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3,540,111

METHOD OF MOVING CROSSARMS

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2 Sheets-Sheet 1

FIG. 1.

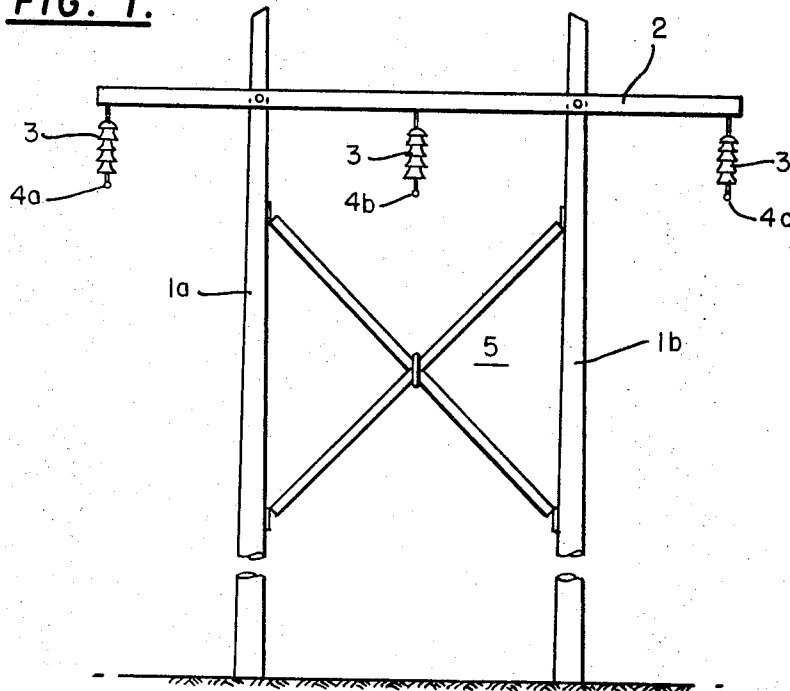
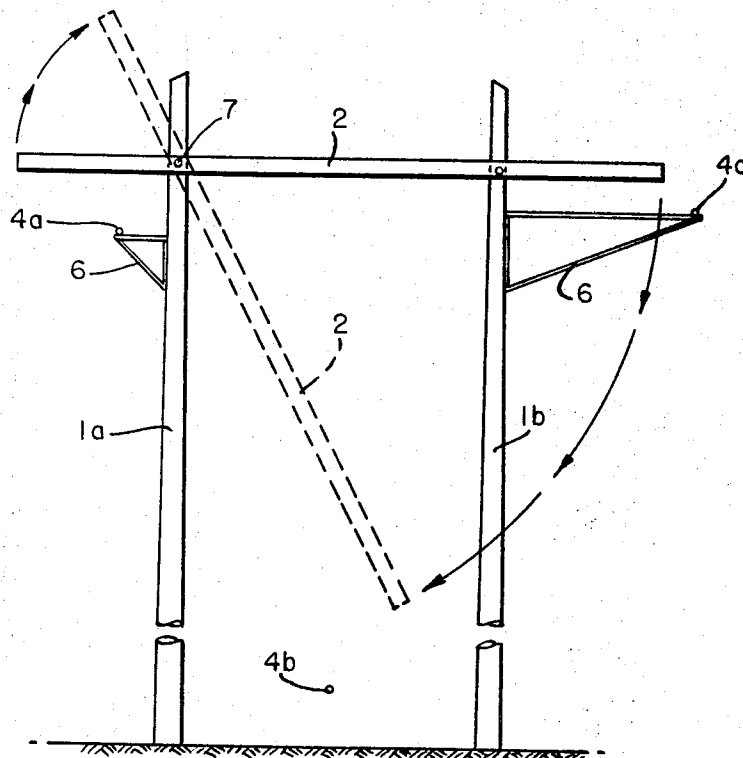


FIG. 2.
(Prior Art)



