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W. T. HAMILTON.
AUTOMATIC CUT-OFF FOR AIR BRAKE APPARATUS.

(Application filed Apr. 1, 1898.)

(No Model.)

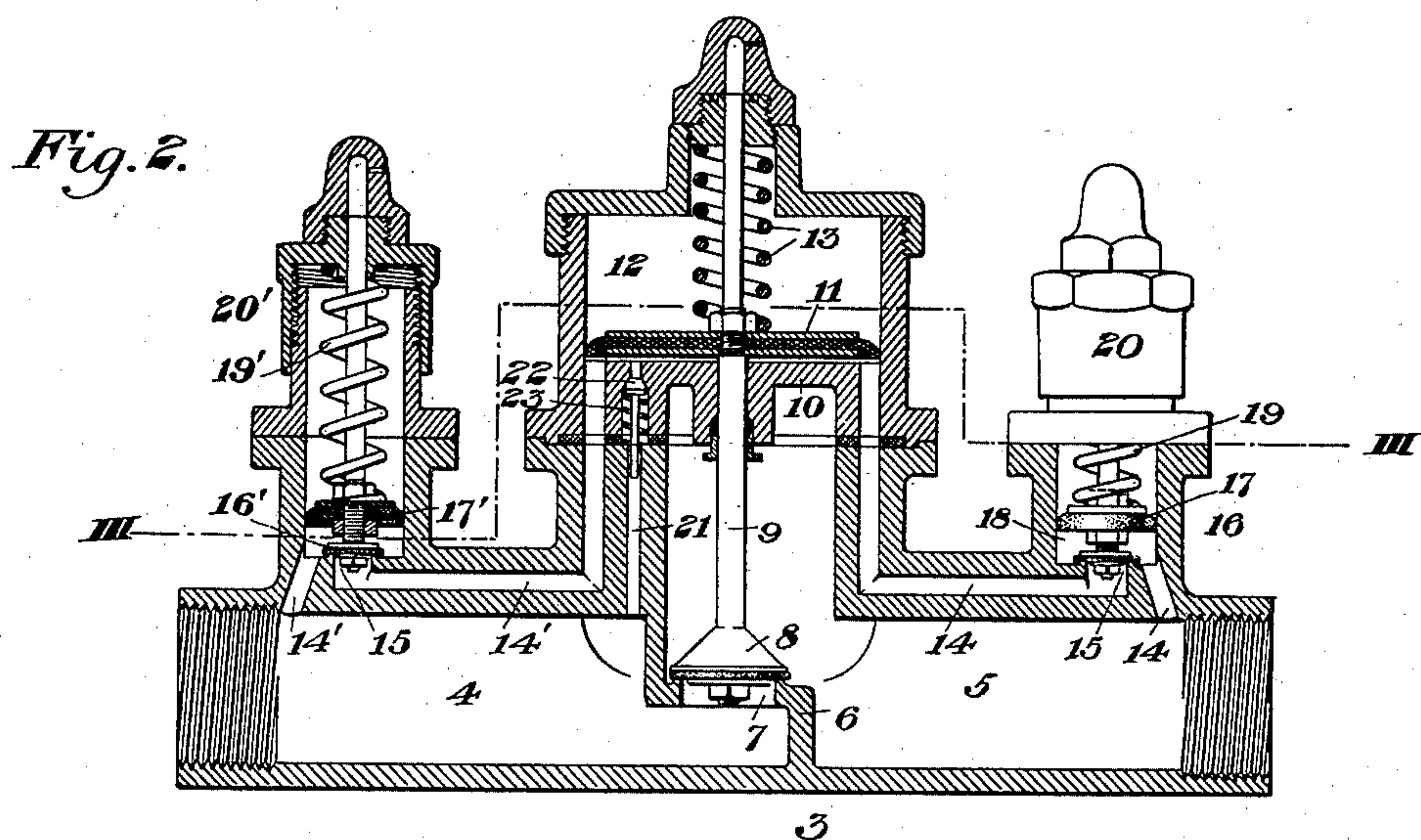
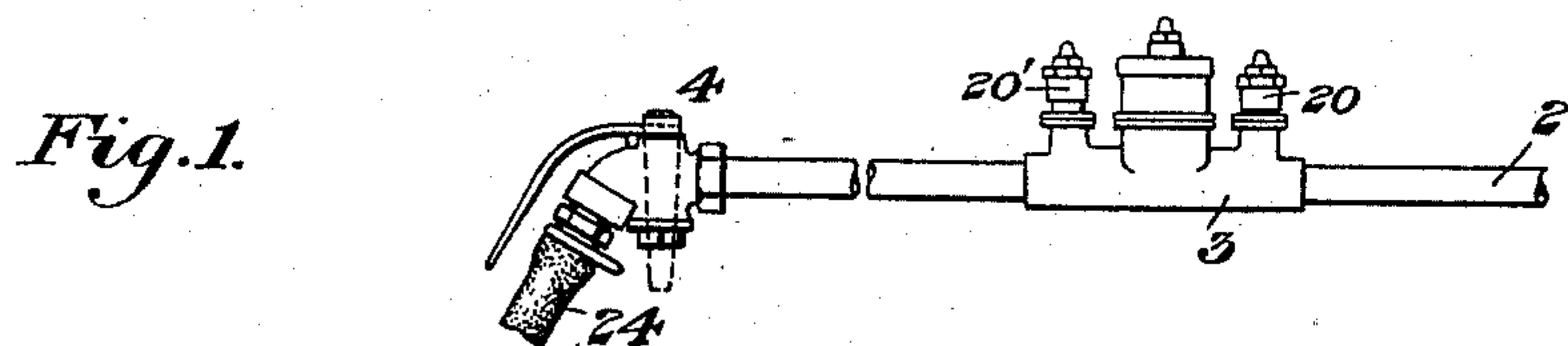
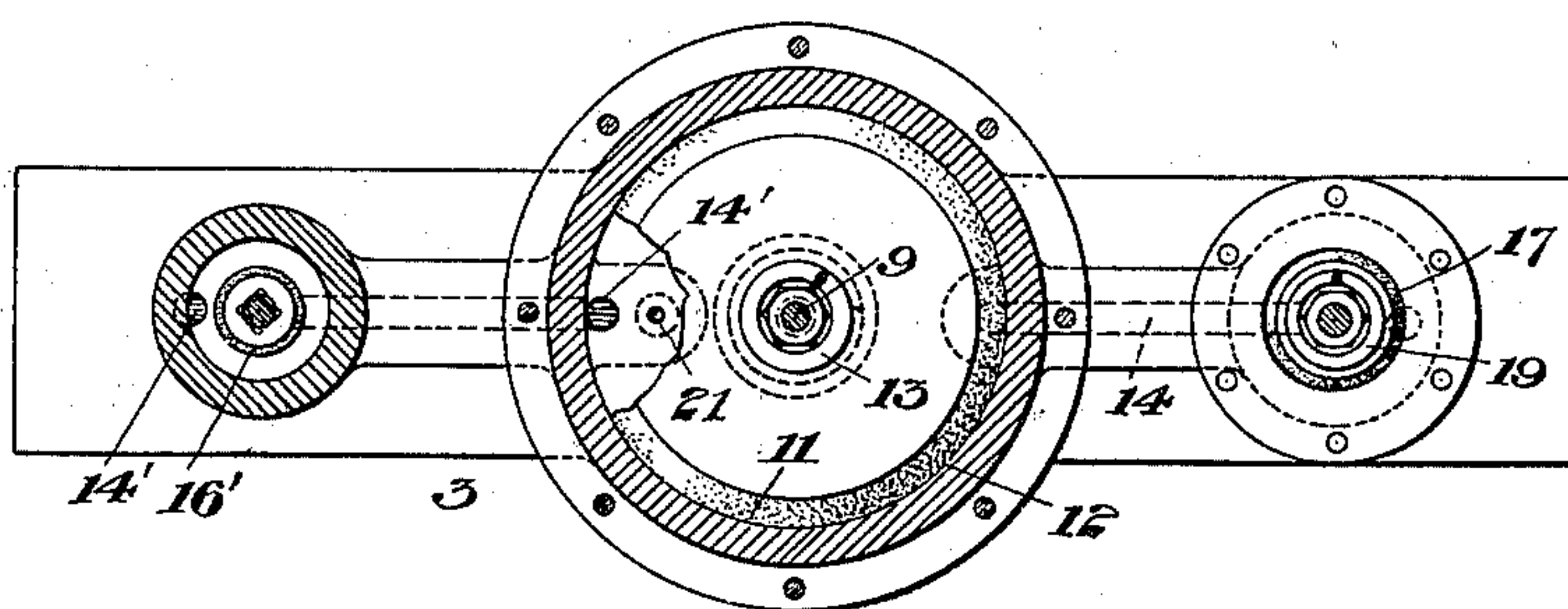


