(No Model.)

2 Sheets—Sheet 1.

A. S. LASLEY.

TRIPLE VALVE.

No. 307,122. Patented Oct. 28, 1884.

Fig. 1.

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(No Model.)

2 Sheets—Sheet 2.

A. S. LASLEY.

TRIPLE VALVE.

No. 307,122. Patented Oct. 28, 1884.

Fig. 2.

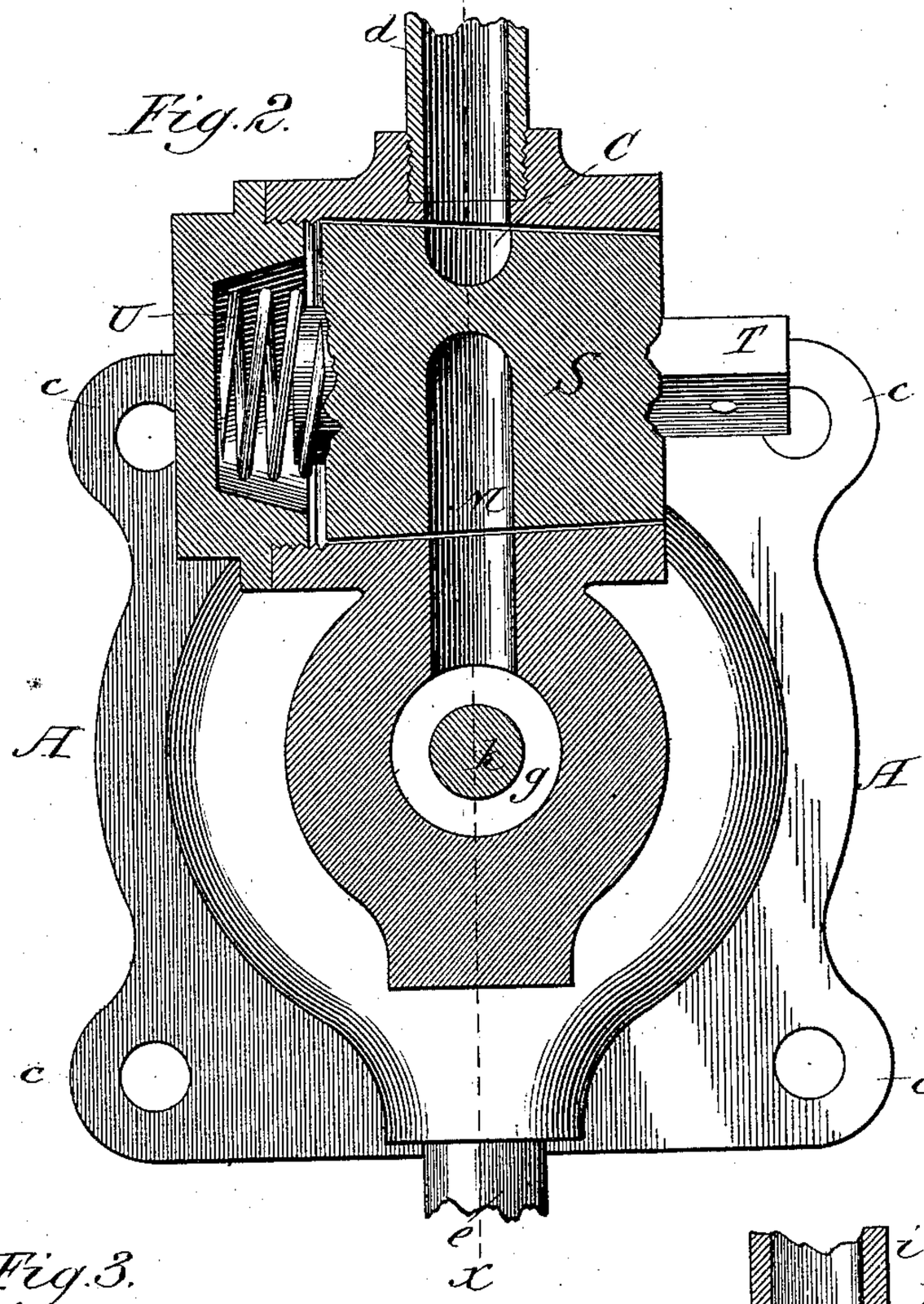


Fig. 3.

