No. 630,383.

Patented Aug. 8, 1899.

W. B. MANN.

TRIPLE VALVE.

(Application filed Feb. 27, 1899.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 2.

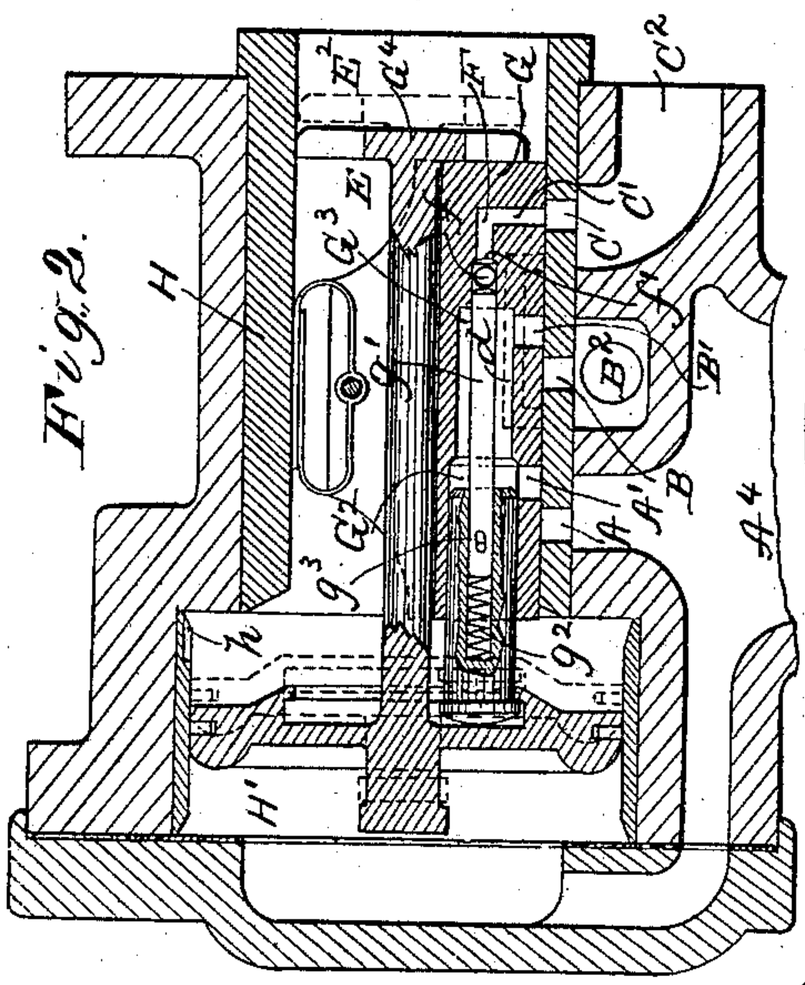


Fig. 4.

