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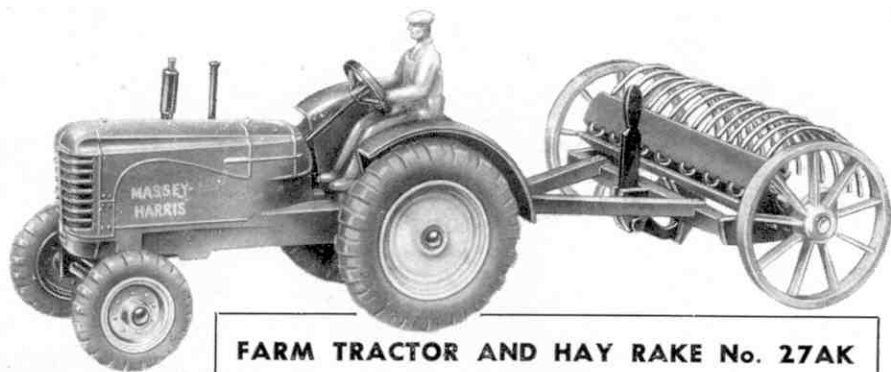
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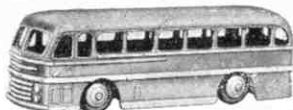
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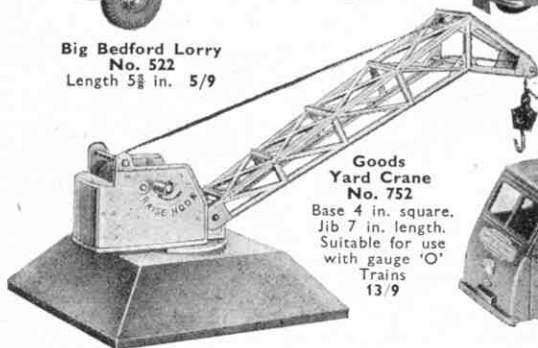
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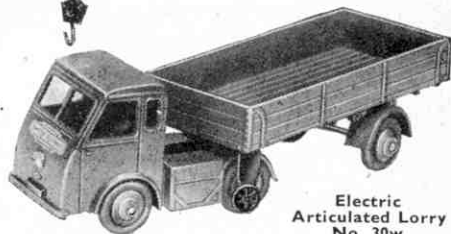
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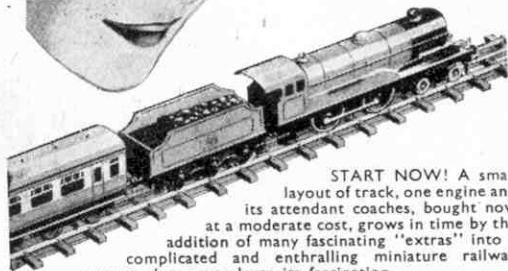
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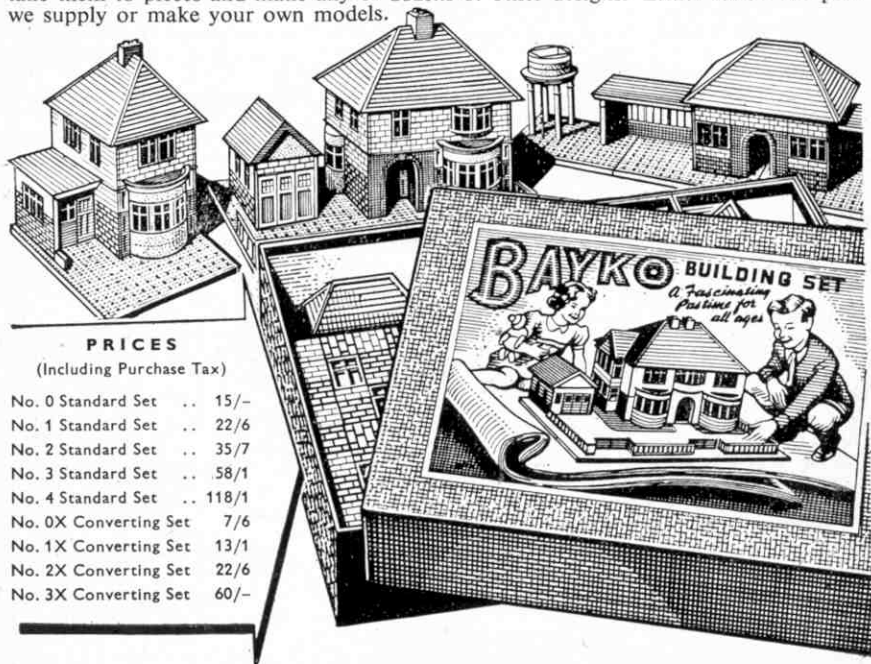


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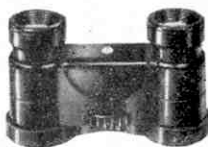
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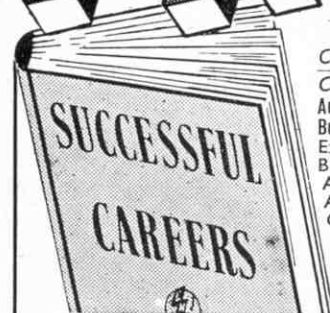
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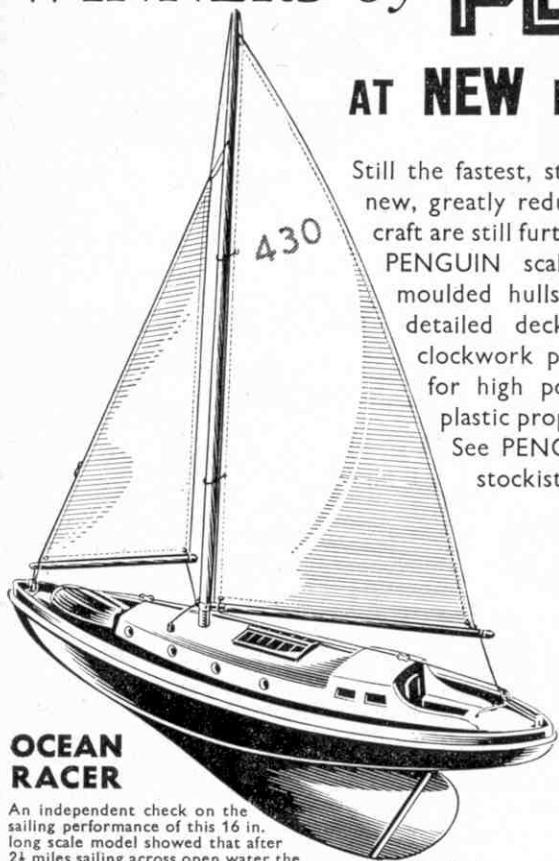
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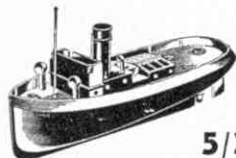
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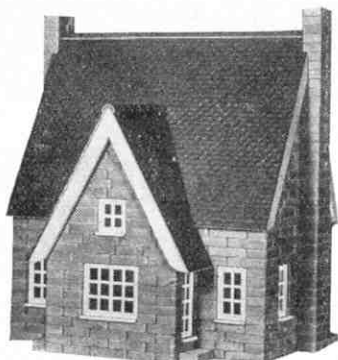
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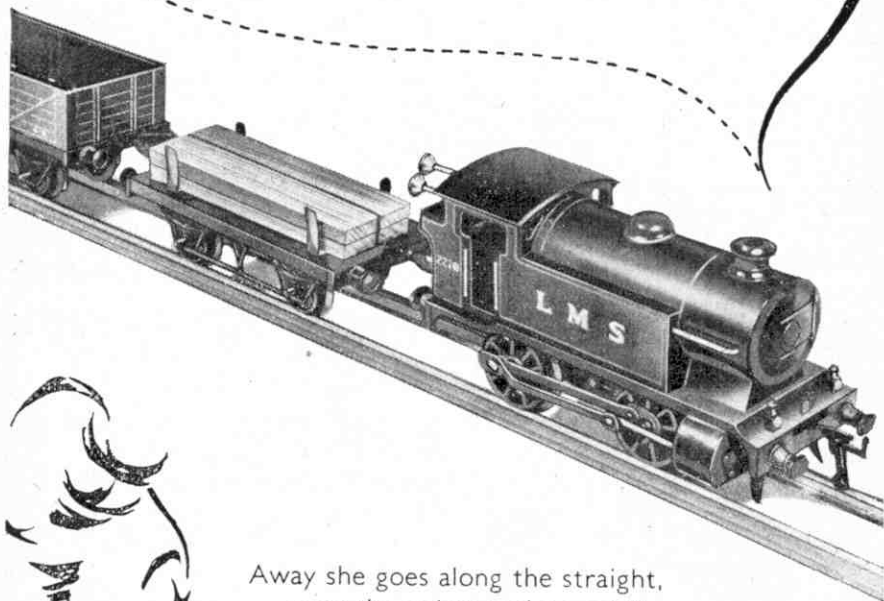
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MAGAZINE

Editorial Office:
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Vol. XXXVIII
No. 3
March 1953

There is Still Time!

March is an exciting month. It is proverbially a time of great gales that blow the winter away, and brings us at its end into the warmer and brighter season of the year.

This year March will be a particularly stirring month also in the Meccano world, for its last day is the closing date of the great 1952-3 International Model-Building Competition. But the excitement will not be so uncomfortable as that provided by the weather. In fact it will be pleasurable, for many of the model-builders sending in entries in the Competition will still be busy putting the finishing touches to their models and having them photographed or drawn. Those who have completed their entries will have the satisfaction that comes from good work well done.

By the end of the month, when our gales have died away, all the excitement of active preparation will have gone, but we shall still have something to keep us alert. The judges, of whom I am one, will have the delightful task of seeing what the ingenuity of model-builders all over the world has produced; competitors will be waiting eagerly to see how their models have fared. I am sure that the entries will include many fine original models, and I am looking forward to giving details of many of them in the Magazine in due course. That will provide model-builders with something to talk about for a long time to come, and no doubt will stir them on to new efforts.

And now, have you solved the problem set by the illustration on this page?

Readers who know Edinburgh may have recognised the scene as the concourse of Princes Street Station in that city, originally the Edinburgh terminus of the one-time Caledonian, the ally of the former London and North Western Railway in the



Many readers know this station, but how many have seen it as it is in this picture, with shafts of sunlight lighting up its November gloom? What station is it?

creation of the famous West Coast Route.

Normally this would have provided quite an ordinary photograph, but just see how a rather dull November scene is lightened up by those wonderful beams of light pouring through openings in the roof. It is the beams that make the picture, the work of an Edinburgh reader, P. Browning, who with it won first prize in Section A of the Photographic Contest of December last.

The Editor

Towers and Roofs

By Bernard Llewellyn

I SUPPOSE most of us are interested in heights. When I was a boy I used to plague the life of a favourite aunt of mine by everlastingly asking her questions about the height of Nelson's Column and the number of stairs leading to the dome of St. Paul's. Every time she called to see us, she produced some more figures from her handbag, and sometimes I suspected her of counting the stairs herself to make sure the reference books were right.

It was while I was standing with a visitor to London in the Whispering Gallery of Wren's great cathedral, listening to the quiet voice of the guide circling the wall, that I started to ponder on the strange fascination that towers and domes and high monuments exercise. In Blackpool visitors make a bee-line for the Tower; in New York they will not go home without seeing the view from the roof of the Empire State Building; in Paris the Eiffel Tower lifts are perpetually busy, and so on. All over the world people seem to want to get as far above ground level as they can and look down on familiar streets and buildings. Not only birds enjoy the bird's-eye view!

Of course there are exceptions. Some of us "can't stand heights;" others have an almost irresistible urge to throw themselves down. On one occasion I was leaning over the observation terrace of New York's highest skyscraper, trying to find the best position for a photograph, when I was suddenly seized by the coat-tails by a hefty uniformed guide. "Don't lean over, chum," he warned. "We lose too many people that way." The distant streets

have exercised a dangerous fascination for many.

I think I've got a pretty good head for heights; but I admit to moments when I have felt uneasy. There was, for instance, that wonderful day in Florence when I climbed up the spiral stairs to the gallery under the great dome which Brunelleschi built over the Cathedral of Santa Maria del Fiore. I stepped out of the dark stone

stairway to the railed gallery that runs, a giddy ledge, below the sombre paintings decorating the inside of Brunelleschi's masterpiece, which all the fifteenth century craftsmen had declared impossible to build. Poised there between heaven and the tiny figures in the nave below, I watched imperturbable craftsmen, sitting on cradles above my head, renovating and cleaning the giant paintings of the roof—human ants hanging in space.

Cathedral roofs are usually among the best spots from which to view the human scene. High up on St. Paul's, you look out over the

smoky magic of London's river. From the roof of Santa Maria del Fiore you witness another magic—that of Florence, a golden city which, legend has it, was founded in a field of flowers. There are the bridges over the lovely Arno; the churches and palaces; and, so near that it seems you could almost touch it, Giotto's famous bell-tower, rising up alongside the cathedral and looking almost too frail to bear the weight of the bells. The view from the top of the campanile is not comparable with that from the lantern of the dome.

Whenever I visit a cathedral, I always find myself looking eagerly for the little



St. Mark's Square, Venice, the loveliest square in Europe, is distinguished by the beautiful campanile seen in this picture.

dark entrance, usually to be found tucked away in a corner of the nave, that gives access to the upper heights by means of a spiral staircase, with a hanging rope for banisters.

Location as well as altitude is important if you are primarily concerned with the view. You see this in Paris. The Eiffel Tower at 984 ft. is far higher than the twin towers of Notre Dame. But the cathedral is centrally situated, and from its gargoyle-infested roofs you get better views of the city than from the more distant tower.

On the whole, when climbing in cities, I favour the lift if there is one about. I don't make a mania of climbing stairs. The lift in St. Peter's, Rome, is a gilded affair rather like a birdcage; but it lifted me effortlessly to the terrace, whence I climbed by cunning stairways inside the shell of Michel Angelo's immortal dome—to the upper cupola. When I emerged into the sunlight, all Rome lay at my feet. Spikes are set up the ribs of the dome's outer casing. When illumination is required, candles are fixed on these by those whose unenviable task it is.

But cathedrals are not the only good vantage points. It takes a steeplejack to give Nelson's eye a polish at the top of the 185 ft. column in Trafalgar Square. Barcelona's Columbus Monument, erected in 1888, is nearly forty feet taller than the London column; but



The best views over Paris are those from the towers of the Cathedral of Notre Dame.

the ordinary visitor can get a good deal nearer the figure of the great Genoese navigator, which is five times life size, than he can get to Nelson's. A tiny lift takes him up to the globe of the world on which Columbus stands.

I went up one afternoon and looked out over the port, the wide avenues, and the landmarks of the historic city. I remembered how Columbus had returned here in 1493 to tell the royal house of Aragon of the new land he had discovered to the westward across the ocean.

Another fine view of Barcelona can be got from inside one of the spires of the fantastic, unfinished Church of the Holy Family. This structure, of which only the spires and facade are completed, is unlike any church I have ever seen. The four immense, hollow spires

are built in open-work stone, so that as you ascend the spiral stairs within them you enjoy breath-taking views all the way up.

Throughout Italy you will find superb towers, of which the Leaning Tower of Pisa is but the best-known oddity. St. Mark's Square in Venice, for example, is overlooked by a fine campanile 350 ft. high. Inside, the customary spiral stairway is replaced by a ramp that climbs round the four sides of a square in short stages. This magnificent tower was built in 1912 to replace one that collapsed ten years previously, after standing for a thousand years.



The Great Wheel in the Prater, Vienna's famous park on the banks of the Danube.

Some people with a liking for heights combine a little excitement with their climbing. There were for instance those French climbers who went up the Eiffel Tower the hard way—hand over hand up the steel framework. But more common are the folk who find time to admire the view when they reach the top of the Big Dipper.

In Vienna there is a famous park called the Prater. It lies west of the Danube between the river and the Danube canal.

Some of my readers who saw the film *The Third Man* may remember it as one of the places featured in the film. In the Prater the tallest thing is the Giant Wheel, and that too, with Orson Welles and Joseph Cotten talking at the window of one of the revolving compartments, was conspicuous in the film.

The circle to the top and down again is a slow one, punctuated by numerous halts as people get in and out at ground-level. This gives the camera enthusiast his chance to make some of his memories of this once gay city by the Danube a little more permanent.

There is no room in this article to make more than a brief reference to architectural pinnacles east and west of Europe. American skyscrapers are too well known to need comment here. For every person who has stood on the high spine of the Rockies there must be a hundred thousand who, like me, have taken one or more of the 67 lifts to the observatory roof of the Empire State Building.

Far more beautiful than these steel and concrete blocks are the "precious towers" of China. That is what the Chinese call their pagodas, which are in fact religious monuments of the Buddhist faith, which reached China from India in the early years of the Christian era. Pagodas of great differing styles of course are found all over the Far East, from India to Burma and Siam. These lovely tapering

towers were frequently erected over some Buddhist relic; and their tapering beauty is sometimes thought to reflect the desire of worshippers to reach the peace of Nirvana, the Buddhist heaven.

Whatever the truth of this may be, pagodas provide lofty heights from which people can look down on the world. When I lived in Canton, I often climbed at week-ends to the top storey of the Flower Pagoda there; its wooden staircase and upper balconies were usually crowded

with Chinese families enjoying an outing.

Many of these pagodas rise well over 200 ft. into the air and they invariably have an odd number of storeys. Some of the largest and most famous took over sixty years to build and cost a fortune as well. Yet they are among the most popular of China's monuments: for hundreds of years pilgrims and visitors have been climbing their worn stairways. A few small pagodas have no stairs at all, and the adventurous traveller who wants to ascend them does so by means of a long plank which is thrown from the window of one storey

to the window of the one above. Such a mode of ascent calls for a particularly clear head!

Only a handful of us will ever climb Himalayan peaks, however envious we may be of those who took part in recent Everest expeditions. Many of us live a long way from mountain ranges. I do not pretend that the towers and monuments and spiral stairs I have been writing about are a substitute for mountains. That would be ridiculous; and I love mountains too much to pretend there is any comparison. But I have had a lot of fun looking out on the world from the tops of high places that man has himself built. And judging from the people I have met in lifts, on staircases and on remote roof-tops, I gather that other folk get a lot of pleasure doing it too.



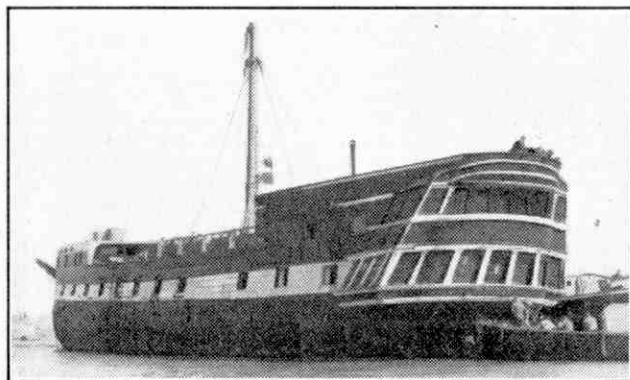
An Eastern gem. The Flower Pagoda of Canton.

An Old-Time Frigate

By David Gunston

JUST inside the narrow neck of Portsmouth Harbour, dwarfed by the warships of today, and close to the continually-running Portsmouth-to-Gosport ferry, lies a trim wooden wall that is the latest survivor afloat of Britain's old sailing navy. She is the little frigate *Foudroyant*, and although only half a mile away in the Dockyard lies berthed in concrete Nelson's famous flagship *Victory*, few of the countless tourists who visit the dry-docked vessel realise the existence of the frigate, now 136 years old, and still sound as a bell beneath the waterline.

The *Foudroyant* deserves to be better



The *Foudroyant* as she is today, moored permanently in Portsmouth harbour, where she serves as a holiday training ship for boys and girls.

known than she is, especially by young people, for instead of being a sort of dead museum, a decaying relic of past glories, she is very much alive as a Holiday Training Ship for youth. Starting at Easter each year, boys and girls from all over the country stay aboard her for a week's or a week-end's holiday, receiving strict nautical training amid the most interesting historic surroundings, and having a jolly good time into the bargain. The frigate is really carrying on the good work formerly done in conjunction with the old French man-o'-war *Implacable*, which had to be scuttled in December 1949 as unfit for further service.

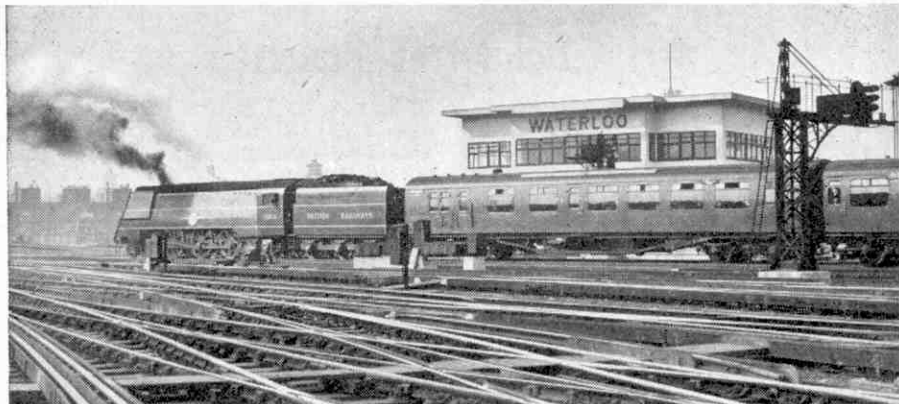
With her low lines, neat in her fresh black and white paint, with decorated stern galleries and proud figurehead still in place, she catches the eye at once, this

one-time 46-gun two-decker. Her figurehead especially is a striking one, of a noble Indian prince, complete with turban, robes and dark complexion. He has gazed out on salt water ever since 1817, when the ship was launched from the old East India Company's Dock at Bombay, and he gives a clue to her origin. For in spite of her French name, the *Foudroyant* is really a British warship, formerly H.M.S. *Trincomalee*, once the fastest ship of the line in the Navy.

Like most of these wooden ships, she carried a fine head of sail and presented a vastly more romantic sight than she does now, with only her mainmast surviving, and the minimum of rigging. She fought in the Crimean War, and was eventually sold to be broken up, for by then iron ships had arrived, with steam to drive them. But the frigate was saved by private intervention and re-named *Foudroyant*, and now, after some recent underwater renovations, she is fit for another half-century of good work.

In her prime her crew numbered several hundred pig-tailed bluejackets, but now her spacious gun-decks are filled with hammocks and trestle tables, and about 100 youngsters a week spend an exciting time aboard. They are taught sailing, the rudiments of seamanship, rowing, swimming, signalling, life-saving and all the rest, amid surroundings that are unique. Discipline is of the strictest, but all is jollity, and although the accommodation is not luxurious it is comfortable, and the training given is absolutely first-class.

A week on board costs three guineas inclusive, and a week-end only, one guinea. There is keen competition for this fine holiday training, but the Hon. Secretary, the *Foudroyant* Committee, Society for Nautical Research, National Maritime Museum, Greenwich, London S.E.10, will give further information.



Waterloo to Padstow by A.C.E.

By E. G. Rudkin

WHEN I heard last summer that the down *Atlantic Coast Express* was to be accelerated to run between Waterloo and Salisbury in less than even time, and with a quicker schedule thence to Exeter, the temptation to travel on it was so great that I promised myself a trip during the first week. Accordingly, rising at 4.30 a.m. on 1st July, I travelled from Derby up to London so as to obtain a complete log of the journey from Waterloo to Padstow.

On my arrival at Waterloo the train was already at Platform 10, and at its head, resplendent in brilliant blue livery and gleaming in the bright sunlight, was one of the magnificent Bulleid Merchant Navy Pacifics, No. 35015 *Rotterdam Lloyd*. Driver Hart, of Nine Elms, was away on the dot at 11.0 a.m., and *Rotterdam Lloyd* was soon gently nosing her way westward round the sharp curves out of Waterloo. Once through the maze of Clapham Junction, and clear of the suburban area at Malden, speed quickly rose to the limit of 70 m.p.h. imposed as far as Surbiton. Hampton Court Junction was passed 1½ minutes early, and after passing Sandown Race Course, just before Esher, speed was maintained in the sixties on the rising gradients to Weybridge and past the old motor racing track at Brooklands, falling to 58 by Woking Junction, where we were still just over a minute early.

The illustration at the head of the page shows the *Atlantic Coast Express* outside Waterloo Station on the point of departure for the west, headed by 4-6-2 No. 35016 *Elders Fyffes*. This and the illustration on the opposite page are from British Railways Official Photographs.

Running was rather restrained over the ensuing 23-mile stretch of automatic-signalled line to Basingstoke. The Canal Aqueduct at Farnborough was traversed at 65 m.p.h., and speed dropped slightly past the huge Fleet Pond to 59 at Hook, increasing to 62 through Basingstoke. On the still rising gradients we picked up to 66 m.p.h., but were one minute late at Worting "Flyover" Junction, and in view of the programmed relaying slack at Hurstbourne further on, matters did not now look so favourable. Speed fell to 59 m.p.h. at the 53½ mile post summit, which is the highest point between Waterloo

and Salisbury, but on the following downhill stretch rose to 71 past the Bank of England paper factory at Overton (57 min. 10 sec.) and to 82 m.p.h. at Whitchurch North, our first "80" of the journey.

