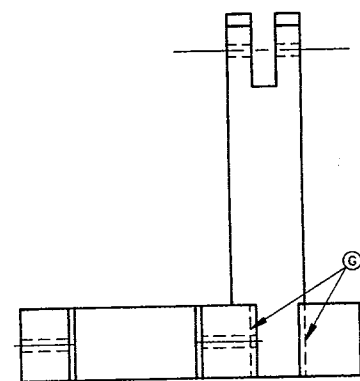


VALVE ARM PIVOT
Wood



BASE
All parts - Wood
All bolts - Brass $\frac{3}{32}$ dia., thread #3-48

10

Wooden Grasshopper Engine

This is a project for the wood and metal worker — a grasshopper type which turned out quite well.

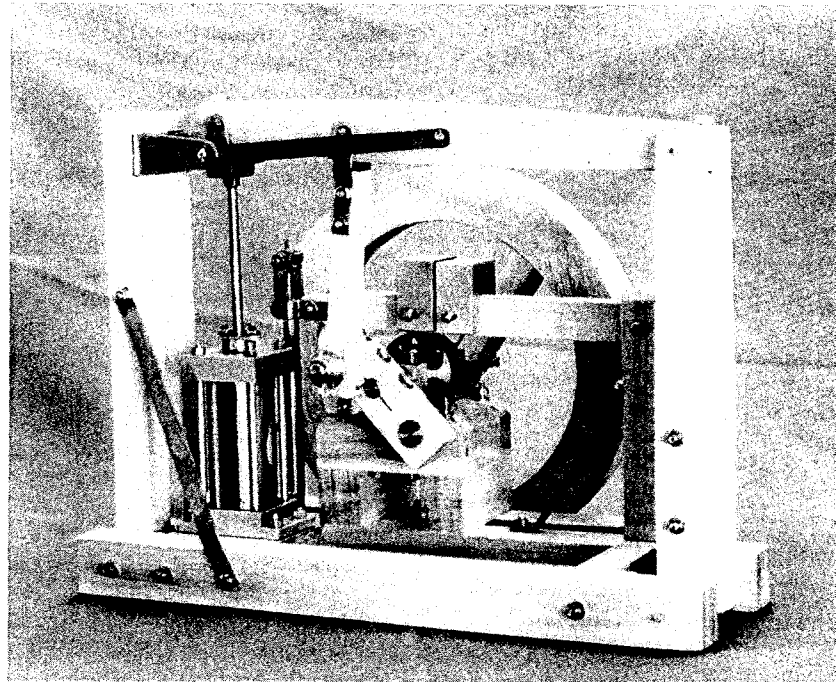
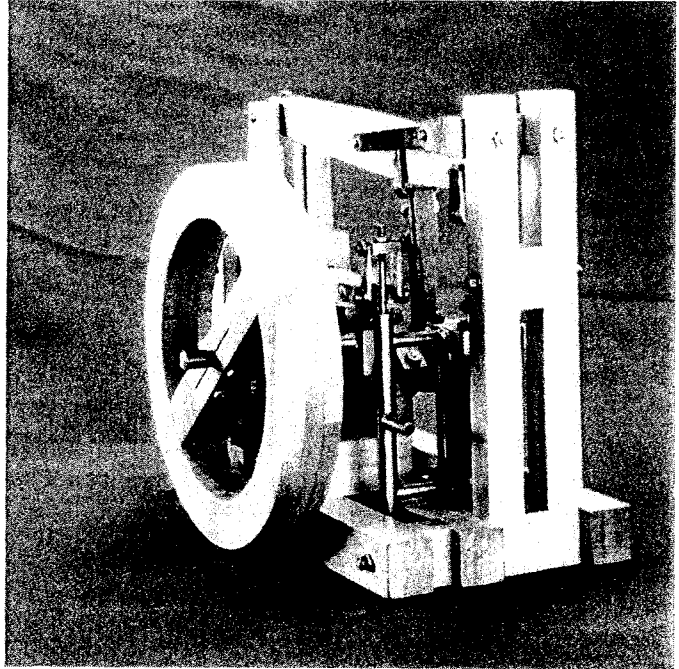
The cylinder and valving are a near duplicate of the Wood Beam Engine. The parts made of wood are a bit different. There is no metal hub in the flywheel and metal pieces were inserted to increase the weight as noted by Ralph Weidman in his model. The crank is wood with a metal pellet added as a counterweight. The frame uses a simple construction, no mortise and tenons. The builder can use his own ideas. Wood cannot be worked as precise as metal, so warpage, a tiny slip when gluing, etc., may require a bit of shimming and filing at assembly to get satisfactory alignments. It is a fun engine to build, not difficult, and it is a good conversation piece to show off at the club meetings.

