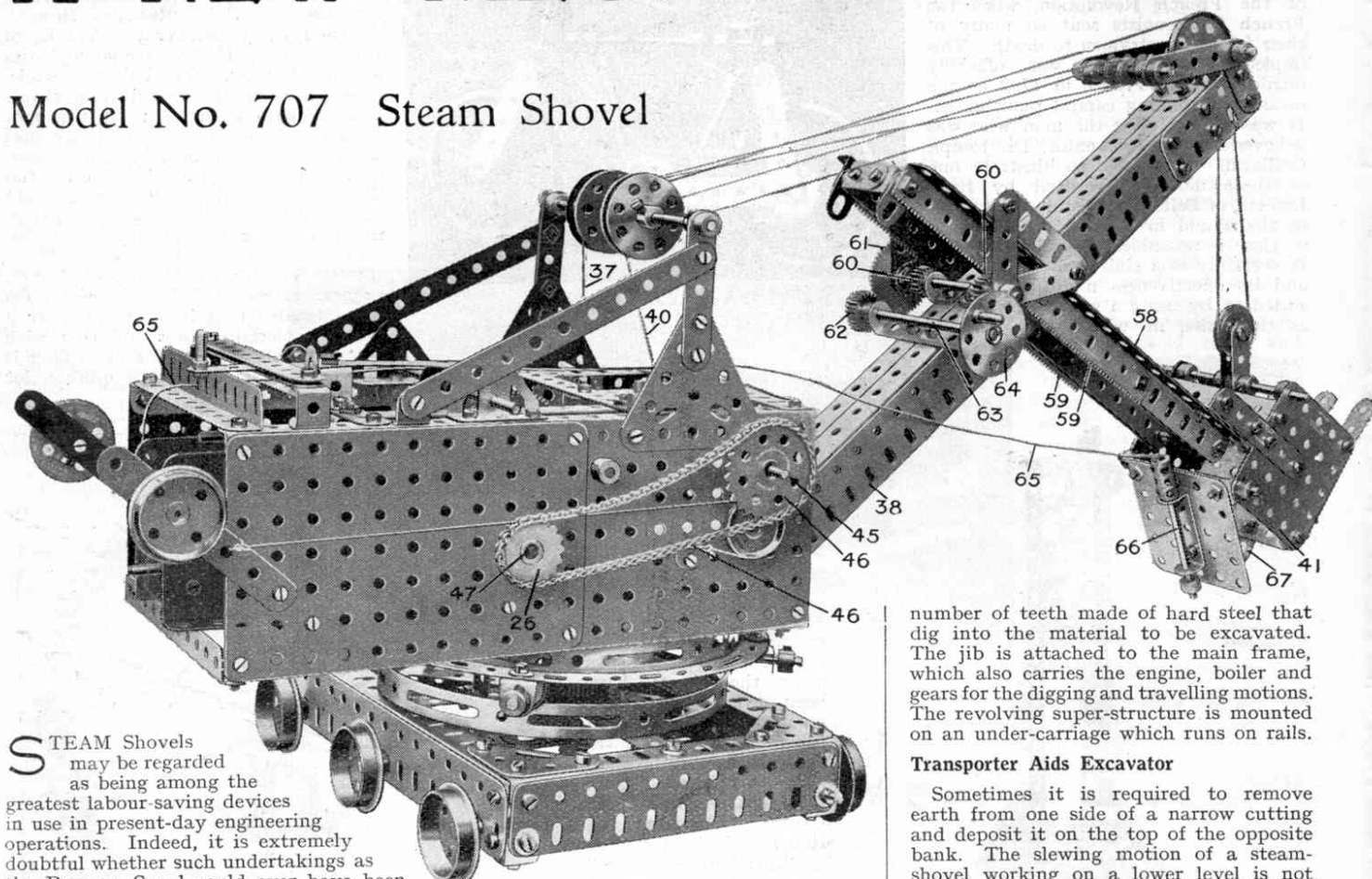


A NEW MECCANO MODEL

Model No. 707 Steam Shovel



STEAM Shovels may be regarded as being among the greatest labour-saving devices in use in present-day engineering operations. Indeed, it is extremely doubtful whether such undertakings as the Panama Canal could ever have been carried out without the aid of these appliances. The modern steam shovel is capable of excavating in one day as much material as could be dealt with by an army of 2,000 men working with pick and shovel. One of its greatest advantages, however, is that it does not have to stop for meals or to rest. It works unceasingly from morning to night, never relaxing its output, and during this time requires only about three men to attend to it. Some idea of the vast amount of work that these machines can get through may be gained by considering the fact that the eighty steam shovels employed in the construction of the Panama Canal were the equivalent of 160,000 men! When housing difficulties have to be taken into consideration—as at Panama, where the work had to be done in a desert area, miles away from civilisation—the saving of expense is enormous.

The Mechanism

Steam shovels are used chiefly in engineering operations in which great quantities of earth have to be removed. They are constructed in various sizes, according to the output required and the nature of the material to be excavated. The bucket is mounted at the end of a beam called the bucket arm, and this in turn is moved on the jib by long racks meshing with gear wheels.

This gearing is generally driven by a separate set of self-contained engines, mounted on the jib at the point where the arm joins it, and this makes it possible to rack the bucket arm in or out as desired, in order to vary the working radius.