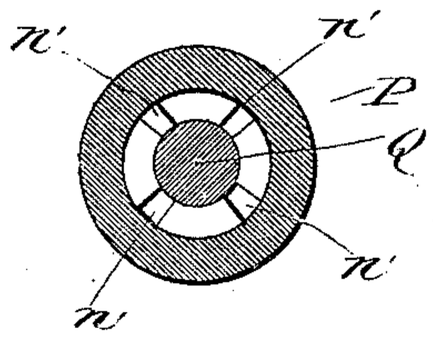
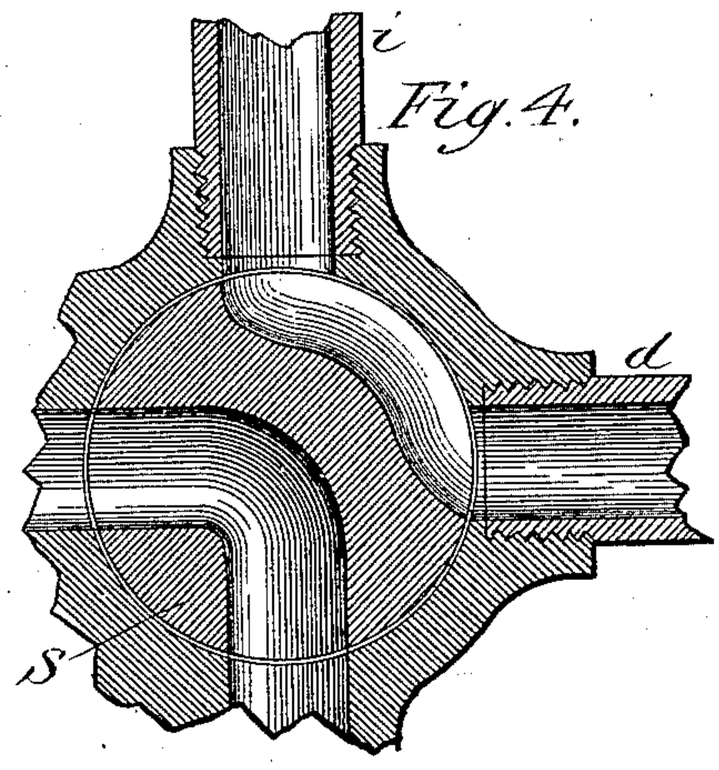


Fig. 4.



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UNITED STATES PATENT OFFICE.

ANSON S. LASLEY, OF CHICAGO, ILLINOIS.

TRIPLE VALVE.

SPECIFICATION forming part of Letters Patent No. 307,122, dated October 28, 1884.

Application filed April 25, 1884. (No model.)

To all whom it may concern:

Be it known that I, ANSON S. LASLEY, a citizen of the United States, residing in Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in "Triple Valves," of which the following is a specification.

This invention relates to improvements in triple valves, the primary parts of which are a piston and a slide-valve, which valves can be used in connection with hydraulic, air, or gas engines, or other mechanisms or apparatus to which said valves are adapted, but which valves are more particularly hereinafter described in their application to air-brakes for railroad-cars, in which brakes a triple valve is employed for establishing a communication between the air-supply pipe leading from the main air-reservoir on the engine and the auxiliary air-reservoir on the car, and also between the auxiliary reservoir and the brake-cylinder, for the purpose of automatically operating the brake.

