

# Rope Drive

This model is a simplified twin, double-acting engine driving a jack-shaft through a rope drive. It has seven ropes with the return using an idler inside the ropes between the pulleys. The Governor is simplified to avoid bevel gears. It is the spring-loaded type. The builder has the choice to make as much or little as he wishes. He can make a single Cylinder or twin Cylinder engine only, with or without Governor using a simple Flywheel. He can make a one-engine rope drive. Of course it doesn't necessarily have to drive a generator.

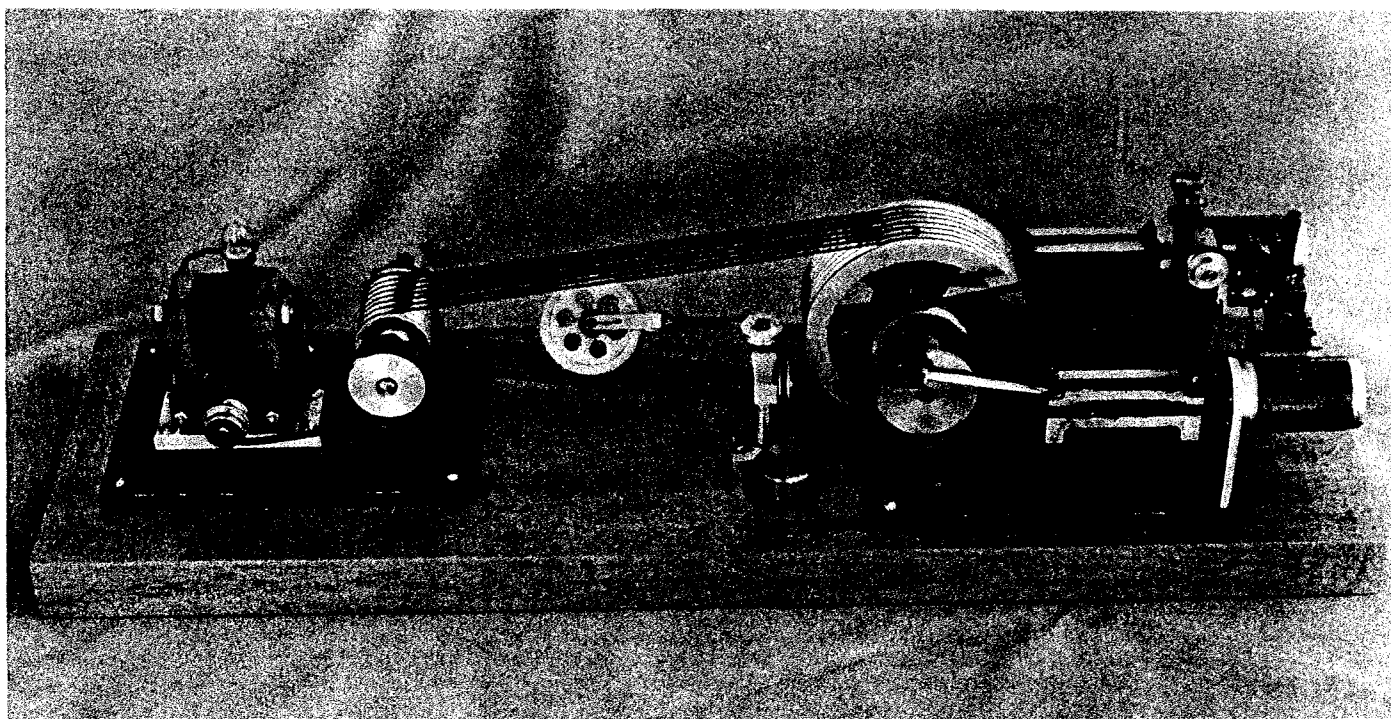
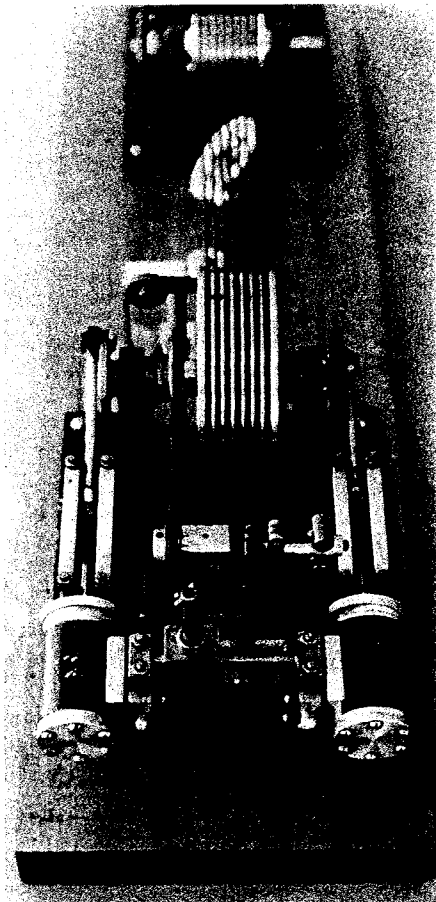
A 3-strand, .050" approximate diameter glossy fish line was used for the "Rope" and Counterweight. The Idler Pulley is plastic. The Governor Belt is 3/32" plastic belt stock purchased by the foot from Cole's Power Model Supply. It will take a little practice to cut and join with heat. If you can find a common O-ring of the right size, it will work better than

