AMATEUR MECHANICS.

A SIMPLE SINGLE-ACTING STEAM ENGINE.

The great bugbear staring the amateur mechanic in the face when he contemplates making a small steam engine is the matter of boring the cylinder. To bore an iron cylinder on a foot lathe is difficult even when the lathe is provided with automatic feed gear, and it is almost impossible with the ordinary light lathe possessed by most amateurs. To bore a brass cylinder is easier, but even this is difficult, and the cylinder, when done, is unsatisfactory on account of the difficulty of adapting a durable piston to it.

The engravings show a simple steam engine, which requires no difficult lathe work; in fact the whole of the work may be done on a very ordinary foot lathe. The engine is necessarily single-acting, but it is effective nevertheless, being about 1-20 H. P., with suitable steam supply. It is of sufficient size to run a foot lathe, scroll saw, or two or three sewing machines.

The cylinder and piston are made from mandrel drawn brass tubing, which may be purchased in any desired quantity in New York city. The fittings are mostly of brass, that being an easy metal to work.

The principal dimensions of the engine are as follows:

Cylinder.—Internal diameter, 1½ in.; thickness, ⅛ in.; length, 3⅝ in.

Piston.—External diameter, 1½ in.; thickness, 3-32 in.; length, 3¾ in.

Length of stroke, 2 in.

Crank pin.—Diameter, ¼ in.; length of bearing surface, ½ in.

Connecting rod.—Diameter, 5 16 in.; length between centers, 5½ in.

Shaft.—Diameter, ⅝ in.; diameter of bearings, ½ in.; length, 6 in.; distance from bed to center of shaft, 1½ in.

Flywheel.—Diameter, 8 in.; weight, 10 lb.

Valve.—Diameter of chamber, 9-16 in.; length, 1¼ in.; width of valve face working over supply port, 3 32 in.; width of space under valve, ⅜ in.; length of the same, 1 in.; distance from center of valve spindle to center of eccentric rod pin, ¾ in.

Ports, supply.—Width, 1-16 inch.; length, 1 in. Exhaust.—Width, ⅛ in.; length, 1 in.; space between ports, 5-16 in.

Pipes.—Steam supply, ¼ in.; exhaust, ⅜ in.

Eccentric.—Stroke, ¾ in.; diameter, 1 5-16 in. length of eccentric rod between centers, 8⅜ in.

Cut-off, ⅝

Thickness of base plate, ¼ in.

Wooden base, 6¼ in x 8 in.; 2⅜ in. thick.

Thickness of plate supporting cylinder, ⅜ in.

Total height of engine, 13¼ in.

Distance from base plate to under side of cylinder head, 9¼ in.

Diameter of vertical posts, 9-16 in.; distance apart, 3⅛ in.; length between shoulders, 6¼ in.

Base plate fastened to base with ¼ in. bolts.

The connecting rod, eccentric rod, crank pin, and shaft, are of steel. The eccentric-strap and flywheel are cast iron, and the other portions of the engine are of brass. The screw threads are all chased, and the flange, *a*, and head of the piston, F, in addition to being screwed, are further secured by soft solder.

Fig. 1 shows the engine in perspective. Fig 2 is a side elevation, with parts broken away. Fig. 3 is a vertical transverse section. Fig. 4 is a partial plan view. Fig. 5 is a detail view of the upper end of the connecting rod and its connections; and Fig. 6 is a horizontal section taken through the middle of the valve chamber.

The cylinder, A, is threaded externally for 1 inch from its lower end, and the collar, *a*, ¼ inch thick, is screwed on and soldered. The face of the collar is afterward turned true. The same thread answers for the nut which clamps the cylinder in the plate, B, and for the gland, *b*, of the stuffing box, which screws over the beveled end of the cylinder, and contains fibrous packing filled with asbestos or graphite. The posts, C, are shouldered at the ends and secured in their places by nuts. Their bearing surface on the plate, D, is increased by the addition of a collar screwed on. The posts are made from drawn rods of brass, and need no turning except at the ends.

The cylinder head, E, which is a casting containing the valve chamber, is screwed in. The piston, F, fits the cylinder closely, but not necessarily steam tight. The head is screwed in and soldered, and the yoke, G, which receives the connecting rod pin, is screwed into the head. The connecting rod, H, is of steel with brass ends. The lower end, which receives the crank pin, is split, and provided with a tangent screw for taking up wear. The crank pin is secured in the crank disk, I, by a nut on the back. The eccentric rod, J, is of steel, screwed at its lower end into an eccentric strap of cast or wrought iron, which surrounds the eccentric, K.

The valve, L, is slotted in the back to receive the valve spindle, by which it is oscillated. The ports are formed by drilling from the outside, and afterward forming the slot with a graver or small sharp chisel. The supply port, for convenience, may be somewhat enlarged below. The holes for the exhaust port will be drilled through the hole into which the exhaust pipe is screwed. The chamber communicating with the exhaust is cored out in the casting.