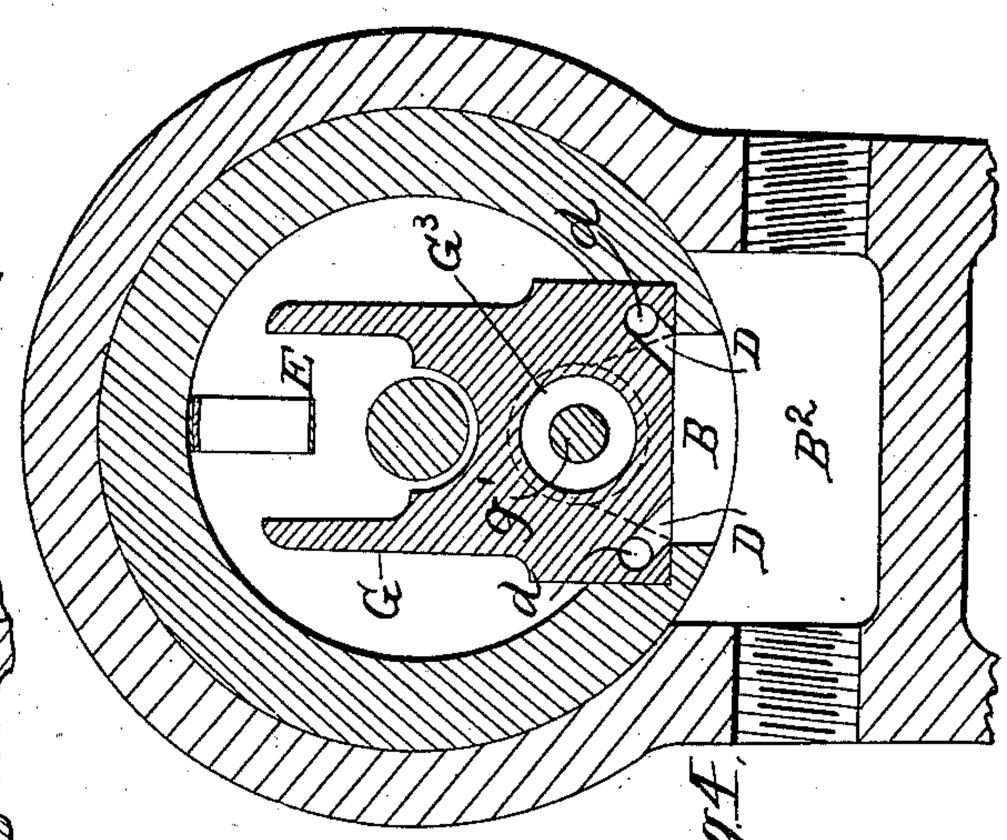


Fig. 3.

