

(No Model.)

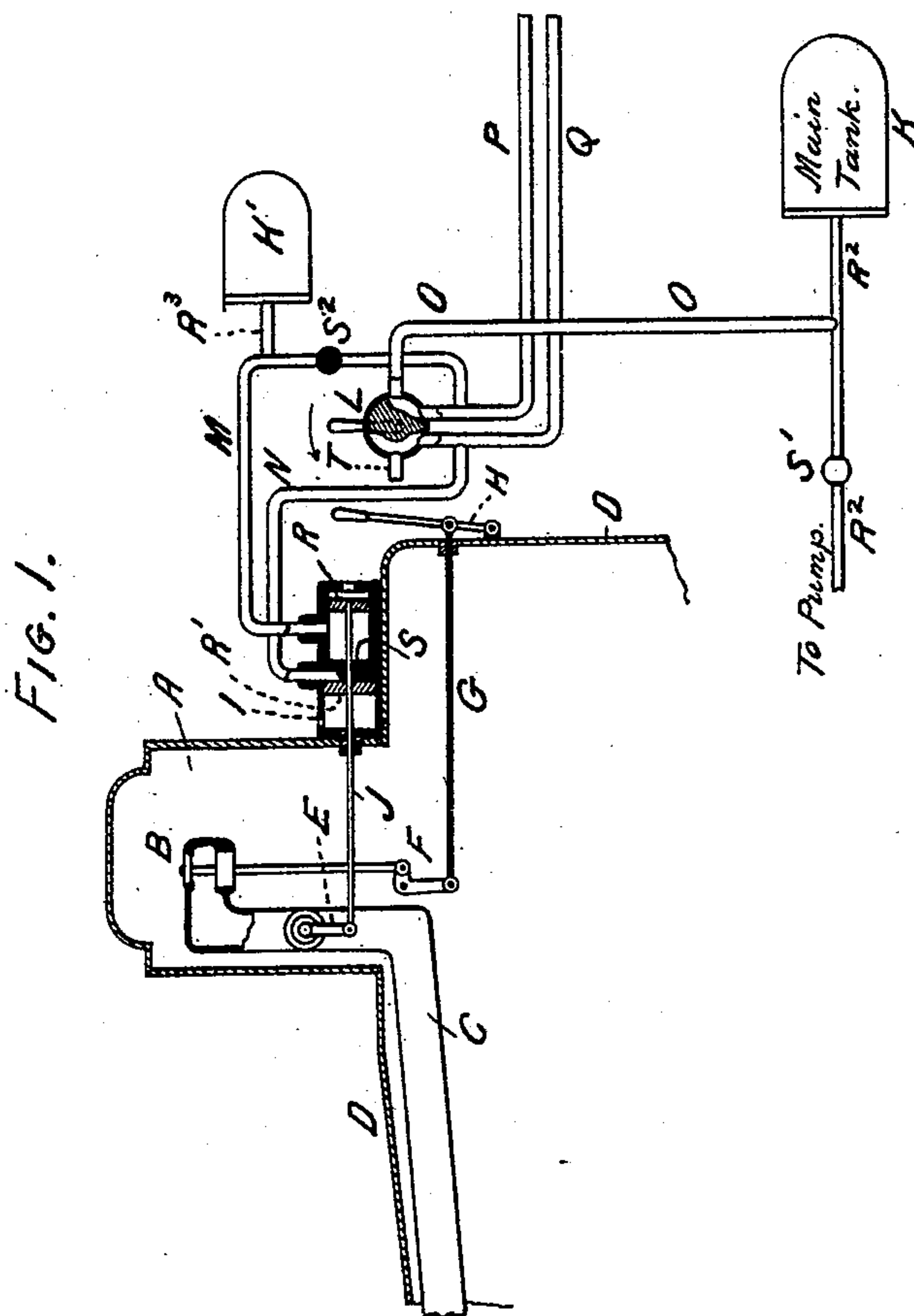
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F. E. KINSMAN.

MEANS FOR AUTOMATICALLY OPERATING THROTTLE VALVES FOR  
STEAM ENGINES.

No. 470,825.

Patented Mar. 15, 1892.



