MECCANO® Magazine

FEBRUARY 1972

MODEL ENGINEER EXHIBITION 1972

MAP HOBBY MAGAZINE

15p

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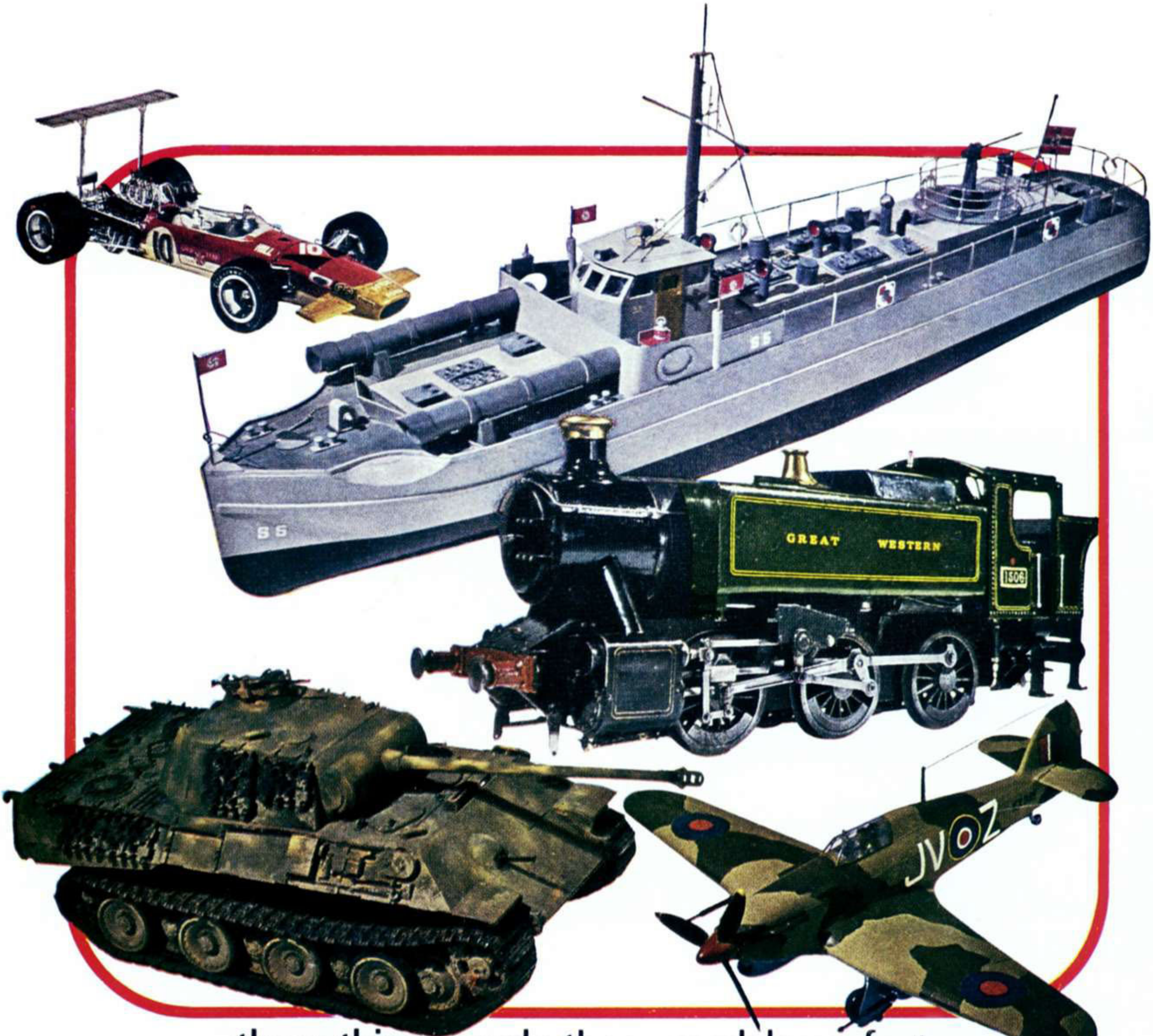

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MECCANO® Magazine

FEBRUARY 1972 VOLUME 57 NUMBER 2

Meccano Magazine, founded 1916

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MAP **HOBBY MAGAZINE**

ABC

FRONT COVER

The original pithead gear of the De Beers diamond site at Kimberley, now preserved as a museum piece, is a "natural" Meccano subject (see page 61) *Photo by Alan Bolton*

NEXT MONTH

Full-size plans for a simple Messerschmitt Bf 109 control-line model will be a popular feature in the March issue.

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Publishers of Aeromodeller, Model Boats, Model Cars, Model Engineer, Radio Control Models, Model Railways, Scale Models, Woodworker, Military Modelling.

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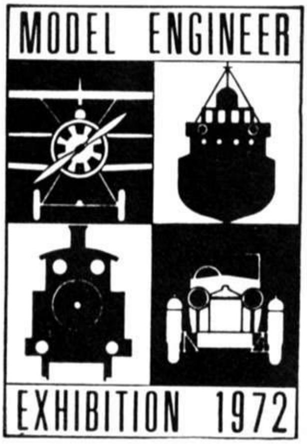
13-35 BRIDGE STREET, HEMEL HEMPSTEAD, HERTFORDSHIRE



41st GREAT SHOW!

SEYMOUR HALL, LONDON, W.1.

4th January — 15th January 1972

OPENING HOURS: DAILY 10 a.m.—9 p.m. NOT SUNDAY (JANUARY 4th, 2.30—9 p.m. JANUARY 15th, 10 a.m.—7 p.m.)

Model Aircraft, Locomotives Boats, Traction Engines Military Models, Crafts

WHAT WILL BE ON DISPLAY

THE MAIN HALL will be laid out in a completely different manner, offering a grand "open plan" scheme with more room for models, which will be grouped under the gallery balcony and in the centre, with a WINNERS' PODIUM to display class champions. The popular S.M.E.E. PASSENGER RAILWAY enjoys its usual position, but with the added feature of the immense Berkshire Superpower $10\frac{1}{4}$ in. gauge locomotive based on its American Freight Locomotive and destined to operate on Lord Gretton's Stapleford Park Railway. This is nearly 19 ft long but will be on show alongside the track. Another locomotive specially built for Stapleford Park will also be on show at the entrance—The Hon. John Gretton's ROYAL SCOT—a fine scale model embodying many of his own design features.

A FLYING CIRCLE stretching right across the hall from balcony to balcony will be available for electric model aircraft flying. This will be at BALCONY LEVEL and provide splendid and spectacular sport with electric models doing nearly all that more powerful outdoor i.c. engined models do—or so we hope!

TRADE STANDS—fewer in number than before, since "club" and other special stands are in another hall—are tastefully grouped in three units, giving convenient access in the MAIN HALL.

Introduction of a MODEL ENGINEER WORKSHOP manned by the S.M.E.E. last year proved immensely popular and will be increased in size and scope, again with experts from S.M.E.E. in charge and assisted by M.E. consultants. Working models under compressed air will also be on show.

BRYANSTON ROOM will be operating as the CLUBMEN'S CORNER with stands manned by the principal governing model bodies of the country, plus club units demonstrating, and offering combined club "little exhibitions". Demonstrations of power tools will also be shown. This hall will contain the TRACTION ENGINE entries, and wall showcases of small exhibits.

LECTURE HALL will be arranged as the BATTLEGROUND with three WARGAMES TABLES for regular miniature battles, where clubs will be invited to run wargames of all popular periods, with opportunities for running commentaries. MILITARIA entries will be displayed here.

BOATING MARINA: For the first time we have taken the SMALL SWIMMING POOL to operate as a nearly 100 ft. long indoor lake for boating activities. R/C boats will be demonstrated daily. Evenings will be given over to inter-club and individual contests. Pool will also be big enough for some steam powered boats to operate by arrangement.

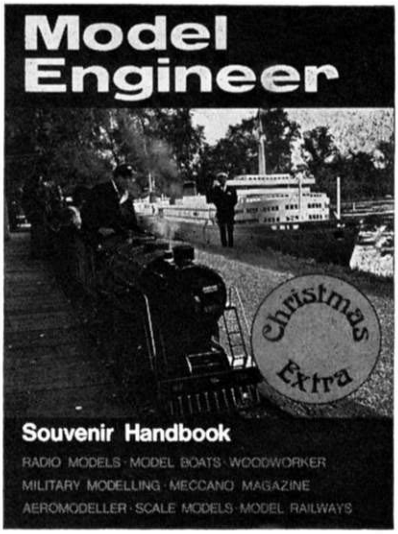
GALLERIES will provide sitting out space, spectator room and house additional club displays including our favourite BOYS' EXHIBITION. Furniture and craft entries under the auspices of *Woodworker* will be on show.

REFRESHMENTS

Snack Bar in the Balcony, Cafe, with teas, soft drinks, sandwiches, cakes Restaurant Service (licensed) available on ground floor. Parties may book in advance.

SOUVENIR GUIDE

Another CHRISTMAS EXTRA issue of *Model Engineer* will be coming out 2nd Friday in December with entries, trade stands, articles galore to assist the visitor and solace the stay-at-home.



ADMISSION

Price of admission at the door will be 25p adult, 15p child. A child is regarded as anyone still at school. Children under 5 who have not started school and are accompanied will not be charged.
Reduced admission charges for pre-booking is as under:
Single and small number pre-booking tickets available from these offices.
Adult $22\frac{1}{2}$p, Child $12\frac{1}{2}$p. Parties of more than 10: Adult 20p, Child 10p.
Teachers i/c parties free—one per 10 in party.
A combined family ticket can also be bought in advance.

Advance Bookings and details from:
EXHIBITION MANAGER,
M.A.P. Ltd. 13/35 BRIDGE STREET,
HEMEL HEMPSTEAD, HERTS.

MODEL ENGINEER EXHIBITION MODEL ENGINEER EXHIBITION MODEL ENGINEER EXHIBITION

A few of the models designed by children for the Pocket Meccano Competition

it's the simple ideas that win!

Right from the start model makers of all ages have risen to the challenge of the Bic Model making competition. The simple but imaginative racing cycle shown below, entered by David Smith of Clifton, Bristol, won first prize in the first quarter of the competition.

Instead of throwing away those used Bic Crystals, model makers have fused them, glued them, bent them and submitted a fascinating assortment of models of all shapes and sizes. Why don't you join in the fun?

Because Bic Crystals write first time every time, there are far more sold in the U.K. than any other ballpen. In fact, each year a Bic Crystal is sold for every man, woman and child in the country plus a few million more.

This is why you will probably find more than you expect in your own home. In offices and factories you should find them by the hundred.

All you have to do . . .
. . . is start collecting medium or fine used Bic Crystal ballpens now, complete a model and enter the competition.

There are cash prizes for the best models produced every three months both senior and junior. Finally, the supreme modeller at the end of the year will be awarded a further cash prize of £250 and the handsome Bic Championship Trophy.

If you have a creative flair and a little imagination – prove it!

BiC

Regd. Trade Mark

model making competition

BiC
Regd. Trade Mark

Model Making Competition

Start collecting your pens now but— one word of warning—

make sure they are genuine Bic Crystal Medium or Fine Point ballpens carrying the Bic Registered Trade Mark because only these are eligible

RULES

1 The participants of the Bic Model Making Competition will be judged on their originality and technical model-making expertise.

2 The competition will be divided into two parts:
Junior: Participants, either sex, under the age of 16 at time of entry. Within this group no heat or flame technique for moulding may be used, but any other form of adhesion may be utilized.
Senior: Participants, either sex, over 16. Within this group, any form of adhesion is accepted. Heat to bend or shape the pens may be used.

3 Entries for the competition must be accompanied by the official entry form below.

4 Any number of BIC Ballpen barrels may be used. All models must be constructed utilising any part of BIC Crystal Fine (Yellow) and Medium (Transparent) ballpens.

5 BIC Crystal barrels may be cut to shape or size, but each barrel must clearly show the Registered trade name BIC (as imprinted on the barrel). Where models are moulded by heat, there must be at least 10 parts where the BIC Registered trade mark is clearly shown.

6 Accessories other than BIC parts may be used *only* to make the model functional or to infer final design, i.e., wheels, transfers, cotton, string, paper, etc.

PRIZES

7 Prizes will be awarded to competitors who, in the opinion of the panel of judges, produce the most creative, unusual or skilful entry for each quarterly competition.

8 **Quarterly prizes will be awarded as follows:**
Senior section—first prize £25.
second prize £15.
third prize £10.
10 consolation prizes of £5 each.
Junior section—first prize £15.
second prize £10.
third prize £5.
10 consolation prizes of £2 each.

9 Models winning any of the three prizes in either Junior or Senior levels of any of the quarterly competitions will automatically be entered in the BIC National Championship Competition and the individual competitor whose model is selected by the judges to be of greatest merit will receive an additional cash prize of £250 together with the 1972 BIC Model-Making Trophy.

10 **Entrants should send their models to:**
The BIC Model-Making Competition, c/o Montague House, 23 Woodside Road, Amersham, Bucks.
Should a model be considered delicate for conventional postage, then a photograph (colour or black and white) may be despatched beforehand. This will be used for preliminary judgement. Entry forms should be clearly attached to each model or photograph entered.

11 No responsibility can be taken for the damage in transportation of any model received. Judges will, however, take into account such unfortunate circumstances and the model will still be eligible for participation within the contest.

12 Should participants require a model returned, then return postage must be included by way of enclosing the appropriate stamps.

RESULTS

13 The 1972 competition will be held during 3-monthly periods and results will be announced during August 1972, November 1972, February 1973.

14 Participants should ensure that their models are despatched to arrive by 1st June (for August judging), 1st September (for November judging) and 1st December (for February judging).

15 Any model received after this date will not be eligible for the relevant Quarter but will qualify for the next Quarter's competition.

16 Any prize winning model will become the property of Biro-Bic Ltd., and may be used in any way they think fit.

17 Employees, relatives or direct associates of Biro-Bic Ltd., Model and Allied Publications Ltd., as well as their advertising agents will not be eligible for this competition.

18 The decision of the Judges is final and no correspondence can be entered into in relation to prizes awarded or decisions made.

I understand and abide by the Rules

Name ....
(BLOCK LETTERS PLEASE)

Address ....

....

.... Age ....

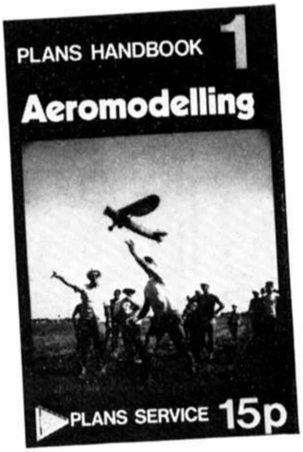
WHERE DID YOU COLLECT YOUR BIC PENS? ....

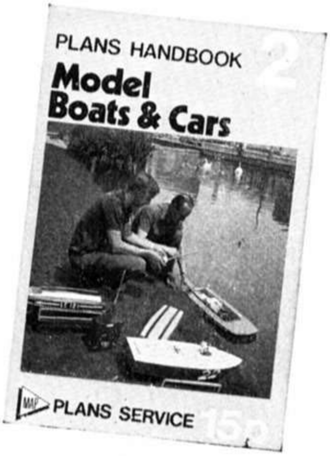
....

MM.I

PLANS HANDBOOKS

15p each



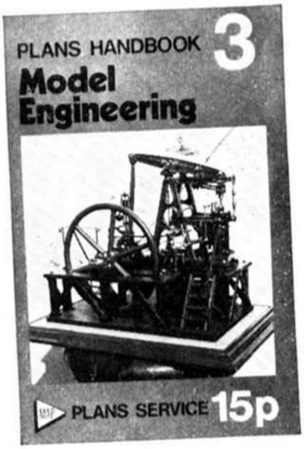


Aeromodelling

128 pages featuring hundreds of working model aircraft, illustrated almost entirely by photographic reproductions of the actual models, plus span, brief description and graded for ease of construction. Also selected engine list with tabulated data; index to illustrated plans X List of vintage unorthodox novel plans, many other classifications, useful articles, order forms Also good selection of trade advertisements.

Model Boats & Cars

96 pages of plans of scale and semiscale ships, tugs, lifeboats, submarines, paddle steamers, period ships, racing yachts, hovercraft, cabin cruisers, mostly illustrated, fully described, and classed for ease of building. Working model cars and usual vehicles are included and a large range of scale car drawings, racing cars ancient and modern. Index of drawings; useful articles on building; waterline plans; trade advertisements.



Model Engineering

96 pages of working model drawings for steam locomotives, traction engines, steam engines, petrol engines, workshop equipment from LBSC, Westbury, Evans, Maskelyne, Bradley, Hughes. Plus useful model engineering information, screwcutting tables, standard threads, letter and number drills, wire and sheet metal gauges, miscellaneous information.

Radio Control Models

96 pages of radio controlled models are described. There are 128 R/C aircraft all illustrated, including S/C Sports Models and Trainers, Galloping Ghost Models, Competition Aerobatic Models, Multi-Sport and Trainers, Pylon Racers, S/C and M/C Scale Gliders and Soarers. 87 model boats suitable for radio control, plus do-it-yourself R/C systems. Many useful instruction features, like the R/C 'Goof-ups'—an introductory feature for beginners. Fully illustrated current F.A.I. aerobatic schedule.

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Model No. 973 EATON YALE
Articulated Tractor Shovel
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● Simulated hydraulic ram action
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Model No. 179 OPEL COMMODORE
● Opening doors
● Opening bonnet revealing detailed engine
● Moulded windows, interior and seats
WITH SPEEDWHEELS
BUILD YOURSELF A
DINKY ACTION KIT
VOLKSWAGEN 1300 SEDAN
● Strong die-cast metal for really tough action
● Opening doors, bonnet and boot
● Moulded interior and tipping seat backs
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INCLUDES HUMBROL ENAMEL!
leaders go for
DINKY TOYS
the tough, action-packed models

ON THE EDITOR'S DESK

We were interested to see that plans for the world's tallest building are being discussed in Toronto. The city already has the tallest building in the Commonwealth, 784 ft., near completion, but the new one will be a whopping 1,650 feet.

Europe's tallest is still the Eiffel Tower at 984 ft., but this is simply a tower with three accommodation areas. The 110-storey New York Trade Centre is currently the world's tallest, at 1,350 ft., but plans have been announced by Sears, Roebuck & Co., for a 1,450 ft. block to go up in Chicago.

The new Toronto building will have 140 floors and be triangular, built round a central concrete core which is probably the only thing that makes it possible from both structural and economic viewpoints. Rounded corners will streamline the tower; winds of 120 m.p.h. will not be unusual at the top. The cost will be in the region of £50,000,000 and the ground area will be the best part of 7½ acres. On a clear day, the view from the top will be some 80 miles, as far as Niagara Falls. Pity the poor chap who, when the lifts break down, gets to his car and finds he's left his brief-case on the 140th floor . . . ! !

Scotia

A new fishery research vessel, the *Scotia*, will shortly be making her maiden voyage. Owned by the Department of Agriculture and Fisheries for Scotland, she has been built by Ferguson Bros. (Port Glasgow) 1969 Ltd., to further research into new fishery techniques and applications. To this end, she is crammed with electronic gear fitted by Marconi Marine.

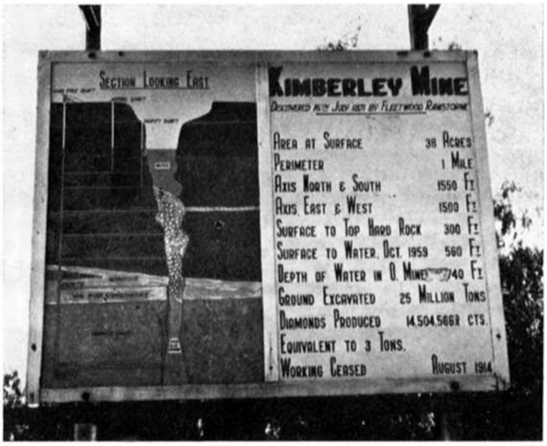
The equipment includes a doppler sonic speed log, which accurately measures speed relative to the sea bed down to 500 ft., or to the water mass where the bottom is deeper. She has a 1200-watt Crusader single-sideband transmitter and Nebula single-sideband receiver, an automatic keying unit, automatic alarm receiver, a Warden II 28-channel radiotelephone, and will have a 400-watt Transarctic 400 single-sideband radiotelephone later on. A portable transceiver covers lifeboat use.

Navigation gear includes a Forecaster K weather chart facsimile receiver and a Lodestar II fully automatic direction-finder with a coupling unit to the auto-alarm which when cut in will provide automatic bearings on distress calls. Add internal telephones and a communal aerial with 40 cabin outline sockets, and some idea of the need for an electronics expert in the crew can be gained.

A Tree or Two

Plans for the planting of a few trees in 1972 are announced by the Government of the Province of Ontario. A mere 55,000,000 of them! We feel that this would have the approval of the peer of the realm who in his retirement from the Services in the early 19th century is said to have walked around with a pocketful of acorns, stopping now and then to push one into the ground with his walking-stick, saying "England'll need 'em one day".

This isn't a bad idea to follow in some places. With mechanised hedge-trimming (or total removal of hedges) the sight of young trees growing from hedgerows is becoming rarer, and this will eventually make a tremendous difference to the beauty and character of the English countryside. If, in your lifetime, you plant only 100 acorns or chestnuts or whatever, and 99 of them don't grow or are cut off or ploughed up or something, the odd one surviving will give pleasure to people for years after you've gone.

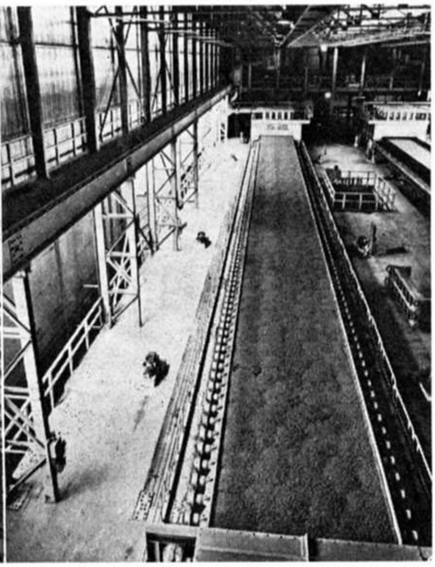


Diamonds

Most people know that considerable numbers of the world's diamonds come from Kimberley in South Africa. The De Beers company, which is one of the giant international businesses, maintains a museum right next to the "Great Hole" at Kimberley, where they used to be able to pick diamonds up practically like pebbles. The museum includes relics of Rhodes and other famous people associated with Africa, as well as exhibits from the early days of the diamond industry and of the De Beers company itself. A complete township has been rebuilt there, and the pithead gear in our cover picture is exhibited. The photograph on this page shows the notice-board beside the Great Hole, sufficiently large, we hope, to be readable.

Model Engineer Exhibition

This issue of Meccano Magazine is due for publication three days after the opening of the 41st Model Engineer Exhibition, at the Seymour Hall, Marylebone, London, W.1, which is about halfway between Baker Street and Edgware Road Tube stations, and only a short walk from Marble Arch. The show is open 10 a.m.–9 p.m. every day except Sunday, till Jan. 15 (when it closes at 7 p.m.) and is very well worth a visit. In previous years many people attending for the first time have expressed their astonishment and their regret that they could not spend two or three *days* looking at everything; certainly there is plenty to see and enjoy for anyone with a mechanical turn of mind.



J. W. Wallington
B.Sc. (Eng.), C.Eng. M.I.Mech.E.
discusses the processes which go to make the materials often taken for granted

Far left, an aerial view of the 3½ mile long B.S.C. Llanwern site looking west to east. The area shown in this photograph covers approx. 2,800 acres.

Left, a view of one of the two 200 ft. long sinter strands in the sinter plant, which processes an improved burden for the blast furnaces.

Photographs courtesy of British Steel Corporation

The Manufacture of IRON and STEEL

IRON and steel are so important to us in our everyday lives and so ever present that we often take them for granted. If one looks around at home, in the street, at a school or in a factory, steel is to be seen everywhere performing a whole host of jobs.

At home our washing machines and refrigerators are made of steel, sometimes our draining boards and sinks, tools that may be used such as saws, hammers, screwdrivers are all made of it. In the street the lamp-posts are made of iron or steel, car bodies are made of thin sheet steel. Our trains run on steel rails and the engines are made of the material. Most of our ships are made of steel and many of our large buildings have a skeleton of steel beams.

In practically every aspect of our lives steel plays an important part and it would be very difficult to imagine what our lives would be like without it.

History

Iron has been known to man since very early times, about the year 3000 B.C. (in Egypt). Traces have been found of steel being made as early as 1000 B.C. Meteoric Iron which contained about 70% iron and 30% nickel was found in very early times and was referred to as "Ben Hipe" roughly translated as "metal from the sky". The earliest references to the making of iron in Britain appear to be in about 100 A.D. when the smiths in the Forest of Dean were known to be obtaining iron by "puddling".

Large scale manufacture of steel in this country only started just over 100 years ago.

Manufacture of Iron and Steel Today

Steel is manufactured by extracting iron from its ores and then refining the iron, which contains a high proportion of carbon, to steel which contains low proportions of carbon.

Iron Ores

These occur in many parts of the world, mainly Russia, Sweden, Labrador, the United States and India which give high grade ores containing up to 70% iron, and in Oxfordshire and Northamptonshire which contains low grade ores, only about 30% iron. This is mined by "opencast" methods which leaves the countryside in a "scarred" condition.

