Feb. 8, 1949. J. W. JACKSON 2,460,985

TOOL FOR RECONDITIONING VALVES

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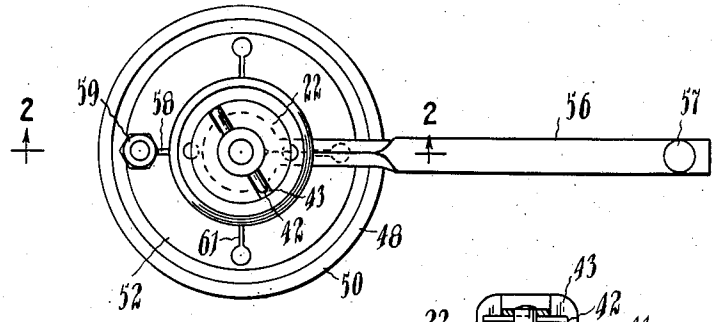

Fig. 1.

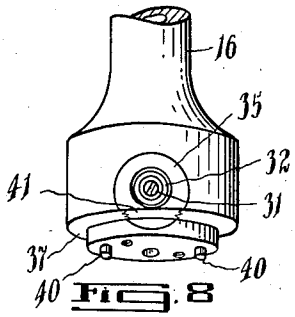

Fig. 8

Fig. 9

Fig. 10.

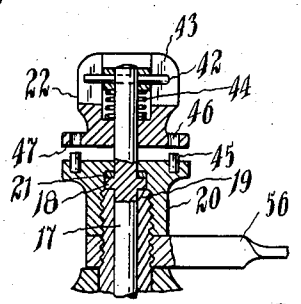

Fig. 11.

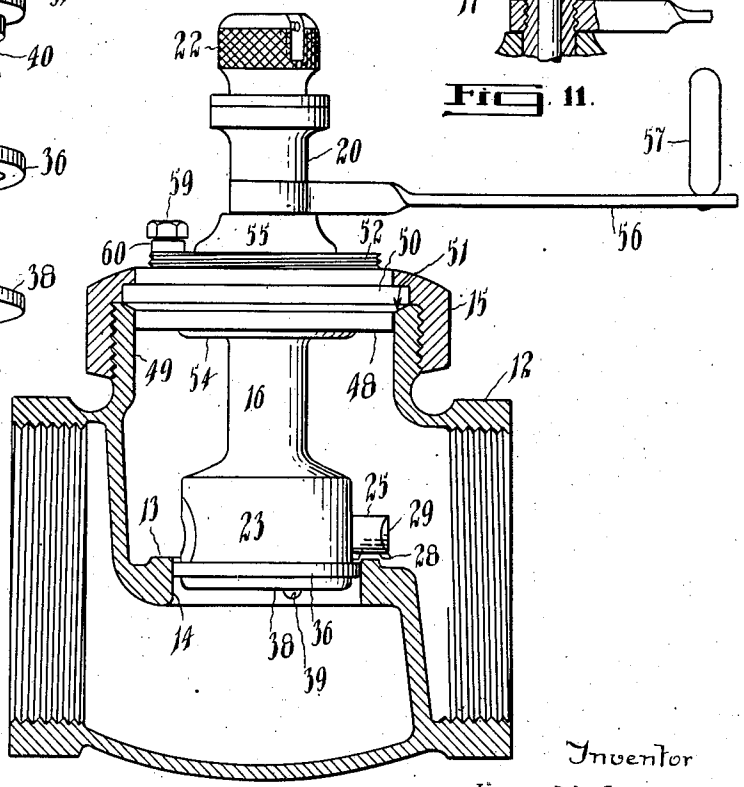

Fig. 2.

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TOOL FOR RECONDITIONING VALVES

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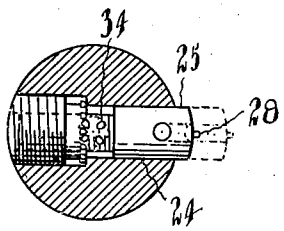

Fig. 4.

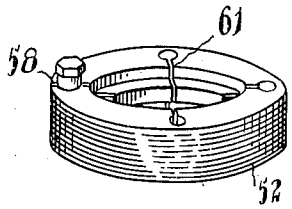

Fig. 5.

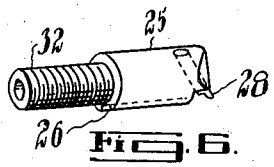

Fig. 6.

