CHAPTER

47 Model Boat Engine

Howard Green of Kerrville, Texas, sent a copy of an article about making a low-profile steam engine for a model boat. It was considerably more complicated than the engine described here. Only the general horizontal compact part of the design is used. Here is a double-acting wobbler with 7/16" bore and 5/8" stroke.

This writer does not claim any great knowledge of boat design and has tried to make a low center of gravity, compact and not too heavy engine which seems to be called for in powering a small boat. This engine, however, takes up more "floor space" than a vertical engine. Experts on small power boat models may find ways of improving on this.

To achieve the low profile, it was necessary to use miter Gears to get the output Shaft in a usable position. These Gears are purchased and not too expensive. This is a small engine, probably good for only about a 2'-0" boat. Lubrication is difficult in the Crankshaft and Gear areas. The surest method is to lift the engine out of the boat and free the Cylinder and Flywheel from the Frame and give a good coating of Moly lube before each run. If the boat is to be put through a lot of hard running, this engine may not be durable enough. In any case, it is fun to make and show off.

The **FOOT** is mostly common machining practice. The important point is matching the Frame at the 1" and 11/32" hole spacing for a free-running Crankshaft. Hold the length of the **SPACERS** alike within a few thousandths. This Foot can be made to match any ribs, cross members or timber as long as the three 2-56 holes and 1/8" Shaft holes are held as shown.

The **FRAME** provides a lot of the features needed for a tiny engine such as steam porting, Cylinder pivot, Crankshaft Bearing and Output Shaft Bearing.

On an accurate 3/8" x 7/8" x 3-1/2" piece of stock, lay out all the outlines and hole centers except the steam ports. Note two **X** 5/32" dimensions match the 5/32" dimensions on the Gear drawing. Holding these dimensions will provide the proper meshing of the Gears.

Next, drill and tap the three 2-56 holes, then drill and ream the two vertical 1/8" Shaft holes and counterdrill for the Spring.

Mount in the 4-jaw and center on, drill and ream 1/8" for the Output Shaft. All of these operations are done while the piece is rectangular. Turn the 1/4" hub.

Make the **DRILL JIG**. Mount the Jig over a close-fitting pin in the Cylinder pivot hole and hold against another close-fitting pin in the Crankshaft hole as shown while drilling the two 1/16" port holes. Turn the Jig over and do the same for the other two holes.

Transfer the centers of these port holes around onto the sides and make the 1/16" cross holes.. Pick up these centers and transfer to the end. Drill 1/16" and tap 5-40 for the Steam Connections. Cut to the outline and make the 5/8" opening for the Gear and mill or shape the Gear end of the Base down to the 5/16" dimension, concentrating on the **X** 5/32" dimensions. Clean out all the chips and plug the 1/16" cross holes as shown. Perhaps you will have a different sequence for these operations.

For the **CYLINDER**, make an accurate 5/8" x 23/32" x 1-1/8" block and lay out all the centers. Chuck in the 4-jaw and make the 7/16" bore. Use the Heads as jigs for spotting the bolt holes. Again, mount in the 4-jaw and make a fine skin cut to true-up the Valve face. Make the .010" undercut and squarely drill and tap for the **PIVOT**. Assemble the Cylinder, inboard head and Piston assembly as shown and drill the 1/16" ports using the Drill Jig.

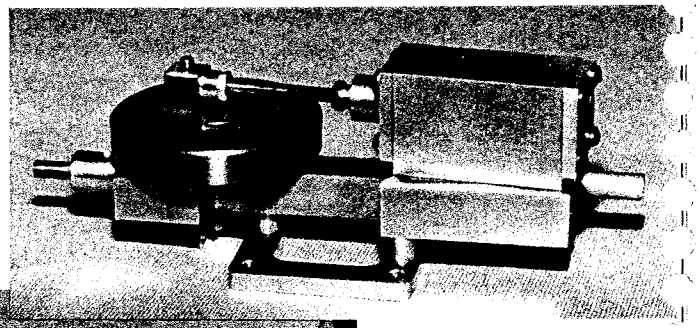
The **MITER GEARS** are purchased and have to be bushed for a close fit on the 1/8" hafting. One is fitted with a set screw for the Output Shaft. The other is fitted into the Flywheel and set with Loctite. The Crankshaft is then set into the Gear with Loctite. Both of these Shafts have flats for the set screws so there will be no problem disassembling.

