C. H. SIMMONS.

VALVE.

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1,369,137. Patented Feb. 22, 1921.

Fig. 1.

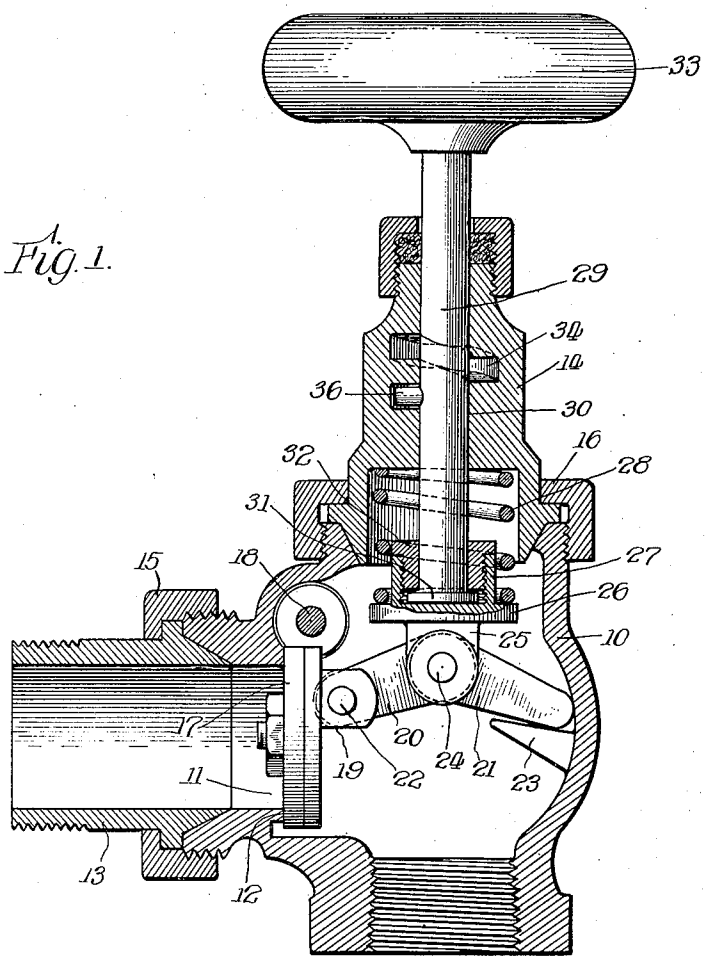
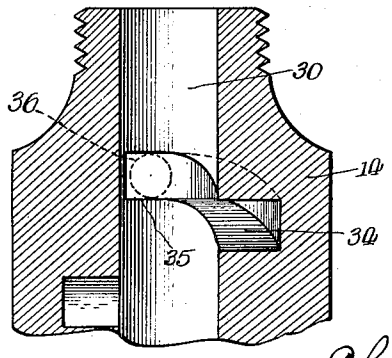


Fig. 2.



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VALVE.

1,369,137. Specification of Letters Patent. Patented Feb. 22, 1921.

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To all whom it may concern:

Be it known that I, CHARLES H. SIMMONS, a citizen of the United States, residing in the city of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Valves, of which the following is a specification.

The present invention relates to advantageous and novel features of construction in valves in general, but concerns more particularly structures of this character of the automatic or self-closing type.

The leading aim and object of the invention in its preferred embodiment is the provision or production of a valve of this kind which is certain to be fully closed or fully opened, it being impossible for the valve to more than momentarily occupy an intermediate or partly open position unless held by the operator. To this end the valve is so constructed and its parts so formed and related to one another that the operator is required to fully open the same, otherwise, upon his releasing the handle, the valve will automatically close.

A further aim and purpose of the invention is the provision of an appliance of this character which comprises few parts, which is effective in action, which is unlikely to become damaged or injured in service, and which may be made comparatively economically.

To enable those skilled in this art to fully understand the construction and mode of operation of an embodiment of this invention and the manner of attaining the specified and other objects of the invention, I have illustrated in the accompanying drawing, forming a part of this specification, a structure incorporating a desired and preferred physical embodiment of the same. This drawing should be referred to in connection with the following detailed description of the structure and its mode of functioning.

In the drawing:

Figure 1 is a substantially-central or vertical section through the improved valve; and

Fig. 2 is a detail sectional view illustrating the upper or outer portion of the cam groove with which a pin on the valve-stem coöperates.

Referring to this drawing, it will be readily seen that the improved valve comprises a suitably-shaped casing or shell 10 equipped with a valve-port 11 and its surrounding or associated valve-seat 12, the casing or shell being fitted with an extension 13 and a cap 14 in the present instance disposed at right angles to one another and detachably fastened to such shell by the threaded collars 15 and 16 respectively, which coöperate with screw threaded parts of the valve-casing in the usual and customary way.

The valve-port is adapted to be opened and closed by a valve 17 of suitable construction hinged or pivotally hung inside of the shell or casing at 18 and having on its inner face spaced apertured ears 19 to which one leg or arm of a toggle 20—21 is pivoted on a pin 22 occupying the alined holes of such ears, the other or companion arm or member of the toggle resting on an inclined ledge or shelf 23 preferably integral with and projecting inwardly from the interior surface of such shell. The middle knuckle or pivot pin 24 of the toggle is mounted in spaced ears or lugs 25 on the underside of a block or disk 26 having on its upper surface an upstanding, circular, internally-screw-threaded rib or flange 27.

