(No Model.) 2 Sheets—Sheet 1.

J. D. P. SCHENCK.

GOVERNOR FOR AIR BRAKES.

No. 488,369. Patented Dec. 20, 1892.

FIG. 1.

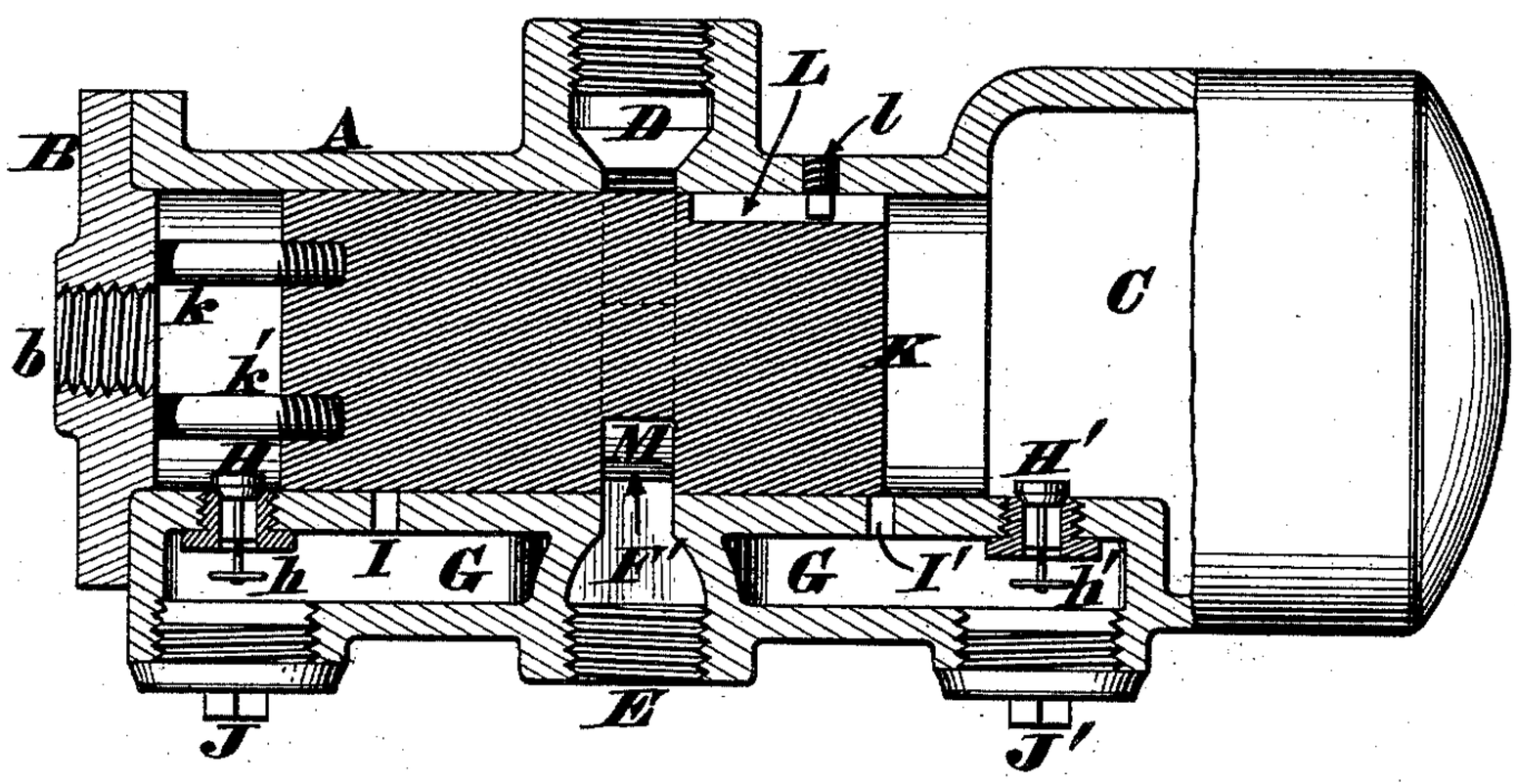


FIG. 2.

