(No Model.) 2 Sheets—Sheet 1.

W. F. DE FOREST.

BRAKE VALVE WITH GOVERNOR ATTACHMENT.

No. 497,405. Patented May 16, 1893.

Fig. 3.

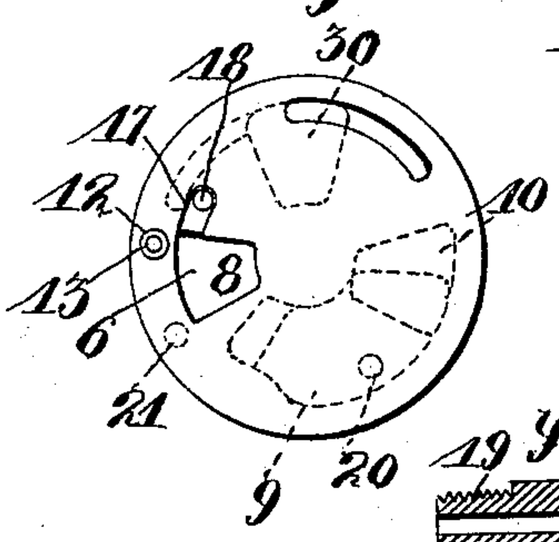


Fig. 1.

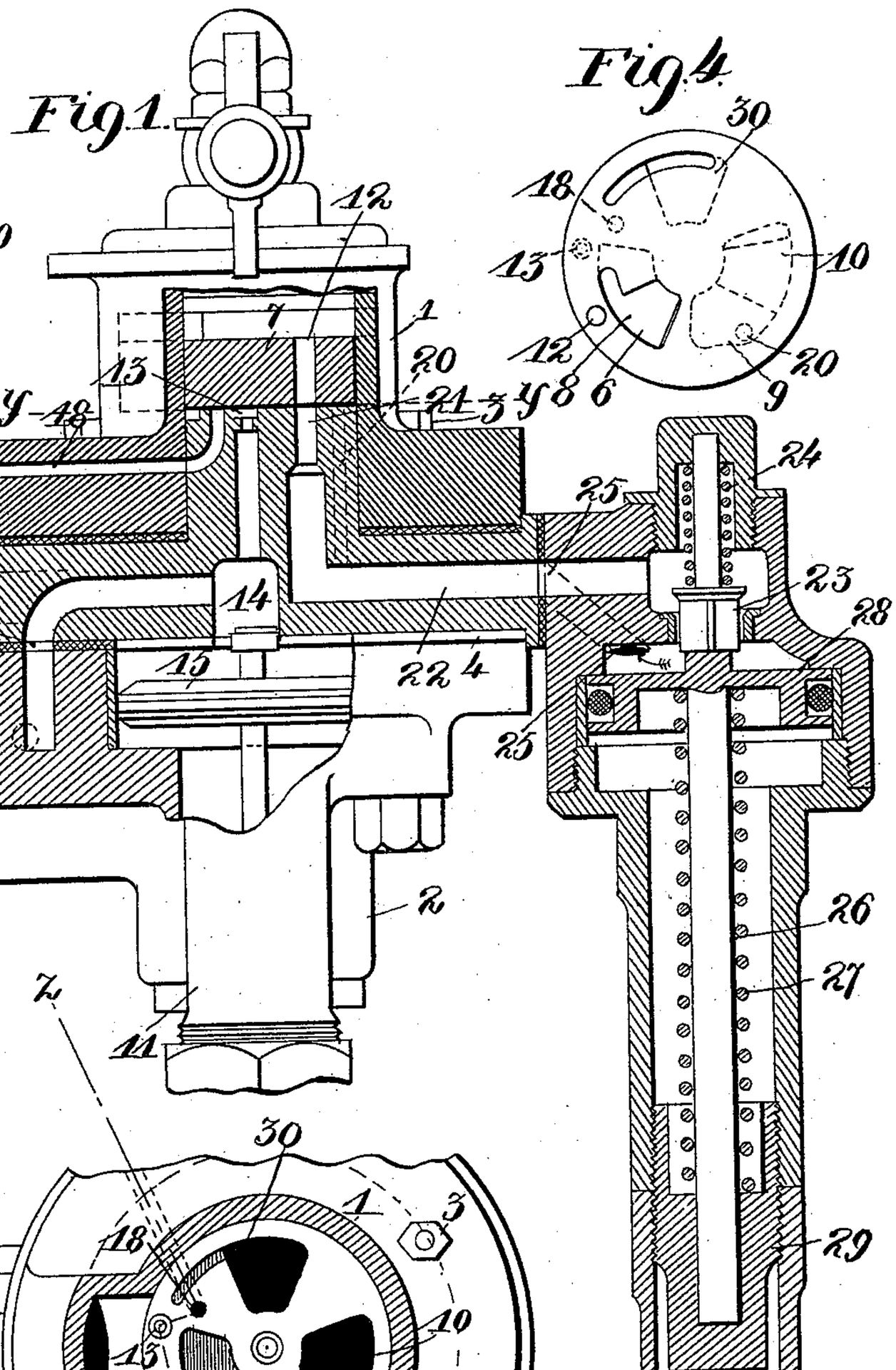


Fig. 4.

Fig. 2.

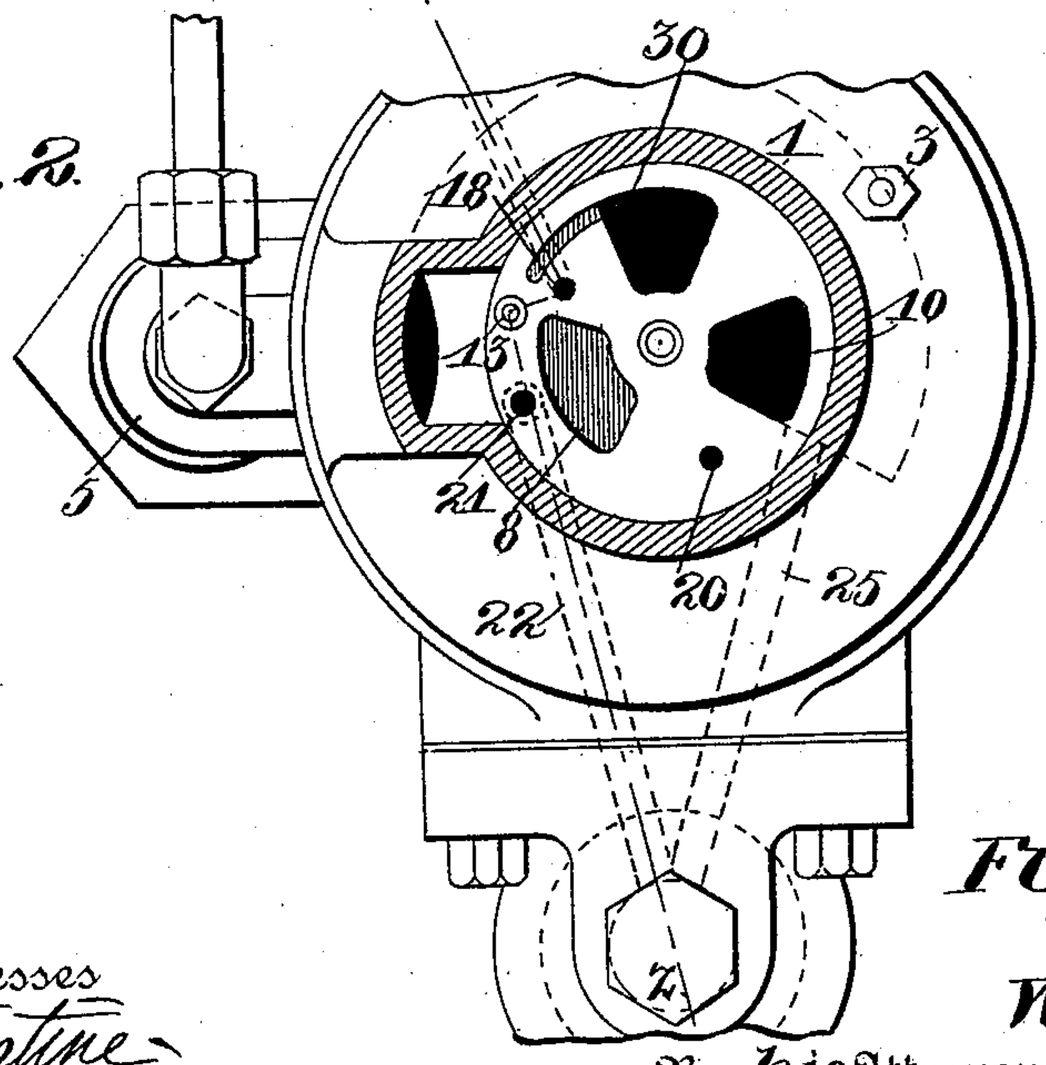
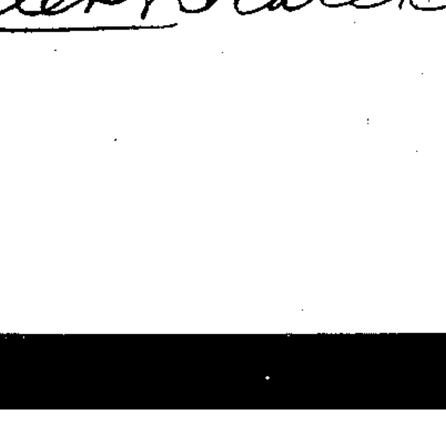