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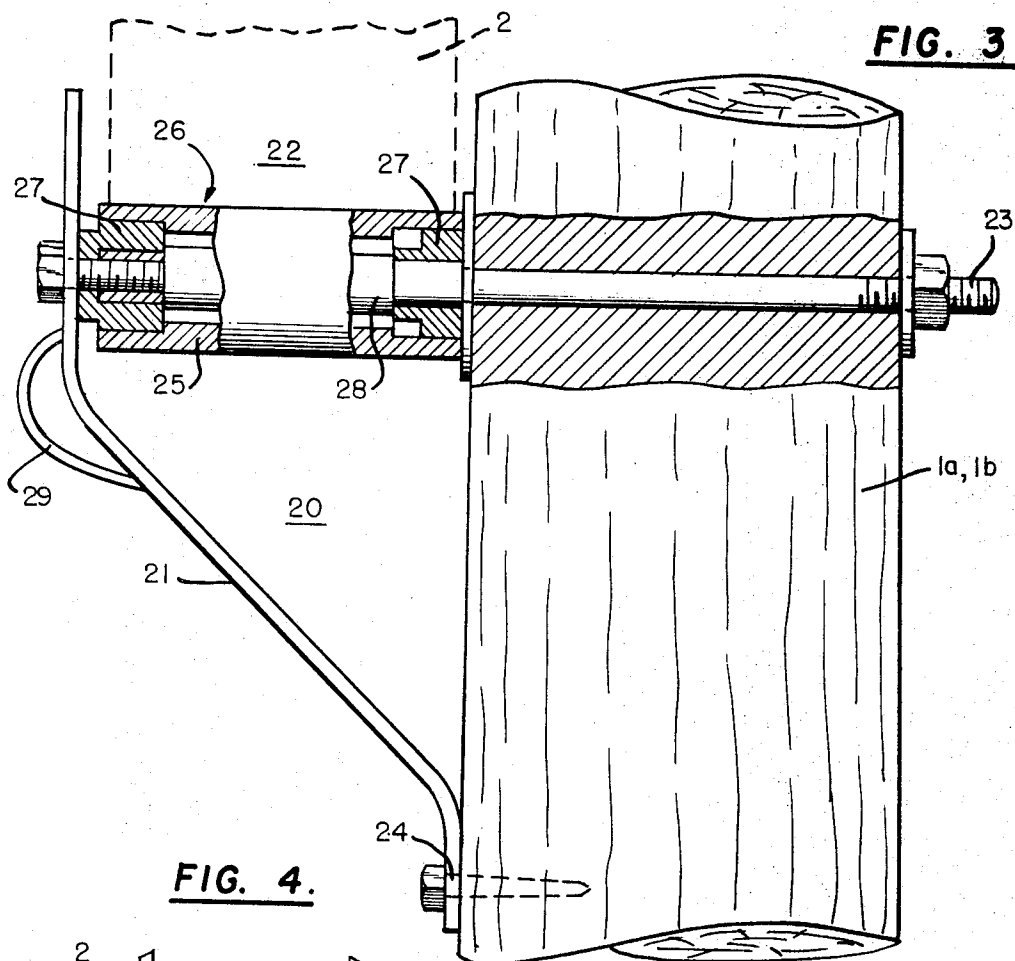
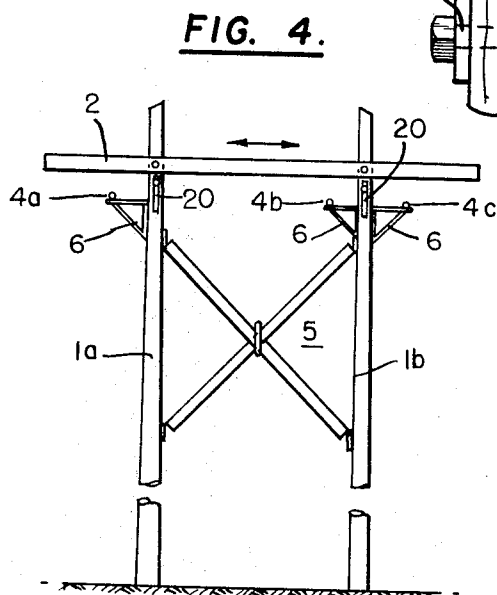
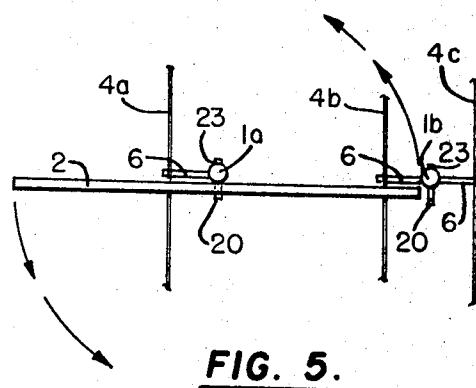
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METHOD OF MOVING CROSSARMS

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21 Claims

ABSTRACT OF THE DISCLOSURE

Removing a crossarm from a power line support structure having multiple support poles by moving the crossarm horizontally on rollers in a direction perpendicular to the power lines until its center of gravity is above one of the support poles, rotating the crossarm first 90 degrees in a horizontal plane and then approximately 90 degrees in a vertical plane and lowering the crossarm to the ground; whereby the crossarm can be removed with a minimum amount of interference with the power lines and other parts of the support structure. A crossarm is mounted by reversing the procedure.