A wire rope attached to the bucket passes over a pulley at the top of the jib and from there to the winding drum, the arrangement being similar to that in a crane. When the gear is thrown in, the drum winds and the bucket is drawn upward, pivoting at the point at which the bucket arm is fixed to the jib. One edge of the bucket is fitted with a cutting edge known as the "lip," and this has a

number of teeth made of hard steel that dig into the material to be excavated. The jib is attached to the main frame, which also carries the engine, boiler and gears for the digging and travelling motions. The revolving super-structure is mounted on an under-carriage which runs on rails.

Transporter Aids Excavator

Sometimes it is required to remove earth from one side of a narrow cutting and deposit it on the top of the opposite bank. The slewing motion of a steam-shovel working on a lower level is not able to accomplish this, and in such circumstances a transporter may be installed to work in conjunction with the shovel. A transporter may also be used with a standard shovel for taking away the excavated material to a greater distance than would be possible with a jib of ordinary length. The transporter may be either in the form of a separate unit distinct altogether from the shovel, or it may consist of a framework attached to the shovel and worked by the main engines.

In both types the earth to be dumped is run up the inclined track of the transporter in a skip, which is made slightly larger than the excavator bucket in order to allow for spillage. The skip is fitted with a hinged door similar to that on the bucket of the excavator, but arranged so that it may be opened at any desired point on the transporter track by means of a moveable trip, placed by the driver at the required position.

A Shovel at Work

When commencing operations the bucket of a steam shovel hangs in a vertical position with the teeth resting on the ground opposite the face of the material to be removed. The driver starts up the engines and throws in the hoisting clutch, and this action drags the bucket forward and upward to the

