

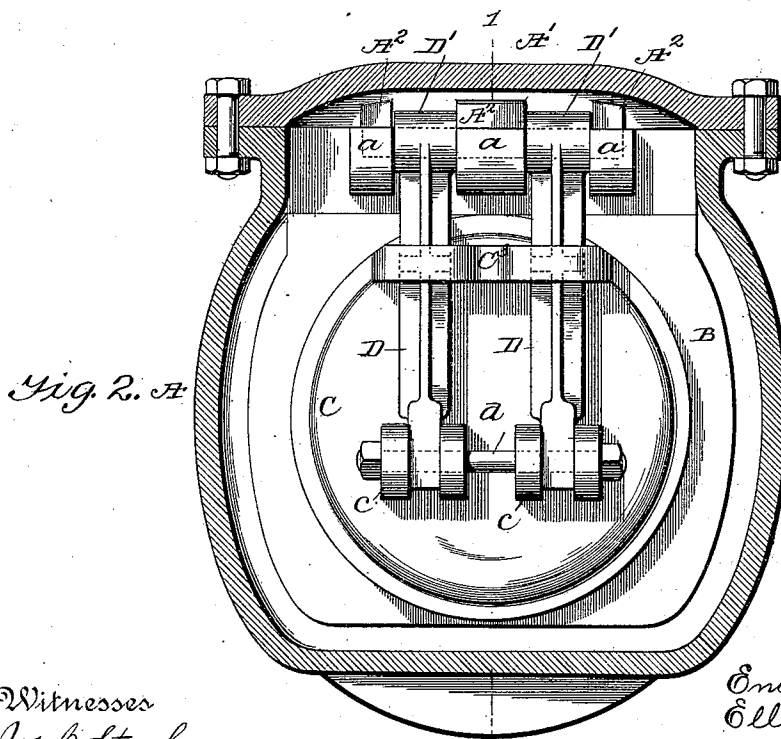
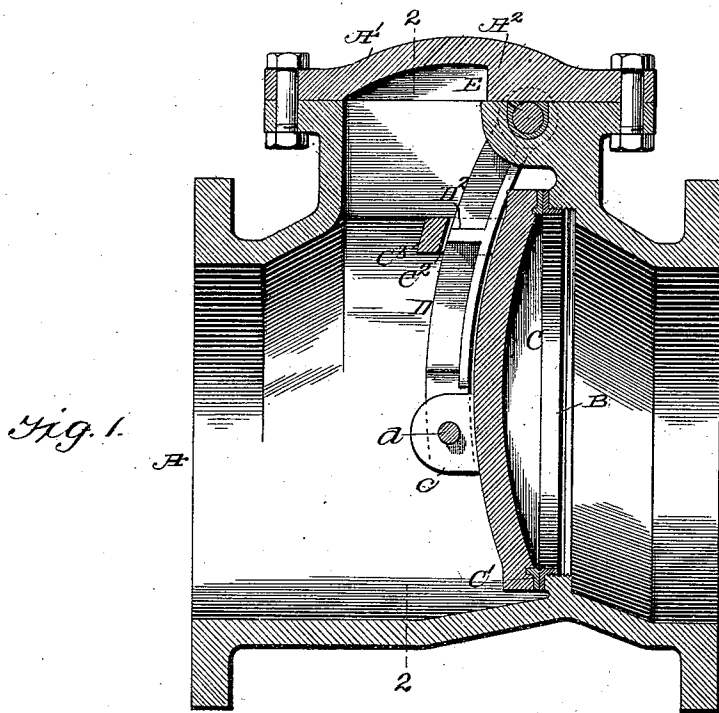
(No Model.)

2 Sheets—Sheet 1.

E. KUICHLING & E. L. ROWE.
CHECK VALVE.

No. 556,636.

Patented Mar. 17, 1896.



Witnesses
Jos. C. Stack.
James R. Mansfield.

Inventor
Emil Kuichling
Ellis L. Rowe
by
Alexander F. Sowell
Attorneys

(No Model.)

2 Sheets—Sheet 2.

E. KUICHLING & E. L. ROWE.
CHECK VALVE.

No. 556,636.

Patented Mar. 17, 1896.

