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FRONT COVER

The thrill of hard sailing is captured in this magnificent shot of an ocean racer running fast in a quartering wind. *Photograph by Gerry Cranham/Sports Illustrated.*

NEXT MONTH

Submarine cables, potato lifting, Big Ben, and another full-size model plan are some of May's contents.

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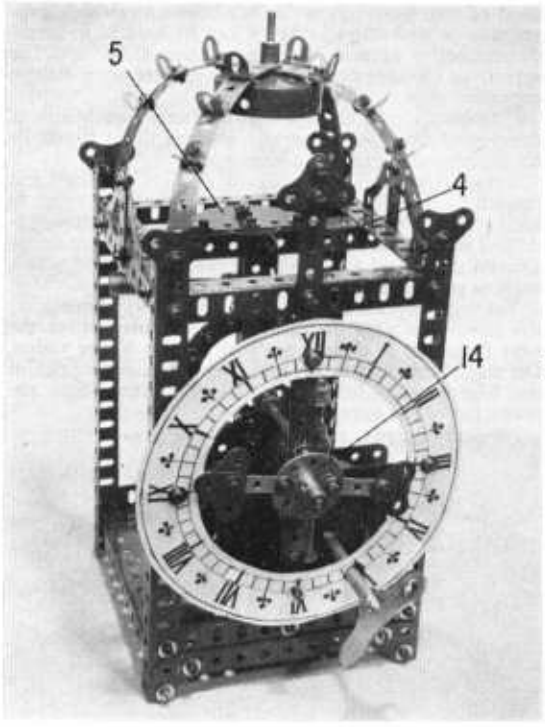
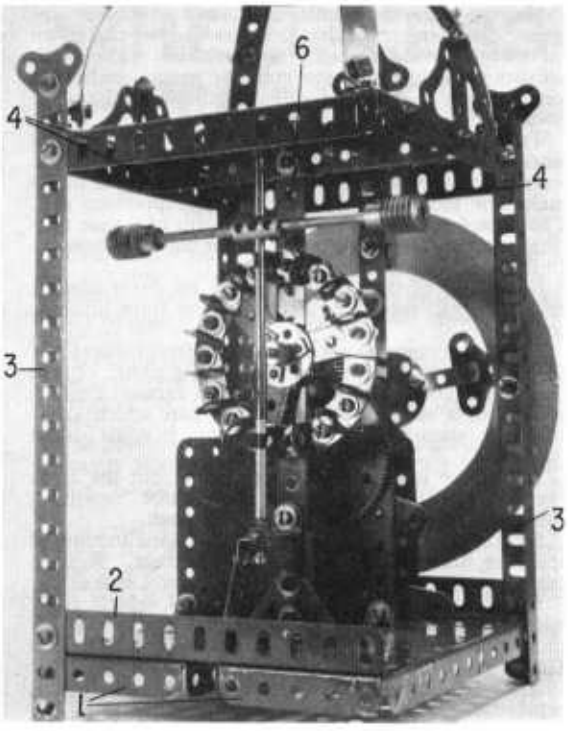




Nuremburg Clock

An historical timepiece built in Meccano by Pat Briggs

ANOTHER first by one of our regular clock makers! Established readers need no introduction to Pat Briggs and his fine Meccano clocks which have appeared in various Meccano publications. This time he pulls off another 'first' by building an historical clock complete with a fully working replica, all in standard parts, of the original Nuremburg 16th Century clock Foliot, Verge and Crownwheel escapement. As usual with Pat's clocks, this one is simple to build, reliable and long running.

In the days of its forebears, clocks of this nature were almost invariably weight-driven as the art of the spring-maker was expensive and still in the process of development. However, the standard Meccano No. 1 Clockwork Motor, which features in many of Pat's clocks, is once again pressed into service with very pleasing results. In fact, the whole mechanism is literally and metaphorically based on the Motor, the remnants of the clock frame being almost superfluous!

Fig. 1. shows the general view of the Nuremburg Clock which reveals its basic simplicity. Generally speaking, our ancestors were quite happy to know the passing of the hour, hence the provision of the hour hand movement only. (Readers who might insist on a minute hand can add their own by using a 12:1 reduction gearing as standard practice). Since it was Pat's intention to reproduce the original in form and movement, the simple form is described here, Bert Love providing the pictures and write-up based on Pat's notes. The clock dial was made very quickly from a ring of white cardboard which was inscribed with a common felt-tipped pen. A winding hole of about ¼ in. diameter is provided on the 'quarter' ring at about the 5 o'clock position.

Construction of the clock case could hardly be simpler, consisting of just two 5½ × 2½ in. Flanged Plates 1 joined by a pair of 5½ in. Angle Girders 2, with four 9½ in. Angle Girders 3 serving as corner posts. Even when one of the latter is removed, as in Fig. 2, to show the escapement, the clock still stands and functions perfectly. Five 5½ in. Angle Girders 4 complete the top of the clock case, four of them in a square with the fifth one bolted across the square top by its end slotted holes, five holes in from the rear of the clock frame. This cross-member carried a 2½ in. Semi-circular Plate 5 at its centre, the curvature to the rear holding an electrical Pivot Bolt by two lock-nuts to form the upper journal for the foliot shaft (See Fig. 1). A 7½ in. Angle Girder 6 is attached centrally to the 5½ in. Angle Girder and runs down to the base of the clock where it is secured in a Trunnion straddling the gap between the two Flanged Plates forming the base (see Figs 2 and 3). The Trunnion is raised by Washers, or suitable packing, to permit the escape wheel shaft ½ in. Pinion 7 to mesh comfortably with the 2½ in. Gear Wheel 8 mounted directly on the Motor drive spindle.

A pedestal bearing for the lower end of the foliot shaft is shown in Fig. 3 and is constructed from a 1 × ½ in. Angle Bracket mounted

four holes up from the bottom of Angle Girder 6, but spaced from the Girder by three or four Washers on the fixing ¾ in. Bolt. A second electrical Pivot Bolt is set in the slotted hole of the Angle Bracket, at the same time securing a ½ in. × ½ in. Angle Bracket on the Pivot Bolt with the two locking nuts being *finger tight*, only. The spare lug of the ½ in. Angle Bracket is then connected to the base of the clock by means of a 1½ in. Perforated Strip 9 and a second ½ in. Angle Bracket, as shown.

Fitting the Basic Gearing

In fitting the basic gearing, a 1½ in. Corner Bracket 10 is secured to the top right-hand corner of the Clockwork Motor, as shown in Fig. 3, using two Nuts and Bolts and leaving the Nuts set square in line. The normal motor output shaft is replaced by a 2½ in. Rod, the 2½ in. Gear Wheel 8 being mounted on this Rod at the rear, with a Worm 11 on the Rod at the front. The Motor is then secured on the base plates with four ½ in. Angle Brackets.

