VOL. XLI No. 3 MARCH 1956

MECCANO MAGAZINE

A KING'S CROSS DEPARTURE.

1/-

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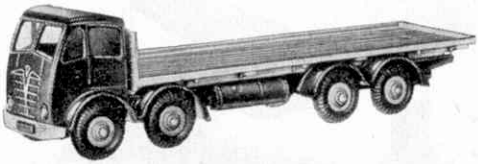

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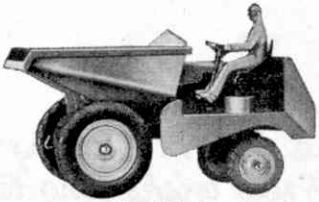

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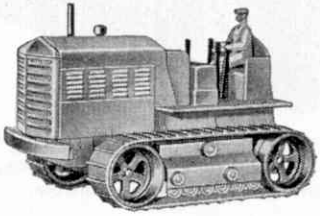

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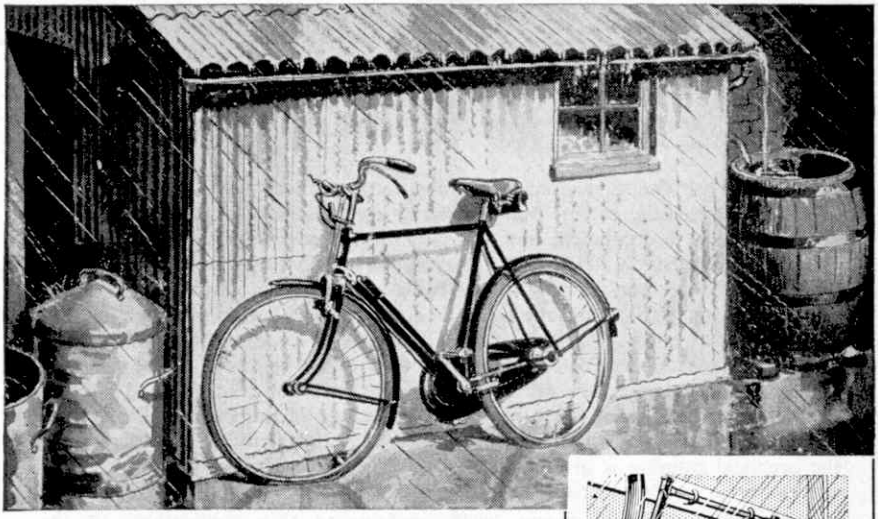

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All the enamelled Triumph parts on the roof of the factory where they remained for over a year!

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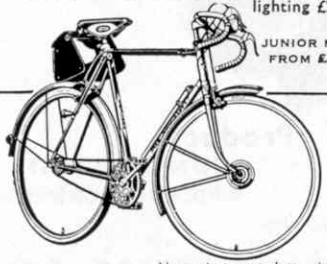

The New TRIUMPH has science behind it

No cycle is complete without a Sturmey-Archer 3- or 4-speed gear and 'Dynohub' hub lighting equipment

Meccano Special Model Leaflets

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Next Month: "PROSPECTING FOR URANIUM"

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Atomic Alarms

After all that we have heard about the terrors of atomic warfare, some of us may have begun to feel that there are dangers in the new power stations, in which changes similar to those causing an atomic bomb explosion are made to yield electric power.

An apprentice trainee at Crewe Works Training School operating a centre lathe. The story of this school, opened last September by the London Midland Region of British Railways, is briefly told on page 120 of this issue.

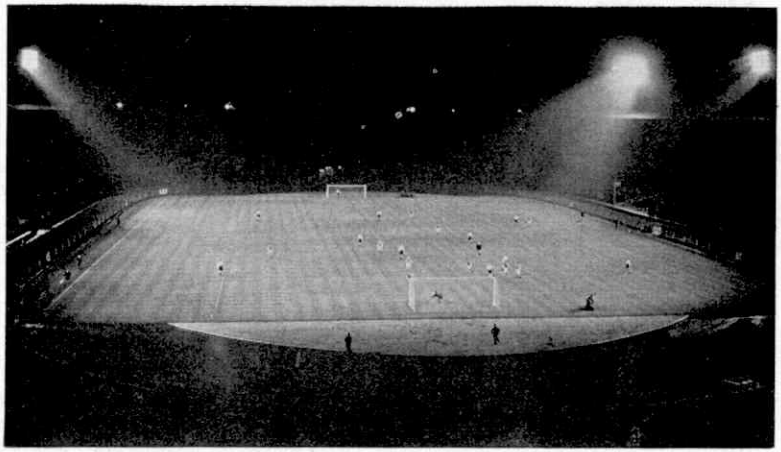
Nuclear power plants are not dangerous so long as they are working correctly and have around their reactors plenty of concrete, lead or other materials to stop harmful radiation. But suppose one got out of control. What would happen then? Would it finish up in a violent atomic explosion, scattering radioactive material for miles around?

Nuclear engineers in the United States wanted to know this too, so they tried it with an atomic power plant built only three years ago. This was one in which the core was surrounded by water as a moderator. The last control rod in its core was suddenly ejected by powerful springs, whereupon the power of the reactor rose very rapidly and with increasing speed. A violent flash, a column of smoke 80 ft. high and a sharp explosion followed, and when the smoke cleared away it was discovered that the entire superstructure of the reactor had gone.

But the explosion was a comparatively small one, and most of the bits of radioactive matter scattered around fell within a radius of only 200 ft. And this was a planned explosion, probably far more severe than any that could happen in ordinary operation.

These tests, and there were more than 200 of them, revealed that an atomic power plant of this kind, with water surrounding its core, is safe in itself. If it were to run away out of control, the heating up would just boil the water away almost instantaneously, and this would shut down the plant before it could destroy itself. So it seems that peaceful uses of atomic power need not alarm us.

The Editor



Floodlighting at Wembley

Largest System in the United Kingdom Installed

By the Editor

WITH the spread of floodlighting to so many of the grounds of our more prominent Football League Clubs, floodlit football has become a regular feature of the game. Now Wembley Stadium, the home of the Football Association Cup Final for more than 30 years, and the scene of so many exciting internationals, has been given its first permanent arena floodlighting system and, as might be expected of such a ground, this is the largest in the United Kingdom.

Many trials and experiments went to the planning of the final system selected for the Wembley arena. It consists of 192 floodlights, mounted 100 ft. above the ground, on the roofs of the stands in fact, in groups of 24 each, carried on eight towers. By the light that they provide spectators on every side of the field can see every detail of the play, with distant players standing out brightly against comparatively dark backgrounds. There is no glare in the eyes of the spectators, as the lamps are cut off sharply to prevent this, and the players' vision of the ball too is first-class, whether looking towards the goal or across the field for corner kicks, throws in and cross kicks.

Football under the new G.E.C. floodlighting at Wembley as the spectator sees it is illustrated in the picture at the head of the page. The new system installed there by the General Electric Company Ltd. is the largest in Great Britain, and the floodlights can be trained to suit events other than football matches.

The use of the tower system not only adds to the comfort of viewing, but ensures that players and spectators do not lose sight of the play, even for a moment, because of the ball passing across the front of the lights.

One special feature produces a very dramatic effect when floodlit games are being played at Wembley. Before the game begins the lamps are switched on at low brightness. But when a start is to be made a touch of a switch increases the illumination on the ground to three times its original intensity. The effect indeed is similar to that of stage lighting when the curtain in a theatre is about to go up.

The towers on the roofs of the stands, four on each side, are built of welded tubular steel, and the greatest care has been taken to make sure that they are perfectly safe. In one special test a steel hawser fixed to a demonstration tower was secured to a lorry-mounted winch that subjected it to a pull equivalent to a gale of 100 m.p.h. Under this severe test the tower moved less than half an inch.

The work of installing the floodlighting system at Wembley was carried out during the summer, when nights were short. This

gave rise to a problem in connection with the training of the units, that is their direction on to the predetermined sections of the arena they were to illuminate. Fortunately the group system lends itself to a system of daytime training, which is so accurate that only a little adjustment is necessary at night, so a considerable number of all-night sessions for the engineers was avoided.

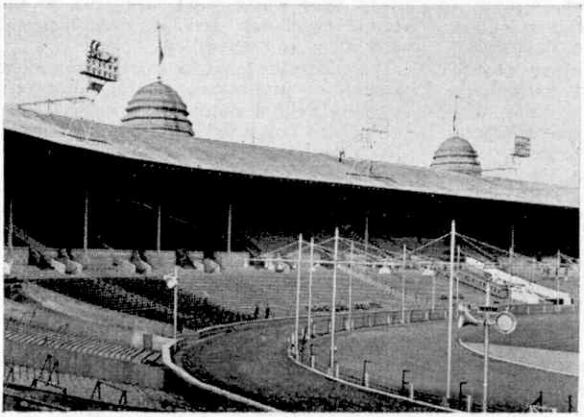
This daytime training was carried out at Wembley. First the lamps were pre-focused. Then the arena was measured and targets consisting of small white discs were placed in positions that had been already set out and charted on the training plan. A photometer, fitted with a shutter to exclude daylight and mounted on a tripod, so that it could be adjusted in any direction, was then placed in the arena at a point representing the average projected throwing distance of all the lights in the group to be trained.

The photometer was connected by a long flexible lead to its current measuring instrument, a micro-ammeter, on the appropriate tower, so that the intensity of the lighting at its position could be read off. The engineer therefore was able to align the floodlights to get immediate readings for each of the many adjustments it was necessary for him to make. Each unit was then switched on separately and the photometer was lined up to it.

Lining up each unit with the aid of a photometer.

Walkie-talkie radio and field telephones also played a great part in this work, saving the engineers many laborious journeys and allowing the work of aligning the floodlights to be completed in less than 12 working hours.

This was the plan followed in checking the focusing of each lamp. Its control was adjusted until the highest reading was obtained on the micro-ammeter connected to the photometer in the arena. Then the floodlight was moved both vertically and horizontally, and aligned accurately so that the centre of its main beam was directed towards the photocell. Next a specially made sighting device was attached to the unit and adjusted until its sights were in line with the photocell. The floodlight was then sighted on its predetermined target and locked in position. This had to be done for each of the 192 floodlights, and only a few minor adjustments were necessary when the full scale night test of the installation took place.



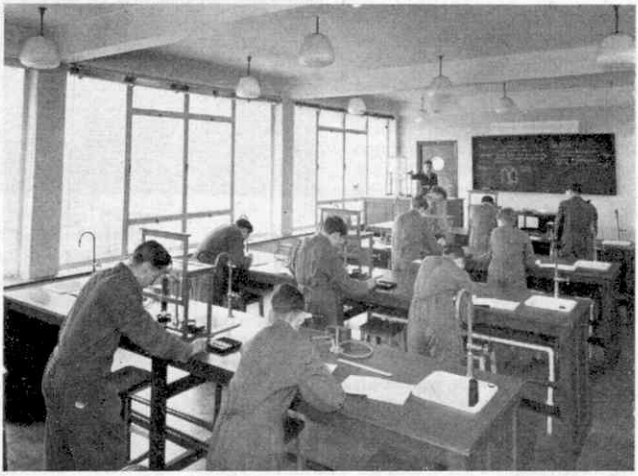
Three of the eight towers of the floodlighting system can be seen in this view of Wembley Stadium.

The Crewe Works Training School

By the Editor

AS every *M.M.* reader knows, the next fifteen years will see the change on British railways from steam to electric and diesel locomotives. We all deplore the decline of the steam engine, which has been a favourite with young and old since the days of George Stephenson and his *Rocket*, but like everything else railways must keep up to date, and they can only do this by looking ahead and selecting motive power that will suit the conditions to be met with in the future.

Whatever the form that our locomotives take, those who will be concerned with the development of these new forms of motive power must be well trained, as must also be the craftsmen who will build and repair the locomotives. There is more to a craftsman than a particular skill in some trade or occupation. The term indeed implies a sense of responsibility and a pride in a good job of work, and the best way of developing these among the railway workers of the future is to instil sound ideas as well as sound method into the minds of those now entering it, in other words, in the minds of the railway workshop apprentices.

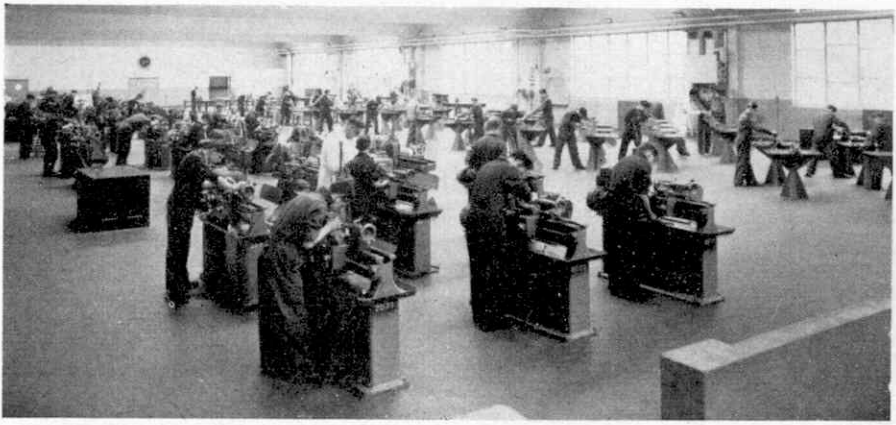


Apprentice trainees at the new Works Training School at Crewe in the well-equipped Science Instruction Room.

It was with the knowledge of this that I paid a special visit to the new Apprentice Training School at Crewe Works. This was opened only towards the end of September of last year, but already it has shown itself to be splendidly equipped, in both staff and shops, to bring along a race of skilled craftsmen who do take pride in what they are doing.

The Training School stands alongside the railway line from Crewe to Chester, along which the *Irish Mail* and other famous expresses pass daily. This line indeed separates the site of the School from the Crewe Works themselves, and the area covered was at one time part of the carriage works. There is a reminder of the use of the site as part of Crewe Works in the form of two lakes, which were provided nearly 80 years ago in connection with a condensing engine used to drive the large rail mill rolls. Now they are the home of swans and water fowl, and the ground around them has been laid out pleasantly with lawns and flowerbeds.

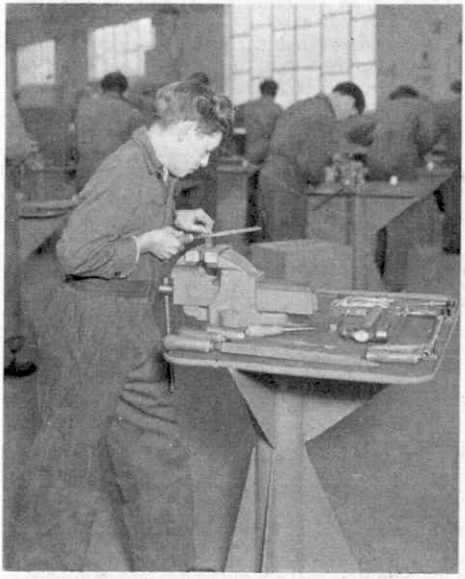
It is all to the good that the surroundings of such an institution as this Apprentice Training School should be trim and tidy, and when I entered the building itself I soon realised that inside as well as out all was in perfect order. An interesting thing that I noticed as I moved through the various rooms was that everything was remarkably neat. The floor was clear of all obstacles, and work on the lathes and in the various shops was being carried on with admirable cleanliness and tidiness. I heard one or two stories, too, that showed how those apprentices who have already passed on into the great Crewe Works have carried into it some of the ideals that have been instilled into them in the School.



The main workshop has an unobstructed floor space of nearly 19,000 sq. ft., and is light and airy.

I will not try to take you through every workshop and classroom of this fine School, of which you will gain a very good idea from the pictures on these pages. The progress of the apprentice trainee himself, however, will help to illustrate the thorough training that he receives.

Boys enter the Training School as soon as they leave school, and must be not more than 15½ years of age. Every applicant is interviewed by the chief instructor, who satisfies himself that the boy concerned is suitable for the training that is to be given. No effort is made to settle immediately which trade is to be followed, for the first four months are probationary, the trainee receiving general instruction in the various sections of the workshop, and attending classes in machine drawing, mathematics and so on.

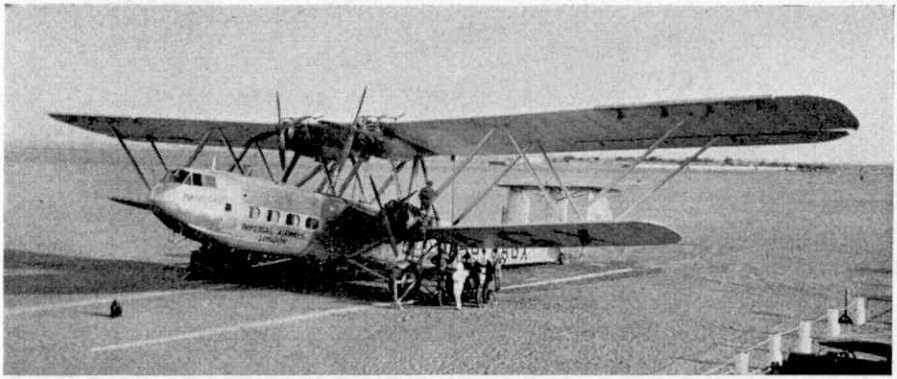


An apprentice trainee in the fitting section at work.

At the end of this period the chief instructor is in a position to decide which trade will suit an apprentice best. There are seven sections—electrical; pattern making and joinery; plate and sheet metal work, copper smithing and welding; moulding and core making, smithing and forging; turning and machining; fitting and assembly; and model making. A long list, but it illustrates the range of the training given and the wide opportunity of selecting a suitable trade. In deciding on this, regard is of course paid to the preference of the apprentice himself.

For the remaining eight months of the School course the trainee is attached to the section including the trade in which he will become an apprentice when he enters the works. His further training includes both theoretical and practical work, and it is interesting to see that the instruction covers industrial history and geography, individual expression and first aid as well as machine drawing and workshop mathematics and science. The courses are planned to give him a good all-round knowledge of the work of the railway workshops that he joins at the

(Continued on page 170)



The Kangaroo's 21st Birthday

By John W. R. Taylor

THE Kangaroo that celebrated its 21st Birthday last December is no ordinary animal. Six times a week, it starts a series of gigantic hops that carry it from England to the other side of the world in 58–75 hours. It is, of course, the famous Kangaroo air service operated in partnership by B.O.A.C. and Qantas, between London and Sydney, and its story is full of interest and adventure.

The first flight from Britain to Australia was made long before the Kangaroo service was opened, by two young Australian brothers named Captain Ross Smith and Lt. Keith Smith and their engineers, Sgts. Bennett and Shiers. They began their journey from Hounslow, near London, on 12th November, 1919, in a Vickers Vimy bomber, like that in which Alcock and Brown had made the first non-stop flight across the Atlantic five months earlier.

The picture above shows "Hannibal," one of the wonderful H.P.42 biplanes that Imperial Airways used on the Kangaroo service. These aircraft flew 10,000,000 miles without ever hurting a passenger, until the last of them disappeared without trace in 1940, during the war.

The illustrations on this and the next page are eproduced by courtesy of British Overseas Airways Corporation.

There was keen competition from other pilots, because the Australian Government had offered a prize of £10,000 for the first successful England-Australia flight by Australian airmen in an all-British aircraft. The attempt had to be completed within 30 days, before the end of the year 1920.

Thirty days sounds a long time in this age of jet aircraft, but things were very different in 1919. Even with two reliable 360 h.p. Rolls-Royce Eagle engines, the open cockpit Vimy cruised at only 90 m.p.h. In Europe, aerodromes were usually no more than small open fields. At most places on the route they were non-existent.

Nevertheless, after all kinds of adventures, Ross and Keith Smith arrived at Darwin on 10th December, and then flew on to Melbourne. As well as winning the £10,000 prize, they were knighted for their achievement. Their mechanics were made officers and given the A.F.C.

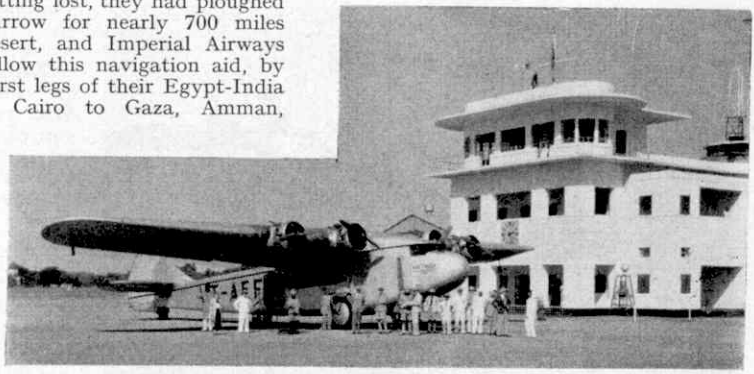
Many other famous flights were made between England and Australia in the next ten years. But aircraft and airline experience were still not good enough for Britain's Imperial Airways to risk carrying passengers regularly over the route.

Nor were all the problems technical ones, because many countries refused to allow air liners to fly over their territories. This helps to explain why the network of air routes linking Britain with her Empire took so long to build up, despite successful survey flights by the Royal Air Force and by civilian pilots like Sir Alan Cobham, whose many long-distance flights paved the way for the airlines and were, in no way, mere stunts.

The first section of the present Kangaroo route to be opened was that between

Egypt and India, because the Government realised that no network of Empire routes would be possible without this vital link in the middle East.

The R.A.F. had been flying across the narrowest part of the Arabian Desert, between Amman in Jordan and Ramadi, near Baghdad, since 1921. To prevent pilots from getting lost, they had ploughed a gigantic furrow for nearly 700 miles across the desert, and Imperial Airways decided to follow this navigation aid, by running the first legs of their Egypt-India service from Cairo to Gaza, Amman, Baghdad and Basra. Strips of desert were cleared for landing fields. Rest houses and radio stations were built, including in one place an armed fort to protect staff and passengers from unfriendly local tribesmen.



"Arethusa" was one of the Armstrong Whitworth "Atalanta" monoplanes with which Indian Trans-Continental Airways began a Karachi-Singapore service in 1933.

At Basra, the service came up against two formidable barriers, consisting of the mountains of Iran and Baluchistan and the no-less-solid refusal of the Iranian Government to allow foreign aircraft into their country. So, when the first D.H. Hercules of Imperial Airways entered service in December, 1926, it flew only from Cairo to Basra. After that, passengers had to go by boat the rest of the way to India.

Not until 1929 did the Iranians allow Imperial Airways to fly around their south coast. Then they suddenly decided that they wanted the air liners to fly instead over the centre of Iran, which would have involved crossing some of the worst flying country in the world. Imperial Airways said a polite "No thank you," and switched their service around the desolate Arabian coast of the Persian Gulf.

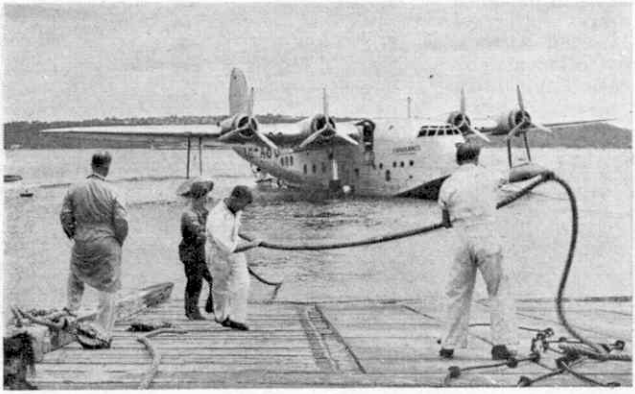
Nor was the first stage of the route any easier to operate. France and Italy raised so many difficulties that, until 1934, passengers normally had to travel by train from Paris to Brindisi, before embarking on a flying boat for the Mediterranean crossing to Egypt.

Meanwhile, other enterprising airlines had begun operations throughout the Empire, often with financial and technical help from Imperial Airways. One of them was Indian Trans-Continental Airways, which, in 1933, began flying 10-seat Atalanta monoplanes from Karachi, across India, to Delhi, Calcutta, and on to Rangoon in Burma, Malaya and Singapore.

So, between them Imperial Airways and

When the approaching end of the war made it possible to re-open the direct route between London and Australia, this was done with Lancastrians — converted Lancaster bombers. This picture was taken at London Airport on 28th May, 1946, on resumption of the direct route.

Indian Trans-Continental Airways could offer by 1934 an all-air passenger service from London to Singapore. Only the last links in the 12,700-mile chain from England to Australia remained to be forged, to the Dutch Indies and on across the wide, shark-infested Timor Sea.



"Coriolanus," the last of Qantas Empire Airways' Empire flying boats, being beached for the last time. She "retired" on 8th January, 1948, after ten years' service and with more than 2,500,000 miles to her credit. Photograph by courtesy of Jo Fallon, Sydney.

The possibility of a through service had been proved in 1931 when the first experimental air mail had been flown between Britain and Australia. The original plan was for Imperial Airways to carry the mail from Croydon Airport to Darwin, where it would be rushed south to Brisbane in two days by the Queensland and Northern Territories Air Services Ltd. (Qantas). After that, Australia's great pioneer airmen Sir Charles Kingsford Smith and Charles Ulm were to carry it from Brisbane to Sydney and Melbourne on behalf of Australian National Airways.

All went well until Imperial's D.H. Hercules made a forced landing and overturned in the Dutch Indies. Fortunately, the crew and mail were safe and were collected six days later by Kingsford Smith, who flew them to Darwin in the wonderful old tri-motor Fokker *Southern Cross*, in which he had made the first flight over the Pacific in 1928. So all the mail got through safely in 25 days.

