(Overseas 3d Canada 5 Cents)

Vertical Log Saw

SPECIAL FEATURES

Timber fed lengthwise into one end of the machine is automatically carried along on rollers and brought into contact with the saw blades. In actual practice the reciprocating motion of the blades enables them to cut their way easily through the timber, which emerges from the other end of the machine in the form of planks.

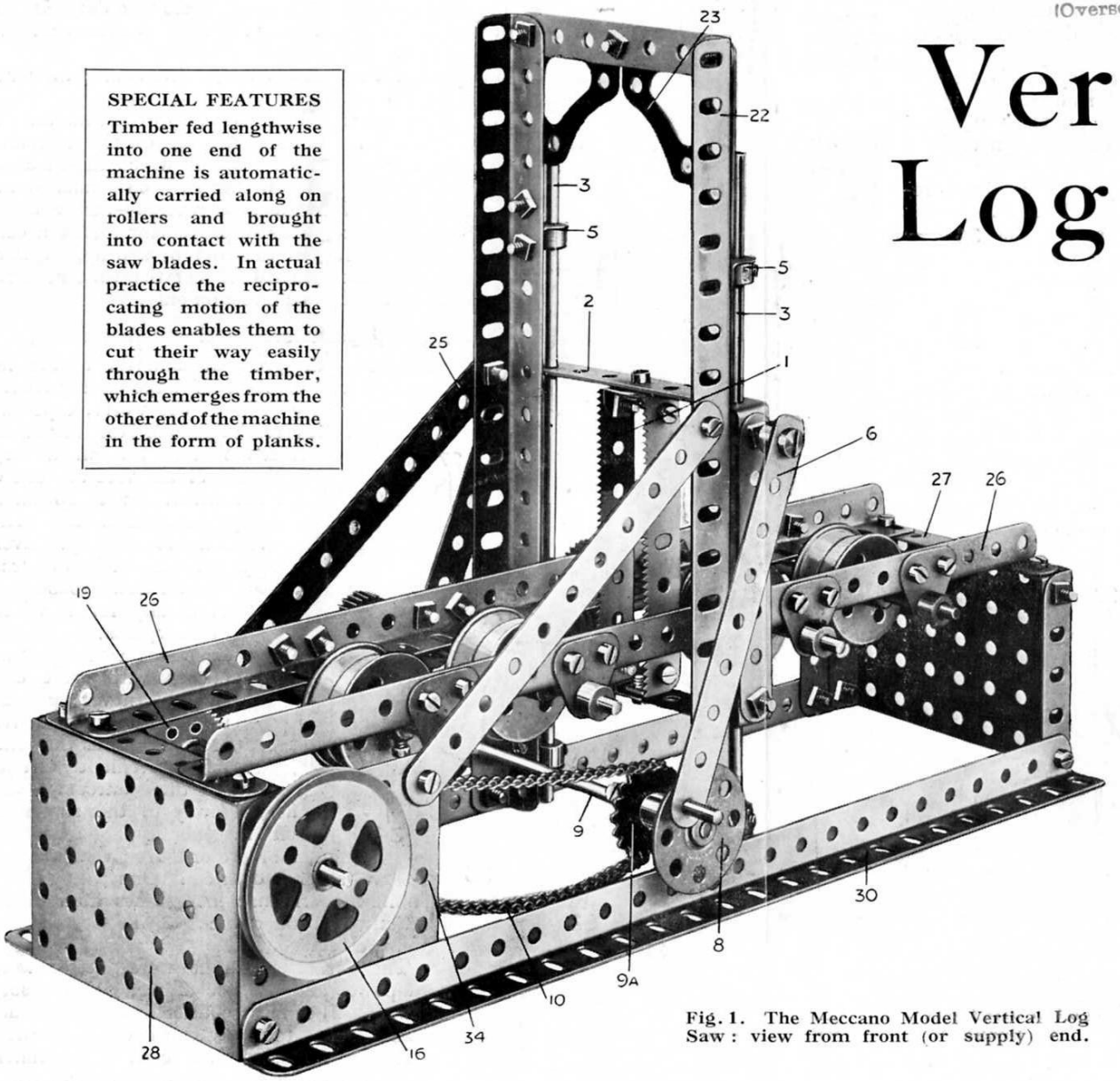

Fig. 1. The Meccano Model Vertical Log Saw: view from front (or supply) end.

