

Another Model In The M.M. Series For The Enthusiast Pick Of The "Pops"

BY "SPANNER"

THE Loom described here is one of the oldest and most popular Meccano models, and if carefully constructed and properly adjusted it is capable of weaving excellent fabric about $2\frac{1}{2}$ " in width.

Framework

Four $18\frac{1}{2}$ " Angle Girders 1 and 6 are secured in a vertical position to the base Girders 2. The $9\frac{1}{2}$ " Angle Girder 4 is supported by four $9\frac{1}{2}$ " Angle

A MECCANO LOOM

Girders 7, which are bolted to the Angle Girders 2. The remainder of the framework may be successfully completed by studying carefully the illustrations.

The next step is the assembling of the gearing, which is shown in the close-up illustration, Fig. 4. This gearing is duplicated, with the exception of the operating handle and axle, at the other side of the model.

The operating handle, which consists of a 4" Circular Plate with a $1\frac{1}{2}$ " Rod attached to its face by a Crank, is secured to a 5" Rod 55 carrying a $\frac{3}{4}$ " Pinion that meshes with a 50-tooth Gear Wheel 54 on an $11\frac{1}{2}$ " Rod. A $\frac{3}{4}$ " Pinion on this Rod engages with two 50-tooth Gear Wheels 62 and 63 fixed on separate Rods that run from side to side of the Loom. The first Rod has secured to it a cam 52 and the second Rod carries a Worm 56. Three Double Brackets are bolted next to each other between two Bush Wheels to make the cams. A cam is fixed by duplicate set-screws at each side of the Loom on the $11\frac{1}{2}$ " Rod 32, and it is set with the centre Double Bracket of each cam diagonally opposite each other.

The Picking Motion

The "picking motion" is the term given to the mechanism by means of which the

Shuttle is thrown from side to side of the slay. Two $5\frac{1}{2}$ " Strips 23 that ride on the cams are mounted on a $\frac{1}{2}$ " Bolt fastened to the $5\frac{1}{2} \times 2\frac{1}{2}$ " Flat Plate, spaced away by a Collar and locked by a nut on each side of the Plate, and they slide between guides formed from vertically disposed $3\frac{1}{2}$ " Strips spaced apart by two Washers. The free end of each Strip is connected by an End Bearing and a lock-nutted bolt to a 10" Rod 50 (an $11\frac{1}{2}$ " Rod cut down), the upper end attached in a similar manner to a built-up crank $1\frac{1}{2}$ " long that consists of two Cranks bolted together in such a manner that their bosses are at opposite ends. The composite crank is secured by double grub-screws to an $8\frac{1}{2}$ " Rod 22 in the upper part of the Loom, which also carries a Crank 36. A Spring and a Driving Band attached to the Crank serves the purpose of maintaining the Strip 23 in intimate contact with the cam.

A Coupling is secured on the end of each Rod 22, a $\frac{3}{4}$ " Bolt being passed through its transverse bore and inserted in the tapped bore of a Coupling on the upper extremity of an 8" Rod forming the "picking stick". The bottom end of this Rod is later to be attached to a length of Spring Cord 25.

