United States Patent [19]

Resch

[11] **3,741,562**

[45] **June 26, 1973**

[54] **APPARATUS FOR THE OPERATION OF A TOOL**

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[22] Filed: **Mar. 26, 1971**

[21] Appl. No.: **128,462**

[30] **Foreign Application Priority Data**

Apr. 24, 1970 Germany ..... P 20 20 076.4

[52] **U.S. Cl.** **269/96,** 81/343, 269/198, 269/235

[51] **Int. Cl.** **B25b 1/18,** B25b 7/16

[58] **Field of Search** 269/96, 97, 196, 269/198, 204, 229, 235; 81/301, 329, 342, 343

[56] **References Cited**

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Assistant Examiner—E. F. Desmond
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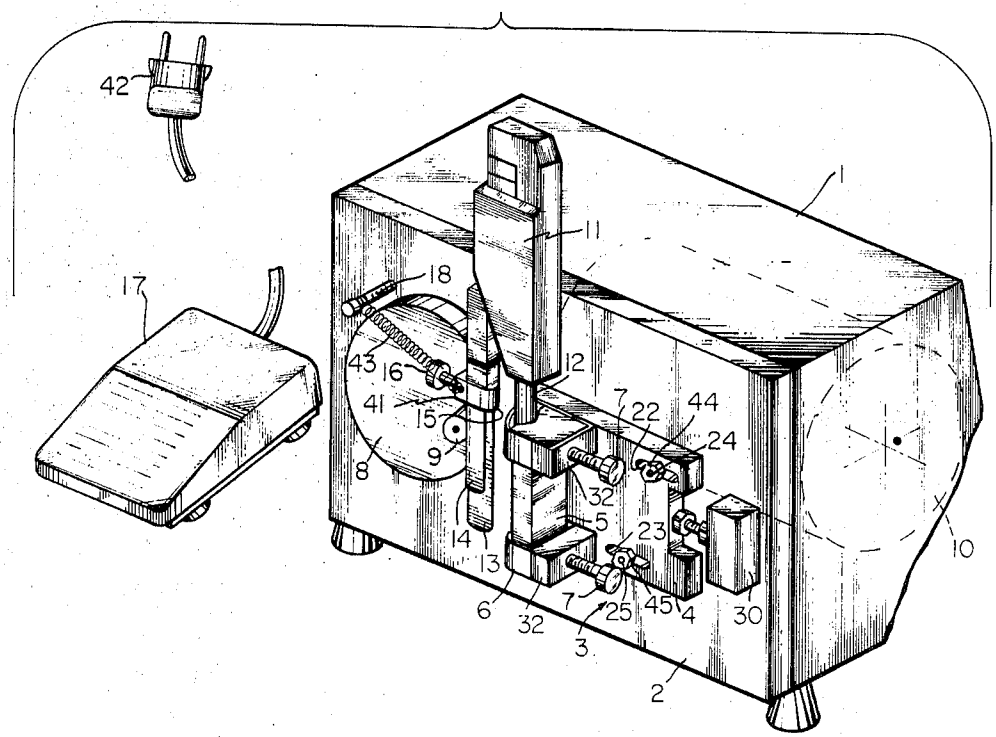
[57] **ABSTRACT**

This invention relates to an apparatus for holding a tool and mechanically operating the tool. The apparatus comprises a clamp which holds the tool and which is adjustably mounted on a plate. The plate is adjustably mounted to the surface of a support frame. A thrust means is also mounted to the frame for applying thrust to a portion of the tool, the thrust means being controllable by a control means which may be in the form of a foot switch. Movement of the thrust means operates the tool.

