

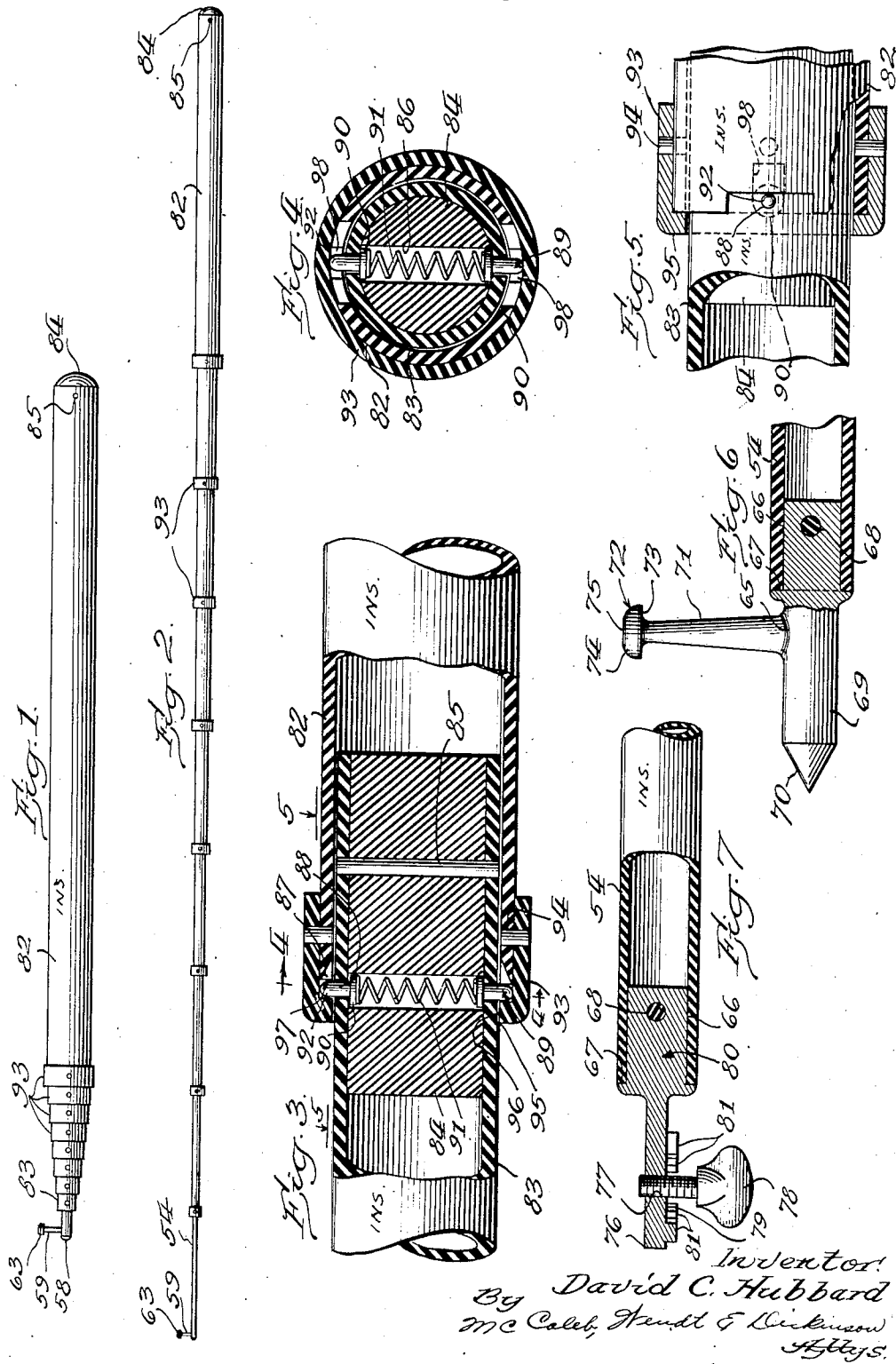
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OPERATING TOOL FOR HIGH TENSION ELECTRIC LINES

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OPERATING TOOL FOR HIGH TENSION
ELECTRIC LINES

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The present invention relates to operating tools for high tension electric lines, and is particularly concerned with telescoping insulating sticks adapted to be used for supporting disconnects and various other types of tools or for use in measuring distances.

This application is a division of my prior application on Operating tools for high tension electric lines, filed August 13, 1941, Serial No. 406,665.

