

Sept. 24, 1946.

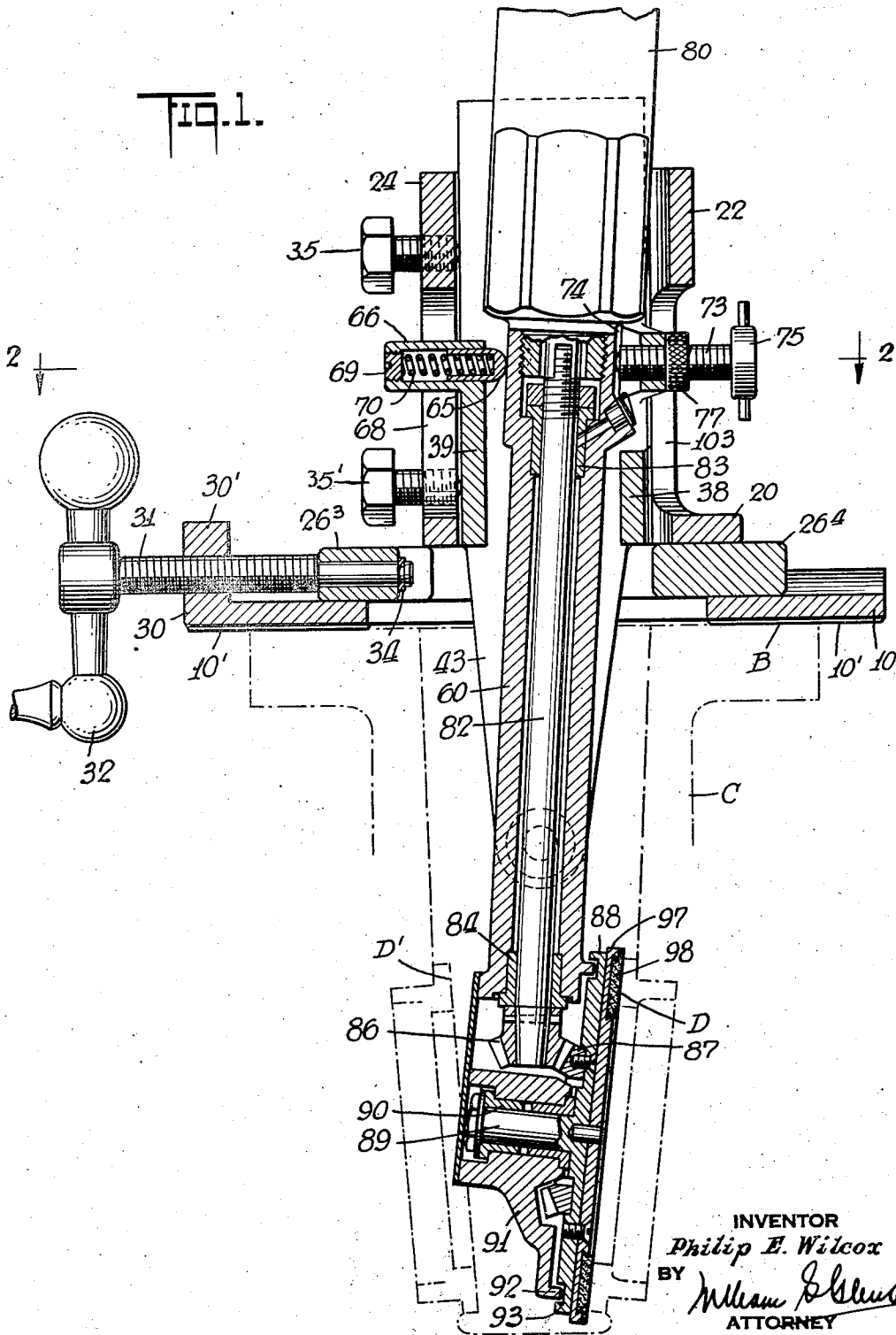
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2,408,280

APPARATUS FOR REFACING GATE VALVES

Filed Dec. 1, 1944

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FIG. 2.

