(No Model.) 2 Sheets—Sheet 1.

J. W. HOWELL.

SYSTEM OF ELECTRICAL DISTRIBUTION.

No. 342,748. Patented May 25, 1886.

Fig 1.

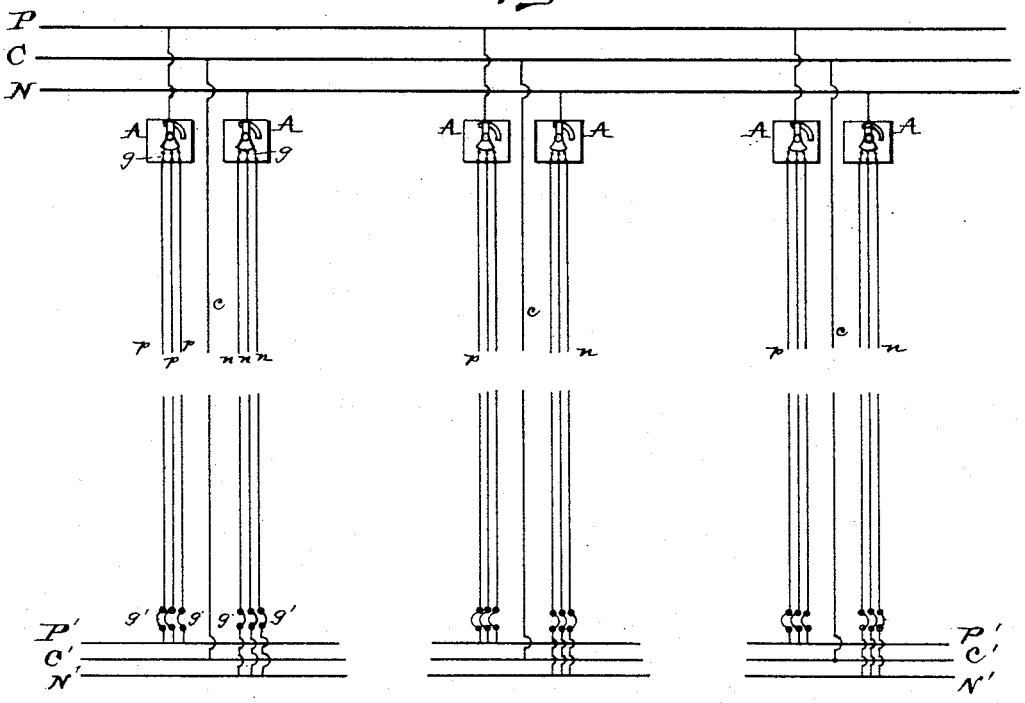


Fig 2.

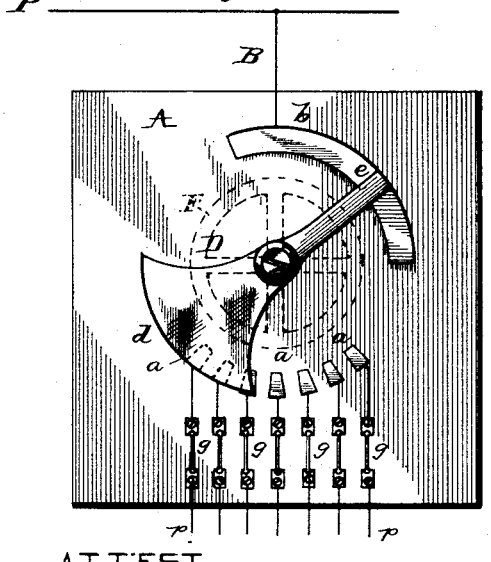
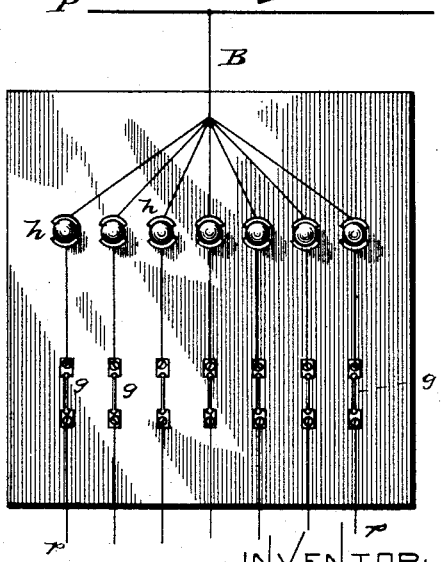


Fig 3.



ATTEST

E. C. Fowland

A. B. Tiddle.

INVENTOR:

John W. Howell

By Dyer & Duell

Attys

(No Model.) 2 Sheets—Sheet 2.