FROM the earliest times man has found it necessary to use tools of various kinds to enable him to make the many and varied articles which he uses in his daily life.

One of the most useful of all the tools which man has devised is the saw. From prehistoric days, implements with serrated edges have been employed to rend or divide various kinds of substances, especially metals and stone. Present-day saws are made of the highest grade steel, the teeth being very sharp and "set" with a high degree of exactitude, but in the very early days saws made of bronze were used, while others were made with flints embedded in a wooden blade and held in place by a form of glue known as bitumen. Even sharks' teeth and the serrated edges of sea shells have been employed to form the saws of savage tribes.

Saws Made of Jewels

Some remarkable forms of saw were used by the ancients. In the early Egyptian civilisation saws

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were in great demand for the cutting of stone with which to build pyramids and temples, etc., and for this purpose these ingenious people used implements made of bronze set with precious jewels for teeth !

The chief use of the tool as we know it to-day is, of course, to saw wood, and the enormous logging operations carried on in the vast forest regions of Canada and Australia, etc., have given a great impetus to the improvement of the saw both in design and the methods of manufacture.

The oldest form of saw is the straight type, which is reciprocating in action and has a flat blade with a straight edge. There are now various other types of saws, such as the circular or disc pattern, and the band saw, the latter being a continuous ribbon or band of metal running over two pulleys and having teeth cut along one edge.

Years ago timber was cut with a saw worked by two people, one standing over the log and drawing the saw upward while the other stood in a pit below and took the downward stroke. This arrangement was known as the "pit-saw."

The "gate-saw" was a later development and came into existence with the application of power to timber-working machinery. The gate-saw was superseded by the "muley," or mill saw, which differed only in the manner in which the blade was fixed. Eventually, as the need for more rapid sawing increased, the "gang-saw" was devised. In this a number of blades, varying from two to forty, were strained in a "gate" or frame, with spacing between each blade, as the thickness of the timber demanded, the whole log thus being cut into many boards at one operation.

In the modern log saw the blades are fixed on frames attached to a reciprocating beam, which, in the vertical pattern, moves in an up and down direction. The log is fixed to the table of the machine and carried slowly against the edges of the saws while the latter are in motion. Since the blades are adjustable the timber can be sawn into planks of any thickness.

