(No Model.) 2 Sheets—Sheet 1.

H. O. MÜLLER.

FLUID PRESSURE BRAKE.

No. 585,828. Patented July 6, 1897.

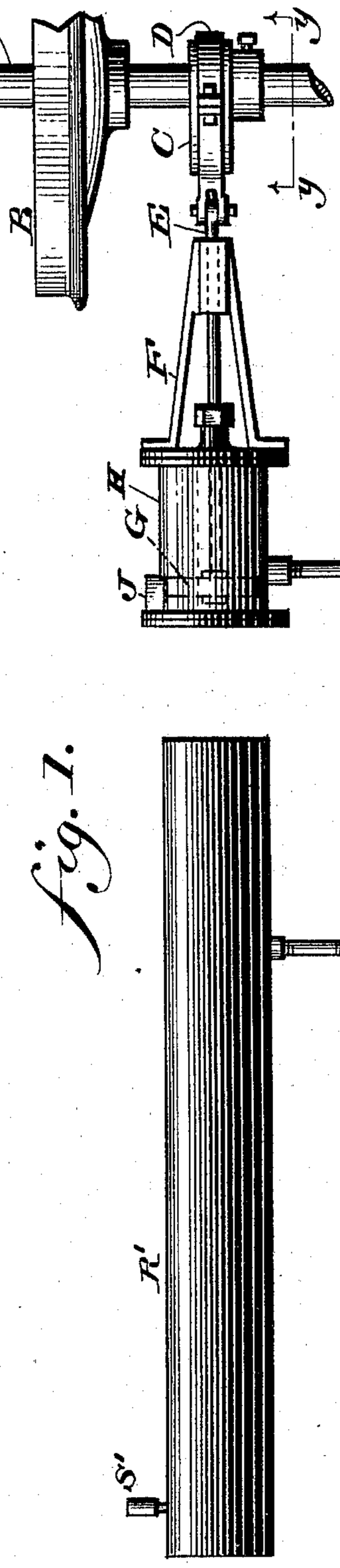

Fig. 1.

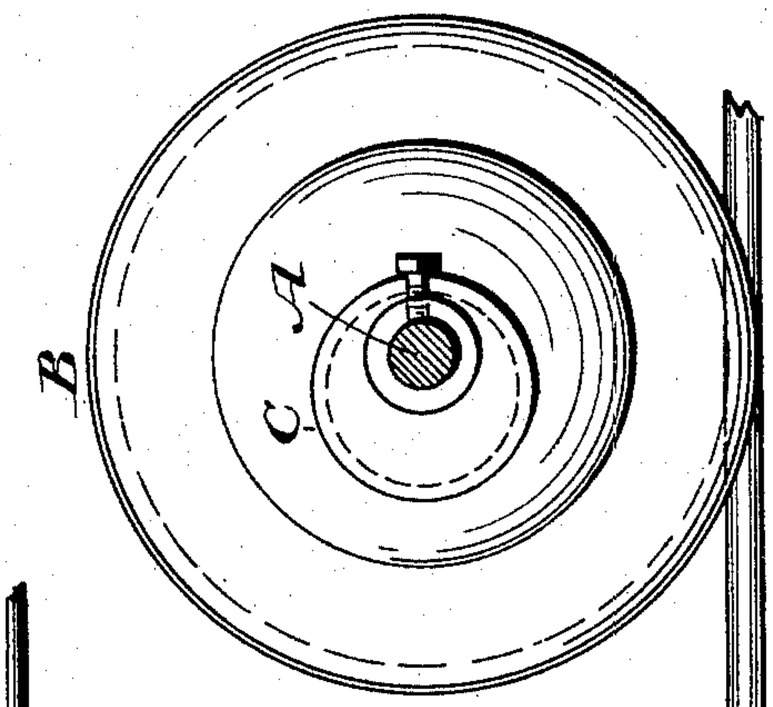

Fig. 3.

