VOL. XXX. No. 9 SEPTEMBER 1945

MECCANO MAGAZINE

WHITE PLUMES (See Page 290)

6d.

Next Month: "HOW B.S.A. BICYCLES ARE MADE"

MECCANO MAGAZINE

Editorial Office:
Binns Road
Liverpool 13
England

Vol. XXX
No. 9
September 1945

With the Editor

Peace at Last

The war is ended. Victory over Japan has brought to a close Britain's grim ordeal lasting nearly six years. Unfortunately the return of peace does not restore the prosperity of the world; instead we find ourselves at the beginning of another fierce struggle, perhaps a long one, to bring our industries back into useful production, and to reopen the channels of trade and commerce. In this great effort the engineer and the technical expert will play a prominent part, and I know that my readers will want to be in the forefront among them.

With the object of giving real help to readers who are in need of practical advice I hope to start very soon a series of articles on careers, similar in general to the articles that proved so outstandingly popular during 1929-33, but up to date in every respect. I shall be glad to have suggestions from readers in regard to the scope and nature of these articles. If any ideas occur to you, send them along.

The Atomic Bomb

It is probable that the surrender of Japan was due to the appearance of the atomic bomb, which caused so much devastation in Hiroshima and Nagasaki that the Japanese realised the hopelessness of their position.

This unexpected climax to a long and cruel war would be less startling to readers of the *"M.M."* than to most people, for reference to such a possibility has appeared in these pages, notably in March of last year in an article on *"This Atom Splitting Business."* When that was written nothing was known of the intensive research work then being carried out by Allied scientists; and according to the information available at the time there seemed little likelihood of the development of the atomic bomb on a practicable scale, as U235, the only material then known to be suitable, was very scarce. Yet the miracle has been achieved, whether by discovering and extracting sufficient of this rare material or by finding other means of creating the same kind of explosion within the atom.

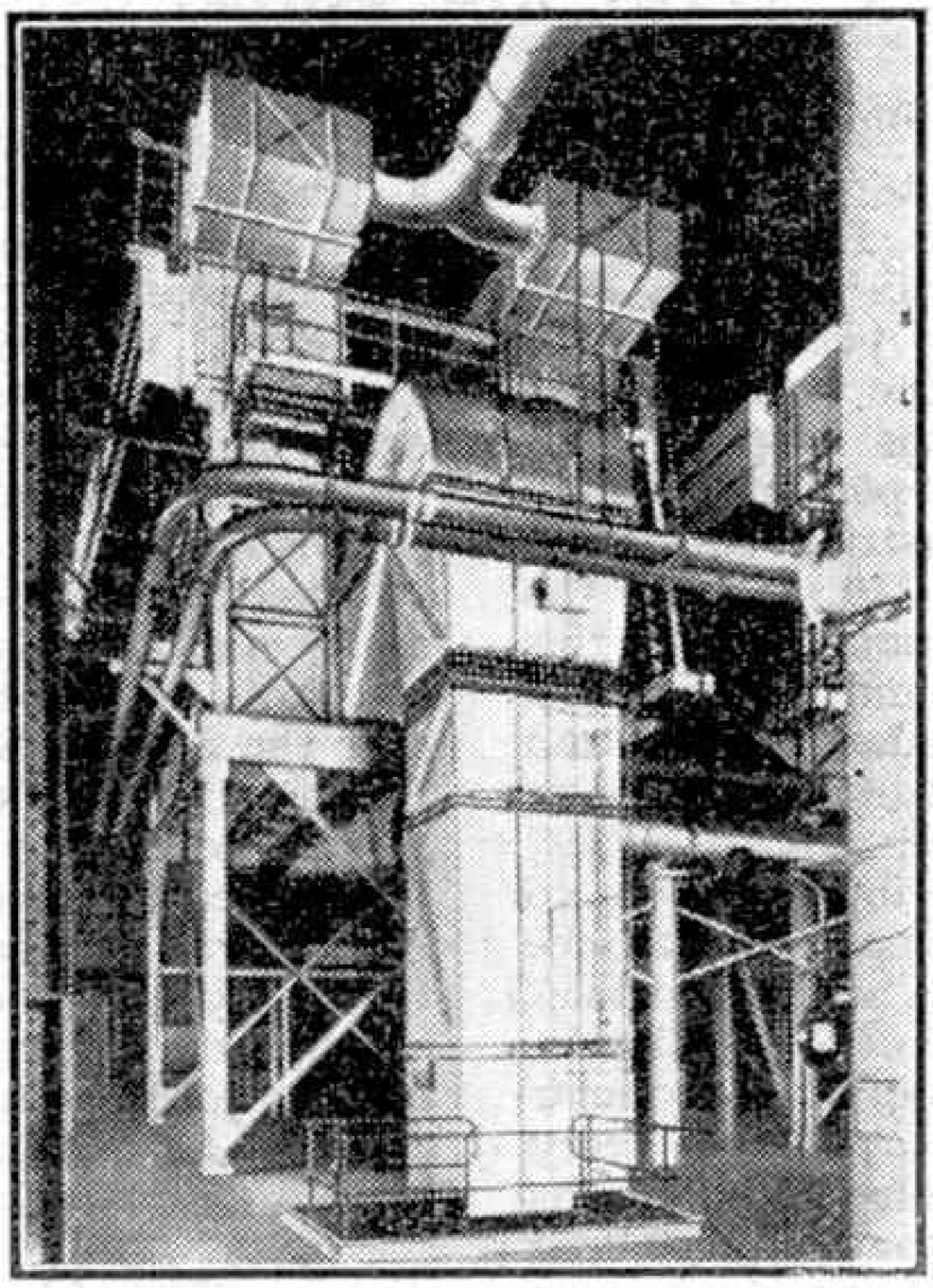
This great feat required the combined efforts over many years of the scientists of many nations, together with the gigantic resources at the disposal of Great Britain and the United States. The trouble and the enormous expense have been well worth while, however, as the bombs undoubtedly have saved thousands of Allied lives. The next question is whether the break-up of the atom can be controlled so that the enormous power released can be used for peaceful purposes, and whether this can be done at reasonable cost.

This Month's Articles

Chimneys Without Smoke

Purifying Flue Gases at Fulham Power Station

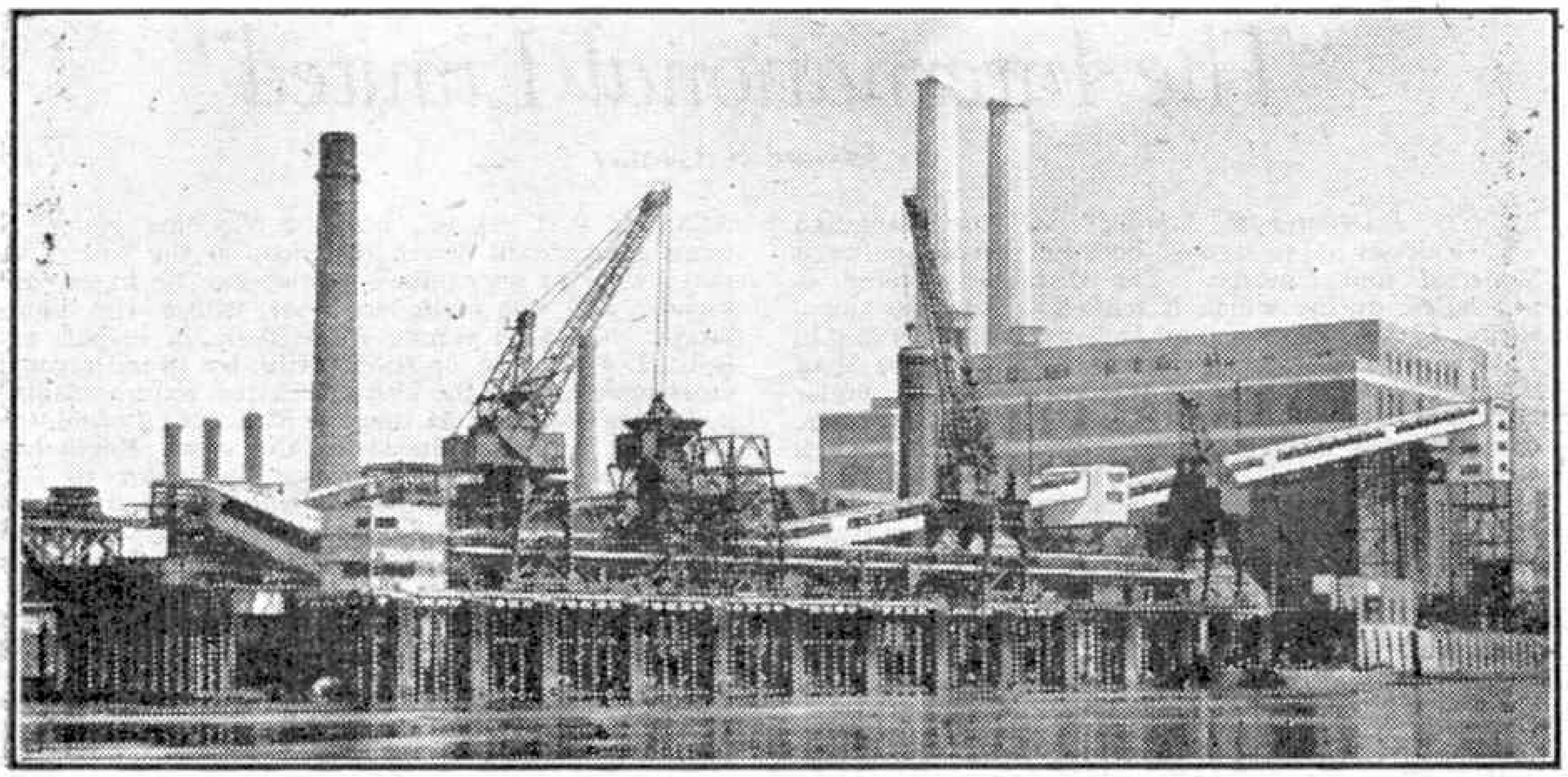
THE imposing chimneys seen on our cover are those of the Fulham Power Station on the banks of the Thames. This station is a modern one, designed for an ultimate capacity of 318,000 kilowatts. When completed it will have five 60,000 kW turbo-alternators. There is also a 10,000 kW house set. Steam for the turbines is produced by watertube boilers, of which there will ultimately be 16, and each boiler is capable of evaporating approximately 300,000 lb./hr. of water. The steam pressure is 625 lb./sq. in. and the final steam temperature is 850°F. The final stage of the power station is now under way, and there are now four chimneys instead of two as shown in the picture; each chimney, which is of concrete construction, rises to a height of 300 feet. The ultimate plant is designed for an output of 1,500 million units of electricity per year.



One of the washer scrubbers in which sulphur and dust are removed from the flue gases at the Fulham Power Station. The illustrations to this article are reproduced by courtesy of James Howden and Co. (Land) Ltd.

The great building that is seen in the upper illustration on the opposite page accommodates the steam generating units, the turbo-alternators occupying an extension of this beyond the chimneys. The whole of the coal required is brought to the station by water, first making a sea voyage and then passing 37 miles up the River Thames to the coaling jetty in sea-going colliers specially designed for the Fulham Borough Council, for which the power station has been erected. There it is conveyed mechanically into the building and fed automatically to the furnaces by mechanical stokers. The boilers are of Stirling make, with three drums, and the walls of the combustion chamber are water cooled. The air passing through the furnace is pre-heated, to ensure proper combustion, heat from the flue gases that otherwise would be wasted being transferred to it in regenerators in which the heating surface is provided by notched and undulated plates that give the highest heat transfer without unduly increasing resistance to the flow of the gases. The air for combustion supplied to the boilers, and the flue gases resulting from the combustion in the boilers, are handled by fans. There are two forced draught fans and two induced draught fans for each boiler, all being driven by electric motors. Devices are fitted to the fans for economic control with variation of the boiler load.

The auxiliary equipment in the boiler house includes a complete range of indicators showing steam pressures, steam flow, water levels, water flow and draught. The percentage of carbon dioxide in the flue gases also is continuously indicated, and smoke density indicating equipment is installed. The essential instruments are mounted on special panels, one for each boiler, and two of these can be seen in the illustration of the boilerhouse firing aisle that is reproduced on page 301. They are indirectly illuminated through diffusing glass that gives an even light over the dials and controls. Below the instrument panel of each is the control desk, on which are push button switches for all the fans, washer re-circulating pumps and air pre-heater motors, while the switches for stoker speed and other controls are mounted on the lower vertical section of the panel. It is impossible to operate



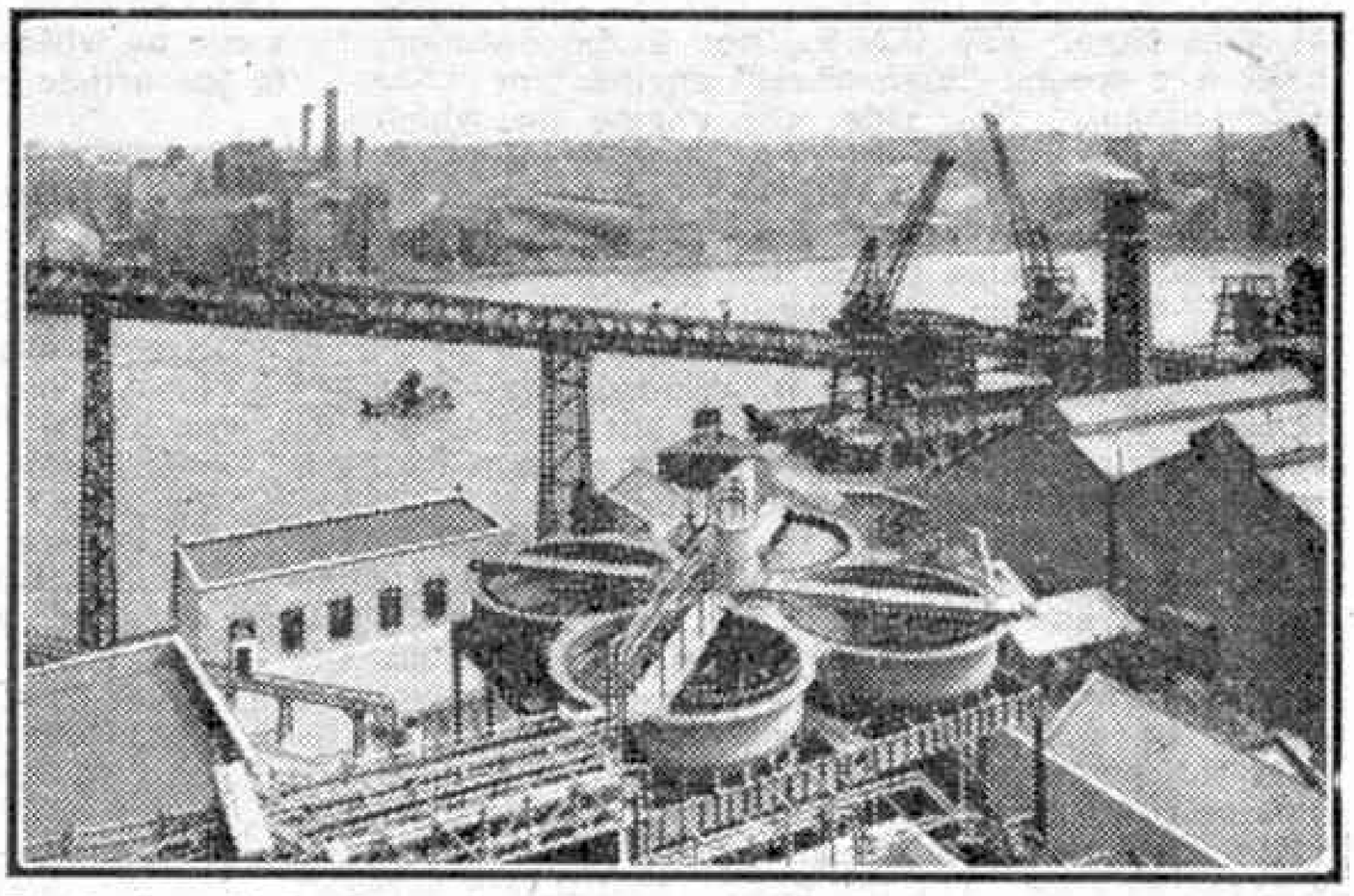
The Fulham Power Station and coaling jetty. All the coal required is brought to the station by water.

any of the push buttons inadvertently, as each must be twisted before it can be pushed in.

In the past we have been accustomed to seeing great black clouds of smoke billowing out of tall chimneys, which have earned an unenviable reputation for spreading grit, dust and tarry matter around us. There is, however, another insidious component in this chimney emission which cannot be seen; this is sulphur oxides, which on release to the atmosphere are capable of producing sulphuric acid with bad effects on buildings, vegetation and health. A modern power station such as that at Fulham avoids all this by washing the gases that pass through the flues from the furnaces of the boilers, and all that can be seen rising from each of its great reinforced concrete stacks when the washers are operating is a great white harmless plume of moisture formed by the condensation in the cold outer air of the water vapour in the flue gases. The approval of the Electricity Commissioners to the erection of the station was subject to the removal of sulphur and dust from the gases before they were turned out into the atmosphere of London.

For purifying the flue gases the Howden-I.C.I. system was adopted. In this the sulphur and dust are absorbed in water containing lime to neutralise the acid vapours, and the process is one of continuous circulation, the object being to avoid the use of large quantities of water. The solid materials are allowed to settle in special tanks so that they can be removed, while the clarified liquor itself is returned to the washers. These solids include chalk, formed by the action on the lime of carbon dioxide, and calcium sulphate and calcium sulphite, in which form the sulphur is removed.

It is interesting to follow the course of the flue gases in order to see how these changes are brought about. After leaving the air pre-heaters these gases enter the scrubbers, in which the washing water flows down packing consisting of vertical boards with pear-shaped tops. The liquid forms a film on the sides of the packing and most of the coarse dust and a large proportion of the sulphur in the gases are removed by this primary (*Cont. on page 322*)



Tanks in which sludge is allowed to settle from the liquor used for washing flue gases.

"The International Limited"

By Edward H. Livesay

"*THE International Limited*" of the Canadian Railway is so named because it runs between Montreal and Chicago. The distance covered is 849 miles. during which it makes at least 20 stops, taking 17 hrs. 45 min., and thus averaging 48 m.p.h. This is a very good performance, and better than it appears at first sight, as it involves passage under the Detroit river between Canada and the States, coupled with electric haulage through the tunnel; that is from Sarnia, Ontario, to Port Huron, Michigan, a distance of three miles. The double change from steam to electricity and back again, and slow travel through the tunnel, take 30 min. We will not attempt to describe the whole journey, but will confine ourselves to the first section only, from Montreal to Toronto. These two cities are the largest in Canada, Montreal having a population of over a million, and Toronto one approaching that number. Naturally a good train service is provided between them, over three routes, two being Canadian Pacific, both single track from Glen Tay, 144 miles out of Montreal, and the third, Canadian National, double tracked throughout. It is the last that comes into this account.

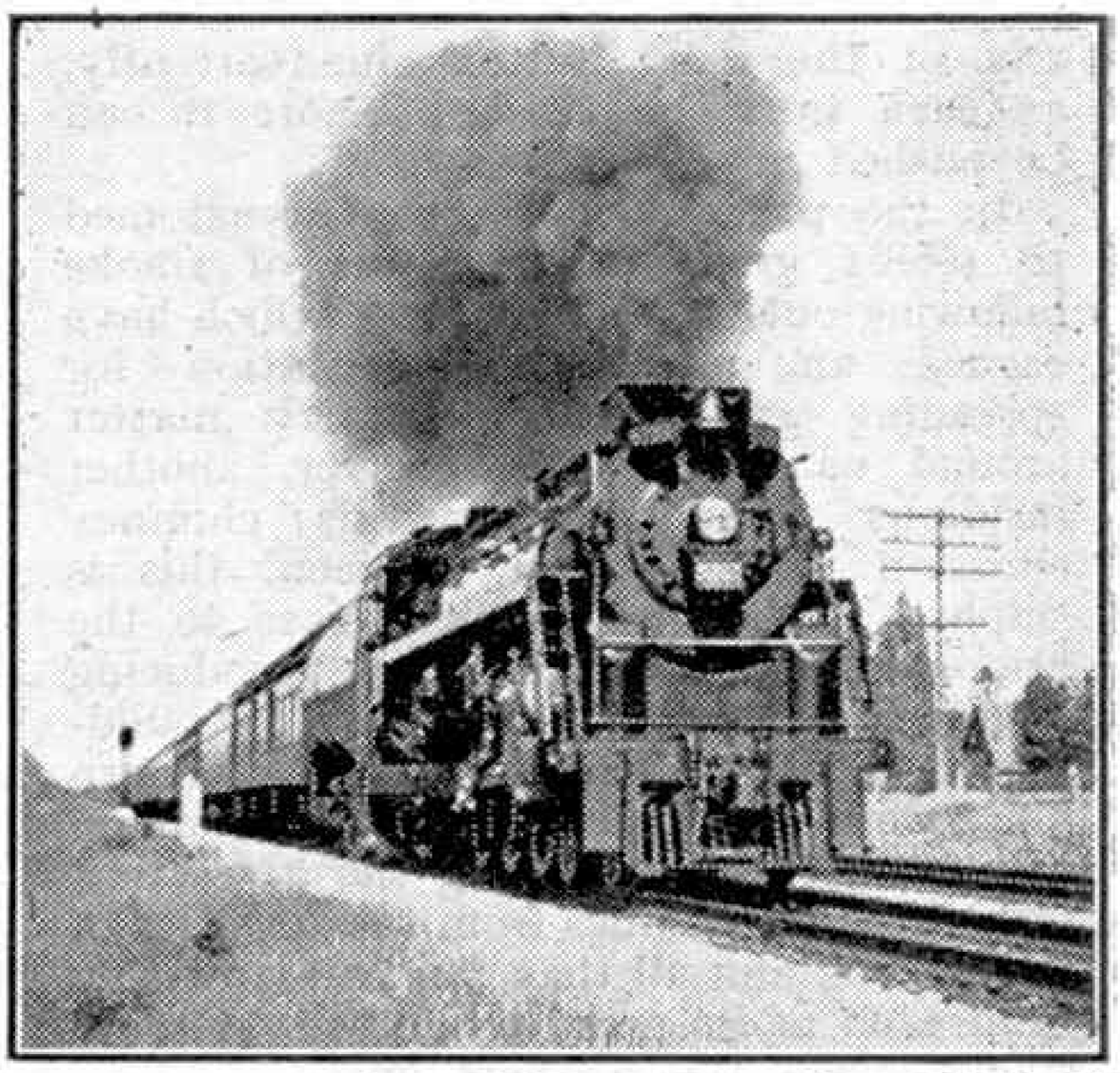
There are no trains in Canada like the non-stop British expresses, such as, say, "*The Flying Scotsman*," "*Coronation Scot*" or "*Cornish Riviera*." The only trains that do bear some resemblance, in being day services, minus sleeping cars, are the two "Pool" trains running in both directions between Montreal and Toronto, 329 miles, but there the similarity ends, 10 stops being made en route, as against one by the "*Coronation Scot*" and none by the other British trains I have named. Comparison shows that the Canadian engine has far the heavier task. Though both average and maximum speeds are up to British standards, the weight of the train is far greater. In all cases the maximum speed is restricted; to 80 m.p.h. in Canada, 90 in Great Britain.

What is a "Pool" train? It is one run jointly by the Canadian National and Canadian Pacific Companies, which share or "pool" the receipts. A few years ago the two companies indulged in cut-throat competition for the lucrative traffic between Montreal and Toronto, with the result that it ceased to be lucrative for either. For instance, timing was cut until in 1931 the C.P.R. ran a train over the first Division, Montreal, to Smiths Falls, 124 miles, at an average speed of 68.9, making it the fastest train in the Empire at that time. The C.N.R., not to be outdone, built five special "high-wheel" engines for "*The International.*" No. 5704, the engine on which I travelled, is one of these. And so things went on.

This didn't pay. Trouble was sure to result sooner or later, probably a wreck; and as profits had gone, both railways came to see the folly of it, agreed to "pool" the traffic, and fixed the time at 6½ hrs. "*The International*" is a "pool" train only as far as Toronto; it leaves the C.P.R. Windsor Station, takes the C.N.R. route, is hauled by one of the C.N.R. special engines, runs into the Union Station in Toronto, and is made up of stock of both companies.

You will probably like to know something of the chief differences that would strike you if you came to Canada and found yourself alongside No. 5704, which will be hauling "*The International*" on the run we are going to take. Some of these features apply to American locomotives in general. The first thing sure to impress you would be the greater size of the engine, chiefly in height and length, and from this many other structural and operational differences arise. The rail gauge, or distance between the metals, is exactly the same on both sides of the Atlantic, 4 ft. 8½ in., but the "loading gauge" is more generous in North America, so the boiler, the real source of an engine's power, can be bigger and higher, and the cylinders that utilise the power larger. No. 5704 stands 15 ft. 3 in. in height, and is 10 ft. 6 in. wide, or about 24 in. by 18 in. larger in cross-section than the average British express engine.

Joining No. 5704 at the C.N.R. Turcot Locomotive Depot, I was introduced to the crew, Enginemen Barden and Peachey, climbing on board to look round the cab. The picture will give you a good idea of what a Canadian cab looks like. It was of the "vestibule," all-enclosed pattern, and had four seats, the two spare ones being of the "drop" variety. The hanging throttle-lever is right in front of the driver (engineer in Canada), with the reversing gear air-operated, the brake controls, and the brake and exhaust-pressure gauges. On the other side are the fireman's gauges, pressure, steam-heat, etc., and the group of five little wheels concern



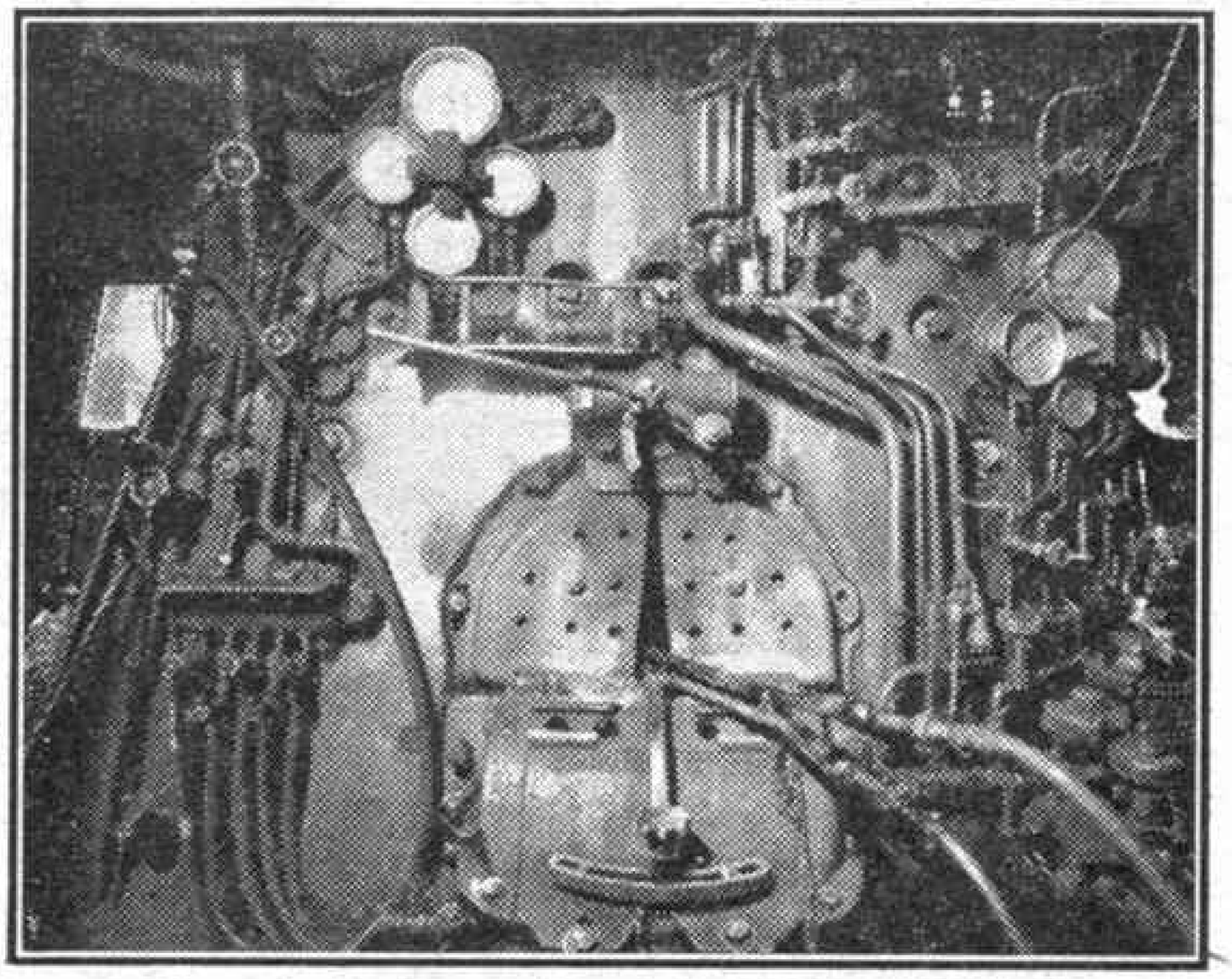
The Canadian National Railway "International Limited," a run on which is described in this article. The illustrations to the article are reproduced by courtesy of the Canadian National Railways.

the five steam jets blowing the fuel into the four corners and centre of the fire-box, the engine having mechanical stoking. A 2-cylinder reversible engine under the cab drives a worm-conveyor bringing the coal forward from the tender, lifts it on to a shelf inside the fire-box, just below the door, whence it is blown by the five steam jets, the operation of which can be seen through the row of holes below the door.

But we must get on with the run. No. 5704's colour-scheme is very handsome, light green, with a darker green running-board picked out with red and gold, red number-plate, and black side-plates. Like all Canadian engines, she is well kept, and starts out from the roundhouse spotless and shining. She pushed the nine cars round into the C.P.R. Windsor Station over a long and rather twisty route; they weighed about 625 tons, a light load in the enginemen's view, but four more were to be added at Brockville.

We got away promptly at 3 p.m.; no green flag here, an air whistle in the cab gives two blasts, sounded by the Conductor (Guard), after he has handed up the "Train Orders" and boarded the train. The two suburban stops disposed of, at Westmount and Montreal West, the real run began, and at Dorval we switched over to the C.N.R. double track main line, and were soon roaring along at 75 m.p.h.

I parked myself on the drop seat behind the fireman, right in the door, trying to keep cool, without much success, seldom leaving it except to get at the drinking-water can, packed with ice in the engineer's locker. There was a long spell of high speed after St. Annes, 70–80, and the riding was good, yet it was much harsher than on the Gresley or Stanier Pacifics. It felt hard, as if the springs were stiffer, as no doubt they were, to compensate for the greater weight on the axles. Possibly the track was not so perfectly kept as it is in Britain; in fact, I am sure it wasn't! Yet it was good, with heavy steel; it must be, to take these heavy engines pounding over it at 80.



In the cab of a locomotive of the C.N.R. "5700" Class.

Barden had forecast very high speed with this train, mentioning a probable figure that made me smile inwardly, as I had made a point of enquiring about this, and had been officially told that 80 was supposed to be the limit, and nothing over that was likely to be done. Nor was it; that is approximately 80, I won't swear to a mile or two. Near Rivierre Beaudette, when we were doing a cool 80! I saw Barden take out his watch, so I followed suit. He studied it for a while, I studied mine. Came a hail: "There you are, a mile in 45 seconds, 90 m.p.h. "Whoa! Come off the roof, that's only 80!" from me. "Eighty? How do you get that way? Mile in 45 seconds is 90!" "Sorry, 80!" We had quite a confab about this, but there, I don't believe Barden really thought it was 90, he was surely too old a hand to make such a bloomer. No, he was pulling my leg.

We had left Montreal West three minutes late, but at Cornwall, the first stop, were a minute ahead, and had averaged 63.8 from St. Annes. Water was taken very quickly, due to a big filler-pipe; then came immediately a steep 1 in 93 incline, the "Hog's Back," the engine accelerating all the way up, and passing over the top at 50. You could certainly hear that exhaust! A harsh roar, and the fire-box a blinding mass of dazzling white flame. It was fascinating to watch the mechanical stoker. No need to be worried at seeing the fireman sweating and swearing in tropic heat, breaking his back and his heart behind a shovel. Peachey just sat in his seat, making an occasional visit to the fire-door to step on a treadle, and see the door fly open if he wanted to peek inside, turning a little injector-wheel, or adjusting the jets or feed occasionally. I too peeked inside frequently, watching the fuel falling ceaselessly on to the shelf, to be picked up by the invisible jets of steam and whirled to a fiery death in that raging box.

I thought of Smith, the fireman on "*King William III*," the engine on which I had made a footplate trip with "*The Cornish Riviera*" when I was in Britain. Smith went through an almost ceaseless cycle of operations—fill scoop, open fire-door flap, discharge scoop, close flap and so on. How he would have liked to be in Peachey's shoes, and have had the benefit of mechanical stoking and a pneumatic treadle-operated fire-door.

Of course Peachey was hot, but not from toil. We all were, though I was probably the coolest of the trio in the cab, sitting right in the door, with my legs outside, while the enginemen were in "hot seats" close to the backplate. Everything about the cab was bone dry, and the deck (footplate) was often drenched with water, yes, and the backplate too, Peachey just sprayed everything inside the cab indiscriminately, including me. However, I didn't mind; I was only wearing a suit of filthy overalls, grimed with the accumulated dirt of many trips on all sorts and conditions of locomotives. A little water might even wash some of it off. The speed was as high as ever, 75–80.

