F. MASTERS.

RENEWING MEANS FOR VALVE STRUCTURES.

APPLICATION FILED NOV. 20, 1919.

1,386,888. Patented Aug. 9, 1921.

2 SHEETS—SHEET 1.

FIG. 1.

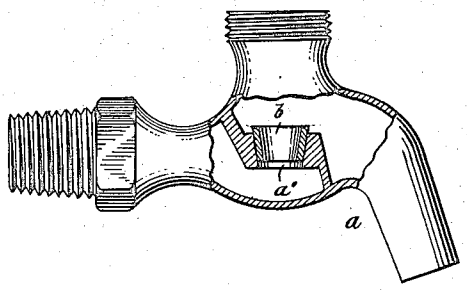


FIG. 4.

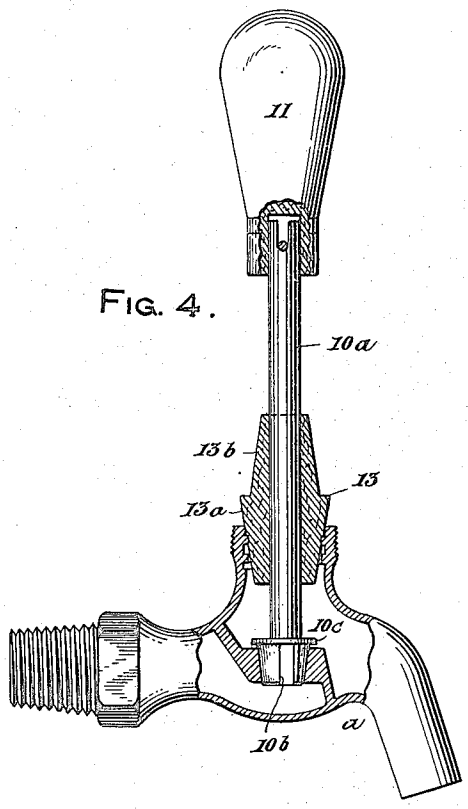


FIG. 6

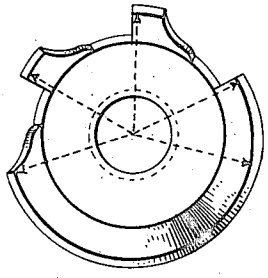
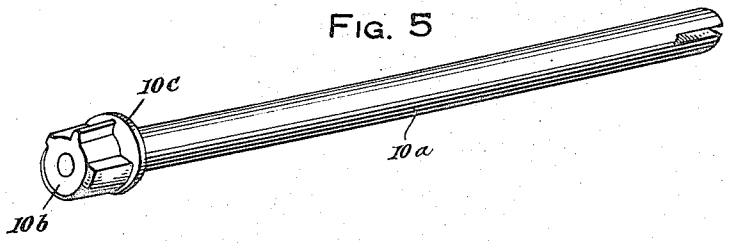


FIG. 5



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2 SHEETS—SHEET 2.

FIG. 2.

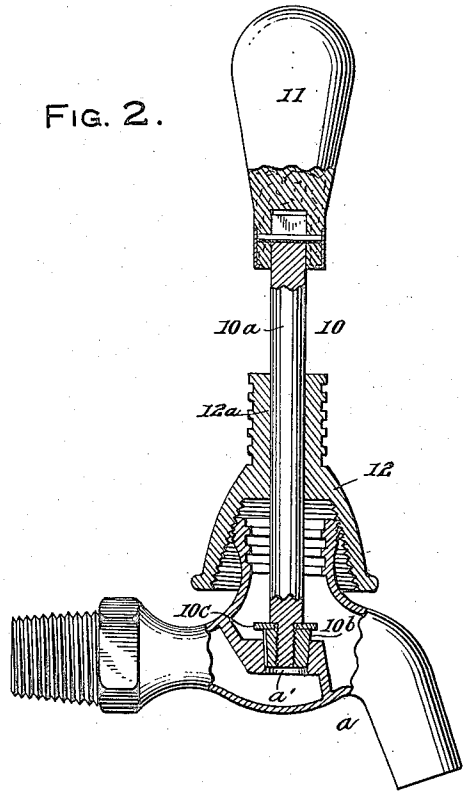
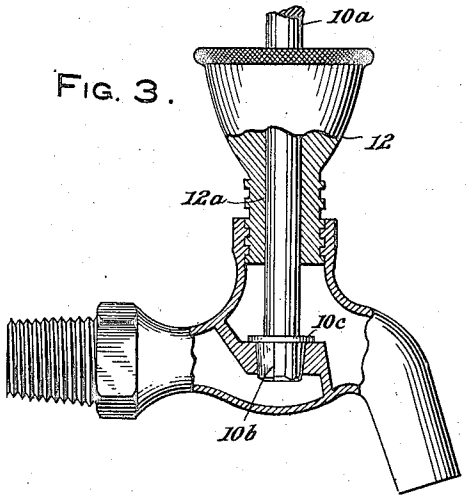


