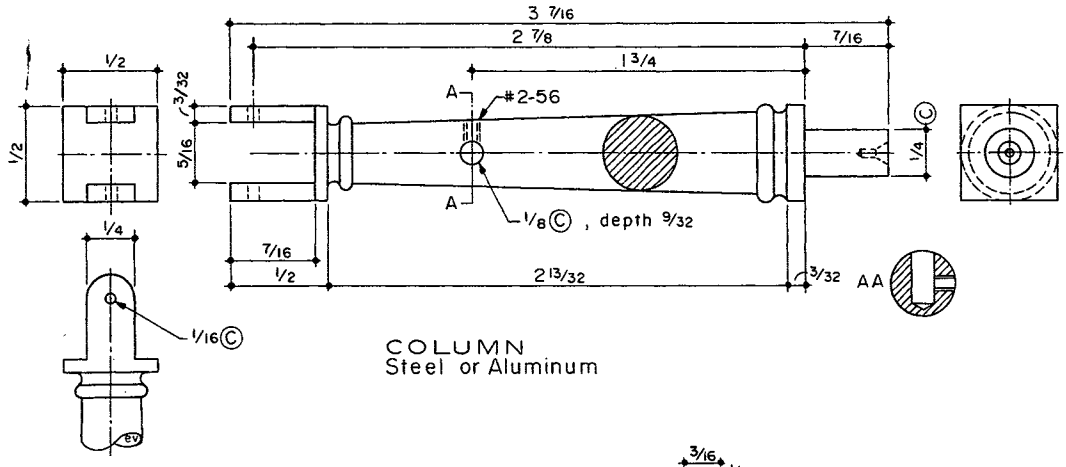
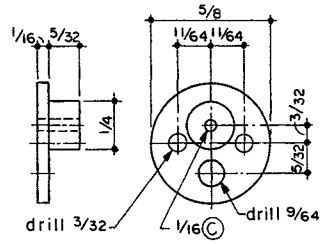
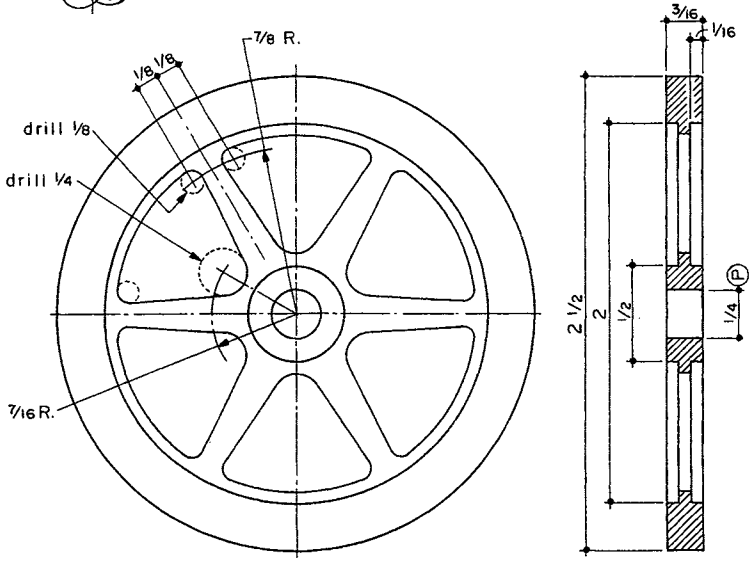


