HINTS

for

THE COLLECTOR AND ENTHUSIASTIC CONNOISSEUR

on running this reproduction steam engine

LIMITED EDITION No. .....

1992

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HISTORY

This reproduction of a Meccano Steam Engine was born out of the idea of a Meccano enthusiast to re-own his childhood dream. Having made No.1 engine from sketches, memory and for fun and taking about 12 months to achieve, after 20 years searching a genuine engine was at last acquired at the Henley Meccano Exhibition of 1991. Thanks to the good offices of Geoffrey Maxwell Wright, proprietor of M. W. Models - "EVERYTHING MECCANO", 4 Greys Road, Henley-on-Thames, Oxfordshire, England, RG9 1RY, telephone (0491) 572436, from whom the reproduction engines are available.

The errors becoming obvious, modifications were made to reproduce the original engine as accurately as possible within reasonable commercial considerations.

By Summer 1992 a limited edition of engines has been produced, tested and made available for the collector and enthusiast.

This reproduction should be regarded with care and common sense, as indeed should all moving machinery, especially when heat and pressure (the basis of power) are involved. With care and routine maintenance should last as long as the originals made in 1929, and are still as good as new.

The engine should at all times be kept clean and free from dust, the boiler emptied and the burner drained, and stored in the box until further required.

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It is recommended that before incorporating the engine in any working model a short course of familiarisation should be taken.

RUNNING INSTRUCTIONS

1) Place the engine on a tin tray, workshop bench, laminate covered table or sink.

2) Remove burner(20), unscrew filler plug(20A), check vent hole(20B) in spirit reservoir is clear, and fill with METHYLATED SPIRIT ONLY (obtainable from any chemist) using the funnel provided. When the container is full, replace the screw cap and put on one side. Have matches or a lighter to hand.

3) Put one drop of special steam oil provided behind the cylinder(5) and on the steam chest face(4) by depressing the cylinder retaining spring and nut(6) with a finger.

4) Remove piston(7) by retaining pressure on the cylinder retaining spring nut and withdraw the piston rod and bearing simultaneously disconnecting the piston from the driving crank pin(7a). Ensuring that the cylinder and piston are clean, apply 1 drop of oil to piston and to bearing.

5) Before re-assembling, check shafts run freely ie gears(11 & 12), shafts(8 & 13) and flywheel(9).

6) Re-assemble piston rod to drive pinion(7a).

7) Push speed control lever(17) over to stop pin(18), forward or reverse.

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8) Flick over flywheel(9) with finger to ensure free engine and return speed control lever to centre vertical position off.

9) Ensure water level cock(23) is open using a small screwdriver.

10) Remove safety valve(22), ensure it is clean and free and the fibre washer(21) is in place.

11) Having checked the boiler is empty, and using the funnel provided, fill boiler through safety valve boss with clean water as hot or nearly boiling as possible from a kettle or jug. When water leaves the level cock stop filling, allow to overflow, close level cock and replace safety valve and fibre washer, nipping tight to prevent steam loss.

12) Having removed methylated spirit storage bottle from the working area, light burner. Push the burner into guide slots(2A) and note the time. After approximately 3-5 minutes (depending on the water temperature when filled) steam should begin to blow from the safety valve.

Then

1) Push speed control lever forward or backward.

2) Flick flywheel in appropriate direction.

3) Engine runs.
DO NOT LEAN OVER EXHAUST STEAM OR CHIMNEY.

4) After approximately 15 minutes running the flame will begin to die and should be extinguished by blowing out to preserve the ceramic fibre wick.

5) The engine will cease to run.

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6) Open level drain cock GENTLY to release remaining steam pressure.

7) NEVER REFILL BURNER WITHOUT REFILLING BOILER. Irrepairable damage could result.

8) Continue to learn until the engine is fully understood and works as you would wish, by repeating the previous steps.

CARE AND MAINTENANCE

Your steam engine is well engineered and of simple construction.

With the aid of a small screwdriver, a 3/16" Across Flats (A.F.) open ended spanner and a pair of small pliers you can strip, clean, inspect and reassemble your engine in a short time.

1) Remove burner unit(20), clean and inspect.

2) Remove chimney unit(24).

3) Remove safety valve, clean and inspect. Examine fibre washer 1/4 bore. The safety valve thread is 6mm.

4) With soft rag to prevent damage, unscrew water level cock body with pliers, clean, inspect and oil plug. Thread 1/4" X 32 T.P.I.

