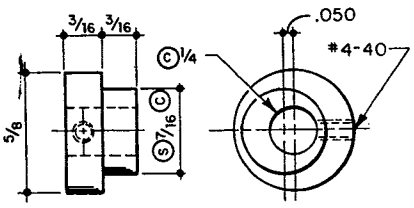
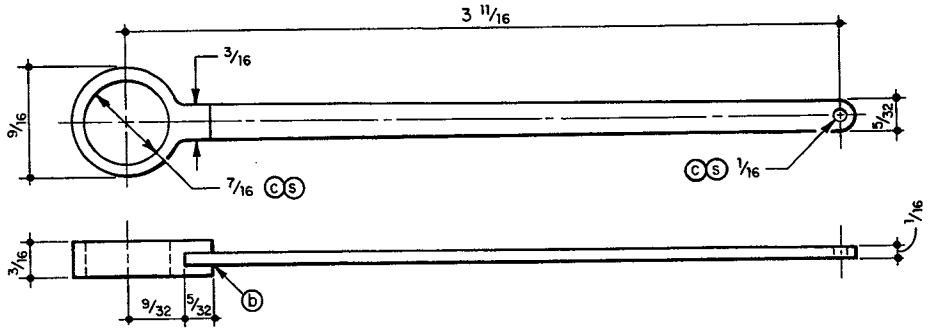
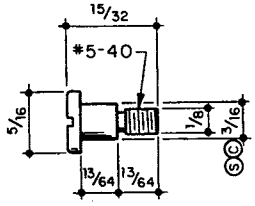