Fig. 7.

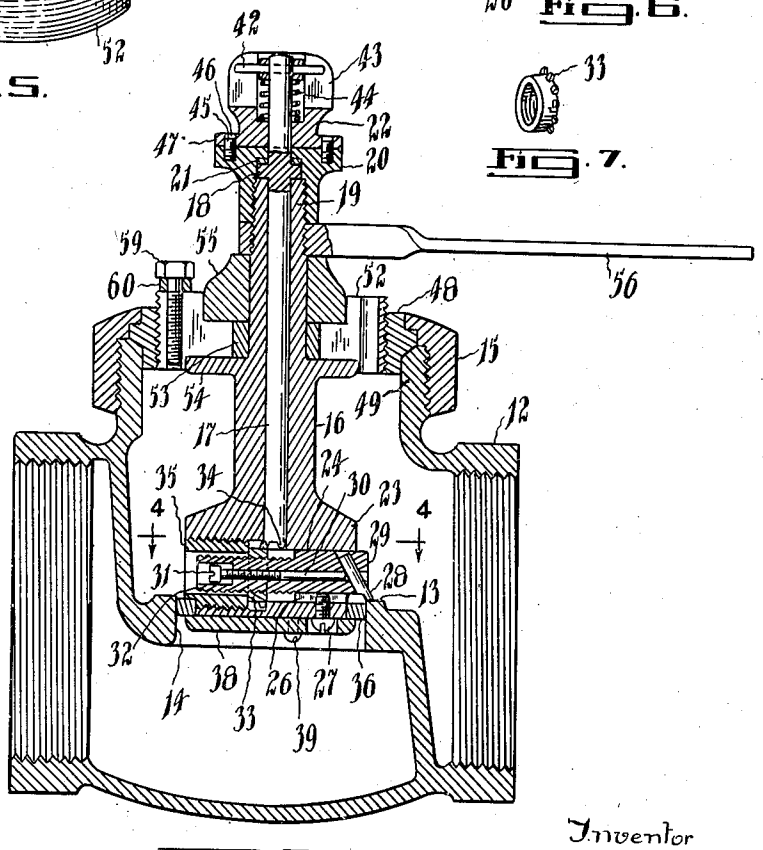

Fig. 3.

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UNITED STATES PATENT OFFICE

2,460,985

TOOL FOR RECONDITIONING VALVES

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Application November 23, 1945, Serial No. 630,475

5 Claims. (Cl. 90—12.5)

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The invention relates to improvements in tools for reconditioning the seats of valves and for turning down the seat portion of a valve when it is necessary to apply an insert to provide a new seat on account of the original one having become worn down beyond repair.

The primary object of the invention is to provide a tool which is adapted to be used without having to remove the valve from the line in which it is connnected.

Another object of the invention is the provision of a portable tool designed to be mounted in the body of a valve and operated with facility in order to recondition the seat thereof.

Another object is to provide a tool of this character by which a damaged or worn valve-seat can be accurately faced off with a cutter to furnish a fresh and true seating surface.

The invention particularly concerns valves of the kind employed in industrial and analogous installations such as those of the globe and angle types. The tool however, is adapted to condition any flat seat of a valve of a size for which it is made and to provide a seat which is as accurate as that which can be formed on a lathe.

The tool comprehends a cutter which is supplied with means by which a cut of a regulable depth can be made, and the tool is so devised that the operation of reconditioning a valve-seat can be performed expeditiously. An advantageous feature of construction is that the tool may be removed at any stage of the operation in order to inspect the work and can be returned to exact position for continuing the operation.

The invention presents a sturdy and efficient tool which can be manufactured at low cost, and one which saves time and labour in conditioning a valve-seat.

While the major objects and advantages of the invention have been related, subsidiary objects and advantages will appear from the ensuing specification of the selected form of the invention which is illustrated in the accompanying drawings.

In the drawings, Fig. 1 is a plan view of the tool.

Fig. 2 is a side view thereof showing it applied to the body of a globe valve for operating on the flat seat thereof.

Fig. 3 is a similar view to Fig. 2 but showing the tool in section.

Fig. 4 is a cross section on line 4—4 of Fig. 3.

Fig. 5 is a perspective view of a ring bearing.

Fig. 6 is a perspective view of the cutter and the holder therefor.

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Fig. 7 is a perspective view of a gear forming a part of the feed mechanism for the cutter.

