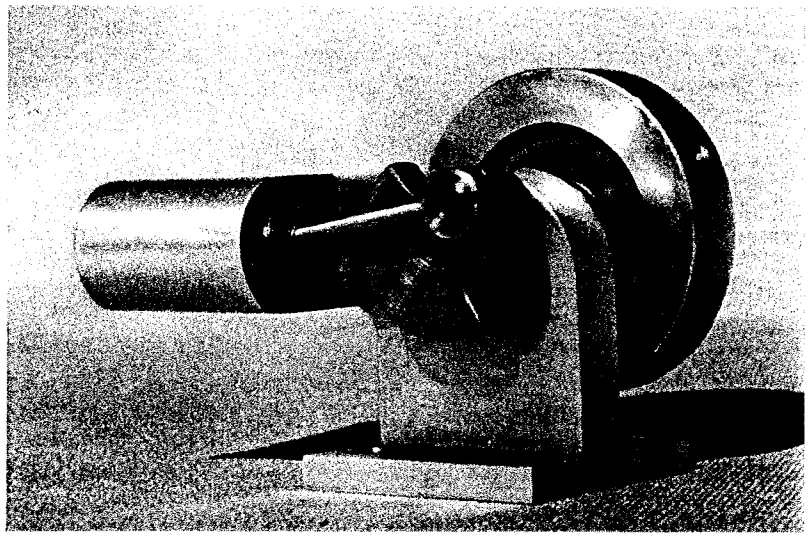
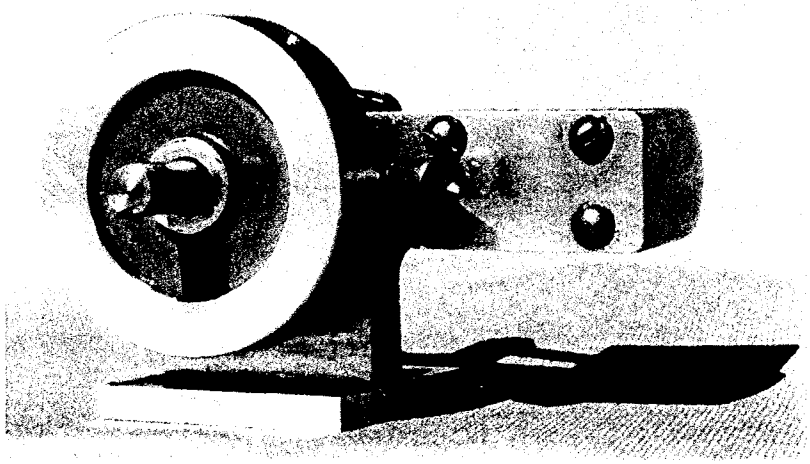
CHAPTER

16 Baldy





Baldy is a novelty engine which, at first glance, appears to be a piston-crank type of construction. The Piston is a ball, so no Wristpin is needed. The large parts are all aluminum on the model shown, though they can be steel or brass. The Ball, Connecting Rod, Bearing and Steam Connection are brass. The Crankshaft and Screw are steel.

Start the **FRAME** with a finished 1/4" x 1" x 1-15/16" piece of metal. Apply layout dye and lay out all the hole centers. Machine all of the holes, but do not plug the 1/16" hole until a drill has been run through the Bearing later.

Make the **BEARING** and **STEAM CONNECTION**. This Connection is for 3/16" plastic tubing but you may have other ideas for this, depending on how you will eventually drive and use this engine. Drill and turn the 3/16" stock and remove it from the chuck. Enter the end into a 1/8" hole in some scrap stock held in a vise and apply heat with a torch. When it's almost red hot, slowly bend to the required shape. Cut it to length and remove all burrs. Solder the Steam Connection to the Bearing and set the Bearing in the Frame with Loctite. Drill the steam passage through the Bearing and plug the hole in the Frame using a press fit or Loctite.

