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WATER GAGE.

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960,944.

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Fig. 1.

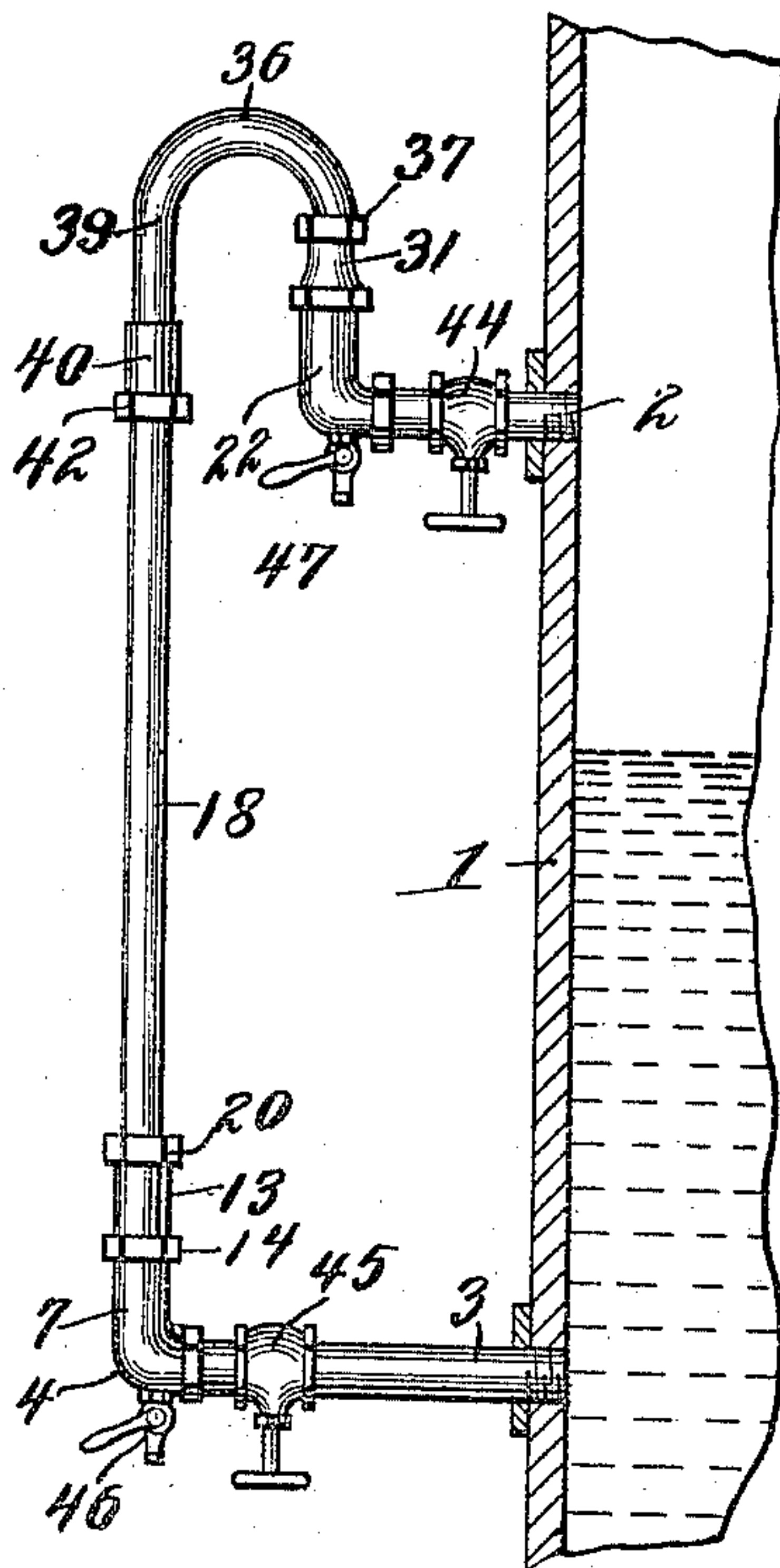


Fig. 3.