Fig. 5.



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(No Model.) 2 Sheets—Sheet 2.

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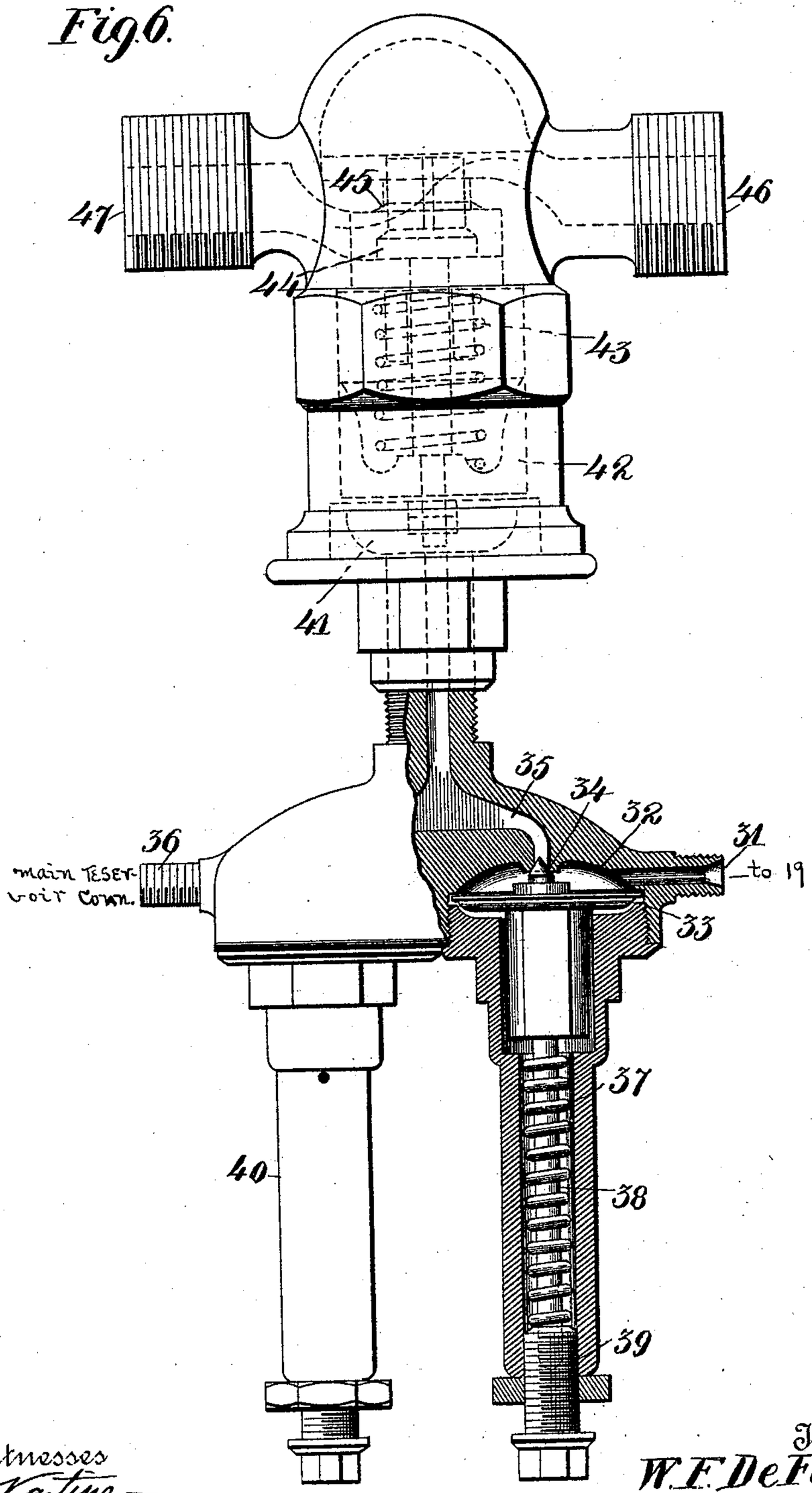
BRAKE VALVE WITH GOVERNOR ATTACHMENT.