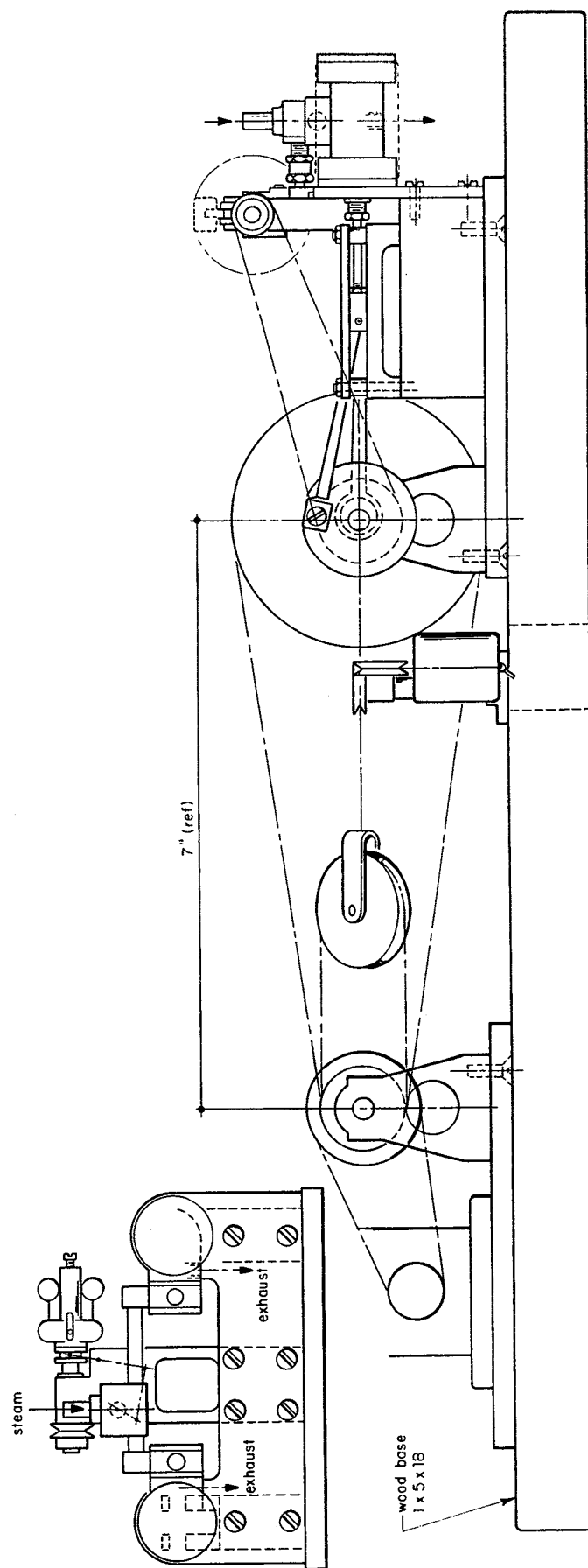
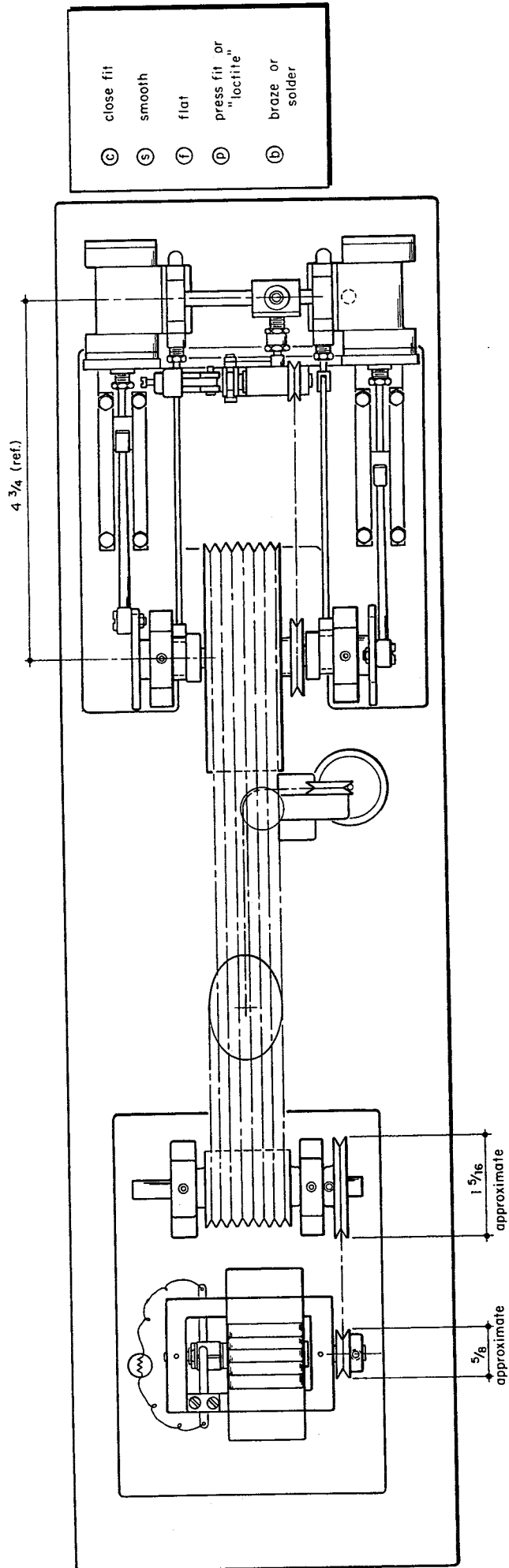
this. You have a lot of leeway with material. Use your judgement and material you have on hand.

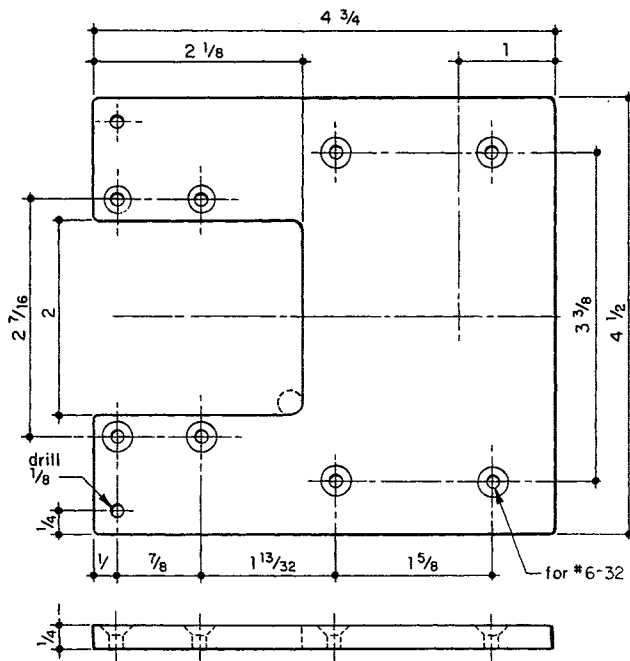
The drawings give all the details, though some parts can use some extra remarks to clear up or suggest layout and machining points.

The **PULLEY GROOVES** are parallel. It is NOT a spiral thread. Use layout dye and mark the tips of the grooves 1/8" apart. Make a setup with a 60° threading tool. Start the tip of the tool by eye, a shade to the left of the 1/8" marks, and feed in .015" to .020"; then, turn until just short of the next 1/8" mark. Repeat until you clean out the space between the marks, leaving about .015" flat at the mark. NOTICE that the **LARGE PULLEY** has seven grooves and the **SMALL PULLEY** has eight.

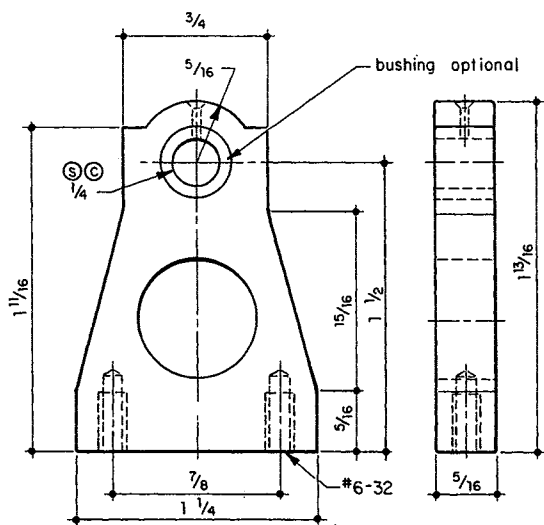
The **LARGE PULLEY** is laid out on one face of the 3" blank and all 18 holes are drilled through. Next it is chucked on the O.D. and the 2-3/8" x



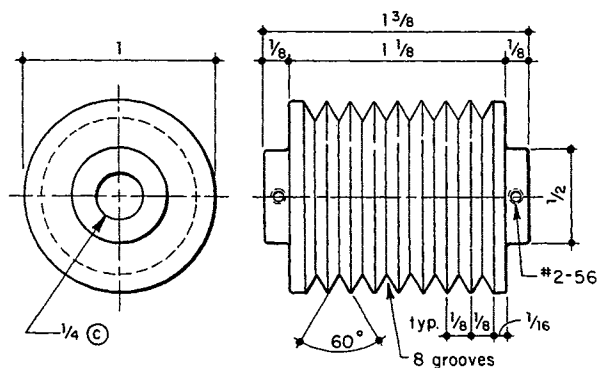




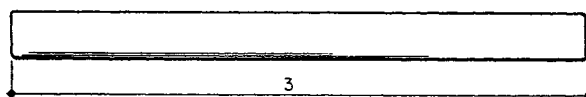
ENGINE BASE  
(1/2 size)



