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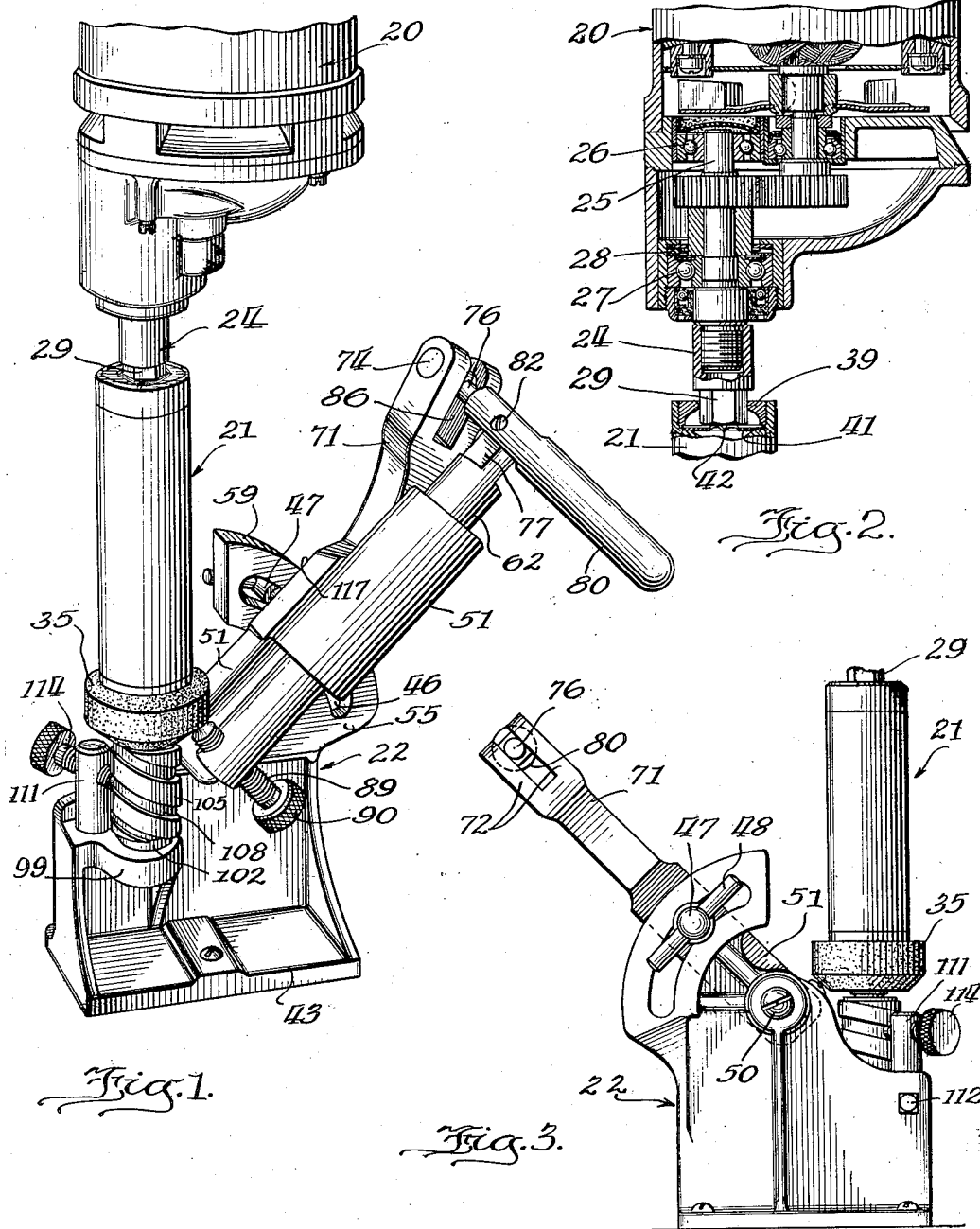
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VALVE GRINDER DRESSING TOOL

