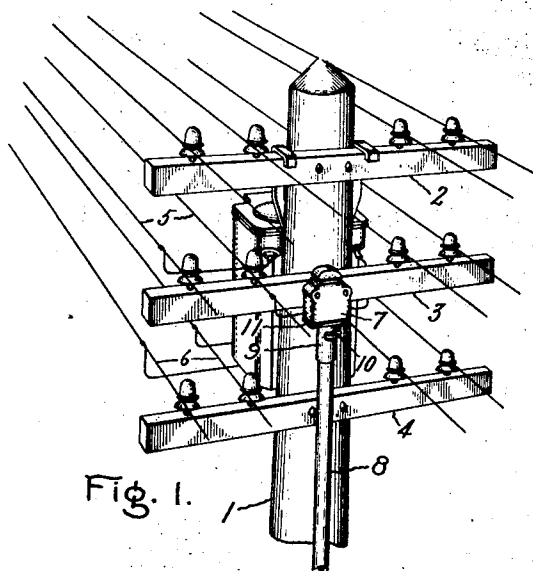
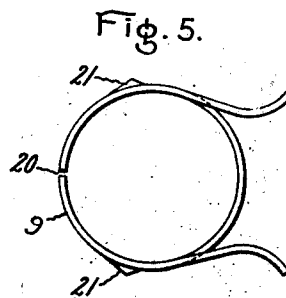
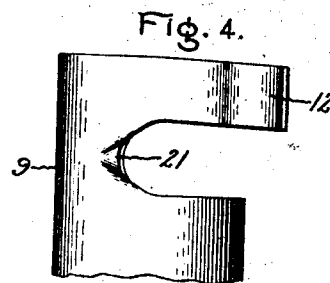
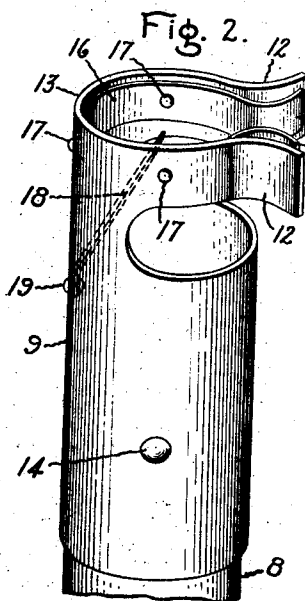
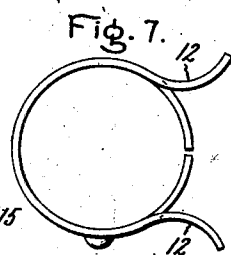
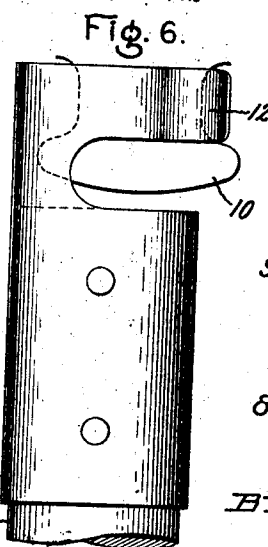
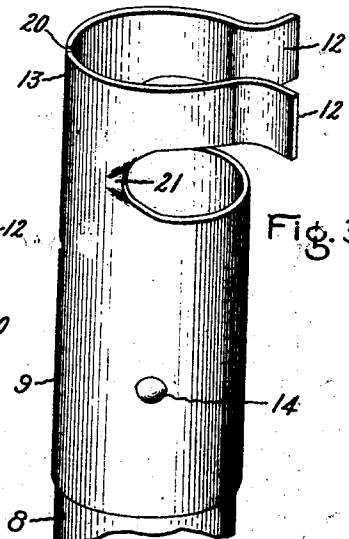


F. C. HANKE.
PLUG PULLER.
APPLICATION FILED JULY 13, 1914.

1,111,380.

Patented Sept. 22, 1914.



WITNESSES:
Raymond B. Hulse
Allen Orford

INVENTOR:
FRANK C. HANKE,
BY *Alfred H. Davis*
HIS ATTORNEY.

UNITED STATES PATENT OFFICE.

FRANK C. HANKE, OF MODESTO, CALIFORNIA, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

PLUG-PULLER.

1,111,360.

Specification of Letters Patent. Patented Sept. 22, 1914.

Application filed July 13, 1914. Serial No. 850,677.

