

E. COPE & J. R. MAXWELL.
Steam-Engine.

No. 226,600.

Patented April 20, 1880.

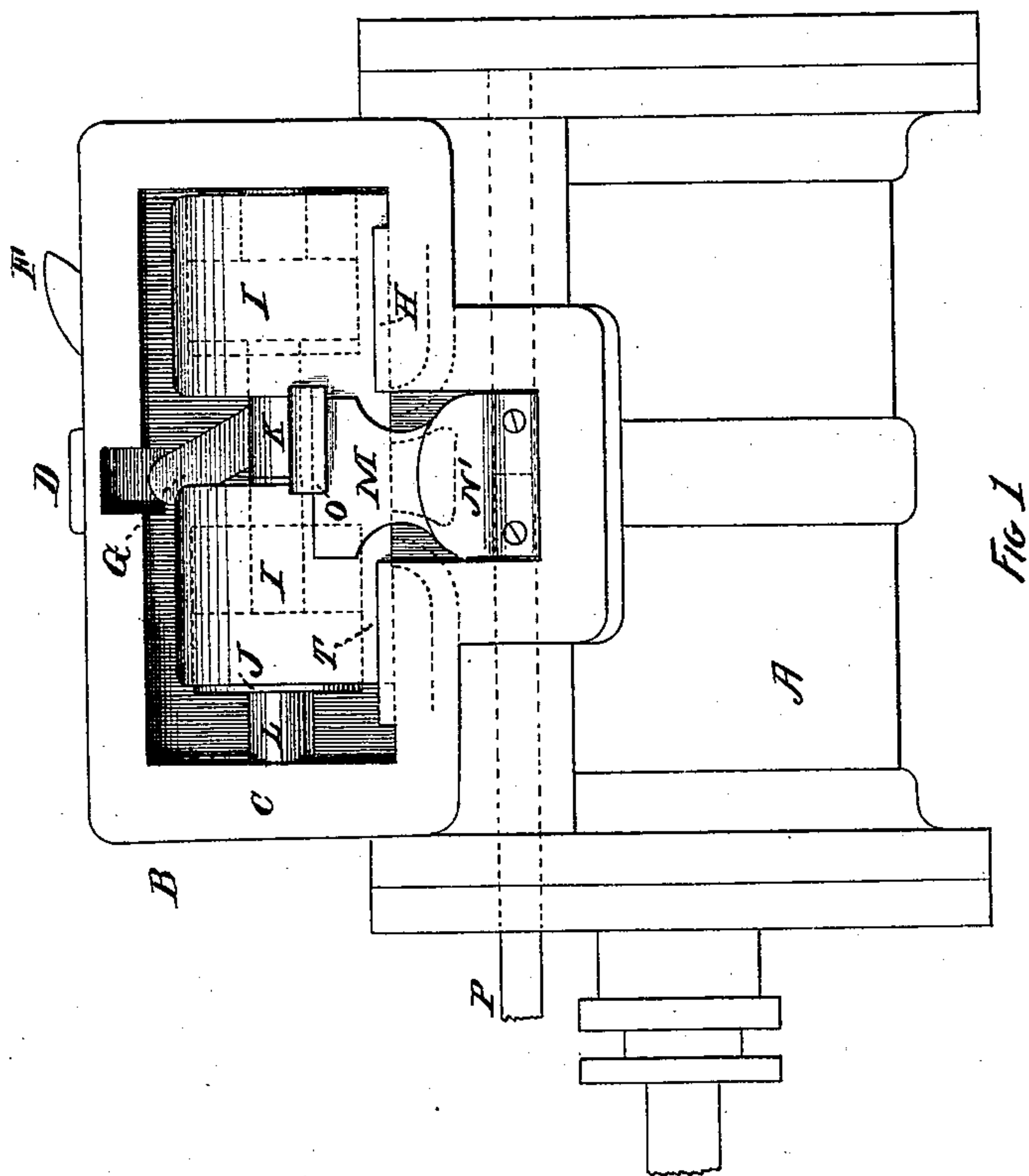


Fig 1

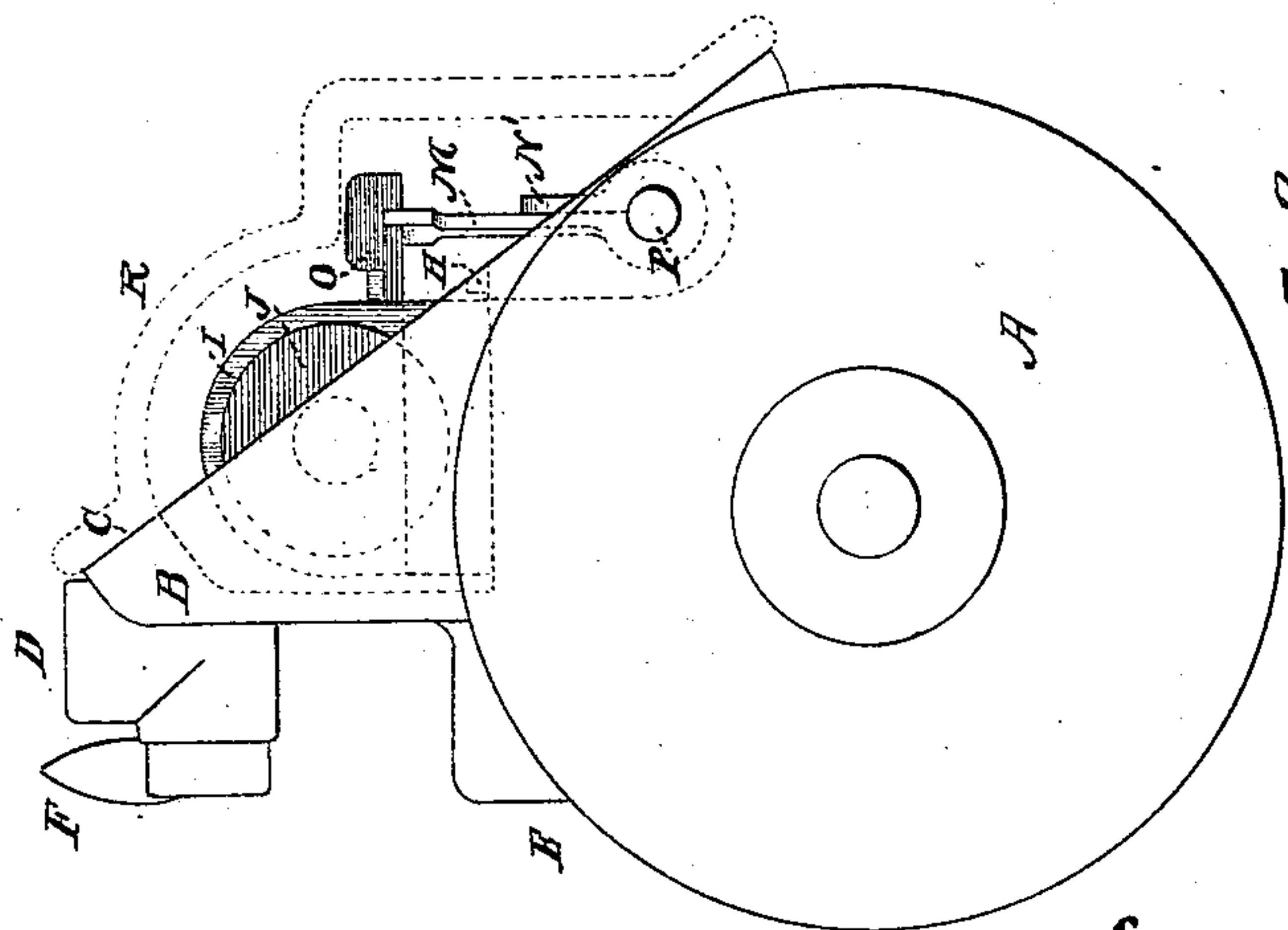


Fig 2

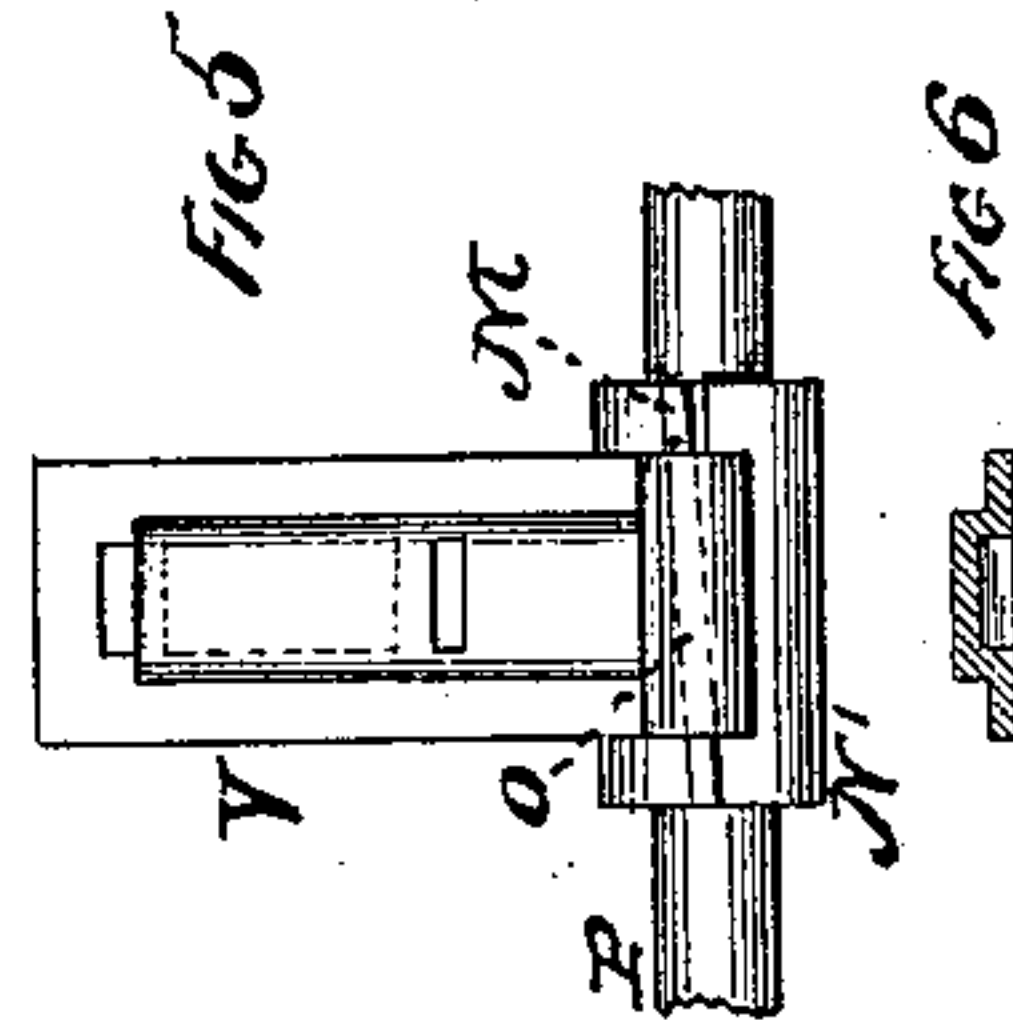


Fig 5

Fig 6

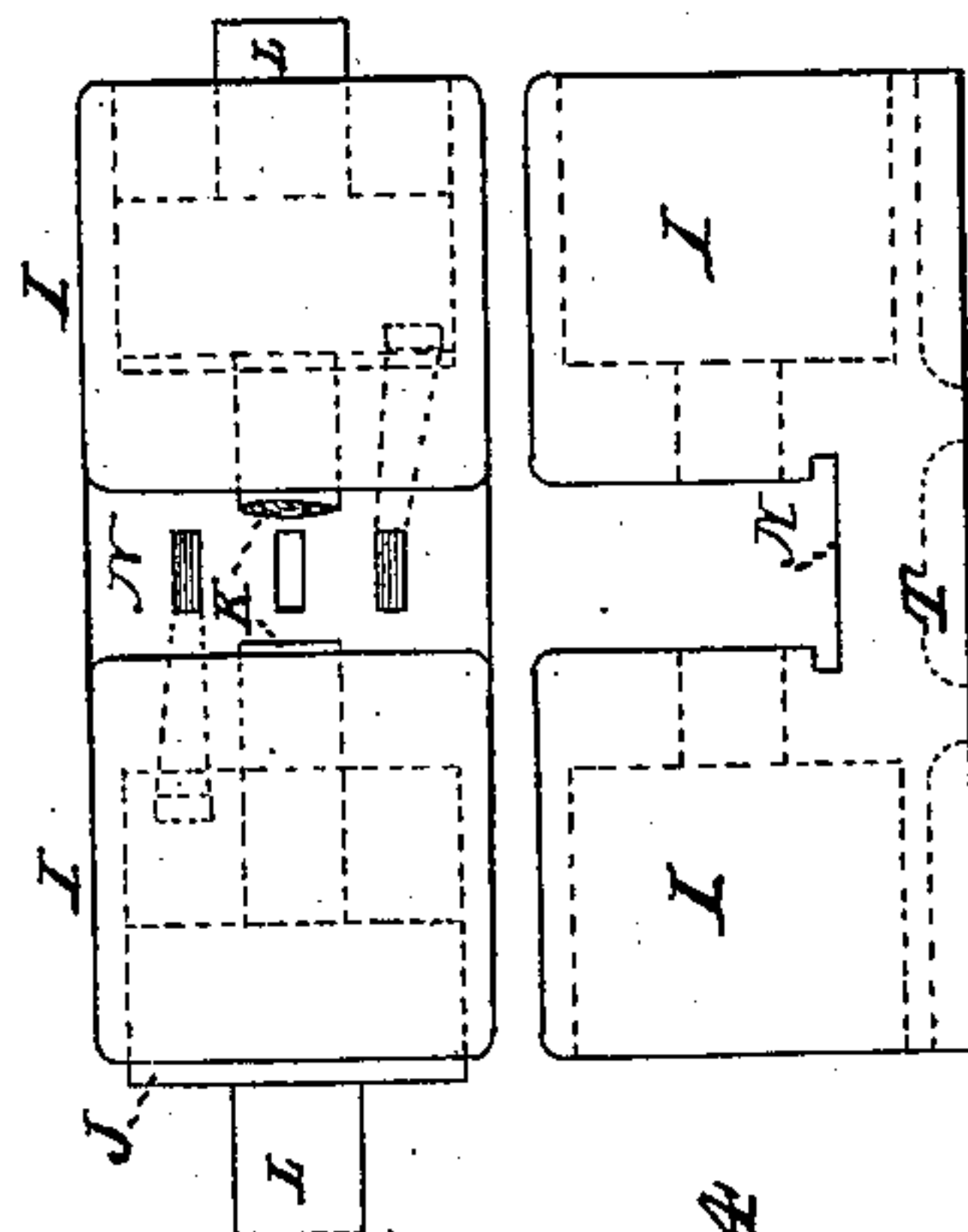


Fig 3

Fig 4

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EZRA COPE, OF HAMILTON, AND JAMES R. MAXWELL, OF CINCINNATI, OHIO.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 226,600, dated April 20, 1880.

Application filed January 6, 1880.

To all whom it may concern:

Be it known that we, EZRA COPE, of Hamilton, Ohio, and JAMES R. MAXWELL, of Cincinnati, Ohio, have invented certain new and
5 useful Improvements in Steam-Engines, of which the following is a specification.

