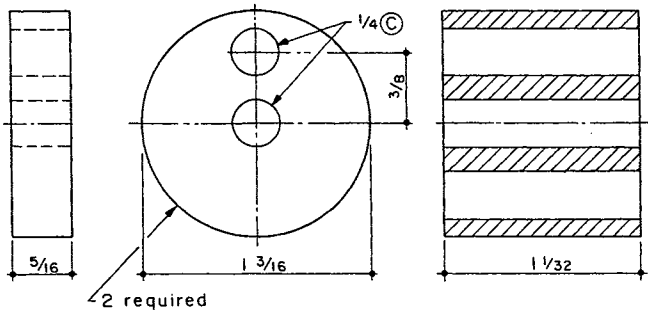
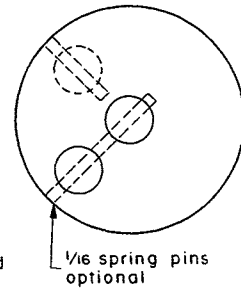
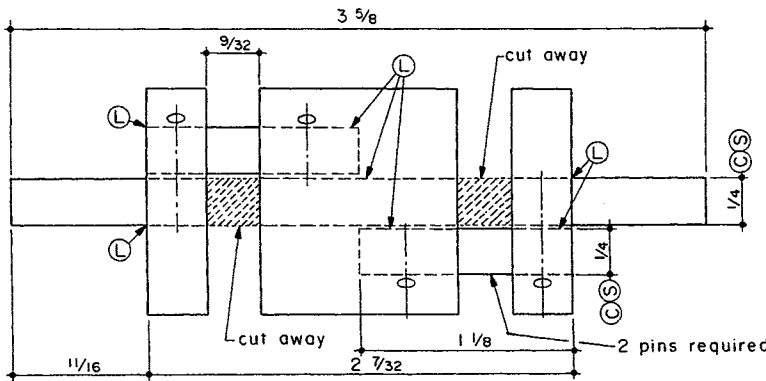
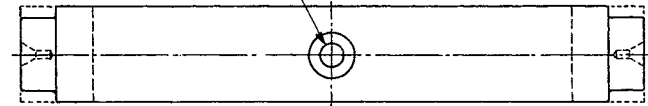
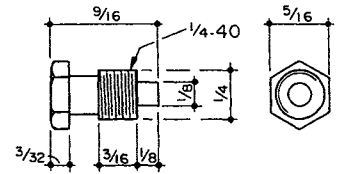