No. 497,405. Patented May 16, 1893.

Fig 6.



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UNITED STATES PATENT OFFICE.

WYATTE F. DE FOREST, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE LANSBERG BRAKE COMPANY, OF SAME PLACE.

BRAKE-VALVE WITH GOVERNOR ATTACHMENT.

SPECIFICATION forming part of Letters Patent No. 497,405, dated May 16, 1893.

Application filed September 21, 1892. Serial No. 446,442. (No model.)

To all whom it may concern:

Be it known that I, WYATTE F. DE FOREST, of the city of St. Louis, State of Missouri, have invented certain new and useful Improvements in Engineers' Brake-Valves with Governor Attachments, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

The present invention is an improvement on the latest Westinghouse engineer's brake valve which is a modified and improved form of that described in Letters Patent No. 401,916, under date April 23, 1889; but the improvement may be applied on any brake valve so constructed as to require a pump governor to be connected with the main reservoir; and the object of my present invention is to prevent an undue accumulation of pressure of air in the train pipe, thus preventing said air from applying the brakes too forcibly and causing the wheels to slide, in cases where occasion for such suddenness does not arise.

A part of the improvement consists in a suitable governor attachment so located as to check the operation of the pump supplying the air to the main reservoir at a time when a sufficient amount of pressure within the train pipe has been reached; and when direct communication between the main reservoir and train pipe exists and in other details of construction fully set forth in the description and the claims.

In the drawings, Figure 1 is an elevation of the valve exposing a section along the line *z—z* Fig. 2, showing the valve in running position, and showing the position of the warning port of my invention. Fig. 2 is a top or plan view along section line *y—y* showing the ports in the valve seat. Fig. 3 is a diagrammatic view of the top of the valve superposed upon the valve seat in the "position for releasing brake." Fig. 4 is a similar view in the "position while running." Fig. 5 is a diagrammatic view of the bottom of the valve showing the position of the ports therein; and Fig. 6 is a partly sectional view of the governor attachment forming a part of my invention.

A reference to the patent above mentioned shows that there are five positions to which the valve governing the admission of air into the train pipe can be turned; the first is the "position for releasing brake," the second the "position while running," the third, "on lap," the fourth, "application of brake service stop" and fifth, "application of brake emergency stop." Only the first two positions will be particularly referred to in connection with the description of my invention.

The valve chamber or casing is composed of two sections, an upper section 1, and a lower section 2 connected by bolts 3, a suitable packing ring or gasket 4 being interposed.

Since a detailed description of all the parts of the valve is not here necessary, I will limit such details to those portions of the present valve which distinguish it from the patented one above referred to, and to such other parts as either co-operate with or directly affect the subject of my present improvement, and refer in a general way to the remaining parts of the mechanism.

Leading from the main reservoir, not shown, is a pipe 5 which communicates with the supply port 6 in the rotary valve 7 in the upper section. When the rotary valve 7 is in "position for releasing brake" the supply port 6 is in communication with the supply port 8 in the valve seat from which the air entering therein passes upward into cavity 9 of the valve, thence through direct application and supply port 10 into the train pipe 11 in precisely the same manner shown in patent above referred to.