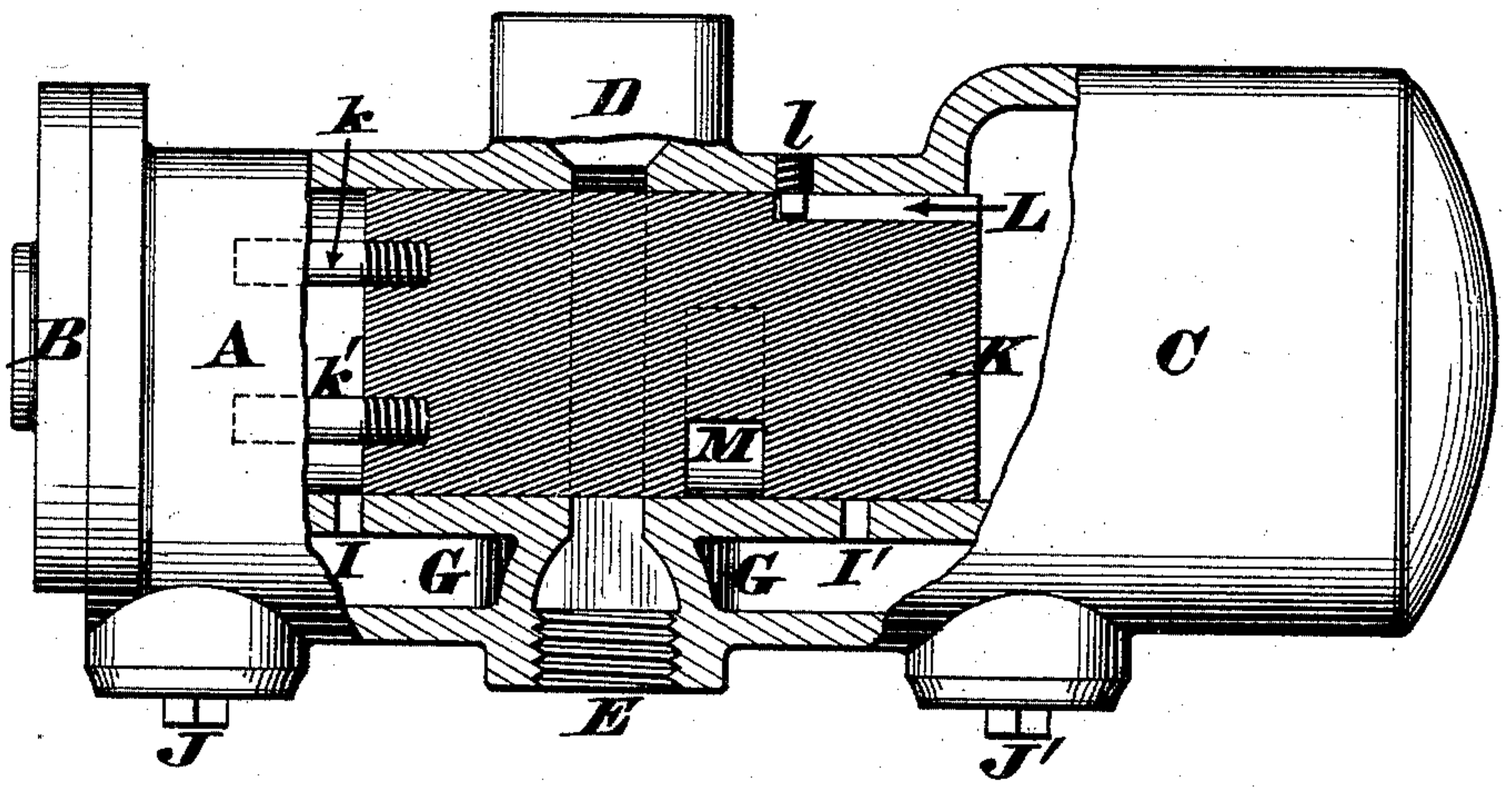
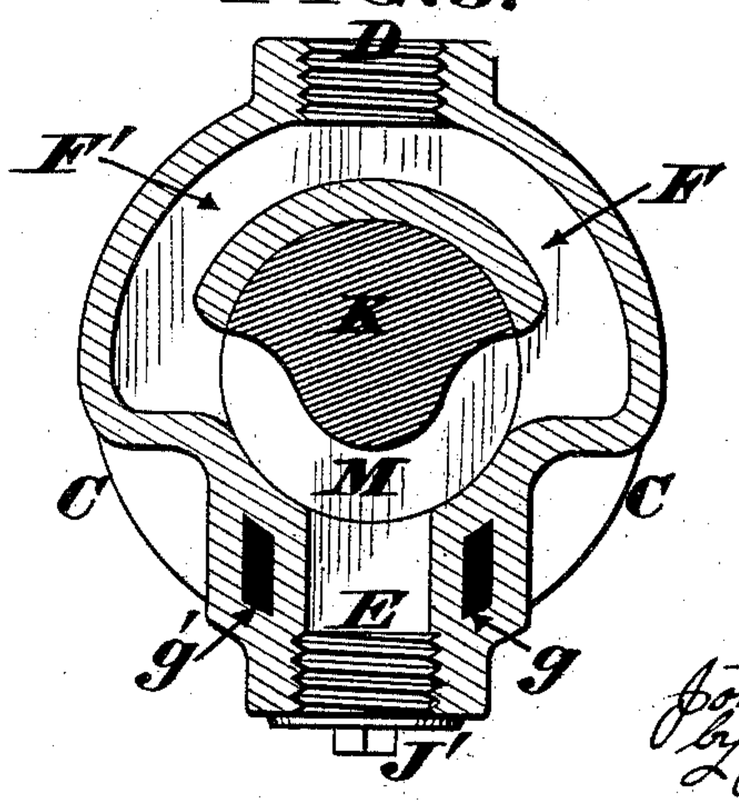


