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ELECTRIC WIRE DISTRIBUTION BOX.

No. 438,592. Patented Oct. 14, 1890.

Fig. 1.

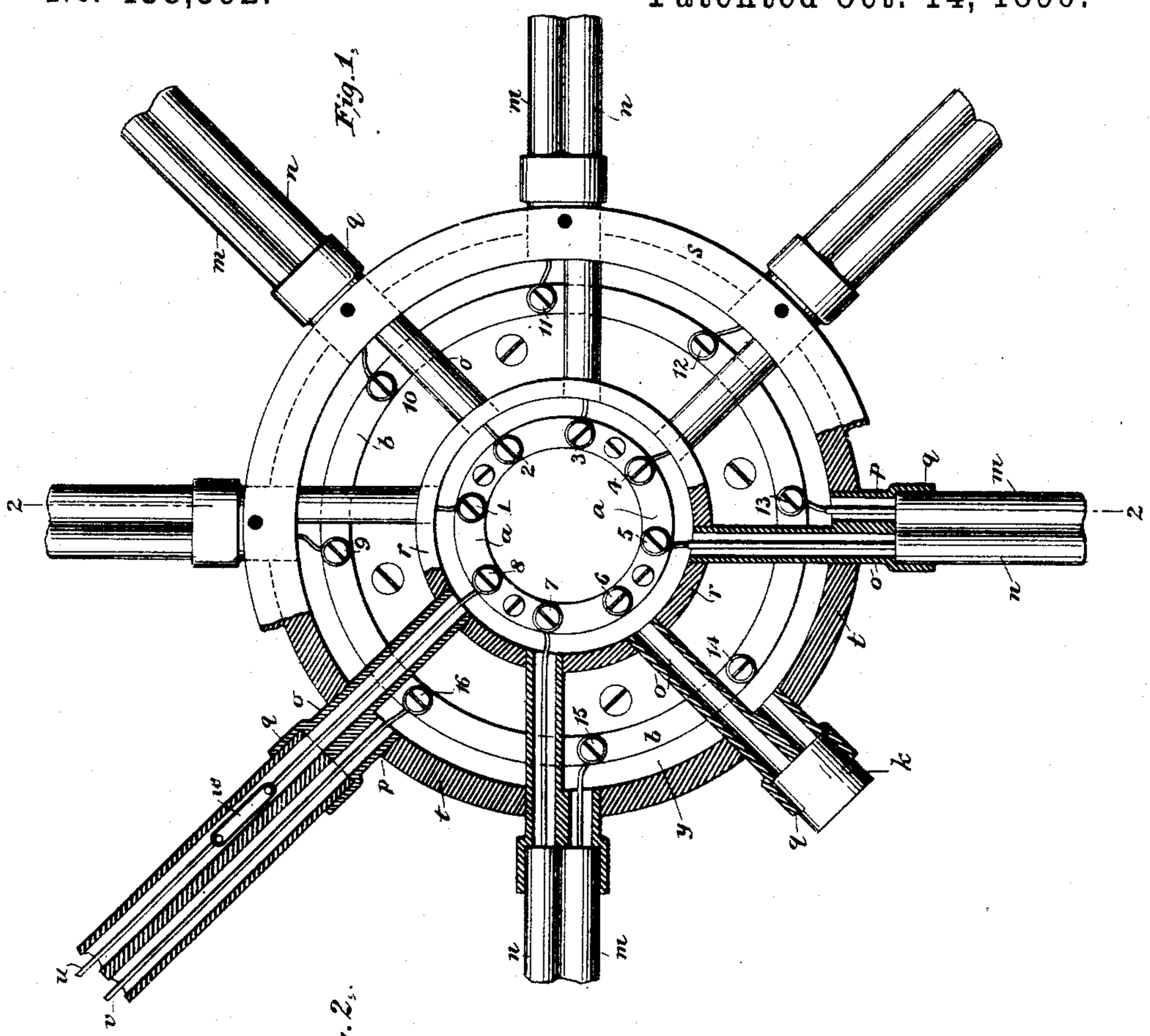
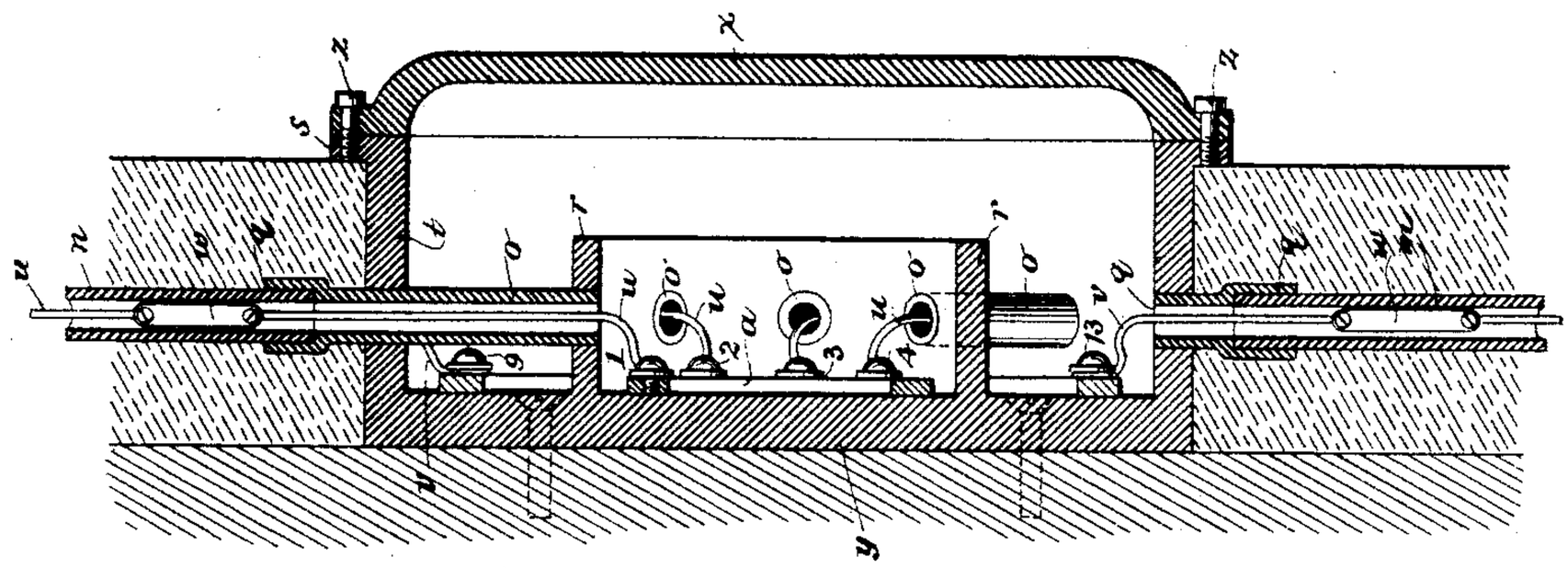