In 1934, Imperial Airways joined forces with Qantas to form a new company named Qantas Empire Airways. The idea was that the two airlines should operate a regular air mail service between England and Australia in partnership, with Qantas handling the final stages.

So, the complete Kangaroo route was opened as an air mail service on 8th December, 1934. The mail was carried in Imperial Airways H.P.42 biplanes and Atalanta monoplanes to Darwin, and from there in D.H.50s and D.H.61s of Qantas. In February 1935, when their new D.H.86s became available, Qantas took over also the Singapore-Darwin sector.

Within two months, on 13th April, the first passengers were carried all the way by air on what was then the world's longest continuous single air route. Their journey from Croydon to Brisbane took 12 days; but, within three years, travelling time on the Kangaroo route was reduced to 9½ days.

This followed introduction of the magnificent Empire flying boats which, in the insignia of both Imperial Airways and Qantas, carried passengers from Southampton to Sydney for the first time in July 1938. Under the Empire Air Mail Scheme, they also carried letters at the rate of 1½d. per half-ounce—one-twelfth of the cost of sending an air mail letter to Sydney today.

The Empire boats continued to operate the Kangaroo route until Italy entered the war in 1940. Then services west of Cairo were diverted to Durban, and passengers destined for England continued their journey via Khartoum and the West African route. The new service ran from Durban, up the east African coast to Mombasa, cross-country to Khartoum, Cairo, Habbaniya in Iraq, along the Arabian coast, over to Karachi, across India to Calcutta, then on to Bangkok, Singapore, through the Dutch Indies to Darwin, round the north and east coasts of Australia to Sydney and across the Tasman Sea to Auckland, New Zealand. It was usually called the "Horseshoe" because of its shape, and was continued until the war spread to the Far East. Then, the loss of two of the flying boats resulted in the severance for a time of all air links to Australia.

They were re-established in 1943 by

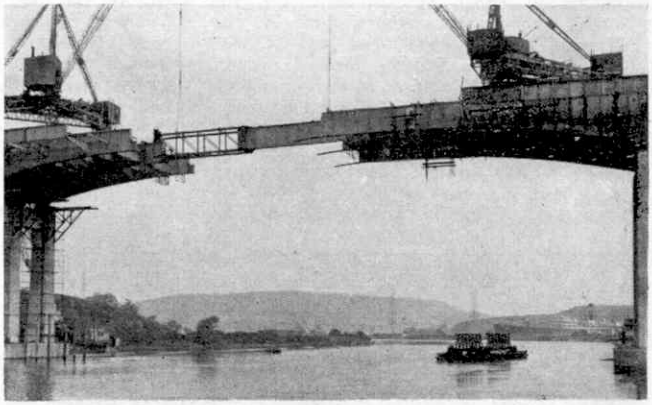
(Continued on page 170)

The Neath By-pass

A South Wales Road Improvement

AN important road improvement scheme completed in South Wales last year, at a cost of about £2,000,000, was the provision of the Neath By-pass. This is about three quarters of a mile long and consists of two steel viaducts, connected by a cutting through a hill. One of the two viaducts includes a fine cantilever bridge across the River Neath. This bridge was the first major bridgework to be carried out in Great Britain since the completion of the bridge across the Forth at Kincardine, Scotland, which was built by the Cleveland Bridge and Engineering Company Ltd., the firm that constructed the Neath By-pass.

The by-pass road has a width between parapets of 90 ft. There are two carriageways, each 22 ft. in width, separated by a 6 ft. central verge, with a cycle track 9 ft. in width and a 6 ft. footpath on each side. Between the two paths are verges 5 ft. in width.



Building the 300 ft. span of the River Neath crossing. The suspended span connecting the two cantilevers is under construction. Photograph by courtesy of the Cleveland Bridge and Engineering Co. Ltd.

The shorter viaduct, at the east end of the by-pass, is about 972 ft. long and consists of eleven spans, supported on steel trestles and portal frames that have foundations of mass concrete. These foundations were built inside cofferdams that were up to 75 ft. in depth.

The second viaduct, which includes the bridge across the River Neath, is about 1,920 ft. long, and has 17 spans. It crosses railway sidings, a canal and saltings on the western bank of the Neath, as well as the river itself. Steel construction is employed throughout for the 17 spans.

It had originally been intended to use foundations of mass concrete, as was done with the eastern viaduct. Ground conditions varied considerably over the area, however, so the foundations were re-designed. Six of the piers are supported on mass concrete formed inside cofferdams, but eight are carried on two concrete monoliths each and the two river piers are supported by six concrete cylinders.

This concrete work is massive. The 16 monoliths measure 24 ft. square and have walls 1 ft. 6 in. thick. The 12 cylinders under the river piers are 9 ft. in diameter, with walls 1 ft. thick, and were sunk under compressed air, the deepest going down to a depth of 80 ft., at which the men engaged were working at a pressure nearly three times that of the atmosphere.

The illustration on this page shows a stage in the construction of the Neath river crossing. The cantilever sections on each side have been completed, and work is in progress on the suspended span, which connects the two inner cantilever arms and completes the roadway. The central span has a length of 300 ft.

The new Neath By-pass was completed after six years of constructional work. It links the London to Fishguard road A48 with the new Jersey Marine road to Swansea docks and shortens the journey from Swansea to Cardiff and London by about six miles, taking traffic through less congested areas than had to be traversed previously. The by-pass is in fact the first section of the proposed motor-way between London and Fishguard.

Road and Track

The Cooper Story

By Peter Lewis

THERE is every indication that the 1956 motor racing season will be one of the most spectacular since the war. The withdrawal of Mercedes-Benz should intensify competition, and we may well have a series of closely fought races comparable with the duels between Alfa-Romeo and Ferrari in 1951.

I feel sure that British Formula I cars will achieve a measure of success, whilst undergoing vital development on the tough continental circuits, and if the Maserati organisation can match the driving ability of Stirling Moss I predict a British World Champion at the conclusion of the eleven championship events.

There have been changes recently in the racing car formulæ, due to expire in 1957, which make 1956 even more important so far as development is concerned. Formula I and III are to continue until 1959 and a new Formula II, for unsupercharged racing cars up to 1,500 c.c. is to be introduced in 1957.

We have several sports cars that can be developed to compete in the new Formula II, and when I motored over to Surbiton, where the father and son partnership of Charles and John Cooper produces the 140 m.p.h., 1,100 c.c. rear-engined Cooper-Climax, John Cooper hastened to assure me that five of these sports cars, powered by 1,500 c.c. Coventry-Climax engines, will be raced during the 1956 season. "From them, we shall develop the new Formula II car," John Cooper told me. "Salvadori and Russell will be the 'works' drivers."

The 1,500 c.c. Cooper should give a good account of itself, coming as it does from a partnership which has contributed a great deal to motor sport in this country and produced more racing cars since 1947 than any other manufacturer in the world.

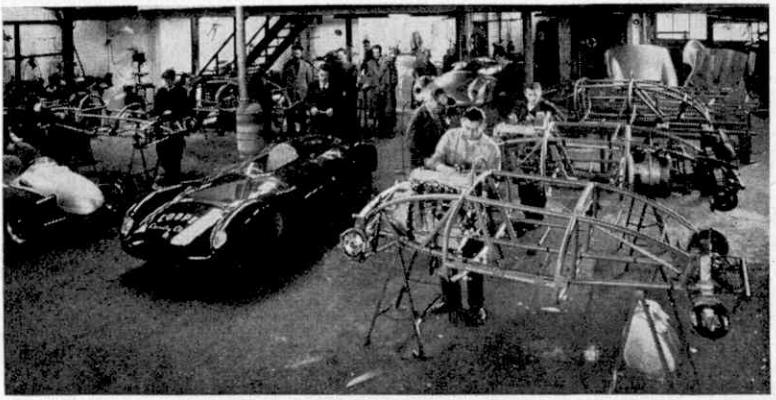
Coopers manufacture their own aluminium body shells and tubular chassis, and incidentally a Surbiton chassis and body was used on the Vanwall prototype.

British Champion, Stirling Moss, learned motor racing in the cockpit of a Cooper-Norton 500 c.c. car. Here he is in the paddock at the September 1953 Crystal Palace meeting, with John Cooper about to push the car.

More than five hundred Cooper cars have been built to date and still they come off the production line at the rate of six a month.

Three hundred and sixty Formula III cars have been manufactured, and Cooper-Norton won the National Championship in 1954 and 1955. Twenty Cooper-Bristols of the old Formula II also have been built at Surbiton, and nearly 100 of the 1,000 c.c. or 1,100 c.c. racing car class as well as Cooper-Bristol and Cooper-M.G. sports cars and several of the beautifully proportioned 180 m.p.h. Cooper-Jaguars.

As a founder member of the 500 Club, John Cooper was one of three enthusiasts who built and raced 500's in 1946, thus paving the way for Formula III. This comparatively inexpensive form of motor racing has been an invaluable training



ground for some of our finest Grand Prix drivers, including Moss and Collins, and has been largely responsible for providing Great Britain with more top flight drivers at the present time than any other country in the world.

John Cooper's first special, powered by a J.A.P. engine and capable of over 100 m.p.h., was so successful that he was asked to make others. "We had no intention originally of manufacturing 500's as a commercial proposition, but the orders came rolling in . . ."

He won the 500 c.c. race at Grenzlandring, Germany in 1952, at 102.66 m.p.h., the first time the winning average in a 500 c.c. event exceeded 100 m.p.h. The following year he won the German Avus Grand Prix in an aerodynamic Cooper J.A.P., after a first lap melee that left him with a stalled engine and a dented car. Three minutes in arrears, Cooper tore after the leaders—reaching 130 m.p.h. on the straight—and caught them six laps from the end.

Nowadays, John Cooper does not race. Testing at Goodwood provides the man who drove an Austin Special round Brooklands at 80 m.p.h. when he was only fourteen years old with his high speed motoring.

In 1952 Mike Hawthorn delighted a Goodwood crowd of 50,000 with his skilful handling of a 2-litre racing car that had only been delivered a few days previously and was still unpainted. This was the new Formula II Cooper-Bristol, based on a larger version of the 500 c.c chassis. He won two events easily and then proceeded to chase Gonzalez (Ferrari) in the Richmond Trophy to such effect that the Argentine driver was only able to keep the more powerful car 26 seconds ahead in 28.8 miles. Hawthorn's subsequent exploits in the astonishing Cooper-Bristol will go down in motor racing history as a classic example of a perfectly matched car and driver.

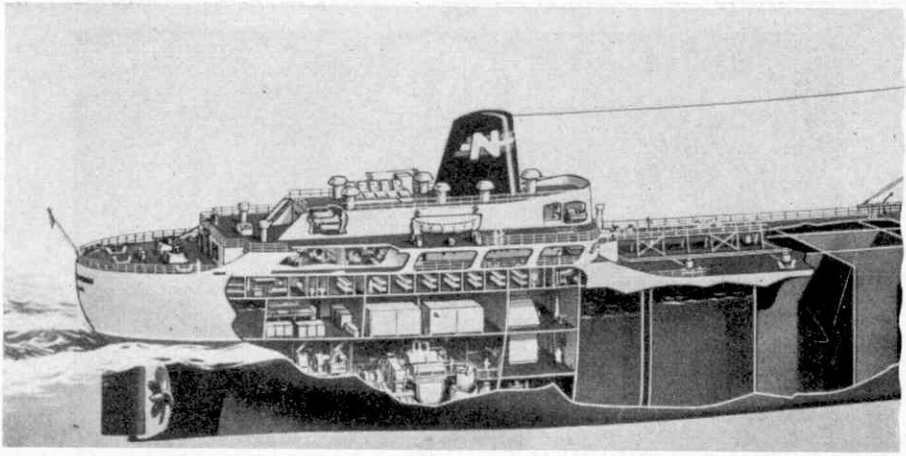
Another such example is the Cooper-Bristol of Bob Gerard, which invariably duels with the more powerful Formula I cars, frequently defeats them and is famous for B.R.M. baiting in Formula Libre events.

A view of the Cooper Works at Surbiton, Surrey, is seen above, with a number of 1,100 c.c. tubular chassis on the right of the picture, and in the centre the Montlhery record-breaking car.

The success story of the remarkable 1,100 c.c. Cooper-Climax has unfolded in less than twelve months — since the 1955 Goodwood Easter meeting, when the new sports car, driven by Ivor Bueb, appeared for the first time and won its class. A few weeks later, at Silverstone, Bueb's car was not only triumphant in its class but crossed the finish line ahead of the best 2-litre car, a Frazer-Nash.

The 1,100 c.c. Cooper-Climax went from success to success. Victories at Crystal Palace, Brands Hatch and Oulton Park were followed by an excursion to Stockholm, where Bueb won the 2,000 c.c. class.

Then came the T.T. with the Bueb/MacDowel car finishing tenth in general classification, ahead of every car up to 2,000 c.c. in capacity except the 1,500 c.c. Porsche in ninth place. Last October the Cooper-Climax captured 12 international records at Montlhery, including 125.86 miles in 1 hour.



The World's Largest Tanker

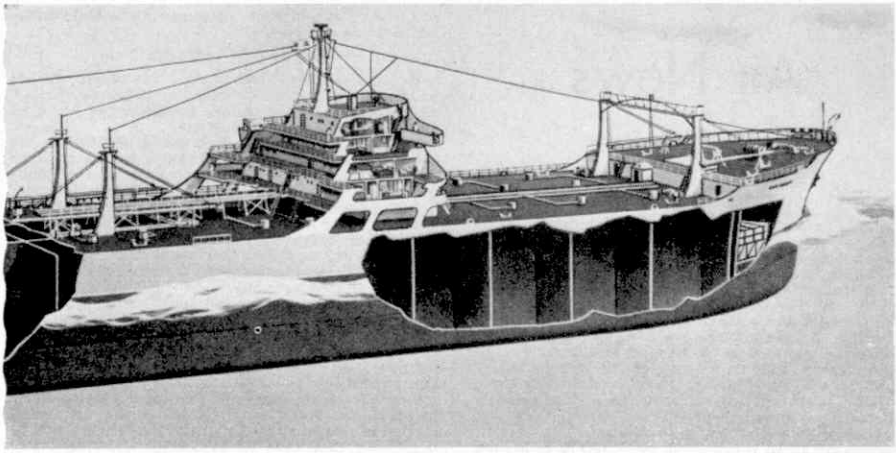
THE launch of the tanker *Spyros Niarchos* last December at the yards of Vickers-Armstrongs (Shipbuilders) Ltd. in Barrow was a great occasion for several reasons. One of these was that the tanker completed a million tons of new building in the Barrow and Naval Yards of the firm since the war. The second was that with her deadweight tonnage of 47,750, the vessel is believed to be the largest oil tanker yet launched, and she is the largest merchant vessel built in Great Britain since the war. Apart from the *Queen Mary* and the *Queen Elizabeth*, only the *Mauretania* will exceed her in size among merchant ships built in Britain that are still in service.

When completed "Spyros Niarchos," the giant vessel seen in section at the head of these pages, will be the largest oil tanker in the world. She was launched on 2nd December, 1955, at the Barrow shipbuilding yard of Vickers-Armstrongs (Shipbuilders) Ltd., to whom we are indebted for our illustrations. The lower picture on the opposite page shows the vessel entering the water when she was launched.

The overall length of the new tanker is 757 ft., only 116 ft. shorter than the Houses of Parliament, from Big Ben to Victoria Tower. If the vessel could be placed in a London street, the lookout man on her bow would find himself on a level with the seventh storey. Her tanks are capable of carrying a sufficient quantity of crude oil to give enough refined petrol to take an 8 h.p. car to the Sun and back again, a total distance of 186,000,000 miles, and half of her original cargo of crude oil would still remain available for manufacture into other products. The shaft horse power of her engines will be the largest ever employed for a single screw merchant vessel, and each of her anchors will weigh as much as a London bus!

It is interesting to compare this giant with the first real modern tanker, that is one in which the shell itself forms the tank. This was the *Gluckauf*, a vessel with the comparatively small deadweight capacity of 3,000 tons, built in 1884 by Armstrong Whitworth's. Like those of the modern oil tanker, of which the giant *Spyros Niarchos* is a fine example, her engines were placed aft for safety, her hull was subdivided into tanks and her arrangements for pumping oil out of them were of the kind still in use; but in those days the sight of a vessel with her funnels well aft was not as familiar as it is today.

It will be seen how immensely larger present day tankers are than the pioneer *Gluckauf*. One reason for this is that transport costs are reduced when large tankers are used, for the super-tanker costs less per deadweight ton to build than a smaller vessel, and her crew is not proportionately larger. In addition, the proportion of fuel used on a voyage to



the oil carried is less on a large vessel, and this is true also of many other items. There are of course limits to the size of tankers, set by canal draughts, berthing facilities, repair dry docks and so on, but within these limits the larger the vessel the cheaper the oil.

So we have the *Spyros Niarchos*, the largest oil tanker yet launched, with an almost all-welded structure. The pictures at the head of these pages show how she is planned. There are 33 cargo oil tanks, three abreast in the width of the vessel, two of which will not be used for cargo oil, however. Forward is a dry cargo hold, which is separated from the oil tanks by a cofferdam, represented in the drawing by a double bulkhead. At the after end of the rows of cargo oil tanks is another cofferdam separating them from the tanks carrying fuel required for the voyage, aft of which come the machinery spaces. Above these are accommodation for officers and crew, the captain, deck officers and radio operators being housed in the bridge superstructure.

The *Spyros Niarchos* will be propelled by a single screw, driven by a set of geared turbines capable of developing a service power of 18,000 s.h.p., and a maximum power of 20,000 s.h.p. These will give a normal sea speed of 17 knots at a draught of 36 ft. Steam is supplied by boilers, burning oil fuel, at a pressure of 600 lb. per sq. inch and a temperature of 860 deg. F. at the superheater outlet. The propeller is of the five-bladed solid type. Electric power will normally be supplied by two kW, 450 V turbo-alternators, each of sufficient capacity to carry the ship's maximum load, with a diesel alternator for stand-by and emergency use.

Air News

By John W. R. Taylor

Tilting Rotor Progress

Flight tests of the Bell XV-3 convertiplane are going well, and it is expected to make its initial conversions from helicopter to "fixed-wing" flight in the near future.

The illustration on this page shows the XV-3 soon after Bell's chief helicopter pilot Floyd Carlson took off in it for the first time last August. At a height of 20 ft. above the ground he manœuvred it in every direction as a helicopter. For cruising flight, the two rotors are intended to tilt forward and down through 90 degrees, so that they work like ordinary propellers, to thrust the aircraft along. The conversion is intended to take 10–15 seconds, without any loss of speed or altitude, and Bell believe that safe, stable flight will be possible with the rotors in any intermediate position. As forward speed is increased, more and more lift will come from the 30 ft. fixed wings, until eventually they will support the aircraft entirely.

If the idea works, aircraft based on the XV-3 will combine the vertical take-off and landing ability of a helicopter with much higher than usual cruising speeds. They will, therefore, be of great value for combat transport, local reconnaissance and casualty evacuation in front-line areas.

The Bell XV-3 convertiplane on its first test flight.

Supersonic Air Liner

A preview of the air liners that may fly the world's long-distance air routes in the 1960's has been given in a report of a speech made in Toronto by Sir Roy Dobson, Managing Director of A. V. Roe and Company. Addressing a group of aircraft workers, he said that Avro Aircraft of Canada are starting design work on a truly supersonic air liner that will cross the Atlantic in 2½ hours at 1,500 m.p.h., offering great comfort, safety and clockwork regularity.

High-Speed Aircraft May "Perspire"

The main problem in very high-speed flight is to prevent aircraft being melted by the friction of airflow over their metal skin at above 2,200 m.p.h. At that speed, the skin might easily heat up to 900 deg. F. in a minute if nothing were done to stop it.

New heat-resistant metals are being developed: but Mr. C. E. Pappas, chief aerodynamicist of the Republic company, believes that a better solution is to make aircraft "perspire." If water could be forced out through tiny holes in the skin, he believes it would go out as steam, carrying off much of the heat caused by friction. Using such devices, Mr. Pappas thinks it might be possible to develop within five years a 6,000 m.p.h. aircraft able to fly at 100,000 ft., provided new structural materials and power plants also become available, as expected.

The New Luftwaffe

Details have been given of the types of aircraft that will be built in Western Germany for the new *Luftwaffe*. At the moment, they include no fighters or bombers, and only one is of German design.

The only jet-plane planned for production is the little French Fouga Magister two-seat trainer, which will be built by the Heinkel and Messerschmitt companies. The Italian Piaggio P.149 four-seat lightplane will be built by Focke-Wulf, in co-operation with Professor Blume's company at Duisburg. The French Noratlas military transport will be produced by a group consisting of Siebel, Weser of Bremen, Henschel and Hamburger Flugzeugbau, a successor to the old Blohm and Voss company.

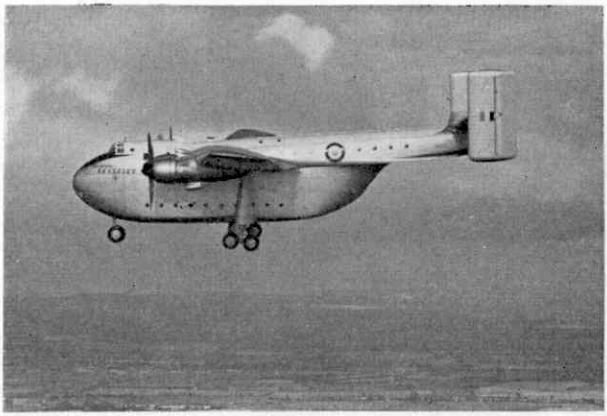
The fourth group, headed by Dornier, will build the Dornier Do.27 observation aircraft, the prototype of which was designed in Spain and built in the Spanish C.A.S.A. works before aircraft work was again permitted in Germany. Powered by a 225 h.p. Continental engine, it is a neat all-metal high-wing monoplane, with excellent take-off and slow-flying performance. An unusual feature is that its fuel is carried in two small underwing tanks, which could be dropped if they were hit in combat and caught fire. The aircraft could then glide safely down.

R.A.A.F. Orders Jet Trainers

Following the lead of the R.A.F., the Royal Australian Air Force have ordered a number of two-seat Vampire advanced trainers and dual-control Canberra operational trainers. All the Vampires will be built in the de Havilland factory at Bankstown, near Sydney. The first two Canberras will come from England; seven more will be built by the Australian Government Factory, side-by-side with the 41 Canberra bombers in production there for the R.A.A.F. Many of these bombers have already been delivered, and Nos. 2 and 6 Squadrons of No. 82 Bomber Wing at Amberley have been completely re-equipped with Canberras.

* * * *

High-ranking Army officers and officials from Scotland Yard recently watched television pictures of the Bristol Aircraft factory and traffic on the Gloucestershire roads, transmitted from a Sycamore helicopter flying at a height of between 500 and 1,000 ft. A standard Pye Industrial TV camera was used for the demonstration, which shows the possibilities of airborne TV for combat reconnaissance and traffic control.



The Blackburn and General Aircraft Universal Freighter is entering service with R.A.F. Transport Command as the Beverley C.Mk.1, as shown here.

Arabian Airlift

A Blackburn and General Aircraft Universal Freighter has completed a remarkable airlift operation for the Iraq Petroleum Company, who are drilling for oil at Jebel Fahud (the Hill of the Lions) in the heart of an Arabian Desert. It made nine return flights in ten days over the 365-mile route from the base port of Umm Said, on the Persian Gulf, to Fahud, carrying a total of 129 tons of equipment. The heaviest single item was a 16½-ton section of the drilling rig, and the biggest a 28 ft. long mud tank. Both went easily into the Universal's 4,000 cu. ft. cargo hold.

It was by no means the first aircraft seen at Fahud, because about 1,000 tons of freight and 2,000 passengers had already been flown in by Silver City Freighters and Hunting-Clan Dakotas before it arrived. But no other civil aircraft in the world could have carried the enormous loads handled by the Universal, especially as the only available loading equipment consisted of ramps welded up on the spot from odd lengths of drill pipe.

The success of the operation left no doubt of the great lifting power and versatility of the Universal, which is entering service with R.A.F. Transport Command as the Beverley C.Mk.1. Powered by four 3,150 h.p. Bristol Centaurus engines, the great 60-ton aircraft had no difficulty in operating from the strip of desert that serves as an airfield at Fahud.

Making Supersonic Bale-Outs Safe

All over the world designers are busy trying to perfect methods of escape by parachute from aircraft flying faster than sound. It seems certain that, eventually, the whole cockpit will have to be blown clear of the rest of the aeroplane and fitted with large 'chutes to lower it safely to earth. Meanwhile, efforts are being made to improve present ejector seat techniques.

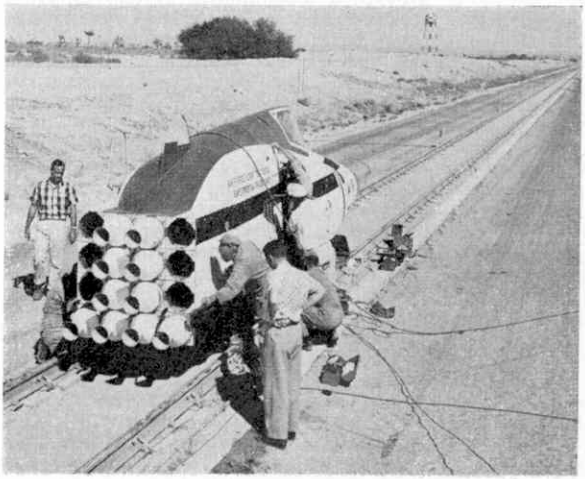
Latest item of test equipment at the U.S.A.F.'s secret Flight Test Centre at Edwards Air Force Base, in California's Mojave Desert, is a rocket sledge that runs on a two-mile track. It is shown in the lower picture on this page. The forward part of the sledge is an actual fuselage nose and cockpit of a Convair F-102A fighter; and up to sixteen 11,000 lb. thrust motors can be used to propel it at varying speeds, with a maximum well above the speed of sound.

