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W. D. KLIPFEL.

AUTOMATIC VALVE.

(Application filed Apr. 5, 1900.)

(No Model.)

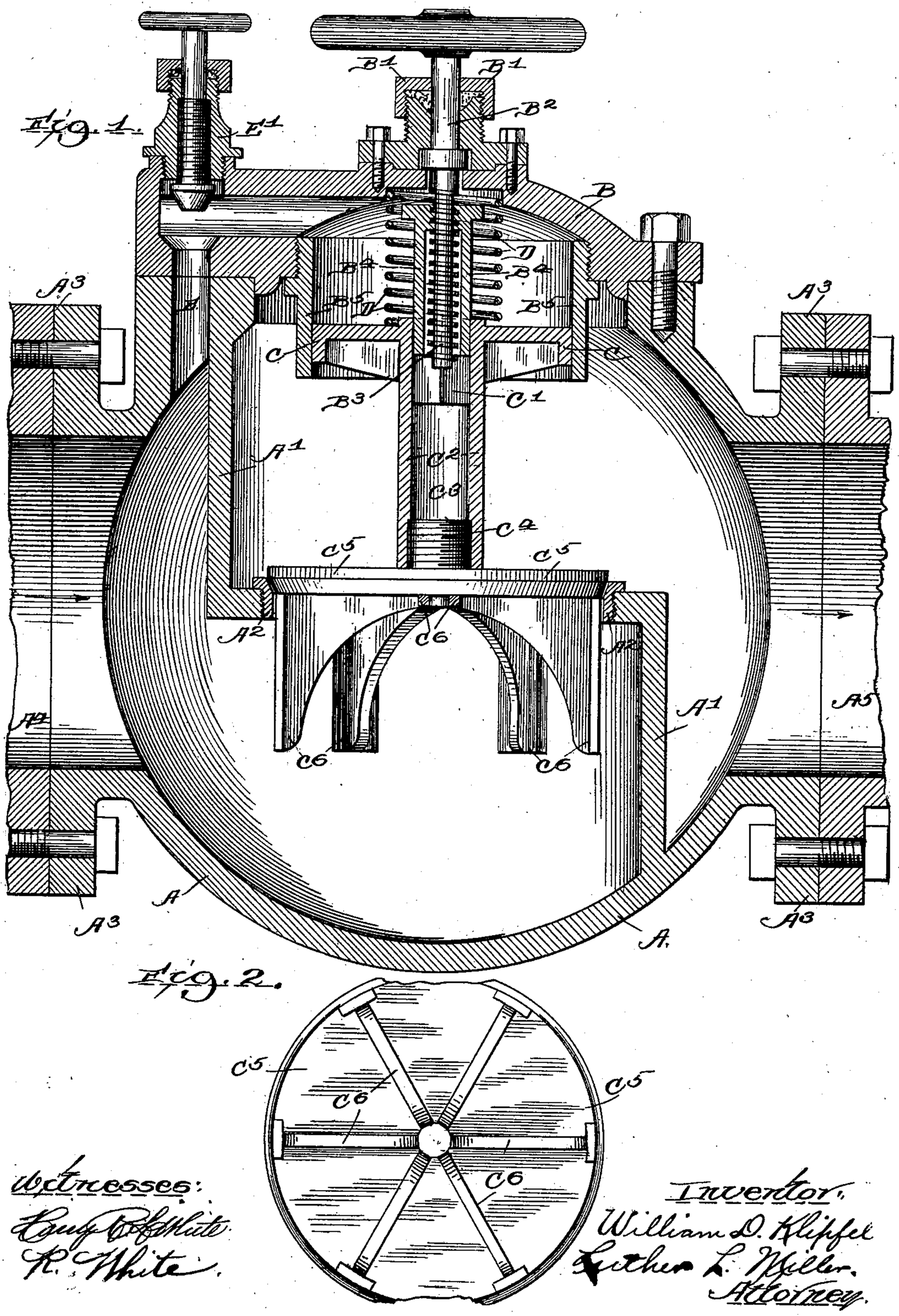

Fig. 1.

Fig. 2.

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UNITED STATES PATENT OFFICE.

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AUTOMATIC VALVE.

SPECIFICATION forming part of Letters Patent No. 668,648, dated February 26, 1901.

