Dec. 31, 1929. H. W. BODENDIECK 1,741,970

INSULATING SAFETY TOOL FOR HANDLING LIVE WIRES, ETC

Filed Nov. 27, 1925

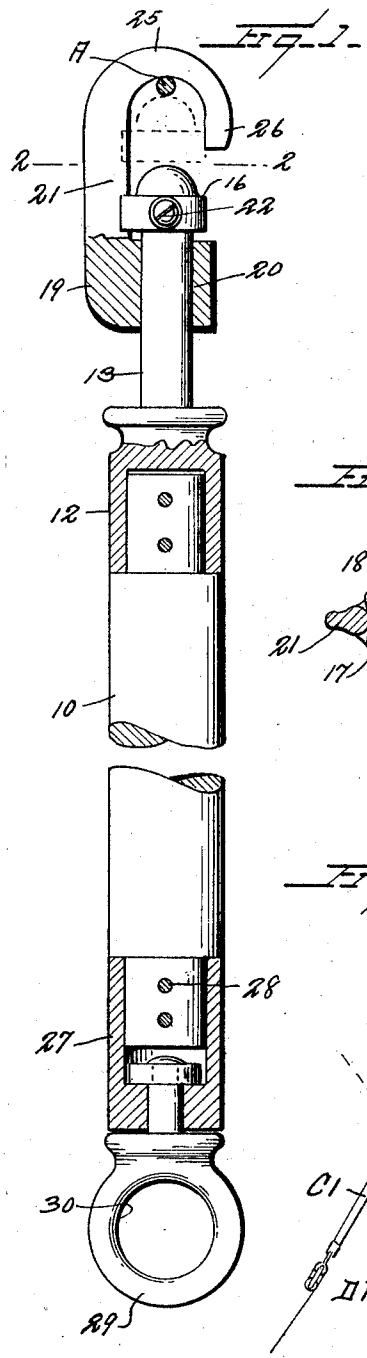


Fig. 1.

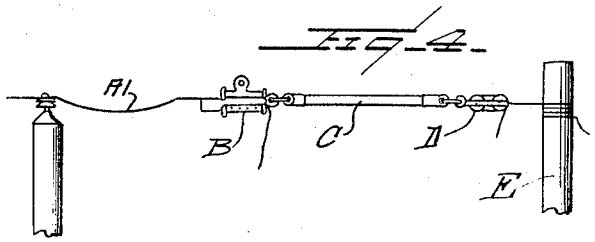


Fig. 4.

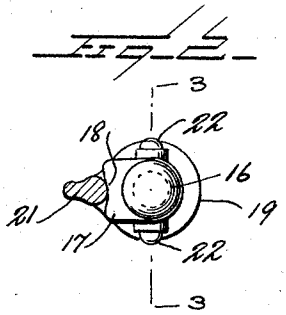


Fig. 2.

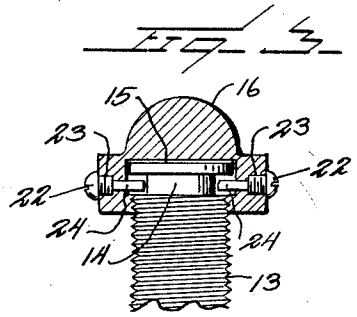


Fig. 3.

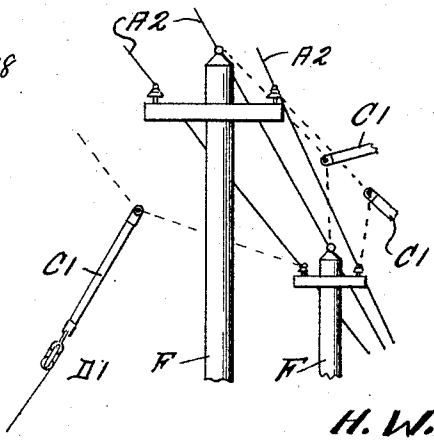


Fig. 5.

