959,801.

W. A. PENDRY.

TRIPLE VALVE.

APPLICATION FILED APR. 12, 1909.

Patented May 31, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

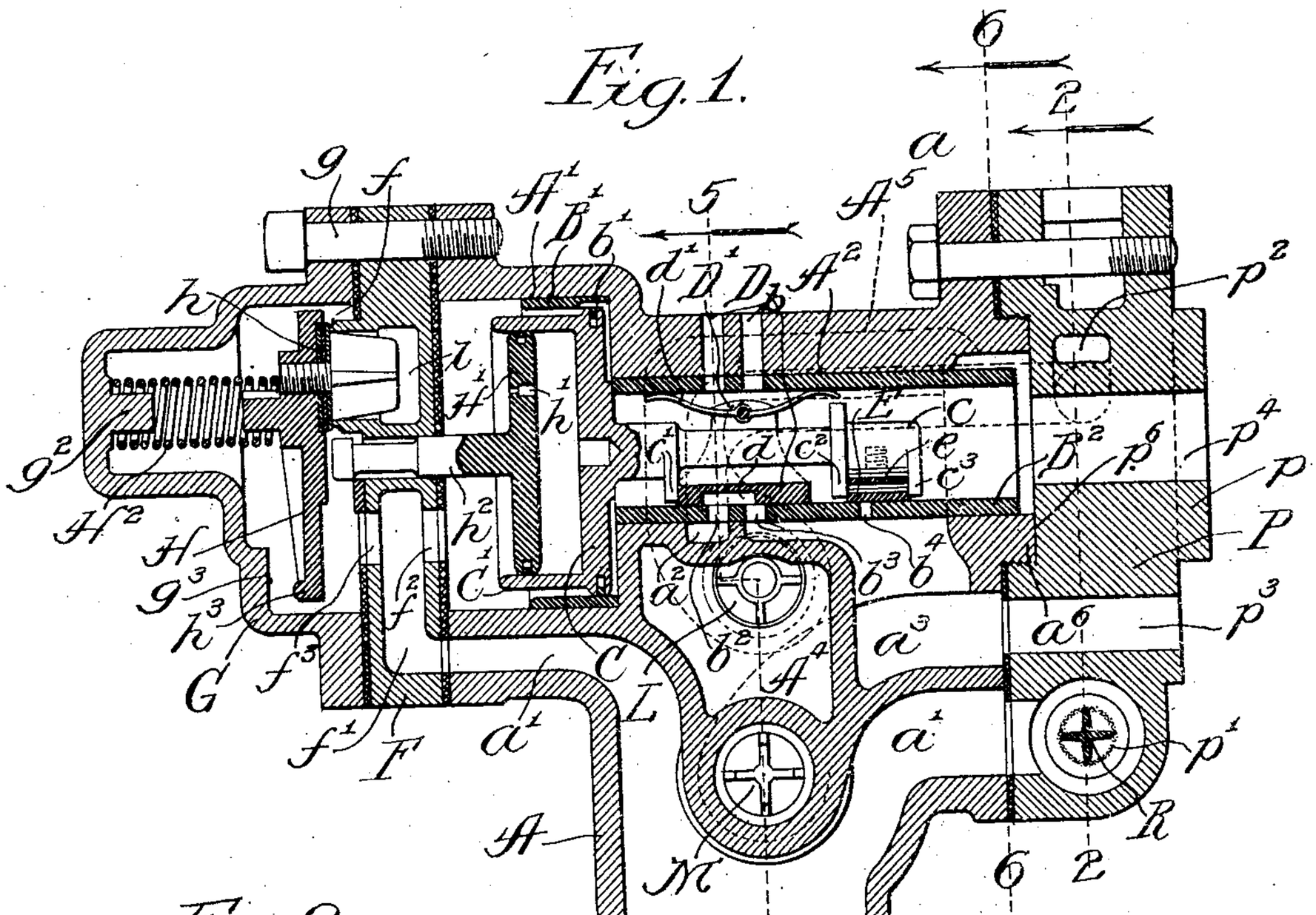


Fig. 2.

