(No Model.) 3 Sheets—Sheet 1.

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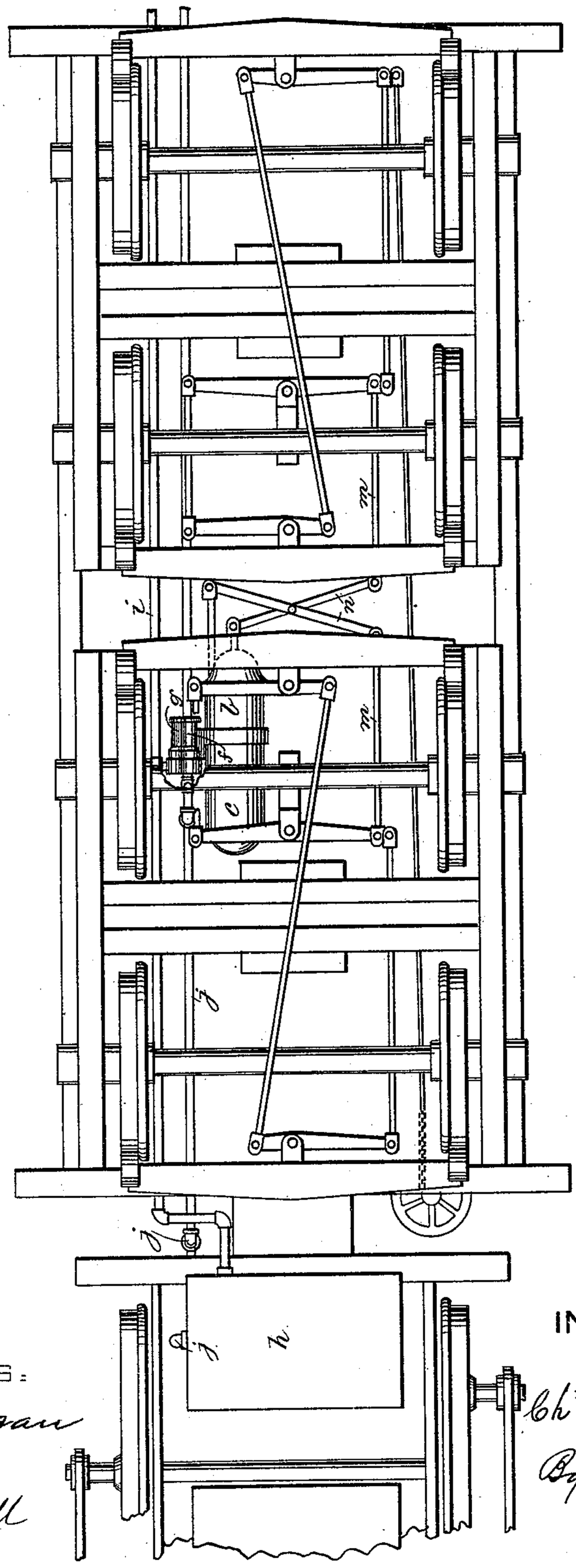
AIR BRAKE.

No. 447,236. Patented Feb. 24, 1891.

Fig-1.



