No. 694,328.

Patented Feb. 25, 1902.

C. A. SELEY.

AIR BRAKE.

(Application filed Aug. 9, 1901.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

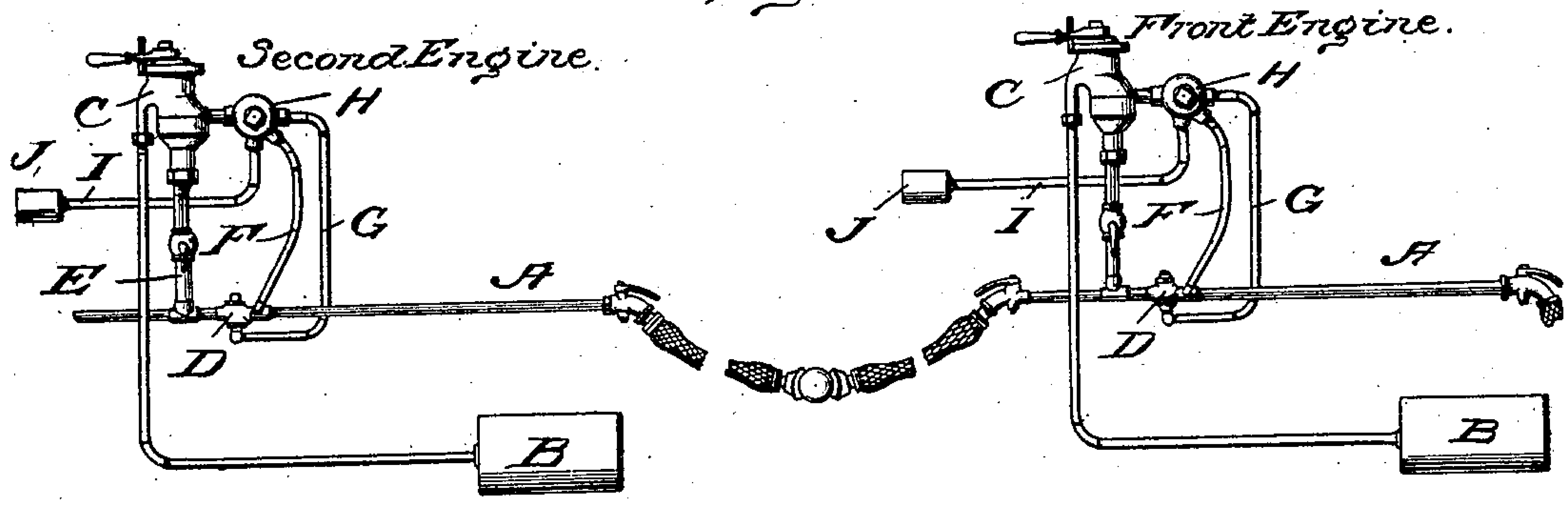
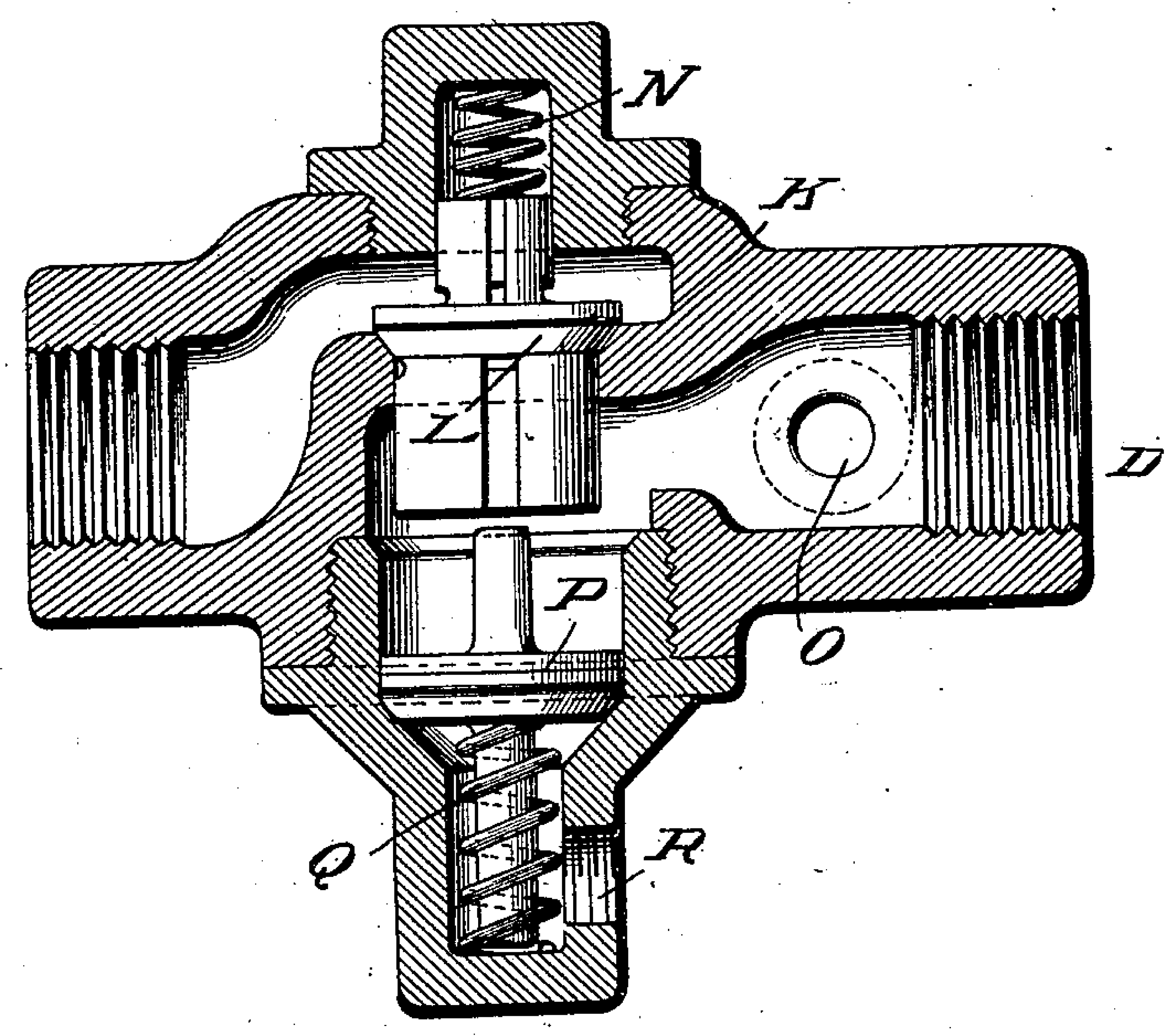