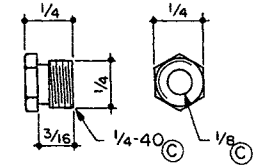
CYLINDER RETAINER
Aluminum



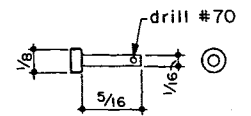
CRANKSHAFT
Steel



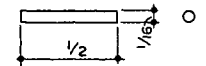
SCREW
Brass
2 Required



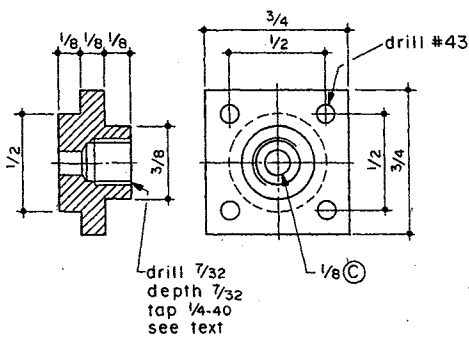
PACKNUT
Brass
2 Required



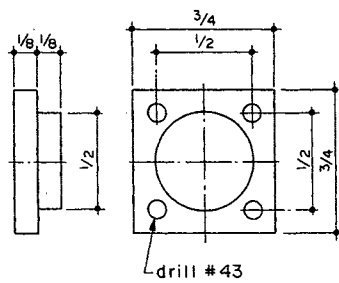
PIN
Brass



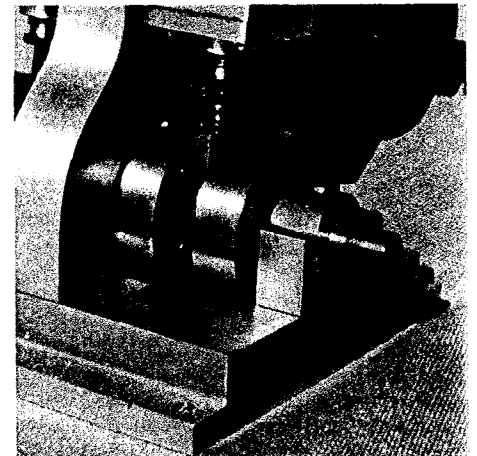
PIN
Brass



HEAD
Brass
2 Required



HEAD
Brass or Aluminum
2 Required



52 Reversible Vertical Twin Wobbler

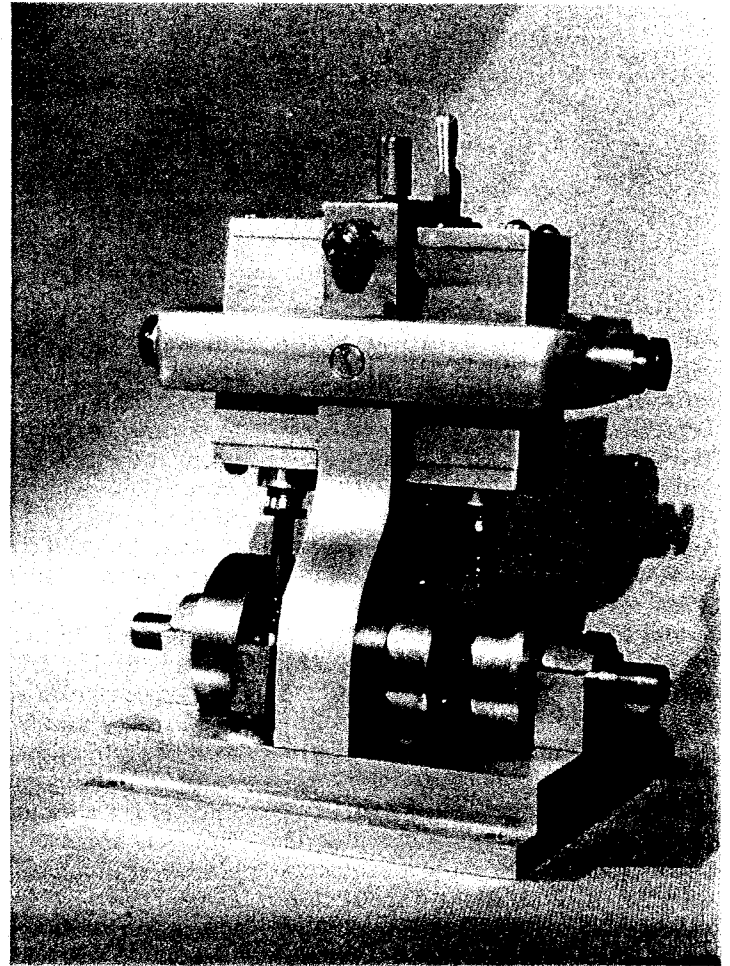
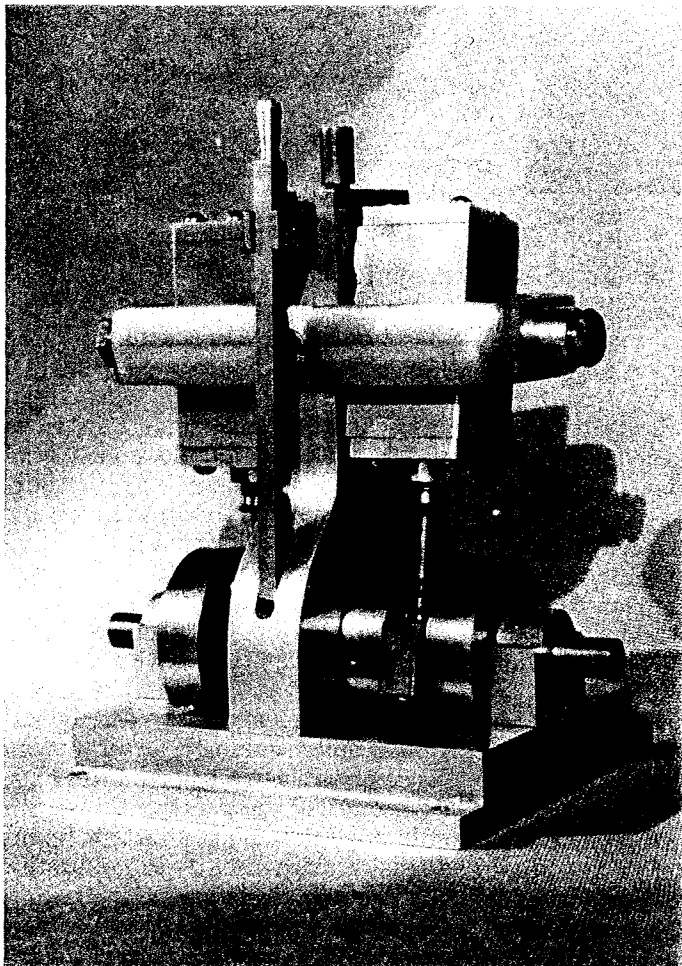
This could be a good engine for a boat. Efforts were made to keep it compact and light weight. Experienced boat builders will have to tell us if it is suitable. It is a combination of ideas from other engines. The Wobble Cylinders are common practice but with a different type of Spring pressure to hold them against the Valve surface. The Crankshaft serves as a Flywheel. The Column requires some careful layout and machining. Several steam passages are drilled and finally the ends plugged in order to get the ports in the proper location. The Reversing Valve is cylindrical and close fitting without Stuffing Box. There is no control for the exhaust. The Cylinders are double acting and the engine is self-starting.

