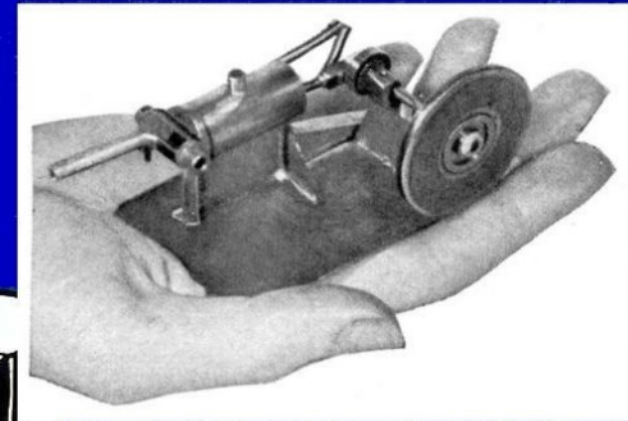
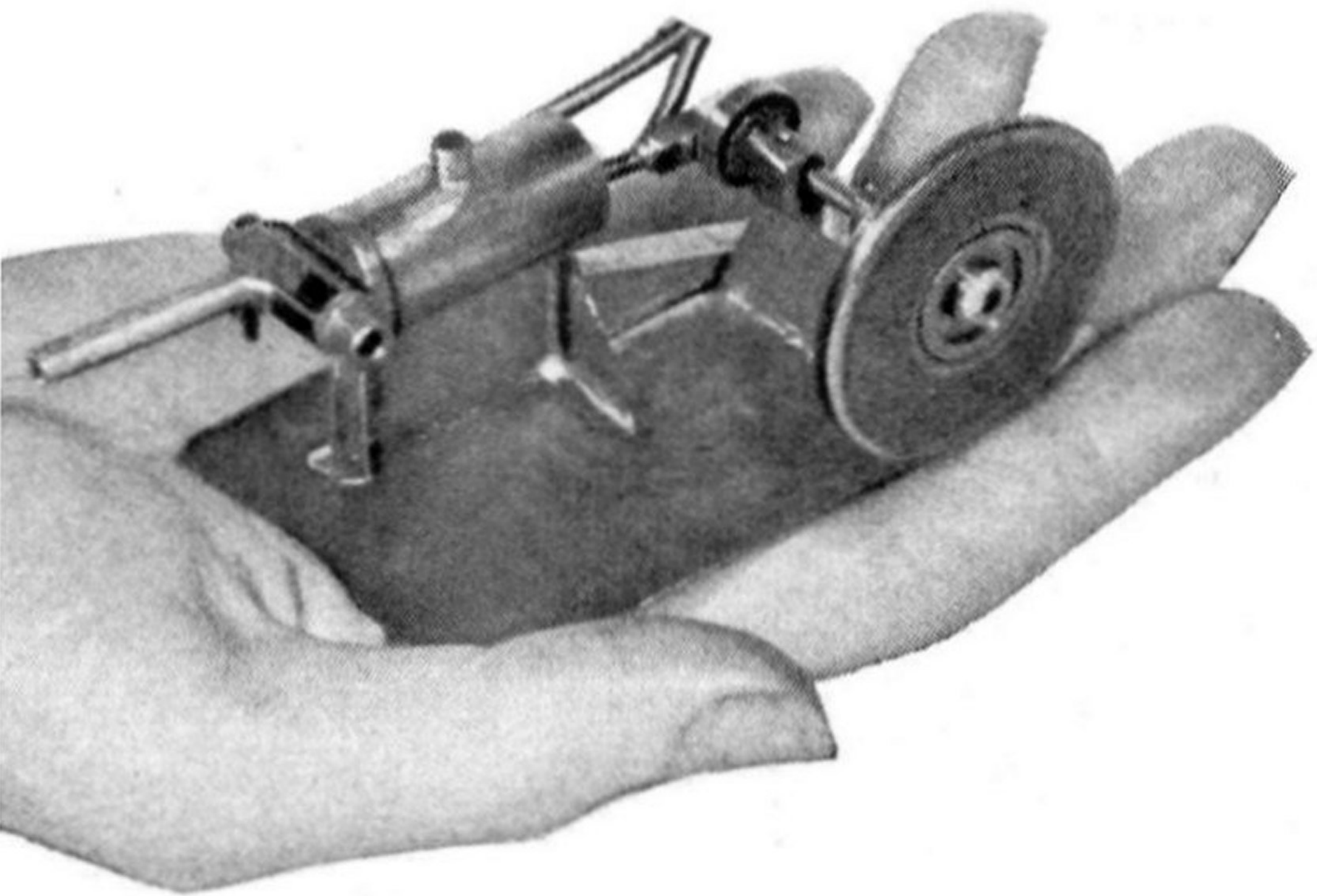