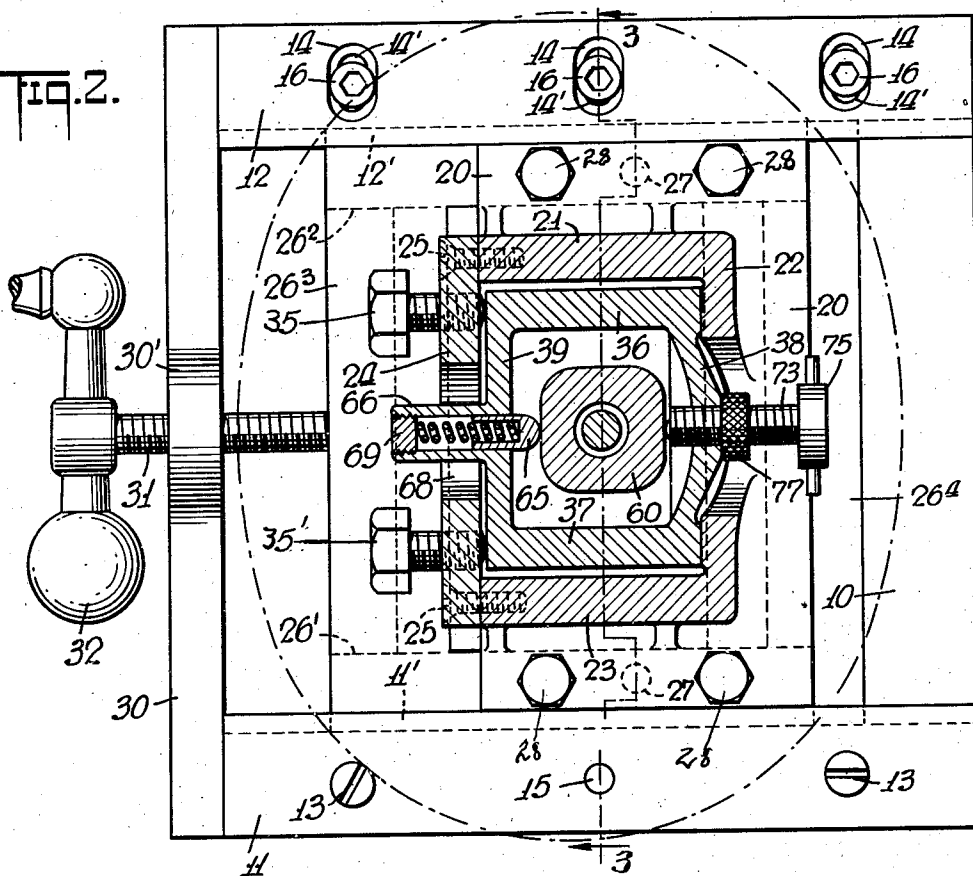
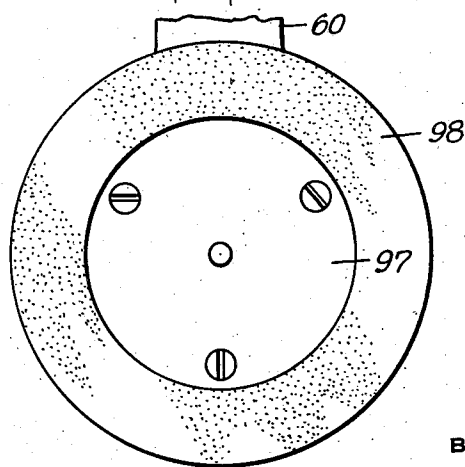


FIG. 4.