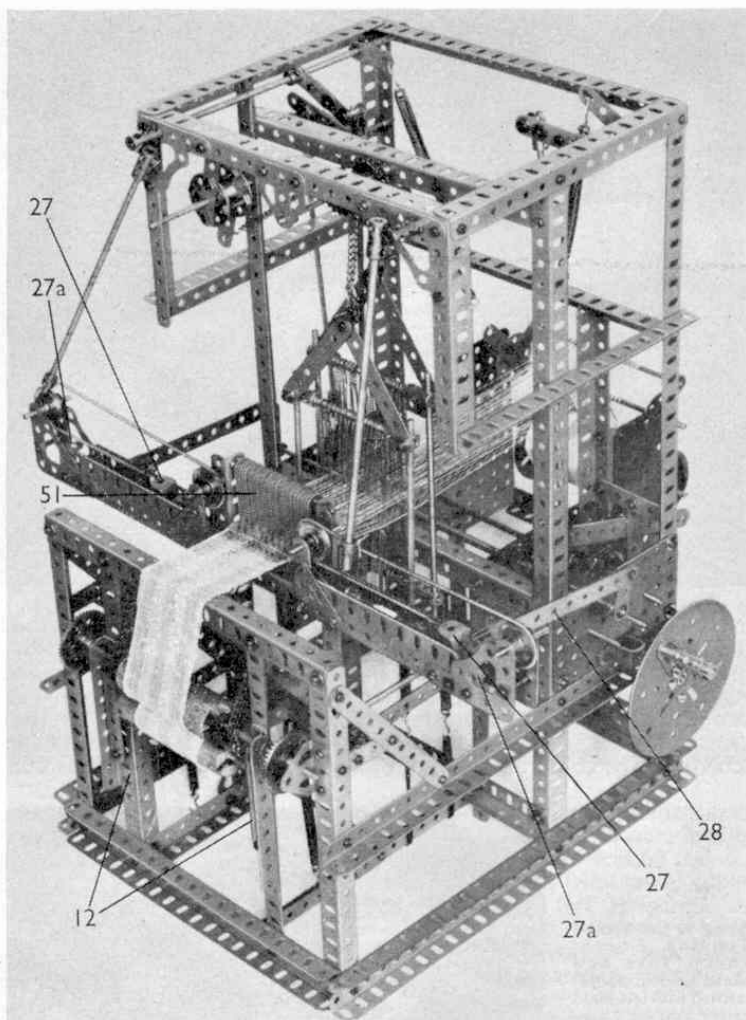


Fig. 1. The Meccano Loom in its completed state seen from the front side, with the neatly woven fabric emerging on the left.

Take-up Motion

A $\frac{1}{2}$ " Pinion on an 8" Rod 53 engages with the Worm 56. This Rod is duplicated on the other side of the model, and the ends of both Rods terminate in $\frac{1}{2}$ " Bevel Wheels that are in mesh with $1\frac{1}{2}$ " Bevel Wheels on the Rod of the sand roller which is made by gluing rough sand paper to a Wood Roller. The lower Wood Roller is rotated by frictional contact with the sand roller, and both rollers are kept together by means of a spring tension device. The lower ends of two Springs are hooked to the frame of the model, and their upper ends are fitted with short lengths of Sprocket Chain which, after passing over 1" Sprocket Wheels above the rollers, are attached to the lower roller spindle by Wire Hooks. The spindle of the lower roller slides in a pair of guides 12 which are arranged so that the spindle is free to move vertically by spacing the 3" Strips away from the Angle Girders with four Washers on each $\frac{3}{8}$ " Bolt.

The Heald Frames

The Healds serve to lift and depress alternate threads of the warp so that the shuttle may be passed between the threads.

The warp threads are those that run longitudinally from back to front of the loom. The thread at right-angles to these is the "weft". Each heald frame consists of two $6\frac{1}{2}$ " Rods and two $3\frac{1}{2}$ " Rods held together by four Couplings, with 30 Healds placed on the $3\frac{1}{2}$ " Rods. Two $3\frac{1}{2}$ " Strips are attached to the upper Couplings and joined at the apex by a Fishplate. Springs 59 are fastened to the lower Couplings, and attached to the Angle Girders 20 by Wire Hooks and 6" Driving Bands. The Fishplates 60 are bolted to lengths of Sprocket Chain 42 and 44 having 38 and 44 links respectively. These Chains pass over 1" Sprocket Wheels 41 and 43, and are attached finally by Wire Hooks to $2\frac{1}{2}$ " Strips 45 and 47 that are fixed by 1" Screwed Rods and nuts to two Bush Wheels secured rigidly to the Rod 49. The Rod carries a Crank, extended by a $2\frac{1}{2}$ " Strip, which is connected by a 9"

Fig. 2. The built-up shuttle and bobbin.