Dummy pilots, as nearly like the human body as sponge rubber, steel skeleton and cast aluminium skull can make them, are strapped into the ejector seat, which is fired by a trigger on the track when the sledge reaches its required speed. First the hood jettisons; then the dummy and seat are catapulted out of the cockpit, the dummy is automatically separated from the seat and the parachute opened. All this takes just five seconds, and is recorded by cine-camera and delicate instruments which measure the forces that would be felt by a human pilot.

British Engines for U.S. Jet-Liners

The latest orders for the Boeing 707 and Douglas DC-8, from Air France, Sabena and S.A.S., bring the total value of contracts for these two U.S. jet-liners to more than $1,000 million. There has never been such a rush for new civil air liners in aviation history, and it looks as if Britain may share the profits, because the Americans know that our turbojets and turboprops are the world's best.

S.A.S. have already announced that their seven DC-8s may be powered by Rolls-Royce Conways, and Boeing are considering this engine for their 104-seat Model 707 and the larger 124-seat version known as the Intercontinental. Without Conways, it is doubtful if either aircraft could fly the London-New York route non-stop throughout the year.



Convair rocket-propelled sledge for testing the ejector-seat equipment of the Convair F-102A fighter. The sledge is shown on the two-mile track along which it runs.

Potters Bar Today

POTTERS BAR station, on the East Coast main line about 13 miles north of King's Cross, has been completely re-constructed, as part of the scheme for widening the line between New Barnet and Potters Bar. The new station has four platform faces, one for each of the four tracks now passing through it, and as certain passenger trains terminate at Potters Bar, a reversing siding, with run-round facilities, also has been provided between the down slow and down fast lines north of the station.

The signal box and north end of the new Potters Bar Station B.R. Eastern Region.

This station re-construction is the first to be completed by the Eastern Region since British Railways announced its modernisation plan, and has taken three years to complete. The new structure is entirely modern in design, with an up-to-date ticket hall connected with the platforms by means of a subway and ramps. The waiting rooms are centrally heated and brightly decorated, and modern lighting has been introduced.

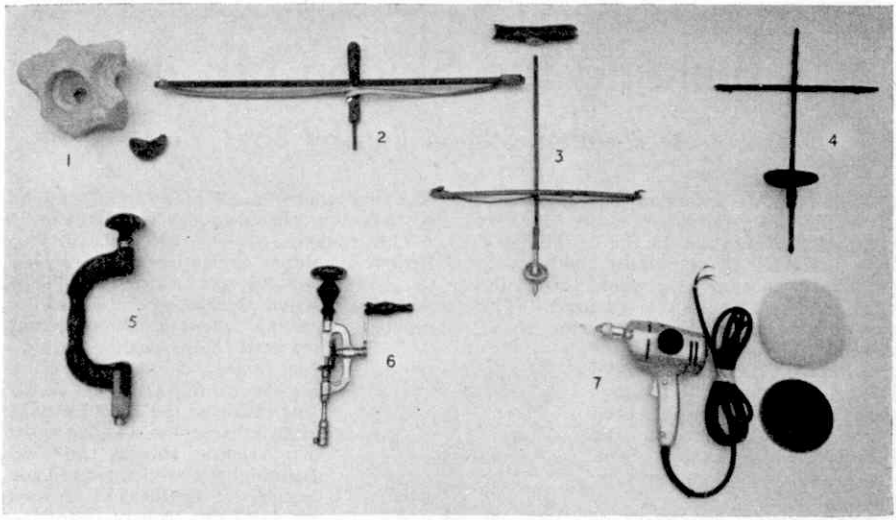
Perhaps the most striking feature of the new Potters Bar station is the new signal box, seen in the illustration reproduced on this page. It is at the north end of the station, above a long low building in which are housed the complicated banks of electrical relays through which the signalling is actuated. The opportunity also has been taken to provide colour light signalling, and indeed to re-organise the whole of the signalling in the station. It is now controlled by a route setting relay interlocking panel, and is the first of its kind to be installed anywhere.

In the new box the signalman remains seated in the central operating position, where he can reach his switches without stretching out, and he has a complete view of the control area and its approaches on an illuminated diagram. In front of him is a console with two wings, one carrying the signal post telephone and other communication facilities, and the other forming a signalman's desk.

The central operating position has two panels, made of Wareite in a pleasing shade of green. On one of them is a small replica of the layout processed in white, and on this are mounted the switches for the routes through the station, in a geographical representation of the signal positions. The purpose of this is to provide a geographical system of route selecting, and so to avoid the necessity of a signalman having to learn and memorise the number and position of the switch associated with any given route. His operating panel indeed is in effect a map of the control area. The only lamp indications on it are small white lights, one at the end of each individual route, which light up when the signalman has completed setting up the route required and the route relay has operated.

The individual switches for the various points are on the second panel, which is vertical. They are three-position switches normally left in the central position, but they can be used to work individual points to either normal or reverse position in an emergency. In the centre of each switch is an indication light that normally is "out," but flashes red while the points are actually moving or if they are in a position different

(Continued on page 170)



Portable Drills Old and New

DRILLING holes is one of man's oldest workshop operations, and on this page is a picture that gives a broad outline of the history of the kind of drill that can be described as portable, which of course means one that can be taken to its work. Look first at the top left-hand corner of the picture, where there is an Egyptian flint drill head, with a trial block of soft limestone. This flint drill head is nearly 5,000 years old, and was taken from an Egyptian temple. It is believed that the drill head was supported in a forked stick that was rotated, and that it was used for removing material from masonry work, or perhaps from the interior of vases.

No. 2 is also an early Egyptian drill, but this time one of the type described as a bow drill. The top of the drill stock or holder seems to have been pivoted in a hollowed out stone bearing, which is not shown in the picture, and for use the wooden bow, the ends of which are connected by a leather cord looped round the stock, was pulled backward and forward.

Another example of a bow drill is seen in number 3, which is an Eskimo drill, ancient in style, but modern in use. The next drill, number 4, is another early one that has survived in New Guinea. It has a fly-wheel, made of wood, and a cross-piece, the ends of which are attached to the top of the drill stock by means of a length of cord. The cord is wrapped round the stock and in use the cross-piece is pushed downward to rotate the drill.

The three tools in the lower row in the picture have a more familiar look. The first, number 5, is a brace used in the Middle Ages. This type gradually replaced the bow drill. It is easier to manipulate and there is no idle return movement. Turning is slower, but the drill is far more efficient as well as handier to use. Number 6 is a type of brace, dating from the middle of last century, that gives speedier drilling by the use of bevel gearing.

Finally, we come to the most modern development—the portable electrical drill. This is one made by Black and Decker Limited, and is driven by a universal motor. It has a pistol grip with a trigger switch. These features were introduced more than 40 years ago by two Americans, Alonzo G. Decker and S. D. Black, who believed that people would always want to drill holes and formed a partnership to manufacture portable electric tools to enable them to do this quickly and easily. It is said that the idea of the pistol grip and trigger switch was suggested by an old type firearm used as an ornament in the room in which the two inventors were discussing their designs.

Building the Skylon Mk. II

A Weather Station Run by Boys

ST. CRISPIN'S Secondary Modern School, Wokingham, Berkshire, is an Auxiliary Climatological Station for the Air Ministry. This involves taking daily readings of temperature, rainfall, wind, etc., and keeping an accurate record. The anemometer, which measures wind speed, and the wind direction indicator are housed at the top of a model Skylon, which rises 36 ft. above the school gardens and has been made by the boys in the Handicraft Workshops from silicon alloy aluminium bar, rod and angle.

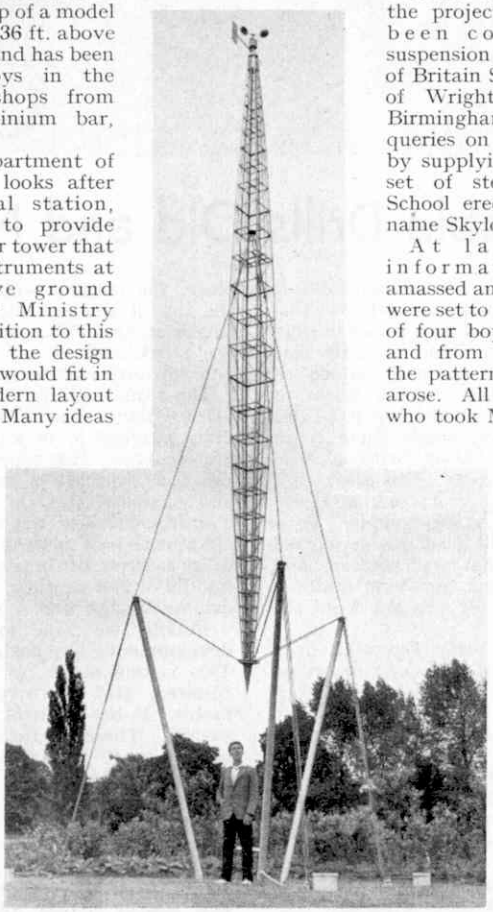
The Science Department of the school, which looks after the Meteorological station, asked Workshops to provide some kind of mast or tower that would hold the instruments at the height above ground required by Air Ministry regulations. In addition to this question of height, the design had to be one that would fit in with the ultra-modern layout of this new school. Many ideas were considered and scrapped before Mr. Brown, who is in charge of the Workshops, decided that a smaller version of the Festival of Britain Skylon might be just the thing.

Mr. Brown had made a model, to test on a small scale the theoretical side of the suspension and this proved most encouraging, for although it was only of wood, thread, pins and steel rod, it showed that while at the summit there was a slight amount of whip, as might be expected, the base was rock steady.

The makers of the original Skylon, British Insulated Callenders Construction Co. Ltd., were approached for details of their feature and they co-operated wholeheartedly, giving great technical and material help, without which the project could never have been completed. The suspension of the 1951 Festival of Britain Skylon was the work of Wrights Ropes Ltd., of Birmingham, who answered the queries on strains and stresses by supplying, free of charge, a set of steel cables for the School erection, to which the name Skylon Mk. II was given.

At last sufficient information had been amassed and the advance guard were set to work. This consisted of four boys of the 4th Year, and from their initial efforts the pattern of work gradually arose. All boys in the school who took Metalwork were able to contribute to the project. They were organised in shifts of four on a rota, so that each week, as a particular form came for its normal lesson, a different group was at work on the big scheme.

Boys of the Rural Science Department excavated for the concrete foundations in the form of a Y, and when this was complete the base fittings were positioned. These were located from a central pin by means of a



The Skylon Mk. II is a smaller version of 1951 Festival of Britain structure built at St. Crispin's Secondary Modern School to carry instruments for measuring the speed of the wind and indicating its direction.

Boys of the school reading instruments inside the weather station Stevenson Screen.

master bar to ensure equality of measurement. Thus there were 3 concrete arms, each 9 ft. long and 1½ ft. wide and sloping from 2 ft. to 1 ft. in depth, set into which were the pylon anchorage, the cable anchorage pulleys and the drums to take the cable ends.

The only piece of work done outside the school was the welding of the top plate to the pylons, as the school does not possess oxy-acetylene equipment.

The problem of interaction between dissimilar metals was solved by giving two coats of aluminium paint to all steel parts.

The three pylons supporting the structure were erected first and set to the required angles. The erecting jig, made from old iron bedstead sides, was placed centrally between the pylons and located by steel bars driven into the soil. Both the erecting jig and the pylons were supported temporarily by wire guys during the raising of the feature.

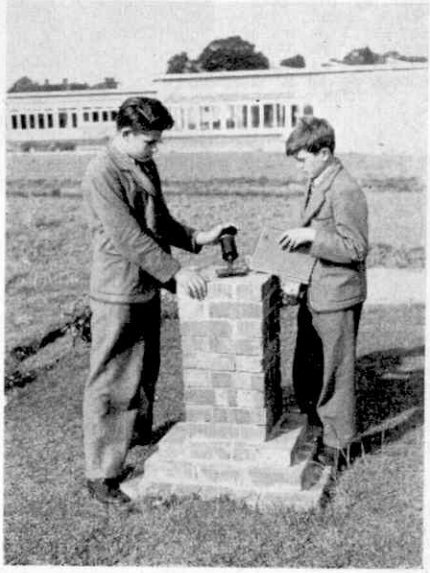
The first erection took place after working for approximately 6 months of school time, but was only a test erection, as at this stage no instruments had been fitted. The Skylon was well tested during gales that followed and nothing untoward occurred except a very slight bending of the structure, which afforded a surprising amount of wind resistance despite the open nature of the construction.

The wind direction indicator was made in the workshops, but the anemometer was bought as it would have been too difficult to construct to the required Air Ministry standard. After the instruments had been fitted and wired by electricians of the Science Department, additional cross bracings were added to the Skylon to prevent any further twisting in high winds.

Less than a year after the start of construction, the Skylon was erected. The instrument wires were buried 2 ft. deep all the way back to the Science Laboratory—to avoid the unwelcome attentions of gardeners! Now, in the entrance hall of the Science Department, the two instruments show their information on two dials, one giving the wind speed in knots and the other the wind direction from any of the 360 degrees.

At an Auxiliary Climatological Station it is necessary to have an adult as the official observer and Mr. F. S. Jeanes, the school groundsman, has undertaken this duty, since he is available at week-ends and holiday time.

(Continued on page 170)



The sunshine recorder.

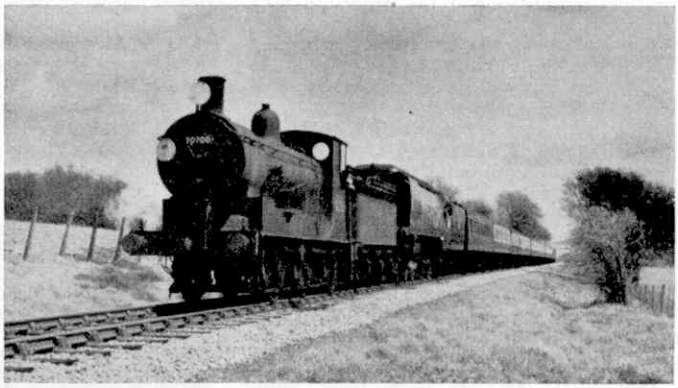
Railway Notes

By R. A. H. Weight

The "Norseman" Express

On the front cover this month the *Norseman* is seen about to leave King's Cross, headed by the well known streamlined Pacific *Dominion of Canada*. It is a summer express, run on most weekdays, conveying passengers travelling between this country and Norway, in connection usually with the arrival or departure at Newcastle (Tyne Commission Quay) of the motorship *Venus* or the steamship *Leda* belonging to the Norwegian Bergen Line, which operates a more frequent service during the holiday season

The *Norseman* train is a handsome 9-coach formation including restaurant cars and a good deal of first class accommodation. As shown in last summer's time-tables, it left King's Cross at 9.5 a.m. and made a fast run to York, 188 miles, where boat passengers were picked up, keeping to the same sectional times as far as Doncaster as the *White Rose* London-Leeds express 15 min. ahead. On Mondays to Fridays it was passed while standing at York by the still faster *Elizabethan*, running non-stop to Edinburgh. After another very smartly timed sprint over the 80 miles to Central Station, Newcastle-upon-Tyne, the *Norseman* is taken for 8 miles by a local engine along riverside suburban lines and then down to the well equipped Tyne Commission Quay alongside the ship. On a good many occasions last year the locomotive used from King's Cross to York was A3 *Gay Crusader*, which with the same crew made a 376-mile round trip from London in the day.



A Southern Troop Special diverted from the main line owing to Sunday engineering work is assisted on the 1 in 60 of Medstead Bank by Drummond "Black Motor" No. 30700. The train engine is No. 34013 "Launceston." Photograph by S. C. Nash.

The running of the corresponding southbound service varies somewhat according to the ship's arrival and the day of the week, but a fast run is similarly made on the East Coast main line from Newcastle to King's Cross, calling at York and also, generally, just outside Grantham station to change enginemen. When I last saw it speeding southward in the afternoon an A2 stationed at York was in charge, typifying the Pacific variety readily available for much of the express work on the former L.N.E.R.

Locomotives in the News

Of the new class 9 2–10–0s lately completed at Crewe, Nos. 92060–6, allocated to 54B, Tyne Dock shed, were at the time of writing on loan to the L.M.R. They are intended for hauling Consett iron ore trains, and to be fitted with Westinghouse pumps for opening and closing the power-operated doors of the bogie wagons specially adapted for that traffic. Nos. 92067–71 are to be stationed at 36A, Doncaster. No. 3400, W.R. 94xx type 0–6–0 pannier tank commencing a new series, has been built by the Yorkshire Engine Co. Ltd.

New class 5 4–6–0s completed at Derby numbered 73095–9 were allocated to 10c, Patricroft, Lancs., and Nos. 73105–7 to 65A, Eastfield Shed, Glasgow, being part of the five completed at Doncaster numbered up to 73109. From Darlington Works small Class 2 2–6–0s numbered 78050–4 were all intended for 66B, Motherwell. Class 4 2–6–4Ts from Brighton made the long journey to Scotland as follows: Nos. 80127–8 allocated to 67A, Corkerhill, Glasgow; Nos. 80129–30 to 66A, Polmadie, Glasgow. Other additions to Scottish stock were 0–6–0 diesel shunters, built at Derby and numbered 13198–13201, to be stationed at Polmadie, and Nos. 13202–5 for Motherwell.

Two L.M.R. 2–10–0s, Nos. 92023 and 92050, have been on loan for trials to the Scottish Region at Kingmoor shed, Carlisle.

Additional diesel shunting engines similar to those mentioned above constructed at Darlington were Nos. 13227, shedded at 51B, Newport; Nos. 13228–9, 51D, Middlesbrough, for Tees-side yards; and Nos. 13230–1 to 53A, Hull, Dairycoates.

Classes that have become extinct, owing to withdrawal lately for scrapping of the last survivors, comprised G1, former L.N.W.R. 0–8–0 freight, the final locomotive being No. 49140 built in 1910; the 1P, L.N.W.R. 2–4–2T type, last engine No. 46616; the old and diminutive ex-Midland Railway 0–4–0 saddle tank class finally represented by No. 41516; and Great Northern type J5 0–6–0, E.R., last numbers 65483, 65498. Last but not least, the solitary Beyer Garratt 6-cylinder "double locomotive," class U1, No. 69999 2–8–8–2, will work no more. It was by far the largest and most powerful British locomotive of its kind and was built in 1925 for banking heavy coal trains up steep gradients in Yorkshire, but is now redundant owing to electrification and recently was tried elsewhere.

Observations on the Paddington main line before and after Christmas showed that the up *Bristolian* was being hauled by Castles stationed at Bristol instead of at Old Oak, an arrangement that allows the driver and fireman to retain the same engine for their round trip, returning from Paddington at 8.5 p.m. Similarly the London men taking the down *Bristolian* normally bring the same locomotive back on the noon express from Bristol. No. 4056 *Princess Margaret*, the oldest Star class 4-cylinder 4–6–0 running on the W.R., was recently overhauled and resumed taking a share on Bristol-Paddington and other fast trains.

No. 6006 King George I cruises past Westbourne Park with an up Western Region express from Birmingham. Photograph by Anthony R. Brown.

Expresses on Branch Lines

Repair or renewal of tracks, bridges and other structures or equipment essential to the maintenance of the permanent way and the safe running of trains at all necessary speeds is constantly going on. Sometimes such work necessitates closing and temporary removal of stretches of line, though one track may remain available for traffic under special control arrangements.

In order to allow the Engineers' staff complete occupation of a site for their gear, cranes and so on, and thus to carry out their task more expeditiously, it is sometimes arranged for all trains to be diverted when a suitable alternative route exists. This happens on a Sunday more often than not, and the diversion is on to what may appear to be just a branch line, perhaps with only a single line for a short distance, though more correctly it is usually a secondary through route that may have the distinction of carrying some of the most important expresses.

An example of such a diversion that has come to my notice lately was main line trains from Charing Cross to Tonbridge and beyond run via Swanley and Otford instead of the normal route between Chislehurst and Sevenoaks by way of Orpington. Others were between London Bridge and Tonbridge via Croydon and Redhill instead of Orpington and Sevenoaks; from King's Cross to Hitchin through Enfield and Hertford (North) instead of via Hatfield; and between Roade and Rugby on the L.M.R. main Euston route via the Northampton loop. A regular winter Sunday diversion while the Severn Tunnel is being examined and repaired necessitates trains going round via Gloucester on the Swindon-South Wales service.

An unusual example featured in one of this month's illustrations was the diversion of Waterloo-Southampton fast trains between Woking and Winchester by way of Alton-Alresford, a long secondary line partly single track, with some steep gradients up one of which assistance was provided by a rebuilt 700 class 0–6–0.

Semi-Express N.E.R. Diesel Trains

Lightweight diesel-car passenger services have been introduced between Newcastle, Sunderland, West Hartlepool, Stockton and Middlesbrough on a 47-mile semi-express journey enabling faster timings to be operated and providing accommodation considerably in advance of the usual two-car units so far employed elsewhere. Four-cars are regularly run, more if required. The vehicles are of the open, corridor type, providing first and third class comfortable seating, with large windows and fine views fore and aft.

The units were built at Derby, where more are in hand. Each driving car has two A.E.C. 150-h.p. horizontal diesel engines. A new diesel test house of unique type is to be built at Derby Works, together with extensions to the shop and machine accommodation to cater for the great increases in this type of rolling stock.

More Fast Freight Services

Fast freight trains formed entirely or partially of vans fitted with vacuum brakes under the control of the driver are an established feature of many main lines, particularly those between London, the North of England and Scotland, affording next-day delivery of important goods, meat, fish, etc., and sometimes running quite long distances without stopping. London Midland Region has more than 50 such services in its freight time-tables and has just added a London (Broad Street)-Glasgow one. In Scotland there are now the *Killie*, running from Aberdeen to Kilmarnock serving Perth, Stirling, Glasgow and elsewhere, the *Hielan' Piper*, from Clydeside to Aberdeen and Inverness, and others.

B.R. Standard Motive Power on the West Highland Railway. No. 73077 a class 5 4-6-0 leaves Upper Helensburgh. Photograph by C. Lawson-Kerr.

Land Clearing in Australia

The Bush Problem on Range Land

CLEARING new land of trees and bushes covering it is quite a problem. The first step is the cutting down of trees that yield valuable timber. This leaves their stumps to be grubbed out, with smaller trees and scrub, that is bushes and smaller growths of all kinds, and these also have to be uprooted before cultivation can begin. The remaining trees can be uprooted by bulldozers with special equipment, as shown in the illustration on this page. In certain instances ground brush has been cleared by starting controlled fires, and explosives and chemicals also might be used, but there are risks attached to such methods, poisons for instance damaging natural grass and making the soil unusable for a time.

The picture at the head of the page shows a Challenger 3 Diesel Crawler Tractor equipped with tree pusher and tree canopy, felling heavy timber in the Australian bush.

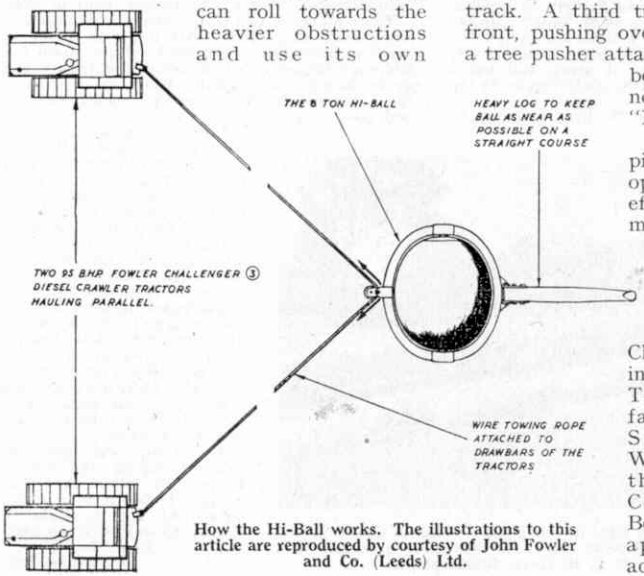
Many of the devices that have been tried for scrub clearing have shown great ingenuity. Most of them are adapted to suit particular requirements in heavily timbered areas throughout the world, which of course vary in character. One of the best-known methods is the use of a heavy chain, each end of the length being attached to the drawbar of a crawler tractor. The first sweep flattens the scrub and the returning sweep usually uproots it. The main drawback with this method is that heavy trees, even when felled before the chain sweeping starts, present obstacles over which the chain must be lifted.

On the Congeling Park estate of the Fowler Brothers, near Williams, in Western Australia, a method of scrub clearing has been used that dispenses with the need for removing heavy timber from the area before sweeps, although even there it is necessary first to fell larger trees.

This method was well demonstrated at a recent "Field Party" at Congeling Park. In it the scrub-clearing "Hi-Ball" was used. As the illustrations to this article show, this is an egg-shaped structure, with welded steel sections supported inside by steel framework. It was designed by Aubrey Fowler, and is 8 ft. high and 8 tons in weight. A heavy log keeps the ball rolling on a more or less straight course.

This gigantic steel ball, known as the Hi-Ball, weighs 8 tons. Towed behind two tractors it is used for clearing scrub.