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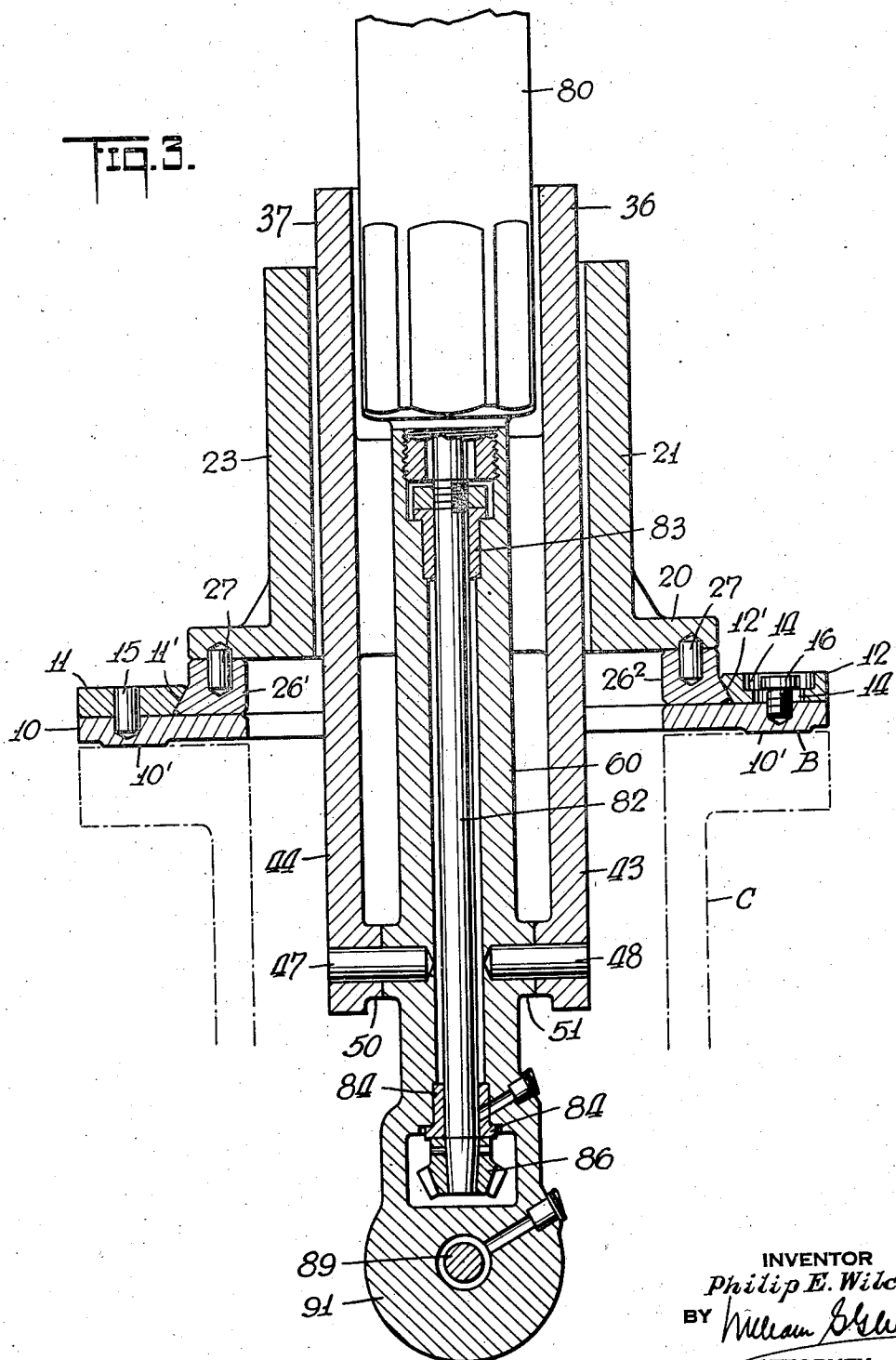
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UNITED STATES PATENT OFFICE

2,408,280

APPARATUS FOR REFACING GATE VALVES

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11 Claims. (Cl. 51-241)

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My invention relates generally to an apparatus for facing off the seats of gate valves.

One of the general objects of my invention is an improved arrangement whereby a seat of a gate valve can be faced off accurately to any desired angle without requiring the removal of the valve.

One of the objects of my invention is an improved arrangement whereby both seats of a gate valve can be faced off accurately to the same degree and more particularly such arrangement wherein the facing off operation can be effected without removing the valve.

For the attainment of these objects and such other objects as may hereinafter be pointed out I have illustrated an embodiment of the invention in the drawings wherein:

Fig. 1 is a vertical section through the refacing mechanism in operative relation to the gate valve;

Fig. 2 is a horizontal section taken on line 2-2 of Fig. 1 looking in the direction of the arrows;

Fig. 3 is a section taken on line 3-3 of Fig. 2; and

Fig. 4 is a view of a detail.

My invention has been developed for the purpose of grinding the seats of a gate valve. To facilitate the understanding of my apparatus and the manner of operation, I show in Fig. 1, in dot and dash lines, the outline of a typical gate valve with the bonnet removed, to uncover and expose its top surface B. The opposed seats marked D and D' are at the lower end of the valve body C. This type of valve is characterized in that these valve seats are presented at the same angle to the vertical and at an angle to each other, as shown in this figure. My invention contemplates that the seats D and D' be faced off without requiring removal of the valve. To this end, the apparatus of the disclosed embodiment has been devised so that it can be seated directly on the top surface B of the valve casing so that the refacing operation requires only the removal of the bonnet which seats on this top surface to close the casing.

