Feb. 18, 1947. N. H. SHEPPARD 2,416,228

CUTTING TOOL

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Fig. 1

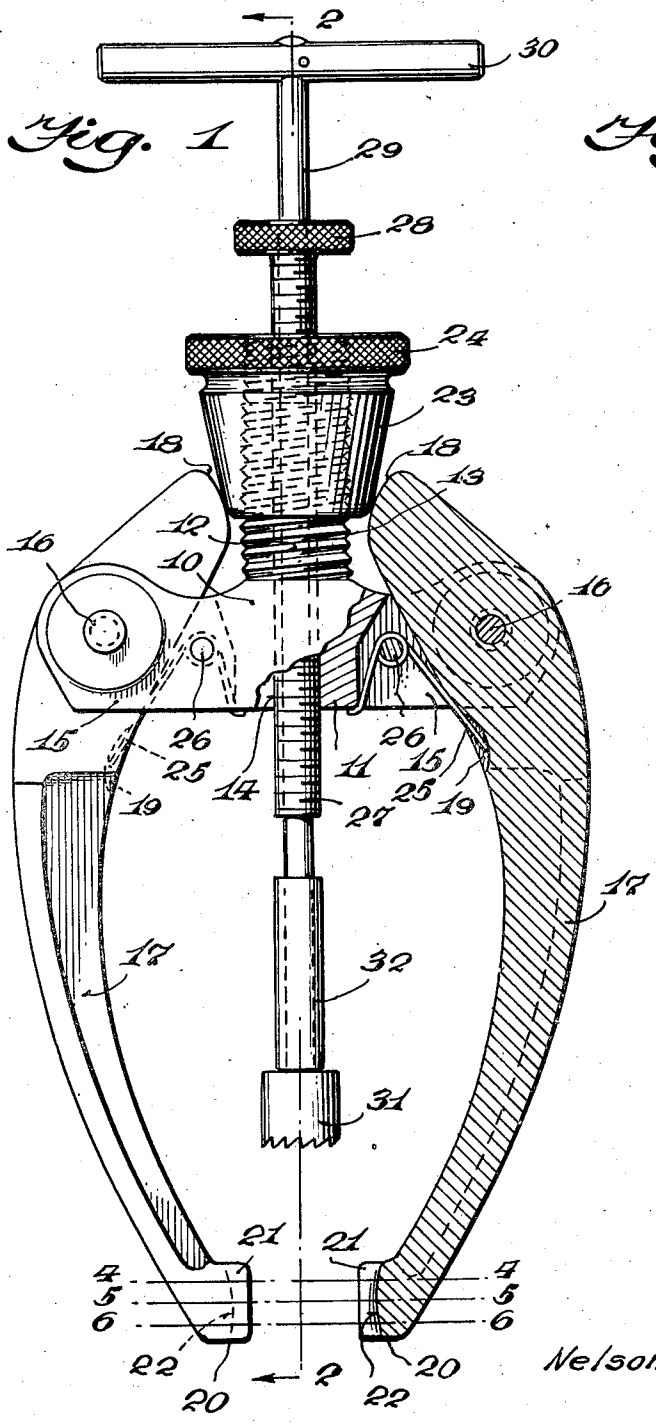
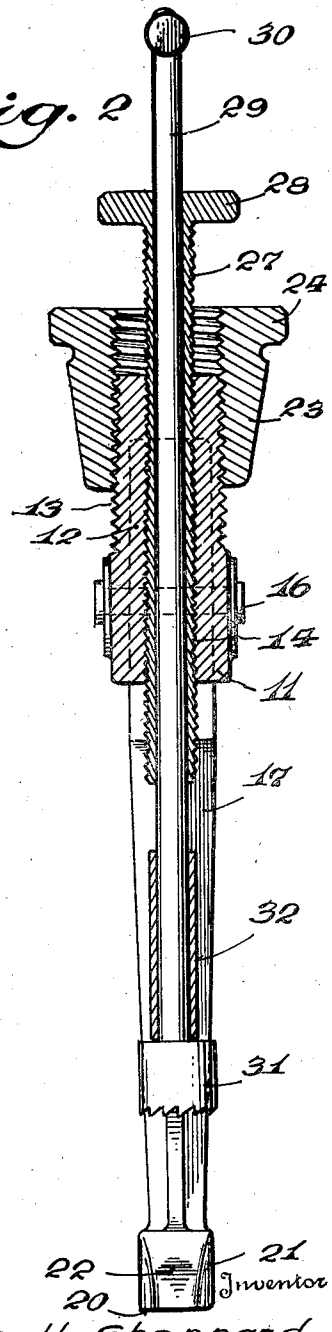


