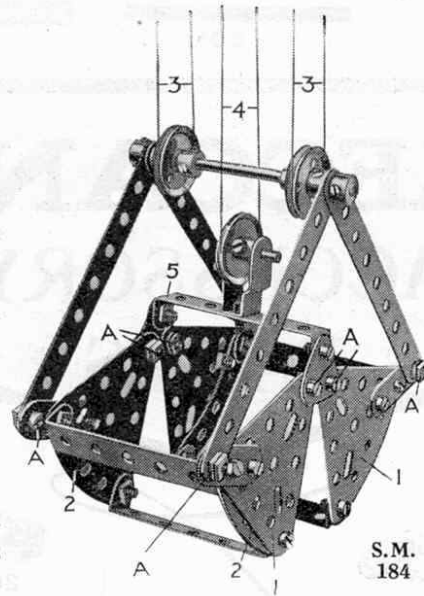


Dragline is designed to perform similar duties to the ordinary Mechanical Shovel, and that the principal difference between the two types of excavators lies in the fact that the bucket of the Dragline is drawn along by means of cables, with the result that its cutting stroke is directed always towards the machine, whereas the stroke of the Shovel is in a direction away from the machine. Hence the Dragline is most usefully employed in levelling or increasing the depth of a cutting or canal bed, while the Shovel is used more often to widen such works, by cutting away the perpendicular sides of the excavation.

The construction of the Meccano bucket will be followed from the illustration (S.M. 183). On the cutting stroke, the teeth 1 are drawn into the earth by means of the Chain 2, while a cord 3 sustains the bucket at the requisite angle. The apparatus is raised or lowered by means of a hoisting cord and pulley block 4.

**S.M. 184—Grab**

A "grab" is a device used in conjunction with coalers or similar machines. It consists of two hinged jaws that may be opened or shut at the will of the operator, and is usually suspended by two separate hoisting cables. The movement of the jaws is effected by operating one or



S.M. 184

both of these cables.

Let us suppose, for example, that it is required to raise a quantity of coal. The grab is lowered in the open position until it rests upon the loose coal, when the cable that closes the jaws is hauled in. This draws together the movable sections, and the grab gathers up a huge "mouthful" of coal. It is then hoisted and swung round to the desired position, where the coal is discharged by re-opening the grab.

The jaws of the Meccano grab are constructed from 2½" Triangular Plates 1 extended at their bases by 2½" Curved Strips 2. The grab is raised or lowered by means of four lengths of cord 3, while another cord 4 passes round a 1" Pulley carried from the cross-piece 5. If both the cords 3 and 4 are hauled in or paid out at the same speed, the grab travels up or down without the jaws moving, but if one cord ceases to move, the

grab opens or closes according to the movement of the other cord. The joints marked "A" are all connected pivotally by means of bolts and lock-nuts (see S.M. 263).

If the outer sides of the grab jaws are filled in with cardboard, or additional parts, the grab will pick up small loads of sand, marbles, etc. It will then form a very useful adjunct to a Hornby goods yard.

## Section XIII. Miscellaneous Appliances

**S.M. 251—Differential Gear**

If we were to examine the tracks of a motor-car that has travelled in a complete circle we should find that the diameter of the circular path of the outside wheels is greater than that of the path of the inside wheels, the difference being equal to twice the length of the axle connecting one inner wheel to one outer wheel. It is obvious, therefore, that when a motor-car travels in a curved line the inner and outer road wheels must rotate at unequal speeds, for the inside road wheels must follow a curve of smaller radius and consequently cover a shorter distance than the outside wheels.

But the two rear wheels are both driven from the same engine, and no doubt all Meccano boys are aware that the difficulty of the variation in speed is overcome by incorporating in the drive transmission some form of differential gear.

The model differential gear shown in S.M. 251 is a striking example of the practical value of the Meccano system, for it demonstrates the principle of this ingenious mechanism in a clear and interesting manner.

The back axle shown in the Meccano model is built up from two separate units—a 3½" Rod 1 and a 5½" Rod 2, which are inserted in the Coupling 3 and allowed to revolve freely. A Contrate Wheel, 4 and 5, is secured to each unit. A 1½" Contrate Wheel 6, with set screw removed, revolves freely upon the Rod 2, and is driven from the ½" Pinion 7 on the propeller shaft 8.

The frame 9, consisting of two 1½" Double Angle Strips bolted to 1½" Strips, revolves with the Contrate Wheel 6, to which it is secured by 1" Threaded Rods 10. Two ¾" Pinions 11 and 12 are mounted on 1" Rods 13, for which the centre transverse hole of the Coupling 3 forms a bearing; they are thus free to revolve independently of each other, but they are engaged by the Contrates 4 and 5.

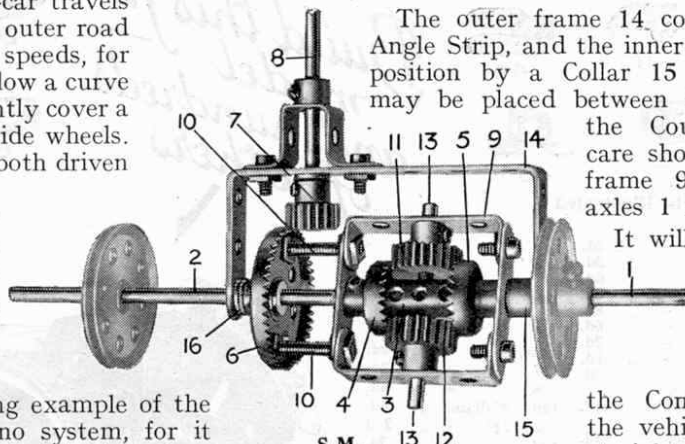
The outer frame 14 consists of a 3½" x 1½" Double Angle Strip, and the inner frame 9 is held in its correct position by a Collar 15 and Washers 16. Washers may be placed between the Pinions 11 and 12 and the Coupling 3 if required, and care should be taken that the inner frame 9 revolves freely upon the axles 1 and 2.

It will now be seen that if one road wheel revolves at a greater speed than the other the Pinions 11 and 12 begin to rotate and adjust the difference in speed between the Contrate Wheels 4 and 5. If the vehicle is running in a perfectly straight course, however, the axles 1 and 2, Contrates 4 and 5, and

Pinions 11 and 12, must all rotate as one unit, since the road-wheels are travelling at the same speed.

The 1½" Pulley Wheels shown in the illustration are affixed to the Rods 1 and 2 and are intended for use as brake drums. They do not concern the differential movement.

(Further Standard Mechanisms appear on page 61)



S.M. 251

**(181)—Single Suspension Grab**

Grabs may be divided into two main classes, "single suspension" and "double suspension." In the latter there are two sets of ropes passing over the jib head pulleys down to the grab, but in the former there is only one. An excellent example of a double suspension grab is that fitted to the Meccano High Speed Ship Coaler (see Special Instruction Leaflet No. 2).

The mechanism by which the single suspension type of grab is controlled is ingenious yet simple, and it is therefore particularly suitable for reproduction in Meccano, as will be seen from the illustrations on this page. We are indebted to Messrs. Stothert and Pitt (Bath) for particulars relating to the prototype of the model.

Fig. 181 is a general view of the grab, whilst Fig. 181a shows the grab head partly dismantled. The construction of the jaws themselves should not present any particular difficulty since they are fairly apparent from the illustration. Each jaw consists of two 2½" Triangular Plates and one 2½" x 2½" Flat Plate. The apices of the Triangular Plates are attached by lock-nutted bolts (see Standard Mechanism No. 263) to 1" Triangular Plates that are bolted rigidly to each end of a 2½" x ½" Double Angle Strip 1, and four connecting bars (4½" Strips) are attached pivotally to the outer ends of the jaws by lock-nutted bolts.

The grab head gear is shown in detail in Fig. 181a, from which it will be seen that the side plates 2 carrying the operating mechanism are 2½" Flat Girders, which are connected together by 1" x ½" and ½" x ½" Angle Brackets 3, 3a. On the side plate shown detached, are fixed two 1" Triangular Plates that carry 1" x ½" Angle Brackets 4 and 5, and to the Bracket 5 is secured a Double Bracket, with two Flat Brackets 6 bolted to it. Two Washers are placed between each Flat Bracket and the Double Bracket for spacing purposes.

The hooks 7 are composed of 2½" Strips bent to the shape shown in the illustrations and attached by means of ½" Bolts to 57-teeth Gears. The ends of the Strips are each fitted with a Pawl and a Flat Bracket. The catch 9 (Fig. 181a) is composed of a Centre Fork, held in the end bore of a Coupling, which also carries a Handrail Support 10 and a balance weight 11 consisting of a 1" Rod to the end of which is secured a Collar. The Gears are arranged to mesh with each other so that the hooks 7 lie at the same angle to the perpendicular, and the Rods on which they are secured should be quite free to turn in the side plates 2.

The Handrail Support 10 of the catch is mounted freely on the spindle of the right-hand Gear, and a ¾" Bolt 8 is secured by double nuts to the Gear in the third hole from that in which the 2½" Strip is secured. Each hook is kept in the normal position by a piece of Spring Cord 12, one end of which is attached to the side plate and the other to a set-screw inserted in the boss of the 57-teeth Gear. Each piece of Spring Cord should be partially wound round the boss of the 57-teeth Gear before it is attached, so that its effort to come back to its normal state, and not its actual tension, is utilised to return the hooks. If it were used in the normal way, the tension would be too great for the purpose in view.

The connecting links between the grab proper and the grab head are attached by lock-nutted bolts to the 1" Triangular Plates, and the hoisting cord 16 is secured to the cross member 1. The cord is then threaded through the round hole in the lower guide 4, and a large

knot made in it in such a position that when the jaws are open the knot rests on top of the guide. The cord may then be passed through the upper guide 5 and through the 1½" Pulley 15, which is termed the "suspender ring." This Pulley is hung by two cords from the jib head. The cords may be of any length to suit the height at which it is desired to effect discharge.

The operation of the grab is as follows: The grab should be assumed to be approaching the suspender with jaws closed. In this position the hooks are resting against the stops 6, the catch 9 is not touching the cord, and the knot is above the catch. The Pawls of the hooks 7 are forced over the rim of the suspender 15, thus causing the catch 9 to rise and bear against the hoisting rope. When the latter is allowed to unwind, the entire weight of the grab is borne by the hooks and the jaws open. As the grab opens to its fullest extent the knot in the hoisting cord passes to the underside of the catch 9.

To release the grab from the suspender, the hoisting rope is hauled in a trifle, thus causing the knot to bear against the underside of the catch. The latter bears, in turn, against the ¾" Bolt 8 and the arms of the hooks fall back on the stops 13. The grab is now freed from the suspender and it can be lowered in the open position. On reaching the material to be removed, the hoisting rope is allowed to fall quite slack so as to give the weight of the Collar 16a a chance to pull the knot free from the catch, and so permit of the closing of the jaws when hoisting is commenced.

The two ½" x ½" Angle Brackets 14 (Fig. 181a), by bearing against the connecting arms of the grab, serve to maintain the grab head in a horizontal position in relation to the jaws under all conditions of service.

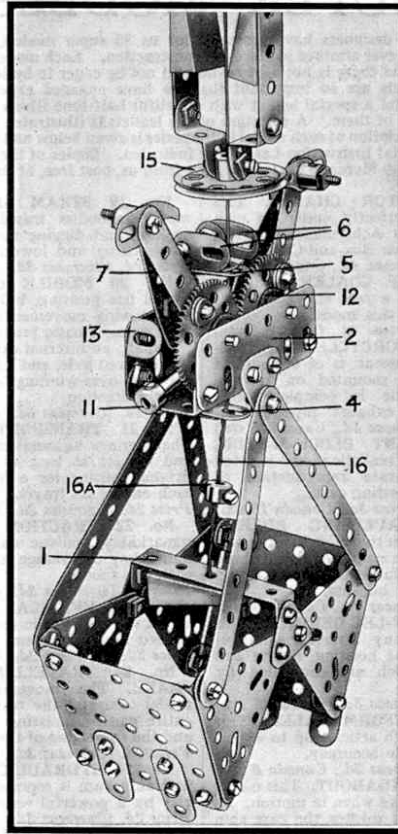


Fig. 181. Single Suspension Grab.

**Miscellaneous Suggestions**

*Under this heading "Spanner" replies to readers who submit interesting suggestions regarding new Meccano models or movements that he is unable to deal with more fully elsewhere. On occasion he offers comments and technical criticisms that, he trusts, will be accepted in the same spirit of mutual help in which they are advanced.*

**(M.74). Morse Practice Set.**—The idea underlying a device by J. Collier (London, S.E.9), is that instead of having a key with which to send the messages, the dots and dashes of the Morse Code are "written" down on a copper sheet with a Meccano Rod, both the sheet and Rod being attached by wires to the source of current supply. Whenever the Rod touches the copper, the circuit is completed and the buzzer sounds or a lamp lights for a long or short period, according to whether a dash or dot is written down. While this idea is certainly very ingenious it holds no advantages over the normal method of transmission, i.e. by key or "tapper."

**(M.75).—Meccano Filter Stand.**—Those who are interested in chemistry will know that a filter stand is always a useful acquisition, and they will accordingly be interested in the device suggested by L. Harrison (Nottingham). It consists essentially of a Rod secured vertically by means of a Bush Wheel to a Wheel Flange, which serves as a base. A 3½" Strip bolted to a Double Arm Crank

is fixed in position on the Rod, and the holders for the funnels are mounted on its extremities. The holders each consist of a Wheel Flange, which is secured by a ¾" Bolt, shank upward, to the end of the 3½" Strip in such a manner that the centre hole in the Wheel Flange is unobstructed by the Strip. Three other ¾" Bolts are fixed in the remaining holes of the Wheel Flange, to support the funnel. The provision of a larger base would make the apparatus steadier.

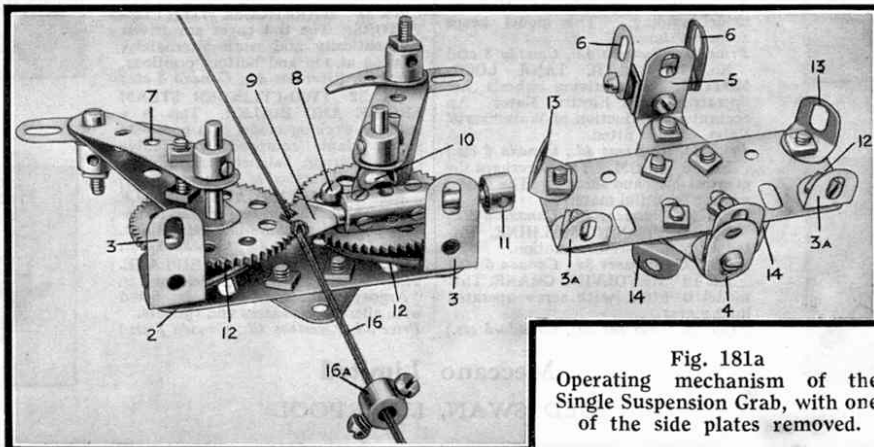


Fig. 181a  
Operating mechanism of the  
Single Suspension Grab, with one  
of the side plates removed.



**(321)—Shaft Governor** (F. Sanders, Glasgow)

Stationary steam engines must be fitted with some form of governing device to maintain a steady speed and to prevent "racing" when the engine is relieved of its load, or in the event of a failure in the drive transmission. The governors operate under the influence of centrifugal force which causes weights on a rotating shaft to move outward, the extent of their movement being dependant upon the speed of the shaft. The weights are connected by link motion to operate the throttle valve, thus regulating the amount of steam entering the cylinder.

Another form of governor is fitted to the crankshaft and varies the throw of the eccentric that operates the slide valve. The mechanism is generally embodied in the flywheel, and as the speed of the engine increases, the eccentric throw is reduced, thus diminishing the amount of steam admitted to the cylinder.

A model of this type of governor is shown in Fig. 321. The flywheel is formed from two Hub Discs bolted together back to back and secured to a Bush Wheel at the centre. The crankshaft is secured in the Bush Wheel and its end protrudes and carries the Rod Socket 1. A 1½" Strip is pivoted on the screwed shank of the Socket and is retained in place by means of lock-nuts. The weights 2 are each formed from three sets of four 2½" large radius

Curved Strips bolted together with the ends overlapping two holes, and are pivoted on ½" Bolts 3. Lengths of Spring Cord are attached as shown so that the weights are normally held close together.

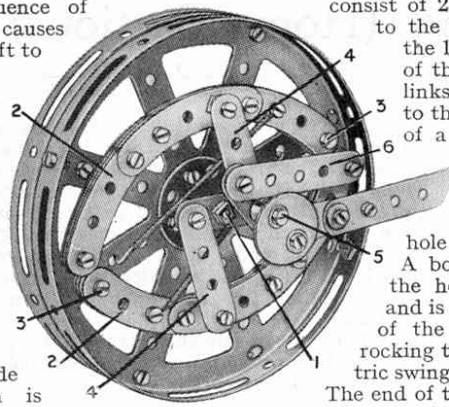


Fig. 321

The connecting links 4, which consist of 2" Strips, are pivoted to the weights and also to the 1½" Strip at the centre of the Wheel. One of the links is pivotally attached to the 1½" Strip by means of a ¾" Bolt that passes through the boss of a Single-Throw Eccentric and also through the centre hole of a Threaded Crank. A bolt is passed through the hole in the Eccentric and is screwed into the boss of the Crank, so that by rocking the Crank, the Eccentric swings about the ¾" Bolt 5. The end of the Crank is pivotally connected to the outer end of one of the pivoted weights by means of a 2½" Strip 6 that is slightly cranked.

When the device is in operation centrifugal force causes the weights 2 to fly outwards against the action of the Spring Cord, and the links 4 turn the 1½" Strip about its central pivot 1. At the same time the link 6 pulls on the web of the Threaded Crank and so rotates the Eccentric about its boss. Thus the outward movement of the weights decreases the effective throw of the Eccentric according to the speed of the engine. As the speed is reduced, the Spring Cord pulls the weights together again and thus the Eccentric throw is increased.

**(322)—Pincer Grab** (E. Tompkins, Bristol)

Bucket type grabs are used extensively for handling loose material such as sand, gravel or earth, but for large blocks and stones it is generally necessary to resort to slinging, which takes considerably longer. An ingenious type of grab or handling large stones has been devised by Messrs. Bucyrus-Erie Co., and a model of this device is illustrated in Fig. 322. The Meccano grab can be used in connection with a model crane or excavator and will give hours of fun handling miniature blocks of stone in a model quarry, etc.