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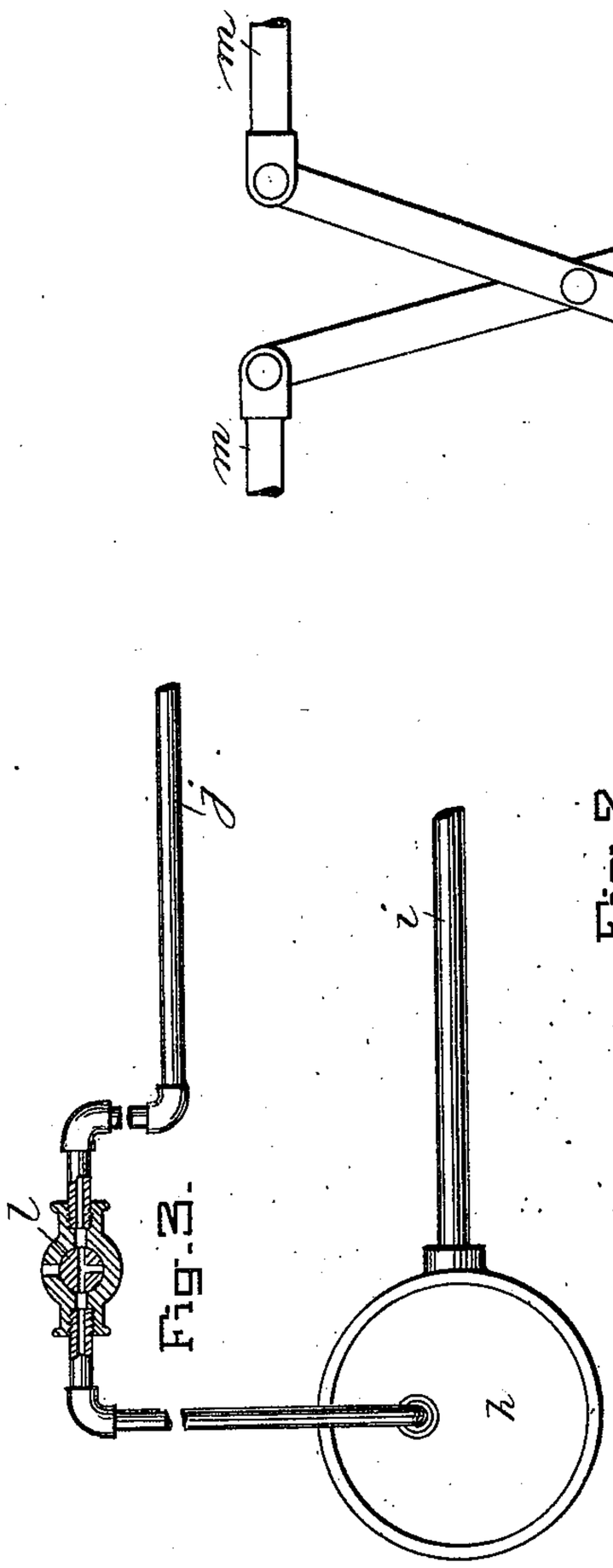

Fig. 2.

Fig. 1.

