No. 656,232. Patented Aug. 21, 1900.

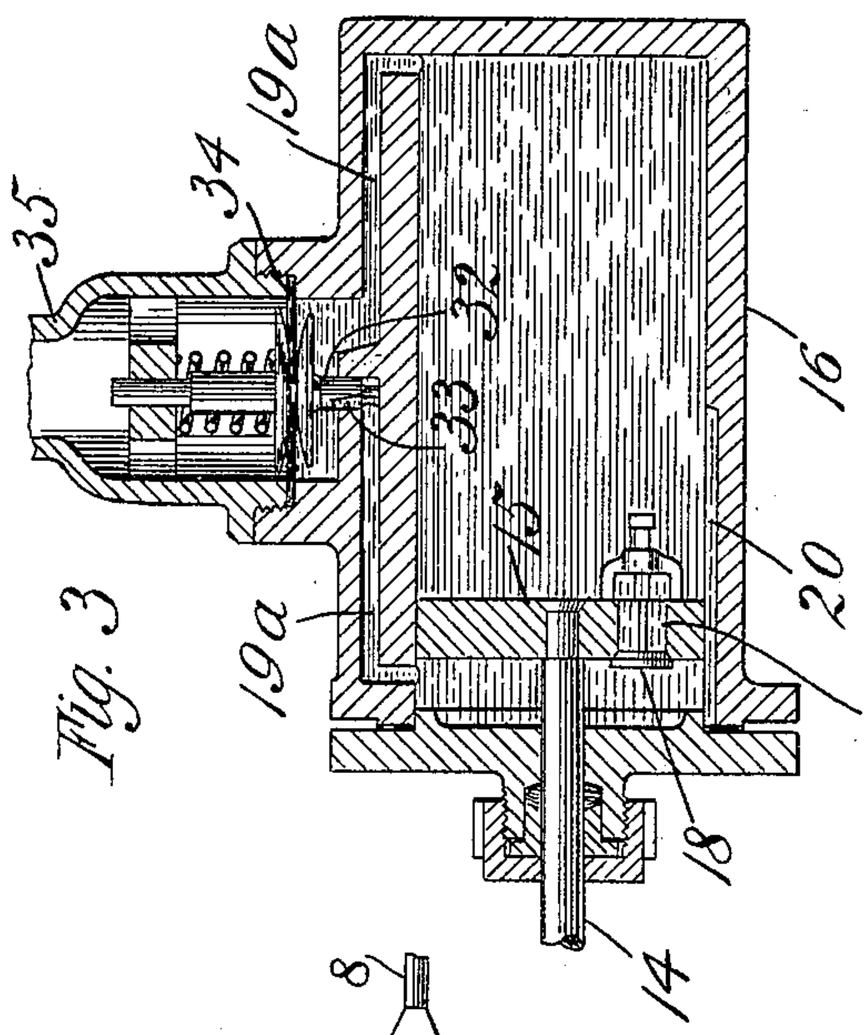
H. H. WESTINGHOUSE.

RAILWAY BRAKE.

(Application filed Dec. 20, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 3



