Nov. 20, 1945. A. G. IMHOF ET AL 2,389,314

PORTABLE TOOL

Filed Dec. 13, 1943 2 Sheets-Sheet 1

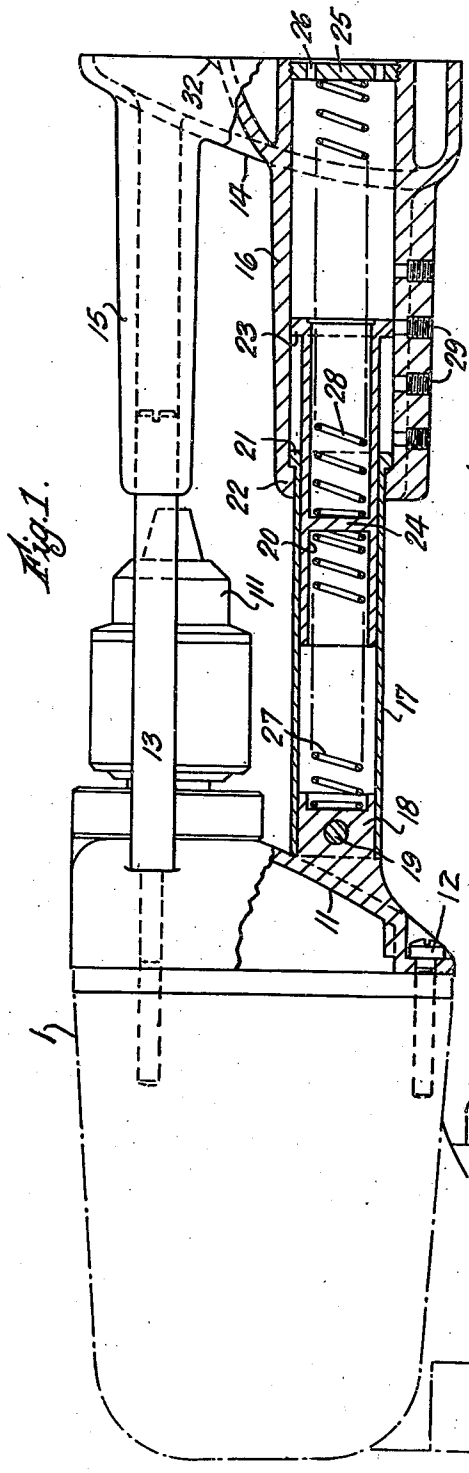

Fig. 1.

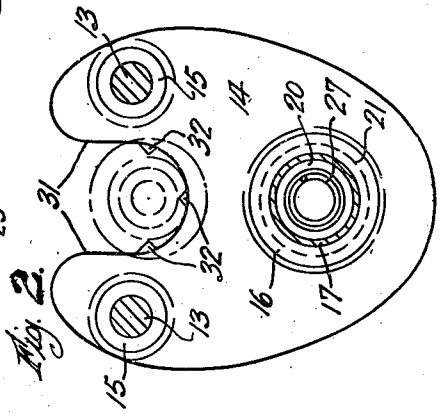

Fig. 2.

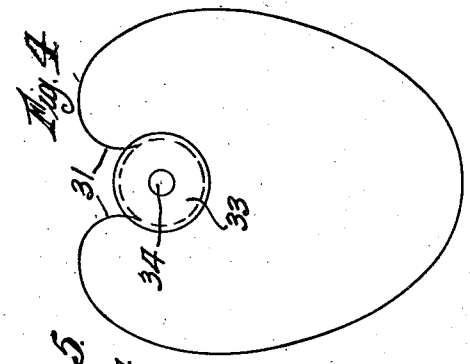

Fig. 4.

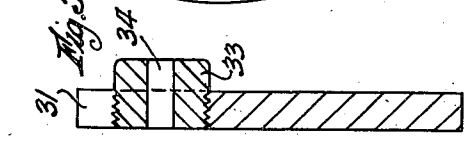

Fig. 5.

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Fig. 3.

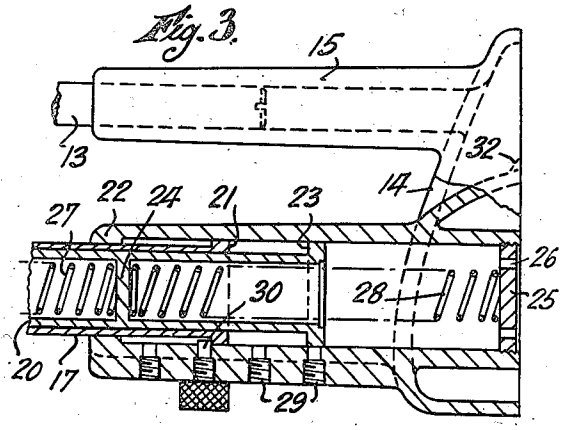
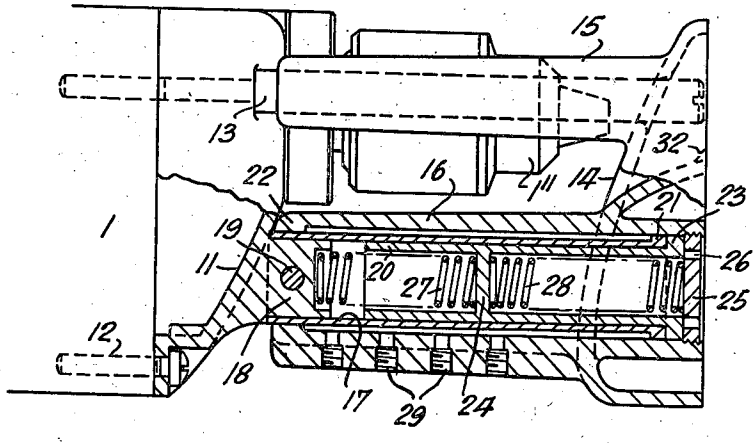