Upon viewing Fig. 3 of the drawings it will be observed that the base or bed plate of this apparatus is shown at 10. It seats directly on the top surface B of the valve casing C which therefore functions as the sole surface of reference for the apparatus. The underface of the base is padded for limited areas as shown at 10' in Figures 1 and 3 and these areas are ground accurately to assure a close fit between

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these surface areas and the areas of the top valve surface B which are in contact therewith.

This base plate is comprised of four walls or sides to define an open rectangular frame to receive therewithin the operative parts which are entered into the valve casing. Rails or gibs 11 and 12 are mounted upon opposed sides of bed plate 10 and are shown as secured thereto as follows: A dowel pin 15 extends upwardly centrally from one of these opposed walls (see Fig. 2) to engage into an opening centrally of the rail 11. This dowel pin 15 serves to initially assemble and locate rail 11 with and on that side or wall. Rail 11 is locked against movement in any preferred or desired manner. Two such screws 13 are shown in Fig. 2, one to each side of the dowel pin 15. These elements 13 and 15 retain the rail 11 associated as shown at the lower end of this figure.

The rail 12 is secured on the opposite wall or side of the bed plate 10 by means which permit a bodily adjustment of rail 12 toward and away from rail 11. These securing means comprise transversely elongated depressions 14 in the upper surface of rail 12, into each of which opens a correspondingly transversely elongated slot 14' through which engages a locking member 16 headed at one end and threaded at the other to engage base 10 by being threaded therinto. This construction is shown in detail as to one of the securing members, centrally at the extreme right of Fig. 3. Three such members are shown in the illustrated embodiment (see Fig. 2). As a result of this arrangement, the rail 12 can be adjusted toward and from rail 11 when screws 16 are loosened, and then locked in adjusted position by tightening screws 16 which are countersunk in depressions 14 of rail 12.

The rails 11 and 12 have their inner faces inclined or undercut as shown at 11' and 12' in Fig. 3 for purposes that will be pointed out shortly. It will be observed from the showing in Fig. 3 that these rails 11 and 12 are narrower than the walls or sides of the base 10 upon which they are mounted and that they overlie the outer portions of these walls and do not overlie the inner portions thereof. The main housing now to be described is mounted upon these inner portions of these opposed side wall members.

The main housing is mounted upon the base for sliding adjustment therealong in the direction to the right or the left in the showing of Figures 1 and 2. This main housing comprises a base 20 (see Fig. 3) and walls 21, 22 and 23 which extend outwardly therefrom and define

a casing with an open side which is closed by the separable wall member 24 detachably secured thereto to form the fourth wall of and complete the main housing structure. This closure wall 24 may be secured in position in any preferred or desired manner. I show threaded members 25 (see Fig. 2) passed through the wall 24 and threaded into the end faces of opposed walls 21 and 23. The base 20 is mounted upon a frame which I will hereafter identify as the slide frame for reasons that will shortly appear. This slide frame is comprised of opposed pairs of walls 26¹ and 26² (see Fig. 3) and 26³ and 26⁴ (see Figures 1 and 2). Upon reference to Fig. 3 it will be observed that the base 20 of the main housing is located on the slide frame by dowel pins 27 which extend upwardly from opposed walls 26¹ and 26² and engage in depressions in the underface of base 20. The drawings show one dowel pin centrally of the length of each of these two walls 26¹ and 26² of the slide frame. (See Fig. 1.) The two dowel pins serve to fix the position of the main housing on the slide frame. Means are provided for securing the main housing against movement relatively to or separation from the slide frame. In Fig. 3 I have illustrated these means as pairs of bolts 28 along opposed sides of the base 20 to each side of dowel pins 27 and received through openings in the base to each side of dowel pins 27 and engaged into the slide frame. The slide frame has the lower portion of the inner faces of opposed side walls 26¹ and 26² (see Fig. 3) inclined outwardly as shown at 28 to engage beneath the inclined faces 11' and 12' of the guide rails 11 and 12. As a result of this arrangement the main housing fixed to the slide frame as explained, is mounted on the bed plate for sliding adjustment thereon to the right or to the left in the showing of Figures 1 and 2.

I will now describe one arrangement whereby the main housing can be adjusted on the bedplate to and held in predetermined position. The bedplate 10 has a flange 30 extending upwardly along one edge of the walls thereof. This flange is enlarged vertically centrally thereof as shown at 30' in Fig. 2. An adjusting member 31 is threaded through this central enlargement 30'. Secured to its outer end is the operating handle 32, rotation of which will advance or retreat the adjusting member 31 which is secured at its inner end to wall 26³ of the slide frame (see Fig. 3), which is held engaged therewith between the shoulder left by the reduced thickness of the innermost portion of member 31 and washer 34 secured at the extreme inner end of 31. From the description thus far given it will be understood that rotation of the handle 32 will adjust the position of the slide frame to the right or to the left in the showing in Fig. 1 and in so doing will correspondingly adjust the position of the main housing carried thereby and of the facing off apparatus carried by the main housing and which I will now proceed to describe.

