No. 849,908. PATENTED APR. 9, 1907.

A. K. MANSFIELD.

STEEL SUPPORTING STRUCTURE FOR ELECTRIC TRANSMISSION CABLES.

APPLICATION FILED APR. 12, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

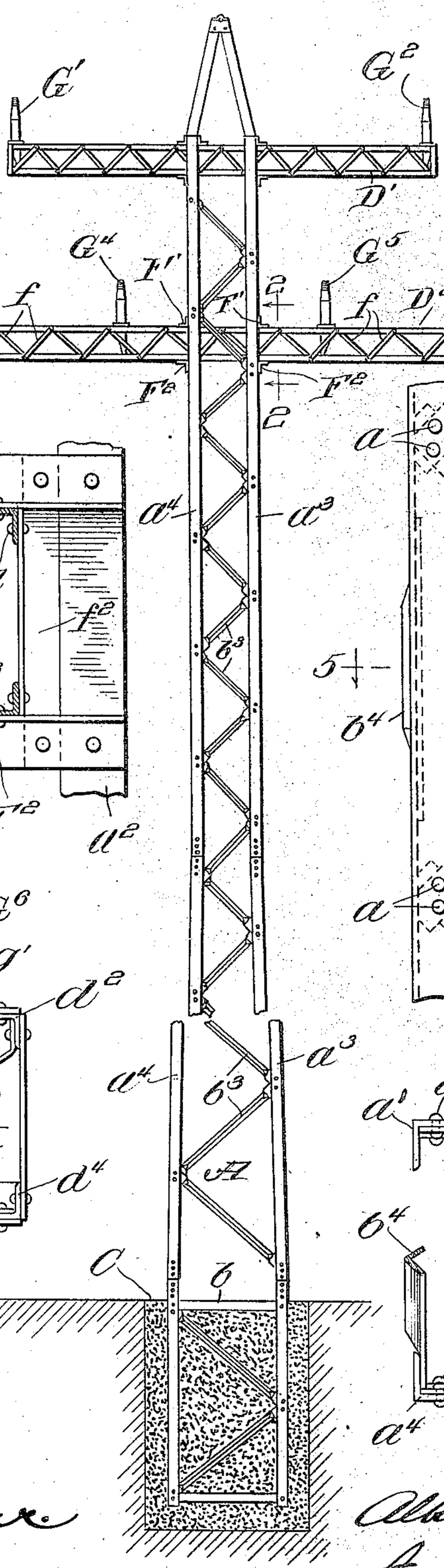

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

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2 SHEETS—SHEET 2.

Fig. 6.

