Nov. 13, 1951 J. B. CLAPP 2,574,776

HOT CLAMP CONNECTOR

Filed Sept. 10, 1946 2 SHEETS—SHEET 1

Fig. 2.

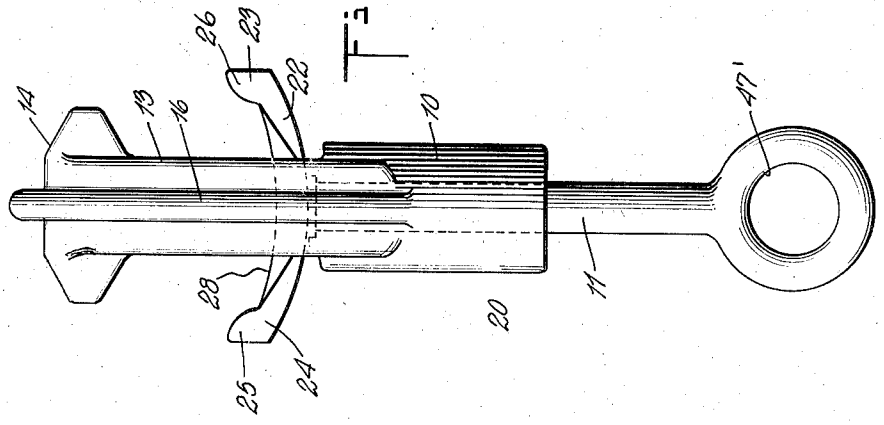
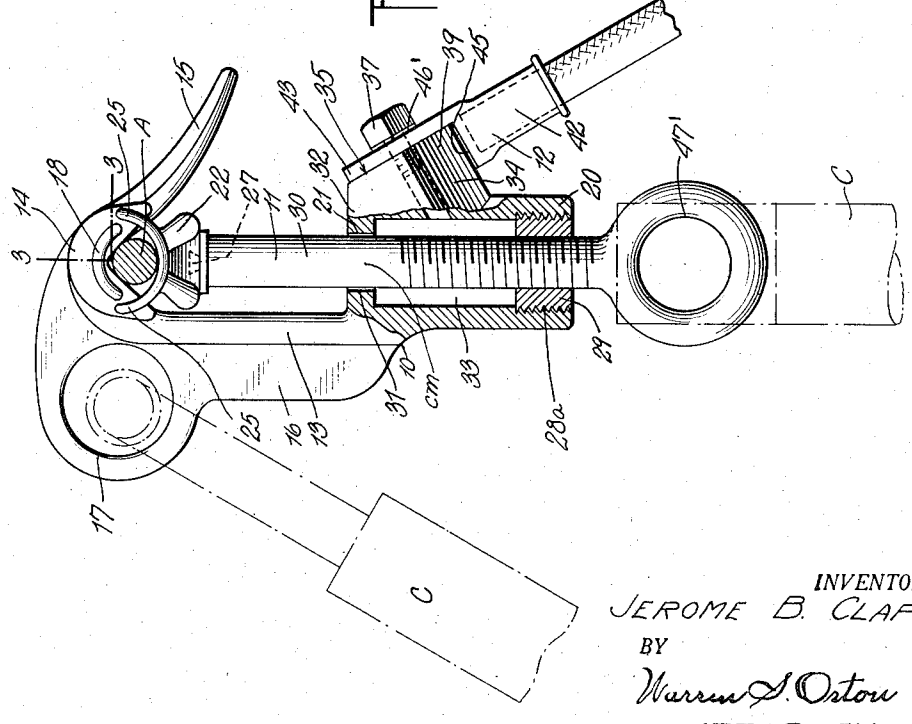


Fig. 1.



INVENTOR.
JEROME B. CLAPP
BY
Warren S. Ostrom
ATTORNEY

Nov. 13, 1951 J. B. CLAPP 2,574,776

HOT CLAMP CONNECTOR

Filed Sept. 10, 1946 2 SHEETS—SHEET 2

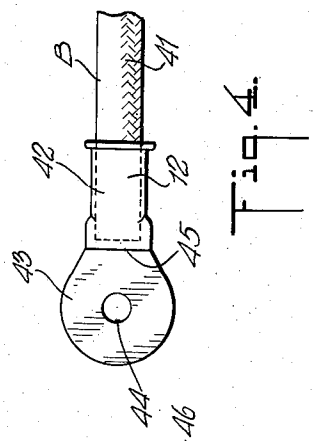


Fig. 4.

