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J. R. KRUSE
HANDHOLE REFACING TOOL

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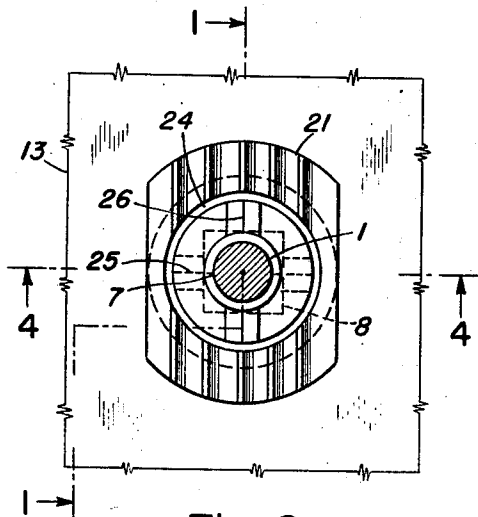
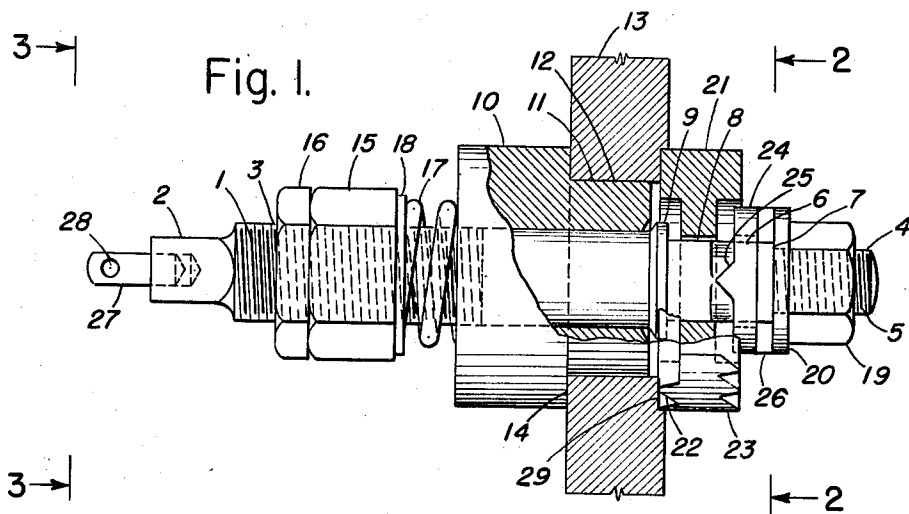


Fig. 2.

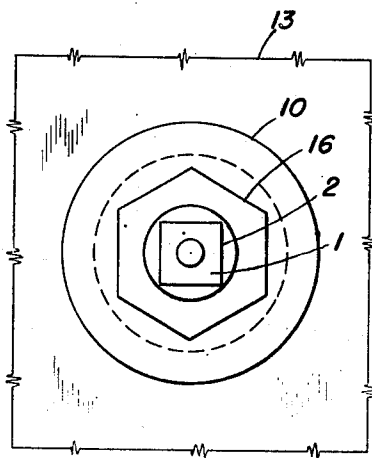


Fig. 3.

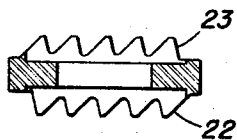


Fig. 4.

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HANDHOLE REFACING TOOL

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4 Claims. (Cl. 90—12)

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This invention relates to an improved device for refacing the seats of closures such as the seats for hand holes in pressure vessels and headers.

When the hand hole plates are removed, for example, from the headers of heat exchangers, so as to clean the interior of the tubes in the associated apparatus, one of the major delays encountered in getting the apparatus back into service is in refacing the seats around the hand holes that receive the hand hold plates so that tight joints will be assured. Heretofore, various means have been used to reface the seats, all of which have been time consuming, expensive and more or less inaccurate.

It is an object of this invention to provide an improved tool for refacing the seats of closures in headers, drums, and the like.

Additional objects of the invention will appear from the following description of an illustrative embodiment when read in conjunction with the accompanying drawings wherein:

Figure 1 shows one embodiment of the new refacing tool mounted within the hand hole of the wall of a vessel, a portion of this view being in cross section taken on line 1—1 of Figure 2;

Figure 2 is an end view of the same device taken on line 2—2 of Figure 1;

Figure 3 is an opposing end view of the refacing tool taken on line 3—3 of Figure 1; and

Figure 4 is a cross section through the tool cutter taken on line 4—4 of Figure 2.