Fig. 2.



Witnesses
Geo. W. Breck
Edward Thorpe.

Inventors
Wm H. Eckert
Wm H. Gregory
By their Attorney
C. L. Burkinbine

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W. H. ECKERT & W. H. GREGORY.

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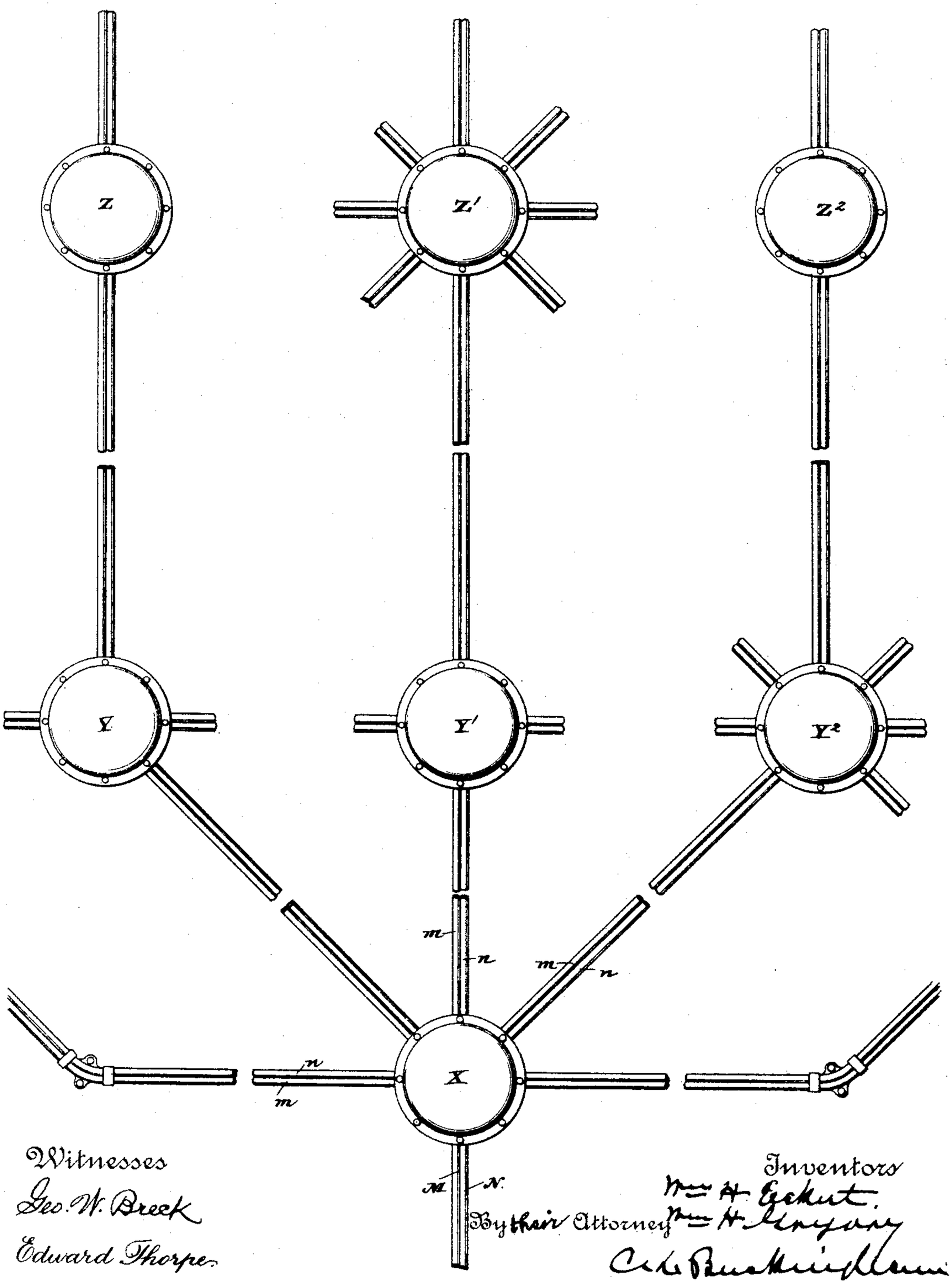
Fig. 3.



Witnesses
Geo. W. Breck
Edward Thorpe.

Inventors
Wm H. Eckert.
Wm H. Gregory
By their Attorneys
Church Burdett & Church

(No Model.) 4 Sheets—Sheet 3.

W. H. ECKERT & W. H. GREGORY.

ELECTRIC WIRE DISTRIBUTION BOX.

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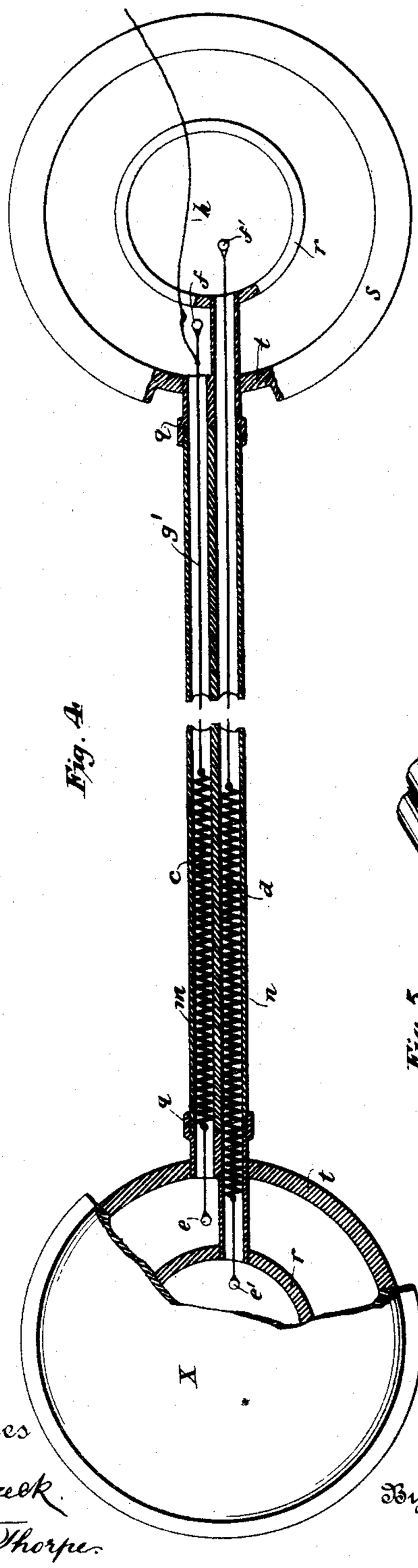

Fig. 4.

