No. 663,631. Patented Dec. 11, 1900.

G. DE LAVAL.

AUTOMATIC EXHAUST RELIEF VALVE.

(Application filed June 9, 1900.)

(No Model.)

Fig. 1.

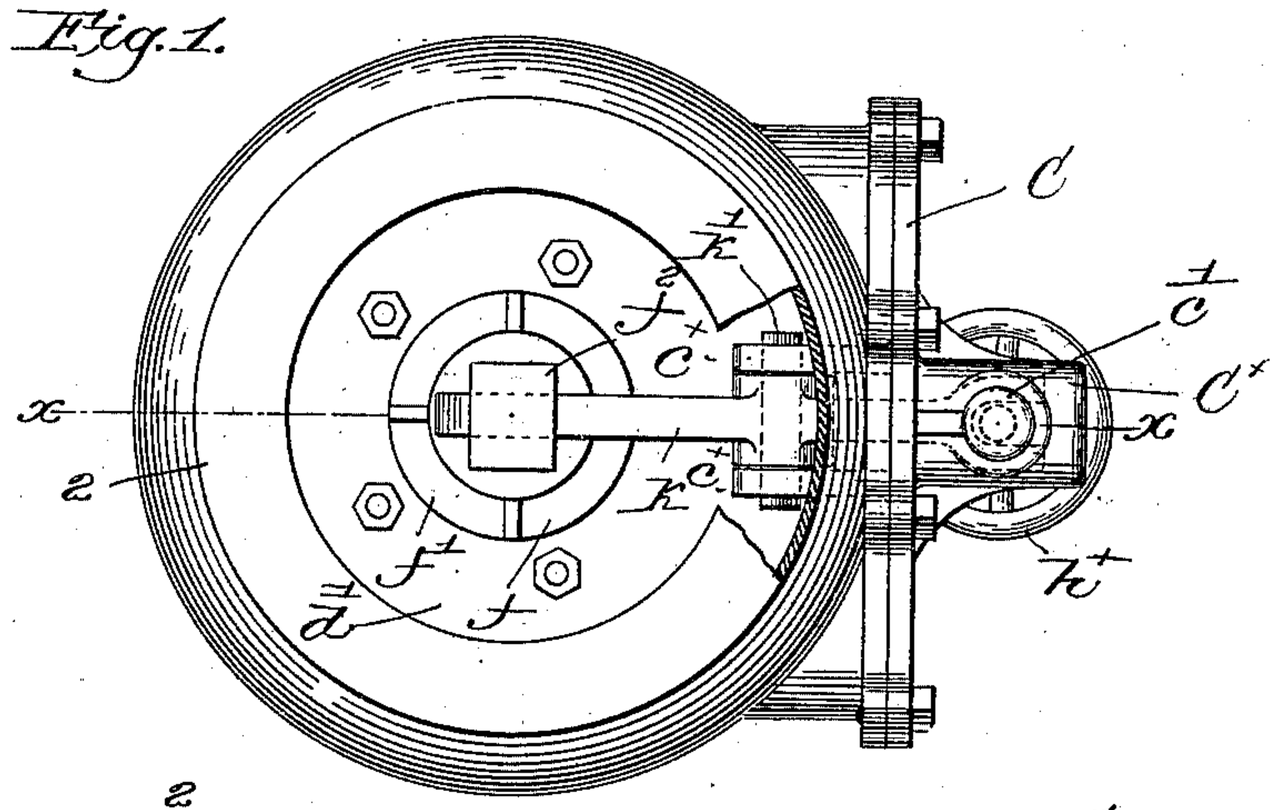

Fig. 2.

