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F. GFELLER

WATER DISCHARGE VALVE

Filed Dec. 23, 1925

Fig. 1.

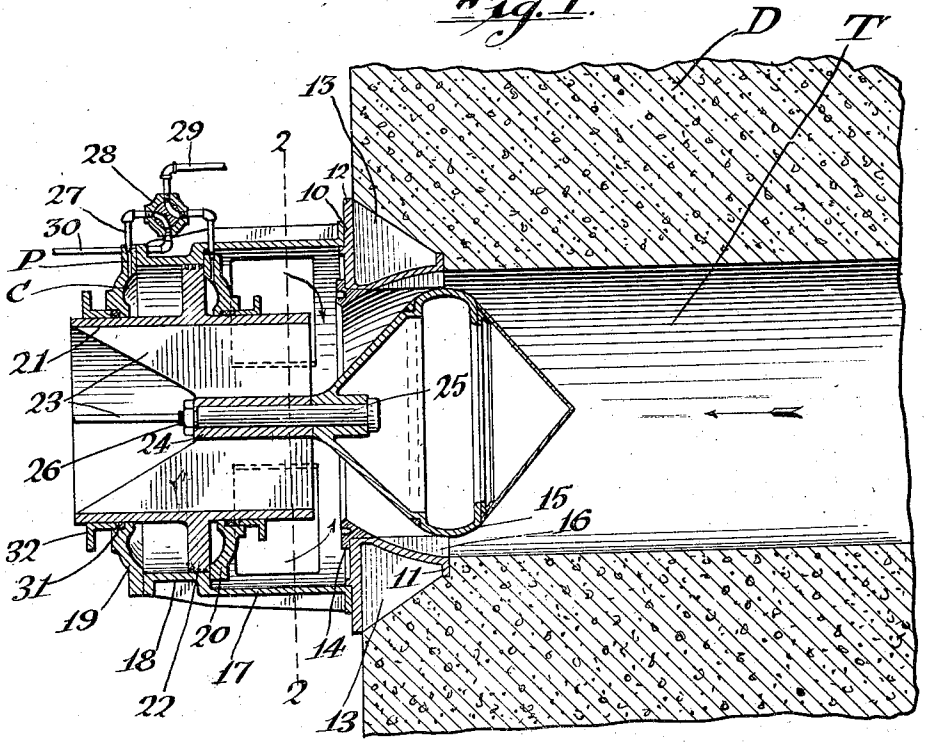
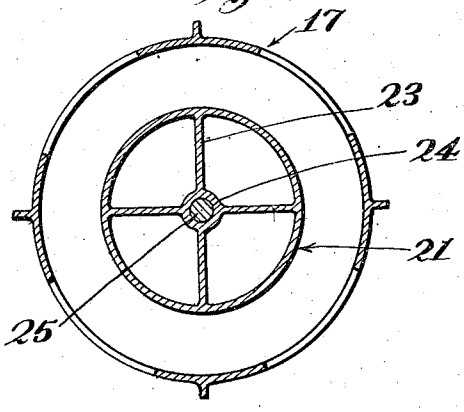


Fig. 2.



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WATER-DISCHARGE VALVE.

Application filed December 23, 1925. Serial No. 77,391.

This invention relates to improvements in water discharge valves primarily designed for use in connection with dams and the like, and may be considered as an improvement upon the water discharge valve disclosed in my co-pending application Serial No. 613,644, filed January 19, 1923.

In this invention as well as that disclosed in my prior application, the valve consists essentially of a valve seat imbedded in or secured to a dam structure adjacent the discharge end of an outlet or tunnel through the dam. The purpose of this construction is to allow the tunnel to remain full of water at all times and to prevent any disturbance of flow through the tunnel which is apt to cause eddy currents and partial vacuums and thus corrode or eat away the interior of the tunnel. In my prior application there is a yoke secured to the valve seat and against which the water discharges when the valve is open. This yoke has a tendency to disperse the water which in certain instances is objectionable.

An object of this invention is to provide a water discharge valve similar in construction and operation to that disclosed in my prior application, but which will not disperse or deflect the water when the valve is open and thus overcome the above objection.

A further object of this invention is to provide a water discharge valve with a novel operating mechanism for opening and closing the valve.

With the foregoing and other objects in view which will be made manifest in the following detailed description and specifically pointed out in the appended claims, reference is had to the accompanying drawings for an illustrative embodiment of the invention, wherein:

Figure 1 is a vertical section through a dam or similar structure and through the improved valve shown as mounted thereon, and

Fig. 2 is a vertical section taken upon the line 2—2 of Fig. 1.

Referring to the accompanying drawings wherein similar reference characters designate similar parts throughout, the dam is indicated at D having an outlet or tunnel T therein. At the discharge end of the tunnel there is provided an annular body 10 which has inside and outside flanges 11 and 12 respectively which are connected by webs 13 imbedded in the masonry of the dam D. Secured to the body is a seat ring 14 forming a seat for the pointed closure 15. This pointed closure may be of any desired construction and is preferably hollow to reduce its weight. It is slidable between guide ribs 16 formed on the interior of the body 10. A frame 17 is secured to the outside flange 12 and presents an interior cylindrical surface 18 which is coaxial with the center or axis of the valve 15.