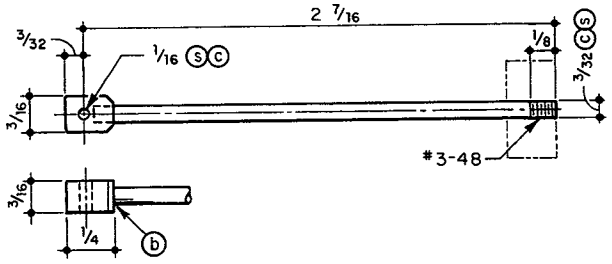
ECCENTRIC
Steel



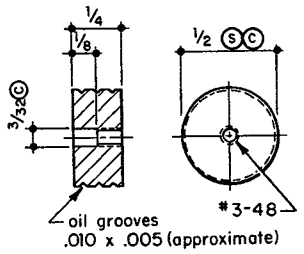
ECCENTRIC STRAP
Brass



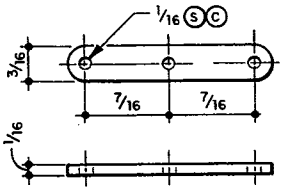
CRANK SCREW
Steel



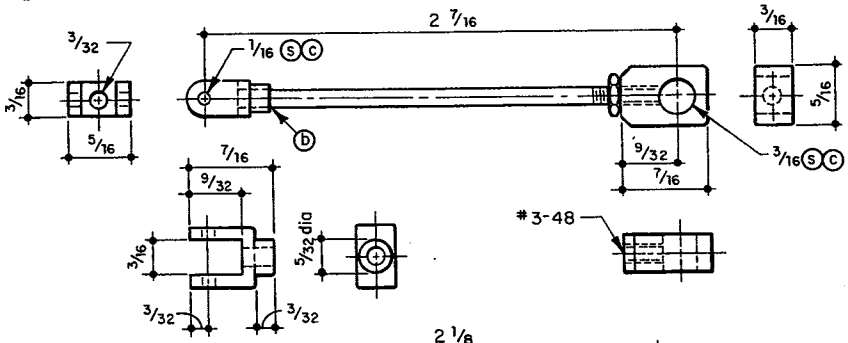
PISTON ROD
Brass

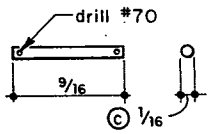


PISTON
Brass

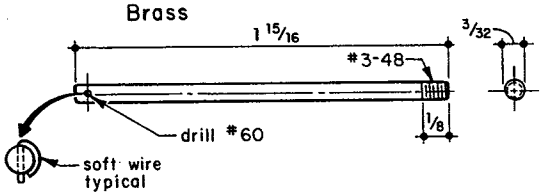


LINK

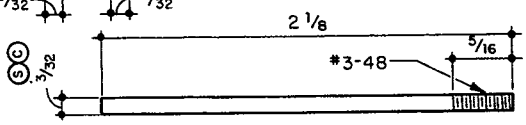




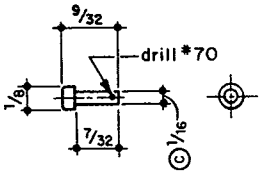
PIN
Brass



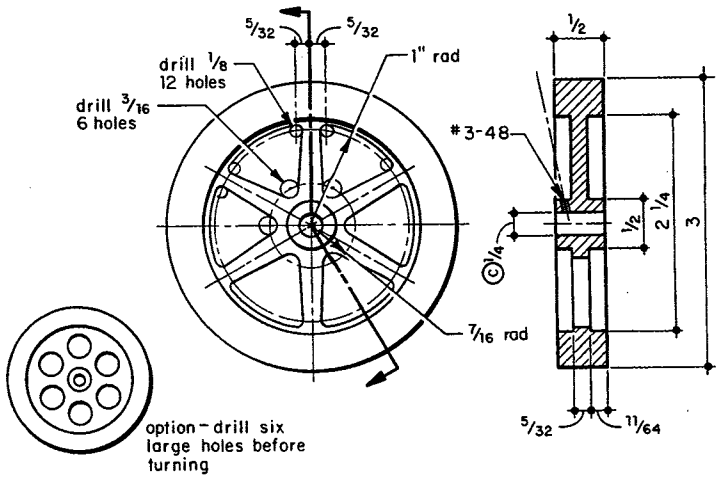
Brass, 2 required



CONNECTING ROD ASSEMBLY
Brass



Brass



FLYWHEEL
Aluminum

CHAPTER

32 Tall Vertical Open Column

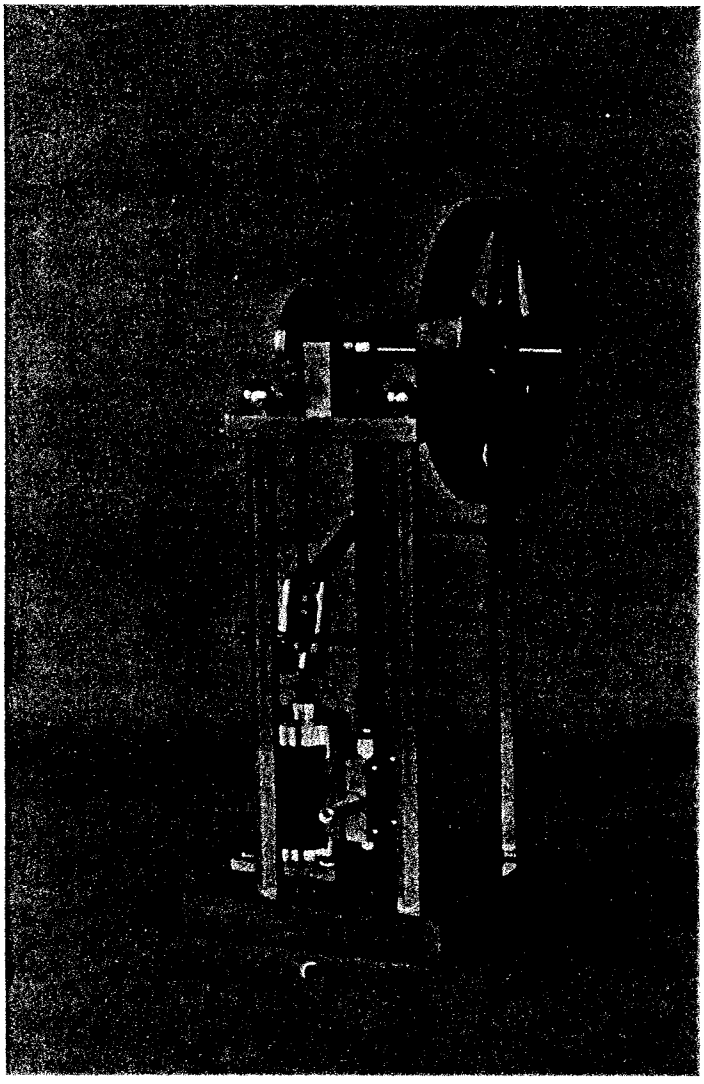
This engine is patterned after a popular engine which is sold in kit form; however, it has a 1/2" bore and 1" stroke instead of a 1" bore and 2" stroke. It is quite simple all around and should be no trouble for experienced builders. Only a few items will be mentioned.

