Sept. 13, 1932. G. HULTMAN 1,877,241

METHOD OF AND APPARATUS FOR CHANGING-OVER POWER-LINE POLES

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Fig. 1.

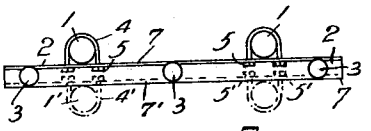


Fig. 2.

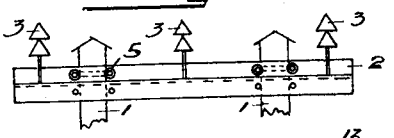


Fig. 3.

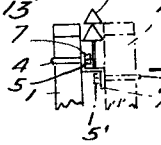


Fig. 4.

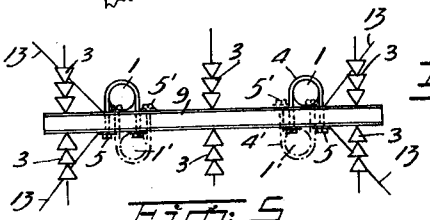


Fig. 5.

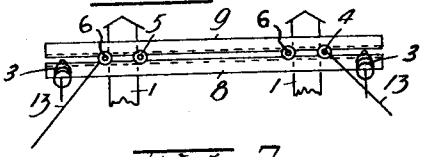


Fig. 6.

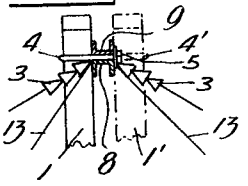


Fig. 6a

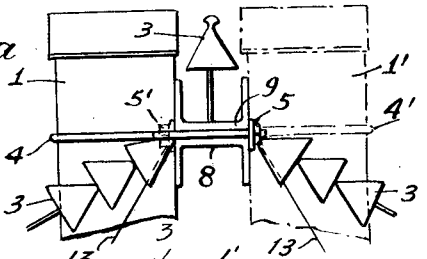


Fig. 7.

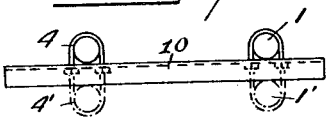


Fig. 8.

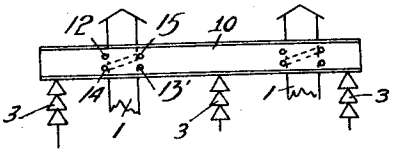


Fig. 9.

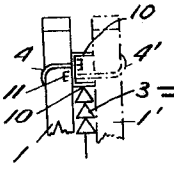


Fig. 8a

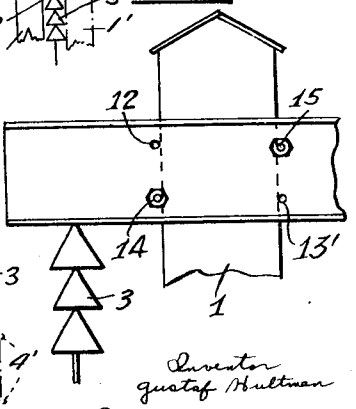


Fig. 10.

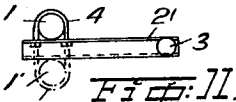


Fig. 11.

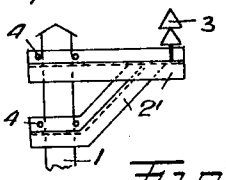
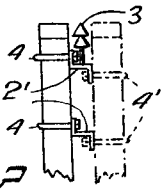


Fig. 12.



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METHOD OF AND APPARATUS FOR CHANGING-OVER POWER-LINE POLES

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Fig. 19.

