(No Model.) 3 Sheets—Sheet 1.

T. H. HABERKORN.

VALVE MECHANISM FOR AIR BRAKES.

No. 508,702. Patented Nov. 14, 1893.

Fig. 1.

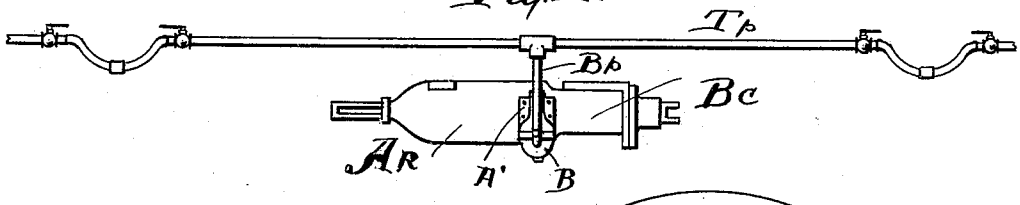


Fig. 3.

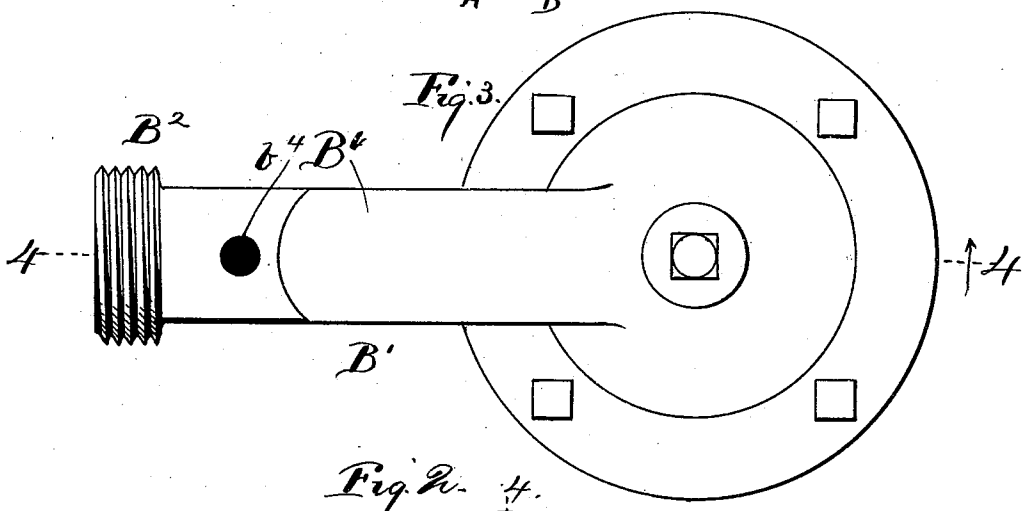
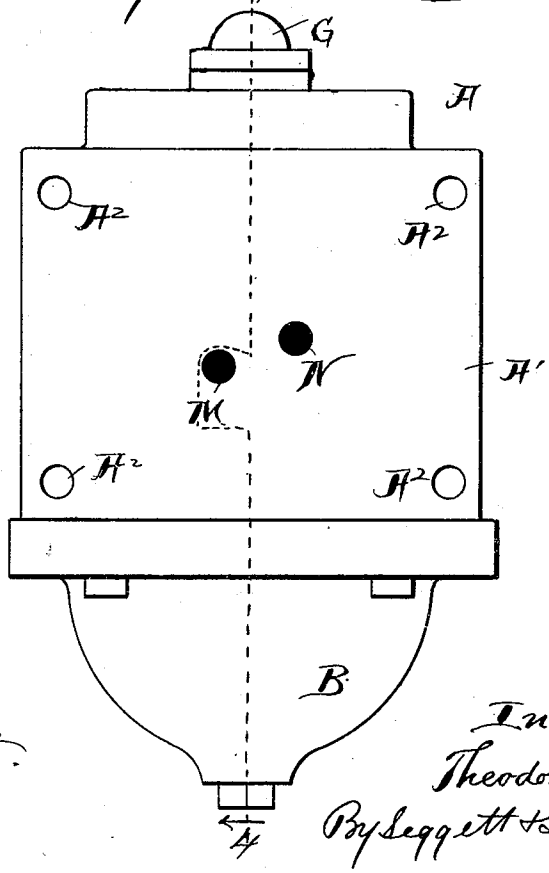


Fig. 2.



