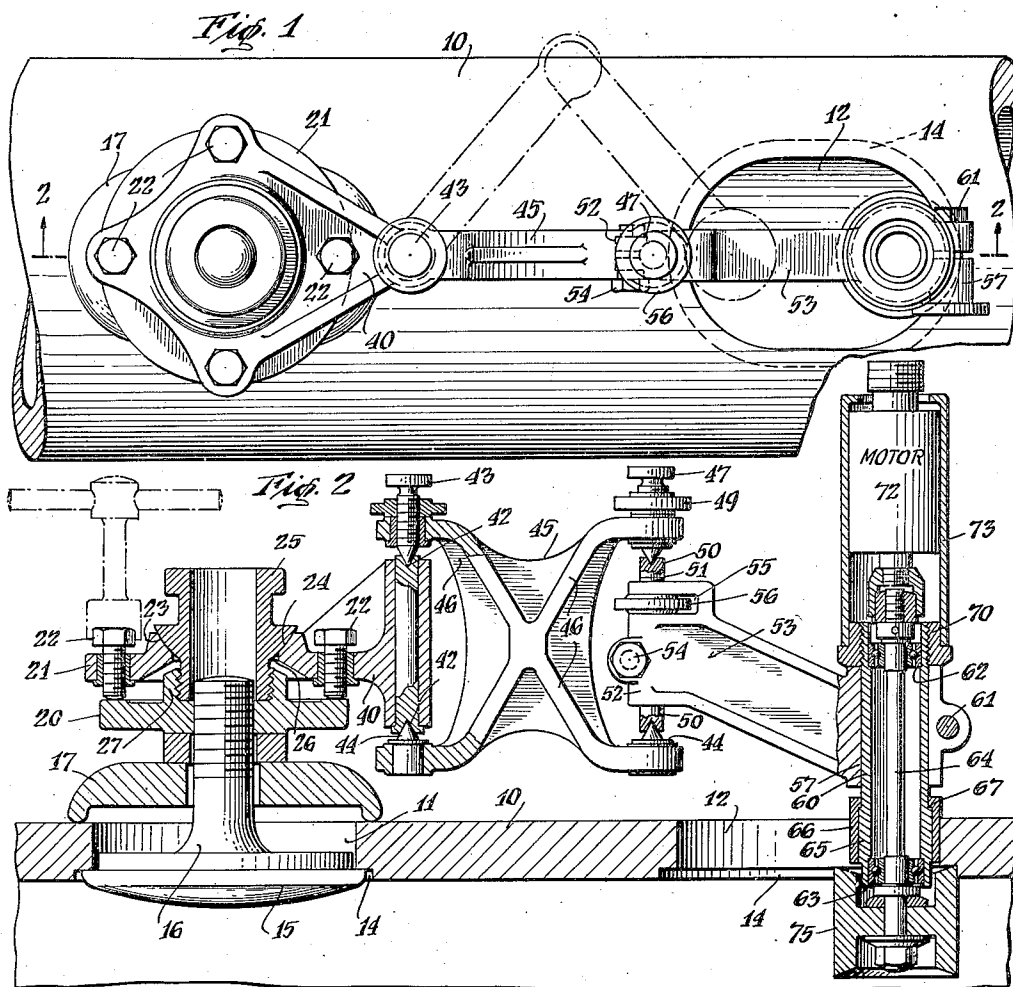
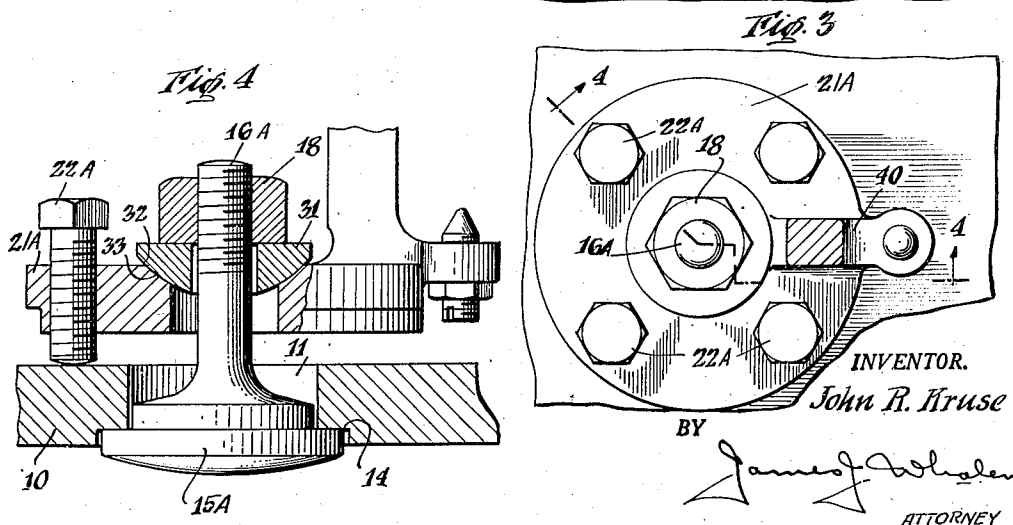