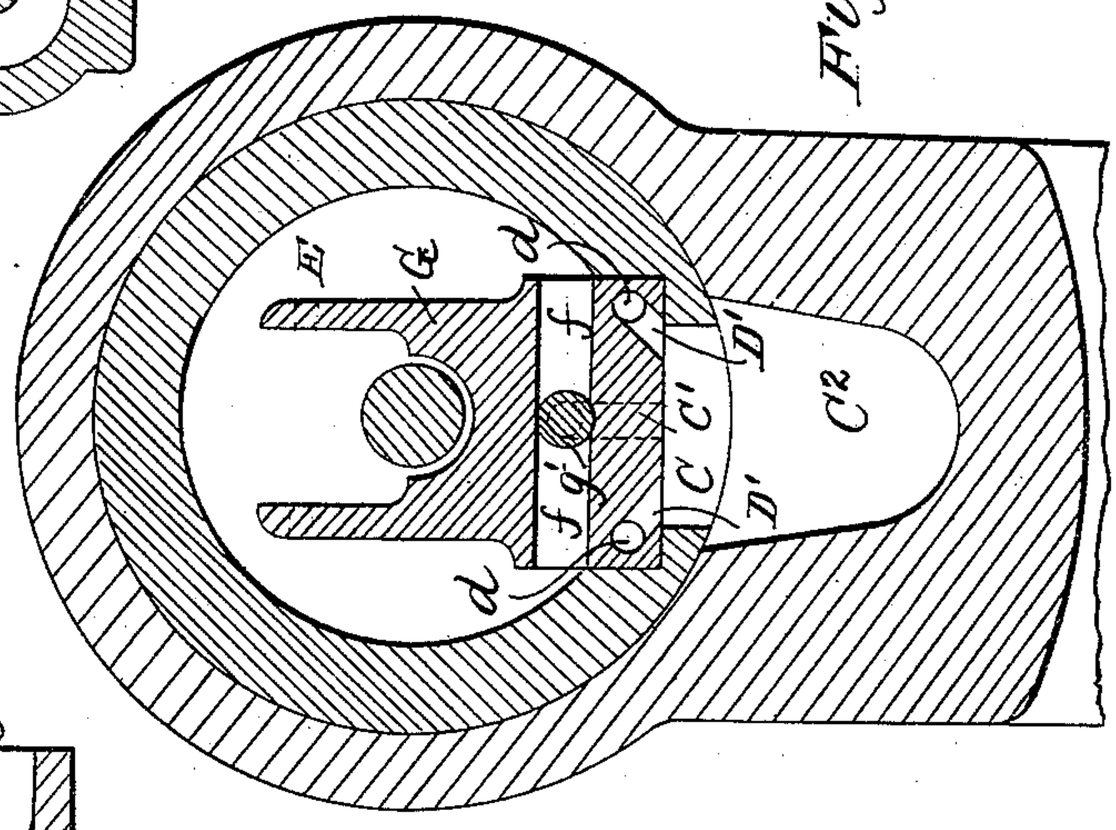
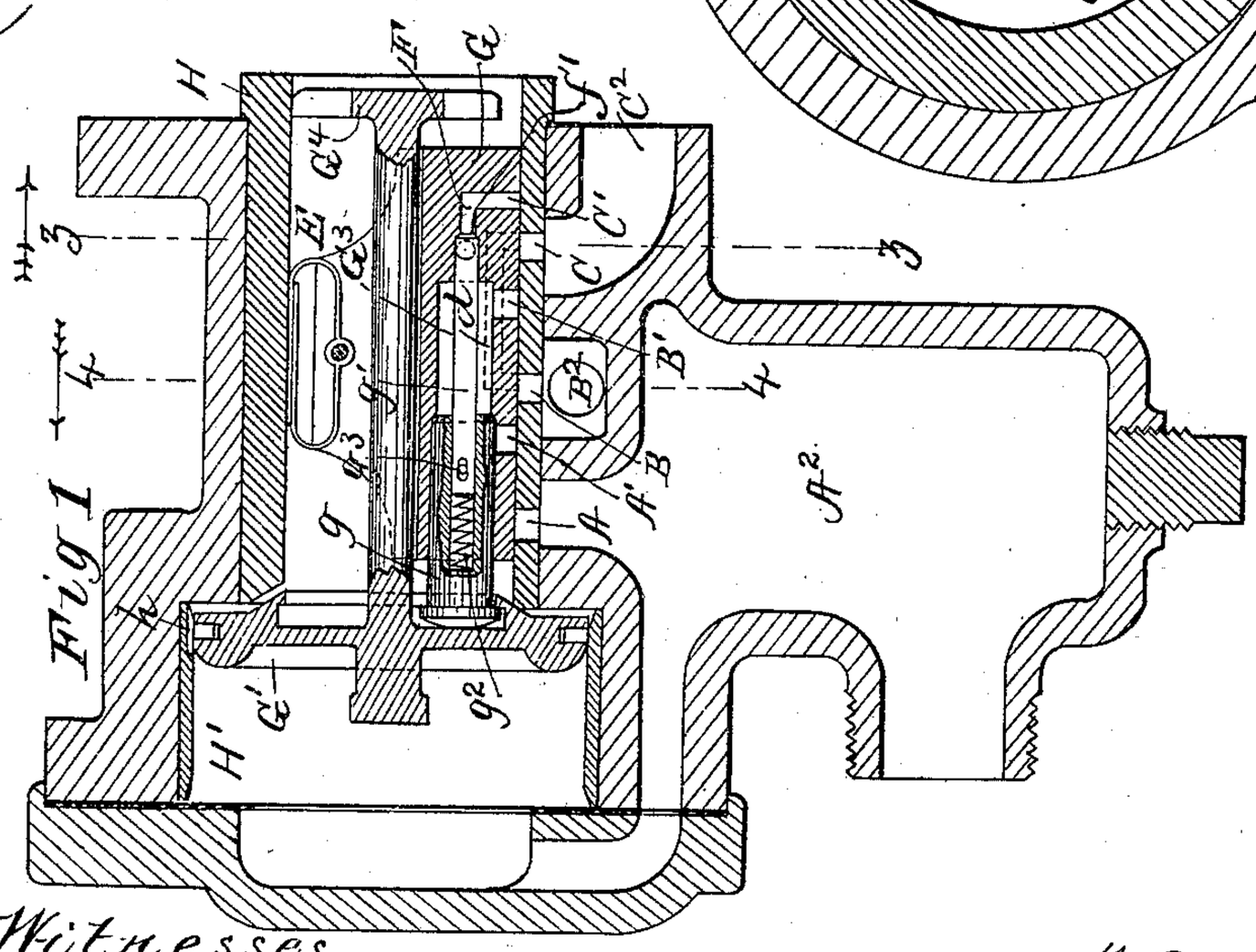


Fig. 1



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No. 630,383. Patented Aug. 8, 1899.

W. B. MANN.

TRIPLE VALVE.

(Application filed Feb. 27, 1899.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 6.

