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MECCANO MAGAZINE

OVER SYDNEY HARBOUR

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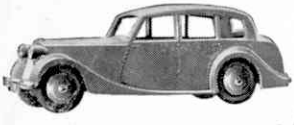

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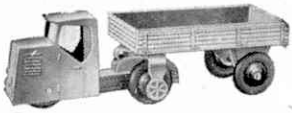

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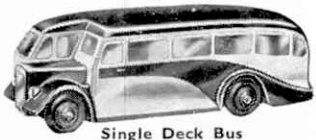

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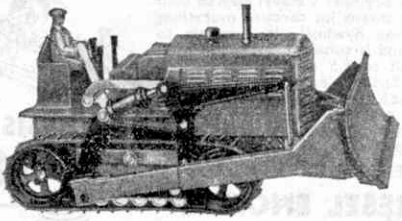

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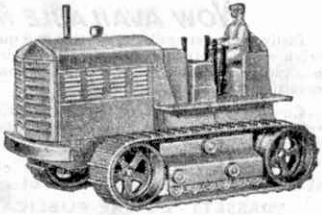

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MECCANO MAGAZINE

Editorial Office:
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With the Editor

The Conquest of Fog

Few of us escaped entirely the fog, the worst for many years, that blanketed Great Britain last November. In some places the A.A. reported "visibility nil," and that means a real blackout. Fogs of this kind are bad for all traffic, but they are specially dangerous for ferries such as those across the Mersey between Liverpool and Wallasey and Birkenhead, and that between Tilbury and Gravesend in the Thames Estuary. In the past Mersey ferries have been slowed down by fog to a serious extent, and on occasion the Tilbury and Gravesend ferry has stopped altogether.

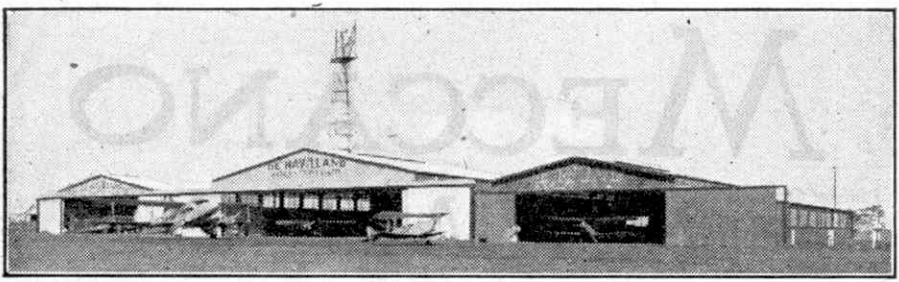
Now radar comes to the rescue of these busy services on crowded waterways. The pioneer application of this wonderful invention was made in August 1947 by the Wallasey Ferries, which every year carry more than 20,000,000 passengers across the Mersey. When fog comes down now on Merseyside the scanner of the Wallasey radar equipment begins to turn, and the pictures of the river it produces on the screen of the receiver show the positions of the ferry boats and of other vessels. This information is given to the captains of the ferry boats by radio telephone, and in this way they are guided safely across the river, missing scarcely one of their scheduled trips, even in such a prolonged fog as that of November. The service now covers the adjoining Birkenhead Ferries, which carry about 7,000,000 passengers a year.

I was reminded of this by the news that the British Railways Tilbury-Gravesend ferry has been equipped with radar. This important service conveys each year some 3,000,000 passengers, many of whom are employed at Tilbury and have their homes at Gravesend; and with this new aid it is hoped to provide a regular service in even the worst weather.

Competition Entries

I am sorry to say that scarcely a month passes without some really good entry of prize-winning standard in one or other of our competitions having to be disqualified because of failure to follow the rules. It seems almost incredible, but entries continue to arrive without the name and address of the sender. In the photographic competitions many readers spoil their chances by failing to state exactly what their prints represent, and giving only a fancy title. Others completely ignore the subject of the competition and send in pictures that have to be disqualified at once because they are of some entirely different subject.

This Month's Contents



Mascot, Sydney, as it was just before the second World War. The three aircraft—a Qantas D.H. 86B, R.A.A.F. "Tiger Moth" and a privately owned "Puss Moth"—typify the range of the Australian de Havilland Company's activities in the thirties. The photographs on this and the next page are by courtesy of de Havilland Enterprise.

Made in Australia

By John W. R. Taylor

TWENTY-ONE years ago a small group of enthusiasts waited for an aeroplane, in a broken-down galvanized iron warehouse in Melbourne, Australia. They were not idle while they waited, for every now and again they invited the staff of a nearby tea warehouse to join in a spirited hunt for the rats which shared the shed with them.

At last their big day came, when a de Havilland "Moth" biplane from Britain arrived at the "factory" in a crate on a trailer. Unfortunately, it had to stay on the trailer all day, as the warehouse roof had sagged and the doors would not open. Once inside, however, its assembly went well until the wings were put on; then both wheels broke through the floor and disturbed a lot more rats. Despite all this, the "Moth" was eventually assembled by the erecting shop staff of one, rigged, inspected and towed away very early one morning, with its wings folded, through the streets to the aerodrome at Essendon, where it was delivered to its proud owner.

To-day, the de Havilland Company of Australia no longer occupy the little shed in Melbourne. Instead, in a fine modern factory at Bankstown, New South Wales, they are busily turning out "Vampire" jet fighters for the Royal Australian Air Force, and rugged "Drover" air liners, like that shown on our cover, designed for arduous service in the Australian bush.

But the last 21 years have seen more than just the growth of this one company in the Commonwealth; for in that time Australia has become the most air-minded country in the world. This is not altogether surprising, as the great distances between cities, and the absence of other forms of transport in the vast undeveloped areas of Central and North Australia, make air transport not merely the quickest and most economical, but almost the only practical means of travel. Perhaps that is why Australia has produced so many magnificent airmen like Harry Hawker, Keith and Ross Smith, Charles Kingsford Smith, Hudson Fysh and Bert Hinkler. Through their efforts Australia is no longer the other end of the world, but the halfway mark on an all-British airline network encircling the globe.

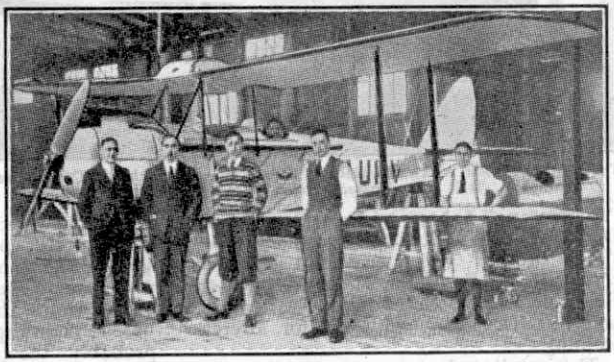
The pioneer flights of Australian airmen were not made in Australian aircraft, however, for comparatively few aeroplanes were built in that country before the second World War. Admittedly, some stick-and-string box-kite biplanes were built by mechanics of the Government Central Flying School at Point Cook, Victoria, early on in the first War to end Wars; and after that War the R.A.A.F. Experimental Station at Sydney built several aircraft under the supervision of Squadron Leader L. J. Wackett—still the Commonwealth's best-known designer. In addition private companies, including the Larkin Aircraft Supply Co., produced some interesting prototypes. Unfortunately, none of these came to much, and even when de Havillands entered the picture in 1927 they did not design their own aircraft, but merely assembled, serviced and repaired machines imported from Britain. Nevertheless, the new company did much to make Australians air-minded, by supplying large numbers of "Moths" to flying clubs and private owners, and

later by introducing the famous "Dragon" and D.H. 86B to Australian airline operators.

The Australian Government realized in the middle 30s that this was not enough; their country needed its own proper aircraft industry to enable it to face the growing threat of war, for obviously it could expect little help from the far-off, hard-pressed British industry. As a result, in 1936 the Government-supported but privately-owned Commonwealth Aircraft Corporation was formed at Port Melbourne, Victoria, with L. J. Wackett as manager.

The first contract received by the new company was for a large number of modified North American NA-16 two-seat general purpose monoplanes, named "Wirraways," which they built under license for the R.A.A.F. Simultaneously the great Empire Air Training Scheme was launched, and the Australian de Havilland Company were awarded a substantial contract to build "Tiger Moths" for the R.A.A.F.

That was only a start, for when war finally broke out the Aircraft Production Branch of the Department of Supply and Development (later the Department of Aircraft Production) set to with a will and formed a special Beaufort Division to organize the production of Bristol "Beaufort" torpedo-bombers in Australia. Unfortunately there was no more aircraft industry factory space available, but a little thing like that is no match for Australian enterprise and ingenuity.

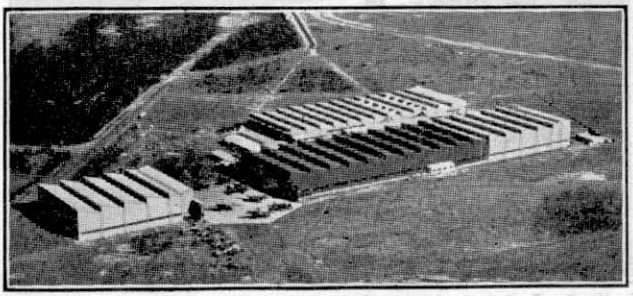


The staff of the Company in 1927, with the first D.H. "Moth" that they assembled at Melbourne.

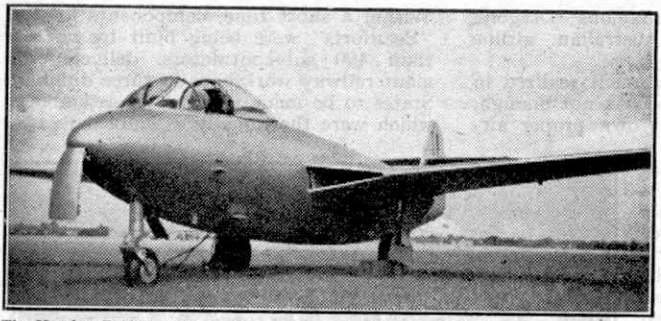
Within a short time, components for the "Beauforts" were being built by no less than 400 sub-contractors, delivered to giant railway workshops in three different States to be made up into sub-assemblies, which were then finally assembled in two factories at Fishermen's Bend, Melbourne, and Mascot, Sydney.

It was originally intended that the Bristol Aeroplane Company should supply all the drawings, jigs and tools needed, together with ten sets of "Beaufort" components to get the scheme under way. But the war situation prevented this, and Australian engineers had to undertake not only much of this basic work but also the development of special constant-speed propellers, retractable undercarriages, self-sealing fuel tanks, gun turrets, and even special grades of steel and duralumin suitable for the "Beauforts." Then the supply of British-built "Taurus" engines was cut off. Not to be outdone, they modified the aircraft to take two American "Twin Wasps," which were put into production by the Commonwealth Corporation.

The first Australian "Beaufort" flew in May 1941. The type was in full production eight months later, and more than 700 were built before they were superseded in production by "Beaufighters" in 1943. Meanwhile, Commonwealths had been going strong and had completed over 700 "Wirraways" and 250



The modern de Havilland factory at Bankstown, New South Wales, where "Drovers" and "Vampires" are being produced.



The Hawker P 1040, which will probably be built in Australia by the Commonwealth Company. It is a land-based version of the N7/46 naval jet fighter.

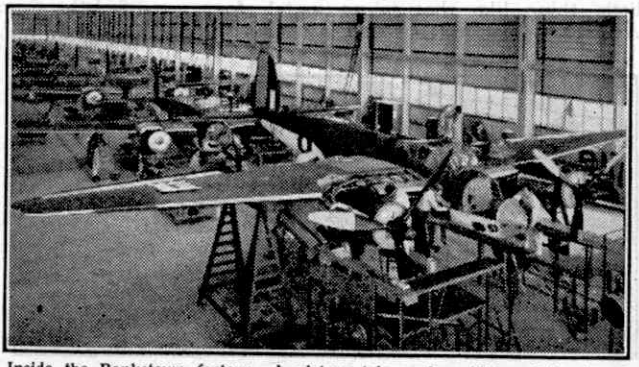
"Boomerang" fighters of their own design. De Havilland's contribution included 1,100 "Tiger Moths," which they had delivered to the R.A.A.F., India, Malaya, Southern Rhodesia and the Netherlands East Indies, and 87 "Dragons" equipped for aircrew training.

The small industry was spreading its wings fast, but the demand for more and better aircraft grew even faster. Japanese warplanes were proving a far tougher proposition than had been expected, and the R.A.A.F. urgently needed high-performance modern fighters able to outfly and outfight the "Zekes" and "Betties." The Australian industry did not intend to let down the Air Force. Commonwealths, continuing their close association with North American Aviation, turned over to production of the "Mustang" fighter; the Beaufort Division started to plan a "Lancaster" Mk IV assembly line at Fishermen's Bend; de Havillands put up a huge modern factory at Bankstown, N.S.W., and began building "Mosquito" intruder fighters. The first was delivered in July 1943, just 13 months after the first drawings had been received, and the R.A.A.F. had been supplied with 108 of these superb aircraft when the atomic bombs ended the Pacific War.

The war was over, but the Australian Government made up their mind never again to be caught napping, as in 1942 when R.A.A.F. pilots gallantly but hopelessly flew training aircraft into action against Japanese "Zeros" at Darwin. Consequently, side-by-side with more peaceful aircraft, modern warplanes continue to roll down the assembly lines in Australian factories. The Commonwealth Company are still building "Mustangs," and have also designed and built a bigger, more powerful fighter of somewhat similar layout, powered by a 2,035 h.p. "Griffon" engine. But piston-engined fighters will soon be things of the past for the R.A.A.F., and Commonwealth are planning to build in Australia the Hawker P 1040, land-based counterpart of the N7/46 and probably the world's finest all-purpose jet fighter. Similarly, the Beaufort Division, at present building 73 Avro "Lincoln" heavy bombers, are preparing to manufacture twin-engined jet bombers of British design at Fishermen's Bend—possibly the revolutionary English Electric aircraft mentioned recently by an American journal.

An important new development is the recent formation in Sydney of Fairey-Clyde Aviation, a subsidiary of the famous British Fairey Aviation Company, to take over the aviation interests of the powerful Clyde Engineering Company. At first the new firm will be engaged chiefly on the repair and maintenance of Fairey "Firefly" fighters and other aircraft in service with the

(*Continued on page 34*)

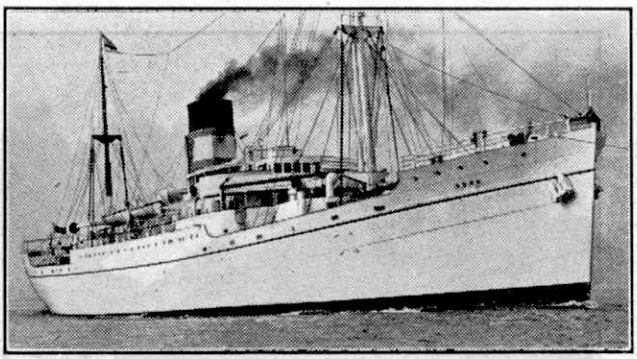


Inside the Bankstown factory. A picture taken when "Mosquito" aircraft were in production there. Photograph by courtesy of de Havilland Enterprise.

The Salvage of the "*Eros*"

By Denis Rebbeck, M.A., M.Sc., B.Litt., M.I.N.A.

THE 17 knot transatlantic fruit ship "*Eros*" was built at Belfast in 1936 by Harland and Wolff Ltd. This splendid looking vessel, with her modern exhaust turbo-electric drive operating in conjunction with a four-cylinder triple expansion steam engine, had made a name for herself by the time war broke out in September 1939. It was only natural then that the Germans would be very pleased if they could send such a useful and fast cargo ship to the bottom of the sea.



Unfortunately for the Allies a well-aimed torpedo very nearly succeeded in accomplishing this Nazi dream, and this short article describes how the ingenuity of a British salvage company cheated the enemy of their victim.

On the morning of 7th June 1940 it became known that the "*Eros*" had been torpedoed 18 miles north of Tory Island. The vessel had a very valuable cargo consisting of fighter 'planes, R.A.F. equipment and a refrigerated cargo of bacon and hams. She was taken in tow by a rescue tug and an attempt was made to tow her into Lough Swilly, but as the vessel was rapidly settling by the head every effort was made to beach her inside Tory Island. This was eventually accomplished and the vessel took the ground about four miles west of Horn Head where she lay with her forward decks submerged to the bridge—a truly sorry sight! The hull was flooded from the stem to the engine room, but the machinery space and the after compartments were intact.

Due to the persistent Atlantic swell it was the 11th June before a diver's examination could be carried out. This showed that the vessel had been hit by the torpedo forward on the starboard side, and her entire forefoot had been carried away, the damage extending up to the 31 ft. draught mark on the stem. The bottom of the chain locker was missing and the anchor cables had fully run out. As these cables were acting as a drag they were severed by gelignite. There was further damage to the ship's structure, too extensive to mention here.

In due course, after sealing certain compartments, and using compressed air, the "*Eros*" was towed off to Lough Swilly, drawing no less than 39 ft. forward (the fore decks just awash), and there, near Buncrana, the vessel again took the ground. She was further lightened, and ultimately beached off Hawks Nest on the Island of Inch, an even more sheltered position. By the 4th July (less than one month after being torpedoed) the "*Eros*" was made fit to proceed to Belfast, and on the following day she was taken in tow, arriving safely in Belfast Lough at 2 a.m. on the 6th July. It was then decided that she should continue the passage to Liverpool in the fine weather conditions prevailing—a change from the unusually bad weather experienced earlier on—and so the little convoy set off again at 7 a.m. on the following day for Birkenhead, where the "*Eros*" was docked on the afternoon tide of the 8th July.

This simple story cannot do justice to the salvage company concerned, but a full account of this clever and daring piece of work would fill many pages of the "*M.M.*"

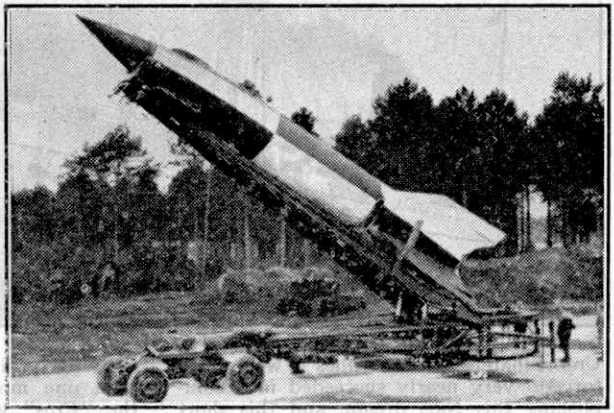
Throughout the war period there was an average of two merchant ship casualties in every five days over the west coast. The importance of Belfast, therefore, as a repair base for damaged ships was appreciated by all concerned, especially the Germans, who damaged the famous Harland and Wolff yards very badly by bombing in 1941,

The German Long Range Rocket

By J. L. Robertson

THE A-4 long range rocket, known to the Germans as "Vergeltungswaffe 2," which means Revenge Weapon 2, was an enormous projectile, measuring 46 ft. in length. It consisted of four main parts, all circular in cross section and together forming the complete hull or fuselage. The warhead contained 1,600 lb. of high explosive, which was detonated by three separate fuses.

Immediately behind the warhead lay the control compartment, in shape a truncated cone divided into four longitudinal sections by plywood partitions. This compartment contained all the equipment necessary for the firing of the rocket and for its steering and control once it had become airborne. Among the intricate mechanisms located here were delicate gyroscopes, radio equipment, tiny motor-alternators, compressed air cylinders, electrical storage batteries of unique design and performance, a mechanism to "arm" the warhead fuses once the rocket had reached a safe height, and a main electrical distribution panel. This compartment formed the "brain" of the rocket, and herein lay the key to whatever success the A4 achieved as a military weapon; just what effect the various controls had on the rocket we shall discuss later.



Elevating the rocket on its special cradle transporter. The rams lifting the cradle can be seen, as well as the launching platform to the rear of the trailer.

The largest part of the rocket fuselage was the centre section or tank bay. This was constructed in two longitudinal halves, each built up from semi-circular formers and channel-section stringers, the whole being covered with smooth, thin steel sheeting; both spot welding and riveting were used in this assembly. In this section were carried the two main tanks, one containing alcohol, and the other liquid oxygen. Oxygen can only exist in the liquid state at the incredibly low temperature of 183 deg. C. below freezing point. For this reason both the main tanks were heavily lagged with glass wool to prevent the oxygen from boiling off at normal atmospheric temperatures, and to prevent the intense cold which emanated from it from freezing up and rendering inoperative various vital mechanisms inside the rocket.

Next in order came the tail unit. This carried the four large stabilizing fins, and contained the main and auxiliary power units. To deal with the last named first, this consisted of a small combustion chamber in which highly concentrated hydrogen peroxide from a tank was mixed with calcium or sodium permanganate. This was, in effect, a small rocket motor, and the high-pressure gases produced inside it were led to the nozzles of a small turbine, which was in turn coupled directly to two centrifugal pumps. To these the alcohol and oxygen delivery pipes were connected via brass bellows, which were inserted into the system to allow for vibration, expansion and contraction.

The output from the oxygen pump was taken through a main distributing valve, and thence through light alloy tubes to "roses" or sprays inside inverted steel cups welded to the head of the combustion chamber of the main power unit. The output from the alcohol pump was forced forward (or up) to the head of the combustion chamber, acting in its passage as a liquid coolant for the main motor unit, and itself being preheated before injection into the combustion chamber. The exhaust from the turbine itself was passed

through a "heat exchanger" and then allowed to escape into the atmosphere.

