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H. HOLZWARTH.

VALVE.

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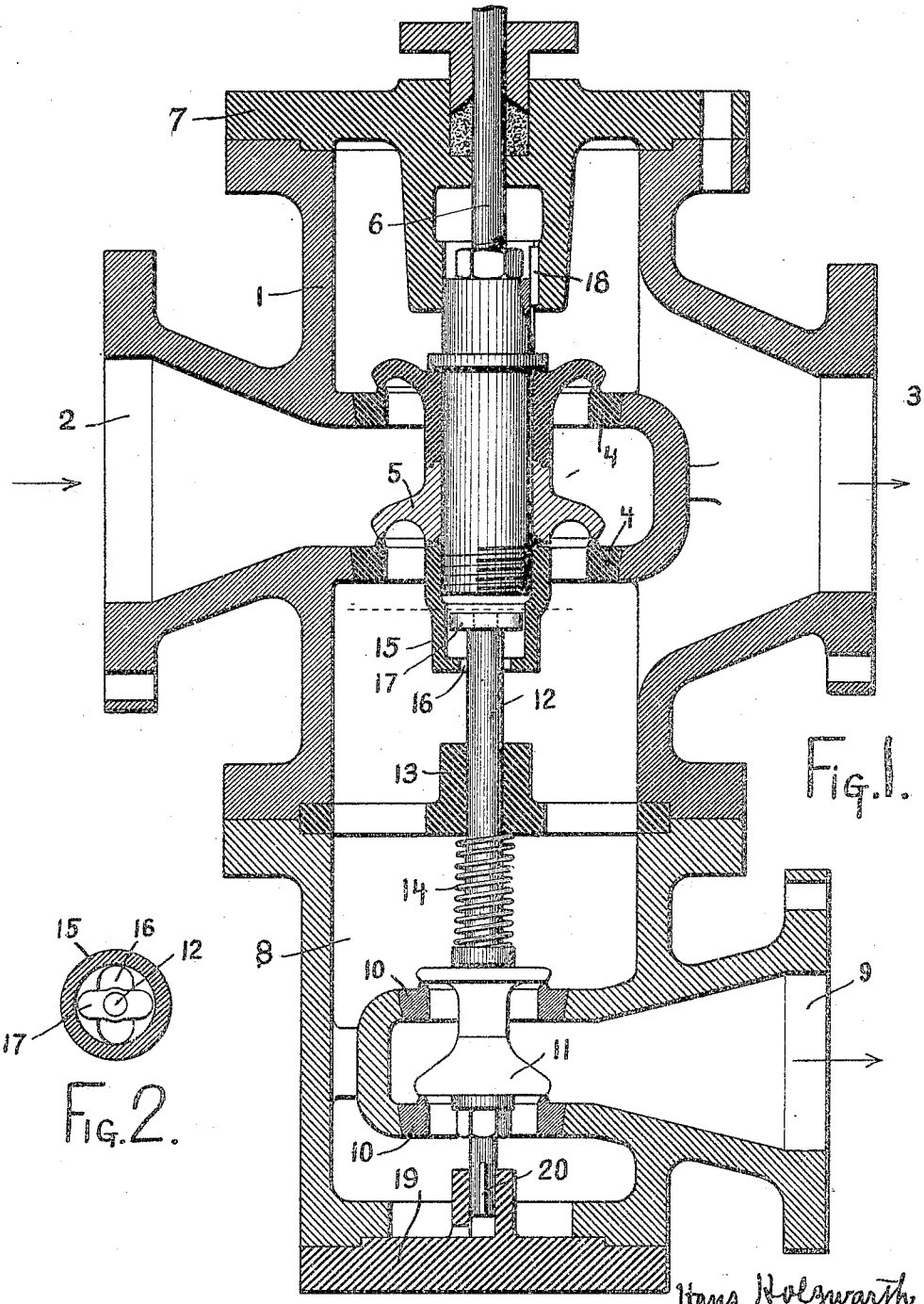


Fig. 1.

Fig. 2.

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No. 790,962. Patented May 30, 1905.

UNITED STATES PATENT OFFICE.

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VALVE.

SPECIFICATION forming part of Letters Patent No. 790,962, dated May 30, 1905.

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To all whom it may concern:

Be it known that I, HANS HOLZWARTH, a citizen of Germany, residing in Hamilton, Butler county, Ohio, (post-office address Hamilton, Ohio,) have invented certain new and useful Improvements in Valves, of which the following is a specification.

This invention pertains to improvements in valves designed to effect a control of flow through two conduits, one of which remains closed until the other one has been opened to some predetermined limit.

My improved valves are applicable to fluids generally; but in this specification I will for the sake of brevity use the word "steam," it being understood that that term is intended to comprehend other fluids.