Fig. 2



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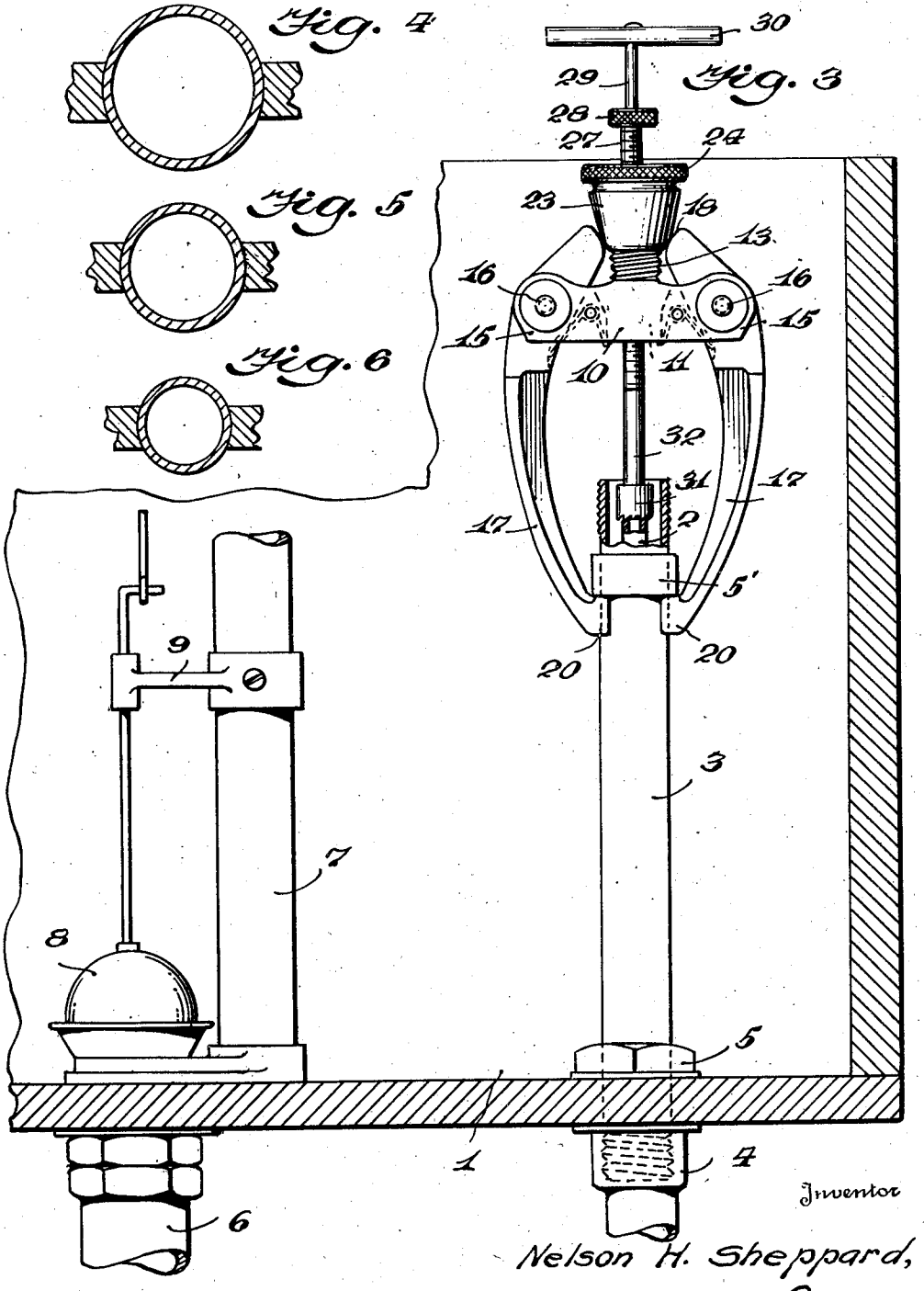
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Fig. 4