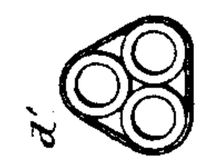

Fig. 6.

Fig. 5.

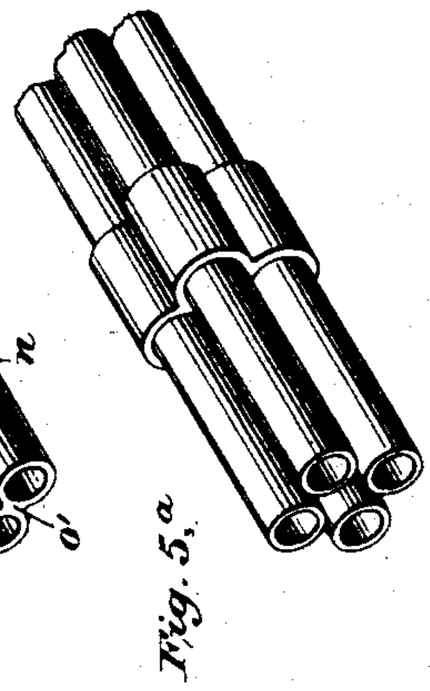

Fig. 5a.

Witnesses
Geo. W. Brock.
Edward Thorpe.

Inventors
Wm. H. Eckert
Wm. H. Gregory
By their Attorney
C. L. Burkinbine

(No Model.) 4 Sheets—Sheet 4.

W. H. ECKERT & W. H. GREGORY.

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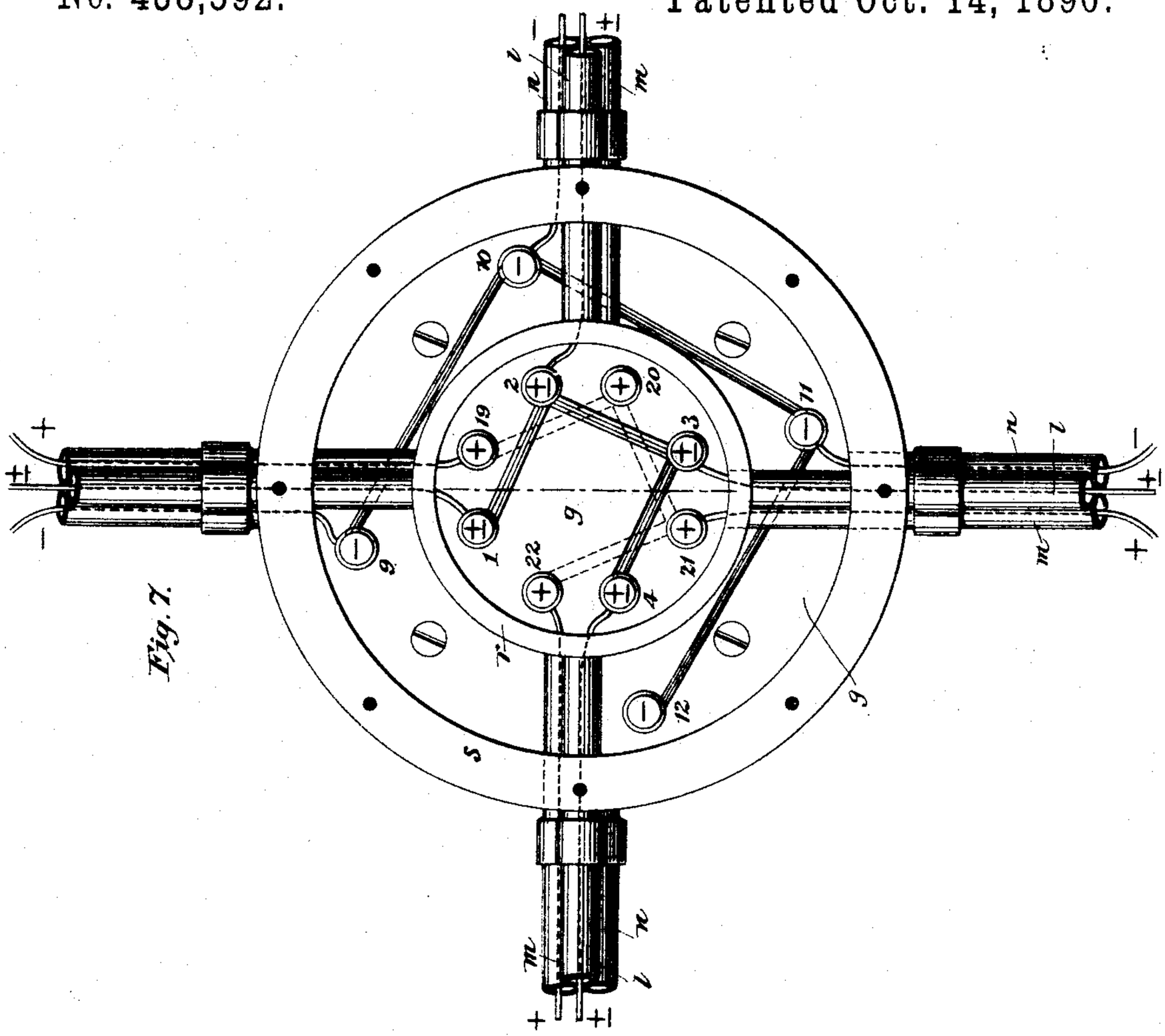

