W. D. SHERWOOD.

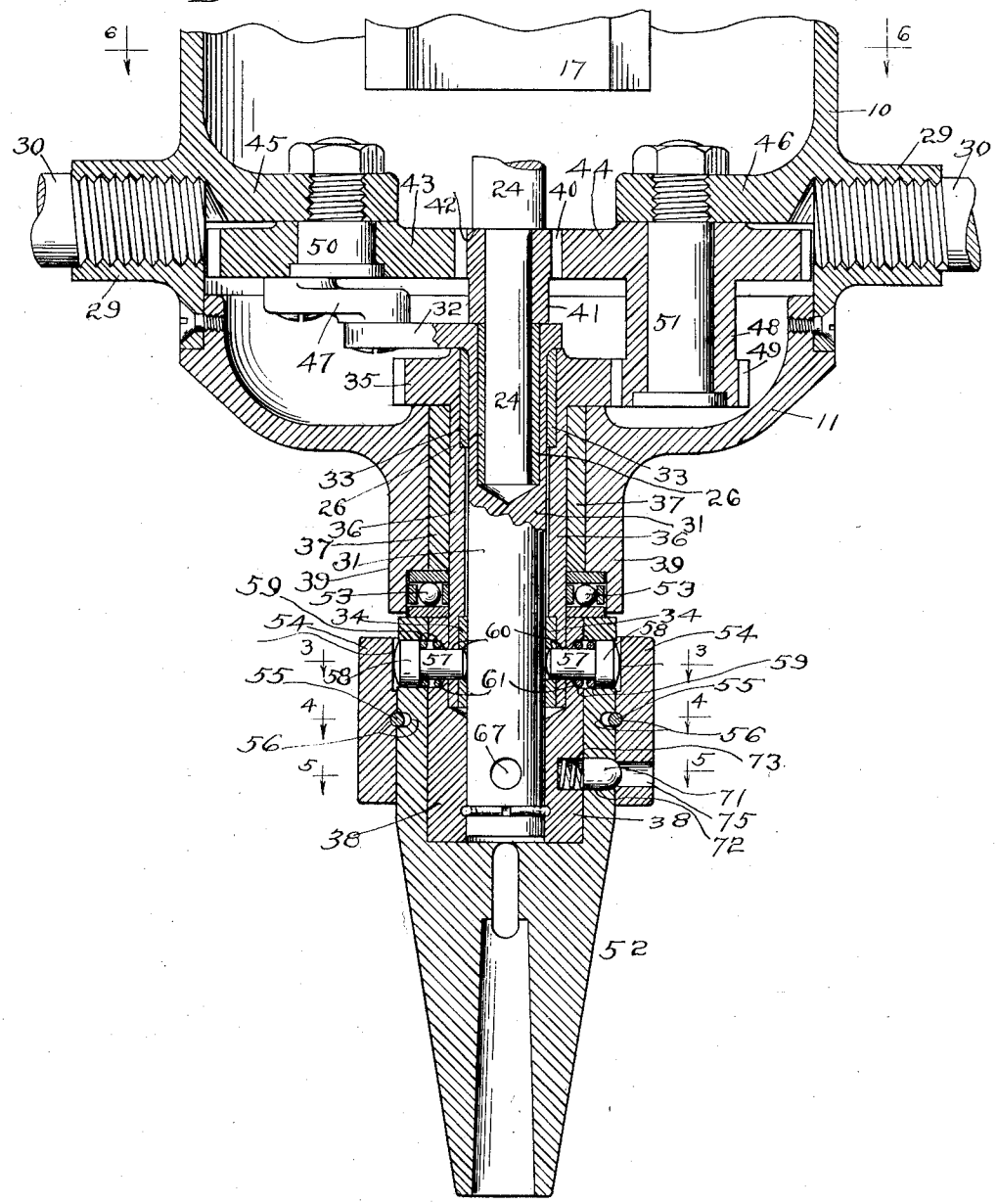
PORTABLE DRIVING HEAD.

APPLICATION FILED FEB. 8, 1910.

988,214. **Patented Mar. 28, 1911.**

5 SHEETS—SHEET 1.

Fig. 1.



