(No Model.) 4 Sheets—Sheet 1.

R. H. SOULE.

CAR HEATING APPARATUS.

No. 421,774. Patented Feb. 18, 1890.

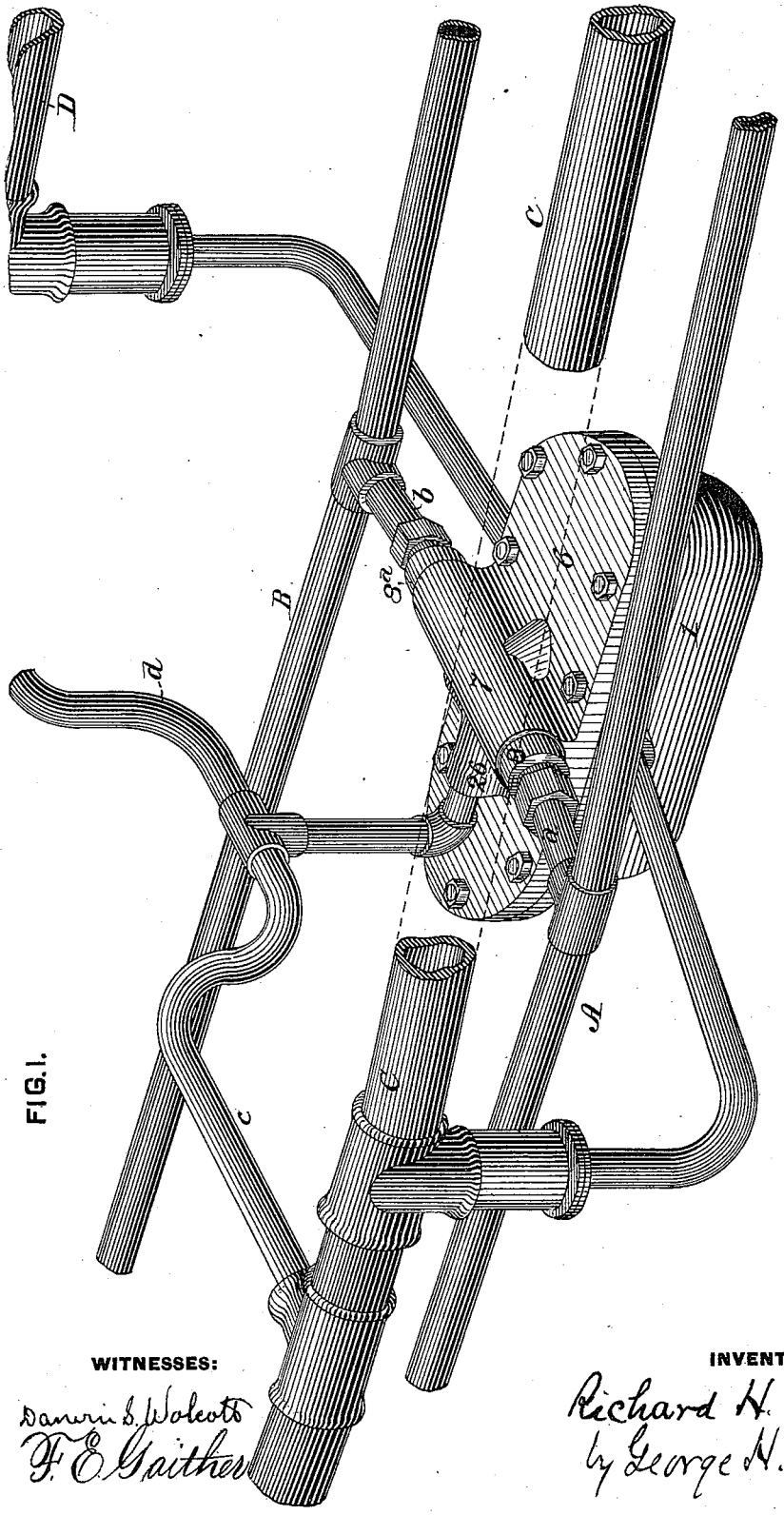

FIG. 1.

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FIG. 2.