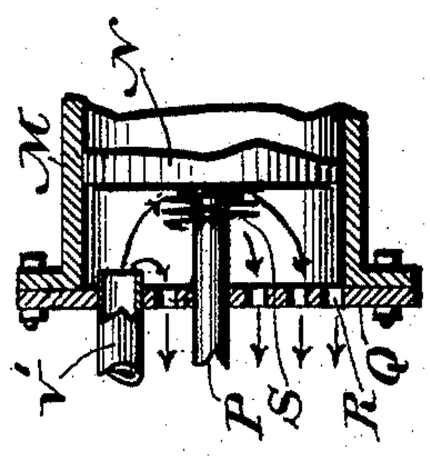

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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fig. 4.

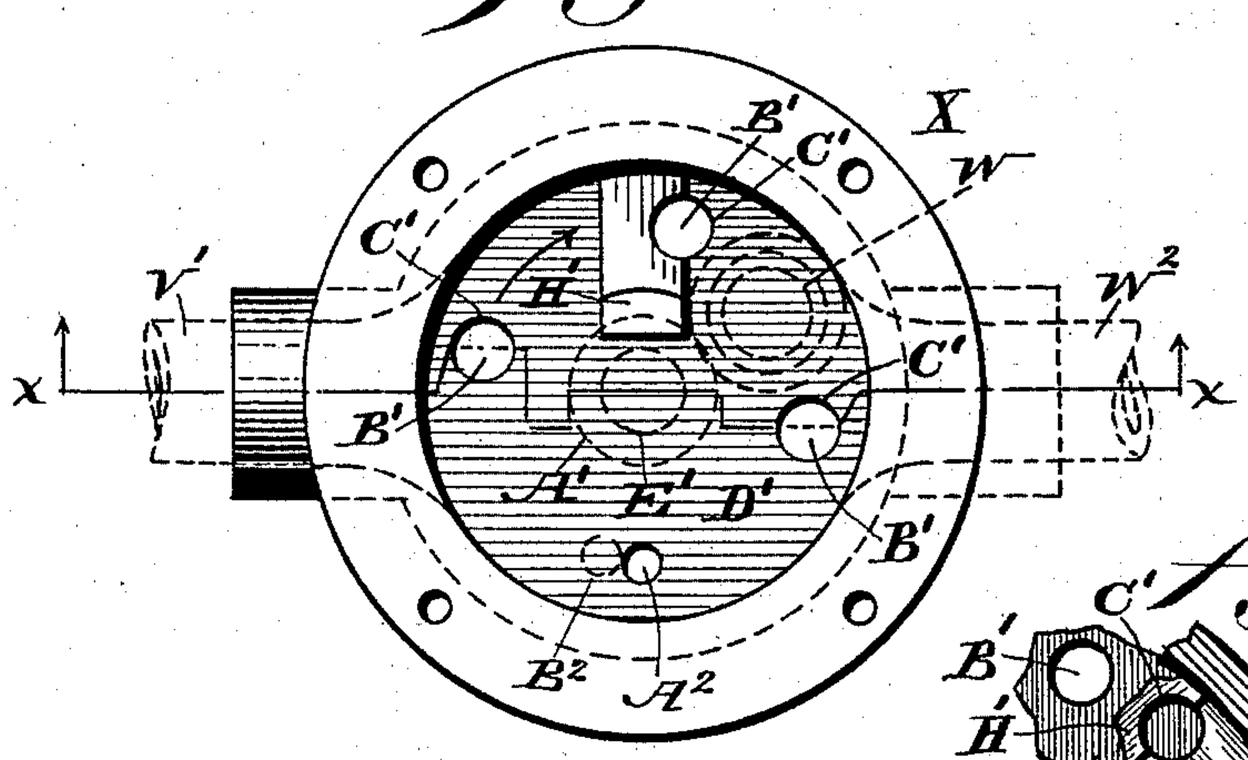


fig. 8.