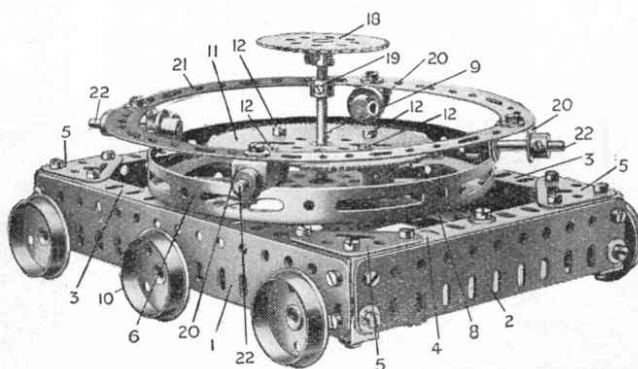


Fig. A

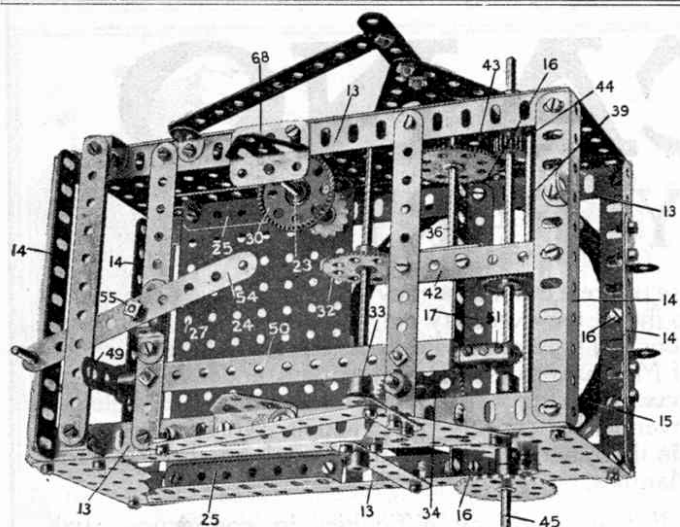


Fig. B

face. At the same time it is thrust outward by means of the racks along the bucket arm until it cuts away the material to the required depth. The driver controls the depth of cut so that an equal thickness is taken throughout the whole length of the stroke, and he thus ensures that the bucket is completely filled when the top of the stroke is reached. At this stage the hoisting clutch is thrown out and the racking motion draws in the bucket until it is clear of the working face, being held in the meantime on the free drum by means of the brake.

The slewing motion is then started up and the bucket is swung over the wagon to be filled, or over the point where the material is to be dumped. When the correct position is reached the driver pulls a cord by his side and so withdraws a catch on the bucket door, thereby allowing the contents of the bucket to be discharged. The slewing motion is then reversed and the bucket is swung back into position to take the next cut from the working face. These operations take place very quickly, and the whole series, or "cycle" as it is called, is performed in from 20 to 60 seconds, the actual time depending upon the size of the machine and the length of the jib.

From Bucket to Tipping Point

When a separate transporter is employed the shovel takes a cut and discharges the material into the skip which stands ready at the foot of the transporter track. When the skip is filled, the transporter driver starts his engines and the loaded skip is hauled up its track to the tipping point. Here the catch holding the door of the skip is knocked out automatically by trip gear, and the skip is emptied. The driver then throws out the hoisting clutch and the skip is lowered by gravity to the foot of the track, the drum to which its hauling rope is attached being allowed to run free, but controlled by the driver with a brake.

An excavator working with a separate transporter is capable of a larger output than a long-jib shovel of equal bucket capacity, largely because the machine has a shorter jib and therefore is able to slew round more quickly. Also it is found

that the coal consumption of the two separate machines is slightly less than that of a single long-jib machine, because the latter is very much heavier and requires more power to work it. The only disadvantages of any importance are that an extra man is required to work the transporter and that tracks must be laid for two machines instead of one.

The Meccano Model

This new Meccano model of a Steam Shovel is an excellent representation of a typical machine. The bucket is fitted with a collapsible bottom and the bucket arm is mounted separately on the jib, its position thereon being controlled by rack and pinion, actuated by hand-wheel. The model includes several interesting features, including a

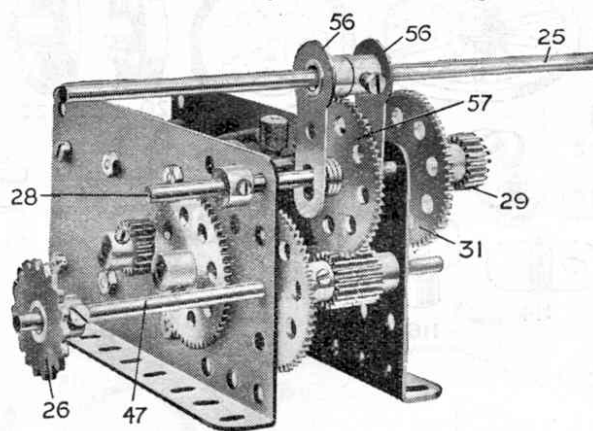


Fig. C

roller-race, in which the circular strip (a new part, No. 145) is used.

