No. 676,398. Patented June 11, 1901.

J. F. MALLINCKRODT & W. H. SAUVAGE.

AIR BRAKE MECHANISM.

(Application filed Sept. 21, 1900.)

(No Model.) 2 Sheets—Sheet 1.

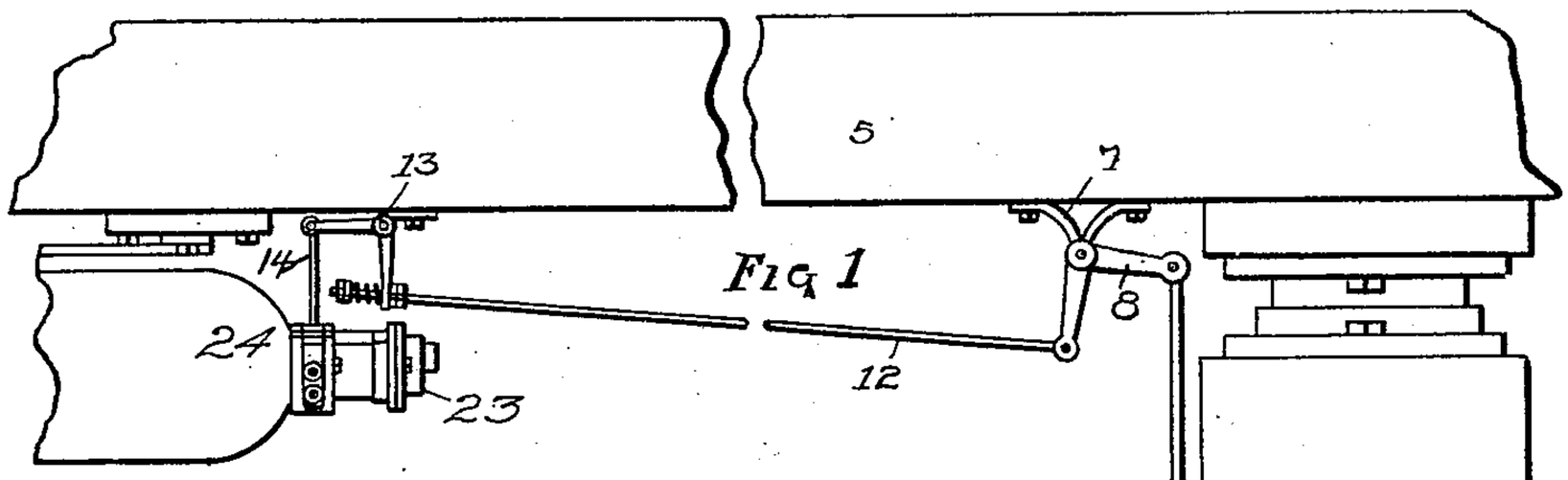

Fig 1

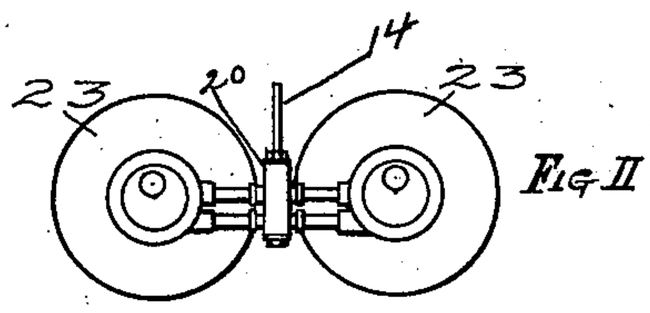

Fig II