Fig. 2.



Witnesses

Jno. Miller.

Deniza Matthews

Inventor

Charles A. Seley

By Wm. C. McIntire

Attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 694,328. Patented Feb. 25, 1902.

C. A. SELEY.

AIR BRAKE.

(Application filed Aug. 9, 1901.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 3.

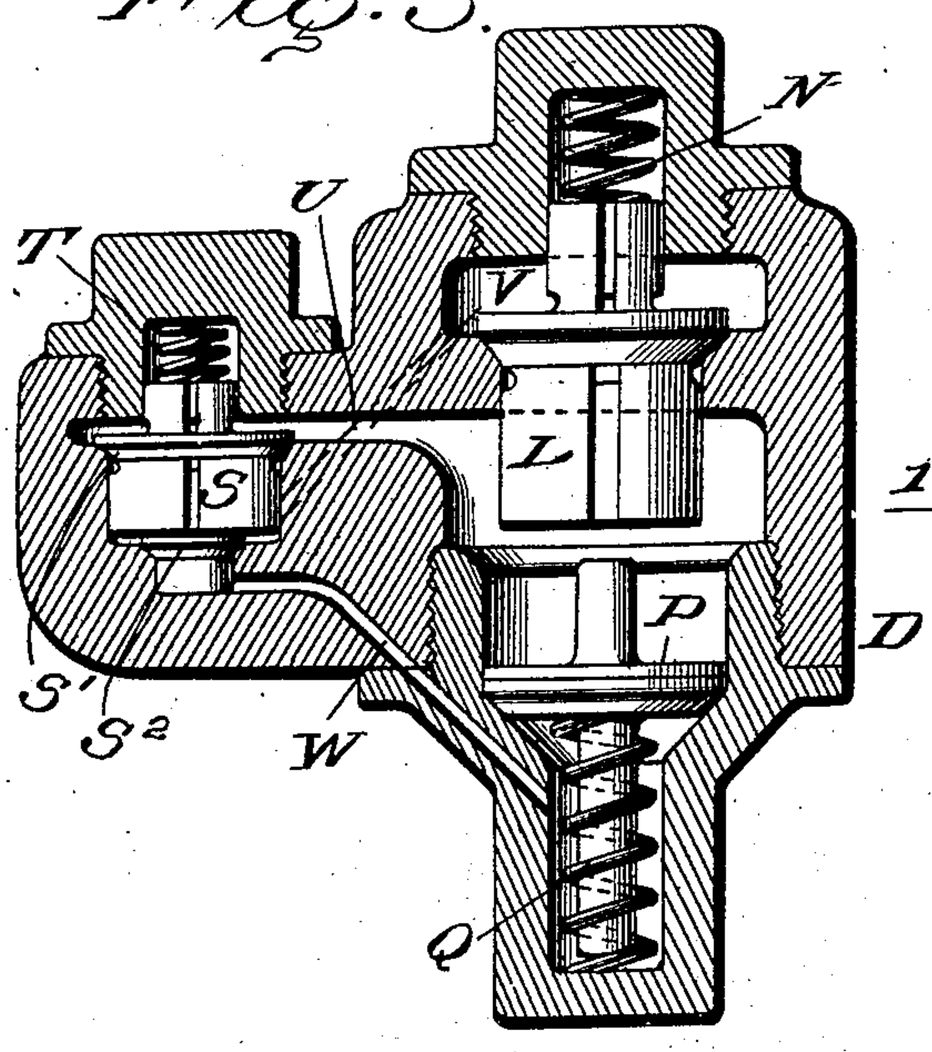


Fig. 4.