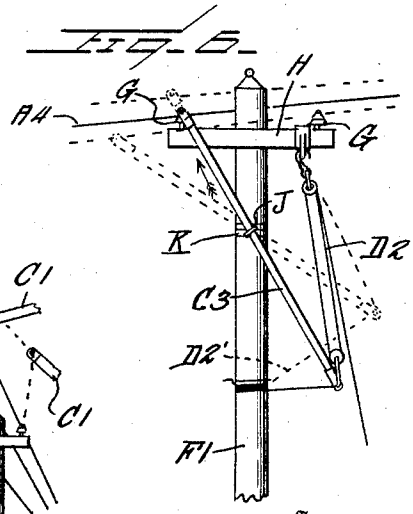


Fig. 6.

Inventor

H. W. Bodendieck

By Watson E. Coleman

Attorney

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UNITED STATES PATENT OFFICE

HENRY WILLIAM BODENDIECK, OF TAYLORVILLE, ILLINOIS, ASSIGNOR TO TIP'S TOOL COMPANY, INCORPORATED, OF TAYLORVILLE, ILLINOIS, A CORPORATION OF ILLINOIS

INSULATING SAFETY TOOL FOR HANDLING LIVE WIRES, ETC.

Application filed November 27, 1925. Serial No. 71,707.

The invention relates to improvements in safety tools for handling live wires carrying heavy electric voltages, say from 33000 volts upward, of the class which, by means of an insulating staff of sufficient length permits the operator to occupy a safe position relative to live wires or appurtenances which are being manipulated, or operated upon.

The purposes of the invention are to provide in conjunction with a sufficiently long and sufficiently insulated staff, a metal head having an integral screw of improved construction; to provide a hook member of improved form adapted to co-act with a movable non-rotative wire-gripping member actuated by the screw and engaging the hook member to prevent rotation of the wire-gripping member; to provide a metal cup surrounding and protecting the lower end of the staff and to provide a substantial eye swiveled on said cup and adapted to receive means for pushing, or pulling, or otherwise manipulating, the insulating tool; to provide improved means for choking the throat of the hook, and thereby preventing the live wire from slipping out of the hook; to provide simple and effective means to prevent kinking or bending of the live wire which is being operated upon; to provide means to prevent grinding on or abrasion of the live wire; to provide an insulated convertible structure, changeable easily and quickly to form the device commonly known as a "link stick," or to form the device commonly known as a "wire tong," the single convertible instrument being both capable of performing every function of the link stick and the wire tong; and in general, to provide a sturdy and dependable instrument, useful in a great variety of ways, and effective and safe in every way; and which may be produced at relatively small first cost.

The invention is illustrated in the accompanying drawing to which reference is hereby made and in which similar reference numerals designate similar parts in the several views.

Figure 1 is in the main, a vertical section taken on the axis of a tool embodying my invention, but for convenience, some of the parts are shown in elevation; Fig. 2 is an enlarged horizontal section taken on the line 2—2 of Fig. 1; Fig. 3 is an enlarged horizontal section taken on the line 3—3 of Fig. 1; Fig. 4 is a diagram showing one of my improved insulating tools used as a link in conjunction with a wedge wire-gripper of usual form, to operate as a safe "come-along."

Figure 5 is a diagram showing a number of my improved tools used as links to pull away from each other all the live wires taken from a pole, to allow safe clearance for removing the pole and substituting another; and Fig. 6 is a diagram showing a number of my improved insulating tools used as tongs or clamps for pushing live wires into desired positions relative to the pole, and holding them there, for safe clearance during the operation of putting on or removing insulators or other appliances.

I will describe first the mechanical structure of my improved insulating tool, and will then point out some of its practical advantages and some of the various ways in which it may be used and will then recite, in the following claims, the new and useful features of my invention.

The staff 10 is preferably of wood treated in any approved manner to exclude moisture and improve the insulating quality of the staff, but any other suitable insulating material may be used, without departing from my invention. The staff may be of any suitable length or size sufficient for handling any conductor or apparatus carrying very heavy voltage and may be used in changing insulators, cross arms, poles and towers, and may be used to pull, push or hold live wires, and apparatus of various kinds at dangerous voltage, and may be used as insulation, between the operator and live wires, heavily charged apparatus tackle, etc.; it may also be used as an element of a jenny for lifting and moving heavy articles, as will be described later.