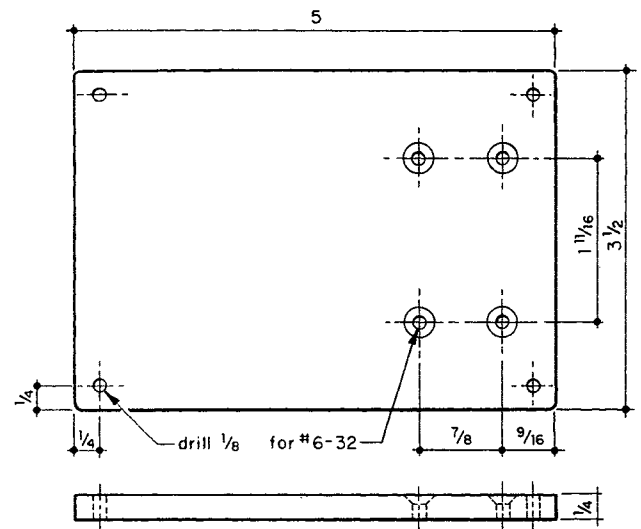
BEARING  
4 Required



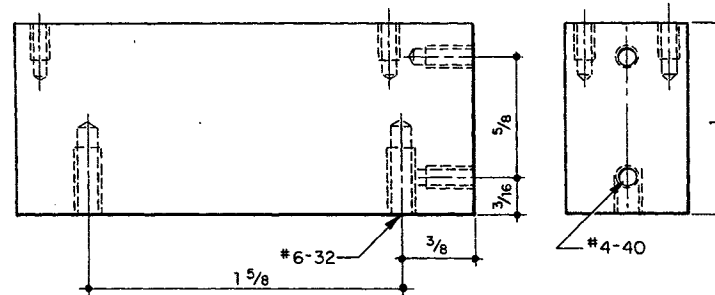
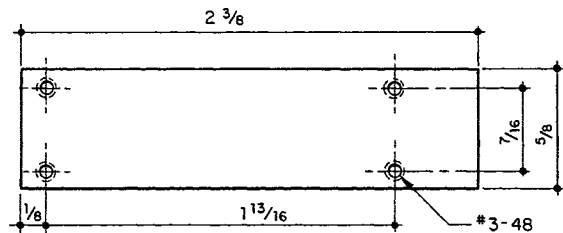
SMALL SHEAVE



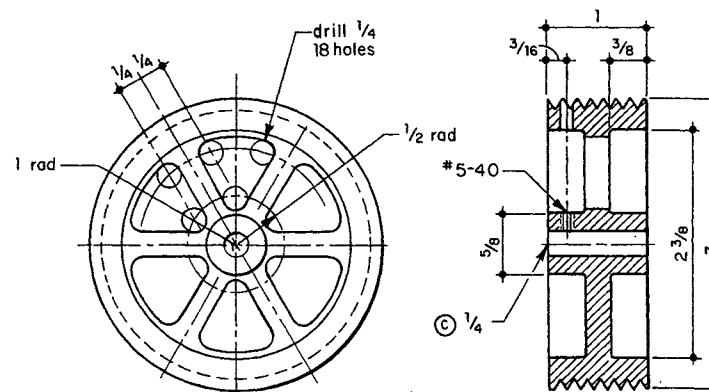
JACKSHAFT



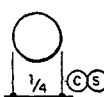
GENERATOR BASE  
(1/2 size)

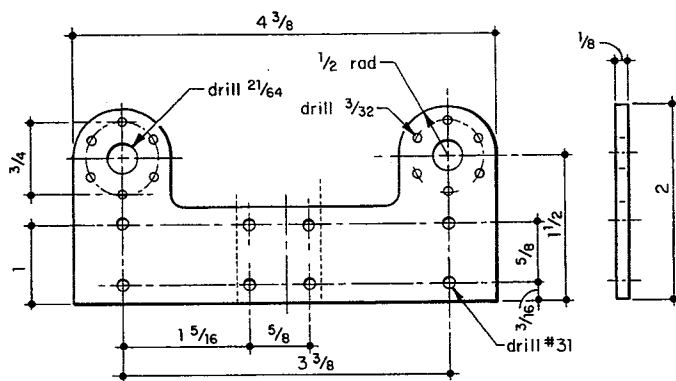


CROSSHEAD BASE  
2 Required

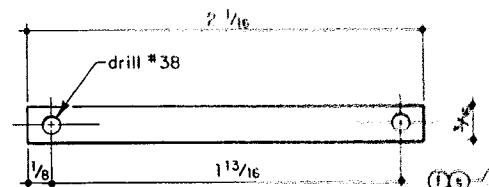


FLYWHEEL-SHEAVE  
(1/2 size)

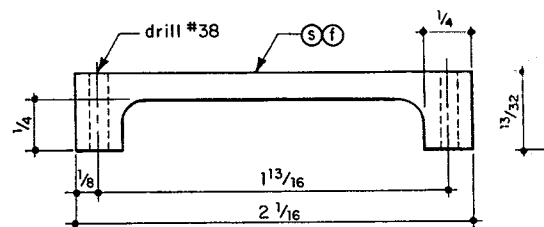




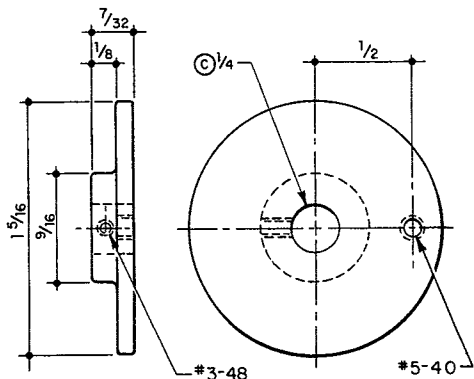
CYLINDER MOUNTING FLANGE



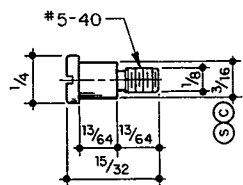
CROSSHEAD GUIDE (UPPER)



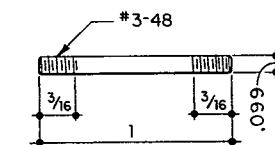
CROSSHEAD GUIDE (LOWER)