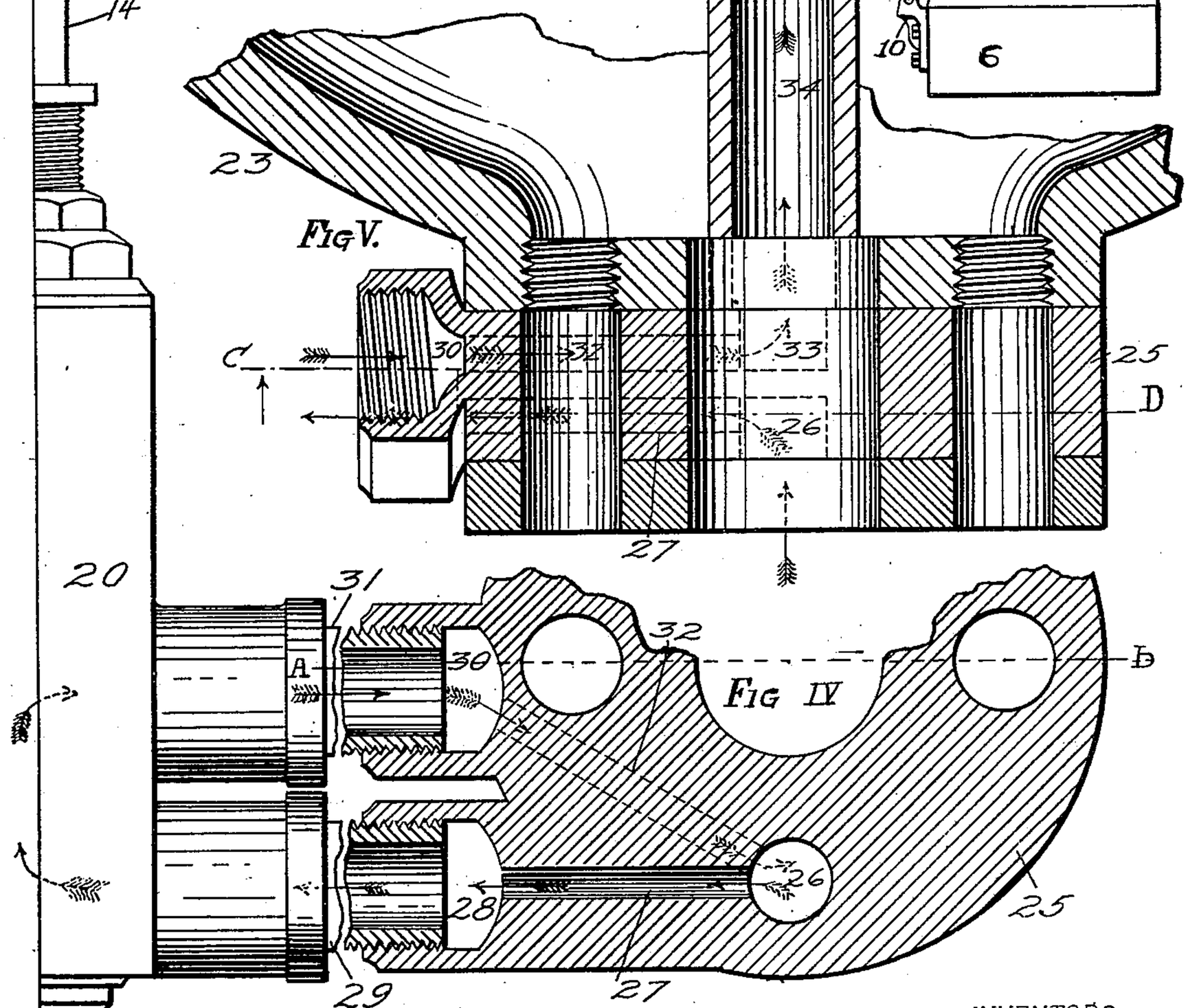

Fig V.

Fig IV

WITNESSES:
Dora B. Shick.
J. H. Bockenfeld

INVENTORS
John F. Mallinckrodt.
BY Wm. H. Sauvage
ATTORNEY.

No. 676,398. Patented June 11, 1901.

J. F. MALLINCKRODT & W. H. SAUVAGE.

AIR BRAKE MECHANISM.