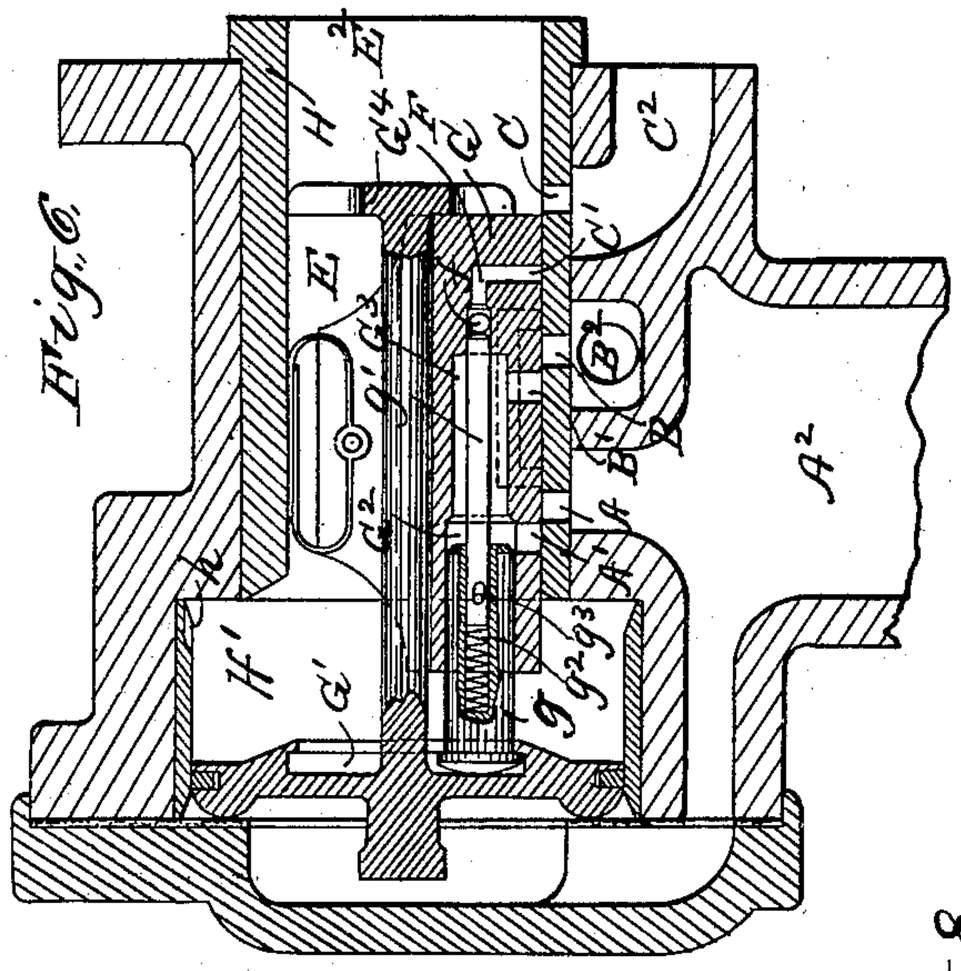


Fig. 8.

