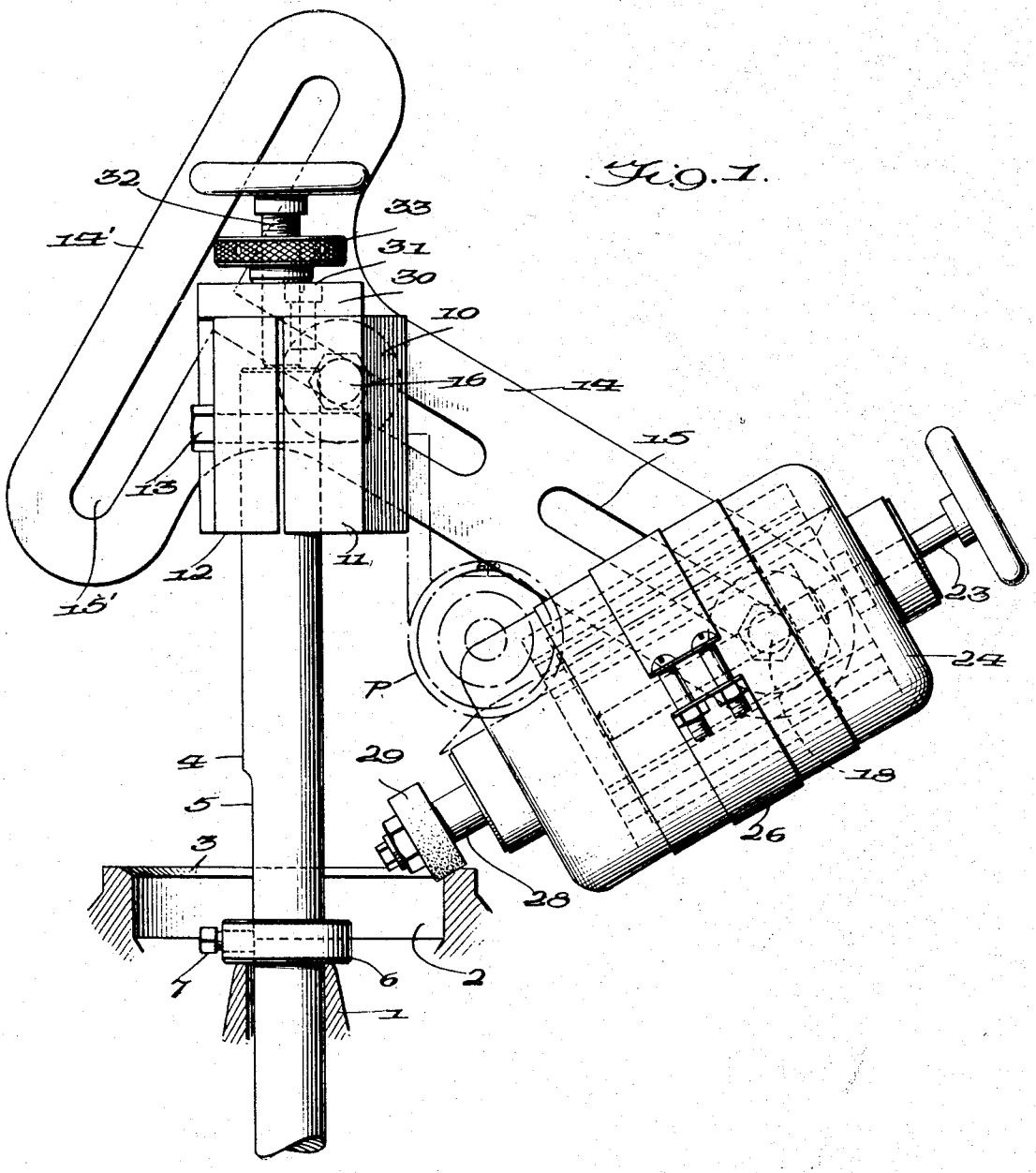
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GRINDING MACHINE

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Fig. 1.