(Application filed Sept. 21, 1900.)

(No Model.) 2 Sheets—Sheet 2.

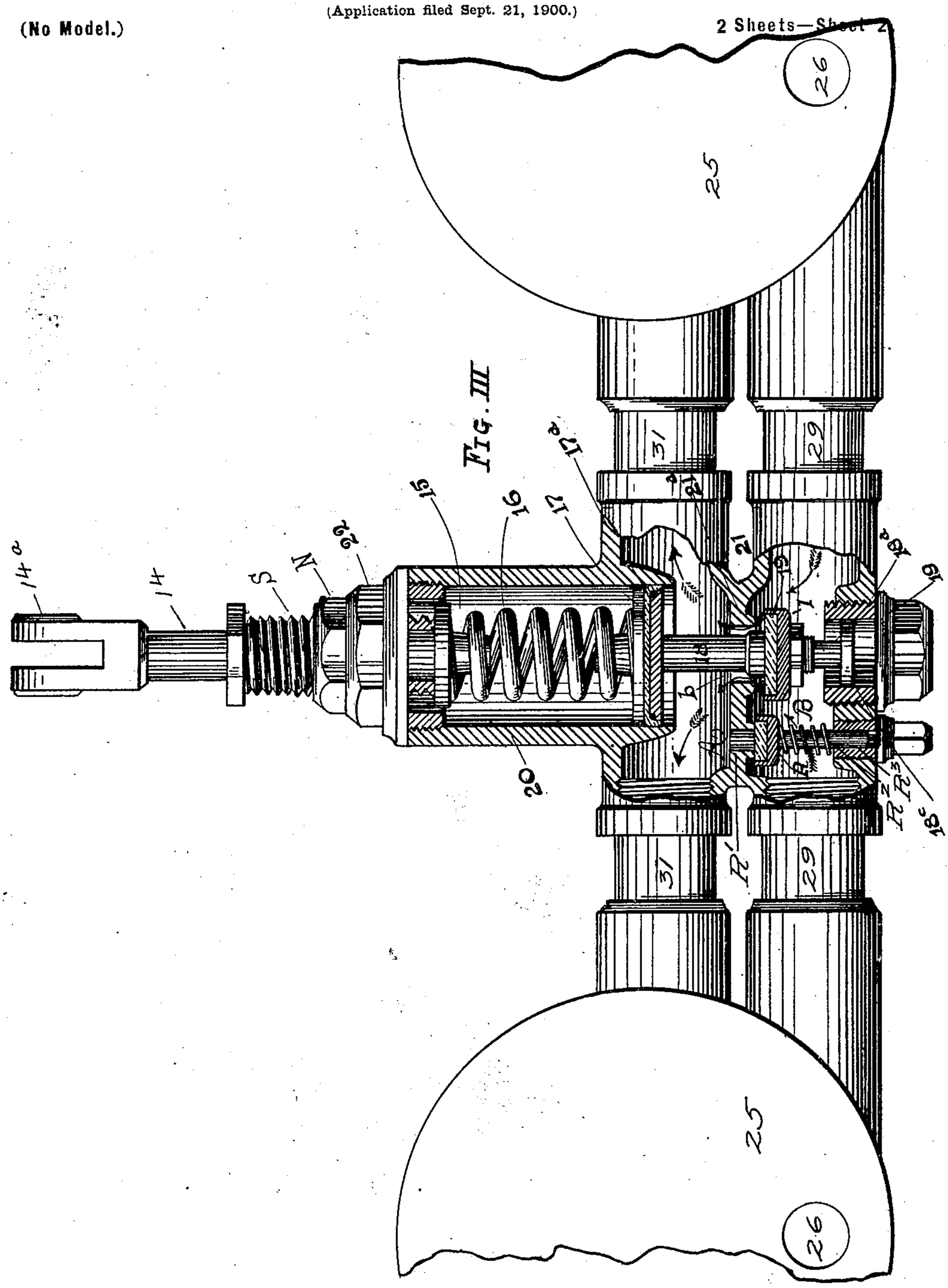

FIG. III

WITNESSES:
Dora C. Shick
J. H. Bockenfeld

INVENTORS
John F. Mallinckrodt.
BY Wm. H. Sauvage.
A. D. Neidig ATTORNEY.