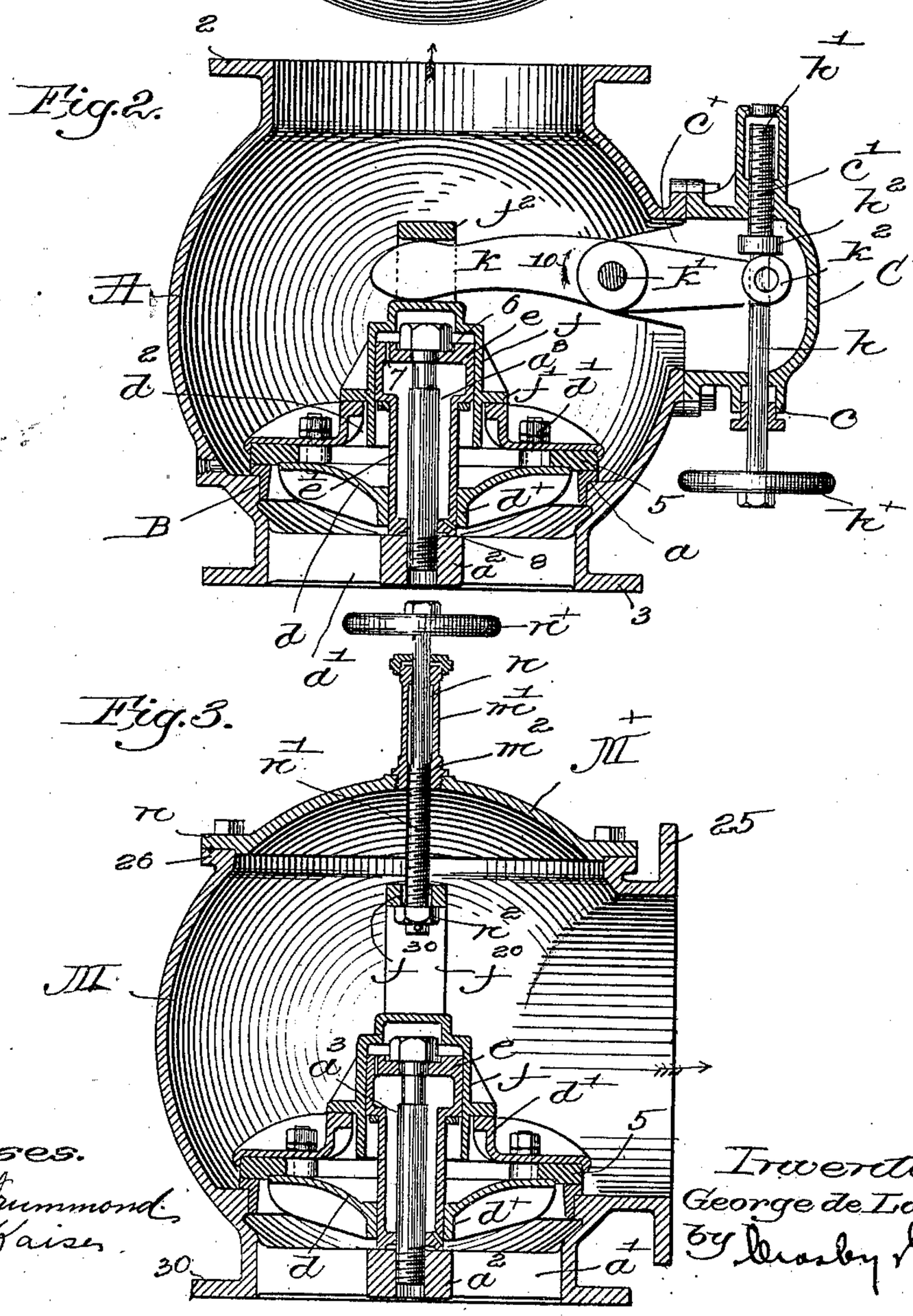

Fig. 3.

Witnesses.
Thomas f. Drummond.
Adolf C. Kaiser.

Inventor.
George de Laval,
by Crosby & Gregory.
Attys

UNITED STATES PATENT OFFICE.

GEORGE DE LAVAL, OF CAMBRIDGE, MASSACHUSETTS.

AUTOMATIC EXHAUST RELIEF-VALVE.

SPECIFICATION forming part of Letters Patent No. 663,631, dated December 11, 1900.

Application filed June 9, 1900. Serial No. 19,680. (No model.)