FIG. 3.



Attest,
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(No Model.) 2 Sheets—Sheet 2.

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FIG. 4.

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UNITED STATES PATENT OFFICE.

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GOVERNOR FOR AIR-BRAKES.

SPECIFICATION forming part of Letters Patent No. 488,369, dated December 20, 1892.

Application filed March 1, 1892. Serial No. 423,329. (No model.)

To all whom it may concern:

Be it known that I, JOHN D. P. SCHENCK, a citizen of the United States, residing at Nashville, in the county of Davidson and State of Tennessee, have invented certain new and useful Improvements in Steam-Governors for Air-Brakes; and I do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the annexed drawings, which form part of this specification.

My invention comprises a steam governor that has been designed more especially for use with air-brakes on railroad trains, although it may be employed with equal advantage for regulating the actions of other appliances operated by steam, gas or compressed air, &c. As generally employed, the governor is applied to a pipe that furnishes steam to the cylinder of an air-brake pump, and when the pressure in the air-reservoir reaches a certain limit, the governor automatically shuts off the supply of steam, and thereby stops the pump. As soon, however, as the pressure of air in the reservoir is reduced below the proper limit, the governor automatically lets on the steam and sets the pump in motion, as hereinafter more fully described.

In the annexed drawings,—Figure 1 is a vertical section of my improved governor, the valve of the same being open to permit a free passage of steam. Fig. 2 is a sectionized side elevation of the governor, the valve being closed to shut off the supply of steam. Fig. 3 is a transverse section of the governor taken in the plane of its inlet and outlet passages. Fig. 4 is a sectionized elevation showing the general arrangement of the steam governor, air-reservoir pressure-regulator, and pipe connections.