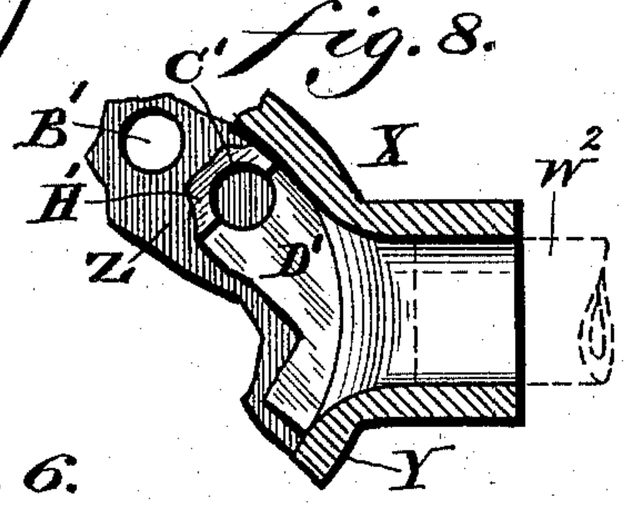


fig. 5.

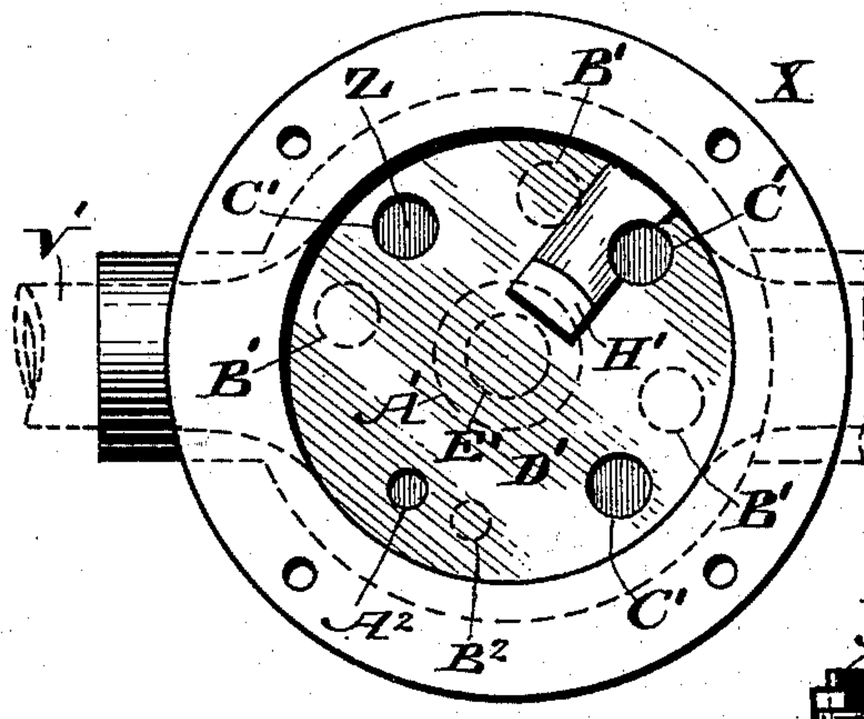


fig. 6.