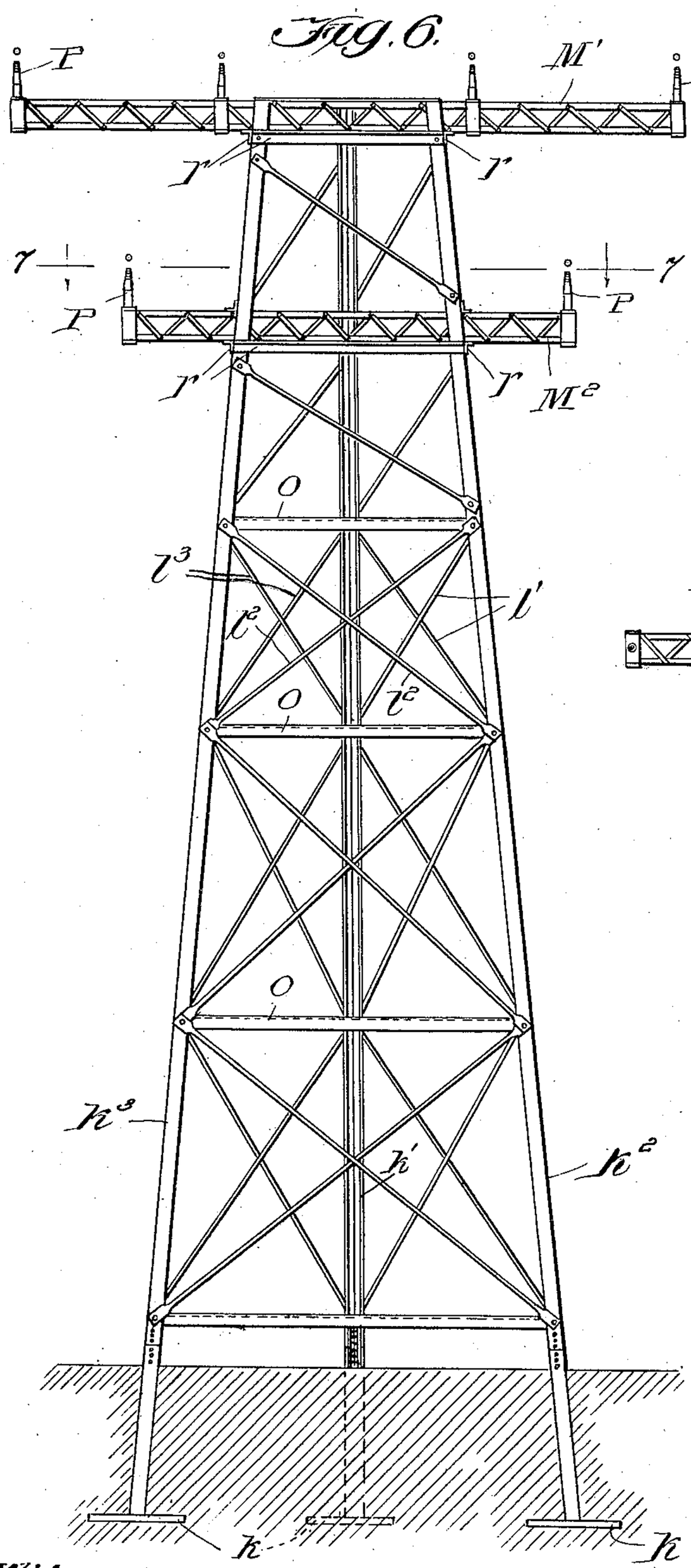


Fig. 7.

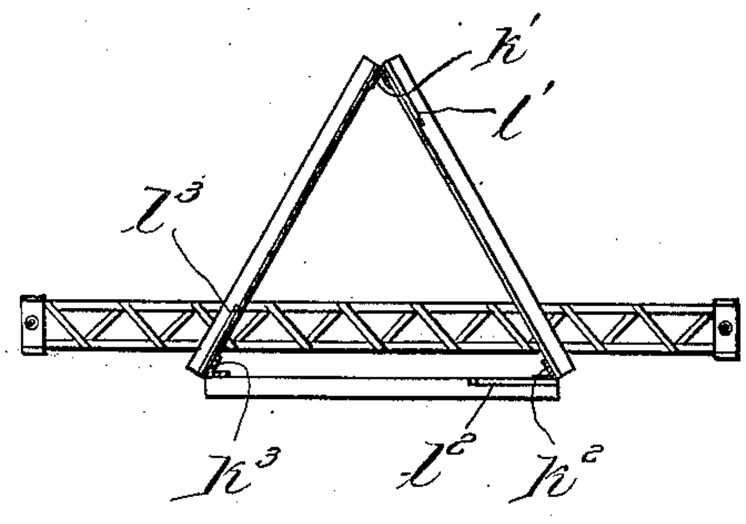
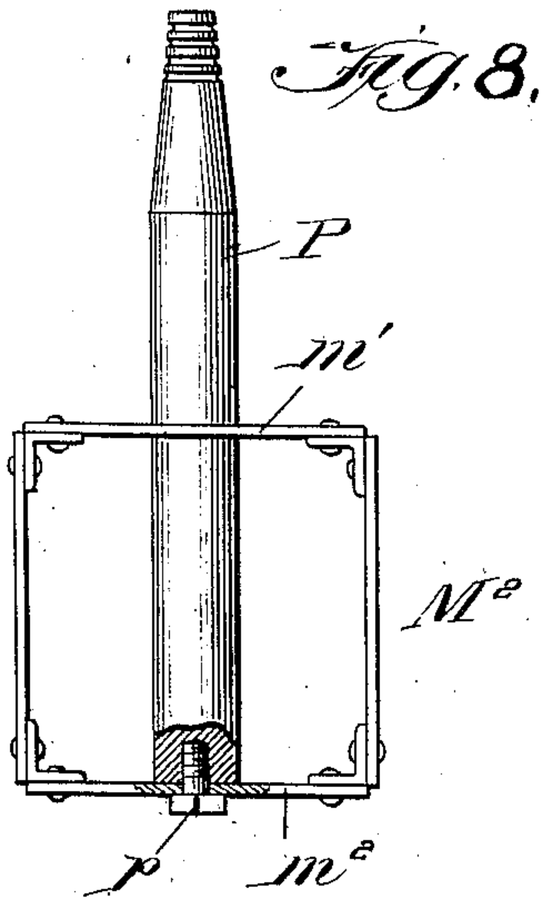


Fig. 8.



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UNITED STATES PATENT OFFICE.

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STEEL SUPPORTING STRUCTURE FOR ELECTRIC-TRANSMISSION CABLES.

No. 849,908. Specification of Letters Patent. Patented April 9, 1907.

Application filed April 12, 1906. Serial No. 311,208.

