

**Spanner solves  
a 'Past Masters'  
problem with  
this specially  
designed model**

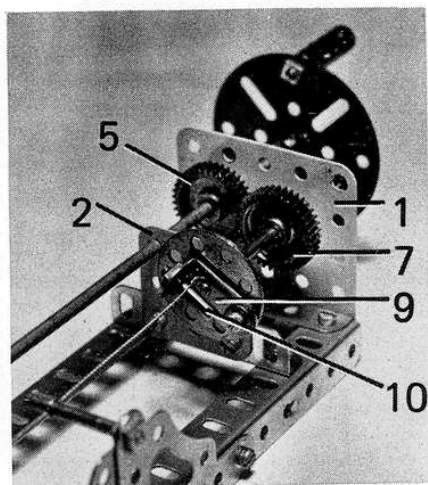
# HEALD-MAKING MACHINE

BEING A TRUE working model, the Meccano Loom featured on the two previous pages makes use of healds to carry and manipulate the warp threads during weaving. The healds are vital components, but unfortunately, since the model was first published twenty years ago, the purpose-made Meccano Heald (Part No. 101) which was included in the system has been discontinued. Lesser magazines might be discouraged by this, but not so the MMQ; if it isn't made, make it, we say, and the machine described here is designed to do just that!

Making your own healds sounds a daunting prospect, but in fact it is remarkably easy and the machine required for the job is simple, as can be seen from the illustration above. A solid frame work is produced from two 9½" Angle Girders, connected together at each end by a 2½" Angle Girder, the securing Bolts in each case also fixing a 2½" x 2½" Flat Plate 1 in position. Two more 2½" Angle Girders are bolted between the 9½" Girders, one through the third holes in from each end, and bolted to each of these is a 1½" x 1½" Flat Plate 2. Centrally fixed to one of the 9½" Girders are two Corner Gussets 3, overlapped as shown, a Long Threaded Pin 4 being tightly locked in the apex holes of the Gusset.

Journalled in one set of upper corner holes of Flat Plate 2 and in

Close-up of one Bush Wheel assembly



the corresponding holes in Flat Plate 1 is an 11½" Rod, held in place by a Collar and a 1" Gear Wheel 5 at one end and by a ½" Pinion 6 at the other end. Gear 5 meshes with a second 1" Gear 7 on a 3" Rod journalled in the remaining upper corner hole of nearby Plate 2 and in the corresponding hole in Plate 1. This Rod is free to move approximately a quarter-inch in its bearings, but it is held in tension by the action of a Compression Spring positioned on the Rod between the back of Plate 1 and a Collar 8. Mounted on the inner end of the Rod is an 8-hole Bush Wheel, to the face of which a 1" x ½" Angle Bracket 9 is fixed by its long lug, with the end of the Rod just protruding through the inner hole in the lug. A Threaded Pin 10 is fixed to the short lug of the Angle Bracket.

A similar Threaded Pin / Bush Wheel construction is built up and mounted on the inner end of another 3" Rod journalled in corresponding holes in remaining Plates 1 and 2. Again, the Rod is free to slide a short distance in its bearings, being held in tension by a Compression Spring and Collar, but this Rod carries a ½" Pinion 11 instead of the previous 1" Gear. The Pinion meshes with a second ½" Pinion which is free to revolve on a Long Threaded Pin 12, locked in the second row centre hole of Flat Plate 1. The Pinion, which is prevented from sliding on the Pin by a Collar, also meshes with Pinion 6 on the 11½" Rod. As a result, when the 11½" Rod is revolved, the two Threaded Pin/Bush Wheel constructions contra-rotate (revolve in opposite directions in relation to

each other). A winding handle for the long Rod is provided by a Face Plate 13, to which is fixed a Long Threaded Pin carrying a loose Coupling and a Collar to serve as an easy-turn handle, although this, of course, is a non-essential refinement.

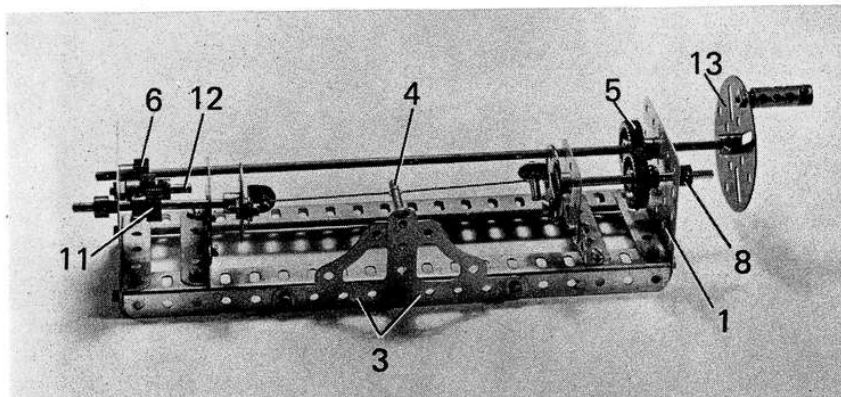
With the Machine completed, operation can begin and it should be stressed that the secret of successful heald-making lies in the wire used. We found that No. 24 s.w.g. steel or copper wire gave perfectly good results.

Cut an 11½" length of wire and form it into a loop by twisting the ends together. Extend the loop into a large sausage shape and mount in the machine by hooking the ends over Threaded Pins 10, with Long Threaded Pin 4 projecting through the centre of the loop. Then, turn the winding handle until the two Compression Springs are fully compressed — and you have one completed heald!

It will be found that the original twisted-together ends of the wire will project, but this should not effect the operation of the healds when mounted in the Loom.