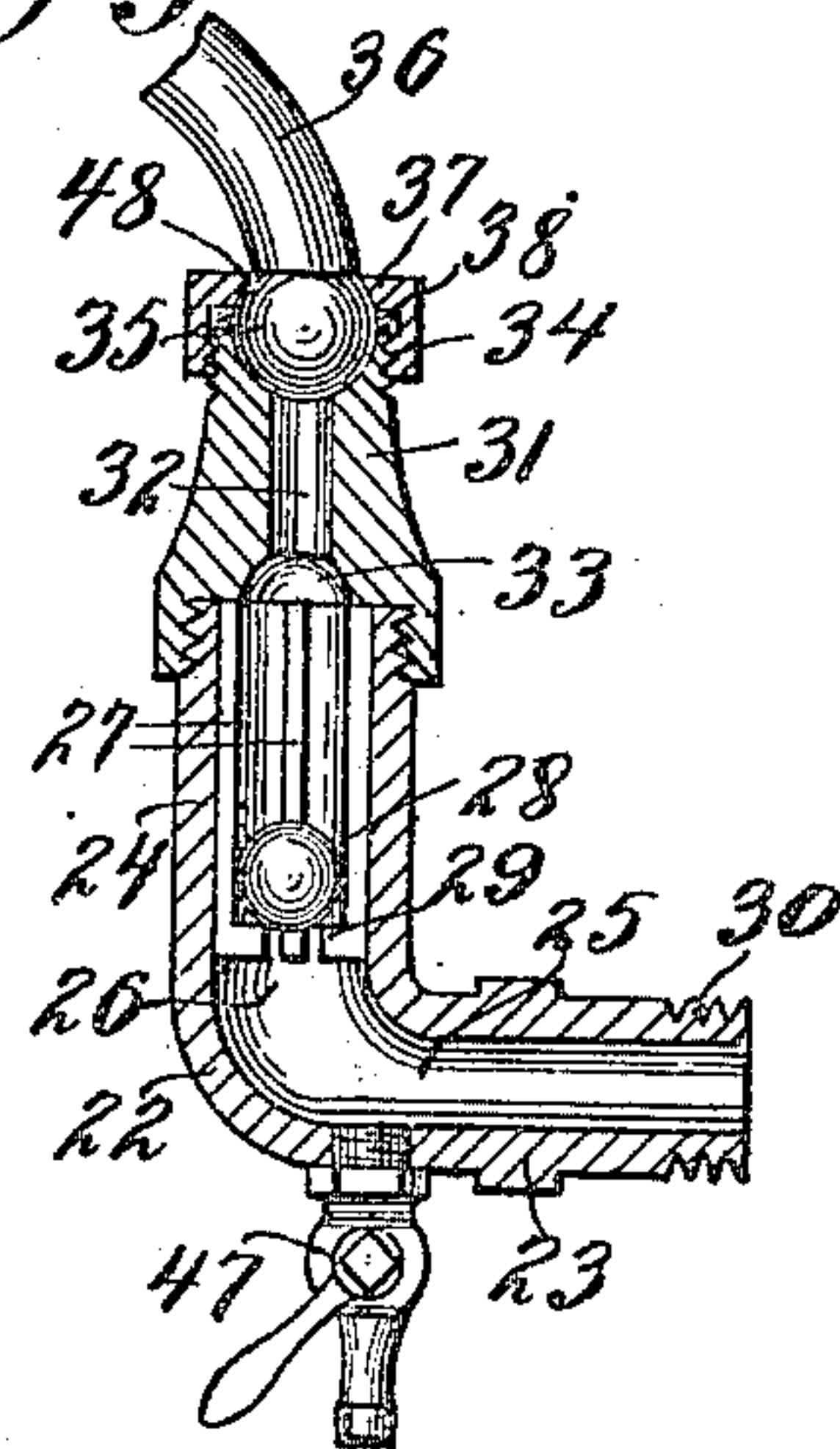


Fig. 4.

