Meccano Suggestions Section

By "Spanner"

(408) Proell's Trip Gear Governor Mechanism

One of the most important accessories of a steam engine is the governor, the automatic mechanism that keeps the speed steady in spite of variations in the load on the engine or in the steam pressure. Many different forms of governors have been invented, and although only a few of these have come into popular use, nearly all possess novel features that make them particularly interesting for incorporation in Meccano models.

One example of a little known governor that will provide model-builders with plenty of scope for experiment is illustrated in Figs. 408 and 408a. It is known as Proell's Trip Gear, and its purpose is to increase or decrease automatically the movement of the inlet valves of the steam engine, an operation that technically is known as adjusting the "cut-off."

The mechanism is driven from the engine crankshaft by a length of Sprocket Chain, and comprises two centrifugal weights each of which is a ¾″ diam. ¾″ face Pinion. These are mounted in 2″ Rods 9, each of which carries a Coupling 10 pivotally connected to a link gear comprising Flat Brackets 11, 14 and 16, and 1″ Corner Brackets. The 2″ Strips and the Flat Brackets fixed to them are supported by a Double Bracket 12, and a Reversed Angle Bracket 15 carries a Double Bracket to which the 1″ Corner Brackets are pivoted. Flat Brackets 14 and 16 are secured to the Corner Brackets, Brackets 16 being carried on Bolts 17 screwed into a "spider" on the vertical 8″ Rod that supports the governor.

When the governor is rotated, the weights fly outward and raise the Bush Wheel 8, the upward movement of which is limited by two Collars. The Bolts 17 also are raised by the link gear, but to a less extent.

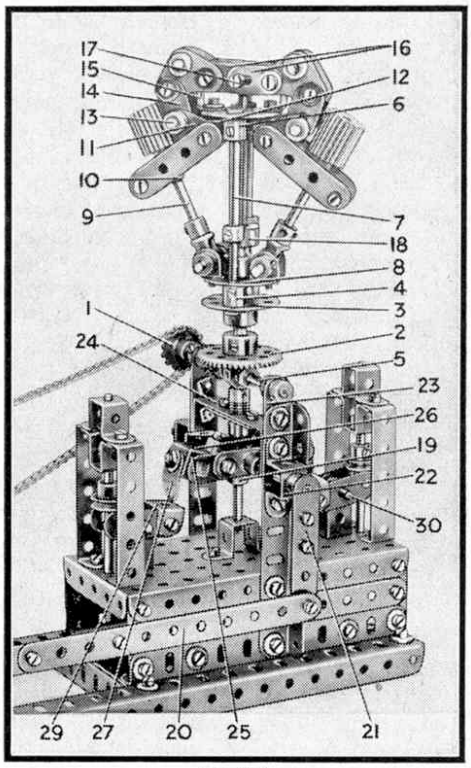

Fig. 408

The 8″ Rod rises under the action of Bolts 17, and ½″ fast Pulley 19 on the Rod also is raised. The movement of the latter in turn lifts the inner ends of two "trips," each of which comprises a Double Bracket 25, a 1″×½″ Angle Bracket 26 and a Flat Bracket 27. The trips are carried on 1″ Screwed Rods that connect the sides of a beam actuated by the rocking lever 21. The latter is connected to the eccentric on the engine crankshaft by Strip 20.

When the arm 21 is oscillated by Strip 20, the Flat Brackets 27 bear against Double Brackets 29 for approximately three quarters of their upward and downward movements.

At normal working speed the Flat Brackets 27 move through fairly large arcs during their downward movement, and depress the Double Brackets 29 a corresponding amount. If the engine speed tends to rise above normal due to any cause, such as fluctuation in steam pressure, or a lessening of the work the engine is called upon to perform, Pulley 19 rises, and Flat Brackets 27 move inward slightly. The result of these actions is that the travel of the steam inlet valves is curtailed and the amount of steam admitted to the engine cylinders is reduced. If the engine speed falls below normal due to a decrease in steam pressure or an increase in the work the engine has to do, Pulley 19 falls and the movement of the inlet valves therefore is increased, thus allowing more steam to pass into the cylinders. The speed of the engine therefore rises until it is once more at normal working speed.