Fig. 7.

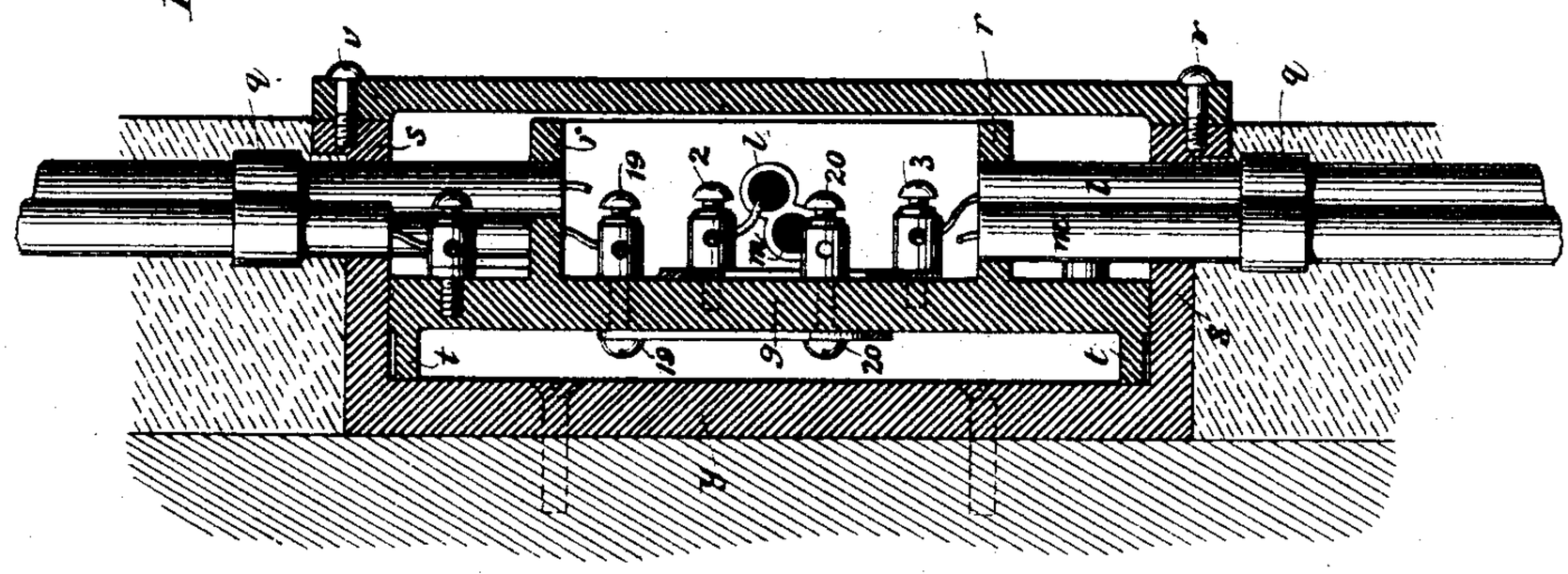

Fig. 8.