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5) Remove four 6BA special brass nuts from base of boiler casing(1) and lift off boiler casing. Wipe out inside to remove soot etc.

6) With great care slacken and unscrew 2 X 1/4" X 40 T.P.I. brass union nuts(3) from rear of steam chest with 3/16" A.F.O.E. spanner.

7) The boiler may now be carefully lifted from the base plate and plinth.

8) DO NOT BEND SOFT COPPER 5/32" OD LIVE STEAM PIPE SILVER SOLDERED TO BOILER, or the LOOSE EXHAUST STEAM PIPE(19).

Great care should be taken in handling these pipes, they can very easily be irrepairably damaged.

Note the position of the exhaust pipe being nearest the spirit burner.

9) The boiler may be wiped clean to remove soot and laid on one side.

10) Remove large screw(16) flat brass washer and belville washer from reversing cam lever. This screw is 4BA thread steel in brass, therefore extra care should be taken not to cross thread the screw when reassembling.

Clean cam ports, examine and oil, do not scratch the surfaces.

11) Remove spring stiff nuts from rear of steam chest. These have a 6BA thread. DO NOT LOSE small cylinder spring which can now be removed.

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12) Wipe out cylinder, ensure steam feed hole is clean.

13) Clean and examine piston, wipe and oil.

14) Wipe steam chest face and lubricate the cylinder pivot pin with steam oil.

15) The gear pinion(11) has 12 teeth of fine pitch and a bore of approximately 1/8" diameter.

No attempt should be made to take any drive from this shaft, or from the flywheel, the surface of which is cambered to throw off any belt.

The retaining screw in the flywheel(9) is 6BA but in the crank pinion, gear wheels(11 & 12) and collar 5/32" Whitworth thread grub screws are used (standard thread).

16) The steam chest blanking screws(27) are 4BA and need not normally be removed. They are needed to drill the steam chest ports which should at all times be kept clear to enable live and exhaust steam to pass freely. The steam chest mounting screws(26) are 6BA.

17) The engine may be reassembled in reverse order, great care being taken to engage union nut threads, valve threads and screws correctly.

NO ATTEMPT MUST BE MADE TO ENGAGE THREADS FORCIBLY.