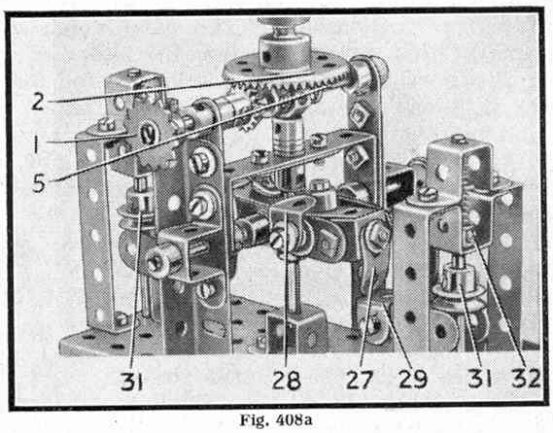

Fig. 408a

(409) Model Motor Car Radiators

Motor vehicles probably are the most popular of all subjects with Meccano model-builders and many enthusiasts confine their activities almost entirely to models of this kind. The secret of this wide-spread popularity of cars and lorries, apart from their great general interest, probably is the ease with which both the chassis and its various mechanisms, and the realism with which the bodywork of a modern vehicle can be reproduced with the fine range of parts now available in the Meccano system. For example, the construction of the bodywork is easy with the aid of Flexible Plates and Strips, and by fitting a suitable radiator the outline of almost any make of vehicle can be obtained. The design of the radiator is of special importance, for when successfully reproduced this part gives a model real distinction.

One of the best known radiator forms is that used on Rolls-Royce cars. This type has a rectangular outline and vertical louvres, and is easily built up from Angle Girders and Strips. The louvres can be represented by Strips mounted on Rods and spaced apart by washers, the Rods being held in the radiator frame by Cranks.

Variations in outline can easily be obtained by the use of Curved Strips and Formed Slotted Strips to suit the model-builder's particular requirements. An alternative to Strips for representing the louvres is Spring Cord. A length of this can be wound around two Rods placed at the top and bottom of the radiator frame, care being taken that each turn of Spring Cord is in contact with the previous one.

Radiators of the "honeycomb" type can be built up with a simple frame of Strips, and with a Flexible Plate of suitable size to represent the "honeycomb." The finished radiator is quite realistic and is suitable for incorporation in almost any type of model car. Many modern sports cars are fitted with a grille in front of the "honeycomb" and often this can be represented by lengths of Sprocket Chain.

The making of radiators for modern streamlined cars is rather more complicated, as the radiator usually merges into the bonnet. In most cases the radiator is housed behind a small grille, however, and it is then only necessary to represent the latter, which can be done quite easily with Strips of various lengths.

A type of bonnet found on American cars has horizontal louvres, which in some cars are continued along the sides of the bonnet. These also are quite easy to reproduce. The short horizontal louvres can be represented by Curved Strips, and can be attached to the bonnet with Angle Brackets. In some cases the louvres are flush with the bonnet and in others they jut forward. Adjustment of the Angle Brackets will allow either type to be represented.

Radiators used on commercial vehicles generally are much more simple in construction and design than those of private cars. In most cases the radiator frame is rectangular in shape and the "honeycomb" is not masked by a grille or louvres. The "honeycomb" can be represented by Springs, Spring Cord or Sprocket Chain. If Springs are used they should be stretched between Rods fixed at the top and bottom of the radiator frame.

(410) Fishing Reel (H. Davies, Newcastle)

Apart from their use in ordinary model-building, Meccano parts can be employed in making equipment and gadgets required in connection with many other hobbies. An interesting example of this has been given by H. Davies, Newcastle, a keen angler who recently made a substitute from Meccano parts for a fishing reel that had been damaged.