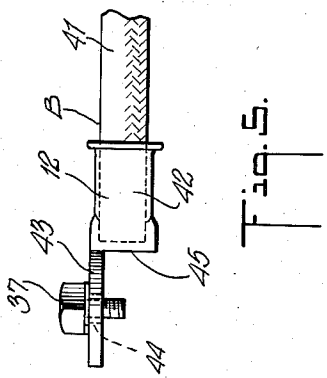


Fig. 5.

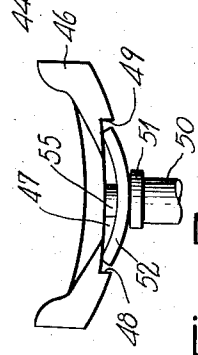


Fig. 6.

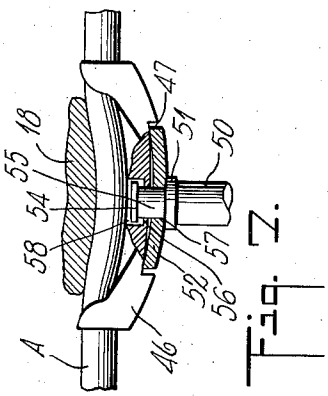


Fig. 7.

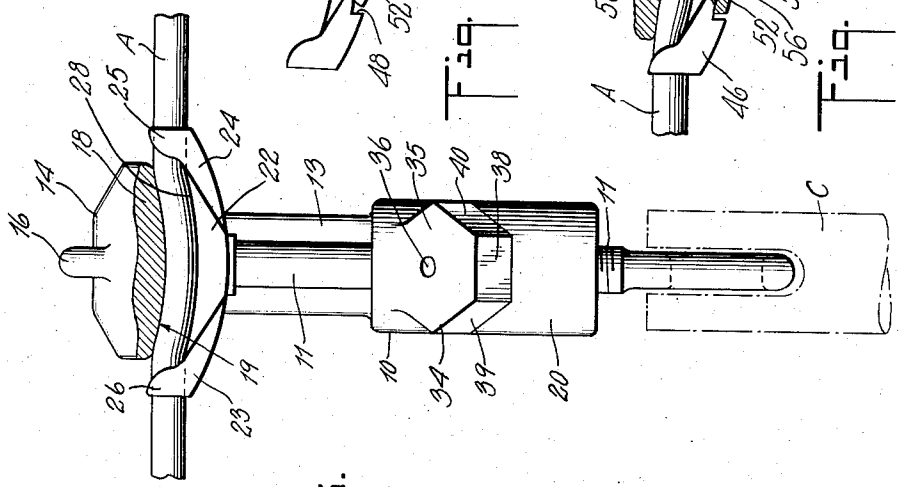


Fig. 3.

INVENTOR.
JEROME B. CLAPP
BY
Warren S. Orton
ATTORNEY

Patented Nov. 13, 1951

2,574,776

UNITED STATES PATENT OFFICE

2,574,776

HOT CLAMP CONNECTOR

Jerome B. Clapp, North Plainfield, N. J., assignor to The Thomas & Betts Co., Elizabeth, N. J., a corporation of New Jersey

Application September 10, 1946, Serial No. 695,897

6 Claims. (Cl. 173—273)

1

The invention relates to a hot line clamp connector of the type designed for connecting a tap wire to an over-head line while the latter is carrying electric current. These lines frequently carry current of high voltage and the procedure of securing a tap wire thereto is a dangerous operation.

The primary object of the invention is to provide safety to the lineman in connecting a tap wire to a hot line. Incidental to this basic objective the present disclosure provides for an improved type of such connector which will meet current needs in practical operations which will avoid objections to known forms of such devices now in general use and which necessitate the use of relatively few and simple parts and thus features economy in manufacturing cost.