Because of the low quality of the 'home' ore and the relatively small quantities mined it is not used very much. Most of our iron ore is imported from the countries named above. Because of the cost of transporting it, iron ore carriers today are large, up to 60,000

Left, wearing protective clothing, operatives are seen in the blast furnace plant during casting operations which take place at about three hourly intervals. Each cast produces 300-400 tons of iron.

tons or even more each. Because these carriers are so large, deep water harbours are necessary to allow them to dock. Thus most big ore carriers must dock in large estuaries like the Severn, the Tees and the Clyde. To reduce the cost of having to transport the ore from the docks to the works, most large modern steelworks are also built on or near the sea coast so that the ore can be unloaded from the ship onto conveyor belts and carried direct to the ore stockyards at the steelworks. The Steel Company of Wales' Abbey Works and Spencer Works, Llanwern, are sited in the Severn Estuary, Dorman Long on the Tees, Colvilles on the Clyde and John Summers at Chester on the Dee Estuary, to name a few. The above-named are all the names of the individual companies before the nationalisation of the steel industry in 1967. Nowadays they are all divisions of the British Steel Corporation.

All steelworks have to have large areas of ground to accommodate stocks of ore to allow them to continue working in the event of a breakdown in communications, from whatever cause.

The ore in its raw state, as mined, is not unlike earth to look at and is very varied in its make-up, from large lumps perhaps a foot across to small pieces no bigger than small pebbles. The next stage to obtain the iron from the ore is to smelt it in a blast furnace along with coke and a few other substances, to help the process along, which will be described later.

It has been found by research that the output from a blast furnace can be improved if the size of the iron ore being fed into the furnace is of a reasonably uniform size, about 1 in. across. To do this the ore is passed through what is called a "sintering" process.

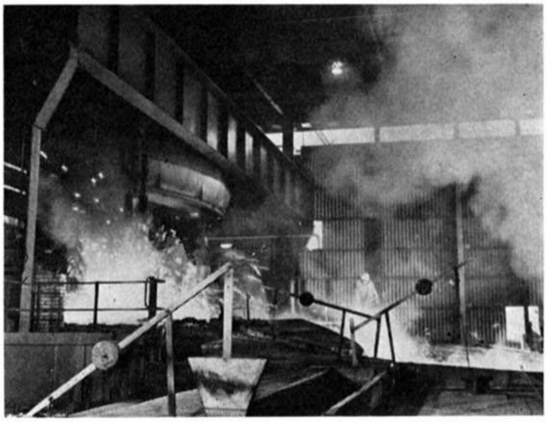
Iron ore is collected from stock by a "boom-stacker" fed onto a belt conveyor which conveys the ore to hammer mills and rod mills, machines which, by various means, break the ore into small pieces. These small pieces are then carried on an iron slatted conveyor through a furnace at a very high temperature in which the ore fuses together and comes out on the exit side of the furnace spread evenly across the metal conveyor, something like a dark brown carpet a couple of inches thick. This is then cooled in air and at the end of the conveyor falls off into bunkers. As the "carpet" falls off it breaks up into fragments which are all very similar in size.

This sinter is then fed, along with coke and limestone, into the blast furnace and comprises what is known as the blast furnace "burden".

Both the other constituents of the "burden", i.e. coke and limestone, are usually manufactured on site in large integrated steelworks (integrated in this sense means that all the manufacturing processes necessary to carry out the transformation of the ore into steel are carried out on one site).

Coke is formed by heating coking coal in large ovens to a temperature of 1450°C. The coal is transformed into coke in about 18 hours. A modern coke oven battery, besides manufacturing coke, will produce a wide variety of other chemicals among them being "coke oven" gas, a fairly rich gas as far as calorific value is concerned, tar, naphthalene, ammonium sulphate, benzene and toluene amongst others. Thus it can be seen that a modern coke oven is a chemical plant in miniature and most of these by-products are recovered and either used within the works or sold.

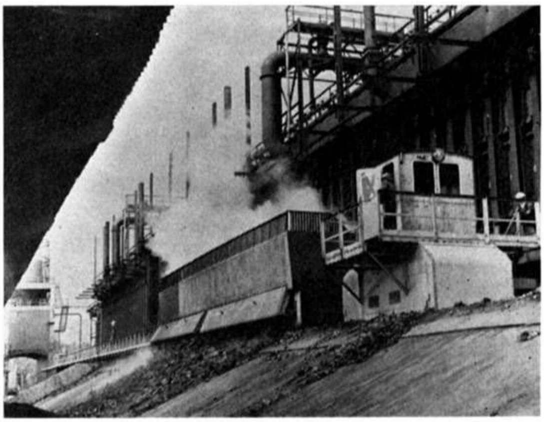
When the coke is properly formed it is pushed by a large ram out of the oven and quenched with water. A modern battery will contain anything up to 60 separate ovens set out in a row and the production is scheduled so that ovens are being "charged" and "pushed" around the clock.

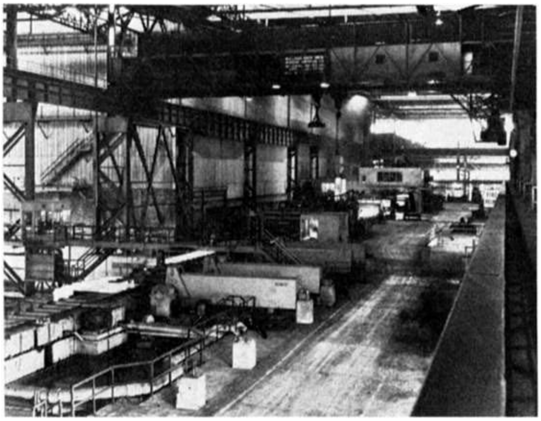


Top, one of the 3 L.D. vessels shown during blowing cycle. This vessel produces approx. 130 tons of steel every 45 minutes

Below, hot metal from the blast furnace is transported by rail to either one of two 1200 ton or a 1350 ton mixer vessel in the steel making shop and stored at a controlled temperature until required.

Bottom, coke oven push—approx. 14 tons of coke is pushed from the oven into the coke car.





The slabbing mill where ingots are rolled into slabs up to 30ft. in length and approx 8 in. to 10 in. in thickness. In the foreground the slab transfer system to the slab yards is shown

Blast Furnace

A modern blast furnace is about 30 feet in diameter at its largest point, which is called "the hearth". Its height is about 100 ft. The output of such a furnace, which is considered the biggest that can be built economically, is about 2,000 tons of iron every 24 hours. In producing this 2,000 tons, 4,000 tons of ore, 1,400 tons of coke, 200 tons of limestone and 8,000 tons of air are used. The furnace consists of a steel shell lined with firebrick. The correct mixture of ore, coke and limestone is fed in small charges into the top of the furnace through what is known as the "bell". The "bell" rotates through a small angle each time so that each charge is distributed evenly in the furnace. Hot air is blown into the bottom of the furnace through nozzles called tuyères (pronounced tweers), and infiltrates its way through the burden and out through the top of the furnace. By this time it has changed into a mixture of carbon monoxide, carbon dioxide, hydrogen and nitrogen known as "blast-furnace gas". This is collected at the top of the furnace and used as a fuel in other parts of the works. Although it has only about one fifth of the calorific value of coke oven gas it still has many uses, either on its own or in a mixture with coke-oven gas.

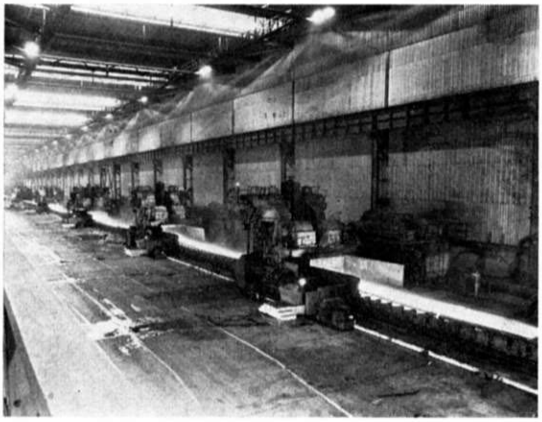
As combustion continues iron is smelted from the ore and trickles to the bottom of the furnace where it accumulates. As it passes through the material in the furnace the iron picks up a number of impurities so that the pool of iron at the bottom contains between 3 and 5 per cent carbon and small percentages of manganese, silicon, sulphur and phosphorus. The purpose of the limestone is to react with the earthy part of the ore which forms a slag which floats on top of the pool of iron. About every four hours the furnace is "tapped". The iron is run off from a tap hole into a ladle rather like a large beaker made from steel and lined with firebrick which carries about 100 tons of molten iron. The slag is also tapped off and allowed to run on to the ground where it solidifies as it cools. It is then broken up for further processing. This slag can be used for various purposes such as road making, fertilisers, or as railway ballast. The molten iron, or "hot metal" as it is called, is at a temperature of about 1,300°C and is ready for transport to the next stage, the steelmaking plant.

About 300 tons of metal is tapped off every four hours. The firebrick lining of a blast furnace undergoes tremendous wear resulting in the furnace having to be shut down every 2 to 3 years to have the old lining removed and a completely new lining installed. This process takes anything from six to nine months and thus it can be seen that to maintain the output from two furnaces continually it is necessary to have three actually on the site to allow for one always being re-lined.

There are three methods of converting iron into steel. They are: (1) the Converter, (2) the open hearth furnace, (3) the electric arc furnace. The first method can be broken down into two sub methods: (a) the L-D or oxygen top blown converter and (b) the Bessemer or bottom blown converter.

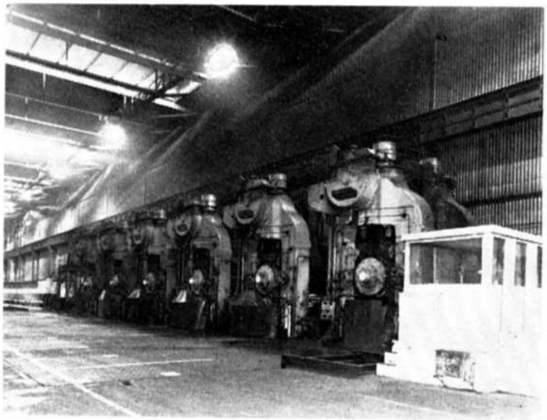
The first method is rapidly becoming the foremost method of making steel in the world. Following a revolution in steel making which took place in the early 1950's in a steelworks at Linz in Austria, which was forced on them by their lack of home produced scrap, the oxygen top blown converter is rapidly replacing all other methods for the mass production of steel. Electric-arc furnaces are holding their place for producing small quantities of special steels, but all other methods are rapidly being swept aside. To illustrate this the following table shows the output of steel in Great Britain by the various methods in 1969 and as forecast in 1975.

	1969 tons	1975 tons
Oxygen top blown converter	7½ million	22 million
Open hearth	14 million	6 million
Electric arc	5 million	5 million
	26½ million	33 million

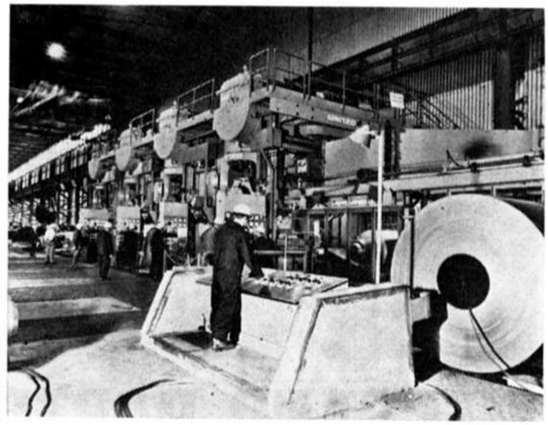


The first process for the large scale manufacture of steel was perfected only just over 100 years ago in 1856 by Henry Bessemer. Two types of iron were the mainstay of manufacturing industry at that time, cast iron, which could be melted and cast into shape but which was brittle and had a low strength, and wrought iron, which could be forged, rolled and shaped in various ways. Iron contains a high percentage of carbon, which makes it brittle. If it is treated with oxygen the carbon will be burnt out. Bessemer blew cold air through molten iron, the oxygen in the air removed the carbon and he was left with mild steel which is strong and tough. Mild steel quickly replaced wrought iron

The roughing section of the 68 in. wide hot strip mill where the slab is rolled to an acceptable thickenss for the 6-strand finishing mill, approx. 1 in.



A view of the 6-stand finishing mill in the hot strip mill where the steel is rolled to the final hot reduced gauge, max. .5 in., min. .047 in.



A view of the 4-stand cold reduction mill where the steel is rolled to the final gauge. This mill is capable of rolling at finishing speeds of up to 4,000 ft. per min.

because it could be made in large quantities and was equally satisfactory for most purposes. The Bessemer process used air which, of course, only contains one fifth oxygen and four fifths nitrogen. This led to large volumes of gas being given off during the "blowing" of a converter. The air was blown through the bottom of the converter through something like a large pepper pot. This meant a complicated construction for the converter vessel. Because of the large quantities of nitrogen blowing through the liquid iron the resulting steel tended to be brittle although nothing like as brittle as cast iron. The early converters carried a weight of 20–30 tons of steel.

Another process was later developed which gave a better quality steel. This was the "open hearth" process in which a large fixed furnace was fed with a mixture of hot metal and scrap steel, as much as one half of the initial "charge" being scrap. The metal and scrap was allowed to "soak", with flames playing on it, for up to 16 hours, during which time the scrap melted and the carbon was removed from the iron. Although this process took a lot longer than the "blowing" of a converter the initial charge was also much larger, being as high as 400 tons. The steel produced by this method was of a better quality and it gradually became the foremost method of steel making in this country. However, it used up a lot of scrap. Scrap steel was obtained from two main sources, one, from within the steelworks itself from all the scrap cuttings obtained from the various processes carried out on the steel and two, from old cars, bikes, stoves etc. through scrap merchants. Scrap was readily available in this country and was no problem to us, but in Austria after the second world war the scrap steel was not available in sufficient quantities to maintain their steel industry. This led the Austrians to look for ways of producing steel with little or no scrap. They eventually perfected a process in which hot metal was put into a crucible very similar to a Bessemer converter only with a solid bottom, and a steel pipe or lance was lowered to within a few feet of the surface of the molten metal and pure oxygen was blown onto the iron. By this method 100 tons of iron can be converted into steel in 20 minutes. A typical composition of the charge into an L-D converter is 96 tons of hot metal, 17 tons of scrap steel, 7 tons of oxygen, and several small additions of lime, bauxite and sinter to produce 100 tons of steel, 8 tons of exhaust gas and 5 tons of slag. After the "blow", when the iron has been converted to steel, the converter is tipped on its axis and the steel is poured into ladles.

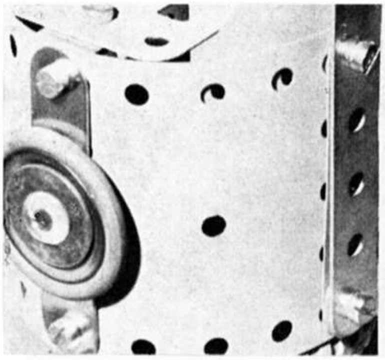
Because an L-D steel making plant is so cheap to build compared with an open hearth plant, and because the quality of the steel produced is so good, the steelmaking plant of this country and, indeed, of the world, is rapidly turning over to oxygen converters. The first converters installed in this country were at the Llanwern works of RTB and came into operation in 1962. This was the first steel plant in the world to rely entirely on L-D converters. Recently the Port Talbot works have shut down their open hearth plant and have installed 300 ton L-D converters.

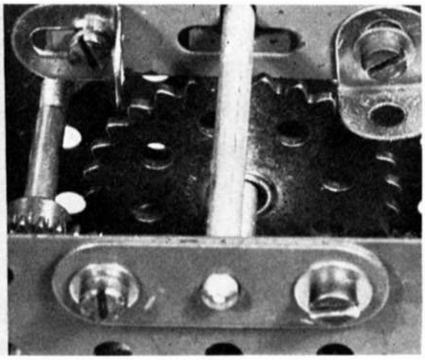
The third main method of steel making, the electric arc, is usually confined to making high quality steels such as stainless steel. Once again this process starts with a load of scrap (high quality). Some coke is added and electrodes are lowered into the mixture. A high intensity electric current passes through the mixture and the heat generated melts the steel. Normal domestic voltage, 220 volts AC, is used. Modern electric arc furnaces reach an output of 100 tons per hour.

Most steel today is then cast into "ingots", rectangular lumps of metal weighing anything up to 15 tons. These ingots are then re-heated to red heat to make them pliable and are then passed through rolling mills.

Rolling Mills

The end varieties of steel are many. It can be produced as flat thin sheet, suitable for motor cars, refrigerators, cookers or furniture, or as sections either I or H used in structural work for buildings and bridges, or as flat thick plates for ship building, or as tubes ranging from fractions of an inch in the bore up to 10 or 12 feet in diameter for gas mains and the like. In each case the ingot of steel has to be rolled into shape. The first stage of rolling to reduce the ingot to a flat slab is done in the "cogging", "slabbing" or "blooming" mills which are terms which describe the end product. Following this the 'slab' 'bloom' or 'cog' is re-heated again to bring it up to rolling temperature and passes through the finishing mill. In the case of steel intended to be flat strip there may be up to seven separate rolling mills or stands, as they are called, in a line, each one reducing the thickness a little more. The steel then emerges from the final stand as a strip about five feet wide, one third of a mile long and travelling at about 40 mph. It is then cooled with sprays of water and wound into a coil whilst still hot.





Far left, Fig. 3a
Left, Fig. 3b.
Bottom of page, left, Fig. 5a, and right, Fig. 5b

MECCANO PARTS AND HOW TO USE THEM

Part Two — The Perforated Strip

By B. N. Love

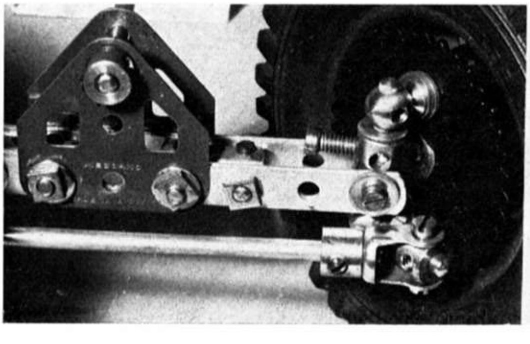
SO common is the Perforated Strip in the Meccano system that the majority of us take it for granted. Its elegant simplicity however, gives a solution to modular construction which taxed the brains of its inventor, Frank Hornby, to a considerable degree at the beginning of this century. His formula of using ½ in. stock material with ½ in. spaced holes has been a successful one for nearly three-quarters of a century and it has been avidly copied by many a competitor from 1901 until the present time.

Today we are bound up internationally with a decimal system and one might perhaps wonder if the pressures for metrication will oblige the Meccano factory to go over to centimetre dimensions. This would require the re-tooling of the factory at a quite uneconomical cost and it is significant that at least two of the continental manufacturers of competitive systems adhere rigidly to the original Frank Hornby module of ½ in. spacing. This format is likely to stay with us for a long period to come.

Steel for Perforated Strips is supplied to the Binns Road factory in coils of the correct width and thickness, or gauge, for the relevant length of Strip. Meccano Perforated Strips longer than 5½ in. are made from a thicker gauge of steel than those of 5½ in. and below. This gives the necessary strength to the longer components. Early parts were made from thin tinplate with folded edges to give the material some rigidity, but Frank Hornby soon realised the advantage of using steel strip for a superior product if it was to achieve world-wide fame and reliability. Squared ends on the first Perforated Strips represented a danger to young children and Frank Hornby put a curved end on the Strips before patenting his invention in the first decade of this century. Fig. 1a shows the early radius adopted and this is still in use today for the Perforated Strips of 7½ in. and longer. When re-designing the punch tools for the shorter Strips, a sharper radius was employed to give an elegant curvature to a right angled corner made up in Perforated Strips as shown in Fig. 1b.

As the popularity of Meccano spread, Frank Hornby was inundated with suggestions for improvements to his basic designs and an early improvement, almost from the outset, was the provision of slotted holes in various Meccano parts. This allowed structures other than those bound by the rigid ½ in. spacing concept and the Slotted Strip was introduced in two versions, the 2 in. and the 5½ in. The smaller one is illustrated in Fig. 2 and this arrived on the scene during the '20s.

Shown alongside the 2 in. Slotted Strip is the latest addition to the range of Meccano Perforated Strips, Part No. 6, which is now supplied with a central hole giving a ¼ in. spacing of holes at the centre. Vehicle gearboxes are very popular in Meccano models and it often happens that a 2 in. width is just right for an approximate scale. Previously, the 2 in. Strip had no

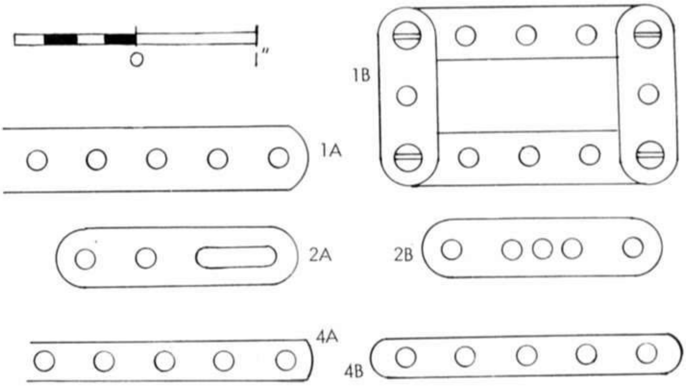


centre hole, making it difficult to centralise the main shaft of the gearbox. The new design overcomes this difficulty and shows its versatility in other applications which will be covered later in this series.

How does one use the Perforated Strip? It is so obvious, is an explanation really necessary? Experienced constructors who get the most out of their models and produce the best results are always looking for the full potential offered by *any* individual Meccano part and the Perforated Strip is no exception. Essentially, as a structural part, the Perforated Strip is a strut and will stand up to quite heavy loads if subjected to tension (a stretching force) rather than to compression (buckling force). This should be borne in mind when assembling crane jibs, parts of which are always in tension and where the Strip is an excellent component choice.

Two other applications of the Perforated Strip, used as an ideal reinforcing item, are shown in Fig. 3a. Overlying the ends of Flexible Plates gives a neat appearance by masking the slotted Plate holes beneath and holds the thinner components securely in place. As a bearing for Axle Rods, the Strip has considerable 'slop', deliberately so, to ease construction for junior builders and even to give the advanced constructor some latitude in getting that awkward joint assembled! Fig. 3b, however, illustrates that, by several layers of Strips, the 'slop' can be evened out and a much better bearing surface provided for Axle Rods doing heavy duty. Such a bearing is also needed where an Axle Rod needs to run absolutely concentrically, as required in the case of Fig. 3b which shows the escapement spindle in a Meccano clock.

In 1962, Meccano made a break with tradition by introducing the Narrow Strip range, illustrated in Fig. 4. Although these Strips, Part Nos. 235–235f, were introduced as experimental parts originally, and not included in junior outfits of the time, their potential was soon exploited by the advanced constructor. They provided a nice scaling down of the standard width of Perforated Strips and made the modelling of connecting rods on railway engines and frameworks of vehicle cabs much easier in terms of an acceptable scale. The ratio of perforation to remaining metal, however, is quite high so they are not made in lengths greater than $5\frac{1}{2}$ in. At this length, they are still excellent components for tie-struts in crane jibs, etc.



Two distinct applications are shown in Fig. 5, the tractor axle shown in Fig. 5a being an example of improved scale, while Fig. 5b shows the narrow Strip as a decorative overlay on a Hub Disc, giving a striking impression of narrow spokes in the rear wheel of a showman's engine. The Meccano Price List does give metric dimensions for the range of Narrow Strips from 60 mm to 140 mm, the width in each case being 9 mm.

The drawings of Fig. 4 show up an anomaly among the Narrow Strips in terms of the shape of the Strip ends. Note that Fig. 4a, which shows the end shape of Narrow Strips 235b, 235d, and 235f (90 mm and upwards) has an end radius of $\frac{5}{16}$ in., similar to that used for 'cropping' the end of steel strip used for standard Perforated Strips of $7\frac{1}{2}$ in. upwards. The shorter Narrow Strips 235 and 235a are not punched from strip material; they are pierced in plate form and then blanked out by a multiple punch which has semi-circular ends. This is just a matter of simpler design in the punching tool, but it explains the difference in curvature illustrated in Fig. 4. There has been some conjecture in the past by older Meccano enthusiasts concerning these different shapes, giving rise in some cases to pretty tall stories! However, it is all a question of tool design being most suitable.

Finally, the versatility of the Narrow Strip is shown in Fig. 6, where two forms of leaf springs for model vehicles are illustrated. Fig. 6a shows the normal semi-elliptic spring usually supported at each end with the axle attached at the centre. The second leaf spring in Fig. 6b is known as a "cantilever spring" being secured at one end with the axle attached to the other. Note the close lapping of the 'leaves' effected by clamping up the 'leaves' in 1 in. Triangular Plates secured by Pivot Bolts.

