

Building a Small Horizontal Steam Engine

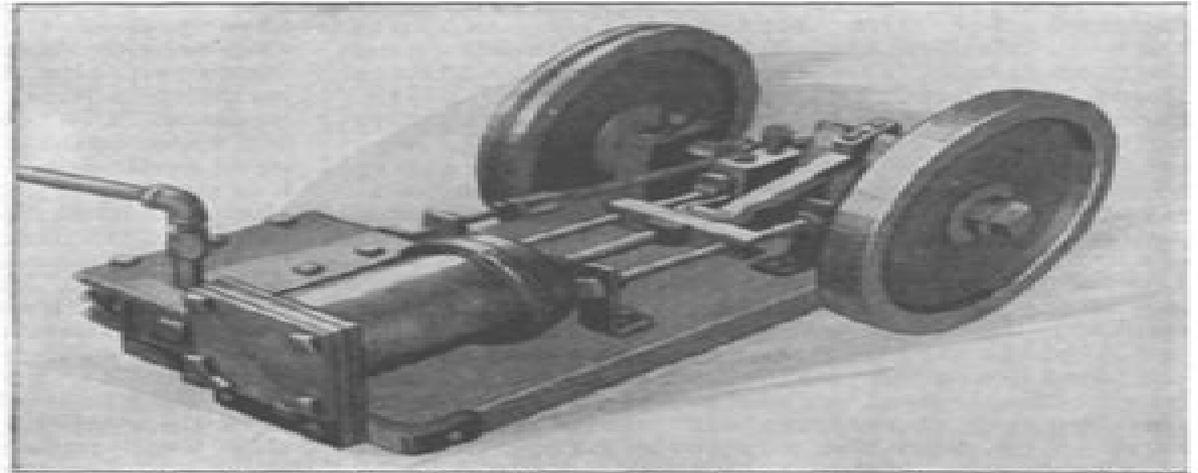
BY HAROLD E. BENSON

THE small engine described in this article was built by the writer in his spare time—about an hour a day for four months—and drives the machinery in a small shop. At 40-lb. gauge pressure, the engine runs at 150 r.p.m., under full load, and delivers a little over .4 brake horsepower. A cast steam chest, with larger and more direct steam ports, to reduce condensation losses; less clearance in the cylinder ends, and larger bearing surfaces in several places, would bring the efficiency of the engine up to a much higher point than this. In the writer's case, however, the engine is delivering ample power for the purpose to which it is applied, and consequently these changes were not made, but, if the engine is to be used for continuous rather than intermittent service, it would be foolish to waste power costing more than the changes needed to conserve it.

It might be remarked, at this point, that no method of construction described here is to be taken as the best; many better methods of making each part will doubtless occur to the reader. Some improvements that were thought of too late to be incorporated in the engine will be mentioned in the proper place.

The cylinder, shown in Fig. 1, is made from a piece of steel pipe, selected with special regard to the condition of the inner surface. This may be bored to size, and lapped, or ground. A standard inside diameter will make the fitting of a standard auto-engine piston ring easy. The ends are threaded on the lathe, standard pipe-thread size, while supported on two conical hardwood blocks, held on a threaded mandrel, and drawn firmly into the cylinder ends with nuts and washers. The standard mandrels for this purpose, if available are more convenient. The rectangular plate A, that supports the rear end of the cylinder, is also bored and

The front cylinder head is a pipe cap, the exterior of which is turned to present a more pleasing appearance, and drilled and threaded to receive the stuffing box, Fig. 2. The distance between the edge of the front-end steam port and the inner side of the cap, when screwed home, should be much less than that shown, not over $\frac{1}{4}$ in., for efficiency, and the same at the rear end. When the cap has been permanently screwed on the cylinder, one side is flattened, as shown, on the shaper or grinder, and the steam ports laid out and drilled. It would be a decided advantage to make these ports as much larger than given as is possible, as the efficiency with $\frac{1}{2}$ -in. ports is far below what it might be.



View of the Engine Complete, Ready to be Mounted on the Bed and to be Connected to the Steam Line; The Total Cost of Building Was \$15.40; This may be Considerably Reduced by Following Closely the Directions Given

To make the stuffing box, a length of 2-in. cast-iron rod is drilled to fit the piston rod, then turned out at the front, recessed to a width of .625 in. for the packing, and threaded to fit the gland nut. The piece is then reversed in the lathe, and the outside threaded to fit the cylinder. After cutting off, the wrench flats are ground on the shoulder. The gland nut is made of brass-bar stock, threaded to fit the stuffing box, and the hexagon ground on it. When the parts are assembled, with the packing in place, the piston and rod should work smoothly.

Popular Mechanics Steam Engine Plans

JE Gale



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