Jan. 13, 1959 H. P. DUPRE ET AL 2,868,051

HOT STICK TOOL WITH EXTENSION HANDLES

Filed Jan. 24, 1956 2 Sheets-Sheet 1

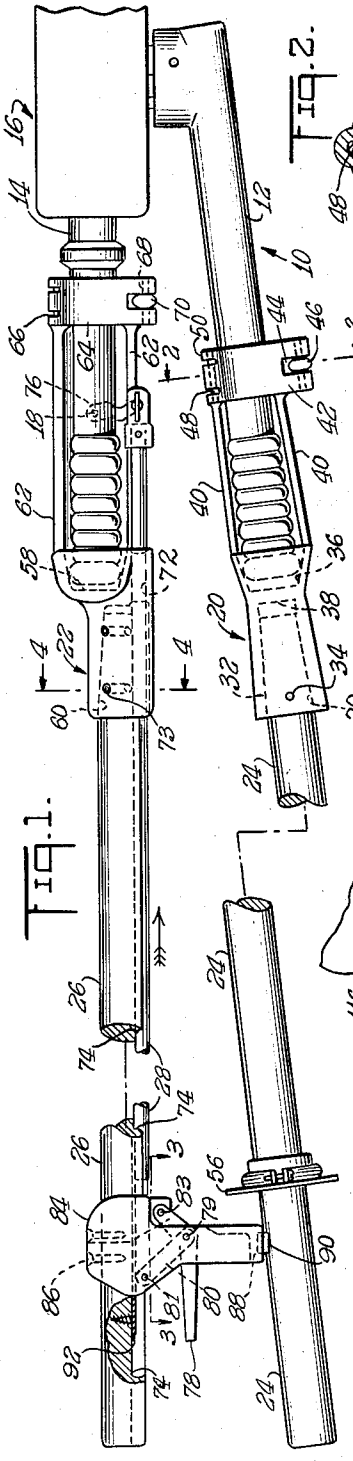

Fig. 1.

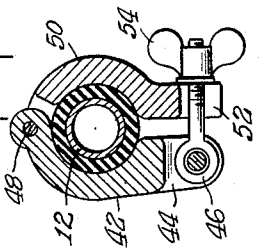

Fig. 2.

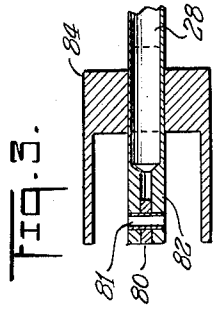

Fig. 3.

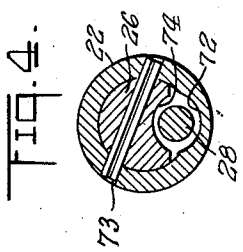

Fig. 4.

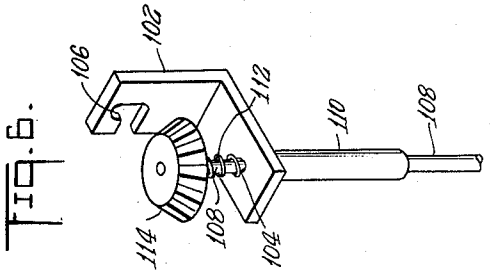

Fig. 6.

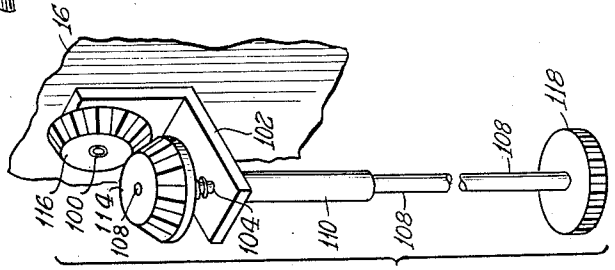

Fig. 5.