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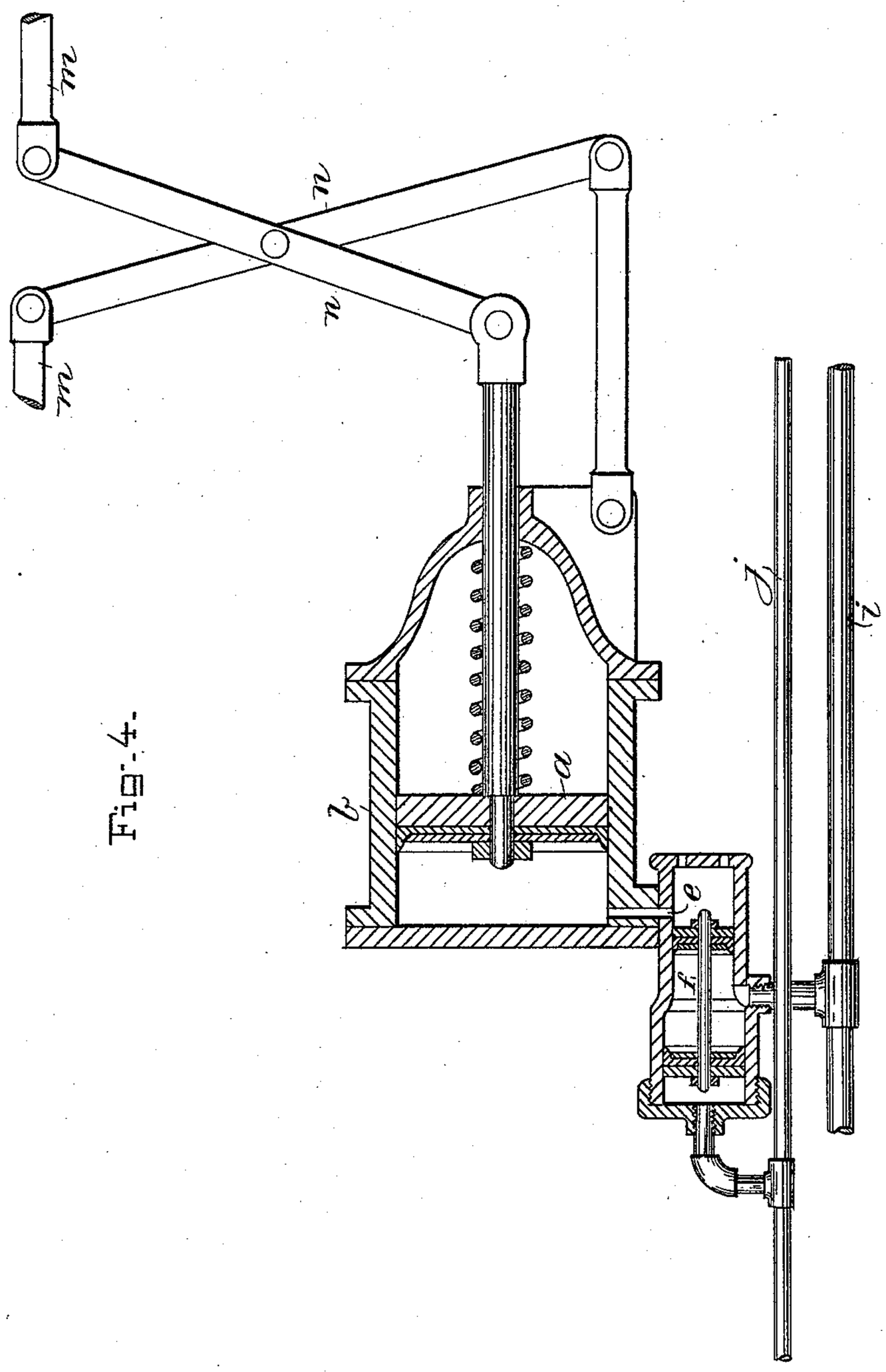

Fig. 4.

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UNITED STATES PATENT OFFICE.

CHRISTOPHER R. JAMES, OF JERSEY CITY, NEW JERSEY.

AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 447,236, dated February 24, 1891.

Application filed February 14, 1890. Serial No. 340,462. (No model.)

To all whom it may concern:

Be it known that I, CHRISTOPHER R. JAMES, a subject of the Queen of Great Britain, and a resident of Jersey City, in the county of Hudson and State of New Jersey, have invented new and useful Improvements in Air-Brakes, of which the following is a specification.

My invention consists of improvements in air-brake mechanism, having for its object to effect the application of the brakes of the rear cars of the train prior to or not later than the application of the brakes of the forward cars.

In the accompanying drawings, Figure 1 represents a plan view of an inverted car and part of a locomotive, showing the application of my improved brake apparatus. Fig. 2 is a horizontal section of the apparatus on an enlarged scale. Fig. 3 is a detail showing the arrangement of the pipes and the engineer's controlling-valve at the locomotive. Fig. 4 is a horizontal section of the apparatus as arranged without the auxiliary reservoir, and also without the secondary valve for applying the brakes when the air-supplying pipes break.