A 9½ in. Strip 12 is now attached centrally to the front of the clock frame and lined up to match with the top hole of Corner Bracket 10 on the Motor, after which the hour-hand shaft is passed through. This shaft is a 3 in. Axle Rod which passes through the eighth hole up of the 9½ in. Strip. It carries a Collar and a 19-teeth Pinion 13, as shown in Fig. 3. The hour hand itself is made from a 3½ in. Narrow Strip bolted to a Bush Wheel 14 which is free to revolve on the shaft, being held in place by a frontal Collar against which the Bush Wheel is kept in fairly tight contact by a Compression Spring behind it. This arrangement keeps the hour hand rotating with the clock movement, but allows it to be set to the correct time when starting the clock. Two 1 in. Corner Brackets make a pointer for the hour hand and a third Corner Bracket forms the tail, the latter being counterbalanced by four Washers on a ¾ in. Bolt.

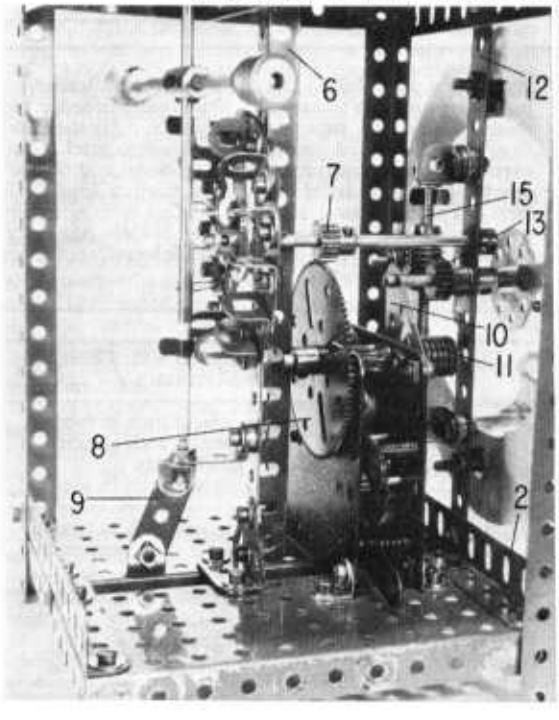
Drive to the hour-hand shaft is via Worm and Pinion reduction on a vertical 4 in. Axle Rod 15, this rod journalled in a pair of Corner Angle Brackets stood off from Strip 12 by three Washers on ¾ in. Bolts. Extra backing-up Washers are used to hold the slotted holes of the Corner Angle Brackets securely. The Rod is held in place by a Collar and a Spring Clip at the top end and the lower 19-teeth Pinion (not shown in the illustration) is set to mesh with Worm 11 on the Motor Shaft.

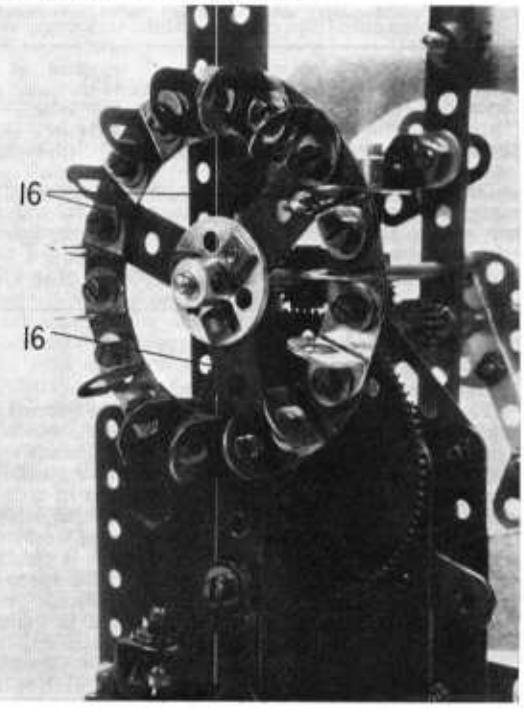
Building the Escape Wheel

The most critical part of the assembly is the escape wheel, and care must be taken with its construction. Verge escapements demand an odd number of teeth in the escapement, or 'crown' wheel, so this has to be a made-up job. Fig. 4 shows the unit in detail.

Three 2½ in. Stepped Curved Strips are joined in a 'circle' by using three Fishplates. At the same time ½ in. Angle Brackets are bolted to every available hole in the ring and three 1½ in. Strips 16 are attached to the centre holes of the three Curved Strips to form the wheel spokes. These are then bolted to a 1 in. electrical Bush Wheel. Choose your parts carefully for this part of the clock; they do not need to be brand new but they do need to be in good condition. Be patient in setting up this escape wheel and make sure of the following points as far as possible: (1) that the crown wheel

(Opposite page Left) Fig. 1. A general view of the Nuremburg Clock, built in Meccano by Pat Briggs. No minute hands were provided on these comparatively simple units. (Right) Fig. 2. The Foliot verge and crown wheel escapement of the historical Clock. An odd number of teeth on the escape wheel is essential. (Below left) Fig. 3. A general view of the simple mechanism of the Clock, grouped around the Meccano No. 1 Clockwork Motor. (Below right) Fig. 4. A close-up view of the escape wheel. This must run concentrically, with Angle Brackets evenly spaced.





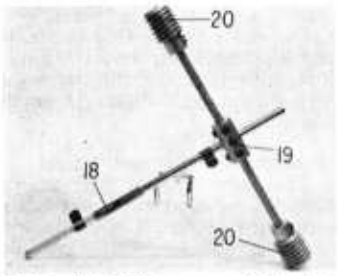


Fig. 5. The Foliot verge which makes use of the special Pivot Rods from the range of Meccano Electrical Parts Note the Spring Clips which engage with the Angle Brackets on the escape wheel.

does not wobble; (2) that it is as concentric as possible; (3) that all 15 Angle Brackets are set squarely in radial line with the shaft centre and that their tips stand off from the wheel rim at the same distance in each case. Thin Brass Washers from the Meccano Electrical Parts range are strongly recommended for setting up any discrepancies in levels in this, or any other part of the clock assembly. Remember that patience here pays handsome dividends!

When you are satisfied that it is running true, the completed escape wheel is mounted on a 4 in. Axle Rod which is passed through the central 7½ in. Angle Girder 6. The 19-teeth Pinion 7 is fixed on the shaft to mesh comfortably and without binding with 2½ in. Gear Wheel 8 on the Motor shaft. The shaft is held in place by Collars and Washers. At this stage a preliminary wind up of the Clockwork Motor should set the hour hand spinning and there will be no doubt about whether the escape wheel is running true!

Foliot Verge

Coming to the Foliot verge, this is simple by comparison with the escape wheel, as can be seen in Fig. 5, and it relies on electrical Pivot Rods for its success. A 3½ in. and a 2 in. Pivot Rod are joined by a Standard Rod Connector 18, a Coupling 19 being fixed towards the end of the longer Rod. A pair of 2½ in. Axle Rods, each fitted with a Worm 20, or similar weight bob, are fixed into the ends of the Coupling, then, finally a pair of Spring Clips are mounted on the composite pivot rod to align with the top and bottom of the escapement wheel.