The easiest way to make the valve is to cut it out of a solid cylinder turned to fit the valve chamber.

An engine of this kind will work well under a steam pressure of 50 lb., and it may be run at the rate of 200 to 250 revolutions per minute.

It is desirable to construct a flat pasteboard model to verify measurements and to get the proper adjustment of the valve before beginning the engine. M.

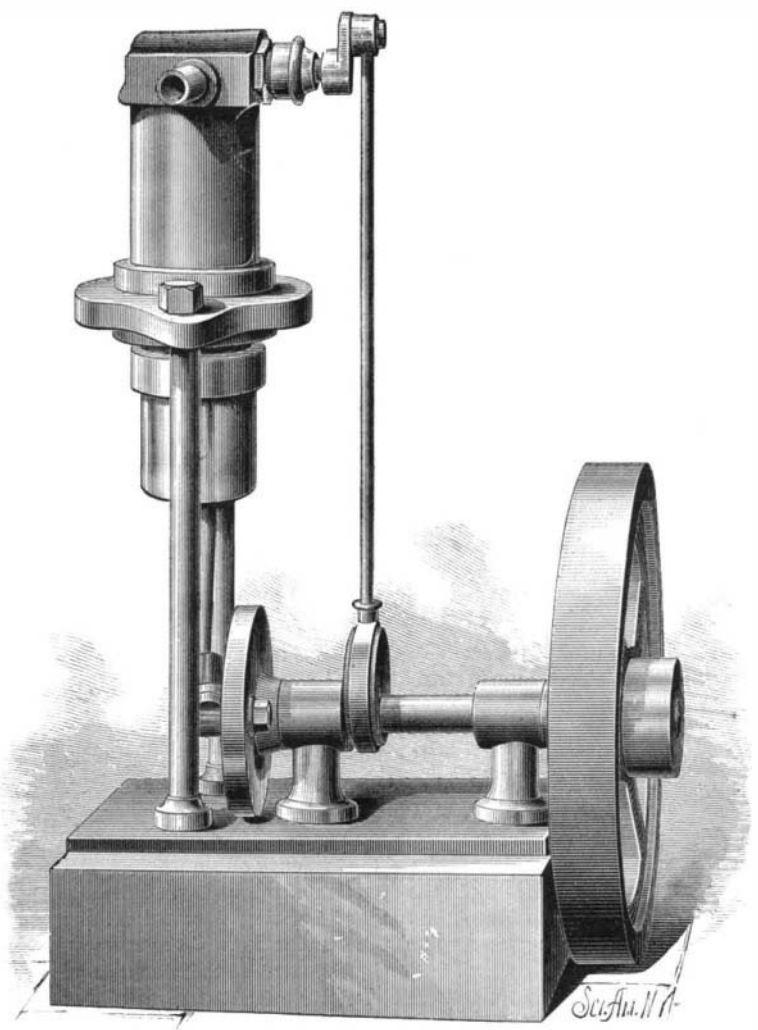
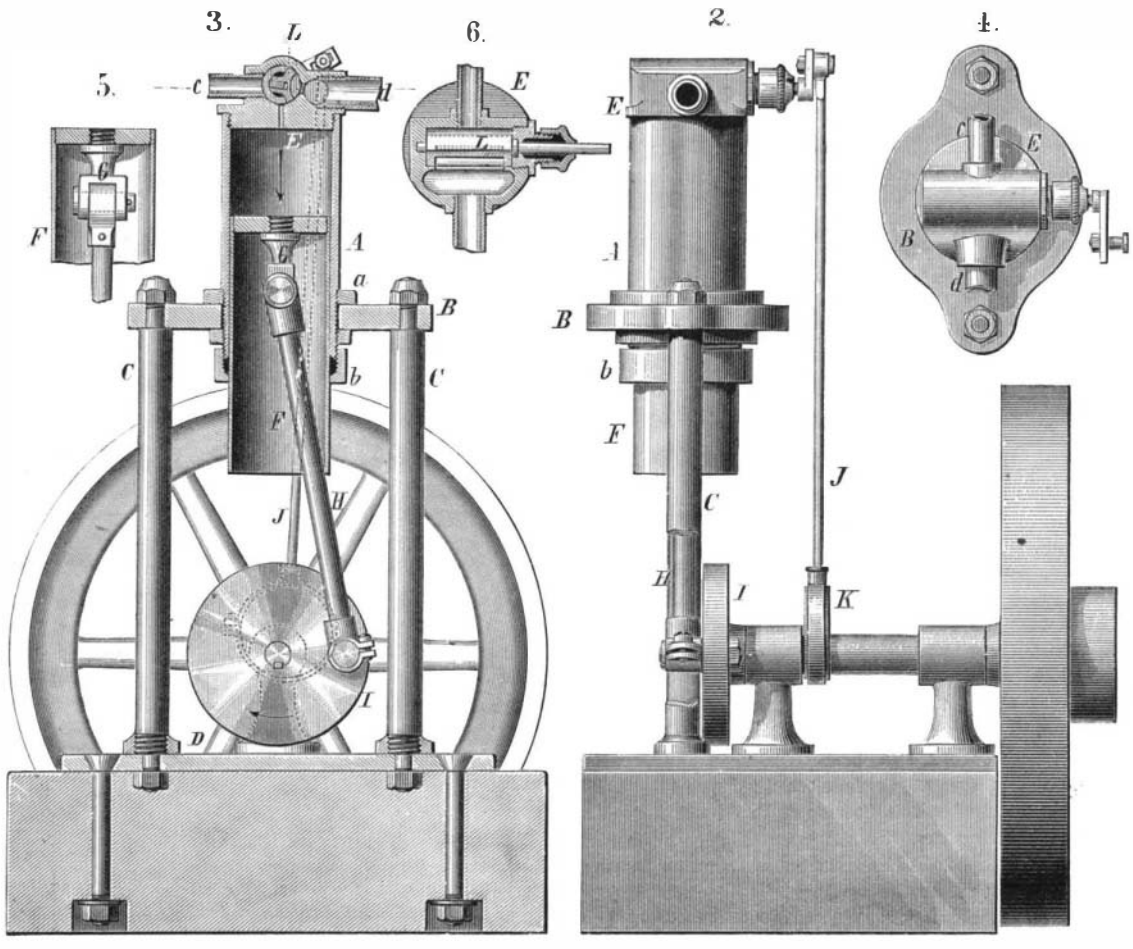