FIG. 3.



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UNITED STATES PATENT OFFICE.

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RENEWING MEANS FOR VALVE STRUCTURES.

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To all whom it may concern:

Be it known that I, FRED MASTERS, a citizen of the United States of America, residing at Ithaca, in the county of Tompkins and State of New York, have invented certain new and useful Improvements in Renewing Means for Valve Structures, of which the following is a specification.

This invention relates to means for renewing the serviceability of valve structures, pertaining more particularly to means for producing an efficient seat formation in cocks and faucets.

While it has heretofore been the practice to maintain the serviceability of cocks and faucets by substituting one valve face for another, as the latter becomes worn, this is more or less limited to cocks or faucets in which the valve face is formed of relatively soft material, as compared with the material of the valve seat, the result being that renewals must be had at frequent intervals. Where the valve face is all metal and adapted to coöperate with a metallic seat the arrangement compulsory under certain conditions the opening and closing of the valve together with the attempt to provide a close joint, produces considerable wear, and this is effective at times on the valve seat.

Attempts have been made to overcome this condition by providing for renewable valve seats, these being in the form of annular members adapted to seat within an opening formed in the diaphragm of the valve body, but such attempts have been more or less unsatisfactory, owing to the tendency to provide conditions of leakage between the metallic seat and the body, it being, of course, understood that the line of contact of the inserted valve seat and the body is that portion of the cock or faucet which is permanently open to the water supply so that the pressure of the water is constantly placed on this line of contact, and if it is imperfectly seated, leakage is likely to occur. Attempts have been made to meet this by employing a coating for the insertible seat face, the coating being of softer metal, the idea being that the softer metal will flow and tend to make a tight joint, but such structures carry the disadvantage of having the softer portion injured in attempting to insert it, and thus accentuate the leakage possibility instead of decreasing it; in addition, the necessity for a composite structure of this type provides for a considerable increase in cost of manufacture, since it necessarily involves a two-stage production.

The present invention relates generally to the renewing of the cocks and faucets by substituting one valve seat for another, such seat being of annular formation and preferably tapered, with the portion of larger diameter forming the seat face, the result being that as the valve is closed, the pressure of the latter will tend to force the seat to position and maintain it therein. The use of a seat of this general type has been contemplated, but the difficulty with the use, as heretofore contemplated, lies in the fact that when one seat is removed the face of the diaphragm opening is inherently affected to such an extent that the insertion of a new seat sets up the conditions of leakage, due to the fact that this line of contact may become rusted or otherwise affected through the use of the cock or faucet and the attempt of the water to leak through, so that the surface of the diaphragm opening is more or less corroded and so affected as to prevent the formation of a tight joint when the smooth face of a seat of similar hardness is placed in position.

It is this latter difficulty that has rendered many of such cocks or faucets useless, and it is the object of the present invention to overcome this difficulty, and, in addition, make possible the utilization of other types of cock and faucet bodies which would, under ordinary conditions, be cast aside as useless.

This is provided by producing a diaphragm face to receive the insertible valve seat with the contact surface of the opening made smooth so that when the seat is placed in position and the valve moved into its seated position, the joint between the seat and the diaphragm will be leakage proof. This is made possible by providing a reaming action on the diaphragm opening through the use of a tool which can be readily inserted into the body of the cock or faucet through the opening which normally receives the valve, the tool having a reaming face such as will permit of a sufficient amount of reaming action on the diaphragm as will remove any corrosion or other effect such as would prevent the proper seating of the seat, the tool being of simple formation and carrying a member adapted to center it with respect to the body so that proper reaming action will be insured and the seat thus properly positioned both to prevent

leakage along the line of contact with the diaphragm opening and between the valve and its seat.