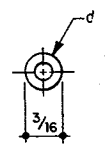
CRANK DISC



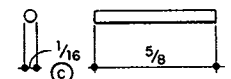
CRANK SCREW



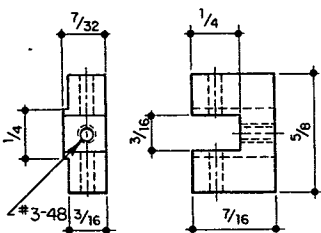
CROSSHEAD GUIDE STUD



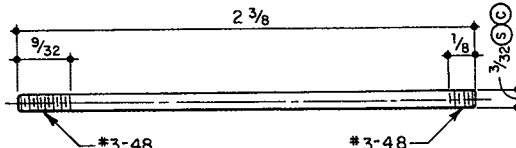
SPA



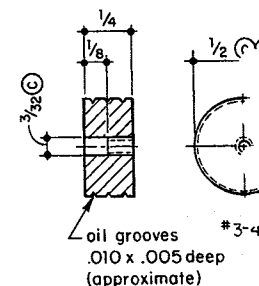
CROSSHEAD PIN



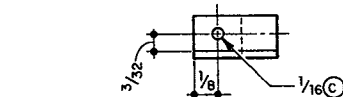
CROSSHEAD



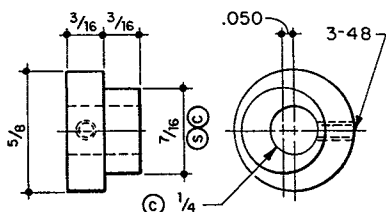
PISTON ROD



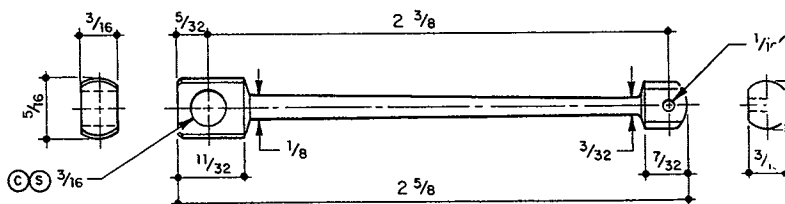
PISTON



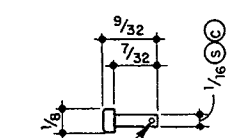
CROSSHEAD



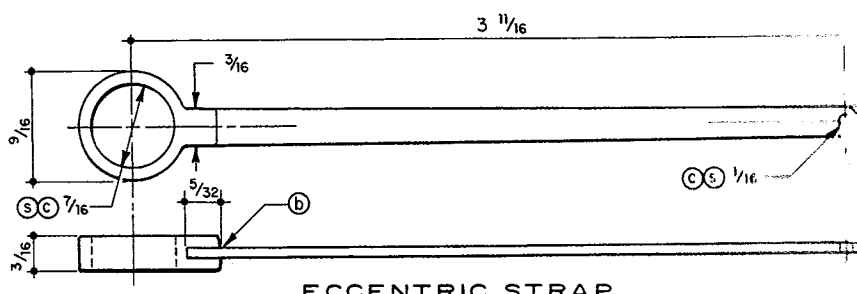
ECCENTRIC



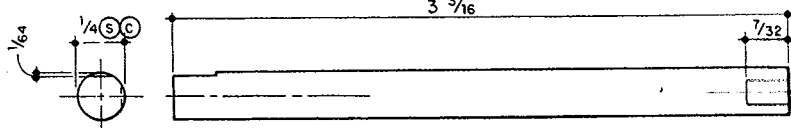
CONNECTING ROD



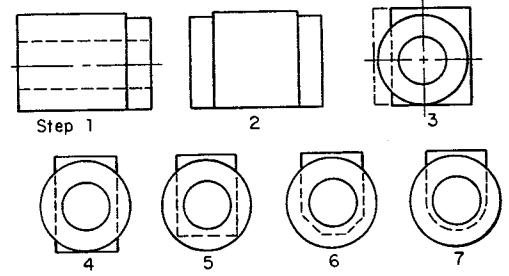
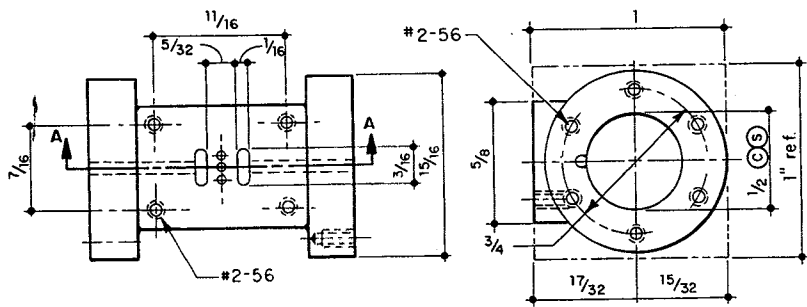
ECCENTRIC STRAP PIN



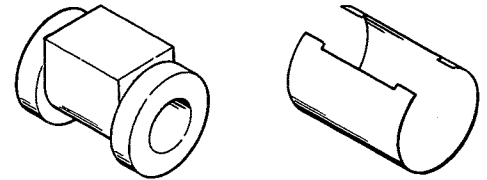
ECCENTRIC STRAP



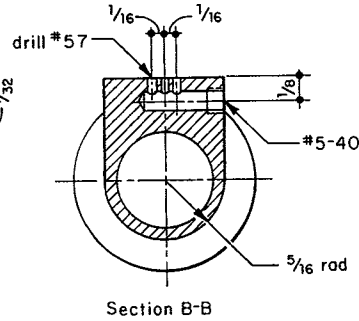
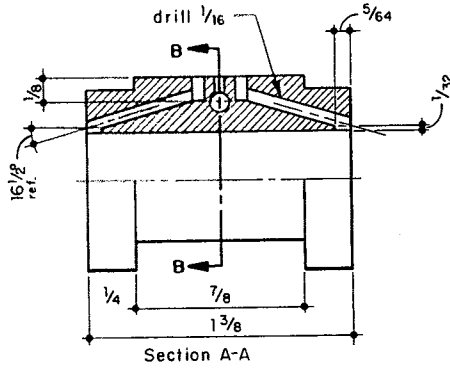
CRANKSHAFT



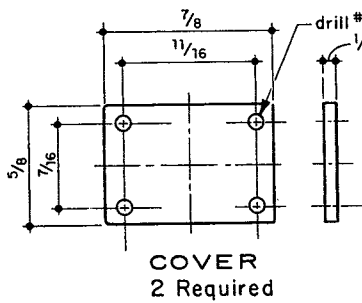
See Text



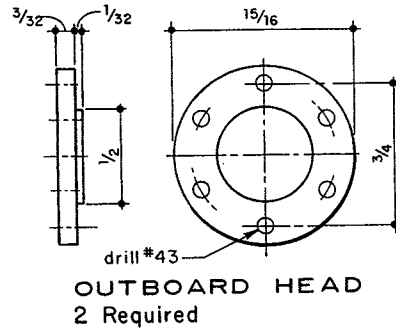
LAGGING  
2 Required



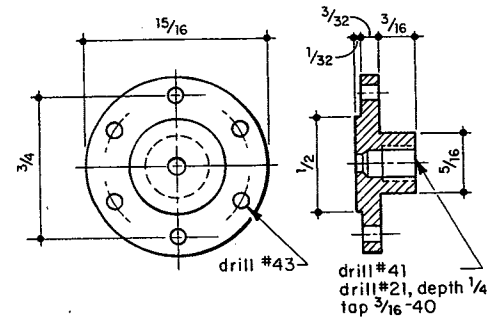
CYLINDER  
2 Required



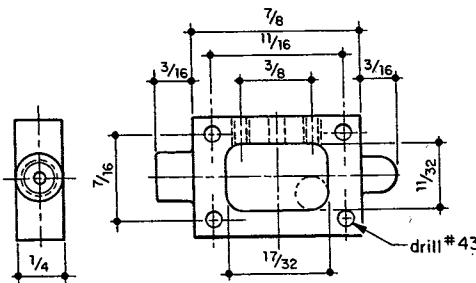
COVER  
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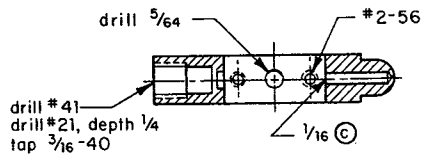
OUTBOARD HEAD  
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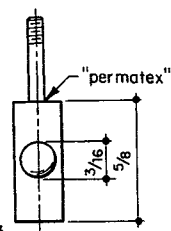
INBOARD HEAD  
2 Required