Rod 39 to a Crank 31 on the end of the cam-shaft. The attachment of the Rod 39 to the lower Crank 31 is effected by means of a Swivel Bearing 30, and to the upper Crank by an End Bearing 48.

Construction of the Slay

With two $12\frac{1}{2}$ " Angle Girders make a channel section. These are held together by four Double Brackets using the same bolts that fasten the $5\frac{1}{2}$ " Flat Girders to the Angle Girders. Corner Gussets at each end serve as bearings for the Rods of the 1" Pulleys and Collars 26. The Reed 51 consists of 31 $2\frac{1}{2}$ " Strips mounted on two Rods, each Strip being spaced apart from the next with one Washer. The Reed is attached to the slay by passing the ends of the Rods carrying the $2\frac{1}{2}$ " Strips through the flanges of the $9\frac{1}{2}$ " Angle Girders 57. A length of Spring Cord 25

passes round each pair of 1" Pulleys and its ends are fixed to the lugs of a Double Bent Strip 27, which slides freely on the bed of the slay. A $1" \times \frac{1}{2}"$ Angle Bracket 27a is bolted at each end to the Corner Gussets. The lower ends of the picking sticks will eventually be attached to the Spring Cord and in this manner the Double Bent Strips are made to flick backward and forward, so that when the shuttle is placed at one end of the slay, one of the Double Bent Strips will engage with the shuttle and throw it across the slay. The other picking stick and Double Bent Strip will then return it. The slay is mounted in place in the loom by passing a Rod through the top holes of the Flat Trunnions 19 and through the bottom holes of the Angle Girders 57. The slay is rocked about its pivot by means of two Cranks 29 secured on the ends of the Rod

carrying the $\frac{3}{4}"$ Pinions that mesh with the 50-tooth Gear Wheels 63. Connection between the Cranks and the slay is formed by means of $5\frac{1}{2}"$ Strips 28, which are attached to the Single Bent Strips 38 bolted to the back of the slay.

Shuttle

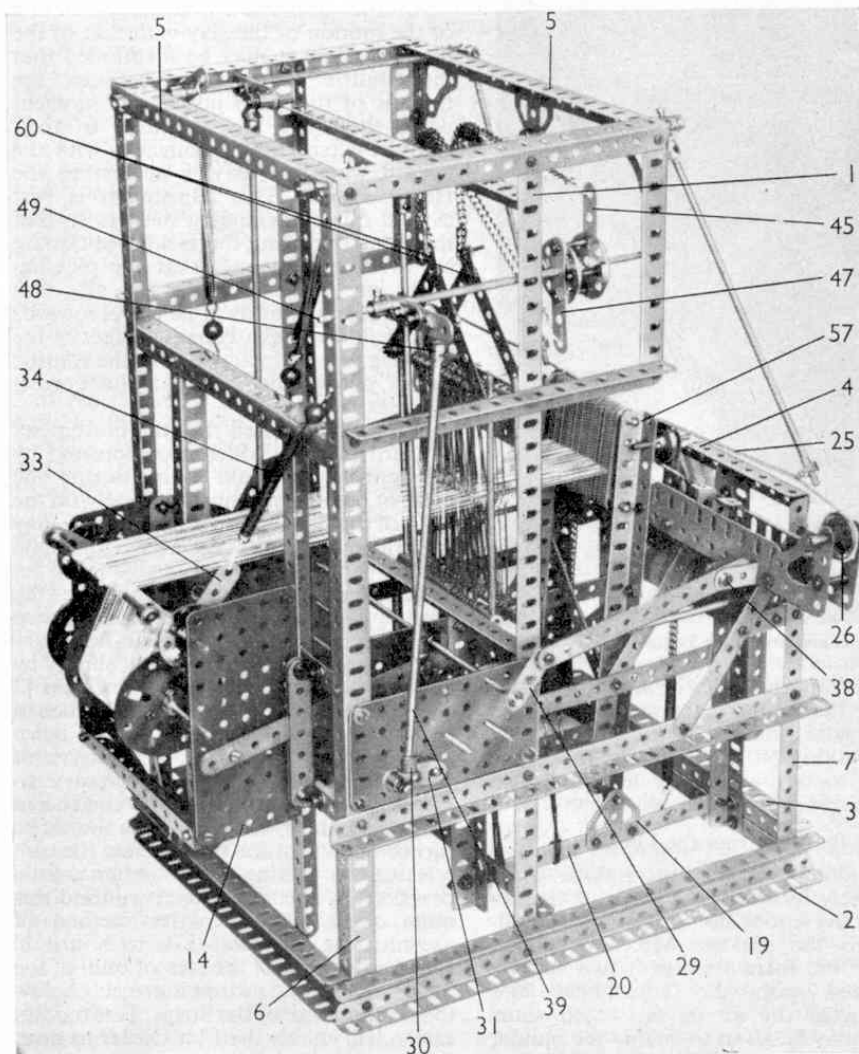
The shuttle is shown separately in Fig. 2. To assemble it bend two $3\frac{1}{2}"$ Strips at each end as shown. An End Bearing with a Washer placed between its lugs is bolted at each end of the Strips. A $1\frac{1}{2}"$ Rod runs freely in the End Bearings, the Grub Screws being screwed down to retain it in position, but not to grip the Rod itself.