Our invention relates to direct-acting engines having steam-moved valves; and it consists of a novel construction of the steam-chest,
10 of the main valve, of the rock-shaft finger, and of the auxiliary valve, as will be pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of the cylinder and steam-chest, the steam-chest cover being removed;
15 Fig. 2, a front elevation of the same; Fig. 3, a plan of the main valve and part of its attachments; Fig. 4, a side elevation of the main valve; Fig. 5, a plan of the auxiliary valve,
20 and Fig. 6 a transverse section of the same.

As shown in the drawings, the steam-chest B is cast upon the cylinder A. The joint between the steam-chest and its cover R is formed at an angle.

25 The valve-face is horizontal, as usual, and its character is as is common to steam-engines. At the top of the steam-chest is cast the admission-boss D. The exhaust-port terminates with the ordinary outlet-boss E.

30 The main valve is of that character, as will be hereinafter explained, which may be moved by hand through the medium of a hand-lever. This lever is shown at F. Its shaft is journaled in a boss cast upon the top of the steam-chest,
35 as shown.

A toe, G, is fixed upon the inner end of the hand-lever shaft. This toe engages with the main valve in any suitable manner.

In the inspection of the action of slide-valves
40 it is very desirable that the edge of the valve shall be exposed to view, so that while the valve is being moved by hand the varying conditions of the ports and valve may be adjudged by reference to the usual scratch-marks on the
45 valve and seat.

It will be noticed that by our improved plan of construction the side of the steam-chest is completely open when the cover is off, and that the edge of the valve and seat is in plain
50 view, unobstructed by steam-chest walls, mechanism, or shadow.

By reason of the peculiar combination of open chest and a hand-lever in its wall the lever can be used to work the valve while the valve is being inspected at its edge. When
55 it is desired to remove the valve the hand-lever mechanism does not in any way interfere. Were the valve moved by a stem, as usual, in addition to the hand-lever, it could be removed without removing the stem. This would be
60 effected by having the usual yoke open at the rear side, so the valve could slide out and leave the yoke, or the usual devices on the end of the valve-stem can be arranged to engage in pockets in the valve, said pockets being open
65 at the back.