Witnesses
Geo. H. Breck.
Edward Thorpe.

Inventors
Wm H Eckert
Wm H. Gregory
By their Attorney
C. L. Buckingham

UNITED STATES PATENT OFFICE.

WILLIAM H. ECKERT, OF NEW YORK, AND WILLIAM H. GREGORY, OF BROOKLYN, NEW YORK.

ELECTRIC-WIRE-DISTRIBUTION BOX.

SPECIFICATION forming part of Letters Patent No. 438,592, dated October 14, 1890.

Application filed July 30, 1890. Serial No. 360,399. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM H. ECKERT, of the city, county, and State of New York, and WILLIAM H. GREGORY, of Brooklyn, county of Kings, State of New York, both citizens of the United States of America, have made a new and useful improvement in the art of wiring structures for electric lighting or other purposes requiring a distribution of electric current among the several apartments of a building, of which the following is a specification.

The object of our invention is to economically secure for each wire a perfect separation from neighboring conductors at all points of the circuits between street-mains and places of consumption within the buildings. To this end we employ an insulating-tube for each conductor, the material of the tube being not only impervious to water, but fire-proof as well, while all of the other parts of our system are especially adapted to this construction. We are aware that others in distributing-conductors for house-wiring have employed insulating-tubes within the walls for carrying conductors, and that two wires forming a loop from a distributing-box to the place of consumption have been twisted into close proximity within a single tube; but this plan we consider objectionable, in that it is the purpose of the arrangement when a lamp-filament breaks for an arc to run across from one wire to the other and to travel between them from the broken lamp to the distributing-box. In our system, however, in case of the destruction of the lamp-filament there is no chance for the formation of an arc, for not only are the two wires of the loop insulated from each other, but they are so far separated by the party-wall between the twin or multiple tubes that an arc cannot be started between them by means of potentials utilized in incandescent lighting, nor could the arc continue along the tube even if it had been started at the lamp. We desire to so protect and separate the conductors of our wiring system that if a lamp breaks current in the loop will at once cease to flow. If, however, an abnormally strong current were to find its way into a lamp—one strong enough to force an arc between the conductors if the lamp had been destroyed—a safety-catch placed within one or both of the loop branches would at once be brought into action. In practice we so construct our safety-catches that they will yield to currents which are no more than sufficient to destroy lamps, and thus it is that while the filament of a lamp is being broken the current will be simultaneously disrupted at another point, though not by the running of the arc from the lamp along the conductors.

We will now describe our invention by reference to the accompanying drawings.

Figure 1 represents an interior view, partially in horizontal section, of a box by which currents from the street-mains may be distributed into adjoining buildings. This box may also be employed to effect distribution from sub-mains within buildings. Fig. 2 is a view in vertical cross-section along line 2 2 of Fig. 1. Fig. 3 illustrates a distributing system in which pipes M N inclose street-mains from which current is conveyed by conductors within pipes *m n* to various sub-distributing points, as boxes Y Y′ Y² and Z Z′ Z². In this case if the current enters box X by the conductor in pipe M and is thence distributed throughout the system, it will return by way of the conductor of tube N. Fig. 4 illustrates a method of passing wires from one union box to another through the insulating-tubes *m n*. Fig. 5 represents a twin pipe having a thick party-wall and a sleeve and clamps for joining two sections together end to end. Fig. 5ª represents four pipes, which are bound together at their ends by means of a common support having four openings and of a form substantially as shown at *c′*, Fig. 6. Fig. 6 represents four diagrams *a′ b′ c′ d′*. The three diagrams *a′ b′ d′* represent cross-sectional views of different methods of grouping three tubes together, while *c′* represents a cross-section of four conduit-pipes. Fig. 7 represents a union box adapted to the distribution of electrical conductors in what is commonly called the "three-wire system," and also illustrates the general plan by which any number of conductors may be run into a single box without danger of accidental cross-connections. Fig. 8 represents a cross-section of such box.