This burst of speed almost enabled even time to be made for the first time before the brakes were fiercely applied for the 15 m.p.h. slack just beyond Hurstbourne. But once past the restriction, speed rose to 68 by Andover, and then Driver Hart made a valiant effort on the 11-mile Porton bank to wipe out the arrears by accelerating on this glorious downward glide through the heart of the Wiltshire Downs. Speed rose from 80 m.p.h. at 77 mile post to a maximum of 85 m.p.h. within three miles. Then the wonderful spire of Salisbury Cathedral came into

view, and the brakes were on again, this time for the slack at Tunnel Junction. *Rotterdam Lloyd* was soon pulling up to a stop at the water column at Salisbury, just inside even time, but a token 25 seconds late.

Two minutes overtime were unfortunately incurred here, apparently in respect of engine requirements, but once past Wilton curve, speed increased on the ascent through the Nadder Valley, rising to 66 m.p.h. at Dinton before falling away to 60 at Tisbury and 53 m.p.h. over the top at Semley. How many travellers know, by the way, that Tisbury Churchyard, besides being the special burial place of the Arundells of Wardour Castle, also contains a 1,000-year old yew tree, the trunk of which is filled with concrete to keep it standing? Once over the gable at milepost 101½ Driver Sims of Exmouth Junction, who had taken over at Salisbury, accelerated down the ensuing 4 miles in 1 in 100-130, passing Gillingham at 83 m.p.h. and increasing to 86 before Templecombe.

The Templecombe bank brought speed down to 55 m.p.h. but once past the "plateau" beyond Milborne Port, 33 min. 10 sec. from Salisbury, a thrilling burst of high speed on the five-mile Sherborne bank at 1 in 80-448 resulted in Yeovil Junction being passed in 1½ minutes under the 41 minute schedule, and in almost even time, from Salisbury.

Sutton Bingham bank brought us down to 57 m.p.h., while the more formidable 2½-mile Crewkerne bank at 1 in 80 saw a further reduction to a rather low 43 m.p.h. at Hewish Summit; and it was in the vicinity of milepost 131 that the up *A.C.E.* flashed by in about 3 seconds, at a relative speed of perhaps as much as 150 m.p.h.

From milepost 133½ Driver Sims and the seven-year old *Rotterdam Lloyd* made their supreme effort. We swept like a hurricane down the glorious 13-mile racing ground to milepost 146½ in an endeavour to regain the one minute arrears. Speed was up to 85 m.p.h. through Chard

Junction, passed in less than even time from Salisbury, and this limit may have been exceeded somewhat at milepost 142. We flashed like a meteor under the ancient Roman Fosse Way Bridge and through Axminster ere the brakes were slammed on for a 15 m.p.h. relaying slack between the 148 and 148½ mileposts. This is surely the worst possible spot for a restriction at any time on the westbound run, falling as it does at the foot of the five-mile stretch of 1 in 80 of the most formidable Seaton bank.

Once past the slack at Seaton Junction, and now heading north-west up into the hills, speed gradually increased from 24 m.p.h. at milepost 150 to 37 m.p.h. at the summit at the west end of the long Honiton Tunnel. The dash down Honiton bank at 1 in 90-100 saw 85 m.p.h. slightly exceeded again before drawing to a smart stop at Sidmouth Junction, now 3½ minutes late because of the Seaton relaying. Here the station staff were really on their toes, but as at Salisbury, overtime to the



A characteristic view of a Merchant Navy 4-6-2 No. 35010 Blue Star in charge of the down Atlantic Coast Express near Winchfield.

extent of 1¾ minutes was incurred. So we left 5¼ minutes late, doomed to a late arrival at Exeter. A last thrilling burst down Whimple bank through the vast apple orchards produced a brave maximum in which 85 m.p.h. was topped again, between Broad Clyst and Pinhoe. And so, with even time just achieved on the third and last leg, the *A.C.E.* drew to a stop in the pleasant Central Station exactly 4¼ minutes late.

Exeter was the end of the super high speed running, but West Country Class Light Pacific No. (Continued on page 164)

Water Supplies for Great Cities

By W. H. Owens

IT is so easy to turn on the domestic tap that, except during rare periods of serious drought, we take the miracle of our modern water supplies for granted. Just as primitive men regarded pure flowing water as Nature's divine gift, and made every wayside spring a holy shrine, so today the unfailling tap is indispensable to our civilisation.

In a hundred and one different ways the water tap safeguards health, yet it is only in comparatively recent times that it has assumed this vital function. Many of our ancestors of a century or

three hundred miles. At least three of the aqueducts are still in use today.

Wherever the Romans conquered they left masterpieces of water engineering like the famous Pont du Gard, near Nimes, in the South of France. This very remarkable aqueduct, built over two thousand years ago, in the time of the Emperor Augustus, consists of three massive tiers of arches, 160 feet high, spanning the valley of the river Gard. It was part of a 26-mile conduit that piped water to the Roman city of Nimes. There is a similarly impressive Roman aqueduct at Segovia in Spain.

After the decline of Roman civilisation, the art of water engineering on such a scale was lost for centuries. The deadly plagues that time and again ravaged European cities in the Middle Ages and later were due primarily to the filthy condition of the rivers or wells from which meagre supplies were drawn. A few English towns, such as Exeter, Plymouth and Hull, could boast reasonably good artificial water supplies at quite an early date, however. From the thirteenth century onward a number of West of England towns had



Craig Goch Reservoir, one of the three originally constructed in the Elan Valley, Radnorshire, to supply Birmingham with water. Photograph by courtesy of the City of Birmingham Information Department.

so ago died of cholera and other terrible diseases contracted through contaminated drinking water.

Strange as it may seem, the water supply of Ancient Rome was altogether superior to that of London in the early nineteenth century. It was much purer and more abundant. For the Romans excelled as water engineers as they did as road builders, and they created first-rate artificial supplies for their cities by discovering how water could be conveyed over distances through aqueducts. Water was brought from the hills to supply houses, bathing establishments and street fountains in Rome by about twelve main aqueducts which, with their network of branches, had a total length of some

open leats, or channels, built to bring in water from the neighbouring hills. At Tiverton, Plymouth, Honiton and elsewhere, stretches of these leats can still be seen.

London once drew its water supplies from numerous wells, and from the Thames and its tributary streams, such as the vanished Walbrook and Fleet. But as the mediæval city grew the wells steadily dried up and the rivers became badly polluted, so new supplies had to be sought from outside.

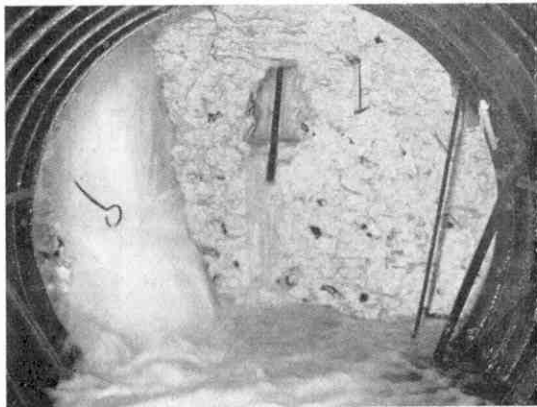
Over seven centuries ago Henry III granted Londoners the right to lay piped supplies, attached to conduits, along the streets. People either fetched the water themselves from the conduits or they could buy it from the water-carriers who, in

Tudor times, became a powerful trade guild and for many years strenuously opposed every scheme put forward for the improvement of the city's water arrangements.

About 1580, however, a Dutchman named Peter Morrys set up the first waterworks under the arches of Old London Bridge, with a pumping plant operated by powerful water-wheels. This survived until 1831, when the bridge was demolished. Meanwhile, a great advance was made at the beginning of the seventeenth century when Hugh Myddelton, a London goldsmith, cut a 40-mile open channel from the town of Ware, in Hertfordshire, to Clerkenwell, then a village on the northern outskirts of London. The New River Scheme, as this was known, was opened in 1613 after James I had contributed financially towards its completion.

The New River, although no longer a source of supply, still forms a part of the vast water undertaking that supplies about 6½ million inhabitants of Greater London and is controlled by the Metropolitan Water Board. The Board draws its supplies from the Thames, the river Lee and from wells, the Thames contributing about two-thirds of the daily average of 320 million gallons.

The science of water purification was not very far advanced a century ago. But by 1852 the pollution of London's

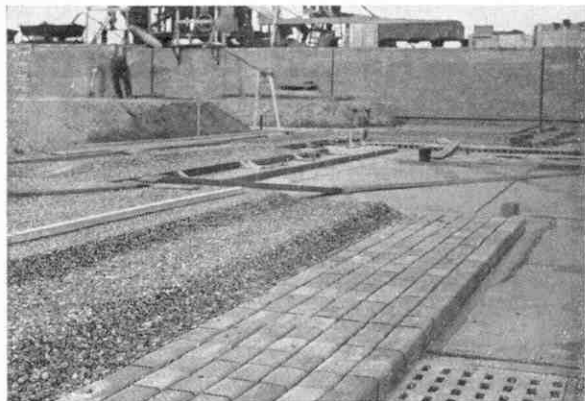


Deptford Well, a heading in the chalk. This is one of London's most prolific well stations, giving up to five million gallons of water a day.

supplies had become so alarming that Parliament passed an Act directing that river water must be filtered, and forbidding the companies to draw supplies from the Thames anywhere below Teddington Weir. The process of purifying water by filtration through sand was invented just over a hundred years ago by James Simpson, engineer to the Chelsea and Lambeth Water Companies. Although his filter beds covered only one acre, the results were very successful and became the foundation of our present-day methods.

Since then purification of municipal water supplies has made great progress. In London, laboratory examination of the water by biologists, bacteriologists and chemists is systematically carried out to ensure that the water in every tap is absolutely pure. The various examinations are based on daily samples collected from all points of the water supply system.

River water begins its journey to the consumer by being pumped into storage reservoirs. From there it is passed on to the filtration plant. The Metropolitan Water Board use a system of double filtration consisting of roughing filter beds first and slow sand beds afterwards. The roughing beds are of the open gravity type, and by supplying partly filtered



A slow sand filter bed under construction. The illustrations on this page are reproduced by courtesy of the Metropolitan Water Board.

water to the slow sand beds the output is considerably increased.

Slow sand filters consist of layers of sand and gravel, laid on a floor covered with a continuous system of underdrains of bricks spaced apart, perforated tiles or porous concrete. Water flows on to the top of the filter, percolates slowly downward through the sand and gravel, and leaves behind on the surface a film of silt, debris and micro-organisms. This film is capable of holding back even bacteria. After some time the surface film becomes so thick as to reduce the rate of filtration until it is necessary to shut off the bed for cleaning.

When the water leaves the filters it receives a small dose of chlorine to ensure the complete destruction of any undesirable bacteria that may have escaped the filters. After chlorination it is pumped through an intricate network of underground pipes and does not emerge into the light again until turned on at the tap.

While London draws its water supplies from close at hand, other big cities have had to go far afield. Birmingham and Liverpool get their tap water from Wales, Manchester from the Lake District, and Glasgow from the Perthshire Highlands. During the last eighty years, many valleys in different parts of Britain have had to be flooded and whole villages with churches and farms submerged to satisfy the thirst of rapidly growing towns and cities.

Birmingham receives its water through a 73-mile aqueduct from three great reservoirs in Radnorshire. These Elan Valley lakes, set amid rugged mountains and hillside forests, are so beautiful that it is difficult to realise they are in fact man-made. The reservoirs on the river Elan collect water from a catchment area in the hills nearly the size of Birmingham itself, and have a combined capacity of 11 million gallons. Now a fourth reservoir on the river Claerwen has been added, with a storage capacity higher than that of the

three already existing. Its construction was described in the January *M.M.*

The Caban Coch Dam, impounding water in the largest of the three earlier reservoirs, is 556 feet long and rises 120 feet above the river bed. But the new Claerwen Dam is about half as high again as any in the Elan Valley, and its overall length, 1,166 feet, is nearly double that of the Caban Coch.

Liverpool's huge reservoir scheme at Lake Vyrnwy, amid the wild Montgomeryshire mountains, dates back about seventy years. Vyrnwy is the greatest and one of the most picturesque

of the Welsh lakes, almost five miles long with its twelve-mile circumference encircled by a motoring road from which splendid views are obtained. It took ten years to build the enormous 1,172-ft. dam across the valley, and at that time it was the largest in Europe—a spectacular engineering achievement. As in the case of the Birmingham reservoirs, a peaceful Welsh valley and its village had to disappear forever under Lake Vyrnwy, though new houses and a new

church were built for the displaced inhabitants at a higher level.

Thirlmere and Haweswater, in the Lake District, lie nearly a hundred miles from the city of Manchester, which they keep supplied with water. The Thirlmere dam was built about the same time as that at Lake Vyrnwy and is a comparably fine piece of engineering. Haweswater, in Westmorland, was brought into the Manchester scheme some years later and involved the sacrifice of Mardale village and its once famous Dun Bull Inn, now replaced by the Haweswater Hotel.

One of Britain's most modern reservoir schemes—the Derwent Valley Scheme in the Derbyshire Peak District—supplies nearly 40 million gallons of water daily to the industrial cities of Derby, Leicester, Nottingham and Sheffield.



Inside the primary filter house at Hampton Waterworks. Metropolitan Water Board photograph.



THE 2nd September, 1952, was a wonderful day for British aviation, and few of the 30,000 people who attended the S.B.A.C. Display at Farnborough airfield on that Tuesday are likely to forget the atmosphere of tense excitement which followed an announcement that the Saunders-Roe Princess flying boat and Britain's new delta bomber, the Avro 698, would fly past during the afternoon.

Sure enough, half way through the flying display, the lovely Princess cruised past, looking sturdy, fast, regal and graceful in a way that only a ship, with or without wings, can look. Then, with their Derwent turbojets roaring, the two little Avro 707 delta-wing research 'planes took off, first the red 707A and then the blue 707B. As they disappeared in the distance over Laffan's Plain, where that great pioneer Col. S. F. Cody made the first flights from British soil in 1908-9, the show went on.

Suddenly the whole airfield was hushed as 30,000 pairs of eyes were turned towards the Plain, straining for a first glimpse of the fantastic bomber which was so secret that it could not be landed at the display. Three tiny specks grew bigger and bigger incredibly fast and in a matter of seconds the sleek, white-painted Avro 698 was overhead, flanked by its tiny "parents," the 707s, their colours and their shape proclaiming unmistakably to the world Britain's leadership in the skies.

Any lingering doubt of that leadership was dispelled by Roly Falk's brilliant demonstration of the 698, which has since

been named Vulcan. Although it had completed only 2 hrs. flying by then, he swept across the field so fast that the speedy little 707s seemed to be left behind, and so low that one almost felt compelled to duck. He then came back with the aircraft's four tremendously powerful Rolls-Royce Avon turbojets throttled right back and small,

odd-looking dive brakes extended above and below the wing, so that the bomber ambled over the field, tail down, unbelievably slowly. Only later, while overseas visitors were still rubbing their eyes to find out if they were

really awake, did the announcer add that Roly Falk was flying the complex giant all by himself!

Even now there is little more that can be written about the Vulcan, except that it can carry Britain's new atomic bomb, or more ordinary bombs higher, faster and farther than anything else in the world. But Avro have stated that they are developing a civil air liner version of the Vulcan that will be able to carry 150 passengers with their baggage, and perhaps a bit of freight, from London direct to New York; then, after an hour or two on the ground, fly back to London, and after a further hour or two, fly back once more to

New York—all in the same day. Quite a lot of people got out their slide rules and said "Crikey" after that statement.

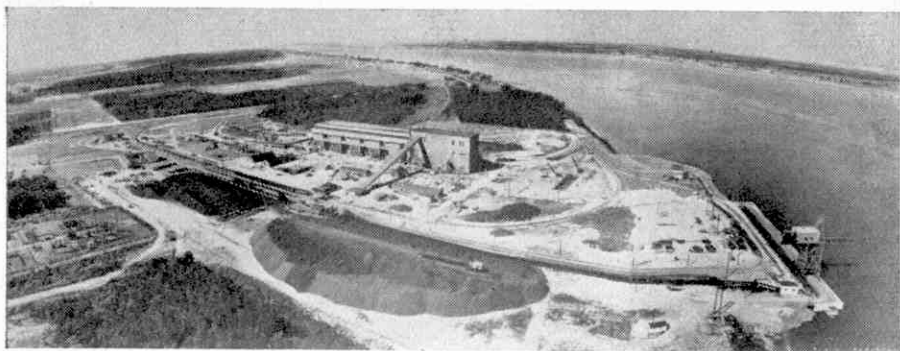
The Vulcan's claim of "more bombs faster and farther" has since been challenged by the crescent-wing Handley Page Victor, which made its first flight last Christmas Eve. (Continued on page 164)

Britain's Delta Bomber

By John W. R. Taylor

The picture above shows the remarkable Avro Vulcan four-engined Delta bomber, and is reproduced by courtesy of Hawker Siddeley Group Ltd.

Both this photograph and the striking view on which our cover is based are by Cyril Peckham.



Project Titanium

A Wonder Metal of the Future

By F. Illingworth

In a bank of furnaces on the St. Lawrence River, midway between Quebec and Montreal, a new metal with an almost limitless future in industry and the home is being made. Its name is titanium. Six hundred miles to the east, on the north bank of the St. Lawrence, construction gangs have flung a railway across incredibly wild country to the heart of the world's largest deposits of ilmenite—the black ore from which the new wonder metal is derived.

"There's so much of the stuff there we just haven't troubled to determine the total extent of the deposit," I was told by Mr. Vic Wansbrough, vice-chairman of the Canadian Metal Mining Association. "We stopped the diamond drills when we'd 'proved' 125,000,000 tons of ore containing on an average 36 per cent. of ilmenite and 42 per cent. iron; just no point in knowing there was more there!"

At Sorel, site of the great new furnaces, I was told: "This is the most important development in the industrial history of Canada. We're making a new metal which may, in time, outstrip steel in tons produced."

The Sorel furnaces turned out only 60 tons of titanium in 1950, the first year of Project Titanium. Last year the figure leapt to 2,500. Next year it will exceed 4,500 tons. But the mining men at the Lake Tio deposit and the scientists and

production men at Sorel speak of such tonnages as "small beer."

"We're thinking in terms of half a million tons of titanium annually," they told me.

What is it about titanium that makes it so valuable? It is half the weight of a piece of steel the same size, yet it is as strong as the stainless steels and considerably stronger than the light

metals, including aluminium. It also has a great resistance to corrosion. Indeed, it is the only metal except platinum that withstands sea-water satisfactorily. Marine engineers certainly have their eyes on this remarkable product. It would put an end to the

need to paint hulls, and would mean lighter and therefore faster ships.

Aircraft manufacturers also would have many uses for a metal that is both lighter than steel and stronger than aluminium. Planes now fly at such speeds that air friction lifts temperatures to a point that weakens the lighter metals—aluminium, for example. Titanium indeed provides the answer to many of the problems arising from the birth of the Jet Age, and it seems as if there will be more uses for the new wonder metal than there are for aluminium.

Why, then, is it only now that metallurgists are "going after" titanium? The answer is this. We have long known

The plant at Sorel, Quebec, on the bank of the St. Lawrence, where ilmenite from the Lac Allard region is smelted to give pig iron and titanium slag. A 160,000 h.p. generating station was built to supply power for this plant.

of this metal's remarkable qualities, but it is only in these last few years that metallurgists have learned how to extract the titanium from the black ore in which it is contained.

After they had solved this problem, the Canadians set to work to broach the vast beds of ore lying in sullen blackness along the banks of a blue lake, 27 miles inland from the little fishing village of Havre St. Pierre, on the north bank of the St. Lawrence.

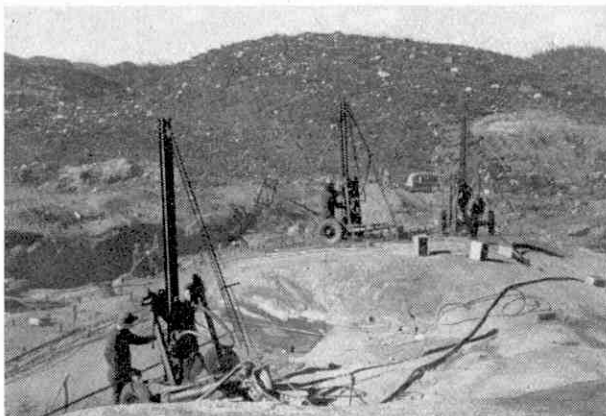
This entailed building a railway from St. Pierre to Lake Tio, site of the main deposit; constructing a deep-water loading and storage wharf at Havre St. Pierre; and building a smelter at Sorel, 600 miles up the St. Lawrence, where there was adequate hydro-electric power to "run the joint."

Work on Project Titanium opened in 1948, and after a little more than two years the first shipment of ore arrived at Havre St. Pierre from along the new railway for shipment to the new furnaces at Sorel.

The construction of the railway proved far from simple. The route lay over bare rock and bog. It involved excavating more than 130,000 cubic yards of bog,

and at one place a maximum depth of 120 feet of "fill" was necessary.

Engineers blasted 400,000 cubic yards of "fill." They built two bridges, one—that across the Romaine River—more than 1,600 feet in length; and they hacked



Boring after clearing the ground on the site of Canada's great ilmenite mine at Lake Tio.

a tunnel 700 feet long through the rocky heights leading to the ore-beds.

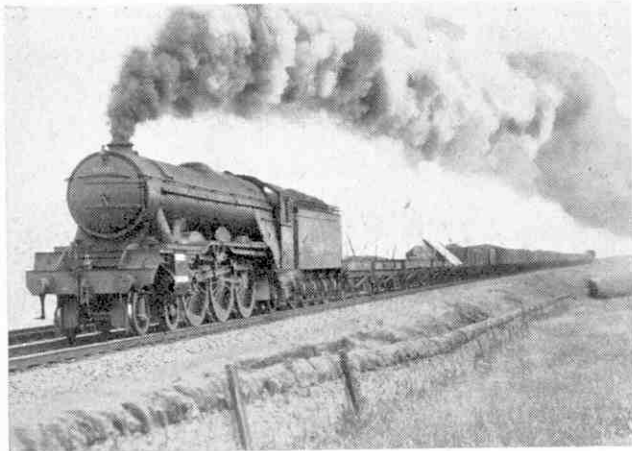
The construction of the wharf at Havre St. Pierre and that of the furnaces at Sorel also provided many problems. But the work was completed on schedule.

"No time to waste," the Canadians told me. "We've got a big future for ilmenite ore." And in little more than two years, the £10,000,000 Project Titanium had stepped into its stride and the £3,000,000 smelter at Sorel was in operation. Now production is going up every month.

Very little can be said about the new process of extracting titanium from ilmenite ore. "We're not talking," say the Canadians. "We'll not say more'n this: the ore is crushed, dried and mixed with coke for charging to the furnaces; the furnace temperature is exceedingly high, and the result of the smelting operation is 500 tons of pig iron and 700 tons of titanium dioxide slag from every 1,500 tons of ore."



Lorries bring ilmenite to the siding where the ore is loaded into railway trucks, for despatch to the smelting plant at Sorel.



In this photograph by E. R. Wethersett a Gresley Pacific is shown on rather unusual duties. No. 60037 "Hyperion" is near Burnmouth with a freight train that includes a long line of coal wagons.

Railway Notes

By R. A. H. Weight

Luggage Labels for Irish Mail Passengers

Attractive tie-on labels were recently being supplied to passengers by the London-Dublin express train and steamer service via Holyhead. The colour scheme represents that used for painting and lining the British Railways corridor carriages, with a window in which the name and address can be inserted. Included is a caption reading *The oldest named train in the world, running since 1848*, though the title may not have been used officially throughout the 105 years.

News from the Scottish Region

Thornton Junction is a key point on the East Coast main line north of the Forth Bridge. To provide for increasing quantities of coal and empty wagon traffic passing to and from old and new collieries in the Fife area a marshalling yard is to be laid out there, with nests of sidings, additional and modernised signal boxes, and other equipment facilitating rapid sorting and dispatching of freight trains.

The recently withdrawn class 4 mixed traffic type 4-6-0 No. 57954 was the last of the former Highland Railway's "Big Goods" or "Clan Goods" type. This engine was H.R. No. 79 and L.M.S. 17954. It was built in 1918 and had always worked in the Highlands, stationed at Inverness. Apart from smaller driving wheels and cylinders the class were almost the same as the well known "Clan" express 4-6-0s, now no more, an advance on the famous Jones goods 4-6-0s, which instituted that wheel arrangement in Britain as long ago as 1894.

The first withdrawn Midland type compound 4-4-0s built as L.M.S. standard engines in 1924 and after are Nos. 40911, 40918, 40922, 41109, 41171 and 41182. Ex-L.N.E.R. 2-6-2Ts No. 67604, 67606 and 67624 are now V3 class.

New locomotives have been allocated as follows: standard class 4 2-6-0s built at Horwich; Nos. 76000-4, 66B, Motherwell; class 4 2-6-4Ts constructed at Derby; No. 80003, Motherwell, Nos. 80004-5, 61A, Kittybrewster, Nos. 80006-7, 66A, Polmadie, and No. 80008, 67A, Corkerhill; 350 h.p. diesel-electric

shunters numbered 13005-8 to 67B-C, Ayr or Hurlford.

Clan 4-6-2s have been seen on trains running from Perth to Inverness as well as to Edinburgh, Waverley, Interchange of Pacific, 4-6-0 and 2-6-0 type locomotives continues on various former L.M.S. and L.N.E.R. routes.

