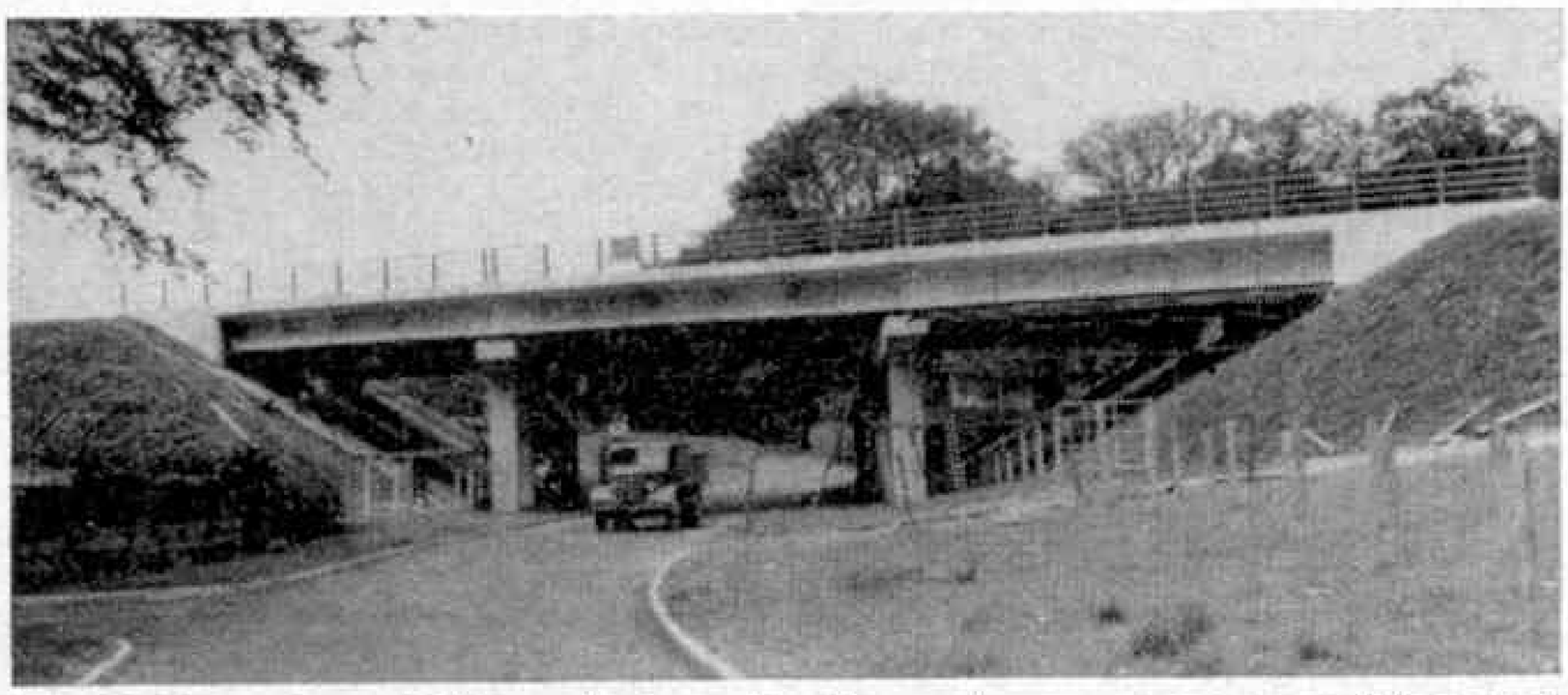
Salmesbury Bridge and the connection with the Preston-Blackburn road at an earlier stage of construction.

and beyond. The new highway curves round the eastern side of Preston and rejoins the A6 road at Broughton. At each end there is a roundabout 240 ft. in diameter to make entry and exit easy, with no crossing of traffic routes.

Extensive civil engineering works were necessary in making the by-pass, and the bridges that had to be built are specially noteworthy. The traveller along the full stretch of the motorway passes over or under twenty-three bridges in all, of varying lengths, from small single span structures to larger ones of three, four and even six spans. Six of them are of reinforced concrete throughout. Five others are built of steel beams, with reinforced concrete slabs, while the remaining twelve have pre-stressed concrete decks.

Let us take a rapid run over the by-pass, beginning at Bamber Bridge, its southern end. The first bridge met takes the motorway over the railway line between Preston and Blackburn. It is a single span structure 49½ ft. in length and 94 ft. wide. From there the new road passes under three other bridges before reaching one of the principal structures, the Higher Walton bridge, which carries the road over the River Darwen. This bridge is really a six span viaduct, 470 ft. long. It has piers and foundations of reinforced concrete, with a deck of continuous steel plate girders, and carries the motorway over a main road as well as the Darwen.

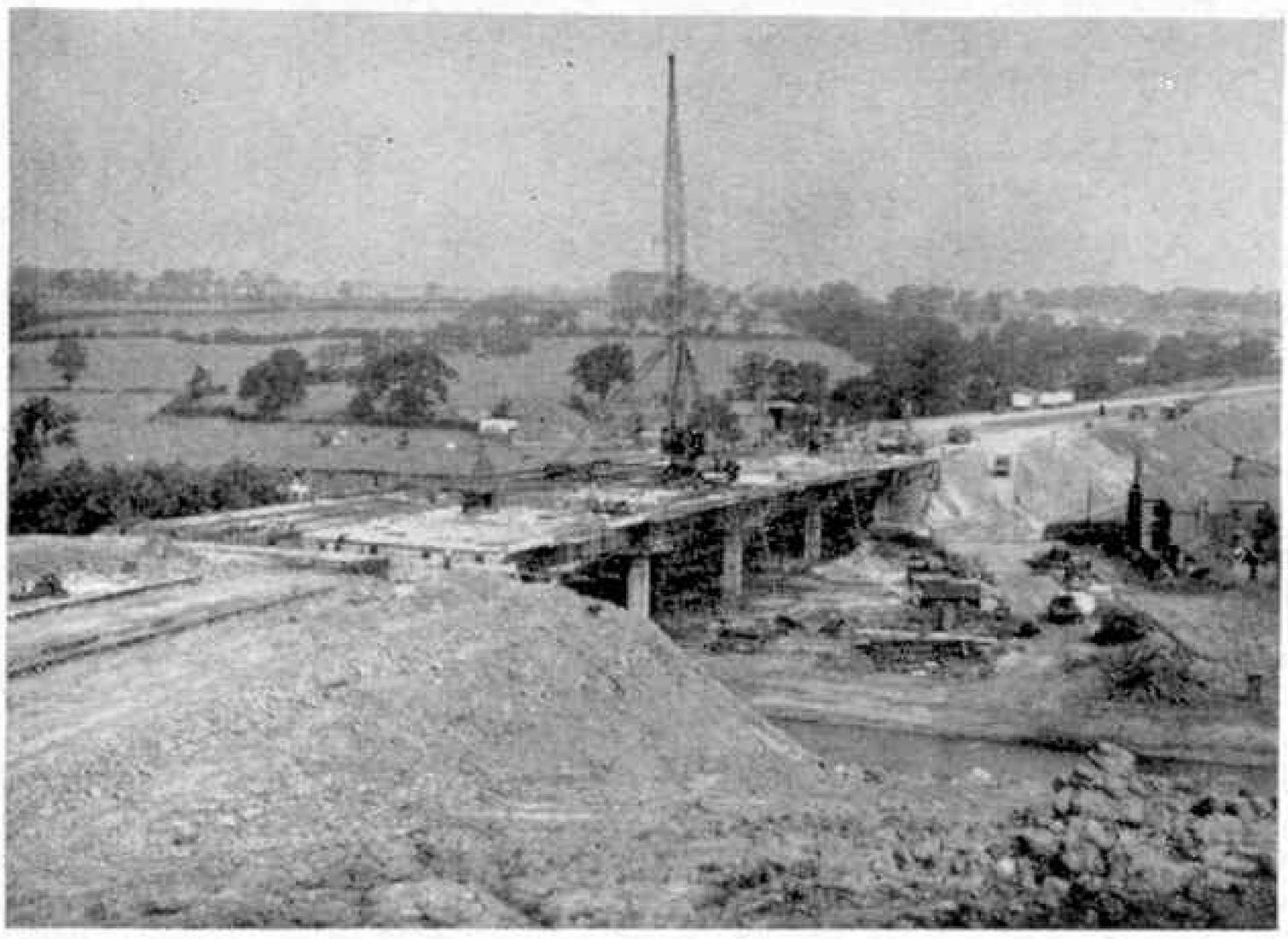
Northward from the Higher Walton bridge, the new highway is carried over another road before reaching the road and river crossing at Salmesbury. This is one of the most interesting examples of engineering that the motorway provides. At this point it passes over the A59 trunk road, between Preston and Blackburn, and also over the River Ribble, which there runs parallel to the road. The bridge that provides for this easy passage is of three spans, 120 ft., 180 ft., and 120 ft. in length respectively, the continuous steel girders giving a total length of 420 ft. between abutments, which are stone faced, as are the piers of the bridge.



The D'Urton Lane Bridge, which carries the motorway across an existing road.

As can be seen

from the top illustration on page 58. Salmesbury bridge is a graceful structure. The work of the civil engineers did not end with its building, however, for it was necessary here to provide means of reaching the motorway and of leaving it. For this purpose two curving ramps descending from the level of the motorway to that of the Preston-Blackburn road have been constructed, one on each side, each ending in a roundabout on the latter. On each ramp there are two roads, one for providing access to the motorway and one allowing for exit from it. Incoming traffic on either side finds its way easily and smoothly into the main stream of the motorway.



The River Darwen is crossed at Higher Walton by the bridge seen under construction in this picture.

On the northern portion of the new road, from the Ribble crossing to Broughton, there are as many as sixteen bridges, the number south of the Salmesbury river bridge being only six. One of them carries the railway line from Preston to Longridge, and was designed by the British Transport Commission. A neighbouring bridge carries the motorway and two large water mains over the road between these two places. It has a deck of steel plate girders, over a reinforced concrete slab under the carriageway.

The remaining bridges carry the new motorway over secondary roads, streams and footbridges, the last of the series being the D'Urton bridge, a three-span structure with a deck of pre-stressed concrete beams. Its overall span is 122 ft., and its width 77 ft.

Acknowledgments for permission to reproduce the pictures illustrating this article are due to Mr. J. Drake, M.I.C.E., County Surveyor and Bridgemaster of Lancashire, to the Cleveland Bridge and Engineering Co., Ltd., Dorman Long and Co. Ltd., and Leonard Fairclough Ltd., builders of bridges on the motorway, and to Tarmac (Civil Engineering) Ltd., main contractors for the enterprise.

Space Notes—*(Continued from page 65)*

encroaching upon the field where liquids so far have reigned supreme—long-range ballistic missiles. Solid rockets already available give thrusts of several hundred thousand pounds, and it will not be long before they are capable of a million pounds thrust. Several of the new large missiles, such as Minuteman, are to use solid propellents and it is probable that some of the smaller satellites of the future will use all solid rockets for their propulsion. But liquids will still be used for the larger projects, as they will always be potentially capable of higher performance.

The oldest solid propellent is gunpowder, but this is now used only in firework rockets. The one that was most commonly used during the last World War was cordite.

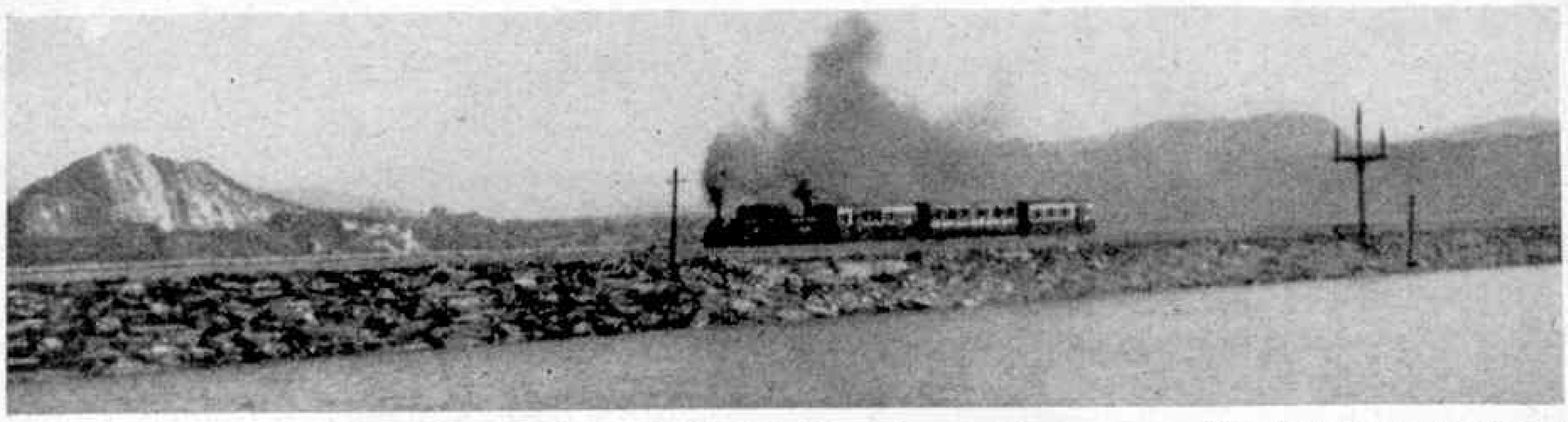
During the last ten years literally thousands of combinations of chemicals have been tried out, among the most successful being those that use some form of rubber as fuel and a cheap oxidant such as ammonium nitrate, which is made in enormous quantities for use as a fertiliser and is very cheap indeed. These are mixed together, with other chemicals added to help bind the mass together. After thorough mixing the propellent is either cast directly into the rocket cases or extruded through dies into the desired shape and then pressed into the case.

"We See, We Act"—*(Continued from page 68)*

it than that, however. The day and night attacks demoralised the enemy. They forced the Communist bands to move continuously from areas where they had established camps and food supplies, and drove them into ambushes set up by the security forces. After surviving the carpets of bombs that rained on them through the trees, thousands of terrorists surrendered; so that by the summer of 1958 the enemy had been depleted from 11,500 active fighting men to probably fewer than 1,000 hunted guerrillas, living on what edible roots, leaves and fruit they could find in the jungle. And, of course, as the morale of the terrorists deteriorated, so that of the security forces and the civilian population of Malaya improved.

When No. 1 flew home to Australia last year, it did so in the knowledge that it had dropped 85 per cent. of all the bombs loosed on the Communists in Malaya, thereby playing a major role in preserving the freedom of this important corner of the Commonwealth.

The piston-engined Lincolns have now been "put in mothballs" as reserve aircraft, and No. 1 has converted to Canberra jet-bombers, also built in Australia. Its work in Malaya has been taken over by No. 2 Squadron of the R.A.A.F., flying Canberras. But No. 1 is ready, as always, to "see and act" in defence of its homeland wherever and whenever danger threatens.



A three coach train in charge of "Taliesin", a Fairlie 0-4-4-0 engine, ambling across the Traeth Mawr Embankment with a Minffordd-Portmadoc morning train.

The Festiniog Railway

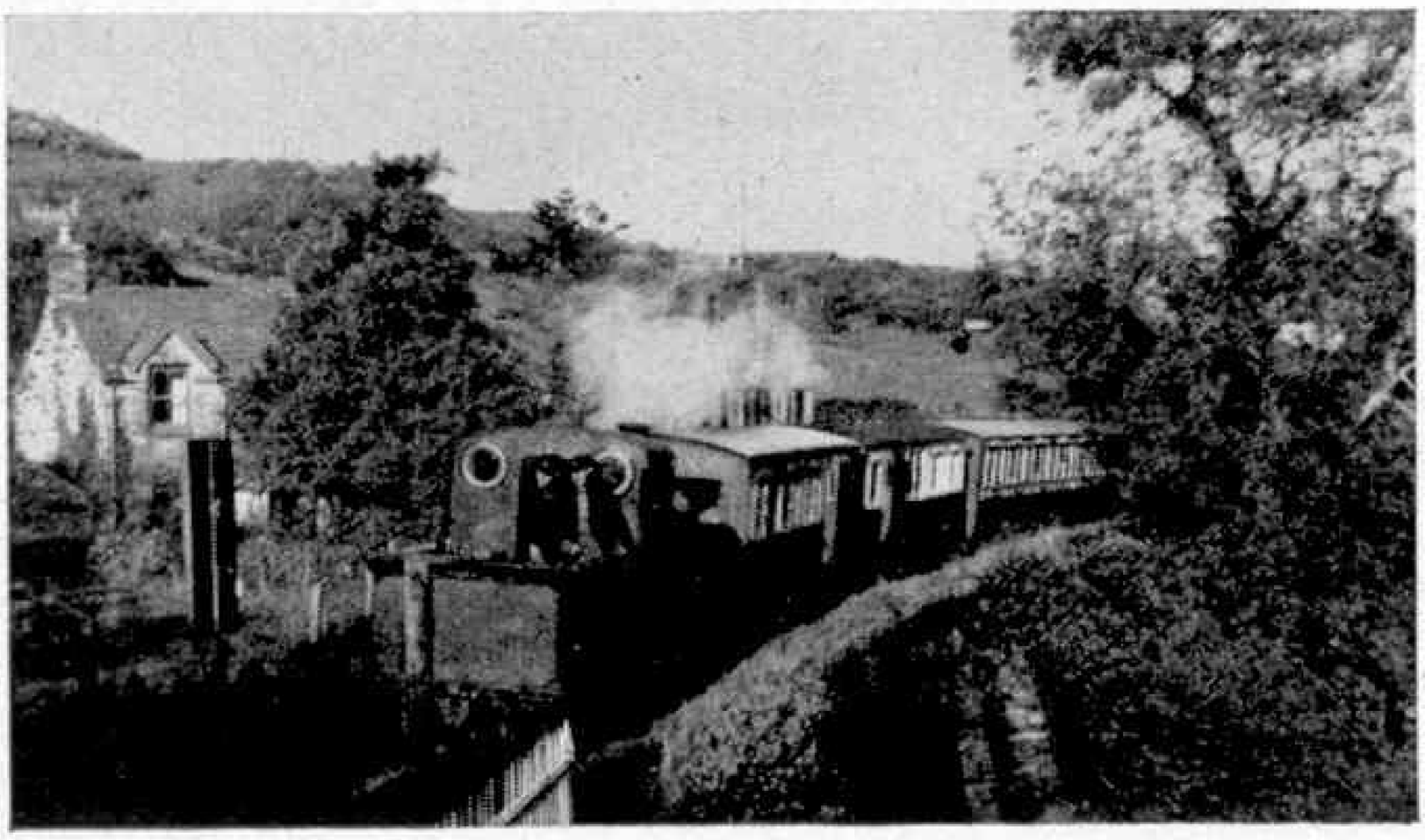
Britain's Premier Narrow Gauge Line

By Geoffrey Oates

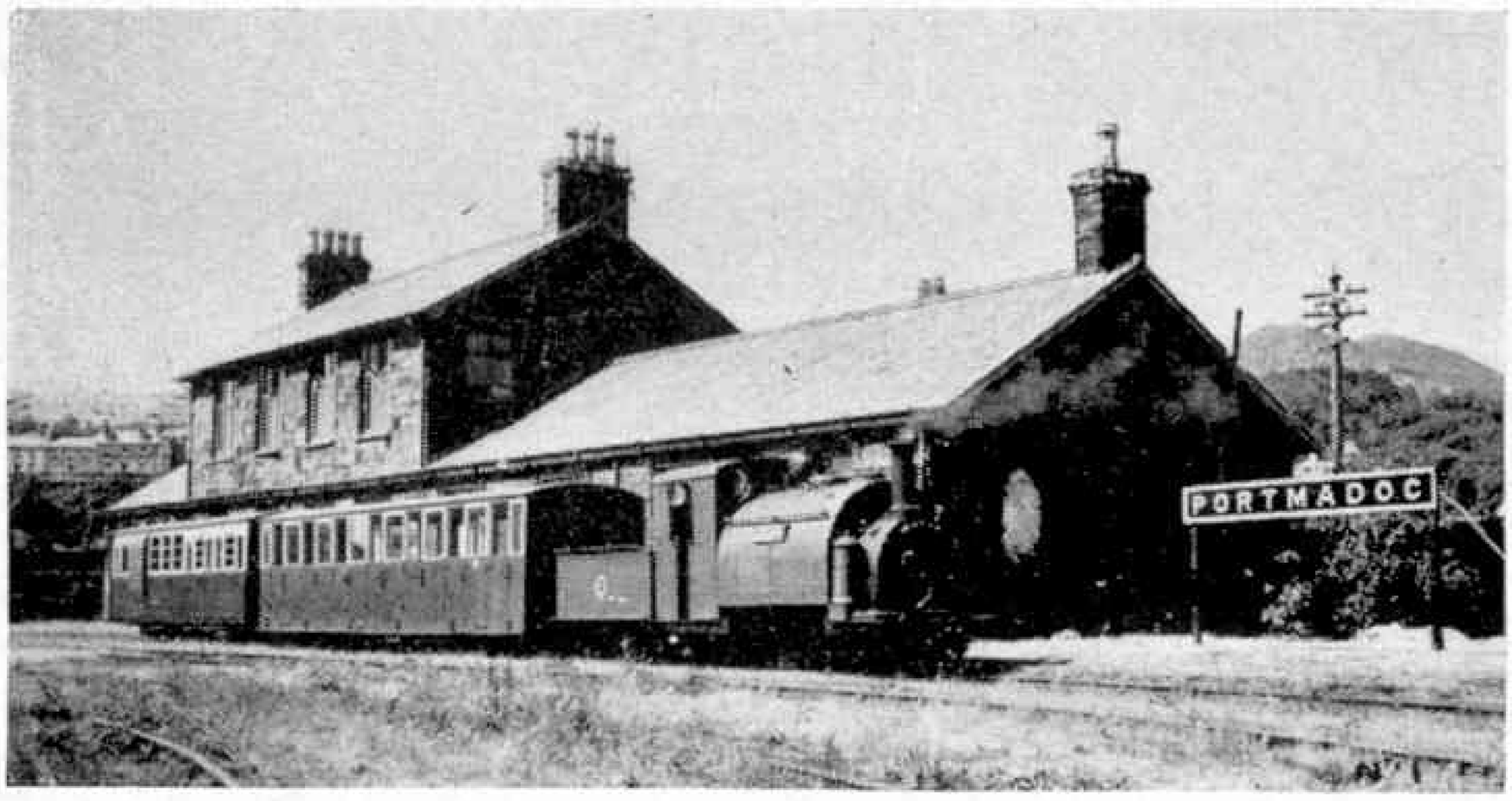
SINCE the revival of the famous North Wales narrow gauge Festiniog Railway in July 1955, progress has gone on apace, for nearly two-thirds of the original 13¼ mile route of 1 ft. 11½ in. gauge from Portmadoc to Blaenau Ffestiniog has now been opened for passenger services. What is even more encouraging is the fact that traffic has increased each year since the line was re-opened.

It will be recalled that by 1956 the railway had opened the 2¼ miles from Portmadoc to Minffordd, which was considered a good advance on the initial one mile to Boston Lodge in the previous year. By the spring of 1957 it had reached Penrhyn, a station that conveniently serves Penrhyndeudraeth, a small town that seems to cling precariously to a steep hillside. But the greatest event in the march of progress was the 4¼ mile extension to Tan-y-Bwlch in April 1958, which is the longest section of line to be opened at one stage. Unfortunately a hydro-electric scheme now in course of construction will prevent the railway from reaching Blaenau Ffestiniog by the original route, which included a tunnel hewn out of solid rock. The Railway Company is confident that the upper terminus will be linked once again in the not too far distant future, however, but by a diversion route.

Apart from the wonderful views, which command the full attention of passengers, especially above Penrhyn, there is now the added delight of being welcomed at Tan-y-Bwlch by the stationmistress, Mrs. Jones, in her colourful Welsh costume. Mrs. Jones, who used to perform this task before the line was closed to passengers at the outbreak of war in 1939, assists the guard in unlocking the carriage doors. The reason for keeping the doors locked while the train is in motion is because the clearances in places are extremely tight; and as an additional precaution, bars are fitted across windows that open to prevent passengers from putting their heads out of them, which is always a dangerous practice.



"Prince" at the head of a train cautiously approaching the level crossing at Penrhyndeudraeth, with both the driver and fireman keeping a close watch.



"Prince" at Portmadoc station in 1955. Photograph by courtesy of the Festiniog Railway

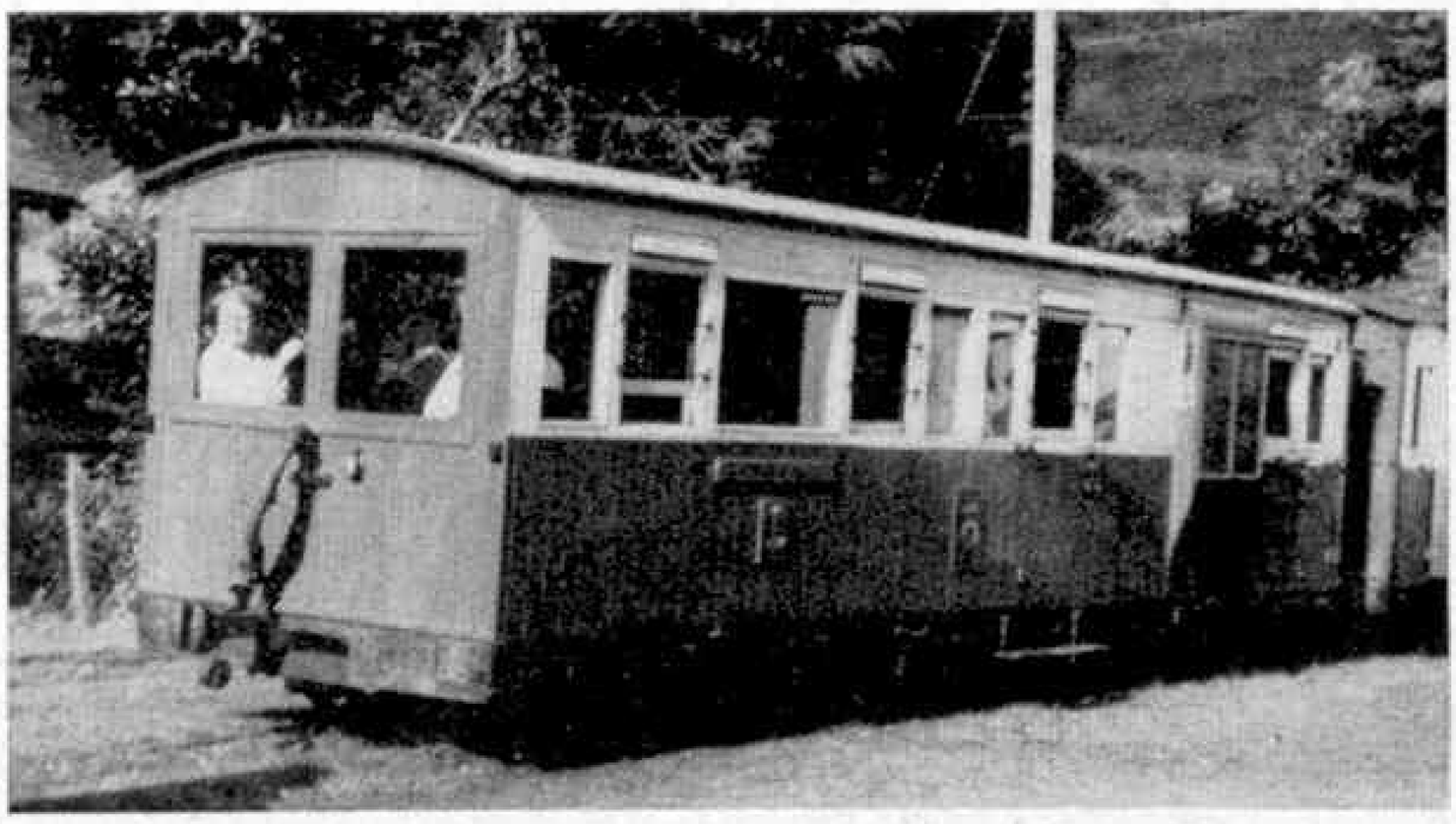
Much of the passenger rolling stock was constructed during the latter part of the nineteenth century, and required completely renovating. However, by last summer seven bogie coaches had been restored and placed in service.

One vehicle has been converted into a Buffet Car where minerals, sweets, postcards and brochures relating to the railway can be purchased. Another has been rebuilt as an observation saloon, and travels at the rear of the train from Portmadoc to Tan-y-Bwlch, passengers willingly paying a supplementary fare for the privilege of riding in it. The popularity of the observation saloon can be measured by the fact that nearly 4,000 people have paid the extra charge in addition to the first-class fare since its innovation last year.

There are two large windows at the Portmadoc end of this coach, which is fitted with seats down each side of the saloon, affording passengers excellent views of the scenery. At the other end of the observation saloon, which is divided by a door with a frosted panel bearing the Company's Coat of Arms, is a special compartment for those joining or alighting from the train at one of the three Halts en route. This convenient arrangement obviates the necessity of the guard walking up and down the train at each Halt looking to see if any passenger wishes to alight.

On the occasion of the Annual Meeting of the Festiniog Railway Society Limited, a body of over one thousand members who give financial and practical support to the Railway Company, I travelled in one of the special trains that ran to Tan-y-Bwlch. The seven fully-loaded carriages were in charge of *Taliesin*, one of the two 0-4-4-0 Fairlie "double-ended" locomotives owned by the Company.

Leaving Portmadoc and crossing the mile long Treath Mawr Embankment, where panoramic views of the Snowdonian peaks are obtained, the train passed Boston Lodge works, the birthplace of *Taliesin*. Our seventy-three year old engine showed little sign that the line was now gently climbing to Minffordd, or, even when the gradients stiffened towards Penrhyn, where the station is on a ledge high up on the hillside. It was from there that the scenery improved considerably as the train started to climb in earnest, and the views were constantly changing as the line twisted and turned on the narrow track that hugged the mountain-side. Looking back I saw Portmadoc and the Treath Mawr Embankment far away, and from our dizzy height the floor of the luxuriant Vale of Ffestiniog was far below. The gorse bushes were ablaze with colour, and the loud but clear double exhaust of *Taliesin* labouring up into the mountains



The observation saloon showing the two large windows from which passengers obtain excellent views of the scenery en route.

sent the sheep and their little white lambs scampering away from the verdant pastures near the lineside.

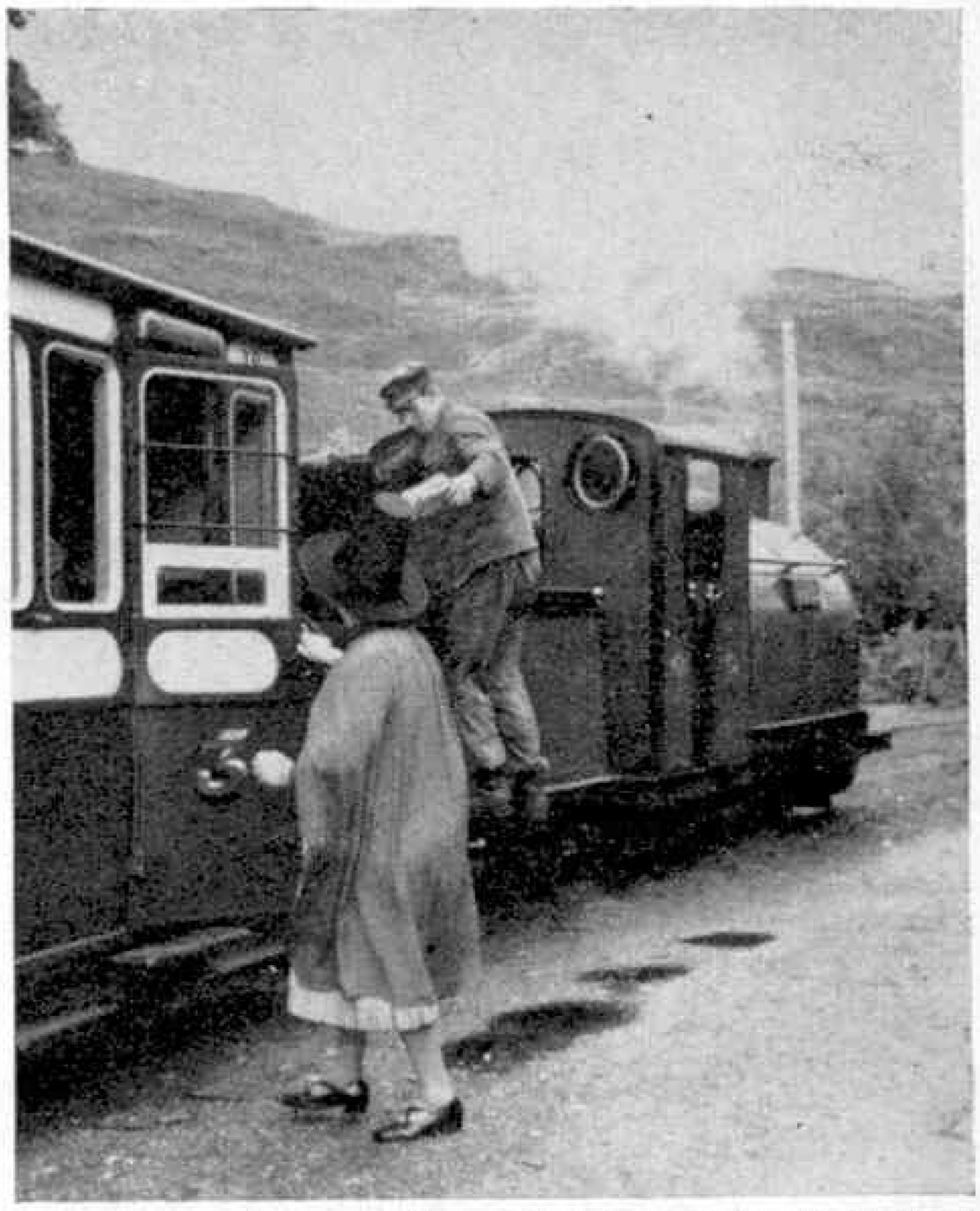
The country became more wooded during the latter part of the journey, and to reach Tan-y-Bwlch the railway had to make a detour in the shape of a horse-shoe bend, swinging high above the waters of Llyn Mair, known as Mary's lake. Tan-y-Bwlch station, 400 feet above sea level, nestles neatly on the mountainside, affording lovely views of other peaks in Snowdonia and of the blue waters of Llyn Mair far below. The cover picture this month shows *Taliesin* and the train ready to leave Tan-y-Bwlch on the return journey to Portmadoc.

During the last two years, the expanding heavy summer traffic has been mainly in charge of *Taliesin*, with the off-peak services ably dealt with by *Prince*, an 0–4–0 saddle-tank with tender, originally built in 1863 by George England & Co.

Last summer the timetable provided for one morning and two afternoon trains each way. The time allowed for each 7½-mile journey was 45 minutes, including stops at Minffordd and Penrhyn, together with halts if required at Pen Cob, Boston Lodge and Pen-y-Bryn. The latter Halt is a quarter of a mile before reaching Penrhyn, which is sited conveniently for residents at Penrhyndeudraeth. Business was good, and as the Railway had experienced overcrowding on the first afternoon train since the Tan-y-Bwlch extension and no further bogie carriages were ready, a few little four-wheelers were hurriedly prepared and painted for last August Bank Holiday. These vehicles were then hauled by *Prince*, which ran as a relief, following *Taliesin* with the 2.30 p.m. train. There were days when both trains ran to Tan-y-Bwlch packed solid, leaving potential passengers standing at Portmadoc station!

First-class accommodation with a carpet on the floor and its soft seating, as compared with the hard boards of the thirds, has proved very popular with passengers; so much so that at times the demand has exceeded the available facilities. Fittings in the first-class compartments include mirrors and pictures, luggage racks, and blinds, but it is the antimacassars on the backs of the seats that give the final touch of elegance!

In 1957 both *Prince* and *Taliesin* were completely repainted and lined out in the Railway's livery, which is green for tank and cab sides, together with the tender, the tank and boiler tops and cab fronts being black.



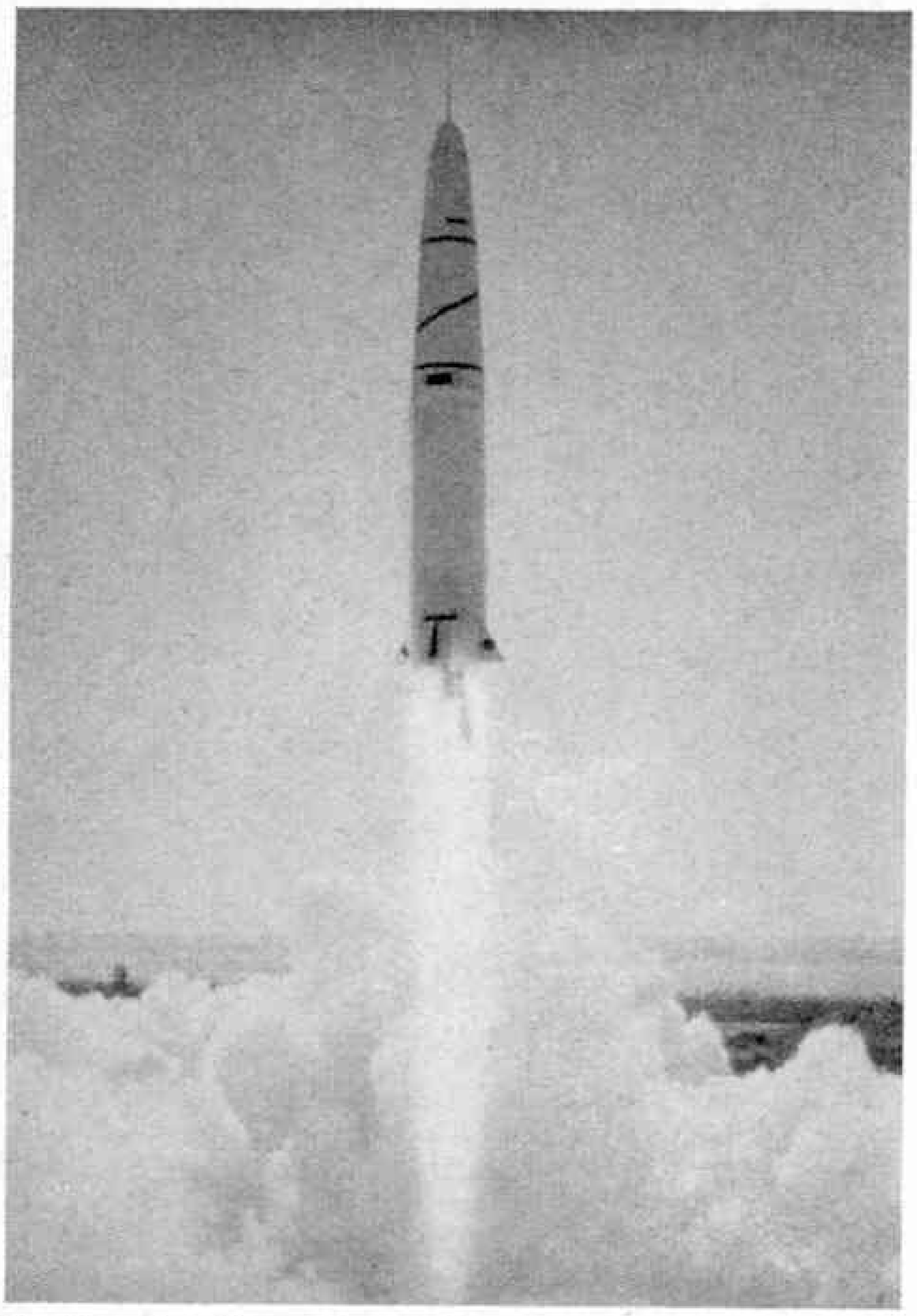
The stationmistress at Tan-y-Bwlch unlocks the carriage door. The bars fitted across the window are to prevent passengers from putting their heads out.

Side rods and connecting rods are painted red and cab interiors cream. The Coat of Arms of the Company is represented as a garter inscribed with the words *Festiniog Railway*, and surmounted by the Prince of Wales' feathers. These embellishments appear on the tender sides of *Prince* and the cab sides of *Taliesin*, in addition to adorning passenger rolling stock.

The livery of the motive power is matched by attractively painted coaches which are green below the level of the windows and cream above, with ends red and roofs grey. A train on the Festiniog Railway certainly adds a splash of colour wherever it may be seen.

The Festiniog is a progressive railway, for when the Ministry of Transport required the road crossing at Minffordd to be protected by level-crossing gates, which could be kept closed across the road when trains were crossing, colour light signals controlled by the position of the gates were installed. This was the first example of electrical signalling and interlocking on the railway. There are gates protecting the other level crossing on the route, which is situated just beyond Penrhyn, where the railway makes an oblique crossing over the road.

Among the old vehicles is one that will not be restored for (*Continued on page 104*)



The Douglas Thor I.R.B.M. has a range of 1,500 miles. In a slightly modified form it is used as the first stage of the Pioneer vehicle. Photograph by courtesy of Douglas Aircraft Co.

Space Notes

By

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

Lunar Probes

At the time of writing there have been three attempts to send a small rocket to the Moon and turn it into a lunar satellite. All three attempts have been unsuccessful, but another is due in the very near future, and its fate will be known before this appears in print.

The first firing was carried out by the United States Air Force on 17th August of last year at Cape Canaveral. The Pioneer, as the rocket is called, took off steadily and began its planned turn towards the north-east. Observers on the ground saw a puff of smoke and thought that it was the second stage lighting up. Instead it was an explosion in the first stage and the rocket plunged into the Atlantic Ocean 10 miles from its launching point.

In the second firing on 11th October the first stage, which was a modified Thor missile, burned for three seconds too long and the guidance equipment failed to correct the resultant 3½ degree error in angle of trajectory. This meant that the Moon would not be reached and an attempt was made to fire the retro-rocket, intended to slow down the missile on approaching the Moon, in order to change its trajectory so that it would not crash back on to Earth. The rocket, which was a solid propellent one, did not fire, as the igniting battery had frozen up.

Pioneer reached 79,212 miles altitude and almost floated in space at around this height for about two hours, since the Earth's gravitational pull at this distance is only 4 per cent. of its value at the Earth's surface. The least-publicised fact about this rocket is that it relayed radio signals between Hawaii and England. Signals from a transmitter in Hawaii were picked up by a receiver in the vehicle and rebroadcast.

The third firing, by the Army this time, took place on 7th November, but the rocket plunged to Earth somewhere in Africa after the third stage failed to ignite.

Planetary Probes

Clearly the space race will not stop at the Moon and it is interesting to speculate on the next steps to be taken. Existing Russian rockets and American rockets of the near future are quite capable of carrying loads beyond the confines of the Earth-Moon system. But although the vehicle could be found to take a probe to, say, Mars or Venus, the big problem would be to guide it. The accuracies required for the Moon probe are high enough, but would be multiplied by a hundred for Mars or Venus. The only real solution would be to have small rockets that could be turned on and off in flight to provide correction as needed.

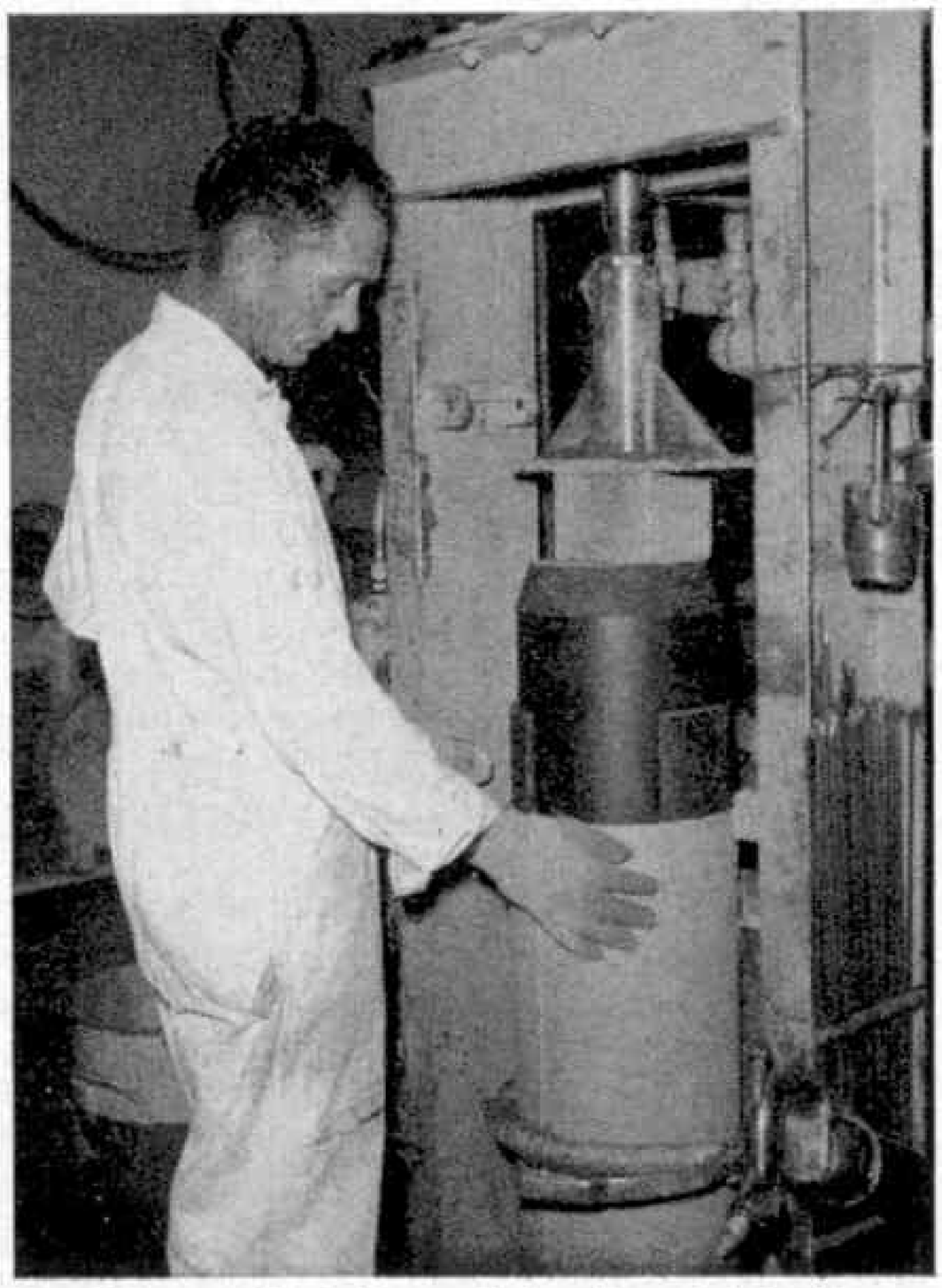
There are three reasons for carrying out such explorations—prestige, the investigation of space at great distances from the Earth, and investigation of the planets themselves. Prestige need not concern us here, but will probably be an important factor in determining the allocation of money to enable such projects

to be carried out. The second reason can be covered even if the probe fails to reach its destination, as the second Pioneer "failure" showed. For the astronomer the third reason is the most compelling of all, for although both of these planets are, astronomically speaking, close to us, there is much that could be learnt from a probe that could never be obtained by Earth-bound instruments. Examples are the composition and density of the atmosphere and the magnetic field.