The suspension block is made from two 2" Strips and 1" Corner Brackets, spaced apart about ½" by means of ¾" securing Bolts. The hoisting cord 4 is tied to one of these Bolts and the other Bolt carries a ½" loose Pulley and two Washers. The Rod 1, passed through the 2" Strips and Corner Brackets, serves as a pivot for the curved arms to which the gripping jaws are attached. Each arm is made of two 2½" small radius Curved Strips to which 4½" Strips are bolted. Collars are used as shown for spacing the Strips apart and making the arms rigid.

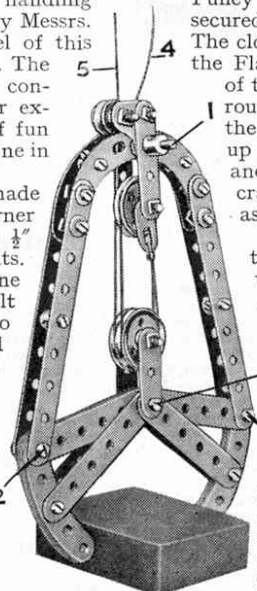


Fig. 322

The jaws each consist of six 2½" large radius Curved Strips, and are pivoted on the ¾" Bolts 2. Each of the latter carries also two 3" Strips, and a further pair of 3" Strips is rigidly bolted at the centre hole of each jaw. The two pairs of Strips on each jaw are pivoted on the ¾" Bolt 3, which carries also two 1½"

Strips. A ¾" Bolt, passed through the upper ends of the 1½" Strips, carries two 1" loose Pulley Wheels between which a Washer is placed for spacing purposes. The 2" Strips of the suspension block carry a 1" loose Pulley and Flat Bracket, on a ¾" Bolt secured in the lower holes of the Strips. The closing "rope" 5 is tied at one end to the Flat Bracket and passes round one of the lower 1" Pulleys. It then passes round the upper 1" Pulley and round the second lower Pulley, to be passed up through the Strips of the frame and over a Pulley at the head of the crane jib. The ½" loose Pulley serves as a guide for the cord.

To open the grab the weight is taken by the hoisting cord 4, and the cord 5 is paid out. Thus the jaws are opened, and by hoisting on the cord 5 they can be closed to grip the article that is to be raised. The weight of the load increases the pull on the cord and in consequence the upper and lower Pulleys are pulled together and the grip on the load is increased. It is important that the hoisting cord 4 should remain slack when the grab is lifting a load. To release the load the cord 4 is hauled in and the cord 5 paid out.

The model crane or excavator to which the grab is fitted must have two hoisting drums that are suitably geared to operate independently or in unison. When the grab is being raised or lowered both cords must be hauled in or paid out together, but one remains fixed when the grab is opened or closed.

**Suggestions Voting Contest**

Once again we are organising a Voting competition to ascertain which suggestions are the most popular with "M.M." readers. From January to December (inclusive) 1934, twenty suggestions were included in the "Suggestions Section," and competitors are asked to write down which four of these they consider to be the best in order of merit. The suggestions published number from 300 to 319, and it is necessary to put only the numbers on a postcard. The suggestion that is considered the best should be written first, and the second best next, and then the third and fourth, and the competitor's full name and address should be written below. Only one list of suggestions may be submitted by each entrant.

The contest is divided into two Sections, Section A for competitors residing in the British Isles, and Section B for Overseas competitors. The two Sections will be treated entirely separately, every vote received being recorded so that the suggestions may be classified in their order of popularity. In each Section the competitor whose list is found to coincide most nearly with the final result of the voting will be presented with a cheque for £1-1s. The next nearest to the general opinion of the voters will be awarded a cheque for 10/6, and twelve "runners-up" will receive consolation prizes.

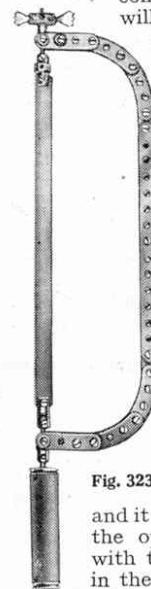


Fig. 323

By treating the entries for both Sections separately, it is possible for different suggestions to appear in the results, and it will be interesting to compare the opinions of Overseas readers with those of competitors residing in the British Isles.

The contributor of the suggestion that is voted best in one or both of the Sections will receive a cheque for 10/6, and the other contributors whose suggestions appear in the final results of the voting will receive consolation prizes.

Postcards must be addressed to "Suggestions Voting" Competition, Meccano Ltd., Binns Road, Liverpool 13. The closing date for Section A is 30th March, and for Section B, 30th April.

**(323)—Hacksaw**

(W. R. H. Temple, Shanklin)

Useful tools, built entirely of Meccano parts, have previously been dealt with from time to time in these pages. Yet another instance of the practical uses of Meccano is shown in the model hacksaw in Fig. 323. The frame is built up from two 9½" Strips, outside which are two 7½" Strips. Curved Strips are bolted at the ends of the 9½" Strips, and Washers are placed between them to make them rigid.

At the outer ends of the Curved Strips, 2" Strips are bolted, and each pair of the latter carries a Coupling that is fixed by bolts inserted through the Strips and screwed into the tapped bores. A Rod is passed through the lower Coupling and carries a Wood Roller fitted between two 1" Pulley Wheels to form a handle. A Strip Coupling is carried on the inner end of the Rod to hold one end of the hacksaw blade, the other end of which is carried in another Strip Coupling secured to a Screwed Rod.

**(381) Stroboscope** (A. Carr, Wolverhampton)

The stroboscope is an ingenious instrument that to-day is largely used by engineers for observing mechanisms working at high speed. A revolving wheel or moving parts of machines appear to be stationary when looked at through the instrument if this is properly adjusted. This effect is obtained by viewing the mechanism through a slit, in front of a rapidly revolving shutter, the speed of which can be varied at will. If the shutter is made to rotate at the same speed as the wheel or other moving object it is desired to examine, the eye receives a succession of glimpses of the mechanism at the same point in its rotation. Owing to the persistence of the image formed in the eye, this series of glimpses blends into a continuous steady image. If the speed of the shutter exceeds that of the moving object the image seen by the eye appears in reverse slow motion, but if the shutter speed is reduced to a point slightly below the speed of the object under observation it is seen revolving slowly in the direction in which it actually is moving.

A simple hand-driven model of this mechanism was submitted by A. Carr, of Wolverhampton, and is shown with the back of the casing removed in Fig. 381. In this model, however, the shutter has four slots in it instead of one, so that as the shutter gives four glimpses of the subject under study each revolution, to obtain a still image, it is necessary to rotate the shutter only at one quarter the speed of the subject.

The mechanism is contained in a box, the front of which is built up from  $5\frac{1}{2}$ " Angle Girders connected together at each end by  $2\frac{1}{2}$ " Angle Girders. Two  $2\frac{1}{2}$ "  $\times$   $1\frac{1}{2}$ " Double Angle Strips and two  $2\frac{1}{2}$ "  $\times$   $\frac{1}{2}$ " Double Angle Strips are bolted in the position shown, to form bearings for Rods 1 and 2. The  $2\frac{1}{2}$ "  $\times$   $1\frac{1}{2}$ " Double Angle Strip forming the bearings for Rod 2 is opened out slightly to allow sufficient clearance for the  $2\frac{1}{2}$ " Gear Wheel. Bearings for Rod 3 are provided by two  $2\frac{1}{2}$ "  $\times$   $\frac{1}{2}$ " Double Angle Strips, the lower one being spaced from the  $5\frac{1}{2}$ " Angle Girders by two Washers on each side. The upper one is similarly spaced from the two  $5\frac{1}{2}$ " Flat Girders.

The shutter is a Face Plate carried on Rod 1, and its round holes are covered by fastening bolts in them or by pasting them over with paper. Behind the Face Plate and on the same Rod, is a  $\frac{1}{2}$ " Pinion, and a Collar is fastened on Rod 1 outside the Double Angle Strip that forms the lower bearing.

A  $2\frac{1}{2}$ " Gear on Rod 2, which carries also a  $\frac{1}{2}$ " Pinion, meshes with the  $\frac{1}{2}$ " Pinion on Rod 1, and a second  $2\frac{1}{2}$ " Gear fastened on Rod 3 meshes with the  $\frac{1}{2}$ " Pinion on Rod 2. Rod 3 carries a  $\frac{1}{2}$ " Helical Gear that meshes with a second  $\frac{1}{2}$ " Helical Gear on the  $3\frac{1}{2}$ " Rod 4. Two  $4\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Strip Plates are used to enclose the front and back of the casing.

The stroboscope can either be held in the hand or mounted on a rigid base. An interesting point to note is that if a mark on a revolving disc is viewed through the stroboscope, only one image appears when the shutter is rotating at a quarter of the speed of the disc. When the shutter speed is increased to half that of the disc, two images diametrically opposite to each other are seen. The reason for this is that the shutter gives a glimpse of the mark on the disc at each half revolution. When the speed of the shutter equals that of the disc, four glimpses are seen each revolution, and four separate still images appear, spaced equally round the rim of the disc.

Many interesting experiments can be carried out with the completed instrument. For example, a word written on a piece of paper pasted to a rapidly revolving disc of cardboard can be read quite easily when viewed through the stroboscope, provided that the speed of the shutter is matched exactly to that of the disc.

**(382) Single Suspension Grab** (B. Adair, Maryport)

Most model-builders will be familiar with the single suspension grab used on the Meccano Level-Luffing Automatic Grabbing Crane, and although this mechanism functions excellently when once adjusted, a little difficulty is sometimes experienced in making the correct size knot in the hoisting cord. Model-builders who have had this trouble will be interested in a single suspension grab by B. Adair, Maryport. In addition to entirely eliminating the trouble referred to, the modified grab has the advantage that it is readily detachable from the hoist cord.

The operating mechanism is contained between two 3" Flat Girders spaced by  $1\frac{1}{2}$ "  $\times$   $\frac{1}{2}$ " Double Angle Strips. At the centres of the Flat Girders are 1" Triangular Plates. To the upper pair of these are fastened  $1\frac{1}{2}$ " Strips, across which further  $1\frac{1}{2}$ " Strips are bolted at right angles. The hooks are bolted to Cranks that in turn are fastened to 2" Rods journalled in the second holes from the ends of the 3" Flat Girders. The Rods

carry also the 57-teeth Gears 1 and 3. Between the 57-teeth Gear 1 and the Crank and on the same Rod is a Handrail Support, to which a Coupling is fixed by its grub screws. It carries Rod 2 in its centre plain hole and forms a catch. A length of Spring Cord 5 is held in a Collar at one end of the 3" Flat Girder, and the other end of the Cord is passed into the centre bore of a Coupling secured on the 2" Rod. This is the controlling spring for the catch.

The  $5\frac{1}{2}$ " Strips that form the arms of the grab are pivoted to  $\frac{1}{2}$ " Bolts. The place of the hoist cord used in the Super Model Crane is taken by an 8" Rod, which passes through Double Angle Strip 6 and through the  $1\frac{1}{2}$ "  $\times$   $\frac{1}{2}$ " Double Angle Strips spacing the vertical  $1\frac{1}{2}$ " Strips. The upper end of the Rod carries an End Bearing, and a Collar is fastened to the lower end. The  $\frac{1}{2}$ " fixed Pulley seen in Fig. 382 takes the place of the knot in the hoist cord. The weight of the Rod and Pulley ensures its proper operation.

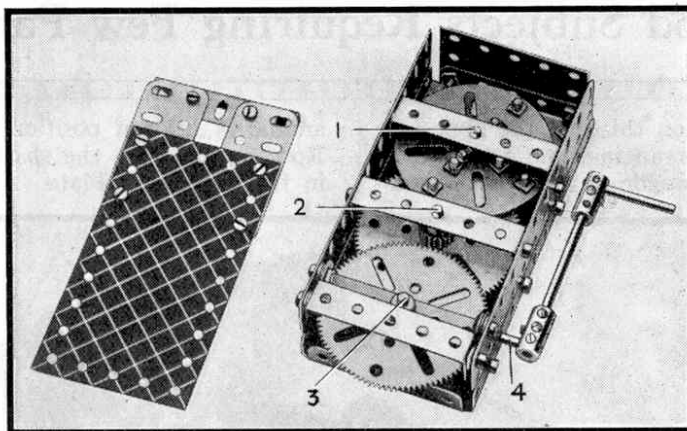


Fig 381

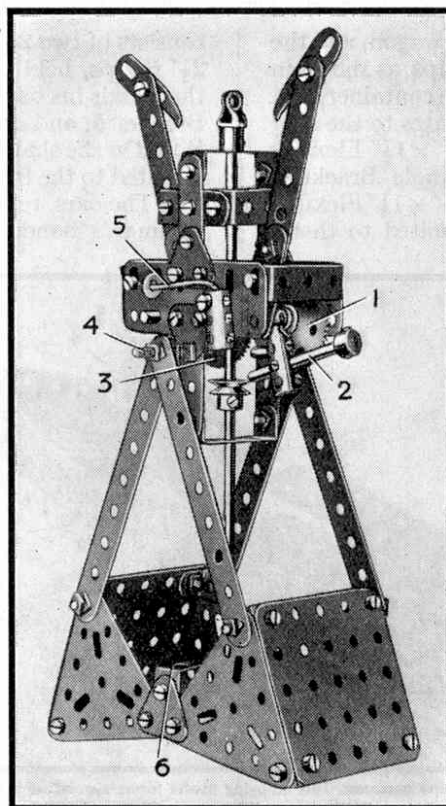


Fig. 382

**Miscellaneous Suggestions**

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**M.195.** L. Cookson, Warwick, submitted recently a suggestion for transmitting the drive from one Rod to another without the use of Couplings. Bush Wheels are secured to the ends of the driving and driven shafts, and a Swivel Bearing is bolted through its boss to a Strip or Plate midway between the shafts. The Collar of the Swivel Bearing is, therefore, pivoted between its forks, and is in line with the bosses of the Bush Wheels. A Rod is passed through the collar so that its ends just engage in diametrically opposite holes in each of the Bush Wheels. When the driving shaft is rotated the Bush Wheel secured on it transmits its motion through the swivel bearing device to the other Bush Wheel. We have tested this arrangement and find that it is satisfactory with Rods 4" or more in length. Shorter Rods than this bind in the holes of the Bush Wheels.

**M.196.** Many model-builders find difficulty in placing nuts on bolts in remote parts of intricate models. J. Stevens of Lowestoft points out that the job is made easy by placing the nut in the arms of a Small Fork Piece, the arms being squeezed together slightly to hold it. The small Fork Piece can then be mounted on a Rod of suitable length to reach the shank of the Bolt. In an alternative arrangement the nut can be gripped in the Fork Piece by means of a nut and bolt passed through the holes in the forks.



# Grabs and Hoists for Cranes

## Equipment That Will Improve Your Models

By "Lock-Nut"

THE fun of building and playing with a model crane is greatly increased by providing it with alternative types of grabs and hoisting tackle, so that loads of different kinds can be lifted. Actual cranes have to handle loads varying from sand and rock to giant concrete blocks and heavy metal castings, and many different types of grabs and lifting gear have been devised to enable them to tackle their work in an efficient and rapid manner. In this article I am showing how some of the more commonly used types of lifting gear can be modelled in Meccano.

All the examples mentioned are easy to build and among them are grabs suitable for building from both large and small Outfits. One of the most simple and generally used grabs is the bucket type employed in actual practice for lifting loose materials such as mud, sand and gravel. A model of this kind is shown in Fig. 1. It has two scoop-like pivoted jaws, which are controlled by ropes from the driving cab and can be opened and closed as desired. The grab is operated by opening the jaws and then lowering it swiftly on to the heap of sand or other material to be moved. The jaws are then closed, an action that causes them to bite into the material and scoop up a full load, and the grab is then hoisted.

The model grab has jaws made of  $2\frac{1}{2}$ " Triangular Plates 1 extended at their bases by  $2\frac{1}{2}$ " Curved Strips 2. It is raised or lowered by means of cords 3, while another cord 4 passes round a 1" Pulley carried on the cross-piece 5. All the cords pass around winding barrels in the crane mechanism. If the cords 3 and 4 are hauled in or paid out at the same speed, the grab travels up or down without the jaws moving, but if one cord is stopped, the grab opens or closes according to the direction of movement of the other cord.

The joints "A" are all pivoted by means of bolts and lock-nuts, and real sand or other loose material can be lifted if the outer sides of the grab are filled in with Flexible Plates. The model crane or excavator to which the grab is fitted must have two hoisting drums that are geared so that they may be operated either independently or together.

Although bucket type grabs are used extensively for handling sand, gravel, earth and similar materials, large blocks and stones cannot be dealt with in this manner and sometimes slings are used. This is a rather slow method, however, and it is now more general to use a grab of the kind shown in model form in Fig. 2. The chief part of the grab mechanism is a suspension block made from two 2" Strips and 1" Corner Brackets, spaced  $\frac{1}{2}$ " apart by means of  $\frac{3}{4}$ " securing Bolts. The hoisting Cord is tied to one of these Bolts and the other Bolt carries a  $\frac{1}{2}$ " loose Pulley and two washers. The Rod 1,

passed through the 2" Strips and Corner Brackets, serves as a pivot for curved arms to which the gripping jaws are attached. Each arm is made from two  $2\frac{1}{2}$ " small radius Curved Strips to which  $4\frac{1}{2}$ " Strips are bolted, and Collars are used as shown to space the Strips apart and make the arms rigid.

Each of the jaws that grip the block or stone consists of six  $2\frac{1}{2}$ " large radius Curved Strips and is pivoted on a  $\frac{1}{2}$ " Bolt 2. Each of the latter carries also two 3" Strips, and a further pair of 3" Strips is rigidly bolted in the centre hole of each jaw. The two pairs of Strips on each jaw are pivoted on the  $\frac{3}{4}$ " Bolt 3, which carries also two  $1\frac{1}{2}$ " Strips. A  $\frac{3}{4}$ " Bolt passed through the upper ends of the  $1\frac{1}{2}$ " Strips carries two 1" loose Pulleys, between which a washer is placed for spacing purposes. The 2" Strips of the suspension block carry a 1" loose Pulley and a Flat Bracket, both on a  $\frac{3}{4}$ " Bolt secured in the lower holes of the Strips. The closing "rope" 5 is tied at one end to the Flat Bracket and passes around one of the lower 1" Pulleys. It then passes around the upper 1" Pulley and around the second lower Pulley, finally being pushed through the Strips of the frame and over a Pulley at the head of the crane jib. The  $\frac{1}{2}$ " loose Pulley serves as a guide for the cord.

