(No Model.)

J. W. KNAUSE.

POLE.

No. 460,826. Patented Oct. 6, 1891.

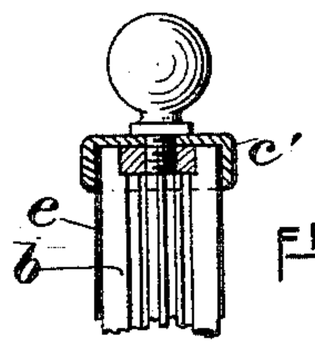

FIG. 4.

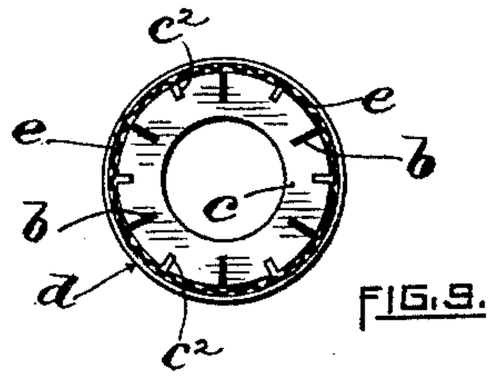

FIG. 9.

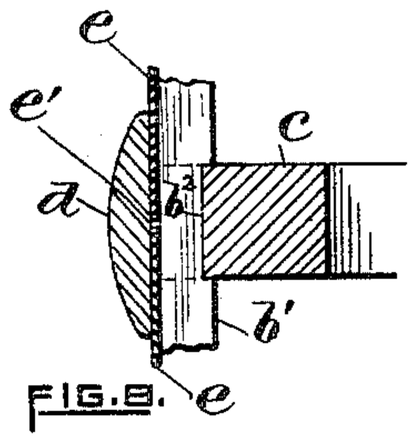

FIG. 8.

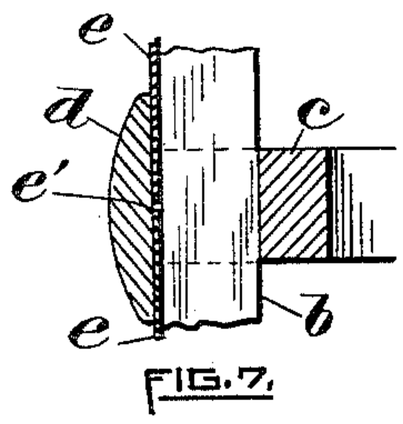

FIG. 7.

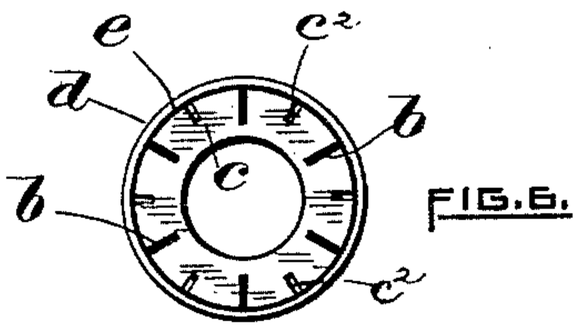

FIG. 6.

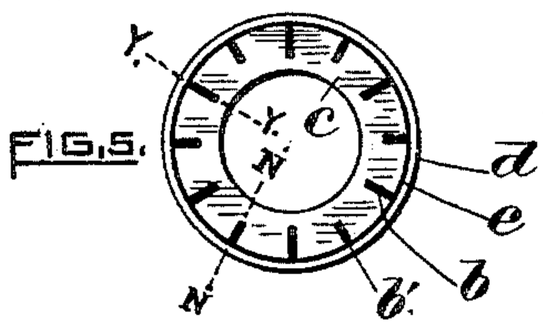

FIG. 5.

FIG. 2.