A hanger fork is received within and supported by the main housing already described. It is comprised of two parallel elongated wall members 36 and 37 connected intermediate their length in parallel spaced apart relation by webs or wall sections 38 and 39. This hanger fork is supported from the main casing in any preferred or desired manner. Upon reference to Figs. 1 and 2 it will be observed that the supporting means shown in the drawings comprise the sets of bolts 35 and 35¹ threaded through the closure

wall 24 of the main casing and whose inner ends abut against the end faces of walls 36 and 37 of the hanger fork so that tightening the bolts secures the hanger fork suspended from the main frame in any predetermined elevated relation.

The walls 36 and 37 extend a substantial distance below the connecting webs or walls 38 and 39. These downwardly extending portions take the form of tapering legs 43 and 44 (see Fig. 1), provided adjacent their lower ends with pivot pins or pintles 47 and 48 received and held in horizontal openings through these ends. For reasons that will appear shortly these lower ends of legs 43 and 44 are shown as provided with inwardly directed enlargements 50 and 51 through which the pivot pins 47 and 48 pass. It will be observed that the pivot pins extend inwardly beyond these enlargements 50 and 51 to form pivots for the spindle casing, now to be described.

The spindle casing is shown at 60 and is a hollow casing the contour of which may be as illustrated in cross section in Fig. 2. It is supported adjacent its lower end on the aforementioned inward extension of pivot pins 47 and 48 which are received in radially extending openings formed in the spindle casing as shown in Fig. 3. As a result the spindle casing 60 is free to swing about the horizontal axis defined by the pivot pins 47 and 48 at the lower end of the hanger fork. The casing 60 is thickened in opposition to portions 50 and 51 to complete the pivot bearing and to space the casing 60 and the forks 43 and 44. The arrangement illustrated in the drawings for controlling the angular position of spindle casing 60 about pivot 47-48 comprises a hollow plunger pin 65 (see Fig. 1) slidably guided within casing 66 which extends outwardly from the web or wall section 39 of the hanger fork and through an opening 68 in the closure wall 24 of the main frame provided for clearance and which guideway is shown closed at its outer end as by threaded plug 69. The plunger pin 65 is yieldingly forced outwardly by a spiral spring 70 contained within the guideway or casing 66 and which abuts at one end against plug 69 and the outer end against the inner surface of plunger 65. These parts are so positioned and related that the nose of plunger 65 is yieldingly held against spindle casing 60 and tends to swing it clockwise about its pivot in the showing of Fig. 1 and maintain it against the end of limiting screw 73 which is threaded through wall 38 of the hanger fork (see Fig. 1), the parts being so positioned and related that the nose 72 of limiting screw 73 engages in groove 74 formed in the opposite side of spindle casing 60. The screw 73 may be rotated by operating handle 75 to retract or advance the nose 72. Manipulation of operating handle 75 moves the nose 72 to the left in the showing of Fig. 1 to swing the spindle casing 60 counterclockwise about its pivot against the pressure of spring 70. A locknut 77 threaded on the adjusting member 73 may be employed to lock that member in its adjusted position. As a result of this arrangement the plunger pin 65 holds the spindle casing 60 engaged against the adjustable member 73 and the two cooperate to fix the angular position of the spindle casing about its pivot.

Within the upper end 80 of the spindle casing 60 is contained either a prime mover or a shaft connection thereto to drive a stub shaft connected to the cutter shaft 82 which rotates within spaced bearings 83 and 84. The lower end of cutter

shaft 82 carries gear 86 in mesh with crown gear 87 secured to the cutter head baseplate 88 in any preferred or desired manner. Extending rearwardly from cutter head baseplate 88 is the short spindle or shaft 89 held in bearing 90 mounted in the cutter casing head 91. As a result of this arrangement the rotation of the cutter shaft 82 will rotate the cutter head baseplate 88. The cutter head casing 91 mounted at the lower end of the spindle casing has a circular flange 92 extending outwardly therefrom to engage freely in the annular groove 93 formed on the inner face of the cutter head baseplate 88.