To all whom it may concern:

Be it known that I, FRANK C. HANKE, a citizen of the United States, residing at Modesto, in the county of Stanislaus, State of California, have invented certain new and useful Improvements in Plug-Pullers, of which the following is a specification.

My invention relates to plug pullers, and it is more particularly concerned with the manipulation of plugs belonging to electric switch and cut-out devices and the like such as are used in the primary connections of transformers, in distribution circuits, in the connections of series lighting circuits to the main line, and for a great many other purposes.

While the plugs of such devices have hitherto been pulled and inserted by taking hold of them directly with the hand, it has been found that this practice at best involves a certain amount of inconvenience and danger—especially in wet weather—since it sometimes happens that an arc is drawn when the plug is pulled, or that a leakage patch from the line to the plug head or handle develops, or that the plug becomes statically charged. Manipulation of plugs directly by hand is the more awkward and inconvenient when (as is usually the case) the devices to which they belong are mounted high above the ground on poles or cross-arms carrying the wires of various circuits; and the risk under these circumstances is sometimes greatly augmented by the location of the devices in positions where it is impossible to get at them without reaching or climbing among the wires. With my plug-puller, even the most inaccessible plugs can be pulled or inserted without any necessity for taking hold of them with the hand or any risk of coming in contact with wires,—and sometimes, when the switch or cut-out devices are not too high, without climbing at all.

In my plug puller I employ simple means for engaging the handle or head of the plug which can readily be made to take hold in such a way as not to yield under the force necessary to pull even the tightest plug. In addition to affording this and various other advantages such as above indicated, the instrument can be made strong, rugged, simple and convenient, and easy and inexpensive to manufacture. I have hereinafter set forth in detail the best forms of it at pres-

ent known to me; yet while my invention extends even to various special features and details of construction and combinations and arrangements of parts shown and described; it is not confined thereto, but can be otherwise carried out and embodied,—as will be apparent both from my description of particular forms and from my claims.

In the accompanying drawing, Figure 1 is a perspective view of a cut-out device mounted on a cross-arm with my plug puller engaging the plug ready to pull it. Fig. 2 is a fragmentary view showing the plug engaging device tilted forward toward the observer, on a larger scale than Fig. 1. Fig. 3 is a similar view of a puller with a modified form of engaging device; Fig. 4 is a fragmentary side view; and Fig. 5 is an end view. Figs. 6 and 7 show a further modification of the engaging device.

In Fig. 1 the pole 1 is shown as carrying three cross-arms 2, 3, 4 which in turn carry the wires of a number of circuits. The wires 5 on the middle cross-arm 3 may belong to main 2000 volt distribution circuits, for example, and the wires 6 on the lower cross-arm 4 may belong to local series lighting circuits of the same or lower voltage. As shown, the wires 5 of one of these main circuits on the middle cross-arm 3 are connected to the primary of a transformer mounted behind the pole 1 and the cut-out device 7 mounted on the middle cross-arm 3 is included in one of these connections, while two of the local circuit wires 6 on the lower cross-arm 4 are connected to the secondary of this transformer. The plug puller is shown as comprising an insulating rod 8 of any convenient length having at one end a plug engaging device 9 engaged above the head or knob 10 of the plug 11 of the cut-out device 7. Ordinarily the cut-out device 7 will be arranged for the plug 11 to be pulled downward to remove it and pushed upward to insert it; and for convenience in description, therefore, I shall herein assume that the engaging device 9 of the plug puller is uppermost, as shown.

Referring, now, to Fig. 2 in connection with Fig. 1, it will be seen that the plug engaging device 9 comprises opposed parts 12, 12 adapted to engage at either side above the plug head 10, and that these engaging parts 12, 12 in effect form a fork extending transversely of the rod 8 and opening

toward one side thereof. At its base 13 the fork thus formed is attached to one side of a sleeve portion of the plug engaging device 9, and the rod or handle 8 is secured in this sleeve by a screw, bolt, rivet, or the like 14. As the engaging device 9 shown is intended to take or receive the plug 11 sidewise, the outer ends of the parts 12, 12 diverge or flare outward so as to facilitate the entrance of the plug into the fork. As thus far described, the device 9 can easily be made from a suitable length of brass or other metal tubing about $\frac{1}{16}$ of an inch thick and $1\frac{1}{2}$ inches in diameter by merely cutting into it laterally near one end and removing a portion of suitable width for more than 180° of its circumference and then severing the portion between the lateral cut and the end at about the middle and bending it open to the form shown. Or, instead of thus cutting away a lateral portion of a previously formed tube to accommodate the plug head 10, etc., one may suitably notch opposite edges of a rectangular piece of sheet metal and then bend it up into a tube etc. as shown. Either of these modes of construction enables the parts 12, 12 to be made quite strong and unyielding against a pull on the rod 8 to withdraw the plug 11 from the device 7.