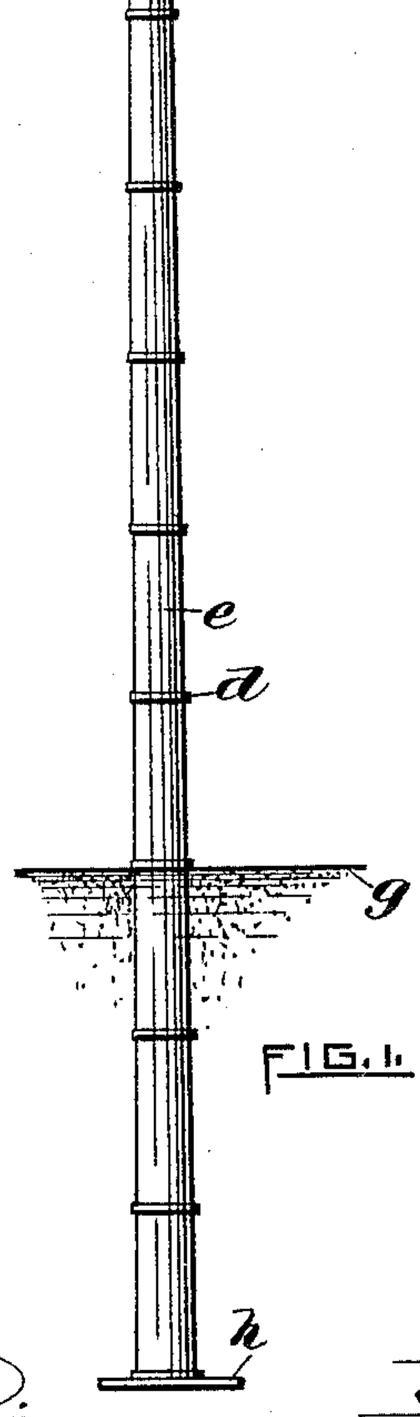

FIG. 1.

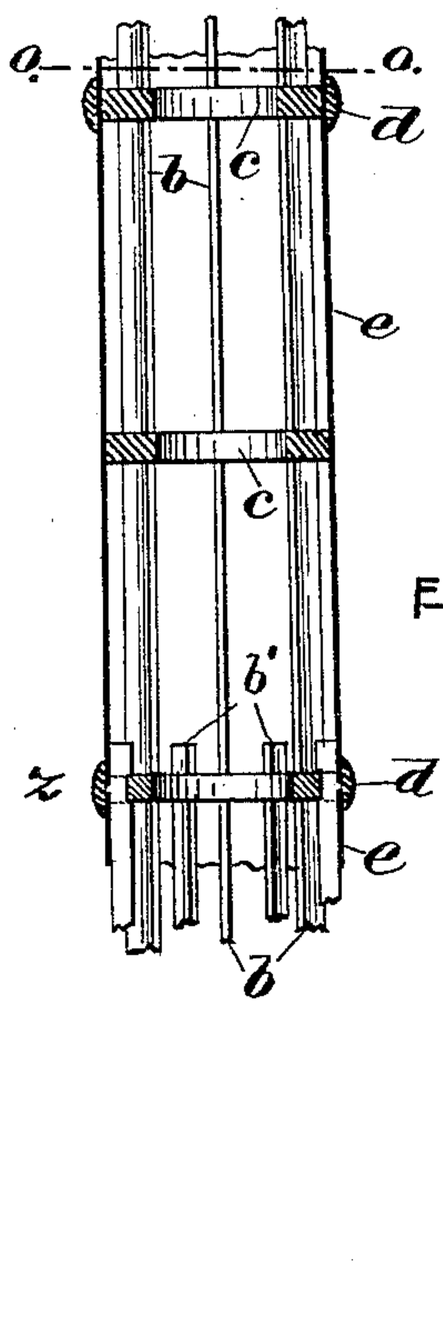

FIG. 3.

WITNESSES.

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UNITED STATES PATENT OFFICE.

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POLE.

SPECIFICATION forming part of Letters Patent No. 460,826, dated October 6, 1891.

Application filed February 18, 1891. Serial No. 381,801. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. KNAUSE, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Poles; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

In supporting overhead electric wires or cables it has been usual heretofore to employ wooden poles, although sometimes metallic poles are used. An objection to wooden poles is, particularly when located along the principal or business streets of cities, that they are frequently very large and unsightly, they are subject to rapid decay, and they are more liable to become broken under severe strain. Iron or metallic poles have in some instances been substituted for wooden ones, as before stated; but the increased cost of such metallic poles has prevented their adoption to a great extent. This is especially true of poles having a length, say, of twenty-five to thirty or more feet, because of their excessive weight.