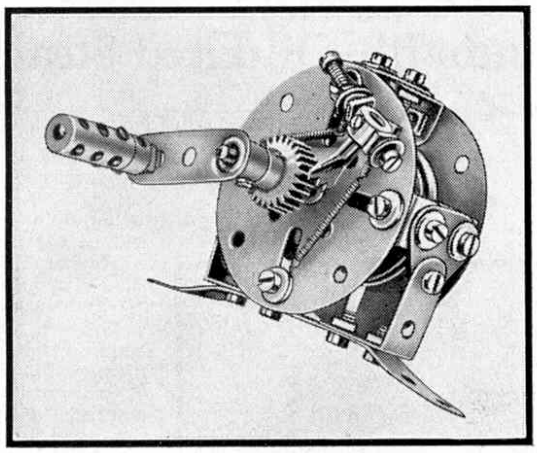

Fig. 410

The result of Davies' efforts is shown in Fig. 410. The sides of the reel are Face Plates, which are joined together by six 1″ × ½″ Angle Brackets. A 3″ Rod is pushed through the bosses of the Face Plates, which are carefully aligned to ensure free running, and it carries two 1½″ Pulleys placed boss to boss. A Collar is fixed on one end of the Rod and a ¾″ Pinion and a Crank are secured to its other end. The Crank carries a handle consisting of a Threaded Pin fitted with a Collar and Coupling. The 1″ × 1″ Angle Brackets are then connected by a 4½″ Strip bent to the shape shown in the illustration.

A check device is made with a Centre Fork gripped in a Collar. The latter part is pivotally mounted on the Face Plate by a bolt and nut. The device is tensioned with Spring Cord as shown, one of the bolts used for attaching the Cord to the Collar being ¾″ long. This Bolt serves as a lever to raise the Centre Fork out of mesh with the ¾″ Pinion so that the reel can revolve freely when casting.

The check device acts like a pawl and ratchet, allowing winding in one direction only. If a two-way check is desired it is only necessary to adjust the Centre Fork until it is disposed radially to the 3″ Rod.

(411) Current Collector for Rotating Models

(B. Pollack, Stirling)

In building models operated by Electric Motors that incorporate rotating structures, it is usually necessary to provide some form of slip ring current collector to supply current to the Electric Motor operating the rotating portion. The usual form of collector is made with a Wheel Flange insulated from a Bush Wheel, but such a device is too bulky for use in certain models, and for these a smaller substitute is necessary. Fig. 411 shows a suitable form devised by B. Pollack, Stirling.

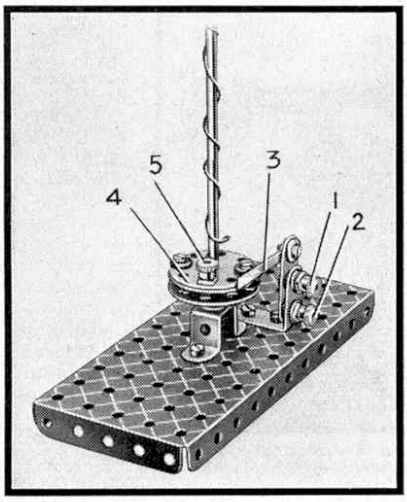

Fig. 411

The rotating portion of the model is carried on a Rod of suitable length. Four 1¼″ Discs 4 are bolted together with 6BA Bolts, which are insulated from the Discs by means of Insulating Bushes and Washers, and the Discs themselves also are insulated from the Rod by wrapping thin paper around the latter before they are slipped over it, care being taken that the paper is not torn in the process. It is necessary to cut away the edges of the Insulating Bushes where they overhang the outer edges of the Discs. A Terminal 5 is then fitted to the 1¼″ Discs.

It is advisable to test the paper insulation of this assembly. A wire is connected from a flashlamp bulb to the Disc, and a second wire joins the Rod to a suitable battery. The lighting of the flashlamp bulb is a sign that the paper is perforated, but the assembly is in order if the bulb fails to light up.

The Discs are held on the Rod by bolting them to a Bush Wheel. This is then secured to the Rod, which is journalled freely in a Double Bent Strip bolted to the Flanged Plate that forms the base. A 1″ × 1″ Angle Bracket is bolted to the 5½″ × 2½″ Flanged Plate, and to it is fastened a 1½″ Strip. The Terminal 2 is insulated from the Strip by means of an Insulating Bush and Washer, but an ordinary washer is placed under the nut to make electrical connection between the Bolt and the Angle Bracket. The upper Terminal 1 is insulated from the Angle Bracket, but is in electrical contact with the 1½″ Strip. A Pendulum Connection 3 is bolted in the upper hole of the 1½″ Strip and makes contact with the 1¼″ Discs.

The Terminals 1 and 2 are connected to those of the Transformer or accumulator supplying the current, and a wire attached to Terminal 5 is connected to the Motor in the superstructure, the other Motor terminal being connected to the framework of the model.