Constructing the Model

Begin by building up the base frame (Fig. A) from $7\frac{1}{2}$ " Flat Girders (1) at the sides, and $5\frac{1}{2}$ " Flat Girders (2) at the front. These are joined to $7\frac{1}{2}$ " and $5\frac{1}{2}$ " Angle Girders (3 and 4 respectively) braced with Corner Brackets (5) at the top, and Angle Brackets at the bottom. A Hub Disc (6) is bolted to a $7\frac{1}{2}$ " Strip (8), which is secured across the Angle Girders and also bolted to two side Angle Girders (3). The vertical $4\frac{1}{2}$ " Rod (9) is then passed through the centre hole of the Strip (8), and beneath is secured a Bevel Wheel. This engages another Bevel Wheel on the axle, which carries the central travelling wheels (10) and is connected by Sprocket Wheels and Chain to the rear axle. The large $3\frac{1}{2}$ " Gear Wheel (11) is then secured to the Hub Disc by four $\frac{1}{2}$ " Reversed Angle Brackets by Bolts (12).

Building the Body

The body (Fig. B) consists of two $5\frac{1}{2}$ " \times $3\frac{1}{2}$ " Flat Plates, overlapped three holes to form each side. These are secured to $9\frac{1}{2}$ " Angle Girders (13) along the upper and lower edges, and these are connected across by $5\frac{1}{2}$ " Angle Girders (14). Beneath the body is bolted a Circular Girder (15) by bolts (16) across which, held by the same Bolts, is a $5\frac{1}{2}$ " Angle Girder (17). Through this Angle Girder passes the Rod (9) carrying a 2" Sprocket Wheel (18). A Collar (19) engages above the Angle Girder Circular Strip* (17).

The Roller Race

Next build up the roller race (Fig. A) formed of four Double Brackets (20), bolted to a Circular Strip* (21). $\frac{1}{2}$ " Fast Pulleys are secured on $1\frac{1}{2}$ " Rods (22), which are also secured with Collars on the outside. The whole is then placed on the top edge of the Hub Disc and the body is threaded on to the Rod (9) in the centre hole of the Angle Girder (17). After the Collar (19) is secured in position, the Sprocket Wheel (18) is bolted to the Rod (9).

The top bearing for the $3\frac{1}{2}$ " Rod (23) is formed by a $1\frac{1}{2}$ " Flat Girder, over which is secured a Trunnion. A $3\frac{1}{2}$ " \times $5\frac{1}{2}$ " Flat Plate (24) is secured to each side of the body by $3\frac{1}{2}$ " Angle Girders (25) in the second hole up. This provides a bed to which the electric motor is secured. On the lower part of the Rod (23) is secured a $\frac{3}{4}$ " Sprocket Wheel from which a Chain drives the Sprocket Wheel (18) which operates the lower bevels to drive the travelling wheels.

The Power Unit

Now build up the motor unit, leaving off the Rod (25) and Sprocket (26). (The Gear Wheels and Rods are clearly seen in Fig. C). The motor is then secured to the plate (24), the correct position being found when the fourth hole from the back of the motor registers with hole (27) in the plate.