To these and other ends therefore, the nature of which will be readily understood as the invention is hereinafter disclosed, said invention consists in the improved construction and combination of parts hereinafter fully described, illustrated in the accompanying drawings and more particularly pointed out in the appended claims.

In the accompanying drawings, in which similar reference characters indicate similar parts in each of the views,

Figure 1 is a side elevation, partly in section, of a cock or faucet showing a seat in position.

Fig. 2 is a side elevation, partly in section, showing a tool in operative position with respect to a cock or faucet.

Fig. 3 is a view similar to Fig. 2 showing its use in connection with a different type of cock or faucet.

Fig. 4 is a view similar to Fig. 2 and showing a different form of centering structure.

Fig. 5 is a perspective view of one form of reaming tool, and

Fig. 6 is an end view of the cutter employed therewith.

In Fig. 1, the cock or faucet body is indicated at *a*, the diaphragm having an opening *a'* into which a removable valve seat *b* is inserted, the seating face of the latter being preferably beyond the plane of the side of the diaphragm which faces the valve. As shown, the opening *a'* is tapered and this taper corresponds to the external taper of seat *b*. As will be understood, the particular amount of projection of the seating face of seat *b* is variable, without affecting the operation of the complete cock or faucet, so that by having a corresponding taper to the opening and the external face of the seat, a seat of standard size may be utilized with openings *a'* which differ to a small degree in diameter one from another, thus enabling a standard size seat to be utilized in connection with either one of a number of cocks or faucets in which the seat can be inserted and properly seated and yet produce the desired seating face arrangement in connection with the valve of the cock or faucet.

Hence, it will be readily understood that by the use of a proper tool, repairs can be made to a number of cocks or faucets by the use of a standard sized seat, and each faucet be rendered serviceable. The greater advantage, however, comes from the fact that such repairs can be readily made where one seat is being substituted by another, for seats of standard size, it being possible to remove one seat, then slightly ream the surface of opening *a'*—thus slightly increasing the diameter of the opening—and producing a smooth and bright surface, and then insert a new seat to position, the slight reaming action permitting the inserted seat to pass farther within the opening and decrease the amount of projection.

And this type of renewal can be continued in connection with a cock or faucet even to a point where a seat of a slightly larger standard size may be utilized, the successive reamings which increase the size of opening gradually reaching a diameter where a seat of larger size may be employed, the result being that a cock or faucet body which, under general conditions would be cast aside, is made serviceable practically indefinitely by such renewals, it being understood that there is no wear or tear on the body portion, and that the parts which become worn and damaged can be readily replaced by others.

This general action is made possible by the use of a reaming tool having its reaming face of suitable configuration, and which preferably has a length of active face sufficient to permit of a number of successive reamings on the same cock or faucet, it being understood that the slight reaming action which is provided at renewal will not necessarily cause the tool to reach its stop, so that the same tool can be used for the reaming of openings which vary slightly in diameter.

A tool of this type is shown at 10 in the drawings, the same having a shank 10^a, and reaming face 10^b and preferably a stop 10^c which can be provided in any suitable manner. The reaming face is located at the inner end of the shank, the opposite end of the latter being adapted to receive a handle 11 which may be detachable if desired. The shank also carries a shiftable centering structure of which two types are shown in the drawings, that shown in Figs. 2 and 3 and indicated at 12, being of metal and of a form capable of engaging either the exterior or the interior threads of the cock or faucet body, as shown in said figures, the shank extending through an opening 12^a formed in the device.

As will be readily understood, the fact that opening 12^a is axial of device 12, and the latter is in turn positioned on the portion of the cock or faucet which carries the valve itself, the tool will be properly alined so that its reaming face will produce the proper taper to opening *a'* so that when the new seat is inserted, its seating face will be properly positioned with respect to the valve face and at the same time the joint between the diaphragm and the seat will be a tight one.

As shown in Fig. 4, for the device 12 may be substituted a simple wooden member 13 which is slidable on the shank, 10^a and which preferably has its ends tapered with respect to the axis of the device, the tapered portions having bases of different diameters,

the larger diameters of these portions—indicated respectively at 13^a and 13^b—being approximately at the center of the device so that either end may form the center structure for centering the reamer.

