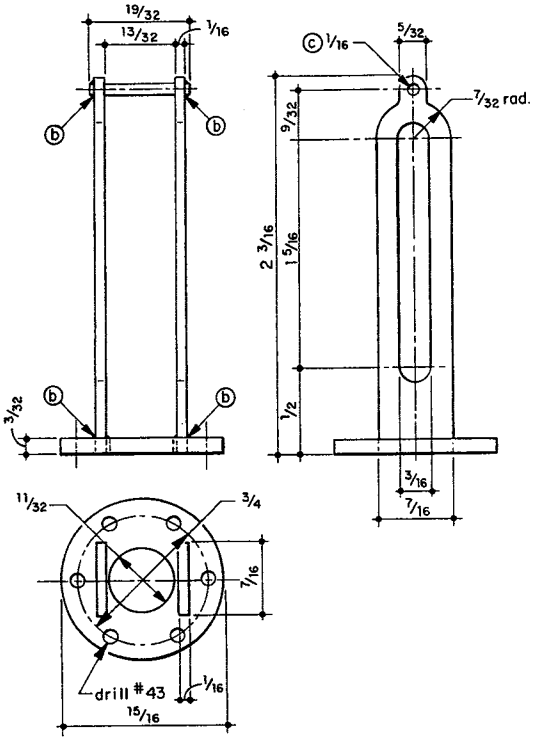
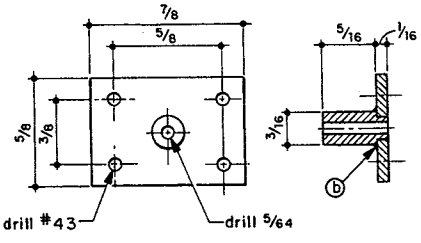
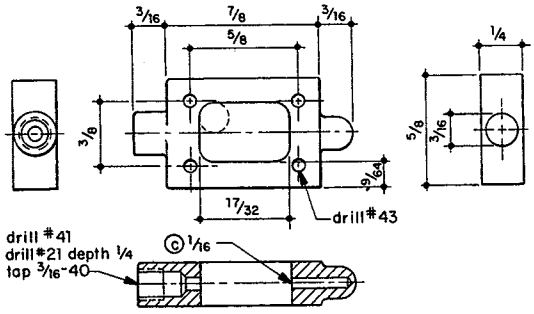