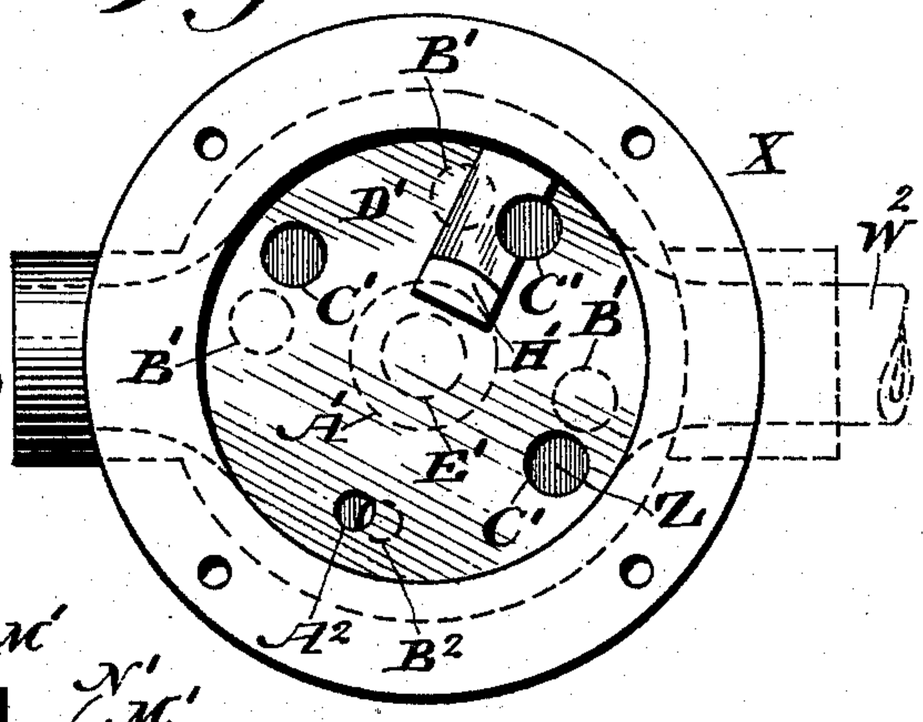
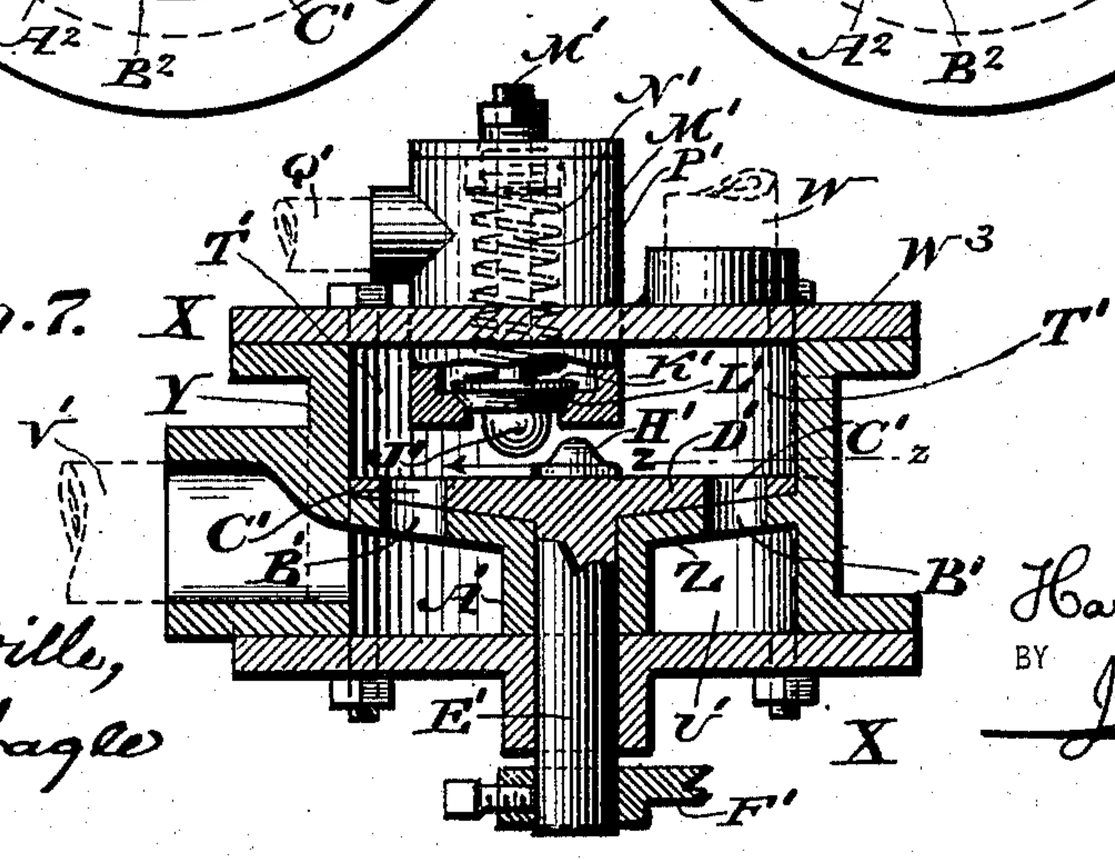


fig. 7.



