Nov. 2, 1954 J. F. FREY 2,693,055

VALVE GRINDER

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Fig. 1.

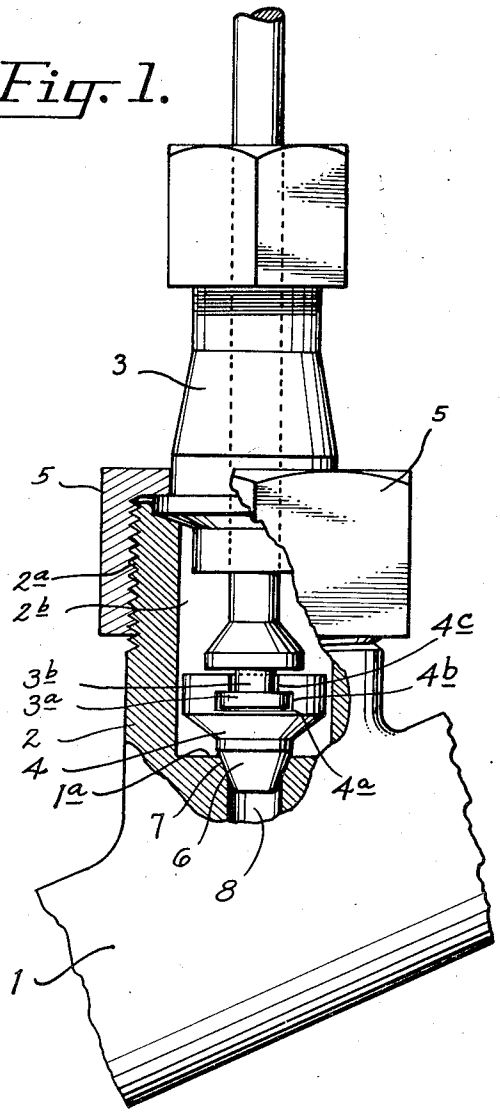


Fig. 2.

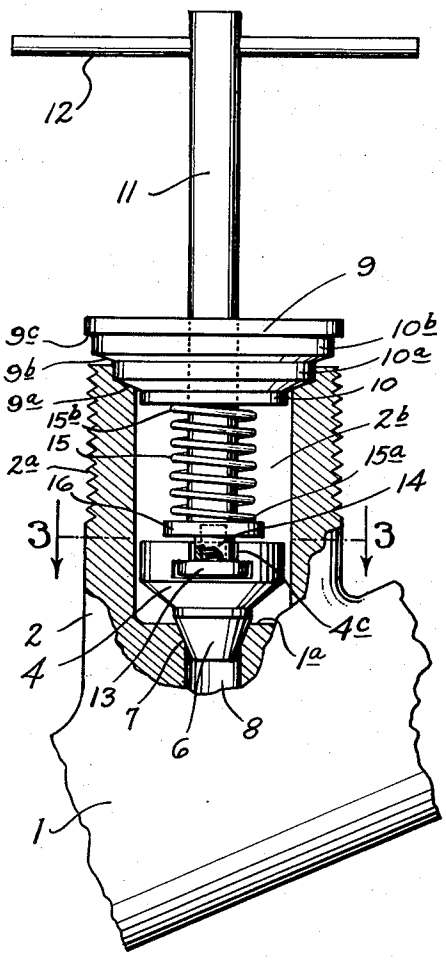
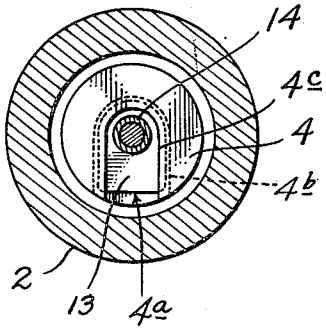


Fig. 3.



INVENTOR.
John F. Frey
BY
Atty.

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VALVE GRINDER

John F. Frey, Portland, Oreg.

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3 Claims. (Cl. 51—27)

My invention relates to a valve regrinding tool, particularly adapted for globe or angle valves having removable valve disks. Frequently, said valve disks and the valve seats therefor become pitted and corroded and it is necessary to regrind or lap them with grinding compound so as to make them seat smoothly one with the other. It is essential that said regrinding or lapping be done with the valve disk in axial alignment with its seat and with more or less steady pressure, so as to produce a tight, exact seat when said operation has been completed. Said type of valve is more or less standard on shipboard and it is impractical to remove said valves from their joining conduits to perform this operation in a machine, and thus it is common practice to remove the bonnets of said valves, detach the valve disks from their stems and attempt to regrind said valve disks and their seats by inserting a flat member or stick in the noncircular recess which joins the valve disk to its stem. Many of these valves are located in awkward places and it is difficult, if not impossible, to perform a good regrinding and lapping operation because of the awkwardness of the installation of said valve and difficulty of maintaining said tool axially aligned with the seat. It has been my experience that frequently when said valves are reground and lapped, the parts do not seat securely and the valves leak.