Important Railway Development in Brussels

A notable connecting railway through the heart of the Belgian capital was opened in October last, with six tracks partly in tunnel connecting the Nord and Midi termini, which are being rebuilt as fine through stations on a higher level. There are also new intermediate stations outdoors and in tunnel, electric traction and signalling. The whole scheme is a noble conception, with work still in hand, enabling great improvements to be effected in long-distance through running as well as in local transit.

Eastern and North Eastern Regions

The D class solitary inside cylinder Hunt 4-4-0 No. 62768 *The Morpeth* has been withdrawn as a non-standard engine after suffering collision damage at Starbeck.

There are now none of the ancient Great Eastern 0-6-0 Stratford Works tank locomotives fitted with a crane for handling materials, recently known as class J92. No. 68668 was the last to remain. There were three little tanks of this kind for many years known as B, C, and D, without numbers.

The Railway Observer announces that departmental locomotives used only in railway works or depots in these Regions are receiving new low "service" numbers.

V2 No. 60854 has a copper-capped new chimney of a type designed to provide better steaming qualities in conjunction with self-cleaning smokebox. V1 2-6-2Ts Nos. 67636 and 67652, now carrying higher boiler pressure, have been modified to V3. New class 4 2-6-0s Nos. 76020-2 are allocated respectively to Darlington, York and Hull (Dairycoates).

Five V2 2-6-2s and three K3 2-6-0s recently moved from Heaton to Tweedmouth Shed. When hauling football excursions in December, B1 4-6-0s Nos. 61119 and 61399, starting in the Great Eastern suburban area respectively at Hoe Street (Walthamstow) and Ilford, proceeded via Stratford, Willesden, Clapham and Streatham Junctions right across London to S.R. suburban stations at Haydon Road (Wimbledon) and Carshalton on electrified lines. More diesel-electric 0-6-0 shunting locomotives have entered service, including No. 12133, at 31B, March, and Nos. 12134-6, 30A, Stratford.

I well remember going down the main line from King's Cross to Hatfield in 1913, to meet what had been described to me as an enormous new freight locomotive on its maiden trip with a heavy coal train from Peterborough to London. It was the first Gresley 2-8-0, G.N.R. No. 456, afterwards L.N.E.R. No. 3456, class 01, of the original 2-cylinder series latterly known as class 03, which has now become extinct as the one remaining example has been condemned. The former G.N.R. 3-cylinder 2-8-0s are class 02, a good many more having been built in L.N.E.R. days.

Among the streamlined Pacifics noted at work almost continuously during the second half of last year from King's Cross shed, including Pullman runs to Leeds and Newcastle, were *Seagull* and *Silver Fox*.

The latter appeared to have run an enormous mileage since last in works for general overhaul. Some of the roller-bearing-fitted, and other A1 4-6-2s were also very much in the main line picture.

A Remarkable Signal Box at Ealing

Among the remarkable features of the new London Transport signal box at Ealing Broadway terminus, handling Central as well as District line trains, are a control desk on which any one push-button may operate points and signals for a particular route and then return to normal automatically after a train has passed. The buttons are made of transparent plastic and by means of refracted coloured lights change colour from red to yellow or green in accordance with the position of the signals. The signalman also has the advantage of being able to "preselect," that is to say he can press the button for a subsequent train movement after he has cleared the signals for a previous one. Immediately the first train has passed through its route, the points will be operated for the next or second route and the signals cleared without any further effort on his part.

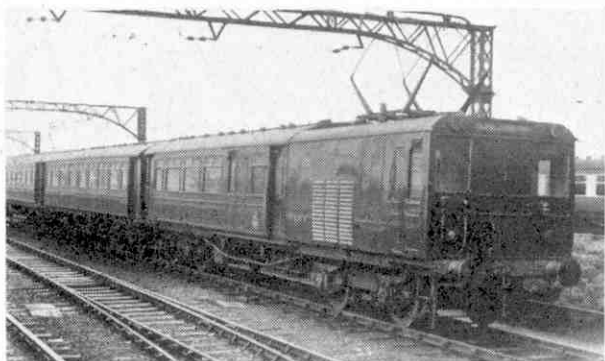
There are 24 colour-light signals and 24 sets of points controlling about 500 movements per day of multiple unit electric trains. The Western Region main line station at Ealing Broadway is adjacent to the L.T.E. one, $5\frac{1}{2}$ miles from Paddington. Safety is ensured in the new installation by track circuits, trainstops at passenger train signals and electric locking.

Exceptional Loads by L.M.R.

Diesel locomotives for Benguela, New South Wales and Rhodesia, and railway coaches and equipment for Ceylon, Kenya and Egypt were among the record total of 8,948 out-of-gauge loads carried on the L.M.R. during 1952. Heaviest load was a 119 ton electric transporter. One of the longest hauls was from Stratford to Dunfermline, 300 miles.

Electric Trains in Morecambe Area

Trials are taking place between Lancaster and Morecambe, on the former Midland line, with electric trains using high voltage A.C. It is fitting that this line should be used for these experiments, as the first A.C. system in Britain was opened in 1908 between Heysham and Morecambe, and extended to Lancaster



A three-coach electric train set modified for the experimental high-voltage A.C. supply recently installed between Lancaster and Morecambe, L.M.R. Photograph by W. S. Garth.

(Green Ayre and Castle stations). This pioneer installation operated till recently.

This new system is an addition to a number of different methods of public transport which have operated in the area during the last 40 years. Most towns have seen the rise and decline of various types of equipment, but it is doubtful if any had so many in operation at the same time. At one time, in addition to the M.R. electric line, the Morecambe and Lancaster area had horse trams, electric trams, petrol driven trams, these between Morecambe and Heysham; and the writer has recollections of electric buses operating in Lancaster, these having batteries charged between trips. There were, of course, steam trams as well.

W. S. GARTH

Powerful Swiss Electric Locomotives

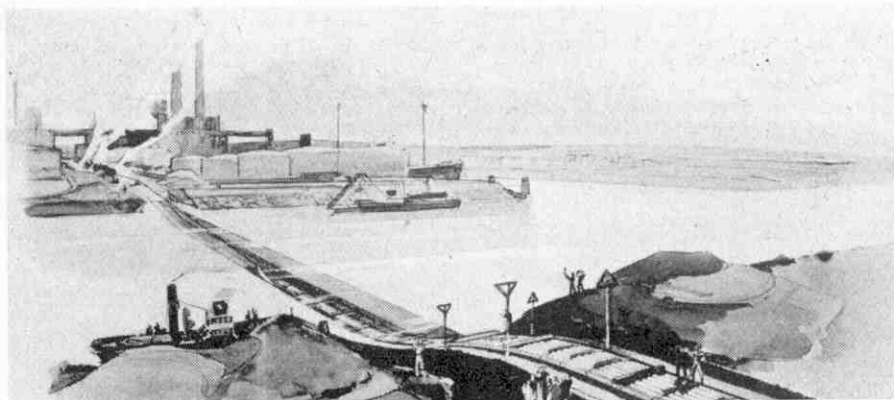
When I was last in Switzerland before the second world war, some of the most striking locomotives used over the severely graded St. Gotthard route into Italy hauling heavy express trains, amid magnificent mountain scenery, were of the twin-unit Ae 8/14 type, weighing in all about 240 tonnes. Combined research has produced a new Ae 6/6 design, a single unit locomotive having two six-wheeled bogies, each axle powered by a 1,000 h.p. motor. This is almost twice as powerful as the normal Ae 4/7 express type of 25 years ago, though weighing little more at 122½ tonnes. The wheel diameter has been reduced to 4 ft. 3 in. to aid adhesion, yet it is anticipated that the maximum speed can be raised from 68 to 78 m.p.h. and loads up to 600 tonnes handled.

Motive Power Depot Improvements

Improvements at Birkenhead motive power depot (L.M.R.) to aid the staff in dealing with the 93 engines maintained there will include mechanical coaling and ash plants, more water columns, and electric light.



Here is 0-6-0T Ryde, No. W3 of the Isle of Wight section of British Railways Southern Region, taking water. This effective view is from a photograph by R. Russell.



An artist's impression of the pipe-laying operation across the Elbe at Shell's Harburg Refinery. The rails on which the pipelines were launched are seen being greased in our lower illustration. Shell photographs.

Launching a Pipeline

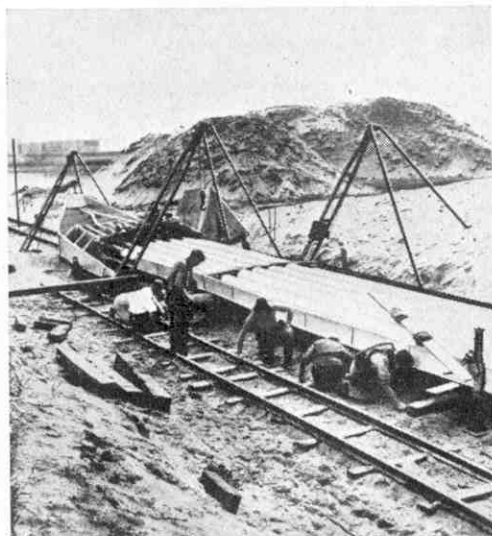
WHEN Shell found it necessary to expand their Harburg refinery, on the banks of the Elbe at Hamburg, the only land available was on the opposite side of the river to the refinery itself, and there new storage tanks and pump and boiler houses are now under construction.

Pipelines were necessary to carry petroleum products across the river, here a quarter of a mile in width. It was impossible to follow the usual plan of floating these into position on pontoons and then lowering them to the bed of the river, as there is too much traffic on the river, and there are also complications in the rise and fall of the tide to contend with.

The ingenious scheme that the Shell engineers worked out was to lay the pipes side by side on a continuous steel plate and to bolt them in position on it. The whole assembly, made up of eight pipelines, was laid out on a launch way consisting of greased rails placed at right angles to the river, with the approaches on both sides cut back to give an easy run. What is described as a launch nose, with upswept bows like those of a war-time landing craft, was fixed at the lead end, and the assembly was pulled across the river by three powerful locomotives.

The pipes were protected against corrosion by giving them thick coatings of bitumen and glass fibre

wrapping. With its launching nose the assembly weighed 160 tons, and it was hauled across the river at a speed of two to three miles an hour. Five sets of traffic lights, walkie-talkie radio and telephones on each side of the river allowed for complete control up to the moment when the pipes settled into the channel dredged in the bed of the Elbe to receive them.



BOOKS TO READ

Here we review books of interest and of use to readers of the M.M. With certain exceptions, which will be indicated, these should be ordered through a bookseller.

"ACROSS THE SPACE FRONTIER"

Edited by CORNELIUS RYAN
(Sidgwick and Jackson, 21/-)

This addition to the rapidly growing list of books on rocket flight development suggests, as a practical step in the exploration of space, the establishment of a "space station" at a point 1,075 miles above the Earth as a base from which to carry out further exploration of space. This station would be in the form of a huge three-decked, wheel-shaped satellite, 250 ft. wide. The men to build it, the materials for its construction, and the research and maintenance equipment to be installed in it, would be sent to the chosen location in space by rocket ships, as later would be the research staff to use it. The men would wear grotesque-looking pressurised suits and carry oxygen for breathing. When completed this great satellite would revolve round the Earth at so great a speed that it would make one complete revolution every two hours. A fleet of rocket supply ships would maintain communication between the Earth and the space station.

This is no idle flight of fancy, but a carefully thought-out plan put forward seriously by a group of American scientists noted for their researches into rocket flight and problems of the upper atmosphere. They claim that all the engineering knowledge required to make possible the construction of the rocket ships and space station outlined in this book is available now, and that if the plan was adopted such a space station could be in service 10 to 15 years hence.

Sir Harold Spencer, Astronomer Royal, contributes a foreword. The book is illustrated with excellent line drawings, striking full-page colour plates, and end-papers showing in colour what the huge wheel-shaped space station would look like as it revolved round the Earth.

"BRITISH CARS 1952"

By PETER CHAMBERS (P.C. Publications, 6/-)

Readers who like to be able to identify immediately any British make of motor car will delight in this book. It illustrates by means of nearly 90 splendid half-tone photographs 36 different makes of cars, including Citroën and Renault, which are assembled in this country from mainly French components. The different makes are dealt with in alphabetical order, with a brief opening comment in each case, and the book ends with tabulated technical specifications of all the cars illustrated.

"THE A.B.C. OF MODEL AIRCRAFT CONSTRUCTION"

By the Rev. F. CALLON
(Model Aeronautical Press, 5/-)

Model aeroplane construction and flying is now firmly established as one of the foremost hobbies of our day. This well-written and lavishly illustrated book is intended primarily for the newcomer who, though full of zeal, is without any experience of aircraft modelling. The first three chapters explain the characteristics and particular advantages of the different materials used in aeromodelling, the types and functions of the tools for the job, and the correct use of these materials and tools. The author stresses the importance of beginning with a simple model, recommends a glider as the first choice, and gives detailed instructions on how to build one.

Other subjects dealt with include building and flying a rubber-driven model aeroplane, and repairing damaged model aircraft. There is a useful glossary of aeronautical terms. The book is illustrated with some 170 splendid half-tone photographs and detailed line drawings.

"INSECTS INDOMITABLE"

By EVELYN CHEESMAN (Bell, 12/6)

The authoress was formerly Curator of Insects at the London Zoo, and many of the discoveries she relates in this fascinating study of insect life are the results of her personal experience during 25 years' work among tropical insects as well as those at home. One of the most interesting chapters is concerned with the sense organs of insects, and other aspects of insect life dealt with are protective devices; dispersal and migration; relationship with plants; parasites and predators. The industrious and highly organised life of bees, wasps and termites provides another fascinating story, and the final chapters deal respectively with instinctive, complex, and individual actions of insects.

The book is illustrated with many fine line drawings of insects by Arthur Smith, of the Natural History Museum, London.

"FLYING SCOTSMAN," "CORNISH RIVIERA" and "THE ROYAL SCOT"

By ALAN ANDERSON (Brockhampton Press, 2/- each)

Each of these three little books, prepared primarily for children, forms a useful guide and commentary on a typical journey of the train concerned. Interesting features on the way naturally occupy a great deal of the account, but train, engine, track, signals and so on are adequately considered. A pictorial route diagram with mileage readings aids the traveller to keep track of his position, and there is a gradient chart, too, that adds to the interest.

Some of the illustrations are reproductions from photographs and several of them are of special interest on account of their viewpoints. In addition, sketches of lineside scenes and all kinds of railway apparatus and so on explain many of the questions that are sure to occur to the enquiring youngster. One or two minor errors have been noted, but these are not sufficient to spoil the books for their intended purpose.

"FLAGS OF ALL NATIONS"

(Brown, Son and Ferguson, 6/-)

This useful identification chart is in the form of a folded sheet, like an ordnance map. It presents in colourful array all the flags of the British Commonwealth of Nations, the Protectorates, Dependencies and Mandated Territories; the flags of other nations, and the International Code of Signals; the whole totalling 367 flags. The chart is printed on good strong paper to withstand frequent use.

"WATERLINE MODEL LINERS"

By C. SWIFT (Percival Marshall, 6/-)

It was not until the second World War that the value of waterline model ships was fully realised. Then model warships and liners of both Allied and enemy vessels were used extensively by the fighting Services for recognition purposes, and in planning fleet strategy. Since then models of this kind have become increasingly popular as media for publicity.

The author points out that the construction of small-scale ships offers advantages not to be found in the making of larger models. For instance, the tools needed are comparatively cheap, and the work can be done on the kitchen or dining room table without undue disturbance. He explains what tools and materials are needed, and how to construct the holds, decks, superstructure, and other essential components, not forgetting the lifeboats. Then follow chapters on painting and finishing waterline model ships, and on making display cases for them. The book is illustrated with many line drawings and excellent four-view plans of various types of ships.



Shipbuilding in Belfast

Centenary of the Queen's Island Shipyard

By Dr. Denis Rebbeck, C.B.E., M.A., M.Sc., B.Litt., J.P., M.I.C.E., M.I.Mech.E.

EVIDENCE of shipbuilding on the Lagan before the eighteenth century is very meagre, and it is generally agreed that the industry as such did not get into its stride until 1791, when a Scot named William Ritchie paid a visit to Belfast with a view to transferring his shipyard from Saltcoats in Ayrshire to the banks of the Lagan. Having seen the possibilities of Belfast as a shipbuilding centre, Ritchie started a small yard the same year, with ten men and a quantity of shipbuilding apparatus and materials.

Ritchie's first ship, the *Hibernia*, of 300 tons burthen, was launched on 7th July 1792. The largest vessel he built was the *James*, of 400 tons, and at the date of her launching, 16th October 1810, she was also the largest vessel ever built at Belfast.

The next stage in the development of the Belfast shipyards was the formation of the world-famous Queen's Island. The progress of Belfast trade and commerce was long impeded by the want of a port authority that would have sufficient power to carry out the various engineering works that were absolutely essential, if vessels of more than 200 to 300 tons burthen were to navigate the slob-lined and winding channel of the River Lagan. The old Ballast Corporation, dating from an Act of 1785, was superseded in 1837 by a new body with larger powers; and this again was displaced in 1847 by the present Harbour Commissioners, vested with the full unified

control of the port. Belfast is indebted to the wise, far-sighted, and extremely able men of that period, who planned the many harbour improvements and laid the foundations upon which the prosperity of Belfast as a port has since been erected.

The most important improvement was the straightening of the river. The excavated material from the new channel was deposited on the eastern side of the cut, so as to form an island that would act as a training bank for the Lagan. This 17-acre island became known as Dargan's Island, after William Dargan,

the contractor who carried out the work. It was used as a pleasure park and was the only public park that Belfast then possessed.

In 1849 the name of the Island was changed to Queen's Island, in honour of Queen Victoria, who visited the city of Belfast in that year to open the New Cut. At a later

date the old channel of the river on the east side of the island was filled in, but the name Queen's Island remained, and became world-famous as that of the birthplace of ocean liners, and up-to-date vessels of all types.

The iron shipbuilding yard on the Queen's Island was laid out in 1853 for a Mr. Hickson, who was a partner in Robert Hickson and Co., owners of the Eliza Street Iron Works, Belfast. The ironworks had been started with the intention of supplying iron plates for ships and boilers; but as there was an insufficient demand,

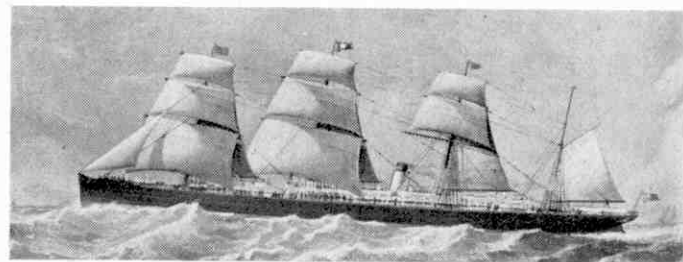
The illustration at the head of the page shows part of the vast range of works of Harland and Wolff Ltd. on Queen's Island, Belfast, looking south east. These works cover a total area of 300 acres, and this article outlines the story of their growth since the first shipbuilding yard was laid out on the Island 100 years ago.

Hickson decided to start a shipbuilding yard of his own, so that he could use the products of his ironworks. He was unfortunate in the choice of his first shipyard manager, and inside twelve months the latter was dismissed. An advertisement for a new manager was put in the papers, and Robert Hickson

responsibility for the construction of the new vessels fell on his broad young shoulders.

After various "teething" troubles with men, material and wages, Harland got the place going to his satisfaction, and the two large sailing ships were completed to the Owners' requirements. Orders were

obtained for several more large sailing ships, as well as steamers; wrecked ships were lifted and repaired; and all went well. Edward Harland, however, was not satisfied at being second in command, and after three years with Hickson he decided to start



A White Star Liner of 1870 built at Belfast. There were four vessels of this type, named *Oceanic*, *Atlantic*, *Baltic* and *Republic* respectively.

waited impatiently for replies to come in.

The man who applied for the position and was, in due course, appointed, was Edward James Harland. His dominant personality was destined to increase considerably this new industry in a locality which, though offering certain advantages, must at the same time have presented very many problems.

E. J. Harland, later Sir Edward Harland, Bart., was born at Scarborough in May 1831, and started in his new position as manager of Hickson's yard at the Queen's Island at Christmas 1854. He was much impressed by the facts that the yard was capable of great expansion, and that it was well placed, alongside a fine patent slip, with clear frontage, allowing the largest ships to be launched with ease.

At this time Robert Hickson had just launched and completed his first ship, the *Mary Stenhouse*, a sailing ship of 1,289 tons register, and the firm had an order for two large sailing ships, one of which was partly framed. This was Edward Harland's first job and, as Hickson was not a practical shipbuilder, the new manager found that the

somewhere on his own account. Enquiries were made by him at Garston, Birkenhead, and other places, but when Hickson heard of his young manager's intentions he offered his own yard at a modest figure, and his offer was accepted.

Harland's first order came from J. Bibby, Sons and Co., of Liverpool, and was for three screw steamers, the *Venetian*, *Sicilian* and *Syrian*, each 270 ft. long, 34 ft. beam and 22 ft. 9 in. depth. These vessels are Nos. 1, 2 and 3 respectively in Messrs. Harland and Wolff's list of ships built—a list that now has almost reached the figure of 1,550.

The Bibby order was considered a large



The devastation of war. This picture shows a section of Queen's Island after heavy air raids in 1941.

one in the middle of the nineteenth century, and it required many additions to the plant and machinery of the Queen's Island. Harland invited Mr. G. W. Wolff, who was at that time sailing as an engineer in the Mediterranean, to return and take charge of the drawing office. Wolff was a very able engineer, who had had considerable experience. He was born in Hamburg on 10th November 1834, and was educated both in Hamburg and at the Liverpool College, subsequently serving his time with Messrs. Joseph Whitworth and Co. of Manchester.

The *Venetian* and *Sicilian* were launched in 1859, and the *Syrian* in 1860, and the propelling machinery, consisting of steam engines of 54 in. bore and 39 in. stroke, was supplied by Macnab and Co. of Greenock.

More orders followed, and as Harland found that he was frequently away from home in connection with the new contracts, he decided to take Wolff in as a partner, so that the latter could attend to any business, and look after the shipyard, during Harland's absence.

As time went on, many acres of ground were added to the Works. In 1867 the Belfast Harbour Commissioners had made a fine new graving dock, the Hamilton dock, and connected the Queen's Island with the mainland. The yard, thus improved and extended, was surveyed by the Admiralty and placed on the first-class list. As a result, the firm were entrusted in 1868 with the building of H.M. gun vessel *Lynx*, and later of the *Algerine* and the store and torpedo ship *Hecla*, of 3,360 tons. It is interesting to compare these tiny vessels with H.M.S. *Eagle*, completed at Belfast last year.

It has been said that Harland and Wolff won their laurels by building the many celebrated vessels that formed the White Star Fleet, but historically it is the other way round. The speedy and economic working of the Queen's Island ships, compared with the more orthodox productions of other yards, had become well known, and it was this that prompted that spirited Liverpool shipowner, Mr. T. H. Ismay, to order six large transatlantic

liners for the Liverpool-New York service in 1869. These six ships were to be as fast as the Cunard and Inman liners, if not faster, and the Queen's Island men eagerly embraced this great opportunity.

The Belfast yards of Messrs. Harland and Wolff Ltd. continued to be improved and enlarged from time to time. When the White Star Line placed an order for the three gigantic vessels *Olympic*, *Titanic*



A recent product of the famous Queen's Island shipyard is H.M. Aircraft Carrier *Eagle*, seen in this picture.

and *Britannic*, in the early part of the twentieth century, two very large steel ganties were built in the Queen's yard to replace the existing plant.

Some years later, when Lord Pirrie was Controller-General of Merchant Shipbuilding during the first world war, he was responsible for the laying down at Belfast of an entirely new shipyard, with six large slips for building standard merchant ships. This yard—the Musgrave yard—increased the potential output of the firm considerably, and was the birthplace of many large vessels for the Union-Castle Line, the Blue Star Line, the Shaw Savill Line, the Royal Mail Lines and other well-known companies. During the second world war, the Musgrave yard was devoted entirely to the production of large vessels for the Royal Navy, and it proved to be, together with the rest of this huge works, a national asset of the greatest importance.

During the months of April and May 1941, exactly 150 years after Ritchie opened his first little shipyard, several savage air-raids were made on the Belfast yards by the German (Continued on page 164)

Engineering News

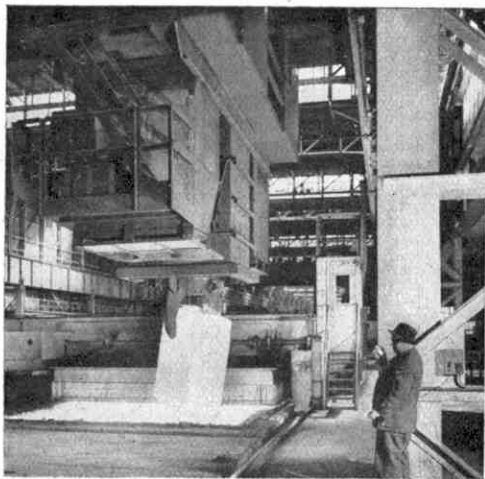
Telecommunications in Modern Steel Mill

The world's most up-to-date steel mill, the Abbey Works of the Steel Company of Wales, is kept running smoothly and efficiently by an ingenious electronic telecommunications system. From the time that raw material arrives at the Works until the finished steel sheet leaves the plant, all the transport and processing operations, including the movements of 13 locomotives and a large number of cranes, is directed by radio, public address systems and telephones, all of which have been designed, built and installed by the General Electric Company Ltd.