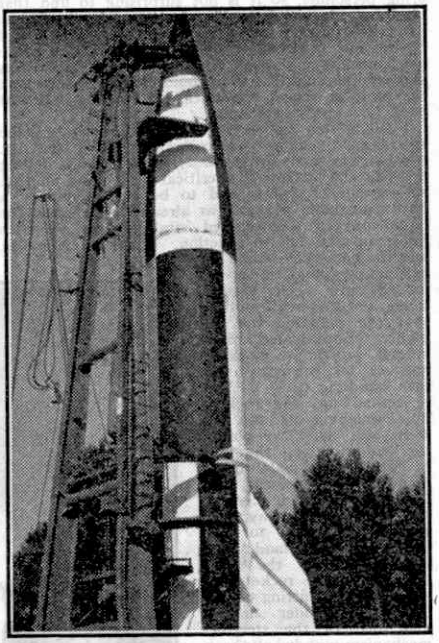
The turbo-pump arrangement was in itself an engineering feat. Although weighing only 170 lb. it could develop no less than 750 b.h.p., to give the very remarkable power weight ratio of only 0.22 lb. per b.h.p.

The four stabilizing fins were of orthodox braced girder construction, and were covered with a thin steel skin. Each fin carried a small air rudder at its trailing tip, these being driven and controlled by hydraulic servos inside the tail unit. Also driven by these servos were the main steering rudders, four vanes so placed as to operate in the jet stream itself.

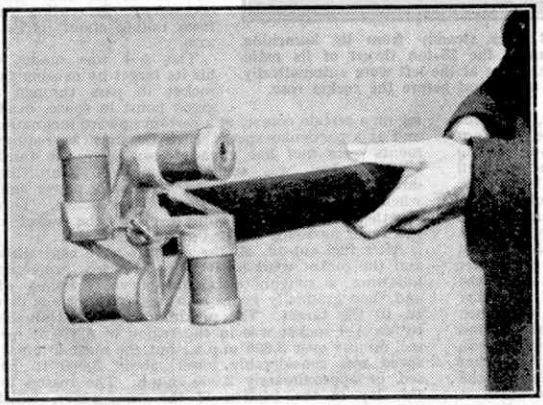
The eight tons of liquid held in the main tanks were pumped out and consumed in just about one minute.

The procedure for preparing and firing an operational rocket was roughly as follows. A small steel platform or table, fitted with four adjustable legs and surmounted by a rotatable ring, was placed in position on a suitable piece of level hard ground. The rocket was then brought up on a special cradle transporter and elevated on its cradle until it reached a vertical position, with the main exhaust directly over the centre of the launching platform. The latter was next jacked up to take the weight of the rocket, and, this done, the securing bands on the rocket were released and the cradle, stil vertical, was withdrawn a yard or so.

This left the projectile standing on its firing platform and the cradle now became a ladder giving access to all parts of the rocket. Two working platforms were hinged to the cradle at convenient points, while electric lights and anti-aircraft machine-gun mountings were also provided. Next the rocket was viewed through special instruments to ensure that it was exactly vertical, as any inaccuracy in this respect would have had a serious effect on the ultimate trajectory. After this process had been completed, all the rocket hatches were opened, and a series of test and power cables connected up. Three of the jet rudders, which were fragile and had travelled so far in a special container, were fitted to their bearings in the rear of the tail unit; the fourth was left off for the time being to allow of access to the exhaust.



The cradle in the vertical position showing the access ladders and working platforms. The rocket hatches have not yet been opened.



The igniter. This was just a large "Catherine Wheel" fired electrically from the control car, in which a signal lamp lit up when the igniter was functioning correctly.

At this point it must be mentioned that the A-4, even in its final form, was at all times a temperamental and far from reliable weapon. This caused a number of serious accidents to

firing personnel, so it is not surprising to find that the next stage in the preparation for action was invariably a meticulous check of all steering and power unit controls. Each section of the intricate mechanism was checked in turn and any failure was at once investigated; if it could not be rectified on the spot the rocket was forthwith rejected and sent back for expert overhaul.

Fuelling was the next step, and one by one the special road tankers were called forward to the site. Alcohol was loaded first, then liquid oxygen. Filling up with the latter was a critical proceeding, in that all subsequent moves had to be carried out to a fixed timetable, because, as already mentioned, the liquid oxygen soon caused vital working parts to freeze up and fail to function. Hydrogen peroxide, and the catalyst, sodium or calcium permanganate, were loaded into their special tanks, and it is worth noting that the peroxide was so highly concentrated that special protective clothing had to be worn by the men handling it.

Tanked up, the rocket, now weighing its full 12 tons, was "laid" by pointing one fin along the line of fire, two dial sights being used to ensure that the operation was carried out accurately. Any adjustment found to be necessary was made by simply slewing the ring upon which the rocket was standing. The fitting of the fourth jet rudder and a final test of the steering mechanism rounded off these prolonged and involved preparations.

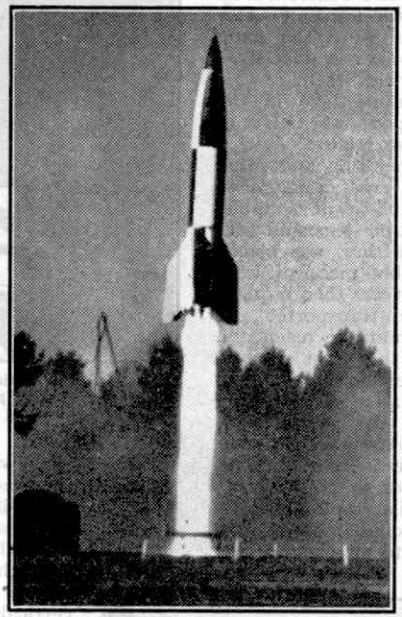
The total time required to get a rocket ready to fire varied considerably, depending mainly upon whether or not the rocket responded perfectly to all its tests. If all went well, the average time was usually about three hours with a fully trained crew.

As soon as the preparations described had been finished all vehicles and unnecessary personnel were cleared from the site, and the igniter, which was nothing more or less than a glorified catherine wheel, was inserted in the exhaust. At this point, then, the rocket stood quite alone upon its little table, with not a soul in sight, and only a wisp of vapour trailing from a vent in the tail showing that, in spite of all precautions, the liquid oxygen was slowly boiling off.

Some hundred yards away, the control car, an armoured half-track vehicle, had been dug in, and inside this car the officer in charge and his engineers had taken up their action stations at complex control panels. These panels were connected to the rocket by cables controlling the propulsion unit, the pressurising and fuel valves and the igniter. A further cable, attached to the control compartment, continued to power all the internal control mechanisms, and this cable, held in position electro-magnetically, was designed to fall away an instant before the rocket lifted. The other cables were disconnected by the rocket itself withdrawing the connections when it started on its flight, just as an ordinary electric plug is pulled from a socket.

At the long awaited "X hour" the officer in charge ordered "*Fire!*" and a puff of blue smoke suddenly erupting from underneath the rocket showed that the igniter had started. Pushing a button in the control car, one of the engineers caused air pressure to be applied to the main rocket tanks, and when sufficient pressure had been applied, the command "*Vorstufe!*" was given. This means "Preliminary Stage." The main alcohol valve was then slightly opened and a small quantity of fuel admitted to the combustion chamber; here it was at once set on fire by the igniter, and a short, stubby jet of bright flame flickered from the exhaust. This jet was anxiously scrutinized to see that it was burning properly and, if it were, "*Hauptstufe!*" or Main Stage followed immediately.

Then things really did begin to happen. Both main valves, alcohol and liquid oxygen, were fully opened, and the turbo-pump, driven it will be remembered by its own small rocket motor, roared into action. With a tremendous, deep ragged bellow the rocket rose comparatively slowly amid sheets of flame and swirling dust, and then shot rapidly upward, trailing a 70-ft. jet of brilliant flame behind it. As the projectile roared upward and dwindled from sight, a graceful vapour trail, similar to that sometimes created by a high-flying aircraft, streamed out in its wake.



The rocket rises steadily from its launching platform, under the 25-ton thrust of its main motor. The cables at the left were automatically released an instant before the rocket rose.

For the first four seconds the rocket rose vertically, and then two of the jet rudders were automatically moved over to cause the nose of the weapon to incline in the direction of the target. This movement continued until the longitudinal axis of the rocket was about 47 deg. from the horizontal; thenceforward, until the fuel was cut off, these rudders held it steady at this inclination. Meanwhile, the other two jet rudders were keeping the A-4 on its correct lateral course and, assisted by the air rudders as and when necessary, preventing it from rolling about its long axis.

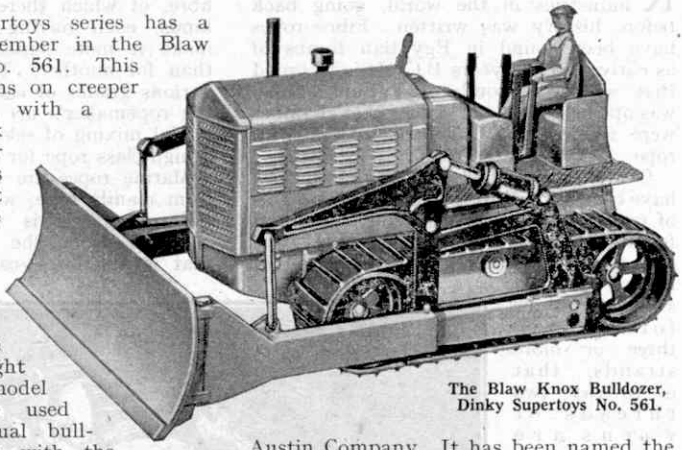
The A-4 was made to hit its target by causing the rocket to pass through a given point in space, heading on a certain course, at a certain upward inclination and at a particular speed. How the first two requirements were met has already been seen; the third, speed control, was achieved simply by throttling down and then shutting off the main power unit when the desired speed had been reached. This, together with the "angle of ascent" of the rocket at the same moment, decided the range.

After fuel cut-off, all the controls were centralized and the rocket went on its way as a free projectile, following a roughly parabolic curve, levelling off and then gradually going into its last ferocious dive on to the target. The maximum speed attainable by an A-4 rocket was in the region of 5,370 ft. per sec. or just over 3,600 m.p.h., but the normal impact speed was considerably lower, about 3,000 ft. per sec. or approximately 2,000 m.p.h. The reason for this lay in the friction of the atmosphere, which not only slowed down the rocket to such a marked degree, but also caused the whole structure to undergo very considerable heating; it is even possible that the A-4 glowed dull red in the last stages of flight.

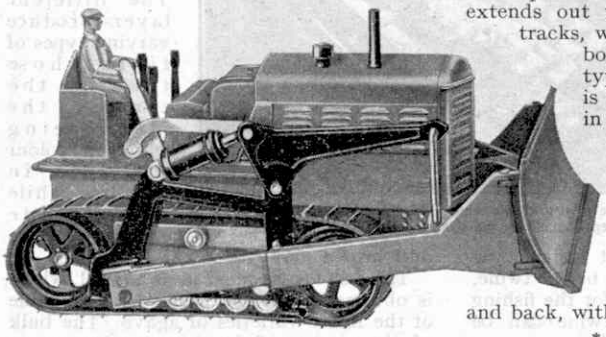
Dinky Toys and Supertoys

Blaw Knox Bulldozer and Austin "Devon"

THE Dinky Supertoys series has a striking new member in the Blaw Knox Bulldozer, No. 561. This impressive model runs on creeper track and is fitted with a heavy framework carrying a bulldozer blade. The frame is correctly hinged at the rear, and the blade is lifted or lowered as desired by means of a lever. It is automatically locked in the raised position when the lever is pulled right back, so that the model can not only be used realistically for actual bull-dozing in miniature with the blade lowered, but also can be run to the site where it is to work with its blade held well above the ground.



The Blaw Knox Bulldozer, Dinky Supertoys No. 561.



The Blaw Knox Bulldozer with the blade raised.

On the real Blaw Knox bulldozer the blade is moved by a hydraulic mechanism, and the hydraulic cylinders on the actual machine, one on each side, are represented in miniature.

This handsome model is enamelled in red, except for the cylinders and actuating arms of the blade, which are black.

The illustration at the foot of this page shows the latest addition to the Dinky Toys series, a splendid reproduction of the Austin "Devon" saloon. This fine 10 h.p. car breaks new ground for the Austin Company. It has been named the A40 because, although the capacity of its engine is only 1,200 c.c., this actually develops 40 b.h.p. The handsome body extends out to the limits of the wheel tracks, with no running boards. The bonnet is of the alligator type, and the front appearance is in a style that is modern in tone, but does not depart unduly from Austin tradition.

The miniature faithfully follows the handsome lines of the bonnet and body-work, and reproduces well the curved mudguards and the stout bumpers front and back, with their over-riders.

* * * *

CORRECTION

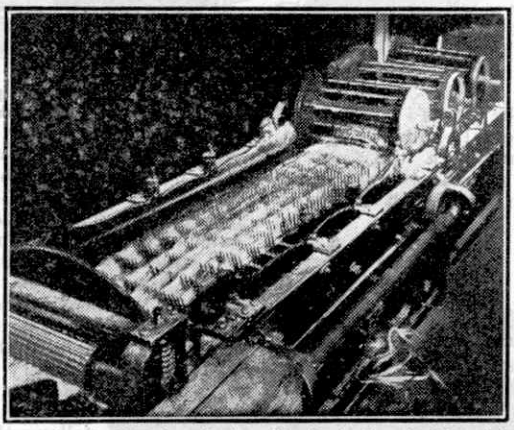
In last month's Dinky Toys article the maximum speed of the Standard "Vanguard" on top gear was given as 50 m.p.h. This should have been 80 m.p.h.

The Austin "Devon," Dinky Toys No. 40d.

Making Ropes From Fibre

ROPEMAKING is one of the oldest industries in the world, going back before history was written. Fibre ropes have been found in Egyptian tombs of as early as 3,000 years B.C. It is recorded that when the tomb of Tut-ankh-amen was opened, the doors of the inner chamber were found to be fastened with a 4-in. rope.

Over a long period various descriptions have been applied to different constructions of rope. Cordage is a general name used for all forms of rope, packing cord, lines and twines. A rope is a composition of more than six threads formed into three or more strands, that is to say two threads or yarns are twisted together to form a strand, and three or more of the strands are laid together to form a rope. Twine is one or more yarns, twisted together, made from soft hemp, jute, manila or sisal. Of these, sisal is generally used for packing purposes and binder and baler twine, and manila for making nets for the fishing industry. If required the twine can be polished with sizing materials.



Preparing the fibre for spinning. The illustrations to this article are reproduced by courtesy of British Ropes Ltd.

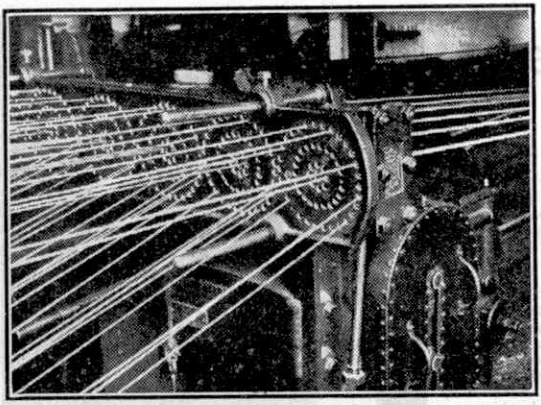
What is called the "lay" of a rope is a matter of interest. A rope is described as "hawser" laid when three strands, each consisting of a number of yarns, are twisted together. This is the general construction, as it is strongest. When four strands, each consisting of a number of yarns, are twisted together to form a rope, this is said to be "shroud" laid, a form that is mainly used for running gear, and over pulleys, as the surface wear is more evenly distributed. Three complete ropes laid together form a "cable"-laid rope. This can be of either right-hand or left-hand finish as desired, and is used where elasticity is required, as for towing springs.

The raw material of the ropemaker is fibre, of which there are many different kinds, each having characteristics that make it more suitable for one purpose than for another. Then again there are various grades of each fibre, and part of the ropemaker's art is the selection and skilful mixing of selected grades to make a high-class rope for a particular purpose.

Marine ropes are manufactured chiefly from manila fibre, which comes from the Philippines. It is very strong, and is obtained from the conjoint leaf stalk that forms the so-called stem of a tree, the non-edible plantain. The fibre is obtained by cutting down the trees near the root and stripping off the leaves just below their expansion. The different layers produce varying types of fibre, those towards the centre of the stem being white in colour and fine in texture, while the outside coverings are dull brown and coarse.

The other fibre most used is sisal, which is obtained from the fleshy leaves of one of the many varieties of agave. The bulk of the sisal used in this country comes from British East Africa. It is a clean white fibre and is used principally in the manufacture of binder twine and packing cords and twines. Other fibres in use are hemps from New Zealand, St. Helena and Mauritius. New Zealand hemp is softer than manila fibre and has a brownish tinge; St. Helena hemp is similar to that from New Zealand in texture, but is rather brighter in colour; while Mauritius hemp is white and similar to sisal, though it has very little sheen.

It should be noted that supplies of manila fibre were cut off in 1941 as a result of the Japanese occupation of the Philippines. It will be several years



The metal register plate through which yarns pass to the foreboard of the rope-making machine.

before it is again in full production, and as it is a dollar purchase only limited quantities can be available for Great Britain. An encouraging fact however is that experiments with special preservative treatments during the war have resulted in the production of sisal cordage that because of waterproofing and rot-proofing makes an effective substitute.

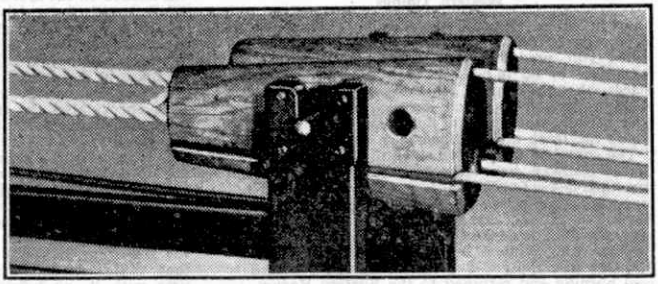
All these fibres are received in press-packed bales, the fibre itself being made up into bundles, or "heads" as the rope-makers call them, which have to be separated before the mechanical process can be begun. The initial process of preparing the fibre for spinning is performed in machines that have two sets of chains fitted with hackle pins or steel spikes. The first chain carries the fibre to the second, which travels at a greater speed, thereby combing and cleaning it. The fibre is fed to the machine in separate heads, and leaves it in a continuous ribbon or sliver as it is called. This process is repeated several times, and the fibre then reaches the second process, which is called drawing. Here the combing process is continued and the fibre emerges from the machine in finer slivers, which are controlled by variation in the speed of the feed and delivery, according to the size of yarn required.

The final process is carried out over automatic or gill spinners. Gill spinners are the latest development in high-speed production. The spinning process involves the conversion of the sliver, which consists of fibres laying parallel to one another, into a yarn composed of fibre with a predetermined twist according to size of yarn.

There are two methods of ropemaking in use to-day, one on the rope-walk, and the other by what are known as house machines. In the first of these, when the yarn is spun the bobbins on which it is wound are transported to the rope-walk or the ropemaking shops. The rope-walk is usually a long building furnished with rail tracks. The yarn is put on to bobbin racks or banks, and when drawn off is passed through a metal register plate, pierced with holes, which are formed in circles corresponding to the outer and inner yarns of the strand of the rope. After the yarns have passed through the register plate they are drawn through a tube in a fixed or standing part of the rope-making machine, which is known as the foreboard.

The combination of yarns, or strand as it is then known, drawn through the tube is attached to the traveller, which is a machine with a series of large revolving hooks. This machine travels down the rope-walk on the rail track, hauling out the strand or strands, and at the same time imparting the twist required. When the predetermined length of strand has been drawn off it is cut from the tube and attached to hooks on the foreboard, similar to those on the traveller.

When sufficient twist or turn has been imparted to the (Continued on page 34)



Laying a rope. The strands pass through grooves in a tapered piece of wood before being twisted together.

Railway Notes

By R. A. H. Weight

National News

It has been decided to adopt standard codes for describing or identifying passenger rolling stock in operating instructions and messages, by means of distinguishing letters, which will also be painted on the ends or sides of vehicles, as is already done in some Regions. "T" indicates third class; "F," first; "C," composite, meaning more than one class of accommodation; following letters will be observed such as: "L," lavatory; "K." corridor; "O," open (not compartment) coach. "R" preceding description of type of vehicle will mean that it is a restaurant or buffet car; "S" will similarly indicate a sleeping car. The tare weight also appears on the ends of most coaches and vans, the latter also having their own descriptive lettering.

Since the post-war resumption of excursion bookings, about three million passengers have been carried in special trains as well as many thousands more by ordinary services. Such facilities are to be continued during 1949, with other developments if circumstances permit. Circular tour tickets at reduced fares are being resumed for the benefit of ramblers and cyclists.

Oil fuelling of locomotives is being discontinued and the apparatus removed.

Railwaymen's badges worn on caps or clothing will gradually be modified to include British Railways' lettering and totem, and the Regional colour as seen on timetable covers and elsewhere.

British railwaymen are to have their own national boxing championships as part of a general scheme for furthering social and recreational activities, as well as fostering a spirit of competition among the Regions.

Some excellent "schools on wheels" fitted with instructional models, cinema projectors, loudspeakers, blackboards, fitters' benches, living and seating accommodation, etc., are already in existence, and make travelling tours of sheds and depots. Two new units, adapted from bogie coaches or vans, have just been completed at Derby and are commencing extensive travels.

