No. 786,332. PATENTED APR. 4, 1905.

J. V. WELLS.

RECHARGING DEVICE.

APPLICATION FILED APR. 14, 1904.

FIG. 1.

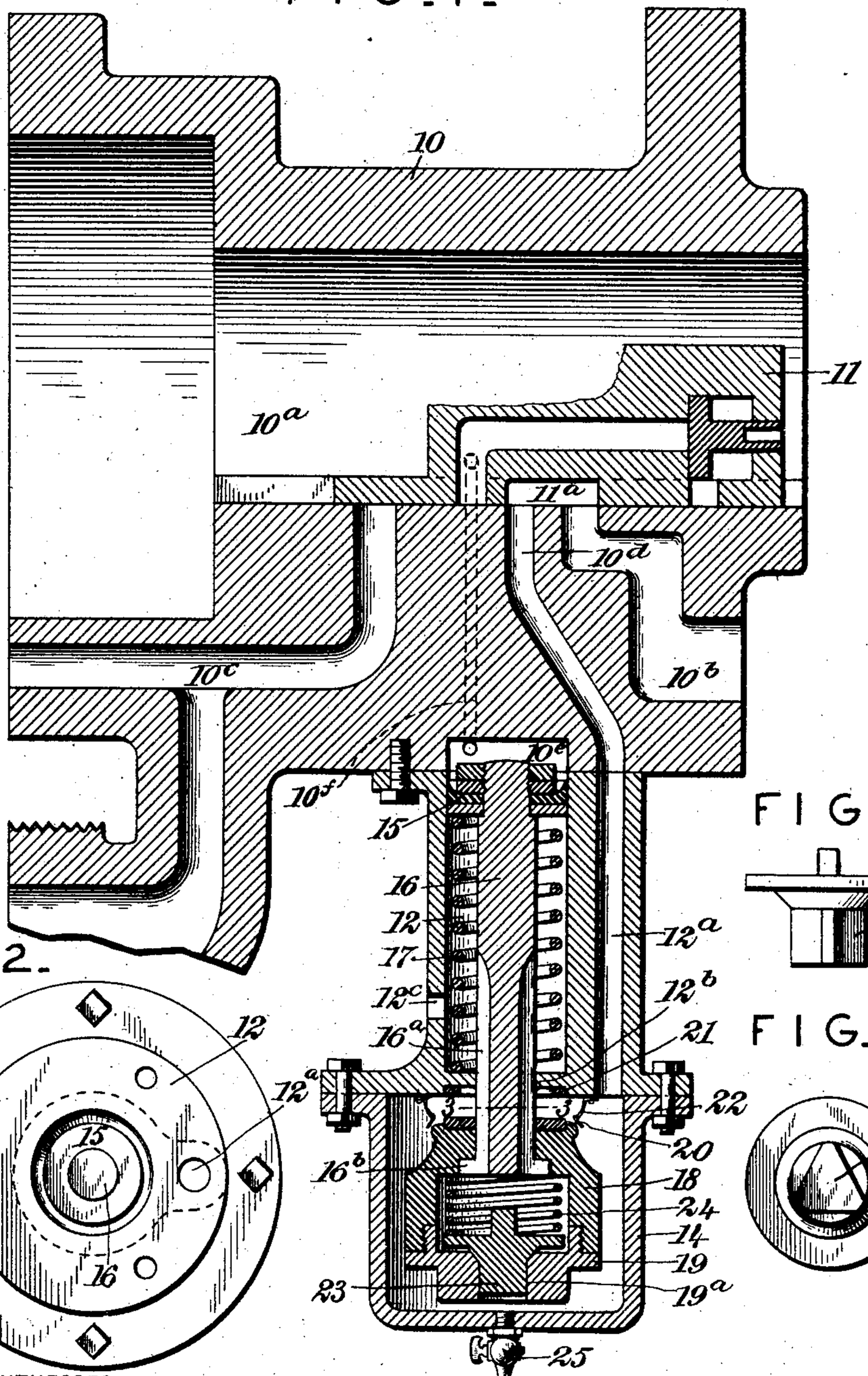



FIG. 2.