Fig. 6.



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UNITED STATES PATENT OFFICE

2,389,314

PORTABLE TOOL

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In Great Britain January 27, 1943

8 Claims. (Cl. 77—55)

This invention relates to means for facilitating the correct positioning and holding of a portable tool such as an electrically driven drilling machine, commonly known as an electrically driven drill, or an electric drill.

According to the present invention we provide a portable tool such as an electrically driven drilling machine with a guide plate which is adapted to be pressed against the action of a spring or its equivalent on to the work to be operated on and is connected to the casing or body in which the tool holder is mounted by means of one or more guides of improved construction which constrain the plate to move (relatively to the machine) in a direction parallel with the axis of the tool itself.

At least one of the guides is so arranged that the travel thereof combined with adequate bearing surfaces to maintain the parts in line is greater than in the case of a simple telescopic arrangement consisting of two parts which are pressed towards their extended position by a spring. This increase in travel is effected by means of a guide (preferably telescopic) comprising two members provided with a third member which serves to maintain the two members aligned, and is constrained to move relatively to the two members as the guide is extended or retracted.

In the accompanying drawings which illustrate the invention:

Figure 1 is an elevation partly in section and Figure 2 is a sectional plan view;

Figure 3 is a detail view;

Figures 4 and 5 show a modification.

Figure 6 is an elevation partly in section of the arrangement shown in Figure 1 but with parts in a different position.

Referring to Figure 1, 1 is a portable electrically driven drilling machine shown in dot and peck lines; 1'' is an ordinary self-centering chuck adapted to hold drills or other tools of different diameters.

11 is a casting which is secured to the casing of the machine 1 by means of a screw 12 and guide pins 13 which are reduced in diameter at their inner ends and screw threaded. 14 is a casting, the outer end of which forms a guide plate and is provided with tubular extensions 15 forming guides for the pins 13, and with a tubular extension 16 which forms the outer member or tube of the telescopic guide giving a greater travel than is the case with a simple telescopic guide. 17 is the inner member of the telescopic guide and comprises a tube which fits onto a boss 18 on the casting 11, and is held thereon by a pin 19. 20 is a floating guide or sleeve which serves as a bearing of considerable length to keep the tubes 16 and 17 coaxial with one another. The tube 17 is a sliding fit on the sleeve 20 and is provided at its outer end with a peripheral flange 21 which is a sliding fit in the tube 16. The tube 16 is provided at its outer end with an internally projecting peripheral flange 22 which is a sliding fit on the tube 17. The sleeve 20 is provided with a peripheral flange 23 which is a sliding fit in the tube 16. 24 is a partition in the sleeve 20. The tube 16 is closed by an end plate 25 which is provided with apertures 26 to allow free ingress and egress of air to and from the tube 16. 27 is a spring located between the boss 18 and partition 24, and 28 is a spring located between the partition 24 and the end plate 25. Normally the tubes 16 and 17 of the guide are maintained in their extended position by the springs 27 and 28, the relative movement between the tubes being limited by the flanges 21 and 22. As the guide is retracted against the action of the springs 27, 28, the sleeve 20 is also constrained by the springs 27, 28 to move relatively to the tubes 16 and 17 until finally in the extreme retracted position the tubes 16 and 17 and the sleeve 20 take up the position shown in Figure 6.

It will be seen that the distance between the boss 18 and the end plate 25 in the extended position of the guide is reduced by substantially one half when in the retracted position shown in Figure 6 and that at all times the tubes 16 and 17 are well supported by the sleeve 20. It will also be seen that with this arrangement if a short drill be employed the telescopic guide would withdraw it an inconveniently long distance from the work. In order to obviate this the outer tube 16 is provided with a number of screw threaded holes 29 into any one of which a screw 30 can be inserted, as shown in Figure 3, which will be engaged by the flange 21 on the tube 17 and thereby restrict the outward movement of the guide plate 14. In Figure 2 the opening 31 through which the drill 1' can be seen is provided with three triangular projections 32 which facilitate the placing of the guide plate 14 in its proper position to drill. Figures 4 and 5 show an alternative arrangement in which the aperture 31 is screw threaded to receive a bush 33 adapted to fit into holes in a jig, the bush 33 having a central aperture 34 of appropriate diameter to form a guide for the drill to be used.