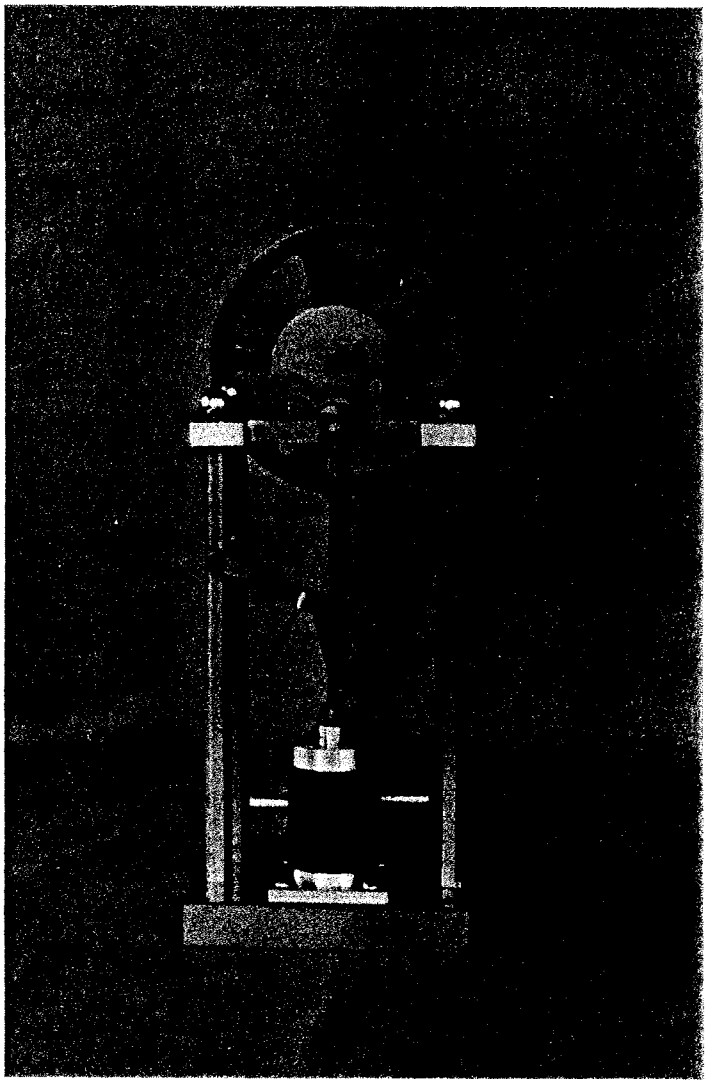
The **BASE** and **TABLE** use common machine shop practice. The steel Base has weight so the engine runs well without anchoring. Screws are used, up from the bottom, for the Columns as an aid in assembly, rather than threading them into the Base. The Rods that support the Arms square up easily so the cap nuts and base screws can be tightened. A little study will show how the Links and Arms produce straight-line motion. Hexagon stock was used on the engine shown. The flat faces of the hex make it easier to lay out and make the holes for the Rods.