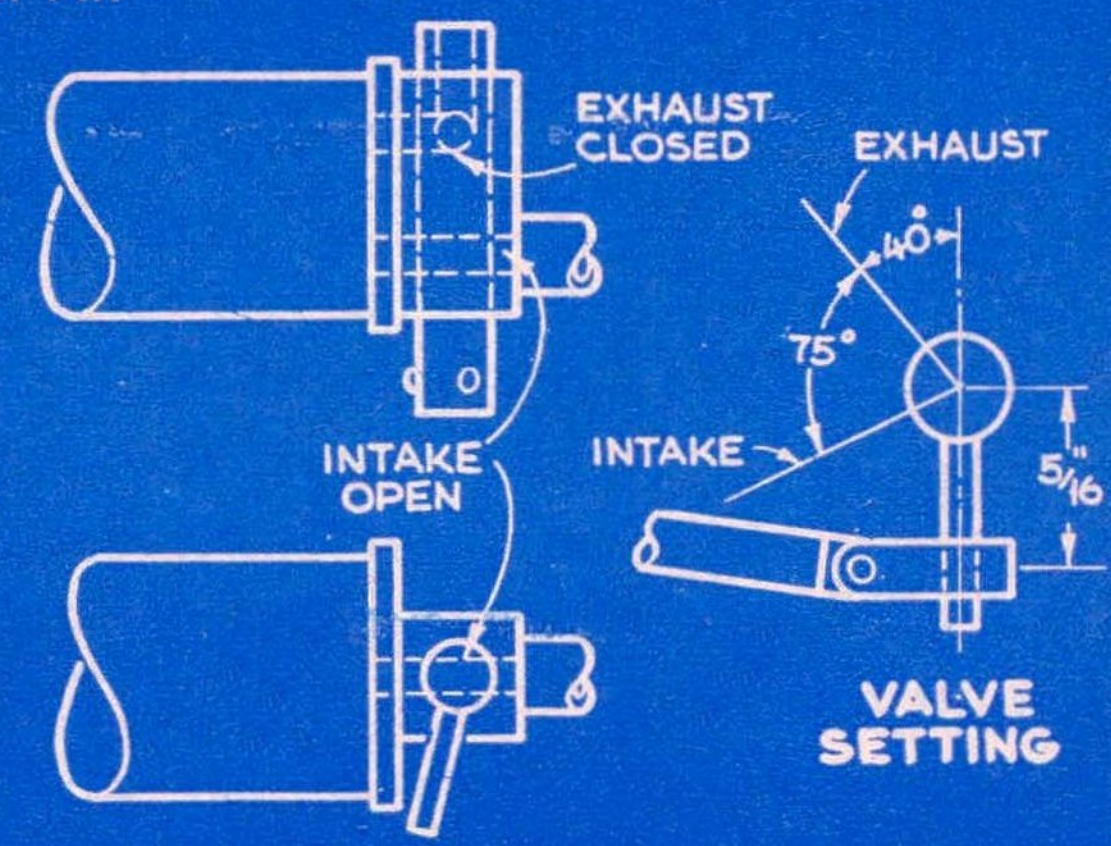
