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MECCANO MAGAZINE

MOULDING PLASTICS – LINE OF 150-TON PRESSES

6D.

Plastics in Everyday Life

IV—Things That Can Be Made

IN our previous articles we have surveyed briefly the organic chemistry with which plastics are directly concerned, the materials used for their manufacture, and some of the processes used for the production of plastic articles.

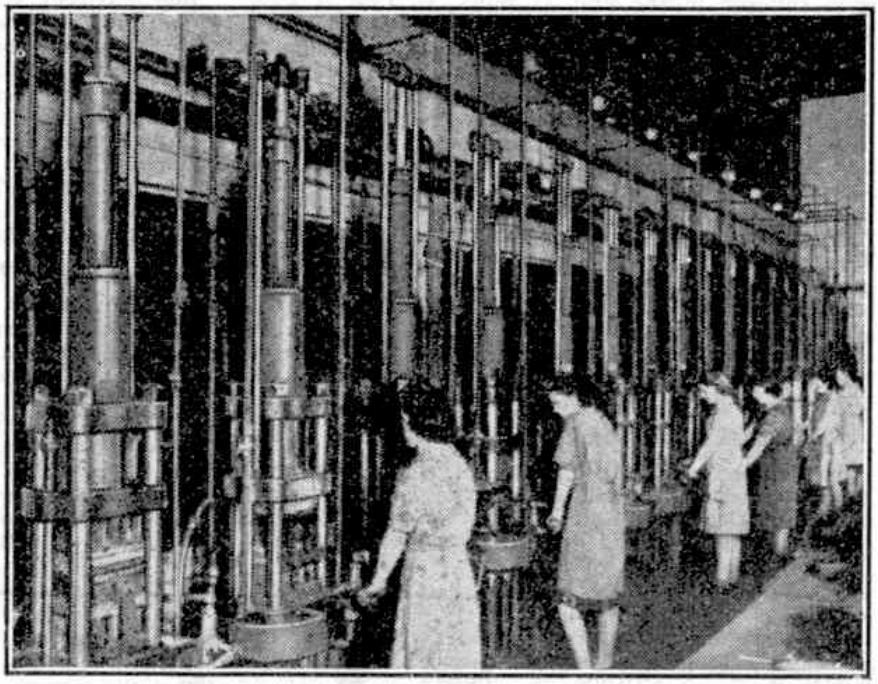
We have considered the various methods of constructing and using moulds in presses, but only a small proportion of the plastics produced are manufactured by those processes. Therefore a bare account of the things that can be moulded would be entirely inadequate to cover the whole range of these interesting materials.

Let us consider plastics then in their relation to a problem which is very close to the personal lives of us all—the rebuilding of our homes and cities. What part can plastics take in this work of reconstruction? We will discuss plastics in this light as far as space will permit, and in so doing we will cover as nearly as possible the whole range of plastic products used in industry and everyday life.

The first plastic articles manufactured for public use were the "Bakelites," during the Great War. They were dark, unattractive materials, but by the late twenties urea-formaldehyde plastics with their bright colours and transparency made an appearance on the market. These earlier amino-plastics were known as "Beetle" and "Polopas" products, and their arrival established the popularity of plastics on the market. If plastics were now suddenly removed from the world many of our activities would be immediately paralysed. Aircraft would not fly, electric current would no longer flow, all motor-cars would stop, wireless would be silenced, and even parts of our clothing would be affected. Further, many types of machinery would be put out of action and our domestic affairs would be seriously disorganised.

Plastics may be valued by their ability to replace other materials; in some cases carrying out the duties better and more cheaply than those materials. New effects and functions are possible, due to the plastic characteristics.

The use of reinforced resin materials for building and fitment constructional purposes is an attractive possibility. A number of organic products seem suitable for minor parts and fittings. The application of these to general architectural purposes is under consideration by the plastics industry, and some are already in demand. Certain plastics, best suited for structural work, have tensile and compressive strengths in ratio to their weights, as high as those of steel and duralumin, but owing to the non-ductility of the materials it is difficult to produce efficient bolting or jointing by the usual methods, since the localisation of the stresses cannot be eased by any flow of the plastic material when it is under load.



Medium size semi-automatic presses with female operators. The photographs that illustrate this article were taken at the Elo Works of Birkbys Ltd., Liversedge, Yorks.