To open the grab the weight is taken by the hoisting cord 4, and the cord 5 is paid out. Thus the jaws are opened, and by hoisting on the cord 5 they can be closed to grip the article that is to be raised. The weight of the load increases the pull on the cord, and consequently the upper and lower Pulleys are pulled together. It will be seen therefore that the greater the weight of the load the stronger is the grip of the jaws upon it. It is important that the hoisting cord 4 should remain slack when the grab is lifting a load. To release the load the cord 4 is hauled in and the cord 5 paid out.

The outstanding feature of the skip illustrated in Fig. 3 is that it automatically unloads as soon as it touches the ground. The model may be used in connection with cranes or aerial ropeways. Each side consists of two  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flat Plates, each of which has two  $2\frac{1}{2}$ " Triangular Plates secured to it, and to the ends of these Plates  $4\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flat Plates are attached by means of Angle Brackets at the inner edges of the Triangular Plates as shown. Each of the Plates 6, which form the discharge doors, turn on two Hinges each, and they carry  $4\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strips along their lower edges.

To each end of the Double Angle Strips are pivoted 3" Strips, and one pair of these is pivoted also to the lower ends of  $2\frac{1}{2}$ " Curved Strips, one on each side of the skip. The

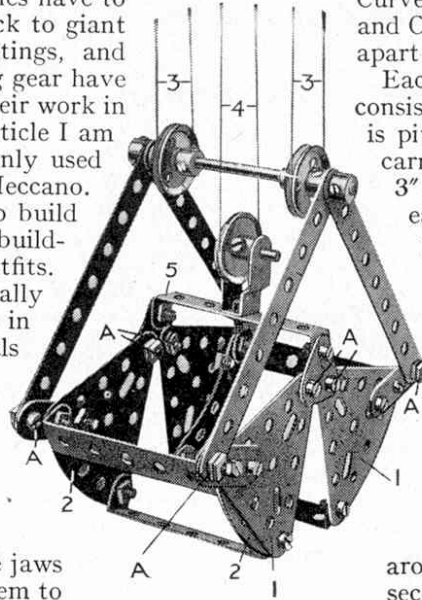


Fig. 1. A model bucket grab used for handling loose material.

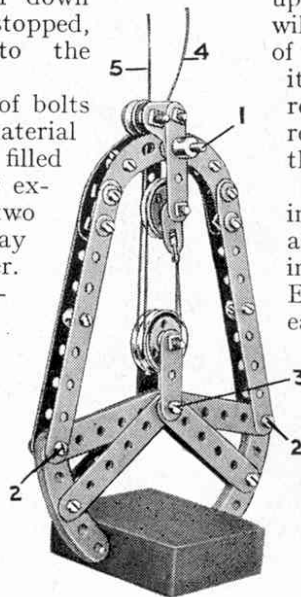


Fig. 2. A novel pincer grab suitable for gripping small blocks and stones.

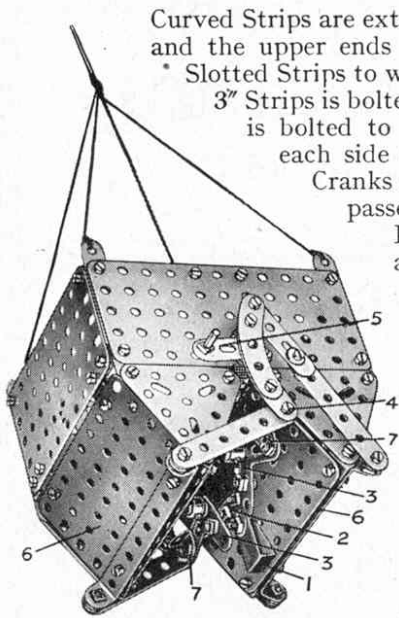


Fig. 3. This twin-chute skip automatically discharges its contents when lowered to the ground.

Curved Strips are extended by similar parts, and the upper ends of the latter carry 2" Slotted Strips to which the second pair of 3" Strips is bolted. A Boss Bell Crank 5 is bolted to the Curved Strips on each side of the skip, and both Cranks are mounted on a Rod passed through the side Plates. The Bell Cranks are provided with Threaded Pins for handles.

Two simple Bell Cranks 3 are pivoted on  $\frac{3}{8}$ " Bolts gripped in Collars carried on 1" Screwed Rods secured to a  $4\frac{1}{2}$ " Strip fitted across the centre of the skip. Angle Brackets 7 are fitted at the outer ends of the Bell Cranks, and a 2" Strip 2 is pivoted

between the inner arms. The pivots are passed through the elongated holes of the Cranks. A 25 gramme Weight 1 is attached to the Strip 2 by means of a 1" Triangular Plate.

When the skip is suspended from the crane, the Weight 1 causes the Angle Brackets 7 on the Bell Cranks to move upwards. By depressing the handle 5 the doors 6 are closed, and the  $\frac{3}{4}$ " Bolts 4 force down the Angle Brackets on the Cranks 3. As soon as they have passed the Brackets, the Weight 1 causes the Brackets to move up again, thus retaining the Bolts in position. The Weight protrudes below the skip, so that it touches the ground first and then releases the Bolts 4. The Weight of the material in the skip causes the doors to open and the load is discharged without external handling. The doors must be closed by hand.

In Fig. 4 is shown another very useful form of grab that is suitable for handling materials of many kinds. It is constructed on what is known as the single-suspension system, one rope only being used for raising and lowering the grab and operating the jaws. As will be seen from the illustration, the model has eight finger-like jaws, each of which is pivotally connected to the rings 1 and 2. The single-suspension operating gear is a compact unit and may be built separately, its design being such as to permit its use on several other types of grab.

The side plates 3 are 3" Flat Girders connected at their lower edges by  $1" \times \frac{1}{2}"$  and  $\frac{1}{2}" \times \frac{1}{2}"$  Angle Brackets. The hooks 4 and 5 each comprise two  $2\frac{1}{2}"$  Strips carrying between them a Pawl and Flat Bracket. One of each pair of Strips is fixed to a 57-teeth Gear mounted on a  $1\frac{1}{2}"$  Rod. These two Gears mesh with each other, and the hooks are held together under light tension by a piece of Spring Cord bolted to hook 5. The right-hand Gear is fitted with a  $\frac{3}{8}"$  Bolt, on which is a Collar that forms the stop for the catch 7. The latter comprises a Coupling pivotally mounted on the shaft of hook 5 by a Handrail Support, and it

carries in its longitudinal bore a Centre Fork and a 1" Rod fitted with a Collar.

At 6 is a  $1" \times \frac{1}{2}"$  Angle Bracket bolted to a 1" Triangular Plate, a similar assembly being fixed to the lower edge of Girder 3. The angular travel of the hooks is limited to approximately 45 degrees by suitable stops. The hoisting cord passes through the  $1" \times \frac{1}{2}"$  Angle Brackets and then through the central hole of the  $1\frac{1}{4}"$  Disc of the ring 1, and is fitted with a Collar at its end. It is important to note that a bulky knot is tied in the Cord as shown at 9.

When the grab is raised under load the hooks 4 and 5 make contact with the suspender ring 8, which is hung from the jib and through which the hoist cord passes. The hooks are forced apart, and are then drawn together again by the Spring Cord so that they hook over the  $1\frac{1}{2}"$  Pulley 8. When the hoist cord is paid out the ring 2 remains stationary but ring 1 falls and the grab jaws open. As the catch 7 is weighted with a Collar, the Centre Fork bears against the hoist rope, so that when this is wound in the knot 9 engages with the Centre Fork and raises the hooks clear of the ring 8. The grab is then held suspended in the open position by knot 9.

Cranes working in metal stockyards and foundries usually are fitted with electro-magnetic lifting tackle in place of a grab or hook. This gear can be reproduced quite easily with Meccano parts and one example is shown in Fig. 5.

Two Bobbins (part No. 181) are wound to capacity with No. 26 S.W.G. wire and attached to the yoke 1, which is composed of three  $1\frac{1}{2}"$  Strips, by the Screwed Rods. The inner leads of the coils are then joined and the outer leads are connected to a Transformer or a battery. The crane hoisting cord passes around the 1" Pulley 3, which turns on a 1" Axle Rod journalled in a Cranked Bent Strip 4 bolted to the yoke 1.

Electro-magnetic lifting tackle of a more powerful type suitable for large model cranes, was described on page 715 of the "M.M." for December 1938. In that case Elektron Magnet Coils were used, and model-builders who do not wish to wind their own coils can also make good use of these in the magnet shown in Fig. 5.

Provision should be made for switching the current on and off, and it is quite easy to make a simple switch by using Meccano parts in conjunction with Elektron parts. One example is a Flat Bracket pivoted on an insulated Bolt and arranged to make contact with a second insulated Bolt.

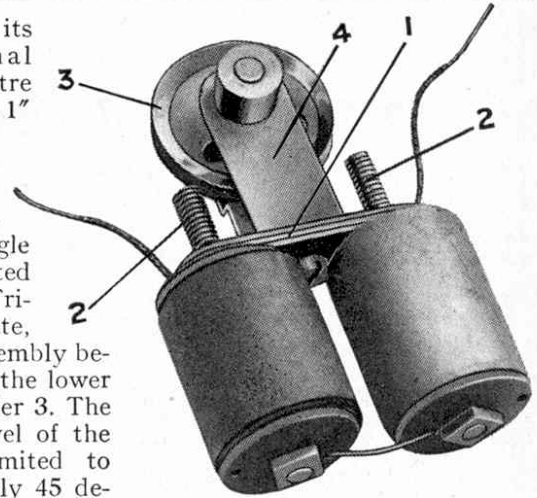


Fig. 5. An electro-magnet forms an interesting alternative to a hook or grab.

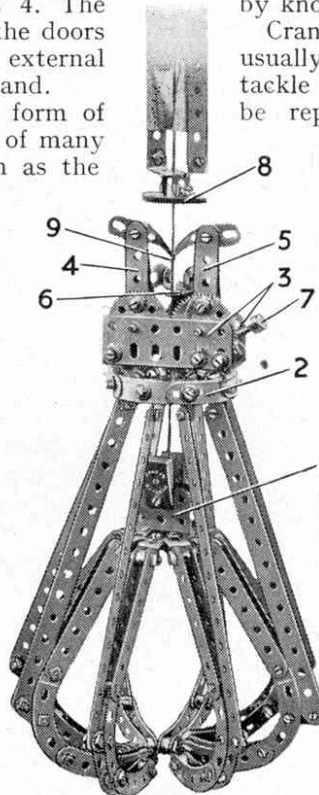


Fig. 4. A multi-jawed grab of the single-suspension type.



# Suggestions Section

By "Spanner"

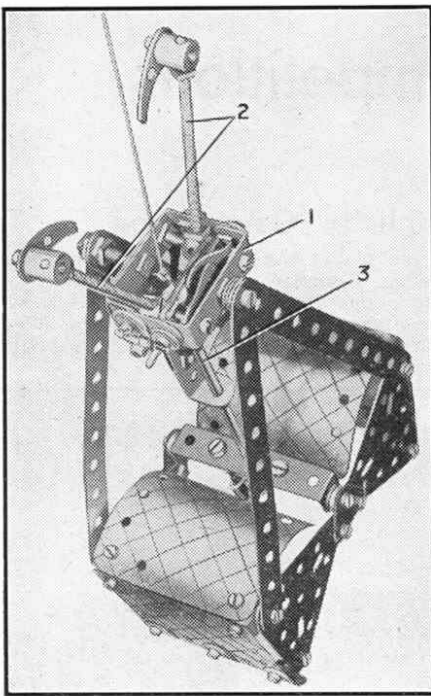


Fig. 523.

## (523) Single Suspension Grab

(N. C. Ta'Bois, Woodford Green)

The framework of the useful grab shown in Figs. 523 and 523a consists of two  $1\frac{1}{2}'' \times \frac{1}{2}''$  Double Angle Strips 1 joined by Flat Brackets. Two Washers are put on the Bolts and one of them carries a Hinge against which bears a piece of Spring Cord. A Flat Trunnion is held by two  $\frac{1}{2}''$  Bolts.

Each of the hooks 2 is a Screwed Rod to which a Pawl without boss is attached by means of a Threaded Boss. One of the Rods is 3" long and the other  $3\frac{1}{2}''$ , and each carries a "spider" as shown. The "spiders" are screwed partly on to the  $\frac{1}{2}''$  Bolts already mentioned, and further  $\frac{1}{2}''$  Bolts fastened to them are free to turn in the holes of the Double Angle Strips. Flat Brackets, one of which is cranked, are fastened to the Bolts. A Bolt on the

cranked Bracket protrudes into the elongated hole of the other Bracket. A piece of Spring Cord attached to the base of the hooks is just strong enough to pull them together.

A Washer is placed on a  $\frac{3}{4}''$  Bolt, which is passed through the Hinge and carries four more Washers, a Collar and a Nut. A  $\frac{1}{2}''$  Bolt is screwed into the Collar and bears against the  $3\frac{1}{2}''$  Screwed Rod. A Collar on a 5" Axle Rod 3 just touches the tip of the  $\frac{3}{4}''$  Bolt when the hooks are on the suspender ring 4, and has a slightly bent Flat Bracket secured to it by a  $\frac{7}{32}''$  Grub Screw. The 5" Rod slides in a  $1\frac{1}{2}'' \times \frac{1}{2}''$  Double Angle Strip bolted to a 3" Strip fixed to the Flat Trunnion. The lower end of the Rod passes through a  $2\frac{1}{2}'' \times \frac{1}{2}''$  Double Angle Strip and is free to slide up and down, but is prevented from turning by an Eye Piece and a  $1'' \times \frac{1}{2}''$  Angle Bracket.

The suspender ring 4 is a 1" fast Pulley to which a Socket Coupling and a Coupling are attached. A Sleeve Piece passes over the two Couplings, and a second Coupling is attached to the first by a Flat Bracket.

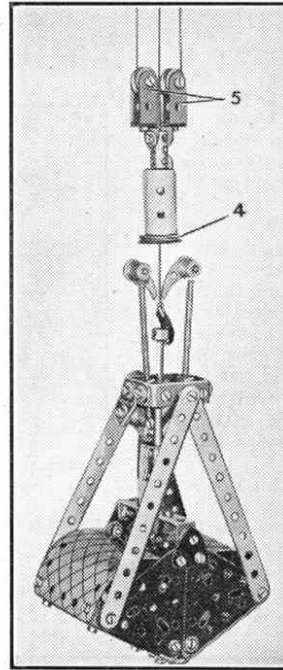


Fig. 523a.

## (524) Automatic Wool Winder

(R. C. Smith, Hawera, New Zealand)

I received recently details of a useful wool winder designed by R. C. Smith, Hawera, N. Zealand. I had the model built up and it is reproduced in Fig. 524.

It will wind a ball of wool direct from a skein, and if desired it may be used in conjunction with a model revolving skein holder.

The construction of the winder is commenced with the base. An E6 or E20B Electric Motor is bolted to two of three  $5\frac{1}{2}''$  Angle Girders that are secured at their ends to  $9\frac{1}{2}''$  Angle Girders 1. The bearings for the winding drum consist of Cranks bolted to the upper ends of a 3" and a  $7\frac{1}{2}''$  Angle Girder 2. The Girder 2 is attached to a  $4\frac{1}{2}'' \times 2\frac{1}{2}''$  Flat Plate 3 fixed to one of the side-members of the base, and is braced by a  $5\frac{1}{2}''$  Strip. This Strip is bolted to the Angle Girder and to a  $4\frac{1}{2}''$  Angle Girder attached to an Architrave.

The gearing that drives the winding drum and the reciprocating guide arm through which the wool passes, is as follows. A Worm 4 on the armature

shaft of the Motor meshes with a 57-teeth Gear 5 mounted on a 2" Rod that also carries a  $\frac{3}{8}''$  Bevel Gear. This Gear meshes with a similar gear on a  $4\frac{1}{2}''$  Rod 6, which also carries a  $\frac{1}{2}''$  Pinion, and a 1" Sprocket that is connected by a length of Sprocket Chain to a similar Sprocket mounted on a  $6\frac{1}{2}''$  Rod forming the winding drum. The wool is fastened to a Cord Anchoring Spring on this Rod.

The reciprocating motion for the guide arm is operated by a Triple-Throw Eccentric mounted on a 4" Rod 7 journalled in a  $2\frac{1}{2}'' \times 1''$  Double Angle Strip bolted to the Plate 3. This Rod is driven from the Motor through a  $1\frac{1}{2}''$  Contrate Wheel meshing with the  $\frac{1}{2}''$  Pinion on the Rod 6. The Eccentric is pivotally connected to a large Fork Piece that carries an 8" Rod, the lower end of which is pivoted on a 1" Rod passed through the centre hole of a  $4\frac{1}{2}'' \times \frac{1}{2}''$  Double Angle Strip bolted between the Girders 1. At its upper end the 8" Rod carries a Rod and Strip Connector through the eye of which the wool is passed.

## (525) An Aircraft Locator Apparatus

(D. Perkins, Hull)

Fig. 525 shows an instrument designed to trace the course of an aeroplane on a map attached to a Ring Frame that forms the base of the model. Construction of the device is quite simple. A Coupling is free to slide along the Rods 3 and is connected by means of four 1" Screwed Rods to two

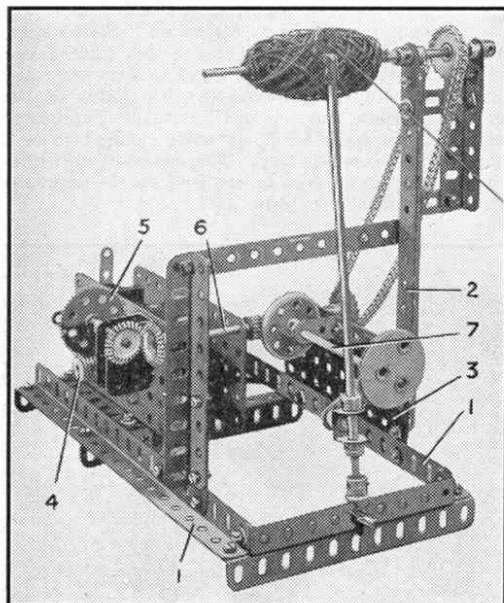


Fig. 524.

