

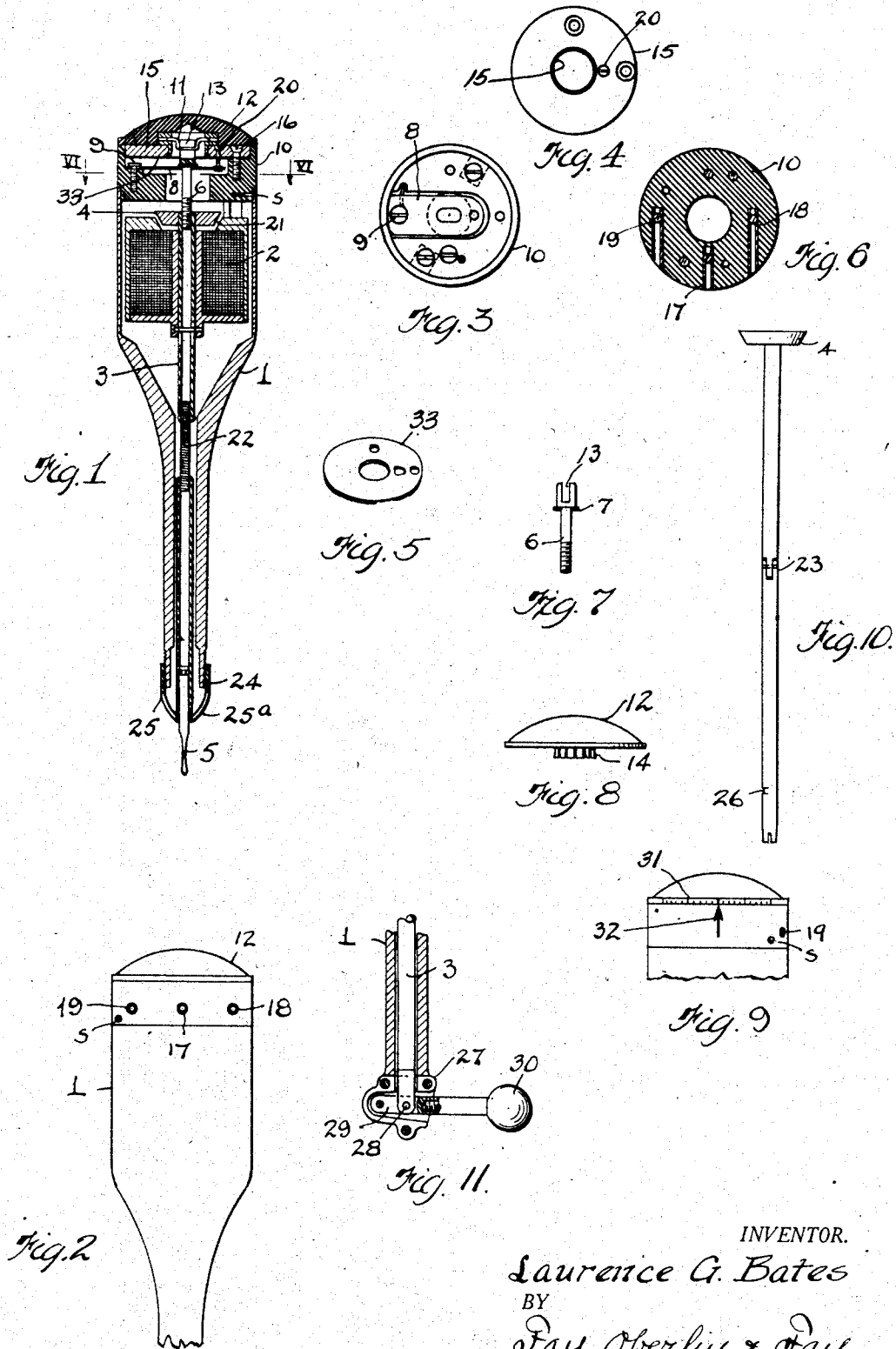
Aug. 12, 1930.

L. G. BATES

1,772,852

ELECTRICALLY OPERATED HAND TOOL

Filed June 18, 1927



INVENTOR.

Laurence G. Bates

BY

Fay Oberlin & Fay
ATTORNEYS.