As an example of the utilization of my improved valves I would refer to the case of a compound engine, in which the pressure of steam to the high-pressure cylinder is under the control of a governor, the high-pressure cylinder exhausting to the low-pressure cylinder, there being a normally closed by-pass to conduct high-pressure steam directly to the low-pressure cylinder in certain cases. In steam-turbines especially is such an arrangement desirable. In my improved valve the governor may operate on the main regulating-valve, while the by-pass valve is closed, thus controlling the flow of high-pressure steam to the high-pressure cylinder, and when this is insufficient to maintain the desired speed then the governor may open the by-pass valve and admit high-pressure steam directly to low-pressure cylinder.

My invention will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section of a valve exemplifying my present invention, and Fig. 2 is a horizontal section of the coupling between the primary and the secondary valves.

In the drawings, 1 indicates the primary-valve casing; 2, the inlet thereto; 3, the outlet therefrom; 4, a valve-seat between the inlet and the outlet, the same being illustrated as being double for a balanced puppet-valve; 5, the valve engaging this seat and serving when closed to close communication between the inlet 2 and the outlet 3; 6, the stem attached to the valve 5 and adapted to be operated by a governor; 7, a bonnet closing the upper end of the primary-valve casing and carrying the stuffing-box through which the valve-stem projects; 8, a secondary-valve casing, the same being preferably disposed in line with and directly connected with the primary-valve casing in such manner that steam passing the primary valve has free access to the interior of the secondary casing; 9, the secondary outlet leading from the secondary-valve casing; 10, the secondary-valve seat, also shown as being double for a balanced puppet-valve; 11, the secondary valve engaging the secondary-valve seat; 12, the secondary-valve stem attached to the secondary valve and loosely connected with the primary-valve stem; 13, a guide for the secondary-valve stem, the same being disposed in the joint between the primary-valve casing and the secondary-valve casing and having openings to permit steam passing the primary valve to freely enter the secondary-valve casing; 14, a spring engaging between the secondary valve and the guide 13 and serving to hold the secondary valve normally closed; 15, a cup-shaped coupling-sleeve screwed upon the enlarged lower end of the primary-valve stem; 16, a slot diametrically disposed in the lower wall of the coupling-sleeve; 17, an oblong button fast on the upper end of the secondary-valve stem 12 and disposed within the coupling-sleeve and adapted when in proper angular position to pass through the slot 16; 18, a key supported by the bonnet 17 and engaging the primary-valve stem and preventing its rotation; 19, a bonnet on the lower end of the secondary-valve casing, and 20 a key engaging the bonnet 19 and the secondary-valve stem and preventing the latter from turning.

Assume inlet 2 to be connected with a source of supply for high-pressure steam and outlet 3 to be connected with the high-pressure cylinder of the compound engine and outlet 9 to be connected with the low-pressure

cylinder of the compound engine and primary-valve stem 6 to be connected with the governor. When the primary valve is opened by the governor, which is the normal condition when the engine is running, the secondary valve 11 remains closed and high-pressure steam has access to the high-pressure cylinder and with such freedom of flow as is determined by the governor. The high-pressure steam passing the primary valve has access to the secondary-valve chamber 8, but, the secondary valve being closed, cannot reach the outlet 9. The governor in its ordinary operation regulates the speed by determining the degree of opening of the primary valve, and in this ordinary action the secondary valve 11 takes no part, but remains closed, and high-pressure steam goes only to the high-pressure cylinder. As the primary valve rises and falls through its normal range of movement the coupling-sleeve plays idly on the button 17.

When the engine speed falls so low that the primary valve opens beyond the limit determined by the degree of lost motion between the coupling-sleeve and the button, then the further rising of the primary valve causes the secondary valve to be opened, whereupon high-pressure steam goes direct to the low-pressure cylinder, the governor thereafter operating on both the valves until the engine speed is such that the secondary valve becomes closed and further restricting action on the part of the governor becomes concentrated on the primary valve.

The key arrangements prevent the turning of either valve-stem, and consequently the button stays in proper angular relationship to the slot 16, so that it cannot pass through the slot. When the valve is to be taken apart, the lower casing may be disconnected and lowered, thus disengaging key 20 and permitting the secondary-valve stem to be turned sufficiently to permit the button to pass through the slot in the coupling-sleeve, or, if desired, before lowering the secondary-valve casing it may be turned without disengaging key 20, so that the button may pass through the slot.

I claim as my invention—

1. The combination of a primary valve, a governor connection located on one side of the primary valve, a secondary valve located upon the opposite side thereof, and a valve-stem connection between and common to both valves, each of said valves being located in a separate valve-chamber and discharging into separate outlets.

