No. 831,040. PATENTED SEPT. 18, 1906.

J. S. CUSTER.

LOAD BRAKE APPARATUS.

APPLICATION FILED DEC. 18, 1903.

2 SHEETS—SHEET 1.

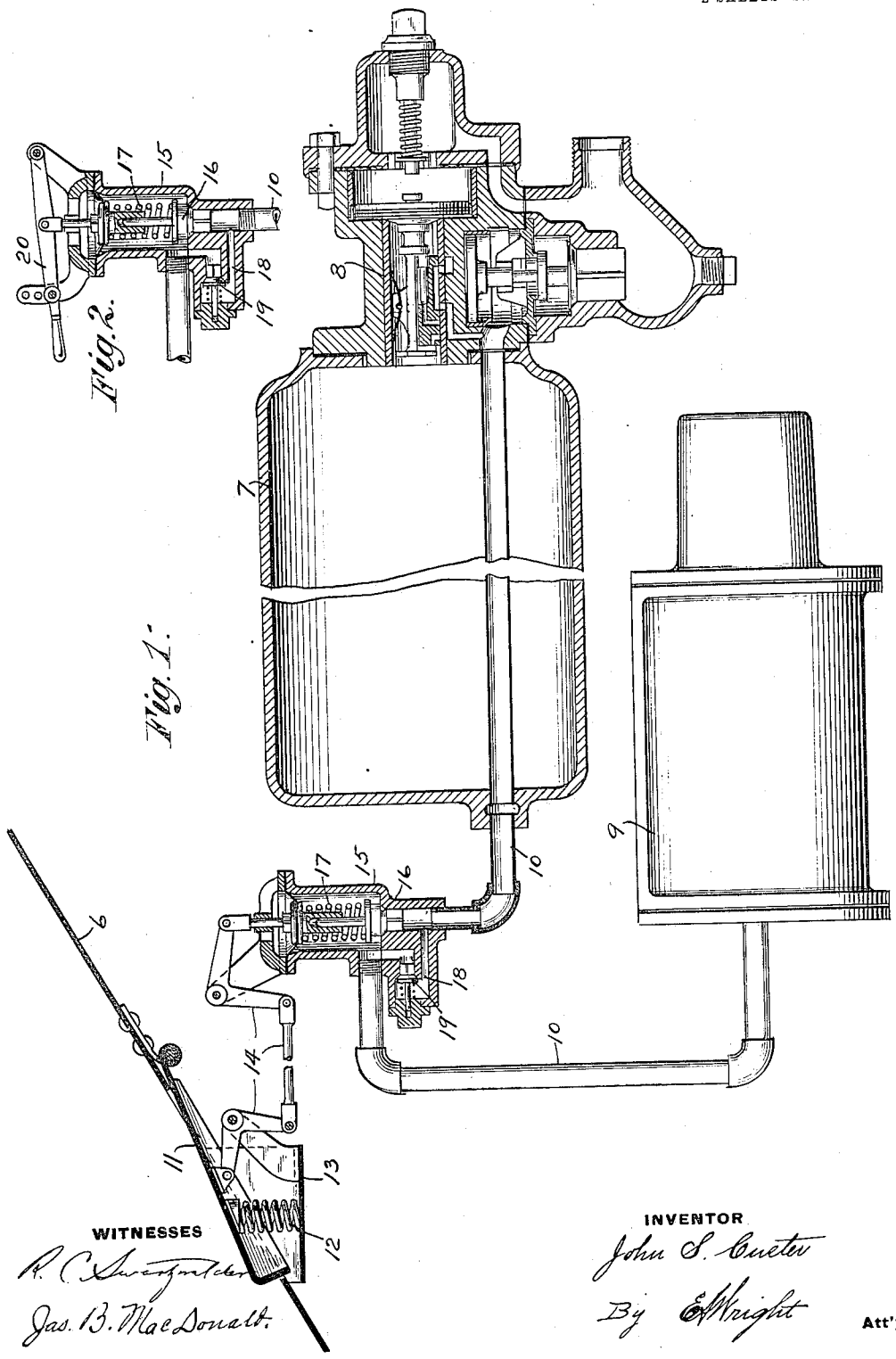


Fig. 2.

