(No Model.) 2 Sheets—Sheet 1.

J. D. P. SCHENCK.

AIR BRAKE.

No. 531,137. Patented Dec. 18, 1894.

Fig. 1.

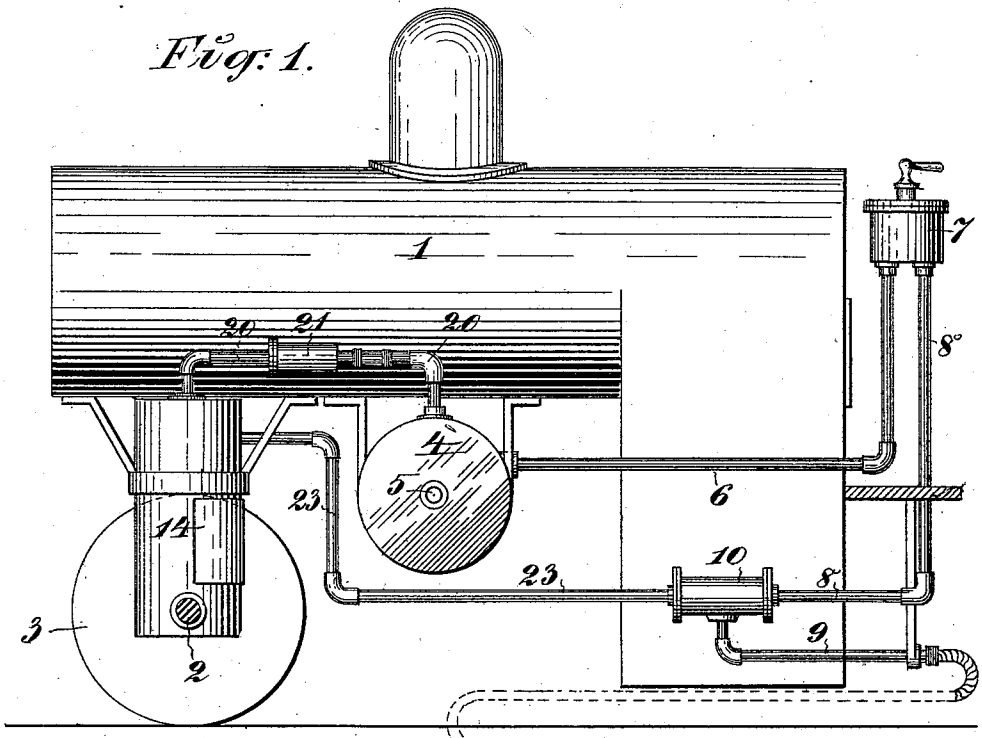


Fig. 1ª

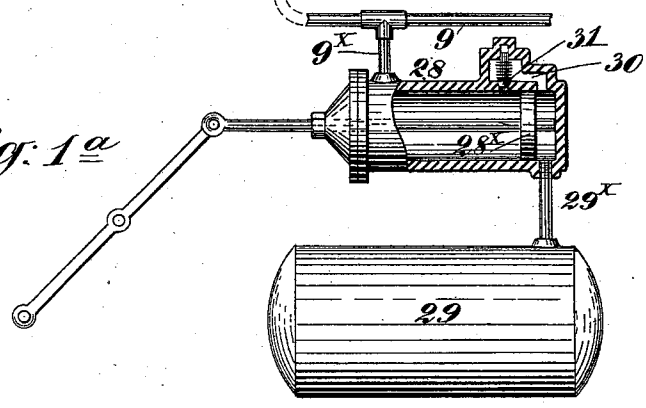
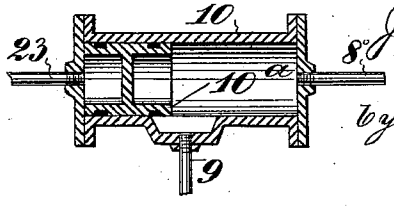


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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AIR BRAKE.

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Fig. 3.

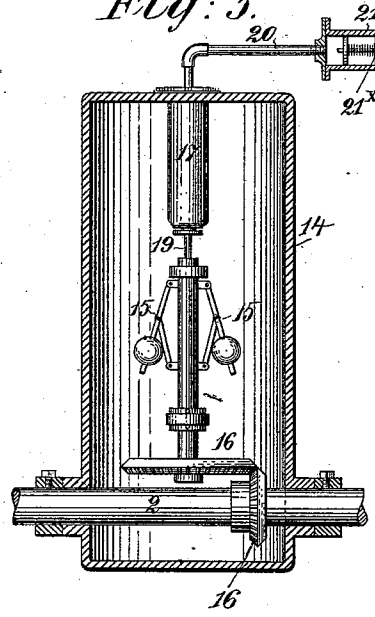


Fig. 4.