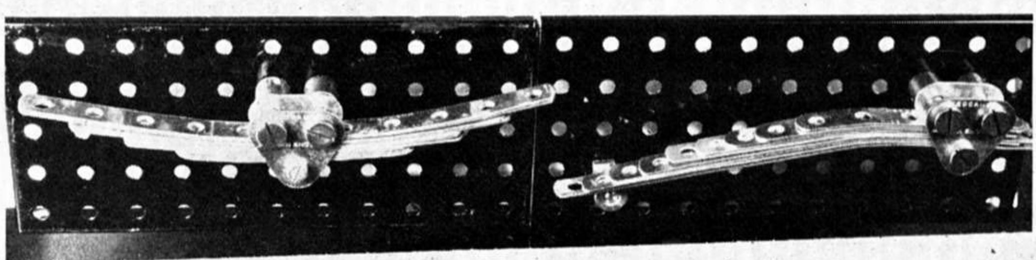
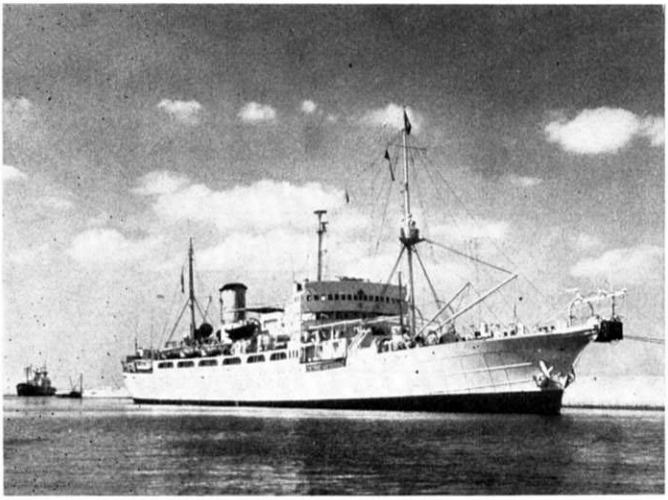


FIG 6a FIG 6b

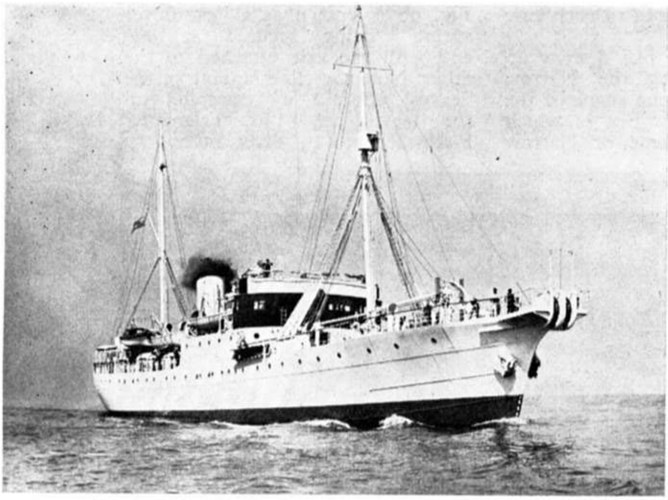


THE POST OFFICE NAVY

BY

TREVOR HOLLOWAY

Photos courtesy of the Post Office



TRAVELLERS using British ports are sometimes puzzled by the sight of vessels having the trim lines and smart appearance of Her Majesty's ships of war, yet closely resembling steam yachts.

The mystery is deepened by the fact that these vessels fly the Blue Ensign which, in the language of heraldry, is 'defaced' by a crest depicting the venerable figure of Father Time regarding with astonishment his hourglass shattered by an electric spark.

The flag is so seldom seen by the general public that few people realise that the vessel belongs to the Post Office fleet of cable ships whose business it is to lay and maintain the Corporation's network of submarine telephone and telegraph cables radiating from the coasts of this country.

Although small in numbers—a total of four vessels only—it is one of the most modernly equipped cable fleets in the world. Its flagship, C.S. *Monarch*, is capable of carrying out cable-laying and repair work in any part of the world. Indeed, she has been frequently on loan to Commonwealth and foreign governments, assisting with major cable-laying projects.

When she was built, in 1946, *Monarch* was the largest ship of her kind in the world. Her overall length is 486 ft. and her steam driven twin screws give a top speed of 14 knots. She carries four cylindrical cable tanks having a combined coiling capacity of 125,000 cubic feet. A few years ago, during a refit, she was modified to lay the latest type of repeater cable. When commissioned, her tonnage was 8,541.

The vessel is fitted with the latest types of navigational aids and has echo sounders capable of giving information on ocean depths up to $4\frac{3}{4}$ miles. Radio equipment includes world-wide telephony facilities, and a weather recorder apparatus produces weather charts from meteorological radio transmissions sent out at regular intervals.

When cable-laying, she carries a crew of 138, including a qualified medical officer. As the vessel is often away from base for long periods, special attention has been paid to providing for the comfort of the crew. There are several mechanised laundry units, a fully equipped hospital, a library, a recreation room, and a canteen. Film shows are a regular feature.

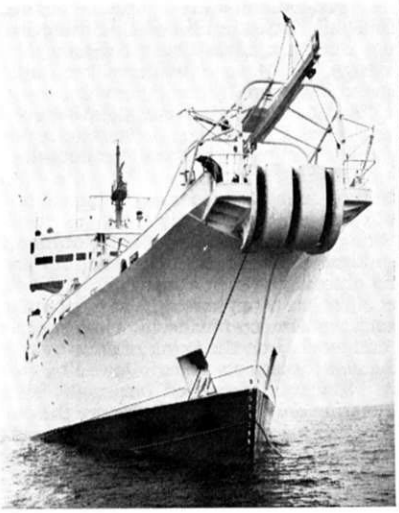
We've all heard the slogan: "Join the Navy and see the world". That certainly applies to life aboard a cable ship. During recent years the *Monarch's* work has taken her to Australia, New Zealand, Fiji, Honolulu, Greenland, Canada, the Bahamas and a score of other far distant lands. It is possible, however, that by the time this article is in print the *Monarch* may have been withdrawn from the Post Office fleet after giving a quarter of a century's faithful service.

Her three companion ships are *Alert*, 5,688 tons (built 1961), crew 111; *Ariel*, 1,437 tons (1939), crew 63; *Iris*, 1,499 tons, (1940), crew 63.

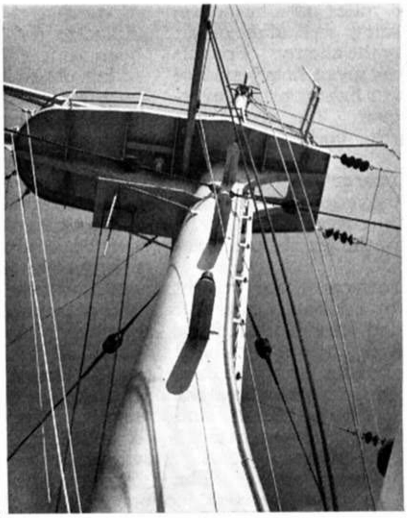
The *Alert* is the fourth to bear that name. Like the *Monarch*, she can operate anywhere in the world, and at any depth. She can carry 900 nautical miles of cable and repeaters and has a speed of 15 knots. Her forward machinery can pay out cable at any speed up to 8 knots, or recover at up to 4 knots.

The rapidly expanding network of long-distance telephone cables has made it imperative that, should a fault develop, repairs must be effected with the minimum of delay. The *Alert* was designed with this end in

Two of the Post Office's shops. Top is the largest in the Post Office Cable Fleet, Cable Ship *Monarch*, 8,541 tons, built in 1946. Left is C.S. *Iris*, a vessel of 1,500 tons. She was built in 1940 and has a crew of 63.



A picture of the *Alert* about to set off on a cable-laying mission. The cable is paid out over the huge sheave, or pulley-wheel, at the bows.



Alert's signal mast with aerial array, halliards, cable signal lights and radio direction finder loop aerial.

C. S. *Ariel* (1437) tons, seen at her berth at Dover. Built in 1939 she carries a crew of 63.

view. Being a diesel-electric ship, she does not have to wait to get up steam, but can put to sea virtually at the push of a button. Another refinement which saves a great deal of time when getting a cable up from the sea bed is a Voith Schneider propeller, hidden underwater in the bows. This propeller can give the vessel a sideways thrust, thereby making manoeuvring into position a much simpler and speedier operation.

The Post Office first became interested in submarine cables and cable ships in 1870 when it acquired the few cables belonging to various telegraph and cable companies; it also took over the first *Monarch*, a small paddle vessel of some 500 tons gross.

Today, the Post Office cable fleet maintain 389 cables on inland waterways having a total length of 1,790 nautical miles, and 25 cables to Europe totalling 7,691 nautical miles. Maintenance of the trans-Atlantic cables is shared with other countries who use the cables.

The Post Office ships are supplied with cable from four submarine cable depots. They are situated at Woolwich, which stores 52,787 cu. ft. of cable; Dover (38,412 cu. ft); Dalmuir, Glasgow (80,153 cu. ft.); and Shandon, Dumbartonshire (67,860 cu. ft.).

One of the biggest jobs undertaken by the Post Office cable fleet in recent years was the laying of 2,300 nautical miles of telephone cable across the Atlantic from Oban, in Scotland, to Sydney Mines, Nova Scotia. The cable is a thin flexible copper tube, insulated in plastic and wrapped with copper foil, jute and steel armouring wire. It can carry 35 telephone conversations simultaneously.

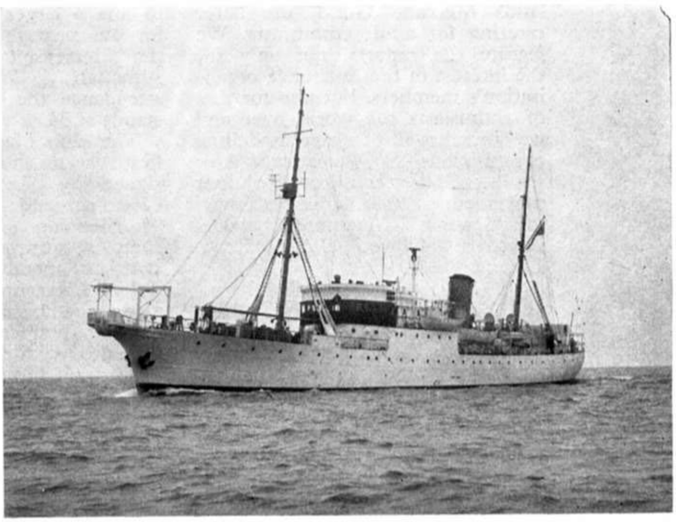
Cable ships are equipped with a huge sheave, or pulley wheel, at each end of the ship, over which the cable is pulled in or paid out. In the ship's holds are tanks in which the cable is stored. They have special paying-out gear which prevents cable being strained when the ship rises on top of a wave in stormy weather. In very stormy weather it may be necessary to sever the cable and for a buoy to be attached to the sea end. The cable is recovered when the sea moderates and spliced to the paying-out end.

Under normal conditions about 200 nautical miles of deep-sea cable can be laid in a day, but perhaps only between 70 and 120 miles of heavier shallow-water cable. Ballast tanks are used to keep the ship in trim when paying out or recovering long lengths of cable.

During the war years, in mine and submarine infested waters, the gallant little Post Office cable fleet carried on its vital work, often under the very nose of the enemy and in constant danger of attack by air. Early in 1941, the Luftwaffe made two heavy and determined attacks on the *Ariel* in one day, but thanks to the fine work of the ship's gunners, only minor structural damage was sustained.

So vital were some of the tasks allotted to the cable ships that every possible precaution was taken to keep the enemy at bay. On one occasion a cruiser, three destroyers and a vast umbrella of fighters were provided to protect the *Alert* while she was doing a top-priority repair job about a hundred miles west of Ushant.

In July, 1943, the *Iris* was directed on a 'suicide'



Right, C.S. *Alert* at sea after undergoing an extensive refit at Newcastle.

mission to repair a cable only 27 miles off Cherbourg, just at a time when the Allies knew well a major air attack was about to be launched by the enemy. For this hazardous undertaking the *Iris* was given heavy surface escort, with a complete squadron of fighter planes overhead to provide adequate air cover. The repair was completed only an hour before the massed Luftwaffe planes took off.

Early in 1944, when it was apparent that operation "Overlord" would not be long delayed, active preparations were put in hand to ensure the success of laying the communication cables required by the armies of liberation.

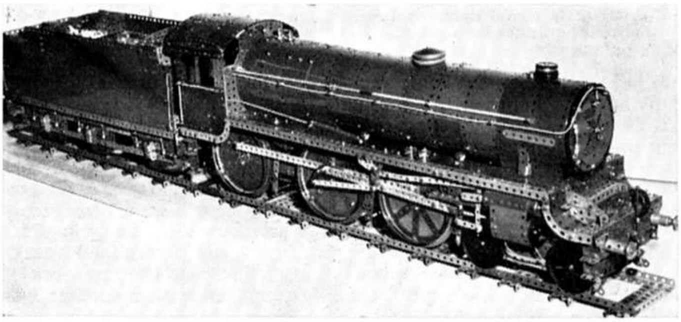
On D-Day, *Iris*, *Alert* (predecessor of the present *Alert*) and the predecessor of today's *Monarch*, together with a Naval cable ship, assembled off the south coast near Bournemouth where two shore ends of cable had been laid in readiness to be spliced to the main length of cable. Immediately the beach at Longues across the Channel had been cleared of the enemy, the *Iris* and *Alert* proceeded to lay the first cable. In just over 24 hours the cable was connected at the Normandy end.

Within 48 hours a second cable was called for. The *Monarch* and the Naval vessel were allotted this task. All went well until all but ten miles of this cable had been laid. Then came tragedy. Owing, presumably, to her unusual design, the *Monarch* was mistaken for an enemy warship and fired on by an Allied destroyer. Before the error could be rectified, five of the *Monarch's* crew were killed, thirteen injured and the vital cable severed. The cable ship limped back to Portsmouth in a sinking condition.

But the gallant little *Alert* stepped into the breach and the last length of cable was successfully laid.

It was, alas, one of *Alert's* last jobs. Not many months later a midget sub. sent her to the bottom and not one of the 55 officers and men aboard her survived. The present-day *Alert* has taken her name as a tribute to a gallant ship and a gallant crew who for close on five years had lived and worked on the brink of eternity.

The loss of the *Alert* was soon to be followed by that of the *Monarch*. She was torpedoed one night by a small enemy submarine only a few weeks before the end of hostilities. So badly holed was she that she sank within the hour, but fortunately it was possible to rescue 69 out of the 72 men aboard.



Ralph Clark's 4-6-2 mixed traffic loco complete with Walschaert's gear and scale tender.

MECCANO CLUB NEWS

REPRINTED below are detailed reports of meetings held by two of the largest Meccano modellers organisations in Great Britain, the "new" Holy Trinity Meccano Club and the now well-established Midlands Meccano Guild, the latter catering for adult enthusiasts. We feature the reports, not only for the interest of the respective organisation's members, but also for that of enthusiasts the world over and we hope that all Meccano modelling organisations—no matter how small—will keep us informed of their movements. Please address all news to: "Spanner", Meccano Magazine, Northern Office, Binns Road, Liverpool L13 1DA.

3rd Meeting of the Holy Trinity Meccano Club

Report by P. Matthews, Secretary.

"A good time was had by all"—a very suitable phrase, I feel, to describe our latest meeting, held on 23rd October, 1971 at the Scout Headquarters, Hurstpierpoint, Sussex. We were of course overflowing and I must apologise to any member who could not find space to display his model adequately.

The attendance was very good indeed, being 27 compared with 14 at the first meeting. It is hoped to hire a larger hall in the village for our next meeting to cater for the increase in membership. Although 27 members were in attendance the actual membership stands at 34.

The club Meccano Guild Certificate was on show for the first time, signed by Mr. H. J. Fallmann, Chairman and Managing Director of Meccano (1971) Ltd. As a complete surprise it was announced that all members of the Holy Trinity Meccano Club had also been made members of the Meccano Guild. Members were then duly presented with their certificates and badges. Of historical interest is the fact that the Club's certificate bears the same club name as the very first certificate to be issued in 1919 by the Meccano Guild and that the founder and club leader of that first club, Stuart H. Wilson is also our Hon. President—a span of some 52 years!

There were so many fine models on display that it would be impossible to describe them all in detail. Leslie Dougal again gave a fine display of models from the "Nickel Period", most notable of which was a pre-war Super Model Travelling Gantry Crane. Phil Bradley showed his Southampton Dock crane and Tony Homden had an 8 ft.-plus model of a cargo ship complete with working derricks, lifeboat davits, hatches and anchor winches. Both Phil and Tony gave demonstrations of their models, an item which I hope will continue with other members at other meetings.

A new member, Mike Nickolls brought along a very clever and amusing 'Sawing the Lady in Half' model. This was another case of originality of thought paying off and I hope to persuade Mike to write an article for the M.M. on this model so that other people can get as much pleasure from building it as we all got from watching it.

Among other members present at the meeting was Noel Ta'bois. Noel is an enthusiast from the 1938–45 period and if you look up your Meccano Magazines for this period you will see many of his ingenious mechanisms described therein. He also swept the hall out after the meeting! Many thanks Noel.

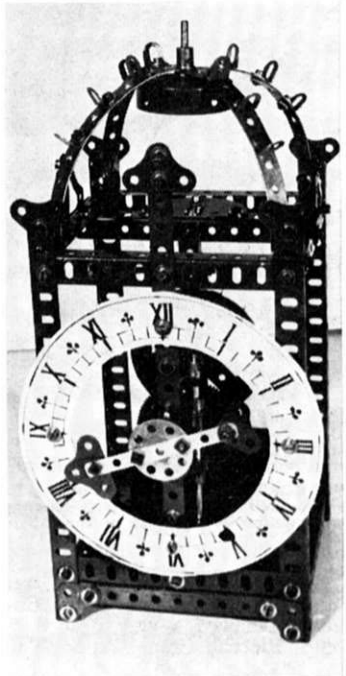
Jim and Diane Gamble journeyed down from Nottingham to help out, and it must be said that Jim was a great help with erecting tables and humping models etc. Diane, together with Margaret Ta'bois and Anne Matthews, did us all proud from the kitchen area and members will, I know, wish to thank them for their splendid efforts.

The date of the next meeting was fixed for Saturday, 29th April, 1972.

All that remains for me to say is thank you all once again for your wonderful support and I look forward to our next meeting very much indeed.

Anyone interested in joining the Holy Trinity Meccano Club should contact the Secretary at 7 Trinity Road, Hurstpierpoint, Sussex. An S.A.E. should be supplied.

Historical working clock by Pat Briggs with replica verge escapement entirely in Standard Meccano parts.



9th Meeting of the Midlands Meccano Guild

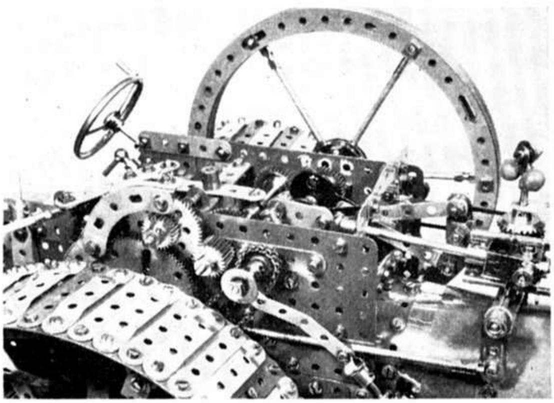
Report and pictures by Bert Love, Secretary.

On 2nd October, 1971, members of the Midlands Meccano Guild arrived at the St. John Ambulance Hall, Stratford-upon-Avon to be greeted, not only by the other members, but by one of the warmest October Saturdays on record! A good omen for the start of yet another successful meeting. Long distance travellers, dusty from trips as far afield as Dundee, Newcastle-on-Tyne, East Kent and Somerset revived themselves with welcome cups of tea brewed by volunteer wives and the meeting started promptly at 2 p.m. with a short address of welcome and an introduction of new members by the Hon. Sec.

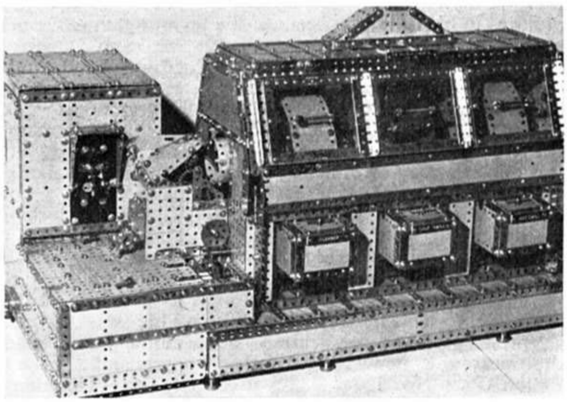
A number of principal models had been selected for demonstration and the first member on the platform was David Guillaume of Alcester who showed a fine model of an industrial processing machine which passed ball bearings from one rotating barrel to another through a complete battery of drums until the polished product was churned out through the delivery chute. Made in the latest Meccano parts, the mode performed splendidly, being completely programmed through an automatic gear-box.

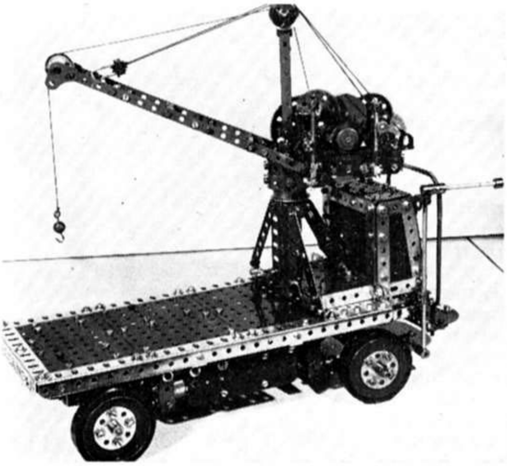
Dennis Perkins of Rugby then demonstrated his beautiful 1½ in. scale model of a Clayton & Shuttleworth Agricultural Traction Engine constructed with the highest degree of modelling skill and requiring close inspection to establish that it was actually constructed from Meccano parts. Very careful selection of pieces, in various shade of Meccano colours across the years, contributed in no small way to the astonishing realism of Dennis's first-class model. All motions worked as in the prototype, of course, and the engine performed like its veteran ancestor.

Detail of the flywheel and crankshaft gearing of Dennis Perkin's superb large scale Traction Engine.

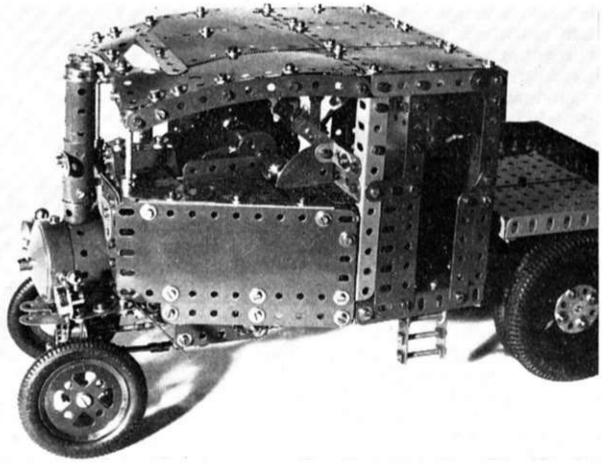


Working model "Barraflow" industrial washing plant by David Guillaume. Oscillating drum drive and feed cycling by automatic gear-box.





Well detailed Collis Crane Truck by Eric Jenkins. Power is provided to chassis via a differential. Crane luffing and hoisting by separate motor. All movements battery driven



Short wheel base Foden Steam Lorry neatly executed by Brian Edwards

Coming down from the large Supermodel class a little, Eric Jenkins showed a very neat Ransomes Electric Crane Truck. This was modelled from a small illustration of the original truck printed in the January 1958 M.M. and Eric had really brought this model to life. Built in a very short time, it was battery-powered, the chassis being fitted with differential drive, parallel steering operated by a tiller bar from the driver's stand, while the rotating pillar crane mounted on the chassis was self-powered by an Emebo Motor with a compact gearbox giving hoist and luffing control.

Blind member John Lorimer of Bromsgrove brought along his industrial planing machine based on a heavy-duty type found in large steelworking plants. John has never been able to see either the prototype or pictures of it and, having no engineering background whatsoever, he has had to build up word pictures in his head to 'visualise' the actual machine. His reproduction was an excellent working model with quick-return motion fitted to the planing table and screw-driven tool-post. John built this machine entirely unaided.

Stephen Lacey of Hinckley demonstrated a model of the Snowdonian rack railway locomotive and passenger car working with great realism on a substantially inclined rail section. Some six feet of track were enough to show the ability of his model to haul up the slope with absolute positive registration on the rack, the new Large-toothed Pinion, Part No. 167c, being used to engage with the edges of $\frac{3}{4}$ in. Washers mounted on extended Axle Rods lying between the rails. Spacing of the rack was achieved by packing with the smaller standard Washers—a novel use for Washers altogether! Details and valve gear on the locomotive were excellent as usual.

Phil Bradley's model was that of the 1950 Southampton Docks 50-ton Travelling Crane. This ran on no less than 32 wheels, all of which were equalised. Luffing was via heavy-duty screw rams and all movements, including main and auxiliary hoists, were reproduced up to Phil's usually high standard.