The object I seek to attain is to produce a metallic pole having ample strength combined with a minimum amount of material and one at the same time easily and quickly made.

To that end my invention consists, essentially, of a series of metallic bars or strips arranged around and engaging a series of spreader-plates located at intervals throughout the length of the pole, the whole being incased in a thin tube made in sections, a metallic band being shrunk onto the tube at the abutting ends of the adjacent sections.

Poles combining my improvement may be made of low-grade bar-steel, the cost per pound being less than cast-iron or even wrought-iron. The bars are placed edgewise and substantially parallel, the variation being due to the taper of the pole. By this arrangement of the steel bars the force or pressure exerted on one side of the pole in a tensile direction is opposed and counteracted by the other bars under compressive action, the spreader-plates of cast-iron at the same time serving to prevent the bars from collapsing or "buckling," as it is sometimes termed. A finished and symmetrical appearance is produced by the addition of the surrounding surface of thin sheet metal and bands, also of steel, which further increase the strength and efficiency of the pole.

In the accompanying sheet of drawings, Figure 1 is a side elevation of a pole embodying my improvements. Fig. 2 is an enlarged longitudinal sectional view taken through the center of the lower portion of the pole. Fig. 3 is a similar sectional view taken, say, about midway of the pole. Fig. 4 is a sectional view taken through the upper portion of the pole. Fig. 5 is a horizontal or cross-sectional view taken on line *x x* of Fig. 2. Fig. 6 is a similar sectional view taken on line *o o* of Fig. 3. Figs. 7 and 8 are enlarged vertical sectional views taken on lines Y Y and N N, respectively, of Figs. 5; and Fig. 9 shows a modified form of casing.

The following is a more detailed description of my improved pole, including the manner of its construction.

a, referring to the drawings, indicates the pole as a whole. It will be seen that the pole is somewhat larger in diameter at the base than at the top or tapering. The exterior surface or envelope *e* is composed of a series of short lengths of thin piping gradually decreasing in diameter, the several joints being protected by snugly fitting steel bands or hoops *d* plano-convex in cross-section. The envelope *e* may be corrugated, substantially as shown in Fig. 9.

The interior of the pole consists of a number of longitudinally-arranged metallic bars *b b'*, supported or separated at intervals by cast-iron plates *c*. These bars, preferably rectangular in cross-section, are cheaply made and are used as delivered from the rolling-mill, except the slight additional labor required to cut them to the desired lengths. The plates *c* grow gradually smaller in diameter, corresponding to the taper of the pole, and are provided with peripheral openings or notches to receive the bars *b* edgewise and radially. The bottom end of the pole rests

on an iron plate *h*, having a groove or pockets *r* to receive the ends of the bars. The upper or opposite end of the pole is provided with a suitable cap *c'*, its form being modified according to the uses to which the pole is to be put, and also arranged to receive the corresponding ends of the bars.

The pieces *e* may be seamless longitudinally or they may be made of thin sheets of steel bent to form and having a riveted joint lengthwise, or the adjacent edges may be bent and locked together similar to the well-known manner of making stove-pipe joints.

The pole is built up substantially as follows: I first provide an open trough or former, V shape or semicircular in cross-section, having a size and length, say, substantially equal to the pole to be produced. In this trough I place the several iron spreaders or collars *c* at a distance, say, of twelve inches apart, the grooves or notches coinciding with each other throughout. I next place into them a series of bars *b*, each being the length of the pole, (obviously turning the frame-work or skeleton meanwhile.) I then introduce a series of shorter and smaller bars *b'*, alternating with the first-named bars. These bars *b'* extend from the foot to or beyond the middle of the pole, or, if desired, they may extend the entire length as the collars *c* are already notched (see c^2) to receive them. Figs. 3 and 6, however, show the narrower bars *b'* omitted, except at *z*, Fig. 3, where the latter terminate. It will be seen, referring to Fig. 8, that the bars *b'* are slightly reduced in width adjacent to the collars *c*, thereby forming notches b^2, which serve to prevent the collars from accidental displacement. These notches may be readily formed at regular intervals during the operation of rolling the bars at the mill. The uncovered pole is now removed from the trough, cords or wires being wound around the pole at intervals to hold the bars in place. The several previously-made lengths or series of tubes *e*, varying in diameter, are next passed over the small end of the pole and placed in position, followed by shrinking hoops *d* upon the abutting end portion *e'* of the casing. (See Figs. 7, 8, &c.)

