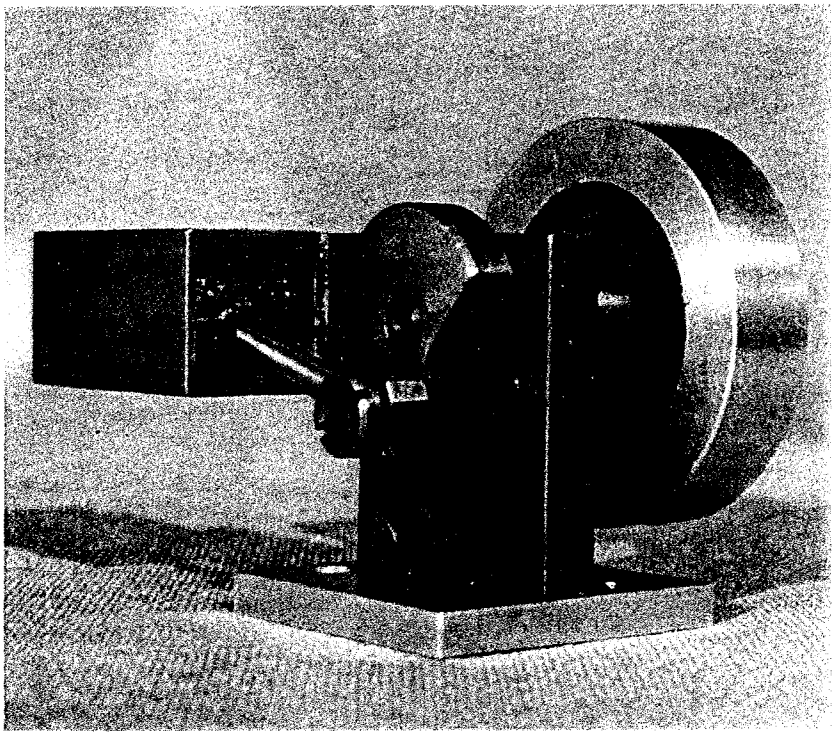
CHAPTER

7 Square



This is a novelty engine. The "Cylinder" is 1/2" square brass tubing soldered to a brass frame. The Piston is a round brass tube placed crossways to take the oscillating motion from the Crank. You might say it is a round Piston in a square "Cylinder". The rest of the material is optional. The model as shown has a 1-1/4" aluminum flywheel but it would perform better with the weight of one made of steel.

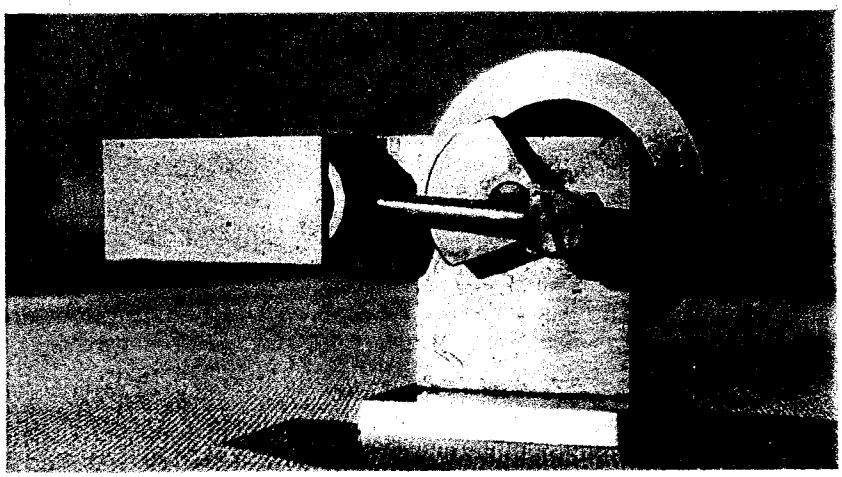
For the **CYLINDER**, select a straight and square piece of 1/2" brass tubing and cut a 15/16" length. This tubing is listed in Cole's Power Models' catalog. Use 1145° silver solder to hold the 1/16" end plate, and then lay out and drill the 1/16" steam passage.

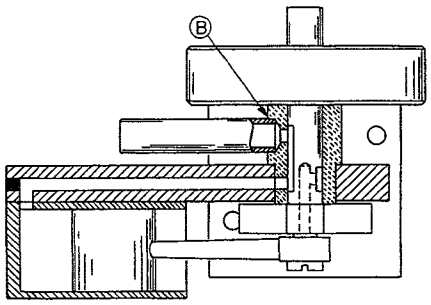
Make the **FRAME** of 3/16" brass complete as shown, except do not plug the 1/16" hole. File a piece of 1/16" aluminum wire to a free fit in the Cylinder and Frame holes. Bend it at a right angle about 1/4" from the end. Brighten the surfaces and apply flux to both the Cylinder and Frame. Melt 430° silver solder over the entire face of the Cylinder leaving only a thin coat. Insert the aluminum wire into the Cylinder with the bent end entering the steam passage and on into the Frame. Hold in position and apply heat with a torch, mostly to the Frame, until the solder melts and flows all around and the parts are tight together. Do not disturb this while cooling. The solder will not stick to the aluminum wire.

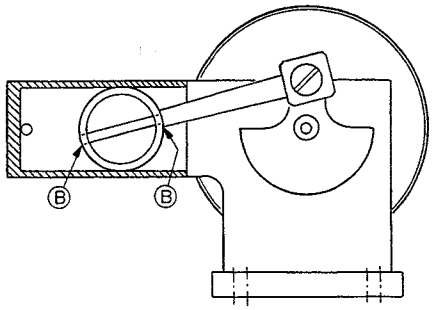
The **BEARING** is brass or bronze. Drill and counterdrill for the 3/4" piece of 3/16" tubing and solder. Set the Bearing in the Frame with Loctite. After curing, drill the steam passage and plug as shown. The plug can be a piece of brazing rod filed to enter about 1/16", set with Loctite, cured and dressed flush.