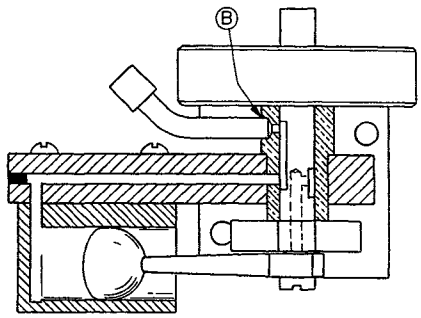
For the **CYLINDER,** start with a piece 1/2" x 9/16" x 13/16" and lay out the centers for the 3/8" bore, four screw holes and the 1/16" port hole and prick punch. These holes must match the holes in the Frame. Center in the 4-jaw using a center test indicator and make the 3/8" bore. Square up the bottom with a boring bar. On the last pass before reaming, make a light undercut for reamer runout so that you do not leave a shoulder for the Piston to strike. Do not break into the bore when drilling and tapping the four screw holes. A bottoming tap is required.

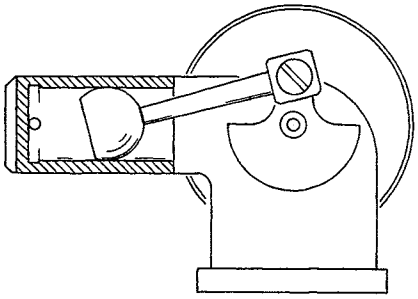
Make the **CRANKSHAFT** as shown. The important thing here is the accurate location and depth of the Valve flats 180° apart and the throw of the Crank set midway between the flats as shown in the assembly view. The Piston is halfway in its stroke and getting full steam. Attach the Crank Disk to the Shaft with a press fit or Loctite.

The **FOOT** and **SHOULDER SCREW** need no explanation. The thread on the screw is best made using a tailstock die holder.

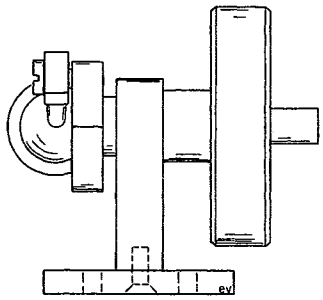
A 3/8" diameter ball is the **PISTON** for this engine. The one shown was made with a small ball-turning fixture on a lathe. Cole's Power Models lists 3/8" stainless steel, bronze and nylon balls in their catalog. A nylon ball seems like a good one to try on a compressed air engine. If you wish to try a free-hand job on a lathe, the method is slow but can produce a fairly accurate ball. First, chuck a piece of steel about 3/64" thick x 3/4" x 3/4" in the 4-jaw and bore out a clean smooth 9/32" hole. Make a light face cut about 1/2" diameter to bring up a sharp clean corner in the hole. This, then, becomes a gauge. The sharp edge of the hole exactly matches the surface of a sphere at any angle the gauge may be held. Chuck a 13/32" or larger bar in the 3-jaw and turn to a diameter of .380". Face the end and make a parting cut 3/8" from the end and about 1/4" wide, leaving a neck diameter of 1/4". Now, start turning the shape of a ball. Take lighter cuts as the ball takes shape. When you can "mike" about .390 in all directions coat the ball with layout dye. Hold the gauge lightly against the ball and rotate the spindle by hand. The sharp edge of the gauge will scrape away the dye on the high spots and show you where to file. Repeat this until you can read .375 in all directions, or you can, at these last passes, use the Cylinder as a gauge until the ball is a close, free fit when oscillated in all directions. The last pass may be only polishing with fine emery. In this case you have the advantage of needing a spherical condition only on a band about 3/16" wide at the center. Drill and tap for the Connecting Rod. Make a final parting cut at 9/32".