It only remains now to set up the verge between the upper and lower Pivot Bolts and to screw them up gently, finally locking the Nuts when the escapement is working properly. Some adjustment of the Spring Clips will probably be required, both in height and rotation, until they are alternately caught and released by the escape wheel. The Foliot verge swings quite vigorously with a characteristic "thump, thump", so it will always remind you of its presence while it is working. This particular form of escapement, however, is notoriously less accurate than the pendulum and anchor escapement, so do not expect chronometer reliability! Nevertheless, the building of this clock is most instructive and results in a very acceptable form of antiquity!

Ornamentation

Clock ornamentation is purely a matter of constructor's choice. Fig. 1 shows the simple embellishments adopted by Pat Briggs, using four 5½ in. Perforated Strips, twelve Angle Brackets, a Boiler End, an Adaptor for Screwed Rod and some Corner Brackets. The result is extremely pleasing, but each individual builder is of course at perfect liberty to follow his own inclinations.

PARTS REQUIRED
BASIC CLOCK

1—1a	1—12b	52—37a	1—126
4—2	2—15b	40—37b	1—133
4—6a	4—16a	40—38	3—133a
4—8a	1—24	1—63	1—120b
1—8b	3—26	3—90a	2—154a
7—9	1—27c	4—111	1—213
3—10	4—32	3—111c	1—214
21—12	6—35	1—120b	1—235b

Electrical Parts

2—545 1—548 1—549 12—561

1 No. 1 Clockwork Motor

SIMPLE ORNAMENTATION

4—2	16—12	8—133a	1—173a
30—37	4—108	1—162a	

HORSE-POWER (*continued from page* 175)

descended from Shires. With his remarkable muscular "forearms" and quarters, short, well-coupled back and the immense power in his frame, the Shire has moved astonishing weights.

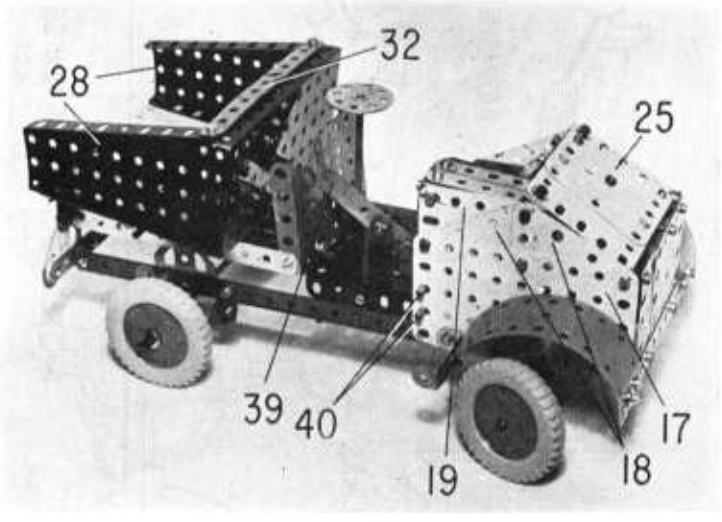
During official trials before a properly-constituted authority, two Shires, yoked tandem-fashion, and on wet granite setts (offering a poor foothold), moved off with the huge weight of 18½ tons. They did this quietly and without any fuss, and as a matter of fact the shaft horse had shifted the mass before the leader got his chains properly tightened. On another occasion two shires moved 16½ tons of wood blocks. Another time two Shires pulled against a dynamometer. The maximum of the instrument was registered and the pull exerted was considered equal to a starting load of 50 tons. The Shire has, of course, always been noted for its strength, and its ancestors of the Middle Ages were the only horses capable of carrying the heavily armoured knights of the period.

BRIDGES (*continued from page* 177)

bridge, illustrating the design principles.

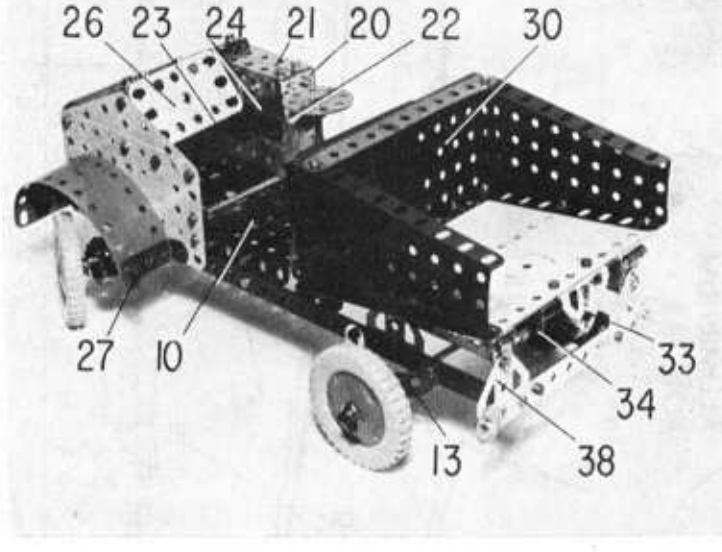
The building of Sydney Harbour bridge seemed to mark the return to favour of the steel arch, which is probably still the most elegant of all bridge designs. In 1931 the Bayonne bridge, built by the same methods as the Sydney bridge, was completed at a cost of sixteen million dollars between New Jersey and Staten Island. The arch span is 1,652 feet and 16,000 tons of steel were used in its construction. Engineers believe it possible that we may yet see steel arch bridges with spans of from two to three thousand feet, and in recent years large steel arch bridges have been erected in various parts of the world. The largest steel arch span in Britain is the Widnes-Runcorn bridge in Cheshire, finished in 1961, with a span of 1082 feet.

COMPARATIVE COMPRESSION & TENSION STRENGTHS OF MATERIALS	
Mild Steel	18,000 lbs per square inch in tension 15,000 lbs per square inch in compression in short struts 13,500 lbs per square inch in sheer
High Tension Steel	20,000 lbs per square inch in tension with an increase for compression and sheer
Nickel Silicon & other alloy Steels	from 24,000 to 30,000 lbs per square inch in tension



DUMPER TRUCK IN MECCANO

'Spanner' describes a No. 7 Set model built by M.M. reader B. Comley



LAST month in Meccano Magazine we gave (rather late!) the results of the Meccano Set model-building contest we ran at the beginning of 1971. Readers who saw last month's feature will remember that we included an illustration of a Dumper Truck built by Master B. Comley of Northfield, Birmingham and entered by him in Sub-section 7 of Section A of the competition. This indicates that the model was built from a No. 7 Meccano Set and that the builder was under 14 years old.

