Feb. 20, 1934. T. H. BOWEN 1,948,061

FASTENER FOR CONNECTING HIGH VOLTAGE CONDUCTORS TO INSULATORS

Filed May 19, 1931 2 Sheets-Sheet 1

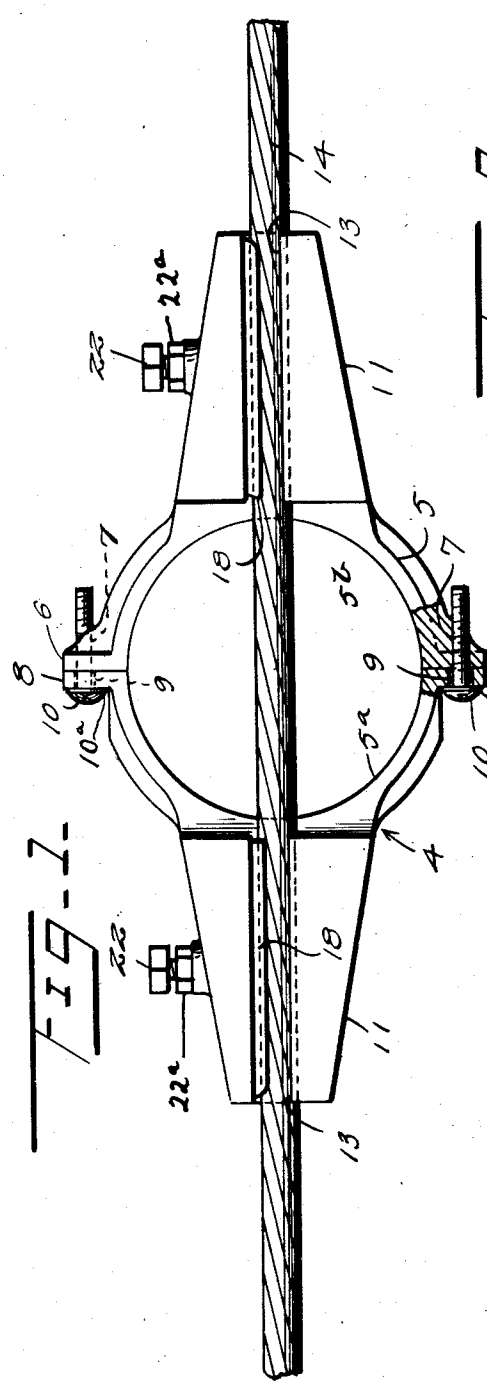


Fig. 1.

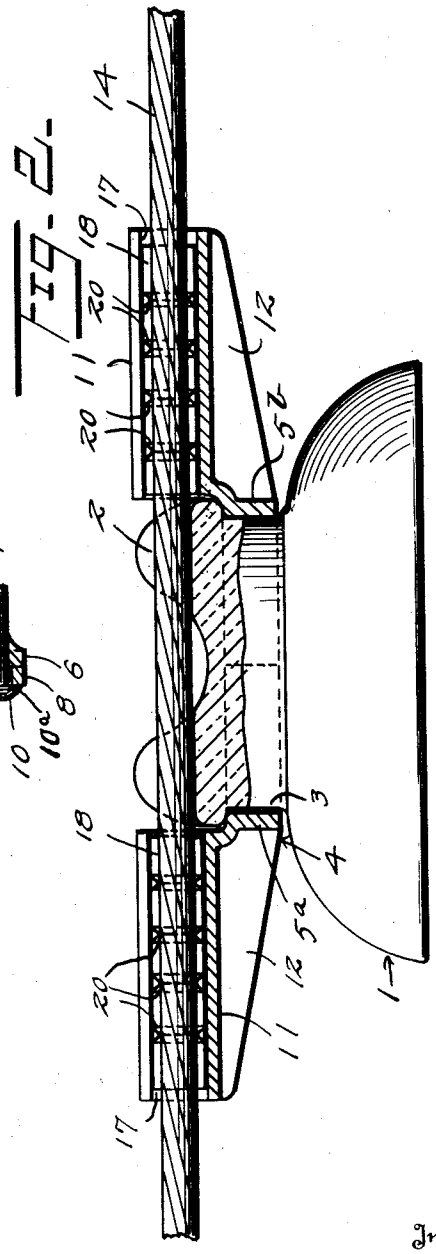


Fig. 2.

