F. L. SMITH & T. B. WILLIAMS.

VALVE SEAT DRESSING TOOL.

APPLICATION FILED NOV. 20, 1911.

1,028,295.

Patented June 4, 1912.

2 SHEETS—SHEET 1.

Fig. 6.

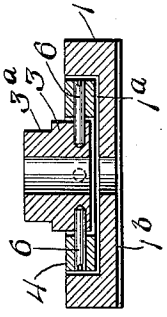


Fig. 5.

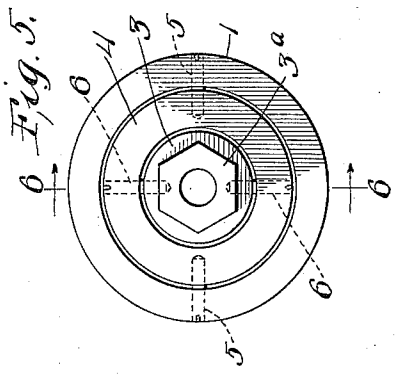


Fig. 4.

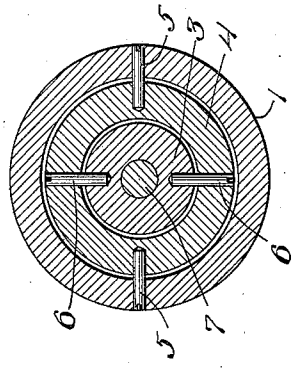
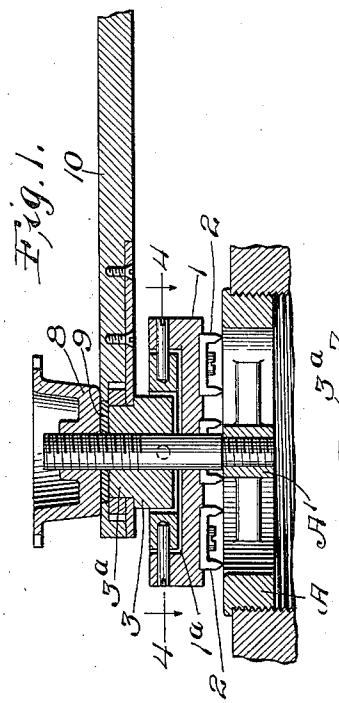


Fig. 1.



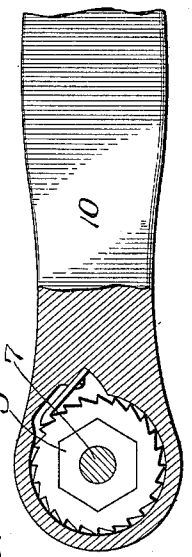


Fig. 3.

Fig. 2.

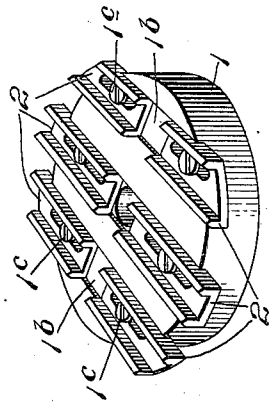


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Fig. 7.

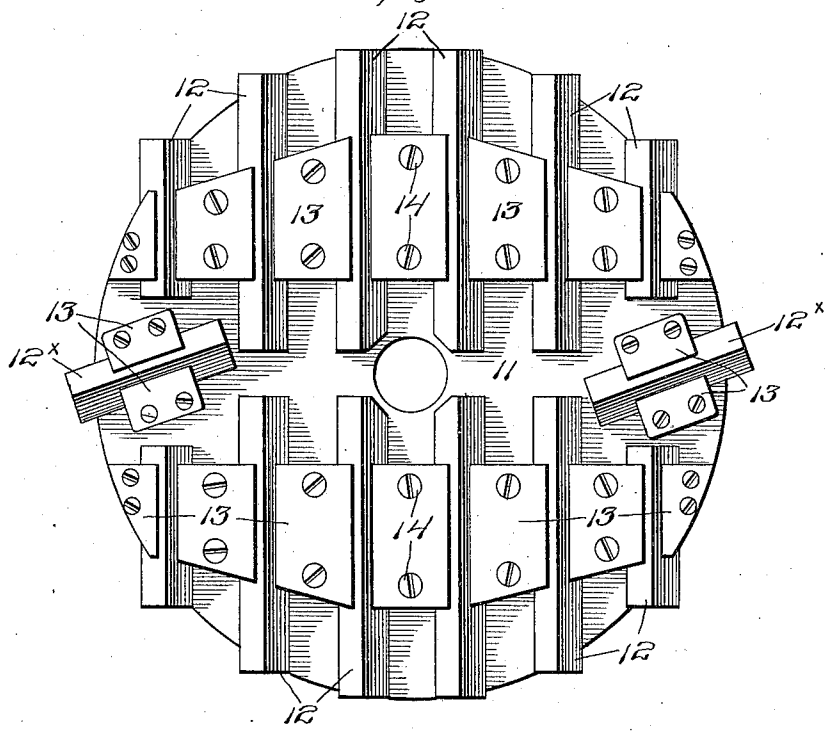
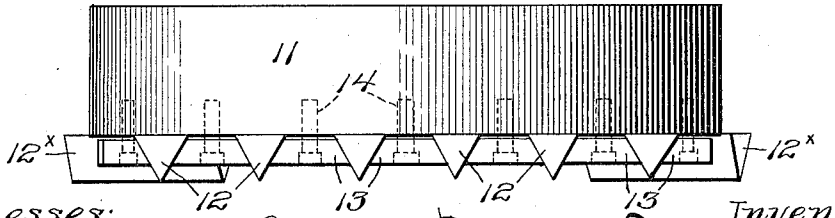