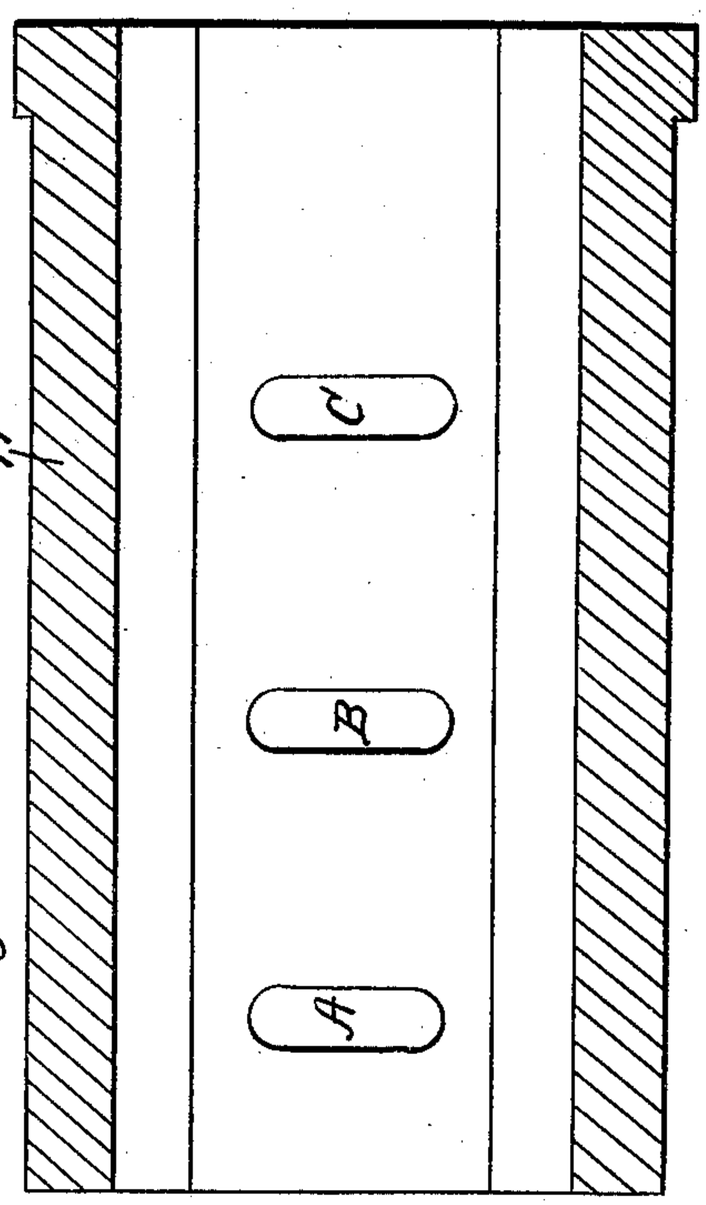


Fig. 5.

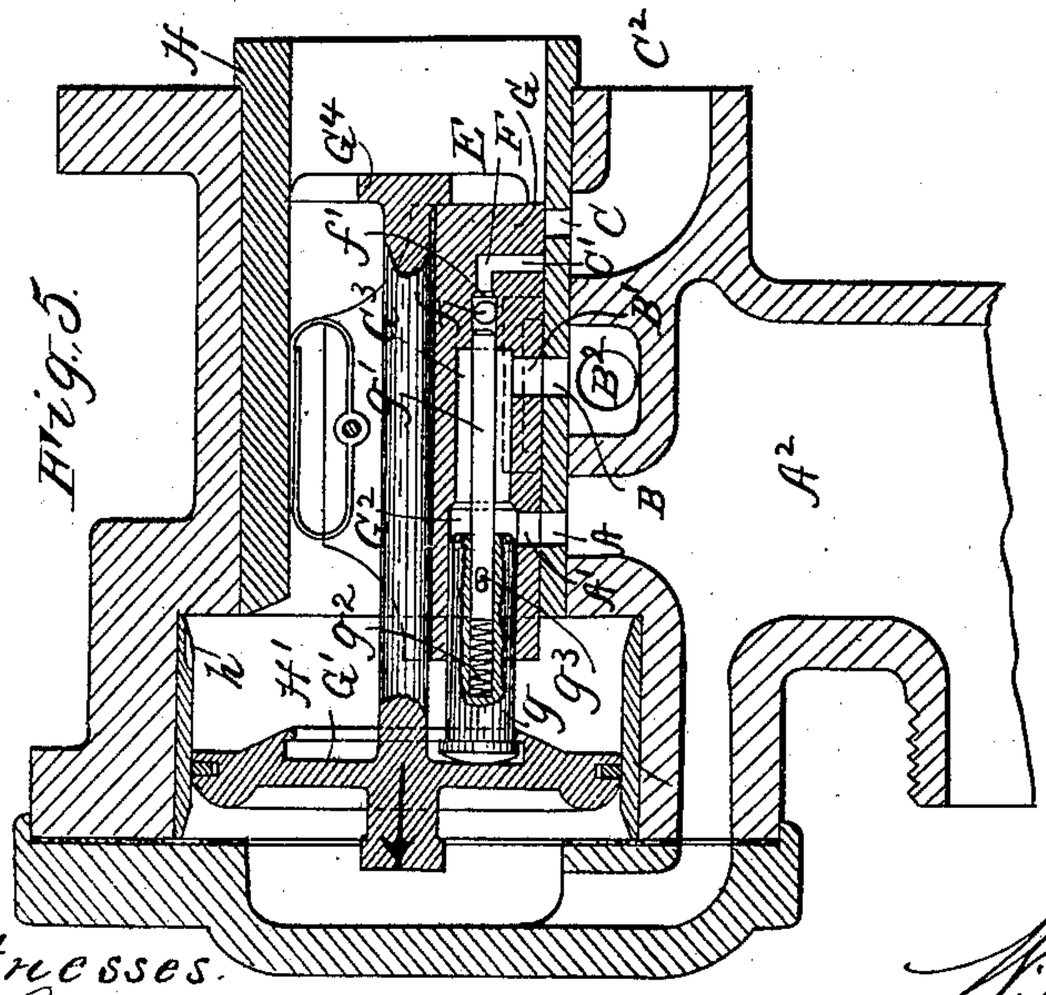
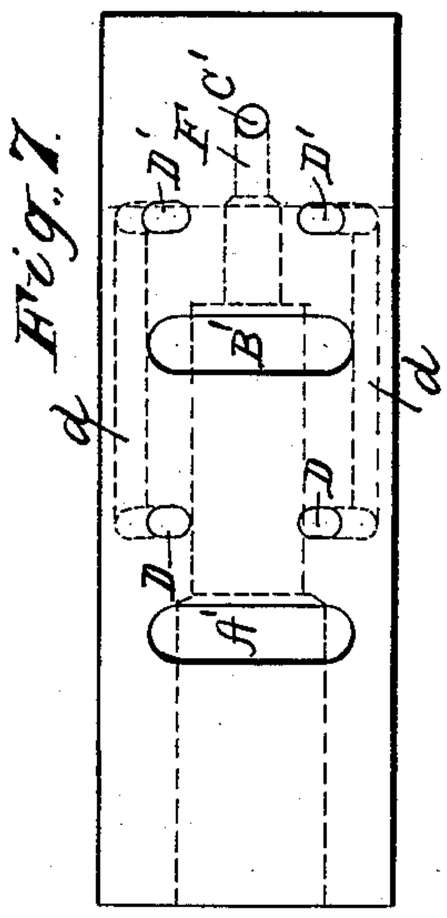