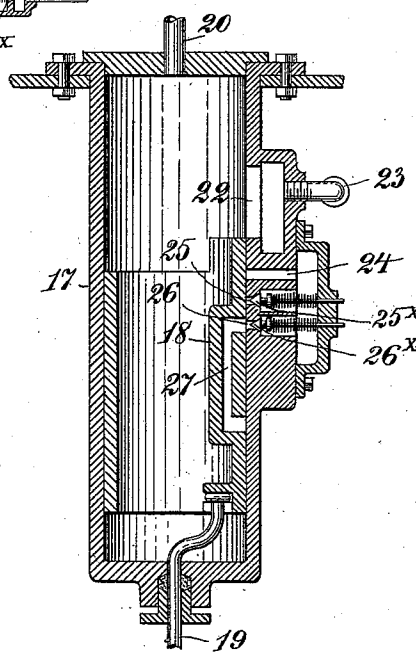


Fig. 5.

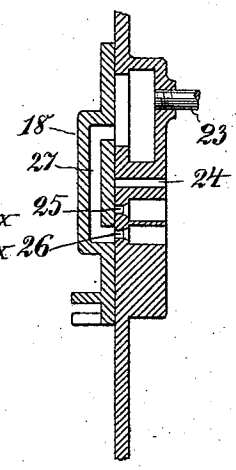


Fig. 6.

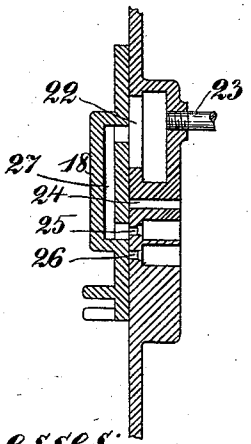
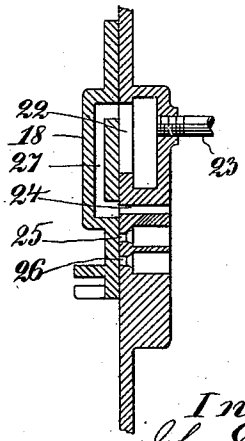


Fig. 7.



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UNITED STATES PATENT OFFICE.

JOHN D. P. SCHENCK, OF NEWARK, NEW JERSEY.

AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 531,137, dated December 18, 1894.

Application filed March 12, 1894. Serial No. 503,226. (No model.)

To all whom it may concern:

Be it known that I, JOHN D. P. SCHENCK, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Air-Brakes, of which the following is a specification.

My present invention relates to the class of air brakes wherein means are provided for automatically regulating the pressure of the brakes according to the speed of the train, such regulation being effected through the medium of a governor driven from one of the axles of the locomotive, or of a car of the train. Such a device is described in my pending application, Serial No. 480,256, filed July 12, 1893, but with the device as illustrated in that application only two pressures are available, namely, the maximum pressure for high speed above a certain number of miles per hour and a minimum pressure for all speeds below that.

The object of this invention is to provide intermediate brake pressures suited to various rates of speed.

The invention will be fully described hereinafter and its novel features carefully defined in the claims.

In its general construction the braking mechanism employed is, or may be, the same as that described in my said application, and in the accompanying drawings I have illustrated the application of my improvements to mechanism similar to that described in the said application.

In the before mentioned accompanying drawings—Figure 1 is a somewhat diagrammatic view of a portion of a locomotive provided with a braking mechanism adapted to my present invention, and Fig. 1ª is a somewhat diagrammatic sectional view of the braking mechanism on one of the cars of the train. Fig. 2 is an enlarged sectional view of the automatic valve employed in this class of brakes. Fig. 3 is a view of the governor which operates the pressure-controlling valve, the casing of the governor and that of the reducing valve being in section. Fig. 4 is an enlarged sectional view of the valve controlling the counter pressure, and its chest, showing the valve in one of its positions; and Figs. 5, 6 and 7 are fragmentary views showing said valve in three other positions.

Before proceeding to describe the improvements embodied in and claimed in this application, I will briefly describe the braking mechanism as to its general features, premising, however, that this general construction is set forth and claimed in my said pending application.

Referring to Fig. 1, 1 is the locomotive, 2 is one of the axles thereof, and 3 is a wheel on said axle. 4 is the main reservoir for compressed air, in which compressed air will be stored by the usual means through a pipe, 5. The compressed air is led by a pipe, 6, to the engineer's valve, 7, which valve may be of the usual kind. A pipe, 8, connects the engineer's valve 7, with the train-pipe, 9, through the casing, 10, of an automatic piston valve, 10^a. This valve is seen in Fig. 2, which shows it and its casing in longitudinal mid section.