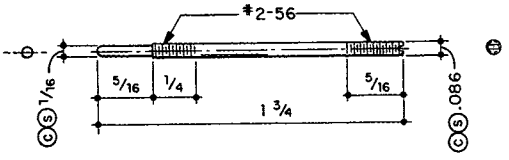
CROSSHEAD GUIDE



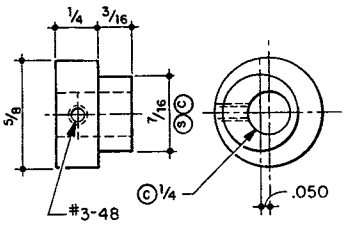
COVER



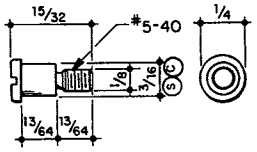
STEAM CHEST



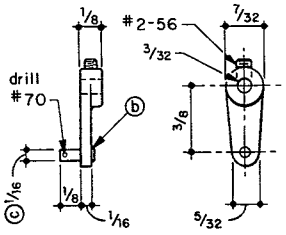
VALVE ROD



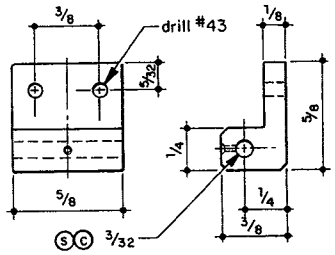
ECCENTRIC



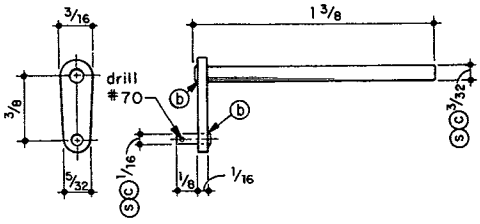
CRANK SCREW



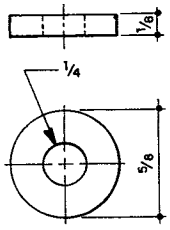
ROCKER ARM
2 Required



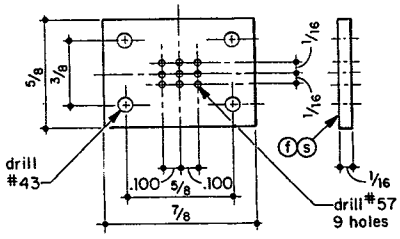
ROCKER BEARING



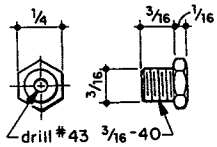
ROCKSHAFT



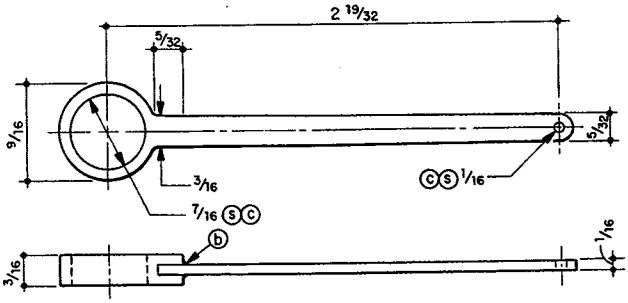
SPACER



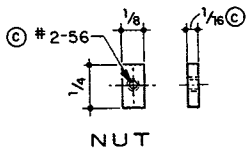
VALVE PLATE



PACKNUT
(Steam Chest)