Filed Feb. 19, 1934

3 Sheets-Sheet 1



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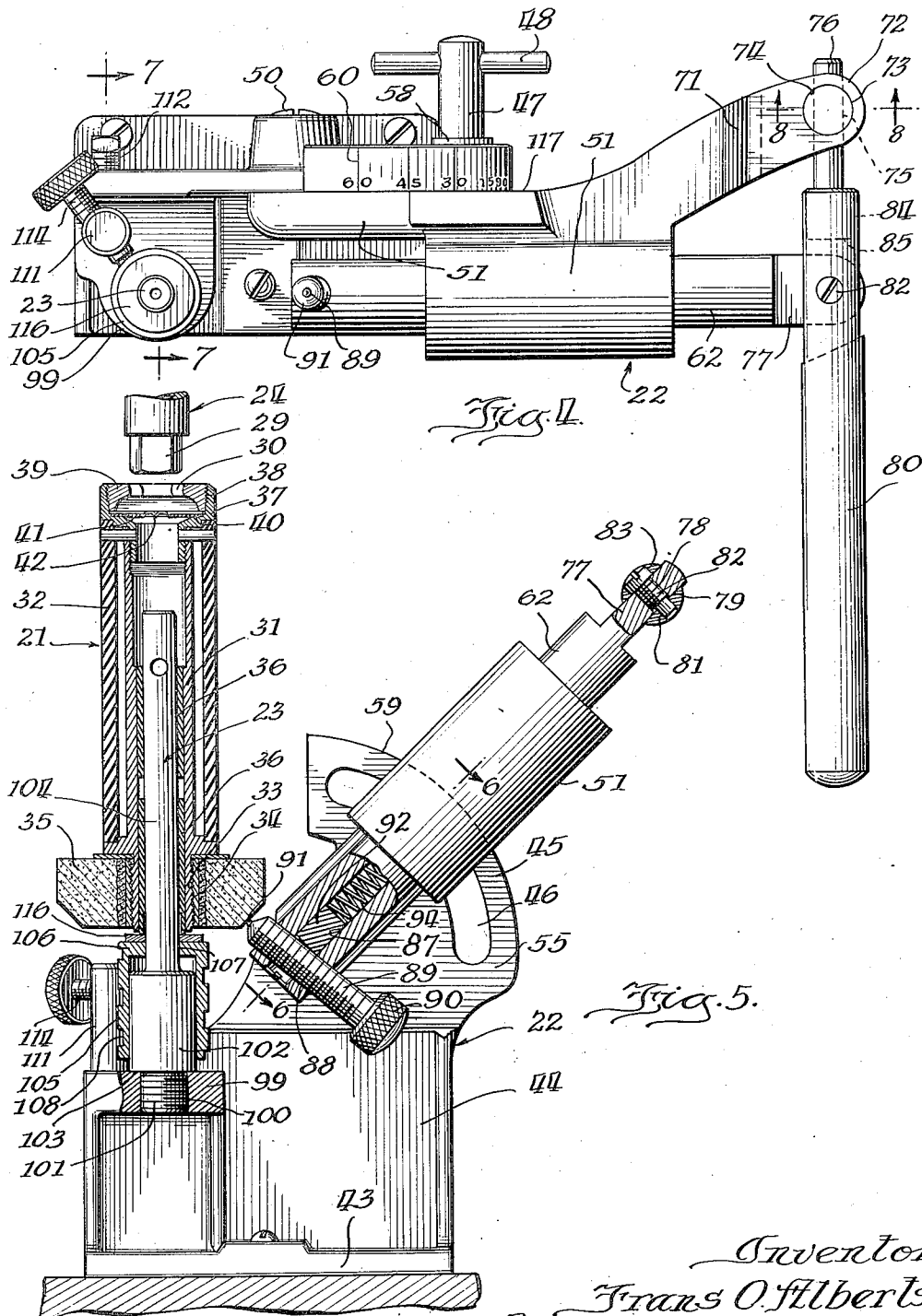
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3 Sheets-Sheet 2