When the engineer admits air from the reservoir 4, to the train-pipe 9, the air enters the casing 10, from pipe 8, at what I call the front end thereof and forces the piston-valve, 10^a, back to the position seen in Fig. 2, thus opening communication between the pipe 8, and the train-pipe 9. The compressed air then flows to the brake-cylinder under the car.

The brake apparatus under the car is illustrated in Fig. 1^a, and consists of a cylinder, 28, a piston, $28^\times$, therein, coupled in the usual way to the brake-lever, and a supplementary air-reservoir, 29, connected by a pipe, $29^\times$, with the cylinder 28, behind the piston. The train-pipe 9, is connected with the cylinder 28, in front of the piston by a branch $9^\times$, and a by-pipe, 30, connects at its respective ends, with the cylinder 28, just in front of, and back of the piston $28^\times$, when the latter is at rest and the brakes are off. In this by-pipe 30, is a check-valve, 31, which permits the air entering the cylinder from the train-pipe to flow around the piston to the reservoir 29, and thus equalize the pressure on both sides of the piston; but when the engineer opens the train-pipe to the atmosphere, thus reducing the tension in front of the piston, the pressure of the air behind the piston acts to drive the latter forward and set the brakes with a pressure which may be substantially equal to that in the reservoir 29. This brake apparatus is not herein claimed, but is merely employed for illustration.

In order to reduce the brake pressure automatically for low speeds, means were employed by which, when the train was running at a speed below a certain rate and the engineer opened the train-pipe to the atmosphere for setting the brakes, a counter pressure or back pressure was put on the brake piston $28^{\times}$. Thus if the tension in the reservoir 29, was seventy pounds and the counter pressure in the train pipe was thirty-five pounds, the braking pressure would be about thirty-five pounds. The means for accomplishing this is illustrated in my pending application before mentioned and is also illustrated herein in connection with my improvements.

Over the axle 2, is mounted a casing 14, in which is a centrifugal governor, 15, driven from the axle through the medium of gear-wheels, 16, one on the axle and the other on the governor spindle. This spindle has bearings in the casing 14. In the casing 14, is mounted a valve-chest, 17, in which plays a slide valve, 18, the stem, 19, of said valve being connected with the governor in such a manner that when the governor balls fly out the valve 18, will, in the arrangement here shown, be moved upward over its seat.

The valve-chest 17, is connected with the compressed air reservoir 4, by a pipe 20, in which is the casing 21, of a pressure-reducing valve $21^{\times}$, so that the air from the reservoir, which may be at a tension of seventy pounds, will be reduced to say thirty-five pounds when it reaches the valve chest 17. The valve 18 controls a port 22, from which a pipe 23 leads to the casing 10 of the automatic valve (Figs. 1 and 2) and enters the same at the end opposite to pipe 8. Consequently, when the train is stopped, or is running at a low rate of speed, the valve 18 uncovers the port 22 and permits air from the valve-chest, at a reduced pressure, to enter the casing of the automatic valve 10^{a}, behind the latter and exert thereon a counter pressure, so that if, under these conditions, the engineer sets the brakes by opening pipe 8, to the atmosphere, the pressure in front of valve 10^{a}, will be relieved and the pressure behind it will force it forward so as to cut off communication between the train pipe 9 and pipe 8, and open communication between the train-pipe and the pipe 23. The pressure behind the brake-piston $28^{\times}$ (Fig. 1^{a}) tending to set the brakes, will then be about seventy pounds, while the counter pressure in front of said piston will be about thirty-five pounds, the difference (thirty-five pounds) being about the actual or effective braking pressure. When, however, the train is running at a high rate of speed, the valve 18 will be moved upward far enough to close the port 22 to the chest and open it to a relief port 24 in the valve seat. (See Fig. 4.) This port 24 being open to the atmosphere relieves the counter pressure on the automatic valve 10^{a} and permits the engineer to put the full pressure on the brakes.

All of the above is shown in my former application, and it will be seen that it provides for but one reduction in the brake pressure.

My present invention provides for any desired number of such variations proportioned to as many different rates of speed. The means for accomplishing this will now be described.

Arranged below the relief port 24, are similar relief ports, 25 and 26, which are closed by spring valves, $25^{\times}$ and $26^{\times}$, respectively. The tension of the spring back of the valve $25^{\times}$ will be less than that back of the valve $26^{\times}$.