Prescott was passed O.T., and here I caught sight of the St. Lawrence, a streak of blue and silver through the trees, and the air got cooler; the afternoon was wearing on. Then came the Brockville stop, and the crew changed. It is a "Division" point, at each of which "ground crews" seize on the engine, apply grease-guns to nipples about the motion, clean the ashpan, and so on. A 73 sq. ft. grate lets a lot of ash through! The 58 miles from Cornwall had been covered in 53 minutes, 65.7 m.p.h. Four cars were added here, bringing the train weight up to 950 tons, so it will be seen that, as the speed would be as high as ever, No. 5704 was going to be extended a little, in the hands of the new crew, Enginemen Clare and Taylor. Getting away again, a stop was made just beyond the station for coal, several tons being taken on in three minutes from a very efficient coal-stage.

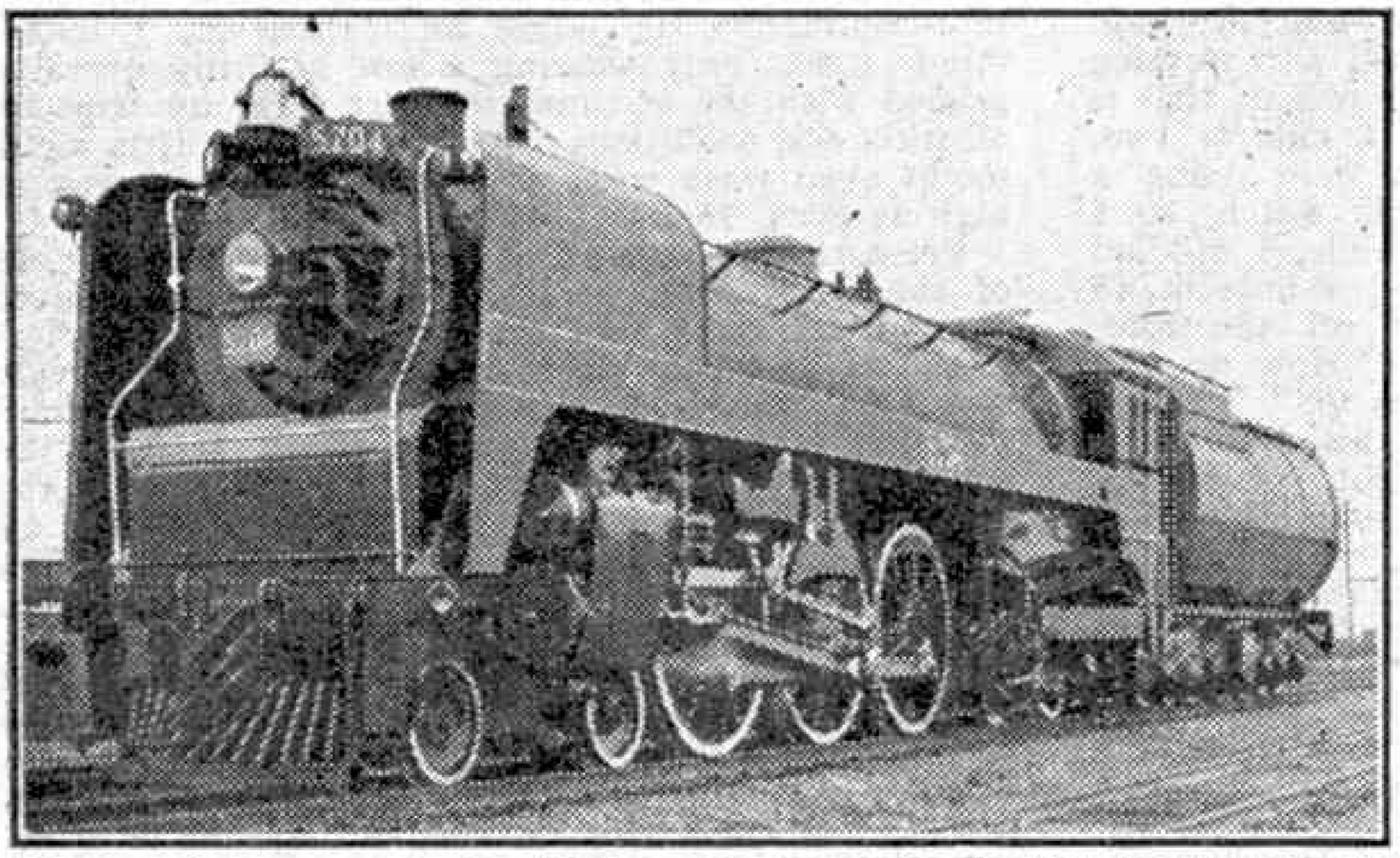
Finally clearing Brockville, we settled down once more, in less trying temperature, running through rougher country, round a lot of curvature and through many rock cuttings. But the speed remained high, the 80 limit being often reached, but not exceeded. No. 5704 was really putting her best foot foremost now, hauling the 950-ton load with tremendous vim. The stoker was grinding away vigorously, sending a continuous stream of fuel into the ravenous fire-box, and keeping the pressure well up in the sixties (two-hundred-and, of course). No. 5704 was doing well, I thought, though Barden had said his regular engine was plenty better, I have heard that sort of remark before from engine men!

Drifting steam naturally gave no trouble; the air was hot, and the tremendous blast in any case carried the exhaust high above the cab. The engineer's window was of the "Kent" revolving pattern, which seemed to me to keep the glass quite free from smuts and smears. This "clear vision" device is simply a circular disc revolving at high speed in contact with a scraper, so nothing has a chance to settle on it. Approaching Kingston, the next stop, there was another steep ¾-mile incline at 1 in 98, which could not be "rushed," and the 950-ton load called for full regulator plus the booster, which was kept in gear for some distance. It cuts out auto-

matically when the engine is "notched up" and is not intended to remain driving at over 12 m.p.h.

This trip was pretty noisy; the engine was working hard, and everything was wide open; one had to shout to make oneself heard. This gets boring after a time, to both parties, and when the whistle chimed in simultaneously it was positively maddening, generally resulting in interjections with no bearings whatever on the conversation. Its long drawn-out bellow always seemed to join in when one wanted to say something in a hurry, or worse still, after one had begun, and felt disinclined to stop. The law enforces its sounding at every level-crossing, and as these occur every mile or so its ill-timed, blatant intercessions were only too frequent, quite spoiling the rhythm of an interesting chat. The bell, fitted on all N. American engines, as it was on English ones too a century and more ago before the whistle was invented, is always rung in city limits, but not at level-crossings, or "grade-crossings," as they are called out here. It wouldn't "carry" well enough, or act as a strong enough deterrent to jackasses "beating the train to the crossing."

I have seen this game played myself; here is an instance. We were entering the town of Peterborough at about 40 m.p.h., and I was sitting in the fireman's seat, looking idly out of the window, when I saw a car rapidly speeding towards us and the crossing that we should be reaching in a few seconds. Watching it, and subconsciously noting where our respective



C.N.R. 4-6-4 locomotive No. 5704, on the footplate of which the "outward" run described in this article was made.

movements would bring us together—it would be at the crossing if we both kept on—I expected the car to slow up and stop. Suddenly, with a thrill, I realised it was not going to stop, it was going to "beat the train to the crossing!" It looked impossible; I felt certain there was going to be a smash. But lo and behold, there was no smash, and looking across the cab through the other window I saw the car disappearing up the road in a cloud of dust.

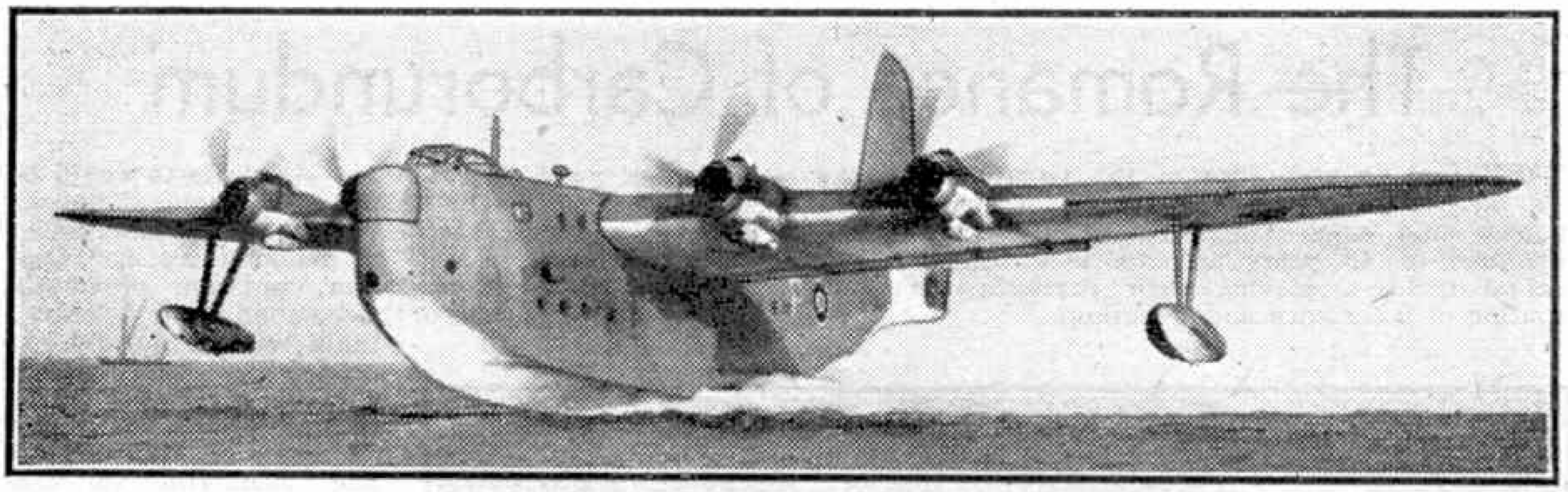
It had been so close a call that if the car had had another coat of varnish it would have been scratched; the driver had missed death by a fraction of a second. I shouted across to the engineer: 'I have often heard about that sort of thing, but never thought I should see it from the cab. I suppose that fool is quite proud of himself." "It was a woman!" he said, disgustedly. Of course he hadn't seen the car at all until it suddenly flashed out on his side; modern high-pitched boilers cut off all the engineer's view of the other side.

By this time we were nearing Belleville, another Divisional point, still roaring along at high speed, lurching and rolling, the harsh ceaseless snarl of the exhaust and the grinding of the coal-conveyor sounding above the rumble of the wheels. Very different this from the almost effortless swaying flight of *"The Coronation Scot"* and *"Flying Scotsman!"* I thought of those beautiful engines, spinning along hour after hour in an atmosphere entirely free from any sense of stress or strain, except perhaps up Shap and Beattock, and could not fail to mark the contrast. No. 5704 was being thrashed, but nevertheless seemed to "take it." American engines expect to be thrashed on occasion, and they are. The fireman doesn't mind; he just speeds up the conveyor a little! Before getting into the station another water-stop was made; we were using a good deal of fuel too, naturally, hauling a 950-ton train at high speed. 114 lb. a mile, or a ton every 19 miles. There may have been some special reason for the coaling-stop, as actually the 20 tons carried should theoretically be enough to run No. 5407 from Montreal to Toronto.

At Belleville the usual "servicing" was done, and the third and last crew, Enginemen Crozier and Henricks, took over. In Canada crews never do over 150 miles running at a stretch, between two Divisional points, at least they never have in my experience. Setting off on the last lap, we were soon bowling along again at the same pace. with Lake Ontario in the picture on the left, the Sun, a ball of fire, sinking lower in a turquoise sky. The silvery waters of the great inland sea were having their effect in the cab; it got quite shivery, a complete contrast to the suffocating heat earlier in the afternoon, as a gentle breeze blew off the surface of the lake. The speed now; on straighter track, seemed higher than ever; I had to stand up to make notes in my pad, which is always the case, I find, when an engine's actions are a bit turbulent. to get some spring in my knees. Otherwise if I try to write sitting down I can't read my own notes!

Yes, it was fast travelling along here, the average to Port Hope, a "flag" stop, or one made at a "halt" or to set down a passenger or two, being 63.9. Off again to Oshawa, where the great General Motors plant is located, humming full blast on war work, the stop only lasting a minute, and we were away on the last lap. I cannot say I was sorry; I had had pretty well enough of it! I had been nearly six hours in that thunderous cab, and the heat in the early stages of the trip had taken it out of me. I wanted to get to Toronto, have a hot bath, follow it with a cold shower and go to bed, and the sooner the better. The engine may have wanted a rest too, she had certainly earned it. But she had a tough assignment to tackle as a finale, the very heavy 7-mile Port Union-Scarboro bank of 1 in 100, which is followed by a similar drop into Toronto. It was taken manfully with the regulator two-thirds open and 40 per cent. cut-off. In this country I have seldom seen "full-regulator" short cut-off running indulged in, for technical reasons that have no place in this article. Deflector-plates beside the smoke-box certainly were not wanted here; the exhaust sounded deep, angry and harsh, shooting high above the chimney before reluctantly curling back over the train. The speed fell to 20 near the top, and she slipped once approaching it, for which she cannot be blamed, with the 950-ton train and booster out of action; it cannot be used at much over 12 m.p.h. But of course No. 5704 made the grade all right. We banged over the summit, and ran easily down the opposite side through the suburbs of Toronto, coming to a stand in the fine Union Station dead on time at 9.30 p.m.

"The International Limited" had covered the 334 miles from Montreal in 390 minutes, making eight stops, and had averaged 51.4 m.p.h. Very good work indeed, I think you will agree, with a load that began at 625 tons and ended at 950 tons.



The Short "Shetland"

Largest British Flying Boat

By John W. R. Taylor

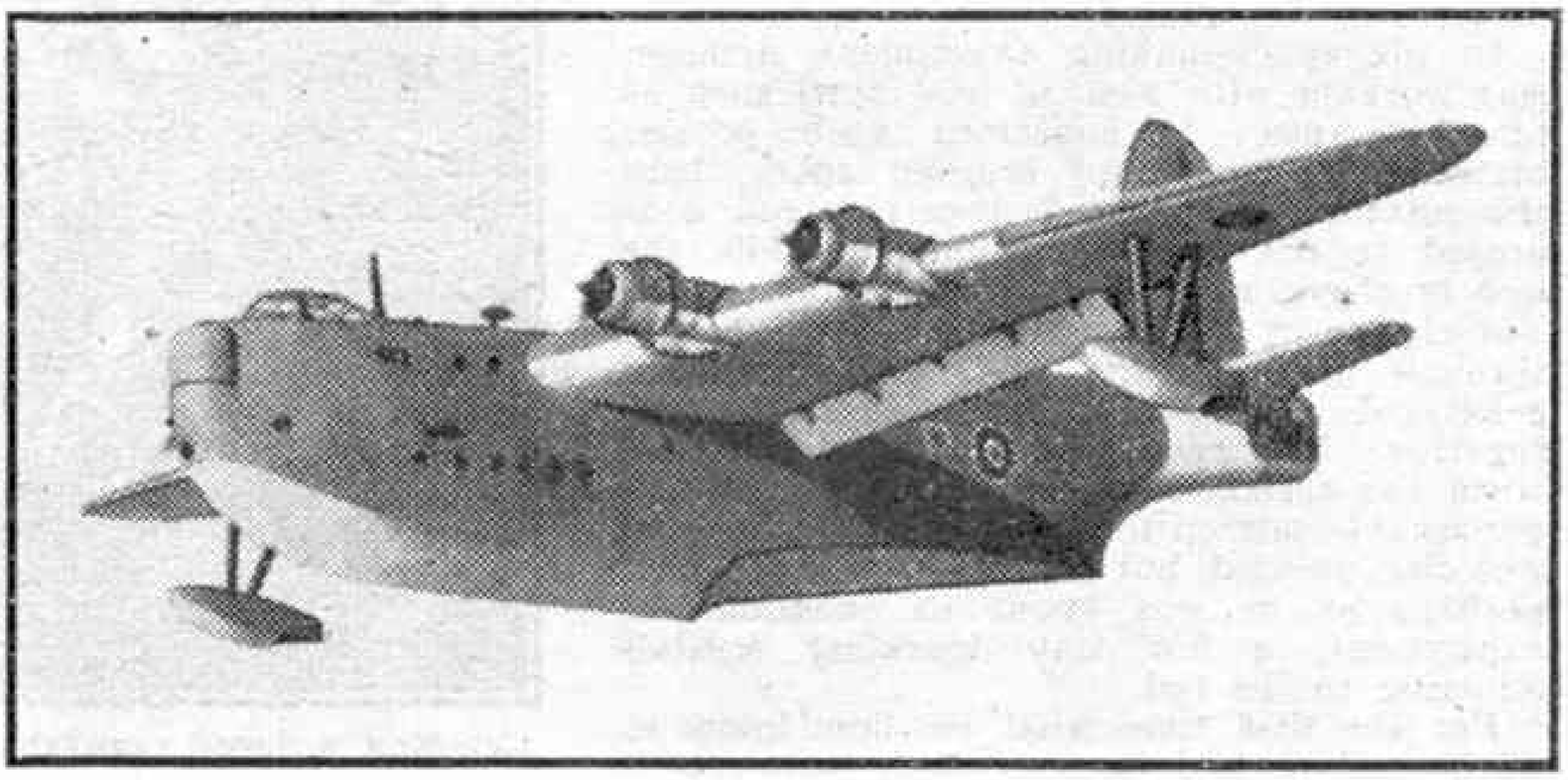
JUST as the name of "Hawker" is always associated with high-speed fighters and the name of "Handley-Page" with big, reliable air liners, so has the name "Short" become almost synonymous with "flying boat" in the British aircraft industry. Consequently, the announcement of a new Short flying boat—the "Shetland"—was certain to attract a good deal of interest at the present time, when attention is focussed on the aircraft being prepared in Britain and America for use on the post-war airlines.

The firm of Short Brothers has the distinction of being the oldest established aircraft company in the world, and in the last 37 years has made many notable contributions to aviation progress. For instance, in 1909 Short No. 2, piloted by the present Lord Brabazon, was the first all-British aeroplane to make a flight of one mile in a closed circuit. In the next year came the Short "Tandem-Twin," the world's first multi-engined aircraft. Then, from the Short factory at Rochester, came in 1912 the first aircraft fitted with folding wings, in 1915 the first aircraft to sink an enemy ship by torpedo, in 1920 the first British all-metal aeroplane, in 1924 the first all-metal flying boat, and, more recently, the "Stirling," the first of the R.A.F.'s four-motor monoplane bombers. The Empire and "Sunderland" flying boats have an unparalleled record of reliability and service, and have carried the flag of British air transport all over the world during the war years.

The "Shetland" certainly carries on the fine traditions of its famous forerunners. Quite apart from the fact that it is the largest British aircraft flying, its top speed of 267 m.p.h. makes it the world's fastest flying boat and it has a maximum range of no less than 4,650 miles—the distance from London to Bombay. It was originally designed, in co-operation with Saunders-Roe of Cowes, for long-range patrol and reconnaissance duties with the R.A.F., to succeed the "Sunderland"; consequently the prototype is fitted with fore and aft gun-turrets. But these are being removed, and production machines will have finely-streamlined hulls, bearing a distinct family likeness to the Empire boats.

The "Shetland" is a very impressive aeroplane with a wing span of 150 ft. and a loaded weight of 58 tons. Its four Bristol "Centaurus" engines give a combined power output of more than 10,000 h.p. A good idea of its size is given by the fact that the tip of its single fin is almost ten feet higher than the average house. But in spite of all this Short test-pilots, who have flown more than 5,000 miles in the "Shetland," are very enthusiastic about its handling qualities. The flight deck for the pilots, navigators, flight engineer and wireless-operator is very spacious and beautifully laid out, with the result that all knobs, dials, levers and "gadgets" needed to fly this great aeroplane seem to be in exactly the right place, and the large Perspex canopy gives an unrestricted horizontal field of vision through 360°.

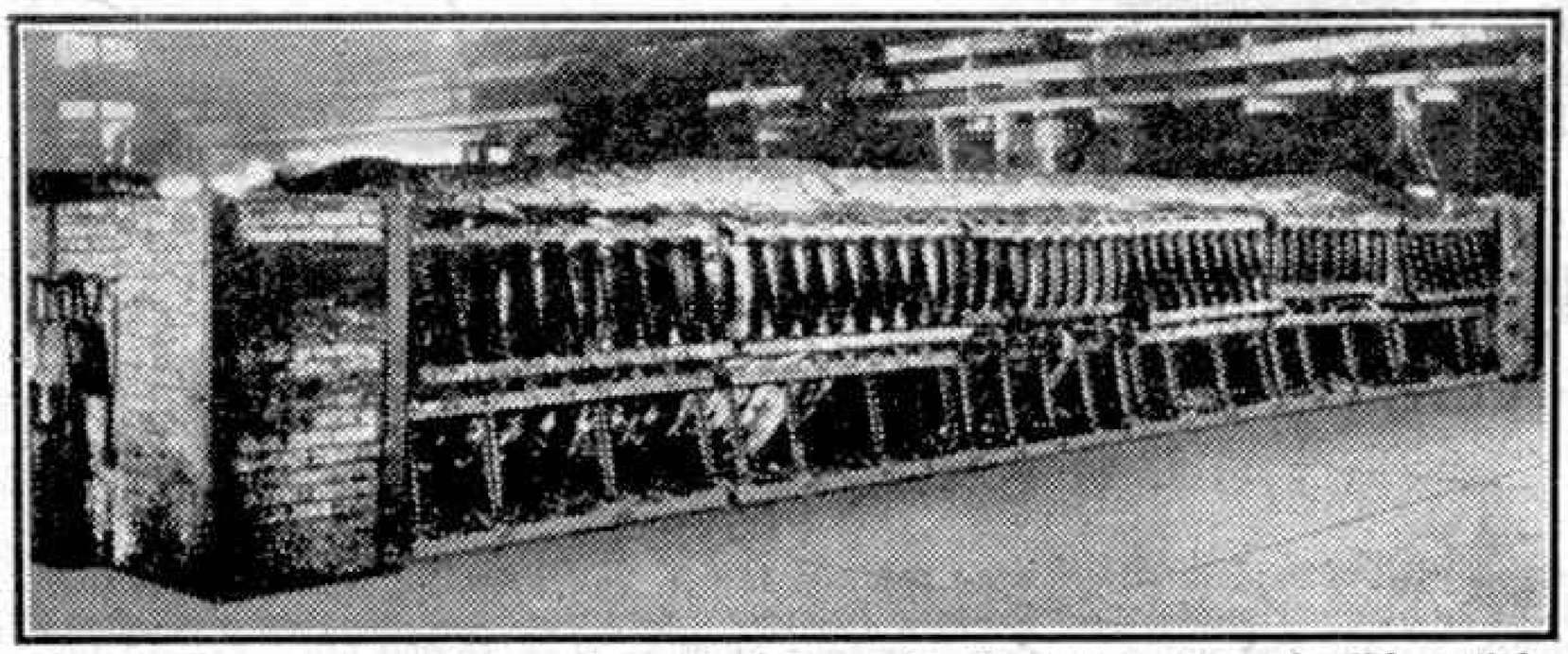
The passenger accommodation is no less spacious and well-planned, and up to 70 passengers can be carried in real comfort on the two decks. Normally, however, provision will be made for 40 day passengers and 24 sleepers. There are three main cabins on the lower deck, complete with dressing rooms and toilet facilities. On the upper deck is the dining saloon, a cocktail bar, kitchen and two mail or freight compartments. The "Shetland" opens up new possibilities on the Empire air routes, for it can carry a payload of 13½ tons for 2,076 miles at 188 m.p.h. Finally, for those who like comparisons, although its wing span is 50 ft. less than that of the Martin "Mars," the "Shetland's" loaded weight is only some 10,000 lbs. less than that of the American flying boat, and its maximum payload is approximately the same.



Another view of the Short "Shetland," Britain's largest flying boat.

The Romance of Carborundum

THE first four decades of the twentieth century have been marked by tremendous progress in science and engineering. Things little more than dreamed of 40 years ago are now commonplace, actual realities, playing their parts in the daily routine of laboratory and workshop.



Electric furnace in which carborundum is made. The illustrations to this article are reproduced by courtesy of the Carborundum Co. Ltd., Manchester.

The engineer of 1945, while fully appreciative of the benefits conferred upon him by the brains and ingenuity of man, has little time to ponder over the romantic stories of the tools he uses. Yet the realms of fiction can offer little to compare with the tales that could be told by the pioneers and inventors whose genius and patience banished drudgery and inefficiency from much of the old engineering practice.

Not very long ago the term "grinding" inferred a laborious process of wearing away surplus metal by holding the work in close contact with a "grindstone," a natural product, not always as efficient as might be desired. In those days grinding was not the universally advocated practice it is to-day, and bold would have been the engineer who prophesied that ere long miracles of engineering would be performed by this despised art. Yet marvellous things were to be achieved, and the new era in engineering came with the discovery of carbide of silicon—the Carborundum known in every country of the world where man lives and works.

In 1891 a man named Edward Goodrich Acheson was experimenting in his laboratory. It is said that his object was the goal that has fascinated men since the dawn of science—the creation of man-made diamonds. It may be so, but on that memorable day jewels of far greater value, at least to industry, were destined to be created.

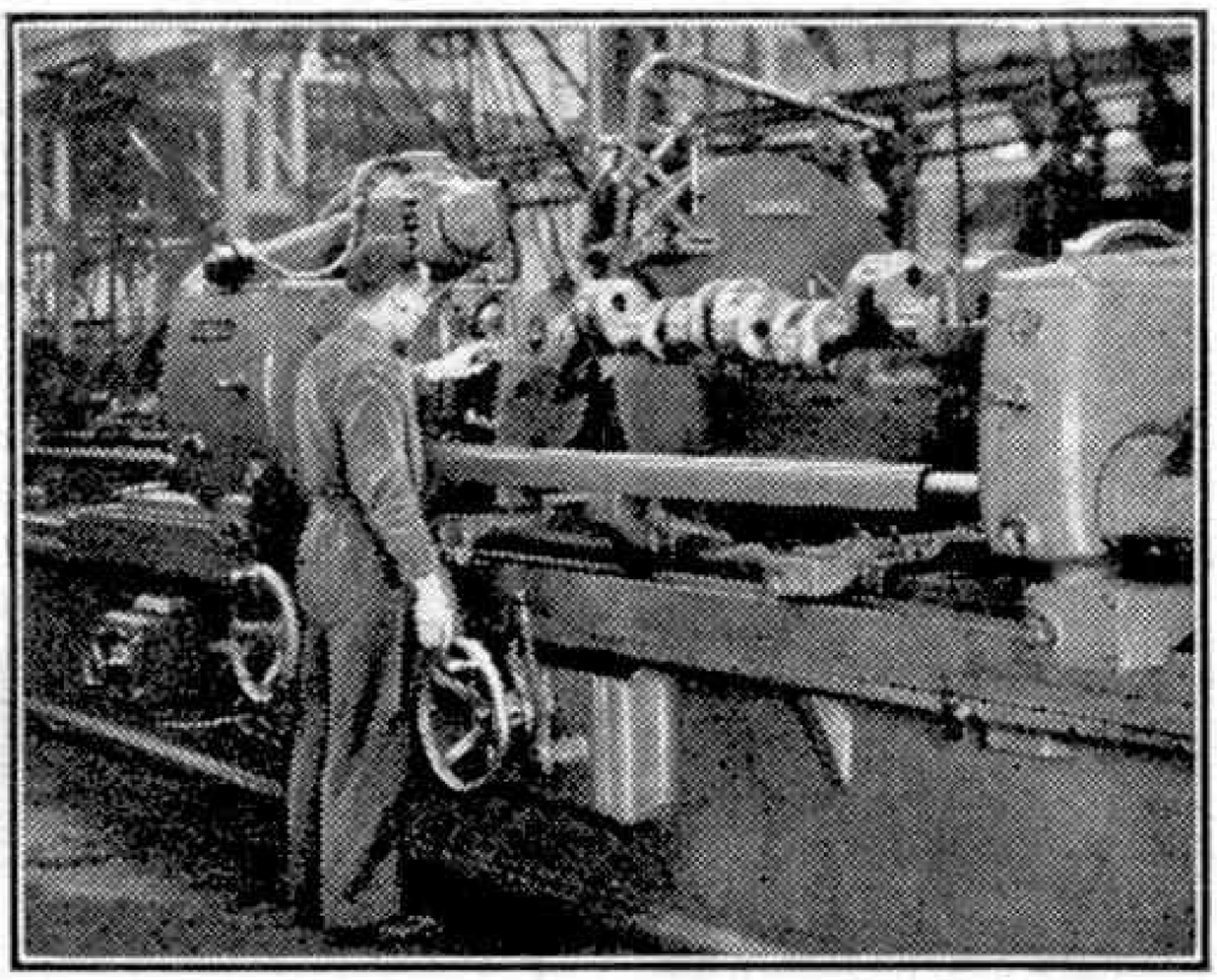
In his epoch-making experiment Acheson was working with a small iron bowl such as plumbers use. It contained such prosaic materials as clay and crushed coke. Into the mixture he plunged a carbon rod connected to his workshop dynamo, while the iron bowl was earthed to complete the circuit. The closing of a switch sent a current surging through the mixture, and the heat thus generated caused the ingredients to fuse together. Not very spectacular, and in fact when the carbon rod was withdrawn nothing remarkable seemed to have occurred. Acheson was disappointed, but his trained eye detected, perhaps as he was about to abandon the experiment, a few tiny sparkling crystals adhering to the rod.

For the first time what we now know as Carborundum had been created, although it is doubtful whether Acheson knew the nature of this new substance. A few simple tests would be sufficient to shatter his dreams of synthetic diamonds, although he found that the crystals were characterised by an amazing degree of diamond-like hardness. They actually cut glass, an operation previously possible only by means of the diamond itself. Acheson's brain worked quickly. It needed no long mental effort on his part to realise that he held the secret of the creation of a new and wonderful abrasive. These diamond-like crystals, beautiful to see, would cut glass. What would they not cut?

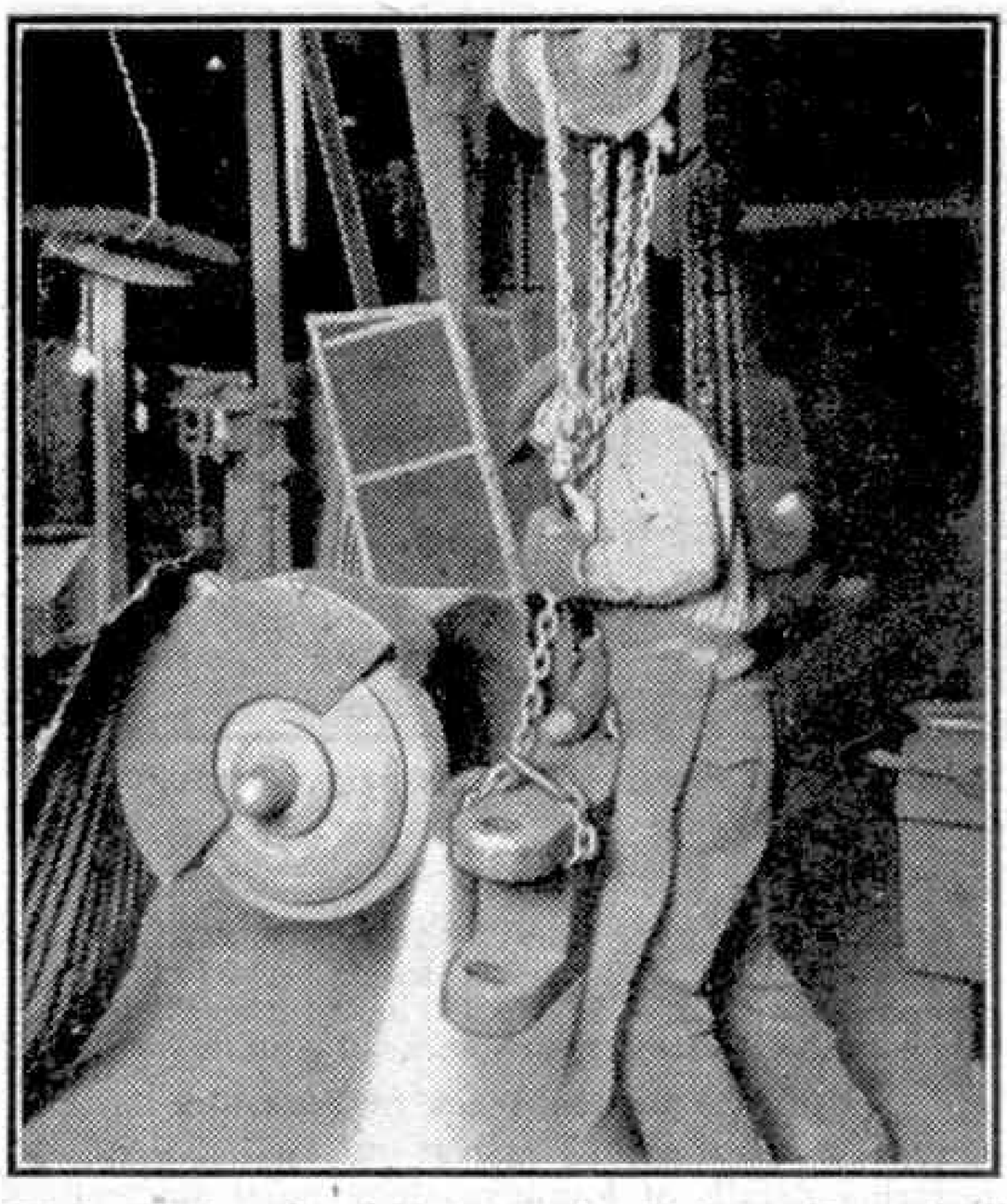
Acheson made more of the crystals, and found that by making certain changes he could increase his output. He collected enough of the crystals to fill a small phial, which he tucked away into his waistcoat pocket. So, carrying the world's entire supply of silicon carbide, he set out for the nearest big town. On the journey he coined a name for the substance—Carborundum.