Select hard maple or any dense hardwood for the **FRAME**. The wood in the model shown is a Central American wood quite like maple. When making the wood pieces, try for all the accuracy you can get. Make all the notches and inserts close so, at final gluing, it will be square and well aligned. Drill the holes in the two outside timbers and clamp to the next piece so you can use it as a jig for spotting the tiebolt holes. Do this on all the related pieces. When all the holes are made in these frame pieces, enlarge, if necessary, all the holes in the inbetween pieces .008" to .015" so the long tiebolts will enter easily. Make all the holes in the Column, Pivot and Bearing Support before gluing. It will be difficult, if not impossible, after assembly. The tiebolts help the clamps when gluing.

If the **BUSHINGS** in the **BEAMS** are not a snug fit, set them with epoxy glue.

The **FLYWHEEL** is made of 1/4" layers built up in hex form and the inside diameters very carefully jigsawed so all three rings match.

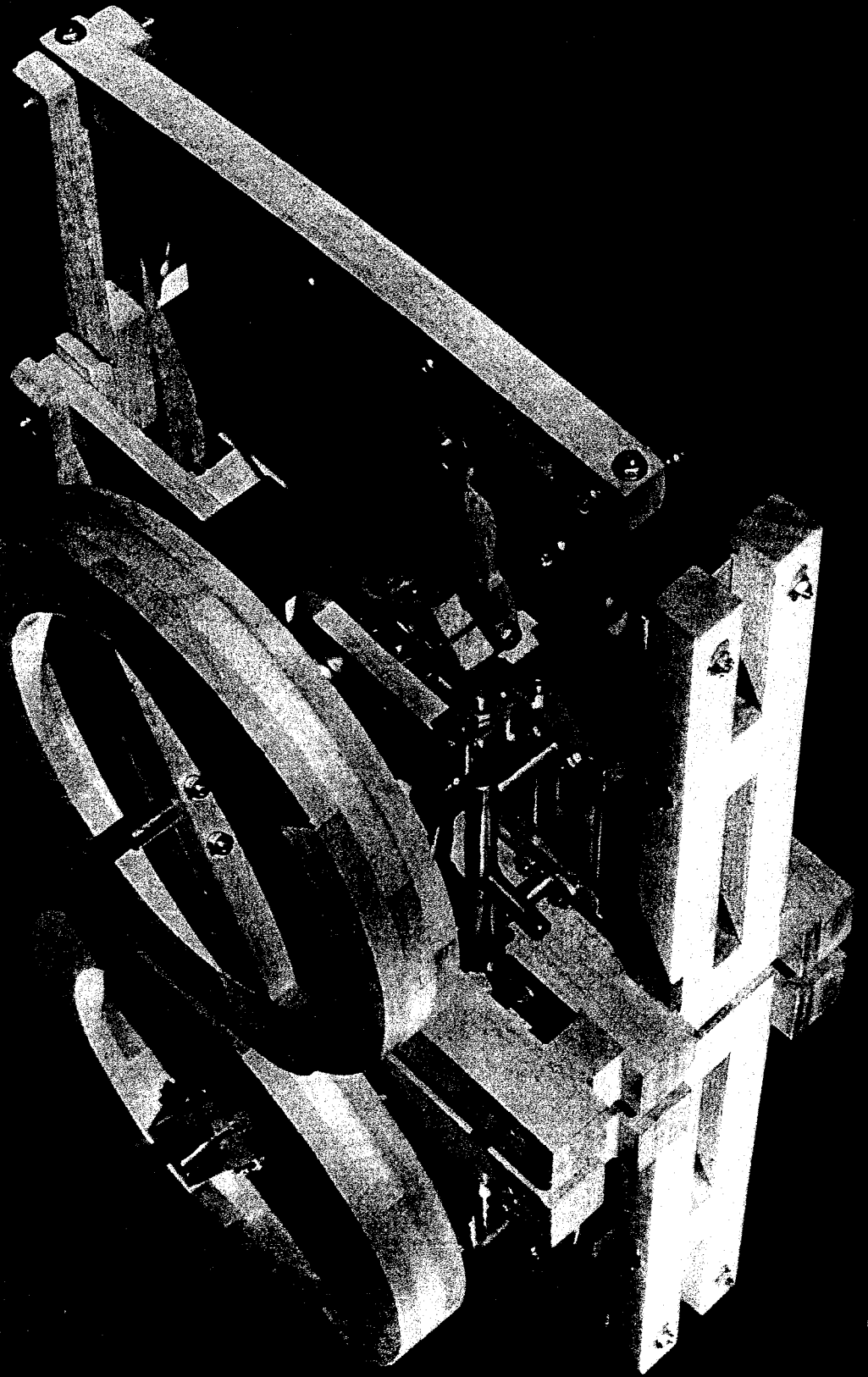
Make the **SPOKE-HUB** a close fit in the center ring. File the 1-7/8" radius to match the inside diameter of the outer rings. The Spoke is centered in the middle ring and a

