

P. WRIGHT.

TRANSFORMER ELECTRIC LIGHTING SYSTEM.

No. 521,924.

Patented June 26, 1894.

Fig. 1

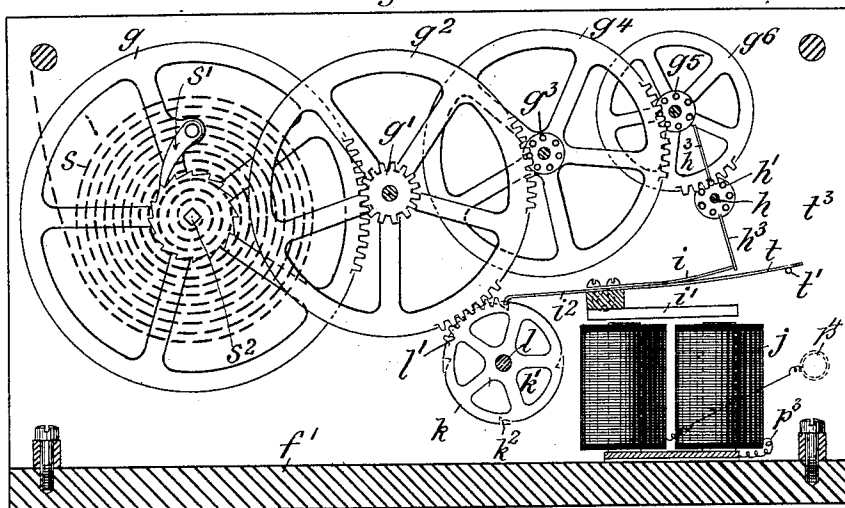


Fig. 2

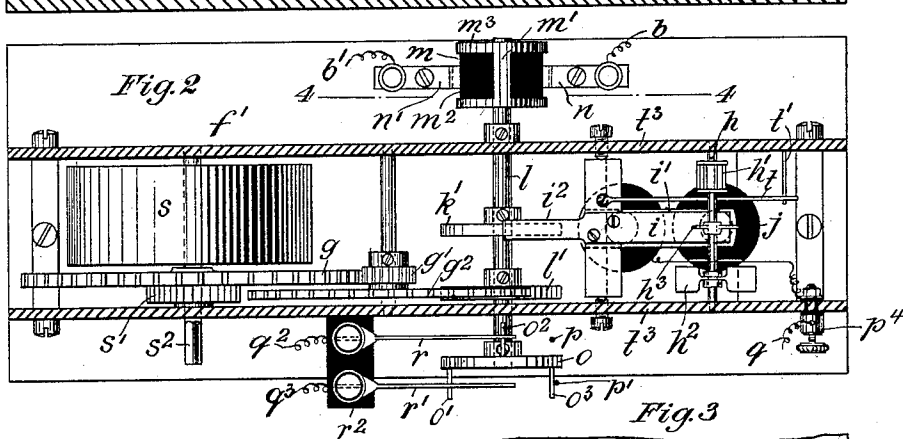


Fig. 3

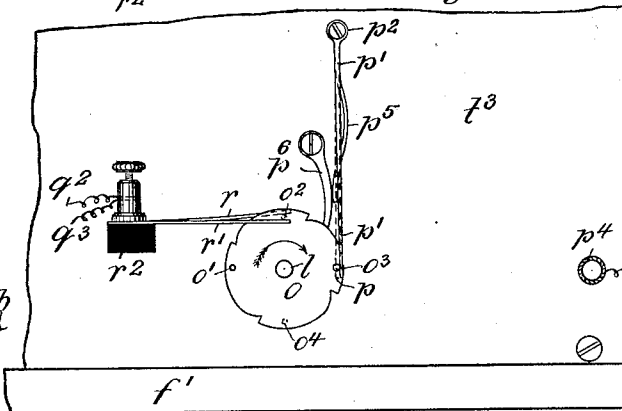
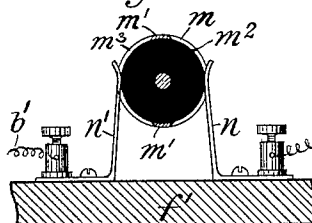