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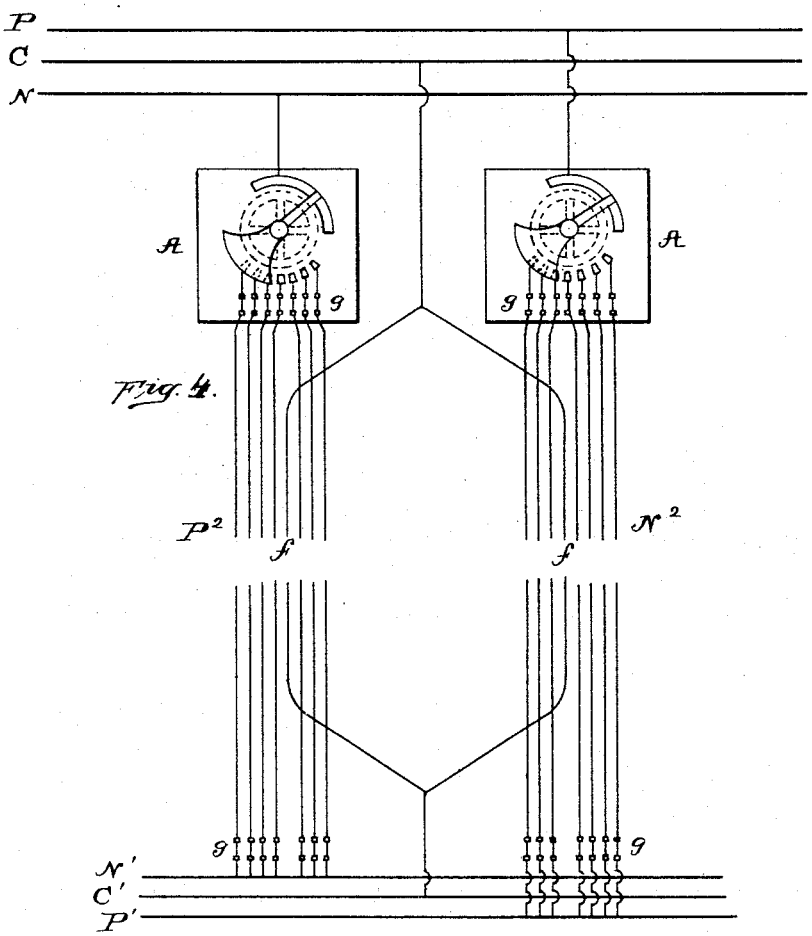
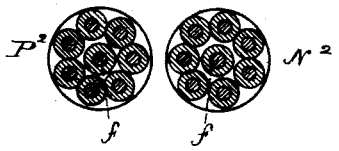


Fig. 4.

Fig. 5.



ATTEST:
E. C. Rowland
H. W. Fiddler

INVENTOR:
John W. Howell
By Dyer & Lang
Atty

UNITED STATES PATENT OFFICE.

JOHN W. HOWELL, OF NEW BRUNSWICK, NEW JERSEY.

SYSTEM OF ELECTRICAL DISTRIBUTION.

SPECIFICATION forming part of Letters Patent No. 342,748, dated May 25, 1886.

Application filed March 12, 1886. Serial No. 194,971. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. HOWELL, of New Brunswick, in the county of Middlesex and State of New Jersey, have invented a certain new and useful Improvement in Systems of Electrical Distribution, of which the following is a specification.

In the Edison system of electrical distribution, as is now well known, the generators at the central station are all connected to common or "omnibus" wires within the station, from which a suitable number of feeding-circuits extend to the centers of distribution of the district supplied, where they are connected with the main or lighting conductors, from which the house-circuits are derived. In such a system it is necessary to provide means for regulating the current carried by each feeder, so as to maintain the same pressure at all the centers of distribution, whereby all the lamps throughout the system will be kept at the same candle-power. Heretofore there has been used for this purpose an adjustable resistance in each feeding-circuit. Such resistances are bulky and expensive, being necessarily composed of a large number of coils of heavy wire.

The main object of my invention is to do away with such resistances, and thereby gain in space and in economy, and simplify the operation of regulating the feeders. I accomplish this by making each feeding-conductor consist of a suitable number of separate strands, insulated from one another, the total conducting capacity being that desired for the feeder. The strands are all connected at the same point to the omnibus conductor, and at the same point to the main or lighting conductors. A switch or switches are provided for each conductor at the station, whereby any desired number of the strands may be placed in or out of circuit, and the current of the feeder thereby increased or diminished.