5 Claims, 8 Drawing Figures



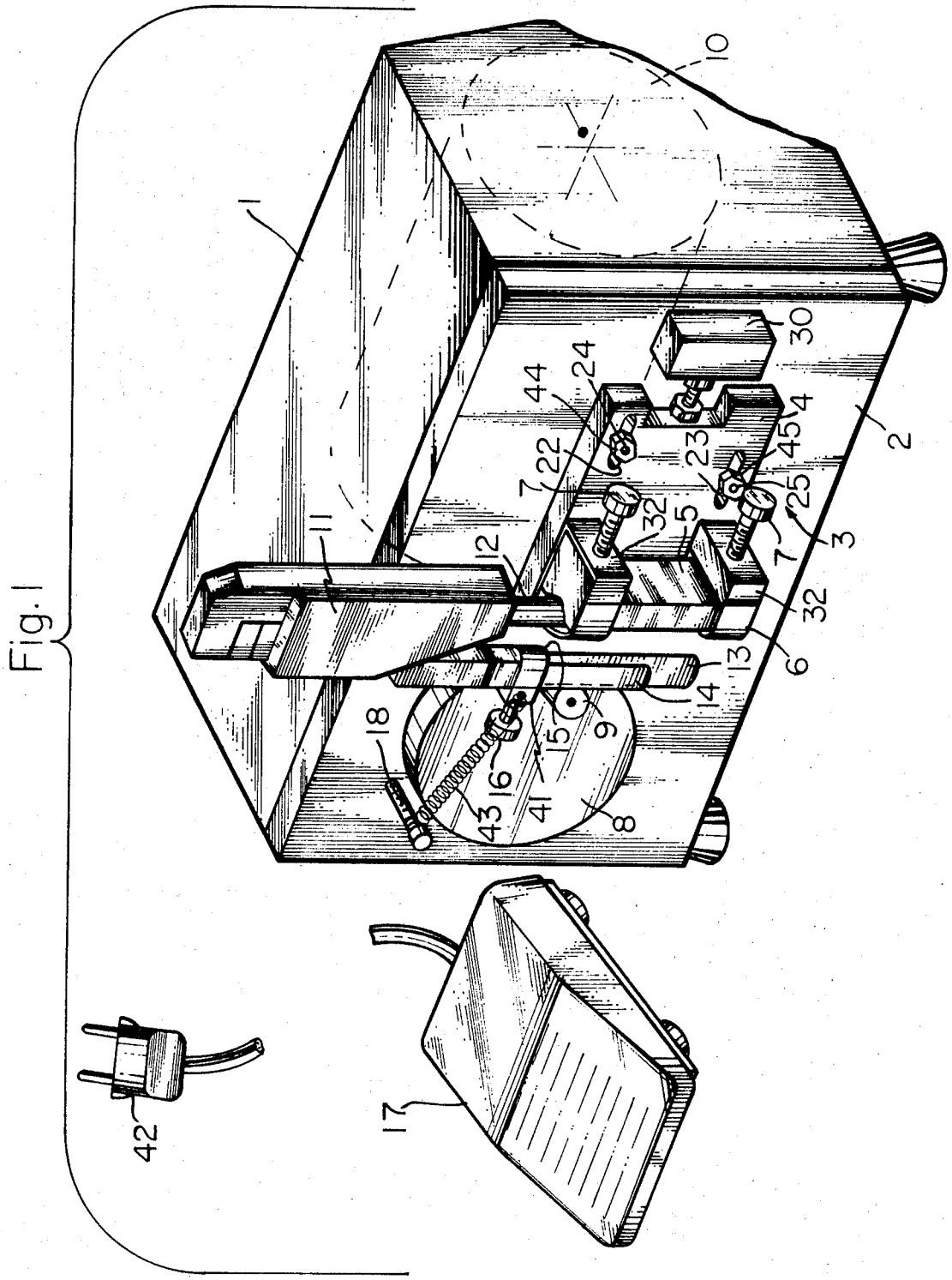

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Fig. 1

Fig 2

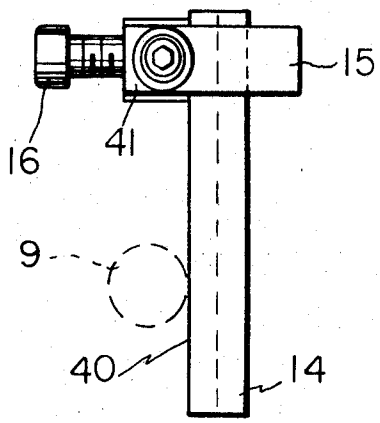


