No. 609,042. Patented Aug. 16, 1898.

J. J. NEF.

AIR BRAKE.

(Application filed Aug. 23, 1897.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

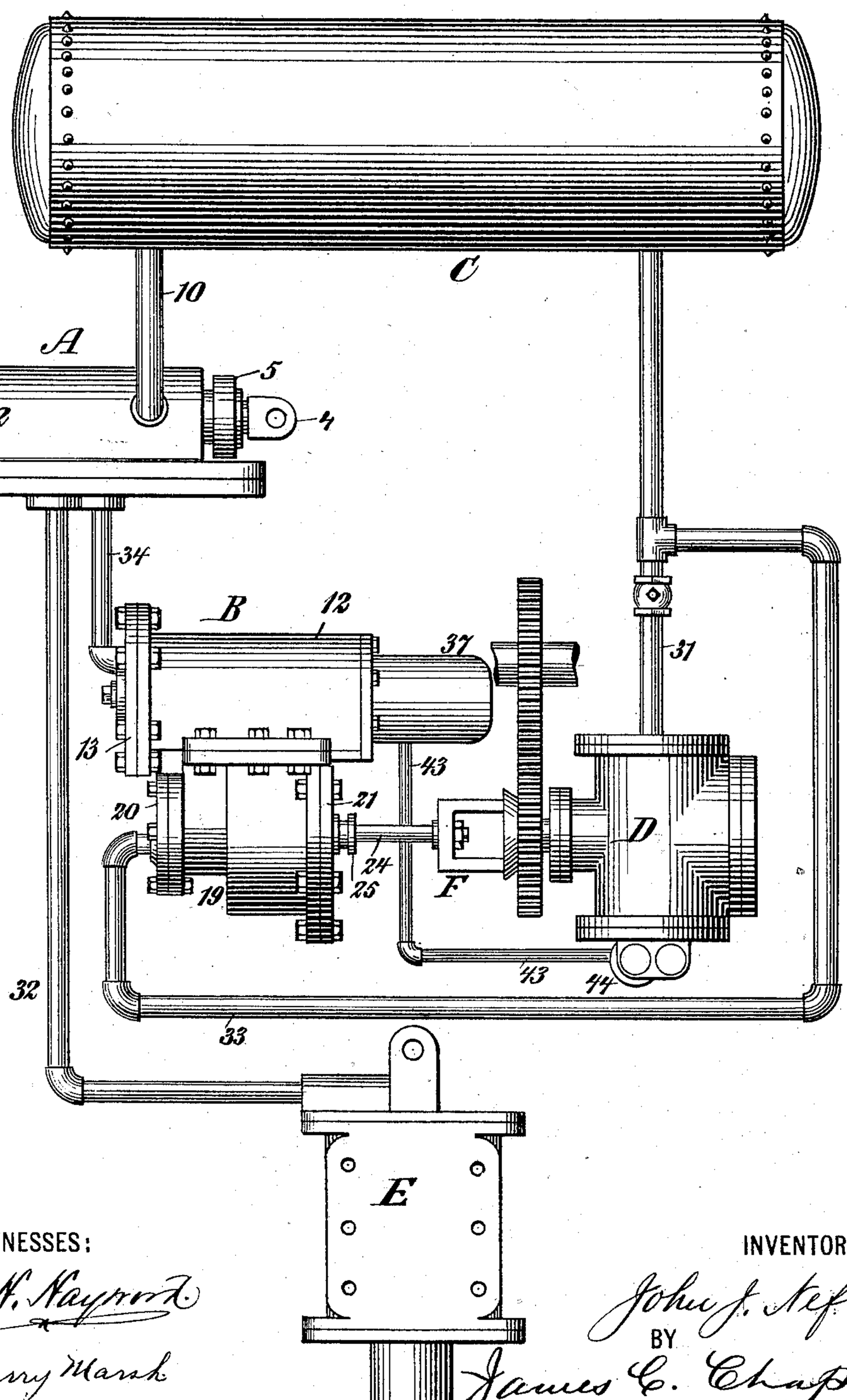

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Fig. 2,

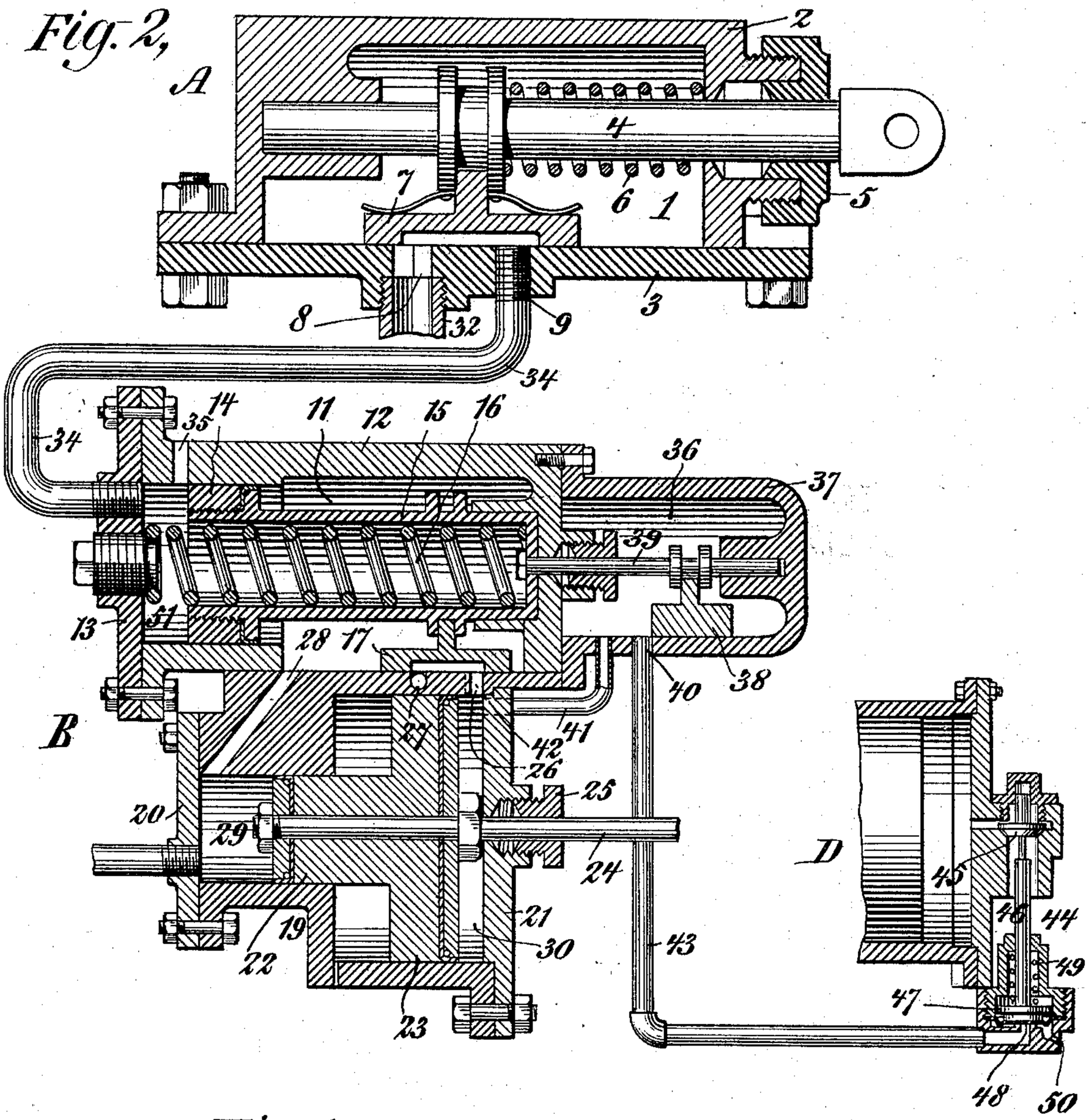


Fig. 4.