Fig. 3.

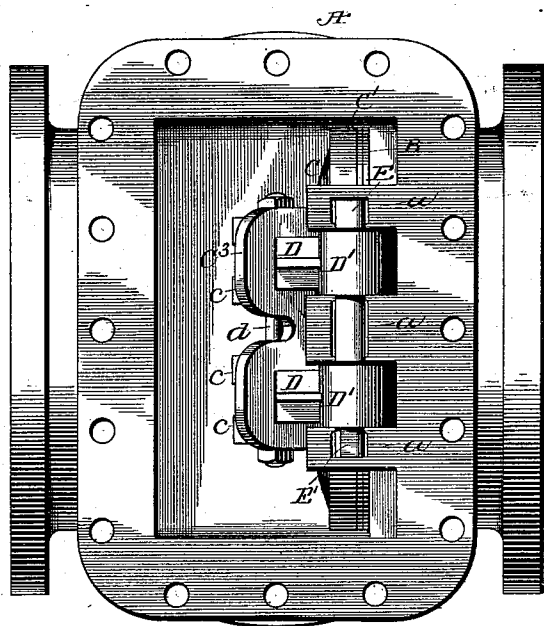


Fig. 4.

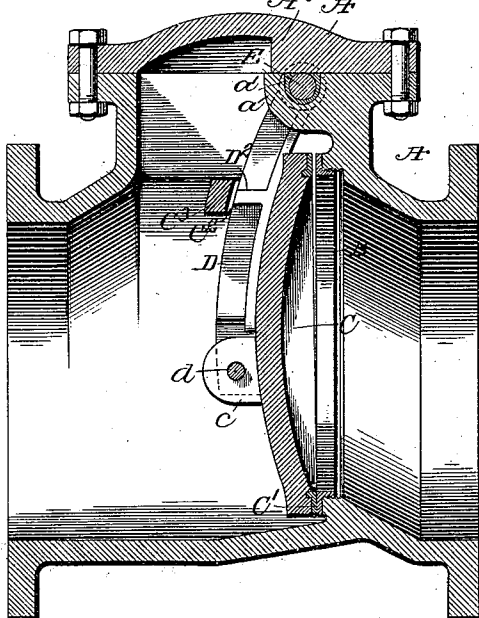
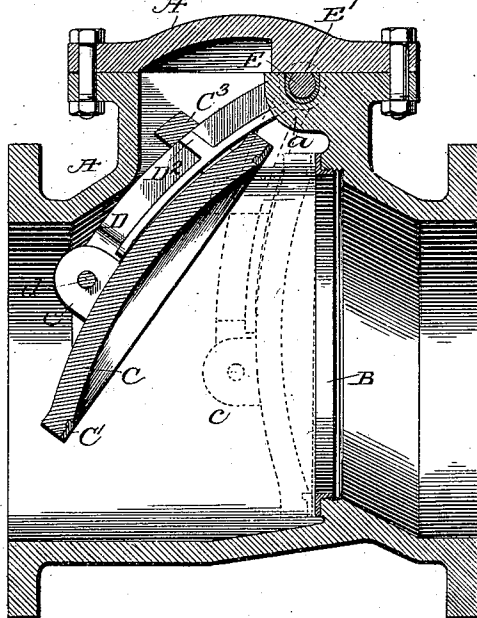


Fig. 5.



Witnesses
Jos. C. Stack.
James R. Mansfield.

Inventors
Emil Kuichling.
Ellis L. Rowe.
By Alexander & Fowell
Attorneys

UNITED STATES PATENT OFFICE.

EMIL KUICHLING, OF ROCHESTER, AND ELLIS L. ROWE, OF TROY, AS-
SIGNORS TO THE RENSSELAER MANUFACTURING COMPANY, OF TROY,
NEW YORK.

CHECK-VALVE.

SPECIFICATION forming part of Letters Patent No. 556,636, dated March 17, 1896.

Application filed May 31, 1895. Serial No. 551,051. (No model.)