## PARTS REQUIRED:

2 - 8a	2 - 31	2 - 74
4 - 9d	21 - 37a	2 - 108
2 - 12b	19 - 37b	1 - 109
1 - 13	4 - 38	2 - 111c
2 - 16a	5 - 59	2 - 115
2 - 24	1 - 63	3 - 115a
3 - 26	2 - 72	2 - 120b
No. 24 s.w.g. Steel or Copper Wire		



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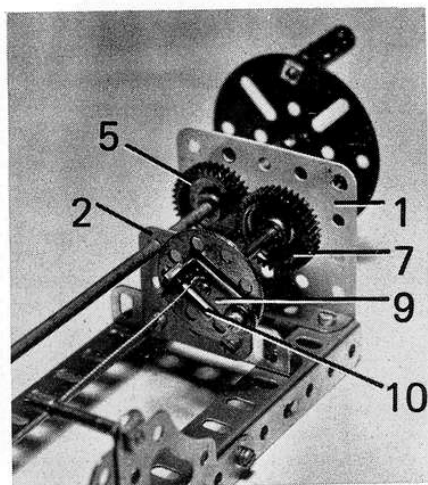
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Close-up of one Bush Wheel assembly



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2 - 24	1 - 63	3 - 115a
3 - 26	2 - 72	2 - 120b
No. 24 s.w.g. Steel or Copper Wire		



# A New Meccano Loom

By "Spanner"

## Motor Driven Weaves Real Cloth

I AM now able to give constructional details of a new Meccano weaving Loom that has been specially designed in response to many requests that I have received from Meccano enthusiasts. This Loom is easy to build and comparatively easy to adjust when completed, and it is one of the most simple automatic machines of this type that can be designed. Even so it is a complicated mechanism, and it is intended therefore as a subject for older model-builders. The shuttle used in the model is built up entirely from standard Meccano Parts.

The main constructional details of the model are given in this issue and next month I shall complete the instructions and give details for adjusting and working the Loom, together with details of a simple Beaming Frame that is required for preparing the warp ready for placing in position in the Loom.

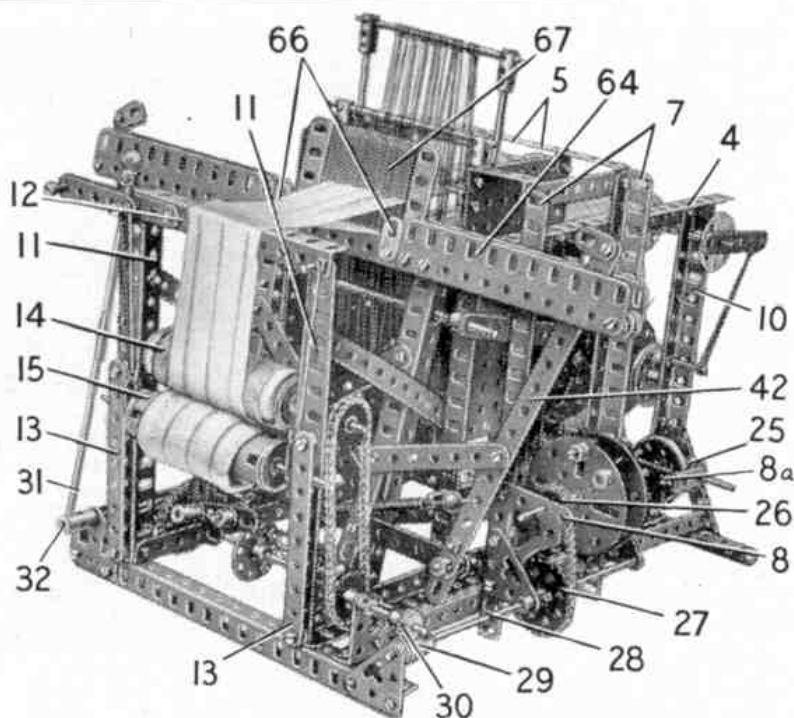


Fig. 1. The fine Meccano weaving loom described on these pages.

### Construction of the Frame

The base of the frame (Fig. 2) is built from four  $12\frac{1}{2}$ " Angle Girders bolted to two  $9\frac{1}{2}$ " Angle Girders. Four  $7\frac{1}{2}$ " Angle Girders 1 are bolted to the inside Angle Girders 2 and are held firm by two  $5\frac{1}{2} \times 3\frac{1}{2}$ " Flat Plates 3, which support two  $9\frac{1}{2}$ " Angle Girders 4 (see Figs. 1 and 2). Two  $4\frac{1}{2} \times \frac{1}{2}$ " Double Angle Strips 5 are fixed between the Flat Plates 3. Bolted to the inside of the Flat Plates 3 are four  $3\frac{1}{2}$ " Angle Girders 6 (Figs. 2 and 4), spaced from the Plates by three Washers on each bolt. Two  $9\frac{1}{2}$ " Angle Girders 7 (Fig. 5), are secured to the base and connected to the top of the Plate 3 by  $1\frac{1}{2} \times \frac{1}{2}$ " Double Angle Strips. Two Corner Gussets 8 and 8a and two  $1\frac{1}{2}$ " Corner Brackets are bolted to the Girders 7 as shown in Figs. 1 and 5. To the Corner Gusset 8a two  $1 \times 1$ " Angle Brackets are fixed, and these, together with two Girder Brackets 9, form the bearings for the driving shaft 24 to the heald tappets. Two  $7\frac{1}{2}$ " compound girders 10 (Fig. 5), are bolted to the base and to the  $9\frac{1}{2}$ " Angle Girders 4, and are braced to the base by  $3\frac{1}{2}$ " Strips. At the other end of the base two  $7\frac{1}{2}$ " compound girders 11 are fixed. These support the *breast beam*, which is a  $5\frac{1}{2}$ " Angle Girder 12. To the girders 11 are also bolted