I have discovered that a valve regrinding tool may be provided by forming an operating shaft similarly to the valve stem which engages the valve disk, and providing a bonnet which encircles said shaft and serves as a journal for the latter. Such type of bonnet may be made with a plurality of seats to accommodate various sizes of valves, and the disk may be securely held to said operating shaft by a spring loaded chuck which lies intermediate the under surface of said bonnet and the upper or opposed face of the valve disk. Said spring loaded chuck not only holds the parts securely together and prevents axial misalignment, but also provides a uniform pressure on the valve disk when the bonnet bears upon the valve body so that the regrinding and lapping operation may be done easily, efficiently and effectively.

The object of my invention, thus, is to provide such a regrinding tool, which may be carried easily in the kit of tools of a marine engineer, and the like, which is of universal application throughout a relatively wide range of sizes of valves met with on shipboard, one which will permit said regrinding and lapping operation to be performed quickly and effectively, and one which requires no careful observation to see that the regrinding and lapping operation does not injure or destroy the valve seat or the valve being operated upon.

A further and more specific object of my invention is to provide such a regrinding tool which produces a uniform pressure between the opposed surfaces of the valve disk and its seat, so that the regrinding and lapping operation will be performed equally and independently of the extent of rotative movement of said disk while it is being gripped and oscillated by the operating handle.

Further and other details of my invention are hereinafter described with reference to the accompanying drawings, in which:

Fig. 1 is a fragmentary elevation of a valve for which my invention is specifically adapted, portions of said valve body, and particularly the neck of said valve body, are shown broken away to disclose details thereof;

Fig. 2 is a similar view of the valve body with the valve disk shown removed from its stem and joined by a regrinding tool embodying my invention, portions of said valve body being shown in section; and

Fig. 3 is a sectional view taken on the line 3—3 in Fig. 1 showing the arrangement of the engaging head of said valve regrinding tool as it is seated in the recess in the valve disk, in axial alignment but in articulated engagement therewith and held against relative rotation of said operating tool and said valve disk.

A valve for which my invention is specifically devised comprises a body **1** having a neck **2** extending laterally therefrom, a valve stem **3** with a removable valve disk **4** carried by the end thereof, and a packing nut **5** joined to the threaded terminus **2***a* of the neck. Said valve disk has a noncircular recess **4***a* formed in the upper portion thereof. Said recess in elevation, as viewed in Fig. 1, is complementary to the letter T inverted and in intaglio. That is to say, its lower portion **4***b* is broader than its upper portion **4***c*.

The valve stem terminates in a head **3***a* joined to the remainder of said stem by a neck **3***b*. The lower portion **4***b* of the valve disk recess accommodates the head **3***a* and encompasses it quite closely, while the upper portion **4***c* of said recess passes the neck **3***b* with some clearance. The fit of the head **3***a* in the lower portion of the recess **4***a* is fairly snug, and said fit holds the valve disk in place upon the valve stem. Said valve disk terminates in a truncated frusto-conic plug valve element **6**. The periphery of said valve element seats in a valve seat **7** formed upon the lateral partition **1***a* of the valve body **1**. Flow through said valve proceeds along passageway **8**. When the plug valve is seated, as shown in Fig. 1, it seals said passageway and inhibits flow therethrough.

When said valve disk and its seat are to be reground and lapped, this may be done by backing off the packing nut **5** from the threaded portion of the neck of the stem of said valve and lifting said valve stem and its associated valve disk upwardly through the bore of said neck. The valve disk may then be removed from the valve stem by slipping said valve disk laterally from engagement with the head **3***a*.

The valve regrinding tool with which my invention is specifically concerned, comprises a bonnet body **9** which is adapted to seat upon and within the threaded portion of the valve neck **2**. Valves are made in several sizes and, thus, I devise said bonnet body with a plurality of lands numbered **9***a*, **9***b* and **9***c*. These differ in diameter one from the other and may be inserted in valves of different sizes. In Fig. 2, I have chosen a valve which seats upon land **9***a*, which is the smallest of the three. As shown in Fig. 2, the step **10** fits more or less loosely within the bore of the valve neck **2**, and the land **9***a* seats upon the sloping top portion of said neck.

Journaled within an aperture formed axially of said bonnet is an operating shaft **11**. This shaft has a handle **12** at its upper end and a head **13** at its lower end. Lying immediately inwardly of said head is a neck **14**. Said head **13** and said neck **14** are similar to but not identical with the head and neck **3***a* and **3***b* of the valve stem **3**. Said head **13** and neck **14** are accommodated within the lower portion **4***b* and the upper portion **4***c* of the recess **4***a* of the valve disk, as shown in Fig. 2, and there is some slight axial play therein. In other words, there is not a tight fit between said head and the lower portion **4***b* of the recess in the valve disk. Such arrangement not only permits easy entry and exit of said head from the valve disk, but also permits pressure to be exerted on the valve disk in operation by a helical spring **15**, which encircles the operating shaft **11**.

