THAT'S right! The flame of a common candle is the sole source of power—no boiler, no displacement chamber, no explosion within the cylinder itself. Fig. 1 shows how it works. You will see right away that it is essentially a model of the heavy-duty, horizontal-type gasoline engine, except for the hinged valve mounted on the cylinder head. This trap-door affair fits tightly over an opening in the cylinder when closed, and is actuated by a cam on the crankshaft. The lighted candle is set with its flame adjacent to the opening. As the piston moves in one direction, the valve opens and the flame is sucked into the cylinder. At the end of the stroke the valve closes. The moment the flame is cut off a vacuum is produced in the cylinder, and the piston is drawn inward on a power stroke. When the piston reverses its direction, the cycle is repeated.

Fig. 2 details the base which is simply a matter of bending, filing and soldering sheet metal. The cylinder, Fig. 3, is a more fussy job. A 1-in. pipe nipple and cap form the body. The inside surface of the pipe must be machined smooth and bored to a diameter uniform throughout the length. Later the piston is turned to fit the bore diameter. The contact surfaces of the valve mechanism should be surface ground and then finished up on a surface plate. Soot which accumulates on the meeting surfaces tends to seal the valve. As you will see from Fig. 3 the pipe-cap cylinder head requires just a simple shoulder cut in the lathe and then some careful hand filing.

Fig. 4 shows the crankshaft, flywheels
and miscellaneous parts that finish up the assembly. The crankpin is pressed into the crank throws, making the crankshaft and connecting rod a unit assembly. The flywheels can be cast of gray iron, brass, or type metal. The cam must be mounted on the shaft with its center line at 90 degrees to the center line of the crank. The piston is made from a piece of aluminum rod approximately 1 in. in diameter. The ring slot is wound with asbestos cord coated with graphite. Spacing sleeves center the connecting-rod end on the piston pin. The connecting rod is filed from a piece of \( \frac{5}{16} \) by \( \frac{5}{16} \)-in. aluminum or duralumin. The same applies to the push rod. The cam follower strip is spring steel from an old clock or phonograph. The tension of the spring must be determined by experiment. It should be sufficient to close the valve quickly when the engine is running at full speed. The cylinder is lubricated by coating the piston with white vaseline each time it is taken out to clean the cylinder. If the engine is operated considerably, the cylinder must be cleaned frequently. When soot accumulation reaches a certain stage it will interfere with efficient operation. Note in Fig. 2 that there are no caps over the main bearings. This is done purposely so that the whole crank assembly can be removed easily for cleaning.
ENLARGED VIEW

At the beginning of the stroke, the hinged valve opens and flame is drawn into cylinder.

Operation of Candle-Flame Engine.

At the end of the outward stroke the valve closes, creating a vacuum in the cylinder.

Bearing surface built up with solder.

Soldered

3/32 soft sheet brass.

3" holes.

5 7/8".

3".

1.5".
Approx. 1” Dia. Piston is machined to fit.

Round groove filed in cap.

1” Iron pipe.

Pipe cap.

Rocker arm.

Hanger.

Holes for #4 mach. screws.

Hinged valve cut from cold-rolled bar pinned to 1/8” shaft.

Filed from 1/4” x 1/4” brass.

Ground flat.