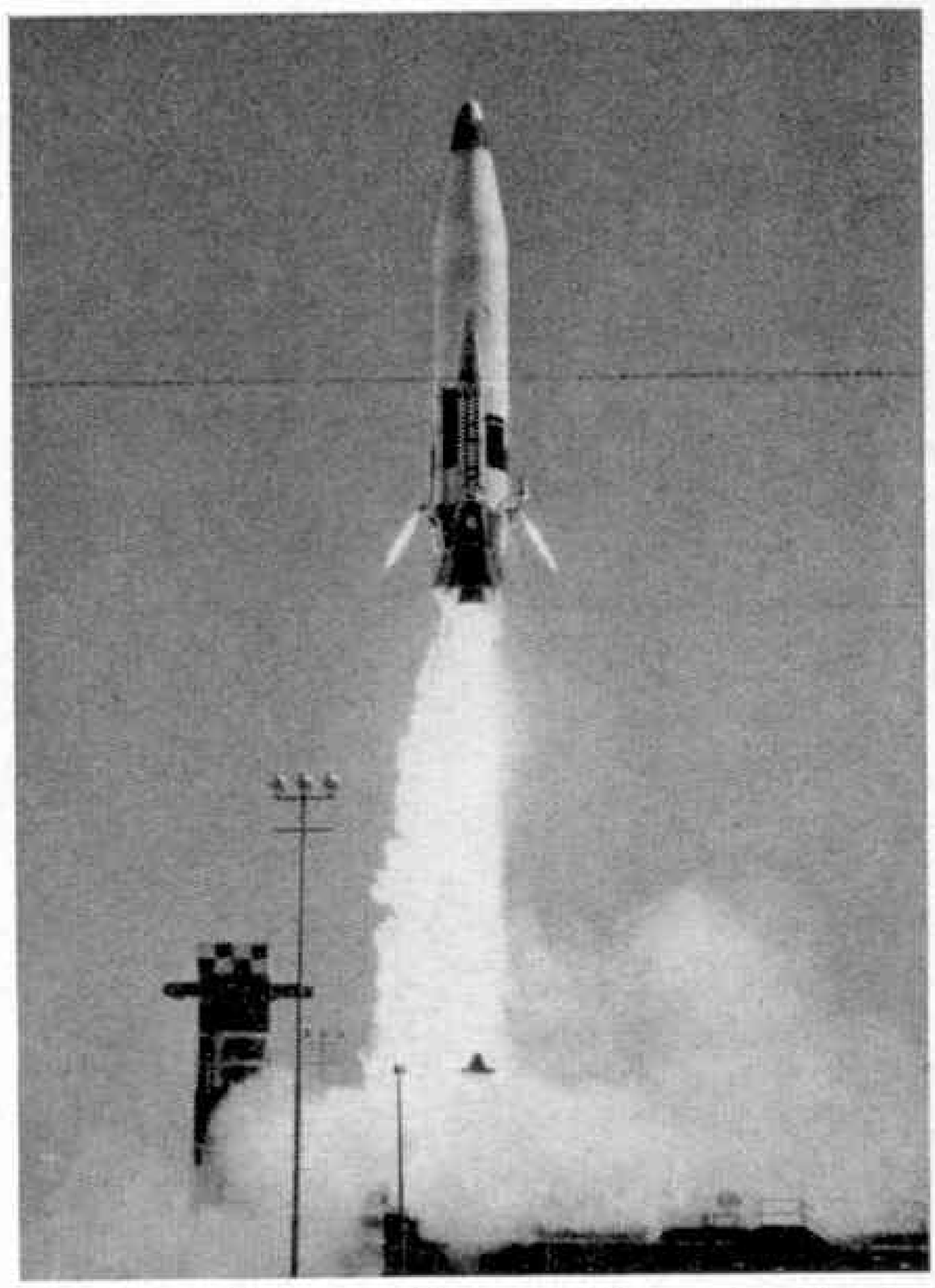
Venus is a special case, as it is covered with perpetual cloud and even its surface features are unknown. Thus a probe to land on Venus and send back information about its surface would be of special interest, but doubtless this will come only in the second generation of planetary probes.

Solid Propellents

The propulsive gases to drive a rocket are obtained by burning a fuel with an oxidant to supply oxygen. These can be in either solid or liquid form. In the liquid-propellent rocket motor the liquids are kept in separate tanks and forced into the combustion chambers where they are burnt. The solid propellent contains within itself all the ingredients necessary for combustion and is placed directly inside the combustion chamber.



A solid propellent charge being forced into its case under a press. Photograph by courtesy of Rocketdyne.



The 5,500 mile range Atlas could be used as the first stage of a Mars or Venus probe. The small controlling rockets can be seen at either side. Photograph by courtesy of Convair.

Liquid propellent rocket motors are quite complicated pieces of machinery compared with solid rockets, and the liquid propellents themselves are often unpleasant and difficult to handle, as was explained in *Space Notes* for August and October of last year.

The solid motor then has the advantages of extreme simplicity and ease of handling, and a fully fuelled missile can be taken from storage and used at a moment's notice. Unfortunately there are snags. As the whole of the propellent is kept in the combustion chamber, this obviously becomes larger and heavier as motors with increased thrust or duration are planned. Fortunately modern propellents will burn satisfactorily at much lower pressures than those of a few years ago, so that cases do not now have to be so strong.

A major drawback with solids is lack of controllability. When a solid is ignited it carries on until it is all burnt, whereas a liquid can be controlled by varying the propellent flow and can be switched off and started as required.

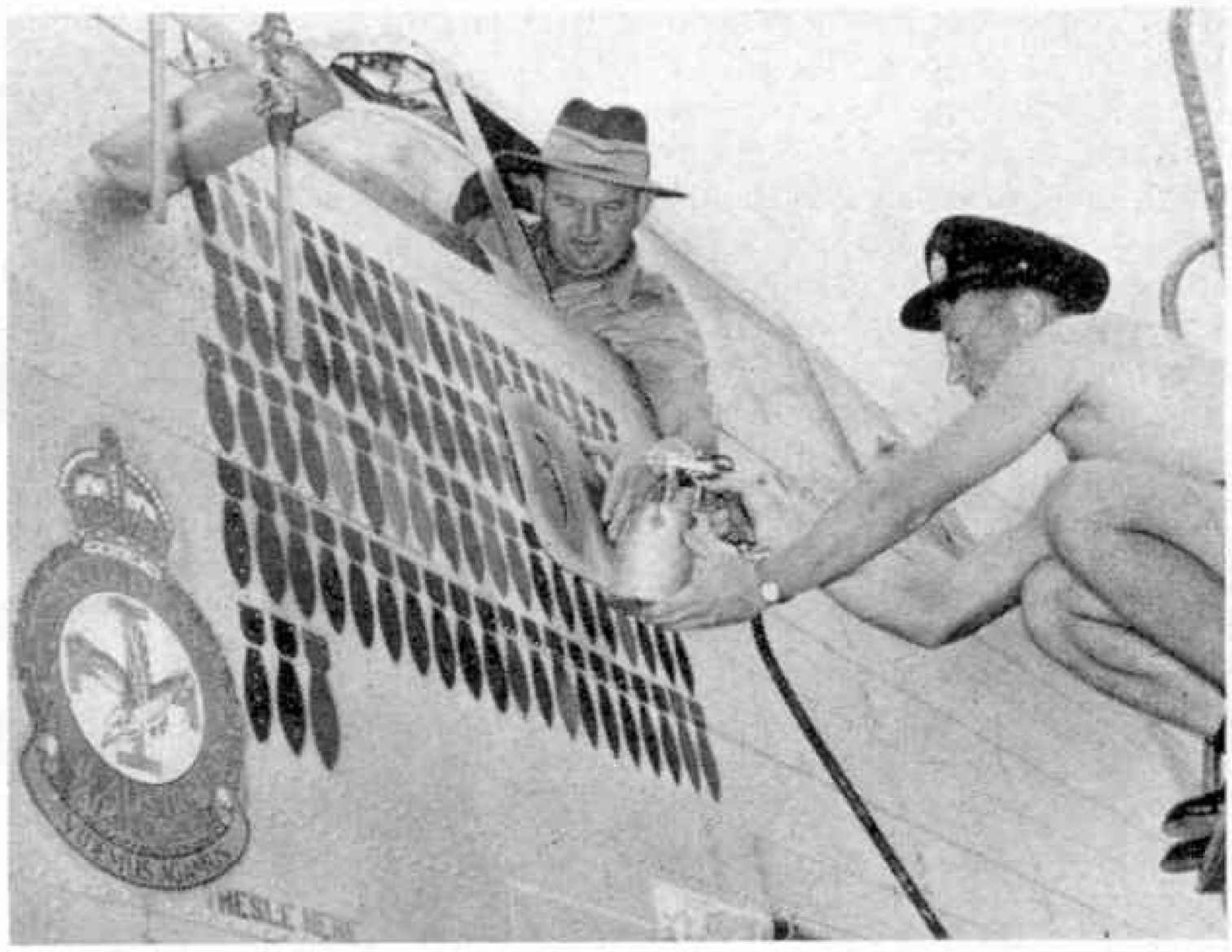
Nevertheless, in spite of these drawbacks and many others, solid propellent rockets are being used on a wider scale now than ever before and are (*Continued on page 60*)

"We See, We Act"

The Story of No. 1 Squadron R.A.A.F.

By

John W. R. Taylor



Another strike goes up on the scoreboard. Light colour (red) is for night operations, black for day strikes. The illustrations to this article are from Royal Australian Air Force official photographs.

NO picture could convey better the character of No. 1 Squadron of the Royal Australian Air Force than that which appears at the top of this page. The slouch hat worn by the man leaning from the cockpit window has long been the 'trademark' of Australia's fine fighting men. Each bomb silhouette on the aircraft represents one raid made by it against the enemy, symbolising the Squadron's splendid record of service. And No. 1's earliest achievements are recalled by part of the arms of Jerusalem that appear on its badge, together with a diving kookaburra and the motto *Videmus Agamus* (We see, we act).

The story of No. 1 began during the 1914-18 War, when the British Army Council suggested that the Dominions might like to raise complete squadrons for service with the Royal Flying Corps. Australia responded at once, and No. 1 Squadron of the Australian Flying Corps, numbering 28 officers and 195 other ranks, embarked from Melbourne on 16th March, 1916.

It was a very new unit, without aircraft or technical equipment. So the men were sent to R.F.C. squadrons in Egypt for training, while most of the officers came to the United Kingdom for final instruction in war flying. As a result it was not until 7th July, 1916, that 'A' Flight of No. 1 Squadron went into action as part of the R.F.C.'s Fifth Wing, in the Western Desert of Egypt. Operating from Kharga oasis, it made long reconnaissance flights to help the Army in the campaign against Senussi tribesmen who had allied themselves with the Turks. When the Senussi were defeated, it was switched to the main Turkish front, east of Suez; and there, on 20th March, 1917, one of its pilots, Lt. F. H. McNamara, won the first Victoria Cross awarded to a flying officer in the Middle East.

The unit's war diary tells how, during an attack on the railway near Tell el Hesi in southern Palestine, the B.E.2C biplane of Capt. Rutherford developed engine trouble, so that he was forced to land behind the enemy lines. Lt. McNamara in a Martinsyde Scout dived through heavy rifle fire to his rescue, although he had already been severely wounded in the thigh. He landed some 200 yards from the B.E.2C, but his injuries prevented him from leaving his aircraft, and helping Captain Rutherford try to re-start the troublesome engine. So, as enemy cavalry were rapidly approaching, it was decided to try and get away in the single-seat Martinsyde.

Captain Rutherford clambered on to the fuselage behind McNamara; but the latter's injured leg prevented him from keeping the aircraft straight during the take-off run and it turned over. The two officers extricated themselves and set fire to the Martinsyde, after which Rutherford helped McNamara over to the B.E.2C and lifted him into the pilot's seat.

While all this was happening, the other

Australian-built Avro Lincoln bomber, the type used by No. 1 Squadron R.A.A.F., from 1948 until re-equipped last year with Canberra jet-bombers also built in Australia.

pilots of the Squadron kept the enemy at bay by diving at them repeatedly with machine-guns blazing. As a result, despite heavy fire, Rutherford was able to swing the B.E.2C's propeller and climb into the observer's seat. McNamara then took off successfully, and, although weak from loss of blood, flew the aircraft back to his aerodrome, 70miles away.

At the time of this gallant exploit, the unit was operating officially as No. 67 (Australian) Squadron of the R.F.C., but since 6th February 1918 it has never been anything but No. 1. It fought throughout the campaign in Palestine and suffered as badly as most R.F.C. squadrons when the Germans, who provided air support for the Turkish armies, attacked its out-of-date aircraft with faster, more manœuvrable types like the Halberstadt fighter.

Not until the first of the famous Bristol Fighters reached Palestine was No. 1 able to establish its superiority, and after that it not only drove the Germans from the skies, but did deadly execution among the retreating Turks. As well as 'Brisfits', it received the one and only Handley Page 0/400 twin-engined heavy bomber allocated to the Middle East; and when the Arabs saw this standing among smaller machines they exclaimed: "Indeed and at last they have sent us *the* aeroplane, of which these things were foals".

The 0/400 could carry sixteen 112 lb. bombs and ten 15 lb. incendiary bombs, and this heavy warload enabled it to wreck the enemy's communications in a single raid on the Turkish central telephone exchange in September, 1918, on the eve of General Allenby's offensive. Six weeks later the war in Palestine was over, and on 11th November the fighting stopped also in Europe.

With the return of peace, the Australian Flying Corps was disbanded, to be succeeded on 31st March, 1921, by the Royal Australian Air Force. No. 1 Squadron was reformed at Point Cook four years later, with D.H.9 bombers and S.E.5 fighters, and with Australia's top ace of the 1914-18 War, Flt. Lt. A. H. Cobby, as its C.O. For fifteen years it trained hard at its home bases. But, when war clouds began to gather in the Pacific, it was clear to Australia's defence planners that the Empire's great naval base of Singapore, although more than 2,000 miles away, was a key to the safety of their country. So, in 1940, the R.A.A.F. sent three squadrons to strengthen the garrison there, including No. 1. Flying Lockheed

Men of the redoubtable 1st/2nd Gurkhas go for a "flip" in one of No. 1 Squadron's Lincolns from their base at Tengah, Singapore.

Hudsons, its primary duty was reconnaissance and attack at sea, with the secondary role of bombing.

In the autumn of that year the squadron was ordered to its battle station at Kota Bharu in north-east Malaya; and it was during a reconnaissance from there on 6th December that its pilots spotted two large Japanese convoys, made up of merchant ships escorted by warships, south of Indo-China and heading west.

Bad weather made it impossible to maintain contact with the ships. Confused messages from Thailand, even after the Japs had invaded that country, added to the difficulties of the British Commander-in-Chief, and the initiative given to him by No. 1's brilliant reconnaissance work, 265 miles from its base, was largely thrown away. There was no such disastrous unpreparedness as the Americans displayed at Pearl Harbour; but the first round of the fight went to the enemy when bombs rained on Singapore and the roar of offshore guns was heard from Kota Bharu just after 1 a.m. on the morning of 8th December.

One of the Australian-built Canberra bombers in service with the R.A.A.F.

An hour later No. 1 received permission to attack the Japanese ships and landing craft. It did so with great gallantry, against overwhelming odds. By the end of the first day's operations only five of the squadron's 13 Hudsons were flyable; but they had killed 15,000 Japanese and accounted for the first Japanese merchant vessel sunk in World War II.

Before long, the enemy overran Kota Bharu and the squadron was withdrawn first to Singapore island and then to Sumatra and Java, where it continued the hopeless attempt to stem the Japanese wave of conquest. Not until its strength was reduced to three Hudsons, with no more in reserve, was it ordered home to Australia, and by then it was too late. A few men got away; but the C.O., Wing Cdr. R. H. Davis, and 159 of his men were taken prisoner.

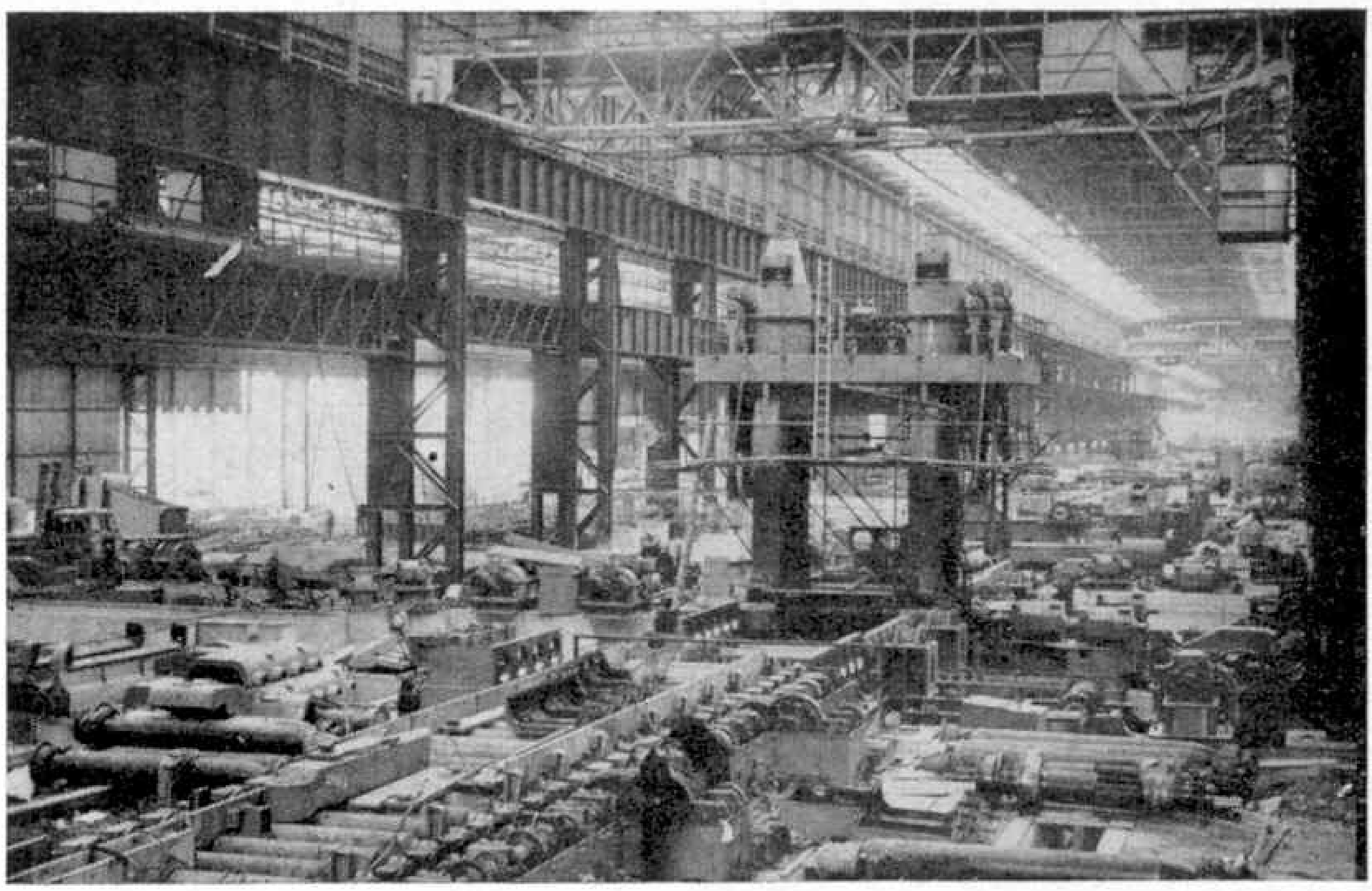
Australia was by then in the front line, and when No. 1 reformed with Bristol Beaufort bombers it was based at Darwin to prevent any repetition there of what had happened in Malaya. In 1945 it was re-equipped with Mosquito bombers and finished the war at Labuan, in Borneo.

Once again it almost disappeared with the return of peace, being kept alive only on a cadre basis until reformed with Australian-built Avro Lincoln bombers in 1948.

An event which occurred in Malaya that year led eventually to the squadron's return to the country where it had served so bravely in 1941. This time it was a squad of Chinese who shot in cold blood three unarmed British planters on 16th June, 1948, triggering off the wave of violence in Malaya which lasted for ten years. From the start air power was one of the most effective weapons available for use against the terrorists, and from July 1950 until last summer it was No. 1 Squadron, R.A.A.F., which formed the spearhead of the counter-attack.

Because it was a long-drawn-out campaign in a distant country, with no major battles, the Malayan fighting was seldom in the headlines. Even more frustrating for the airmen taking part in attacks on reported Communist hide-outs in the thick jungle was that there were seldom any visible results to show for their work. No. 1 Squadron's Lincolns dropped 14,750 tons of bombs in almost 4,000 sorties, yet could claim to have been directly responsible for killing only 23 terrorists.

There was more to (Continued on page 60)



Universal Beam Mill at Lackenby

By the Editor

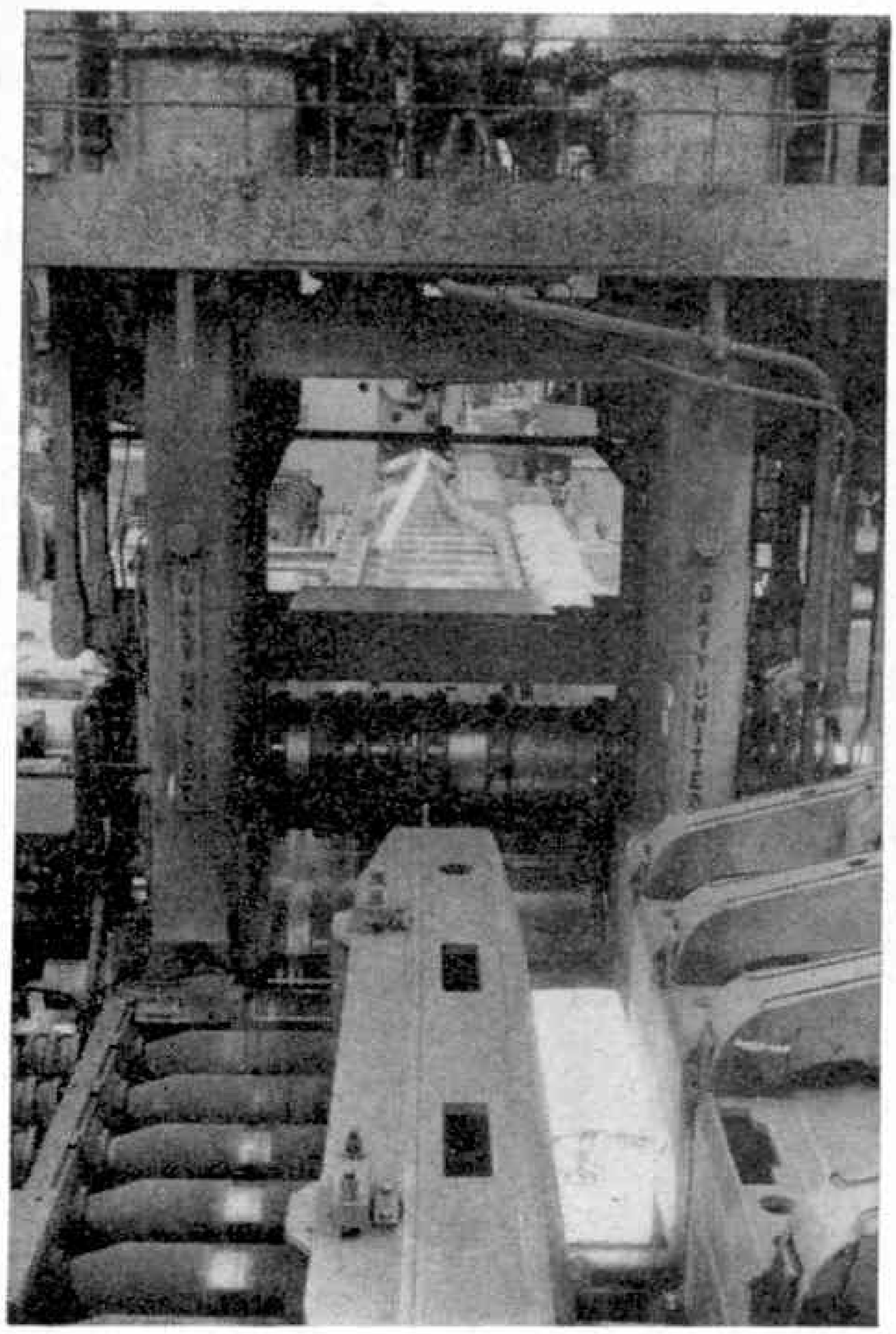
LACKENBY is near Middlesbrough, in Yorkshire, where the well-known firm of Dorman, Long and Co. Ltd., have just built and brought into use what is described as a Universal Beam Mill. The idea of a mill in a steel works is that steel is pressed into some desired form by passing it while white hot between rollers or rolls, to use the customary name. For instance, steel plate is made by passing white hot billets of steel between two rolls, one above the other, that reduce its thickness by the desired amount. Sometimes each roll has another one backing it in order to exert effectively the pressure required.

The universal beam mill at Lackenby has for its special purpose the rolling, not of sheet steel, but of beams and columns and other steels ections. It is a huge plant, which cost about £20 million and is housed in a gigantic building more than half a mile in length. The first successful mill of this kind was developed by an English steel man, Henry Grey, and built in Luxembourg as long ago as 1902. In it there are not just two rolls, an upper one and a lower one, but *four*. Two of these are vertical, and the other two are horizontal, so that they press on all faces of the beam at the same time.

The picture above shows a view of the mill in which large steel beams, girders and other heavy sections are made at the new works at Lackenby of Dorman, Long (Steel) Ltd., to whom I am indebted for the illustrations to this article. The mill and its accompanying equipment cost about £20,000,000, and the building housing the plant is more than half a mile long.

To appreciate exactly what this means take a glance at the lower picture on the next page. There you will see, not only the four rolls of the universal beam mill, but also the type of beam that they are designed to produce. The section of this shows the two flanges and what is called the web of the beam, by which the flanges are connected.

Using four rolls for work of this kind instead of two is claimed to give a better product. When only two rolls are used, these work the steel of the flanges of the beam against the side walls of deep grooves. It is then necessary to allow a generous taper on the fianges, but beams with practically no taper at all can be made by the four roll method.



The first unit in the new plant is the blooming mill seen in this picture, which rolls white hot ingots into "blooms" of the shape required for further operations.

In the picture of the arrangement of rolls in this universal beam mill there are two further rolls near the main four rolls. These are used to work the edges of the flanges, squaring them and controlling their length.

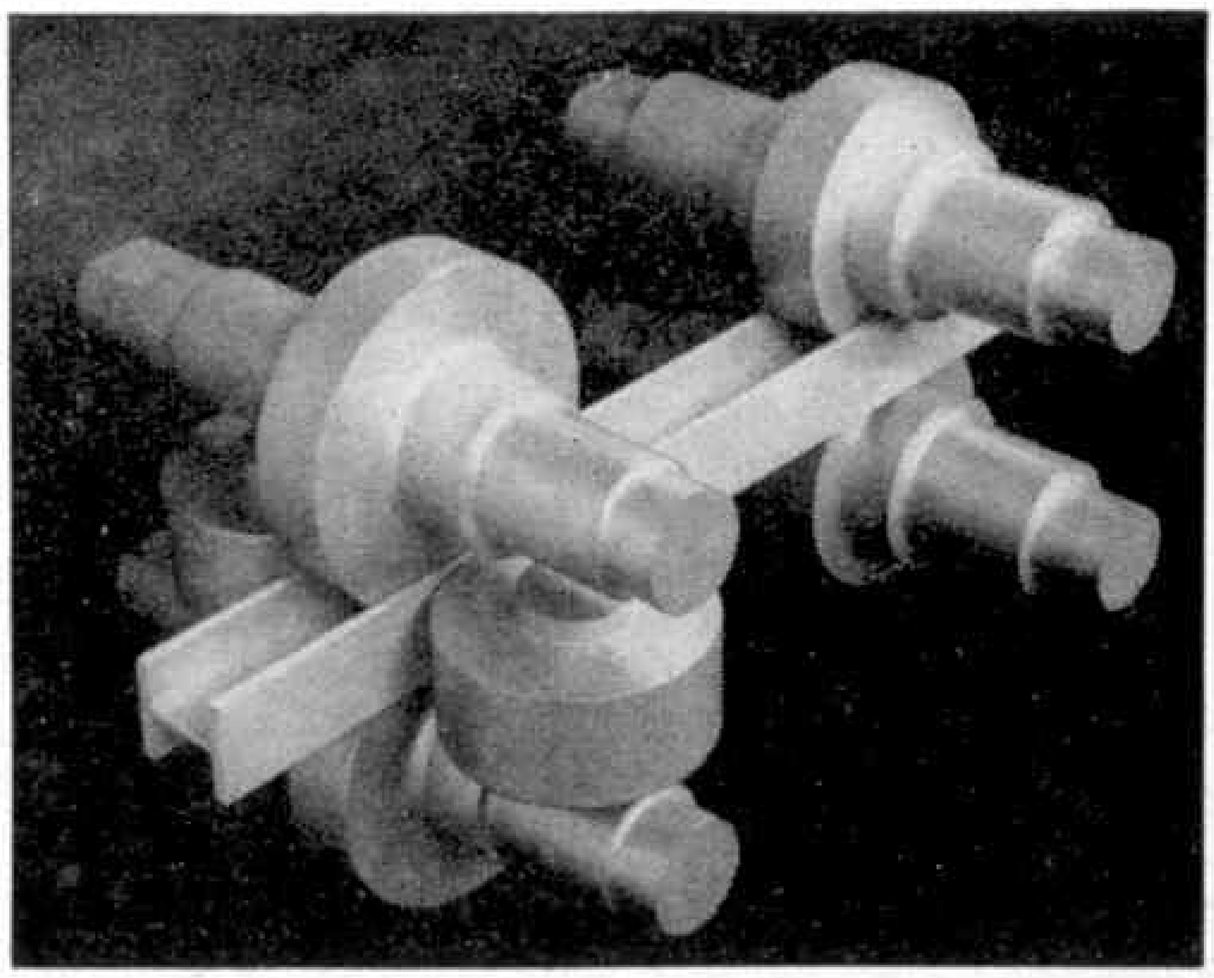
In practice two universal mills are usually employed in making beams; one of these is called the roughing mill, and the other the finishing mill. So the reduction to the required thickness of metal in the beam and its flanges is made in two stages, and the rolls are adjusted as required between successive passes in order to keep the elongation or lengthening of flanges and their connecting web equal.

The new mill at Lackenby has been built to produce from eight to ten thousand tons of beams a week. The steel for making these comes from the steel furnaces in the form of ingots, in their moulds, weighing from four to twenty tons. They are stripped from the moulds by means of powerful cranes, those used for the heaviest ingots having a lifting capacity of 40 tons, and are placed in soaking pits. Of these there are twelve built in pairs. They are heated by means of blast furnace gas, and when the ingots are heated evenly throughout to the right temperature they are lifted out to begin the journey down the long line from which they emerge as finished beams.

First an ingot to be dealt with passes over an automatic weighing machine that registers its weight. Then it runs on to the blooming mill. This is a rolling mill that gives it the shape suitable for the action of the universal mill. It takes rolls up to a maximum diameter of 4 ft. 4 in. and a weight of about 30 tons each. These can be changed very quickly when necessary. This is more often than with the usual type of blooming mill.

The next step is to cut the bloom, as the product of the blooming mill is called, to the right size for further operations. For this purpose giant blades are driven through it by a hydraulically operated machine of 1,350 tons capacity. They can make four cuts at full stroke in a minute and a half, repeating after a further 1½ minutes and are capable of cutting slabs of steel 10 in. thick and 50 in. wide. The crop, that is the part cut off that is not required for further operations, is pushed forward to a point where it is allowed to fall down a chute out of the way.

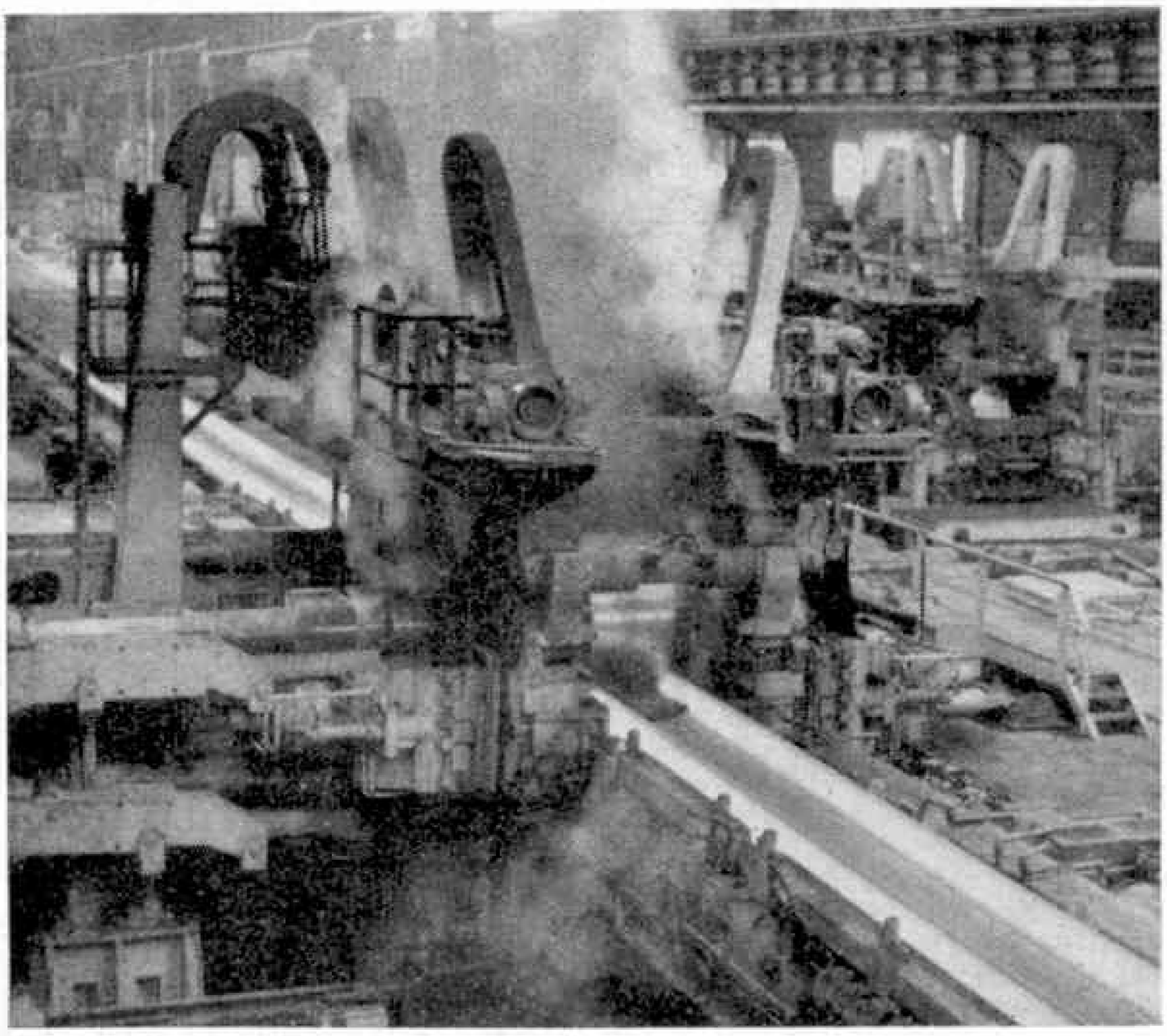
What follows then depends upon the size of the universal beam that is to be rolled. The shaped blooms for the largest of the beams keep their heat better than smaller ones do, because proportionally their radiating surface areas are smaller.



How the four rolls of the universal mill are arranged. The additional two rolls on the right square the edges of flanges.

So they travel straight on to the universal roughing mill. Smaller blooms are skidded sideways and passed on to a re-heating furnace before they find their way to the universal mills.

The two universal mills, roughing and finishing, are the essential components of the whole of this installation. Those at Lackenby follow in general principle previous mills of this kind, but many new features have been introduced to ensure more accurate sections, simpler adjustments and a high rate of production.



A 36 in. by 16½ in. universal beam passing through the finishing mill.

Each mill consists of two stands, one following the other, as seen in the lower illustration on the previous page. The shaped bloom passes first through the edging stand on the right, with its two horizontal rolls, and thence to the main stand, with its two horizontal and two vertical rolls.

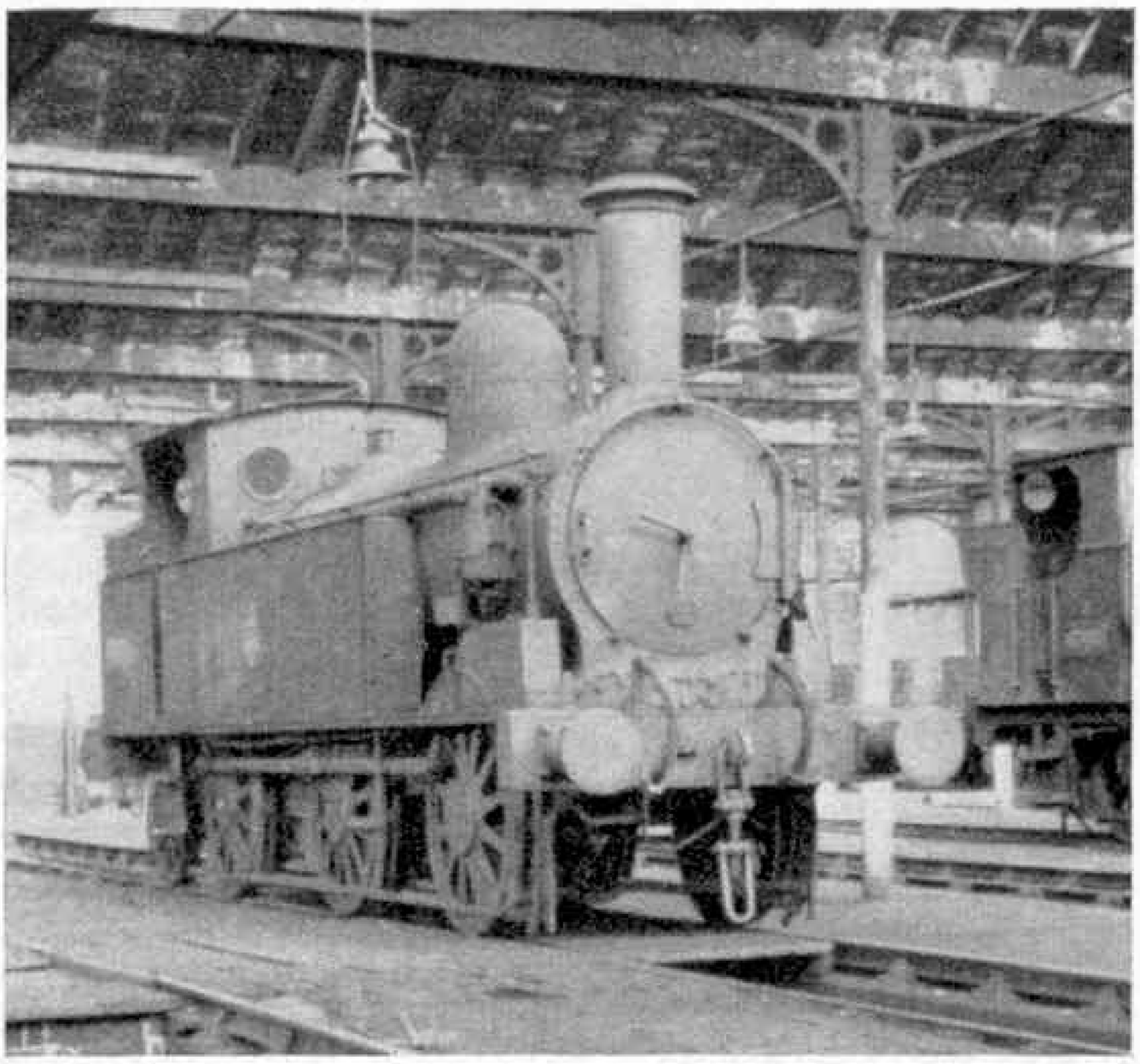
Successful rolling is largely dependent on keeping the piece being rolled at the correct level relative to the roller tables of the line along which the billets and the beams made from them travel. So on the main stand top and bottom screws have been provided to bring the top and bottom rolls together between successive passes, while maintaining the constant pass level. The vertical rolls too have to be moved inwards as the flanges of the beam are reduced in thickness, and this again is done by means of screws, progress being watched carefully and adjustments made as desired.

It is equally important to see that the beam is guided on to the rolls correctly, and mechanically adjusted side guides are provided for this purpose. The drive to the main rolls, which are 4 ft. 5 in. in diameter when new, is provided by a single motor of 8,000 h.p.

After leaving the finishing stand the rolled beams pass on to hot saws to be cut to the lengths required by customers. They are still hot, so they go on to the banks on which they stay until they are cold, after which they are straightened. This is done by four reciprocating presses, usually called "gags," for the larger beams, and by a roller straightening machine for the smaller ones. Each of the presses is capable of dealing with the largest beams that can be rolled in the mill. Finally they reach the piling bay, where the magnet cranes pick them up and pile them, ready for loading into wagons. Nearby is equipment for cold sawing and beam splitting, so that beams and other sections can be cold sawn to length as required, or dealt with in any other way that is necessary.

There are many services and maintenance requirements on a gigantic plant of this kind. For instance, there is a comprehensive water system that provides filtered water for a large range of purposes, and this is re-circulated, so that only make-up water is taken from the water mains. Another example of the services required is the maintenance of the giant rolls that shape the beams and other products. This is carried out in a roll turning shop in which there are six roll lathes. Outside the shop, but so placed that use is made of the same crane as in that section, are the roll stocking racks, on which no fewer than 448 rolls could be stored ready for use. The ingot moulds kept in stock in the mill, by the way, weigh 4,800 tons.

Another interesting feature is a walkway, 15 ft. above the ground, that runs the full length of the mill bay. This gives access by stairs at frequent intervals to all parts of the mill floor. Safe and easy access too is given by means of gangways and stairs to every part of the building where men must go in their work.



L.M.R. No. 58926, now withdrawn, the last of the ex-L.N.W.R. 0-6-2 "Coal Tanks" and the last Webb engine to remain in traffic. In this photograph by E. D. Chaplin it is shown at Abergavenny.

Railway Notes

By

R. A. H. Weight

Western Travels and Running Observations

Following the same route as the *Cathedrals Express* on a slightly quicker timing, the 11.45 a.m. from Paddington was worked through to Hereford by Castle 4–6–0 No. 7007 *Great Western*, displaying the former company's coat of arms, with 9-on, a little over 300 tons. A signal stop and some repair slowings made the first booked call, at Oxford, a little behind time. All was well thereafter through attractive country. There was a maximum of 80 m.p.h. down Honeybourne bank before stopping at Evesham and at Worcester, Shrub Hill, which was reached well within the 2½-hr. schedule from London. We were early also into Hereford after passing beside the Malvern Hills, close to hopfields and traversing two single-line tunnels mentioned recently in connection with diesel journeys.

Our locomotive was stationed at Worcester. Other Castles shedded there and noted on the way were No. 7005 *Sir Edward Elgar* and No. 5086 *Viscount Horne*, since withdrawn for scrapping, which was rebuilt from the older Star class in 1939. The only similarly modified one still running bearing an original Star number is 4037 *The South Wales Borderers*, which I saw take over the westbound *Devonian* from an L.M.R. Jubilee at Bristol.

A smart green modified Hall 4–6–0, No. 7917 *North Aston Hall*, stationed at Westbury and manned by two successive crews from that depot, was working the 12.30 p.m. principal-stations Paddington-Weymouth train throughout with a light load, leaving the West of England main line at Castle Cary, in which I travelled as far as Yeovil, Pen Mill, an ex-G.W.R. station. Then on behind W.R. 2–6–2T No. 5525 to the Town station, where there is a view of the S.R. locomotive shed close by. There M7 ex-L.S.W.R. 0–4–4T No. 30129 was waiting with the pull-and-push short train running backwards and forwards, connecting with the Waterloo-Exeter main route at Yeovil Junction, some distance away.

Later W.R. pannier tank No. 3733 took me to Taunton. A good deal of the way was on a single track. The train also ran on portions of the main Paddington-Exeter lines, first that via Castle Cary, then a section of the older Bristol route and from Cogload Junction into Taunton along the four-track stretch combining the two. From Taunton to Bristol I rode the *Cornishman* on its way from Penzance and Devon to the Midlands, headed by No. 5024 *Carew Castle*, which made up time.

At Weymouth in the summer I was able to watch the rare working in this country as a daily feature along public roads and quays also used by motor traffic of the main line passenger train from London. This brought passengers and luggage alongside s.s. *St. Julien*, bound for the Channel Islands. I also saw freight and shunting operation among the lorries and cars, so to speak. The locomotives are outside cylindered 0–6–0 pannier tanks, No. 1366 series, of light type fitted with a warning bell as well as whistle, liberal use being made of both of these. The trips to and from the main line are accompanied by experienced shunters.

After leaving a long-distance dining-car train running through the Midlands, S. Wales and West of England, I made a memorable trip from Pontypool Road to Quakers Yard on the way to Aberdare along a hilly and twisty cross-country route behind pannier No. 3716. We crossed a number of Welsh valleys, viewing in quick succession heather-clad moors, mountains, collieries and other industries, with villages at all sorts of altitudes as well as many railway lines far below that make connection with our tracks and at one time were owned by several different companies.