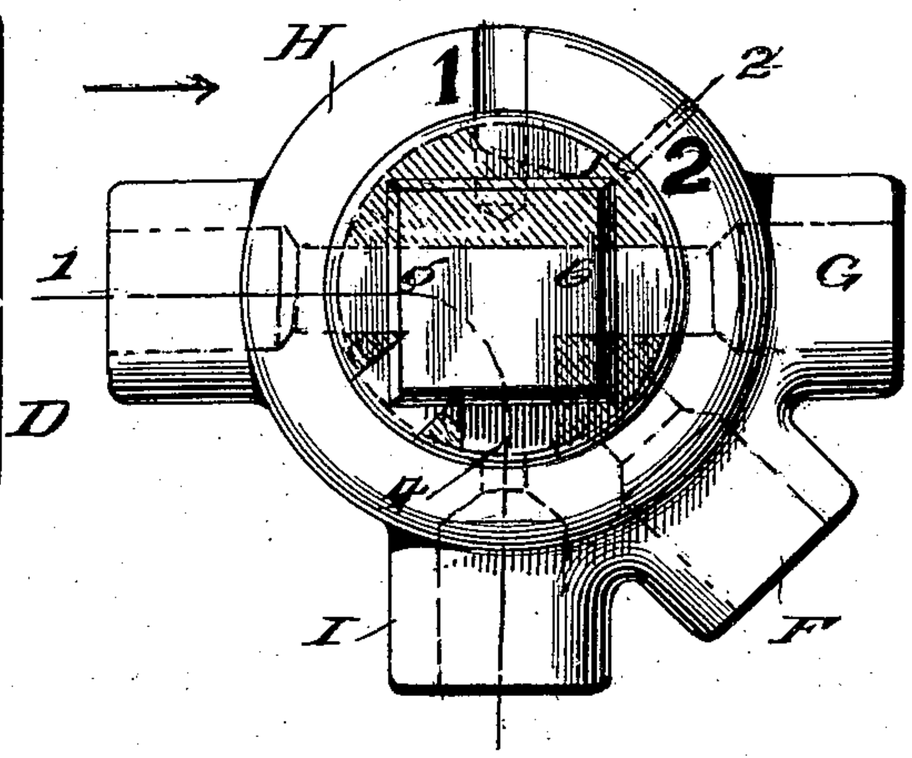


Fig. 6.

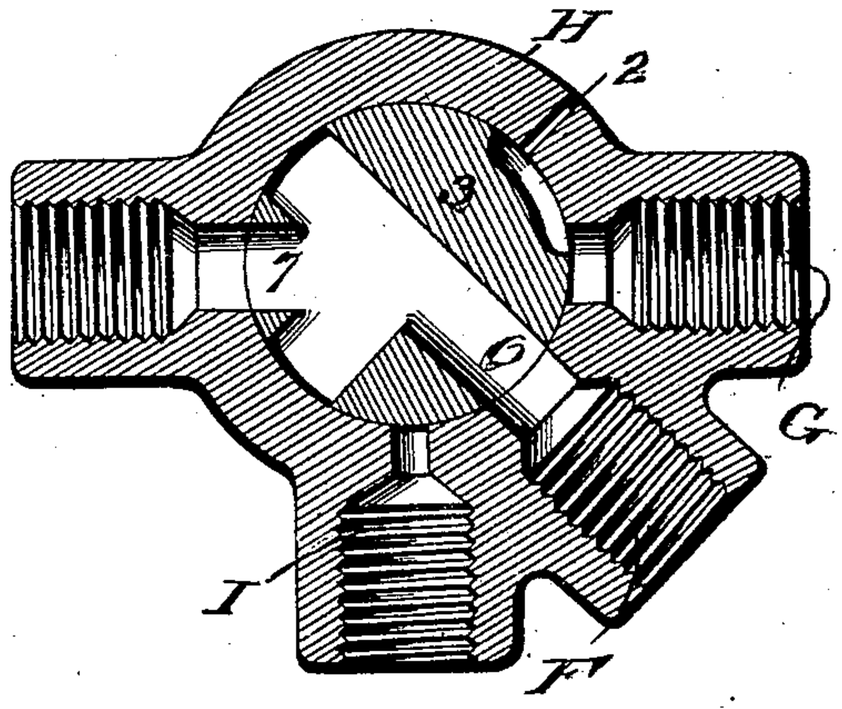
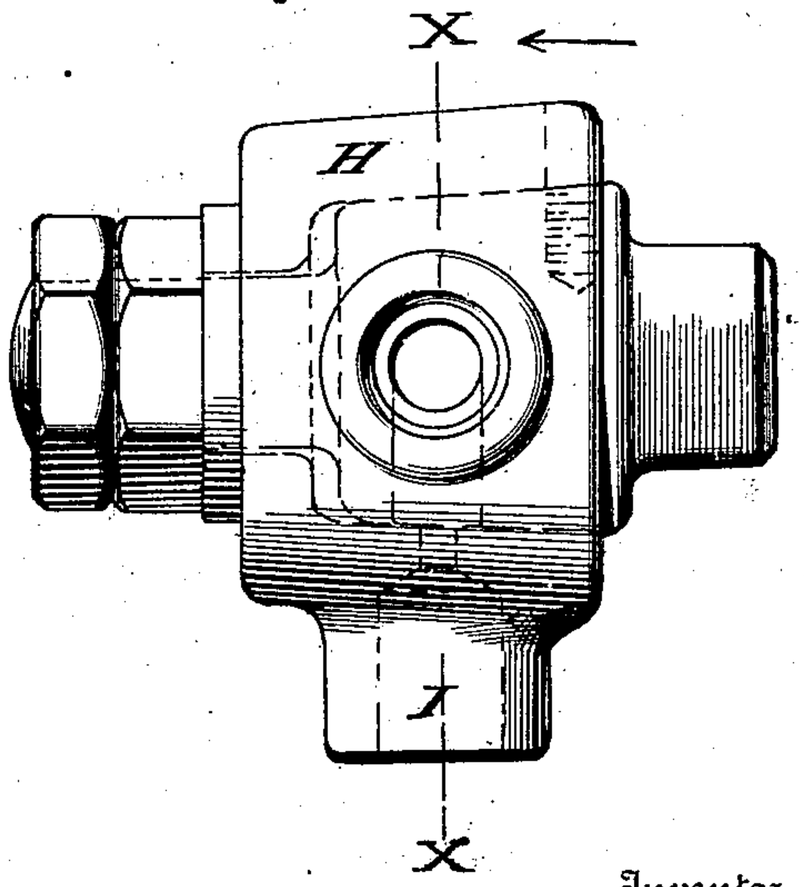