To all whom it may concern:

Be it known that we, EMIL KUICHLING, of Rochester, in the county of Monroe, and ELLIS L. ROWE, of Troy, in the county of Rensselaer, State of New York, have invented certain new and useful Improvements in Check-Valves; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

This invention is an improvement in check-valves especially designed for use on water-supply systems, and its objects are, first, to obviate the injurious shocks and pounding from water-ram in the pipes (attendant on the use of check-valves as ordinarily constructed) by making the valve-gate open and close in a peculiar manner; second, to so construct the check-valve that its gate will open or close under very low pressure or from the slightest current of water in either direction, or gradually but quickly unseat itself under high pressure, and will be operated without loss of head or pressure in the mains, and, third, to render all parts of the check-valve readily accessible, and simple and durable in construction.

The invention therefore consists in the novel construction and combinations of parts hereinafter claimed, and the following is a detailed description of what we consider the best and simplest form of check-valve embodying our invention, reference being made to the accompanying drawings, illustrating the same, by letters of reference.

In said drawings, Figure 1 is a central vertical longitudinal section through the check-valve on line 1 1, Fig. 2. Fig. 2 is a transverse section through the valve-casing on line 2 2, Fig. 1, showing the valve and its hangers in full lines. Fig. 3 is a top plan view of the valve with the top plate of casing removed. Figs. 4 and 5 are detail sections like Fig. 1, showing the different positions of the valve in opening and closing.

The valve-casing A, as shown, is provided with a vertical bronze valve-seat B near one end, the bottom of passage through the cas-

ing being inclined upwardly toward this seat at the inlet side and dropping below the seat on the outlet side, so that there will be no place for lodgment of silt, &c., which might choke the valve. In the top of the casing is an opening closed by a removable cover A'. Said opening is of such size that the entire gate mechanism can be readily put in or taken out, as desired, when cover A' is removed.

The gate C is provided with a bronze facing C' to fit against the seat B, and has two pairs of perforated ears *c c* projecting from its rear face, said ears being horizontally in line and below the central horizontal diameter of the gate. Between these ears are pivotally secured the lower ends of hangers D D by means of a through-bolt *d*. Said hangers are preferably of bronze, extend above the gate, and have sleeves D' on their upper ends by which they are hung on a stub-shaft E, which is supported in U-shaped lugs *a*, projecting from the inner wall of the casing directly above seat B, as shown.

The shaft E is centered in any suitable manner in its bearings or supports *a*, so that the gate is hung directly opposite its seat and (when the seat is vertical, as shown) will just close by gravity, if otherwise unaffected. The shaft is properly centered in its bearings by pouring soft-metal packing into the cavities in lugs *a*, while the gate is held properly on its seat in any suitable manner, such packing being indicated at *a'* in Fig. 1.

On the under side of cover A' are lugs A², which fit over lugs *a* when the cover is in position and confine the shaft E in place. To prevent rotation thereof the shaft is slightly flattened at one end, as at E', beneath the lugs, as shown in Fig. 3.

Hangers D pass through a yoke C³ on the back and near the top of the gate. The passages C² through the yoke are slightly larger than the hangers are thick, so that the gate is allowed a limited swing upon bolt *d* in relation to the hangers.

The hangers are preferably T-shaped in cross-section to make them light, but are provided with cross-flanges D² where they pass through the yokes to increase their contact wearing-surfaces.