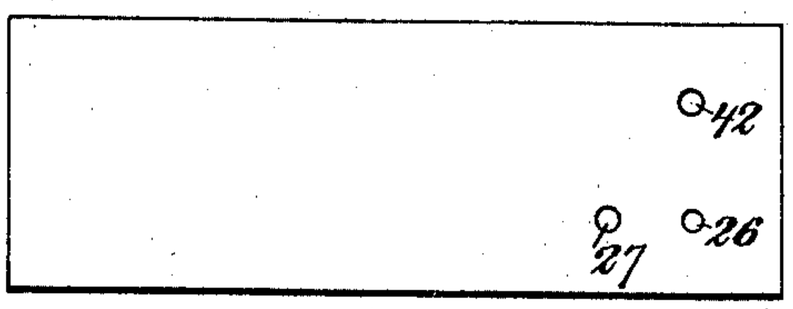
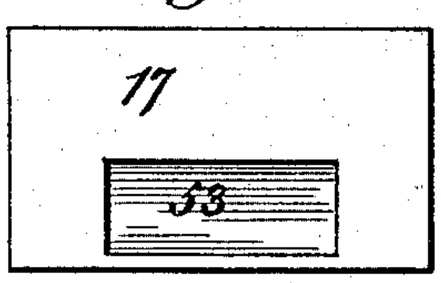


Fig. 3.



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AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 609,042, dated August 16, 1898.

Application filed August 23, 1897. Serial No. 649,145. (No model.)

To all whom it may concern:

Be it known that I, JOHN J. NEF, a citizen of the United States, residing at New York, in the county and State of New York, have invented a new and useful Improvement in Air-Brakes, of which the following is a specification.

This invention relates to air-brakes in which the pressure of air is supplied by a pump actuated from the axle of the car and where the pump-actuating mechanism is disconnected from the pump-piston or its connections when the pump is to be stopped and is again connected when the pump is to be operated, a clutch or like device being commonly used to make this connection, and has for its object the provision of efficient and reliable means for automatically relieving the pump from its work of compressing air while the pump is being connected with its operating mechanism, thus rendering it certain that the connection is completely made before the work of compressing air is begun. A large amount of wear upon the connecting parts is thus avoided which otherwise will occur where the pump commences to operate and force air into the reservoir against a high pressure in the reservoir before the connecting parts are firmly set against each other.

It also consists in the novel construction, combination, and arrangement of parts hereinafter described.

In the drawings accompanying and forming a part of this specification, Figure 1 is a general view showing the pump with its actuating mechanism, a pump-governor, a reservoir in which compressed fluid is stored, a service-valve, and a brake-cylinder. Fig. 2 is a sectional view of a service-valve, governor, and part of the pump in a plane parallel to plane of view in Fig. 1. Fig. 3 is a face view of valve in governor; and Fig. 4, a top view of said valve-seat, showing location of ports controlled by said valve.

Similar characters of reference designate like parts in all the figures.

This mechanism comprises in a general way the service-valve A, the governor B, the reservoir C, the pump and pump-operating mechanism D, and the brake-cylinder E.

In the preferred form of my invention herein shown and described the service-valve A comprises a valve-chamber 1, formed of valve-casing 2 and base-plate 3, a valve-rod 4, stuffing-box 5, spring 6, valve 7, port 8, leading to the brake-cylinder E, port 9, leading to the governor B, and a connection 10 with the reservoir C. Governor B comprises a valve-chamber 11, formed of the valve-casing 12, with head 13, having within it a piston 14, hollow piston-rod 15, spring 16, and valve 17, an auxiliary valve-chamber 36, formed of a valve-casing 37, having within it valve 38, valve-rod 39, and provided with a port 40, connected by pipe 43 to valve 44 of pump D on the lower side of diaphragm 48, and having a communication 41 with port 42 in the valve-chamber 11, and comprises also the compound cylinder 19, having heads 20 and 21, pistons 22 and 23, piston-rod 24, stuffing-box 25, and provided with port 26, admitting air from chamber 11 to larger cylinder 30, an exhaust-port 27, and passage-way 28 from small cylinder 29 to valve-chamber 11.

Pump D is of any approved form and is supplied with a valve 44, adapted to open and close communication between the compression-chamber of the pump and the atmosphere, and, as here shown, comprises a valve 45, rod 46, head 47, a diaphragm 48, which when acted upon by air-pressure opens the valve, and a spring 49 to close the valve when the air-pressure is relieved when the air has escaped through the small opening 50. Pump D supplies air to the reservoir through connection 31 and is thrown into and out of operation by engagement of a suitable clutch, as F. The brake-cylinder E is of any approved form, is provided with the usual piston and connections, and has a pipe connection 32 with port 8 of service-valve.