Henry P. Dupre
Walter Reischer
Richard G. Wallenhorst
INVENTORS

BY Harry Ernest Rubens

ATTORNEY

Jan. 13, 1959 H. P. DUPRE ET AL 2,868,051

HOT STICK TOOL WITH EXTENSION HANDLES

Filed Jan. 24, 1956 2 Sheets-Sheet 2

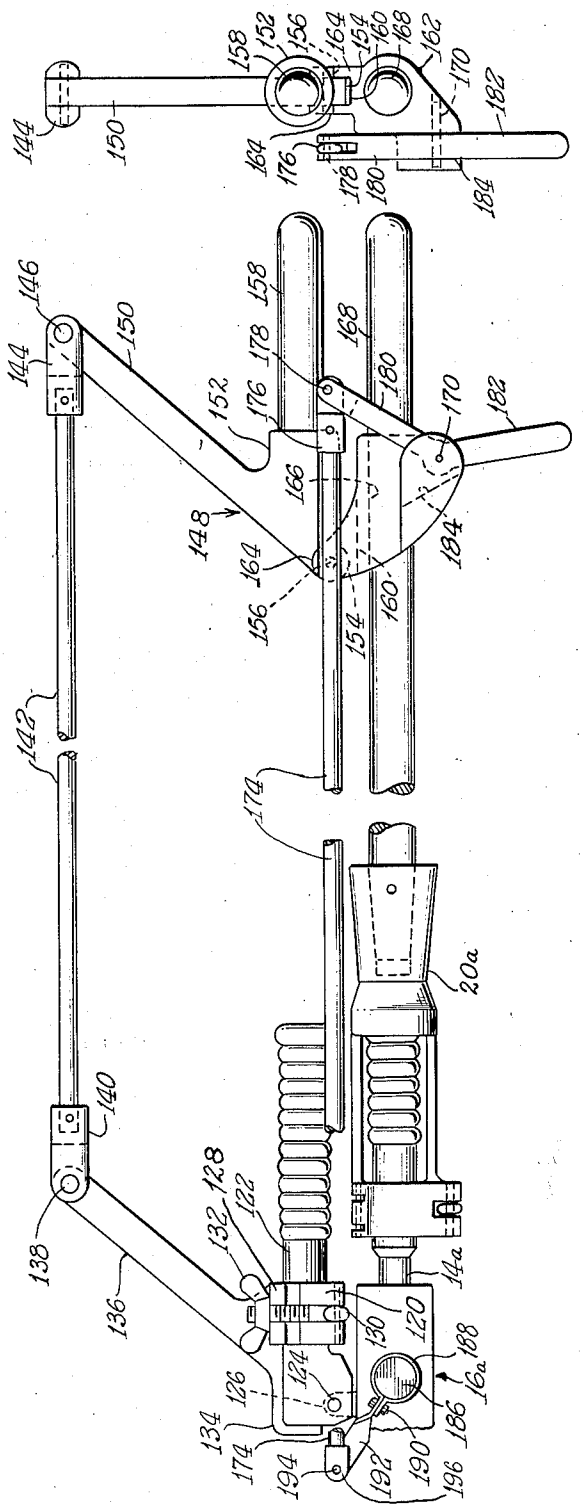

Fig. 8.

Fig. 7.

Henry P. Dupre
Walter Reischer
Richard G. Wallenhorst
INVENTORS.

BY Harry Ernest Rubens

ATTORNEY

United States Patent Office

2,868,051

Patented Jan. 13, 1959

2,868,051

HOT STICK TOOL WITH EXTENSION HANDLES

Henry P. Dupre, Wilton, and Walter Reischer and Richard G. Wallenhorst, Norwalk, Conn., assignors to Burndy Corporation, a corporation of New York

Application January 24, 1956, Serial No. 561,043

11 Claims. (Cl. 81—15)

Our invention relates to a tool having auxiliary extension handles and controls.

In the installation of electrical connectors to power cables, for example, it is unsafe in many cases for the operator to come close to the cable. Sometimes the place of installation is difficult to reach.

The principal object of our invention is to provide a multistroke lever operated tool of the ratchet or hydraulic type having a release mechanism, adapted to permit safe operation in inaccessible or hazardous locations.

Still other objects are to provide such a tool with handle extensions which are simple to apply and remove; that are insulated from the tool body to provide additional protection from electric shock; that are protected against moisture collecting pockets; that employs nested controls to provide a compact structure; and to provide a construction which is relatively inexpensive to manufacture and simple to assemble.