Communication with the locomotives is carried out by radio telephone, which operates on a selective calling system working from three control centres, each of which is linked to a central transmitter.

The operator at one of the control points dials the number of the wanted locomotive, and this causes a bell to ring and a lamp to light only in the cab of the called locomotive. At the same time an "Engaged" lamp lights in all the other locomotives and so warns their drivers that they cannot be answered if they call before the "Engaged" lamp is extinguished. A similar arrangement is provided at the control, so that each operator knows if either of the others is using the station.

Another interesting application of telephony is to be found in the rolling mill. The cranes operating in the soaking pit area, one of which is seen in the upper illustration on this page, may have to be called from any one of a number of control points, and since their cabs are heat-insulated, they are also partly sound-insulated, and therefore a special form of loud speaking telephone is used. The audio signals are superimposed on the direct current wires carrying the motive power for operating the cranes, and no form of carrier



The foreman talking by loud speaking telephone to a crane operator lifting a white hot ingot from the soaking pit at Abbey Works. Owing to its closeness to the white hot ingot the cab has to be heat insulated. Illustration by courtesy of the General Electric Company Ltd.

telephony is used. This system was evolved by engineers of the Steel Company and put into practical use by the G.E.C.

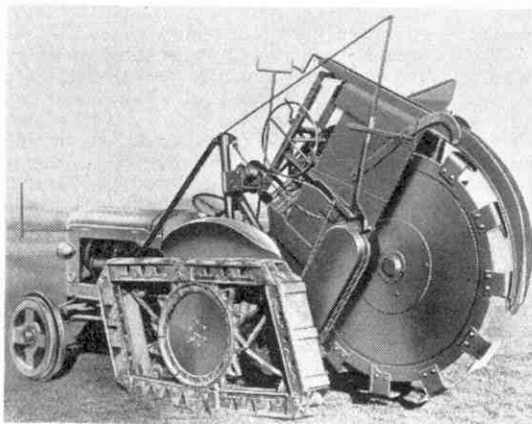
A Trench Digger and Pipe Laying Machine

The lower illustration on this page shows the Howard trench digging and pipe laying machine, which is designed to cut drainage trenches and lay the pipes in one operation. It is a product of Rotary Hoes Ltd., Horndon, Essex, and is arranged for fitting to the New Fordson Major diesel tractor, with which it is sold as a complete unit. The machine is mounted at the rear end of the Tractor and is arranged so that it can be raised and lowered, either by a special hydraulic ram or by a winch and cable, the latter being used also to support the digger clear of the ground for transport.

The digger is driven from a power take-off on the Tractor, and consists of a large disc mounted vertically and fitted around its perimeter with 12 spade-like blades, which are capable of digging to a depth of 3 ft. 6 in. with a width of 9 in. Any loose soil left behind by the blades is collected by a scoop-like scraper, which can be adjusted to suit trenches of varying depth.

The pipe-laying attachment, which is not shown in our illustration, is mounted on the scraper blade, and consists of a chute fixed on a suitably constructed base, down which the tiles slide, the forward end of the base serving to sweep aside any small deposits of loose earth remaining in the trench. Also, the base is shaped so that as it moves along it produces a groove, in which the pipes are laid. Attached to the base, and following behind it, is a cast-iron roller, which passes over the laid pipes and ensures that they are evenly bedded down and in alignment.

The Tractor is fitted with Rotoped tracks, which give improved traction, and special cast iron front wheels.



The Howard Trench Digger and Pipe Layer referred to on this page. The pipe-laying attachment is not shown. Photograph by courtesy of Rotary Hoes Ltd., Horndon, Essex.



Exciting New DINKY TOYS

THE three additions to the Dinky Toy series announced last month are very fine and attractive models of entirely different types.

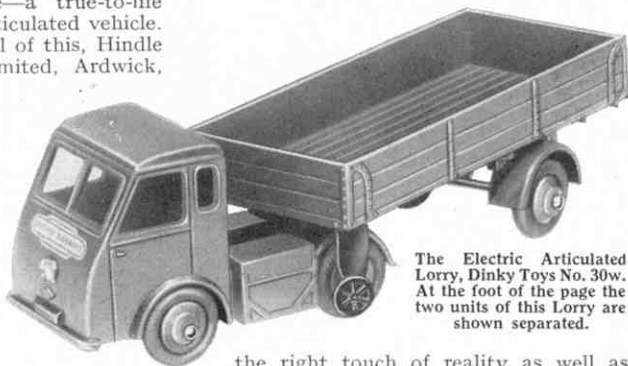
The first of these newcomers is a particularly exciting one—a true-to-life miniature of an electric articulated vehicle. The makers of the original of this, Hindle Smart and Company, Limited, Ardwick, Manchester, construct a very fine range of battery electric delivery vehicles known as Helecs. The example chosen for this fine new Dinky Toy is in two units that can easily be separated and coupled together. This means that while a trailer is being loaded or unloaded the tractor or power unit can be used for hauling other loaded trailer units elsewhere.

The two units are readily coupled and disconnected, a feature that is well reproduced in the Dinky Toys miniature. In this the tractor is just backed centrally into the front of the trailer to which it is to be coupled, and a spring tongue on the former then engages with a slot in the swivelling bogie carrying the front wheels of the latter. The two are disconnected by simply reversing the process.

Many Hindle Smart battery delivery vehicles are in use on British Railways, and it is therefore appropriate to find that this new Dinky Toy is enamelled in

the crimson of the London Midland Region, with the British Railways totem in its correct place on the front of the cab.

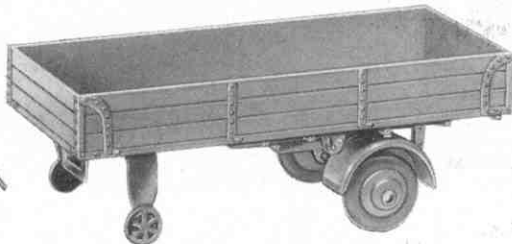
Every Dinky Toys owner who runs a Dinky Toys layout will give a warm welcome to this newcomer, which is highly attractive in itself and will provide



The Electric Articulated Lorry, Dinky Toys No. 30w. At the foot of the page the two units of this Lorry are shown separated.

the right touch of reality as well as novelty to his model town or village.

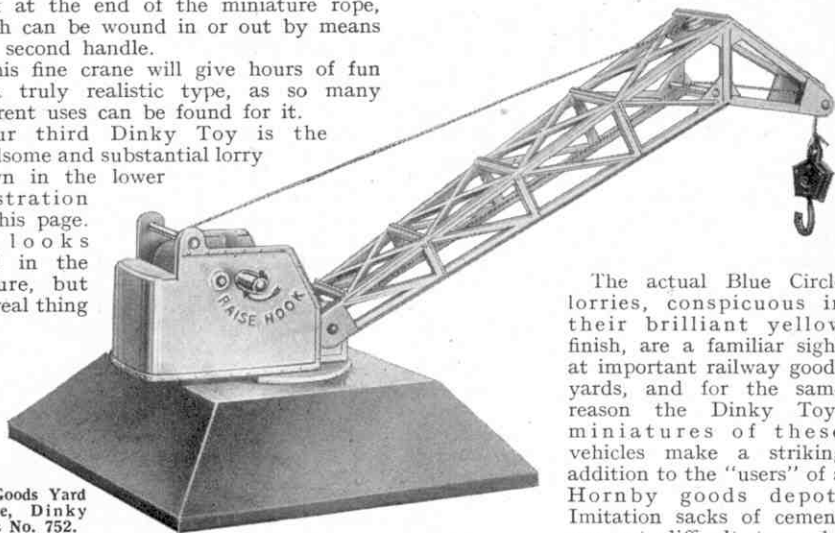
The second of these new Dinky Toys is of an entirely different type. It is the Goods Yard crane seen in the illustration at the head of the next page, which will also be attractive to Hornby Gauge 0 train owners, for its size makes it suitable for their layouts as well as for those of Dinky Toys owners. The base provides stability because of its size and weight, and the crane itself can be turned right round, through a circle if required. As the jib can be raised or lowered by turning a handle, loads can be lifted or lowered over a wide area, and there is a useful



hook at the end of the miniature rope, which can be wound in or out by means of a second handle.

This fine crane will give hours of fun of a truly realistic type, as so many different uses can be found for it.

Our third Dinky Toy is the handsome and substantial lorry shown in the lower illustration on this page. It looks good in the picture, but the real thing



The Goods Yard Crane, Dinky Toys No. 752.

is even more attractive. Observant readers will recognise it at once as an exact reproduction in miniature of one of the characteristic lorries used for carrying bags of cement.

The lorry itself is a Leyland Comet, fitted with the special type of body employed by the Blue Circle Portland Cement group. It is enamelled yellow, and the well-known blue circle appears on each of the doors of the cab, while on the lorry itself are the words BLUE CIRCLE PORTLAND CEMENT, on the off side, and FERROCRETE SAVES TIME, on the near one. Ferrocrete is a rapid-hardening Portland cement. On the back of the vehicle are the words "SNOWCEM" CEMENT PAINT in white on a black background, a reference to yet another of the many products of the Blue Circle group.

The actual Blue Circle lorries, conspicuous in their brilliant yellow finish, are a familiar sight at important railway goods yards, and for the same reason the Dinky Toys miniatures of these vehicles make a striking addition to the "users" of a Hornby goods depot. Imitation sacks of cement are not difficult to make

from stiff grey or white paper, and can be stuffed with sand, sawdust or some similar material, but take care they don't leak! When loaded with these the lorries look most realistic, and the commodity that they carry will add variety to the traffic dealt with at the Hornby goods depot. The sacks will also provide work for the fine Dinky Toys Goods Yard Crane, and they will be easy to handle if they have loops of fine string attached to them.

The Dinky Toys Leyland Cement Wagon is also a most appropriate vehicle to use in connection with the construction of model towns or housing estates, for cement is used in large quantities by building contractors. Indeed a fleet of these attractive lorries might be needed to cope with the demand!



This handsome lorry is the Leyland Cement Wagon, Dinky Toys No. 533.

Meet Tom Hayhow

By John W. R. Taylor

TOM HAYHOW is a quite incredible character. To start with, he holds a total of 28 aviation records—far more than anyone else in the world. And he is just as much at home on the road, on the sea, or even under the sea, as in the air; because, among other things, he is a fully-qualified ship's engineer, deep sea diver and proud owner of the oldest motor cars in his native county of Norfolk.

The cars are typical of Tom Hayhow, whose love of anything mechanical is combined with a real sense of humour; and it is no uncommon sight to see him racing down Piccadilly in the direction of the Royal Aero Club at the wheel of his handsome 1906 Renault. Nor are the cars mere showpieces, as he proved when he drove his 1903 Gladiator in the last London to Brighton Run for veteran cars

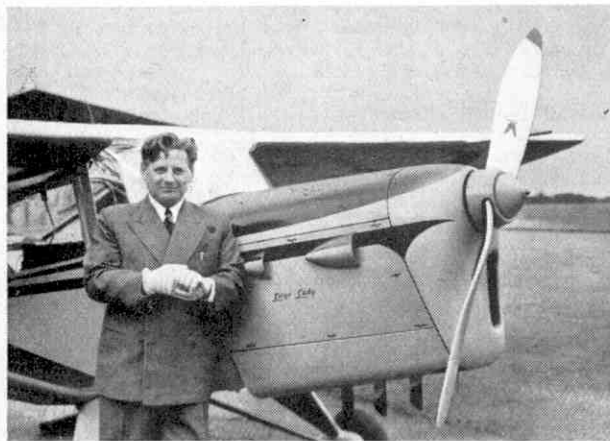
Meccano merchant ship with a mousetrap inside it, which "exploded" when rammed by a toy torpedo.

That started us talking about another of his unusual qualifications, as an explosives expert. But perhaps I had better start at the beginning. . .

Young Thomas Hayhow got off to a disappointing start when his career as a Naval Officer Cadet was cut short by eye trouble. But he transferred to the Merchant Navy and rose in time to the position of chief engineer aboard a merchant ship. This was perhaps the most important period of his training, for he not only learned a great deal about ships and their engines, but developed a healthy respect for everything mechanical and an engineer's instinct for detecting and diagnosing faults, however slight.

He left the Merchant Navy to form his own business as a marine engineer, specialising in salvage and shipbreaking, jobs for which his knowledge of ship construction was invaluable. Never content to do jobs by halves, he quickly became an expert in the use of explosives as an aid to ship-breaking, and then qualified as a diver so that he could inspect jobs himself under water whenever necessary.

It was because of his marine business that Tom Hayhow became a pilot in 1947. His home is at Bagshot in Surrey, and his business at



Thomas W. Hayhow and his Auster Aiglet Trainer aircraft Liege Lady.

and won a Gold Medal by arriving at the other end bang on schedule.

Knowing something of Mr. Hayhow's adventurous life, I felt sure that it would interest readers of the *M.M.*, so I asked him a few weeks ago if I could introduce him to you all. He was delighted, because he was an enthusiastic Meccano modeller himself some 35 years ago, and recalled making quite a lot of odd-shaped aeroplanes. But then, as now, his first love was the sea, and the model of which he was most proud, built during the 1914-18 War, was a

Stockton-on-Tees. The journey between the two takes eight hours by road and, as he has to make it at least once a week, it wasted a lot of precious time. So, with about as much fuss as if he were buying a new suit, he bought an aeroplane and started learning to fly it. Characteristically, he decided that as there was nothing very difficult in flying straight and level, he would spend most of his time practising landings and take-offs.

So, day after day, he marked out a spot on the aerodrome where he wanted to



finish his landing run; then took off, did a quick circuit and landed, first into wind, then cross-wind and even down-wind. If he overshot his mark he put some money in a collecting box for the local hospital, whose funds benefited considerably before he was satisfied and qualified for his Private Pilot's Licence. He has since had good reason to feel thankful for this concentration on perfect landings!

Having obtained his licence, he began using his Auster Aiglet just like a motor car, ferrying regularly between Fairoaks Aerodrome and Middlesbrough in two hours, and from Middlesbrough to Liverpool in 40 minutes, compared with four hours by road. He also formed a small air taxi company named Crowflight, equipped with a four-seat Proctor.

By 1951, Tom Hayhow was quite an experienced pilot and one of the small number of Englishmen who own and use an aircraft regularly for business purposes. He had also taken part in several races, often flying the Tiger Moth G-AHRM which many of you must have seen in that fine film *The Sound Barrier*. So when the *Daily Express* organised their South Coast Air Race that year, he entered his little Aiglet just for fun. Much to his surprise, he passed 16 aircraft which took off before him, kept in front of 37 others, including a Spitfire, and romped home in second place to win £500.

Since then he has been a familiar and popular figure at most British air races. But he wanted to do more than just win a few prizes, and that is why he decided to spend so many week-ends last summer setting up air records. Being, in his own words, "an aging juvenile," he thought he could best tackle point-to-point records in

the light 'plane category, and chose for the job the spritely new clipped-wing Trainer version of the Aiglet. He installed a big 60-gallon fuel tank in the rear of the cabin and, leaving nothing to chance, filled the space next to his pilot's seat with the finest available radio and navigation aids, including a Decca Navigator, which shows automatically on instruments the exact position of an aircraft at all times during flight. And, in tribute to Her Majesty the Queen, he named his little aircraft *Liege Lady*.

Starting at Easter 1952 with 18 "there and back" records from London to Paris, the Hague, Brussels, Luxemburg, Dublin and Amsterdam, Le followed with records to and from Copenhagen, Berne and Stockholm, and from Madrid to London. Only once did he fail to achieve the average speed of more

than 100 m.p.h. needed for a record, when he lost his way in bad weather and overflew Madrid by about 60 miles. His skill at landing probably saved his life then, for he ran out of fuel and had to force-land on a rough country road. The local inhabitants were extremely kind and helpful; and he eventually managed to get airborne again with a tankful of motor car petrol, brought to the 'plane in buckets and filtered through his handkerchief!

Modestly, Tom Hayhow gives much of the credit for his records to the dependable little Gipsy-engined Aiglet, and to the staff of the Royal Aero Club and London Traffic Control, who have supervised his record attempts and given him special clearance through the crowded skyways around London. And he has a special word of praise for the oft-maligned R.A.F. Meteorological

(Continued on page 164)

The illustration above shows Tom Hayhow's famous little Aiglet Trainer in the air. Photograph reproduced by courtesy of "The Aeroplane."

Recovering Derailed Locomotives

By S. C. Townroe, A.M.I.Mech.E.

STEAM cranes, with lifting capacities ranging from 36 to 50 tons, are stationed at all large Motive Power Depots. Two such cranes together can re-rail the

subsidence while under load, the crane supports were watched through theodolites.

In July 1952 Lord Nelson class 4-6-0 No. 30854 *Howard of Effingham* was derailed at Shawford, near Winchester, and lay on its side 15 feet below and 50 feet from the running line. The recovery of this engine intact was effected entirely by the use of a mechanical excavator and a bulldozer.



First steps in recovering this derailed Lord Nelson class locomotive were to dig a pit alongside and to lash rails to its wheels before rolling it upright.

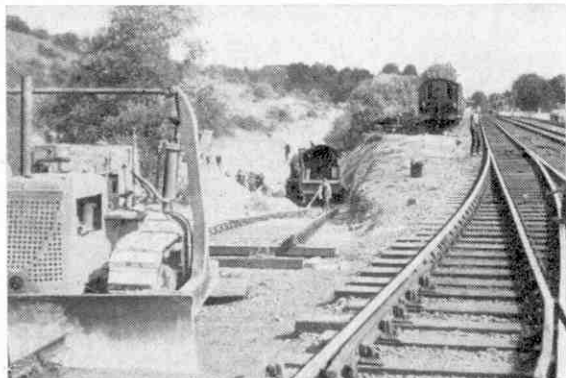
heaviest locomotives now running on British Railways, provided of course that the load is within reach and that the cranes can stand on firm track. For a full load the radius of the crane jib should not exceed about 20 feet. Owing to the great concentration of weight when lifting, cranes cannot be used on bridges, on light branch lines, or in sidings laid on soft ground.

In November 1951, floods breached an embankment of a single-line near Midhurst, Sussex, and engine No. 32552 fell chimney-first into the gap. The line was due for closing, anyway, and this mishap stopped all further traffic! The embankment itself was cut away to form a slope, up which the engine was hauled. After the Weedon accident, in 1951, Pacific No. 46207 *Princess Arthur of Connaught* landed in a field and it was essential to recover it intact, in order to carry out tests to determine why it became derailed. To allow cranes to be used, special foundations had to be laid for them, and to detect the slightest sign of

1 in 13, and a temporary track was laid between the engine and the running line. Finally, the bulldozer's power-operated winch hauled the engine up the bank by means of a hawser and pulley-blocks. The operations took seven working days, and traffic on the main line suffered no interference.

Now and again, unfortunately, a locomotive comes to rest so far from the line that cranes

(Continued on page 164)



A bulldozer winds in the hawser to pull the engine up a slope constructed to lead back to the line.

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.

DAYS IN JUGOSLAVIA

Last summer I went to Yugoslavia and Austria with my mother and father, travelling by car.

The children in Yugoslavia gave us a wonderful welcome, waving to us from the roadside as we passed by. I noticed that their toys were not as good as ours, as they were mostly made of wood. Another thing I noticed was that there were very few cars in Yugoslavia. We travelled many miles, but scarcely saw any.

We visited Ljubljana, which is quite a big town. It was very different from home because there were many trams and no buses. I enclose a photograph of one of the trams that my father took. He is greatly interested in transport and pointed out to me the good condition of the track. These trams were much faster than those of Liverpool and all of them were single deckers. I enjoyed riding on them particularly because we were allowed to stand in front with the driver. Very few people spoke English, but my father speaks German.

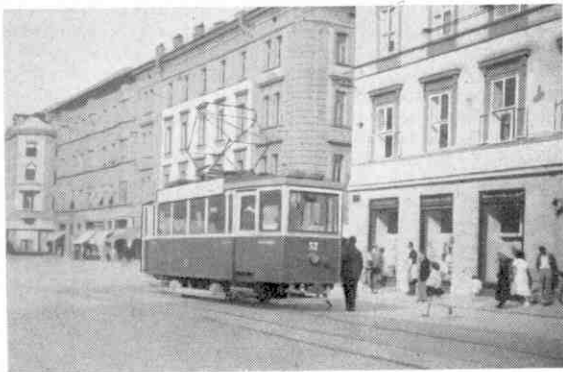
I counted the tramway routes in Ljubljana and there were five altogether. Some of them went four or five miles from the centre of the city. The fares are cheaper than they are at home.

We had an excellent lunch at the Grand Hotel. It was explained that the shops were privately owned and that only the big department stores belonged to the State. The Yugoslavs are very friendly and allowed us to take photographs. We had tea at a lovely restaurant, where they served beautiful cakes full of cream and the tea itself was very good. The fruit and sweets

did not cost much and we did not have to give any coupons for them.

During our stay in Yugoslavia we saw a lot of soldiers about on the roads. I was surprised to find that those we encountered used horses instead of motor vehicles for transport purposes.

JOHN PIERCY (Liverpool).



Tramcar in a street of Ljubljana, in Yugoslavia. Photograph by H. E. C. Piercy, Liverpool.

THE RIGI RAILWAY

I had a ride last summer on the oldest rack railway in the world, that from the holiday resort of Vitznau, on Lake Lucerne, to the top of the Rigi mountain.

The railway was the pioneer work of the Swiss engineer Nicholas Riggenbach, whose monument is to be seen at Vitznau along with a most interesting specimen of the earliest type of locomotive used on the line. This engine has the additional distinction of being the very first to be turned out by the Swiss locomotive works at Winterthur.

The railway rises 4,500 feet in its course of about 4½ miles, and its steepest gradient is about one in five. The steam trains of earlier days took 80 minutes to complete the ascent. They have now been replaced by sleek, powerful electric cars which do the trip in 35 minutes. The descent takes 42 minutes, safety precautions demanding lower speeds.

The rack of the railway was arranged centrally between the running rails, so that it could be traversed by a cog wheel on the engine. As the line is so steep the original steam locomotives were built "on the slope," so that their boilers were horizontal and their cabs upright when they were on gradients. This is clear from the reproduction on this page of one of my photographs, which shows the first engine used on the line. Its modern counterpart is in strong contrast to it. I also photographed the flower-decked engine-sheds with their fan of lines converging on a turntable, a typical example of Swiss neatness.

S. H. JARVIS (Cheadle Hulme).



The first locomotive used on the Rigi Railway. Photograph by S. H. Jarvis, Cheadle Hulme.

Meccano Special Model Harbour-Building Crane

ON almost every coast line it is possible to find a few natural harbours. In olden times these were sufficient for sheltering the small ships of those days, but as times changed and ships became both larger and more numerous, it became increasingly necessary to provide many more harbours by artificial means, and for this purpose very strong breakwaters had to be constructed. Usually these great breakwaters are built up from huge blocks of concrete and granite, each weighing anything up to 50 tons or more, and giant cranes of a special type are necessary to handle these blocks and place them in position. They are known as block-setting cranes, and some of them are among the largest cranes in existence.

The splendid model shown in Fig. 1 on these pages is designed to represent one of these huge cranes. It incorporates all essential movements and will be found a

really absorbing subject for any model-builder with a fair amount of Meccano at his disposal.

Constructional details of this fine model are to be given in two separate issues of the *M.M.* Here we are describing the tower and the boom with its travelling bogie, and a full description of the operating mechanism, and the special block-lifting gear, will appear in next month's *M.M.*

The tower legs are four $9\frac{1}{2}$ " Angle Girders bridged at the upper ends by $7\frac{1}{2}$ " Angle Girders. A $5\frac{1}{2}$ " \times $1\frac{1}{2}$ " and a $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plate are bolted to each $7\frac{1}{2}$ " Angle Girder, and are edged by $7\frac{1}{2}$ " Strips. The legs are connected halfway up the tower by four $7\frac{1}{2}$ " Angle Girders. The $2\frac{1}{2}$ " Strips 1 and 3" Strips 2 make the assembly rigid.

The lower track of the roller bearing for the boom is a 6" Circular Plate 3. It is fixed to a square made from four $5\frac{1}{2}$ " Angle Girders, and is bolted to two $7\frac{1}{2}$ " Angle Girders 4 fixed across the top of the tower. The rollers are eight $\frac{3}{4}$ " Flanged Wheels, each free to turn on a $\frac{3}{4}$ " Bolt fixed in a Collar. The Collars are fixed by bolts to a Circular Strip, but each is spaced from it by a nut.

A Wheel Disc is bolted at the centre of the Circular Plate 3, and a $3\frac{1}{2}$ " Gear 5 is attached to the Plate by $\frac{3}{4}$ " Bolts. Rod 6 (8") is free to turn in the Gear 5 and in the Wheel Disc, and is mounted at its lower end in a $1\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip bolted between $7\frac{1}{2}$ " Angle Girders 7. A $\frac{3}{8}$ " Bevel on Rod 6 meshes with a similar Bevel on 8" Rod 8. Rods 6 and 8 are held in position by Collars. Rod 8 carries two $\frac{3}{4}$ " Sprockets.