UNITED STATES PATENT OFFICE

LAURENCE G. BATES, OF CLEVELAND, OHIO, ASSIGNOR TO THE BOWLER AND BURLICK COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO

ELECTRICALLY-OPERATED HAND TOOL

Application filed June 18, 1927. Serial No. 199,855.

This invention relates to hand tools, and more particularly tools of the type having an electro-magnetically reciprocated mandrel; and it is among the objects of the invention to provide a readily controlled device adapted to operate with various reciprocatively driven tools or points as desired, such as matting tools, cutters, engraving tips, drills, pluggers, etc. Other objects and advantages will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, consists of the features hereinafter fully described, and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain constructions embodying the invention, such being however illustrative of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawing:

Fig. 1 is an axial sectional view of an embodiment of the invention; Fig. 2 is an elevational view of the upper end of the same; Figs. 3 and 4 are details in plan; Fig. 5 is a detail in perspective; Fig. 6 is a section taken on the plane indicated by the line VI—VI, Fig. 1; Figs. 7, 8 and 9 are elevational details; Fig. 10 is an elevational view of a detail modification; and Fig. 11 is a sectional view of a further detail modification.

Referring more particularly to the drawing, which illustrates the invention as applied to a jeweler's tool, the reference numeral 1 designates a casing within which is an electro-magnet 2. Reciprocable in the magnet is a mandrel 3 having an armature 4, and projecting on through the casing to carry a tool point 5. Threaded into the upper end of the mandrel, which may be made hollow if desired, is a screw 6, the head 7 of which rests on a plate-spring 8. The latter is anchored at its other end by a screw 9 which is set into an insulating headpiece 10 fastened to the casing in any suitable manner, for instance by screws 8. This spring tends to lift the mandrel away from the magnet, and the length of stroke is gauged by the throw

allowed the armature, adjustment being had by means of the screw 6. A stirrup 11 extends from the cap 12 across in the slot 13 of the screw such that rotation of the cap correspondingly rotates the screw for adjustment. The cap may be held in such rotatable position in any suitable manner, as for instance by snap-projections 14 engaging the walls of an opening 15' in plate 15, somewhat as the parts of a snap-fastener engage. That is, the cap may be snapped into place, and may be turned through an angle of rotation, for adjusting the screw and armature throw, and yet may be readily pried off when it is desired to disassemble the tool. The plate 15, of disk-like form and usually of insulating material is fastened to the head 10 by suitable means, for instance screws 16. In the head 10 there are lateral bores to receive plug-in connections from the line of operating-current supply. A central bore 17, preferably screw threaded, may serve to receive one terminal plug of the lead-in wires, the one end of the magnet wire being connected to the bushing of the bore, and the other end of the magnet winding connects to the bushings in bores 18 and 19. One of these latter, however, is a direct connection from bushing to magnet, while the other goes by way of the plate-spring 8 and a contact 20 located to coact therewith. From this, it will be seen that when the lead-terminal is plugged into one of the bushings, for instance 18, the circuit to the magnet goes by way of the contact and spring, while when plugged into the other bushing, the circuit goes direct. This allows of the same winding to operate on either direct current or alternating current supply according as the second terminal is plugged into the bushing leading through the interruptor contact or into the bushing leading direct. By providing one terminal as a screw-threaded plug for engagement in bushing 17 and the other feed terminal as a slip plug engageable in plain bushings 18 and 19, one set of equipment may function for either current supply as available.

The design of the armature 4 is such as to particularly facilitate powerful thrust, being of a general plate or disk-like shape,

and beveled or undercut with tapering or sloping face edgewise where opposite the pole face 21 of the magnet. In this manner, magnetic leakage is minimized and the lines of force in the magnet field are directed to be most effectively exerted for a strong sharp pull upon the armature for this usage.