It will be noticed that the pivots or hinge of the gate on its hangers is below the center of the gate or near the side of the gate farthest from the shaft E. Consequently there will be a tendency of the upper end of gate to drop away from the hangers. The gate is hung in this peculiar manner so that instead of rising bodily away from the seat in opening its upper end or edge nearest the shaft E will first tilt off the seat and allow water to flow past the top of the valve before the lower part is off the seat, and in closing the same peculiar hinging causes the reverse action of the valve, for the top of the valve will reach the seat before the lower part. Consequently while the greater part of the water is shut off at once a sufficiently small quantity of water is caught between the lower edge of valve and seat to cushion it and prevent the injurious jarring and pounding which would certainly ensue if the entire water-way was closed at once. Hence it will be seen that the action of the gate hung in this peculiar manner is such that the slightest current of water in either direction will operate it, and no appreciable loss of head or back pressure upon the pumps can ensue, and by being cushioned in the closing process the usual wear upon the seats and consequent leakage caused by pounding of the gate in closing, in valves as usually constructed, is avoided. For instance, when the gate is closed, as indicated in Fig. 1, it fits closely and easily on seat B. If a small quantity of water be withdrawn from the main in rear of the gate the slight pressure in front thereof will tilt the upper part of the gate slightly backward, as indicated in Fig. 4, unseating the upper portion of the gate sufficiently to allow the minute quantity of water to pass before swinging the gate entirely off its seat, and as soon as the pressure on both sides of gate is equal the gate closes easily and quietly. If a large volume of water is to pass, the gate is first tilted back, as described, and then bodily swung off its seat, as indicated in Fig. 5. When the rush ceases the gate tilts forward by gravity, as indicated in dotted lines, Fig. 5, and the upper part of the gate first contacts with the seat; but, as the gate is hinged on its hangers, it yields until the bottom comes in contact with the seat also. Thus the double swinging movement of the gate prevents any sudden clacking of the gate against its seat and consequent sudden cut-off of the entire water-passage. If the gate be forced suddenly in either direction it will tilt on its hangers, and therefore instead of lifting directly away from the seat at all points, or seating directly on the seat at all points, it gradually separates from and comes back to the seat. This tilting action of the gate causes an automatic water-cushioning of the gate in opening and closing, and it further renders the check-valve very sensitive in action, for it will respond immediately to very slight changes in pressure which would

not affect the gate if it has to lift bodily from the seat at all points simultaneously.

While we prefer to hang the gate vertically, as shown in drawings, it might in some cases be arranged on an incline, as in ordinary forms of check-valves, the hinge connections being maintained, so that it would be cushioned in opening and closing, as described.

For small check-valves one hanger might be found sufficient; and for very large mains we would prefer to arrange a number of the gates over corresponding seats, constructed substantially as described, but having a total area equal to the desired water-way, rather than use one large gate, as the multi-gate check-valve would be more sensitive in action.

The foregoing with the drawings will make clear the peculiar tilting motion of the gate and its method of hanging, whereby the weight of the gate is supported on the pivots, thus requiring only the slightest flow of water to open the check, also its method of opening one side first and closing in the same manner—that is, the area of water above where it is hung is so much greater than below where the gate is pivoted onto its hangers, that in closing the top of the gate always closes first and cushions down on the water passing through it.

Having thus described our invention, what we therefore claim as new, and desire to secure by Letters Patent thereon, is—

1. In a check-valve the combination of a casing, and seat, with a tilting and swinging gate hinged on swinging supports below its center, substantially as and for the purpose set forth.

2. In a check-valve the combination of the casing, the seat, and the hangers hinged to the casing above the seat, with the gate fitted to the seat and hinged to the hangers below its center, so that the gate will tilt off and on its seat in opening and closing, substantially as and for the purpose specified.

3. In a check-valve the combination of the casing, the seat, and the hangers hinged to the casing above the seat with the gate fitted to the seat and hinged to the hangers below its center, so that the gate will tilt off and on its seat in opening and closing, and the yoke attached to the gate and embracing the hangers to limit the movement of the gate in relation thereto, substantially as and for the purpose described.

4. In a check-valve, the combination of the casing having a seat, lugs above the seat and a shaft supported in said lugs; with the gate fitted to said seat, and the hangers suspended from said shaft and pivoted to the gate below its center, for the purpose and substantially as described.

5. In a check-valve the combination of the casing having a seat, lugs above the seat and a shaft supported in said lugs; with the gate fitted to said seat, and the hangers suspended from said shaft and pivoted to the gate below

its center, and the yoke attached to the gate loosely embracing the hangers, substantially as and for the purpose described.

6. The herein-described check-valve consisting of the casing having a seat, U-shaped lugs above the seat, a detachable cover having lugs fitting over those in the casing, a shaft supported in the lugs of the casing; the hangers suspended from said shaft, a gate hinged to the hangers below its center, and the yoke on the upper side of gate loosely

embracing the hangers, all substantially as and for the purpose set forth.

In testimony that we claim the foregoing as our own we affix our signatures in presence of two witnesses.

EMIL KUICHLING.
ELLIS L. ROWE.

Witnesses:

HORACE G. PIERCE,
SOLOMON R. HENDRICKS.