For constructional members we may either use parts moulded to the required shape, bars or sheets, machined by hand as for metals. The cost of moulds and presses increases very rapidly with the size of the parts required; therefore it is only economical to use small mouldings

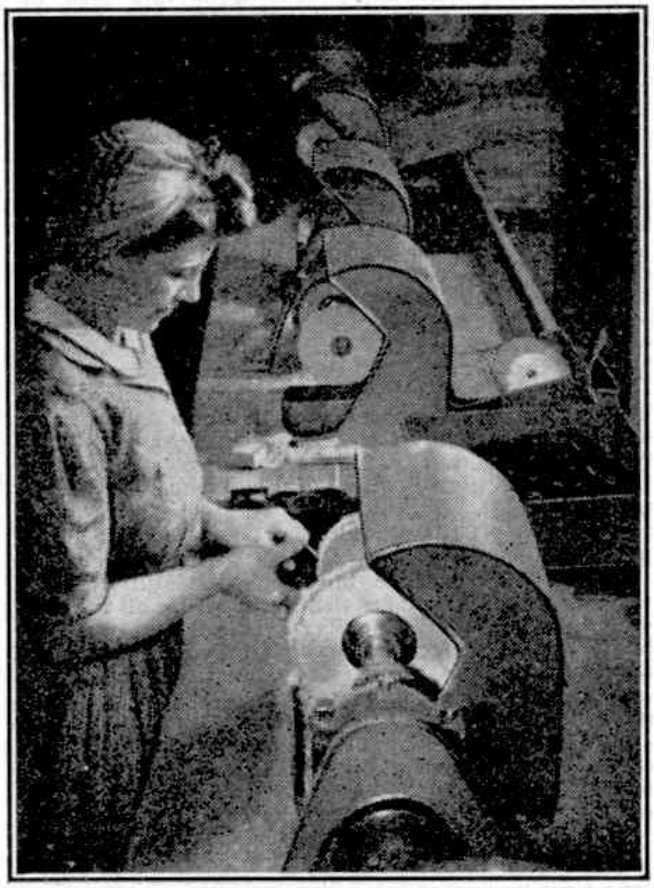
for standardized parts. Larger structural members may be built up by bolting or gluing. The bolting requires heavy additional reinforcement, and a really strong glue must be developed to produce efficient joints; which indicates that these materials will, for the time being, be confined to use for fitments and lightly stressed parts only.

In the previous articles the impregnation by resins was mentioned. It is this process that is opening the field of structural work to plastic materials. The process entails—instead of the normal mixing of fillers of a fibrous or powdered nature with the resin—an almost reverse procedure that is the forcing of the resin into organic absorbent materials such as wood, paper and fabrics. This results in a type of material unobtainable by moulding processes, and which will become the basic type of material for constructional purposes. It has been claimed that resin-impregnated soft-woods are harder than teak or ebony.

Impregnation of green timber is carried out in the following way. The resin, usually a phenolic one, in solution form is forced through the lower end of a log by a special machine. The sap, containing elements which are harmful to the timber, is forced out of the other end of the log, until this is fully impregnated by the resin. By this method all the cells and cell walls are completely filled by the resin and the log can then be dried in a kiln in a relatively short space of time, leaving the required moisture content. A retarder may be added to the resin to allow for long curing, so that the wood may be worked upon by the machinery or craftsmen while it is still comparatively soft. The impregnated log may be sawn up and used as ordinary hard wood.

This process has a special value for naval work owing to its extra strength over other home-produced woods. It can be used in thinner sections than ordinary timber, thereby taking up less room; and it is claimed to be almost fireproof and to have a long life owing to its resistance to wear, splintering, dry rot, insects, grease and chemical action; laminated and veneered woods made up from impregnated timbers are claimed to be far stronger than normal plywood of the same thickness.

Textiles, too, may be treated with formaldehyde resins to make them crease-proof. It has been found that cotton, linen, and artificial silk crumple easily, owing to the relative plasticity of the fibres. Treatment with synthetic resins



Mopping or polishing.

assists the resistance of these materials to creasing without losing their other qualities. Cellulose threads are also strengthened and enabled to resist stretching and distortion in the same way.

A strong fabric-based plastic is obtained by soaking cotton flock in an emulsion of water with a thermosetting resin chosen for suitable properties. When the water is driven off the resultant felt-like mass is pressed into sheet form and dried. This material is reputed to have several times the strength of other thermosetting plastics and is in use for stressed parts in light structure.

Continuous bands of paper or fabric are passed through a bath of solution. The solvent is then driven off and the material is cut into convenient size sheets. These sheets are used separately, or pressed together under the influence of heat into solid blocks from which any desired shape may be machined. It is from this type of material that plastic gears are cut, and found to be highly resistant to shock, silent acting and long lived.

The freshly resin-coated paper may be wound on mandrils and dried to produce tubing able to resist water and chemical action. Laminated blocks formed from impregnated fabrics are very strong, and are used for bearings which withstand

abrasive wear. Bearings made from this type of material have withstood heavy duty for long periods on the German State Railways in the effort by that country to save metal.

Such materials as these may eventually replace metal and timber parts in buildings, and by their use save considerable weight, space and expense.