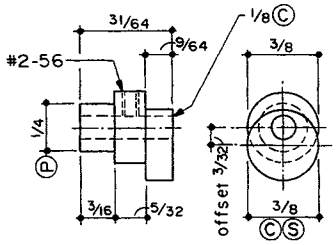
COLUMN
Steel or Aluminum



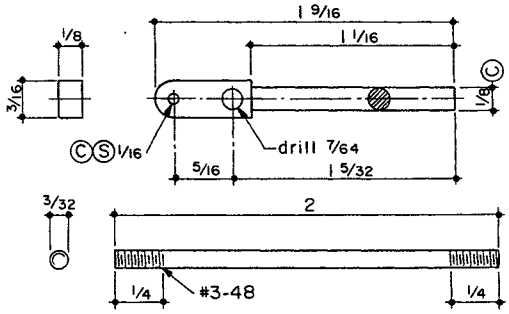
HEAD
Brass



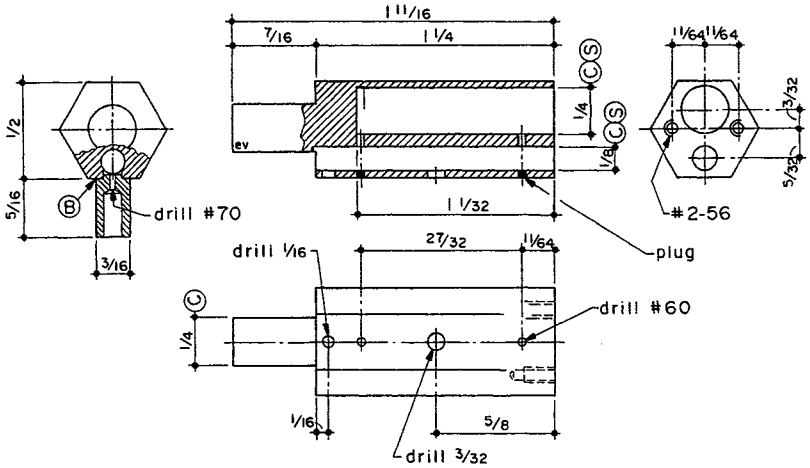
FLYWHEEL
Any Metal



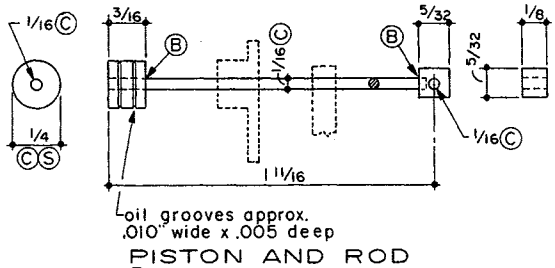
ECCENTRIC HUB
Steel



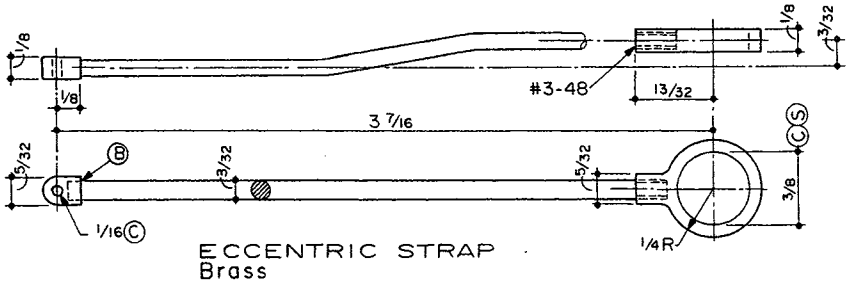
PISTON ROD SUPPORT
Brass



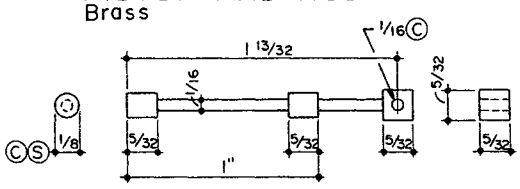
CYLINDER
Brass



PISTON AND ROD
Brass



ECCENTRIC STRAP
Brass



VALVE
Brass

CHAPTER

24 Beam

This miniature Beam Engine has fair proportions and close resemblance to the original engines. It is quite simplified, though, and some parts are a bit tiny.

On the model shown, the Base and Bearing are steel. The Column, Flywheel andBeam are aluminum. The weight of an iron Flywheel would make it run better. The Column and Beam can be any handy material. TheCrank Shaft and Pin are steel. All the remaining parts are brass or bronze. The Eccentric can be steel or bronze.