Beautiful working clocks were displayed by Pat Briggs and Leslie Dougal, two of the Guild's 'resident' clockmakers. One of Pat's examples used four clockwork motors with differential inter-connections for long-running performance plus power for strike and chime mechanisms. Pat also produced a genuine 'antique' movement by showing a Meccano clock using a verge, crownwheel and foliot balance escapement, circa 16th century 'Nuremburg' design. Again, the standard Meccano Clockwork Motor was employed and the clock ran like a jeweller's piece. Leslie's clock was a beautiful 'Granddaughter' clock clad in Flexible Plates from the blue/gold era of Meccano, but blended very skilfully with early nickel plated parts to produce an elegant case clock. This was electrically driven, the motor being made from standard parts and a strike was included.

Tony Homden brought along a merchant ship model some $8\frac{1}{2}$ ft. long with a great deal of true-to-type working gear included. This comprised anchors and cables in hawse pipes with working capstans, working derricks over the cargo hatches operated from masthead switches, a jumbo lifting derrick forward for heavy cargo, four ship's lifeboats with automatic release and lowering gear plus authentically positioned navigation lights. The usual deck fittings such as bollards, cleats, ventilators and gangways were all skilfully modelled by Tony, a former Merchant Navy man himself!

Jack Partridge showed the pre-war L.N.E.R. Locomotive 1,000 while Ralph Clark's model from the same region was a 1 in. scale model of the 1942 B.1 Class general duty locomotive with working Walschaert's valve gear.

The Hall was alive with models and enthusiasm and when the demonstration talks were over, members were free to roam among the model-builders to see the rest of the many exhibits and to swop ideas. Afternoon tea, deliciously laid out by the 'canteen staff' was much appreciated and a very happy meeting continued until members left for home as darkness fell.

Anyone interested in joining the Midlands Meccano Guild should contact the Secretary at 61 *Southam Road, Hall Green, Birmingham* 28. *An S.A.E. should be enclosed with the enquiry.*

Design and Construction of Bridges

Part One of a series of interest to all engineering-minded readers

By Terence Wise

THE single decker bus slewed wildly across the road towards the barrier in the centre of the dual carriageway. The automatic doors burst open suddenly and explosively. The driver forced the steering wheel hard over and slowly the bus regained its position, only for the process to be repeated a minute later. Determinedly but crazily the bus zigzagged its erratic course over the bridge.

I experienced this hair-raising ride one evening when crossing the mile of river spanned by the Severn suspension bridge, one of the many new bridges in this area and certainly, with its revolutionary aerodynamic design, the most impressive of all the numerous bridges that have been built in this country over the past decade. This journey, made during a strong gale, aroused my curiosity concerning the engineering skill that enabled such a bridge to be built and I began to 'see' the wonder of bridges everywhere that previously I had crossed hundreds of times without a second look. I started investigations.

Chambers Encyclopaedia defines a bridge as "an engineering structure carrying a path, road, railway or canal across a river, a valley or like obstacle, or across another road or railway". This is a rather drab description for creations that are rarely ugly, no matter how utilitarian, but are often exceedingly graceful, expressing in every soaring span the triumph of Man overcoming Nature's obstacles. Bridges are also classified under type of design and material, whether fixed or opening, single or continuous span. In the following months I shall deal with the various types of arch, cantilever, girder and suspension bridges, but in the present article it is first necessary to describe the basics of bridge building and span the history of the development of bridges up to the revolution caused by the introduction of iron and steel. To understand bridges one must start at the beginning, not the end!

All bridges must depend ultimately on their foundations, for any subsidence of these at a later date could be fatal. Consequently the siting of a bridge often depends on the availability of good conditions for foundations. Fig. 1 illustrates the formations that decided the position and design of the Severn suspension bridge. Rennie's beautiful Waterloo bridge in London had to be demolished—despite loud protests from the public—simply because during a period of a hundred years one of the piers, built on wooden piles, had sunk over two feet and rendered the bridge unsafe. The building of foundations is especially difficult where water or soft soil is encountered and caissons—box-like shells of timber, concrete or steel that are later filled in to become part of the permanent structure—have to be constructed.

On the foundations are built piers of stone, brick, steel or concrete, usually in the form of a slender shaft nowadays (Fig. 2) although before the Renaissance piers were thick, rather clumsy things, for they not only carry the weight of the bridge but also must resist the extreme pressures of any floods. The piers at each end of a bridge, in addition to taking the weight of the bridge, are also sometimes subjected to a horizontal thrust and they are then termed abutments (Fig. 3). In modern suspension bridges the towers carrying the cables and the anchorages at each end of the cables represent the piers. Retaining walls are also built to contain the approach embankments to some bridges and these are known as wing walls.

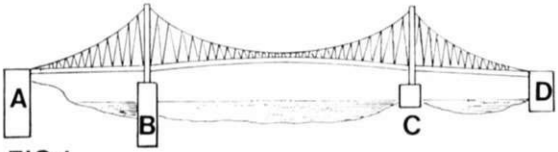


FIG 1

Fig. 1–A. Beachley anchorage, built on hard limestone after digging through 60 feet of sand.
B. Beachley pier, set 35 ft. down.
C. Aust pier, a depth of only 4 ft. before building on Ulverstone Rock.
D. Aust anchorage again only a small depth of 10 feet to the limestone.

FIG 2

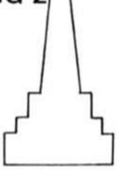


Fig. 2–The slender shaft of a modern pier resting on the widened base of the foundation.

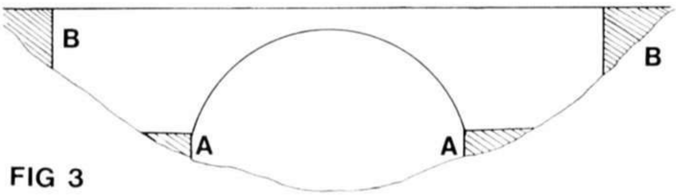


FIG 3

Fig. 3—A. Two abutments to resist the thrust of the arch ring *and*
B. Two more abutments for the bridge deck, supporting the earthwork of the bridge approaches and forming the ends of the bridge.

Heading photo, the medieval stone bridge over the River Monnow at Monmouth was built in 1272. The distinctive toll gate was added in 1296.

A 19th century stone arch bridge, carrying a railway line: this technique has remained unchanged after 2,000 years.

The type of bridge erected on the piers is often determined in the first instance by the availability of sites for the piers, the nature of the approaches to the bridge and, in the case of rivers used by shipping, the height above water level needed for navigation. Into the design of the bridge must also be incorporated a safety margin to provide for wind pressures and to cover this the designers allow for the maximum stress being exerted on every section of their bridges. Bridge loads are governed by law in most countries.

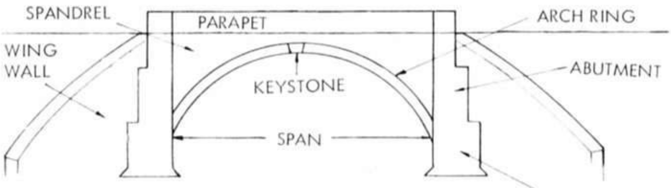


FIG 4

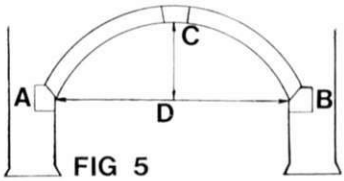


FIG 5

The first type of bridge design, usually attributed to the Romans, was the simple arch. The principle was known to the Sumerians as early as 3,600 B.C. but the oldest surviving bridge in the world is a stone arch bridge at Izmir, Turkey, dating from about 850 B.C. In the 6th century B.C. the Romans were building timber bridges, but by the end of the 2nd century B.C. were constructing stone arches. Their Ponte Fabricio over the Tiber in Rome, built in 62 B.C., is still in use today. With the fall of the Roman Empire, however, bridge building came to an end in Europe until the time of the Crusades, when communication with the East reawakened interest. About this time were built the famous Ponte d'Avignon and the infamous London Bridge, which incidentally survived 623 years until 1832! But the arches of these bridges were still steep and small, with massive piers, and it was not until the Renaissance that bridge building made its first major step forward.

The main disadvantage of close-set piers, aptly illustrated by the rapids of old London Bridge, was the obstruction to the flow of water. This caused the river to constantly swirl around the piers and by a scouring action eventually undermine them. The Italians discovered that the arch not only exerted vertical pressure on the piers, but also horizontal thrust. This discovery enabled them to develop the segmental and elliptical arches with their slender, widely spaced piers which caused less obstruction to the river and at the same time, by lowering the rise of the arch, permitted the construction of a more level roadway over the bridge.

The development of the arch reached completion with this discovery as far as design was concerned and it was only to be modified by the introduction of new materials such as iron, steel and eventually reinforced and pre-stressed concrete. Basically any stone or brick arch usually consists of part of a solid ring erected on a temporary staging to take the weight during construction, with the central keystone being placed in position last. Once the keystone is in position the staging is removed and the structure settles until the compressive forces are evenly balanced. (Telford's bridge over the Severn at Over in Gloucestershire dropped ten inches at this vital moment owing to movement at the eastern abutment. A normal drop would be perhaps two or three inches.) Thus it can be seen that all movement at the ends of an arch must be prevented. Several arches can be built to thrust horizontally against each other, but the ends of the series of arches must always be terminated by really solid abutments. Fig. 4 points out the various parts of an arch bridge. Fig. 5 shows that the arch ring 'springs' from the abutments A and B and at the springing point rests on skewbacks—special courses of brick or stone dressed to the correct angle. At the crown C the arch rises above the chord line (the straight line A–B joining the ends of the arc) to a height C–D which is called the rise of an arch. This is measured from chord line to soffit. The extrados and intrados are the outer and internal surface curves of the arch, and the soffit is the highest point of the intrados. Dressed bricks or stones that form the ring of the arch are called voussoirs, being specially tapered to shape. Today both brick an stone have been almost entirely superseded by concrete.

Many notable stone bridges were erected during the next century—the longest and flattest brick arch ever built is Brunel's railway bridge over the Thames at

Partially destroyed by floods in 1598, and further damaged in the 19th century, the Ponte Rotto in Rome was built in 181 B.C. These remaining arches are typical Roman. In the background is the Ponte Fabricio.

COMPARATIVE COMPRESSION STRENGTHS OF MATERIALS	
Brick	8-12 tons per sqare foot
Limestone & Sandstone	20 ,, ,, ,, ,,
Granite, etc.	30 ,, ,, ,, ,,
Concrete	750 pounds per square inch
Reinforced Concrete	1,000 pounds per square inch in the concrete 18,000 pounds per square inch tension in the steel.

The bridge over the Thames at Richmond, built in 1773, just before the first iron bridge. The width was doubled in the 1930s.

Maidenhead, with two spans of 128 feet each and a rise of only 24 feet 3 inches—but all these bridges were merely re-using the same construction principles. The next great advance in the art of bridge building did not come until 1776, when a Shropshire iron founder named Abraham Darby began the building of the world's first iron bridge, curiously enough once more across the Severn, near Coalbrookdale in Shropshire. Next month we shall investigate the development of the cast iron bridges and the introduction of wrought iron, reaching a peak with Brunel's Royal Albert bridge at Saltash.

NORTHWEST PASSAGE *(Continued from page 91)*

so far through the ice-infested seas. After a long winter icebound at Melville Island, Parry continued west, sailing almost to Banks Island, the last land mass of the passage.

After Parry came the ill-fated Sir John Franklin. One of the greatest Arctic navigators, he had spent 25 years adventuring in the Far North before embarking on his last fatal voyage in 1845. The two ships, with a total company of 130 men, were last sighted by a Greenland whaler at the end of July that year as they entered Lancaster sound. Nothing more was heard of them.

With a £10,000 reward offered for the discovery of the vanished expedition, over the next ten years mo‹e than 40 others set off from both sides of the Atlantic hoping to solve the mystery. Gradually the tragic story was pieced together. After being gripped in the ice for nearly a year and a half, Franklin and many others died of exposure. Survivors abandoned the doomed ships, but all perished as they tried to cross the ice to safety.

Among the searchers for Franklin was Commander Robert McClure. He rounded Cape Horn and followed Captain Cook's earlier trail from the Pacific. Beyond Bering Strait, McClure turned east and navigated the westernmost channel of the Northwest Passage. From a 1,300-foot mountain on Banks Island he looked east and could confirm the existence of a through sea route. But McClure's ship was frozen fast, and it was three years before a rescue party arrived.

McClure and his companions did actually make the first transit of the Passage, although 200 miles were made by sled. Another half century passed before Amundsen finally succeeded in making the first east to west crossing entirely by ship, reaching the Bering Strait at the end of August, 1906, after three long winters locked in the ice.

Not until 1954 did the Canadian ship *Labrador* captained by Commodore Robertson, carry out the first transit of the Northwest Passage ever made in a single season.

Now, more than 60 years after Amundsen, the *Manhattan* has pioneered what could well be the break-through for commercial navigation in the Arctic. Many problems still have to be solved before this is feasible. But sometime in the Seventies, mammoth icebreaking supertankers, two or three times as large as the *Manhattan*, could be shipping crude oil from the North Alaska field by the most direct route to America's east coast ports, and thence to world markets. The potential value of big-ship navigation to future development of the Arctic's natural resources is tremendous indeed.

Right, The *Manhattan* trapped in heavy ridging ice in a northern area of Baffin Bay. Beyond is the new Canadian Coastguard icebreaker *Louis S. St-Laurent* which later moved in along the tanker to ease pressure and allow the ship to move again.

HIGH FLYERS

John Ruffels provides some facts on a subject which, while familiar, is still relatively unstudied.

Asian countries have elaborate variations on the basic kite theme. Left, a kite depicting Seri Rama, a prince from the Hindu epic Ramayana. Picture shows the kite being launched into the air. Below, a "wau bulan" or moon-kite gets the name from its shape. The bow-type device fixed to the head of the kite gives a pleasant humming sound when in the air.

MOST people probably regard the kite as little more than a children's toy, but it really deserves a much higher status. Kites have given invaluable service to men for centuries—in engineering, in warfare, in science and many other spheres of life.

The kite originated in China about three thousand years ago and was believed to have magical properties. Even today, the kite plays an important part in the life of several Far Eastern countries. The Japanese and Koreans fly them to keep evil spirits at bay during weddings, feasts and funerals. Farmers in Thailand fly kites to summon the good weather winds before crops are sown. "Kites Day" is an annual holiday among the Chinese. Kite-fighting is a popular sport which originated in Malaya. The object is to knock your opponent's kite out of the sky. Often the kite has powdered glass stuck onto the line and the player has to manoeuvre his kite into a position from where he can sever the other's cord.

In the West, kites have been used in serious warfare too. In 1066, the Saxons under King Harold flew kites as communications signals at the Battle of Hastings. During the Second World War, some German submarines carried kites which were towed on the surface and used to lift a sailor into the air to make long-range observations. Anti-aircraft gunners in the American army were trained by shooting down kites with aeroplane silhouettes.

At its best, kite-flying is a very skilful sport and many famous people take an active interest in it, among them astronaut John Glenn, Mrs. Jackie Onassis, actor James Stewart and singer Burl Ives.

The world altitude record for kite-flying is over 44,000 ft., but in Britain it is against the law to fly a kite above two hundred feet or within three miles of an airport. Only in special circumstances will the Board of Trade issue a licence for anyone to go higher, mainly because of the obvious danger to aircraft. In the U.S.A. recently, a schoolboy did force a plane down when his kite line fouled up a propeller. In Britain, a nine-year-old boy living in Mablethorpe, Lincolnshire, plunged most of the town into darkness when his kite was blown into an overhead power cable.

More often than not however, the kite has been a help rather than a hindrance to men's activities. They were first used in meteorology in 1749, when Alexander Wilson and Thomas Melville used kites to hoist thermometers into the sky. The American statesman and scientist Benjamin Franklin carried out a famous experiment with a kite in 1752. He hung a metal key from a kite string and by attracting electricity from the air during a thunderstorm, showed the existence of electrical properties in lightning.

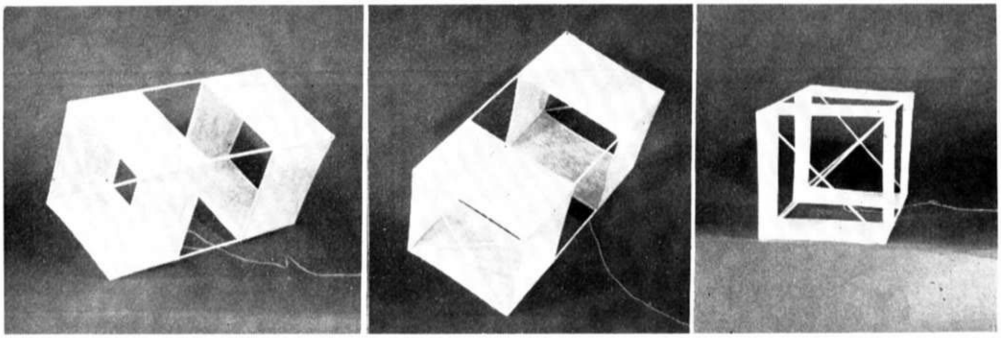
Kites have frequently been used by engineers in the early stages of bridge-building. One famous example was the bridging of the Niagara River between Canada and the U.S.A. at Niagara Falls in 1848. The builders had been unable to take a line across the turbulent river by boat or by rocket. Finally, a boy called Homan Walsh flew his kite, named the Union, to the opposite bank and a cable attached to his kite line established the first link for the bridge. When he died fifty years later, Walsh was buried near the spot where his kite had helped to join two nations.

The principle of flying a kite is quite simple: the current of air moving horizontally strikes the face of the kite, tending to drive it backwards. The inclined surface of the kite thrusts it upward and in addition, the rush of air around the sides creates a partial vacuum on the upper surface of the kite.

It was the understanding of this basic principle which led to the development of early gliders and aeroplanes.

In 1804, Sir George Cayley built the first glider by fixing a kite to one end of a pole and a tail-plane fin to the other. In 1893, Lawrence Hargreave flew the first biplane box-kite in Australia and it was this which provided the basic form of the original aeroplane flown by the Wright brothers in December 1903.

The most recent development of kite flying is the sport extended from water ski-ing. Heights of up to three hundred feet have been reached by water skiers clinging on to giant kites—and that's about as close to flying with the birds as men will probably ever come.



. . . and for you to make,

A Simple Box-Kite

by Meccano Magazine Staff

BOX kites are relative newcomers to the kite family, the first record of such a shape being only about 70 years ago. The chief differences between them and flat kites are that they are auto-stabilising and need no tail, that reasonably made they need only one attachment point for the line, and that they fly much higher for the line length used, i.e., more overhead.

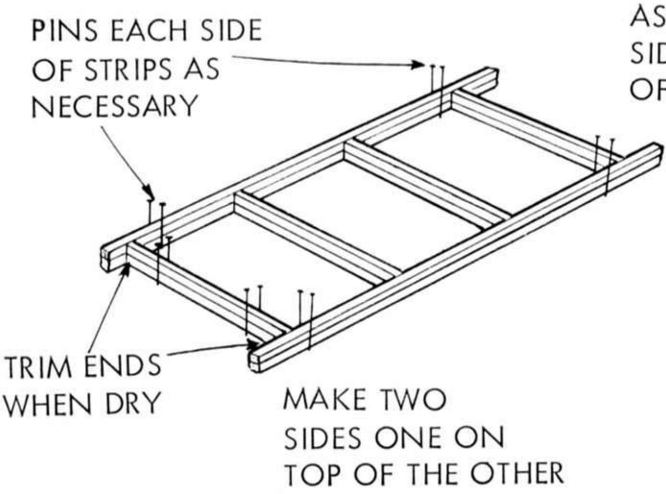
The drawing overleaf is by no means the smallest that can be made to fly successfully, but it is a convenient size and will fly in quite modest breezes. It is of course fairly fragile, though robust enough if handled properly, and not likely to come to much harm in flying, unless you try it in a gale!

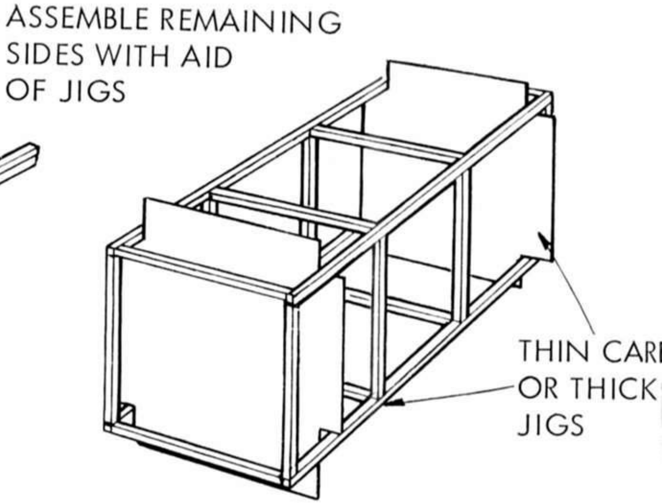
You can, by careful cutting, just get it out of 5 pieces of $36 \times \frac{1}{16} \times \frac{1}{16}$ in. hard balsa or spruce (or $\frac{3}{32}$ in. balsa) but to be on the safe side you may like to buy 6 lengths. Cut four lengths for the corner members and pin down (pins each side, not through the wood) two lengths each side on the plan, one piece above the other. Cut pairs of cross-members and cement in and leave to dry thoroughly. Making two sides together like this is quicker and ensures that the sides are alike.

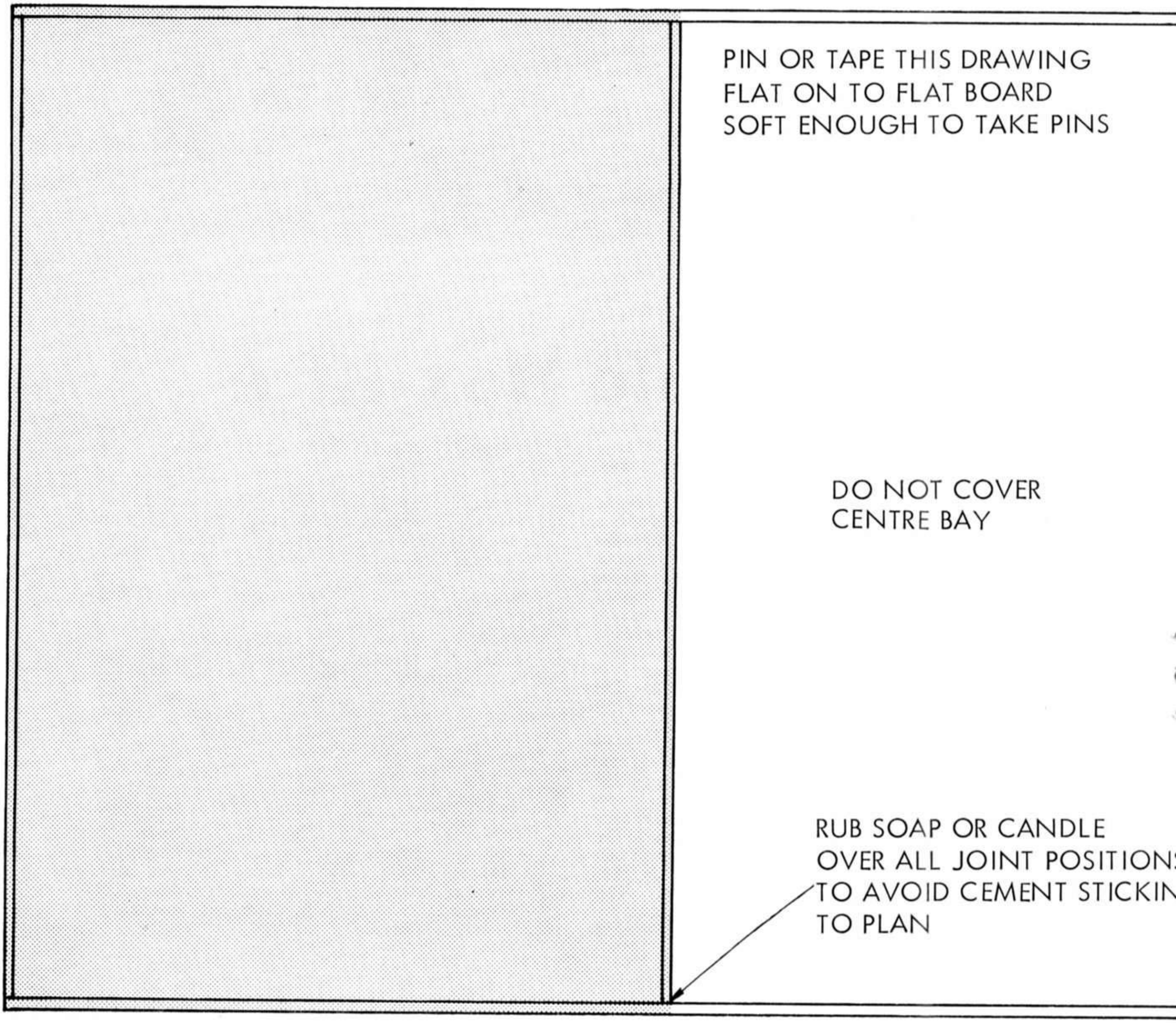
When dry, unpin and lift off the plan. Separate by sliding a razor blade between the sides, cutting through any cement blobs *carefully*. Now we have to make the two sides into a square, and to do this it is easiest to make two thin card or stout paper jigs as drawn. Make sure they are square! Cement the remaining cross members in, then put diagonals across each end as drawn; one must obviously pass under the other, and this joint should also be cemented.