Fig. 3.



WITNESSES

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UNITED STATES PATENT OFFICE.

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AUTOMATIC CUT-OFF FOR AIR-BRAKE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 613,034, dated October 25, 1898.

Application filed April 1, 1898. Serial No. 676,082. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM T. HAMILTON, of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Automatic Cut-Offs for Air-Brake Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 shows in side view one of my improved devices applied to the train-pipe of an air-brake apparatus. Fig. 2 is a vertical section of the device on a larger scale, showing part of the device in elevation. Fig. 3 is a horizontal section on the line III III of Fig. 2.

The main objects of my invention are twofold—namely, first, to provide means whereby, upon the breaking of a train equipped with an automatic air-brake system or on the bursting of a hose thereon, the engineman may be able from the engine to release the air-brakes on the part of the train next to the engine without need of sending a man to close the angle-cock on the last car next to the place of separation of the train or bursting of the hose, as heretofore, and, second, to prevent the engineman from inadvertently, by repeatedly setting and releasing the brakes, reducing the air-pressure in the reservoirs to such extent as to be incapable of further setting the brakes.

The first object is important in preventing possibility of accidents, because when, for instance, a train equipped with air-brake apparatus of ordinary construction breaks in two the brakes on both parts of the train are immediately set automatically, and as the angle-cock at the rear end of the forward section is open the brakes cannot be released until that cock is closed by hand; but, and especially when such event occurs on a downgrade, the rear section of a train may by partial release of its brakes continue to advance and may collide with the front section, the engineman being unable to get it out of the way. When my improvement is applied to a train, it enables the engineman at once upon the breaking in two of the train to release the brakes, and thus to resume control of the train and to draw the front section, if necessary, forward out of the way of the pursuing rear sec-

tion. In like manner if the air-hose should burst within a few cars of the rear of the train, although such bursting would immediately set the brakes, my improvement, by enabling the engineman to release the brakes in the forward section of the train, will make it possible for him to draw the whole train forward, as may be necessary in order to escape a train which may be following in the rear.

The second object of my invention is also of importance, because it sometimes happens that in stopping a train or controlling its speed the engineman may repeatedly and at close intervals set and release the brakes, so that eventually and unexpectedly to him the air-pressure may be reduced to such an extent as to be no longer sufficient to set the brakes and stop the train. If this should happen on a downgrade, the train may get out of control of the engineman, and by running away may do serious damage before sufficient pressure can be restored by the air-pumps to put the train again under control. My improvement makes this impossible, for when the pressure of air in the reservoirs has been reduced below a predetermined safety-point it will automatically prevent the engineman after setting the brakes from releasing them until the pumps have restored sufficient air-pressure to the main reservoirs to enable the brakes to be set again after they have been released. My improvement is therefore a safety apparatus of very great value in the prevention of accident from this and like causes.

In the drawings, 2 represents the train-pipe of an air-brake system applied to a car. At each end of the car, in the train-pipe, is interposed one of my automatic valves 3 on the inner side of the angle-cock 4. I show in Fig. 1 only one of these valves. The valve at the other end of the car is similar in construction. Figs. 2 and 3 illustrate what I deem to be the best form of construction of this automatic valve.

