(No Model.)

W. H. LAWRENCE.

ENGINE GOVERNOR.

No. 487,224. Patented Nov. 29, 1892.

Fig. 1.

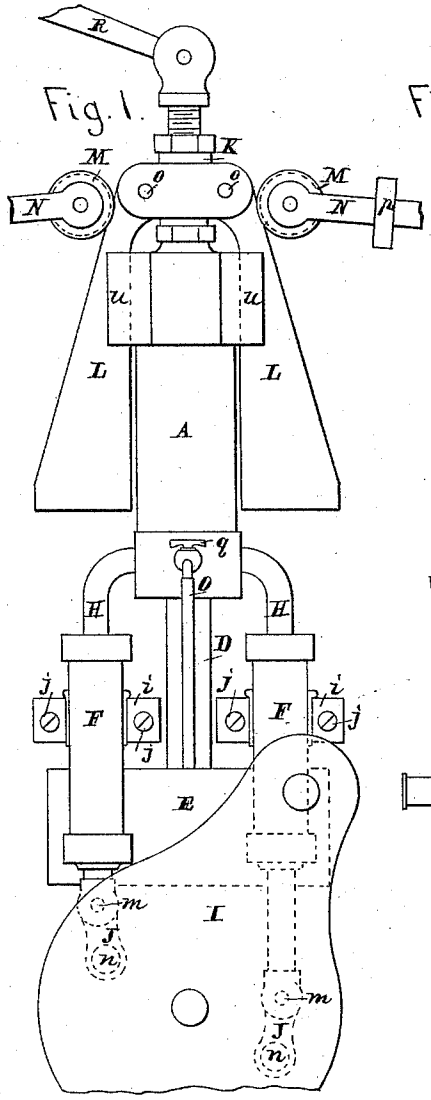

Fig. 2.

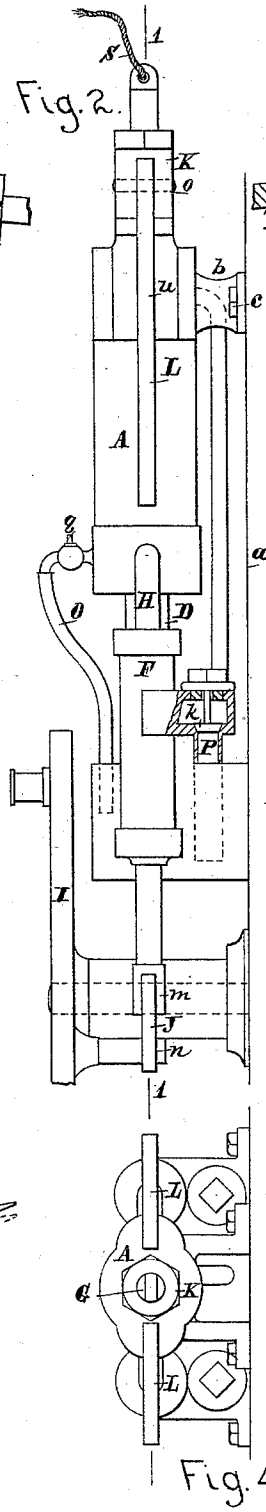

Fig. 3.

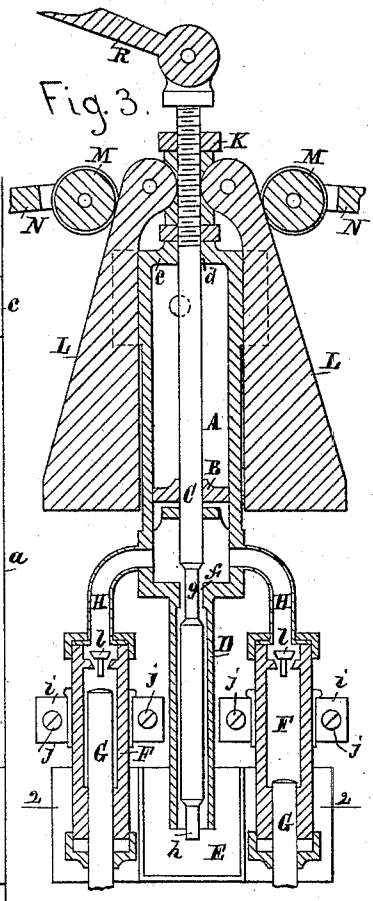

Fig. 6.