The main valve T is of ordinary character so far as its face is concerned. It is moved by steam acting in auxiliary cylinders I, cast upon the back of it. These cylinders are open
70 at one end. Each cylinder contains an auxiliary piston, J. These pistons are stationary, and as the cylinders are open at one end they perform only the functions of a common single auxiliary cylinder.

75 The two auxiliary pistons J have central projections, L, which abut against the end walls of the steam-chest, and they also have central projections, K, which abut against each other. This allows of easy construction and ready re-
80 moval. The main valve being withdrawn from the steam-chest brings the auxiliary cylinders with it, and the auxiliary pistons can then be withdrawn from their cylinders. All bolts, screws, blocks, &c., are dispensed with about
85 the valve.

The two auxiliary cylinders stand a slight distance apart, and the bottom of the gap thus formed is utilized as the seat of the auxiliary
90 valve. This seat N is of the ordinary kind, the function of the auxiliary valve being to admit and release the steam used in the auxiliary cylinders.

The usual arrangement of ports between the seat N and the auxiliary cylinders accom-
95 plishes the usual result.

The walls of the gap are grooved at the seat N, as shown in Fig. 4. The edges of the auxiliary valve are formed to slide in these grooves. The office of the grooves is to keep the aux-
100 iliary valve from lifting.

It should have been stated that the main

valve is guided sidewise in its motion by ledges H, projecting upward from the main seat.

The auxiliary valve V moves transversely with reference to the main valve. Its movement is effected by the rock-shaft P, which is slightly rotated at each end of each stroke of the main piston. This rotation may be effected in any of the usual ways by outside tappets on the main rod or by tappets within the main cylinder.

The rotation of the rock-shaft is caused to reciprocate the auxiliary valve V through the medium of the finger M, which engages with a notch or groove formed in the under side of a head, O, cast upon the auxiliary valve.

The acting edge of the finger M is of such length as to permit the proper travel, or incidental motion rather, of the auxiliary valve as it is carried along by the main valve. Should the main valve start to move before the auxiliary valve has moved far enough to open a full port, the auxiliary valve continues to open. This is effected by inclining the acting edge of the finger M, as shown in the drawings, so that the travel of the main valve causes travel of the auxiliary valve in an obvious manner. The auxiliary valve can be quickly withdrawn from its seat, when desired, for inspection, there being no screws or bolts to remove.

The finger M is bored at its lower end to receive the rock-shaft P. The hub of the finger, instead of being solid, is split upon the upper side, as shown in Fig. 2 at N', and is thus caused to act as a clasp, which may be tightened upon the rock-shaft by the same screws which secure the finger against rotation upon the rock-shaft, or by other screws should pins or feathers be used for the latter purpose. This method of attachment allows of rigid attachment and easy removal. The finger M is located within a pocket cast in the bottom edge of the steam-chest, and this pocket is open to plain view upon the removal of the steam-chest cover.

The simplicity of construction and ready accessibility of the parts are secured in an extraordinary degree by the arrangement of our device.

We claim as our invention—

1. In a steam-engine, the combination, with a steam-chest having its cover-seat at an angle to the valve-face, of a hand-lever for operating the valve by hand, a toe engaging with the valve for the purpose of transmitting the lever motion to the valve, and a spindle journaled in the side wall of the steam-chest, and having said lever attached to one of its ends and said toe attached to the other end, substantially as set forth.

2. The steam-chest B, having its cover-seat C at an angle to the valve-face when formed with the open finger-pocket at the lower edge, substantially as shown, as specified.

3. In a steam-engine in which the auxiliary valve travels transversely to and is carried by the main valve, the actuating-finger M, having its acting edge set at an incline to the line of travel of the main valve, substantially as set forth.

4. In a steam-engine, the combination, with a main valve having a pair of auxiliary cylinders attached to and moving with it, of a pair of pistons fitting within said cylinders and provided with stems abutting against each other and the end walls of the steam-chest, and an auxiliary valve-seat arranged in the gap formed between said auxiliary cylinders, substantially as set forth.

5. The auxiliary valve V, sliding between the auxiliary cylinders I, and prevented from lifting by grooves in the cylinder-heads, substantially as set forth.

6. In a steam-engine, the steam-chest B, having its cover-seat C in a plane parallel with the line of travel of the main valve, and so inclined to the transverse plane of the main valve-seat as to leave the side of the steam-chest entirely open when the cover is off, whereby the edge of the main valve is exposed to plain view while in position, substantially as set forth.

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