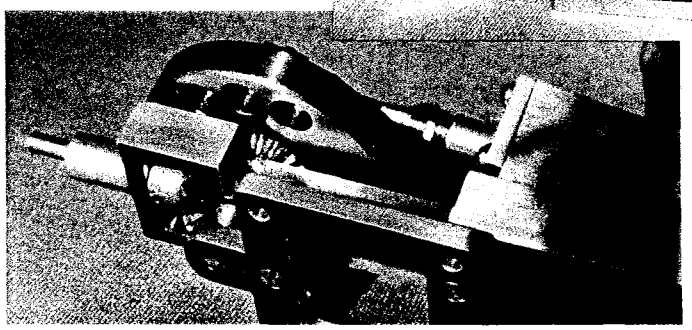
At moderate speeds with the engine well anchored, vibration was not too bad. There is a spot where you will have to cut and try in reducing vibration.

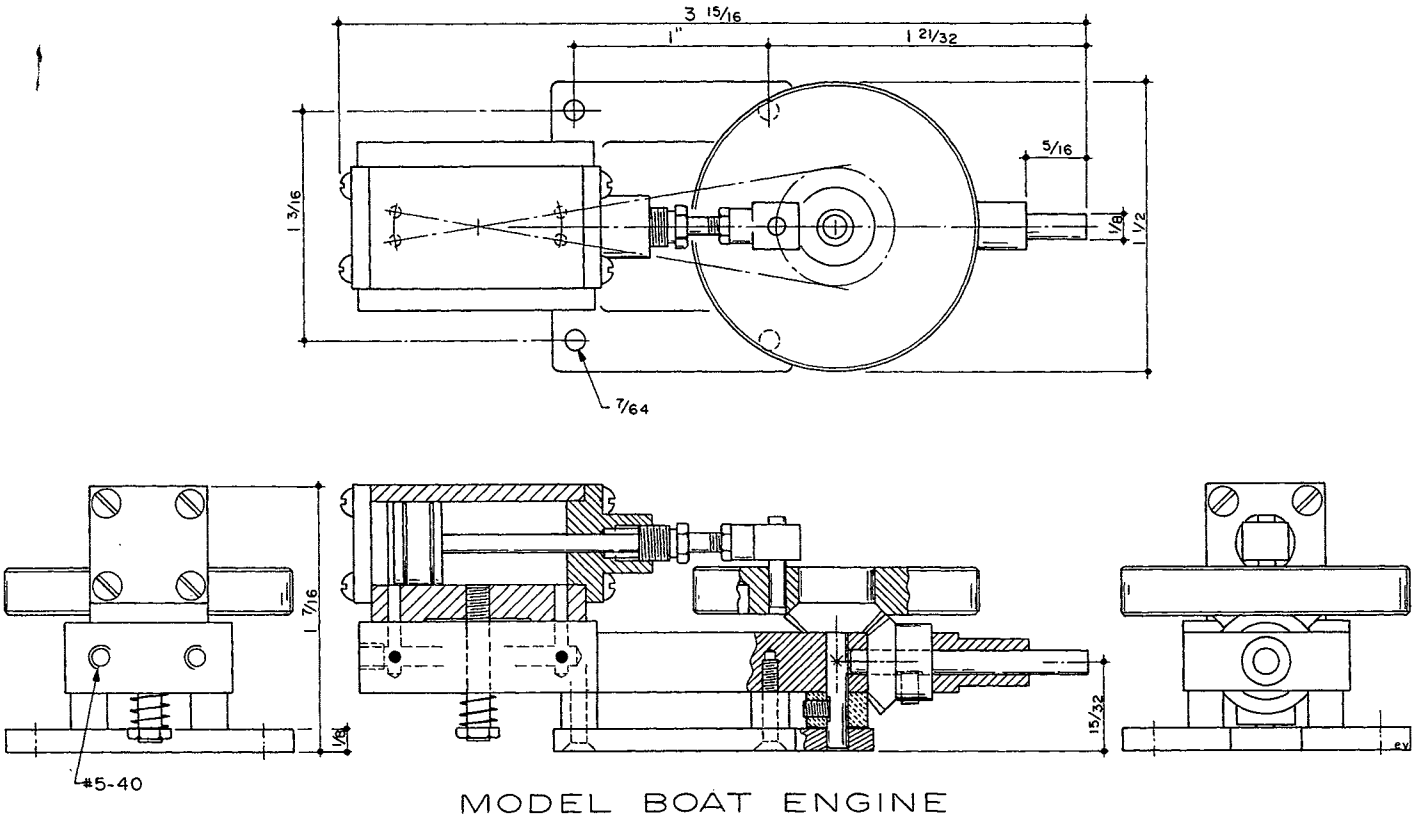
The dimensions of the **SPRING** used on the model are shown. Try some from your collection.