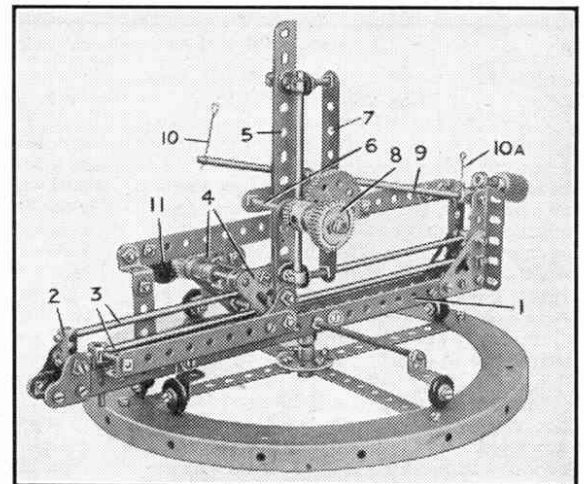


Fig. 525.

$1\frac{1}{2}''$  Corner Brackets 4, the left-hand one of these being bolted to a  $6\frac{1}{2}''$  Rack Strip 5. A movable unit is built up from a  $1\frac{1}{2}''$  and a 2" Strip joined by a 3" Screwed Rod 6, and is attached to Collars that slide up and down  $4\frac{1}{2}''$  Rods fixed (Continued on page 332)

# Suggestions Section

By "Spanner"

## (526) Flywheel Governor ("Spanner")

Most of the devices that are fitted to steam engines to keep the speed constant under varying loads take the form of a centrifugal governor. Another type of governor is illustrated by the mechanism shown in Fig. 526, and the manner in which it controls the engine also differs from the usual arrangement.

In this device a weighted arm is mounted "off centre" so that it is sensitive to

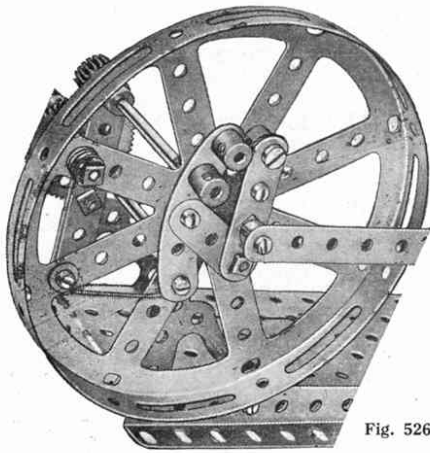


Fig. 526.

changes in speed of the flywheel. It is connected by a  $1\frac{1}{2}$ " Strip to a second pivoted Strip, which is attached to the slide valve rod. When the speed of the engine increases the end of the weighted lever flies outward, due to an increase of centrifugal force, and the lever is moved nearer the centre of the wheel, thus decreasing the radius of eccentricity of the point where the Strip is pivoted. This means that the travel of the slide valve shortens, and therefore the point in the stroke of the piston at which the admission of steam is cut off occurs earlier. The reverse happens when the speed decreases.

The Curved Strip is pivoted to a  $\frac{3}{8}$ " Bolt and spaced from the Hub Disc by Washers, and is prevented from flying outward too freely by a length of Spring Cord which is passed half-way round the pivot of the Strip before being fixed in place. The 2" Strip is bolted to a Crank that is free

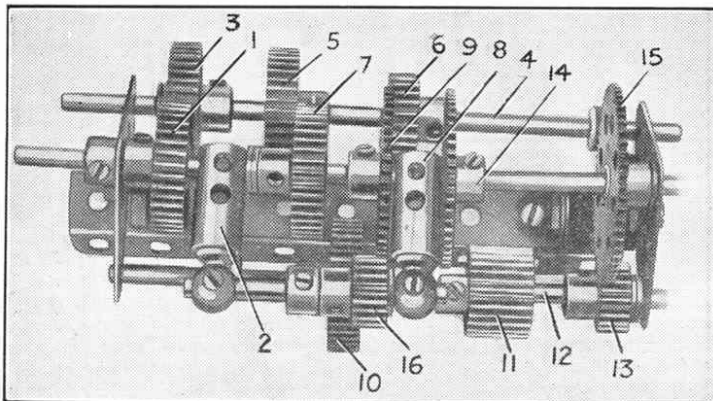


Fig. 527.

to turn on a Pivot Bolt secured to the Hub Disc.

## (527) A Five-Speed and Reverse Gear-Box

(A. M. Simms, Bangor, Northern Ireland)

The compact gear-box shown in Fig. 527 is suitable for incorporation in model motor lorries, and provides five speeds forward and two reverse. The driving shaft is a  $1\frac{1}{2}$ " Rod, and it carries a 1" Gear 1. The other end of this Rod is inserted in a Threaded Coupling 2 that is fixed to a 1" Screwed Rod secured to the channel girders. The 1" Gear 1 remains in constant mesh with a 1" Gear 3 mounted on a 5" Rod 4 that is slidable in its bearings, and carries also another 1" Gear 5 and a  $\frac{3}{8}$ " Pinion 6. The 1" Gear 5 moves in and out of mesh with a 1" Gear 7 mounted on a  $1\frac{1}{2}$ " Rod journalled in the Threaded Coupling 2, and in another similar Coupling 8 secured to a 1" Screwed Rod attached to the girders. The  $1\frac{1}{2}$ " Rod also carries a 50-teeth Gear 9 that moves into engagement with the Pinion 6.

The Gears 7 and 9 are caused to engage and disengage a 1" Gear 10 and a  $\frac{3}{4} \times \frac{1}{2}$ " Pinion 11 respectively, mounted on a 5" Rod 12 that is slidable in its bearings. Rod 12 carries also a  $\frac{1}{2}$ " Pinion 13, and both Pinions 11 and 13 move into mesh with a 50-teeth Gear 14 and a 57-teeth Gear 15 respectively, secured to the driven Rod. The reversing  $\frac{1}{2}$ " Pinion 16 is free to pivot on a 2" Rod held in Handrail Supports screwed in the longitudinal tapped bores of the Couplings 2 and 8.

To engage top gear the Rods 4 and 12 are moved to the farthest limits of their travel to the right and left respectively, and the drive is transmitted through gears 1, 3, 5, 7, 9, 11 and 14. Slight movement of Rod 12 to the right disengages Pinion 11 and Gear 9, and Gear 10 goes into mesh with Gear 7, giving second gear. Movement of Rod 12 further to the right causes Pinion 13 to mesh with Gear 15, resulting in third gear. To engage the fourth and fifth gears the Rod 4 is moved to the extreme left, when

the drive is transmitted either through gears 1, 3, 6, 9, 7, 10, 11 and 14, or 1, 3, 6, 9, 7, 10, 13 and 15.

The two reverse speeds are obtained by moving Rod 12 to the extreme right and Rod 4 to left or right, when the 1" Gear 10 meshes with the Pinion 16 and the drive is taken either through Gears 5 and 7 or 6 and 9.

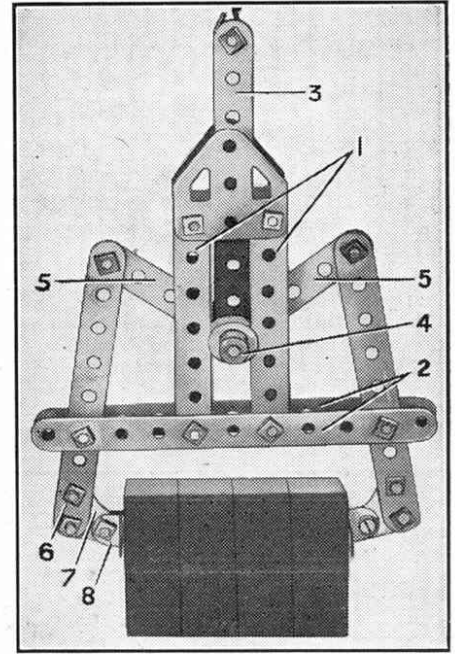


Fig. 528.

## (528) Friction Grip Grab ("Spanner")

Fig. 528 shows a friction grip grab for use with model block-setting cranes. The  $3\frac{1}{2}$ " Strips 1,  $5\frac{1}{2}$ " Strips 2, and Flat Trunnions are in duplicate, and the two sides of the frame so formed are spaced apart by Washers and Collars. Two  $4\frac{1}{2}$ " Strips 3 secured to a Hook slide between the Strips 1, and they are guided by two  $\frac{1}{2}$ " loose Pulleys held in place, one on each side of the Strips, by means of Collars. The ends of two  $2\frac{1}{2}$ " Strips 5 are mounted pivotally on the axle 4 of the Pulleys, and are connected at their outer ends by bolts and lock-nuts to  $4\frac{1}{2}$ " Strips 6,

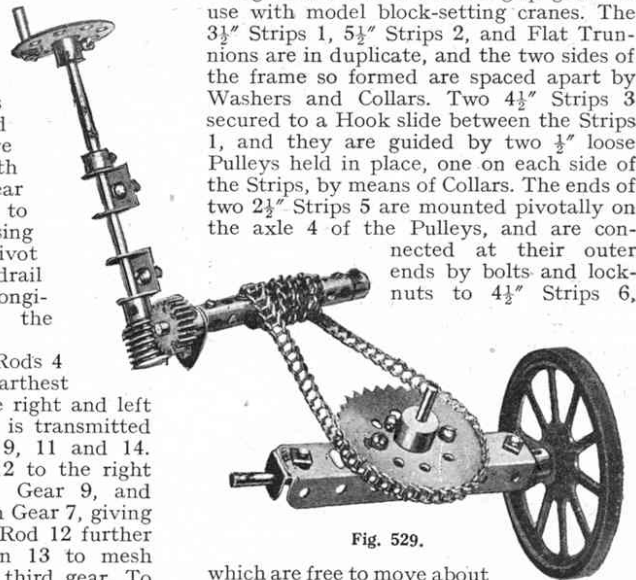


Fig. 529.

which are free to move about bolts in the Strips 2. A cord passes round one of the  $\frac{1}{2}$ " Pulleys and is secured to Strips 2.

When the cord is pulled the jaws of the grip open so that they can be placed one at each side of the block to be raised.

## (529) Traction Steering Gear ("Spanner")

This example shows a form of steering gear that will be found very suitable for large model traction engines and similar models. The steering wheel is secured to a Rod journalled in Double Brackets bolted to the side frame plate of the tractor. It carries at its lower end a Worm engaging a  $\frac{3}{4}$ " Pinion on a horizontal Rod that carries several Couplings and Collars. The heads of the grub screws of these serve to grip a continuous length of Sprocket Chain that is wound five or six times around the Couplings and then passes round the 2" Sprocket on the front axle.

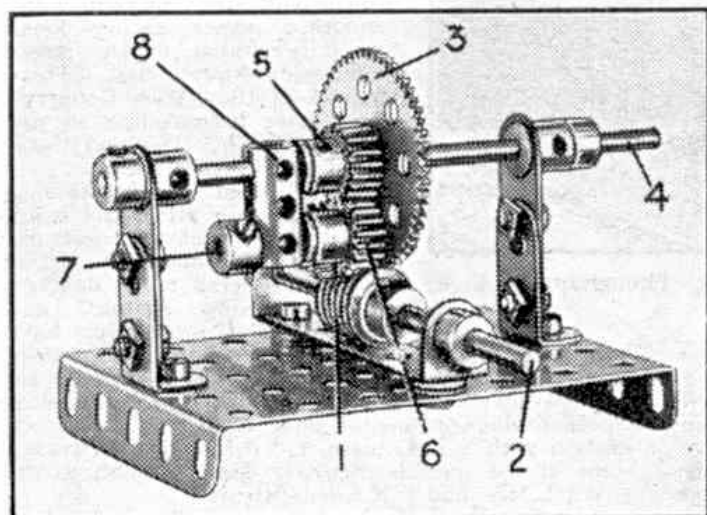


# Among the Model-Builders

By "Spanner"

## READER'S NOVEL INTERMITTENT MOTION GEAR

Michael Corley, Hull, has been busy building a



An intermittent motion device used in a model pile-driver by M. Corley, Hull.

model pile-driver, and in the course of its construction developed a novel intermittent motion drive that may interest other Meccano users. It is illustrated on this page. A Worm 1 is mounted on a Rod 2, which in the original device was the armature shaft of an E020 Electric Motor. The Worm drives a 57-teeth Gear 3 that is free on the driven Rod 4, which carries also a fixed  $\frac{1}{2}$ " Pinion 5. Pinion 5 contacts a second  $\frac{1}{2}$ " Pinion 6, which is mounted on a  $1\frac{1}{2}$ " Rod 7 held at one end in a hole of the 57-teeth Gear and at the other in a Coupling 8 mounted freely on the Rod 4 as shown. The Rod is retained in place by Collars.

When the Worm is rotated, the 57-teeth Gear is driven and carries around with it the Pinion 6. The entire unit is positioned on the Rod 4 so that once during each revolution of the 57-teeth Gear both the Gear and the Pinion 6 are in contact with and driven by the Worm. The Pinion 6 thus transmits drive to the Rod 4 through the fixed Pinion 5, for approximately one-fifth of each revolution of Gear 3. To ensure this the Pinions must be mounted on their Rods with their bosses pointing away from the Gear 3 as shown. In Corley's original model the drive to the winding shaft of the pile-driver was transmitted through a further reduction gear having a ratio of 6:1.

Corley says it is possible to modify the above arrangement to give faster working by replacing the Coupling with a Bush Wheel, which is attached to the 57-teeth Gear by 1"

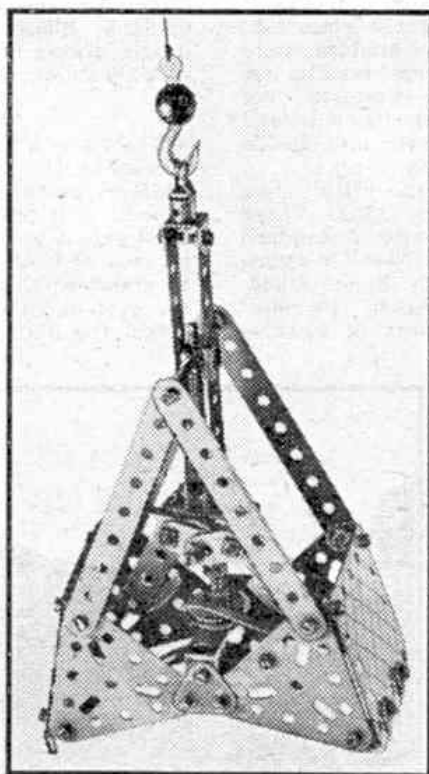
Screwed Rods. Two or three Pinions can then be mounted between the Gear and the Bush Wheel.

## A SINGLE SUSPENSION CRANE GRAB

N. C. Ta'Bois, Woodford Green, sends the following details of a novel crane grab he has designed. It is a very simple arrangement based on the single suspension principle, and its special feature is that it is self-contained and therefore can be attached to the hoisting cord of any model crane.

The jaws, which are constructed as shown, are joined by 1" Triangular Plates to which is bolted a  $2\frac{1}{2}$ "  $\times$   $\frac{1}{2}$ " Double Angle Strip, gripped between a 1" fast Pulley and a Collar on a 5" Axle Rod. A  $1\frac{1}{2}$ " Angle Girder is bolted to a  $1\frac{1}{2}$ " Strip, and two  $\frac{1}{2}$ "  $\times$   $\frac{1}{2}$ " Angle Brackets. These carry  $4\frac{1}{2}$ " Strips joined at their upper ends by a Double Bracket, to which is bolted an End Bearing for hoisting. One of the  $4\frac{1}{2}$ " Strips passes through an Eye Piece in which the 5" Rod is free to slide. The Eye Piece is attached to the  $4\frac{1}{2}$ " Strips supporting the jaws by two  $1\frac{1}{2}$ " Bolts. Nuts lock these Bolts to the Eye Piece and the Strips pivot freely.

Two 2" Strips have a Pawl without boss attached to them at one end and at the other carry a  $\frac{1}{2}$ " Bolt. One of the Bolts passes through the  $1\frac{1}{2}$ " Angle Girder and carries a Flat Bracket attached by its round hole. The other  $\frac{1}{2}$ " Bolt carries two Washers, which are placed on its shank before the Flat Bracket is attached. A  $\frac{3}{8}$ " Bolt is fixed to this Bracket by two nuts, and its shank passes into the elongated hole of the other Flat Bracket.



This single suspension crane grab was designed by N. C. Ta'Bois, Woodford Green, and has several novel and interesting features.

A Pendulum Connection gripped between one of the  $\frac{1}{2}$ "  $\times$   $\frac{1}{2}$ " Angle Brackets and the  $1\frac{1}{2}$ " Strip already mentioned, is bent slightly and presses on the right-hand Flat Bracket. Both Brackets are thus pressed down and the 2" Strips and Pawls are held free of the 1" Pulley. The head of the  $\frac{3}{8}$ " Bolt joining the two Flat Brackets is pushed upward by a second Pendulum Connection fixed to one of the  $2\frac{1}{2}$ " Triangular Plates by a  $\frac{1}{2}$ "  $\times$   $\frac{1}{2}$ " Angle Bracket.

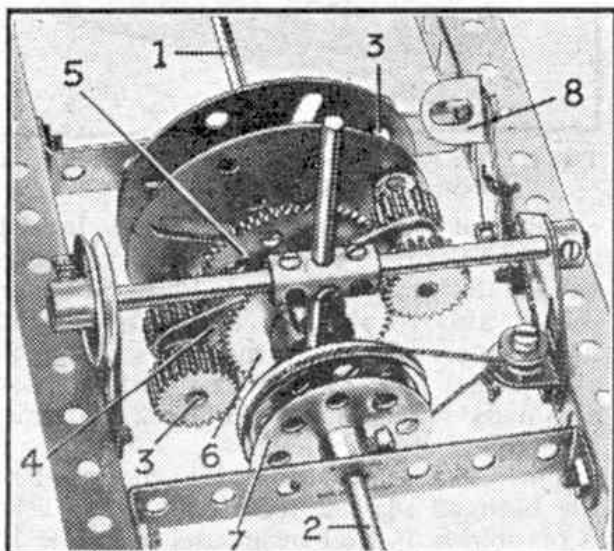
The action of the grab is as follows. The grab descends with the jaws open, but when it reaches the ground the unit carrying the  $1\frac{1}{2}$ " Angle Girder, 2" Strips and Pawls, slides down the 5" Rod and the Pawls engage under the 1" Pulley. When the hoisting cord is hauled in, the grab is supported by the 1" Pulley and the jaws close. The load is now transported to its destination and lowered. On touching down the Pawl unit drops sufficiently to allow the Pawls to disengage from the 1" Pulley, which is possible owing to the Pendulum Connection fixed to the Triangular Plate now being held clear of the  $\frac{3}{8}$ " Bolt. If the hoisting cord is now wound in, the Pawl unit rises and lifts the grab by the Eye Piece, so opening the jaws.