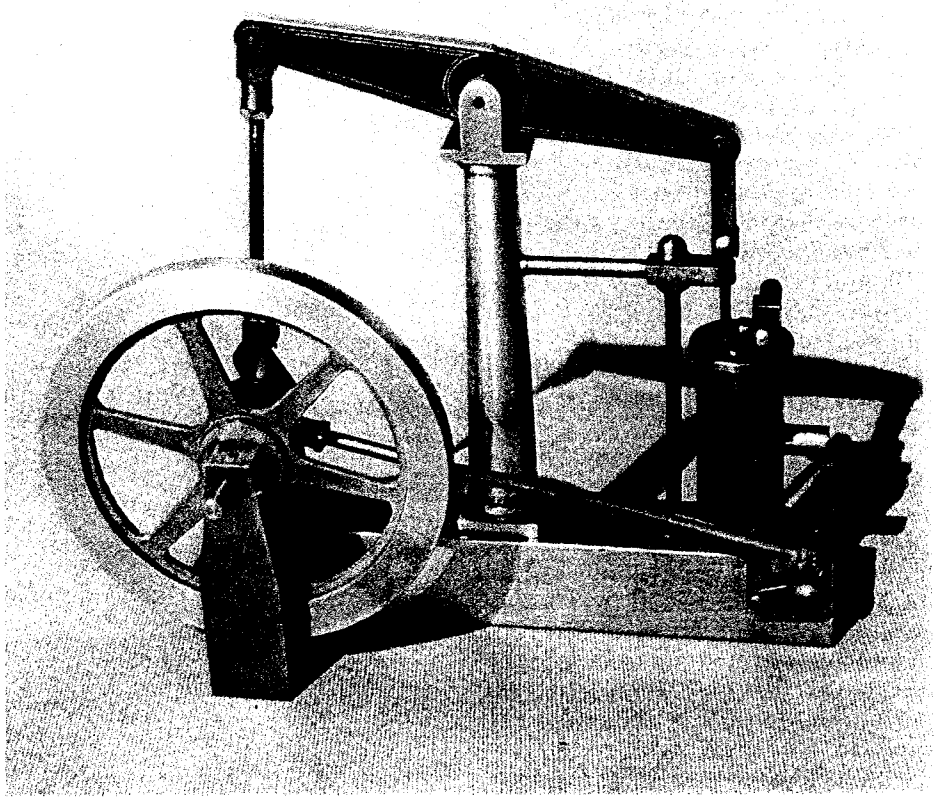
The **BASE** and **BEARING** are simple and straightforward and need no comment.

The **COLUMN** can be made as fancy as you wish. The square part at each end provides gripping and square-up surfaces when drilling and milling.

The **FLYWHEEL** can be a 1/4" or 7/32" thick square or disk to start. From the center, scribe the two circles for the rim. Set a divider to the radius of the inside circle and pace off six equal spaces. Draw three centerlines through opposite marks for the centerlines of the spokes. Run 7/8" and 7/16" radius arcs as shown. Set the dividers at 1/8" and strike off the centers for the twelve 1/8" holes. Use a convenient divider setting and cross the arcs to get the centerlines between spokes for the six 1/4" holes. Centerpunch and drill the twelve 1/8" and six 1/4" holes. Chuck in a four-jaw, centering with a test indicator, gripping on about one-third the thickness of the stock. Turn the O.D., face and web for the spokes. Bore the center 1/4" for a press fit or Loctite on the Eccentric. Reverse in the chuck and turn the opposite side. Coat the web with layout dye and scribe the lines and arcs tangent to the holes and saw out the spokes with a jeweler's saw.

Make the **CYLINDER** of brass or bronze. The Cylinder bore and Valve bore offsets are picked up in a 4-jaw.

The **HEAD** starts out as a 5/8" disk 1/4" thick. Lay out the four holes. Drill the two 3/32" and the 9/64" hole. Chuck in a 4-jaw, offset for the 1/16" hole and turn to a loose 1/4" fit in the Cylinder bore.



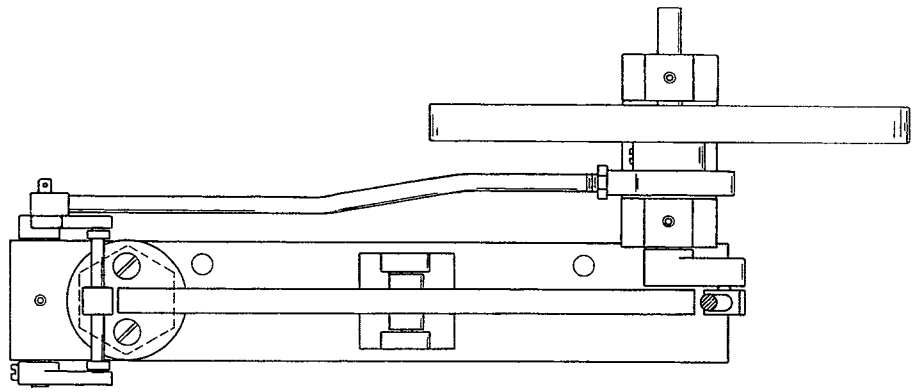
The remainder of the parts are tiny and take patience and time. Soldering is used often here. The ends on the **RODS** are soldered rather than turned from the solid. When soldering, use a holding fixture or some means to hold squareness. To keep from oversoldering, apply the flux to the joint and use the stickiness of the flux to hold a tiny speck of solder cut with shears. In some cases, this speck is no larger than the head of a common pin. Apply heat with a torch. Solder before drilling the crossholes.