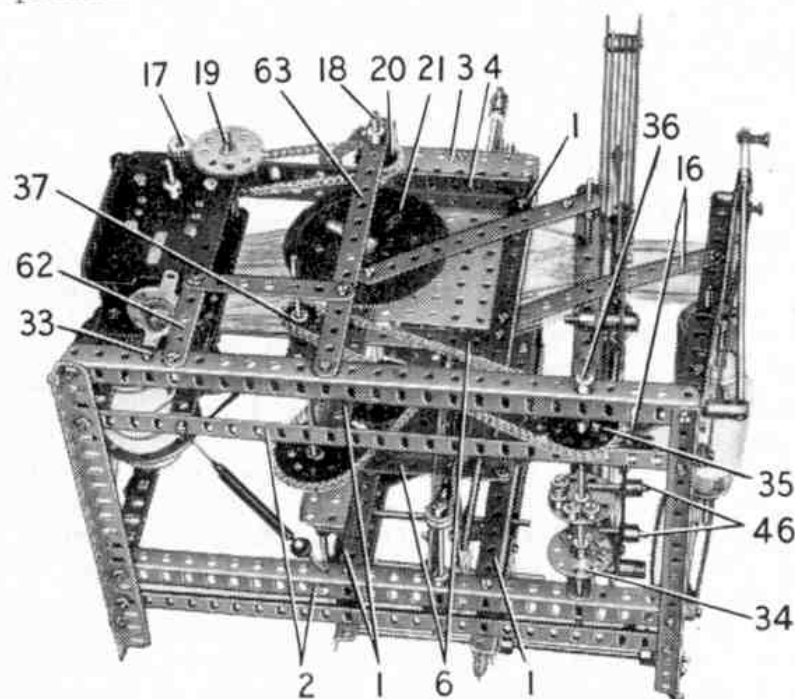


Fig. 2. The loom seen from below, to show details of the frame and the mounting for the E20R Electric Motor.

two  $4\frac{1}{2}$ " Strips 13 spaced from the girders by four Washers on each of the Bolts. A lock for the Motor starting handle is a  $2\frac{1}{2}$ " Strip mounted on Pivot Bolts and held by Compression Springs against a

on the Motor shaft engages with a 57-tooth Gear, on the shaft of which another  $\frac{1}{2}$ " Pinion 17 drives a 57-tooth Gear on Rod 19, which also carries a 1" Sprocket. A Chain from this drives another 1" Sprocket 20 on Rod 18, which also carries a  $\frac{1}{2}$ " Pinion that engages a  $3\frac{1}{2}$ " Gear Wheel 21 on Rod 22 (Fig. 5). Rod 18 is supported in Strip 63 (Fig. 2), and one of the Flat Plates 3. Rod 22 (Fig. 5) has a 2" Sprocket 23 at its centre, and a  $2\frac{1}{2}$ " Gear is fixed to the Rod at the opposite end to the Gear 21.

The  $11\frac{1}{2}$ " Rod 24 carries at its centre a 2" Sprocket, which is connected by Chain to Sprocket 23, a  $\frac{3}{4}$ " Pinion 25 at one end, and a  $\frac{3}{4}$ " Sprocket 37 (Fig. 2) at the other end.

The two cams that operate the heald frame tappets each consists of a Face Plate 56 (Fig. 5), fitted with a Threaded Boss and a  $\frac{1}{2}$ " Bolt carrying six Washers. These Face Plates are mounted as shown with the Threaded Bosses diametrically opposite to each other on a Rod supported in the Corner Gussets 8 and 8a, and the Rod carries also a  $1\frac{1}{2}$ " Contrate that is driven by the Pinion 25.

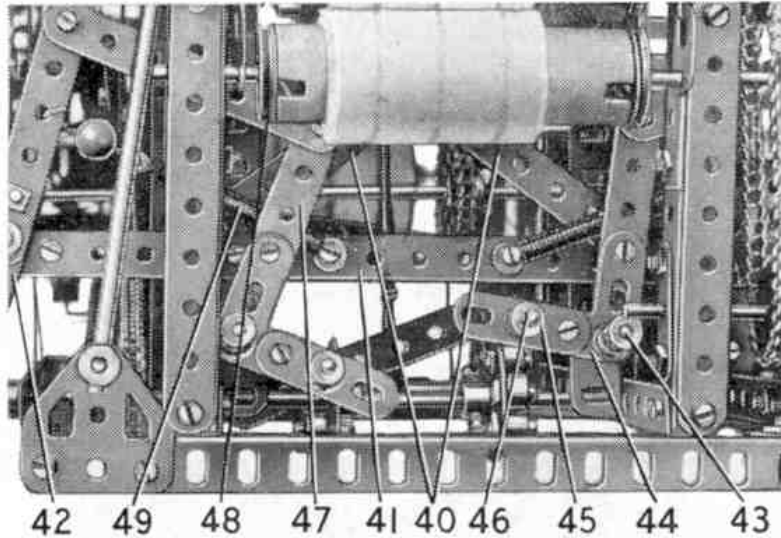


Fig. 3. A close-up view of the cam mechanism that operates the picking sticks.

$3\frac{1}{2}$ " Strip bolted to the side of the Girder 12 (Fig. 1). The sand roller 14, which is a Wood Roller with rough sand paper glued around, is held between 1" Pulleys on a Rod mounted in the girders 11.

The take-up Roller 15 is mounted on a Rod between 1" Pulleys, and the Rod slides between girders 11 and the Strips 13. This Roller is held against the sand roller 14 by the tension of two Driving Bands. These are attached to Fishplates slipped over the ends of the lower Roller Rod, and the Bands are anchored at their upper ends to the Pivot Bolt and  $\frac{1}{2}$ " Bolt fixing the Girder 12 in position. The breast beam is braced by two  $5\frac{1}{2}$ " Strips 16 placed as shown in Fig. 2.