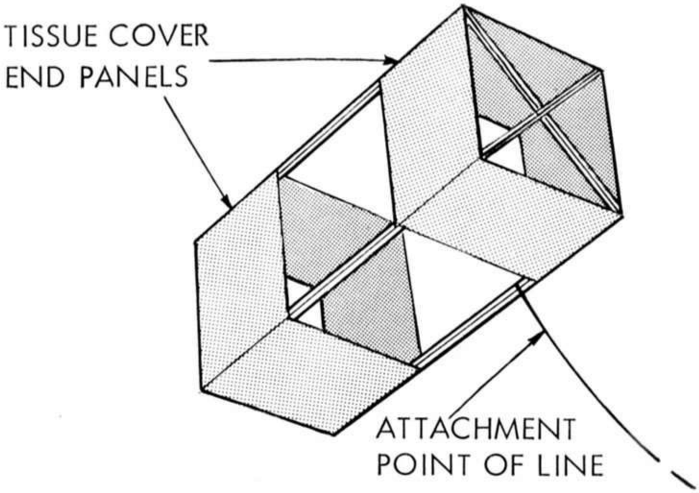
Tissue cover the end bays with lightweight model aircraft tissue (which can be bought coloured) using Gripfix or a similar paste to attach it. Each end can be done with one strip passing round all four sides. Leave an overlap to make handling the tissue easier; trim this off with a razor when the paste is dry. Try to draw the tissue evenly in place as you work. When trimmed, hold the kite ends in steam from a kettle to shrink the tissue lightly—too much shrinkage will bow all the wood frame. Paint on a coat of thin banana oil to airproof the tissue, but do not colour dope or paint it.

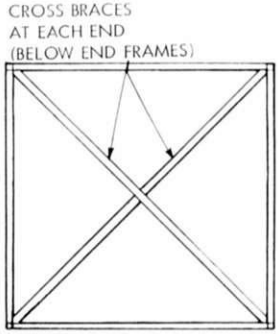
Use ordinary thin sewing cotton (or nylon) for a line; a 100 yard reel will be plenty. Tie the end to one strut as shown, and the kite is ready to fly. A winch makes things easier and keeps the cotton from tangling, and a simple one is sketched.


PINS EACH SIDE
OF STRIPS AS
NECESSARY
TRIM ENDS
WHEN DRY
MAKE TWO
SIDES ONE ON
TOP OF THE OTHER

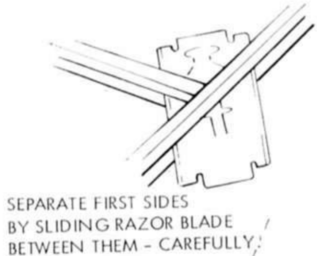

ASSEMBLE REMAINING
SIDES WITH AID
OF JIGS
THIN CAR
OR THICK
JIGS

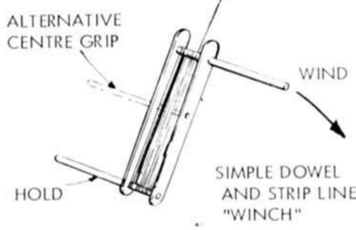

PIN OR TAPE THIS DRAWING
FLAT ON TO FLAT BOARD
SOFT ENOUGH TO TAKE PINS
DO NOT COVER
CENTRE BAY
RUB SOAP OR CANDLE
OVER ALL JOINT POSITION
TO AVOID CEMENT STICKIN
TO PLAN

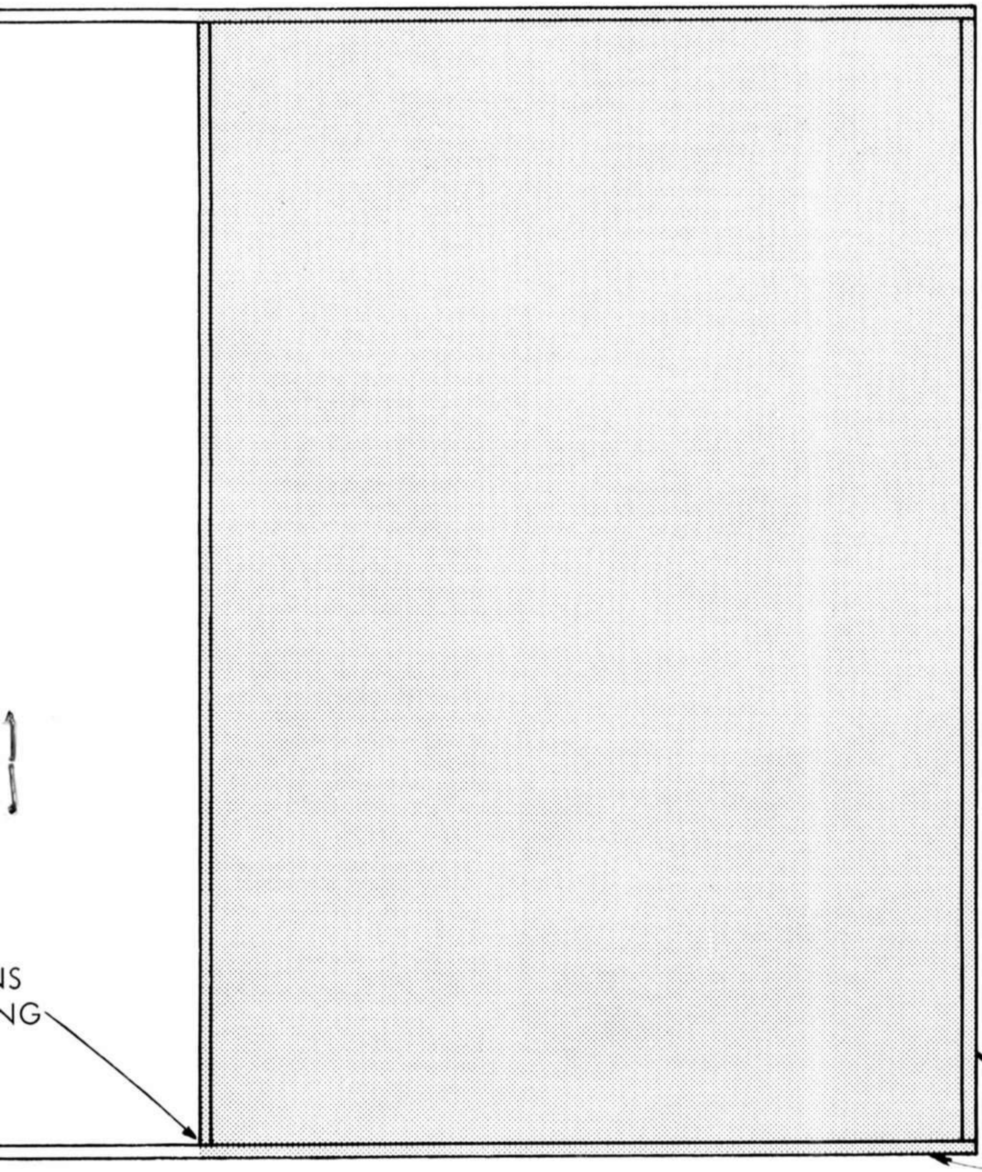

TISSUE COVER
END PANELS
ATTACHMENT
POINT OF LINE

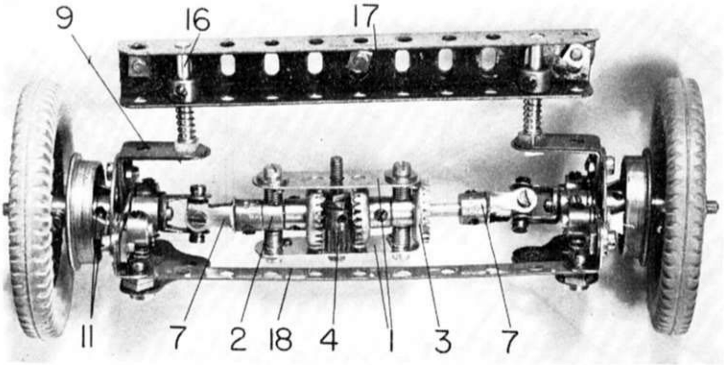

CROSS BRACES
AT EACH END
(BELOW END FRAMES)

D
PAPER


SEPARATE FIRST SIDES
BY SLIDING RAZOR BLADE
BETWEEN THEM - CAREFULLY!


ALTERNATIVE
CENTRE GRIP
WIND
HOLD
SIMPLE DOWEL
AND STRIP LINE
"WINCH"


NS
NG
USE 1/16" HARD BALSA
OR SPRUCE, OR 3/32"
MEDIUM BALSA



Among the Model-Builders

with 'Spanner'

THROUGHOUT history, distinguished men of the times have been honoured with popular titles, bestowed on them by their contemporaries. The Roman commander Alexander, for example, was known as "The Great", or King Richard I as "The Lionheart" and, more recently, Alexander Graham Bell became famous as the "Father of the Telephone". If it was customary to bestow such titles on Meccano modellers today, one man who would undoubtedly deserve recognition is James Grady of Dundee, Scotland, and the title I would give him is "Champion of the Small-Scale Vehicle Builders"!

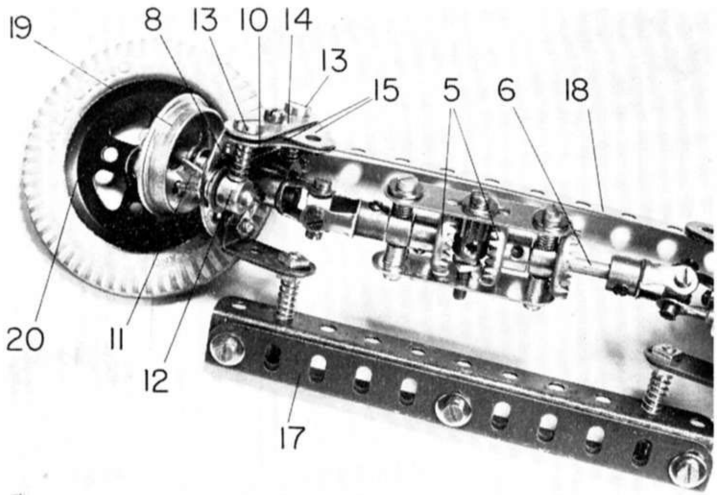
James is fast becoming an expert on useful mechanisms for small motor vehicles and you can bet your last new halfpenny that, if we feature in these pages a motor chassis mechanism designed for use with 3 in. Pulleys and Tyres, it won't be long before James turns up with a similar, but much more compact mechanism suitable for smaller wheels, and hence, smaller models. As James himself said in a recent letter, "My favourite battle cry is "Why should the lads with the big Sets have all the fun?" Why, indeed, James, and my sincere thanks go to you for all the valuable material your crusade has led you to design.

To get down to business, in last October's M.M. we featured a front-wheel drive mechanism using 3 in. Pulleys with Tyres as road wheels and, sure enough, James has now supplied me with a smaller, yet very comprehensive Unit of a similar type. It is shown in the accompanying illustrations fitted with 2 in. Pulleys and Tyres for road wheels, but it can also be used with $1\frac{1}{2}$ in. Pulleys.

It will be noticed by regular readers that the Unit makes use of a differential and a braking system, also designed by James, which have previously been mentioned in these pages. The differential consists of two of the latest style of 2 in. Strips 1 which are attached by $\frac{3}{8}$ in. Bolts at one end to a Collar 2, a Cord Anchoring Spring on the shank of each Bolt and a Washer under the bolthead acting as spacers. At their other ends, the Strips are similarly attached to, but spaced from, a $\frac{3}{4}$ in. Contrate wheel 3, care being taken that the fixing $\frac{3}{8}$ in. Bolts do not foul the central bore of the Contrate. (This also applies to Collar 2).

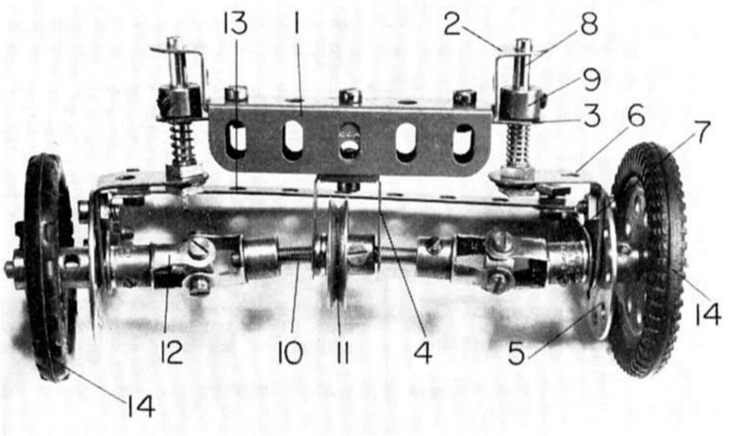
Mounted in the central holes of the Strips is a $1\frac{1}{8}$ in. Bolt, on which a $\frac{7}{16}$ in. Pinion 4 is free to rotate, but is prevented from sliding on the Bolt shank by two lock-nuts. In constant mesh with the Pinion are two $\frac{3}{4}$ in. Contrate Wheels 5, one fixed on a 1 in. Rod journalled free in Collar 2, and the other on a $1\frac{1}{2}$ in. Rod 6, journalled free in Contrate 3. Secured on the outside end of each of these Rods is a Universal Coupling 7.

Each hub assembly is similarly built up from an 8-hole Bush Wheel to which a 1 × 1 in. Angle Bracket 9 and a 1 × $\frac{1}{2}$ in. Angle Bracket are bolted, one on top of the other for strength. A 2 in. Strip 10, at right-angles to the lug of Bracket 8, is also secured to the face of the Bush Wheel, but note that, instead of Bolts, this is fixed with two Centre Forks 11 and Collars 12. Each Centre Fork is first fitted with a Washer, then the shank of the Fork is inserted through a hole in the Bush Wheel face, is fitted with two packing Washers, passed through



Top, a compact but highly effective Front-wheel Drive Unit designed by Mr. James Grady of Dundee, Scotland, for use in smaller motor vehicles. It will operate with $1\frac{1}{2}$ in. or 2 in. Pulleys and Tyres as road wheels.

Left, a close-up view of Mr. Grady's first Front-wheel Drive Unit showing the brake drum partially removed.



First of Mr. Grady's "simple" Front-wheel Drive Units, suitable for 1½ in. Pulleys with Tyres. Although it does not incorporate a differential, it is nonetheless interesting in operation and Meccano historians will also be interested in the very old-design Tyre Mr. Grady has fitted for the photograph!

the respective hole of Strip 10 and is finally secured with one Collar 12. The "empty" threaded bores of Collars 12 must point vertically downwards. Screwed into these bores are two Pivot Bolts 13, each fitted with a Compression Spring and the two are connected by a 1½ in. Strip 14 and two 1 in. Corner Brackets 15, arranged as shown to form a bell shape. The apex hole of the "bell" should be in line with the end hole in the spare lug of Angle Bracket 9. A Long Threaded Pin 16 is then tightly fixed in this end hole of the Bracket to complete the hub.

With both hubs similarly built, a Compression Spring is added to Pin 16 in each assembly, then a 5½ in. "U"-section channel girder 17 is mounted on the Pins, being held in place by a Collar mounted on each Pin between the flanges of the girder. The girder itself is built up from two 5½ in. Angle Girders. Compression Springs on the Threaded Pins, of course, serve as a good independent suspension system. The rear ends of Strips 10 in each hub are connected by a 5½ in. Narrow Strip 18, lock-nutted to Angle Brackets attached to Strips 10, to serve as the steering tie-bar.

A 2 in. Rod, serving as the stub axle, is next passed, free, through the boss of each Bush Wheel 8, to be fixed in the free end of one or other Universal Couplings 7. A 1⅛ in. Flanged Wheel 19 is mounted on the Rod with its flange over the heads of Centre Forks 11, then the road wheel 20 is secured in place.

Under operating conditions, drive is taken to Contrate Wheel 3, while a suitable brake linkage (Strip or Cord) is connected to the apexes of the "bell" assemblies. Movement of the bell assemblies causes Centre Forks 11 to turn, thus bringing their heads into contact with the flanges of Flanged Wheels 19 to give effective braking. The Compression Springs on Pivot Bolts 13 ensure automatic brake release when braking pressure is released.

PARTS REQUIRED

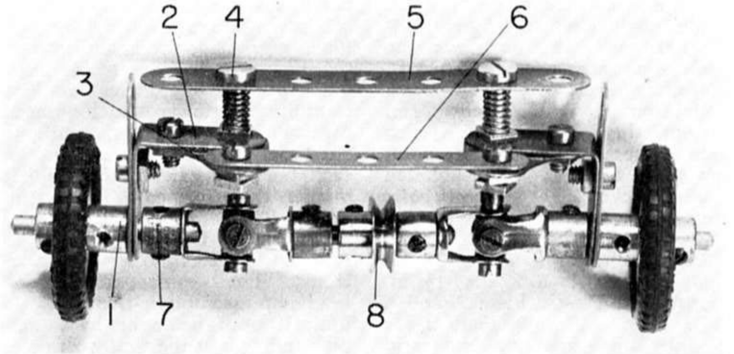
4—6	1—18a	15—37a	2—115a
2—6a	1—18b	11—37b	6—120b
2—9	2—20	20—38	4—133a
2—12	2—20a	7—59	2—140
2—12a	2—24	4—65	2—142a
2—12b	1—26c	4—111c	4—147b
2—17	3—29	1—111d	4—176
			1—235f

Simple Units

Mr. Grady has also supplied me with two considerably less complicated Front Wheel Drive Units which, although they are not engineeringly correct in that they do not incorporate differentials, could nonetheless be used in simple models where the privilege of "modellers' licence" may be invoked. The first, designed for 1½ in. Pulley-based road wheels, consists of a "U"-section cross-member 1, built up from two 2½ in. Angle Girders connected together, with each end connecting Bolt also holding a ½ in. Reversed Angle Bracket 2 and a 3½ in. Strip 3 in place. A centre connecting Bolt holds a Double Bracket in place by one lug, a 1 × ½ in. Double Bracket 4 being bolted to the lower lug of this Double Bracket as shown.

Each hub assembly is supplied by an 8-hole Bush Wheel 5, to which a 1 × 1 in. Angle Bracket 6 and a 1½ in. Strip 7 are bolted, the latter spaced from the Bush Wheel by a Washer. Fixed in the end hole in the spare lug of Bracket 6 is a Long Threaded Pin 8, on which a Compression Spring is mounted, the Pin then being inserted in the spare lug of Reversed Angle Bracket 2 and the end hole of Strip 3, where it is held in place by a Collar 9. This arrangement again provides effective independent suspension.

Journalled in the end holes in the lugs of Double Bracket 4 is a Flexible Coupling Unit 10, held in place by a 1 in. Pulley 11 between the lugs of the Bracket, three Washers at one side being used for spacing purposes. A Universal Coupling 12 is fixed on each end of the Flexible Coupling, the stub axle—a 1½ in. Rod—being passed, free, through the centre of the hub and into the other side of the Universal Coupling, where it is fixed in



The compact design of this, the smallest of Mr. Grady's Front-wheel Drive Units, is evident from this illustration. The mechanism is suitable for use with 1 in. Pulleys and Tyres as road wheels, although "modellers' licence" has again been used in that there is no differential.

place. A Washer spaces the Couplings from the hub. Strips 7 in the two hub assemblies are connected by a 4½ in. Narrow Strip 13, lock-nutted between Angle Brackets bolted to Strips 7, while the road wheels 14 are of course fixed to the stub axles to complete the Unit. In operation, of course, a belt drive would be taken to Pulley 11.

PARTS REQUIRED

1—3	1—12a	12—37b	2—140
2—6a	2—18a	8—38	2—142d
2—9d	2—21	2—59	1—175
1—11	1—22	2—115a	1—235d
1—11a	2—24	2—120b	
2—12	14—37a	2—125	

Mr. Grady's third and final offering is a delightfully effective little unit, designed for use with 1 in. Pulleys with Tyres and, again, a working suspension system is included. Each hub assembly in this case consists of a Crank 1, to the arm of which a 1 × 1 in. Angle Bracket 2 is bolted. Tightly fixed to the spare lug of the Angle Bracket is a 1 in. Corner Bracket 3, but note that the apex fixture is achieved by a Pivot Bolt 4 instead of by an ordinary Bolt. Each Pivot Bolt carries a Compression Spring and the Pivot Bolts in the two assemblies are also connected, as shown, by a 3½ in. Strip 5. Lock-nutted between the spare holes of the Corner Brackets in each hub is a 2½ in. Narrow Strip 6, serving as the steering tie-bar.

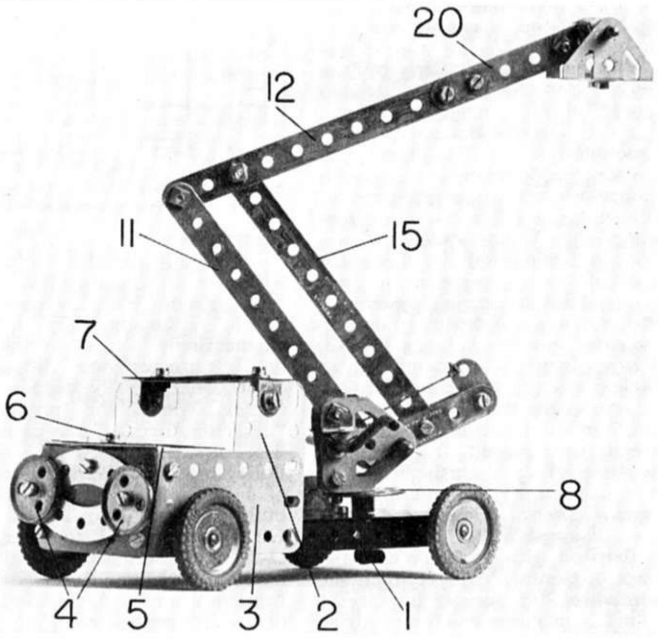
Each stub axle is provided by a 1½ in. Rod, journalled free in the boss of Crank 1, and held in place by a 1 in. Pulley with Tyre outside the Crank and by a Universal Coupling 7 inside the Crank. The inner ends of the two Universal Couplings at each side are connected by another 1½ in. Rod, on which a ½ in. Pulley with boss 8 is fixed. As with the previous mechanism, a belt drive would be taken to this Pulley.

PARTS REQUIRED

1—3	1—23a	2—62	2—142c
2—12a	8—37a	2—120b	2—147b
3—18a	6—37b	2—133a	1—235
2—22	2—38	2—140	

Hydraulic-lift Truck

A No. 2 Set model built and described by Brian Turpin



Meccano Set No. 2 contains all the parts needed to build this working Hydraulic-lift Truck, designed by the author of this article.

THE more familiar one becomes with the Meccano system, the more apparent it is that the model possibilities are limited only by the imagination and mechanical ingenuity of the builder. So, with a wide range of pieces available, it is easy to forget those frustrating early days when all the most interesting models in the book seemed to need a larger outfit than one yet had. Going back to explore the possibilities of the number 2 outfit was the result of a challenge to construct an interesting and original working model from a low-numbered set and I think the Hydraulic-lift Truck featured here does prove the point that there are lots of unexploited resources even in the most basic Meccano outfits.

Chassis & Cab

At one end of a 5½ × 2½ in. Flanged Plate 1, a 2½ × 1½ in. Transparent Plastic Plate 2 and a 5½ × 1½ in. Flexible Plate 3 are fixed by the same two Nuts and Bolts at each side. The Transparent Plates are upright to form the cab side windows, while the Flexible Plates go outside them, and overlap the Flanged Plate by three holes. The two Flexible Plates are now carefully bent towards each other to overlap by five holes, and are fixed together by a Nut and Bolt at each bottom corner of the vehicle bonnet thus formed. Two 1 in. Pulleys (without boss) 4 are fixed to a pair of Curved Strips by a Nut and Bolt each, to serve as head-lamps. The complete radiator and headlamp assembly is then fastened to the front of the bonnet by a single Nut and Bolt at the top, which also completes the fixing of the over-lapped Flexible Plates.

A Double Angle Stiip 5 joins the two sides of the bonnet by the top corner holes at the front of each side and to this is fixed a 2½ × 1½ in. Plastic Plate forming the bonnet top. Note that the single Nut and Bolt with Washer 6 used here also serves as the radiator cap. Another Double Angle Strip 7 joins the centre holes at the top of the cab side windows, while a 2½ × 1½ in. Plastic Plate fixed to this by two Nuts and Bolts forms the cab roof Do not use Washers on the top two Nuts and Bolts here, unless you have extra ones.

Before fixing two pairs of 1 in. bossed Pulley Wheels on 3½ in. Axle Rods to provide road wheels, a Reversed Angle Bracket is bolted underneath the chassis in the centre hole fourth row from the back of the Flanged Plate, its free end in line with the third hole from the back. This, together with the Flanged Plate, forms the bearing for the rotating arm.

Hydraulic Lift Arm and Working Platform

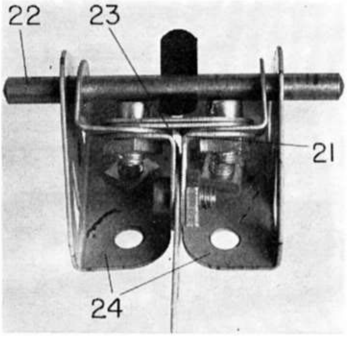
A Bush Wheel 8 on a 1 in. Axle Rod fits into the bearing just made, and is held by a Spring Clip, with a Washer. To the flat upper side of the Bush Wheel a pair of Angle Brackets 9 is fitted, using the round hole of one and the elongated hole of the other and sliding them as far apart as possible before tightening the single fixing Nut and Bolt. To the vertical lug of each Angle Bracket is now fixed a Flat Trunnion 10, a well-tightened Nut and Bolt going through the base corner hole of each, with the side of each Trunnion resting on the Bush Wheel. This assembly forms the hydraulic arm support, but the arm itself should be built up separately and fixed to the support when completed.