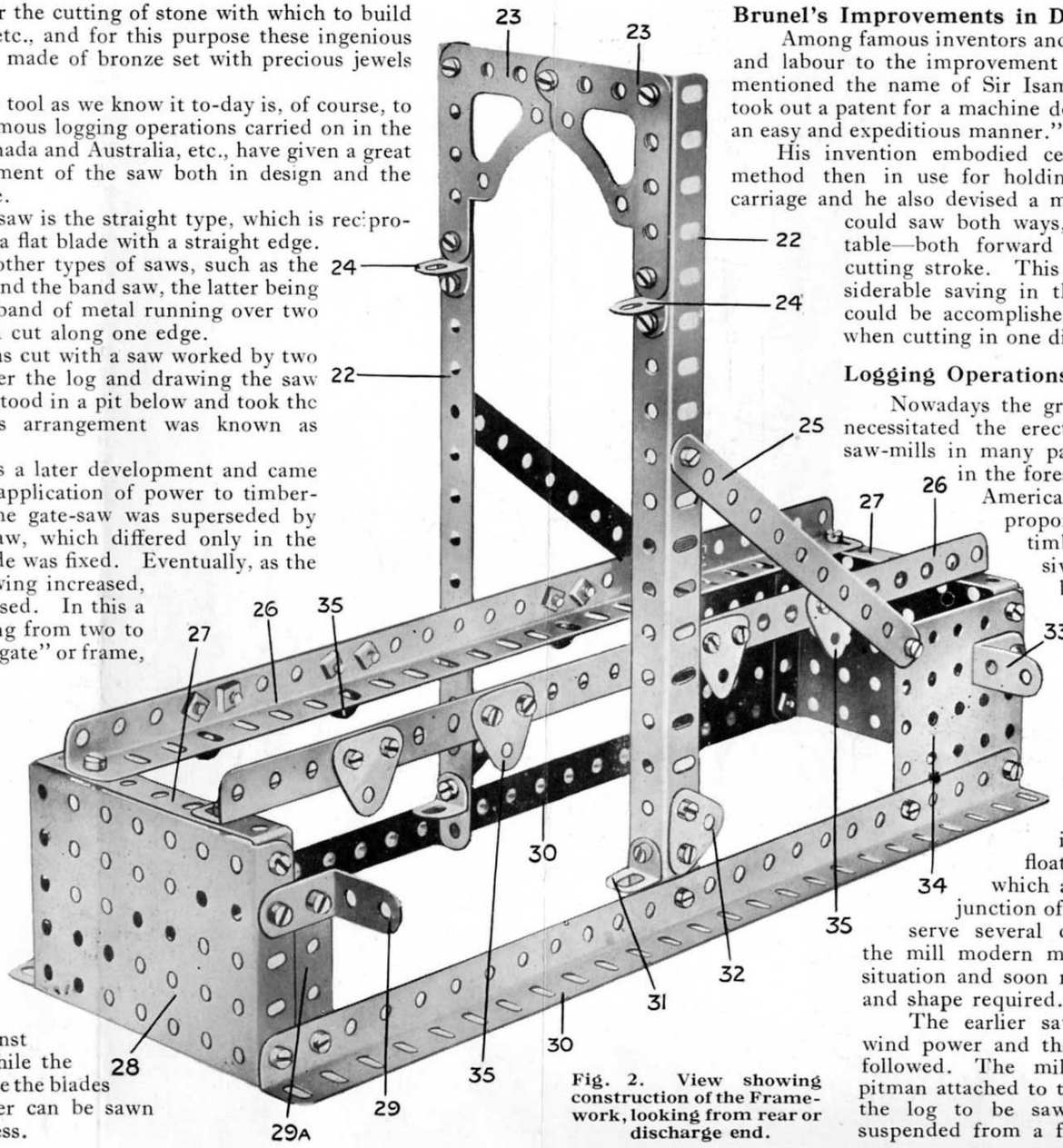

Fig. 2. View showing construction of the Framework, looking from rear or discharge end.

Brunel's Improvements in Design

Among famous inventors and engineers who devoted time and labour to the improvement of sawing machines may be mentioned the name of Sir Isambard Brunel, who, in 1805, took out a patent for a machine designed "for sawing timber in an easy and expeditious manner."

His invention embodied certain improvements on the method then in use for holding the log on the travelling carriage and he also devised a means by which the machine could saw both ways, that is, each stroke of the table—both forward and reverse—was made a cutting stroke. This improvement meant a considerable saving in the cost of sawing, as work could be accomplished in half the time required when cutting in one direction only.

Logging Operations in North America

Nowadays the great demand for timber has necessitated the erection of large and powerful saw-mills in many parts of the world, especially in the forest regions of North America. America's forests furnish a large proportion of the vast amount of timber which is used so extensively throughout the many branches of industry. Every year some millions of trees are cut down to be used eventually for a variety of purposes. Trees selected for "felling" are chosen with great care, and whenever possible those located near a river are selected, as they may be conveniently rolled into the stream and floated away to the saw-mills, which are generally situated at the junction of two or more rivers and thus serve several districts. Once they reach the mill modern machinery takes hold of the situation and soon reduces the logs to the size and shape required.

The earlier saw-mills were operated by wind power and the use of water power soon followed. The mill consisted of a wooden pitman attached to the waterwheel shaft, while the log to be sawn was carried on rollers suspended from a framework above the wheel

and gradually fed by means of hand levers towards the reciprocating saw blade.

About 1634 several saw-mills were erected on the Atlantic coast of North America. The saws employed here were rather ponderous affairs, the blade being attached by a long pitman from the waterwheel shaft to a massive "gate" running in wooden slides, while a rack and pinion device operated the saw table on which the log was placed. Later, however, the demand for timber so increased that it was essential to find means for more rapid production, and the machines were improved continuously until, finally, the saw-mill as we know it to-day was evolved.

Details of a typical Logging Mill

A logging mill usually stands on the banks of a river or pond and huge poles driven into the bed of the river serve to hold long pieces of timber to which chains are attached, the whole forming a boom into which the logs are floated and kept until required.