### The Drive

An E20R Electric Motor is bolted to one of the angle girders 10 (Fig. 5) and is supported also by a  $2\frac{1}{2}$ " Strip 62 (Fig. 2) bolted to the base, and a  $3\frac{1}{2}$ " Strip attached to a vertical  $7\frac{1}{2}$ " Strip 63. A  $2\frac{1}{2} \times \frac{1}{2}$ " Double Angle Strip is bolted to the inner sideplate of the Motor and to one of the Girders 2. A  $\frac{3}{4}$ " Bolt is used to fasten  $2\frac{1}{2}$ " Strip 62 and the  $3\frac{1}{2}$ " Strip to the Motor, and this Bolt acts also as a stop to prevent the Motor starting lever from going into reverse (Fig. 2). A  $\frac{1}{2}$ " Pinion

on the Motor shaft engages with a 57-tooth Gear, on the shaft of which another  $\frac{1}{2}$ " Pinion 17 drives a 57-tooth Gear on Rod 19, which also carries a 1" Sprocket. A Chain from this drives another 1" Sprocket 20 on Rod 18, which also carries a  $\frac{1}{2}$ " Pinion that engages a  $3\frac{1}{2}$ " Gear Wheel 21 on Rod 22 (Fig. 5). Rod 18 is supported in Strip 63 (Fig. 2), and one of the Flat Plates 3. Rod 22 (Fig. 5) has a 2" Sprocket 23 at its centre, and a  $2\frac{1}{2}$ " Gear is fixed to the Rod at the opposite end to the Gear 21.

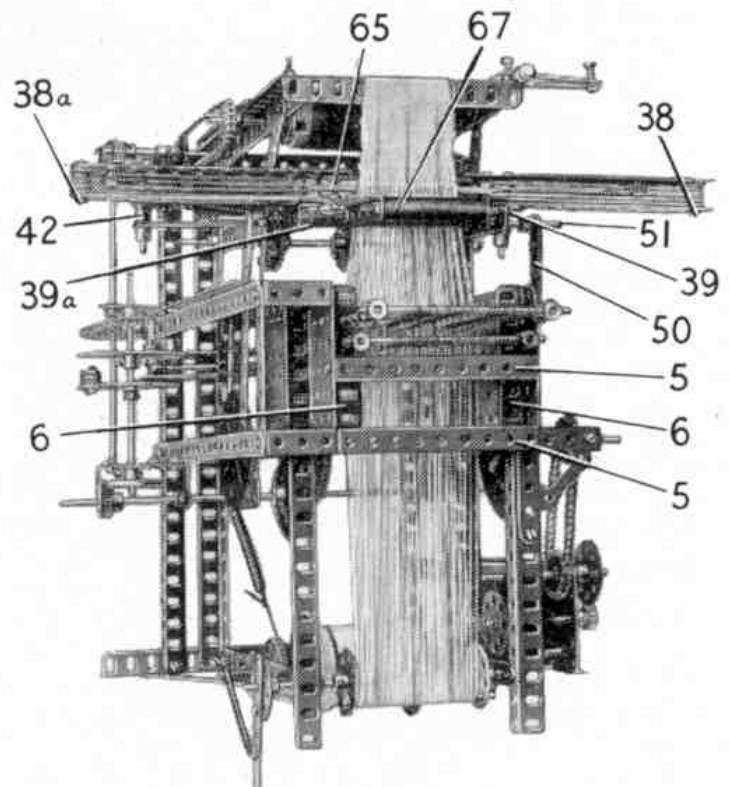


Fig. 4. The arrangement of the shuttle race can be seen in this overhead view.

This Rod carries also a  $\frac{3}{4}$ " Sprocket 26 (Fig. 1), which drives a  $1\frac{1}{2}$ " Sprocket 27 on Rod 28. Rod 28 is mounted in the Corner Brackets previously mentioned as bolted to the Angle Girders 7, and in another Corner Bracket fixed to the end of the base. This forms the drive to the sand roller, through a Worm 29 that engages a  $\frac{1}{2}$ " Pinion 30. The Rod on which Pinion 30 is fixed is mounted in a  $1\frac{1}{2}$ " Corner Bracket, and in a  $1\frac{1}{2}$ " Strip bolted to one of the girders 11. A 1" Sprocket on this Rod is connected by Chain to a 1" Sprocket on the Rod of the sand roller 14.

The Motor is started and stopped from a control handle 31, which is a Rod fixed in a Threaded Coupling 32. An  $11\frac{1}{2}$ " Screwed Rod is locked by a nut in the Coupling, and at a point about one inch from the other end of the Screwed Rod a Threaded Crank is fixed to it with two nuts. The end of the Screwed Rod is supported in a  $1" \times 1"$  Angle Bracket held by Bolt 33 (Fig. 2) to the base. A  $\frac{1}{2}$ " Bolt in the Motor starting lever engages with a  $1" \times \frac{1}{2}"$  Angle Bracket bolted to the arm of the Threaded Crank.

### The Picking Cams

The shuttle is "thrown" to and fro along the shuttle race or guide of the slay 64 (Fig. 1), by the action of picking sticks 42, which in turn are actuated by cams. Each of these two cams consists of four Collars bolted in four adjacent holes of a Bush Wheel 34 (Fig. 2), secured on a Rod 36. The entire slay assembly rocks to and fro on this Rod 36. A  $\frac{3}{4}$ " Sprocket 37 drives a  $1\frac{1}{2}$ " Sprocket 35 and rotates the cams in an anti-clockwise direction. It is important to note that these cams also are set at  $180^\circ$  to each other, that is with the Collars in each cam diametrically opposite.