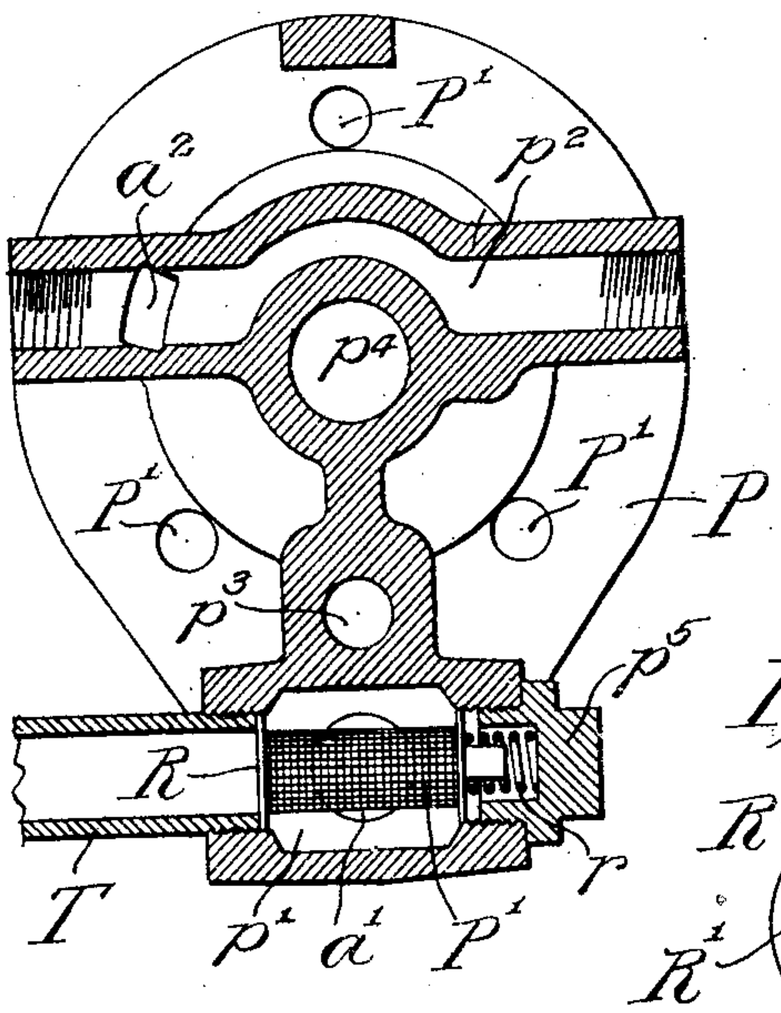


Fig. 3.

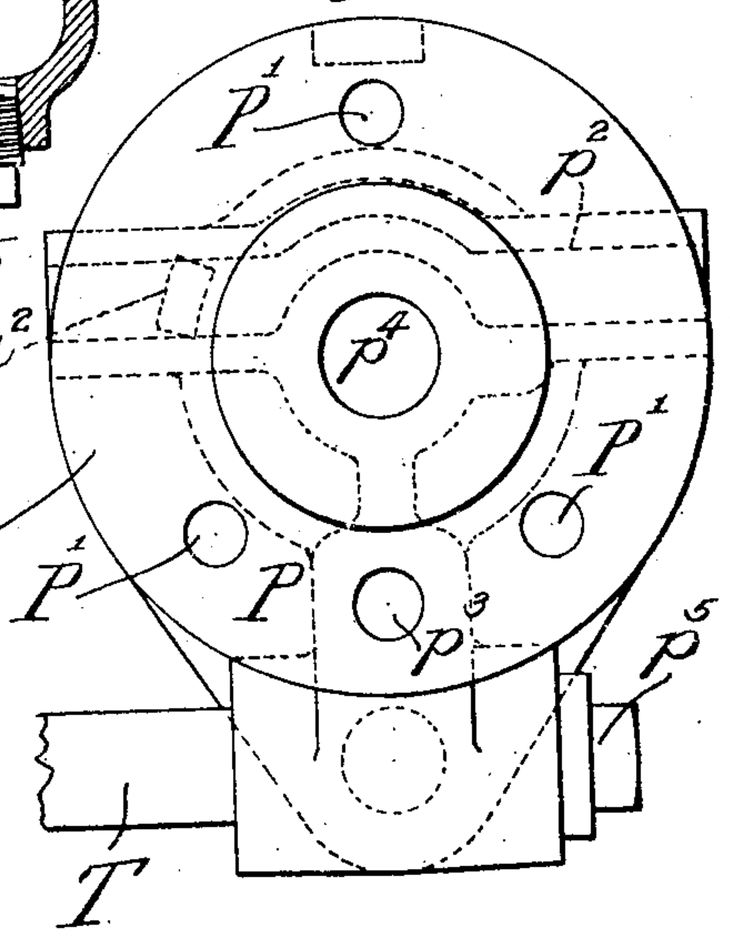
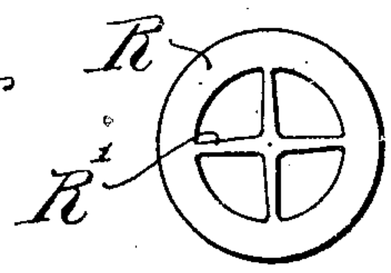


Fig. 4.