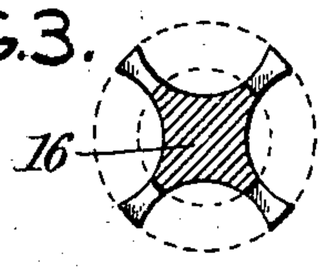

FIG. 4.




FIG. 5.




FIG. 3.

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No. 786,332. Patented April 4, 1905.

# UNITED STATES PATENT OFFICE.

JOHN V. WELLS, OF BRADDOCK, PENNSYLVANIA.

## RECHARGING DEVICE.

SPECIFICATION forming part of Letters Patent No. 786,332, dated April 4, 1905.

Application filed April 14, 1904. Serial No. 203,123.

*To all whom it may concern:*

Be it known that I, JOHN V. WELLS, a citizen of the United States, and a resident of Braddock, in the county of Allegheny and State of Pennsylvania, have invented a new and Improved Recharging Device, of which the following is a full, clear, and exact description.

This invention relates to a recharging device adapted to be used in connection with the triple valves of automatic air-brake systems. It is useful in connection with triple valves of various sorts, but especially with the triple valve forming the subject-matter of my copending application, Serial No. 135,738, filed December 18, 1902, in connection with which it is here illustrated.

The object of the invention is to provide means for retaining the brake-cylinder pressure during the recharging of the auxiliary reservoir in such a manner, however, as will enable the brakes to be quickly and fully released when the predetermined auxiliary-reservoir pressure has been reached. This end I attain by providing a valve controlling the triple exhaust and seated by the action of a spring and the brake-cylinder pressure upon the reduction of the auxiliary-reservoir pressure. I also provide a releasing means operated by the auxiliary-reservoir pressure and adjustable to respond to said pressure when the same has reached a predetermined degree. In this manner as the triple-valve slide moves to running and release position the retaining-valve seats and closes the triple exhaust, provided the auxiliary-reservoir pressure has been reduced below the strength of the said spring, thus retaining the brake-cylinder pressure until the normal working pressure has been reëstablished in the auxiliary reservoir, whereupon the retaining-valve is unseated by the action of the releasing device influenced by the auxiliary-reservoir pressure.

My invention also involves a secondary retaining-valve, which acts to a certain extent independently of the first-mentioned or main retaining-valve to cause a certain amount of pressure to be exhausted from the brake-cylinder even when the main retaining-valve is seated. By adjustment of the spring of this secondary valve the pressure retained in the brake-cylinder to hold the brake during the recharging period is regulated.

The invention involves various other features of major or minor importance, and all will be fully set forth hereinafter.

This specification is an exact description of one example of my invention, while the claims define the actual scope thereof.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a sectional view showing the general outline of a triple valve constructed in accordance with that disclosed in my copending application above referred to and showing my improved recharging-valve attached. Fig. 2 is a top plan view of the cylinder forming part of the recharging-valve and showing the cup-leather piston therein. Fig. 3 is a sectional plan view of the stem of the main retaining-valve on the line 3 3 of Fig. 1, and Figs. 4 and 5 are detail views of the secondary retaining-valve.

10 indicates the casing of the triple valve, having the main cavity $10^a$ and the triple slide 11, the latter having, among other things, the exhaust-cavity $11^a$. The main cavity $10^a$ is in communication with the auxiliary, as usual, and said casing 10 is formed with a brake-cylinder communication $10^b$ and a train-line communication $10^c$. The triple exhaust-port $10^d$ extends to the outer side of the casing or shell 10 and communicates with a continuation-port $12^a$, formed in the walls of the cylinder 12, which constitutes part of the recharging-valve and is bolted or otherwise fastened to the side of the valve-casing 10. The port $12^a$ extends to the outer or lower end of the cylinder 12 and communicates with a chamber 14, fastened to said end of the cylinder. An opening $12^b$ establishes communication between the chamber 14 and the cylinder 12, and said cylinder also has an opening $12^c$ leading into the atmosphere. At its inner or upper end the cylinder 12 communicates with a slide-cavity $10^e$, formed in the casing

10, and this cavity in turn communicates by a port $10^f$ with the main cavity $10^a$ of the triple-valve casing, such communication being at one side and independent of the triple slide 11. In the cylinder 12 is arranged a cup-leather or other form of piston 15, connected to a rod 16, forming the stem of the main retaining-valve. This stem extends downward or outward through the opening $12^b$ into the chamber 14, and its outer portion is grooved or fluted, as indicated at $16^a$, while the extremity thereof is formed with a flange $16^b$, the purpose of which will fully appear hereinafter.