Construction of the arm is not difficult. A ⅜ in. Bolt is fastened tightly with a Nut through the end hole of a 5½ in. Strip 11, a second 5½ in. Strip 12 then being added to the Bolt shank, again using the end hole. The Bolt is finally fixed tightly through the end hole of a third 5½ in. Strip 13, parallel to the first, using two Nuts, this leaving the two outside Strips (11 and 13) firmly secured alongside each other, with the centre Strip 12 free to swivel.

Right, the simple but effective construction of the working platform is clear in this "bird's eye view" of the top of the elevating arm.

Below left, a close-up view of the elevating arm mount in place on the mobile chassis of the model.

Below right, an underside view of the arm mount as it appears when removed from the chassis.



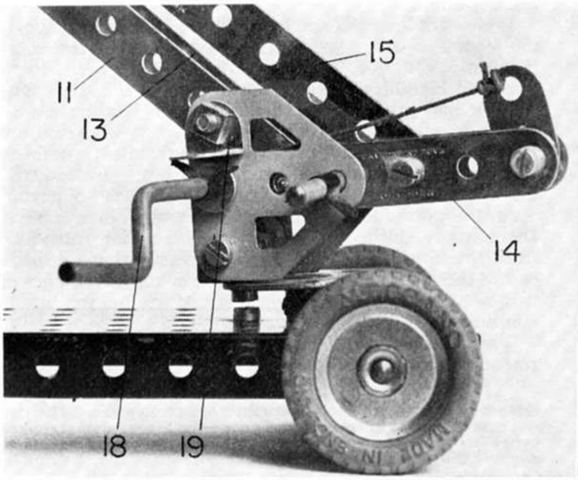
To the opposite or lower ends of the two fixed 5½ in. Strips, a pair of 2½ in. Strips 14 are secured by a ⅜ in. Bolt through their end holes. The 2½ in. Strips are positioned on the outside of the 5½ in. Strips 11 and 13, with two Washers between the 5½ in. Strips acting as spacers, and the ⅜ in. Bolt is lock-nutted so that the 2½ in. Strips can swivel. One end of another 5½ in. Strip 15 is now held by a ⅜ in. Bolt passing through the centre holes of the pair of parallel 2½ in. Strips 14. This Strip 15 should swivel freely on the ⅜ in. Bolt between the 2½ in. Strips, three Nuts being used on the ⅜ in. Bolt to keep the 2½ in. Strips spaced apart. The opposite end of 5½ in. Strip 15 is lock-nutted through the third hole of the other swivelling 5½ in. Strip 12, thus completing a narrow parallelogram movement.

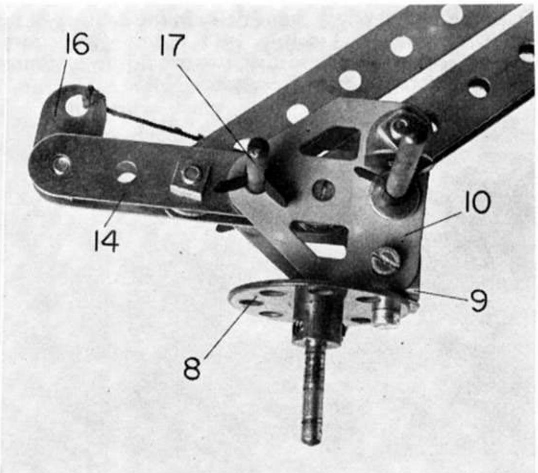
Firmly attached to the far end of one of the two 2½ in. Perforated Strips 14 is a Fishplate 16, secured at right angles to the Strip by its elongated hole. A 2 in. Axle Rod 17 is passed through the apex holes of the two Flat Trunnions and through the "empty" holes of Strips 14 furthest from the Fishplate, with a Spring Clip at each end to retain it. Through the central base holes of the Flat Trunnions goes a Crank Handle 18, held centrally by two Spring Clips with Washers. The upper base hole in each Flat Trunnion carries an Angle Bracket 19 positioned to prevent the Spring Clips rotating with the Crank Handle, forming in this way a simple friction brake on the Crank Handle.

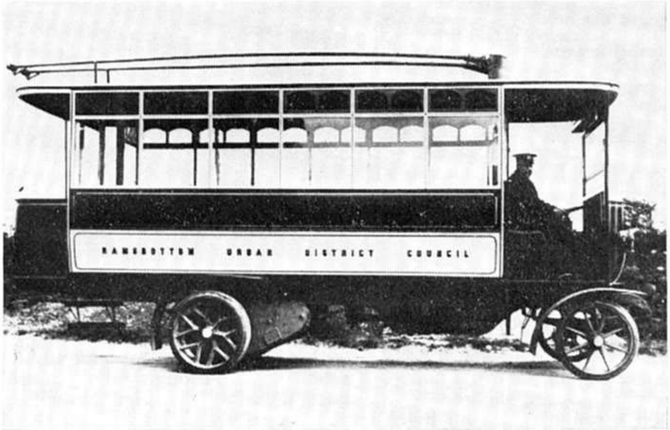
A short length of Cord is firmly fixed to the Crank Handle, and the free end fastened to the Fishplate at the end of the 2½ in. Strips. The lifting arm assembly now rests with the two parallel 5½ in. Strips 11 and 13 against the Crank Handle. When the Crank Handle is turned, the Cord pulls the Fishplate, so that the two 2½ in. Strips move slightly up at the far end, while the 5½ in. Strips slide downwards against the Crank Handle supporting them, giving a lifting motion to the arm. The Spring Clip brake enables the arm to remain in any position.

The upper end of Strip 12 is now extended three holes by a 2½ in.

(*Please turn to page* 93)







RAMSBOTTOM—Trolleybus Pioneer

by M. EVANS

Photos: Courtesy of R. B. Parr

RAMSBOTTOM is a small Lancashire town with a population of about 16,000. The principal industries are cotton-weaving, calico-printing and rope-making. It is situated between Rawtenstall and Bury and is one of the few bus-operating Urban Districts. Peel Tower and Grants Tower overlook the place, the latter being dedicated to the Grant Brothers, benefactors to the town, who appear as Cherryble Brothers in 'Nicholas Nickleby'.

Of special significance to the public transport enthusiast is the fact that trolleybuses were pioneered in Ramsbottom. The trackless system appears to have been inaugurated because plans to construct a tramway came to nought. Tramway powers were, in fact, obtained in 1903 to put down track, amounting to twenty chains double and seventy-eight chains single. When it was realised, however, that the tramway project could not be fulfilled, the Council applied, in 1912, for trolleybus powers and a shed was built in Stubbins Lane in 1913 at a cost of £1,898. Operation commenced in August of the same year, Ramsbottom being the first railless traction system independent of tramway operation in the country, and the only one in North Lancashire. One route was constructed, Holcombe Brook to Edenfield.

The installation had cost £13,350 (£3,000 more than the original estimate) and it was calculated that an average income of £68 per week would be required to make the system pay. Some delay in the delivery of the cars was experienced in July, 1913, but the Council was able to secure a promise that two would be in Ramsbottom before the end of August.

The actual Board of Trade Inspection, carried out by Major Druitt and Mr. Potter, took place on 21st August, 1913. The route was traversed from Ramsbottom station to Edenfield and from this point to Holcombe Brook. Those present included Councillor Wilkinson, the Chairman of the U.D.C., J. B. Hamilton of Leeds Corporation Tramways, the Consulting Engineer, Mr. Jenkins, Manager of the Bury Corporation Tramways and representatives from the Post and Telephone Department, Rawtenstall Tramways, R.E.T. Construction Company and Clough Smith. Mr. Wyld, the Manager, drove the first car and Corporation employees were also carried. A second car was tried as well. A good part of an hour was given over to the examination of the wires and various parts of the equipment. All went well and the system was found to be generally satisfactory. Brakes were tested on both cars. The actual route was three-and-a-half miles in length, with a gradient descent from Edenfield into Stubbins, hence the special precautions taken over the brakes.

A fare of 3d was charged from Holcombe Brook to Edenfield, with a 1d for any four quarter mile stages and ½d for each two stages. The service was half-hourly.

In December, 1913 an effort was made to arrange with Trackless Trolley Limited to send a Cedes-Stoll car to Ramsbottom for a free trial. This does not appear to have taken place however.

Power was supplied from a special station adjoining the depot.

It was not long before the neighbouring local authorities began to cast a watchful eye on Ramsbottom as, at that time, Dundee, Aberdare, Bradford, Leeds, Stockport and Keighley were either already in the trolleybus field or had proposals in that direction. Evidence also seems to suggest that the possibility of interrunning Ramsbottom's trolleybuses with the tramways of both Bury and Rawtenstall was not ruled out. Indeed, the first vehicles carried under-running trollies to permit them to operate in conjunction with trams, if necessary. Incidentally, although Manchester did not introduce trolleybuses until March, 1938, suggestions were made to run them as early as 1908 and one of the advantages of trolley vehicle operation was stated to be the inter-running possibilities.

The Ramsbottom trolleybus held the municipal transport field until the early 1920's. The same year as

(Heading photo), an early Ramsbottom trolleybus. The two designs of spokes are worthy of note—the larger and stronger types being on the rear wheels. (Left), the crowd seems to suggest that the photo was taken shortly after the opening of the system.

the Council installed electric traction (1913), the Lancashire and Yorkshire Railway inaugurated an electric train service from Bury to Holcombe Brook (which survived until 1951). This was a sure indication of how important this mode of transport was then regarded.

In the summer of 1922 Railless Limited of Moorgate Street, London, E.C. demonstrated a new type of single motor railless car at Dover. The car had just been completed for Ramsbottom. It was brought to Dover for inspection and tested on very steep gradients, including a 1 in 10 stretch. The demonstration made a great impression on Mr. E. H. Bond, the Manager of the Dover Corporation Tramways, who declared himself to be in favour of replacing the town's tramways by this form of traction—this suggestion as early as 1922. Track renewals were heavy and it appeared, at the time, that Dover would adopt the trolleybus. This straw did not indicate the direction of the wind, however, and the trams succumbed to East Kent buses in 1937.

In Bolton, trials were carried out pre-1914 with both petrol and steam buses. Services commenced in 1908 to Darcy Lever and Brownlow Fold, operation continuing until the tramways were opened on these sections in 1910 and 1911. Bolton's second and more successful attempt was in 1923 with three Leylands. Rawtenstall ran buses as early as 1907, when an Orion, 'The Rossendale', was put on the road. This was followed by Ryknields the next year. Like Bolton, however, these early efforts were failures. Rawtenstall had to wait until 1924 before bus operation began in earnest. It was no surprise, therefore, when Ramsbottom's first buses, Thornycrofts, entered service in 1923. Five years later Leylands, the subsequent mainstay of the fleet, came onto the scene. By now it was evident that the days of the trolleybus in Ramsbottom were numbered; the solid-tyred vehicles must have contrasted strongly with the recently acquired, and more modern looking buses. In addition to this, the system was running down. So on 31st March, 1931, the town said farewell to the small venture in electric traction. The poles remained in place for some years afterwards and to trace the route, even if one did not, in fact, have any knowledge of the former system was not difficult. The bus fleet increased as the years went by and in 1947 double-deckers were introduced.

Had Ramsbottom's tramway plans materialised the route would have been from Holcombe Brook to Edenfield (as the trolleybus one), but the tramway plans included Rawtenstall. The gauge was to have been 4 ft. 8½ in. Bury, where electric tramways were constructed during 1903–04, had proposals for extensions to Holcombe Brook and Stubbins as well as to Rawtenstall via Edenfield. The aforementioned would have affected Ramsbottom and, as the Bury gauge was also 4 ft. 8½ in., through running would have been possible.

Now a little about the system itself. The fleet consisted of seven R.T. vehicles. Details exist of Nos. 1 to 6. The cars had six windows and an open platform at the rear. The words 'Ramsbottom Urban District Council' appeared on the lower panels. The maximum weight, when loaded, was five tons. The trollies permitted a radius of 16 ft. from the centre of the trolley wire. The seating capacity was 28 and transverse seats were used. The cars had direct chain drives, each with two 20 H.P. motors and series parallel controllers. Electrical equipment was by Siemens and the bodies were built by Lockwood and Clarkson of Leeds. The vehicles were of a special composite construction. 'Garcke' for 1928 states that all seven cars had two motors, but the last one No. 7 (already mentioned) appears to have been a single motor car. Messrs. Clough Smith erected the overhead which was of the tramway type, the poles being of bracket arm construction. Overhead junction work of the E.M.B. type was designed and manufactured by Electro-Mechanical Brake Company. The power was at 10,000 volts, transformed at the substation to line voltage of 500 and supplied eventually by the Lancashire Electric Power Company.

The proposal for a free trial of a Cedes-Stoll vehicle in Ramsbottom in 1913 came from the Council and this must have been the case with several municipalities at that time—always ready to obtain better rolling stock and equipment for the system, ears always tuned to any new development.

In the late summer of 1938, whilst on the way to Bury, the writer encountered the remnants of the Ramsbottom trolleybus system, seven years after its demise. The poles were indeed very similar to tramway ones. As a matter of fact Edenfield–Holcombe Brook could well have been taken for an abandoned tramway route. The poles themselves were on the heavy side with lamps suspended from the brackets. The colour was dark olive and the appearance was not too pleasing on the eye. That was all that remained of an Urban District Council's pioneering efforts in the field of trolleybus operation a quarter of a century earlier.

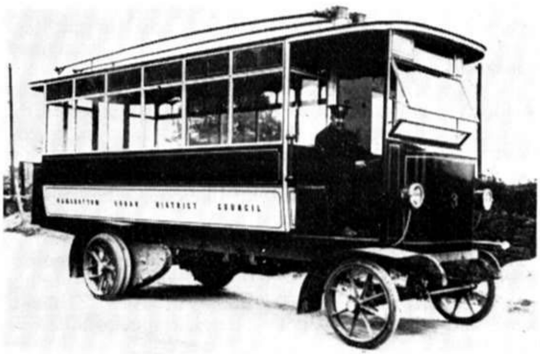
Most of the early trolleybus systems did not last the distance—Dundee closed in 1914, Stockport in 1919, Keighley's first routes in 1921 and Aberdare in 1925. Ramsbottom was, so to speak, the last of the lights to go out. Various factors, such as difficulties in obtaining replacements and the ever developing motorbus, contributed to the downfall of the early trolleybus pioneers. It seems that, in the early days, the trolleybus held great promise. What might have been a boon to municipal transport never really 'arrived'. In view of the fact that trolleybuses in the pioneering era had a future less certain than that of the tram, Ramsbottom certainly took a courageous step in adopting this form of transport.

Acknowledgement

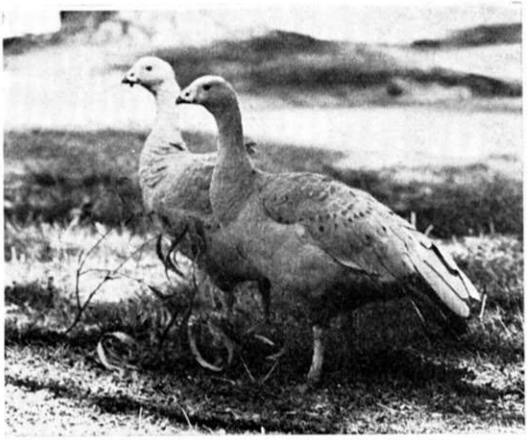
The writer wishes to express his thanks to the Librarian of the Institution of Electrical Engineers for the use of the library facilities. Amongst these were the bound volumes of both 'The Tramway and Railway World' and 'The Tramway and Light Railway Journal' for the year 1913.

Certain details on Ramsbottom have also been taken from the excellent publication 'Great British Tramway Networks' by W. H. Bett and J. C. Gillham.

In addition I send my sincere good wishes to Miss U. B. Murphy, B.A. A.L.A. of Ramsbottom Public Library for kindly providing me with points of information contained in the captions.



(Right), Here can be seen the influence of the tramcar in the early trolleybus designs.



The Handsome Bird of Bass Strait

Frank Madigan describes Australia's Cape Barren Goose.

OF ALL the magnificent birds which fly across the wild seas of Bass Strait, Australia, or abound on its numerous islands, undoubtedly the Cape Barren Goose is the most handsome.

Although first discovered by white men in 1792 on the Recherche Archipelago in Western Australia, by French naturalists of D'Entrecasteaux's expedition in search of La Perouse, these birds have made the Bass Strait islands their natural habitat for millions of years.

At the present time, it is estimated that out of the meagre 5,000 now living, at least 3,000 are to be found on the islands of Bass Strait, mainly on the Furneaux Group.

Large flocks were once plentiful on Cape Barren Island in Bass Strait, and indeed it was from this picturesque area that they derived their name.

As far back as 1797–8 George Bass, the famous navigator, shot geese on this island. Around about that time, shipwrecked sailors on Preservation Island, south of Barren Island, kept themselves alive, while waiting to be rescued, by feeding mainly on the wild geese they found on the island.

Before the coming of the settlers, and the ruthless sealers of Bass Strait, these birds were counted in tens of thousands. Now, they are becoming rare; in fact, out of the tally of 9,000 species of birds to be found in the world, they are reputed to be the third rarest on earth.

The Cape Barren Goose is a handsome, large, greenish-grey bird, standing about two feet tall, and weighing from seven pounds to ten pounds on maturity. It looks every inch a goose and trumpets like one. The gander fights his enemies in the best goose-like tradition and, like that particular family of birds, is a grass-grazer.

However, it is not related to the European goose, although some authorities believe it originally sprang from a giant, now extinct, goose of New Zealand. Other naturalists feel it is an aberrant species allied to the Shelducks.

There is practically no difference in the appearance of the males and females, both having grey plumage with black spots on their wings, contrasting with pinkish red legs and lime green cere over the bill.

The Cape Barren Goose is a very aggressive bird at nesting time, so much so that, in zoos and sanctuaries, these birds are separated from other water birds at this time. For it is very wary, and does not tolerate interference with its nesting activities even from human beings.

The eggs are laid in a nest on the ground, and six glossy white eggs usually form the normal clutch. Their breeding time is during the winter months between June and September, although the pairing off of the birds occurs much earlier, usually about February.

Sometimes the Cape Barren Goose is known as a 'pig-goose', because of its grunting noise, and if kept in captivity on a farm, it soon takes over the poultry run.

Yet another peculiarity is that although web-footed, it shuns the water, preferring mostly to feed on land grasses and herbage.

Some landowners, when they took over these islands for sheep-farming, condemned the bird as a pasture-pecking pest. They destroyed the geese, for food because "its tasty flesh would grace any table", for sport because "a good game bird it is" and to rid themselves of a pest because "they foul the pastures".

The earlier settlers in Victoria, Hamilton, Hume and Hovell, found flocks of the Cape Barren Goose were visiting the mainland in 1824.

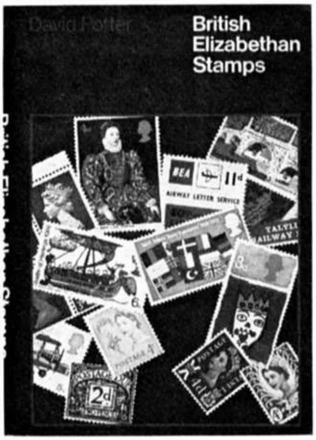
The English naturalist, John Gould, a few decades later on, says: "This is one of the Australian birds which particularly attracted the notice of the earlier voyagers to that country, by nearly every one of whom it is mentioned as being very plentiful on all the islands of Bass Strait, and so tame that it might easily be knocked down with sticks, or even captured by hand; during my sojourn in the country, I visited many of the localities above mentioned, and found so far from its being still numerous, it is almost extirpated".

Fortunately for the "Cereopsis Novae Hollandiae", the scientific name for this interesting bird, and which means the wax-faced bird from New Holland, there were many to champion its cause. One of the most famous was Bishop Montgomery of Tasmania, who said sixty or more years ago: "What is rare and harmless ought to be fostered. We do not possess much in Tasmania which is of unique interest, and we owe it to the world to conserve these rare creatures. Here is a bird known to all naturalists everywhere as one of the most interesting in the world . . . to shoot down these geese for the pot is like shooting rare Birds of Paradise in New Guinea for the same purposes".

The species is now totally protected in Tasmania, and its islands, and also in Victoria. Many farmers are quite happy about this law for, as they say, they enjoy seeing a skein of the great grey goose dropping down on their pastures.

As these big, wild birds are now protected and admired, combined with the fact that they breed well in captivity, naturalists have reported that the Cape Barren Goose is thriving in sanctuaries throughout Scotland, France and the Wildfowl Sanctuary of Peter Scott's at Slimbridge in England. Scott was particularly fascinated by them.

Because of sensible foresight, it now seems certain that the Cape Barren Goose, most handsome creature of the wild birds of the Bass Strait off the Victorian coastline, will always remain part of Australia's amazing legacy of bird life.



Books for Collectors

STAMPS

by James A. Mackay

STAMP collectors are more fortunate than hobbyists in other fields, in the number of books and catalogues available to them. Every year sees a flood of literature about philately, ranging from general books for beginners to specialised monographs for the advanced philatelist. At one time publishers were content to have a single book on their lists, but nowadays the tendency is to go into the subject in greater detail by producing a series of books, each by recognised experts. Arthur Barker have set the ball rolling with an excellent series which take the reader step by step through the various levels of stamp collecting. *An Introduction to Stamp Collecting*, by Colin Narbeth (£1.25), as its name suggests, gives a general description of the hobby and explores the different aspects such as one-country collecting, thematic collecting and postal history. Useful information is given on albums and accessories, hints on mounting and display, and discusses some of the pitfalls, such as forgeries and bogus stamps, which trap the unwary.

James Watson's *Branching out in Stamp Collecting* (£1.25) covers much the same ground but assumes that the reader has acquired the basic rudiments and therefore takes the story a stage farther. The book is divided into three sections, dealing with general collecting, thematic collecting and the layout and writing-up of the collection. The third book in the series, *Specialised Stamp Collecting* (£1.50) by sports commentator Robert Bateman, demonstrates his versatility. The theme of this book is the selection of a country or group of countries and the study of their stamps, postal stationery, fiscal stamps and labels in depth. Such by-ways as essays, proofs, specimens, local and private stamps are discussed. Having progressed from the general to the specific the collector should then read *Advanced Philatelic Research* by Patrick Pearson (£1.75) which goes into the scientific and technical aspects of stamp collecting, the problems involved in plate reconstruction, the importance of postmarks and postal history, and touches briefly on other fields for research such as airmails, official mail and local posts.

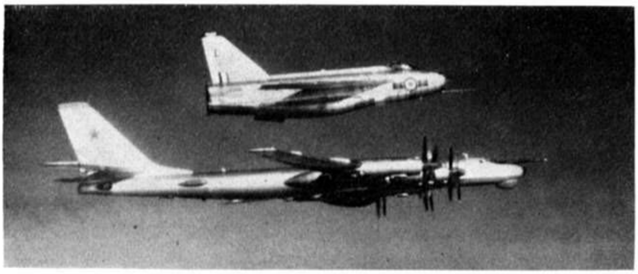
Arthur Barker, incidentally, have produced a companion series aimed at numismatists. Titles produced so far are *An Introduction to Coins and Medals* (£1.25), *Commemorative Medals* (£1.25), *War Medals* (£1.50) and *Greek and Roman Coins* (£1.75) and other books in the pipe-line will deal with the coins of Great Britain and paper money.

Two other publishers have recently embarked on stamp series. So far Heinemann's have only produced two titles, both by the brothers L. N. and M. Williams. *Techniques of Philately* (£1.50) is designed as an introductory work, but lays emphasis on the technical aspects of stamp design and production. The companion volume *Cinderella Philately* is a comprehensive guide to local stamps, charity issues, telegraph stamps and revenue stamps—items which the standard catalogues ignore but which are nevertheless of growing interest to collectors. For years these 'Cinderellas' have been neglected but more and more collectors are now turning to these sidelines.

Batsford have also produced two books within the past few months. David Potter's *British Elizabethan Stamps* (£2.50) is the first comprehensive guide to the stamps of the present reign. Since more stamps have appeared in the past twenty years than in the previous half century, collectors have been kept busy and the appearance of an excellent book on the subject is therefore timely. *Airmails 1870–1970* (£3.10) deals with the first century of aerophilately, from the balloon and pigeon posts of the Siege of Paris to the souvenir envelope carried to the moon by the Apollo XI astronauts.

Books on stamps come and go, but the catalogues seemingly go on for ever. Stanley Gibbons, whose catalogues have been appearing regularly since 1965, are still the unchallenged leaders in this field. *Stamps of the World* 1972 (£3.50) now runs to some 2,000 pages and catalogues in simplified form the issues of every country from 1840 to date. This massive tome is an absolute must for the general and thematic collector. Of the more detailed catalogues only that dealing with the stamps of the British Commonwealth still appears annually. The *1972* edition, priced at £2.50, gives a tremendous amount of detail, differentiating shades, watermarks and perforations and listing major errors and varieties. In recent years certain non-Commonwealth countries have been treated in separate catalogues, but this experiment is now being abandoned and Gibbons hope shortly to publish larger volumes covering the rest of the world in similar detail.