Inventor
T. H. Bowen

By Watson E. Coleman
Attorney

Feb. 20, 1934. T. H. BOWEN 1,948,061

FASTENER FOR CONNECTING HIGH VOLTAGE CONDUCTORS TO INSULATORS

Filed May 19, 1931 2 Sheets-Sheet 2

Fig. 3.

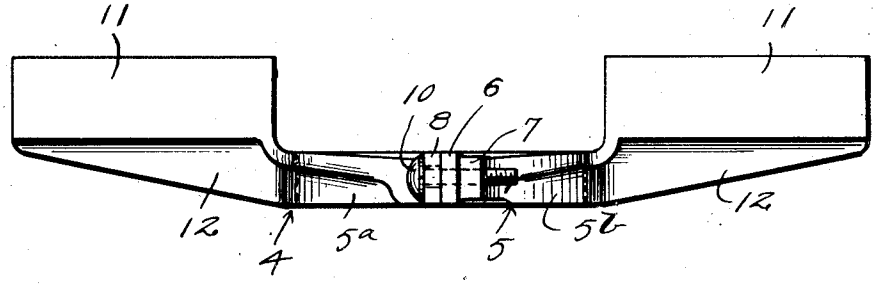


Fig. 4.

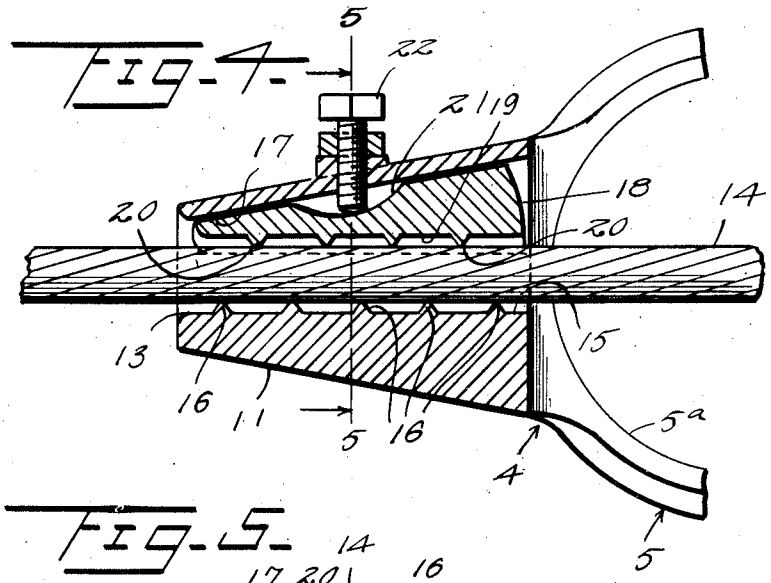
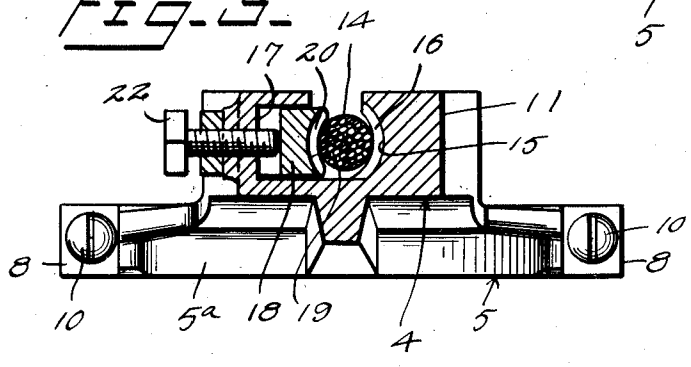


Fig. 5.