One of the objects of the invention is the provision of an improved telescoping disconnect stick which is adapted to be used for handling blade disconnects or fused cutouts of any style, and which is of light weight and collapsible, to be packed in a very limited space.

Another object of the invention is the provision of an improved telescoping insulating stick of the class described, which has a high mechanical and dielectric strength, a low moisture absorption, and which is adequately insulated so that it may be used on high tension circuits.

Another object of the invention is the provision of an improved telescoping insulating stick having an improved latching arrangement, all of the exposed parts of which may be made of insulating materials, and by means of which any or all of the sections may be latched in the extended position.

Another object of the invention is the provision of an improved telescoping insulating stick which is provided with an improved structure for preventing rotative motion between the various sections of the stick so that it may be used for exerting a relatively strong torque.

Another object of the invention is the provision of improved forms of latching mechanism for telescoping disconnect sticks or tools by means of which the sections may be secured in extended position or they may be collapsed at will.

Another object of the invention is the provision of an improved telescoping insulating stick adapted to be used for measuring the height or spacing of conductors.

Another object of the invention is the provision of an improved telescoping insulating stick adapted to be used with a universal head so that it is available for connection to a multiplicity of different types of tools and which is also provided with automatic latching means for latching the sections in extended position.

Other objects of the invention will be apparent from the following description and the accompanying drawing, in which similar characters of

reference indicate similar parts throughout the several views.

Referring to the single sheet of drawings,

Fig. 1 is an elevational view of a telescoping insulating stick constructed according to the invention embodied in a disconnect stick, with its parts in collapsed position;

Fig. 2 is a similar view of the same disconnect stick with the sections fully extended;

Fig. 3 is a fragmentary sectional view taken on a plane passing through the axis of the stick and through the axes of the latches showing the details of construction;

Fig. 4 is a transverse sectional view taken on the plane of the line 4—4 of Fig. 3 looking in the direction of the arrows;

Fig. 5 is a fragmentary elevational view in partial section showing the details of construction of the joints between sections of the stick and arrangements for preventing relative rotation;

Fig. 6 is a fragmentary elevational view in partial section showing another type of tool which may be carried by the end of the stick; and

Fig. 7 is a view similar to Fig. 6 of another type of fitting to be carried by the end of the stick, this being a universal fitting for attachment to various types of tools at various angles.

Referring to Figs. 1 and 2, these are elevational views of an operating tool embodying the invention which may be embodied either in a measuring stick or a stick for supporting various tools. The stick itself is made up of a plurality of telescoping tubes arranged in a series and adapted to be telescoped into each other to collapse the stick into a minimum length.

The tubes may be made of a canvas-base laminated plastic tubing having a low rate of moisture absorption and a high mechanical strength. In some embodiments of the invention the tubing may comprise tubes of an indurated fiber. All parts of the stick are preferably made of insulating material, there being no metal used except the metal fitting at the end where such a fitting is employed and the metal springs which are used in the latches.

For example, such a measuring stick, including nine sections, each of which extends to about three feet, makes a 27 ft. insulating rod for measuring conductor heights. The sections can be provided with foot and inch markings, printed or painted on the sections, but the tubes are preferably not weakened by any marking grooves, since that would have an undesirable weakening effect on the stick when extended.

Such a measuring stick will readily indicate the length by the extension of a predetermined number of its sections and the distance between the end of a multiplicity of extended sections and the conductor to be measured, can readily be determined by the use of a rule, and added to the extended length of the stick.

The endmost section 82 is preferably made longer and larger than the other sections, but its length is also definite so that from the end of the plug 84 to the end of the collar 93 of this section the distance is either three or six feet. Each of the successive sections of the series is of such size that it is slidably received in the tube of the next larger size adjacent to it so that the sections will all slide or telescope into each other to form a collapsed structure such as shown in Fig. 1.

The endmost section 82 may be closed by means of a wooden or other insulating plug having a shank which fits in the bore of the tube 82 and a half round knob which terminates flush with the outside of the tube 82. An insulating pin 85 secures the plug 84 in place. Both the pin 85 and the plug 84 may also be cemented in place.

As all of the joints and latching mechanisms are similar, only one need be described in detail. In Fig. 3, 82 indicates the end of the larger of the sections, and 83 indicates the adjacent end of the smaller of the sections.

The tube 83 (Fig. 3) is closed at its right end by a similar wooden plug 84 having a tight frictional fit in the end of the tube 83, and also secured by means of a transverse insulating pin 85. Both the pin 85 and plug 84 may be cemented in place.