Fig. 5

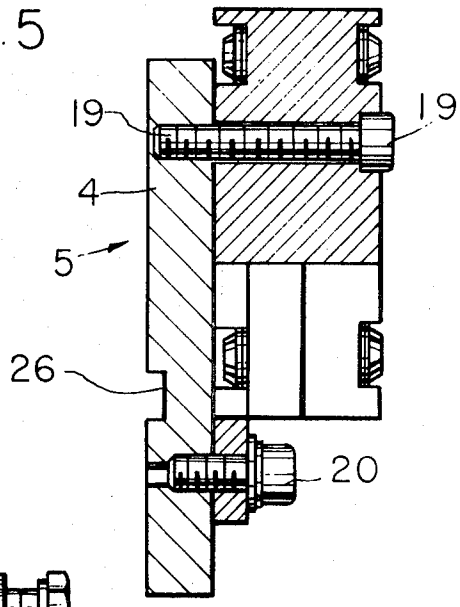


Fig. 4

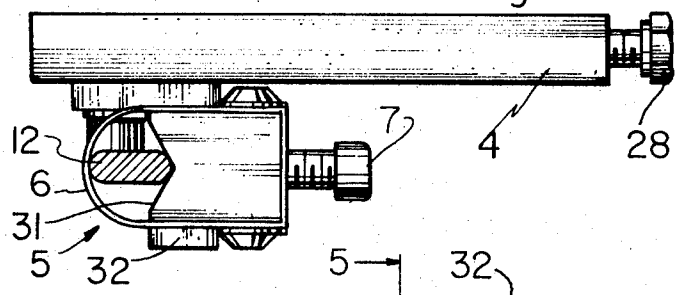
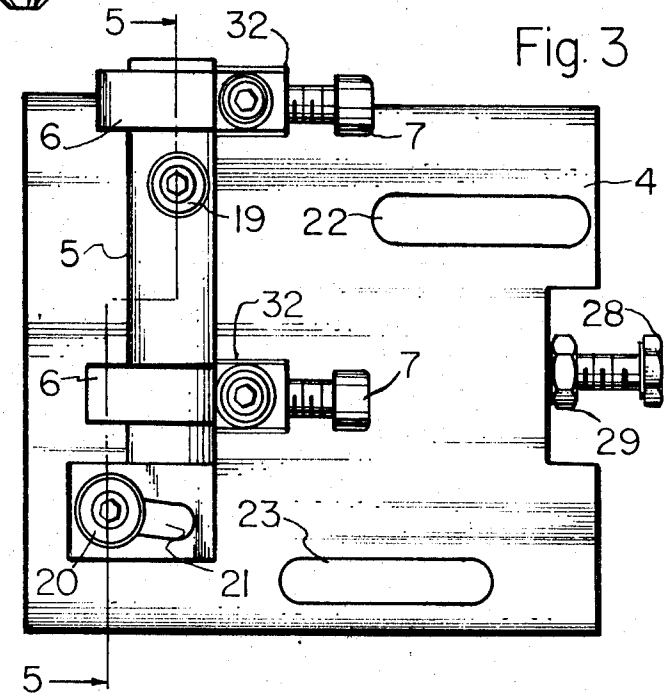