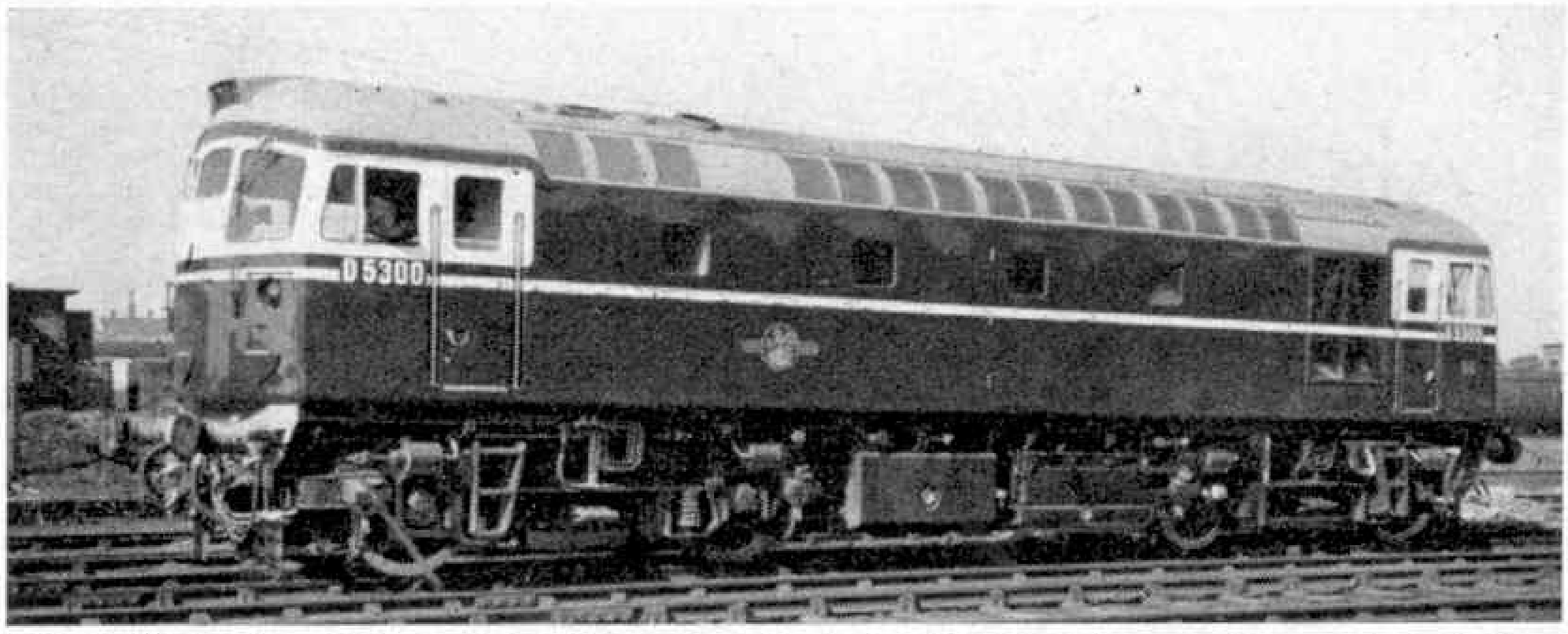
We also ran over the spectacular, single-line Crumlin viaduct, which is just over 100 years old. It is 1,658 ft. long on a big curve, and is partly 200 ft. above valley, road and railway below. From it there are remarkable views. We crossed Hengoed Viaduct also, having seen on the way workmen's trains double-headed by 2–6–2, 0–6–2 and pannier tanks. Locomotives of the last two types are numerous in S. Wales.

A modern diesel train with fine front end views took me from Quakers Yard to Pontypridd, thence down the Taff Valley amid much more railway activity to Cardiff, Queen Street, first and so into the far side at the main, General Station.

While in the West Midlands I saw No. 7013 *Bristol Castle*, now with double chimney and looking very bright, on two consecutive days. It was hauling the *Cambrian Coast Express* from Paddington to Shrewsbury and back, and taking over for the return journey from a Manor class engine.

Railroad Problems in the U.S.A.

The railroads of the United States are still mainly operated by private corporations or companies. Many of them cover vast areas and provide fine passenger service in the way of speed and accommodation for day and night travel over long distances. There is very little steam locomotive working now, as even the huge and very powerful types introduced during the last 15-20 years have been replaced by big diesels. Owing to clearance gauges being much more liberal than here, it is possible to have locomotives, and rolling stock in



B.R. D 5300, a type 2 diesel-electric locomotive, the first of 20 intended for service on Great Northern suburban lines. B.R. Eastern Region official photograph.

great variety, of greater height and width than in Great Britain.

Problems besetting the railroads there include the severe competition felt from the increasing networks of air and long-distance road services, resulting in reductions in the number of trains and staff. It was gratifying, however, to learn that the Illinois Central R.R., Chicago, had recalled 200 employees to their car-construction shops, as a recovery in freight traffic is anticipated and a large number of box-cars (covered freight wagons) are to be built or reconditioned, as well as more steel cabooses (guards' vans) and cars equipped for "piggy-back" working, which is something like the British road-rail and container service.

Alterations with several accelerations announced by the Illinois affect famous streamlined and other expresses with names such as *The City of Miami*, *Panama Limited*, *Hawkeye* and *The Chickasaw*.

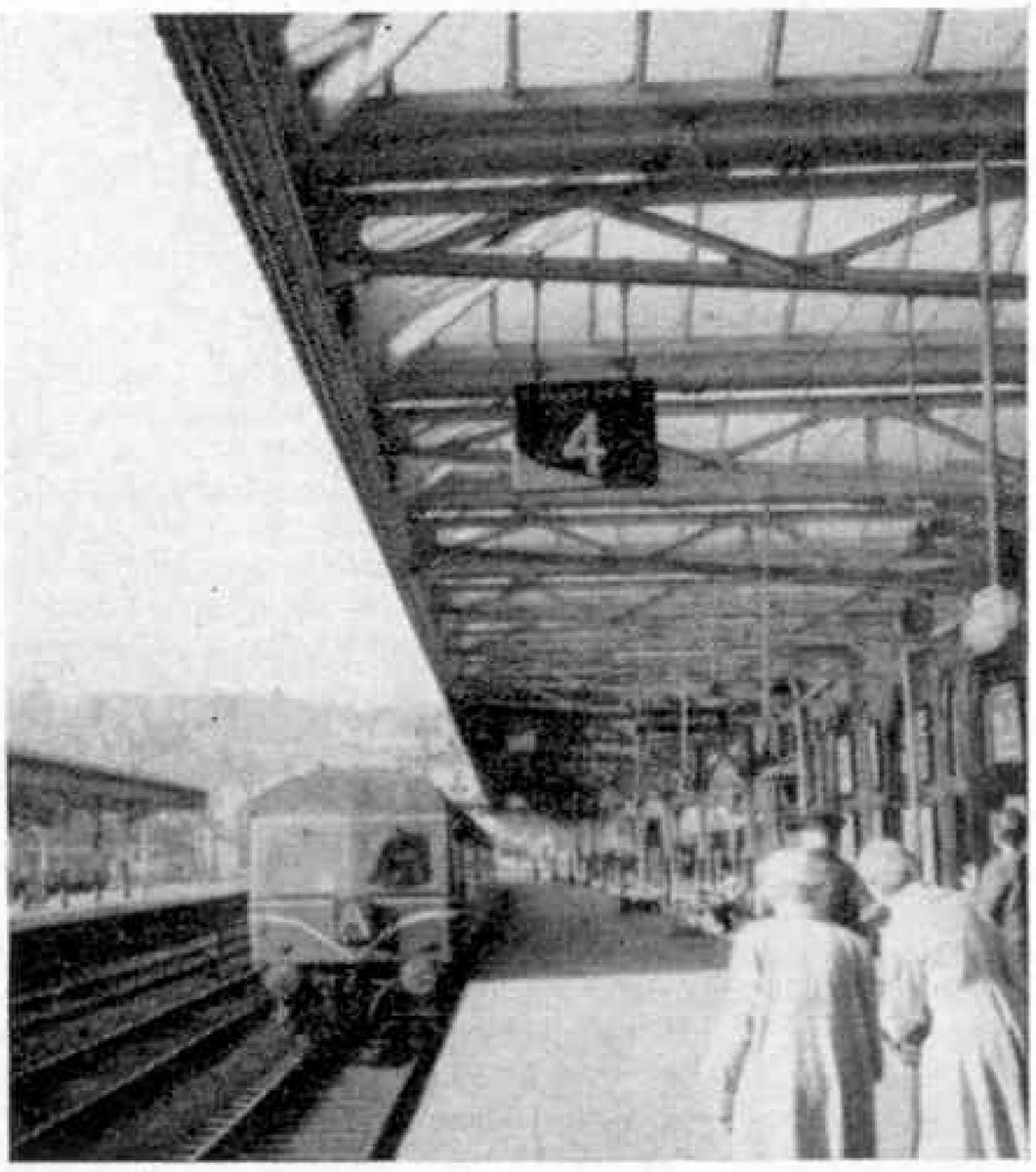
London Transport Developments

Service locomotive No. L92 is the former W.R. 0–6–0T No. 5786.

Three new trains built by well known firms for trial on the busy Piccadilly Line, which runs from northern to western outskirts via central and west end of London stations, consist of 7 cars each. These provide increased seating and door space, improved lighting and springing, interior decoration and destination indicating. The exteriors consist of light alloy panelling unpainted. Plain aluminium-like finish will become more general for L.T.E. rolling stock.

Inner-Circle trains are being formed of six instead of five cars. Completely new 4-car sets are under construction for outer suburban services when electrification is extended beyond Rickmansworth.

An ingenious installation of electrically-controlled signals and points, together with wires on tunnel walls that when pinched together by a driver illuminate visual indicators to the front or rear, facilitates the running of longer freight trains through from north to south London yards and their assistance by steam or diesel banking engine from the Metropolitan Moorgate widened lines up to Ludgate Hill, S.R.



A W.R. inter-city diesel express train entering Newport (Mon.), station. Photograph by C. A. Gostling.

Crewe and its Locomotives

It was announced recently that the famous locomotive works at Crewe had turned out the last steam locomotive to be built there. This was B.R. Standard 2–10–0 No. 92250, which was put into service with appropriate ceremony. The works were established in 1843, and 7,331 steam locomotives have been built in them. Henceforth diesel-electric construction will be the rule, but heavy repairs to L.M.R. steam locomotives remaining in service will continue to be carried out there.

It is remarkable that an engine built there as long ago as 1887 should have been condemned shortly before the appearance of Crewe's last steam locomotive. This veteran was No. 58926, the last of the former L.N.W.R. "Coal Tanks", and the last Webb engine to remain in ordinary traffic.

F. W. Webb, the designer, was one of the most famous of the Chief Mechanical Engineers who have presided over the activities of the extensive works. He contributed a great deal to the development and extension, and to the traditions of Crewe, not only during his tenure of the chief position there, but also as Works Manager under John Ramsbottom, whom he succeeded in 1871.

* * * *

Principal trains recently began to be hauled regularly between Edinburgh and Aberdeen over the East Coast route by one locomotive unchanged, as was the case years ago. Various types of Pacific stationed at Haymarket share with A2 4–6–2 or V2 2–6–2 locomotives belonging to Ferryhill, Aberdeen, shed.

Owing to loss or damage affecting some external part of a locomotive not vital to its running efficiency, engines are seen occasionally and temporarily at work with, for instance, a nameplate on one side only or without a dome cover. A Sandwich, Kent, reader reports an N 2–6–0 passing his station having no smoke deflector on the left-hand side.

Air News

By

John W. R. Taylor

Introducing the Caribou

Because of its sharply-upswept rear fuselage, the de Havilland Canada Caribou, shown in the accompanying illustration, looks something of a freak at first glance. But its shape will become familiar in the years ahead, for this sturdy twin-engined transport offers the kind of performance for which many airlines and air forces have been waiting.

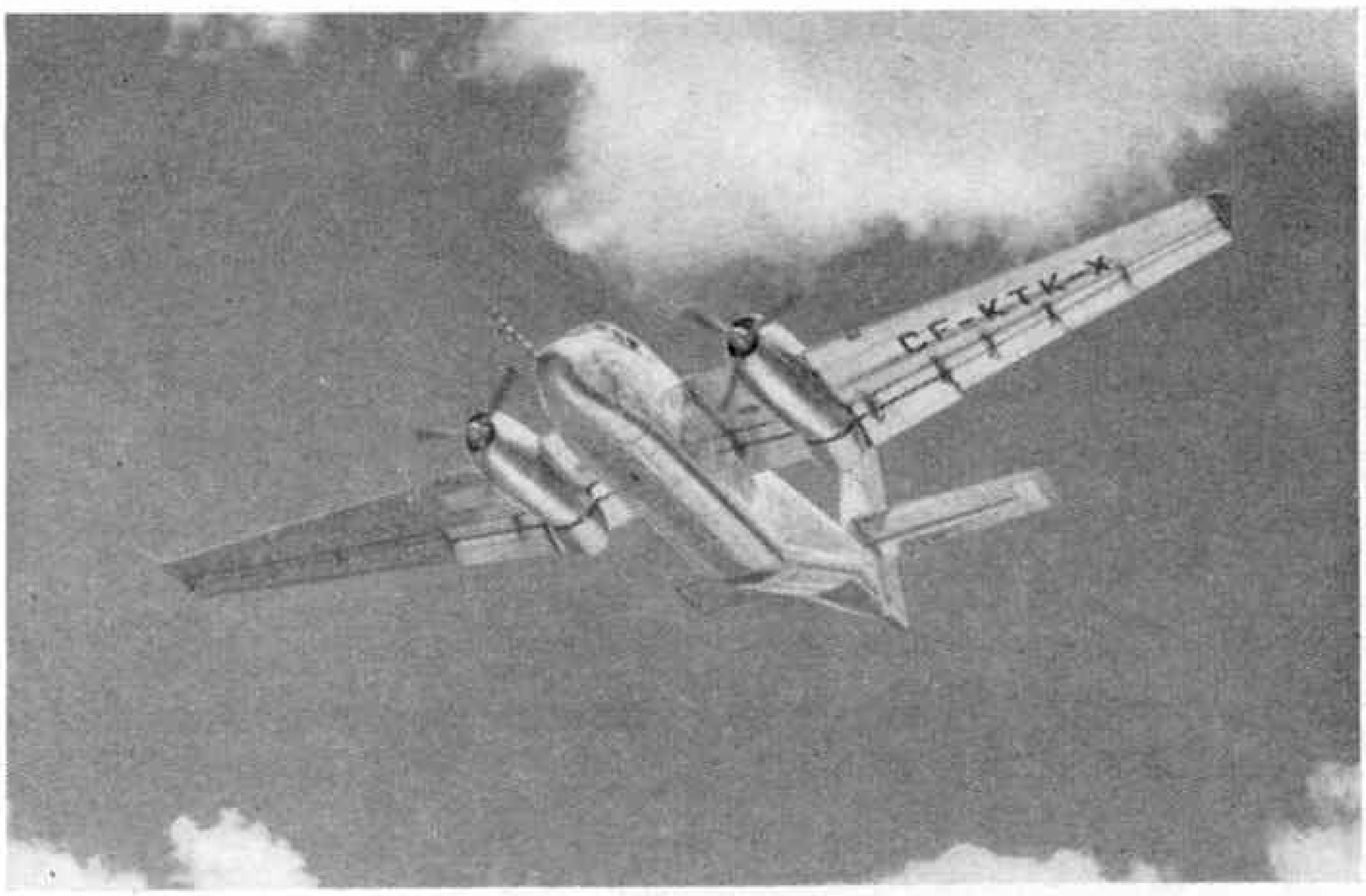
The original intention was to produce an aeroplane that would require no more room in which to take off and land than the company's famous single-engined Otter, but would carry twice the Otter's payload. To meet the demands of the Canadian Army, it was decided to provide rear loading doors big enough to enable equipment such as jeeps and field guns to be loaded easily up a ramp and to be air-dropped by parachute when the doors were left off. This led to the upswept fuselage, which also provides clearance under the tail for lorries to back up to the rear doors to discharge their loads.

Next essential was extreme reliability, so the new aircraft was designed to have two 1,450 h.p. Pratt & Whitney R-2000-7M2 piston engines of the kind that are flying some 10,000 hrs. every day in DC-4s and other aircraft. To ensure quick take-off, it was given full-span double-slotted wing flaps, the hinges for which can be seen under the wing.

An almost unlimited variety of payloads was made possible by the large unobstructed cabin and big doors; but standard seating is for up to 27 civilian passengers in three-abreast seats, which fold against the wall when the aircraft is needed for freighting, or 28 fully-equipped troops in seats along the side walls. The 3½-ton freight load can include two jeeps, and there is room for 14 stretchers and ten sitting casualties or attendants in the ambulance version.

Sales prospects seemed so good two years ago that de Havilland Canada decided to start work right away on 20 of the new aircraft, which they named the Caribou. The prototype flew on 30th July, 1958. The first production machine will go to the Canadian Army, the second to the Canadian Government, and the third will be one of five for evaluation by the U.S. Army.

The Caribou spans 96 ft., is 68 ft. 10 in. long and weighs 24,000 lb. fully-loaded. It has a range of up to 1,350 miles at 148-183 m.p.h. and will take off and land in under 500 ft.



The Caribou twin-engined transport is a product of the Canadian de Havilland company, and is described on this page.

Flying Bicycle

Since the early days of this century, there have been many attempts to fly by fitting wings and pedal-driven propellers to ordinary bicycles. What the experimenters have failed to realise is that the average man cannot produce nearly enough muscle-power to keep such a heavy contraption airborne.

However, the "flying bike" is by no means impractical, and a group of leading British aeronautical experts, including B.E.A.'s chief engineer, Mr. Beverley Shenstone, met recently to discuss the possibility of building one. They decided that if the design were tackled scientifically, using the latest ideas on high-lift wings, light structures and efficient propellers, success could probably be achieved at low cost. The result would not be a single-seater, because by adding a second crew-member who would be able to use both arms and legs for propulsion, available power would be more than doubled. It could be flown for considerable distances a few feet above the ground.

Figures given by Mr. Shenstone show that a man can exert about 1½ h.p. momentarily, ⅝ h.p. for a minute and ½ h.p. for an hour, which goes to show that most of us do not know our own strength!

Farewell to the Stratocruiser

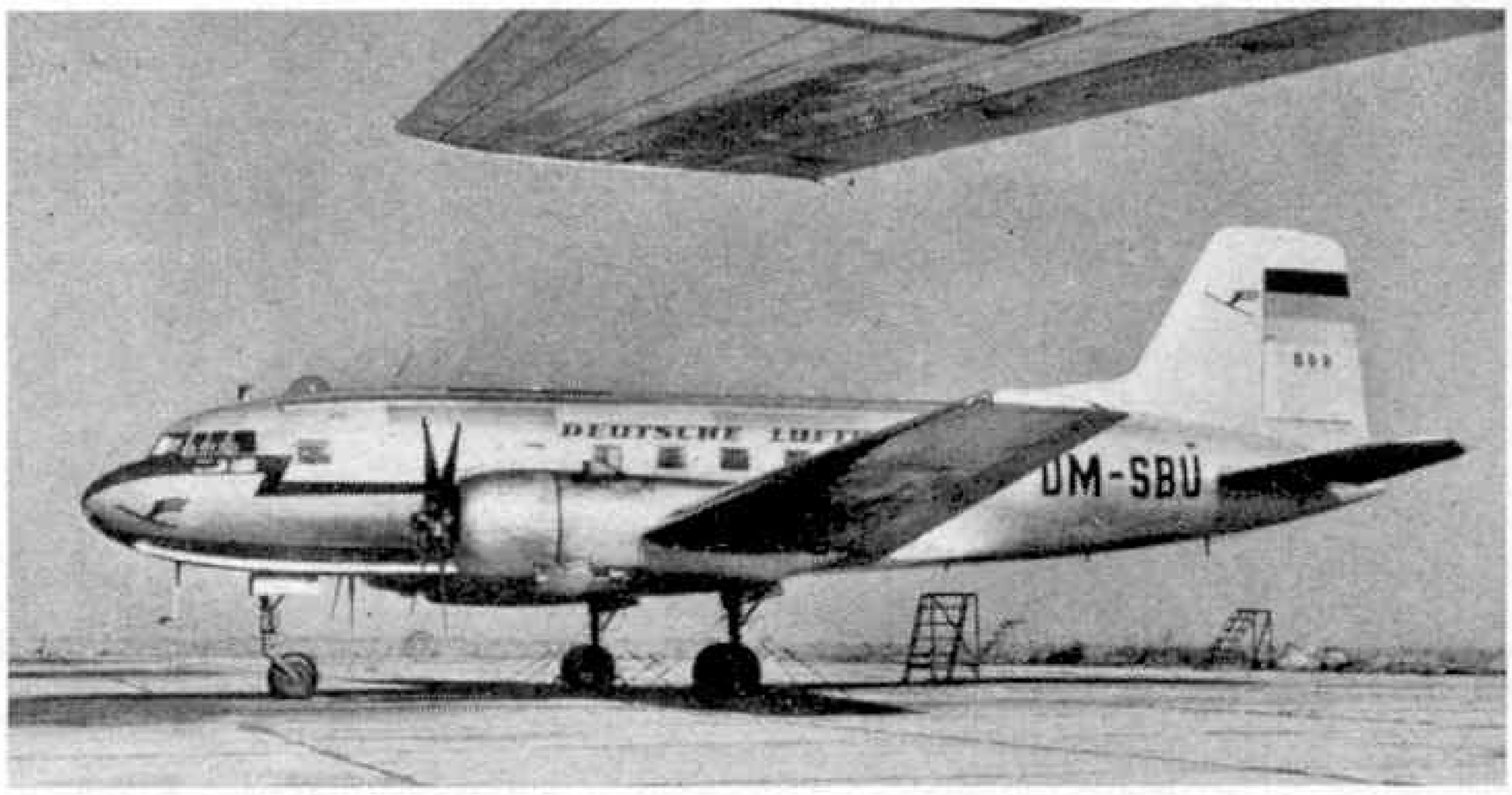
After being in continuous service since 6th December, 1949, B.O.A.C.'s Stratocruisers were retired from the North Atlantic route last November. Immensely popular with passengers because of their roominess and reliability, they made 12,700 crossings and carried 603,000 passengers in their nine years on the transatlantic run. They will still be seen for a while in the insignia of the new Nigerian and Ghana Airways.

Civil Canberras

Smartest Canberras in the world are two American Martin-built B-57s operated by the U.S. Civil Aeronautics Administration. Finished in a striking white paint scheme, with black flashes on fuselage and engine nacelles, they are being used to check that air navigation aids throughout the United States are efficient and accurate enough for use by the new generation of 600 m.p.h. jet air liners.

* * * *

Prayer mats for Mohammedan passengers are installed in the Tu-104A jet-liners used on Czech Airline's Prague-Cairo service. The reason is that the aircraft are airborne at dawn and sunrise, the Muslim times for prayer.



An Ilyushin Il-14P of the East German Deutsche Lufthansa.

The Other Lufthansa

Despite the name "Deutsche Lufthansa" painted on the side of the air liner shown in the upper picture on this page, you will never see this aircraft used on the Lufthansa services to British airports. The reason is that it belongs not to West Germany's national airline but to the "other Lufthansa" operated by the East German Democratic Republic.

Formed in May 1954, this airline began flying between Berlin-Schonefeld and the east European capitals of Warsaw, Prague, Budapest, Sofia, Bucharest and Moscow two years later. Its main equipment consists of Russian-designed 18/26-passenger Ilyushin Il-14Ps of the type illustrated, built under licence at Dresden; but it also operates Russian 10-passenger Antonov An-2 single-engined biplanes and Czech four-seat Super Aero light twin-engined monoplanes for air taxi work, and Czech L-60 Brigadyr high-wing monoplanes for crop-spraying and dusting duties.

Knobbly Electra

If you saw the elegant prototype of Lockheed's Electra turboprop air liner during its demonstration tour of 29 countries last autumn, you will have to look twice to recognise the aircraft shown in the lower illustration on this page as the same basic design. The reason is that this particular airframe has been modified into what is known as an aerodynamic prototype of the P3V-1 anti-submarine version of the Electra which is under development for the U.S. Navy.

Very large numbers of P3V-1s will enter service if, as is almost certain, they prove capable of doing the job. Powered by four 4,500 h.p. Allison T56-A-10W turboprops, they will have a completely re-styled interior, with comfortable quarters for the 10-man crew, including bunks and a galley, and a mass of complex radar equipment.

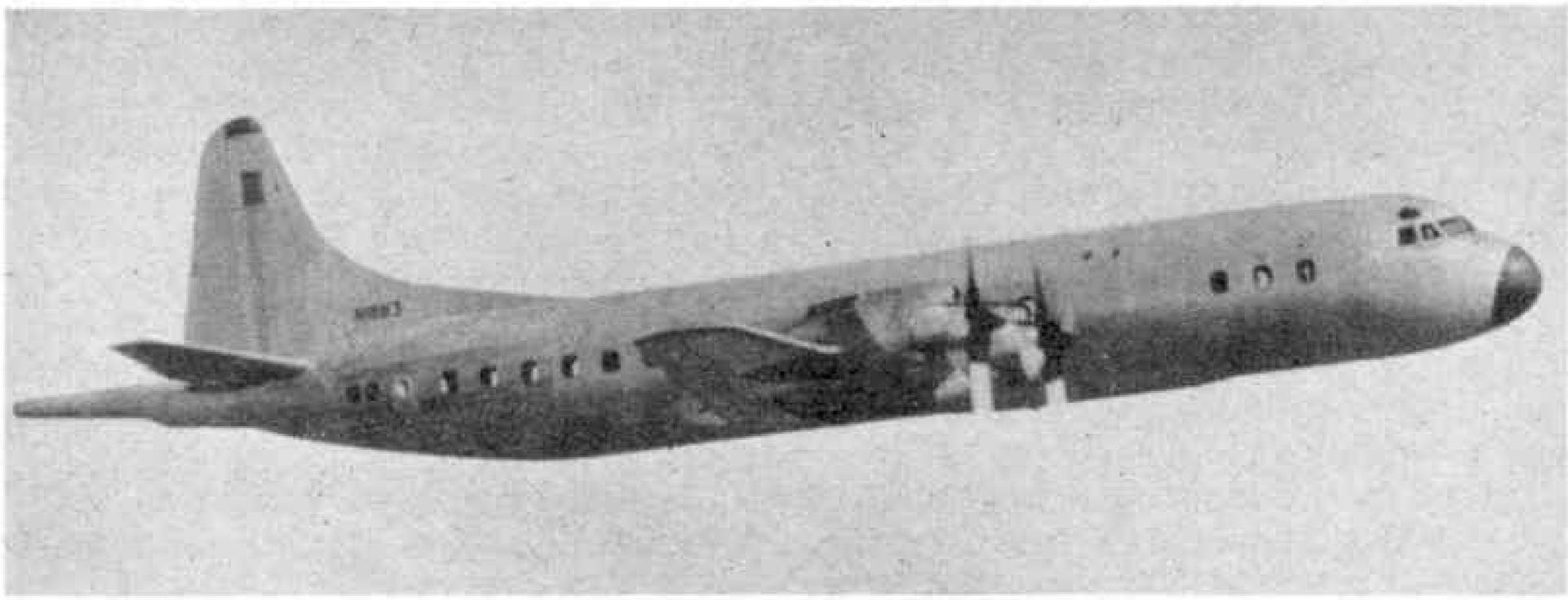
The plastic cone-shaped tail extension will house MAD (magnetic anomaly detector) gear, which locates a metallic submarine under the water by noting changes in the Earth's magnetic field. Advanced underwater sound detection apparatus will be provided, and the P3V-1 will have a huge radar scanner in a streamlined bulge under its fuselage. The latest kinds of airborne anti-submarine weapons will be carried and, when required, the P3V-1 will be able to cruise at up to 450 m.p.h.

British Manned Satellites

It was announced recently by the chief aerodynamicist of Armstrong Whitworth, Dr. W. F. Hilton, that the company has been making design studies of manned satellites since mid-1957. Launched into an orbit by means of ramjet and rocket powered boosters, the satellites would consist of unpowered gliders which would use several different techniques to survive the heat generated by re-entry into the atmosphere. Careful design would create shock-waves some distance ahead of the gliders to carry off much of the heat, and low wing-loading would enable them to lose speed relatively slowly, at great heights, where the atmosphere is very "thin".

Five Million Farm Flights

Not many people realise what big business agricultural flying has become in New Zealand, where a vast fleet of light planes is used to increase the acreage of land suitable for raising sheep and cattle. In the past ten years, more than five million flights have been made by these aircraft on top-dressing alone, which involves spreading fertiliser over barren land, often in hilly country where low-altitude flying is no picnic. Almost 3,000 tons of clover and grass seed, 9,000 tons of weed killer and 22,000 tons of rabbit poison have been distributed by aircraft; while nearly 2,000 tons of fencing and supplies have been dropped in remote areas. The great saving of time fully justifies the cost.



Aerodynamic prototype of the P3V-1 anti-submarine version of the Lockheed Electra, under development for the U.S. Navy.

A Mighty Lorry

18-Wheel Vehicle Carries 100 tons

By Richard J. Salter, B.Sc.(Eng.), A.M.I.C.E.

A HUGE 18-wheel truck has been built to carry earth-filling to a dam being made in South Dakota, U.S.A. The Oahe Dam, as it is called, is being constructed across a swiftly flowing river, and the engineers were able to stop the flow of water by tipping earth into it more quickly than it could be carried away downstream.

Suitable earth for making the dam was found two miles away from where it was being built, and this giant truck was constructed to help move the 24½ million cubic yards of earth required.

The truck, which is articulated, was made by altering a heavy Euclid dump-truck and then fixing a huge earth-carrying box at the rear. By using a very strong new type of steel it was found possible to make the trailer a great deal lighter so that the engine was able to pull more earth. The Euclid truck had originally two diesel engines, and the power of these was increased by fitting turbo-superchargers and also by altering the engine to run faster.

The height of the truck when running is 14 ft., but when the load is being tipped the height is as much as 45 ft. So that time was not wasted while the vehicle was tipping, it had to be made capable of tipping its load in 15 seconds. The box itself, in which the load is carried, has a length of 45 ft. and a width of 15½ ft. When travelling on the level the top speed is about 35 m.p.h.

To carry the truck and its load eighteen tyres are fitted so that the weight is well spread and the pressure per square inch on the ground is not too high. It has been possible to use this large vehicle on the rough roads around the dam, and when this article was written it was carrying nearly five thousand tons every day.

Another interesting engineering operation in constructing the dam has been the driving of the water-outlet tunnels, using a mechanical mole. The mole is a long, metal cylinder that has a revolving disc at the front, to which are attached three lines of cutting knives. As the disc turns the knives cut into the ground, loosening the soil, which is moved back through the mole and along the tunnel on an endless moving belt.

Using this large machine, six tunnels were dug through the hillside for a distance of a third of a mile, all part of a huge scheme to store water and use it for irrigation and producing electrical power.

MECCANO MAGAZINE

Junior Section

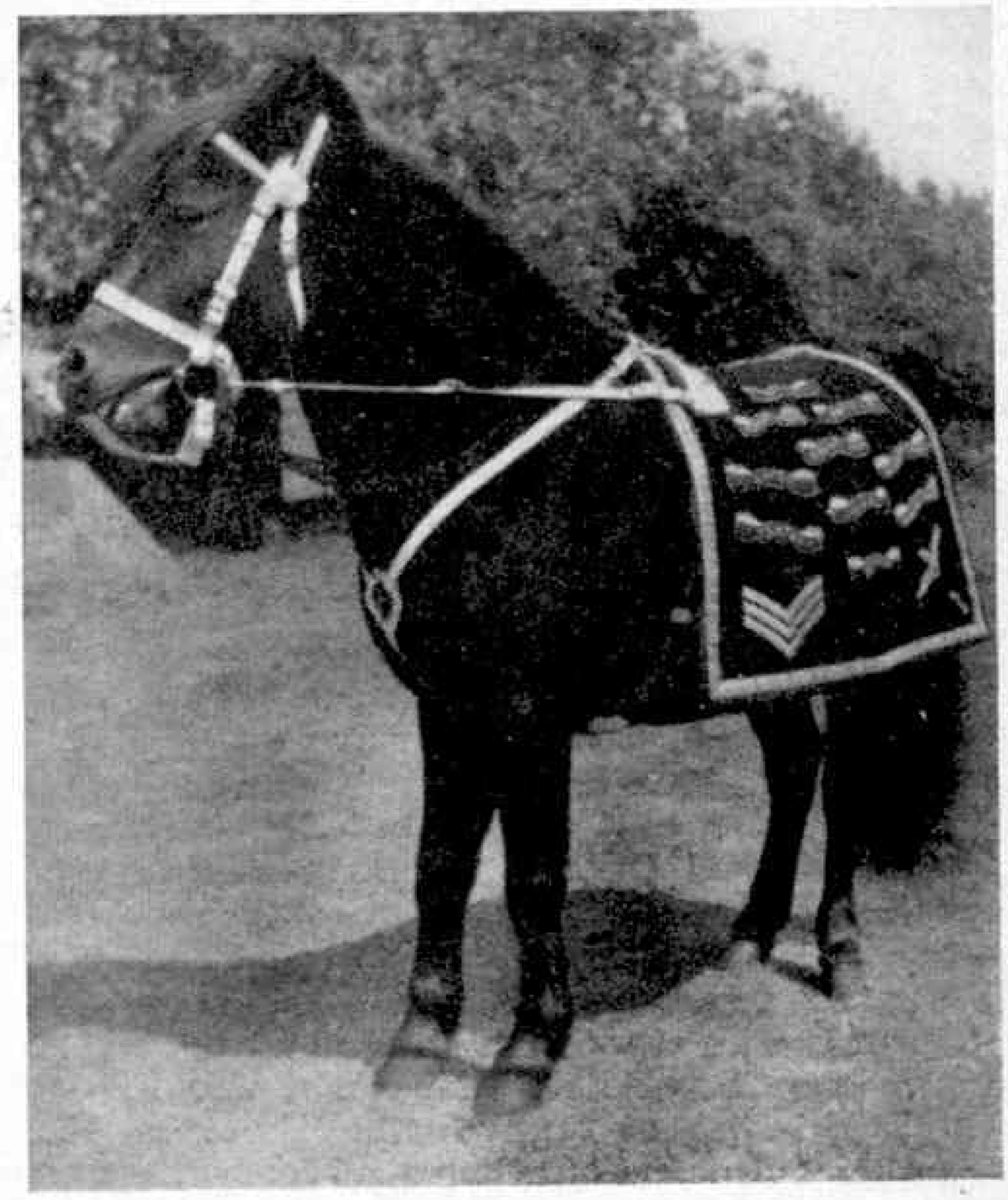
PETER WEBB, who lives in Warlingham, Surrey, is a proud boy because when he was at Euston recently the driver of the diesel-electric locomotive No. 10000, on *The Royal Scot*, let him sit in the cab. And to prove it he sent me the photograph reproduced above. He said that the cab was beautifully clean and as comfortable as a car.

The Parachute Regiment, the youngest infantry regiment in the British Army, has as its mascot a pony. In fact each of the three battalions has its own pony. *Pegasus*, *Samson* and *Bruneval* are their names. As the sign of the parachute formation is *Pegasus*, the winged horse, it seems only right that they should adopt ponies as their mascots.

The lower picture on this page shows *Pegasus*, the mascot of the First Battalion of the Parachute Regiment. On his blanket you can see all the battle honours of the battalion embroidered in gold wire, and also his sergeant's stripes and the badge of the Parachute Regiment.

Pegasus has travelled all over the Middle East, including Cyprus and Egypt. He travelled in an aircraft carrier of the Royal Navy. Unfortunately he was not able to go to Suez in 1956, or to Jordan in 1958 with his battalion.

Pegasus is a proud pony, and the Parachute Regiment is proud of him. The photograph reproduced here reached me from A. H. Newman, Aldershot, who also gave me these details about him and his comrades.



Easy Model-Building

Spanner's Special Section for Juniors

Mobile Light Crane

Here is one of those easy-to-build little models with which you can have a lot of fun. It is the Light Mobile Crane shown in Fig. 1 and all the parts you will want to make it are contained in an Outfit No. 0.

First take a 5½″ × 2½″ Flanged Plate and bolt to its flanges two Flat Trunnions as at 2; at the other end of the Plate bolt two Trunnions 3 and 4. Pass a Crank Handle through the holes in the pointed ends of the Flat Trunnions and fix two Spring Clips to it to hold it in place. Now take two 5½″ Strips and bolt each of them to the Trunnions as shown. These form the lower part of the jib and they are fixed to the Trunnions in a special way, known as lock-nutting, which allows them to move in relation to the Trunnions. To fix each Strip first pass a bolt 5 through the Trunnion and fit it with a nut. Now place the Strip on the shank of the bolt, using the end hole in the Strip, and finally fit a second nut on the bolt. Now hold one nut with a Spanner and tighten the other nut so as to grip the Strip tightly.

If this is done properly it will be found that the Strip is fixed tightly to the bolt but the bolt itself is free to turn in the hole of the Trunnion. This process of "lock-nutting", of which there are other forms, is used in many circumstances in model-building, so you should bear it in mind so that you can use it when designing models to your own ideas.

Having fixed the two 5½″ Strips in the way described bolt to their upper ends two more 5½″ Strips, overlapping the lower Strips by two holes. Now join the two sides of the jib together by bolting at their upper ends two Angle Brackets 6 and 7 and then bolting the Angle Brackets together by means of a bolt 8. Finish the jib by fixing an Angle Bracket 9 in the place indicated.

Bolt a Fishplate in the second from front holes in each side flange of the Flanged Plate and pass through their round holes a 3½″ Rod to carry the front wheels. These are 1″ Pulleys fitted with Tyres. Now pass another 3½″ Rod through the right Flat Trunnion 2 and place on the Rod a Bush Wheel. Now push the Rod through the other Flat Trunnion 2 and fix a Spring Clip on each end of it to hold it in place. Finally fix the Bush Wheel in the centre of the Rod, by means of its set-screw.

The model is now nearly complete and all that remains to be done is to bolt a 2½″ × ½″ Double Angle Strip 10 to the Flanged Plate in the position shown. Tie a piece of Cord to one lug of the Double Angle Strip and then lift the jib and pass the Cord through holes in its sides as indicated. Having done this tie the other end of the Cord to the other lug of the Double Angle Strip. To complete the Crane tie a length of Cord tightly to the centre of the Crank Handle, then take it up and pass it through the hole in the Angle Bracket 9 fixed to the jib, and tie to it a Curved Strip or some other suitable spare parts to form a load.

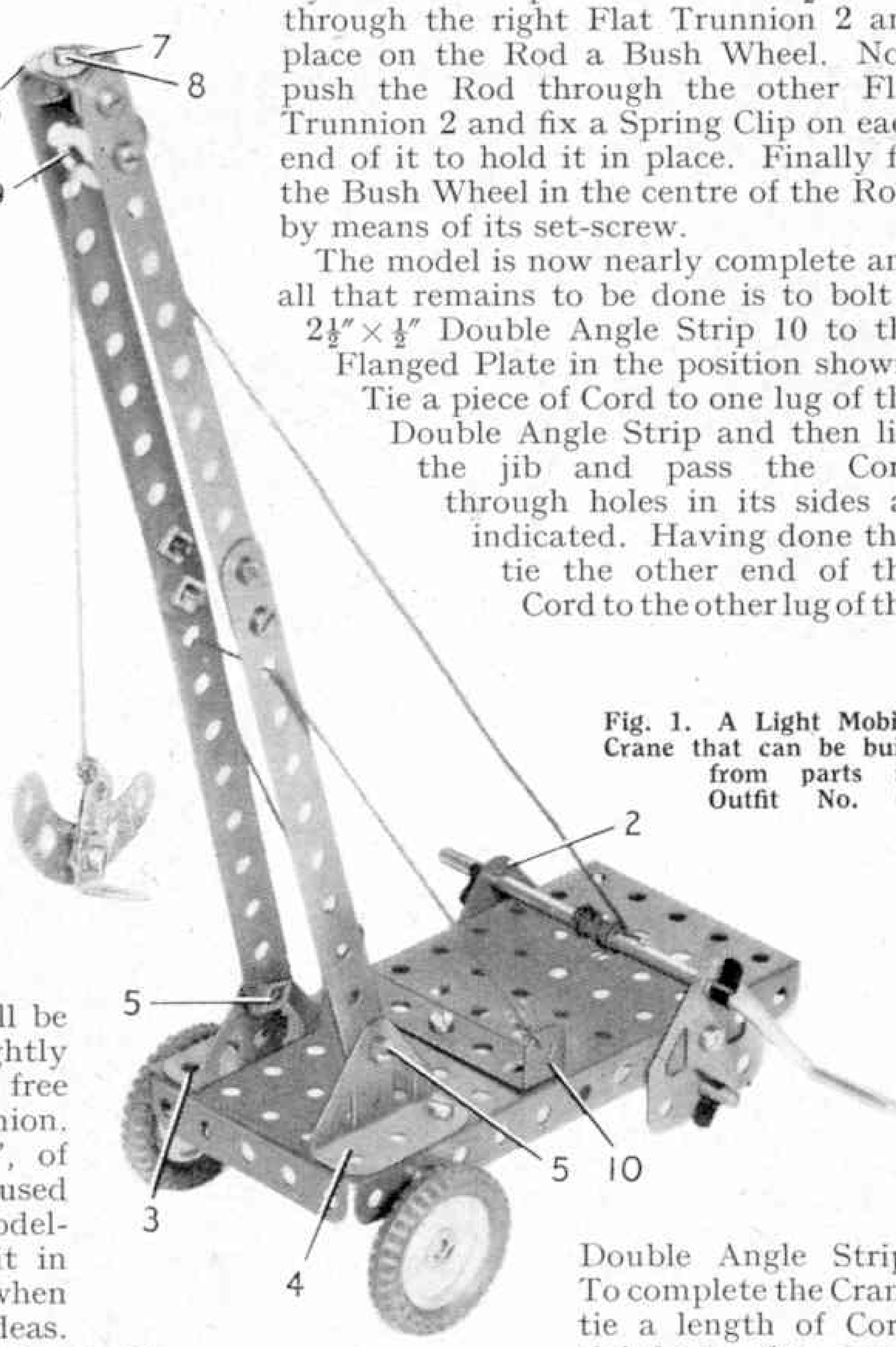


Fig. 1. A Light Mobile Crane that can be built from parts in Outfit No. 0.

A list of the parts required to build the model is given at the end of this article.

Helicopter

Each side of the Helicopter consists of a $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate that is bolted to a $5\frac{1}{2}''$ Strip 1, which overlaps it by three holes. The bolts, which hold the $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate and the $5\frac{1}{2}''$ Strip 1 together, hold also a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate on each side. The Flexible Plates are bolted together and the two $5\frac{1}{2}''$ Strips are joined together at the rear.

The tail support is a $2\frac{1}{2}''$ Strip 2, which is slightly curved and bolted at one end to two Angle Brackets held together by the same bolt as that which holds the $2\frac{1}{2}''$ Strip. The Angle Brackets are each bolted in the fourth holes from the rear ends of the two $5\frac{1}{2}''$ Strips 1.

The casing of the fuselage at the front consists of two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Curved Plates that are bolted to the $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates that form the sides. The $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Curved Plates are joined together by two bolts, and one of these holds also a $2\frac{1}{2}''$ Strip 3. This $2\frac{1}{2}''$ Strip is curved slightly and is bolted to another $2\frac{1}{2}''$ Strip that in turn is bolted to the centre holes of a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 4 and a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Curved Plate that forms the floor of the cockpit.

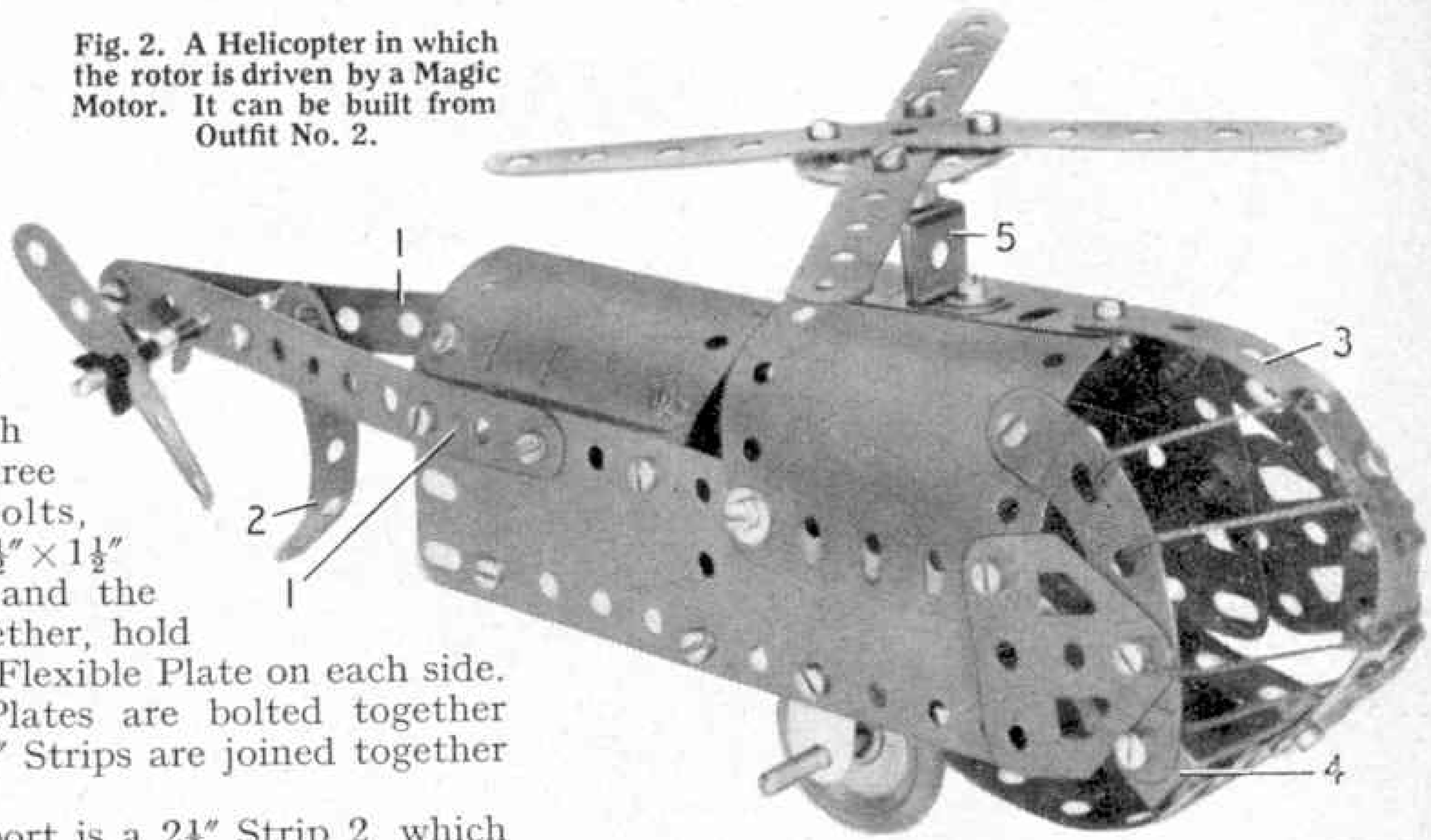


Fig. 2. A Helicopter in which the rotor is driven by a Magic Motor. It can be built from Outfit No. 2.