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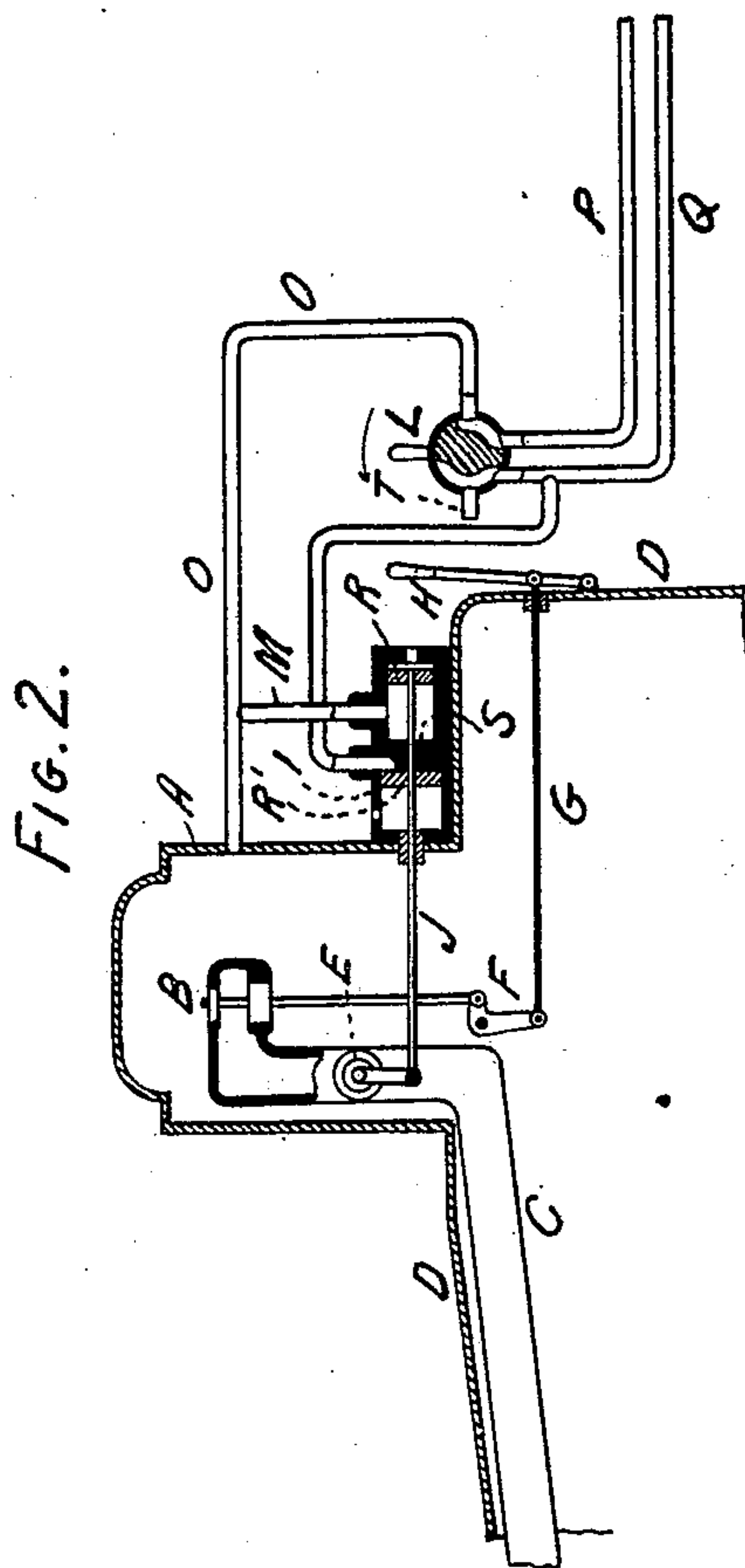
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# UNITED STATES PATENT OFFICE.

FRANK E. KINSMAN, OF PLAINFIELD, NEW JERSEY.

MEANS FOR AUTOMATICALLY OPERATING THROTTLE-VALVES FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 470,825, dated March 15, 1892.

Application filed July 16, 1890. Serial No. 358,920. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK E. KINSMAN, a citizen of the United States, and a resident of Plainfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Means for Automatically Operating Throttle-Valves for Steam-Engines, of which the following is a specification.

My invention consists in a novel combination of parts whereby the throttle-valve of a steam-engine may under normal conditions be actuated by a hand-gear, and in certain contingencies be automatically operated independently of said hand-gear upon the setting of the brakes, or, in practice, probably a little sooner.

The invention also consists in certain novel combinations of parts whereby the more effective operation of an apparatus embracing the aforesaid features of my said invention is secured.