ECCENTRIC STRAP

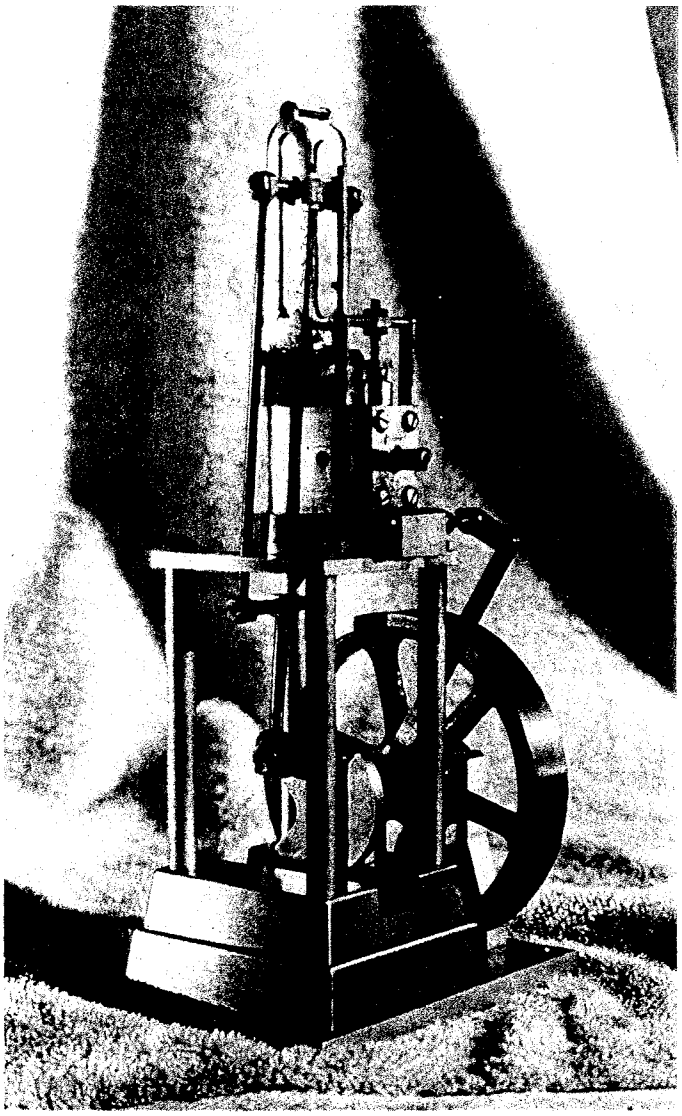


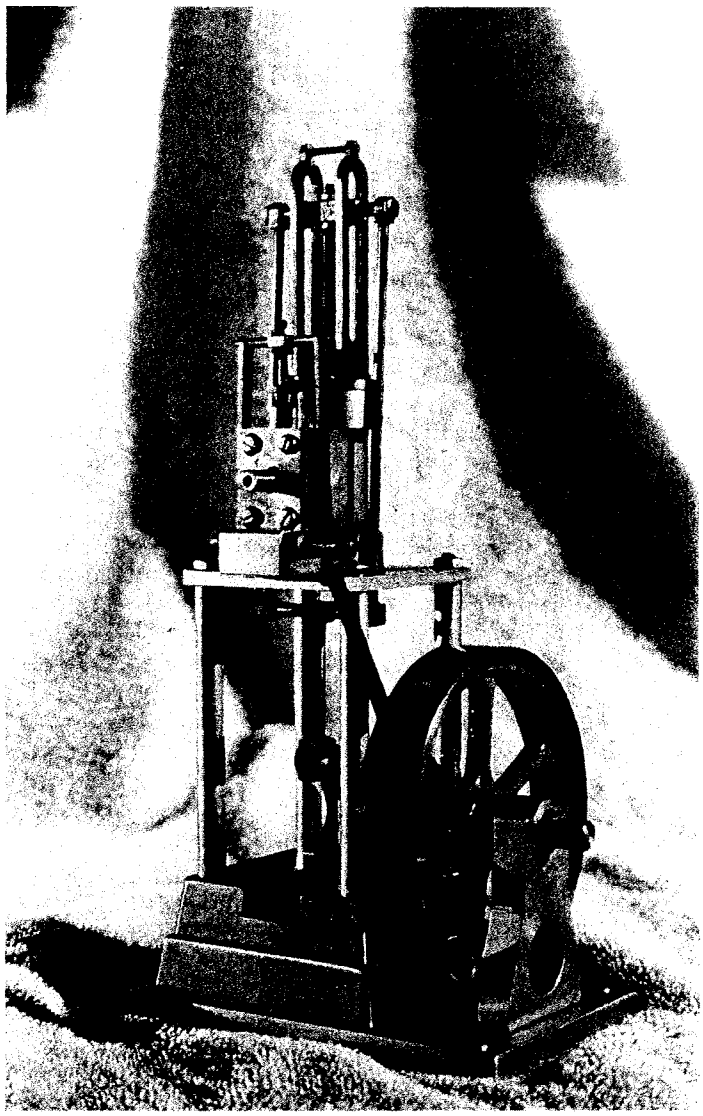
NUT

c close fit	b braze or solder
s smooth	p press fit or loctite
f flat	

CHAPTER

29 Mine Engine





This model is patterned after an old mine engine. It has an interesting Connecting Rod and Crosshead Guide. A Rocker Shaft and linkage operate the Valve.

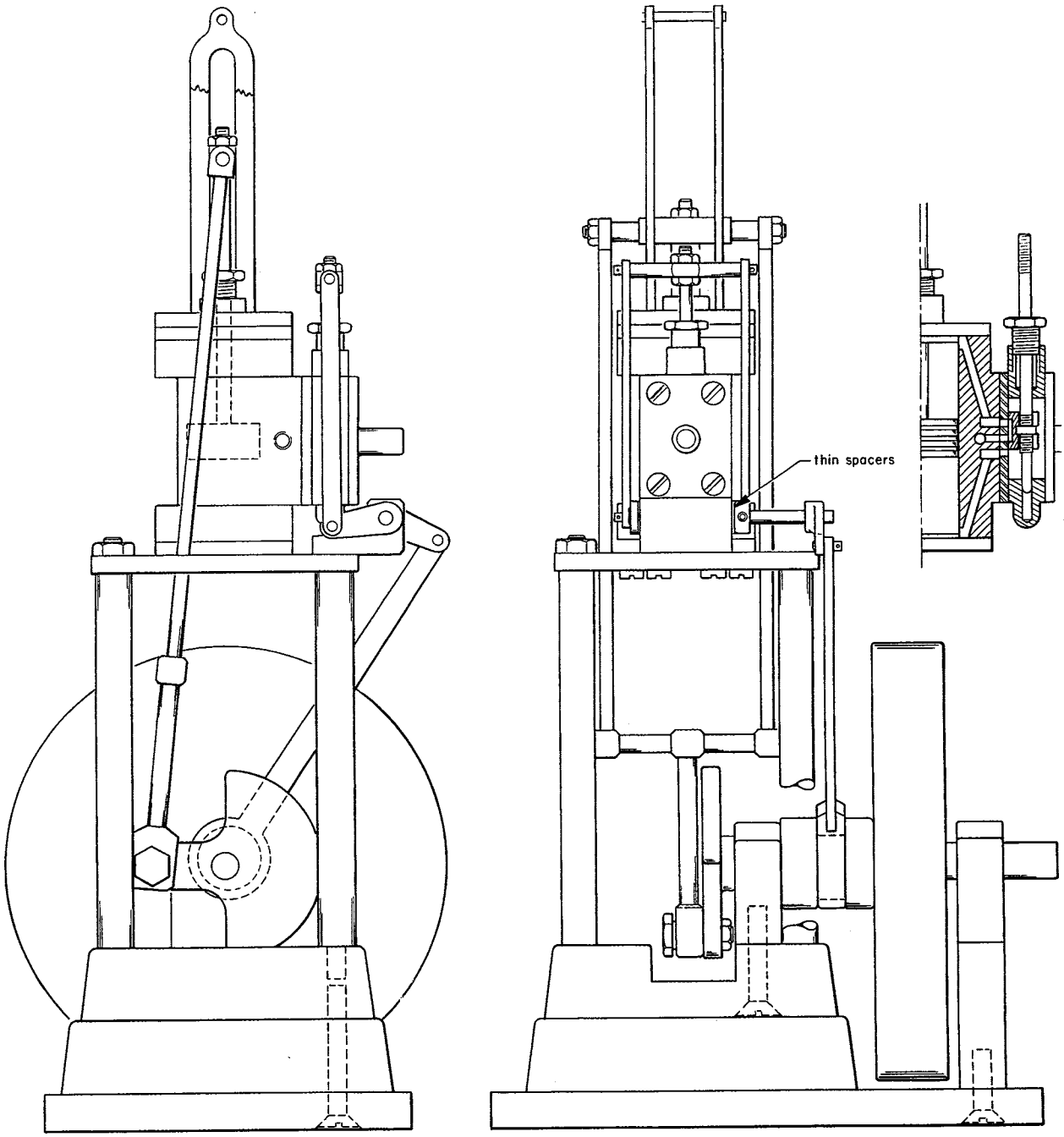
No castings are required for this engine. A lot of the parts can be made from odds and ends.