The $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 4 is bolted at each of its lugs to a $2\frac{1}{2}''$ Stepped Curved Strip bolted to the side of the fuselage. A Flat Trunnion fills in the space and lengthens the cockpit at the front of the model.

The rotor blades of the Helicopter are made up of two $5\frac{1}{2}''$ Strips bolted to a Bush Wheel, and they rotate on a $3\frac{1}{2}''$ Rod journalled in a $\frac{1}{2}''$ Reversed Angle Bracket 5 that is bolted to the roof of the cockpit. The same bolt as that holding the $\frac{1}{2}''$ Reversed Angle Bracket 5 in position holds a built-up reversed angle bracket made from two Angle Brackets joined together. These form the mountings for a $3\frac{1}{2}''$ Rod.

The $3\frac{1}{2}''$ Rod is journalled also in the centre hole of a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip bolted across inside the fuselage.

The wheels of the model are mounted in the round holes of two Fishplates, one of which is bolted to each side of the fuselage. At the rear of the Helicopter a tail rotor consisting of a $2\frac{1}{2}''$ Strip, is free to rotate on a $2''$ Rod journalled in the third hole from the end of each $5\frac{1}{2}''$ Strip 1.

Cord is interlaced through the holes of the Strips that make up the front of the cockpit and the main rotor is driven by a *Magic* Motor that is bolted inside the fuselage in the position shown. The Motor pulley is connected by a Driving Band to a $1''$ Pulley fixed

(Cont. on p. 104)

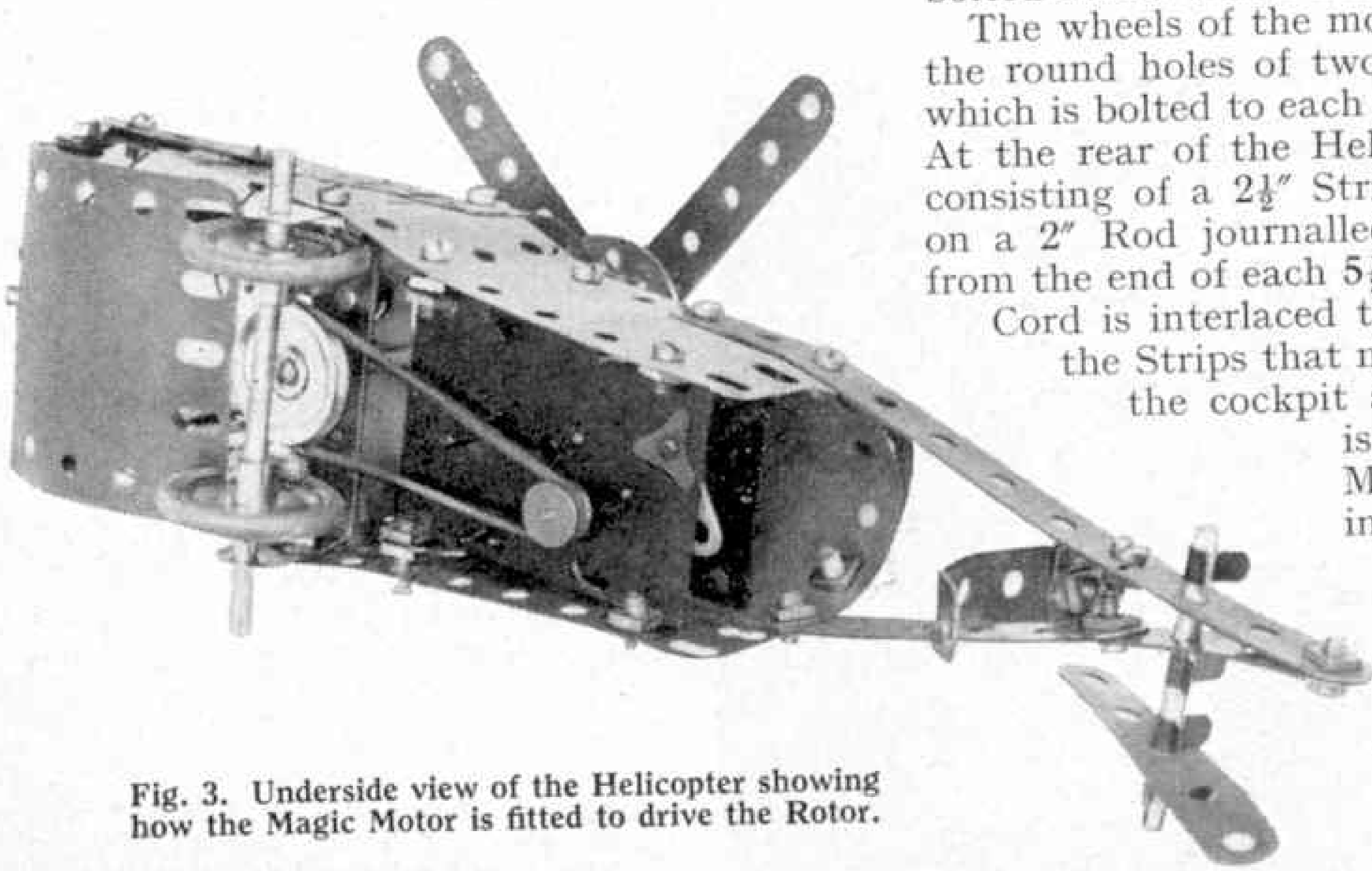


Fig. 3. Underside view of the Helicopter showing how the Magic Motor is fitted to drive the Rotor.

DINKY TOYS NEWS

By **THE TOYMAN**

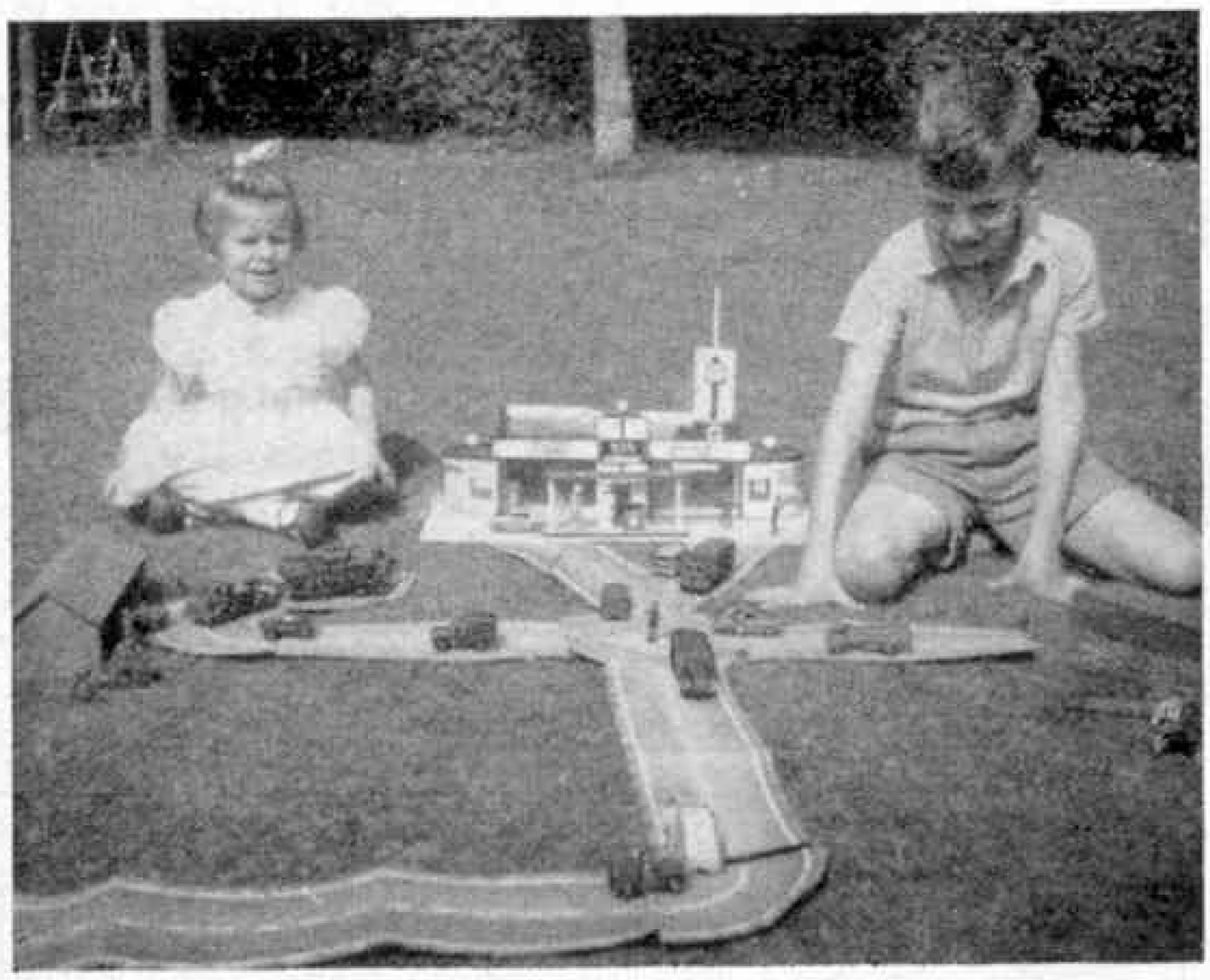
HOW appropriate it is that the world's finest model of the world's best car should be a Dinky Toy! The world's best car of course is the Rolls-Royce Silver Wraith and the Dinky Toys miniature of it is superb.

As you will see from the fine picture in colour on the back cover of this issue, the new Dinky Toy reproduces wonderfully the character and atmosphere of the luxurious actual car, which is a Silver Wraith with beautiful bodywork by the well known coachbuilders Park Ward and Co. Ltd., Willesden. And there is also a very exciting feature, for the model has independent suspension of all four wheels, which gives the effortless smooth running of its original. This is an entirely *new* development in Dinky Toys, and it is one that will arouse the greatest satisfaction and delight among collectors.

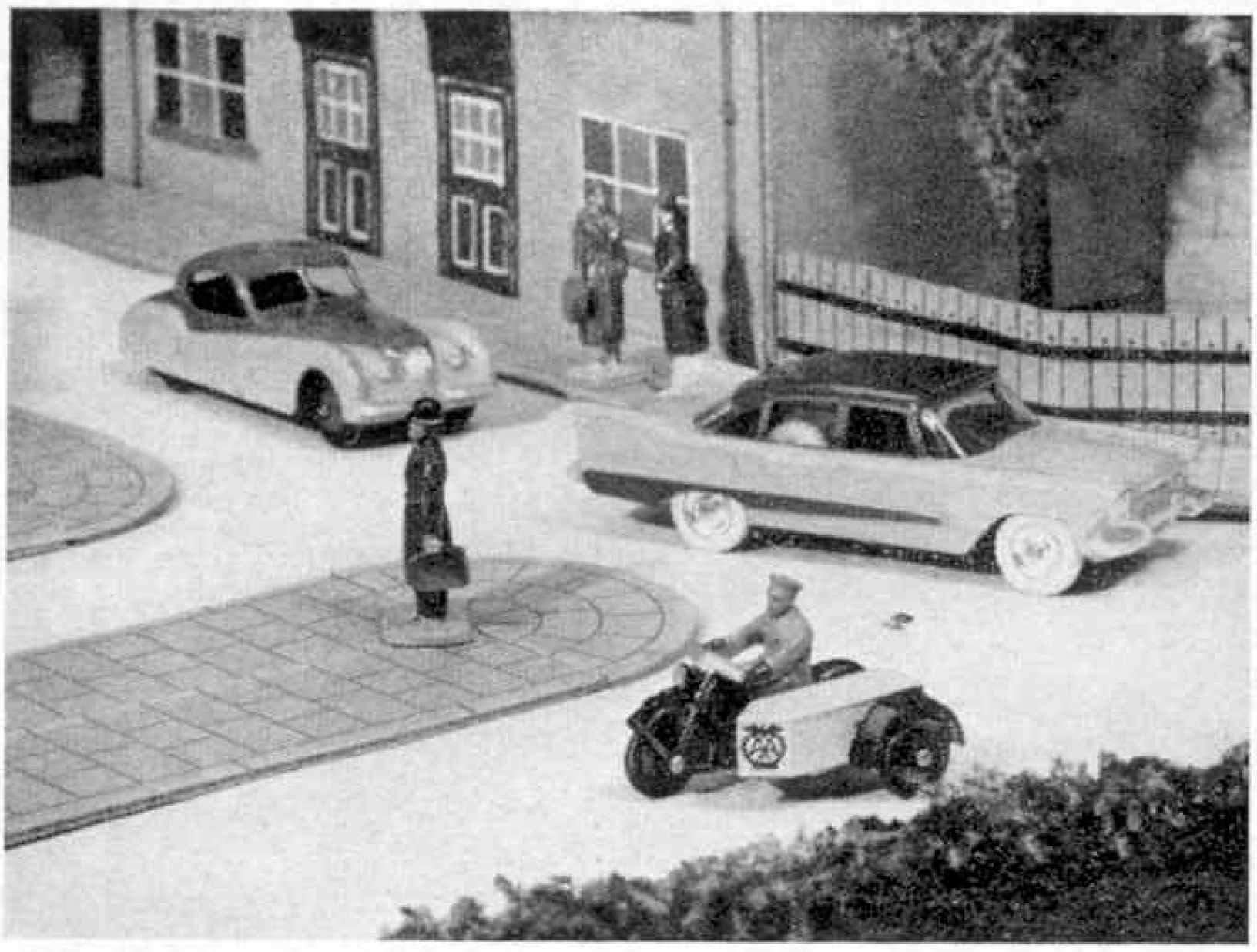
A fine collection of Dinky Toys, arranged in an attractive layout owned by F. Mayes, Whitchurch, Bristol 4.

Other splendid features of this magnificent new Dinky Toy are the brilliance of the plating of the world-famous Rolls-Royce radiator, which is beautifully reproduced, and of the bumpers, headlamps and wheel centres, and the reproduction of the well-known mascot, which is also plated.

Rolls-Royce cars are world renowned for their superb silent running engines and mechanism. On the road they simply glide along without the slightest fuss,



Lorna and Brian Bridges, Reading, have a lot of fun with their Dinky Toys on this road layout and filling station.



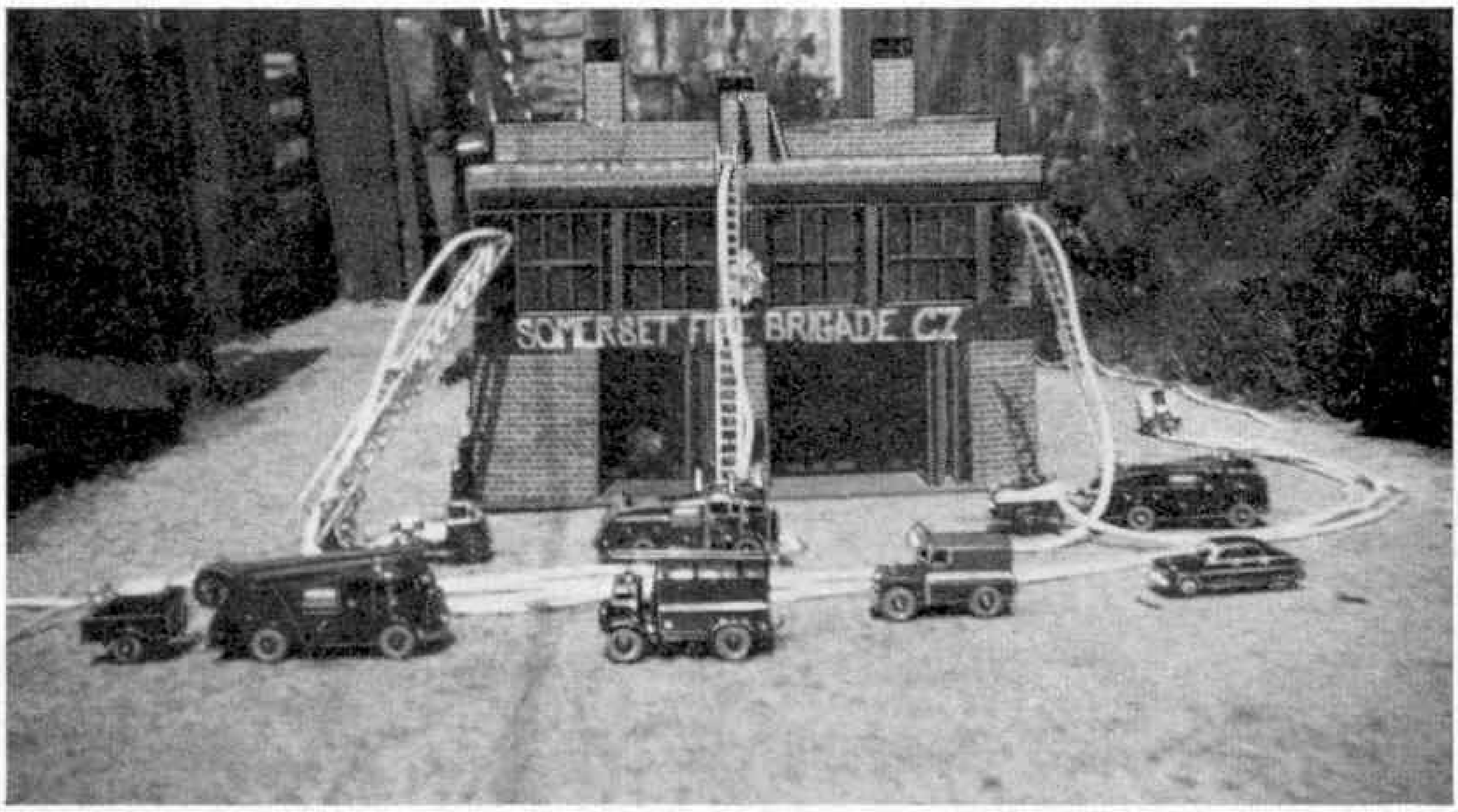
The Dinky Toys A.A. Motor Cycle Patrol (No. 270) rounding a corner in a town layout.

and in their passage they attract admiring glances from all. The Dinky Toys Rolls-Royce, finished in two beautiful shades of grey, both similar to colours actually used by Park Ward and Co. Ltd., for the real car, and with its plastic windows and shining wheel hubs fitted with black treaded tyres, has the dignity, grace and elegance always associated with its original.

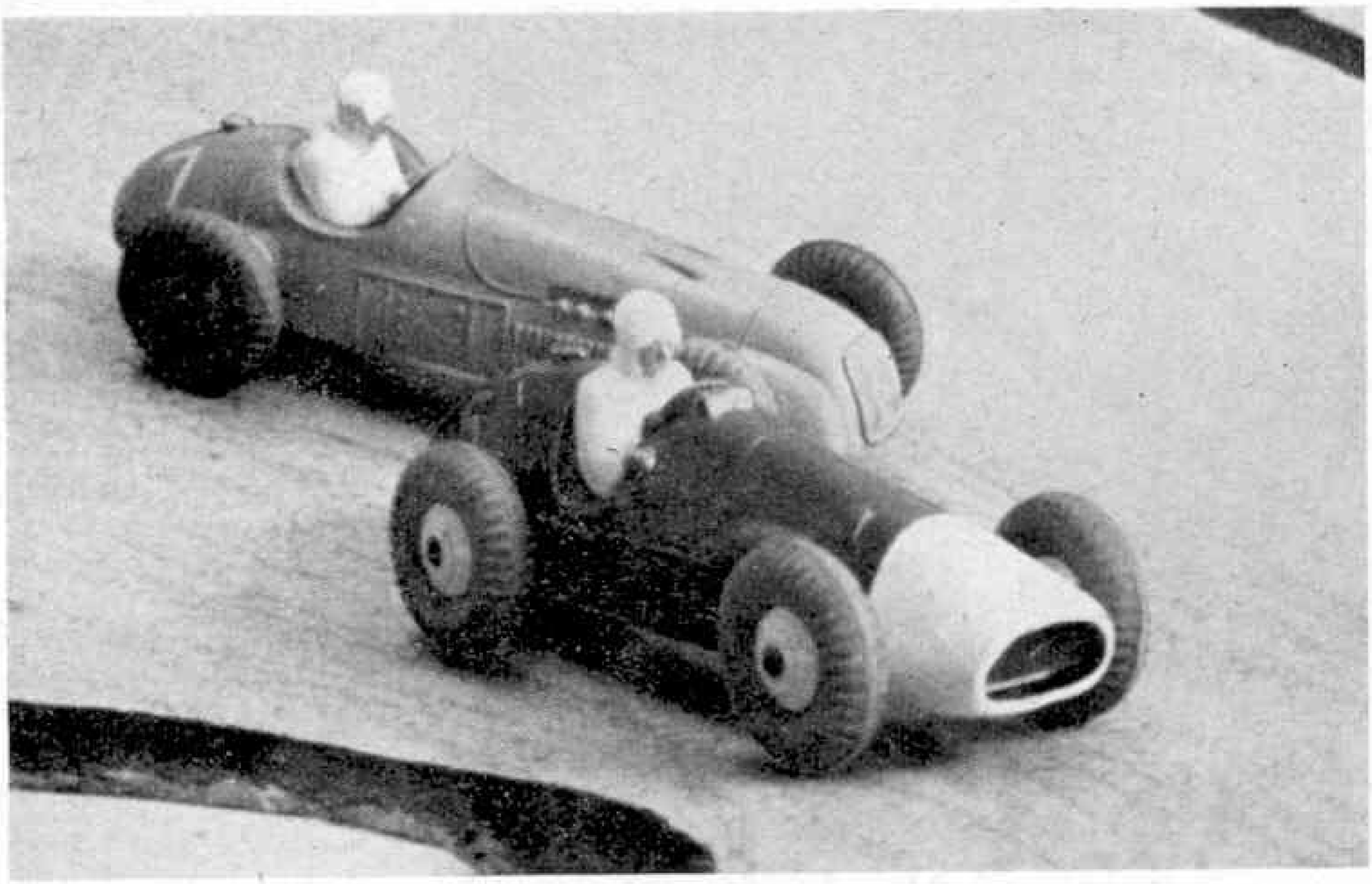
Another fine addition to the Dinky Toys range this month and one that is also sure of a big welcome by collectors, is a fascinating miniature of the familiar A.A. Motor Cycle Patrol. This is Dinky Toys No. 270, and it is seen incorporated in a section of a town layout that appears at the top of this page. The model is finished in the usual A.A. style, black motor cycle with silver handlebars and yellow tool sidecar. The driver is in a light brown uniform, with dark brown gauntlets, and the well-known "A.A." sign is carried in black on the pointed front of the sidecar. The tyres and wheel hubs are black. So the miniature will be as easily recognised on Dinky Toys layouts as the real thing is on the roads.

So much for the new models, and now let us see what some collectors have been doing with their Toys recently. One of them, C. H. Walters, Wellington, Somerset, has been busy building up a fire station layout for use with his Dinky Toys Fire fighting vehicles, and when completed it was a great success. The layout won a prize in a local hobbies competition.

The Station building is made from match boxes and incorporates many of the features of a real fire station. The building is equipped with electricity and it has lighting



The fire station designed for use with his Dinky Toys by C. H. Walters, Wellington, Somerset.



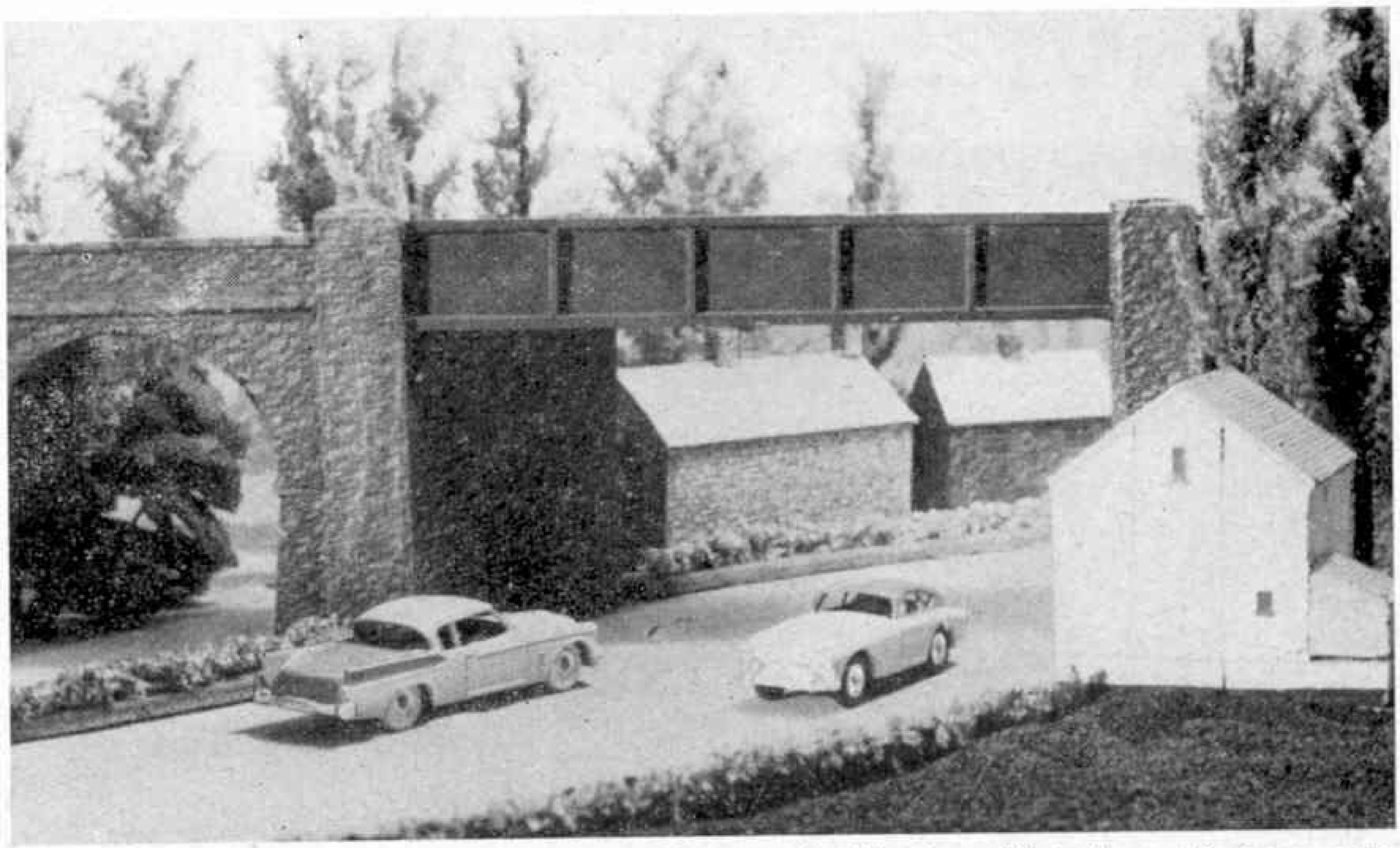
A thrilling duel between Dinky Toys Ferrari and H.W.M. Racing Cars. The photograph and setting is the work of G. Lewis, Bristol.

as well as a control room and a siren that blares its warning whenever news of a fire is received.

Outside the building the four fire engines have obviously just returned from a fire and the hoses, which are white shoe laces, have been left to dry out.

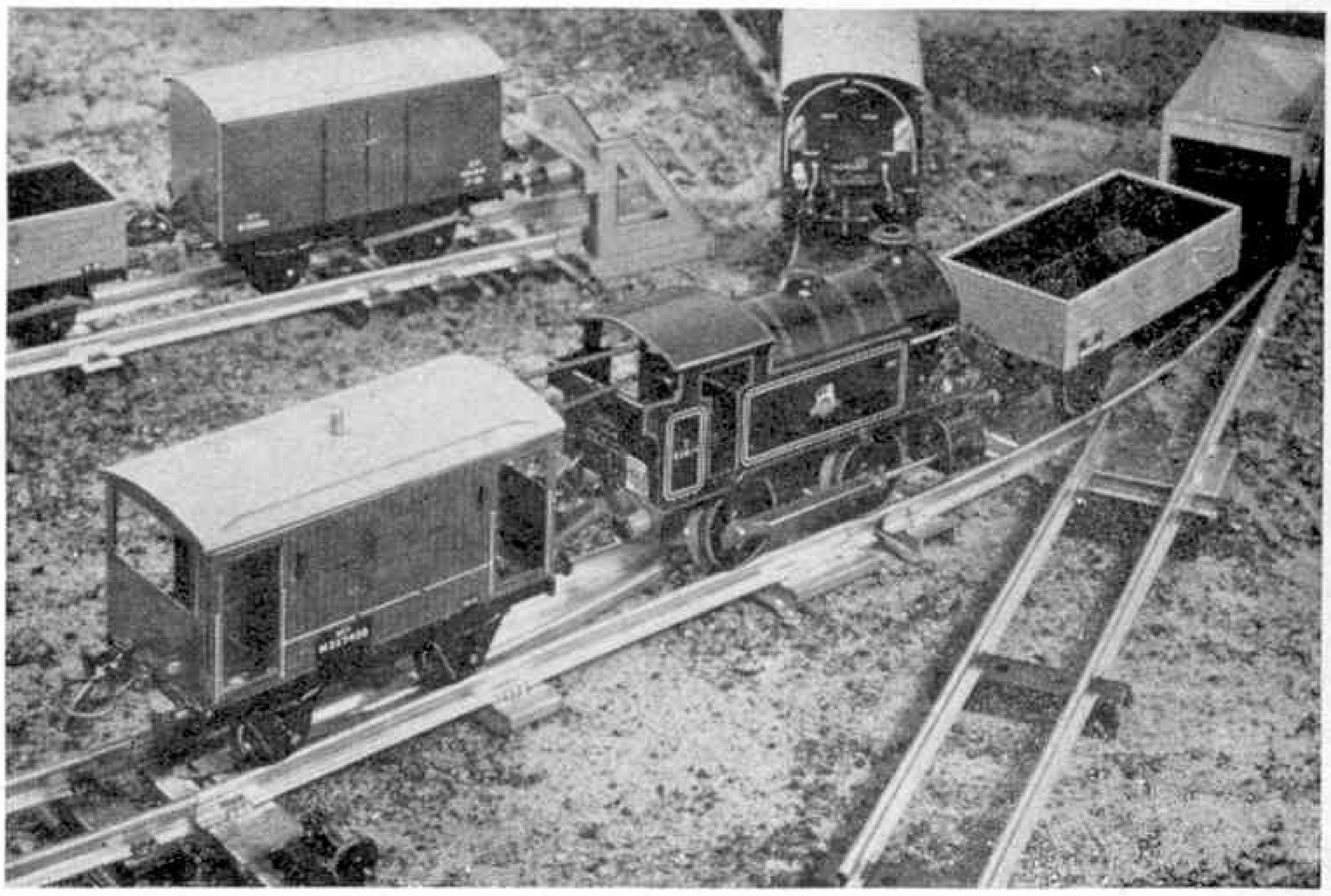
The picture at the top of this page shows two competitors, a Ferrari and an H.W.M., racing neck and neck for the finishing line, and I would not care to forecast the winner. The photograph was sent to me by Geoffrey Lewis of Bristol, and he tells me that it was taken in the dining room of his home. He has arranged the setting with such skill that it is hard to realise that the scene is not a real one!

Finally here is a "stop press" news item. The Dinky Toys range of buses is now augmented by a new item, No. 291 London Bus–Exide. This is available in the familiar red colour of London Transport and bears on each side the advertisement *Exide Batteries* in black and yellow.



An attractive corner of a village layout that provides a good setting for a Dinky Toys A.C. Aceca and a Studebaker Golden Hawk.

"Tommy Dodd" writes about:



Making up Trains

IT is some time since we had a talk about train formation, or in other words the way in which trains can be made up. In the Hornby System there is plenty of variety in rolling stock, so that the Gauge 0 owner usually has little difficulty in the assembly of a train of the kind he requires for almost any service.

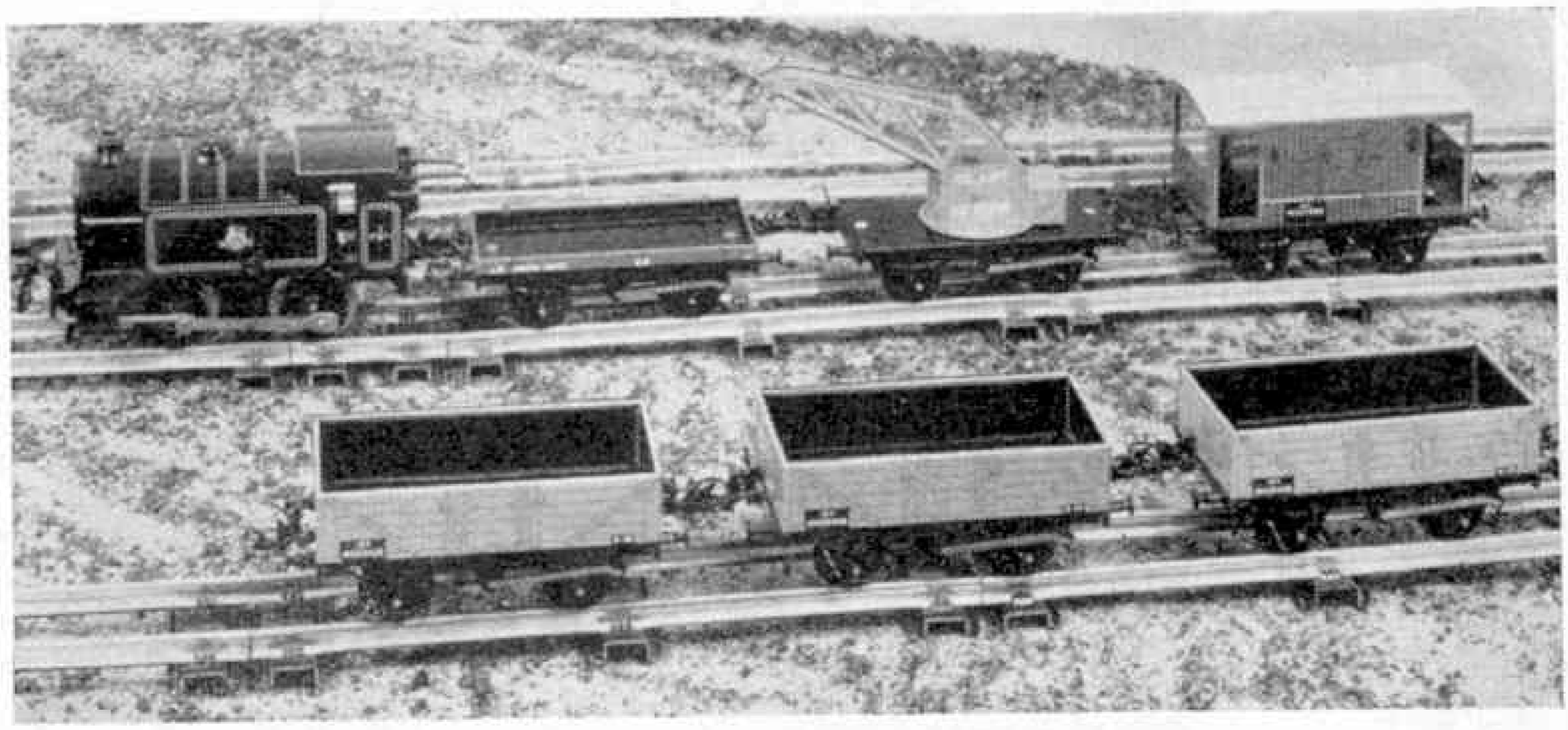
Although there is such a good choice for both passenger and goods traffic for Hornby Clockwork railways, I must remind you of one or two things affecting the selection of stock. In one of our recent talks I mentioned the differences between the various forms of couplings used on different classes of Hornby Coaches and Wagons. While No. 50 vehicles cannot be coupled to Nos. 20/21 and 30/31 stock, the items in these two series can be used with one another, although they have different forms of coupling.

In making up your trains, don't forget that the brake van in which the real guard rides is almost always the last vehicle. There are some exceptions to this, but there is no need for me to say more about this particular point now. It can quite well form one of the subjects of a later talk.

In the picture above a No. 40 Tank Locomotive pushes wagons and pulls a Goods Brake Van while carrying out a shunting movement.

You may wonder then what the engine in the picture above is doing with Wagons attached in front and with the Goods Brake Van coupled behind the bunker. The explanation is that the picture shows a shunting movement going on, in which the Wagons are being pushed along the sidings to the place required. At the same time, the Brake Van, which is to be placed on the track running down toward the centre of the page, is being moved up by the engine so that it will be ready for shunting along this track once the right-hand Points shown in the picture have been set for this movement. "Push-and-pull" arrangements of this kind are sometimes necessary in the course of shunting movements in particular layout conditions.

An interesting point about the upper illustration on page 84 is that it shows a train conveying the Hornby Crane Truck along the line. No doubt there is a lifting job of some kind in hand, perhaps a special loading operation that makes the use of the Crane necessary. You can have all sorts of fun arranging jobs of this kind either in loading or unloading something unusual, or perhaps in connection with some



A short train conveying a Hornby Crane Truck passes Wagons in the foreground. Next to the Crane is a Low-sided Wagon used as a "runner".

engineering work at the lineside.

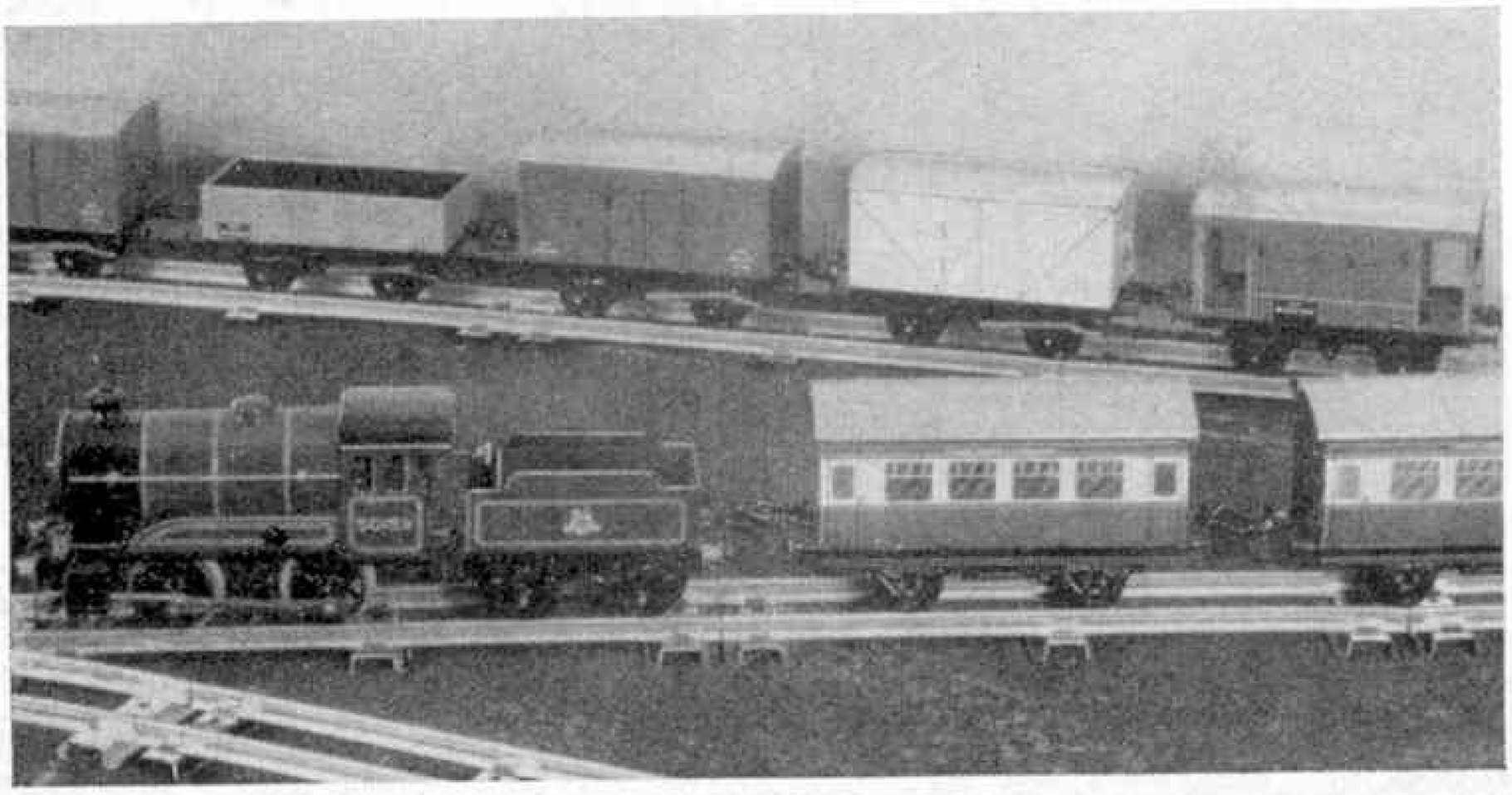
You will notice that the train is completed by the Goods Brake Van at the rear, but you may wonder why there is a Low-Sided Wagon between the engine and the Crane Truck. The Wagon could be employed in such circumstances to carry one or two oddments useful for jobs in which the Crane is used, but in this instance it is simply acting as a "runner wagon" as it is called. The jib of the Crane overhangs the end of the frame of the Crane Truck and therefore the runner wagon is placed so that there is clearance for the jib between the Crane Truck and the engine.

A small point in this same picture concerns the No. 50 Open Wagons in the foreground. Although they are not doing anything, they do add to the effectiveness of the scene. Wagons or vans just standing in sidings are a familiar enough sight on real railways, and in the simple manner shown we capture quite a bit of realistic atmosphere.

The situation is not quite the same in the lower picture, where there is in the background part of a goods train made up and ready for use. Although normally the Vans shown, excepting the Brake Van, would be assembled next to the engine on one of the more important freight services they are just as likely, in a more local goods train, to find themselves in almost any order.

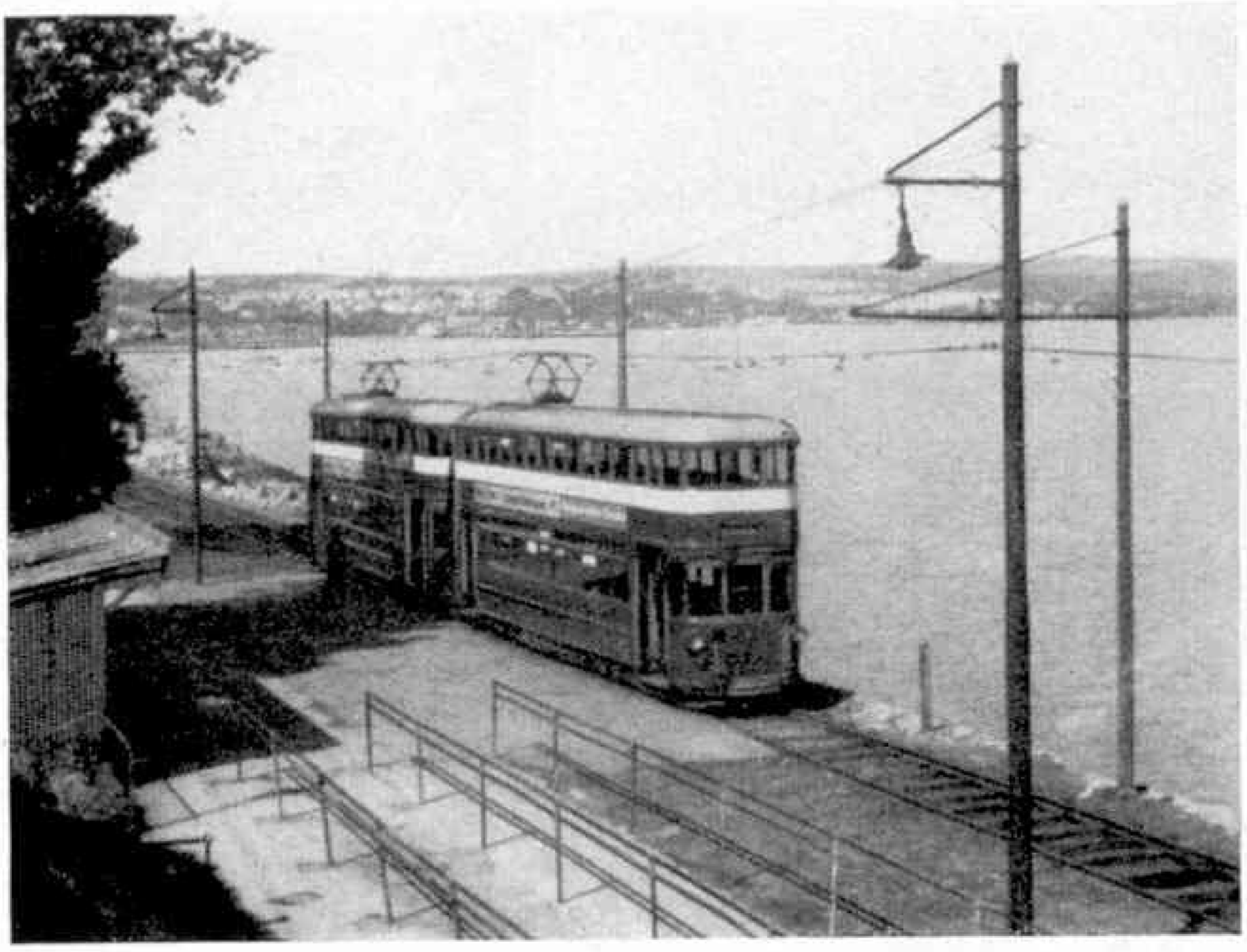
You cannot see the Brake Van of the passenger train in that picture, but you can be sure that there is one. It is good to be able to have a Brake Van on passenger trains next to the engine as well, but if this means that a train is going to be rather long for our layout, the presence of an ordinary Coach next to the Tender is quite reasonable.

In case some of you did not see the January *M.M.*, in which the point was specially mentioned, I must tell you that the Train Name and Destination Labels intended for Hornby-Dublo Coaches can be used quite effectively on Hornby No. 51 Coaches, as they are in our picture here. You just place them in position, and they stick.