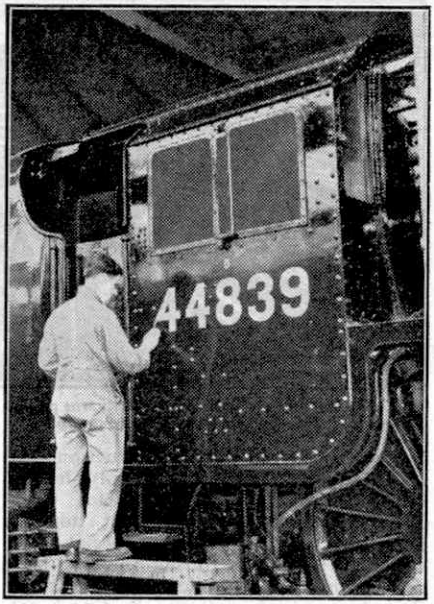
The North British Locomotive Co. Ltd., Glasgow, are turning out "L1" 2-6-4Ts to L.N.E.R. design, numbered from 67731 upward. Some are already at work on the King's Cross-Cambridge lines from Hitchin shed. We learn that Nos. 67735-6, painted lined black and fitted with electric light, went when new to Polmadie or Hamilton sheds, whence they have been working former L.M.S. duties to and from Glasgow Central. The North British Locomotive Co., like other British firms, have a number of important orders on hand for engines destined to work in various parts of the world.

Western Tidings

As in other Regions, there is not yet a settled locomotive or rolling stock painting policy, so Swindon styles still predominate. Higher speeds up to a maximum of 85 m.p.h. are now allowed in certain places, though a more general permitted maximum is 75; reduction to much lower speeds is necessary past certain stations and junctions, over curves, or where the track and roadbed may be under repair.

The complete locomotive stock of the narrow gauge Corris Railway has been condemned, consisting of two tiny 0-4-2Ts, Nos. 3-4, which we described not long ago. Withdrawals continue of some of the 51xx 2-6-2T, because new 41xx ones have come into service, numbered 4160-7, largely for use in South Wales. Latest 0-6-0Ts include Nos. 7435-9. Ministry of Supply 2-8-0 No. 63152 has reverted to coal burning and returned to the Eastern Region.

Locomotive performance varies a good deal in these difficult days, but we are glad this month to be able to give brief details of several excellent runs of which logs are to hand. The 2¼ hour business man's expresses between Paddington and Birmingham, calling at High Wycombe, are not easy to work, in view of the extra speed restrictions at several points. They are not "King" turns. A fine 10-coach set is provided weighing 335 tons empty. Northbound from Paddington at 9.0 a.m. the latest "Castle," No. 7017, "*G. J. Churchward*," was stopped by signal before Westbourne Park, just out of the terminus, then checked before High Wycombe, where the arrival was 2 min. late. After getting away well uphill, and touching 80 m.p.h. after Princes Risborough, came the long-lasting dead slowing past redrainage works at Haddenham. The performance throughout was of a high order; notwithstanding three more slowings, Snow Hill, Birmingham, was reached to time—equivalent to a non-stop run from London, unchecked apart from normal slacks, in 118½ min. for 110½ miles.



Putting the finishing touches to the number of a London Midland locomotive. British Railways Official Photograph.

The return train leaving Birmingham at 4.50 p.m. was headed on the first occasion by one of the modified "Halls" with 6 ft. driving wheels, No. 6974, which provided some hurricane travelling. A fast start and a maximum of 85 down Hatton bank took the train through Leamington, 23¼ miles, in 24¼ min., Banbury, 43 miles, in 46¼ min., two minutes early. After that there was an easing, but although there were four other checks after the Haddenham crawl, Paddington was reached approximately to time. For the second run "County" No. 1021 "*County of Montgomery*," of the high-pressure intermediate express type, was the steed, and did not run so fast, but maintained a good average, with quicker travel through Bicester and beyond to give time in hand for the Haddenham delay, so reaching Wycombe punctually.

The mid-day up train on Saturday with 15 coaches, 494 tons tare or about 530 gross, is very heavy for that route, though a "*Castle*" unaided has kept time with it, on balance. Pilot assistance is given to these engines sometimes when loads are heavy between Leamington and Banbury or Birmingham.

The latest Southern Electric locomotive No. 20003. It can work continuously for several days and nights and haul passenger trains at speeds up to 75 m.p.h., or 1,000 ton freight trains. British Railways Official Photograph.

One of the more usual engines, No. 6005, "*King George II*," of Wolverhampton, when timed from Leamington improved on schedule most of the way when circumstances allowed, stopping at Banbury and Bicester. The maximum speed approaching Greenford was 70½, and this heavy train was in Paddington well ahead of time on a schedule allowing some recovery margin when operated by a "King" in good condition.

No. 7014 "*Caerhays Castle*," of the latest batch, on the noon luncheon car express from Bristol to London, with "13 on," 430 tons full, had to draw up to get the whole train to the platform at Bath, then suffered two long signal stops before Chippenham, which station was left 12½ min. late. Including a slowing through Reading, the 71½ miles between Swindon and Ealing were covered in 69½ min. on an almost perfectly graded road, giving an arrival at Paddington less than 10 min. late. Since this run was recorded the train has been notably accelerated, being allowed only 80 min. from passing Swindon to arrival at Paddington. "*Caerhays Castle*" achieved this with ease.

Two further "Bulldog" 4–4–0s with 5 ft. 8 in. driving wheels have been condemned. These are No. 3335, unnamed, of the earlier series, and No. 3445 "*Flamingo*" of the last lot built.

London Midland Region

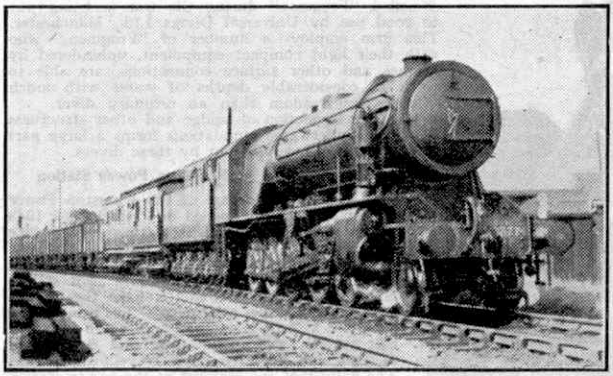
As we foreshadowed some months ago, historic locomotive names, which in some cases date back almost to the earliest years of railways and have been carried by a succession of gradually larger engines, have been chosen for eight of the "Patriot" 4–6–0s which are to be converted to "6P" with the tapered boiler. No. 45545, "*Planet*," the first, was ready in November last. The other selected names are "*Vulcan*," "*Goliath*," "*Courier*," "*Velocipede*," "*Champion*," "*Dragon*" and "*Harlequin*." Class "5" 4–6–0s Nos. 44755–6, with Caprotti gear, also have double chimneys.

Nos. 44709–12, built at Horwich, are allocated to Crewe, 5A. "4P" 2–6–4Ts Nos. 42170–4, completed at Derby, have all gone to Scotland: the first three to Polmadie, 27A, and the last two to 28C, Carstairs. More light 2–6–2Ts, "2P," from Crewe are allotted chiefly to Midlands or North Wales depots as follows: Nos. 41223–4, 7B, Llandudno Junction; No. 41225, 3B, Bushbury; No. 41226, 3C, Walsall; Nos. 41227–8, 2E, Warwick; and No. 41229, 5A, Crewe. They are seen on many parts of the system.

"Royal Scots" have been reported working through between Glasgow and Manchester, via Preston. The only "7P" 4–6–2 to retain streamlined casing at the time of writing is No. 6243, "*City of Lancaster*." There are some dark blue, also green, experimentally painted express engines still running.

The L.M.R. transported 546,414 wagons of coal during four weeks ending October 31st last. "Save the lbs. and so help to save the £s" runs a coal-saving appeal to operating staff.

Various station platforms, bridges and retaining walls are to be renewed or repaired.



A Ministry of Supply 2-10-0 No. 73774 on test with a dynamometer car on a Bristol - Eastleigh coal train. Photograph by A. F. Cook.

New Southern Names

The names of the first two "Merchant Navy" 4–6–2s of the series of 10 under construction are announced as: No. 35021, "*New Zealand Line*": No. 35022, "*Holland America Line*." "West Countries" Nos. 34042–3 are named respectively: "*Dorchester*," "*Combe Martin*"; "Battle of Britain" series: No. 34060, "*25 Squadron*"; No. 34082, "*615 Squadron*."

Engineering Notes

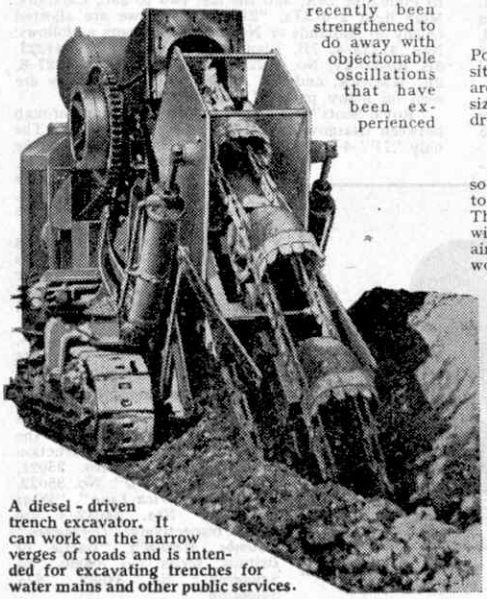
Two Fine Excavating Mechanisms

Many kinds of public utility services such as electricity, gas and water require the construction of miles of small trenches to accommodate the various pipes and cables. Until comparatively recent years such trenches had to be cut by manual labour, but nowadays various ingenious machines are available to do the work much more quickly and cheaply. One of these machines is the trench excavator shown in the lower illustration. It is a product of John Allen and Sons (Oxford) Ltd., and can dig a trench only 13 in. wide to a depth of 6 ft., a task that a man using a shovel would find impossible as he would require a wider space to work satisfactorily at such a depth. In normal working, in ordinary soil, the machine will cut about 30 yards of trench 13 in. wide and 3 ft. deep in one day. The chain of digging buckets is driven by a diesel engine, and an oil-operated hydraulic system is provided for raising or lowering the boom. The machine is mounted on creeper tracks and can travel along roads at speeds of either 2½ or 4 miles per hour.

A different type of excavator is the Mobile Shovel shown in the upper illustration. This machine, which is also a product of John Allen and Sons Ltd., can be used either as a shovel or a crane. It is driven by a diesel engine, and when used as an excavator is fitted with a shovel of ½ cu. yd. capacity, working on a boom 15 ft. 3 in. in length. This boom is replaced by a trellis girder jib 25 ft.–30 ft. long when the machine is used as a crane.

Strengthening a Great Bridge

The Whitestone suspension bridge, New York, which is the fourth largest suspension bridge in the world, has recently been strengthened to do away with objectionable oscillations that have been experienced ever since it was built in 1939. By reinforcing certain of the main girders in the bridge it is hoped that the oscillations will be reduced or eliminated; and while this work has been in progress opportunity has been taken to widen the deck so as to provide a three-lane roadway, 31 ft. in width, for each direction of traffic. The bridge has a length of 2,300 ft. between the towers and end spans of 735 ft. each.



A diesel-driven trench excavator. It can work on the narrow verges of roads and is intended for excavating trenches for water mains and other public services.

The mobile excavator-crane mentioned on this page. This machine and the one shown below are products of John Allen and Sons (Oxford) Ltd.

A New Harbour in Mozambique

A great new harbour, which may prove to be the finest south of the Equator, is now under construction in Nacala in the Portuguese colony at Mozambique. The harbour is situated in the bay of Fernao Veloso, and its inner area could provide anchorage for several ships of the size of the "*Queen Elizabeth*" without any preliminary dredging.

"Frogmen" at Work Again

Experience of underwater working gained by the so-called "Frogmen" during the war is being put to good use by Universal Divers Ltd., Manchester. This firm employs a number of "Frogmen," who with their light compact equipment, unhindered by airlines and other surface connections, are able to work in considerable depths of water with much greater freedom than an ordinary diver.

The inspection of bridge and other structures with underwater foundations forms a large part of the work carried out by these divers.

Coal Handling at Kingston Power Station

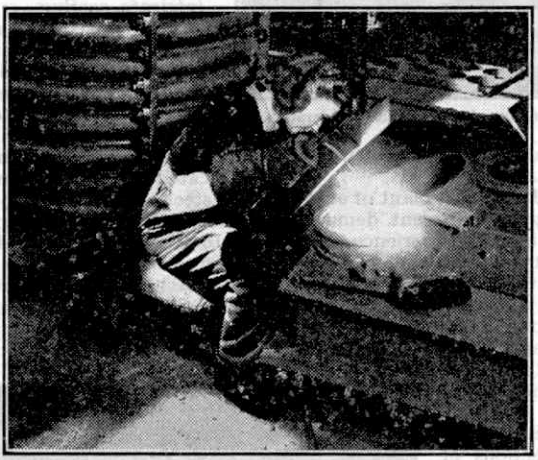
An interesting feature of the Kingston Power Station, which was opened on 27th October 1948 by the King and Queen, is a transporter bridge that spans the full 200 ft. width of the coal storage area. This serves the double purpose of distributing the coal over the area as it arrives in barges, and of removing it from the storage area to the furnaces as required. The transporter, complete with its reclaiming cranes and conveyor belt system, weighs 350 tons, and is mounted at each end on a 16-wheel travelling carriage. The daily fuel requirement of the power station under full-load conditions is between 1,000 and 1,200 tons.

Story of the Widnes Foundry

A Century of Engineering Development

TOWARDS the close of the 18th century, the industrial life of this country sprang into an extraordinary fullness of working achievement; many abstract sciences burst from their academic seclusion to reshape the entire practice of craftsmanship, manufacture and commerce. The impact of the new era was particularly noticeable in the Widnes-St. Helens area, which even at that time was renowned for its special industries and its community of skilful artisans and inventive mechanics.

The early history of the Widnes Foundry is largely the biographical record of one man, Thomas Robinson, born in St. Helens on 8th May 1814. He came of lowly folk, and as an orphan was adopted by his uncle John Cook, a tradesman of the town. After a very short period at a local school young Robinson went to Northwich to work in a chemist's shop. The dull routine job failed to appeal to him; he wanted to work to real purpose and to exercise his creative instinct in the making of useful things. A neighbouring smithy attracted him irresistibly, and apparently he was more often to be found helping at the anvil than weighing out the chemist's salts.



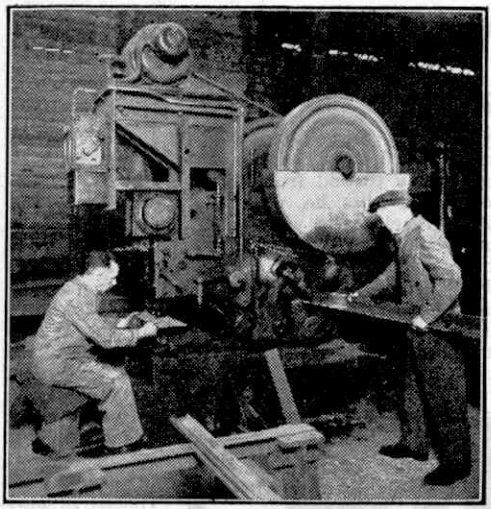
Electric arc welding in the Constructional Department of the Widnes Foundry. The operator shown was a war-time trainee who became one of the most skilled electric welders the Company have ever employed. For the illustrations to this article we are indebted to the Widnes Foundry and Engineering Co. Ltd.

Very naturally his job soon came to an end, and he was sent to be a blacksmith's apprentice at the Wheelock Forge near Crewe. This was fortunate for him, for he now found himself in a job that really appealed to him. In due course he moved from the Wheelock Forge to other jobs, and finally, as a regular journeyman blacksmith, now 26 years old, he took up work in Liverpool. This employment called for a daily journey of 10 miles each way to and from his home in St. Helens and this he walked six days a week. Blacksmiths were busy and well paid men in those days, but, even with the £6 a week he is said to have earned, 20 miles each day shows the calibre of the man.

It was natural for a man of Robinson's mettle to seek independence, and it was not long before he set up in business with his uncle John Cook. Robinson and Cook, Engineers and Ironfounders, began business in a small workshop in St. Helens in May 1841. The modest little firm prospered amazingly. Robinson himself was the operative engineer, Cook was the "sleeping partner" who provided much of the financial requirements of the business. While blacksmith's work formed the bulk of his activities, Robinson showed himself a gifted inventor of machines and plant. He originated glass grinding machines, devised new methods of moulding and casting in iron and earthenware, and designed chemical process plants. Many of these inventions of his came into general use, and some, with only slight modifications, are in common practice to this day.

During the 1914–18 war the firm produced a great deal of plant for the manufacture of high explosives and special equipment for the making of finer chemicals and drugs.

In 1936 the company was bought by Thos. W. Ward Ltd. of Sheffield, and constituted as a separate undertaking



A "Pels" cropping and punching machine in operation.

under the style of Widnes Foundry and Engineering Co. Ltd.

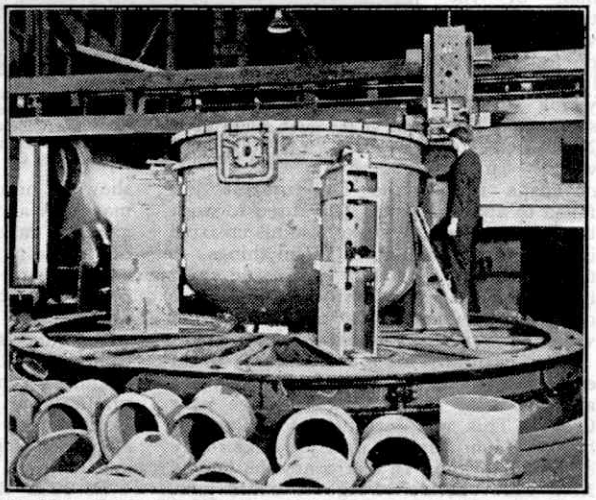
In World War II chemical plant of every description was again in urgent demand, and Widnes Foundry experience and productive capacity was extended to the full. The Constructional Department turned out a great variety of equipment, including parts for Bailey Bridges, prefabricated ship units, portable cranes for Admiralty and Royal Engineers, and gun settings for the Navy.

Now let us take a glance at some of the sections of the Widnes Foundry. The accuracy of every casting depends primarily on the skilled technical knowledge of the pattern-maker. In the pattern shop, which is equipped with every conceivable item of woodworking equipment, are built up skilfully adapted prototypes from which the moulder prepares his forms. Picture 1, on the next page shows one of the firm's oldest pattern-makers, who began work at the Foundry over 35 years ago. After the pattern-maker, the moulder's skilled technique is the next requirement in the production of good castings. Picture 2 shows the preparation of the mould for a crane barrel casting.

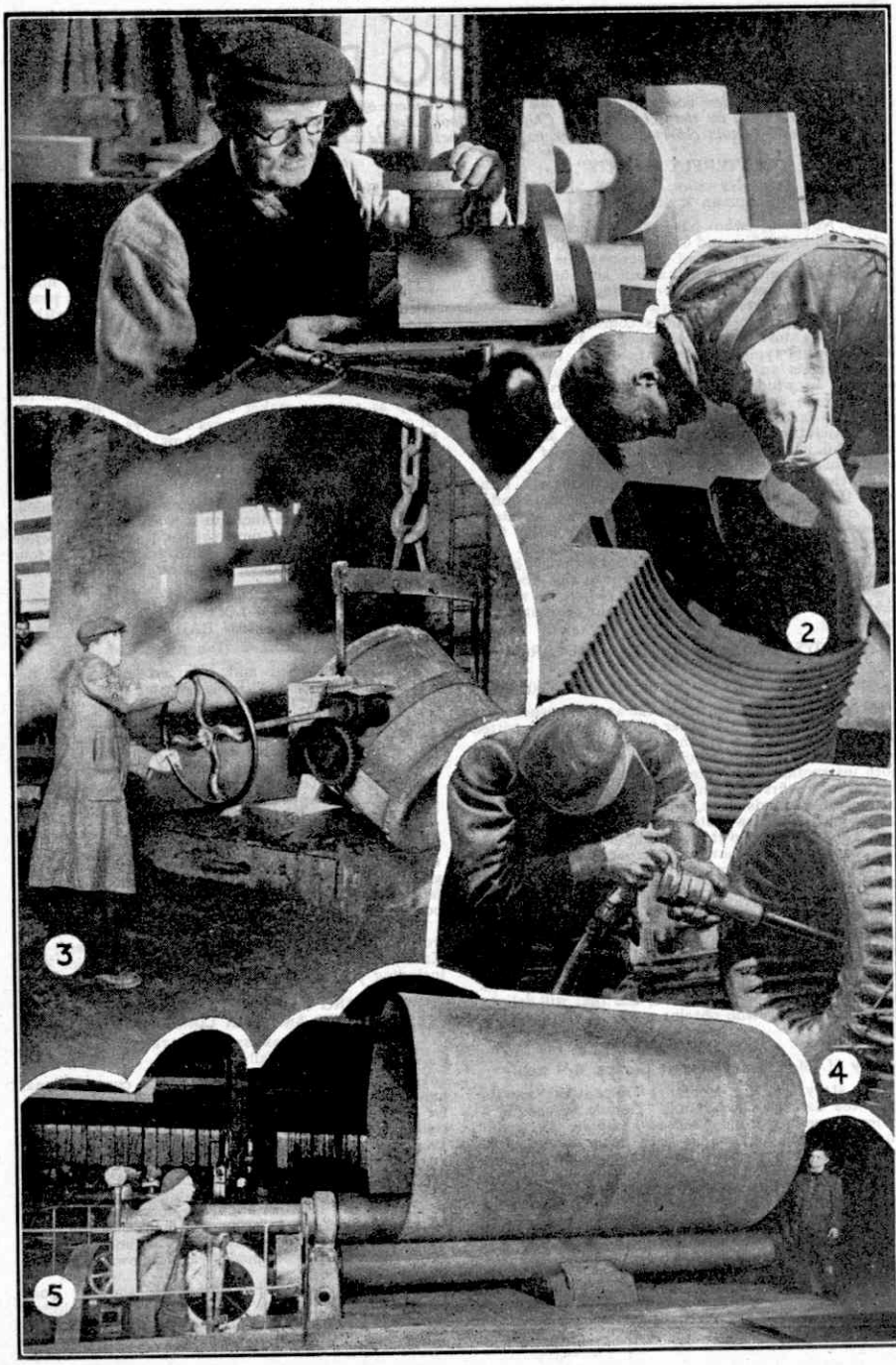
The shops produce castings of various types up to 25 tons. Special care is taken of the melts and Picture 3 shows the exciting job of metal pouring.