### The Slay and Shuttle Race

The shuttle race is made in two sections. Each of these is built-up by placing on a  $\frac{3}{4}$ " Bolt 38 (Fig. 4) the following parts, in the order given starting from the head of the Bolt: a  $5\frac{1}{2}"$  Flat Girder, a  $9\frac{1}{2}"$  Strip, a Washer, a  $5\frac{1}{2}"$  Strip, two Washers, a  $5\frac{1}{2}"$  Strip, two Washers, a  $5\frac{1}{2}"$  Strip, two Washers, a  $5\frac{1}{2}"$  Strip, a  $9\frac{1}{2}"$  Strip, a Washer and a second  $5\frac{1}{2}"$  Flat Girder. The two

sections thus assembled are then placed together so that the  $9\frac{1}{2}"$  Strips of one section overlap the same Strips of the other section by nine holes. The two sections are then connected together by the  $1\frac{1}{8}"$  Bolts 39 and 39a (Fig. 4). The  $5\frac{1}{2}"$  Strips of the sections are spaced apart on these Bolts by Washers, and in addition to the  $5\frac{1}{2}"$  Strips the Bolts support three  $4\frac{1}{2}"$  Strips 65 placed face to face at the exact centre of the shuttle race. Two Fishplates 66 (Fig. 1) are fixed to the front

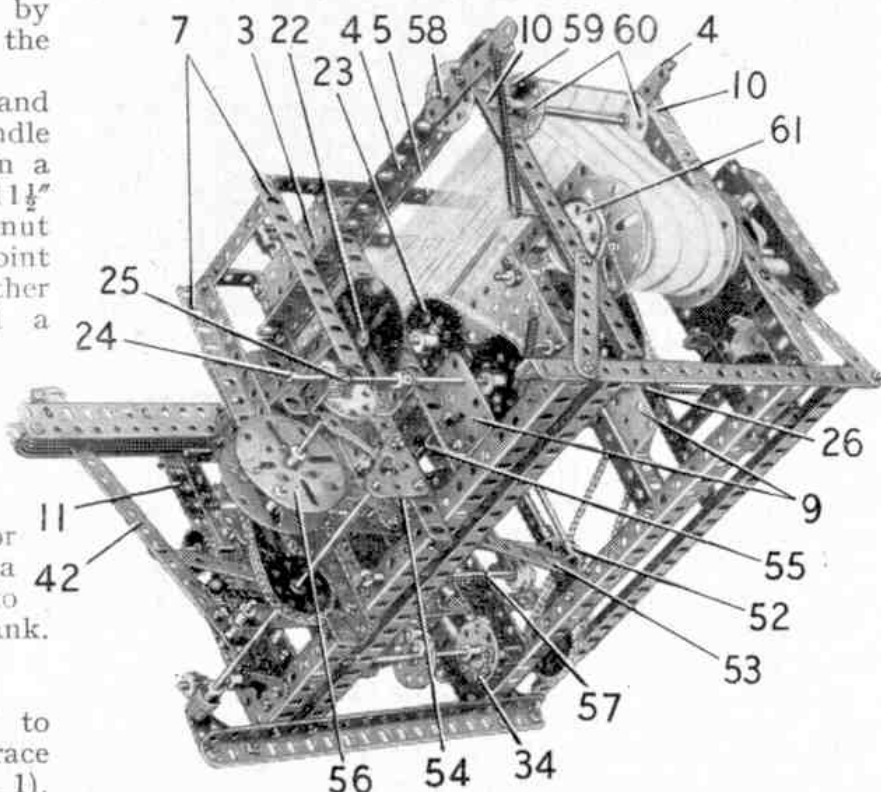


Fig. 5. The cams controlling the movements of the heald frames can be seen in this view of the loom.

edge of the shuttle race at the inner ends of the Flat Girders.

The reed 67 (Fig. 1) is built from  $2\frac{1}{2}"$  Strips, which are spaced with Washers on two 3" Screwed Rods and edged at each side with a  $2\frac{1}{2}"$  Angle Girder as shown. This unit is then bolted to the centre of the shuttle race. The shuttle race is attached by Bolts 39 and 39a (Fig. 4), to two  $7\frac{1}{2}"$  Angle Girders, which are pivoted at their lower ends on the Rod 36 already mentioned. The Girders are braced by two crossed  $5\frac{1}{2}"$  Strips 40 (Fig. 3). Two  $9\frac{1}{2}"$  Strips 41 placed face to face are bolted centrally across the  $7\frac{1}{2}"$  Angle Girders, and a Crank is bolted to each end of the Strips.

Each picking-stick 42 (Fig. 3), is a  $7\frac{1}{2}"$  Strip, and it has a Fishplate fixed to its upper end as shown and a Double Arm Crank to its lower end. The Double Arm Crank of each

(Continued on page 614)



# A New Meccano Loom

## The Beaming Frame and Other Details

By 'Spanner'

ASSUMING that the Loom has been built up to the stage described in last month's *M.M.*, the next operation is the construction of the Heald Frames. These are the frames that hold the Healds through which the warp threads are passed from the beam. They are actuated by the cams 56 and rise and fall to provide the "shed" through which the shuttle carrying the weft thread passes.

On a 4" Rod (bottom) and a 4½" Rod (top) 30 Healds should be placed, with a Coupling on each end of each Rod. The Couplings are joined together lengthwise by 5" Rods, and these must be passed through the top 3½" Angle Girders 6 before the Rods are fixed in the Couplings. The lower Couplings carry 3½" Rods to extend the 5" Rods lengthwise, and an End Bearing 52 (Fig. 3, December *M.M.*) is secured to the bottom of one of the Rods. A 7½" Strip 53 is pivoted between the lugs of the End Bearing, and this Strip is *lock-nutted* to a Fishplate 54 pivoted on Rod 55. The Fishplate is *lock-nutted* in the 10th hole of Strip 53, counting from the End Bearing. Spring Clips are used to space the Fishplates and hold the Strips 53 in line with cams 56.

After being raised by the action of the cams, the Heald Frames are returned to their lowest positions by the tension of 2½" and 6" Driving Bands looped together and anchored on a Rod 57 (Fig. 3), and the bottom of the Heald Frames. The Heald Frames should move very freely on depressing Strips 53.

### The Warp Tension Mechanism

A simple mechanism is provided to keep the warp threads at a suitable tension. This is shown clearly in Figs. 3 and 4. Two Bush Wheels are fixed to Rod 58, with a 3" Rod 59 mounted in holes in the Bush Wheels. A Bush Wheel extended with a 3" Strip is fixed to the end of Rod 58. A 6" Driving Band looped between the 3" Strip, and a 1½" Bolt fixed to the

frame imparts the required tension to the warp threads while the Heald Frames are moving up and down. A Cord, slightly tensioned with a Spring and passed over a 1½" Pulley 61, maintains tension on the warp beam.