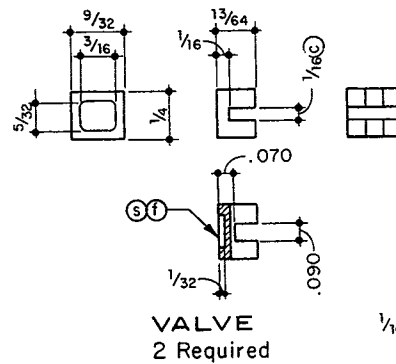
STEAM CHEST  
2 Required



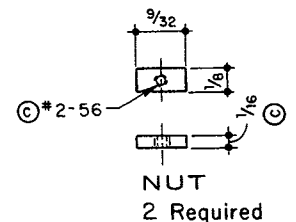
VALVE PLATE  
2 Required



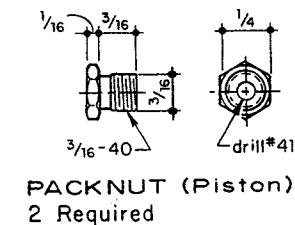
VALVE ROD  
2 Required



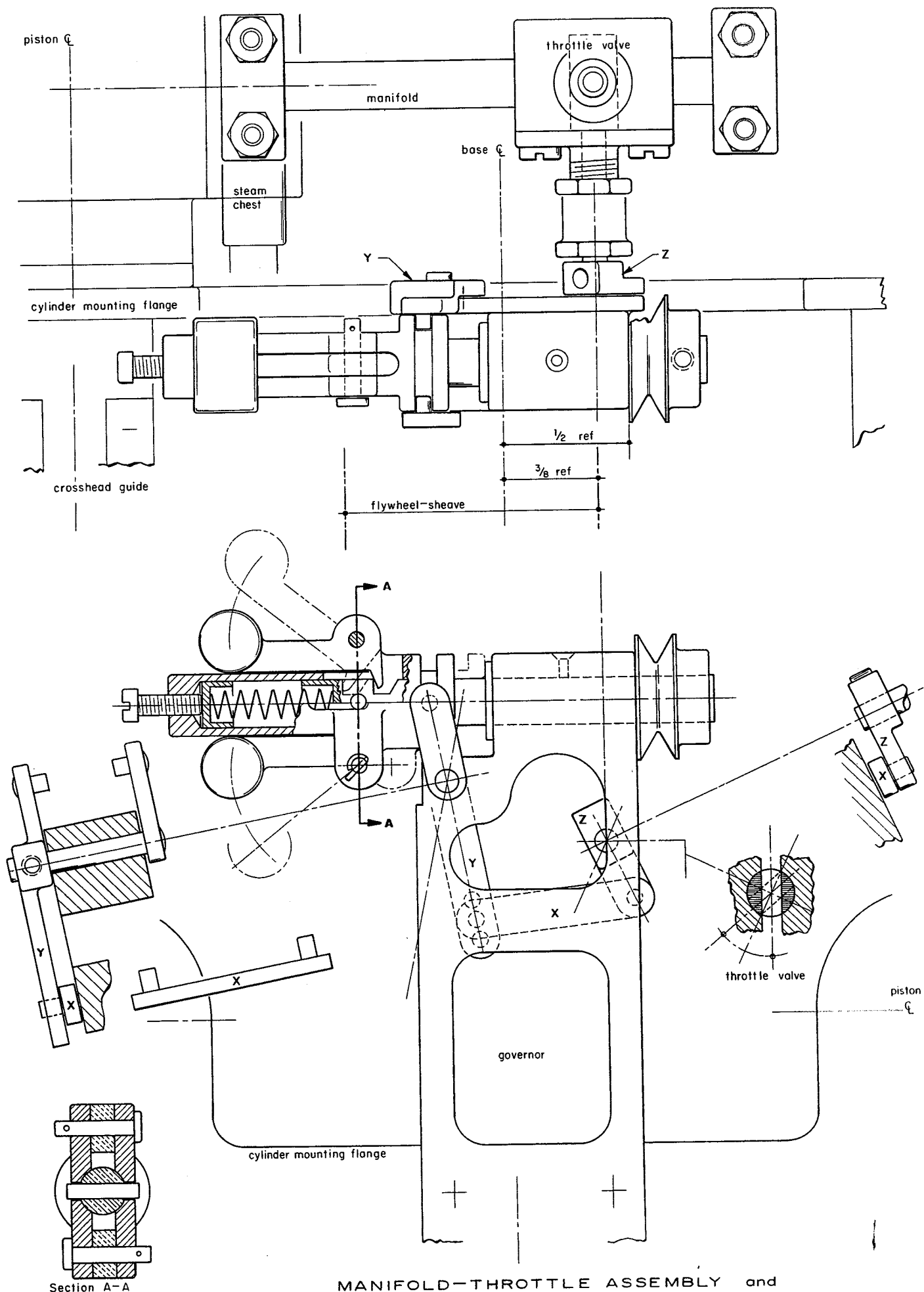
NUT  
2 Required

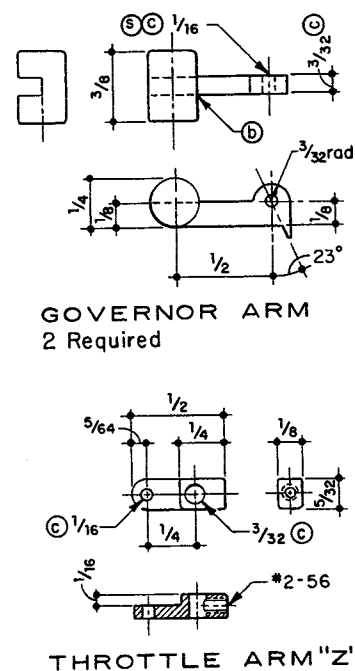
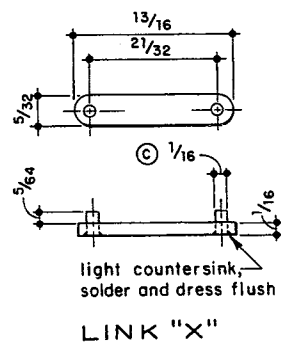
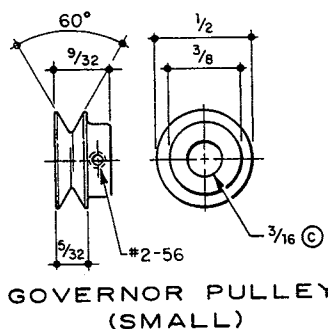
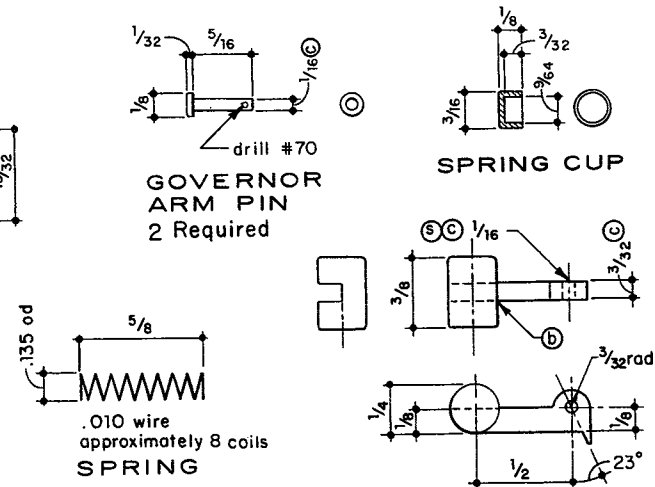
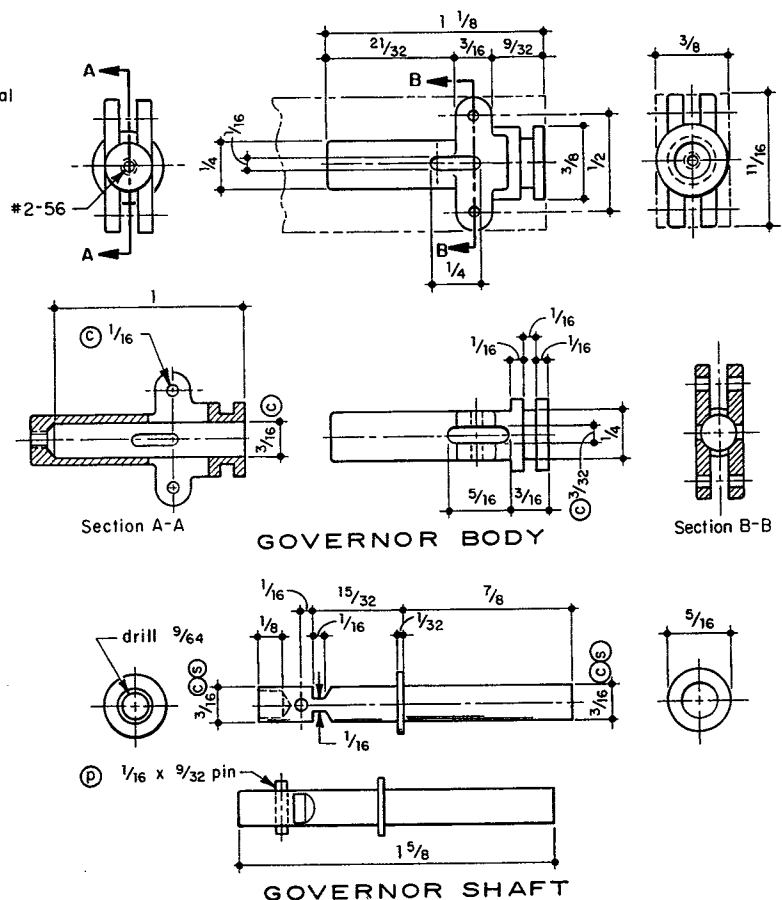


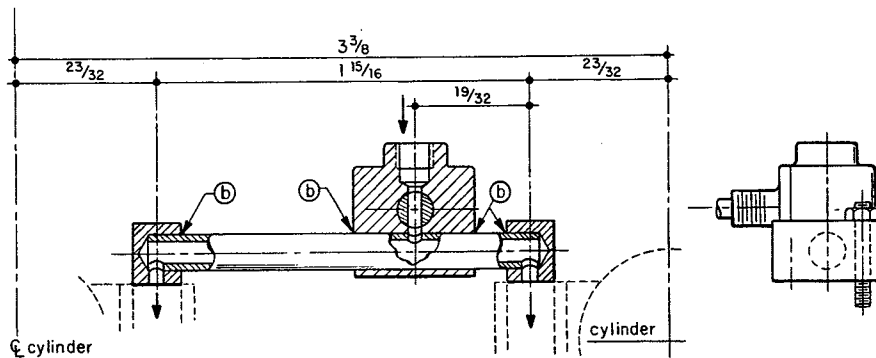
PACKNUT (Valve Rod)  
2 Required