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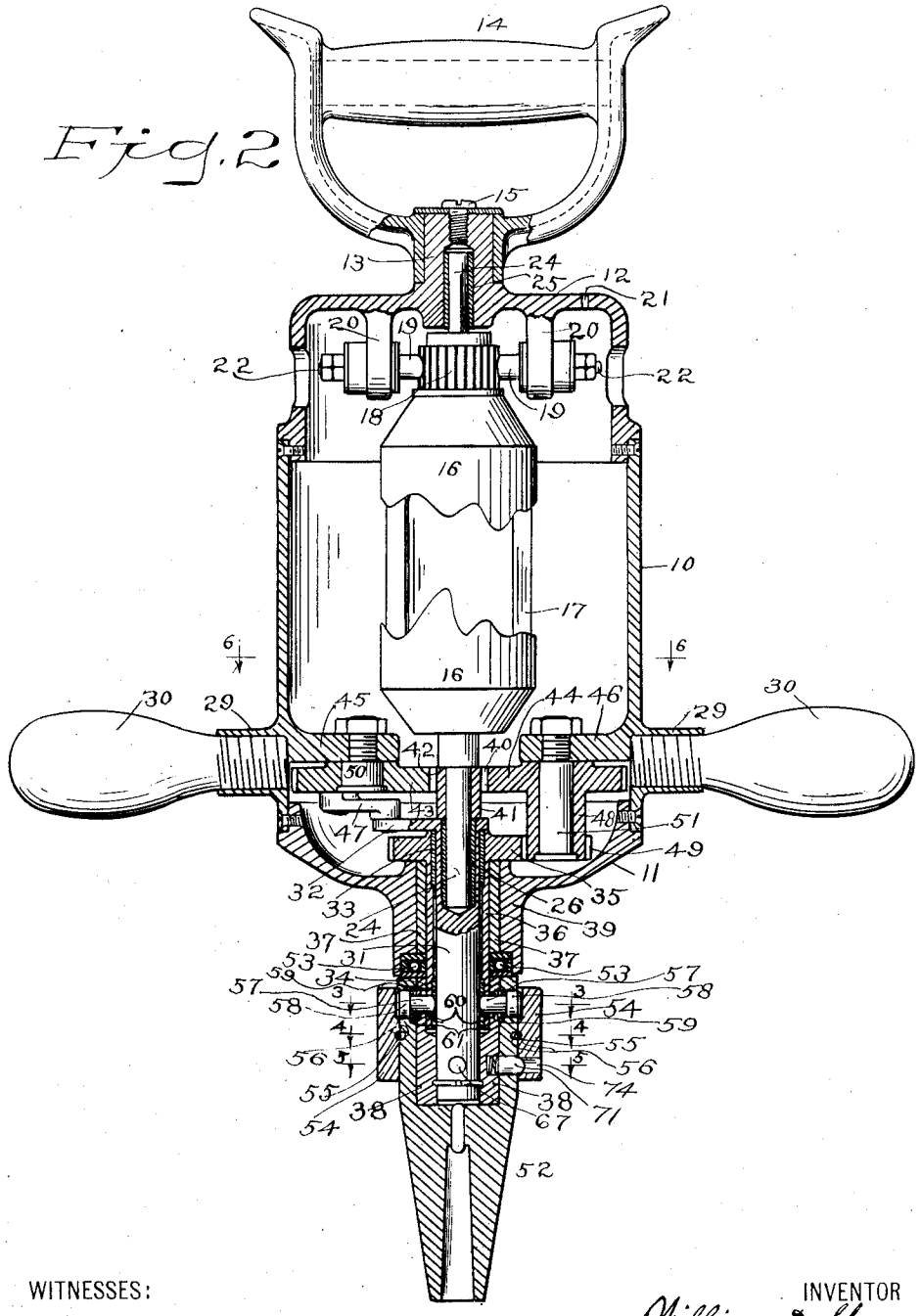
5 SHEETS—SHEET 2.

Fig. 2



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5 SHEETS—SHEET 3.

Fig. 3.

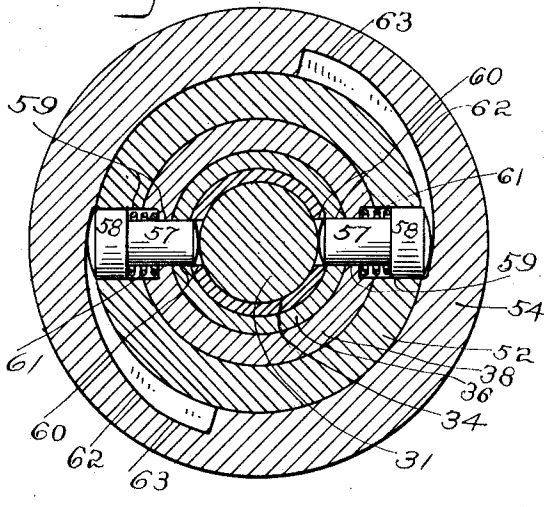


Fig. 4.