Application filed April 5, 1900. Serial No. 11,701. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM D. KLIPFEL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Valves, of which the following is a specification.

This invention relates to automatic valves, and particularly to that class known as "check-valves," the object of the invention being the production of such a valve embodying the novel features of construction hereinafter described.

In this invention a valve-casing having an inlet-opening and an outlet-opening is provided with a balanced valve capable of closing the passage between said inlet and said outlet openings. A spring tends to hold the valve-closure against its seat, and a hand-wheel is provided for firmly seating the valve-closure when it is desirable to positively close the valve. This valve is particularly adapted for use in connecting a single boiler with the pressure of a number of other boilers. When for any reason the pressure in the single boiler falls below the required pressure maintained by the other boilers, the valve-closure, actuated by the difference in pressure, automatically seats itself and shuts off the single boiler from the pressure of the battery of boilers. If the difference in pressure is due to the disability of the single boiler, the cut-off valve may be firmly seated by means of a hand-wheel.

In the accompanying drawings, Figure 1 is a vertical central section through a valve embodying the features of my invention. Fig. 2 is an under face view of the valve-closure.

Like letters of reference indicate corresponding parts throughout both views.

In the construction of this valve I provide the valve-casing A, which in this instance is substantially of globular form. Within the valve-casing A are the usual partition-walls A′, having the valve-seat ring A^2 screw-threaded in an opening in said partition-walls. The valve-casing A is provided with flanges A^3, by means of which the valve is secured to the inlet steam-pipe A^4 and the outlet steam-pipe A^5, the former communicating with a single boiler and the latter with the main steam-pipe or header of the battery.

B is the bonnet of the valve. It contains the usual stuffing-box B′ and the valve-actuating rod B^2, extending through said stuffing-box, upon the lower end of which rod is cut the left-hand thread B^3. This rod lies within a sleeve B^4 of rectangular external form, the interior of which sleeve is screw-threaded to correspond with the threads B^3 on the valve-actuating stem B^2.

B^5 is a cylinder having a screw-thread connection with the bonnet B, the curve of the walls of said cylinder being concentric with the central axis of the valve-seat ring A^2. A piston C, having the square central opening C′, adapted to receive the rectangular sleeve B^4, lies within the cylinder B^5 and is free to slide longitudinally therein. The piston C is provided with the integral valve-stem C^2, having the cylindrical axial opening C^3, which is a continuation of the square opening C′ in the piston C. The lower end of this valve-stem is internally screw-threaded and adapted to receive the correspondingly-screw-threaded stud C^4 of the valve-closure C^5, whereby the piston C and said valve-closure are held in fixed relation.—The guide-arms C^6, extending downward from the lower face of the valve-closure C^5, are formed integral with said closure and are intended to guide the closure to its seat A^2.

A coil-spring D surrounds the rectangular sleeve B^4, extending between the bonnet B and the face of the piston C, and by its pressure tends to thrust the valve-closure C^5 against its seat-ring A^2. In practice the spring D is quite light, being but little more than sufficient to move the valve-closure C^5 when the valve-stem occupies a horizontal position or a position different from that in which it is represented in the drawings.

The upper part of the bonnet B communicates with the inlet side of the valve-body A by means of a by-pass E, adapted to be closed by the valve E′ (of usual construction) therein. This by-pass is to afford a means of communication between the inlet side A^4 of the valve and the upper end of the cylinder B^5 in order that the pressure in the inlet side may

be exerted upon the upper face of the piston C.

With steam-pressure in both sides of the valve-casing it will be observed that the pressure tending to open the valve is that within the inlet side exerted upon the lower face of the valve-closure C^5, together with the pressure in the outlet side of the valve exerted upward against the under face of the piston C, and that the pressure tending to force the closure C^5 against its seat A^2 is that within the outlet side of the valve-body pressing downward upon the upper face of the closure C^5 plus the pressure of the steam in the inlet entering the cylinder B^5 through the by-pass E upon the upper face of the piston C, together with the downward pressure of the coil-spring D, which latter, as before stated, is slight. It will thus be seen that the valve hereinbefore described is a balanced valve intended to be interposed between two sources of pressure nearly equal. If the pressure in the inlet A^4 becomes slightly less than that in the outlet A^5, the pressure upon the lower side of the closure C^5 and of the piston C is overcome by the pressure upon the upper side of said closure and said piston and with the force of the spring D to assist the closure C^5 is forced against its seat-ring A^2, where it remains until the pressure in the inlet side A^4 of the valve is in excess of that in the outlet side A^5 thereof. The aggregate area of surface exposed to the pressure tending to open the closure C^5—to wit, the area of the under face of the closure C^5 plus that of the under face of the piston C—is but a little less than the area of the surface upon which the closing pressure is exerted or the upper face of the closure C^5 plus that of the upper face of the piston C, but sufficiently greater, so that the valve would operate when placed in the position it is represented to occupy in Fig. 1 of the drawings without the spring D. This spring is added to overcome the weight and friction of the closure C^5 and the piston C when the valve occupies a position different from that in which it is herein shown.