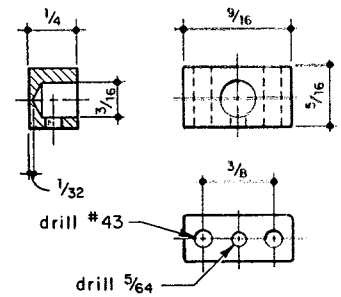
PACKNUT (Piston)  
2 Required



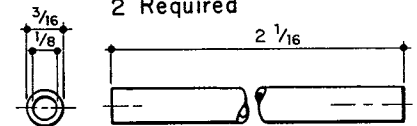




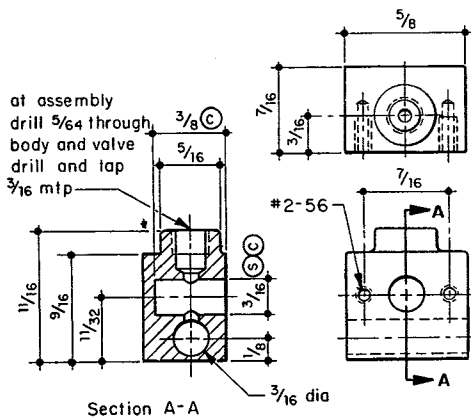
MANIFOLD-THROTTLE VALVE



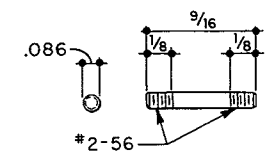
MANIFOLD BLOCK  
2 Required



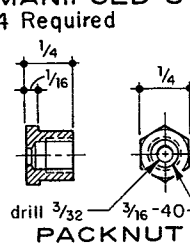
drill after assembly  
MANIFOLD TUBE



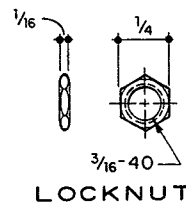
THROTTLE VALVE BODY



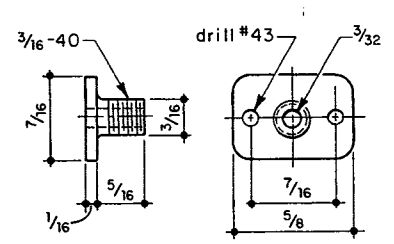
MANIFOLD STUDS  
4 Required



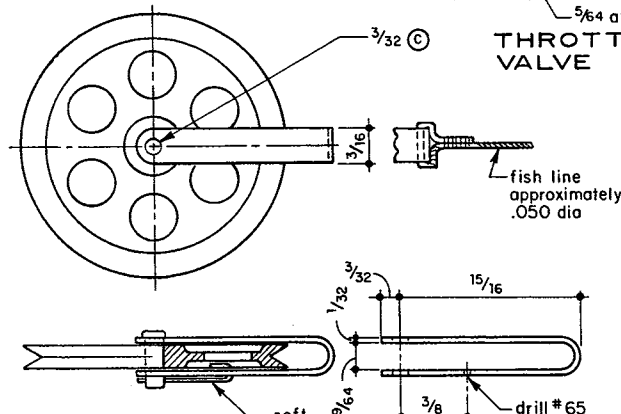
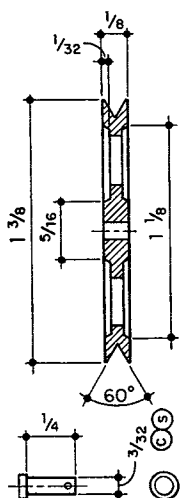
PACKNUT