The brake-actuating piston *a* in the cylinder *b* is subject to the action of compressed air from the auxiliary reservoir *c*, and exhaust through port *e*, controlled by the operation of the piston-valve consisting of two heads of different sizes connected at a suitable distance apart by a stem and arranged in a case or cylinder bored in two different sizes correspondingly, and hereinafter called "valve *f*," the heads being designated as "large" and "small," respectively. The small head of this valve opens communication between auxiliary reservoir *c* and brake-cylinder *b* through ports *d* and *e*, and closes the exhaust from the brake-cylinder and the reverse, according as it is shifted from the position in which it is represented in Fig. 2 between said ports *d e* to the right hand of port *e* and back again. The space or chamber between the heads of said valve *f* is in constant communication with the reservoir *c* through port *d*. The normal action of the air in the said reservoir closes the communication between the reservoir and the brake-cylinder and keeps the exhaust-passage from the brake-cylinder open through the overbalancing effect on the larger head of the valve *f*, which is so placed as to maintain the small head between the ports *d* and *e*. The auxiliary reservoir *c* is in communication with the main reservoir *h* on the locomotive, or it may be directly connected with the compressing-pump by the pipe *i*. I make such communication through the chamber between the heads of valve *f*, as in Fig. 4, or through another piston-valve consisting of similar larger and smaller heads coupled at a suitable distance apart by a stem in a correspondingly-bored case, and hereinafter called "valve *g*," and arranged side by side with valve *f*. The pipe *i* is connected to the case of this valve behind the large head, in which there are passages *p*, through which the air enters to the space between the two heads and thence into the space between the heads of valve *f* through the open passage between the said spaces of these two valves. A disk *q* and spring *k* are provided to close these passages *p* in case pipe *i* becomes disrupted, and there is a port *s* opening from the case of valve *g* into the space behind the large head of valve *f*, which port is closed by the large head of valve *g* when held in the right-hand position by the overbalancing pressure of the air from pipe *i* on the large head.

For opening communication between the compressed-air chamber of valve *f* and brake-piston for applying the brakes the chamber behind the large end of the valve *f* is connected with the main reservoir on the locomotive or with the compressing-pump, if preferred, by the pipe *j*, subject to the engineer's controlling-valve *l*, so that compressed air is admitted thereto by the engineer to apply the brakes by overbalancing the air from the pipe *i* on said valve.

In operation the chamber between the large and the small heads of valve *f*, being always in communication with the main tank through pipe *i*, and the pressure being allowed to escape from behind the large head of valve *f* through pipe *j* by the engineer's valve, the overbalancing pressure on the large head of valve *f* shifts said valve, so as to open the brake-cylinder port to the exhaust and normally holds it in that position; and when the engineer admits compressed air through pipe *j* to the chamber behind said large head such

pressure, together with the pressure of the compressed air between the two heads on the small head, overbalances the valve in the other direction and shifts it, so as to open port *e* to the compressed air between the two heads, and thus apply the brakes. It is believed that by this arrangement the brakes of the hind cars may be applied first, while it is thought that in the common arrangements, in which they are applied through the escape of the air from the engineer's valve, it is the brakes of the forward cars that are applied first, as before stated. This different action is supposed to be because in the exhaust arrangement the pressure is first diminished at the exhaust-cock *l*, and thence backward gradually along the brake-controlling valves of the cars, so that they act successively from the front backward, while the compressed air admitted into the exhausted or partly exhausted pipe *j* must first flow back to the end and fill and back up, so to speak, in the pipe before pressure will rise in the brake-controlling valve sufficient to actuate them. It follows, therefore, that the brakes of the rear cars must be first affected, or, if not first, certainly as soon as the others and so that the hind cars will be slowed before or as soon as the others, and thus be effectually prevented from colliding with those in advance.

While it is preferred to employ the auxiliary reservoir *c* for the benefit of a reserve of air in close proximity to the valve, it may of course be dispensed with, as represented in Fig. 4, because the pipe *i*, connected with the valve, or as shown, will give good results, and particularly in this arrangement for the release of the brakes by the normal action of the air admitted to the valve from the tank or pipe *i* it is not so important to have a reserve, because it is not so necessary to have quick action for the release of the brakes as for the application of them.