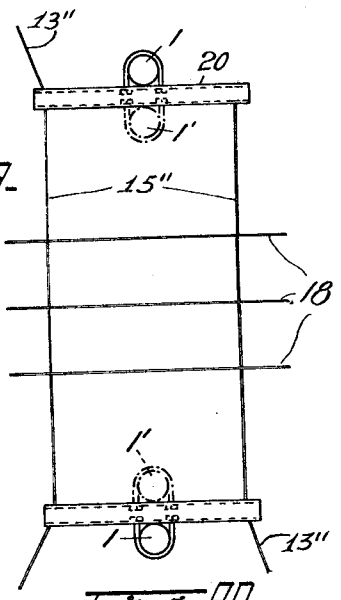

Fig. 20.

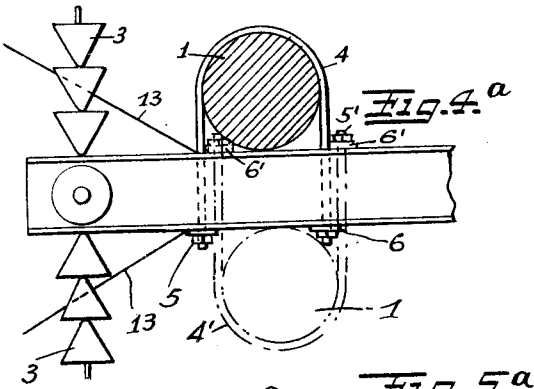

Fig. 4a

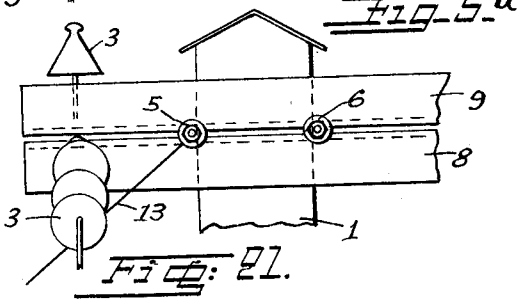

Fig. 5a

Fig. 21.

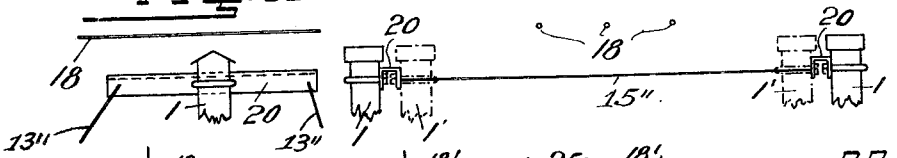

Fig. 22

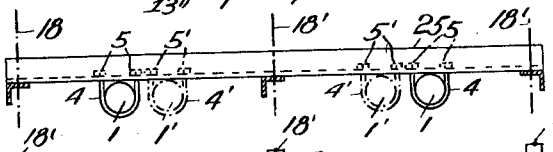

Fig. 23.

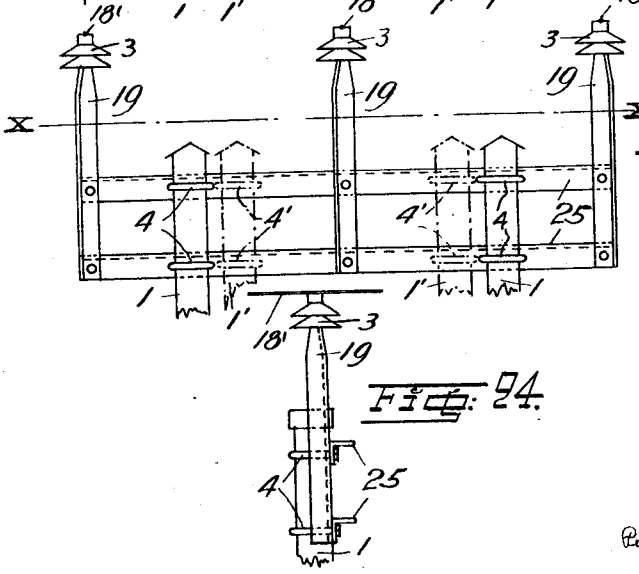

Fig. 24.

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METHOD OF AND APPARATUS FOR CHANGING-OVER POWER-LINE POLES

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Fig. 13.

