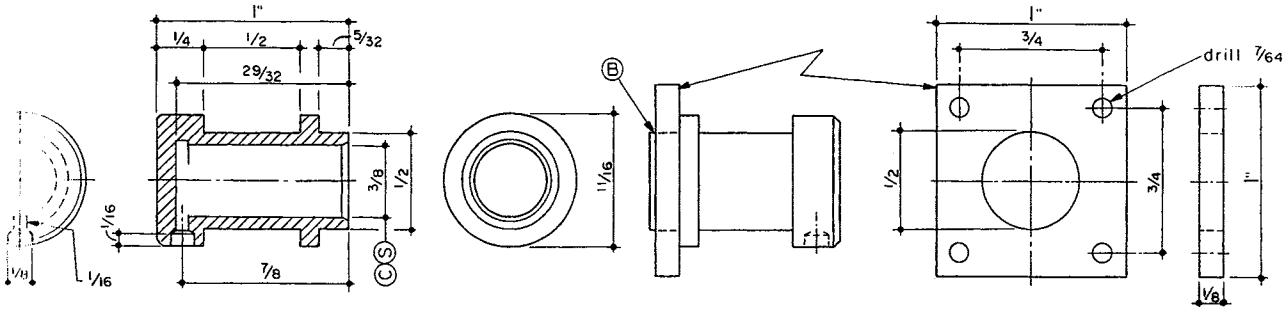
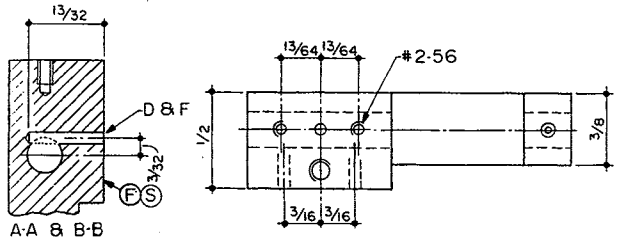
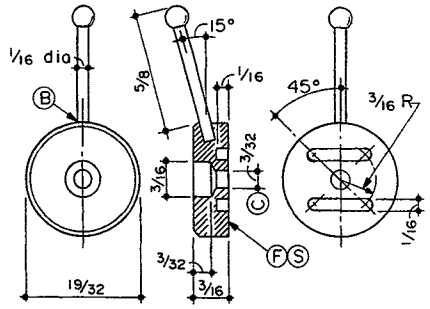