The mandrel may be in the form of a solid stem, for some uses, but in the case of a tool particularly adapted for jeweler's matting and engraving usage, I prefer to introduce a degree of flexibility or jointing such as to allow of a certain amount of lateral play at the point. This may be accomplished by setting in a length of flexible shafting or the like 22 in the central portion of the mandrel, or in the form shown in Fig. 10 a pivot joint 23 may be interposed. In any such case, it will be seen that some lateral throw is possible, the extent thereof depending upon the clearance provided below. To regulate and adjust such clearance, an adjusting cap 24 is screw-threadedly mounted on the end of the casing, such that the mandrel and tool carried projects therethrough, being guided by a tapering-surface guide 25. Such guide is furthermore adjustable by virtue of having split prongs 25^a whereby the opening through the guide is expanded or retracted as the cap 24 is screwed more or less upon the barrel of the casing.

The lower end of the mandrel is equipped with a tool-point receiving chuck. A simple and preferred form for this comprises a recessed or tubular end for the mandrel, and a lock-indent 26 therein, such that with a tool point having a slight wing projection on its inner end this wing projection may be pushed in past the lock 26 and then be rotated slightly to engage there-behind, somewhat in the manner of a bayonet joint.

The tool points adaptable to this device may of course be quite varied. In Fig. 1, there is illustrated an equipment having a matting tool point 5, such as will be suitable for finishing mat surfaces in jeweler's and engraver's work. In Fig. 11, the mandrel 3 is equipped with a tool point for dapping. Such point may consist of an attachment 27 to clamp on the threaded end of the barrel of the casing, the mandrel being connected to a pivot 28 on a lever 29. This lever may have a screw threaded socket to receive working-points 30 of different size and contour. Such lever may be of first or second class, as desired. The mandrel carrying such a beater-point may thus be readily operated on jewelers' hollow-ware, etc., particularly in difficulty-accessible places, where a beater action is wanted.

In the use of the device, as will be readily understood from the foregoing, the lead wires for the operating current from the line are plugged into the respective socket bores in the head of the tool, one lead terminal screw-

ing into the central screw socket 17, and the other lead terminal plug being set into the one or the other of the lateral bores 18 or 19 according as direct current or alternating current is to be used, in the case of the alternating current, the circuit leading direct to the magnet, and the alternations of the current serving to intermittently pull the armature and the mandrel, while in the case of the direct current, the circuit leads through the interruptor contact 20 whereby the necessary intermittent action is secured. In either case the spring 8 accomplishes the return of the stroke, the positive blow of the magnetic throw being directed to the tool point. By turning the cap 12 to the right or left, the adjusting screw 6 may be manipulated to lengthen or shorten the throw as required. The graduated scale 31 on the periphery of the cap in conjunction with a pointer 32 marked on the head forms a convenient gauge by means of which adjustment may be facilitated. Where a lateral component of thrust is desired, particularly as in the case of matting, the cap 24 may be turned so as to spread the guide portions 25^a, thereby correspondingly allowing free or lateral play for the tool point 5. Adjustment as to this may accordingly be had as required. Adjustment of the spring 8 in so far as its particular setting may be concerned can be attended to in the original assembly of the device and with the insulating sheet 33 finally positioned thereabove this portion of the device will require no further attention on the part of the operator, such adjustment of the throw of the mandrel as may be required, being had entirely externally by the cap in its rotatable or oscillable mounting.

As already seen, the particular tool points applied may be varied in accordance with the particular work in hand, and correspondingly also the size and weight of the assembly generally will vary from a light pen-like device for delicate engraving work in the jewelry trade on the one hand, or on the other hand the coarser types of work in other lines will correspondingly be provided for by larger and heavier construction. The principle may thus be applied to a wide range of metal working, fine or coarse, die work, stone engraving and cutting, etc.

Other modes of applying the principle of the invention may be employed, change being made as regards the details disclosed, provided the means stated in any of the following claims or the equivalent of such, be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In a device of the character described, the combination of a solenoid magnet, a reciprocable mandrel projecting through said magnet, and a disk-like armature secured to said mandrel to reciprocate therewith and

having a beveled edge adjacent the magnet, said mandrel being adapted to carry a tool.

2. In a device of the character described, the combination of a solenoid magnet, a mandrel projecting through said magnet, an armature secured to said mandrel and having a sloping face, the face of the magnet being correspondingly sloping, a spring for retracting said mandrel, and an adjusting screw engaging the spring to control its throw, said mandrel being adapted to carry a tool.