The model did not actually win a prize in the competition, owing to the very high standard of entries in the Sub-section, but it was still a first-class construction, worthy of the highest praise—especially considering the builder's age! We said last month that we would give full building instructions for the model in due course and so, true to our word, here they are. Before going into detail, however, I should just like to say that I have written the instructions from the photographs of the model which were supplied with the entry. I had nothing else to go by, therefore it is possible that I have made a few errors in the description where I could not see exactly what sized parts were used. (The Rods, particularly, were a problem). If I have boobed, I trust Master Comley will forgive me!

Chassis and Steering

The chassis is built up from two 12½ in. Angle Girders 1, connected together at their ends by two 3½ × ½ in. Double Angle Strips 2 and through the fourth holes from the rear by a 5½ in. Strip 3, the last serving as the rear axle cross-member. Locknutted through each end hole of the Strip is a Double Bracket, the securing Bolt also fixing a 1½ in. Strip 4 between the lugs of the Bracket, as shown, then Strips 4 at each side are connected by a 5½ in. Strip 5, this also lock-nutted in position. The stub axles—supplied by 1½ in. Rods—are of course journalled in the lugs of the Double Brackets, each being held in place by a Collar and a 2½ in. Road Wheel 6.

Steering control is achieved by an interesting and slightly different linkage from the normal on this particular model. A 1½ in. Strip 7

Above, the chunky appearance of Master Comley's Dumper Truck shows clearly in this illustration. Remember that the dumper bucket is at the front of the model.
Left, in this general front view of the model, the simple but effective construction of the dumper bucket is clearly shown.

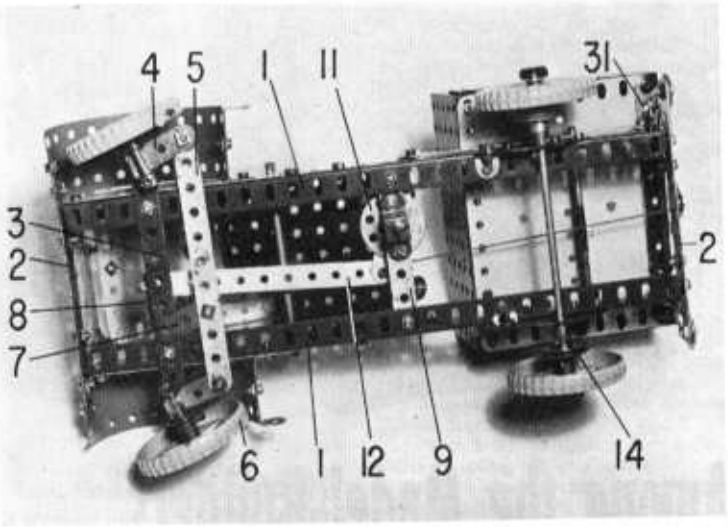
is tightly fixed by a Nut on a ⅜ in. Bolt, then the Bolt is passed through the fourth hole of Strip 3. Another 1½ in. Strip 8 is tightly locked by Nuts on the Bolt shank, this being positioned roughly at right-angles to Strip 7 and arranged on the Bolt so that the Bolt is free to turn in Strip 3, but is not excessively sloppy. Strip 7 is lock-nutted to Strip 5.

Girders 1 are next connected through their twelfth holes from the front by a 3½ in. Strip 9, after which a 3½ × 2½ in. Flanged Plate 10 is "butted" to the top of the Girders by Fishplates. Journalled in this Plate, in Strip 9 and in a Double Bent Strip bolted to the underside of the Strips, is a 4 in. Axle Rod serving as the steering column and held in place by an 8-hole Bush Wheel 11 above the Strip and by a Spring Clip beneath the Double Bent Strip. Bolted across the Bush Wheel is a 2 in. Strip which is connected to the end of Strip 8 by a 5½ in. Strip 12, lock-nutted in place to complete the steering linkage. A second 8-hole Bush Wheel serves as the steering wheel.

The front axle is supplied by a 6½ in. Rod held by Collars in the centre holes of two 2½ in. Stepped Curved Strips 13 attached to Girders 1. Note that the rear end of each Curved Strip is bolted direct to its respective Girder, while the forward end is attached to an Angle Bracket and Fishplate bolted to the Girder. A 1 in. Pulley 14 is added to each end of the Rod, followed by a 2½ in. Road Wheel. This Wheel is free to turn on the Rod, being held in place by the Pulley and by a Spring Clip on the end of the Rod, the Spring Clip spaced from the Road Wheel by a Washer.

Engine Cover and Seat

Moving to the engine cover, a 3½ × 2½ in. compound flexible Plate 15, overlaid along its lower edge by a 5½ in. Strip 16, is bolted to rear Double Angle Strip 2, while two 4½ × 2½ in. Flat Plates 17 are bolted one to each Girder 1 in the position shown. The compound plate is built up from two 2½ × 2½ in. Flexible Plates, overlapped three holes, with the inside upper edges overlaid by a 3½ in. Strip. The ends of this Strip, with the plate, are attached to the upper rear corners of Plates 17 by Angle Brackets, at the same time helping to extend the top

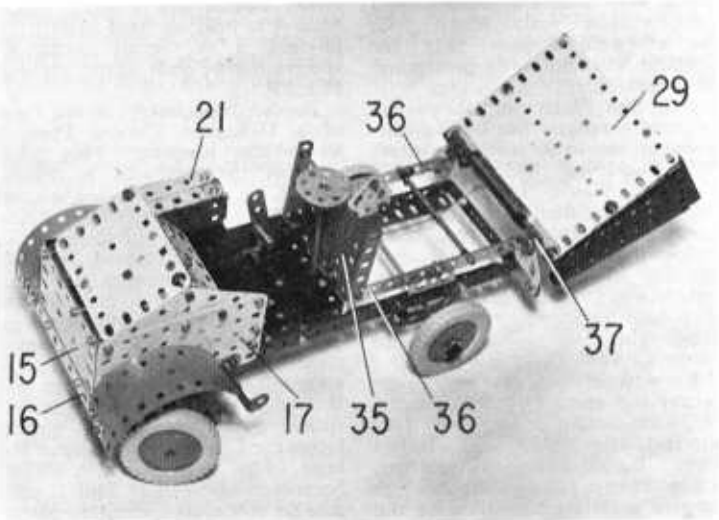


of each Flat Plate with two 2½ × 1½ in. Triangular Flexible Plates 18, arranged to form a wide triangle.