2. The combination of a primary-valve chamber having a valve-seat, a primary valve and a valve-stem seated therein, a connection for a governor upon one side of the primary valve, a secondary-valve chamber communicating with the primary chamber having a valve-seat, a secondary valve and valve-stem seated therein located upon the side opposite the governor connection of the primary valve, and a lost-motion connection between the valves.

3. The combination of a primary-valve chamber having a valve-seat, a primary valve and valve-stem seated therein, a connection for a governor upon one side of the primary valve, a secondary-valve chamber communicating with the primary chamber having a valve-seat, a secondary valve and valve-stem seated therein located upon the side opposite the governor connection of the primary valve, and a valve-stem connection between and common to both the valves, each of said valves being located in a separate valve-chamber and discharging into separate outlets.

4. The combination of a primary valve, a governor connection located on one side of the primary valve, a secondary valve located upon the opposite side thereof, and a lost-motion connection between the primary and secondary valves.

5. In a valve, the combination, substantially as set forth, with a structure comprising a chamber having an inlet and an outlet, a double primary-valve seat between the inlet and outlet, a double balanced puppet primary valve coöperating with said seat, and means for moving such valve, of a secondary-valve chamber having an inlet and an outlet and a double secondary-valve seat between the inlet and the outlet, a double balanced puppet secondary valve coöperating with said secondary-valve seat, means for holding the secondary valve normally closed, operative connections between the primary valve and the secondary valve for causing them to move simultaneously, and a lost-motion device in said connections whereby the secondary valve moves in unison with the primary valve only after the primary valve has opened to a degree in excess of the limit of said lost-motion device.

6. In a valve, the combination, substantially as set forth, with a valve-casing having an inlet and a primary and a secondary outlet and a primary-valve seat between the inlet and primary outlet and a secondary-valve seat between the primary and secondary outlets, said valve-seats being in a common line, a primary valve coöperating with the primary-valve seat, means for moving the primary valve, a secondary valve coöperating with the secondary-valve seat, means for holding the secondary valve normally closed, a stem connecting the primary and secondary valves for causing them to move simultaneously, and a lost-motion device in said stem whereby the secondary valve moves in unison with the primary valve only after the primary valve has opened to a degree in excess of the limit of the said lost-motion device.

7. In a valve, the combination, substantially as set forth, of a primary-valve casing having an inlet and a primary outlet and a primary-valve seat between the inlet and the outlet, a

removable bonnet for said valve-casing, a secondary-valve casing secured to the first-mentioned casing and having a secondary outlet and means for receiving fluid passing through the primary-valve seat and having a secondary-valve seat before the secondary outlet, said valve-seats being disposed in a common line, a valve for each of said valve-seats, means for moving the primary valve, a stem for the secondary valve, a non-circular button upon said stem, a coupling-sleeve inclosing said button and uniting said stem to the primary valve and having an opening to permit said button to pass through its floor, said button having longitudinal lost motion in said coupling-sleeve so that the primary valve may open to a certain extent while the secondary valve is closed and then open the secondary valve, means for holding the secondary valve normally closed, and devices for normally preventing the relative rotation of the coupling-sleeve and stem.

8. In a valve, the combination, substantially as set forth, of a primary-valve casing having an inlet and a primary outlet and a primary-valve seat between the inlet and the outlet, a removable bonnet for said valve-casing, a secondary-valve casing secured to the first-mentioned casing and having a secondary outlet and means for receiving fluid passing through the primary-valve seat and having a secondary-valve seat before the secondary outlet, said valve-seats being disposed in a common line, a valve for each of said valve-seats, means for moving the primary valve, a stem for the secondary valve, a non-circular button upon said stem, a coupling-sleeve inclosing said button and uniting said stem to the primary valve and having an opening to permit said button to pass through its floor, said button having longitudinal lost motion in said coupling-sleeve so that the primary valve may open to a certain extent while the secondary valve is closed and then open the secondary valve, means for holding the secondary valve normally closed, and key devices for normally preventing the relative rotation of the coupling-sleeve and stem.

9. In a valve, the combination, substantially as set forth, of a cylindrical casing 1 having the inlet 2 and outlet 3 and the double valve-seat 4, the bonnet 7 thereon, the cylindrical valve-casing 8 in line with and secured to the first-mentioned casing and having the outlet 9 and the double seat 10, the bonnet 19 on the second valve-casing, a primary valve in the first valve-casing, the stem 6 connected with the primary valve, key device 18 to prevent the rotation of the primary valve, the secondary valve in the secondary casing, the secondary-valve stem 12, key device 20 to prevent the rotation of the secondary-valve stem, spring 14 holding the secondary valve normally closed, oblong button 17 on the secondary-valve stem, and coupling-sleeve 15 having oblong opening 16 and inclosing said button and serving in coupling the two valves loosely together.

HANS HOLZWARTH.

Witnesses:
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