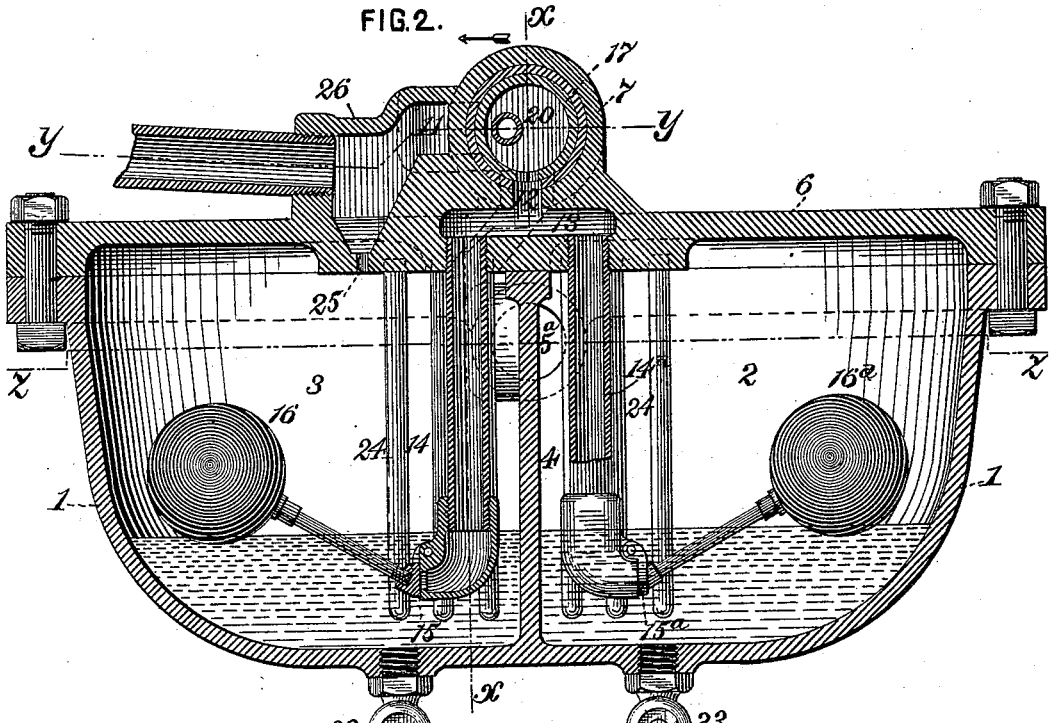

FIG. 3.

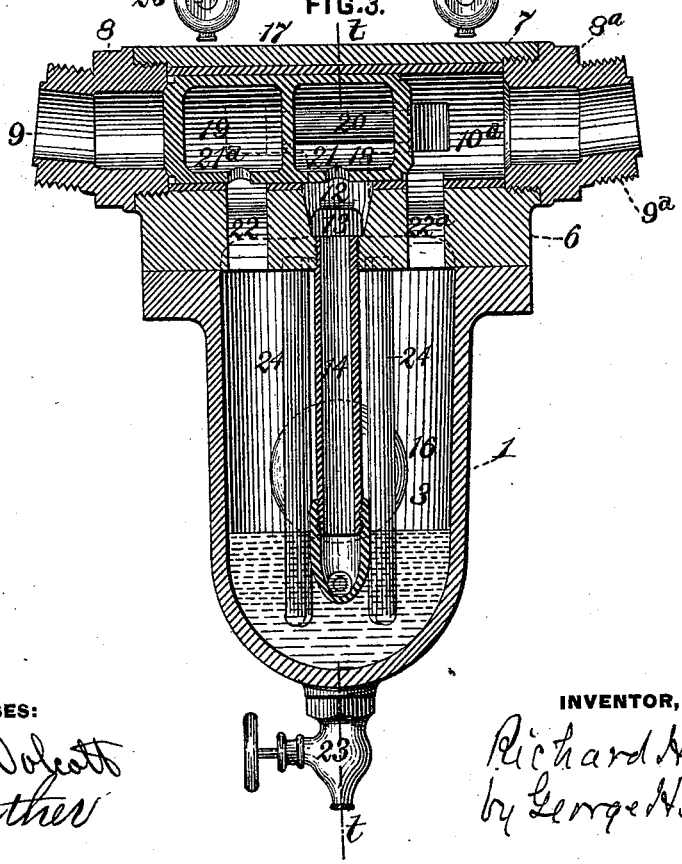

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FIG.4.