Fig. 4



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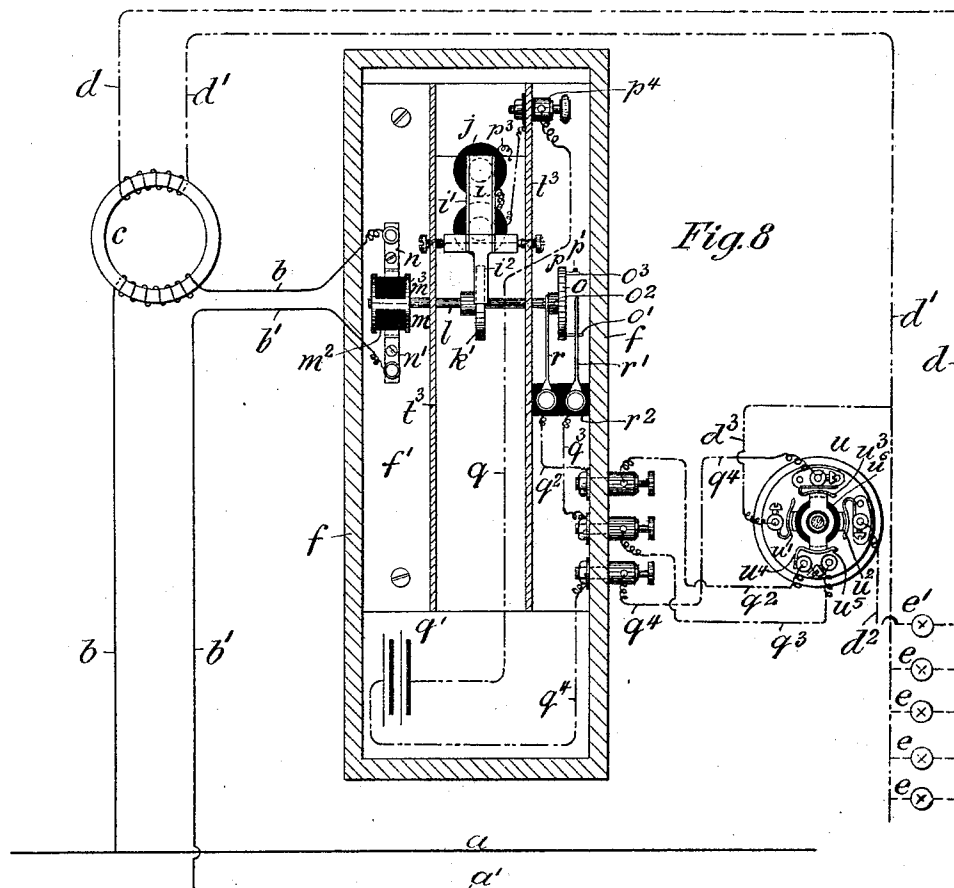


Fig. 6

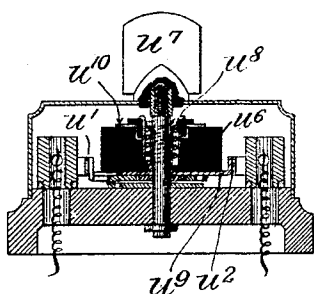


Fig. 7

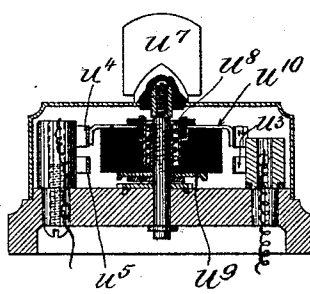
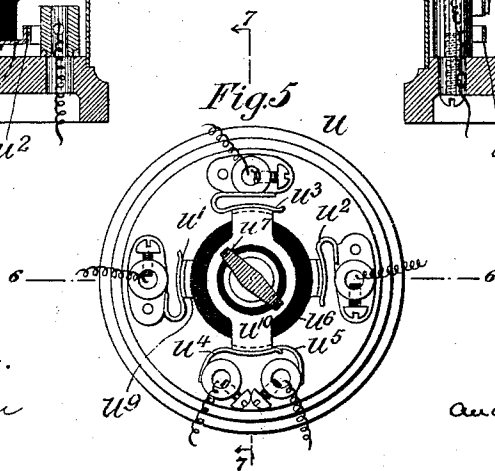


Fig. 5



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UNITED STATES PATENT OFFICE.

PETER WRIGHT, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE
UNITED GAS IMPROVEMENT COMPANY, OF SAME PLACE.

TRANSFORMER ELECTRIC-LIGHTING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 521,924, dated June 26, 1894.

Application filed December 9, 1893. Serial No. 493,208. (No model.)

To all whom it may concern:

Be it known that I, PETER WRIGHT, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Transformer Electric-Lighting Systems, of which the following is a specification.

Theoretically no current should traverse the primary circuit and coil of a transformer when the secondary or lamp circuit is broken, for example by the extinguishment of the lamps disposed therein. Practically, however an appreciable quantity of current traverses or leaks through the primary coil and circuit when the secondary or lamp circuit is broken, for example, by the extinguishment of the lamps; and this leakage current through the primary circuit and coil gives rise to considerable loss and waste, especially in the case of halls, churches, and other buildings which are only lighted occasionally or at comparatively long intervals.