Fig. 1.—SIMPLE SINGLE-ACTING STEAM ENGINE.



SIDE ELEVATION, SECTIONAL, AND DETAIL VIEWS OF SIMPLE ENGINE.

MISCELLANEOUS INVENTIONS.

An improved finger ring has been patented by Mr. David Untermeyer, of New York city. The object of this invention is to furnish finger rings so constructed that they can be opened out to represent serpents, and which, when being worn, will give no indication of being anything more than rings.

An improved heel skate-fastener has been patented by Mr. Elijah S. Coon, of Watertown, N. Y. This invention consists, essentially, of a screw-threaded hollow plug or thimble, a dirt plate for covering the opening in the plug, and a spring for holding the dirt plate in place. This fastener possesses several advantages over one that is permanently attached to the heel. Being cylindrical, it is more easily connected, because the hole for its reception can be made with a common auger or bit without the necessity for lasting the boot or shoe or using a knife or chisel. Being screw threaded it can be readily screwed into place with a common screwdriver; this also enables it to be screwed either in or out, in order to make it fit the heel key. The screw thread permits of screwing it in beyond the surface of the heel, so as to prevent it from wearing out by the ordinary wearing of the shoe.

An improved velocipede has been patented by Messrs. Charles E. Tripler and William H. Roff, of New York city. The object of this invention is to obtain a more advantageous application of the propelling power than the ordinary cranks, to avoid the noise of pawls and ratchets, and to guard the velocipedes against being overturned should one of the rear wheels pass over an obstruction.

Mr. Philip H. Paxon, of Camden, N. J., has patented a machine that will cut lozenges in a perfect manner, and will not be clogged by the gum and sugar of the lozenge dough.

Mr. John H. Robertson, of New York city, has patented an improved mat, which consists of longitudinal metal bars provided with alternate mortised and tenoned ends, and composed of series of sockets united by webs and of wooden transverse rods entered through said sockets and held therein by vertical pins.

Mr. Charles F. Clapp, of Ripon, Wis., has patented a novel arrangement of a desk attachment for trunks. The desk and tray may be lifted from the trunk when the desk is either raised or lowered.

A combined scraper, chopper, and dirter has been patented by Messrs. Francis A. Hall and Nathaniel B. Milton, of Monroe, La. The object of this invention is to furnish an implement so constructed as to bar off a row of plants, chop the plants to a stand, and dirt the plants at one passage along the row, and which shall be simple, convenient, and reliable.

Mr. Hermann H. Cammann, of New York city, has patented a basket so constructed that it can be compactly folded for transportation or storage.

Messrs. David H. Seymour and Henry R. A. Boys, of Barrie, Ontario, Canada, have patented an improvement in that class of devices that are designed to be applied to steam cylinders for introducing oil or tallow into the cylinder and upon the cylinder valves. It consists of an oil cup provided with a gas escape, a scum breaker, an interior gauge, and an adjustable feed pipe extension.

Mr. John H. Conrad, of Charlotte, Mich., has patented a portable sliding gate which will dispense with hinges and which can be used in any width of opening. It may be readily connected with a temporary opening or gap made in the fence.

An improved reversible pole and shaft for vehicles has been patented by Mr. Francis M. Heuett, of Jug Tavern, Ga. The object of this invention is to so combine the parts of shafts for vehicles that they may be readily transposed and reemployed to form the tongue without removing the thill arms or hounds from the axle.