To all whom it may concern:

Be it known that I, GEORGE DE LAVAL, a citizen of the United States, residing at Cambridge, county of Middlesex, State of Massachusetts, have invented an Improvement in Automatic Exhaust Relief-Valves, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates more particularly to relief-valves used in a branch from the exhaust-pipe of a condensing-engine, the valve opening toward the atmosphere when the pressure of the exhaust for any reason exceeds that of the atmosphere, the valve seating automatically when the exhaust-pressure drops below that of the atmosphere. In order to prevent concussion or hammer when the valve is thus seated, some form of dash-pot is provided, one structure being shown in United States Patent No. 270,573 and another in United States Patent No. 521,030. The former valve is intended for use with a horizontal exhaust-pipe and the latter with a vertical pipe; but in both instances the dash-pot is outside of the valve-case. Frequently these dash-pots are in the way, and very often the piping is located on the outside of the building, causing the water in the dash-pot to freeze. Oil, glycerin, and other fluids have been employed to obviate freezing, but with indifferent success.

My present invention has for its object the production of an automatic relief-valve wherein the dash-pot device is located within the valve-case, so as to be out of the way, and also to prevent freezing should any water collect in it. Means are also provided for holding the valve from its seat when it is desired to run non-condensing.

Various novel features of my invention will be hereinafter described, and particularly pointed out in the following claims.

Figure 1 is a top or plan view of a vertical relief-valve embodying one form of my invention, the valve-case being partly broken out. Fig. 2 is a vertical sectional view thereof on the line $x\,x$, Fig. 1; and Fig. 3 is also a sectional view of an angle relief-valve with another form of device for holding the valve from its seat.

Referring to Figs. 1 and 2, I have shown the valve-case A as globular and with openings at its top and bottom surrounded by annular flanges 2 3, respectively, for connection at the bottom with the exhaust-pipe, a pipe usually being attached to the upper flange 2 to lead the exhaust in any desired direction to the atmosphere. An annular shoulder a in the lower portion of the case has resting upon it the valve-seat B, shown made as a separate casting, the relief-valve being adapted to rest upon the top of the seat. The said valve is shown in two parts $d\,d'$, the former having a central hub or bearing $d^{\times}$ for a purpose to be described, a packing or gasket 5, of rubber or other suitable material, being securely held between the parts d and d' and projecting beyond the periphery of the former to rest upon the seat. A spider a' in the bottom opening of the valve-case is provided with a centrally-threaded hub a^2 to receive a headed stud a^3, extended up through the valve and through a hollow piston e, said piston having a hollow depending stem e', which rests upon the top of the hub a^2 and is held rigidly in place by the head of the stud a^3, said head being shown as seating in a recess 6 in the top of the piston. A dash-pot f, open at its lower end, surrounds the piston snugly, as clearly shown in Fig. 2, and is provided with an annular flange f', by which it is secured to the member d' of the valve, the lower end of the dash-pot passing through the central opening d^2 of the upper portion of the valve member. The shank e' of the piston passes through the bearing $d^{\times}$ and serves to support and guide the valve below the valve-seat, while the sliding contact of the dash-pot and piston e form a guide for the valve above the seat, thus insuring a very steady movement of the valve without necessitating a top bridge. The piston has a port 7 opening into the dash-pot, and a port 8 is made in the piston-shank below the bearing $d^{\times}$, said ports permitting the passage of air or steam into the shank and hollow piston, and thus into the dash-pot. When the valve is raised, the steam or air is sucked in, and when the pressure of the exhaust falls below that

of the atmosphere the valve will descend, and the slow expulsion of the fluid from the dash-pot through the piston and its shank acts as a cushion to prevent hammer or shock when the valve seats.

It will be manifest that the dash-pot is wholly within the valve-case, and thus is not only entirely out of the way, but it is prevented from freezing should any moisture or water collect in it.

It is desirable sometimes to hold the relief-valve from its seat—as, for instance, when working the engine non-condensing—and for this purpose I have provided a suitable sustaining device, one form of which is shown in Figs. 1 and 2. The valve-case *a* has at one side a transverse opening fitted with a removable cover-plate C, having a closed housing or bonnet $C^{\times}$, which is provided with a stuffing-box *c* to receive a rotatable shaft or stem *h*, extended upwardly through the bonnet and threaded at its upper end at *h'* to engage a similarly-threaded bearing *c'* on the top of the bonnet, the shaft being provided exteriorly with a hand-wheel $h^{\times}$ and within the bonnet with a collar h^2, Fig. 2. A lever *k*, fulcrumed at *k'* on ears $c^{\times}$, secured to the cover-plate C, (see dotted lines, Fig. 1,) is bifurcated at its rear end to embrace the shaft or stem *h* below the collar h^2, the bifurcated ends being rounded, as at k^2, Fig. 2, to engage the collar. The inner end of the lever *k* extends centrally above the valve and through a loop f^2, formed on the dash-pot, as herein shown, whereby when the inner end of the lever is rocked in the direction of the arrow 10, Fig. 2, the valve will be lifted from its seat and held suspended, such movement of the lever being effected by rotation of the shaft or stem *h* in such direction as to lower the collar h^2. Normally the parts will be in the position shown in Fig. 2, so that when the valve is lifted from its seat the lever *k* can rock to permit such movement.