"King's Cross - Edinburgh" say the Destination Labels on these Hornby No. 51 Coaches. The Labels are actually Hornby-Dublo products, as mentioned in this article.

Of General Interest

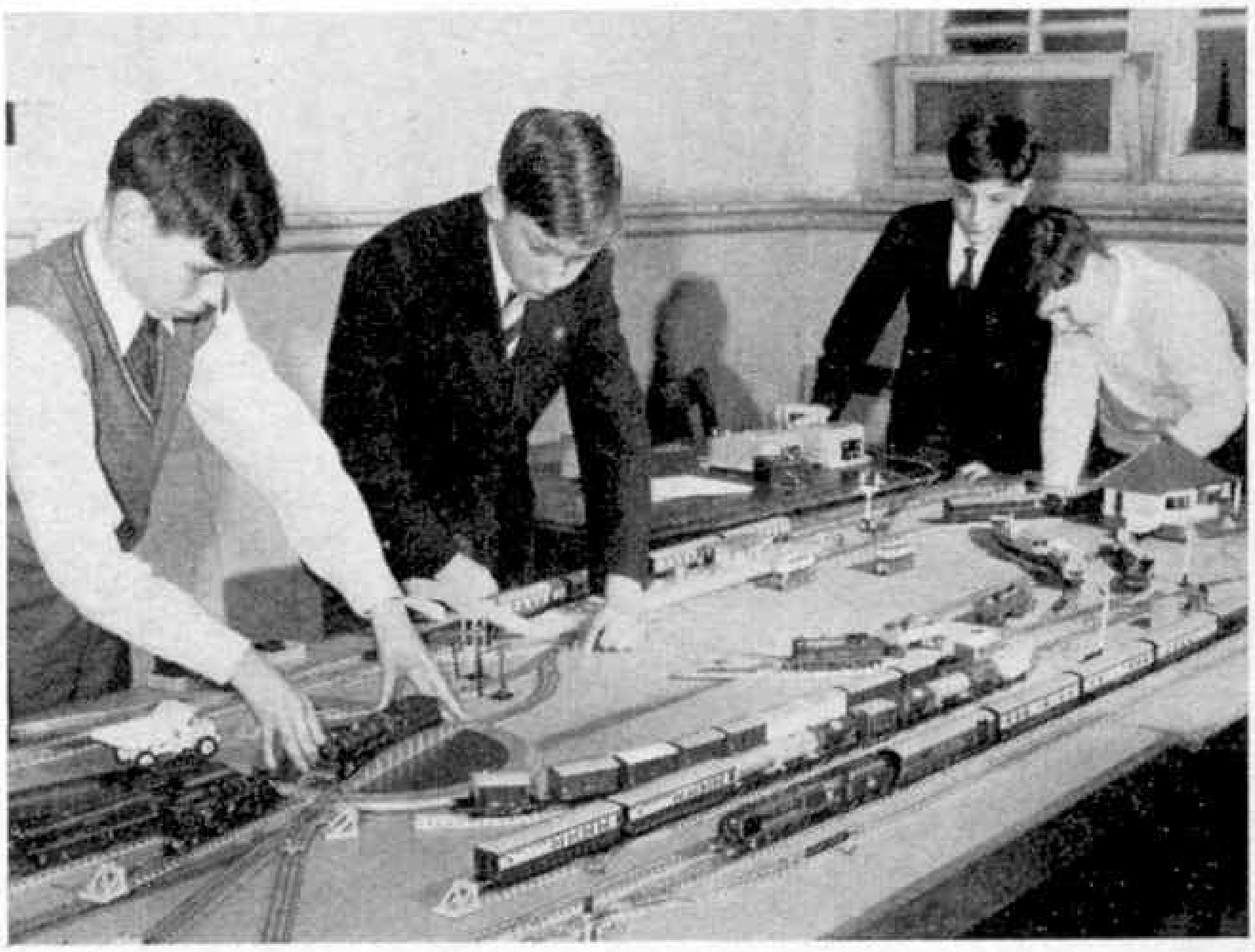


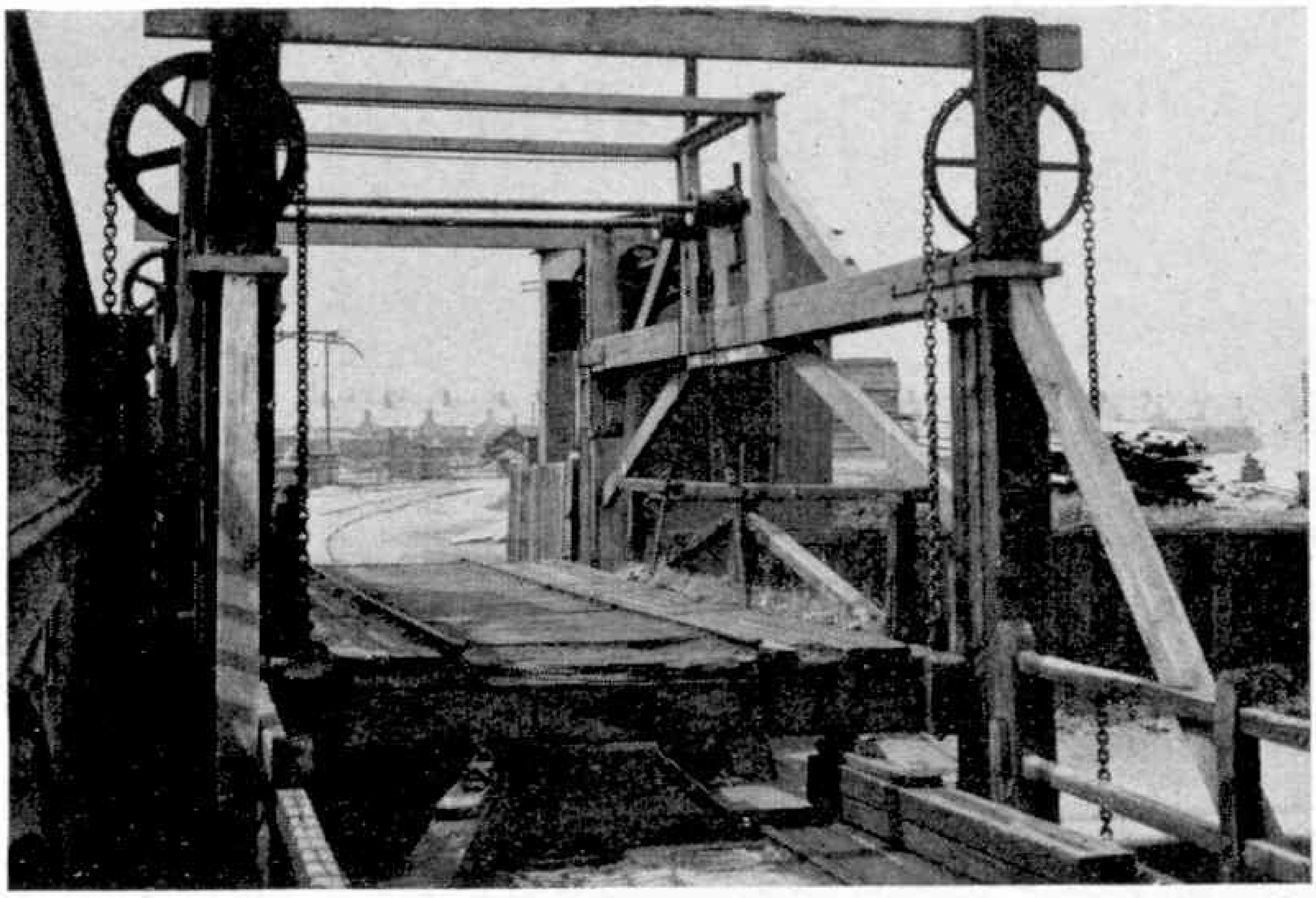
J. JOYCE, of Raynes Park, London, visited Swansea recently and secured the picture reproduced above of the Mumbles Railway, usually described as "the world's oldest passenger railway." When sending it to me he added some notes on its history since passenger service on the line began in 1807, when horse traction was used. Later the trains were hauled by steam locomotives, but electric operation began in 1929 with large double-deck cars. These have seating for 106 passengers each, and at busy times the cars run in pairs, as shown in the picture. A curious feature is that they have entrances on one side only.

Joyce enjoyed the 5½-mile ride from Swansea to Mumbles. The track is mostly single, with automatic points and signals, and for much of the way it runs beside the sea, with extensive views of Swansea Bay. The trains are fast, and it did not seem long before our reader had reached the terminus at Mumbles pier.

There is a story attached to the lower picture on this page. It began with a Bazaar arranged by members of the North Harrow and District Choral Society. As their contribution to this effort four Hornby-Dublo enthusiasts, Richard King, John Lane, Quentin Hopkins and Kevin Spiers, decided to exhibit a Hornby-Dublo layout, and the picture shows the result. The display was a great attraction to visitors, and the four boys also thoroughly enjoyed themselves.

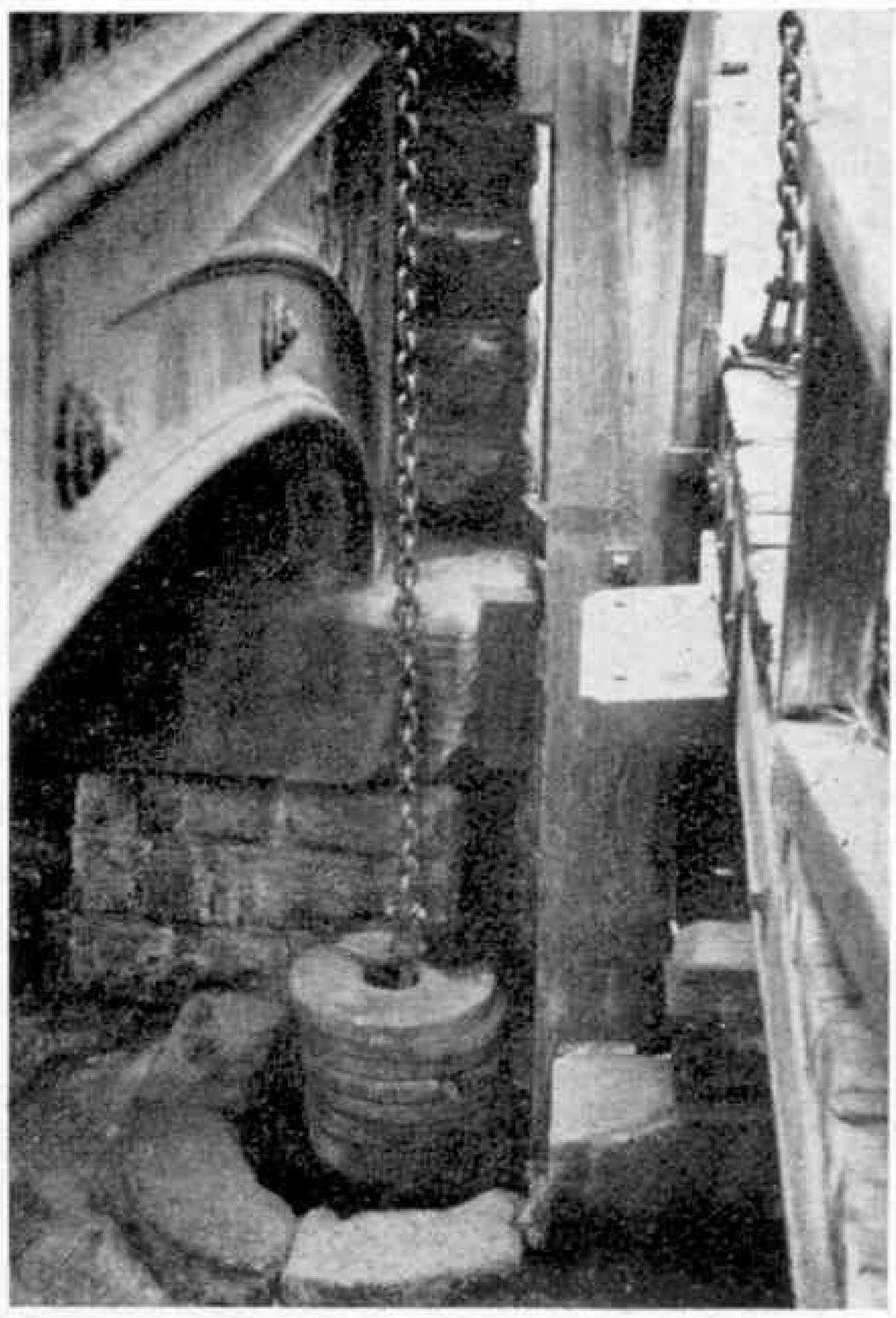
Other Hornby-Dublo enthusiasts have made good use of their railways on similar occasions. The idea is a good one, and I should be glad to hear of further examples.





A Unique Railway Bridge

By A. S. Marshall, A.I.B.P., A.R.P.S



SPANNING The Grand Union Canal in the heart of industrial Leicester is an old railway bridge that can well be described as unique. This is made almost entirely of wood, as the picture above shows, and is of a horizontal lifting design. It was built in 1845 in the workshops of the Leicester and Swannington Railway to replace an almost identical structure designed by Robert Stephenson and built by the company in 1834. Parts of this original structure indeed were retained in the existing bridge.

The movable span, which is 28 ft. 6 in. long and 11 ft. 6 in. wide, carries the single track of the Soar branch of the Leicester and Swannington Railway. This was opened in October 1834 and provided valuable additional accommodation for coal traffic.

Lifting is by power from an engine house on the canal bank. Shaft drive to the centre of the structure winds lifting chains round drums, and the whole is counterbalanced by iron weights at the corners. An unusual feature of the counterbalancing is a hole dug into the canal bank to allow free movement of one of the weights. This can readily be seen in the lower illustration on this page.

A Winter Model-Building Competition

WE are now in the peak period of the model-building season, and this therefore is a fine opportunity for a new general model-building competition in which every Meccano owner can take part. With this in mind we are offering splendid prizes, in the form of Cheques and Postal Orders, in a contest in which models of any size and type can be entered.

Simple cranes built with small Outfits, giant locomotives constructed from the largest ones, bridges, motor vehicles and machines of all kinds all are eligible. Every model-builder should join in this grand contest, even if his Outfit is a small one and he is a beginner, for the judges will take these points into consideration in making their awards.

It is very easy to prepare an entry for this Contest. The model itself must not be sent; all that is required is a photograph or a good sketch, with any notes required to explain special constructional features. On the back of each photograph or drawing he sends in the competitor must write his name, address and age, and then forward his entry to *"Winter Model-Building Contest, Meccano Ltd., Binns Road, Liverpool 13."*

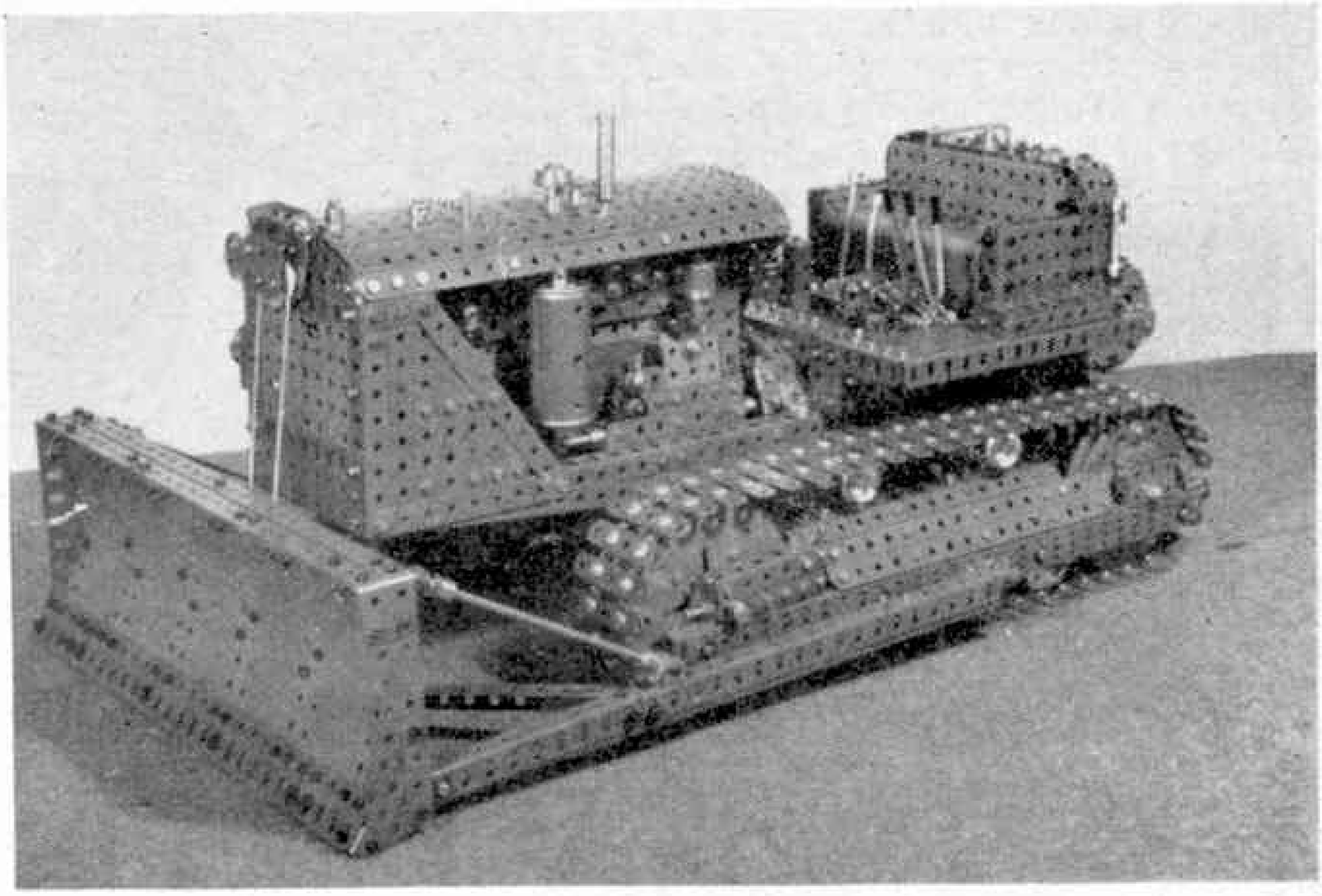
The Competition is open to readers of all ages and is divided into two Sections, "A" for competitors under 14 years of age, and "B" for competitors 14 years of age or over.

A complete set of cash prizes will be awarded in each section of the Contest to the builders of the most interesting and well-constructed models received. Full details of these prizes are given in the panel on this page.

In addition to the actual prizes a number of Certificates of Merit will be awarded to those competitors whose models fall just short of prize-winning standard. Prize-winners will be notified by letter as soon as possible after the closing date and some of the outstanding entries will be illustrated in the *Meccano Magazine* later.

Competitors should note that the closing date in both Sections of the Contest is 30th May, 1959. Entries may be posted at any time before that date, but entries received after 30th May will not be eligible.

Photographs or drawings of unsuccessful entries will be returned to the sender only when a stamped addressed envelope is enclosed for that purpose. It should be noted, however that photographs or drawings of prize-winning entries become the property of Meccano Ltd., and may be reproduced, if suitable, in the *Meccano Magazine*.



A model bulldozer built by J. H. Thorpe, Sidcup, as an entry for a previous Meccano Competition. It possesses many attractive constructional features.

MECCANO WINTER MODEL-BUILDING COMPETITION

The following Prizes will be awarded in each Section of the Competition:

	£	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

A number of Certificates of Merit will also be awarded.

Among the Model-Builders

By "Spanner"

A Simple Reversing Mechanism

Fig. 1 illustrates another of the many interesting mechanisms designed by Mr. H. H. Taylor, Huddersfield, quite a lot of whose work has been included in past issues of the Magazine.

This time it is a simple reversing mechanism that has many applications. To construct it join two $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates 1 and 2 together, using a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plate 3 and two $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips. A Washer should be placed between the lugs of the Double Angle Strips and the Flanged Plates. Then bolt two 1″ Triangular Plates 4 to the Flanged Plates by means of $\frac{1}{2}''$ Bolts with Collars on their shanks. To a Crank 5 a 2″ Slotted Strip 6 and a $3\frac{1}{2}''$ Strip 7 are bolted. On a $2\frac{1}{2}''$ Rod mount a 2″ Pulley Wheel and a 1″ Gear Wheel 8, and loosely the Crank 5. The Rod is journalled in the 1″ Triangular Plates 4. A $\frac{1}{2}''$ Pinion 9, mounted on a $\frac{3}{4}''$ Bolt, is fixed in the 2″ Slotted Strip so as to mesh with the 1″ Gear Wheel 8.

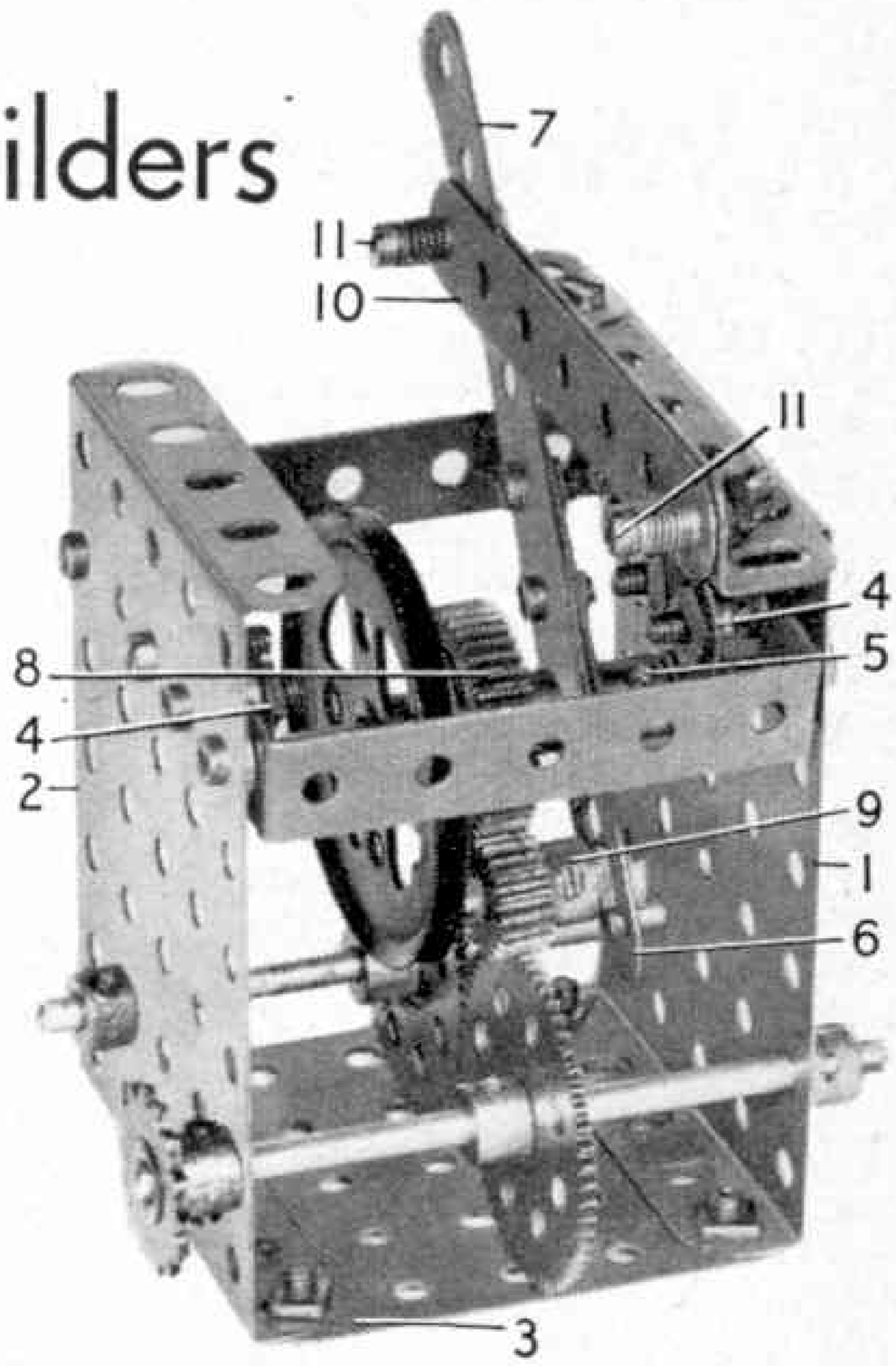


Fig. 1. A simple form of drive reversing mechanism designed by H. H. Taylor, Huddersfield.

Two $3\frac{1}{2}''$ Rods, each of which carries a 57-tooth Gear Wheel, are mounted between the two Plates 1 and 2, and the Gears are meshed with each other. The Rods are held in position by Collars and a $\frac{3}{4}''$ Sprocket Wheel. Bolt a $3\frac{1}{2}''$ Angle Girder to the top flange of the Flanged Plate 1. A $3\frac{1}{2}''$ Strip 10 is spring loaded with Compression Springs on the $\frac{3}{4}''$ Bolts 11, which are lock-nutted. This Strip 10 holds in place a lever consisting of a $3\frac{1}{2}''$ Strip 7, and by moving the lever to and fro, forward, neutral, and reverse drive positions can be obtained.

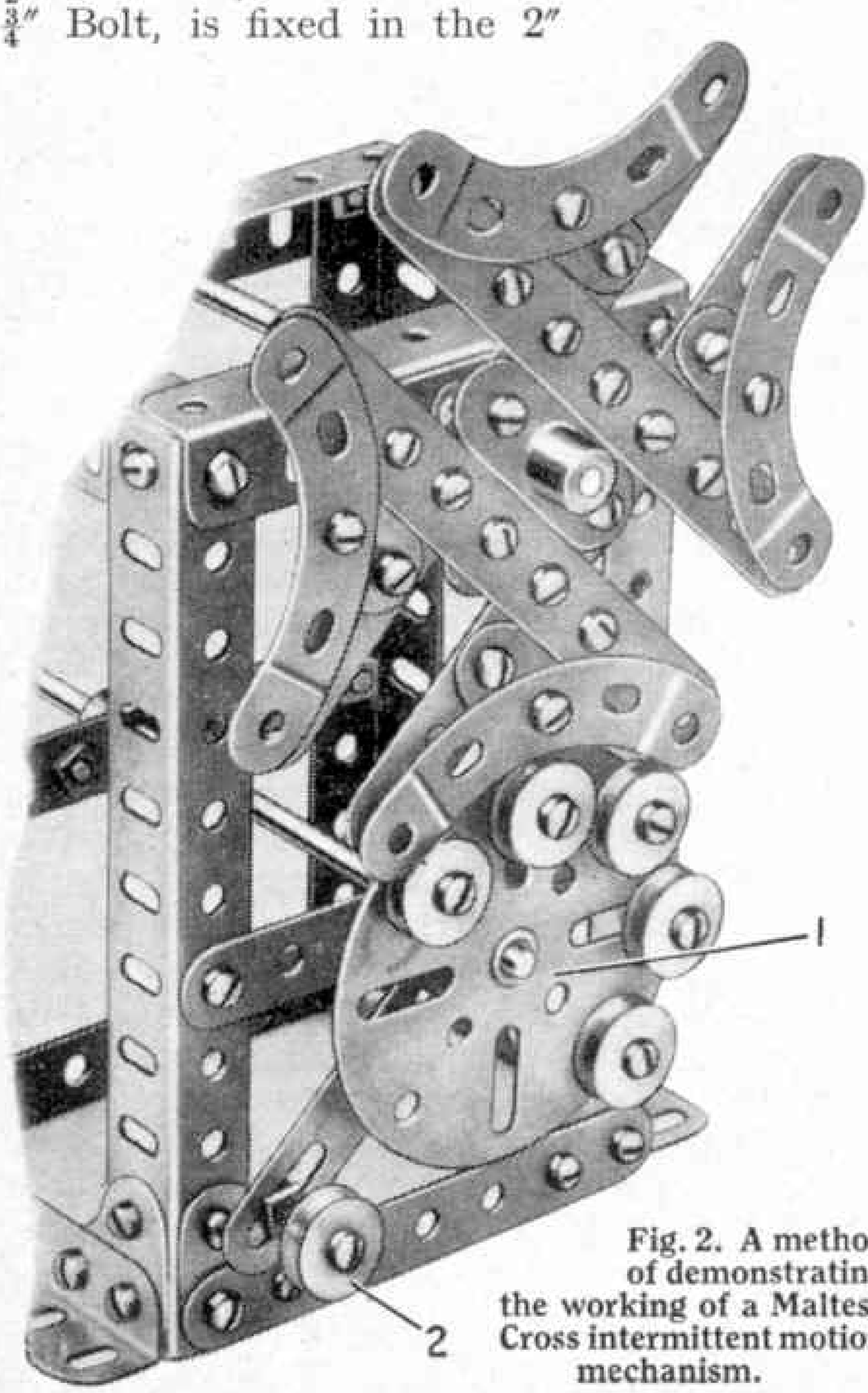


Fig. 2. A method of demonstrating the working of a Maltese Cross intermittent motion mechanism.

Large Maltese Cross Mechanism

This intermittent drive mechanism is suitable only for comparatively slow speeds, but it is an interesting one to assemble and to observe in operation. The framework in this instance is built up from $5\frac{1}{2}''$ and $3\frac{1}{2}''$ Angle Girders braced by means of 1″ Corner Brackets, but it will of course be dispensed with when the mechanism is incorporated in a model.

The driving member is a Face Plate 1, which is mounted on a short Rod and fitted with five $\frac{1}{2}''$ loose Pulleys held in place by means of $\frac{3}{8}''$ Bolts. At the back

of the Face Plate, but on the same Rod, a Crank carrying a 2″ Slotted Strip is fitted and the slot of the Strip forms an adjustable support for a ¾″ Bolt carrying a ½″ loose Pulley. This Pulley is free to rotate on the Bolt and is prevented from moving along its shank by means of Washers.

The cross is made up at its centre of two Double Arm Cranks placed with their bosses pointing in opposite directions on a suitable Rod of length. It can be seen in the illustration that the rear Double Arm Crank carries two 4½″ Strips, placed parallel to the front Double Arm Crank. Two further 4½″ Strips are bolted to the front Double Arm Crank and also to the first mentioned pair, relative to which they are at right angles. The ends of the Strips are now linked by means of 2½″ small radius Curved Strips held in place by Flat Brackets.

It will be seen that as the arm on the driving member rotates, the ½″ loose Pulley 2 engages with the slots in the cross, and during the stationary periods the cross is prevented from turning by the five ½″ loose Pulleys secured to the Face Plate 1.

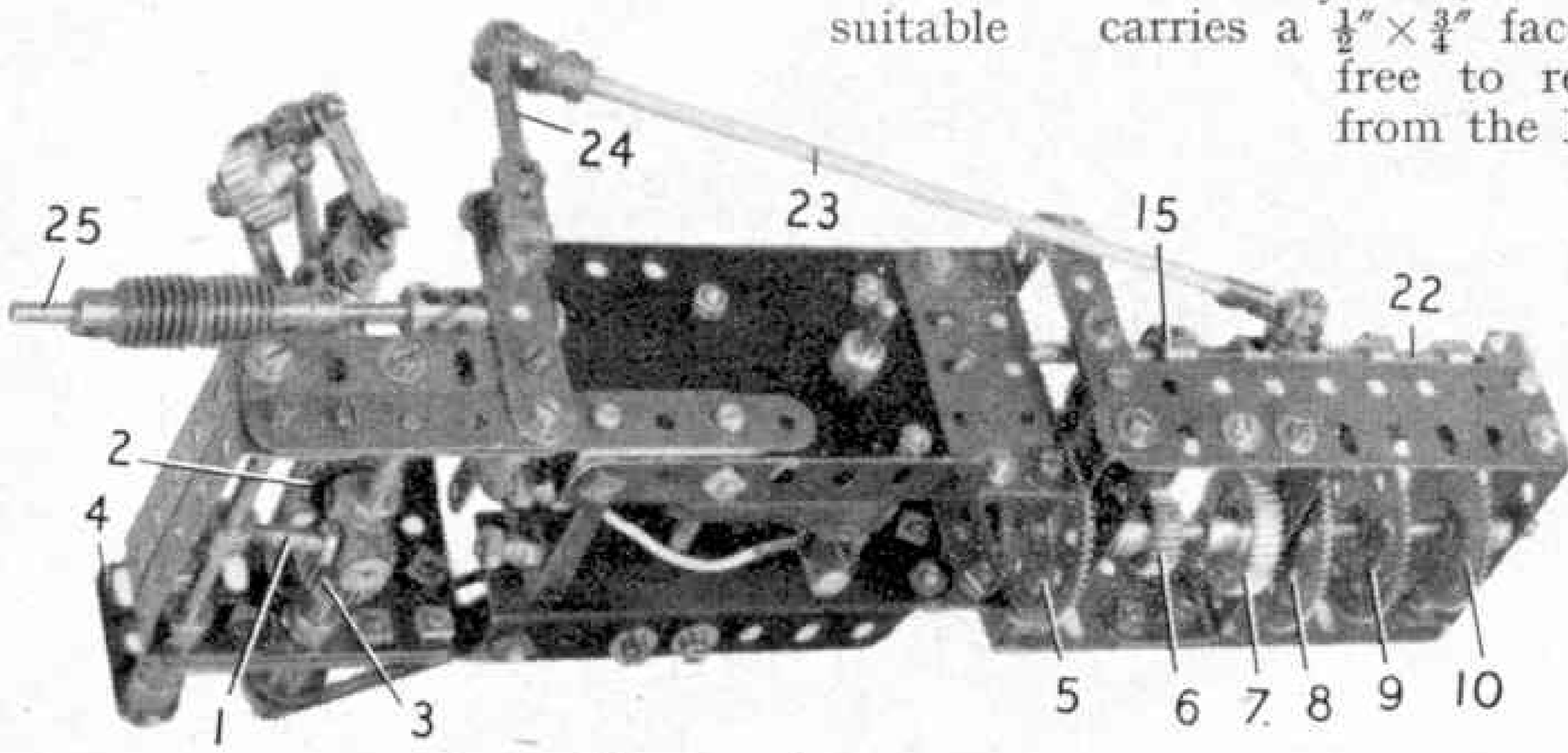


Fig. 3. An automatic transmission mechanism designed by J. F. Sharp, Newsome, Huddersfield.

An Automatic Transmission Gear

I have recently obtained details of an ingenious automatic transmission gear designed by Mr. J. F. Sharp, Newsome, Huddersfield, which is of special interest in view of the fact that gear-changing is controlled by a governor mechanism driven by the power Motor. The gear-box provides 4-speeds and the whole unit is very neatly assembled. The complete mechanism is shown in Figs. 3 and 4, and the construction of the governor, gear-box drive and the housing, should be quite clear from the illustrations.

The gear-box input shaft carries a 57-tooth Gear 5, a Washer, a ¾″ Pinion 6 and a 1″ Gear 7. The output shaft protrudes about ¼″ into Gear 7 and carries a 60-tooth Gear 8, 57-tooth Gear 9, 50-tooth Gear 10, and six Washers.

The layshaft, which is a 5″ Rod 11, carries a ½″ × ¾″ face Pinion 12, which is free to revolve and is spaced from the Flanged Plate 13 by a Washer. Also on the layshaft are a 50-tooth Gear 14, a Crank 15, a 1″ Gear 16, a $\frac{7}{16}$″ Pinion 17, a ½″ Pinion 18 and a ¾″ Pinion 19. The end of the shaft is supported by a 1½″ Strip 20 spaced by three Washers from Plate 21.

The gear ratios obtainable are as follows: 1st gear is obtained through gears 6 and 14, 17 and 8, and 2nd gear is obtained through gears 6 and 14, 18 and 9, and 3rd gear through gears 16 and 7, 18 and 9. 4th gear is given by meshing gears 16 and 7, 19 and 10.

The layshaft is moved by the selector bar 22. Details of the linkage of Rods 23 and 24 to the governor arm 25 should be clear from the illustrations.

The operation of the mechanism is as follows. When the Motor is at rest, the gear-box is in neutral gear as the layshaft 11 is positioned at its fullest extent. As the Motor speed increases,

(Cont. on page 104)

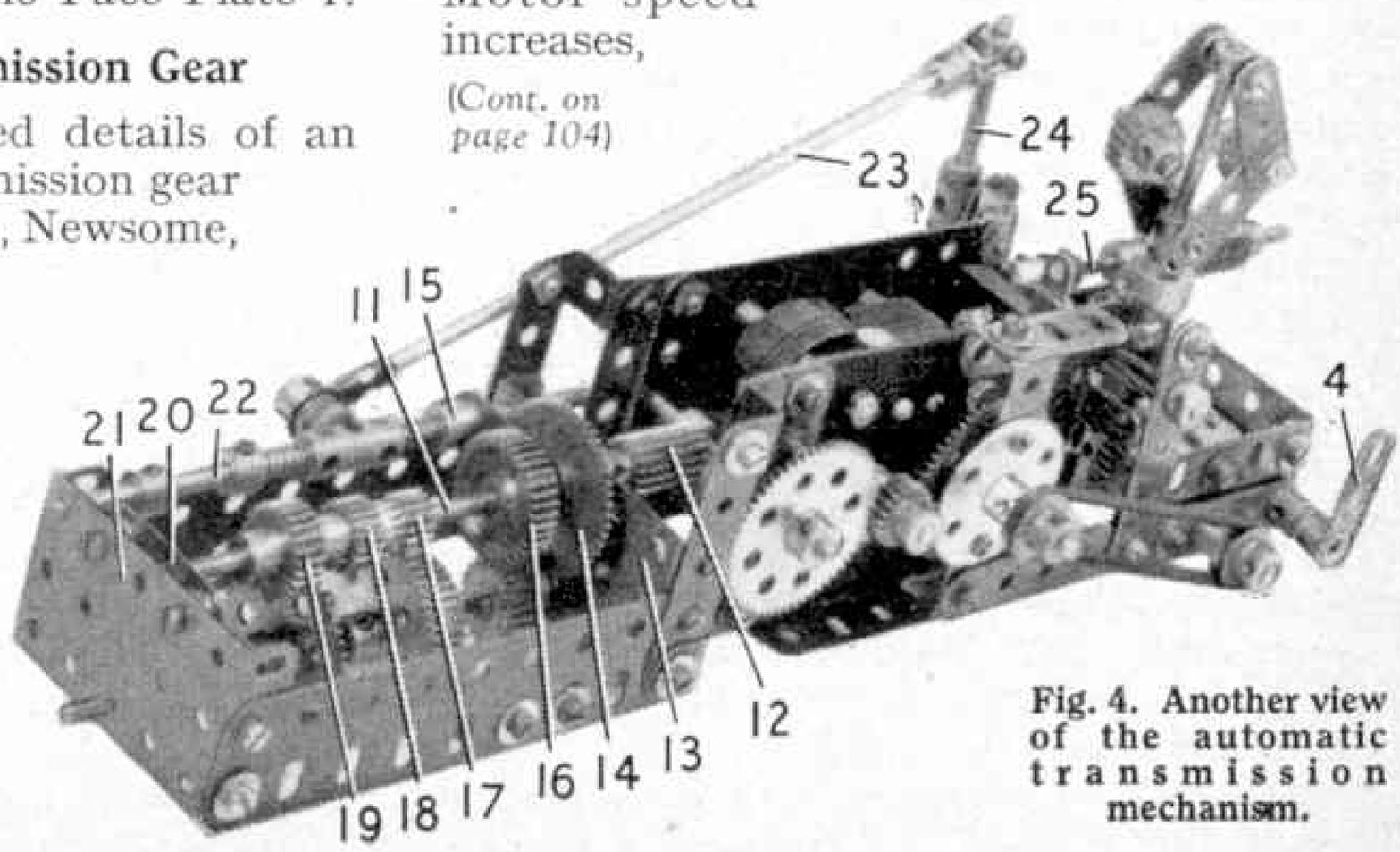


Fig. 4. Another view of the automatic transmission mechanism.

MODEL OF THE MONTH

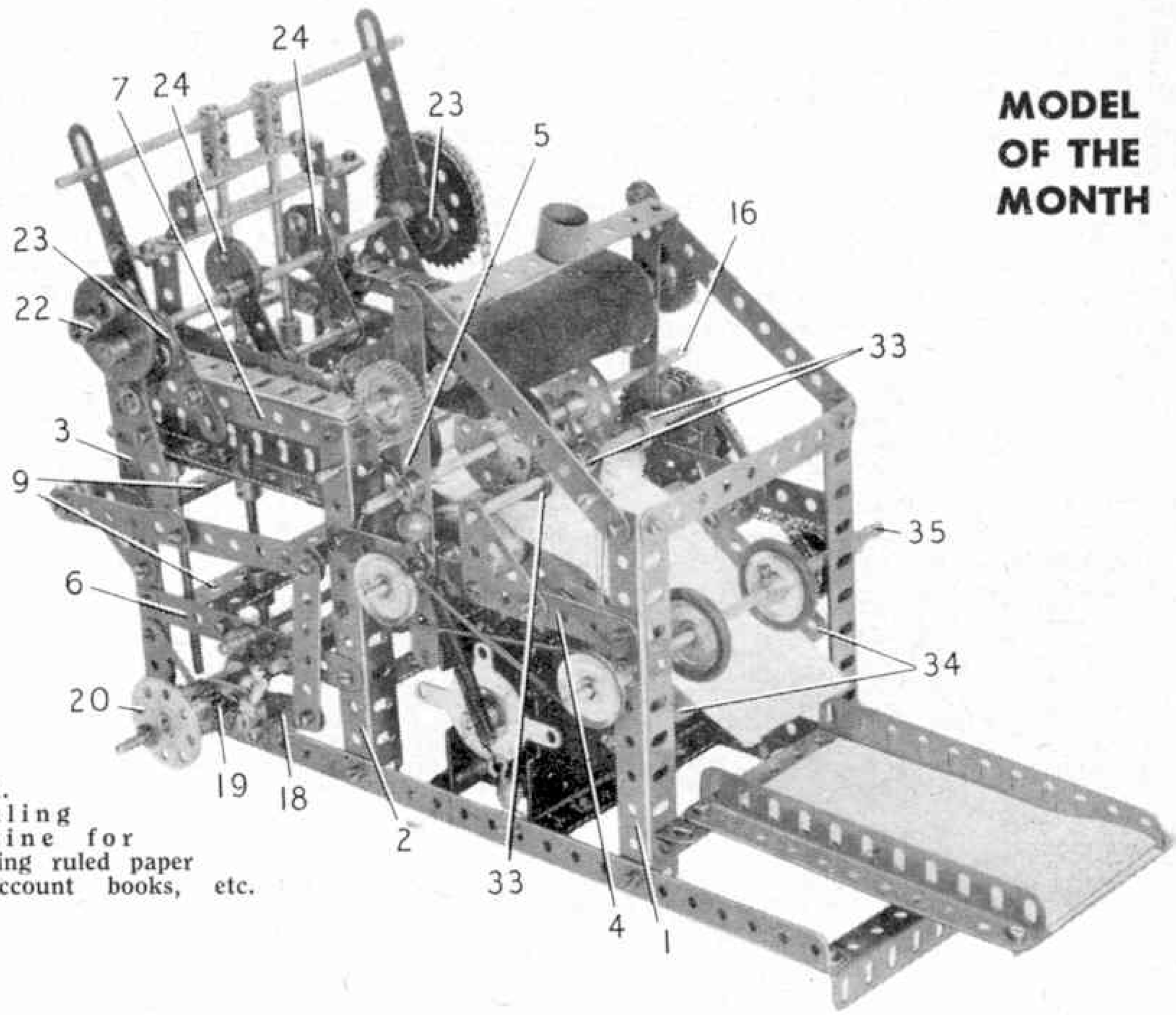


Fig. 1. A Ruling Machine for producing ruled paper for account books, etc.

Paper Ruling Machine

WE have included in the Model of the Month subjects from time to time models of machines that will "do something", that is, carry out some kind of useful work. Among these have been a machine that folds lengths of woven cloth into bales, a machine for filling boxes automatically with pills or other articles, and a wire covering machine. We are adding this month a fine model of a printer's paper ruling machine, which is designed to print rule lines on paper, for use, for example, in the making of ledgers and other account books.

The model is shown complete in Fig. 1 on this page and while it is not at all difficult in construction, the building of it should provide plenty to interest the constructor. The model is driven by an E20R(S) Electric Motor and is most realistic when in operation.

As usual readers who wish to build the Ruling Machine can obtain full constructional details and a list of the parts required to build it simply by writing to the Editor enclosing a twopenny stamp to cover the cost of postage.

Readers living in Canada, Australia, New Zealand, South Africa, Rhodesia, Ceylon, United States of America and Italy can obtain the instructions by writing to our main agents for those countries, also of course, enclosing appropriate stamps for postage.

We advise readers who wish to build this model to apply for the instructions as soon as possible because there is sure to be a big demand and we cannot guarantee to supply Model of the Month instructions after the end of the month in which the model is illustrated in the *Meccano Magazine*. So to avoid disappointment write for your copy as soon as you receive this issue.