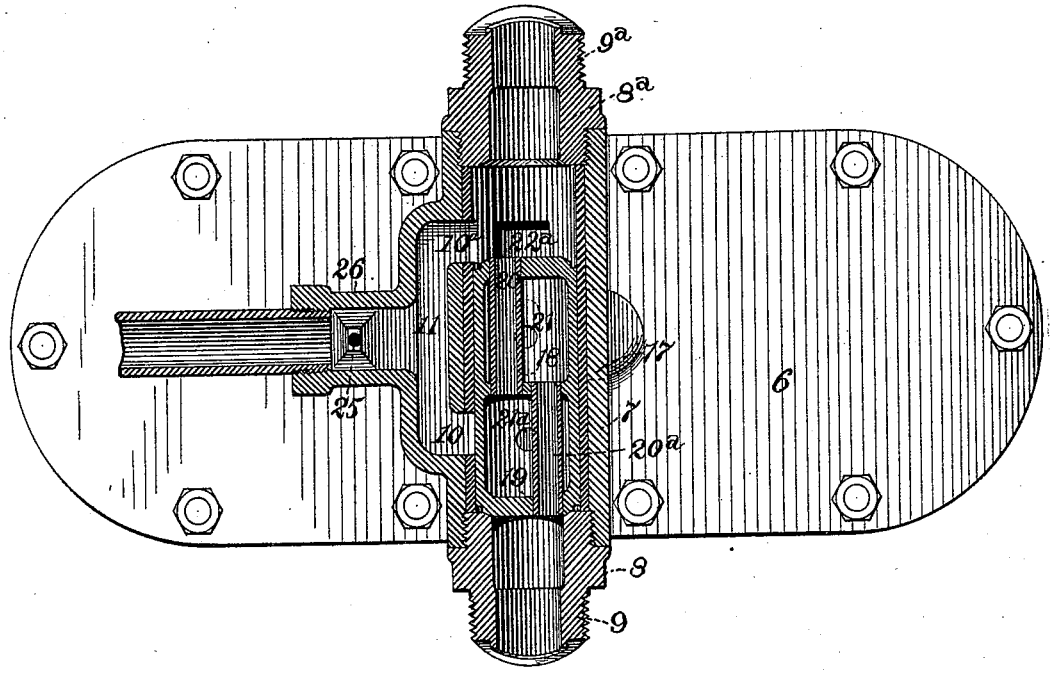

FIG.5.