Fig. 7.



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UNITED STATES PATENT OFFICE.

WILLIAM B. MANN, OF BALTIMORE, MARYLAND.

TRIPLE VALVE.

SPECIFICATION forming part of Letters Patent No. 630,383, dated August 8, 1899.

Application filed February 27, 1899. Serial No. 707,107. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM B. MANN, a citizen of the United States of America, and a resident of the city of Baltimore, State of Maryland, have invented a new and useful Improvement in Triple Valves, which invention is fully set forth in the following specification.

My invention relates to air-brakes for railway-trains, and more particularly to the triple-valve mechanism for controlling the operation of such brakes.

In making emergency applications of the brakes it is necessary to secure the reduction of train-pipe pressure with great rapidity throughout the entire length of the pipe, and for this purpose many quick-action valves are provided with an auxiliary venting-valve controlling the passage of air from the train-pipe, such auxiliary valve being directly operated or rendered operative by the triple-valve piston when it makes its emergency throw. In some cases the air passing from the train-pipe is allowed to escape to the atmosphere, and in other cases it is conducted from the train-pipe to the brake-cylinder, in which latter case a check-valve is required to prevent back pressure from the brake-cylinder to the train-pipe. All such devices which require the addition to the triple valves of auxiliary valves, check-valves, and the necessary operating mechanism therefor are objectionable, because they complicate the triple-valve device, greatly increase its chances of getting out of order, and largely add to its original cost. Furthermore, in all cases with which I am familiar the actual escape of air from the train-pipe in quantity sufficient to cause quick serial action does not occur at any triple valve before the piston of said valve has completed its full traverse, so that the time required to secure action from all the triple valves of a train is equal to the time required for the traverse of the triple-valve piston plus the time required to sufficiently vent the train-pipe at each triple valve to produce quick action of the next succeeding valve multiplied by the number of cars in the train, whereas if the venting of the train-pipe could be commenced before the triple-valve piston has completed its traverse there would be a saving of a fraction of a second on each car, which on a train of, say, fifty cars would very materially decrease the time required for an emergency application of the brakes.

The present invention has for its object to provide a quick-action triple-valve mechanism which when the triple-valve piston is given its emergency traverse shall operate to permit the escape of air from the train-pipe without the use of any auxiliary, check, or other valve additional to the main and graduating valves.

A further object of the invention is to provide a quick-action triple valve which shall operate to permit the escape of air from the train-pipe before the triple-valve piston has completed its emergency traverse; and, finally, the object of the invention is to simplify the construction and operation of quick-action triple valves, and thereby render them more durable and effective in operation and less costly to construct.

With these objects in view my invention consists in a triple-valve casing having ports leading to the train-pipe, to the brake-cylinder, and to the atmosphere, with a main valve having a duct or ducts therein which connect the brake-cylinder and the atmosphere ports when the valve is in release position and another duct which connects the train-pipe and atmosphere ports when the valve is in the act of moving to emergency position to permit braking air to enter the brake-cylinder.

Furthermore, the invention consists in a main and graduating valve and an operating-piston therefor, the main valve having a duct or ducts which connect the brake-cylinder with the atmosphere when the valve is in release position, a second duct controlled by the graduating-valve and through which braking air enters the brake-cylinder when the parts are in graduating position, and a third duct which connects the train-pipe with the atmosphere as the main valve moves to emergency position to permit braking air to enter the brake-cylinder.