Fig. 8 is a perspective view of the bottom end of the tool body in which the holder is slidably mounted.

Fig. 9 is a detail of a guide ring which loosely encircles the lower end of the body.

Fig. 10 is a detail of a retainer for the guide.

Fig. 11 is a vertical section of the tool showing a thimble in raised position.

In order to illustrate the manner of using the tool of the present invention, there is shown at 12, a standard valve body which is provided with a flat seat, denoted at 13, surrounding the port or duct 14. In certain makes of such valves the stem assembly is secured by a nut 15 having screw-threaded engagement with said body. In carrying out the invention this nut may be used to fasten the tool while the same is being used, as will be explained in greater detail.

The tool comprises an elongated body 16 preferably of a circular shape in cross section and supplied with a central aperture in which is mounted a spindle 17. The spindle projects upwardly of the body 16 and is provided with an integral collar 18 shouldered at its lower side against the face of the upper end 19 of the body. The upper side of said collar is shouldered by a locking nut 20 screwed on said upper end 19. Desirably a thrust washer 21 is interposed between the collar 18 and the nut 20 in order to minimize wear due to upward thrust on the spindle. The collar precludes endwise movement of the spindle which is free to turn in said body when actuated by a thimble 22.

The body 16 is enlarged at its lower end as at 23 and this enlargement is supplied with a transverse aperture 24 at right angles to the spindle-axis, which is circular in cross section and slidably contains a holder 25 of a similar cross section. The enlargement is of a slightly less diameter than the opening 14 in the valve-seat 13 so as to project loosely therein when the tool is inserted in the valve-body 12.

The holder 25 is held against rotation about its axis by means of a longitudinal slot 26 therein engaged by a screw 27 or analogous means. The holder carries a cutter 28 angularly arranged to project downwardly and outwardly from the front face 29 of its outer end so as to engage and operate across the flat seat of the valve when the body 16 is rotated. The cutter is secured by a pin 30 loosely disposed in an axial hole in the holder and tightened against the cutter by a screw 31 having a head located

in a counterbore at the rear end of the holder. The securing means for the cutter therefore does not interfere with the operation of the same when the tool is required to be used for entirely cutting away the seat to substitute an insert for providing a new seat.

The rear section **32** of the holder is of a reduced diameter and threaded externally and on this section is threadedly mounted a toothed wheel of the bevel-gear type indicated at **33**. This toothed wheel is in constant mesh with peripheral teeth **34** formed on the lower end of the spindle **17** which constitute therewith a right-angle drive for cross feed of the cutter and its holder. This gearing is operated by rotation of said spindle and it will be understood that rotation of the spindle in one direction will feed the cutter outwardly and that reverse rotation will feed it inwardly. The gear **33** is located in a rear enlargement of the aperture **24** and in this enlargement a cylindrical bushing **35** is fitted by means of screw threads. The inner end of the bushing forms a thrust shoulder for the gear **33**.

Below the holder **25** there is provided a guide ring **36** which is made a slip fit in the duct **14** of the valve for centering the lower end of the body **16** therein and assuring of a true cutting operation across the face of the seat. The guide ring is a brass member rotatably relative to the body **16** and seated in an annular groove **37** formed on the lower end **23** thereof. The groove is composed in part by a reduction in the diameter of said end **23** and in part by a retaining washer **38** attached by ordinary fastenings means including screws as at **39** and dowels **40**. Preferably the bushing **35** is locked by the provision of a flat **41** thereon engaged by the guide ring **36**—see Fig. 8.

Adverting to the thimble **22**, this is connected to the spindle **17** and devised to secure it in a set position to which it may be rotated. The connecting means consists of a pin **42** transversely extending through the spindle and loosely engaged in an axially directed slot **43** formed in the thimble, which thimble being knurled or milled so that it may be gripped firmly by hand and turned. This means of connection enables the thimble to be raised on the spindle against the pressure exerted by a compression spring **44**. The thimble is normally locked to the body **16** by means of pins **45** projecting upwardly from the nut **20** and loosely engaged in holes **46** provided in the inner face **47** of the thimble—as best discernible in Fig. 11. To unlock the spindle so that it may be rotated to feed the cutter it is only necessary to pull the thimble upwardly clear of the pins **45**. When the cutter has been fed a desired amount the thimble is again locked by the pins and the engagement is retained by the spring **44**.