4 and 5 represent a pipe or passage within the valve-casing, having an intermediate partition 6, provided with a valve-port 7. The part 4, which is next to the end of the car and to the angle-cock, I call the "outside" passage, and the part 5, next to the middle of

the car, I call the "inside" passage. The valve-port 7 is controlled by a valve 8, whose stem 9 passes through stuffing-boxes in a cap 10 and is connected with a piston or diaphragm 11, which is set in a chamber 12 and is inwardly actuated by a spring 13.

14 14 is a passage leading from the inside passage 5 to the chamber 12 under the diaphragm, and 15 is a valve-port in said passage controlled by valve 16, operated by a piston or diaphragm 17 in a chamber 18, with which the parts of the passage 14 communicate. A spring 19 tends to urge the valve 16 to its seat, and its pressure can be regulated by adjustment of a screw-cap 20. Connected with the outside passage 4 is a valve 16'; but as its ports, actuating-diaphragm, and spring and the matter of its connection with the under side of the diaphragm 11 are similar to the construction above described in connection with the valve 16 it is unnecessary to repeat the same, and I have indicated them on the drawings by the same reference-numerals, distinguishing them by the prime (') mark.

21 is a vent-passage which leads from the under side of the diaphragm 11 to the outside passage 4, and 22 is a valve in said passage which is normally seated toward the diaphragm 11 by a spring 23.

The manner in which the casing of the apparatus is preferably made in several parts and fitted together is sufficiently shown in the drawings without further description.

In adapting the apparatus for use in an air-brake system carrying ordinarily, say, seventy pounds pressure in the train-pipe and auxiliary reservoirs I adjust the spring of the valve 16 so that it will require, preferably, say, sixty pounds pressure on the under side of the diaphragm 17 to open said valve, and I adjust the springs of the valves 8 and 16' so that they will require, preferably, say, thirty pounds pressure on the under side of their diaphragms to open them and so they will close when the pressure is less than that degree.

In the normal operation of the air-brake system the air-pressure being exerted upon the diaphragm 17 will unseat the valve 16 and will admit the air through the passage 14 14 to the under side of the diaphragm 11, and acting upon the valve 22 it will unseat said valve and permit the air-pressure to pass through the passage 21 into the passage 4, and acting upon the diaphragm 17' it will unseat the valve 16', thus admitting pressure through the passage 14' 14'. The air-pressure from the passage 14 14 acting on the under side of the diaphragm 11 will raise it and will unseat the valve 8, opening the port 7, and said valve will remain unseated during the normal operation of the system. This action will take place on all the cars on the train, the angle-cock at the rear end of the train being of course closed. If now the train should break in two and should part the hose

24 at the left of the apparatus shown in the drawings, the reduction of pressure caused thereby in the train-pipe would immediately set the brakes in both sections of the train and all the valves 8 would immediately close. The main reservoir and air-pump on the engine would, however, instantly restore the pressure in the train-pipe, and when that pressure reached sixty pounds it would act upon the diaphragm 17 of each of the valve apparatus in that section of the train and would successively open all the valves 8 thereof except the one next to the end of the last car, which would remain closed because of the vent-passage 21 permitting the free escape of air from the chamber under the diaphragm 11 past the valve 22, and thus reducing the pressure in the train-pipe slightly below sixty pounds—that is, slightly below the pressure required to operate the valve 16. Such restoration of the pressure throughout the system would of course release the brakes. All the valves 16 throughout the train would then close; but each of the valves 16' except the last would remain open, because operated at a lower air-pressure than that required to open the valve 16, and would thus keep all the valves 8 open except the last of the train, because when the valve 16' is open the air from the train-pipe has free access to and can freely operate the actuating-diaphragm 11 of the main valve 8. The air-brake system would thus be in operative position throughout the section of the train coupled to the engine, and there would be sufficient air-pressure in the system to enable the engineman readily to control and set the brakes.

It will be seen that the operation of the apparatus as above described is entirely automatic and reliable and that it will not in any way interfere with the reduction of the pressure in ordinary service stops.