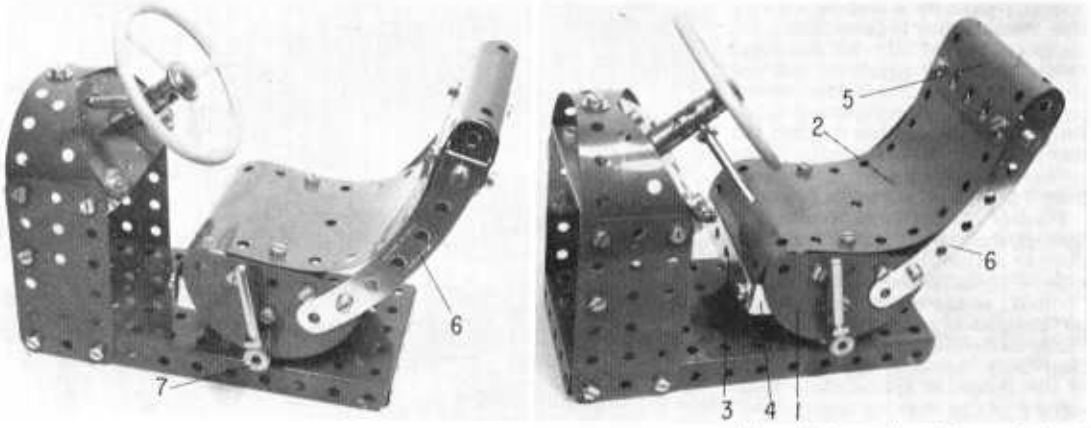
Bolted as shown to the left-hand of these triangles is a 2½ × 1½ in. Flexible Plate 19, to the forward corner of which an Angle Bracket is fixed. Secured to the spare lug of this Angle Bracket are another Angle Bracket 20, a Fishplate and a 2½ in. Strip 21, a second 2½ in. Strip and another Angle Bracket being bolted to the end of the Fishplate. The second Strip is arranged parallel to the first Strip, as can be seen in the accompanying photographs. A Fishplate 22 is bolted to the spare lug of the last Angle Bracket.

The seat is supplied by a 2½ × 1½ in. Flanged Plate 23, bolted to the forward upper edge of right-hand Flat Plate 17, a 2½ × 1½ in. Flexible Plate 24 being bolted to the spare flange of this Plate. The engine cover is then completed by a compound 3½ × 2½ in. flexible plate 25, built up from two 2½ × 2½ in. Flexible Plates, attached by Angle Brackets to the apexes of the earlier-mentioned "triangles". A seat-back is provided by a final 2½ × 1½ in. Flexible Plate 26, attached to the compound plate by further Angle Brackets, while each rear mudguard is built up from a curved 5½ × 1½ in. Flexible Plate bolted to Strip 16 and to a 1½ × ½ in. Double Angle Strip 27, bolted to Flat Plate 17.

(*continued on page* 203)



Above, an underside view of the Dumper Truck built by B. Comley from a No. 7 Meccano Set and entered by him in last year's model-building contest. The model incorporates rear-wheel steering.
Right, a general view of the Dumper with the bucket in the "tipped" position.



Above left, an adjustable seat designed by Bert Love of Birmingham to show that Meccano-built seats can be realistic, attractively-shaped and comparatively free of uncomfortable obstructions.

Above, another view of the basic seat showing its comparative scale with the larger Meccano Steering Wheel.

Among the Model-Builders

with 'Spanner'

DESIGN engineers have two well-known comments on development projects, one being "If it works right, it should look right" and the other, "The simpler its construction, the less there is to go wrong". With these home-spun truths in mind 'Among the Model-builders' this month deals with the development of a theme on a reclining chair. The illustrations and models, supplied by Bert Love, are really in the form of suggestions to set the model-builder thinking for himself, and it will be seen that, although, Meccano Parts are basically angular in form, there is no reason why model vehicles should have angular seats which look uncomfortable because they are bristling with holes, or protruding Nuts & Bolts.

Our first illustration shows the essential simplicity but lifelike contours of the basic seat, this effect being achieved by the use of Meccano Plastic Plates for the 'upholstery'. As Plastic Plates have been manufactured in red, black and blue over the past decade, they are very suitable for contemporary upholstery colours, and each of them blends very well with the modern bright zinc finish of Meccano Strips.

Construction of the basic passenger seat starts by bolting a pair of 2½ in. Semi-circular Plates 1 to the ends of a 2½ × 1½ in. Flanged Plate. Before doing so, however, a 2 in. Strip is placed on each flange to give a little extra width to the spacing of the Semi-circular Plates. This allows the 5½ × 2½ in. Plastic Plate 2 to take up a natural form between the chair sides, towards the front. The lower end of the Plastic Plate is trapped between a 2½ in. Strip 3 and a 2½ × 1½ in. Double Angle Strip 4, the latter then going in between the side plates of the seat where it is secured in place by one Nut and Bolt only, at each side, in the centre of the Semi-circular Plates.

The Plastic Plate is next bent over the seat until the 5th side holes can be bolted to the centre line of the 2½ × 1½ in. Flanged Plate. This action causes the Double Angle Strip 4 to bear up hard against the internal 2 in. Strips acting as spacers on the ends of the Flanged Plate.

Further 'upholstery' in the form of a U-Section Curved Plate 5 forms the headrest. This plate overlays the top end of Plastic Plate 2, both the parts being secured to a 2½ × ½ in. Double Angle Strip, bolted one hole in from the end of two 4 in. Curved Strips 6, on each side to form the back support. The lower end of the Curved Strip is similarly attached, one hole from the end, to the side plate of the seat. Note that it is secured, again, by one Nut and Bolt only, but the rearward natural springing of the plastic plating forces the Curved Strips against the head of an adjacent Bolt in the Semi-circular Plate. Thus, with only six boltheads holding the plastic upholstery (which is very pleasing to the touch in its contoured shape), we have an elegant seat form interlocked by its own fastenings.

The two lower Bolts securing the Curved Strips also hold a 2½ × ½ in. Double Angle Strip which not only gives additional bracing between the chair sides, but also allows the upholstery to be completed at the rear with the addition of a 3½ × 2½ in. Plastic or standard Flexible Plate. This is attached by its slotted holes at the top to the back of the headrest, is overlaid with a 2½ in. Strip for external appearance, and is secured at the lower end, one hole up from the slots, to the Double Angle Strip mentioned. The entire construction of the basic chair is as simple as that!

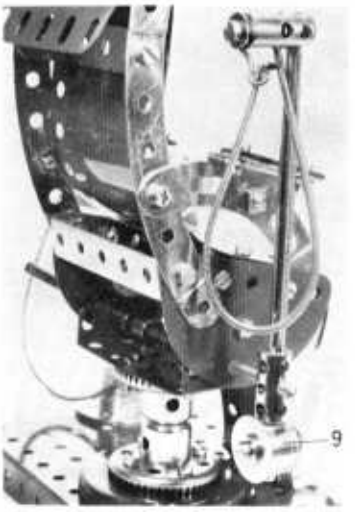
Now we come to the self-locking device, again, very simple, but quite positive. Any substantial Meccano baseplate will do for mounting the chair which pivots fore and aft on a 2½ in. Axle Rod. This is passed through the far side of the seat in the bottom hole of the Semi-circular Plate, then through a Collar and finally into the open end of a Rod Socket. The threaded tip of the Rod Socket comes through the bottom of the nearside Semi-circular Plate which is held captive by a Washer (preferably a thin brass Electrical Washer) to reduce enamel scoring, and a Threaded Boss 7 to act as a locking nut.