A represents a horizontal cylinder, having at one end a head B, and provided at its opposite end with an enlarged closed-chamber C, for a purpose that will presently appear. Head B is tapped at *b* for attachment of one end of a pipe leading to an air reservoir pressure regulator of any approved brake system.

D, is the steam inlet and E the outlet of the cylinder, which passages are connected by a pair of semi-annular channels F, F′, the latter being more clearly seen in Fig. 3.

Arranged longitudinally of cylinder A, and under the same is a channel G, having side branches *g*, *g′*, to clear the outlet E, and this channel communicates with said cylinder by means of two valves H, H′, and a pair of valveless-ports I, I′. These valves have a limited vertical-movement and close against detachable seats *h h′*, screwed into the lower side of the cylinder, access being afforded to said seats and valves by unscrewing the caps J, J′.

Adapted to have a limited stroke within the cylinder A, is a piston K, having at one end a pair of stops *k k′*, capable of striking against the inner side of head B, and thereby arresting the advance of said piston, the return stroke of the same being regulated by a groove L, and screw pin *l*. This groove is cut along the upper side of piston K, and prevents it turning around within the cylinder.

M is a practically semi-annular channel in the under side of the piston.

In fitting up this governor a pipe *d* is led from the locomotive boiler to the inlet D, and another pipe *e* is led from the outlet E to the steam cylinder that drives the air-pump or compressor. A pipe *b′* is also led from the air reservoir pressure-regulator and connected to the cylinder head B, which pressure-regulator *b′* must be provided with a pair of automatic valves, one of which will open when the pressure in the air reservoir is reduced—say to seventy pounds, while the other valve will open when a certain pre-determined pressure is reached, say ninety pounds to the square inch. Now, until this pressure is reached, or slightly exceeded, all the operative parts of the governor occupy the normal positions seen in Fig. 1, the piston K being advanced, and its stop pins *k*, *k′*, brought in contact with the head B, thereby causing the channel M, of said piston to communicate with the channels F, F′, of cylinder A, as seen in Fig. 3, the port I′, of said cylinder being partially uncovered. Therefore, when the throttle-valve is opened, steam will traverse the pipe *d*, enter the inlet D, flow around the chan-

nels F, F′, enter the opposite ends of channel M, and thereby reach the outlet E. From this outlet the steam passes through the connecting pipe *e* to the steam cylinder and thus works the pump as long as may be necessary to keep up the required pressure in the air reservoir N, seen in Fig. 4 at which moment the valve O opens and allows compressed air to enter the front end of cylinder A. This air can not escape through the valve H, because it opens upwardly, and therefore, the only result is to drive the piston K, as far back within the cylinder as the groove L and stop *l* will permit. As the piston recedes within the cylinder, the port I′, is closed, and the channel M brought to a position where it no longer communicates with the channels F, F′, and by the time said piston has completed its backward stroke the port I will be uncovered. Compressed air will then pass through this port to the channel G, traverse the latter, open the valve H′, and enter the chamber C, thus establishing a uniform pressure at each end of piston K. This retracted position of the piston is seen in Fig. 2, reference to which illustration shows that the channel M is no longer in a position to connect the channels F, F′, with the outlet E, and on this account, the supply of steam to the pump is cut off. As the capacity of chamber C, is relatively greater than that portion of cylinder A, traversed by piston K, while moving back, there is comparatively little compression of air behind said piston, and therefore it is shifted by a very slight excess of air pressure. But when the pressure in the air reservoir N is reduced, say to seventy pounds to the square inch, the valve P opens, thus causing a corresponding reduction in pipe *b′*, and then the ninety pounds pressure, accumulated in chamber C, instantly advances the piston K to its normal position, and the pump is at once started by admitting steam to the cylinder, as previously described. When steam is flowing through the governor, it exercises an upward pressure within the channel M, the result being to overcome the weight of piston K, and leave it free to respond the instant air is admitted in front of it.