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GRINDING TOOL FOR REFACING THE SEALING
SURFACES OF HEADER ACCESS HOLES
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GRINDING TOOL FOR REFACING THE
SEALING SURFACES OF HEADER ACCESS
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5 Claims. (Cl. 51-241)

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This invention relates to power operated tools and particularly to an improved tool for refacing the seats of closures for holes in headers or drums.

The invention is applicable to headers having a multiplicity of adjacent hand hole closures, such as are used in economizers, superheaters, sectional headers of boilers and the like. When the hand hole plates are removed from the headers 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 hole 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 accurate.

It is an object of this invention to provide an improved refacing tool for the seats of closures for holes in headers.

In the drawings:

Figure 1 is a plan view showing the improved refacing tool mounted in a hand hole of a header to reface the seat of another hand hole thereof;

Figure 2 is a sectional view on the line 2-2 in Figure 1 and shows the detailed construction of the mounting and supporting means for the refacing tool.

Fig. 3 is a plan view of the mounting platform for a modified form of the tool; and

Figure 4 also shows the modified mounting for the tool, as viewed on line 4-4 of Fig. 3.

In Figure 1 a broken portion of a header 10 is shown having hand holes or access holes 11, 12 each provided with a finished seat 14 on which a hand hole closure or plate 15 fits. Hand hole plate 15 is provided with a threaded stem 16 receiving a yoke 17 resting on the outer wall of the header so that the plate 15 may be drawn tightly against seat 14 by screwing down a nut 18 which when the hand hole is closed in use occupies the position of the threaded anchor plate or platform designated 20 in Fig. 2.

Subsequent to removal of hand hole plates 15 and cleaning of tubes connecting with the header 10 it may be deemed necessary to resurface the seats 14 of one or more hand holes. For this purpose the closure plate is reinserted in a hand hole (as at 11) immediately adjacent to one (12) whose seat is to be resurfaced. However, instead of fastening the plate 15 by means of its nut a threaded anchor plate or

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platform 20 of the tool is mounted on the stem. By these means the platform 20 is held rigidly in fixed, spaced relation to the hand hole seat 14. A leveling plate 21 surmounts the anchor plate and is provided with adjusting screws 22 which contact the anchor plate 20. It is formed on its upper face with a spherical surface 23 which engages a matching spherical surface 24 on a nut 25 extending through an aperture 26 at the center of the surface 23. Nut 25 is provided with an external thread which engages an internal thread within a collar 27 on plate 20. When the nut 25 is screwed firmly onto plate 20, the leveling plate 21 may be brought into proper parallel relation with the hand hole seat to be refaced by adjusting screws 22.

As shown in Figure 4 the anchor plate 20 of Figure 1 is dispensed with. The leveling plate 21A is provided with spherical face 33 which bears upwardly against spherical face 32 of washer 31. The washer 31 in turn bears upwardly against nut 18 of stem 16A of closure plate 15A. Leveling plate 21A is provided with leveling screws 22A which bear directly against header 10. When the leveling screws 22A are adjusted to bear against header 10 and to contact the spherical faces 32 and 33, nut 18 will bear tightly against washer 31, the seat closure plate 15A will tightly bear against seat 14 and leveling plate 21A will then be rigidly held in fixed relation to hand hole seat 14.

Arm 40 extends from leveling plate 21 (Fig. 1) or leveling plate 21A (Fig. 4) and is provided with a member at right angles thereto arranged with sockets 42 for receiving the pointed bearing ends of a set screw 43 and pin 44 carried at one side of a double yoke or link 45 having four arms 46. Two arms of the yoke 45 are provided with threads for receiving set screws 43 and 47, two arms provided with holes for receiving pins 44. Obviously the pins 44 may be replaced by adjustable set screws 43 and 47 whereby four set screws would permit movement of the yoke 45 normally with respect to the leveling plate 21 (or 21A) and the hand hole seat 14.