Attachment of the Collar and

Rod Socket to the baseplate is as follows: space the Collar and Socket at 2 in. centres and pass ¾ in. Bolts for each, up through the baseplate from below, packing them with half-a-dozen Washers as they protrude. The boltshanks go into the tapped bores of the Collar and Rod Socket respectively and, as these two items are also fitted with their own Grub Screws, a very positive hold is achieved on the 2½ in. Rod. Finally, a Long Threaded Pin is secured tightly in the cross bore of the Threaded Boss, this acting as an instant-lock lever which permits the passenger seat to be inclined to any desired angle and to be instantly locked in place.

So much for the basic seat, but what ideas does it conjure up for the constructor? Providing the steering wheel in the photographs is quite incidental, yet it does show how the basic form lends itself to a passenger seat for a sports car, for instance. Other forms, such as aircraft or trans-continental railway passenger seats, come to mind and no doubt individual constructors will have other ideas. In Bert's case (although I am assured that he has no particular brief for dentistry) these "other ideas" resulted in the very neat and fully-equipped dentist's chair shown in the remaining illustrations. The general effect of the chair is most realistic, the 'stainless steel' pedestal basin and the fearful 'drill' completing the fiendish equipment!

First job is to raise the chair to operational height and to provide it with a swivelling motion. A strong base for the chair is made from a 1½ in. Contrate Wheel 1 secured to a Wheel Flange by ½ in. Bolts going through the baseplate. Thanks to the bright zinc finish on modern Meccano parts (which shines like chromium plate after a brisk rub with a domestic metal polish) a versatile 'stainless steel' capping is provided by a Chimney Adaptor 2 which has several applications in the model. Two of them, mounted back to back, provide a very substantial swivel bearing for the dentist's chair. A second 1½ in. Contrate Wheel bolted to a separate 2½ × 1½ in. Flanged Plate 3 provides a sturdy journal for a 1½ in. Axle Rod on which the chair swivels, while the Flanged Plate provides tilting journals for the actual seat.



A close-up view of the dentist's drill and "Bowden" flexible drive.

Basic construction of the chair is similar to that already described, but with one or two additions. Armrests are provided by 3 in. Curved Strips 4, attached at the rear to the chairback by Nuts and Bolts. At the front, however, they are simply sandwiched inside the chair frame, between the Semi-circular Plate and the 2 in. packing Strips, the 'stepped' portion of the Curved Strips acting as a convenient shoulder stop to the insertion. Short Angle Girders, fitted with 1½ in. Insulating Strips from the Electrical Set, complete the armrest 'pads'. Leg and footrests are made from a 2½ × 1½ in. Flexible Plate 5, reinforced by two 2½ in. Strips set at an angle to suit the Constructor and bolted under the leading edge of the chair, with a 1½ in. Angle Girder completing the footrest.

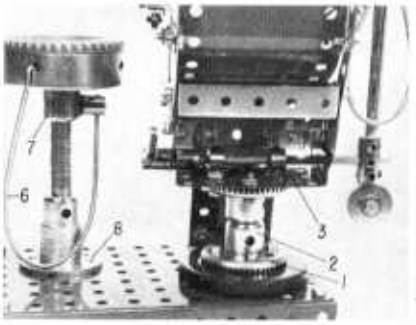
The locking mechanism, fully illustrated in one of the photographs, is basically similar to that for the original chair, but this time two Collars are included as it is not possible to secure the Rod Socket shown from below. The two Collars are held in place by ¾ in. Bolts passing through the upper Contrate Wheel, the Bolts being lock-nutted to Flanged Plate 3. Also a 3 in. Axle Rod is used so that the electric 'drill' motor can be mounted integrally with the dentist's chair, on the outside end of the Rod. Locking is as in the prototype basic chair.

The ancillary equipment fitted is, of course, incidental to the basic design but, since its construction is so simple, it has been included and a brief description is given here. The pedestal basin makes use of current Meccano Parts so that the bright zinc finish overall does give a professional appearance. The dental syphon tube 6 is supplied by six inches of Flexible Spring Cord secured at one end in the cross-bore of a Threaded Coupling by a short Grub Screw. A standard Bolt from inside the upper Chimney Adaptor 7 fixes the Threaded Boss to the pedestal. The syphon swanneck is simply a Hook for Spring Cord which lodges conveniently in one hole of the Boiler End forming

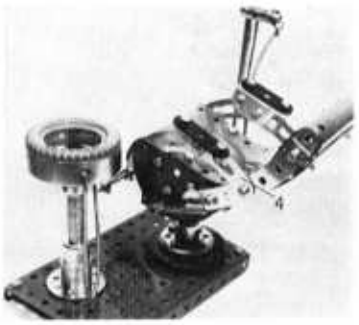
(*continued on page* 203)

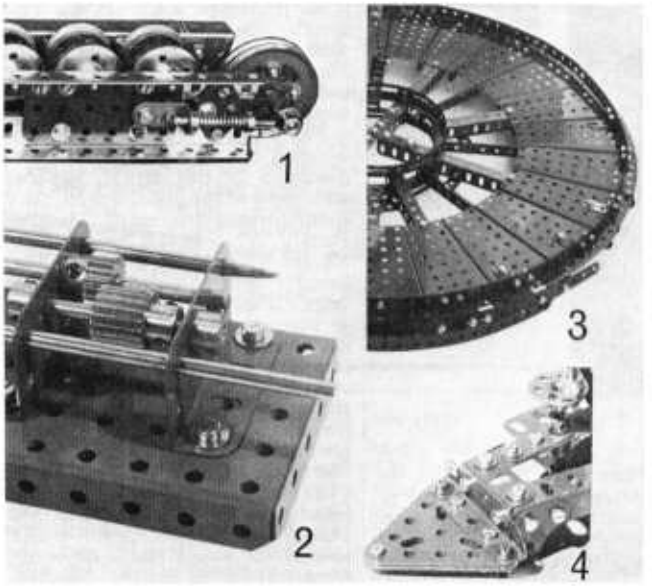
A magnificent extension of the basic seat is this amazingly realistic Dentist's Chair which illustrates how the seat can be adapted for specific purposes with a little thought.

In this close-up view of the Dentist's Chair, the swivel and the pivot mountings are shown in detail.



Further details of the dental apparatus showing the "stainless steel" pedestal basin.





Meccano Parts and how to use them

Part 4 — Plates

By B. N. Love

So far in this series we have considered Strips and Girders, together with the means of fastening them together to form the 'skeleton' of a model structure. In many cases, the lattice construction resulting is adequate for bridges, towers, crane jibs etc., but in a majority of models some kind of plating is required to add rigidity or to cover in unwanted open spaces and to provide, at the same time, journals for running shafts and anchoring points for other parts of the model.