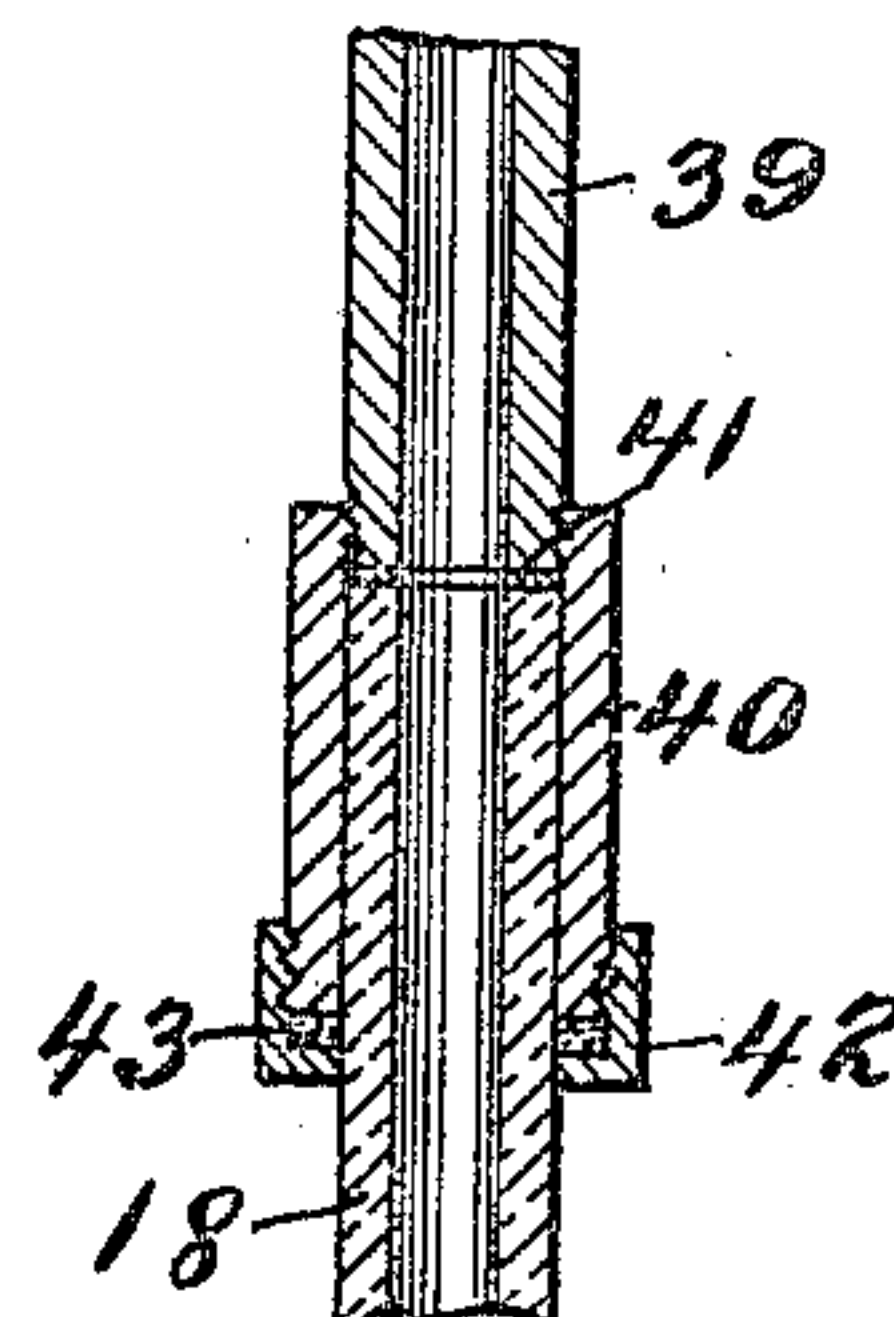
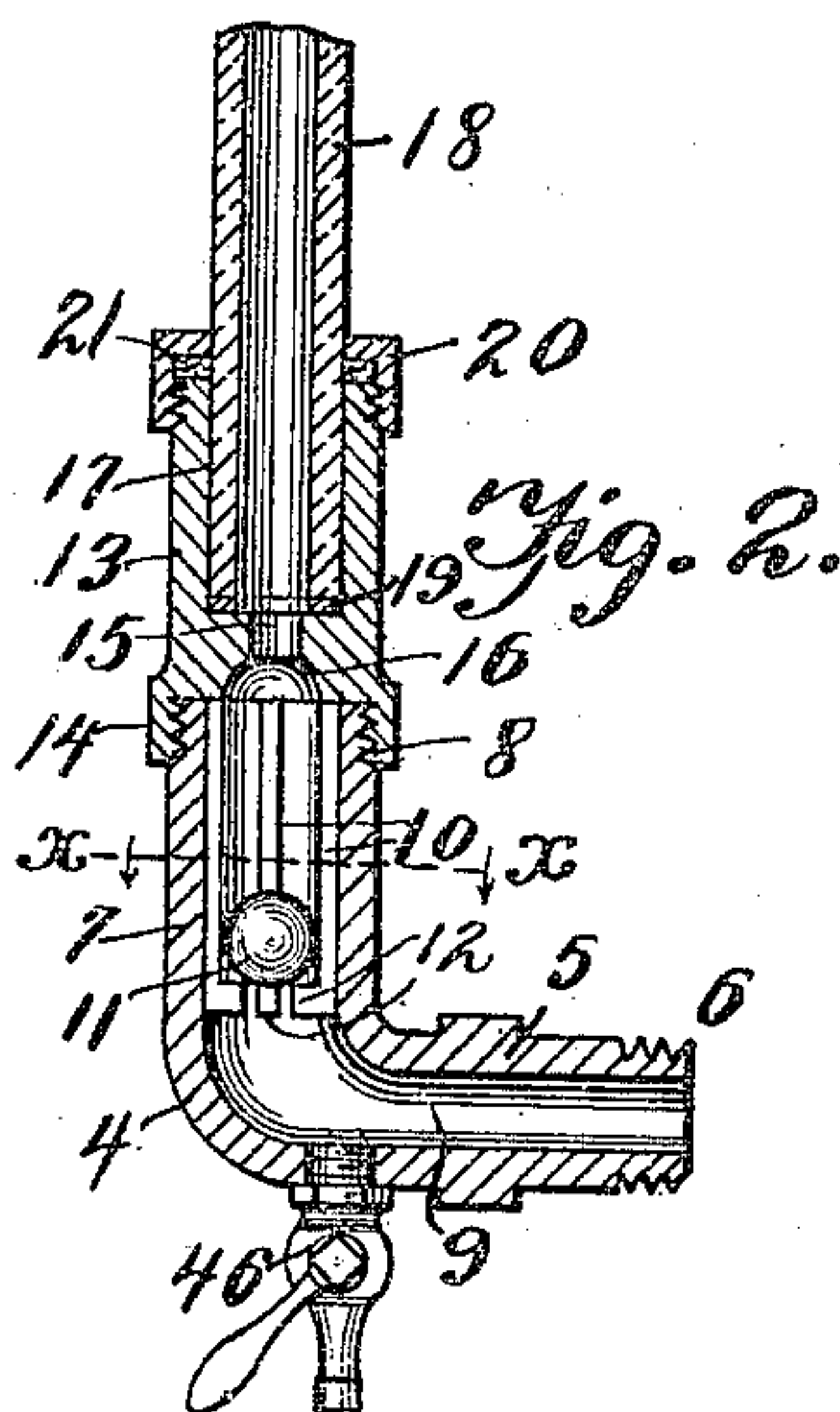