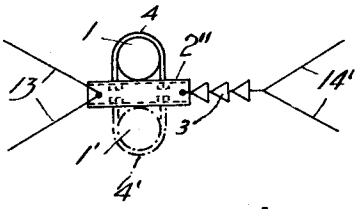


Fig. 14.

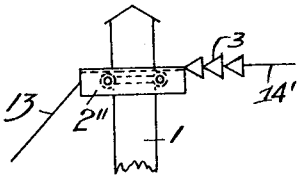


Fig. 15.

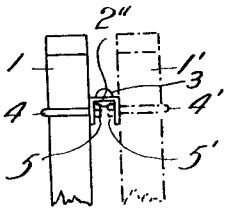


Fig. 16.

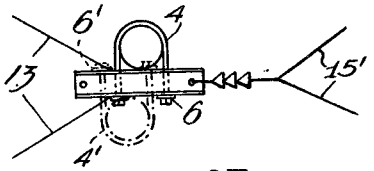


Fig. 17.

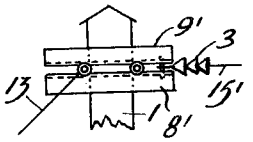
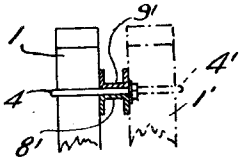


Fig. 18.



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METHOD OF AND APPARATUS FOR CHANGING-OVER POWER-LINE POLES

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Fig. 25.

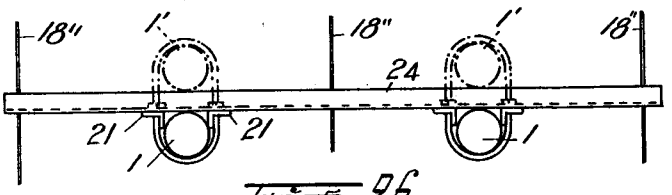


Fig. 26.

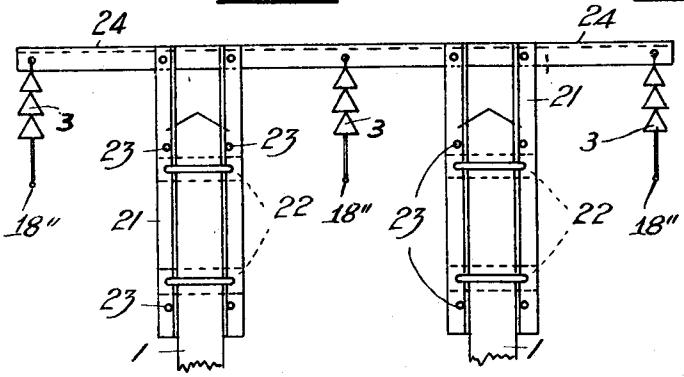


Fig. 27.

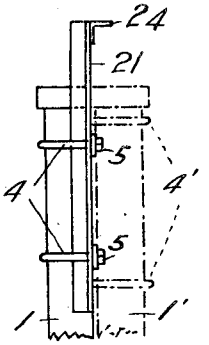


Fig. 28.

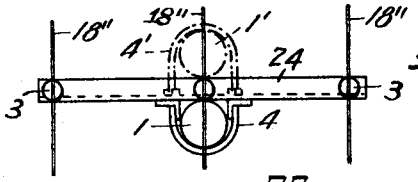


Fig. 29.