The air-reservoir pressure-regulator may be of any approved construction, a simple form the same being seen in Fig. 4, where S is a casing secured upon a reservoir N, communication being afforded between these two members, N and S by coincident ports *n*, *n′*, *s*, *s′*. The ports *n*, *s*, open into the end chamber T of the casing, while the other ports *n′*, *s′*, lead into another end chamber U.

V is a chamber located between these two chambers T, U, and having the pipe *b′* connected to it.

v is a port leading from chamber V, into the chamber T, which port is normally closed by the valve P, the latter being adjusted to open when the air pressure in reservoir N falls to seventy pounds.

v′ is another port leading from chamber V, into the chamber U, which port, together with the port *s′*, is normally closed by a loaded or spring-pressed valve O, that opens only when a maximum pressure has accumulated within the reservoir N. Usually, said valve O is set at ninety pounds, and when this pressure has been pumped into reservoir N, the valve momentarily opens, the result being that compressed air now passes through the ports *n′*, *s′*, *v′*, and enters the central chamber V. The compressed air then traverses the pipe *b′* enters the governor cylinder A, and retracts its piston K, as previously described. It is evident this ninety pounds pressure holds the other valve P securely to its seat, but the instant the pressure falls to seventy pounds, said valve opens and uncovers the port *v*. This opening is due to the fact that there is still a pressure of ninety pounds imprisoned within the chamber V, and its connections, while there is but seventy pounds within the air reservoir. Furthermore, as there is now an uninterrupted communication between reservoir N, chamber V, pipe *b′*, and cylinder A, it is evident there must be a corresponding reduction of pressure between the piston K and the head B of said cylinder, and as the closed chamber C, of the latter, is charged with ninety pounds, said piston immediately advances, as previously explained. Finally, the air-pressure regulator, herein alluded to, is fully described in my application Serial No. 430,391, filed in the United States Patent Office April 23, 1892. Therefore, I expressly disclaim from this case any device or invention revealed in said application.

I claim as my invention,—

1. The combination, in a steam-governor operated by compressed air, of the closed cylinder A, having an inlet D, outlet E, side channels F, F′, passage G, ports I, I′, and valves H, H′, and the reciprocating piston K, having a channel M, that opens communication between said outlet E, and channels F, F′, when said piston is in its normal position, substantially as herein described.

2. In a steam governor, operated by compressed air, a cylinder having a steam inlet and outlet, an air inlet at or near one end, a closed chamber at its other end, and a longitudinal passage having two ports and two valves, that permit a flow of air from one end of said cylinder to the other, in combination with a reciprocating piston having a channel that opens communication between said steam-inlet and outlet when said piston is in one position, and cuts off communication between said inlet and outlet when it is shifted to an opposite position, substantially as described.

3. In a steam governor, operated by compressed air, a cylinder having a steam inlet and outlet, an air inlet at or near one end, but closed at its other end, and a longitudinal passage having two ports and two valves that

permit a flow of air from one end of said cylinder to the other, in combination with a reciprocating piston having a channel that opens communication between said steam inlet and outlet when said piston is in one position, and cuts off communication between said inlet and outlet when it is shifted to an opposite position, substantially as described.

4. A steam governor consisting of the cylinder A, having a steam inlet D, an outlet E, an air inlet *b*, a channel F, a longitudinal passage G, a pair of ports I I′, a pair of inwardly-opening valves H, H′, and a reciprocating piston K, having a channel M, in combination with an air-pressure regulator provided with a pipe connection leading to said cylinder and having a pair of automatic valves, one of which opens when the air pressure reaches a maximum, while the other valve opens when the pressure falls to a minimum, substantially as herein described.

5. A steam governor for air brakes, consisting of a cylinder having a steam inlet and ontlet, and a reciprocating piston that is retracted by a full pressure of air and advanced by a reduction of pressure, in combination with an air-pressure regulator having connection with said cylinder and provided with a valve that opens when the air pressure reaches a maximum, and a valve that opens when the pressure falls to a minimum, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN D. P. SCHENCK.

Witnesses:

JAMES H. LAYMAN,

ALFRED M. DAVIES.