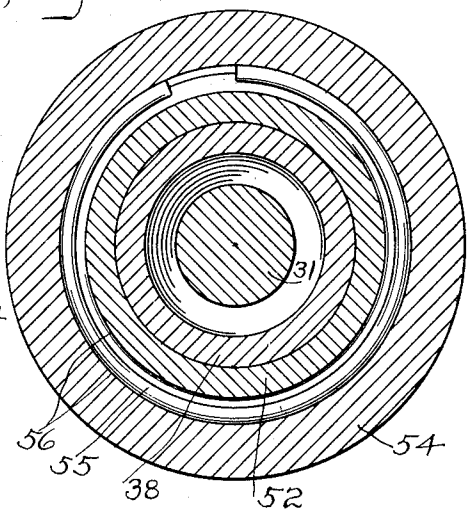
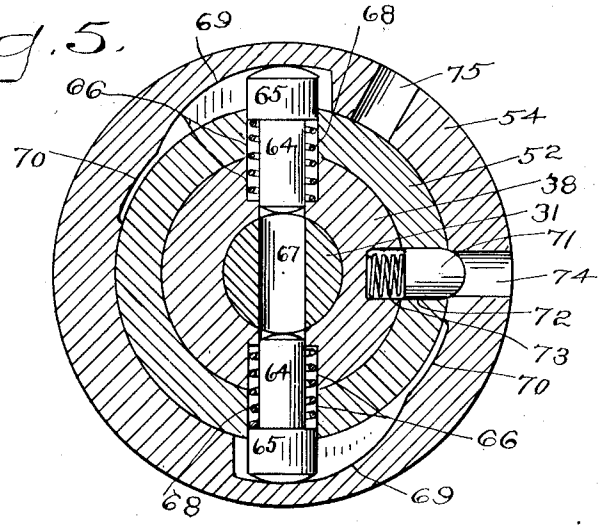


Fig. 5.



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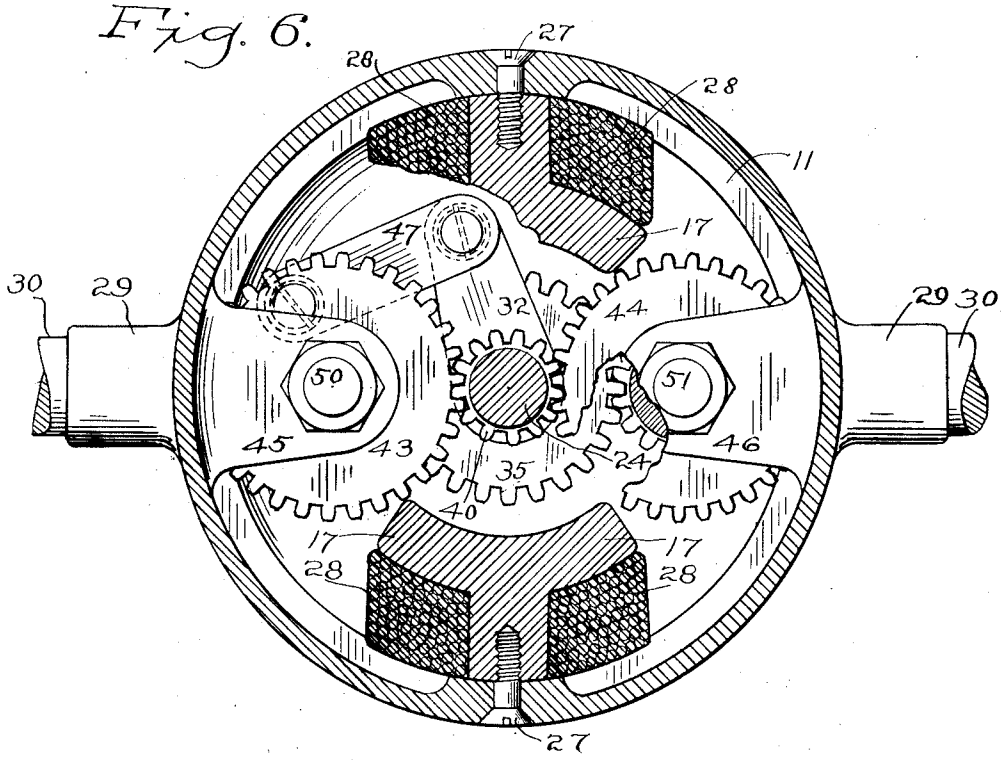
5 SHEETS—SHEET 4.