The principal objects of my present invention are, first; to provide for the simple, automatic and practical interruption of the primary circuit subsequent to the interruption of the secondary or lamp circuit, (due for example to the extinguishment of the hall or vestibule light or lamp) whereby the loss of current incident to the above mentioned leakage, is obviated. Second; to provide compact, simple, and reliable mechanical and electrical means for controlling the interruption of the primary and secondary circuits in such manner that the secondary circuit is broken or interrupted before the primary circuit, so that freedom from sparking at the terminals of the primary circuit is insured for the reason that when the primary circuit is broken it is carrying the leakage current only, and not the normal current, it being understood that as soon as the secondary or lamp circuit is interrupted, the primary circuit carries only the leakage current above referred to. Third; to provide compact, durable, and efficient switch mechanism and connections for controlling the secondary or lamp circuit and also the local circuit and its mechanical devices that operate to make and break the primary circuit, and fourth; to pro-

vide convenient, compact and comparatively inexpensive circuit controlling mechanism and mechanical and electrical devices for starting and stopping the same to effect the making and breaking of the local and of the primary circuits.

In my invention, use is made of positively driven mechanism adapted to make and break the primary circuit, of a local circuit and battery connections and an electro magnet for releasing said mechanism, and of a manual switch adapted to make and break the secondary or lamp circuit and also to control the local circuit, the construction and arrangement being such that when the manual switch is turned to make or break the secondary or lamp circuit, it also operates to close the local circuit through one of two conductors and an electro magnet whereby the positively driven mechanism is set in motion and operates first; to break the local circuit, then to make or break the primary circuit and also close the other conductor of the local circuit; and finally to be automatically brought to rest.

My invention consists of the improvements hereinafter described and particularly referred to in the claims.

The nature, characteristic features, and scope of my invention will be more fully understood from the following description taken in connection with the accompanying drawings, forming part hereof, and in which—

Figure 1 is an elevational view partly in section of the positively driven mechanism for making and breaking the primary circuit, showing the centrally pivoted armature of the electro magnet having one of its extremities disposed in range of a cam-wheel and the other of its extremities adapted to be shifted into and out of range of a revolving arm. Fig. 2, is a top or plan view of the same showing also the switch for making and breaking the primary circuit and also the circuit interrupter for making and breaking the electrical continuity of the two like conductors of the local circuit. Fig. 3, is an elevational view illustrating the automatic circuit breaker for controlling the local circuit. Fig. 4, is a sectional view taken on the line 4—4 of Fig. 2. Fig. 5, is a view of the manual switch with its exterior housing removed.

of an insulating block r^2 , carried by the framework t^3 . These spring contacts r and r' , are respectively connected to conductors q^2 and q^3 , forming part of the local circuit connections and the conductors q^2 and q^3 , are adapted respectively to be alternately connected by means of a manual switch u , to the return conductor q^4 , and thence to the local battery q' . For the sake of clearness, it may be remarked, that when the disk o , is in the position shown in Figs. 2, 3, and 8, a part of the local circuit connections are as follows: from the battery q' , through conductor q , coils of the magnet j , conductor p^3 , frame t^3 , post p^2 , spring contact p' , detent p^6 , disk o , pin o^2 , spring contact r , and conductor q^2 . When the disk o , has been rotated through ninety degrees, the local circuit connections would be as before described to the post p^2 , and thence they would be by the spring contact p , and detent p^6 , the disk o , the pin o' , spring contact r' , and conductor q^3 . Obviously, there is a position approximately midway of the travel of the disk o , in turning ninety degrees at which neither of the spring contacts r or r' , contact with any of the pins o' , o^2 , o^3 , and o^4 .

The manual switch u , is provided with five contacts u' , u^2 , u^3 , u^4 , and u^5 , and with the usual insulating cylinder u^6 , adapted to be rotated through intervals of ninety degrees each with a snap by means of the thumb lever u^7 , acting through the intervention of a spiral spring u^8 . Two of these contacts u' and u^2 , being disposed diametrically opposite each other are connected by means of conductors d^2 and d^3 , with the respective wires or conductors d and d' , of the secondary or lamp circuit, and it may be remarked, that the lamp e' , being the one that is disposed at the door-way or entrance is interposed in the conductor d^2 . The contact u^3 , is connected with the conductor q^4 , and the contacts u^4 and u^5 , are connected respectively with the conductors q^2 and q^3 . The spring rubbing surfaces of the contacts u' and u^2 , are constructed in the ordinary manner and are disposed in the same plane, so that the contacting bridge piece u^9 , applied to the under side of the cylinder u^6 , bridges them as shown in Fig. 6, after each two operations or turnings of the thumb lever u^7 . The spring rubbing surfaces of the contact u^3 , are two in number and are disposed in different planes as shown at the right-hand side of Fig. 7, and each of the contacts u^4 and u^5 , is provided with a single spring rubbing contact and these spring rubbing contacts are disposed in different planes corresponding with the planes of the spring rubbing surfaces of the contact u^3 .