The device is fitted with two

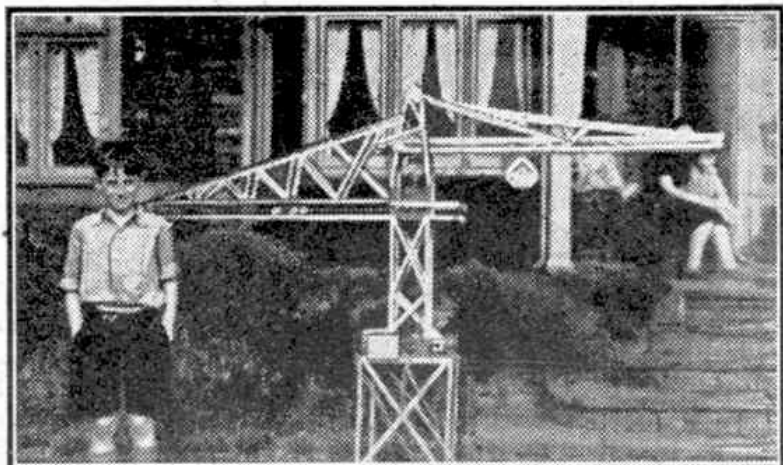
refinements that contribute to successful and smooth working. One is a Collar on the 5" Rod placed about  $\frac{1}{2}$ " above the 1" Pulley. This prevents the Pawl unit from falling too far and the 2" Strips from being forced apart by the Pulley and becoming loose on their Bolts. The other refinement is a Formed Slotted Strip, which keeps the load material, such as sand or soil, away from the Pawls. This Strip is attached as follows. A  $\frac{3}{4}$ " Disc is slipped on to a  $\frac{3}{4}$ " Bolt passed between the 3" Rods pivotally uniting the 2 $\frac{1}{2}$ " and 1" Triangular Plates. The Formed Slotted Strip is then placed on the shank and secured by a nut. The 3" Rods therefore are gripped between the Disc and Strip.

#### CREEPER TRACK—SUGGESTED METHOD OF CONSTRUCTION

S. Rogers, Portsmouth, is interested in the construction of model vehicles fitted with creepers, and has written to me asking for suggestions for making suitable tracks. There are of course many different ways in which creeper tracks can be built up from Meccano parts, and the most suitable method in a particular case will be decided by the scale of the vehicle and the Meccano parts available to the builder. One very useful type of creeper is shown in the centre illustration on this page. This is suitable for use on small models and is quite simple to assemble. It was devised some years ago by a keen model-builder, M. Morris, Burnley. Two Driving Bands are threaded through the holes in Flat Brackets and held in place by short pieces of wire in the manner indicated. The complete track is arranged so that the Driving Bands fit in the grooves of pairs of 1" fast Pulleys fixed on  $1\frac{1}{2}$ " Rods journalled in 2 $\frac{1}{2}$ " Strips. The middle pair of Pulleys support the centre part of the track and they are all spaced apart on their Rods by Washers. The wires and the Driving Bands provide a good grip on the ground, and a model fitted with tracks of this type should be able to climb quite steep inclines.



An epicyclic gear-box that gives two speeds and is suitable for use in a motor chassis.



Anthony C. Doxford, St. Bees, and his model of a high-speed ship-coaling plant. The model is driven by two 20-volt Electric Motors.

#### AN EPICYCLIC GEAR BOX FOR MOTOR CARS

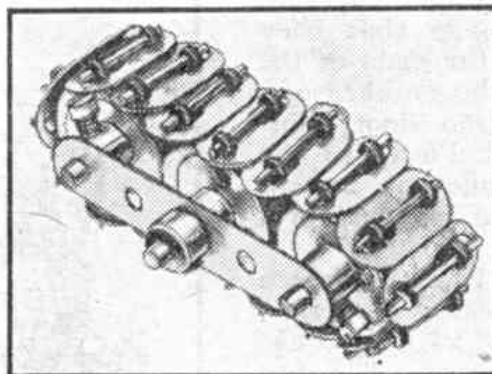
Model-builders experimenting with motor chassis construction should try out the epicyclic gear-box shown on this page. It provides an interesting variation and possesses advantages over the more orthodox gear-boxes, chief of which are the smoothness with which the drive is taken up and the fact that all the gears are in constant mesh.

The gear-box is shown mounted between the side girders of a Meccano motor chassis. The driving shaft 1 carries two Face Plates, which are spaced about  $\frac{1}{4}$ " apart and carry two 2" Axle Rods 3. Each of these Rods is fitted with a  $\frac{1}{2}$ " and a  $\frac{3}{4}$ " Pinion, and a 2 $\frac{1}{2}$ " Strip 4 placed between them. The Rods are held in place by Collars, and it is important that they are free to rotate.

The driven shaft 2 is passed through the centre hole of the Strip 4, and is inserted in the boss of the Face Plate on Rod 1 for a short distance to keep it correctly centred. A 57-teeth Gear 5, fixed on the Rod, is spaced from the Face Plate by a Washer and from the Strip 4 by three Washers. The 50-teeth Gear is held in a Socket Coupling in which a  $1\frac{1}{2}$ " Pulley also is secured. The Socket Coupling unit is free on the Rod 2, and a Collar is placed between the Gear 6 and the 2 $\frac{1}{2}$ " Strip. A length of cord is tied to an Angle Bracket fixed to the frame and passed around the  $1\frac{1}{2}$ " Pulley, and then is led around a  $\frac{3}{8}$ " Bolt, which is fixed by two nuts to the Angle Bracket and carries two Washers to hold the cord in place. The cord is finally tied to a foot pedal 8, consisting of a pivoted  $1\frac{1}{2}$ " Strip to which an Angle Bracket is bolted. A Bush Wheel 7 is fixed on the driven Rod, and the shanks of bolts fitted to the  $1\frac{1}{2}$ " Pulley can be made to engage the holes in the Bush Wheel to form a dog-clutch.

The Socket Coupling unit is free to slide on its Rod and its movement is controlled by a hand lever consisting of a 2 $\frac{1}{2}$ " Axle Rod. The lever is held in a Coupling carrying two 2" Rods that are journalled in Flat Trunnions bolted to the side girders.

To engage low gear the hand lever is pulled back, thus disengaging the dog-clutch, and the foot pedal is depressed to apply the brake to the  $1\frac{1}{2}$ " Pulley, which is held stationary. Top gear is engaged by releasing the foot pedal and moving the hand lever forward. This engages the dog-clutch and gives a "straight through" drive, as the two Gears 5 and 6 become solid on the driven Rod 2.



Creeper track suitable for medium-size tractors and other vehicles.



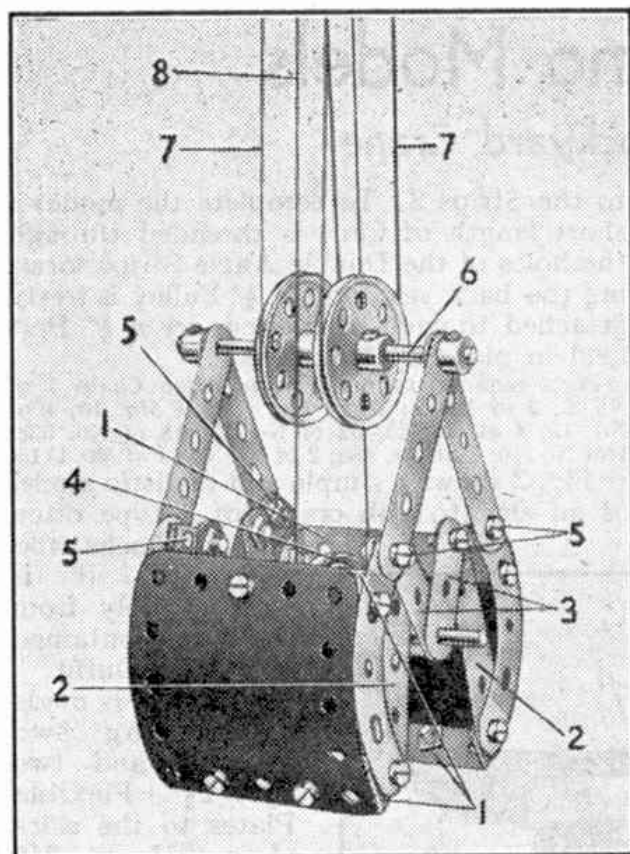


Fig. 3. This working grab forms an interesting accessory for use with model cranes.

suitable grab. This month I am describing a particularly neat and efficient grab that can be used for lifting material such as small pebbles, etc. The device is shown in Fig. 3.

The jaws are formed by Curved Strips bolted to each side of  $2\frac{1}{2}'' \times \frac{1}{2}''$  Double Angle Strips 1, and a  $1\frac{1}{8}''$  radius Curved Plate is attached to the Double Angle Strips. The  $2\frac{1}{2}''$  Strips 2 on each side of the grab are fixed to the lower pair of Double Angle Strips, and  $1\frac{1}{2}''$  Strips 3 are bolted to the end holes of the Strips 2 as shown. A  $3\frac{1}{2}''$  Rod is passed through the end holes of the Strips 3. This Rod is weighted with two Worm Wheels, and carries a  $1\frac{1}{2}''$  Pulley 4. Four  $2\frac{1}{2}''$  Strips are pivoted by lock-nutted bolts 5 to the Curved Strips, and a  $3\frac{1}{2}''$  Rod 6 is passed through their end holes and held in place by Collars. This Rod is fitted with two  $1\frac{1}{2}''$  Pulleys.

Two separate lengths of Cord are used for hoisting the grab, and it is important to make sure that these are of exactly the same length. These Cords are marked 7 in the illustration, and they are fastened at one end to the jib head. They are then passed around the  $1\frac{1}{2}''$  Pulleys on Rod 6 and over two similar pulleys in the jib, and are finally tied to a winding shaft in the cab of the model.

The jaws can be opened and closed by the Cord 8. This is tied to the jib head and is passed around the Pulley 4. It is then led over a Pulley in the jib and is fastened to a winding shaft in the cab. In order to raise or lower the grab, Cords 7 and 8 must be wound at the same rate. The jaws are opened or closed by operating Cord 8 independently of Cords 7.

#### A SPANISH READER'S PRINTING MACHINE

Alberto Enrique de Balle Perera, Barcelona, has been busy model-building, and one of his models is the automatic printing machine that is illustrated on this page. A reconstruction of this model was built for entry in a local

competition, where it was awarded First Prize. Among its many interesting features are automatic inking and paper feed, and an electrical relay device for stopping the drive when the paper supply runs out.

The reconstructed model is rather more elaborate and neater in construction, but unfortunately the photographs in my possession are not suitable for reproduction.

### Prizes for Meccano Models

Model-builders should not miss the opportunity of winning the fine prizes we are offering in the February General Model-Building Competition, which was first announced in the February "M.M." All that is necessary to take part in the contest is to build a Meccano model. This may be of any type, and every reader is eligible to compete in the contest no matter what his or her age may be. Any size of Outfit may be used in building a model, but good workmanship and constructional details that show ingenious uses for Meccano parts will attract the attention of the judges far more than the mere size of a model.

After the model is built the next job is to obtain a suitable illustration of it. This should be a photograph preferably, but a sketch will do quite well. The competitor must write his age, name, and address on the back of the illustration and enclose it, together with a brief description of the model, in an envelope addressed "February General Model-Building Contest, Meccano Ltd., Binns Road, Liverpool 13."

Entries will be grouped into two Sections, one for competitors living in the British Isles and the other for Overseas competitors. Entries from competitors in the British Isles may be sent in at any time up to March 31st. Entries from readers living Overseas will be accepted until 30th June.

The following prizes will be awarded in each Section for the best built and most interesting models received. First, Cheque for £2/2/-; 2nd, Cheque for £1/1/-; 3rd, P.O. for 10/6. There will be also five consolation prizes of 5/- each for entries of merit that do not gain a major award, and Certificates of Merit. All prize-winners will be notified by letter.

It should be noted that successful entries become the property of Meccano Ltd., but photographs or sketches of unsuccessful models will be returned to senders provided that a stamped addressed envelope of the necessary size is enclosed with the entry for that purpose.

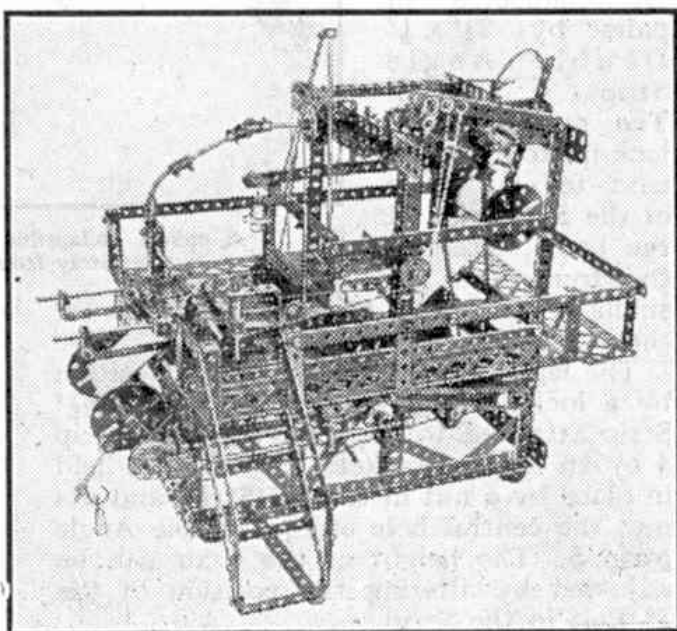


Fig. 4. An interesting printing machine built in Meccano by Alberto Enrique de Balle Perera, Barcelona.

Rod 13, so that one of these Couplings is brought in line with the appropriate Gear Ring. When the control pedal 16 is depressed, this Coupling raises one of five  $3\frac{1}{2}$ " Strips pivoted on Rod 14, which

then turned in the same way as a Screwdriver to tighten the bolt.

**Pincer Grab for Cranes**

In actual practice cranes used for handling loads of particular kinds are often fitted with special equipment designed to speed up the loading and unloading operations. Among these special fittings are grabs for handling loose material in bulk, such as coal, gravel, etc., and pincer grabs to hoist loads such as blocks of stone. A simple pincer grab made with Meccano is shown in Fig. 4. The construction is easy but it will readily lift imitation stone blocks made from wood or other suitable material, and will add to the interest of a model crane designed for loads of this kind.

The two arms of the grab are each made from a  $3\frac{1}{2}$ " Strip and a  $2\frac{1}{2}$ " Curved Strip. End Bearings bolted to the Curved Strips carry Centre

Forks that form the jaws of the grab. The arms are freely connected by a lock-nutted bolt 1. A  $2\frac{1}{2}$ " Strip 2 is lock-nutted to the upper end of each arm, and the upper ends of these Strips are connected by a lock-nutted bolt that supports also a Fishplate 3. This Fishplate is used to attach the grab to the crane hook.

Models of grabs used for handling bulk materials such as coal, iron ore, etc., can be made quite easily with even a fairly small Outfit, and some interesting operating schemes can be devised for grab cranes. This type of grab should be made in two sections hinged together at their upper ends. The main suspension Cord should be attached

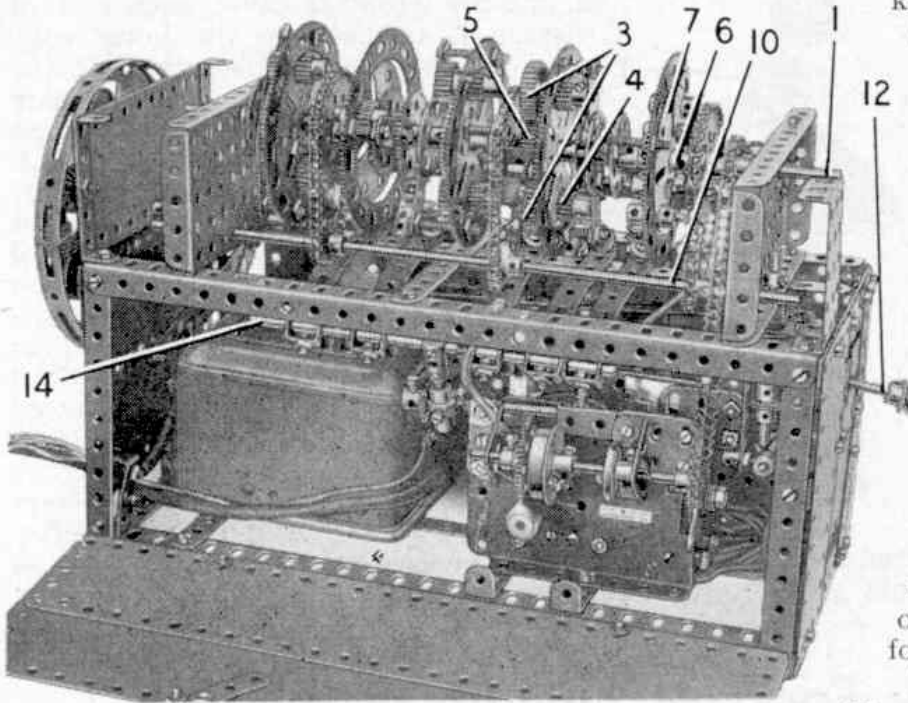


Fig. 2. The pre-selector gear-box seen from the other side, with part of the casing removed.

brings an Angle Bracket 15 into engagement with the Gear Ring and prevents it from turning. The Angle Bracket is bolted to a  $1\frac{1}{2}$ " Strip 17.

**A Useful Accessory**

From time to time I have given details of hints on placing nuts and bolts in inaccessible positions in models. The most useful tool for dealing with nuts in awkward places is the Box Spanner, Part No. 34b, with which most model-builders will be familiar. Very often however, it is necessary to tighten a bolt placed in such a position that it is difficult to insert and turn the standard Screwdriver. The simple tool shown in Fig. 3 should prove very useful in these circumstances.