Inventor

T. H. Bowen

By Watson E. Coleman

Attorney

Patented Feb. 20, 1934 1,948,061

UNITED STATES PATENT OFFICE

1,948,061

FASTENER FOR CONNECTING HIGH VOLTAGE CONDUCTORS TO INSULATORS

Thomas H. Bowen, Louisville, Ky.

Application May 19, 1931. Serial No. 538,524

7 Claims. (Cl. 173—313)

This invention relates to means for fastening high voltage conductors or lines to insulators, and has for one of its objects to provide a fastener which shall be adapted to obviate the necessity of the use of the tie wires and the ribbons now employed in securing such conductors or lines to insulators, through the medium of which the conductors or lines may be secured to the insulators more firmly than is possible when tie wires are employed, and through the medium of which the conductors or lines may be secured to the insulators in a shorter time with greater ease than is possible when tie wires are employed.

The invention has for a further object to provide a fastener of the character stated which shall be adapted to be readily secured to an insulator, which shall be adapted to permit a conductor or line to be readily placed therein and in the groove of the insulator with the aid of a high line stick or tool, and which shall be adapted to permit the conductor or line to be clamped therein through the aid of such stick or tool.

The invention has for a further object to provide a fastener of the character stated which shall be adapted to positively hold the conductor or line against lengthwise movement with respect to the insulator, and which shall also be adapted to positively hold the conductor or line against upward displacement from the groove of the insulator.

The invention has for a further object to provide a fastener of the character stated which shall be simple and durable and capable of being manufactured and sold at low cost.

With the foregoing and other objects in view, the nature of which will appear as the description proceeds, the invention consists in the construction, combination and arrangement of parts hereinafter fully described and claimed, and illustrated in the accompanying drawings, wherein:—

Figure 1 is a view partly in top plan and partly in horizontal section of the fastener with a fragmentary portion of a conductor or line clamped therein.

Figure 2 is a view partly in side elevation and partly in vertical section illustrating the fastener and conductor or line applied to an insulator.

Figure 3 is a view in side elevation of the fastener.

Figure 4 is a sectional view taken on a horizontal plane extending longitudinally and centrally through one of the arms of the fastener, and

Figure 5 is a sectional view taken on the vertical plane indicated by the line 5—5 of Figure 4.

Referring in detail to the drawings, 1 designates an insulator of that type employed in securing high voltage conductors or lines to poles, cross arms and towers. 2 designates the conductor or line receiving groove and 3 the tie wire receiving groove of the insulator, the former being straight and located in the upper end of the top or head of the insulator, and the latter being annular and located in a side of the top or head immediately below the upper end thereof.

The fastener, which is generally designated 4, comprises an annular member 5 through the medium of which it is secured to the insulator 1. The ring 5 fits in the groove 3 of the insulator 1 and to the end that it may be readily positioned in the groove it is made of sectional formation. The ring sections 5*a* and 5*b* are semi-circular, the section 5*a* being provided at its ends with outwardly directed lugs 6 which are provided with openings 7 having their walls screw threaded, and the section 5*b* being provided at its ends with outwardly directed lugs 8 which are provided with openings 9 having smooth walls. Bolts 10, passing freely through the lugs 8 and engaging the lugs 6, provide means for securing the ring sections 5*a* and 5*b* in assembled relation on the insulator 1.

An arm 11 is carried by each of the ring sections 5*a* and 5*b*. The arms 11 are located above the ring sections 5*a* and 5*b* and medially between the ends thereof. The arms 11 extend outwardly from the ring sections 5*a* and 5*b*, and are integrally connected at their inner lower corners with the ring sections. Ribs 12 formed integrally with the ring sections 5*a* and 5*b* and with the arms 11, and located at the lower sides of and equal in length to the arms, serve to strengthen and reinforce the connection between the ring sections and arms and support the arms against the possibility of being bent downwardly with respect to the ring sections.