Prior to my invention the air-receiving chamber extending below the piston-chamber, and connecting therewith by a perforation in the bottom of the piston-chamber, has had its lower end closed by a plug having formed therewith a tube inclosing a spiral spring surrounding a rod projecting through a central perforation in the bottom of the piston-chamber, and for cushioning the piston in its descent, a hammering blow of the piston being prevented by a leather washer laid on the bottom of the piston-chamber. The piston of these valves is provided with a packing consisting of a flexible metallic ring cut through on one side and working by a spring action against the piston-chamber in a circumferential groove on the piston, and the piston-rod, which also carries the slide-valve, extends above the latter, and has a bearing in the screw-cap of the valve-shell, for staying the piston and slide-valve against a lateral or rocking movement, in which respect a spring in an open recess in the slide-valve and bearing against the rod is employed as an auxiliary, as well as to prevent the slide-valve from working by gravity alone.

From the above description it will be seen that in the construction referred to a full stroke of the piston involves a violent contact with the bottom of the piston-chamber, which contact sooner or later strains and otherwise injures the piston and disturbs the stability of the slide-valve. Besides this, a slight accumulation of ice in the bottom of the air-receiving chamber is sufficient to destroy the operation of the spring-cushion, the tubes and spring of which, the packing in the piston, and the recesses and openings in the slide-valve are catch-alls for dirt and other obstructing substances, and, besides, are liable to freeze up even before the spring-cushion, or, at least, to become so nearly so as to render their operation uncertain or so slow that the valve will not effectively operate, and must therefore be cut off from the auxiliary air-cylinder, and the brake be operated as an ordinary and not as an automatic air-brake. A triple valve to successfully and automatically operate an air-brake must of necessity respond quickly to any variation in the air-pressure employed to operate it, and must have all of its parts positive in their operation, and adapted to quickly relieve the brake-cylinder piston from air-pressure the instant it is desirable to unset the brake, and, above all, to avoid as nearly as possible any liability of any of the operative parts of the valve from freezing, or of being retarded in their movements by an accumulation of foreign substances.

The objects of my invention are therefore to promote the efficiency of a triple valve by having its operative parts so constructed that unavoidable accumulations, whether of ice, dirt, or other substances, may be conveniently and quickly removed before they have materially obstructed any of the movable parts of the valve. A further object is to dispense entirely with any necessity of a spring-cushion for the piston or a washer to take up its striking force, and at the same time avoid the necessity of employing devices affording a receptacle for foreign substances or liable to freeze and by either of these means retard or destroy the operation of the piston. A further object is to provide a slide-valve adapted without injury to itself to take up an otherwise striking force of the piston. A further object is to establish an equilibrium of air-pressure on both ends of the slide-valve when

upon its seat, and thereby not only relieve its actuating-spring from any strain by the air-pressure, but at the same time insure an effective seating of the valve under every degree of air-pressure to which it may be subjected when in operation. A further object of my invention is to center the slide-valve and piston in such a manner that the air-pressure in the valve-chamber will exert a force tending to relieve the valve and its centering device from a liability to stick either from freezing or from foreign substances. A further object is to provide a convenient means for adjusting the valve, which means, together with the valve, shall be convenient of access. A further object is to provide means whereby the exhaust-port in the triple valve for the brake-cylinder may have a diameter equal to that of the air-supply ports or passages, or at least such a diameter that the air may be so quickly exhausted from the brake-cylinder that the brake may be as instantly released as the slide-valve is lifted off its seat; and, finally, to provide certain details of construction hereinafter fully described. I attain these objects by devices illustrated in the accompanying drawings, in which—

Figure 1 is a central longitudinal section of a triple valve embodying my invention, said section being taken on the line *x x* of Fig. 2. Fig. 2 is a transverse section of the same, taken on the line *y y* of Fig. 1; Fig. 3, a transverse section of the slide-valve and its bearing-shaft, taken on the line *z z*, Fig. 1; Fig. 4, a section of the cut-off plug turned to cut off the triple valve.