The purpose of the connection of the air-supply pipe *i* through the valve *g* is to provide for the automatic application of the brakes when it may happen, through any accident, that the pipe *i* may be broken, in which case, the air being exhausted from behind the large head of valve *g* through the broken pipe, the spring *k* instantly closes passages *p* by the disk *q*, and the overbalancing pressure of the compressed air in the valves on the larger head of valve *g* shifts said valve so as to open communication through port *s* to the space behind the large head of valve *f* and equalize the pressure on said head and enable said valve to be shifted by the confined air the same as when other air is admitted through pipe *j*, so as to admit air from the main reservoir to the brake-piston, and thus apply the brakes, escape from behind piston-valve *f*, through pipe *j*, when broken, being prevented by the check-valve *o* in said pipe. The brake-piston is connected by the levers *n* to the rods *m*, that actuate the brake-levers; but this forms no part of what I claim in this application.

I claim—

1. The combination, with the brake piston and cylinder, of the piston-valve controlling the brake-cylinder port, the constantly-open main compressed-air pipe connected to the case of said valve in the arrangement for opening and normally keeping the brake-cylinder port open to the exhaust by the pressure of the main tank and for admitting compressed air from the main tank to the brake-cylinder to apply the brakes when said valve is reversed, and the pipe connecting said valve-case behind the large end of the valve with the main tank subject to the engineer's valve in the arrangement to overbalance the pressure on said valve through the main pipe and reverse the valve to open the brake-cylinder to the compressed air from said main pipe by the air admitted by the engineer's valve through the pipe connected with the valve-case behind said large end of the valve, substantially as described.

2. The combination, with the valve controlling the brake-cylinder port for admitting the compressed air to apply the brakes and for exhausting it to release the brakes, of the constantly-open pipe connecting the case of said valve between the heads thereof with the main tank, the pipe connecting said case behind the large head with the main tank through the engineer's valve, said first-mentioned pipe admitting the air for opening and keeping the brake-cylinder port open to the exhaust and admitting air to the brake-cylinder to apply the brakes when the valve is reversed, and the other pipe admitting air to reverse the valve for so applying the brakes when the engineer's valve is opened, substantially as described.

3. The combination, with the brake piston and cylinder, of the valve controlling the brake-cylinder port, the main supply-pipe admitting air to actuate said valve for normally exhausting the brake-cylinder and for filling said cylinder when the valve is reversed, also another supply-pipe subject to the engineer's controlling-valve and admitting overpowering pressure to reverse said valve to open the brake-cylinder port and admit air from the main supply-pipe to apply the brakes, and also the secondary valve intermediate to the main supply-pipe and the said valve controlling the brake-cylinder port and automatically admitting overpowering pressure from the chambers of the two valves behind said valve controlling the brake-cylinder port to reverse it and apply the brakes when the supply through the main pipe fails.

4. The combination, with the brake piston and cylinder, of the valve controlling the brake-cylinder port, the main supply-pipe admitting air to actuate said valve for normally exhausting the brake-cylinder and for filling said cylinder when the valve is reversed, also another supply-pipe subject to the engi-

neer's controlling-valve and admitting opposing and overpowering pressure to reverse said valve and open the brake-cylinder port to apply the brakes, also the secondary valve intermediate to the main supply-pipe and the said valve controlling the brake-cylinder port and automatically admitting overpowering pressure from the chambers of the two valves behind said valve controlling the brake-cylinder port to reverse it and apply the brakes when the supply through the main pipe fails, the inlet-passages for the air from the main pipe through the large head of the secondary valve, and the disk and spring for closing said passage when said air-supply through the main pipe fails, said pipe connecting with the main tank through the engineer's valve, having a check-valve in close proximity to the chamber of the valve controlling the brake-cylinder port.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 29th day of January, 1890.

CHRISTOPHER R. JAMES.

Witnesses:

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W. B. EDELL.