Pollack used this collector in a model traction engine driven by an Electric Motor. By means of Angle Girders he connected the model to the vertical Rod of the collector, and two leads were then taken to the Motor. The model could then travel in a circle without entangling the leads.

(412) Compact Differential Gear

(S. Rowston, Blackburn)

In constructing a model motor vehicle in which any attempt is made to incorporate the essential mechanisms of the chassis, some form of differential gear is required. If the vehicle is a large one the differential may be that used in the Motor Chassis, Model No. 10.5, described in the Instruction Manual for Outfits Nos. 9 and 10, but when only a small vehicle is being built a more compact arrangement is necessary. In this case the mechanism shown in Fig. 412 can be used. It was designed by S. Rowston, Blackburn. Another advantage of the gear is that very few parts are required for its construction.

A "spider" taken from a Swivel Bearing is fitted with two Pivot Bolts, which carry Collars 1 and 2 respectively. The Pivot Bolts are screwed into the "spider" so that their screwed ends butt together and lock them in position. The ½″ Bevel Gear 3 is fitted on a ½″ Bolt that also is screwed into the "spider."

Nuts are screwed on the shanks of two ¾″ Bolts, which are then inserted in diametrically opposite holes in a Bush Wheel. A second nut is then placed on each Bolt. The ends of the Bolts are screwed into the tapped holes of the Collars 1 and 2 to fix the latter firmly to the Pivot Bolts.

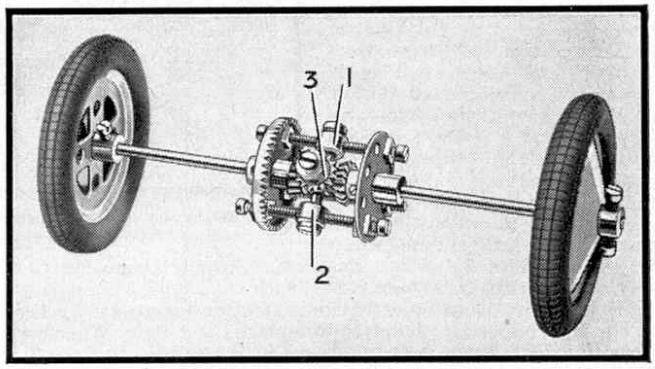

Fig. 412

A Rod of suitable length to form half of the rear axle is inserted in the boss of the Bush Wheel, and it carries a ½″ Bevel Gear placed in the position shown. The inner end of the Rod fits in the bore of the "spider." The nuts on the ¾″ Bolts are now tightened up so that the ½″ Bevel Gear is held in mesh with the Bevel Gear 3. The 1½″ Contrate Wheel is attached to the Collars in a similar manner, and a ½″ Bevel Gear is then fitted on the other half of the axle. A little play must be allowed between the teeth of the Gears in order to permit smooth running, and to strengthen the assembly a 2″ Screwed Rod is lock-nutted to the Contrate Wheel and to the Bush Wheel.

When the mechanism is fitted in the chassis of a model, a ½″ Pinion or a pinion from an E1 Electric Motor should be arranged to mesh with the 1½″ Contrate Wheel to transmit the drive from the gear-box.

Miscellaneous Suggestions

M.204. The need for miniature mudguards arises in building small model sports cars or motor vehicles. These can be made of Formed Slotted Strips, but an interesting alternative is suggested by H. Hayes, Preston, who finds the Mudguards from a Motor Car Constructor Outfit ideal for the purpose.

New Meccano Models

Balance—Ice Cream Cart—Windmill—Oil-Fired Steam Plant

THE four models we are describing this month will interest owners of widely different sizes of Outfits, for they can be built with the contents of Outfits Nos. 1, 4, 5 and 7 respectively. The smallest is a balance with which letters and other light articles can really be weighed, and is easily constructed with the parts included in Outfit No. 1. The models for Outfits Nos. 4 and 5 are respectively an ice cream cart of the type often seen specially at the seaside, and a windmill that reproduces well the movements of a particularly attractive type. The largest model is an oil-fired boiler plant and steam engine designed for Outfit No. 7.