A Coupling 1 is fixed at one end of a long Rod, and a Rod 2 is passed through one end of the Coupling and is held in place by a Collar and a Gear. The lower end of the Rod 2 should be filed to the same shape as the blade of a screwdriver. The tool is used by holding the long Rod in one hand and inserting the filed end of the Rod 2 in the slot of the bolt to be tightened. The Gear is

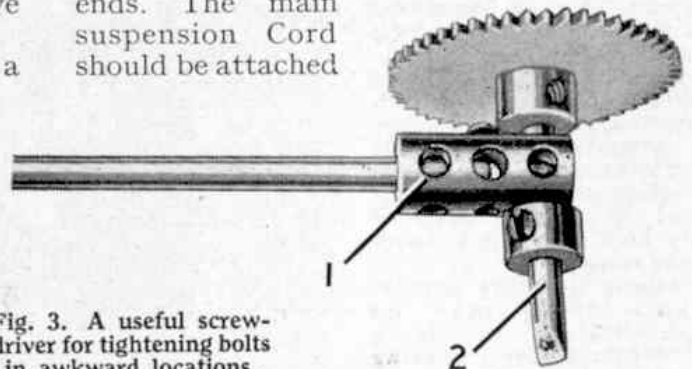


Fig. 3. A useful screwdriver for tightening bolts in awkward locations.



to a Strip or Rod arranged across the hinged joints. With this system, when the grab is hoisted, the jaws or lower edges of the two sections will snap together.

Very often in actual practice what is known as a single suspension system is used. With this arrangement a single rope serves not only to support the grab, but by an ingenious system of trip levers the rope controls the opening and closing of the grab jaws.

The single suspension system is interesting to build and to operate, but the quantity and range of the parts needed to build a mechanism of this kind make it outside the scope of a small Outfit owner. Fortunately it is possible to operate a simple grab quite

easily and effectively without using a large number of parts. An extra length of Cord is fastened to the same winding shaft as the main hoisting Cord. The second Cord is taken over a Pulley at the jib head, and is tied to the centre of another piece of Cord, each end of which is fastened to the lower edge of one section of the grab. If the two Cords are tied to the winding shaft are wound at the same time, the grab remains closed, but if the second Cord is made shorter than the first it opens the jaws of the grab. All you need to do to operate the grab is to pass the second Cord over a Pulley placed at one end of a lever pivoted in the crane cab. When the lever is moved the Pulley depresses the second Cord and by reducing its effective length opens the grab for unloading.

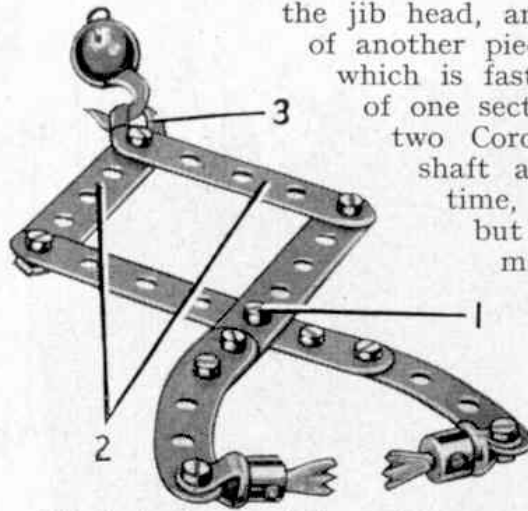


Fig. 4. A pincer grab for model cranes.

## A New Form of Universal Joint

The illustration below shows a new type of universal joint invented by M. Kremer, Luxembourg. It consists essentially of two cogged wheels the teeth of which are of a spherical form, each wheel in appearance looking like half an orange sliced into sections. The cogs are mounted on shafts supported in a "hinged" framework, the result of this arrangement being that the two shafts can be moved through a full 360 degrees without interfering with the meshing of the cogs they support. It will be seen therefore that if one of the shafts is driven the cogs will transmit the drive to the other shaft irrespective of the angle between the two shafts. The method of "hinging" the framework can be seen in the illustration.

It is interesting to note that in his initial experiments the inventor used Meccano to help him in designing a suitable framework for the gearing, thus adding a still further example to the already long list of cases in which Meccano has proved of practical use to designers and inventors.

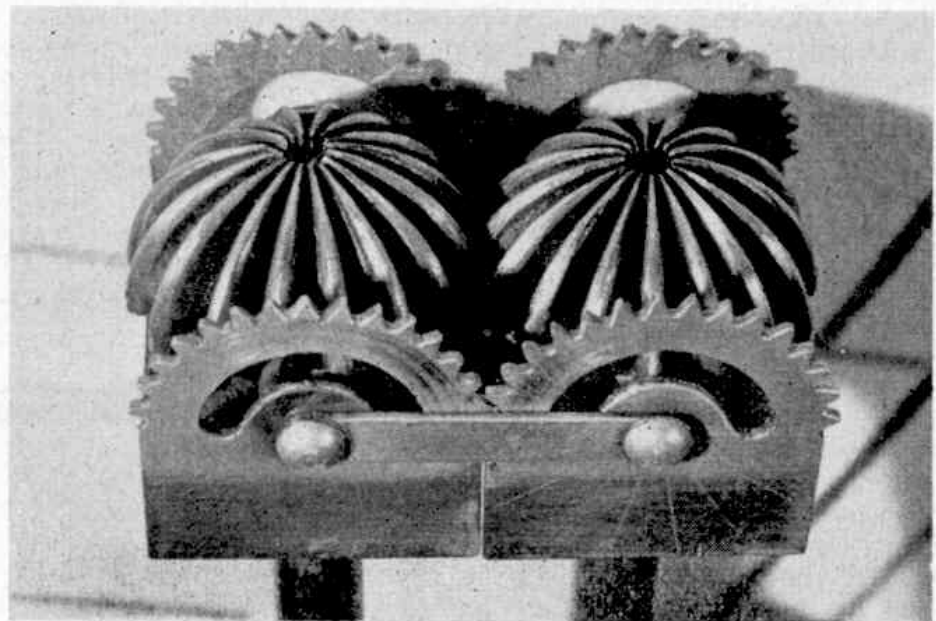
The new universal coupling permits a power drive through much greater angles than is possible with the more conventional types of coupling and eliminates the need for flexible shafts of any kind. Also, it is much more compact.

Among its many possible applications may be mentioned its use in a screwdriver for working "around corners."

It has applications in the aircraft and motor car industries and also in various forms of machine tools.

One particular and rather interesting application that has been suggested is in drilling teeth! We all know the imposing form that the dentist's drill now takes. A Kremer joint that only needs to be adjusted in one direction is said to be very suitable for incorporation in a more compact form of drill.

Below is a reproduction of the Kremer joint, a novel form of universal joint for which many uses have been suggested.



# Among the Model-Builders

By "Spanner"

clamped between this Double Angle Strip and a  $1\frac{1}{2}'' \times \frac{1}{2}''$  Double Angle Strip 3, and the lower corners of the Curved Plate are connected to the Flanged Plate by Angle Brackets.

A Coupling is fixed by a nut on a  $\frac{3}{4}''$  Bolt passed through each of the Triangular Plates 1, and the two Couplings are connected by a 2'' Rod. Each Coupling supports a  $4\frac{1}{2}''$  Rod 4, on which a Coupling 5 is free to slide. The Couplings 5 are connected by two  $2\frac{1}{2}''$  Rods, which carry a further Coupling 6 placed centrally on the Rods. Four  $2\frac{1}{2}''$  Strips are passed over the ends of the  $2\frac{1}{2}''$  Rods and over 2'' Rods supported in the Double Angle Strips 3, and are held on the Rods by Spring Clips.

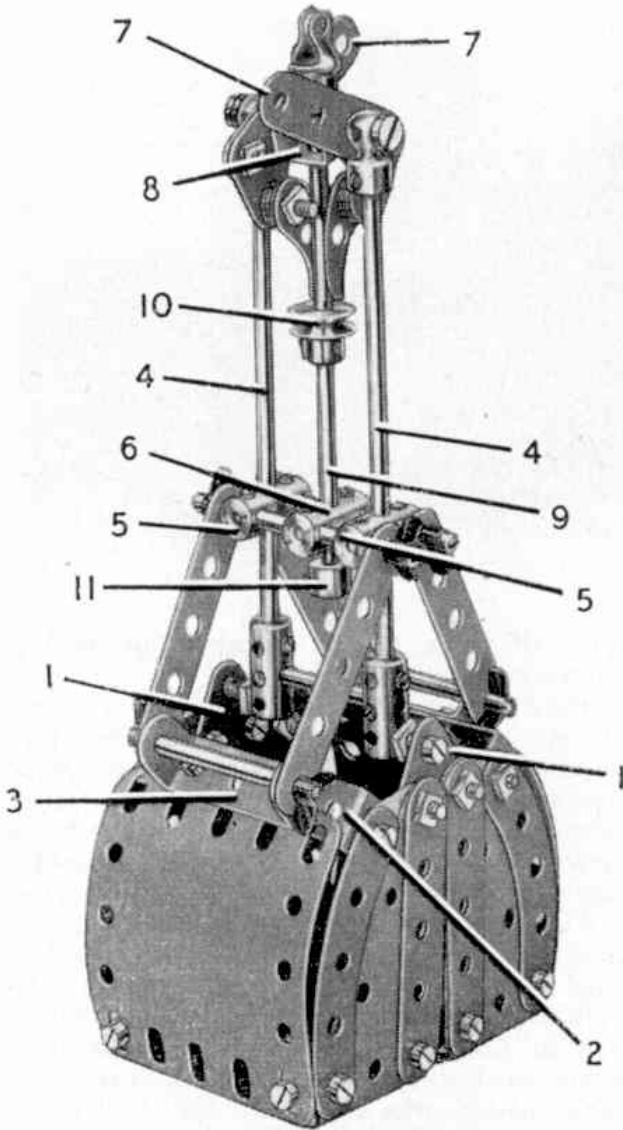


Fig. 1. Model-builders who are interested in cranes will find this single-suspension grab simple to build and to operate. It is designed by Mr. D. W. Thomasson, Bristol.

## Single-Suspension Grab

The grab illustrated in Figs. 1 and 2 is of the single-suspension type, and is based on a design submitted by Mr. D. W. Thomasson, Bristol. The grabbing mechanism is very efficient, and an important feature is that the trip device that operates the grab is remarkably easy to adjust.

The grab jaws are made by bolting  $2\frac{1}{2}'' \times 1\frac{1}{2}''$  Triangular Flexible Plates to the flanges of  $2\frac{1}{2}'' \times 1\frac{1}{2}''$  Flanged Plates, the Triangular Flexible Plates being strengthened by  $2\frac{1}{2}''$  Strips and  $2\frac{1}{2}''$  Curved Strips joined at their upper ends by Fishplates. A 1'' Triangular Plate 1 is lock-nutted to the jaws on each side, and a  $2\frac{1}{2}'' \times \frac{1}{2}''$  Double Angle Strip 2 is bolted between the upper ends of the Curved Strips. A  $1\frac{1}{16}''$  radius Curved Plate is

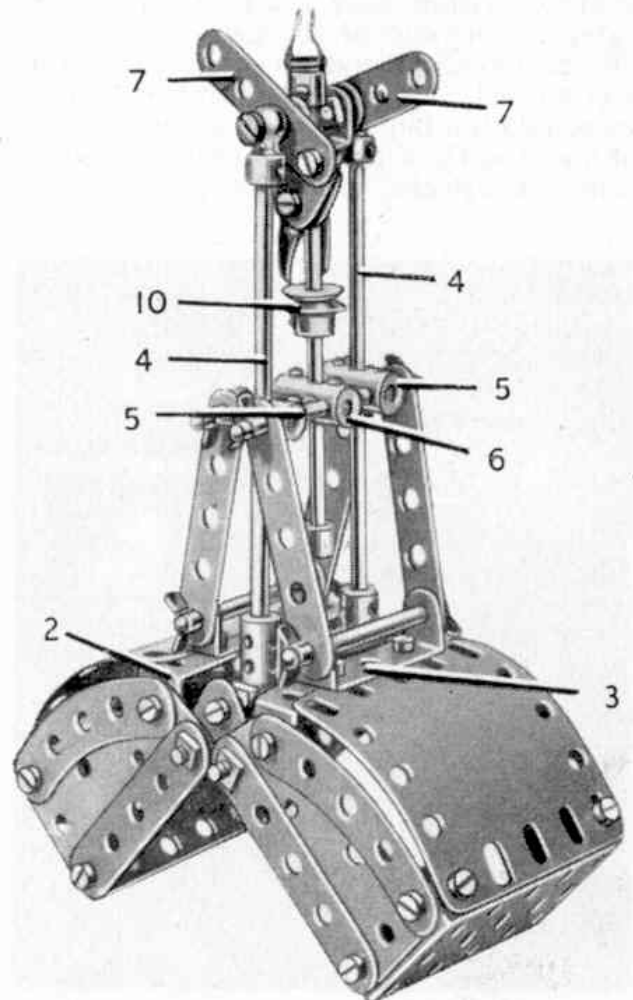


Fig. 2. Another view of the single-suspension grab showing the jaws open ready to pick up their load.



Fig. 3. This fine model of a giant block-setting crane was built by Mr. C. E. Saunders, Christchurch, New Zealand. Mr. Saunders is Leader of the Christchurch Meccano Club.

Each of the Rods 4 carries at its upper end a Handrail Coupling in which a Pivot Bolt is free to turn. A 2" Strip 7 is placed on the Pivot Bolt, together with a 1" Corner Bracket that is bolted to one end of the Strip. The Pivot Bolt is then fixed by its nuts in a Double Bracket 8. A Pawl without boss is attached to each Corner Bracket by a  $\frac{1}{2}$ " Bolt, but is spaced from it by five Washers.

A  $4\frac{1}{2}$ " Rod 9 is passed through the Double Bracket 8 and a  $\frac{1}{2}$ " Pulley 10 is fixed on the Rod. The Rod is then passed through the Coupling 6 and a Collar 11 is fixed on its lower end. An End Bearing placed at the upper end of Rod 9 serves to attach the grab to the crane hook.

In addition to the grab a suspender or trigger ring is required. This can take any convenient form, such as a Cylinder or a ring of Curved Strips, and it should be suspended from the crane jib at the height at which it is required to discharge the grab. The hoisting Cord should pass freely through the centre of the ring, which should be weighted sufficiently to depress the Strips 7 of the grab when these engage the ring as the grab is raised.

The sequence of operations is as follows. Assuming the grab to be on the ground with the jaws open (Fig. 2), when the hoisting Cord is raised Pulley 10 engages

the Pawls, which lift the Rods 4 and thus close the jaws. The grab can now be lifted until the Strips 7 engage the suspender ring, and as the Strips are depressed they move the Pawls clear of Pulley 10. The Rods 4 are then released and the jaws open to discharge the contents of the grab.

#### A Fine Block-Setting Crane

The model of a giant block-setting crane shown in Fig. 3 on this page was built by Mr. C. E. Saunders, Leader of the Christchurch, New Zealand, Meccano Club, and has won a prize in a Club Competition. The boom of the model is 4 ft. 6 in. in length and the crane has an overall height of 2 ft 9 in. The crane travels majestically along the ground at a speed of 3 in. per minute, while the boom makes a complete revolution in 55 seconds. The crane is capable of lifting heavy loads and is operated by an E20R Electric Motor. The model is a fine example of this type of model-building and reflects great credit on its constructor.

#### A Gearless Rear Axle Drive

The simple rear axle unit for model vehicles seen in Fig. 4 is based on a design sent to me by Mr. R. M. Minshall, Macclesfield, Cheshire. The device is intended for use in models when sufficient gears are not available to assemble the usual type of differential mechanism. Mr. Minshall's mechanism introduces a

(Continued on page 170)

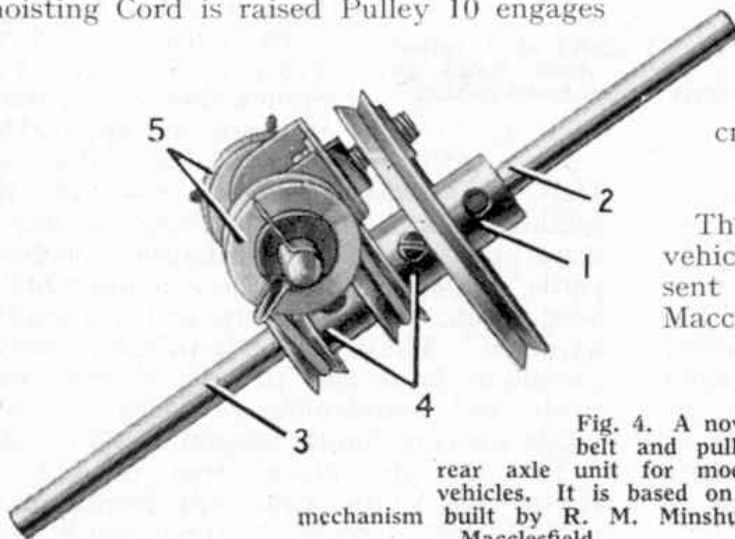
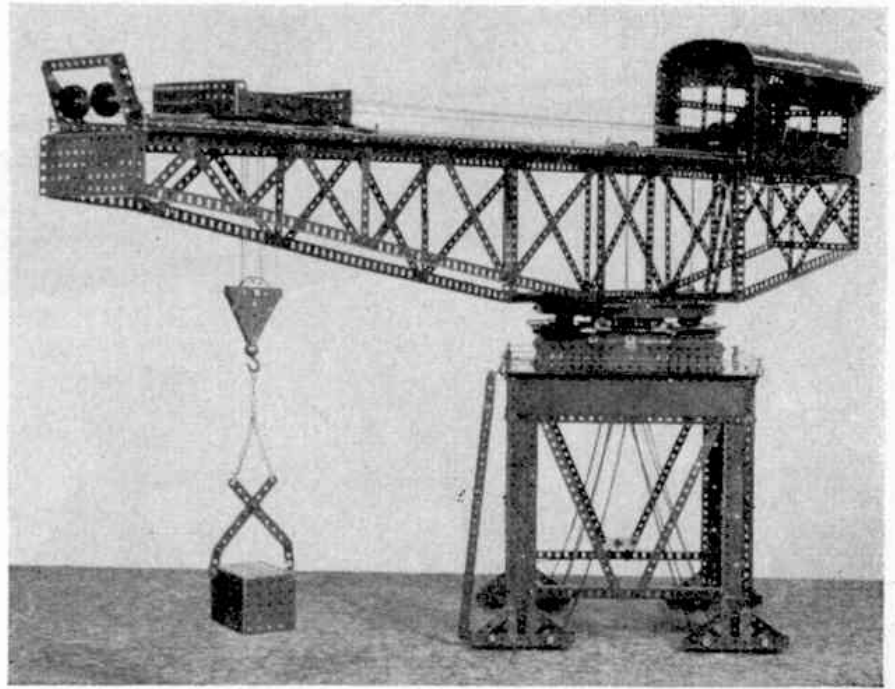
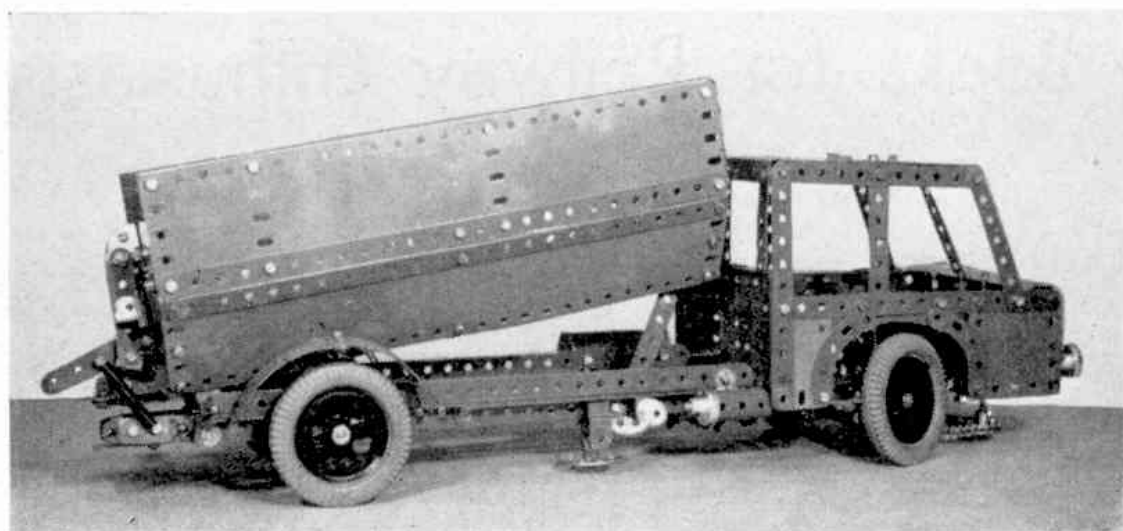


Fig. 4. A novel belt and pulley rear axle unit for model vehicles. It is based on a mechanism built by R. M. Minshall, Macclesfield.