Two basic forms of rigid Plates are provided in the Meccano system, namely, Flat Plates and Flanged Plates. The latter adopt the same principle for rigid edges as that used in the manufacture of Angle Girders, i.e. the edges of the Plates are folded over at Right Angles. Most common of the Flanged Plates is the 5½ × 2½ in. Flanged Plate which has been included in virtually every Meccano Outfit since the birth of the system in 1901. It even featured in the pre-Second World War OOO Outfit! Choice of 5½ × 2½ in. dimensions proved to be very acceptable from the outset for this particular Flanged Plate, which has featured as the baseplate in many thousands of different models. Flat Plates are often required where a Flanged Plate would prove awkward to fit and to give Flat Plates some strength they are manufactured in a thicker gauge of steel. These items should not be confused with the Meccano Flexible Plates which are of much thinner material and which will be covered in a later part of the series.

An inspection of a list of Meccano Parts will show that Plates in general feature in two or three separate parts of the price list and to familiarise readers with the part numbers a table is shown here which includes a description of Meccano Plates, in order of size, with the part numbers shown in the final column. With such a range of perforated Plates, the constructor has a wide choice at his disposal and some of their applications are illustrated in the accompanying photographs.

Typical applications of Part No. 52 appear in Figs. 2, 5 and 6. Fig. 2 shows a common arrangement in which the Flanged Plate makes a general base for mounting journal brackets upon it in models requiring gear boxes etc. The surprising strength of the 5½ × 2½ in. Flanged Plate is demonstrated by its use as the baseplate of a production tool, part of which is shown in Fig. 5. When fitted together, the tool will actually form short Meccano Strips into a special shape for caterpillar tracks and although the finished Strip is bent to a perfect shape each time, no distortion whatsoever occurs in the Flanged Plate. A 2½ × 2½ in. Flat Plate is also featured as part of the tool and its job is to hold four locating pins in the correct position when inserted through holes in the base Flanged Plate from below. Again, no distortion occurs in this Plate even after repeated use.

Perhaps the most interesting of the Flanged Plates is the Sector Plate, so called (quite correctly) because it forms part of the sector of a complete circle. It is very rarely featured in such a form because no less than 24 of them are required to complete a full circle! They are, nevertheless, supplied in all current Meccano Outfits from No. 5 upwards, the manuals for which show many applications of the Sector Plate. Models requiring tapered effects such as sand hoppers, car chassis, ships' decking etc., make good use of Part No. 54, but, for the record, Fig. 3 shows that the Sector Plate does match up in circular form and this part illustration shows how a very large base can be constructed for a really giant model of a dragline.

Of comparable interest in the Flat Plate section are the Triangular Plates, Part Nos. 76 and 77. Fig. 4 shows four of the 2½ in. Triangular Plates bolted together to form the heavy spade trail of a Field Gun model and the slotted holes in this size of Plate are shown clearly. These add versatility to the Plate which may be used as the side journals of a winding mechanism for a winch etc., in which case the slotted holes permit the non-standard spacing of Meccano Gears which do not normally mesh together, such as the 1 in. Gear and the 15-teeth Pinion. As the 1 in. Gear has 38 teeth, the reduction ratio obtained is close to 2½ : 1 which makes a nice scale speed reduction. To locate the second shaft in such a winch, a Fishplate,

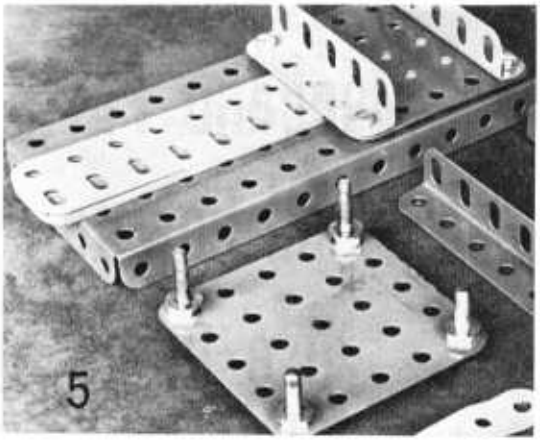


Fig. 5 shows a production tool for forming caterpillar track components. This and the other illustrations are all referred to in the text.

Part No. 10, would be bolted by its slotted hole to a corner hole of the Triangular Plate and its round hole would be set over the slot in the Triangular Plate to locate the Axle Rod in the required position for gear meshing.

Part No. 77 is the smallest three-holed Plate in the Meccano system, but it is also one of the most versatile. An equilateral triangle with holes at ½ in. centre spacing is provided by the 1 in. Triangular Plate and one application of this part is shown in Fig. 1 where two of them are combined to make a 'diamond' plate. This allows a 2 in. Slotted Strip to be critically located in the side frame of an excavator base. Note also the use of the 3 × 1½ in. Flat Plate, Part No. 73, to hold the Girder members of the side frame and the number of anchoring points it provides for attachments.

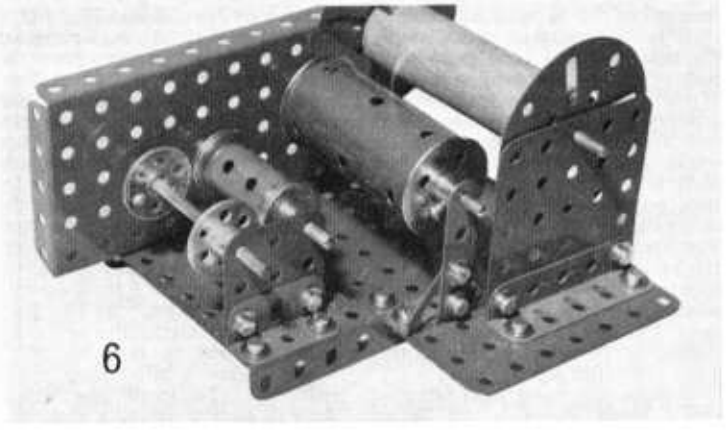
Readers who have been following the series will have noticed the frequent appearance of Angle Girders (featured in Part 3) in the models illustrated here. This is simply because the Angle Girder is the natural complement to the Flat Plate, adding strength at the base and rigidity to vertical Flat Plates used as journal sides for gear boxes, crane cabs and general side plating. This continuous feature throughout this series shows the natural tie-up between the parts in the Meccano system so that, while it is impossible to feature a large number of applications of particular parts in a single Chapter, the series as a whole will show repeated examples of parts already discussed at a basic level.

There is of course, a whole family of other Meccano Plates known as Flexible and Strip Plates in rectangular form from 12½ in. in length down to 1½ in., but, generally speaking, they are perforated at their edges only, for attachment, and are not designed to act as journal plates, their job being to cover in model frameworks in the most economical manner with enhanced appearance of a non-perforated surface. The same principles apply to the Triangular Flexible Plates, the gauge of steel being the same as that used for Flexible Plates and examples of the use of all of these thinner plates will appear elsewhere in the series.