At a point spaced from the end of the tube 83, the plug 84 is provided with a transverse cylindrical bore 86, and the tube 83 is provided with a smaller counterbore 87. The counterbore 87 is adapted to receive the cylindrical body 88 of a latching button 89. A circular head 90 on the latching button 89 is received in the bore 86, and the head limits the outward movement of the button.

A helical compression spring 91 is located in the bore 86 and engages the heads 91 of two of the buttons 89, to urge them outward. Each button 89 preferably has the end of its body 88 provided with a rounded, tapered, or partially spherical surface, 92, to aid in bringing about the retraction of the button by camming action.

The larger tube 82 is provided on its end, surrounding the tube 83, with a cylindrical ferrule 93 of the same insulating material, having a tight frictional fit about the tube 82 and secured in place by cement and by means of a plurality of through pins 94 of insulation.

The ferrule 93 has a radially inwardly extending annular flange 95, which is provided with a circular aperture 96 for slidably receiving the tube 83.

The flange 95 is spaced from the end surface 97 of the tube 82 sufficiently to provide space for the latching button or pin 89.

At two diametrically opposite points the insulating tube 83 is provided with the tapered slots 98, adapted to engage the rounded end 92 of the latching button 89 and to cam the button inward when the buttons are in registry with the slots 98 and the two sections are pushed toward each other in such manner as to telescope the section 83 into section 82.

In some embodiments of the invention the space

between the end 97 and flange 95 may be an annular groove so that the sections are not secured against rotation relative to each other, but are secured against collapse when each latching button 89 is rotated away from its release chute 98.

In other embodiments of the invention the inner tube 82 may have axially extending shoulders in the annular groove which receives the latching button 89, the annular shoulders engaging the button to prevent relative rotation between the sections. In such case the sections can be used to exert a torsion or a twist on a tool, as well as a pull or push.

The insulating plugs and pins which are used may be made of any suitable electrical insulating material such as a molded phenolic condensation compound or indurated fiber as well as wood, and the same is true of the sleeves, collars, and latches.

As previously stated, any number of sections may be employed. The endmost section 21 may have the open end of its tube 54 closed by an insulating plug 55 of wood or other suitable insulating material, such as fiber, or a molded phenolic condensation compound, such as "Bakelite."

This insulating plug has a cylindrical portion which fits inside the tube 54, and has an annular shoulder engaging the end of the tube. The outer end 58 of the plug may be partially spherical, and the plug has a frictional fit in the tube 54. It is, however, preferably secured in place by means of the disconnect pin 59, which passes through the through-bores in the tube 54 and plug 58. The disconnect pin 59 comprises a substantially cylindrical pin, provided with a cylindrical head 63 carried by the cylindrical shank. The pin is preferably canvas base phenolic material.

The head 61 may be chamfered, giving it a tapered outermost portion, which is more easily inserted into an aperture of a cover or a disconnect. The shank is secured in the bore by means of a transverse pin which may be of insulating fiber or metal, and the transverse pin has a tight frictional fit in the disconnect pin 59, in the wooden plug 58 and the tube 54.

Referring to Fig. 6, this is a fragmentary elevational view in partial section of another form of head for the end of the tool. In this case the end assembly comprises a metal member 65, having a cylindrical portion 66 fitting in the end of the tube 54, and having an annular shoulder 67 engaging the end.

The cylindrical portion 66 is secured in place by a transverse headless rivet 68, which passes through the cylindrical portion 66 and tube 54. The fitting 65 has a cylindrical shank 69 provided with a conically pointed end portion 73.

The cylindrical shank 70 has a transversely extending arm 71 at right angles to the shank 69, and preferably of smaller size, and the arm 71 may be tapered toward its outer end portion, where it is provided with a circular head 72. The circular head has an abrupt shoulder 73 on its inner side, and it is tapered around it at 74, near its outer face 75.

The tapered or rounded surface 74 is adapted to facilitate the entry of the head 72 into a hole in a cover or disconnect. The abrupt shoulder 73 is adapted to retain the arm 71 in such a hole.

The axially extending shank 69 in combination with the transverse arm 71 is useful in pushing members connected with a transmission line, and the tapered or conical point 70 serves to permit

the shank 69 to be inserted in apertures more readily.

In addition to the tight frictional fit between the closure plugs, rivet pins, interlocking sleeves, and tubes, these members may be cemented in place wherever they are supposed to be fixedly secured to another member.