In use this valve is connected on its inlet side with the steam-pipe from a single boiler and on its outlet side with the main steam-pipe or header from the battery of boilers. When the steam-pressure in the single boiler is sufficiently greater than that in the header, the latter pressure raises said valve from its seat, and when the steam-pressure in the boiler is less than that in the header the closure C^5 is thrust firmly against its seat by said excess of pressure in the header. If the lowering of pressure in the boiler results from an accident to the boiler or its parts, the boiler may be cut off from the header by turning the hand-wheel fixed to the valve-rod B^2 and forcing the rectangular casing B^4 downward against the stud C^4, holding the closure C^5 firmly on its seat A^2. Some steam will leak around the piston C; but this can be checked by closing the valve E′ in the by-pass E, and the single boiler will then be completely cut off from the battery of boilers.

While I have described this valve in its use in connection with steam-boilers, it is clear that it may be used in any place where it is desirable to maintain a certain pressure in fluids, or as a reducing-valve by varying the proportionate areas of the piston C and the valve-closure.

I claim as my invention—

1. In a valve, in combination, a valve-casing having an inlet and an outlet opening; a valve-seat; a valve-closure; a cylinder alined with said valve-seat; a valve-stem on said closure, said stem having an opening therein; a piston fixed with relation to said valve-stem; a sleeve adapted to slide within the opening in said valve-stem; a valve-rod having a screw-thread connection with said sleeve; and a spring extending between said piston and a portion of the valve-casing.

2. In a valve, in combination, a valve-casing having an inlet and an outlet opening; a valve-seat; a valve-closure; a cylinder alined with said valve-seat; a valve-stem fixed to said closure, which valve-stem has an axial opening therein; a piston for said cylinder, fixed with relation to said valve-stem; a sleeve adapted to slide within the axial opening in said valve-stem; a valve-rod having a screw-thread connection with said sleeve; and a spring surrounding said sleeve, and extending between said piston and the upper part of said valve-casing.

3. In a valve, in combination, a valve-casing having an inlet and an outlet opening; a valve-seat; a valve-closure; a cylinder alined with said valve-seat; a valve-stem fixed with relation to said closure, which stem has an axial opening therein; a piston for said cylinder, having a central, angular opening coinciding with the axial opening in said valve-stem; a sleeve adapted to slide in the opening in said piston and the axial opening in said valve-stem; a valve-rod having a screw-thread connection with said sleeve; a spring surrounding said sleeve, and extending between said piston and a portion of the valve-casing; said valve-casing being provided with a by-pass opening forming a communication between the interior of said cylinder and the inlet side of the valve-casing; and a closure for said by-pass opening.

4. In a valve, in combination, a valve-casing having an inlet and an outlet opening; a bonnet; a partition dividing the interior of said casing in two parts; a valve-seat in said partition; a valve-closure for said seat, which valve-closure has guide-arms extending from one of its sides; a valve-stem fixed with relation to said closure, which stem has an axial opening; a piston fixed with relation to said stem, said piston having a central, angular opening coinciding with said axial opening in said stem; a cylinder within which said pis-

ton is adapted to move; a sleeve adapted to slide in said central opening of said piston and said axial opening of said valve-stem; a valve-rod rotatably mounted in said bonnet, which rod has a screw-thread connection with said sleeve; a spring surrounding said sleeve, and extending between said piston and said bonnet; said bonnet and said valve-casing being provided with a by-pass opening communicating between the interior of said cylinder and said inlet; and a closure for said by-pass opening.

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