The improved refacing tool here illustratively shown comprises a spindle 1 provided at one end with a squared shank 2 and a threaded portion 3 and having at its opposite end a reduced section 4 provided with a threaded portion 5. Adjacent said opposite end is a cylindrical portion 6 of larger diameter than the reduced section 4 forming a shoulder 7. Beyond the cylindrical portion 6 in direction away from the reduced section 4 is a squared section 8 and beyond said squared section 8 there is provided a flange 9.

A guide bushing 10 is mounted in a close running fit on to the spindle 1 and has a reduced portion 11 which fits snugly into the hand hole 12 of the wall 13 of a vessel. A shoulder 14 limits the projection of reduced portion 13 into the hand hole. A retaining nut 15 engages the threaded portion 3 of spindle 1 and is backed up by a lock nut 16. Between retaining nut 15 and bushing 10 is a spring 17 and washer 18.

On the opposite end of spindle 1 is mounted nut 19 and washer 20 which nut when drawn up causes the washer 20 to seat against shoulder 7.

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On squared portion 8 of spindle 1 is mounted a cutter 21 which in this instance is provided with cutting edges 22 and 23 on both sides of the cutter 21. A slight clearance is provided between the squared hole of cutter 21 and the squared portion 8 of spindle 1 to provide a free limited wobbling motion of the cutter on the spindle.

Between the cutter 21 and the washer 20, and fitting over the cylindrical portion 6 of the spindle 1, is a universal joint washer 24. This washer 24 is provided with knife edge bosses 25 and 26 one on each side of the washer 24. The bosses 25 and 26 are placed with their knife edges passing through the center of the washer and at right angles with respect to one another. In Fig. 1: first boss 25 protrudes from the left face of washer 24, this boss being shown in horizontal position (see also Fig. 2); and second boss 26 protrudes from the right face of the same washer 24, this boss being shown in vertical position (again also see Fig. 2). The outer end of the spindle 1 may be provided with a projection 27 having a hole 28.

When the refacing tool is to be used, the lock nut 16, the nut 15, the washer 18, the spring 17 and the guide bushing 10 are removed from the spindle 1. The cutter 21 is placed on squared portion 8 of the spindle 1 between the flange 9 and the reduced end 4. On this end are then placed the universal joint washer 24, the washer 20 and by means of nut 19 the washer is drawn tightly against the shoulder 7. The cutter now has a limited free movement upon the portion 8 of the spindle. By means of a cord, chain or wire (not shown) fastened through the hole 28 in the projection 27 in the end of the spindle 1, the tool is pulled from the enlarged master hand hole (not shown), through which it entered into inner portion of the pressure vessel, up into position into the hand hole where it is to be used. Thereafter the guide bushing 10, the spring 17, the washer 18 and the nut 15 are replaced on the spindle 1 and the nut is drawn up until the spring 17 is compressed lightly. Then the lock nut 16 is drawn against nut 15. The refacing tool is now in position for operation.

By means of a ratchet wrench (not shown) which is placed on the outer squared end 2 of the spindle 1, the spindle is slowly turned in the direction of cutting. One side of the cutter may be used for cleaning the surface of the hand hole seat 29, which may slightly dull the cutting tooth, and the other side may be used for refacing the seat if such seat requires more than just cleaning.

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Because the cutter 21 is loosely fitted over the squared portion 8 of the spindle 1 and bears against the universal joint washer 24, the cutter is permitted to follow evenly over the surface of the seat 29 of the hand hole 12 which seat may or may not be perpendicular to the axis of the refacing tool spindle 1. The compression of the spring determines the rate of cutting the seat. It has been found that only a very slight compression may be used.

Preferably the cutter is of the type shown in which the cutting edges are parallel although any type of cutter may be used such as one having radial cutting edges.

The tool is suitable for various diameters of hand holes, the only changes required for a larger hole are a larger guide bushing 10 to fit the larger hand hole 12 and a larger cutter 21 to fit the larger hand hole seat. The larger cutter 21 will have substantially the same width as the smaller cutter shown and therefore will pass, when mounted on the spindle 1, through the larger holes thereby avoiding the necessity of passing it through the master hand hole and drawing it into position with a cord.

By my invention I provide a simple and light cutting tool which requires little effort to operate and which permits the cutter to automatically adjust itself so as to rest evenly upon the tube seat to be refinished and to provide an even cut.