The bearing ends of set screw 47 and pin 44 at the end of the link remote from the leveling plate 21 (or 21A) rest in sockets in a pin 50. Pin 50 is threaded at 51 for a portion of its length and is finished to a smooth cylinder for the remaining portion. The pin 50 has a running fit within a split bearing 52 provided in the end of an arm 53. The end of the arm 53 is provided with a slot extending for the length of bearing 52 for the purpose of clamping the

bearing onto the pin 50 by means of set screw 54. Transversely of bearing 52, arm 53 has another slot 55 into which a knurled wheel 56 fits and engages the thread 51 on pin 50. By turning the knurled wheel 56, the arm 53 may be moved vertically along the pin. A key between bearing 52 and pin 50 prevents the pin from turning with wheel 56. At its other end arm 53 is provided with a split cylindrical guide 57 having a bore which fits over a cylindrical spindle housing 60. A set screw 61 clamps the guide 57 onto housing 60. Housing 60 supports bearings 62 and 63 in recesses, the bearings in turn supporting spindle 64. The lower end of housing 60 has a raised, finished surface 65 over which fits a guide roller 66 with a shoulder 67 to prevent its falling off. A bushing 70 screwed to the top of housing 60 permits the attachment of a sleeve 73 within which an air motor 72 may be supported. The shaft of motor 72 is coupled to the upper end of spindle 64. The lower end of spindle 64 is provided with a grinding wheel 75.

In operation the leveling plate 21 (or 21A) is mounted on a header above one hand hole opening as 11 while the grinding wheel 75 is inserted into an adjacent hole as 12 whose seat is to be refaced. By means of the adjusting screws 22 (or 22A) the leveling plate 21 (or 21A) is leveled or brought into parallelism with the seat 14 of hole 11 and with adjustment by knurled wheel 56 the arm 53 is moved vertically until the cutting surface of grinding wheel 75 contacts lightly all around the hand hole seat 14 to be refaced. Motor 72 is then started which rotates the grinding wheel. By the adjustment of knurled wheel 56, the grinding wheel is made to cut and reface the seat as the wheel is manually moved around the periphery of the hand hole. Roller 66 guides wheel 75 and limits the width of the seat to be ground. To obtain different widths of seats, rollers of different diameters may be used.

A number of adjacent hand hole seats may be ground from one mounting of the leveling plate 21 (or 21A). To move the grinding wheel from one hand hole to another, the lock nut 49 and set screw 47 are loosened thereby permitting the pin 50 and with it the rest of the grinding tool attached thereto to be lifted out of the hand hole just refaced and to be inserted into the next hand hole to be refaced. Set screw 47 and lock nut 49 are then readjusted to support the grinding tool and leveling plate 21 (or 21A) again adjusted, if necessary, to suit the placement of the grinding wheel with respect to the next hand hole to be refaced in the same manner as described above. Obviously the grinding wheel 75 may be replaced by a brush for cleaning the seat where grinding is unnecessary.

What I claim is:

1. In a grinding tool for refacing the sealing surface of access holes and the like in drums and the like, the combination of a tool anchor member, means cooperating with an access hole for securing said member to said drum in fixed relation to the hole sealing surface to be refaced, a tool leveling plate, means including a swivel connection for attaching said plate to said anchor member in a manner permitting the plate to be tilted, cooperating leveling means for said plate for adjusting the plane thereof into substantial parallelism with the plane of said hole surface to be refaced, a tool link hinge-connected to said leveling plate at one end and

free to swing in a plane substantially parallel to the plane of that plate, a tool arm hinged at one end to the free end of said link and swingable in a plane also substantially parallel to the leveling plate plane whereby the free arm end may be traced fully around the access hole to be refaced, a grinding wheel carried by said arm's free end for rotation about an axis normal to the said arm-link swinging plane and mounted to permit wheel-edge contact with the access hole's sealing surface, tool driving means for rotating said grinding wheel, and means intermediate said wheel and said leveling plate for adjusting the wheel's position along its said rotation axis whereby to bring the wheel edge into desired engagement with the hole sealing surface to be refaced so that by tracing same around that sealing surface while manipulating said plate leveling means the plane of said trace movement may be accurately coincided with the sealing surface plane.

2. In a grinding tool for refacing the sealing surface of access holes and the like in drums and the like, the combination of tool anchor means including a hole closure plate internally seated within one of said holes and having an outwardly protruding threaded stem, means for holding said plate firmly seated so as to maintain said stem in fixed relation to the sealing surface of an adjacent access hole to be refaced, a tool leveling plate, means including a swivel connection for attaching said leveling plate to said stem in a manner permitting the plate to be tilted, cooperating leveling means for said plate for adjusting the plane thereof into substantial parallelism with the plane of said hole surface to be refaced, a tool link hinge-connected to said leveling plate at one end and free to swing in a plane substantially parallel to the plane of that plate, a tool arm hinged at one end to the free end of said link and swingable in a plane also substantially parallel to the leveling plate plane whereby the free arm end may be aligned over and traced fully around the said access hole to be refaced, a grinding wheel carried by said arm's free end for rotation about an axis normal to the said arm-link swinging plane and mounted to permit wheel-edge contact with the latter hole's sealing surface, tool driving means for rotating said grinding wheel, and means intermediate said wheel and said leveling plate for adjusting the wheel's position along its said rotation axis whereby to bring the wheel edge into desired engagement with the said hole sealing surface to be refaced so that by tracing same around that sealing surface while manipulating said leveling means the plane of said trace movement may be coincided with the sealing surface plane.