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FLUID-PRESSURE BRAKE.

SPECIFICATION forming part of Letters Patent No. 585,828, dated July 6, 1897.

Application filed April 10, 1896. Serial No. 586,970. (No model.)

To all whom it may concern:

Be it known that I, HARRY O. MÜLLER, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Fluid-Pressure Brakes, which improvement is fully set forth in the following specification and accompanying drawings.

My invention relates to fluid-pressure brakes; and it consists of means for utilizing the energy of a rotating axle to store sufficient pressure to actuate the brake mechanism according to requirements upon the manipulation of a valve of novel construction.

It further consists of the novel construction of controlling-valve and its adjuncts, means being provided by the proper manipulation of said valve for positively and effectively directing fluid-pressure upon the brake-cylinder, so as to instantly cause the application of the brake to the car-wheels, and provision being further made for conducting any excess of said pressure to a suitable storage-tank and for afterward utilizing the same, as when an emergency stop is desired, and for further utilizing said pressure to a slight degree when it is only desired to partially retard the rotation of the car-wheels, as, for example, in descending grades.

It further consists of a novel construction of safety-valve attachment for the aforesaid controlling-valve, whereby any dangerous excess of pressure is avoided, provision being made for positively causing the operation of said safety-valve when desired.

It further consists of novel details of construction, all as will be hereinafter fully set forth, and specifically pointed out in the claims.

Figure 1 represents a plan view of a portion of a fluid-pressure brake embodying my invention, the car-trucks and their adjuncts being omitted for the sake of clearness of illustration. Fig. 2 represents a longitudinal sectional view of the end of the brake-cylinder seen in Fig. 1. Fig. 3 represents a section on line *y y*, Fig. 1. Figs. 4, 5, and 6 represent plan views of a novel construction of controlling-valve employed, the cover thereof being removed in order to show the ports of the valve-disk proper in the different positions which it may be caused to assume. Fig. 7 represents a vertical section of the controlling-valve, showing the interior construction of the same, the section being taken on line *x x*, Fig. 4. Fig. 8 represents a partial section on line *z z*, Fig. 7, showing the modified manner of making connections between the controlling-valve and the pump which may be employed, if desired.

Similar letters of reference indicate corresponding parts in the several figures.

Referring to the drawings, A designates a car-axle, the same having mounted thereon car-wheels B of usual construction.

C designates an eccentric which is attached to said axle in any well-known manner and has mounted thereupon the eccentric-strap D, to which an end of the piston-rod E is secured, said rod being guided in a suitable yoke or support F.

G designates a piston to which the othe end of the rod E is attached, the said piston being located within the pump or compressor-cylinder H, which latter is provided with the valve J, which may be a clapper or check valve of such construction that at one stroke of the piston G an inflow of air through said valve J is permitted, the latter, however, being seated on the return stroke of the piston, whereby the air is discharged through the outlet-pipe K, which leads from said cylinder H, said pipe having a branch L, which leads to the interior of the brake-cylinder M, the latter having therein a piston N, to which one end of the piston-rod P is attached, the latter being guided in the head Q, which is provided with the perforations R, as will be clearly understood from Fig. 2.

S designates a spring contained within the brake-cylinder, which has one end abutting against the head Q, while its other end contacts with the piston N, the latter thus being normally held in the position seen in Fig. 1.

T designates a lever to which an end of the piston-rod P is attached, said lever being fulcrumed on any suitable support U and having attached thereto the rods V, which lead to the brake-shoes, the latter and their trucks being omitted for the sake of clearness of illustration.

W designates a branch leading from the pipe K to the top or head W^3 of the valve X, the detailed construction of the latter being best seen in Fig. 7.

Y designates the exterior casing of the valve, the same having within it the partition or diaphragm Z, which in the present instance is made inclined or dished shape, the substantially central portion of said partition having a neck A′ attached thereto.