Fig. 5.



Witnesses
Jno. Shiris.
Deniza Matthews.

Inventor
Charles A. Seley
By Wm. C. Linthicum
Attorney

UNITED STATES PATENT OFFICE.

CHARLES A. SELEY, OF ROANOKE, VIRGINIA, ASSIGNOR OF ONE-HALF TO WILLIAM H. LEWIS, OF ROANOKE, VIRGINIA.

AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 694,328, dated February 25, 1902.

Application filed August 9, 1901. Serial No. 71,469. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. SELEY, a citizen of the United States, residing at Roanoke, in the county of Roanoke and State of Virginia, have invented certain new and useful Improvements in Air-Brakes; and I do hereby 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.

My invention relates to certain new and useful improvements in air-brake systems for locomotives, and has for its object to so construct the same that the air-pumps and main reservoirs of engines can be utilized when two or more engines are coupled in handling a train.

Ordinarily and when two or more engines are employed in handling a train the air-pumps and main reservoir of the leading engine only are used, the brake-valves of the following engines being cut out, because the feed of air from the valves of the following engines would interfere with the proper action of the brakes on the train unless the engineers in charge of the following engines should put the handles of their valves on "lap" or in cut-out position and stop the feed from their valves when the brakes are applied from the leading engine. Uncertainty of action results under these conditions, and the necessity for absolute certainty of action in air-brake service requires the cutting out of the brake-valves of the following engines, and accordingly under the present ordinary system the labor of pumping air for the entire train is thrown upon the leading engine.

By the employment of the devices and connections constituting the subject-matter of my invention the operation of applying the brakes and at the same time utilizing the pumps and main reservoirs of all the engines is accomplished; and with these ends in view my invention consists in the construction and arrangement hereinafter more fully described, by means of which the brake application is made on a leading engine in the usual manner by making a reduction in the train-pipe pressure, which reduction in pressure does not act immediately upon the air in the train-pipe of the train, but is by the use of my improved devices brought to act upon the equalizing piston-valve of the brake-valve of the following or second engine in the same manner as if the reduction had been made from the equalizing-reservoir of said second engine, and thus causing a corresponding reduction to be made in the train-pipe of the train and applying the brakes in the usual manner, and the discharge of the train-pipe air is made from the exhaust-port of the brake-valve of the second engine. If more than two engines are used, the reduction on the second engine will act on the third, and so on to the train. In case of an emergency application being made on the head engine the device will automatically open a valve which is ordinarily closed during service applications and permit the flow of air forward to the emergency discharge-port of the engineer's valve of the leading engine, while at the same time there is a heavy discharge from the service discharge-port of the second and following engines, the total amount of these openings facilitating free discharge of the air-pressure and consequent quick action of the train-brakes.