Fig. 1.

WITNESSES

R. C. Sweetser

Jas. B. MacDonald.

INVENTOR

John S. Custer

By E. Wright Att'y.

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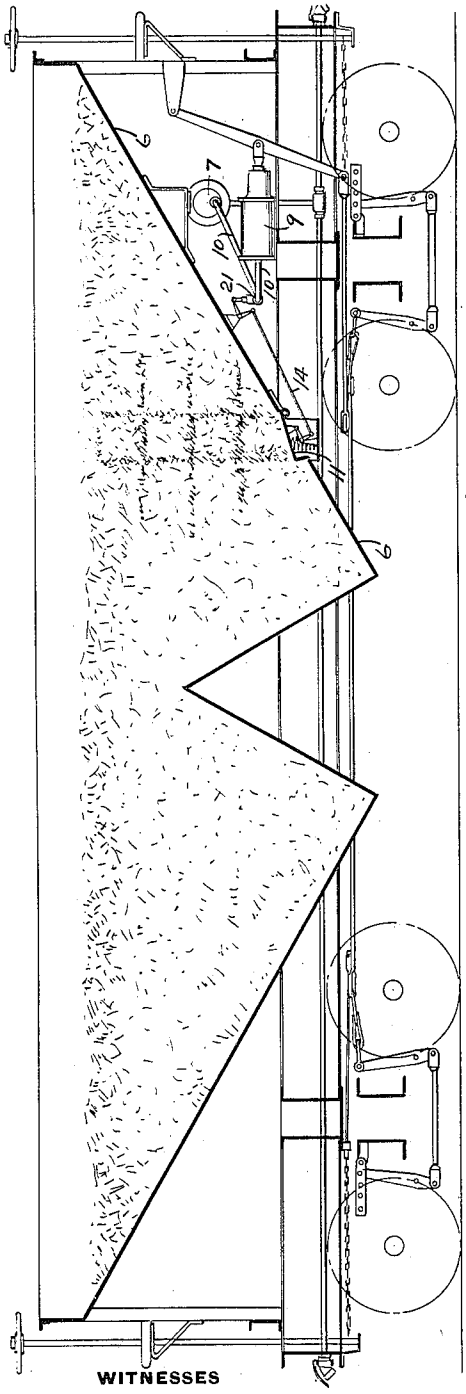


Fig. 3.

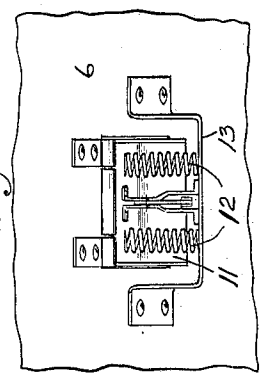


Fig. 5.

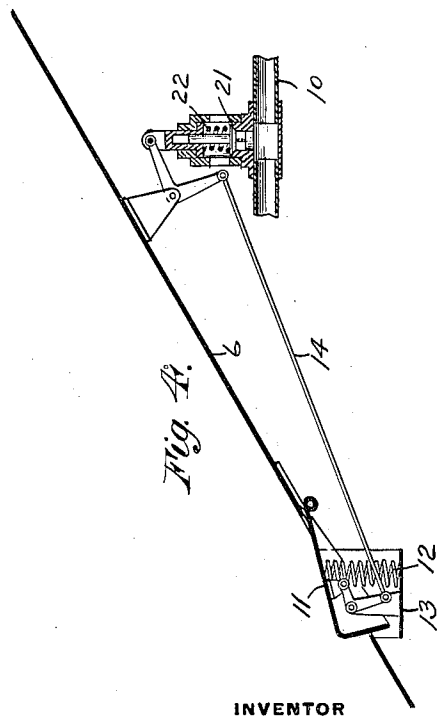


Fig. 4.

WITNESSES

R. A. Swartzlander

Jas. B. MacDonald.

INVENTOR

John S. Custer

By E. Wright

Att'y.

UNITED STATES PATENT OFFICE.

JOHN S. CUSTER, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO THE WESTINGHOUSE AIR BRAKE COMPANY, OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

LOAD-BRAKE APPARATUS.