While the preferred embodiment of my invention has been shown and described, it will be understood that such showing is illustrative rather than restrictive and that changes in construction, combination and arrangement of parts may be made without departing from the spirit and scope of the invention as claimed.

I claim:

1. In a grinding tool for cleaning and refacing the sealing surfaces of circular access holes and the like in vessel walls and the like, the combination of a rotatable cutter having a cutting edge contactable with the wall sealing seat around the hole to be finished, a spindle extending from said cutter and wall seat through said hole to the opposite wall side, means mounting the cutter on the spindle for rotation therewith accompanied by freedom of said cutting edge to tilt into planes out of normal with the spindle's axis of rotation as best contact with said seat surface may require, means carried by the wall-seat end of said spindle for bearing against the cutter to press it against the said seat to be finished, a thrust-transmitting washer interposed around the spindle between said end means and the cutter and having on each side a diametrically extending raised ridge displaced by about 90 degrees from a similar raised ridge on the other washer side whereby to provide universal joint action that permits cutter tilting as aforesaid, means at the other end of the spindle for engaging said opposite side of the wall in a way to exert upon the spindle an adjustable endwise pull which urges the cutter against the hole-sealing seat as aforesaid, and means for imparting rotation to the spindle.

2. In a grinding tool for cleaning and refacing the sealing surfaces of circular access holes and the like in vessel walls and the like, the combination of a rotatable cutter having a cutting edge contactable with the wall sealing seat around the hole to be finished and having a polygonal central opening passing axially there-through, a spindle extending from said cutter and wall seat through said hole to the opposite wall

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side and having a polygonal portion that passes through said cutter opening in mating relation thereto for transmission of rotating torque to the cutter but with sufficient clearance to permit tilting of said cutting edge into planes out of normal with the spindle's axis of rotation as best contact with said seat surface may require, means carried by the wall-seat end of said spindle for bearing against the cutter to press it against the said seat to be finished, a thrust-transmitting washer interposed around the spindle between said end means and the cutter and having on each side a diametrically extending raised ridge displaced by about 90 degrees from a similar raised ridge on the other washer side whereby to provide universal joint action that permits cutter tilting as aforesaid, means at the other end of the spindle for engaging said opposite side of the wall in a way to exert upon the spindle an adjustable endwise pull which urges the cutter against the hole-sealing seat as aforesaid, and means for imparting rotation to the spindle.

3. In a grinding tool for cleaning and refacing the sealing surfaces of circular access holes and the like in vessel walls and the like, the combination of a rotatable cutter having a cutting edge contactable with the wall sealing seat around the hole to be finished, a spindle extending from said cutter and wall seat through said hole to the opposite wall side, means mounting the cutter on the spindle for rotation therewith accompanied by freedom of said cutting edge to tilt into planes out of normal with the spindle's axis of rotation as best contact with said seat surface may require, a head carried by the wall-seat end of said spindle for bearing against the cutter to press it against the said seat to be finished, a thrust-transmitting washer interposed around the spindle between said end head and the cutter and having on each side a diametrically extending raised ridge displaced by about 90 degrees from a similarly raised ridge on the other washer side whereby to provide universal joint action that permits cutter tilting as aforesaid, means including a compression spring at the other end of the spindle for engaging said opposite side of the wall in a way to exert upon the spindle an adjustable endwise pull which urges the cutter against the hole-sealing seat as aforesaid, and means for imparting rotation to the spindle.

4. In a grinding tool for cleaning and refacing the sealing surfaces of circular access holes and the like in vessel walls and the like, the combination of a rotatable cutter having a cutting edge contactable with the wall sealing seat around the hole to be finished, a spindle extending from said cutter and wall seat through said hole to the opposite wall side, means mounting the cutter on the spindle for rotation therewith accompanied by freedom of said cutting edge to tilt into planes out of normal with the spindle's axis of rotation as best contact with said seat surface may require, means carried by the wall-seat end of said spindle for bearing against the cutter to press it against the said seat to be finished, a thrust-transmitting washer interposed around the spindle between said end means and the cutter and having on each side a diametrically extending raised ridge displaced by about 90 degrees from a similar raised ridge on the other washer side whereby to provide universal joint action that permits cutter tilting as aforesaid, means including a hole-centering plug at the other end of said spindle for engaging said opposite side of the wall in a way to exert upon

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the spindle an adjustable endwise pull which urges the cutter against the hole-sealing seat as aforesaid, and means for imparting rotation to the spindle.

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