In the accompanying drawings, Figure 1 is a diagrammatic view, partly in section, showing my invention applied to a locomotive and combined with an automatic air-brake system. Fig. 2 is a similar view showing my invention combined with the steam-boiler of the engine. Fig. 3 is a similar view and showing my invention combined with another form of air-brake mechanism. Fig. 4 is an enlarged sectional view of one of the operating-cylinders.

In the practice of my invention I prefer to employ it in connection with an air or steam brake system; but it is obvious that the broad principle of automatically controlling the auxiliary throttle-valve or the main throttle-valve to shut off the steam-supply to the operating-cylinders may be carried into practical effect by means of any of the well-known brake systems.

In Figs. 1 and 2 of the drawings, A represents the steam-dome of the locomotive; B, the main throttle-valve; C, the pipe for conveying steam to the steam-cylinders; D, the main body of the locomotive; E, an auxiliary throttle-valve; F, a bell-crank lever for operating the main valve B, and H a hand-lever for operating said bell-crank lever F by means of the connecting-rod G. The auxiliary throt-

tle-valve E is controlled and operated by means of a valve I, of cylindrical form and peculiar construction, and this valve I is in turn operated, as will presently be described, by means of the engineer's brake-valve L and the system of piping M N O P Q, forming part, in Fig. 1, of an automatic air-brake system, and in Fig. 2 of a steam-brake system.

In the arrangement shown in Fig. 1 the various parts are in the normal position of disuse when all the valves are closed and the steam is shut off. In this position the engineer's brake-valve L is so turned that the outlet T, which opens to the outer air, is connected to the pipe Q, and also through Q to the pipe N. This causes any pressure that might have existed against the face of the piston-head R' of the valve I to be removed. The pressure-pipe O, however, is connected through the valve L to pipe M, as shown, and by M to the face of the piston-head R, thereby keeping the piston in the position shown and the valve E closed, and this condition of things will be maintained so long as the brakes on the train which are operated by pipes P and Q remain on, and by this means prevent any steam from being admitted by valve B into the steam-pipe C and thence to the steam-cylinders of the engine. When it is desired to start the engine, the engineer must first release his brakes, which is done by turning the valve L in the direction of the arrow, thereby closing the air-outlet T and connecting both P and Q to the other main pressure-pipe O. It will be noticed that the piston-head R' is larger in area than the piston-head R, and that the valve I is divided into two parts by a diaphragm S, while the two pipes P and Q are both connected to the pressure-pipe O, and by O to the main pressure-tank K, whose pressure is constantly maintained by a pump operating through pipe R<sup>2</sup>. S' is a check-valve to prevent the pressure in the tank K from escaping should anything happen to the pump. In this way air-pressure is admitted by means of pipes M and N to both sections of cylinder I and press upon both piston-heads R and R', as shown; but R', being the larger in area, has a greater pressure exerted upon it than there is upon R, and by the difference of these pressures the pistons R' and



R, and with them a crank-rod J, are moved back and the valve E is opened by the rod J, thereby permitting steam to be passed through C, when the valve B is opened by the hand-lever H and rod G and bell-crank lever F. While the train is running and the parts are in the position just described, if the train should part the brakes would be automatically set and at the same time the pistons in valve I would be operated and act to resume the position shown in Fig. 1, and thereby close the valve E, automatically shutting off the steam from pipe C. This action of the pistons in valve I takes place because when the train parts, as pipe Q will be opened to the external air, relieving the pressure on piston-head R', and, although pipe P is also open to the air, the pressure will still be kept up in pipe M and against piston-head R by the pressure from the auxiliary tank K' through pipe R<sup>3</sup>. The pressure in tank K' is prevented from diminishing or escaping by the check-valve S<sup>2</sup>, and this pressure operating on piston-head R will force the piston-heads R' and R into the position shown in the drawings and thereby close the auxiliary valve E and shut off the steam-supply to the cylinders. Fig. 2 illustrates a similar arrangement, only in this case steam-pressure from the steam-dome A is used instead of air-pressure, as in Fig. 1; but the operation is the same.