### The Shuttle

Construction of the shuttle, which is shown in Fig. 2 on the opposite page, is quite simple. It consists of two 3½" Strips, two End Bearings and a 1½" Rod. The ends of the Strips are bent slightly to fit the lugs of the End Bearings. A ¾" Bolt, which should for preference be

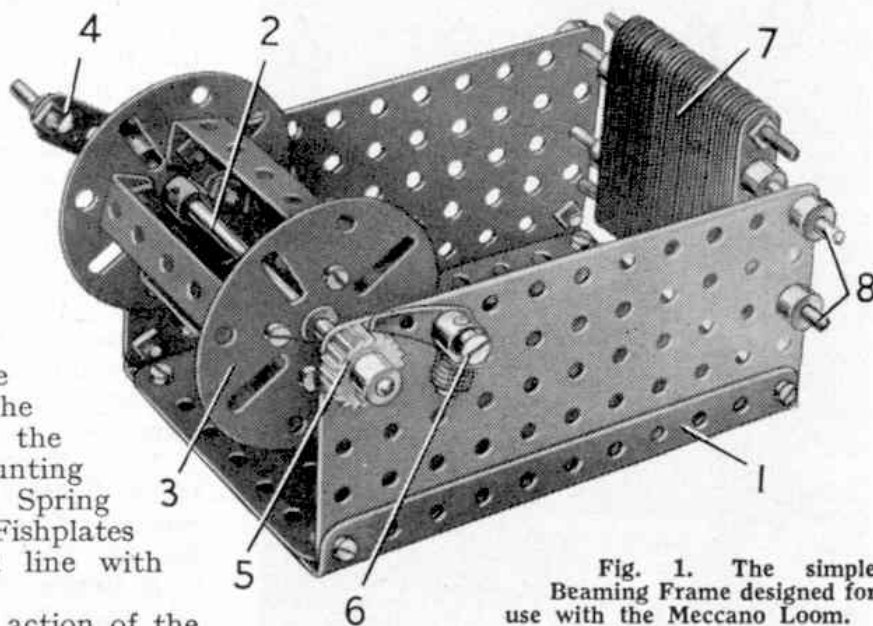


Fig. 1. The simple Beaming Frame designed for use with the Meccano Loom.

filed slightly shorter, is passed through the end hole of one of the Strips and then through the lugs of an End Bearing. A Washer is placed on the Bolt between the lugs of the Bearing, and the Bolt is then passed through the end hole of the other 3½" Strip. This process is repeated at the other ends of the Strips.

A 1½" Rod that forms the spindle on which the weft thread is wound, is held loosely in the bosses of the End Bearings, and is retained in place by stops made by screwing the grub screws right down. *The grub screws must not grip the Rod.* The sides of the shuttle must be parallel and the completed shuttle must be an easy sliding fit in the shuttle race. When

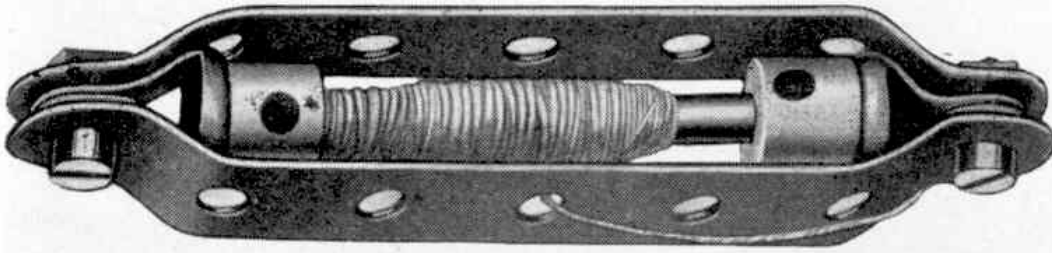


Fig. 2. The built-up Loom Shuttle.

### Drawing the warp

Put the prepared beam in the

it is in position in the race the picking sticks must strike the shuttle nose centrally.

Carefully wind some "weft" thread on the shuttle spindle, keeping it in the centre portion of the Rod. Do not try to put too much on at one filling, and make sure it will run off perfectly freely, otherwise the shuttle may "stick" between the warp threads. The thread is then brought out from the shuttle as shown.

### Beaming Frame

Fig. 1 shows a simple Beaming Frame suitable for preparing the beam of warp threads ready for insertion in the Loom. The base of the frame is a  $5\frac{1}{2}" \times 3\frac{1}{2}"$  Flat Plate, fitted at each side with a  $5\frac{1}{2}"$  Angle Girder 1 that supports a  $5\frac{1}{2}" \times 2\frac{1}{2}"$  Flat Plate. A Rod 2 carries the beam 3 on which the threads are wound.

A handle 4 is fitted to one end of the Rod 2, and the other end carries a Ratchet Wheel 5. A Pawl 6 on a Pivot Bolt engages the teeth of the Ratchet Wheel. The Pawl is weighted by Washers on a  $\frac{3}{8}"$  Bolt screwed into its boss.

The reed or frame 7 consists of 31  $2\frac{1}{2}"$  Strips spaced apart by Washers on two Screwed Rods, and is supported in the  $5\frac{1}{2}" \times 2\frac{1}{2}"$  Flat Plates by Collars on two Rods 8.