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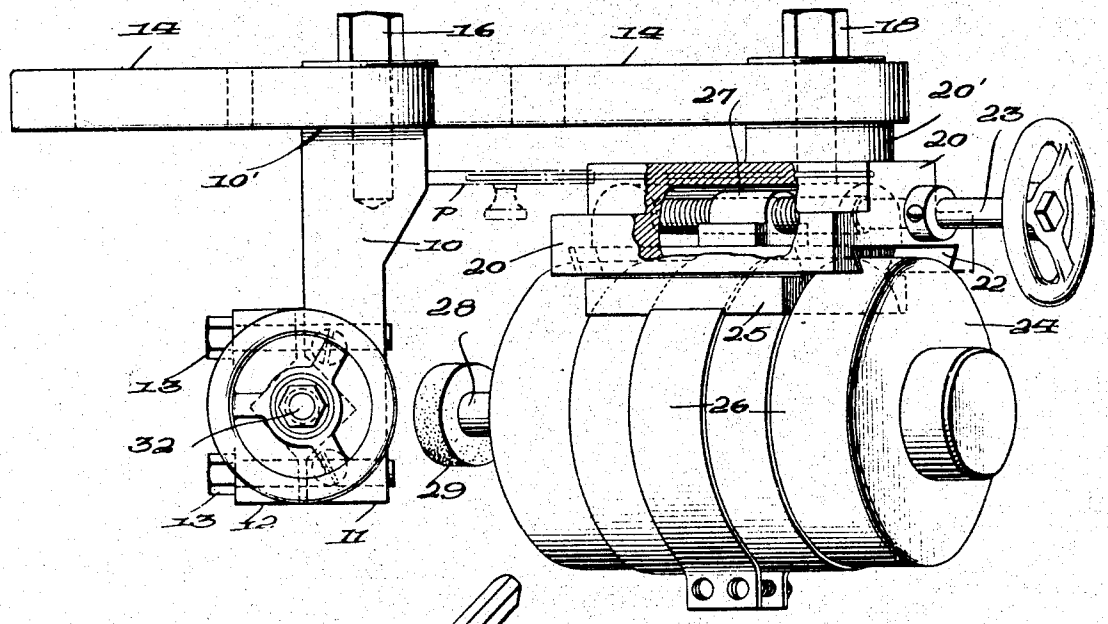
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GRINDING MACHINE

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Fig. 2.



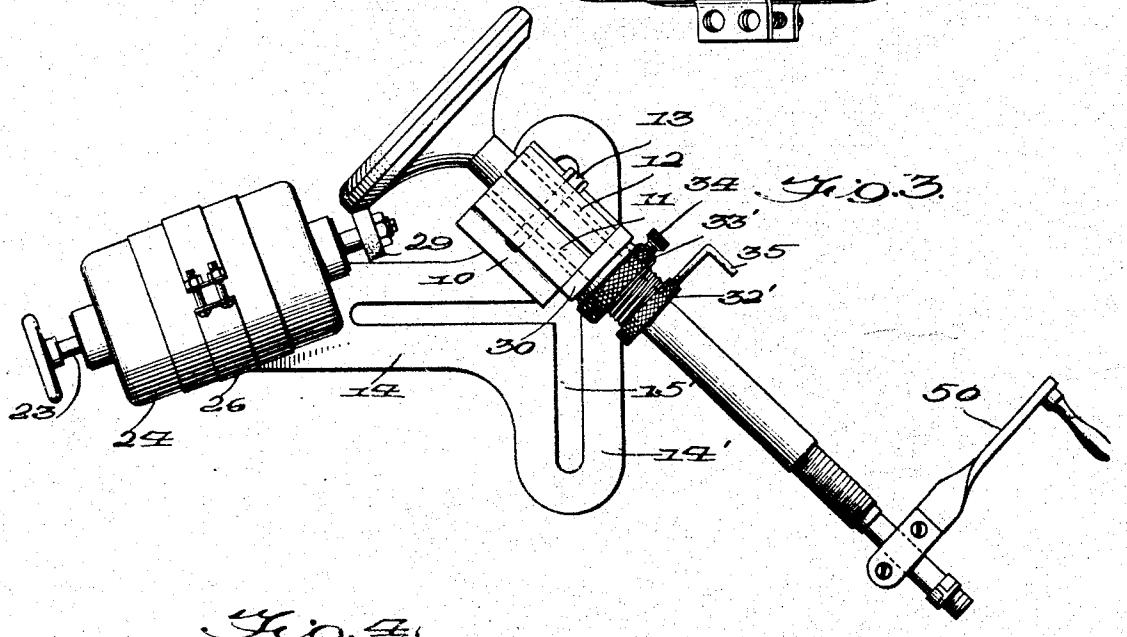
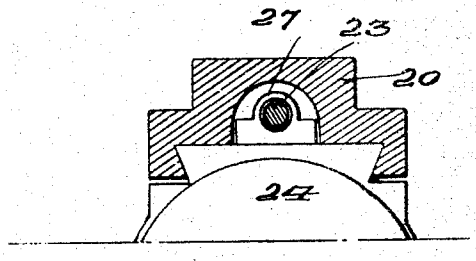


Fig. 3.