The invention relates generally to a method, and a tool used therein, of removing and replacing crossarms from a support structure for mounting wires, for example, power lines, with a minimum of interference with the wires. More particularly, in the present invention the crossarm is moved laterally on roller tools until its center of gravity is above a roller tool; rotated 90 degrees in a horizontal plane and, if necessary, 90 degrees in a vertical plane; and lowered to the ground. The invention has been found to be especially useful in removing and replacing a crossarm on a power line support structure having two vertical poles and one or more parallel crossarms mounted thereon with three high voltage lines being carried by each of said crossarms and the invention will be described in detail with respect thereto. However, the invention is not so limited and the disclosure with respect thereto should be considered as merely exemplary.

Heretofore, when it was desired to remove a crossarm from its support poles the wires were first disconnected, removed, and temporarily remounted in positions at sufficient distances to permit the rotation of the crossarm about one of its mounting bolts in a plane vertical both to the ground and to the power lines, i.e., a plane parallel to the vertical poles. It was therefore necessary to lower the center wire twenty-four to thirty feet for clearance. Moreover, if there were additional crossarms or bracing structures below the crossarm to be removed, the lower members would have to likewise be dislocated or lowered a distance sufficient to permit the rotation of the crossarm being removed. This prior art procedure has been relatively burdensome, time-consuming, difficult, and dangerous. The power lines in the prior art method are also put under greater stress and strain. Moreover, in the present invention by moving the crossarm laterally on rollers, the insulators can be removed without extensive reaching by the lineman whereas in the prior art method it was necessary to reach seven feet to unhook the insulators.

It is therefore an object of the invention to provide a method, and a tool for use therein, of removing and replacing crossarms on multiple support members which is less burdensome, time-consuming, difficult and dangerous.

It is also an object of the invention to provide such a method, and a tool for use therein, which places less stress and strain on the wires being supported.

It is a further object to remove and replace the crossarms with a minimum amount of interference with the wires.

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Another object is to permit a lineman to disconnect the insulators without extensive reaching.

Other objects and advantages of the invention and a full understanding thereof may be had by referring to the following description and claims taken together with the accompanying drawings, in which:

FIG. 1 is a front view of a standard transmission line support tower;

FIG. 2 illustrates a prior art method;

FIG. 3 is a plan view of the roller tool of the present invention; and

FIGS. 4 and 5 illustrate the the method of the present invention, with FIG. 4 being from the same perspective as FIGS. 1 and 2 and FIG. 5 being a top view.

FIG. 1 shows a basic "H-structure" support tower including two vertical poles 1a and 1b separated by fourteen feet with a twenty-nine foot horizontal crossarm 2 bolted thereto and extending seven feet to either side. Three power lines 4a, 4b and 4c carrying phases A, B and C are suspended by means of insulators 3 from the crossarm 2. In transmission systems requiring more than three lines, additional crossarms are supported between the two vertical support poles 1a and 1b. For added strength, an X-brace member 5 is included.

PRIOR ART

The standard prior art procedure for removing the crossarm 2 will be described with respect to FIG. 2. To change the crossarm 2 the old method has been to, by means of jack sticks, insulated link sticks and rope blocks, disconnect the three lines 4 from their respective insulators 3, with lines 4a and 4c then being supported by insulating sticks 6 and line 4c placed out away from and past where the crossarm 2 extends to its side. The insulators 3 themselves are then removed. It should be noted that the linemen on poles 1a and 1b have to reach approximately seven feet to disconnect the lines 4 and their insulators 3. Line 4b is then lowered a substantial distance, usually twenty-five to thirty feet, so as to permit rotation of the crossarm 2. However, if an X-brace 5 is present, it must first be removed before line 4b can be lowered. In some cases, there are two and three sets of X-braces present, depending on the length of the vertical poles 1a and 1b, all of which may have to be removed. Removal of any crossarm and lines located within twenty-five feet below of crossarm 2 would likewise have to be done. If the lines 4 are shielded (which involves a six foot extension above the crossarm 2), it is also necessary to remove the shield wire above vertical pole 1a and place it on the other side of the tower so it would not interfere with the rotation of the crossarm 2. In the event the pole does not have a shield, then it is necessary to mount a gin pole on pole 1b to mount a rope block used in rotating the crossarm 2. Once the line 4b is set in its removed position, the crossarm 2 is unbolted from one of the poles, for example 1b, and rotated about the remaining bolt 7 in a plane parallel to the vertical poles 1a and 1b, i.e., a plane perpendicular to the lines 4 and the ground (note dashed arrow). The remaining bolt 7 is then disconnected and the crossarm 2 is lowered to the ground. A new crossarm is replaced by reversing the procedure, i.e., raised, bolted, rotated and bolted again with the lines 4 being connected to their respective insulators.