Now knock two nails into a wall, a few yards apart, and then wind around them 30 turns of thread. These are now taken off the nails carefully, and cut at one end. You will then have 60 separate lengths of thread. The threads are now drawn through the reed, two threads between each pair of Strips, and with one knot are secured to the centre of the beam axle. Holding the threads tightly in the left hand, wind them on to the beam; the reed will space the threads evenly between the Face Plates. A little practice will soon produce a neat beam.

loom. Take the first thread, pull it through the *first* heald on the *front* frame, then the second thread and pull it through the *first* heald on the *back* frame. These two threads are drawn through the *first* division or dent in the reed. Continue in this way using each dent until all the threads are drawn through. Lightly brush and pass them around the upper roller and secure them to the take-up roller by means of the Rod placed in its groove.

### Timing the Loom

The mechanism must be set so that when the slay is at back centre, one heald frame is in its highest position and will stay up until the shuttle has passed through the warp threads. The picking stick motion should then come into action just before the slay reaches back-dead centre, and should shoot the shuttle across to reach the other end just as the slay leaves back dead-centre. A little time spent in careful adjustment will soon give the desired position for smooth running.

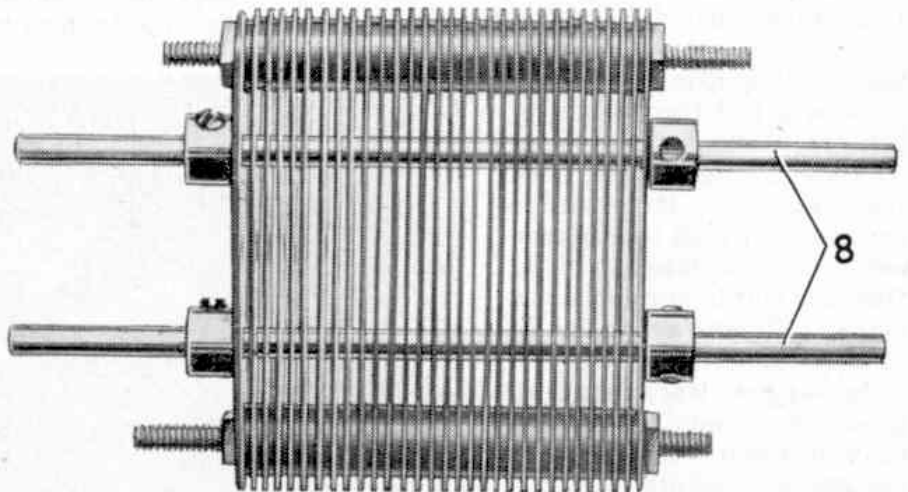


Fig. 3. The reed removed from the Beaming Frame to show its construction more clearly

Parts required to build the Meccano Loom: 6 of No. 1a; 5 of No. 1b; 14 of No. 2; 5 of No. 2a; 9 of No. 3; 3 of No. 4; 33 of No. 5; 1 of No. 6a; 4 of No. 8; 6 of No. 8a; 4 of No. 8b; 9 of No. 9; 2 of No. 9a; 6 of No. 9b; 2 of No. 9d; 10 of No. 10; 1 of No. 12; 3 of No. 12a; 1 of No. 12b; 1 of No. 13; 3 of No. 13a; 4 of No. 14; 6 of No. 15; 5 of No. 15a; 2 of No. 15b; 6 of No. 16;

(Continued on page 50)

*Now you can really get weaving with this...*

# POWER LOOM

*A Classic from the 'Fifties*

A WORKING LOOM is among the most impressive of all Meccano models. Its synchronised precision movements are fascinating to watch; its business-like metallic chatter is music to the mechanically-tuned ear. But, most important of all, it gives the builder the ultimate satisfaction of seeing his creation actually weave real cloth.

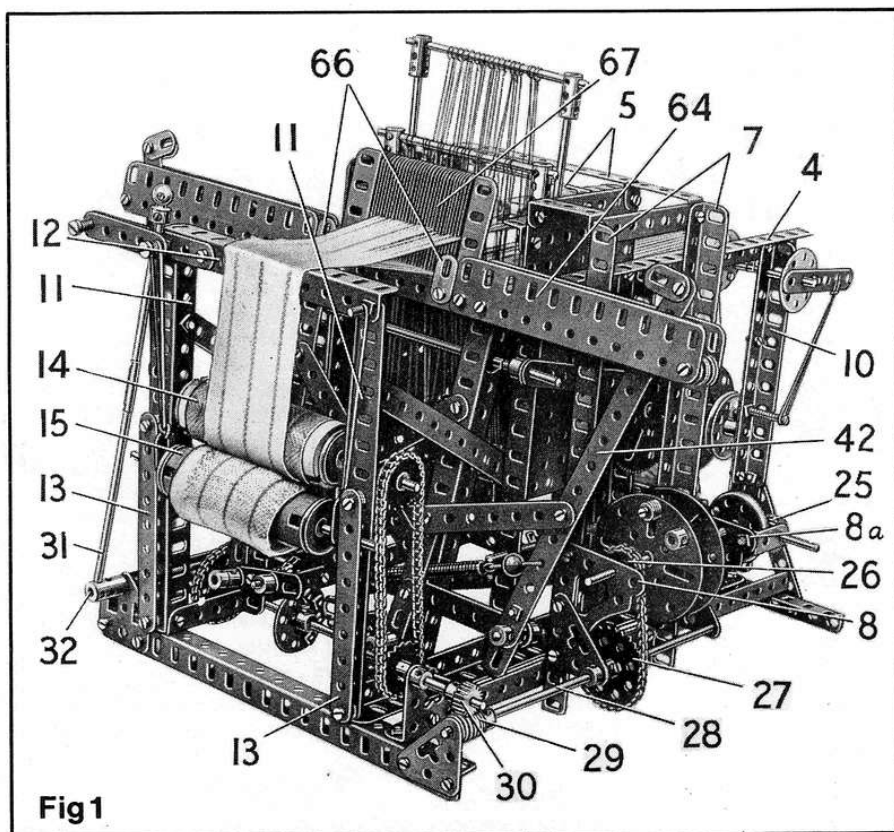


Fig 1

For this, the fourth article in our 'Past Masters' series, we have chosen a powered Loom which was originally featured in the December 1953 and January 1954 issues of the M.M. In fact, the accompanying illustrations are the actual original photographs, found in a dusty old file! The model has the advantage of being fully operational, with minimum complexity and, in our opinion, it qualifies as a Meccano Classic.

