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W. B. MANN.

HIGH SPEED BRAKE.

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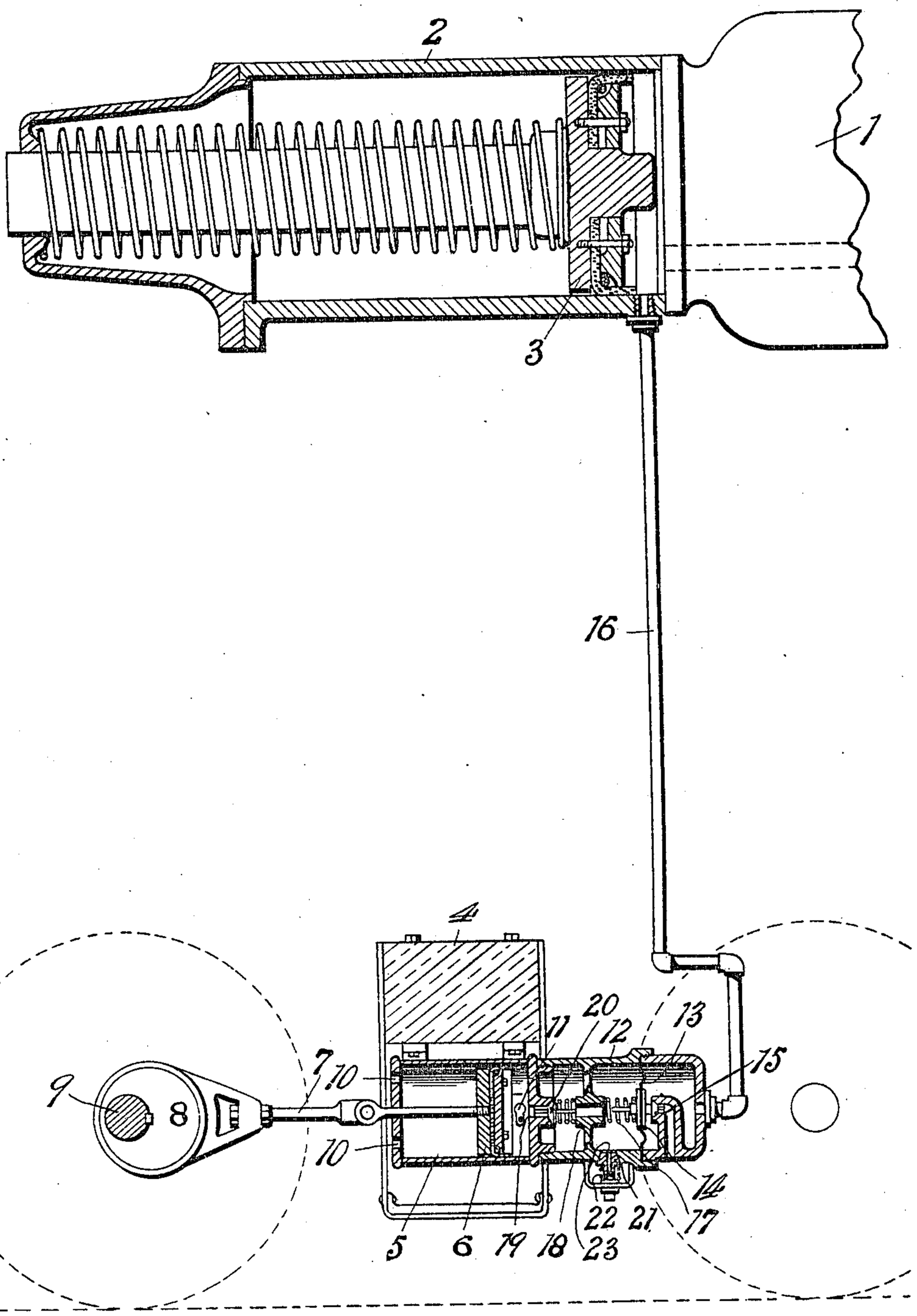

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UNITED STATES PATENT OFFICE.

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HIGH-SPEED BRAKE.

No. 831,795. Specification of Letters Patent. Patented Sept. 25, 1906.

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To all whom it may concern:

Be it known that I, WILLIAM B. MANN, a resident of Baltimore, Maryland, have invented a new and useful Improvement in High-Speed Brakes, which invention is fully set forth in the following specification.