Referring to Figs. 1 and 2, we show a series of double conduit-pipes *m n*, in which the conductors within *n* are joined with metallic ring

a at points 1 to 8, while the conductors within *m* are likewise joined to a common ring *b* at points 9 to 16. The ring *a* being placed within the insulating hood or cylinder *r*, and *b* without, the two are securely insulated from each other, and a cross within the union box is thus rendered impossible. To further insure against accidental contact between the conductors of each double pipe, *n* in each case is continued across the annular space between ring *t* and cylinder *r*, while the pipe *m* only extends through the walls of *s*. The conductors emerging from tubes *m* are exposed at their connections with ring *b;* but this is unobjectionable, since the *n* conductors are only exposed after they have entered the separate circular space within *r*. For convenience of construction, instead of extending one tube of the double pipe in each case through both *t* and *r* and the other only through *t*, we prefer to employ as an entering section a double pipe consisting of a long conduit *o* and a short one *p*, having a thick party-wall between them and an enlarged opening *q* at their outer extremity, within which *m n* closely fits. If all of the branches leading from a union box are temporarily not required for use, some may be closed, as by a plug *k*, Fig. 1. As shown in Fig. 1, the conductors carried within the double pipe *m n* usually represent the branches of a loop leading away from and back to the box, within which loop is placed an electric light or other transformer of electric energy at some neighboring point. Obviously one of the double pipes may be employed to connect the street-mains with the box, in which case if current flows into the union box it will, after reaching ring *b*, pass in multiple arc outwardly by conductors in tubes *m*, through the various transformers, and back to ring *a* by conductors in pipes *n*, and thence along to the street-main. Either or both of the conductors *u v*, placed within a set of pipes *m n*, may be provided with a piece of fusible metal *w*, which will be destroyed or broken by the passage over it of an abnormally strong current.

In Figs. 7 and 8 we have shown an arrangement particularly adapted to the three-wire-lighting system, in which one wire is normally neutral, while a second conveys a positive and the third a negative current, as is indicated in Fig. 7. If now the triple conduit shown at the top of Fig. 7 were connected with the dynamo or generator, current would arrive at binding-post 19 on the upper side of insulating-plate *g*, thence passing through the plate to a conductor joined with binding-posts 20 21 22, which, like 19, extend from the lower to the upper side of *g*, and by this means furnishing current to the wires marked "plus" in the other conduits leading from the box. The negative wire from the dynamo is likewise joined with binding-post 9, and by a conductor placed on the upper side of *g* to posts 10 11 12. In this case the binding-posts do not extend through *g*. Again, the neutral wire from the generator is attached to a binding-post *l*, and thence by a common conductor to points 2 3 4, thus affording a neutral connection from the dynamo to the several conduits. It is now seen that all of the conductors in the conduits which are joined with the negative pole of the dynamo are brought within the annular space above plate *g*, between *r* and *s*, while within *r* and also above plate *g* are placed all of the connections by which the generator is joined with the several neutral conductors. In the same manner all of the connections between the positive pole of the machine and the conduits are made on the lower side of the plate *g*. By this means three conductors carrying heavy currents of different strength may be brought within a union box and divided into any number of branches without the possibility of cross-connection between any two of the three. In like manner four conductors from a generator or generators might be led into a union box and there divided with safety if a cylinder-like rim *r* on the upper side were placed on the under side of plate *g*, as shown in dotted lines in Fig. 8. In such case one set of connections would be placed within the cylinder *r* beneath *g* and another in the annular space without.

In Fig. 4 we have shown a means by which we are enabled to pass conducting-wires from one union box to another. In this case the box at the left is supposed to be on the lower story and the one at the right above. Within the tube *m* is placed a spiral spring *c*, normally extending through, say, one-third or one-half of its length, one terminal of said spring being connected by a string to point *e*, while the other end is connected by *g'* to a pin *f* in the upper union box. If now it is desired to carry a conductor from the lower to the upper box, the wire attached to pin *e* is removed therefrom, and is joined with the conductor. The spring is then elongated by a downward pull of the hand and permitted to fly back, carrying with it the wire to the upper box. A wire *h* is shown as connected to the wire *g*, by which, if necessary, the wire from below may be pulled upward without the use of the spring *c*. By the aid of the spring *c*, however, a number of wires may be shot upward from the lower story without assistance from the upper floor. We have also shown a spring *d* placed within pipe *n* and connected by wires from end to end with pins *e' f'*. Pipe *n* joins central apartments of the union boxes or compartments distinct from those joined by *m*.