A combined metal screw-block and socket 12 is secured at one end of the staff. An upwardly extending master-screw 13 is integral with the block 12. The screw 13 has a flat upper end 15 and a circumferential groove

14. A metal cup-shape gripper 16 surrounds the grooved part of the screw loosely, so that the screw is free to rotate in the cup of the gripper in order that the gripper may be advanced and retracted without rotating as will be described later.

The gripper 16 (Figs. 2 and 3) has an integral lateral extension 17 which has a vertical groove 18 at its free end.

The hook-body 19 has a lengthwise bore 20 having screw threads to match the threads of the master screw 13 and has also an upright guide member 21 shaped to fit loosely in the groove 18 in the extension 17, to permit the extension to slide freely on the upright member. Screws 22 are inserted in holes 23 opposite to each other and have studs 24 which enter the circumferential groove 14 near the upper end of the master screw 13. From the foregoing description it will be seen that the upright member 21 will permit free sliding of the gripper 16, but will prevent it from rotating, and that the gripper 16 being non-rotative the rotating master screw will act to push the gripper upward, or pull it downward, according to the direction of rotation of the staff 10. The arched hook-member 25 extends over the gripper and is supported on the live wire A, which is to be manipulated. The hook member has a downwardly extending terminal 26. The transverse distance between the inner edge of the upright guide 21 and the inner edge of the terminal 26 permits the gripper to slide freely between them. The under surface of the hook 25 and the upper surface of the gripper are rounded as shown and the wire A is held between them. The rounded surface of the gripper 16, as herein disclosed, is substantially semi-spherical and in referring to the rounded surface of the hook 25 it is to be understood that this is in a transverse direction. The gripper has only a sliding movement, hence the rotating of the master-screw 13 cannot cause any grinding or abrasive action of the gripper on the wire, or other article. The rounded surfaces of the hook and the gripper in contact with the wire permit oscillation of the tool, when used as a tong or clamp, in the direction of the length of the wire to bring the tool into the position most convenient for use, without risk of bending or kinking the wire.

In order to remove the link it is only necessary to rotate the staff to cause the retracting of the gripper from the hook, and remove the screws 22, and then hold the gripper between the fingers and rotate the staff to retract the master-screw from the gripper. To replace the gripper the operation just described will be reversed.

When the gripper is in place the appliance will be in condition for advantageous use as a tong or clamp and when the gripper is removed the appliance will be in condition for use as a link or pulling device to pull on live wires.

In the latter case the staff will be rotated to cause the upper part of the master-screw to advance to a limited extent, into the space between the inner edge of the guide 21 and the inner edge of the terminal 26; thus closing the opening and leaving clear space between the upper end of the screw and under surface of the hook to permit free movement of the implement in the direction of the length of the live wire, when the implement is being used as a pusher, without any risk of the wire slipping out of the hook. When the hook has been placed in the desired position the master screw may be similarly advanced further into the hook to grip the wire firmly to prevent accidental slipping of the hook on the wire.

The outer surface of the screw block or socket 12 surrounding the master-screw 13 provides an abutment or shoulder for contact with the inner adjacent end of the hook body 19 so that the relative movement of the screw 13 and body 19 is limited by such contact. The length of the screw 13 is such to assure the outer flat end 15 of the screw 13 being positioned substantially at the free extremity of the terminal 26 and substantially closing the space between said terminal 26 and the member 21 of the body 19 when the abutment or shoulder referred to is in contact with the inner adjacent end of the body 19. This is of particular importance as it assures the desired free engagement of the hook member 25, with the wire A when the tool is being used as a link, and also during such use eliminates the liability of the tool having clamping or binding engagement with the wire.