Fig. 5

Fig. 6

Fig. 3



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CUTTING TOOL

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This invention relates to a cutting tool, and pertains more particularly to a device which is adapted for recutting or reforming the valve seat formed on the water inlet pipe of a water closet flush after the same is installed within the latter, although the same is obviously not restricted to such specific use.

Usually the water inlet pipe has a valve seat formed on its upper end, and said inlet pipe is placed within and in spaced relation to a surrounding water overflow pipe.

Not infrequently, the valve seats of these water inlet pipes are improperly formed viz: not exactly true with respect to the longitudinal axis of such pipe. Again, such valve seats quite frequently become worn from constant use. In either instance, these defects result in constant leakage and wastage of water due to the fact that the valve member does not properly seat thereon so as to prevent the flow of water therepast.

Heretofore no proper tool has been available for overcoming these defects while the inlet pipe, upon which the valve seat is formed, is in operative position within the flush tank. This is primarily due to the fact that the surrounding overflow pipe is not always of uniform diameter. Consequently it has been necessary for the repairman to provide tools of varying sizes having means for gripping or otherwise engaging the surrounding over flow pipe so as to properly maintain a grinding tool in alined position with the seat to be repaired. This is rather an expensive procedure and consequently rather than undergo the expense of providing various sized tools for this purpose, the repairman will remove the defective supply or inlet pipe in its entirety and replace the same with an entirely new unit. It is obvious that this is an extremely expensive and unnecessary procedure, the burden and expense of which must be borne by the ultimate consumer or user.

In order to overcome the foregoing disadvantages of the prior art, it is the primary important object of this invention to provide a cutting tool of the above character which is so constructed that the same can be used for recutting or reforming valve seats of the character described wherein the inlet or supply pipe is surrounded by overflow or other pipes of varying sizes or diameters.

Another important object of this invention is to provide a device or tool of the character described which is adapted for reforming or recutting a valve seat regardless of its position below the upper end of the surrounding overflow or other pipe from which the tool is supported.

Another important object of this invention is to

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provide a device of the above character which is all purpose or universal in use for reforming or recutting a valve seat while the latter is in its operative or fixed position within the flush tank, thereby eliminating the necessity of removing the inlet pipe during the cutting operation, or of replacing the same with a new unit.

Another important object of this invention is to provide a tool of the above character which is provided with means for properly and accurately positioning the same in cutting relation to the valve seat to be operated upon.

Another important object of this invention is to provide a tool of the above character which will tightly and firmly engage a support and automatically aline the cutting element with the valve seat to be reformed.

A further important object of this invention is to provide a tool of the above character having means for accurately adjusting the position of the cutter so that the depth of the cut can be conrolled at all times.

A still further important object of this invention is to provide a tool of the above character which is simple in construction requiring few parts, accurate and efficient in operation, and one which can be cheaply and economically manufactured and placed upon the market at a reasonable cost.

The foregoing and other objects and advantages of this invention will be readily apparent throughout the course of the following specification, claims and drawings forming a part hereof, and in which latter,

Figure 1 is an elevation partly in section of the tool forming the subject matter of this invention,

Figure 2 is a sectional view taken on line 2—2 of Figure 1, looking in the direction of the arrows,

Figure 3 is a fragmentary elevation partly in section of a flush tank with the cutting tool mounted in operative relation with respect to the inlet pipe and the overflow pipe, said pipes being shown partly in section.

Figure 4 is a fragmentary sectional view taken on line 4—4 of Figure 1, showing the jaw faces of the tool engaged with an overflow pipe of enlarged diameter,

Figure 5 is a fragmentary sectional view taken on line 5—5 of Figure 1, and similar to Figure 4, but showing the jaw faces of the tool engaging with an overflow pipe of smaller diameter, and

Figure 6 is a fragmentary sectional view taken on line 6—6 of Figure 1, and similar to Figures 4 and 5, but showing the jaw faces of the tool en-

gaging with an overflow pipe of still smaller diameter.