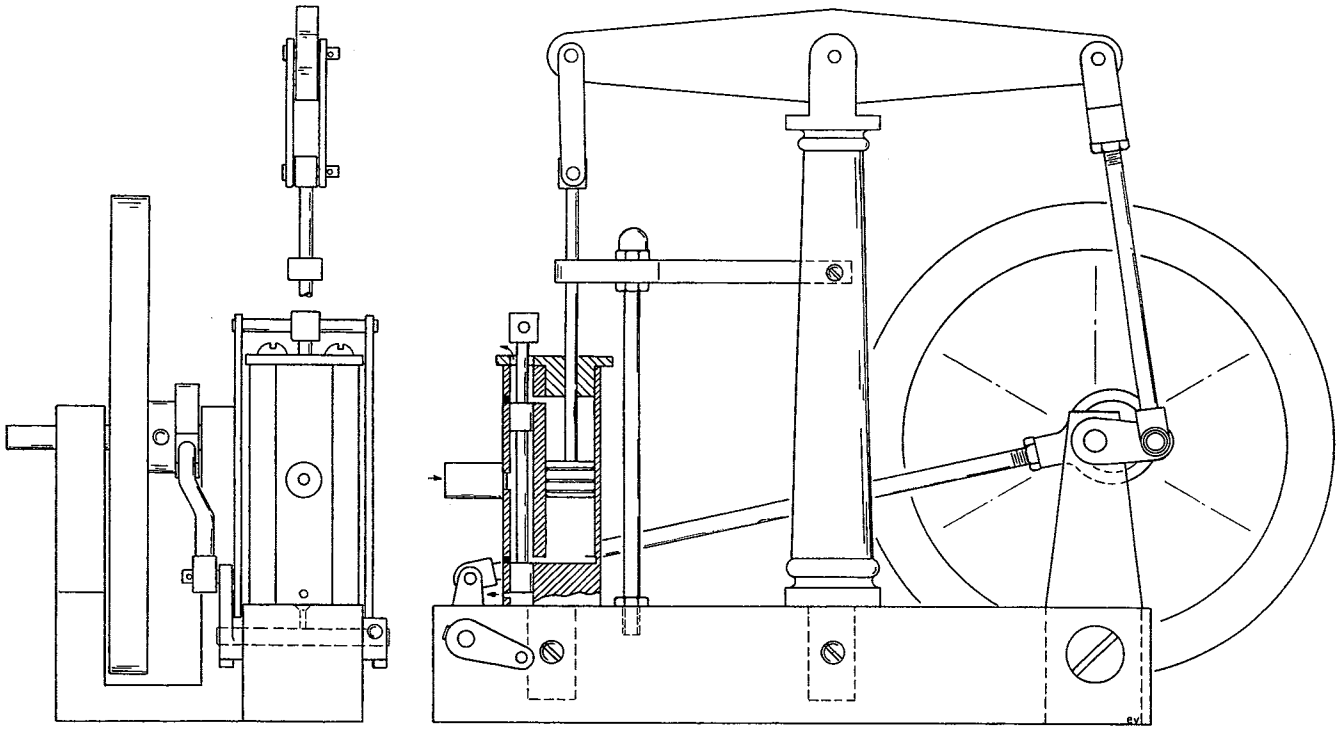
When soldering the **PISTON** and **ROD**, place the Cover and Support Bar before attaching the 1/8" x 5/32" block. The same applies to theValve Linkage.

The Pins without crossholes are held by light prickpunch marks. When setting the Eccentric, the Crank Arm should be horizontal and the Eccentric set for one or the other extreme of travel as shown on the assembly. The drawing shows the Piston at mid-stroke with the Valve full open.