After casting, the skill of the dresser comes into play. Pneumatic tools are of course largely utilized for this work, but much is still done by the original method of hammer and chisel. Inspection is specially emphasized. Only the best castings, free from hard spots and porosity, are allowed to go forward to the machine shop. Picture 4 shows a dresser at work with a pneumatic chisel on the interior of an intricate casting.

The Constructional Department at Widnes was completely re-organized in 1939. The same skilled hands that built Bailey Bridges, pre-fabricated ship components and Mulberry Harbour equipment during the war years, now produce an infinite variety of fabricated construction in mild and stainless steels. Picture 5 shows plate-bending rolls capable of forming cylindrical shapes up to 16 ft. 8 in. wide, of 1 in. mild steel. Alternative rolls increase the capacity of the machine to the accommodation of plates 27 ft. wide of $\frac{3}{8}$ in. thickness. The work shown under manipulation is 8 ft. 8 in. in diameter.



The body of a cast iron still being machined on a vertical boring machine. The table diameter of this machine is 21 ft.



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.

"BUTTERFLY HAUNTS"

By L. HUGH NEWMAN, F.R.E.S., F.R.H.S. (Chapman & Hall. 21/–)

Mr. Newman, who has contributed many fine articles on butterflies and other insects to the "*M.M.*," has had the happy idea of presenting the butterflies of Great Britain in their natural surroundings. To each of 64 of these, all genuine living British species, he has devoted two opposite pages in this book. First in each of these sections comes a good reproduction of a suitable photograph of the butterfly itself, usually on its typical food plant, and on the opposite page there is an excellent reproduction of the kind of scene in which it can be found. In some cases indeed there are two of these photographs, but the page is a large one, measuring 9¼ in. by 7 in., and the illustrations are impressive in size as well as delightful in subject. There is also a brief account of the insect itself.

To the expert this handsome volume will bring back the joys of summer days during winter, and it will quicken the interest of the novice. As Brian Vesey-Fitzgerald points out in his appreciative foreword, however, there is more here than beauty. The author is an expert on butterflies, and although he has not tried to put all his knowledge into this book, he has contrived in the space available to give his readers a wealth of accurate information about the butterflies dealt with.

"THE BOYS' BOOK OF ENGINES, MOTORS AND TURBINES"

By ALFRED MORGAN (Stanmore Press. 10/6)

Mr. Morgan is well known as the author of successful books on electricity and other topics, specially written for boys, and here is another volume from him on a subject of outstanding interest. His book provides both instruction and recreation for its readers.

The author first explains simply how steam and oil engines of all kinds work, how electricity is produced and applied, and how water wheels and water turbines act. Then he turns to the building of working models. The reader is shown how to make small water wheels, a steam engine, a steam turbine and an engine that will run on "dry ice." He learns also how to make a toy electric motor that will operate on current from a battery, and a synchronous motor.

All the models described in the book have actually been built by boys, and no snags are likely to arise when the instructions given are faithfully followed. The plans are practical and the material required is inexpensive. The book indeed is one that will delight the fortunate boy who obtains a copy.

"YELLOWFACE"

By H. MORTIMER BATTEN (Evans. 6/- net)

This story by Mr. Mortimer Batten has for its scene the Canadian woodlands. Donnie Hughes is a trader, travelling from camp to camp in the woodlands by canoe, and on his trips he is accompanied by Banska, a bear cub that he has adopted. His trading is successful, but he runs foul of Johnson, known as Yellowface because of his curious appearance. Yellowface is a dangerous enemy who nearly kills Donnie, being thwarted only by Banska, who attacks the villain. The sequel is very exciting. Yellowface is captured after a long chase, but escapes from the police, only to come to a final reckoning with Banska, who rids the world of a dangerous criminal.

This adventure story is packed with thrills from start to finish, and is one of the best of its kind that the author has written.

"IN NATURE'S WORKSHOP"

By NORMAN WYMER (Harrap. 8/6 net)

The sub-title of this book is "*With the Creepy-Crawlies*," a description that gives a clue to the marvellous creatures dealt with. These range from the worm, distinguished as the ploughman, to the ant, which is a natural architect, the silk worm, a maker of fine thread, and the oyster, which produces pearls. Altogether 13 of Nature's workers are dealt with in turn, but not in a dry account of their lives and works; instead we have their stories as told to two brothers by their father in pleasant short talks, during which the actual work of the creatures concerned is examined. For instance, the story of the wasp as a paper maker begins with the digging out of a wasps' nest, which allows the boys to see exactly how this is constructed and how it sheds light on wasp life. The story winds up with a surprising estimate of the value of the creepy-crawlies to ourselves.

Most boys will be vastly interested in the book, which will introduce them to a world that is strange to most people, but nevertheless is very attractive and full of surprises. The illustrations include four full page plates in colour and a large number of line drawings in the text.

"THE McINTOSH LOCOMOTIVES OF THE CALEDONIAN RAILWAY"

By A. B. MCLEOD (Ian Allan Ltd. 3/6)

This is a revised and enlarged version of the "*McIntosh Locomotives*" book reviewed in the "*M.M.*" in March 1945. It follows the same general plan, dealing in a concise yet very readable manner with each class in turn of the well-known series of engines put into service on the former Caledonian Railway by J. F. McIntosh, who ruled at St. Rollox from 1895 to 1914. These were remarkable for consistency in design and appearance, strongly built and hard-working, yet elegant and attractively finished. Excellent illustrations of the engines in characteristic attitudes on such trains as the "*Grampian Corridor*," the "*Granite City*" and the "*West Coast Postal*" are given, with principal dimensions and interesting facts of each class, and there are useful details of the post-grouping history of the locomotives.

Copies can be obtained from booksellers, or direct from Ian Allan Ltd., Mail Order Department, 33, Knollys Road, Streatham, London S.W.16, price 3/8½ including postage.

"BUILDING PASSENGER ROLLING STOCK" "WAGON AND VAN CONSTRUCTION"

By ERNEST F. CARTER (Percival Marshall & Co. Ltd. 3/– each)

Here are two more of Mr. Carter's constructional handbooks on railway subjects. They are intended for the enthusiasts who revel in building their own rolling stock. Each begins with general remarks on the types of real rolling stock concerned, and then deals fully with their reproduction in miniature, giving details of materials, methods and tools, with hints on overcoming the inevitable snags that arise to plague the beginner. This is followed by useful information on the painting and finishing processes. Both books are thoroughly practical, and useful to the more experienced model railway owner as well as the beginner.

Illustrations consist of drawings showing constructional details, with scale drawings of a selected prototype in each. The author shows great ingenuity in making fittings from commonplace articles.

"CIGARETTE CARD CAVALCADE"

By A. J. Cruse
(Vawser and Wiles Ltd. 10/6 net)

No cigarette cards have been issued since 1940 and owing to shortage of paper it may be some time before more come along. If anything, this lapse has increased their interest for collectors, who will welcome this interesting survey. The hobby is not confined to schoolboys. Many of those who no doubt began to collect cards when they were very young have retained their interest in later life. This is not surprising, for in a way the cards have produced a passing pageant of the times in which they were issued, and hunting down rare sets and examples provides the collector with all the pleasures of the chase.

Mr. Cruse remarks that there are over 3,000 series of British cards, while more than 500 British sets have been issued overseas and over 750 by foreign manufacturers. The earliest cards of course were used only as stiffeners, and 70 years ago some of these carried pictures, usually of actresses and glamorous beauties. One day in 1878 Edward Bok picked up one of these cards thrown down in the street and noticed that the back of the card was blank. This seemed to him a waste of space, and he suggested to the company issuing them that the cards would become more interesting and attractive if a biography of the subject was printed on them. When the first cigarette card appeared is not known, but this suggestion by Edward Bok was certainly the beginning of the long series of cards that have taught us something about great men, beautiful scenes and famous buildings, history, flying, science, medals, flags and indeed almost every topic under the Sun. In the book we can read the stories of many of the most outstanding of these, while typical examples can be studied in the 102 illustrations of famous cigarette cards on the 28 whole page plates included in the book.

Other attractions of Mr. Cruse's volume are notes on errors and forgeries, in which many collectors specialize; hints on the mounting and display of cards; and suggestions for further series when the issue of these attractive bits of card is resumed. The story of tobacco too is told briefly, with many tales of the changes that have occurred since the Elizabethans introduced the custom of smoking; and generally the book is packed with interesting details that cover as wide a range as do the cards themselves.

"MINIATURE LOCOMOTIVE CONSTRUCTION"

By John H. Ahern
(Percival Marshall & Co. Ltd. Price 8/6)

In this book the rather specialized subject of miniature locomotive building receives the same practical and painstaking attention from the author as was evident in his previous "*Model Building Construction*," reviewed in the "*M.M.*" in August 1947. It is primarily devoted to the electrically-operated types in Gauge 00, though many of the principles advocated can be applied equally well to other scales and to clockwork engines. Steam locomotives are not considered; they form quite a separate branch of the subject of model engine building.

The methods described represent the results of the author's experience in the construction of small-scale locomotives, and illustrate the fascination of building-up a model locomotive from raw materials, with perhaps a few purchased fittings. Those who have not experienced this will be encouraged by the author's confession that his book records not only what is supposed to happen, but what actually does happen sometimes. The illustrations consist largely of excellent and instructive line sketches showing different parts, method of assembly and so on.

The author deals so well with what we may call the mechanical part of the job that it is a little disappointing that the painting and finishing processes are not described.

"THE BOYS' BOOK OF SOCCER"

(Evans, 10/6)

We have received the 1949 edition of this annual, which should certainly be in the hands of all boys who are interested in Association football. All the articles, stories and illustrations in this fourth edition are entirely new, and it provides a wealth of reading for the enthusiast. There are articles on the laws of the game, how to play it well, and how to make oneself fit, a necessary preliminary to playing the game properly. Stories are told of famous football teams and of outstanding matches, including the 1948 Cup Final and international games, and there is a special section devoted to records and dates of importance in the history of the game. Stories and puzzles, cartoons and crosswords in which football plays a part, make up a very fine book.

The illustrations are noteworthy. They include line drawings in the general articles and stories, and in addition there are many excellent reproductions of photographs of games, players and football scenes.

"STILL MORE OF MY BEST RAILWAY PHOTOGRAPHS"

No. 13 (L.M. Region)

By Rev. Canon E. Treacy
(Ian Allan Ltd. 1/9)

Canon Treacy has already contributed to this well-known series, and his third selection of railway photographs is very welcome. In choosing this set he has introduced more variety, aiming at presenting pictures instead of being content with just portraits of engines or trains. He explains the new principles on which his selection is based in an interesting introduction, and the result of his thoughts, as seen in the collection forming these pages, certainly arouses the keenest interest in the railway fan as well as in the photographic enthusiast. Many of the shots are striking, while the different aspects are well varied.

Copies can be obtained from booksellers at 1/9 each, or from Ian Allan Ltd., Mail Order Department, 33, Knollys Road, Streatham, London S.W.16, price 1/11½ including postage.

"THE A.B.C. OF BRITISH LOCOMOTIVES"

Parts I, II, III, IV
(Ian Allan Ltd. 2/- each)

The renumbering of British locomotives in accordance with the national scheme has made necessary the revision of the familiar "ABC" books, and Parts I to IV now deal respectively with the steam locomotives of the Western, Southern, London Midland and Eastern Regions of British Railways. All engines in service up to 31st August 1948 appear class by class in order of their new numbers, together with their names where these are carried.

As usual with these excellent booklets, illustrations are plentiful and varied, the principal dimensions of the various classes are given, and there are lists of depots and other useful details. Copies are available from bookstalls and booksellers, 2/- each, or direct from Ian Allan Ltd., Mail Order Department, 33, Knollys Road, Streatham, London S.W.16, price 2/2½ including postage.

"BUNKLE AND BELINDA"

By M. Pardoe (Routledge. 7/6)

Bunkle and his family are now firmly established favourites. They have appeared in five previous books by Mr. Pardoe and have earned the further distinction of appearances in the Children's Hour of the B.B.C. Readers of the "*M.M.*" therefore will not need any special recommendation of this, the latest adventure of Bunkle and his brother and sister with their friends in Cornwall. It is exciting enough, for besides enjoying themselves thoroughly on holiday they go down a tin mine that seems to hold a mystery, discover a cave that is found to contain a long-lost treasure, and discover a concealed uranium mine.

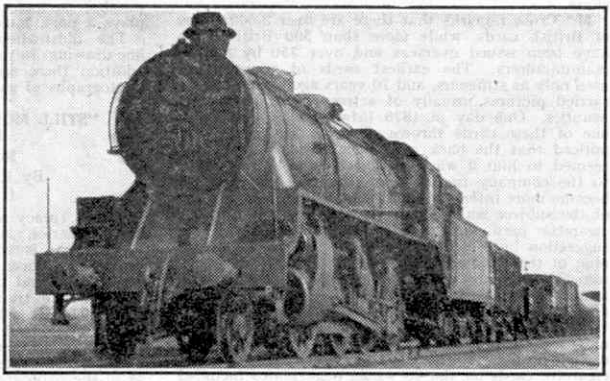
A Railway Enthusiast Goes to Belgium

By J. D. Mills

HERE are related the experiences of a railway enthusiast's holiday visit to Belgium, when the writer was lucky enough to have the opportunity of visiting Ostend and Bruges running sheds.

The crossing was made by the Dover-Ostend service and the arrival at Ostend was in the evening. Damage to Ostend Harbour Station during the war has necessitated an extensive reconstruction programme. Our Bruges-Brussels express did not depart for some two hours, and during this time a careful study of the station and rolling stock was made. Our train was made up of first and second class coaches painted olive green, in addition to "Blue" International Sleeping Cars. All the stock was of the latest steel-panelled design and luxuriously fitted out.

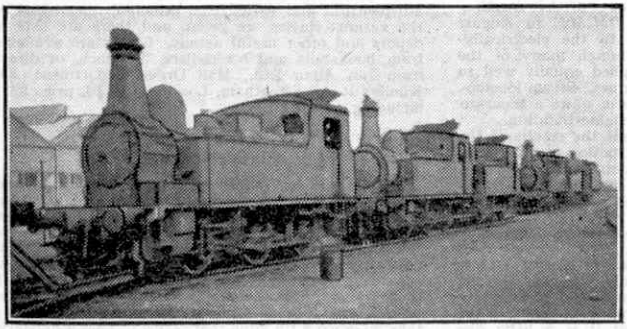
One of the locomotives seen was a giant 4–6–2 or "Super-Pacific" painted green and in spotless condition with shining brasswork. Close examination showed many interesting features, including electric head and tail lamps as well as cab lighting, two fire-hole doors to aid the fireman, and a high-capacity bogie tender. Another engine seen was an aged 4–4–2T on a Bruges-Ostend local train. This was fitted with an unusual coal hopper in the bunker and it carried also a supply of briquettes on the cab roof. After chatting with the driver I heard the familiar clank of connecting rods, and on looking round saw another of the "Super-Pacifics" gracefully backing on to our Bruges-Brussels train. In a few minutes, with a long blast on the siren whistle, we moved off on our journey.



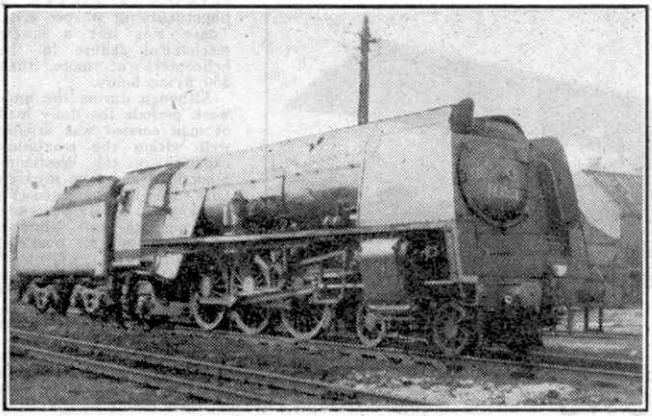
Belgian State 2-8-0 No. 38016 near Bruges on the freight train referred to in this article.

The first locomotive depot to be visited was Bruges, one of the system's largest and most modern sheds. Here two of my friends and I presented ourselves at the main office where we were cordially received, and then handed over to two officials who spoke fluent English. The shed is of the usual ferro-concrete design and is maintained in excellent condition—a happy feature throughout the Belgian State Railways. Combined with the steam shed is a railcar shed and works, as well as a commodious yard.

We were first shown into the railcar shed where both steam and diesel-driven cars are kept. Then we toured the yards and were surprised to find a large number of withdrawn 0–6–0 tender



A row of old engines at Ostend. Note the remarkable shape and size of their chimneys.



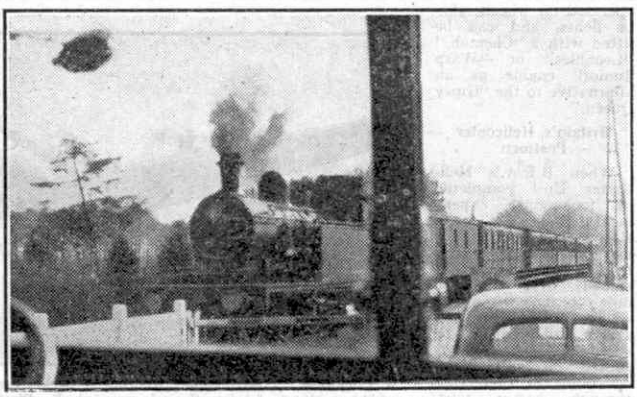
Belgian State Railways "Pacific" locomotive No. 1021 at Ostend.

engines. They were mainly of Sharp Stewart build, and they provided excellent opportunities for my camera. At the far end of the yard was 0–6–0 No. 44260 that had been involved in a fatal accident at Bruges. The engine, which had only been "off the shed" a few minutes, came into a head-on collision with a passenger train that was running against the signals, both fireman and driver of the 0–6–0 being killed instantly.

We were then taken to the water softening and cleansing tower recently installed; in this the water supply is softened and cleaned by an all-mechanical process. From this high vantage point it is possible to secure a fine photograph of the shed yard and surrounding countryside. After this we inspected the locomotive shed and works and said good-bye to our guides, who presented me with the number plate of an ex-German locomotive that had been destroyed by the R.A.F. On that happy ending we left our friends.

In the afternoon of the same day I went in search of a suitable place for taking photographs of trains at speed. I found my site some half a mile from the station on a high embankment, where one has an unobstructed view of trains entering and leaving Bruges. After "shooting" a number of passenger trains I waited hopefully for a goods train to put in an appearance, but these seemed to be very rare. After waiting an hour and a half in vain I packed up my camera and tripod and began to descend the embankment. Immediately I heard the familiar siren whistle and rattle of goods wagons travelling at speed through the station; dropping my rucksack I clambered up the embankment again and just managed to set the shutter and direct vision viewfinder before it thundered by.

At Ostend locomotive depot I was received with the same cordiality. Ostend depot is not as large as Bruges, but possesses a carriage and wagon works alongside the engine shed. Here the ravages of the late war could still be seen; once-beautiful sleeping cars were now burnt-out shells and there were hundreds of wagons twisted and bent by bomb-blast and fire. The shed contained the usual 4–6–2 and 4–6–0 express engines as well as some German-built 2–8–0s with enormous outside cylinders and Walschaerts valve gear. Outside the shed was a row of the oldest engines in Belgium waiting to be scrapped. They were 0–6–0 tanks with small wheels and enormous milk-churn-shaped chimneys.



A typical Belgian level crossing scene, photographed through the window of a bus. A stopping train hauled by a 4-4-2T is approaching the crossing.

The Prestwick "Pioneer" four-seater aircraft described on this page.

Air News

By John W. R. Taylor

The Prestwick "Pioneer"

A feature of the Prestwick "Pioneer" that never fails to impress onlookers is its incredibly short landing run. It can land literally within its own length, needing a run of only some 30 ft. in a moderate wind. Apart from helicopters, no other aircraft in the world can match this performance and, of course, it is more economical than helicopters for most purposes.

The "Pioneer," illustrated above, was developed to a military specification for air observation post and liaison duties, and undoubtedly owes much to the German Fieseler "Storch," two of which landed on a glacier high in the Swiss Alps in 1946 to rescue passengers from a crashed air liner. It shares many of the "Storch's" design features, including full-length leading edge slots and extensive wing flaps, combining them with slightly higher power and rugged all-metal construction.

It is designed for operation from very small areas, and could prove invaluable for air taxi, ambulance or similar duties in places like the Scottish islands and highlands. It is not designed for high speeds, but its 250 h.p. "Gipsy Queen" engine enables it to carry four people for 500 miles at 114 m.p.h., which is quite good when considered in conjunction with its slow-flying characteristics. What is more it can be operated on wheels, skis or floats, and can be fitted with a "Cheetah," "Leonides" or "Wasp Junior" engine as an alternative to the "Gipsy Queen."

Britain's Helicopter Postmen

When B.E.A.'s Helicopter Unit completed its four-month experimental mail service in East Anglia last year, it had made 100 daily flights (Sundays excluded) over the 270 mile "beat," without a single break, and its strict adherence to schedule had been interrupted on only three occasions, in each case through heavy mist. Thus, Europe's first scheduled helicopter mail service achieved a punctuality of 97 per cent. There was not a single mechanical failure in the helicopters in more than 350 flying hours.