PRESENT INVENTION

As shown in FIG. 3, a roller tool 20 having a support bracket 21 with a roller element 22 mounted thereon is secured by means of central bolt 23 and a bolt passing through lower bolt hole 24 to each of the poles 1a and 1b so that the lower portion of the crossarm 2 contacts the upper portion 26 of the cylindrical rotating member 25 of the roller element 22. Rotating member 25 rides on bear-

ings 27 which are secured to central support element 28 which in turn is secured to central bolt 23 and bracket 21. A hook 29 is provided on the bracket 21 for over-all ease in handling the roller tool 20. If appropriate holes are not already provided in the poles 1a and 1b, then it will be necessary to drill such holes before securing a roller tool 20 to each of the vertical poles 1a and 1b.

As can be seen in FIG. 4, after the roller tools are in place, the crossarm 2 is completely unbolted from the poles 1a and 1b so that it now rests on the roller tools 20. The lines 4 are disconnected from their respective insulators 3 and in turn secured by insulating sticks 6 to the poles 1a and 1b and the insulators 3 themselves are removed. To ease the removal of the insulators 3, the crossarm 2 may be shifted laterally (note arrow) by rolling it on the roller tools 20 approximately five and a half to six feet either way, requiring no more than a two foot reach.

As illustrated in FIG. 5, the crossarm 2 is then moved laterally until its center of gravity is approximately above the roller tool 20 on one of the poles, for example 1a. This position should be just as the end of the crossarm 2 clears the other roller tool 20 and the other pole, in the example, 1b. The crossarm 2 is then rotated ninety degrees in a plane parallel to the ground (note arrows) until it is parallel to the lines 4 and is situated between, in the example, pole 1a and line 4b. The crossarm 2 can then be lowered to the ground. If there is additional support structure below, for example, an X-brace 5 or one or more additional crossarms, the crossarm 2 is further rotated approximately ninety degrees in a vertical plane to thereby avoid the structure and then lowered. To mount a new crossarm, the above procedure is reversed, i.e., the crossarm is raised parallel to the wires 4, rotated ninety degrees until it rests at its midpoint on the roller tool 20 mounted on pole 1a, and then rolled laterally on the roller tools 20 until it is in its proper position; the crossarm is then bolted to the poles 1a and 1b and the insulators 3 and lines 4 reinstalled.

It should be noted that during the procedure of removing and replacing the crossarm 2, appropriate rigging is used between the crossarm and the poles 1a and 1b and the linemen located on the poles 1a and 1b and on the ground, to insure complete control and guidance of the crossarm during its movements. This is the same in general principle as followed in prior art methods.

In the event the poles 1a and 1b support a double crossarm structure, i.e., two crossarms mounted face-to-face on opposite sides of the poles, the opposite crossarm can be taken down in a similar way by using the double roller in which there are mounted two roller tools 20 at opposite ends of an elongated bolt similar to central bolt 23. If the support structure is a single crossarm construction but a new pole has been changed on the opposite side of the crossarm, i.e., one pole is on one side of the crossarm and the other pole is on the other side, the roller tools 20 are mounted on opposite sides.

In the present invention, an experienced crew of six or seven men can change-out a crossarm in approximately an hour to an hour and a half as compared to a minimum of three or four hours by the prior art method.

Many variations in the method steps and various changes in the structural details in the roller tool can be made from those described above without departing from the spirit and scope of the present invention and the above description is to be considered only exemplary.