In order to insure that when pulled the plug 11 shall remain in the engaging device 9 regardless of how the plug puller may be turned and handled, I prefer to provide yielding means for retaining the plug in the fork formed by the parts 12, 12. For this purpose the portions of the parts 12, 12 between which the plug enters may be made resiliently yielding with reference to one another and may have outwardly divergent surfaces, so that they shall be forced apart by the plug and then spring together and retain it. As shown in Fig. 2, these relatively yielding portions consist of the free ends 15, 15 of a strip 16 of cold-rolled copper or brass or other springy metal fastened inside of the fork by three rivets 17. The ends of the parts 12, 12 adjacent the springs 15, 15 are further apart than the latter, so that the only resistance or hindrance to the entrance of the plug into the fork comes from said springs. Besides the springs 15, 15, the means for retaining and holding the plug 11 in the fork may include a yielding member 18 consisting of a strip of springy sheet metal extending upward and forward from the rivet 18 which secures it to the rear of the tube.

In the engaging device shown in Figs. 3, 4 and 5 the parts 16 and 18 illustrated in Fig. 2 are dispensed with. Here the resiliently yielding portions of the parts 12, 12 which are forced apart by the entering plug 11 are their free outer ends, which accordingly lie closer together than in Fig. 2.

The resilient yielding of the parts 12, 12 with reference to one another necessary to secure the same action as in Fig. 2 results from their own springiness,—enhanced if it need be, by a longitudinal slot 20 at the rear of the tube extending down nearly or quite to its lower end. As shown especially in Figs. 4 and 5, the parts 12, 12 are inclined downward a little toward the open end of the fork in order that the head 10 of the plug 11 may stay in it better, and the metal of the tube is bulged out a little at 21 to accommodate the head 10 better.

In the further modified engaging device shown in Figs. 6 and 7, resilience of the parts 12 may be almost or entirely dispensed with, reliance being placed on the tendency of the top heavy plug to tilt in the engaging device and on the friction of its consequent engagement with said parts at their upper and lower edges to keep it in said device. The device may advantageously be made from drawn steel tubing by means of suitable dies. The slot of the drawn tubing is at the front and only in the sleeve portion of the device; but as this sleeve portion is firmly secured on the rod 8 by two rivets or the like, the slot obviously does not affect the action of the device.

It will readily be seen that the plug 11 can be put in an engaging device 9 of any of the above described forms and then inserted in the cut-out device 7 by means of the plug puller just as easily as it can be withdrawn. For ordinary purposes the over all length of the plug puller need not exceed two feet, though of course it may be made as long as desired.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. A plug puller comprising a rod having at one end a plug engaging device with opposed parts adapted to engage at either side above the plug head and unyieldingly to a pull on the rod, portions of said parts between which the plug enters being resiliently yielding with reference to one another so as to be forced apart by the plug and then spring together.

2. A plug puller comprising a rod having at one end a plug-engaging device adapted to receive the plug sidewise, said device comprising a fork for engaging above the plug head that extends transversely of the rod and is unyielding to a pull on the rod and including yielding means for retaining the plug in the fork.

3. A plug puller comprising a rod having at one end a transversely extending fork for engaging above the plug head that is unyielding to a pull on the rod, portions of said fork between which the plug enters having outwardly divergent surfaces and being resiliently yielding with reference to one another so as to be forced apart by the

plug and then spring together and retain it.

4. A plug engaging device for a plug
puller comprising a sleeve portion for re-
ceiving a handle and a transversely extend-
5 ing fork for engaging above the plug head
attached at its base to one side of the sleeve
and opening toward the other side thereof.

5. A plug engaging device comprising a
metal tube having a lateral portion near one
10 end cut away to accommodate a plug head
and having the portion between the lateral

cut and the end bent open to form a trans-
versely extending fork for engaging above
the head.

In witness whereof, I have hereunto set my 15
hand this 2nd day of July, 1914.

FRANK C. HANKE.

Witnesses:

M. G. BOONE,
T. G. SHERWOOD,
P. H. GRIFFIN.