B′ designates ports in the partition or diaphragm Z, which in the present instance are three in number, although it will be evident that their number may be increased or diminished according to requirements, said ports being adapted to register with the ports C′ of the valve-disk or valve proper, D′, which is adapted to rest upon the diaphragm Z, said disk having a stem E′ depending therefrom and extening through the neck A′, said stem having the arm F′ attached thereto, to which the rod G′ is connected, which may extend to any suitable point, so as to be under the control of the attendant.

A^2 designates a port of reduced diameter in the valve-disk D′, which is adapted to register with a similar port B^2 in the diaphragm Z when it is desired to only slightly retard the rotation of the car-wheels, as in descending grades, &c.

H′ designates a dog mounted upon the valve-disk D′, which is adapted to contact with the boss J′, which depends from the valve K′, the latter being provided with a suitable seat L′, whereupon it will be evident that if the rotation of the disk D′ and the dog H′ thereon is continued far enough in the direction of the arrow seen in Fig. 7 the valve K′ will be raised from its seat, for a purpose to be hereinafter referred to.

M′ designates a stem attached to the valve K′, said stem having surrounding the same a spring N′, one end of which abuts against the valve K′, while its other end contacts with a suitable portion of the casing or shell P′, which rests upon the cover W^3 of the valve X.

Q′ designates a pipe or conduit leading from said casing P′ into the storage-reservoir R′, which latter is provided with a safety-valve S′, which may be of any approved construction.

It will be evident that communication may be had with the chamber T′ in the upper portion of the controlling-valve X in other ways than by the pipe W, since it will be evident that a boss may be cast on the side of the cylinder Y and a pipe introduced thereinto, it being immaterial at which point the fluid is introduced into said chamber T′.

The chamber U, below the diaphragm Z, has its outlet through the pipe V′, which leads to the interior of the brake-cylinder, as will be evident from Figs. 1 and 2.

The operation is as follows: When the parts are in their normal position, the ports C′ in the valve-disk D′ register with the ports B′, as indicated in Figs. 4 and 7, whereupon it will be seen that the reciprocation of the piston G will cause air to be pumped through the pipe K and branch L, and thus discharged upon one side of the piston N, air being also simultaneously pumped through the pipe W into the chamber T′, thence through the ports B′ and C′ to the chamber U′, and thence through the pipe V′ into the brake-cylinder M, upon the opposite side of said piston N, and so long as this condition exists the pressure upon said piston will be balanced, the tension of the spring S assisting to maintain said piston in equilibrium, and no movement will be imparted thereto or to the lever P or the rods V. If now the valve-disk D′ is caused to rotate by the proper manipulation of the rod G′, so that the ports B′ C′ are out of alinement, the parts will assume the position seen in Fig. 5, and it will be evident that the air which is initially discharged into the chamber T′ will immediately fill up the pipe W and be conducted through the branch pipe L against the piston N, and the pressure thereupon being now unbalanced said piston will be moved to the left of the position seen in Fig. 1, thereby moving the brake-rods V and applying the brakes, it being apparent that any dangerous or extraordinary pressure accumulating in the chamber T′ will be permitted to escape through the medium of the valve K′ into the pipe Q′, and thence to the storage-reservoir R′, such action taking place when the pressure in the chamber T′ exceeds the combined pressure on the valve K′, caused by the accumulated pressure in the reservoir R′ and the spring N′, any dangerous accumulation of pressure within said storage-reservoir R′ being relieved by the safety-valve S′.

In going down grades, when it is desired to only slightly retard the rotation of the car-wheels, the valve-disk D′ is rotated until the ports A^2 B^2 are in partial alinement, as indicated in Fig. 6, whereupon it will be apparent that the pressure upon the right-hand side of the piston N will be only slightly increased, since a portion of the air is allowed to pass into the chamber U′ and thence to the spring or left-hand side of the brake-piston, thereby enabling the brake to be applied to only a slight degree, as is desirable in descending grades and under other similar conditions.