LOCKNUT

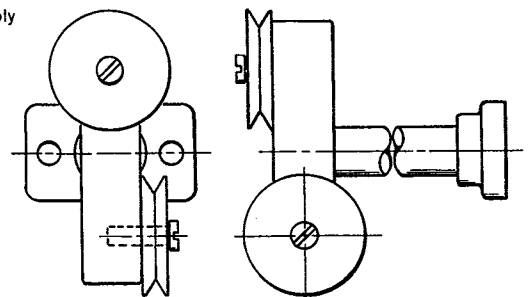


THROTTLE COVER

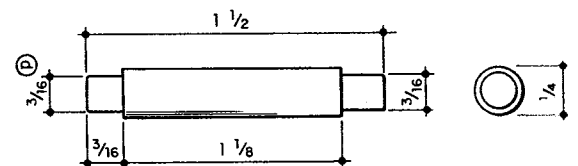


IDLER PULLEY

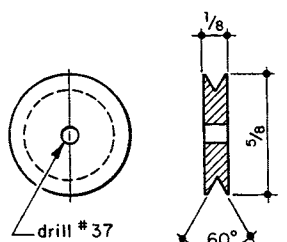
THROTTLE VALVE



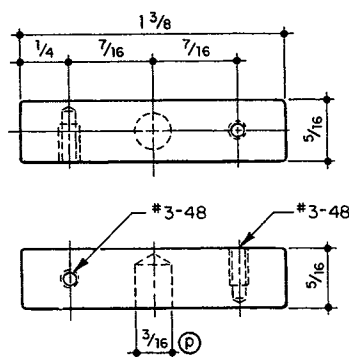
COUNTERWEIGHT STAND



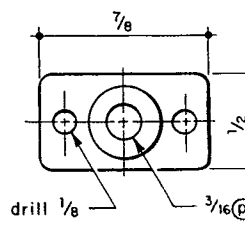
COUNTERWEIGHT COLUMN



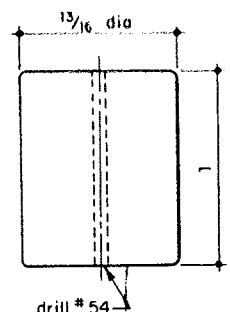
COUNTERWEIGHT PULLEY  
2 Required



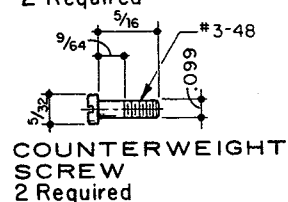
COUNTERWEIGHT BEAM



COUNTERWEIGHT BASE



COUNTERWEIGHT



COUNTERWEIGHT SCREW  
2 Required



3/8" recess cut in the face. Drill for the set screw and tap hub. Re-chuck, gripping the inside of the rim just formed. Turn the second side and bore for the shaft. Coat the O.D. with layout dye and scribe lines (while still in the chuck) for the grooves, and machine the grooves as mentioned above. Layout lines joining the holes and saw and file the spokes.

For the **SMALL PULLEY**, chuck a piece about 3" long and make the grooves, bore and hubs in one chucking.

The **PACKING** is 1/16" strands unraveled from braided asbestos graphited packing. Do not snug up the Packing Nuts too tight. Turn them in lightly with the fingers.

The **LAGGING** is tin can stock. Make a heavy paper pattern that fits the Cylinder and transfer to the metal. The Lagging is mostly a cut-and-try job. Carefully roll over a mandrel to a diameter smaller than the 1/16" flanges on the Cylinder and spring it in place.

The **CONNECTING ROD** and **VALVE ROD** should both start out long enough for chucking and tail-stock support center holes.

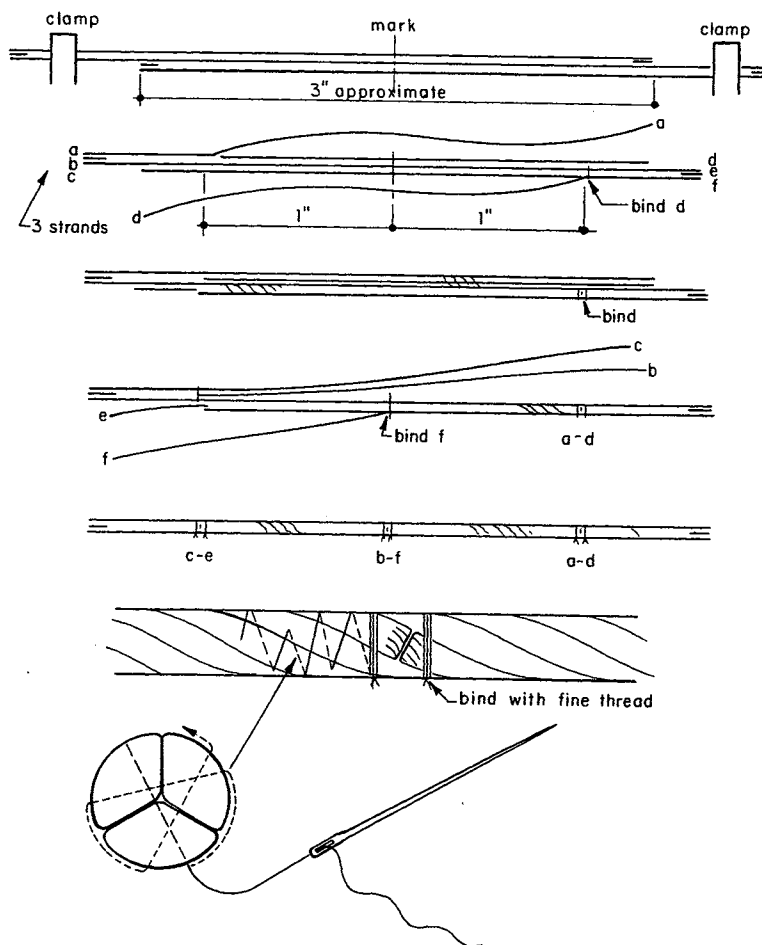
The **GOVERNOR COLUMN** is mostly layout and machining operations. The use of Bushings in the option provides an excellent reservoir for oil to feed the Oilite.

The **GOVERNOR BODY** uses 3/8" x 11/16" stock chucked in the 4-jaw, with about 1-1/2" projecting. Turn the 3/8" diameter back for 9/32" and make the 1/16" groove. Bore 3/16" 1" deep and drill #50 for 2-56 adjusting screw. Turn 1/4" diameter 7/8" long for final parting at 21/32". Make a milling setup to bring the lugs down flush with the 1/4" diameter body. Mill or drill and file the 3/32" and 1/16" slots. This body must be a close but free fit on the **GOVERNOR SHAFT**.