These known forms of connectors have not proven entirely satisfactory in actual service, among other reasons because the lift rod for locating therein, often becomes entangled in adjacent wires; they are difficult to locate in place especially in the presence of high winds and stormy conditions and unless extreme care is exercised in securing the connectors to the line the connectors have a tendency to slip off the line. These known forms of connectors also have the disadvantage in that they are bulky and usually have their center of gravity above the point at which they engage the line, thus tending to provide a structure which is difficult to handle and liable to topple over while being installed, and which is liable to twist the line on which it is hung as the tap wire swings back and forth in use.

Known forms of clamps tend to twist around the conductors after installation due to the out of line pull thereon by the lead wire. Further these old forms of clamps tend to become loose in time due to the vibration to which the conductor is subjected; they tend to "freeze" on the line by reason of the corroding of their tightening screws and in general too many sizes of clamps are required at present to accommodate the various types of conductors and lead lines now in general use.

Accordingly among the other objects of this invention, one is to provide a simple form of hot clamp connector which will avoid the objections inherent in similar known constructions; which will not tend to twist on the conductor; which will not wear loose; which will be compact and easy to construct and install; which will assist the usual clamping operation to secure the tap positively to the line; which will dispose its lifting eye and its bolt turning eye in position so as

2

to be readily accessible to the hot stick as it is manipulated from a position below the line and at the same time to avoid any interference with the hot stick as it is shifted from one eye to the other.

Still another object of the invention is to provide a simplified means for securing the tap wire to the connector in such a way that the tap wire will not accidentally fall even if its securing means should become loose by reason of vibration of the connectors and which tap wire may extend from the connector in any one of two or three depending positions.

Still another object is to provide a standard size of clamp which can be secured to various sizes of conductors and in which leads of different sizes may be attached to the same clamp simply by providing tap terminals of a size to fit the particular size in tap to be connected.

Various other objects and advantages of the invention will be in part obvious from an inspection of the accompanying drawings and in part will be more fully set forth in the following particular description of one form of device embodying the invention, and the invention also consists in certain new and novel features of construction and combination of parts hereinafter set forth and claimed.

In the accompanying drawings:

Fig. 1 is a view in side elevation of a hot line clamp connector constituting a preferred embodiment of the invention shown with the barrel portion in axial section, mounted in position with the tapped conductor depending therefrom and showing the linesman's disconnect stick or similar tool in ghost outline engaging the eye holes;

Fig. 2 is a view in rear elevation of the device shown in Fig. 1 and with the lower jaw fully lowered into position to underlap the line shown in Fig. 1;

Fig. 3 is a view in front elevation of the connector with the tapped conductor omitted and with the forwardly protruding portion of the hook lip broken away to show the upper jaw in vertical section on the line 3—3 of Fig. 1;

Fig. 4 is a detailed view of the upper end of the tap connector as viewed from the underside of Fig. 1 and showing the locating ledge;

Fig. 5 is a view in side elevation of the tap connector shown in Figs. 1 and 4 disconnected from the tap.

Fig. 6 is a detailed view in side elevation of a modified form of connection between the eye bolt and head when not under load and;

Fig. 7 is a similar view when under load.

In the drawings there is disclosed an overhead live line or conductor A from which it is desired to connect a tap B by means of the hot line connector herein featured.

The clamp connector comprises two major jaw forming elements, a main body 10 forming a rugged casting and an eye bolt 11 provided with a head, together with an associated minor element constituting a coacting conductor terminal 12 forming an end of the tap B.

The main body comprises a rugged upstanding plate-like post 13, the upper end of which rounds forwardly to form a bonnet or head 14 of greater width than the post and then gradually reduces in width to form a long downwardly and forwardly extending hook-like lip 15 designed to overlap the line A and assist in guiding the connector on to the line. A reinforcing rib 16 projects rearwardly from the post with gradually increasing width considered upwardly and curves forwardly into position overlapping the bonnet 14. The rib 16 is of maximum horizontal width as it rounds into the bonnet and at this wide portion is provided with a lifting eye hole 17. It is noted that this eye is located in offset relation to the balance of the device and thus the space therebelow is free of anything which might interfere with the action of the disconnect tool C. The bonnet is provided centrally thereof with the upper element 18 of a jaw clamp offset forwardly from the post 13 as shown in Fig. 1. This upper element considered in side elevation as shown in Fig. 1 forms on its underside 19 an inverted wide spreading U-shaped arc which merges from the inverted U at its ends into a more or less V-form at its center as shown in Fig. 1. Considered in its longitudinal dimension as shown in section in Fig. 3 the under clamping surface 19 is slightly convex with its lowermost point at its center and disposed to bear down on the lead A.