For the **BEARINGS**, start out with an accurate 5/16" x 3/4" x 27/32" and 5/16" x 1-1/4" x 1-27/32" blocks. Scribe the outlines on the face of each Bearing. Drill and tap for anchor holes. Lay out the center of the shaft hole on the Tall Bearing and mill both to the outline. Assemble the Bearings to the Floor, Base and Sub-Base, all tight and well aligned.

On the model shown, the assembly was mounted in the cross-slide milling attachment. The Shaft center was picked up with a wiggler and the Shaft holes line-drilled and reamed in easy steps. Now you have a choice of 1/4" reamed holes in the Bearings or enlarge to 3/8" for Bushings. "Oilite" bushings were pressed in on the model shown. A 1" long screw and thick nut were used as a jack between the Tall Bearing and the Base to take some of the drill thrust. This operation might be done in a drill press.

The **CROSSHEAD GUIDE** consists of carefully milled or filed parts, soldered together. Make an accurate block (preferably aluminum since solder won't stick to it) to clamp between the guides, squarely against the flange to hold the parts in place while soldering.

Chuck 5/8" diameter stock in the 4-jaw for the **ECCENTRIC**. Brighten the O.D. and bore 1/4". Offset .050" and turn the 7/16" diameter. Mount a square-ended bar in the tool post



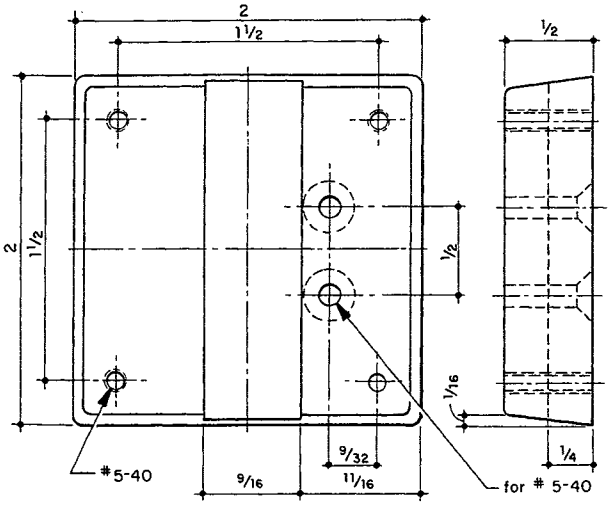
and bring it up against the stock. "Zero" the cross-slide collar. Turn the chuck so two jaws are horizontal. Ease off the vertical jaws slightly and back up the rear jaw about 1/16". Push the stock back, using the front jaw. Advance the cross-slide .050" and ease the stock back against the bar, using the rear jaw. Snug up all jaws. Now, when the high spot just kisses the bar and then the chuck is rotated 180 degrees, a .100" bar should just pass between the bar and the stock in the chuck. Spot the setscrew on the centerline through the offset. It helps when timing the Valve.