Bearings for the travelling wheels are made by bolting $9\frac{1}{2}$ " Angle Girders to the lower ends of the tower legs, and by attaching $9\frac{1}{2}$ " Strips to $1"$ \times $\frac{1}{2}"$ Angle Brackets fixed to the legs. Three Trunnions are bolted to each $9\frac{1}{2}$ " Angle Girder, and three Flat Trunnions are connected to

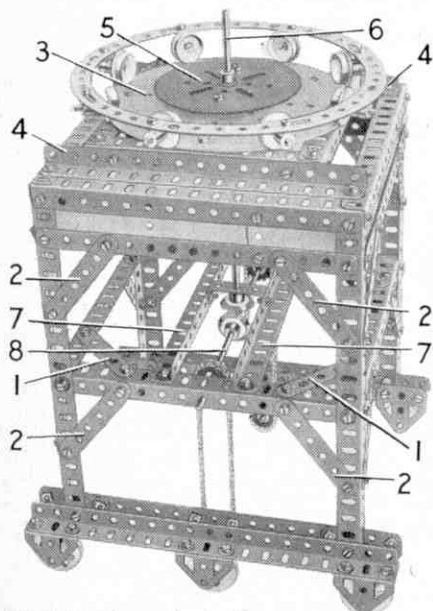
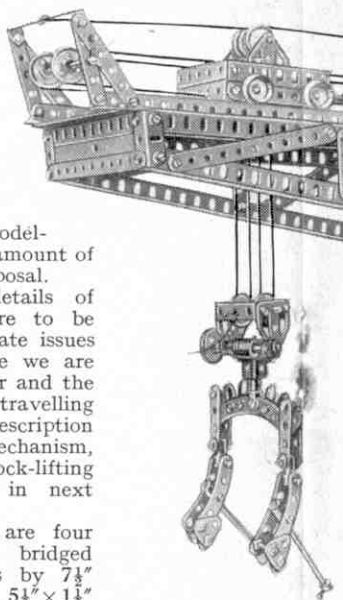


Fig. 2. The tower, showing the drive to the travelling wheels, and the roller bearing.

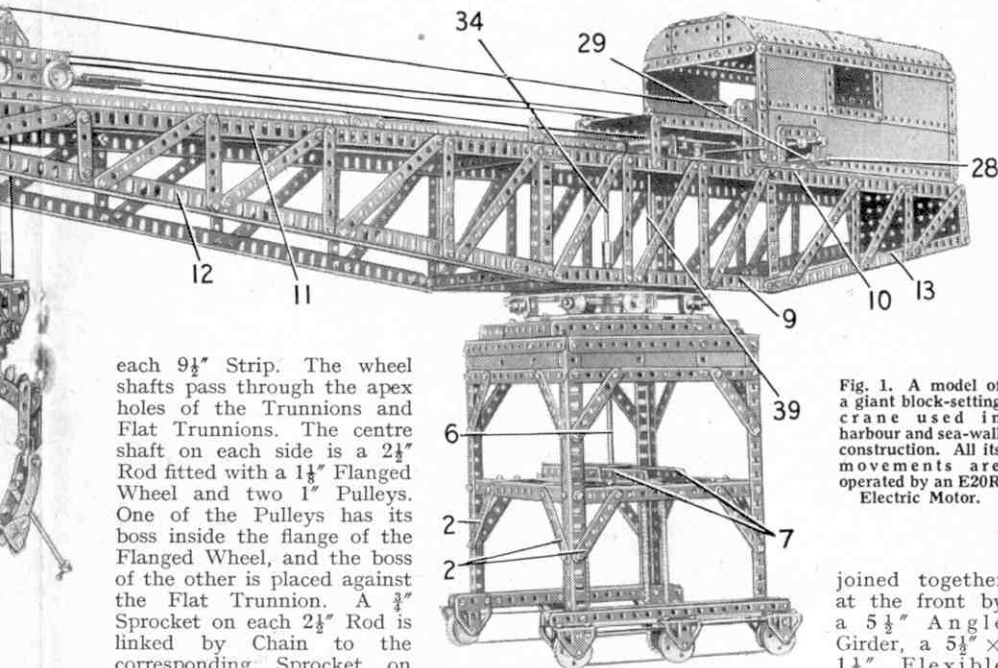


Fig. 1. A model of a giant block-setting crane used in harbour and sea-wall construction. All its movements are operated by an E20R Electric Motor.

each $9\frac{1}{2}$ " Strip. The wheel shafts pass through the apex holes of the Trunnions and Flat Trunnions. The centre shaft on each side is a $2\frac{1}{4}$ " Rod fitted with a $1\frac{1}{8}$ " Flanged Wheel and two 1" Pulleys. One of the Pulleys has its boss inside the flange of the Flanged Wheel, and the boss of the other is placed against the Flat Trunnion. A $\frac{3}{4}$ " Sprocket on each $2\frac{1}{2}$ " Rod is linked by Chain to the corresponding Sprocket on Rod 8.

The 1" Pulleys are connected by 10" Driving Bands to other 1" Pulleys on 2" Rods carrying the outer travelling wheels. These Rods are also fitted with $1\frac{1}{8}$ " Flanged Wheels.

The boom is mounted on a 6" Circular Plate that forms the upper track of the main bearing. Its main girders are each made by bolting a $12\frac{1}{2}$ " Angle Girder 9 to the Circular Plate. A $4\frac{1}{2}$ " Angle Girder is attached vertically to each end of the Girder 9 and these support a $24\frac{1}{2}$ " Angle Girder 10 extended by a further $24\frac{1}{2}$ " Angle Girder 11. A $1\frac{1}{2}$ " Angle Girder is fixed to the end of Girder 11, and is connected to a $24\frac{1}{2}$ " Angle Girder 12 linked to Girder 9 by a $2\frac{1}{2}$ " Strip. Angle Girder 10 is connected by a $2\frac{1}{2}$ " Angle Girder to a $12\frac{1}{2}$ " Angle Girder 13, which is bolted to a 2" Strip fixed at the rear end of Girder 9. The main boom girder is braced by Strips of various sizes.

The boom girders are

joined together at the front by a $5\frac{1}{2}$ " Angle Girder, a $5\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plate and a $5\frac{1}{2}$ " Strip, by two $5\frac{1}{2}$ " Angle Girders bolted between the ends of Girders 9, and by a $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flat Plate and a $5\frac{1}{2}$ " Angle Girder at the rear of the boom. The platform on which the mechanism and cab are mounted is made by bolting five $5\frac{1}{2}$ " \times $3\frac{1}{2}$ " Flat Plates across the Angle Girders 10. The rails for the crab or bogie that carries the lifting tackle, are each made from an $18\frac{1}{2}$ " and a $12\frac{1}{2}$ " Angle Girder

(Continued on page 164)

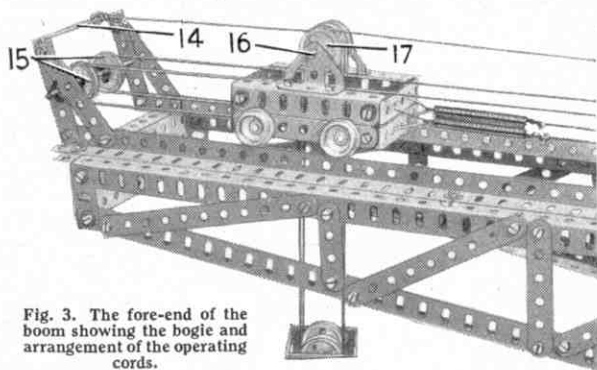


Fig. 3. The fore-end of the boom showing the bogie and arrangement of the operating cords.

Bird Ringing

How Migration Routes are Traced

By R. A. F. Cox

EVERY day metal bands are placed on the legs of birds by various registered "ringers" throughout the country. These bands are small pieces of aluminium, in different sizes for different birds, stamped with a serial number and the address of the British Museum. As each bird is ringed—this is called "banding" in the United States—its number is recorded, together with the date, place of ringing and any other particulars such as sex, age, etc. The records are then placed in the care of Miss Leach at the British Museum, who deals with all the ringing carried out in Britain.

The purpose of ringing birds is to find out exactly where birds travel to, how long they live and various other details that can be achieved only by this method. Much ringing is carried out by ordinary bird watchers in their own gardens, but special observatories have been established round the coast, by the British Trust for Ornithology, where migrating birds can be trapped and ringed. These observatories have wardens and they can generally accommodate a few visitors. They are well equipped with traps of various kinds and are usually situated on islands or remote headlands. Some of them, such as that on Fair Isle, are inaccessible during some months of the year.

The most usual type of trap is the Heligoland, which is illustrated on the opposite page. The principle of the trap is that the birds are driven from the cover in front of it into a large funnel, and eventually into the catching box at the end. The catching box has a glass front, so that it appears to the birds to be a way out. The trapped birds are taken out, ringed, measured, weighed and finally released. By weighing the birds it is possible to determine how much

weight they use up on their migratory journeys.

Anyone wishing to become a ringer has to pass a test, and be "vetted" by an already experienced ringer, to ensure that the rings do not get into the hands of irresponsible individuals who may easily do harm to the birds, for ringing a bird is not an easy job.

The main migration takes place in spring and autumn, although some migration and dispersal takes place during the rest of the year too. The autumn

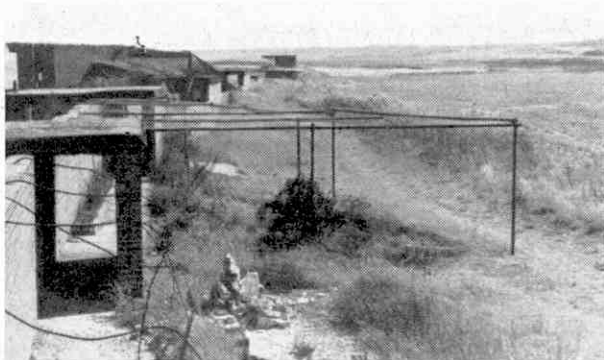


A dunlin caught in an automatic trap on a tidal pool and ringed at the Cley Observatory, on the Norfolk coast about ten miles from Cromer.

migration is the most spectacular, owing to the increased bird population at that time of year. In October 1951 200 robins were caught in three days at one observatory, but many thousands of birds perish on migration.

The warden of a bird observatory has many other tasks besides ringing. At some observatories a daily census is taken of the whole bird population around, and at all of them records of weather conditions and migration are taken, because on some days swarms of migratory birds can be seen arriving at the coast or leaving it in thousands. At night even greater numbers are seen at the lighthouses and lightships round the coast.

Observatories usually are cold, bleak places and the warden's job is not an enviable one, but he is willing to undergo



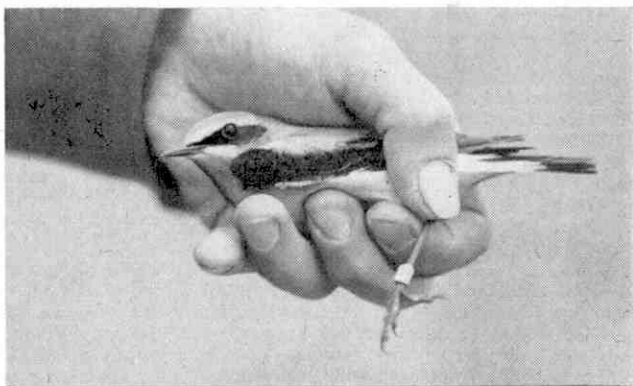
The entrance to the Heligoland trap at Cley. In this birds are driven through a funnel of wire netting into the catching box.

great hardships for love of this fascinating hobby, for most wardens are not paid at all. Their trouble is well rewarded by the thrill of having a ringed bird recovered from some distant land. The chances of this are very remote, for many ringed birds must die and fall in the sea, or be covered by sand in the desert or leaves in a forest, never to be seen by a human being again. In spite of these odds, some are recovered, such as the shearwater that was found in South America after having been ringed on the island of Skokholm in Wales, or the turnstone discovered in the Arctic wastes of Greenland. Often starlings from Britain are found in European countries, and a robin ringed at Cley in Norfolk was recovered from Minorca in the Balearic Islands. One should always examine a dead bird to see if it has a ring on one of its legs. If it has, whatever the inscription on the ring, it should be sent to Miss Leach at the British Museum, Natural History, South Kensington, London S.W.7.

The illustrations to this article are from photographs taken at Cley bird observatory, which is situated on the Norfolk coast about 10 miles from Cromer. The upper one on this page shows the entrance to the Heligoland trap with

cover in the centre. Also there, is a drinking pool. The others are of a dunlin and a Greenland wheatear which have been ringed. The Greenland wheatear was caught in the Heligoland trap, but the dunlin, a small wader, was caught in an automatic trap on a tidal pool.

It is difficult to determine any exact routes that birds follow on migration, although birds such as ducks and waders do tend to follow rivers. Inland migration routes are hard to define because it is difficult to distinguish which birds are taking up summer residence and which are just passing through. Some places are definitely favoured by certain birds, however, especially reservoirs and sewage farms, where such birds as waders and water-fowl can be seen. A migrating bird needs only shelter and, more especially, food, and so its route is governed by these two factors. Where food is plentiful birds travel on a broad front, but when it is



A Greenland wheatear that was caught in the Heligoland trap at Cley. The illustrations to this article are from photographs by P. Clarke, Sheringham.

limited, or their food is specialised, they tend to congregate where they can obtain it. That is why reservoirs and sewage farms attract so many ducks and waders; passerines do not as a rule assemble in large numbers at one place, but I know an inland hill that is a favourite halting place of wagtails, wheatears and warblers.

Porcelain Enamel

By Frank Spicer

PORCELAIN enamelling on steel is a comparatively modern development, and is quickly assuming an important role in the world of today. It owes its growing popularity to the following factors. It is fairly cheap, will not scratch, is easy to clean and extremely hygienic, does not stain and will not easily chip.

Just exactly what is porcelain enamel? It is a vitreous, or glossy coating of silicates, field spar and fluxes, which is fused or welded to a steel sheet. Making it is not as easy as it sounds. For instance, the surface of the steel sheets to be enamelled has to go through several processes of cleaning and of preparation. Further, the enamel must be reduced to a powder of a certain screen size, that is the particles must all pass through a certain mesh of wire before use.

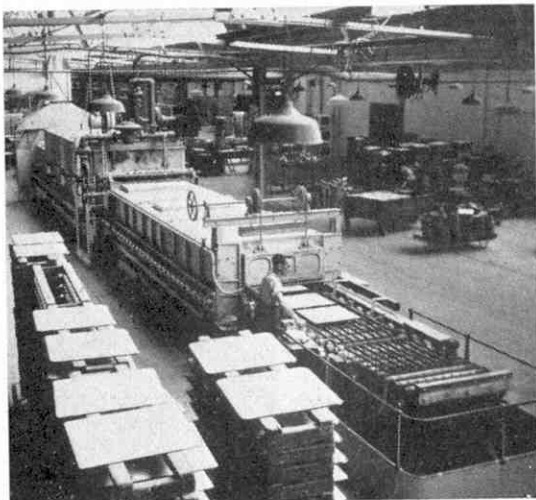
The steel surface is cleaned by either mechanised or chemical means. In the former the surface of the steel is bombarded by a jet of sand or steel shot on to it at a pressure of 50 lbs. per sq. in. In the latter the steel is immersed in various acid solutions.

The minerals from which the enamel is made are mixed and melted together at the high temperature of about 2,300 deg. F. The molten mass is then discharged into a cold water bath, which shatters it into thin granules. It is these granules that are now ground down into a finer creamy substance with water, clay, colouring elements, etc. After being well mixed in a ball-mill, the liquid enamel is applied to the steel surface by one of two methods, either spraying or by dipping. Whether the articles to be enamelled are dipped or sprayed of course will depend upon their shape and design. Awkward objects with deep pockets cannot be dipped successfully because too much enamel would be retained in these pockets.

After the application of the enamel, the articles are allowed to dry so that in the end they are covered with a fine powder. Then they are placed in a special furnace, where the enamel is fused on to the surface of the steel, forming a coating possessing a smooth hard finish.

Before introduction into the fusing furnace all articles should be evenly supported to prevent distortion and sagging. A method of supporting small plates can be seen in the photograph. Longer sheets, when being fused in a continuous furnace, are usually hung vertically on the conveyor belt, which carries them through the pre-heating, fusing and cooling zones. The temperatures required vary with the colours.

A wide variety of colours can be produced by porcelain enamelling, in fact the



Porcelain enamelled plates leaving a furnace after firing, which fuses the enamel on their steel surfaces.

whole spectrum can be achieved by using various colour combinations. Blue enamels are produced by adding cobalt oxides. For yellows and oranges cadmium sulphides are used and brown is obtained by the use of chromium, iron and manganese. Reds are given by the addition of cadmium and selenium compounds, greens follow the use of chromates, and black is derived from the calcined compounds of iron, manganese, cobalt, chromium and occasionally nickel.

Next time you see a piece of enamel ware remember that you are observing a triumph of chemistry and engineering—the welding of glass to steel, for in reality porcelain enamel is a glass.

Photography

In the Country

By E. E. Steele

OF all the months, March, I think, is the most bracing and exciting. Although winter may still hit us with all he's got, it is but a dying effort, and spring flowers are showing, even though the snowflakes may be falling. Each day brings something fresh, as the wild creatures emerge from their cosy winter quarters, and hibernating butterflies awake to life, greedily drinking the nectar from the pure white blossoms of the blackthorn. The air is fresh and clean, and white clouds will be sailing across blue skies, with yet leafless trees forming graceful patterns.



Water Hen's nest.

This is an excellent time to take a long walk into the country, complete with camera and films. It is best to load up with "chrome" films, such as *Verichrome* or *Selochrome*, as these are ideal for fresh green colours and blue skies. Take a pale yellow filter, and double the exposure when using it, and you will obtain far superior snapshots, with skies filled with natural clouds, instead of just white blanks. Make a determined effort to use one or other of the many simple exposure calculators, which may be had for the price of a film, or less. For years I used the Burroughs-Wellcome combined diary and exposure guide, which indicated the exposure for all kinds of subjects with remarkable accuracy, besides containing a mine of information. It is now known as *The Johnson Photographic Year Book*.

Using these means anyone should be able to obtain negatives which are technically good, and capable of giving excellent prints. In addition you will need something which cannot be purchased, but which can be acquired with care and patience; that is a "Seeing Eye." The artist paints just what he requires in his landscape, leaving out all irrelevant bits and details.



Climbing days are here again! The illustrations to this article are from photographs by the author.

The photographer cannot do this, but he can so choose his viewpoint that he makes the very best use of the subject he has chosen. Supposing he sees a promising landscape of tree and sky and cloud. He first decides just how much he wants in his picture, and then strolls round and chooses his viewpoint by repeatedly examining the scene in his viewfinder. His idea is to keep out of the picture all but the bare essentials, while the novice tries to crowd too much into the picture space, including telegraph poles and bitty backgrounds which spoil the picture.

Try, therefore, to make simple pictures consisting of masses of tones rather than multitudes of bits and pieces that have no relation to each other.



A charming spring scene.



The Saab-32 Lansen (Javelin) described below. Photograph by courtesy of Svenska Aeroplan A.B., Sweden.

Air News

By John W. R. Taylor

New Swedish Jet Fighter

Sweden's first 700 m.p.h. aircraft, the Saab A-32 Lansen (Javelin), has completed successfully its initial flight tests and is in production at Linköping for the Royal Swedish Air Force. Intended primarily for attacking ground and sea targets, it is a large two-seat aircraft, with thin sharply sweptback wings, and is powered by a Rolls-Royce Avon turbojet. Armament is secret, but includes guns, bombs and rockets; and the Saab-32 carries radar equipment to find its targets in all weathers by day or night and to ensure extreme accuracy of fire.

Other features shown in the photograph above include wing leading-edge slots which, with large Fowler-type flaps, give the aircraft good handling qualities at low speed; and big fairings which smooth airflow at the root of the adjustable tailplane.

Avon engines to power production A-32s will be built under licence in Sweden by Svenska Flygmotor A.B, who are already producing D.H. Goblin and Ghost turbojets.

Helicopter Survey

Details have been given in Ottawa of an interesting aerial survey operation carried out last year by a party of 16 Canadian scientists, with the object of mapping 57,000 sq. miles of barren land lying between the Great Slave Lake and Hudson Bay. To speed the work they used two helicopters, a light 'plane and a heavy freight aircraft, which landed supplies at different points before the ice melted. Dr. C. S. Lord of the Geological Survey of Canada, who led the expedition, estimated that use of helicopters for the first time in geological survey enabled the party to complete in one summer work that would have occupied ground parties for 25 years, an immense saving of time.

Gannets for Australia

Following the lead of the Royal Navy, the Royal Australian Navy have ordered British-built Fairey Gannets to re-equip their carrier-based anti-submarine squadrons. The Commonwealth's Navy Minister, Mr. McMahon, has stated that the initial contract is for 40 aircraft, costing £3,200,000, for delivery in 1955.

At the moment the R.A.N. has only one operational carrier, H.M.A.S. *Sydney*, which put in fine service in Korean waters last year, equipped with Hawker Sea Fury fighters and Fairey Firefly strike fighters and anti-submarine aircraft. But a sister-ship, H.M.A.S. *Vengeance*, is on its way to Australia to join *Sydney*. Australia's Navy is thus very air-minded, and delivery of

the twin-engined, three-seat Gannets will, in due course, give them an anti-submarine force second to none in the world, for these aircraft carry all the latest and most effective search radar and secret submarine-killing weapons.

First Turboprop Light 'Plane

Light aircraft fitted with turbojet engines have been flying for two or three years in France; but the first propeller-turbine powered light 'plane—the Cessna XL-19B Bird Dog illustrated on this page—made its first flight only four months ago, on 5th November, 1952. This is surprising, because the powerful, lightweight, economical propeller-turbine is an ideal engine for such aircraft.

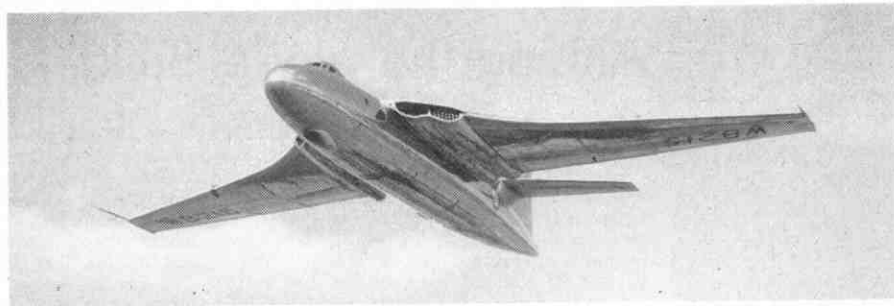
The standard L-19A Bird Dog has been used with great success for observation and liaison duties in Korea. Installation of a 210 h.p. Boeing Type 502-8 propeller-turbine makes it even more versatile, as this engine runs satisfactorily on almost any type of fuel used by military forces, including diesel oil, petrol,



Cessna XL-19B Bird Dog, the world's first propeller-turbine powered light aircraft, taking off on its maiden flight at Wichita, Kansas. Photograph by courtesy of Boeing Airplane Company, U.S.A.

standard U.S. Army lorry fuel, high octane aviation spirit or paraffin. In addition, the changeover from six-cylinder piston-engine to propeller-turbine, which involves very few airframe changes, saves 125 lb. in weight and so makes possible either higher performance or increased payload.

As a further experiment, three Boeing engines of the same basic type are being installed in a Sikorsky S-55 twelve-seat helicopter.



The second prototype Vickers Valiant jet bomber, powered by four Rolls-Royce "Avon" engines. It is one of the new types of bomber ordered for the R.A.F. Photograph by courtesy of Vickers-Armstrongs Ltd.

The New Zealand Air Race

Starting date for this year's big international air race from England to Christchurch, New Zealand, will be Thursday, 8th October. The race will include both speed and handicap sections; but the first aircraft over the finishing line will not necessarily be the winner, as the competitors will take off individually at short intervals to ensure safe, effective air traffic control along the route. Comparative performance will then be calculated on arrival at Christchurch.

It promises to be an exciting race, as entries include R.A.F. Valiant and Canberra jet bombers, an R.N.Z.A.F. Hastings, Australian Mosquito and, probably, a flight-refuelled B-47 Stratojet bomber of the U.S.A.F.

Flying Cowboys

Cowboys of the huge 500,000-acre Waggoner Ranch, which covers some 800 sq. miles of North Texas, have swapped their boots and saddle for a three-seat Bell Model 47 helicopter. Not only does it enable them to find stray cattle much more quickly; but the noise of its rotor is sufficient to drive strays out of the mesquite and chapparal back to the main herd.

Propjet Ambassador

The second prototype Airspeed Ambassador air liner has been flown to Bristol's factory at Filton, where its two 2,600 h.p. Centaurus piston-engines will be replaced experimentally by two 3,780 h.p. Proteus 705 propeller-turbines. It is not the first

time that this particular airframe has been used as a flying test bed, as de Havillands borrowed it to flight test the type of hollow steel propellers they have developed for the Bristol Britannia air liner. There is no possibility that the Proteus-Ambassador will be put into production.

U.S. Army Aviation

Ever since the U.S. Air Force became an independent Service, the U.S. Army have been trying to gain control of aircraft used in support of their ground forces. An important new concession brings that objective nearer, as it permits the Army to increase their air component to a total of 2,200 helicopters and light aeroplanes for observation, liaison, local supply and troop movement in inaccessible areas. The agreement stipulates that the light 'planes must not exceed 5,000 lb. empty weight; but there is no specified weight limit for the helicopters. This is just as well, for the Army have under development the giant Hughes XH-17 jet-powered tank-carrying helicopter and the 40-seat Piasecki XH-16, which is as big as a Skymaster four-engined air-liner and may in due course supersede the U.S.A.F.'s fixed-wing troop transports.