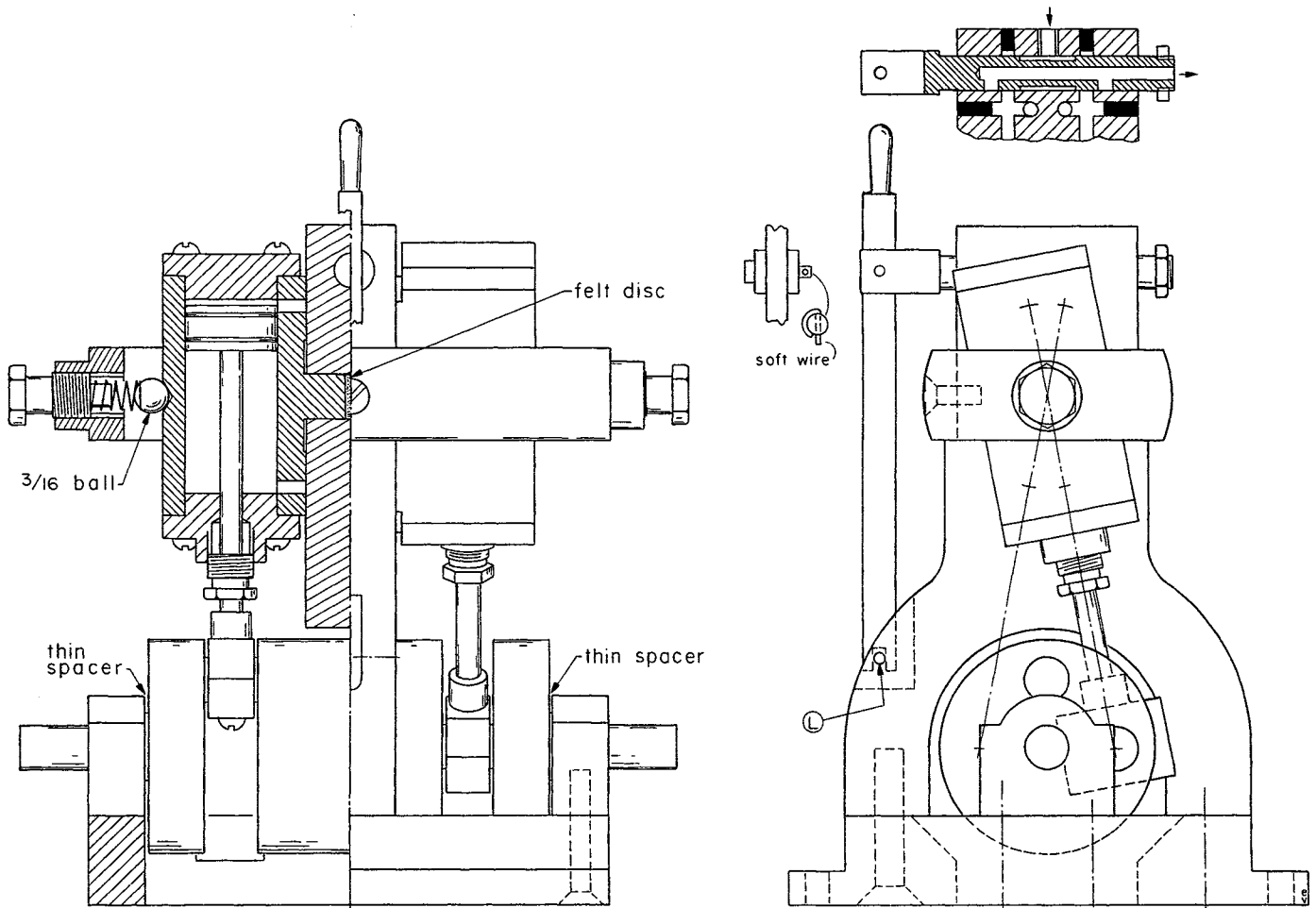
The **BASE** is simple and no extra

remarks are needed. As usual, on these engines, you can use your own ideas such as rounding some corners and cutting away the flange between the anchor holes forming four rounded lugs.

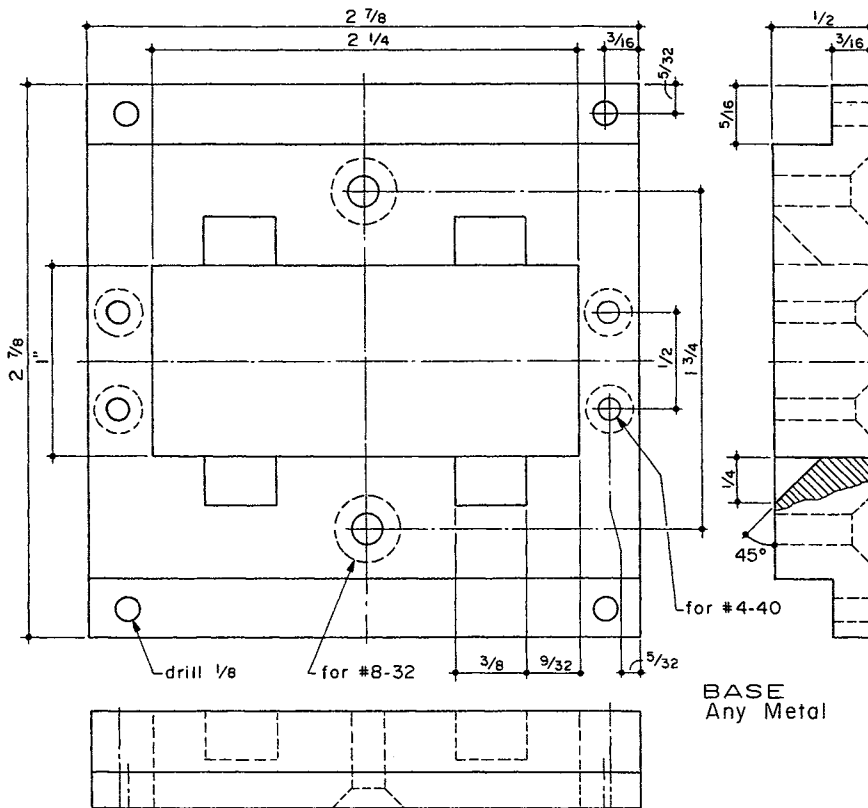
The **COLUMN** is about the most complicated part. Start out with an accurate 1/2" x 2-1/4" x 3-5/8" block. Lay out all the outlines and hole centers except the steam ports and oil hole. Bore and ream the two 1/4" holes. If the engine is to get some hard usage, the Pivot hole may be bushed. Make the drill jig. The jig is placed over the Pivot Pin and against the Pin at the Crank center. Drill the four holes **P** using the jig. Cut to the outline on two surfaces **Q**. Leave the lower end solid for now. Transfer the port hole centerline around to the