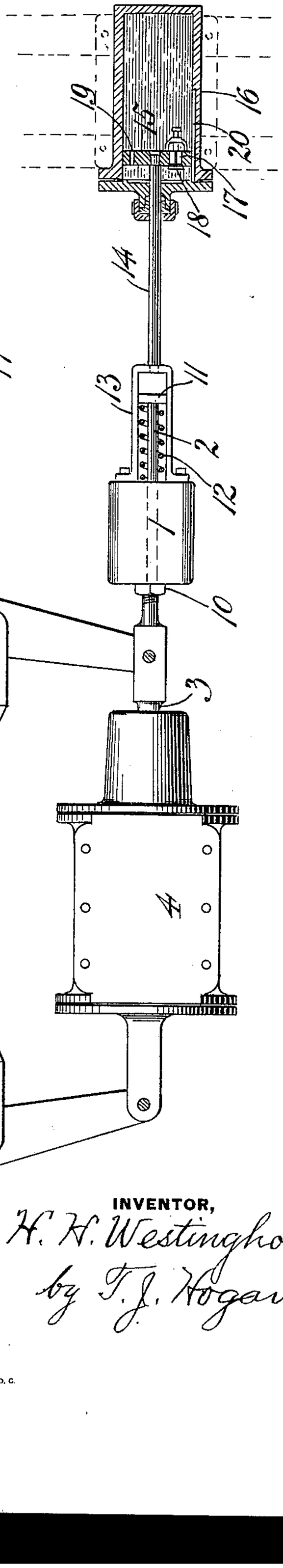
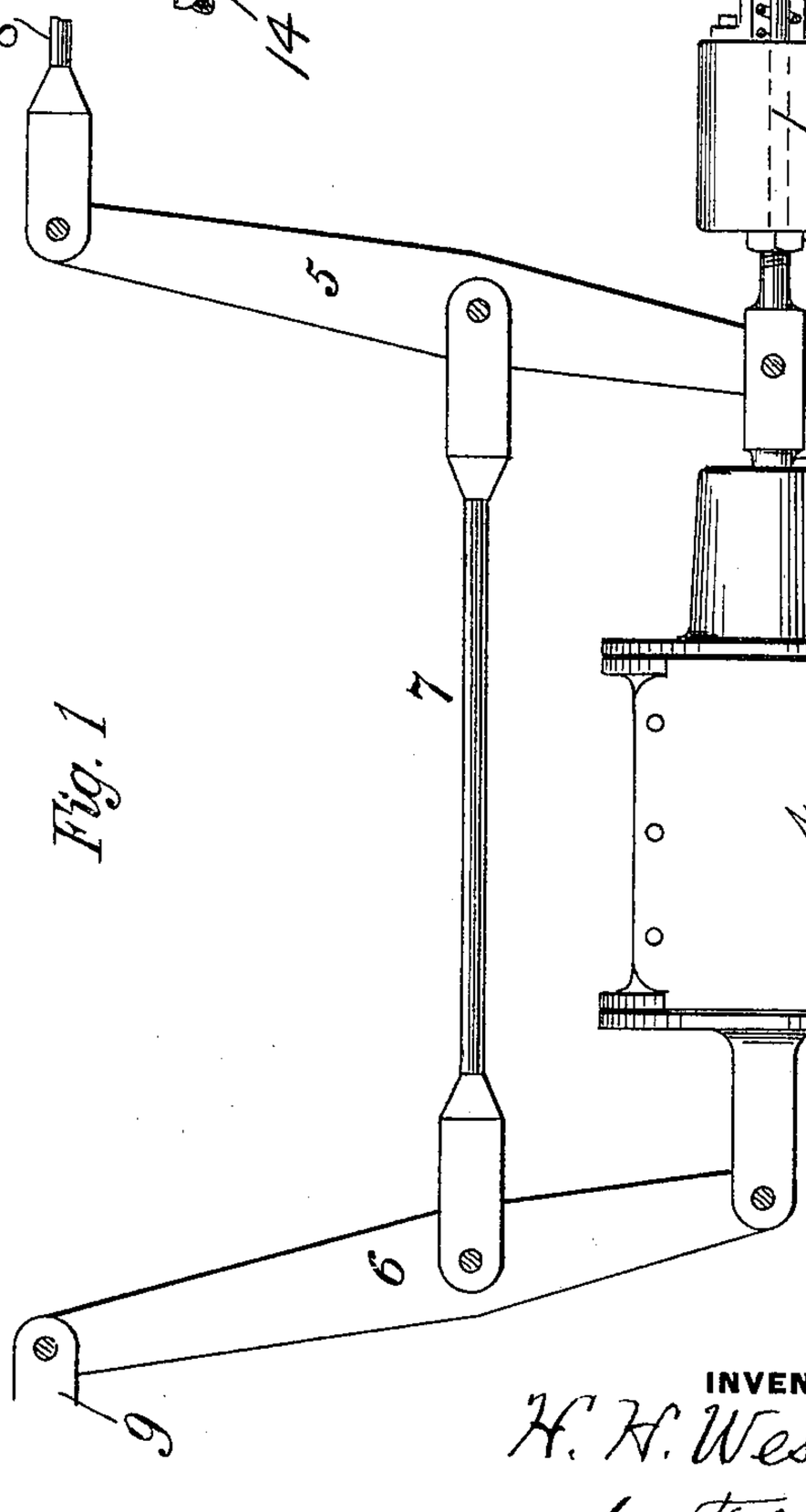