I would state that, as drawn, the length of each piece of pipe or casing *e* indicates two feet, the joint being formed adjacent to the alternate collars *c*. The pole is surmounted by any suitable cap or top, as desired. The opposite end of the pole is adapted to readily enter a supporting or base plate *h*, which in use rests in the bottom of the hole formed in the earth *g*, Fig. 1. I would further state that, as drawn, the pole is more especially adapted to support trolley-wires employed to conduct a current of electricity to the motors of electric street-cars.

Without departing from the spirit of the invention I may introduce still another series of small bars alternating with the others, or the short intermediate bars may be omitted altogether, thereby employing bars alike in length throughout, although if desired, they may be unlike in area cross-sectionally.

I do not limit my invention to the employment of bars having a rectangular form transversely, as, obviously, bars having different forms cross-sectionally can be substituted. I prefer the form represented, because it is more cheaply produced, and at the same time possesses great stiffness, combined with reduced weight.

The pole may be cylindrical throughout its length, but for equal strength and stiffness I prefer to make the pole tapering, because the latter form will require less stock and be correspondingly lighter.

In lieu of providing the bars with notches b^2 to support the collars or spreader-plates *c* vertically, other means may be adopted—as, for example, the workman may, by a cold-chisel, roughen or burr the bars at intervals, or in any other suitable manner.

I claim as my invention—

1. As an article of manufacture, a metallic pole composed of laterally supported and guided bars arranged longitudinally of and substantially parallel with the pole's axis, an exterior casing or envelope, and suitable end caps or plates.

2. A metallic pole of the class hereinbefore described, having its strain-resisting or body portion formed of one or more series of guided bars arranged longitudinally of the pole's axis, and a metallic envelope or casing surrounding said bars and firmly held in contact therewith.

3. A metallic tapering pole consisting of one or more series of bars arranged longitudinally of the pole, supported spreader plates or collars having the bars mounted therein, a snugly-fitting exterior casing or envelope of metal, and end caps or plates.

4. The metallic pole, substantially as hereinbefore described, consisting of one or more series of bars arranged longitudinally of the pole's axis, a series of interior spreader plates or collars provided with peripheral notches to receive said bars, an exterior envelope of thin metal, bands holding the envelope in place, a base-plate, and a suitable top or cap.

5. In a metallic pole provided with suitable end caps or plates, the combination of one or more series of bars arranged longitudinally of the pole's axis, notched spreader plates or collars having said bars mounted in said notches, a series of longitudinally-arranged metallic tubes or sleeves surrounding and in contact with the bars, and exterior hoops or bands snugly engaging the sleeves and concealing the roundabout joints.

6. In a metallic pole provided with suitable end caps or plates, the combination of one or more series of bars arranged longitudinally of the pole's axis, notched spreader plates or collars having said bars mounted in said notches and supported by the bars, an exte-

rior metallic tube or sleeve formed in sections snugly engaging said bars, and means for holding the sections in position.

7. In a metallic tapering pole provided with suitable end caps or plates, the combination, substantially as hereinbefore described, of a series of bars arranged longitudinally of the pole's axis and extending the length of the pole, a series of similarly-arranged shorter bars, spreader plates or collars having said bars mounted therein, a series of tapering tubes or sleeves surrounding and engaging the bars and spreader-plates, and exterior hoops or bands snugly engaging the end portions of adjacent sleeves.

In testimony whereof I have affixed my signature in presence of two witnesses.

JOHN W. KNAUSE.

Witnesses:
CHARLES YOCHUM,
JOHN L. JOHNSON.