An innovation due to Mr. Fowler is that, instead of fixing the wire rope attached to the tractors to the spindle and at each side of the ball, a heavy pulley is fastened in front of the ball on a yoke that allows the ball to move freely along the rope. The advantage of this is that instead of remaining in a fixed position between the two tractors, the ball can roll towards the heavier obstructions and use its own momentum to assist in dragging down heavier trees.



How the Hi-Ball works. The illustrations to this article are reproduced by courtesy of John Fowler and Co. (Leeds) Ltd.

The trees on the estate are a mixture of white gum and mural, with scattered jarrah and red gum up to two feet in diameter. In a typical operation the "Hi-Ball" was hauled by a Fowler Challenger 3 Diesel Crawler Tractor, with another Crawler hauling along a parallel track. A third tractor proceeded out in front, pushing over the largest trees with a tree pusher attachment. Later it moved behind to pull out stumps not uprooted by the "Hi-Ball."

As can be seen from the pictures on these pages the operation showed how effective this particular method of scrub clearing is.

The Fowler Brothers are direct descendants of the original Fowlers of Leeds, the founders of the firm making the Challenger Tractor used in this demonstration. They are the biggest farmers in the Great Southern area of Western Australia, and their two properties, Congeling Park and Beaufort Downs, aggregate approximately 35,000 acres.

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.

NEW STREET LAMP IN LONDON

The accompanying photograph shows the new type of street light installed at Goose Green, Dulwich (London). It is a G.E.C. cold cathode lantern, installed experimentally by the Camberwell Borough Council when the roundabout on which it is erected was constructed upon the removal of tram lines three years ago.

This is the latest development in modern street lighting, and provides excellent colour rendering together with good architectural appearance and negligible maintenance costs.

The lantern stands 21 feet high. The globe is an opal Perspex cylinder, which will not have to be opened for three and a half years, and inside are five 67½ watt Osram cold cathode fluorescent tubes, each having a life of 15,000 hours. The tubes are operated through transformers housed in the base of the column.

Three safety devices are installed, which come into operation when the top is lifted off, when the covers of the transformers are removed, or when any electrical fault develops inside the lantern.

So far this is the only one of its type in London, but it is estimated that for a 40 ft. broad highway the lamps would have to be spaced 100 to 150 feet apart. The surface brightness by night is surprisingly low compared with the light it gives, and has a mauve appearance. The lantern itself weighs 95 lb., and has an aluminium finish.

MICHAEL F. T. FIFE (Dulwich).

A new type of street lamp at Dulwich. Within its cylindrical lantern are 5 G.E.C. cold cathode fluorescent tubes. Photograph by M. F. T. Fife, Dulwich.

AN INTERESTING MONUMENT IN SOUTH AFRICA

In the quiet city of Grahamstown, South Africa, known locally as the City of Saints, there stands in the beautiful Botanical Gardens an ancient relic of the Kaffir wars. This is the Old Provost, an old military prison built by the British Army in 1838.

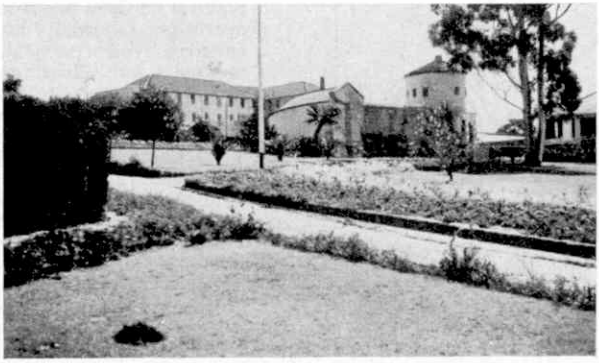
The building is one of the oldest in Grahamstown and consists of a three-storied tower, in which there are a semi-circular row of eight cells, a guard room, and a cell for solitary confinement, the whole enclosed by an immense 14-ft. wall. Inside the Old Provost there is a courtyard, at one time paved with stone and used as an exercise yard.

The cells are 8 ft. by 10 ft. with high arched ceilings and are reputed to have been shared by nine men. At one time or another several famous native chiefs were held in captivity here. The cell for solitary confinement is less than half the size of the other cells and has no window, two small slits being the sole means of ventilation.

The guard room has a fireplace and a heavily barred window. The mess room is in the tower and is circular with slit windows let into the thick walls at two foot intervals. There is a steep narrow wooden staircase leading to the room above, and there is also an immense fireplace.

The tower was used as a look-out during the wars, in conjunction with the British Army. Today it is a national monument and a quaint and interesting link with the past.

D. C. R. GUYE (Grahamstown).



The round tower towards the right in this picture, taken in Grahamstown, South Africa, is the Old Provost, which is well over a century old. Photograph by D. C. R. Guye, Grahamstown.

MECCANO MAGAZINE

Junior Section

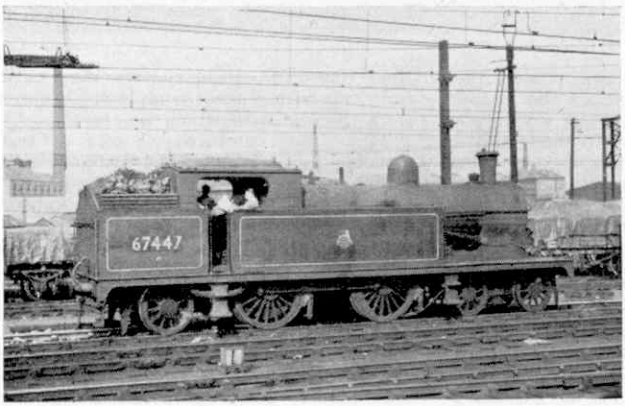
OLD AND NEW

I SEEM to be creating a register of very young boys playing with Meccano, Hornby Trains or Dinky Toys, with a girl included for good measure. Well, the boy whose portrait is seen here looks happy, and after all two-year olds are as entitled to be pleased with the world as are their elders—and probably have more justification.

Even while they are as young as David Johnson, of Workington, boys can get real enjoyment out of such a Dinky Toy as the Car Transporter, which is what David has in his box. In spite of his youth he is already a genuine collector, with a goodly array of Dinky Toys to play with. No doubt in the years to come he will develop into a Meccano and Hornby Railway stalwart and an ardent *M.M.* supporter.

I have not included the railway picture seen at the foot of the page because of the ladder that seems to reach upward from the flower-pot chimney of the locomotive to the lamp, but because it illustrates old and new on British Railways. The scene is at London Road Station, Manchester, between which and Victoria Station, Sheffield, trains are now hauled by electric locomotives. The many wires of course are those of the overhead system through which current is supplied to the motors of these engines, but the steam locomotive beneath them is one that formerly formed part of the stock of the Great Central Railway and was built in the early years of the century.

David Johnson, who lives in Workington, admires his newly-acquired Dinky Toys Car Transporter.



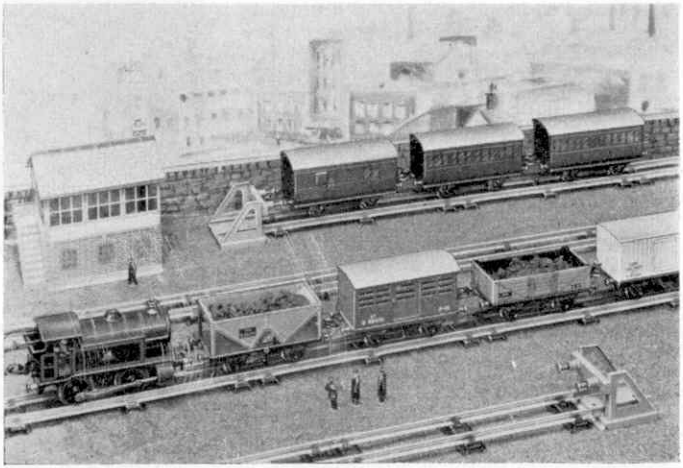
A picture that contrasts old and new on British Railways. On the tracks outside London Road Station, Manchester, stands a former Great Central locomotive, with above it the overhead wires through which current is supplied to the electric locomotives of the Manchester-Sheffield line. Photograph by Dr. G. D. Parkes, Oxford.

Mixed Traffic and Oiling

By "Tommy Dodd"

OUR talk last month finished up with a few notes on the formation of short and special trains. These seem to have interested a good many of you and I think that we might as well have a further talk on the subject. This time, however, we will deal with ordinary trains such as those you see in the illustrations in these pages.

In the first picture we have an ordinary local goods train on a Hornby layout. This is of mixed formation because it is of the type that is usually referred to as a "pick-up goods." A real train of this kind works its way along a particular route, picking up what traffic may be ready to move, and leaving either loaded wagons or empties as necessary, at each yard in turn.



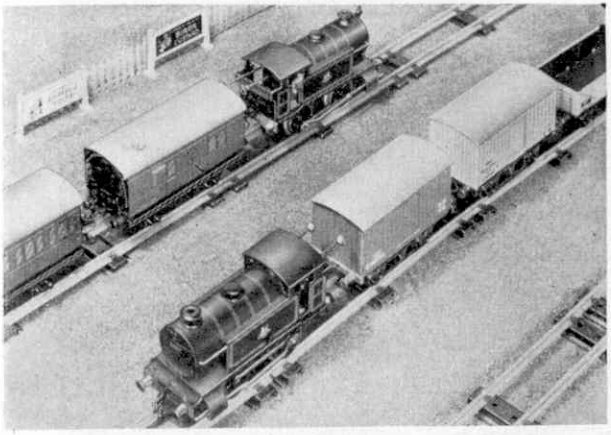
A mixed goods train makes its way down the line. No. 41 passenger stock is in the background.

This is a fine type of train to work on a Hornby railway and the small selection of wagons shown in the picture is simply an indication of the possibilities of variety. We have next to the engine a Hopper Wagon. Then come an empty Cattle Truck, an ordinary Wagon, and a Refrigerator Van. Variations on this order and selection are possible of course, as those of you who are familiar with the Hornby range of rolling stock will know very well. When working such a train we should remember the reason for which each vehicle is included in the formation. In our train in the picture the Hopper Wagon may perhaps have a load of coal for a local factory, the empty Cattle Truck may have been ordered down the line for some cattle that will be travelling later, and in the Wagon may be a load of house coal, destined for another station yard. Finally, the Refrigerator Van can be taken to carry perishables for a depot from which they will be distributed by road—by Dinky Toys of course!

On the average continuous railway, with perhaps a couple of sidings, this kind of working can be carried out almost indefinitely. Bearing in mind the recent remarks in these pages on *Shunt with Care*, we can start our train off with the vehicles in a certain order. After a series of shunts on successive calls at the sidings—each time round if necessary—we may easily finish up with a train completely different from the one with which we started.

This "fetch and carry" sort of train working forms part of the ordinary daily round of the real railway, and when reproduced in miniature it can provide a great deal of really good fun. We should enjoy our railwaying, rather than take it too seriously, and a little imagination accounting for this or that type of traffic is all to the good.

Passenger train formations, especially those concerned with local traffic need not change much, if at all. Just take a look at the passenger stock in our first



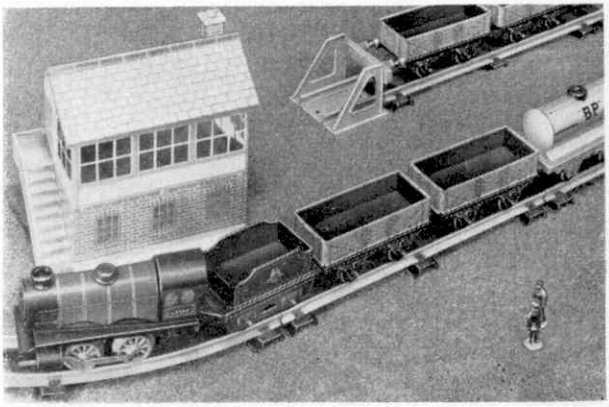
A passenger and a goods train, each in charge of a No. 40 Tank, pass one another on a Hornby layout.

and second illustrations. In the first one the empty train standing in the siding has its Passenger Brake Van at the rear end. The passenger train in the second picture has a Van next to the engine. If we can have a Van at each end of the train, so much the better, but if not then we can place it at the rear, which is where we are accustomed to find the guard's van. If this cannot be managed then there is no need to worry a lot because all Hornby Nos. 41/51 stock are fitted with lamp brackets, so that a tail lamp can be displayed on whichever vehicle happens to be at the end. As many of you will have noticed, the guard on a real train does not always travel right at the tail end.

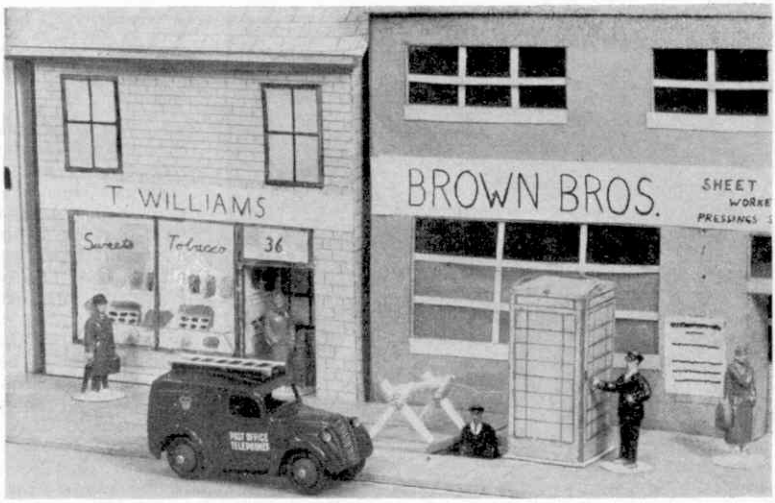
Oiling still seems to present a problem to many youthful miniature railwaymen. It is not easy perhaps to strike a happy medium in oiling, because the use of engines by individual owners varies considerably on different layouts. We must take care not to over-oil and as long as axles, gears and moving parts generally have a moist, "oily" but clean look about them the engine will run perfectly well.

One or two of you may run across a similar problem to that reported recently by one of the younger Hornby engine drivers that I know. He said that his engine had a squeak when running, although he had oiled it. Lubrication *was* in order—except in the one place from which the squeak came! That was where the piston rods pass through the cylinder covers. A tiny drop there is necessary from time to time, but do not forget that it must be a *tiny* drop. This will last quite a long while. A dry piston rod is liable to squeak, especially on a fairly new engine.

The oiling of rolling stock is not always done as carefully as it might be. A good scheme is to place the vehicle to be attended to upside down. Push the axle inward with the thumb while two fingers of the same hand keep the wheel close to the side frame. Now pop a drop of oil on the axle at the inner side of the wheel and allow the wheel and axle to regain their normal position. This should be done with each axle bearing. The oil will soon find its way along between the axle and the wheel. This way of doing the job is much more effective and less messy than that usually followed of placing oil on the axle ends outside the frames.



A neat little train of No. 20 rolling stock passes the Signal Cabin, while two miniature figures watch it go by.



DINKY NEWS

A Telephone Service Van and a New Sports Car

By **THE TOYMAN**

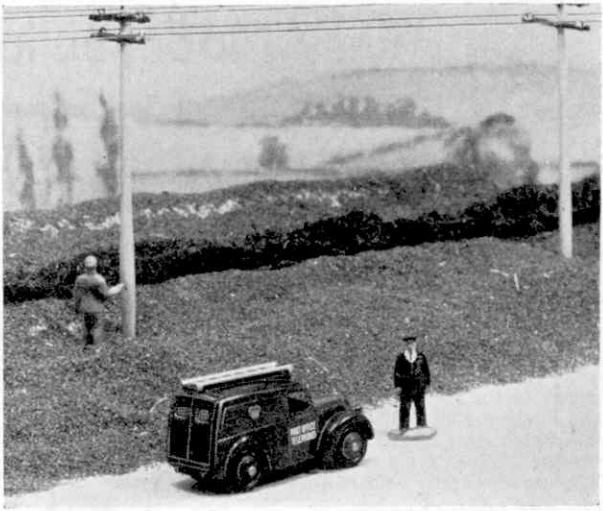
FOLLOWING the introduction of the Dinky Toys Pillar Box and the Royal Mail Van, many collectors suggested that a telephone service van would make a very fine addition. Some of them thought that the Royal Mail Van, suitably finished, could be used to represent a telephone van, but we had a better idea—to make a completely new model, faithful in every detail.

So here is the first new Dinky Toy for the month, No. 261 Telephone Service Van, a splendid miniature of the real vehicle. It is correctly finished in green and black, with the Royal Crown and appropriate lettering on each side, and of course the familiar ladder is attached to the top of the body. It looks good in my pictures. It looks even better in the reproduction in colour on the back cover of this issue. And I think all of you who have it, or at any rate have actually seen it, will agree that this little van is one of the most attractive in the range.

I wonder how many collectors have paid any attention to the provision of telephone poles, wires and kiosks in their layouts. I must admit that I had overlooked the realistic effect these can provide until the introduction of the Telephone Service Van drew my attention to details of this kind. A public telephone kiosk is an obvious choice for a Dinky Toys Town feature, and to start with I turned my attention to providing one. It proved quite easy to make from cardboard, cut to shape and glued together. The small frames and panes of glass forming the sides and door of the real thing are difficult to cut out in miniature, so in my model I simply drew these details on the cardboard and then painted the kiosk in suitable colours, but if you have the necessary skill and patience you could use cellophane.

Installing a telephone kiosk in a Dinky Toys town. The Dinky Toys Telephone Service Van, No. 261, is prominent in the scene.

Nowadays the tendency in built-up areas is to lay telephone cables underground, and this scheme is very convenient in miniature where overhead wires may make it difficult to control and "operate" traffic in a model town. In my scene one of the linesmen is shown working in a hole in the ground alongside the kiosk, while his companion is just entering the kiosk to complete the wiring inside.



Linesmen at work. The Dinky Toys Telephone Service Van in a typical country layout.

Their Van is parked by the pavement.

Incidentally there is no need to cut away your baseboard to make a hole in the ground, as shown in my picture! For this scene I raised the level of the pavement and road about an inch by placing wood blocks over the ordinary baseboard. The blocks were arranged to leave a small gap next to the kiosk, and a sheet of paper was then laid on the blocks with a hole in the paper exactly over the gap. A simple barrier made from matchsticks completed the scene.

Imaginary underground cables are ideal for Dinky Toys towns—and are no trouble to make! But poles and overhead wires look very effective along country roads. A suitable building on the outskirts of the town can represent a telephone exchange, with the wires leading to it.

The picture at the top of this page shows linesmen on maintenance work on the overhead wires of a country road. The telephone poles are simply the handles of old paint brushes fixed in Meccano Bush Wheels screwed to the baseboard. I glued matchsticks in notches cut in the poles to represent the cross arms, and small pieces of paper glued to the matches made effective insulators.

To complete the effect I passed lengths of strong cotton through pin holes in the paper insulators. Threading and fastening the cotton is quite a tricky job, but the result is well worth the time it takes. In actual practice the poles leading to a busy town have so many cross arms that the result is rather like a Christmas tree, but I found that two arms were quite sufficient in miniature, besides making the wiring process very much easier.

Now for some details of the second exciting new model this month, the Aston Martin DB3 Sports, Dinky Toys No. 110, which is shown at the foot of this page and in colour on the back cover. This is a splendid model of one of the most successful competition cars produced by the famous Aston Martin firm. It has to its credit a really formidable list of racing successes throughout the past season. The new Dinky Toy is beautifully modelled and gives a vivid impression of the power and speed of the real car. The Aston Martin DB3 Sports can be obtained in two distinctive colour schemes, grey with blue seats and wheels, and green with red seats and wheels. In both cases the driver wears white racing kit.

Sports car and racing car enthusiasts will welcome the addition of this fine Aston Martin DB3 Sports, No. 110, to the Dinky Toys series.

Easy Model-Building

Spanner's Special Section for Juniors

I HAVE two new models for you this month. One is the fine Jeep seen in Figs. 1 and 2, which can be built from the parts in Outfit No. 1. The other is the Cabin Monoplane shown in Fig. 3, built from parts in Outfit No. 2.

You should start building the Jeep with the main frame or chassis, which consists simply of a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate. Make the sides and top of the bonnet by bending a $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate to the shape shown in the pictures, and then bolt it to the Flanged Plate. Use the same bolts to fix in place two $2\frac{1}{2}''$ Strips 1. A $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip is next bolted between the upper ends of these Strips to represent the windscreen frame. Then bolt a Flat Trunnion on top of the Flexible Plate forming the top of the bonnet, using a $\frac{3}{8}''$ Bolt fitted with two Washers to attach the Plate at the front.

Now fix a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 2 between the sides of the bonnet, and attach a $2\frac{1}{2}''$ Strip 3 to a Fishplate bolted to the Double Angle Strip. Two further Fishplates fixed to the Double Angle Strip are used to complete the front of the radiator. The headlamps are represented by Washers placed on bolts fixed in the end holes of Strip 3. This construction is clearly shown in Fig. 1.

The next step is to make the sides and back of the body. For these you need a $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate bent as shown in Fig. 2, and bolted to the Flanged Plate. Fix a Flat Trunnion to the back and use the same bolt to support an Angle Bracket. Now fix a $2\frac{1}{2}''$ Strip 4 to the Angle Bracket to make the rear seat. For the front seats you require two Trunnions bolted together as shown. Attach these to a $\frac{1}{2}''$ Reversed Angle Bracket 5 bolted to the Flanged Plate. Take two $5\frac{1}{2}''$ Strips, and arrange these one on each side between the Flexible Plates, as shown at 6 in the pictures.

Now you can fit the wheels. These are 1" Pulleys fitted with Motor Tyres, and they are fixed by their set-screws on $3\frac{1}{2}''$ Rods passed through the appropriate holes in the flanges of the Flanged Plate forming the main frame of the Jeep. Make the mudguards from $5\frac{1}{2}''$ Strips arranged as shown and attached to Angle Brackets bolted to the Flanged Plate. You can represent the spare wheel by two Rubber Rings tied together and attached by Cord to the back of the body. Then fit an Angle Bracket at the back by means of a $\frac{3}{8}''$ Bolt, and you have completed a simple but delightfully realistic miniature of this well known vehicle.

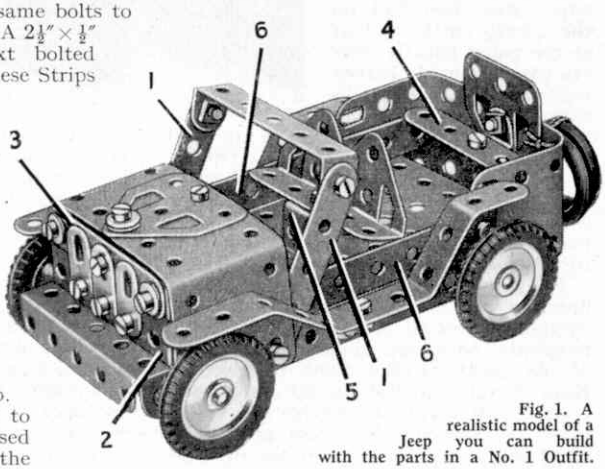


Fig. 1. A realistic model of a Jeep you can build with the parts in a No. 1 Outfit.

You will require the following parts to build the model Jeep: 4 of No. 2; 4 of No. 5; 3 of No. 10; 4 of No. 12; 2 of No. 16; 4 of No. 22; 28 of No. 37a; 24 of No. 37b; 4 of No. 38; 1 of No. 40; 2 of No. 48a; 1 of No. 52; 4 of No. 111c; 1 of No. 125; 2 of No. 126; 2 of No. 126a; 4 of No. 142c; 2 of No. 155; 2 of No. 189.

Cabin Monoplane

You should start building this model by assembling the two strips 1 that form the main side members of the body or fuselage. Each of these is a $5\frac{1}{2}''$ Strip, and to them are bolted a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip at the front and a $2\frac{1}{2}''$ Strip at the rear. The $2\frac{1}{2}''$ and the $5\frac{1}{2}''$ Strip are overlapped two holes.

The next step is to assemble the nose, and for this you will need a 1 11/16" radius Curved Plate 2. Bolt this Curved Plate to the front ends of strips 1, using two of the bolts to support Angle Brackets. Now fix a Bush Wheel 3 to these Angle Brackets, and fix a 2" Rod in the Bush Wheel. The propeller is a 2½" Strip placed on the Rod and held on it by a Cord Anchoring Spring.

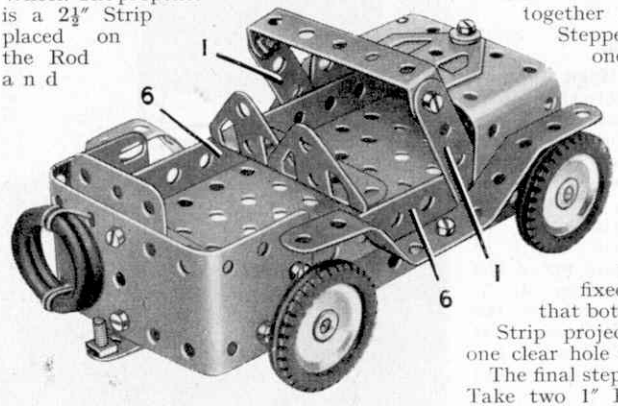


Fig. 2. This rear view of the Jeep shows the arrangement of the spare tyres and the towing hook.

For the rear section of the fuselage you will require a U-section Curved Plate 4 and a 1 11/16" radius Curved Plate 5. Bend the Plate 5 to U-shape and bolt the two Plates together as shown. Now fix the rear end of Plate 4 to the strips 1, and support the front end of Plate 5 by Fishplates 6. Bolt a 2½" Strip 7 and a Rod and Strip Connector to the Plate 5, and connect Strip 7 to a ½" Reversed Angle Bracket fixed to the nose Plate 2.