There is nothing special about the **PISTON** except the careful cut-and-try until the Piston is a close free fit in the Cylinder.

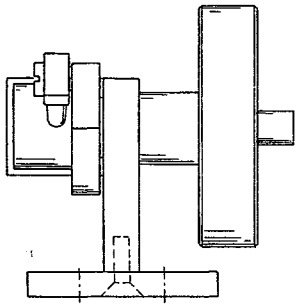
For the **ROD**, centerpunch the end of a 1/8" x 1/4" brass bar in the center of the end. Center in the 4-jaw with about 1/4" projecting, using a center test indicator. Drill a tiny center hole, using a 3/64" center drill. Loosen two adjacent jaws and extend the stock about 1-3/4". Hold the stock against the tailstock center and tighten those two jaws. The turning can now be completed. Start back far enough to be able to cut away the tailcenter hole. The taper is at about







SQUARE



1-1/4° off the lathe centerline. Bore the 1/8" crank pin hole and solder into the Piston making sure the Crankpin hole is parallel with the axis of the Piston. Make the shoulder screw of steel.

Make the **CRANKSHAFT** as shown. The important thing here is the accurate location and depth of the Valve flats, 180° apart, and the throw of the Crank set midway between the flats as shown in the assembly view. The Piston is halfway in its stroke and taking full steam.

The **FOOT** needs no mention.

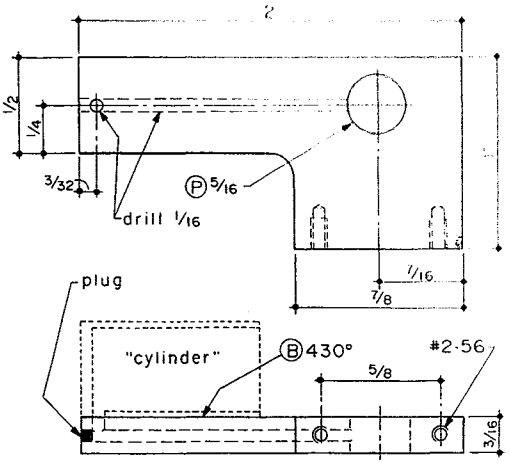
The **FLYWHEEL** is 1-1/4" diameter x 5/16" wide. The pressure of the setscrew is transmitted to the Shaft by a free-fitting pin in the tap-drill hole.

Assemble, lubricate and give it a trial run on 5 to 10 pounds of air.

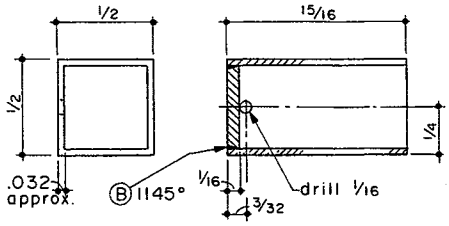
SAFETY FIRST

DO NOT USE

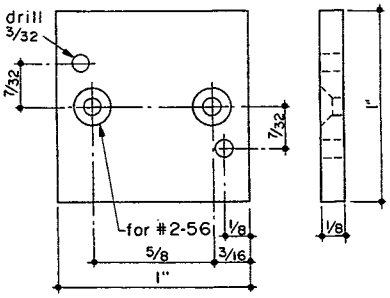
DULL TOOLS



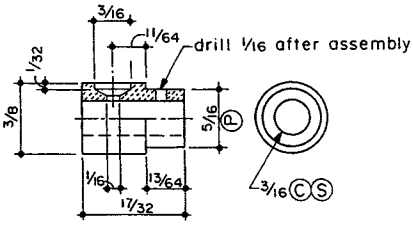
FRAME
Brass



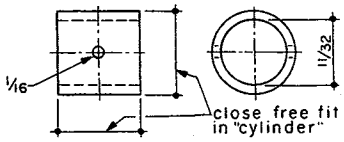
"CYLINDER"
Brass



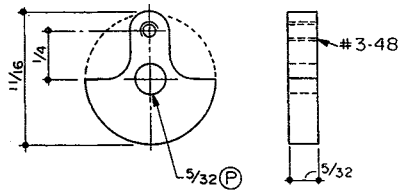
FOOT
Aluminum

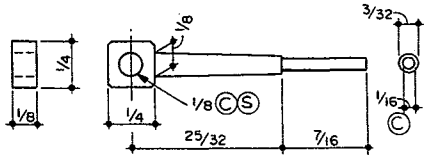


BEARING
Brass

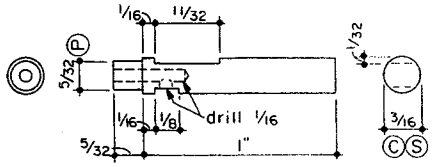


PISTON
Brass

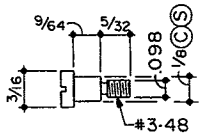




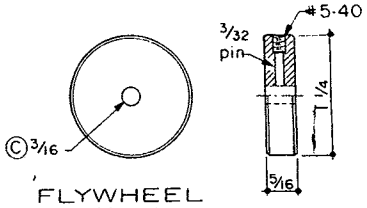
CONNECTING ROD
Brass



CRANKSHAFT
Steel



SCREW
Steel



FLYWHEEL
Any Metal