UNITED STATES PATENT OFFICE.

JOHN F. MALLINCKRODT AND WILLIAM H. SAUVAGE, OF DENVER, COLORADO; SAID MALLINCKRODT ASSIGNOR OF HIS RIGHT AND SAID SAUVAGE ASSIGNOR OF PART OF HIS RIGHT TO CHARLES C. WELCH, OF SAME PLACE, AND THE SAUVAGE DUPLEX AIR BRAKE COMPANY.

AIR-BRAKE MECHANISM.

SPECIFICATION forming part of Letters Patent No. 676,398, dated June 11, 1901.

Application filed September 21, 1900. Serial No. 30,666. (No model.)

To all whom it may concern:

Be it known that we, JOHN F. MALLINCKRODT and WILLIAM H. SAUVAGE, citizens of the United States of America, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Air-Brake Mechanism; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

Our invention relates to improvements in air-brake mechanism; and its object is to automatically regulate the braking force to properly correspond with the weight of the loaded car. It is well known that a pressure in the brake-cylinder that will be sufficient for a loaded car will slide the wheels of the car when empty. Hence our improvement consists of means capable of positive adjustment to give a normal braking force suitable for an empty car and capable of automatic adjustment through the instrumentality of the weight of the load to give a braking force suitable for the loaded car and exactly proportionate to the weight of the load. This is accomplished by placing an auxiliary valve between the triple valve and the auxiliary reservoir, whereby the air must pass from the triple valve through a port controlled by the auxiliary valve on its way to the brake-cylinder, the arrangement being such that when the pressure in the brake-cylinder is proportionate to the weight of the load this pressure will act to close the valve and prevent a further increase of the pressure in the cylinder. As the pressure which holds the auxiliary valve open is directly proportionate to the weight of the load, the air-pressure in the brake-cylinder, which acts to close the valve automatically, must also be properly proportionate to the weight of the load.

Having briefly outlined our improved construction, we will proceed to describe the same in detail, reference being made to the accompanying drawings, in which is illustrated an embodiment of the invention.

In the drawings, Figure 1 is a fragmentary side elevation of a car equipped with our improvement. Fig. 2 is an end view of two cylinders connected by our auxiliary valve mechanism. Fig. 3 is a similar view, partly in section, showing the parts greatly enlarged, the valve being full size. Fig. 4 shows the auxiliary valve in elevation and the disk between the triple valve and the auxiliary reservoir in section. This is a section taken on the line C D, Fig. 5. Fig. 5 is a section taken on the line A B, Fig. 4.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate the spring-supported car-body, and 6 the sand-board, which is relatively stationary. Fulcrumed on a bracket 7, fast on the car-body, is a bell-crank lever 8, to one arm of which is connected a rod 9, whose lower extremity is attached to a bracket 10, fast on the sand-board. To the opposite arm of the lever 8 is connected one extremity of a rod 12, whose other extremity is connected with one arm of a bell-crank lever 13. The other arm of this lever is connected with the forked extremity 14^a of a stem 14, which passes through a plain or unthreaded opening formed in an exteriorly-threaded sleeve S. The lower extremity of this sleeve normally engages a collar 15, fast on the stem 14. This collar engages the upper extremity of a coil-spring 16, whose lower extremity bears upon a piston 17, fast on the stem 18 of a governor-valve I. The piston 17 fits closely within the casing 20 and is provided with a cup-leather 17^a, forming an air-tight joint between the piston and casing, the latter being preferably cylindrical and formed integral with a double-T-shaped casing 21, inclosing a chamber separated by a partition 21^a into two compartments A and B. In the partition 21^a is formed a port *b*, controlled by the valve I. This valve is provided with a lower stem portion 18^a, to which is attached a disk 18^c, arranged to move in a chamber formed in a

screw-plug 19, inserted in a threaded opening formed in the bottom of the valve-casing 21.