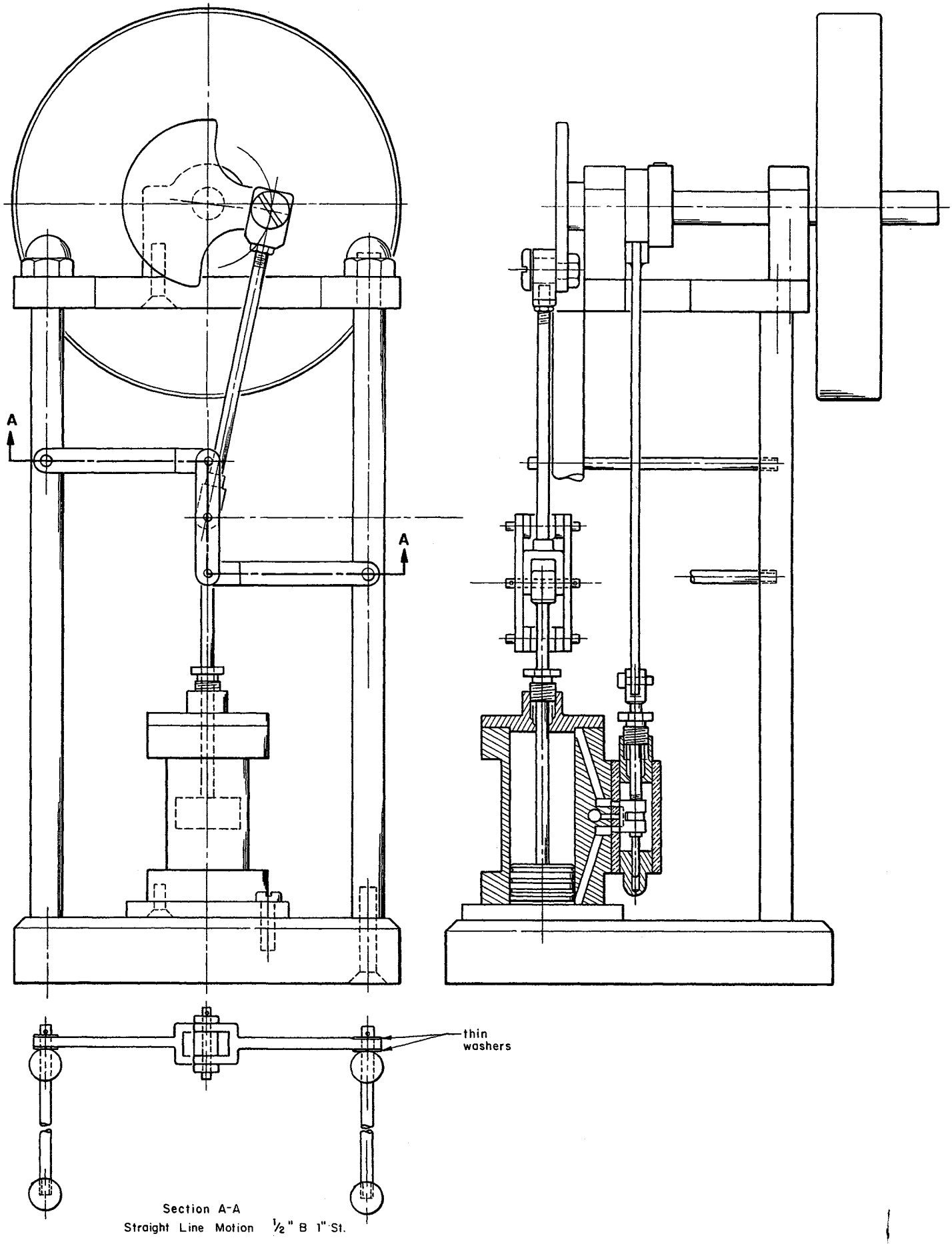
The **ARMS** are made out of the solid. The 3/32" and 1/16" holes are drilled while the stock is square and then the 3/32" Arm and 3/16" Fork are milled or shaped. Solder the 1/16" x 3/16" Pins as shown.

The **BEARING BLOCKS** are tapped #5-40 and the Shaft center is laid out and center punched on one piece. Both Bearings are squarely mounted on the table and then this assembly is squarely mounted in the cross-slide milling attachment. The Shaft center is picked up with a wiggler and drilled in easy stages, and then finally reamed to size. Bushings are optional here. These Bearings should be marked so they can be remounted in the position as they were reamed.