In operation the tool is placed in position, the guide plate 14 being pressed against the work to be drilled so that its surface is in contact with the surface of the work to be drilled. So long as the guide plate is held in this position, the machine is constrained to move in a direction at right angles to the work.

The guide plate 14 may, if desired, be formed as an electromagnet.

If the work to be drilled is e. g. curved instead of plane the guide plate 14 may obviously be so shaped as to make contact therewith.

Although Figure 1 shows a drilling machine having two telescopic guides (13, 15) without a

spring and one spring actuated telescopic guide it is obvious that all the guides may be spring actuated. Further, if desired, the guides **13**, **15** may be dispensed with and the guide plate **14** may be guided solely by the telescopic guide, this latter being provided with means such as a key and keyway to prevent rotational movement between the machine **1** and the guide plate **14**.

It has been found that a portable drilling machine fitted with a guide plate according to this invention is particularly suitable for drilling several thicknesses of thin material at the same time. If a jig be used, there is less wear on the jig (even without the use of a bush such as is shown at **33** Figure 4), the holes made by the drill are circular, the risk of breakage of the drill is reduced, and there is less wear on the sides of the drill.

What we claim is:

1. In a portable tool, the combination of a tool holder, a guide plate adapted to be pressed against the work to be operated on by said tool, and at least one guide comprising three members slidably mounted relatively to one another, one of the members serving to maintain the other two members in line with one another, means constraining the said member to move relatively to the two members as the guide is extended or retracted, the said guide connecting said guide plate to said tool, whereby the guide plate is constrained to move in a direction parallel with the axis of said tool holder, and means tending to force said guide to its extended position.

2. In a portable tool, the combination of a tool holder, a guide plate adapted to be pressed against the work to be operated on by said tool, and at least one guide comprising three tubular members slidably mounted relatively to one another, one of the members serving to maintain the other two members coaxial with one another, means constraining the said member to move relatively to the two members as the guide is extended or retracted, the said guide connecting said guide plate to said tool, whereby the guide plate is constrained to move in a direction parallel with the axis of said tool holder, and means tending to force said guide to its extended position.

3. In a portable tool, the combination of a tool holder, a guide plate adapted to be pressed against the work to be operated on by said tool, and at least one guide comprising two tubular members slidably mounted on a sleeve, a partition in said sleeve, and means constraining the members and sleeve to move relatively to one another as the guide is extended or retracted, the said guide connecting said guide plate to said tool, whereby the guide plate is constrained to move in a direction parallel with the axis of said tool holder and means tending to force said guide to its extended position.

4. In a portable tool, the combination of a tool holder, a guide plate having an aperture to enable the end of the tool to be seen where it enters the work and adapted to be pressed against the work to be operated on by said tool, and at least one guide comprising three members slidably mounted relatively to one another, one of the members serving to maintain the other two members in line with one another, means constraining the said member to move relatively to the two members as the guide is extended or retracted, the said guide connecting said guide plate to said tool, whereby the guide plate is constrained to move in a direction parallel with the axis of said tool holder, and means tending to force said guide to its extended position.

5. In a portable tool, the combination of a tool holder, a guide plate, a bush on said guide plate adapted to fit into holes in a jig, said guide plate being adapted to be pressed against the work to be operated on by said tool and to be positioned by said bush, and at least one guide comprising two tubular members slidably mounted on a sleeve, a partition in said sleeve, and means constraining the members and sleeve to move relatively to one another as the guide is extended or retracted, the said guide connecting said guide plate to said tool whereby the guide plate is constrained to move in a direction parallel with the axis of said tool holder, means tending to force said guide to its extended position, and means for limiting to various lengths the travel of said guide.

6. In a portable tool, the combination of a tool holder, a guide plate adapted to be pressed against the work to be operated on by said tool, a bush on said guide plate adapted to fit into holes in a jig, and at least one guide comprising three members slidably mounted relatively to one another, one of the members serving to maintain the other two members in line with one another, means constraining the said member to move relatively to the two members as the guide is extended or retracted, the said guide connecting said guide plate to said tool, whereby the guide plate is constrained to move in a direction parallel with the axis of said tool holder, and means tending to force said guide to its extended position.

7. In a portable tool, the combination of a tool holder, a guide plate adapted to be pressed against the work to be operated on by said tool, and at least one guide comprising three members slidably mounted relatively to one another, one of the members serving to maintain the other two members in line with one another, means constraining the said member to move relatively to the two members as the guide is extended or retracted, the said guide connecting said guide plate to said tool, whereby the guide plate is constrained to move in a direction parallel with the axis of said tool holder, means tending to force said guide to its extended position, and means for limiting to various lengths the travel of the guide plate relatively to the tool.

8. In a portable tool, the combination of a tool holder, a guide plate adapted to be pressed against the work to be operated on by said tool, and at least one guide comprising three tubular members slidably mounted relatively to one another, one of the members serving to maintain the other two members coaxial with one another, means constraining the said member to move relatively to the two members as the guide is extended or retracted, the said guide connecting said guide plate to said tool, whereby the guide plate is constrained to move in a direction parallel with the axis of said tool holder, means tending to force said guide to its extended position, and means for limiting to various lengths the travel of the guide plate relatively to the tool.

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