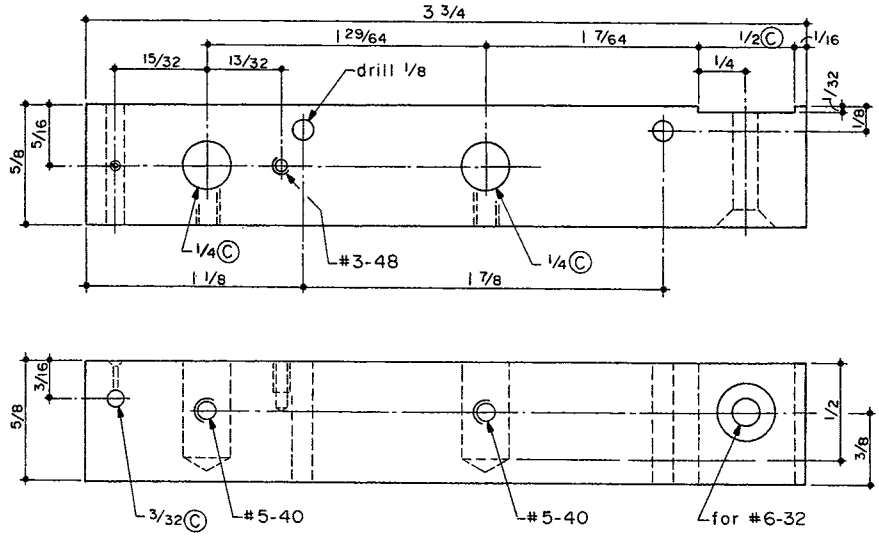
This engine is fitted with a simple support for the Piston Rod to reduce the side thrust at the head. If you are ambitious, you can lay out and fit the famous Watt straight-line motion to this engine instead of this fixed support. It will be a challenge and will require some very small parts.

This is a small model of a giant that ran 50, 60 or so revolutions per minute. You will be lucky if you can make this one run that slow. Try for the smoothest, slowest speed possible. It will make a good showing on as little as 5 psi.