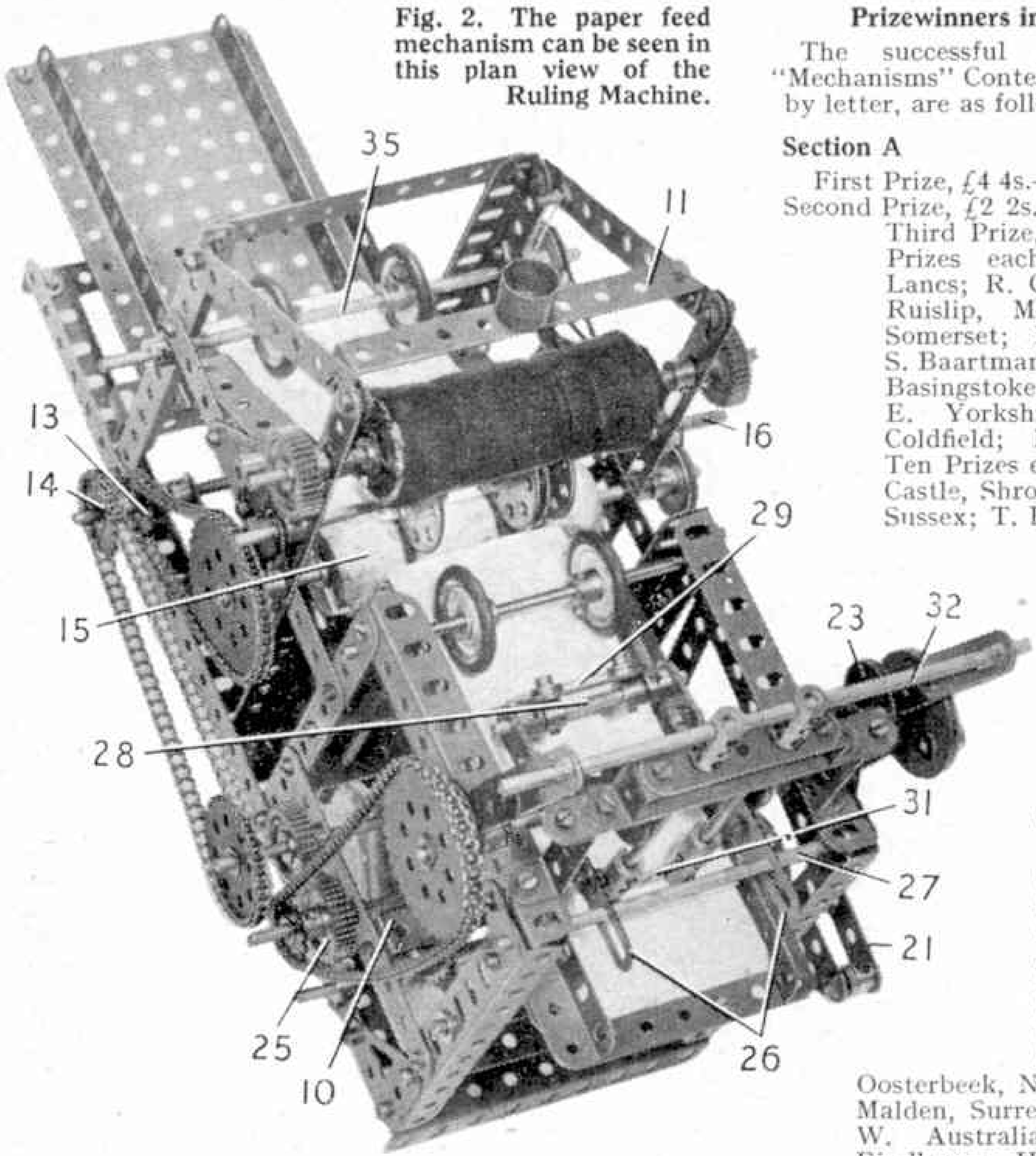


Fig. 2. The paper feed mechanism can be seen in this plan view of the Ruling Machine.

Prizewinners in the "Mechanisms" Contest

The successful competitors in the Meccano "Mechanisms" Contest, all of whom have been notified by letter, are as follows:

Section A

First Prize, £4 4s.—J. M. Hammond, Arnold, Notts; Second Prize, £2 2s.—R. W. Gillings, Reading, Berks; Third Prize, £1 1s.—N. Haines, Cardiff; Ten Prizes each of 10/—S. Ingham, Nelson, Lancs; R. Cole, Enfield, Middx; J. Reeve, Ruislip, Middx; S. Sampson, Clevedon, Somerset; M. Lobenberg, London S.W.5; S. Baartman, Pretoria, S. Africa; J. A. Olsson, Basingstoke, Hants; P. Hare, Sutton on Hull, E. Yorkshire; R. G. Matthews, Sutton Coldfield; M. Poore, Harrow, Middlesex; Ten Prizes each of 5/—T. Pickard, Bishop's Castle, Shropshire; M. Lanning, Forest Row, Sussex; T. R. E. Latter, Dinas Cross, Pembs; R. H. Khan, Karachi, W. Pakistan; P. Kellow, Torquay, Devon; T. Shiva Rao, Calcutta-26, India; A. Stewart, Moray, Scotland; R. Canovan, Norbury, London S.W.16; B. Tisdall, Kingston Hill, Surrey; S. J. Clearman, New York.

Section B

First Prize, £4 4s.—H. C. O. W. Geesink, The Hague, Holland; Second Prize, £2 2s.—A. Konkoly, Budapest, Hungary; Third Prize, £1 1s.—R. A. Wild, Weymouth, Dorset; Ten Prizes each of 10/—Okko Bosgra, Weesp, Netherlands; C. Kensit, London S.W.15; G. Th. van Beusekom, Oosterbeek, Netherlands; T. J. Hatchett, New Malden, Surrey; B. Pickersgill, East Burburg, W. Australia; Tr. T. van Vollenhoven, Eindhoven, Holland; D. E. Hall, Hatch End, Middx; P. H. Kessler, Lucerne, Switzerland; A. W. Umpelby, Newton Abbot, Devon; J. F. Sharp, Berry Brow, Huddersfield; Ten Prizes each of 5/—J. Hutchinson, Wormhill, Nr. Buxton, Derbyshire; Prabir Kumar Sen, Calcutta 4, India; J. P. Michel, Paris Arr. 15, France; J. Shirlaw, Edinburgh 11; Alberto Morales, Mexico; L. Holman, Camborne, Cornwall; Miss J. Noad, Sutton, Surrey; R. Tuthill, E. Dereham, Norfolk; J. M. N. Aylmer Hall, Bushey, Herts; J. F. Loder, Plympton, Devon.

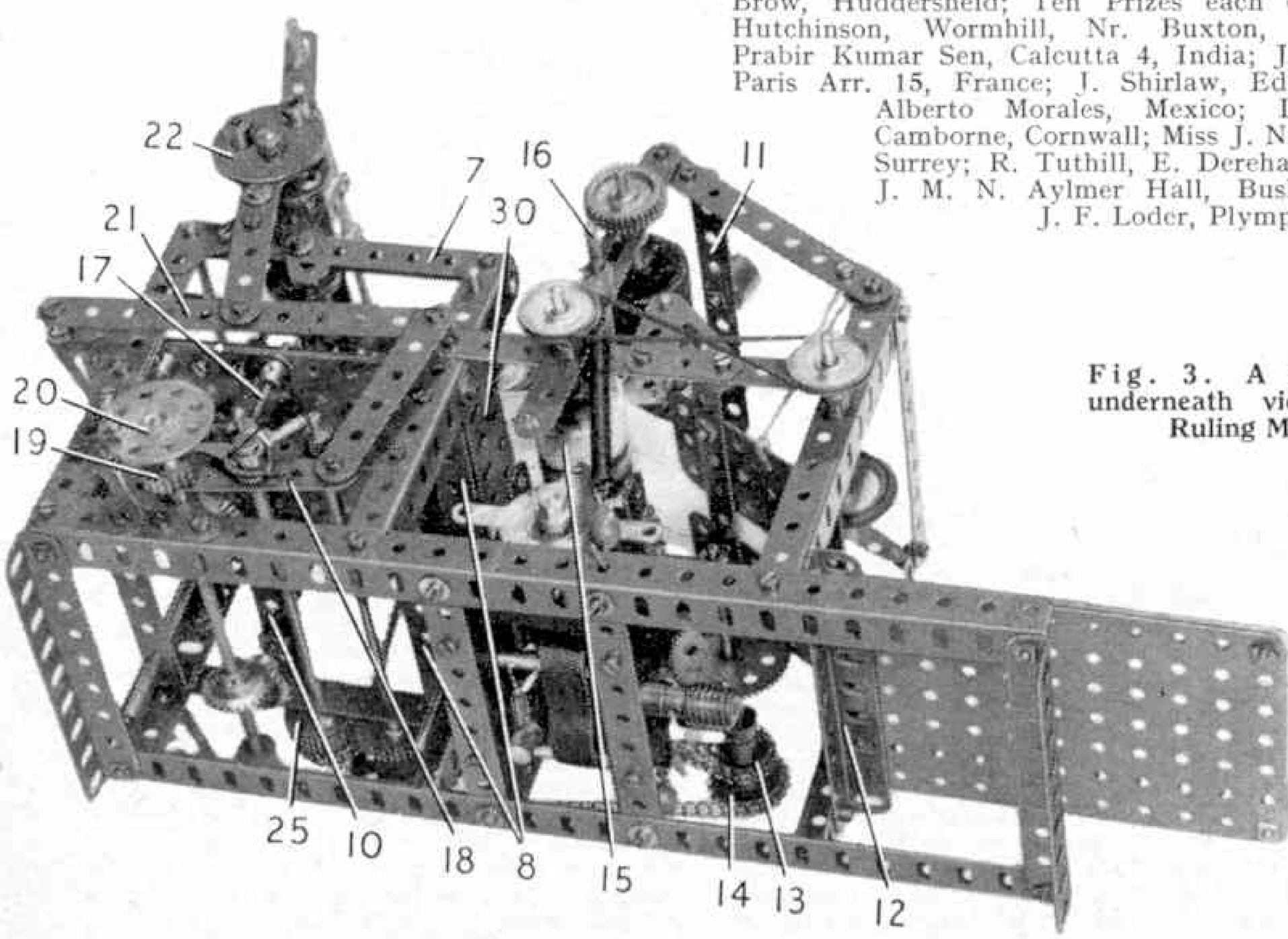


Fig. 3. A side and underneath view of the Ruling Machine.

Club and Branch News

WITH THE SECRETARY

MERIT MEDALLIONS

I have again the pleasure of giving below the names of Club members who have been awarded the Merit Medallion during the past twelve months, and of congratulating them on their good work on behalf of Club and Guild which earned them this official recognition.

Just in case any of the new Clubs which attained affiliation with the Guild during the period in review have forgotten for the moment, I will mention that every Club is entitled to two Merit Medallions per Session, to be awarded in acknowledgment of good service rendered by the members concerned. This service can take the form of recruiting new members, putting forward constructive items for improving the Club programme, being ever ready to do a good turn at Club meetings, and so on.

Here, then, is the latest list: CONSETT AND DISTRICT Y.M.C.A. M.C.—Bromley, J.; Nixon, P. JUVENTUS (EXETER) M.C.—Collacott, D. J.; Goode, A.; Grant, M.; Greenaway, P.; Hutchings, J.; Hyde, R.; Langdon, F.; Lord, P.; Westcott M. MAYLANDS (WESTERN AUSTRALIA) M.C. — Bransby, W.; Bucholz, G.; Gibbs, G.; Holliday, J.; McComish, L.; McIntosh, D.; Montague, E.; Pelusey, F. MILE END (PORTSMOUTH) M.C.—Enfield, R.; Hallen, E.; Marten, M.; Ruston, P.; Steer, W.; Welch, D.

John Gillespie, the busy Secretary of the Newtown School Waterford (Eire) M.C. A high standard of Meccano model-building is maintained by the members, and the recent Exhibition by the Club was an outstanding success.

CLUB NOTES

COPDOCK & WASHBROOK (IPSWICH) M.C.—Meetings are held every Tuesday and the Club programme includes model-building competitions and games evenings. In one recent competition the subject was *A Bridge*, and the winning model was built by Graham Smith, a member of P. Napper's team. At two meetings just before Christmas members made calendars out of plywood, and achieved some excellent results. *Secretary:* A. C. Pearsons, The Gables, Washbrook, Ipswich, Suffolk.

CONSETT & DISTRICT Y.M.C.A. M.C.—A new member, Mr. Dennis Snowdon, has taken over the Meccano model-building section, and plans to have many fine models displayed at a large-scale Hobbies Exhibition to be held at the Y.M.C.A. this spring. *Secretary:* D. F. Trout, 66 Sherburn Terrace, Consett, Co. Durham.

MILE END (PORTSMOUTH) M.C.—Meccano model-building has continued, and a Dinky Toys layout night was greatly enjoyed. Mr. P. Leggatt gave an interesting talk on *Road Safety*, and members had to plan such things as the correct procedure for taking a vehicle from a major into a minor road. During a musical evening members were invited to "spot" tunes from different countries. *Secretary:* Mr. A. J. Nicholson, 213 Sultan Road, Buckland, Portsmouth.

BORDEN GRAMMAR SCHOOL (SITTINGBOURNE) M.C.—At one meeting a contest was held with Meccano motors, which had to be as low geared as possible. The contest was won by a *Magic* motor which managed to climb a gradient of almost 1 in 2. Work on the model railway has continued. *Secretary:* B. L. Sedge, 19 Cavour Road, Sheerness, Kent.

INDIA

MYSORE M.C.—Model-building continues to be popular, especially among the younger section, and some excellent models have been completed. A Club social was held on the 14th November at the residence of the Vice-President of the Club, when most members and officials attended. After tea and general discussions, a film show was held. The event was so successful that it has been decided to hold a social meeting every month. *Secretary:* Mr. M. N. Radhakrishna, 16 Mothikhana Buildings, Santhepet, Mysore 1, India.

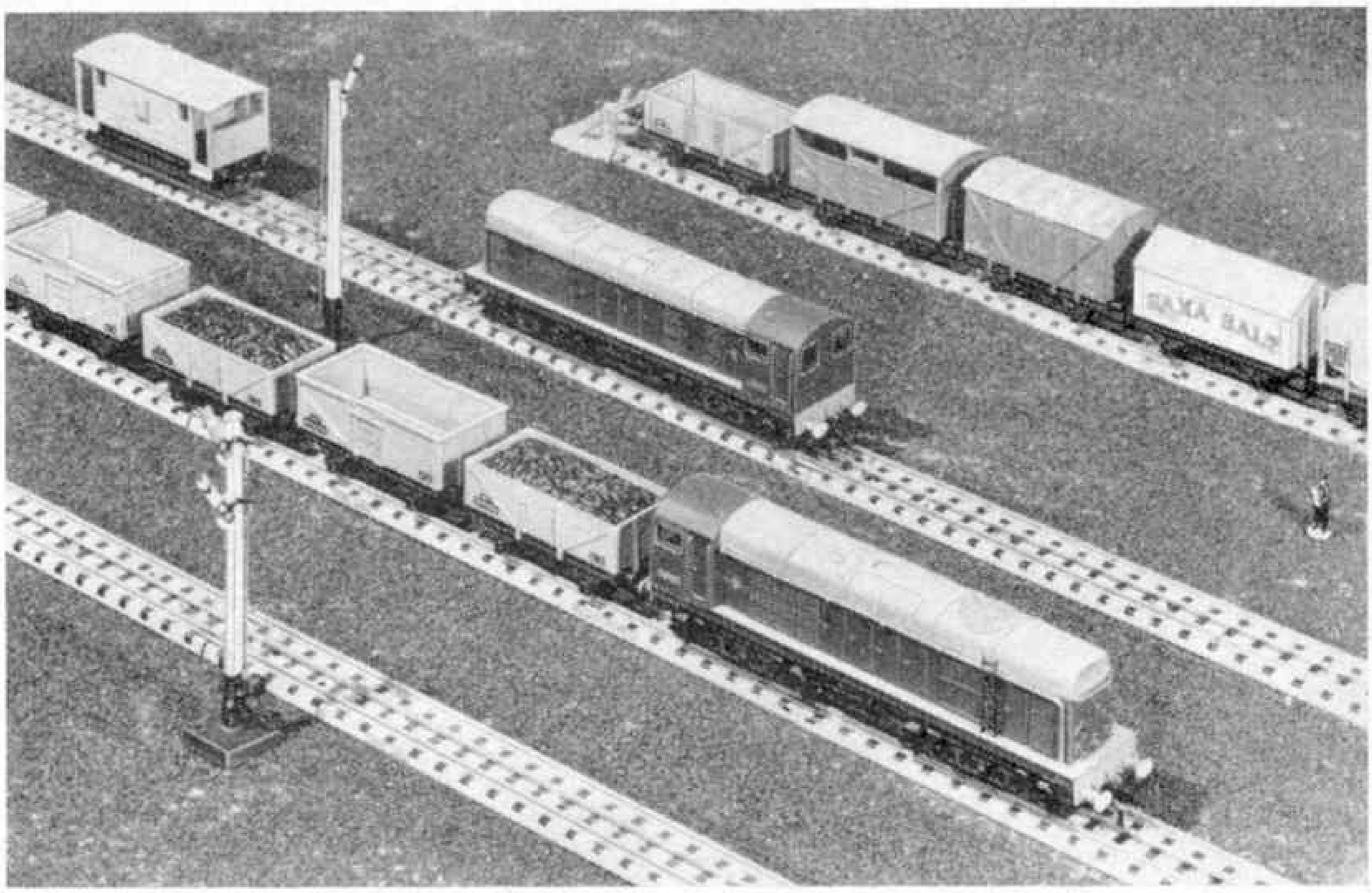
BRANCH NEWS

SILVER ROAD (NORWICH).—Meetings are held every Monday evening in St. Mary Magdalene Parish Hall, and new members will be welcomed. Recently the Group visited the Midland and Great Northern joint line, travelling from Norwich City to Melton Constable and Cromer Beach, and returning by way of Norwich Thorpe. *Secretary:* Mr. I. T. Rix, 26 Dalcon Road East, Norwich.

EDLINGTON COUNTY SECONDARY SCHOOL (DONCASTER).—The Branch has made a good recovery from the loss of its equipment in 1957, and now has five locomotives including *Bristol Castle*. Some members still kindly bring their own locomotives for service on the Branch layout, and most meetings are devoted to train operations. *Secretary:* T. Gater, 82 Markham Road, Edlington, nr. Doncaster, Yorks.

KIDDERMINSTER MODEL RAILWAY CLUB.—Members are now comfortably settled in new quarters, which have been named *Railway House*. They have two rooms, one for the railway proper, and the other for the various model-building groups, and for lectures, film shows, etc. Honorary membership has been conferred on Miss D. Bowkett, who has so ably looked after the catering over a long period. *Secretary:* A. J. Potter, 35 Woodfield Crescent, Kidderminster.

AVIARY (LEEDS).—The well-varied programme carried out during the first Winter Session included treasure hunts, a photographic competition and a film show. The Branch were invited by British Railways to see the exhibition of passenger rolling stock at Leeds City station in October last, and spent a most interesting evening there. *Under-Secretary:* I. M. Pountney, 1 Arley Grove, Leeds 12, Yorkshire.



HORNBY RAILWAY COMPANY

Our Diesel at Work

By the Secretary

LAST month we had a talk about the fine new Diesel-Electric Locomotive recently added to the Hornby-Dublo System. I know that many of you have already obtained this splendid addition to the series, and so have given a new look, and an up-to-date one, to your layouts. I am sure that those who have done so have already found plenty of varied work for the new engine to do, and perhaps the accompanying pictures and the notes on them will give you some new ideas to follow up.

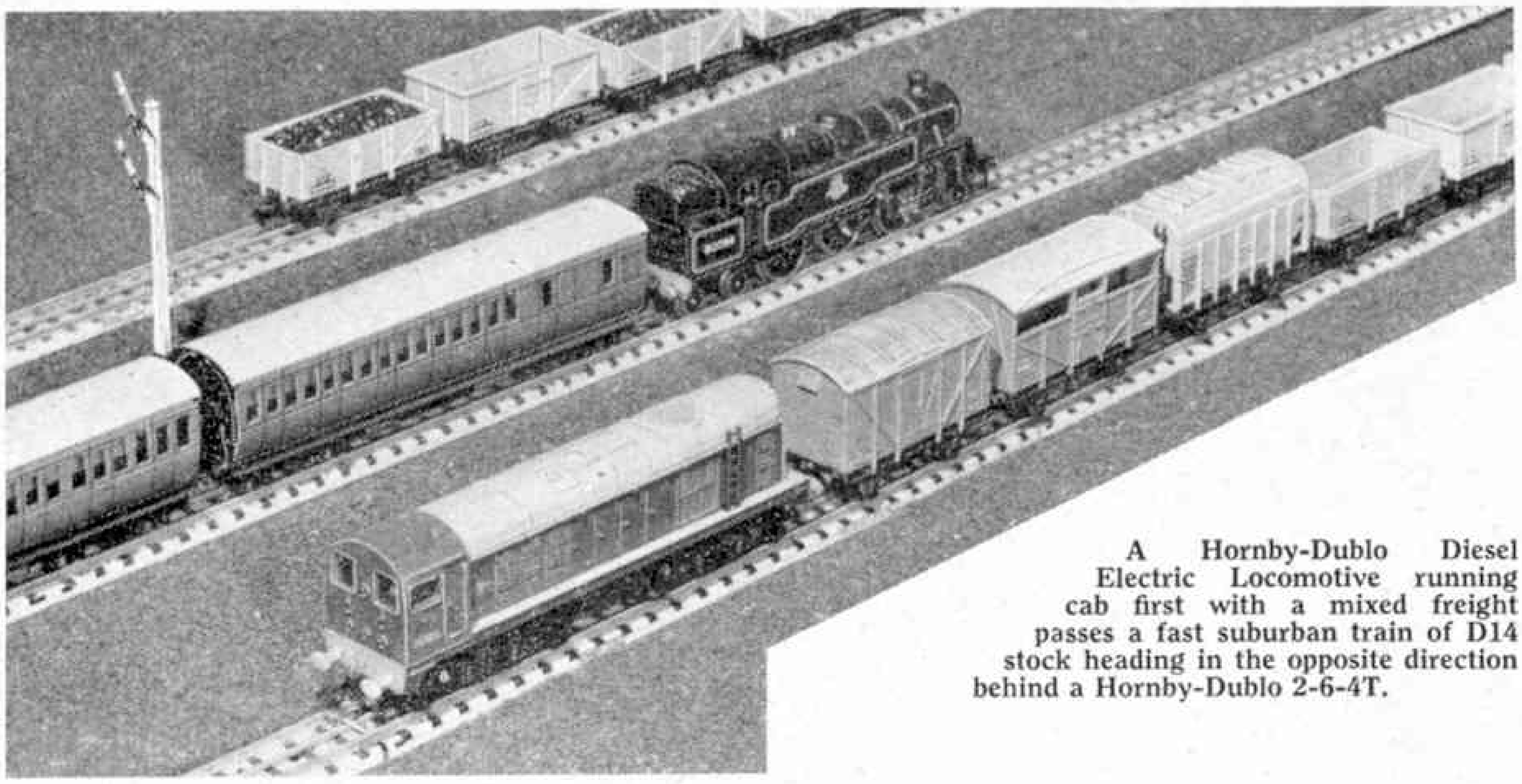
In the picture at the head of the page are two Hornby-Dublo Diesel Electric Locomotives busy with freight traffic. The front, rear and side views of this fine locomotive are clearly seen in it.

Before going further, I feel that I must draw your attention to the importance of the instructions given in the booklet that you find in the box with your engine. Correct lubrication is vital, so attend to it regularly, but don't overdo your applications of oil to the various oiling points. It is specially necessary to lubricate the armature shaft bearings. The situation of these and of the other details is made perfectly clear in the instruction booklet.

Another point that requires particular attention is the brush gear. And don't neglect the tyres that are fitted to one pair of the wheels in the motor driven bogie. Keep these clean and be sure to renew them when required.

The Hornby-Dublo Diesel-Electric Locomotive is, as you know, based on the first B.R. Standard design of diesel for what American railwaymen call "road service," which is main line running as distinct from yard or shunting work and has nothing to do with roads in the ordinary sense of the term. Although most of the real engines of the class have been allocated to the London area, where they are engaged for the most part on what is known as "transfer freight" work, there are instances of the employment of others elsewhere. So at the present time, with diesel power becoming more widespread, it will not be surprising to find engines of this sort at work in widely separated areas.

Transfer freight is the name given to inter-connecting goods train services between the different Regions by way of

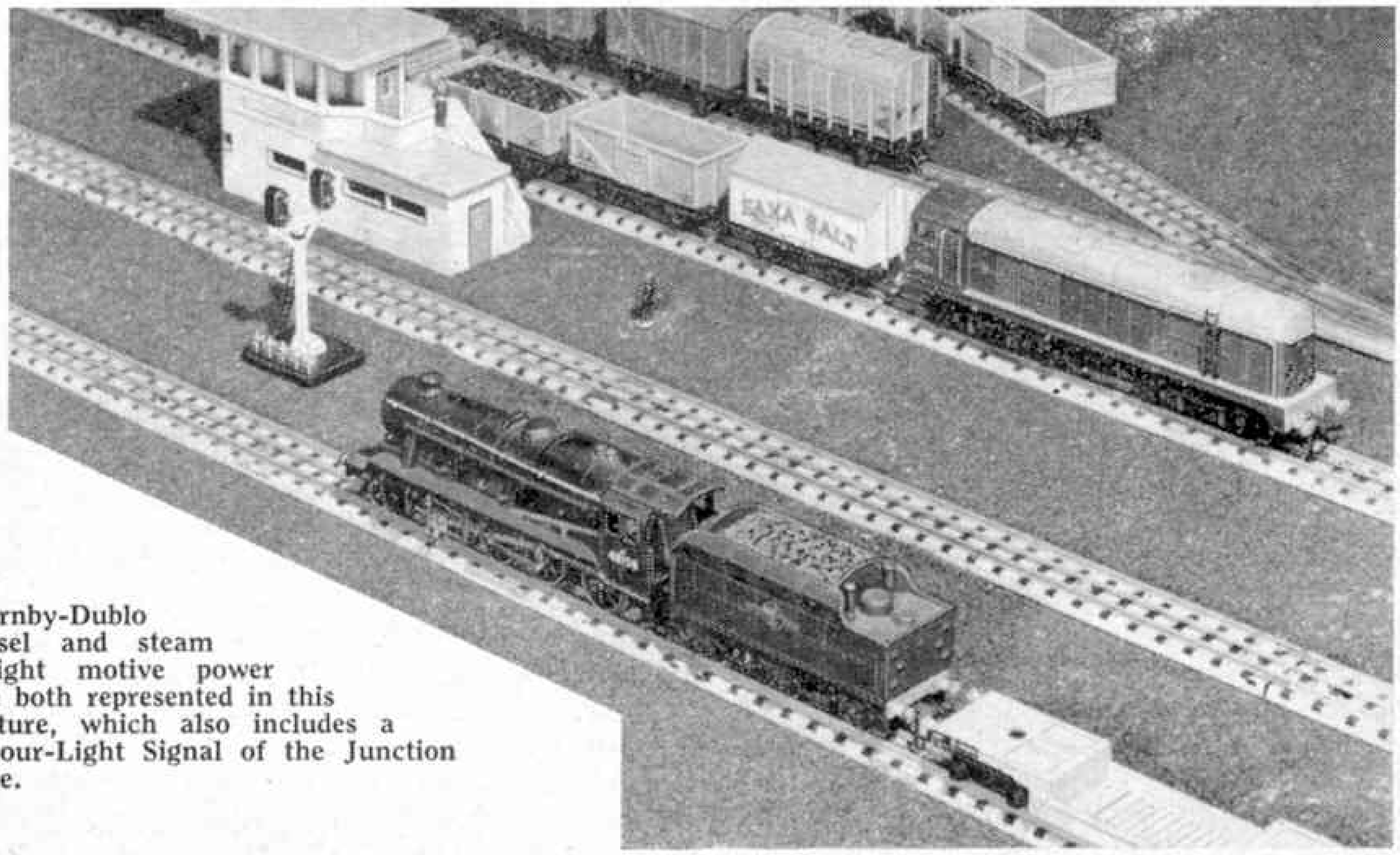


A Hornby-Dublo Diesel Electric Locomotive running cab first with a mixed freight passes a fast suburban train of D14 stock heading in the opposite direction behind a Hornby-Dublo 2-6-4T.

various routes, which in the London area are numerous. Naturally traffic of this kind is varied, so that there is ample opportunity for making up some really interesting trains. With this I can leave the illustrations to speak more or less for themselves, and I am sure that those of you who are keen to follow up this sort of thing will lose no time in making up even more varied "consists," to use another American name, for your Diesel-hauled freight trains.

On most layouts the new Diesel will probably not just replace any of the steam type engines so far in use. It will rather help to provide the variety in motive power which, no less than in rolling stock, so appeals to the miniature railway owners. Therefore one can expect to see such scenes as are depicted in the lower illustration on this page, where a Diesel and one of the highly popular 8F 2–8–0s are both busy with varied freights.

In another picture, steam power is retained for the passenger services as a fast residential train of D14 stock headed by one of the capable 2–6–4 Tanks is passing one of the new Diesels. This situation is quite in order; although there have been instances of passenger stock being worked by the D8000 class diesels, passenger duties cannot be undertaken by them, at least during the winter months, because they are not fitted for train heating. Obviously we must see that we make our



Hornby-Dublo diesel and steam freight motive power are both represented in this picture, which also includes a Colour-Light Signal of the Junction type.

passengers comfortable! But we can use our Diesel, among other and varied duties, for empty stock working, particularly in disposing of a train after its arrival at a main terminus, that is when it is being returned to the carriage sidings for attention before the next trip.

As a motive power unit the Hornby-Dublo Diesel is easily managed. This is because its double bogie wheel arrangement enables it to conform readily to the Points and curves, and often reverse curves, that are necessarily found in siding and yard layouts. The engine responds well to the movement of the control handle so that, although not primarily intended for shunting work, it can be used very effectively for such duties in miniature. This being so, it can readily be employed for pick-up goods duties, setting off from its depot and attaching a Goods Brake Van in order to travel along the line and assemble wagons from here and there into a train.

The short train of fitted vans of the SD6 Ventilated type is shown above headed by Hornby-Dublo D8000. Other fitted Vans will be added to the train later and a B.R. Standard Brake Van will take the place of that shown for a through main line run.

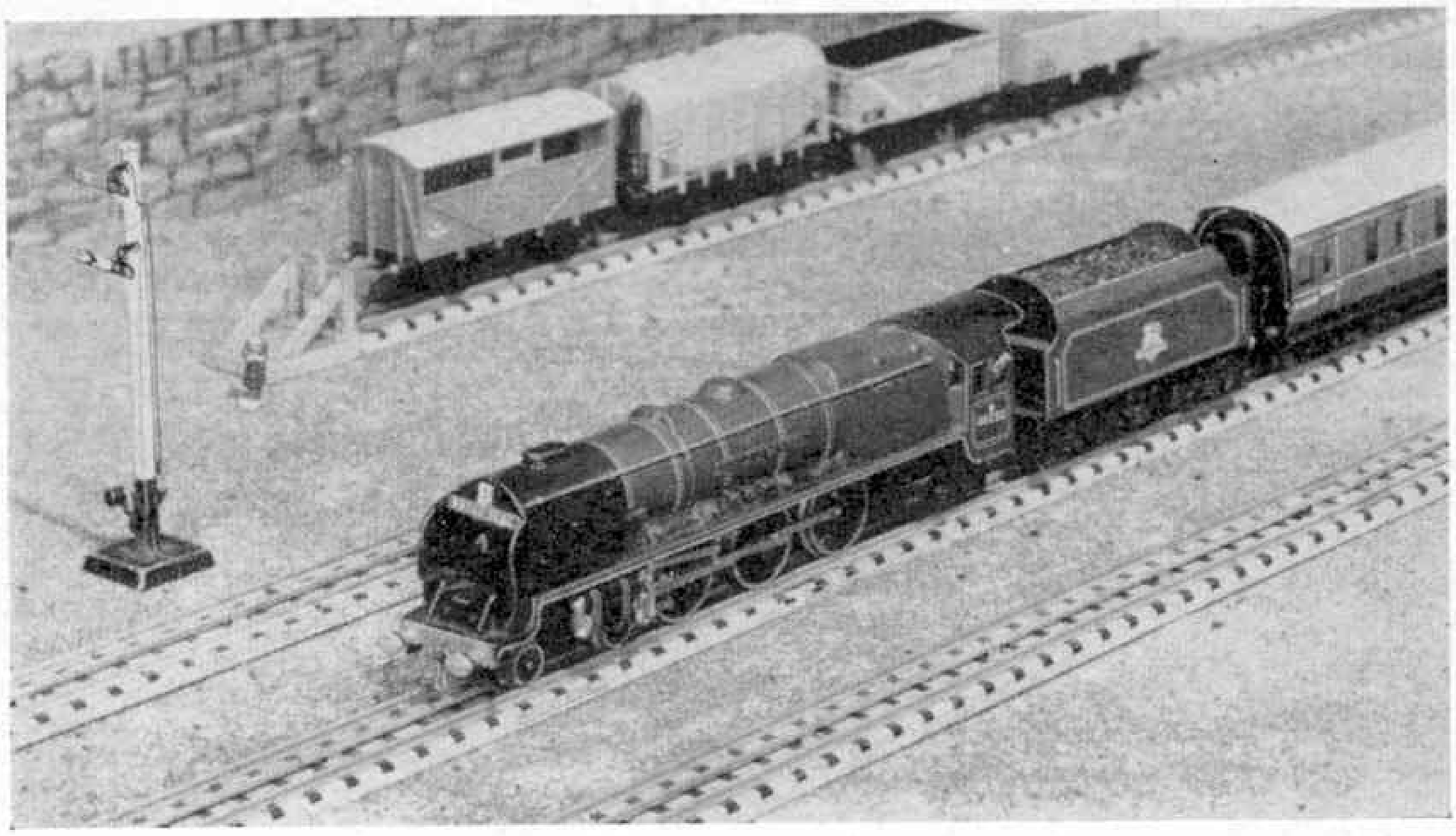
Even on a simple layout this type of work can be carried out easily, so long as the track layout is suitable, and it is really good fun. Successive calls at wayside stations or yards in real practice have to be "imitated" in miniature on the average oval layout by having the engine, or the train as it grows, calling repeatedly at the same set of sidings. By the use of Hornby-Dublo Uncoupling Rails, strategically sited, the wagons can be sorted out and the actual marshalling of the train can be changed several times over in the course of a trip.

This is the type of work that never loses its fascination either in real or miniature practice and the Hornby-Dublo owner has the advantage over the real railwayman in that he is doing it for entertainment, not merely in the course of duty!

Some of these B.R. type 1 Diesels are, or have been, put to work in this way so that anyone who adopts the plan suggested has quite good reason for doing so.

Again, there have been instances of the use of this class of locomotive on more important through freight trains. It will not be out of place in miniature therefore to assemble a fast freight train consisting entirely, if required, of vehicles representing brake-fitted prototypes. In miniature the feature that distinguishes a fitted vehicle is that it is finished in the colour known as bauxite, just as in real practice for such stock. Most of you already know all about this, as this topic has cropped up on several occasions in our talks.

One of our photographs shows a Hornby-Dublo Diesel with a short train of SD6 "fitted" vans. It is in fact on the way to collect other vans to be assembled into a fully fitted train. Then the L.M.R. Goods Brake Van shown in the photograph will be replaced by the latest SD6 vehicle, the B.R. Standard Goods Brake Van, which is ideal for fast fitted services.



Headboard Hints

CORRESPONDENCE received at H.R.C. Headquarters is always a fair indication of the way things are working on Hornby-Dublo railways. Since the introduction last Autumn of the Locomotive Headboards and Train Name and Destination Labels, many *M.M.* readers and miniature railway owners have written to us about them asking questions and making suggestions.

A popular query concerns the use of the Locomotive Headboards on Hornby-Dublo engines other than those for which they have been designed, such as the *Duchess of Atholl* 4–6–2 that was in production before *Duchess of Montrose* became the standard L.M.R. 4–6–2 in the Hornby-Dublo range. As stated in the talk by the H.R.C. Secretary about Locomotive Headboards and Train Name and Destination Labels in these pages last October, the metal Headboard produced for the current L12 *Duchess of Montrose* can be applied without difficulty to the older *Duchess of Atholl*.

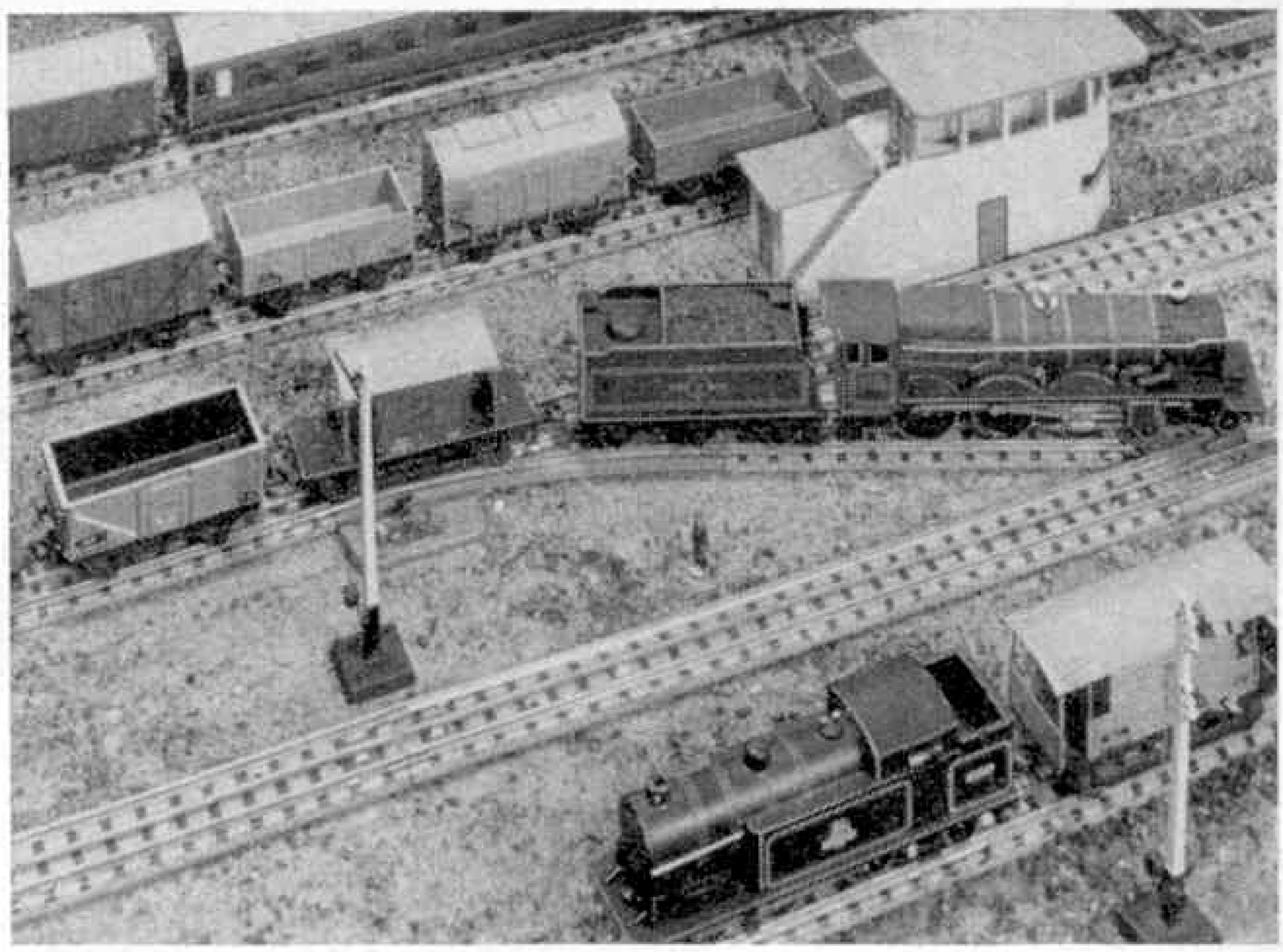
Strictly speaking, it is not really correct to use this Headboard on the older engine, as boards of the type represented were not in use during the L.M.S. period represented by *Duchess of Atholl*. But there are many of these engines still running on Hornby-Dublo railways and there is plenty of excuse for distinguishing them in this way, especially in view of the recent development on the L.M.R. whereby some of the Stanier 4–6–2 locomotives have been given a maroon livery not unlike that used for the earlier Hornby-Dublo Duchess.

But, to return to the question, it is easy to fit the Headboard that is designed for the current L12 Locomotive to the older *Duchess of Atholl* engine. The Headboard is specially shaped and it is mounted on either Duchess by means of lugs that slip in between each hand-rail and the actual smoke-box.

"Duchess of Montrose" proudly wears the "Royal Scot" Headboard as it heads a train of D22 Corridor Coaches. The Headboard is easily fitted, as described in this article.

So much for the board itself; what about the Label with which to decorate it? In the P22 Train Set, the Headboard is provided ready labelled with the striking *Royal Scot* title and the Coaches carry appropriate side board Labels. These Labels, whether on the engine Headboard or on the Coaches themselves, can readily be changed by the individual owner. In their place he can use any of the alternative L.M.R. titles that are listed. The special nature of the Labels makes this operation a simple one, but care must be taken to see that the Labels not in use are "stored" on the special backing paper on which new Labels as bought are always mounted.

By the way, when removing the Labels



Your "Bristol Castle" Locomotive need not always be heading a named express. Here an engine of this type is leaving a loop for the main line with a mixed freight.

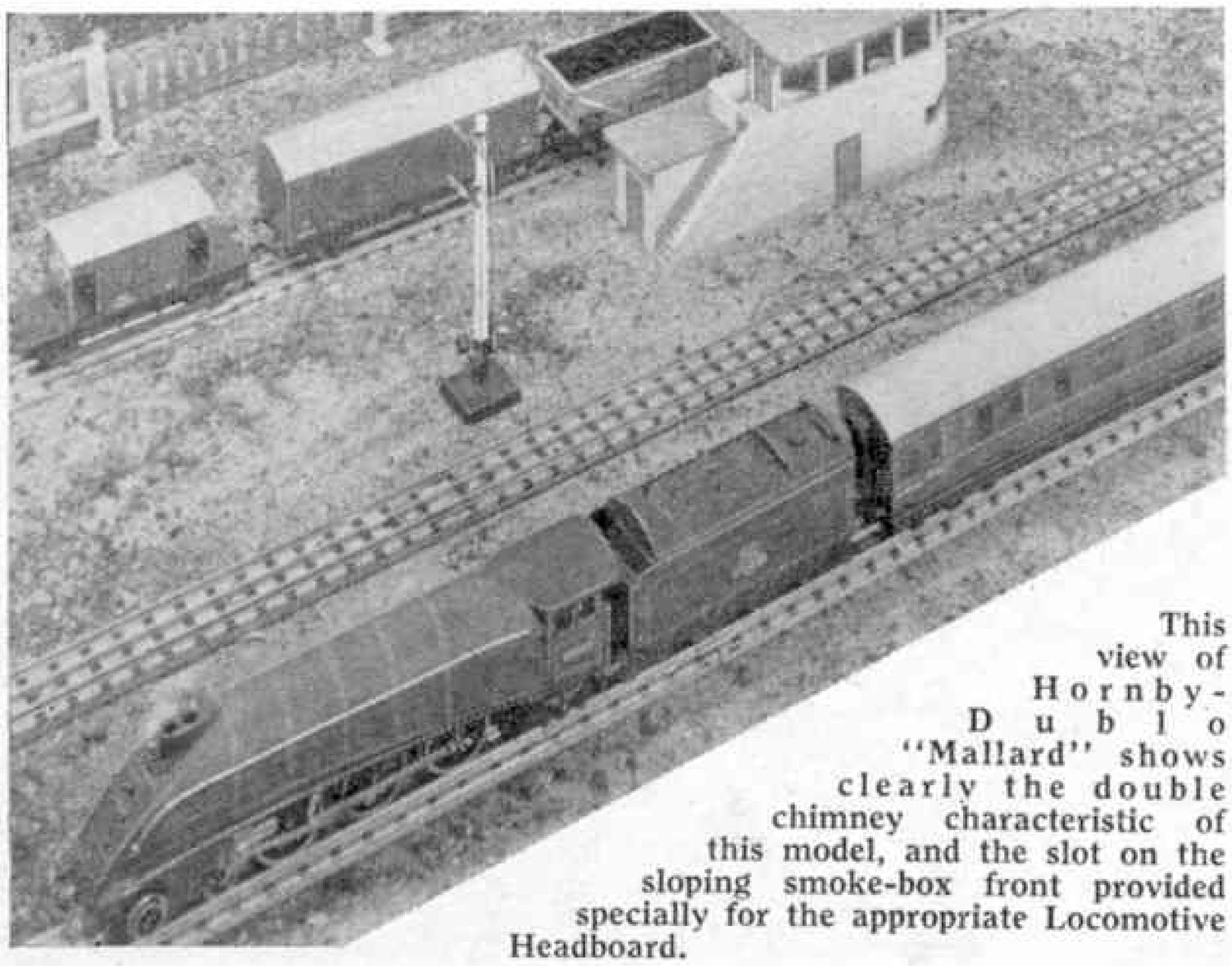
from this paper for use do *not* be tempted to pull the Labels off the backing sheet, but rather peel the paper away from the Labels themselves. The packets that contain these items have on them a little diagram that explains this quite clearly.

Easily the favourite question concerning these things asks whether it is possible to fit the Headboard that is designed for the revised L11 Locomotive *Mallard* on the older *Silver King*. There seems to be an idea about that all that it is necessary to do is to provide a slot in the sloping front of the engine to receive the "tail" of the Headboard. Even if this could be done, it would not be the whole answer, for a Headboard so fitted would not stay upright. In fact, to overcome this particular difficulty it was necessary to provide in the production models of *Mallard* a special projection inside the housing. Any such addition to *Silver King* would not readily be possible.

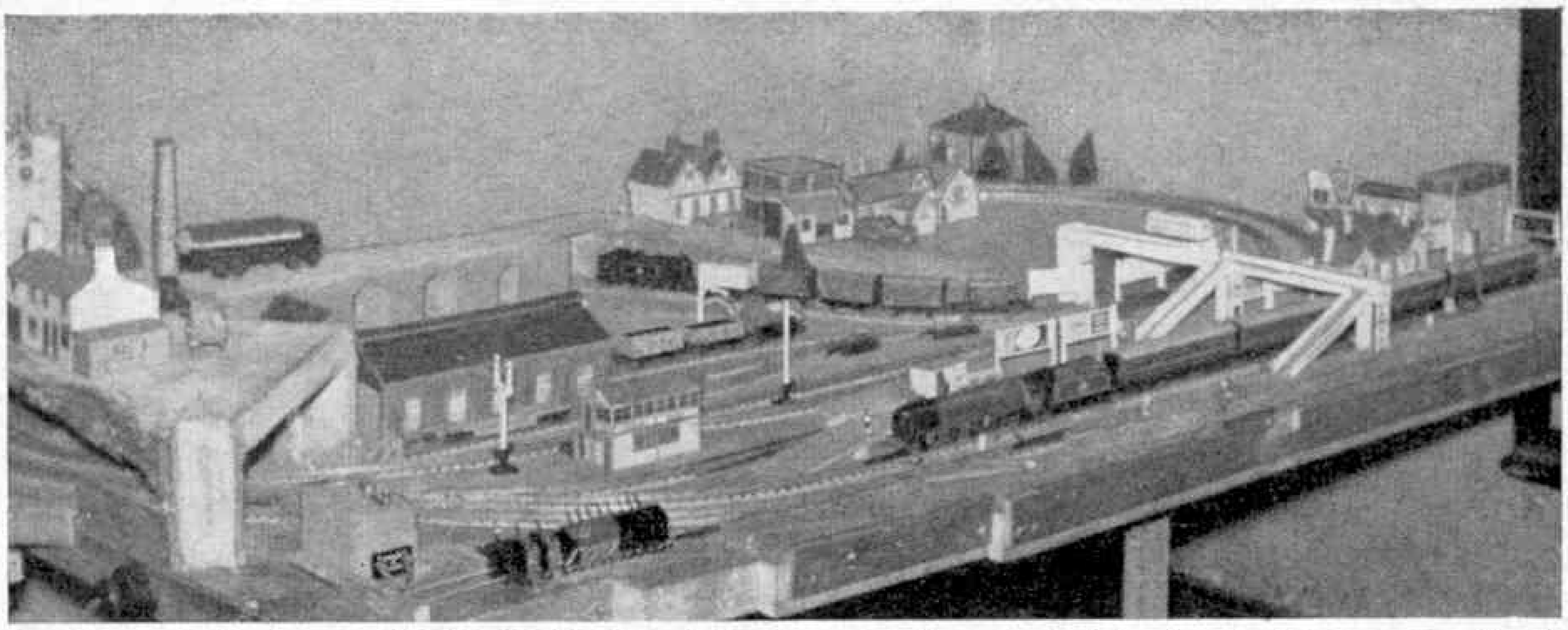
Another point about these two engines, but not connected with Headboards, concerns the double chimney that is carried by the current L11 Locomotive. Many owners have written to ask whether this can be provided on their *Silver King* engines. Here the answer is that the chimney is part of the main body casting and this makes such a change impossible.