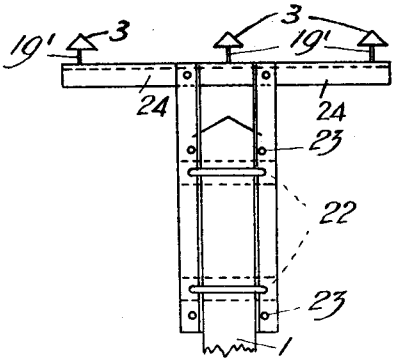


Fig. 9a

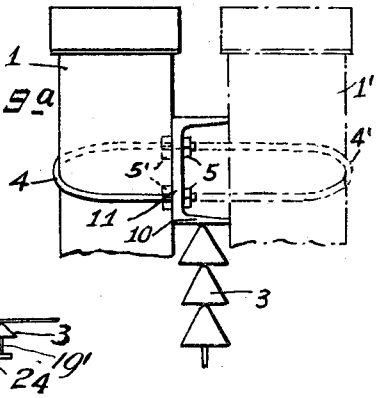
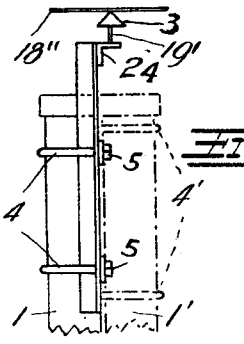


Fig. 30.



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UNITED STATES PATENT OFFICE

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METHOD OF AND APPARATUS FOR CHANGING-OVER POWER-LINE POLES

Application filed September 22, 1928, Serial No. 307,693, and in Sweden September 29, 1927.

The use of wooden or similar poles for carrying either electrical transmission lines or protecting devices which are necessary in thoroughfares and roads crossed by electrical transmission lines, and especially high tension lines, has the disadvantage that, after some time, the poles must be replaced by new ones, on account of decay. Hitherto, this operation was difficult and expensive.

The methods previously used are the following:

The conductors or wires were first disconnected from the insulators, then the old pole was removed and a new one, carrying insulators, was erected in its place, and finally the wires were fastened to the insulators. Lately, this method has been improved, the new pole being erected near the old one, and the wires detached from the old one, and fastened to the insulators of the new pole, after which the old pole was removed. Nevertheless, during the operation, it was always necessary to cut off the current in the transmission line.

In the case of telephone and telegraph lines, provided with poles and cross bars for carrying the wires, the last mentioned method was generally adopted. During the last years, this method has been simplified as follows: A temporary device was erected for carrying the cross bar in place. The cross bar was then detached from the pole which could be removed while the cross bar was supported by the temporary device. A new pole was erected in the place of the old one, the cross bar being fastened to it, and the temporary device removed. Although this method was less expensive than the first one, the amount of work involved and the cost of the temporary device were always considerable.

When a transmission line crosses a road, it is necessary in order to ensure the safety of the road to interpose wires or other protecting devices between the transmission line and the road. When the poles carrying said protecting devices had to be changed it was hitherto necessary to take down said protecting devices while the change was made. Consequently, during that time, the traffic had to be interrupted on that road, or, in the case of a high tension line, the current had to be cut off, or else temporary protecting devices had to be utilized, which were very expensive.

The object of the present invention is to make it possible to replace poles carrying wires whenever it is necessary, without any of the inconveniences above mentioned.

The invention comprises a method according to which the cross bar carrying the wires is fastened to a new pole erected close to the old one before the said cross bar is detached from the old pole.

The new pole is erected in such a position close to the old one, that it is adjacent to the cross bar carrying the wires, and said cross bar may consequently be secured to the new pole before it is separated from the old one. Therefore, the wires carried by the cross bar are not touched or displaced in any way, and they may continue to fulfill their office, either as electrical conductors, as protecting wires, or as stay wires.

This method is applicable to poles carrying transmission lines, telegraph lines, or the protecting wires above referred to.

The invention further comprises devices for the application of the method above explained, said devices comprising means for carrying the wires whereby the workmen replacing the poles of a high tension transmission line, need not come into dangerous proximity to the electrical conductors.

Regarding the stay wires which hitherto were generally fastened to the poles, they must, according to the invention, be fastened to the cross bars carrying the electrical or protecting wires. A pole can then be replaced without touching the stay wires. When some stay wires cannot be fastened to the ordinary cross bars, special fittings must be provided for them on the poles, so that such fittings can be secured to the new poles and detached from the old ones in the same manner as the cross bars.