A model of a special Coal Lorry designed to fill and weigh sacks of coal automatically in the presence of the customer. It was built by C. J. Somerfield, London N.3

## Notes and Ideas for Meccano Model-Builders

By "Spanner"

### An Interesting Model Coal Lorry

The model coal lorry illustrated on this page was built by C. J. Somerfield, London N.3, and is based on a very interesting type of vehicle known as the Autobagger, introduced by Charrold Ltd., London. In building his model, Somerfield has tried to incorporate some of the main functions of the vehicle, which operates semi-automatically and is designed to load a weighed amount of coal into a sack in the presence of the customer. The actual vehicle was illustrated on page 505 of the October, 1957, *Meccano Magazine*.

The sequence of operations in the model is as follows. First the container is tipped and the chute cover moved away so that coal flows into the bucket of the machine. When the correct weight is in the bucket—and this is indicated by a pointer—the chute cover closes. Then the release lever is operated and the bucket is lowered so that the coal can be run off into a sack. Finally the container is lowered to its normal position, and the release lever falls back into place automatically.

### A Useful Crane Grab

In Fig. 1 is shown a useful working grab that can be fitted to many kinds of model

cranes. The grab jaws are constructed from  $2\frac{1}{2}$ " Triangular Plates 1 edged at their bases by  $2\frac{1}{2}$ " Curved Strips 2. The grab is raised or lowered by means of four lengths of cord 3, while another cord 4 passes round a 1" Pulley carried from the cross-piece 5. If both the cords 3 and 4 are hauled in or paid out at the same speed, the grab travels up or down without the jaws moving, but if one cord ceases to move the grab opens or closes according to the movement of the other cord. The joints marked "A" are all pivoted by means of

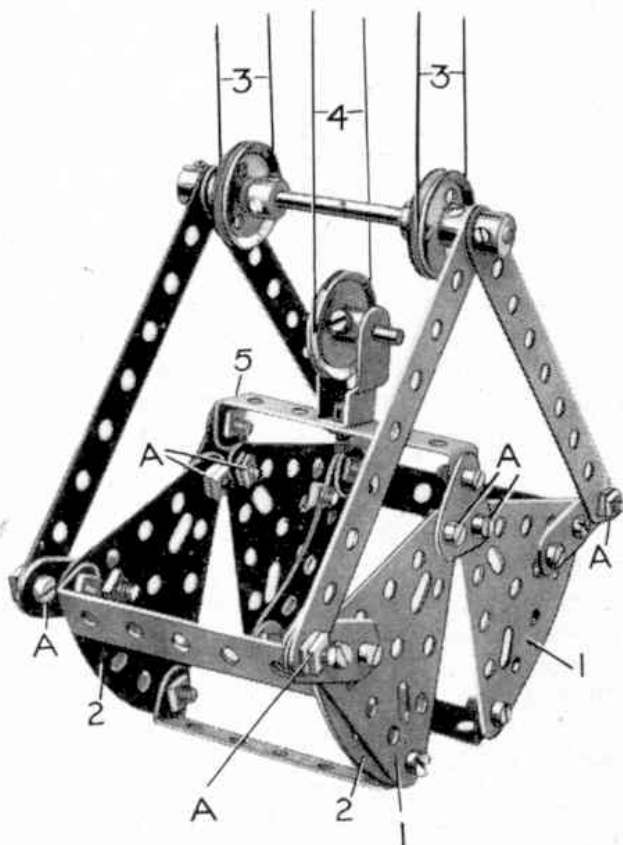


Fig. 1. A working grab that will be of interest to model crane builders.



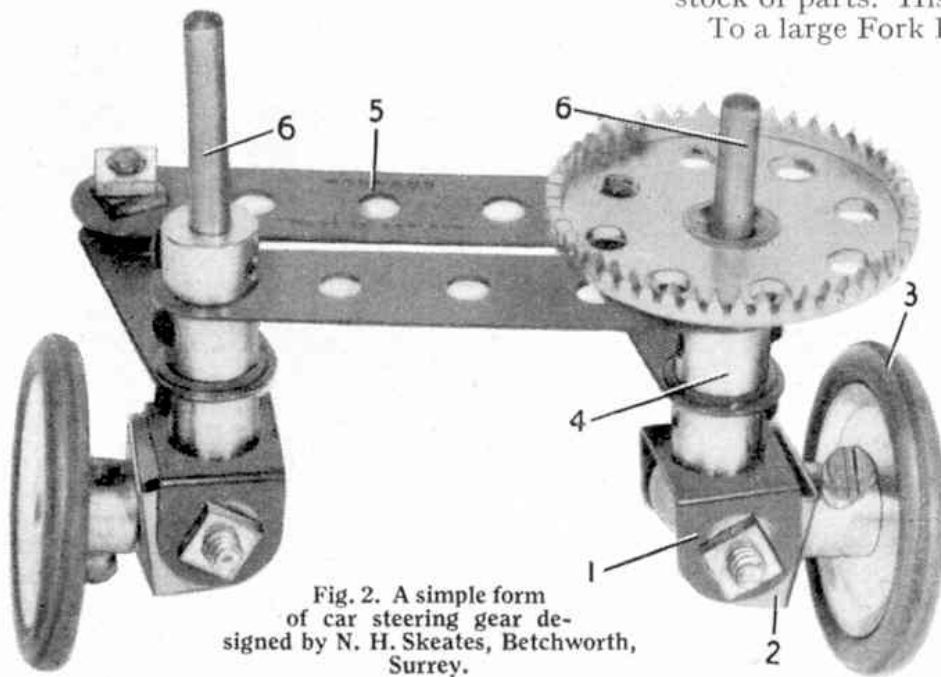


Fig. 2. A simple form of car steering gear designed by N. H. Skeates, Betchworth, Surrey.

bolts and lock-nuts. If the outer sides of the grab jaws are filled in with cardboard, the grab will pick up small loads of sand, marbles, etc.

#### Simple Steering Gear

Eleven-year-old N. H. Skeates, Betchworth, Surrey, asks me to include in these pages details of a simple form of steering gear he has designed, as he thinks it may be a help, and be of interest to, other young model-builders who do not possess a large

stock of parts. His idea is shown in Fig. 2.

To a large Fork Piece 1 a Double Bracket 2 is bolted at a slight angle to give the effect of camber to the road wheel 3, which is fixed on a  $\frac{3}{8}$ " Bolt passed through the Double Bracket. This construction is the same for both road wheels. The Fork Pieces are fixed on the ends of short Rods 6, one of which carries a Contrate Wheel that can be meshed with a Pinion on the steering column.

The track rod assembly is made by slipping a Washer over a  $\frac{3}{8}$ " Bolt which is then passed through the slotted hole of a Crank 4 and fitted with a nut that is tightened securely. The shank of the Bolt is then passed through an end hole of a  $2\frac{1}{2}$ " Strip 5 that forms the track rod, and is fitted with lock-nuts. This process is repeated for the other wheel.

This is an easy, yet effective method of steering, which does not entail any complicated construction features, thereby enabling inexperienced model-builders to make use of it.

## Big Prizes for Small Models

LAST month we announced details of the Simplicity Model-Building Competition and as this is open for entries until August 31, we are repeating the main details so that any readers who did not see the previous issue will have a chance to prepare, and send in, entries.

In the "Simplicity" Contest we are offering Cash Prizes for miniature Meccano models of any kind constructed realistically with the minimum number of parts. It is not necessary for a model actually to work. A realistic appearance is all that is required. It is possible to make hundreds of really "life-like" models using no more than a dozen or so Meccano parts, and the prizes will be awarded to those who succeed in producing the most realistic and original models. The Competition is open to every owner of Meccano, and it is only necessary to send a photograph or a good sketch of

any model you wish to submit. Entries should be addressed: "Simplicity Model-Building Competition, Meccano Ltd., Binns Road, Liverpool 13".

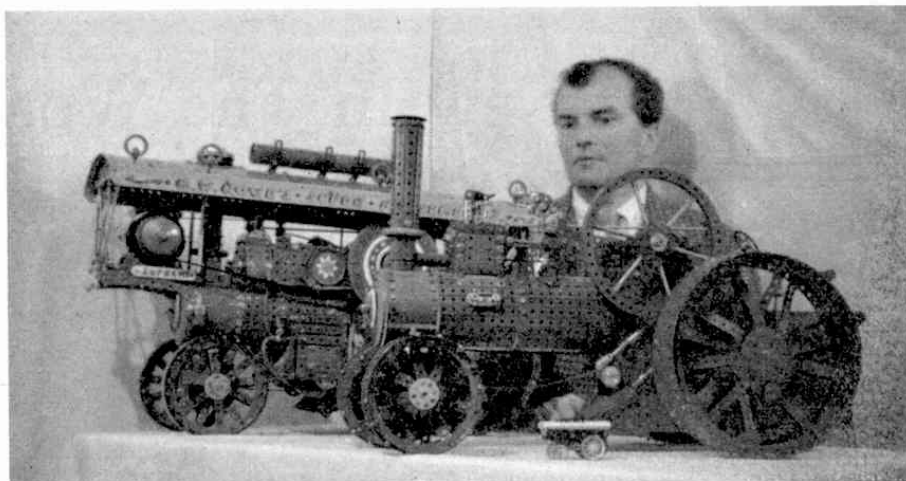
All entries will be grouped into one section, but the age of the competitor will be taken into consideration in assessing the merits of his work.

Your photographs or drawings, if unsuccessful, will be returned to you provided that a stamped addressed envelope of the necessary size is enclosed. It should be noted, however, that photographs of prize-winning models become the property of Meccano Ltd.

The prizes will be as follows: First, Cheque for £5 0s. 0d.; Second, Cheque for £3 0s. 0d.; Third, Cheque for £1 10s. 0d. There will be also ten prizes each of 15s., and ten prizes each of 7s. 6d.

Don't forget: the closing date is August 31.

# AMONG THE MODEL- BUILDERS



Two fine model Traction Engines and their builder B. W. Rowe, Newton Abbot. Mr. Rowe is a very keen Meccano constructor, and many examples of his work have been illustrated in the "Meccano Magazine" from time to time. His models are always impeccably neat, finely proportioned and full of skilfully executed details.

## RATCHET LEVER

Fig. 1 shows a simple ratchet mechanism for control levers in models such as cranes, and it is small enough to be used also in model vehicles as a hand brake lever.

The brake lever is a Rod 1 fixed in a Coupling 2, which is screwed to one end of a short Screwed Rod. This is fitted with a nut and a  $\frac{1}{2}$ " Pinion 3, and is then passed through the model framework 4 and fitted with a second nut. The two nuts are tightened to fix the Screwed Rod firmly in place and to prevent Pinion 3 from rotating, but Coupling 2 must be free to pivot.

A bolt 5, fitted with two Washers, is passed through an Angle Bracket 6 and is screwed tightly into one of the threaded holes in a Collar. A  $\frac{3}{8}$ " Bolt passed through the Collar is screwed into Coupling 2, leaving the Collar free to turn on the Bolt. A  $2\frac{1}{2}$ " Driving Band is slipped over the Bolt 5, through the slotted hole in Angle Bracket 6, round Coupling 2 and over a bolt in the Coupling. This holds the Angle Bracket against the teeth of Pinion 3 to form a ratchet. The ratchet can be released by a lever 7 formed by a Pawl pivoted on a Bolt screwed into a Collar on Rod 1. A short length of wire connects lever 7 and Angle Bracket 6.

## FRICTION GRIP TACKLE FOR CRANES

Fig. 2 shows a useful friction grip

for use with block-setting cranes. This is quite simple to build and is suitable as an attachment for small models of this kind.

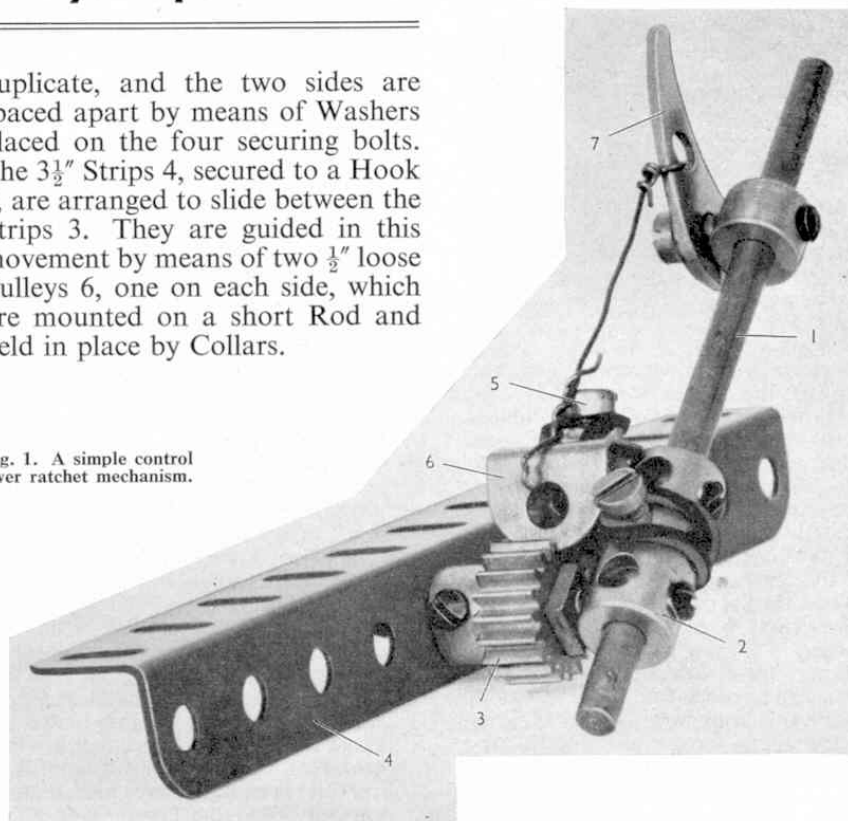
The apparatus comprises a framework built up from  $3\frac{1}{2}$ " Strips 1 bolted to transverse  $5\frac{1}{2}$ " Strips 2 and  $1\frac{1}{2}$ " Strips 3. The framework is in

The ends of two  $2\frac{1}{2}$ " Strips 7 are mounted pivotally on the same Axle Rod between the Pulleys, and are connected at their outer ends, by means of lock-nutted bolts, to  $5\frac{1}{2}$ " Strips 8. The latter are free to pivot on bolts 9 passed through the  $5\frac{1}{2}$ " Strips 2. A short operating cord 10 passes round one of the  $\frac{1}{2}$ " Pulleys 6, and is secured to Strips 2.

## By "Spanner"

duplicate, and the two sides are spaced apart by means of Washers placed on the four securing bolts. The  $3\frac{1}{2}$ " Strips 4, secured to a Hook 5, are arranged to slide between the Strips 3. They are guided in this movement by means of two  $\frac{1}{2}$ " loose Pulleys 6, one on each side, which are mounted on a short Rod and held in place by Collars.

Fig. 1. A simple control lever ratchet mechanism.





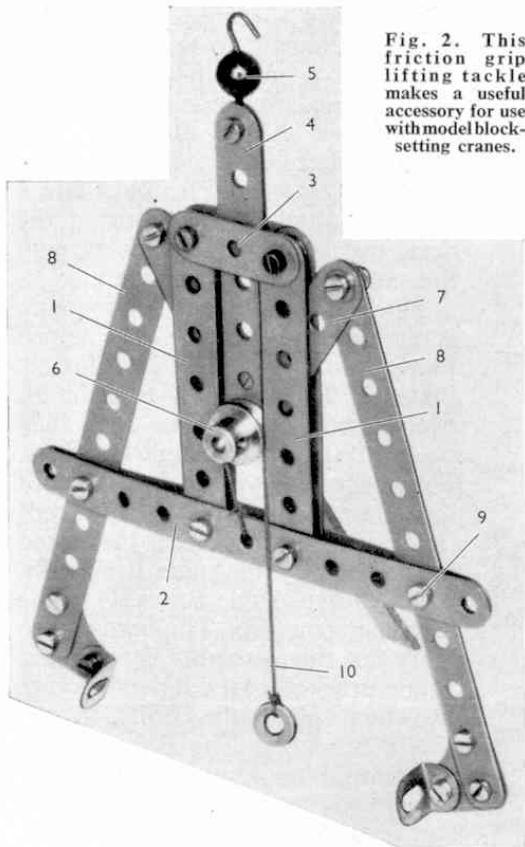


Fig. 2. This friction grip lifting tackle makes a useful accessory for use with model block-setting cranes.