A cup-shape ferrule 27, surrounds the lower terminal part of the staff and is secured by rivets 28. An eye 29 has a swivel connection with the ferrule 27 and has a relatively large opening 30 to receive a stake or similar appliance to prevent lengthwise movement of the link, or to receive a pole or staff extending through the eye to admit of two or more persons to pull on the staff to straighten a wire, or to pull on an article supported on the wire.

Referring to Figs. 4, 5 and 6 in succession, some common modes of using insulated safety links will now be described:

Fig. 4 shows a broken wire A^1 gripped by a wedge wire-puller B of usual construction. The insulating link C is connected with the wire puller B and with the block and tackle D, which is connected with any suitable stationary object E. The link insulates the block and tackle from the wire A^1 and the puller B, so that the user may safely operate the tackle, and so that the parts D, C, and B cooperate as a very effective "come-along" to stretch the wire.

Fig. 5 shows two poles F, three live wires

A^2 disconnected from one pole and held widely separated from each other by the respective insulating links C^1, operated from a safe distance by tackle D^1. When the wires are all disconnected and held at safe distance, the front pole F may be removed with safety and another pole may be set in its place.

Fig. 6 shows a pole F^1 a live wire A^4, disconnected from an insulator G, on a cross-arm H; an insulating link C^3 of suitable length, fulcrumed and slidable, in a D-shape ring J, connected with the pole F^1 by a suitable strap K. The upper end of the insulating link is engaged with the wire A^4. Tackle gear D^2 connects the lower end of the link C^3 with the cross arm H, or may, optionally, connect it with the pole F^1, as indicated by dotted lines $D^{2\prime}$.

It is obvious that upon proper adjustment and use of the tackle D^2, or $D^{2\prime}$, as the case may be, the link C^3 may be used as a lever to lift the wire A^4 off the insulator G; or may be used as a pusher to push the wire A^4, to a safe distance from the pole.

Other and different uses, which will readily occur to skilled users, need not be detailed here.

Having fully described my invention what I claim as new and desire to secure by Letters Patent is:

1. A tool of the class described comprising an elongated member, a screw carried by said member and projecting therebeyond, a body, said screw being threaded through a portion of said body, said body having a hook member extending across the outer end of the screw, a gripper, means for detachably connecting the gripper to the outer end portion of the screw for coaction with the hook member, said gripper moving up within the hook member upon rotation of the screw in one direction for clamping coaction therewith, the outer end of the screw when the gripper is removed serving to substantially close the hook member to permit said hook member to be used as a link, the connection between the gripper and the screw being swiveled, and means carried by the gripper and coacting with the body for holding said gripper against rotation with the screw.

2. A tool of the class described comprising an elongated member, a screw carried by said member and projecting therebeyond, a body, said screw being threaded through a portion of said body, said body having a hook member extending across the outer end of the screw, a gripper, means for detachably connecting the gripper to the outer end portion of the screw for coaction with the hook member, said gripper moving up within the hook member upon rotation of the screw in one direction for clamping coaction therewith, the outer end of the screw when the gripper is removed serving to substantially close the hook member to permit said hook member to be used as a link, the connection between the gripper and the screw being swiveled, and means carried by the gripper and coacting with the body for holding said gripper against rotation with the screw, the outer surface of the gripper being parti-spherical, the surface of the hook member opposed to the applied gripper being transversely rounded.

3. A tool of the class described comprising an elongated member, a screw carried by said member and projecting therebeyond, a body, said screw being threaded through a portion of said body, said body having a hook member extending across the outer end of the screw, a gripper, means for detachably connecting the gripper to the outer end portion of the screw for coaction with the hook member, said gripper moving up within the hook member upon rotation of the screw in one direction for clamping coaction therewith, the outer end of the screw when the gripper is removed serving to substantially close the hook member to permit said hook member to be used as a link, the connection between the gripper and the screw being swiveled, and means carried by the gripper and coacting with the body for holding said gripper against rotation with the screw, the portion of the member surrounding the screw providing an abutment for contact with the body to limit the relative movement of the screw and the body one toward the other.

In witness whereof I have signed this specification at Springfield, Illinois, this 13th day of November, 1925.

HENRY WILLIAM BODENDIECK.