To make the tail unit take a ⅜" Bolt and pass it through the end hole of one of the strips 1. Next place on the Bolt an Angle Bracket, a Washer, two Fishplates, a Washer and another Angle Bracket. Pass the Bolt through the second strip 1 and hold the parts tightly in place by a nut, taking care that one Fishplate points upward, while the other hangs down to form the tail skid 8. The next job is to bolt a 2½" × 1½" Flexible Plate to each Angle Bracket as shown, with a 2½" Strip 9 fixed to the front edge of each Flexible Plate. The tail fin and rudder are made with two Flat Trunnions bolted together as shown, with two 2½" Stepped Curved Strips fixed to one of them. Then bolt these parts tightly to the upright Fishplate mentioned previously.

For each wing you need a 5½" × 1½" Flexible Plate and a 5½" Strip. Bolt these together at their outer ends and then attach them to Angle Brackets fixed to the strips 1. Take care that both the Flexible Plate and the Strip project inside the fuselage by one clear hole each.

The final step is to fit the landing wheels. Take two 1" Pulleys and fit them with Rubber Rings. Now fix each Pulley on a ⅜" Bolt passed through the hole at the pointed end of a Trunnion, and bolt the Trunnions to the wings.

If you carry out this job correctly you will find that the wheels are held in place quite firmly, but the Pulleys and their Bolts will be able to turn freely in the holes in the Trunnions.

Parts required to build the Cabin Monoplane: 4 of No. 2; 6 of No. 5; 4 of No. 10; 8 of No. 12; 1 of No. 17; 2 of No 22; 1 of No. 24; 34 of No. 37a; 33 of No. 37b; 7 of No. 38; 2 of No. 48a; 2 of No. 90a; 3 of No. 111c; 1 of No. 125; 2 of No. 126; 2 of No. 126a; 2 of No. 155; 1 of No. 176; 2 of No. 188; 2 of No. 189; 1 of No. 199; 2 of No. 200; 1 of No. 212.

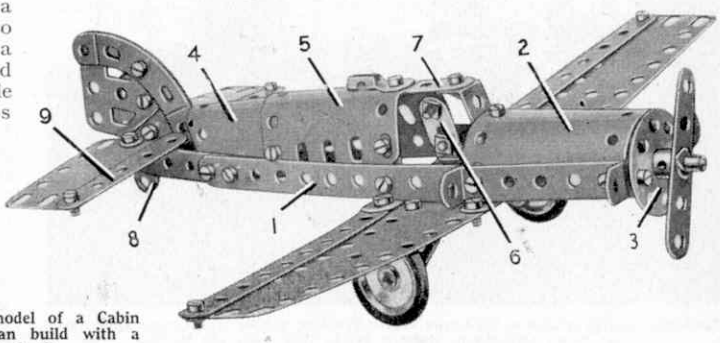


Fig. 3. A fine model of a Cabin Monoplane you can build with a a No. 2 Outfit.

Of General Interest

Really Magical

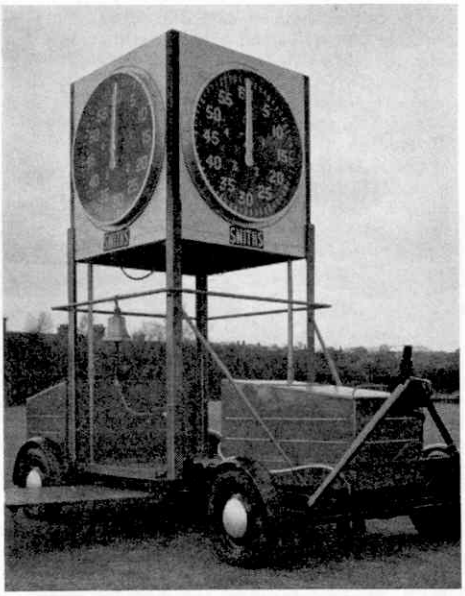
Here is a marvellous Magic Square, sent in by J. B. Reade, Wolverhampton. It is built up from the numbers 1 to 16, and all rows, columns and diagonals add up to 34. Even discontinuous "diagonals" give this total. A typical "diagonal" of this kind is made up of the numbers 4, 7, 13 and 10, the rule being that when the diagonal disappears over one edge it reappears on the opposite edge.

1	15	4	14
12	6	9	7
13	3	16	2
8	10	5	11

As if that were not enough, the numbers in the four corners of the Magic Square also add up to 34, and so do the numbers in the corners of every square with sides of two or three numbers that can be carved out of the figure.

Timing Show Jumping

Now that television has helped to make show jumping more popular than ever, the equipment seen in the upper picture on this page will perhaps be of special interest. Many of you will have seen its large dials before, either when present at show jumping competitions or when watching events of this kind on their television screens.



Smith's Automatic Timing Equipment measures instantly and accurately the time taken by competitors in show jumping to complete the course. Photograph reproduced by courtesy of Smith's English Clocks Ltd.

The timing equipment has been specially designed to provide strictly accurate time control for organisers of jumping competitions at horse shows. When a course over the jumps is to be timed, each competitor begins by interrupting an invisible infra-red ray across the starting gate, the effect of which is to start two very accurate watches, which stop automatically at the end of the course.

The woodworking section at the Crewe Works Training School, where trade apprentices are given preliminary training before they enter the Works.

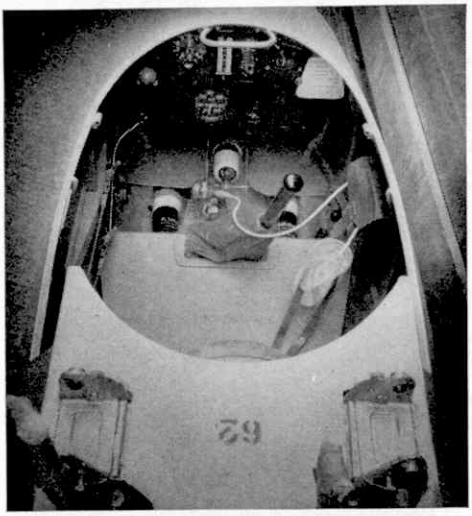
Cross-Country by Glider

By P. G. Francis

IT was a fine sunny morning as we rigged our Olympia, and as we bolted the wings on to the fuselage we cast an anxious eye up at the weather. The sky was quite cloudless, but we knew we probably would not have to wait long for conditions to boil up a bit.

Perhaps you have noticed how clouds build up during the day in summer and fade away again towards evening. This is because moist air heated by the earth "boils" just like water, and as each current of hot air rises moisture condenses and forms the fluffy little cumulus clouds typical of a summer afternoon. It is this rising air that the glider pilot wants, and it is surprising how much power there is in it. Lift of more than twenty feet a second is not uncommon, and this will carry a glider up as fast as a Spitfire could climb.

Thunder clouds contain such violent currents of air rushing up and down that few pilots are willing to go into them. Those who do are in something that can carry them up to 20,000 feet or more! On the other hand it may break up the sailplane and send the unhappy pilot back, down through freezing cloud at the end of a parachute line.



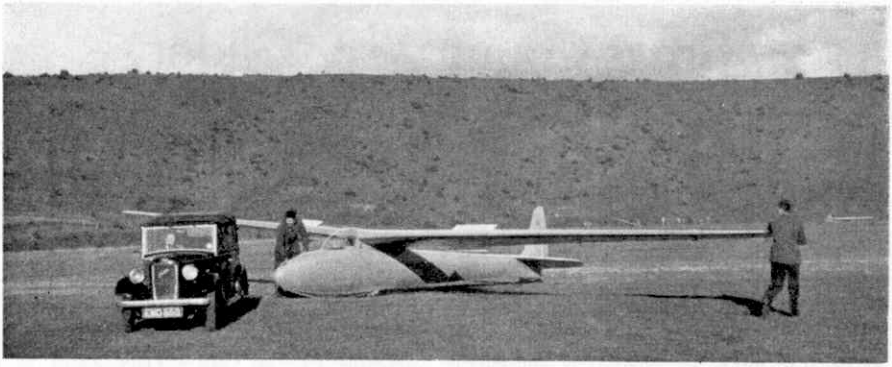
In the cockpit of the Olympia Eon glider, in which the flight described in the accompanying article was made. Photograph by courtesy of Elliotts of Newbury.

After rigging the Olympia I walked out to the launching point, where the instructor was doing straight-forward circuits with beginners in the two seater. A cable is attached to the nose of the plane and is wound in by a winch at the other end of the field, so that the glider goes up like a kite. When he is directly above the winch at about 800 feet he casts off the cable and glides back again. Such flights last about four minutes, but while the instructor is up there he can get the feel of the air and after one circuit he said to me, "I'd get away now if I were you. It's pretty active already."

The chances of picking up thermals, as the rising currents of warm air are called, are not too good from a winch launch, so I discussed the possibility of an aerotow by the club's Tiger Moth to a height of say, 1,500 feet, where they would be stronger. But there was no one to spare on the Tiger just then, so I decided to try my luck.

After putting on the parachute I strapped myself in and studied the map. I had already done my best the night before to memorise all the landmarks on the course. This is necessary, because one spends most of the flight turning circles with little time to look at maps. I had planned a cross-country flight of about 80 miles, which with luck should take no more than three hours. So praying that I might reach my goal I gave the signal to wind in the cable.

In the distance one can always hear the winch engine revving up and quite suddenly the sailplane rumbles a few feet. Then the shaking and bumping changes into smooth flight. The initial climb is steep, but it flattens out towards the top of the launch, when the cable is released. It is a practice of mine to do a few turns immediately after releasing the cable, because sometimes the heat of the winch engine will set off a thermal. This time, however, I was out of luck,



Glider ready for launching—not by the car!

so I turned and headed upwind towards a bare chalk field that looked promising. All this time I kept one eye on the variometer, a very sensitive instrument that tells me whether I am climbing or not. It can measure a climb of as little as six inches a second.

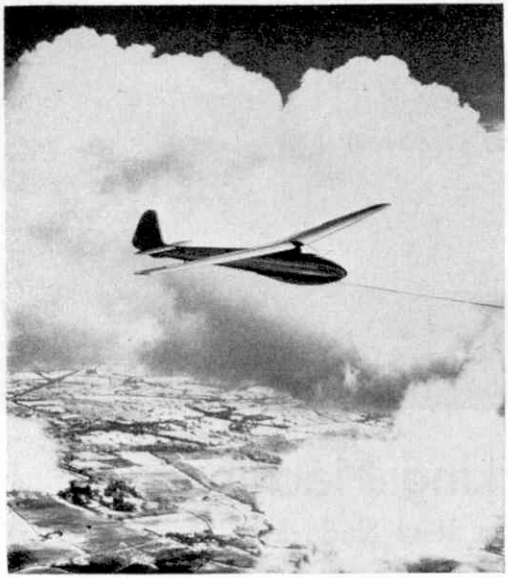
Quite suddenly I felt a gentle bump under the port wing. This meant uplift. I turned towards it quickly and was gratified to see the little green ball in the vario tube climb to two feet a second; but the lift was very elusive and occasionally I got into the downdraught that always surrounds a thermal. At 1,500 feet the lift faded out or I lost it—probably I lost it—so I had to turn round and make for the chalk field again. This time, however, I hit stronger lift and managed to work it up to 2,000 feet, but again lost it.

After more searching I saw a cloud slightly up wind that appeared to be still forming, which meant that a thermal should still be winding up into it. I flew towards it and hit a steep downdraught, but at any rate that showed there must be a thermal near. I flew through this as fast as possible and hit the lift with a bump at the other side. I managed to circle in this to 3,000 feet, but by then the cloud was beginning to decay and the lift gave out. However, 3,000 feet is enough to go away on. So, setting the Olympia on a compass course, I poked out into the unknown.

Even though I was flying at a ground speed of about 60 m.p.h., the plane seemed to be almost stationary in comparison with the ground below. I flew straight on course for about ten minutes, with no sign of any more thermals and a loss of about a thousand feet of height. Anxious not to waste time I kept on course hoping to hit something on the way, but by the time I was down to 1,000 feet I abandoned that idea and made for a group of farm buildings over on my right. As these are hotter than the surrounding country they are a likely source of thermals. I noted also that there were some good fields round about in case I was forced to land.

The first thing I got over the farm

Grace in the air. Photograph by Chas. E. Brown, "Aeronautics."



A glider can be released at a greater height when towed by an aeroplane than from a winch launch, and so given a better chance of picking up rising currents. Photograph by Chas. E. Brown, "Aeronautics."

was a smell of manure in the cockpit. The air was rising anyway! A moment later the wings gave a playful tweak and I heaved a sigh of relief as we began to climb. As we climbed higher the speed of the thermal increased, and by the time we reached 4,500 feet we were going up at twenty feet a second straight into cloud. Switching on the turn and bank Indicator I settled down to some blind flying in the twilight of cloud.

Instrument flying is an art, especially when the air is rough inside cloud. After a few moments you cannot tell whether you are flying round in circles or straight ahead, and you have to rely entirely on the instruments, even though half the time you are convinced that they are all wrong because your senses tell you something quite different. Eventually the lift gave out and I emerged into blinding daylight at about 5,500 feet feeling a bit sick.

The ground looks very different from this height, and it was some time before I was able to work out my position. Although towns are easily seen they are apt to look alike, and it is easier to use road junctions and rivers as landmarks. These are always strongly marked on aero maps, as are lakes and reservoirs. I found I had drifted quite a bit, probably because the wind at that height was blowing from a slightly different direction, and had to correct my compass course.

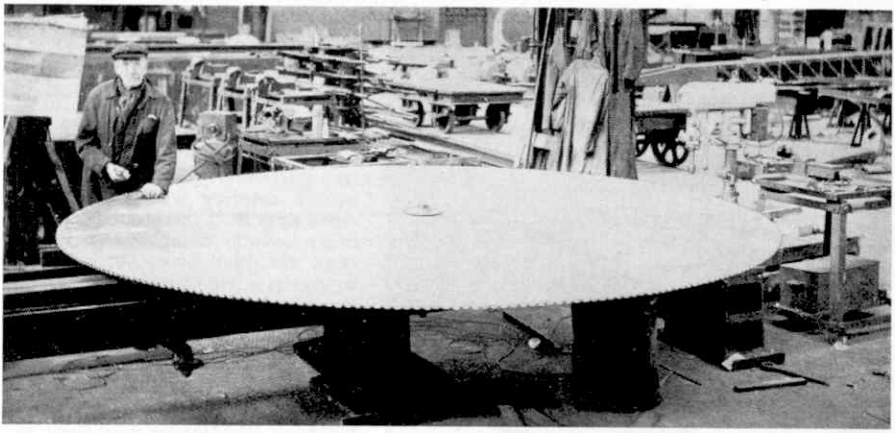
After flying for some time on course, ignoring any lift, I came to a particularly flat and damp part of the country with not a single cloud over it. I remembered hearing other pilots complaining of the dead air just here, so I decided to give it a wide berth. Fortunately there was a cloud street to the north. A cloud street is a long roll of clouds, where it is possible to cruise all along their length and keep in lift. This time I managed to cruise under them at 80 m.p.h. and lose no height at all. Having used these as a stepping stone, as it were, I now put the Olympia back on course.

The purpose of the flight was now more or less over. Although I could not yet see it, I knew the airport I was aiming for was now about fifteen miles away, and beyond that I could see the silver gleam of the sea shining through the haze. One cannot fly much further than the east coast without getting one's feet wet. The English Channel has been crossed by gliders, but not the North Sea!

On this particular flight there was not even the anxiety of not knowing whether I was going to make it or not, a frustration in which many good flights end. I had plenty of height to spare and after putting the air speed up to 60 m.p.h. arrived over the airport at a thousand feet.

A glider is not normally equipped with radio, so it is essential to keep one's eyes open for other aircraft when landing in places like this. Gliders of course can come down in any small sized, even fairly rough field, and more often than not they have to; but one tries to land as near civilisation as possible, which is why aerodromes are popular. Finally I decided the approach was clear and put the Olympia into a dive, pulling out the airbrakes so as to lose height more quickly. Unlike powered planes, which are stalled on to the ground, gliders are flown straight in till they sink down of their own accord. With the help of the airbrakes this is only a few yards and I came to rest just outside the flying control tower.

(Continued on page 170)



Stone Working Machinery

The Largest Circular Steel Blade Ever Made

THE enormous circular saw shown in the picture at the head of this page is believed to be the largest circular blade ever manufactured. It measures 11 ft. 7½ in. in diameter, and a walk round its circumference would cover more than 36 ft. It was made by the Anderson-Grice Company Ltd., Carnoustie, as part of a stone-sawing machine built for the South Western Stone Company Ltd., Portland.

The saw was specially rolled at the works of Colville Ltd., Motherwell. A piece of steel this size is not easy to move about, so after it reached Carnoustie, a team of expert sawsmiths was brought from Spier and Jackson Ltd., Sheffield, to flatten the plate before it was machined at the Taymouth Engineering Works. The team returned at a later stage to tension the blade before it was put into service.

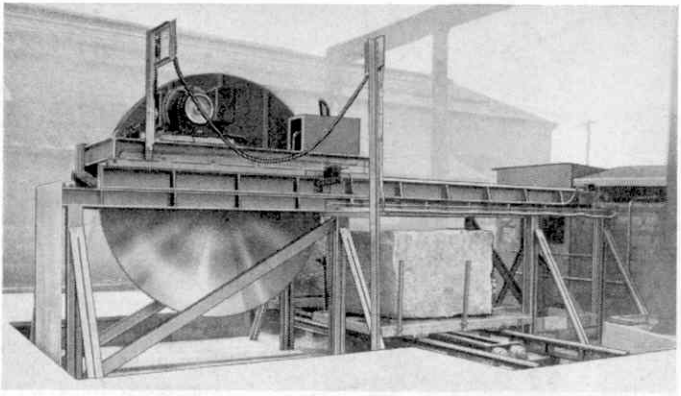
The giant circular saw seen in the illustration at the head of the page is believed to be the largest circular steel blade ever made. It is a little more than 11½ ft. in diameter and over 36 ft. round, and it forms part of the large stone sawing machine described in this article. Our illustrations are reproduced by courtesy of the Anderson-Grice Co. Ltd., Carnoustie.

The cutting of stone by this giant circular saw is actually carried out by diamonds! Round the edge of the saw blade 300 steel teeth are inserted. Each working tooth carries a diamond weighing seven eighths of a carat, and a few special teeth carry many small diamonds, the purpose of which is to give a smoother finish to the sawn face of the stone than is given by the larger cutting diamonds.

The machine in which this giant circular saw is used is seen in the upper picture on the opposite page, in which the blade itself can readily be seen. On the right is a block of stone on one of the twin tables of the machine. Each of these tables is capable of carrying a block 12 ft. long, 5 ft. deep and 6 ft. wide, weighing up to 25 tons. As the blade rotates the tables move in under it from either side in turn, so that when the block on one of them has been sawn it is immediately withdrawn, on which the other table with its stone block moves into place.

One table is loaded while the other is passing under the saw, and the result of this arrangement is that the machine can be kept at work almost continuously. It is used for sawing long slices or slabs of stone off the huge blocks brought to the machine from the Portland quarries. The slabs are then processed further by stone working machines of more normal size, to give blocks of the kind required for building purposes.

The elevated gantry on which the saw carriage is mounted is 40 ft. long. The carriage runs on rails bolted to the top of the gantry, and carries a 45 h.p. electric



The stone sawing machine in which the giant blade is mounted. Each of its two tables is designed to carry blocks of stone weighing up to 25 tons.

motor, which drives the saw spindle. In normal working the blade makes 287 revolutions a minute. so that the speed of its cutting edge is 10,500 ft. a minute. The rate at which it is fed into the stone through which it is sawing is automatically varied to suit the character of the stone. A 10 h.p. motor drives the saw carriage through reduction gearing, and the feed can be varied from $3\frac{1}{4}$ in. to $16\frac{1}{4}$ in. a minute.

The machine operator who controls this giant machine is seated, with all his controls within easy reach, in a control cabin at one end of the gantry, in which all the electrical and mechanical controls are housed. He can cut repeated slices from a 25-ton block of stone to an accuracy of a sixteenth of an inch. There are many safety interlocks, to make sure that in spite of high speed working no wrong moves can be made.

Stone working has advanced far from the days when shaping was carried out by masons using chisels and hammers. Nowadays the use of machines has become more common, and indeed is necessary in view of the shortage of skilled masons and present-day higher costs of all kinds.

An example of a very fine and efficient stone machine is one now at work in the yard where stones are prepared for the building of Liverpool Cathedral, which is still in progress. This machine, like the stone sawing machine also illustrated on these pages, was made by the Anderson-Grice Company Ltd., Carnoustie, and it works in the same way as a metal planing machine, using similar tools. The stone to be shaped is mounted on a carriage that slides it forward under a cutting tool carried on a cutting head. The cutting tool is tipped with tungsten carbide, and by varying its position and angle it can be used for shaping curved surfaces as readily as it planes a flat surface of a block of stone. The lower illustration on this page shows the machine at work on a special block of this kind required in the building of the Cathedral. The kind of work it can do is well shown by the complex shape of the stone.

Few stone planing machines of this kind have as yet been built, and the one at the Liverpool Cathedral site is expected to be at work there for 15 years or so. It is 12 ft. long and 5 ft. 6 in. wide. When it has completed the shaping of a block of stone, the surfaces are worked over by masons to give them a hand-finished look. The machine itself apparently produces a surface that is too smooth.

A planing machine that is used for shaping large stone blocks for Liverpool Cathedral.

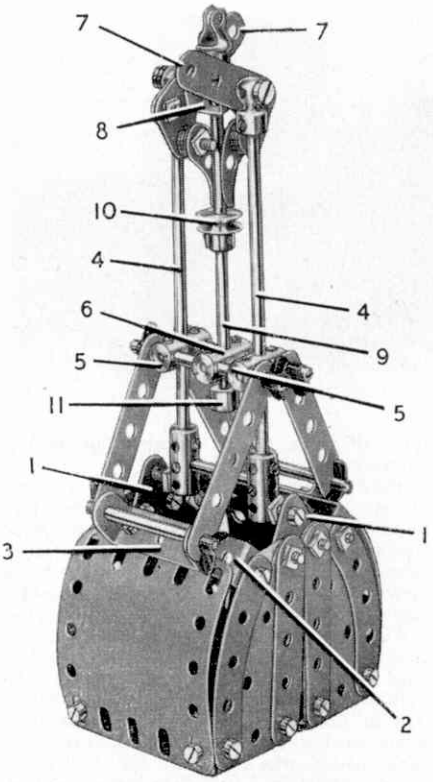


Fig. 1. Model-builders who are interested in cranes will find this single-suspension grab simple to build and to operate. It is designed by Mr. D. W. Thomasson, Bristol.

Single-Suspension Grab

The grab illustrated in Figs. 1 and 2 is of the single-suspension type, and is based on a design submitted by Mr. D. W. Thomasson, Bristol. The grabbing mechanism is very efficient, and an important feature is that the trip device that operates the grab is remarkably easy to adjust.

The grab jaws are made by bolting $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Triangular Flexible Plates to the flanges of $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plates, the Triangular Flexible Plates being strengthened by $2\frac{1}{2}''$ Strips and $2\frac{1}{2}''$ Curved Strips joined at their upper ends by Fishplates. A 1" Triangular Plate 1 is lock-nutted to the jaws on each side, and a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 2 is bolted between the upper ends of the Curved Strips. A $1\frac{11}{16}''$ radius Curved Plate is

Among the Model-Builders

By "Spanner"

clamped between this Double Angle Strip and a $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 3, and the lower corners of the Curved Plate are connected to the Flanged Plate by Angle Brackets.

A Coupling is fixed by a nut on a $\frac{3}{4}''$ Bolt passed through each of the Triangular Plates 1, and the two Couplings are connected by a 2" Rod. Each Coupling supports a $4\frac{1}{2}''$ Rod 4, on which a Coupling 5 is free to slide. The Couplings 5 are connected by two $2\frac{1}{2}''$ Rods, which carry a further Coupling 6 placed centrally on the Rods. Four $2\frac{1}{2}''$ Strips are passed over the ends of the $2\frac{1}{2}''$ Rods and over 2" Rods supported in the Double Angle Strips 3, and are held on the Rods by Spring Clips.

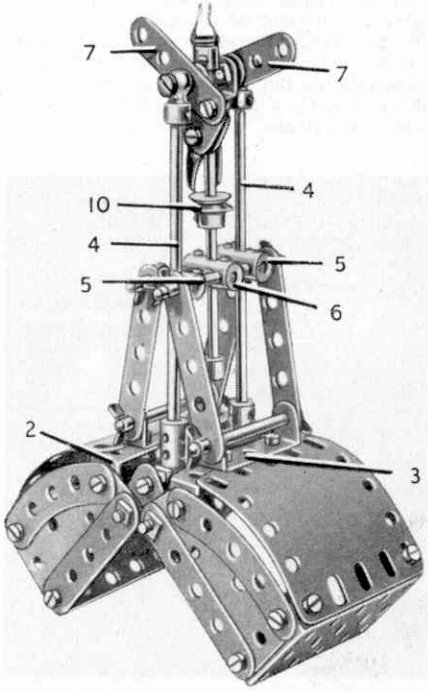


Fig. 2. Another view of the single-suspension grab showing the jaws open ready to pick up their load.