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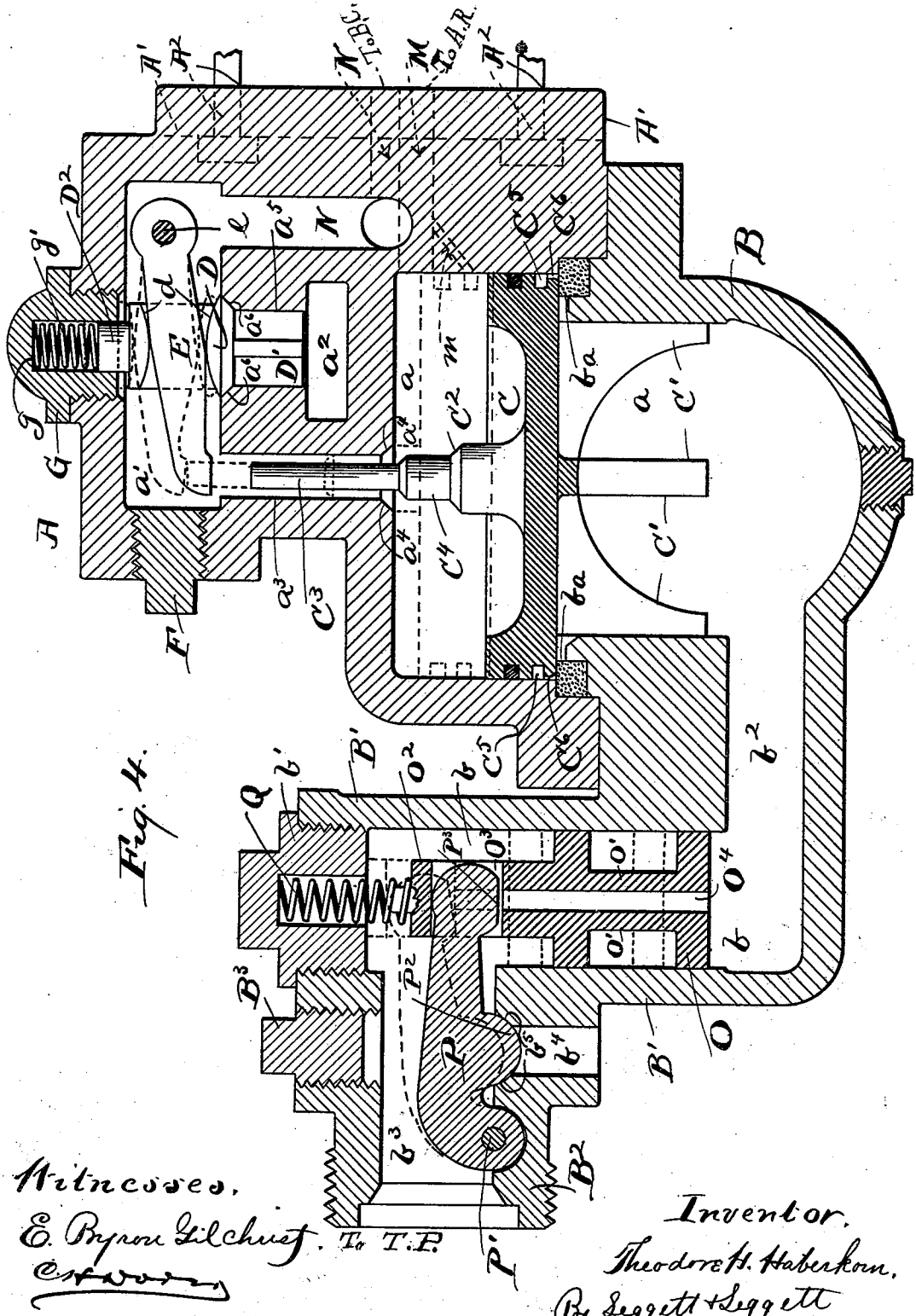

Fig. 4.