The upper extremity of the cylindrical casing 20 is closed by a screw-plug 22, provided with a threaded opening through which the sleeve S passes. The upper extremity of this sleeve is fashioned to receive a wrench for purposes of adjustment, while its lower extremity engages the collar 15 of the stem 14. By virtue of this construction it is evident that the normal tension of the spring 16 may be regulated at will by adjusting the screw-sleeve S. A lock-nut N engages the screw-sleeve S and is screwed down to engagement with the cap 22 when the sleeve S is properly adjusted.

Between each triple valve 23 and the adjacent extremity of its auxiliary reservoir 24 is secured a disk or plate 25, having an opening 26, which connects the triple valve with a passage 27, formed in the disk 25 and leading to a tapped opening 28, into which is screwed a pipe or conduit 29, connecting the opening 28 with the chamber B of the valve-casing. The chamber A of the valve-casing is connected with a tapped opening 30 of the disk by a pipe 31. From this opening 30 a passage 32 leads to an opening 33 in the head of the auxiliary reservoir communicating with the pipe 34, leading to the ordinary brake-cylinder. (Not shown.) When two auxiliary reservoirs and brake-cylinders are employed, the construction just described is duplicated. (See Fig. 3.)

With our improved construction the triple valve performs its ordinary function; but the air instead of going from the triple valve directly to the pipe 34 and thence to the brake-cylinder passes first through the port 26, the passage 27, the opening 28, the pipe 29, into the chamber B, thence through the port *b* to the chamber A, and thence by way of the pipe 31, the opening 30, and the passage 32 to the pipe 34 of the auxiliary reservoir.

The tension of the spring 16 will depend upon the weight of the load in the car, since as the car-body is forced downwardly, the lower extremity of the rod 9 being connected with a relatively stationary support, the bell-crank levers 8 and 13 will be actuated to force the stem 14 downwardly, and thus increase the tension of the spring beyond the normal when set for the empty car. It will therefore be readily understood that whether the car be empty or loaded the area of the piston 17 may be so arranged that when the pressure in the brake-cylinder is exactly proportionate to the weight of the load this pressure acting in the piston 17 will exert the necessary force to lift the piston and close the valve I.

A small valve R normally closes a port R′, formed in the partition 21ª. A spring R^2 surrounds the valve-stem R^3 and is of sufficient strength only to support the weight of the valve and hold it against its seat. This valve is utilized in releasing the brakes. When it is desired to release the brakes and the pressure is restored in the train-brake pipe, whereby the triple valve is operated to allow the air to pass again to the auxiliary reservoir, there is a reduction of pressure in the chamber B of the valve-casing 21, since this chamber communicates with the port of the triple valve through which the air ordinarily escapes from the brake-cylinder; but the air cannot escape directly from the brake-cylinder, since the valve I is closed. The air, however, escapes from the chamber B through the exhaust-port of the triple valve to the atmosphere, allowing the valve R to open, whereby the pressure is reduced in the chamber A. The action of the spring 16 then opens the valve I, allowing the air to escape freely from the brake-cylinder, releasing the brakes.

Having thus described our invention, what we claim is—

1. In a fluid-pressure brake system, the combination of a spring-held valve interposed between the pressure source and the brake-cylinder and in communication with both, said valve being normally open, means whereby the power of the spring to hold the valve open is increased as the gravity of the load increases, and means connected with the valve and in communication with the fluid in the brake-cylinder whereby the action of said fluid closes the valve and cuts off the fluid from the brake-cylinder, when the pressure therein becomes properly proportionate to the gravity of the load.