The cutter head is mounted for rotation on the lower end of shaft housing 60 and is driven by the cutter shaft 82 supported therewithin. The cutter head baseplate 88 is guided in this rotation by the annular flange 92 engaged in the circular groove 93. Secured to the outer face of the cutter head baseplate 88 is the cutter plate 97 to the outer face of which is secured the grinding or cutting element or surface 98.

The apparatus herein described is seated with its parts fully assembled on the valve top with the pads 10' at the bottom of the baseplate 10, in direct engagement with top surface B of the valve casing as the surface of reference, and with the cutter projected into the valve body C and into adjacency to that valve seat which is to be faced off.

It is one of the objects of the invention that the parts be readily assembled for the facing off operation and be readily disassembled when this operation is completed. The adjustments provided for are for the purpose of bringing the cutting element 98 into predetermined relation to the valve seat at the right in the showing of Fig. 1 for example, and these adjustments comprise the following: The vertical position of the cutting element can be adjusted by elevating or lowering the hanger fork. The walls 22 and 24 of the main casing are cut away as shown at 63 and 103 in Figs. 1 and 2 of the drawings so that the plunger casing 66 and the adjusting member 73 will clear these walls. The lateral adjustment of the cutter 98 towards the valve seat upon which it is to operate, i. e., the adjustment in the horizontal, is effected through adjustment of the slide frame by operating handle member 32. The adjustment of the slide frames adjusts the main frames and the hanger fork or housing and the shaft casing, in other words all of the apparatus except the base or bed plate 10. The angular position or relation of the cutter 98 about a horizontal axis is predetermined by member 73 operated by handle 74. These various adjustments can be effected with the parts assembled as shown in the drawings and the valve seat ground or cut to the desired angle or degree.

When the facing off of one valve seat has been completed, the main casing is lifted vertically (and with it all of the operating mechanism including the hanger housing, the shaft casing and the cutter head) sufficiently to clear base 20 of the main casing from engagement with the two dowel pins 27 and the main casing reversed, i. e., turned 180° about its vertical axis and then resealed upon these dowel pins 27. The grinding or cutting element 98 will now be presented facing the other valve seat in precisely the same relation as to the three aforementioned adjustments as it was presented to the valve seat already faced off so that the other valve seat will be faced off to precisely the same angle and degree.

I have thus accomplished the purpose of my invention which as stated was to provide a simple apparatus which can be given the various adjustments required to fix the position of the cutter with relation to the valve seat to be faced off, and I have done this by the use of a single reference for the grinding of both valve seats without disturbing that reference.

It will be observed that pivots 47—48 and the adjusting members 65 and 73 are so located in my apparatus, that the former is within the valve casing and adjacent the valve seats in the operative relation of the parts whereas the latter are well above the valve casing and far removed from the pivot 47—48. It will further be observed that the parts are constructed for assembly in the nested relation shown in the cross section of Fig. 2. The advantages that flow therefrom will be appreciated by those skilled in this art.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. Mechanism for facing off the inclined seats of a gate valve without requiring the removal of the valve, said mechanism comprising a bedplate having an opening therethrough and adapted to be seated on the upper face of the open valve casing, a main frame and means for mounting it on and for sliding adjustment relatively to the bedplate, said means comprising a guideway on the bedplate and a slide frame received therein, means for mounting the main frame on the slide frame for adjustment therealong, a hanger supported by and for vertical adjustment relatively to the main frame said hanger extending below the bedplate into adjacency to the valve seats when the bedplate is seated on the valve casing and a cutter carrying member pivoted to the lower end of said hanger for angular adjustment about a horizontal axis located below the bedplate and adjacent the valve seats to bring the cutter into parallelism with the valve seat to be faced off, said cutter carrying member extending above the base plate and means above the base plate for angularly adjusting the cutter carrying member, said means for mounting the main frame on the slide frame comprising interengaging elements spaced 180° apart in a horizontal plane, for locating the main frame on the slide frame so that the main frame can be lifted vertically from the slide frame to disengage said elements, said elements being duplications of each other whereby when the main frame is lifted from off the slide frame and turned 180° about a vertical axis it can be re-seated upon the slide frame with the cutter in parallelism to the other valve seat.