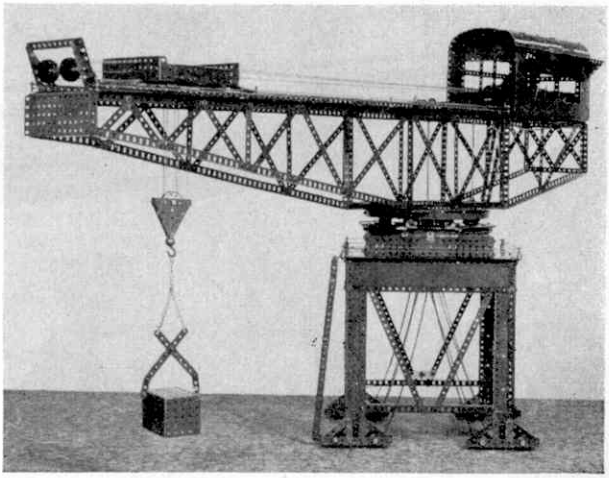


Fig. 3. This fine model of a giant block-setting crane was built by Mr. C. E. Saunders, Christchurch, New Zealand. Mr. Saunders is Leader of the Christchurch Meccano Club.

Each of the Rods 4 carries at its upper end a Handrail Coupling in which a Pivot Bolt is free to turn. A 2" Strip 7 is placed on the Pivot Bolt, together with a 1" Corner Bracket that is bolted to one end of the Strip. The Pivot Bolt is then fixed by its nuts in a Double Bracket 8. A Pawl without boss is attached to each Corner Bracket by a ½" Bolt, but is spaced from it by five Washers.

A 4½" Rod 9 is passed through the Double Bracket 8 and a ½" Pulley 10 is fixed on the Rod. The Rod is then passed through the Coupling 6 and a Collar 11 is fixed on its lower end. An End Bearing placed at the upper end of Rod 9 serves to attach the grab to the crane hook.

In addition to the grab a suspender or trigger ring is required. This can take any convenient form, such as a Cylinder or a ring of Curved Strips, and it should be suspended from the crane jib at the height at which it is required to discharge the grab. The hoisting Cord should pass freely through the centre of the ring, which should be weighted sufficiently to depress the Strips 7 of the grab when these engage the ring as the grab is raised.

The sequence of operations is as follows. Assuming the grab to be on the ground with the jaws open (Fig. 2), when the hoisting Cord is raised Pulley 10 engages the Pawls, which lift the Rods 4 and thus close the jaws. The grab can now be lifted until the Strips 7 engage the suspender ring, and as the Strips are depressed they move the Pawls clear of Pulley 10. The Rods 4 are then released and the jaws open to discharge the contents of the grab.

A Fine Block-Setting Crane

The model of a giant block-setting crane shown in Fig. 3 on this page was built by Mr. C. E. Saunders, Leader of the Christchurch, New Zealand, Meccano Club, and has won a prize in a Club Competition. The boom of the model is 4 ft. 6 in. in length and the crane has an overall height of 2 ft 9 in. The crane travels majestically along the ground at a speed of 3 in. per minute, while the boom makes a complete revolution in 55 seconds. The crane is capable of lifting heavy loads and is operated by an E20R Electric Motor. The model is a fine example of this type of model-building and reflects great credit on its constructor.

A Gearless Rear Axle Drive

The simple rear axle unit for model vehicles seen in Fig. 4 is based on a design sent to me by Mr. R. M. Minshull, Macclesfield, Cheshire. The device is intended for use in models when sufficient gears are not available to assemble the usual type of differential mechanism. Mr. Minshull's mechanism introduces a

(Continued on page 170)

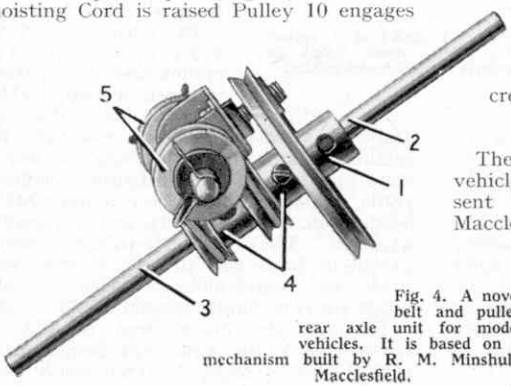
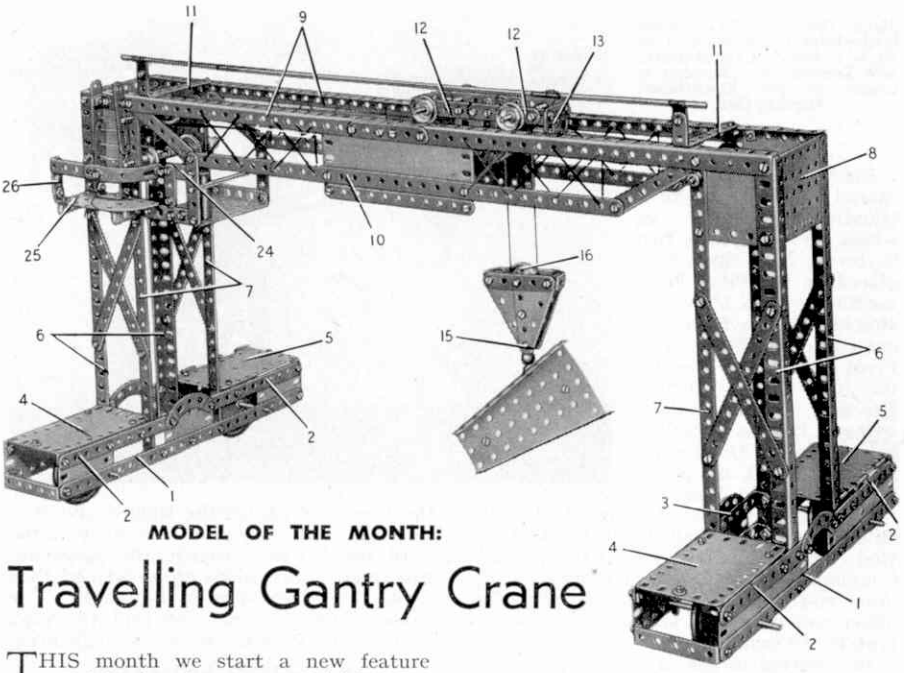


Fig. 4. A novel belt and pulley rear axle unit for model vehicles. It is based on a mechanism built by R. M. Minshull, Macclesfield.



MODEL OF THE MONTH:

Travelling Gantry Crane

THIS month we start a new feature specially for the owners of fairly large Outfits, and for model-builders generally who have good stocks of parts at their disposal. In this we shall select each month an interesting subject and build a Meccano model of it in the usual way. Detailed illustrations, from photographs of the model, will be given, with a general explanation of the original, that is the actual vehicle, machine or structure on which it is based, and of its working. Full model-building instructions also will be prepared and Meccano enthusiasts who wish to build the model can obtain these and a list of parts required free of charge by writing to the Editor.

In the past the main problem in connection with describing models of the larger type in the *M.M.* has been to make the illustrations sufficiently large and clear to enable model-builders to pick out the details, and at the same time to include all the instructions necessary to build the model without difficulty. With the new arrangement it will be possible to make the pictures larger, and where necessary or advisable, to use more of them.

Some of the models included in the series may be designed for construction with a particular Outfit, while others will be non-Outfit models intended for model-builders who have large collections of parts.

The first model to be featured under the new arrangement is a fine Travelling Gantry Crane, a general view of which is reproduced as Fig. 1. This model is designed for construction with the parts included in Outfit No. 7, and it is particularly interesting to build and to operate.

Fig. 1 (Above). A model of a typical tower Gantry Crane, which forms an excellent subject for the model-builder.

In actual practice travelling gantry cranes have widespread uses and are applicable to many kinds of work. They are most valuable, however, in conditions such as those found in sheet metal stock yards, warehouses, coaling yards, foundries, etc. They require little head room, work speedily and are easily handled. They are frequently seen travelling from end to end of the long sheds and warehouses in large railway goods yards or lining quaysides and docks.

The Meccano model seen in Fig. 1 shows clearly the structural design of a typical gantry crane. Strongly-built end

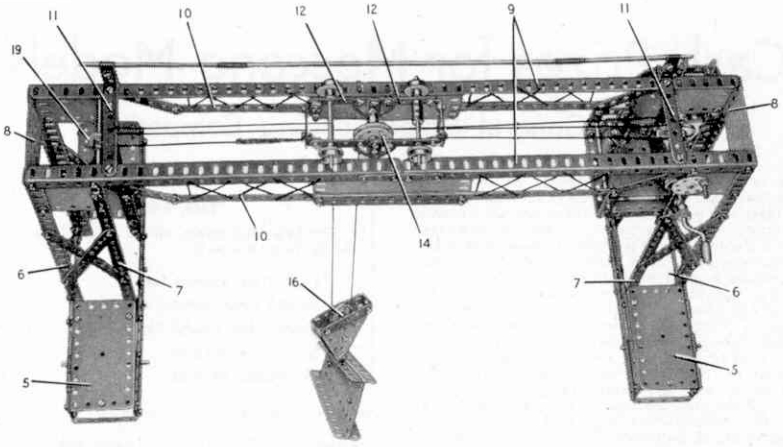


Fig. 2. A view of the top of the gantry.

towers support a large compound moving girder on which the hoisting trolley or traveller is mounted. In practice this type of crane usually is powered by electric motors. The Meccano model is hand-operated, but it can be made to carry out all the essential movements of a real gantry crane. On fairly small cranes the driving cabin may be located in one of the towers, but in larger and more powerful types the driver has a special cabin situated on or beneath the gantry trolley. The latter position enables the driver to see all that is taking place on the site over which the crane is working, an advantage that is very important when handling a heavy load. In the model the driver's cabin is placed at the top of one of the towers, as this is more convenient for working a hand-operated model.

A travelling gantry crane of the kind represented by the model is fitted with wheels that run on rails. There are other types, however, differing in constructional details. For example, in a crane used in a long narrow building it may be advantageous to dispense with the end towers and the ground rails, thus saving valuable space. To do this the gantry is mounted on rails attached to and arranged parallel with the long walls of the building and placed near the roof. This type of gantry crane is used extensively in steel works and other buildings, but tower supports are usually necessary in the open.

For constructional purposes the model can be divided into three convenient sections, consisting of the two end towers and the main girder or gantry. The towers are similar in general design and each is provided with a wheeled base so that the completed model can be moved over the load to be lifted. The next step is to assemble the trolley and the stout girder that forms the gantry. The girder can then be bolted to the upper ends of the towers. The final steps in the assembly of the model are to mount the winding handles and mechanism in one of the towers, and arrange the operating Cords.

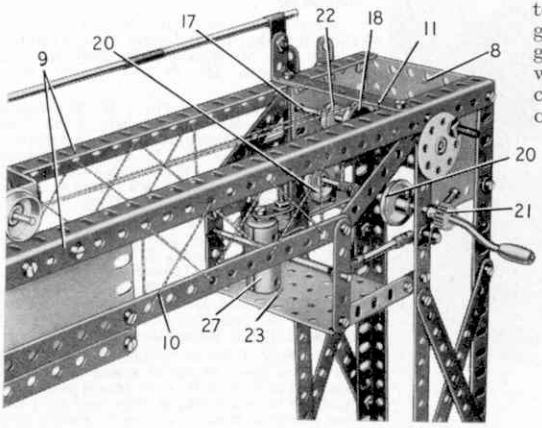


Fig. 3. The hoist and traveller operating mechanism.

Cash Prizes for Meccano Models

A New General Model-Building Competition

HERE is another fine opportunity to turn your Meccano model-building to good account and win a cash prize for your efforts. There are no tiresome rules to study or entrance forms to complete, and every owner of a Meccano Outfit is eligible to send in an entry.

All you have to do is to build a model of your own design, obtain a good photograph or prepare a clear sketch of it, and then send the drawing or print to us. Models of any size and any kind are suitable for this competition. There are no restrictions on the size of the Outfit or the number of parts you can use, and you can base your model on any subject you like.

There are two Sections in the Contest: Section A, for model-builders who are under 14 years of age on 31st May, 1956, and Section B, for competitors who will be 14 or over on 31st May, 1956. Details of the fine Cash Prizes to be awarded to the winners in each Section are given in the panel at the top of this page.

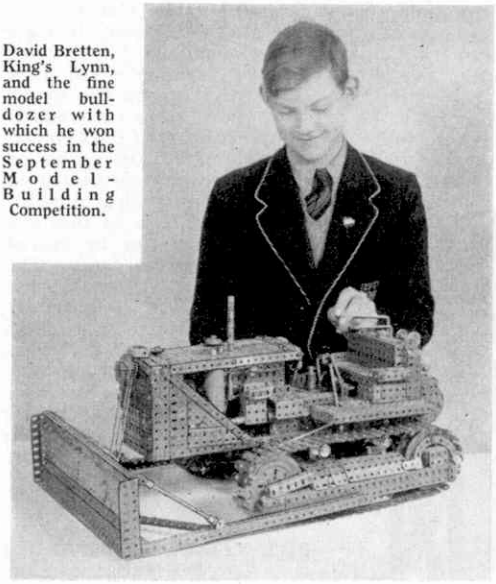
Although there are no restrictions on the choice of subjects, model-builders are advised to select the prototypes of their models with care, bearing in mind the parts they have available. It is far better to choose a fairly small and compact model you can build really well, rather than to start out to build a large, complicated structure that is really outside the scope of the range of parts in your possession. When the entries are judged, full allowance will be made for the size of the Outfit available to the builder and for his age, so that a young competitor who sends in details of a small well-designed model will have just as much chance of success as an older model-builder with a good stock of parts who is able to build a larger and more detailed model.

Entries should be addressed *March General Model-Building Competition, Meccano Ltd., Binns Road, Liverpool 13.* Don't forget! Photographs or drawings only are required, and your name and address and the age you will be on 31st May, 1956, must be written on the back of each paper or print submitted. Entries must reach us not later than *31st May.*

THE PRIZES

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

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



David Bretten, King's Lynn, and the fine model bull-dozer with which he won success in the September Model-Building Competition.

SEPTEMBER GENERAL MODEL-BUILDING COMPETITION

Section A.

First Prize, Cheque for £4/4/–: R. Denny, Ipswich. Second Prize, Cheque for £2/2/–: M. Harris, London S.E.10. Third Prize, Cheque for £1/1/–: A. Fenelon, Limerick.

Ten Prizes each of 10/–: P. Pomeroy, Johannesburg, S.A.; C. Taylor, Bolton; I. D. Tomlinson, Sheffield 11; E. Smith, Sidcup; B. Carpenter, Christchurch, N.Z.; G. Bethell, Waipukurau, N.Z.; R. Farnsworth, Sheffield; H. Goodhew, Bearsted; P. Strudwick, Edenbridge; R. D. Foster, Driffield.

Ten Prizes each of 5/–: P. Adamson, Exeter; R. Shields, London N.W.11; C. Davis, Cullompton; M. Gillibrand, Harrogate; J. E. Hillier, Bexhill-on-Sea; D. Wilson, Blackburn; M. Ash, North Tawton; M. Alabaster, Birmingham; J. Penn-Bull, Woodford Green; E. McGee, Glasgow W.3.

Section B.

First Prize, Cheque for £4/4/–: P. Kessler, Lido di Roma, Italy; Second Prize, Cheque for £2/2/–: R. M. Minshull, Macclesfield. Third Prize, Cheque for £1/1/–: F. S. Rouse, Cheltenham.

Ten Prizes each of 10/–: W. R. Dannatt, Weston-Super-Mare; C. Cohen, Cape Town, S.A.; W. J. Slosse, Antwerp, Belgium; D. Basson, Pretoria, S.A.; E. H. Chandler, Stratford-on-Avon; E. Bunch-Olesen, Vejle, Denmark; D. Bretten, King's Lynn; A. Morales, Leon, GTO. Mexico; S. Reid, Aberdeen; J. B. Villalobos, Valparaiso, Chile.

Ten Prizes each of 5/–: L. Cowper, Oxford; S. C. Freeman, London S.E.6; D. O. Harfitt, Southampton; I. S. Smith, Glasgow; D. B. Gravatt, London N.W.4; P. J. Marais, Wynberg, S.A.; R. Cameron, Gisborne, N.Z.; L. Shorrock, Preston; S. Scholtz, Lichtenburg, S.A.; W. Sicker, Zurich 6, Switzerland.

The First Prize in Section A was awarded for an excellent model of a single deck diesel bus, and in Section B an intriguing and unusual model of a motor-driven snow and ice cutting and removing machine received a similar award.

Club and Branch News

WITH THE SECRETARY

MAKING THE MOST OF EXHIBITIONS

When reading the excellent report of the recent very successful exhibition organised by the Droylsden County Secondary School Branch No. 555, summarised elsewhere on this page, I was impressed by the extent to which this vigorous and enterprising Branch had obtained the co-operation of other model-building enthusiasts in the district. This resulted in the exhibition being on a much bigger and more interesting scale than would have been possible with the resources of the Branch alone.

This joint enterprise proved very profitable to the Branch, and all the organisations concerned must have gained from the publicity. The local goodwill thus created will be taken a stage further if, in turn, the Branch is invited by these "outside" clubs to take part in their exhibitions. I commend the idea to Branches that so far have tended to regard annual exhibitions as solely for the purpose of "showing off" what the Branch itself can do.

Always try co-operation when you can; it helps everybody concerned. School Clubs or Branches are perhaps rather better placed to arrange joint exhibitions of this sort than others, but the latter should keep their eyes open for similar opportunities.

* * * *

While on about exhibitions, I must not let the opportunity slip of reminding Club Leaders and Branch Chairmen of the very useful—and inexpensive!—publicity for these events that is available on this page, where I am always very pleased to publish announcements of forthcoming exhibitions. Details for publication should include the full address where the exhibition is to be held, the date, time of opening and prices of admission. Any other information will be welcome.

Be sure to send me such information in good time—say, six weeks beforehand.

A. Ings, who was recently appointed Secretary to the Hornsea M.C. This very active Club, now in its 26th year, held a voting competition a few months ago that resulted in Meccano model-building emerging as the most popular Club activity—a very wise choice!

CLUB NOTES

Consett and District Y.M.C.A. M.C.—Model-building has progressed well, and competitions have produced some excellent entries. In a recent contest members were required to design a model tractor and then to build it. The model pit is being modernised, the cages being dismantled and replaced by skip winding. The scenic effects for the Club layout are almost completed. The Club was visited recently by the St. George's M.C., Gateshead, and a very enjoyable day was spent together. A committee of four members has been formed. Club roll: 36. *Secretary:* B. Ward, 10 Cyril Street, Number One, Consett, Co. Durham.

Hornsea M.C.—Meetings have followed the usual pattern of Meccano model-building, film shows and games. Club roll: 13. *Secretary:* A. W. Ings, Carlton Lodge, Cliff Road, Hornsea, E. Yorks.

St. Thomas and District (Exeter) M.C.—Models completed recently have included a tank locomotive, aerial railway, mobile crane, country station and an Army tank. Club roll: 15. *Secretary:* D. Morgan, 33 Cowick Road, St. Thomas, Exeter.

Launceston M.C.—Members have been busy constructing new models and repairing old ones in readiness for the Club Exhibition. Films shown at a recent meeting were loaned by the Petroleum Films Bureau, and included one about model aircraft and another about model cars. Club roll: 45. *Secretary:* R. G. Keast, 18 Dunheved Road, Launceston, Cornwall.

AUSTRALIA

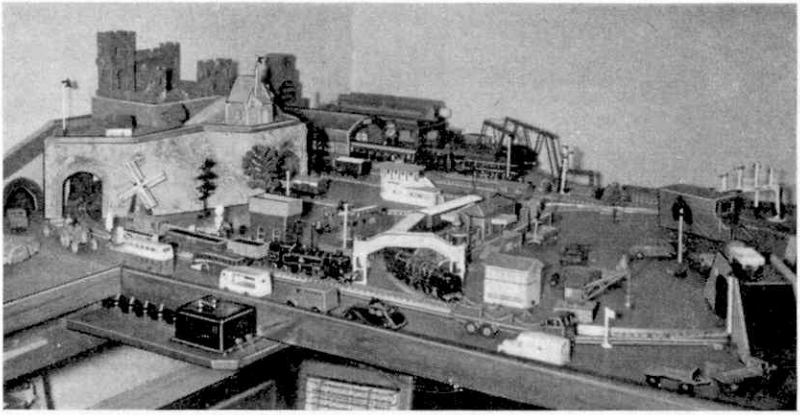
Maylands M.C.—Several members are keen to display their Meccano models as evidence of spare time educational activity, during local Education Week. The models include the Eiffel tower, hammerhead crane, diesel locomotive and a motor chassis. The Club have constructed a large working model designed to display photographs of leisure-time youth activities, for the National Fitness Council. Club roll: 44. *Leader:* Mr. V. Malmgreen, 16 Kennedy Street, Maylands, Western Australia.

BRANCH NEWS

Droylsden County Secondary School—The third annual Exhibition, held on 9th–10th December last, was most successful. The Branch's own display was supported by a fine one by Jim Edgar, of Manchester Model Railway Society, and by the Stockport and District Model Engineering Society and the Northern Association of Model Engineers. There were three Hornby-Dublo layouts in operation. The Branch also staged a very good show of Meccano models. *Secretary:* Mr. J. Lawton, Droylsden County Secondary School, Manor Road, Droylsden.

Hale End (London)—The Branch railway is benefiting from small contributions of track and rolling stock by members and their friends. The work of designing and producing lineside accessories is making steady progress. As a sideline several members have become interested in Meccano model-building. Arrangements have been made for a visit to a B.R. Midland Region and a Western Region locomotive shed. Photographs have been taken of the Branch layout and of the members. *Secretary:* A. L. Coe, 463 Hale End Road, Highams Park, London E.4.

Abbeyfield Road (Sheffield)—The Branch layout has been considerably enlarged, and track operations of greater interest are now possible. The Branch room has been equipped with an electric heater, and the greater comfort is much appreciated. *Secretary:* R. North, 132 Abbeyfield Road, Sheffield 4.



HORNBY RAILWAY COMPANY

The Railway Through "Castle Hill"

By the Secretary

I HAVE had news recently of a Hornby-Dublo layout that I am sure will be of interest to all readers. A striking view of most of this system appears above, while a rail layout plan of the line, without isolating details, forms the lower illustration on the opposite page. This railway is run by *M.M.* reader Richard Ford-Smith, who has put together a clean and workmanlike layout in which not only Hornby-Dublo Trains, but Dinky Toys and Meccano Parts also have a share.

Apart from the neatness of the layout as a whole, and the uncrowded effect of the rail and road systems, what has appealed to me specially is the way in which the layout departs to a certain extent from the conventional form usually known as the oval. It is true that the main line does follow this general shape, and it includes the familiar inner circle or loop, with additional dead end tracks extending from it. Beyond the main track in the upper part of the diagram on the next page you will notice that there are various extensions forming four dead end tracks in all. The pair nearest to the main track serve a terminal station, part of the walls and roof of which can be seen in the picture on this page. The other two tracks serve respectively an engine shed and a goods depot.

Above is a view across the layout of Richard Ford-Smith, Romsey, Hants. Rail and road features are well combined, the whole scene being dominated by the Hill and Castle in the background.

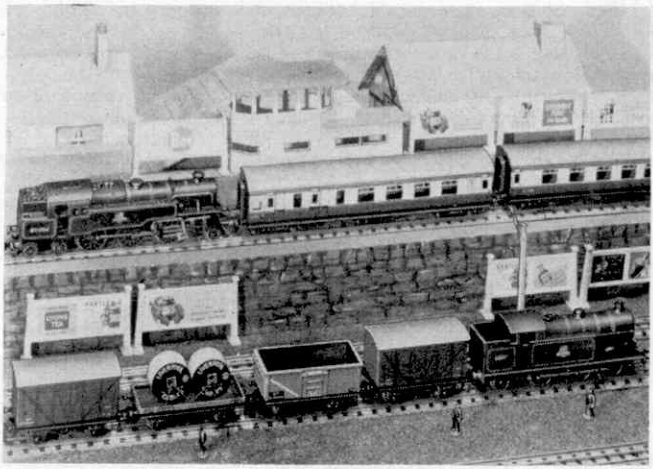
Just as the track extensions in this direction have made necessary an addition to the original rectangular baseboard, so also have corresponding extensions in the road system called for further baseboard development. So the whole system of road and rail—the former is not indicated in the diagram—is now accommodated on a "T"-shaped board. This shape has special advantages in making the whole of the layout readily accessible. Both sides of the main stem of the "T," which carries the main line, are exposed and the width of this section—4 ft. only—is also a help. The extensions previously referred to that produced the final "T" shape are of course readily reached as well.

It will be noted that the control gear is mounted on a separate panel projecting from the lower side of the main baseboard. This is an arrangement that is being followed more and more nowadays, as it keeps the surface of the board entirely free of control apparatus and this means more room for railways, roads or effects. It will be seen that from the control position the operator has a very good view of everything that goes on round the line.

In addition to the terminal station referred to previously there is also a

wayside station, situated alongside the inner circular loop, just beyond the Footbridge in the centre of the illustration. In addition there is a wayside halt. In the illustration this is hidden behind a goods train, but its position can be traced by means of the water tank behind it.

At one end the line tunnels through a hill on which is situated a miniature village overshadowed by a mediæval castle, the antiquity of which is in striking contrast to the modern railway below. *Castle Hill*, as perhaps we may call it, was built up with a wooden framework covered by wire netting and with the surface moulded in papier-mache. The whole of the hill is a separate feature, and once the lighting connections to the buildings on it have been disconnected, the hill can be removed from the baseboard, if this should be necessary at any time. Miniature railway engineers who have had to cope with derailments in tunnels at times will appreciate the usefulness of this.