From the foregoing construction, it follows that in every position of the cylinder u^6 , either the bridge piece u^9 , applied to the bottom of the cylinder u^6 , or the bridge piece u^{10} , applied to the top thereof, is in contact with one or the other of the rubbing surfaces of the contact u^3 . Moreover one or the other of

the contacts u^4 and u^5 , is in electrical connection with the contact u^3 , according as the top or bottom bridge piece u^9 or u^{10} , is in engagement with the contact u^3 ; so that as the thumb lever u^7 , is turned, it alternately makes and breaks the shunt circuit $d^2 d^3$, through the intervention of the bridge piece u^9 , and consequently short circuits or includes the lamps, and at each turn or slip of its movement transfers the local circuit from the conductor q^4 , to either the conductor q^2 , or conductor q^3 , through the alternate intervention of the bridge pieces u^9 and u^{10} .

The mode of operation of the hereinabove described apparatus may be described as follows: Assuming that the parts of the apparatus are in the position shown, more especially in Fig. 8, it is evident that the primary circuit is broken because the spring contacts n and n' , rest upon the insulating parts m^2 , of the switch m ; consequently there can be no loss or waste of current by leakage, and of course the lamps are extinguished. In order to light the lamps e , contained in the hall, church, or other building, the attendant in charge will first want to light the vestibule or hallway lamp e' . However, it may be remarked that use may be made of the main switch u , for interrupting the entire secondary circuit. For this purpose he rotates the thumb lever u^7 , of the switch u , one stage, that is the cylinder u^6 , is turned or snapped ninety degrees. This rotation of the thumb lever causes the bottom bridge piece u^9 , to be turned out of engagement with the contacts u' and u^2 , (with the result that the shunt circuit $d^2 d^3$, is made) and into engagement with one of the rubbing surfaces of the contact u^3 , and with the rubbing surface of the contact u^4 , whereby the local circuit is completed through the conductor q^2 , spring contact r , pin o^2 , spring contact p' , frame t^3 , conductor p^3 , coils of the electro magnet j , conductor q , battery q' , and conductor q^4 . The completion of the local circuit in the manner above described causes the electro magnet j , to attract its armature i' , against the influence of the spring t , whereby the detent, lug or projection i , is drawn downward clear of the arm h^3 , while at the same time, the rear end i^2 , is lifted out of the low part k^3 , of the cam-wheel k' . Whereupon the train of gears is permitted to move under the influence of its motive power, thus causing the shaft l , to be revolved. The revolution of the shaft l , causes the high part k , of the cam-wheel k' , to engage with the end i^2 , of the armature lever and thus lock the detent, lug or projection i , in depressed position and clear of the arms h^3 . The continued rotation of the shaft l , causes the pin o^2 to pass from beneath the spring contact r , whereby the local circuit through the conductor q^2 , is broken, and the further rotation of the shaft l , causes the switch m , to be turned around until the contact brushes $n n'$, are bridged by the metallic conductors m' and m^3 , thus completing the primary circuit.

Simultaneously with the completion of the primary circuit, the disk o , is revolved into such position that the end i^2 , of the armature lever falls by reason of the resiliency of the spring t , (or by gravity), into the next low part k^3 , of the cam-wheel k' , whereby the detent, lug or projection i , comes into range with the arm h^3 , and thus prevents further movement of the train of gears. Prior to the arc rest of the train of gears, the pin o' , comes into contact with the spring contact r' , thus introducing the conductor q^3 , into the local circuit when the same shall have been closed through the contact u^5 , by the next operation of the thumb lever u^7 , which would occur, of course, when it is desired to extinguish the lights. It may be remarked, that after the lights have been lighted, any or all of the lamps e , may be extinguished or lighted at pleasure by means of keys on their sockets or in any preferred manner. However, the lamp e' , must be permitted to burn until it is desired to extinguish all the lamps and to cut the transformer out of the primary circuit $b b'$. To extinguish all the lights and cut the transformer out of the primary circuit, the thumb lever u^7 , is turned in the same direction through ninety degrees with the result that the lower bridge piece u^9 , opens the shunt circuit $d^2 d^3$, thus extinguishing the lamps e , and with the result that the top bridge piece u^{10} , closes the local circuit through the conductor q^3 , pin o' , spring contact p , and detent p^6 . Whereupon the train of gears is again set in motion and subsequently interrupts the primary circuit $b b'$, through the intervention of the switch m . In this connection it may be remarked, that as soon as the switch u , is turned the lamps are extinguished thus causing the absence of current except that due to leakage in the primary circuit $b b'$, whereby the switch m , is required to break the primary circuit when it is carrying only the leakage current, so that sparking at the terminals $n n'$, is avoided, this interval between the interruption of the primary and secondary circuits being due to the time consumed by the revolution of the train of gears. No spark of course occurs on closing the primary circuit although all the lamps interposed in the secondary circuit are turned on at the moment of closing the primary circuit.