No. 831,040. Specification of Letters Patent. Patented Sept. 18, 1906.

Application filed December 18, 1903. Serial No. 185,679.

To all whom it may concern:

Be it known that I, JOHN S. CUSTER, a citizen of the United States, residing in Pittsburg, county of Allegheny, State of Pennsylvania, have invented a certain new and useful Improvement in Load-Brake Apparatus, of which improvement the following is a specification.

This invention relates to fluid-pressure brakes, and more particularly to what is known as "load-brake" apparatus, by means of which the braking power may be automatically adjusted according to the weight of the load upon the car, whereby the braking power is limited to a safe degree upon empty cars, but is greatly increased upon loaded cars. Various devices for this purpose have heretofore been proposed in which the lowering or settling movement of the car-body in compressing its supporting-springs, due to the weight of the load, has been utilized to adjust some load-regulated device, such as a brake-cylinder admission-valve or blow-down valve or adjustable leverage, for increasing the braking power when the car is loaded and for limiting said braking power when the car is empty. It has been found, however, that the amount of compression of car-springs is not uniform, but that after a certain period of use many of the springs take on a permanent set, so that any device which depends for its actions upon a certain compression of the car-springs becomes unreliable and usually inoperative.

The principal object of this invention is to provide means not dependent upon the amount of compression of the car-springs, but actuated by the weight or pressure of the material itself with which the car is loaded for adjusting a load-regulated device to give heavy braking power when the car is loaded and light braking-power when the car is empty.

Another feature of the invention relates to the form of valve device employed for regulating the brake-cylinder pressure.

In the accompanying drawings, Figure 1 is a diagrammatic view, partly in section, showing one form of my invention; Fig. 2, a section of my improved regulating-valve with hand-operated adjusting means; Fig. 3, a longitudinal sectional view of a hopper-bottom car, showing a slightly-modified form of my improvement applied thereto; Fig. 4, a detached sectional view showing this modification on a larger scale; and Fig. 5, an end view of a portion of the inclined floor of the car-body, showing the spring-supported plate pivoted thereto.

Referring to the construction shown in Fig. 1, the invention is illustrated as applied to a hopper-bottom freight-car having an inclined floor 6 and equipped with the standard air-brake apparatus, comprising auxiliary reservoir 7, triple valve 8, brake-cylinder 9, having pipe connection 10, leading to the service-port of the triple valve, all of which is of the usual construction.

According to my invention yieldingly-supported means, such as a movable plate, is mounted upon the car-body in such a position as to be subjected to the weight of the material forming the load on the car, and for the purpose of illustration I have shown a plate 11 pivoted to the inclined bottom 6 of the car and adapted to close an opening through the car-bottom, so that when the car is loaded the material forming the load will rest directly upon the pivoted plate 11. Springs 12, carried on a bracket 13, are preferably used for yieldingly supporting the plate, and any desirable form of mechanical connections, such as the lever-and-rod connections 14, may be provided for adjusting a load-regulated device for varying the braking power according to the position of said movable plate.

The preferred form of valve device shown in Figs. 1 and 2 comprises a casing 15, located in the pipe 10, leading from the triple valve to the brake-cylinder and contains a spring-loaded check-valve 16, closing toward the triple-valve connection, thus comprising an excess-pressure valve, the spring 17 of which may be adjusted according to the load on the car to admit a less or greater degree of pressure to the brake-cylinder. A return by-pass 18, having a check-valve 19, is provided for exhausting the air from the brake-cylinder to the atmosphere when the triple valve is moved to release position.

The maximum amount of air under pressure, which may be charged into the brake-cylinder from the auxiliary reservoir through

the triple-valve device, is determined by the adjustment of the spring 17 of the excess-pressure valve, and this adjustment may be made either automatically by the weight of the load on the car, as indicated in Fig. 1, or manually by means of a hand-lever 20, as indicated in Fig. 2.