17 indicates an expansive spring which encircles the stem 16 within the cylinder 12 and bears between the outer head thereof and the piston 15, tending to move the parts 15 16 and the elements attached thereto inward to or slightly beyond the position shown in Fig. 1. When the pressure in the main cavity $10^a$ of the casing 10, such being the auxiliary-reservoir pressure, exceeds the strength of the spring 17, the piston 15 and the attached parts will be moved downward or outward, effecting a result which will be hereinafter fully set forth.

The main retaining-valve preferably is composed of a case-like body 18, having a cap 19 fitted into the lower or outer end thereof, the inner end of the body sliding freely on the lower end of the stem 16 and the flange $16^b$ communicating downward or outward movement to the main retaining-valve with respect to the stem 16. Owing to the corrugations $16^a$ in the stem 16, a free movement of the braking fluid may take place through the upper or inner end of the body 18 of the main retaining-valve, and this fluid movement may also take place through the opening $12^b$ when the main retaining-valve is not seated. Said valve is provided with gaskets 20, coacting with gaskets 21, carried on the cylinder 12, as Fig. 1 indicates, and when the main retaining-valve is moved so as to contact these gaskets with each other the passage of the fluid from the chamber 14 between the main retaining-valve and the cylinder 12 is prevented.

22 indicates spring-catches which are attached to the cylinder 12 and adapted to engage the inner end of the retaining-valve body 18, so as to hold the valve in seated position until the spring-catches are overcome by superior force.

According to the form of the invention here shown the cap 19 is formed with an opening $19^a$, constituting a seat for a check-valve 23, which constitutes the secondary retaining-valve and is normally seated by an expansive spring 24, contained within the main retaining-valve body 18. By means of this secondary valve 23, notwithstanding that the main retaining-valve may be seated, upon seating the secondary valve pressure may be passed from the chamber 14 outward through the corrugations $16^a$ into the cylinder 12 and thence to the atmosphere by the port $12^c$.

25 indicates a cock which may be placed in the chamber 14 to serve the double purpose of allowing this chamber to be drained out and also of allowing the entire recharging apparatus to be cut out of action whenever desired.

In the operation of the device the normal auxiliary-reservoir pressure operates when the brakes are not applied to force down the piston 15, causing the stem 16 to bear on the secondary retaining-valve 23 and drop open the main retaining-valve 18 free from the catches 22, thus giving a free passage from the triple exhaust $10^d$ to the atmosphere through the continuation-port $12^a$, chamber 14, corrugations $16^a$, cylinder 12, and port $12^c$. When the brakes are applied and the auxiliary-reservoir pressure has equalized with the brake-cylinder, the reduced pressure in the auxiliary and in the main cavity $10^a$ of the triple valve allows the spring 17 to move up the piston 15, carrying the stem 16 and lifting the main retaining-valve into proximity to its seat. To recharge the auxiliary without releasing the brakes, a train-line increase should be made, causing the triple slide to move into running and release position. Owing to the disposition of areas on the main retaining-valve when the brake-cylinder pressure blows into the chamber 14 through the passage $10^b$, cavity $11^a$, and ports $10^d$ and $12^a$ the retaining-valve, already lifted near its seat, is forced upward, causing the gaskets 20 and 21 to engage and preventing the passage of the braking fluid between the main retaining-valve and the cylinder 12. The parts will stay in this position until the auxiliary-reservoir pressure has been raised to the normal, whereupon the piston 15 will be forced down, and the stem 16 in descending will strike the secondary valve 23 and return the main retaining-valve to its unseated or open position, thereby releasing the brakes. However, should it be desired to continue braking the auxiliary reservoir should not be permitted to recharge to the entire normal pressure at which the valve 18 unseats, but only to recharge to within a few pounds of such pressure. The operator can by this means continue braking and recharge after each application to within a few pounds of the normal pressure, this being continued indefinitely after the valve 18 has once been seated and the auxiliary-reservoir pressure being at this time maintained to within a few pounds of the normal pressure. During the above-described operations the secondary retaining-valve has an independent action in that by the adjustment of the spring 24 said valve may be made to open to allow the escape to the atmosphere through the corrugations $16^a$ of the stem 16 of any pressure exceeding a