A coil spring 28 encircles the rib or flange and bears at one end on a face of the extension or cap 14 and at its other end on the disk or block 26, thus acting through the toggle on the hinged valve tending to close the same. A cylindrical rod or stem 29, fitted at its outer end with a handle 33, is revolubly mounted in the central, longitudinal bearing or bore 30 of such member 14, and, at its inner end, it has a circular enlargement or head 31 revolubly held between the disk and the inner end of a threaded collar or sleeve 32 screwed into the flange or rib 27. This construction permits the rotation of such rod and head relatively to the member 26, but the latter is compelled to participate in its longitudinal or lengthwise reciprocations.

The wall of the bearing 30 has a helical or cam groove 34 accommodating a pin 36 fixed to and extended laterally radially from the rod or stem 29, and the pitch of such groove is sufficiently steep and the spring 28 suf-

ficiently strong so that in expanding to automatically close the valve the spring will cause the travel of the pin in the groove and consequently a rotation of the rod simultaneously with its axial inward movement. In order, however, to maintain the valve in fully open position, or in any other predetermined position if preferred, the end portion 35 or other proper part of the cam groove is made without pitch or inclination with respect to the axis of the rod, and, accordingly when the pin 36 is in such portion of the groove, the rod is thereby locked or held from responding to the action of the spring.

Assuming that the valve is closed and maintained in such relation by the action of spring 28 and that it is desired to open it, the operator turns handle 33 thus rotating the shank or stem 29, and, by reason of the travel of pin 36 in the spiral or cam groove, the rod 29 and its head 31 are caused to recede or move axially outwardly against the action of spring 28, and this rectilinear movement is transmitted through the element 32 and disk 26 to the toggle which is thus collapsed or bent, and during such action the member 21 of the toggle slides inwardly somewhat on its supporting ledge or shelf 23. If the operator turns the handle 33 sufficiently to bring the pin 36 into the straight part 35 of the cam groove and then releases the handle, the valve will be maintained fully open, because the spring 28 cannot cause the pin 36 to travel in the part 35 of the groove by reason of its direction with reference to the line of action of the spring. If, however, the operator releases the handle 33 before the valve is completely opened, that is to say before the pin 36 reaches the part 35 of the groove, the spring will immediately close the valve, being of sufficient strength to cause the travel of the pin in the inclined or helical portion of the groove. It is assured, therefore, that the valve when not being manipulated is in either fully closed or completely opened position.

If the valve is in its opened position and it is desired to close it, all that is necessary on the part of the operator is to turn the handle 33 sufficiently to cause the pin 36 to enter the inclined or helical part of the groove and then release the handle. Thereupon the structure responds to the expanding action of the spring and the valve is promptly and fully closed automatically.

While it may not be absolutely essential, nevertheless it is desirable to so construct the parts that the link or arm 21 of the toggle will not only have an edge bearing on the support 23 when the valve is closed but also bear at its end against the inner face of the shell or housing, thereby relieving the rod or stem 29 from considerable strain in its bearing 30.

Those trained in this art will readily appreciate that many minor mechanical changes may be made in the structure depicted and described without departure from the heart and essence of the invention and without the sacrifice of any of its substantial benefits and advantages. For example the element 21 and its associated bearing 23 may be omitted from the construction, but it is desirable, however, to employ these parts to secure a preferred arrangement and balancing of the strains in the appliance. Stated somewhat differently, the invention is susceptible of a variety of embodiments, the one presented being merely brought forward by way of example only.

I claim:

1. A valve structure of the character described comprising in combination a valve-casing having a valve-port, a movable valve to open and close said port, a toggle to move said valve to open and closed positions, a spring acting on said toggle tending to automatically close the valve, and means to maintain said valve open against the closing action of said spring only when the valve is in a predetermined open position substantially as described.

2. In a valve structure of the character described, the combination of a valve-casing having a valve-port, a movable valve to open and close said port, a toggle connected to said valve, a spring tending to close said valve, a handle, a stem for said handle having an operative connection with said toggle, means provided with a cam groove, and a pin on said stem adapted to travel in said groove, the latter being shaped to retain said pin in one position against response to the valve closing action of said spring, substantially as described.

3. In a valve structure of the character described, the combination of a valve-casing having a valve-port and an internal ledge, a movable valve to open and close said port, a toggle connected to said valve and having one of its arms with a sliding bearing on said ledge, a spring tending to automatically close said valve, a handle, a handle stem, a bearing member in which said stem is revoluble and longitudinally slidable, means operatively connecting said stem to the knuckle joint of the toggle, said bearing member having a cam groove, and a pin on said stem in said groove, the latter being shaped to retain said pin in one position against response to the valve closing action of said spring, substantially as described.

4. A valve structure of the character described, comprising in combination a valve-casing having a valve-port, a hinged valve adapted to open and close said port, a ledge on said casing, a toggle having one leg pivotally connected to said valve, the other toggle leg bearing on said ledge, a block connected

to the knuckle joint of said toggle, a spring acting on said block tending to straighten the toggle and automatically close the valve, a bearing member having a helical groove, a handle, a handle stem having a rotary and sliding bearing in said member and having a rotary connection with said block, and a pin on said stem in said helical groove, the latter being shaped to permit automatic closing of the valve by the spring except when the pin is in that portion of the groove corresponding to the fully open position of the valve, substantially as described.

CHAS. H. SIMMONS.