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KEY TO DRAWINGS
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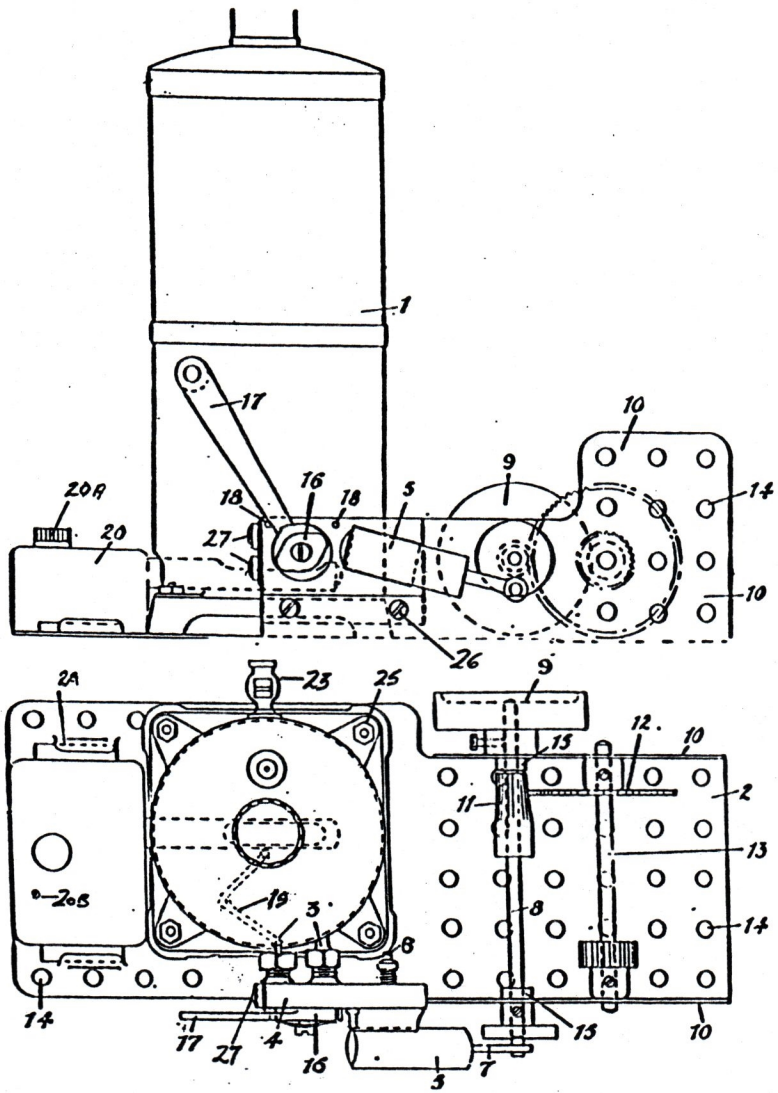
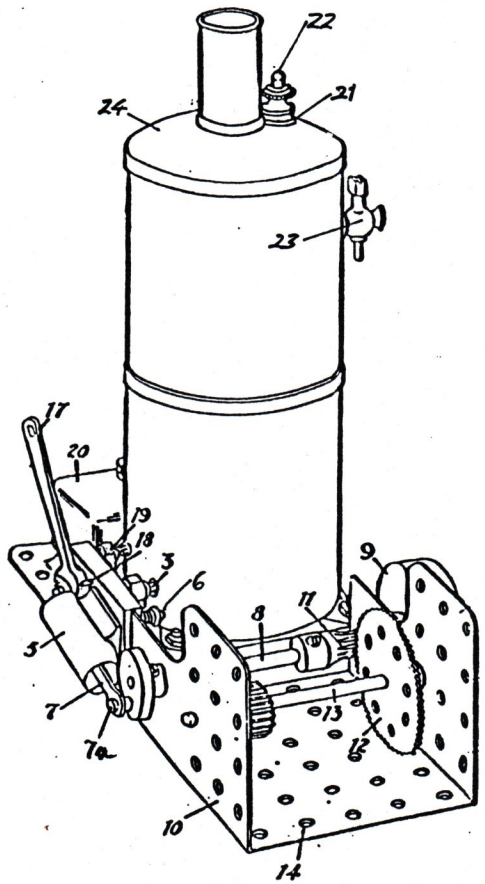
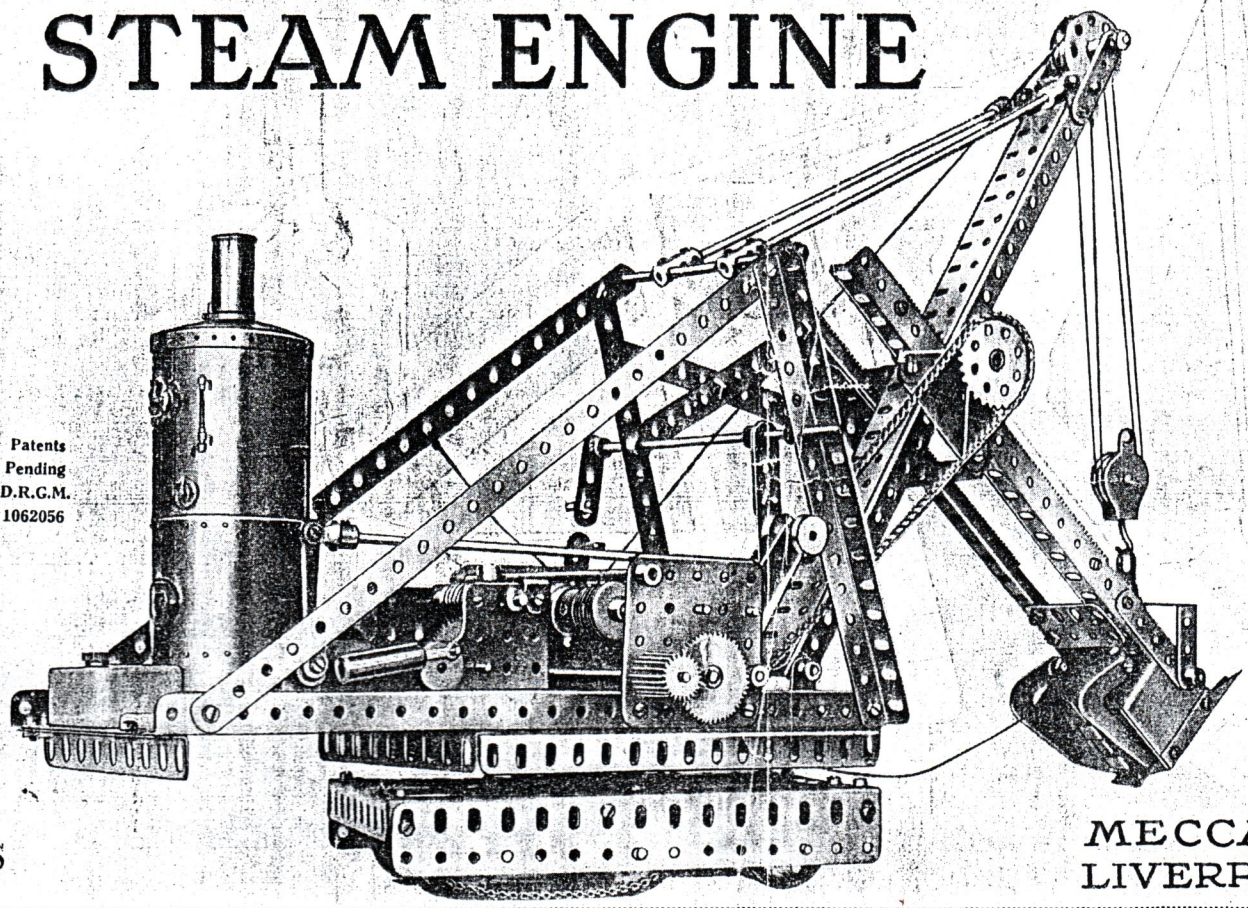
1) Boiler casing
2) Baseplate
2A) Guide slots
3) Steam union nuts
4) Steam chest
5) Cylinder
6) Cylinder retaining spring & nut
7) Piston and crank
7a) Crank shaft, wheel & pin
8) Crank shaft
9) Flywheel
10) Cheek plate
11) 12 teeth pinion
12) 77 teeth gear
13) Geared secondary shaft
14) Holes
15) Bushed drive shaft bearing
16) Reverse lever cam screw
17) Speed control lever
18) Stop pin
19) Exhaust steam pipe
20) Burner
20A) Spirit reservoir cap
20B) Spirit reservoir vent hole
21) Safety valve washer
22) Safety valve
23) Water level cock
24) Chimney unit
25) Boiler casing nuts
26) Steam chest mounting screws
27) Steam chest blanking screws