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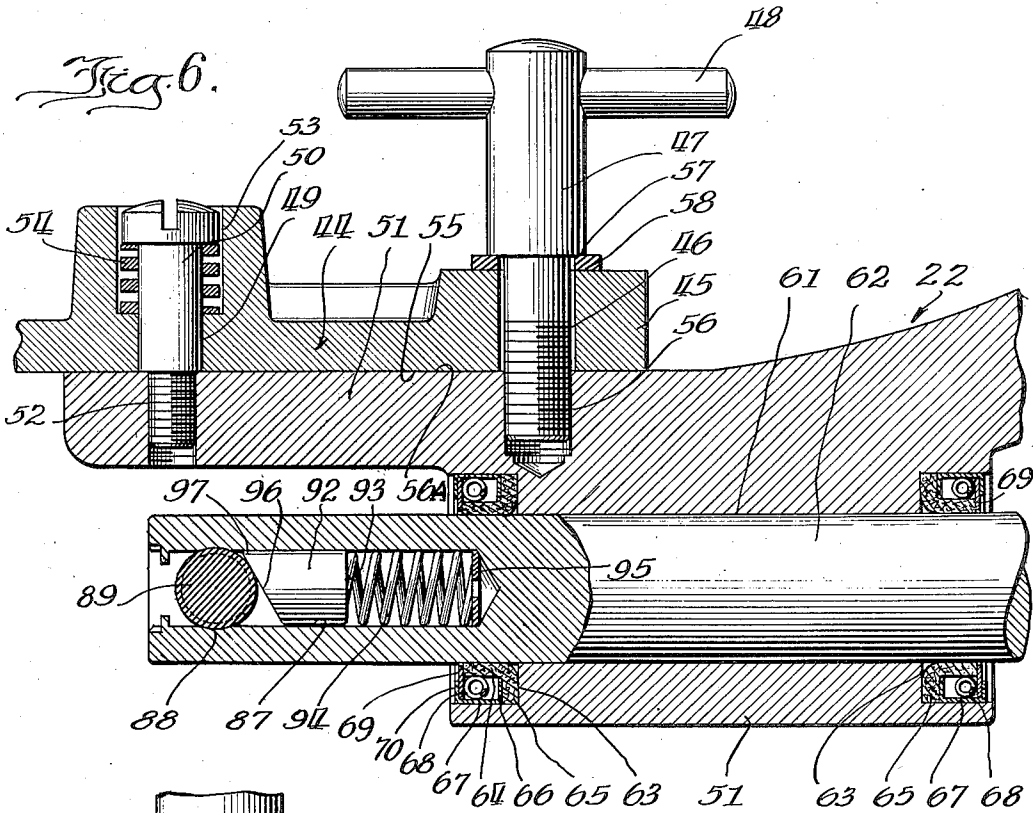
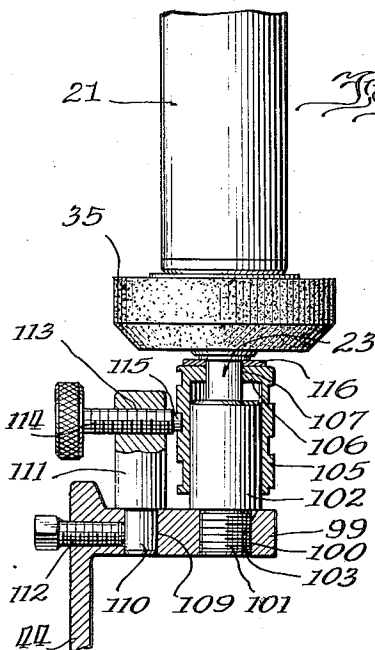
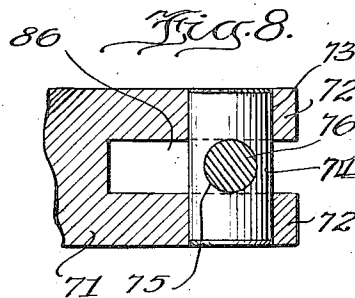
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VALVE GRINDER DRESSING TOOL