Similar letters of reference indicate the same parts in the several figures of the drawings.

The valve-case is preferably made in two parts, A B, the upper part, A, being provided with an annular flange, *a*, projecting into the lower part, B, a suitable packing, *b*, serving in connection with the flange to form a tight joint between the case-sections, which are additionally provided with laterally-projecting flanges *c*, (see Fig. 2,) through perforations in which bolts are passed for clamping said sections rigidly but removably together.

Formed in the case-section A is an air-supply passage, C, a continuation of which is formed in case-section B, into which the passage opens, said passage being connected by a pipe, *d*, when the valve is in use, with the brake-valve (not shown) and the main reservoir (not shown) on the engine. Case-section B forms a chamber, D, for convenience designated as a "supply-chamber," which chamber is separated from the piston-chamber E by a perforated diaphragm, F, which is seated upon a shoulder on section B and held in its seat by the flange *a* on the section A. This perforated diaphragm serves to strain the air escaping through it into the piston-chamber, and thereby prevent dirt and other foreign substances escaping from the supply-chamber into the piston-chamber, and thence to the bearing-surfaces and passages of the valve-structure; and, besides, this perforated diaphragm permits condensations, lubricants, &c., to escape from the upper part of the valve structure to the bottom of the supply-chamber. The supply-chamber is preferably of a straight cylindrical form, and has its bottom end closed by a screw-cap, G, that, when removed, provides for the largest possible access to the chamber for removing accumulations, and particularly ice, which latter, if it fails to drop out by its own gravity, can be quickly and readily broken up—an operation not practical when such a chamber is only accessible through an orifice suitable for a plug, as in the structures now commonly employed. Piston-chamber F has on one side, near its top, a groove, H, bisecting at its upper end with an eduction-passage, H′, connected with an auxiliary reservoir (not shown) upon the car, to which the triple valve and brake-cylinder, hereinafter referred to, are attached by a pipe, *e*, tapped in said passage. The piston I is provided with a peripheral groove for receiving a packing, *f*, which is preferably composed of a solid filling of solder, but may be of any metallic substance which is desirable, but at the same time softer than brass, of which the piston and the inner walls of the piston-chamber, if not the entire case, are preferably composed. Metallic packing is desirable because less liable to tightly freeze or to be injured if thrown into operation when frozen, and, besides, does not gather upon its surface foreign substances, which would increase the friction and wear of both the piston and its bearing-surface. Piston I has cast with or otherwise rigidly secured upon its upper surface an inclined check-valve, J, the seat of which is formed in the top of the case and similarly inclined, and the stem *g* projects into a vertical eduction-passage, K, in the case, said stem being provided with a groove, *h*, running out the upper end thereof, the purpose of which groove will hereinafter be described. Passage K affords a communication of the piston-chamber with a slide-valve chamber, L, in the upper end of the case, and bisects a passage, M, continued by a pipe, *i*, leading to the brake-cylinder, (not shown,) and also an escape-passage, N, which is in a plane slightly above the said passage M. The valve-chamber L has its upper end closed by a screw-cap, O, secure in position like the cap G, and forming the entire top of the valve-chamber, so as to provide ample access to the same. The lower portion of the valve-chamber is inclined, as shown at *j*, to form a seat for a cone-shaped slide-valve, P, free to slide on a shaft, Q, provided with a shoulder, *k*, rigid with the check-valve stem *g*, and supporting the slide-valve when in an elevated position above its seat. The bore of this valve above that portion bearing on the shaft is enlarged in diameter to form an annular chamber, *l*, not only to provide room for a spring, *m*, encirc-