Although during the mid-week periods the daily load of mail carried was usually well within the maximum capacity of the Westland-Sikorsky helicopters used on this service, Saturday's week-end mail between Peterborough and Norwich often imposed an overload beyond the "official" maximum of 400 lb. The biggest load of mail lifted was, in fact, 680 lb., representing about 10,200 letters and post cards.

During the total period of operation, something in the region of 500,000 letters, post cards and small packages were delivered and collected, giving East Anglian residents a speeding up of their correspondence by 12 hrs. or more during the week, and up to 48 hrs. at week-ends.

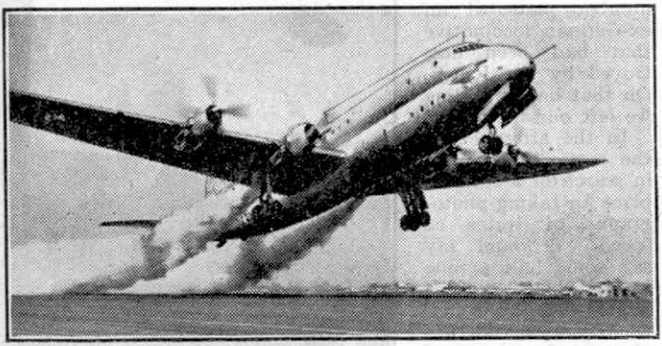
D.H. "Vampires" Fly 960 Miles Non-Stop

On the last stage of a recent 6,000-mile delivery flight from England to India three de Havilland "Vampires" for the Government of India covered the 960 miles from Sharjah to Khambalia non-stop. This is a remarkable distance for fully operational single-engined jet fighters with normal tankage and equipment as supplied to the Royal Air Force.

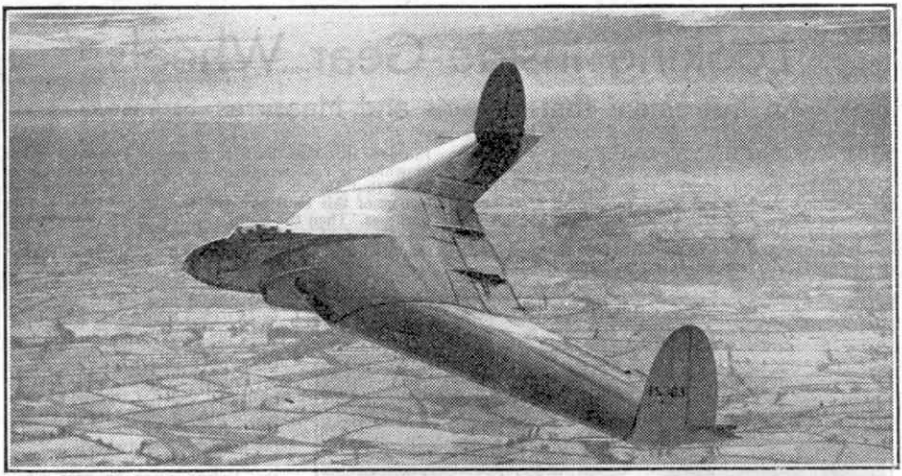
Air-Britain

A new organization known as Air-Britain has been formed to foster interest in aviation among people of both sexes and all ages. It is the post-war successor to the nation's 800 wartime Spotters' Clubs, which closed down in April 1946.

Air-Britain's Secretary is John S. Webb, who organized the Reading Sky Observers' Club and also edits the organization's monthly magazine "*The Skywriter*," which is circulated privately to members. Air-Britain has both a London Headquarters, at 15, Tavistock Street, W.C.2, and a large number of local branches. Members are offered facilities for visits to civil airfields and air displays, membership of the Aircraft Recognition Society at a reduced fee, and access to an Information Pool operated by specialists who can supply data on such things as aircraft registrations and history, as well as photographs.



A Lockheed "Constitution" making a rocket-assisted take-off to test the effect of this method of take-off on large aircraft. Photograph by courtesy of Lockheed Aircraft News Bureau.



A new picture of the Armstrong Whitworth A.W.52 "Flying Wing" research aircraft. Photo. "Flight" Copyright.

New Marine Airport

B.O.A.C. flying boats operating services to South Africa, Pakistan, India, Australia and the Far East now call at Alexandria, in Egypt, instead of at Cairo. This change has been made at the request of the Egyptian Government, who have built a new marine airport on Lake Mariut, which has the great advantage of being near the centre of Alexandria.

Alexandria is not a new port of call for British flying boats, as the old Imperial Airways' "Empire" flying boats used the harbour there before the war.

The change concerns B.O.A.C. flying boats only, and the Corporation's landplane services to and through the Middle East continue to use Almaza airfield at Cairo.

A Supermarine Amphibian

The new Vickers-Supermarine "Seagull" amphibian, illustrated on this page, must surely rank as one of the most interesting aircraft ever built. Designed as a "maid-of-all-work" for the Royal Navy, it is intended as a replacement for the veteran "Sea Otter," the type that has given such good service on air-sea rescue and liaison duties.

Despite the fact that it carries a crew of three, has folding wings and can operate from land, sea or carrier-deck, the "Seagull" has a top speed of 260 m.p.h., which is exceptionally high for this type of aircraft. The explanation of this performance is the clever combination of a Rolls-Royce "Griffon" engine, comparatively clean design and the use of a special variable-incidence wing. First tried out on the experimental "Dumbo" torpedo-bomber, this wing can be set to give maximum lift for take-off, and then turned bodily in relation to the fuselage during flight to avoid the usual nose-down attitude that causes excessive drag and so reduces performance.

The "Seagull" has a span of 52 ft. 6 in. and weighs 14,500 lb. fully loaded. Its "Griffon" engine, which drives a six-bladed contra-prop, normally develops 2,055 h.p., but this can be increased to 2,500 h.p. by water-methanol injection.

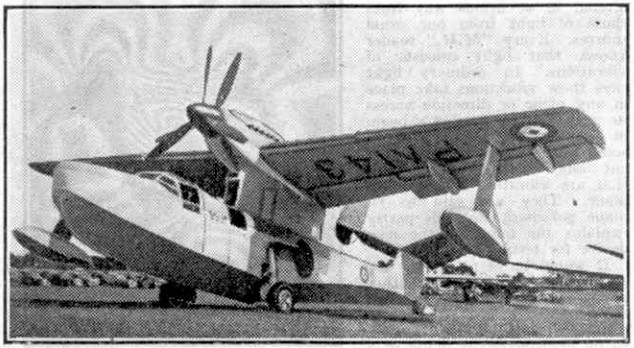
Cotton Plants Sprayed by Helicopter

Further proof of the helicopter's ability to perform jobs beyond the scope of any other form of transport was recently given in the Sudan. A total of 90 acres of young cotton plants at Turabi were sprayed with insecticide from a Westland-Sikorsky S-51 helicopter, to counter the ravages of the jassid insect, which sucks the leaves of cotton plants, causing a reduction in yield. Normally such spraying is done by tractor, but this proved impossible during irrigation.

This is believed to be the first time that a helicopter has been flown in Africa.

"Hornet" Showmanship

During a recent demonstration tour of the United States, Lieut. Cdr. D. B. Law, D.S.C., leader of the Royal Navy's No. 806 Squadron, carried out two complete loops in a de Havilland "Sea Hornet" with both engines stopped. He then re-started the engines in the air and continued his demonstration.

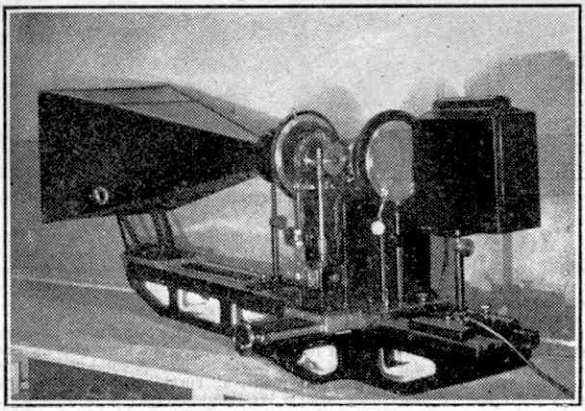


The Supermarine "Seagull" air-sea rescue amphibian, which has a variable-incidence wing. It is powered by a Rolls-Royce "Griffon" engine.

Looking Inside Gear Wheels

An Instrument that Detects and Measures Stresses

NOT so long ago it was difficult to learn what was happening to the teeth of gear wheels while these were in motion, or generally to find exactly how pieces of metal behaved when they were stretched, compressed or bent. It was impossible to see inside them, and the way in which they changed under stresses, or where they were subject to their greatest ordeals, could be learned only by calculations. These were liable to uncertainty, and some of them we now know to have been based on wrong ideas.



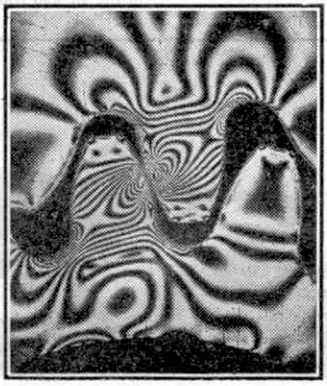
The polariscope used for detecting stresses in metal parts. Gear wheels in mesh are being tested. Our illustrations are by courtesy of David Brown and Sons (Huddersfield) Ltd.

All this has been changed by the introduction of a remarkable testing device to which the somewhat cumbersome word of polariscope is given. The upper illustration on this page shows one of these instruments that was designed and built in the Research Department of David Brown and Sons (Huddersfield) Ltd. This makes use of light rays or beams, but these have been altered in a curious way from those of light from our usual sources. Every "*M.M.*" reader knows that light consists of vibrations. In ordinary light rays these vibrations take place in any plane or direction across its path, but by passing a beam of light through certain crystals some of the vibrations can be cut out, leaving only waves that are vibrating in the same plane. They are said to be plane polarised, and this partly explains the name of the new device for testing for stresses.

It would be of no use to try to pass rays of light, whether polarised or not, through steel rods, plates or gear wheels, so for these tests the part that is to be investigated is made of a transparent plastic, that is one that allows light rays to pass through it. This part is fixed in a special frame in which it can be subject to forces proportional to those that act on its steel prototype, several suitable frames of this kind having been designed for various purposes. Then the frame is placed in the polariscope. On the right of this is a mercury vapour lamp mounted in a lamp house, the light from which passes through a circular sheet of a special glass called Polaroid, which gives the required polarising effect. The polarised beam passes through the part under test and then into an analyser, which again consists of a circular sheet of Polaroid, and an image of the part under test is then projected on a ground glass screen. Often photographic records are required, and then a camera is used in place of the screen.

The plastic material of which the testing piece or gear wheel is made is capable of what is known as double refraction, that is it splits the polarised light passing through it into two rays. These vibrate in the directions of the two principal stresses to which it is subject, and travel at different speeds. The two rays are recombined in the analyser, but as they go through the strained plastic at different speeds they are now out of step, so that on the screen or photographic plate they interfere with each other. The image of the model reveals this by a series of brightly coloured lines if ordinary light is used, and as black lines only if the original light has only one colour. How far the two rays are out of step at any point depends on the magnitudes of the two principal stresses at the point, and these can readily be calculated.

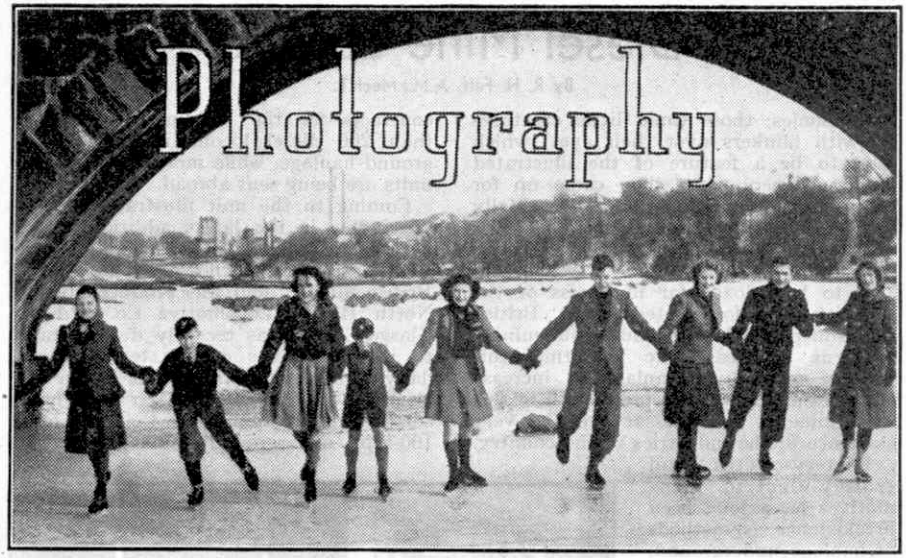
There are two kinds of line patterns. One is formed when the plane in which the light passing through the model vibrates coincides with the direction of the principal stresses. This is cut out by the analyser and the result is a pattern of black lines, known as isoclinics, on the screen. These show the directions of the principal stresses. They can be cut out when not wanted, by the use of a special piece of mica known as a quarter-wave plate, and then only the second pattern of lines, called isochromatics, is seen. These are like contour lines on a map; crossing them indicates movement from a region of low stresses to one of high stresses, so that the increase in stress is greatest where they are close together.



Polariscope image of gear wheels in contact under load.

The lower illustration on this page shows a polariscope picture of two gear wheels in action, one driving the other. The isochromatic lines are crowded together where the two teeth shown in the centre are in contact with each other, showing that the

(*Continued on page 34*)



The Skaters. Photograph by R. Wrigley, Clitheroe.

Frost and Snow Pictures

THE most striking frost pictures are seen when there has been both frost and fog; then damp air, freezing on every twig and leaf, transforms what may be an otherwise drab picture into a fairyland scene. The morning sunshine that gives such a delightful sparkle to everything also sets a time limit to the photographer's opportunity, as the delicate beauty of rime-covered trees soon melts away.

Open landscapes seen in sunshine after a heavy fall of snow seem to be ideal subjects for photography, but unless there is some dark object in the near foreground the picture is almost always uninteresting. The effect is similar to that of an expanse of open sea photographed from the shore; without a foreground such as rocks or a boat the picture seems flat. A foreground object for a snow scene may be almost anything in the way of a building or a tree or trees; the only requirement is that it should be relatively dark and well defined.

A small stream in its winter dress usually provides good pictures, especially at a point where it makes a bend. This bend idea can be remarkably important in pictures. For instance, one may be walking along a country lane under snow and see nothing to photograph; then the lane makes a sharp bend to right or left, and immediately a picture is provided.

Pictures of groups of skaters are easy to take and generally turn out well. Curling also is a good subject, but it is often necessary to wait patiently for a while until the curlers group themselves suitably. Sledging too is worth attention, and in my opinion is greatly neglected. Another happy subject is that of children excitedly snowballing. Outdoor pictures of this kind definitely require bright sunshine to look well, and it is not much use wasting films on a really dull day.

Finally, look round for any big snowman in your neighbourhood; if he is well made he will provide a happy picture. A friend of mine has an album of pictures of snowmen taken during past winters, and it is one of the most amusing albums I have seen.

If you develop your films yourself, remember that the development of snow and frost films should be rather shorter than normal in order to produce negatives that are full of detail, but without harsh contrasts.

The Diesel Mine Locomotive

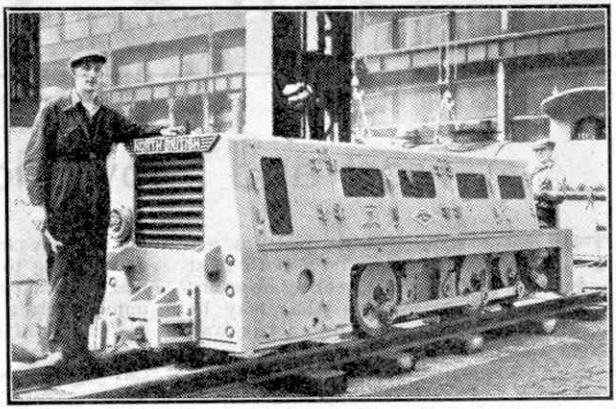
By R. H. Fett, A.M.I.Mech.E.

PIT ponies, those timid little creatures with blinkers over their eyes, which used to be a feature of the illustrated Sunday papers when they came up for their annual grazing period, are gradually but surely disappearing. Their place is being taken by the modern diesel mine locomotive, infinitely more powerful and able to haul loads far in excess of the capacity of our four-footed friends. British mines in particular, and numerous mining concerns overseas, are adopting this modern method of haulage to increase output and step up the production of this vital mineral, so necessary to the very existence of the industries of the country.

Battery-electric and trolley-electric locomotives have long been in existence as methods of haulage underground, but there are limitations on the use of the latter where "gassy" mines are concerned because of the possibility of explosion, while the battery locomotive is expensive in upkeep and can work for relatively short periods only before requiring recharging. The trolley locomotive also is dependent upon an outside source of power, the failure of which would paralyse the whole haulage system of a pit.

The diesel locomotive however is an independent unit, able to go anywhere where tracks are laid, work continuously for 24 hours if necessary, except for short refuelling periods, and if it should break down haulage in the pit is not suspended, as the offending locomotive may be towed into the underground depot and repaired. It is less expensive to instal the diesel locomotive in the pit, as it requires no external source of power, no overhead wires or special charging depots and costly operating gear. It is therefore no surprise to find the diesel which, especially abroad, has shown itself supreme in the traction field, taking its place as the principal method of haulage in the pits. Not so long ago the National Coal Board announced the placing of contracts for the building of no fewer than 200 diesel locomotives for underground haulage, while more of these small units are being sent abroad.

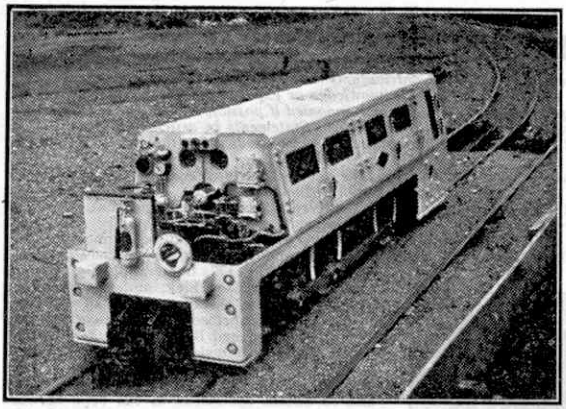
Coming to the unit illustrated on this page, this is the latest addition to the fleet of locomotives now working in the British pits. It is known as the "North British Miner," and was produced by the North British Locomotive Co. Ltd., of Glasgow, and was recently demonstrated to representatives of the technical and daily press along with officials of the Coal Board. It is unique in so far as it has a smaller cross-sectional area than any other 100-h.p. underground mine locomotive.



The "North British Miner," a 100 h.p. diesel mine locomotive designed and built by the North British Locomotive Co. Ltd., Glasgow, to whom we are indebted for the illustrations to this article.

Its height and width do not exceed the corresponding dimensions of the standard high capacity mine tub; this is a most important feature where the mining engineer is concerned, as it means smaller tunnels or roadways.

Power is derived from a six-cylinder Davey Paxman diesel engine, which develops 100 h.p. at 1,250 r.p.m. In addition to the radiator fan, lighting dynamo and other auxiliaries, the engine drives a two-stage air compressor, which charges the high pressure air bottle to 450 lb. per sq. in. This air is used for engine starting, the air being led to the engine cylinders through a distributor block. A reducing valve in the pipe line brings down this pressure to 60 lb. per



A three-quarter rear view, showing the controls and driver's seat.

sq. in. for operating the compressed air braking system, gear-box control, sanding and horn.

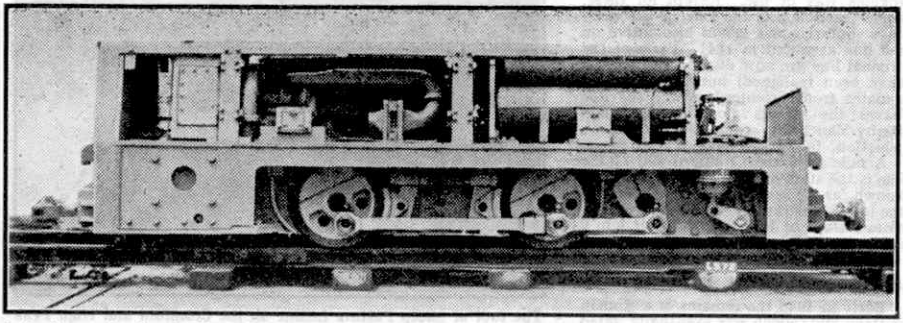
The drive from the engine is taken through a flexible bonded rubber coupling to a three-speed oil operated S.L.M. gear-box, which incorporates a final bevel and reduction gear on a jackshaft, the fly cranks of which are connected to the four road wheels through coupling rods. Reversing is by means of an air-operated dog clutch, which engages one or other of the crown bevels.

The gear-box gives three speeds of 3, 6.5 and 15 m.p.h. in each direction, at which the respective tractive efforts are 8,400 lb., 4,380 lb. and 1,900 lb. The locomotive weighs 15 tons in working order, and on a basis of 25 per cent. adhesion against a running resistance of 20 lb. per ton it can haul a load of 420 tons, including the weight of the unit, or 28 times its own weight at 3 m.p.h. on the level.

Most important of all things on underground power equipment is flame proofing, and for a diesel locomotive exhaust conditioning also is essential. No power equipment of any description which is liable to give off flame or is subject to internal explosion is allowed to work in a "gassy" pit without being fully flame proofed. The diesel engine is subjected to flame proofing at both the induction or air intake end and at the exhaust. The flame traps consist of stainless steel blades about two inches deep placed back to back in a pack, with spacers between which allow a maximum gap of only 16 thousandths of an inch; no flame can penetrate these gaps.