sides and drill four holes **S**. Transfer the centerlines of the **S** holes up over the top and drill two holes **T**. Drill two holes **U** for the retainer. Do not break through into the steam passage. This will require a bottoming tap. Make the 3/16" Valve bore **W** close fitting and smooth. Drill and tap 1/8" steam connection at **V**. Chuck in the 4-jaw and bore the 1-5/16" hole at **X**. Complete milling to shape at **Y**. Next, tap the 8-32 mounting holes. Mill the Lever pivot slot and drill 1/16" at **Z**. Drill 1/16" oil hole at 20°, both ways off horizontal and vertical as shown in special view "lubrication". Avoid breaking into a steam passage. A close plug in the 1/4" bore will prevent drill breakage. Blow all chips and dirt out of steam passages and plug as shown, either press fit or Loctite.





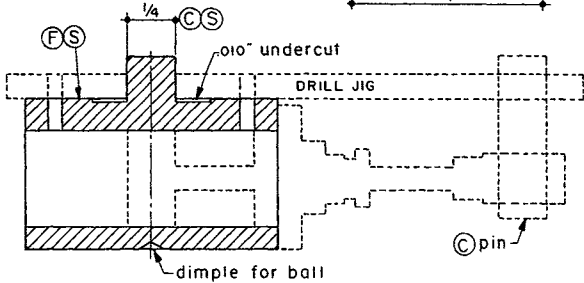
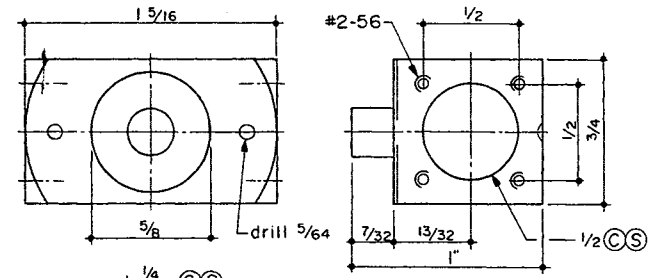
RVTW
REVERSIBLE VERTICAL TWIN WOBLER



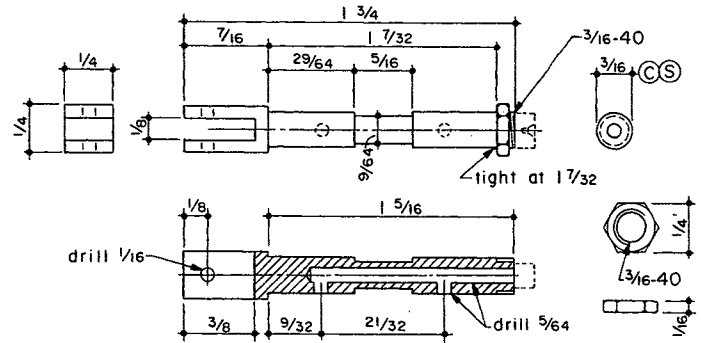
Punch out a 1/4" diameter **DISK** from 1/16" felt for the lubrication at the Pivots. It will slowly feed the oil to the Pivots.

The **BEARINGS** need no explanation except bushings may be added if this engine may get some hard usage.

