Jan. 19, 1960 N. J. REES 2,921,367

INSULATOR CLIP INSERTING TOOL

Filed July 18, 1957

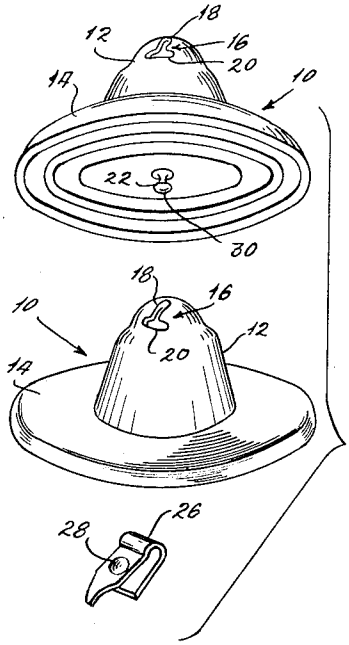


FIG. 1

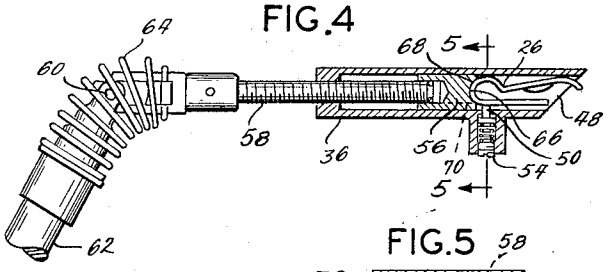


FIG. 4

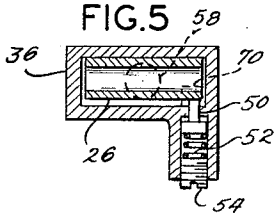


FIG. 5

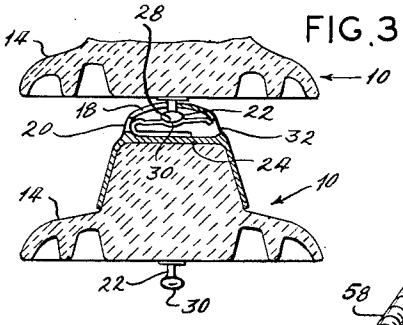


FIG. 3

FIG. 2

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INSULATOR CLIP INSERTING TOOL

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5 Claims. (Cl. 29—225)

This invention concerns power line tools, and more particularly tools for inserting locking clips in insulator strings such as are commonly used on high voltage power transmission lines.

High voltage power transmission lines are usually suspended at some distance above the ground on metal or wooden supporting structures. In order to provide sufficient flexibility for such lines to withstand wind pressure and temperature changes, the wires constituting such lines are usually suspended from their supporting structures by strings of insulators in which individual insulators can be attached to one another in any desired number to provide the required insulation strength. In order to allow replacement of a damaged insulator without replacing the whole string, these insulators are usually provided with ball-and-socket joints which allow easy removal of any one insulator from the string. In the past, these joints were locked by means of a cotter pin while in service so that the insulator string could not come apart under the mechanical influence of swaying wires.

It was eventually found that insulator strings constructed on the foregoing principle had a tendency to cause severe radio interference when any motion was imparted to the wires, as for example by the wind, due to inadequate metal-to-metal contact between the ball and socket in the joints, linking particularly at such places where, due to the geometrical configuration of the line, the load on the insulator string was small. In order to obviate these difficulties, the cotter pin previously used was replaced by a spring clip designed to force the ball and socket into firm electrical connection. Such a clip is described in application Serial No. 408,893, filed February 8, 1954, of Raymond A. Young, assigned to the same assignee as this invention. However, difficulties were encountered in installing these spring clips, particularly when the work had to be performed where the installer had to remain several feet away from the line for safety reasons. My invention is designed to overcome these difficulties, and its principal object is therefore to provide a tool with which the spring clips can be rapidly, safely and efficiently installed in insulator strings.

I shall now describe my invention, reference being had to the drawing in which:

Figure 1 is an exploded view of a standard insulator link showing the spring clip;

Figure 2 is a perspective view of the tool of my invention;

Figure 3 is a sectional view of two insulators in linked position;

Figure 4 is a longitudinal section of the barrel and operating mechanism of the tool; and

Figure 5 is a transverse section of the barrel taken along line 5—5 of Figure 4.