Phenolic resins were first used as bonding agents for plywood about the year 1930, and these in use are waterproof, highly resistant to bacterial attack, and easily bent after steaming. Under test it has been found that the adhesives will remain insoluble even after the wood has decayed. It is possible to mould the resin-bonded plywood into a range of shapes, by use of dies, and by reinforcing the plywood with cross layers of fabric and thin veneers. This produces strong and durable curved forms. The edges of the ply are sealed under pressure, using heat-reactive resins applied in liquid form and pressed out under heated rollers. High strength plies are produced by using resin-impregnated ply sheets bonded with plastic glues and hot pressed. Proof of the strength of these laminated resin-impregnated and bonded plies is provided by the air-screws made up from them.

The ability of these plies to withstand adverse weather conditions makes them suitable for all manner of external work in the form of wall and weather boards. The surfaces may be finished with fabric, and impregnated with water-resistant and fire-resistant resins. These provide a good base for paint or wallpaper, rendering plaster unnecessary.

Resistance to the action of fire by plywoods can be carried out in various ways, although it is true that no woods can truly resist combustion since they are organic materials and must consequently carbonise under the influence of heat. The plies can be so arranged that the laminations retard the evolution of inflammable gases. The edges of the laminated boards will char, but not readily burn. A further precaution against fire may be taken by impregnating anti-pyrene salts, which do not support combustion, into the plies before gluing up.

Resin adhesives may also be used for combining asbestos and metal in composite boards to form fire resisting sheets.

Veneers of urea or phenolic resin sheets may be glued on to resin-bonded plies. Panels made from these veneers have hard surfaces which are reasonably stretch-proof and can be made blister-proof by including a backing metal foil behind the decorative surface. These surfaces may be used where hard-wearing qualities are required combined with a decorative treatment as in bathrooms, kitchens, school-rooms, etc.

Laminated blocks made up of resin-impregnated sheets of wood are pressed together under heat, with fabric reinforcement as required, and used for bench tops, kicking plates, skirtings, chair treads, nosings, inlaid and block flooring and many types of furniture fitments.

Until some twenty years ago paints, varnishes and lacquers have had the same derivations from the time of the early Egyptians, in flax seed oil and fossil resins. Since the introduction of mass-production quick-process requirements, speedier acting coatings have successfully been evolved by plastic research chemists. One of the great assets of plastic materials is that no painting is required either to protect them from adverse conditions or to beautify them by colouring or glazing. The freshness and clarity of colour remains fast for the full life of the material.

As plastics have such abilities, paints, enamels and varnishes have been evolved from them for application upon the surface of other materials for protection and decoration. It has been found that the use of phenolic resin in paints and varnishes produces high water resistance compared with other coatings. Phenolic baking coats suitable for outdoor use resist sea and fresh water, sunlight, temperature changes, solvents, chemicals, sterilisation and perspiration, and form good electrical insulators. Such coats are used chiefly in motor-car manufacture, and on builders' hardware, metal doors, canopy fittings, steel frames, metal balustrading, escutcheon plates, etc. The finishes may be anything from bright colours to a dull matt. They are claimed to have a long life under test. Further uses are found as linings of storage tanks, beer vats, petrol and oil tankers and wagons and containers for other corrosive liquids and solids. The application of these coatings is not confined to ferrous metals; they may also be used on non-ferrous metals and many other materials such as wood, paper and textiles.

Drilling and tapping section of finishing department.

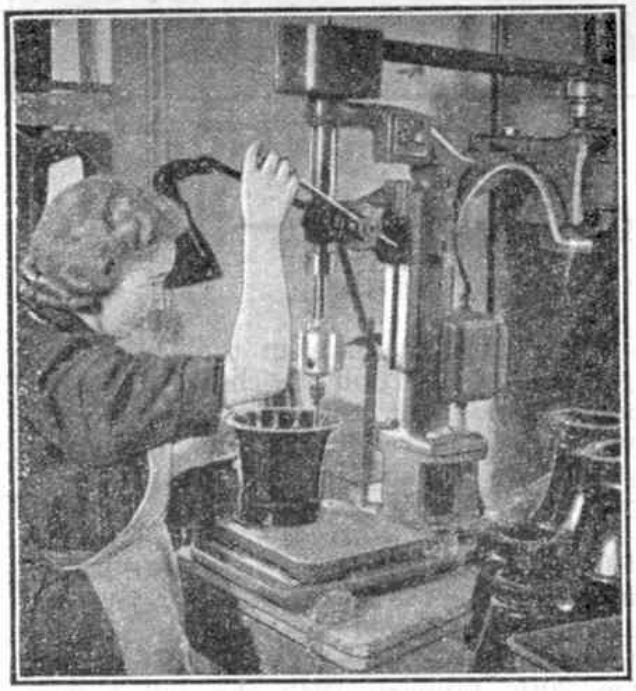
Considering the general uses of plastics in structural work—at the present stage of development—only the very lightest structures are possible, owing to the size, expense and strength of the parts required for larger structures; and it is improbable that existing materials such as timber, brick, steel and ferro-concrete will be commercially superseded by plastic structures on a large scale.