The **CONNECTING ROD** is a soldered assembly. Solder the Crank end squarely to the crossbar and solder the two eyes to the 3/32" rods. Run a piece of 3/32" stock through the eyes and the 3/32" rods into the crossbar. Clamp this assembly squarely to a plate while soldering.

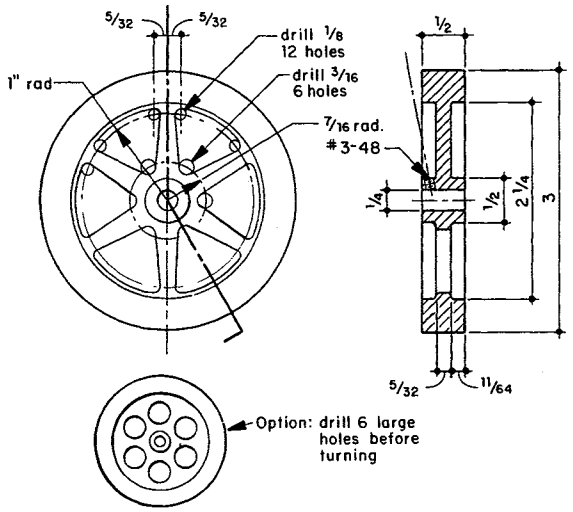
If you choose to bevel the **BASE** and **SUB-BASE**, make the beveling the last operation. All the operations are laid out and made from square surfaces.

The **STEAM CONNECTION** on the Steam Chest Cover is for 3/16" tubing. Make your Cover to suit.

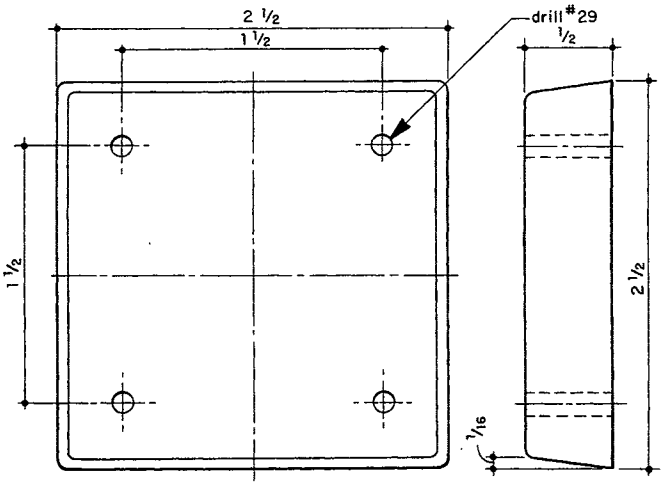
At **ASSEMBLY**, adjust the Piston Rod so the Piston is centered between the heads. Clamp the Steam Chest temporarily with the Cover removed. With the Piston at mid-stroke as shown in the Left Hand Assembly view, spot the centerline through the Eccentric in line with the Link as shown. This should put the Valve at the lowest end of its travel, giving full steam flow. You have three adjustments you can make to center the Valve properly. If you watch the