A special conveyor known as a "jack ladder" projects from the mill and down under the water, so that the logs may be floated on to it, and by means of a series of spikes which dig into the logs the latter may be hauled up the incline of the conveyor to the mill floor. Here each log is rolled upon "runners" and carried to the sawing machine, where, by a touch of a lever, which causes an arm to rise in the "runners," the log is thrown on to the saw table. Another lever is then pulled, thereby operating an iron "dog," or grip, which digs into the log and holds it tightly in position ready to be cut.

As the lumber is sawn it drops from the machine on to rollers which carry it to an edging machine and afterwards to a trimmer—an ingenious arrangement of saws which advance and recede at the operator's pleasure, cutting the lumber to equal lengths and trimming off any defective portions. So soon as one log has been sawn another follows and so on in endless succession.

The space available will not permit mention of all the other ingenious contrivances which are to be found to-day in a completely equipped saw-mill. It must suffice to record that machines are provided for every purpose and operation, and so well do they function that the human hand need not touch the logs at all. Machinery, guided by human intelligence, does all the work from the time the rough log enters the mill until it is cut and trimmed or manufactured into various articles. Some idea of the extent of the timber industry and the importance of the saw-mill may be gauged from the fact that the saw-mills of the United States alone produce over 26,000,000,000 feet of machined timber every year.

This short account of the evolution of the log saw will, we hope, give added interest to the Meccano model, which faithfully reproduces the essential features of a modern machine. While being perfectly simple to construct, the model forms an interesting piece of mechanism that, in the hands of a Meccano boy, is capable of affording much good fun and pleasurable instruction.

The model is designed on the vertical blade principle, the saws being attached to a reciprocating frame which moves in an up-and-down direction. The log to be sawn is placed on the feed rollers of the machine, and is carried slowly past the edges of the saws whilst the latter are in motion.