Fig. 1



WITNESSES:

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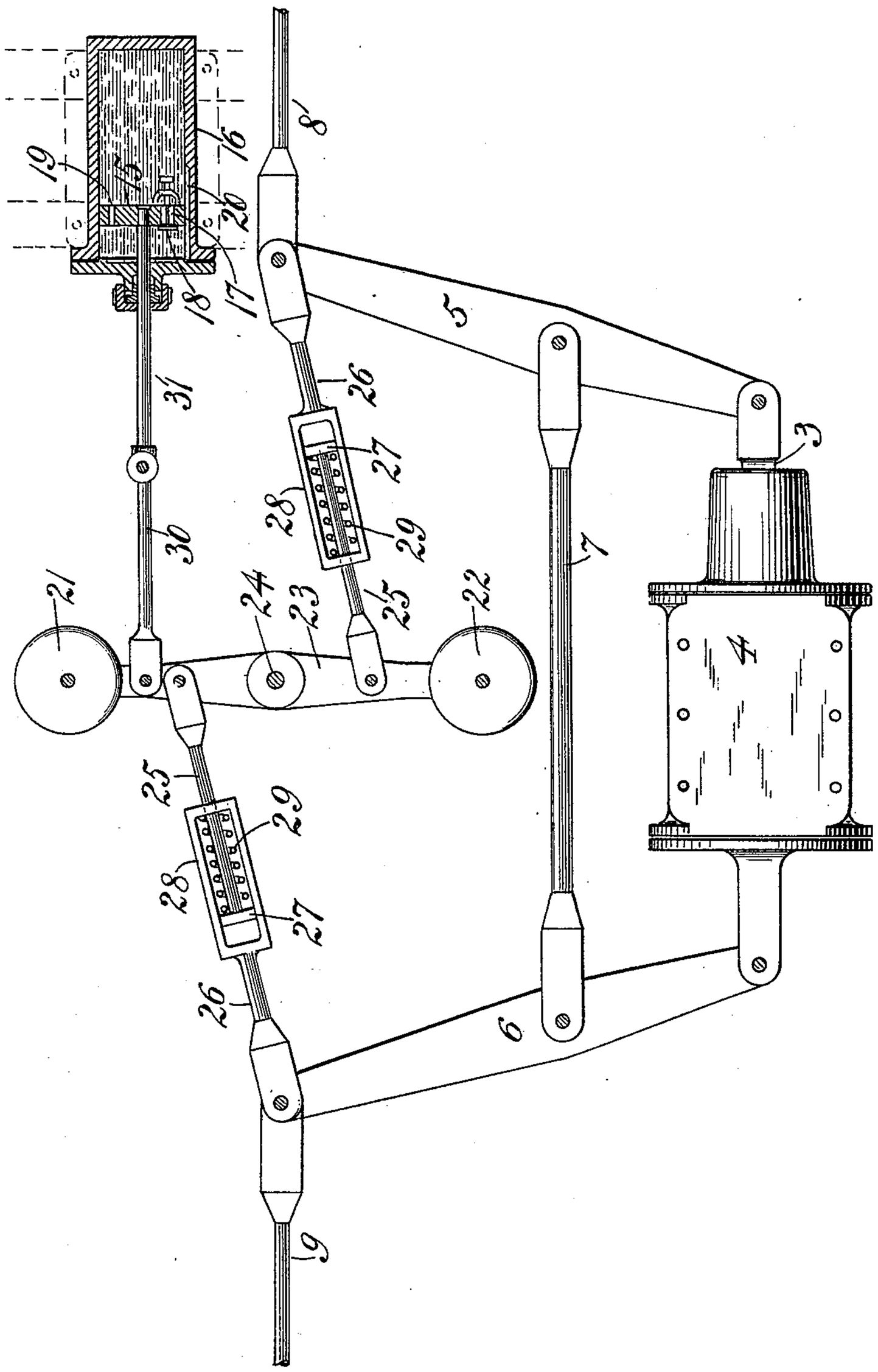
Fig. 2