Removing the nut at the Spring frees the Cylinder and it can be easily lifted off. Loosening the **COLLAR** set screw, the Flywheel assembly can be lifted off for cleaning and lubrication. If it does not rotate in the right direction, use the other port as intake. Use your favorite packing.

This engine ran good on 5 to 10 psi air.

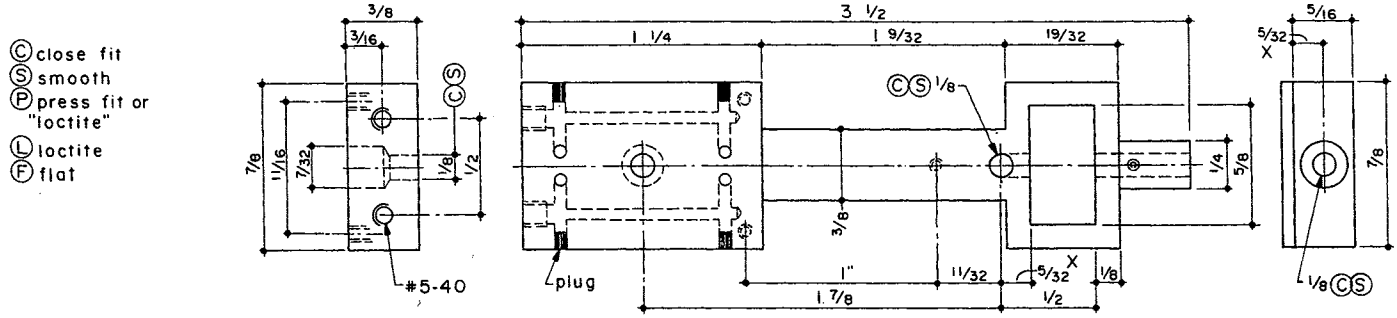


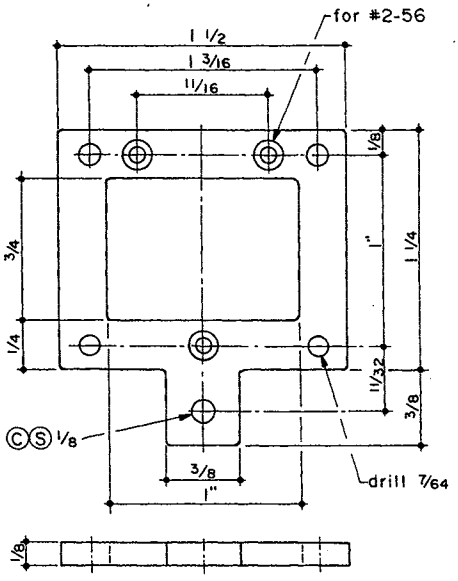




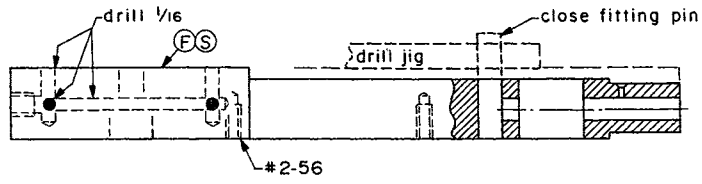
MODEL BOAT ENGINE

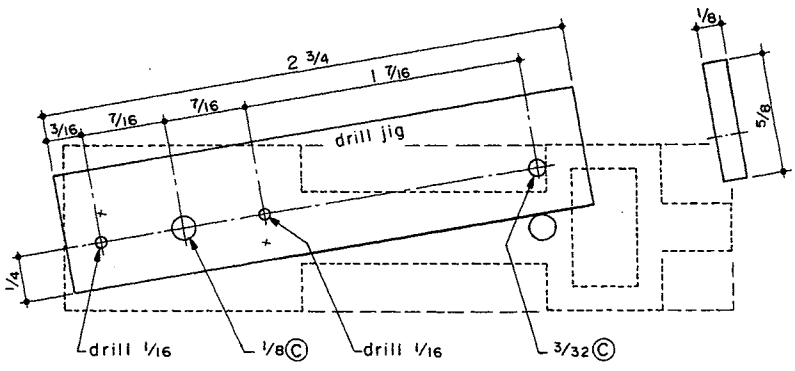
Ⓒ close fit
Ⓢ smooth
Ⓟ press fit or "loctite"
Ⓛ loctite
Ⓕ flat