These are, however, two problems: (1) The Healds necessary for successful operation are now obsolete and no longer available, and (2) we don't have the space here to print the building instructions! Not to worry though; the first problem is solved with the special Meccano Heald-making Machine featured on Page 72 and, to solve the second problem, we have printed the building instructions separately. To obtain a copy, please send an S.A.E. (overseas, two International Reply Coupons) to Meccano Magazine Quarterly, Binns Road, Liverpool L13 1DA. (We regret we can supply only one free copy per subscriber; thereafter 10p for each additional copy). Get weaving!

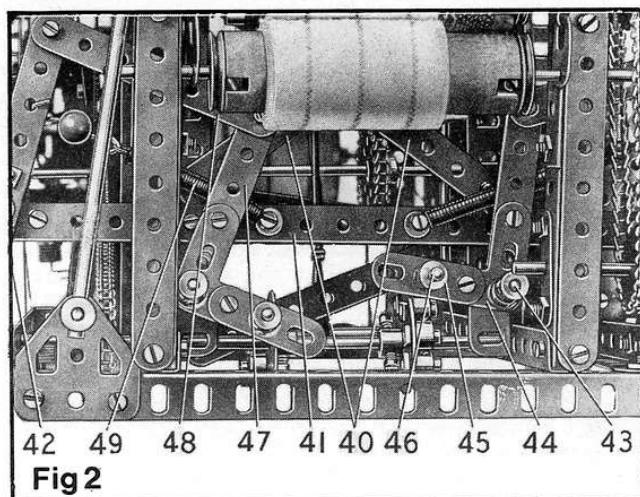


Fig 2

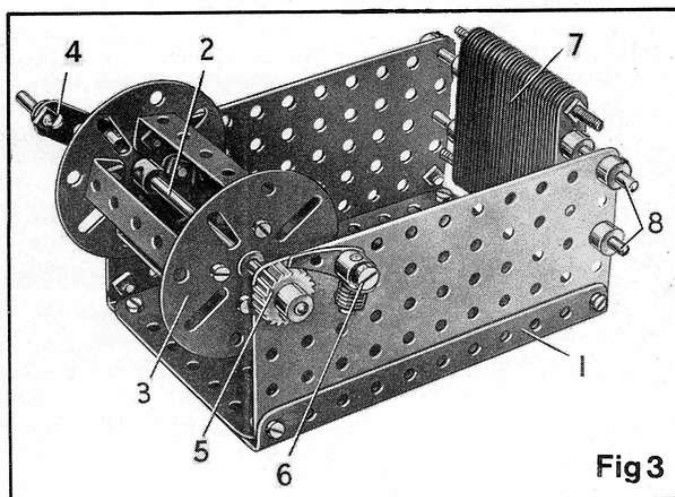
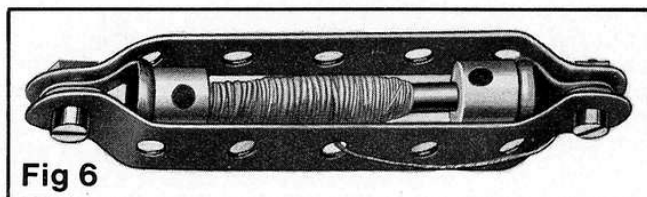
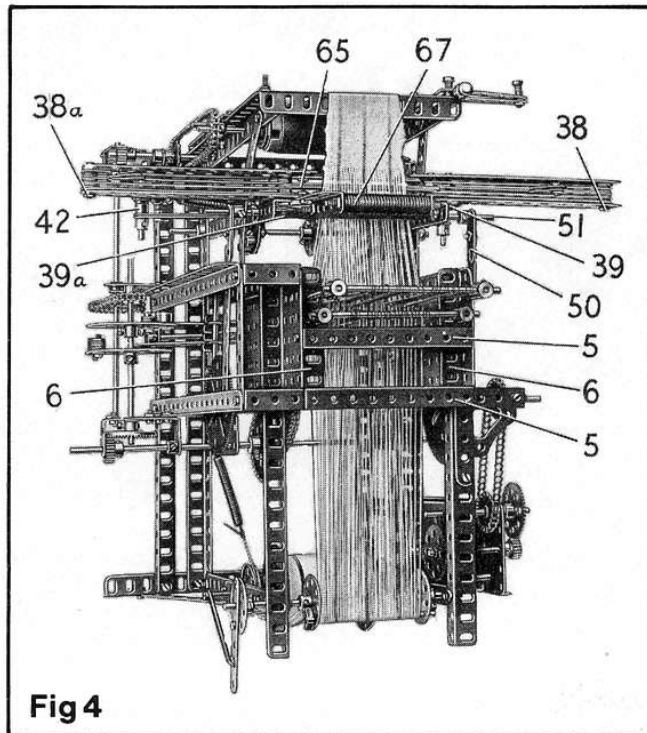


Fig 3





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Fig. 1, a general view of the Meccano Loom showing its compact appearance.

Fig. 2, a close-up view of the cam mechanism that operates the picking sticks.

Fig. 3, the Beaming Frame – a useful accessory for preparing the beam of warp thread for insertion in the Loom.

Fig. 4, an overhead view of the model showing the arrangement of the shuttle race.

Fig. 5, an underside view showing details of the frame and the mounting for the E15R Electric Motor. (A now-obsolete E20R Motor was used in the original model).

Fig. 6, the Shuttle which is built up from standard Meccano parts.

Fig. 7, the Reed used in the Beaming Frame.

Fig. 8, a low-angle side view of the Loom showing the cams controlling movement of the heald frames. The healds, themselves, are now obsolete, but adequate substitutes may be made using the special machine featured overleaf.