Fig. 4.



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UNITED STATES PATENT OFFICE

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GRINDING MACHINE

Application filed November 10, 1930. Serial No. 494,778.

The invention relates to a machine for grinding valves and valve seats, said machine being of the general type as that shown in my copending application Serial No. 486,010, filed October 2, 1930, and differing from the latter in the structure and arrangement of parts to adapt the present machine to the grinding of valve seats having various angles of bevel or inclination and to the grinding of the surfaces of the valves cooperating therewith.

The invention is illustrated in the accompanying drawings, in which:—

Fig. 1 is an elevation of the machine as applied for grinding the seat of a valve having a central valve stem guide.

Fig. 2 is a plan view, partly in section, of the machine.

Fig. 3 is an elevation of the machine arranged for grinding a valve.

Fig. 4 is a detail view, partly in elevation and partly in section, of the support for the motor.

Referring more particularly to Fig. 1 of the drawings, 1 indicates a tubular valve stem guide which is fixed centrally and axially within the valve port or opening 2, which latter is provided with the usual tapered or beveled valve seat 3, which seat is to be ground or refinished by means of the machine constituting the subject-matter of the present invention. Fitted within the bore of the valve stem guide 1 is a spindle 4 having a flat face 5 extending longitudinally of the spindle for a portion of its length, to enable a collar 6 surrounding the spindle to be securely clamped thereto, in adjusted relation, by means of a set screw 7, so that the spindle will be supported firmly, but rotatably in the valve stem guide, with a predetermined length of the spindle extending above the guide.

Secured to the upper end of the spindle is a bracket 10 having a flat face 10′, substantially parallel to the longitudinal axis of the spindle, which bracket includes a split sleeve formed of sections 11 and 12 embracing the upper end of the spindle and connected by bolts 13, 13.

Engaging the flat face 10′ of the bracket is a flat plate 14, which is preferably of T form, the head portion 14′ of which is provided with a transverse slot 15′ which connects with a longitudinal slot 15 formed in the stem or body portion of the T, which slot 15 may be interrupted by a bridge or cross piece intermediate its length to preserve the necessary elements of strength and rigidity of the plate. Cooperating with either of the slots 15 or 15′ is a set screw 16, which engages a threaded opening in the flat face 10′ of the bracket and serves to lock the bracket and the split sleeve carried thereby firmly to the plate with the latter in any desired or predetermined angular adjustment with respect to the longitudinal axis of the sleeve and, therefore, in the same angular adjustment with the longitudinal axis of the spindle engaging the sleeve.

Secured to the same face of the plate 14 as the bracket 10 is a guide block 20 provided with a boss 20′, which has a threaded opening therein to engage a set screw 18 passing through the slot 15 in the plate and by means of which the guide block or member 20 is rigidly locked at any desired position of angular adjustment on the plate and also at any predetermined distance from the spindle 4. The lower face of the guide block 20, which is substantially parallel with the face of the plate 14, is provided with a dovetailed guide slot 22 to receive the beveled edges of a slide 25 secured to an electric motor 24 by means of a strap 26, the upper face of the slide having a screw threaded socket 27 thereon, which is engaged by a feed screw 23, which is journaled in the guide block 20, is freely rotatable but incapable of longitudinal movement and serves to adjust the motor 24 toward and from the axis of spindle 4.

The shaft 28 of the motor is parallel with the face of plate 14, so that, in the various positions of adjustment of the machine, the longitudinal axis of the spindle 4 and the shaft 28 of the motor will lie in the same plane. Secured to the end of the shaft 28 is a grinding wheel 29, the several parts being capable of adjustment to bring the face of the grinding wheel in position to

operate on the valve seat 3 and grind or refinish the same with the proper bevel or inclination. The proper angular adjustment of the shaft of the motor 28 with respect to the spindle 4 and, therefore, to impart the proper bevel to the valve seat 3, may be accurately determined by means of a protractor *p* shown in dotted lines in Figs. 1 and 2.