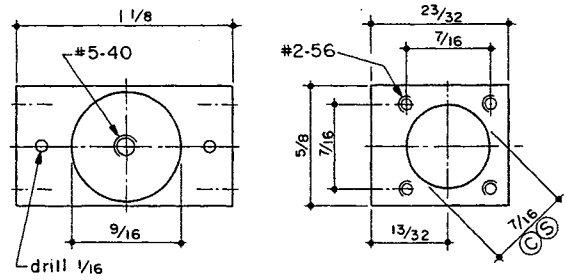


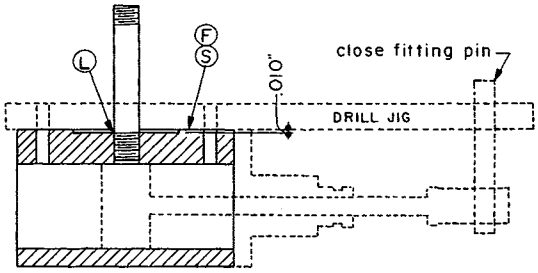
FOOT
Aluminum



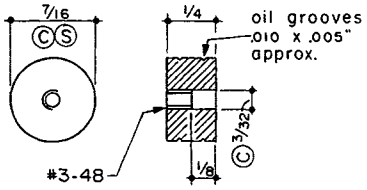


FRAME
Hard Aluminum

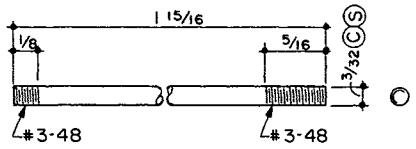




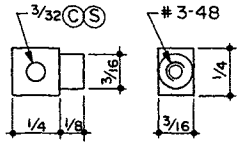
CYLINDER
Hard Aluminum or Brass



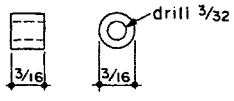
PISTON
Brass



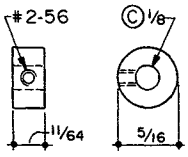
PISTON ROD
Brass



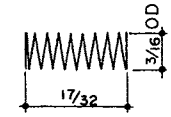
BEARING
Brass



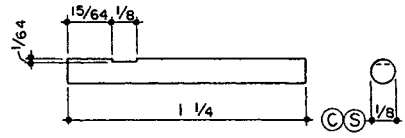
SPACER
Aluminum