Fig. 8.



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UNITED STATES PATENT OFFICE.

FRANK L. SMITH, OF CHICAGO, ILLINOIS, AND THOMAS B. WILLIAMS, OF ORANGE, MASSACHUSETTS, ASSIGNORS TO LEAVITT MACHINE COMPANY, OF ORANGE, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

VALVE-SEAT-DRESSING TOOL.

1,028,295. Specification of Letters Patent. Patented June 4, 1912.

Application filed November 20, 1911. Serial No. 661,380.

To all whom it may concern:

Be it known that we, FRANK L. SMITH and THOMAS B. WILLIAMS, citizens of the United States, and residing at Chicago, in the county of Cook and State of Illinois, and Orange, in the county of Franklin and State of Massachusetts, respectively, have invented new and useful Improvements in Valve-Seat-Dressing Tools, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

The purpose of this invention is to provide a convenient tool for dressing or reseating worn valve seats and like surfaces.

It consists of the features and elements shown and described and their combinations as indicated in the claims.

In the drawings:—Figure 1 is a medial sectional view showing a valve seat and a tool embodying this invention in position for operation thereon. Fig. 2 is a perspective view of the tool showing the arrangement of the cutters thereof. Fig. 3 is a detail plan view partly in section of a ratchet wrench shown in Fig. 1, as the means of operating the tool. Fig. 4 is a section taken as indicated at line 4—4 on Fig. 1. Fig. 5 is a top plan view of the tool. Fig. 6 is a medial section taken at a plane directly transverse to the sectional view of Fig. 1, as indicated at line 6—6 on Fig. 5. Fig. 7 is a plan view of a tool head embodying this invention and fitted with cutters of a modified form. Fig. 8 is a side elevation of the tool shown in Fig. 7.

The tool illustrated in the drawings is designed for truing up or "dressing" plane surfaces of limited extent, being particularly arranged for such work in connection with valve seats of the type found in pumps and hydraulic machinery in general. Fig. 1 shows the tool applied to such a valve seat without removal of the latter from the pump housing in which it is secured.

The tool comprises a cutter holder or head, 1, shown as circular in form, and having one of its circular faces provided with means for holding a plurality of cutters, 2. These cutters are so arranged that their cutting edges will all lie in the same plane, it being the intention that the holder shall be rotated about an axis through the center of its circular face with the cutters in contact with the surfaces to be dressed. Since it is desired to obtain a true surface on the valve seat with the least possible waste of material and with the least possible amount of cutting, this tool is not arranged to cut down the valve seat to any predetermined plane; instead, it is adapted to accommodate itself to the old surface of the seat, so that as many and as much of the cutting edges of the cutters shall rest upon this surface as is possible without their moving out of their common plane. In this way, the true plane to which the worn surface most nearly conforms is determined, and the surface is made to conform to this plane with the minimum of wear and waste.

In order that the tool may accomplish the function above described, the driving member, 3, to which the power is applied for rotating the holder, 1, is connected with the latter through an intermediate member 4. This intermediate member, 4, is an annulus accommodated in a recess, 1^a, in the head and coupled therewith through the pivots, 5, 5, whose axes are substantially parallel to the plane of the cutter edges and intersect the axis of rotation of the head, 1. The annulus, 4, is similarly coupled with the driving member, 3, through a similar pair of pivots, 6, 6, disposed along an axis perpendicular to the axes of the pivots, 5, 5. Thus, the driving member, 3, and the cutter head, 1, are connected by what is commonly termed a universal joint, which allows these two elements to rotate about different and intersecting axes.