Furthermore, the invention consists of a quick-action triple-valve mechanism of but three parts besides the valve-casing—viz., the main valve, the graduating-valve, and the

actuating-piston—said parts so coöperating as to control the pressure for releasing the brakes, for making service and emergency applications thereof, and for venting the train-pipe to secure quick action; and, finally, the invention consists in certain improved details of construction, which will be hereinafter described and then pointed out in the claims.

The inventive idea involved in the invention may find mechanical expression in various forms, and for the purpose of illustration I have shown one of such forms in the accompanying drawings; but I wish it understood that the same is shown for the purpose of illustration only and not as defining the limits of the invention.

In such drawings, Figure 1 is a central vertical longitudinal section of a triple-valve mechanism embodying my invention, parts being in elevation and the valve being in release position. Fig. 2 is a similar view with the parts in graduating position. Fig. 3 is an enlarged transverse section on the line 3 3, Fig. 1. Fig. 4 is a similar view on the line 4 4, Fig. 1. Fig. 5 is a view of the parts in the act of moving to emergency position, showing an open passage from the train-pipe to the atmosphere. Fig. 6 is a view similar to Fig. 1, but with the parts in emergency position. Fig. 7 is an enlarged bottom plan view of the face of the main valve, certain ducts therein being shown in dotted lines; and Fig. 8 is an enlarged plan view of the bottom of the triple-valve casing, showing the ports therein leading to the train-pipe, the brake-cylinder, and the atmosphere.

In a suitable valve-casing H, I form ports A, B, and C, A leading to the train-pipe A^2, B to the atmosphere through passage B^2, and C to the brake-cylinder passage C^2.

G is the main valve, operated in the usual and well-known manner by the piston G′, which has lost-motion connection with the valve through the head G^4, as shown. Within the main valve is a chamber G^2, connecting with a chamber G^3, which in turn connects with a passage or duct F, leading from the chamber G^3 to the lower or operating face of the main valve.

A′ is a port opening from the face of the valve into chamber G^2, B′ a like port opening into chamber G^3, and C′ a port opening into passage or duct F. Side ducts *f f* lead from the passage or duct F out through the sides of the main valve to the valve-chamber E, which is in free communication with the auxiliary reservoir through passage E^2. There is also formed in the body of the main valve one or more ducts, in this case shown as two ducts *d d*, which ducts open to the face of the valve through ports D D and D′ D′, the distance between ports D′ and D being substantially equal to that between ports B and C. The graduating-valve consists of a part *g*, which is attached to the piston G′, as shown, and enters chamber G^2 and seats as a valve in a valve-seat formed at the junction of chambers G^2 and G^3. Projecting forward from the part *g* and through chamber G^3 into passage F is a stem *g′*, shown in this instance as entering a longitudinal bore in the part *g* against the tension of a spring g^2 and held in position by a pin-and-slot connection g^3. This stem *g′* seats as a valve on a valve-seat *f′* in the passage or duct F. The lengths of the parts *g g′* are so arranged that when the piston G′ abuts the valve G (see Fig. 1) the valve *g* is seated, so as to close communication between chambers G^2 G^3, and the valve *g′* is seated, so as to close communication between duct F and ducts *f f;* but when the head G^4 abuts the valve G (see Figs. 2, 5, and 6) the valves *g g′* are unseated, and communication between chambers G^2 G^3 and between ducts F *f f* is opened. The usual feed-in valve *h* is provided for the purpose of charging the auxiliary reservoirs from the train-pipe.

The operation of the device is as follows: The parts being in the position shown in Fig. 1, air passes from the train-pipe to the auxiliary reservoir through the feed-in valve *h*, and the brake-cylinder is in communication with the atmosphere through ports C D′ D′, ducts *d d*, and ports D D B. If now the pressure in the train-pipe be slightly lowered through the engineer's valve, the piston G′ will move toward train-pipe pressure. The first effect of this movement will be to unseat valves *g g′*, after which head G^4 will contact with valve G and move it along until port C′ registers with port C, at which time the pressure on opposite sides of the piston G′ will be equalized and it will come to rest and air will flow from the auxiliary reservoir through the valve-chamber E, ducts *f f* and F, and ports C′ and C to the brake-cylinder, the latter being no longer in communication with the atmosphere, because ports D D′ do not now register with ports B and C. This passage of air from the auxiliary reservoir to the brake-cylinder soon causes the pressure on the auxiliary-reservoir side of piston G′ to fall slightly below train-pipe pressure, whereupon said piston shifts from the position shown in full lines, Fig. 2, to that shown in dotted lines, thereby seating the valve *g′* on the seat *f′* and closing the ducts *f f* and preventing the passage of any more air from the auxiliary reservoir. If desired, this graduating action for service applications of the brakes may be repeated by again slightly lowering train-pipe pressure through the engineer's valve. With the parts in the position shown in dotted lines, Fig. 2, pressure in the brake-cylinder is held constant and pressure in the train-pipe and auxiliary reservoir is substantially equalized. To release the brakes, pressure in the train-pipe is raised by permitting air to flow thereinto from the main reservoir and return the parts to the position shown in Fig. 1. To make an emergency application of the brakes, a large reduction of from eight to twelve pounds is made in train-