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TRIPLE VALVE.

APPLICATION FILED APR. 12, 1909.

959,801.

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2 SHEETS—SHEET 2.

Fig. 6.

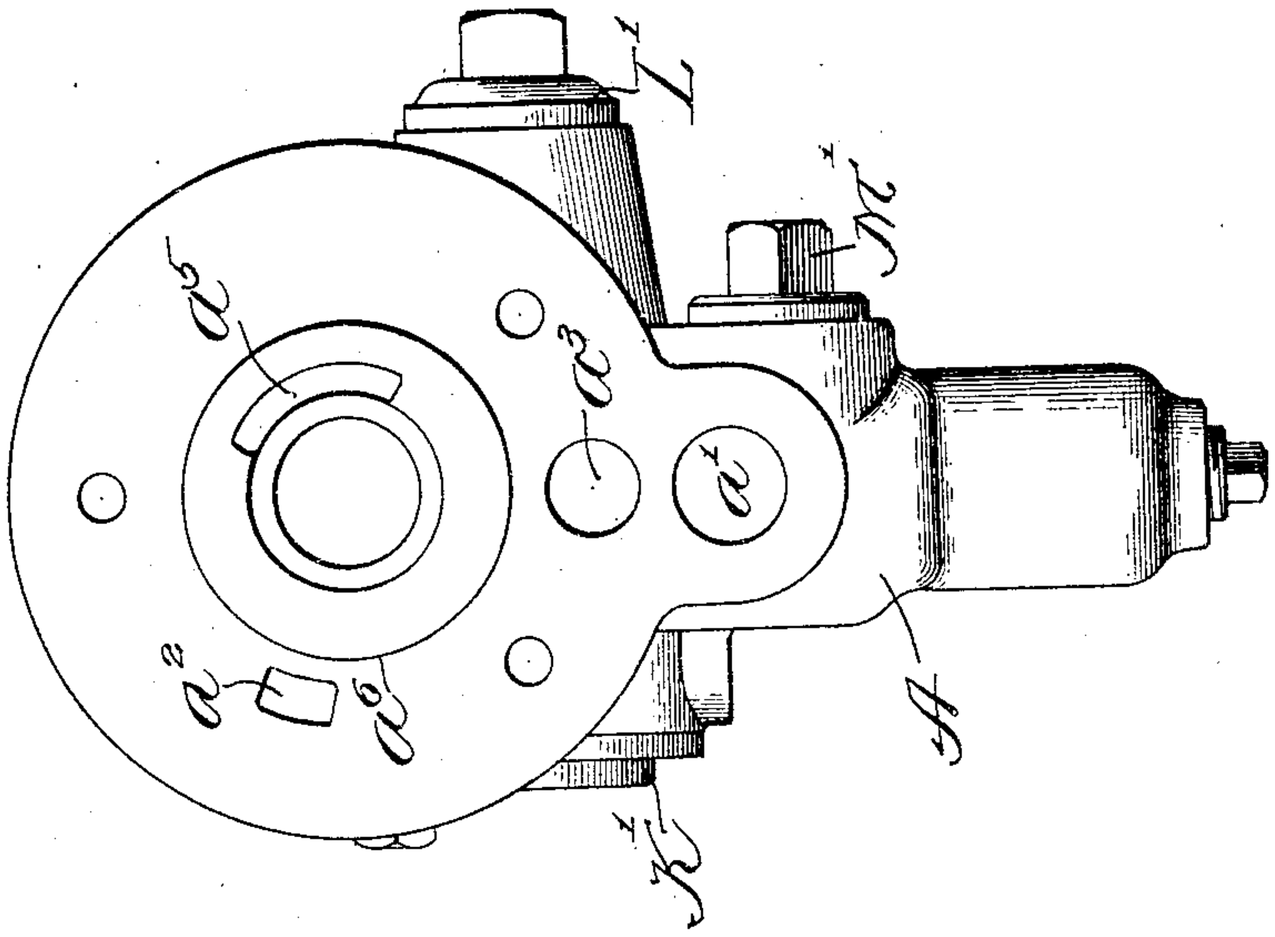
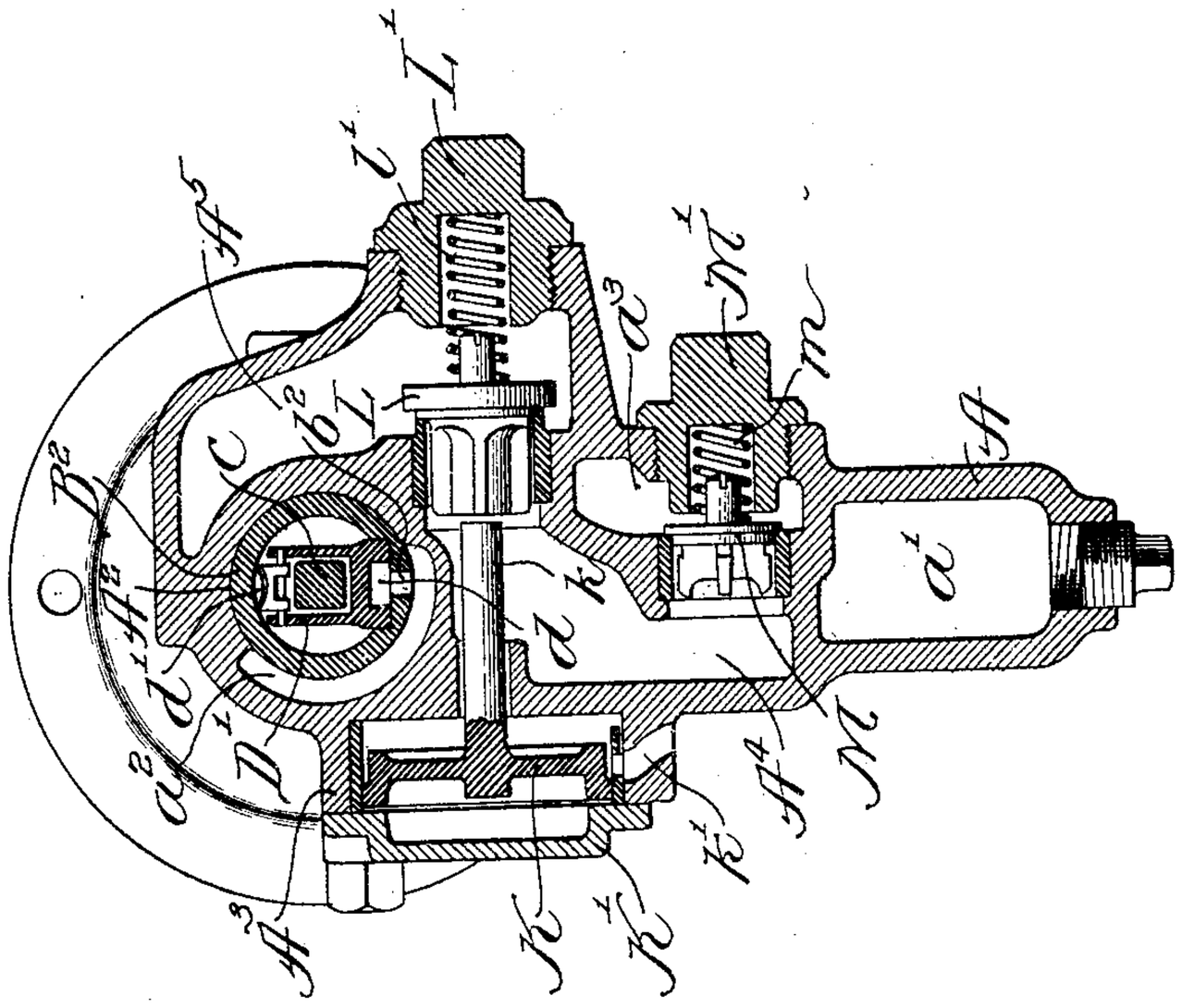


Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM A. PENDRY, OF DETROIT, MICHIGAN.

TRIPLE VALVE.

959,801. Specification of Letters Patent. **Patented May 31, 1910.**

Application filed April 12, 1909. Serial No. 489,422.

To all whom it may concern:

Be it known that I, WILLIAM A. PENDRY, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Triple Valves, of which the following is a specification.

My invention relates in general to automatic air brakes, and more particularly to improvements in triple valves.

In the use of triple valves, it is often necessary to remove the valve mechanism from the inclosing casing in order to replace valve faces, valve seats, and worn out packings, and in order to remove foreign matter from ports and passages which has been deposited by the compressed air. In triple valves in general use, in order to remove the valve mechanism from the inclosing casing, it is necessary to disconnect the couplings with some of the coöperating parts of the brake apparatus, as the couplings are connected with parts of the casing which must be detached in order that the valve mechanism may be removed. This operation requires considerable time and labor, and consequently delays the use of the car upon which the brake apparatus needing attention is located.

One of the objects of my invention is to provide an improved quick acting triple valve, the entire valve mechanism of which may be removed from the casing without detaching the couplings leading to the other parts of the brake apparatus.

A further object of my invention is to provide an improved triple valve in which the strainer through which the train pipe air passes to the triple valve may be readily removed for the purpose of discharging the dust and other foreign matter collected therein, without disconnecting the train pipe.

A still further object of my invention is to provide an improved quick acting triple valve, which will be comparatively simple in construction, economical in manufacture, efficient in operation, and durable in use.

My invention will be more fully disclosed hereinafter by reference to the accompanying drawings, in which the same is illustrated as embodied in a convenient and practical form, and in which—

Figure 1 is a central vertical section, showing the valve mechanism in release position; Fig. 2, a transverse sectional view on line 2, Fig. 1; Fig. 3, an elevational view, looking from the right in Fig. 1; Fig. 4, a detail view of the strainer cage; Fig. 5, a cross section on line 5, 5, Fig. 1; and Fig. 6, an elevational view of the main section of the triple valve casing with the end section thereof removed, the plane of this view being indicated by line 6, 6, Fig. 1.

The same reference characters are used to designate the same parts in the several figures of the drawings.

Reference letter A indicates the main section of the casing, and comprises a cylindrical piston chamber A′ and a valve chamber A^2. A cylindrical bushing B′ is located within the piston chamber A′ and is provided with the usual feed groove b'.

B^2 indicates a bushing in the valve chamber A^2 which is provided with ports b^2, b^3 and b^4 extending through the valve seat therein. The port b^2 registers with an underlying port leading to an exhaust passage a^2, the latter extending upwardly partially around one side of the valve casing—as shown in Fig. 5—and thence longitudinally of the valve casing, as indicated by the dotted lines in Fig. 1. The ports b^3 and b^4 communicate with a passage a^3 extending longitudinally of the valve casing and adapted to be placed in connection with the brake cylinder. The bushing B^2 is prevented from creeping within the valve chamber A^2 by means of the usual pins inserted in alining holes b in the upper wall of the valve chamber and adjacent the wall of the bushing.

a' indicates the train pipe passage in the valve casing which extends to and communicates with the piston chamber A′.

C indicates the triple valve piston fitting within the bushing B′ and having a valve stem c extending concentrically therefrom into the valve chamber.

D indicates the main slide valve which is provided with a passage d in the under surface thereof. Parallel wings D′ project upwardly from the sides of the main valve D and support between their upper ends a leaf spring d' which engages the under surface of the top of the bushing B^2 and through its tension retains the valve D in contact with the underlying seat in the bushing. The valve D is located within lugs c' and c^2 formed on the valve stem c, the distance between the lugs being slightly

greater than the length of the valve so as to permit a small movement of the piston without moving the valve D.

E indicates the service graduating valve which controls the underlying port b^4 and is located between lugs c^2 and c^3 on the valve stem c. A spring e is interposed between the valve stem and valve E to retain the latter in contact with the underlying valve seat.

F indicates the head of the piston cylinder A′, which is provided with a passage f' registering with the adjacent end of the train pipe passage a' and communicating through a port f^2 with the piston chamber A′. The passage f' also communicates through a port f^3 with the interior of a cap G. The cap G and cylinder head F may be conveniently secured to the main section A of the valve casing by means of bolts g passing through registering holes in flanges on the cap G and head F and into screw threaded engagement with alined holes in a flange around the adjacent end of the piston chamber A′.

The triple valve piston C is provided with a circular flange C′ which forms a cylinder in which is located a piston H′, the latter being provided with a restricted hole h' therethrough. A stem h^2 projects concentrically from the piston H′ and extends through a guide opening in the head F. A lever H is located within the chamber in the cap G in alinement with the stem h^2. The lever H carries a valve h normally engaging a seat f surrounding a port leading to a passage i in the head F. A spring H^2 is interposed between the lever H and the end of the cap G for normally retaining the valve h closed against the seat f. A stud g^2 is provided on the inner surface of the end of the cap G for centering the spring H^2, and a similar stud is provided on the lever H. The end h^3 of the lever H opposite to the valve h is adapted to engage a shoulder g^3 within the cap G to form a fulcrum for the lever H in emergency applications of the brakes.