When the car is empty and there is no material resting on the movable plate 11, the spring 12, acting through the mechanical connection 14, compresses the spring 17 to a certain point, which, for example, may be equivalent to an air-pressure of twenty pounds per square inch acting on the back of the valve 16, tending to keep the same closed. Then upon successive applications of the brakes being made air under pressure from the auxiliary reservoir will open said valve and flow into the brake-cylinder until the brake-cylinder pressure rises to an amount—say thirty five pounds per square inch—which, together with that of the spring 17, is substantially equivalent to the degree of pressure remaining in the auxiliary reservoir. In this way the maximum pressure which can be supplied to the brake-cylinder is limited on empty cars to such a degree as will not cause a sliding of the wheels.

When the car is loaded, the weight of the material acting upon the plate 11 causes a compression of the spring 12 and a movement of the plate about its pivot, which movement, acting through mechanical connections 14, decreases the amount of compression to which the spring 17 is adjusted, so that a much greater degree of air-pressure may be admitted to the brake-cylinder.

According to the modification shown in Figs. 3 and 4 the load-regulated plate is employed in connection with a safety or blow-down valve 21, applied to brake-cylinder or the pipe 10, leading to the brake-cylinder, the movement of the plate acting through the mechanical connection 14 to adjust the spring 22 of the safety-valve. The operation of this form of my improvement will now be apparent, the upward movement of the plate 11 when the car is empty acting to decrease the load of the spring 22 of the blow-down valve 21 and the reverse movement caused by the weight of the material when the car is loaded acting to increase the compression of the spring on said valve to retain a much higher pressure in the brake-cylinder. It will also be evident that the amount of depression of the plate 11 against its supporting-spring will vary in proportion with the amount of material loaded upon the car, so that if the car is only partially loaded the braking pressure will be only partially increased.

While I have shown my improvement applied to only two forms of load-regulating valves, it will be obvious that it is equally well adapted for operation in connection with various other modifications of load-regulated devices for securing light braking power on the car when empty and heavy braking power when the car is loaded.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A load-brake apparatus comprising a device for varying the braking power and means actuated by the weight or pressure of the material itself forming the load on the car for adjusting said device.

2. A load-brake apparatus comprising a device for varying the braking power and means independent of the car-springs and actuated by the weight of the material forming the load on the car for adjusting said device.

3. A load-brake apparatus comprising a device for varying the braking power and a movable plate subject to the weight of the material forming the load on the car for adjusting said device.

4. A load-brake apparatus comprising a device for varying the braking power and a spring-supported plate pivoted to the car and subject to the weight of the material forming the load for adjusting said device.

5. In a load-brake apparatus the combination with a valve device for regulating the brake-cylinder pressure, of means actuated by the weight or pressure of the material itself forming the load on the car for adjusting said valve device.

6. In a load-brake apparatus the combination with a valve device for regulating the brake-cylinder pressure, of a movable plate subject to the weight of the material forming the load on the car for adjusting said valve device.

7. In a load-brake apparatus the combination with a valve device for regulating the brake-cylinder pressure, of a spring-supported plate pivoted to the car and subject to the weight of the material forming the load for adjusting said valve device.

8. In a load-brake apparatus, the combination with a train-pipe, auxiliary reservoir, triple valve and brake-cylinder, of a spring-actuated excess-pressure valve in the passage leading from the triple valve to the brake-cylinder and adapted to be opened by fluid flowing therethrough, and means for adjusting said spring.

9. In a load-brake apparatus, the combination with a train-pipe, auxiliary reservoir, triple valve and brake-cylinder, of a spring-actuated excess-pressure valve in the passage leading from the triple valve to the brake-cylinder and adapted to be opened by fluid flowing therethrough, and means actuated by the load on the car for adjusting said spring.

10. In a load-brake apparatus, the combination with a train-pipe, auxiliary reservoir,

triple valve and brake-cylinder, of a spring-actuated excess-pressure valve in the passage leading from the triple valve to the brake-cylinder and adapted to be opened by auxiliary reservoir pressure supplied through the triple valve, and means actuated by the load on the car for adjusting said spring, and a check-valve-controlled by-pass around said excess pressure-valve for exhausting the fluid from the brake-cylinder.

In testimony whereof I have hereunto set my hand.

JOHN S. CUSTER.

Witnesses:
R. F. EMERY,
JAS. B. MACDONALD.