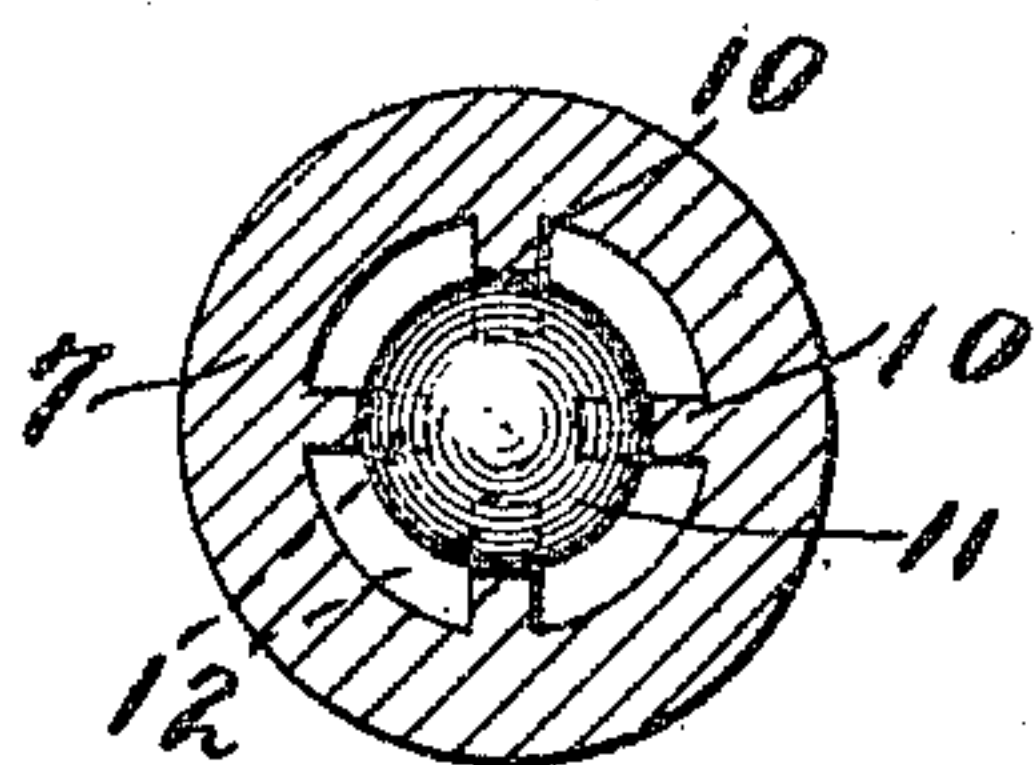