The tool of my invention is provided with two long insulating handles, one of which is pivotally attached to the metal body of the tool, and the other of which is rotatably attached to the piston of the tool so as to permit operation of the tool through the intermediary of a universal joint. The tool is provided with a barrel which receives a spring clip, and an arcuate portion which fits around the socket part of the insulator for the purpose of positioning the tool during insertion of the clip. When the tool has been properly positioned, the rotatable handle is turned, whereby a piston contained in the barrel pushes the spring clip out of the barrel and into the slot-like opening in the socket of the insulator through which the ball of an upper insulator is inserted into the socket of a lower one. When the insertion of the spring clip is complete, rotation of the rotatable handle in the opposite direction withdraws the piston into the barrel and allows removal of the tool for reloading purposes.

Referring now to Figure 1, two insulators of the standard type are shown at 10. Each insulator is provided with a hollow socket portion 12 made of any suitable metal and firmly cemented to the porcelain body 14 of insulator 10. The socket 12 is provided with a T-shaped slot 16 having a longitudinal top portion 18 and a transverse bottom portion 20.

Each insulator 10 is provided on the underside with a ball member 22 in the shape of a collar button. This ball member is so dimensioned that when it is inserted into the slot 16 in a longitudinal direction, it will pass through the transverse portion 20 of the slot 16 but will be retained inside the socket 12 by the sides of the top portion 18. In view of the dome shape of the socket 12, the ball member 22 can be moved upwardly as it moves along the portion 18 of slot 16, so that eventually, when the ball member 22 is fully inserted, there will be a space between the bottom 24 of the socket 12 and the bottom of the ball member 22, as is shown to advantage in Figure 3. A spring clip 26 can thereupon be inserted through the portion 20 of slot 16 as shown in Figure 3 until a recess 28 formed in the top of spring clip 26 engages the rounded bottom 30 of ball member 22 and makes firm contact therewith regardless of any possible movement of ball member 22. At the same time, the insertion of spring clip 26 has blocked the opening 20 of slot 16 so that ball member 22 can no longer be removed from socket 12 until clip 26 is first removed by pushing it out by means of an appropriate tool inserted through opening 32 in the rear of socket 12.

The tool for inserting the spring clip 26 is shown in Figure 2, wherein the numeral 34 designates the stationary insulating handle to which the barrel 36 of the tool is pivotally attached with a bolt 38. A curved arm 40 is attached to the side of barrel 36 at 42. This curved arm 40 has a radius of curvature sufficient to easily fit around the largest size socket 12 which is likely to be encountered in the use of the tool, and its inner surface is sloped so as to parallel the slope of the socket surface. A screw 44 is provided in the curved arm 40 to allow adjustment of the tool to smaller size sockets by keeping the curved arm 40 spaced from the socket surface. A screw 46 is provided at the end of the curved arm 40 diametrically opposite the opening of the barrel 36. The function of this screw is to engage the opening 32 of the socket 12 so as to position the tool in line with the portion 20 of the slot 16, and to hold it in place during the inserting operation. The screw 46 is adjustable just like the screw 44 so as to permit adaptation of the tool to sockets of different sizes.

Referring now to Figure 4, the barrel of my tool is again shown at 36. The tool is loaded by inserting a spring clip 26 into the barrel 36 through the opening 48 until it reaches the position shown in Figure 4. A detent 50 is pressed against spring clip 26 by a spring 52 resting on screw 54 so as to keep spring clip 26 from falling out of barrel 36 when the tool is turned upside down. A piston 56 is mounted inside the barrel 36 and can be moved back and forth by means of the screw 58

which can be rotated by turning the handle **62** to which it is connected by universal joint **60**. A heavy spring **64** is mounted around the universal joint **60** to give mechanical protection thereto. The piston **56** is provided with a curved front face **66** which receives the similarly shaped rear portion **68** of spring clip **26**. A groove **70** is provided in one side of the piston **56** so as to prevent the detent **50** from impeding the movement of piston **56**. The piston **56** can be assembled with the screw **58** in any wellknown manner, access for this purpose being provided by opening **72**.