To all whom it may concern:

Be it known that I, ALBERT K. MANSFIELD, a citizen of the United States, residing at Batavia, county of Kane, State of Illinois, have invented a certain new and useful Improvement in Steel Supporting Structures for Electric-Transmission Cables; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates in general to the transmission of electricity from a point where it is generated to a distant point of use, and more particularly to supporting structures for electrical-transmission cables.

At the present time in the transmission of electricity from a point of generation—such, for instance, as Niagara Falls—to a distant place of use, such as Pittsburg, it is usual to support the conducting-cables upon metallic poles or towers. It is desirable that the supporting poles or towers should be located as far apart as possible in order that a minimum number may be required. It is therefore necessary that the poles or towers for the cables should be of sufficient structural strength to sustain the weight and withstand the tension of the lengths of cables between adjacent poles or towers. It not infrequently happens that cables break, which imposes upon the supporting structure at each side of the broken section a severe torsional strain due to the weight and tension of the sections of cable at each side of the broken section.

The primary object of my invention is to provide a supporting structure for electrical-transmission cables which will possess the requisite structural strength and will require a minimum amount of steel in its construction.

A further object of my invention is to provide a supporting structure for cables which will be simple in construction, inexpensive in manufacture, and durable in use.

The embodiments of my invention herein disclosed may be generally described as consisting of a plurality of columns composed of angle-steel spaced apart, bars forming lacings connecting the flanges of the columns, cross-arms supported upon the united columns and formed of parallel bars of angle-steel united by lattice-bars, and means for rigidly securing the cross-arms intermediate of their ends to the columns.

My invention will be more fully described hereinafter with reference to the accompanying drawings, in which the same is illustrated as embodied in two convenient and practical forms, and in which—

Figure 1 is an elevational view of a pole embodying my invention; Fig. 2, a sectional view of a cross-arm on line 2 2, Fig. 1; Fig. 3, an end view of a cross-arm; Fig. 4, an enlarged elevational view of a section of the pole; Fig. 5, a cross-sectional view on line 5 5, Fig. 4; Fig. 6, an elevational view of a tower embodying my invention; Fig. 7, a sectional view on line 7 7, Fig. 6; and Fig. 8, an end elevational view of a cross-arm.

Similar reference characters are used to designate similar parts in the several figures of the drawings.

Referring more particularly to Figs. 1 to 5, inclusive, reference-letter A indicates the pole composed of four columns a', a^2, a^3, and a^4, formed of angle-steel.

Girths or bars are provided for rigidly uniting the columns of the pole, such bars being preferably sections of angle-steel, the ends of the sections being flattened and united by suitable means—such, for instance, as rivets—to the flanges of the columns. The bars are preferably arranged diagonally, the adjacent ends of adjoining bars overlapping and being united to the flange of the column by the same rivets a.

Reference character b' designates the bars uniting the alined flanges of the columns a' and a^2, while reference character b^2 indicates the girths uniting the alined flanges of the columns a^2 and a^3. b^3 and b^4 indicate the girths connecting the flanges of the columns a^3 and a^4 and a^4 and a', respectively.

The lower end of the tower is preferably embedded in a foundation c, of concrete, the columns near the top of the concrete foundation being united by horizontal girths b.

The pole A supports one or more cross-arms, upon which are mounted the insulator-pins for supporting the cables. I have shown in Fig. 1 two cross-arms D' and D^2; but it will of course be understood that only one cross-arm may be employed or more than two, if desired.

Each of the cross-arms is composed of a plurality, preferably four, bars of angle-steel. (Indicated in Fig. 2 by reference char-

acters d', d^2, d^3, and d^4.) The alined flanges of the angle-bars forming the cross-arms are rigidly united by strips of steel f, preferably arranged diagonally with the adjacent ends of adjoining strips overlapped and united by the same rivets d to the flanges of the angle-bars. The cross-arms extend between the columns of the pole and are rigidly secured thereto by angle-bars of steel F′ and F² above and below the arms and rigidly secured to the flanges of the columns. Plates f' and f^2 are preferably located at each side of the cross-arms intermediate of the flanges of the columns and rigidly united by rivets or other suitable means to the transverse angle-bars F′ and F². The transverse angle-bars and vertical bars united thereto rigidly unite the cross arms to the pole and resist any tendency of the cross-arms to twist when subjected to a torsional strain.

Diagonal bars D, such as shown in Fig. 3, are provided within the cross-arms, the ends of such bars being rigidly secured to flanges of the angle-bars composing the cross-arms. The upper cross-arm D′ is provided with two insulator-pins G′ and G², while the lower cross-arm D² is shown as provided with four insulator-pins G³, G⁴, G⁵, and G⁶. The pins on the two cross-arms are preferably arranged out of vertical alinement, as shown in Fig. 1.