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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VALVE GRINDER DRESSING TOOL

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Application February 19, 1934, Serial No. 711,847

8 Claims. (Cl. 125—11)

The present invention relates to valve grinder dressing tools, and is particularly concerned with the provision of an improved dressing tool for use with the valve seat grinder described and covered by my co-pending application, Serial No. 711,848, filed February 19, 1934.

The present dressing tool may, however, be used with all types of grinding stones, provided the tool holder is of suitable size to be supported upon the dressing tool pilot.

One of the difficulties encountered with the dressing tools of the prior art is that the cuttings become lodged on the diamond supporting plunger and soon wear away the plunger or its guide in such manner that the dressing tool is no longer accurate. Another difficulty lies in the fact that wear takes place on the supporting threaded member for the diamond and the lost motion which results from these worn parts also affects the accuracy of the dressing tool.

One of the objects of the invention is the provision of an improved grinding stone dressing tool which has its diamond supporting plunger suitably protected from the grindings, etc., so that the plunger and its guide will not be worn and may be used for long periods of time without impairing their accuracy.

Another object of the invention is the provision of an improved dressing tool of the class described in which the lost motion due to the wear or loose fit of the threaded diamond-supporting member is always taken up by means of a spring contrivance so that increased accuracy will result.

Another object of the invention is the provision of an improved actuating mechanism for the diamond-supporting plunger, by means of which the diamond may be moved with greater uniformity across the surface of the stone in the dressing operation and by means of which the sticking and corresponding jerky movement of the plunger is eliminated.

Another object of the invention is the provision of an improved dressing tool which is simple in construction, sturdy, and capable of mass production, so that the invention may be brought within the means of a vast number of users who may practice the grinding and dressing methods and utilize the tool as described herein.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawings, in which similar characters of reference indicate similar parts throughout the several views.

Referring to the drawings, of which there are three sheets:

Fig. 1 is a side elevational view of the dressing tool, tool holder, stone, and motor driver during the operation of dressing of the stone;

Fig. 2 is a fragmentary sectional view of the lower end of the motor driver, showing the resiliently supported drive shaft;

Fig. 3 is a rear elevational view of the dressing tool with a tool holder and stone in place;

Fig. 4 is a top plan view of the dressing tool without the tool holder and stone;

Fig. 5 is a front elevational view of the dressing tool with the tool holder and stone, the tool holder and parts of the dressing tool being shown in section in order to show the details of the mechanism;

Fig. 6 is a fragmentary sectional view of a part of the dressing tool, taken on the plane of the line 6—6 of Fig. 5, looking in the direction of the arrows, and showing the details of construction of the plunger and diamond securing screw;

Fig. 7 is a fragmentary front elevational view of the dressing tool in partial section, showing the details of structure of the dressing tool, pilot, and adjustable support for the grinding stone;

Fig. 8 is a fragmentary sectional view taken on the plane of the line 2—2 of Fig. 4, looking in the direction of the arrows, showing certain details of construction of the operating handle.

The complete dressing tool assembly preferably comprises the motor driver 20, the tool holder 21, the dressing tool 22, and the dressing tool pilot 23 (Fig. 5). The motor driver 20 preferably consists of a series wound commutator motor having suitable speed increasing gearing and provided with an axially extending drive shaft terminating in the driving knuckle 24. The details of construction of the drive shaft of the motor driver are shown in Fig. 2, where the drive shaft 25 is rotatably and slidably mounted in the lower end of the motor driver by means of anti-friction bearings 26, 27.