Fig. 3



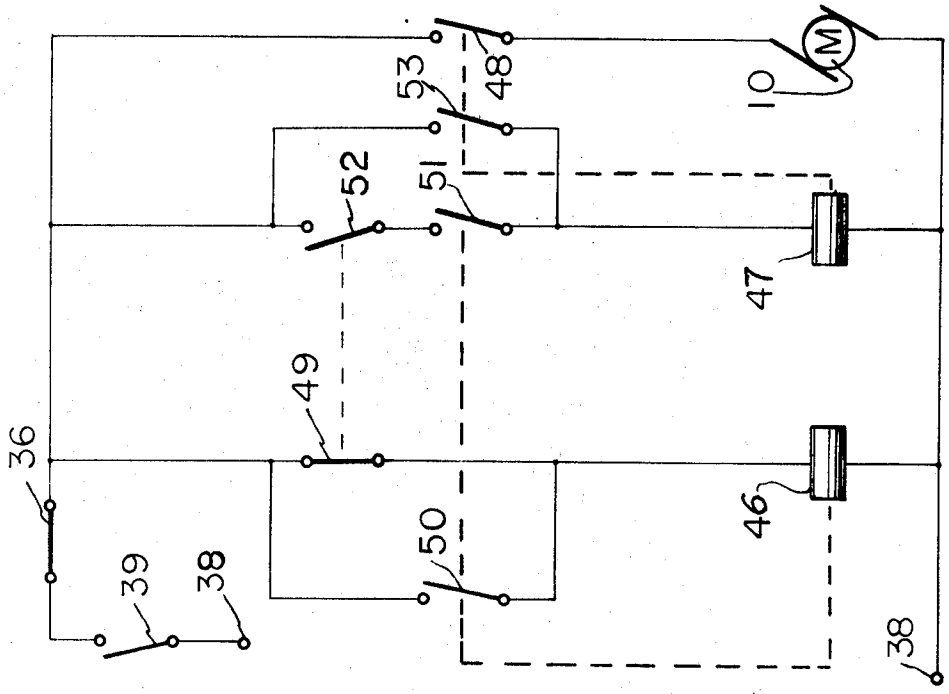


Fig. 8

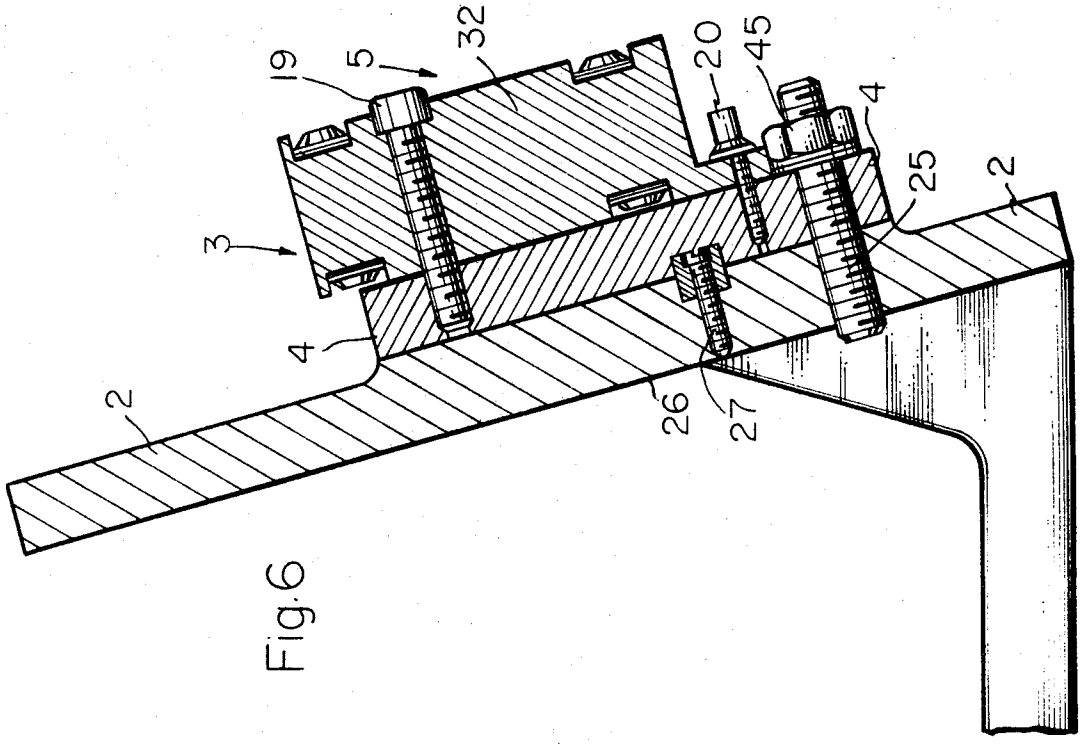


Fig. 6

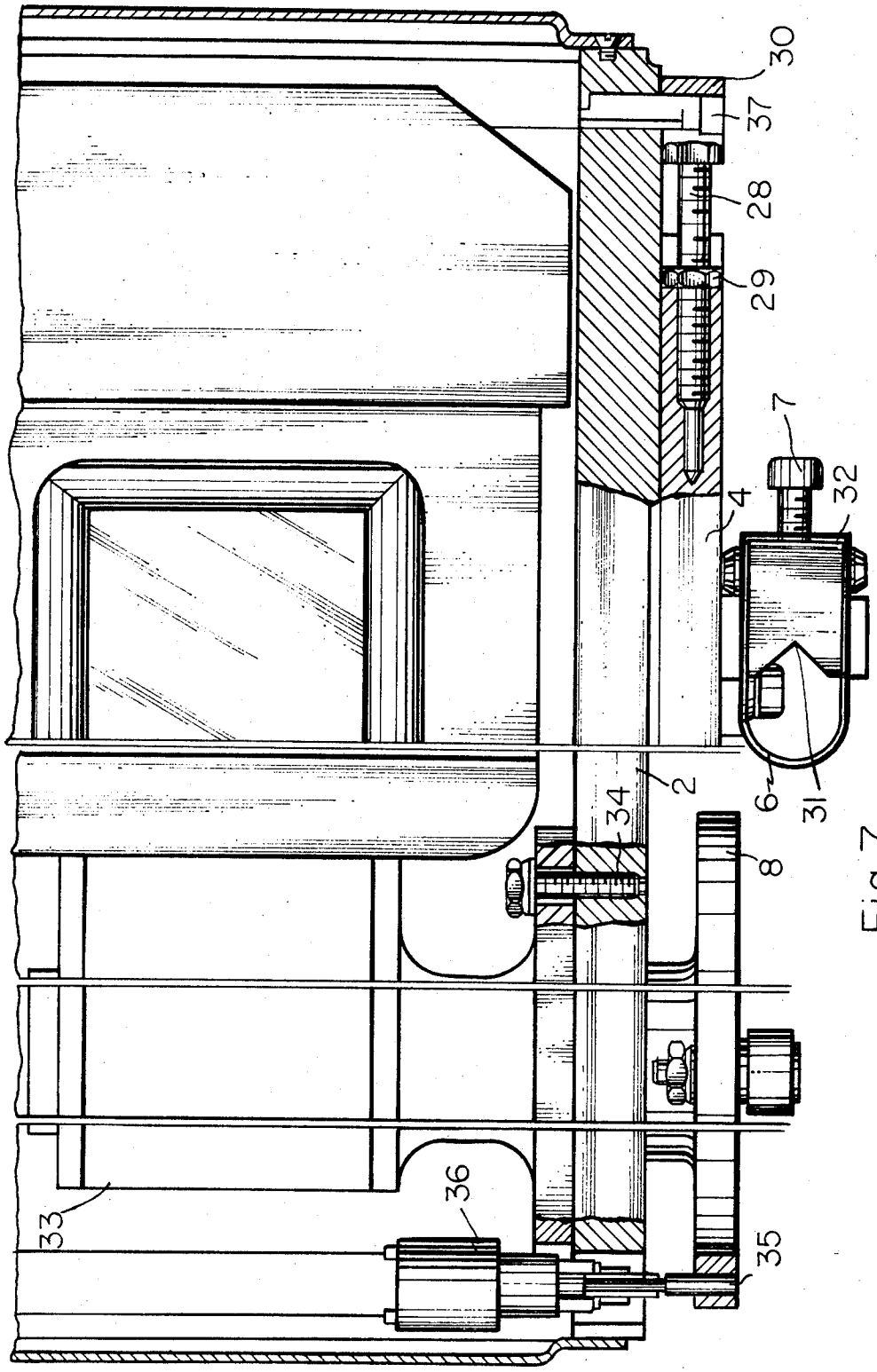


Fig. 7

APPARATUS FOR THE OPERATION OF A TOOL

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to the field of tools, and more particularly to machines used to hold and operate tools.

2. Description of the Prior Art

According to the prior art, apparatus for holding and operating tools were limited to certain tools whose dimensions and configurations matched closely with certain dimensions of the apparatus designed to operate the tools. Prior art apparatus for operating tools were not adjustable to adapt them to a wide variety of tools shape and size. Additionally, prior art apparatus did not have means for rapidly exchanging different tools for operation in the same apparatus.

SUMMARY OF THE INVENTION

An object of the present invention is to provide an economical apparatus for holding and operating tools which is not limited to use with tools whose dimensions and configurations closely match certain dimensions of the apparatus.

An additional object of the present invention is to provide an apparatus for holding and operating tools that is adjustable so that a wide variety of tool shapes and sizes may be used with the apparatus.

A further object of the present invention is to provide an apparatus for holding and operating tools that has a means for rapidly exchanging and positioning different tools for operation in the same apparatus.