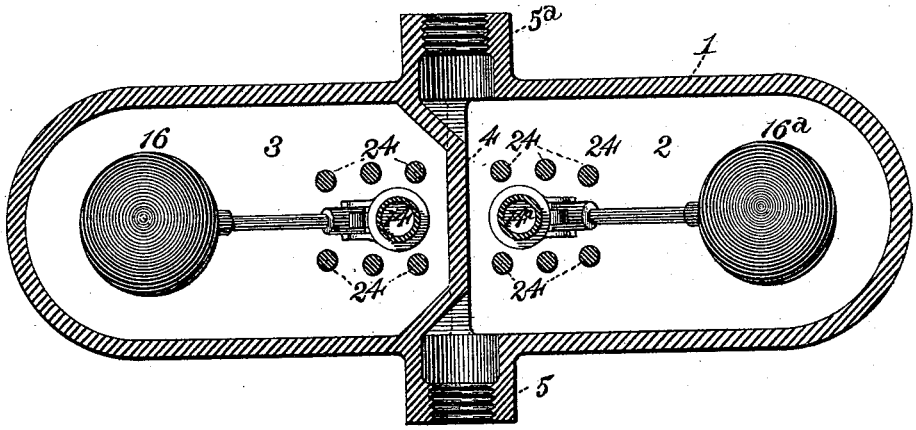

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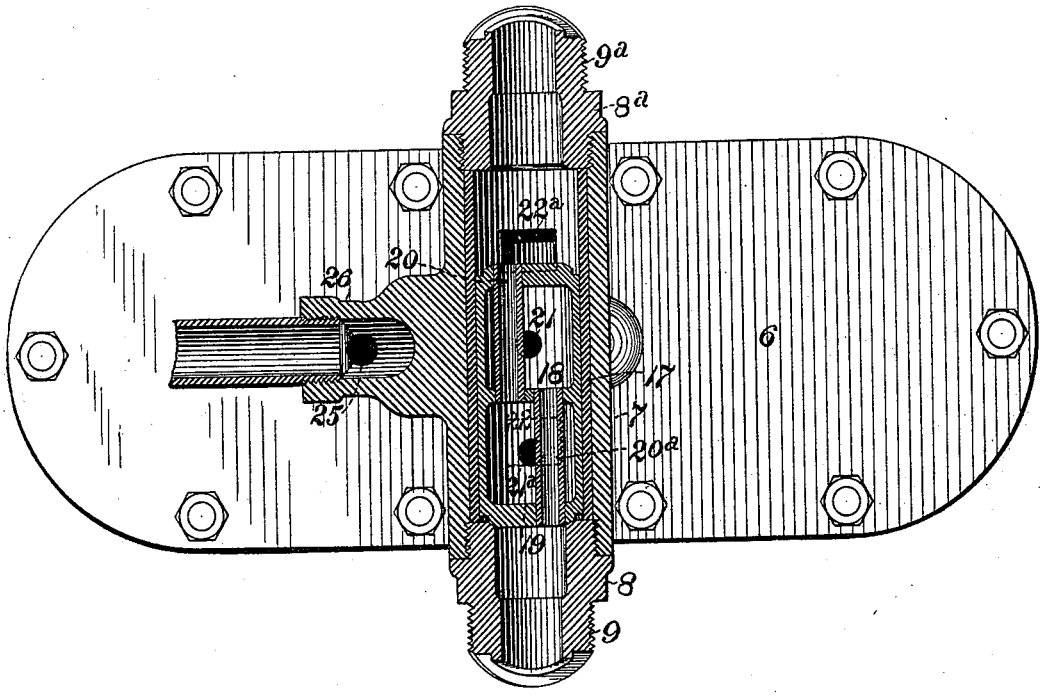
FIG. 6.



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UNITED STATES PATENT OFFICE.

RICHARD H. SOULE, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO THE STANDARD CAR HEATING AND VENTILATING COMPANY, OF SAME PLACE.

CAR-HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 421,774, dated February 18, 1890.

Application filed April 15, 1889. Serial No. 307,341. (No model.)

To all whom it may concern:

Be it known that I, RICHARD H. SOULE, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Car-Heating Apparatus, of which improvements the following is a specification.

The invention described herein relates to certain improvements in that class of car-heating apparatus described and claimed in an application, Serial No. 278,958, filed July 3, 1888, by George Westinghouse, Jr., and known as the continuous car-heating system. In the system or apparatus described and shown in said application ample provision is made for draining off the water of condensation from the radiators and connections of each car, and the return of such condensation to the engine or other source of steam; but no provision is made for the removal of the water of condensation which may be formed in the steam-supply pipe, except by forcing the same through the radiators in the car.

The object of this invention is to provide for the removal of the water of condensation from the steam-supply at each car without forcing the same through the radiators, thereby avoiding the employment of the high steam-pressures heretofore necessary in order to lift the water of condensation through the radiating system, such movement or removal of the water of condensation being necessary in order that the steam may be supplied equally to each car.

In general terms, the invention consists in the construction and combination of mechanical devices or elements, all as more fully hereinafter described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is in the nature of a diagrammatic view, showing the relative arrangement of the several parts of the heating apparatus. Fig. 2 is a sectional elevation of my improved valve and trap, the plane of section being indicated by the line *t t*, Fig. 3. Fig. 3 is a similar section on the plane of the line *x x*, Fig. 2. Fig. 4 is a top plan view, partly in section, the plane of section being indicated on the line *y y*, Fig. 2. Fig. 5 is a sectional plan on the plane of the line *z z*, Fig. 2; and Fig. 6 is a view similar to Fig. 4 of a modification of the trap and valve.