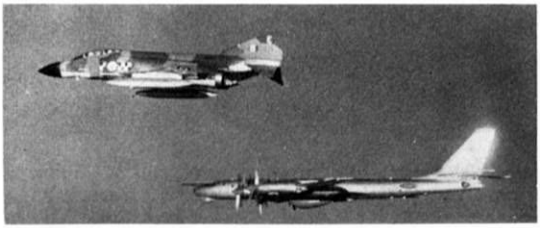
Christies *Review of the Year* (published by Hutchinson at £5) is a sumptuous volume, lavishly illustrated in colour as well as black and white, and covering every aspect of the activities of this famous auction house. They are now associated with the stamp auctioneers, Robson Lowe, and a section is therefore devoted to stamp sales, which totalled £1,119,104 for the past season.



AIR NEWS

by

John W. R. Taylor



Bear Stalking from Leuchars

It was at the RAF Station of Binbrook, in Lincolnshire, that I first saw the modern sport of Bear and Badger stalking in action. "Sport" is really the wrong word. These particular "Bears" and "Badgers" are Russian Tu-95 and Tu-16 long-range bombers. Hunting them, with cameras and other equipment rather than weapons, is one of the key jobs that the Royal Air Force has to perform 24 hours a day, 365 days a year, to prove that Britain's air defences remain as alert as when Hitler's *Luftwaffe* was defeated in the Battle of Britain.

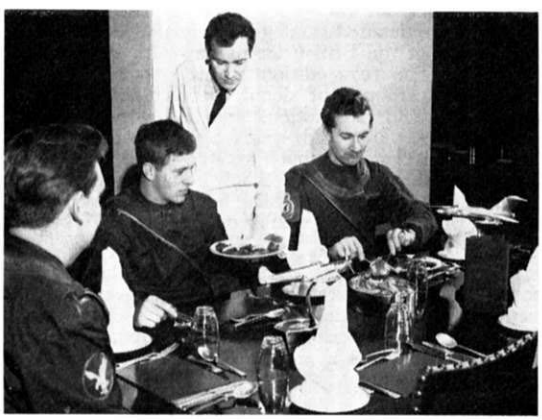
My purpose in visiting Binbrook was to gather facts and photographs for a recruiting booklet entitled *Into the* 70's *with the Royal Air Force*, which many of you may have seen. At the time, it was not permissible to tell the full story of the Lightning fighters whose pilots waited, in the "Quick Reaction Alert" hangar, for the order to take-off for a rendezvous with Russian bombers over the North Sea. Now, the Ministry of Defence have not only released details of such operations but have made available the photographs on this page, showing RAF fighters "escorting" the uninvited guests.

A typical operation begins when a pair of "blips" appears among the yellow lines and moving spots of light on a screen in the semi-darkness of a Norwegian radar station. A few seconds of study are enough to persuade the operator to reach for a telephone that will alert SHAPE Headquarters in Mons, Belgium, a United States Air Force base outside Reykjavik, Iceland, and RAF Strike Command Headquarters at High Wycombe in Buckinghamshire.

Below ground in the operations centre from which the great bomber offensive against Germany was directed in the second World War, the duty air defence commander decides quickly what the two unidentified aircraft are and where they are heading. By now they are being tracked on RAF radar screens in the North of Scotland, and by NATO observers in Europe, and are clearly heading through the Faroes Gap.

As soon as the air defence commander gives the word, a controller calls the RAF Station at Leuchars, Fife, where two Lightnings of the Interception Alert Force are waiting inside a hangar, noses pointed to the long runway, fully fuelled and with a deadly Red Top air-to-air missile mounted on each side of their noses.

Nearby, their pilots lounge in easy chairs, reading, watching television or playing cards, but never really relaxing. A box on the wall squawks. Within seconds one of the pilots is running down the corridor, pulling on his Mae West lifejacket and buckling his flying suit. Almost before a visitor can realise what is happening,



Heading pictures, Lightning meets "Bear" at 30,000 ft. The large under-fuselage radome identifies a "Bear-D". On another occasion, a Strike Command Phantom escorting a "Bear-D". Right, an RAF Lightning gets airborne after an alert.

Left, lunch is taken in flying-suits, with a car outside ready to race back to the hangars

Below, reheat on—Lightnings scramble from RAF Leuchars before heading out towards the North Sea.

the pilot has been strapped into the cockpit, the hangar doors have opened and the Lightning has roared down the runway, afterburner blazing for a steep climb to 30,000 ft.

As he heads northeastward, high above the grey waves of the North Sea at just below the speed of sound, the pilot receives a continuous crackle of instructions from a ground controller at the base on the Aberdeenshire coast. Within minutes he sees ahead a pair of Tu-16s, known as "Badgers" to NATO forces, each carrying a crew of eleven and packed with cameras and electronic listening devices. Sometimes a member of the Soviet aircrew waves to the fighter pilot, in the strange camaraderie that has existed between combat fliers since air fighting began; but this is no game. The "Badgers" have been sent to probe Europe's defences, to learn as much as possible about the types of radio and radar in use by air forces, armies and navies, to find out where the transmitters are located, to seek out gaps. The prompt arrival of the Lightning, and its formidable appearance, must make them glad that the interception is outside Britain's national airspace and that the Red Tops will not be launched.

A few years back the Russians found that they could sometimes shake off such an escort by dropping down to a few feet above the wave-tops. The Lightnings followed them down but burned up so much fuel in the denser atmosphere thay they soon had to abandon the chase. All that has changed. The signal that "scrambled" the Lightning from Lecuhars also led to the despatch of a Victor tanker-plane from Marham, Suffolk. As the Lightning tails the Soviet bombers, the Victor tags along a few miles away, ready to top up the fighter's fuel tanks if the mission looks like lasting longer than about an hour.

The crews of the Tu-16s can have no hope of outstaying their escort. Availability of the Victor tankers enables RAF fighters to pick up Russian intruders hundreds of miles out over the North Sea if necessary. Each of the big aircraft carries enough fuel to keep a Lightning airborne for 17 hours. A similar quantity of petrol, instead of kerosene, would take the average family car three times round the world.

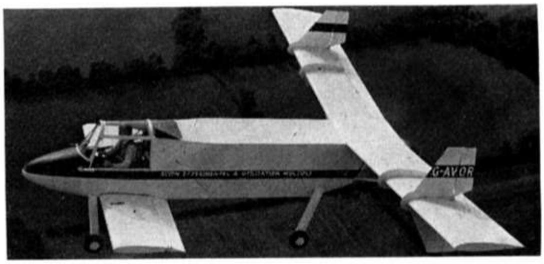
Today the Lightnings of Nos. 11 and 23 Squadrons share their Interception Alert Force duties at Leuchars with the two-seat Phantoms of No. 43 Squadron—the famous "Fighting Cocks". The Phantoms wait inside the hangar with their wings folded; instead of Red Tops they carry Sparrows and Sidewinders. Their interception "targets" are the same, but every year there are more of them. In 1970, more "Bears", "Badgers" and "Bisons" headed around Norway's North Cape towards the U.K. than the total for all previous years. The alertness of the welcoming committee should ensure that their cameras and electronic reconnaissance devices are never exchanged for something more lethal.

Back to Tandem Wings

Sixty years ago a Polish pioneer named Stefan Drzewiecki built a strange-looking aeroplane with a square-section fuselage, a short-span rectangular wing under the nose, a longer-span wing above the rear fuselage, three tail-fins above the rear wing, a cockpit in the nose, a pusher propeller at the tail and a four-wheel fixed undercarriage.

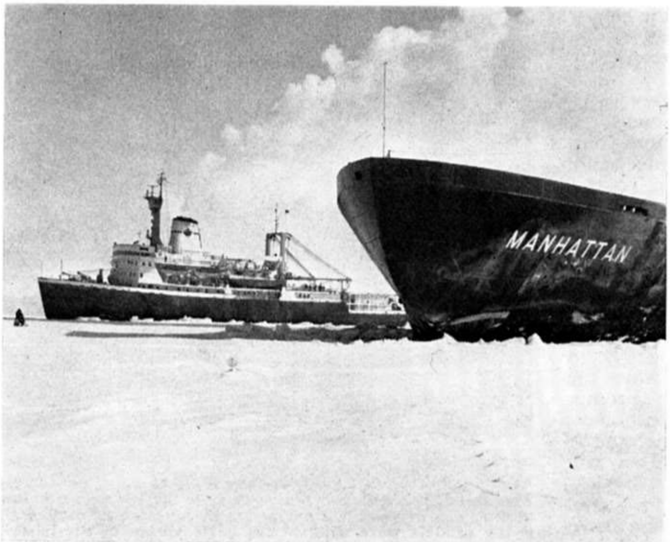
If you change the first nine words in the above paragraph to read "Last year a British test pilot named David Lockspeiser", you will have an equally valid description of one of the most interesting new aeroplanes of the present day. There could be no better illustration of the old adage that "There is nothing new under the sun", for the Lockspeiser LDA-01 has been designed to take advantage of the very latest ideas in light aeroplane manufacture and seems to be just the vehicle that we need for many jobs in the 'seventies.

Above and below is the Lockspeiser LDA-01 utility prototype. The third fin, which can be seen in the photograph just above, was removed after initial flying trials. Small-scale flying models were used in the early stages of the design.



The designation LDA-01 stands for Land Development Aircraft and the idea was to evolve a low-cost, sturdy machine that would carry a one-ton payload and be equally efficient for a wide variety of tasks. It is intended to operate on wheels, floats or skis, carrying passengers or freight or performing crop-spraying and dusting, distressed-area relief (goods in, stretcher out), air survey and reconnaissance, fire-fighting and other duties. G-AVOR, the prototype shown in the illustrations on this page, was built as a 70 per cent full-scale version of the proposed one-ton carrier and flew for the first time on August 24th. Its rear wing spans 29ft. It is 22 ft. 6 in. long, has a maximum loaded weight of 1,400 lb., and is powered by an 85 h.p. Continental C85-12 four-cylinder engine. A flush-fitting, removable ventral container serves as an interchangeable "mission pack" for non-passenger payload When it is removed, the LDA-01 can carry in the same place a complete set of its own spares, including wings. To make manufacture and repair as easy as possible, each rear wing and the foreplane are interchangeable.

In its initial form the LDA 01 was underpowered and had a top speed of about 83 m.p.h. during its early flight trials. The airframe is strong enough to take a more powerful engine, and a 340 h.p. Lyocming 0-540 could be used in a future version of the basic LDA-01 if required. This would enable the small-scale aircraft to carry a 1,000 lb. payload.



The Northwest Passage

SHALL WE SEE A COMMERCIAL ROUTE THROUGH THE ARCTIC?

BY W. H. OWENS

THE successful trial voyage of the ice-breaking tanker SS *Manhattan*, through the Northwest Passage to the new Alaskan oilfield a year or two ago, raised high hopes of establishing all-the-year commercial navigation in the Arctic. This perilous sea route across the roof of the world is a frozen graveyard of countless ships and their crews.

Straits, channels, islands and anchorages, from Southern Greenland and Labrador to the distant Bering Strait, bear the names of a succession of daring navigators who, over a period of four to five centuries, strove to find a short-cut passage to the East.

Instead of the riches of China and India, which lured those adventurers to years of incredible hardship—sometimes to disaster and death—it is the recently found oil wealth of Northern Alaska that has opened this new chapter in the long story of Arctic endeavour.

The 115,000 ton *Manhattan*—the world's first ice-breaking supertanker—was not the first ship to battle its way through the Northwest Passage. But she was by far the largest vessel ever to sail the Arctic Ocean, and the first commercial craft to make the surface voyage from the U.S. east coast to Prudoe Bay, Alaska, and on through the Bering Strait to Anchorage, on the Pacific.

In 1958 the American submarine *Nautilus* had astonished the world with a polar crossing under the ice. The *Nautilus* submerged in the Pacific, off Alaska, and surfaced four days later north of Iceland—just 52 years after the Norwegian explorer, Amundsen, had achieved the centuries-long dream of breaking through the surface passage. But the voyage took Amundsen and his crew in the *Gjoa* three years.

This saga of ocean adventure began back in 1497, when the Bristol merchant, John Cabot, crossed the Atlantic in his sailing ship *Matthew* to find a direct trade route to China. Although he failed to do this, by his landfalls in Newfoundland and Nova Scotia he discovered North America instead. In the following year, Cabot reached Greenland and Baffin Island before intense cold, mountainous icebergs and a mutinous crew forced him to turn back.

During the 16th century, many navigators from Europe sailed west in search of the passage to the Orient. Among them was Gaspar Cortereal from Lisbon, who landed in Greenland and was surprised to encounter Eskimos. He had expected to find Chinamen there. Jacques Cartier, the French explorer, was well off the Arctic trail. In 1536, however, he discovered the great St. Lawrence River, and so opened the way for the exploration of western Canada.

Later in the century, Martin Frobisher and John Davis from England advanced the Arctic search. In 1576 Frobisher set off with three ships. The first went down with all the crew in a storm off Greenland. The second was blown far off course. In the third ship, Frobisher landed at Baffin Island and explored the bay that bears his name.

Ten years later, Captain Davis sailed far beyond the Arctic Circle, through the strait named after him, to within 1,200 miles of the Pole. There he found "the Sea all open, and 40 leagues between land and land". For the first time the true entrance to the Northwest Passage, through Lancaster Sound, had been sighted.

Earlier navigators had mistaken Hudson Strait, leading into Hudson Bay, as the way to the elusive sea passage. The famous exploratory voyages of Henry Hudson

Left, In this type of ice—four to six feet in thickness, often under pressure and snow-covered—the *Manhattan* moved very slowly, often covering no more than 12 miles in a 24-hour period.

(1607–10) in this area added considerably to man's knowledge of the Far North. After narrowly escaping death many times in his tiny ships, Hudson eventually fell victim to a mutinous crew. On his last voyage in the *Discovery*, they cast the master and his son adrift in an open boat. The castaways were never seen or heard of again.

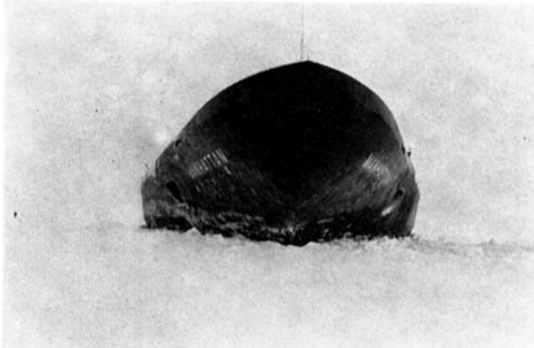
It was one of the leading mutineers, Robert Bylot, who accompanied William Baffin on the next great Arctic voyage. In 1616, sailing 300 to 400 miles further north than Davis, they reached a point nearer to the Pole than any other navigator for two centuries afterwards. Nevertheless, they missed the entrance to the Northwest Passage.

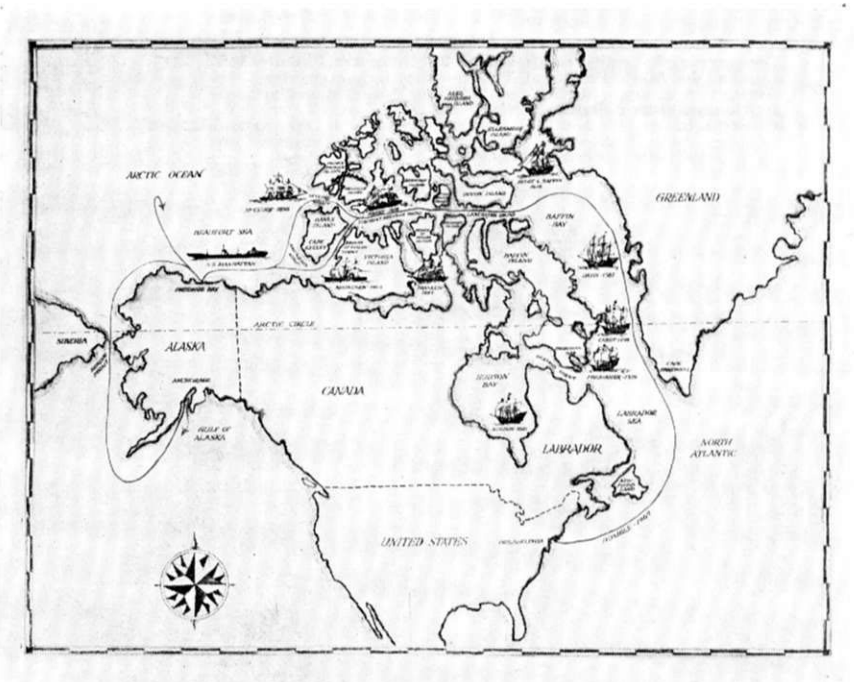
European navigators were by now disillusioned with the Arctic search, and many doubted if a sea passage to the Pacific existed at all. For the first time since Cabot's voyages, there was a break of about a century before the next expedition. But interest was revived when, in 1728, news came that the Danish explorer Vitus Bering, then a captain in the Russian Navy, had discovered the narrow sea passage between Alaska and Siberia.

Half a century later the British Government, because of increasing trade with China, offered a handsome reward for the discovery of the Northwest Passage. Captain Cook, fresh from his South Seas triumphs, led a new expedition, but this time from the Pacific. Rounding Cape Horn and sailing the entire length of America's western coastline, he passed through Bering Strait and actually reached the North Alaska coast before ice barred his progress.

Early in the 19th century another name was added to the Arctic map. In 1818 William Parry, with the ships *Hecla* and *Griper*, battled westwards from Baffin Bay through the dangerous sounds between the remote Arctic islands. None before him had ever penetrated

(*please turn to page* 75)



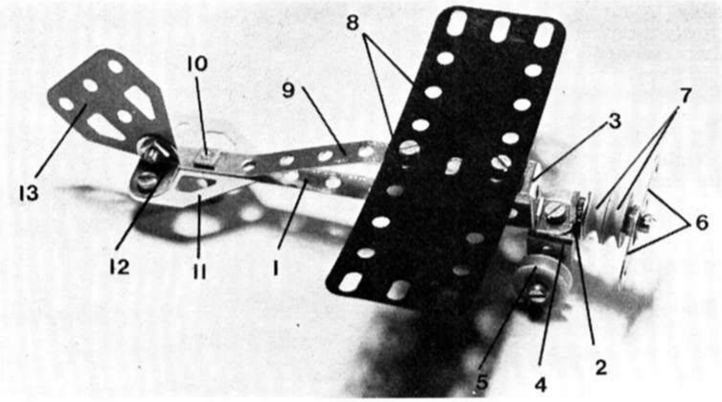


Above right, end-on view of the *Manhattan* ploughing through the ice of the Northwest Passage. This section was specially reconstructed to convert the 115,000 ton ship into the world's largest ice-breaking tanker.

Centre right, officers of the *Louis S. St.-Laurent*, specially trained skin-divers for Arctic operations, are heading towards the stern of the *Manhattan* where they will go down to inspect the screws of the huge tanker. This skindiving operation was conducted on at least three occasions during the voyage.

Right, map illustrating five centuries of Arctic voyages, from Cabot's second voyage in the "Matthew" (1498) to that of the 115,000 ton ice-breaking tanker *Manhattan* (1969-70).

Heading photo, CCGS *Louis S. St-Laurent*, the Canadian Coast Guard's largest and most powerful icebreaker, appears rather diminutive as she sits next to the huge tanker whose bow rests high on ice.



This early Aeroplane model, which netted one of the runners-up prizes in Section 2 of the Competition, was the work of Timothy Haylett of Poole, Dorset.

More from Pocket Meccano

By 'Spanner'

The extremely well-proportioned Lawn-Mower, below left, designed by Mark Powell of Thurmaston, Leicester, was a deserving runner-up in Section 1 of the recent Pocket Meccano Competition. Another delightful little model which gained a runners-up prize in the Pocket Meccano Competition is the Sewing Machine from Section 3, shown below right. Designer was Raymond Anderson of Morpeth, Northumberland.

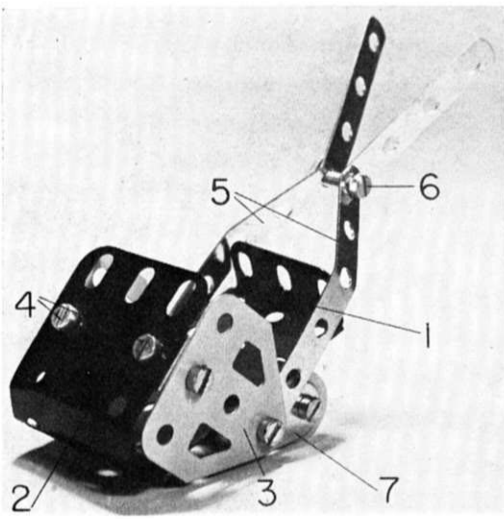
IN these pages last month we reported on the outcome of the recent Pocket Meccano Competition and we also gave building instructions for the three models which gained 1st places in the Competition's three age Sections. At the same time, we promised to bring you more contest entries over the coming months and, true to our word, here are three particularly pleasing examples—a Lawn-Mower from Section 1, an Aeroplane from Section 2 and an "Electric" Sewing Machine from Section 3. These particular models, incidentally, have been chosen from the runners-up, but future presentations might well include non prize-winning models.

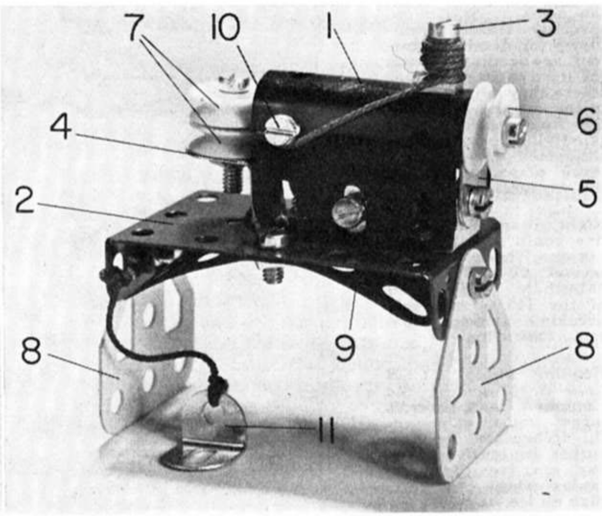
When building the Lawn-Mower and Aeroplane, it is necessary to bend some of the parts. This may not appeal to some modellers, but, if done properly, it should not cause any damage and, with equal care, the components can be straightened to their original shape.

Lawn-Mower

Beginning with the Lawn-Mower, the most attractive feature of this model, apart from its originality, is its compactness, with every part representing an easily-recognisable section of the original. Full marks go to its designer, 5½ year-old Mark Powell, of Thurmaston, Leicester.

Attached to the underside of a 2½ × 1½ in. Flanged Plate 1 is a 2½ × 1½ in. Plastic Plate 2 which is bent around the flange forming the front of the machine. Two Flat Trunnions 3, one on either side of Flanged Plate I, are attached to the free end of Plastic Plate 2 by means of two Angle Brackets held by Bolts 4.





The handles of the Mower are made from two 4½ in. Narrow Strips 5, bent into the formation shown and strengthened by a ½ in. Bolt 6 passed through the fourth hole of the Strips.

Along with the apexes of Trunnions 3 and two Fishplates 7, which hold the rollers, the Strips are connected to Flanged Plate 1 by two Angle Brackets 8. The rollers themselves consist of four ½ Pulleys 9, two at each side, mounted on ½ in. Bolts, fixed to Fishplate 7.

PARTS REQUIRED

4—12	13—37a	1—51	2—126a
4—23	10—37b	3—111a	1—194
			2—235d

Aeroplane

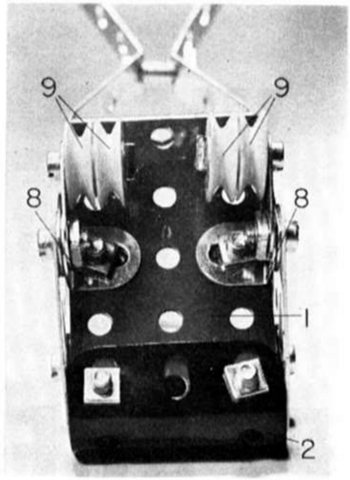
Moving onto the interesting little Aeroplane, it is necessary when building this to bend one of the two 4½ in. Narrow Strips making up the fuselage, to give it a more streamlined appearance. The designer of this authentic "Early Aeroplane", as he calls it, is Timothy Haylett, aged 9, of Poole, Dorset.

Attached to the forward end of the straight Narrow Strip 1 is an Angle Bracket 2 and a ½ in. Reversed Angle Bracket 3 which overlap as shown, the Bolt securing them also connecting two Angle Brackets 4 to the underside of Strip 1. Fixed by Nuts in the spare lugs of these Brackets are two ½ in. Bolts, on which ½ in. Pulleys 5 are mounted to serve as the undercarriage wheels.

The propeller unit consists of two Fishplates 6, tightly fixed by a Nut on a ¾ in. Bolt. Two ½ in. Pulleys 7 are added to the Bolt shank, which is then lock-nutted to the spare lug of Angle Bracket 2.