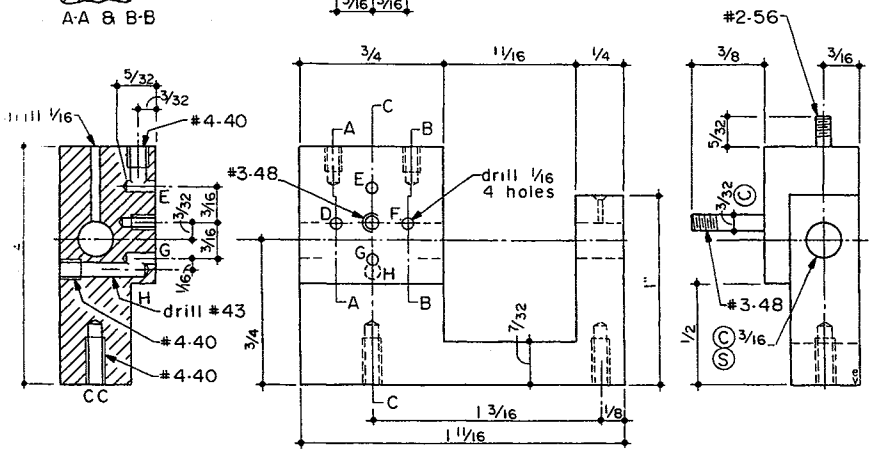
CYLINDER
Brass

CYLINDER SUPPORT
Brass

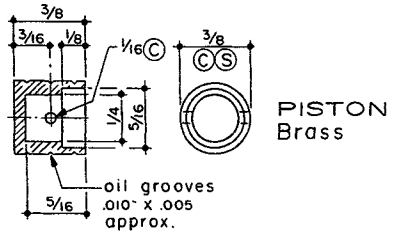




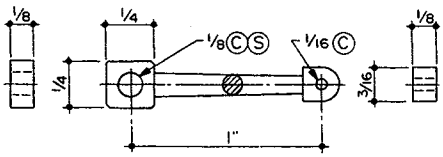
REVERSING VALVE
Brass



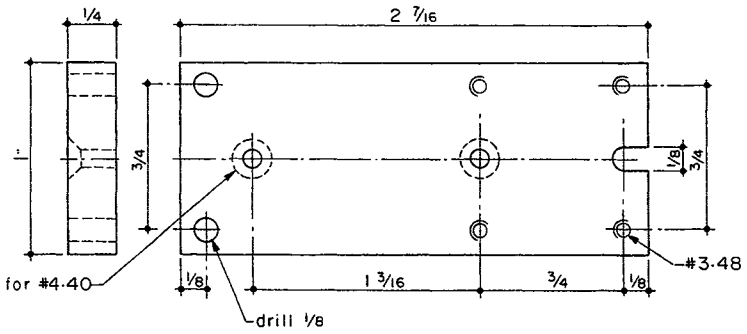
BEARING
Brass



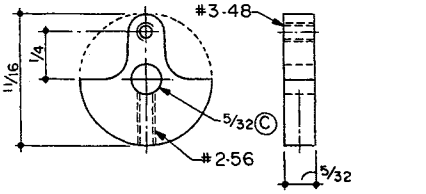
PISTON
Brass

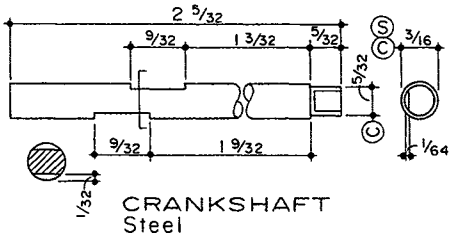


CONNECTING ROD
Brass

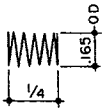


BASE
Any Metal





CRANKSHAFT
Steel



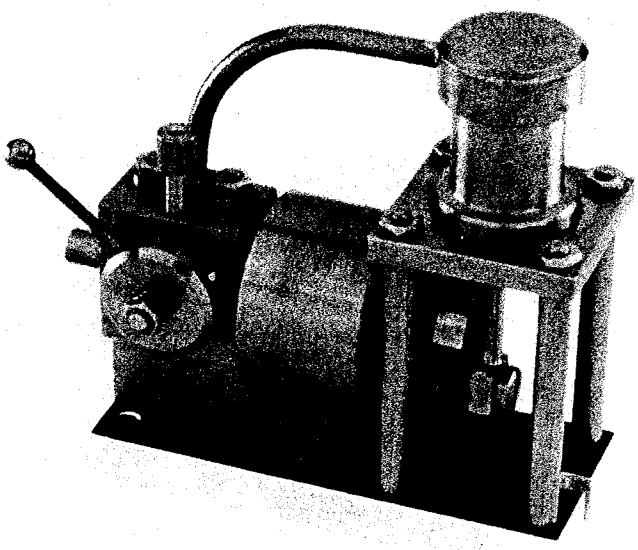
SPRING
Steel
.025" wire
5 coils

CHAPTER

3

A bit more complicated:

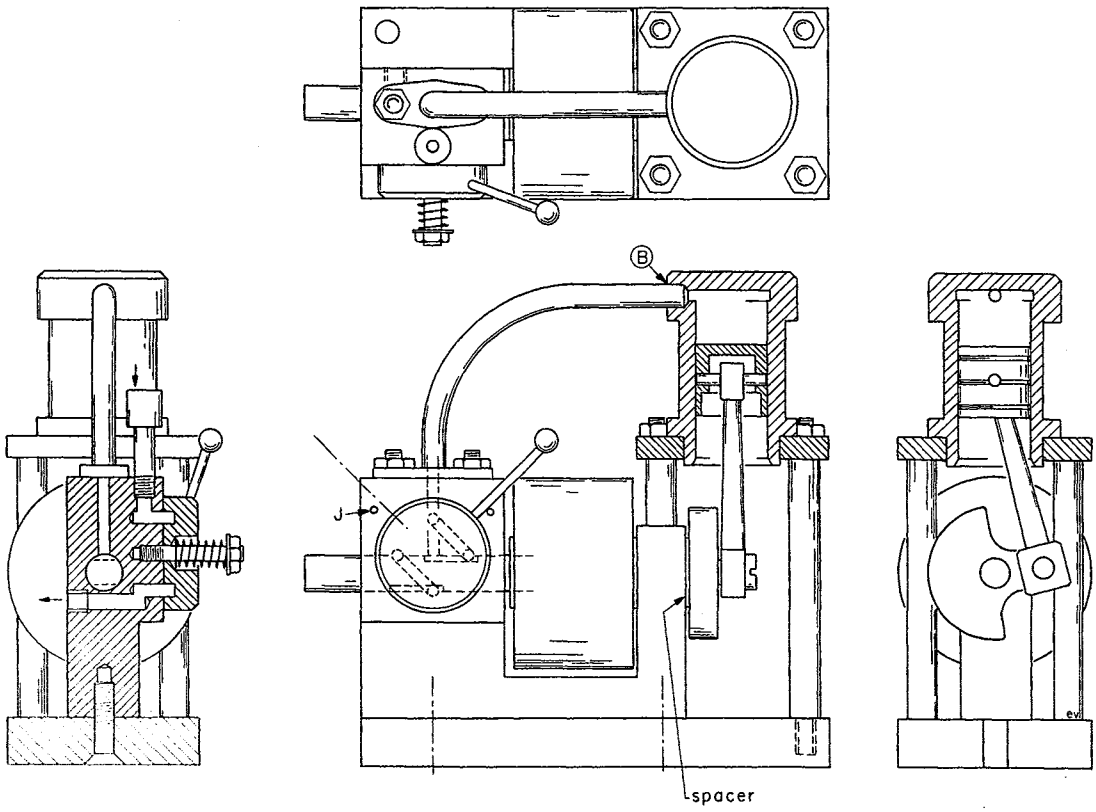
Open Column With Reverse



Perhaps the Open Column With Reverse model is more novel and interesting than practical, although it could power a small boat. It is single-acting and capable of fair speed. It is sensitive in the shaft-valve area which requires close fits to reduce leakage. Any small model using the flats on the shaft as valving will have a bit of leakage along the shaft. Many small models depend on the close fit on the piston and valve rods to avoid making tiny packnuts and stuffing boxes.

The **CYLINDER** and **SUPPORT** are straight turning and machining operations. After soldering, use the square Support to locate the tubing hole.

The **BEARING** is made from an accurate 3/8" x 1-1/4" x 1-11/16" block and the 1/8" x 3/4" x 3/4" projection soldered on to provide the thickness rquired for the porting and Valve. When cutting the 11/16" gap,



OPEN COLUMN WITH REVERSE

tensions may be released, causing the **U** shape to spread apart. Check and, if necessary, use the vise as a press and bend it back to a square condition. Lay out and ream the Shaft hole. Complete laying out all the remaining holes.

Drill and tap all the threaded holes except the Exhaust hole. Insert a close-fitting 3/16" rod in the Shaft hole and drill the deep Port holes **D** and **F** that break into the Shaft opening. Drill the shallower holes **E** and **G** for Intake and Discharge. Drill the Discharge hole **H** until it makes a good cut into the 1/16" hole **G**. Clean this out with a tiny round file for a good exhaust passage. On this piece, the Shaft must be a close fit in the Bearing to keep leakage to a minimum. It is advisable to start out with a slightly tight fit and run it until free.

Make the **VALVE** of brass. There isn't much more than straight turning involved. The two slots should match the four Valve holes in the Bearing. At assembly, insert a 1/16" diameter free-fitting pin in the **E** hole with about 1/32" to 3/64" projecting to enter the Valve. Place the Valve over the stud and this 1/16" pin and spot the two pins **J** to limit the Valve travel.

The **PISTON** is simple and straight machining. The **CONNECTING ROD** is turned from 1/8" x 1/4" stock. The **WRIST PIN** should be a smooth piece of drill rod about .010" less in length than the Piston diameter. Two carefully-placed prick pin marks will keep the Pin in place. Use an oil stone to remove any metal that has raised above the Piston O.D.

The **CRANK SHAFT** is a close fit in the Bearings, as mentioned above. To keep the flats centered in the Bearing, a fibre spacer is used. The thickness will run about .020" to .025".

The **CRANK DISK** is a simple carving of steel. The set screw is used to anchor this because of the importance of centering the throw midway between the flats. It allows you to adjust so timing can be made equal for both directions of rotation.

The **PIPING** is a solder job and must be fitted at final assembly.

It is not a self-starter. You will have to give it a start if it stopped on dead center the last time it ran. This, however, is a fair-running engine after it is broken in.