We preferably form our conduit-pipes by molding paper so treated as to be fire and water proof into a form having a thick party-wall *o'*, as shown in Fig. 5. For the three-wire system, or other purposes in which it may be necessary to carry three conductors in close proximity to each other, we may mold paper-pulp into forms shown by *a' b'*, Fig. 6. We may also group three tubes together by

molding them separately and joining them by means of a paper or other suitable band, as shown at *d'*, Fig. 6. We have also shown at *c'*, Fig. 6, a conduit consisting of four pipes or tubes molded together. Fig. 5ª shows a grouping of four pipes, the latter being held together by a coupling-block having four apertures, within each of which sections of pipe may be placed end to end. In this instance the pipes are held together entirely by the coupling-block. Where the tubes are not in the first instance cast into one integral mass instead of molding them from paper-pulp, they may be formed by winding sheet-paper upon a suitable mandrel or by any other of the many well-known ways now known in the art of making paper tubes.

What we claim, and desire to secure by Letters Patent, is—

1. In a system for wiring houses or other structures, the combination of a distributing-box connected with the street-mains or other conductors, two or more compartments within said box separated from each other by an insulating wall or walls, a series of distributing-conduits, each of which consists of a double pipe of insulating material leading from said box, the arrangement being such that corresponding tubes of the several conduits are brought within one compartment while the others are carried to the second compartment of said box, and a loop-conductor whose branches are respectively placed within the two tubes of each double pipe and carried from a transformer of electrical energy into the separate compartments of a distributing-box, substantially as described.

2. In a system for wiring houses or other structures, the combination of a distributing-box placed in connection with the main conductors, a series of distributing-conduits consisting of a double pipe of insulating material, through the two tubes of which the wires of a loop are separately carried to an electrical transformer or a sub-distributing box, two compartments within said distributing-box separated by an insulating-wall, a common conductor placed within one compartment, within which the positive terminals of the several loops are joined, and a common conductor within the second compartment, with which all negative terminals are connected, as and for the purpose set forth.

3. In a system for wiring houses or other structures, the combination of a distributing-box connected with street-mains, a series of distributing-conduits *m n*, each being formed of a double tube having a thick party-wall, two compartments within the distributing-box separated by an insulating-wall *r*, a common conductor *a*, placed within *r*, and a second conductor *b*, placed without, a prolonged extension *o*, opening into the compartment *r*, and a shorter pipe *t*, opening into the outer compartment around *r*, as and for the purpose set forth.

4. In a distributing-box for use in a system in wiring houses or other structures, the combination of a series of conduits consisting of double tubes *m n*, having a thick party-wall formed of insulating material, extension-tubes *o p* of different lengths, two compartments within said distributing-box separated by an insulating-wall *r*, and two common conductors *a b*, as and for the purpose set forth.

5. In a distributing-box for use in a system for wiring houses or other structures, the combination of a series of compartments within said distributing-box separated by party-walls, a common conductor within each compartment, a series of distributing-conduits, each of which consists of multiple tubes having thick party-walls formed of insulating material, a separate conductor for each tube, the corresponding wires of the several conduits being joined together within a single compartment of the box, substantially as described.

6. In a distributing-box, the combination of a series of conduits, each of which consists of a group of tubes formed of insulating material, said tubes being separated from each other by thick party-walls, a separate conductor placed within each tube of the series, a series of compartments within said box, equal in number to the tubes of each conduit, a common conductor within each compartment, and electrical connections, substantially as described, whereby corresponding conductors are joined together within separate apartments.

7. In a distributing-box, the combination of a disk *g*, within which are placed three sets of binding-screws or other electrical connections, a common conductor for joining together each of said three sets of binding-screws, one of said conductors being placed beneath and the other two above said disk, (one within and the other without an insulating-wall *r*,) and a series of distributing-conduits, each being formed of three tubes of insulating material, said tubes being separated by thick party-walls, as and for the purpose set forth.

8. As a means for passing wires from a union box in one story of a building to a like box in an upper story, a spring *c*, and an inclosing-tube, within which said spring is placed, a wire connecting the upper end of said spring to the upper distributing-box, and means for joining the lower end of said spring to the conductor to be inserted within the insulating-conduit, as and for the purpose set forth.

9. The combination of two union boxes, pins *e f*, spring *c*, insulating-tube *m*, and wires joining the ends of said spring with pins *e f*, substantially as described.

WILLIAM H. ECKERT.
WILLIAM H. GREGORY.

Witnesses:
W. M. MINER,
WM. ARNOUX.