Fig. 6.



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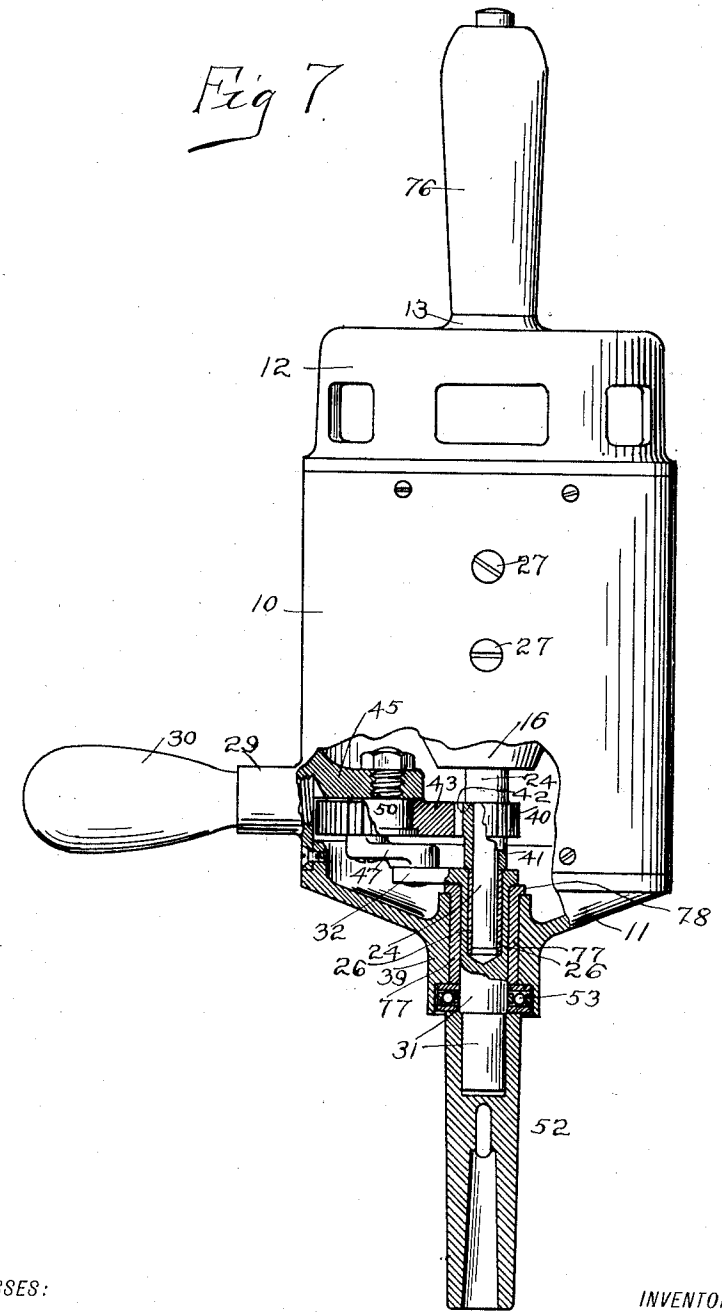
5 SHEETS—SHEET 5.

Fig 7.



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UNITED STATES PATENT OFFICE.

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PORTABLE DRIVING-HEAD.

988,214. Specification of Letters Patent. Patented Mar. 28, 1911.

Application filed February 8, 1910. Serial No. 542,762.

To all whom it may concern:

Be it known that I, WILLIAM D. SHERWOOD, a citizen of the United States, residing at Bridgeport, county of Fairfield, State of Connecticut, have invented an Improvement in Portable Driving-Heads, of which the following is a specification.

This invention has for its object to produce a portable driving head adapted for general use in driving tools as in grinding valves, in drilling and for carrying grinding, polishing and buffing wheels, which may be conveniently carried to any place where the work is to be done, may be operated in any position and which when intended for general use shall be provided with mechanism for producing both oscillatory and rotary movement of a chuck, collet or tool holder, a simpler form of the head being adapted for valve grinding and other uses requiring oscillatory movement only.