3. In a grinding tool for refacing the sealing surfaces of access holes and the like in drums and the like, the combination of a tool anchor member, means cooperating with an access hole for securing said member to said drum in fixed relation to the hole sealing surface to be refaced, a tool leveling plate, means including a swivel connection for attaching said plate to said anchor member in a manner permitting the plate to be tilted, cooperating leveling means for said plate for adjusting the plane thereof into substantial parallelism with the plane of said hole surface to be refaced, a tool link hinge-connected to said leveling plate at one end and free to swing in a plane substantially parallel to the plane of that plate, a tool arm hinged at

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one end to the free end of said link and swingable in a plane also substantially parallel to the leveling plate plane whereby the free arm end may be traced fully around the access hole to be refaced, a grinding wheel carried by said arm's free end for rotation about an axis normal to the said arm-link swinging plane and mounted to permit wheel-edge contact with the access hole's sealing surface, tool driving means for rotating said grinding wheel, means intermediate said wheel and said leveling plate for adjusting the wheel's position along its said rotation axis whereby to bring the wheel edge into desired engagement with the hole sealing surface to be refaced so that by tracing same around that sealing surface while manipulating said leveling means the plane of said trace movement may be accurately coincided with the sealing surface plane, and guide means further carried by said arm's free end for riding upon said access hole's boundary wall in a way which directs refacing movement of the grinding wheel over the hole's sealing surface.

4. In a grinding tool for refacing the sealing surfaces of access holes and the like in headers and the like, the combination of tool anchor means including a hole closure plate internally seated within one of said holes and having an outwardly protruding threaded stem, a yoke encircling said stem in contact with the header's outer surface, a tool anchor plate screwed onto said stem against said yoke whereby to hold the closure plate firmly seated and the anchor plate fixed in relation to the sealing surface of an adjacent hole to be refaced, a tool leveling plate likewise encircling said threaded stem and having on one side a spherical surface rimming the plate's stem-accommodating opening and being provided with leveling screws that extend from the other side to bear against said anchor plate at spaced points around said stem, a clamp nut with a spherical face for screw-engaging said anchor plate to bear that face against said leveling plate's spherical surface and thereby hold said plate leveling screws firmly against the anchor plate while permitting tilting adjustment of the leveling plate, a tool link hinged to said leveling plate at one end and free to swing in a plane substantially parallel to the plane of that plate, a tool arm hinged at one end to the free end of said link and swingable in a plane also substantially parallel to the leveling plate plane whereby the free arm end may be aligned over and traced fully around the said access hole whose surface is to be refaced, a grinding wheel carried by said arm's free end for rotation about an axis normal to the said arm-link swinging plane and mounted to permit wheel-edge contact with said hole's sealing surface, tool driving means for rotating said grinding wheel, and means intermediate said wheel and said leveling plate for adjusting the wheel's position along its said rotation axis

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whereby to bring the wheel edge into desired engagement with the hole's sealing surface to be refaced so that by tracing same around that surface while manipulating said leveling screws the plane of said trace movement may be coincided with the sealing surface plane.

5. In a grinding tool for refacing the sealing surfaces of access holes and the like in headers and the like, the combination of tool anchor means including a hole closure plate internally seated in one of said holes and having an outwardly protruding threaded stem, a tool leveling plate encircling said stem and having on one side a spherical surface rimming the plate's stem-accommodating opening and being provided with leveling screws that extend from the other side to bear against the header's outer surface at spaced points around said stem, a clamp nut with a spherical face for screwing on to said threaded stem to bear that face against said leveling plate's spherical surface and thereby hold said plate leveling screws firmly against the header as aforesaid thus maintaining said closure plate firmly seated while permitting tilting adjustment of the leveling plate, a tool link hinge-connected to said leveling plate at one end and free to swing in a plane substantially parallel to the plane of that plate, a tool arm hinged at one end to the free end of said link and swingable in a plane also substantially parallel to the leveling plate plane whereby the free arm end may be aligned over and traced fully around an adjacent access hole whose sealing surface is to be refaced, a grinding wheel carried by said arm's free end for rotation about an axis normal to said arm-link swinging plane and mounted to permit wheel-edge contact with said hole's sealing surface, tool driving means for rotating said grinding wheel, and means intermediate said wheel and said leveling plate for adjusting the wheel's position along its said rotation axis whereby to bring the wheel edge into desired engagement with the hole sealing surface to be refaced so that by tracing same around that sealing surface while manipulating said leveling screws the plane of said trace movement may be coincided with the sealing surface plane.

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