In order to feed the grinding wheel toward the work, a similar screw feed connection between the bracket 10 and the spindle 4 is provided as in the machine illustrated in the prior application aforesaid, the same comprising a threaded nut or collar 30 which is secured to the member 11 of the collar by one or more bolts 31, which nut is engaged by a feed screw 32, the lower end of which bears upon the upper end of the spindle 4, the feed screw being provided with an operating hand wheel and with an adjustable set nut 33, by means of which it is held in its adjusted position.

The machine exemplified in the prior application aforesaid was adapted to grind valve seats of a fixed bevel or inclination and varying diameters, but the machine of the instant application is adapted to grind valve seats and valve faces of different bevels or inclinations and varying diameters. The adjustment of the machine to vary the inclination of the longitudinal axis of the shaft of the motor to grind valve seats of varying inclinations or bevels is effected by adjusting the longitudinal axis of the plate 14 with respect to the axis of the spindle 4 or adjusting the motor 24, as a whole, angularly with respect to the longitudinal axis of the supporting plate 14. The coarser adjustments may be effected by moving the plate 14 angularly with respect to the axis of the spindle 4 and the final or finer adjustments may be made by angularly adjusting the motor on the plate, the parts being locked firmly in adjusted position by means of the bolts or set nuts 16 and 18, respectively. The operation of the machine, when it has been properly adjusted, is substantially the same as that illustrated in the application aforesaid, that is to say, the spindle 4 is engaged with the valve seat guide 1, so that the operating face of the grinding wheel 29 will be substantially parallel with the valve seat to be ground and will be separated from the valve seat by a slight space. The electric motor is started and the grinding wheel brought into engagement with the valve seat by the operation of the feed screw 32. The machine is then bodily rotated on the spindle 4 as an axis, so that the grinding wheel will engage and resurface the valve seat throughout the entire peripheral extent of the latter. If the valve seat is of considerable width, the grinding wheel may be caused to traverse the surface of the seat radially as well as circumferentially, the radial movement being effected by means of the feed screw 23 by means of which the motor is moved toward and from the spindle according to the direction of rotation of the feed screw.

For operating upon valve seats of varying diameters, it will be obvious that the relative adjustments of the bracket 10 and the motor 24 on the supporting plate 14 by engaging the set screws 16 and 18 in different portions of the T slot in the plate can be readily effected and, as stated, the angular adjustment of the shaft of the motor relative to the axis of the spindle 4 may be effected either by the adjustment of the plate 14 with respect to the bracket 10, or the adjustment of the motor 24 angularly with respect to the plate, or both.

When the machine is applied to grinding the valve face instead of the valve seat, as hereinbefore described, the spindle 4 is dispensed with and the remaining parts of the machine are adjusted and disposed in the manner illustrated in Fig. 3, that is to say, the stem of the valve, the face of which valve is to be ground, is engaged with the sleeve carried by the bracket 10 and the bracket and the motor are so adjusted on the plate 14 as to bring the operating face of the grinding wheel 29 opposite the face of the valve in such relation that the angle between the axis of the motor shaft and the axis of the valve spindle is the same as the angle of inclination of the valve face relative to the axis of the valve spindle or stem. The motor is then started and the valve face moved into contact with the grinding wheel 29 by the feed device consisting of a collar 33′ abutting the member 30 secured to the split sleeve of the bracket, which collar is interiorly threaded and engaged by an exteriorly threaded thimble or sleeve 32′, which is adapted to be locked to the spindle of the valve by a threaded rod 35, which acts as a set screw and also as a handle for imparting rotary movement to the thimble 32′. When said adjustment has been effected, the sleeve 33′ and the thimble 32′ may be locked together by means of a set screw 34. When the face of the valve is brought into adjusted engagement with the grinding wheel 29, rotary movement is imparted to the valve by a crank handle 50 clamped to the end of the valve spindle, the rotation of the valve bringing the entire peripheral face of the valve to be ground into engagement with the grinding wheel. Further feeding of the valve toward the grinding wheel may be effected by an additional partial rotation of the thimble 32′ by the handle 35. The plate 14 during the operation of grinding the valve may be clamped in a vise or other suitable device for holding the machine firmly in position.

From the foregoing description and illustration, it will be readily understood that,

when applied to the grinding of valve faces, the machine may be adjusted to operate on valves of different diameters and different inclinations or bevels of the valve faces by adjusting the bracket and the motor on the supporting plate 14 in the same manner that these elements were adjusted in the application of the machine to the grinding of valve seats.