ling the shaft, but an internal air-chamber for the valve, which chamber is extended above the base of the cone by an annulus, *n*, provided with perforations *o*, affording a communication between the air-chamber *l* and the valve-chamber, and the bottom of chamber is provided with radial slots *n'*, opening into the chamber below the valve. Spring *m* seats at its lower end on the bottom of the air chamber of the slide-valve, and at its upper end bears against a disk, Q', tapped and vertically adjustable on the shaft Q, for adjusting the tension of the spring, and with it the pressure of the valve on its seat. In this connection it may be observed that by seating the spring well down toward the bottom of the valve, as shown, the operation of the spring is, for obvious reasons, more effective, while at the same time a positive and accurate seating of the valve is attained, and the friction of the valve reduced to a minimum. The disk Q' is provided with perforations *p*, the purpose of which will hereinafter be described, and has a free bearing against the straight walls of the valve-chamber, and serves not only to center the slide-valve, but also the check-valve and the piston. With the parts in the position shown in Fig. 1, in which the piston is elevated above the lower end of the groove H, the check-valve is seated, and the slide-valve is raised above its seat, air flowing through the supply-passage C into the chamber D, and, passing through the perforated diaphragm into the piston-chamber, will enter the groove H, and pass thence through passage H' to the auxiliary reservoir, which may, for present purposes, be supposed to be filled and under pressure by the air entering the valve through the supply-passage. If, now, the pressure in the supply-passage be reduced, the back-pressure of air in the auxiliary reservoir upon the piston will press the piston down below the groove H, and at the same time lower the check-valve away from its seat until the groove *h* in its stem establishes a communication between the upper part of the piston-cylinder and passage M, just before which the slide-valve is fully seated and the air immediately flows out of the auxiliary reservoir through passage H', K, and M to the brake-cylinder and sets the brake. As air enters passage M, it also flows through slots *n'* in the slide-valve into the chamber thereof, and out its top, and through the perforations *p* in the centering-disk to the upper part of the valve-chamber; but as the piston continues to descend, drawing with it the slide-valve shaft, the spring of the slide-valve is compressed with the internal chamber of said valve, and the centering-disk seats itself on the flange of the slide-valve, after which the ascending air escapes through the perforations *o* in said flange to the perforations in the disk. This accumulation of air above the slide-valve and centering-disk establishes an equilibrium of air-pressure on both of their respective faces, and secures an effective seating of the valve against a pressure otherwise tending to lift it, while also relieving the spring from undue strain and from having a tension greater than is required for its normal purposes; and in this connection it should be stated that the spring, in addition to actuating and cushioning the slide-valve, also affords a spring-resistance for both the check-valve and piston, tending to check their fall after the slide-valve is seated, and thereby prevents a hammer-blow of the centering-disk on said valve.

When it is desired to unset the brake, air-pressure is again admitted through the supply-passage C to the piston, which it forces upwardly, and with it the groove *h*, which, as soon as it passes the lower end of the straight wall of the passage K, cuts off the supply of air to the passage M, at which moment the slide-valve is lifted off its seat and the air in the brake-cylinder returns back through passage M and escapes from the triple valve through the escape-passage N.

The general construction of my triple valve and the arrangement of its several passages and movable parts is such that ample room and provision are made for having the exhaust-port N of substantially the same diameter as the passages, and in any case of a sufficient diameter to permit the air in the brake-cylinder to quickly escape, and hence the brake to be instantly released, and the usually prolonged hissing noise of the escaping air obviated. If desirable, however, this exhaust-port may be screw-threaded, as shown, and be contracted by means of a nipple, R, having a bore of any preferred diameter. The exhaust-port may be formed in the same plane with the passage M; but it is preferably raised above that plane in order to have as direct an exit-passage for the air as is possible and consistent with the desired dimensions and configurations of other parts and an effective closing of said port by the slide-valve.

Fitting and turning in the valve-case is a cut-off plug, S, (see Figs. 2 and 4,) which is of the common and well-known construction—that is to say, is bored out at *q* and grooved at *r*, to register, respectively, with passages M and C, which passage C, by turning the plug and cutting out the passages M and the lower portion of passage C, and hence the triple valve, (see Fig. 4,) may be made to register with and directly join the upper part of passage C with the upper end of passage M, whereby the brake-cylinder may be operated by a direct air-pressure from the main reservoir when for any cause the triple valve is not in working order. This plug is provided with the usual conical stem T for the application of a wrench to turn it, and also a spring, U, for holding it against its seat.