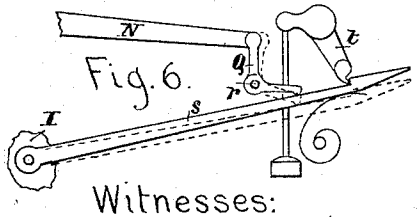

Fig. 5.

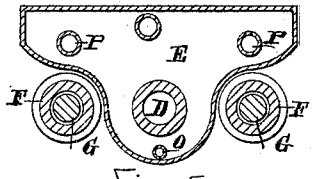

Fig. 4.

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ENGINE-GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 487,224, dated November 29, 1892.

Application filed March 17, 1892. Serial No. 425,322. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. LAWRENCE, a citizen of the United States, residing at Newburyport, in the county of Essex and State of Massachusetts, have invented a new and useful Stop-Motion, of which the following is a specification, reference being had to the accompanying drawings.

My invention has for its object mechanism which is applicable to a steam-engine or other engine or machine for stopping the engine or machine when there is an excess of speed.

The invention consists in the devices and combinations of devices hereinafter set forth, and specifically pointed out in the claims.

In the drawings, Figure 1 is a front elevation of mechanism embodying my invention. Fig. 2 is a side view of the same. Fig. 3 is a section of certain parts, taken in the direction of lines 1 1 in Fig. 2. Fig. 4 is a plan of certain parts. Fig. 5 is a section taken on line 2 2 in Fig. 3. Fig. 6 illustrates connection of one of the thrust-rods with hook-rod and valve-lever of a well-known engine.

Held, preferably in a vertical position, as against a support, (indicated by the line *a*,) by means of stands *b* and screws *c*, is a cylinder A, having therein a piston B. This piston has a rod C, which extends upward through a bearing at *d* therefor in the head *e* of the cylinder and extends downward through an opening in the other end of the cylinder into a tube D, fixed to the cylinder and opening at its lower end into a tank E. A part of the piston-rod fits closely the opening *f* from the cylinder to the tube. At the required places *g* and *h* the piston-rod is made of less diameter than the opening at *f*.

Situated in suitable relation to the cylinder A are two pumps secured to the fixed support *a*, as by means of stands *i* and screws *j*. I prefer to employ plunger-pumps, each having a barrel F, plunger G, an inlet-valve *k*, and an outlet-valve *l*. Above the outlet-valve an opening extends from each pump to the cylinder A below the piston B, as by means of a pipe H. Each plunger, working closely in the lower end of the pump-barrel, is connected with rocker I, as by means of a link J, pivoted at *m* to the plunger and at *n* on a pin fixed to the rocker. On the piston-rod, outside of the cylinder A, is adjustably secured a collar K, the rod and collar being threaded, as shown. To this collar are pivoted oppositely at *o o* two beveled pieces or wedges L. Against the outer face of each of these wedges bears the friction surface or roll M of a thrust-rod N, which may slide in suitable bearings, one of which is shown at *p*. From the cylinder A, below the piston, extends another opening to the tank E, as by means of a pipe O. This opening may be closed by means of a cock *q*. A pipe P also extends from the tank E to the inlet-valve of each of the pumps.