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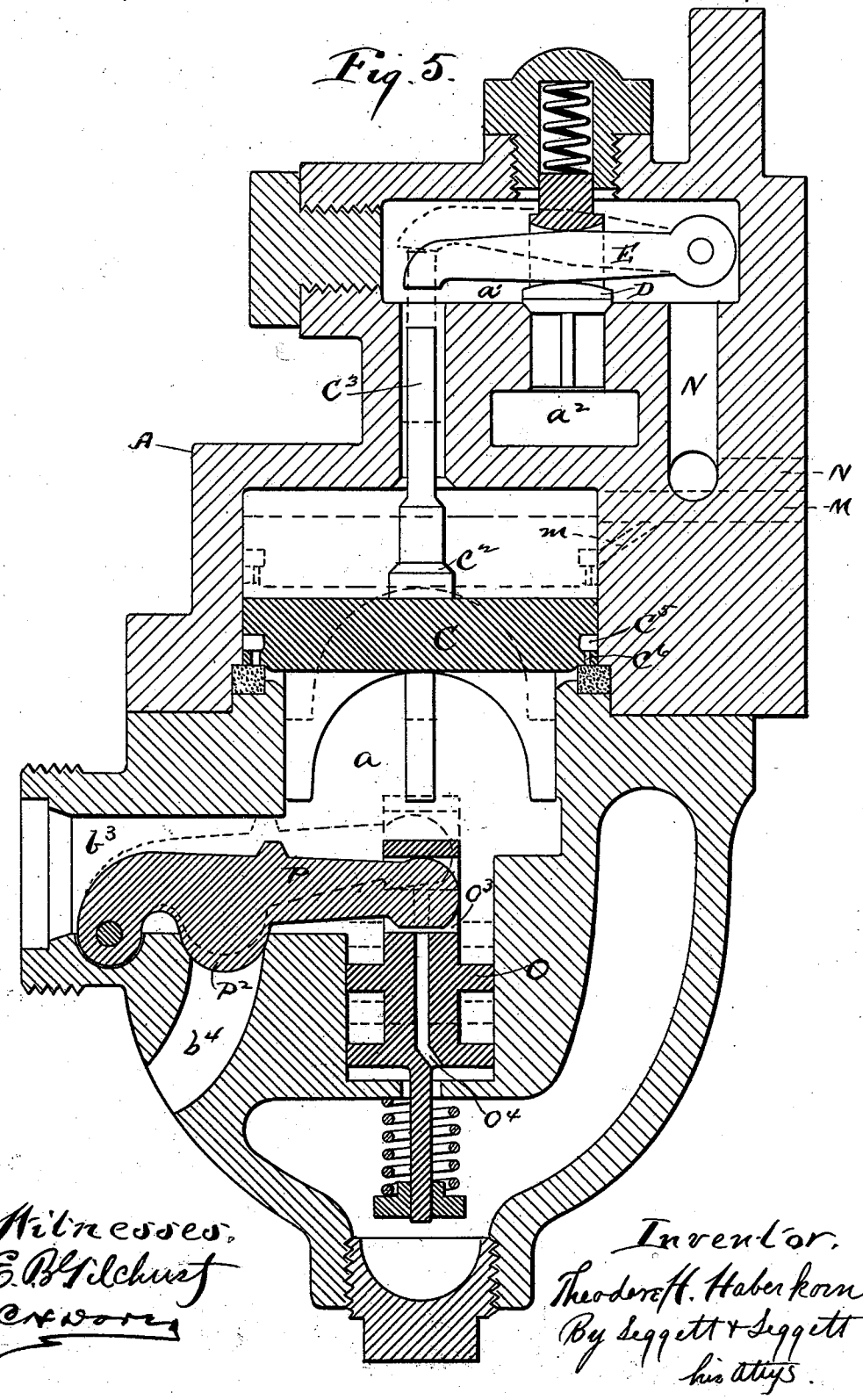
Fig. 5.



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UNITED STATES PATENT OFFICE.

THEODORE H. HABERKORN, OF FORT WAYNE, INDIANA.

VALVE MECHANISM FOR AIR-BRAKES.

SPECIFICATION forming part of Letters Patent No. 508,702, dated November 14, 1893.

Application filed August 16, 1892. Serial No. 443,196. (No model.)

To all whom it may concern:

Be it known that I, THEODORE H. HABERKORN, of Fort Wayne, in the county of Allen and State of Indiana, have invented certain new and useful Improvements in Valve Mechanism for Air-Brakes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to auxiliary valve-mechanism for air-brakes, whereby upon the reduction of the air-pressure in the train-pipe in the application of the brakes, air from the train-pipe under each car or vehicle of a train, is permitted to escape, preferably into the atmosphere, the object being to render the action of the brake-system in a long train of cars much more rapid and harmonious than has heretofore been possible.