With these and other objects in view I have devised the simple and novel driving head of which the following description in connection with the accompanying drawings is a specification, reference characters being used to indicate the several parts.

Figure 1 is a longitudinal section of the forward end of my novel driving head illustrating mechanism for producing both oscillatory and rotary movement; Fig. 2 a longitudinal section of the entire head showing the shaft as driven by an electric motor; Figs. 3, 4, 5 and 6 are transverse sections, on an enlarged scale, on the lines indicated respectively by 3—3, 4—4, 5—5, and 6—6 in Fig. 2, looking in the direction of the arrow; and Fig. 7 is an elevation partly in longitudinal section, illustrating a simplified form of my novel driving head adapted to produce oscillatory movement only as for valve grinding.

The invention consists in certain constructions and in certain parts, improvements and combinations which will be hereinafter described and then specifically pointed out in the claims hereunto appended.

10 denotes the body of my novel head which may be of cast iron, 11 the front end piece and 12 the rear end piece, both of which may be of aluminum if preferred. The rear end piece is provided with a hub 13 to which a breast piece and handle, indicated as a whole by 14, is secured in any suitable manner as by a screw 15.

The mechanism may be driven in any suitable manner. In the present instance I have shown it as driven by an electric motor within the head. As the special construction of the motor is immaterial, I shall merely describe it briefly.

16 denotes the armature, 17 the poles, 18 the commutator and 19 the carbon brushes which are carried by brackets 20 upon the inner side of rear end piece 12. The wires (not shown) enter the head through a hole 21 in the rear end piece and are connected to terminals 22 carried by the brackets. The armature and commutator are carried by a driving shaft 24 which rotates in bushings 25 and 26, bushing 25 being seated in hub 13. The poles are secured to the body by screws 27, the pole windings being indicated by 28. The body is provided externally with threaded hubs 29 which receive handles 30, one or both being used as most convenient. Bushing 26 for the driving shaft is seated in an oscillating shaft 31 which carries a crank 32 and is itself journaled in bushings 33 and 34. Bushing 33 is seated in a gear wheel 35 carried by a sleeve 36 in which bushing 34 is seated. Sleeve 36 is adapted to rotate in bushings 37 and 38, bushing 37 being seated in a hub 39 projecting from front end piece 11.

40 denotes a driving pinion carried by the driving shaft and having a hub 41 which bears against the end of oscillating shaft 31, the driving shaft having a shoulder 42 against which the pinion is seated. This pinion meshes with gear wheels 43 and 44. Gear wheel 43 is journaled on a stud 50 carried by a bracket 45 extending inward from the body, and gear wheel 44 is journaled on a stud 51 carried by a bracket 46 extending inward from the opposite side of the body.

47 denotes a link the ends of which are pivoted respectively to gear wheel 43 and to crank 32 (see Fig. 6 in connection with Fig. 1) whereby oscillatory movement is imparted to the crank and to shaft 31 for a purpose presently to be explained. Gear wheel 44 is provided with a hub 48 carrying a pinion 49 which meshes with gear wheel 35 on sleeve 36.

52 denotes a chuck, collet or tool holder

which is secured to bushing 38 with a drive fit.

53 denotes a ball bearing between bushing 38 and the chuck and bushing 37 and hub 39 on end piece 11. This bearing takes the end thrust of the chuck in use.

The special form of chuck, collet or tool holder used is immaterial so far as the present invention is concerned. I have shown a simple form of chuck adapted to receive the shank of a carrying tool when the head is used for valve grinding, or the shank of the drill, or of a carrier for a grinding, polishing or buffing wheel.

54 denotes an oscillatory shifting ring which is detachably secured to the chuck by a spring ring 55 seated in half sockets 56 in the chuck and shifting ring respectively.