In conclusion, it should be observed that it would be no departure from the spirit of my invention to employ a widely-different con-

struction of slide-valve in connection with the piston and check-valve herein shown and described, or vice versa; and, furthermore, a triple valve may be made with the relative position and configuration of the several passages and grooves changed, and yet embody the essential features of the invention herein involved.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a triple valve, a cylindrical air-supply chamber utilizing and exclusively occupying the entire lower end of the valve-case below and contiguous to the piston-chamber, and having its lower end closed by a cap of a diameter equal to, if not greater than, that of said chamber, whereby the operative parts of the valve are wholly isolated from the accumulations, which, collecting in said chamber, are removable in a mass from the valve, substantially as and for the purpose described.

2. In a triple valve, the combination of the contiguous and straight cylindrical air-supply and piston chambers with a diaphragm provided with a series of perforations, and extending entirely across and wholly dividing said chambers, substantially as described.

3. In a triple valve, the combination of the air-supply chamber provided with a shoulder, and the straight cylindrical piston-chamber provided with a vertically-projecting flange, with a diaphragm extending entirely across the piston-chamber, and provided with a series of perforations over its entire surface, said diaphragm being seated on the shoulder, held down by the flange, and dividing said chambers, substantially as described.

4. The combination of the piston, the piston-chamber, the supply-chamber, and the perforated disk dividing said chambers with a supply-passage opening in the supply-chamber, an exit-passage in the piston-chamber above the piston, and a grooved passage in the walls of the piston-chamber, bisecting said exit-passage and extending below the piston when at its highest elevation, substantially as and for the purpose described.

5. The combination, with the valve-case and piston, of the check-valve rigidly secured to the piston, tightly seating against said case and cutting off all communication between the piston-chamber and eduction-passage above the piston, substantially as described.

6. The combination of the piston-chamber, the piston, and the eduction-passage in the end wall of said chamber above the piston, with a check-valve tightly seating against said end wall and cutting off all communication between the eduction-passage and the piston-chamber, substantially as described.

7. The combination of the piston and the slide-valve with the stem and shaft connecting said valve and piston, and a groove, *h*, in said stem, substantially as described.

8. The combination of the piston and the slide-valve with the stem and a shaft provided with a grooved channel extending from its upper end part way its length, said shaft and stem forming a connection of the piston with the slide-valve, substantially as described.

9. In a triple valve, a slide-valve provided with an internal air-chamber having inlet and outlet perforations or slots at or toward the extremities of said internal chamber, substantially as and for the purpose described.

10. The combination of the piston, the piston-chamber, and a chamber external thereto and having a common center therewith, with a centering-disk bearing against the walls of the external chamber, and a rigid connection between said disk and piston, substantially as described.

11. The combination of the slide-valve, the chamber, and the bearing-shaft thereof with a centering-disk mounted on said shaft, bearing against the walls of said chamber, and perforated, substantially as and for the purpose described.

12. The combination of the slide-valve, the chamber, and the bearing-shaft thereof with a centering-disk mounted on said shaft and bearing against the walls of said chamber, substantially as described.

13. The combination of the slide-valve, the bearing-shaft thereof, and the centering-disk, adjustable on said shaft, with a spring confined between said disk and valve, substantially as and for the purpose described.

14. The combination of the passage M and the escape-passage in a plane above the passage M with a slide-valve intermediate said passage and adapted to close the escape-passage, substantially as described.

15. In a triple valve, a cone-shaped slide-valve chamber having straight cylindrical walls extending above and of greater diameter than the valve, in combination with a cap of a diameter equal to or greater than said straight walls, and closing the end of said chamber, substantially as and for the purpose described.

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