2. In an air-brake system the combination with air-brake mechanism, of a chamber separated by a partition into two compartments, one of which is in communication with the triple valve, and the other in communication with the brake-cylinder, the chamber-partition being provided with a port, a valve arranged to control said port, a spring normally holding said valve open, a connection between the spring and the body of the car whereby the tension of the spring is increased by the weight of the load, and means connected with the valve and arranged to utilize the fluid-pressure in the brake-cylinder to close the valve automatically when the pressure has become properly proportionate to the weight of the load.

3. In an air-brake system, the combination of a valve-chamber divided into two compartments communicating by a suitable port, one compartment being in connection with the triple valve and the other with the brake-cylinder, a valve arranged to control said port, a spring normally under tension to hold the valve open, a piston connected with the valve-stem and engaging one extremity of the spring, a stem provided with a collar engaging the other extremity of the spring, and arranged to be acted on by the car whereby the tension of the spring is increased as the weight of the load increases.

4. In an air-brake system, the combination with the brake mechanism, of a chamber divided into two compartments, one of which communicates with the triple valve and the other with the brake-cylinder, a branch chamber communicating with the chamber-compartment connected with the brake-cylinder, the partition between the two chamber-compartments being provided with a port, a valve arranged to control said port, a piston connected with the valve-stem, located in the branch chamber and exposed to the air in the brake-cylinder, a coil-spring located in the branch chamber and engaging said piston at one extremity, a stem provided with a shoulder engaging the opposite extremity of the spring, and means connected with the last-named stem whereby the tension of the spring is increased as the weight of the load increases.

5. In an air-brake system, the combination of a valve-chamber divided into two compartments communicating by a port, one of said compartments being in communication with the triple valve and the other with the brake-cylinder, a valve arranged to control said port and provided with a stem, a branch chamber communicating with the valve-chamber, a piston fast on the valve-stem and located in the said branch chamber, said piston being exposed to the air in the brake-cylinder, a spring mounted in the branch chamber and bearing against the piston at one extremity, a screw-sleeve inserted in the top of the branch chamber, a stem passing through said sleeve and provided with a shoulder engaging the opposite extremity of the spring, the screw-sleeve being also arranged to engage said shoulder for regulating the normal tension of the spring, and suitable means for connecting the last-named stem with the car-body whereby the normal tension of the spring increases with the weight of the load.

6. In an air-brake system, the combination of a chamber divided by a suitable partition into two compartments A and B communicating with each other by a port, the compartment A communicating with the brake-cylinder, and the compartment B with the triple valve, a valve arranged to control the said port, a branch chamber communicating with the chamber A, a stem connected with the valve and projecting into said chamber, a piston attached to the valve-stem and arranged to move in said branch chamber, a spring located in the branch chamber and engaging said piston, a stem provided with a shoulder engaging the extremity of the spring opposite the piston, a lever mounted on the car-body and having one arm connected with said stem, another lever mounted on the car-body, a rod whose extremities are respectively connected with one arm of each lever, and a rod connecting a relatively stationary part of the car with an arm of one of the levers, the arrangement being such that the tension of the spring in the branch chamber increases as the weight of the load increases.

7. In a fluid-pressure brake system, the combination of a chamber divided by a partition into two compartments A and B, communicating with each other by a port, the compartment A being in communication with the brake-cylinder, and the compartment B in communication with the triple valve, a valve arranged to control said port, means for normally holding the valve open, a connection between said means and the car-body whereby the opening pressure on the valve increases with the gravity of the load, means connected with the valve and exposed to the fluid-pressure in the brake-cylinder whereby the valve is closed when the pressure in said cylinder becomes properly proportionate to the gravity of the load, the partition between the two chamber-compartments being provided with an auxiliary port, and a valve normally closing said port but arranged to open when the fluid-pressure in the chamber B becomes less than that in the chamber A.

In testimony whereof we affix our signatures in presence of two witnesses.

JOHN F. MALLINCKRODT.
WILLIAM H. SAUVAGE.

Witnesses:
DORA C. SHICK,
MARY C. LAMB.