Referring in detail in the drawings, and for the present to Figure 3, thereof, 1 designates a flush tank of the usual form having a water supply or inlet pipe 2 disposed within and supported in spaced relation to a surrounding overflow pipe 3. The supply and overflow pipes 2 and 3 respectively, are supported in vertically extending position within the flush tank by means of the usual spud 4 and binding nut 5 between which the bottom of the flush tank is gripped or held. A nut 5' is threaded upon the upper end of overflow pipe 3, for binding the usual valve operating mechanism, not shown, in the desired position.

The usual main water outlet pipe 6, standard 7 and flush ball valve 8 supported and guided by the bracket 9, are also shown for purposes of illustration only. Further detailed description of these parts is deemed unnecessary, except insofar as the same concern the instant invention, for these or similar parts of flush tanks are old and well recognized and understood by those skilled in the art.

The cutting tool forming the subject matter of this invention, includes an inverted T-shaped body portion 10 having a horizontal head portion 11 and a stem portion 12 rising vertically therefrom. The stem 12 is formed with external screw threads 13 for a purpose to be hereinafter more fully described.

The body 10 is formed with an internally threaded opening or passage 14, which is so located as to extend axially of and completely through the stem 12 and the adjacent portion of the attached head 11.

Each of the outer free ends of the head 11 is bifurcated so as to provide pairs of oppositely extending and horizontally alined spaced arms 15, 15.

Pivotally secured between each of said pairs of spaced arms 15, adjacent the free ends of the latter, as by means of a transversely extending pin 16, is a substantially flat clamping bar 17 of substantially semi-elliptical configuration when viewed in side elevation, see for example, Figure 1.

The inner side faces of the bars 17, adjacent their upper ends, are reversely curved in a downward direction so as to provide cam-shaped portions 18. The bars 17 further have each of their inner opposed side faces formed with a pocket or recess 19 disposed slightly below the lower edge of the head 11.

The lower end of each of the bars 17 is formed with a support engaging jaw 20 which is adapted to cooperate with the opposite jaw 20 so as to engage and clamp a pipe or other support therebetween.

The jaws 20 are each provided with a pipe or other support engaging face or groove 21. The jaw faces 21 are each concave in transverse cross-section and the bottom wall 22 thereof is slightly convex in longitudinal cross-section with the highest point at the lower end of the groove and the lowest point thereof at the upper end of said groove when the tool is in the position of Figure 1. In other words, the convex bottom wall of the cooperating jaw faces act in effect as rockers, so that the same will firmly grip pipes of varying diameters, from the largest to the smallest as the jaws 20 are moved inwardly toward each other. The shape of the jaw faces thus result in automatically positioning and maintaining the tool in proper axial alinement with the valve seat to be reformed or recut.

An inverted frusto-conical cam nut 23 having a knurled finger engaging area 24 therearound is threadedly engaged with the threads 13 formed on the stem 12 and is adapted to be moved downwardly thereon between the cam faces 18 of the bars 17 so as to swing or pivot the same about the pins 16 to move the jaws 20 toward each other and into gripping relation with a pipe or other support.

A pair of expansion spring members 25, one each for each of said bars 17, are supported upon the head 11, between the arms 15 by means of transverse pins 26. One end of each of the springs 25 engage the adjacent portion of the head 11 so as to have a bearing thereagainst, while the opposite end of each of the springs engage and seat with its corresponding pocket or recess 19. Thus it will be seen that the springs 25 normally and constantly urge the jaw faces 20 of the bars 17 in an outward direction away from each other, and the upper ends and thereby the cam portions 18 of the bars into constant contact with the cam nut 23.

Adjustably engaged with the internally threaded passage 14, is an externally threaded tube 27 having a smooth axial bore. The tube 27 has a knurled finger engaging head 28 carried by the upper end thereof.

Slidably and rotatably mounted in the bore of the tube 27, is a rod 29 having a handle 30 fixed to its upper end and a cutting head 31 fixed to its lower end.