I would here remark that the casing of my improved auxiliary valve-mechanism is preferably integral with the head or cap of the casing of the triple-valve mechanism and in the accompanying drawings, Figure 1 is a side elevation showing the casing of my improved valve-mechanism and the casing of the triple-valve-mechanism rigid with the auxiliary air-reservoir and brake-cylinder, showing also the train-pipe and the branch pipe that connects the train-pipe with the auxiliary valve-casing. Fig. 2 is an opposite side elevation of the casing of the triple-valve mechanism, relative to the elevation shown in Fig. 1, exhibiting the ports that open into the brake-cylinder and auxiliary-reservoir, respectively. Fig. 3 is a bottom plan, showing the head or cap of the casing of the triple-valve-mechanism and the casing of my improved auxiliary-mechanism. Fig. 4 is a side elevation in vertical section on line 4—4 Figs. 2 and 3, looking in the direction of the arrow. Fig. 5 is a side elevation in vertical section of the triple-valve-mechanism and auxiliary valve-mechanism, exhibiting a somewhat modified construction and arrangement of parts.

Before proceeding with a description of my present invention, I will briefly describe what is known as the Haberkorn triple-valve mechanism for air-brakes and its operation, as disclosed in United States Patent No. 413,252, granted to me October 22, 1889, and which triple valve mechanism is disclosed in the accompanying drawings.

Referring to Figs. 1, 2, 3 and 4, A represents the casing of the triple-valve mechanism, the same having on the one side thereof a broad flange, A′, for attaching the casing to the brake-cylinder and auxiliary reservoir, B C, and A R, respectively, said flange having the necessary holes A^2 for the securing-bolts. Casing A has three compartments or chambers, a, a' and a^2, respectively. Within the larger or primary chamber, a, operate valves C and C^2, the surrounding walls of said chamber nicely fitting valve C, and said chamber is closed below by a cap or head B. The upper section of this cap or head is bored to receive wings or guides C′ of valve C, the cap having a seat, b^a, for said valve. Chamber a, below valve C, is connected with the train-pipe Tp, as hereinafter described, that leads along under the cars of a train and supplies the different auxiliary air-reservoirs wherein compressed air is stored for operating the respective brake-cylinders of the different cars. Chambers a and a' are connected by bore a^3, endwise of which operates valve-stem C^3 that is enlarged at its lower end, as at C^4, such enlargement of the stem nicely fitting within bore a^3. Enlargement C^4 of the valve-stem, at its lower end, terminates in valve, C^2, (already referred to) that is integral with valve C, the top wall of chamber a about the lower end of bore a^3, having a seat a^4 for valve C^2. A port, M, for the passage of air into the auxiliary reservoir (shown in dotted lines Fig. 4 and in solid lines Fig. 2) opens into the upper part of chamber a. Valve C has a recess, C^5, extending all round the edge of the valve, and vertical orifices C^6 between said recess and the lower face of the valve, said recess and orifices, when the valve is elevated as shown in dotted lines, Fig. 4, admitting air into port m (shown in dotted lines Fig. 4) that leads from chamber a to and opens into port M. The secondary chamber a' is connected by bore a^5 with the exhaust-chamber a^2, that opens into the external atmosphere. A port, N, opens into chamber a'

and leads to the brake-cylinder, B C. Casing A, about bore a^5, has a seat, a^6, for a valve, D, the depending wings or guides D′ of said valve operating in said bore. Valve D has a stem D^2 projecting upwardly through chamber a', and provided with a slot, d, through which extends lever E that engages the top and bottom walls of said slot. Lever E is pivoted at e to casing A and the free end of the lever is adapted to be engaged by valve-stem C^3 during the elevation of valves C and C^2. The casing has a lateral screw-threaded opening for assembling the parts and closed by a correspondingly threaded plug F. A similar opening on top is closed by plug G provided with a central bore g opening inward for receiving the upper end of the stem of valve D, with a spring g', located as shown, to co-operate with the gravity of the valve and connected lever in closing the valve.