What is claimed as invention is:

1. A method of changing the vertical position of a generally horizontal crossarm (2) with respect to a generally vertical support structure having at least two spaced vertical support members (1), said support structure supporting members (4) extending in a direction generally away from the plane of said support structure, comprising the steps of:

(a) disconnecting the extending members (4) from said support structure;

(b) unsecuring said crossarm from said support structure;

(c) moving said crossarm in a horizontal direction and a direction perpendicular to the extending members (4);

(d) rotating said crossarm in a horizontal plane; and

(e) changing the vertical position of said crossarm; whereby said crossarm does not interfere with said extending members.

2. The method of claim 1 wherein, in step (d), the rotation is approximately ninety degrees.

3. The method of claim 1 wherein, in step (c), said crossarm is supported by one or more rollers mounted on said support structure as it is moved.

4. The method of claim 1 wherein, in step (d), said crossarm is also rotated in a vertical plane.

5. The method of claim 4 wherein the vertical rotation is approximately ninety degrees.

6. The method of claim 1 wherein the position of said crossarm is being changed from a higher position on said vertical support members to the ground or a lower position and the method steps are performed seriatim.

7. A method of replacing a used horizontal crossarm (2) carrying three or more lines (4) on insulators (3) and secured between at least two vertical support poles (1) comprising the steps of:

(a) mounting a roller tool (20) having a freely rolling surface (26) on each of said poles directly beneath said crossarm;

(b) disconnecting said lines from said crossarm and supporting them in positions not substantially removed from their original positions;

(c) completely unsecuring the crossarm from said poles so that the crossarm is supported by said rolling surfaces;

(d) moving said crossarm in a lateral direction on said rolling surfaces;

(e) positioning said crossarm with its center of gravity in a position approximately over one of said roller tools;

(f) rotating said crossarm in an horizontal plane until it is parallel with said lines; and

(g) lowering said crossarm to the ground;

whereby said crossarm is removed from said poles with a minimum of interference with said lines.

8. The method of claim 7 wherein a different crossarm is secured to said poles in the analogous position formerly held by said used crossarm by generally repeating the above steps in reverse order.

9. The method of claim 7 wherein the insulators are removed from the crossarm in step (d), whereby only a short reach is required.

10. The method of claim 7 wherein said poles carry additional support members below said crossarm and step (f) further includes after the horizontal rotation, rotation in vertical plane until said crossarm is approximately parallel to said poles; whereby said crossarm can be lowered without interfering with said additional support members.

11. The method of claim 3 wherein said roller comprises: a roller element (22), including a central support member (28) and a cylindrical roller surface member (25, 26) mounted for rotation on said central support member, and bracket means (21) for supporting said roller element and securing it to said support structure.

12. The method of claim 11 in which said central support member is fixedly secured to a bolt member (23) for mounting said tool to said support structure.

13. The method of claim 12 in which said bracket means is connected to said central support member at the end remote from said bolt member and has an extension portion extending from the remote end of said central support member to a securing position for said support structure located below the juncture between said central support member and said bolt member.

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14. A method of changing the vertical position of a generally horizontal crossarm (2) with respect to a generally vertical support structure having at least two spaced vertical support members (1), said support structure supporting members (4) extending in a direction generally away from the plane of said support structure, comprising the steps of:

- (a) changing the vertical position of said crossarm in a manner in which said crossarm does not interfere with said extending members;
- (b) rotating said crossarm in a horizontal plane;
- (c) moving said crossarm in a horizontal direction and a direction perpendicular to the extending members (4);
- (d) securing said crossarm to said support structure; and
- (e) connecting the extending members (4) to said support structure.

15. The method of claim 14 wherein, in step (b), the rotation is approximately ninety degrees.

16. The method of claim 14 wherein, in step (c), said crossarm is supported by one or more rollers mounted on said support structure as it is moved.

17. The method of claim 14 wherein, in step (b) said crossarm is also rotated in a vertical plane.

18. The method of claim 14 wherein the position of said crossarm is being changed from ground level or a lower position to a higher position on said vertical support poles and the method steps are performed seriatim.

19. The method of claim 16 wherein said roller com-

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prises: a roller element (22), including a central support member (28) and a cylindrical roller surface member (25, 26) mounted for rotation on said central support member, and bracket means (21) for supporting said roller element and securing it to said support structure.

20. The roller tool of claim 19 in which said central support member is fixedly secured to a bolt member (23) for mounting said tool to said pole.

21. The roller tool of claim 20 in which said bracket means is connected to said central support member at the end remote from said bolt member and has an extension portion extending from the remote end of said central support member to a securing position for said pole located below the juncture between said central support member and said bolt member.

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U.S. Cl. X.R.

29—426; 52—40; 174—45; 254—134.3