The possibility of using it as a substitute for diamond dust had instantly occurred to him, and accordingly he interviewed several diamond experts. Diamond dust, then used for gem polishing, cost 3/- per carat, or more than £300 per lb. Acheson had carefully graded some of his Carborundum but the jewellers smiled sceptically; he persisted, and finally induced the diamond men to give his creation a trial. The results were successful, startlingly successful; and Acheson was given an order—the first in the world—for ten carats of Carborundum. The price was 1/8 a carat, or £183 per lb. Just imagine sprinkling the precious stuff on concrete floors for non-slip purposes at 2 lb. per sq. yard, a practice common enough to-day!

But what else was it good for? A close study of the properties of Carborundum revealed remarkable facts. It was intensely hard, intensely sharp, and



Grinding a large crankshaft by means of a Carborundum wheel.



High speed work. A fast running Carborundum wheel is being used to clean up a heavy casting.

infusible at any known heat. Obviously it was eminently suited for use not only as an abrasive, but as a refractory material too. But the world already used emery as an abrasive, and emery cost less than 2½d. per lb. It used fireclay as a refractory, and fireclay was dear at £5 per ton. Carborundum could only be used for purposes for which a fabulous price could be paid, and its use seemed confined to the precious stone trades. But the brain that created Carborundum was undaunted by obstacles such as these. A company was formed, and soon improved methods further increased the output. The limited market became glutted and the price came tumbling down until it reached 10d. per carat, or only £61 per lb.

To a small extent this broadened the market, but the magic crystals were being created at the rate of four ounces a day, and decided action became necessary.

It was found that valves could be ground in a fraction of the time taken by emery, and Carborundum was sold for this purpose at 45/- per lb. Purchasers kept a tin of it in the office safe and weighed out small quantities for the foreman on requisition. This new use for Carborundum quickly exhausted the stock and it became imperative to enlarge the plant. The company possessed an optimistic management, and an order for 10 lb. of their product was considered reason enough for further extensions. The price to the valve grinders became 4/- per lb., and the output 45 tons per year.

Then dentists heard about it, and began to drill offending molars with tiny wheels made from the new substance. They reduced the drilling time by two thirds. Surely this was worth the higher price, and at least the victims thought so. So the dentists acclaimed Carborundum and used it.

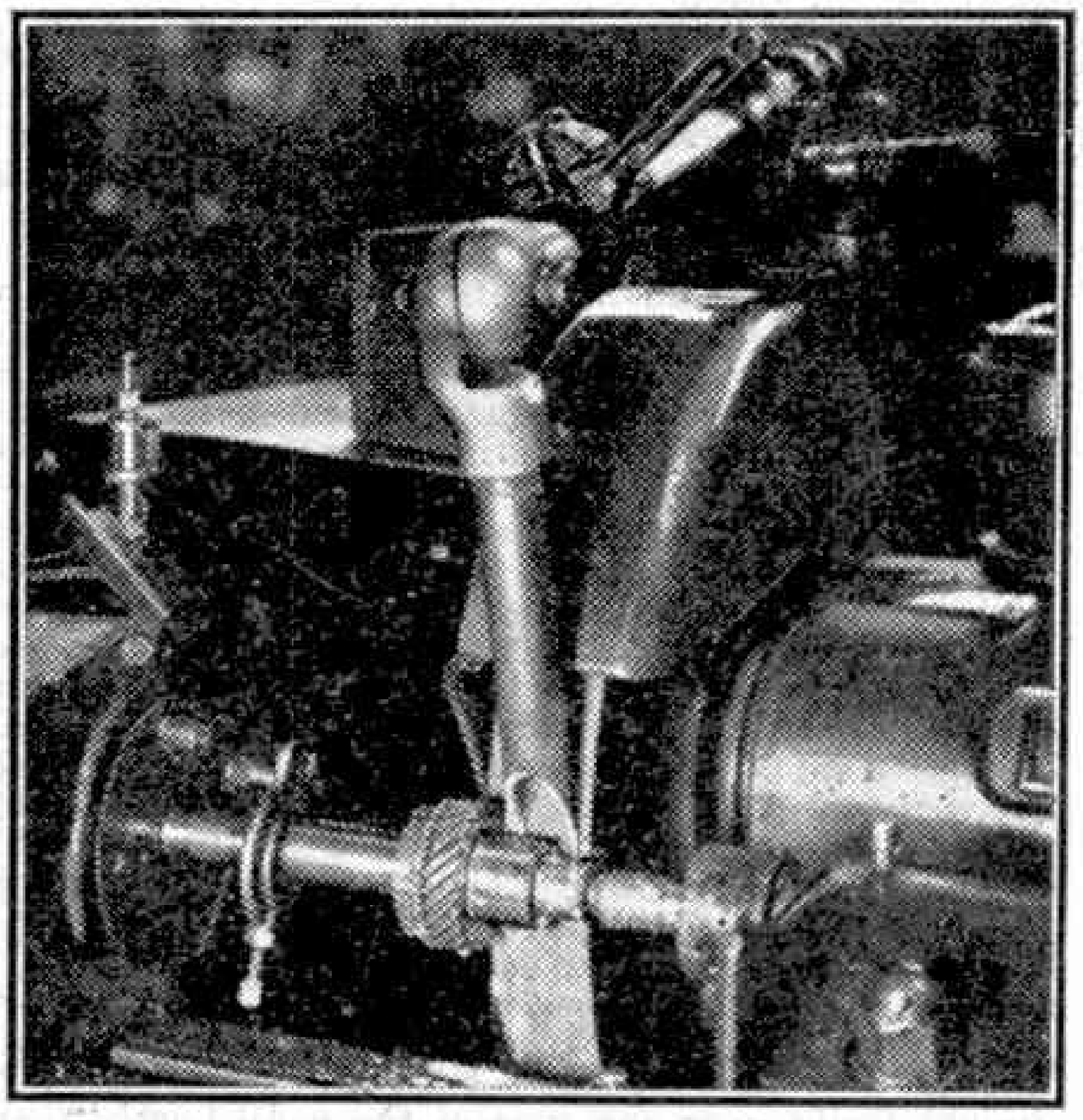
But the possibilities now seemed exhausted and the entire world was using only one half of the 45 ton output. And while the directors of The Carborundum Company were pondering this another body of men had succeeded in solving their own problem and the Falls of Niagara were harnessed. Just when cheap electricity was needed it came in sight, and the men who were struggling with the problem of what to do next with Carborundum saw new light. These optimists with their 45 tons per year, only one half of which they were selling, signed contracts with the electrical company to take sufficient power to make 900 tons. It was not even certain that the power contracted for could be delivered, yet these men borrowed the money to build a factory capable of turning out 40 times as much Carborundum as could be sold. The furnaces were started up in 1895 and Carborundum was produced in the new plant.

The directors began to look round for new markets. The problems that beset them must have been sufficient to deter the stoutest hearts, but not so these optimists. Their prospective clients had for years used natural abrasives and knew all about them. They bought them from long-established firms and were satisfied; Carborundum still cost many times the price of emery. But gradually the unknown company convinced an incredulous public of the value of their product, and with the increased demand came the decrease in the terrifying price.

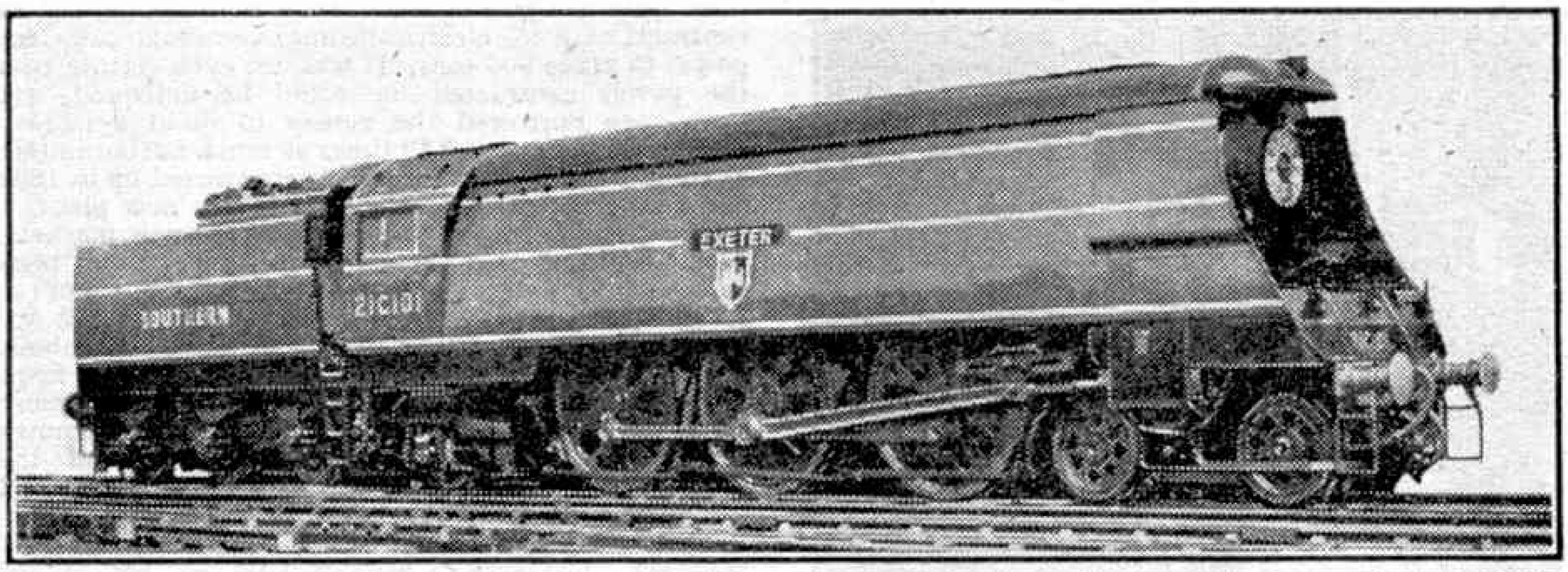
The first large scale invasion was on the granite polishers. The granite workers paid 2d. per lb. for emery and were staggered when quoted for the new abrasive. But the efficiency of Carborundum was eight times that of emery and now only three times the price, so Carborundum was used. Then the company began to make grinding wheels.

It is roughly estimated that, allowing for difference in thickness, diameter, arbor hole, shape, grit and degree of hardness, nearly a quarter of a million different varieties of wheels are required to meet the regular trade. By 1898 the sales of Carborundum had caught up with the amount of electricity originally contracted for, and another 1,000 h.p. was signed up. Since that date the ever-growing demand on the company's resources has necessitated tremendous extensions of the plant, and Carborundum is nowadays made in Canada also, from the power generated by the Shawinigan Falls in Quebec. This is the Carborundum that is shipped to England and to the great works of The Carborundum Company Limited, in Trafford Park, Manchester. Here the grains are made into the familiar grinding wheels, scythe stones, sharpening stones, and the many other Carborundum products in everyday use. Some day another story will be told of the tremendous contribution this remarkable material has made to the War effort, and that story will be worth reading.

The tiny crystals play their part in so many industries that a complete list would occupy as much space again. There is a grinding wheel 72 in. in diameter for grinding (*Continued on page 322*)



Grinding aero engine parts. The grinding wheel is seen behind the work.



S.R. No. 21C101 "Exeter," the first of the new "West Country" class described on this page. Photograph by courtesy of the Southern Railway.

Railway News

The Southern "West Country" Class

By courtesy of the S.R. we are able to illustrate and describe the new "West Country" 4–6–2 class now in course of production. These engines have been designed to work over the restricted routes west of Exeter, where the present 4–6–2 and 4–6–0 classes are not permitted owing to load limitations on bridges and track. The reduction in weight effected has been very largely achieved by the use of welding in the construction of engines and tenders.

The new locomotives are in almost every respect smaller editions of the now famous "Merchant Navy" class, as compared with which the weight on each driving axle has been reduced from 21 to 18¾ tons, the total weight of engine and tender from 142½ to 128½ tons, and the diameter of each of the three cylinders from 18 to 16½ in. The grate area is decreased from 48½ to 38½ sq. ft., the total combined heating surface from 3,273 to 2,667 sq. ft., and the tractive effort at 85 per cent. boiler pressure from 37,500 to 31,000 lb.

The "West Country" locomotives are a considerable advance upon anything hitherto seen along the Exeter to Plymouth or Ilfracombe routes, where for many years the working over steep gradients has been in the hands of 2–6–0 or 4–4–0 engines, some of which are becoming elderly.

Features common to both of the notable new "Pacific" classes designed by Mr. O. V. Bulleid, Chief Mechanical Engineer of the S.R., include the air smoothed external casing; Bulleid patent chain-driven valve gear, actuating all three piston valves from an inside position; "B.F.B." cast type wheel centres, clasp brakes, thermic syphon in fire-box; electric lighting; 6 ft. 2 in. driving wheels and boiler pressure of 280 lb. per sq. in. Special provision is made for the enginemen's comfort on the footplate in the way of seating and draught screens, and for easy observation when running forward or backward.

The "West Country" engines look smart in malachite green livery with yellow lining. Altogether 70 have been authorised, numbered from 21C 101 upward, and they will bear the names of cities, towns or villages in Wiltshire, Dorset, Devon or Cornwall. The first three to go into service are named "*Exeter*," "*Salisbury*" and "*Plymouth*." They have been designed to be as light as possible, yet powerful enough for the haulage of heavy passenger and freight trains over any part of the main lines. They are apparently within gauge for the narrow-tunnelled Hastings direct line of the Eastern Section, though it is doubtful if they could be turned at St. Leonards or Hastings, as the overall length is 67 ft. 5 in. compared with the 58 ft. 10 in. of the "Schools," which are well within the compass of a 60 ft. turntable.

Off the Beaten Track in Yorkshire

We are indebted to Mr. E. W. Petchey for interesting details of journeys along quiet single lines in South Yorkshire, including a trip over the privately owned Easingwold Railway, which is only 2½ miles long. It runs to the small town of Easingwold, starting from Alne, a country station on the East Coast main line about 11 miles north of York, near the half-way point at which the engine crews used to change by means of the corridor tender on the non-stop "*Flying Scotsman*," and where southbound speeds ruled high in normal times.

The train was headed by the line's only engine, No. 2, an 0–6–0 saddle tank built by Hudswell, Clark and Co. Ltd., in 1903. Behind this were a main line cattle wagon and the Easingwold Company's ex-N.E.R. ancient four-wheeled coach, boasting one first-class and two second-class compartments, as well as a section for guard and packages. There is no continuous braking system; the track is formed mostly of flat-bottomed rails and appeared to be considerably overgrown with grass and weeds. The other passengers were regular travellers for whom the driver waited if necessary, blowing his whistle meanwhile! The maximum number of advertised journeys per day at present is three each way; seven or more were operated in 1939, so the service may soon improve. This little railway was opened in 1891 and has always been confined to the short length from Alne.

Not far north of Alne two truly rural L.N.E.R. branches are reached by means of one of the junctions near Pilmoor. The longer one eastward runs along the foot of the Hambledon Hills by way of Ampleforth, Gilling and Helmsley up into fine moorland country at Pickering, where connection is made with the Scarborough, Malton and Whitby lines. No. 1755, a "G5" class ex-N.E.R. 0–4–4T, propelled the train, which consisted of a three bogie coach set, over the whole 33 miles from Alne to Pickering, presumably operating on the push-and-pull principle. Although through Scarborough services used the route in peacetime, this is just now a two-trains-a-day each way line. So is the Pilmoor-Knaresborough branch by way of Boroughbridge, except on Tuesdays and Saturdays. Along this line the trains work through to and from Harrogate. From Pilmoor the train of five coaches on a Saturday was well filled as it went along westward hauled by No. 1235 of the once famous N.E.R. 4–4–0 class "R," now L.N.E.R. class "D20" and in course of withdrawal. The track was not exactly in first-rate condition.

There are three intermediate stations but no

passing places in use on this 12-mile single line, and there are no signals of the normal type. For reasons of economy a few large diagonally painted and differently coloured warning or position indicator boards have been substituted for signals, with a smaller "station board" that presents a green indication for line clear and is operated by the man in charge of the station. The branch is worked on the single line "train staff and ticket" plan, with level crossings and sidings protected by the customary locking devices. There are several other entertaining L.N.E.R. branch lines in Yorkshire, many of the stations of which present fine floral displays.

Flat-Bottomed Track on British Main Lines

As mentioned by Mr. R. A. H. Weight in the first instalment of his "*A Railway Enthusiast Abroad*" articles last month, bull-headed rails have long been standard in this country, but a few experimental lengths of flat-bottomed track of the Continental type have been laid in by the L.M.S. and L.N.E.R. on main lines, so that further development in that direction may be noted here. We illustrated and described in the May 1944 "*M.M.*" a section of goods line with cross-overs just relaid with flat-bottomed rails on the G.N. section of the L.N.E.R., the location actually being Harringay. Mr. Weight asks us to make this point clear.

A New G.W.R. 4-6-0 Express Locomotive

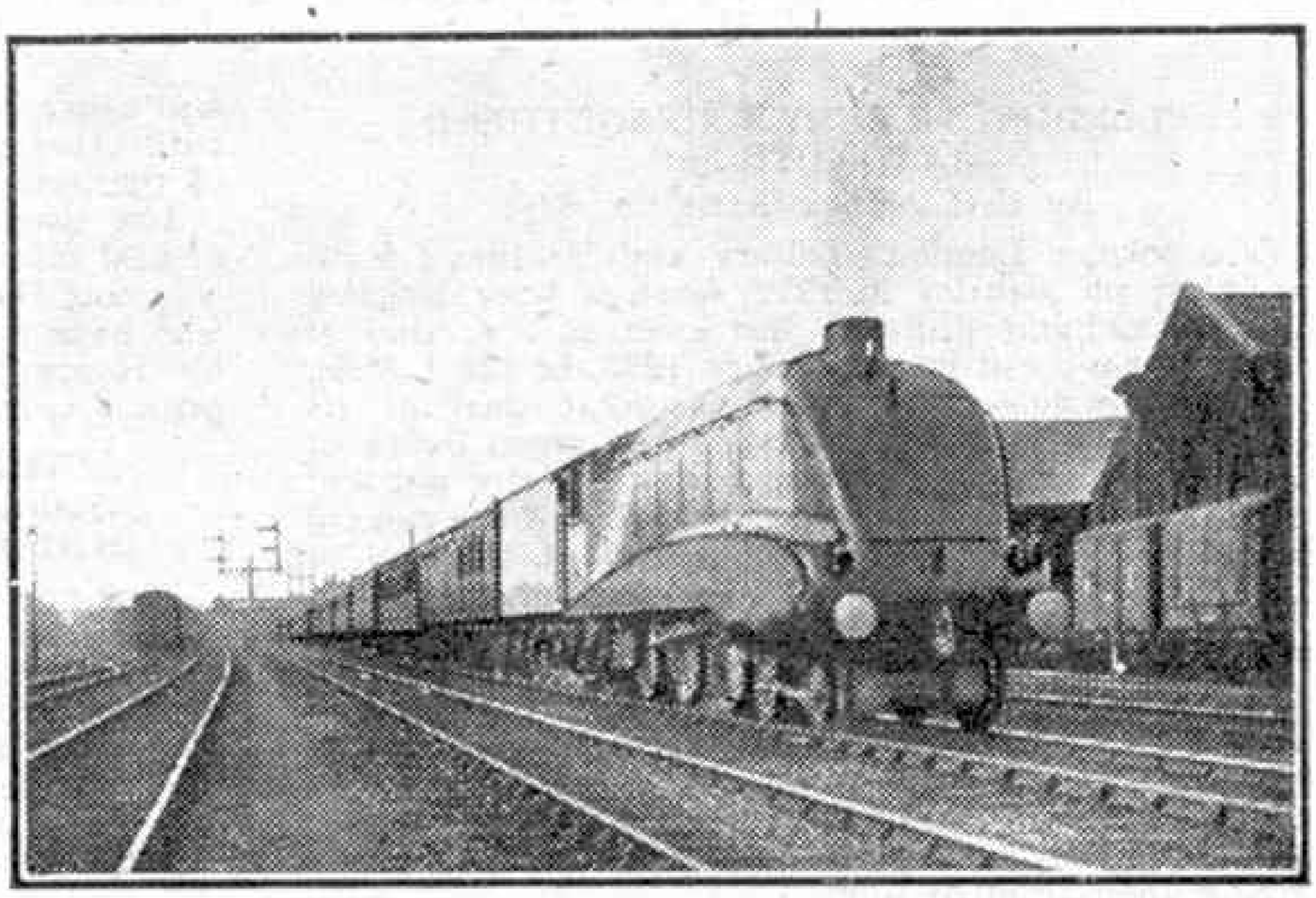
From Swindon Works there has emerged the first representative of a new intermediate 2 cyl. 4-6-0 express type; it is numbered 1000, painted and lined out in peacetime style. The boiler pressure is 280 lb. per sq. in., the highest yet employed on the G.W.R. Increased superheat is provided, as on the latest "Halls," the combined heating surface being 1,979 sq. ft., and the coupled wheels are 6 ft. 3 in. diameter. The tractive effort is 32,580 lb.

A novel feature is a double chimney and blastpipe, fitted experimentally though enclosed in a typical G.W.R. copper capped chimney casing.

L.N.E.R. Locomotive Notes

Cambridge shed long housed a stud of "B12" class 4–6–0 express engines of the standard type or as rebuilds that bore the brunt of the Great Eastern main line traffic for many years. Now it has not one of this class allocated to it. Instead there are nearly 20 "B17" or "Sandringham" 4–6–0s stationed there, in addition to two of the latest "Antelope" or "B1" class, which work Royal trains and other important services to and from King's Cross as well as Liverpool Street.

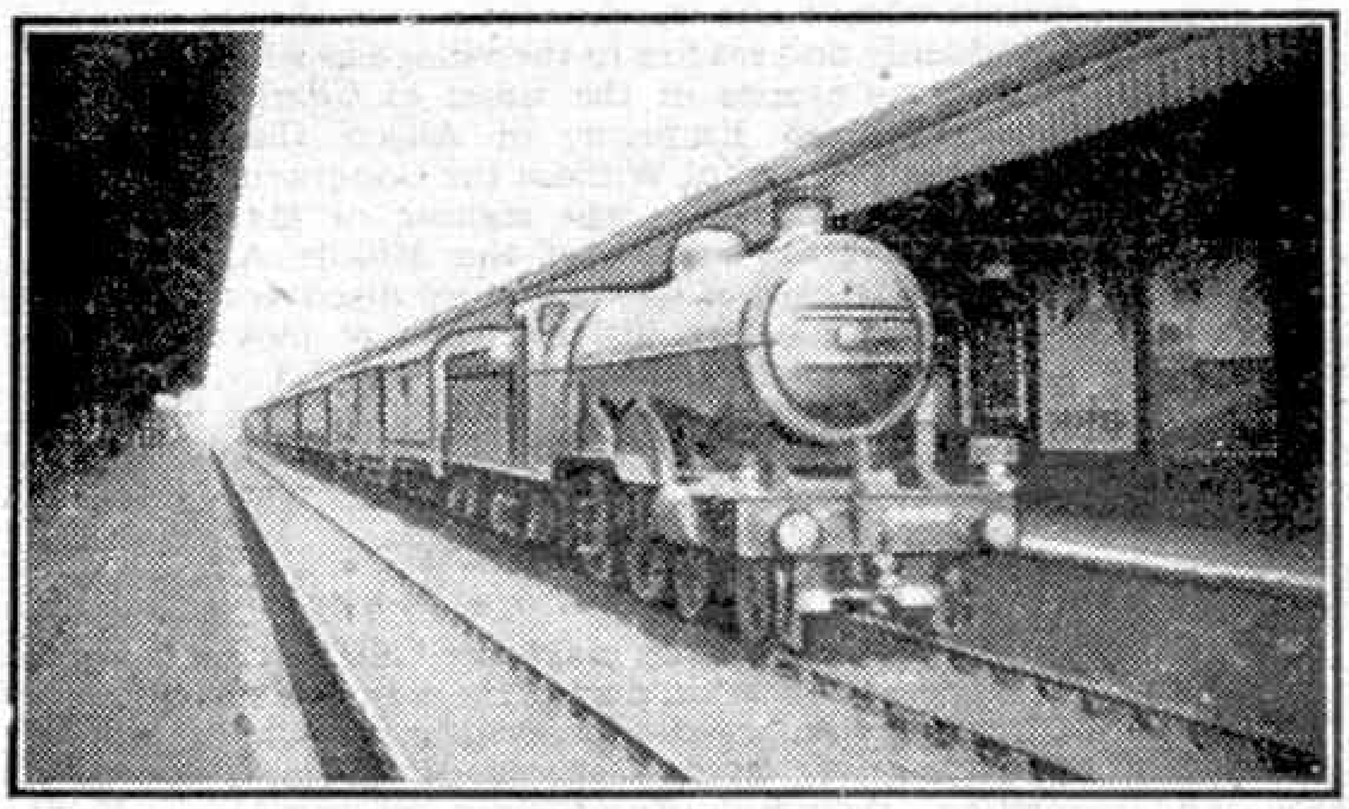
Most of the shunting in the extensive sidings that parallel public roads and quays at Great Yarmouth is operated by two "super-Sentinel" four-wheeled 3 ft. 2 in. locomotives numbered 8403–4, having high-pressure vertical boilers and controls at each end for either-way working. On occasion one of the distinctive ex-Great Eastern tram engines also appears. These locomotives were built specially for the Wisbech and Upwell Tramways, or the open quayside lines at East Anglian ports. The larger are class "J70" 0–6–0 tanks with outside cylinders and Walschaerts gear, and driving wheels 3 ft. 1 in. diam. The whole locomotive above the footplate is covered in by wooden casing, but the motion is now open to access. A bell is mounted on the roof and is rung to warn pedestrians and people working about the sidings of the engine's approach. In addition to this precaution, at Yarmouth a boy with a red flag walks or runs in front of the Sentinel or tram engine; he also alters the points in advance of the next movement.



Up express leaving Grantham, hauled by No. 2509 "Silver Link" in her original finish.

No. 206 is the first "K3" large 2–6–0 to be converted from 3-cyl. to 2-cyl., under Mr. Thompson's direction. The boiler pressure at the same time has been increased to 225 lb. per sq. in. It is understood that the experimental Nicholson thermic-syphon has been removed from "V4" 2–6–2 No. 3402, and that a normal fire-box like that on No. 3401 "*Bantam Cock*," the sister engine, has been substituted. The Gresley "Pacifics" with 180 lb. boiler pressure are now classified "A10" instead of "A1," presumably on account of a new 4–6–2 series to be introduced.

Further "Atlantics" withdrawn include G.N. class "C1" Nos. 3298, 4417, 3275, 3291, 4434, and 3299. The last four were among the minority that retained the original smaller 18½ in. cylinders and slide valves; those not modernised at the front end are, on the average, slower starters and not quite so good at maintaining high speeds over long distances with considerable loads, so that since 1927 they have not been rostered for the most important main line duties worked by "Atlantics" on the G.N. section, except in cases of emergency or traffic pressure. "C7" ex-N.E.R. 4-4-2 2205 is also scrapped; from the same section Nos. 1237-8 of the largest 4-4-0 class "D21" have gone.



L.N.E.R. No. 4442 the "Royal Atlantic" of the former Great Northern Railway, running into Finsbury Park Station.

BOOKS TO READ

Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members, and certain others that will be indicated, these should be ordered through a bookseller. We can supply copies to readers who are unable to place orders in this manner. Order from Book Department, Meccano Ltd., Binns Road, Liverpool 13, adding 6d. for postage.

"LONDON, TILBURY AND SOUTHEND LOCOMOTIVES"

By C. LANGLEY ALDRICH. 3/-

The former London, Tilbury and Southend Railway lost its identity in 1912, when it was absorbed by the Midland Railway, but even as a section of that railway, and latterly, since 1923, of the L.M.S., the line managed to retain a great deal of its characteristic individuality. The gay green livery of its engines has given way in turn to Derby red and black, but the heavy business services and the general operating characteristics remain and at the end of last year there were still 83 engines of "Tilbury" pattern in service.

In this readable and attractive booklet of 40 pages Mr. Aldrich presents a brief descriptive illustrated souvenir of L.T.S. locomotive types. There are four sections, of which the first deals with the 4–4–2 tanks, the most characteristic "Tilbury" engines, giving their original numbers, names, builders, dates and so on, with the renumberings carried out by the Midland and later by the L.M.S. In the next section similar details are given of the 0–6–2 goods tanks, the odd two 0–6–0 tender engines owned by the L.T.S., and the imposing but unfortunate "Baltic" or 4–6–4 tanks.

Various points of interest are next dealt with. The locomotive painting scheme is described and reference is made to the various gadgets that helped to give "Tilbury" engines their appearance. Finally we have the names of the Locomotive Superintendents and Chief Mechanical Engineers who have dictated the locomotive fortunes of the line, details of the various motive power depots, a useful summary of the locomotive stock and a ready-reference table for identifying engines, together with brief details of principal dimensions.

The booklet contains 14 excellent full page illustrations. It can be obtained direct from Mr. C. Langley Aldrich, 104, Grove Crescent, Kingsbury, London N.W.9, price 3/3 post free.

Owing to difficulties due to the war, it is impossible to guarantee prompt delivery of books ordered as described above.
Every effort, however, will be made to ensure speedy despatch.

"SHIPS' LIGHTS AT A GLANCE"
"SIGNALLING AT A GLANCE"

(Browne. 2/9 each)

The subjects of this notice are not books, but charts, each consisting of a circular card on which is a second, a little smaller, that can be turned round over it. In the upper of the two cards windows are cut so that diagrams, figures, etc. in certain positions on the lower card can be read, and round the outer edge of the lower card are the conditions to which this information applies.

The chart for "*Signalling at a Glance*" has letters and numbers round the outer edge of the lower card, and the required signals in Morse and semaphore are seen through the windows of the upper card when it is turned round so that the indicator points to the one concerned. In the case of the "*Ships' Lights at a Glance*" chart, designed by Mr. R. M. Richardson, Chief Officer, H.M.S. "*Worcester*," vessels of all types in various relative positions are marked on the rim of the lower card, and as the upper one is turned, coloured diagrams of the appropriate lights appear in the windows, with day signals, fog signals and other details. In each case the rules concerned, with other useful information, are given on the back of the card.

The two cards present a large amount of fundamental information in a very concise and interesting way, and they should be of the greatest value to those who have to learn that by heart. They are published by Henry Browne and Son Ltd., Barking, Essex, price 3/- each post free.

"THE BOOK OF MILES AIRCRAFT"

Edited by D. A. RUSSELL, M.I.Mech.E.
(Harborough Publishing Co. Ltd. 10/6 net)

This fine book is on the same lines as "*The Book of Westland Aircraft*" reviewed in our November 1944 issue. It tells the story of one of the younger but most progressive aircraft firms in this country, from the day in 1922 when F. G. Miles, an engineer, spent five shillings on a short flight in an old Avro 504 biplane and at once became an ardent enthusiast of flying, to the present time, when hundreds of Miles machines are in service with the Royal Air Force. This interesting account of the birth and development of the Miles company is lavishly illustrated.

The greater part of the book is devoted to a brief history of every type of aircraft produced by the company, with a short specification, two photographs and a page of 3-view scale drawings of each machine.

The book is published by The Harborough Publishing Co. Ltd., Allen House, Newark Street, Leicester, price 11/6 post free.

"THE CONQUEROR"

By MARGARET LEIGHTON (Harrap. 7/6 net)

Here are 12 stories of boys and girls who lived from 500 to 1,500 years ago. Each story is based on some exciting event or turning point in history, and in the tales we meet many great men and learn something of what they did. But the other characters in the stories, the young nobles, the peasant boys and girls of all classes, are just as real. We begin well with the escape of a boy who lived in Roman Britain when fierce warriors from over the sea swooped in suddenly and set fire to the village in which he lived. Then come stories of the times of Charlemagne, the great Frankish Emperor, of Alfred the Great, of the Norsemen and of William the Conqueror. Exciting tales of the Crusades, the signing of Magna Charta and other great events of the Middle Ages follow, and the boy hero of one fine story discovers the secret of Gutenberg before his invention of movable types was made known to the world.

Each story is introduced by a note that helps the reader to understand the times in which it is set. The illustrations are excellent.

"AIR REVIEW"

(Air Review Ltd. 3/- Bi-monthly)

The popular aviation magazine "*Air Review*," which suspended publication during the war, has re-appeared. It is greatly enlarged and lavishly illustrated, and its contents cover many aspects of military and civil aviation, including descriptions of machines, flight test reports, pages of 3-view drawings of aircraft, and reviews of recent aviation books.

Engineering Notes

Linking the Orkney Islands

An interesting engineering feat was carried out by the Admiralty to improve the anchorage in Scapa Flow, Orkney. At almost any time the race or tidal flow between the islands is very strong, and in bad weather communication is difficult if not impossible. These Scapa Flow islands are now joined to Mainland by a causeway that not only makes communication easy, but also has prevented any repetition of German submarine attacks such as that which brought about the destruction of the battleship "*Royal Oak*" in 1939. Now that the war is over the people living on these islands will find the causeway of great benefit.