In the practice of my invention I secure under each car a trap 1, divided into two chambers 2 and 3 by the transverse partition 4, the chamber 2 thereof being provided with inlets 5 on each side for the admission of the water of condensation from the radiators in the car, as described and shown in the Westinghouse application, hereinbefore referred to. On the cover 6 of the trap I form a cylinder 7, the heads or ends 8 8^a of said cylinder being provided with threaded nipples 9 9^a, which are connected by suitable pipe-sections with the main lines of pipe A and B on the car, either of said lines of pipe being employed as a supply or exhaust pipe, as fully described in said Westinghouse application. The cylinder is provided at points adjacent to its ends with outlet-ports 10 10^a, connecting with a passage 11, which in turn is connected by pipes *c* and *d* to the radiators C and D within the car. About midway of the cylinder is formed a port 12, connecting with a passage 13, which is connected by pipes 14 14^a with the chambers 2 and 3 of the trap. These pipes extend to near the bottom of the trap, and are provided at their lower ends with valves 15, operated by floats 16, as will be more fully described. Within the cylinder is arranged a piston-valve 17, provided with chambers 18 and 19. Each of these chambers is connected by a pipe 20 20^a, passing through the other chambers, with the opposite end of the cylinder, as shown in Fig. 3—that is to say, the chamber 19 is connected with the right-hand end of the cylinder by a pipe or tube 20, passing through the chamber 18, while the latter communicates with the left-hand end of the cylinder by a tube 20^a, passing through the chamber 19. These chambers are provided with ports 21 21^a, so located that in certain positions of the valve said ports will register with the port 12 of the cylinder.

In the position of the valve 17, as shown,

steam enters from one of the main lines of pipe through the head 8^a of the cylinder, the valve having been shifted by the pressure of the steam, and passes thence by the port 10^a and passage 11 to the radiators in the car. From the radiators the steam and water of condensation flow into the chamber 2 of the trap, the inlets 5 and 5^a being connected, as hereinbefore stated, to the radiators. As soon as sufficient water of condensation has accumulated in the chamber 2 to raise the valve 15^a, the water of condensation will, by the action of an exhaust apparatus connected to the other main line of pipe, as fully shown and described in the said Westinghouse application, be drawn up the dip-pipe 14^a through the passage 13 and ports 12 and 21 into the chamber 18 of the valve 7, and from said chamber the water is drawn through the tube 20^a, the head 8 of the cylinder and the main line of pipe A, connected thereto, to the point or points of discharge.

It will be readily understood that in an apparatus constructed and operated as hereinbefore described any condensation which may be caused in the main supply-line of pipe will either be forced along the path of the steam, as hereinbefore described, from the supply to the exhaust line of pipe, or else will be forced onward to the rear end of the train, in either case requiring a higher pressure of steam than required for purposes of heating. In order to remove the water of condensation from the steam-supply pipe under each car, and that without forcing it through the radiating or heating apparatus of the car, the main lines of pipe A and B are so secured to the car as to incline somewhat from their ends to their points of junction with the nipples 9 9^a of the cylinder 7, said nipples having a slight upward inclination, as shown in Figs. 1 and 3, so that the branch pipes *a* and *b* will also be slightly inclined. This arrangement of the pipes A and B and their branch pipes *a* and *b* relative to the cylinder 7 will insure a thorough drainage of the supply-pipe into the cylinder, from which such water of condensation will escape into the chamber 3 of the trap by ports 22 22^a, arranged at or near the ends of the cylinder so as to be uncovered when the valve 17 is shifted, as shown in Figs. 3 and 4. The water accumulates in this chamber until of sufficient height to raise the valve 15, when the water will be drawn up through the dip-pipe 14, passage 13, ports 12 and 21, into the chamber 18 of the valve, as described in connection with the water in the chambers 2. By reference to Fig. 3 it will be seen that the steam which enters the chamber 3 through the port 22^a cannot escape therefrom, as the valve 15 is held closed by the float, except when the water attains sufficient height to raise the float and valve; but at such times the water itself will form an effectual seal. Any steam which may pass up through the ports 22 and 21^a into the chamber 19 will flow by the tube 20 into the right-hand end of the cylinder, and thence either into the trap again or else out through the port 10^a.