In operation, the tool of my invention is first loaded by inserting a spring clip into the barrel as shown in Figure 4. The operator then lifts the tool into position by means of the handles, using the handle **34** to adjust the height of the tool, and using handle **62** for leveling it. The tool is then hooked around the socket **12** of the insulator on which the inserting operation is to be performed, the inward end of screw **46** being inserted in the opening **32** of the socket. When the tool is thus in position, the opening **48** of the barrel will be properly aligned with the portion **20** of slot **16**. Thereupon, the operator turns handle **62**, which transmits its motion through universal joint **60** to screw **58**. The piston **56** is thus moved forward within the barrel **36** and pushes the spring clip **26** out of the barrel through opening **48**, and into the socket **12** through portion **20** of slot **16**, until the clip comes to rest below ball member **22** in the position shown in Figure 3. The handle **62** is then rotated in the opposite direction so as to withdraw the piston **56** back into the barrel **36** and prepare the tool for the next operation. When this is done, the tool is unhooked from the socket **12** by manipulating the handles **34** and **62**, whereupon the tool is ready for reloading.

It will be seen from the foregoing that I have provided a tool which allows fast, accurate, and safe installation of spring clips in insulator strings. Obviously, my invention is capable of being carried out in a number of varying embodiments without departing from the spirit thereof, and I therefore do not desire to be limited by the foregoing description but to cover and include all embodiments properly within the scope of the appended claims.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. A clip inserting tool for electrical insulators of the suspension type having a ball-and-socket joint comprising a barrel for receiving a clip, a piston movably mounted within said barrel for pushing said clip out of said barrel, an arcuate arm mounted on said barrel having spacing means thereon for facilitating alignment of said barrel with a clip receiving opening formed in the socket of said electrical insulator, a screw member cooperating with said barrel to move said piston, a rotatable handle, and a universal joint connecting said screw member and said handle so as to permit operation of said screw member by said handle regardless of their relative positions for pushing said clip from said barrel into said clip receiving opening.

2. A tool for inserting anti-static clips into a ball-and-socket joint of electrical insulators of the suspension type comprising a first handle, a barrel pivotally mounted on said first handle for receiving a clip, a piston mounted in said barrel for pushing said clip, resilient means associated with said barrel for impeding movement of said clip in said barrel, an arcuate arm mounted on said barrel, means on said arm to engage a cooperating opening in said socket, means on said arm for maintaining a predetermined spacing between said arm and said socket, and means for moving said piston so as to push said clip out of said barrel and into said clip receiving opening.

3. A tool for inserting anti-static clips into a ball-and-socket joint of electrical insulators of the suspension type comprising a first insulated handle, a barrel pivotally mounted on said first handle for receiving a clip, a piston mounted in said barrel for pushing said clip, resilient means associated with said barrel for impeding movement of said clip in said barrel, an arcuate arm mounted on said barrel, means on said arm to engage a cooperating opening in said socket, means on said arm for maintaining a predetermined spacing between said arm and said socket, a second insulated handle, a screw member arranged to move said piston within said barrel, and a universal joint connecting said second handle and said screw member so as to permit operation of said screw member by said second handle regardless of the angle therebetween.

4. A clip inserting tool according to claim 3, further comprising a flexible mechanical shield surrounding said universal joint.

5. A clip inserting tool comprising a clip-receiving barrel, a first barrel supporting handle mounted for pivotal movement with respect to said barrel, a piston within said barrel, a second handle adapted for pivotal movement with resect to said barrel in a plane substantially parallel to the plane of movement of said first handle but around an axis spaced from the axis of movement of said first handle, and means connecting said piston and said second handle so as to move said piston within said barrel when said second handle is moved in a predetermined manner, an arcuate arm attached to said barrel adapted to extend around a work piece and having at its extremity a first protuberance for engaging said work piece, and a second protuberance on said arm spaced from said first protuberance for maintaining a predetermined space between said arm and said work piece.

References Cited in the file of this patent

UNITED STATES PATENTS

519,354	Sheppard	May 8, 1894
750,408	Speelman	Jan. 26, 1904
1,485,036	Kingsley	Feb. 26, 1924
1,672,477	Tipsord et al.	June 5, 1928
2,138,802	Clancy	Nov. 29, 1938
2,199,833	Fleischman	May 7, 1940
2,797,471	Hamberger	July 2, 1957

FOREIGN PATENTS

311,712	Germany	Apr. 7, 1919

OTHER REFERENCES

Popular Mechanics, December 1912, page 775.