Fig. 6 shows an interesting combination of a number of the Plates discussed in this article, together with some of the principles included in the opening chapters of "Meccano Parts.....". In this case, Part No. 53, the 3½ × 2½ in. Flanged Plate, forms a base unit and the popular large Flanged Plate forms a bearing, or journal plate, for the far side of the model. This particular model is purely a demonstration unit for cylindrical parts so the near side of the model is 'cut-away' mechanically, for the sake of clarity. Width is given to the base by a 5½ × 3½ in. Flat Plate on which a 2½ × 2½ in. Flat Plate is erected for use as a journal plate. The smallest Flat Plate, Part No. 76, forms a neat journal for two Axle Rods at the front end of the model. Note the use of Angle Girders to support the vertical Flat Plates and the use of Washers under the Boltheads for added strength.

The use of Plates alone is not always sufficient for mechanical rigidity and constructors should bear this in mind, particularly if there is any side thrust occurring in the model. For instance, if any of the winding drums in Fig. 6 were subject to heavy side movement, the Flat Plates would not be sufficiently braced for this and additional brackets, set at right angles to the Flat Plates and reaching well up their edges, would be necessary for reliable performance.

As with any other Meccano part, the constructor should always have a keen eye open for exploiting the Flanged Plate and Flat Plate. To give a simple example, a lift cage of rigid construction with centralising guides can be built from two of No. 52, two of No. 72, four of No. 10 and *four* of No. 37! The reader is invited to try this one for himself!



Description of Plate		Part No.
Flanged Plate	5½ in. × 2½ in.	52
" "	3½ in. × 2½ in.	53
" "	2½ in. × 1½ in.	51
Flanged Sector Plate	4½ in. long	54
Flat Plate	5½ in. × 3½ in.	52a
" "	5½ in. × 2½ in.	70
" "	4½ in. × 2½ in.	53a
" "	2½ in. × 2½ in.	72
" "	3 in. × 1½ in.	73
" "	1½ in. × 1½ in.	76
Triangular Plate	2½ in. side	76
" "	1 in. side	77

DUMPER TRUCK (*continued from page* 185)

Load Body

In the case of the load body, or dumper bucket, two Flanged Sector Plates 28 are bolted to a 5½ × 4½ in. compound flexible plate 29, built up from two 5½ × 4½ in. Flexible Plates, the securing Bolts helping to fix in position a 5½ × 2½ in. Flanged Plate 30 and a 5½ in. Strip 31. The upper flange of the Sector Plates are braced by another 5½ in. Strip 32, bolted between them, while a Trunnion 33 and a 2½ × ½ in. Double Angle Strip 34 are secured to the centre underside of Strip 31. The lugs of the Double Angle Strip later serve as the bucket hinges.

A mounting for the bucket assembly is built up from a 3½ × 2½ in. Flanged Plate 35 which is attached by Angle Brackets to Flanged Plate 10. Two 5½ in. Strips 36 are then bolted one to the lower end of each flange of this Plate, the opposite end of each Strip being bolted, along with a right-angled Rod and Strip Connector 37, to the apex of a Flat Trunnion 38. The base of the Flat Trunnion is bolted to a 5½ in. Strip secured to front Double Angle Strip 2. The bucket is pivotally attached to the mounting by a 5 in. Rod passed through the lugs of Double Angle Strip 34 and held in right-angled Rod and Strip Connectors 37. Spring Clips on the Rod outside the Double Angle Strip lugs keep the bucket centrally situated.

Last of all, a simple control mechanism for tipping the bucket is provided by a length of Cord, one end of which is tied to the lower end of a lever, built up from a 2½ in. Strip 39 pivotally mounted between the lugs of a 1 × ½ in. Double Bracket bolted to Flanged Plate 10. The Cord is first brought back and around two 4 in. Rods 40, held by Spring Clips in vertically adjacent holes of Flat Plates 17. It is then taken forward and over a compound rod, supplied by two 2 in. Rods joined by a Rod Connector, to be finally tied to the apex of Trunnion 33.

With this control arrangement, the bucket will tip when the lever is pulled back, although the bucket must be restored by hand to its original position. This "one-way" control, however, does not detract noticeably from the fun!

PARTS REQUIRED

9—2	1—15	20—38	4—59
2—3	1—15a	2—38d	2—90a
4—5	2—15b	1—40	6—111c
4—6a	2—17	1—45	1—126
2—8	2—18a	2—48	4—126a
7—10	2—22	1—48a	1—147b
2—11	2—24	2—48b	4—187
1—11a	2—34	1—51	3—188
14—12	11—35	1—52	2—189
1—12a	1—36	2—53	4—190
2—12c	130—37a	2—53a	2—192
1—14	100—37b	2—54	2—212a
			1—213
			2—221

AMONG THE MODEL-BUILDERS (*continued from page* 187)

the basin. It so happens that the 1¼ in. Motor Tyre is a nice push-fit inside a Boiler End so it makes a neat simulation of the inverted rim of the dental basin. Even a plug-hole is provided by an electrical Terminal Nut ('stainless steel' again!) which has a few turns on the threads of a 4 in. Screwed Rod. This simply passes right through the stack of small and large Washers forming the pedestal, two 8-hole Wheel Discs 8, with their holes staggered, forming the pedestal base. Finally, the Screwed Rod is secured below the baseplate by a Washer and Nut—what could be simpler?

Construction of the electric 'drill' is also very simple. The motor is supplied by yet another Chimney Adaptor 9, capped with a small and a large Washer, the Bolts shown being passed into the threaded bores of an internal Collar mounted on a 1 in. Axle Rod. The Collar, in turn, is attached to the lower end of a Coupling, mounted on the chair pivot rod and carrying a 4 in. Keyway Rod in its longitudinal bore. This allows a short length of Spring Cord to lie partially inside the keyway, thus simulating a Bowden drive from the motor. Teased-out ends of the Spring Cord are trapped by Grub Screws in the Coupling and in a Threaded Coupling 10 fixed on the upper end of the Keyway Rod. The final drill cable—six inches of Spring Cord—is locked in one of the tapped bores of the Threaded Coupling, a Wire Hook being secured at the other end of this coupling to hold the drill 'bit' which is represented by a Coupling Screw for Spring Cord, Part No. 58a.

It only remains for me to invite readers to take it from here, remembering never to be put off by small models—they can exercise the imagination and ingenuity of the constructor every bit as much as the super model, and they offer great scope for a handful of parts in a limited space.

PARTS REQUIRED
(Basic chair only)

2—5	12—38	1—59	1—179
2—6	1—47	1—64	1—194b
1—16a	2—48a	2—111c	1—194e
20—37	1—51	1—115a	