An idea for a novel Hornby-Dublo layout. The tracks at different levels, with the goods yard below the passenger train lines, give this layout a very attractive appearance.

There is a roadway up to the village and the castle — a steep climb for Dinky Toys cars. This can be seen on the extreme left hand of the illustration. On the opposite side of the hill, but out of sight in our view, there is a flight of steps leading down to the railway terminus below.

At normal surface level a fence runs alongside the railway from the mouth of Castle Hill Tunnel to the road overbridge seen in the right hand corner of our picture. This separates road traffic from the rail, but road vehicles can reach the inside of the circular section, and therefore the wayside station, by means of the road overbridge.

The gradual increase of road traffic by the further addition of Dinky Toys caused the second baseboard extension mentioned earlier. This took place to make room for a large garage and service station. Beneath this extension is a shelf used for the Hornby-Dublo Railer, ready to hand in case of derailments, and the usual materials for cleaning and maintenance. This setting away of such equipment helps to maintain the neat and tidy appearance that is characteristic of the railway. Similarly the electric fire used to heat the garage in which the railway is situated also stows away under the baseboard, being brought out into open space when in use.

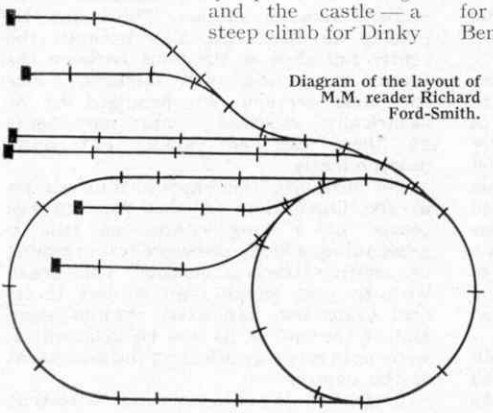
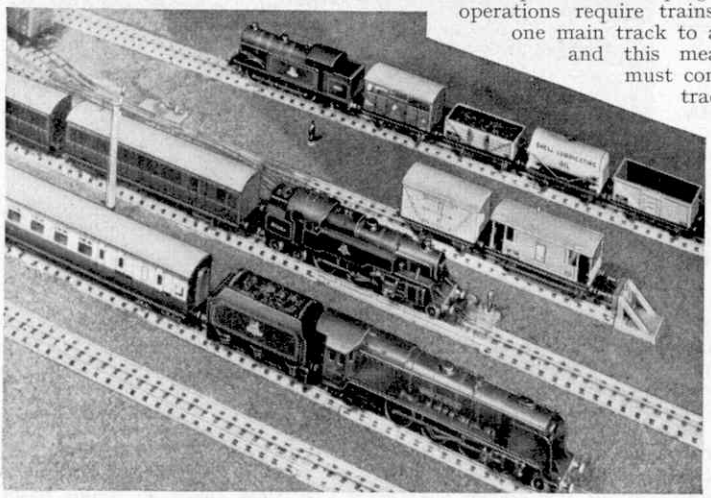


Diagram of the layout of M.M. reader Richard Ford-Smith.

What I have called *The railway through Castle Hill* is a good example of a system on which the railway itself remains at one level, but the lineside effects are built up to a certain extent.

Train Control in Hornby-Dublo

IN conversations with railwaymen, or when reading about train movements, one inevitably learns something about *Control*. This is the name generally applied to the Control Office staffs, who regulate train running and endeavour as far as possible to keep traffic moving. The Control Office watch the working of the line through the reports and messages received from different places, and from this knowledge of the situation on the line can arrange for modification of normal working arrangements, if necessary, to suit special circumstances.



A Duchess-hauled express on a Hornby-Dublo railway overtaking a stopping train headed by a 2-6-4 Tank Locomotive.

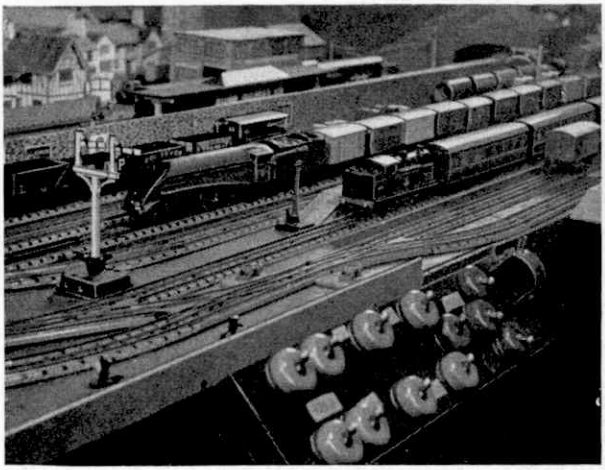
Train control in Hornby-Dublo can mean much the same thing, but the operator has the advantage as a rule of having the whole of his railway directly under observation. Then, too, on most layouts the owner is not only a Train Controller, but fills the post of signalman and engine driver as well. This enables him to keep things working smoothly and, as long as he does not attempt to do too much at once, the trains should run according to the previously arranged programme.

Apart from the actual control, with the working of Electrically-Operated Points and Signals as well as the running of the trains, there is also the question of power supply, which is closely linked with control. The Hornby-Dublo System involves individual supply as far as the trains are concerned, the rule broadly being one supply, one track, one train. If this rule is observed no difficulties will be encountered.

The setting of Points and the switching in or out of isolating sections and the movements of the trains will follow one another in a definite sequence according to the operations in progress. Of course, operations require trains to travel from one main track to another at times, and this means that Points must connect the various tracks. These main tracks usually form individual main sections, each with its own supply and control gear, so it is necessary to insulate such sections from one another. This is done by placing an Insulating Tab between the centre rail clips at the joint between the Points connecting such sections. Once the main sections are arranged to be electrically separate, train movements on them can be carried out quite independently.

For instance, the express train shown in the illustration on this page in the course of a long continuous run is overhauling a local passenger train running on another track alongside. This train, with its own supply and subject to its own Controller, can make various stops and at the end of its run be disposed of, without in any way affecting the movement of the express.

Different layouts require different supply, control and isolating arrangements,



A view on the Hornby-Dublo layout, jointly owned by R. Wild and F. Walton, referred to on this page.

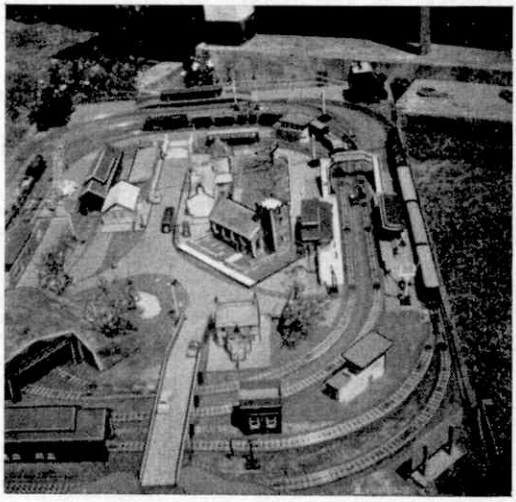
according to the space and equipment available and the movements required. Individual sidings, loops or lengths of main line may be isolated by means of the Isolating Rail and Switch. Where Isolating Switch Points are in use fewer Isolating Rails are needed, but the supply arrangements to the track are not quite the same as when using Electrically Operated Points, which do not have the isolating switch feature.

Our two illustrations on this page show readers' layouts in which the question of supply and control obviously have been carefully considered. They are similar in that the main lines are individually supplied and controlled, but they differ in one important respect that will be mentioned later.

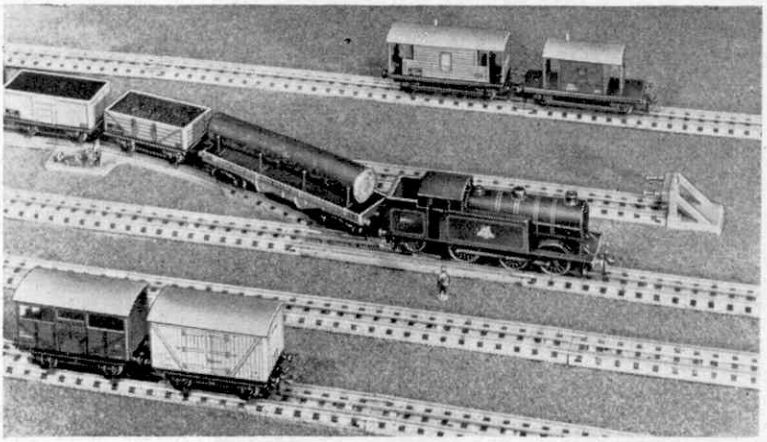
In the upper picture we have a view of part of the Hornby-Dublo layout jointly owned and operated by *M.M.* readers R. Wild and F. Walton, of Stockport. Although the track layout is comprehensive, it consists basically of two main sections. The control arrangements for individual sidings, loops and so on are very complete. Thus each of the tracks shown in the illustration forms a separate section and both the train of vans headed by a streamlined 4–6–2 and the passenger train are waiting their turn to move. In the illustration, as well, is one of the small sectional control panels built up by the owners. We hope to refer to this layout again in these pages.

Although the other layout, shown in the lower photograph, is jointly operated too, by four enthusiastic young readers whom we know as Allan, John, Peter and George respectively, it differs in that the control arrangements are not concentrated at one point, but are dispersed so that youthful Traffic Controllers do not get in each other's way, as they would at a single control position, with possibly disturbing results.

The layout is arranged on a baseboard 7 ft. 6 in. × 5 ft. with three main running tracks. The general scheme is fairly clear from the illustration. There are various sidings too, of course, to serve the various sheds and depots of home construction. Traffic is handled by four Locomotives, each type of Hornby-Dublo engine being represented, and there is a good selection of rolling stock.



A well laid out system in Colombo, Ceylon, that is operated by a company of four brothers.



Permanent Way?

"PERMANENT WAY" is a familiar phrase, although the word *permanent* must not be taken too literally. The name distinguishes a made and completed track used for regular traffic from a roughly laid track used by the engineers and contractors during the construction of a railway.

Like all things subject to wear and weathering, the so-called permanent way requires constant attention and periodic renewal. In this respect the Hornby-Dublo Engineer is more fortunate than his professional counterpart. Hornby-Dublo track is subject only to indoor "weather" and it does not have to be in use 24 hours a day. Actual renewal or replacement is almost unknown in ordinary use. A Hornby-Dublo layout almost always goes through several stages of development during which the track may be relaid several times, but the original Rails with which the railway began are practically certain to find a place in every later plan.

Above a Hornby-Dublo goods train moves gently from the loop on to the main line. The Bogie Bolster Wagon next to the engine carries an appropriate load.

The laying and relaying from time to time of the track will not affect its life or reliability as long as care is used in assembly, in screwing down and in subsequent dismantling. During the latter process particularly, there is a tendency for the Permanent Way "staff" to waggle the Rails from side to side as they are drawn apart from one another. This should be avoided, as it tends to distort the fishplates or rail clips and next time the Rails are used these parts will not make such good contact as they did before. A straight pull apart is all that is necessary when Hornby-Dublo Rails are being separated from one another.

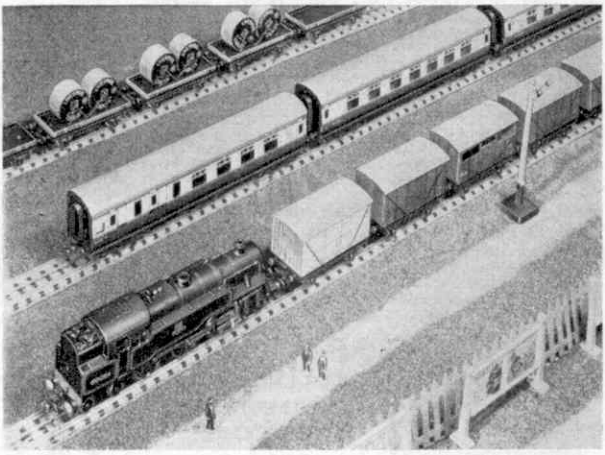
Even on those railways where the track can be put down temporarily, and not screwed down to a base, it is possible to preserve the Rails in good order if they are handled carefully. It is of course much better to have a baseboard, if this is possible, and to have the Rails mounted on it in a more or less permanent formation.

With such a base it is important that there should be plenty of framing underneath to keep the board as rigid as possible. This is specially necessary when a board has to be removed from the table or support and stored away, as often happens. If the board is inclined to bend when being handled, this movement may result in poor contact eventually, as the result of strain on the rails. We have had instances of this sort of thing reported to us, so here is a point that should be watched by all Hornby-Dublo Engineers.

The surface of the baseboard should be

as level as you can possibly make it. If there are any waves or lumps, you are sure to find that they occur in just the very place where you want to have Points or a Crossing, or some other track arrangement where really good level is essential! The time and trouble taken to secure a good base for the track will be well spent.

Track cleaning is a task that most of us find irksome, but it is necessary that it should be seen to if reliable running is to be secured. A certain amount of "muddy" deposit tends to form on the rails as the result of train running, and this must be removed or poor contact will be experienced and the running of the trains will suffer.



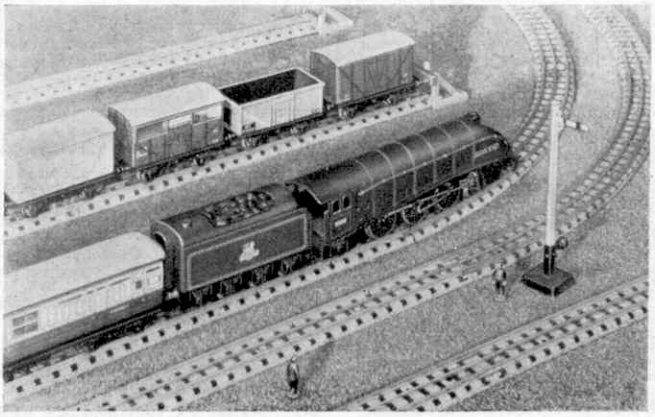
A busy section of a Hornby-Dublo Layout, with trains passing on the main line and a load of cable drums on the siding.

Although various methods of track cleaning have been proposed by enthusiasts from time to time, and there are one or two track cleaners about, the familiar cleaning rag easily obtained in any household is a well trusted asset to the Hornby-Dublo permanent way man. See that your rag is close in texture, and not fluffy, and without any raggy bits that will catch any rail ends, fishplates, points blades and so on.

Here and there on the railway you may have to use a brush from time to time, particularly at Points and other places where a cleaning rag does not always penetrate to surfaces other than those of the rails.

A good wipe over the track before each running session is best. If this is done regularly it will not take long, because little deposit will have had a chance to form. If the job is neglected and the deposit is fairly heavy, the clean dry rag normally used will have to be moistened with a cleaning agent such as carbon tetrachloride (C.T.C.) as recommended in the Hornby-Dublo Train instruction booklet packed in each Train Set. Never use paraffin, as it leaves a greasy surface behind.

Too much pressure on the track, especially on the centre rail, should be avoided as this may cause the centre rail to contact the track base.



The attractive parallel sweep of double track makes this corner of a Hornby-Dublo layout very realistic.

For other Stamp Advertisements see also pages 168 and xviii

Stamp Collectors' Corner

By F. E. Metcalfe

INVESTING IN STAMPS

I SUPPOSE that one of the most common expressions used by stamp collectors, is that one in which they ask "Is it going to be good?" In other words, will the stamp referred to go up in value? From that it might seem that stamp collectors are a mercenary lot of people, who apparently are only concerned with the monetary angle of their hobby.

But of course they are no different from anyone else in this respect. How could they be, when all manner of folk, from dustmen to dukes and kings, collect stamps? The explanation is that postage stamps cost money, some of them a lot of money, and the average collector spends more on his hobby than he can afford to throw away. Spending as much as he does on stamps, he simply must see to it that part of this expenditure at least will come back, if one day he has to sell.

This being the case, one cannot wonder at the times one hears the expression already referred to, and there is every justification for its common use. So let us without shame be quite frank and study the £. s. d. of philately.

On more than one occasion I have written against the purchase of expensive packets of mixed stamps, with the object of seriously undertaking the formation of a general collection. The reason why I am so much against such a thing is that you can never get anywhere trying to collect on general lines. This being the case you get tired of making no real progress, and when you want to sell your collection, as you invariably do when you start on general lines, there is no relation between the price you are offered and that you have paid.

It may be that you had decided to collect on restricted lines, having realised the futility of going after everything, with the world's post offices pouring out scores of new stamps every day. But when you see what a small proportion of your outlay comes back from your discarded collection when you sell out, you are afraid to spend more money that you cannot afford to throw away on stamps. And so the hobby has lost one more collector, and one who need not have been lost had a start been made on the right lines.

Well, what are the right lines? As a matter of fact I have already partly indicated what they are, but before I try to complete the answer, let me reply to another question, often asked, as to whether it is possible or not to make money out of stamps, or to be a bit more delicate, can stamps be a good investment?

Now as a lot of people make a living buying and selling stamps, obviously money can be made out of them. But the only profit that the average collector can hope to make out of his hobby is the one it yields in the way of pleasure, and at the first glance this could and should be considered sufficient, if it were not that more money may be spent on stamps than the average collector can afford to disregard.

Even so, if a collector can get back a good percentage of his outlay when he sells his collection, then he should be satisfied. He can be sure of this, if he collects on right lines; he will not do this if he tries to gather a general collection.

No doubt some readers will have noticed that an American collector who died some months ago left a large collection, which in auction will bring in not one, but several comfortable fortunes. A general collection, you will say. But actually it wasn't, for it contained none of the common items that find their way into mixed packets. What it did contain were the early classics, which mostly cost a mint of money in the first place, and are quite beyond the financial reach of ordinary folk.

As a matter of fact, these stamps have in a sense ceased to be items for stamp collectors; instead they have become counters for investment, almost similar to diamonds, etc., which are put away, as nest eggs, by certain rich people. They are bought and put away into safe deposits for a possible rainy day. This is quite all right, but such operations have nothing to do with the hobby of stamp collecting. Actually the owners all too often know nothing about stamps and could not care less.

The middle issues of a few selected countries would be rather nice to collect, but to be quite candid, I am rather afraid that most of these have had their day. There was a time when you could put any good stamp away, knowing that sooner or later its worth would be realised and it would then bring its full value. That cannot be said to be true any longer. The reason is that thousands of new issues are piling on top as it were, smothering the poor middle issues. So from an investment point of view I cannot recommend them, though of course the selling value of a well-formed collection would be much higher than that of a general collection that had cost the same money.

This brings us to the stamps of today. If we were living in France say, or Spain or Portugal, then the stamps of their respective colonies would have the best investment chance. But those of us living in the British Commonwealth will do best going in for our own issues. I would say that there are real investment possibilities about a Queen Elizabeth collection, and I pick this section out because most of the stamps can be obtained at current rates. Many KGVI stamps are still available at the same figures, and you cannot go far wrong with these either.

There is one thing to remember if you favour used, however. See that you only take up perfect copies, and that you mount your mint in such a manner that you do not mess up all the gum on the back, or your investment will be a poor one indeed. And to sum up, enjoy the *pleasure* your stamps can give you.

For other Stamp Advertisements see also pages 166 and xviii

Stamp Gossip

ST. HELENA

YET another British Colony has celebrated the centenary of its first postage stamp by issuing a set of three stamps, with the best design of all. This is St. Helena, the date of release being 3rd January.

Just a hundred years ago this South Atlantic colony issued a single stamp of a 6d. denomination, which covered St. Helena's postal needs until 1863. The first printing was not perforated, and in Gibbons' catalogue is listed mint at £14 and used £12, although copies can be bought at much less than this. Even so, a decent looking specimen will be above the reach of the average young collector, so for him the new set, which includes in its design an illustration of St. Helena's first stamp, will have to suffice.

Nobody need grumble about that. First day covers are available at about a couple of shillings, and along with a mint set, will make a nice page in any collection. That you will realise from the accompanying picture—and a "stamp on a stamp" is always attractive.

A NEW VARIETY

Recently I received a very interesting letter from a young collector who is evidently going to make a good philatelist, for he is taking the trouble to examine his stamps before sticking them in his collection. He sent me a copy of the current 1d. stamp of Rhodesia-Nyasaland and asked me if I could explain the perforation, which was different from that given in the catalogue. He wanted to know if it was that he could not measure correctly, or that the catalogue was wrong.

The answer is that he *can* measure perforations all right—at least he had done so on this occasion—but still the catalogue is not wrong, for the country concerned brought out some coils of penny stamps towards the end of 1955, and these had been perforated on a special machine, so that the measurement differs from the stamps that appeared in sheet form last July.

These coil stamps are easy to distinguish, for they are of a deeper shade of ultramarine than sheet stamps, a point that my correspondent had also noticed.

QUITE A SHOCK

Some time ago another collector sent me a stamp on which there was supposed to be a variety, and to point out where this variety was a line had been drawn in ink right across the stamp. Fortunately the stamp was of no particular value, and beyond telling the collector in my reply that such a mark would spoil any stamp, I did not think that I need take any further steps. It seemed to me that after all I have said about clean stamps, and nice cancellations, no one else would know or care so little about the condition of their stamps as to mark them with ink deliberately.

Alas, I got quite a shock, for another stamp turned up similarly defaced, and that indeed was the third time I have been shown a stamp where the owner had marked, in ink, the position of some fancied variety.

Will all young collectors please note that to mark a stamp in any way is to lower its value, and if the marks are in ink, the depreciation will be serious.

There is a way of removing ink marks from used stamps, and it is particularly easy for purple ink, but I don't wish to encourage this practice.

If you wish to point out some variety, just draw a small square the size of your stamp, if you cannot make a decent job of copying the design, alongside the stamp in the album, and make a mark on the drawing at the position where the flaw or whatever it is, occurs on the stamp. Never, never, mark the stamp itself!

RELATIVITY

Now don't shy off when you read the word relativity, for this is not going to be a disquisition on that subject. I could not discuss it if I wanted to, knowing only that the man responsible was that great savant, Einstein, who died recently in the U.S.A. Israel has honoured his memory with a well designed stamp, and I imagine that as time goes on other countries will follow suit.

The stamp will be very popular with thematic collectors, of whom many collect "scientists," which is how they describe such collections. These are of great interest and can be most instructive, if pains are taken to read about those concerned and salient details are written under each stamp.

CACHETS

I have no doubt that the cachet illustrated will be of great interest to collectors, though some here in Britain may not know much about it. Canadians and Americans will not need to be told much, for they are used to them.

The Canadian Post Office, while not willing to issue special stamps, is quite ready from time to time to provide what are known as cachets, and these accompany the postmarks, of which they are in a sense part, on envelopes posted at special post offices at exhibitions and those ever popular stampedes.

Envelopes thus cancelled are naturally very popular overseas, as would similar British productions be if our own Post Office had enough enterprise and initiative to provide them. Alas, it takes about a year for our authorities to make up their minds to overprint a stamp, and prepare one for issue, so we will have to be content with these interesting covers from Canada.

And if any British collectors have any friends in Canada, a gentle nudge about these covers with the cachets may produce one or two. But don't make that appear too pointed. Just give a hint.

The Crewe Works Training School—(*Continued from page 121*)

end of his course and are liberal in character. During the school course, indeed, the trainee visits the main workshops at Crewe itself and industrial works and places of interest elsewhere.

When at the end of his year in the school he enters the Crewe Works as a trade apprentice he finds that there a progressive system of workshop training awaits him. He moves systematically from section to section, and the result is that on the completion of his apprenticeship, at the age of 21 years, he has gained experience in every phase of the actual shop work relating to his chosen trade.

One of the most important provisions of the apprentice training scheme is the wide prospect open to the trainee. Provision indeed is made for half of the higher engineering apprenticeships, which carry special facilities, to be filled each year by trade apprentices who have forged ahead in their work and studies. From the very beginning of their association with Crewe apprentices are encouraged to attend evening classes at technical schools, and to work their way up so that they can take advantage of this facility. There is no reason indeed why an ambitious boy beginning the course may not eventually qualify himself as an engineer or electrical engineer, and so rise to the highest posts in railway service. Everything depends upon the apprentice himself, for promotion is not automatic, but is strictly dependent upon the ability and enterprise of the individual.

A special feature of the apprentice scheme at Crewe is the interest taken in the welfare of those concerned. There are well equipped canteens in the works, where the apprentice trainees make contact with the staff employed in the production shops. All forms of sport and recreation are encouraged, and there is also a club and institute, with an amateur dramatic section and provision for badminton, table tennis and boxing. A very fine gymnasium is available, and the boys are taught elementary first aid.

Potters Bar Today—(*Continued from page 132*)

from that required to set the route. When the signalman has completed the correct movement the flashing red light goes out and a small white light appears below each individual switch to show that the particular points are locked.

Until all the appropriate points in a route show their "lock" lights, the signal for that route will not be clear. The "lock" lights remain until the route switch has been restored and all track circuits controlling these points are clear. So the signalman is given every possible aid as a check on his movements.

Building the Skylon Mk.II—(*Continued from page 135*)

At 0900 G.M.T. Mr. Jeanes makes his daily round, first to the Meteorological Station's Stevenson Screen, with its wet, dry, maximum and minimum thermometers, and then to the rain gauge, and thermometers. Finally he takes his readings, from inside the Science buildings, of wind direction, wind speed and air pressure.

The procedure is then for the boys on weather duty to make a round of the instruments and to make their own records for comparison with those of the official observer.

Each month a large chart is completed showing day by day readings, averages and notes on any peculiar happenings. When this chart and hundreds of others from similar stations throughout the country are received at the Air Ministry, they are checked and compared and finally printed in book form for future reference.

So the boys of St. Crispin's offer a service, not only to the community of Wokingham, but also to the nation's weather records.