A tubular barrel 20 of cylindrical form extends integrally from the lower portion of the post 13 with its bore 21 extending axially therethrough and aligned with the center of the jaw clamp element 18.

The eye bolt 11 extends through the bore of the barrel and is provided at its upper end with a T-shaped head 22 having wide spreading wings 23 and 24 with upturned U-shaped crotch forming ends 25 and 26 respectively. The extreme upper end of the bolt is reduced to provide a pivot pin 27 and this pin is rotatably mounted in a bearing recess provided therefore in the underside of the head 22 at its center. The upturned ends 25 and 26 are spaced apart to provide a clearance 28 therebetween and each upturned end forms a U-shaped trough for receiving and for bearing upwardly on the line A, and thus the ends collectively constitute the lower clamping element of the connector. It is noted from the showing in Fig. 3 that the distance between the upwardly facing ends 25 and 26 is greater than the length of the upper clamping surface 19 thus providing a clearance at each end of the element 18 and the bearing ends 25 and 26 of the lower jaw. This arrangement causes the opposite ends of the lower clutch element to engage the line A at points offset from the adjacent ends of the upper clutch element. This vertical offsetting of the points of engagement of the clamp with the upper and lower portions of the line is to cause the line to bend or kink slightly as shown in Fig. 3 and to form in effect a snubbing action on the line A. The head 22

is preferably formed of a heavy spring metal so that while it is substantially rigid it does have at least sufficient flexibility and elasticity to spring when firmly pressed or rather overpressed into its clutching position engaging the line A. On the contrary the bonnet and upper clamping jaw 18 is quite rigid and is not intentionally designed to have any spring. The lower portion of the barrel bore is enlarged and provided at its lower end with screw threads 28*a*. A closure nut 29 seals the bottom of the bore. The threaded length at the lower portion of the bolt turns in this nut as it raises and lowers the lower jaw and the upper unthreaded portion 30 of the bolt slides freely through a smooth bore opening 31 in the upper wall 32 of the barrel. The portion of the enlarged bore between the nut 29 and the wall 32 forms a long lubricant containing chamber 33 through which the threaded portion of the bolt works.

It is a feature of this disclosure that when the connector is hanging loosely on the line the jaws of the clutch coact to define a point of suspension about mid-length of the surface 19 and that the connector hangs down in suspended position centered about a vertical line passing through said point of suspension. This vertical line thus passes through the center of mass of the connector located at about the point marked *cm* on Fig. 1 and is thus well below the point of suspension. This has the effect of maintaining the connector more or less in staple equilibrium when hanging freely on the line A, and when finally secured to the line minimizes any tendency to impose and tortional twist on the line from which it is suspended.

The barrel is provided on the side thereof beneath the lip 15 and thus on the side opposite to the rib 16 with an upwardly inclined boss 34. The outer face 35 of the boss is inclined at an angle of about 60 degrees to the horizontal. The face 35 is located as close as possible to both the eye bolt considered horizontally and as close as possible to the movable jaw considered vertically so as to reduce the amount of offset and thus the horizontal length of leverage arm between the face 35 and the vertical line through the point of suspension and the center of mass *cm*. By reducing the leverage arm there is minimized any turning movement on the connector which might be imposed thereon by the weight or a long tap wire B. The boss is provided centrally thereof with a threaded bolt hole 36 for receiving a short bolt 37. The boss 34 is of somewhat hexagonal form particularly on its underside which forms three flat surfaces, a horizontal bottom surface 38 and two adjacent inclined surfaces, a left surface 39 and a right surface 40 each extending at an included angle of 60 degrees with the horizontal surface 38.

The tap B includes a tap conductor 41 which is arranged to be connected electrically and mechanically to the boss in any one of three positions and for this purpose is provided with the terminal 12 which comprises primarily a sleeve 42 crimped onto the conductor 41 and provided with a flat or prong-like extension 43 having a bolt hole 44 at its center.