In addition to flame proofing, the diesel engine exhaust requires to be conditioned before release to the atmosphere; in other words it is washed in a conditioner box, passing through water several times and then through some filtering medium where it gives up its moisture and any solids it may carry. Carbon monoxide, so deadly a component of the petrol engine exhaust, is almost non-existent in the diesel exhaust, and is not permitted to exceed .06 per cent. In this case the exhaust is diffused to the extent of 16/1 air to gas ratio before release, being mixed with the air from the radiator fan.

The driver sits at the rear end of the locomotive. Driving is very simple, the three principal controls being engine throttle, gear change and power brake. The locomotive is fitted with central automatic buffer-couplers and is suitable for gauges between 2 ft. 6 in. and 3 ft. 0 in.



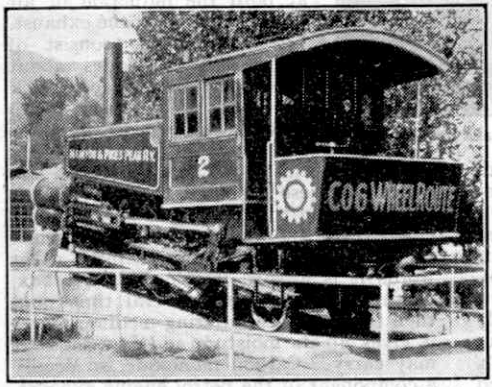
Induction and exhaust side, with the doors removed. The inlet flame trap is on the right of the air inlet filter.

From Our Readers

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

THE "COG WHEEL ROUTE"

Pike's Peak in Colorado, U.S.A., 14,134 ft. high, was discovered in November 1806 by Lieutenant Zebulon M. Pike of the U.S. Army. It has the distinction of possessing the longest rack or "cog" railway in the world, formerly a steam line, but now diesel-electric in working. This is nine miles long and the accompanying illustration shows a steam locomotive of this railway now on permanent exhibition at Manitou. The "Cog Wheel Route" emblem on the bunker will be noticed.



A Pike's Peak rack-rail engine preserved at Manitou, Colorado. Photograph by R. A. Davison, Stafford.

R. A. Davison (Stafford).

THE HIGH PEAK RAILWAY

The Cromford and High Peak Railway, now a section of the London Midland Region, was constructed in 1825–32. It was, and still is, a remarkable section of railway, for of the original 33 miles, only 12 were level. There were eight inclines, on which cable haulage by stationary engines was in use. Except for these, horse traction was the rule in the early days, but the first steam locomotive on the line appeared in 1841. Parts of the original line are now disused and several have been realigned; but the old route remains from Cromford, where the line leaves the sidings alongside the main Derby-Manchester route at High Peak Junction, to Parsley Hay.

A mile from the Cromford end of the line is the start of a cable-worked incline, known as "Sheep Pasture," shown in the lower illustration. The abrupt change from a slope of 1 in 200 to one of 1 in 9 is clearly visible.

J. E. Allen (Stanmore).

A SECOND CENTURY POTTERY KILN

Early in 1946 the remains of a Roman pottery kiln, which was eventually dated as having been in use during the latter half of the second century A.D., were found in a small Suffolk village.

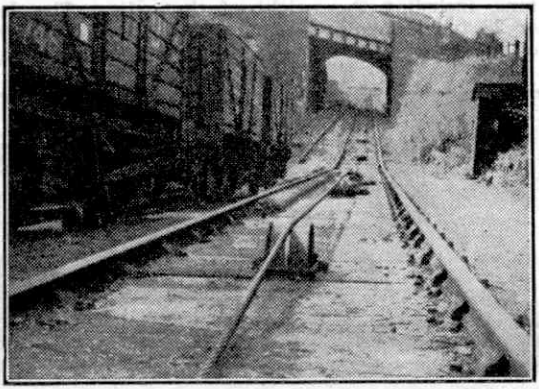
When I arrived at the site, I found that the dome-shaped outer wall, which had originally risen to a height of 7 ft. or 8 ft., had collapsed, filling the lower half with debris and smashing any vessels that had been left inside. This outer wall of clay, some three to four inches thick, and the remaining pieces, still bore the impressions of the osier twigs that had formed the framework around which the dome had been constructed.

By noon, the interior had been cleared and many fragments of pottery recovered. We were later able to piece most of it together and so obtain specimens of the type of ware that was produced. We found that this kiln was used mainly for the firing of vases and flat dishes.

The actual layout of the kiln was unusual, being oval instead of the nearly round shape that is normal. Level with the top of the firing arch it was approximately 4 ft. 6 in. by 3 ft., and in the centre of the wall, 5 ft. 6 in. by 4 ft. The central stand was separated from the outer wall by a channel 6 in. wide. It supported the base, pierced at intervals to allow the flames and hot gases to enter the interior. The stand and base were burnt to a brilliant red, indicating that the kiln had been working at very high temperatures. The vessels when ready were stacked on the base, the dome was then sealed and firing commenced. Firing was carried out by lighting a fire in a deep channel outside the arch, the flames and hot gases being blown into the kiln by the prevailing winds.

The pottery from this kiln is a light grey in colour, rough glazed on the outer surface with a darker shade, sometimes almost black, depending on the temperature to which it was fired. Although there were many other potteries in the district, none produced ware of the same texture as this one, and all differ in the proportion of mica in their products.

A. Rudd (Ixworth).



The foot of Sheep Pasture incline on the Cromford and High Peak line. Photograph by J. E. Allen, Stanmore.

Club and Branch News

WITH THE SECRETARY

A HAPPY NEW YEAR

With this first issue of 1949 I have pleasure in wishing a happy and successful New Year to all members of the Guild and the H.R.C. In the past year more than 10,000 new members have been enrolled in the Guild, and nearly 13,000 in the H.R.C. I hope that even these figures will be surpassed during 1949.

I am also looking forward to real progress among Clubs and Branches. Every existing organization should be adding considerably to its strength with the coming of so many new members, and its proceedings should become livelier and more enjoyable as its strength increases. More new Clubs and Branches too should be coming into existence. Every member of the Guild or the H.R.C. who does not already belong to a Club or Branch should look round for one that he can join, and I shall be glad to give information that will be helpful in this respect. Where there is no Club or Branch in the neighbourhood the enthusiasts there should set to work to form one. The first step of course is to find others willing to join in the effort, and this usually is not difficult, as every member must have friends who also are enthusiasts.

The great thing is to get together, even if the number to start with is small, for there is no doubt whatever that the fun of model-building or of Hornby and Hornby-Dublo Train operation is increased to a surprising extent when it is shared with others. Once a Club or Branch is started it will soon grow, and provide many happy times for its members.

RAILWAY FILMS

I have received a very interesting list of 16 mm. colour sound films and film strips on railway work, railway travel and general interest subjects from the London Midland Region of British Railways. These can be obtained on loan by Meccano Clubs and Branches of the H.R.C. The colour sound films deal with holiday resorts, railways and important British industries, and the film strips are modern "lantern slides" providing up to 100 still pictures, typical titles being "Passenger Trains," "Permanent Way," and "Travelling Post Offices." They are only loaned where assurance is given that a suitable projector and a competent operator are available, and when admission is free. They will provide splendid programme items for Clubs and Branches who are able to make use of them, and any Leader or Chairman who is interested should write to me, so that I can give him further particulars and tell him where to apply.

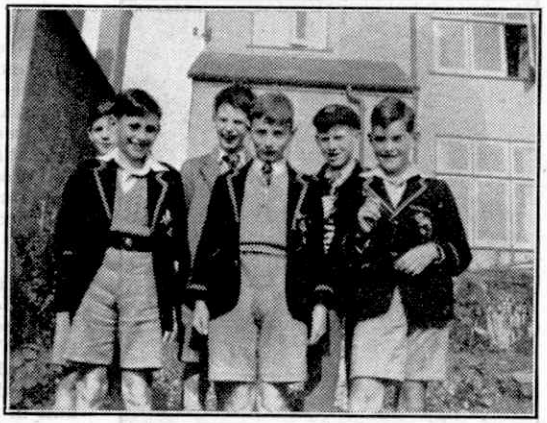
CLUB NOTES

WHITGIFT SCHOOL M.C.—A competition with an omnibus as the subject has been held. The Hornby Train Section continues active and a Hornby-Dublo Section has been formed. Members visited the Shirley M.C. by invitation for Lantern Lectures, and Visits have been paid to the Kenview Model Railway, Finsbury Park Station and King's Cross. Club roll: 30. *Secretary:* P. J. Cousins, 20, Langley Oaks Avenue, Sanderstead, Surrey.

THORNTON GRAMMAR SCHOOL (THORNTON) M.C.—Engineering and Woodwork Sections have been formed. Members of the Engineering Section are building a model of the Hawkesbury Bridge, New South Wales. The Club Library has been re-opened. Club roll: 17. *Secretary:* M. H. Reynard, 43, Bronte Old Road, Thornton, Bradford.

PETERBOROUGH M.C.—Fine models have been built of a combine harvester and the Eiffel Tower. A Visit has been paid to a local engineering works. Games and Debates are enjoyed regularly. A Darts Tournament has been held and a successful Christmas Party was organized. Club roll: 16. *Secretary:* R. Booker, 110, Alexandra Road, Peterborough.

WORCESTER COLLEGE FOR THE BLIND M.C.—Steady progress is being made. Members are building a set of railway rolling stock, one group building trucks, another coaches and a third locomotives, and a fourth laying down track. The local telephone exchange has been visited, and a visit to the Austin Motor Works has been arranged. *Leader:* Mr. R. D. Follett, Worcester College for the Blind, Worcester.



Members of the Stroud Branch, No. 502, Chairman, Mr. C. T. Hargest, Secretary, D. Hargest. This Branch was affiliated in July 1947. Track meetings are held regularly and good displays have been organized, including an outdoor Exhibition of Hornby Trains and Dinky Toys in July last that was specially reported in the local newspaper. Cricket and other indoor and outdoor games also are enjoyed.

BRANCH NEWS

DAWSON PRIMARY BOYS' SCHOOL (DAGENHAM)—Regular track meetings continue. At one of these locomotives were tested and certificates of their performance were given. Mr. J. Brooks, Chairman, gave demonstrations with his own locomotives. Lantern Lectures on the history of British railways have been given. A Newsletter by Mr. E. Lynch, Locomotive Inspector at Plaistow, gave interesting details of locomotive work. *Chairman:* Mr. J. Brooks, Dawson Primary Boys' School, Ellerton Road, Dagenham, Essex.

Among the Model-Builders

By "Spanner"

Reversing Mechanism for E06 and E020 Motors

Owners of either the Meccano E06 or E020 type Electric Motors will know that they are supplied with a special pulley fitted to the armature shaft. In most cases this pulley can be connected by Cord or a Driving Band to a suitable pulley on the model. In some types of models, however, it is preferable to drive through a gear train, and Fig. 1 shows how this can be combined with a neat reversing mechanism.

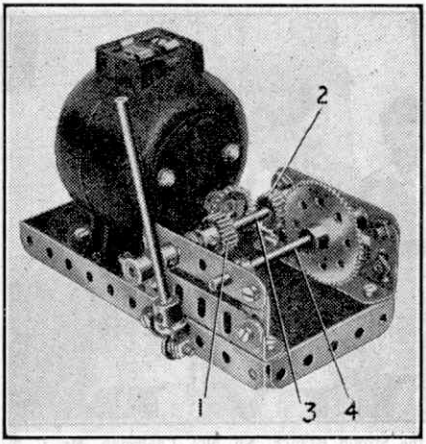


Fig. 1. A useful driving and reversing mechanism fitted to an E06 or E020 type Meccano Electric Motor.

The Motor is bolted to the base of the model, and the armature pulley is removed and replaced by a $\frac{3}{4}$" Contrate. From the Contrate the drive can be transmitted to either of two $\frac{1}{2}$" Pinions 1 and 2. These are fixed on a Rod 3, mounted in two $2\frac{1}{2}$" Strips. The $2\frac{1}{2}$" Strips are supported at each end by Fishplates bolted to $2\frac{1}{2}$" Angle Girders attached to the base. From Rod 3 the drive is taken to the output shaft 4 by a 57-teeth Gear meshing with the Pinion 2.

Movement of Rod 3 is controlled by a Rod fixed in an End Bearing that is attached by a lock-nutted bolt to an Angle Bracket bolted to the base. The Rod engages between Collars fixed to the end of Rod 3 outside the framework.

First Prize winner A. R. Tinckson, Sydney. He won the highest award in the "February" Model-Building Contest (Overseas Section).

Friction Drive

Here is a suggestion for a novel friction drive device that I received from an old Meccano enthusiast, F/Lt. N. C. Ta'Bois, who is now serving with B.A.O.R. in Germany. Regular readers of the *"M.M."* will remember the many models and mechanisms devised by Ta'Bois that have appeared in past issues of the *"M.M."* His friction device, shown in Fig. 2, was designed for use in the drive to the film take-up spool of a cinematograph.

Two $1" \times \frac{1}{2}"$ Angle Brackets are bolted together by means of a set screw and nut to form a large reversed angle bracket. One end of this is bolted to a 57-teeth Gear Wheel that is loosely mounted to a Rod, while its other end is journalled on the Rod. Two Collars retain this built-up unit in place. Seven Spring Clips are now pressed on to the Rod. The drive is transmitted from the Gear Wheel through the Angle Brackets and Clips to the Rod. By varying the number of Clips the power transmitted can be controlled.

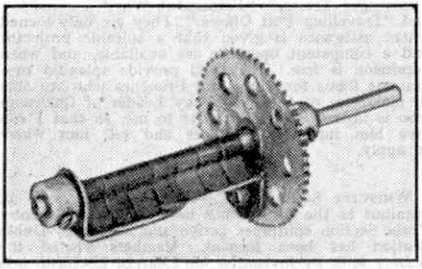


Fig. 2. A novel friction drive device designed by F/Lt. N. C. Ta'Bois, B.A.O.R., Germany, for use in the take-up spool drive of a cinematograph.

How to Use Meccano Parts

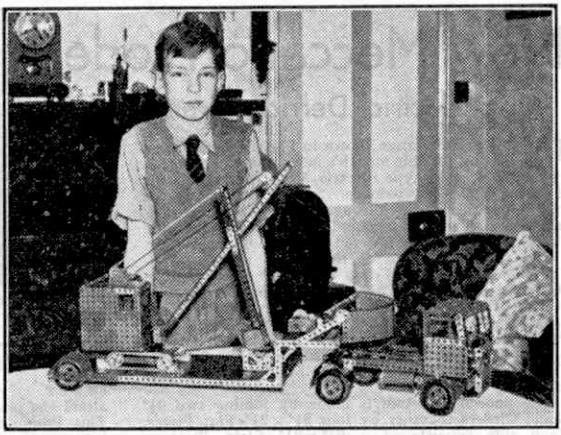
Fork Pieces (Part No. 116 Large; Part No. 116a Small)

Fork Pieces are designed for making pivotal connections between Rods and Strips, or between two Rods meeting at right-angles. In Fig. 4 a small Fork Piece is used as a bearing for a ½" loose Pulley, which runs on a ½" Bolt passed through its arms. A large Fork Piece makes a neat journal bearing for a short Rod, and it is useful also for forming a connection or bridging piece between other parts such as Strips.

Threaded Boss (Part No. 64)

The Threaded Boss is of the same diameter as the Collar, but measures ⅜" in length and is perforated longitudinally and transversely with threaded holes. Hence the part is particularly valuable in Meccano screw gearing. In Fig. 3 for example, a Threaded Boss is shown mounted on a short Screwed Rod, but it is prevented from rotating with the Rod. Consequently, when the handwheel shown is rotated the Boss travels longitudinally, and in the mechanism illustrated this movement is utilized to control a simple brake device.

The Threaded Boss is useful also for connecting Strips and Girders to Screwed Rods.



A model-builder at home. Here is 12-year old David Hughes of Dursley, Gloucestershire, with an interesting model excavator and carrier he has built. David is a pupil at the Dursley Grammar School and is a keen Meccano boy.

"NEW-YEAR" MODEL-BUILDING COMPETITION

In the first Meccano competition to be announced in 1949, we are offering fine cash prizes for models of any kind built by readers of the "*M.M.*" There are no age limits, and the only conditions are that models must be built from Meccano parts and must be the unaided work of competitors themselves. There is no restriction whatever on the kind or size of models that may be submitted.

The contest is divided into two Sections, A, for competitors of all ages living in the British Isles; B, for competitors of all ages living Overseas. The prizes to be awarded in each Section are as follows: First, Cheque for £3/3/–; Second, Cheque for £2/2/–; Third, Cheque for £1/1/–. There will be also five prizes each consisting of a P.O. for 10/6 and five prizes each of 5/–. Certificates of Merit also will be awarded.

Section A will remain open for entries until 28th February, but Overseas readers entering for Section B, can send in their entries up to 31st May next.

Actual models must not be sent. All that is required is a photograph or a neat sketch of the model together with a few details of its chief features. Entries should be addressed "*New Year Model-Building Contest, Meccano Ltd., Binns Road, Liverpool 13.*" Competitors should note that illustrations of prize-winning models become the property of Meccano Ltd., and will not be returned.

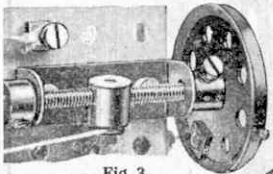


Fig. 3.

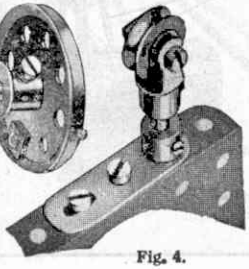


Fig. 4.

Examples of uses for the Meccano Threaded Boss and the small Fork Piece.

"COLLIS TRUCK" MODEL-BUILDING CONTEST

This is the last opportunity we shall have of reminding intending competitors living in the British Isles, of the fine prizes to be won in the "*Collis Truck*" Model-Building Competition, full details of which were first announced in the November 1948 issue of the "M.M." The Home Section of this Contest closes on the 31st January, so that there is not much time to lose in sending in entries. The Overseas Section closes on 30th April.

1948 MODEL-BUILDING COMPETITION RESULTS

April General Contest (Overseas). The principal prizes were awarded as follows: 1st Prize, Cheque for £2/2/–: A. W. Dickie, Dunedin, New Zealand; 2nd, Cheque for £1/1/–: G. Burns, Warragul, Victoria, Australia; 3rd, Cheque for 10/6: R. J. Hadwick, Auckland, New Zealand.

"Meccano Picture" Contest (Home). 1st Prize, £2/2/–: J. A. Draper, Worcester Park; 2nd, £1/1/–: R. J. Sowersby, Davyhulme; 3rd, 10/6: J. Williams, Tolworth.

Overseas. 1st Prize, £2/2/–: R. O. Bickley, Melbourne, Australia; 2nd, £1/1/–: J. A. Erdos, Wellington, New Zealand; 3rd, 10/6: G. Burns, Warragul, Australia.

New Meccano Model

Electric Derrick Crane

THE fine derrick crane shown in Fig. 1, which forms the subject for this month's new model, is operated by an E06 or E020 type Electric Motor, and is capable of lifting quite heavy loads. All its movements are driven by the Motor through a compact gear-box, and a neat reversing mechanism is fitted so that the jib and load can be lowered steadily under power.

The triangular base of the model is built first. The main members of this are 18½" Angle Girders bolted at one end to 5½"×2½" Flanged Plates, and at the other end to 3½"×2½" Flanged Plates. The 5½"×2½" Plates are joined by two 5½" Strips, and the 3½"×2½" Plates by a third 18½" Angle Girder. A 3" Pulley 1 is bolted at the centre of the 5½"×2½" Flanged Plates to form part of a built-up ball bearing as shown in Fig. 2.

The floor of the cab is made by joining two 9½" Angle Girders together by four 5½"×2½" Flat Plates. Each side consists of a 9½"×2½" Strip Plate, a 5½"×2½" Flexible Plate and two 9½" Strips. These are bolted at the rear to a vertical 5½" Angle Girder, and at the front to 7½" Angle Girders 2. The vertical Girders are joined across by 5½" Strips and by a 5½" Angle Girder at the rear. The Angle Girders 2 are extended upward by 4½" Angle Girders, and the latter are connected at their upper ends by a 3½" Angle Girder 3. The supporting tower of the cab is completed by attaching two 7½" Strips 4 to 3" Angle Girders bolted to the Angle Girder 3. A pivot is provided by a 2" Rod passed through a Double Bent Strip and a 3½" Angle Girder. The Rod is fitted at its upper end with a Bush Wheel 5, and is held in position by Collars.

The centre section of the jib consists of four 12½" Angle Girders joined together by 1½" Strips to form a box girder. This is filled in by 5½"×1½" and 2½"×1½" Flexible Plates held in place by nuts on Screwed Rods passed through the Girders and Plates. The jib is completed by a tapered section at each end consisting of four 9½" Strips. The Strips on each side are joined together nine holes from their ends by 1½"×½" Double Angle Strips. The jib is pivoted on a 3½" Rod held by Collars in a 2½"×1" Double Angle Strip bolted to the front of the cab.

The gear-box is shown removed from the cab in Fig. 3, and is built up as a separate unit and bolted to the cab floor when assembled. The sides of the unit are 5½"×2½" Flat Plates, and the bottom is two 3½"×2½" Flanged Plates. The sides are also joined by two 3½"×½" Double Angle Strips at each end. The input shaft 6 is a 6½" Rod mounted in a 2½"×1" Double Angle Strip bolted to the side of the housing. The Rod 6 is held in place by Collars, and carries a ½" Pinion 7. This Pinion meshes with a ½" diameter ¾" face Pinion fixed on a 4½" Rod 8, which is also mounted in a 2½"×1" Double Angle Strip. The Rod 8 is free to slide within limits, and is controlled by a lever 9, fixed on a transverse 4½" Rod. This Rod is journalled in 1" Corner Brackets and carries a Crank at one end. A ¾" Bolt fixed to the Crank engages between Collars on the Rod 8 so that movement of the lever alters the position of the ½" diameter ¾" face Pinion. This Pinion is positioned so that it can be brought into engagement with either side of a 1½" Contrate, to reverse the direction of drive.