This invention relates to air-brakes for railway and other cars, and more especially to what are known as "high-speed" brakes. In this class of brakes a very high pressure is carried in the auxiliary reservoir, which when the brakes are applied, and particularly in emergency applications, equalizes the pressure between the auxiliary reservoir and the brake-cylinder at a very high point, usually from seventy to seventy-five pounds. When the train is running at a very high speed, this pressure when exerted through the brake-shoes upon the wheels acts simply as a braking pressure without checking the revolution of the wheels to such an extent as to cause them to slide, and thereby flatten the wheels; but as the speed of the train decreases such a high-braking pressure would cause the sliding and consequent flattening of the wheels, and to obviate this it has heretofore been proposed to provide means for lessening the pressure in the brake-cylinder, and this is usually in the form of a leak from the brake-cylinder to the atmosphere, whereby pressure begins to escape from the brake-cylinder immediately upon its entrance thereto. The result of this is that the pressure in the brake-cylinder begins to decrease, and hence the braking pressure on the brake-shoe decreases before the speed of the train has been materially checked or checked to the desired extent.

The object of the present invention is to provide a high-speed brake which shall utilize the high braking pressure so long as the speed of the train continues above a predetermined rate, and which shall then permit an automatic decrease of the pressure in the brake-cylinder, the rate of decrease being proportionate to the decreased speed of the train.

With this object in view the invention consists in the usual or any suitable auxiliary reservoir and brake-cylinder combined with a relief-valve for permitting the escape of pressure from the brake-cylinder to the atmosphere, said valve, however, being held closed by pressure due to the speed of the train as long as said speed exceeds a predetermined limit, and when the speed of the train falls below said limit the pressure retaining said valve on its seat is automatically decreased until the pressure from the brake-cylinder acts to open the relief-valve and permit the escape of pressure from the brake-cylinder down to any predetermined point, at which point the relief-valve is automatically closed by a load-spring bearing thereon.

The particular means employed to exert the pressure upon the relief-valve in order to hold it closed while the train is moving at a high speed is that of a load-valve, above mentioned, supplemented by air-pressure due to a compressor operated from some moving part of the car—as, for example, the car-axle. This compressor is in constant operation whether the train moves at a high or a low rate of speed; but the amount of air compressed against the relief-valve is proportionate to the speed of the train. More specifically stated, the relief-valve is mounted upon a diaphragm open on one side to the pressure from the brake-cylinder and on the opposite side to pressure in the cylinder communicating with the compressor, said diaphragm and relief-valve being provided with a load-spring which normally closes the relief-valve against any pressure in the brake-cylinder below the predetermined point—say fifty-five pounds to the square inch. The cylinder on the compressor side of the said diaphragm is provided with a valve opening to the atmosphere, and this valve is loaded with a spring which retains the valve on its seat against any pressure which when added to the load-spring on the relief-valve would be less than the high-speed pressure desired in the brake-cylinder—say seventy or seventy-five pounds—and an always open leak is placed on the compressor side of the diaphragm leading to the atmosphere. As a convenient means of construction this leak may lead directly through the vent-valve referred to.

The inventive idea involved may receive various mechanical expressions, one of which is shown in the accompanying drawing, which is a vertical section through the brake-cylinder and the high-speed apparatus.

Referring to the drawing, 1 is an auxiliary reservoir, 2 the brake-cylinder, and 3 the

brake-cylinder piston, of the usual or any desired construction. Suspended to any part of the under side of the car, as to a beam 4, is a cylinder 5, preferably located between the axles of one of the car-trucks, in which cylinder plays a piston 6, operated by the connections 7, leading to an eccentric 8 on one of the axles 9 of the truck. As here shown, the cylinder and piston constitute a single-acting compressor, always open to the external atmosphere through the ports 10 and provided with an intake-valve 11 in front of the piston. Connected to the cylinder 5 is a second cylinder 12, divided transversely by a diaphragm 13, carrying a relief-valve 14, controlling a relief-port 15, leading from the cylinder to the external atmosphere. On the same side of the diaphragm 13 as the relief-port 15 the cylinder 12 is connected to the brake-cylinder 2 by a pipe 16, which enters the brake-cylinder in front of the brake-piston, so that the pressure in the brake-cylinder and against the diaphragm 13, tending to open the relief-valve 14, is always equal. The relief-valve 14 is provided with a load-spring 17, reacting between the said valve and an abutment 18 in the cylinder 12. If it is desired that the braking pressure in the brake-cylinder shall equalize at fifty-five pounds when the train is running at a moderate speed, then the pressure of the load-spring 17 on the diaphragm is such as to always retain the valve closed against a pressure of fifty-five pounds, while it will permit any pressure in excess of that to lift the valve and reduce the pressure in the brake-cylinder until the desired pressure of fifty-five pounds is secured. The cylinder 5 of the compressor connects, through a port 19, with the cylinder 12, and this port is controlled by a non-return valve 20. On the compressor side of the diaphragm 13 cylinder 12 is provided with a valve 21, which is loaded with a spring 22, and a leak-port 23 is also provided in said cylinder, on the same side of the diaphragm as the valve 21, and for convenience of construction is shown as passing directly through said valve.