The present invention provides an apparatus for operating tools, such as pliers, that vary widely in size and configuration. The apparatus has a frame with a mounting surface. A clamping means for holding a tool is coupled to the mounting surface, and a means for applying thrust to the tool is operatively attached to the mounting surface. The means for applying thrust is controlled so that the tool can be operated.

In a particular embodiment, one lever arm of a tool is held in a clamp consisting of a V-shaped block with two tension straps which can be tightened to hold the lever arm securely against the V-shaped block. The clamp is adjustably coupled to a plate. The plate, in turn, is bolted to the mounting surface. Threaded fasteners extend from the mounting surface through elongated holes in the plate so that the plate can be adjusted relative to the thrust means and relative to the mounting surface. The thrust means consists of a disc which is rotatably mounted on the mounting surface. A roller post located eccentrically on the surface of the disc provides thrust when the disc is rotated so as to bring the post up against a second lever arm of the tool for moving the second lever arm with respect to the fixed first lever arm of the tool. The disc is rotated by a gear means which is connected to a motor.

The apparatus is adaptable to a wide range of tools, since the straps which hold the tool, the clamp which hold the straps, the plate which holds the clamp, and the roller post which applies the thrust may all be adjusted. The plate containing the clamp and tool can readily be removed from the mounting surface and replaced with another plate containing a different tool. An adjustable spacer can be provided on the plate so that the plate can be easily relocated on the mounting surface by abutting the spacer against a stop projection provided on the mounting plate.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an overall perspective view of the apparatus with the cover removed and with a tool clamped in place;

FIG. 2 is a view of a surface protector;

FIG. 3 is a front view of a clamping means for holding a tool with tension blocks which are mounted on a plate;

FIG. 4 is a plan view of the clamping means according to FIG. 3;

FIG. 5 is a section through the clamping means along line 5—5 of FIG. 3;

FIG. 6 is a sectional drawing showing the fastening of the clamping means to the mounting surface of the frame of the apparatus;

FIG. 7 is a partial plan view showing the disc, the gear means, the terminal switch, and the plate in relation to the mounting surface; and

FIG. 8 is an electrical circuit diagram of the apparatus.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in FIG. 1, the apparatus comprises a frame with a mounting surface 2 connected to its housing 1, and having a clamping means 3 arranged on the mounting surface. The clamping means comprises a plate 4 with a tool holder 5 held thereon. The tool holder 5 is embraced by two tension straps 6, each of which can be tightened using a set screw 7 of a tension block 32. A disc 8 upon which a roller post 9 is eccentrically positioned is placed opposite the clamping means 3. The disc gear is powered by an electric motor 10 through a gear means 33 (FIG. 7). A plier-like tool 11 with two lever arms 12 and 13 is shown placed in the apparatus by way of example. The first lever arm 12 is clamped into the tool holder 5 by tensioning straps 6. A surface protector 14, shown in more detail in FIG. 2 is fastened to the second lever arm 13 of the tool 11 by means of tensioning strap 15 and set screw 16. As the disc 8 is rotated, the roller 9 rolls along the surface protector 14 and thus closes tool 11. The purpose of the surface protector 14 is to protect the roller 9 from excessive wear at a possibly roughened surface of the second lever arm 13 and/or to prevent damage to a soft handle of the lever arm 13. A coil spring 43 is connected to the tension block 41 and the screw 18 in order to open the tool after withdrawing the roller from the tool. The apparatus also includes a foot switch 17 and an electric plug 42 with their connecting conduits.

FIG. 2 shows the design of the surface protector 14 with the corresponding tension strap 15, the tension block 41 and the set screw 16. The surface protector is constructed with a V-shaped profile to locate the second lever arm 13 of the tool 11 in the inner rounded apex of the V. The roller 9, shown with dotted lines, rolls along the outer surface 40 of the surface protector.