By oscillation of the rocker I the pumps will be operated and liquid in the tank E will be forced into the cylinder A below the piston B. If the cock *q* is closed and the annular opening at *f* from the cylinder to the tube D and around the smaller part *g* of the rod C, which smaller part is shown in the drawings as in the opening *f*, is rightly proportioned with reference to the desired limit of speed, the liquid will flow from the cylinder A down the tube D into the tank E as fast as it is pumped into the cylinder when the speed is below said limit and the piston B will not be forced upward; but if the speed is increased beyond said limit the liquid will not flow out of the cylinder as fast as it is forced therein and the piston will be forced upward a sufficient distance to cause the larger part of the rod C to enter the opening *f* and fill the same, thus acting as a valve, and thereupon the piston will be more rapidly forced a longer distance upward (since no liquid flows from the cylinder) and until the smaller portion *h* of the piston-rod enters the opening *f*, when owing to the flow of the liquid through this opening the pressure on the piston will be only such as to cause it to remain in the position to which it has been forced. Owing to such motion of the piston and piston-rod, the wedges L will be moved so as to cause the thrust-rods N to slide for stopping the motive machine. If such machine be a steam-engine of well-known construction, wherein the wrist-plate may be the rocker I, by attaching the outer end of a thrust-rod N to a lever Q, pivoted at *r*, whereby the reciprocating hook-lever *s* of such engine is pressed away from engagement with the valve-lever *t*, as illustrated in Fig. 6, steam will be shut off, and therefore the en-

gine stopped. To restore the piston to position for another action for stopping, the liquid is drawn from the cylinder by means of the cock *q*. The required movement of piston and rod C connected therewith for stopping may be made by hand, either by means of a lever R (shown in Figs. 1 and 3) or by a cord S, (shown in Fig. 2,) which, being suitably guided, may extend and be pulled at any convenient distance.

It will be seen that only one wedge L would be needed in many cases and that when two wedges are used one might be employed for moving one valve or other device for stopping, while the other wedge and thrust-rod might be employed for closing another valve or operating another stopping device. Such stopping device may be an ordinary shipper or other known instrument for stopping a motive or other machine.

I pivot each wedge L to the piston-rod and provide a slot or socket at *u*, in which the wedge may move while being maintained in suitable position, simply to secure accurate and well-balanced actions; but the wedge might be fixed rigidly to the piston-rod.

Other well-known means for working the pumps or one pump only might be employed, and the relative position of pumps and cylinder might be changed, as would occur to one of ordinary mechanical skill, and the essential features of my invention be retained. Since the portion of the piston-rod of larger diameter performs the office of a valve, it may be regarded simply as a valve connected with and to be moved by the piston for closing the outlet of the opening from the cylinder to the tube D or waste-pipe and tank. It should be further noted that while I prefer to pump into the cylinder liquid and that the liquid should be oil air might be employed with like action and result.

I claim as my invention—

1. The combination, with a cylinder, a piston therein having a piston-rod, a valve to move with the piston, and an apparatus for forcing liquid or air into said cylinder at the same side of the piston as the opening in the cylinder governed by said valve, of a wedge connected with said piston and a thrust-rod, substantially as specified.

2. The combination of a cylinder, a piston therein, and a rod for said piston extending on each side of the piston outward from the cylinder, the part of said rod on one side of the piston being of different diameters or sizes to govern an opening in the end of cylinder through which said rod extends, substantially as specified.

3. The combination of a cylinder closed at one end and having an opening in the other end, a piston in said cylinder, and a rod of different diameters or sizes, connected to said piston and extending through to govern said opening, substantially as specified.

4. The combination of a cylinder, a piston therein having a rod connected with said piston and extending in both directions therefrom to fit and move in an opening in one end of the cylinder and open and close the opening in the other end of the cylinder, a wedge connected with the piston-rod, to be moved thereby, and a pump to force liquid or air into the cylinder, substantially as specified.

5. The combination of a cylinder, piston and piston-rod, a wedge connected with the piston-rod, and a thrust-rod to be moved by said wedge, a valve connected with the piston, and an outlet in said cylinder to be governed by said valve, an inlet on the same side of the piston as said outlet, another outlet opened or closed by a cock, and a pump for forcing liquid or air into the cylinder through said inlet, substantially as described.

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