Another feature of my invention is the placing of a safety-catch or fusible length of wire in each strand of each feeding-conductor. Preferably I place two safety-catches in each strand, one near the junction with the omnibus wire, the other near the junction with the main conductor. Thus, if a cross or short circuit occurs, the safety-catch of only one strand will be burned out and the feeder therefore will not be destroyed. By making each feeder in several strands repairs can be made without removing the whole feeder from use, as each strand can be operated upon by itself. For overhead or pole lines, the wires may be either bare or insulated, and they are preferably run separately upon the poles. Thus the running of the very large and heavy wires sometimes required for feeding-conductors is done away with. The small wires can be drawn much tighter and straighter than the large ones, and a line of better appearance is thereby produced, and the labor of putting up the small wires is much less. In an underground system of conductors the strands, first carefully insulated, are grouped together in cables. These cables may be made of any desired length in one continuous cable without a joint, and can be laid as one piece, obviating the necessity of a joint every few feet, as in the Edison system. This saves labor and expense in laying and prevents the trouble now experienced from leakages and grounds at the joints. All the strands forming both conductors of a feeder may be placed in one cable, or those forming the positive conductor put in one cable, and those forming the negative conductor put in a separate cable. In a three-wire or compensating system I prefer to make only the positive and negative wires in strands, while the middle or compensating conductor, which does not have to be regulated, is a single wire of the proper size. Where cables are used, the central wire of each cable is preferably used as the compensating-conductor.

I usually prefer to make each conductor of from five to ten strands, though the number of strands will be, of course, governed by the circumstances of each case.

In the annexed drawings, Figure 1 is a diagram of a system embodying my invention; Fig. 2, a view showing the preferred arrangement of a feeding-conductor at the central station; Fig. 3, a view of another arrangement thereof; Fig. 4 a diagram illustrating the manner of connecting the compensating-conductor in an underground system; and Fig. 5, a section of the cables employed in such system.

Referring first to Figs. 1, 2, and 3, P, N, and C are respectively the positive, negative, and compensating omnibus wires at the central station, to which the generators (not

shown) are connected. P', N', and C' are main or lighting conductors. Each positive feeding-conductor is composed of several separate strands, *p p*, and each negative feeding-conductor of a number of strands, *n n*. *c c* are the compensating feeding-conductors. A is a switch for placing the strands in and out of circuit. One of these switches is provided for each conductor of each feeding-circuit, so that the two sides of a feeder may be kept alike. The switch consists of a suitable number of contact-blocks, *a a*, to each of which a wire, *p*, (or *n*,) is connected, and a long block, *b*, from which a wire, B, large enough to carry this whole feeder-current, goes to the omnibus wire. D is a pivoted contact-arm, whose end *d* is wide enough to bridge all the blocks *a* and whose other end, *e*, travels upon long block *b*. Arm D may be provided with a hand-wheel, *f*, (shown by dotted line,) for turning it. It will be seen that when arm D is turned more or less of the strands of the feeding-conductor are connected with the omnibus wire. Sufficient space is left between blocks *a* and block *b* to permit the circuit to be broken by throwing arm D off from all the blocks. On the same base as the switch, or in any other convenient location, are placed safety-catches *g g*, one for each strand of the conductor. Near the junction of each strand with the main conductor is placed a safety-catch, *g'*.

In Fig. 3 is shown a separate switch for each strand. Plug-switches *h h* are shown; but it is evident that any other suitable form of switch may be employed.

In Figs. 4 and 5, P^2 represents a positive cable, and N^2 a negative one. The switches, safety-catches, and connections of the separately-insulated wires of the cables are the same as those already described. The central wires, *f*, of each cable are connected together near each end of the feeder, and connected to the compensating omnibus wire and to the compensating lighting-conductor, the two wires *f f* thus forming together the compensating feeding-conductor.

What I claim is—

1. In a system of electrical distribution, a feeding-conductor composed of two or more strands or wires insulated from one another, in combination with means for placing a greater or less number of such strands in circuit, substantially as set forth.

2. In a system of electrical distribution, the positive and negative conductors of a feeding-circuit, each composed of two or more strands or wires insulated from one another, in combination with means in connection with each conductor for placing a greater or less number of its strands in circuit, substantially as set forth.

3. In a system of electrical distribution, a feeding-conductor composed of two or more separate strands insulated from one another, in combination with one or more safety-catches in each strand, substantially as set forth.

4. In a system of electrical distribution, the combination, with a feeding-conductor composed of two or more strands or wires insulated from one another, of a switch adapted to place more or less of said strands in circuit, or to break the circuit of all said strands, substantially as set forth.

5. In a compensating system of electrical distribution, a feeding-circuit whose positive and negative conductors are each a cable composed of two or more insulated strands or wires, and one or more wires of each cable being connected to form the compensating-conductor, substantially as set forth.

This specification signed and witnessed this 16th day of February, 1886.

JOHN W. HOWELL.

Witnesses:

WM. J. LATUS,

CHAS. A. GUNDAKER.