As shown, each chamber of the trap is provided with a drain-cock 23 for removing any water which may accumulate after a car has been disconnected from the train, thus obviating any liability of the apparatus becoming inoperative through the freezing of the water in the trap, and the consequent sealing of the valves 15 and 15^a. In order to prevent the apparatus from becoming inoperative when through carelessness the traps are not drained, as stated, a number of rods 24, formed of copper or other good heat-conducting material, are arranged around the dip-pipes 14 and 14^a. Said rods are secured at their upper ends to the cover 6 of the trap, and extend down below the lower ends of the dip-pipes, as shown in Figs. 2 and 3. In case water should freeze in the traps the floats and valves would by the expansion of the solidifying water be raised, opening the lower ends of said pipes. As long as the ice remains solid it is evident that the admission of steam into the upper portion of the trap will not have any effect upon the water below the ice, and hence there would not be any circulation, as is necessary for the effective operation of the apparatus. The steam acting alone upon the surface of the ice would act very slowly in thawing the same; but by means of the rods, whose upper portions would be heated by the steam, the ice around such rods would be melted, forming holes through which the steam could act on the water below the ice, forcing the same up through the pipes, thereby allowing the steam to act on both sides of the ice, quickly melting the same, and permitting of the necessary circulation through the apparatus.

In order to provide for the drainage of the pipes connecting the cylinder 7 with the distributing-pipes of the radiators and the distributing-pipes themselves, a port 25 is formed on the nipple 26, to which the pipe leading to the radiators is connected, said port 25 connecting with the chamber 3 of the trap, as shown in Figs. 2, 4, and 6.

If desired, the ports 10 10^a and passage 11 may be omitted, as shown in Fig. 6, the steam passing down through the ports 22 and 22^a, which are controlled by the valve 17, into the chamber 3, and thence up through the port 25 into the nipple 26 and the pipes leading to the radiators, it being understood that when used as above stated the port 25 should be made of sufficient size to permit the flow of an adequate amount of steam to effect the heating required.

No claim is made herein to the employment of heat-conducting rods within the trap for the purpose of melting the ice formed

therein, as such construction forms the subject-matter of application, Serial No. 322,429, filed August 30, 1889.

I claim herein as my invention—

1. In a car-heating apparatus, the combination of a radiator, two lines of pipes extending from places or points convenient for the supply of steam and the exhaustion of water of condensation, a trap connected to the radiator and to said lines of pipe for receiving the water of condensation, a valve mechanism having suitable connections to the trap and to the said lines of pipe, and a system of ports adapted in either position of the valve or valves of said valve mechanism to afford a passage-way from the then steam-supply pipe to the radiator and to the trap, and another passage-way from the trap to the opposite pipe, substantially as set forth.

2. In an apparatus for heating cars, the combination of a radiator, two lines of pipes extending from places or points convenient for the supply of steam and the exhaustion of water of condensation, a double-chambered trap having one chamber connected to the radiator and the other chamber to said lines of pipe, a valve having suitable connections to both chambers of the trap and to said lines of pipe, and a system of ports adapted in either position of the valve to afford a passage-way from the then steam-supply pipe to the radiator and to one chamber of the trap, and another passage-way from both chambers of the trap to the other line of pipe, substantially as set forth.

3. In a car-heating apparatus, the combination of a radiator, two lines of pipe extending from places or points convenient for the supply of steam and the exhaustion of water of condensation, a double-chambered trap having one chamber connected to the radiator, a cylinder 7, connected to said lines of pipe and provided with outlet-ports 10 10^a, connected to the radiator, and 22 22^a leading to the other chamber of the trap, and with an inlet-port 12 from both chambers of the trap, and a reversible valve provided with chambers 18 and 19, ports leading to said chambers and arranged in certain positions of the valve to register with the port 12, and tubes connecting said chambers with the cylinder at opposite ends of the valve, substantially as set forth.

In testimony whereof I have hereunto set my hand.

RICHARD H. SOULE.

Witnesses:
W. B. CORWIN,
DARWIN S. WOLCOTT.