Slidably mounted upon said shaft is a follower **16**. This is engaged by the lower end **15***a* of the helical spring **15** and bears against the upper face of the valve disk. The head **13**, the neck **14**, and the follower **16** provide a releasable chuck for holding the valve disk securely and axially aligned with the operating shaft **11**, as is shown in Fig. 3. That is to say, the profiles of said parts are such that when the parts are pushed into position, they will align themselves axially with the shaft, and the pressure of the follower against the upper face of the valve disk will hold said parts axially aligned, although slight articulation is permitted. The upper surface of said helical spring bears against the under face of the bonnet body **9**. When

the bonnet body 9 is seated, as shown in Fig. 2, it is normally held down by the operator and compression is built up in the helical spring to hold the valve disk downwardly on its seat. Due to the fact that the valve seat and the bonnet body are fixed distances from each other, said compression on said spring is uniform and, when the operating shaft is rotated, uniform pressure will be exerted in the regrinding and lapping operation performed with said tool. The lands and steps hold the bonnet axially aligned with the center line of the bore of the valve neck, which coincides with the center line of the passageway 8. The conformation of the frusto-conic plug valve also holds said valve element aligned with its seat, and the slight articulation permitted by the helical spring tends to permit said parts to remain aligned and guided by the contacting surfaces of the bonnet and of the valve disk in its seat.

In regrinding and lapping a valve disk and its seat, valve grinding compound is applied to the periphery of the frusto-conic plug valve element 6 and the shaft is rotated back and forth through an arc usually less than 180° so that the resulting abrasion will cut away pits and corrosion and will grind smooth surfaces for said plug valve element and said seat.

As is apparent, the alignment of said parts by said tool is more or less automatic and the seat and the plug valve are ground true with respect to their centers and with respect to each other, merely by said partial rotative movement of the handle. When the plug valve and its seat have been ground sufficiently as to smoothness and to depth, the plug valve may be removed from the head of the operating shaft and re-engaged with the valve stem and the valve can be reassembled by screwing down the packing nut 5. Valves may quickly be reground and lapped aboard ship or elsewhere and the work be done, with my improved tool, which will be such that a smooth, certain, leak-proof joint is produced.

As is shown in Figs. 2 and 3 of the drawings, the head 13 and the neck 14 are screw-threaded together. The head 13 has a threaded stem 13*a* formed thereon and this is screw-threaded to the threaded bore 14*a* of the neck. This permits these parts not only to be adjusted longitudinally of the operating shaft 11 to accommodate itself to the various sized valves, but also permits the parts to be detached readily and replaced.

I claim:

1. A valve regrinding tool adapted detachably to engage a valve disk having a stem engaging recess formed upon one face thereof and to rotate it upon its seat in a valve body, comprising a bonnet body adapted to seat upon the valve body, an elongated operating shaft journaled in said bonnet, a head of noncircular contour carried by one end of said shaft, said head being generally complementary to the stem engaging recess in said valve disk, a follower slidably mounted on said operating shaft and cooperating therewith to define a releasable chuck for engaging said disk, and an elastic element bearing at one end upon the under side of said bonnet body and at the other end upon said follower, whereby when said head is seated in the stem holding recess of said valve disk, said spring bears upon said follower and grips and prevents lateral displacement of said valve disk.

2. A valve regrinding tool adapted detachably to engage a valve disk having a stem engaging recess formed upon one face thereof and to rotate it upon its seat in a valve body, comprising a bonnet body adapted to seat upon the valve body, an elongated operating shaft journaled in said bonnet, a head of noncircular contour carried by one end of said shaft, said head being generally complementary to the stem engaging recess in said valve disk, a follower slidably mounted on said operating shaft and cooperating therewith to define a releasable chuck for engaging said disk, and a coiled spring encircling said shaft, bearing at one end upon the under side of said bonnet body and at the other end upon said follower, whereby said head is seated in the stem holding recess of said valve disk, said spring bears upon said follower and grips and prevents lateral displacement of said valve disk.

3. A valve regrinding tool adapted detachably to engage a valve disk having a stem engaging recess formed upon one face thereof and to rotate it upon its seat in a valve body, comprising a bonnet body adapted to seat upon the valve body, an elongated operating shaft journaled in said bonnet, a head of noncircular contour carried by one end of said shaft, said head being generally complementary to the stem engaging recess in said valve disk, a follower slidably mounted on said operating shaft and cooperating therewith to define a releasable chuck for engaging said disk, and an elastic element bearing at one end upon the under side of said bonnet body and at the other end upon said follower, said head being slightly thinner than the depth of the recess in said valve disk to provide limited play of said valve disk longitudinally of said operating shaft, whereby when said head is seated in the stem holding recess of said valve disk, said spring bears upon said follower and grips and prevents lateral displacement of said valve disk, and also resiliently holds the latter in its seat to permit it to be ground and lapped in place upon said seat.

No references cited.