The pump is thrown in and out of engagement with its operating mechanism by the movement of the piston-rod 24, connected to the pistons 22 and 23. As shown in the drawings, the said piston-rod and pistons are in the position for the engagement of the pump-operating mechanism. This smaller cylinder 29 is in open communication at all times with the reservoir C, and consequently the reservoir-pressure is acting at all times on the smaller piston 22. The larger cylinder 30 has communication with the valve-chamber 11 through the port 26, which port is opened and

closed by the valve 17, the valve 17 also controlling the exhaust from the cylinder 30 through port 26 and the exhaust-port 27. Owing to the difference in the sizes of the pistons 22 and 23 it is clear that when pressure is admitted to cylinder 30 the pistons will be moved to the left and the pump-operating mechanism thrown out of engagement. It is likewise clear that when air is exhausted from cylinder 30 the pump-operating mechanism will be thrown into engagement for the reason that the reservoir-pressure acts at all times on piston 22.

The valve 17 is attached to the hollow piston-rod 15, to which is attached also the piston 14. The spring 16 in the hollow piston-rod tends to force said piston-rod to the right, as shown in Fig. 2, and to move the valve 17 to shut off from cylinder 30 the pressure in valve-chamber 11, which through passage 28 has within it at all times reservoir-pressure from cylinder 29, and to open said cylinder 30 to the exhaust. The pressure in the valve-chamber 11, acting upon piston 14, tends to move said piston-rod and valve to the left—that is, to open communication between the valve-chamber 11 and cylinder 30—from which it follows that when the air-pressure in valve-chamber 11 falls below a point sufficient to counterbalance pressure of spring 16 said spring will cause valve 17 to exhaust the air from cylinder 30, thereby permitting the pressure on piston 22 to throw the pump mechanism into engagement, and when the pressure in valve-chamber 11 rises above said point it will overcome the spring, and as such pressure is increased it will move valve 17 to the left and admit pressure to cylinder 30 and throw the operating mechanism of the pump out of engagement.

It will be noted that the pump will not be thrown into engagement until valve 17 has practically completed its travel to the right, for until then the lap of the valve will not open cylinder 30 to the exhaust. It will be further noted that having been thrown into engagement the pump will not be thrown out of such engagement until the valve has practically completed its travel to the left, for until then its lap will not uncover port 26 to open communication between cylinder 30 and valve-chamber 11.

The movement of the piston 14 to the right to exhaust the air from cylinder 30 and to cause the pump-operating mechanism to be thrown into engagement, as has been described, is also accomplished when the brakes are released and the air from the brake-cylinder exhausted through the pipes 32 and 34 into the space 51 to the left of piston 14, the air from the brake-cylinder finally escaping through the opening 35 after the piston 14 has completed its movement. This occurs when the brakes, having been previously applied by a movement of the valve 7 in the service-valve A to the right, are released by a movement of the said valve in the opposite direction opening communication between pipes 32 and 34.

Through the application of the brakes the pressure in valve-chamber 11 falls slightly and valve 17 moves toward the right, but not sufficiently to exhaust the air from cylinder 30. When the brakes are released, the exhaust from the brake-cylinder forces valve 17 to its extreme right, the air from cylinder 30 is exhausted, and the pump thrown into operation. When the exhaust from the brake-cylinder escapes through opening 35, valve 17 will immediately return to the position it occupied just after the brakes were applied; but until its return to practically its extreme left position (which it will not do until the pump has operated to restore to the reservoir the pressure lost in the application of the brakes) the pump will remain in operation, as has already been explained.

As heretofore constructed the shock and wear upon the pump and pump-operating mechanism when they are thrown into engagement are very great. To overcome this difficulty, I provide means for automatically relieving the pump of its work of compressing air until the engagement of the operating parts has been fully effected. For accomplishing this I provide an auxiliary valve-chamber 36, heretofore partially described. The valve-rod 39 therein is rigidly attached to piston 15 in valve-chamber 11 and also to the valve 38, which controls the port 40. The valve-chamber 36 has communication with the valve-chamber 11 through the pipe 41 and port 42, said port being controlled by the valve 17 in valve-chamber 11 in such a way that when the rod 15 is moved to the right to throw the pump into action the port 42 is closed. By the same movement of the rod 15 the valve 38 opens the port 40 and through the pipe 43 admits air under the diaphragm 48, thereby lifting the valve 45 from its seat and opening communication between the compression-chamber of the pump and the atmosphere, said valve being held open until the air in the auxiliary chamber 36 has exhausted through the small opening 50 beneath the diaphragm 48. This opening 50 is made of such size relatively to the volume of air to be exhausted that the valve 45 is held open long enough to permit the complete engagement of the pump-operating mechanism. While this valve 45 is thus held open, the air is free to pass from the compression-chamber of the pump into the atmosphere, and consequently no compression takes place and the pump and its operating mechanism are relieved from all strain which occurs when the pump is pumping against reservoir-pressure. When the air below the diaphragm 48 has exhausted, the spring 49 lowers diaphragm 48 and permits the valve 45 to return it to its seat, and compression in the pump begins.