Slidably mounted on the rod 29 between the lower end of the tube 27 and cutter head 31 is a sleeve 32 for limiting or stopping the upward movement of the rod 29 and cutter 31 with respect to the adjustable tube 27. The stop sleeve 32 may be of any desired length predetermined by the work to be operated upon.

In operation, when it is desired to reform or recut the valve seat which is formed on the upper end of the water inlet pipe 2 of a flush tank, the usual valve casing and valve not shown, are removed from the upper end of the overflow pipe 3.

The tool forming the subject matter of this invention is then placed in position on the overflow pipe 3, as shown in Figure 3. This is accomplished by disposing the jaws 20 below the usual binding nut 5' so as to limit the upward movement of the tool during the cutting operation.

The cam nut 23 is then turned on the stem 12, by gripping the knurled portion 24 with the fingers, so as to move the same in a downward direction. Such movement of the cam nut 23 causes outward separating movement of the upper portions of the bars 17 and consequent inward movement of the jaws 20 for firmly gripping the overflow pipe 3 below the nut 5'.

The threaded tube 27 is then turned downwardly by means of the head 28 until the lower end thereof engages the sleeve 32 to thereby move the cutter 31 into contact with the valve seat on the upper end of the water inlet pipe 2.

Cutting or reforming of the valve seat is then accomplished by rotating the cutter head 31 by means of the rod 29 and handle 30.

As the valve seat is cut and thereby reduced, the cutter head may readily be maintained in contact therewith by slightly turning the adjusting tube 27 which through the sleeve 32 will cause downward movement of the cutter head.

It will be particularly noted that regardless of the distance existing between the upper end of the overflow pipe 3 and the upper end or valve seat of the inlet tube 2, the cutter can be main-

tained in cutting relation with said valve seat by making the necessary adjustments of the threaded tube 27.

After the desired cutting operation has been completed, it is merely necessary to back off the cam nut 23 upwardly along the stem 12 and the jaw faces 20 will move out of engagement with the overflow pipe 3 under the influence of expansion springs 25 operating outwardly against the jaw supporting bars 17.

As stated above the particular shape of the jaw faces 20 will readily adapt themselves to pipes of varying diameters, as shown in Figures 4, 5 and 6 and will firmly grip and automatically position the tool in proper cutting alinement with the valve seat to be cut. This is an important feature of the hereinbefore described tool, for such alinement cannot be maintained if the jaw faces are pivoted to their supporting bars.

It is to be understood that the form of my invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of my invention, or the scope of the subjoined claims.

Having thus described the invention, what is claimed as new and desired to secure by Letters Patent is:

1. A tool of the character described, including a base member, an externally threaded stem rising from said base member, spaced jaw members pivotally connected intermediate their ends to said base member, a rotatable inverted substantially cone-shaped member threadedly carried by said stem for engaging the inner opposed faces of the free upper ends of said jaw members and for actuating said jaw members toward each other, means constantly urging the jaw members away from each other, an adjustable stop member mounted for movement through said stem and base member, a rod slidably mounted in said stop member and rotatable with respect thereto, and a cutter mounted on said rod.

2. A tool of the character described, including

a base member, a stem rising from said base member, spaced jaw members pivotally connected intermediate their ends to said base member, cam means movably connected to said stem independently of said jaw members for engaging the inner opposed faces of the upper free ends of the latter and for actuating said jaw members toward each other, means constantly urging the jaw members away from each other, an adjustable stop member mounted for movement through said stem and base member, a rod slidably mounted in said stop member and rotatable with respect thereto, and a cutter mounted on said rod.

3. A tool of the character described including a base member, a stem rising from said base member, spaced jaw members pivotally connected intermediate their ends to said base member, means movably connected to said stem independently of said jaw members and having a part disposed between and engaging the inner opposed faces of the upper free ends of the jaw members for actuating the same toward each other, means constantly urging the jaw members away from each other, an adjustable stop member mounted for movement through said stem and base member, a rod slidably mounted in said stop member and rotatable with respect thereto, and a cutter mounted on said rod.

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