We accomplish these and other objects and obtain our new results as will be apparent from the device described in the following specification, particularly pointed out in the claims, and illustrated in the accompanying drawing, in which:

Fig. 1 is a side elevation of my hot stick tool.

Fig. 2 is a sectional view taken in the plane 2—2 of Fig. 1.

Fig. 3 is a sectional view taken in the plane 3—3 of Fig. 1.

Fig. 4 is a sectional view taken in the plane 4—4 of Fig. 1.

Fig. 5 is a perspective view of a modified form of release valve and control.

Fig. 6 is a perspective view of the supporting bracket and parts for the same.

Fig. 7 is a fragmentary side elevation of a modified form of hot stick tool.

Fig. 8 is an end view of the handle construction thereof

The hot stick tool **10** of our invention comprises the lever arm **12** and stationary arm **14** connected to a hydraulic press **16**, such as is illustrated in Patent 2,254,613. The press is provided with a release trigger **18** which operates to release a hydraulic valve, not shown, to relieve the hydraulic pressure at the end of the press operation, permitting the jaws to be opened. A mechanical ratchet operated multistroke tool may be used, if desired, in place of the hydraulic tool.

The tool **10** includes the cup-ended bodies **20** and **22**, which are cupped over level arm **12** and stationary arm **14** to which they are secured respectively, and into the opposite ends of which the extension handles **24** and **26** are inserted. A control rod **28** slidably operates through body **22** to operate the release trigger **18**.

Specifically, the body **20** is provided with a tapered recess **30** into which the tapered end **32** of handle **24** is inserted and attached, as for example, by pin **34**. The body **20** is also provided with a tapered recess **36** for receiving the lever arm **12**. These recesses are tapered to receive, with a snug fit, arms of various presses which may

be slightly different in diameter, as well as to compensate for manufacturing tolerances of the arms of the presses and of the extension handles. The two recesses are separated by a wall **38** to prevent moisture from collecting on the end of extension handle **24** and causing deterioration of its insulating qualities.

The cup-ended body **20** is additionally provided with an extension **40** terminating in a grooved clamp **42** for holding the lever arm **12** of the press to insure stability of the body. The clamp is slotted as at **44** for receiving the eye bolt **46**, and perforated for the hinge pin **48** of cap **50**. As is shown in Fig. 2, the clamp cap **50** is similarly grooved for encircling the lever arm, perforated for receiving the hinge pin **48**, and slotted at **52** to receive the shank of the bolt **46**. A wing nut **54** is secured to the bolt for applying the clamping pressure.

The extension handles **24** and **26**, and control rod **28**, are of hot stick quality insulating material. An insulating hand guard **56** is bolted to the extension handle to keep the operator from sliding his hand too close to the press when installing tap connectors on energized electric cables.

The cup-ended body **22** is constructed similarly as body **20**, being provided with the cupped recesses **58** and **60** for the press arm **14** and extension handle **26**, respectively; clamp extension **62**, cap **64**, clamp cap hinge pins **66** and **68**, and eye bolt **70**.

The cup-ended body **22** and extension handle **26** are provided with grooves **72** and **74**, respectively, as shown in Fig. 4, to permit the control rod **28** to nest therein. This provides a guide for the rod and makes the design more compact. Pin **73** is used to secure the handle to the body. The control rod is provided with a pivoting connecting link **76**, one end of which is secured to the release trigger **18**. The other end of the control rod is operated by the hand grip **78**, pivotally connected at **79** to toggle link **80**. The link is in turn pivotally mounted at **81** to a thimble **82** positioned at the end of control rod **28**, as is shown in detail in Fig. 3. The other end of the hand grip **78** is pivotally mounted at **83** to a supporting frame **84** encircling handle **26** and attachd thereto by screws **86**.

The bell crank shape of the hand grip permits the operator, while wearing heavy gloves, to slide a finger under the hand grip during operation of the extension handles. Compression of the hand grip towards the extension handle **26** will extend the control rod in a direction opposite from that of the arrow and actuate the release valve.