The letter balance is shown in Fig. 2. In making it two $5\frac{1}{2}''$ Strips are first bolted to two Trunnions, which are fastened to the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate that forms the base. The beam of the balance consists of two $5\frac{1}{2}''$ Strips overlapping four holes, and it is pivoted on a lock-nutted $\frac{3}{8}''$ Bolt passing through the fifth hole from one end and the top holes of the vertical $5\frac{1}{2}''$ Strips. Two $2\frac{1}{2}''$ Strips overlapping two holes are then pivoted to the short arm of the beam, as shown in the illustration, and to them is pivotally attached a third $2\frac{1}{2}''$ Strip. The latter Strip is connected to the vertical $5\frac{1}{2}''$ Strips by a $2''$ Rod fitted with $1''$ Pulleys. All the joints of course are pivotal in order to allow free movement of the beam.

The tray on which the letters are placed is a Bush Wheel fitted with two Flat Trunnions and two Curved Strips, and the Bush Wheel is attached to the top of the $2\frac{1}{2}''$ Strip below it by means of an Angle Bracket. A $1''$ Pulley is fixed to the other end of the beam to balance the weight of the tray, and a rider consisting of three Angle Brackets, a Flat Bracket and a $1''$ Pulley is arranged to slide along the beam. A vertical post fitted with Flat Brackets provides stops that prevent excessive movement of the beam.

Before the balance can be put into practical use it is necessary to calibrate it. A strip of paper is glued to the beam, and weights of 1, 2, 3 and 4 oz. are placed in the scale pan in succession, the rider positions that give exact balances being marked. If actual weights are not available various objects of known weight are used instead, and the scale of marking is worked out in a similar manner.

Parts required to build the model letter balance: 4 of No. 2; 4 of No. 5; 3 of No. 10; 5 of No. 12; 1 of No. 17; 4 of No. 22; 1 of No. 24; 24 of No. 37; 6 of No. 37a; 3 of No. 38; 2 of No. 48a; 1 of No. 52; 4 of No. 111c; 2 of No. 126; 2 of No. 126a; 4 of No. 155a.

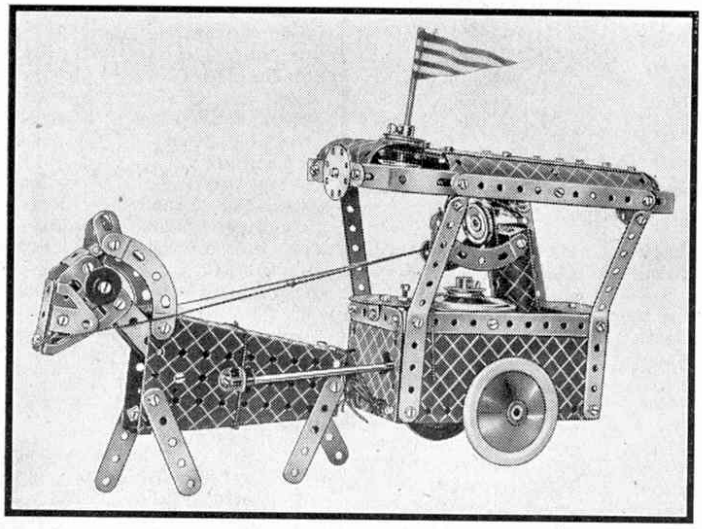

Fig. 1. An amusing model of a familiar street and seaside subject. This representation of an ice cream cart can be built from the contents of Outfit No. 4.

The ice cream vendor's vehicle is shown in Fig. 1. The bottom of the cart is a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate, to the flanges of which are bolted two $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates to form the sides, and two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates to form the front and rear respectively. The Plates are strengthened at their upper edges by $5\frac{1}{2}''$ and $2\frac{1}{2}''$ Strips, and the canopy supports are $5\frac{1}{2}''$ Strips. The canopy itself consists of a $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate and the halves of a Hinged Flat Plate from which the centre pin has been removed. To the long edges of the plate so formed are bolted $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates bent as shown, and $1\frac{11}{16}''$ radius Curved Plates form the front and rear. The Flexible Plates and Curved Plates are strengthened at their lower edges by $5\frac{1}{2}''$ and $2\frac{1}{2}''$ Strips respectively, their ends being joined by Formed Slotted Strips.