The passage i in the head F leads to a cylinder A^3 at one side of the main section A of the casing—as shown in Fig. 5. In the chamber A^3 is a piston K having a stem k extending through the wall between the cylinder A^3 and the chamber A^4. K′ indicates the head of the chamber A^3, while k' indicates an atmospheric port leading from the chamber A^3 and controlled by the piston K. A valve L is located in alinement with the stem k and controls a passage connecting the chamber A^4 with a chamber A^5, the latter chamber communicating with the extended auxiliary reservoir port a^5 in the end of the main section A of the casing.

L′ indicates a removable cap extending through the outside wall of the chamber A^5 through which the valve L is inserted. l' indicates a spring interposed between the cap L′ in the valve L for normally retaining the latter in closed position.

M indicates a check valve controlling a passage through the wall which separates the chamber A^4 from the brake cylinder passage a^3. This valve is normally retained seated by a spring m interposed between the same and a removable cap M′ in the outer wall of the passage a^3.

The above described quick acting triple valve mechanism does not in itself constitute my invention, as it is substantially the same as that known as the "New York triple valve," but is shown and described in order that the improvements which I have invented may be clearly understood.

P designates an end section of the valve casing which is adapted to be permanently secured to a supporting member of the brake apparatus, such, for instance, as the end of the brake cylinder or auxiliary reservoir. All of the connections between the valve casing and other parts of the brake apparatus are made through the end section P, so that such connections need not be disturbed when it is desired to remove the valve mechanism to be repaired or cleaned. The end section P of the valve casing is provided with a plurality of holes P′ extending therethrough with which register holes through the flange a around the adjacent end of the main section A of the valve casing. Bolts are adapted to pass through the holes in the flange a and registering holes P′ into engagement with the supporting member of the brake apparatus, so that by removing such bolts section A may be entirely detached while the section P remains upon the supporting member.

In order to accurately retain the sections P and A in proper relation, a recess p^6 is provided in the adjacent surface of the section P, in which is received the usual circular flange a^6 projecting from the adjacent surface of the main section A of the valve casing, and in order to more efficiently support the section P upon the end of the brake cylinder or auxiliary reservoir, a circular projection p is provided corresponding to the circular projection a^6 on the end of the main casing section A, to be received within the usual opening or depression formed in the brake cylinder or auxiliary reservoir.

A transverse passage p' extends through the lower portion of the section P with which communicates the passage a' in the section A. One end of the passage p' is adapted to be closed by a plug p^5—as shown at the right of Fig. 5—while the other end of such passage is adapted to have secured thereto a branch T of the train pipe. A transverse passageway p^2 extends through the upper portion of the section P with which communicates the exhaust passageway a^2,

one end of such transverse passage p^2 being adapted to be closed by a plug, and the other end adapted to communicate with an exhaust conduit leading to any desired point. A central passage p^4 extends through the section P in alinement with the valve chamber and is adapted to communicate with the auxiliary reservoir. A passage p^3 also extends through the section P and registers with the passage a^3, the opposite end of such passage p^3 being adapted to be placed in communication with the brace cylinder.

It is frequently necessary in the operation of triple valves to remove the strainer interposed between the train pipe and valve mechanism in order that the collected dust and foreign matter may be removed. In triple valves as heretofore constructed such strainers have been interposed between the train pipe branch and the valve casing, so that it has been necessary to disconnect the train pipe in order to remove the strainer. In my improved triple valve the strainer may be readily removed without disturbing the train pipe connection, as will be readily seen by reference to Fig. 2, in which P′ indicates a circular strainer concentrically located within the train pipe passage p'. The strainer P′ is supported upon radial wings R′ of a cage R, the latter having circular flanges at its ends, one of which rests against the end of the train pipe T while the other is supported within the opposite and corresponding screw threaded opening leading to the passage p'. A spring r is interposed between the adjacent end of the cage R and the removable plug p^5. It is consequently merely necessary to remove the plug p^5, when the cage R may be withdrawn from the passage p', and after having the dust and foreign matter cleaned therefrom, may be replaced within the passage p' and the cap p^5 screwed into position to close the end of the passage p'.

The operation of my improved triple valve is as follows:

Release or running position.—Fig. 1 illustrates the parts of the valve mechanism in release or running position, in which the brake cylinder communicates through the passages p^3, a^3, port b^3, passage d in the main valve D, port b^2, passage a^2, and passage p^2 with the exhaust. Train pipe pressure passes through the passage p', passage a', passage f', port f^2, feed groove b' in the bushing B′, valve chamber, and passage p^4 to the auxiliary reservoir. It will be observed that the reservoir is disconnected from the ports b^2, b^3 and b^4 by the main valve D and graduating valve E. The train pipe pressure also passes through the port f^3 into the chamber within the end cap G of the valve casing.