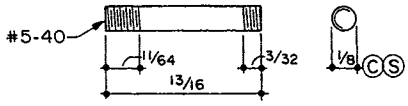
COLLAR
Brass



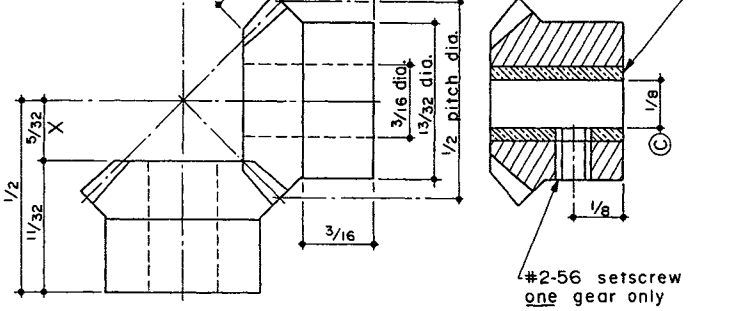
SPRING
Steel
.028" wire



SHAFT
Steel

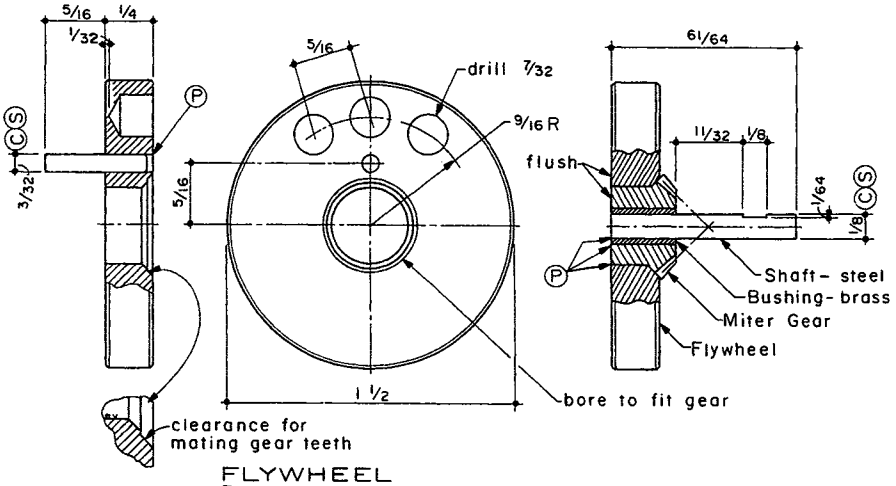


PIVOT
Steel

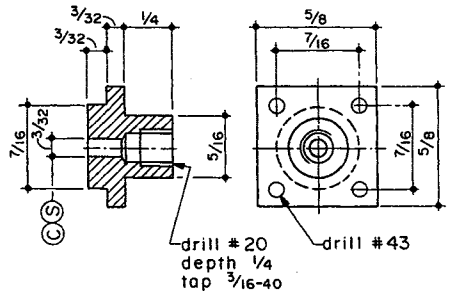


GEARING

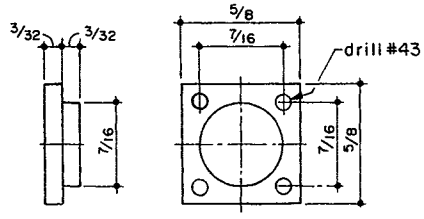
PURCHASE:
one set of miter gears-
brass
20° pressure angle
32 pitch
ratio 1:1
16 teeth
Boston Gear: catalog no. G462Y
item code 12114



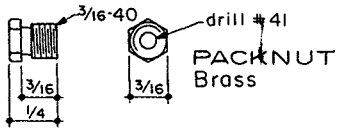
FLYWHEEL
Brass



HEAD
Aluminum or Brass



HEAD
Aluminum or Brass



PACKNUT
Brass