3. In a device of the character described, the combination of a solenoid magnet, a mandrel projecting through said magnet, an armature secured to said mandrel, a spring for retracting said mandrel, a head forming part of the enclosure for the armature and supporting said spring, an adjusting screw in the end of said mandrel, and a cap mounted on said head for rotating said screw.

4. In a device of the character described, the combination of a solenoid magnet, a mandrel projecting through said magnet, an armature secured to said mandrel, a spring for retracting said mandrel, a head forming part of the enclosure for the armature and supporting said spring, an adjusting screw in the end of said mandrel, and a snap-fastening cap mounted on said head for rotating said screw.

5. In a device of the character described, the combination of a solenoid magnet, a mandrel projecting through said magnet, an armature secured to said mandrel, a plate-spring for returning said mandrel, a head forming part of the enclosure for the armature and to which said spring is anchored, and an adjusting screw bearing against the free end of said spring and threading into the mandrel.

6. In a device of the character described, the combination of a solenoid magnet, a mandrel projecting through said magnet, an armature secured to said mandrel, a plate-spring for returning said mandrel, a head forming part of the enclosure for the armature and to which one end of said spring is anchored, an adjusting screw bearing against the free end of said spring and threading into the mandrel, a stirrup engaging in the slot of said screw, and a cap mounted on said head for actuating said stirrup.

7. In a device of the character described, the combination of a solenoid magnet, a mandrel projecting through said magnet, an armature secured to said mandrel, a plate spring for returning said mandrel, a head forming part of the enclosure for the armature and to which one end of said spring is anchored, an adjusting screw bearing against the free end of said spring and threading into the mandrel, a stirrup engaging the slot of said screw, a cap mounted on said head for actuating said stirrup, and resilient

means for holding said cap in rotatable position.

8. In a device of the character described, the combination of a solenoid magnet, a mandrel projecting through said magnet, an armature secured to said mandrel and having a sloping face, and means whereby either alternating current or direct current may energize said magnet, said means including connections direct to the magnet-winding and a separate connection through a make-and-break contact operated by the mandrel-reciprocation.

9. In a device of the character described, the combination of a solenoid magnet, a mandrel projecting through said magnet, an armature secured to said mandrel, a plate-spring for returning said mandrel, a head to which one end of said spring is anchored, a contact on said plate in circuit with said magnet, an adjusting screw in the end of said mandrel and engaging said spring, and a cap mounted on said head for actuating said adjusting screw.

10. In a device of the character described, the combination of a solenoid magnet, a mandrel projecting through said magnet, an armature secured to said mandrel, a plate-spring engaging said mandrel for returning the same, a head to which one end of said spring is anchored, a contact on said spring, and plug-in connections whereby said spring-contact may be included in circuit or be shunted.

11. In a device of the character described, the combination of a solenoid magnet, a mandrel projecting through said magnet, an armature secured to said mandrel, and means in said mandrel for effecting a lateral throw at the end.

12. In a device of the character described, the combination of a solenoid magnet, a tool-carrying mandrel projecting through said magnet, an armature secured to said mandrel, and means for varying the distance permitted in lateral throw at the tool-carrying end of the mandrel.

13. In a device of the character described, the combination of a casing, a solenoid magnet, a tool-carrying mandrel projecting through said magnet, an armature secured to said mandrel, and a tapering collar threaded on the end of the casing and surrounding the mandrel for varying its distance of lateral throw.

14. In a device of the character described, the combination of a casing, a solenoid magnet therein, a mandrel in said magnet, an armature secured to said mandrel, and a collar threaded on the end of the casing and having tapering split projections surrounding the mandrel for varying its distance of lateral throw.

15. In a device of the character described, the combination of a casing, a solenoid mag-

net therein, a mandrel in said magnet, an
armature on said mandrel, a plate-spring for
returning said mandrel, a head to which one
end of said spring is anchored, an adjusting
5 screw bearing against the free end of said
spring and threading into the mandrel, and
a collar threaded on the end of said casing,
and having tapering split projections sur-
rounding the mandrel for varying its dis-
10 tance of lateral throw.

Signed by me this 13th day of June, 1927.

LAURENCE G. BATES.

15

20

25

30

35

40

45

50

55

60

65