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UNITED STATES PATENT OFFICE.

HENRY H. WESTINGHOUSE, OF PITTSBURG, PENNSYLVANIA.

RAILWAY-BRAKE.

SPECIFICATION forming part of Letters Patent No. 656,232, dated August 21, 1900.

Application filed December 20, 1898. Serial No. 699,843. (No model.)

To all whom it may concern:

Be it known that I, HENRY H. WESTINGHOUSE, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered a certain new and useful Improvement in Railway-Brakes, of which improvement the following is a specification.

The object of my invention is to provide an improvement in railway-brake apparatus; and to this end it consists in new and improved means whereby the force of inertia may be utilized for the purpose of increasing the braking force and by which the pressure with which the brakes are applied may be gradually reduced; and it further consists in certain combinations and features of construction, all as hereinafter set forth.

My present invention is an improvement on that shown and described in my pending application, Serial No. 695,236, and provides means whereby the additional force due to the action of inertia may be rendered operative and gradually reduced.

In the accompanying drawings, which illustrate my invention, Figure 1 is a plan view, partly in section, of a portion of a brake apparatus embodying my invention; Fig. 2, a similar view illustrating a modification, and Fig. 3 a modification of the cataract-cylinder.

In my pending application referred to I have shown means whereby the force of inertia may be utilized to augment the braking force of ordinary brake systems by means of an inertia device, weight, or mass which being put in motion by the action of the ordinary brake mechanism tends by reason of its inertia to continue moving after the shoes have been applied to the wheels, and thereby exerts an additional force through its connection with that mechanism.

My present invention provides, in combination with such inertia device, weight, or mass, means whereby the inertia device may be temporarily locked in position when the brakes are first applied and then gradually released, so as to gradually reduce the additional braking force due to its inertia.

In Fig. 1 of the drawings my improvement is shown applied to a fluid-pressure-brake mechanism in which an inertia device or weight 1 is mounted on an extension 2 of the rod 3, which is connected to and operated by the movement of a piston within the brake-cylinder 4. The piston-rod 3 is connected to and is adapted to operate the levers 5 and 6, which are connected together by a rod 7, and which are also connected by rods 8 and 9 with the brake mechanism on the trucks at each end of the car. The rod 2 is provided on one end with a head or collar 11 and is surrounded by a spring 12, which bears at one end on the head or collar 11 and at its other end against the inertia device or weight 1, so as to hold it normally in contact with a shoulder or nut 10 on the extension of the piston-rod. A yoke 13 is secured to the weight 1 and is connected, by means of a rod 14, with a piston 15 in a cylinder 16, which is charged with liquid. The piston 15 is provided with a comparatively-large passage 17 extending through it, which is controlled by a non-return valve 18, and a smaller valveless passage 19 also extends through the piston. In the wall of the cylinder 16 is formed a groove 20, which extends from the left-hand end of the cylinder to the right, a distance somewhat greater than the stroke of the piston in the brake-cylinder 4.

The inertia device or weight 1 operates to augment the braking force only when the brakes are applied with sufficient suddenness to cause the weight to slide on the rod 2 and compress the spring 12. In applying the brakes when the piston-rod 3 is moved slowly outward the weight 1 may not move relatively to the rod 2, and the piston 15 in the cylinder 16 will then be moved a distance equal only to the stroke of the brake-cylinder piston. This movement will be effected with but little resistance, since a comparatively-free flow of liquid from right to left may take place through the passage 17 in the piston and through the groove 20 in the wall of the cylinder. When the brakes are released after such an application, the return flow of liquid from the left of piston 15 to the right will take place through the groove 20 and the passage 19, the valve 18 being closed. The capacity of the groove 20 should be such as to permit the piston 15 to return with the desired rapidity in releasing the brakes.