Much consideration has been given to the part which prefabrication can play in our rehousing schemes. The Americans have used simplified units, made up in factories in the form of resin-impregnated timber wallboards, insulated and weathered. Such units may be large enough to cover part of one side of a room, or the whole of one side of a house. Many of the fixtures required in the finished building such as the plumbing, light fittings, wash basins, baths, built-in fitments, etc., can be incorporated in the design of these units, and special joints arranged for easy assembly on the site of the various sections of the building.

The external renderings of buildings may be made up of a plastic facing material which may be applied

in the form of a putty. Unlike cement or similar renderings which crack and flake off, specially in seaside localities, this material would remain impervious to water penetration and chemical attack. The setting of the material can be adjusted to the required time by the chemical accelerators. The slightly plastic character of the finished rendering would resist cracking due to any movement of the backing materials.

The hundred and one smaller items required in the completion of a building, beyond the main building materials, may in many cases be constructed



Tapping Screw Threads.

of plastic materials. Plastic roofing tiles, for instance, of a resinous nature, under the trade name of "Mipolan," are claimed to be non-inflammable, and are lighter in weight than ordinary tiling, thus saving structural members.

Further uses for plastic tiling may be found for interior, protective, and decorative functions. Such tiles would naturally have a different character from externally used tiles, and would be suitable for such duties as well as tiles in kitchens and bathrooms, especially near, but not close to sources of heat, and as splashback surrounds for sinks and basins.

An important aspect in the favour of plastic tiles is that the material is less chilly to the touch than marble, glass, stone or earthenware, and combined with its ability to withstand heat and chemicals, is more suitable than those materials for bench tops, bars, flooring and walling materials in hospitals, laboratories, restaurants, nurseries, schools, and many other establishments.

Considering plastics for the use of windows in buildings, it is claimed that certain transparent plastics admit much more light than glass and also allow ultra-violet rays to pass through, which ordinary glass does not. The consideration which withholds plastic glass from the ordinary householder is the price. However, the war has considerably increased the output of such products as Perspex, distrene and polystyrene, to such an extent that Perspex, at least, has even reduced its price since the beginning of the war, contrary to the general run of purchase price adjustments. One difficulty which the chemists are striving to overcome must be surmounted before organic glass can be used successfully. Despite the toughness of the material, it is comparatively soft and fairly easily scratched. The finer scratches are removable by brisk polishing, but in domestic buildings a glazing material must be able to withstand more than light scratches.

Glass and plastics have been combined together by a firm in the United States to form a new safety glass, claimed to be highly resistant to shock and splintering. Two sheets of hardened glass plate are sealed together with a plastic joint, leaving a margin of the same plastic around the edge of the sheet. The edge strip has the same thickness as the finished compound sheet, and may be nailed, bolted, screwed, or pressed for the purpose of fixing one sheet into any frame. This resin-bonded safety glass is calculated to have ten times the strength of ordinary safety glass.

Reference has already been made to the use of fabrics in the manufacture of reinforced plastic materials. Thermo-setting plastics, moulded with shredded and woven fabrics, produce the strongest type of resinous compound, the tensile strength of which renders it a suitable material even for the production of such articles as gear wheels, which are silent in operation and have equal strength, weight for weight, to steel gears.

By such methods of manufacture the visible character of the fabric is lost in the resultant material. In interior decoration and furnishings, however, fabrics are necessary in their own characteristic forms. Fine artificial silk threads may be woven into delicate fabrics for household linen and decorative work. Although it is admitted that artificial fabrics are uncomfortable for use as clothing, owing to the lack of air spaces for easy temperature adjustments in the fabric, it is this ability to resist sudden temperature changes that gives this material insulating properties in addition to its decorative powers. The artificial fabric may also be more compactly woven, using a still thicker plastic thread, and thereby producing a stiff material which may be used as stiff sheets mouldable into many varied shapes.

One of the most important of the specialised building uses for plastics is found in hospitals. By using plastics for walling and furnishings, the architect can be certain of a non-porous material with no cracks, crevices, or joints to harbour germs and infection. The surfaces are smooth and can be quickly washed down with sterilisers, without risk of injury to the plastic. Plastic floors, walls and furnishings, with chemical, heat proof, and fire-resisting abilities, will stand up to the wear and tear of hospital use with more safety for the patients than rubber, wood or plaster finishes.

In some exhibition work various parts of the displays, normally opaque, are constructed of a transparent sheet of plastics so that the observer may see the inner working parts. The example in mind is that of an exhibition motor-car, part of the engine and body being made of glass and plastics, giving a clear view of the internal mechanism.