The operation of the triple-valve mechanism is as follows:—The air under pressure, forced along through the train-pipe from the engine, enters chamber a below valve C, elevating valves C C^2 to the position shown in dotted lines, Fig. 4, thus seating valve C^2, thereby closing bore a^3—in other words closing communication between the auxiliary air-reservoir and the brake-cylinder. Meantime valve-stem C^3 has engaged and tilted upward lever E, thereby elevating valve D, (see dotted lines Fig. 4) whereby communication is opened from the brake-cylinder to exhaust-chamber a^2 and thence to the atmosphere, and in such position of parts the air-supply from the train-pipe passes *via* orifices C^6 and recess C^5 in valve C, and ports m and M in the casing to the auxiliary-reservoir, and when the air-pressure in the reservoir becomes equal to the pressure in the train-pipe, valves C and C^2 are still held elevated by reason of the larger lower surface of valve C that is exposed, the difference between the areas of the upper and lower surfaces of the valve exposed to the air-pressure within chamber a being the area of the space inclosed within the seat for valve C^2, which difference is just sufficient to cause the valves to maintain their elevated positions so long as the air-pressure is the same above and below valve C. The elevated positions of the valves may be considered their normal positions, and except while the brakes are being applied the train-pipe and auxiliary reservoir are consequently always in open relation, thus affording sufficient time for the accumulation of the maximum pressure in the reservoir. When it is desired to apply the brakes, the pressure is reduced in the train-pipe, and such reduction of pressure below valve C causes the latter to descend, thus closing communication between the train-pipe and auxiliary reservoir, then closing the exhaust-port, the gravity of valve D and lever E and spring g acting in concert to close the exhaust-valve, then opening bore a^3, whereby the air from the auxiliary reservoir may pass to the brake-cylinder *via* ports M and N, valve C being seated. When the maximum air-pressure is re-established in the train-pipe the valves are again lifted to their normal or elevated positions.

Having thus disclosed the manner of operating the brakes as heretofore through the agency of what is known as the Haberkorn triple-valve mechanism, I will now proceed with a description of my improved auxiliary valve-mechanism.

Referring to the same figures of drawings, (viz:—1, 2, 3 and 4) it will be observed that cap or head B of the casing of the triple-valve-mechanism, is extended laterally and upwardly forming the casing B′ of my improved auxiliary valve-mechanism. Within casing B′ is a vertical chamber b that is closed at the top by a screw-threaded plug b'. Chamber b, at the lower end, is in open relation, by means of a lateral duct b^2, with the lower part of chamber a in the casing of the triple-valve mechanism. Chamber b, at its upper end, is in open relation, by means of a lateral duct, b^3, with branch-pipe, Bp, that as already indicated, leads from the train-pipe, casing B′ terminating in a nozzle B^2 at the outer end of duct b^3 for attaching the branch pipe, all the air conducted from the train pipe to the auxiliary reservoir, through parts A, B, entering at said nozzle. Endwise of chamber b is adapted to operate a piston, O, that fits nicely within the surrounding walls of chamber b, but is preferably reduced in size, as at O′, to reduce the friction and render the same as light as practicable. Piston O has an upwardly-extending stem, O^2, that is slotted, as at O^3, for the reception of the free end of a lever, P, that extends lengthwise of duct b^3 and is pivoted at its opposite end, as at P′, to casing B′. Integral with lever P is a valve, P^2, that is adapted to open and close a port b^4 in casing B′. Port b^4 leads from duct b^3 and opens preferably into the atmosphere, and casing B′, about the inner end of said port, has a seat b^5 for valve P^2. Piston O is provided with a port, O^4, preferably centrally located and comparatively narrow as shown. Port O^4 leads from slot O^3, that is in open relation with duct b^3, to the lower end of the piston. Duct b^3 in the normal position of parts shown in solid lines, is in open relation with chamber a, and in Fig. 4 of the drawings referred to, such communication is shown through chamber b^3, slot O^3, port O^4, and duct b^2, the size of the free end of lever P being such that it does not entirely fill the width of slot O^3. The bottom wall of slot O^3 is horizontal, and the lower side of the free end of lever P is flat as at P^3, and, in the closed position of valve, P^2, is parallel with the bottom of slot O^3, or approximately so, but does not close the communication between port O^4 and duct b^3. It will therefore be readily under-

stood that when a sudden reduction in the air-pressure of the train-pipe is effected this reduction of air-pressure will be immediately extended to the air-pressure above piston O before it is equally extended to the air-pressure below said piston, owing to the narrowness or small transverse area of port O^4 in the piston; consequently piston O will be elevated, and upon such elevation, owing to opposing parallel flat surfaces of lever P and bottom of slot O^3 in the stem of the piston communication between port O^4 and duct b^3, will be momentarily closed, resulting in a positive opening of valve P^2, as equilibrium of air-pressure at opposite ends of piston O cannot be established until the piston has tilted lever P sufficiently to reopen communication between duct b^3 and port O^4, as shown in dotted lines. This opening of valve P^2 permits a quantity of air from the train-pipe or rather, from the branch-pipe that leads from the train-pipe, to escape through port b^4. Valve P^2 remains open but a small fraction of a second, which is sufficient; that is, it requires but a fraction of a second to reestablish the equilibrium in the air-pressure above and below piston O, valve P^2 being closed upon the descent of the piston caused by the action of a spring Q, located as shown, in concert with the gravity of lever P and said piston. Referring to the same figure (4) of the drawings, casing B′, at the top of duct b^3, has a screw-threaded bore closed by a correspondingly threaded plug B^3, by removing which and plug b', access is had to the interior of the casing for assembling the valve mechanism.