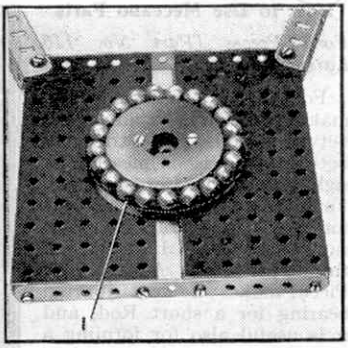


Fig. 2. The ball bearing unit on which the control cab is mounted.

The 1½" Contrate is fixed on a 4" Rod 10, which is mounted in the side-plates. The bearings in which this Rod rotates are strengthened by 2½" Strips. The Rod is fitted between the Plates with a ½" Pinion 11 and a Worm Gear. Movement of the load and luffing of the jib are controlled by the 4½" Rods 12 and 13. Each of these carries a 57-teeth Gear and two 1" Pulleys. A Cord Anchoring Spring is placed between the 1" Pulleys on each Rod. The Rods are allowed approximately ½" sliding movement in their bearings, so that either of the 57-teeth Gears can be brought into mesh with the Pinion 11.

The Rods 12 and 13 are controlled by a lever 14. This is fixed in a Coupling locked on a 6½" Rod mounted in the lower pair of 3½"×½" Double Angle Strips joining the sides of the mechanism. The 6½" Rod carries two Couplings 15 and 16, fitted with 2" Rods that engage between the 1" Pulleys and Collars on the Rods 12

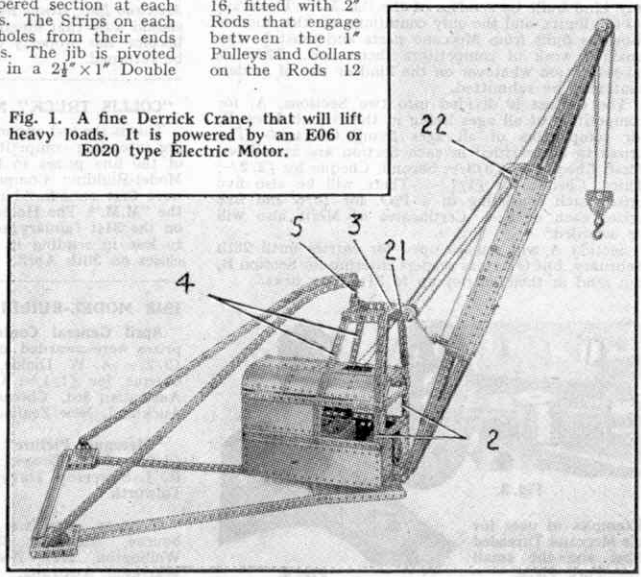


Fig. 1. A fine Derrick Crane, that will lift heavy loads. It is powered by an E06 or E020 type Electric Motor.

and 13. The Collar on Rod 12 is fitted with a $\frac{3}{8}$" Bolt, so that when the drive to this Rod is disengaged the Bolt contacts a second Bolt 17 and prevents the Rod from turning. The Rod 13 is fitted with a similar automatic brake, but in this case the $\frac{3}{8}$" Bolt is screwed into the boss of the 57-teeth Gear.

The slewing motion of the cab is operated by a $6\frac{1}{2}$" Rod 18, mounted in Flat Trunnions bolted to the lower $3\frac{1}{2}$" × $\frac{1}{2}$" Double Angle Strips. This Rod carries a 57-teeth Gear 19 and a $\frac{1}{2}$" Pinion 20. The 57-teeth Gear is positioned so that by sliding the Rod 18 it can be meshed with a Worm on Rod 10. Movement of Rod 18 is controlled by a lever 21, which is fixed in a Coupling. The Coupling is locked on a 4" Rod that carries also a Crank, and a Threaded Pin attached to the Crank engages between Collars on the Rod 18. The 4" Rod is prevented from moving freely by a 1" Pulley fitted with a Rubber Ring arranged so that it presses against the mechanism side plate.

The complete gear-box unit is bolted to the floor of the cab, and an E06 type Electric Motor is also bolted in position. A $\frac{3}{4}$" Sprocket on the Motor armature shaft is connected by Sprocket Chain to a $1\frac{1}{2}$" Sprocket on Rod 6.

The cab is pivoted on a built-up bearing formed by a Wheel Flange bolted to the Pulley 1, and by 21 Metal Balls arranged in the groove between the rim of the Pulley and the Wheel Flange. A $1\frac{1}{2}$" Rod is fixed in the Pulley 1, and passed through a second 3" Pulley bolted to the base of the cab. A $1\frac{1}{2}$"

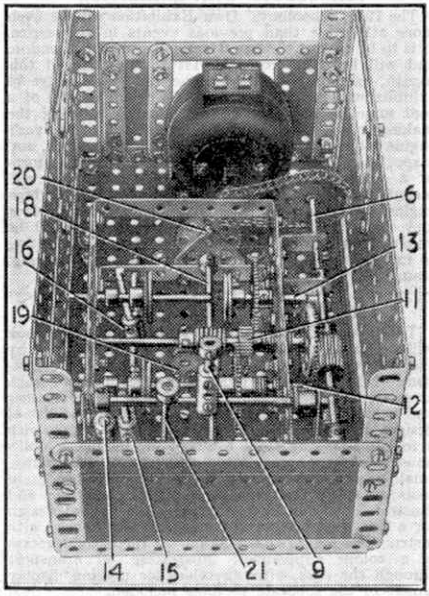


Fig. 4. The cab with the roof removed to show the mechanism.

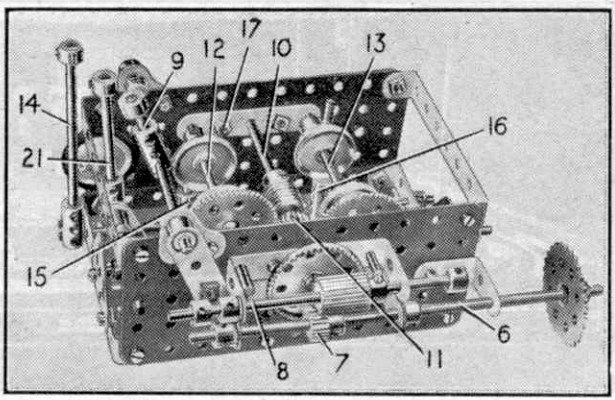


Fig. 3. The gear-box removed from the control cab.

Contrate is fixed on the upper end of the $1\frac{1}{2}$" Rod so that it meshes with the $\frac{1}{2}$" Pinion 20.

The cab is braced by stays extending from the $3\frac{1}{2}$" × $2\frac{1}{2}$" Flanged Plates of the base and attached by Angle Brackets to the Bush Wheel 5. Each of these stays is built up from $12\frac{1}{2}$" Strips and $5\frac{1}{2}$" Curved Strips.

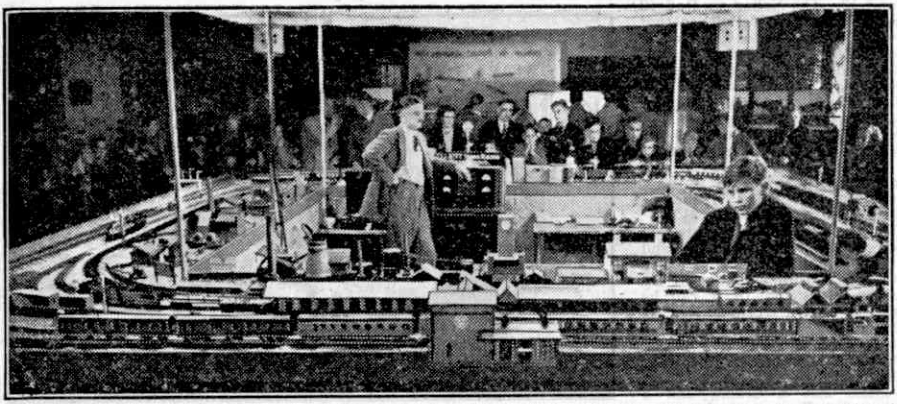
The arrangement of the jib luffing Cords is as follows. A length of Cord is tied to the Rod 13, and passed over 1" Pulleys on Rods 21 and 22. It then passes around two further sets of 1" Pulleys on Rods 21 and 22, and is tied finally to Rod 21. Rod 21 is mounted in a $2\frac{1}{2}$" × 1" Double Angle Strip, and Rod 22 in Trunnions fixed to the jib.

The hoisting Cord is tied to Rod 12, and passed over a $\frac{1}{2}$" loose Pulley on Rod 21. It is then taken round a $\frac{1}{2}$" Pulley mounted between the jaws of a Fork Piece fixed to the jib, and over a 1" loose Pulley at the jib head. It is passed round a 1" loose Pulley in the pulley block, and again round similar Pulleys in the jib head and pulley block. It is then tied to the jib head.

The pulley block consists of two Flat Trunnions joined by Double Brackets, and a Large Hook is attached by a $\frac{3}{8}$" Bolt. The roof of the cab is built up from Flexible Plates and is connected to the sides by Obtuse Angle Brackets.

If required the completed model may be fixed by screws to some form of baseboard. The model is well-balanced however, and will remain stable even with the jib lowered to its maximum radius under normal loads. If exceptionally heavy loads are raised the $3\frac{1}{2}$" × $2\frac{1}{2}$" Flanged Plates of the base can be weighted to increase the stability.

Parts required to build the Electric Derrick Crane: 6 of No. 1; 12 of No. 1a; 2 of No. 1b; 6 of No. 2; 2 of No. 3; 2 of No. 4; 8 of No. 5; 8 of No. 6a; 3 of No. 7a; 4 of No. 8; 2 of No. 8a; 2 of No. 8b; 4 of No. 9; 2 of No. 9a; 2 of No. 9b; 2 of No. 9c; 2 of No. 11; 1 of No. 12; 3 of No. 12a; 3 of No. 14; 4 of No. 15a; 2 of No. 15b; 3 of No. 16; 1 of No. 16a; 3 of No. 17; 4 of No. 18a; 1 of No. 18b; 20 of No. 19b; 11 of No. 22; 4 of No. 23; 2 of No. 22a; 1 of No. 24; 3 of No. 26; 1 of No. 26b; 3 of No. 27a; 2 of No. 28; 1 of No. 32; 170 of No. 37; 22 of No. 37a; 85 of No. 38; 1 of No. 45; 3 of No. 46; 5 of No. 48; 4 of No. 48b; 2 of No. 52; 4 of No. 53; 1 of No. 57b; 32 of No. 59; 2 of No. 62; 5 of No. 63; 6 of No. 70; 8 of No. 81; 2 of No. 89; 4 of No. 90a; 1 of No. 94; 1 of No. 95a; 1 of No. 96a; 3 of No. 111; 15 of No. 111c; 2 of No. 115; 21 of No. 117; 1 of No. 116a; 1 of No. 120b; 4 of No. 126; 2 of No. 133a; 1 of No. 137; 1 of No. 155; 1 of No. 147b; 2 of No. 176; 2 of No. 188; 12 of No. 189; 4 of No. 192; 2 of No. 196; 1 E06 or E020 Electric Motor.



A good view of the Exhibition Model Railway operated by Mr. J. Elliott, Spalding. The system was first referred to in the "M.M." last October, and occupies a space 22 ft. by 20 ft. There are nine locomotives, some of which are electrically operated and some steam driven, 35 main line coaches and over 50 goods vehicles.

Made in Australia—(*Continued from page 4*)

new Australian Naval Air Arm, but we can expect to hear much more of them in the future.

Meanwhile the 225th, and last, "Mosquito" has left Bankstown, and deadly little "Vampire" jet fighters are beginning to appear there, together with "Drover" seven-seat air liners. The "Vampires," P 1040s and the new jet bombers will all be fitted with Rolls-Royce "Nene" turbo-jets built by the Engine Division of the Commonwealth Company. It marks the beginning of a new era for Australian aviation, for in these aircraft the R.A.A.F. will have some of the world's most efficient fighters and bombers, while the Australian-designed "Drover" is undoubtedly as good as anything else in its class anywhere in the world.

Australia, strategically-placed, may well become in time a leading aviation research and production centre of the British Commonwealth. If it does, the record of its aircraft industry proves that there will be no lack of initiative and skill to retain Britain's traditional leadership in the air.

Looking Inside Gear Wheels—(*Cont. from page 24*)

stresses there are severe. But they also show that there is another area in each tooth that is heavily stressed. This is on the free face of the tooth and right at the roots.

This remarkable device enables the engineer to look into his productions and see where they are subject to the greatest forces tending to distort or break them. With this information he can design them better, both to stand up to their tasks and to make their work easier and more precise.

Making Ropes from Fibre—(*Cont. from page 11*)

strand, the three strands on the traveller are taken off their respective hooks and fixed to a centre hook ready for laying together.

Between the foreboard and the traveller is a machine known as a top-cart, on which is fixed a tapered piece of wood with three or four grooves in it, according to the number of strands to be laid together. The three strands are put in their respective grooves and the machinery is started to impart further turn to the strands and opposite turn to the rope.

This operation causes the top-cart to travel in the direction of the foreboard, and results in the three strands twisting together to form a rope; and according to the speed at which the top-cart is made to travel, the lay of the strands in the rope becomes longer or shorter as required.

When laid up, the finished rope is ready for coiling, which is the method used for packing rope in a compact form for delivery.

The other method of making rope is by means of house machines in the rope-making shop. The yarn is put on bobbin banks or racks, drawn off, and formed into a strand on a machine a few feet away, known as a former, the strand being wound on to a bobbin. When sufficient strand has been formed, the bobbins are put into a closing machine, which is then set in motion to close the strands into the finished rope.

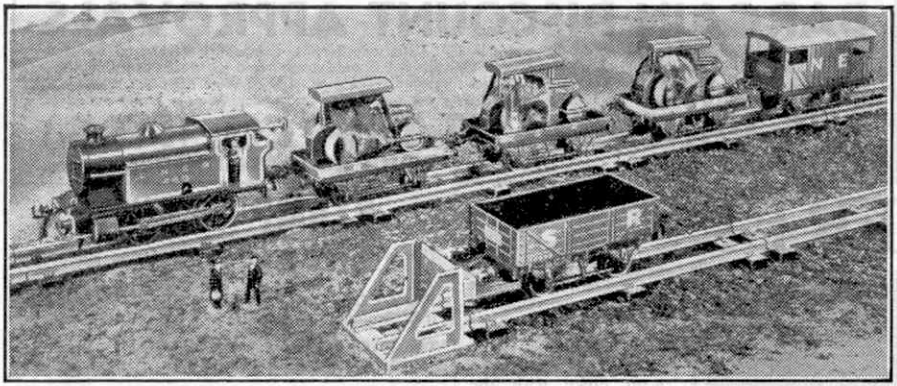
SCHOOLBOYS' OWN EXHIBITION

The 1949 Schoolboys' Own Exhibition will be even more attractive than previous events in this series. It is to be held at the new Horticultural Hall, London, and will be open from the 1st to the 15th of this month, excluding Sundays. The very wide range of exhibits will include a complete working model of a coal mine in Perspex, working models showing the making of steel, models of aircraft, a destroyer's engine room platform on which visitors can work, and a special British Railway exhibit that takes the form of a working model railway. Other exhibits will include aircraft models, a sectional gas turbine engine, postage stamps, books, games of all kinds and cigarette cards, and at one stand boys will be able to meet famous speedway riders. Prizes amounting to more than £150 will be awarded in model-making, stamp collecting and other competitions.

THE HOBBIES HANDBOOK OF 1949

The 1949 edition of this well-known Handbook will be found of the greatest value and interest by the fretworker, model-maker, toy maker and craftsman. It gives full details, with drawings, of such attractive models as a motor coach, a cargo steamer and a trailer lorry, and there is an illustrated list of designs for 350 other things that can be made with a fretsaw, ranging from a model fire engine, a doll's house and an express locomotive, to photo frames, small toys and farm figures. The excellent series of tools made by Hobbies Ltd. also are described and illustrated, and in addition there is a special design for a fine model of an old English stage coach, with instructions for its construction. A further attraction is a colour supplement illustrating air transport through the ages, with directions for making display panels of the separate pictures included.

The Handbook can be obtained from newsagents and Hobbies Branches for 1/–, or from Hobbies Ltd., Dereham, Norfolk, price 1/2 post free.



A consignment of Aveling-Barford Diesel Rollers makes an effective load on Hornby Flat Trucks. The rollers are partly sheeted over, as suggested in the article.

Dinky Toys on Hornby Layouts

MOST Hornby Train owners make use of Dinky Toys and Supertoys in connection with their Hornby Train layouts. The presence of these attractive miniatures round about the line helps to give a realistic appearance and to dispel the impression that the system is "all railway" and nothing else.

The actual size of the Dinky Toys chosen is important, but some latitude can be allowed in miniature, according to the position in which any individual item is to be used and its particular type.

Many of the vehicles in the Dinky Toys range are best used for representing road traffic in the neighbourhood of the line. Then any that are on the small side are kept fairly well away from the trains, so that they do not look unsuitable. Most of them look very effective as loads when carried on suitable Hornby Wagons or waiting at the goods yard or siding to be loaded.

The accompanying picture shows a train of Flat Trucks on which a consignment of "Aveling Barford" Diesel Rollers is loaded. When these are used in this way it is advisable to cover over the inner part at least of the Rollers with some kind of miniature sheet; this will disguise the fact that the driver is a fixture on his vehicle! The same scheme can be applied to the recently-introduced Massey-Harris Tractor. This in its striking colouring lends a bright touch to the train by which it is conveyed. Both the Roller and the Tractor are, of course, excellent also for lineside use.

All gauge 0 railway owners must have welcomed the appearance of the various Foden, Guy and Bedford motor vehicles in the Dinky Supertoys range, as they are practically perfect for gauge 0 purposes. The big Fodens are best left for long-distance road work, but the others can quite reasonably be used as railway-owned road motors. The Guy Flat Truck and the Bedford Articulated Lorry are particularly suitable for this purpose. Some Hornby Train owners make a special feature of their "Road Motor Department," and this is quite a good scheme. Where several vehicles are employed they can be housed together in a suitable building, and on systems operated by several boys together the younger ones will readily look after the running of the "Company's" motor vehicles.

A recent Dinky Toy of which very good use can be made on station platforms or in goods depots is the B.E.V. Electric Truck. Strictly speaking it is slightly too large for gauge 0, but it is so effective that this is readily overlooked. For dealing with the miscellaneous luggage at a passenger station, or the even more varied items handled by the "Goods Department," the Electric Truck is most effective.

Among other typical favourites with Hornby Train owners are the Royal Mail Van and the Mechanical Horse and Open Wagon. The real vehicles of these types are seen every day at stations, in city streets, and on country roads.

For other Stamp Advertisements see also pages 38 and xi.

Stamp Collecting

"The Still-vex't Bermoothes"

By F. Riley, B.Sc.

CONTINUING our Empire stamp tour, we now sail north-eastward 800 miles or so from the Bahamas to visit the outlying Bermudas, or the "still-vex't Bermoothes," as Shakespeare calls them in "*The Tempest*." They are out in the Atlantic Ocean, 580 miles away from the North American continent, and they seem to have been used as a calling place by Elizabethan adventurers on their way to the Spanish main. There are about 100 islands in the group, but between them they only cover some 20 square miles, an area only a little greater than that of the city of Newcastle, and only 16 or so of them have people living on them. These enjoy a beautiful climate, but severe hurricanes sweep over the Bermudas at times. This does not prevent enjoyment of the glorious sunshine on the wonderful beaches of the colony, or of yachting in the waters surrounding the islands. Another interesting point is that the Bermudas are coral islands built up by the tireless coral polyp on the summits of heights rising from the bed of the Atlantic Ocean.

The islands were discovered by a Spanish explorer, Juan Bermudez, but to English seamen they became known as Somers Islands after Sir George Somers, the leader of the first settlement, whose vessel was wrecked there in 1609. The largest is called Bermuda and occupies about three quarters of the total area of the group. It is connected by causeways and bridges with neighbouring islands, and on it is Hamilton, the chief town and the seat of government.

Naturally the achievements of Sir George Somers have been celebrated in the stamps of the Bermudas, some of the earlier stamps of the present century carrying a representation of a ship, presumably that in which he sailed and was wrecked. The first of these appeared in 1910. Portrait stamps of Queen Victoria had been used from 1865 to 1901, when a new stamp showing a dry dock with sailing ships was issued. Some of the earliest portrait stamps are rather rare, and perhaps would be beyond the pockets of younger collectors. This certainly is the case in regard to the earliest stamps of all, issued in 1848, which were prepared by W. B. Perot, then postmaster of Hamilton. These were circular, with the words Hamilton-Bermuda printed round the circumference and the date 1848 in the centre. The value "One penny" was written in ink on the stamp, which had on it also the signature of the postmaster. Specimens of this postmaster stamp are rare, and the catalogue value runs into hundreds of pounds each.

An interesting stamp appeared in 1920, to celebrate 300 years of representative institutions in the Bermudas. The chief features of the design were a portrait of King George V and the familiar Bermudas ship of 300 years ago, in oval frames. A second issue celebrating the same anniversary was called for in the following year, and this provided a new design, in which the ship was relegated to one of the corners and was much smaller.

Not until after the Silver Jubilee was any effort made to produce a real pictorial set for the Bermudas. There was certainly plenty of good material in the islands for designs, and an excellent selection was made, as the illustrations on this page suggest. Yet there seems to be a lack of life about the results, probably because the designs were not the work of artists. They are well printed and the colours are good, but they do not give a real idea of the brightness and activity of life in the Bermudas. Yet they should be included without hesitation in any collection of Empire stamps, and they will certainly make a good appearance in the album if they are well arranged and written up.