12 is a port in the rotary valve 7 communicating with port 13 in the seat thereof while the rotary valve 7 is yet in "position for releasing brake" as shown in Fig. 3, the air thus passing into chamber 14 above piston 15 in the lower section which piston controls the escape of air from the train pipe through openings not shown, leading from the train pipe into the atmosphere, when occasion arises to apply the brakes. The air above the piston is also stored to give sufficient volume thereto in an auxiliary reservoir not shown communicating with chamber 14 by passage 16.

It is obvious from the foregoing that when the rotary valve 7 is in "position for releasing brake" the main reservoir and the train

pipe are in direct communication. The passage of air and the general construction thus far are the same as in the patented valve.

It is the practice of engineers through carelessness to leave the valve in the position for releasing after the brakes have been released and while the train is running, instead of turning the same to its proper position, namely the second or the "position while running," when direct communication between the main reservoir and the train pipe is broken. The purpose of turning the valve 7 to the second position is to accumulate the usual excess of air pressure in the main reservoir over that carried by the train pipe, which excess is employed as is well known for purposes of releasing the brakes after the same have been once applied. Now, while running, this excess must be kept out of the train pipe which result could of course not be accomplished if the valve 7 were turned in the first position as the communication between the main reservoir and train pipe is direct.

From the above the object of my invention will be readily understood. The port 6 has a lateral extension 17 communicating with a warning port 18 in the valve seat, which port leads outwardly to a nozzle 19 in one side of the valve seat, said nozzle being provided with a screw-threaded end to be connected with a pipe not shown leading to the governor hereinafter described. When the valve 7 is in its first position or that for releasing brake, the lateral extension 17 and the warning port 18 are in communication, and air is allowed to pass freely through suitable pipe connections at the nozzle 19 to the governor shown in Fig. 6. When however the valve is turned to the "position while running" as shown in Fig. 4 the valve operates in all respects as the valve of the old construction, that is to say, direct communication between the train pipe and the main reservoir ceases, and port 12 in the valve is brought opposite port 21 in the valve seat through which main reservoir pressure now passes to the passage 22 leading therefrom to the feed valve 23 controlled by feed valve spring 24, thence by the feed port 25 to the port 10 and the train pipe; while train pipe pressure is maintained in the chamber above the piston 15 through port 10, cavity 9, and equalizing port 20, thus equalizing the pressure on top and under the piston 15, the action being the same as in the old valve and requiring no detailed description here.

In the present instance the feed valve instead of being held by a spring having a resistance of twenty pounds as in the patented valve, in the overcoming of which resistance by air pressure in the main reservoir sufficient time may elapse to give the train pipe and auxiliary reservoirs opportunity to lose much pressure by leakage, is controlled by a feed valve piston 26 operated by a spring against the piston 28 on one side and adjusting nut 29 on the opposite side. In case the pressure within the train pipe falls by reason of leakage below the normal, thus lessening train pipe pressure on top of piston 28, the spring 27 which is set to about seventy pounds immediately raises the feed valve 23 overcoming the resistance of valve spring 24, and allowing air from the main reservoir to enter the train pipe as shown by arrow in Fig. 1. What corresponds to the "preliminary exhaust port 38, leading from the seat of the valve to the atmosphere" of the patented valve is in the present case elongated and made to open into the direct exhaust passage or what is termed "direct application and exhaust port" 30, as seen in Fig. 2. In this respect the present valve is simplified, but such features are not here claimed, my improvement being limited to the warning port in the valve seat and to such other portions as necessarily co-operate with it.

As is well known, the object of the extra pressure which is generally twenty to thirty pounds, in the main reservoir over the pressure carried by the train pipe, is to release the brakes at the proper moment; but when the brakes are once released and the train is running this extra pressure must be kept out of the train pipe. If therefore the engineer through carelessness, and this happens quite frequently, fails to restore the valve to the running position leaving the same in the "position for releasing the brake," the main reservoir and the train pipe will be in direct communication, and unless checked, the pump will force an excess of pressure into the train pipe not only causing the brakes to be applied with unnecessary violence when occasion requires the stopping of the train, but hampering their release subsequently. With my improvement this difficulty is removed since, if the valve 7 is allowed to remain in the release position the air passing through the warning port 18 will immediately operate on the low pressure diaphragm of the governor thus shutting off the supply of steam from the air pump thus stopping the pump. As no engineer will allow his pump to stop while the train is running the oversight on his part is immediately noticed and he accordingly shifts the valve to its proper position, that is the "position while running."