The valve mechanism shown in Fig. 3 is what is known as an "angle relief-valve," the pipe or other connection with the atmosphere being secured to an annular flange 25, surrounding the outlet made in one side of the substantially globular valve-case M.

The valve proper, valve-seat, dash-pot, and its coöperating piston are substantially the same in Fig. 3 as those hereinbefore described and shown in Figs. 1 and 2; but in Fig. 3 I have shown another form of device for holding the valve from its seat. The valve-case has a top opening surrounded by an annular flange 26 to receive a flange *m* of the partly-globular bonnet $M^{\times}$, said bonnet having at its top, directly over the longitudinal axis of the valve, a stuffing-box *m'*, provided with a threaded bearing m^2 for the threaded end *n'* of a shaft or spindle *n*, extended through the stuffing-box and provided at its exterior with a hand-wheel or other suitable device $n^{\times}$. The inner end of the shaft or stem *n* is extended loosely through a loop f^{20}, secured to or forming a part of the dash-pot, and the shaft is held from withdrawal by means of a suitable nut n^2. To lift the valve and hold it from its seat, the shaft *n* is rotated in the proper direction to thus lift the dash-pot and attached valve. Under normal conditions the shaft will occupy the position shown in Fig. 3, permitting free play up and down of the loop f^{20} when the valve rises or falls, the hole f^{30} in the top of the loop being large enough to permit the free passage of the threaded end of the shaft therethrough. With the angle-valve shown the case is provided with a bottom flange 30 for the steam-pipe connection.

In the practical embodiment of my invention herein illustrated the relative movement of the dash-pot and its coöperating piston is effected by connecting the dash-pot with the valve and the piston with the valve-case.

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

1. The valve-case and a contained valve-seat, the valve adapted to seat on the latter, a dash-pot wholly within the case, a coöperating piston, means controlled by the valve to effect relative movement of the dash-pot and piston, and positively-acting means to act upon said valve and retain it unseated and fixed at any desired point.

2. The combination with a valve-case and a valve-seat, of a valve, a dash-pot movable with the valve, a coöperating piston fixedly mounted on the case and extended axially through the valve into the dash-pot, and a bearing on the side of the valve opposite the dash-pot, to slide on and be guided by the piston, said bearing being extended beyond the plane of the valve-face.

3. The combination with a valve-case and a valve-seat, of a valve, an inverted dash-pot secured to the upper side of the valve, to control by fluid compression the return of the valve to a seat, a piston coöperating with the dash-pot and having a reduced stem extended through the valve and rigidly secured to the case below the valve-seat, and a bearing on the lower side of the valve, sliding on the shank of the piston to guide the valve.

4. The valve-case having a lower opening and a contained valve-seat, a valve adapted to seat on the latter, a dash-pot mounted on the upper side of the valve and having a closed upper end, and a hollow piston rigidly mounted on the case and extended through the valve into the dash-pot, and having inlet and outlet openings, movement of the valve from its seat being resisted by the formation of a partial vacuum in the dash-pot due to relative movement of the latter and the piston.

5. The valve-case having a lower opening and a contained valve-seat, the valve adapted to seat on the latter, a dash-pot mounted

on the valve and closed at its end remote therefrom, a coöperating hollow piston rigidly secured to the valve-case and extended through the valve into the dash-pot, and a bearing on the valve extended beyond the plane of its face and encircling the stem of the piston and sliding thereon when the valve opens or shuts.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE DE LAVAL.

Witnesses:
JOHN J. FINLAY,
HERBERT S. HAMBLETT.