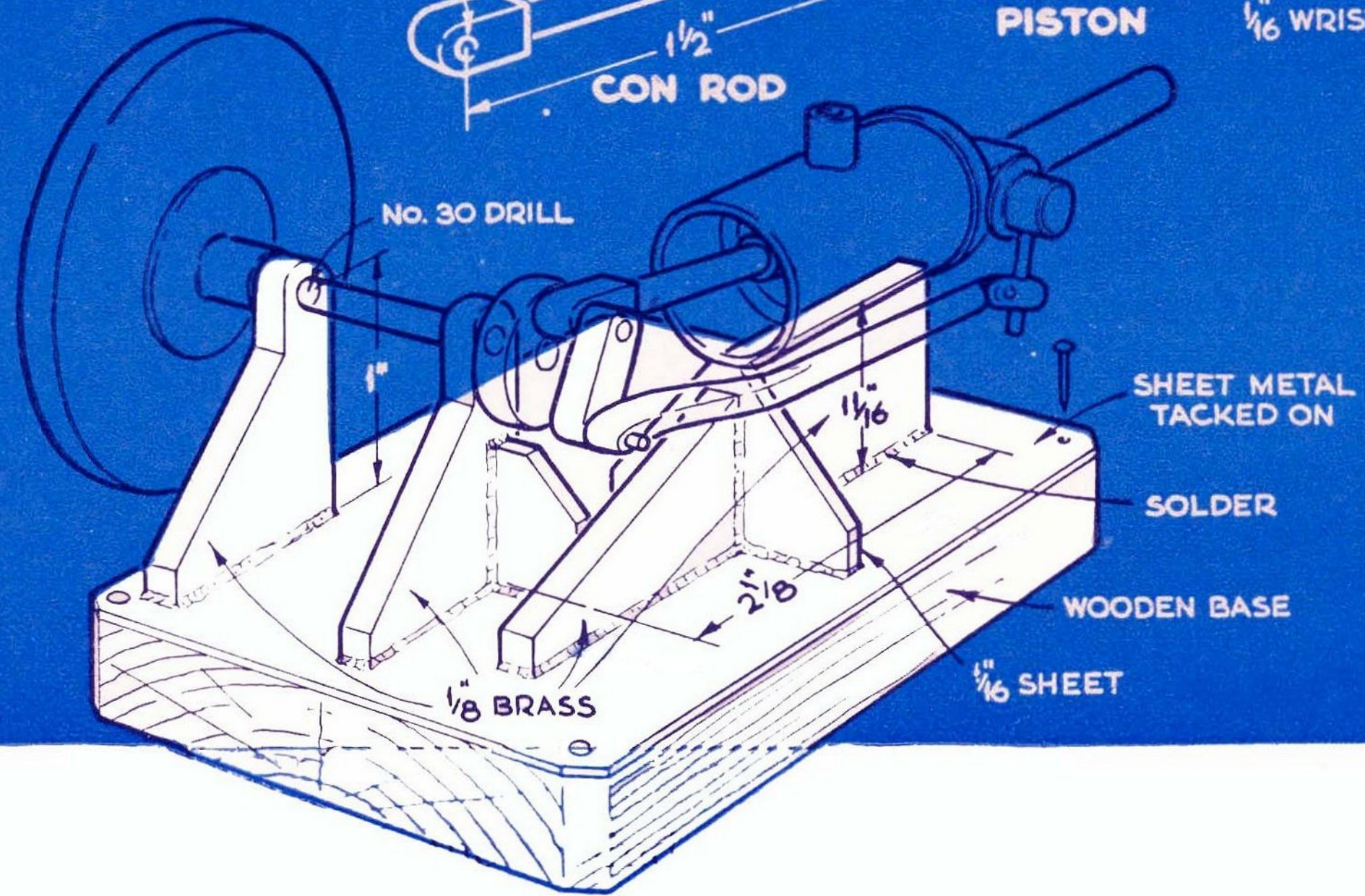
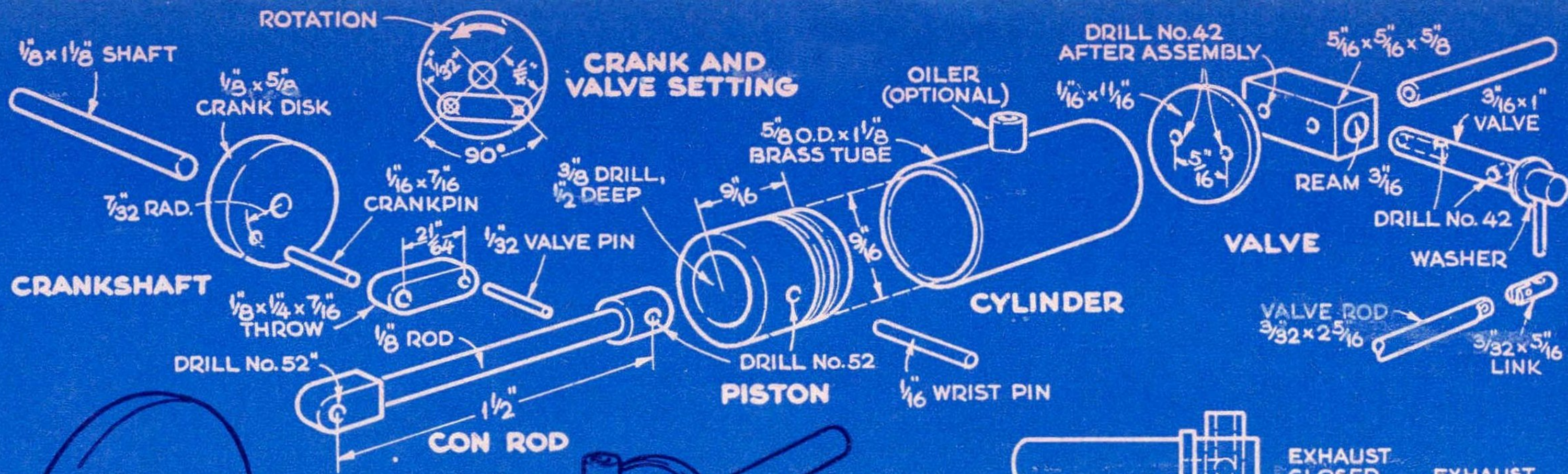