Two heads 19 and 20 are secured to the frame at the ends of the cylindrical surface 18 and form the ends of a cylinder. A tubular member 21 is slidable within the heads 19 and 20, and has an axis coincident with that of the valve closure 15. It is provided with an annular flange 22 which fits and slides upon the cylindrical surface 18, this flange constituting a piston which is rigid with the tubular member. Radial webs 23 are formed integral with or secured to the tubular member 21 and are joined to a central hub 24. A bolt 25 extends through the valve closure 15 and through the hub 24 and is tightened by means of a nut 26. The opposed faces of the two heads 19 and 20 are preferably concaved, as indicated at C, and have ports P which terminate in the concavities. Suitable pipes 27 connect the ports to a suitable valve, such as a four-way valve indicated at 28. The pipe 29 connects the valve to a suitable source of fluid pressure, such as for example the water in the reservoir provided by the dam. A pipe 30 provides an exhaust for the four-way valve 28.

In operation the valve acts as follows: In turning the four-way valve 28, fluid pressure can be admitted to the space between the flange 22 and the head 19, causing the tubular member to move toward the dam and consequently moving the valve closure 15 toward the entrance to the tunnel or outlet T, thus opening the valve. When the valve is

open, as shown upon Fig. 1, water passes around the pointed closure 15 through the annular body 10 and through the tubular member 21 between the radial webs 23. The stream being thus confined by the tubular member 21 will not become dispersed or scattered, as is the case to a small degree in the device in my co-pending application. The forward edges of the webs 23 which are adjacent the valve seat are preferably sharpened forming knife edges so as to reduce the friction of water passing through the tubular member. It will be noted that as the valve is in its fully open position, the edge of the tubular member 21 which is most adjacent the body 10 is spaced therefrom. This is an important feature of the construction in that it allows air to enter the tubular member with the stream, thus reducing any tendency of a partial vacuum being formed therein. When a partial vacuum is formed in a conduit of this kind, it is very destructive in that it quickly corrodes and eats away the metal.

By this construction it will be readily appreciated that a large supply of air can readily enter the tubular member 21 with the stream, so that no partial vacuum will be formed. In order to close the valve the four-way valve 28 is turned, so that fluid pressure is admitted between the flange 22 and the head 20, thus moving the tubular member and valve closure from right to left, causing the valve closure to seat upon the ring 14. It will be readily understood that while fluid pressure is being admitted between the flange 22 and the head 20, it is being exhausted from the space from between the flange 22 and the head 19. Any leakage between the heads 19 and 20 and the tubular member 21 is effectively prevented by means of packing 31 compressed by means of glands 32.

A further advantage of the above described construction resides in the ease with which the device can be dissociated for purposes of repair or inspection. It will be understood that by loosening the bolts which fasten the heads 19 and 20 in place, these heads can be removed and the tubular member 21 can be removed by unscrewing the nut 26. In this manner the complete operating mechanism can be removed, leaving the valve closure 15 in place. Although the valve closure 15 may fill with water because of seepage or there may be one or more small holes in the valve closure to allow water to enter it and thus prevent any tendency to collapse the closure, the water cannot leak very easily past the bolt 25. In this manner the complete device can be overhauled with very little difficulty and at the same time it will not be necessary to allow the water to escape through the tunnel T.

A feature of the construction of the improved valve resides in the manner in which it is initially mounted upon the dam or wall. During the construction of the dam the annular body 10 alone is embedded in the soft concrete over the outlet or discharge end of the tunnel T. After the concrete has hardened, the pointed closure 15 with the bolt 25 projecting therefrom is inserted into the body and slides upon the ribs 16. After the closure has been so positioned, the seat ring 14 is then applied, locking the closure from being withdrawn from within the annular body 10. After this has been done the frame 17 and the tubular member 21 can be applied. By this construction it will be appreciated that workmen in constructing the dam need only concern themselves with the proper positioning of the annular body 10.

It will be understood that various changes may be made in the detail of construction without departing from the spirit or scope of the invention as defined by the appended claims.

I claim:

1. A valve comprising an outer stationary annular seat, an inner movable closure adapted to seat thereon, a tubular member behind the closure through which fluid passes after passing the closure when the closure is open, said tubular member being secured to said closure, and means for seating and unseating the closure, there being a passage whereby air may enter the tubular member and mix with the liquid therein as it passes therethrough so as to destroy partial vacuums which may tend to form in the tubular member.

2. A valve comprising a body providing an outer annular valve seat on the forward side thereof, an inner movable closure adapted to seat thereon, means for seating and unseating the closure, a tubular member arranged behind said body and through which fluid passes after passing the valve closure, said tubular member being secured to said closure, there being a passage permitting air to freely enter the tubular member with the fluid to destroy partial vacuums which might tend to form in the tubular member.