Upon pulling the cord, the jaws of the grip are opened so that they fall on either side of the block that is to be raised; it is then released and the pull of the hoisting cord attached to the Hook 5 acts through the levers 7 and 8 and causes the jaws of the grip to close very tightly on the block. The actual dimensions of the blocks that may be picked up are confined within certain limits, but these limits may be varied to some extent by moving the pivots of the  $5\frac{1}{2}$ " Strips 8 to some other position in the transverse Strips 2.

### AN AUTOMATIC REVERSING MECHANISM

The device shown in Fig. 3 will be found extremely useful in models used for display and exhibition. It enables models such as Pit Head Gears and Elevators to operate for considerable periods without any attention, as the reversing of the winding drum controlling the hoisting and lowering

of the cage is carried out automatically.

The Rod 1 is driven by the Motor, and is fitted with a  $\frac{1}{2}$ " Pinion 2, a Worm Gear and a 1" Gear. The Rod 3 is free to slide in its bearings, and it carries a  $\frac{1}{2} \times \frac{1}{2}$ " Pinion and a  $\frac{1}{2} \times \frac{1}{4}$ " Pinion and a 1" Gear fitted at each end of a Socket Coupling. A third  $\frac{1}{2}$ " Pinion 4 is loose on a  $\frac{3}{4}$ " Bolt secured to the side Plate of the mechanism.

The Worm on the Rod 1 meshes with a 57-teeth Gear locked on a short Rod 5. This Rod is journalled in two  $2\frac{1}{2} \times \frac{1}{2}$ " Double Angle Strips. A Coupling is secured by its centre hole to the upper end of this Rod.

The required gears are selected by a simple mechanism that consists of a  $2\frac{1}{2}$ " Strip passed through a Slide Piece that is free to turn in the centre hole of a Double Angle Strip. One end of the  $2\frac{1}{2}$ " Strip carries a small Fork Piece and the other end is

pivotaly attached to the Coupling on the Rod 5. A Coupling is secured in the jaws of the Fork Piece by a  $\frac{1}{2}$ " Bolt, and two 1" Rods



held in this Coupling engage the groove on the Socket Coupling on the Rod 3.

The drive to the winding drum is taken from the  $\frac{1}{2} \times \frac{1}{2}$ " Pinion on the Rod 3 to a  $2\frac{1}{2}$ " Gear on the winding shaft.

Before a model is set in motion care should be taken to ensure that there is no excessive play in the selector mechanism and that the positions of the gears on Rod 3 allow a brief period in neutral, otherwise the mechanism will be jammed.

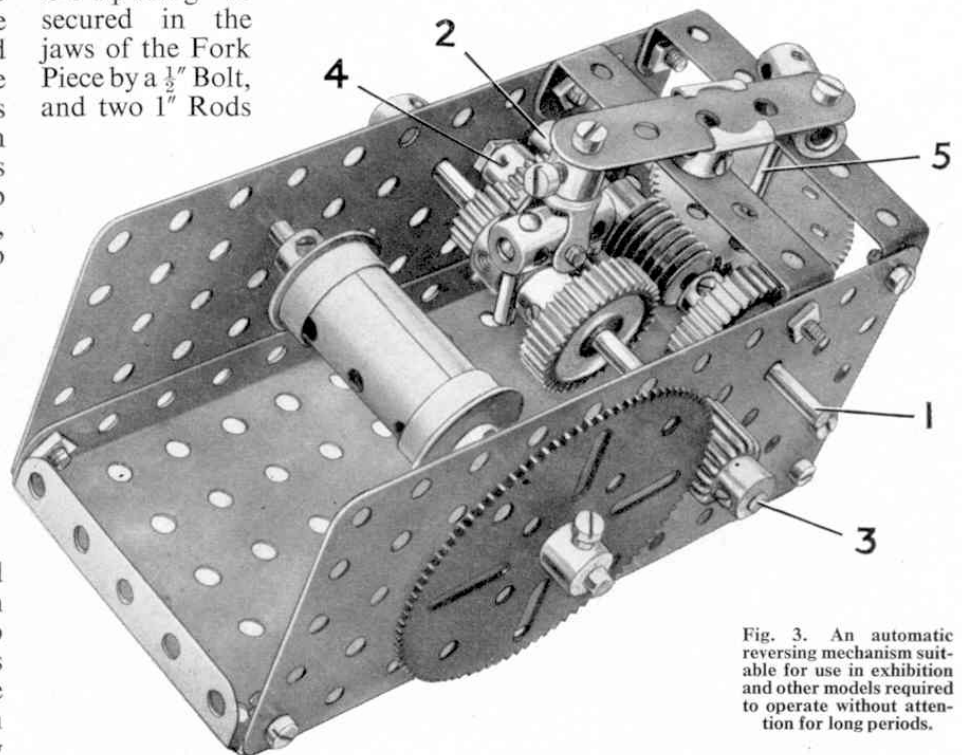
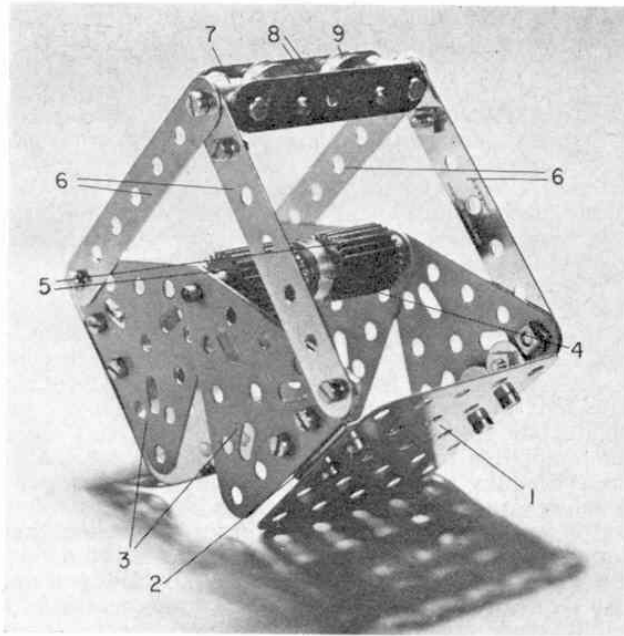


Fig. 3. An automatic reversing mechanism suitable for use in exhibition and other models required to operate without attention for long periods.

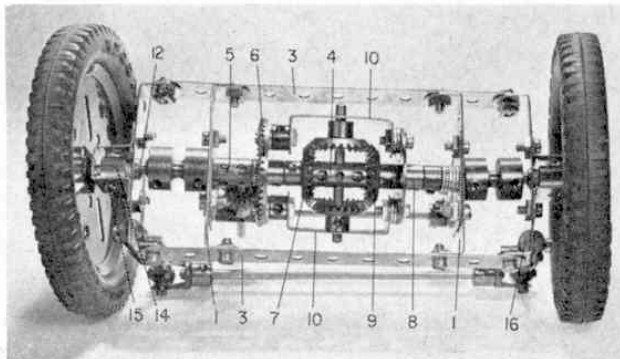


A simple, but extremely efficient Priestman Grab which can be opened automatically from the control box of its parent model.

### Front-Wheel-Drive unit

WITH ALL the fuss that is made over front-wheel-driven cars, these days, you might be forgiven for thinking that front-wheel-drive was something new. In actual fact, of course, it isn't. It's been going for almost as long as the motor car, itself! Meccano Limited even published details of a genuine miniature front-wheel-drive system something like 40 years ago and, since then, similar mechanisms have appeared in the M.M. from time to time. Featured here is another unit in the same series, the work of Mr. Pat Lewis of Formby, Lancs., and this example is of particular interest because of the first-rate swivel joints it incorporates. These joints allow a positive flexible drive to the wheels and also allow the wheels themselves to move through a considerably larger angle than is the case in most other Meccano front-wheel-drive units.

To ensure smooth running, care should be taken with construction. A frame is first produced from two  $2\frac{1}{2} \times \frac{1}{2}$  in. Double Angle Strips 1, to each of which a Flat Trunnion 2 is bolted, the Double Angle Strips then being connected together, as shown, by two  $5\frac{1}{2}$  in. Strips 3, the Strips projecting two holes beyond the Double Angle Strips. Journalled in the Double



An effective Front-Wheel-Drive Unit designed by Mr. Pat Lewis of Formby, Lancashire.

# AMONG THE MODEL BUILDERS

## Readers' Meccano ideas described by Spanner

Angle Strips and in part of the longitudinal bore of a Coupling 4 are two 2 in. Rods, one Rod carrying a fixing Collar outside its Double Angle Strip and a Short Coupling 5, two Washers, a  $1\frac{1}{2}$  in. Bevel Gear 6 and a  $\frac{7}{8}$  in. Bevel Gear 7 inside its Double Angle Strip. The other Rod also carries a fixing Collar outside its Double Angle Strip, while, inside, it carries five Washers, another Collar, an 8-hole Bush Wheel 8 and a  $\frac{7}{8}$  in. Bevel Gear 9. Note that Short Coupling 5, Bevel Gear 6 and Bush Wheel 8 are free to turn on the Rods and that the external fixing Collars are held in place by *Set Screws*.

The faces of Bevel 6 and Bush Wheel 8 are now joined by two  $1\frac{1}{2} \times \frac{1}{2}$  in. Double Angle Strips 10, these being spaced from the Bush Wheel by two Washers on each securing Bolt and spaced from the Bevel by a Collar and one Washer on each Bolt. Mounted in these Double Angle Strips, but fixed in the centre transverse bore of Coupling 4, is a 2 in. Rod on which two  $\frac{7}{8}$  in. Bevel Gears 11 are secured, these Gears meshing with Gears 7 and 9.

Turning to the ball joints, these are both similarly built up from a Handrail Support 12, passed free through a  $2\frac{1}{2} \times \frac{1}{2}$  in. Double Angle Strip 13 and locked by a Nut in an Adaptor for Screwed Rod 14. (The Double Angle Strip must not be mounted in place in the unit at this stage). A Double Bent Strip 15 is slipped over the Adaptor and bolted to the Double Angle Strip. A *Set Screw* is screwed into the head of the Handrail Support, after which the Support is inserted, unfixed, into one end of a Socket Coupling, the other end of which is positioned, also unfixed, over one or other of the external fixing Collars. The lugs of the Double Angle Strip are then lock-nutted to the ends of Strips 3. Secured to each Double Angle Strip is a Slotted Coupling 16, in the longitudinal bore of which a  $1\frac{1}{2}$  in. Rod is fixed. A Swivel Bearing 17, is mounted on the end of each Rod, the Swivel Bearings then being connected by a 5 in. Rod.

Each Flat Trunnion 2 is now extended one hole by a  $1\frac{1}{2}$  in. Strip, as shown. Fixed to the Strip nearest Bevel Gear 6, but spaced from it by a Washer, is a Threaded Coupling 18, in the longitudinal bore of which a  $3\frac{1}{2}$  in. Rod is held, this Rod also being held by Collars in the other  $1\frac{1}{2}$  in. Strip. Journalled in the centre transverse bore of the Threaded Coupling and in the appropriate transverse bore of Short Coupling 5, is a  $2\frac{1}{2}$  in. Rod 19, held in place by a Collar and carrying a  $\frac{1}{2}$  in. Bevel Gear 20. This Bevel meshes with Bevel 6.



Finally, 3 in. Pulleys with Motor Tyres are mounted, free, on Adaptors for Screwed Rod 14, where they are held by Collars. The Unit is of course driven through Rod 19. The Set Screws in the Collar and Handrail Support inside each Socket Coupling, by the way, engage in the slots in the Socket Coupling to enable the drive to be passed on to the wheels.

#### PARTS REQUIRED

|       |        |        |        |
|-------|--------|--------|--------|
| 2-2   | 1-24   | 2-48   | 2-111c |
| 2-6a  | 4-30   | 4-48a  | 2-126a |
| 1-15  | 1-30a  | 10-59  | 2-136  |
| 1-16  | 1-30c  | 1-63   | 2-142b |
| 1-16a | 30-37a | 2-63b  | 2-165  |
| 3-17  | 22-37b | 1-63c  | 2-171  |
| 2-18a | 16-38  | 1-63d  | 2-173a |
| 2-19b | 2-45   | 2-111a |        |

### Priestman Grab

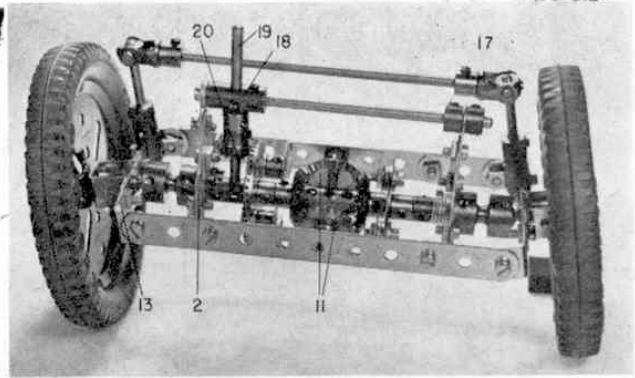
On an entirely different subject, I recently noticed a fairly small excavator in Meccano's Model-building Department which included a simple, but extremely effective Bucket Grab, controlled by an equally simple and effective operating mechanism. I felt that both the Grab and control mechanism would be of interest to crane builders and so I would like to include slightly modified versions of them here.

To being with, the actual Bucket is easily produced from two  $2\frac{1}{2} \times 2\frac{1}{2}$  in. Flat Plates 1, each attached by two  $2\frac{1}{2} \times \frac{1}{2}$  in. Double Angle Strips 2 to two  $2\frac{1}{2}$  in. Triangular Plates 3. The apexes of each pair of Triangular Plates are pivotally joined by a 3 in. Rod, in the centre of which a free-running  $\frac{1}{2}$  in. loose Pulley 4 is mounted. Also mounted on the Rod should be a number of parts to serve as weights for opening the Bucket, and we used two  $\frac{3}{4}$  in. faced  $\frac{3}{4}$  in. diameter Pinions 5 plus half-a-dozen Washers.

Lock-nutted to the Triangular Plates are four  $3\frac{1}{2}$  in. Strips 6, these being brought together in pairs at the top and pivotally attached to two Threaded Bosses 7. Fixed between these Threaded Bosses through their transverse bores are two  $2\frac{1}{2}$  in. Strips 8, spaced from the Bosses by two Washers on the shank of each securing Bolt, and in the Strips are journalled two 1 in. Rods, each carrying two Washers and a  $\frac{1}{2}$  in. fixed Pulley 9. When the Grab is lifted by Strips 8, the Bucket should open under the weight of the parts on the hinge Rod.

In the case of the control mechanism, the mounting would depend on the parent model, but, for demonstration purposes, we used two  $2\frac{1}{2} \times 2\frac{1}{2}$  in. Flat Plates bolted to a  $5\frac{1}{2} \times 2\frac{1}{2}$  in. Flanged Plate. Journalled in the Flat Plates are two  $4\frac{1}{2}$  in. Rods 10 and 11, Rod 10 carrying four fixed 8-hole Bush Wheels 12, 13, 14 and 15, and Rod 11 carrying a Coupling 16 in which a  $1\frac{1}{2}$  in. Rod 17 is fixed. Free to turn and slide on this last Rod is a  $\frac{1}{2}$  in. loose Pulley 18 that is prevented from coming off the Rod by a Collar. Rod 11 is held in place by Collars and is turned by means of a 1 in. Pulley 19, fitted with a Rubber Ring, while Rod 10 is turned by a handwheel built up from an 8-hole Bush Wheel 20 fitted with a  $\frac{1}{2}$  in. Bolt. A 1 in. Pulley with Motor Tyre 21 is also fixed on Rod 10, the Tyre rubbing against one of the Flat Plates to serve as a friction brake.

Bush Wheels 12, 13, 14 and 15 make up two winding drums, Bush Wheels 12 and 13 serving as the end checks of drum 1 and Bush Wheels 14 and 15 as the end checks of Drum 2. The Cord from drum 1 is passed beneath Pulley 18, is taken up and around a



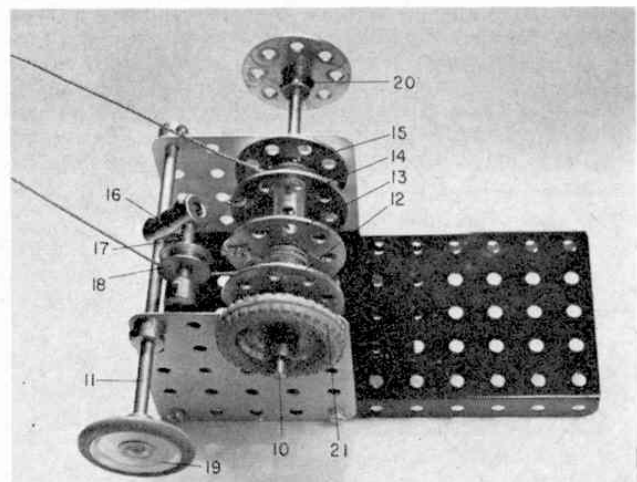
Another view of the Front-Wheel-Drive Unit showing the driving axle.

Pulley in the jib-head of the parent model, then is taken down and beneath one Pulley 9; along and up around the other Pulley 9, to be finally tied to the jib of the parent model. The Cord from drum 2, on the other hand, is taken straight up and over a second Pulley in the jib-head; is brought down and around Pulley 4, then is taken up and also tied to the parent model.

In operation, the Grab can be raised and lowered by turning handwheel 20, while the Bucket can be opened by turning Pulley 19 in a clockwise direction, this causing Pulley 18 to press against the Cord from Drum 1, thus, in effect, shortening the Cord. The other Cord, however, remains the same length, therefore the weights on the Bucket hinge Rod cause the Bucket to open.

#### PARTS REQUIRED

| Bucket Grab |        | Control Mechanism |        |
|-------------|--------|-------------------|--------|
| 4-3         | 26-37a | 2-15a             | 4-37b  |
| 2-5         | 28-37b | 1-18a             | 1-52   |
| 1-16b       | 22-38  | 2-22              | 3-59   |
| 2-18b       | 4-48a  | 1-23              | 1-63   |
| 1-23        | 2-64   | 5-24              | 2-72   |
| 2-23a       | 4-76   | 6-37a             | 1-111a |
| 2-25b       |        |                   | 1-142c |
|             |        |                   | 1-155  |



A useful winding unit and control mechanism specially designed for use with the Priestman Grab described in this article.