In Figs. 3 and 4 is illustrated an arrangement of the mechanism whereby it is only necessary to have one valve B instead of the valves B and E, as shown in Figs. 1 and 2. This is accomplished by a peculiar arrangement of connecting-rods J<sup>2</sup> and G' and operating-valve I<sup>3</sup>. In this case the piston-head R<sup>4</sup> of the operating-valve I<sup>3</sup> is connected by a tubular connecting-rod G' to the bell-crank lever F, and sliding in this tubular rod G' is a rod J<sup>2</sup>, connected to the hand-lever H, and on the rod J<sup>2</sup> is a circular groove c. The piston-head R<sup>4</sup> is hollow and is fitted with plungers a a, which are pressed into the groove c by springs b b. The pressure of these springs b b is so regulated that when everything is in its normal condition the pressure on both sides of piston-head R<sup>4</sup> will be balanced by the pressure received through pipes M and N, and their grip upon rod J<sup>2</sup> will be sufficient to allow the engineer, by means of the hand-lever H, to move rod J<sup>2</sup>, and with it piston-head R<sup>4</sup> and connecting-rod G', and so open valve B; but in case the brakes are operated either by the engineer turning the brake-valve L or by the parting of the train, as already described, the pressure through pipe N will be removed from one face of the piston-head R<sup>4</sup>, and the pressure exerted upon its other face through pipe M will overcome the grip of the plungers a a upon rod J<sup>2</sup> and force the piston-head R<sup>4</sup> back and along rod J<sup>2</sup>, and so, by means of the connecting-rod G', bell-crank lever F, and rod W', automatically close valve B. When the lever H is moved back and pushes the rod J<sup>2</sup> in, the plungers a a again

engage with the groove c, and when the brake-valve L is properly set the valve B can again be opened, as before described.

In the forms of the devices shown in the figures above described the specific means for controlling the flow of steam to the engine-cylinders are equivalents in the broad sense, and when considered with reference to the actuating mechanism—that is to say, whether there be one valve or two valves for controlling the steam—the generic idea involved in the device as a whole is not changed. I therefore term the single valve of Fig. 3 and also the two valves of Figs. 1 and 2 “steam-controlling means,” and when a valve of this steam-controlling means is mentioned in the claims the term “valve” will have reference to the valve of Fig. 3, or to either of the valves of Figs. 1 and 2.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with a throttle-valve placed in the steam-passage leading to the engine-cylinders and with the hand-lever of said valve, of an intermediate pressure-cylinder I<sup>3</sup>, a piston R<sup>4</sup>, having the piston-rod G', the hand-gear stem J<sup>2</sup>, devices for locking said stem to said piston-rod and for permitting the backward throw of the piston, and devices for transmitting motion from the piston-rod to the throttle-valve, whereby the latter may be designedly operated under normal conditions by the hand-lever and automatically operated by excess or preponderance of pressure upon one side of the piston, substantially as described.

2. The combination, with a throttle-valve placed in the steam-passage leading to the engine-cylinders and with the hand-lever of said valve, of an intermediate pressure-cylinder I<sup>3</sup>, the piston R<sup>4</sup>, a piston-rod to said piston G', the hand-gear stem J<sup>2</sup> and spring-clutches connecting said stem and piston, but permitting on occasion the backward throw of the piston with reference to said stem, and mechanism for transmitting motion from the piston-rod to the throttle-valve, substantially as described.

3. The combination, with a throttle-valve placed in the steam-passage leading to the engine-cylinders and with the hand-lever of said valve, of an intermediate pressure-cylinder I<sup>3</sup>, piston R<sup>4</sup>, tubular piston-rod G', hand-lever stem having recesses c and extended into the said tubular piston-rod, and the gripping-jaws a a and springs b b, placed in suitable cavities in the piston, all substantially as described.

4. The combination, with the steam-pipe leading to a cylinder, of means for controlling the steam in said pipe, a hand-lever and a piston-motor, the lever and motor being capable of independent movement and each having means for connecting it with a valve of the steam-controlling means, a brake system or apparatus, a valve (an engineer's valve) for controlling the brake apparatus, and means



controlled by said valve for causing a preponderance of pressure upon one side of the motor, substantially as described.

5 The combination, with the steam-pipe leading to an engine-cylinder, of means for controlling the steam in said pipe, a hand-lever and a piston-motor, the lever and motor-piston being capable of independent movements, the one being connected to the other  
10 by the slip-joint and the motor-piston having connection with a valve of the means for controlling the steam, a brake system or ap-

paratus, a valve for controlling the brake apparatus, and means controlled by said valve for causing a preponderance of pressure on 15 one side of the motor-piston, substantially as described.

Signed at New York, in the county of New York and State of New York, this 25th day of June, A. D. 1890.

FRANK E. KINSMAN.

Witnesses:

E. R. KNOWLES,  
E. IRVING CARR.