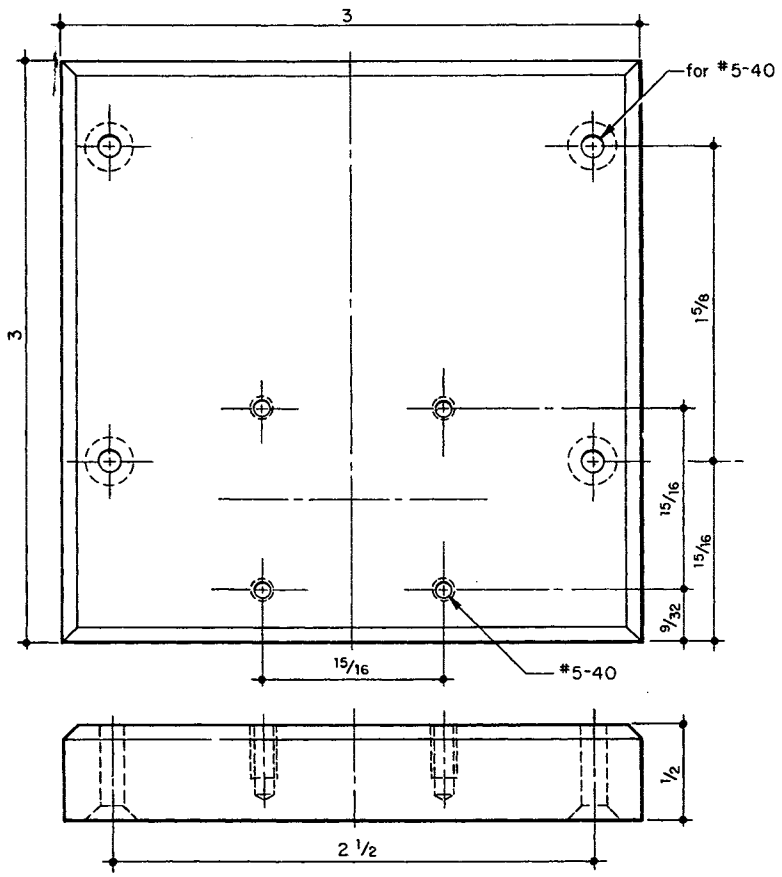
For the **CYLINDER**, make an accurate 1" x 1" x 1-3/8" (or 15/16" x 1" x 1-3/8") block. Lay out all the centers and lines on all faces and drill and tap all holes while the block is square. The Heads can be used as jigs after the center is bored for the Piston,