In case a quick or emergency stop is required it is only necessary for the attendant to rotate the valve-disk D′ in the direction indicated by the arrows in Fig. 7, whereupon it will be apparent that the dog H′, contacting with the boss J′, will cause the valve K′ to be positively lifted from its seat, and since the ports in the diaphragm Z and valve-disk will then be out of alinement the accumulated pressure within the reservoir R′ will be permitted to instantly rush into the chamber T′, and thence through the pipes W, K, and L to the brake-cylinder, thereby augmenting to a high degree the unbalanced pressure on said brake-piston, the same being further in-

creased by the continued reciprocation of the piston G, whereupon it will be apparent that the brakes will be instantly and effectively applied.

The brake is instantly released when the valve-disk E′ is moved into the position seen in Figs. 4 and 7, the air being then permitted to flow from the chamber T′ to the chamber U′ and thence out of the pipe V′, the spring S serving to restore the piston N to the position seen in Fig. 1 and acting in conjunction with the air which has been pumped through the pipe V′, the course of said air before and after its impact with the brake-piston being indicated in Fig. 2, from which it will be seen that the air is discharged with considerable force directly against the piston N, thereby accelerating its return movement, a function which could not be attained if the exhaust were conducted directly to the atmosphere.

The air-pressure is stored in the reservoir R′, in addition to being directed thereinto through the valve K′ when there is excess of pressure to the chamber T′, by the attendant after the brake has once been applied prior to releasing the same, turning the valve-disk E′ until the dog H′ contacts with the boss J′, thereby unseating the valve K′ and allowing the accumulation of pressure in the chamber T′ to be discharged through the pipe Q′ into the reservoir R′, said valve K′ seating itself when the dog H′ assumes the position relative thereto (seen in Fig. 7) through the medium of the spring N and the back pressure thereupon from said reservoir R′.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a fluid-pressure brake system, means for compressing air, a controlling-valve, a brake-cylinder, pipes leading from said means to said valve, and to an end of said brake-cylinder, a pipe leading from the other end of the latter to said valve, whereby air from the latter is caused to impact against the brake-piston and accelerate its return movement, one end of said brake-cylinder having an apertured head, and a spring intermediate said brake-piston and head.

2. In a fluid-pressure brake system, a brake-cylinder, means for compressing air or other fluid, pipes leading from said means to a controlling-valve, and to one end of said brake-cylinder, connections from said valve to the other end of said brake-cylinder, a safety-valve mounted on the casing of said first-mentioned valve, and connections from said safety-valve to a storage-reservoir, in combination with rods adapted to actuate a brake.

3. In a fluid-pressure brake system, the herein-described controlling-valve, comprising a casing, a partition therein, a valve-disk seated in said partition, ports in the latter and said disk adapted to be in alinement, a chamber above said disk, a conduit therefrom leading to an air-pump and one end of the brake-cylinder, and a chamber below said partition leading to the other end of said brake-cylinder, in combination with connections adapted to lead to the brake mechanism.

4. In a fluid-pressure brake system, a controlling-valve consisting of a casing, a partition therein, a disk seated on said partition, ports in the latter and said disk adapted to be in alinement, a dog mounted on said disk and adapted to contact with a projection on a safety-valve located above said disk, a conduit from the chamber above said safety-valve leading to a storage-reservoir, and pipes leading from above and below said diaphragm to the ends of the brake-cylinder, in combination with an air-pump.

5. In a fluid-pressure brake system, a controlling-valve, an air-compressor, a brake-cylinder, a safety-valve attached to the casing of said controlling-valve, a partition in said valve-casing forming upper and lower chambers, and means for causing a communication between said chambers, the ends of the brake-cylinder and said compressor.

6. In a fluid-pressure brake system, an air-compressor, a controlling-valve, a valve-disk therein, a storage-tank, connections from the latter to said valve, a brake-cylinder, connections common to said air-compressor, valve and brake-cylinder, a piston in the latter, a piston-rod passing through an apertured head in said cylinder and adapted to actuate the brake mechanism, a spring intermediate said piston and head, a spring-pressed safety-valve mounted above said valve-disk, and means for mechanically unseating said safety-valve.

7. In a fluid-pressure brake system, a valve-casing having upper and lower chambers, connections therefrom to an air-compressor, and a brake-cylinder, a safety-valve communicating with said upper chamber, a connection leading therefrom to a storage-reservoir, and means for mechanically unseating said safety-valve.