What I claim is:

1. A grinding machine, comprising a plate having longitudinal and transverse slots therein, a bracket carried by said plate and provided with a spindle receiving sleeve having its axis parallel to the face of the plate, means engageable with said slots for securing the bracket to the plate in any selected angular adjustment, an electric motor adjustably secured to said plate with its shaft substantially parallel to the face of the plate and at any selected angular adjustment to the axis of the sleeve, and a grinding wheel on the end of the motor shaft.

2. A grinding machine, comprising a plate having longitudinal and transverse slots therein, a bracket carried by said plate and provided with a sleeve having its longitudinal axis substantially parallel with the face of said plate and adapted to receive a spindle, means selectively engageable with said slots for securing the bracket to the plate in any desired angular adjustment, an electric motor secured to said plate for rotating and sliding adjustment thereon with its shaft substantially parallel with the face of said plate, and a grinding wheel on the end of the motor shaft.

3. A grinding machine, comprising a substantially T-shaped plate slotted longitudinally and transversely, a bracket adjustably secured to the face of said plate by a set screw engaging the slot, said bracket having a spindle receiving sleeve on its outer end with its axis parallel to the face of the plate, an electric motor adjustably secured to said plate with its shaft substantially parallel with the face of the plate and adjustable to any selected angle to the axis of the sleeve, and a grinding wheel on the end of the motor shaft.

4. A grinding machine, comprising a substantially T-shaped plate slotted longitudinally and transversely, a bracket adjustably secured to the face of said plate by a set screw engaging the slot, said bracket having a spindle receiving sleeve on its outer end with its axis parallel to the face of the plate, an electric motor secured to the plate by a set screw engaging the slot for sliding and rotary adjustment, the shaft of the motor being substantially parallel to the face of the plate, and a grinding wheel on the end of the motor shaft.

5. A grinding machine, comprising a plate having angularly disposed slots therein, a bracket having a split sleeve, the longitudinal axis of which is substantially parallel with the face of the plate, a set screw traversing the slot to clamp the bracket to the plate in any selected angular adjustment, an electric motor carried by the plate with its shaft parallel with the face of the plate, a set screw mounted in the slot to clamp the motor to the plate with the motor shaft in any selected angular and spaced adjustment relative to the axis of the sleeve, and a grinding wheel on the end of the motor shaft.

6. A grinding machine, comprising a base plate, a bracket mounted for locked adjustment longitudinally and transversely of one face of said plate and having a spindle receiving sleeve the axis of which is parallel to the said face, an electric motor mounted for sliding and pivotal adjustment on said plate with its shaft parallel to said face, and a grinding wheel on the end of the motor shaft.

7. A grinding machine, comprising a spindle adapted to engage a central valve stem guide, a sleeved bracket mounted on the upper end of said spindle, a base plate secured to and adjustable on said bracket in a plane substantially parallel with the axis of said spindle, an electric motor mounted for sliding and pivotal adjustment on said plate with its shaft parallel to the face of the plate, and a grinding wheel on the end of the motor shaft.

8. A grinding machine, comprising a spindle adapted to engage a central valve stem guide, a sleeved bracket mounted on the upper end of said spindle and having a face parallel to the axis of said spindle, a slotted base plate abutting said face of the bracket, a set screw traversing the slot and serving to lock the plate in various positions of angular adjustment relative to the axis of said spindle, an electric motor mounted for sliding and pivotal adjustment on said plate with its shaft parallel to the face of the plate, and a grinding wheel on the end of the motor shaft.

9. A grinding machine, comprising a base plate having angularly disposed slots therein, a bracket having a spindle receiving sleeve on its outer end the axis of said sleeve being parallel with the face of the plate, means selectively engageable with said slots for adjustably securing the bracket to the plate in any desired angular adjustment, an electric motor secured to the plate for pivotal and sliding adjustment relatively to the axis of the sleeve, and a grinding wheel on the end of the motor shaft.

10. A grinding machine, comprising a plate having angularly disposed slots therein a bracket having a spindle receiving sleeve thereon, and a flat base engaging said plate, a set screw engaging a slot in the plate for locking the plate to the bracket in selected angular relation to the axis of the sleeve, an

electric motor mounted on the plate with its shaft parallel with the face of the plate, a grinding wheel on the end of the shaft, a set screw engaging a slot in the plate to lock the motor to the plate in adjusted angular and spaced relation to the axis of the sleeve, a spindle engaging the sleeve, means for effecting feeding movements between the sleeve and spindle, and means for effecting movements of the motor toward and from the spindle.

In testimony whereof I affix my signature.

HUGH M. ALBEE.