Many precautions have to be taken in industrial works, both for the protection of the workers and the articles manufactured. It is often necessary to have transparent screens over working parts of machinery, to collect thrown-off lubricants and to protect the operator. Glass is unsuitable, as it would crack under heat and vibration, whereas the worst conditions would only cause distortion to a plastic sheet, and vibration would have little effect if the parts were properly fixed. Glass also can be highly dangerous to personnel should it be struck by fragments from a machine. If it is likely that metal fragments will be thrown from a machine, the plastic transparent sheet may be reinforced with a wire mesh.

It was early in the 1920s that plastics had their first big impetus caused by the boom in the production of wireless sets. Orders were placed for millions of parts and tons of raw materials. The next advance was given by the demand for plastics in the electrical systems of motor-cars. In many cases plastic parts cost now only one-third to one-quarter of the original prices, indicating the improved methods of manufacture.

It is interesting to note here that the sizes of plastic mouldings are theoretically unlimited. However, using high pressures (*Continued on page 522*)

Club and Branch News

WITH THE SECRETARY

ENJOY FESTIVITIES THIS CHRISTMAS

This month the thoughts of all Club members are on the delights of the social gatherings that are invariably held during the Christmas and New Year season. In this they are right, for comradeship and good will are essential Meccano Guild features, and anything that can add to the good spirits of Club members should be encouraged. I hope that in every Club there will be at least one meeting devoted to fun and games, with plenty of good refreshments, and that as many as possible will see their way to extending their hospitality to prospective members, or to the parents and friends of existing members.

This festive season is also the time for a little serious thought, however. It may have been found that some particular item in the programme has not aroused the keenness and enthusiasm that is looked for at Club meetings. If so, now is the time to drop it and to find an alternative. Fortunately this is usually easy, for while some items may not have proved attractive others will certainly have shown themselves to be just what the members want, while there are always new schemes to be tried out.

MERIT MEDALLION NOMINATIONS

Leaders also should keep in mind their nominations for Merit Medallions. In a month or two I shall publish the list of 1946 winners of this award, and if Leaders wish their Clubs to be well represented in this list, as they should be, they should make their decisions at once. There are two Merit Medallions for each Session in each Club, and all that the Leader has to do in each case is to pick out the members who have done the best work on behalf of the Club, either as organisers, as contributors to the programmes, or as recruiting agents. Any good work on behalf of the Club can be recognised in this manner, and I want all Leaders who have not yet done so to send me their nominations within the next month.

Mr. C. Kemp, a Deputy Leader of the Hornsea M.C., Leader, Mr. R. W. Shooter, Secretary, P. Hobson. This fine Club has had a long and successful career. It was affiliated with the Guild in April 1930, and the programme followed has been notable for its variety, including electrical and scientific experiments, cinema shows and indoor games, in addition to Meccano model-building and Hornby Train operation.

RECENTLY INCORPORATED BRANCHES

496. GOWERTON BOYS' GRAMMAR SCHOOL—Mr. T. S. James, Headmaster, Gowerton Boys' Grammar School, Loughor, Swansea, Glam.
497. W.H.P.S. (WHIPS)—Mr. W. H. MacRobert, Waterkloof House School, Brooklyn, Pretoria, South Africa.

PROPOSED BRANCHES

EXMOUTH—Mr. V. C. Clarbull, 5, Turner Avenue, Exmouth.

BEDMINSTER—Mr. Barrow, 104, St. Peter's Rise, Headley Park, Bristol 3.
WEST WICKHAM—Mr. D. J. Hancock, 12, Manor Road, West Wickham.
HARROW—P. Rhodes, 51, Kingsway, Harrow.
BAGSHOT—D. C. Bradbury, "Hero of Inkerman," Bagshot, Surrey.
NORTH ASHTON—G. H. Littler, 121, Billinge Road, North Ashton, Nr. Wigan.
SHEFFIELD—Mr. H. Johnson, 17, Scotia Close, Manor Estate, Sheffield 2.
CORK—Mr. M. O'Connell, 105, Lower Road, Cork, Eire.
SHIRLEY—Mr. R. G. Parker, 44, Hazeloak Road, Shirley, Nr. Birmingham.

Club Notes

HENLEAZE (BRISTOL) M.C.—An excellent start was made with the programme of the Winter Sessions. Mr. R. E. Frost, Leader, has been ill, and during his absence the father of one of the members has kindly taken over his duties. Locomotive coaling plant models were demonstrated at one meeting, and others have been devoted to Hornby Train operation to timetable. Club roll: 18. *Secretary:* M. E. Frost, 32, Oakwood Road, Henleaze, Bristol.

ST. OSWALDS M.C.—Model-building competitions continue the most popular feature, other attractions including a monthly Hobbies Night and Track Nights, when Hornby Trains are run to timetable. Railway postcards are shown with the aid of an episcope. A monthly magazine is to be tried. Club roll: 32. *Secretary:* D. R. C. Pavey, 37, Croft Road, Norbury, London S.W.16.