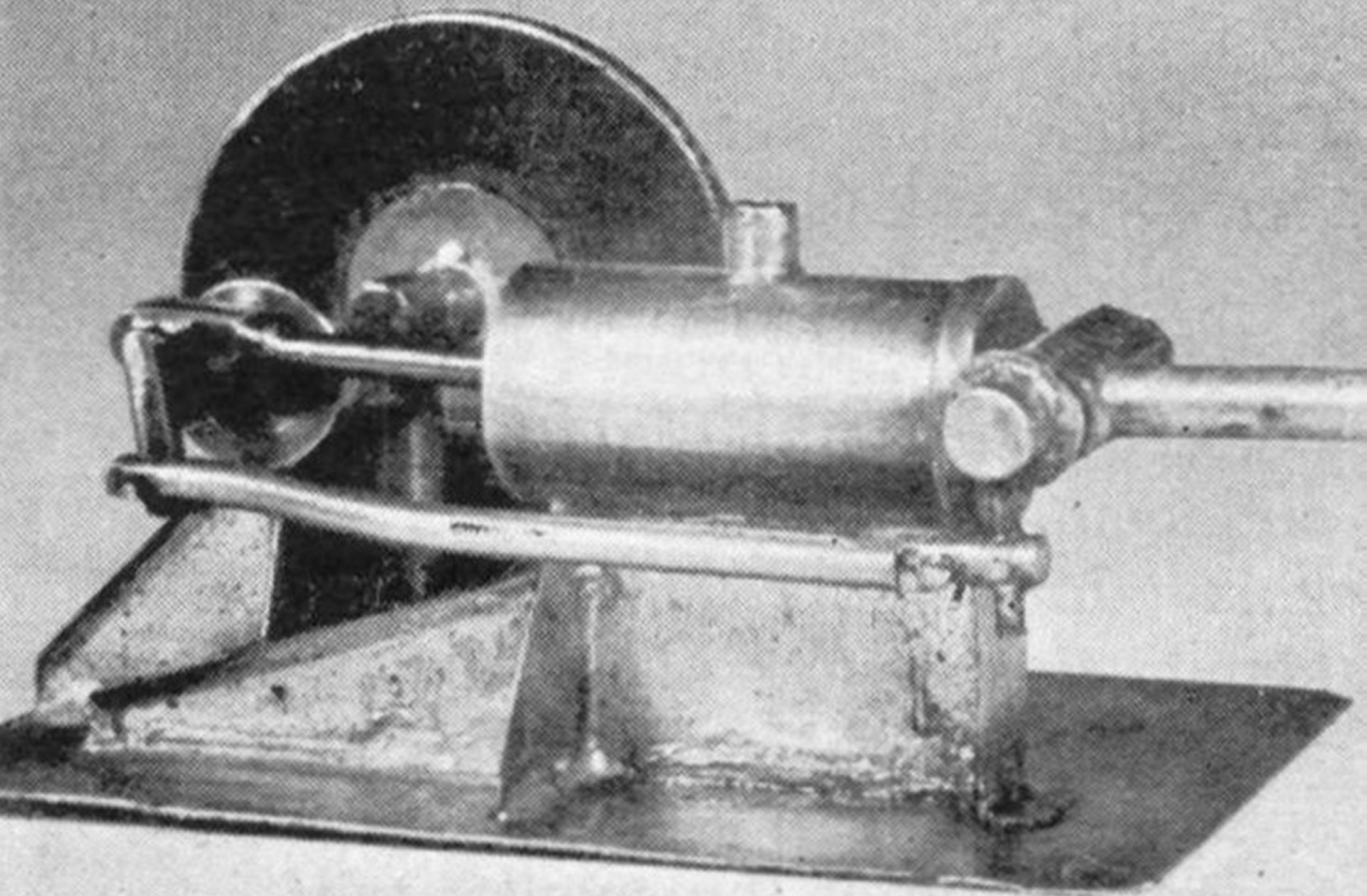
Scraps and Solder Become an Engine



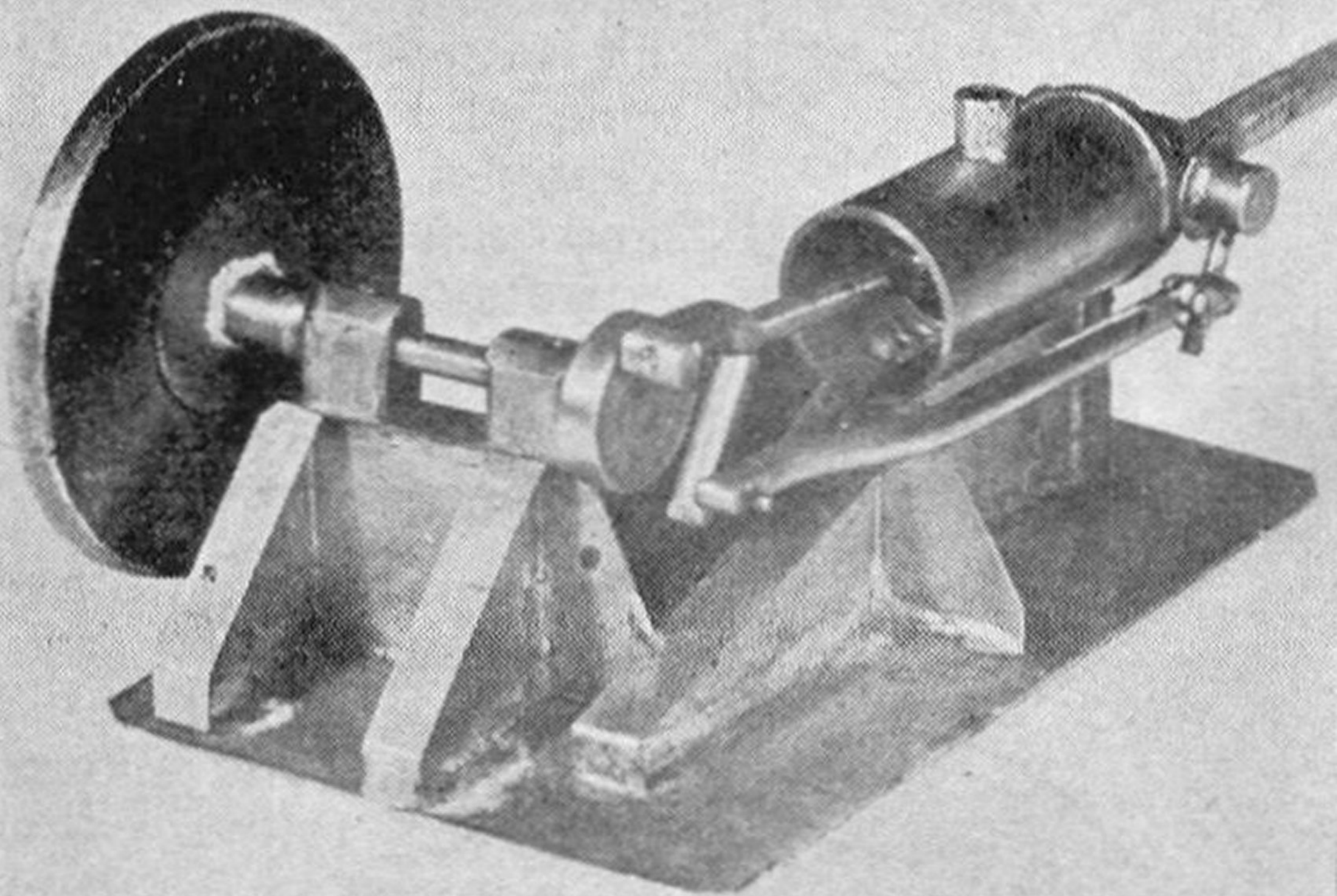


**In just two evenings
you can build this
palm-sized power plant.**





Rocker valve action is driven by an extra crank throw displaced 90° from connecting-rod crank-pin. The inlet tube can be connected to a boiler or air source by rubber tubing.



Business end of engine shows solid bearings soldered onto supports bent up from sheet metal. The short tube on top of the cylinder is an oil cup for lubricating the piston.

SCRAPS AND SOLDER BECOME AN ENGINE

1250

It's always a thrill to build something that runs. This little steam engine has plenty of zip and an eye-catching valve action. Hooked to a toy boiler, bicycle pump, air tank, or carbon dioxide cylinder, it will run a model or a midget electric generator with enthusiasm.

So long as you use only air, CO₂, or low-pressure steam, you can safely assemble the engine with soft solder, like the one shown. For hot steam, above 15 lb., better use silver solder.

The cylinder is brass tubing. Smooth the bore by wrapping very fine abrasive cloth around a rod and working it back and forth in the cylinder. If you can find another piece of tubing that is a good sliding fit in the bore, make the piston by soldering a disk on one end. Otherwise, turn aluminum or brass to a shake less but free-running fit in the cylinder; turn two oil grooves, and drill in from an end to lighten the piece.