Warp Tensioning Mechanism

When the heald frames descend after forming the "shed", the threads of the warp naturally fall slack, unless special mechanism is provided to remedy the matter. Slacking of the warp would, of course, prevent satisfactory work being turned out by the model, and in order to compensate for any sag of the threads, a particularly ingenious device known as a warp tensioner is incorporated in the model. This mechanism and its arrangement may be seen in the rear view of the model Fig. 3, and a study of this illustration in conjunction with the following description will make the matter quite clear. It consists of a $6\frac{1}{2}"$ Rod journaled in the Flat Plates 14 and carrying two Bush Wheels, to one of which a $2\frac{1}{2}"$ Strip 33 is bolted. Two Cranks are bolted to the Bush Wheels as indicated in Fig. 4, and a Rod is secured in the bosses of the Cranks. The warp threads from the "beam" (two Face Plates bolted to the lugs of four $2\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips) are first passed over the fixed Rod, then round the movable Rod, to the healds. The necessary tension is supplied by means of a Spring 34 attached to the Strip 33 as shown.

The beam is restrained from free rotation by a band brake consisting of a 2" Pulley secured to the beam axle, and round which passes a piece of Cord. One end of the Cord is attached to the frame of the model, and the other is tied to a

Fig. 3. The Loom seen from the rear and showing the Beam and tensioning device.



Spring that keeps the Cord in constant state of tension round the Pulley and thus supplies the required retarding effect.

Preparing to Weave

The best material for use as the warp threads in the Meccano Loom is Coats Chain Mercer—Crochet No. 40, and for the weft, No. 60. The take-up gearing may be altered to two 1" Bevel Wheels instead of the $\frac{3}{4}$ " and 1 $\frac{1}{2}$ " Bevel Wheels and then the weft No. 40 can be used.

Before threading the healds, etc., it is of the utmost importance to see that the various movements of the model take place in their correct order. First, the Heald frames should both be arranged so that the eyes of both frames coincide when the slay is at the front centre. Then, with one of the Heald frames raised and the other lowered to their greatest extent, the slay will be as close as possible to the front Heald frame. At the same time the picking motion must throw the Shuttle across the slay, and this cycle of operations must take place with unfailing regularity.

take-up Roller by means of a Rod placed in the groove of the Roller.