57, see Fig. 3, denotes push pins which are provided with heads 58 seated in sockets 59 in chuck 52 and bushing 38 and adapted to be forced into sockets 60 in sleeve 36 and bushing 34 to lock the sleeve and bushing 34 to the chuck and bushing 38. Springs 61 in sockets 59 bear against the bases of the sockets and against the heads of the pins and act normally to withdraw the pins from sockets 60 and force them against cam walls 62 in the inner face of the shifting ring (see Fig. 3 in connection with Fig. 1). These cam walls are so laid out that when heads 58 of the push pins are in engagement with the high portions of the cam walls the push pins will be forced into sockets 60 and will lock the chuck to sleeve 36 and bushing 34, which have rotary movement only, thus imparting rotary movement to the chuck and the tool carried thereby, this being the position of the parts shown in the drawings. When the shifting ring is oscillated to place the low portions of cam walls 62, which are indicated specifically by 63, in alinement with the push pins, the springs will force the pins outward and disengage them from sleeve 36 and bushing 34, thus leaving the chuck disconnected from the sleeve. This position of the parts is not shown in the drawings but will be obvious from Fig. 3.

Turning now to Fig. 5, 64 denotes push pins which are provided with heads 65 seated in sockets 66 in chuck 52 and bushing 38 and adapted to be forced into a transverse hole 67 in oscillating shaft 31 to lock said shaft to bushing 38 and the chuck. Springs 68 in sockets 66 bear against the bases of the sockets and against the heads of the pins and act normally to withdraw the pins from hole 67 in the oscillating shaft and force them against cam walls 69 in the inner face of the shifting ring. These cam walls are the reverse of the other set of cam walls and are so laid out that when the heads 65 of the push pins are in engagement with the low portions of the cam walls the push pins will be withdrawn by the springs from hole 67 in the oscillating shaft leaving the chuck disconnected from said shaft, as shown in Fig. 5, this position of the parts corresponding with Fig. 3. When the shifting ring is oscillated to place the high portions of cam walls 69, which are specifically indicated by 70, in alinement with the push pins, said pins will be forced forward into hole 67 in the oscillating shaft and will lock the chuck to said shaft, thus imparting oscillatory movement to the chuck and the tool carried thereby. This position of the parts is not shown in the drawings but will be obvious from Fig. 5.

The shifting ring is locked in either of its engaging positions by means of a locking pin 71 seated in a socket 72 and forced outward by a spring 73 into engagement with a hole 74 in the shifting ring to lock said ring in position to produce rotary movement of the chuck, as in Fig. 5, and into engagement with a hole 75 in the ring to lock said ring in position to produce oscillatory movement of the chuck. The shifting ring in practice is knurled and it will be noted that the forward end of the locking pin is rounded so that the application of a little power to the ring will disengage the locking pin from either of the locking holes and permit the ring to be oscillated to disengage the shaft from the chuck and connect the sleeve therewith and vice versa.

The form of driving head illustrated in Fig. 7 is adapted for use when oscillatory movement of the chuck only is required as in valve grinding, this form being especially adapted for use as a valve grinder. In this form but one handle 30 is required and a handle 76 is substituted for the breast piece which is shown upon the other form. The rotating sleeve and all of the mechanism for producing rotary movement is dispensed with. Driving shaft 24 carries a pinion 40 which meshes with a gear wheel 43 mounted on stud 50 carried by bracket 45 as before. The oscillating shaft 31, crank 32 and link 47 are the same as before, likewise the bushing 26 seated in the oscillating shaft in which the driving shaft has its bearing. The oscillating shaft has its bearing in a sleeve 77 seated in hub 39 on end piece 11 and having a flange 78 bearing on said hub. The chuck, collet or tool holder is secured directly to the oscillating shaft (ordinarily with a drive fit) instead of to a bushing which may have either oscillatory or rotary movement. The ball bearing takes up the end thrust of the chuck as in the other form.

The operation of the form illustrated in Fig. 7 will be obvious from the drawing. Rotation of the driving shaft by means of pinion 40, gear wheel 43, link 47 and crank 32 produces oscillatory movement of the chuck or tool holder as is required in valve grinding, in which a screw driver or other

suitable tool is carried by the chuck or holder and oscillates the valve to grind it. In practice, with my novel driving head I am able to grind a valve in from five to ten minutes that it would take several hours and frequently half a day to grind by hand.