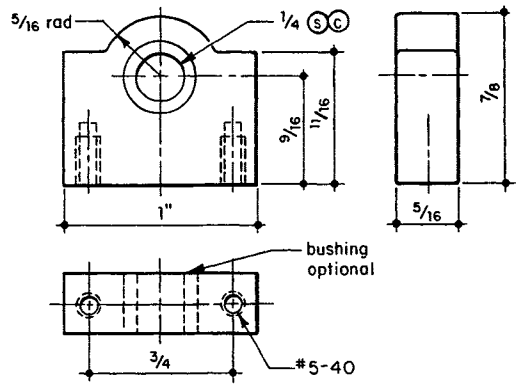




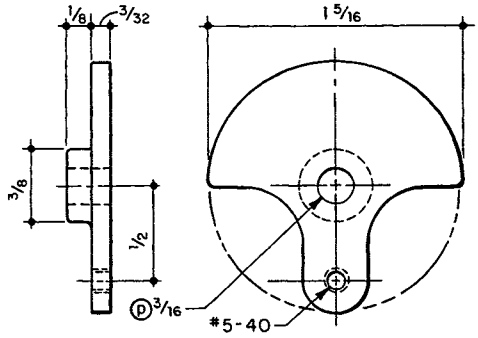
TALL VERTICAL OPEN COLUMN



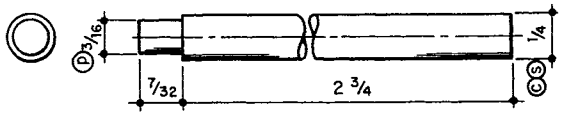
BASE
Steel



BEARING
Aluminum, 2 required



CRANK
Steel



SHAFT
Steel

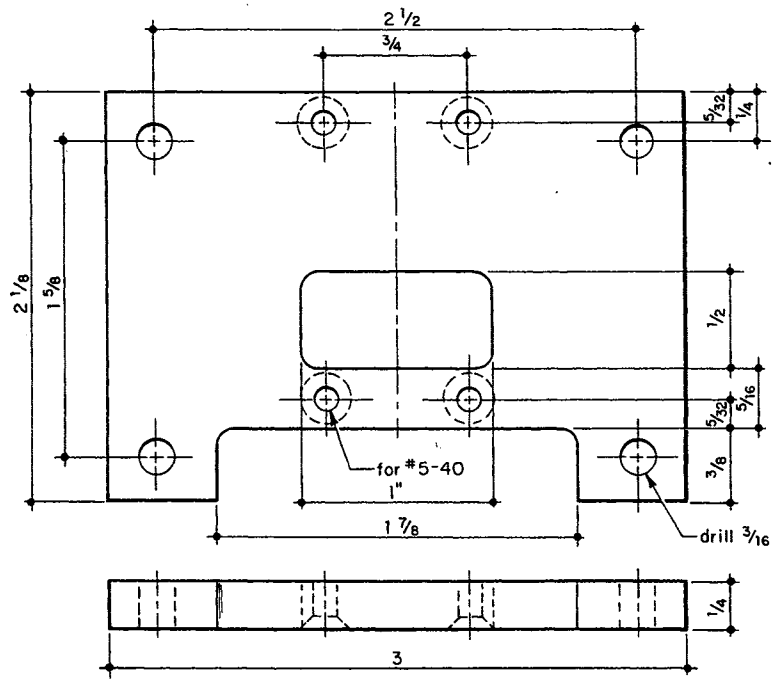
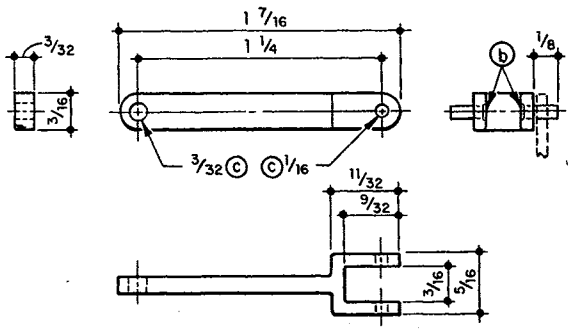
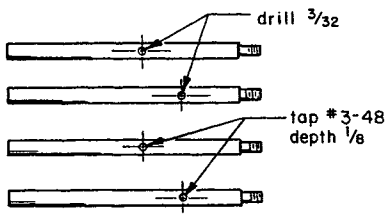