The extension 43 forms with the unreduced portion of the sleeve a flat shoulder 45 designed to engage selectively either one of the surfaces 38, 39 or 40 depending on the direction at which it is desired to extend the depending conductor 41. The bolt 37 is passed through the hole 44 in the prong-like extension and a lock washer

46' is located between the head of the bolt and the prong-like extension 43. When the nut 37 and the terminal 12 are removed lubricant may be introduced through the bolt hole 36 and into the lubricant chamber 33. The lower end of the bolt forms an eye 47' into which is designed to be hooked the laterally extruding finger D forming the upper end of the tool C.

Referring to the modification shown in Figs. 6 and 7 a head 46 corresponding to the head 22 is provided on its underside with a centrally located recess 47 which form a pair of inwardly facing shoulders 48 and 49. The upper end of an eye bolt 50 corresponding to the eye bolt 11, is passed loosely through the head 46 and is upset at its end to prevent the head from becoming lost from the bolt. As specifically shown in Fig. 7 the upper end of the eye bolt 50 above its flange 51 is reduced to form a neck 55 whose upper end is provided with a flat bolt head 54. A rim-like bearing portion 56 of the jaw head underlaps the bolt head and extends towards the neck to defeat separation of head 46 from the bolt 50 as it is retracted. The underlapping portion 56 is provided centrally thereof with an opening 57 in which the neck rotatably fits. The head 54 is located to have a slight freedom of axial movement in a socket 58 formed in the head 46 above the bearing portion 56. The neck is slightly longer between the flange 51 and the bolt head 54 than the combined thickness of the spring plate 52, portion 56 and any clearance therebetween to provide sufficient play to permit the spring plate 52 to move into the less loaded position shown in Fig. 6 before head 54 acts on the portion 56 in the act of withdrawing the head 46 bodily and positively away from the lead A. The bolt is provided with a lifting or stop flange 51, a bowed spring plate 52 preferably formed of stainless steel, is fitted in the recess with its opposite edges facing and normally spaced from the shoulders as shown in Fig. 6.

When the bolt is elevated as previously described in connection with the showing in Fig. 3 the pressure of the flange 51 on the underside of the center of the bowed spring 52 will cause it to elongate towards the stop shoulders 48—49 and therethrough to bear upwards on the head 46 to crimp the conductor A as shown in Fig. 3 but in this case under the powerful cushioning action provided by the deformed spring 52 as shown in Fig. 7.

I claim:

1. A hot line clamp provided at its upper portion with a head constituting an upper element of a clutch for engaging the line, a barrel integral with the lower part of the body portion and in axial alignment with the center of the upper element, said barrel provided with a bore, said barrel including at its upper end a fixed wall provided with a smooth bolt-guiding opening, a nut for closing the lower end of the bore, an eye bolt extending through the bore with a smooth mid-length portion having a snug sliding fit in said opening and guided thereby and having another portion in threaded engagement with the closure nut, a coacting lower clutch element carried by the upper end of the bolt above the barrel, the bore of the barrel providing a lubricant containing chamber through which the threaded portion of the bolt works and the lower end of the bolt below the barrel provided with a turn eye.

2. A hot line clamp provided at its upper portion with the upper element of a clutch for engaging the line, and provided at its lower portion with a barrel having a bore extending therethrough, a bolt extending through the bore, in threaded engagement with the barrel and provided with the coacting lower element of the clutch, said bore providing a lubricant containing chamber through which the bolt works, and said barrel provided on a side thereof with a boss constituting a means for attaching a tap wire thereto, said boss provided with a bolt hole providing access to the lubricant chamber, and threaded for receiving a nut for securing the tap wire to the boss.