All of the details of the motor driver may be substantially as described in my co-pending application, Serial No. 711,848, filed February 19, 1934, for Valve seat grinding machines, and therefore it is not necessary to describe all of these details except to point out that the shaft 25 is supported for axial movement as well as rotation on account of the movement of the lower bearing 27 in its socket, and the shaft is urged to outward position by a spring washer 28 which engages the lower bearing and also engages the bearing housing to urge the shaft

downward. The weight of the motor is thus resiliently supported by means of the shaft 25 and spring washer 28 when the motor is permitted to rest on the dressing tool with its shaft end in the socket of the tool holder and the grinding stone is protected from shocks to which it might otherwise be subjected.

The driving knuckle 24 is provided with a lower noncircular or hexagonal end 29 which is adapted to engage in a noncircular socket 30 in the upper end of the tool holder 21 so as to drive the tool holder with the drive shaft 25.

The tool holder 21 is similar in construction to that described in my co-pending application for Valve seat grinding machines, mentioned above. It comprises a metal supporting sleeve 31, upon which is mounted a handle or housing 32 of insulating material. At its lower end the supporting sleeve 31 has a threaded extension 33, upon which the hub 34 of the grinding stone 35 is mounted.

The sleeve 31 is lined with a hardened steel bearingsleeve 36, which may be made in two separate parts, if desired, and the pilot 23 has an upper cylindrical part, also made of hard tempered steel. These two parts are adapted to be used together, the tool holder rotating on the pilot without the wear of these parts by means of the cuttings, because both of the parts are too hard to take up or support the cuttings, and all that is necessary is to keep the pilot and the complementary sleeve suitably lubricated to prevent the wear of these parts by long use.

At its upper end the supporting sleeve 31 supports an end plug 37 which has a threaded bore 38 for receiving the threaded member 39, having the hexagonal aperture 39. The plug 37 has an annular seat 40, upon which is seated a spring washer 41 of tempered resilient steel and having a plurality of radially extending ribs 42. The spring washer 41 is clamped between the shoulder 40 and the threaded member 39, and the hexagonal end 29 of the driving knuckle rests upon the spring washer 41.

All of the parts so far described may be substantially as disclosed in the co-pending application for Valve seat grinders, referred to above, as the same tool holder, motor driver, and grinding stone are assembled with the dressing tool to perform the dressing operation.

The dressing tool, indicated in its entirety by the numeral 22, consists of a cast metal base 43 having an upwardly extending web 44 with an arcuate portion 45 at the top. The arcuate portion 45 of the web has an arcuate slot 46, through which passes a clamping bolt 47, having a transverse pin 48 for engagement with the fingers. The upwardly extending web 44 is also provided with a transversely extending bore 49 for rotatably supporting a screw bolt 50, which serves as a trunnion for the pivoted plunger supporting member 51.

Screw bolt 50 passes through the bore 49 and is threaded into a threaded bore 52 in the plunger-supporting member 51. The web or body 44 of the dressing tool is provided with a counterbore 53 and a helical spring 54 is compressed between the head of the bolt 50 and the base of the counterbore 53. Spring 54 draws the adjacent flat surface 55 of the dressing tool body and the flat surface 56A of the plunger-supporting arm into engagement with each other and tends to hold the plunger-supporting member 51 in any adjusted position.

The screw bolt 47 is threaded into a bore 56 in the plunger-supporting member 51 and has an annular shoulder 57 which engages the rear side of the web or body 44 to clamp the body of the dressing tool and the plunger-supporting member 51 together.

A suitable washer 58 may be interposed between the shoulder 57 and the body 44, if desired. The arcuate portion 45 of the upwardly extending web 44 is provided with a cylindrical surface 59, the axis of generation of which lies in the axis of the screw bolt 50, and this cylindrical surface is provided with indicia 60 (Fig. 4) indicating the angle at which the plunger of the dressing tool may be set.