In order that those skilled in the art to which my invention appertains may know how to make and use my invention, I will proceed to describe the construction and operation of the same, referring by letters to the accompanying drawings, in which—

Figure 1 shows in side elevation the devices and connections applied and shown in relation to the brake apparatus of a pair of coupled engines. Fig. 2 is a vertical longitudinal section of what we denominate the "train-pipe check-valve." Fig. 3 is a vertical cross-section of Fig. 2 and showing also a supplementary emergency-application valve which does not appear in Fig. 2. Fig. 4 is a side elevation of the controlling-cock employed in connection with the engineer's valve, the valve-plug and the ports or passages to the pipe connections being shown in section and dotted lines. Fig. 5 is a side elevation of the same looking in the direction of the arrow at

Fig. 4. Fig. 6 is a vertical section taken on the line $x\,x$ of Fig. 5 and looking in the direction of the arrow at said figure.

Similar letters of reference indicate like parts in the several figures.

Referring to Fig. 1, the devices shown to the right of a central vertical line represent the connections on the front or leading engine and those on the left those of the second or following engine. A is the train-pipe of the engines, connected by hose and couplings between the engine and to the train-pipe of the train. Both engines are shown as equipped alike and as follows: In addition to the train-pipe A, main reservoir B, engineer's brake-valve C, and their usual connections I have added the train-pipe check-valve D (see Figs. 1 and 2) in the train-pipe just in advance of the connecting-pipe E to the engineer's brake-valve. Two pipes F G connect with this check-valve and also with a cock H near the engineer's brake-valve, and a third pipe I connects the cock H with the engineer's equalizing-drum J. The construction and operation of the cock H is as follows: The body has screw-threaded passages for connection to the engineer's brake-valve at 1, for connection to the equalizer-drum J at I, for connection to the train-pipe check-valve at F and G, and is formed with a vent-port 2. The plug 3 of the cock H is adapted to be used in two positions, (indicated by the block-numerals 1 and 2,) and its ports or passages when used on a leading engine are arranged as shown in dotted lines and in section at Fig. 4, which arrangement will be referred to as position "1." In this position the equalizing-drum J is cut into communication by way of pipe I, ports 4 and 5, and thence by the usual passages into the equalizing piston-valve chamber of the engineer's valve, permitting the air-pressure to flow to and from the equalizing-drum in the usual and customary manner in ordinary brake service. At the same time the air-pressure passes through port 6, pipe G, and port R to the under side of piston P in the train-pipe check-valve D, and this pressure, together with spring Q, will raise piston P, which in turn will raise valve L and hold it open for the free passage of air-pressure through the train-pipe check-valve D. Thus it will be seen that the function of the cock H, with its ports arranged in the position called "1," permits the usual and customary manner of operating air-brakes by permitting the air-pressure in the equalizer-drum to perform its usual functions and also to cause the train-pipe check-valve to remain open, permitting the flow of air-pressure through it in either direction of the train-pipe. In this position the vent-opening 2 is closed and inoperative. The plug 3 of cock H on a second or following engine, when two or more engines are hauling a train, should be put in what may be called position "2," and the arrangement of the plug-ports for this position is as shown in Fig. 6. It will be seen that the communication is established between the engineer's brake-valve and the train-pipe check-valve through ports 7 and 6, pipe F, and port O into the train-pipe check-valve, permitting flow of air-pressure from the train-pipe ahead of the train-pipe check-valve through and into the equalizing piston-chamber of the engineer's brake-valve. This position of the plug of the cock H also shuts off air-pressure from the engineer's valve to the pipe G and establishes atmospheric pressure only from the under side of piston P in train-pipe check-valve D through pipe R, pipe G, groove in plug 3, and vent-hole 2. The purpose of this is hereafter more fully explained. The purpose of arrangement in position 2, as shown in Fig. 6, is to cut out the equalizer-drum and cut in the train-pipe forward of the train-pipe check-valve, making it, in effect, the equalizing-reservoir for that engine, and this is further accomplished by the seating of the valve L, thus preventing flow of air forward through the train-pipe check-valve into the reservoir. The discharge of air on the head or leading engine is slight on making a brake application, being only that from the train-pipe between the two check-valves D of the two engines; but the discharge of the air from the train-pipe of the train is from the valve on the second engine. This feature or function affords a definite, distinctive, and unfailing signal to the engineer of the second engine that the engineer on the leading engine has made a brake application and that he is required to coöperate in handling the brakes, both by placing his brake-valve handle on lap, thus cutting off the feed from his valve during the time the brakes are applied, and also to assist in releasing the brakes at the proper time and recharging the train-pipe, as the necessities of the situation may require. The engineer on the second engine by placing his valve on the lap when he hears the sound of the air being discharged at his brake-valve will save the waste of air that would otherwise come from his feed-port and make a continuous blow-out of the exhaust-port after the train-pipe pressure had equalized, and by his assistance in releasing the brakes and recharging the train-pipe the work of pumping air is shared with the leading engine, brakes are released quicker, and the wear and tear of the equipment is lessened and equally distributed.