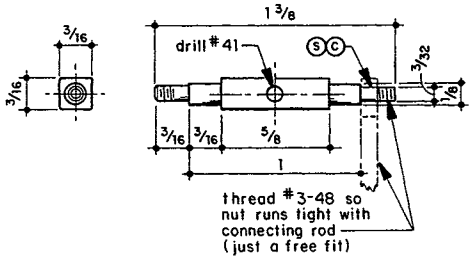
BASE



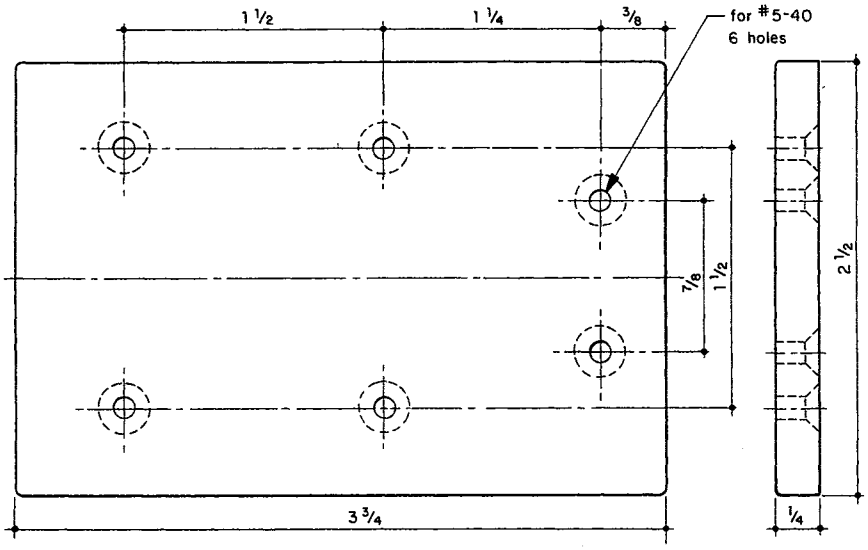
FLYWHEEL



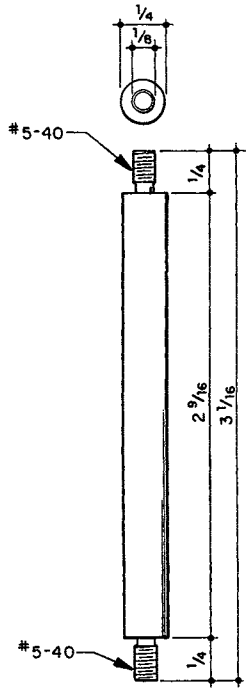
SUB-BASE



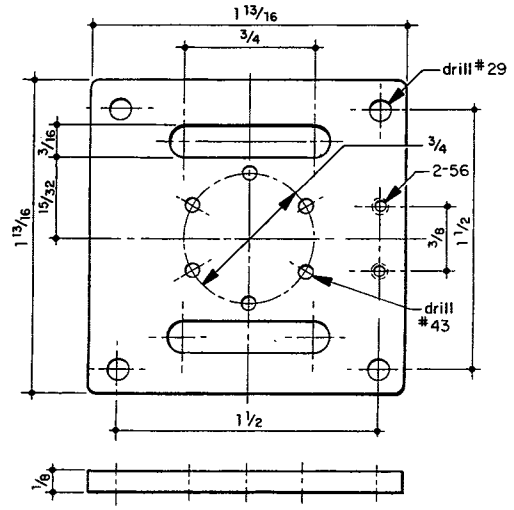
CROSS HEAD

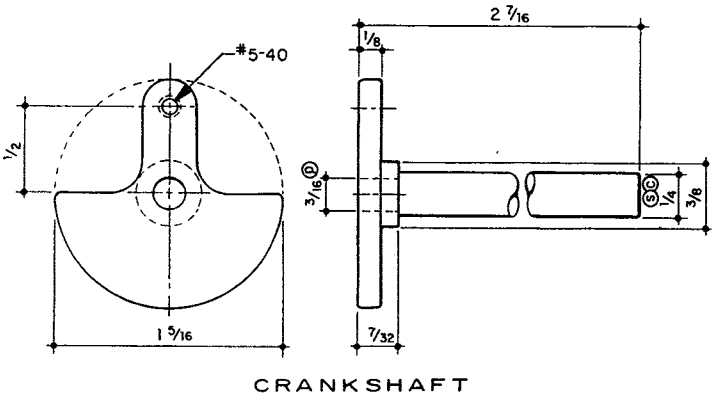


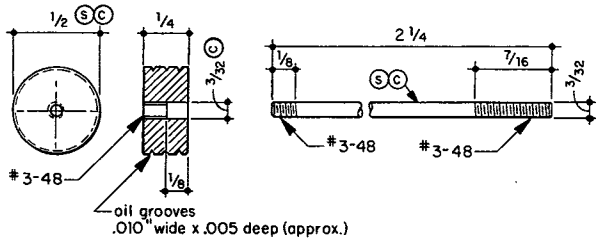
FLOOR

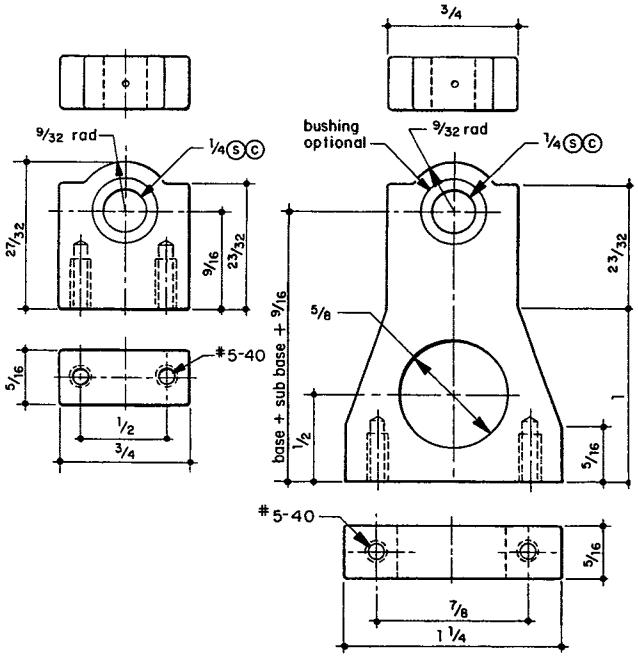


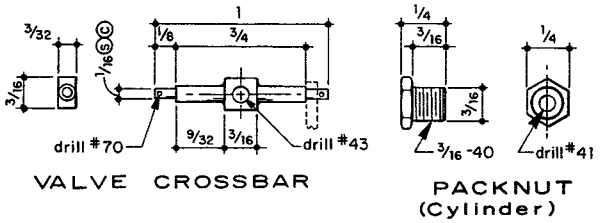
COLUMN

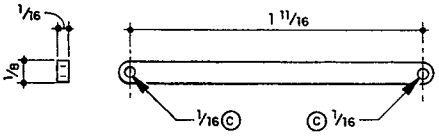

1 13/16
3/4
drill #29
3/4
2-56
drill #43
1 1/2
TABLE

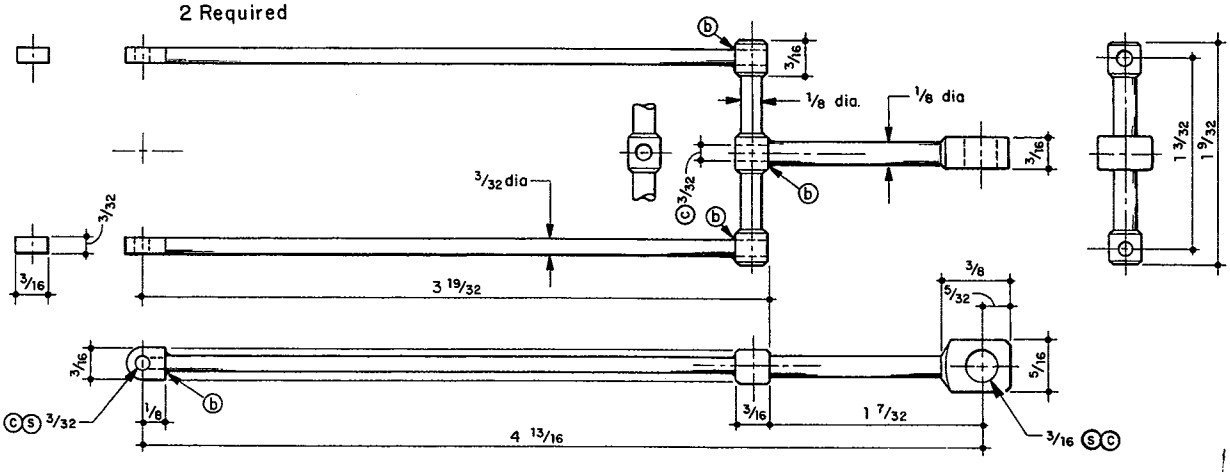

#5-40
1/2
1 5/16
2 7/16
1/8
3/16
1/4
3/8
7/32
CRANKSHAFT

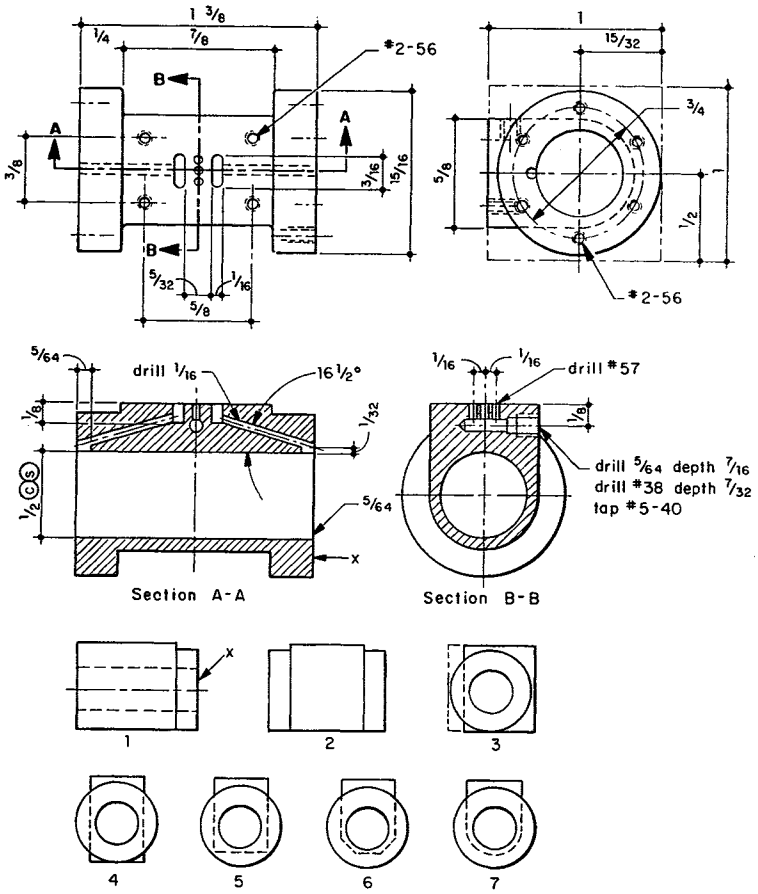

1/2
1/4
3/32
#3-48
1/8
oil grooves
.010" wide x .005 deep (approx.)
2 1/4
7/16
3/32
#3-48
#3-48
PISTON AND ROD


3/4
9/32 rad
1/4
bushing optional
9/32 rad
1/4
27/32
9/16