The arms 11 are provided in their upper sides with longitudinal grooves 13 which are arranged in coaxial relation with each other and which when the fastener is applied to the insulator aline with the groove 2 of the insulator so as to receive those portions of the conductor or line 14 located close to the insulator. Corresponding side walls of the grooves 13 are convex in cross section and such walls, which are designated 15, are provided with teeth 16 which extend transversely thereof and which are curved similarly to the curvature of the walls.

The other side walls of the grooves 13 are provided with recesses 17 which extend throughout the entire length thereof and which are open at their ends and inner sides. The top and bottom walls of the recesses 17 are parallel, and the outer walls thereof are arranged at an angle to the walls 15 of the grooves 13, the outer walls inclining laterally inward from the inner to the outer ends of the arms 11. Wedges 18 are slidably mounted in the recesses 17 with their inclined outer lateral sides in contact with the inclined walls of the recesses. The inner lateral face of each wedge 18 is concave at 19 and has teeth 20 which extend transversely of the grooves and which are curved similarly to the grooves. Each wedge 18 has its outer sides recessed to provide curved surfaces 21 which extend longitudinally of the wedge and with which the inner end of a screw 22 engages. The screws are screw threadedly engaged in the arms 11 and provide means through the medium of which the wedges may be moved in the direction of the curved walls 15 of the recesses 13 to clamp the conductor or line 14 between such walls and the corresponding curved inner lateral sides 19 of the wedges.

In practice, the fastener 4 is secured to the insulator 1 through the medium of its sectional ring 5, the ring engaging in the groove 3 of the insulator to hold the fastener against movement in any direction with respect to the insulator. After the fastener 4 has been applied to the insulator 1 with the wedges 18 in their greatest spaced relation to the walls 15 of the recesses 13, the conductor 14 is placed in the groove 2 of the insulator and said recess of the fastener, and this may be easily and quickly done through the medium of a high-line stick or tool.

After the conductor 14 has been applied to the insulator 1 and fastener 4, the screws 22 are turned up to move the wedges 18 in the direction of the walls 15 of the grooves 13, to the end that the conductor will be clamped to the fastener. As the screws 22 extend laterally outward from the arms 11, they may be readily turned up through the medium of a line stick provided with a socket. During the adjustment of the wedges 18, the teeth 20 of the wedges and the teeth 16 of the arms 11 engage the conductor 14, and as these teeth are arcuate they positively hold the conductor or line against upward displacement with respect to the fastener 4, and also hold the conductor against lengthwise movement to any material extent with respect to the fastener. Any such movement of the conductor or line 14 will move one of the wedges 18 outwardly with respect to the arm 11 carrying such wedge, and such movement of such wedge will, due to the contact of its arcuate surface 21 with its screws 22, result in the movement of the wedge in the direction of the opposing wall of the recess 13 and bring about a firmer clamping action on the conductor or line. If the insulator 1 is to be removed from the pole, cross arm or tower to which it is applied, the conductor 14 may be, after backing out the screws 22 by the high-line stick, readily removed from the clamp and insulator by a high-line stick. The clamps may be readily applied to the new insulator and thereafter the conductor or line 14 may be readily applied to and secured to the fastener. Lock washers 10*a* and lock nuts 22*a* are provided for the screws 10 and 22, respectively.

Should the conductor or line 14 break, only those portions located between the poles or towers where the break occurred will fall, due to the fact that the conductor or line cannot become displaced in lengthwise direction from the fastener 4. The fastener 4 may be made of any metal possessing sufficient strength to hold the conductor or line 14 and the insulator 1 and to hold the conductor or line in the event of the breaking of the same. The fastener 4 may also be used for the purpose of dead-ending a conductor or line, and when used for this purpose will obviate the necessity of wrapping the conductor or line around the top of an insulator in a so-called figure 8. In addition to reducing the time and labor necessary to connect a high voltage conductor or line to an insulator, the fastener obviates the necessity of the use of the tools now employed to connect a tie wire to an insulator and connect the tie wire to the conductor or line and the tool now employed to wrap a ribbon about the conductor or line, and thus materially reduces the cost of equipment necessary to connect the conductor thereto.