8. In a fluid-pressure brake system, a valve-casing having a partition therein forming upper and lower chambers, a port or ports in said partitions for exhausting the compressor and brake-cylinder, a valved connection to a storage-reservoir, a valve-disk controlling said ports, and means actuated by said valve-disk, for operating an emergency stop, the fluid-pressure being conveyed to the brake-cylinder by closing said valve.

9. In a fluid-pressure brake system, a storage-reservoir, normally out of communication with the air-pumping mechanism, a controlling-valve, an apertured partition within the casing of the latter, dividing the interior into upper and lower chambers, means for controlling the passage of air through said partition, a connection intermediate said reservoir and upper chamber, a valve located in said connection, and means for operating said valve.

10. In a fluid-pressure brake system, a storage-reservoir, a controlling-valve, an apertured partition within the casing of the latter,

dividing the interior into upper and lower chambers, means for controlling the passage of air through said partition, a valved connection intermediate said reservoir and upper chamber, means for forcing air into said upper chamber, and for causing the application of the brake mechanism, and means for conducting any excess of air to said reservoir.

11. In a fluid-pressure brake system, a valve-casing having a partition therein, forming upper and lower chambers, an air-compressor operated from the car-axle, connections from said compressor to one of said chambers, ports in said partition for exhausting the compressor and brake-cylinder, and a valve-disk controlling said ports, in combination with means actuated by said disk for operating an emergency stop, the fluid-pressure being conveyed to the brake-cylinder by closing said valve.

12. In a fluid-pressure brake system, a controlling-valve, a casing therefor, a partition within the same dividing the interior into upper and lower chambers, a storage-reservoir, a connection from the latter to one of said chambers, a safety-valve in said connection, ports in said partition, a disk controlling said ports, a brake-cylinder, a connection intermediate the latter and said controlling-valve, and means common to said disk and safety-valve for unseating the latter.

13. In a fluid-pressure brake system, a brake-cylinder, a piston therein, connections from said piston to the brake mechanism, an air-compressor, a controlling-valve, conduits common to said compressor, valve and one end of said cylinder, the other end of the latter being provided with an apertured head, a spring intermediate the latter and said piston, a conduit intermediate said controlling-valve and head, means for causing a partial stoppage of a car, and means for effecting an emergency stop.

14. In a fluid-pressure brake system, a reservoir, a valve-casing, a disk within the same, having a dog attached thereto, a conduit intermediate said reservoir and valve-casing, and a safety-valve located in said conduit, said safety-valve having a boss thereon, with which said dog is adapted to contact.

15. In a fluid-pressure brake system, an air-compressor, a controlling-valve, a casing therefor, a brake-cylinder, a pipe leading from said compressor to said valve-casing and cylinder, a reservoir and a pipe leading therefrom to said casing, in combination with means for effecting the emergency stop by closing said valve.

16. In a fluid-pressure brake system, an air-compressor, a valve, a casing therefor, a brake-cylinder, a storage-reservoir normally removed from direct connection with said compressor and suitable connections therebetween, in combination with means for effecting an emergency stop, by closing said valve, and means for effecting a partial stoppage of a car.

17. In a fluid-pressure brake system, a storage-reservoir normally out of communication with the air-pumping mechanism, a valve-casing, a connection from the latter to said reservoir, a valve within said casing, means for conveying any excess of pressure to said reservoir, and means for applying a brake, by closing said valve.

18. In a fluid-pressure brake system, a storage reservoir normally out of communication with the air-pumping mechanism, a valve-casing, a connection from the latter to said reservoir, a valve within said casing, and means for applying a brake, by closing said valve.

19. In a fluid-pressure brake system, a controlling-valve, a casing, an air-compressor, a brake-cylinder, a partition in said valve-casing, forming upper and lower chambers, and means for causing a communication between said chambers, an end of the brake-cylinder and said compressor in combination with means for effecting an emergency stop, and means for effecting a partial stoppage of a car.

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