23/32
23/32
5/8
base + sub base + 9/16
1/2
1
5/16
5/16
#5-40
1/2
3/4
#5-40
5/16
7/8
1 1/4
BEARINGS

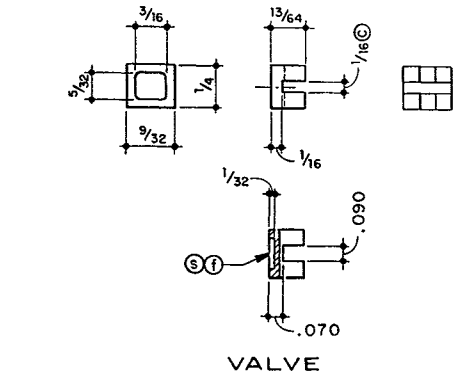

3/32
3/16
1/16
1
1/8
3/4
drill #70
9/32
3/16
drill #43
VALVE CROSSBAR
1/4
3/16
3/16 -40
1/4
drill #41
PACKNUT
(Cylinder)


1/16
1/8
1 11/16
1/16
1/16
LINK
2 Required

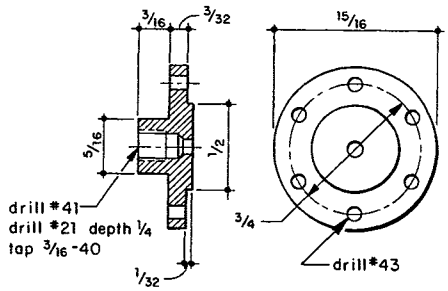

3/16
1/8 dia.
1/8 dia
3/16
3/32 dia
3/32
3/32
3/16
3 19/32
3/8
5/32
5/16
3/16
1/8
3/32
3/16
1 7/32
4 13/16
3/16
1 3/32
1 9/32
CONNECTING ROD



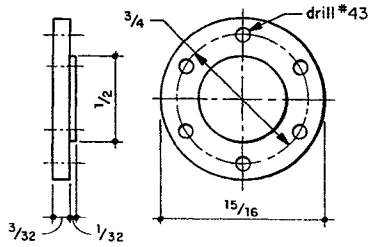
CYLINDER



VALVE



UPPER HEAD



LOWER HEAD

action of the Valve in relation to the Piston, you will soon get the drift of what is needed. The Valve should equally expose the Valve holes at each end of its stroke. When the Piston is at one extreme of its travel, no steam should enter the Cylinder.

The **PACKING** is 1/16" strands, unravelled from braided asbestos graphite packing. Do not snug up the packing nuts too tight. Turn them in lightly with the fingers. It is not strictly necessary to use this type packing. Some short pieces of fine copper wire in the #70 holes will keep the Links in their place.

It is an interesting engine to watch and the one shown ran fine on as little as 5 psi air.

Now's the time to start your own Vertical Mine Engine and get in on the enjoyment!

Why not head for your shop right now and get started?

Be sure you always practice

SAFETY FIRST

USE YOUR GOGGLES — WEAR PROPER CLOTHING
DOUBLE-CHECK YOUR SET-UP — USE PROPER SPEED
USE PROPER COUNTERBALANCE
DO NOT USE DULL TOOLS — USE PROPER LIGHT
KEEP FLOOR CLEAN