It will be seen that by my construction I entirely do away with the necessity of using a tie wire extending around the insulator 1 and that instead of this I form my conductor clamping or gripping device of two sections, a section having confronting ends disposed at right angles to the length of the conductor and held together by the screws 10. This is an important feature of my construction inasmuch as it spaces the screws 10 away from the conductor 14 which is a very necessary thing where a conductor is carrying high tension currents. Furthermore, it places the screws 10 in such position that they may be readily operated to tighten them up by the use of a high line stick as it is called. Furthermore, my construction permits the fastening or gripping means to be attached to the insulator before the insulator is attached on the arm or pole. Again with my construction, the conductor 14 is held positively by two relatively long wedges 18 and the opposed relatively long jaws so that the conductor is held or clamped over a relatively long area. By means of the screws 22, the wedges 18 may not only be forced inward, so as to accommodate conductors of different diameters, but these screws 22 prevent each wedge from backing out and the curved faces 21 of the recesses in the wedges act in conjunction with the screws 22 to cause the member 18 to wedge against the conductor no matter how much the member 18 may be forced inward and act to cause the member 18 to be wedged against the conductor whether strain be placed upon the conductor to pull it in one direction or the other. In other words, there is a positive grip on the conductor no matter in which direction the conductor is pulled. If it were not for the screws 22, my device would not be applicable to conductors of different diameters or while the members 18 might be forced inward against a conductor, if it were not for the recesses 21, the members 18 would not exert any wedging action. With my construction, therefore, a conductor is positively held by both wedges against longitudinal movement in either direction. Furthermore, this permits a conductor to be "dead ended" and held by both wedges or a single wedge as may be desired. If a conductor or wire should burn down between the poles, my fastening device will hold on both sides of the insulator to the left of the insulator as well as to the right. With my construction, furthermore, the screws 22 which hold the wedges in place against the conductor are entirely separate from the means which holds the sections of the fastener together

around the insulator, thus permitting the adjustment of these wedges without in any way affecting the engagement of the two sections with the insulator. These screws 22 are held in locked position by the lock nuts 22*a* and cannot, therefore, back out by reason of vibration or anything of this nature.

Both of the screws are disposed on the same side of the fastener and hence may be operated from the ground or from the pole. My fastener can be reached with an insulated stick and socket wrench from the center of the pole without any danger to the lineman. The screws 22 in my construction are on one side of the fastener, as before remarked, which is the side facing the pole. With my construction, the wedges are put in place initially with the screws 22 turned fully outward and thus the conductors may be readily slipped into place between the wedges and the opposed jaws and then the wedges shifted inward to lock the conductors to the jaws. Thus there is no necessity of a lineman inserting the wedges by hand and thus rendering himself likely to come in contact with the high tension wires.

While I have described the principle of the invention, together with the structure which I now consider the preferred embodiment thereof, it is to be understood that the structure shown is merely illustrative and that such changes may be made, when desired, as fall within the scope of the invention as claimed.

What is claimed is:—

1. A fastener for connecting a conductor to an insulator having a top or head provided with a conductor receiving groove, the fastener comprising arms having conductor receiving grooves adapted to register with and form continuations of the groove in the head, one wall of each of said grooves being concave and the other recessed, the recesses having their outer walls inclined laterally inward from their inner to their outer ends, wedges slidable laterally and longitudinally in said recesses and having concave sides opposing said concave walls, screws carried by the arms disposed transversely to the length of the wedges, engaging with the wedges and providing means by which the wedges may be moved transversely of the length of the arms while permitting longitudinal movement of the wedges, the wedges having wedging engagement with the screws in any laterally adjusted position of the wedges and means for securing the arms to the top or head.