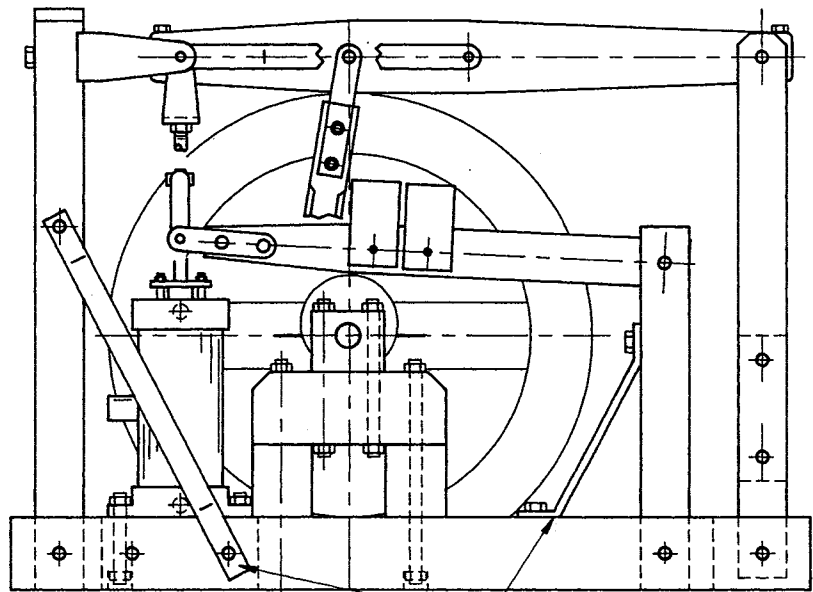
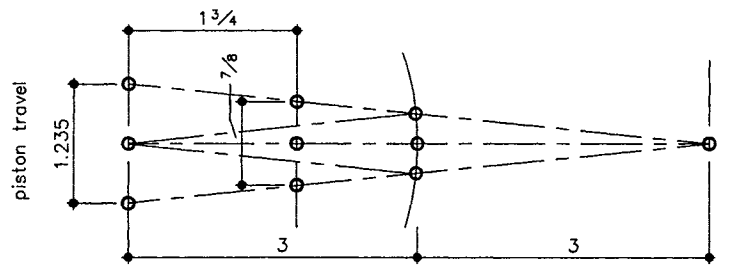
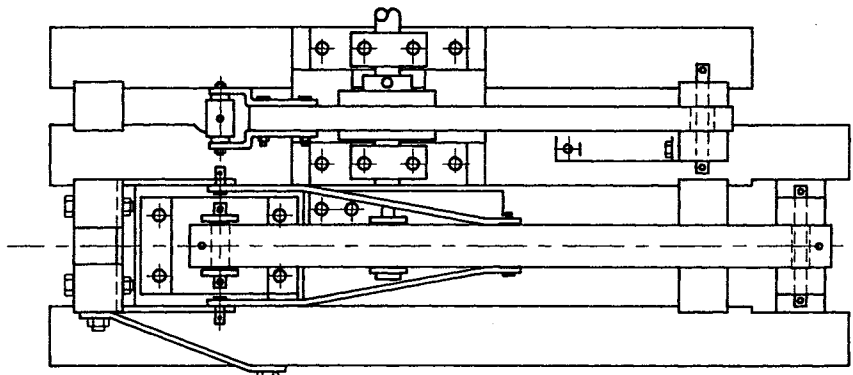
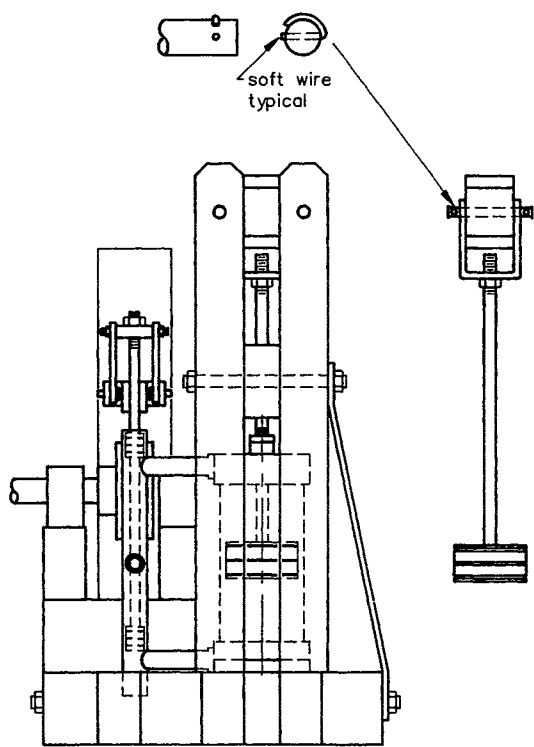