The DHC-3 Otter

De Havilland Aircraft of Canada's excellent DHC-2 Beaver light transport, described in the January *Air News*, will soon be joined in service by a bigger aircraft on the same lines, the DHC-3 Otter. As can be seen in the lower illustration on this page, the Otter has the same sturdy, workmanlike appearance as its smaller brother, and it was, in fact, originally named King Beaver. But it is much bigger and more powerful, with a span of 58 ft., loaded weight of 7,200 lb. and 600 h.p. Pratt and Whitney R1340 Wasp engine. It can carry up to 14 passengers or a ton of freight at 139 m.p.h., has a maximum endurance of 10½ hours, and inherits the Beaver's exceptional landing and take-off performance.

Canadian Pacific Airlines are planning a non-stop air service from Vancouver to London over the Arctic in 16 hours. The service will link with others from Tokyo and Sydney to provide the fastest through services from the Far East and Australia to Europe.

B.O.A.C. are considering an airoach service over the same route with turboprop Britannias.



The DHC-3 Otter single-engined transport, a new product of de Havilland aircraft of Canada Ltd., by whose courtesy this photograph is reproduced.

Mr. Arthur W. Dickie, Auckland, N.Z., a regular competitor in M.M. Competitions. He has won several prizes for the excellence of his model-building.



Meccano in 1925

The attractive model motor-cycle and side-car shown on this page will no doubt appear strange to young model-builders of today, but it is particularly interesting in view of the fact that it was built nearly 30 years ago; it is therefore a splendid example of the kind of models built by the fathers of the present generation of Meccano enthusiasts.

The model was constructed in 1925 by Mr. E. Vassie, East Tilbury, who now has a young son who is also a keen model-builder.

Mr. Vassie's model was built in the original nickel-plated Meccano, well before the coming of Flexible Plates and many other parts that are familiar to model-builders today. Keen observers will also spy in its construction several parts that are not included in the Meccano System now. A pleasing feature of the model is the amount of realistic detail that it incorporates, a feature that is often lacking in small models of complicated subjects.

I feel sure that the accompanying illustration will arouse nostalgic memories of their early Meccano days among my older readers, many of whom still write to me regularly and send me suggestions and ideas. Although in some cases they are no longer active model-builders themselves, they take a keen interest in the Meccano activities of their sons and in all matters connected with the hobby and the "M.M."

Another Friction Clutch Reversing Mechanism

In the May 1952 "M.M." I described a reversing mechanism designed by

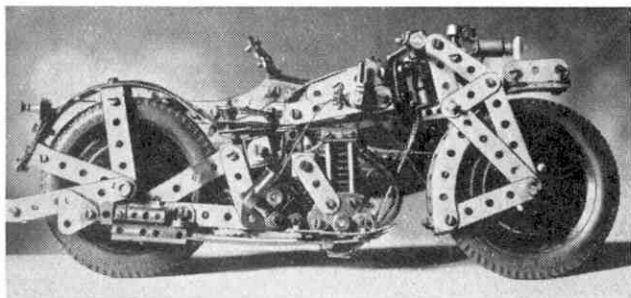
Among the Model-Builders

By "Spanner"

A. Roberts, Capetown, in which the drive was engaged through friction clutches. This month I am illustrating (Fig. 1) an interesting modification of Roberts' idea, which can be used in model vehicles, as the input and output shafts are mounted in a straight line. This mechanism is somewhat simpler than the original design, but it operates on the same principle.

The framework consists of a $4\frac{1}{2}$ " and a $3\frac{1}{2}$ " Strip connected by two $2\frac{1}{2}$ " x $\frac{1}{2}$ " Double Angle Strips, each of which is fitted with a Double Bent Strip. Two 1" Gears 1 are freely mounted on $\frac{3}{4}$ " Bolts attached to the framework by nuts.

The input shaft 12 is a 2" Rod fitted with a $1\frac{1}{2}$ " Contrate 2, and the Rod projects through the Contrate sufficiently to support a 1" loose Pulley fitted with a Rubber Ring. The Rod is held in position by a Collar, so that the Contrate engages the teeth of the Gears 1.



This realistic motor-cycle and sidecar was built by Mr. E. Vassie, East Tilbury, in 1925, and is a good example of the actual machines of that period.

The output shaft is a 4" Rod 3, and it carries two 1" Pulleys 4 and 5, each fitted with a Rubber Ring, a 1" loose Pulley also fitted with a Rubber Ring, and a $1\frac{1}{2}$ " Contrate 6 that engages the teeth of Gears 1. The Contrate 6 is loose on the Rod, and it is held in position by a Collar 7 and Washers.

The Contrates 2 and 6 are positioned so that there is just sufficient clearance from the Pulleys 4 and 5 to permit the Rods 12 and 3 to rotate independently. When Rod 3 is moved to the left (Fig. 1) Pulley 4 is pressed against the Contrate 2 and it provides a direct friction drive between Rods 12 and 3. When Rod 3 is moved to the right Pulley 5 engages the Contrate 6,

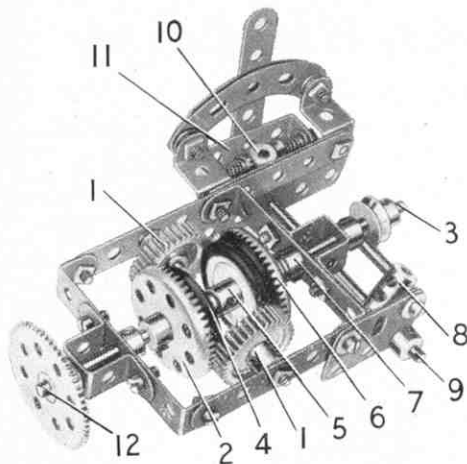


Fig. 1. A useful friction clutch reversing mechanism.

and the drive is then reversed through the action of the gears.

The movement of Rod 3 is controlled by a Coupling 8 fitted with a 1" Rod that engages between a Collar and a $\frac{1}{2}$ " Pulley. The Coupling is fixed on a transverse Rod 9 mounted in a $2\frac{1}{8}$ " and a $1\frac{1}{2}$ " Flat Girder, and it carries also a Coupling 10. The operating lever is a 3" Strip loosely mounted between Collars on Rod 9, and it carries a $1\frac{1}{2}$ " x $\frac{1}{2}$ " Double Angle Strip 11. A Pivot Bolt fitted with a Compression Spring is passed through each lug of the Double Angle Strip and held in place by lock-nuts, so that the head of the Bolt bears against the Coupling 10. The lever operates in a quadrant formed by two $2\frac{1}{2}$ " stepped Curved Strips fixed to $\frac{1}{2}$ " Reversed Angle Brackets.

Servo Brake-Clutch for Cranes

The apparatus shown in the drawings reproduced as Fig. 2 is a form of external brake clutch that has been designed by N. Gottlob, Klampenborg, Denmark, for use in connection with a crane winding drum.

The external brake servo clutch is particularly

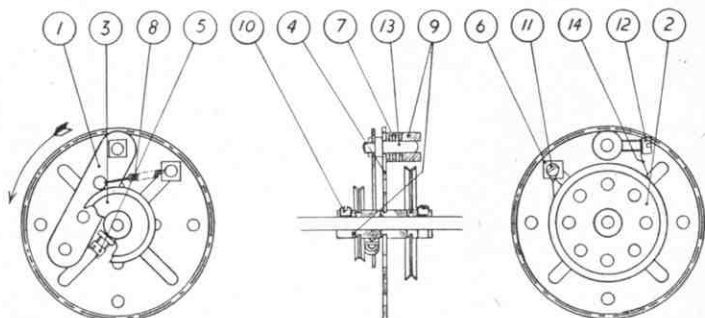


Fig. 2. A diagrammatic arrangement of the external servo brake-clutch designed by N. Gottlob, Klampenborg, Denmark.

applicable to crane winding drums. On a suitable Rod a $1\frac{1}{2}$ " Pulley 2 is fixed. A $2\frac{1}{8}$ " Gear Wheel 4 free to turn on the Rod is placed next to the Pulley and a 1" Pulley 3, also free on the Rod, is fitted next to the Gear Wheel. A Collar 9 keeps the Pulley and Gear Wheel in place. A brake band 14 is at one end fixed to a $\frac{3}{8}$ " Bolt 11 and at the other end to a crank consisting of a $\frac{3}{8}$ " Bolt 12 which firmly clamps another Collar 9 to the shank of a Threaded Pin 13. Five Washers 7 are placed on the Threaded Pin for spacing purposes. To the other end of the Threaded Pin a 2" Strip 1 is firmly attached and a small piece of Spring Cord 8 makes the Strip rest against the boss of the Pulley 3.

A Bolt 5 is lock-nutted in this boss without gripping the Rod. When the Pulley is turned relatively to the Gear Wheel this bolt will bear against the Strip 1 and thus tighten the brake band around the Pulley 2. This brake band should be so arranged that when the Strip rests against the boss of the 1" Pulley the Pulley 2 is free to turn relatively to the Gear Wheel. By far the best material for the brake band is a short piece of thin mild steel wire. The winding drum is fixed to the Rod together with a suitable holding brake. To operate the clutch the Gear Wheel is set in motion in the direction of the arrow and when a braking effect is applied to the 1" Pulley, a braking effect is exerted between the Gear Wheel and the Pulley 2, locking these two parts firmly together. The more the 1" Pulley is braked off the firmer the Gear Wheel and the Pulley are locked together. Pulley 2 must be free to turn inside the brake drum when the clutch is disengaged.

This servo clutch should be worked at a comparatively low speed.

New Meccano Models

Gantry Hoist—Metal Sawing Machine

OFTEN to be seen among the many different kinds of load handling machines, in factories and engineering works, are simple gantry hoists of the type that forms the subject of the model shown in Fig. 1. A hoist of this kind is used for handling loads of the lighter kind and consists of a motor-driven hoist winch suspended from a trolley that runs on a gantry. The winch is operated by a man standing on the ground, who controls the hoisting and lowering of the load by pulling chains connected to the switch gear of the winch motor.

Building the Model

An Angle Bracket is bolted at each end of one of the sideplates of a *Magic* Motor 1 and a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate 2 is then bolted to each Angle Bracket by the Bolts 3. One of these Bolts also holds in place an Angle Bracket 4.

Two $2\frac{1}{2}''$ Strips 5 are attached to the Flexible Plates 2 and two $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips 6 are bolted between the $2\frac{1}{2}''$ Strips. To the Double Angle Strip nearest to the hoisting shaft, a $2\frac{1}{2}'' \times 2\frac{1}{2}''$

Flexible Plate extended by a Semi-Circular Plate, is fixed.

A 2" Rod is mounted in Double Angle Strips 6, and is fitted with two 1" Pulleys 7 and 8. Pulley 7 is spaced from the Double Angle Strip by two Washers, and Pulley 8 is connected by a driving belt to the pulley on the *Magic* Motor.

A $3\frac{1}{2}''$ Rod, which forms the winding shaft, is passed through the end holes of Strips 5 and carries two 1" Pulleys 9 fitted with Rubber Rings. The

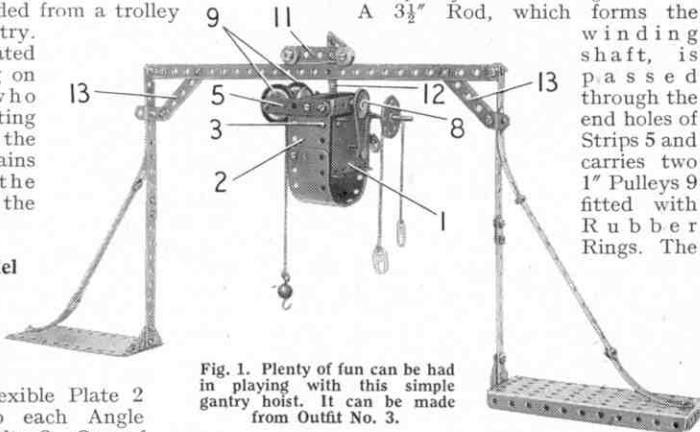


Fig. 1. Plenty of fun can be had in playing with this simple gantry hoist. It can be made from Outfit No. 3.

Pulleys 9 are arranged one on each side of Pulley 7, and are spaced slightly wider apart than the diameter of Pulley 7. By sliding the $3\frac{1}{2}''$ Rod one of the Rubber Rings can be made to press against the rim of the Pulley 7. This arrangement provides a friction drive to the winding shaft, and by sliding the $3\frac{1}{2}''$ Rod the opposite way the second Rubber Ring is brought into contact with Pulley 7 to reverse the direction of the drive.

The sliding movement of the winding shaft is controlled by two lengths of Cord tied to a Bush Wheel. The Bush Wheel is fixed on a $3\frac{1}{2}''$ Rod mounted in Angle Bracket 4 and in a second Angle Bracket bolted to the Flexible Plate. A Rod and Strip Connector 10 is placed on the end of the $3\frac{1}{2}''$ Rod, and a Fishplate bolted to the Connector is arranged so that its slotted hole passes over the end of the winding shaft. A Washer and a Spring Clip are placed on the shaft at each side of the Fishplate.

The wheels on which the hoist travels are a $\frac{1}{2}''$ loose Pulley and the $\frac{1}{2}''$ fixed Pulley supplied with the *Magic*

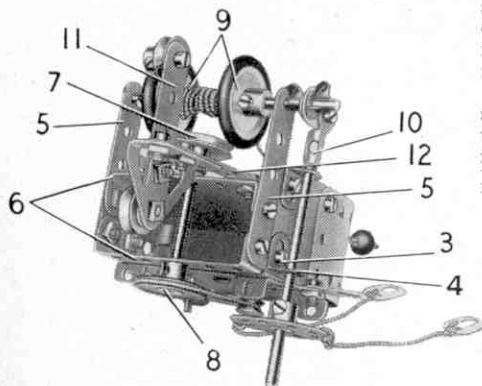


Fig. 2. The hoist removed from the gantry.

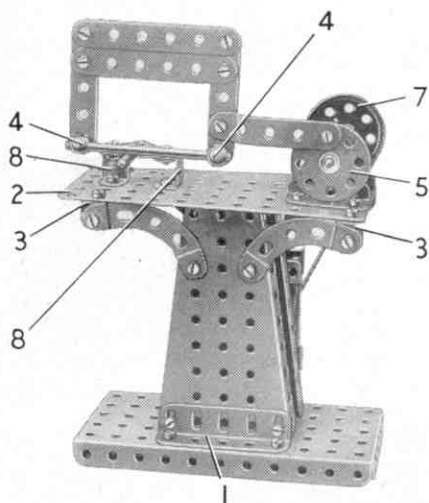


Fig. 3. A model of a metal sawing machine fitted with a Magic Motor.

Motor. The fixed Pulley is held by its grub-screw on a $\frac{3}{8}$ " Bolt passed through a $2\frac{1}{2}$ " Strip 11. The loose Pulley is free to turn on a $\frac{3}{8}$ " Bolt, which is attached by two nuts to Strip 11. This assembly is bolted to a Trunnion, which is supported by a $2\frac{1}{2}$ " Strip 12 fixed tightly to one of the Double Angle Strips 6. The hoist is completed by a $5\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plate curved to shape and fixed to the Flexible Plates 2, and by bolting a Fishplate to the brake lever of the Magic Motor. The hoisting Cord is tied to the Rod and wound between the Pulleys 9.

The gantry rail is formed by two $12\frac{1}{2}$ " Strips, and at each end it is connected by an Angle Bracket to a column made from two $5\frac{1}{2}$ " Strips overlapped two holes. The assembly is strengthened by $2\frac{1}{2}$ " Strips 13 bolted to the rail and attached to $\frac{1}{2}$ " Reversed Angle Brackets fixed to the upright columns. One of the columns is connected by a Flat Trunnion to a base consisting of a $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate, and the other is fixed to a Trunnion bolted to two $5\frac{1}{2}$ " \times $\frac{1}{2}$ " Flexible Plates. A bracing strut for each column consists of a $5\frac{1}{2}$ " Strip and two Formed Slotted Strips arranged as shown.

The model shown in Fig. 3 represents one of the many different types of sawing machines used in engineering workshops for cutting rods and bars of metal. The model is driven by a Magic Motor and it provides an interesting subject for young constructors.

The base of the model is a $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate, and to this are bolted two $2\frac{1}{2}$ " Angle Girders 1. These Girders in turn are bolted to two Flanged Sector Plates, which form a column that supports the worktable. The worktable is a $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flat Plate 2, which is fixed to the Flanged Sector Plates by four $2\frac{1}{2}$ " stepped Curved Strips. One end of each Curved Strip is bolted to a Flanged Sector Plate and their other ends to the lugs of $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strips 3 bolted underneath the $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flat Plate.

The saw frame consists of two $2\frac{1}{2}$ " Strips and two 3" Strips. The saw, which is represented by a Rod, is held at each end in Handrail Supports 4 fixed to the lower ends of the $2\frac{1}{2}$ " Strips. The saw frame is actuated by a $2\frac{1}{2}$ " Strip, which is attached to the frame at one end, and at the other is pivoted freely on a $\frac{3}{8}$ " Bolt lock-nutted in a hole of a Bush Wheel 5. The Bush Wheel is fixed on a 3" Rod supported in two Trunnions bolted to the $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flat Plate. The Rod is held in place by a Collar 6, and it is fitted with a $1\frac{1}{2}$ " Pulley 7. A Magic Motor is bolted to one of the Flanged Sector Plates, and its pulley is connected by a Driving Band to the Pulley 7. The metal to be cut is held between two $1\frac{1}{2}$ " Strips fixed to Double Brackets 8.

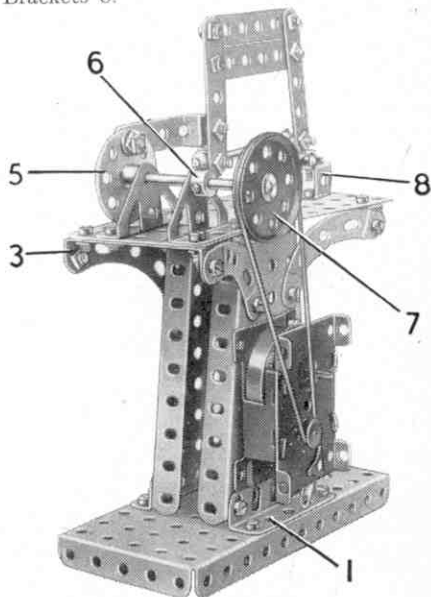


Fig. 4. This view of the metal saw from the rear shows how the driving Motor is fitted.

Over 400 Prizes To Be Won

Have You Sent In Your Own Entry Yet?

By "Spanner"

HAVE you made sure of your chance of winning one of the hundreds of Cheques and Postal Orders that will soon be speeding on their way, from our offices in Binns Road, to fortunate model-builders in all parts of the world? With them will be letters carrying tidings of success in the great International Meccano Model-Building Competition, now nearing its closing date.

If you have not yet sent in an entry there is still time to plan one, but **DO IT NOW!** Build your model, prepare the necessary photographs or sketches, and send these to *Meccano Ltd., Binns Road, Liverpool 13*, as soon as you can, so that they will arrive before the closing date, which is 31st March.

The competition is open to every owner of a Meccano Outfit whatever his age or the size of his Outfit, and over four hundred Cash Prizes are offered for the best models received.

Full details of the Competition and instructions for preparing and sending in entries, are given in a Special Competition Folder, which you can obtain free of charge from your Meccano dealer. If you are unable to obtain a copy locally however, just send a postcard to *Information Service, Meccano Ltd., Binns Road, Liverpool 13*, and a Folder will be sent to you immediately.

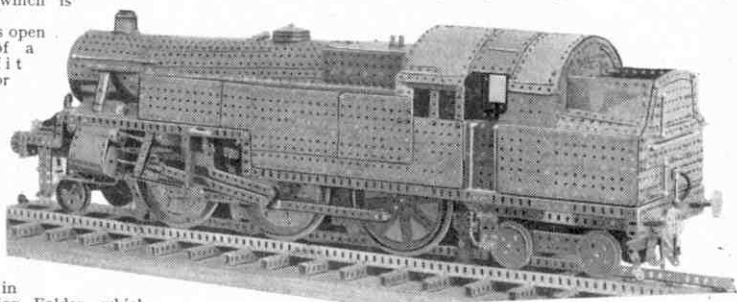
Before sending your effort be careful to see that all the instructions given in the Special Competition Folder have been followed. Entries have already been received without the senders' ages, and some even lacking their names and addresses. This of course is fatal, for an entry is useless without these particulars.



Ernest Hill, Bury, one of the hundreds of wise young model-builders who have already sent in their entries for the Meccano International Model-Building Competition.

Therefore make sure that each photograph or drawing, and also each sheet of paper in your entry, bears on the back your age on the 31st March next, your name and full address, and the signed declaration *I am a Meccano Owner.*

There is one other point, which concerns prize-winning entries. Photographs or drawings of models that receive prizes become the property of Meccano Ltd., and will not be returned to the senders. Every endeavour will be made to return an unsuccessful entry provided that a correctly stamped and addressed envelope is sent with it for that purpose, but Meccano Ltd. cannot accept responsibility for the safe custody



This realistically proportioned model tank locomotive won a prize for C. Howard Pendlebury, Hinckley, in the advanced model-builders section of an M.M. Competition some years ago.

or return of any entries.

As this will be the last chance I shall have of wishing the best of luck to every competitor, I want to assure you that I am looking forward with real interest to seeing the results of your efforts!

SPECIAL "CORONATION" COMPETITION

Don't forget that the special Coronation Model-Building Competition announced in the January issue of the Magazine, is open for entries until 31st May next.

In this Contest readers are invited to send in models of suitable subjects connected in any way with the Coronation ceremony, or the public celebrations of this historic Royal event. As examples of suitable subjects we might mention the State Crown, the State Coach, the Coronation Chair and famous London buildings such as Buckingham Palace, Westminster Abbey and the Admiralty Arch, under which the Coronation procession will pass on its way down the Mall. There are plenty of other fascinating and suitable subjects for models, and the competition is open to Meccano owners of all ages living in any part of the world.

Full details of the Prizes to be awarded will be repeated in the April M.M. Meanwhile, if your entry is ready you can send it to *Coronation Model-Building Competition, Meccano Ltd., Binns Road, Liverpool 13.*



Club and Branch News



WITH THE SECRETARY

THE VALUE OF PUBLICITY

There is a well-known saying that "It Pays to Advertise." I was reminded of this when I read the excellent report of the recent Exhibition held by the Belgrave Union (Leicester) M.C., and referred to in the caption on this page and in *Club Notes* last month. The outstanding success of this one-day Exhibition, which was visited by about 1400 people, was undoubtedly due in part to the wide publicity that had been given to the event beforehand, for it was advertised not only in the local newspapers but by means of posters in all parts of the city. This enterprise helped greatly to stimulate public interest. The Club gained further valuable publicity by the visit of reporters of the local press to the display, and the high praise they gave it in their published reports.

In the result Club funds benefited substantially, and so many applications for membership were received that there is now a waiting list.

There is a moral in all this for other Clubs, and Branches!

PROPOSED CLUB

NEWTON ABBOT—Mr. Neil Brown, 108, Abbotsbury Road, Newton Abbot, S. Devon.

PROPOSED BRANCHES

HOUNSLOW—Mr. A. Christie, 33, Avondale Gardens, Hounslow, Middx.

LIVERPOOL—Mr. P. F. McDonald, 8, Oriol Road, Bootle, Liverpool.

CLUB NOTES

COPDOCK AND WASHBROOK M.C.—This newly-affiliated Club is making good progress. Model-building meetings are being held, and there are competitions every fortnight. A 9.5 mm. film projector has been bought with funds raised at a Whist Drive. New members will be welcomed. Club roll: 9. *Secretary*: K. E. Whitten, The Street, Copdock, Nr. Ipswich, Suffolk.

EXETER M.C.—At the Christmas season the Club joined forces with the Knights of the Road Club and the Juventus Club. Model-building continues as energetically as ever, and the recent output has included a tractor and trailer, motor van and a 4 ft. high crane. The Club have been asked by the Juventus organisation to construct for them a large windmill and a tall clock for use on the stage in a pantomime they are preparing. Club roll: 30. *Secretary*: K. Strudwick, 22, Water Lane, St. Thomas, Exeter.

BURY GRAMMAR SCHOOL M.C.—The Annual Exhibition held at the end of last term was a great success, and included a fine display of Meccano models, in which prizes were offered for the best exhibits. Another great attraction was an extensive Hornby-Dublo layout in operation. The Aero Club Section

also made a good show, and almost continuous flying was in progress during the exhibition. Another successful Film Evening has been held, when two railway films *Engine on Shed* and *Main Line Diesel* were greatly enjoyed by a large audience. Club roll: 40. *Secretary*: J. A. Strafford, 13, Maple Grove, Prestwich, Nr. Manchester.

BRANCH NEWS

MAGDALEN COLLEGE SCHOOL (OXFORD)—In an interesting railway Talk on *Western Kings and Castles* the lecturer compared the various advantages and disadvantages of each class of locomotive, and concluded by expressing his opinion that the Castle was superior to the King in most respects. *Secretary*: D. F. Moss, 61, Victoria Road, Summertown, Oxford.

ABBAY (CARLISLE)—Experimental layouts featuring single and double track lines and a figure eight respectively have been put down at recent meetings. A new member of the Cathedral clergy who is keenly interested in railways has promised to lend railway magazines to the Branch. *Secretary*: J. Bell, 28, Blunt Street, Carlisle.