Fig. 5.



Witnesses

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UNITED STATES PATENT OFFICE.

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WATER-GAGE.

960,944.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, CARL WILHELM JOHNSON and CHARLES MERRIDITH RATHKE, citizens of the United States, and residents of Brockwayville, county of Jefferson, and State of Pennsylvania, and the city of Pittsburg, county of Allegheny, and State of Pennsylvania, respectively, have invented certain new and useful Improvements in Water-Gages, of which the following is a specification.

Our invention relates to water gages for steam boilers and particularly to water gages equipped with means for automatically shutting off the water and steam from the boiler when the sight glass becomes loosened in its sockets or broken.

The water gage of a steam boiler consists generally in a tubular sight glass having its ends arranged in socket members connected with the boiler above and below the water line. When the sight glass is accidentally broken the steam and hot water escape freely and scatter about the boiler room, or the cab if in a locomotive, injuring the attendants and frequently endangering life. It is true that the socket members, or the ducts, leading to them, are provided with valves for shutting off the steam and water, but these are usually manually controlled valves and it is practically impossible to approach the same while the steam and hot water are issuing freely from the gage.

The object of our invention is to provide an improved water gage equipped with means for automatically shutting off the steam and water from the boiler when the sight glass is broken.

A further object of our invention is to provide a water gage as mentioned having the automatic water and steam shut-offs, and provided with manually operable means for cutting off the water and steam from the socket members, while the device is undergoing repairs.

A further object of our invention is to provide a water gage for steam boilers characterized as above mentioned and of such construction that the air contained within the sight glass, particularly after placing a new one, may be driven out before the steam is admitted thereto.

A further object of our invention is to provide a water gage wherein a new sight glass may be readily placed without remov-

ing any of the parts of the device, and the sight glass tightly secured within the sockets without danger of breaking the same.

Other objects will appear hereinafter.

With these objects in view our invention consists generally in a pair of similar elbow members each arranged with an upwardly extending vertical portion and equipped with means for securing the same to and in communication with the boiler, one above and the other below the water line, caps secured to the upper end of the upwardly extending portions and provided with a valve seat, guides in each of said vertical portions, ball valves arranged in said guides, a sight glass and sockets for the ends of said glass, the whole being so arranged that the pressure of the steam and water will quickly seat said ball valves when said sight glass is broken to automatically shut off the water and steam.

Our invention further consists in a water gage as mentioned provided with manually operable valves located between said elbow members and the boiler whereby additional means are provided for cutting off the steam and water from the gage while being repaired.