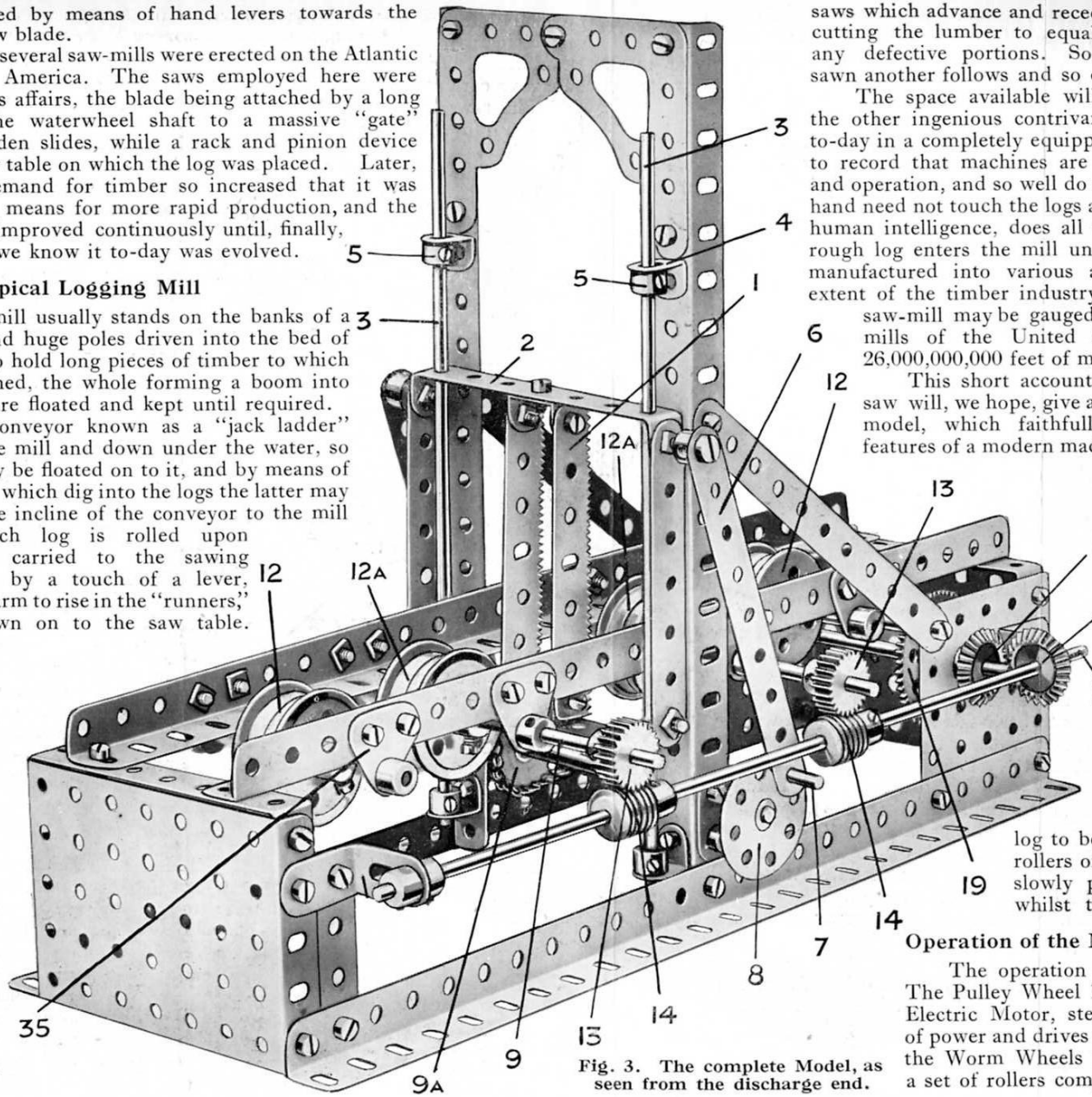

Fig. 3. The complete Model, as seen from the discharge end.

Operation of the Meccano Model

The operation of the model is as follows. The Pulley Wheel 16 (Fig. 1) is attached to an Electric Motor, steam engine, or other source of power and drives the shaft 15 (Fig. 3) carrying the Worm Wheels 14, which impart motion to a set of rollers comprising the "feed" by which

the logs are brought to the saws. The saw frame itself is operated by means of connecting rods and cranks, which cause the frame to oscillate in a vertical plane, with the cutting edges toward the log. The latter is fed slowly on to the saw teeth by the revolving rollers and is thus cut into planks, the width of which depends on the distance between the saw blades. If preferred the shaft carrying the Pulley Wheel 16 (Fig. 1) may be fitted with a handle built up from standard Meccano parts (see Meccano Standard Mechanisms Manual, details Nos. 255 to 259) thus dispensing with the Motor or engine.

In order to simplify the construction, each detail of the Meccano model Vertical Log Saw is described separately, so that with the aid of the various illustrations no difficulty should be experienced in building a successful model.

Constructing the Framework

Proceed to build up the framework by bolting two 12½″ Angle Girders 30 to two 3½″×2½″ Flanged Plates 28, as shown in Fig. 2. To the top of each end Flanged Plate 3½″×½″ Double Angle Strips 27 are secured to form a support for the two 12½″ Angle Girders 26, which may now be secured in position.

The two vertical 9½″ Angle Girders 22 are bolted to the Angle Girders 30, the bolts passing through the thirteenth holes in the latter. The Angle Girders 22 are spanned at the top by two Architraves 23 joined together as shown. Now bolt two Angle Brackets 24 to the Angle Girders 22, passing the bolt through the sixth hole from the top end of the Girders.

At the operating end of the base frame two 2½″×2½″ Flat Plates 34 are bolted to the Angle Girders 30 and to the sides of the Flanged Plates 28. At the front end of the framework a 2″ Strip 29a is secured as shown and to this is attached a 1″×1″ Angle Bracket, while a further 1″×1″ Angle Bracket 33 is secured to one of the Flat Plates 34. It is important to note here that the outer end holes in the Angle Brackets 33 and 29 must be exactly opposite each other as these two Brackets carry the shaft 15 (Fig. 3).

To the outer sides of each Angle Girder 26 (Fig. 2) are bolted four 1″ Triangular Plates 35, and two Angle Brackets 31 are fastened to the lower ends of the Girders 22. These Brackets, together with the Angle Brackets 24, form the supports for the guide Rods 3 (Fig. 3) carrying the saw frame. Any further details of the framework will be quite clear from the illustrations.