When the motor is in position, owing to the Rod (28) being slideable the Pinion (29) may be engaged with the Contrate Wheel (30) or the Gear Wheel (31) with the Gear Wheel (32). The spindle of the other Gear Wheel (32) carries

(Continued on page 309)

* This new Meccano part will be announced shortly

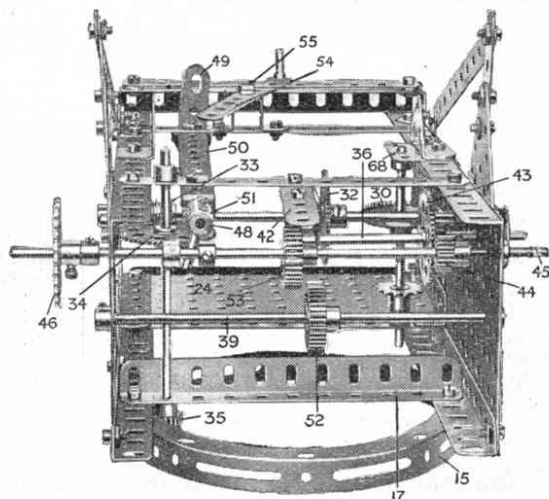


Fig. D

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Air Race Thrills

An exciting new game which claims to give the players all the thrills of aviation without any of the attendant risks, has recently been sent to us by the makers. "Flip-o-Hoy" consists of a strong board, 26" x 17½", on which are drawn an outer circle or aerial course and an inner circle known as the propeller course, on account of the swinging propeller mounted in the centre. Each player has a well-made model aeroplane fitted with revolving wheels and propellers, and the board is designed to represent the view as seen from an aeroplane in flight. Travelling over the aerial course the 'plane experiences various adventures such as stunting, gaining altitude, and engine trouble, while the propeller course is marked out with numbers, signifying awards and incidents that occur in aviation.

"Flip-o-Hoy" (which is made by Mr. H. W. Woods, of Farnborough, Hants.), is an ideal game for winter evenings, and an illustration with further particulars will be found on page 317.



Readers frequently write to me asking if I can recommend books that are both of interest and of use. In this column I review books that I consider specially appeal to Meccano boys. I do not actually supply these books, which may be obtained either through any bookseller or direct from the publishers.

All About Our Wonderful Ships

By Archibald Williams

(Casell & Co. Ltd. 7/6 net).

Ships have a great fascination for young and old alike, for there is an element of romance about even the most disreputable tramp steamer. To the landsman every ship is more or less a mystery, and in "All About Our Wonderful Ships" the author succeeds in dispelling something of this mystery without destroying any of the romance. He tells us how ships are designed and built and describes the wonderful machinery, hidden away in their interiors, that propels them steadily across the oceans of the world. He takes us on imaginary tours of inspection of vessels of various types, ranging from giant Atlantic liners to fussy little tugs, and he shows us how each is perfectly adapted to its special purpose. Altogether Mr. Williams has succeeded in producing a book that will appeal to all British boys, and more particularly so to those interested in the sea. The book is well illustrated with numerous plates and figures.

"The New Photographer,"

(41, North John St., Liverpool. Price 2d Weekly).

This interesting photographic paper more than maintains its high standard of excellence, and indeed becomes increasingly attractive. It caters specially for the beginner, and those of our readers who feel that the results they are obtaining are not proportionate to the labour and money they are expending would do well to become regular subscribers and so acquire a good photographic education at the small cost of 2d. per week. In addition to clearly-written and well-illustrated articles, there are competitions so graded that every reader has a chance of winning a prize, no matter how small his photographic abilities may be. Of particular interest is a great holiday competition with cash prizes amounting to £165. Full details will be found in the current issue, and a free copy will be sent to any of our readers who applies mentioning the Meccano Magazine.

"Wireless World and Radio Review."

(Wireless Press, London. Price 4d. Weekly).

This publication is a radio review in the best sense of the term. The latest issue to hand, No. 265, includes the first of three important contributions by Professor E. Mallett on sound in relation to wireless. Users of frame aerials will read with keen interest a description of a receiver specially designed for use with such aerials. Another article describes the wireless equipment of aeroplanes of the U.S. Post Office Department.