The Kangaroo's 21st Birthday—(*Cont. from page 124*)

the longest and one of the most daring non-stop flights ever attempted. With all land routes closed, Qantas began a weekly service with Catalina flying boats over the Indian Ocean, non-stop from Perth to Ceylon. Carrying mail and V.I.P. passengers, the 3,513-mile service took about 27 hours and was named the "Route of the Double Sunrise," because passengers saw the sun rise twice before alighting.

In 1944, the Catalinas were joined by two Liberators. Flying via Learmonth in N.W. Australia they reduced flying time to 17 hours, and the two types of aircraft completed 824 crossings between them, before the approaching end of the war made it possible to re-open the direct route with converted Lancaster bombers. Known as Lancastrians, they flew first from Hurn in Hampshire and later from the newly-opened London Airport to Sydney in only 63 hours. B.O.A.C., which had succeeded Imperial Airways in 1940, operated them as far as Karachi, where Qantas crews took over.

Flying-boats were re-introduced on to the Kangaroo Service in 1946, in which year Qantas became an all-Australian company. Although slower than landplanes, they offered great comfort and safety, and many passengers were sorry to see them go, when first Qantas and then B.O.A.C. replaced them with Constellations.

Today, the Kangaroo is an all-landplane service, operated with B.O.A.C. Constellations and Qantas Super Constellations, which offer a journey time of 75 and 58 hours respectively. This year you will see important new progress, for B.O.A.C. will introduce Britannias on the Kangaroo route and Qantas plan to increase their services.

Cross-Country by Glider—(*Continued from page 151*)

Flying control are used to this sort of intrusion and meet you with a smile, and welcome hands to de-rig the glider—which is another reason why you land on airfields! The first job is to 'phone the club to tell the retrieving team where you have landed. Then follows a long wait while you watch impatiently for the sign of a car with a long trailer like a covered wagon, and wonder whether they have lost their way.

Gliding depends on team work; you certainly could not fly without a retrieving team—and you may be doing the same thing for them tomorrow. Conditions had been perfect today, and one could not go wrong. But tomorrow's pilot may not get away at all, or may be brought down in a small field, or perhaps on a recreation ground or a golf course only a few miles from the club. That is part of the luck of gliding, but you are always full of plans of what to do when next you get away. In fact, like the fishermen, you are always thinking of the one that got away!

Among the Model-Builders—(*Continued from page 155*)

certain amount of friction when the model turns a corner, as it depends for its action on a rubber band, which must slip round one of the Pulleys when the model is turned. It is an interesting arrangement, however, and possibly model-builders will be able to modify the design to meet their own requirements.

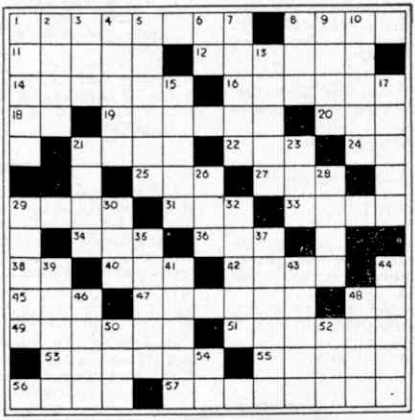
The drive to the rear axle is transmitted by a Driving Band to a 1½" Pulley 1. This Pulley is free to turn on one of the half-shafts 2 and 3, each of which carries at its inner end a ½" Pulley with boss 4. A ½" Bolt is fitted with a Washer, which is held against the head of the Bolt by a nut. The Bolt is then passed through the round holes of two Angle Brackets and these also are fixed tightly in place by a nut. Finally the ½" Bolt is locked by two nuts in a hole in the Pulley 1.

A 1½" Rod is passed through the slotted holes of the Angle Brackets, and two ½" loose Pulleys 5 are held on this Rod by Spring Clips. A small rubber band is passed round one of the Pulleys 4 is taken over the Pulleys 5 and is then passed round the second one of the Pulleys 4.

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.

An Interesting Crossword Puzzle



CLUES ACROSS

1. Entwines
8. Poisonous serpents
11. Musical composition
12. To whiten
14. Top rooms
16 Decree
18. Pronoun
19. Idle
20. No
21. School
22. Little Miss Muffet did this
24. Lord Lieutenant (abb.)
25. Colour
27. Downcast
29. Hoard
31. Past Tense
33. Sailor's story
34. Ox
36. Famous regiment
38. That is reversed
40. Rodent
42. So let it be
45. Dental degree
47. On time
48. To exist
49. Pageant
51. Desert
53. King
55. Tree
56. Brought into life
57. Cement

CLUES DOWN

1. Noisy quarrel
2. Repetition of words
3. Insect
4. Fool
5. To falsify
6. Note well
7. Lustre
8. Conjunction
9. Scrutinise
10. Glass vessel
13. Open spaces
15. Tendon
17. Fine thread
21. Jealousy
23. Bridge
26. Father
28. Mend
29. Small fish
30. Spike of corn
32. Two kinds—small or grand
35. Fibre
37. Collision
39. U.S.A. state
41. Company
43. Girl's name
44. Growth
46. Celebrity
48. Husks of corn
50. Bronze complexion
52. Girl's name
54. Negative

Here is another of our popular Crossword puzzles. There are no traps in the clues, or alternative solutions; and apart from initials and names every word used can be found in a standard dictionary.

There will be the usual two sections in this contest, for Home and Overseas readers respectively, and in each prizes of 21/–, 15/– and 10/6 will be awarded for the best solutions. There will be a number of consolation prizes. If necessary the judges will take neatness and novelty into account when making their decision. Do not cut out this diagram, but make a careful copy of it, and when you have solved the puzzle write your name, address and age on the back of your entry.

Entries should be addressed *March Crossword, Meccano Magazine, Binns Road, Liverpool 13.*

Closing dates: Home Section, 30th April; Overseas Section, 31st July.

Draw Your Prehistoric Monster

From a look into the future in our space ship drawing contest, we now turn to the distant past, when huge prehistoric reptiles and other giant creatures roamed the Earth.

We invite readers to send us a drawing of what they imagine these creatures looked like. Drawings must show the monsters in their natural surroundings. If you have no ideas at all on the subject, you can learn something about the appearance of the dinosaurs and their fellow giants from books on the story of the Earth, and, if you want to do the thing thoroughly, from encyclopædias and similar works of reference in your local public library.

Competitors' drawings must be their own unaided work, and can be in pencil, or pen and ink, and coloured if desired. The contest will be in two sections, A for readers aged 16 and over, and B for those under 16. Each competitor must write his name, address and age on the back of his drawing, and state in which section his drawing is entered. There will be separate Overseas sections, and in each section prizes of 21/–, 15/– and 10/6 will be awarded. Entries should be addressed: *Prehistoric Monster Contest, Meccano Magazine, Binns Road, Liverpool 13.* Closing dates: Home Section, 30th April, Overseas, 31st July.

Fireside Fun

Haughty Lady (after buying a stamp): "Must I put it on myself?"
Post Office Clerk: "No, madam, on the letter."

* * * *

A family quarrelled so much that the maid finally gave notice. "What's wrong?" asked the mistress. "Haven't we always treated you like one of the family?"
"That you have, ma'am," replied the maid. "And I've stood as much of that as I could."

* * * *

Shoemaker: "Here are the boots for your new expedition to the Antarctic. Were you satisfied with the ones I made for your last trip?"
Explorer: "Oh, quite. Best boots I ever ate."

* * * *

"And what are you doing at the university, my boy?"
"Taking medicine, Granny."
"And do you feel the better for it?"

* * * *

Jones left camp every night pushing a wheelbarrow piled high with straw, and every night the guards searched the straw, without finding anything. Then one of the guards was transferred.
"Say, Jones," he said on his last night on guard, "I'm pretty sure you're taking something out, what is it? I won't tell."
"Wheelbarrows," said Jones with a grin.

* * * *

* * * *

Tom: "Do you like your work?"
Jim: "Yes, I can sit and look at it for hours!"

* * * *

Talkative shopper: "I am trying to get something for my husband. Can you help?"
Assistant: "How much were you asking for him?"

* * * *

Tom: "I don't know what Jim does with his money. Yesterday he was short and he is short again today."
John: "Did he want to borrow from you?"
Tom: "No, I wanted to borrow from him."

BRAIN TEASERS

FIVE MINUTE CROSSWORD

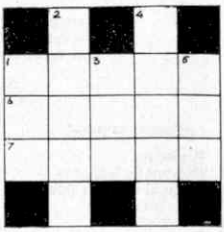
Clues

Across

1. Later
6. Steal—nearly
7. Earthy

Down

1. Serpent
2. If you do this when you have done 1 across you will be correct
3. The cause of a famous party
4. Source of sweetness
5. Abbreviated transport



* * * *

A WORDY PROBLEM

Can you find an eleven letter word of two syllables of five and six letters each from the following clues? The first syllable indicates something you do carefully if you have the habit described by the second syllable. The meaning of the second syllable is in direct opposition to the meaning of the whole word.

* * * *

JUMBLED CLUES

Each of the 12 clues listed below can be used to identify one syllable of a familiar two-syllable word. There are two clues for each word, but they have been mixed up. Can you identify the syllables from the clues and then rearrange them in correct pairs to form the six complete words?

1. Oxygen is one
2. A measure of length
3. A pace
4. Rise up!
5. A prank
6. Post
7. Familiar overhead
8. An aid to shopping
9. Container
10. All around us
11. Writing material
12. Mail

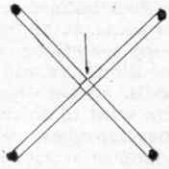
* * * *

ANSWERS TO LAST MONTH'S PUZZLES

The Square made with Matches

Having laid out the four matches as shown in the *M.M.* last month let your friends try to solve the puzzle. They are likely to make all sorts of remarkable trials without success and then, when everybody gives it up, you merely pull one of the matches a fraction of an inch outwards. By doing this, you will cause a tiny space, which is square, where the four match ends come together. The arrow in the diagram alongside points to the space in question.

You must take care to arrange the match ends at the outset so that this square is formed when only one match is withdrawn, as explained.



How Long was the Fish

The fish was 6 ft. long. Head 9 in. Tail 27 in. Back 36 in.

STAMP ADVERTISEMENTS

(see also pages 166 and 168)

READERS' SALES AND WANTS

SALES

Brickplayer Kits Nos. 3 and 4 with extras Strong Wooden Box, 50/-.—N. Hobbs, 413 Reddings Lane, Birmingham 11.

Trix Twin 00 Layout for sale, Track, Points, Engines, Controllers, Rolling Stock, Accessories. S.A.E. for list.—Squires, "Arcadia," Canonsfield Road, Welwyn, Herts.

"Eagles," Vol. 1–6 inc., £3 o.n.o.—Tyler, 145 Norval Road, N. Wembley, Middlesex.

"M.M.s" January 1946–February 1956 inclusive, as new; 50/- post free.—Wyatt, 25 Coleridge Road, Cambridge.

"M.M.s" 1948–1952 inclusive, 5/- each year; 1953 and 1954, 6/- each year; January–July 1955, 1/- each copy. All in good condition. — S. Caro, 148 Kimberley Road, Roath, Cardiff.

MECCANO MAGAZINE

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Advertisements of goods currently manufactured by Meccano Ltd. cannot be accepted.

Marklin HO Locos., Rolling Stock, Automatic Accessories, Track, etc.—Apply M.M. Box No. 94.

Steam Engine, twin cylinder S.E.L. Model Major, No. 1550, high grade finish, very good condition, little used, price 30/-.—N. Slack, The Deanery, Elphin, Co. Roscommon, Eire.

45 "Model Engineers." Details from — Scott, Lomond Lodge, Arden, by Alexandria.

S.A. Hub Gear A.W., 15/-, fair condition. Fulvue Camera, repairable, £1 or offers. Two Dynamos, 7/6 each without cycle attachments. Viewmaster with one reel. Offers? Also Trix Accessories and many Coins and Notes. S.A.E. for list.—A Rose, 12 Woodside Avenue, Highgate, London N.6.

WANTS

Urgently required by collector, pre-war Dinky Toys Tractor and Tram Car. Reasonable price paid.—I. F. D. Green, 19 Normandy Avenue, Barnet, Herts.

Pre-war Hornby Pullman Coaches, any condition for cannibalising.—Sparks, "Tanga," The Ryde, Laleham, Middlesex.

0 Gauge "Princess" Body or Damaged Locomotive.—Thomas, 20 Kingsmead Drive, Woolton, Liverpool.

Obsolete Dinky Toys Army Vehicles, *i.e.*, Tanks, Lorries, Water Tank Trailers, etc.—I. F. Davies, "Woodville," 30 Villa Road, Mid-Higham, nr. Rochester, Kent.

Any bound volumes "M.M.s" 1942–1952 in good condition. Reply with price to—Jarand, Lough Cutra, Gort, Galway.

"Book of Meccano Parts and How to Use Them".—Peter Lawford, 20 Boundary Road, Higher Irlam, Manchester.

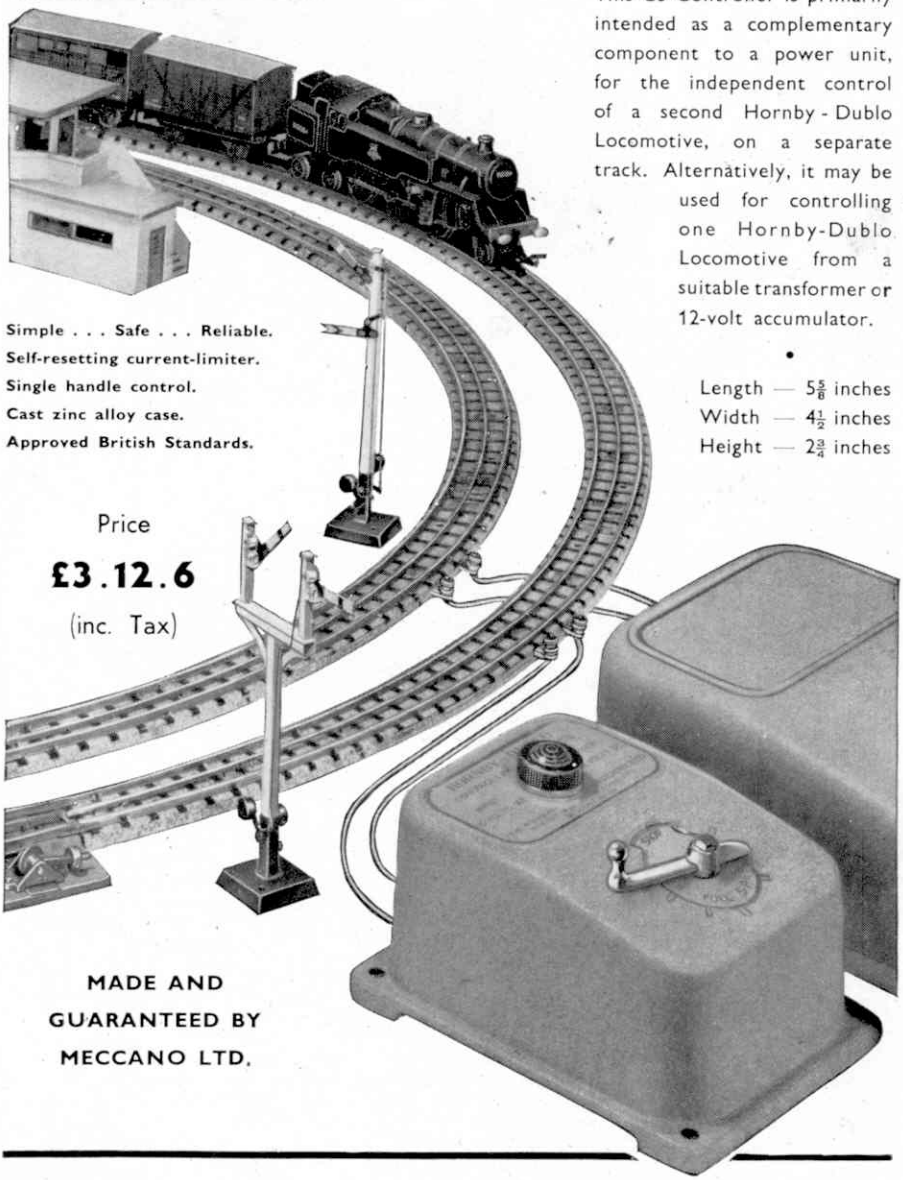
Publications in G.W.R. "Boys of all Ages" series, also 1938 bound volume Meccano Magazine. Good condition essential.—Matthews, 46 Fore Street, Heavitree, Exeter.

Gauge 0, Hornby, Bassett-Lowke, 4–6–2 and Tender, Steam type Loco., Electric or Clockwork; Marklin 0 Gauge 2–8–2 Tender, "Cock of the North". Send price and condition, postage paid by buyer.—John Rougeau, 67 Main Street, Bridgeboro, New Jersey, U.S.A.

HORNBY DUBLO

C3 Controller

This C3 Controller is primarily intended as a complementary component to a power unit, for the independent control of a second Hornby - Dublo Locomotive, on a separate track. Alternatively, it may be used for controlling one Hornby-Dublo Locomotive from a suitable transformer or 12-volt accumulator.



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Single handle control.
Cast zinc alloy case.
Approved British Standards.

Length — $5\frac{5}{8}$ inches
Width — $4\frac{1}{2}$ inches
Height — $2\frac{3}{4}$ inches

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£3.12.6
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DINKY TOYS

TRADE MARK REGISTERED

New

Ready during March

No. 261 TELEPHONE SERVICE VAN

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Price 3/3 (inc. Tax).

No. 110 ASTON MARTIN DB3 SPORTS CAR

This famous race-winner is an exciting addition to the Dinky Toys range. Racing number on sides and bonnet. Fitted with driver in white kit. Enamelled in green or salmon pink. Length $3\frac{1}{2}$"

Price 3/6 (inc. Tax).

More models in two-colour finish

The two-tone finish for Dinky Toys private cars has been extended this month to include.

No. 157 Jaguar XK120 Coupe, available in cerise/turquoise blue or grey/yellow **Price 2/9** (inc. Tax)

No. 170 Ford Fordor Sedan available in cream/red or salmon pink/blue **Price 2/9** (inc Tax)

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MODEL OF THE MONTH (March 1956)

GANTRY CRANE

Construction of the Towers

The two towers are identical in construction. The base of each tower consists of a 12½" Strip 1 and two 5½" Strips 2 on each side (Fig. 1). The Strips 2 are joined at the centre by a 3½" x ½" Double Angle Strip 3 and a 2½" Stepped Curved Strip. The Strips 1 and 2 at the outer side of each base are connected by two 5½" x 1½" Flexible Plates, and those on the inner side are joined by three 2½" x 1½" Flexible Plates.

The sides of the base are connected at each end by two 2½" x ½" Double Angle Strips bolted between the Strips 1 and 2. The Double Angle Strip between the Strips 2 at one end supports a 4½" x 2½" Flexible Plate 4, and to the Double Angle Strip at the other end is bolted one half of a Hinged Flat Plate 5. The inner ends of the Plates 4 and 5 are connected to the Strips 2 by Angle Brackets.

The bases are mounted on Road Wheels fixed to one 4" and three 3½" Rods, which are held in the Strips 1 by Spring Clips.

Each tower is formed by two 12½" Angle Girders 6 and two 12½" Strips 7, (Fig. 1). The Strips 7 are bolted to the lugs of the Double Angle Strip 3 and are connected to one of the Strips 1 by Angle Brackets. The Girders 6 are joined at the top of the tower by a 3½" x 2½" Flanged Plate 8, and are connected to the Strips 7 by 2½" x 2½" Flexible Plates. The tower is braced by two crossed 5½" Strips on each side.

Assembly of the Gantry

Each side of the gantry consists of a built-up girder 9, made from two 12½" Angle Girders joined end-to-end at the centre by a 3" Strip (Fig. 1). The girders 9 are bolted to the tops of the towers, and built-up strips 10 are joined to the girders by 3½" Strips at each end. The built-up strips are each made from two 12½" Strips overlapped 18 holes, and they are connected to the girders 9, at the centre of the gantry, by 5½" x 2½" Flexible Plates. Each Plate is strengthened along its lower edge by a 5½" Strip.

Two 3½" Strips 11 are bolted to the girders 9 as shown in Fig. 2. The bolts holding these Strips at one end fix also 1" x 1" Angle Brackets, and to these Angle Brackets are bolted Right-Angle Rod and Strip Connectors that support the handrail. The handrail consists of an 11½", a 4½" and a 5" Rod joined by Rod Connectors.

Travelling Carriage and Pulley Block

The travelling carriage consists of two 2½" Strips 12 on each side, bolted at the centre to a Flat Trunnion. A Crank is fixed also to the Strips so that its boss coincides with the hole in the pointed end of the Flat Trunnion. The Strips 12 are connected to two 1½" x ½" Double Angle Strips, to each of which is bolted a Flat Trunnion 13. A 1½" Rod is fixed in the two Cranks, and at the centre of this Rod is mounted a built-up pulley 14, made from a 1" loose Pulley,

two Wheel Discs and two Collars. One of the axles carrying the carriage wheels is a 3½" Rod, and the other consists of a 2" and a 1½" Rod joined by a Coupling.

Each side of the pulley block is formed by two 2½" x 1½" Triangular Flexible Plates bolted together and edged at the top by a 2½" Strip. The sides are connected by two Double Brackets and by a ¾" Bolt 15. A small Loaded Hook is supported on this Bolt between two Spring Clips. A 1" loose Pulley 16 is mounted between two Collars on a 1" Rod.

The Operating Mechanism

Movement of the travelling carriage is controlled by turning a Bush Wheel fixed on a 4½" Rod 17 that carries a 1" Pulley 18, (Fig. 3). A length of Cord is tied to one of the Flat Trunnions 13, is passed round the Pulley 18 and through holes in both the Flat Trunnions 13. It is then taken round a 1" Pulley 19 on a 4½" Rod, and is tied to a Driving Band secured by a short piece of Cord to one of the Flat Trunnions 13. The Driving Band is stretched slightly to tension the Cord.

The Rod 17 is held in place by a ½" fixed Pulley inside the tower, and the Rod carrying the Pulley 19 is kept in position by Collars. A 5" Crank Handle is mounted at the top of one of the towers, and is fitted with two 1" Pulleys 20 and a ½" Pinion 21, (Fig. 3). A ½" Bolt is fixed in the Pinion, so that by sliding the Crank Handle this Bolt engages a Spring Clip on a ⅜" Bolt fixed by a nut in the hole below the Crank Handle. This forms a simple brake, which is released by pulling the Crank Handle outward.

A length of Cord is tied to a Cord Anchoring Spring placed on the Crank Handle between the Pulleys 20, and is taken over a ½" loose Pulley 22 on Rod 17. The Cord is passed through one of the Flat Trunnions 13, round the Pulleys 14 and 16, and over the 3½" Rod forming one of the carriage axles. The Cord is passed through the second Flat Trunnion 13 and is tied finally to one of the Strips 11.

Control and Inspection Platforms

A 3½" x 2½" Flanged Plate 23 is attached to one of the towers by Fishplates, and is connected by 2½" Strips to the ends of the strips 10. The handrail is formed by a 4" Rod and a 2" Rod fitted at each end with a Rod and Strip Connector, and arranged as shown in Fig. 1. At one side a 1½" Strip 24 is connected to the Flanged Plate 23 by a second 1½" Strip extended by a Fishplate.

A 2½" x 1½" Flanged Plate 25 is attached to one side of the tower by Angle Brackets, and a Semi-Circular Plate is bolted to it. The handrail consists of a 2½" x ½" Double Angle Strip and a Formed Slotted Strip. It is connected to the Strip 24 by an Angle Bracket, and is supported at the other end by a 1½" Strip 26 attached to the Flanged Plate 25 by an Angle Bracket (Fig. 1).

The ladder to the top of the tower consists of two 2½" Strips bolted to 1" x 1" Angle Brackets fixed to the Flanged Plate 25, and two similar Strips attached to one of the girders 9 by ½" x ½" Angle Brackets. The rungs are represented by Cord.

The controller attached to the Flanged Plate 23 is a Sleeve Piece 27 bolted to a ½" Reversed Angle Bracket, which is secured to a flange of the Flanged Plate. The control handle is a Fishplate, which is fitted with a Threaded Pin and lock-nutted to a Chimney Adaptor pressed into the end of the Sleeve Piece.

Outfit No. 7.

GANTRY CRANE

March 1956 "M.M."

Parts Required

12	of No. 1	2	of No. 22a	2	of No. 111a
18	" " 2	1	" " 23	2	" " 111c
6	" " 3	1	" " 23a	2	" " 115
2	" " 4	1	" " 24	1	" " 125
12	" " 5	2	" " 24a	4	" " 126a
3	" " 6a	1	" " 26	1	" " 163
8	" " 8	13	" " 35	1	" " 164
4	" " 10	177	" " 37a	1	" " 176
2	" " 11	173	" " 37b	1	" " 186
18	" " 12	33	" " 38	4	" " 187
4	" " 12a	1	" " 40	6	" " 188
1	" " 13	2	" " 48	4	" " 189
1	" " 15	9	" " 48a	4	" " 190
3	" " 15a	2	" " 48d	2	" " 191
2	" " 15b	1	" " 51	2	" " 192
4	" " 16	3	" " 53	1	" " 198
2	" " 17	1	" " 57c	2	" " 212
2	" " 18a	6	" " 59	2	" " 212a
1	" " 18b	2	" " 62	2	" " 213
1	" " 19h	1	" " 63	1	" " 214
4	" " 20b	4	" " 90a	1	" " 215
4	" " 22	1	" " 111	4	" " 221

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The Editor

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