In the form illustrated in Figs. 1 to 6, inclusive, for valve grinding or any operation requiring oscillation of the tool, the shifting ring is oscillated from the position shown in Figs. 1 and 2, which corresponds with the position of the parts in Figs. 3 and 5, and locking pin 71 is disengaged from hole 74 in the shifting ring and caused to engage hole 75 in said ring. As the ring is oscillated, heads 65 of push pins 64 will ride up on the high portions 70 of cam walls 69 and the pins will be forced into engagement with transverse hole 67 in the oscillating shaft, thus locking the chuck or tool holder to said shaft. It will be understood of course that this shaft oscillates continually while the driving shaft is in rotation and in order to impart oscillatory movement to the tool holder it is simply required to lock it to the oscillating shaft. To produce rotary movement of the chuck or tool holder, it is required to disengage it from the oscillating shaft and to connect it to sleeve 36 which is always rotating. This is effected by moving the shifting ring from the position just described, in which locking pin 71 is in engagement with hole 75 in the ring, to the position shown in Figs. 3 and 5, in which locking pin 71 is in engagement with hole 74 in the ring. This movement causes the heads of push pins 64 to ride down from high portions 70 of cam walls 69 into engagement with the low portions of said cam walls, springs 68 forcing the push pins out of engagement with transverse hole 67 in the oscillating shaft and heads 68 of push pins 57 riding up from low portions 63 to the high portions of cam walls 62 and forcing the push pins against the power of springs 61 into engagement with bushing 34 and rotating sleeve 36, which in this form carries the chuck or tool holder, so that the rotary movement of the sleeve is imparted to the chuck or tool holder. It will thus be seen that oscillation of the shifting ring is the only movement required to change from rotary to oscillatory movement of the tool holder, and vice versa.

Having thus described my invention I claim:

1. A portable driving head of the character described comprising a driving shaft, an oscillatory shaft driven thereby, a rotary sleeve also driven by said driving shaft, a tool holder, and means for operatively connecting said tool holder with either said oscillatory shaft or said rotary shaft.

2. A portable driving head of the character described comprising a driving shaft, an oscillatory shaft in which one end of said driving shaft is rotatably mounted, a tool holder operatively connected with said oscillatory shaft, and means operated by said driving shaft for oscillating said oscillatory shaft.

3. In a device of the character described, the combination with a driving shaft and a tool holder, of intermediate mechanism for producing either rotary or oscillatory movement of the tool holder and an oscillatory shifting ring and connections for shifting from one movement to the other.

4. In a device of the character described, the combination with a driving shaft, a pinion carried thereby and a tool holder, of gearing driven from said pinion whereby either oscillatory or rotary movement may be imparted to the tool holder, an oscillatory shifting ring, and connections for shifting from one movement to the other.

5. In a device of the character described, the combination with a driving shaft, a pinion carried thereby and a tool holder, of gear wheels meshing with said pinion, a pinion carried by one of said gear wheels, a rotating sleeve carrying a gear wheel meshing with said second pinion, an oscillating shaft carrying a crank, a link pivoted to said crank and to the gear wheel meshing with the first pinion and not itself carrying a pinion, an oscillating shifting ring and means controlled thereby for connecting the tool holder to either the rotating sleeve or the oscillating shaft.

6. A portable driving head of the character described comprising a driving shaft, a drive pinion secured thereto, a gear wheel meshing with said pinion, an oscillatory shaft provided with a crank arm adjacent said gear wheel, a link having one end connected to said crank arm and the other end connected with one face of said gear wheel, and a tool holder operatively connected with said oscillatory shaft.

7. In a device of the character described, the combination with a driving shaft, a pinion carried thereby and a tool holder, of gear wheels meshing with said pinion, a pinion carried by one of said gear wheels, a rotating sleeve carrying a gear wheel meshing with said second pinion, a shaft mounted to oscillate in said sleeve, a crank carried by the oscillating shaft, a link pivoted to said crank and to one of the first-mentioned gear wheels, and means for connecting the tool holder to either the rotating sleeve or the oscillating shaft.

8. In a device of the character described, the combination with a rotating sleeve and a shaft mounted to oscillate therein, of a tool holder and means for connecting the tool holder to either the sleeve or the shaft.

9. In a device of the character described, the combination with a rotating sleeve, a

shaft mounted to oscillate in said sleeve and a tool holder, of an oscillating shifting ring and means controlled by said ring for connecting the tool holder to either the shaft or the sleeve.

10. In a device of the character described, the combination with a rotating sleeve, a shaft mounted to oscillate in said sleeve and a tool holder, of an oscillating shifting ring, means controlled by said ring for connecting the tool holder to either the shaft or the sleeve and means for locking the sleeve at either of its adjustments.