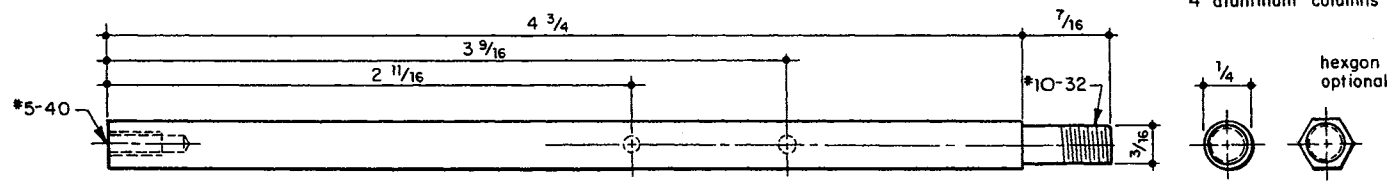
TABLE
Aluminum



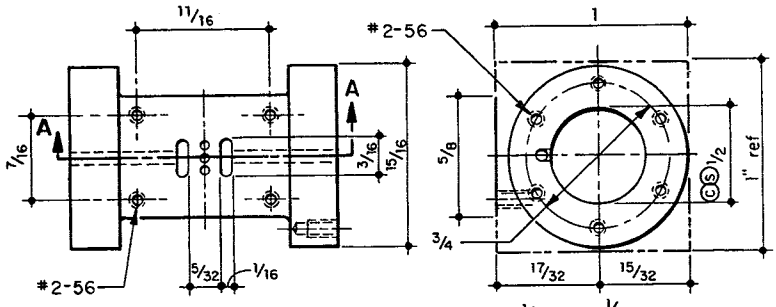
ARM, BRS.
2 required

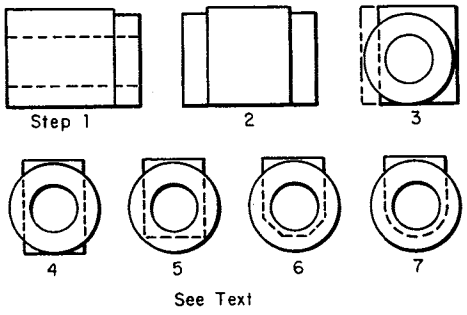


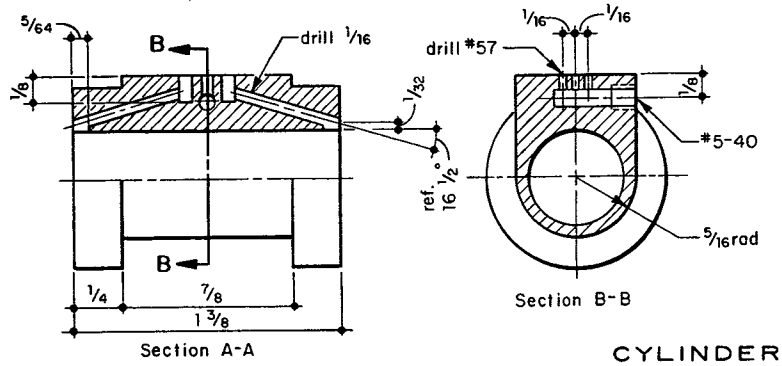
4 aluminum columns

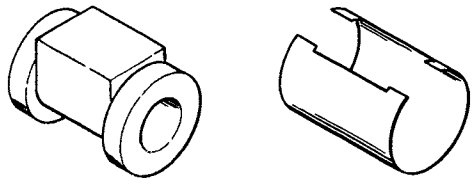


COLUMN
Aluminum, 4 required

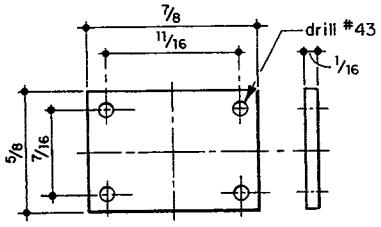




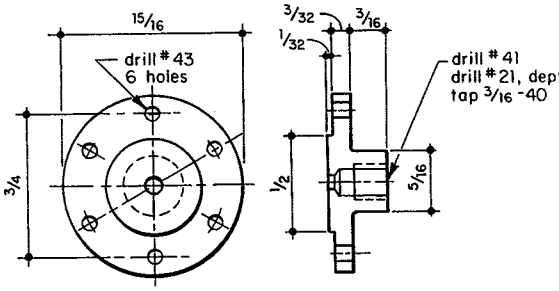




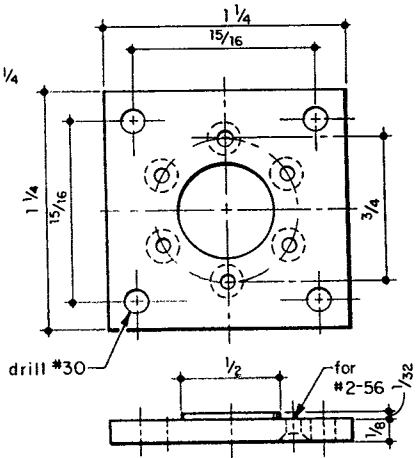
CYLINDER
Aluminum



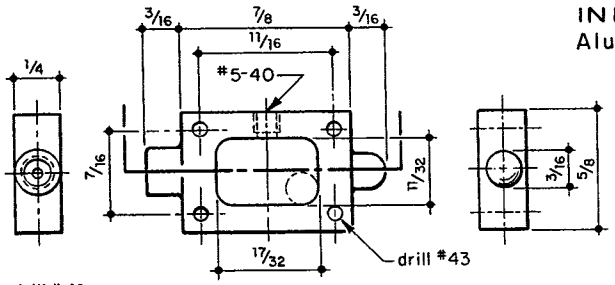
COVER
Brass

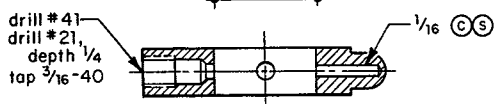


INBOARD HEAD
Aluminum

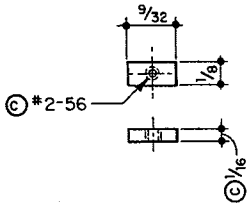


OUTBOARD HEAD
Aluminum

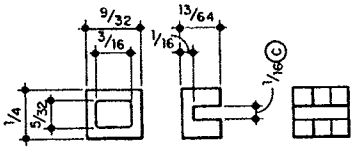


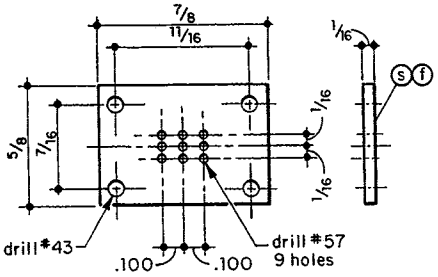


STEAM CHEST
Aluminum

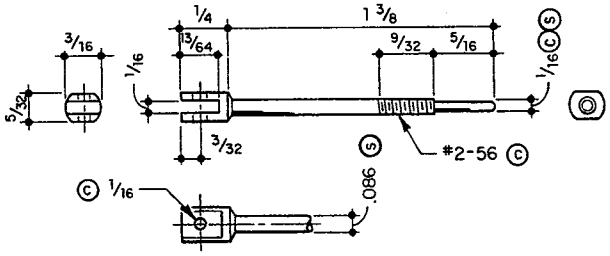


NUT
Brass

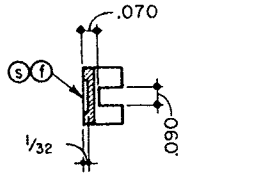




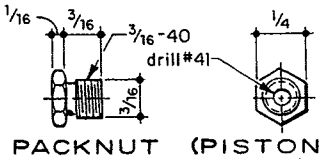
VALVE PLATE
Brass



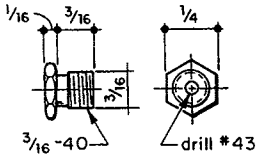
VALVE ROD
Brass



VALVE
Brass



PACKNUT (PISTON)
Brass or Aluminum



PACKNUT
(VALVE ROD)
Brass or Aluminum

keeping the bolt pattern square with the Steam Chest face. Turn and bore as in **Step 1** and reverse in the lathe for **Step 2**. Make a milling setup for **Steps 3, 4, 5** and **6**. Rounding, as in **Step 7**, is optional.

The **LAGGING** is thin stock traced from a heavy paper pattern made by cut-and-try. Roll the metal to a diameter smaller than the flanges and carefully spring it in place.

The **STEAM CHEST** is laid out completely on an accurate 1/4" x 5/8" x 1-1/4" block. Center in the 4-jaw and turn each end and bore. Drilled holes form the radius for the inside opening.

In making the **VALVE**, try for freedom so it will float on the seat (steam pressure holds it down) and, at the same time, avoid sloppiness at the Valve Nut and Valve Rod.