Service application.—When the train pipe pressure is reduced to the usual extent for a service application of the brakes, the auxiliary reservoir pressure forces the piston C toward the left, but at such a speed that the pressure between the pistons C and H′ escapes through the hole h', and consequently the piston H′ is not moved relatively to the lever H. This movement of the piston moves the main valve D through the contact of the lug c^2 on the piston rod c with the adjacent end of the valve, until the port b^3 is closed and the connection between the brake cylinder and exhaust thereby closed. This movement of the piston is imparted to the graduating valve E by the lug c^3, so that the port b^4 is uncovered, thereby permitting auxiliary reservoir pressure to pass through such port and the passages a^3 and b^3 to the brake cylinder. When the supply of air to the brake cylinder lowers the auxiliary reservoir pressure slightly below that of the reduced train pipe pressure, the piston C moves slightly toward the right until the lug c' engages the adjacent end of the valve D, such movement of the piston C serving to move the graduating valve E over the port b^4 and thereby discontinue the supply of auxiliary reservoir pressure to the brake cylinder. By further lowering the train pipe pressure, this action is repeated until the brakes have been applied with the desired power.

Emergency application.—When an excess of reduction of train pipe pressure occurs, the excess pressure of the auxiliary reservoir quickly forces the piston C toward the left, and as the movement of the piston occurs before the pressure can escape from between the pistons C and H′ through the restricted hole h', the piston H′ is also moved toward the left and its stem h^2 forced into engagement with the lever H. The end h^3 of the lever H first engages the shoulder g^3, and then the lever rocks upon its end h^3 so that the valve h is moved away from the seat f. Train pipe pressure then passes through the port f^3, through the valve seat f, passage i, to the space within the chamber A^3 between the piston K and chamber head K′. The piston K is consequently forced toward the right in Fig. 5, so that the stem k thereof unseats the valve L against the tension of the spring l. This movement of the piston K uncovers the exhaust port k', so that the train pipe pressure is reduced by being exhausted to the atmosphere. The unseating of the valve L permits auxiliary reservoir pressure to pass through the enlarged port a^5, chamber A^5 into the chamber A^4, thence past the check valve M into the passage a^3, and through the passage p^3 to the brake cylinder. As soon as the pressure escapes from between the pistons C and H′ through the restricted hole h', the spring H^2 closes the valve h against its seat f, thereby preventing further passage of train pipe air to the chamber A^3. The tension of the spring l

acts through the valve L and piston stem *k* to return the piston K to the position shown in Fig. 5. Such action of the spring *l* also closes the valve L and discontinues the supply of auxiliary reservoir pressure from the port a^5 to the brake cylinder. Upon increasing the train pipe pressure, the piston C is moved toward the right to the position shown in Fig. 1, thereby connecting the brake cylinder with the exhaust port and the train pipe auxiliary reservoir.

From the foregoing description, it will be observed that I have invented an improved quick acting triple valve, all of the moving parts of which, together with the coöperating stationary parts, may be removed by disconnecting the main portion A of the casing from the supporting section P, allowing the section P to remain fixed upon the supporting member of the brake apparatus, and thereby obviating the necessity of disconnecting any of the connections between the triple valve casing and coöperating parts of the brake apparatus, inasmuch as all of such connections extend from the stationary section P.

It will be further observed that I have invented an improved triple valve in which the screen for preventing the passage of dust or foreign matter to the valve mechanism may be readily removed to be cleaned without disconnecting the train pipe connection.

While I have illustrated and described my invention with more or less detail, yet it is to be understood that I do not consider that my invention is restricted to any specific embodiment, but may be expressed in any physical forms coming within the terms of my claims.

I claim:

1. In a triple valve casing, the combination with an end supporting section having axial passages therethrough adapted to be connected with the auxiliary reservoir and brake cylinder, and having a transverse train pipe passage communicating with an intermediate axial port, of means for permanently attaching said section to a supporting member of the brake apparatus, a main casing containing the valve mechanism and having longitudinal main reservoir, train pipe and brake cylinder passages registering with the adjacent surface ports of the corresponding passages in said end section, and means for detachably supporting said main section upon said end section.

2. In a quick acting triple valve casing, the combination with an end supporting section having axial passages therethrough adapted to be connected with an auxiliary reservoir and brake cylinder, and having transverse train pipe and exhaust passages therethrough each communicating with an intermediate axial port, of means for permanently attaching said section to a supporting member of the brake apparatus, a main casing section containing the valve mechanism and having longitudinal main reservoir, train pipe, brake cylinder and exhaust passages therein adapted to register with the adjacent surface ports of the corresponding passages in said end section, and means for detachably supporting said main section upon said end section.