Our invention further consists in a water gage characterized as above mentioned and equipped with a return bend connected by a ball and socket joint with the cap of the upper elbow member, the free end of said return bend and the cap on the lower elbow member being provided with sockets for the ends of the sight glass, said ball and socket joint providing means whereby the upper socket may be readily turned upwardly and to the side while inserting the tube or sight glass in the lower socket and then turn down over the upper end thereof and also providing means whereby the two sockets may be brought into alinement when securing the sight glass therein without danger of breaking said glass.

Our invention further consists in various details of construction and arrangements of parts all as will be fully described hereinafter and particularly pointed out in the claim.

Our invention will be more readily understood by reference to the accompanying drawings forming a part of this specification and in which—

Figure 1 is a side elevation of a water

gage embodying our invention in its preferred form, Fig. 2 is a vertical section through the lower elbow member and cap piece, taken upon an enlarged scale and also illustrating the lower end of the sight glass in the lower socket, Fig. 3 is a similar view of the upper elbow member illustrating the ball and socket connection between the same and the return bend, Fig. 4 is a detail sectional view illustrating the upper socket at the end of the return bend and Fig. 5 is a horizontal cross section taken on the line $x-x$ of Fig. 2 and illustrated upon a much enlarged scale.

Referring now to the drawings 1 indicates the plate of the boiler to which the gage is attached and 2 and 3 short pipes or nipples fixed to said plate above and below the water line of the boiler respectively and to which the gage proper is secured and connected to the boiler.

Secured to the lower pipe 3 is the lower elbow member 4 comprising a horizontal portion 5 terminating in an externally threaded end 6 and a vertical portion 7 extending upwardly therefrom and having its upper end externally threaded as at 8. The member 4 is provided with a channel or passage way 9 which communicates through the pipe 3 with the boiler below the water line. The vertical portion of the channel 9 is enlarged in diameter and arranged in said vertical portion are guides 10 for a ball valve 11. The guides 10 comprise parallel vertical ribs cast integrally with the member 4 and formed at their lower ends with inwardly projecting lugs 12 limiting the downward movement of the ball valve 11 and upon which said valve normally rests.

Threaded upon the upper end of the member 4 is a cap piece 13 which comprises a cylindrical member enlarged and internally threaded at its lower end to receive the threaded end 8 of the member 4, and said enlarged end is squared as at 14 to form a wrench hold. The member 13 is provided with a bore 15, the lower end of which is enlarged and shaped to form a valve seat 16 for the ball valve 11 and its upper end is enlarged in diameter forming an elongated socket 17 for the lower end of the sight glass 18. It should be noted that the guides 10 extend to the upper end of the member 4 and their upper ends abut the end of the cap piece 13 adjacent the valve seat 16. If preferred a gasket or washer 19 may be interposed between the lower end of the sight glass and the bottom of the socket. Threaded upon the upper end of the cap piece 13 is a member 20 between which and said cap piece is arranged packing 21 for forming a tight joint between the sight glass and the socket.

Secured to the upper pipe 2 and communicating through the same with the boiler

above the water line is an elbow member 22 similar to the member 4 and comprising a horizontal portion 23 and a vertical upwardly extending portion 24. The elbow member 22 is provided with a channel 25, the vertical portion 26 of which is enlarged in diameter and provided with parallel guides 27 similar to the guides 10.

28 indicates the ball valve arranged between the guides and 29 the lugs on the lower ends of the guides 27 to limit the downward movement of the ball.

The inner end of the horizontal portion 23 is threaded as at 30. Threaded upon the upper end of the vertical portion 24 of the elbow member 22 is a cap piece 31 having a central longitudinal bore 32 in alinement with the portion 26 of the bore 25. The lower end of the bore 32 is enlarged and shaped to form a ball seat 33 against which the ball 28 is directed by the guides 27. The upper end of the bore 32 is enlarged and shaped to form a socket 34 to receive the ball 35 formed on the end of the return bend 36 and forming a ball and socket joint or connection between said return bend and said cap piece.

37 indicates a member threaded upon the cap piece 31 and holding the ball 35 in the socket, and 38 indicates packing interposed between said member, said cap piece and said ball for forming a steam tight joint.