2. Mechanism for facing off the inclined seats of a gate valve without requiring the removal of the valve, said mechanism comprising a bedplate having an opening therethrough and adapted to be seated on the upper face of the open valve casing, a main frame and means for mounting it on and for sliding adjustment relatively to the bedplate, said means comprising a guideway on the bedplate and a slide frame received therein, means for mounting the main frame on the slide frame for adjustment therealong, a hanger supported by and for vertical adjustment relatively to the main frame said hanger extending below the bedplate into adjacency to the valve seats when the bedplate is seated on the valve casing and a cutter carrying member pivoted to the lower end of said hanger for angular

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adjustment about a horizontal axis located below the bedplate and adjacent the valve seats to bring the cutter into parallelism with the valve seat to be faced off, said means for mounting the main frame on the slide frame comprising interengaging elements spaced 180° apart in a horizontal plane, for locating the main frame on the slide frame so that the main frame can be lifted vertically from the slide frame to disengage said elements, said elements being duplications of each other whereby when the main frame is lifted from off the slide frame and turned 180° about a vertical axis it can be reseated upon the slide frame with the cutter in parallelism to the other valve seat.

3. Mechanism for facing off the inclined seats of a gate valve without requiring the removal of the valve said mechanism comprising a bedplate having an opening therethrough and adapted to be seated on the upper face of the open valve casing, a main frame and means for mounting it on and for sliding adjustment relatively to the bedplate, said means comprising a guideway on the bedplate and a slide frame received therewithin, means for mounting the main frame on the slide frame for adjustment therealong, a member supported by and for vertical adjustment relatively to the main frame and hanger extending below the bedplate into adjacency to the valve seats when the bedplate is seated on the valve casing and a cutter carrying member pivoted to the lower end of said hanger for angular adjustment about a horizontal axis located below the bedplate and adjacent the valve seats to bring the cutter into parallelism with the valve seat to be faced off, said cutter carrying member extending above the base plate and means above the base plate for angularly adjusting the cutter carrying member.

4. Mechanism for facing off the inclined seats of a gate valve without requiring the removal of the valve said mechanism comprising a bedplate having an opening therethrough and adapted to be seated on the upper face of the open valve casing, a main frame and means for mounting it on and for sliding adjustment relatively to the bedplate, said means comprising a guideway on the bedplate and a slide frame received therewithin, means for mounting the main frame on the slide frame for adjustment therealong, a hanger supported by and for vertical adjustment relatively to the main frame said hanger extending below the bedplate into adjacency to the valve seats when the bedplate is seated on the valve casing and a cutter carrying member pivoted to the lower end of said hanger for angular adjustment about a horizontal axis located below the bedplate and adjacent the valve seats to bring the cutter into parallelism with the valve seat to be faced off.

5. Mechanism for facing off the inclined seats of a gate valve without requiring the removal of the valve said mechanism comprising a bedplate having an opening therethrough and adapted to be seated on the upper face of the open valve casing, a main frame having a base and walls extending upwardly therefrom and means for mounting the main frame for sliding adjustment along the bedplate, said means comprising a guideway on the bedplate and a slide frame received within the guideway and means for mounting the main frame on the slide frame for adjustment therealong, a hanger supported for vertical adjustment relatively thereto and extending below the bedplate into adjacency to the

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valve seats when the bedplate is seated on the valve casing and a cutter carrying casing pivoted to the lower end of said hanger for angular adjustment about a horizontal axis located below the bedplate and adjacent the valve seats, said cutter carrying member extending above the base plate and means above the base plate for angularly adjusting the cutter carrying casing to bring the cutter into parallelism to the valve seat to be faced off and cutter rotating mechanism carried within said casing.

6. Mechanism for facing off the inclined seats of a gate valve without requiring the removal of the valve said mechanism comprising a bedplate having an opening therethrough and adapted to be seated on the upper face of the open valve casing, a main frame and means for mounting the main frame for sliding adjustment along the bedplate, a hanger supported for vertical adjustment relatively thereto said hanger extending below the bedplate into adjacency to the valve seats when the bedplate is seated on the valve casing and a cutter carrying casing pivoted to the lower end of said hanger for angular adjustment about a horizontal axis below the bedplate and adjacent the valve seats, said cutter carrying member extending above the base plate and means above the base plate for angularly adjusting the cutter carrying casing to bring the cutter into parallelism to the valve seat to be faced off and cutter rotating mechanism carried within said casing.