The particular form of the reaming face 10^b may be varied, one form being shown in Fig. 5, it being understood, however, that it is preferred that the axial length of this portion of the tool be sufficiently great to permit of the use of the tool in the reaming of proper openings which differ slightly as to diameter, thus making the tool serviceable in connection with the repairs of different cocks and faucets, thus eliminating the necessity of a repair man carrying a large number of reaming tools to accommodate for different size openings.

By this general arrangement, it is possible for cocks and faucets to be readily repaired while in position, the small amount of reaming action necessary to provide a smooth face not materially affecting their conditions, such as a tendency to stop up the cock or faucet. It is thus possible for a repair man to carry in stock one or more tools 10, and a number of seats *b*, of standard sizes, making it possible for him to quickly renew the serviceability of cocks or faucets or by properly preparing the diaphragm of cocks or faucets of other types, permitting them to be renewed as to serviceability in a simple and efficient manner.

The particular form of the reaming tool is not herein specifically described or claimed forming the subject matter of a copending application, it being preferred, however, that the tool be of such type as will permit of the production of a smooth surface to opening *a'* by but a slight reaming action, thus not materially changing the diameter of opening *a'* when a new seat is being placed in position.

This latter result may be obtained by providing the reaming face with one or more teeth, the toothed portion preferably not extending throughout the circumference of the face, the face preferably having a smooth portion concentric with the axis of the tool and which contacts with the wall of the opening *a'* as the tool is rotated, smoothing the wall and making it unnecessary to provide for a materially deep reaming cut of the diaphragm.

While I have shown the passageway or opening *a'* as having its tapered portion extending throughout the width of the diaphragm, it will be understood that, if desired, it may extend but a portion of such distance from the side of the diaphragm which faces the valve, such arrangement being possible in some cases and is considered as falling within the present invention.

While I have herein shown and described one or more ways in which the present invention can be carried into effect, it will be readily understood that changes or modifications therein may be found desirable or essential in meeting the various exigencies of use, and I desire to be understood as reserving the right to make any or all such changes or modifications therein as may be found desirable or essential in so far as same may fall within the spirit and scope of the invention as expressed in the accompanying claims when properly construed.

What I claim as new is—

1. As a means for renewing the serviceability of valve structures, wherein the partition of the valve body carries the passageway through the valve in axial alinement with the valve member, portable means insertible into the valve body for producing a taper of definite value to the passageway in the direction of its axis, and an annular valve seat having an external configuration to tightly fit said tapered passageway and project beyond the partition in the direction of approach of the valve, whereby positioning of the valve seat may be preceded by such means operating to produce a smooth metallic surface for the reception of the seat.

2. As a means for renewing the serviceability of valve structures, wherein the partition of the valve body carries the passageway through the valve in axial alinement with the valve member, portable means insertible into the valve body for producing a taper of definite value to the passageway throughout its length and in the direction of its axis, the operation of said means serving to vary the diameter of the valve body passageway as compared to the diameter prior to the means operation, and an annular valve seat having an external configuration to tightly fit said tapered passageway and project beyond the partition in the direction of approach of the valve, whereby positioning of the valve seat may be preceded by such means operating to produce a smooth metallic surface for the reception of the seat.

3. As a means for renewing the serviceability of valve structures, wherein the partition of the valve body is formed with an opening to receive a removable annular valve seat in axial alinement with the valve, portable means insertible into the valve body in the absence of a seat within said opening, and adapted to produce a taper of definite value to such opening throughout the length of the latter, said taper producing means having an active length to permit the production of passageways differing in diameter on the same plane of valve structure partitions, whereby the removal of one valve seat will permit of the positioning of a renewal seat of larger external diameter with the opposing contacting sur-

faces of the passageway and the seat formed to provide smooth metallic surface contact with an accurate fitting of the inserted seat.

4. Means as specified in claim 1 characterized in that the portable means is in the form of a tool having a reaming face adapted to produce a smooth wall and a passageway with a minimum removal of material.

5. Means as specified in claim 1 characterized in that the portable means is in the form of a tool having a reaming face adapted to produce a smooth wall and a passageway with a minimum removal of material, the tool having a shank carrying a shiftable centering structure adapted to coöperate with the valve body in centering the tool with respect to its seat.

In testimony whereof I affix my signature.

FRED MASTERS.