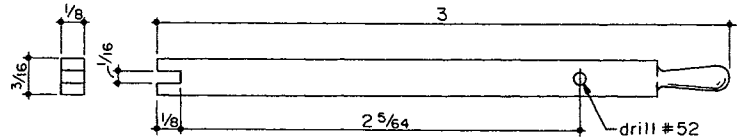
The **CYLINDER RETAINER** is perhaps more fussy than need be, though it adds a bit to the appearance, and is a dandy little exercise in turning. The drawing tells the story pretty well. First, on a 1/2" x 1-3/8" x 3-1/4" block, lay out all the outlines and centers. Drill the four 1/4" holes for the 1" x 2-1/2" center opening. Saw and file to shape. Drill lathe center holes in each end. Drill #32 the center holes in the side. Counter-sink later. Turn one end. Reverse and turn the second end. The diameter across 1-3/8" is simple, but making the rounded corners is not so easy. The one shown was roughed out with



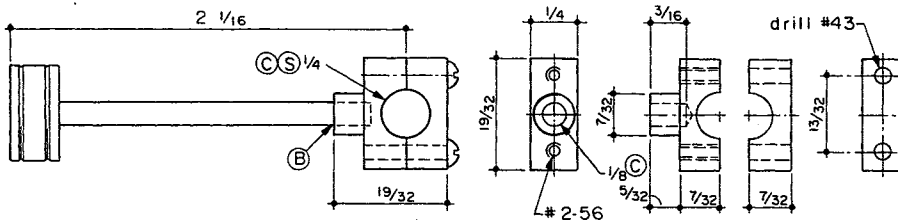
CYLINDER
Brass
2 Required



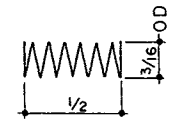
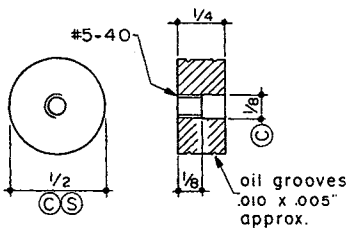
VALVE
Brass



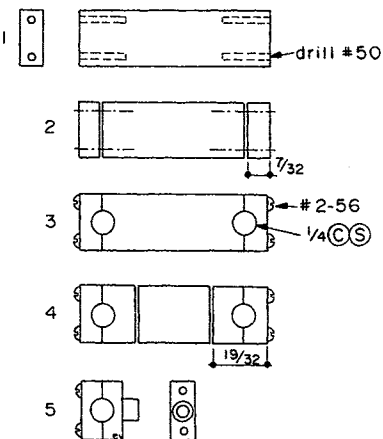
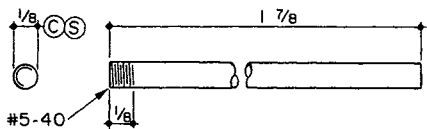
LEVER
Any Metal



PISTON AND ROD
Brass
2 Required



SPRING
Steel
Wire dia. .025"
2 Required



Nut. When making the **PACK NUT**, open the die a wee bit to make a close fit at the 1/4-40 thread. The reason being that, since there are no guides, the Piston, Head and Pack Nut must take all the forces that keep rocking the Cylinder.

The **PISTON AND ROD** are pretty well covered by the drawings. Try for good concentricity at the Piston and Rod. A five-step layout shows how the Bearing ends of the Rod were made. After assembly, the 1/4" holes were centered on the joint. Next, the 19/32" assemblies cut off the ends are chucked in the 4-jaw and the hub turned and bored 1/8".

Make the 3/16-40 **NUT** for the Valve.

The **REVERSING VALVE** calls for some close fitting and spacing. Center some 1/4" stock in the lathe chuck with about 2-1/4" projecting. Make a small center hole and bring up the tailstock for support and turn the 3/16" diameter to the closest free fit in the Column that you can make. Make

the 5/16" x 9/64" neck very close to dimension. Now, turn the 3/16" diameter down to about 11/64" at the end, 1-5/16" from the shoulder. Then mount the 3/16-40 die in the tailstock and thread it so the Nut runs tight at 1-7/32". This may take several "cut-and-tries". Drill 5/64" steam passage. Trim off the stub end at the 1-5/16" dimension and carefully lay out and drill the two 5/64" holes at 9/32" and 21/32". Cut off at 1-3/4" and make the 1/8" slot parallel to the two 5/64" holes you just made and make the 1/16" pin hole.

The **SPRINGS** used had the dimensions shown. Try some from your collection. You will get a feel for the drag and know when the tension is right. A hard steel ball coated with grease will serve well under the Springs.

Make sure that everything runs free and is well lubricated, and try on 10 psi air. The model shown ran on only a few pounds, just barely turning over and reversing easily.