3. A valve comprising a seat, a closure adapted to seat thereon, a frame, a tubular member slidable upon the frame opposite the center of the valve seat whereby when the valve is open, fluid may pass therethrough, means connecting said tubular member to the closure so that the closure may be movable thereby, an annular flange upon said tubular member constituting a piston, a cylinder upon said frame in which said flange is disposed, and means for admitting fluid to said cylinder upon either side of said flange to move said tubular member in either direction.

4. A valve comprising an annular body

providing an outer stationary valve seat, an inner movable closure adapted to seat upon one side of said seat, a frame disposed upon the other side of said seat, a tubular member slidable upon said frame disposed opposite the center of said annular body so that when the valve is open, fluid may pass therethrough, means connecting said tubular member to the closure, and means for moving said tubular member so as to move the closure thereby.

5. A valve comprising an annular body providing a valve seat, a closure adapted to seat upon one side of said seat, a frame disposed upon the other side of said seat, a tubular member slidable upon said frame disposed opposite the center of said annular body so that when the valve is open, fluid may pass therethrough, means connecting said tubular member to the closure, and hydraulic means for moving said tubular member so as to move the closure thereby.

6. A valve comprising an annular body providing a valve seat, a closure adapted to seat upon one side of said seat, a frame disposed upon the other side of said seat, a tubular member slidable upon said frame disposed opposite the center of said annular body so that when the valve is open, fluid may pass therethrough, means connecting said tubular member to the closure, said tubular member having an exterior annular flange constituting a piston, means providing a cylinder in said frame in which said flange is disposed, and means for admitting fluid pressure to said cylinder upon either side of the flange to move the tubular member and closure in either direction.

7. A valve comprising an annular body providing an outer stationary valve seat, an inner movable closure adapted to seat upon one side of said seat, a frame disposed upon the other side of said seat, a tubular member slidable upon said frame disposed opposite the center of said annular body so that when the valve is open, fluid may pass therethrough, means connecting said tubular member to the closure, and means for moving said tubular member so as to move the closure thereby, said tubular member being spaced from said body as and for the purpose described.

8. A valve comprising an annular body providing a seat, a pointed closure adapted to seat upon one side of the body and having a stem extending through the body, a frame secured to the body upon the other side thereof, a tubular member slidable in said frame and disposed opposite the center of the body so that when the valve is open, fluid may pass therethrough, webs disposed within said tubular member and connected to said stem, and means for moving said tubular member so as to seat and unseat the closure.

9. A valve comprising an annular body providing a seat, a pointed closure adapted to seat upon one side of the body and having a stem extending through the body, a frame secured to the body upon the other side thereof, a tubular member slidable in said frame and disposed opposite the center of the body so that when the valve is open, fluid may pass therethrough, webs disposed within said tubular member and connected to said stem, and means for moving said tubular member so as to seat and unseat the closure, said tubular member being adapted to assume a position in spaced relation to said body when the valve is in fully open position as and for the purpose described.

10. A valve comprising an annular body providing a seat, a pointed closure adapted to seat upon one side of the body and having a stem extending through the body, a frame secured to the body upon the other side thereof, said frame presenting an interior cylindrical surface, a tubular member having an external flange fitting said surface and slidable thereon, heads secured to the frame at each end of the cylindrical surface and fitting around said tubular member, and means admitting fluid to the space between either head and said flange to move the tubular member in either direction, said tubular member being provided on its interior with webs secured to said stem, whereby the closure may be moved by said tubular member.

11. A valve comprising an annular body providing a seat, a pointed closure adapted to seat upon one side of the body and having a stem extending through the body, a frame secured to the body upon the other side thereof, said frame presenting an interior cylindrical surface, a tubular member having an external flange fitting said surface and slidable thereon, heads secured to the frame at each end of the cylindrical surface and fitting around said tubular member, and means admitting fluid to the space between either head and said flange to move the tubular member in either direction, said tubular member being provided on its interior with webs secured to said stem, whereby the closure may be moved by said tubular member, said tubular member being adapted to assume a position in spaced relation to said body when the closure is in full open position as and for the purpose described.

12. A valve comprising an annular body adapted to be mounted in a masonry structure about the outlet end of a tunnel therethrough, said body having a seat on its forward side, a closure member adapted to seat upon said seat, a tubular member arranged behind said body through which fluid passes after passing the valve closure, means connecting the tubular member to the valve

closure, means for moving the tubular member and valve closure to seat and unseat the valve closure, and means providing a guide for the tubular member, said tubular member being so arranged that when the valve is in fully open position, the forward end of the tubular member will be spaced from said body, whereby air may freely enter the forward end of the tubular member with the fluid and destroy partial vacuums which might tend to form therein.

In testimony whereof I have signed my name to this specification.

FREDERICK GFELLER.