AUSTRALIA

MAYLANDS (PERTH) M.C.—Recent outstanding events have included successful exhibitions, at one of which the proceeds amounted to nearly £8. Table Tennis and Darts Championships Tournaments also have been arranged. At the regular Model-Building sessions a travelling Gantry Crane, Steam Wagon and Trailer, Bagatelle Table and a Roundabout have been constructed in addition to a Meccanograph and a "Pacific" Tank Locomotive. Club roll: 28. *Secretary:* B. Stewart, 69, 9th Avenue, Maylands, Western Australia.

Branch News

BANBURY—Track meetings continue to be the chief feature of the programme. "Specials" are frequently run in addition to the regular timetable goods and passenger trains. Plans are being made to operate a "*Cornish Riviera*" Train Set. *Secretary:* D. Hopkins, 348, Warwick Road, Banbury, Oxon.

THE PERSE SCHOOL—A special feature has been made of Film Shows and Lantern Lectures. A special visit to four important junctions was greatly enjoyed. *Secretary:* D. Mann, 151, Shelford Road, Cambridge.

Among the Model-Builders

By "Spanner"

J. E. Meggitt, Ipswich, a keen Meccano model-builder.

A COMBINED GEAR-BOX AND CLUTCH

Mr. R. F. Newton, Buckhurst Hill, is a very keen Meccanoite, who has submitted several interesting suggestions to these pages in the past. Another of his achievements is the somewhat unusual gear-box and clutch mechanism shown in Fig. 1. An interesting feature is that the lay-shaft gears are carried in sliding cages at the sides of the model. The Flat Girders 1, which form the sides of the lay-shaft frames, are journalled at each end on Rods, and gear selection is carried out through a gear shift lever 2 shown at the top of the model.

The gate is built up from two 3½" Angle Girders joined by two ½" Bolts. Each Bolt carries a Fishplate spaced from the Girders by Nuts. These Fishplates are arranged to form an H-type frame with four positions, indicating three forward speeds and a reverse. The gear lever is made from a Screwed Rod, and a ball-bearing mechanism is built up from Cranks and Couplings. A 2½" Rod 3 fitted with a Coupling at each end is used as the selection lever and slides the lay-shaft cages into the required position.

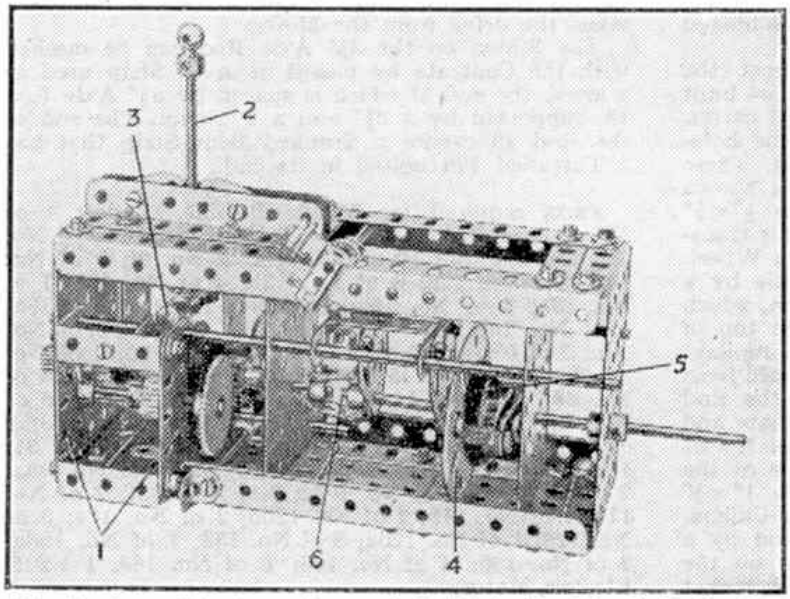


Fig. 1. A combined gear-box and clutch designed by R. F. Newton, Buckhurst Hill.

The clutch plates 4 and 5 are made from a Face Plate and a 1" Pulley fitted with a Motor Tyre. The Pulley is held against the Face Plate by two Springs, and a withdrawal mechanism is built up from two Flat Trunnions and two 2½" × ½" Double Angle Strips. A lever for the clutch release mechanism is made from a Crank mounted on a 3" Rod. The arm of the Crank causes the withdrawal cage to slide longitudinally on its guide Rods, and by means of an extending Coupling 6, built from Fishplates and Collars, the driving shaft is levered forward and the Face Plate unit of the clutch disengages.

The ½" Pulley held in the end of a Coupling, seen at the side of the model, forms the clutch pedal. The Coupling is held on the end of the 3" Rod that carries the Crank, so that when the pedal is pressed it actuates the withdrawal mechanism and the clutch disengages.