Actually there are two pictorial series to be considered, issued in 1936 and 1938 respectively. Certain designs of 1936 are repeated in 1938, with portraits of King George VI replacing those of King George V. The stamps illustrated on this page are from the second series. The 1d. black and scarlet, and the 1½d. blue and chocolate, show the Hamilton Docks, with a schooner and a liner prominent. The 2d., light blue and sepia, shows a yacht, the "*Lucie*." The 2½d., light and deep blue, and the 1/-, green, show Grape Bay; this is an empty beach scene, framed by rather lifeless trees. The 3d., black and rose red, shows St. David's Lighthouse. The higher values from 2/- to 12/6 are formal in character, using a design that had already been introduced on the stamps of Nyasaland.

The 7½d., in black, blue and yellow-green, was not added to the set until 1941, and is by far the finest of these stamps. It is horizontal in form, and shows the Longtail flying over the Bermuda scene; the arms of the colony are shown in one corner.

After the issue of these stamps in 1938 there were colour changes with the 2d., the 2½d. and the 3d Similar changes occurred at various dates with the higher values of this series. For instance, the 2/- value appeared in purple and blue in 1942; the surface of the blue paper used was mottled with white specks, and because of this the stamps have become known as the "Spotted Dicks." This variety is valued more highly than the stamp of the original colour, but in the lower values referred to the obsolete colours are of greater catalogue value than those now current.

For other Stamp Advertisements see also pages 36 and xi.

Stamp Gossip
and Notes on New Issues

By F. E. Metcalfe

IT doesn't seem a year since the writer of these notes was last sending good wishes for the New Year to Meccano readers, even though so many things have happened in the stamp world. However, here we are again with those good wishes, and may the coming twelve months be full of philatelic pleasures for all of us.

The world's post offices do their best to keep us busy, presumably subscribing to the old belief that a busy man is a happy man; or is it that they have no objections to a share of our pocket money? Whatever the reason they do provide us with plenty of pretty stamps, and of all the hundreds which are issued annually, none perhaps are more popular than the "Health" stamps of New Zealand. The wonder is that other countries have not imitated this popular Dominion by issuing similar stamps. It is said that India is going to do so. So successful have been these "Health" stamps that although several millions have been printed this year, the New Zealand Post Office announces that three quarters of the whole printing were sold during the first week they were on sale. Good luck, New Zealand Post Office! You print attractive stamps, you print enough to go round, and you treat collectors and dealers alike, in an entirely satisfactory manner.

Our "Wedding" stamps continue to hold the centre of the stamp collecting field, and the cracks in American magazines are still as hearty as ever. In most cases the writers of them omit to mention that we are not yet so bereft of events to commemorate that we must fall back on a barnyard fowl, as the U.S.A. did in the "Chicken" issue of 9th September. Nevertheless U. S. A. Commemorative stamps continue to enjoy great popularity among junior collectors, owing to their cheapness; and many are quite attractive, though if they are compared with some of the superb issues of certain Continental countries such as Austria and France their artistic shortcomings are manifest.

An Australian reader very kindly sent a first day cover of the Mueller commemorative stamp, and remarked in his letter that he liked to read about stamps of his own country. Don't we all? However, while nobody can accuse the Australian postal authorities of issuing stamps that are particularly attractive—their muddy colours are their chief drawback, though the terrible centering of many is also a big handicap—there is no doubt that they are exceedingly popular. There is one stamp in the recently issued K.G. VI catalogue of Gibbons that in the writer's opinion is the greatest bargain price in the whole of that book. Perhaps collectors of K.G. VI stamps may like to guess which stamp is referred to.

It is known officially that Barbados and Turks and Caicos Islands are to have stamps bearing dollar currency, and collectors have assumed apparently that all West Indian Islands will make the same change. But it seems strange that colonies like St. Kitts and Leeward Islands should be bringing out new stamps in sterling, if they were also to adopt the almighty dollar. Now the writer of these notes has heard that all the stamps of the Leeward Group, that is Leeward Islands, St. Kitts, Montserrat, Antigua and Virgin Islands, will not be changed from sterling. The news was not official, but it came from a good quarter.

During the currency of the "Olympic Games" set, the philatelic papers were full of the news that a sheet of the 1/– value overprinted 1 rupee for Muscat had been found with the overprint double. The sheet had 120 stamps, and many collectors were wondering just what these stamps were worth. Apparently most of them were bought up by a well-known London stamp firm, and it is interesting to see that they value these "errors" at £40 each. That is a nice little profit for somebody.

Our third illustration shows a handsome stamp from Bahawalpur. It commemorates the first anniversary of the union between Pakistan and the issuing country. Now as a rule Indian native states issue the least appreciated stamps of the whole of the British Commonwealth, in spite of the great philatelic interest of many of them; but so attractive are all the stamps of Bahawalpur that many collectors are taking them up. It might be a wise move to go in for some of the cheaper ones, but they are to be recommended generally from an investment standpoint; moreover it is not always possible to obtain new issues from the post office at face value, which is not a good sign.

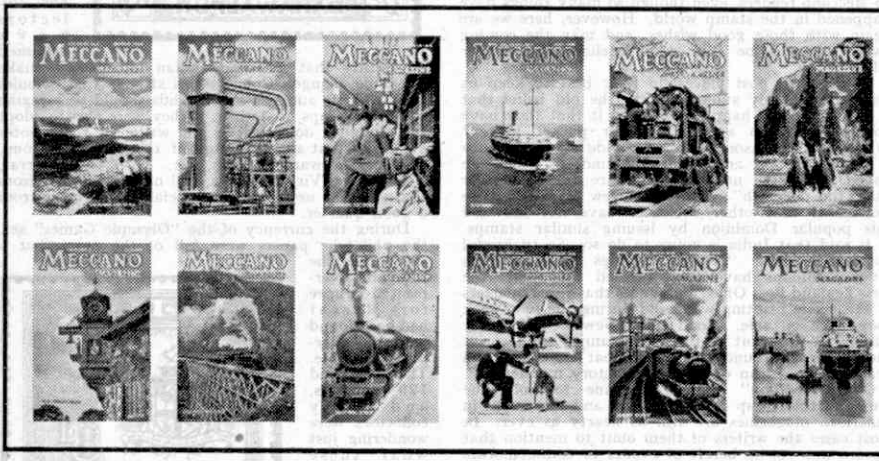
Our last illustration this month shows the new 8d. stamp from Fiji. This has the same design as the still current 1/5 value, but it is in only one colour, carmine, whereas the 1/5 was in two colours, black and carmine. It will be seen from our reproduction that the arms of the Colony form the principal feature of the design.

During the currency of the two Channel Islands stamps, which were withdrawn from sale on 30th September, dealers found that this was about their "best seller." Everybody, collectors and laymen alike, bought copies, and yet the demand is still almost as brisk as ever, though two or three times face value is being charged. Blocks of four at present prices may be worth putting away, though, of course, nobody will make a fortune out of the purchase.

Competitions! Open To All Readers

Prize-winning entries in "M.M." competitions become the property of Meccano Ltd. Unsuccessful entries in photographic, drawing and similar contests will be returned if suitable stamped addressed envelopes or wrappers are enclosed with them.

Which Were the Most Popular Covers of 1948?



Here are reproductions of the 12 covers of 1948. These are very small and they are in black and white, so that they do not give any idea of the colour and brilliance of the originals. They are reproduced only as reminders to our readers, who are now asked to express their opinions on them in our customary January Cover Voting Contest.

All that each entrant in this competition has to do is to state on a postcard: A, which cover he likes best, and B, what he thinks will be the order of popularity of the covers as decided by the votes of all the competitors. In the lists sent in the covers must be referred to by the names of the months in which they appeared, and it is not necessary that a competitor's own favourite should be at top of his list under the second heading.

Entrants should write their names and addresses on the postcards, and these should be sent to "*1948 Cover Voting Contest, Meccano Magazine, Binns Road, Liverpool 13.*" There will be separate sections for Home and Overseas readers, with prizes in each of 21/–, 15/– and 10/6 respectively. Closing dates: Home Section, 28th February; Overseas Section, 30th June.

Draw a Motor Car of 1949

The Motor Show in November of last year revealed to us the secrets of the motor cars of 1949. In general these seem to be taking on a different appearance from those of pre-war days. We may not see many of them on the roads in Great Britain during 1949, as the majority are for export, but every reader will have seen pictures of them and a few will have been lucky enough to see the cars themselves. With this in mind we have arranged for our second competition a drawing contest in which the subject is the motor car of 1949.

Any make of car can be taken as the subject for an entry in this contest, provided it is of the latest type, and the car chosen can be shown from any angle or in any surroundings. With these conditions satisfied, judging will be based entirely on the merits of the entry as a drawing, but if competitors wish they can use colour in preparing their entries. The name, age and address of the competitor, with the make of car chosen by him for his entry, must appear on the back of each drawing submitted.

As usual in these competitions, there will be separate competitions for Home and Overseas readers, and in each of these there will be two sections, A for competitors over 16 years of age, and B for those under 16. Prizes of 21/–, 15/– and 10/6 will be awarded, with Consolation Prizes for other deserving entries, in each section.

Envelopes containing entries should be addressed "*January Drawing Contest, Meccano Magazine, Binns Road, Liverpool 13.*" Closing dates: 28th February in the Home Section and 30th June Overseas.

January Photographic Contest

This month we begin the 1949 series of photographic competitions. For the first of these readers are invited to send in photographs of any subject. There are only 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.

The competition will be in two sections, A for readers aged 16 and over, and B for those under 16. Each competitor must state in which section his photograph is entered. There will be separate sections for overseas readers, and in each section prizes of 21/–, 15/– and 10/6 will be awarded.

Entries should be addressed "*January Photographic Competition, Meccano Magazine, Binns Road, Liverpool 13.*" Closing dates: Home Section, 31st January; Overseas Section, 31st May.

Competition Results and Solutions

HOME

AUGUST 1948 "NAME SQUARES" CONTEST

1st Prize: D. Allen, Leicester. 2nd Prize: I. M. Allison, Honiton Clyst. 3rd Prize: F. I. S. Carter, Halesworth. Consolation Prizes: Miss J. Hayter, Harpenden; J. K. Tunstall, Bolton; M. K. Davis, London S.W.19.

AUGUST 1948 "OLYMPIC QUIZ"

1st Prize: D. Woods, West Mersea. 2nd Prize: T. E. Jones, Rock Ferry. 3rd Prize: P. Webber, Gillingham. Consolation Prizes: C. E. Abbott, Radley College; H. B. C. Johnston, Sutton; P. A. Marshall, Lincoln.

AUGUST 1948 PHOTOGRAPHIC CONTEST

1st Prize, Section A: R. R. Bushell, Hoddesdon; Section B: P. Clifford, Wembley. 2nd Prize, Section A: H. J. Edwards, Tunbridge Wells; Section B: R. S. Hall, Aberdovey. 3rd Prize, Section A: J. W. Hind, Nottingham; Section B: D. Elliott, Portaferry. Consolation Prizes: H. W. Hardcastle, Harrogate; R. Amin, Bexleyheath; J. E. Allen, Stanmore; R. M. Shields, London, S.W.3; W. Thomson, Durham.

SEPTEMBER 1948 SHIPS CONTEST

1st Prize: T. Brown, Carlisle. 2nd Prize: K. A. Wells, Sanderstead. 3rd Prize: D. Collman, Newport. Consolation Prizes: J. K. Tunstall, Bolton; J. G. Brown, Greenock; R. Pryde, Cardiff; R. Pearson, South Harrow.

SEPTEMBER 1948 ERRORS CONTEST

1st Prize: J. McMillan, Hurlford. 2nd Prize: C. E. Wrayford, Bovey Tracey. 3rd Prize: E. Bellars, Newton-le-Willows. Consolation Prizes: D. H. Lythorpe, Cheadle; T. Maurice, Oadby; A. H. Clark, Swindon; J. Brumwell, Newcastle-on-Tyne 2; M. B. Dean, Hitchin; J. R. Hearn, Gillingham.

SEPTEMBER 1948 PHOTOGRAPHIC CONTEST

1st Prize, Section A: S. L. Connors, New Malden; Section B: E. B. Sadler, Newcastle-on-Tyne 2. 2nd Prize, Section A: T. F. Rice, Rushden; Section B: P. Clifford, Wembley. 3rd Prize: Section A: T. Mahoney, Dundee; Section B: B. Jones, Aberdeen. Consolation Prizes: A. J. Nicholson; Portsmouth; H. Jackson, Preston.

OCTOBER 1948 PHOTOGRAPHIC CONTEST

1st Prize, Section A: E. Oldham, Hyde; Section B: N. Cox, Sully. 2nd Prize, Section A: R. Atkins, Eccles; Section B: B. Foskett, London S.W.15. 3rd Prize, Section A: R. J. Maxwell, Bolton; Section B: S. Heaton, Bradford. Consolation Prizes: J. Giddings, Bristol; A. Brown, Isleworth; H. Brearley, Crewe; J. H. Taylor, Aberdeen; Mrs. M. U. Jones, Birmingham 13; J. Bratby, Hale; G. P. Clark, Moreton-in-Marsh; H. R. Wright, Stow-on-the-Wold; D. A. Brockies, London S.E.9; S. L. Connors, New Malden; H. Meyer, Chandler's Ford; D. Watson, Glasgow; M. Illingworth, Burley-in-Wharfedale.

OVERSEAS

FEBRUARY 1948 LOCOMOTIVE SHADOWS CONTEST

1st Prize: H. Humphreys, Durban, S.A. 2nd Prize: D. J. White, Christchurch N.1, N.Z. 3rd Prize: N. G. Geddas, Paris, France. Consolation Prizes: E. H. Parker, South Otago, N.Z.; L. J. Rimmer, Adelaide.

MARCH 1948 NOVEL DRAWING CONTEST

1st Prize: B. Evetts, Cape Town, S.A. 2nd Prize: D. Johnston, Dublin, Eire. 3rd Prize: B. Laxon, Auckland S.E.3, N.Z. Consolation Prizes: S. Taylor, Madras, India; J. Hughes, Amsterdam, Holland.

MARCH 1948 HIDDEN NAMES CONTEST

1st Prize: L. G. Poole, Melbourne, Australia. 2nd Prize: D. J. White, Christchurch N.1, N.Z. 3rd Prize: I. T. G. Johnstone, Wellington C.1, N.Z. Consolation Prizes: B. Price, Singapore; I. Miller, Dublin, Eire.

MARCH 1948 PHOTOGRAPHIC CONTEST

1st Prize, Section A: Miss N. P. Milne, Hawke's Bay, N.Z. Section B: B. H. Ollier, Madras, India. 2nd Prize, Section A: L. J. Butterworth, Lyons, France; Section B: F. A. Bagona, Cape Town, S.A. 3rd Prize, Section A: T. Thompson, Hong Kong; Section B: K. Shepherd, Elisabethville, Belgian Congo. Consolation Prizes: H. Falconar, Quebec, Canada; G. Burns, Warragul, Australia.

APRIL 1948 PHOTOGRAPHIC CONTEST

1st Prize, Section A: P. Duffy, Portumna, Eire; Section B: R. Williamson, Brisbane, Australia. 2nd Prize, Section A: K. J. Milne, Hastings, N.Z.; Section B: B. Andrews, Bombay, India. 3rd Prize, Section A: S. Parker, Vancouver, Canada; Section B: A. Dalal, New York, U.S.A. Consolation Prizes: R. Clatworthy, Salisbury, S. Rhodesia; R. Campbell, East London, S.A.; P. Blakemore, East London, S.A.

SOLUTIONS

APRIL 1948 THRILLS VOTING CONTEST

1st. No. 5; 2nd. No. 1; 3rd. No. 6; 4th. No. 3; 5th. No. 4; 6th. No. 2; 7th. No. 7; 8th. No. 8.

APRIL 1948 LOCOMOTIVE CONTEST

1. Lamp iron. 2. Air compressor. 3. Sand pipe. 4. Sand box. 5. Whistle. 6. Handrail. 7. Injector steam pipe. 8. Cab handrail. 9. Guard iron. 10. Footstep. 11. Main steam pipe. 12. Mechanical lubricator. 13. Coupling rod. 14. Air reservoir. 15. Eccentric rod. 16. Ash pan. 17. Axle box.

King's Cross-Newcastle express near Retford, hauled by former L.N.E.R. "Pacific" No. 15 "Quicksilver." Photograph by E. Oldham, of Hyde, who was awarded 1st Prize in Section A, October 1948 Photographic Contest.

Fireside Fun

"You've got more money than brains."
"But I have hardly any money at all."
"Well, that fits what I said."

* * *

"You see, my dear. I haven't forgotten it this time."
"But you didn't take one out with you to-day."

* * * *

"Can you make a cigarette lighter?"
"Yes, that's easy."
"How do you do it, then?"
"Take the tobacco out."

* * * *

Bill: "I see Jones has sold his car."
Bob: "Yes. The outgo for the upkeep was too much for his income."

* * * *

THIS MONTH'S HOWLER

Infinity is where all parallel lines meet, but no one can join them.

* * * *

"No, thank you. Sit down, I can stand."
"Lemme get off! We've passed my stop."

BRAIN TEASERS

In the square of letters shown below the names of eight makes of motor car, all very well-known, are hidden. The letters of these names have been placed in position on a definite plan. What are the motor cars represented, and what is the plan?

B	U	D	D	E	N	S	O
D	A	R	A	I	N	B	S
A	E	S	I	I	M	G	G
A	E	M	O	T	S	T	M
N	D	I	H	R	L	N	A
L	R	R	L	N	R	U	A
R	T	S	Y	D	E	L	O
M	E	A	L	T	H	N	Y

* * * *

SPEED WORK

A train 220 yds. long enters a tunnel measuring a furlong in length. If the speed of the train is 60 m.p.h., where will the guard's van at the rear have reached by the time the engine is just emerging from the tunnel? B.I.N.

* * * *

"Dear me. I've only enough for the bill."
"Let me add it up again, sir."

* * * *

THE ANSWER IS GIVEN HERE

Here is an interesting and at the same time quite easy multiplication sum, in which the answer is given. What is wanted is to find the figures represented by the letters. Can you do this?

```
  DEMOCRAT
         O
 ---------
 DDDDDDDD
 ---------
```

* * * *

SPREADING OUT

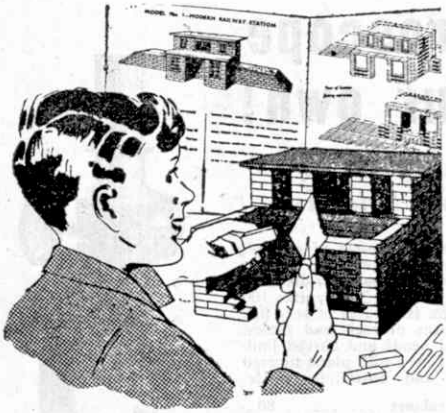
What English word of one syllable becomes a word of three syllables when a single letter is added to it?

* * * *

SOLUTIONS TO LAST MONTH'S PUZZLES

The six words of six letters each in our first puzzle last month were: 1, FestaL; 2, IguanA; 3, NepheW; 4, NatanT; 5, EnhalO; 6, YeomaN. The first and last letters of these words make up the names FINNEY and LAWTON.

Our second puzzle was a catch. NI is half of NINE; L represents 50. Putting them together we get NIL. In Latin 40 is represented by XL; divide this into equal parts by drawing a line horizontally and the upper half is VI.



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(See also pages 36 and 38)

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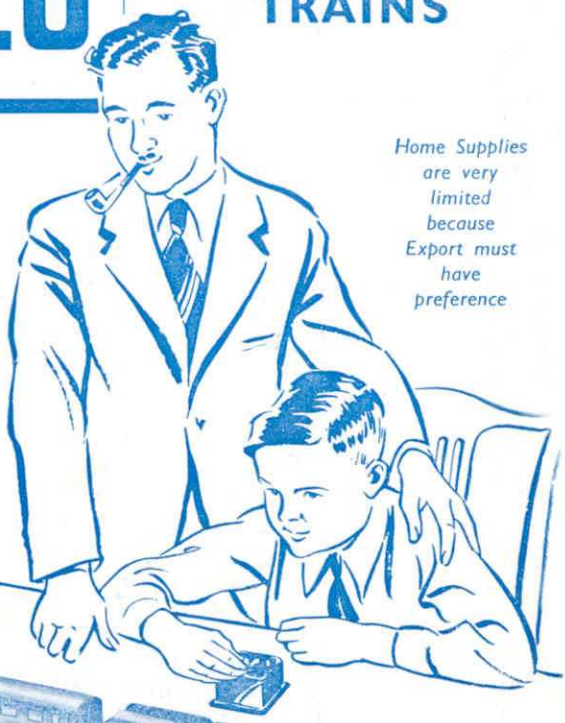

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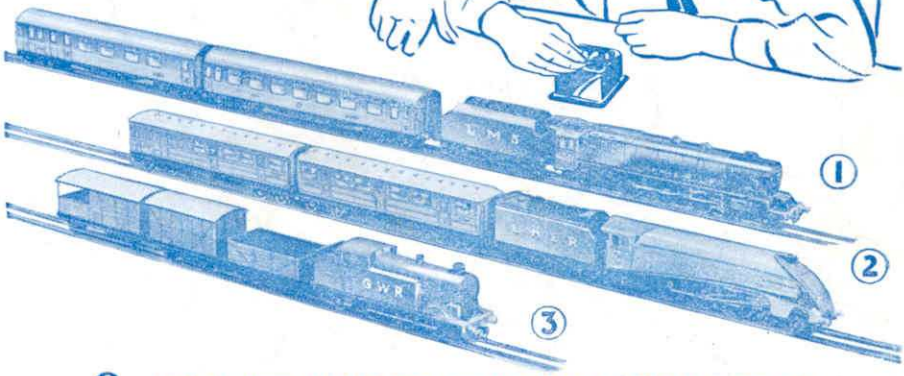

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