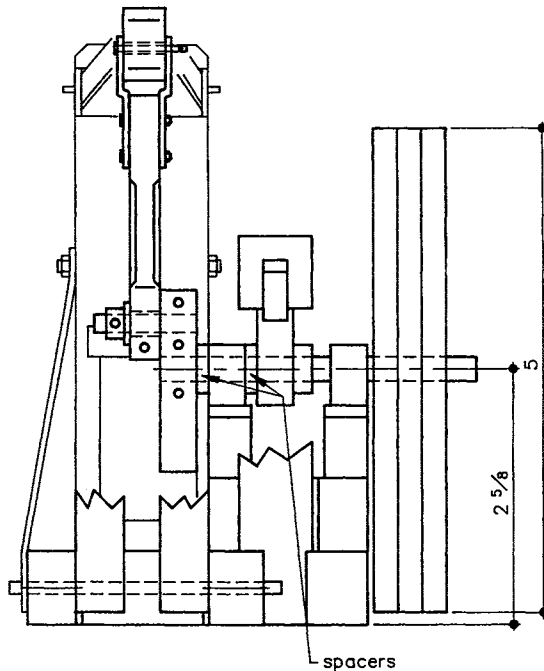
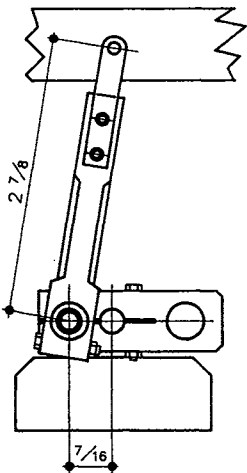
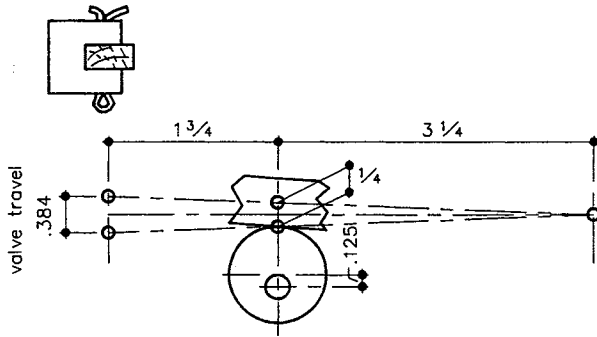
prick punch mark for the Shaft centered off the 3-3/4" ID of the Ring. With care, the punch mark should center in the middle of the Spoke, as well. Drill four holes for #2-56 bolts in the Spoke before gluing. The 1/4" Shaft bore is done later. The three

layers with the Spoke in place should be assembled with small clamps to check for fit and alignment. Tongues on the ends of the Spoke help alignment and hold the rings in place while the inside diameters of the rings are matched.

Wooden Grasshopper Engine







Drill two small holes in the waste area for small brads that will prevent sliding when gluing and clamping. **DON'T FORGET THE STEEL WEIGHTS.** When the glue has set, jigsaw the outside diameter a bit oversize. Chuck the Wheel, gripping the rim I.D. in your metal-working lathe 4-jaw and center the prick punch mark with a center test indicator. If all is well, the rim I.D. will run quite true and be satisfactory. Carefully turn the O.D. with a keen tool bit. Drill the 1/4" shaft hole. Take back to the jigsaw and add the slot at the center. When all the wood parts are glued and sanded, they can be given a fine spray coat of varnish.

At this point you are finished with the wood work section of this engine and can now get into the metal work that gets the engine running.