MILE END (PORTSMOUTH)—The new quarters which the Branch shares with the Mile End M.C. are very satisfactory, as there is room for additional trestle tables on which to construct layouts. At one recent Hornby-Dublo night the largest layout yet laid down was operated, members bringing extra rails, trucks and points which they had received as Christmas gifts. Hornby Clockwork Nights also have been held, with a different layout in use on each occasion. Preparations are well in hand for a two-day Branch Exhibition. *Secretary*: M. Powell, 92, Renny Road, Fratton, Portsmouth.



Cheery members of the Belgrave Union (Leicester) M.C. with Oscar, the Meccano robot, one of the outstanding models displayed at the Club's fourth Annual Exhibition in the Belgrave Union Church Rooms on 15th November last year. On the left of Oscar and holding his metallic hand, is Sandra Smith, aged eight, and just visible in the centre background is Mr. C. S. Smith, the energetic Leader and Secretary of this flourishing Club.

HORNBY RAILWAY COMPANY

By the Secretary

IT has often been said that a good miniature railway is always complete, but never finished. That is easy to understand. Even in its earliest days it provides a service over the sections already laid down, but the owner is constantly looking for improvements to allow him to handle traffic more efficiently and planning extensions to give him more business. He is indeed in the same position as were the pioneers of our real railways. They started with more or less local lines, which spread out farther and farther until they provided a vast network covering the entire country.

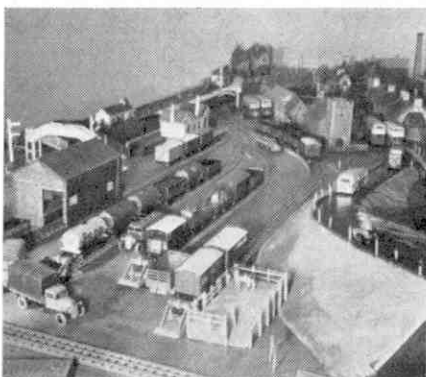


Hornby-Dublo "Sir Nigel Gresley" heads an express train in a realistic setting.

A. W. Fry, of Romsey, Hants., is an owner of this kind and his layout certainly has grown on these realistic lines. In its earlier stages it consisted of a single track main line, with an avoiding line in the neighbourhood of a principal station. This avoiding line had to be available for trains running in each direction, so it was arranged outside the main oval to make it as useful as possible. Good main line working resulted, but the sidings, which were inside the main oval, suited trains running in one direction and were not so convenient or realistic for those moving in the opposite direction.

This sidings problem was tackled at a later stage. A loop line was developed inside the main track, and sidings, served now by trailing points, were taken from this loop. The result was better working, for the engines of trains

Looking for more Traffic



The layout of A. W. Fry, Romsey, Hants, in its earlier stages. In striving for a better layout the sidings have since been reversed.

running in the wrong direction for reversing wagons into the sidings could then readily be run round their trains, to effect the movement quite easily and naturally. In making this change the run of the sidings was reversed.

No doubt other extensions are now being thought of, or will be considered, but for the time being the layout is that shown in the diagram. It now has double track main lines, which give easier working of traffic, for they are electrically separate and therefore can be controlled independently. The "run-round" crossover points joining the two main tracks near the large station have the usual insulating gap in the centre rail connections.

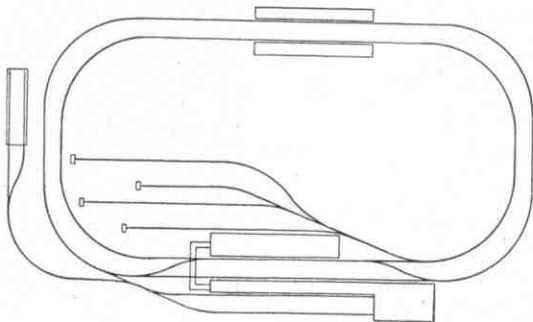


Diagram of the Hornby-Dublo layout described on this page.

Station and Yard Working

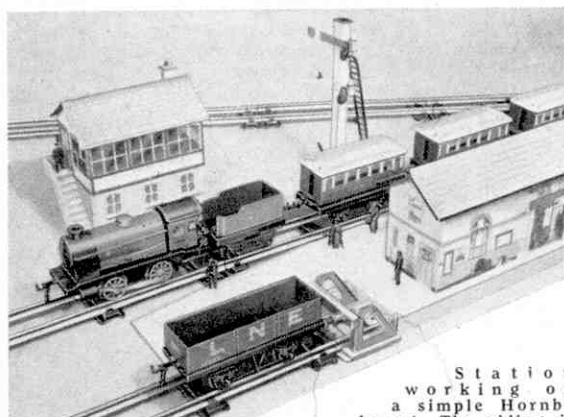
ALTHOUGH to many train running on a main lines is the chief interest on a Hornby layout, there are other branches of miniature railwaying that appeal strongly to the keen operator. The variety of attractions that the hobby presents is

siding extends into the bay formed by the space behind the platform ramp or sloping end piece. This siding is correctly finished off by means of a Hornby Buffer Stop and is just the place for an odd wagon to stand, as one is doing in the picture. Sometimes we may want to add another vehicle to a train that stops at the station, or take one off, and here again the siding comes in useful. Even with a simple arrangement of this kind there is ample opportunity for quite good railway operation, if we go the right way about it.

Work in the goods yard is necessarily somewhat different because a greater variety of stock is involved and the actual loads also have to be considered. To help in handling the latter a very fine piece of equipment is now available in the Goods Yard Crane, Dinky Toys No. 752, which is shown at work in the lower illustration. Crane "driving" in miniature is a most fascinating business

and our "man on the job" can really enjoy himself carrying out various lifts, swinging loads between wagons and road vehicles.

The road traffic side of things as applied to a Hornby railway is an entertaining business too, but that is another story that we hope to deal with in a future *M.M.*



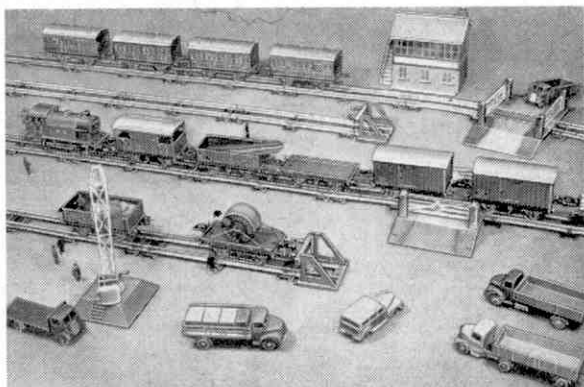
Station working on a simple Hornby layout. The siding is

terminated by Buffer Stops in the space behind the platform ramp.

one of its greatest features, and many of these are of absorbing interest in themselves.

Station and yard arrangement and working are good examples of special "corners" of railway working. Simple layouts that leave the operator plenty of room to work in are better than those on which close placing of different features prevents easy handling of the trains. On a clockwork railway, of course, there must be a certain amount of hand operation, not only of engines and trains, but also of points levers, signals and so on, and this gives the young owner of a Hornby Clockwork system the feeling that he really is the "man on the job."

Look at the station layout shown in the upper illustration on this page. Here is the standard No. 3 Station peopled by Dinky Toys figures, railwaymen and passengers. A single



A busy yard on a Hornby layout with sidings and through tracks. The Level Crossings provide a way over the two tracks for road traffic.

Variety in Continuous Dublo Layouts

THE aim of every Hornby-Dublo railway owner is to run trains in as realistic a manner as possible. No two layouts are really alike, because of individual requirements and variations in the conditions affecting the actual position of the tracks.

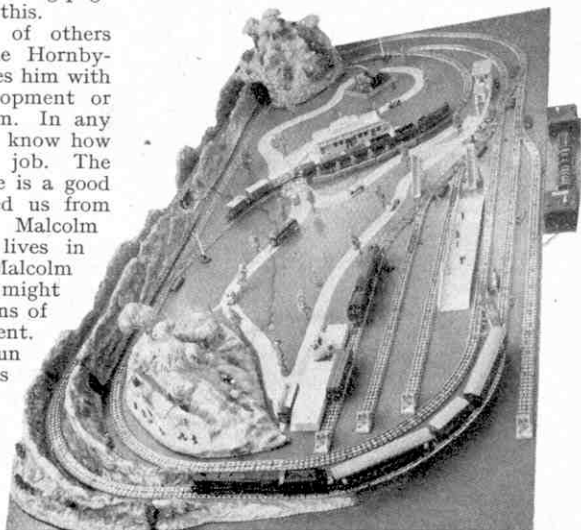
Many layouts may be continuous in plan, owing to the wishes of their operators to have their trains making long non-stop runs in a restricted space, but the systems themselves invariably differ considerably in detail. One has only to examine the illustrations on this and the following page in order to realise the truth of this.

Looking over the layouts of others invariably is attractive to the Hornby-Dublo owner, and often provides him with ideas that lead to the development or modification of his own system. In any case it is always interesting to know how the "other fellow" does the job. The railway illustrated on this page is a good example. Details of it reached us from far overseas, for the owner Malcolm Bevan, H.R.C. No. 180989, lives in Adelaide, South Australia. Malcolm is an invalid and his railway, as might be expected, has been the means of many happy hours of enjoyment. Malcolm likes to share the fun with others, and his layout as you see it has often been displayed for charitable purposes. Needless to say, on these occasions it attracts eager attention from enthusiasts of all ages.

The railway is laid on a baseboard 8 ft. long and just over 4 ft. wide, and the arrangement of the track is clearly shown in the illustration. An interesting point, especially for display purposes, is that the outer main track runs separately from the inner one for some distance. This separation is effected by means of lineside scenic work, in the construction of which papier-mache has been largely used. It is fascinating to see a train on the outer track disappear behind this scenic work, and to catch sight of it again where it emerges momentarily to cross a small bridge, only to disappear again and to come out finally from a tunnel through which the inner track also passes. A wonderfully realistic touch, this.

It will be noticed that there are the

usual sidings inside the main oval, and that platforms are provided for passenger and for goods trains. Although the passenger platform is situated alongside the inner main track, trains from the outer track can make their way to it by means of the two sets of points arranged to form crossovers between the two tracks. Thus both inner and outer tracks can be used quite independently for traffic in each direction. As they take separate, but roughly parallel courses over a good deal

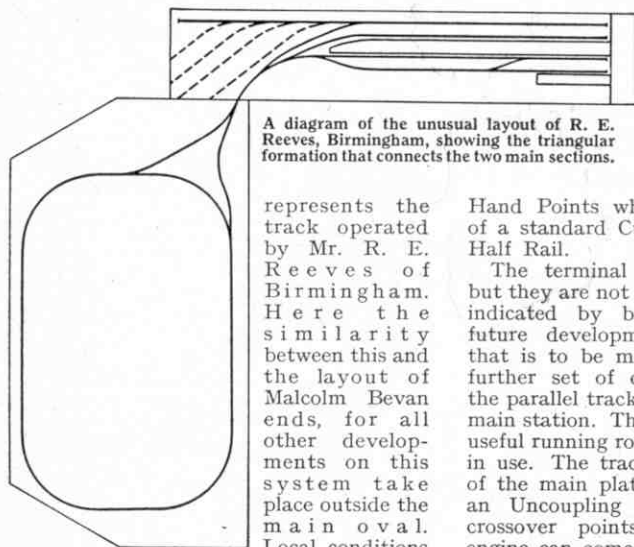


The splendid Hornby-Dublo layout of Malcolm Bevan, Adelaide, South Australia. The system is laid out in a very attractive manner and sponge rubber is used extensively in connection with the scenic effects.

of their length, this is a reasonable arrangement.

In the photograph a goods train is traversing a useful connecting loop that passes across the board in such a way that it can be used for turning a train round if necessary. One end of this track, going right across the board diagonally, joins the inner main track at one end of the oval. This arrangement keeps it clear of the station and siding points, and allows more space for the development of the platform arrangements and tracks.

A continuous main line is also a feature of the layout shown in the diagram at the head of the opposite page, which



A diagram of the unusual layout of R. E. Reeves, Birmingham, showing the triangular formation that connects the two main sections.

represents the track operated by Mr. R. E. Reeves of Birmingham. Here the similarity between this and the layout of Malcolm Bevan ends, for all other developments on this system take place outside the main oval. Local conditions

are responsible for this interesting arrangement, for the main oval on its own board has to fit in a window bay of such dimensions that little worth-while development can be carried out inside it. There is an advantage in this, for the main track is kept free from complications and long main line runs are readily possible.

The terminal section of the track, which is accommodated on a separate baseboard, is connected to the continuous main line by means of a triangular junction. This type of formation has been referred to previously in the *M.M.*, but it will be of interest to indicate the exact arrangement of rails and points that are used here. To the curved branch of the Left Hand Points at the top of the main oval a Straight Quarter Rail and a Straight Half Rail are added. Then comes the curved branch of the Right-Hand Points at the head of the triangular junction. To the straight branch of these Points is joined a full Curved Rail, and then comes a

Curved Half Rail arranged to form a reverse curve. This joins up to the straight branch of the Left Hand Points near the edge of the board. The remaining leg of the triangle between these Points and the Left

Hand Points where we began is formed of a standard Curved Rail and a Curved Half Rail.

The terminal arrangements are good, but they are not yet completed, the sidings indicated by broken lines representing future developments. Another addition that is to be made is the inclusion of a further set of crossover points between the parallel tracks on the upper side of the main station. These will complete the very useful running round arrangements already in use. The track serving the lower edge of the main platform in the diagram has an Uncoupling Rail just short of the crossover points, so that an arriving engine can come to rest, back up slightly to uncouple and then make use of the loop provided to run round its train.

Similar careful provision for engines and train movements has been made on the layout shown in the lower picture. This system, which was described in the *M.M.* in April last year, belongs to Marcus Womersley, of Wareham, Dorset. The goods yard shown in the illustration is not elaborate, but the track arrangements enable an engine to run round its train to shunt the wagons into the various sidings.



The goods yard and engine shed on the Hornby-Dublo layout of Marcus Womersley, Wareham, Dorset.

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Stamp Collectors' Corner

By F. E. Metcalf

YOUR QUEEN ELIZABETH COLLECTION

RECENT copies of the Crown Agent's Bulletin give details of several Queen Elizabeth sets that are being printed, and of course we already have in being a number of stamps that belong to the group. But before I go any further I had better say a word about the correct designation of the collection we have in mind. Shall we call it QE II or QE? "What does that matter?" many English collectors may say. Just a minute, I am afraid that it does matter quite

a lot to some. Recently I received a letter from overseas about some notes I had written, and in it were the words "You are using the term QE II. As no stamps were issued during the reign of Queen Elizabeth of England is this distinction necessary?"

Many people are against the use of the figure II, which suggests that the previous Elizabeth was more than the Queen of England,

or that the present one is only the Queen of England. "Would any harm be done by omitting the figure II?" No harm whatever, I suppose. So let us drop it, though perhaps we'll have to use the figures occasionally when we are referring also to KG VI, for it would look odd to use figures in one case and not the other.

Some collectors are rather at sea as to which of the recently issued stamps should be included in their QE collections. For instance, since the death of the king sets have appeared for Seychelles, etc., which bear the late monarch's portrait; on the other hand, we have sets for Brunel and Zanzibar that show no such connection, though projected during the late reign.

With stamps, like many other things, one has to compromise, so as one cannot draw a hard and fast line, common sense has to rule academic logic. Thus we get the average collector leaving out the stamps that show the late king's portrait, but including those that like the Zanzibar set have no such image.

That perhaps disposes of one knotty problem, and now we come to another. All collectors would like to include in their collections all QE stamps, but there is such a thing as cash to consider, so we had better go into the important question of cost. First of all,

can you afford to spend the best part of £100 in the next two years, and then about one pound a week afterwards? If you can then the QE world is yours and all that is in it, except for freak and costly varieties. You will not only be getting an awful lot of fun, but forming a nice little nest egg as well, just as KG VI collectors did and are doing, for their stamps are still going strong.

For the many who cannot afford so much, there are many ways of limiting one's expenditure and still having a nice little collection within reach. Let us suppose that you have only ten shillings a week to spend on stamps. You can either take up a group—the West Indies is the most popular— to the top value, or you can take all countries in the

Commonwealth up to a top face value of 1/-. To repeat, you will get an awful lot of fun, and perhaps some profit in the long run, providing you stick to your job of collecting, and leave the question of buying sheets of stamps as an "investment" to others who know more about it.

We still have that section of would be QE collectors who do not want to spend more than a shilling or two weekly. Well, their needs can be met very nicely. What about a collection to 6d. or even 3d.? Most dealers make up these short sets. Perforation and shade varieties can be picked up separately; most dealers sell them loose.

For collectors who take up to 1/- or over, a new issue service is a No. 1 priority. There are plenty of reliable services and to be a member of one is a certain and easy way of getting most stamps as they come out. There may be a bit more fun picking up this and that set, but there is no fun missing any, which is quite easy to do, and those that are missed often prove to be the scarce ones.

There has been a good deal of discussion as to whether stamps are a good investment or not. This is a question we should deal with, for most collectors spend more cash on these scraps of paper than they can afford to throw away on a mere hobby. I have had a good deal of experience of stamps from the investment angle, and perhaps my considered opinion may be of some value.

As an investment, pure and simple "thematic" stamps cannot be considered as at all good. At best, such stamps are a mere gathering of bits and pieces of sets, and dealers do not want to be bothered selling oddments, unless of course rare stamps are concerned, and there are not many to be found in this class of collection.

On the other hand, it is different with modern colonial stamps. The demand is world-wide, and if a collector will take care of his stamps and their mounting, and be content with forming a collection, and not, as previously mentioned, just buying sheets or blocks of stamps that are supposed to be scarce, a nice little investment is being formed.

Do not think however that stamps you buy today can be sold at a profit tomorrow. A stamp collection must mature. It is a case of waiting a few years until dealer's stocks need replenishing. Do that and you should have no cause for complaint.

A final word, do not collect stamps at all if the money angle is all that concerns you. After all there are other and better investments than stamps if pounds, shillings and pence are the only criterion. But actually the collecting of colonial stamps yields other benefits, and perhaps in a further article sometime I will point out what these are, though some must be obvious to all to account for the popularity of stamp collecting. If the monetary angle has to be taken into consideration, however, take great care how you mount your stamps, particularly if they are mint, for badly mounted stamps lose a lot of their value.



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Stamp Gossip

"PAPERS, PAPERS"

THAT forthright nation the United States already holds the palm for stamps issued to commemorate rather odd events or subjects, so we need not be too surprised at one of the latest, a three cent purple stamp in honour of newspaper boys. After all, why not? No city could be complete without them, and if not quite so romantic, they are certainly more typical of the modern British scene than those "lovely violet" sellers whom the BBC plug every Saturday night.

Anyhow, here is the stamp. The design is well up to American standards, which if truth be told is not particularly high at times, but the newspaper boys stamp will probably pass muster in that respect, and the subject alone will make the stamp popular, with junior collectors at least.

GUESS WHAT?

If it hadn't been for the script, or whatever one calls Japanese writing, who would have guessed that my uppermost illustration was of a stamp from Nippon? This has been issued to commemorate the 75th anniversary of the founding of Tokio University, but it looks more like a stamp from Belgium than from that Far Eastern country that latterly has produced so many charming designs. The stamp is quite a nice little effort, but much more typical of the West than the East.

WATCH YOUR STAMPS

Collectors of South African stamps will know about the 4d. stamp that in 1944 was overprinted Official on the right side and Offisiel on the left, and in which the last E of the latter word had a diaeresis or two small dots over it. These dots are not particularly easy to see and the 4d. stamps with them are not particularly expensive. The Commonwealth Catalogue, which takes great care about giving the true market value, only prices mint or used pairs at 6d.

Now news has been released that the 1½d. stamp also exists with this special kind of overprint, and these are really worth looking for. Single copies will not be very valuable, for South African stamps are generally collected in bi-lingual pairs.

My first acquaintance with the stamp was when a collector showed me a single copy some months ago. The date was very blurred, but it was probably 1946. The owner had had it for some time, and while he had been on the lookout ever since it had turned up, he had seen no others. Nor have I, although it must be admitted that I have not looked very hard. But I am sure the stamp is scarce, and readers should take a peep at any copies they may have. Don't



forget you are looking for a 1½d. stamp, the one with the gold mine design, smaller size, with two small dots just on the top of the second E in the Offisiel overprint.

THURN AND TAXIS

Perhaps not many young collectors will know much about the stamps of the old German States, but I simply cannot resist asking the Editor to let

me illustrate the very delightful stamp that has been issued by West Germany to commemorate the centenary of the first stamps of Thurn and Taxis. I am not going to bother you with details of these dull age-old issues, but I do want to persuade you to be sure and get a copy of the new one, which shows the postman spinning along in what we would call, I suppose, a dog cart—I expect to be told that it is not a dog cart at all—blowing his post-horn.

Many colours have been used in the printing of the stamp, and a few coppers buys one. It will be suitable for inclusion in at least half a dozen different kinds of thematic collections, and to me at any rate it is about the nicest stamp I have seen for many a long day.

THE NEW AND THE OLD

Many M.M. readers must have been to Rome, so our fourth illustration cannot help but interest them. The writer well remembers standing in that silent Colosseum, as many others must have stood, where even the most unimaginative can picture ghosts of the historic past. What would those figures of centuries ago have thought, if a plane similar to the one depicted on the Italian stamp illustrated had passed over in their day.

The stamp was issued on 1st October to commemorate the "First Private Aeronautics Conference." A most interesting design, don't you think?

CORONATION STAMPS

There is news every day just now about what this, that and the other country intends to do about special Coronation stamps. The news that South Africa is also to produce a 2d. stamp is particularly welcome, for we can depend on something really nice, apart from the fact that we are so glad that we are all going to celebrate philatally.

My comment about what a nice stamp we can be certain of getting is evoked by the sight of the last set we got from this country. I refer to the Van Riebeck issue. You are pretty sure to have a set. Just look at it again. Anything so handsome for the Coronation should take the prize for the best design. But, and it is a big but, Australia with its three Coronation stamps is bound to pull something special out of the bag—so do your best, South Africa! And don't let us forget New Zealand, which has had to change the values, owing to the alteration of postal rates. It won't be long now before we'll be able to see just what delights have been prepared for us. Southern Rhodesia has certainly given us a shock. They said they lacked time to bring out a Coronation stamp, but now state there will be a 2/6 value.



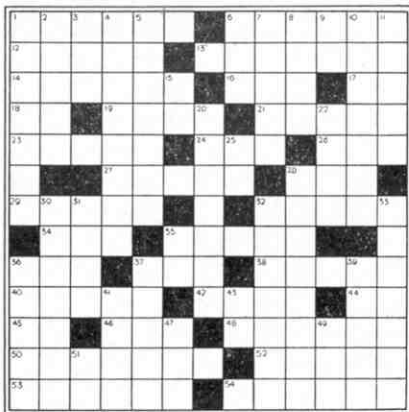
Competitions! Open To All Readers

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. Guardian
6. Parts of flower
12. Worship
13. Encourage
14. Prayer
16. Surface measure
17. Travel
18. Award for bravery
19. Image
21. To prise
23. Make reparation
24. Animal
26. Single
27. Upright
28. Aged
29. Eastern titles
32. The body
34. Possessive pronoun
35. Author of *Robinson Crusoe*
36. Wrath
37. Something earned
38. Scottish landlord
40. Resin
42. Whirl swiftly
44. Ordinance Data (in brief)
45. Not out
46. Previously
48. Radiating from a central point



50. Strangeness
52. Birds
53. Irish name
54. Good features

47. Indicates wind direction
49. Not after C and after it
51. Deputy Lieutenant (abbrev.)
36. Dialect
37. To smooth and arrange
39. Cook
41. "In the year of"
43. Pair (abbrev.)

CLUES DOWN

1. Retrieve
2. Order
3. Negative
4. Their work applies to men, plants and horses
5. Delivers
6. Vegetable
7. Nobility
8. Trunk with green top
9. Preposition
10. Fairy tales
11. Sleeper's noisy breathing
15. Exclamation
20. Footmen
22. Rodent
25. Short for Saint
28. Evergreen shrub
30. Girl's name
31. Separate particular
32. Cluster of leaves
33. Crowds together
35. District Attorney (init.)

This month we present another of our popular crossword puzzles. There are no traps in the clues, or alternative solutions, and every word, apart from names, can be found in a standard dictionary.

There are two sections in the competition, for Home and Overseas readers respectively, and in each prizes of 21/-, 15/- and 10/6 will be awarded for the best solutions. If necessary the judges will take neatness

and novelty into consideration when making their decisions. Do not cut out the diagram. Make a copy of it for your entry, and on the back of it write your full name, address and age.

Entries should be addressed *March Crossword, Meccano Magazine, Binns Road, Liverpool 13*. The closing date in the Home section is 30th April, and in the Overseas section, 31st July.

Aeroplane Drawing Contest

In this competition we give readers another opportunity of showing their skill in drawing. The subject chosen is aircraft, which can be of any type, and the machine can be shown on the ground or water as the case may be, or in flight. Drawings may be in colour, but competitors must remember that it is the drawing itself on which the judges will rely.

There will be the usual two sections, for Home and Overseas readers respectively, and in each there will be prizes of 21/-, 15/- and 10/6 in order of merit, with consolation prizes for other good efforts. Each competitor must write his name, address and age on the back of his entry and state what aircraft the drawing represents. Entries must be forwarded in an envelope or wrapper addressed to *Aeroplane Drawing Contest, Meccano Magazine, Binns Road, Liverpool 13*. Closing dates: Home Section, 30th April, Overseas Section, 31st July.