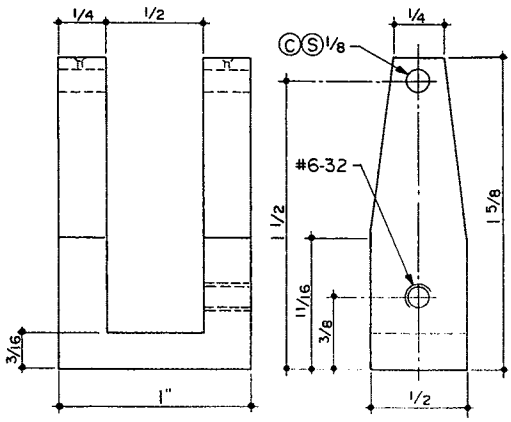




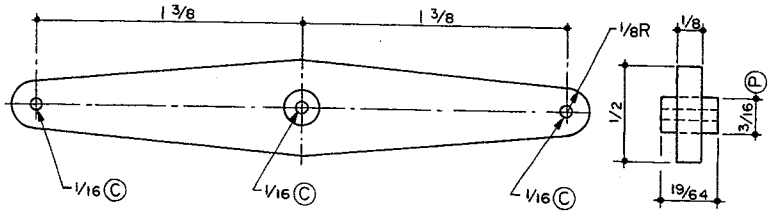
BEAM



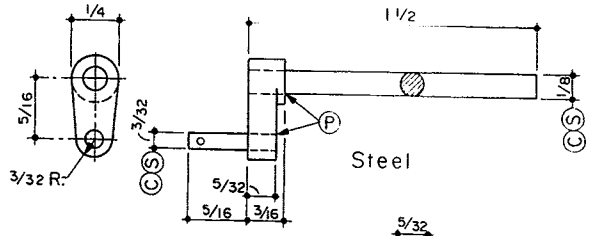
BASE
Steel or Aluminum

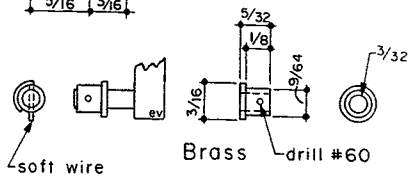


BEARING
Steel or Aluminum

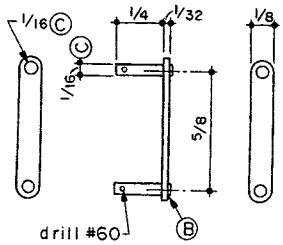


BEAM
Aluminum

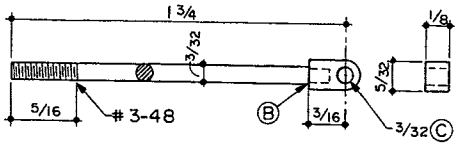


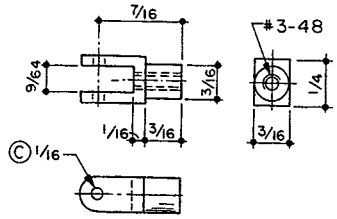


CRANKSHAFT

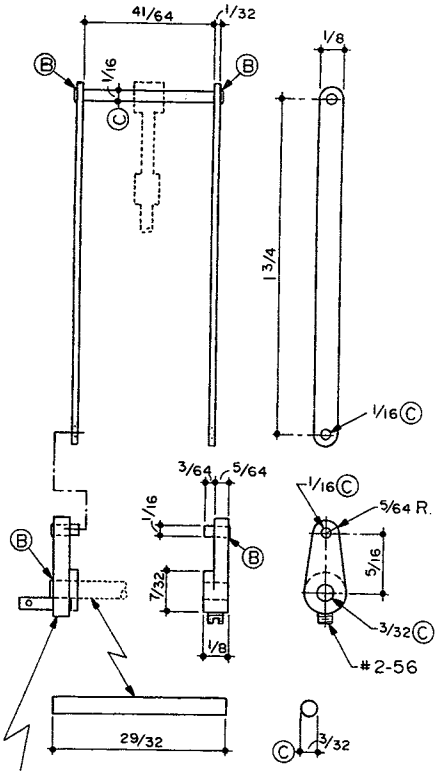


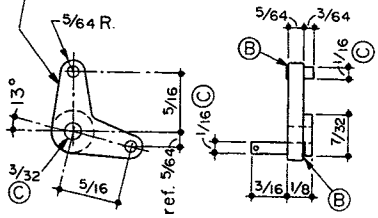
BEAM LINKAGE
Brass



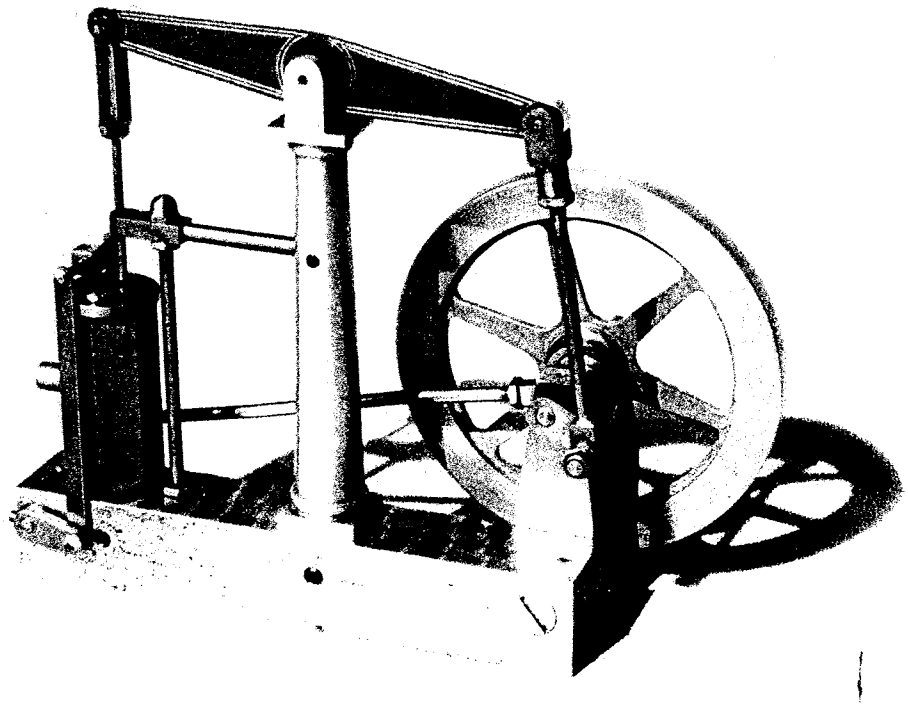


CONNECTING ROD
Brass





VALVE LINKAGE
Brass



SAFETY FIRST

USE PROPER SPEED