NOVEL SPEED INDICATOR AND CONTROLLER

Various speed indicating and controlling devices have been described in the "*M.M.*" from time to time, and this month I am able to include a particularly novel arrangement sent to me recently by an enthusiastic model-builder living at Flixton, Lancs. Unfortunately this contributor's name and address has been mislaid, and I shall be glad if he will write to me.

The device is shown in Fig. 2. It consists of a governor, which is made up from four 2½" Strips bolted to Collars 1. These are fitted with two weights each consisting of twelve ¾" Washers 2, spaced on each side of the 2½" Strips and held in place by a lock-nutted 1" Screwed Rod. The Screwed Rod also carries a Fishplate 3, which is used as a means of attachment for a tension Spring.

The speed indicator is made up from a sliding Rod that is actuated by the governor, and a rack 4, built up from ¾" Washers equally spaced by Washers. A Rack Segment carrying a pointer engages the Washers, and as the governor weights fly outward under centrifugal force the Rack Segment is pulled around its pivot and the Pointer moves across a fixed scale.

A sliding Coupling used in conjunction with the indicator is built up from two Bush Wheels as follows. Two Threaded Bosses are bolted diametrically opposite on the face of one of the Bush Wheels, and they carry 1½" Rods that pass through corresponding holes on the other Bush Wheel.

A FINE PRIZE-WINNING LOCOMOTIVE

The model shown in Fig. 3 is an excellent reproduction of an American "Austerity" type locomotive.

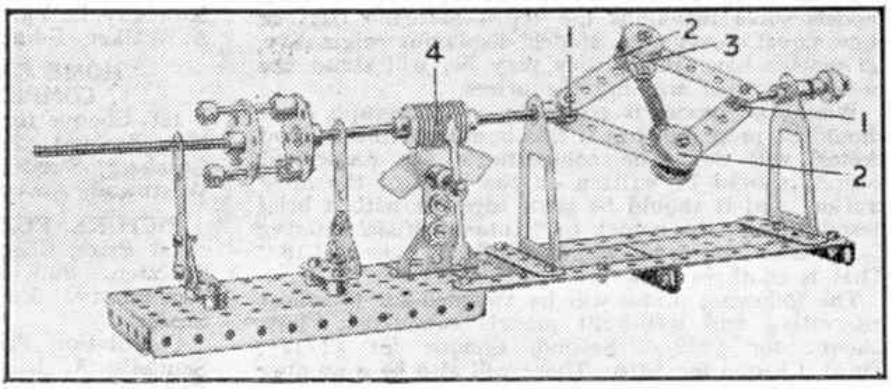


Fig. 2. A novel disc gear is used in this interesting speed indicator.

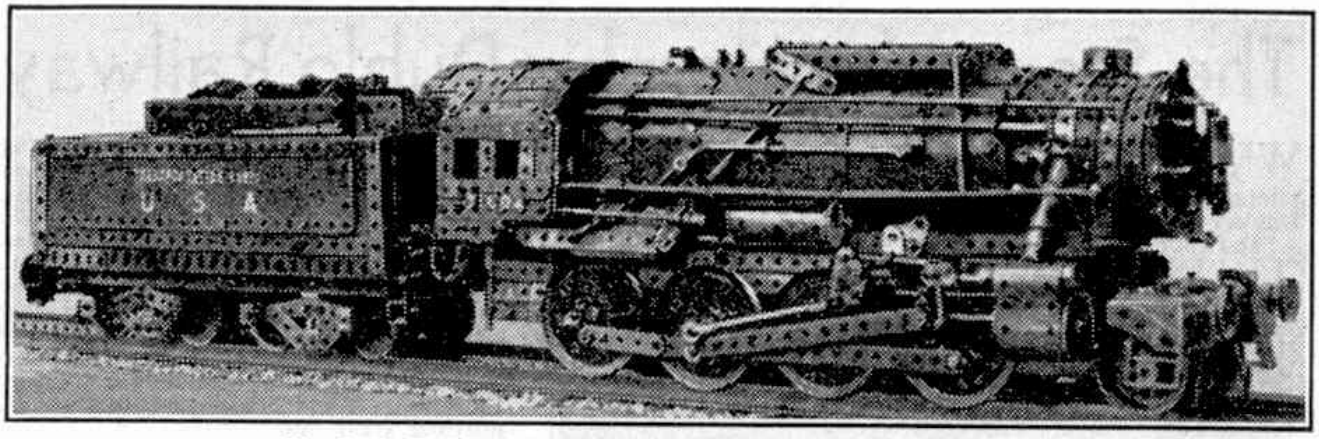


Fig. 3. J. E. Meggitt's American type "Austerity" locomotive.

It was built by J. E. Meggitt, Ipswich, who submitted it for the April Model-Building Competition, in which it was successful in winning Second Prize. The model is a fine example of careful planning, and the builder has given considerable attention to reproducing many of the smaller details, the inclusion of which gives the model a most realistic appearance. It is also a good example of Meccano parts used to the best advantage.