7. Mechanism for facing off the inclined seats of a gate valve without requiring the removal of the valve said mechanism comprising a bedplate having an opening therethrough and adapted to be seated on the upper face of the open valve casing, a main frame having a base and walls extending upwardly therefrom and means for mounting the main frame for sliding adjustment along the bedplate, said means comprising a guideway on the bedplate and a slide frame received within the guideway and means for mounting the main frame on the slide frame, said last mentioned means comprising interengaging elements on the slide frame and the base of the main frame which locate the main frame on the slide frame and which permit the main frame to be lifted off from off the slide frame, said elements being located 180° apart in a horizontal plane and being duplications of each other whereby the main frame can be lifted from off the slide frame and turned 180° about a vertical axis and reseated upon the slide frame, a hanger supported for vertical adjustment relatively thereto said hanger extending below the bedplate into adjacency to the valve seats when the bedplate is seated on the valve casing and a cutter carrying casing pivoted to the lower end of said hanger for angular adjustment about a horizontal axis below the bedplate and adjacent the valve seats, said cutter carrying member extending above the base plate and means above the base plate for angularly adjusting the cutter carrying casing to bring the cutter into parallelism to the valve seat to be faced off and cutter rotating mechanism carried within said casing.

8. Mechanism for facing off the inclined seats of a gate valve without requiring the removal of the valve, said mechanism comprising a bedplate having an opening therethrough and adapted to be seated on the upper face of the open valve casing, a main frame and means for mounting the latter on the former comprising interengaging elements on the main frame and on the bed-

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plate which permit the main frame to be lifted vertically to disengage said elements, said elements being located on the frame and on the bedplate, 180° apart in the horizontal plane and being duplications of each other whereby the main frame can be lifted freely and turned 180° about a vertical axis and the elements reengaged, a member supported from the main frame for vertical adjustment relatively to the bedplate and a cutter carrying member pivoted to said first mentioned member for angular adjustment about a horizontal axis to bring the cutter into parallelism with the valve seat to be faced off, whereby the two valve seats can be faced off in succession to the same degree without requiring any change in the angular adjustment of the cutter carrying member.

9. Mechanism for facing off the opposed seats of a gate valve without requiring the removal of the valve said mechanism comprising a bedplate adapted to be seated on the upper face of the open valve casing and which serves as the reference for the bedplate and means for supporting a cutter from the bedplate in cooperative relation to one or the other of said valve seats, said means comprising a base member seated on the bedplate and interengaging means spaced 180° apart in the plane parallel to the bedplate for holding the base member against movement in a plane parallel to the bedplate but permitting a movement of the base member vertically relatively to the bedplate to disengage said elements, said elements being duplications of each other whereby when the cutter has completed the facing off of one seat, the base member can be lifted vertically and turned 180° about a vertical axis and resealed to reengage said interengaging elements without disturbing the aforementioned reference for the bedplate, to thus present the cutter in operative relation to the other valve seat.

10. Mechanism for facing off the opposed seats of a gate valve without requiring the removal of the valve said mechanism comprising a bedplate adapted to be seated on the upper face of the open valve casing as the reference for the bedplate and means for supporting a cutter from the bedplate in cooperative relation to one of the

other of the valve seats said means comprising a slide frame adjustable along the bedplate and a main frame seated on the slide frame and interengaging means spaced 180° apart in the plane parallel to the bedplate for holding the main frame against movement relatively to the slide frame in a plane parallel to the bedplate but permitting a movement of the main frame vertically relatively to the slide frame to disengage said elements, said elements being duplications of each other whereby when the cutter has completed the facing off of one seat, the main frame can be lifted vertically and turned 180° about a vertical axis and resealed to reengage said interengaging elements without disturbing the aforementioned reference for the base plate or the adjusted position of the slide frame, to thus present the cutter in operative relation to the other valve seat.

11. Mechanism for facing off the opposed seats of a gate valve without requiring the removal of the valve said mechanism comprising a bedplate adapted to be seated on the upper face of the open valve casing and which serves as the reference for the bedplate and means for supporting a cutter from the bedplate in cooperative relation to one or the other of the valve seats said means comprising a slide frame adjustable along the bedplate and a main frame seated on the slide frame and interengaging means spaced 180° apart in the plane parallel to the bedplate for holding the main frame against movement relatively to the slide frame in a plane parallel to the bedplate but permitting a movement of the main frame vertically relatively to the slide frame to disengage said elements, said elements being duplications of each other and means for adjusting the angle of the cutter whereby when the cutter has completed the facing off of one seat, the main frame can be lifted vertically and turned 180° about a vertical axis and resealed to reengage said interengaging elements without disturbing the aforementioned adjustments or the aforementioned reference for the base plate, to thus present the cutter in operative relation to the other valve seat.

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