When the brakes are applied so as to cause the piston-rod 3 to move suddenly outward, the weight 1 will continue to move after the piston-rod 3 has completed its stroke and will compress the spring 12 and move the piston 15 to the right beyond the right-hand end of the groove 20. When the weight 1 reaches the end of its movement, the pressure by which the spring 12 is compressed acts, in addition to the air-pressure in the brake cylinder, to press the brake-shoes to the wheels. The valve 18, controlling the passage 17 in the piston 15, is closed and the fluid on the left of the piston 15 will temporarily prevent the release of the additional pressure. The spring 12, acting on the weight 1 and through the yoke 13 and rod 14 on the piston 15, will tend to move the piston 15 to the left, and the flow of fluid through the passage 19 from left to right of the piston 15 will permit this movement, so that the spring 12 will gradually expand and the additional pull on the piston-rod 3 due to the inertia of the weight will be released.

In the construction shown in Fig. 2 of the drawings the piston-rod 3 of the brake-cylinder 4 is connected, as in Fig. 1, with a lever 5 and by means of a rod 7 with a lever 6, and these levers are connected to the pull-rods 8 and 9, which are connected to the truck-levers near the ends of a car.

Weights 21 and 22 are mounted on the ends of a lever 23, which is pivoted at its middle to a fixed support on the car by means of a pin 24, and the lever 23 is connected with the pull-rods 8 and 9 and with the levers 5 and 6 by means of the rods 25 and 26. The rods 25 are provided with heads or collars 27 on one end, which are adapted to slide in yokes 28 on the rods 26, and springs 29, which surround the rods 25, bear at one end on the head 27 and at the other end on the end of yoke 28. The lever 23 is also connected by rods 30 and 31 with a piston 15 in a cylinder 16, which is charged with liquid. A small passage 19 extends through the piston, and a comparatively-large passage 17 also extends therethrough and is provided with a non-return valve 18, which permits the liquid to flow through the passage 17 from right to left when the piston is moved to the right, but prevents a return flow through that passage.

When the brakes are applied, the outward movement of the brake-cylinder piston-rod 3 will cause the levers 5 and 6 to pull on the rods 8 and 9 and to push on the rods 26 and 25, and thereby to partially rotate the lever 23 about its pivot. This movement of the lever 23 will move the piston 15 to the right in the cylinder 16, and the extent of the movement will depend on the suddenness with which the brake-cylinder piston 3 is moved outward. If the brakes are applied by a slow or gradual movement of the brake-cylinder piston-rod, the inertia of the weights 21 and 22 may not be great enough to cause any considerable compression of the springs 29, and the piston 15 in the cylinder 16 will then move a limited distance to the right, which will be proportional to the movement of the brake-cylinder piston-rod 3. When this movement of the piston 15 is being made, the liquid in the cylinder 16 on the right of the piston 15 flows freely to the left through the passages in the piston and through a groove 20 in the wall of the cylinder, the length of the groove 20 being such that the piston does not move beyond it. When after such a gradual application of the brakes the brakes are released, the piston 15 may be moved to the left without any considerable retardation, because the liquid on the left of the piston is free to flow around the piston to the right through the groove 20.

When in applying the brakes the brake-cylinder piston-rod 3 is moved out with any degree of suddenness, a correspondingly-rapid movement will be given to the lever 23 and weights 21 and 22 and the inertia of the weights will tend to give them an increased travel by which they will act through the rods 25 to compress the springs 29 and to exert an additional pull on the rods 8 and 9 equal to the force required to compress the springs. The piston 15 in the cylinder 16 will be moved to the right beyond the inner end of the groove 20, and as it moves the liquid on the right of the piston will flow around and through the piston to the left. The valve 18 will close when the piston 15 reaches the end of its stroke to the right and the immediate return of the piston 15 will be prevented by the liquid on the left of the piston. The springs 29 being under compression will exert a pull on the rods 25, 30, and 31 and gradually move the piston 15 to the left as the liquid on the left of the piston passes through the small passage 19 to the right, so that the force exerted by the inertia device, in addition to that exerted by the air in the brake-cylinder, will be gradually reduced.