In building the various sections of the causeway nearly 630,000 tons of rock were carried and dumped into the sea, and this work was then skirted with 5 ton and 10 ton concrete blocks, of which over 325,000 tons were used. These were dumped at random along the sides of the causeway.

An Important New Bridge Scheme

A scheme to replace with a high-level double-deck bridge the well-known transporter bridge that crosses the River Mersey and the Manchester Ship Canal between Runcorn and Widnes, is under consideration. The upper deck of the new bridge would link up with the main traffic route leading through Widnes and Runcorn respectively, while the lower one would carry local traffic only. Each deck would accommodate dual carriageways and cycle tracks. It is estimated that the cost of the work at pre-war prices would be over £2,000,000.

A Sea Wave Controller

Among the exhibits at a War Exhibition arranged by the Dunlop Rubber Company Ltd., was a device known as a pneumatic sea wave controller, which was produced for the Admiralty. It consists of a concrete keel, 8 ft. in diameter and 200 ft. long. Attached to this are four air chambers made from flexible rubber material, and arranged one inside another. Each chamber has a capacity of 7,000 cub. ft., and the complete device is placed broadside to the advancing waves.

The air pressure inside the four chambers increases at a constant rate from 1 lb. in the outermost covering to 4 lb. in the fourth or innermost chamber. As each wave reaches the device it first bends over the outer covering, then the second, and so on. The effect of the gradually increasing resistance tends to reduce the height of the waves and is sufficient to lower a 6 ft. high wave to a height of 1 ft. The device proved very successful and was used in certain landing operations during the European War.

Thin Plastic Sound Records

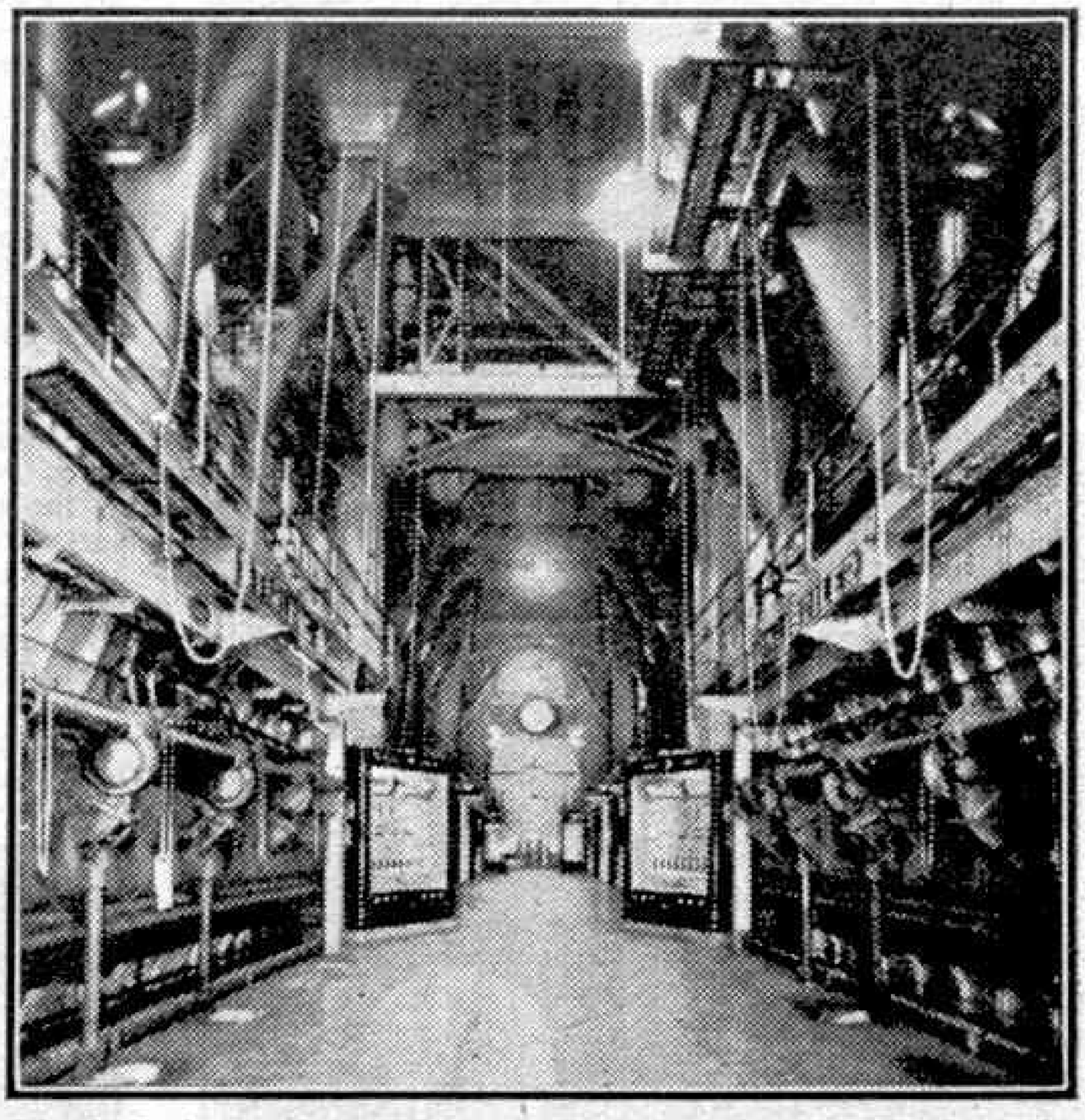
A wartime development in the United States is a very thin sound record made from plastic sheets. The record is only 7 in. in diameter, but each side of it will record about 15 minutes of dictated speech. Although the record is very light and can be posted in an envelope at ordinary postage rates, it is sufficiently tough to be bent, rolled, dropped and even written on with a pencil, without damage to the sound track. A pile of about 100 records has a total thickness of approximately one inch, and they can be stored indefinitely without risk of warping.

Records of this kind have been used by the American Army and Navy in special communication work during the war, and by hospitals and radio stations. Each record can be played back at least 100 times before its sound track wears out.

Russia's New Helio Boilers

The Russians are building a solar heat boiler plant, in which the Sun's heat will be used to generate steam. The work is being carried out by the U.S.S.R. Academy of Sciences in Tashkent, which is in a region that enjoys sunshine for three-quarters of the year. The Sun's heat will be collected by a giant parabolic reflector over 30 ft. in diameter, which will reflect and focus it on to a boiler situated above. The boiler is designed to produce about 250 lb. of steam an hour.

Meanwhile another boiler has been designed having a capacity over twice as great as the Tashkent boiler and will be built as soon as circumstances permit.



The boilerhouse firing aisle of The Fulham Power Station. An article describing the station appears on page 290 of this issue. Photograph by courtesy of James Howden and Co. (Land) Ltd.

A New Type of Life-Boat

The first of a new type of motor life-boat designed by the Royal National Life-boat Institution has recently undergone trials. The new boat is the first of the class known as the light Liverpool type to have two engines and twin screws. A similar boat was nearly completed when Cowes was bombed in May 1942, when with two other life-boats she was destroyed. The new boat is 35 ft. 6 in. long with a beam of 10 ft. 8 in., and weighs 8¼ tons. To make her more stable she is provided with tanks, which are filled with half a ton of water after she has been launched. Her two engines are of 18 h.p. each and give her a speed of 7½ knots. They are designed to be watertight, and even if the engine-room were flooded they would continue to work. The boat carries a crew of seven and can take 30 people on board in rough weather. She is a gift to the life-boat service from Devon, having been built out of a legacy from the late Mr. Arthur Cecil Paine, of Torquay.

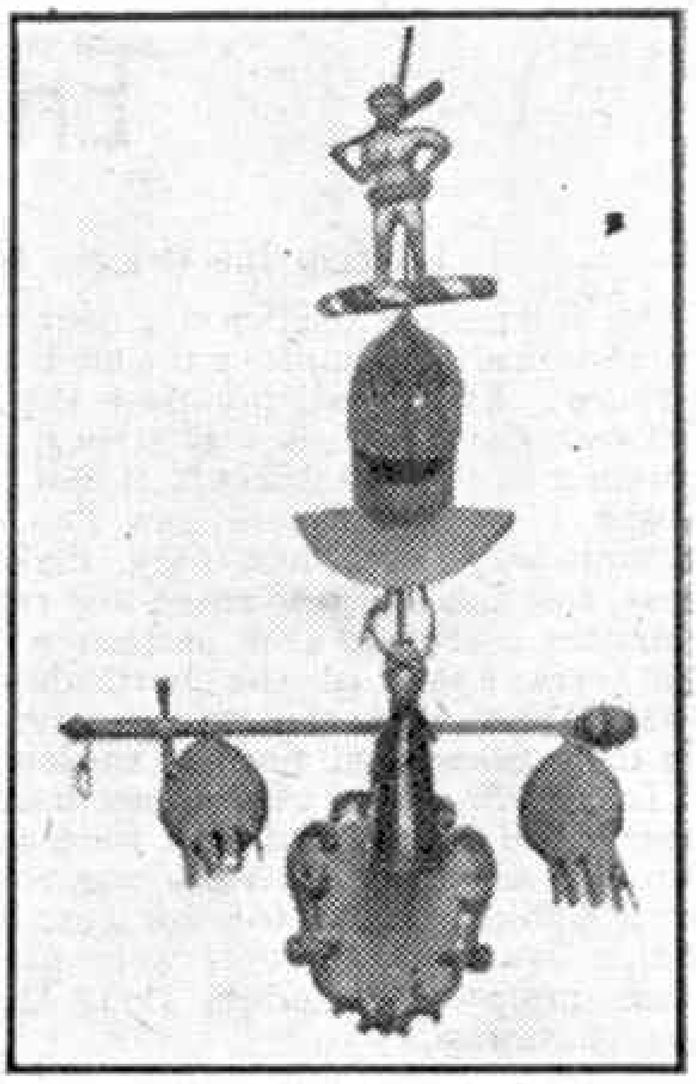
Photography

Pages from the Album

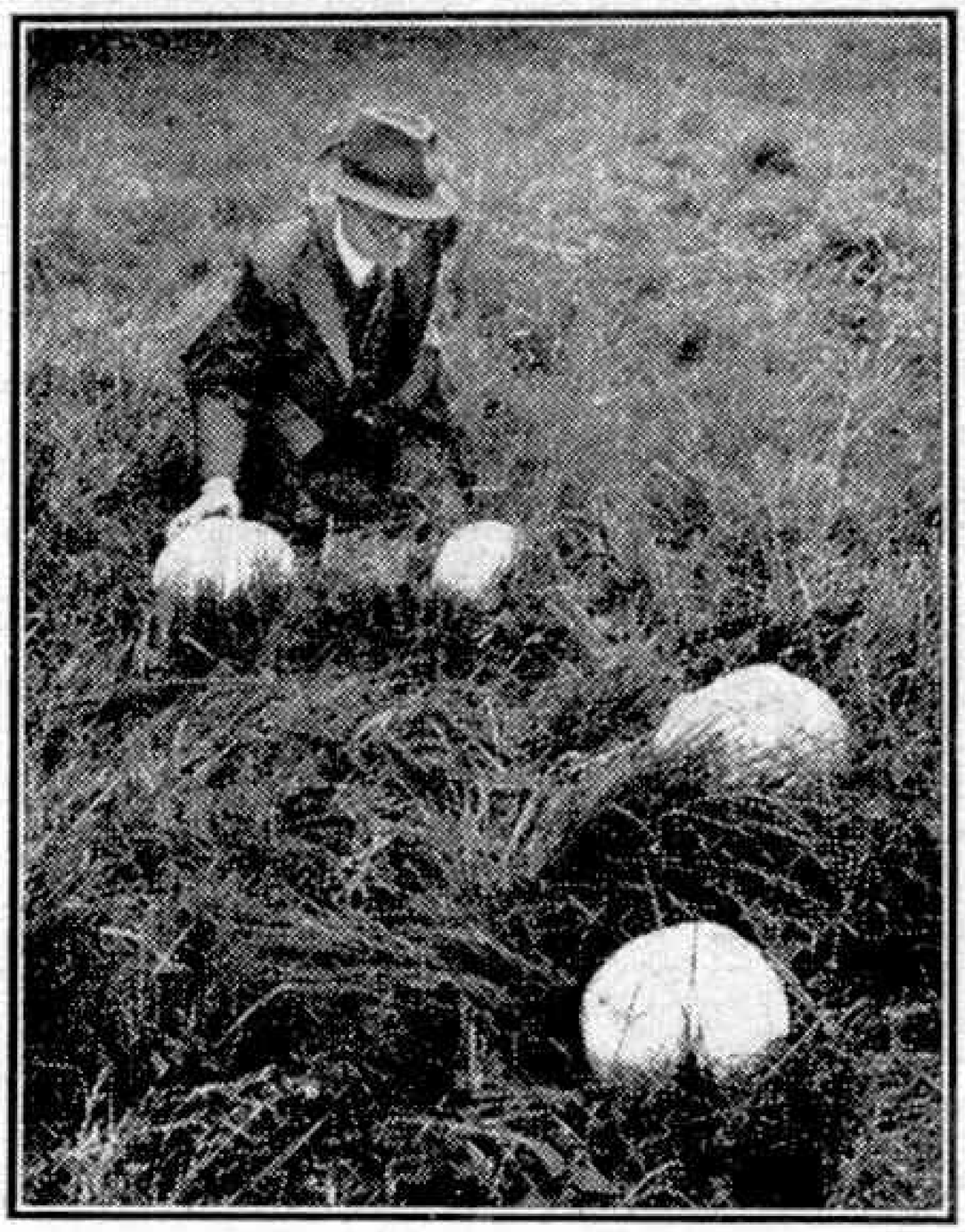
By E. E. Steele

ONE of the many pleasant things about this grand hobby of photography is the happy memories recalled when you turn over the leaves of your album of prints.

On this page, for instance, is a print taken in the small church of Stainfield, showing the supposed clothes and armour of the terrible "Wild Man" of Stainfield. My friend and I visited this little church last year. We made our way through the park along a little byway and entered the church, remembering the legend of the "Wild Man." There, on the wall, the curious armour was hanging, surmounted by an effigy of the "Wild Man" holding his cudgel. I set up my tripod and made a couple of exposures, although the lighting was very poor.



Effigy and Relics of "Wild Man" in Stainfield Church, Lincs.



Giant Puff-Balls.

Stainfield was the home of the Tyrwhitt-Drake family, and the old story goes that the "Wild Man" frequented the woods, killing and plundering, and all were afraid to venture near for fear of their lives. It is said that Sir Francis Drake came to Stainfield with the avowed intention of despatching the monster. Making his way deep into the woods, he was attracted to the lair of the "Wild Man" by the screeching of a magpie that the "Wild Man" kept to warn him of the approach of human beings. The "Wild Man," hearing the cries, hurriedly left his den and engaged in a terrific battle with Sir Francis, but was overpowered and slain, and the countryside freed from his terror.

Idly turning over another page we notice this little wild rabbit. Although wild, his parents thought fit to build their burrow in the garden, where they often sample the lettuce and other tasty things; and so the little rabbit came into the world one cold day in early Spring. The burrow was concealed under a small pile of rubbish, and when it was discovered the little rabbit had grown his fur coat, and was already making small excursions outside the hole.

I remember carefully removing the rubbish to expose the entrance, setting up the camera just in front of the opening, and then waiting for baby rabbit to appear. At length he popped out his nose and surveyed with some doubt the strange mountain outside his home. When he became convinced that it was a mountain, and not some huge monster waiting to devour him, he boldly came out and posed quite nicely, until the click of the shutter sent him dashing back to safety.

Turn the page over again, and here are more holiday photographs. This one of Giant Puff-Balls is interesting. We were cycling along pleasant country lanes when we noticed some large white objects in the meadow. We got off to investigate and were surprised to find Giant Puff-Balls. Some of these attain up to a foot or more in diameter, and weigh many pounds. As they were rather scattered we rearranged them a little, and my friend posed beside them to give them scale while I made the exposure.

Now that you have turned over with me one or two pages of my album I am sure you will be keen to make albums of your own photographs.

Young wild rabbit.

The Cleaning of Locomotives

By "Shed Superintendent"

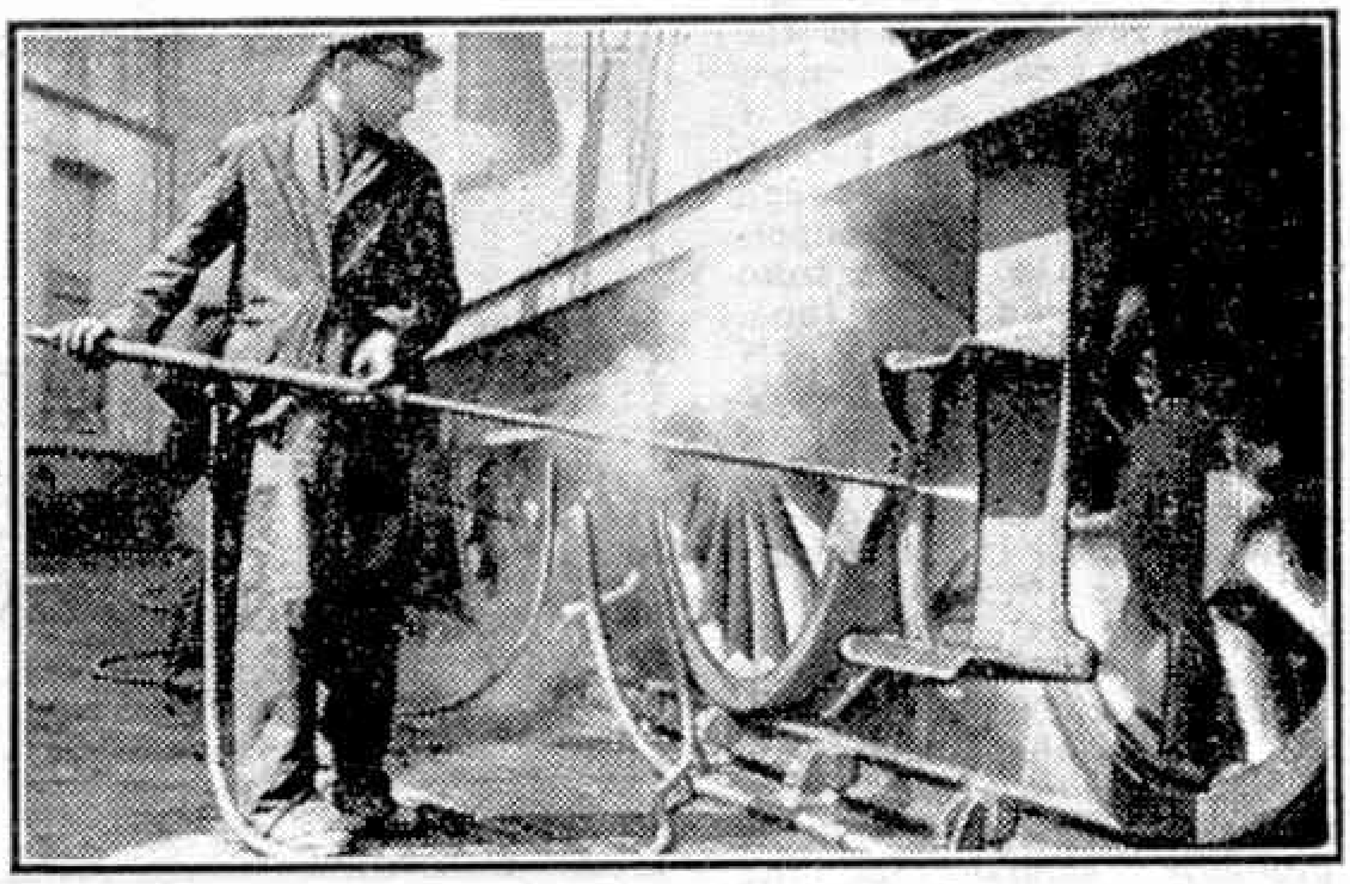
ELDERLY enginemen are prone to recall with pride the days gone by. Forty years ago it was the rule and fashion for engines to have glossy paint and bright steel. How was it done?

Before leaving the Workshops in those days, engines would stand in the paintshops for weeks while nine or more coats of paint and varnish were applied, and quick drying paints were not in use. In the Running Sheds every engine was given a daily wipe down, and a scrupulous clean each week on "Shed" day, when the driver and fireman allocated to a particular engine would spend the day doing jobs on it, as a change from working trains. Woe betide the cleaners of those days who failed to satisfy the drivers. Clean engines were an inspiration to the staff, although costly in time and materials.

With new operating methods in the intervening years, engines have ceased to enjoy such luxurious treatment. During this war engines have collected the dust and dirt faster than it could be removed by the few available cleaners, and an appeal for volunteer cleaners met with a splendid response. No doubt some *"M.M."* readers now know just how filthy an engine can become!

Plans are now being made to return to better conditions. One of the devices coming into general use in Running Sheds is the spray gun, shown in the upper illustration. This delivers a jet of high-pressure steam and water which will remove grease and dirt, however thick, in a few seconds. It can be used on all parts except open paintwork, which would be liable to suffer under such treatment. Paintwork is now treated with a light mineral oil, but this tends to dry with a dull finish, especially on warm boilers, and, when supplies permit, a petroleum jelly will be used, or other greasy polish, to secure a good gloss finish.

Designers have also been studying the cleaning problems and future engines will be easier to clean. The new "Merchant Navy" class on the Southern Railway, for instance, has clean lines and total enclosure of almost all the working parts, which makes these engines very much easier to clean than the older engines. The only difficulty with streamlined engines is that, as there are no running-boards, cleaners must use ladders or trestles to clean the boiler.



Engine cleaning with Spray Gun.

Engine 1790, "U" Class, Southern Railway being cleaned.

Of course many engines are running about in wartime livery, painted black, and these will continue in service until they become due for high-mileage general repairs, so that it will be a year or two before a better standard of painting can become general. Just prior to the war experiments were made with special enamels, not always in the traditional colours, and we may expect colour scheme surprises.

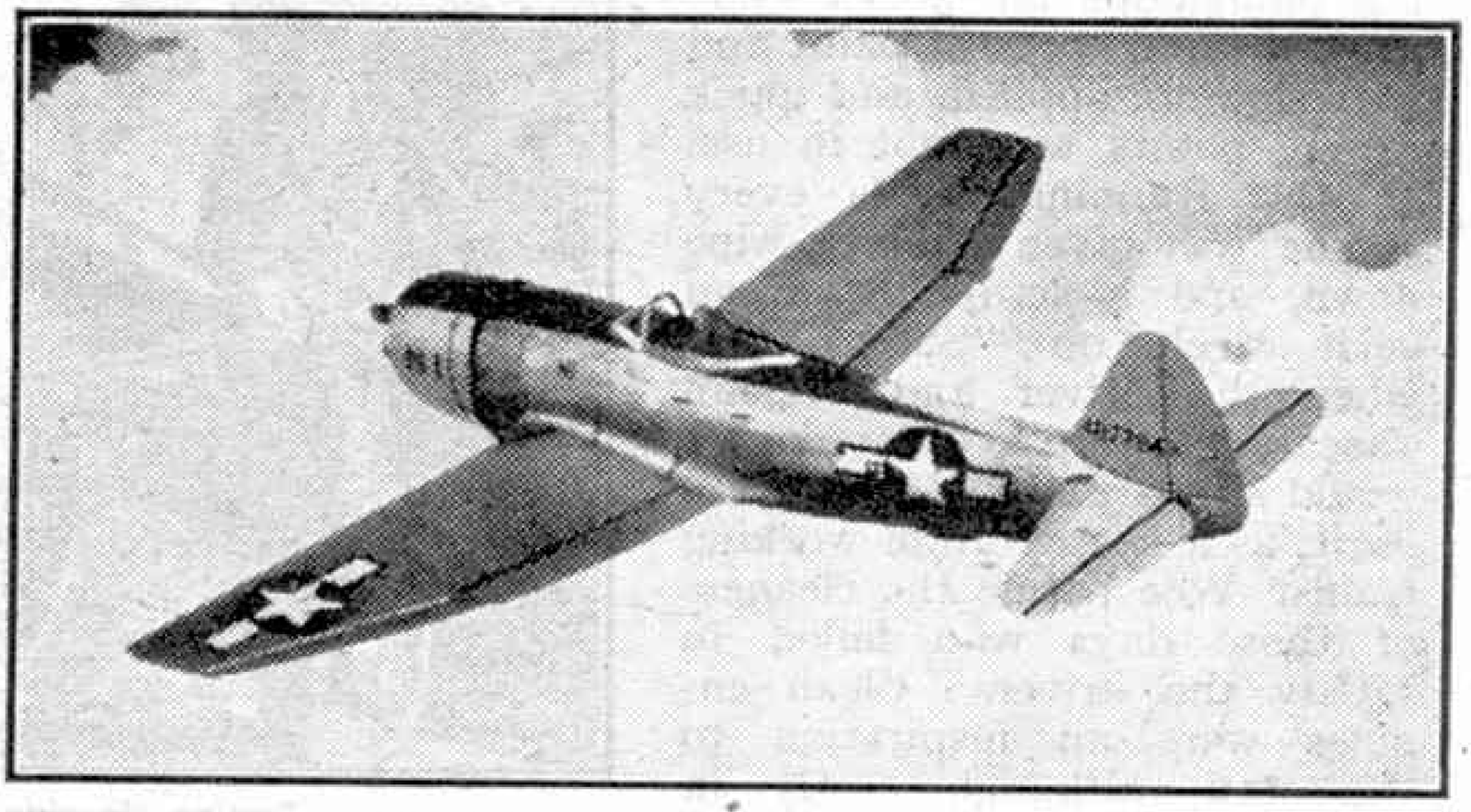
Air News

An Improved "Thunderbolt"

Both plants of the Republic Aviation Corporation, U.S.A., are turning over to the production of a new and improved version of the "Thunderbolt," which is coming into squadron service in considerable numbers and is shown in the upper photograph on this page. Known as the P-47N, this version has a re-designed wing of greater area, somewhat similar to the elliptical wing of earlier versions but with "clipped" tips. Additional internal fuel tankage in the wings gives the new "Thunderbolt" a combat radius of more than 1,000 miles, which was quite enough to enable it to escort "Superfortresses" over Tokyo from advance bases on Iwo Jima.

Fully loaded the P-47N weighs around 10 tons, which is "a lot of aeroplane for one man to manage" but apparently it is quite manœuvrable. Its armament is certainly formidable, as in addition to eight .50 in. machine-guns it can carry ten 5-in. rockets and two 500 lb. bombs. The guns are sighted by means of a new compensating sight, probably similar to the British Mark IID gyro-sight, which ensures deadly accuracy. The latest and most powerful "Double-Wasp" engine is fitted, which gives the "Thunderbolt" a speed in the region of 450 m.p.h.

J.W.R.T.



The improved Republic "Thunderbolt" fighter-dive bomber described on this page. Photograph by courtesy of Republic Aviation Corporation, U.S.A.

England to Australia in 63 Hours

British Overseas Airways have speeded up their record "Lancastrian" air service to Australia to reach Sydney in 63 hrs., clipping 9 hrs. off the previous schedule. This 12,000-mile service, inaugurated on 31st May last to serve the needs of the war in the Far East, is the fastest and longest air route in the world. It calls at Lydda (Palestine) and Karachi, where crews of Qantas Empire Airways, B.O.A.C.'s Australian associate, take over and fly the aircraft to Sydney. The number of flights also has been increased from one to two a week in each direction.

On the 16th July last British Overseas Airways began a fast service to India with "York" aircraft, which reach Karachi in 31 hrs. as against about 33 hrs. by the other flying boat and landplane services.

With these additions B.O.A. are flying over 150 services a week throughout the world, and of these 74 a week arrive and depart from the main landplane base in this country at Hurn, near Bournemouth, and from Poole Harbour, a few miles away. From these two bases services operate to West Africa, Egypt, India, Australia, and the U.S.A. From Hurn there are now 14 landplane services a week in each direction to Egypt and three a week to India. Hurn is also the base for the "Lancastrian" service to Australia, and for the twice-weekly service to West Africa and the routes to Lisbon and Madrid. From Poole there are six flying boats a week to India via Egypt, and four to Baltimore, U.S.A.

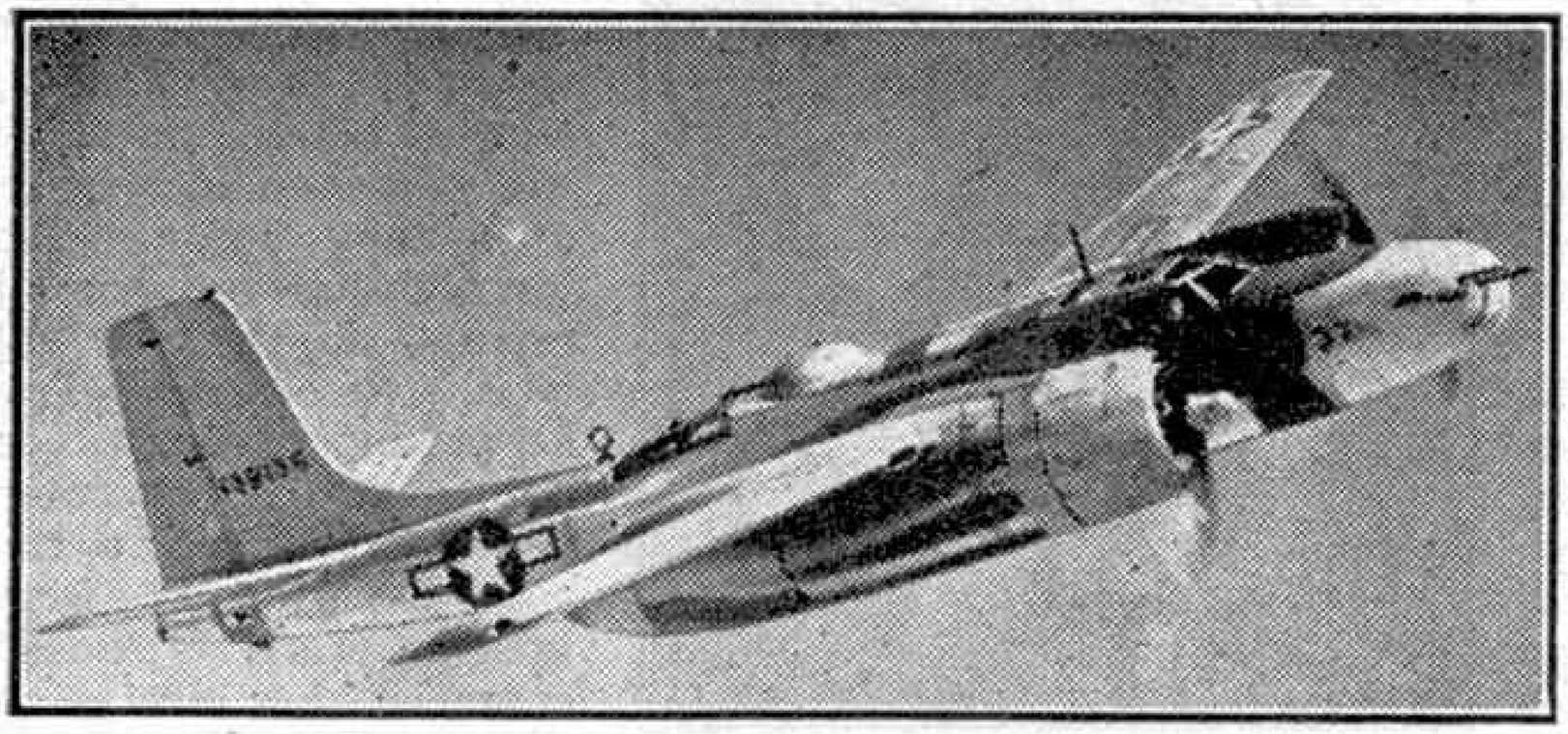
In addition to these routes British Overseas Airways operate a daily service between Prestwick, Scotland, and Montreal, Canada, in each direction. From Cairo the Corporation fly services to East and South Africa, India, Turkey, Persia, Abyssinia, Aden and the Persian Gulf.

Tasman Empire Airways Progress

Three flights in each direction a week are now made on the trans-Tasman flying boat service between Auckland, New Zealand, and Sydney, Australia, a distance of 1,340 miles. This service is operated by Tasman Empire Airways, of New Zealand, and since it began in April 1940 a total of 14,899 passengers, 601,089 lb. of air mail and 225,366 lb. of freight and excess baggage have been carried. A thousand crossings of the Tasman Sea have been accomplished by the company's flying boats without injury to any passenger or member of a crew, and without any loss of mail or freight—a fine record.

* * * *

A national airport is to be constructed at Reunion, on the South coast of Natal, with three concrete runways, the longest of which will be 2,333 yds., and 66 yds. wide. The other two runways will be 1,600 yds. long and 50 yds. wide. The airport will have full refuelling and repair facilities, and it is estimated that it will cost about £4,000,000.



Douglas A-26 "Invader," fastest American bomber. Its armament ranges from 50-calibre machine-guns to 75 mm. cannon, and it is equipped with remotely-controlled gun turrets.

The Miles M.38 "Messenger," Britain's latest light aeroplane. It was originally designed for specialised war duties, and is a 3-4 seat machine.