If, in controlling a train equipped with air-brake apparatus provided with my improvement, the engineman, by repeated setting and releasing of the brakes, should reduce the air-pressure in the train-pipe, and auxiliary and main reservoirs, to less than thirty pounds, or the pressure for which the valve 16' is set, the springs 19' will immediately close said valves, and the valve 16 having already been closed by the reduction of pressure below sixty pounds, all pressure will be cut off from the diaphragm 11, and the valve 8 will close, the valve 22 acting to prevent pressure from reaching the diaphragm through the vent-passage 21. Such closing of the valves 8 will occur throughout the train and will prevent the engineman from releasing the brakes until the air-pressure from the main reservoir into the pipe has been restored to more than sixty pounds, whereupon the brake will be released and the auxiliary reservoirs recharged. In the meantime the thirty pounds pressure in the brake-cylinders throughout the system will be quite adequate to keep the brakes set.

One of these automatic cut-off valves is

placed upon the tank of the engine or at some point between the tank and the first car. In this case the sixty-pound regulating-valve is next to the tank and cannot be raised until
 5 that amount of pressure has been stored up in the main reservoir. It is evident that this arrangement is necessary, as a break might occur between the first car and the engine, and if the engine were not provided with an
 10 automatic cut-off valve it would be impossible for the engineer to jump up and release the brakes and get away from the remainder of the train.

The apparatus thus operated is an effective
 15 safety device for the purpose above described.

It is evident that the adjustment of the different valves may be varied to suit different conditions of use and that within the principle of my invention as defined in the claims
 20 the apparatus may be modified in various ways.

I believe that I am the first to employ an automatic cut-off valve which will close on the reduction of the air-pressure below a certain point and the first also to employ such
 25 valve with controlled air-inlets to admit air for opening the same with mechanism adapted to open one inlet at a lower pressure than that at which the other will open, so that the
 30 valve when opened by pressure through the high-pressure inlet can be held open by pressure acting through the low-pressure inlet.

I claim—

1. In air-brake apparatus, a cut-off valve
 35 connected with the train-pipe, and means independent of said cut-off valve adapted automatically to open and close said valve on the variance of pressure beyond a certain point; substantially as described.

40 2. In air-brake apparatus, an automatic cut-off valve, connected with a train-pipe, means set to operate conjointly with and to control the movement of said automatic cut-off valve, said parts being held open by a predetermined
 45 pressure, any abnormal reduction in said pressure causing these parts to completely

close the train-pipe until the predetermined pressure is restored.

3. In air-brake apparatus, a cut-off valve connected with the train-pipe, and means set
 50 automatically to open said valve by a certain pressure in the train-pipe, and other means set to open the same by less pressure, whereby when the valve has been opened by the one it can be held open by the other; substan-
 55 tially as described.

4. In air-brake apparatus, a cut-off valve connected with the train-pipe, and adapted to be moved by the air-pressure and air-inlets adapted to admit air for moving the same,
 60 and mechanism controlling the inlets, one inlet being adapted to open at a lower pressure than that at which the other will open, whereby when the valve has been opened by pressure through the high-pressure inlet, it can be
 65 held open by pressure acting through the other inlet; substantially as described.

5. In air-brake apparatus, the combination with the train-pipe, of a cut-off valve at each end of the car, air-operated mechanism adapt-
 70 ed to move the cut-off valve, inlet-ports on the outside and inside of the cut-off valve respectively, and mechanism adapted to control said inlet-ports and to permit the passage of air therethrough at different pressures; sub-
 75 stantially as described.

6. In air-brake apparatus, the combination of a cut-off valve, its actuating-diaphragm, ports leading to said diaphragm from opposite
 80 sides of the cut-off valve, high and low pressure valves controlling said ports respectively, said valves having springs by which they may be adjusted to operate at certain pressures, and a vent-passage and valve; sub-
 85 stantially as described.

In testimony whereof I have hereunto set my hand.

WILLIAM T. HAMILTON.

Witnesses:

THOMAS W. BAKEWELL,
 GEORGE B. BLEMMING.