It will be seen that the cylinder 16 and piston 15 operate in the manner of a cataract or dash-pot to permit and to regulate the gradual release of the additional pull on the rods 8 and 9; but they operate not merely as a releasing device, but as the means by which an otherwise momentary force is converted into a continuing force.

The location, dimensions, or capacity of the the groove 20 in the cylinder 16 may be varied, and, if preferred, may be dispensed with altogether, and, if preferred, a diaphragm may be employed instead of the piston 15.

In Fig. 3 of the drawings I have shown a modification of the cataract-cylinder, in which a passage 19^a for permitting a gradual release of the additional pull on the rods is formed in the wall of the cylinder instead of in the piston, and the passage 19^a is controlled by a valve 32, with a slot 33 formed therein of such form and dimensions that when the dia-

phragm 34 is moved up or down the capacity of the passage may be varied; but the passage need not be entirely closed at any time. I have shown the valve 32 connected to and adapted to be operated by the movement of the diaphragm 34; but my invention is not limited to this particular means for operating the valve.

It is preferred that the valve 32 should be operated so as to diminish the capacity of the passage for a return flow of the fluid when the train is moving at high speeds, and thereby retard the release of the additional pull on the brake-rods, and when the train is running more slowly a freer flow of the fluid should be permitted. To effect this, the pipe 35 may be arranged so that the pressure therein will be controlled by a centrifugal governor, as in the patent, No. 218,149, to George Westinghouse, Jr., dated August 5, 1879, in which a diaphragm for operating a valve is acted on by pressure in a pipe extending throughout the train and the pressure in the pipe is varied by the action of a centrifugal governor.

I claim as my invention and desire to secure by Letters Patent—

1. The combination, with a brake apparatus, comprising means for applying the brakes, of additional means for utilizing the force of inertia to augment the braking force, and means whereby the additional force may be gradually reduced.

2. The combination, with a brake mechanism, comprising means for applying the brakes, of additional means for utilizing the force of inertia to augment the braking force and a cylinder and a piston connected with the mechanism, for effecting and continuing the application of an additional force due to the action of inertia.

3. The combination, with a brake mechanism, of an additional inertia device and a cataract-cylinder and a piston connected with the mechanism, whereby a gradual reduction of the braking force may be effected.

4. The combination, in a brake mechanism, of a brake-actuating device, a yielding connection between the brake-actuating device and a part of the mechanism which is movable relatively thereto by the action of inertia, and a cataract, or dash-pot, device connected with the part of the mechanism which is movable relatively to the brake-actuating device by the action of inertia.

5. The combination, in a brake mechanism, of a brake-actuating device, a yielding connection between the brake-actuating device and a part of the mechanism which is movable relatively thereto by the action of inertia, a cylinder and a piston in the cylinder connected with the mechanism which is movable by the action of inertia.

6. The combination, in a brake mechanism, of a brake-actuating device, an inertia device connected thereto, a cylinder, a piston in the cylinder connected with the inertia device and adapted to retard return movement of the inertia device.

7. The combination, in a brake mechanism, of an inertia device, a yielding connection between the mechanism and the inertia device, which is subject to strain by the action of inertia, and means for continuing and gradually reducing the strain.

8. The combination, with a brake apparatus, of an inertia device, means for utilizing the force of inertia to augment the braking force, means whereby the additional force may be gradually reduced, and means whereby the rapidity of the reduction may be varied.

In testimony whereof I have hereunto set my hand.

HENRY H. WESTINGHOUSE.

Witnesses:

L. E. LOVE,

JOHN C. CUTHBERT.