The Miles "Messenger"

The new Miles "Messenger," illustrated on this page, seems to be everybody's dream of a post-war light aeroplane come true, as it has a first-rate performance and is of robust construction in addition to being almost foolproof. It is a three or four-seater low wing monoplane designed by Mr. George Miles, can take off and land in only 60 yds. in a 5 m.p.h. wind, and can climb very steeply. In fact, carrying three people and 390 lb. of luggage it can clear a height of 50 ft. in a distance of 138 yards. It has a top speed of 120 m.p.h. and the amazingly low stalling speed of 28 m.p.h. The one-piece wing has a span of 36 ft. 2 in. and an area of 191 sq. ft., and the machine has a loaded weight of 2,400 lb.

Much of the credit for the high performance must go to its 140 h.p. de Havilland "Gipsy Major" engine, combined with careful design to a very rigid specification. The original requirements for which the "Messenger" was designed fortunately ensured that it would be an ideal aircraft for the private owner. It was intended for wartime use from small, unprepared landing strips, often surrounded by trees and other obstacles. So it had to be easy to fly, to have an unrestricted view in all directions and to be capable of operation in all weather conditions, carrying a crew of two, complete with parachutes, a large radio transmitter/receiving set, armour protection and other military equipment.

Having seen the prototype, the Army and R.A.F. were convinced of the suitability of the "Messenger" for the difficult tasks they had in mind, and it was put into production. Miles' own confidence in their new aeroplane was shown by a series of unrehearsed trials they staged for the benefit of the Minister of Aircraft Production, then Sir Stafford Cripps, and some of his officials. First of all the "Messenger" was flown with no less than six people packed into its cabin, and in spite of the great overload it took off in only eight seconds. Then it was flown into a vertical net, the whole impact being taken by the wings before the aircraft dropped to the ground. No damage of any kind was sustained. It was also catapulted off a trolley by powerful rockets intended for assisting the take-off of much heavier machines. Still no damage was sustained.

The "Messenger's" petrol consumption of 6 gall. per hr. at a cruising speed of 94 m.p.h. makes it very economical to run. It is extremely stable in the air, and almost anybody can fly it after a few hours' instruction.

J.W.R.T.

Handley Page Apprenticeship Schemes

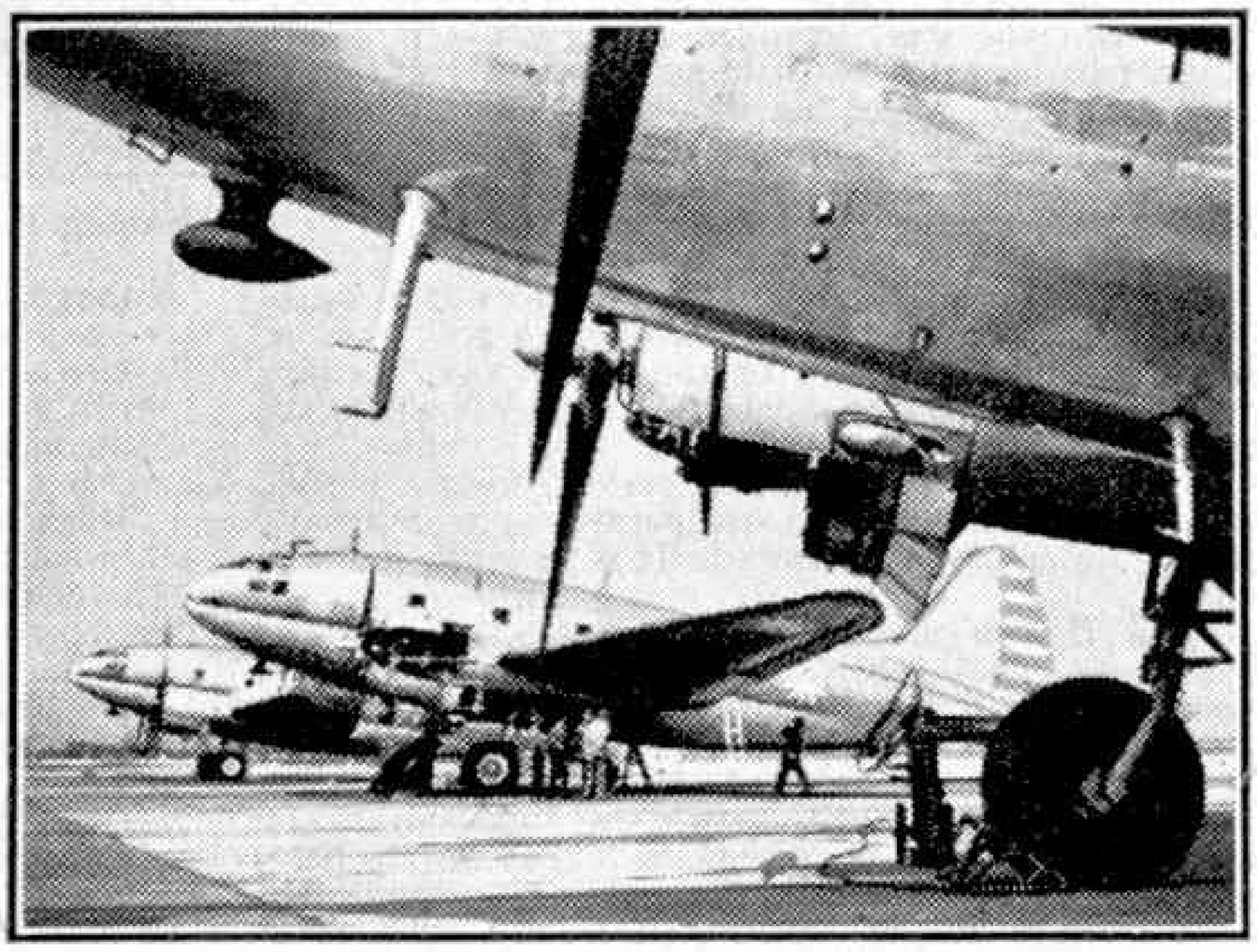
Handley Page Ltd., creators of the famous "Halifax" heavy bomber, have given details of their training courses for aeronautical engineering apprentices. No premium is required, and the apprentices receive pay during their training.

There are alternative courses for the prospective aeronautical engineer. One is known as the graduate apprenticeship course; it is for students taking a full-time engineering course at a University or engineering college, and provides them with the requisite practical workshop training in the company's Cricklewood factory. The other course is a 5-yr. one for the technical apprentice, who spends 3½ yrs. of that time in practical instruction in the factory and the remaining 1½ yrs. in the particular branch for which he has proved to be most suited. The practical instruction in the works is combined with theoretical training on two days a week at the Northampton Day Engineering College. Candidates for this course must be between 16 and 17½ yrs. of age, and have passed Matriculation or School Certificate with six Credits, including Mathematics and a Science subject.

There is also a course for trade apprentices, which is designed to train boys to become skilled craftsmen in fitting, turning, machining, tool-making, milling or sheet metal work, or as millwrights. Entrants for this course must not be over 16 yrs. of age, and are chosen from pupils at junior technical or secondary schools and also from shop and office boys.

* * * *

The development of internal air lines in Portugal is to be carried out by Aerial Transport Company, a new firm. Three de Havilland DH 89 "Dragon Rapides" have been ordered, and the first of them is expected to be delivered in time to go into service on the Lisbon-Oporto air route next October.



Workmen putting the finishing touches to a Curtiss C-46 "Commando" transport prior to its delivery to the China National Aviation Corporation. This company operates air routes in China, Burma and India under contract to the Chinese Government. Photograph by courtesy of Curtiss-Wright Corporation, U.S.A.

HOW THINGS ARE MADE:

Permanent Magnets

By Eric N. Simons

THE electric clock on the mantelpiece or in the "*Queen Mary*" contains a tiny little permanent magnet. The miner, as he wanders along the galleries of a coal mine, is at the same time, though he may not realise it, carrying a permanent magnet in his electric lamp. The captain of a merchant ship steering a secret course to avoid minefields relies on a compass in which is a permanent magnet. The man who comes to check the amount of electric current you have used is able to do so because inside the electric meter is a permanent magnet. The radio set that gives you the latest war news carries a permanent magnet in its speaker. The telephone that rings just when you least wish it to do so has a magnet inside it.

Thus the permanent magnet is one of the most important parts of electrical equipment, and readers may find it interesting to study how it is made in the enormous quantities called for by the modern world. The exact method of manufacture is largely governed by the precise kind of magnet material used. Some of these materials are steels that can be cast or forged to the desired shape. The more effective and newer magnet alloys, which are not steels, can only be made as castings, however, because they are too hard and brittle to be forged or rolled.

To take the magnet steels first, the ways in which these are moulded, rolled and fabricated are pretty much the same as in making tool steels, with this difference—that whereas with tool steels the important properties are the physical and mechanical, for example cutting power, tensile strength, hardness, etc., with magnet steels, the magnetic properties are what matter. Consequently, any way of handling the steel that would be likely to injure or weaken the magnetic properties cannot be employed. For example, heat is liable to affect these properties, so that when the steel is rolled or forged it must be reheated as little as possible, and no later annealing or softening process, designed to relieve the strains set up by mechanical working, must be adopted, unless it is known that the steel will have to be machined (that is drilled or cut in a machine tool) before it is used. Even then, the annealing temperature will have to be as low as possible. In the same way, forming temperatures must be no higher than will allow the material to be properly shaped.

If a magnet steel is heated for too long a period, or raised to too high a temperature, its magnetic properties cannot be restored. It is so much material spoiled.

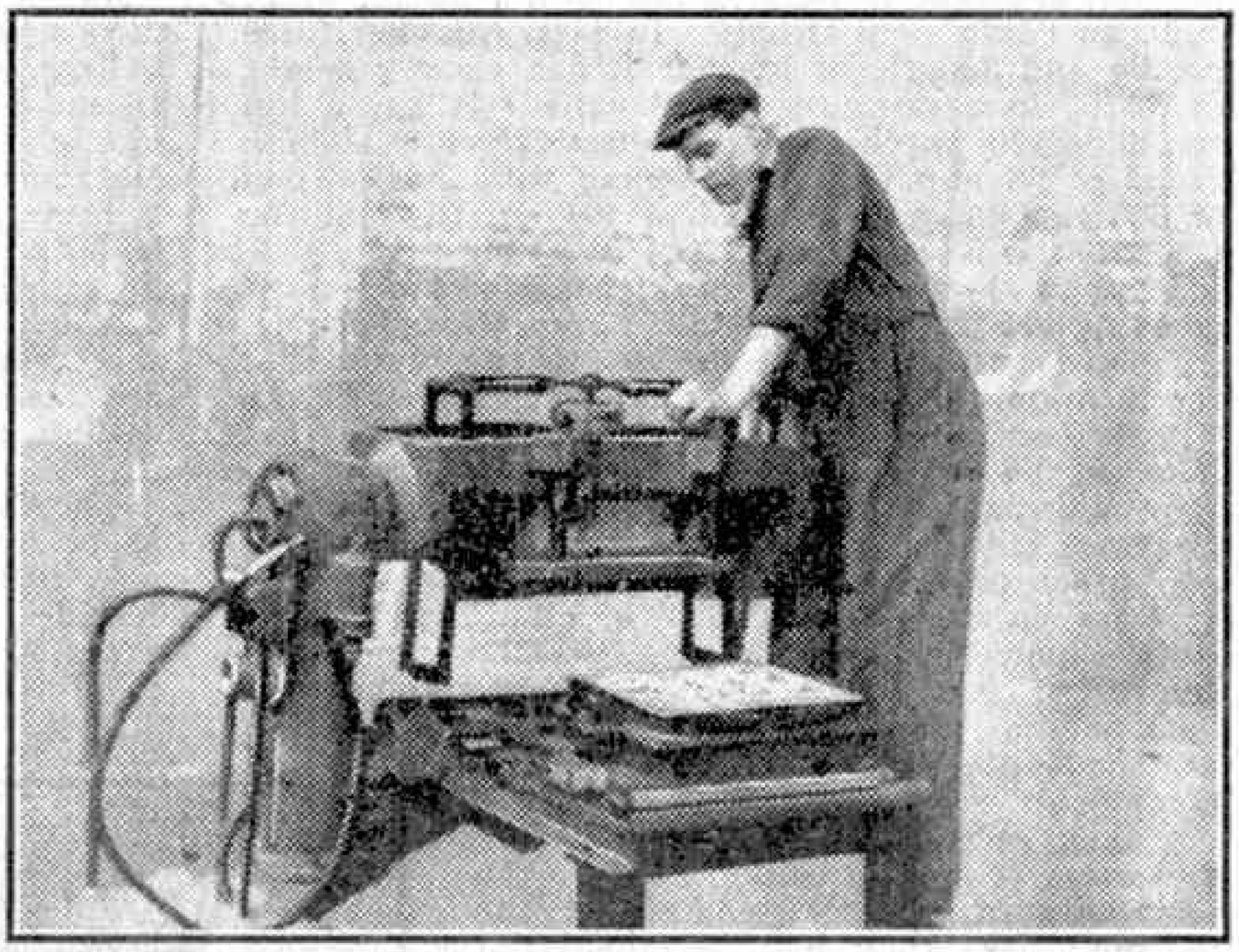
Most British magnet steels are made in electric furnaces. The high-frequency induction crucible process is used because it prevents any impurities from passing into the steel from the source of heat, since the heat is induced by eddy currents, as explained in an earlier article in this journal by the present writer. Another point is that the electrical stirring set up in the molten steel causes all the heavy alloys to be distributed evenly throughout the mass of metal. Otherwise they might sink to the bottom and produce ingots of varying composition.

Some makers have used electric arc furnaces for making magnet steels, and even open hearth furnaces have been used for making the cheaper carbon-manganese and low chromium steels.

In general, ingots of magnet steels are forged or rolled as soon as possible after they have solidified, though some American makers cool them in lime or dry sand before rolling them. Any surface defects in the ingots are removed by grinding them out.

Usually, the shapes of permanent magnets made from suitable steel have to be given by hot shaping, carried out as quickly as possible at a medium temperature. The magnets are usually cooled in the air from the working temperature, and some are hardened by plunging them into a tank of oil or into an air blast as soon as they have been shaped.

Magnets are always, if possible, designed so that they can be machined without an annealing treatment. The hardened magnets are allowed to cool in the furnace just slowly enough to prevent their becoming too hard and brittle as a result of too sudden a contact with the cold air. As soon as they have cooled to about 540 deg. C. they are taken out of the furnace and allowed to cool in the open, that is they are laid on the floor. At this temperature there is no possibility of their becoming too hard.

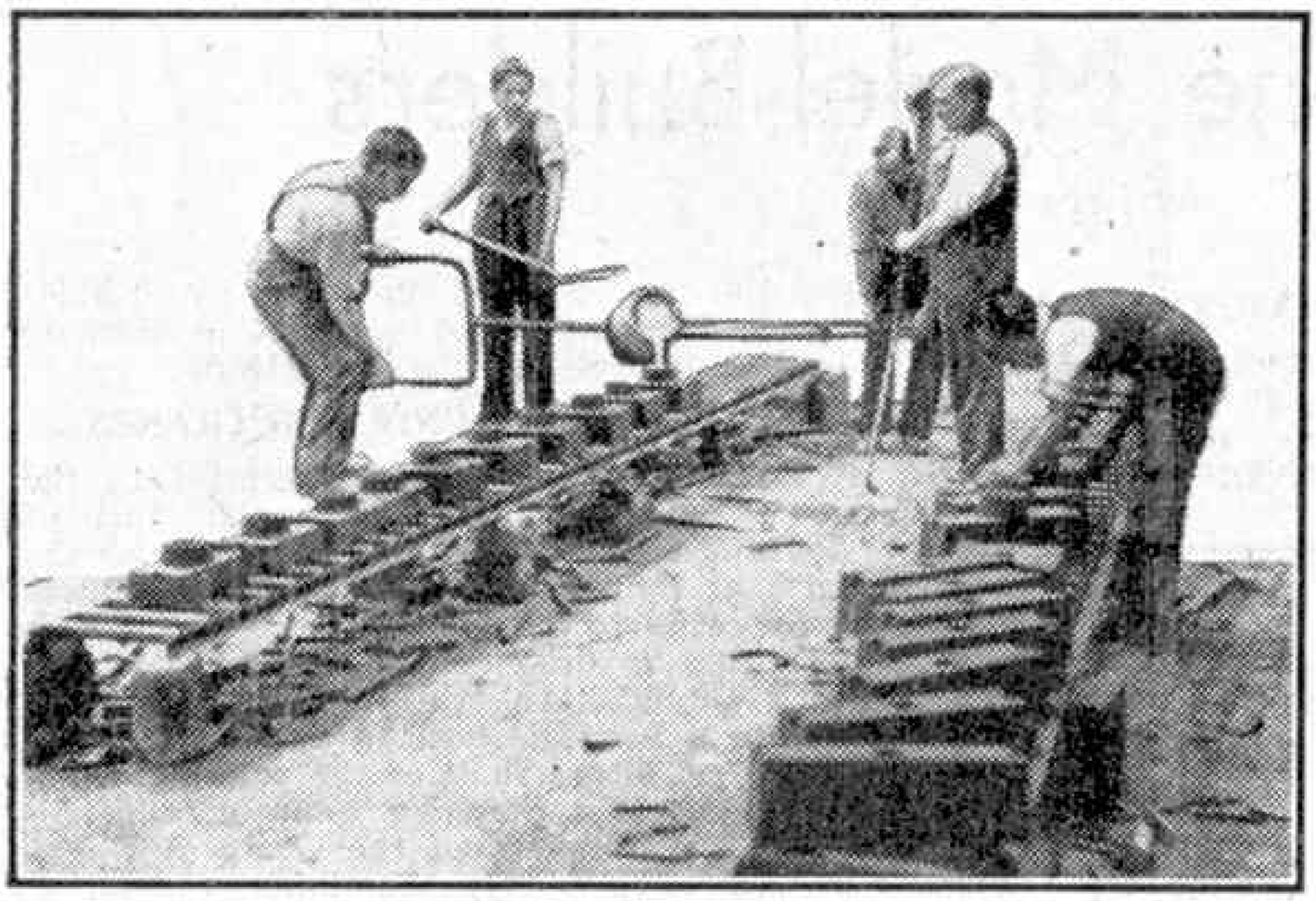


Making the mould for a permanent magnet.

The magnets may now have to be ground to give them a smooth surface and good finish. This is done with great care to prevent cracks from occurring, and but little metal is removed at a time.

Many magnets have so complicated a shape that they cannot be forged, and must therefore be cast. This applies also to certain magnet alloys that cannot be forged because of their extremely hard and brittle character. There is no striking difference between the magnetic properties of a forged or a cast magnet. The casting, if of magnet steel, will not be quite so tough as the forged magnet, but the same precautions as regards heating must be observed.

The moulds for casting these complicated or newer alloy magnets are of sand, containing a percentage of oil to keep the grains closely together. The moulds are made by a machine worked by hand, if the magnets are of an intricate character, but if large quantities are required, which is usually the case, a different type of machine which automatically jolts the mould so as to make the sand bed down firmly in the containing iron box is used.



Casting the magnets.

To make casting easier, the magnets are sometimes cast in sets of eight, using a base mould, an upper mould, and a top piece; that is, the mould is in three sections. The handling of these moulds is made easy by means of what are termed roller conveyors, seen in the upper photograph on this page.

After the moulds have been filled with molten metal, and given a brief period in which to cool, they are passed along the conveyor and through a trapdoor at the further end. Here, each casting is separated from its neighbour by a blow from a hammer. The three sections of the mould are held together by simple clamps and wooden wedges.

The machining of the magnets is quite simple. A steel magnet is first ground mechanically on its sides and end, and then, perhaps, holes are drilled in it. The newer magnet alloys can only be ground, and if drilling can be carried out at all, it is only with the utmost difficulty. The designer of magnets desiring to use these new alloys because of their high magnetic properties must be very careful in his design to eliminate all necessity for drilling.

Small magnets for electric clocks are made from steel strip by punching them out. Where the magnets are large this punching may have to be done hot, but the smaller magnets do not need hot punching. The limits of size allowed to the maker are extremely small, and a magnet must not be more than one thousandth of an inch out in its diameter or thickness. The little hole in the centre of one of these clock magnets must not be more than .0015 in. out in its diameter.

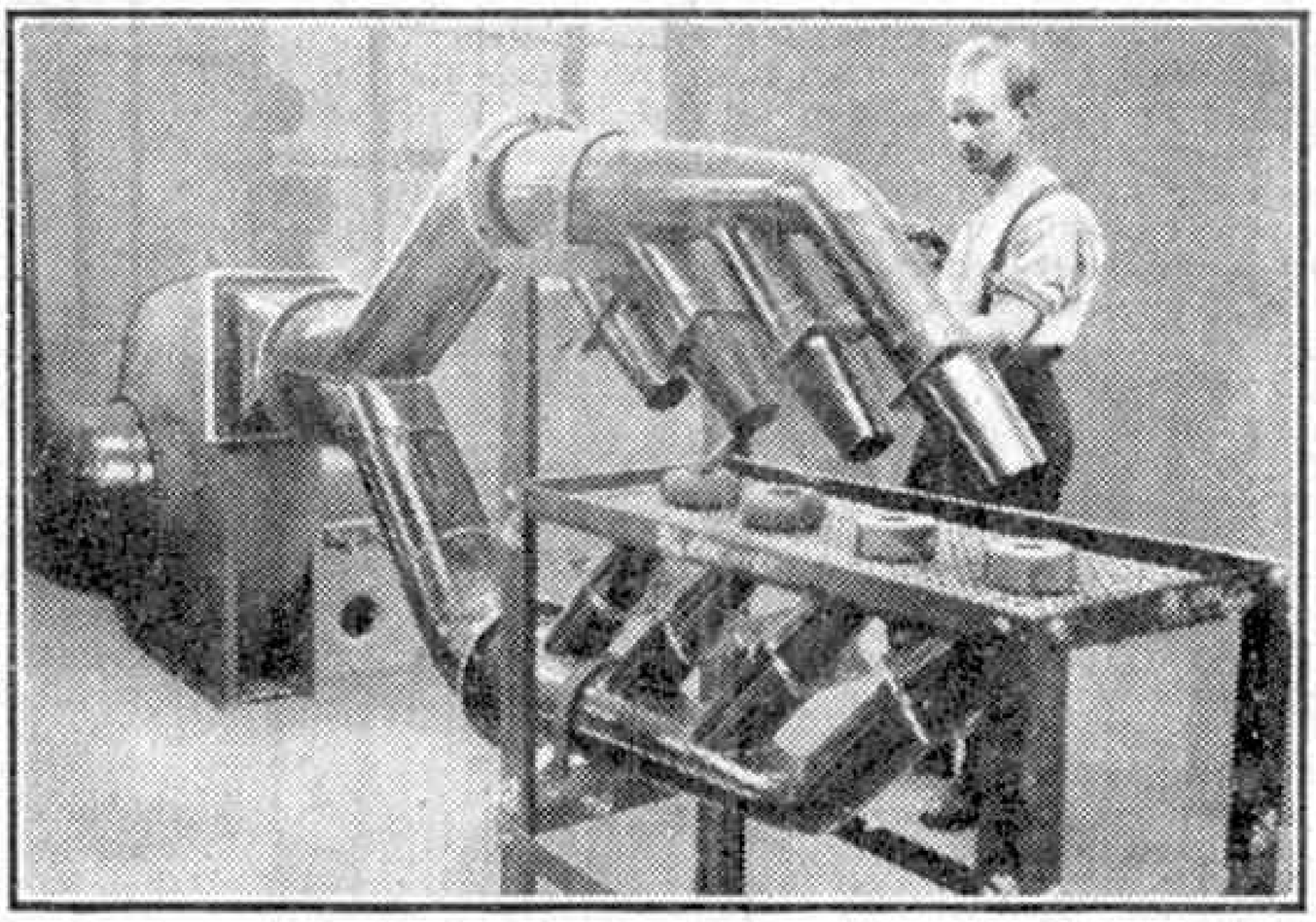
The punching out of the magnets is done by specially shaped punches incorporated in presses. The strip steel is caused to pass continuously under the rising and falling punch. Underneath the punch is a die, or shaped impression, and the strip steel passes between the descending punch and the stationary die, so that it is forced to take on the desired form by the pressure of the punch as it forces the strip into the die impression. After punching, the blanks are ground on the surface to the proper thickness, and the hole that has been punched in them is enlarged by a special tool called a reamer, until it attains the precise diameter required; while it is also countersunk, that is given a bevelling all round its circumference to take the head of a screw.

The magnets as they now stand are merely shaped steel discs. They have no magnetic power at all. This means that they must be magnetised before they can be used. The magnetising is carried out by a special and rather complicated electrical machine. The magnet is placed on the platform or table of this machine, electric current is switched on and allowed to flow through a coil. This strongly magnetises the magnet, which is then transferred to a testing instrument.

The testing instrument generates a current which is measured by a meter, and indicates clearly whether the magnets possess the proper magnetic values.

The various types of material used for making these magnets should be realised. Eliminating chromium steel and carbon-manganese steels, which are relatively low in price, and are used only when very large tonnages of magnet steels are required, the principal materials used are first, a steel containing about 6 per cent. of the element tungsten. This is not extensively used to-day, because it is difficult to harden it without cracks being developed, and because much better magnetic properties can now be obtained from other materials. Then there is a range of steels containing cobalt. Of these there are five different types, containing respectively, 3, 6, 9, 15 and 35 per cent. of cobalt. Later, there came a range of iron-nickel-aluminium alloys which speedily found great favour because they were eminently suitable for making loud speaker moving coil magnets and for lighting and ignition uses, for example in permanent magnet electric motors. What it really amounted to was that by means of these alloys magnetic energy could be supplied at a lower cost than when the magnets were made of cobalt steel. These alloys were also much lighter than cobalt steel. The design for any magnet could therefore be shorter and thicker, which was an advantage, because it meant that instruments in which the magnet was used could be smaller in size.

The metallurgist did not stop short with nickel aluminium alloy, however. He next discovered a remarkable alloy produced by adding cobalt and copper to an alloy of nickel, chromium and iron. This alloy had magnetic properties superior even to those of nickel-iron-aluminium. Consequently, it was most advantageous when *(Continued on page 322)*



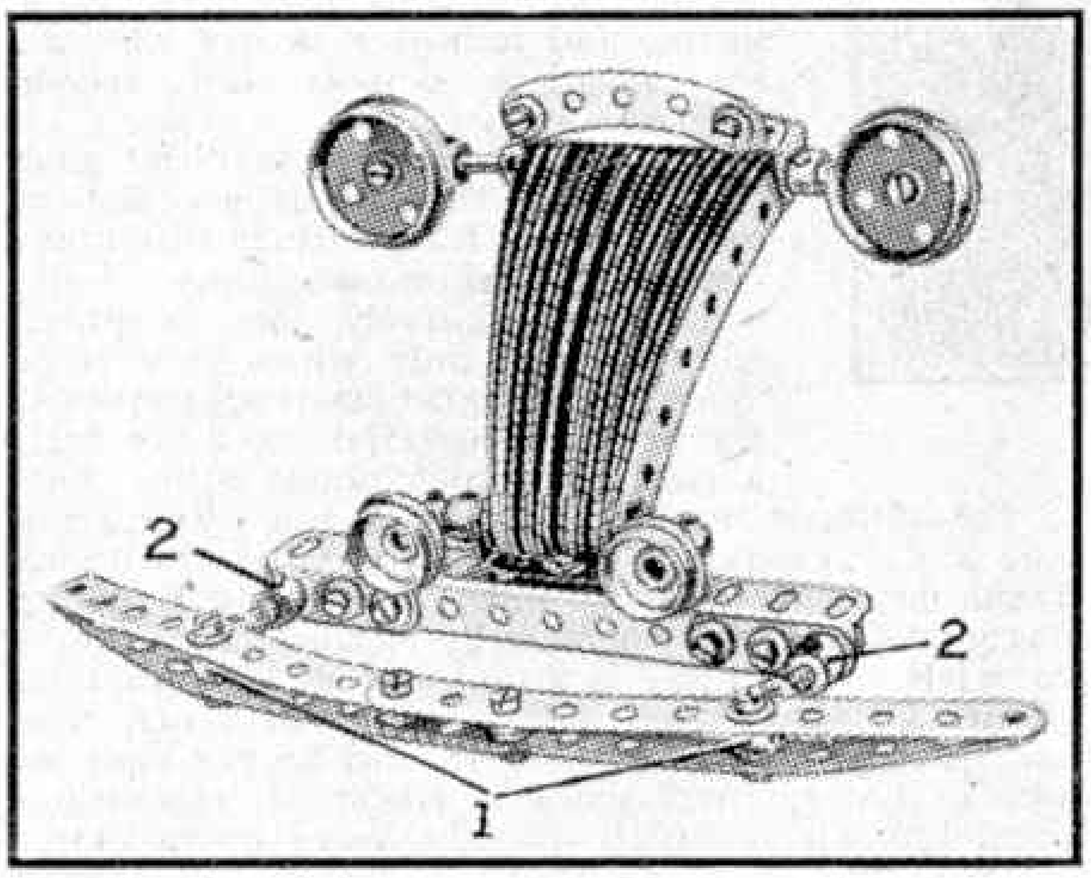
Cooling the magnets after heat treatment.

Among the Model-Builders

By "Spanner"

MOTOR CAR RADIATOR CONSTRUCTION.

One of the main items contributing to the realism of a model motor car is the radiator. If this is cleverly constructed it adds immensely to the appearance of the model, and it is therefore well

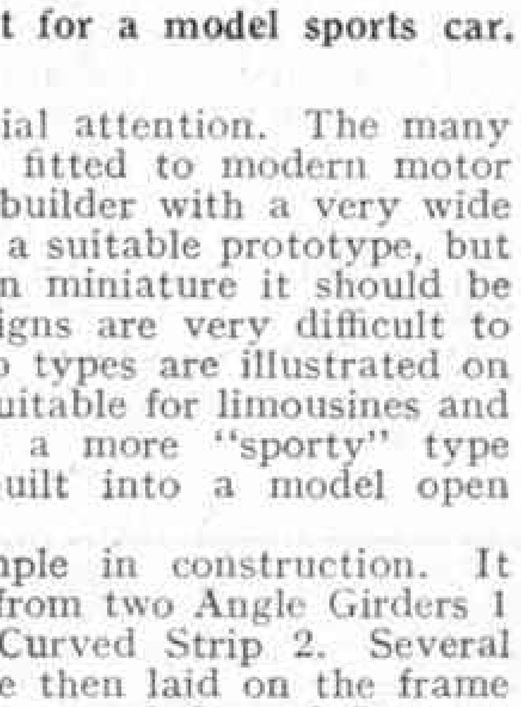


A radiator and bumper unit for a model sports car.

worth while to give it special attention. The many different types of radiators fitted to modern motor vehicles provide the model-builder with a very wide range from which to choose a suitable prototype, but in selecting one to model in miniature it should be remembered that some designs are very difficult to reproduce successfully. Two types are illustrated on this page. One of these is suitable for limousines and lorries, while the other is a more "sporty" type and would look well if built into a model open touring car.

The former is quite simple in construction. It consists of a frame formed from two Angle Girders 1 joined at each end by a Curved Strip 2. Several Rods of suitable lengths are then laid on the frame and are held in place by a second Curved Strip at top and bottom, these Strips being bolted tightly to the Curved Strips 2 by ½" Bolts.

The sports type radiator is shown assembled with spring-loaded bumper bar and lamps, and its construction is easy to follow from the illustration. The Curved Strips forming the grille are mounted at each end on a Rod, and are spaced from each other at their upper ends by two Washers. The Rods pass through the ends of two Double Angle Strips, and carry Flanged Pulleys. The bumper bar also consists of Curved Strips bolted end to end, the two compound curved strips thus formed being bolted face to face but spaced apart by Handrail Couplings 1. These carry short Rods that are free to slide in the bosses of Cranks bolted to the front cross beam of the car chassis, but are retained in place by Collars. Compression Springs are placed on the Rods between the Handrail Couplings and the cross beam.



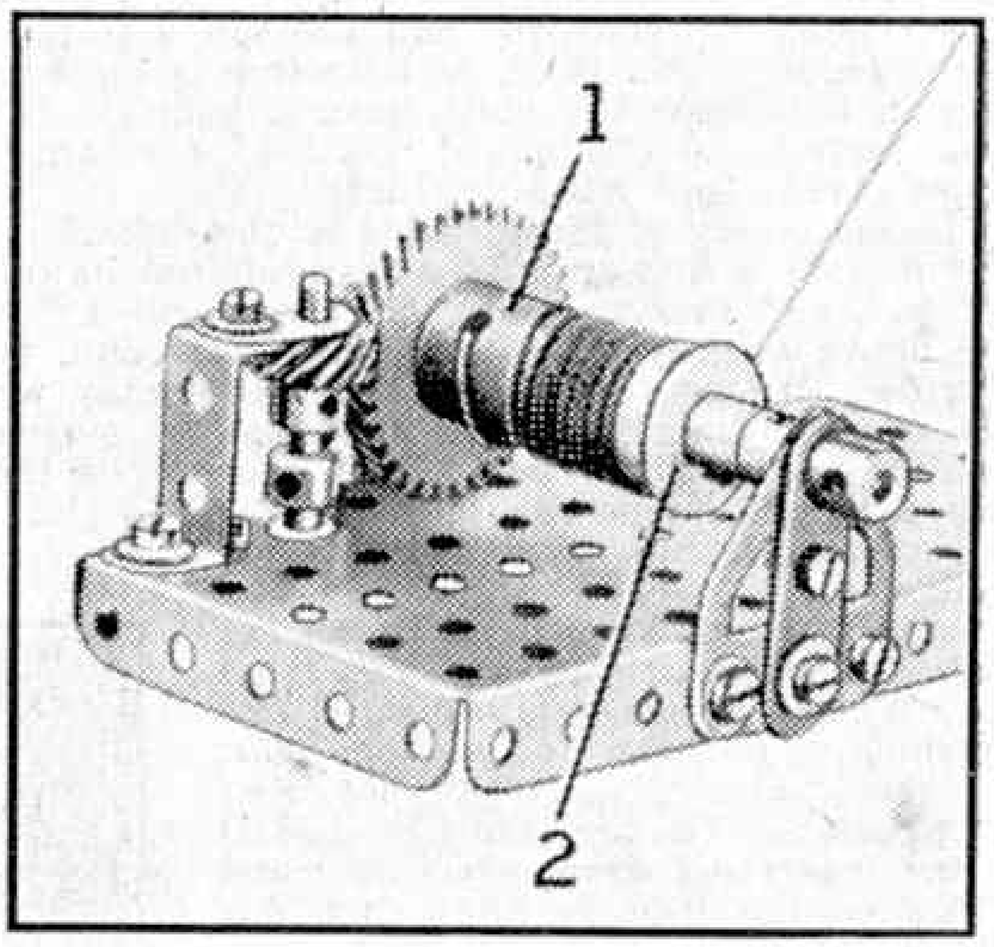
A car radiator constructed mainly from Rods and Angle Girders.