A DIFFERENTIAL FOR THE SMALL CAR

Differential gears are always interesting to model-builders accustomed to experimenting with the more complicated mechanisms, and because of this some of the many different types of differentials that it is possible to assemble from Meccano parts have been dealt with very fully in past issues of the Magazine. Recently I received a still further suggestion from R. J. Shephard, Old Colwyn, and his arrangement is shown in Fig. 4. A good feature of this is the few gears required, and the compact nature of the arrangement should make it very useful in models where space is limited. It consists of two $1\frac{1}{2}$" Contrate Wheels and two $\frac{1}{2}$" Pinions, which are mounted in a framework built from $1\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips and $1\frac{1}{2}$" Strips.

The drive to the cage can be arranged by bolting a $1\frac{1}{2}$" diam. Bevel Gear to the side of the framework and meshing this with a $\frac{1}{2}$" diam. Bevel on the driving shaft.

When the resistance on both of the road wheels is equal, the $1\frac{1}{2}$" diam. Contrate Wheels revolve at the same speed; but when the resistance varies, as when the car is turning a corner, the speeds of the two Contrates are automatically adjusted as required by the radius of the turn.

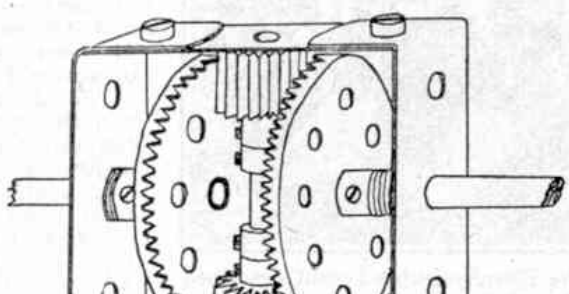


Fig. 4. Differential mechanism. An arrangement suggested by Mr. R. J. Shephard, Old Colwyn.

"OFF THE BEATEN TRACK"

A novel model of a floating dock shown in Fig. 5 was built by P. Giese, Buenos Aires. It is built entirely from Meccano parts and is complete with a model tugboat constructed in scale with the general layout.

I am illustrating the model as an example of originality and to show the excellent results that can be obtained from comparatively simple constructions, provided that the subject chosen has individuality and "freshness." Many model-builders unfortunately get into a rut and seldom build anything but cranes, bridges and locomotives, although there are thousands of other equally interesting and more novel subjects awaiting their attention.

A MECCANOGRAPH SUGGESTION

Various schemes have been devised for tracing designs on Meccanographs, and one of these is to employ a blunt point to trace out the design on the upper side of carbon paper, which transfers the impression to a sheet of paper placed underneath it. L. S. Osborn (Dandenong, Victoria, Australia), uses an Axle Rod that has been filed down to a point. The method of mounting the Rod is worthy of note. A Crank is bolted to one end of a $3\frac{1}{2}$" Strip and carries the Rod, the upper end of which is fitted with a 1" Gear that gives the point the requisite pressure for tracing the design. The Strip is pivoted on a Hinge bolted in the third hole from its other end, and at the end of the Strip are two Compression Springs that tend to press the point downward. The Hinge is bolted to an Angle Bracket on the writing arm. One of the Springs is held between the shanks of Bolts, and the other is on a $\frac{3}{4}$" Bolt.

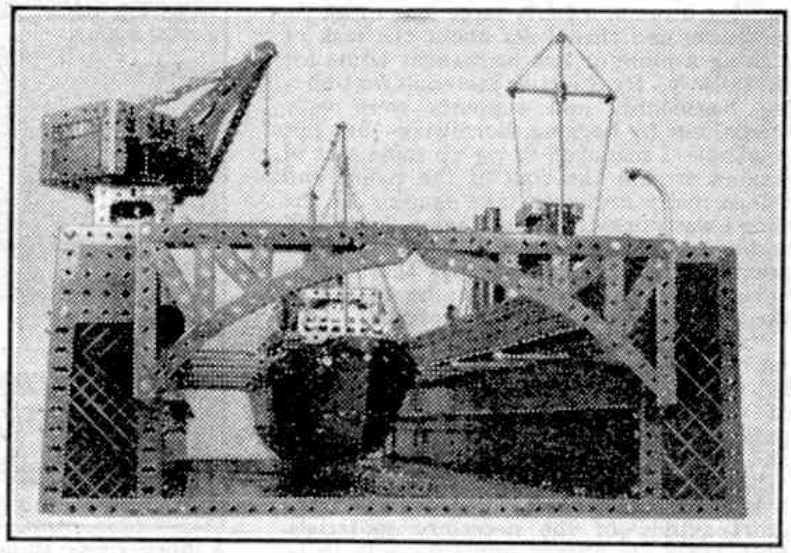


Fig. 5. "Off the Beaten Track." A novel subject for modelling excellently interpreted by P. Giese, Buenos Aires.