Two Semi-Circular Plates are attached by Angle Brackets to each end of the cart, and a Double Angle Strip is bolted between the sides. The latter part supports a $3\frac{1}{2}''$ Rod, which is pushed through the centre hole in the Double Angle Strip and through the Flanged Plate. The Rod carries at its upper end the Road Wheel and the $1''$ Pulley that represents the ice cream freezer, and its lower end is fitted with a Spring Clip. The Road Wheels on which the model runs are fitted on a $3\frac{1}{2}''$ Rod that represents the axle.

The driver's body consists of two U-Section Curved Plates bolted together to form a cylinder, to the upper edge of which is attached a $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip by means of an Angle Bracket, the same bolt holding also a Double Bracket. A $1''$ Pulley forms his face and his hat is a Bush Wheel, and both parts are fixed in place by $\frac{3}{8}''$ Bolts. His arms are $2\frac{1}{2}''$ Curved Strips, which are bolted to the ends of the $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips. The completed figure is bolted to the side of the cart.

The "horse" consists of two Flanged Sector Plates joined together with Flat Brackets. Its head is built up from Trunnions and Flat Trunnions, which are fastened to the $3\frac{1}{2}''$ Strips and Curved Strips forming the neck. The eyes are washers painted black. The shafts of the cart are $4''$ Rods, and they are attached to the horse and cart by means of Spring Clips.

Parts required to build the model ice cream cart: 8 of No. 2; 2 of No. 3; 8 of No. 5; 5 of No. 10; 2 of No. 11; 5 of No. 12; 4 of No. 12c; 2 of No. 15b; 3 of No. 16; 1 of No. 17; 4 of No. 22; 1 of No. 24; 8 of No. 35; 75 of No. 37; 2 of No. 37a; 4 of No. 38; 1 of No. 48; 3 of No. 48a; 1 of No. 52; 2 of No. 54a; 4 of No. 90a; 3 of No. 111c; 2 of No. 126; 2 of No. 126a; 1 of No. 176; 3 of No. 187; 2 of No. 189; 2 of No. 190; 1 of No. 191; 2 of No. 192; 1 of No. 198; 2 of No. 199; 2 of No. 200; 1 of No. 212; 1 of No. 213; 2 of No. 214; 2 of No. 215; 2 of No. 217a; 2 of No. 217b.

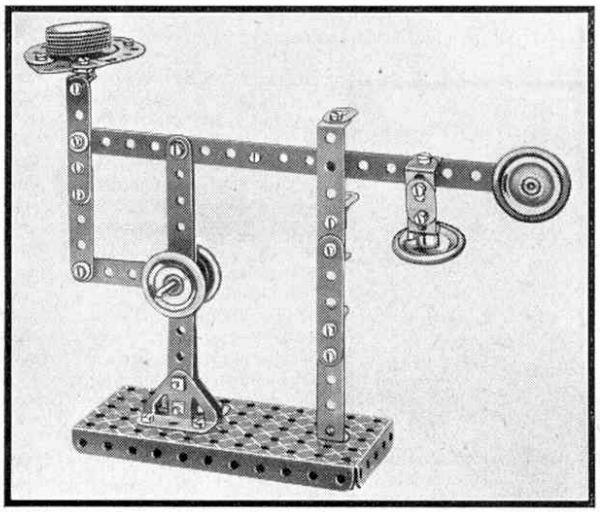

Fig. 2. An easily-built balance that can be put to practical use in weighing letters. It can be built from the contents of Outfit No. 1.

The model windmill shown in Fig. 4 is of the revolving type and is fitted with a fantail, which is mounted at the end of two booms that project from the mill and are supported at their outer ends on wheels. When the wind changes its direction the fantail is rotated and drives the wheels of the boom, thus turning the mill so that the sails always face the breeze.

The superstructure is the first part of the model to be built. A Hinged Flat Plate 2 that forms the roof of the mill is extended downwards at each side with Flexible Plates. The side shown in Fig. 4 consists of two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates, one $4\frac{1}{2}'' \times 2\frac{1}{2}''$ and one $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate. The other side comprises three $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates. The lower $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates are strengthened with $5\frac{1}{2}''$ Strips, to each end of which are fastened Angle Brackets. Similar parts are attached also to the corners of the Hinged Flat Plate and are connected by $3\frac{1}{2}''$ Strips, to which are bolted Semi-Circular Plates.

The rear wall of the mill consists of two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ and two $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates, the door posts being formed by $2\frac{1}{2}''$ Strips as shown. The front wall is edged round with Strips in the same