The operation of the device is as follows: Suppose a train to be running at a high speed—say sixty miles an hour—with a pressure of ninety pounds in the auxiliary reservoir and the proportion of the reservoir and brake-cylinder to be such that upon an emergency application of the brakes the pressure would equalize at seventy pounds in the brake-cylinder, and let it also be supposed that it is desired to utilize a braking pressure of only fifty-five pounds in the brake-cylinder when the speed of the train is less than forty miles an hour. In this case the load-spring 17 is arranged to permit the diaphragm to yield and open the relief-valve 14 when any pressure in excess of fifty-five pounds is brought against the diaphragm on the brake-cylinder side thereof, and the spring of the valve 21 is so adjusted as to hold said valve 21 to its seat against any pressure in said cylinder, which when combined with the power of the load-spring 17 shall be less than the pressure of seventy pounds on the brake-cylinder side of the diaphragm 13, but which shall open when the combined force of the load-spring 17 and the pressure in the cylinder 12 slightly exceeds seventy pounds on the brake-cylinder side of the diaphragm. The proportion between the leak-port 23 and the compressor is such that when the train is running at a speed of less than forty miles an hour the leak will permit air to escape from the cylinder 12 as fast as it is forced therein by the compressor; but when the speed of the train exceeds forty miles an hour the compressor will act to compress the air in the cylinder 12 faster than it escapes through the leak 23. As a result of this the pressure on the compressor side of the diaphragm 13 will rapidly increase until the pressure in the cylinder when combined with that of the load-spring 17 is capable of holding the relief-valve 14 to its seat against a pressure of seventy pounds upon the brake-cylinder side of the diaphragm 13. Under these conditions with a train running sixty miles an hour when an emergency application is made the pressure in the brake-cylinder is suddenly raised to seventy pounds, and this pressure is quickly communicated to the brake-cylinder side of the diaphragm 13, tending to open the relief-valve 14. This, however, is opposed by pressure on the opposite side of the diaphragm slightly exceeding seventy pounds, and the valve is therefore held to its seat and a braking pressure of seventy pounds retained in the brake-cylinder until the speed of the train is reduced from sixty to forty miles an hour. As soon as or very shortly after the speed of forty miles an hour is reached the pressure on the compressor side of the diaphragm 13 decreases by reason of the slackened speed of the compressor and the continual leak through the leak-port 23 and the pressure within the brake-cylinder acts upon the diaphragm 13 and opens the relief-valve, whereby the pressure in the brake-cylinder is permitted to escape through port 15, thereby gradually reducing the pressure in the brake-cylinder. This reducing action continues until the pressure in the brake-cylinder has reached fifty-five pounds, when the load-spring 17 acts to close the relief-valve and hold it closed, thereby retaining the pressure of fifty-five pounds in the brake-cylinder until the train is brought to a stop. The continued action of the compressor of course forces air in the cylinder 12 on the compressor side of the diaphragm 13; but this escapes through the leak-port 23 as fast as it enters the cylinder.

It will be understood, of course, that the

pressures assumed in the brake-cylinder for high-speed and ordinary braking purposes are arbitrary in this case and are assumed merely for the purpose of illustration and that the proportions of the compressor, leak-port 23, and the load-spring 17 may be varied to suit the various conditions and pressures that may be desired in any particular case.

What is claimed is—

1. In a high-speed brake, the combination of a brake-cylinder, with a relief-valve, a movable member secured thereto, devices exerting a constant force upon said member to close said valve against brake-cylinder pressure, and an air-compressor operating in proportion to the speed of the train and compressing air to augment said devices.

2. In a high-speed brake, the combination of a brake-cylinder, a relief-valve casing communicating therewith, a relief-valve controlling a vent-port in said casing, a diaphragm supporting said valve, a spring tending to seat said valve against brake-cylinder pressure, an air-chamber to the rear of said diaphragm and an air-compressor forcing air into said chamber.

3. In a high-speed brake, the combination of a brake-cylinder, a relief-valve casing communicating therewith, a relief-valve controlling a vent-port in said casing, a diaphragm supporting said valve, a spring tending to seat said valve against brake-cylinder pressure, an air-chamber to the rear of said diaphragm, an air-compressor forcing air into said chamber, and a leak-port in the walls of said chamber.

4. In a high-speed brake, the combination of a brake-cylinder, a relief-valve casing communicating therewith, a relief-valve controlling a vent-port in said casing, a diaphragm supporting said valve, a spring tending to seat said valve against brake-cylinder pressure, an air-chamber to the rear of said diaphragm, an air-compressor operating in proportion to the speed of the train and forcing air into said chamber, a leak-port in the walls of the chamber and a vent-valve opening under a predetermined pressure.

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

WILLIAM B. MANN.

Witnesses:
LEVEN J. GWINN,
REEVE LEWIS.