The 1 $\frac{1}{2}$ " Rod should be taken out of the shuttle and placed in a Coupling fixed on the end of a Motor shaft. It is not advisable to put too much thread on the Rod at a time, and it should only be wound over the inch in the centre (see Fig. 2). Replace the Rod in the shuttle and thread the "weft" through the centre hole of one of the 3 $\frac{1}{2}$ " Strips. The weft should come off the Rod easily.

When the operating handle is turned, one of the Heald Frames rises and the other falls simultaneously, thus "shedding" the warp. The slay moves up to the Heald frames, and as it pauses before commencing its return journey the Shuttle is thrown across the slay between the parted warp threads, leaving in its wake a trail of weft thread. On the return of the slay the reed drives before it loose thread left by the shuttle, so forming what is termed the "first pick" of the weft. By continuing to turn the handle the process is repeated, but this time the Shuttle is

to turn out really good material that may be put to some useful purpose.

First of all, it should be understood that adjustments to the finished model will be necessary to ensure that the different movements are timed correctly. For example, it is quite probable that in a newly-completed model some difficulty will be experienced in getting the Shuttle to work properly and regularly, and this, of course, is one of the most important movements of the whole machine. Careful attention, therefore, should be paid to this matter.

I have already mentioned that any trouble arising through the Shuttle sticking in the slay may usually be overcome by the simple expedient of lining the floor of the slay with a strip of cardboard, or better still a strip of tin. This will provide a smooth even surface on which the Shuttle may slide easily to and fro. The next operation is to carefully adjust the springs that control the picking motion, taking care to ensure that the tension of both springs is equal. Several experiments may be necessary before the springs are in correct adjustment, but any trouble taken at this point will be amply repaid by the better quality of the woven cloth.

Another important point is the timing of the motion of the slay with that of the Shuttle. Here it may be mentioned that the Shuttle must shoot between the threads of the warp just at the moment when the latter are separated to their greatest extent, which coincides with the instant when the slay is nearest to the Heald Frame. This adjustment is best carried out by arranging matters so that the cams operating the picking-sticks are set in such a manner that the picking-sticks are released when the slay has completed two-thirds of its travel towards the Heald Frames. Thus the effect of the time-lag is counteracted, and the Shuttle passes across the warp at the correct moment.

It should be noted that the bottom set of warp threads, which are depressed by the appropriate Heald Frame during one cycle of operations, must lie closely on the floor of the slay, otherwise the Shuttle may foul them in its passage across the slay. The upper set of threads also should receive attention in order to ensure that the Shuttle has a clear path between the two sets of threads. The adjustments necessary to effect this may be carried out simply by varying the lengths of Sprocket Chain 42 and 44 that connect the Heald Frames to the arms 47 and 45.

In order to obtain the sudden jerk of the picking-sticks that is necessary to throw the Shuttle smartly from end to end of the slay, the operating handle should be turned quickly at the point where the cam releases the picking-sticks. After a little practice the amateur weaver will find this quite easy. An alternative method of accentuating this motion is to bolt a 2" Flat Girder against the face of each of the Strips 23 (Fig. 4), so that it projects below the bottom edge of the Strip. This modification will enable the Flat Girder to drop