Arranged upon the outer or free end of the return bend 36, which extends vertically downwardly, as at 39 is a socket 40 to receive the upper end of the sight glass 18. The socket 40 preferably comprises a cylindrical member threaded upon the lower end of the return bend as shown in detail in Fig. 4. The end of said return bend forms an annular shoulder at the upper end of the socket between which and the upper end of the sight tube may be arranged a gasket 41. Threaded upon the lower end of the socket member 40 is a member 42 between which and said socket is interposed packing 43 making a steam tight joint.

Interposed in the pipes 2 and 3 between the boiler and the elbow members 22 and 4 are manually controlled valves 44 and 45 respectively, the threaded ends 6 and 30 of said members preferably engaging the same.

46 and 47 indicate drain valves tapped into the elbows 4 and 22 respectively beneath the ball valves 11 and 28 for a purpose hereinafter described.

When the water gage is in operation the valves 44 and 45 remain open and the valves 46 and 47 are closed. The pressure throughout the device being equal the ball valves 11 and 28 remain in lowermost position resting upon the lugs 12 and 29 respectively. Should the sight glass 18 break or become leaky at the sockets the pressure therein and above the balls will rapidly decrease to sub-

stantially atmospheric pressure which is far below that of the boiler pressure. Consequently the unbalanced pressure of steam and water beneath the balls will rapidly and
 5 firmly seat the same in their respective valve seats in the cap pieces 13 and 31, thereby shutting off the steam and hot water and preventing the same from being scattered about the boiler room. The valves 44 and
 10 45 may then be conveniently closed to insure against the water and steam escaping should the ball valves become displaced which is not probable. The members 20 and 42 are then loosened and the fragments of
 15 the sight glass removed from the sockets. The member 37 is then loosened and the return bend 36 turned upwardly and if desired to the side in order to prevent interfering with placing a new sight glass in the
 20 lower socket 17. It should be noted that the member 37 is provided with an aperture 48 through which the member 36 projects, which aperture is of sufficient size to permit free movement of the member 36 after the
 25 member 37 is loosened. After the new sight glass is secured in the socket 17, the socket 40 is lowered over the upper end of said tube and the member 42 tightened. It is obvious that by means of the ball and socket joint
 30 34—35 the sockets 17 and 40 will readily be brought into alinement as the member 42 is tightened, otherwise the glass is liable to be broken when being secured in position. The member 37 is then tightened and the device
 35 ready for further use.

After the new glass is placed in position the balls 11 and 28 will remain seated as the pressure in the glass is below boiler pressure or at substantially atmospheric pressure, and
 40 further said glass is full of air which must be removed. The valves 46 and 47 are then opened which relieves the pressure below the balls and allows them to drop on to the lugs at the lower ends of the guides. The valve
 45 46 is then closed and the valve 45 slowly opened after which the pressure within the boiler will drive the water through the tube 18 expelling all air from the device through the valve 47. As soon as the water begins to
 50 escape through the valve 47 it is obvious that

all of the air has been expelled and the valve 47 is closed and the valve 44 opened, throwing the device into normal operation. The valves 46 and 47 are also adapted to be used
 as ordinary drain valves to drain the gage 55 and also adapted to be used in blowing out the gage to clean the same.

Having described our invention what we claim as new and desire to secure by Letters Patent is:

A water gage for steam boilers comprising upper and lower elbow members, valved pipes for connecting the same to a boiler above and below the water line thereof respectively, said members each having an upwardly ex- 60
 tending portion, vertical guides formed in said portions and extending to the upper end thereof, a ball in each of said portions be- 65
 tween said guides, lugs on the lower ends of said guides to limit the downward movement 70
 of the balls, cap pieces secured to the upper ends of said upwardly extending portions, said cap pieces being provided with passage ways and formed with valve seats at their 75
 lower ends against which said balls are adapted to be directed by said guides, a sight glass, a socket for the lower end of said sight glass in the cap piece of said lower elbow member and communicating with the passage way in said cap piece, a socket in the upper end of 80
 the cap piece on the upper elbow, a return bend having a ball on one end fitting in said socket and a socket at the other end of the bend to receive the upper end of the sight glass and means for securing said ball 85
 in its respective socket, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of subscribing witnesses.

CARL WILHELM JOHNSON.

CHARLES MERRIDITH RATHKE.

Witnesses to the signature of Carl Wilhelm Johnson:

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WM. J. STAPEL,

GEO. HUTTON.