At Fig. 2 the interior of the train-pipe check-valve D is clearly illustrated, showing the case or body K, valve L, arranged to seat and cut off flow of air forward when a reduction of pressure has been made on the leading engine, but permitting the flow of air rearward when the excess of pressure due to releasing or feeding is from the leading engine. This valve is slightly loaded by a slight spring N in order that it may be steadied under the vibrations of engine movement

and to quickly respond to a reduction of pressure by seating. The port or opening at O is for connection with the pipe F for the purpose heretofore explained. Below the check-valve L is a piston P, the purpose of which is as follows: If an engine was equipped with the devices and connections already described and an air connection was needed at the front end of the engine, it is obvious that the train-pipe check-valve D would not permit the flow of air-pressure forward through the train-pipe and that a by-pass pipe or a device to hold the check-valve open when desired would be necessary. The function of the piston P and the spring Q is to hold the valve L up from its seat, and to thereby give free communication through when desired, the action being as follows: The upper surface of the piston is exposed to train-pipe pressure, which tends to push it down to the bottom of its chamber. The lower surface is normally under atmospheric pressure only, because unless it is desired to hold the check-valve open all pressure on the lower side of the piston is allowed to escape by way of the opening R into pipe G and cock H to the atmosphere by way of the groove in plug 3 and vent-hole 2. This being the case, the piston P is held down by the pressure above it, compressing the spring Q and permitting the check-valve L to seat. If it should be desired to raise the check-valve for passage of air-pressure through the valve, the cock H is turned to establish communication through the pipe G with the under side of the piston P, equalizing the pressure below and above it, releasing spring Q, which will then raise it, and the stem of said piston will then raise and hold open the valve L, thus permitting a free passage of air forward. The practical advantage of this part of the device or of a by-pass in connection with the check-valve will be found when occasion requires the backing up and pulling of an engine, or in case of the failure from any cause of the brake apparatus of the leading engine when the pipe forward can operate the brakes of the forward engine, all of the brakes then being handled from the second engine.

The description of the construction and operation thus far given relates to the operation of the valve in ordinary service braking and during which times the supplementary valve, which is shown at Fig. 3, remains passive, but in emergency conditions said valve is brought into action, and I will now proceed to describe the same.