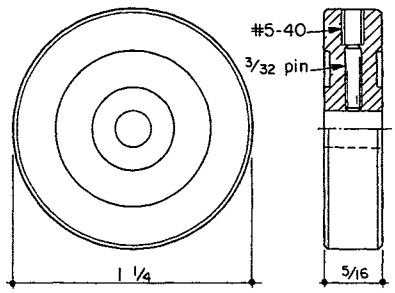
For the **CONNECTING ROD**, lay



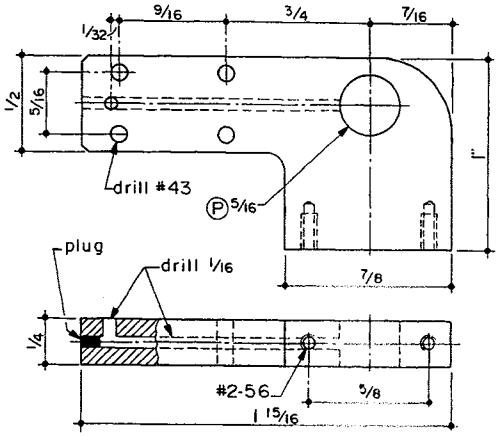


BALDY

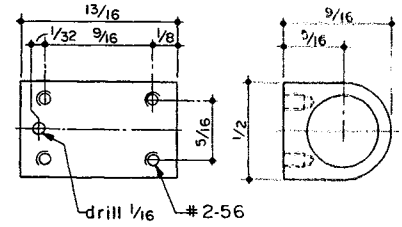


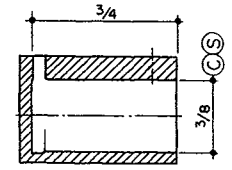


FLYWHEEL
Any Metal

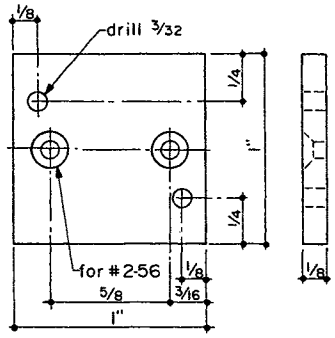


FRAME
Aluminum

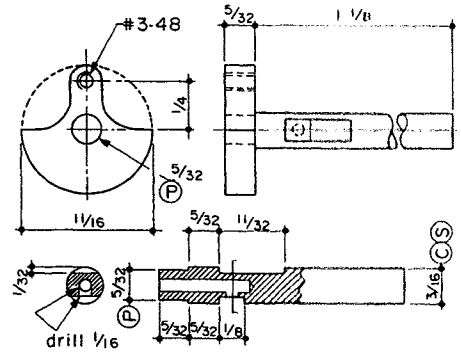




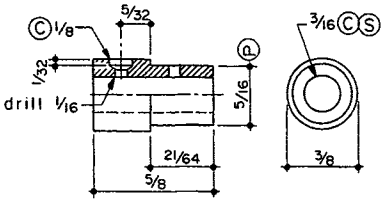
CYLINDER
Aluminum



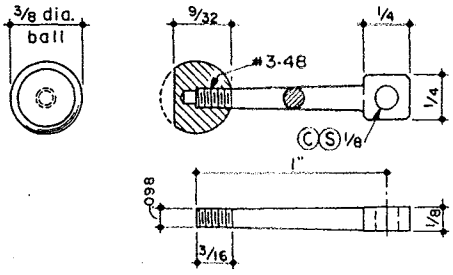
FOOT
Aluminum

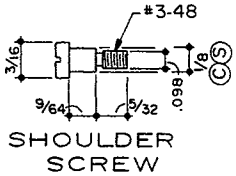


CRANKSHAFT
Steel

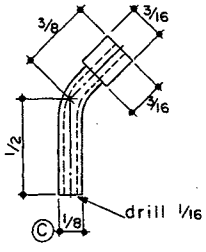


BEARING
Brass

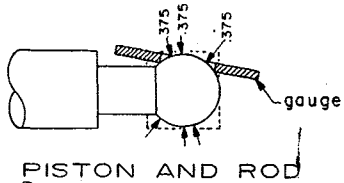




SHOULDER
SCREW
Steel



STEAM
CONNECTION
Brass



PISTON AND ROD
Brass

out and prick punch the center of the end of a 1/8" x 1/4" bar. Chuck in the 4-jaw with about 1/4" projecting from the jaws. Center with a center test indicator and drill a center hole with a tiny 3/64" center drill. Mark two adjacent jaws with chalk. Loosen these two jaws and extend the bar out about 1-1/2" from the jaws. Hold the piece against the tailstock center and tighten the two marked jaws. Turn and thread, keeping in mind enough length to remove the center hole later. Cut to length and ream 1/8" for the Crank screw. If the thread fit is loose, apply Loctite and turn into the ball to the right length and set aside to cure. (This will not work on nylon.)

The **FLYWHEEL** is 1-1/4" diameter x 5/16" wide and fitted with a setscrew. The small taps are not long enough to reach the center, so a free-fitting pin in the tapdrill hole transmits the pressure to the shaft.

Assemble and lubricate *Baldy* and give it a trial run on about 5 to 10 pounds of air. After a few hours of watching *Baldy* perform, you're ready to start on your next project.