NEAT WINDING DRUM UNIT FOR CRANES

Michael Ellison, Birkenhead, is interested in the construction of model cranes, and spends much of his time devising new constructional methods for the various parts of the mechanisms. One of his ideas relates to the winding drums and is shown on this page. The drum is driven through Helical Gears (Parts Nos. 211a and 211b), the smaller Gear taking the drive from a vertical shaft to the larger Gear, which is mounted on the shaft of the winding drum. Also on this shaft is a Chimney Adaptor, which is pushed up against the face of the Gear. A Sleeve Piece 1 is then slipped over the Chimney Adaptor and a ¾" dia. Flanged Wheel 2 is fixed on the shaft to hold the Sleeve Piece in place. The complete drive and winding unit thus formed is very neat and compact.

SUGGESTED NEW MECCANO PART

Several ideas for additions to the Meccano range of parts have been received from W. D. Butler, Redditch. Some of these are impracticable for various



This neat winding drum for model cranes makes good use of Meccano Helical Gears.

reasons, but others follow on almost similar lines to schemes suggested by several other model-builders, and of these one or two are worthy of consideration.

Butler says that he could find uses for a part resembling a Strip having one or more Double Brackets attached to it. He mentions that while it is possible to build up such an item from parts already in the Meccano range, the surface of such a built-up part would not be flat and smooth owing to the presence of bolts. He suggests that a part of the kind he describes would be smooth surfaced, and therefore would be useful for making built-up wheels to take a belt or rope drive. The parts should be supplied either Curved to various radii, similar to the 3" Formed Slotted Strips, or straight, so that model-builders could bend them as desired. The lugs of the parts would serve as means of attachment for the spokes, and in this way it would be possible to build up large wheels suitable for tractors, agricultural machines and locomotives.

I think there is something in this idea and as

somewhat similar schemes have been put forward by other model-builders it will receive consideration when it is possible to plan new parts for the Meccano system. One objection, however, is the bending of the parts that would be necessary. The parts would have to be made from metal that would allow bending and re-straightening indefinitely. If the parts were supplied already curved a wide range of different radii would be necessary if their full utility was to be attained. Also, unless the assembly was carried out very carefully, the completed wheel would not run truly.

READER'S IDEA FOR A MECCANO VICE

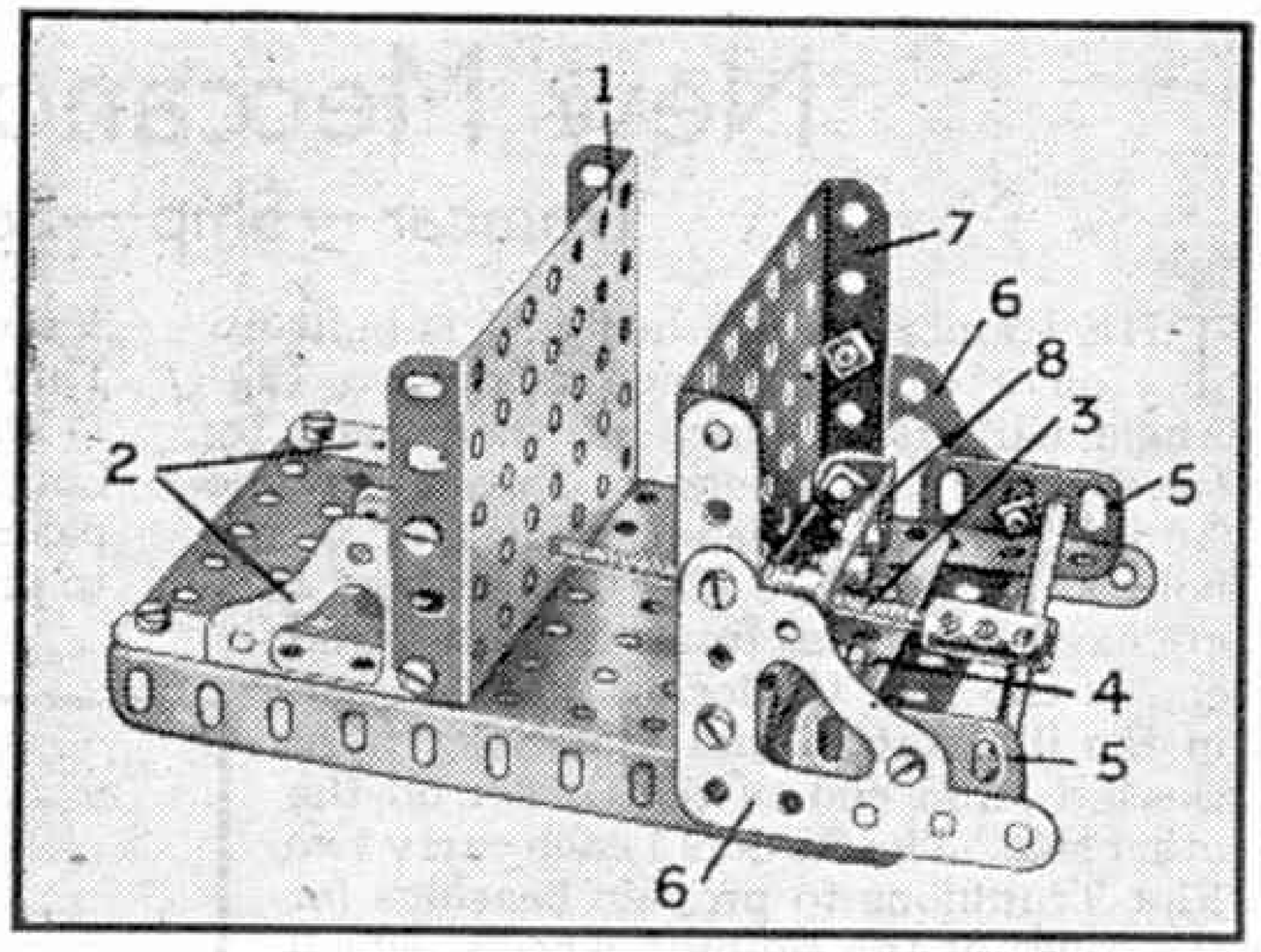
A suggestion submitted by Martin Harrison, Bristol, takes the form of a vice that will be found useful for gripping small jobs while light work is to be carried out on them. The vice is shown in the upper illustration on this page and it is built entirely from Meccano parts. It should be understood, however, that the grip it provides is sufficient only for the lightest work, and its chief interest lies in its constructional details. There are several ways in which the vice could be strengthened, and no doubt some readers will like to experiment with this object in view.

The base of the vice is built from two 5½" Angle Girders and a 5½" × 5½" Flat Plate.

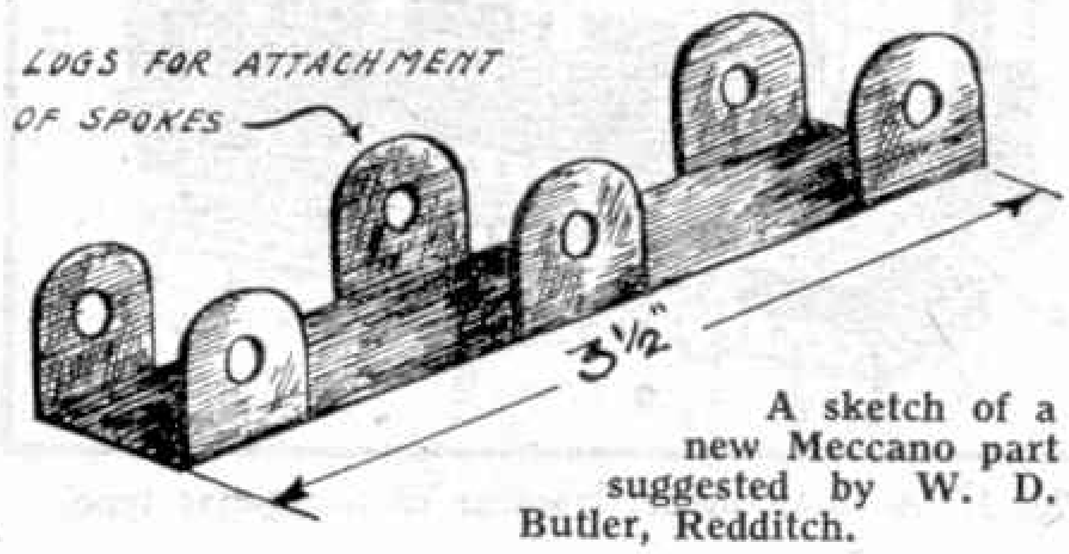
A 3½" × 2½" Flanged Plate 1 is fixed to a pair of Flanged Brackets 2, and is reinforced by a 3½" Angle Girder bolted to the base between its flanges. One end of the 4½" Threaded Rod 3 is journalled in a 1" × ½" Angle Bracket bolted to the base at the rear of Flanged Plate 1, and a Coupling and three Washers are placed upon it between this Bracket and the Angle Girder used to strengthen Plate 1. The other end of the Threaded Rod passes through the Angle Girder 4, which forms a guide for the 1½" Angle Girder 5 bolted to the Architraves 6.

These Architraves are bolted to the flanges of a second 3½" × 2½" Flanged Plate 7 that forms the movable jaw of the vice, and they slide against the sides of the 5½" Angle Girders fixed to the base. A 3½" Double Angle Strip 8 is bolted to the Flanged Plate 7 and carries a Threaded Crank, through the threaded bore of which passes the Threaded Rod 3.

The handle is formed by a short Rod held in a Coupling.



A vice built entirely from Meccano.



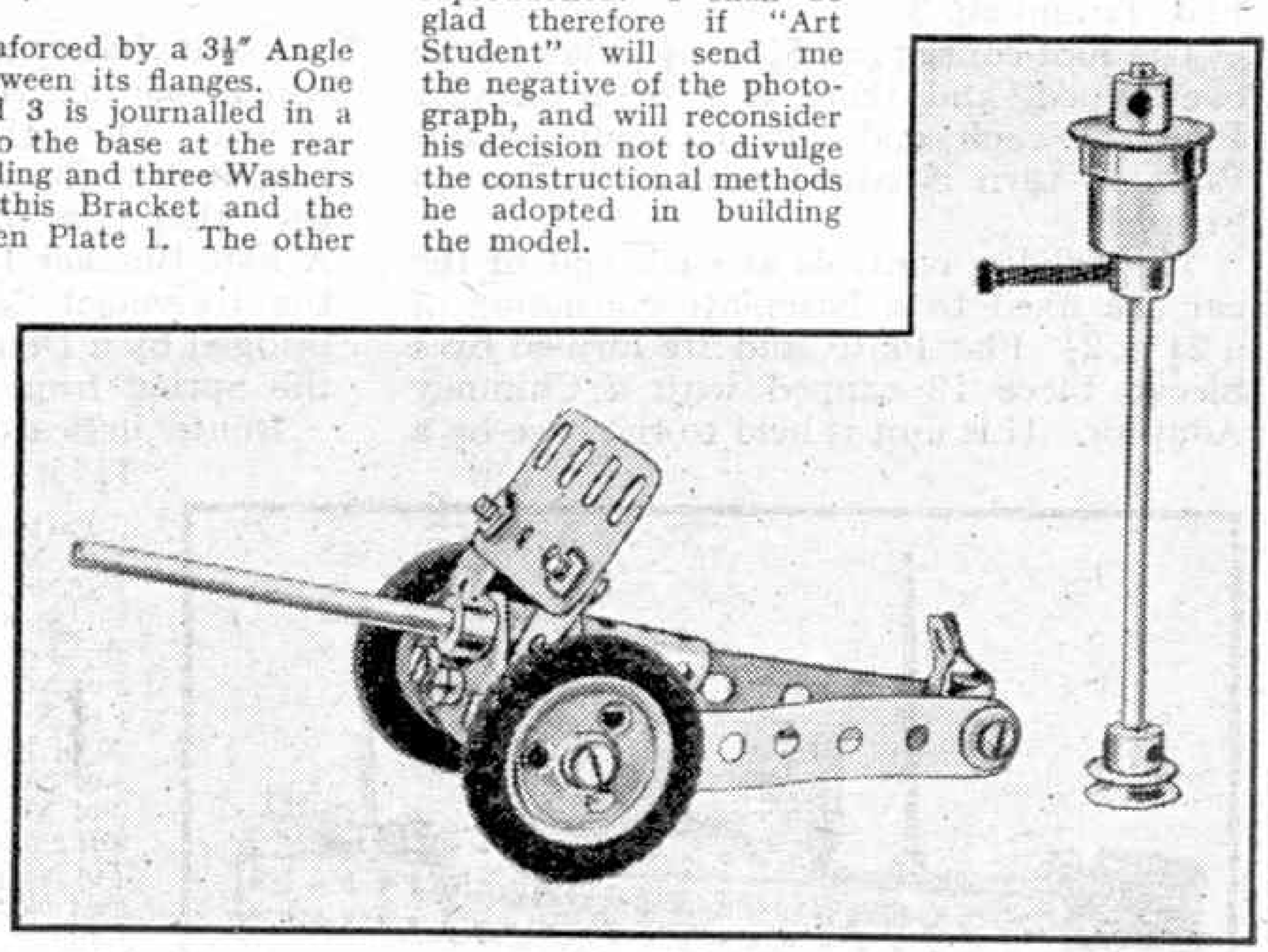
A sketch of a new Meccano part suggested by W. D. Butler, Redditch.

POPULARITY OF SIMPLE MECCANO MODELS

"Simplicity" model-building seems to be very popular with Meccano enthusiasts of all ages. It really is remarkable what fine effects and realism can be obtained from a few Meccano parts cleverly assembled together, and every "Simplicity" Contest that has been announced in the "*M.M.*" has produced hundreds of most ingenious models. Two examples from a recent competition appear on this page. They are a field gun built by D. Ball, Stockton Brook, Stoke-on-Trent, and a lamp-post which is the creation of M. A. Reed, Woodford Green. The latter comprises only six parts. The field gun is more elaborate, but every part has been chosen with great care.

AN ANONYMOUS CONTRIBUTION

I have received a letter signed simply "Art Student, Liverpool," and without the sender's address, enclosing a few details and a photograph of a very fine locomotive built from Meccano and odds and ends of materials. I should like to include a description and illustration of the model in the "*M.M.*," but unfortunately the photograph is not suitable for reproduction. I shall be glad therefore if "Art Student" will send me the negative of the photograph, and will reconsider his decision not to divulge the constructional methods he adopted in building the model.



Two "simplicity" models from a recent "M.M." competition. The gun is the work of D. Ball, Stoke-on-Trent, and the lamp-post was built by M. A. Reed, Woodford Green.

New Meccano Models

Tramcar—Ship—Semaphore

THE tramcar shown in Fig. 1 is built up on a chassis formed from two 12½″ Angle Girders 1 joined at their ends by two 3½″ Angle Girders 2. Two 9½″ Angle Girders, one of which is shown at 6, are bolted on top of the 12½″ Girders, and they are fixed four holes from the right-hand end of the 12½″ Girder on the side seen in the illustration and four holes from the left-hand end of the Girder on the other side. The Girders 1 each carry two Flat Trunnions to provide bearings for the axles of the running wheels, which are 1⅛″ Flanged Wheels.

The bodywork is built around a series of vertical ribs, consisting of four 7½″ Angle Girders and 7½″ Strips. Two of the 7½″ Girders are bolted to each 9½″ Girder of the chassis on each side, those on the near side in the illustration being indicated at 4 and 5. The bow ends of the tram are formed by Strips and Flexible Plates, and a cowcatcher-type safety guard is fitted at each end. This consists of two 3½″ Flat Girders 7 bolted together and then attached to a 3½″ × ½″ Double Angle Strip bolted between 12½″ Strips 8. The Strips 8 are fitted to Flat Girders, which are attached to 7½″ Strips 9 bolted to the Flat Trunnions 3.

The roof consists of 5½″ × 3½″ Flat Plates overlapped, and there is a Semi-Circular Plate at each end. Each Semi-Circular Plate in turn is edged with a 3″ Curved Strip 11.

The driving controls at each end of the car are fixed to a baseplate consisting of a 2½″ × 2½″ Flat Plate, and are formed by a Sleeve Piece 12 capped with a Chimney Adaptor. This unit is held to the base by a Screwed Rod fitted with a Collar carrying a Threaded Pin at its upper end.

The trolley gear is formed by a Universal Coupling 13, which is fixed to a ¾″ Bolt passed through the roof of the car and free to pivot. The Universal Coupling carries in one of its bosses a short Screwed Rod 14, to which one end of a Spring is attached as shown. The other end of the Spring is passed over the trolley 16, which is held in the other boss of the Universal Coupling. A Flat Bracket 15 is bolted to each side of the Universal Coupling, and the two are bridged by a Double Bracket that prevents the Spring from slipping out of place.

Route indicators are formed from two 1½″ × ½″ Double Angle Strips 10.

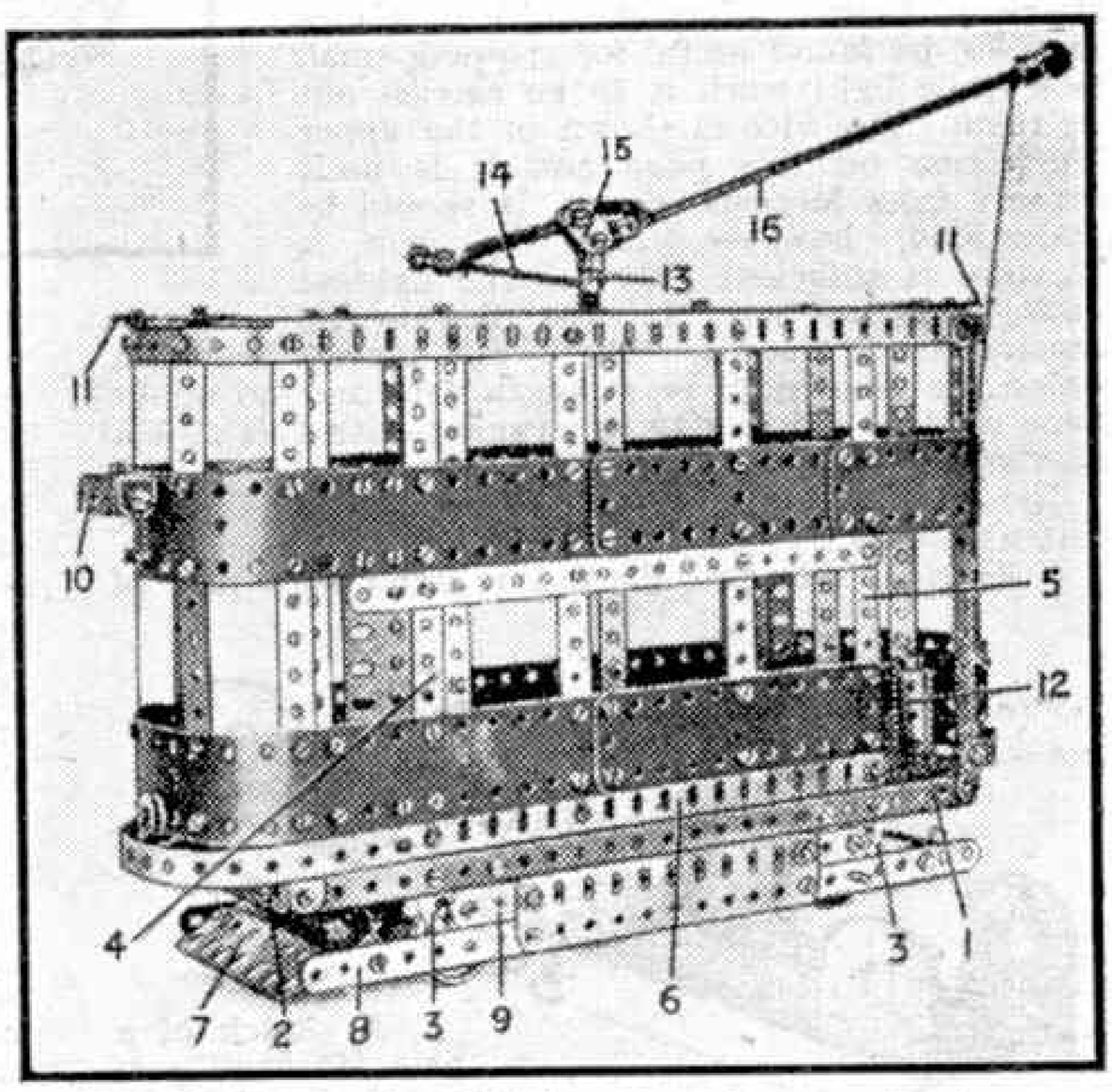


Fig. 1. A small model tramcar of a popular type.

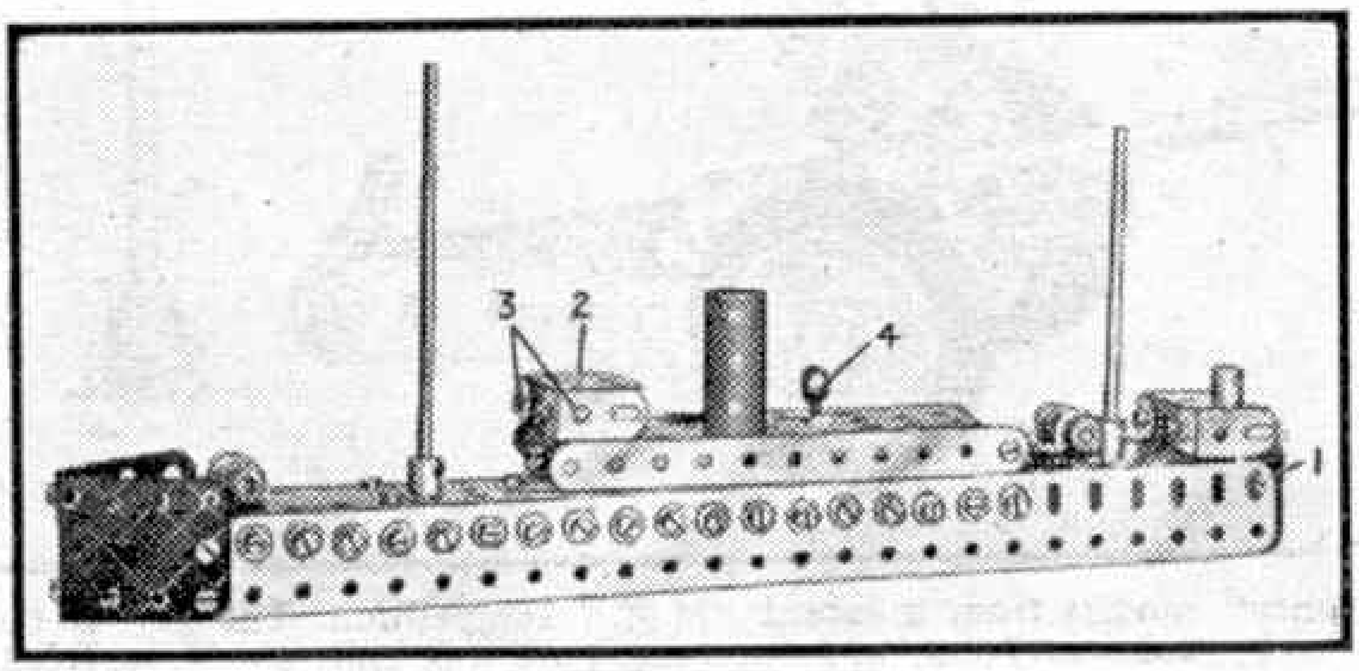


Fig. 2. Only a few parts are required to build this simple cargo ship.

Parts required to build model Tramcar: 2 of No. 1a; 8 of No. 1b; 4 of No. 2; 2 of No. 2a; 5 of No. 3; 9 of No. 4; 2 of No. 5; 4 of No. 8; 2 of No. 8a; 4 of No. 8b; 4 of No. 9b; 6 of No. 10; 1 of No. 11; 2 of No. 12; 1 of No. 13a; 2 of No. 15b; 4 of No. 20; 3 of No. 23; 194 of No. 37; 20 of No. 38; 1 of No. 43; 4 of No. 48; 2 of No. 48b; 2 of No. 52a; 6 of No. 59; 2 of No. 72; 3 of No. 80c; 2 of No. 89a; 2 of No. 103; 4 of No. 103d; 2 of No. 103e; 2 of No. 111; 2 of No. 111a; 2 of No. 115; 1 of No. 116a; 4 of No. 126a; 1 of No. 136a; 1 of No. 140; 2 of No. 164; 14 of No. 189; 2 of No. 214; 2 of No. 216.

The cargo ship shown in Fig. 2 is commenced with the hull.

The sides of this are 12½″ Flat Girders spaced apart by 1½″×½″ Double Angle Strips at suitable points. The stern is enclosed by a short Flexible Plate 1, and each side of the bow is a 5½″×1½″ Flexible Plate. The deck is filled in with Flat Plates and Flexible Plates.

The fore part of the bridge deck is a 2½″×1½″ Flanged Plate, and a similar part is used for the after half. These are edged at each side with a 5½″ Strip, the stern ends of which are bolted to a short Strip fixed vertically to the 12½″ Flat Girders. The bridge house is constructed from a Channel Bearing 2 and two 1″×½″ Angle Brackets 3. The deck house is constructed in a similar manner. Each winch is a Double Bracket carrying a short Rod fitted with a ½″ Pulley and a Collar. The masts are Rods held in Rod Sockets fixed to the deck.

Parts required to build model Cargo Ship: 2 of No. 2; 2 of No. 11; 4 of No. 12; 4 of No. 12b; 1 of No. 15a; 1 of No. 16; 2 of No. 18b; 68 of No. 37; 39 of No. 38; 3 of No. 48; 2 of No. 53; 5 of No. 59; 1 of No. 64; 3 of No. 73; 1 of No. 81; 1 of No. 98; 2 of No. 103b; 1 of No. 111; 1 of No. 111c; 1 of No. 126a; 2 of No. 160; 1 of No. 163; 1 of No. 164; 2 of No. 179; 4 of No. 188; 1 of No. 217a.

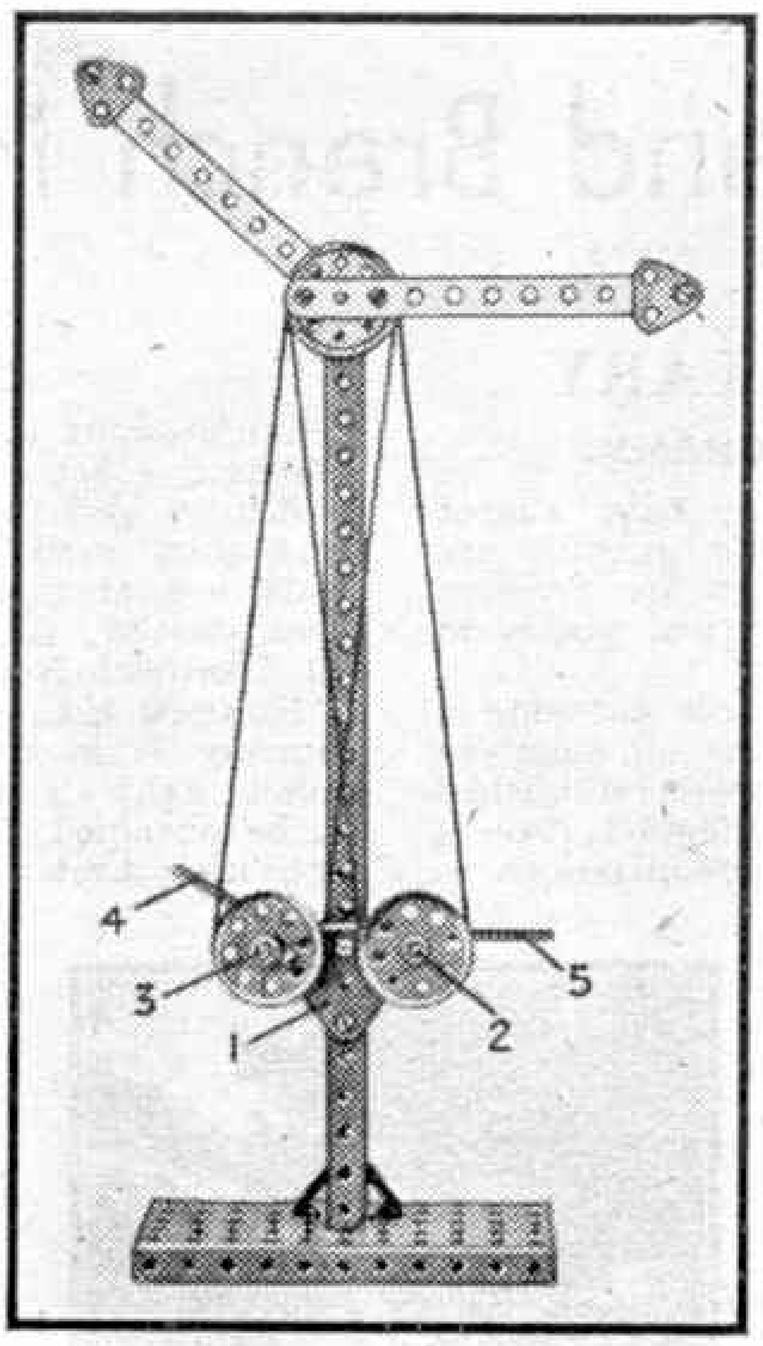


Fig. 3. Good fun can be had with a pair of semaphore signals of the type shown here.

The column supporting the arms of the semaphore shown in Fig. 3 consists of two 12½″ Angle Girders mounted vertically on a 5½″×2½″ Flanged Plate by means of a Trunnion. In the eighth holes from the lower ends of the Angle Girders two Flat Trunnions 1 are bolted, and two 2½″ Strips bolted to the Angle Girders across the tops of the Flat Trunnions carry 1½″ Rods 2 and 3. On one end of each Rod a Bush Wheel is fixed, both Rods being held in place by fixing Couplings on their other ends. These Couplings carry 1½″ Rods 4 and 5, that form the operating handles.

At the upper ends of the 12½″ Angle Girders is a 1″ Rod on which are mounted two 1½″ dia. Pulleys. To each Pulley a 5½″ Strip is bolted, each Strip being fitted with a 1″ Triangular Plate at its outer end. Driving Bands are passed around the Pulleys at the upper end of the column and those on the Rods 2 and 3.

Parts required to build model Semaphore: 2 of No. 2; 2 of No. 5; 2 of No. 8; 1 of No. 16a; 2 of No. 17; 2 of No. 18a; 4 of No. 21; 2 of No. 24; 19 of No. 37; 10 of No. 38; 1 of No. 40; 1 of No. 52; 2 of No. 59; 2 of No. 63; 2 of No. 77; 1 of No. 126; 2 of No. 126a.

More Prizes for Model-Builders

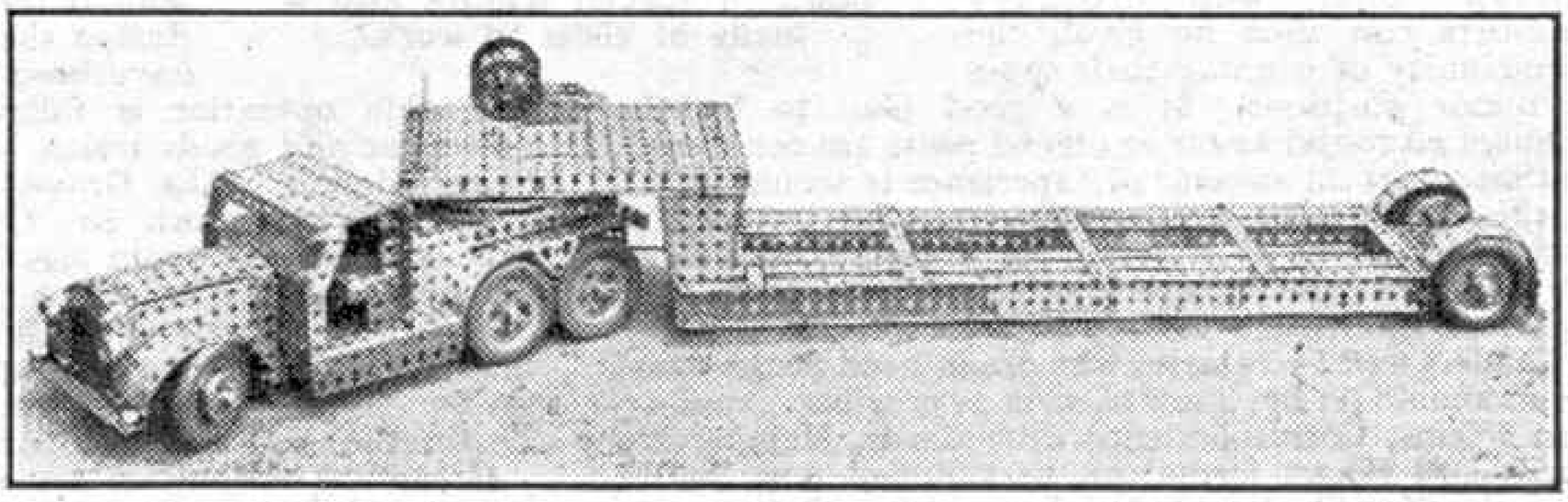
This month we are offering prizes consisting of cheques and postal orders in a competition in which Meccano models of any size and subject can be entered. The Competition is open to readers of all ages.