The valve S has a double seat, one above at S′ and one below at S^2 and is held to its seats and steadied by the coil-spring T, which for said purpose is put under slight compression when located. With this construction air-pressure from the train-pipe ahead of the train-pipe check-valve D is admitted above the valve S through the horizontal channel or port U, and air-pressure from the train-pipe back of the train-pipe check-valve D is admitted through the channel or port V to the chamber containing the valve S, but between the seats S′ S^2. The relative areas of the top of the valve S, which is exposed to the downward pressure of the air admitted through the channel or port U, and the bottom, which is exposed to the upward pressure exerted by the air admitted through the channel or port V, are such that any ordinary service application will not sufficiently unload the top of the valve to permit the pressure against the under side to raise said valve. If, however, an emergency application is made on the leading engine, the train-pipe will be immediately emptied as far back as the check-valve D of the following engine and by means of the port or connection F to the equalizing-chamber and piston of the engineer's valve, causing movement of the piston and a heavy discharge at the exhaust-opening. At the same time, however, the reduction of the train-pipe pressure acts through the channel or port U, relieving the air-pressure from the top of valve S. The pressure against the under side of said valve through the channel or port V will then raise said valve and establishing communication between channel or port V and the oblique channel or port W and with the chamber under the piston P. As heretofore explained the piston P is held down to the bottom of its chamber by the air-pressure above it, coming from the train-pipe ahead of the check-valve D; but under the emergency application this air-pressure is taken off and the pressure from the train-pipe back of the check-valve D now passes by the ports V and W to the under side of the piston P, forcing it up sufficiently to in turn raise the valve L fully open, whereupon the flow of air-pressure passes forward from the train-pipe of the train through the valve D and the train-pipe ahead to the emergency exhaust-port of the engineer's valve of the leading engine. The free passage thus made for the flow of air permits the quick reduction necessary for quick action of the train-brakes in an emergency, in which action the engineer on the second engine may assist by putting his valve in the emergency position if aware of danger. In any event he will be duly warned by the discharge of air from the exhaust-port of his valve of a brake application and can then at least place his valve on lap. When the train-pipe pressure has been fully exhausted, as by an emergency application, it will be obvious that the spring T will again seat the valve S, and when the train-pipe is again recharged the piston P will be pushed down by the air-pressure above it, spring N will seat valve L, and the entire apparatus will be restored to normal conditions for use in the usual manner.

Having described the construction and operation of my improvements, what I claim as new, and desire to secure by Letters Patent, is—

1. In an air-brake system, the combina-

tion, with the train-pipe and engineer's brake-valve, of a check-valve, placed in the train-pipe at a point in advance of the connection between the train-pipe and the engineer's brake-valve, said check-valve provided with a pipe connection by which air-pressure can pass from the train-pipe ahead of the check-valve, to the equalizing-chamber of the engineer's brake-valve, substantially as described.

2. In an air-brake system, means for cutting out of the equalizing-drum pressure from the equalizing-chamber and valve of the engineer's brake-valve, and the substitution therefor of the pressure in the train-pipe ahead of a check-valve, so placed as to prevent flow or air-pressure forward through the check-valve, said pressure to flow through suitable connections from the train-pipe ahead of the check-valve to the equalizing-chamber of the engineer brake-valve, substantially as and for the purpose described.

3. In an air-brake system, the combination with the train-pipe and engineer's valve of a check-valve placed in the train-pipe at a point in advance of the connection between the train-pipe and the engineer's brake-valve, said check-valve so arranged as to prevent flow of air-pressure forward, except when held open by the action of a spring, said spring to be compressed or released by action of a piston operated by air-pressure from below by means of a cock in a pipe connecting the cavity under the piston with the engineer's brake-valve at a suitable point, substantially as and for the purpose described.

4. In an air-brake system, the combination with the train-pipe and engineer's valve, of a train-pipe check-valve, placed in the train-pipe at a point ahead of the connection of the train-pipe to the engineer's valve, said check-valve being provided with a supplementary valve with a double seat, and with ports for the passage of air-pressure, substantially as and for the purpose described.

5. In an air-brake system, the combination with the train-pipe and engineer's valve, of a train-pipe check-valve located in the train-pipe at a point in advance of the connection of the train-pipe with the engineer's valve, said check-valve having a pipe connection with a controlling-cock; a pipe connecting the chamber under the spring-piston of the train-pipe check-valve with the controlling-cock; a pipe connecting the equalizing-drum with the controlling-cock and a connection between the controlling-cock and the engineer's brake-valve leading into the equalizing-piston-valve chamber, substantially as and for the purpose described.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES A. SELEY.

Witnesses:

LAWRENCE S. DAVIS,

JNO. SAUNDERS.