Roller Feed Mechanism

The log is caused to move past the saws by the pairs of reversed Flanged Wheels 12 and 12a (see Fig. 3). The centre pairs of these wheels are positively driven from the two ¾″ Pinions 13, which are engaged by the Worms 14 carried on the Rod 15. The Rod 15 is held in its bearings 29 and 33 (Fig. 2) by means of two Collars placed one on each side of the Angle Bracket 29.

The movements of the Flanged Pulleys 12 and 12a and of the saws 1 are effected simultaneously from the driving Pulley Wheel 16 (Fig. 1), the Rod of which carries a ½″ Pinion that engages a 57-teeth Wheel 19 (Fig. 3). A Bevel Wheel 17 is carried on the outer end of the Rod of the gear 19 and engages a corresponding Bevel 18 carried on the Rod 15.

The saws, represented by the Rack Strips 1, are carried in a vertically movable frame 2 that slides on the Rods 3, the latter being held in the Angle Brackets 4 by means of Collars 5, and a reciprocating movement is imparted to the frame by means of the link Strips 6. These consist of two 4½″ Strips (one on each side of the machine) and are connected to the frame 2 by Pivot Bolts lock-nutted to the frame and spaced with Collars. The lower holes of the Strips engage the Threaded Pins 7 carried in Bush Wheels 8, the Rod 9 of which carries a ¾″ Sprocket 9a and is connected by a Sprocket Chain 10 (Fig. 1) to a Sprocket Wheel on the spindle of the Gear Wheel 19.

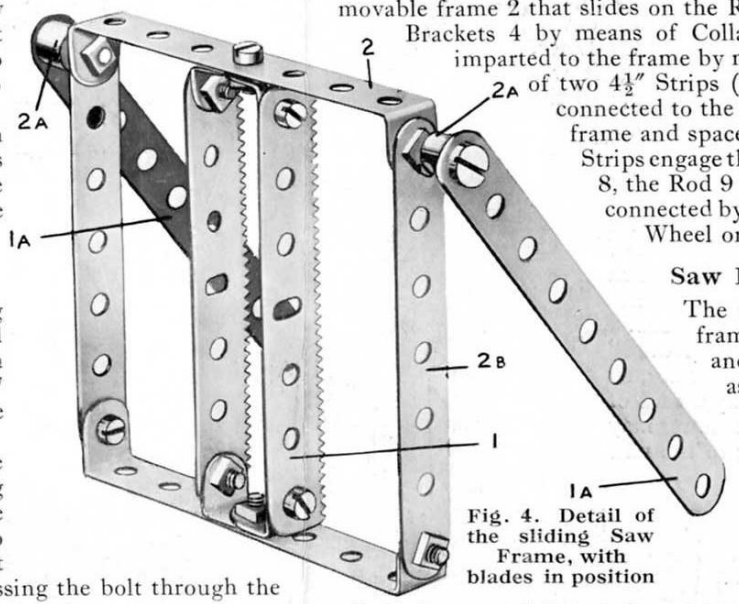

Fig. 4. Detail of the sliding Saw Frame, with blades in position

Saw Blade Unit

The saw blades are secured in a rectangular framework built up from two 3½″ Strips and two 3½″×½″ Double Angle Strips, as shown in Fig. 4. Two 3½″ Rack Strips represent the saw blades and are bolted by Angle Brackets to the inside of the frame. The remaining portions of the saw blade unit have already been mentioned in the section dealing with the saw motion. The model when completed should be carefully inspected for alignment and all moving parts lubricated so as to ensure perfect freedom of movement.

The machine may be set in motion by means of a Meccano Electric Motor of either the high or low voltage type. If the latter type Motor is used a Meccano 4-volt 8 or 20 ampere-hour Accumulator will be found quite satisfactory, but if a high voltage Motor is available the necessary energy may be taken from the house electric lighting circuit. Before attempting to plug the Motor into the house circuit, however, the reader is advised to consult the special leaflet dealing with this matter and describing the apparatus required. This leaflet may be obtained from all Meccano dealers, or information will be forwarded, on request, by Meccano Ltd., Liverpool.

PARTS REQUIRED

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3	,,	3	2	,,	16	2	,,	32	12″	,,	94
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4	,,	8	1	,,	20a	6	,,	37a	2	,,	108
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