It should be understood that wherever a tight frictional fit is specified for fixed securement, cement may also be employed, and the cement is preferably of an insulating character.

Referring to Fig. 7, this is a view similar to Fig. 6, showing a universal head for use on the insulating stick of Fig. 1 or Fig. 2. This universal head is of the type having a securing shank 66 of cylindrical shape adapted to fit in a tube 54, and with an annular shoulder 67 so that it is secured to the stick in the same manner as shown in Fig. 6.

The universal head has a substantially circular flange 76 carried by the shank 66, and having a centrally located threaded through aperture 77 for receiving the wing nut 78. The face 79 of the universal head 80 toward the head of the bolt 78 is provided with a plurality of regularly spaced lugs 81 arranged in a circle and separated by slots of the same width as the lugs 81. Thus this universal head is adapted to be attached to any of a multiplicity of tools, with the tool at various angles, the tool having a circular flange similar to the flange 76, except that it has a slot instead of an aperture 77.

The wing nut 78 and lugs 81 serve to secure the tool in any of a plurality of angular positions.

Among the tools which may be used on the end of a stick provided with such a universal head are clamp stick heads, wrenches, wire tong heads, tie stick heads, fork heads, ratchet wrench heads, cotter key remover and replacer, cotter key puller, locating pins, chuck blanks, fuse pullers, screw drivers, insulation knife, paint brushes, insulator brushes, folding rules, bolt headers, ball socket adjusters, mirrors, hack saws, pruning saws, etc.

The operation of the operating tool as a measuring stick is as follows:

The largest section of the tube is of definite length from its extreme end to the farthest end of the collar 93 which it carries and this length is known by the operator to be three or six feet or some other predetermined length. The length of the additional sections is such that when they are in extended position they each add a predetermined length to the stick, such as three feet, or some other known distance.

Thus, those sections of the stick which are collapsed are not to be used but when they are extended, it is only necessary to count the number of extended sections and to multiply and add to the length of the large or housing section to determine the length of the extended stick. The accurate measurement is then secured by using a ruler at one end of the stick to determine the number of inches.

In order to extend the stick, it is only necessary to pull on the appropriate collar 93 of a smaller section and to grasp hold of and pull on the larger section 82. The latches 83 will then spring out into the annular groove between the collar 93 and the end of each section and prevent further extension of the sections beyond the desired position. Collapse of the sections can then be prevented by twisting all of the sections in such manner that the pins 92 do not register with the beveled slots 87.

If it is desired to use the pole to apply rotative

force, the telescoping sections will, of course, be turned in the opposite direction to that in which the handle is to be twisted when the pole is to be used. This will take up all of the clearance between the latching plungers 92 and the slots in the ends of the tubes in which they are received.

When it is desired to collapse the stick, it is only necessary to rotate any section to be collapsed until its plunger 92 registers with the tapered slot 87 and a push on the smaller tube will cause it to telescope into the larger while the camming surface 87 causes the plunger 92 to be retracted against the spring 91.

It will thus be observed that I have invented a telescoping tool for use on live transmission lines, which is adapted to be collapsed to a minimum length or extended to provide an insulating pole for tools of various types. All of the exposed parts of the telescoping stick or pole are made of insulating material, and the stick is adapted to have a high insulating value. It has a high mechanical strength and may be used with various types of tools for transmitting torsion, push, or pull, or combinations of these forces upon the tool and the devices on which the tool works.

I have found that the mechanical strength of the stick is high enough to use on hot wire clamps of all kinds and on various types of tools customarily employed on the end of a wooden or other insulating stick.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. An extensible tool for transmission lines, comprising a pair of telescoping sections of tubular insulating material, the smaller of said sections being adapted to slide into the larger of said sections, and a latching mechanism between said smaller and larger sections, comprising a guide carried by said smaller section, resilient means in said guide, a latching member slidably mounted in an aperture of said smaller section and engaged by said resilient means, and oppositely located shoulders on said larger section for engaging said latching member, said oppositely located shoulders comprising an end portion of said larger tubular member and an inwardly extending flange carried by a ferrule fixedly secured to said larger tubular member.

2. An extensible tool for transmission lines, comprising a pair of telescoping sections of tubular insulating material, the smaller of said sections being adapted to slide into the larger of said sections, and a latching mechanism between said smaller and larger sections, comprising a guide carried by said smaller section, resilient means in said guide, a latching member slidably mounted in an aperture of said smaller section and engaged by said resilient means, and oppositely located shoulders on said larger section for engaging said latching member, said oppositely located shoulders comprising an end portion of said larger tubular member and an inwardly extending flange carried by a ferrule fixedly secured to said larger tubular member, said larger tubular member having a tapered slot leading from its end toward its inner surface whereby

the latching member may be cammed inward by the telescoping movement of said sections when the latching member is in registry with said tapered slot.