Cut a disk of sheet brass for the cylinder head, and a length of square or hex stock for the valve housing. Drill a No. 13 hole lengthwise through this for the oscillating valve. Spot two punch marks 5/16" apart on a diameter of the disk. Then solder the disk to the cylinder and the valve housing to the disk, parallel to the punch marks.

Run a No. 42 drill from the open end of the cylinder into the punch marks to form the ports. The intake port runs right through the valve housing; the other just into the No. 13 hole.

Cut a piece of 3/16" brass rod to length for the valve and solder a washer 1/4" from one end. Insert it in the valve housing after running a No. 12 drill or a 3/16" reamer through. Then drill through the exhaust port half way into the valve. Rotate the valve 75° and drill the intake port through.

Remove the valve to drill a hole outside the washer, displaced 40° from the exhaust port, for the pin that carries the valve-rod link. Also drill a hole lengthwise from the other end to meet the exhaust port and open it to the air.

Solder a short piece of tubing over the intake port on the valve housing as a steam inlet. Then slip the valve into the housing, and carefully solder a second washer on the exhaust end to retain it, sheet metal, with solid bearings soldered on. Solder the cylinder in place cautiously so as not to overheat and loosen the valve.

Bearings and the cylinder support can be sawed from 1/8" brass, or bent up of sheet metal, with solid bearings soldered on. Solder the cylinder in place cautiously so as not to overheat and loosen the valve.

Drive the crankshaft into the crank disk, after you've drilled a No. 53 hole on a 7/32" radius. In this, drive and solder a 1/16" crankpin. Make the con rod by soldering or screwing endpieces onto a 1/8" rod. Put the con rod on the crankpin before soldering on the outside throw. Position the throw to bring the valve pin 90° ahead of the crankpin and on a 1/4" radius.

The flywheel shown was made by soldering a 1 3/8" steel washer onto a brass hub drilled a press fit on the crankshaft. If you can't get a flywheel from an old toy, you can cast one of lead or turn one from solid stock, a faucet handwheel, or the like.

The 3/32" valve rod is about 2 3/8" long. Bend an offset in it as shown in the photos. Assemble it with 1/16" pins and check the valve action. The ports should be wide open when the piston is midway on its stroke - that is, with the crankpin at the top or bottom of its circle. Some valve adjustment can be made by bending the valve rod to shorten it slightly. If the exhaust valve doesn't open all the way, a longer rod should be substituted.

If everything works freely, the engine should run on as little as 2 lb. pressure. A hole drilled halfway along the cylinder, with a bit of tubing soldered over it as an oil cup, keeps the piston lubricated.

END