HOW TO USE THE MECCANO STEAM ENGINE



Patents Pending D.R.G.M. 1062056

This Manual contains a Selection of Choice Meccano Models, showing how simply and effectively the Meccano Steam Engine may be incorporated

Price 1/-

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MECCANO LIMITED
LIVERPOOL-ENGLAND

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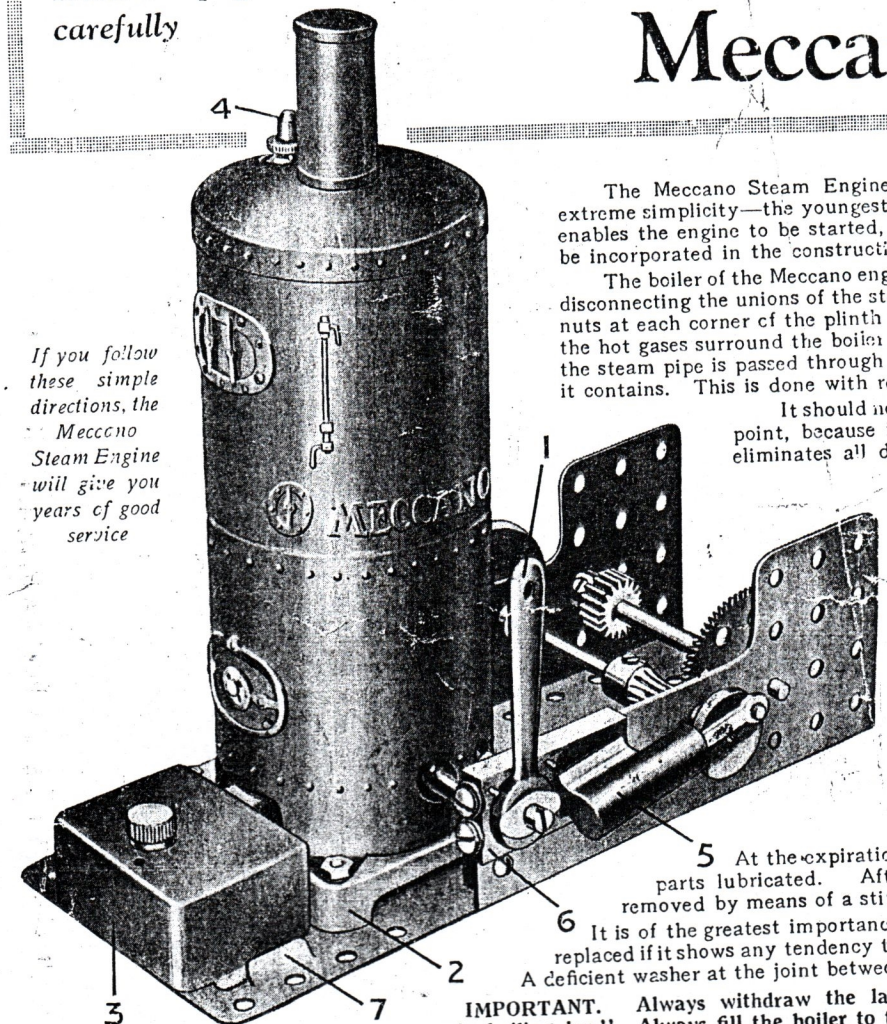
Read this page carefully