Center 5/8" diameter stock in the 4-jaw for the **ECCENTRIC**. Brighten the O.D. and bore 1/4" for the Shaft. Offset .050" and turn 7/16" diameter. One method is to mount a square-ended bar in the tool post and bring it up against the stock. "Zero" the cross-slide collar and turn the chuck so two jaws are horizontal. Ease off the vertical jaws and back up the rear jaw about 1/16". Push the stock back, using the front jaw. Advance the cross-slide .050" and ease the stock back against the bar, using the rear jaw. Snug up all the jaws. Now, when the high spot just kisses the bar and then the chuck is rotated 180°, a .100" diameter rod should just pass between the bar and the stock. Spot the set screw on the centerline through the offset. It helps when you are tuning the Valve.

The **FLYWHEEL** shown was made from a salvage round-belt pulley. A Stuart-Turner 10H Flywheel is just right for this model or one can be made from 1/2" flat stock. Lay out and drill twelve 1/8" and six 3/16" holes as shown. Chuck in the four-jaw, gripping about 1/8" of the stock thickness. Center and turn the O.D., the 11/64" x 2-1/4" recess and the Shaft bore. Reverse and mount in the three-jaw, gripping on the rim I.D. and finish the O.D. and second recess. Apply layout dye to one entire web, scribe lines tangent to the holes and saw and file the spokes to shape.

The **CONNECTING ROD** is provided with a bit of adjustment so the Piston travel can be centered in the Cylinder length.

The **PACKING** is 1/16" strands unraveled from braided asbestos graphite Packing. Do not turn the Packing Nuts too tight. Turn them in lightly with the fingers. It is not strictly necessary to use this type of Packing.

Short pieces of soft wire in the #70 holes will keep the Links in place.

At **ASSEMBLY**, spot the Piston at one dead-center position and tighten the Eccentric with its axis at 90° from the centerline through the Crank. Temporarily fasten the Steam Chest and adjust the Valve so it equally exposes the Valve holes at each end of the stroke.

When the Piston is at one extreme of its travel no steam should enter the Cylinder.