The plunger-supporting member 51 is provided with a longitudinally extending bore 61, serving as a guide for the plunger 62. The bore 61 and plunger 62 are preferably cylindrical in shape and are accurately and closely fitted to each other so that the plunger moves upward and downward through the bore 61 with a minimum of play or tolerance.

In the devices of the prior art, the cuttings frequently got into the guide of the plunger and soon the guide and plunger were both so worn that they could no longer perform their functions accurately.

In the present invention the bore 61 preferably leads to counterbores 63 at each end, and the counterbores 63 are provided with suitable oil seals, each of which may be identical in construction. For example, the oil seal may consist of a leather washer having a cylindrical portion 64 and an outwardly extending flange 65. The flange 65 is confined in place by means of an inwardly extending flange 66 on a channeled annular member 67. A helical garter spring 68 extends about the cylindrical flange 64 of the leather and urges it into engagement with the plunger 62.

A metal washer plate 69 is located outside of the garter spring and is held in place by the inwardly extending flange 70 of the channeled member 67. The channeled member 67 may be a close frictional fit in the counterbore 63.

It will thus be observed that the leather washer 64 of the oil seal is adapted to wipe against the side of the plunger 62 as it moves, and when suitably lubricated will continuously maintain in clean condition that portion of the plunger which enters the guide bore 61. All cuttings and foreign matter are excluded from the interior or guiding part of the bore 61, and there is very little wear on the plunger or its guide.

At its upper end the plunger-supporting member 51 is provided with an upwardly extending arm 71 having a bifurcated end 72. The parts of the bifurcated end 72 are provided with transverse bores 73 for receiving a cylindrical trunnion 74, which has a transverse bore 75 for slidably receiving the rod 76.

The plunger 62 has a flat end portion 77 with a transversely extending bore 78, and the flat end 77 is adapted to be received in a slot 79 located in the handle 80.

Handle 80 is provided with a small bore 81, serving as a bearing for the lower end of a screw bolt 82, and with an enlarged bore 83 serving as a bearing for the head of screw bolt 82. Screw bolt 82 is threaded into the bore 78 passing through the handle and through the flat end 77 of the plunger, and pivotally mounts the handle 80 on the plunger 62.

At its upper end in Fig. 4 the handle 80 is provided with a cylindrical bore 84, as well as the

slot 79, previously described, and the rod 76 has an enlarged portion 85 which is fixedly secured in the bore 84, such as, for example, by a drive fit. The end 76 of the rod is slidably mounted in the trunnion 74, and the trunnion 74 is rotatably mounted in the bores 73.

As the handle 80 is oscillated from left to right, or vice versa, in Fig. 4, moving the plunger in a corresponding direction, the rod 76 slides back and forth in the trunnion 74, and the trunnion 74 rotates in the bores 73. Trunnion 74 is retained against axial movement by the rod 76, which is confined in the slot 86. The lower or left hand end of plunger 62 (Fig. 6) is provided with a bore 87 and with a transverse communicating threaded bore 88.

The threaded bore 88 is adapted to receive the threaded diamond-supporting screw 89 having a knurled head 90 and having at its opposite frusto-conical end the cutting diamond 91. The bore 87 contains a slidably mounted cylindrical plunger 92 having a flat end 93 engaging a helical compression spring 94. The opposite end of the spring 94 is seated upon a metal washer plate 95 in the lower end of bore 87. The plunger 92 is provided with a beveled end 96 so that its point 97 engages the upper side of the threaded member 89, and the plunger 92 not only provides sufficient friction on the threaded member 89 to retain it in any adjusted position, but the beveled surface 96 is located on that side from which the grinding stone rotates, and the beveled surface 96 is adapted to take up all the lost motion between the screw 89 and its bore 88 so that there is no lost motion due to wear of the threaded surfaces.