It will be obvious to those skilled in the art to which my invention appertains that modifications may be made in details without departing from the spirit thereof, hence I do not limit myself to the precise construction and arrangement of parts hereinabove set forth and illustrated in the accompanying drawings, but

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

65 1. A transformer system of electrical distribution comprising, a line, primary, secondary, and local circuits, positively driven

mechanism released by electro magnetic devices in the local circuit and adapted to make and break the local and primary circuits, automatic means for stopping said mechanism, and a switch for controlling the secondary and local circuits, substantially as described. 70

2. A transformer system of electrical distribution comprising, a line circuit, a primary circuit in parallel with the line circuit, a local circuit, positively driven mechanism released by electro magnetic devices in the local circuit and adapted to make and break the local and primary circuits, automatic means for stopping said mechanism, and a switch for controlling the secondary and local circuits, substantially as described. 75 80

3. A transformer system of electrical distribution comprising, a local circuit having three conductors, a switch adapted to make and break the secondary circuit and to connect one of the conductors of the local circuit with each of the other two, positively driven mechanism adapted to automatically check its own motion and provided with a switch for the primary circuit and with a circuit maker and breaker for breaking the local circuit and for connecting one or the other of its two conductors with the third, substantially as described. 85 90 95

4. In a transformer system of electrical distribution, a manual switch provided with top and bottom bridge pieces and with three contacts, whereof one is provided with two rubbing surfaces and the others with one rubbing surface each, in combination with a local circuit having three conductors and an electro magnetic device for controlling positively driven mechanism, substantially as described. 100 105

5. In a transformer system of electrical distribution the combination of, positively driven mechanism provided with a three way circuit breaker adapted to make circuit alternately with a pair of contact springs and to intermittently break contact with both, a switch having two bridge pieces and three contacts whereof one is provided with two rubbing surfaces and whereof the other two are provided with one rubbing surface each, and an electric circuit having a conductor extending from its source of electricity to the circuit breaker and having two conductors from said contact springs to the switch contacts having one rubbing surface each, substantially as described. 110 115 120

6. In a transformer system of electrical distribution the combination of, a primary circuit, a switch and its actuating mechanism for said circuit, an armature lever tending to stop said driving mechanism, an electro magnet and circuit connections for attracting said armature, and a positively driven cam-wheel for controlling said armature lever upon the de-magnetization of the electro magnet, substantially as described. 125 130

7. In a transformer system of electrical distribution the combination of, a switch for

making and breaking the primary circuit, positively driven gearing for actuating said switch, a pivotal armature lever adapted to release and check said mechanism, an electro magnet for causing said armature to release the mechanism, a cam-wheel for permitting said armature lever to check the mechanism, and a circuit breaker adapted to break the circuit of the electro magnet when the armature lever is controlled by the cam-wheel, substantially as described.

8. A transformer system of electrical distribution comprising, an induction coil and its primary and secondary circuits, a train of positively driven gearing adapted to operate a switch interposed in the primary circuit, and a switch and its connections interposed in the secondary circuit and adapted to set said mechanism in motion in order to effect the breaking of the primary circuit subsequent to the decrease of current in the secondary circuit, substantially as described.

9. In a transformer system of electrical dis-

tribution the combination of, positively driven mechanism adapted to make and break the primary circuit, a manual switch for interrupting the secondary circuit or any portion thereof, and mechanical and electrical devices and circuit connections controlled by said switch and adapted to govern said mechanism, substantially as described.

10. In a transformer system of electrical distribution, mechanical and electrical devices for breaking and making the primary circuit, and a manual switch and connections for cutting out and in the secondary circuit and for controlling said mechanical and electrical devices, substantially as described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

PETER WRIGHT.

Witnesses:

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K. M. GILLIGAN.