The body **16** is provided with an adapter **48** for supporting it in the valve-body **12**. The adapter is a ring of a diameter for fitting in the upper part **49** of the valve-body **12** from which the stem is removed and is provided with a peripheral ridge **50** having an inclined bottom face **51** which rests on the beveled end face of said part **49** and thereby aligns the tool with the valve axis. In the case of repair of a valve which is supplied with the nut **15**, referred to earlier in the specification, the adapter is secured by this nut while the tool is being used, otherwise a special nut is employed.

The adapter is internally threaded to engage

an externally-threaded ring bearing **52** by which the tool is fed longitudinally of its axis for setting the depth of cut. The ring bearing is rotatably mounted on the body **16** and shouldered against endwise movement. To this end the body is supplied with a bearing surface preferably furnished by a bushing **53** rigid thereon. A flange **54** integral with the body provides a shoulder at the lower side of the ring bearing and a detachable collar **55** on the body provides a shoulder at the upper side of the ring bearing which is desirably recessed to receive said flange and collar.

A lever **56** having a handle **57** serves as a crank for turning the body on the ring bearing. The lever is screw-threaded on the upper end **19** of the body to tighten against the collar **55** and the nut **20** locks it in place. Obviously other means could be resorted to in order to attach said lever and if so desired a ratchet connection could be employed without departing from the invention.

The ring bearing **52** is supplied with means by which it may be locked to the adapter **48** in any position to which it is adjusted. To this end it is split as at **58** and the split portion is provided with a hole having threaded engagement with a headed screw **59** encircled by a collar **60** and adapted on being tightened to expand the ring bearing to frictionally hold it stationary. To facilitate expansion the ring bearing may be slotted at intervals as at **61**.

In the use of the tool it is placed in the valve and supported by the adapter with the valve elevated from the seat thereof and with the guide ring **36** inserted in the seat opening **14**. The ring bearing is turned by hand to screw feed the body of the tool downwardly until the cutter contacts the face of the seat. The thimble is then raised and turned to withdraw the cutter clear of the seat, whereupon the ring bearing is again turned to feed the cutter below the seat-face according to the depth of cut required. The ring bearing is made fast in its set position by the locking device **59** and the thimble is turned to feed the cutter outwardly into engagement with the seat. On turning the hand lever the cutter is rotated about the spindle axis to cut the seat. The seat is faced off by repeating the operations of turning the thimble and hand lever. Any number of cuts may be made across the face of the seat until the same is properly reconditioned. If the seat is damaged beyond repair it can be cut away for the fitting of a new seat.

It will be manifest from the preceding description that the invention provides a highly efficient and serviceable tool in which the parts can be made of materials to resist wear and that all surfaces that require oiling can be amply lubricated to assure of smooth operation and long life.

What I claim is:

1. In a tool for reconditioning valve seats, an elongated body for insertion downwardly into a valve to the seat thereof, said body having an axial bore and having an aperture extending through its lower end at right angles to its axis, a spindle mounted in said bore for rotation and held against endwise movement, the lower end of said spindle being provided with peripheral teeth, a holder slidably mounted in said aperture and held against rotative movement, said holder having a cylindrical section provided with circumscribing screw threads, a bevel gear in mesh with said peripheral teeth of said spindle and

held against endwise movement in said aperture, said bevel gear having a bore threadedly engaged with said screw threads for feeding holder transversely of said body upon movement of said spindle, a cutting tool carried by said holder, and means for turning said body.

2. A tool as defined in claim 1, in which the said bevel gear is held in mesh by means of a cylindrical bushing encircling the said cylindrical section of the holder and screw threaded in the said aperture of the body.

3. A tool as defined in claim 1, in which the said cutting tool angularly projects from an end face of said holder and is secured by a screw endwise extending through said holder and accessible at the end of the holder opposite said cutting tool whereby interference with the cutting edge of the tool is avoided.

4. A tool as defined in claim 1, in which the said spindle is manually rotatable by means of a thimble slidably keyed thereon for non-rotative engagement with the said body when moved in one direction, and in which said spindle is biased

by a spring to retain said non-rotative engagement.

5. A tool as defined in claim 1, in which the said body is provided with means for supporting it on the valve comprising a ring bearing turnably seated in a recess provided in said rotatable body, an adapter ring threadedly engaged with said ring bearing and having an inclined seating face for engaging the valve body, and means for securing the adapter ring to the valve body.

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