predetermined degree which may be required to keep the brake supplied during the recharging operation. For example, it may be assumed that the normal auxiliary-reservoir pressure is seventy pounds, that this will equalize in the brake-cylinder at fifty-five pounds, that the spring 17 is of sufficient strength to raise the piston 15 against fifty-five pounds, seating valve 18, and that the spring 24 is of sufficient strength to hold the valve 23 seated against all pressures under fifteen pounds. It therefore may be seen that upon a service application of the brakes or any application short of equalizing the auxiliary-reservoir pressure with the brake-cylinder the piston 15 will not be affected, and consequently that the recharging device will not come into operation. However, should an emergency or full aplication of the brakes be effected and the auxiliary-cylinder pressure equalize in the brake-cylinder at or below fifty-five pounds upon the triple slide moving to release position the spring 17 will then assert itself and raise the main retaining-valve sufficiently to seat it. When this takes place, the pressure in the chamber 14 will lift the valve 23, allowing this pressure to pass through the corrugations $16^a$ to the cylinder 12 and out by the port $12^c$ until the pressure in the chamber 14, and consequently in the brake-cylinder, is exhausted to fifteen pounds, whereupon the spring 24 will assert itself and seat the valve 23, thus retaining this fifteen pounds pressure in the brake-cylinder until the normal auxiliary-reservoir pressure has been restored, whereupon the recharging device will be automatically released in the manner before explained. The above figures of pressure are given purely as examples, and it will be apparent to persons skilled in the art that various adjustments of the parts may be made to vary the above operation widely. The spring-catches 22 effectually prevent the return of the main retaining-valve, which might otherwise take place owing to the relatively small volume of the chamber 14 and of the leakage which might take place therefrom. These catches are, however, readily overcome by the positive pressure exerted through the rod or stem 16, actuated by the auxiliary pressure on the piston 15.

It will be apparent that by opening the cock 25 a clear passage will be provided from the triple exhaust to the atmosphere and that the recharging device will be completely cut out of action. This is important in cases where a train may require but few retaining-valves in action. This element 25 also serves as a drip-cock. I would also explain that any of the ordinary retaining-valves now in use may be connected with my recharging device at the port $12^c$, in which case the operation of the said ordinary retaining-valve will be wholly independent of that of the recharging device. Finally, I would point out that the secondary retaining-valve 23 may, if desired, be dispensed with, in which case when the spring 17 moves the main retaining-valve into seated position the triple exhaust will be sealed absolutely and no pressure will be allowed to escape until the main retaining-valve is seated. This will hold in the brake-cylinder all of the pressure originally blown thereinto. Such an arrangement will be useful in certain phases of railroad engineering—for instance, on roads where the grades are very heavy and it is desirable, therefore, to hold a high pressure in the brake-cylinder.

Various changes in the form, proportions, and minor details of my invention may be resorted to at will without departing from the spirit and scope thereof. Hence I consider myself entitled to all such variations as may lie within the intent of my claims.

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

1. A recharging device, comprising a casing or inclosure, including a cylinder and a chamber communicating therewith, the cylinder having a vent to the atmosphere and being adapted to communicate with the auxiliary reservoir and the chamber being adapted to communicate with the brake-cylinder, a piston in the said cylinder, a stem connected to the piston, a spring pressing the piston against the auxiliary-reservoir pressure, a main retaining-valve having limited sliding movement on the stem, and a secondary retaining-valve carried by the main retaining-valve.