The invention will be hereinafter more fully described with reference to the accompanying drawings, in which

Fig. 1 is a plan view of a double pole with insulators supporting the wires.

Figs. 2 and 3 are respectively a front and a side view corresponding to Fig. 1.

Fig. 4 is a plan view of a double pole with hanging insulators, equipped with stay wires in order to resist stresses.

Figs. 5 and 6 are respectively a front and a side view corresponding to Fig. 4.

Figs. 4*a*, 5*a* and 6*a* are enlarged views corresponding respectively to Figs. 4, 5 and 6.

Figs. 7, 8 and 9 are respectively a plan view, a front view and a side view of a double pole with hanging insulators.

Figs. 8*a* and 9*a* are enlarged views corresponding to Figs. 8 and 9.

Figs. 10, 11 and 12 are views similar to Figs. 1, 2 and 3 but corresponding to a single pole.

Figs. 13, 14 and 15 are respectively a plan view, a front view and a side view of a single pole with hanging insulators, equipped with stay wires.

Figs. 16, 17 and 18 are analogous views showing a single pole carrying protecting wires, and equipped with stay wires.

Figs. 19, 20 and 21 are respectively a plan view, a front view and a side view of two poles carrying protecting wires.

Figs. 22, 23 and 24 are respectively a sectional view along X—X of Fig. 23, a front view and a side view of a double pole with cross bars provided with vertical girders for carrying the electrical conductors in such a position that the workmen exchanging the poles will not risk coming into contact with said electrical conductors.

Figs. 25, 26 and 27 are respectively a plan view, a front view and a side view of a double pole carrying the cross bar by means of vertical girders.

Figs. 28, 29 and 30 are views analogous to Figs. 25, 26 and 27, but relating to a single pole.

In Figs. 1 to 3, the double pole is constituted by the two poles 1, 1 and 2 indicates the cross bar carrying the insulators 3. The cross bar 2 is fastened to the pole 1 by straps 4 passing through corresponding openings in the cross bar and tightened by nuts 5. Hitherto, the crossbar usually consisted of an angle girder, but according to the present invention it may be constituted of any kind of girder (U-section, Z-section, or H-section girder) which can easily be secured, on either side, to a pole. The cross bar shown in Figs. 1 to 3 consists of a Z-section girder, provided in its flange 7, with openings for the straps 4, which are tightened around the pole 1 by means of nuts 5. Similar openings are provided in the flange 7′ of the girder 2. The insulators 3 are fixed to the web of the girder 2.

When it is desired to replace a pole 1, a new pole 1′ is erected near the old one in such manner as to be in contact with or very close to the flange 7′ of the grinder 2. Straps 4′ are then disposed around the new pole 1′ their ends passing through the openings provided in the flanges 7′ of the girder 2, and then tightened by means of nuts 5′ so as to fasten the cross bar 2 to the new pole 1′. The straps 4 are loosened and the old pole 1 removed.

It is obvious that this method may as well be applied when the cross bar consists of a U-section girder or of an H-section girder. Angle girders may equally be used as crossbars, but in that case, it is necessary, when a pole is to be replaced, to place a clamp between the vertical part of the girder and the new pole, in order to obtain stability.

In Figs. 4 to 6 the cross bar is composed of two channel irons 8 and 9, with their webs opposite and a space left between them. The straps 4 pass through said space and are tightened by means of washers 6 and nuts 5. When the old poles 1 are to be replaced by new ones 1′, the operation is effected in the same way as previously explained, but the new straps 4′ are tightened by washers 6′ and nuts 5′ applied against the flanges of the channel irons opposite those which bear the nuts 5, as is shown by the enlarged view of Fig. 4*a*. It will be noted that the stay wires 13 serving to balance the stresses applied to the poles are secured to the cross bar and not to the poles. It is obvious that when the poles are replaced the stay wires have not to be touched.