As shown in Fig. 1, the valve seat, A, happens to be provided with a central spider having a hub portion, A^1, which is centrally threaded and thus adapted to receive the lower end of the threaded stud, 7, which may be furnished along with the cutter as a part of the outfit. The upper end of this stud is also threaded, carrying a nut in the form of a hand-wheel, 8, and a loose washer 9, through which pressure may be transmitted from the hand-wheel to the driving member, 3, of the cutter, both the driving member and the cutter-head being axially apertured to accommodate the stud. Thus,

the cutter-head, 1, may be firmly forced to its work against the valve seat, A, and may operate thereon in a plane which is not necessarily exactly perpendicular to the axis of the stud, 7, when the latter is secured in the threaded bore of the hub, A^1. As the work proceeds, the hand-wheel may be used to follow up the cutter and keep it in engagement with the valve seat, A. Where direct pressure is thus employed against the face of the material which is being worked upon, it is undesirable to employ any form of cutter which would tend to draw itself into the material when put under such pressure; consequently the cutters are made with a wedge-shaped cross-section near their cutting edges and have no tendency to dig into the surface of the material, their action being rather in the nature of a scraping cut. However, since the cutters are all placed with their cutting edges tangential to some circle described about the center of rotation of the head, 1, no cutters being radial with respect to this center, the resulting cut is not an ordinary scraping cut, but appears rather as a paring operation, the waste cutting off in the form of a spirally twisted shaving. Further, by arranging the cutters with their cutting edges tangential to different circles, they are given different angles of approach to the work and tend to produce a finished surface lacking any regular markings corresponding to those found on a surface which is finished by a single tool having a regular path of travel, as is the case in lathe or planer work. Any marks or indentations made by the cutters themselves are readily obliterated by the overlapping cut of the succeeding cutter due to the difference of its angle of approach.

In the drawings, the driving member, 3, is shown with a hexagonal boss, 3^a, which is intended for driving engagement with a ratchet-wrench or operating handle, 10. Obviously, this mode of operation may be replaced by any continuously rotating device where the dimensions of the pump or other machinery permit. Similarly, the invention is not limited to the employment of the particular arrangement shown for exerting pressure upon the cutter-head, since many valve seats would not happen to be provided with threaded spiders like that shown, and other means of attaching clamping devices would be required and might readily be devised.

The cutters shown in Fig. 2 as applied to the tool head, 1, are of channel form, having each flange of the channel sharpened to a V-shaped cutting edge and having a longitudinal slot formed in the web of the channel to admit a clamping screw, 1^c, for securing the cutter at any desired position in a guide groove, 1^b, formed in the face of the head, 1. This form of cutter, by making possible so simple a means of securement, is well adapted to the smaller sizes of tools for the purpose indicated, but for the larger sizes the arrangement shown in Figs. 7 and 8 is preferred. In this case the tool head, 11, is not provided with any guide grooves. The cutters, 12, are each single-edged instead of double-edged, being formed of stock whose cross section is of the form of an equilateral triangle; thus any one of the three edges is adapted to serve as a cutting edge when these triangular cutters are secured to the face of the head, 11, by means of beveled clamping blocks, 13, which may be drawn down to clamping position by screws, 14, engaging the head, 11. The parallel arrangement of the cutters, 12, shown in Fig. 7, resembles that illustrated in Fig. 2, but in view of the considerable space at either side of the head, which would be unserved by cutters if this arrangement were followed strictly, there are added an extra pair of cutters 12^x, disposed obliquely with respect to the cutters, 12, and parallel to each other and positioned about midway between consecutive cutters, 12.

In view of the fact that the arrangement of the cutters upon the cutter head results in a considerable overlapping of their respective paths of travel upon the surface to be dressed, it will be readily understood that sliding adjustment of the various cutters in the direction of their cutting edges will not tend to leave any portion of the work surface unprovided for, but will merely result in distributing the cutters over a larger or smaller area. Thus the longitudinal slots of the smaller cutters and the exterior clamping blocks for the larger cutters permit of sliding adjustment for varying the working area of the device.

We claim:—

1. A tool comprising a cutter head, a plurality of cutters and means securing them thereto and adapted to permit sliding adjustment in the direction of their cutting edges, said cutting edges being disposed in a single plane, the cutter-head being adapted for rotation about an axis perpendicular to said plane, and being adapted to receive pressure in the direction of said axis.

2. A tool comprising a cutter-head, a plurality of cutters, each of equilateral triangular cross-section, each edge thereof being adapted to serve as a cutting edge, and means on the head adapted for securing the cutters thereto with their active cutting edges in a single plane; means for exerting pressure on the cutter-head in a direction transverse to said plane, and means for rotating the cutter-head about an axis transverse to said plane.

3. A tool comprising a cutter-head, a plurality of cutters therefor of equilateral triangular cross-section, all three longitudinal

edges of such cutters being adapted to serve as cutting edges, the cutter-head having a plane surface; beveled clamping blocks arranged thereon and clamp screws securing them thereto, said blocks being adapted to engage the sloping sides of the respective cutters for securing them upon the head with their active cutting edges in a single plane; means for rotating the cutter-head about an axis perpendicular to such plane, and means for exerting pressure upon the cutter-head in a direction transverse to such plane.

In testimony whereof, I have hereunto set my hand at Wilkes-Barre, Pennsylvania, this 10th day of November, 1911.

FRANK L. SMITH.

Witnesses:
D. L. O'NEILL,
S. I. KLUMP.

In testimony whereof, I have hereunto set my hand at Orange, Massachusetts, this 7th day of November, 1911.

THOMAS B. WILLIAMS.

Witnesses:
F. A. HOWE,
E. H. BALL.