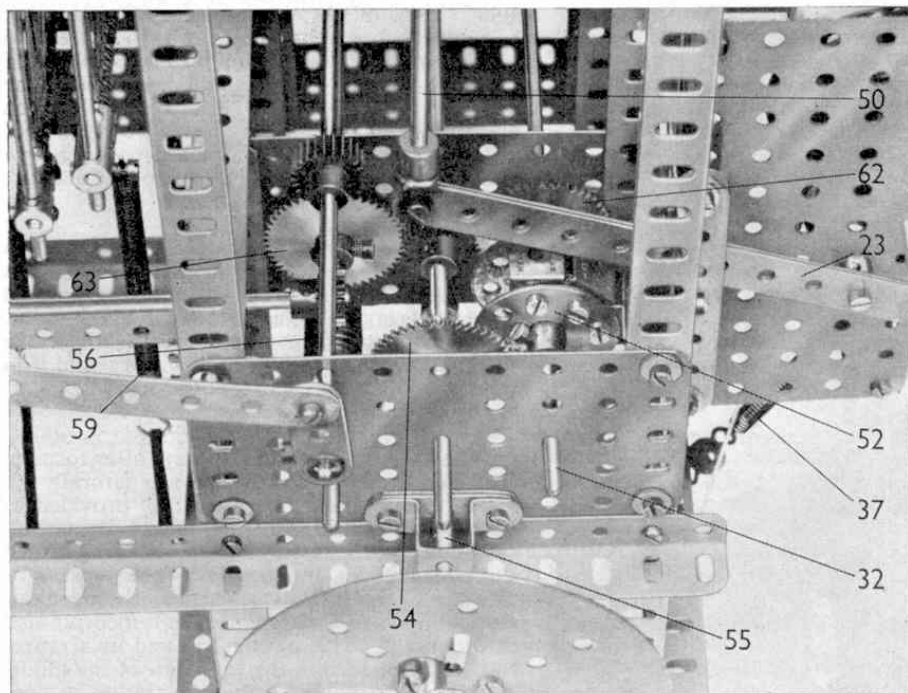


Fig. 4. The gearing and "picking stick" cams at one side of the Loom.

Threading the Healds

Starting at the right-hand side, a single warp thread is passed through each "eye" of the Healds, the threads passing through the "eyes" of the two Heald frames alternately. Care should be taken to see that none of the threads cross. Two threads are passed through each division of the reed, and attached to the take-up rollers. A reed hook will greatly help in threading up the warp.

Sufficient warp thread should be unwound from the beam to allow the Healds to be easily threaded, and the ends of the threads are then clamped to the lower

thrown from the opposite end of the slay. The reed then presses the second pick into place against the first.

The taking-off rollers in the meantime revolve slowly and draw in the woven fabric as weaving proceeds.

Getting the Best from the Loom

Providing that the instructions given are closely followed, the actual construction of the Loom should offer little difficulty to the average Meccano model-builder; but there are one or two matters connected with the adjustment and working of the model on which some advice may be given to enable the builder

Fig. 5. Looking down on the Loom. In this view the slay bed can be seen.

with extreme suddenness off the receding face of the cam, and will thus speed up the motion to a greater extent than would be possible by the Strip merely riding on the cam. In order to cause the Flat Girder to follow closely the contour of the cam, the Spring 37 may be duplicated.

It will be realised that considerable strain is placed upon some of the Gears and Rods of the mechanism, and in order to prevent the Gears slipping on their shafts, all set-screws must be secured very tightly. If any parts are still found to slip on their Rods, especially in connection with the picking motion mechanism, the set-screws should be duplicated, thereby doubling their powers of resistance.

Where considerable trouble is experienced from this cause, it is a good plan to file a small flat in the Axle Rods immediately beneath the set-screws, thus providing a better gripping surface.

Threading of the Heald Frames

There are one or two matters in connection with the threading of the warp threads through the Heald Frames on which some advice may be useful.

Before the warp threads are passed through the Healds, they must first be wound on to the built-up unit forming the beam. This can best be done on a Beaming Frame and I shall endeavour to include a description of a suitable Beaming Frame in the *M.M.* in the near future.