In Figs. 7 to 9, the cross bar consists of a single channel iron 10, with its web situated in a vertical plane, secured to the pole 1 by straps 4 passing through diagonally located openings 14 and 15 in the web of the girder. Supplementary openings 12 and 13′ are equally provided in the said web. The replacement of the old poles 1 by new ones 1′ will be executed in the same way as above explained. The new straps 4′ will pass through the openings 12 and 13′ and when the exchange of poles is effected, the channel iron 10 will have its flanges applied against the new pole 1′.

In Figs. 10 to 12 the cross bar is carried by a single pole. The cross bar may be made of Z-section girders or of channel irons bent according to the shape illustrated in the drawings. The method for replacing the old pole 1 by a new one is the same as for the device shown in Figs. 1 to 3.

Fittings for fastening stay wires and protecting wires may evidently be fastened to the pole in accordance with the above mentioned principle, so that an exchange of poles may take place without the stay wires or the protecting wires being touched.

According to Figs. 13 to 15 which show the invention applied to a single pole with hanging insulators situated at a bend of an electric line, the cross bar consists of a channel iron 2″ to which the electrical conductors 14′ are secured by means of insulators 3. To balance the stresses exercised by the wires 14′

stay wires 13 are secured to the cross bar 2''. The channel iron 2'' is fastened to the pole 1 by means of a strap 4, the ends of which pass through openings provided in the flange of the said channel iron, and are secured there by means of nuts 5. Supplementary openings are provided in the other flange, and serve to receive the ends of the straps 4' when the cross bar is fastened to a new pole 1'. Said straps 4' are then tightened by means of nuts 5'.

In Figs. 16 to 18 the pole 1 serves to carry protective wires 15', and is provided with stay wires 13. The cross bar is constituted by two channel irons disposed in the same way as the channel irons 8 and 9 of Figures 4 to 6.

Figs. 19 to 21 show two poles 1, 1, carrying protecting wires 15'' stretched between the cross bars 20. 18 indicates high voltage lines and the wires 15'' disposed under them constitute a protecting net. In these figures, the cross bars are constituted by channel irons similar to those shown in 2'' in Figures 13–15. It is obvious that cross bars of different shapes and sections may be used, but the method of fastening the cross bar to a new pole before detaching it from the old one is always the same.

In the modification shown in Figs. 22 to 24 the double pole 1, 1 carries two cross bars 25 consisting of angle girders, and disposed one above the other. Said cross bars are fastened to the poles by means of straps 4 and nuts 5. Angle girders 19 vertically disposed, are secured to the cross bars, and are provided with insulators 3' for carrying the high voltage wires 18'. Supplementary openings in the cross bars 25 are provided for receiving the ends of the straps 4' which serve to fasten the new poles 1' to the same face of the cross bars. It will be noted that the workmen who must do that are sufficiently far from the high voltage wires to prevent any accident.

In Figs. 25 to 27 the cross bar, consisting of an angle girder is carried by the pole by means of other angle girders 21. These angle girders 21 are fastened to the poles by means of straps 4 passing through openings provided in said girders 21 and through corresponding openings in plates 22 and tightened by nuts 5. Other openings 23 are provided in the angle girders 21 so as to receive the ends of straps 4' serving to secure said girders 21 to new poles 1' before they are detached from the old ones 1.

The modification shown in Figs. 28 to 30 is very similar to the realization illustrated in Figs. 25–27. The difference is in the fact that the insulators are shown in Fig. 26 hanging to the cross bar, while in Fig. 29 they are shown mounted on rods secured to said cross bars.

Obviously, many modifications may be introduced in the method and the devices herein described without departing from the principle of the invention.

I claim:

1. The method of replacing a pole carrying wires by means of a cross bar, which comprises erecting a new pole adjacent the cross bar, fastening the cross bar on the new pole, unfastening the cross bar from the old pole, and removing the old pole.

2. The method of replacing a pole carrying wires by means of a cross bar, which comprises erecting a new pole adjacent the free side of the cross bar, fastening the cross bar to the new pole, unfastening the cross bar from the old pole, and removing the old pole.