I would here remark that the air-pressure in the train-pipe is usually about seventy pounds per square inch and the same pressure exists at opposite ends of piston O.

By the employment of my improved mechanism, owing to the fact that a quantity of air is discharged from the train-pipe at every car or vehicle, a uniform reduction of air-pressure is effected almost simultaneously the entire length of the train-pipe; hence, the triple-valve mechanism of the brakes of the different cars or vehicles act approximately simultaneously, resulting in a most rapid and harmonious application of the brakes throughout the train. Of course, a difference in the air-pressure at opposite ends of piston O is only effected upon a sudden reduction of air-pressure in the train-pipe. When the brakes are applied gradually by means of a slow reduction of the air-pressure in the train-pipe, the difference aforesaid in the air-pressure at opposite ends of piston O is not effected and consequently valve P^2 remains closed.

In Fig. 5 is shown a somewhat modified construction and arrangement of the members of my improved mechanism. Among the principal changes may be mentioned that chamber *a* of the casing of the triple-valve mechanism is in direct communication with duct b^3; but I prefer the construction and arrangement of parts shown in Fig. 4, for the reason that the interposition of piston O with its restricted air-passage-way or port O^4 renders the action of the triple-valve mechanism more gentle in its operation.

What I claim is—

1. In valve mechanism for air-brakes, the combination with the triple-valve-mechanism and inclosing casing having a chamber, *a*, extending below the triple-valve-mechanism, and a chamber, *b*, in open relation with chamber *a* and adapted to communicate with the train-pipe of the air-brakes, of a piston adapted to operate endwise of chamber *b* and having a restricted port or passage-way, a port, b^4, and a valve, for closing said port, operatively connected with the aforesaid piston, substantially as and for the purpose set forth.

2. In air-brakes, the combination with train-pipe and triple-valve-mechanism, of a port for permitting the escape of air from the train-pipe, a valve normally closing said port, suitable means for retaining said valve in its closed position, a chamber located between said valve and triple-valve-mechanism, a piston provided with a restricted port or passage-way and adapted to reciprocate endwise of said chamber, the piston being operatively connected with the aforesaid valve in such a manner that its restricted port or passage-way shall, in the normal position of parts, be in open relation with the train-pipe, and the arrangement of parts being such that a sudden reduction of pressure within the train-pipe shall automatically actuate said piston to open the aforesaid valve, substantially as and for the purpose set forth.

3. In valve-mechanism for air-brakes, the combination with the triple-valve-mechanism and casing for said mechanism, said casing being provided with a chamber, *a*, and a casing, B′, rigid with the casing of the triple-valve mechanism and having a chamber, *b*, in open relation with chamber *a* and adapted to communicate with the train-pipe of the air-brakes, of a port, b^4, adapted to permit the escape of air from the train-pipe, a valve for closing said port, a longitudinally-perforated piston adapted to operate endwise of chamber *b* and operatively connected with the aforesaid valve, and a spring acting in the direction to retain the valve aforesaid seated, the arrangement of parts being substantially as shown and for the purpose specified.

4. In air-brakes, the combination with the train-pipe and triple-valve-mechanism operatively connected with said pipe, of a port, b^4, for permitting the escape of air from the train-pipe, a valve, P^2, for closing said port, a vertical chamber, *b*, located between said valve and triple-valve-mechanism, a longitudinally perforated piston, substantially as shown, operatively connected with said valve and adapted to operate endwise of chamber *b*, and suitable means for holding said valve

to its seat, the arrangement of parts being such that a sudden reduction of air-pressure within the train pipe will automatically actuate said piston to open the aforesaid valve, substantially as and for the purpose set forth.

In testimony whereof I sign this specification, in the presence of two witnesses, this 13th day of July, 1892.

THEODORE H. HABERKORN.

Witnesses:
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PAUL F. KUHNE.