FIG. 3 shows an embodiment of the clamping means 3. As already shown in FIG. 1, the tool holder 5 having two clamps is fastened to plate 4. Each clamp comprises a tension block 32, a tension band 6, and a set screw 7. The tool holder is fastened to the plate by two screws 19 and 20. In the area of the screw 20, the tool holder 5 is provided with a radial slot 21, and can thus be rotated in the area of the radial slot 21 about the

screw 19 when the screws are loosened. This rotation enables the tool 11 which is held by the tool holder 5 to be placed in a position favorable for its use. In addition, the plate 4 is provided with two elongated holes 22 and 23 for fastening the plate 4 to the mounting surface 2 by means of threaded fasteners 24 and 25 and nuts 44 and 45, as shown in FIG. 1. Since plate 4 can be displaced relative to mounting surface 2 within the limits of the elongated holes 22 and 23, any tool 11 can be placed into such a position that the roller 9 on disc 8 is capable of closing the tool upon rotation of the disc. To assure proper alignment of plate 4 with respect to mounting surface 2, a groove 26 visible in FIGS. 5 and 6 is formed on the rear surface of the plate, the groove engaging with a screw 27 fastened to the mounting surface 2. The screw 27 may be replaced by a suitable spring fitting arrangement (not shown).

Removal of plate 4 along with the tool 11 clamped thereon is easily accomplished by loosening nuts 44 and 45 located on the threaded fasteners 24 and 25. In this manner, different tools can be changed quickly. In order to place a newly inserted tool, along with the clamping means, immediately into an adjusted position, an adjustment screw 28 with a lock nut 29 is placed at a lateral side of the plate 4. Prior to loosening the clamping means from the mounting surface 2, the adjustment screw 28 is turned outwardly to the stop 30, shown in FIG. 1, and secured in that position. When replacing the clamping means, the plate 4 is placed over the threaded fasteners 24 and 25 and slid in the direction of the elongated holes 22 and 23 until the adjustment screw 28 impinges on the stop projection 30. The plate 4 is thus properly positioned and can be fastened to the mounting surface 2 by re-tightening the nuts 44 and 45.

FIG. 4 shows tool holder 5 with tension strap 6, tension block 32, and set screw 7 fastened to the plate 4. The tool holder 5 is provided with a V-shaped notch 31 for accommodating the first lever arm of the tool. By tightening the set screw 7, the tension block 32 is lifted from the tool holder 5, and the lever arm of the tool is tightened by the tensioning strap 6.

FIG. 5 shows the tool holder 5 fastened to the plate 4 by means of screws 19 and 20. The groove 26 is in the rear surface of plate 4.

FIG. 6 shows clamping means 3, which consists of plate 4 and tool holder 5, fastened to the mounting surface 2. Threaded stud 25 extends through the elongated hole 23 (visible in FIG. 3) in plate 4 and is threaded into mounting surface 2. The plate 4 is clamped to the mounting surface 2 by tightening the nut 45 on the threaded stud fastener 25. The second threaded fastener 24 with its corresponding nut 44 is not visible in this figure. The screw 27, which engages the groove 26 on the rear side of the plate 4, is also threaded into the supporting surface 2.

The gear 33 connects the electric motor 10 with the disc 8 as shown in FIG. 7. The gear 33 is fastened with screws 34 to the mounting surface 2. A pin 35 is placed on the disc 8 in such a position as to operate terminal switch 36 (which is also attached to mounting surface 2) during one rotation of the disc. The position of the adjustment screw 28 in plate 4 is also shown in a section of FIG. 7. The stop projection 30 for the adjustment screw 28 is fastened to the mounting surface 2 by means of a screw 37.

FIG. 8 shows an electrical circuit diagram with electric motor 10 connected by a switch contact 48 which is controlled by a relay 47; and also shows a momentary normally closed switch 36, a master switch 39 located at the electrical input terminals 38 of the circuit. Two current branches containing one relay each 46 and 47 are connected parallel with the motor 10 and the switch contact 48. One switch 49 of foot switch 17 is located in one of the current branches containing the relay 46 and is connected in series with relay 46. A switch contact 50 is placed parallel to switch 49 and is controlled by relay 46. In the second current branch there is a switch contact 51 connected in series with relay 47 and with a second switch 52 of the foot switch 17. A switch contact 53, controlled by relay 47, is placed in parallel to the series circuit formed of switch contact 51 and switch 52. With relays 46 and 47 de-energized, all switch contacts 50, 51, 53, and 48 controlled by the relays are opened. The method of operation of the circuit is explained in detail below:

By closing the master switch 39, the voltage at input terminals 38 is applied through the normally closed switch 36 and the switch 49 of foot switch 17 to relay 46. The switch contacts 50 and 51 which are controlled by relay 46 then close. Switch 49 and switch 52 are contained in foot switch 17. When foot switch 17 is operated, switch 49 is opened and switch 52 is closed at the same time. Current continues to flow through relay 46 when switch 49 is opened, however, due to the closed switch contact 50. Closing of switch 52 causes relay 47 to be energized, whereby both switch contacts 53 and 48 close. Closing of switch contact 48 puts the motor 10 in motion. Even after opening switch 52, the relay 47 remains energized through its closed switch contact 53 and thus the switch contact 48 remains closed. Following a complete revolution of disc 8 which is moved by motor 10, the switch 36 is momentarily opened. With the foot switch 17 not depressed, that is with switch 52 open, the relay 47 is de-energized and the motor 10 is disconnected, because the switch contact 48 opens. The motor 10 can be put in motion again only by renewed operation of the foot switch 17. If switch 49 is opened, by operation of foot switch 17, during the short disconnection of the current of the terminal switch 36, both relays 46 and 47 are de-energized and the motor is also disconnected. In any case, restarting of the motor is possible only by renewed operation of the foot switch 17.

The invention is not intended to be limited to the embodiment described herein. A large number of modifications within the spirit of the claims is possible. For example, the distance between the pressure part of the thrust means and the clamping means also may be made adjustable by adjusting the pressure part (the post or roller) on the disc moved by the motor. A pneumatic or hydraulic drive of a piston or cylinder also may be used in lieu of a rotating disc as a means of applying thrust. Both the thrust height and the position of the clamping means at the mounting surface of the apparatus may be adjustable.

It is not necessary for the clamping means, as described in the preferred embodiment, to consist of two parts, the plate and the tool holder, which are movable in relation to each other; but the clamping means also may be designed as a single part. However, it would then be advisable to allow for both a horizontal and vertical adjustment of the clamping means in relation

to the mounting surface of the housing and the rotating disc. Other clamping means, such as jaws tensioned relative to each other, may be used for fastening the lever arm of the tool instead of the tensioning straps.

An overload fuse which separates at a predetermined power limit may be used to protect the electric motor and tool from overload. Alternatively, a slip clutch arrangement can be mechanically coupled to the motor.

It should, of course, be understood that other changes can be made in the form, details, arrangement, and proportions of the various parts within the limits of the claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. Apparatus for holding and operating a dual-handle pliers-type tool comprising:
- a support,
- cyclically operable motor-driven means mounted thereon in position for applying a thrust to one handle of said tool,
- a plate movably mounted on said support,
- clamp means adjustably mounted on said plate and adapted to grip the other handle of said tool,
- guide means controlling the direction of movement of said plate on said support,
- stop means mounted on said support,
- adjustable spacer means on said plate engageable with said stop means, and
- fastening devices securing said plate, when in adjusted position, to said support.

2. An apparatus for holding and operating a tool comprising:
- a support having a mounting surface with a stop projection and a guide projection thereon,
- clamping means for holding said tool, mounted on said mounting surface,
- means operatively supported relative to said mounting surface for applying a thrust to a part of said tool; and
- means for controlling said means for applying thrust, whereby said tool can be operated,
- said clamping means including:
  - a plate adjustably coupling said clamping means to said mounting surface, said plate having
  - at least one tool clamp thereon,
  - at least one elongated hole therethrough, with a releasable fastener projecting from said mounting surface and through said hole,
  - a locating groove in that face of said plate which contacts said mounting surface, said groove interfitting with said guide projection, and
  - an adjustable spacer on an edge of said plate, engageable against said stop projection.

3. The apparatus as claimed in claim 1, wherein said motor-driven means for applying thrust includes
- a disc rotatable by a motor, and
- a post eccentrically mounted on said disc
- said disc being mounted on said support in position where said post will engage and impart thrust to said one handle of said tool during a portion of a cycle of rotation of said disc.

4. The apparatus as claimed in claim 3, wherein said one handle of said tool has a clamp thereon carrying a protector member which is engaged directly by said post when said post is imparting thrust to said one handle.

5. The apparatus as claimed in claim 1, wherein said support has spring means mounted thereon, coupled under tension to said one handle, and tending to hold said one handle in engagement with said post.

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