In Fig. 6 I have shown a form of governor to be used in connection with my invention. 31 represents a nozzle communicating with an air pipe not shown leading to pipe nozzle 19 at the warning port. The air passes into a chamber 32 above a piston 33 terminating in a valve seat 34 and leading into a passage 35. The passage 35 constitutes a common chamber into which enters the air coming from the main reservoir through the nozzle 36. Piston 33 is controlled by regulating spring 37 surrounding the valve stem 38, and confined between the bottom of the piston and the regulating nut 39. The interior construction of the second leg or branch 40 of the governor is identical with the first with the exception

that the spring confined therein is set to main reservoir pressure or about ninety pounds, whereas the spring 37 is set to a little less than ordinary train pipe pressure, or to about sixty-five pounds. The two pistons or valves therefore operate independently, one branch controlling the pump when the rotary valve 7 is in "position for releasing brake" to control the pressure within the train pipe, and the other branch controlling the pump when the rotary valve is in "position while running" or any other position except the first, to control the pressure within the main reservoir. The common chamber 35 leads to a passage 41 leading to the bottom of a governor piston 42 controlled by governor piston spring 43 as shown in dotted lines. The air entering under the bottom of the piston overcoming the tension of the spring seats the valve 44 against its seat 45 and steam is accordingly shut off from the pipe 46 leading to the boiler, pipe 47 leading of course to the air pump. If the rotary valve 7 is in "position for releasing brake" and the train pipe pressure becomes too great the air entering nozzle 31 of the low pressure branch of the governor will depress the valve 33 enter chamber 35 and passage 41 and, operating against the governor piston 42 close the valve 44 and thus shut off the steam from the pump. The air entering the pipe 36 of the high pressure branch of the governor operates in precisely the same manner to close the valve 44 when pressure in the main reservoir becomes too great. It will thus be seen that by my invention pressure within the train pipe can never pass beyond a certain predetermined point, and is wholly independent of the control the governor has over the pressure maintained in the main reservoir.

Having particularly described my invention, what I claim is—

1. In an engineer's brake valve, the combination of a valve casing or chamber, a main air-reservoir connection and a train-pipe connection leading thereinto, a direct supply port formed in the valve seat in the chamber and adapted to establish direct communication between said connections, a warning port in the valve seat adjacent to the supply port in said seat, a supply port in the valve communicating with said warning port, a pump governor, and pipe connections leading from the warning port controlling said governor, substantially as set forth.

2. In an engineer's brake valve, the combination of a valve casing or chamber, a main air-reservoir connection and a train-pipe connection leading thereinto, a direct supply port formed in the valve seat in the chamber, a supply port in the valve having a lateral extension, a warning port in the valve seat adjacent to the supply port in the seat, communicating with said lateral extension, a pump governor communicating with the main air-reservoir, and having a low pressure and high pressure branch, the low pressure branch communicating with the warning port, to control the pressure within the train pipe when the valve is in the releasing position, substantially as set forth.

3. In an engineer's brake valve, a main air-reservoir connection communicating with the valve casing or chamber, a train pipe connection leading into said casing, a direct supply port formed in the valve seat in the chamber, and adapted to establish direct communication between the main reservoir and the train pipe, a pump governor having a low and a high pressure branch, the high pressure branch communicating with the main reservoir, and the low pressure branch communicating with the valve casing, the two branches being controlled independently, substantially as set forth.

4. In an engineer's brake valve, the combination of a valve casing, a main reservoir connection and train pipe connection leading thereto, means for establishing direct communication between said connections, a warning port in the valve seat of the valve, a supply port in the valve communicating therewith, a governor having a low pressure and a high pressure branch, the low pressure branch being in communication with the warning port, and the high pressure branch being in communication with the main reservoir; said governor having a common chamber leading from the two branches of the governor, said chamber serving to carry air pressure independently from the valve casing and main reservoir respectively, and a piston controlled by the air within said chamber to shut off the steam supply passing through the governor, substantially as set forth.

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

WYATTE F. DE FOREST.

Witnesses:
J. B. CLARK,
EMIL STAREK.