When the pressure in the reservoir is restored and its action on piston 14 moves valve 17 to the left, causing a disengagement of the

pumping mechanism, as heretofore described, the valve 38 in the auxiliary chamber closes the port 40 by the same movement the valve 17 opens the port 42 and admits air from chamber 11 to auxiliary chamber 36. The valves 17 and 38 are so arranged with respect to the ports 42 and 40, which they respectively control, that the port 40 in the auxiliary valve-chamber is closed just prior to the opening of port 42 in valve-chamber 11. Said valves are also so arranged with respect to ports 26 and 40 that when they are moved to the right port 40 is opened before port 26 is opened to the exhaust. Said valve 17 has a recess 53, Fig. 4, forming an air-passage from cylinder 30 to the exhaust-port 27 through port 26 when said valve is moved to the right.

I claim—

1. In an air-brake system the combination with an air-reservoir a pump and its operating mechanism a pump-governor connecting and disconnecting said pump-operating mechanism and the pump of means whereby the compression-chamber of the pump is opened to the atmosphere while said pump-operating mechanism is being connected with said pump, substantially as described.

2. In an air-brake system the combination with an air-reservoir, a pump and its operating mechanism, a pump-governor connecting and disconnecting said pump-operating mechanism and said pump of means whereby the suction-valve of said pump may be controlled by the operation of said pump-governor substantially as described.

3. In an air-brake system the combination with an air-reservoir, a pump and its operating mechanism a pump-governor connecting and disconnecting said pump-operating mechanism and the pump of an auxiliary chamber and means whereby when the pump is stopped said auxiliary chamber is supplied with air under pressure, and the pump is started said air-supply is shut off and the air in said auxiliary chamber is caused to actuate a valve on the pump to open communication between the compression-chamber of the pump and the atmosphere.

4. In an air-brake system the combination with an air-reservoir, a pump and its operating mechanism, a pump-governor connecting and disconnecting said pump-operating mechanism and said pump of an auxiliary air-chamber having communication with the valve-chamber of said pump-governor under the control of the valve therein, mechanism whereby the suction-valve of said pump may be controlled and a communication between said auxiliary air-chamber and said suction-valve-controlling mechanism, substantially as described.

5. In an air-brake system the combination with an air-reservoir, a pump and its operating mechanism, a pump-governor connecting and disconnecting said pump-operating mechanism and said pump of an auxiliary air-chamber having communication with the valve-chamber of said pump-governor under the control of the valve therein, mechanism whereby the suction-valve of said pump may be controlled, and an auxiliary valve in said auxiliary air-chamber substantially as described.

6. In an air-brake system the combination with an air-reservoir, a pump and its operating mechanism, a pump-governor connecting and disconnecting said pump-operating mechanism and the pump of an auxiliary chamber, a communication from said auxiliary chamber to a port in the valve-chamber of the pump-governor, said communication being operated by the movement of the valve in the valve-chamber which throws the pump out of action and closed by the reverse movement, a communication between the auxiliary chamber and the suction-valve of the pump a valve in said auxiliary chamber connected to and moved with the valve in the valve-chamber, whereby when the valve in the valve-chamber is moved to start the pump the valve in the auxiliary chamber opens communication between the auxiliary chamber and the said suction-valve of the pump causing said suction-valve to open and whereby a movement of the valve in the valve-chamber of the pump-governor in the opposite direction closes said port in said auxiliary chamber.

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

JOHN J. NEF.

Witnesses:
ANDREW J. BRISLIN,
JOHN J. RANAGAN.