The frame **84** has a recess **88** into which is attached an oil resistant sponge rubber pad **90**. The handle **24** hits against this pad rather than against the frame to prevent damage to the handle.

A support for the ferrule **82** to prevent bowing of the control rod during the pressure stroke of the operating lever **78** is a guide plate **92**. The end of the ferrule and the end of the toggle link **80** bear on this guide plate. The plate fits into the bottom of the groove **74** in the handle **26** and is suitably mounted thereto.

One purpose of the handle frame construction is to prevent the supporting handle and the pumping handle from coming too close together. The advantages resulting from this are: (1) the operator cannot hit his knuckles together at the end of the final stroke; (2) a housing that protects against accidental damage to the operating lever, toggle link, and control rod ferrules; (3) a place to mount the operating lever and a guiding hole for the control rod; (4) protection against damage to the tool handles due to the increased mechanical advantage resulting from the effectively increased length of the tool handles, such as bending of the tool handles. The tool has a stop on the pumping lever and body to indicate the end of the stroke.

If sufficient force is applied to the lever after the stop is reached, it is possible to bend the lever. The high mechanical advantage of the handles, due to their length, could create this excessive force.

An alternate means for remote operation of the manual release valve is shown in Figs. 5 and 6. Over the valve release shaft **100** is hooked the right angle bracket **102** provided with an aperture **104** on one portion, and a hook slot **106** on the other, as shown in Fig. 6. The control rod **108** extends through a tubular extension **110** of the bracket, and through aperture **104**. Spring **112** and bevelled gear **114** are positioned thereover. A connecting bevelled gear **116** is secured to the end of release shaft **100**. The control rod **108** terminates adjacent the handle extension, not shown, in a covered knob **118**. The rod and knob are of insulating material, or suitably covered with insulation.

It is characteristic of the previously described handle construction that the longer the handles are made (for protection against higher voltages or for greater reach), the smaller the angle the press lever moves through during pumping, and the more strokes that are needed to reach blow-off pressure. The following type, illustrated in Figs. 7 and 8, permits blow-off at the same number of strokes for all handle lengths.

The press lever clamp **120** is attached to the press lever **122** near the pivot **124** of the lever on the press body bracket **126** extending from press **16***a*. The press lever cap **128** is hinged to the press lever clamp **120** and the two parts are locked together by a pivoted eye bolt **130** and captured wing nut **132**. The press lever clamp **120** has a finger **134** that prevents the clamp from sliding down the press lever during the pumping stroke. The location of the clamp cap **128** prevents the clamp from sliding up the lever during the return stroke. The clamp **120** has an arm **136** extending at an angle to the press lever **122**. The length of the arm **136** and the angle are dependent on the desired mechanical advantage. The arm is shown here at a 45° angle to the press lever because this is considered the most practical. At the end of the arm **136** is a pin **138** that pivotally connects the arm to the ferrule **140** on the end of the linkage bar **142**. The other end of the linkage bar has another ferrule **144** which is the same as ferrule **140**. The ferrule **144** is pivotally pinned at **146** to the pumping handle frame **148**.

The pumping handle frame **148** consists of arm **150**, socket **152**, and an elbow **154** for the pivot pin **156**. The arms **150** and **136** are the same length so that the linkage bar will clear the press lever arm at all times. The socket **152** receives a wooden insert, such as the pumping handle **158**, or it may be made with the handle an integral part of the pumping handle frame. The distance from the pivot pin **156** to the end of the handle **158** is the same as the distance from the pivot **124** to the end of the press lever arm. The angle between the handle arm **158** and the arm **150** is the same as the angle between the press lever and the arm **136**. These lengths and angles are used to keep the mechanical advantage the same as the mechanical advantage of the press. Variations of these lengths and angles can be made without departing from the spirit of this invention.

The elbow **154** fits in a slot **160** in the lever support casting **162**. The ears **164** have holes for the pivot pin **156**. The lever support casting also has a hole **166** for the supporting handle **168**, and a hole for the operating lever pivot pin **170**. The supporting handle **168** extends from cup-ended body **20***a* clamped to arm **14***a* of press **16***a*. Also the various wooden handles and sticks may be held in their holes in the metal parts by roll pinning, riveting, glueing, or by using wooden screws. The hole for pin **170** is the same distance from the supporting lever handle center line as the pivot **124** is from the tool center line. The control rod **174** terminates in ferrule **176** which is pivoted at **178** to the bell crank **180**, the remaining end **182** of which forms the lever for the control rod when pivoted at pin **170**, through slot **184** in the lever support casting **162**.