2. A recharging device, comprising a casing or inclosure including a cylinder and a chamber at one end of and communicating with the cylinder, said cylinder having the other end adapted to communicate with the auxiliary-reservoir pressure and having a discharge or exhaust port intermediate its ends and the chamber being adapted to communicate with the brake-cylinder pressure, a piston in the cylinder, a spring pressing the piston against the auxiliary-reservoir pressure, a grooved stem attached to the piston and extending through the communication between the cylinder and chamber, a chambered main retaining-valve located in the said chamber and having limited sliding movement on the grooved portion of the stem, said main retaining-valve being adapted to bear against the adjacent cylinder-head to close the fluid-passage between the said head and the main retaining-valve, and a secondary retaining-valve carried by and commanding an orifice in the said chambered main retaining-valve.

3. A recharging device, comprising a casing or inclosure including a cylinder and a chamber at one end of and communicating with the cylinder, said cylinder having the other end adapted to communicate with the auxiliary-reservoir pressure and having a discharge or exhaust port intermediate its ends and the chamber being adapted to communicate with the

brake-cylinder pressure, a piston in the cylinder, a spring pressing the piston against the auxiliary-reservoir pressure, a grooved stem attached to the piston and extending through the communication between the cylinder and chamber, a chambered main retaining-valve located in the said chamber and having limited sliding movement on the grooved portion of the stem, said main retaining-valve being adapted to bear against the adjacent cylinder-head to close the fluid-passage between the said head and the main retaining-valve, a secondary retaining-valve carried by and commanding an orifice in the said chambered main retaining-valve, and means for releasably holding the main retaining-valve in active position.

4. A recharging device, comprising a casing or inclosure including a cylinder and a chamber at one end of and communicating with the cylinder, said cylinder having the other end adapted to communicate with the auxiliary-reservoir pressure and having a discharge or exhaust port intermediate its ends and the chamber being adapted to communicate with the brake-cylinder pressure, a piston in the cylinder, a spring pressing the piston against the auxiliary-reservoir pressure, a grooved stem attached to the piston and extending through the communication between the cylinder and chamber, a chambered main retaining-valve located in the said chamber and having limited sliding movement on the grooved portion of the stem, said main retaining-valve being adapted to bear against the adjacent cylinder-head to close the fluid-passage between the said head and the main retaining-valve, a secondary retaining-valve carried by and commanding an orifice in the said chambered main retaining-valve, and spring-catches adapted to engage opposite sides of the main retaining-valve to hold said valve yieldingly in active position.

5. The combination with a triple valve, of a recharging device, comprising a main retaining-valve controlling the triple exhaust, means for unseating said valve, such means being actuated by the auxiliary-reservoir pressure, a secondary retaining-valve, and means for yieldingly seating the same, the secondary retaining-valve being carried by the main retaining-valve.

6. The combination with a triple valve, of a recharging device, comprising a main retaining-valve controlling the triple exhaust, means for unseating said valve, such means being actuated by the auxiliary-reservoir pressure, a secondary retaining-valve, and means for yieldingly seating the same, the secondary retaining-valve being carried in the main retaining-valve.

7. A recharging device for fluid-pressure brake systems, comprising a valve adapted to command the triple exhaust, means for unseating said valve operated by the auxiliary-reservoir pressure, and a spring-catch adapted to yieldingly hold the valve seated.

8. A recharging device for fluid-pressure brake systems comprising a chambered valve adapted to command a triple exhaust, means for unseating said valve operated by the auxiliary-reservoir pressure, and a secondary retaining-valve mounted in the chambered valve and controlling an exhaust-opening therein.

9. A recharging device for fluid-pressure brake systems comprising a casing having a passage therethrough communicating with the triple exhaust, a retaining-valve commanding said passage, means for unseating the valve operated by the auxiliary-reservoir pressure, the retaining-valve having a passage therethrough, and a secondary retaining-valve commanding the passage in the first-named or main retaining-valve.

10. A recharging device for fluid-pressure brake systems comprising a valve adapted to command a triple exhaust, means for unseating the valve operated by the auxiliary-reservoir pressure, and a catch adapted releasably to hold the valve seated.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN V. WELLS.

Witnesses:
C. A. STOKES,
E. H. HUTZEN.