pipe pressure by permitting air to escape rapidly through the engineer's valve, and the preponderance of pressure on the auxiliary-reservoir side of piston G′ causes it to quickly shift from the position shown in Fig. 1 to that shown in Fig. 6—that is, to make the full traverse of its cylinder H′. In making this traverse it unseats valves *g g′*, as before, and then shifts the main valve G so that the port C is uncovered, as clearly shown in Fig. 6. While the valve G is thus shifting from the release to the emergency position port A′ passes over port A, and port B′ simultaneously passes over port B, thereby directly connecting the train-pipe with the atmosphere through ports A A′, chambers G^2 G^3, and ports B B′, and air thus escaping from the train-pipe serves to lower the pressure therein sufficiently to cause the next triple valve in the series to take quick action. As the main valve continues to shift toward the position shown in Fig. 6 ports A′ and B′ are carried out of register with ports A and B, respectively, and air ceases to pass from the train-pipe to the atmosphere. It will thus be seen that before the piston of the first valve in the series has reached its full traverse the reduction in train-pipe pressure necessary to cause the second valve in the series to take quick action has been secured. It will also be noted that my entire valve mechanism is made up of the main and graduating valves and the operating-piston therefor and that I secure all the functions heretofore obtained from quick-action triple valves without the complications due to check-valves, auxiliary valves, and operating mechanism therefor. In returning the parts from emergency position (shown in Fig. 6) to release position (shown in Fig. 1) the valve *g* closes communication between chambers G^2 and G^3, so that as ports A′ and B′ pass over ports A and B, respectively, on the return movement no air is allowed to escape from the train-pipe to the atmosphere.

Having thus described my invention, what I claim is—

1. The combination of a train-pipe, brake-cylinder and auxiliary reservoir, with a main valve which while shifting from release to emergency position opens communication between the train-pipe and the atmosphere so as to vent the train-pipe and secure quick serial action and then closes such communication and opens a passage from the auxiliary reservoir to the brake-cylinder.

2. The combination of a train-pipe, brake-cylinder and auxiliary reservoir, with a main valve through which, before it has completed its emergency throw, a passage is opened and closed whereby the train-pipe is vented sufficiently to cause quick serial action.

3. The combination of the train-pipe, auxiliary reservoir and brake-cylinder, with a main valve, having a duct therein opening and closing a passage from the train-pipe to the atmosphere while the valve is shifting to emergency position, an operating-piston for said main valve, and a valve connected to said piston and controlling said duct.

4. The combination of the train-pipe, auxiliary reservoir and brake-cylinder, with a main valve, having a duct therein conducting air from the train-pipe while the valve is shifting to emergency position, an operating-piston for said main valve, a valve connected to said piston and controlling said duct, and a graduating-valve operated by said piston and controlling a graduating-duct in the main valve.

5. The combination of a train-pipe, brake-cylinder and auxiliary reservoir, with a valve-casing having ports leading to the train-pipe, and the atmosphere, with a main valve having a duct which, while the valve is making its emergency throw, connects the train-pipe and atmosphere ports so as to cause quick serial action, and disconnects said ports before the valve has completed its emergency throw.

6. The combination of the train-pipe, auxiliary reservoir, and brake-cylinder, with a main valve having two connecting-chambers therein, an operating-piston for said main valve, a valve connected to said piston and normally closing communication between said chambers but opening when the piston shifts toward train-pipe pressure and a port in each of said chambers, one of which ports opens to the train-pipe and the other of which opens to the atmosphere while the main valve is shifting to emergency position.

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

WILLIAM B. MANN.

Witnesses:
THOS. C. BAILEY,
CHAS. LEVIS.