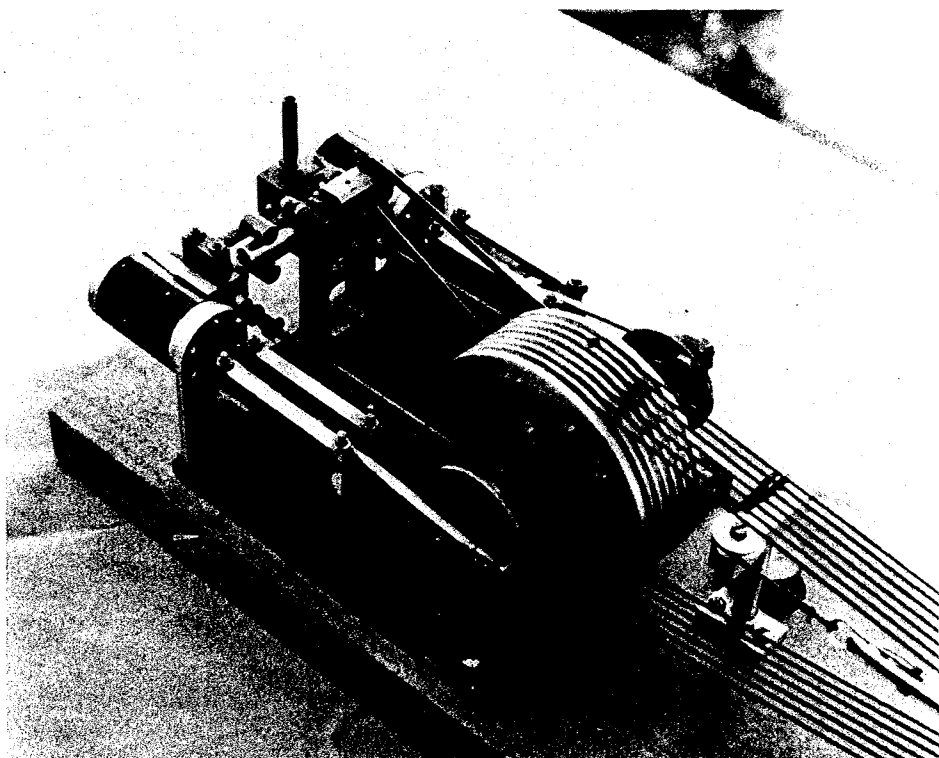
The **GOVERNOR SPRING** dimensions shown are those of a spring found in the odds-and-ends department and seemed to be just right.

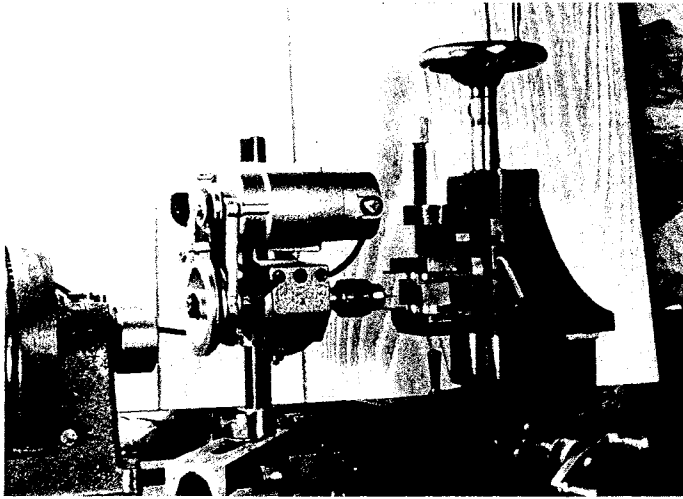
When making the **GOVERNOR ARMS**, leave the 23° point a bit full and work down at assembly with a small file, keeping the two as near alike as possible.

Make the **THROTTLE VALVE** a close but free fit in the **THROTTLE BODY**. The flyball rotation doesn't have much force to move the Valve. A thin thrust washer made from .002" to .004" steel shim stock at the Shaft

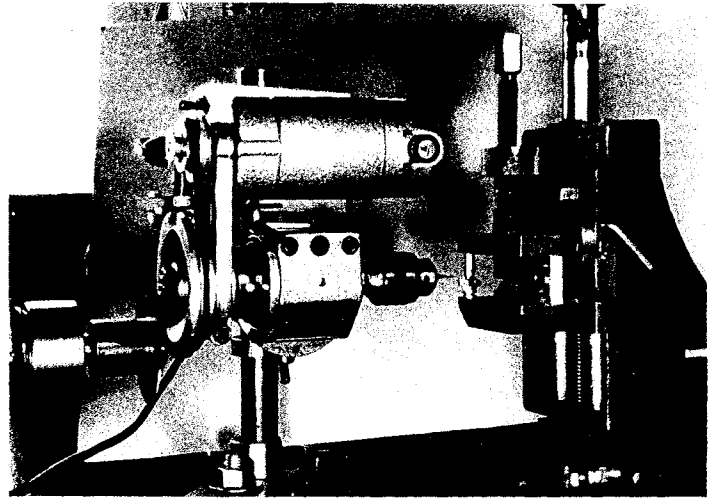


SPLICING THE "ROPE" FOR THE ROPE DRIVE





Milling the steam passages in the Cylinders.



Milling the slots in the Governor Body.

end will reduce friction end-ways. Give this valve a thin coat of light "Molly" and oil at assembly.

The **THROTTLE COVER** was made long for Bearing support. When the **PACKNUT** was run down, it tended to turn with the Shaft. A thin 3/16-40 locknut was set when the final setting was found. Give the packing a good soaking with light oil. Avoid all the drag possible on the entire Governor assembly. At the same time avoid sloppiness.

Solder one block on the **MANIFOLD** tube. Assemble on the Steam Chest and establish the location for the other block and body and solder it. Spot the Valve Body at 19/32" and solder.

The **IDLER PULLEY** is plastic for light weight and low friction. Anchor the Pin through the Pulley with a short length of copper wire run through the pin and side of the Yoke as shown. This prevents the Pin from rotating in the thin metal of the Yoke. Avoid all the weight possible in this assembly. Bind the fish line with fine thread and add a drop of glue.

The "**ROPE**" used on this model is a three-strand fish line about .050" in diameter. Splicing this line may try your patience. After several experiments, this method was used and it made a fair joint with the least thump as it went over the pulleys. You will find tweezers handy for this job.

- Completely thread the Rope over the pulleys and bring the ends so there is an overlap. With tension about right and Counterweight high, make a mark across both Ropes with a felt pen. Hold these ends together with a spring clothes

pin or such and carefully slip the outside two or three Ropes off the Pulleys so you have some slack to mount the Ropes in a work-holding fixture. Keep the marks in line and Rope reasonably tight because it maintains the length that fits over the Pulleys. Each strand is numbered. Unwind **A** and **D** as shown.

- Cut **D** and bind to prevent further unwinding.
- Wind **A** around **E - F** in the groove left by **D**.
- Cut **A** so it meets the end left by **D** and bind, thus we are avoiding a knot which can cause trouble.
- Unwind **B** and **C** back 1" to the left of the mark and bind.
- Unwind **F** back to the mark and bind.
- Wind **B** in the groove left by **F** and cut **B** and **F** at the mark

and bind.

- Cut **E** and **C** 1" left of the mark and bind. remember to keep the slack to a minimum.

When all the ends are tied, use fine needle and thread and further bind the ends by piercing the strands in all directions back about 3/16" from the joint. Draw the thread up snug and work back toward the start so the ends can be tied with a simple square knot. A small drop of glue at the joint will help prevent the threads from loosening. Now each joint has two full strands, which is plenty for this service.

At the final engine **ASSEMBLY**, turn the Crank to one dead center position and tighten the Eccentric with its axis 90° from the centerline through the Crank. Adjust the Valve to equally expose the Valve holes at each end of the stroke. Set both Eccentrics alike to either lead or follow the Cranks.

Splicing the Rope.