CATALOGUES RECEIVED

The 1925 catalogue recently issued by Messrs. Hobbies Ltd. (Dereham, Norfolk) is a most interesting production and as a guide to the selection of outfits and materials for fretwork it is unequalled. No less than 640 different designs for fretwork articles are included and over 80 pages are devoted to the tools and materials required for some 20 other pastimes, such as bent iron work, picture-framing, strip-work, wood-carving, etc. The catalogue, which contains more than 200 pages and is beautifully printed and illustrated, will be sent post free for 1/-. With each copy is included free an excellent design for a fretwork bureau.

A New Meccano Model (cont. from p. 285)

a Worm (33, Fig. D) which engages a Gear Wheel (34). On the spindle of (34) is a Pinion (35), which engages and drives the 3½" Gear Wheel (11), thus rotating the shovel.

On the 3½" Rod (36) is wound the Cord (37) for raising and lowering the jib (38), and on the 6" Rod (39) is wound the Cord (40) for raising and lowering the shovel (41). The Rod (36) is journaled in a Trunnion bolted underneath the Strip (42) and carries a 1½" Gear Wheel (43), which is engaged by a Pinion (44) on an 8" Rod (45). This is driven by a 1½" Sprocket Wheel (46) from the 1" Sprocket Wheel (26) on the motor spindle (47).

The spindle (45) is slideable by the rotation of an 8" Rod (48) operated by the Crank (49), the Rod being journaled in the ends of a 5½" x ½" Double Angle Strip (50), a Coupling (51) carrying a 1" Rod which engages between two Collars on the Rod (45). In this way the Pinion (44) may be meshed with the Gear Wheel (43) in order to raise or lower the jib, or a 1" Gear Wheel (52) on the Rod (39) may be engaged with a 1" Gear Wheel (53) to raise or lower the shovel arm (38).

The Rod (28) is slideable by a 4½" Strip (54) pivoted at (55), the outer end of which engages between two Cranks (56). These grip on either side of a 1½" Gear Wheel (57), several washers being placed between the Cranks to take up the slack. The shovel (41) is carried on a sliding frame consisting of Angle Girders (58) to which are bolted Racks (59). These are engaged by ½" Pinions (60) on a 3½" Rod. A 50-toothed Gear Wheel (61) is driven by a ½" Pinion (62) on a 3½" Rod (63) operated by the hand-wheel (64). The bottom of the shovel is released by a Cord (65) connected to a sliding Rod (66), the end of which enters the aperture of a Flat Bracket (67).

Parts required:

2 of No.	1A	1 of No.	28
1 "	1B	2 "	30
6 "	2	2 "	31
1 "	2A	1 "	32
4 "	3	1 "	33A
1 "	4	5 "	35
5 "	5	195 "	37
7 "	6	24 "	38
4 "	8	1 "	40
6 "	8A	1 "	45
4 "	8B	1 "	48
4 "	9	3 "	48A
2 "	9B	1 "	48D
4 "	9D	5 "	52A
4 "	9F	36 "	59
7 "	10	3 "	62
6 "	11	2 "	63
11 "	12	4 "	72
4 "	12B	2 "	76
2 "	13A	2 "	77
8 "	14	36 "	94
2 "	15	1 "	95
1 "	15A	1 "	95A
7 "	16	3 "	96
4 "	16A	1 "	96A
1 "	18A	2 "	103
5 "	18B	2 "	103B
8 "	20	2 "	103F
1 "	21	1 "	103H
2 "	22	2 "	103K
4 "	22A	4 "	110
2 "	23	4 "	111
4 "	23A	2 "	115
5 "	24	1 "	118
1 "	25	4 "	125
9 "	26	3 "	126
1 "	27	4 "	133
7 "	27A	1 "	143
1 "	27B	1 "	145

Electric Motor

A Novel Stamp Album

Messrs. Geo. Philip & Son Ltd. (32, Fleet Street, London, E.C.4) are publishing a novel form of Stamp Album (price 7/6), combined with an Atlas that will appeal to many stamp collectors who are interested in Geography. The publishers will send full particulars to any reader on his mentioning the "M.M."