Several owners of *Silver King*, and even of the older *Sir Nigel Gresley* 4–6–2s, have written about a scheme they have used to provide their engines with Headboards. This involves fitting a length of thin wire round the buffer casings at the front end of the engine. Such an addition is not very noticeable, and it does allow a Headboard of the type produced for the *Bristol Castle* Locomotive to be hung up in front of the locomotive. This has specially hooked lugs to fit the curved smoke-box handrail of *Bristol Castle* and it is these lugs that enable our friends to suspend the board on the wire that they have added to their A4s. The board is not the correct shape really, but any of the East Coast Route titles can be applied to it.

One objection to this scheme is that unless the wire is carefully shaped and fitted the board will hang rather low down, but some of our friends do not appear to mind this, so long as they can carry the train name at the front end of the engine.



This view of Hornby-Dublo "Mallard" shows clearly the double chimney characteristic of this model, and the slot on the sloping smoke-box front provided specially for the appropriate Locomotive Headboard.



The Hornby-Dublo layout of D. W. Cahill, of South Hackney, is laid on a raised baseboard. The tunnel section in the left-hand corner is built up on a wooden framework, as clearly shown in the illustration.

Board Matters

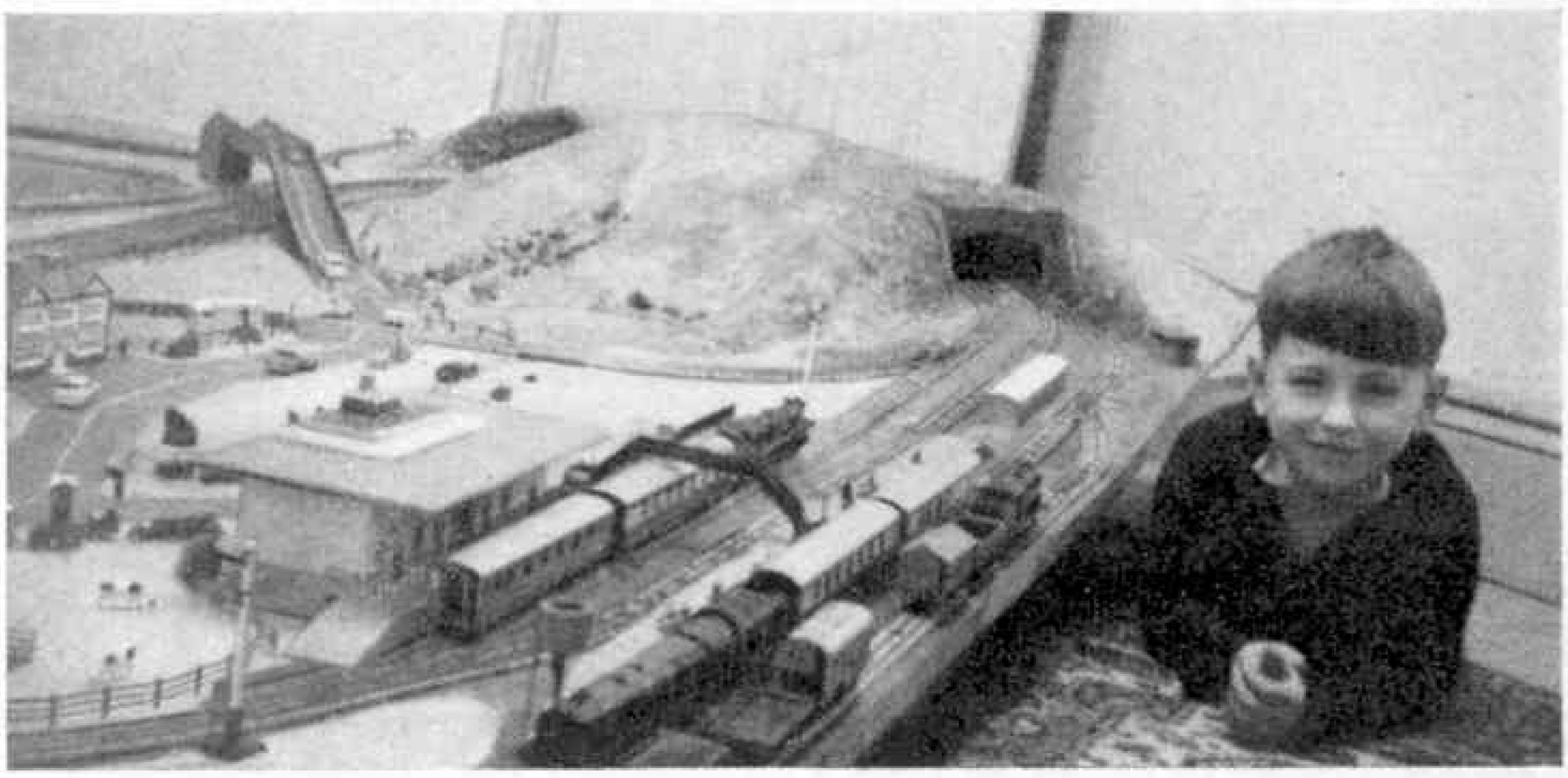
By "Layout Man"

THIS month I have more space than usual for our layout talk, which is fortunate because there are several points of interest on the systems shown in our pictures here. Layout topics appeal to many readers, who look forward from month to month to seeing in these pages how other enthusiasts have arranged their railways, how they have developed their lineside features, and how the different systems are run.

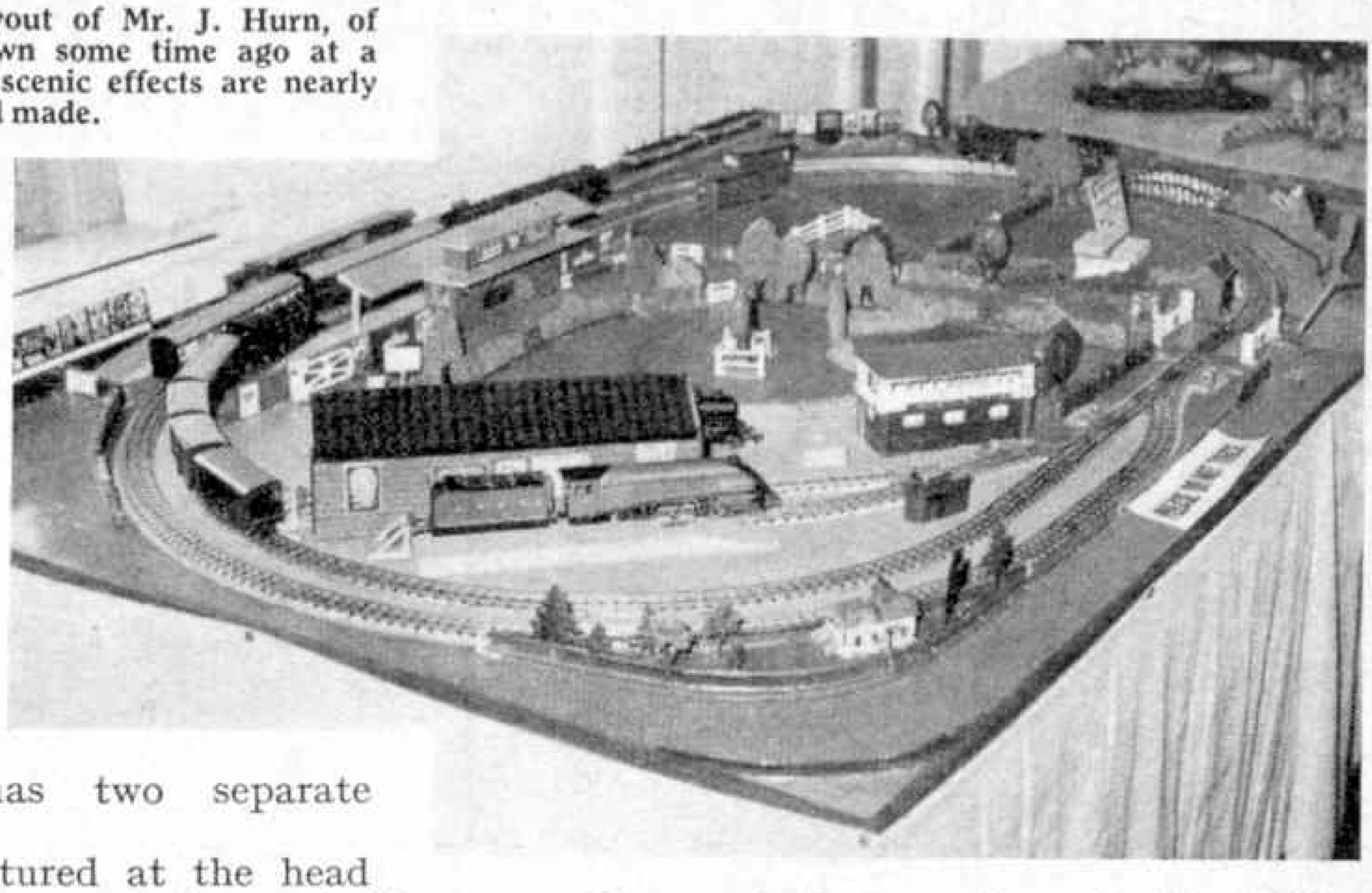
Many railways begin on the floor, but as a rule a move is soon made to a baseboard of some kind because this keeps the railway all together, as it were, and it is ready for use at any time with a minimum of preparation. The baseboard need not be a raised one and if floor space is available some of the younger Hornby-Dublo owners do seem to prefer literally to get down to things, like Brian Harvey in the lower picture on the next page.

A further example of a low baseboard is that used by Philip Jones, of Sheffield, whom you see, also getting down to it, in the illustration below. An attractive feature of this layout is the manner in which the lineside has been developed, particularly the tunnel through which the railway runs at one end of the board. The picture shows the finished job, which is quite convincing, the actual contours of the tunnel being built up by modelling over a base of wire mesh suitably shaped. The tunnel entrances are made from tinplate built up by soldering, and similar methods have been used to produce road bridges.

The actual baseboard is of interest, as it is built up in three sections for storage purposes and train operations are carried



Philip Jones, of Sheffield, has an effective baseboard layout, with a tunnel section at one end.



The Hornby-Dublo layout of Mr. J. Hurn, of Boston, that was shown some time ago at a local Exhibition. The scenic effects are nearly all hand made.

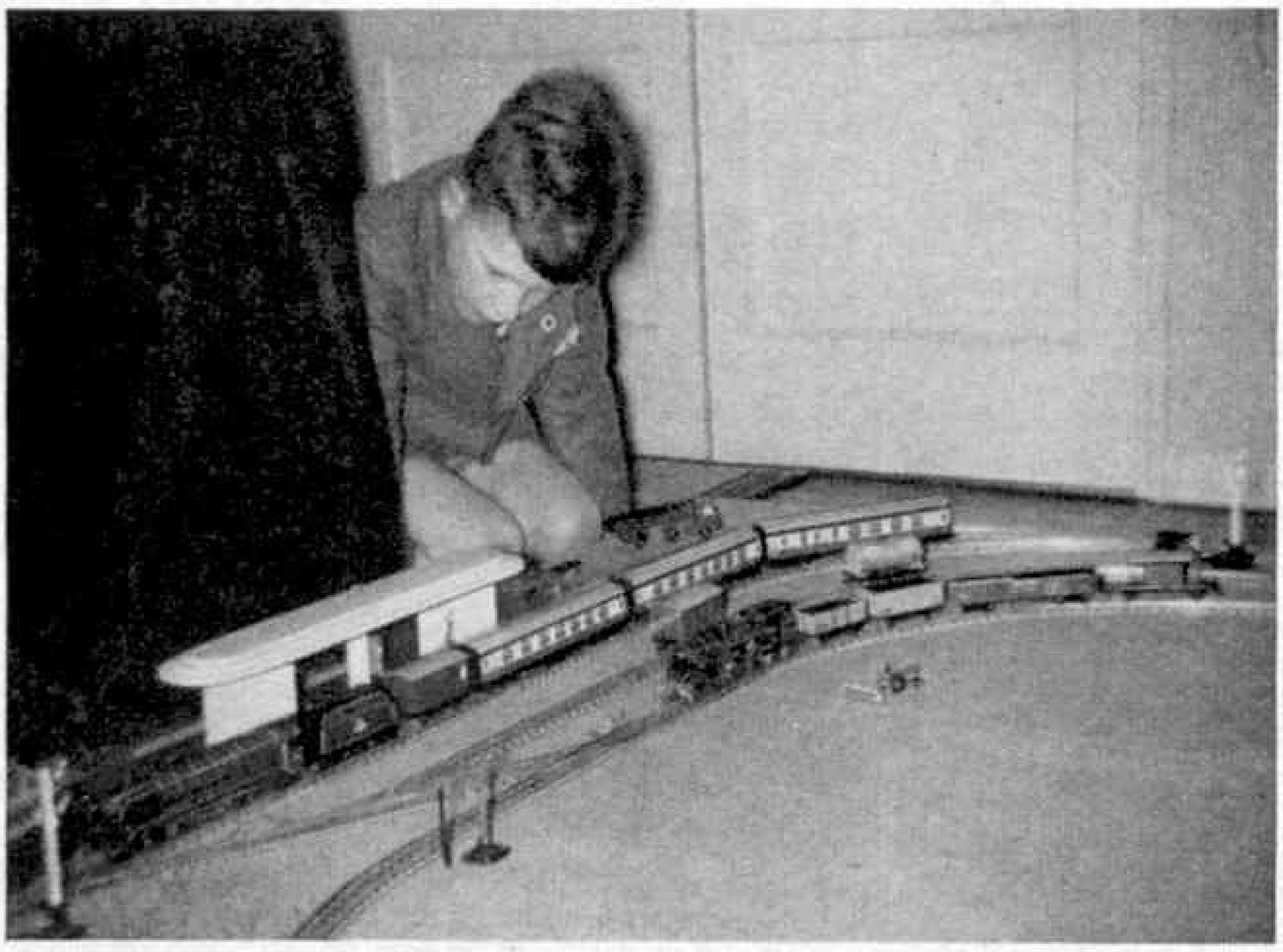
out on two independently controlled circuits. Philip and his father are now exercising their skill in building up a further system, with a different scenic and track layout. Not every Hornby-Dublo owner has two separate systems!

The layout pictured at the head of this article also includes a built-up tunnel section at one end, on which there are several buildings. The wooden framework that is invariably necessary for this sort of thing is clearly shown. This is another father-and-son layout, for Mr. D. W. Cahill and his 9 year old boy have been busy developing this railway for some years. Since the photograph was taken the system has developed considerably, as is the way with all good Hornby-Dublo railways. Obviously the need for a sound baseboard was realised from the start for the actual base is framed up with 2 in. by 1 in. timbers underneath, not only round the edges of the board, but also at intervals across it, which is a necessary feature if a satisfactory base is to be secured.

It seems to be becoming quite the fashion for individual Hornby-Dublo owners, or groups of owners, to display their railways at local functions of various kinds and there is little doubt that such railways always attract a great deal of attention. An example from Harrow is illustrated on page 85, and our third picture here shows the layout of Mr. J. Hurn, of Boston, similarly placed on exhibition some months ago. You will notice that the system is basically simple, which is always a good thing, not only for exhibition work, but for ordinary operation as well.

A point to note is that for exhibition purposes it makes things a lot easier if the railway can be moved on its own baseboard, as can the layout shown.

And the same thing applies to Brian Harvey's railway below. This is a really portable layout that hangs up when it is not in use, for on one side of the board are two hinge pins. When the board is turned up on end these engage two hinge sockets on the wall of a bedroom and the railway baseboard then becomes the door to a home-built corner clothes cupboard.



Brian Harvey, of Basingstoke, with his Hornby-Dublo layout that is laid on a door.

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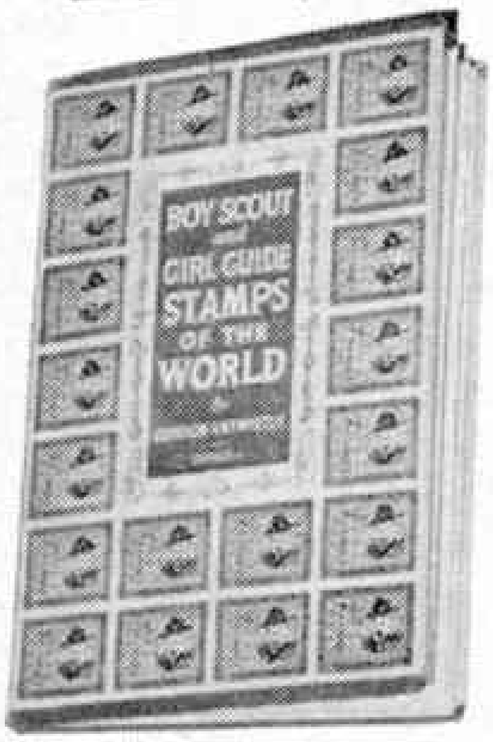

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Stamp Collectors' Corner

By F. E. Metcalfe

WHAT CAN I COLLECT?

A correspondent from Yorkshire recently told me that when he was young he had formed a general collection. He had laid it on one side over twenty years ago, thinking it would be nice, in years to come, for one of his children. That time had now come, but after getting out his album and buying a Simplified Catalogue, he had been quite shocked to see how many thousands of stamps had been issued since he suspended operations.

He and his son together had tried to resuscitate the collection. Both had come to the conclusion that the day of general collecting — that is collecting the stamps of all countries and all periods — was over. They had thought of going in for British Commonwealth stamps only, but even a collection with this limitation was more than they could manage, so he asked me for suggestions for a further cutting down. I know there are others similarly situated, so I thought it would be a good thing to deal with his problem here.

The first point raised by my Yorkshire correspondent was that he wanted, along with his son, to go in for British Commonwealth stamps, and whereas on some other occasion I may go into the question of collecting foreign, on this occasion we will stick to British, naturally by far the most popular.

It is almost 120 years since the first British stamps were issued, and with fifty or sixty Commonwealth countries all hard at work for so many years, it is only natural that these bits of paper total thousands. Moreover, all the time they are releasing new specimens, so even if we cut out all foreign, there still remain far too many stamps for us to undertake to form into a collection that looks anything more than a conglomeration of bits and pieces.

About the best limitation that I could suggest, for investment, interest and fun, is to go in for about the most popular group of stamps in the world. Yes, you have guessed it, British Commonwealth stamps of the present reign. When I say investment I do not want to claim that you are likely to make money collecting *any* stamps, but I do think that for the average British collector the "QE" issues have the best re-sale value. Nor do I wish to infer that all who are likely to read these lines can afford to go in for "QE" stamps to the top value. But collectors, like everyone else, can cut their coats according to the cloth available, and if their spare cash is limited, well then they need only take values up to a shilling, or even threepence.

This will give them a collection worth looking at, if they will only take the trouble to mount their stamps tastefully. I remember hearing of one Scottish collector winning an important competition with stamps that only went up to 1/– face. These happened to be KGVI stamps, but it was when these were current, and what could be done with KGVI stamps then could be done with "QE" stamps now.

I think some figures would be helpful, while we are on the question of cost. If you were to join a new issue service, and take all Commonwealth stamps to the top value, it would have to be an exceptional year if your outlay exceeded £40. If you took to say a shilling top, less than half of this sum would be necessary. If you were only to take up to 3d., then it would not be necessary to join a service. You would simply start buying sets as and when you could. If any of the sets contain obsolete values, as some do, try to take these in as you go along, and then of course any new values within your range should be bought when they come out.

Many collectors prefer used stamps, but personally I prefer mint, and I am going to suggest that in the long run you will be glad if you go for stamps in the latter state. To be quite candid, most of the British Commonwealth stamps belonging to the small colonies on sale as used are simply cancelled to order. So better go in for the stamps that are what they purport to be.

As for an album, cut out those with spaces marked for stamps. Go in for a plain loose leaf, and then you can arrange your stamps to your liking, and even if you are short of a few, you can make them look something, which can never be the case if a page has a number of unfilled spaces. I have never seen a collection yet, in what is known as a printed album, that looked anything worth while, for even if the pages were full, the result had nothing personal or original about it. The collection was merely like any other that might be mounted in the same albums. Be original. Make your own collection. Show your own taste and personality.

And you will need one of the catalogues to show you your way about. Fortunately they are not costly. There are the Gibbons *Two Reigns*, a paper-back that lists both KGVI and QEII stamps, which sells at 7/6, and the Commonwealth, which lists QE stamps, at 6/6, fully bound. I don't think you will go far wrong with either.

To collect stamps of all countries may teach you geography, but you will find yourself overwhelmed with stamps if you try to do this. So if uncle wishes to present you with what you want to start a collection, try tactfully to get him to read this article!

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(For other Stamp Advertisements see also pages 100 and xxii)

Stamp Gossip

THE QUEEN'S STAMPS

A few months ago, Mr. F. F. Quirk, who lives in the United States and is an avid collector of British Commonwealth stamps of the present reign, complained to me that while there were many societies in his country—even for toothpick collectors!—there was not one devoted to the very popular "QE" stamps. Recently he wrote to tell me that the omission has been rectified, and that he and others had formed such a group. They have their own little magazine, and welcome members from any part of the world. Collectors who would like to join should write to Mr. Quirk, through the Editor of the *M.M.*, for details and a copy of the group's journal.

Those who do this should without fail enclose in their letters a reply coupon. These can be obtained at any Post Office for a few coppers, and they can be exchanged for a postage stamp. Incidentally, these reply coupons do not seem to be as well known as they should be. They are very useful.

FORGERIES

Another letter I received not very long ago referred, though the writer was not aware of the fact at the time of writing, to forgeries. Now one of the reasons why modern stamps are to be preferred, by beginners at any rate, is because they are less likely to be forged. But in this letter were two stamps that the sender thought were New Guinea £1 value. They looked a bit different from each other, aud the owner thought one might be a variety, but he could not find any listed variation of the stamp in his catalogue.

This is not surprising. One stamp was quite in order, but the presumed variety was a forgery, and not a very good one at that. It was easy to spot, and it is a pity that all forgeries are not so crude as this one. Alas, some deceive even the expert.

It is not just the out and out forgeries that collectors have to contend with. Skilfully repaired rare stamps are being turned out continually. Then there are cleaned stamps, more dangerous to the average collector than the rest because they are more likely to come his way. For instance, British colonial stamps are often employed for fiscal purposes, one of the purposes for which they are produced. But when used fiscally they cease to be postage stamps, and collectors won't have them.

In a stamp trade magazine, *The Philatelic Exporter*, I read recently "High values of Ceylon which have been fiscally used, cleaned, and bogus postmarks applied are reaching London from Singhalese sources. They are offered at considerable reductions on the prices normally commanded by postally used stamps." Not only the stamps of Ceylon are being treated thus. Many of the high values from the West Indies are being cleaned. Another method of catching out collectors is to sell stamps that have been used on telegram forms, but I'll have to leave these for some other time. In the meanwhile take great care when you purchase expensive stamps that seem cheap.

ZIP GOES A MILLION

I mentioned some time ago that a collection belonging to an American who died a year or two ago was being disposed of by a British firm of stamp auctioneers. The sales are now over, after having netted over one million pounds. I know it sounds incredible, and I am afraid that those who are not addicted to stamp collecting will use other terms, not quite so mild.

While it is true that those who bought all those costly bits of paper would be stamp collectors, it is also true no doubt that they would be looking at their purchases more as investments than anything else. Will their investments pay off? Well, perfect rare stamps are going up all the time.

Some of the stamps have come to Britain. One of the sales was held in London, the others in New York. If all the sales had been held in London, I think quite as much would have been realized, for London is still the world's stamp centre.

HUMAN RIGHTS

I am afraid that we all talk glibly about such things, but how much of our talk is off the top? Several countries have issued stamps to commemorate the tenth anniversary of the proclamation by the United Nations; after all, this is as good an excuse as any for a new stamp issue.

All that apart, as usual Israel has issued by far the most attractive stamp, with a multi-coloured design. For those interested, the Hebrew inscription when translated reads *Thou shalt love thy neighbour as thyself.* Could anything be more apt?

VICTORIA

I have particular pleasure in asking the Editor if he will illustrate the stamp issued on 1st December to commemorate the first British establishment in the Southern Cameroons, which came to be called Victoria. The stamp is a real beauty, and cheap enough for anyone to be able to buy.

The designs of British Commonwealth stamps have come in for a deal of criticism lately. Hence my delight in being able to show one that none can criticise.

TIP OF THE MONTH

Indian stamps have been very much in the news lately, for some very attractive issues are coming from that country. It is indeed high time that I wrote more fully about them, and I hope to do this shortly. In the meantime see if you can find a nice copy of the 10r used issued in 1949. This is a stamp that should double in value in a year or two. The catalogue numbers are Commonwealth 52 and Stanley Gibbons No. 324.

Family Party at Binns Road

ONCE again we have a picture of a happy visit to Liverpool by a fortunate member of the Dinky Toys Club whose Collectors' Licence number was picked out by Stirling Moss, this time at the end of October last. The winner was Richard Avery, of Bicton, near Shrewsbury, and with him came Mrs. Avery and his two brothers John and Peter. Of the three boys, Richard is the one on the left. John, the eldest, is holding up a Dinky Supertoys Blaw-Knox Bulldozer, and watching him on the right is Peter. As usual, the visitors were welcomed by Mrs. U. P. Hornby, and they spent a marvellous day touring the Works at Binns Road and at Speke.

Perhaps your Licence number will be selected next month by Stirling Moss—if you have a Licence. If you haven't, write for one now.

The Festiniog Railway—(*Continued from page 63*)

public use again, but will be preserved as a museum piece. This is a "Hearse", which was built many years ago and fitted with a roller stillage to assist the easy movement of coffins into or out of the wagon. Apart from a roof ventilator there were vent holes on each side of the "Hearse", and in keeping with its mournful purpose quite eleborate urns were fitted at each of the four corners of the vehicle.

A museum for small exhibits was started at Portmadoc Station in 1956. Limited space and lack of funds have prevented the development of a permanent museum and explain why the rolling stock to be preserved, such as the "Hearse", is at present stored.

It is greatly to the credit of the Railway, and of the enthusiasts who have given it a new lease of life, that the passengers carried have increased in number each year. In the 1958 season over 60,000 people were taken to Tan-y-Bwlch. Now the Company is consolidating its position before embarking on extending passenger service above Tan-y-Bwlch. Track renewals and the rehabilitation of further passenger rolling stock is essential, while it is understood that the work of restoring *Merddin Emrys*, a second veteran Fairlie, is now in hand in readiness for the summer of this year. The remaining steam locomotives *Princess* and *Welsh Pony*, two sister engines of *Prince*, which were all built about the same time, still lie stored at Portmadoc awaiting overhaul.

What a happy coincidence that Britain's premier narrow gauge line, while remaining a living monument to the narrow gauge railway, should operate its services on the fringe of Snowdonia, which is noted for its unsurpassed beauty, and so give pleasure to countless holidaymakers.

Electricity Across the Sea—(*Continued from page 57*)

the electrical world perfected a means of converting direct current to alternating current at sufficiently high voltages.

The two trial cables, slightly more than 3 in. in diameter, were made to slightly different designs so that the final design of cable and accessories could be more easily determined. The insulated core was lead sheathed, the lead again being protected from chemical action by an impervious covering, and from mechanical damage by heavy galvanised steel wires, with an overall covering of impregnated jute.

It is estimated that by integrating the British and French electric power systems, more than £20,000,000 will be saved on new plant alone in the next few years and running costs also will be cut.

Easy Model-Building—(*Continued from page 79*)

on the 3½" Rod carrving the rotor.

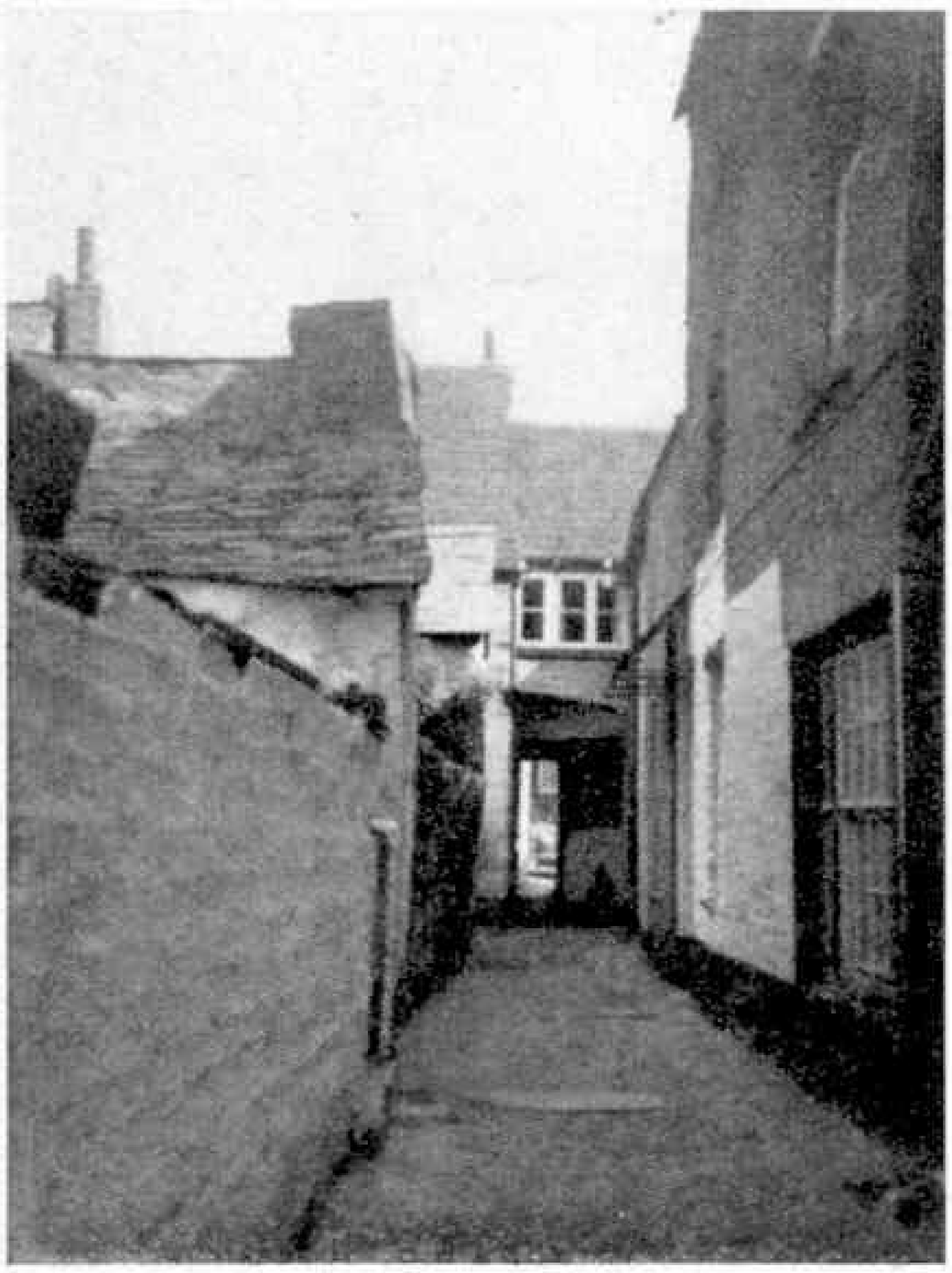
Parts required to build the model Helicopter: 4 of No. 2; 6 of No. 5; 2 of No. 10; 6 of No. 12; 2 of No. 16; 1 of No. 17; 4 of No. 22; 1 of No. 24; 4 of No. 35; 40 of No. 37a; 38 of No. 37b; 8 of No. 38; 1 of No. 40; 2 of No. 48a; 2 of No. 90a; 2 of No. 111c; 1 of No. 125; 2 of No. 126a; 2 of No. 155; 2 of No. 189; 2 of No. 190; 1 of No. 199; 2 of No. 200.

Parts required to build the Mobile Light Crane: 4 of No. 2; 4 of No. 10; 4 of No. 12; 1 of No. 16; 1 of No. 19a; 2 of No. 22; 1 of No. 24; 4 of No. 35; 20 of No. 37a; 18 of No. 37b; 4 of No. 38; 1 of No. 48a; 1 of No. 52; 2 of No. 111c; 2 of No. 126; 2 of No. 126a; 2 of No. 142c; Piece of String.

Among the Model-Builders—(*Continued from page 89*)

the various gear ratios are brought into action until top gear is engaged. On application of a load to the output shaft, the gear-box will automatically change down to a suitable ratio with which to tackle the load.

The governor drive can be disengaged by causing Pivot Bolt 1 to raise ¾" Contrate 2 clear of ¾" Pinion 3 by means of Crank 4. This enables neutral gear to be engaged at any time.



This further example of a narrow street, in Port Isaac, Cornwall, was photographed by Howard Marks, Kenfig Hill, Glamorgan.

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.

Famous Cottage in a Garden

We rubbed our eyes and looked again. No, they were still there! Anne Hathaway's Cottage, York Minster and Glamis Castle. Supposedly they were more than 2,000 miles away in Britain and yet we were looking at them in the heart of Canada's Prince Edward Island, that province of rolling green fields and deep red soil.

This happened while we were on a camping holiday in the Island last August. During a drive, David, aged 9, had suddenly spotted a large arrowed sign that read REPLICAS, and pointed to a side-road. I had turned the car off the main highway and had followed these mysterious arrows, bumping over some three or four miles of rough rust-red dirt road to arrive at the beautiful grounds of "Woodleigh", the home of Lt.-Col. W. E. Johnson, near Kensington, P.E.I., in which models of these symbols of Britain's tradition stand.

What fun it was to get down on hands and knees and peep into the living room of the Manor House at Stoke Poges with the church nearby and Thomas Gray of Elegy fame sleeping peacefully in the churchyard, or to shake hands across the stone battlements of Glamis Castle. We were Gullivers in Lilliput.

The wonderful buildings have all been constructed to scale in stone or wood by Lt.-Col. Johnson as a hobby. The superb stone model of York Minster illustrated in last month's *M.M.* has taken five years to build and is not really finished yet!

On our way back to Massachusetts, we saw the last Liverpool tram at the trolley museum in Kennebunk, Maine. This was pictured in the *M.M.* in February of last year. We were able to spend a most enjoyable half-hour exploring both upstairs and down.

T. L. Coombs (North Scituate, U.S.A.)

This miniature replica of Ann Hathaway's Cottage can be seen in a Canadian garden. Photograph by T. L. Coombs, North Scituate, U.S.A.

"Make it yourself. Huh! Why, even the woodworms can bore straighter holes than you!"

Fireside Fun

"Now," said a film director to the stunt man, "this is what I want you to do. You hear a shot, look round wildly, and then plunge over this 40-foot precipice into the water."

"But there's only two feet of water there," came the objection.

"Well, you don't want to drown, do you?"

* * * *

A photographer and his small son were walking along the Strand when a negro passed them.

"Look, Dad," said the youngster, "there goes a negative!"

* * * *

Hoping to be the first to relate some unwelcome news, a youth rushed into a room and said: "Father, I had a fight with Joe Joiner to-day."

"I know you did," was the stern reply. "Mr. Joiner came to see me about it."

"Well," said the son, "I hope you came out of it as well as I did."

* * * *

For many years, a club had employed a Chinese cook, and one evening, after an unusually good dinner, the manager decided to raise his wages. The next day was pay-day and the Chinese noted the extra money in his envelope.

"Why you pay me more?" he asked.

"Because," replied the manager, "you've been such a good cook all these years."

The Chinese thought it over, then said: "You been cheating me long time, eh?"

* * * *

"Thankful! What have I to be thankful for? I can't pay my bills."

"Then, man alive, be thankful you aren't one of your creditors."

* * * *

"You know," said a young know-all to a farmer, "your methods of cultivation are years out of date. I should be surprised if you made £10 out of that field of oats."

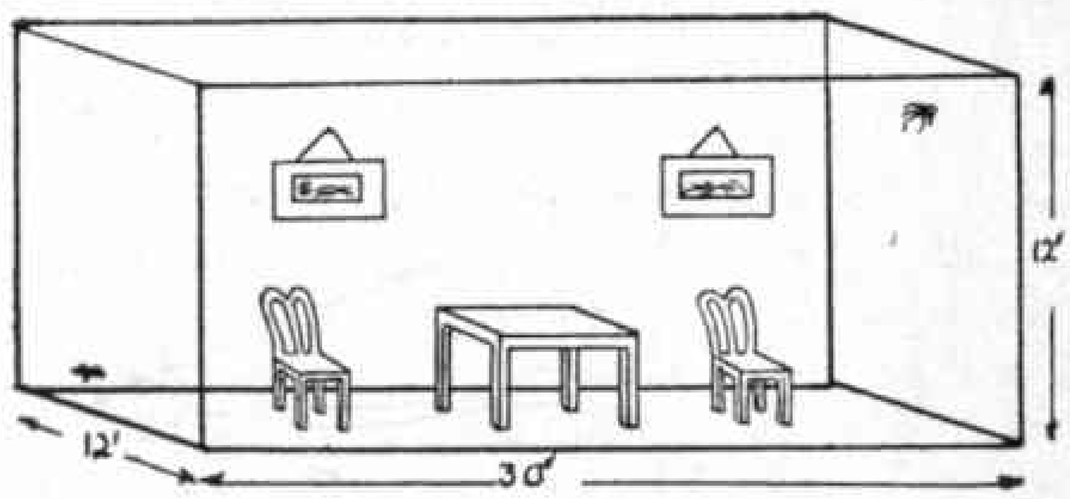
"So would I," came the reply. "It's barley."

THIS MONTH'S BRAIN TEASERS

A QUESTION OF AGE

An undergraduate who is interested in figures tells me that his grandmother's age in years is a perfect square. Also it is equal to the difference between the square of his father's age and the square of his mother's age. His father is one year older than his mother. How old is his mother?

* * * *



THE SPIDER AND THE FLY

A spider and a fly were in a room. The spider was in the middle of an end wall exactly a foot from the ceiling. The fly was on the opposite end wall exactly in the middle and a foot above the floor. The fly was asleep, and the spider having spotted his victim, crawled towards him by the quickest path possible and made his capture. Which way do you think the spider took in order to get to the fly as quickly as possible?

* * * *

ANSWERS TO LAST MONTH'S PUZZLES

Can You Solve This?

The apparently meaningless letters in our first puzzle last month represent a conversation between a customer and a waiter in a restaurant, and the solution is as follows:

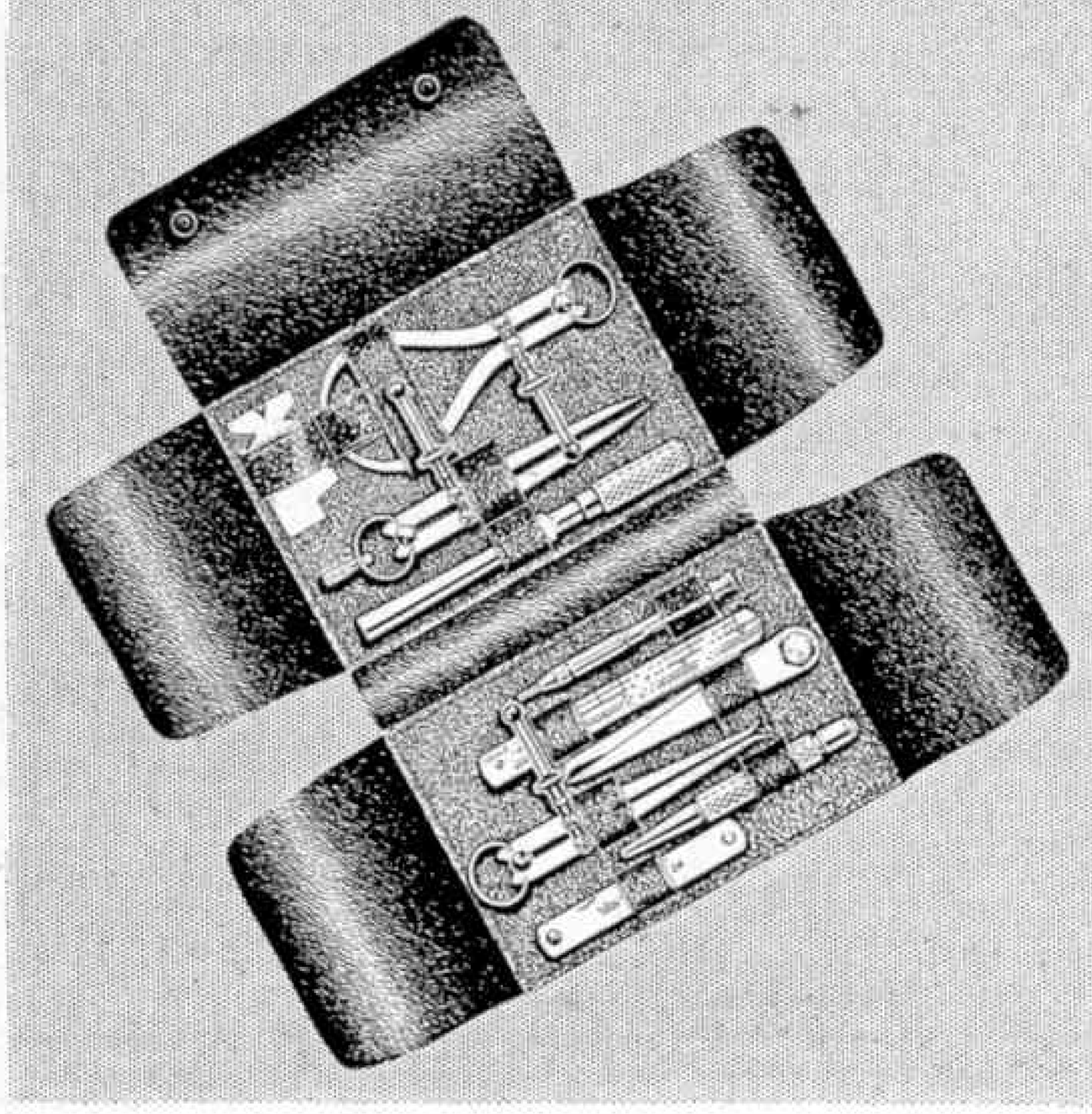
"Have you any ham?"
"Yes, we have ham."
"Have you any eggs?"
"Yes, we have eggs."
"O.K. Ham and eggs."

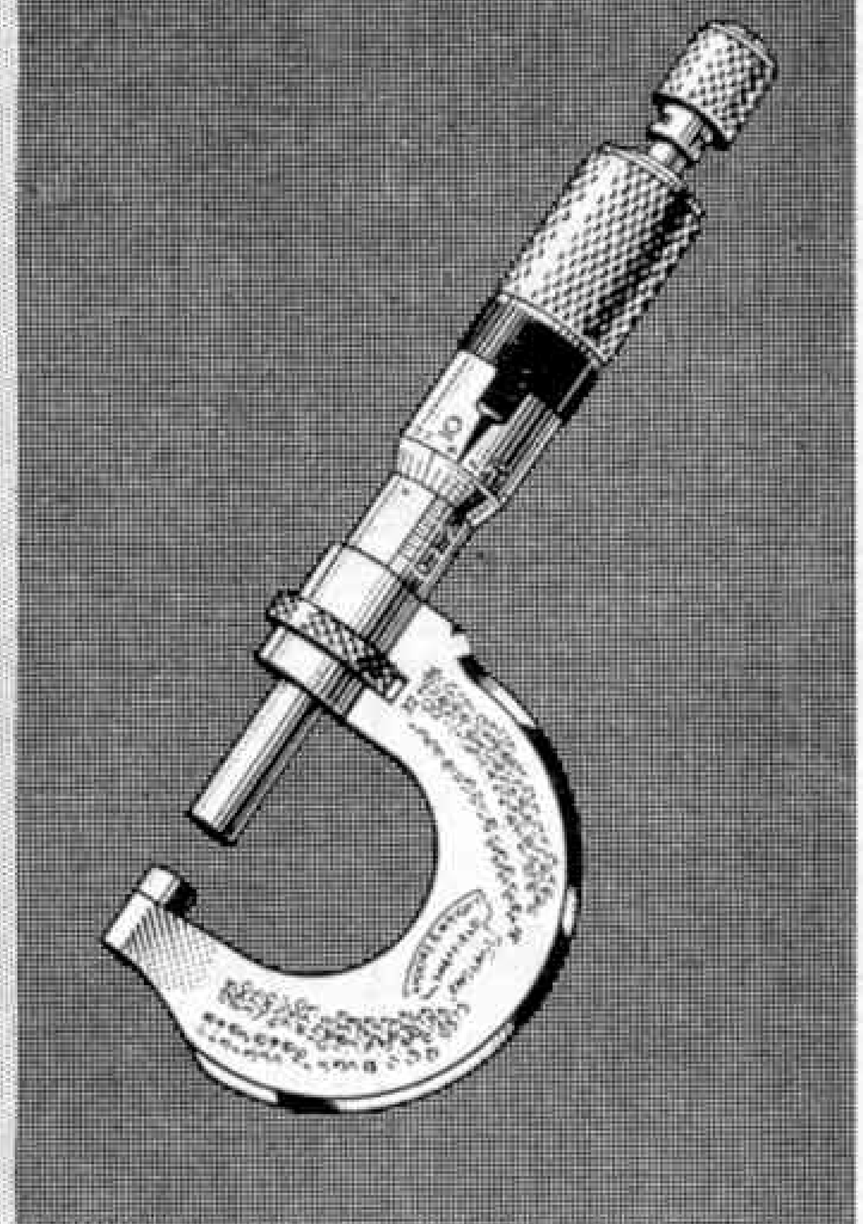
* * * *

The Barge in the Lock

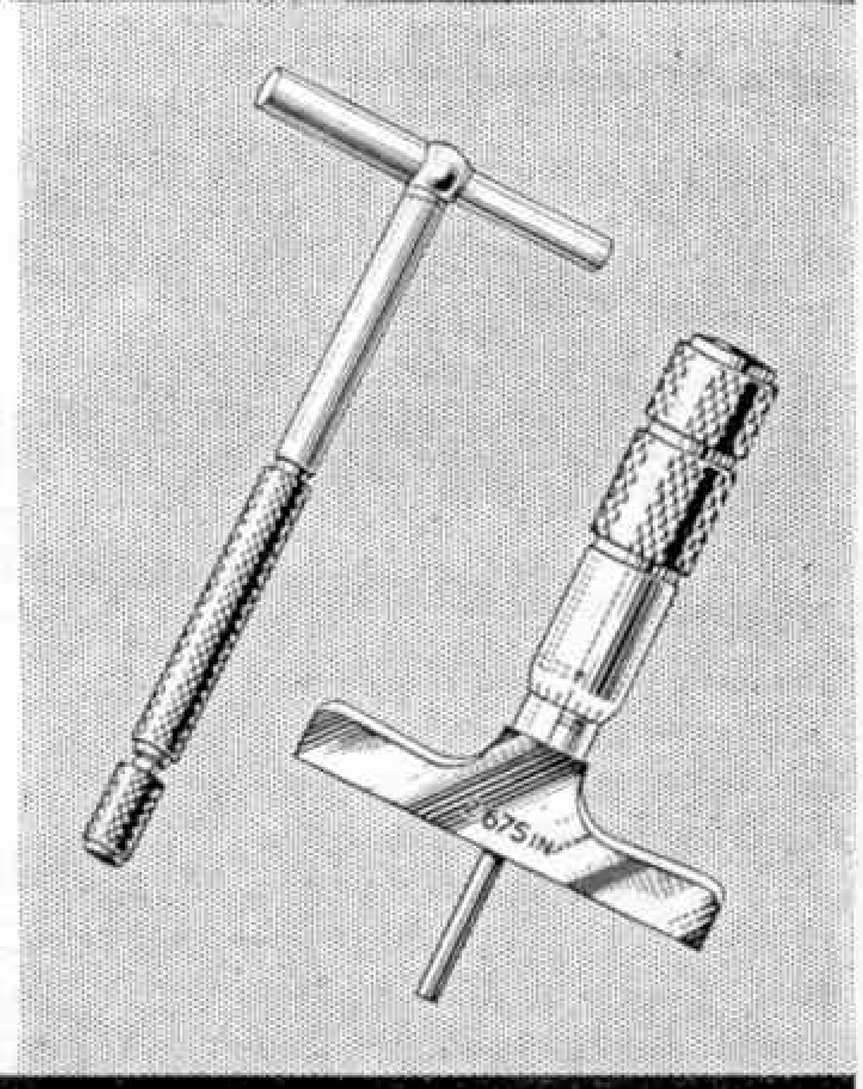
The water level will fall. This is because when the iron ore is in the boat it displaces water equal to its own weight, but when the ore is dumped in the water the amount of water displaced is equal only to its volume.