How to Operate the Meccano Steam Engine



If you follow these simple directions, the Meccano Steam Engine will give you years of good service

The Meccano Steam Engine possesses several features of exceptional interest, foremost among which is its extreme simplicity—the youngest boy can operate it with ease. A single control lever (marked 1 in the illustration) enables the engine to be started, stopped and reversed. Another important feature is the ease with which it may be incorporated in the construction of Meccano models.

The boiler of the Meccano engine has a remarkable steam-raising capacity, and this is due to its construction. By disconnecting the unions of the steam and exhaust pipes, by means of the special spanners supplied, and undoing the nuts at each corner of the plinth (2) the boiler may be removed from the rest of the engine. It will then be seen how the hot gases surround the boiler for practically the whole of its outside surface. A further important point is that the steam pipe is passed through the firebox in order that the steam may be superheated and deprived of the water it contains. This is done with real steam engines, and its effect is to make considerably more power available.

It should next be noted that the lamp container (3) is outside the firebox. This is an important point, because it prevents the spirit from becoming heated and boiling over, and thus entirely eliminates all danger from fire. The container is held firmly in position by clips.

HOW TO START THE ENGINE

The first step is to make sure that the cylinder, the reversing block on which it oscillates, and the bearings of the crankshaft are thoroughly well lubricated. Then the safety valve should be unscrewed and examined to make sure that the valve is not sticking to its seat.

The boiler is filled with the aid of the funnel supplied, the gauge cock (not visible in the illustration) in the meantime being left open to allow air to escape, and also to indicate when the water commences to flow from the gauge cock. The cock is now closed by means of the special spanner, and the safety valve replaced.

The lamp is next filled with methylated spirit, the wick is lighted, and the lamp placed in position. Care should be taken to ensure that the lugs on the lamp container engage the clips (7) on the bed-plate. No attempt should be made to start the engine until a good head of steam has been obtained.

HINTS ON CARE AND UPKEEP

At the expiration of each run the water should be drained out of the boiler and the various moving parts lubricated. After a period of service the barrel will become coated with soot, which should be removed by means of a stiff brush.

It is of the greatest importance that the safety valve should receive regular attention, and the washer should be replaced if it shows any tendency to stick to its seat. The stem of the valve should be given a drop of oil occasionally. A deficient washer at the joint between the valve body and the boiler is often the cause of serious loss of steam.

IMPORTANT. Always withdraw the lamp immediately the engine begins to slow down or stops, to obviate the possibility of "boiling dry." Always fill the boiler to the correct level when refilling the lamp.