March Photographic Contest

The third of our 1953 series of photographic contests is a general one in which we invite readers to submit prints of any subject. Each competitor may submit only one photograph, which must have been taken by him, and on the back of his print must be stated exactly what the photograph represents, also his age must be given.

The competition will be in two sections, A for readers aged 16 and over, and B for those under 16. Each competitor must state in which section his photograph is entered. There will be separate Overseas Sections, and in each section prizes of 21/-, 15/- and 10/6 will be awarded. Entries should be addressed: *March Photographic Contest, Meccano Magazine, Binns Road, Liverpool 13*. Closing dates: Home Section, 31st March; Overseas Section, 30th June, 1953.

Competitors who desire their entries to be returned should note the paragraph at the top of this page.

Competition Results and Solutions

HOME

SEPTEMBER 1952 ERRORS CONTEST

1st Prize: J. H. Smith, Wolverhampton. 2nd Prize: R. Wilson, Ellesmere. 3rd Prize: D. Digger, N. Malvern. Consolation Prizes: T. Johnson, Rotherham; H. Perry, Smethtwick 40; R. Lillie, Shaftesbury.

OCTOBER 1952 PHOTOGRAPHIC CONTEST

1st Prize, Section A: R. Whyte, London N.5; Section B: P. D. Ashton, London S.W.20. 2nd Prize, Section A: W. D. Askham, Northampton; Section B: M. G. Ross, Leeds 5. 3rd Prize, Section A: J. Hampson, Farnborough; Section B: A. Hickey, Wigan. Consolation Prizes, Section A: G. D. Bonner, Edinburgh 4; T. Mahoney, Dundee; K. C. Campbell, Durham; P. Abigail, Greenford; Section B: P. W. Skillern, Stockport; J. R. Mayes, London N.W.9; D. M. Slater, Coulsdon; T. Renfrew, Glasgow.

OCTOBER 1952 RAILWAY CONTEST

1st Prize: A. W. Burges, New Malden. 2nd Prize: T. N. B. Silcock, W. Horsham. 3rd Prize: J. Britton, London W.5. Consolation Prizes: G. Dines, Brackley; J. Mycock, Stockport; G. Mycock, Stockport; N. Hayward, Shrewsbury.

NOVEMBER 1952 PHOTOGRAPHIC CONTEST

1st Prize, Section A: C. H. E. Huxley, Ellesmere Port; Section B: J. Bursell, Cottingham. 2nd Prize, Section A: B. J. Holden, Burgess Hill; Section B: J. M. G. Grant, Ramsgate. 3rd Prize, Section A: S. Bruce Marsh, London N.19; Section B: E. Young, Penrith. Consolation Prizes: R. M. Maclean, Cromer; A. J. Potten, Aldershot; J. H. Newman, Kettering; C. K. Jones, Bude.

NOVEMBER 1952 CROSSWORD PUZZLE

1st Prize: B. H. Dunham, Norwich. 2nd Prize: E. Tasker, Barnsley. 3rd Prize: B. Meese, Doncaster. Consolation Prizes: D. Dickinson, Croxley Green; R. J. Pankhurst, E. Dereham; P. Ponsford, Welling; R. Driver, Wolsingham; D. McLeod, Anstruther.

NOVEMBER 1952 DRAWING CONTEST

1st Prize: D. V. Games, Pinner. 2nd Prize: R. Robinson, Carlisle. 3rd Prize: D. Cater, Ipswich. Special Editorial Prizes: I. Macfarlane, Stafford; D. M. Shepherd, Bradford. Consolation Prizes: I. Giles, Scunthorpe; G. P. Carder, Preston; P. Mintoft, Kettering; D. Needham, Croydon; S. Thomas, Birmingham 16; E. G. Hodgkins, Rodborough.

DECEMBER 1952 PHOTOGRAPHIC CONTEST

1st Prize, Section A: P. Browning, Edinburgh 11; Section B: P. D. Ashton, E. Molesey. 2nd Prize, Section A: C. E. Wrayford, Newton Abbot; Section B: J. Price, Colwall. 3rd Prize, Section A: P. R. Forsey, Bath; Section B: M. Judd, Southampton. Consolation Prizes, Section A: J. H. Smith, Wolverhampton; R. W. Lucas, Sutton Coldfield; P. A. Spring, Stockport; Section B: T. Kevin, St. Annes; K. Taylor, Hyde; W. Frame, Bearsden.

OVERSEAS

JULY 1952 CROSSWORD PUZZLE

1st Prize: J. C. Lennie, Dun Laoghaire, Irish Republic. 2nd Prize: J. Richard, Nakuru, Kenya. 3rd Prize: D. N. Brennan, Blackrock, Irish Republic. Consolation Prizes: S. Bafna, Gopalpur, Pakistan; A. C. Shepherdson, Kumalo, Bulawayo; S. T. Allen, Te Puke, N.Z.

JULY 1952 LAYOUT CONTEST

1st Prize: J. B. Powell, Plumstead, S. Africa. 2nd Prize: R. B. Croker, Remuera, N.Z. 3rd Prize: M. J. Mackintosh, Christchurch, N.Z.

SOLUTIONS

AUGUST 1952 AIRCRAFT CONTEST

1. Airspeed 'Oxford' (G.B.) Aircrew trainer, communications. 2. Fairey 'Gannet' (G.B.) Anti-submarine. 3. Bristol 'Brabazon' (G.B.) Experimental airliner. 4. Percival 'Prentice' (G.B.) Primary trainer. 5. Avro 'Lincoln' (G.B.) Heavy bomber. 6. Vickers 'Viking' (G.B.) Airliner. 7. Bristol 'Freighter' (G.B.) Transport. 8. Handley Page 'Marathon' (G.B.) Feederliner. 9. Handley Page 'Hastings' (G.B.) Troop carrier and transport. 10. Lockheed 'Constellation' (U.S.A.) Airliner. 11. Percival 'Proctor' (G.B.) Light passenger. 12. Handley Page 'Hermes' (G.B.) Airliner. 13. Gloster 'Meteor' (G.B.) Fighter. 14. Hawker 'Hunter' (G.B.) Fighter. 15. Vickers 'Swift' (G.B.) Fighter. 16. English Electric 'Canberra' (G.B.) Medium bomber. 17. Percival 'Prince' (G.B.) Feederliner and light service aircraft. 18. Saunders-Roe 'Princess' (G.B.) Flying boat transport. 19. Vickers 'Viscount' (G.B.) Airliner. 20. Avro 'York' (G.B.) Transport. 21. Auster 'Autocrat' (G.B.) light transport. 22. Miles 'Martinet' (G.B.) Target towing.

AUGUST 1952 TRAIN CONTEST

1. By the engine carrying two headlamps, one over each buffer, except on Southern Region. 2. A set of coaches kept more or less permanently coupled. 3. On Continental Boat trains. 4. The location of the vacuum release cord. 5. A passenger brake van fitted with a stove. 6. A pull-and-push unit. 7. A vehicle with both vacuum and Westinghouse brake equipment. 8. A coach which has both first and third class accommodation. 9. A set of coaches, the inner ends of each pair being supported on one bogie. 10. The Whittingham Railway, Lancashire.



"Now what shall we make?" A prize winning photograph by Mrs. S. Bruce Marsh, London N.19.

Shipbuilding in Belfast—(Continued from page 132)

Luftwaffe, and fire and explosion wrought tremendous havoc in all parts. There can be no doubt that the attacks were made with the deliberate intention of obliterating the shipyards and engine works, and thus to neutralise the valuable work that was being done, in both new construction and maintenance and repair, for the Western Approaches and other theatres of war.

Harland and Wolff's can claim the questionable privilege of being the most heavily damaged shipyard in Great Britain during the second world war, but thanks to the industrious labours of its employees, ably supported by several large building contractors, the badly damaged premises have been entirely reconstructed and replaced by the most modern shops and equipment.

The Company played an important role in the shipbuilding effort of the United Kingdom during the second world war, when the Harland and Wolff output was approximately 10 per cent. of the total merchant ship output of the British Isles. It has repeatedly headed the tonnage returns of the world's shipbuilders and to-day, with a full order book, it is playing its part in the fight for national economic recovery. 1952 was the thirteenth year in succession in which more than 100,000 gross tons of shipping was launched by the Company—a noteworthy achievement for the Queen's Island shipyard, which celebrates its centenary this year.

Waterloo to Padstow by A.C.E.—(Cont. from page 119)

34023 *Blackmore Vale*, lightly loaded with the four vehicles now left, ran to such good purpose that the five minutes we were late in starting from Central were almost regained. We arrived a minute early at Meldon Junction, but there we were unfortunately delayed four minutes by signals, waiting the 12.45 p.m. Padstow to Okehampton.

Particularly smart work at Halwill, where no less than 1½ minutes were picked up, saw us "right time" at Camelford, despite having lost 2½ minutes at Launceston taking water. A two-minute signal delay at St. Kew Highway could not be recovered however, and so we finally came to a stop at the outermost terminus of Padstow two minutes late after a most enjoyable and memorable journey.

Britain's Delta Bomber—(Continued from page 123)

One day we might know which is, in fact, the more formidable; but for the time being the R.A.F. could hardly care less. Knowing that all three of Britain's super-bombers, the *Valiant*, *Victor* and *Vulcan*, are better than any others in the world, they have simply ordered all three. The result will be the surest guarantee of that longed-for "peace and goodwill" which was in all our minds the day the *Victor* made its first take-off.

Meet Tom Hayhow—(Continued from page 137)

Service, who sorted out the weather for him and, during his return from Copenhagen, guided him into a veering wind stream which put his ground speed up to 150 m.p.h. instead of the usual 120 m.p.h. He seldom mentions the fact that each flight has cost him about £75, for which his only reward is the satisfaction of having gained one more record for his country.

It seems significant that Tom Hayhow's records have been achieved at the start of this second Elizabethan Era, in which British aircraft rule the skies just as British ships ruled the seas under Elizabeth the First. Tom Hayhow has that traditional spirit of adventure, combined with practical commonsense, that is so badly needed today; and I feel sure that all *M.M.* readers will join with me in wishing "God speed" to this grand sportsman at the start of the racing season in this Coronation Year.

Recovering Derailed Locomotives—

(Continued from page 138)

cannot lift it, and other ingenious methods have to be tried in order to recover it. In the worst cases, there may be no alternative but to cut the locomotive to pieces. When a tank engine, No. 30672, disappeared down a lift shaft at Waterloo Station a few years ago, the breakdown gang took the engine to bits below ground.

The age of a locomotive may be such that it is not worth the cost of elaborate recovery operations; for example, when a 53-year old goods engine, No. 43260, plunged into a drainage canal at Shipwick, Somerset, in 1949, it was scrapped on the spot.

Perhaps the most remarkable feature of these mishaps was that, in every case, the enginemmen escaped with their lives.

Meccano Harbour Blocksetting Crane—

(Continued from page 141)

joined by a 1½" Strip, and they are attached by Fishplates to Girders 10 and 11. The 1½" Strip should be placed on the outside face of each of the rails, as otherwise the flanges of the bogie wheels may foul the edges of the Strip as the bogie passes over the join. The rails overhanging the front of the boom by one hole, and a gantry made from two 2½" and two 3" Strips connected by a 3½" x ½" Double Angle Strip 14 is bolted to them. A 4" Rod is held in the gantry by Spring Clips, and two 1" loose Pulleys 15 are mounted between Spring Clips on this Rod.

Each side of the bogie consists of two 3½" Angle Girders joined by Fishplates to make a channel section girder, and the sides are connected together by four 2½" x ½" Double Angle Strips. Two 3½" Rods mounted in the lower pair of Angle Girders carry ½" Flanged Wheels spaced so that they fit the rails. A 2" Rod 16 passes through Trunnions bolted to the carriage, and on it are three 1" loose Pulleys 17 retained between Collars.

(To be continued next month)

"THE STRATFORD UPON AVON AND MIDLAND JUNCTION RAILWAY"

By J. M. DUNN (The Oakwood Press. 5/-)

The S.M.J., as the line dealt with in this book was known, operated some of the most unprofitable lines in England, and was never really well known in spite of its efforts to popularise itself as the Shakespeare Route. Its passenger traffic has now ceased, but its western end is likely to see more activity than before as the result of the routing of much heavy goods traffic from the old Great Central line to South Wales by way of Woodford and Broom Junction.

Mr. Dunn tells his story concisely, with a sketch map that make it easy to follow the meanderings of this elusive system, and diagrams and details of its engines, one, surprisingly enough, of the Fairlie double-boiler type.

"THE NORTH STAFFORDSHIRE RAILWAY"

By "MANIFOLD" (J. H. Henstock Ltd. 25/-)

The compact North Staffordshire Railway, based on Stoke, was a busy and efficient line that proudly boasted of never having had a passenger killed in any of its passenger trains. It owned canals and looked after them, and had hotels, two golf courses, a County cricket ground and such unusual equipment as a barge lift, a manual fire engine, two steam buses and a steam roller.

In this book, the joint writings of five authors, all familiar with the line and its territory, trace the history of this unique line from the canal era to the end of its independent existence in 1923, the year of grouping. Illustrations are plentiful, showing engines, trains and other equipment, while there are also a map, gradient profiles and other items.

Fireside Fun

"The new telephone book came in this morning dad. It seems all right."

"Seems all right? What do you mean?"

"I spent all afternoon ringing numbers and I found no mistakes."

"Why must you have more of the cake than Henry?"

"Becos' he's older. He was eating cake three years before I was born."

"Why is doing nothing so tiring, I wonder?"

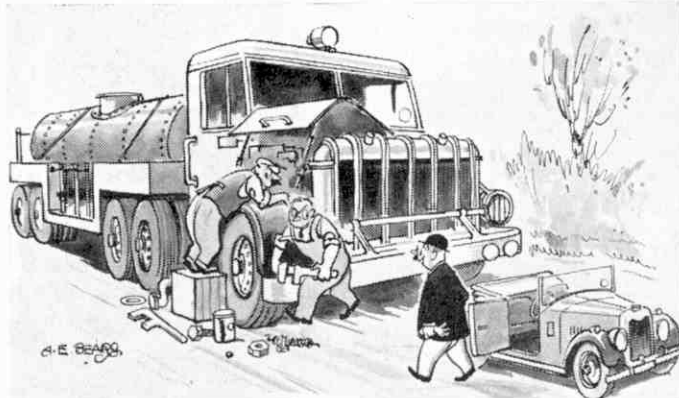
"Easy. Because you can't stop and rest."

"Look, that notice outside your shop says eight languages are spoken here."

"Yes, sir. I put it there for the gentlemen who come to the United Nations meetings."

"I've tried you in French, and that other customer spoke Italian to you, with no result. Now, who does speak all those languages?"

"Who speaks them? Why, the gentlemen who come to the United Nations meetings, of course."



"Can I help?"

(Reproduced by courtesy of the A.C.V. Gazette)

Out in the Wild West Rustler Pedro was standing trial. Just as the hearing started it was seen that a juror was missing.

"Hi, where's that jurymen gone?" angrily enquired the judge.

"He's just gone to look after his hamburger joint," explained the foreman. "But it's all right. He left his verdict with me."

"Look, I want this photograph of my dead husband enlarging, but I want you to remove his hat. Can you do that?"

"Easily, madam. On which side did he part his hair?"

"I don't know, but you'll see that when you take his hat off."

"A camel hair brush, is it? It's very small, isn't it?"

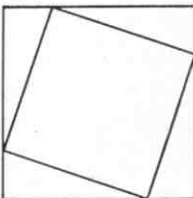
"Of course. They are all small."

"Goodness! It must take a camel an awful time to brush himself."

BRAIN TEASERS

LOOK FOR THE LEAST

Draw a square. Then from each corner in turn measure off any distance along the sides of the square, taking these in order. Join the four points measured off and you will find that you have another square, inscribed in the first one. The diagram shows this.



The puzzle is to find the inscribed square that has the least side and therefore the least area.

A LIQUID AFFAIR

Here is an example of a type of puzzle that used to be very popular. Suppose I have two containers, one of which is capable of holding three pints of liquid and the other five pints, and that I have plenty of water to play with. I want to measure out four pints of it. How can I do this, using only the two containers in my possession? L.A.C.

YOU CAN JOIN IN THESE

When Bill met John he offered him a very tricky match puzzle. "Lay down three matches to form a triangle with equal sides, and then add three other matches and make four triangles all of the same size," he said.

"I'll try it," replied John. "While I am struggling with it let me point out that if I win one of your marbles from you I shall have just as many as you, but if you win two from me you will have twice as many as I have. Without looking or counting, how many marbles have I?" A.R.S.D.

SOLUTIONS TO LAST MONTH'S PUZZLES

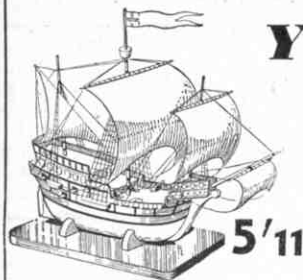
Our first puzzle last month perhaps was not easy, but readers who have studied geometry would see how to calculate the size of the sphere. They would then find the diameter to be 5 ft. 10 in.

Our second puzzle was really a catch. The solution is ISLAND.

The five words in the first word square of our third puzzle are METAL, ERASE, TASTE, ASTER and LEERS. Those of the second word square are OATS, ABUT, TUBE and STEM.

Suppose that in our fourth puzzle the page, line and word were A, B and C respectively. Going through the operations asked for then gives 100 A, plus 10 B, plus 10 C. In the number left therefore the page number is in the hundreds position, the line number in the tens position, and the word number in the units position.

The unknown letter of our last puzzle of course was X, which has been unknown since algebra began, but is easily detected here.



THE MARY FORTUNE
Kit No. 2914

5/11

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6/3

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HIGHSTONE UTILITIES

Meters. 15 v., 2½ in., m/c, 9/6; 150 v., 2½ in., m/c, 10/-; 3.5 amp., 2 in. T.C., 6/-; 4 amp., 2½ in. T.C., in case with switch, 9/6; 100 m/a, 2 in., m/c, 7/6; Units containing 2,500 microamp. movements, 7/-, post 1/-. All meters post extra.

Bell Transformers. These guaranteed transformers work from any A.C. Mains, giving 3, 5, or 8 volts output at 1 amp., operate bulb, buzzer or bell. Will supply light in bedroom or larder, etc. Price 9/-, post 8d. BELLS, 6/-.

Ex-R.A.F. 2-valve (2-volt) Microphone Amplifiers as used in plane inter-com., in self-contained metal case; can be used to make up a dead air outfit, intercommunication system, or with crystal set, complete with valves and fitting instructions, 20/-, post 2/-.

Hand Microphones, 10/-, with switch in handle, and lead, 4/6; Tannoy, 6/-; Similar instrument, moving coil, 7/6, post 8d. **Mike Buttons** (carbon), 2/-, **Moving Coil,** 4/6; **Transformers,** 5/- All post 4d., each.

Soldering Irons. Our new streamlined Iron is fitted with a curved pencil bit; 200/250 v., 50 watts, 11/6.

Standard Iron with adjustable bit, 200/250 v., 60 watts, 13/6. **Heavy Duty Iron,** 150 watts, 16/6, all post 6d. **Crystal Sets.** Our latest model is a real radio receiver, fitted with a permanent crystal detector, 12/6, post 8d.

De Luxe Receiver in polished cabinet, 18/6, post 1/-; Spare Permanent Detectors, 2/- each. When ordered separately, 2/6, with clips and screws, 2/10, post 3d. **Headphones,** brand new, S. G. Brown, G.E.C., etc., 15/-, 23/-, and super-sensitive, 30/-, post 8d. **New Headphones,** 10/-.

Balanced armature type (very sensitive), 12/6. Both post 8d. **New Single Earpieces,** 3/6. Bal. armature type, 4/6; ex-R.A.F. earpiece, 2/6, post 4d. **Headphones,** in good order, 6/- (better quality), 7/6, all post 8d.

Letters only. Money refunded if not completely satisfied

58, New Wanstead, London E.11

Illustrated List sent on request with 1½d. stamp and S.A.E.

A Power-Driven MOTOR CRUISER

COMPLETE FOR ONLY

9^d



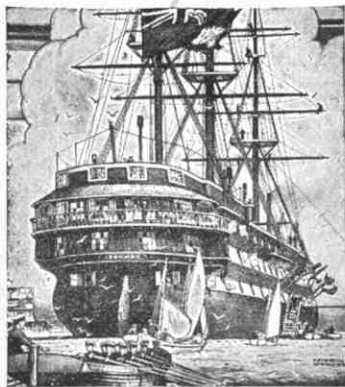
This model builds into a realistic motor cruiser by Thorneycroft from three printed cards (in colour) supplied in wrapper with easy-to-follow instructions. A few drops of methylated spirit (unlit) are sufficient to drive the model for 30 minutes or more. This is a fascinatingly simple yet effective model to build that will give hours of pleasure. Easy to build. If ordering by post, add 2d. for postage.

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Moored in the Menai Straits

Cadets on entry are enrolled cadets R.N.R. The "Conway" course is primarily designed to fit boys for ultimate command in The Merchant and Royal Navies. Sailing, Rowing, Rugby Football, Boxing, Athletics, Swimming are well featured in training, in keeping with the ship's motto "Quit Ye like Men, Be Strong"

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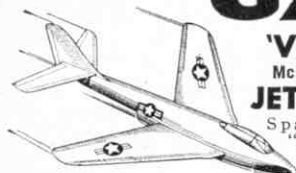
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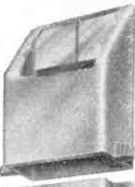
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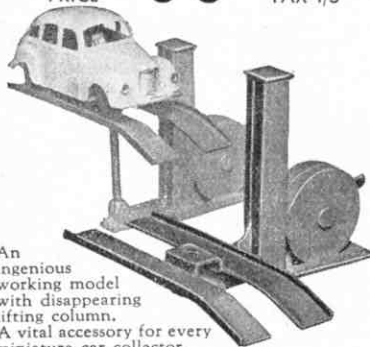
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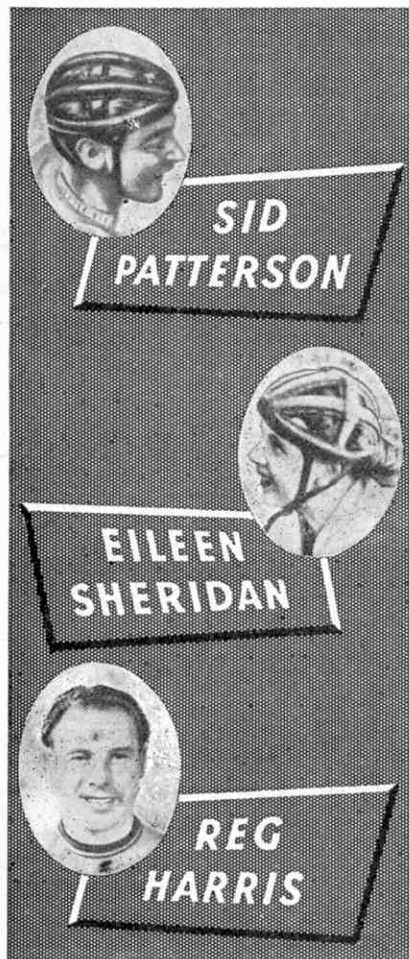
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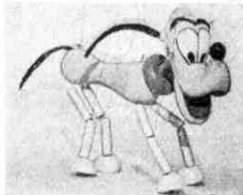
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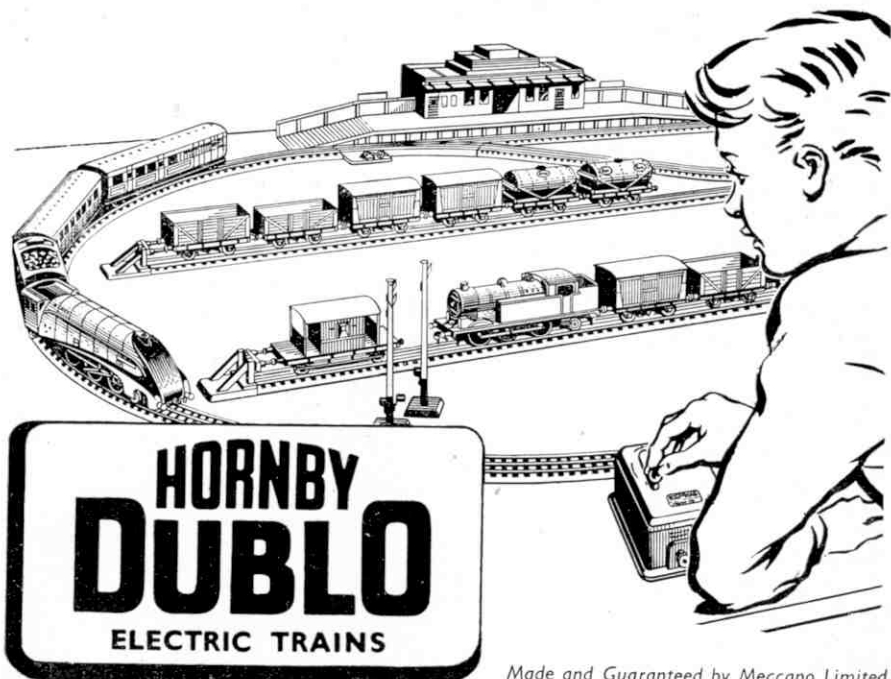
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