The base 43 also supports a horizontally extending table 99 having a threaded bore 100 for receiving the threaded end 101 of the dresser pilot 23. Dresser pilot 23 has a cylindrical enlargement 102 above the threaded end and an annular shoulder 103 which engages the top of the table 99 when the threaded portion 101 is threaded home.

The pilot is also provided with the accurately cylindrical portion 104 at the top made of hardened steel for engaging in the hardened steel sleeve 36 which is carried by the tool holder 21 and is rotatably and slidably mounted on the pilot.

For the purpose of adjustably supporting the grinding stone in predetermined position a metal sleeve 105, the end of which is closed by an inwardly extending flange 106, is mounted slidably on the cylindrical portion 102.

A bore 107 in the end 106 slidably receives the cylindrical portion 104 of the pilot, and the outer surface of the sleeve 105 is provided with a helical groove 108, preferably substantially rectangular in section. The table 99 also has another transverse bore 109 for receiving the reduced end 110 of a stud 111.

A set screw 112 secures the end 110 in the bore 109, and the stud 111 has a horizontally extending threaded bore 113 for receiving the screw bolt 114, which has a reduced cylindrical end 115. End 115 may be slidably received in the groove 108, and the sleeve 105 may be rotated until it reaches any predetermined height within its range of movement, whereupon it may be secured there by turning in the screw 114 until the end abuts against the sleeve 105.

A suitable steel washer 116 is preferably used above the end of the sleeve 105, and the tool holder rests upon the washer 116 through the

engagement of the lower end of the hardened metal sleeve 36 with washer 116.

The operation of dressing a grinding stone with the present apparatus may be described as follows: The stone is mounted on the tool holder, and the tool holder is slidably and rotatably mounted on the dresser pilot.

The plunger 62 is set at a predetermined angle by means of the knife-like edge 117 of the plunger supporting member 51 and the indicia 60, the plunger-supporting member 51 being clamped in place by turning in the screw bolt 47.

The sleeve 105, which supports the stone at proper height, is then adjusted so that the diamond will just touch the stone. The motor driver is placed with the end 29 of its drive shaft in the non-circular socket 30, and the motor is turned on.

As distinguished from the operation of grinding, the motor should be held as nearly vertical as possible in the dressing operation so that the grinding stone will be rotated upon the true axis of the pilot 23 as nearly as that can be accomplished without vibration. The grinding stone is then dressed by moving the handle 80 back and forth to reciprocate the plunger and cause the dressing diamond to move across the face of the stone, and the stone is accurately dressed to frusto-conical form. The cut which is taken should be as small as possible.

The present dressing apparatus is adapted to be used for long periods of time without losing its accuracy because the plunger and its guide are protected against the cuttings and abrasive material and will not be worn in such manner as to cause inaccuracy.

The force multiplying handle 80 enables the operator to move the dressing diamond more steadily and uniformly and is more satisfactory from this point of view than a spring actuating plunger, which requires exertion of a greater force and sometimes sticks. The guide surfaces of the plunger and its support being protected, there is little danger in this case of the plunger sticking, and the dressing operation may be carried out in such manner as to provide a very accurate frusto-conical surface on the stone.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim is new and desire to secure by Letters Patent of the United States, is:

1. In a valve grinder dressing machine, the combination of a supporting base having an upwardly extending web with a metal plate pivotally mounted on said web, said web having a plurality of indicia, and said plate having a bore, a plunger slidably mounted in said bore, a dressing member mounted on said plunger, said plate having counterbores at each end of said plunger and non-metallic means mounted in said counterbores for maintaining said plunger and bore clean of abrasive material.

2. In a valve grinder dressing machine, the combination of a supporting base having an upwardly extending web with a metal plate pivotally mounted on said web, said web having a plurality of indicia, and said plate having a bore, a plunger slidably mounted in said bore, a dressing member mounted on said plunger, said plate hav-

ing counterbores at each end of said plunger and non-metallic means mounted in said counterbores for maintaining said plunger and bore clean of abrasive material, said non-metallic means comprising leather members having cylindrical flanges engaging said plunger and a helical coil spring on each of said cylindrical flanges for drawing said leather into engagement with said plunger.