11. In a device of the character described, the combination with a rotating sleeve, an oscillating shaft and a tool holder, of a shifting ring having reverse sets of cam walls and spring push pins actuated by said cam walls to lock the tool holder to either the shaft or the sleeve.

12. In a device of the character described, the combination with a rotating sleeve, an oscillating shaft and a shifting ring having reverse sets of cam walls, of sets of spring push pins socketed in the parts and actuated by the cam walls, one set being adapted to engage and disengage the sleeve and the other set to engage and disengage the shaft, for the purpose set forth.

13. In a device of the character described, the combination with a rotating sleeve, an oscillating shaft and a tool holder, of a shifting ring having reverse sets of cam walls, spring push pins actuated by said walls to lock the tool holder to either the shaft or the sleeve and means for locking the shifting ring at either of its adjustments.

14. In a device of the character described, the combination with a rotating sleeve, an oscillating shaft and a tool holder, of a shifting ring having reverse sets of cam walls and locking holes, spring push pins actuated by the cam walls to lock the tool holder to either the shaft or the sleeve and a spring locking pin adapted to engage either of the locking holes to lock the shifting ring at either adjustment.

15. In a device of the character described, the combination with a rotating sleeve, an oscillating shaft and a tool holder, of a shifting ring having reverse sets of cam walls, said tool holder and shifting ring having half-sockets, a spring ring in said half-sockets to retain the shifting ring in place, and spring push pins actuated by the cam walls to lock the tool holder to either the shaft or the sleeve.

16. In a device of the character described, the combination of a tool holder, an oscillatory shaft to which it is attached and which is provided with a crank, a head in which the shaft is journaled, a gear wheel journaled in the head, a link pivoted directly to the gear wheel and to the crank, an electric motor within the head and driving connections between said motor and the gear wheel.

17. In a device of the character described, the combination of a portable head, a motor secured therein, a gear wheel journaled therein, a pinion carried by the motor and meshing with the gear wheel, an oscillatory shaft, a crank carried thereby, a link pivoted to the crank and directly to the gear wheel and a tool holder carried by the shaft.

18. In a device of the character described, the combination of a motor, a pinion on the motor shaft, a gear wheel meshing with said pinion, an oscillatory shaft, a crank carried thereby, a link pivoted directly to the gear wheel and to the crank and a tool holder carried by the oscillatory shaft.

19. In a device of the character described, the combination of a portable head, a motor secured therein, a pinion upon the motor shaft, a gear wheel meshing with the pinion, an oscillating shaft, a crank carried thereby, a link pivoted directly to the gear wheel and to the crank, a tool holder carried by the oscillating shaft and a ball-bearing intermediate the tool holder and the head.

20. In a device of the character described, the combination of a tool holder, an oscillatory shaft, a rotary sleeve, means for connecting the tool holder to either the shaft or the sleeve, a crank carried by the shaft, a gear wheel carried by the sleeve, a gear wheel having link connection with the crank, an electric motor and driving connections intermediate the gear wheels and the motor.

21. In a device of the character described, the combination of a portable head, an electric motor therein, a tool holder, an oscillatory shaft, a rotary sleeve, intermediate driving connections between the motor and the shaft and the sleeve and means for connecting the tool holder to either the shaft or the sleeve.

22. In a device of the character described, the combination of a portable head, an electric motor therein, a tool holder, an oscillatory shaft, a rotary sleeve, intermediate driving connections between the motor and the shaft and the sleeve, an oscillatory shifting ring having reverse cam walls, and spring push pins actuated by the cam walls to lock the tool holder to either the shaft or the sleeve.

23. In a device of the character described, the combination of a portable head, an electric motor therein, a tool holder, an oscillatory shaft, a rotary sleeve, intermediate driving connections between the motor and the shaft and the sleeve, an oscillatory shifting ring having reverse cam walls, spring push pins actuated by the cam walls to lock the tool holder to either the shaft or the sleeve and means for locking the shifting ring at either of its adjustments.

24. In a device of the character described, the combination of a portable head, an electric motor therein, a tool holder having two sets of sockets, spring push pins in said sockets, an oscillatory shaft having a transverse hole adapted to be engaged by one set of push pins, a rotary sleeve having sockets adapted to be engaged by the other set of push pins, a shifting ring having sets of cam walls to actuate the sets of push pins, for the purpose set forth, and driving connections intermediate the motor and the shaft and the sleeve.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM D. SHERWOOD.

Witnesses:
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