The release valve **186** is gripped by loop clamp **188**, the ends of which are secured by bolt **190**, and terminate in arm **192**, pivoted at pin **194** to the ferrule end **196** of the control rod **174**. This is an alternate form of clamp for a knob type of release valve. The clamp **188** may terminate in an apertured arm **192** suitable for engaging a hooked end of a control rod which will cause the valve mechanism to be rotated and operated thereby.

In each case, the handle carrying the control rod is always mounted to the press arm containing the release mechanism.

The apparatus thus described will permit the remote control of the compressioin tool located in a confined or hazardous space. The apparatus permits the tool to be operated in the ordinary manner. The apparatus is designed to permit attachment or removal of the extension parts in an easy and simple manner.

A toggle arrangement mounted on the supporting handle may be employed to linearly operate the release valve mechanism. The parallel pivoting link construction eliminates the need for increasing the number of strokes for increased handle length over that required for ordinary handle lengths. The parallel link construction provides increased length without loss of mechanical advantage.

We have thus described our invention, but we desire it understood that it is not confined to the particular forms or uses shown and described, the same being merely illustrative, and that the invention may be carried out in other ways without departing from the spirit of our invention, and, therefore, we claim broadly the right to employ all equivalent instrumentalities coming within the scope of the appended claims, and by means of which, objects of our invention are attained and new results accomplished, as it is obvious that the particular embodiments herein shown and described are only some of the many that can be employed to attain these objects and accomplish these results.

We claim:

1. A tool comprising a multistroke press having jaws and a pair of arms mounted to said tool, one moving with respect to the other to compress the jaws against each other, a release mechanism for releasing the jaws of the press from compression, a pair of handles each having free ends and connecting means to the arms of the press, said tool provided with a control rod having connecting means to the release mechanism and terminating at the free end of one of the handles whereby the press may be operated at a distance beyond the press arms.

2. The tool of claim 1, wherein the connecting means for said arms comprises cup-shaped members having tapered recesses for positioning over the ends of the arms, and clamping means extending from said cup-shaped members for clamping the cup-shaped members to the arms.

3. The tool of claim 1, wherein one of the handles is provided with a grooved portion through which the control rod is slidably mounted.

4. The tool of claim 1, wherein the attachment to the release mechanism is a clamp, said control rod being pivotally connected to said clamp whereby a sliding motion of the control rod will cause a rotation of said clamp.

5. The tool of claim 1, wherein the handles are connected to the tool arms through a plural-bar parallel linkage.

6. The tool of claim 1, wherein the release mechanism and control rod are provided with engaging bevelled gears, whereby the control rod may be rotated to operate the release mechanism.

7. The tool of claim 1, wherein one handle is provided with a frame fixed thereto having a resilient stop for limiting the movement of the other handle.

8. The tool of claim 1, wherein one of said pair of handles is provided with a frame fixed thereto providing a guide for the control rod.

9. The tool of claim 1, wherein the control rod is provided with a pivoting lever mounted on one of the handles.

10. The tool of claim 1, wherein one of the handles is provided with a frame through which the control rod is slightly mounted, a lever mounted to said frame and connected to the control rod by a link for operating the same.

11. The tool of claim 1, wherein one of the handles is provided with a frame, a bell crank mounted to said frame and connected to the control rod by a link for operating the same.

References Cited in the file of this patent

UNITED STATES PATENTS

2,032,309	Rechard et al.	Feb. 25, 1936
2,039,895	Green	May 5, 1936
2,057,201	McCluskey	Oct. 13, 1936
2,182,663	Eby et al.	Dec. 5, 1939
2,254,613	Matthysse	Sept. 2, 1941
2,538,006	Keppler	Jan. 16, 1951
2,556,663	Smalley	June 12, 1951