The insulator-pins may be conveniently secured to the cross-arms by providing a plate g' across the top of the arm, through a hole in which the pin extends. A lower plate g^2 is provided beneath the cross-arm, upon which the lower end of the pin rests. The lower end of the pin is preferably flattened, as indicated at G, and is secured by a bolt or rivet g to an angle-section H, rigidly secured between the flanges of the lower angle-bars of the cross-arm.

The upper ends of the columns of the pole may be conveniently connected by converging sections rigidly united at their outer ends, as shown in Fig. 1, for the purpose of carrying an additional wire or cable, if desired.

Referring to Figs. 6, 7, and 8, in which I have illustrated my invention as embodied in a tower, reference characters k', k^2, and k^3 indicate columns composed of angle-steel, the angle between the flanges of the columns being sixty degrees. It is well known that an angle-bar of sixty degrees possesses greater stiffness or a greater radius of gyration than a ninety-degree angle-bar, other dimensions in each case being the same.

The alined flanges of the columns are connected by intersecting rods, through the flattened ends of which rivets or bolts pass for securing the same to the columns. The adjacent ends of adjoining rods are preferably overlapped, so that a single rivet or bolt may pass through alined holes in the ends of both rods and secure the same to the column. The rods intermediate of the columns k' and k^2 are indicated by reference characters l', while reference character l^2 and l^3 designate the rods uniting the alined flanges of the columns k^2 and k^3 and k^3 and k', respectively.

Intermediate of the crossed tie-rods are horizontal girths o, rigidly united at their ends to the alined flanges of the columns. The ends of the girths may be conveniently secured to the columns by the same rivets or bolts which connect the rod to the columns.

The lower ends of the columns extend below the surface of the ground and are provided with base-plates k for more securely anchoring the tower.

Cross-arms M′ and M² are secured to the tower for supporting the insulator-pins P. These cross-arms are constructed the same as the cross-arms previously described in connection with the tower A. The insulator-pins P are secured to the cross-arms by means of a transverse plate m' through a hole in which the pin extends. The lower end of each pin is supported upon a plate m^2 and secured thereto in any suitable manner—as, for instance, by means of a screw p, extending through the plate into engagement with the lower end of the pin.

The cross-arms extend between the columns and are supported upon sections of angle-bars r, rigidly secured to the alined flanges of the columns. Similar sections of angle-bars are located above the lower cross-arms m^2, as clearly shown in Fig. 6.

From the foregoing description it will be observed that I have invented an improved supporting structure for electrical-transmission cables which may be embodied either in a pole or in a tower, and which is so constructed as to possess a maximum strength for sustaining the weight and strain of the cables and for withstanding the torsional strain incident to the breaking of one or more cables.

It will be further observed that by means of my invention the supporting structure comprises a minimum amount of steel, and is therefore economical in construction.

Having now fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a supporting structure for electrical-transmission cables, the combination with an upright structure, of a cross-arm fixed to said upright structure and comprising a plurality of angle-bars arranged about a central axis laced together, and means mounted upon said cross-arm for securing a cable thereto.

2. In a supporting structure for electrical-transmission cables, the combination with a laced angle-bar pole, of a cross-arm fixed to said pole comprising four angle-bars arranged about a central axis and laced together, and means mounted upon said cross-arm for supporting a cable thereon.

3. In a supporting structure for electrical-

transmission cables, the combination with an upright structure, of a cross-arm fixed to said structure and composed of parallel bars of angle-steel and lattice-bars rigidly connected at their ends to the alined flanges of said bars.

4. In a supporting structure for electrical-transmission cables, the combination with a plurality of columns formed of angle-steel, of lattice-bars rigidly united at their ends to the flanges of said columns, a cross-arm rigidly secured intermediate of its ends to said columns and composed of parallel bars of angle-steel and lattice-bars rigidly united to the alined flanges of the bars, and insulator-pins mounted upon said arm.

5. In a supporting structure for electrical-transmission cables, the combination with a plurality of columns formed of angle-steel, of diagonally-arranged lattice-bars rigidly united at their overlapping ends to the flanges of said columns, a cross-arm rigidly secured intermediate of its ends to said columns and composed of parallel bars of angle-steel and diagonal lattice-bars united at their overlapped ends to the alined flanges of said bars.

6. In a supporting structure for electrical-transmission cables, the combination with a plurality of metal columns, of diagonally-arranged lattice-bars rigidly united at their ends to said columns, a cross-arm rigidly secured intermediate of its ends to said columns, and composed of a plurality of bars of steel, and diagonal lattice-bars united at their ends to the said metal bars.

In testimony whereof I sign this specification in the presence of two witnesses.

ALBERT K. MANSFIELD.

Witnesses:

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