The model itself is not required, all that should be sent being a photograph or drawing, with any notes required to explain special constructional features. Each photograph or drawing must bear the competitor's name, address and age, and the entry should be forwarded to "*Autumn Model-building Contest, Meccano Limited, Binns Road, Liverpool 13.*"

Entries will be divided into two sections, A, for competitors of all ages living in the British Isles; B, for competitors of all ages living Overseas. Section A will close on 31st October next, but Section B will remain open for entries until 31st December.

The following prizes will be awarded in each Section of the Contest to the builders of the most interesting models received:—First, £2/2/-. Second and Third Prizes will consist respectively of £1/1/- and 10/6. There will be also five further prizes of 5/-.

All prizewinners will be notified as soon as possible after the closing dates.



A fine model articulated lorry driven by an E20B Electric Motor. It was built by D. Ball Stoke-on-Trent, and was awarded a prize in an "M.M." competition.

Club and Branch News

WITH THE SECRETARY

MAKE SURE OF YOUR PROGRAMME

With the coming of September we have almost reached the Winter Sessions. Outdoor pursuits are still being followed, but the evenings are growing darker and soon it will be time to return wholly to the Club or Branch room.

What steps have been taken towards ensuring a really successful and enjoyable time for all members during the coming Winter Sessions? In well established Clubs and Branches there is little difficulty, but it is necessary to go carefully in new organisations in order to make sure that the best is being made of every opportunity. There is only one sound way of ensuring this—that is by holding a general meeting at which schemes suggested by officials and members can be thoroughly discussed. The Leader or Chairman of course naturally takes the lead in formulating plans, but any member should be invited to make suggestions for the programme and there should be free criticism and voting so that the programme finally settled shall be approved by all concerned.

There is one point about which I should like to warn new Clubs and Branches. It may be found that members are particularly enthusiastic about one special pursuit, but the mistake must not be made of giving this an undue proportion of time. Some particular hobby or Club occupation may be enjoyed for a few weeks if practically all meetings are devoted to it, but by Christmas members will begin to tire of it and enthusiasm for Club life will then flag. Variety is the key to success in Clubs and Branches.

PROMOTION FOR KEEN MEMBERS

The annual meeting that I have suggested might well be devoted also to the election of officials, a matter that calls for special attention once a year. Where any official has done good work opportunity should be taken of promoting him to a more important post, and ordinary members can then be given the opportunity of winning their spurs in minor positions. It is a good plan to let the honours go round as far as official posts are concerned, so that a certain amount of experience is accumulated. If this is done the sudden departure for business or other reasons of a secretary or treasurer is not so great a blow, since there is some other member with sufficient knowledge to step into his place.

Leaders and Secretaries who are in need of the usual forms should let me know as soon as possible. Application Forms, Correspondence Club Cards, Membership Cards and report forms can be supplied now, and I hope it will not be long before I am again able to supply badges. There will be an announcement on this page as soon as information on this point is available.

Terry Hearn is an active member and official of the Thebarton (Australia) M.C., Leader, Mr. E. H. S. Gibson. This Club, which was affiliated in December 1928, is remarkable for the scientific aspect of the models built. A special feature also is made of visits to works.

CLUB NOTES

BIRCHGROVE (CARDIFF) M.C.—Meetings are held at Birchgrove School. Recent events include a tour of a factory and the setting up of a telephone, which was then used by members. General knowledge tests are arranged regularly and a Magazine has been started. Club roll: 17. *Secretary:* K. W. Jones, 43, Pantbach Road, Birchgrove, Cardiff.

DURHAM M.C.—The terminal station for the Club's Hornby Train Layout has now been completed and colour light signals are being made. More rails are to be obtained. Good progress is being made in all activities. Club roll: 8. *Secretary:* T. C. Hindson, Westholme, Durham Moor, Durham.

STAPLEFORD (NOTTS.).—An excellent programme is being followed, with Cricket, Cycle Runs, Treasure Hunts and other outdoor activities prominent. Alternative Club room programmes are arranged in case of bad weather. Model-building and Hornby Train Nights also are arranged and indoor games played. Club roll: 12. *Secretary:* P. K. Dennis, 36, Hicking Lane, Stapleford, Notts.

BRANCH NEWS

NORTHAMPTON (ABINGTON). — A baseboard has been made for the track, which represents the L.M.S. lines from Euston to Holyhead, Manchester and Liverpool, with branches. The track occupies two rooms. Both clockwork and electric working are carried out regularly at meetings. A visit is planned to the New England (Peterborough) engine shed of the L.N.E.R. *Secretary:* A. M. Nisbet, 116, Park Avenue North, Northampton.

WATERLOO (DUBLIN).—Full lighting has been restored to all stations, and traffic on the Branch railway has been continued. The relaying of the entire line is planned and will be carried out as soon as more material becomes available. Locomotives and rolling stock have been kindly lent by various members and friends, particularly during busy seasons. *Secretary:* S. B. Carse, 38, Oakley Road, Ranelagh, Dublin.

HORLEY.—Meetings are being held at the homes of members, and during the summer garden layouts have been arranged. In each case timetable operation is followed, with both express passenger and goods trains. *Secretary:* A. J. Murray, "Glendalough," The Grove, Horley, Surrey.

MILL STREET AND ST. OWENS (HEREFORD).—An excellent Branch room has been secured. It has a platform round it, on which the Branch track is being laid down. This includes a large goods siding, and interesting operations are expected when the track is in complete running order. *Secretary:* H. Bland, Berrington House, King Street, Hereford.

GIFFNOCK.—Members are very busy extending the layout, adding scenery and carrying out operations. The programme also includes visits. *Secretary:* J. S. Cant, 13, Forres Avenue, Giffnock, Glasgow.

Hornby-Dublo Coal Traffic

THE transport of coal is an important feature in railway working, and indeed the earliest forms of railways in this country were developed originally for this purpose. On any miniature railway too, even the simplest, a "coal" train is invariably one of the earliest items, whether the wagons actually carry coal or not. Coal traffic in miniature can include a variety of interesting operations, and on this page we deal with a few schemes for the benefit of Hornby-Dublo owners.

As regards layouts, most Dublo railways include one or two sidings. If we have only one it is still possible to operate a reasonably realistic running programme as we shall see later. We will suppose too that the rolling stock at our disposal includes a few open wagons; and if we are lucky enough to possess either a Dublo Coal Wagon D1 or one of the high-sided Coal Wagons D2, we have exactly the equipment we require.

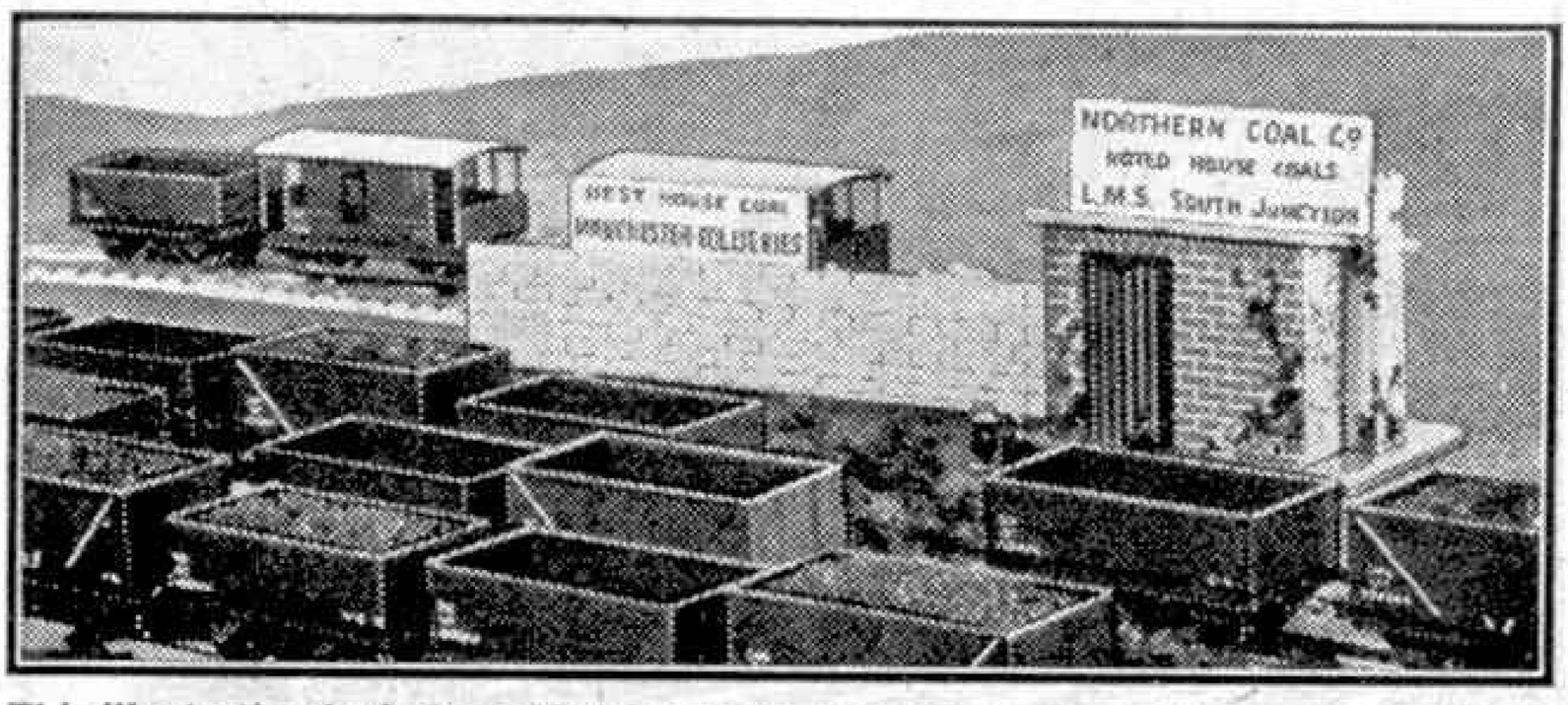
For a coal train of course we must have coal, or at least our wagons must be loaded. Probably every model railway owner passes through the stage when nothing less than real coal in his wagons will do. This, however, is a messy business, especially if the coal is taken straight from the domestic stock and used to fill up the wagons. Apart from the weight thus added to the train, which may cause the locomotive to object, this scheme is not too popular with parents, for obvious reasons! An overturned wagon full of bits of coal and dust means trouble.

To get over this difficulty the standard Hornby Coal Wagons D1 and D2 were provided with moulded loads representing coal. It is possible, however, that if our wagons of these types have been obtained from a previous owner, as so often happens in these days, the original loads have been lost. So we have to set about providing a substitute. This is not difficult, and has been described before in these pages. Briefly the scheme is to make up a false bottom of card, like the lid of a box, that will fit neatly inside each of our wagons, the top being just below the upper edges of the wagon sides. The top surface is painted black and when dry is covered with glue or Seccotine. Into this are set small pieces of coal that have been left to soak in water to remove the dust and then allowed to dry. This "washed" coal is clean to handle, and when once stuck down is not likely to cause any trouble.

When we think of real coal trains we nearly always call to mind the long trains of nothing else but coal wagons trundling along behind a big main line mineral engine. The Dublo System has not yet expanded sufficiently to make such trains possible, but we can have a great deal of fun in assembling and finally distributing a train of coal wagons on a less ambitious scale. In any case the assembly and distributing processes are much the same whether the main line haul is long or short.

Let us begin operations with a locomotive, the handy Dublo 0-6-2 Tank of course, and a Goods Brake. Even if the latter is not of the same company as the engine it will not matter much nowadays, as we often see "foreign" brake vans on the trains of our particular local railway. Our loaded coal wagons must be standing in the siding if we have only one, or they can be more dispersed if we are fortunate enough to have several. The engine and van make a series of journeys round the main line, calling at each siding in turn, or making a succession of stops at the same siding if our layout is restricted in scope. Each call will represent a different colliery, and finally when we have collected a complete train the whole can be run several times round the whole circuit.

At this stage in real practice a "trip" working of this kind usually ends at a big marshalling yard, where traffic is concentrated for various centres and block trains for different destinations are despatched. Probably we cannot carry out such operations in detail owing to limited quantities, but we can run the train into a siding or loop in order to change engines for the main line stretch of the working. If we have no other engine, then the halt can be made use of to "coal and water" our tank engine and generally prepare it for a more or less lengthy run. If we have another engine, a Dublo 4-6-2 Streamliner for instance, it will be quite in order under the working conditions of to-day to attach it even to a coal train.



This illustration includes a Hornby Platelayers' Hut, adapted to serve as a "coal office" as suggested in this article.

Whichever way we manage things our train can make several halts in the course of its journey for "train examination" and "loco. purposes." On a clockwork line these halts can be made use of for the necessary winding of the engine. Then finally another stop is the prelude to the last stage of operations when the train makes a few local journeys with several stops, supposedly to dispose of the different wagons at various local yards. This final job of course is normally a tank engine duty, at least on a Dublo layout. We must not forget that our locomotive depot will require supplies of coal from time to time, and one or two wagons from our train can be set aside for this purpose.

Alternatively we can make use of the Dublo High-Capacity Wagon. Although primarily intended for the carriage of brick traffic it will not be unreasonable to use it for "loco. coal." A point in favour of the inclusion of this vehicle in a coal train is the fact that it represents an automatic brake-fitted vehicle. As such it should be run behind the engine, its brake power then being supposedly available to assist the engine in controlling the train, which in real practice would be loose-coupled and unbraked on the run except for the guard's hand brake.

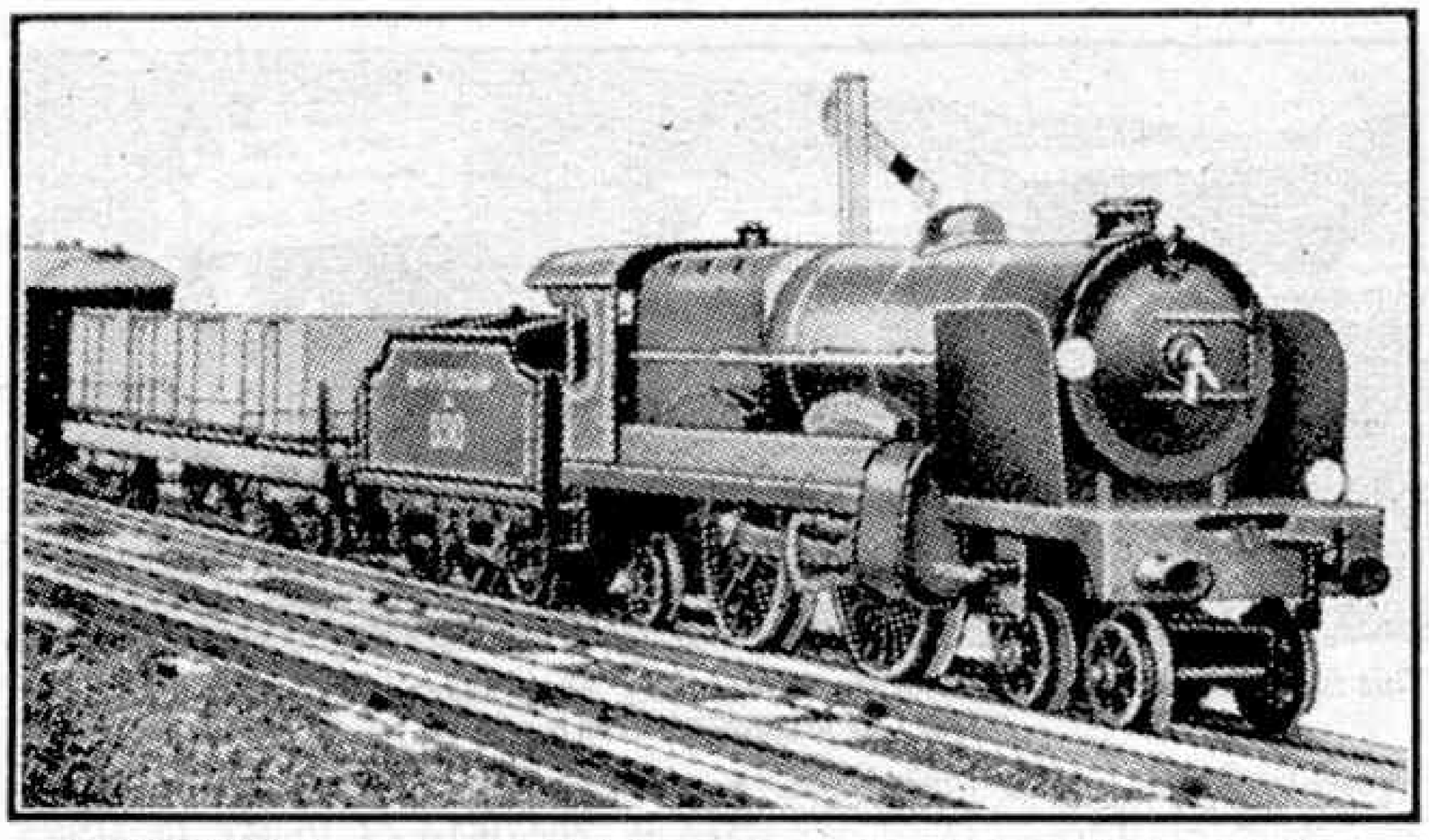
In conclusion we should carry out similar operations in order to work back the corresponding empty wagons to the loading points, the miniature "loads" being temporarily "parked" somewhere out of sight while this part of the operations is going on.

The Hornby Platelayers' Hut makes a suitable coal office, or we can make one from wood or cardboard.

Unusual Operations for Hornby Railways

ONE of the most familiar workings in real or model railway practice is the running of a local "pick up" goods train. It potters along from point to point, distributing and picking up traffic, and in spite of its leisurely habits it plays an important and essential part in the conduct of freight traffic. We have often dealt with the operation of a train of this kind in miniature, and so long as the goods accommodation at wayside stations is satisfactory there are no snags attached to its working.

Whatever arrangement the sidings in any particular goods yard may follow, the provision of a goods loop off the main line is of considerable advantage. The loop, having points at each end, can be entered or left equally easily no matter which direction the pick-up goods train is following. It provides also the means for the engine to run round its train if necessary in the course of operations, or for manœuvring particular vehicles into or out of the yard according to the "lie" of the goods sidings in relation to the main line.



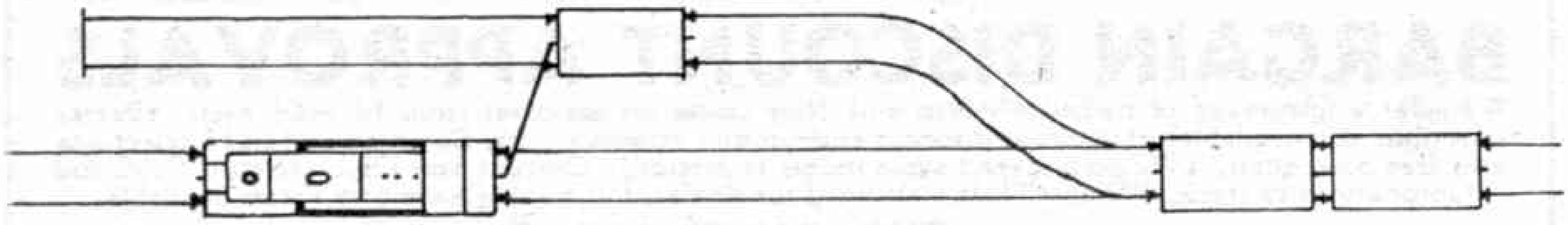
A Hornby S.R. express hauled by a No. 3 "Lord Nelson" Locomotive.

Sometimes, however, owing to lack of space or lack of material, we may have to do without a loop line and be content with a plain dead-end siding. This is quite good as far as it goes, so long as the points leading to it off the main line are "trailing" to the normal direction of running of the trains. Problems arise, however, when the points are "facing" to trains moving in the normal direction. That is to say the trains approach the single end of the points, and can either be directed to the branch line or siding, or can continue straight on, according to the way the switch rails of the points are set.

For example, let us consider the situation at the siding shown in the accompanying diagram. The train shown, travelling from right to left, has approached the siding, and it is required to detach the first wagon and place it in the siding. We uncouple the first wagon from the rest of the train; but if we run the engine and this vehicle straight into the siding the engine will be unable to rejoin the train and proceed on its way.

In actual practice this difficulty could be overcome by using a shunting horse to haul the wagon into the siding after the engine has moved forward clear of the points. In remote places, however, a horse would not be available, and the method used is indicated in the diagram. The engine stops at the facing end of the points and is unhooked from the first wagon, which is itself also detached from the rest of the train. The engine moves forward clear of the points, and then stops while a length of steel cable is used to connect it again to the first wagon. The points are set for the siding, the engine moves slowly ahead to take up the slack in the cable, and then continues hauling so that the wagon moves into the siding and can be left there. The engine is then free to back on to the train again and resume its journey. The siding of course must be parallel to the running line and must not be at too great a distance from it.

This scheme can be made use of in similar situations in miniature, but the operation must be carried out slowly and carefully otherwise we may have trouble. For the cable connecting the engine and the wagon a length of Meccano Cord will do very well, or failing that a piece of smooth light string, a loop being tied at each end to slip over the coupling hook.



This diagram illustrates the unusual shunting operation referred to in this article.

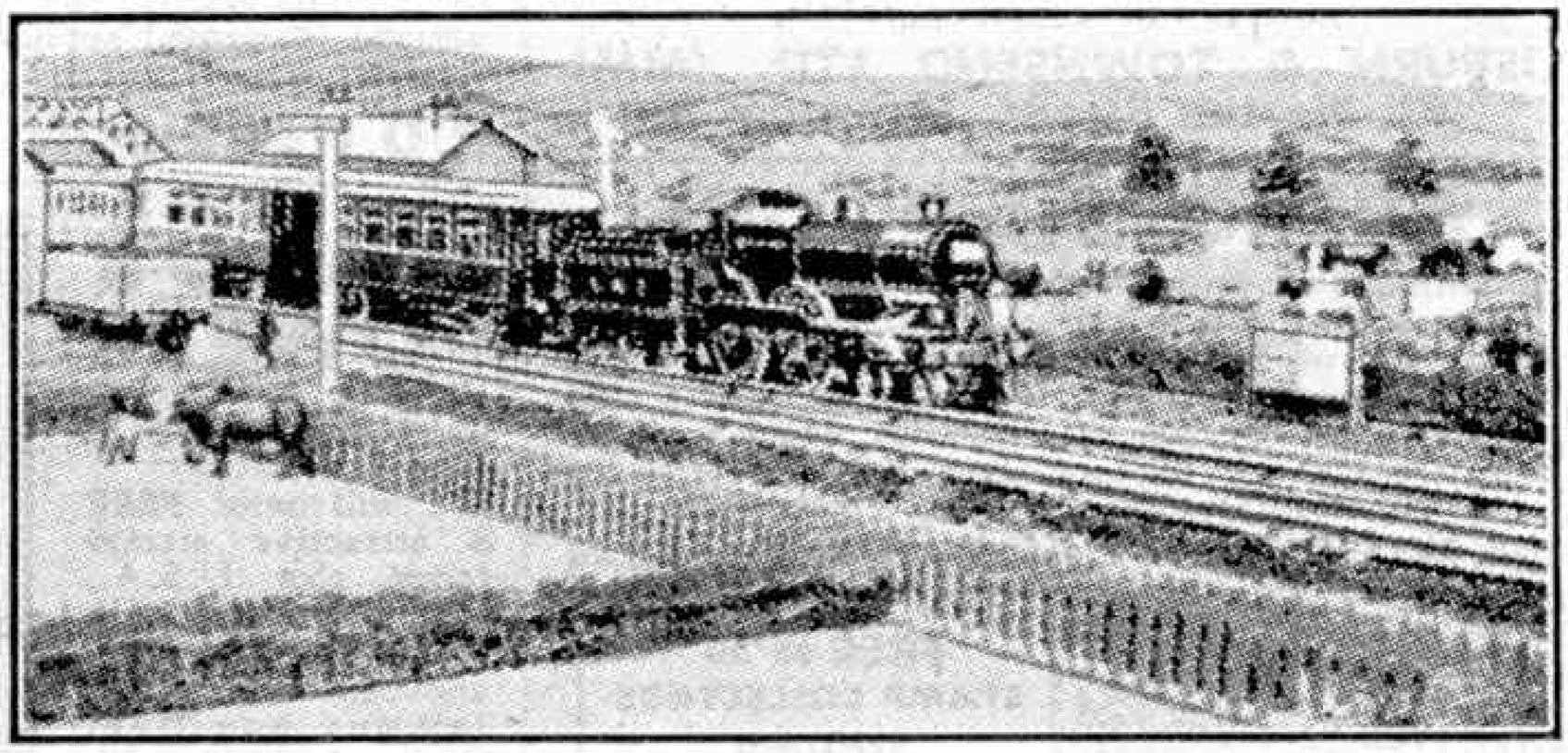
The actual length of the miniature cable will depend on the distance of the siding from the main line and should be determined by experiment. It must not be too short or it will lie at too sharp an angle between the engine and the wagon, and the pull sideways on the latter may cause it to come off the rails. Readers will find entertainment in experimenting with this unorthodox but quite effective little idea.

Military traffic of various kinds continues to be a feature of British railway operation, and many readers have made a practice of representing this in various ways on their own layouts. Ambulance trains are distinctive, and we gave some general hints regarding these in the Hornby Railway pages of the "*M.M.*" in October 1944. Trains for normal troop movements usually consist of main line passenger stock, and there is invariably attached at the rear a considerable "tail" of vans for baggage purposes. This can be copied on a small scale, using either vans of the passenger train type such as the No. 1 Guard's Van, or the "fitted freight" type of vehicle such as the No. 1 or No. 2 Luggage Van. In addition, perishable traffic vehicles that owing to present conditions have little application for their original purpose, can be pressed into service.

Those who like to mix their engines and stock, or rather to operate the engines and stock of different companies together, have plenty of justification for doing so nowadays. Engines are still seen well off their normal beaten tracks for various special purposes, and the assortment of vehicles used for special trains is at times quite odd. Therefore we can have quite a lot of fun making up and running a thoroughly mixed lot of trains, especially if we combine forces with one or two model railwaymen.

In actual practice special trains are distinguished by a code number displayed on a board carried on the front of the locomotive, a favourite place being on the smoke-box door. We can easily provide suitable "boards" for our miniature locomotives by cutting a few rectangles of thin card about $\frac{1}{2}$ in. long and $\frac{3}{8}$ in. deep.

To attach the board we can form a little "loop" of similar card and gum this behind the actual board so that the locomotive lamp bracket below the chimney will fit nicely into the space between the board and the loop. This method requires patience and care, and we must allow the gum to set hard before we use the board. Another method is to pierce two small holes with a pin, one near each end of the top edge of the board. Through these holes we thread a length of cotton and tie this up to form a loop by means of which the board can be hung from the top lamp bracket on the engine front.



A special train on a Hornby layout hauled by a model L.M.S. "Standard Compound."

Another interesting scheme is the operation of a pull and push train. As we have explained in previous "*M.Ms.*," the engine of a motor train pulls the train in one direction, but pushes it in the other. In the latter operation the driver rides in a special compartment at what now becomes the leading end of the train and arrangements are made to control the working of the engine and the braking. A realistic motor train can be built up by using a small tank locomotive with one or two bogie coaches.

For other Stamp Advertisements see also pages 318 and viii.

Stamp Collecting

The Pictorials of New Guinea

By F. Riley, B.Sc.

NEW GUINEA, the next place of call in our Empire stamp tour, is a country in which we have all taken great interest in the war years. At times there were signs that the Japanese would overrun it, as they did British Borneo and Sarawak; but the Battle of the Coral Sea, followed by the great advance of the Australian forces over the Owen Stanley Mountains, the backbone of the island, relieved our fears. Since then the Allied Forces there have gone on to one victory after another.

Apart from its war interest, New Guinea possesses many attractions for us. It is an immense island, 1,500 miles from one end to the other, with a greatest width of about 430 miles. It is in the tropics and the rainfall is ample, with the result that the country is almost buried in thick jungle and scrub. Fighting their way through the almost impenetrable jungle has indeed been one of the greatest difficulties that confronted the Allied troops who reconquered the parts seized by the Japanese. Around the coasts there are mangrove swamps in which mosquitos breed, and there the heat is oppressive and exhausting; but inland every grade of climate is represented as the land rises until the summit of the mountains are reached, and these are snow clad.

Animal life too is plentiful on the island, with tree kangaroos and wallabies, crocodiles and snakes; and there are many wonderful birds, from the cassowaries with their black plumes, birds of paradise, kingfishers, parrots and pigeons, to the bower bird, which builds a great nest around sticks and trees and then decorates it with flowers. Insects also are plentiful. Perhaps the most remarkable of these are the butterflies, gorgeous in colour, and some of them so large that they can be hunted with a shot gun. One species has yielded specimens measuring almost a foot across the wings.

The natives are no less interesting, for New Guinea in large part is still in the Stone Age, with head hunting and cannibalism not far behind. So there is ample scope for the production of attractive pictorials.

The first stamp design of British New Guinea or Papua appeared in 1901 and shows a lakatoi or native canoe, with a native village in the background. The canoe is easily recognised by the curious shape of the sail, which can be seen on two of the stamps illustrated on this page. This was a good start, but the one pictorial in different values had to satisfy collectors and others until 1932. In the meantime it had been pressed into service on air-mail stamps twice, in 1929 by overprinting the words "*Air Mail*" and in 1930 by overprinting with a crude representation of a monoplane. Airmail became of great importance in New Guinea when gold was discovered in the interior, for there were no roads to the goldfields and practically all transport had to be dealt with by air.

This brings us to the 1932 set, a very long pictorial one. The subject of the 1d. stamp, shown on this page, is the son of a Papuan chieftain. Other natives pictured include a masked dancer, a Papuan dandy and a native policeman. The lakatoi also reappears on one of the stamps of the 1932 issue, and tree houses are shown on the 1½d. value. These are typical of New Guinea village life. The houses are built high up among the branches of tall trees and the inhabitants are able to pull up the ladders after them to prevent the approach of enemies.

Of this fine set the stamps of the lower values are reasonably priced, and when well arranged make a splendid display in the album. Those who can add the higher values will have a display that will give them the greatest satisfaction.

Four of these pictorials reappeared as Silver Jubilee stamps, in each case suitably overprinted. The country had already celebrated a jubilee of its own in 1934, the 50th anniversary of the declaration of the British Protectorate; and the occasion was marked by the issue of four stamps in two designs, one of them showing the Union Jack being hoisted at Port Moresby, the capital. Another interesting pictorial came in 1938 in the form of an air-mail stamp in celebration of the jubilee of the declaration of British possession, showing Port Moresby, with an aeroplane flying over the harbour; and in the following year there came another air stamp, this time showing natives pulling rafts.

At the time when the British Protectorate was declared, part of New Guinea was in German hands. Soon after the outbreak of war in 1914 Australian forces took possession of this, and it came under Australian mandate when peace was declared. It was then called the Territory of New Guinea and extended to New Britain and other islands in the Pacific, with Rabaul as the principal centre. Collectors should bear in mind the distinction between Papua and the Territory of New Guinea. The first stamps that appeared in the latter under British control were German stamps overprinted for the use of occupying forces. These were followed by a few pictorials, showing such subjects as a native village and a bird of paradise.

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For other Stamp Advertisements see also pages 316 and viii.

Stamp Gossip

and Notes on New Issues

By F. E. Metcalfe

BY the time these words appear in print the long-promised sets for Nyasaland and Jamaica will be out and on sale. Whereas the former set is of a permanent character, that for the West Indian colony is for one year only; so those collectors who do not wish to buy both at once—for the total face value is considerable—had better buy the Jamaica set first. Next month we hope to illustrate one or more stamps from each set.

Both sets have been mooted for a long time, and the Jamaica stamps are well overdue.

There is no definite news yet from Australia regarding the proposed stamp to be issued in honour of the late President Roosevelt. The writer has before him a letter which he received from the Postmaster-General's Department in Melbourne, stating that no decision has yet been reached. The letter is dated 11th May, so it looks as though the idea has been turned down; otherwise there would probably have been news by cable before this.

One very interesting item in the August number of the Crown Agents' Bulletin is the news that three new stamps are to be issued for St. Lucia, of values 8d., 3/- and £1. The significant point is that not only are these very unusual values for St. Lucia, but the designs are to be similar to the small stamps at present in use, up to 3d.

As already mentioned, Malta is to have a new set, and according to reports the stamps will be smaller than those in use now. So putting two and two together it may mean that the colonies are now inclining towards stamps cheaper to produce. It is to be sincerely hoped not, for the attractiveness of the present pictorial stamps has a great deal to do with their popularity, and the saving of a shilling or two a thousand is a drop in the bucket indeed compared with the profit earned on the sale of stamps to collectors.