Driving Models with the

Meccano Steam Engine

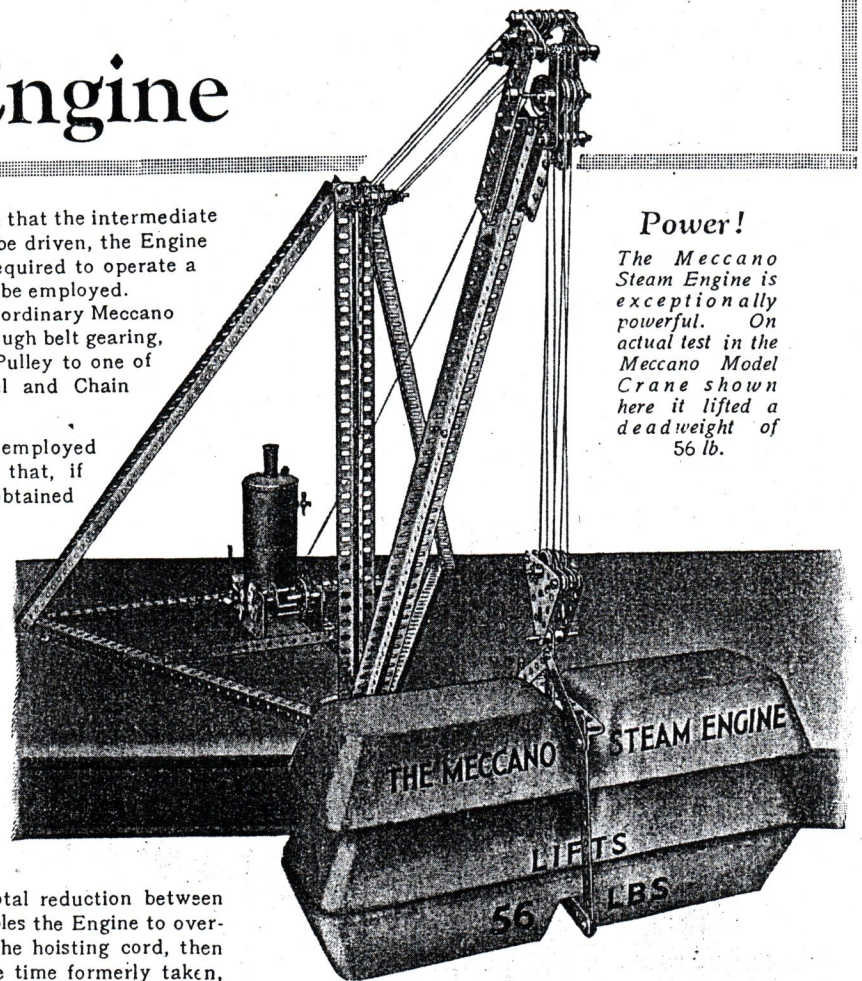
The Meccano Steam Engine is capable of driving almost any Meccano model, provided that the intermediate gearing is designed and constructed properly. No matter what type of model is to be driven, the Engine should always be allowed to rotate at maximum speed. This means that if it is required to operate a slow-moving model, a gear that will provide a considerable reduction in speed must be employed. The simplest means of obtaining the necessary reduction is, of course, provided by the ordinary Meccano gearing. If gears are not available the drive from the Engine can be transmitted through belt gearing, and the speed can be reduced at the same time by taking the drive from a small Pulley to one of much larger diameter (see Models Nos. S3, S4, S6, S18, etc.). Sprocket Wheel and Chain gearing may, of course, be used equally well in place of belts.

How to Cope with Heavy Loads

Whatever type of gearing is employed it is important to remember that, if the driven shaft moves more slowly than the driving shaft, a mechanical advantage is obtained and increased loads may be overcome, the apparent gain in power being roughly in proportion to the loss in speed. If the drive is led through 1 : 1 gearing (i.e., two Gears of equal size meshing together or two Pulleys of equal diameter connected by a belt), there is no gain in power to counteract the loss through friction. Such gearing should therefore be avoided as far as possible, and when it is necessary to transmit the power from one point to another, the gearing should always result in some reduction in speed in the driven shaft, unless it happens that speed is a more important consideration than power.

Correct Gearing

Numerous examples of the different types of gearing that should be employed in connection with the Steam Engine will be found in this manual. In Model No. S13, Steam Capstan, the winding drum, which is mounted on a vertical axis, is required to rotate fairly slowly, so that it may overcome considerable loads. Consequently on the secondary Engine shaft, which is driven from the ½" Pinion on the crankshaft, a Worm is mounted and engaged with a Pinion on the winding drum shaft. A Worm and Pinion provide a speed ratio of 19 : 1 ; hence the total reduction between the crankshaft and the winding shaft is 57 : 1. The use of pulley blocks also enables the Engine to overcome increased loads. For example, if a crane can lift 10 lbs. coupled directly to the hoisting cord, then by using a single-sheave pulley block, so that the load is raised in just twice the time formerly taken, the model should be capable of lifting 20 lbs. (not allowing for loss through friction). Similarly, if a two-sheave pulley block is used so that the crane hook is raised in four times the period occupied originally, then a load of nearly 40 lbs. could be raised. Therefore the mechanical advantage is "2" and "4" respectively in these examples.



Power!

The Meccano Steam Engine is exceptionally powerful. On actual test in the Meccano Model Crane shown here it lifted a deadweight of 56 lb.