2. A fastener for connecting a conductor to an insulator having a top or head provided with a conductor receiving groove, the fastener comprising arms having conductor receiving grooves adapted to register with and form continuations of the ends of the groove in the head, one wall of each of said grooves being concave and the other provided with a recess, the outer walls of said recesses being inclined, wedges slidable in said recesses and having concave inner sides opposing said concave walls, the wedges being provided at their outer sides with longitudinally concave recesses, screws carried by the arms and contacting with the faces of the recesses, and means for securing the arms to the top or head.

3. A fastener for connecting a conductor to an insulator having a top or head provided in its upper end with a diametric conductor receiving groove, the fastener having opposed arms adopted to register with the ends of said groove, the arms having upwardly opening longitudinally elongated conductor receiving grooves constituting continuations of the groove in the head, one wall of each groove being recessed, and a wedge disposed in the recess of each arm, the recess being of a depth such that the wedge may be disposed entirely within the recess to permit the ready insertion of the conductor or removal thereof when the wedge is fully retracted, and means whereby each wedge may be shifted transversely of its length into operative clamping engagement with the conductor.

4. A fastener for connecting a conductor to an insulator having a head provided with a conductor receiving groove, the fastener having means for embracing the head and having two arms extending outwardly from said means, each arm having an upwardly opening conductor receiving groove adapted to register with the ends of the groove in the head, one wall of the recess being concavely curved transversely to the length of the groove, the other wall being recessed, a longitudinally movable wedge disposed within the recess and constituting a jaw confronting the opposite wall of the recess, and a screw extending through the wall of the recess whereby the wedge may be shifted toward the opposite wall, the wedge when bearing against the conductor having wedging engagement with the screw.

5. A fastener for connecting a conductor to an insulator having a head provided with a neck and a diametric conductor receiving groove in its upper face, the fastener being formed in two sections, each section defining a semi-circular element, said elements when joined embracing the insulator around said neck, each section of the fastener having arms extending outward, each arm having a conductor receiving groove adapted to register with the ends of the groove in the head, one wall of the groove being concavely turned transversely to the length of the groove, the other wall being recessed, a longitudinally movable wedge disposed in the recess and having a concavely curved inner face confronting the curved inner face of the opposite wall of the groove, and a screw extending through the outer wall of the recess and bearing against said wedge whereby the wedge may be shifted toward the first named wall and have wedging engagement with the screw.

6. A fastener for connecting a conductor to an insulator having a head provided with a conductor receiving groove, the fastener having means for embracing the head and having two arms extending outward from said means, each arm having a conductor receiving groove adapted to register with the ends of the groove in the head, one wall of the groove being concavely curved transversely to the length of the groove, the other wall being recessed, a conductor engaging wedge disposed in the recess and having its inner face concavely curved transversely to the length of the wedge, the outer face of the wedge having a longitudinally extending concave recess, and a screw extending through the wall of the first named recess and engaging in the concave recess of the wedge whereby the wedge may be shifted toward the first-named wall and have at all times wedging engagement with the screw when the wedge is shifted in either direction.

7. A fastener for connecting a conductor to an insulator having a top or head provided with a conductor receiving groove, the fastener comprising a sectional ring adapted to embrace the top or head, means for securing the ring sections

in assembled relation on the top or head, arms extending radially outward from the ring sections and provided with grooves adapted to aline with the groove of the top or head, and means for clamping the conductor in the grooves of the arms, said clamping means including a wedge-shaped member movable laterally and longitudinally of the grooves, and a tightening screw carried by each arm extending transversely of the length of the corresponding wedge and acting to shift the corresponding wedge inward toward the medial plane of the arm, but permitting longitudinal movement of the wedge.

THOMAS H. BOWEN.