3. In a triple valve casing, the combination with a main section adapted to contain the valve mechanism and having brake cylinder, train pipe, and auxiliary reservoir passages therein terminating in ports in the end surface thereof, of a supporting section having passages registering with said ports in the main section, the train pipe passage being T-shaped and adapted to connect at either of its alined ends with the train pipe.

4. In a triple valve casing, a main section adapted to contain the valve mechanism and having brake cylinder, train pipe, and auxiliary reservoir passages therein, and also having an exhaust passage extending transversely of and partially around said section and thence longitudinally within said section to the surface thereof which is adapted to engage the surface of a supporting member.

5. In a triple valve casing, the combination with a main section adapted to contain the valve mechanism and having brake cylinder, train pipe and auxiliary reservoir passages therein terminating in an end surface of said section, of an end section adapted to be permanently attached to a supporting member of the brake apparatus, and upon which said main casing is removably supported, said end section having axial brake cylinder and auxiliary reservoir passages therethrough registering with the brake cylinder and auxiliary reservoir passages in the main section, and adapted to be connected with the auxiliary reservoir and brake cylinder, said end section also having a transverse passage and intermediate port registering with the train pipe passage in the main section, either end of said transverse passage adapted to be connected with the train pipe.

6. In a triple valve casing, the combination with a main section within which the valve mechanism is adapted to be contained and having brake cylinder, train pipe, and auxiliary reservoir passages extending therethrough and terminating in an end surface thereof, said section also having an exhaust passage extending transversely of and partially around the same, and thence longitudinally therein to the said end surface thereof, of an end section adapted to be permanently attached to a supporting member of the brake apparatus and upon which said main casing section is adapted to be removably supported, said end section having

passages therein registering with said passages in the main section and adapted to be connected with the train pipe, auxiliary reservoir, brake cylinder and exhaust.

7. In a triple valve casing, an end section adapted to be permanently attached to a supporting member of the brake apparatus and upon which the valve mechanism inclosing section of the casing is adapted to be removably supported, said end section having a transverse passage therethrough with either end of which the train pipe may be connected, and also having axial passages therethrough with which the auxiliary reservoir and brake cylinder may be connected.

8. In a triple valve casing, a section adapted to be interposed between a main section of the casing and a supporting member of the brake apparatus and having auxiliary reservoir and brake cylinder passages extending axially therethrough and terminating in the surfaces thereof which engage the adjacent surfaces of the main casing section and of the supporting member of the brake apparatus, and also having a lateral passage extending therethrough with either end of which the train pipe may be connected from which a branch passage extends to the surface which engages that of the main section of the casing.

9. In a triple valve casing, a section adapted to be interposed between a main section of the casing and a supporting member of the brake apparatus, and having auxiliary reservoir and brake cylinder passages extending axially therethrough and terminating in the surfaces thereof which engage the adjacent surfaces of the main casing section and of the supporting member of the brake apparatus, and also having lateral train pipe and exhaust passages extending therethrough from which branch passages extend to the surface thereof which engages the surface of the main section of the valve casing.

10. The combination with a triple valve casing, of a train pipe, a coupling member intermediate of the casing and train pipe having a straight passage therethrough with one end of which the train pipe is connected, a plug closing the other end of said passage, and a tubular strainer within said passage alining with the train pipe and removable through the opening closed by said plug, said coupling member having a space around said strainer communicating with the train pipe passage in the casing.

11. The combination with a triple valve casing, of a supporting section adapted to be interposed between said casing and a member of the brake apparatus, said supporting section having a transverse passage therethrough communicating intermediate of its ends with the train pipe passage in the casing, a train pipe connected with one end of said transverse passage, a plug closing the other end of said passage, and a strainer in said transverse passage removable through the end thereof closed by said plug.

12. The combination with a triple valve casing, of a supporting section adapted to be interposed between said casing and a member of the brake apparatus, said supporting section having a transverse passage therethrough communicating intermediate of its ends with the exhaust passage in the casing, an exhaust conduit connected with one end of said transverse passage, and a plug closing the other end of said transverse passage, the exhaust conduit being adapted to be connected with either end of the transverse passage and the other end to be closed by said plug.

In testimony whereof, I have subscribed my name.

WILLIAM A. PENDRY.

Witnesses:
GEO. L. WILKINSON,
ANNA L. WALTON.