Parts required to build Loom 16a: 2 of No. 1b; 12 of No. 2; 10 of No. 3; 2 of No. 4; 42 of No. 5; 4 of No. 6; 2 of No. 6a; 4 of No. 7a; 10 of No. 8; 17 of No. 8a; 8 of No. 8b; 5 of No. 9; 2 of No. 9a; 2 of No. 10; 10 of No. 11; 6 of No. 12; 2 of No. 12b; 4 of No. 13; 6 of No. 13a; 6 of No. 14; 1 of No. 14a; 4 of No. 15; 6 of No. 16; 1 of No. 16a; 6 of No. 18b; 1 of No. 20a; 4 of No. 22; 9 of No. 24; 5 of No. 25; 2 of No. 26; 5 of No. 27; 2 of No. 30a; 2 of No. 30c; 2 of No. 32; 2 of No. 35; 260 of No. 37a; 218 of No. 37b; 154 of No. 38; 10 of No. 43; 3 of No. 45; 2 of No. 46; 4 of No. 48a; 4 of No. 53a; 4 of No. 57c; 14 of No. 57d; 1 of No. 58; 36 of No. 59; 15 of No. 62; 13 of No. 63; 2 of No. 70; 6 of No. 82; 1 of No. 94; 4 of No. 96; 62 of No. 101; 2 of No. 102; 4 of No. 103c; 2 of No. 106; 6 of No. 108; 2 of No. 109; 2 of No. 111; 2 of No. 111a; 12 of No. 111c; 1 of No. 126; 3 of No. 126a; 2 of No. 133; 1 of No. 146a; 6 of No. 147b; 8 of No. 166; 6 of No. 186a; 2 Balls Coats No. 40; 1 Ball Coats No. 60; 5 of No. 13 cut to 2 at 10", 1 at 9" and 2 at 8½"; 26 B.A. Nuts and Bolts.

TALYLLYN CALENDAR

The Talyllyn Railway Company have issued their annual calendar which, as usual, shows scenes from this popular little line. The illustrations will bring back happy memories to *M.M.* readers who have had the pleasure of a trip on the railway, and include some excellent "shots" taken along the route as well as interesting pictures showing maintenance work being carried out at the Pendre Yard. There is a fine close-up picture of Locomotive No. 1 *Talyllyn*.

The 1963 calendar costs 3/—, and is obtainable from Mr. R. K. Cope, "Brynglas", Beckman Road, Pedmore, Stourbridge, Worcs. Although the company have printed several hundred more

calendars this time than last the demand is always keen and application for the calendar should be made as soon as possible.

BRITISH BUSES FOR HOLLAND AND AUSTRALIA

Orders from Western Australia and Holland have been placed with Leyland Motors Ltd., for 54 of their Worldmaster export buses, valued at £190,000.

Perth's Metropolitan Passenger Transport Trust has placed a contract for 30 Worldmasters, generally similar to those previously supplied to the undertaking. They will be powered by 125 h.p. under-floor diesel engines and equipped with four-speed Pneumo-Cyclic "no-clutch" gear-boxes and powerful air brakes.

A non-standard feature of the Worldmasters for the Trust will be their engine cooling systems. All the aluminium components normally used in the system will be replaced by cast iron units, because of the unusually heavy corrosive action on aluminium by the water in Perth.

The order from Holland has been placed with Leyland's associate company, Leyland Holland N.V., by Gelderse Tramwegen, who are buying Leylands for the first time. They will use them as con-

tinental touring coaches and as inter-city service buses. Their 24 Worldmasters will have five-speed Pneumo-Cyclic gear-boxes and will be powered by engines similar to those in the vehicles going to Perth.

PINE HARVESTING: A NEW INDUSTRY

At Mango Creek, in the midst of the mahogany forests of British Honduras, a new industry of pine harvesting is growing up. From the stumps and roots of pine trees, cut down many years ago, is to be extracted a highly-concentrated and valuable resin that is used in the manufacture of insecticides and disinfectants.

The owners of these vast forests, Belize Estates and Produce Co. Ltd., operate a fleet of A.E.C. "Mandator" tractors—the total will be brought to twelve as the result of a recently-placed order—which are engaged on hauling trailer loads of stumps over forest tracks to a stockpile some miles away. From this stockpile the mill and factory at present being built will soon draw their supplies for crushing and processing. The entire output of extracted pine essence will be sent to America to supply users of essential oils.