10 3. In a dressing tool, the combination of a supporting base with an upwardly extending portion, a plunger guide pivotally mounted on said upwardly extending portion, said upwardly extending portion having an arcuate slotted threaded member threaded into said plunger guide and extending through said slot and having a shoulder for engaging the opposite side of said upwardly extending portion to draw said plunger guide against said upwardly extending portion and secure the same, said plunger guide having a bore through the same, a plunger slidably mounted in said bore, a lever mounted on said plunger, a trunnion pivotally mounted on said plunger guide, the end of said lever being slidably mounted in said trunnion.

25 4. In a dressing tool, the combination of a supporting base with an upwardly extending portion, a plunger guide pivotally mounted on said upwardly extending portion, said upwardly extending portion having an arcuate slotted threaded member threaded into said plunger guide and extending through said slot and having a shoulder for engaging the opposite side of said upwardly extending portion to draw said plunger guide against said upwardly extending portion and secure the same, said plunger guide having a bore through the same, a plunger slidably mounted in said bore, a lever mounted on said plunger, a trunnion pivotally mounted on said plunger guide, the end of said lever being slidably mounted in said trunnion, said plunger having a transversely extending threaded member carrying a dressing member, and a beveled plunger located in said first-mentioned plunger and engaging said threaded member to urge the threaded member toward the side toward which the grinding stone is rotated to take up any lost motion of the threaded member in its threaded socket.

50 5. In a dressing tool, the combination of a base having an upwardly extending pilot stem carried by said base, a plunger slidably mounted on said base, a hand lever for reciprocating said plunger, a transversely extending threaded member carried by said plunger and having a dressing member thereon, a tool holder rotatably

mounted on said pilot, and a grinding stone carried by said tool holder to be dressed by said dressing member when said plunger is reciprocated.

6. In a dressing tool, the combination of a base having an upwardly extending pilot stem carried by said base, a plunger slidably mounted on said base, a hand lever for reciprocating said plunger, a transversely extending threaded member carried by said plunger and having a dressing member thereon, a tool holder rotatably mounted on said pilot, and a grinding stone carried by said tool holder to be dressed by said dressing member when said plunger is reciprocated, said tool holder having a hardened steel sleeve engaging said pilot, and said pilot having a hardened steel surface to prevent the taking up of abrasive material by either of said sleeve or pilot.

7. In a dressing tool, the combination of a base having an upwardly extending pilot stem carried by said base, a plunger slidably mounted on said base, a hand lever for reciprocating said plunger, a transversely extending threaded member carried by said plunger and having a dressing member thereon, a tool holder rotatably mounted on said pilot, and a grinding stone carried by said tool holder to be dressed by said dressing member when said plunger is reciprocated, and a driving member comprising an electric motor having a drive shaft with a non-circular end engaging in a non-circular socket in said tool holder, said tool holder having a resilient metal member for supporting the end of said shaft.

8. In a dressing tool, the combination of a base having an upwardly extending pilot stem carried by said base, a plunger slidably mounted on said base, a hand lever for reciprocating said plunger, a transversely extending threaded member carried by said plunger and having a dressing member thereon, a tool holder rotatably mounted on said pilot, and a grinding stone carried by said tool holder to be dressed by said dressing member when said plunger is reciprocated, and a driving member comprising an electric motor having a drive shaft with a non-circular end engaging in a non-circular socket in said tool holder, said tool holder having a resilient metal member for supporting the end of said shaft, said drive shaft being slidably mounted in said motor housing, and resilient means for urging said drive shaft outward and resiliently supporting said motor when the drive shaft is resting on the tool holder.

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