3. A hot line clamp connector provided with a clamp for securing the connector to an overhead line, said connector composed mainly of an upstanding rugged body portion having two lateral projections, the upper projection forming the fixed element of the clamp and the lower projection forming a barrel, a vertically disposed bolt threaded through the barrel, having at its upper end the coacting element of the clamp and having an exposed eye at its lower end, said barrel provided with an outwardly and upwardly extending rugged boss integral therewith, the outer face of the boss forming an upwardly facing contact surface inclined at an angle of about sixty degrees to the horizontal, the under side of the boss defined by three flat surfaces, the two outer surfaces each forming an angle of about sixty degrees to the middle surface, and a tap line provided with a terminal including a sleeve having a flat extension for overlapping and engaging the outer face of the boss, said sleeve and extension coacting to form a flat shoulder designed to engage selectively any one of the three surfaces to determine the direction at which the terminal projects from the boss, and means for securing the terminal extension to the boss in position to locate the tap conductor in offset relation to the bolt eye.

4. In a hot line clamp connector, the combination of a one-piece rugged upstanding body portion having at its upper end a lateral extension forming the upper and relatively fixed element of a clamp and having at its lower end a lateral extension underlapping the upper extension and including a barrel and a boss projecting outwardly beyond the barrel, a screw extending through the barrel and in screw-threaded engagement therewith, said screw provided with a relatively shiftable clamp element swiveled to the adjacent end of the screw, the outer side of the boss providing an upwardly and outwardly facing contact surface and having a threaded screw hole opening through said contact surface, and the lower side of said boss defined by three side walls extending at an angle to the contact surface and to each other, a tap provided with a terminal having a prong-like end fitted flatwise on said contact surface in overlapping relation thereto and having an abutment shoulder depending from the prong-like end and fitted selectively to any one of said side walls to define the angle at which the tap depends from the connector, and a screw passed through the prong-like extension in screw-threaded engagement with the hole for securing the terminal to the connector and thus securing the tap in its selected depending position.

5. In a device of the class described, a one-piece rugged casting including an upstanding post having an upper integral lateral extension forming the downwardly facing and relatively fixed jaw element of a clamp, and a second extension integral with the lower portion of the post un-

derlapping the upper extension and forming a long rigid barrel providing therein a lubricant-containing chamber, means on the side of the barrel opposite the post for demountably attaching a tap line thereto, a nut in threaded engagement with the bottom of the barrel for closing the lower end of the chamber, the barrel including an upper wall integral therewith and provided with a smooth opening, an eye-bolt threaded through the nut and guided axially through the smooth opening in its movement to and from the fixed jaw, the bolt in the portion thereof passing through the nut and smooth opening being exposed to the lubricant in the chamber, and a relatively shiftable jaw element of the clamp swivelled to the end of the eye-bolt adjacent the fixed jaw, movable by the eye-bolt to and from the fixed jaw element to clamp a line between the jaws and said shiftable jaw element being restrained by the post to a limited rotary movement about the axis of the eye-bolt.

6. A hot line connector including a casting provided with a head forming the upper element of a line-engaging clamp, an upstanding closed barrel constituting an integral part of the casting and located below the said upper element, a bolt threaded through the barrel and provided at its upper end with a head forming the coacting lower element of the clutch for engaging the line, said barrel providing a lubricant chamber of fixed volumetric capacity adapted to be filled with a lubricant and through which a

threaded part of the bolt extends and through opposite ends of which the bolt is guided.

JEROME B. CLAPP.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
862,082	Lewis	July 30, 1907
1,016,798	Thomson	Feb. 6, 1912
1,055,305	Kneisel	Mar. 4, 1913
1,233,197	Cuthbert	July 10, 1917
1,712,067	Bodendieck et al.	May 7, 1929
1,737,506	McCracken	Nov. 26, 1929
1,912,519	Freebury	June 6, 1933
1,925,403	Pounder	Sept. 5, 1933
1,948,838	Bash	Feb. 27, 1934
1,968,736	Bodendieck	July 31, 1934
1,984,566	Bodendieck	Dec. 18, 1934
2,009,289	Caird	July 23, 1935
2,237,619	Williams	Apr. 8, 1941
2,253,432	Johnson	Aug. 19, 1941
2,283,061	Hendley	May 12, 1942
2,304,807	Donoghue	Dec. 15, 1942
2,319,602	Hendley	May 18, 1943
2,420,895	Merriman	May 20, 1947
2,431,439	Williams	Nov. 25, 1947
2,448,402	Thompson	Aug. 31, 1948
2,530,299	Hendley	Nov. 14, 1950