The operation of the mechanism described is as follows: When the train is stationary the slide valve 18 will be in the position seen in Fig. 4, and the air in the valve-chest 17, which we will assume to have a tension of thirty-five pounds, will have free access to the casing of the automatic valve 10^{a} by way of the open port 22 and the pipe 23. When the train is set in motion the valve 18 will slowly rise as the speed increases, but until it rises to the position seen in Fig. 5 there will be a counter pressure on the automatic valve 10^{a} equal to thirty-five pounds, and should the engineer set the brakes he will only be able to apply a braking pressure equal to the difference between this counter pressure and that in the train pipe 9. When the valve 18 shall have risen to the position seen in Fig. 5, the valve will have closed the port 22 to the interior of the valve-chest 17 and opened said port through the medium of a port passage 27 in the valve, to the relief port 26. The valve $26^{\times}$, controlling this port, is a reducing valve and as soon as the port 26 is opened to the port 22, the counter pressure behind the automatic valve 10^{a} will be reduced from thirty-five pounds to say twenty-five pounds. This will, of course, increase the available braking pressure ten pounds. As the speed of the train continues to increase the valve 18 will continue to rise until the relief port 25 is opened to the port 22. This position of the valve 18 is seen in Fig. 6. As the valve $25^{\times}$ at this relief port is set to reduce the counter pressure to a still greater extent, say to fifteen pounds, it will be obvious that at this rate of speed the available braking pressure will be again increased ten pounds, making it about fifty-five pounds. As the speed increases and approaches more nearly to the maximum, the valve 18 will rise to the position seen in Fig. 7, wherein the port 22 is open to the relief port 24. As this port has no reducing valve, it will be obvious that all of the counter pressure will now be removed and the effective braking pressure will be equivalent, substantially, to the full pressure in the reservoir 29.

There may, of course, be more than two reducing relief ports, but the two shown herein fully illustrate the principle and construction.

I do not limit myself to the specific mechanical construction and arrangement herein shown as these may be varied without departing materially from my invention. For ex-

ample the valve 18 may be moved in some other than an upward direction by the governor. I have shown what I believe to be the simplest arrangement. The air pressures here given are only for illustration and they may be departed from at will. The slide valve 18 shown herein is tubular in form and practically balanced, but any suitable form of slide valve may be used as well as any of the known forms of centrifugal governors for operating the valve. It is only necessary that the governor shall impart the proper extent of movement to the valve and the means for accomplishing this result are within the scope of any skilled machinist.

Having thus described my invention, I claim—

1. In an air-brake for cars wherein means are employed for putting a counter pressure on the brake-piston at low rates of speed, the combination with the casing 10 of the automatic valve open at one end to the engineer's valve, at the other end to a source of compressed air under low tension, and at the side with the train-pipe, the said train-pipe, and the valve 10^a in said casing, of a valve adapted to control the admission of air under low tension behind the valve 10^a, and to open the said casing in succession to a series of relief ports, whereby the tension of the counter pressure is regulated, and a governor driven from the axle of the train and operating said valve, as set forth.

2. In an air-brake for railway cars, the combination with the automatic valve controlling the admission of air to the train-pipe when the brakes are set, to provide a counter pressure of less tension than the main pressure, and the casing of said valve, of a valve-chest, open to a source of air at low tension, said chest having a port 22, open to the casing of the automatic valve and back of the latter, and a series of relief ports, some of which are controlled by pressure-reducing valves, a valve 18 in said chest adapted to open the relief ports in succession to the port 22, and a governor driven from one of the axles of the train and operating the valve 18, whereby the position of said valve is governed by the speed at which the train is moving, as set forth.

3. In an air-brake for railway cars, the combination with the main air-reservoir, a pipe connecting said reservoir with the train-pipe, the automatic valve and engineer's valve controlling the flow of air to the train-pipe, the said train-pipe, and a governor driven from an axle of the locomotive or train, of a valve-chest open to air under a tension less than that in the main reservoir, said chest having a port 22, open to the casing of the automatic valve and back of said valve, a relief port 24, open to the atmosphere and a relief port or ports controlled by spring valves which resist the outflow of air thereat, and a valve operated by the governor and adapted to open the port 22 to one or the other of the said relief ports, according to the speed at which the train is moving, as set forth.

4. In an air-brake for cars wherein means are employed for automatically regulating the effective braking pressure in accordance with the speed of the train, the combination with a main compressed air-reservoir, an engineer's valve, a train-pipe, an automatic cut-off valve between the engineer's valve and the train-pipe on the car, means for supplying air at a tension below the maximum tension behind said automatic valve for actuating it to cut off the train-pipe from the engineer's valve and opening the train-pipe to the reduced air-pressure, and a governor driven from one of the axles of the train, of means controlled by said governor for effecting a graduated reduction of the tension of the air behind said automatic cut-off valve at intervals as the speed of the train increases, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOHN D. P. SCHENCK.

Witnesses:
CHARLES A. WINTER,
EDWARD WINTER.