And what about this month's new issues of foreign stamps, as distinct from colonials? Well, the good old U.S.A. once more obliges, and we are able to illustrate the first of a set of four issued in honour of the late President Roosevelt. This is the 3 c., and the others, of values 1 c. 2 c. and 5 c., will appear at intervals of a month. Each stamp bears a portrait of the President and shows a picture of a place connected with his life.

Perhaps the most popular design for a stamp is one showing a ship. A good second is one depicting a railway engine, and the Peruvian stamp illustrated this month shows a real old-timer, the sort of engine which was apparently pulling our train when we took that August Bank holiday trip! Quite a few used Peruvian stamps arrive in this country, so the stamp in question, part of a short set, should get into quite a few collectors' hands.

Victory stamps are all in the air. Both New Zealand and South Africa are definitely preparing sets. Canada and Australia are said to be doing the same and many of the colonies will undoubtedly follow suit. Apparently the appearance of these particular stamps was delayed until Japan had been polished off. However, Brazil has got cracking already, and we are able to illustrate one of a set of five issued to celebrate the victory in Europe, in which victory Brazil played her part. It is a pity collectors will have to be content with odd used values of this set, for they are quite handsome and o course welcome, coming as they do from our ally.

Apparently we have not yet come to the end of the London-produced stamps for the French Colonies. The latest set to show up is one of 14 values from 5 c. to 20 f. issued by French Equatorial Africa. Like the rest of the sets the stamps have a shoddy appearance, and the less said about the design the better.

A pleasing contrast is a stamp from a letter that recently arrived from Belgium. It is not particularly new—it forms part of a set of 10 issued for charity—but is such a delightful contrast to the French colonial stamp that we cannot refrain from illustrating it. Study the design carefully; note the frame, background and the pose of the figure.

The tip for the month. Buy your set of Channel Islands now, but don't give more than you need. Sets of 13 values are being offered at round about 25/- as this is written.

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.

A PREFABRICATED "CASTLE"

There have been in recent issues of the "*M.M.*" two stories of houses built in a day, and to these I can add an instance of a castle built in the same time. This happened nearly 200 years ago, and provided a curious early example of prefabrication.

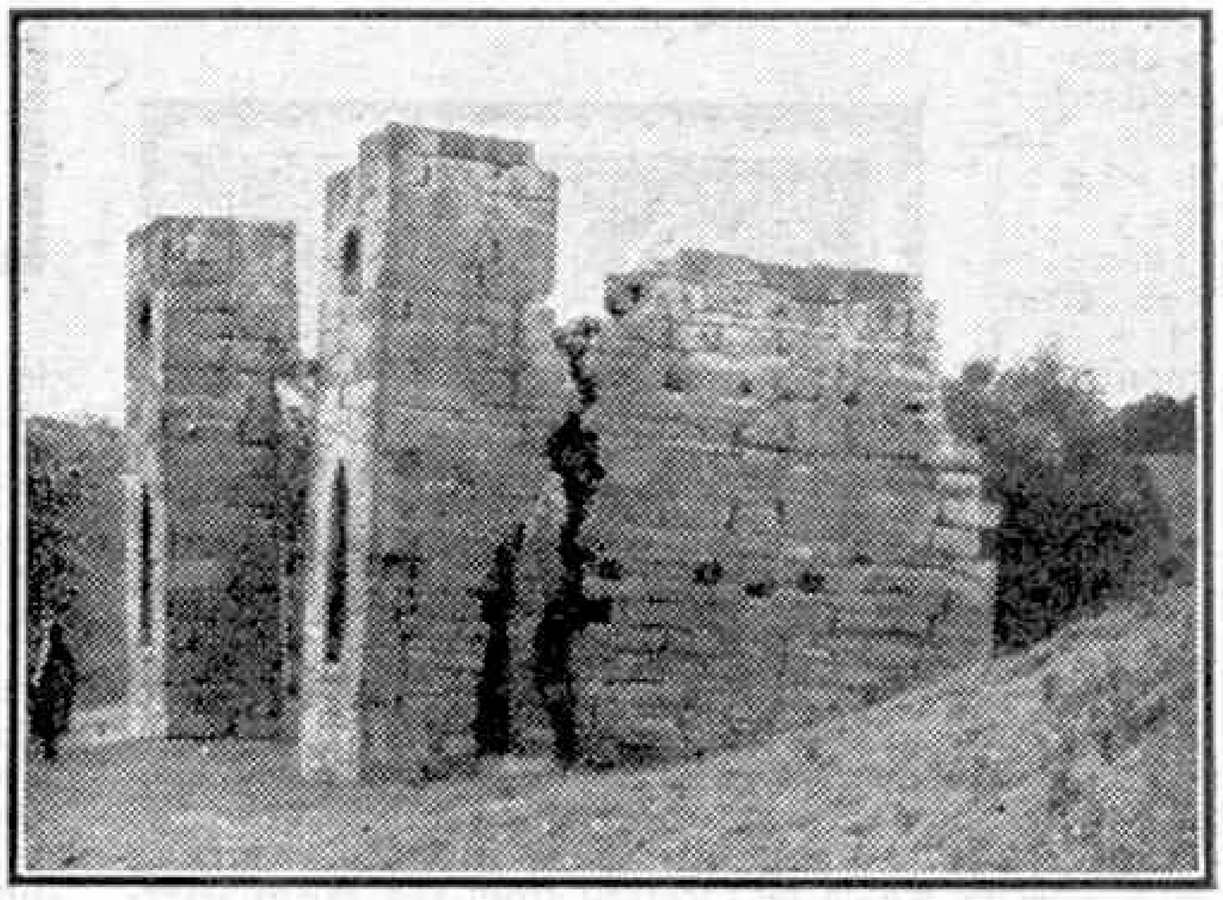
Sir Francis Delaval, whose ancestor by the way came over with the Conqueror from Laval in Normandy, was perhaps the gayest of the gay Delavals, of Seaton Delaval Hall, in the south-east corner of Northumberland. He entertained lavishly, and one of his guests in the year 1750 was Samuel Foote, the celebrated actor, with whom he made a wager that he could build a castle in a day if he could be allowed to choose the particular day.

Sir Francis fixed upon a day almost a month ahead, and immediately engaged an architect and an army of workmen preparing the stone. On the appointed day the work of erecting the prefabricated structure began with the coming of daylight. It was completed, so the story goes, by starlight, and hence the original name of Starlight Castle for the structure.

The castle is in miniature, but is quite substantial. It is built of stone, and has two storeys, with two rooms up and two down, each with a fireplace. It was certainly habitable for it was occupied continuously up to the year 1900.

The castle is built on the grassy slopes of the Seaton burn, where it overlooks a delightful sweep of Merkel Dene, or Holywell Dene as it is now more generally known.

J. DUREY (Newcastle-on-Tyne).

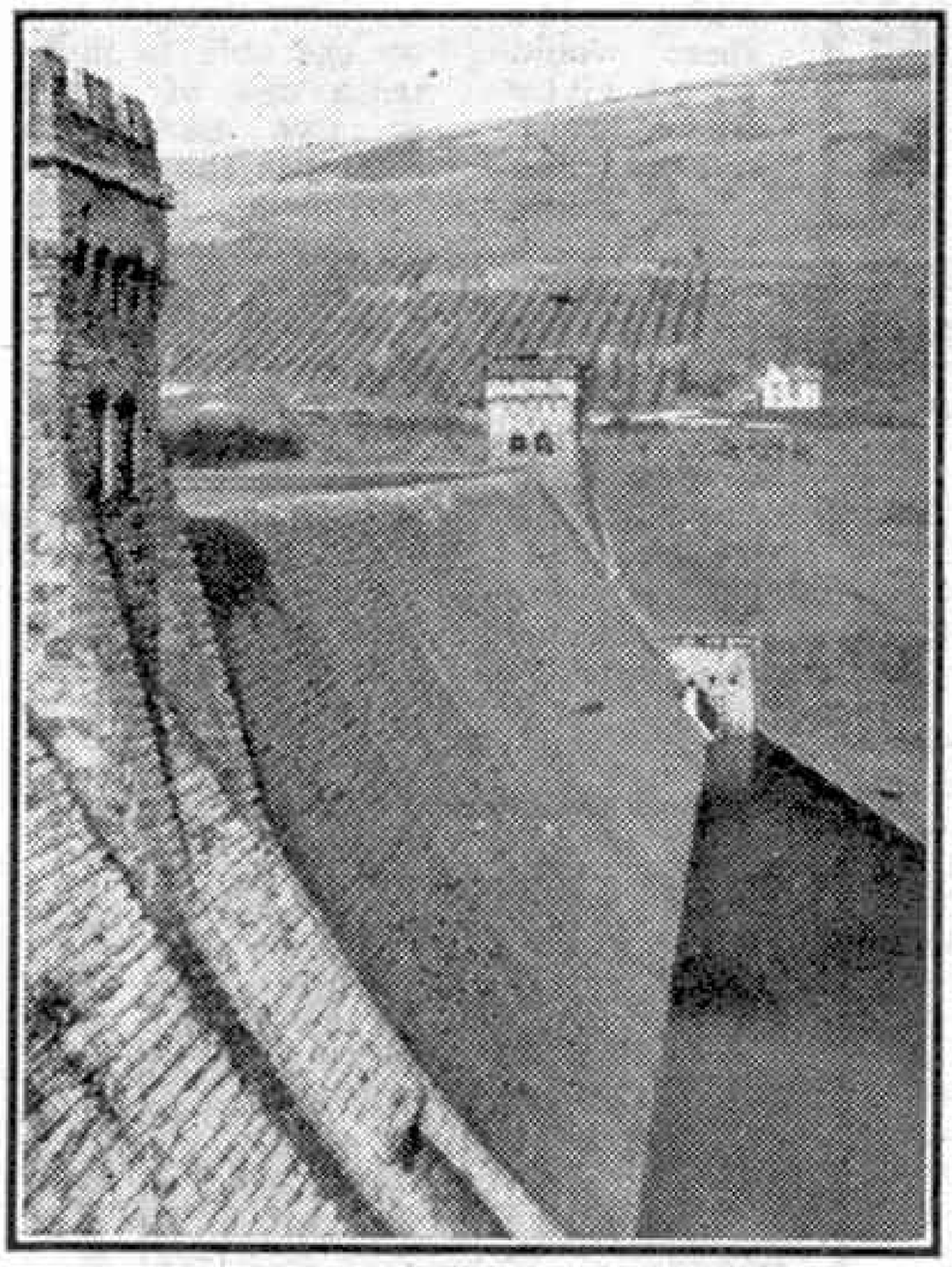


Starlight Castle, built in a day. It is nearly 200 years old and derives its name from its completion by starlight. Photograph by J. Durey, Newcastle-on-Tyne.

THE DERWENT VALLEY DAMS

Visitors to North Derbyshire who are not familiar with the region are often surprised at the size of the great reservoirs constructed by the Derwent Valley Water Board. The first to be constructed were the Howden and Derwent Reservoirs, which were completed in 1912. The dams are built of masonry and are exceedingly massive and impressive structures. The weight of stone in the two together has been estimated at over 1,200,000 tons.

The more northerly is the Howden Dam, which is 1,080 ft. long and 117 ft. high above the valley floor. The Derwent Dam, which is shown in the accompanying photograph, is 1,110 ft. long and 114 ft. high. The foundations extend downward for a further 54 ft. to the shales and gritstones on which the dam rests. These rocks are so crushed and contorted that they are not watertight, and it was necessary to sink waterproof concrete curtains below the dam foundations.



Derwent Dam, one of the great dams built in Derbyshire by the Derwent Valley Water board. Its height is 114 ft. Photograph by A. W. Bull, Beeston, Notts.

The curtains extend along the whole length of the dams and into the hills on each side of the valley. In the Derwent Dam the curtain, which is 6 ft. wide, extends downward for 55 ft. below the foundations, so that the dam is over 200 ft. in height from the bottom of the curtain to the crest.

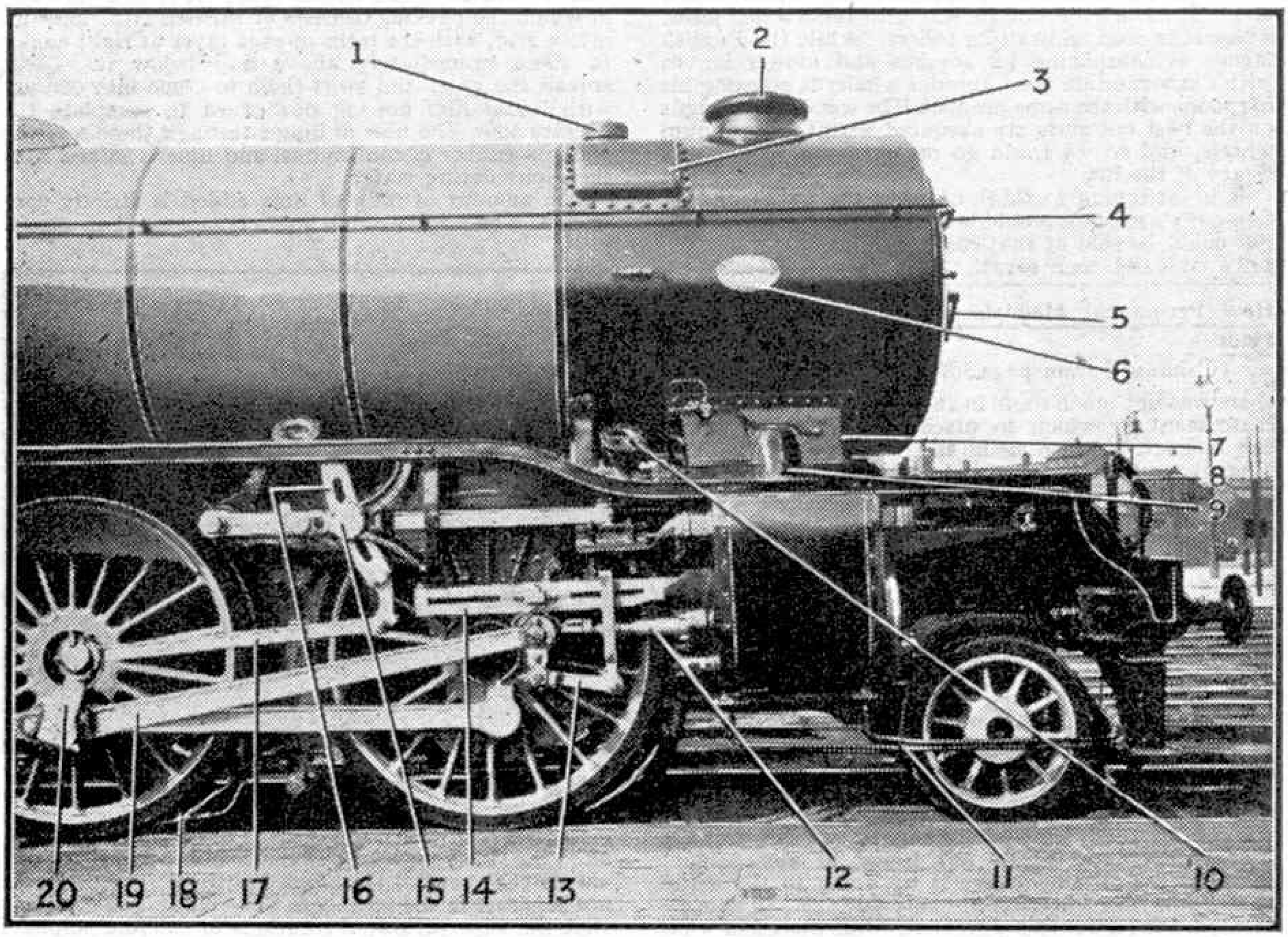
The third and largest of the chain will be the newly constructed Ladybower Reservoir, in which the level of the water is steadily rising. Unlike the older reservoirs it has a dam of the embankment type, with a watertight core of "puddled" clay that extends down to the impervious rocks and into the hill sides. The clay core is supported by massive earthen embankments.

Systematic afforestation is being carried out in the vicinity of the reservoirs, evidence of which can also be seen in the illustration. This will help to preserve the natural beauty of the Valley, although much of course must be ost. As already noted in a previous article on this page, Derwent Hall, an old coaching inn and two villages will disappear under the waters of Ladybower Reservoir.

A. W. BULL
(Beeston, Notts.).

Competitions! Open To All Readers

What Locomotive Parts are These?



The various parts of locomotives and how they work are of interest to all *"M.M."* readers, and this month's contest is designed to give them a chance to put such knowledge to profitable use.

The illustration on this page shows the front end of one of the L.N.E.R. "Green Arrow" locomotives. Certain carefully selected parts have been distinguished by numbers, and competitors are required to name them. In the entry the number and name of each part should be given, followed by an account of its purpose that should be brief. Entries must be written on one side of the paper only, and on the back of each sheet submitted must appear the sender's name, full postal address, and age.

The contest will be divided into the usual Home and Overseas sections, in each of which prizes of 21/–, 15/– and 10/6 will be awarded to the competitors who submit the best sets of answers. A number of Consolation prizes also will be awarded, and in the event of a tie for any prize, neatness and general novelty will be the deciding factors. Entries should be addressed: *"September Locomotive Problem, Meccano Limited, Binns Road, Liverpool 13,"* and should be posted to reach this office not later than 31st October in the Home Section and 30th April 1946 in the Overseas Section.

September Photographic Contest

This month's photographic contest is the 9th of our 1945 series, and in it, as usual, prizes are offered for the best photographs of any kind submitted. There are two conditions — 1, that the photograph must have been taken by the competitor, and 2, that on the back of the print must be stated exactly what the photograph represents. A fancy title may be added if desired, but entries on which the conditions stated are not observed will be disqualified.

Entries will be divided into two sections, A for readers aged 16 and over, and B for those under 16. They should be addressed: *"September Photo. Contest, Meccano Magazine, Binns Road, Liverpool 13."* There will be separate sections for Overseas readers, and in each section prizes of 15/– and 7/6 will be awarded. Closing dates: Home Section, 29th September; Overseas, 30th March 1946.

The Romance of Carborundum—

(*Continued from page 297*)

textile machine parts, and a tiny manicure file for my lady. Huge muffle furnaces of Carborundum and tiny rods for the grid circuits of radio sets. Mosaic workers use large Carborundum slabs for surfacing their floors, and the surgeon hones his tempered instruments with a stone made from the finest Carborundum flour. It has even found its way into the woollen mills, where it is used on drafting rollers. While the English farmer is sharpening his scythes and mower knives with Carborundum the Labrador whaler is pointing his harpoons with the same product. The wonderful designs on the best cut glass are executed with Carborundum wheels, and so we could go on until the reader was weary of the list.

It is intriguing to think of what the Carborundum Company's revenue would be if its present colossal output could be sold at that early price of 1/8d. per carat!

How Permanent Magnets are Made—

(*Continued from page 307*)

there was not much room in the instrument in which to place the magnet, because again the magnet could be made shorter and thicker. This alloy was lighter and tougher, and though it cost a little more, it was not more expensive per unit of energy obtained.

Since then a still more important magnet alloy has been discovered, but about this not much can yet be said, because for the period of the war certain facts about it had to be kept secret. It is, however, essentially a development of the nickel-cobalt-aluminium-iron alloy, in which the proportion of these elements are slightly varied; but the highest magnetic values yet found in any magnet material are obtained from it by doing to the metal something that sounds extremely strange. It is heat-treated, that is subjected to heat, while placed in what the electrical engineer terms a powerful magnetic field. The properties thus obtained enable a smaller magnet to be produced without any loss of energy as compared with a nickel-cobalt-aluminium-iron alloy of double the size. Thus, not only can more be done with this material, but the size of the magnet for different uses can be cut down considerably. Correspondingly, the cases and other parts of the instruments containing these magnets can be greatly reduced in size, which all means a lowering of cost when the instrument reaches the purchaser or the shop.

It must, however, be pointed out that this material is more expensive than other alloys per ounce of weight, and its special importance lies in the direction of reducing the size and weight of the larger magnets.

Even now, the discoveries of the magnet maker have not ceased. An important new development is the making of magnets from suitable metal powders, which are compressed into the required shape at a high temperature. These "sintered" magnets are designed for intricately shaped magnets that are difficult to cast in small sizes. They can be made in sizes weighing as little as a few grammes each. Their magnetic values are a little bit less than those of the corresponding magnet alloy made in the ordinary way, and they are only economical to use when very large quantities are required. This is because the tools required to make them are very expensive.

So many remarkable developments have been introduced during the last twenty years in the making of magnets that it would be foolish to prophesy that we are yet at the end of the metallurgist's resources in this direction. It is, however, good to realise that British magnet makers have always been in the forefront of these inventions and discoveries, and will continue to be so in the years to come.

Chimneys Without Smoke—

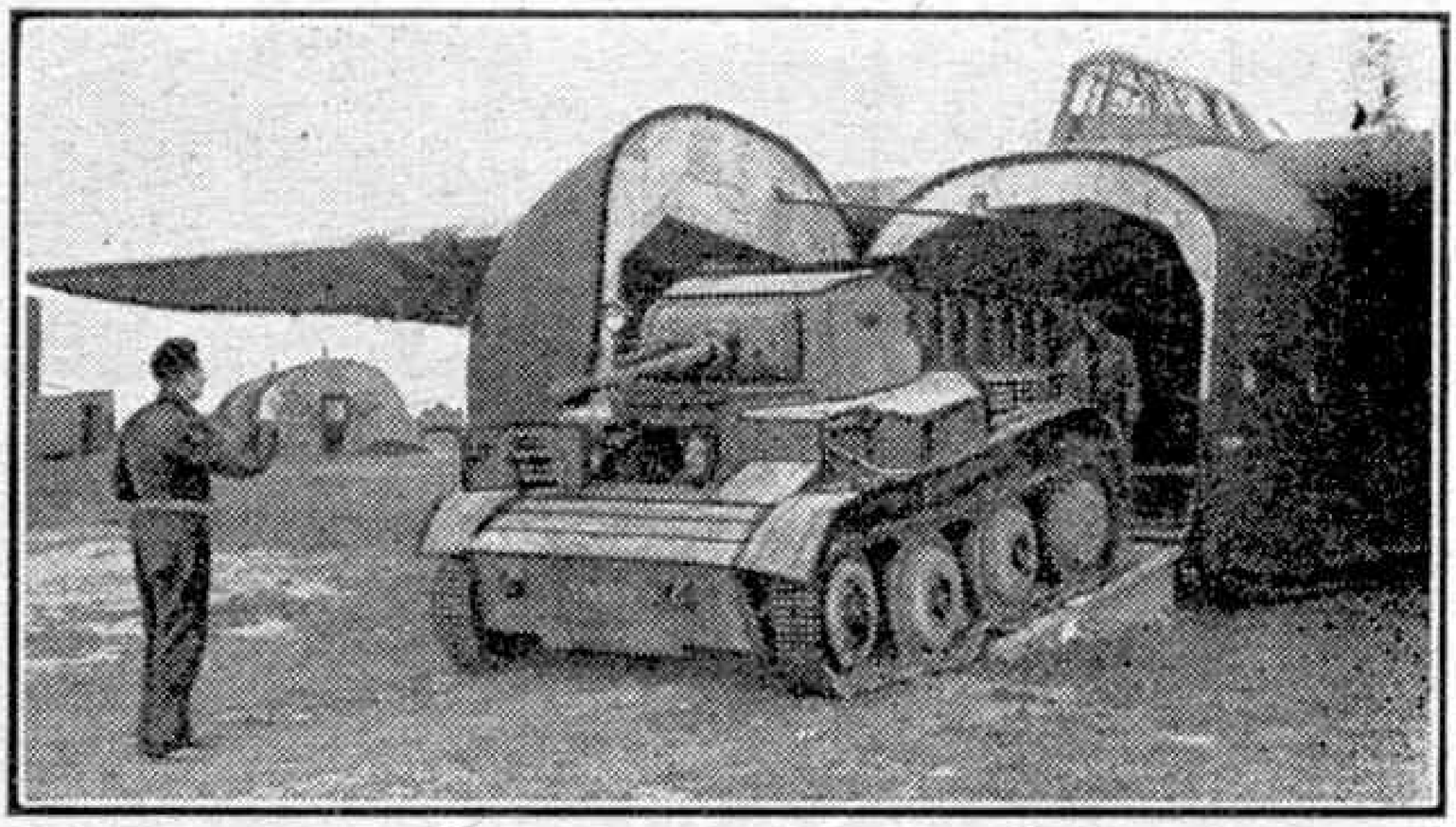
(*Continued from page 291*)

element section, as it is called. After passing through this section the gases rise to other scrubbing surfaces, in which the packing consists of wooden laths built up into a grid, with the laths of each layer at right angles to those immediately above and below it. These spread the gases and swirl them to come into contact with liquid film flowing downward to complete the purification. The flow of liquor through these sections of the scrubber is continuous, and lime is mixed with the recirculating water.

The amount of milk of lime added is strictly controlled. The acidity of the liquor is measured on special instruments in which use is made of thermionic valves, and the instruments automatically operate needle valves that control the supply of lime. The solids do not separate in the scrubbers. The plant is so arranged that the supersaturated solutions of calcium sulphate and sulphite crystallize out in special delay tanks, through which the liquor passes after leaving the scrubbers and before it is re-circulated. This keeps the scrubbers and their packing clear of scale.

As solids accumulate in the washing liquor part of the washing liquor is drawn off and allowed to settle in conical settling tanks, from the bottom of which the solids are drawn off as a mud or sludge. This is run into barges for disposal, and to prevent it from forming a solid mass incapable of flow it is agitated by blowing compressed air through it. The clarified liquor from the sludge tanks is eventually pumped back into the washing system.

How efficiently this plan purifies the gases before these find their way into the atmosphere through the chimneys is shown by the fact that the amount of sulphur is usually reduced to six thousandths of a grain in a cubic foot. This is well below the permitted figure of three hundredths of a grain per cu. ft., and corresponds to the removal of 99 per cent. of the sulphur originally present in the coal burned in the furnaces. The efficiency of dust extraction is also very high, only the merest traces of this passing out to the atmosphere in particles so small that more than 5,000 of them placed side by side would form a line only an inch in length.



A "Tetrarch" tank backing up the ramp into a G.A. "Hamilcar" glider.

COMPETITION RESULT

HOME

May "Layout Planning" Contest. — 1st Prize: D. H. Earle, Wembley Park; 2nd Prize: S. Andrews, London S.W.17; 3rd Prize: G. C. Flowers, Woodford Green.

Fireside Fun

Agent: "Don't you want your office furnishings insured against theft?"

Manager: "Yes, All except the clock. Everybody watches that."

* * * *

"It's been a long tiring journey."

"Aye! And so it ought to be for the money!"

* * * *

"Before Albert was married he said he would be the boss or know the reason why."

"And now?"

"He knows the reason why."

* * * *

"Hello, is that Smith's, the hay and corn dealer?"

"Yes."

"Well, send up a bale of hay at once."

"Who is it for?"

"The horse, of course."

* * * *

"I see Jones is going to retire from business for five years."

"Oh, I have heard him say that before."

"But it's true. This time the judge said it."

* * * *

"Why did you raise your hat to that fellow we just passed."

"Well, you see, he sold me a bottle of hair restorer months ago and I did it to show him what a hollow mockery his treatment was."

* * * *

"Ah'm gettin' married soon, boss."

"Good man. Have you fixed up the banns and things?"

"There'll be noa band, boss, just Bill Higgins an 'is concertina. Ah can't afford noa bands."

* * * *

"I see you bought a dog. I thought you didn't like dogs."

"I don't really, but my wife picked up a lot of dog soap cheap at a sale."

* * * *

The fisherman had sat patiently without a bite for hours when a small boy ran up to him, followed by a large lady.

"Let's see you catch a fish, mister," shouted the boy.

"Alfie, you naughty boy, talking like that," cried the large lady. "Don't catch one for him till he says please, mister."

* * * *

THIS MONTH'S HOWLER

Dialect is a language we speak just among friends.

BRAIN TEASERS

NEAT WORK IF YOU CAN DO IT

A corridor 9 ft. long and 2 ft. wide was to be covered with linoleum, but there was only a strip of this measuring 6 ft. by 3 ft. Can you explain how to cut this strip of linoleum into two pieces that will exactly fit the floor of the corridor?

* * * *

A SPELLING NOVELTY

The figure below looks like a haphazard rectangle of letters, but it is more than that, for hidden within it are the names of British or American aeroplanes. How many of these can you spell out, starting anywhere and moving at each step to the next letter above, below to either side or diagonally? Every letter must be used at least once, but you can use each as often as you like.

B O M P N T S
M Q S I A E S
I U R T R L I
H T O F O N G
E C K R I R I
L L S A D V E

* * * *

THIS IS MORE COMPLICATED

Let us turn now to money, but this must take the form of National Savings Stamps. If there are 60 spaces in a National Savings Stamp book, and the stamps are of either 6d. or 2/6 in value, how many different sums can be made up by filling up the book?

When you have worked this out turn to postage stamps and see how to make up 2/- worth with some 2d. stamps, five times as many 1d. stamps and the rest in 2½d. stamps. T.K.C.

* * * *

IN THE SHADOWS

Here is one that you ought to solve without writing anything down, and indeed without much effort. A man 6 ft. finds that his shadow is 8 ft. long, while that of a tree near him is 24 yards long. How high is the tree? T.K.C.

* * * *

"Well, how do you like your new job, James?"

"I'm quite taken up with it, Sir!"

* * * *

SOLUTIONS TO LAST MONTH'S PUZZLES

In our first puzzle last month the number to be divided works out at 8,290 and the diviser is 13. This gives the dividend as 637 with a remainder of 9.

Jim Smith has 63 Meccano Parts, his brother 21 Parts and Johnny Green 126 Parts. This solves our second puzzle.

The lady in our third puzzle was very smart. It is easy to see that altogether the tramp had done 80 jobs in the country, for the three farmers named, but he said that he had done three times as many in the country as in the town. As 80 cannot be divided by 3 he was not telling the truth.

Lastly the family affair. The smallest number of tickets required to take in the long list of people named is 4. If you do not believe this try to work it out again.

MECCANO MAGAZINE

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

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

Readers' Sales and Wants. Private advertisements (i.e., not trade) are charged 1d. per word, minimum 1/-. Cash with order. Readers' advertisements are published as soon as possible; inclusion in the first issue after receiving them cannot be guaranteed.

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

READERS' SALES AND WANTS

SALES

"Modern Wonders," Nos. 11 to 148 inclusive (33 and 57 missing); also 19 copies "Modern World," good condition; lot 20/–, or best offer.—J. Keightley, Rock, Kidderminster, Worcestershire.

38 "Flights" for sale; May 1944 to Feb. 1945; excellent condition; offers to—B. Gibson, Thornfield Crescent, Selkirk.

Meccano No. 4 with others 25/–; Juneero No. 2 25/–; Punch Ball 40/–; Ukulele 21/–; "M.Ms." 1944 comp. 4/–; "B.O.Ps." 1944 comp. 6/–; all in good condition.—D. Jones, Bwlchau, Carmel, Llanelly, South Wales.

Meccano Parts Oddments; excellent condition; very cheap to clear; list available.—Howitt, Farndon, Newark, Notts.

"Meccano Magazines" from August 1936 to December 1944 inclusive; two missing; what offers?; good condition.—54, Gosforth Road, Blackpool.

Hornby Gauge "0" "Flying Scotsman," complete with Tender, Trucks, Station, 40 ft. of Rails, four Points, Acute Angle Crossing, Transformer and Circuit Breaker; all electric; engine requiring slight gear repair; bargain £7/10/–.—Fullerton, 14, Gimhavon Rise, Witham, Essex.

No 2 First/Third Corridor Coach, L.N.E.R.; excellent condition, 12/6.—Salway, 12, Cranborne Avenue, Norwood Green, Southall, Middlesex.

No. 2 Special L.M.S. Tender; new condition; 8/6 or exchange 2 ft. Radius Points.—Harrup, Ashe Park, Nr. Basingstoke.

WANTS

Meccano 2 in. Pulleys with Road Tyres.—Green, 3, Barrow Road, Kenilworth.

In as perfect condition as possible, covers intact: "M.Ms." 1–15 inclusive, Dec. 1922, Feb. and May 1923; up to 10/– each copy. Write first—F. G. Reynolds, 30, Portland Avenue, Sidcup, Kent.

Blank Cartridge Pistol or Air Pistol; must be in good condition; good price given.—Thomas, 55, Talbot Road, Port Talbot, Glamorgan.

Hornby No. 2 Special Tank Clockwork Locomotive; L.M.S. in good condition; offer £1.—Jones, 5, Railway Cottages, Hooton, Wirral, Cheshire.

Meccano Nuts; Bolts; 2 in. Pulley Wheels with Tyres; Bevel Gears; 6 volt Reversing Electric Motor; Pivot Bolts; Gear Ring; Angle Girders. State price wanted.—Spence, 15, Denhamgreen Place, Edinburgh.

One copy of Feb. 1945 "M.M."; good condition essential. Write, giving particulars to—D. A. Walker, 10, Bath Road, Reading, Berks. Will pay 2/6 for it.

Meccano Instruction Book No. 6.—Hunt, 10, Newport Crescent, Headingley, Leeds 6.

MECCANO
DINKY TOYS
HORNBY TRAINS
DUBLO TRAINS

THE GREAT DAY when we shall again be able to supply these famous toys is getting near. Our Works, which are still on war production, will change over to our own goods as rapidly as conditions permit—soon, we hope!

So keep looking out for our announcements.

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PUBLISHED BY MECCANO LTD., BINNS ROAD, LIVERPOOL 13, ENGLAND.
Printed by John Waddington Ltd., Leeds and London.