3. The method of replacing a pole carrying wires by means of a cross bar, which comprises erecting a new pole adjacent the cross bar and on the same side as the old pole, fastening the cross bar to the new pole, unfastening the cross bar from the old pole, and removing the old pole.

4. In a pole and cross bar assembly for carrying overhead wires, means for securing the wires to the cross bar, means for fastening the cross bar to the pole, and supplementary fastening means for securing the cross bar to a new pole before the cross bar is detached from the first pole in order to replace said pole with a new pole.

5. In a pole and cross bar assembly for carrying overhead wires, comprising a girder, means for securing the wires to the girder, means for fastening the girder to the pole, and supplementary means for fastening the girder to a new pole before the girder is detached from the first pole in order to replace said pole with a new pole.

6. An overhead wire carrying device comprising a pole, a cross bar, fastening means for securing said cross bar to said pole, said cross bar being provided with one set of openings adapted to receive said fastening means and with another set of supplementary openings for receiving additional fastening means, whereby said cross bar may be secured to a new pole before its detachment from said first pole by supplementary fastening means extending through said supplementary openings, and means for securing the wires to said cross bar.

7. An overhead wire carrying device comprising a pole, a cross bar, fastening means for securing said cross bar to said pole, said cross bar being constituted by a girder providing one of its flanges with openings adapted to receive said fastening means and in another of its flanges with supplementary openings for securing additional fastening means, whereby a new pole erected adjacent said first named pole may be secured to said girder by additional fastening means extending through said supplementary openings before said girder is detached from said first

named pole, and means for securing the wires to said girder.

8. An overhead wire carrying device comprising a pole, a cross bar, fastening means for securing said cross bar to said pole, said cross bar being constituted by a girder provided in its web with one set of openings adapted to receive said fastening means and with another set adapted to receive additional fastening means, whereby said cross bar may be attached to a new pole erected adjacent said first named pole before said cross bar is detached from said first named pole, and means for securing a wire to the cross bar.

9. An overhead wire carrying device according to claim 20 including a cross bar constituted by a girder provided in its web with two sets of diagonally disposed openings to receive fastening means for securing the cross bar to the first named pole and a supplementary fastening means for securing the cross bar to a new pole.

10. An overhead wire carrying device comprising a pole, a cross bar, fastening means for securing said cross bar to said pole, said cross bar being constituted by a girder provided in one of its flanges with openings adapted to receive said fastening means and in the same flange with supplementary openings adapted to receive additional fastening means, whereby said cross bar may be attached to a new pole by means of additional fastening means received in said supplementary openings before said cross bar is detached from said first named pole, and means for securing the wires to the cross bar.

11. An overhead wire carrying device comprising a pole, cross bars, fastening means for securing said cross bars to said pole, said cross bars being constituted by girders provided with openings adapted to receive said fastening means and with supplementary openings adapted to receive additional fastening means, whereby said girders may be attached to a new pole before their detachment from said first named pole by means of additional fastening means extending through said supplementary openings, and vertical arms fastened to said girders and provided with insulators for carrying the wires.

12. An overhead wire carrying device comprising a pole, cross bars, fastening means for securing said cross bars to said pole, vertical girders secured to said cross bars and provided with openings adapted to receive said fastening means and with supplementary openings adapted to receive additional fastening means, whereby said girders may be secured to a new pole before their detachment from said first named pole by means of additional fastening means extending through said supplementary openings, and means for securing the wires to the cross bars.

13. An overhead wire carrying device comprising a pole, a cross bar, fastening straps for securing said cross bar to said pole, said cross bar being constituted by two girders spaced apart at a distance sufficient to receive said fastening straps between, washers having a diameter sufficient to span the space between said girder, and nuts adapted to be screwed on the ends of said straps so as to force said washers against said girders.

In testimony whereof I affix my signature.

GUSTAF HULTMAN.