Two 2½ × 1½ in. Plastic Plates 8 serve as the wings, these being bolted to one end of the bent Narrow Strip 9, with the forward Bolt also fixing the Strip to the spare lug of Reversed Angle Bracket 3.

Fixed between the rear ends of Narrow Strips 1 and 9 by two Nuts on a ½ in. Bolt 10, head downwards, is a Flat Trunnion 11, representing the tailplane. Secured to this Flat Trunnion, in the position shown, is an Angle Bracket 12, to the vertical lug of which another Flat Trunnion 13 is Bolted to serve as the tail fin and complete the model. Note that the downward-protruding head of Bolt 10, by the way, serves as the undercarriage tailwheel.



An underside view of the Lawn-Mower showing the arrangement of the ½ in. Pulleys representing the roller.

PARTS REQUIRED

2—10	15—37a	1—111a	2—194
4—12	8—37b	1—125	2—235d
4—23	1—111	1—126a	

Sewing Machine

In the case of the Sewing Machine, this is a delightful little model designed by 13-year-old Raymond Anderson of Morpeth, Northumberland. The body is formed by bending a 2½ × 1½ in. Plastic Plate 1 to the shape shown and bolting the ends to two overlapping Angle Brackets secured to a 2½ × 1½ in. Flanged Plate 2, the Bolt shank protruding upwards through the Plate.

A ½ in. Bolt 3 is held by Nuts in Plate 1 as shown, this later serving as a cotton reel. Also bolted to Flanged Plate 2 are a ½ in. Reversed Angle Bracket 4 at one end of the "machine" and an ordinary Angle Bracket at the other end. The vertical lug of the Angle Bracket is extended by a Fishplate 5, to which a ½ in. Pulley 6 is bolted to represent the handwheel, while two more ½ in. Pulleys 7 are secured by a ¾ in. Bolt to the spare lug of the Reversed Angle Bracket to represent the sewing head. Note that the downward-protruding shank of the 3 in. Bolt serves as the sewing needle.

Flanged Plate 2, of course, serves as the sewing table, its legs being provided by two Flat Trunnions 8 bolted to the flanges of the Plate. Another 2½ × 1½ in. Plastic Plate 9 is curved slightly to fit between the flanges of the Plate, being fixed to the underside of the Plate by Bolts passed through the centre edge of both Plates. A short length of Cord, representing cotton, is then wound several times round Bolt 3, is brought along and trapped under the head of a Bolt 10, fixed to Plate 1, and is taken back and over Reversed Angle Bracket 4 which lies beneath the "needle".

One last and very important item needs to be added. The model is intended to represent an electric sewing machine and, as no motor can obviously be included, a foot-switch is provided by way of "electric" identification. It consists simply of an Angle Bracket 11 on a length of Cord tied to one corner of Flanged Plate 2, but it serves the purpose admirably!

PARTS REQUIRED

1—10	13—37a	1—111	2—126a
4—12	9—37b	2—111a	2—194
3—23	1—51	1—125	1—Length of cord

HYDRAULIC LIFT TRUCK

(*continued from page* 83)

Strip 20, to which the working platform is attached by means of a fork 21 made from four Angle Brackets. Two of these are fastened to the arm by their elongated holes, with one Nut and Bolt, the other two being bolted to the first two also through their elongated holes, leaving the round holes free to carry a 2 in. Axle Rod 22. The same two Nuts and Bolts joining the Angle Brackets also hold two Fishplates 23 against the inside of the fork, these being provided simply to space the Bolt heads so that they only just clear the Axle Rod, and this allows the single Spring Clip remaining in the Set to hold the Axle Rod centrally. Two Trunnions 29 can now be slid on to the two ends of the Axle Rod, and joined together by a final Fishplate to complete the model.

PARTS REQUIRED

4—2	1—19s	7—38	2—126
3—5	4—22	1—40	2—126a
4—10	2—22a	2—48a	4—142c
8—12	1—24	1—52	2—189
2—16	6—35	2—90a	2—193
2—17	39—37a	3—111c	2—194
1—18b	30—37b	1—125	

WAR AND PEACE

Frank Lomax looks at the latest Dinky Toy releases

Stand by for firing! The Berliet Missile Launcher prepares to release its NORD R-20 guided missile, used specifically for the purpose of photographic reconnaissance. In the background the "Honest John" awaits instructions. The missile launching unit is "loaded" as shown in the left-hand picture by pushing the protruding catch down the ramp, which contracts the spring, until it is held in postiion by the action of the button at the lower end.

WAR, destructive as it always has been, was not such a bloody and conclusive affair in the days when the only weapons available were bows and arrows, spears and swords. Unfortunately, however, an ingenious alchemist in ages past discovered that the black powder he had invented, later named gunpowder, produced surprising results when ignited. Ever since then, the sombre game of war has grown in destructive power, with an ever-increasing aftermath of devastation.

The introduction of gunpowder led to the development of military equipment and rocketry which has now reached an extremely high degree of sophistication, although, in the latter context, gunpowder has, of course, been generally superseded by the highly-combustible liquid fuels used, for example, in the modern guided missile. I am always impressed when I watch one of these missiles being released, especially from mobile launchers, those powerful heavily-armoured lorries supported by six or more large wheels.

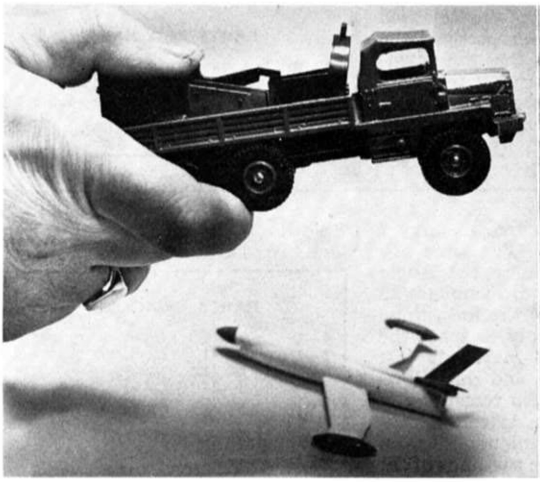
Such a vehicle has been chosen by Meccano (1971) Ltd., for one of their two latest Dinky Toy models to be released this month—the Berliet Missile Launcher, Sales No. 620. An authentic and working reproduction of the original, this model should attract a good deal of interest from all types of enthusiasts, but before looking at it in detail, something should be said about the real thing. Needless to say, the Berliet Missile Launcher does very much exist in real life, being a French-produced vehicle in service with the French military forces. Although I assume it can be adapted to carry a variety of missiles, we are interested here only in the NORD R-20, a model of which is supplied with the Dinky Toy.

The R-20 is not a rocket, nor is it a weapon of destruction in the sense of a flying bomb, packed with high explosives. It is, in fact, a "pilotless" photo-reconnaissance aircraft, powered by a turbo-jet engine, although it does use a rocket-assisted take-off technique. Launched from the front line of action, it is guided by radio control on its photo-reconnaissance mission and is then brought back, to be landed at a spot where the camera equipment can be recovered. It performs, in short, a unique and extremely useful military role.

In the case of the Dinky Toy, all major details have been included in the sturdy bodywork of this realistic model which undoubtedly increases its play-value. The hydraulic mechanism of the six heavy-duty wheels is represented on the sides, together with a simulated water tank, fuel tank and small luggage-carrier.

The cab has the practical, square bluntness of a military vehicle, but is nevertheless sufficiently detailed to be worthy of interest. Accurate and neat representations of the cab doors, complete with handles and hinges, are provided and the metal roof has been so designed as to give the appearance of the original's coarse canvas top. Bonnet hinges, radiator-grille and a manufacturer's emblem are also shown. The front bumper is plated and glazed windows are fitted, all adding to the model's realism.

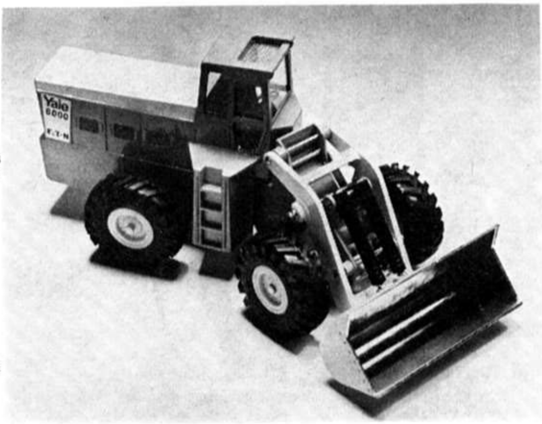
The most exciting feature, however, is the working missile launching equipment which, as already mentioned, comes complete with a



NORD R-20 turbo-jet aircraft, and is fired by a spring-trigger mechanism. Made in tough plastic, as is the aircraft, the launching unit is situated on the back of the lorry with the missile ramp at an angle of approximately 20 degrees. Running through the centre of the ramp is a spring which is attached to a projecting catch. When the latter is pushed down the ramp, the spring contracts, and is held in this position by the action of a button, protruding up from the lower end. Firing the missile is then a simple matter of depressing the button which releases the spring.

Overall, the model is finished in an appropriate military green with the launching unit in black. The missile body of my review sample is white, with the nose, wing tips and tail-fins in red. Thus, the parent vehicle and the missile between them add up to a truly action-packed reproduction which will not only interest collectors of military equipment, but also will appeal to the general model collector on the look-out for good new additions to his range.

The real Yale Articulated Tractor Shovel is considered a very powerful, versatile vehicle and the Dinky Toy version has incorporated many of the original's features, as this close-up picture clearly shows. Below, when in the right surroundings the realism of Dinky's Yale Articulated Tractor Shovel is definitely increased. One can almost hear the whirring of the engine as it scoops up another load with its shovel!



Giant Digger

The original version of our next Dinky Toy release would probably be found in far more peaceful surroundings than the Berliet Missile Launcher—although it could be used for clearing away the debris resulting from any action in which the Berliet might be involved! You are, however, far more likely to see it hard at work on a large building site, or moving large quantities of earth on a new motorway construction scheme. This interesting vehicle, in fact, has virtually no limitations as far as heavy-duty uses are concerned, being suitable for almost any job where pulling, pushing or lifting are required. Why? Because the vehicle in question is the mighty Yale Articulated Tractor Shovel—a near-giant piece of modern earth-moving equipment, produced by the British branch of the international Eaton Corporation.

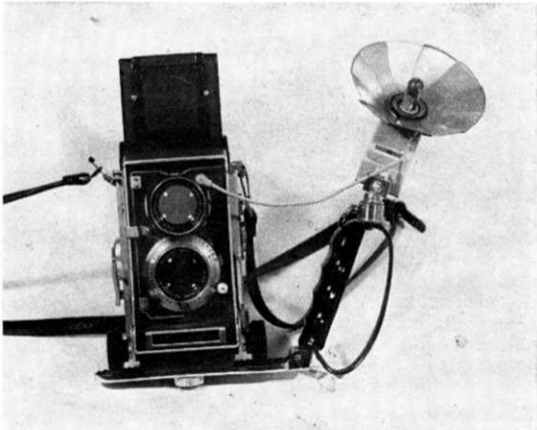
In these days of large-scale construction work, large-scale plant equipment is required and the Yale is nothing if not big. With a length around the 21 feet mark, it has a huge digging bucket with a capacity of 10 cubic yards. Despite its size, however, it is remarkably manoeuvrable—an ability achieved by the fact that it is articulated, i.e. its body is in two parts pivotally linked together. Its huge bucket is obviously capable of carrying enormous loads, yet, even when swinging such heavy loads high in the air, the machine itself manages to stay rock-solid on its wheels. This exceptional stability is achieved by its very long wheelbase, coupled with its wide tread, the continuous tracking of front and rear wheels and a low centre of gravity.

Heavy plant equipment holds a fascination for many people—myself included—and I can well imagine the Yale to be an exciting vehicle to watch in action, judging by the authentically reproduced features of the new Dinky Toy, Sales No. 973. The most interesting feature of the model, of course, is the lifting and lowering shovel bucket which is controlled by a simulated hydraulic ram action. I am always impressed by the miniature hydraulic systems on Dinky Toy vehicles and this model is no exception. It really is a realistic affair with the complete bucket arm being able to move through a distance of 90 degrees and the bucket itself through almost twice as much! Also, the main body section is articulated, as on the real thing, the pivot being situated in front of the cab, which allows even more mobility.

The long body, 178 mm in length, is supported by four large, moulded tyres with thick treads, ideal for rough terrain and the worst weather conditions. An accurate representation of the metal ladder leading to the driver's high cab is included in the bodywork, as well as several panel doors and a large radiator-grille on the engine section. The cab itself is fitted with moulded windows, steering wheel and black interior seating, the finishing touch being provided externally by two identification labels, one attached on either side of the engine section and printed with the words, "YALE 6000 E.T.N.". Another label is carried at the rear, this sporting the single name, "YALE".

My review model, before me as I write, is finished in a two-tone orange and yellow body with yellow wheel centres, black tyres and black simulated hydraulic rams.

As a sturdy, attractive model, rich in detail and action features, it should undoubtedly prove a great favourite.



PHOTOGRAPHY IS EASY No. 4

PHOTOGRAPHY WITH FLASH

by

Peter Wilkes

IF YOU should ever have the chance of seeing a professional photographer photographing people outdoors in brilliant sunshine, you may be both astonished and puzzled to see him not only include a flash unit among his equipment but, in lighting conditions you believe ideal for such work, use this source of artificial light continuously.

There can, surely, be no better proof that flash is no longer regarded as a source of makeshift light to be used only when natural lighting conditions are insufficient for camera work.

Flash, in photography today, is being regarded, not as an accessory for occasional use, but as equipment which, in the production of good pictures, is as essential as the camera.

Unfortunately many instruction books and handbooks fill page after page with the intricacies of flash—pages that by their sheer bulk give the subject a mystical quality that, to the uninitiated, is sufficient to frighten him away for ever.

Like many other subjects in photography that the experts have deemed, in their wisdom, to cover with technicalities that would defy many nuclear physicists, flash, when the trimmings are stripped off, is a straightforward subject that can help any camera user to get better pictures.

Basically flash is a source of light of high intensity and short duration available in two forms, as a bulb which fits into a flash torch and which is connected to the camera and operates automatically just at that moment when the shutter is opened at the time of exposure, or as "electronic flash", a unit which again connects to the camera but, unlike the bulb, can be used over and over again.

Obviously, with a source of light lasting only a fraction of a second, normal methods of exposure calculation are of no avail. Here the manufacturers of both bulbs and electronic flash have come to our aid by means of tables calculated from the "GUIDE NUMBER" of the flash.

The simplicity of flash exposure can be seen if the tables on the back of a packet of flash bulbs are examined.

Taking as an example the tables set out on the back of the small XM1B bulbs which are designed to fit any of the flash torches today obtainable cheaply, the information given is as follows:

With a shutter speed of 1/30 a second and with a film rated at 125 ASA;

Subject	distance	6 ft.—"f"	stop	required	32
,,	,,	9 ft.—"f"	,,	,,	22
,,	,,	13 ft.—"f"	,,	,,	16
,,	,,	18 ft.—"f"	,,	,,	11
,,	,,	25 ft.—"f"	,,	,,	8

Could any method of photography be so simple?

Another guide to exposure and a means of assessing the relative power of flash units and bulbs, is the "guide number" given to each by the maker.

If you remember the "guide number" for the bulbs or electronic flash in use you do not even need the makers' tables. All that is required is for this "guide number" to be divided by the distance the flash is from the subject and the nearest whole number is the "f" stop required.

An example from the XM1B bulbs which, with a film of 125 ASA, have a guide number of 140, illustrates the ease of flash exposure.

For a subject 18 ft. from the flash, dividing 140 by 18 to the nearest whole number gives an "f" stop of 8—exactly as per the table supplied.

Confusion is sometimes caused because, on many cameras, there are two connections for the flash lead, one marked "X" and the other "M".

It must be remembered that, in the construction of the camera shutter, it has to be arranged for the flash to fire

Left, a portrait taken with umbrella flash and small amateur flash unit. Anyone can take such photographs with even the simplest of flash units and cheapest of umbrellas. Above left, showing how a simple camera bracket can be fitted to any camera and, with the swivel head of the flash attachment, make bounce flash easy.

at the moment when maximum light can be obtained through the shutter.

The "X" synchronisation, as the arrangement for the flash to fire at the right moment is called, is used for all electronic flash units, and for flash bulbs at a shutter speed of no faster than 1/50 of a second. The "M" setting is used if a rapid shot is required for a fast moving subject with 1/100 a second exposure or more with bulbs marked "M" on the packet.

In the past flash, as a form of lighting for portraits, has had a bad name among photographers because of the harsh shadows caused when the flash unit has been fitted to the camera and used as a sole frontal means of lighting.

A vast improvement comes if the flash is held away from the camera using an extension lead between the shutter and the unit.

With practice, after the camera has been focused and the exposure set, the flash can be held in one hand and the camera operated with the other.

However, without doubt the most effective way of using any flash unit to maximum effect indoors is to use the method now adopted by practically all professional and advanced amateur photographers, "bounce flash". This consists of "bouncing" the light from a ceiling instead of pointing it directly at the subject and gives a more diffused, natural, light. Using this method first class portraits can be taken indoors with flash as a sole source of illumination.

Naturally, when using this system the flash is not so powerful, but a rule of thumb which adequately covers the light loss is, in a medium sized room with light coloured walls and ceiling, to open up two or three "f" stops.

So popular has this technique become that there are now available bounce flash units designed on the principle of the umbrella and appropriately called the "flash brolly". These give the diffused light characteristic of "bounce flash" but remove any uncertainty of exposure. Such is the ease and reliability of this brolly system that today few professional studios dealing with indoor work are without at least one such unit.

In appearance, a flash brolly looks very much like a conventional umbrella, with a covering of pure white material, and instead of a handle, the end of the unit is designed to fit onto a tripod. In use the flash, either bulb or electronic, is fixed to a special bracket near the top of the "handle", the unit positioned, in the case of a "head and shoulders" portrait, some 6 ft. from the sitter and, after the "f" stop has been selected from the table supplied with the unit, the exposure made.

The advantage of the "flash brolly" is, providing the same flash unit is used each time, the absolute and total certainty of perfect exposures every time.

A further advantage of the unit is brought about because of the pure white colour of the covering material. By using white there is absolutely no danger of a "colour cast" which makes the system ideal for indoor work in colour.

If, using the conventional bounce flash method of utilizing walls and ceiling to bounce the light from, a coloured room is chosen, the light reflected will be of the colour of those walls with, in the case of colour film, disastrous results for the sitter.

Flash, however, as was mentioned at the commencement of this article, is not confined to indoor use under adverse lighting conditions. Used as a "fill-in light" to lighten the shadows in outdoor portraits and close up work, flash gives a definite improvement to normal camera work.

Again, although this use outdoors has had, over the years, the most fearful technical mumbo jumbo written about it, taken down to its basic essentials for practical photography, it is as easy to use as normal indoor flash, when the exposure is calculated from the maker's tables.

Flash, in outdoor work, is required to lighten those dark shadows which are impossible to avoid when photographs of people etc. are taken in conditions of brilliant sunshine, and for this it has to supplement the main light source as opposed to acting as the main light.

Because of this supplementary use of flash, the exposure is easily determined.

A straightforward exposure calculation is made as would be done if no flash was to be used. If, for example, you were taking a photograph of a friend on a beach in bright sunlight, the exposure would, in all probability, be 1/500 a second at f8.

Take now the "f" stop arrived at—8—divide into the guide number for the flash, say with a small electronic unit 80. Take the flash back to 10 ft. (80 divided by

Left, showing how a flash, using an extension lead, can be held off the camera. Using the flash in this way leads to better modelling and does away with the "harsh" lighting of flash used direct on camera.

Right, a simple flash umbrella for amateur use. Shown with small electronic flash unit mounted on it and unit positioned on a tripod.

8)—with the light loss due to the flash being used in the open a fill-in ratio of 1–2 would result. In normal practice a ratio of 1–4 gives the best results and this can be obtained by simply covering the flash with an unfolded handkerchief, or a folded single strength tissue.

Flash need not be used only according to conventional means.

If a camera is put on a tripod, the shutter opened as for a time exposure and left open one can, on a dark night, make a composite picture guaranteed to mystify your friends, by using flash as the "exposure" and the same person moving position within the picture frame each time the flash is fired.

The points to watch, when you want the same person in the picture 3 or 4 times, is that the positions do not overlap, that the flash is held at the same distance from the subject for each "exposure" and that it is not allowed to shine directly into the camera lens.

A beginner to flash photography often has difficulty in deciding whether to use flash bulbs or invest in one of the small electronic flash units now available at such a reasonable price.

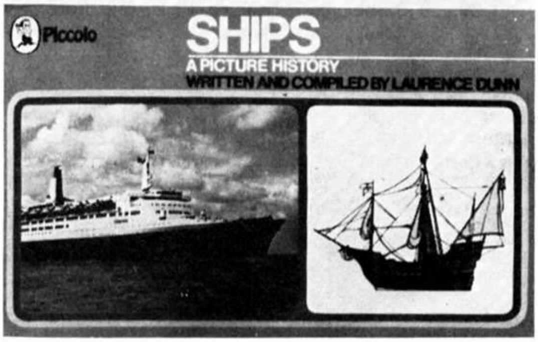
As compared with these cheaper electronic units, even the smallest flash bulb has a greater light output—guide numbers for small electronic units are in the region of 80 while for bulbs for amateur use, a guide number of 140 can be expected.

Although the duration of electronic flash is shorter than a bulb, 1/500 to 1/1,000 of a second, the deciding factor should be the frequency you will use flash.

If it is only as a supplement to your photography at times of parties etc., then the humble flash bulb will be far less costly than investing in an electronic flash.

However, if your interests take in portraiture and other indoor photography and you can visualise yourself using the bounce flash technique, progressing eventually to "brolly flash", then an electronic unit will, in the long run, prove to be an economical necessity. The initial outlay will be more than saved as flash bulbs, if used in quantity, are an expensive item in day to day photography.

Have You Seen?



THE latest release from Tamiya, to be imported from Richard Kohnstam Ltd., is the 1/6 scale Dax Honda which is probably the best kit they have produced so far. The parts for the kit have eight different finishes, a clear lacquered, deep metallic red for the painted areas, chrome, matt chrome for a polished aluminium effect, a hard black, a soft black used for parts such as handle grips and the seat, clear, a transparent red for rearlight, and a transparent orange for winkers, plus hollow rubber tyres, so hardly any painting is necessary, which should help towards the cost of the kit (£3.50). It includes many working parts, such as a spring loaded stand and brake pedal, suspension front and rear and a movable seat showing the petrol tank and battery.

The parts fit extremely well on this kit, in fact, so well that when we test fitted some of the parts to make sure they aligned correctly, we could not part them again and so they were left unglued. This is one of the most pleasing kits that this particular reviewer has ever built, well worth the £3.50. In fact, the whole kit can be summed up in one word, superb!

In the book line we have three new books about ships. The largest one, entitled "The World of Model Ships and Boats", by Guy R. Williams, contains hundreds of excellent photographs and drawings in colour and black and white, of some of the finest model boats, of all periods, that exist in the world today. The photographs are accompanied by a text which describes the various models; as a minor niggle, it is to be hoped that the information on earlier models is more accurate than that on contemporary R/C boats! The book is published by Andre Deutsch Ltd., 105 Great Russell St., London W.C.1, and retails at £3.50.

The second book, "Discovering Ship Models", by Norman Boyd, is a small one, but explains the development of the ship model through the ages of civilised man and the craftsmanship that is necessary to build one. The general contents are informative and would be of use to the scale model ship enthusiast, the beginner, or anyone thinking of building a ship model, and the price of 30p represents excellent value. The book is published by Shire Publications, Gubblecote Cross, Tring, Herts.

The third book, "Ships, A Picture History", is also rather small, but every one of the 158 pages contains a photograph or drawing, together with a brief history and data on the ship concerned. The book covers from 1600 B.C. to the present day (1970). This too, is 30p, and is exceptionally good value. Author is Laurence Dunn, and it is a Piccolo series book by Pan Books Ltd., London.

MODEL RAILWAYS

FEBRUARY

- "Few modellers get full value from their railways", says a writer for the February issue. His contribution "Let There Be Darkness" includes ideas for illuminating the model scene.
- A portable control panel complete with sectionalised switch layouts is a useful refinement but it needs careful planning to make it a success. MODEL RAILWAYS shows you how.
- Did you know that rubber band transmissions are claimed to be superior to conventional worm and gear wheel drive for model locos? Read a detailed report on the subject and see if you agree.
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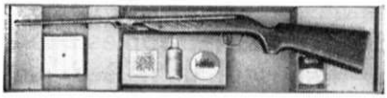

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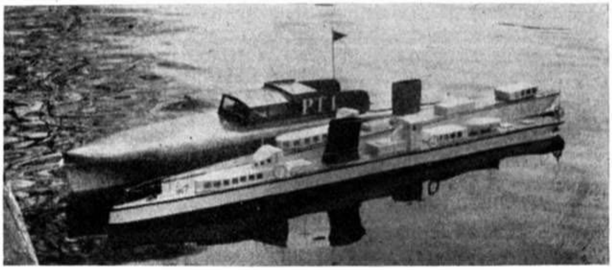

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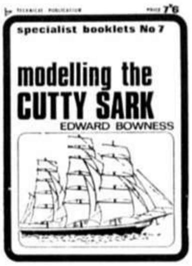

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