Where accuracy is essential . . .





. . . and it is essential in **both** the buying **and** the using of tools . . . remember that it pays to buy good tools, tools upon whose accuracy you can rely. M&W precision tools are made to British Standard Institute Specification—you can rely on them. If accurate measurement is your requirement **REMEMBER—**



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measure up to any job

SEND 10½d. IN STAMPS FOR A COPY OF OUR LATEST CATALOGUE, MENTIONING THIS JOURNAL.

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SEND YOUR COUPON NOW

To **THE LEAGUE OF PITY, VICTORY HOUSE, LEICESTER SQUARE, LONDON, WC2**

Please enrol me as a member. I enclose P.O. for 2/6.

NAME..... AGE.....

ADDRESS.....

.....

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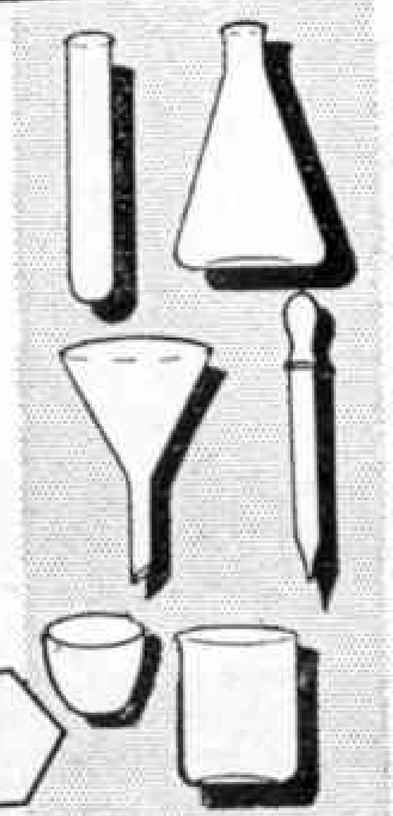
Also Lott's Stone Puzzle together with book of 105 problems.

Ask to see them at your dealer or write to the manufacturers for current price list, enclosing 2d. stamped addressed envelope.



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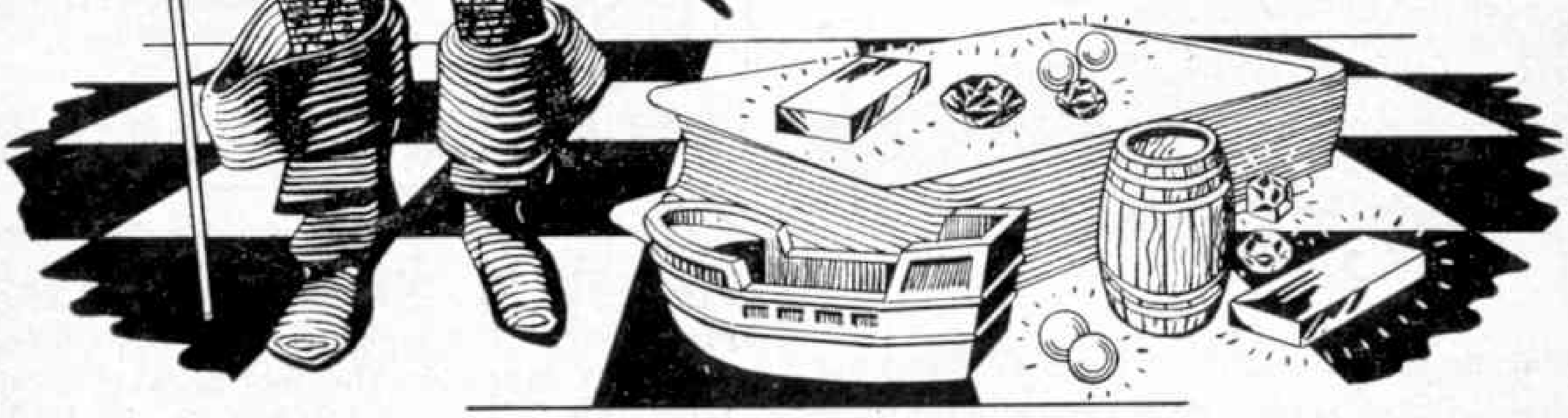

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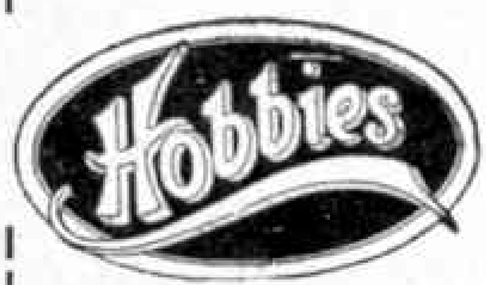

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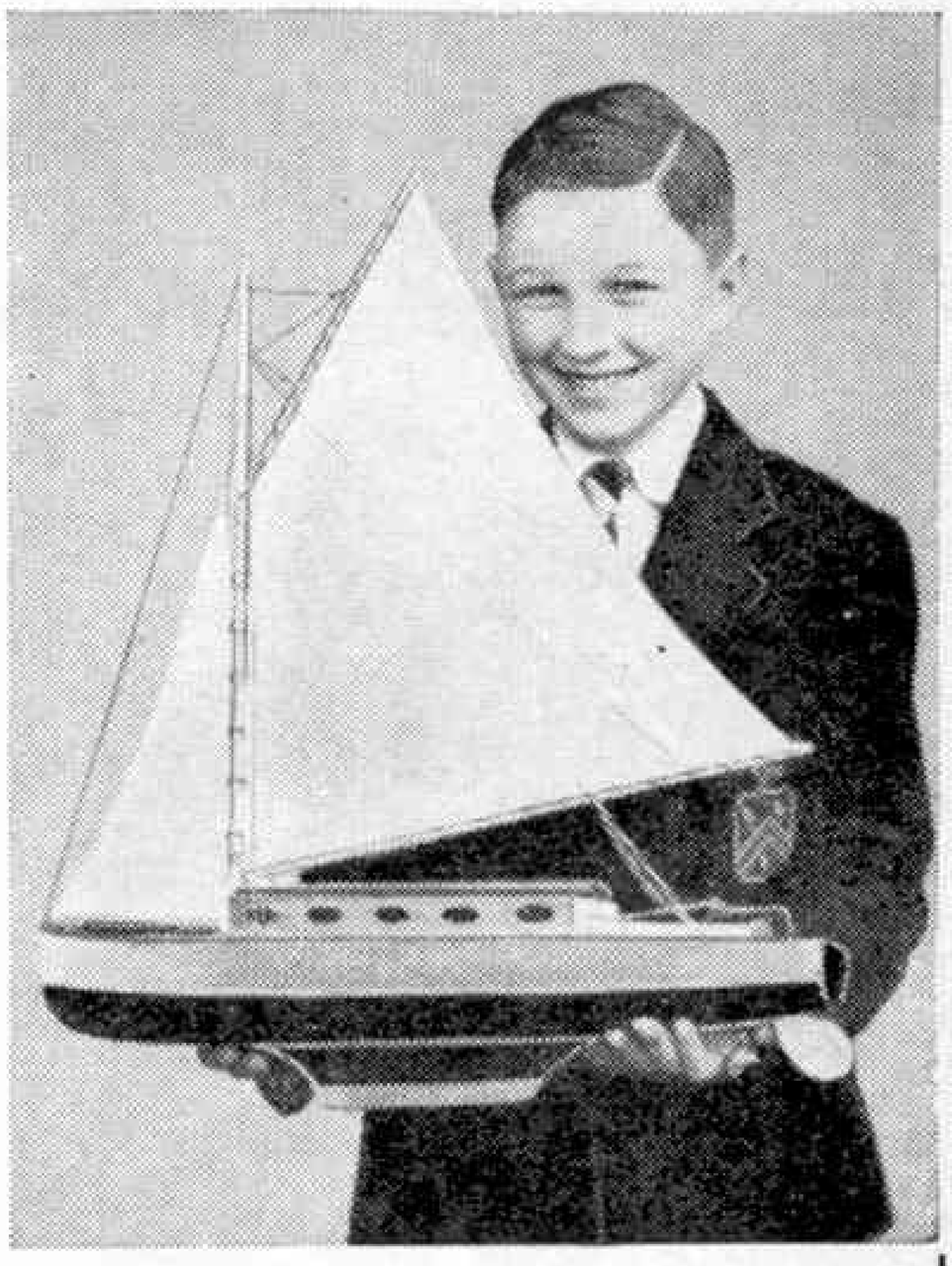

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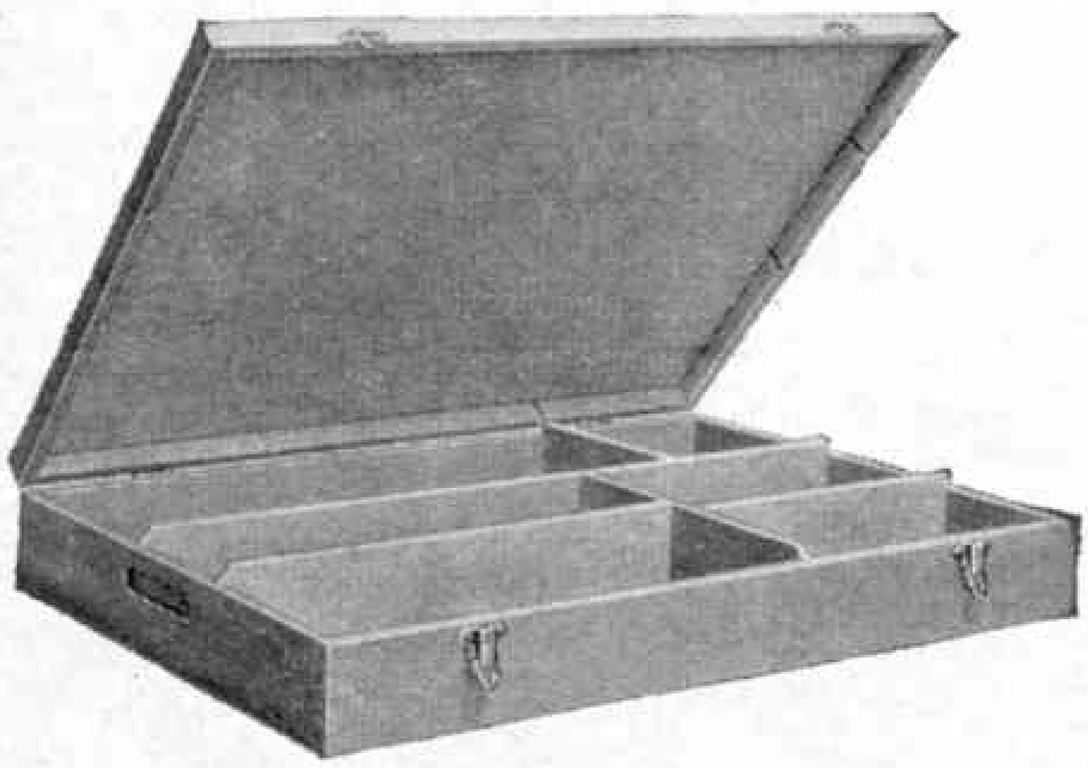

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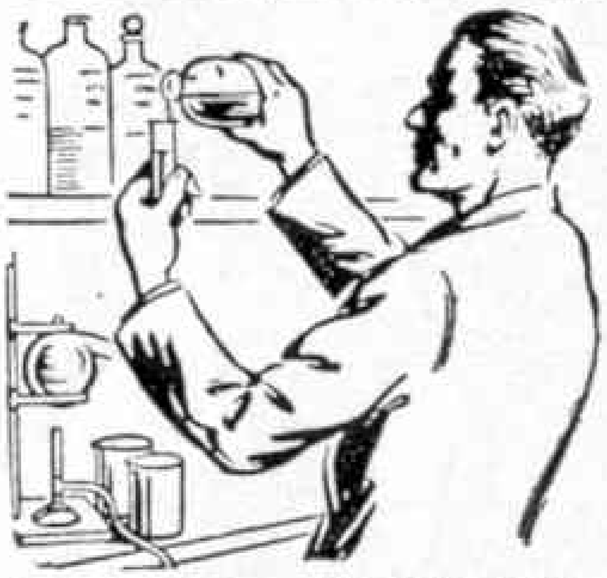

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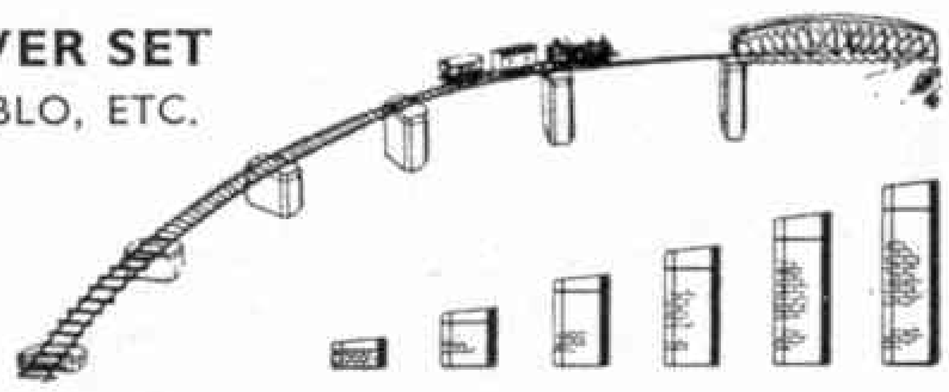

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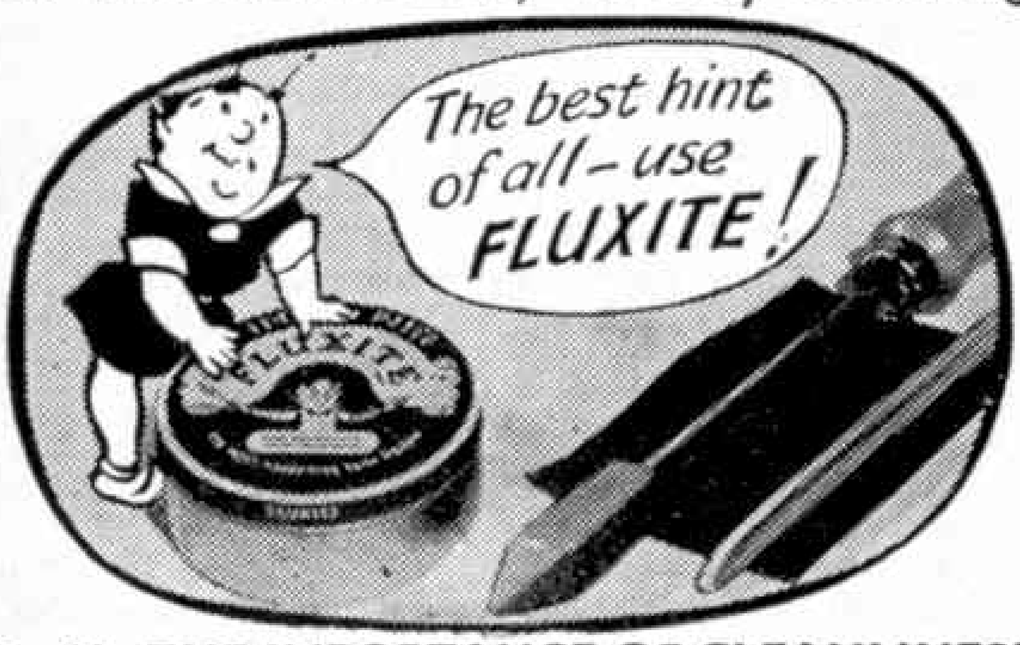

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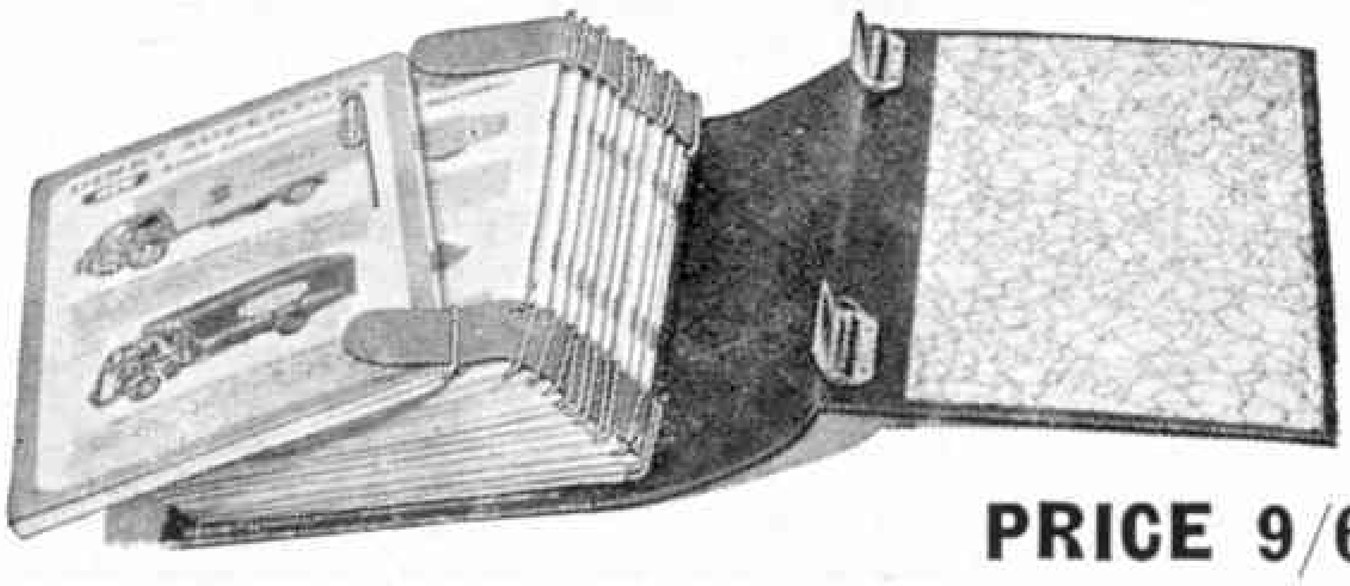

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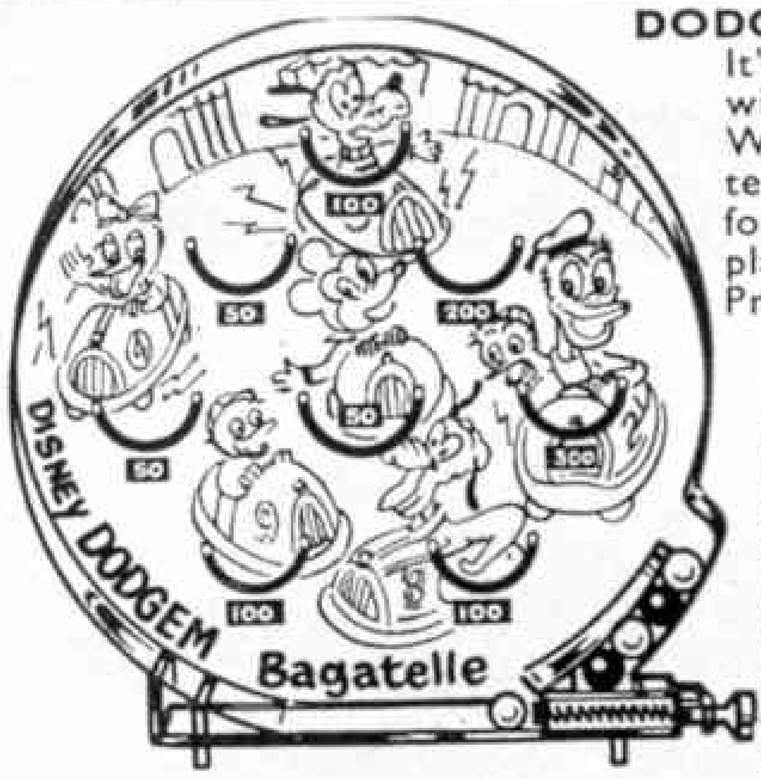

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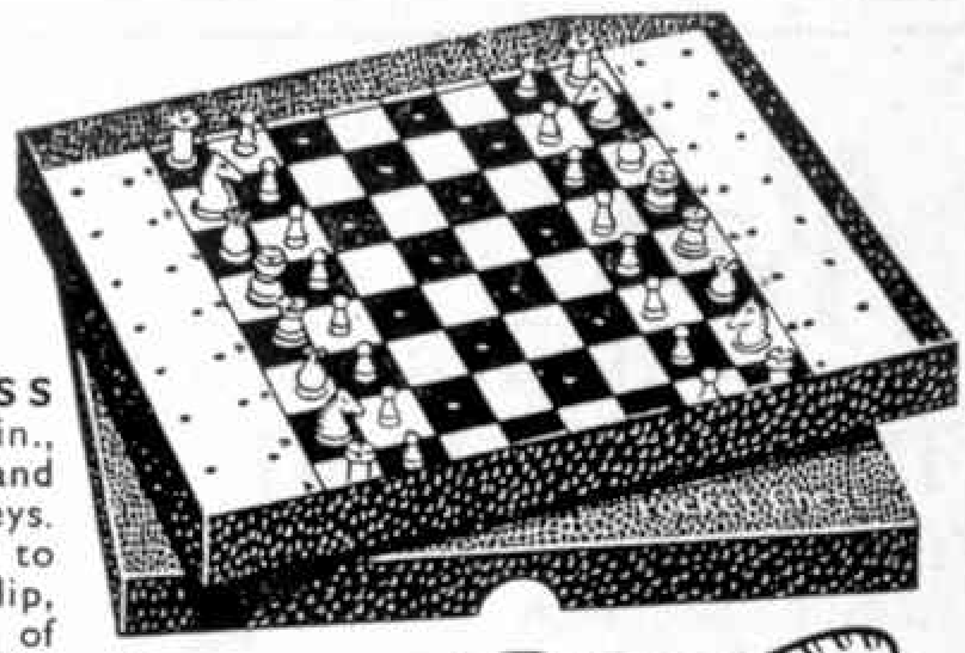

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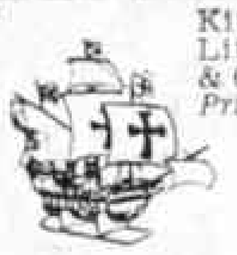

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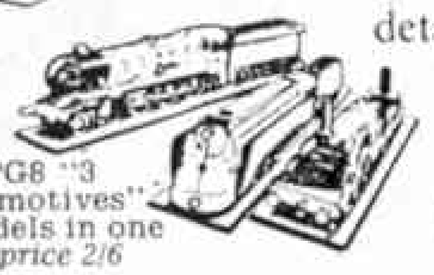

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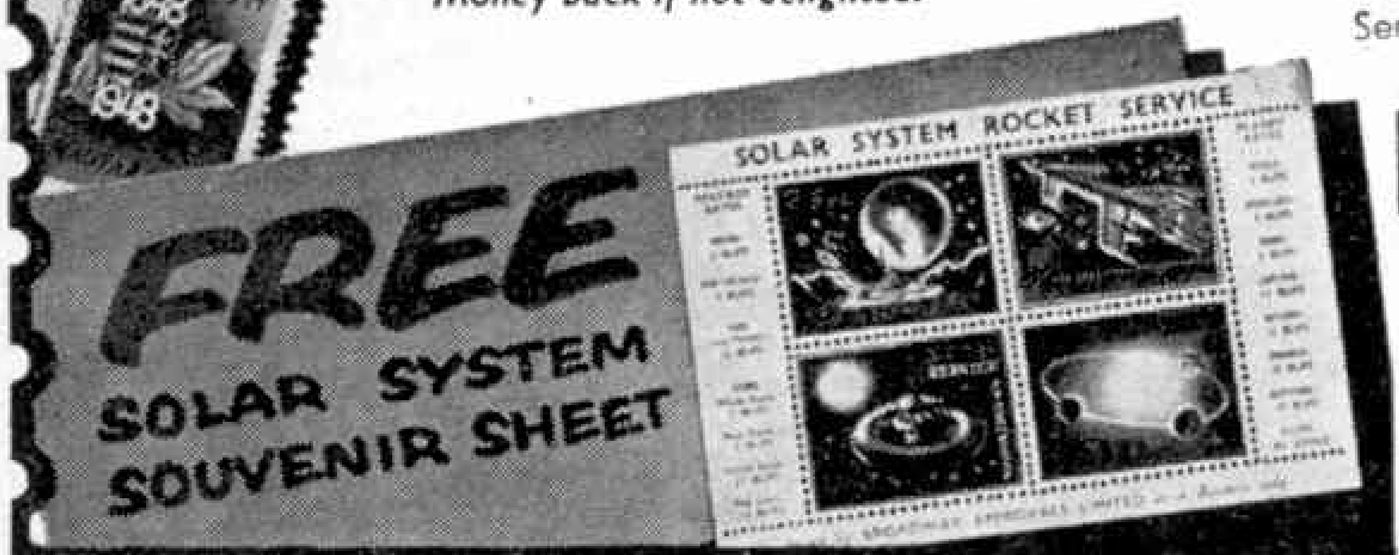

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183 "M.M.s" January 1942 to June 1958, mostly mint condition. Offers to—Johnston, 16 South Street, Chichester.

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"M.M.s" complete with Covers, September 1928, January 1930, October 1931 (Super Grabbing Crane Pt. 2), June 1932, January 1934, May 1937, Also Leaflet 3 Motor Cycle and "M.M." cutting of 14a Clock.—Moyes, 40 Johnstone Drive, Rutherglen, Glasgow.

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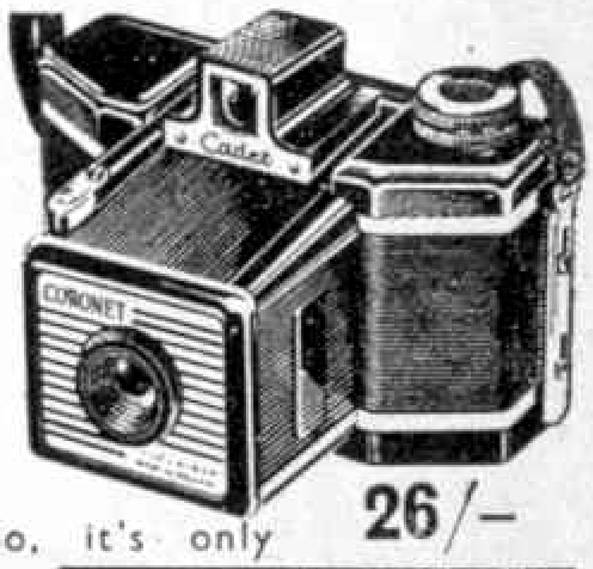

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No. 3

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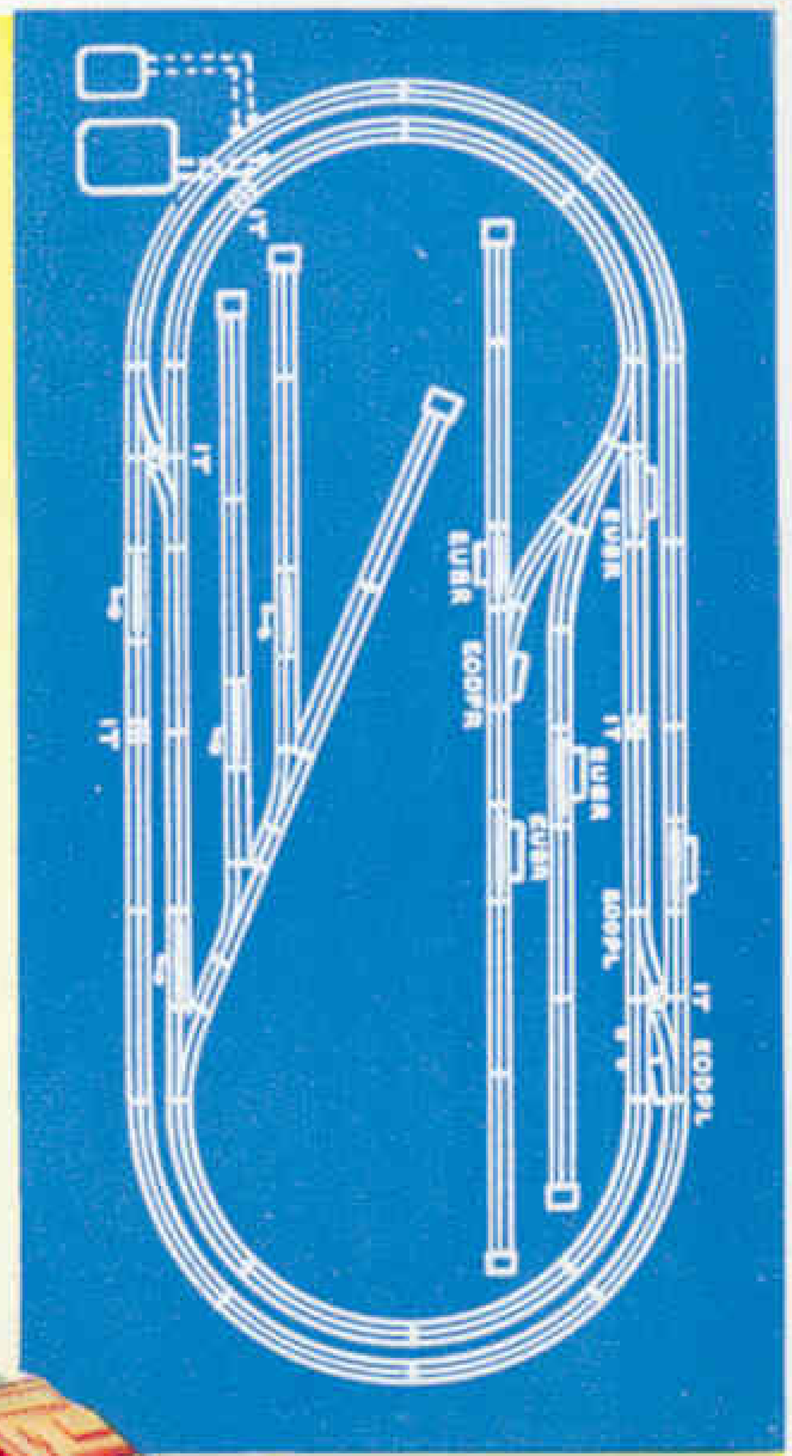
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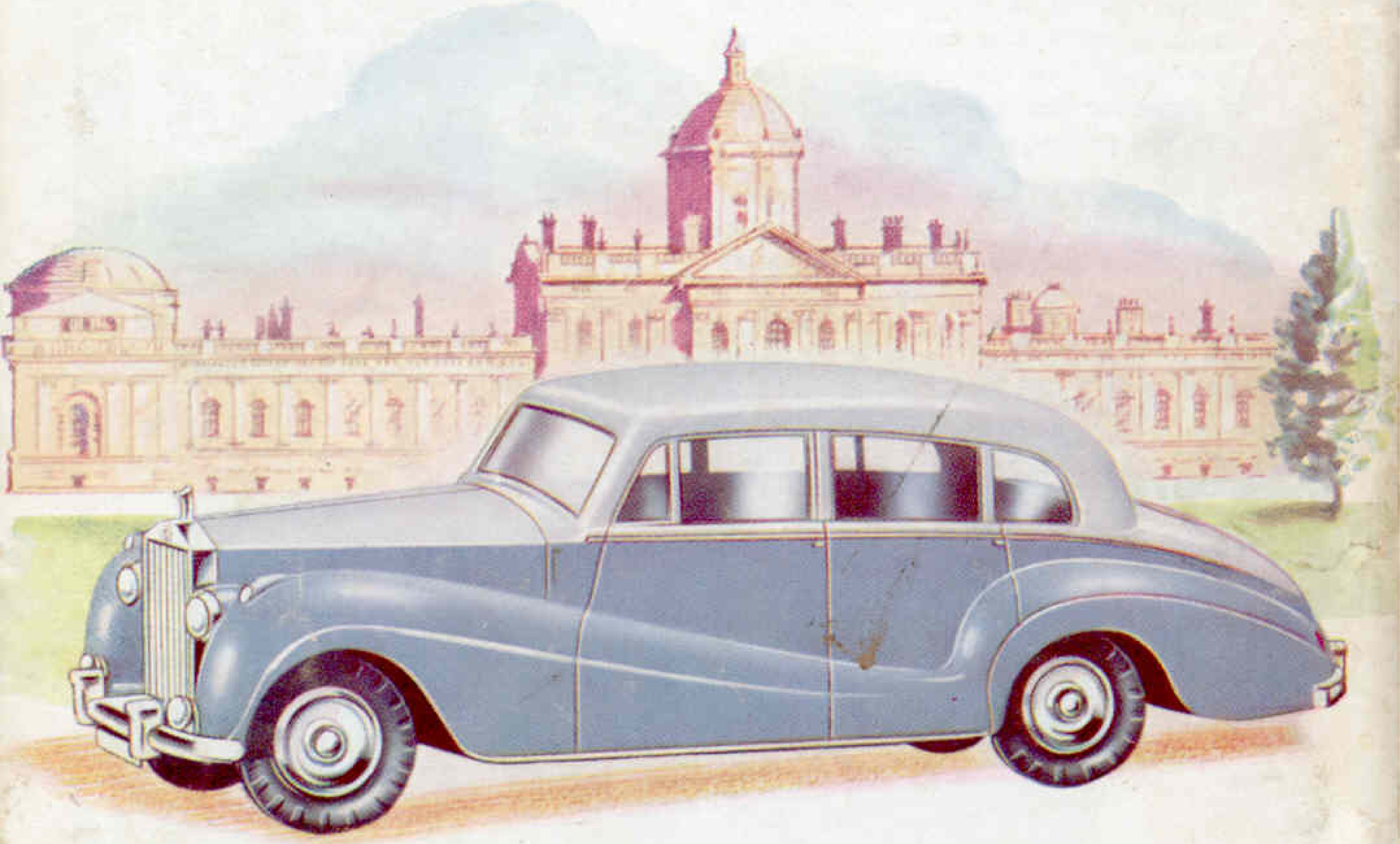

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MODEL OF THE MONTH.

RULING MACHINE.

Illustrated in the February, 1959 issue of the Meccano Magazine.

Construction of the Frame.

Each side of the frame consists of a 12½" Angle Girder fitted with three vertical 5½" Angle Girders numbered 1, 2 and 3. The Girder 3 is braced by 1" and 1½" Corner Brackets. A 5½" Strip 4 is bolted between the Girders 1 and 2, and a 5½" Slotted Strip 5 is passed over a 6½" Rod mounted in the Strip 4. The Strip 5 is connected to the Girder 1 by a 4½" Strip, the bolts used for this purpose being lock-nutted. A 4½" Strip 6 is fixed between the Girders 2 and 3, and the upper ends of these Girders are connected by a 4½" Angle Girder 7½

The sides are connected by 4½" Angle Girders bolted to the ends of the 12½" Angle Girders, by two pairs of 4½" x ½" Double Angle Strips 8 and 9 fixed between the Girders 2 and 3, by further 4½" x ½" Double Angle Strips 10 and 11, and by a 4½" Angle Girder 12 and a 4½" Strip fixed to the Girders 1.

The Motor and the Drive to the Rollers.

An E20R(S) Electric Motor is fixed to 4½" Strips bolted across the base, and two 1" x 1" Angle Brackets are fixed to the upper edges of one of the side-plates. These Angle Brackets are spaced from the side-plate by one Washer on each bolt. A Worm Gear on the armature shaft drives a 57-tooth Gear on a 4½" Rod held in the Angle Brackets by Collars. This Rod carries a ¾" Sprocket 13 and a 1" Sprocket 14.

Sprocket 13 is connected by Chain to a 2" Sprocket on the Rod on which the Slotted Strips 5 are mounted. The Slotted Strips are held in place by Collars, and a Wood Roller 15 is fixed on the Rod by two Collars. A single layer of lint is glued to the Wood Roller. A 6½" Rod 16 is mounted in the centre holes of the Slotted Strips 5, and this Rod is fitted with four Bush Wheels. Collars are placed on the Rod outside the Slotted Strips, then on each side a Small Loaded Hook attached to a Tension Spring is hooked in place. The lower ends of the Springs are connected by Small Loaded Hooks to the base Girders. These Springs press the Bush Wheels on Rod 16 against the Roller 15.

A 6½" Rod mounted in the upper slotted holes of the Slotted Strips 5 carries a Wood Roller wound with several layers of lint. The Rod is weighted by two 1" Gears, so that the Wood Roller presses against the Bush Wheels. A Chimney Adaptor bolted to the Double Angle Strip 11 is filled with ink. A length of wool or wick is placed in the ink

and one end is arranged just above the upper Roller. The ink will be found to drip slowly on to the lint round the Roller.

The Paper Holder and its Elevating Mechanism.

The sheets of paper ($4\frac{7}{8}$" x 2 5/16") are stacked between the upturned flanges of $5\frac{1}{2}$" Angle Girders bolted to a $5\frac{1}{2}$" x $3\frac{1}{2}$" Flat Plate. Underneath the Plate four Double Arm Cranks are arranged, and these support in their bosses $3\frac{1}{2}$" Rods that slide in the pairs of Double Angle Strips 8 and 9. A Threaded Crank is fixed centrally to each side of the Flat Plate and a 3" Screwed Rod 17 is supported in it. The Screwed Rod passes through the Double Angle Strip 10 and it carries at its lower end a $\frac{7}{8}$" Bevel Gear. The Screwed Rods on each side are held in the Double Angle Strip by Collars.

The Bevel Gears on the Screwed Rods engage similar Bevel Gears on a $6\frac{1}{2}$" Rod, which is mounted in 1" Corner Brackets bolted to the base Girders. At one end of the Rod a Collar is fixed, then a $2\frac{1}{2}$" Strip 18 is placed in position, then a Ratchet Wheel 19 is fixed in place and finally a hand control wheel 20 is added. A Pawl is mounted on a Pivot Bolt held in Strip 18 and is held against the teeth of Ratchet 19 by a short piece of Spring Cord. A Threaded Pin screwed into the boss of the Pawl serves as a release handle.

A 3" Strip is lock-nutted between Strip 18 and a $5\frac{1}{2}$" Strip 21, which is lock-nutted to a $1\frac{1}{2}$" Corner Bracket bolted to one of the Girders 3 and is spaced from the Corner Bracket by a Collar and two Washers. A $2\frac{1}{2}$" Strip lock-nutted to the centre of Strip 21 is bolted to a Triple Throw Eccentric 22, mounted in its $\frac{1}{2}$" stroke position on a $6\frac{1}{2}$" Rod. The latter Rod is supported in two built-up bearings, each consisting of a $1\frac{1}{2}$" Strip and a 2" Slotted Strip bolted to one of the Girders 7. The $6\frac{1}{2}$" Rod carries Single Throw Eccentrics 23 and 24, and a 2" Sprocket. The Sprocket is connected by Chain to a $\frac{3}{4}$" Sprocket on a $6\frac{1}{2}$" Rod fitted with a 1" Gear 25. Gear 25 engages a similar Gear on another $6\frac{1}{2}$" Rod, and a $1\frac{1}{2}$" Sprocket on the same Rod is connected by Chain to the Sprocket 14. The $6\frac{1}{2}$" Rods carrying the 1" Gears are held by Collars in the Strips 6.

Arrangement of the Paper Feed

The Eccentrics 24 pivot between Collars on a $2\frac{1}{2}$" Rod mounted in built-up strips 26. Each of these strips consists of a $2\frac{1}{2}$" Strip and a 2" Slotted Strip overlapped two holes. The slotted holes are passed over a 5" Rod 27 held in the frame, and Cranks are bolted to the inner ends of the $2\frac{1}{2}$" Strips. The Cranks support a $2\frac{1}{2}$" Rod 28 fitted with two Collars. Two $1\frac{1}{2}$" Flat Girders 29, with a piece of thin rubber clamped between them, are fixed on bolts screwed into the Collars. Two Washers are placed next to the head of each bolt. As the Eccentrics 24 rotate, the rubber between the Flat Girders 29 presses against the upper sheet of paper and pushes it forward under rollers formed by 1" Pulleys fitted with Rubber Rings. These Pulleys are fixed on a 5" Rod mounted in the frame. The main stack of paper is prevented from moving forward by a $4\frac{1}{2}$" Flat Girder 30 bolted to the Girders 2.

The stack of paper is prevented from moving except under the action of the feed mechanism by a weight 31, formed by a $1\frac{1}{2}$" Strip held in two Strip Couplings. The Strip Couplings are fixed on $3\frac{1}{2}$" Rods mounted in a $4\frac{1}{2}$" Strip and a $2\frac{1}{2}$" Strip connected by $\frac{1}{2}$"

Reversed Angle Brackets. The $4\frac{1}{2}$" Strip is supported by $1\frac{1}{2}$" x $\frac{1}{2}$" Double Angle Strips bolted to the Girders 7. The upper ends of the $3\frac{1}{2}$" Rods carry Couplings fixed on a $6\frac{1}{2}$" Rod 32. Rod 32 is located in the slotted holes of 2" Slotted Strips bolted to the Eccentrics 23. These Eccentrics must be set so that they raise the weight clear of the paper when the rubber between the Flat Girders 29 is pushing the upper sheet forward.

As the printed paper leaves the rollers it is guided by three Pawls 33, arranged as shown on a 5" Rod mounted in $1\frac{1}{2}$" Corner Brackets bolted to the Strips 4. The paper slides down two 3" x $1\frac{1}{2}$" Flat Girders 34, bolted to a $4\frac{1}{2}$" x $\frac{1}{2}$" Double Angle Strip lock-nutted to the Strips 4. A rubber band looped between one of the Flat Plates and a bolt in the frame presses the assembly against Rubber Rings on 1" Pulleys, which are fixed on a $6\frac{1}{2}$" Rod 35. A 1" Pulley on this Rod is connected by a crossed Driving Band to a similar Pulley on the Rod carrying the Roller 15.

The handwheel 20 is used to bring the stack of paper level with the upper edge of the Flat Girder 30. The printed paper is stacked in a delivery tray formed by $5\frac{1}{2}$" Angle Girders and a $5\frac{1}{2}$" x $3\frac{1}{2}$" Flat Plate bolted to the Girder 12.

<u>Parts required for building the Ruling Machine</u>:- 3 of No. 2; 8 of No. 2a; 1 of No. 4; 5 of No. 5; 3 of No. 6a; 2 of No. 8; 10 of No. 9; 5 of No. 9a; 2 of No. 12b; 8 of No. 14; 3 of No. 15; 1 of No. 15a; 6 of No. 16; 2 of No. 16a; 6 of No. 22; 4 of No. 24; 1 of No. 24a; 1 of No. 27a; 4 of No. 30; 4 of No. 31; 1 of No. 32; 109 of No. 37a; 104 of No. 37b; 11 of No. 38; 2 of No. 43; 2 of No. 48; 5 of No. 48c; 2 of No. 52a; 2 of No. 55; 4 of No. 55a; 4 of No. 57c; 28 of No. 59; 5 of No. 62; 2 of No. 62a; 2 of No. 62b; 2 of No. 63; 2 of No. 63b; 2 of No. 73; 2 of No. 80c; 1 length of No. 94; 2 of No. 95; 1 of No. 95a; 1 of No. 96; 2 of No. 96a; 1 of No. 103c; 2 of No. 103h; 2 of No. 106; 3 of No. 111c; 2 of No. 115; 2 of No. 125; 1 of No. 130; 4 of No. 130a; 5 of No. 133; 4 of No. 133a; ~~1 of No. 133a;~~ 1 of No. 147; 3 of No. 147a; 1 of No. 147b; 1 of No. 148; 4 of No. 155; 1 of No. 164; 1 of No. 186a; 1 E20R(S) Electric Motor.