3. In a telescoping electrical tool, the combination of a telescoping stick, comprising a plurality of insulating tubular sections of successively smaller size, each smaller section sliding into the next larger section, with an electrical tool carried by one end of said telescoping stick, latching means operating between said sections for securing said sections in extended position, means for preventing relative rotation between said sections when the sections are in extended position, and means carried by one of said sections and acting on said latching means for effecting a retraction of the latching means upon predetermined movement of one section relative to the other.

4. In a telescoping electrical tool, the combination of a telescoping stick, comprising a plurality of insulating tubular sections of successively smaller size, each smaller section sliding into the next larger section, with a universal fitting having an attaching flange and a threaded member for securement to various tools carried by said telescoping stick, latching means operating between said sections for securing said sections in extended position, means for preventing relative rotation between said sections when the sections are in extended position, and means carried by one of said sections and acting on said latching means for effecting a retraction of the latching means upon predetermined movement of one section relative to the other.

5. In a measuring stick for use on high tension lines, the combination of a plurality of tubular sections of electrically insulating material arranged in a series, each of said sections having an outer diameter of such size that it slidably fits in the next adjacent larger section, and a collar carried by each of the larger sections, said collars having an inwardly extending flange engaging the next smaller section and insulating latch means carried by the smaller sections and adapted to be engaged between the flange of said collars and the end of each larger section.

6. In a measuring stick for use on high tension lines, the combination of a plurality of tubular sections of electrically insulating material arranged in a series, each of said sections having an outer diameter of such size that it slidably fits in the next adjacent larger section, and a collar carried by each of the larger sections, said collars having an inwardly extending flange engaging the next smaller section and insulating latch means carried by the smaller sections and adapted to be engaged between the flange of said collars and the end of each larger section, and an insulating plug for enclosing each of the end sections.

7. In a measuring stick for use on high tension lines, the combination of a plurality of tubular sections of electrically insulating material arranged in a series, each of said sections having an outer diameter of such size that it slidably fits in the next adjacent larger section,

and a collar carried by each of the larger sections, said collars having an inwardly extending flange engaging the next smaller section and insulating latch means carried by the smaller sections and adapted to be engaged between the flange of said collars and the end of each larger section, and an insulating plug for enclosing each of the end sections, one of said plugs being provided with a transverse outwardly projecting pin adapted to be used as a disconnect.

8. In a measuring stick for use on high tension lines, the combination of a plurality of tubular sections of electrically insulating material arranged in a series, each of said sections having an outer diameter of such size that it slidably fits in the next adjacent larger section, and a collar carried by each of the larger sections, said collars having an inwardly extending flange engaging the next smaller section and insulating latch means carried by the smaller sections and adapted to be engaged between the flange of said collars and the end of each larger section, and an insulating plug for enclosing each of the end sections, one of said plugs being provided with a notched disc having a threaded member threaded into said disc for engagement with a similar disc in securing tools in any of a plurality of different angular positions.

9. In a measuring stick for use on high tension lines, the combination of a plurality of tubular sections of electrically insulating material arranged in a series, each of said sections having an outer diameter of such size that it slidably fits in the next adjacent larger section, and a collar carried by each of the larger sections, said collars having an inwardly extending flange engaging the next smaller section and insulating latch means carried by the smaller sections and adapted to be engaged between the flange of said collars and the end of each larger section, and an insulating plug for enclosing each of the end sections, said sections also having plugs located in the smaller of two engaging sections, said plugs having transverse bores for housing said latching means.

10. In a measuring stick for use on high tension lines, the combination of a plurality of tubular sections of electrically insulating material arranged in a series, each of said sections having an outer diameter of such size that it slidably fits in the next adjacent larger section, and a collar carried by each of the larger sections, said collars having an inwardly extending flange engaging the next smaller section and insulating latch means carried by the smaller sections and adapted to be engaged between the flange of said collars and the end of each larger section, and an insulating plug for enclosing each of the end sections, said sections also having plugs located in the smaller of two engaging sections, said plugs having transverse bores for housing said latching means, and said latching means comprising a pair of insulating plungers engaged by a compression spring in the bore of said latter plug.

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