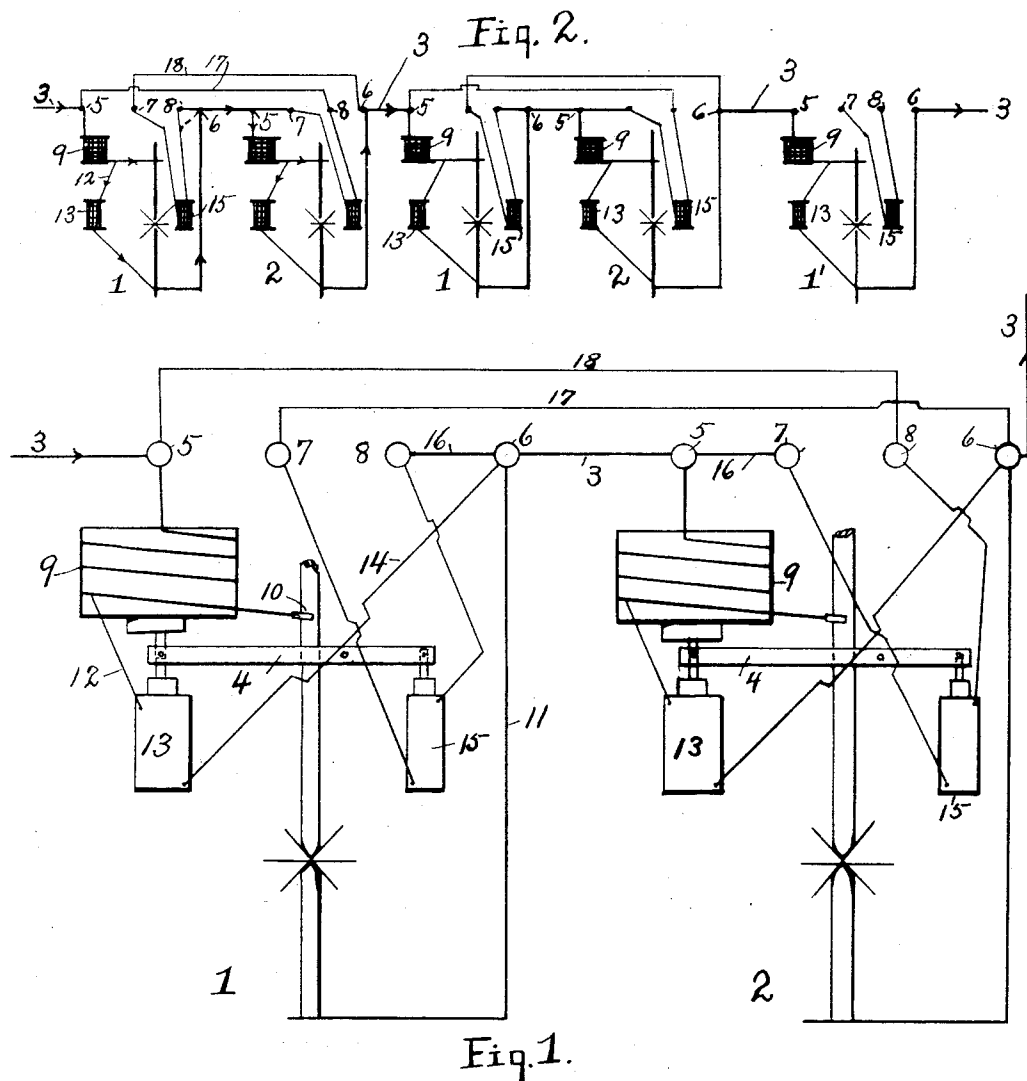


S. W. RUSHMORE.
ARC LIGHTING.

No. 541,290.

Patented June 18, 1895.



Witnesses
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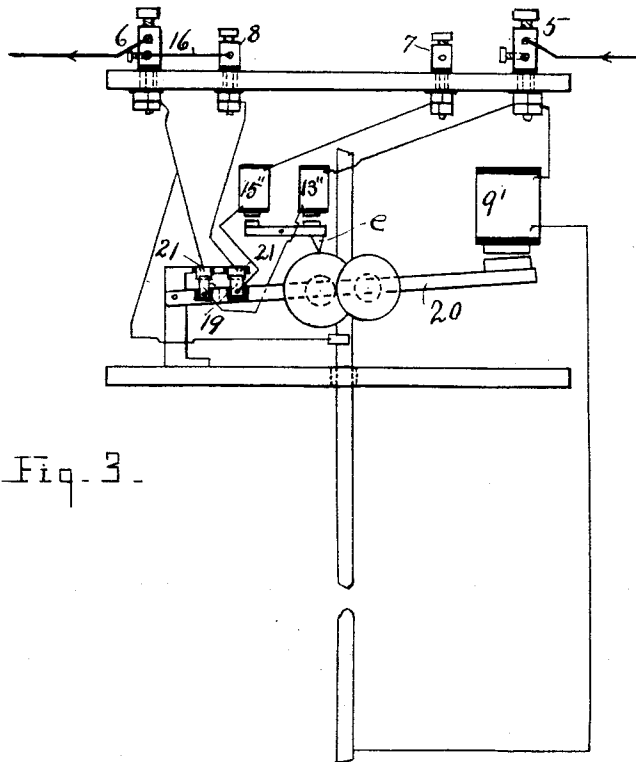


Fig. 3.

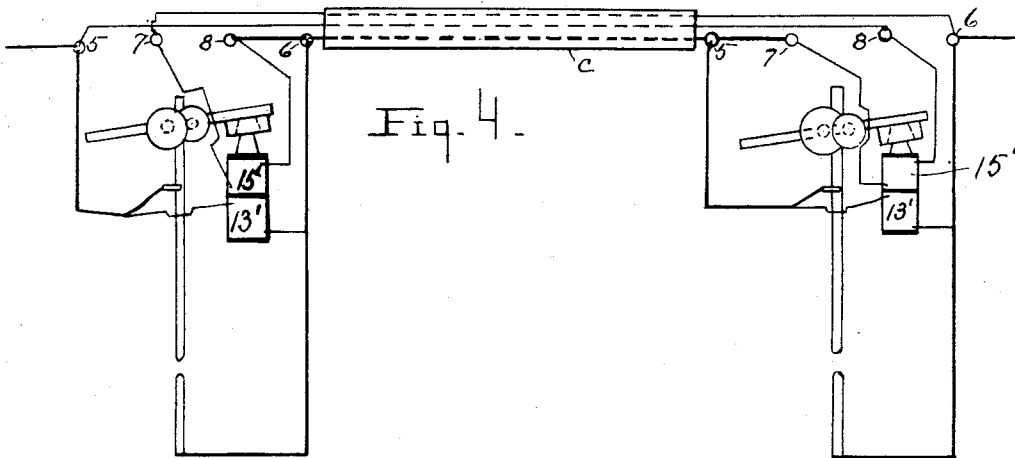


Fig. 4.

WITNESSES:

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SAMUEL W. RUSHMORE, OF BROOKLYN, NEW YORK.

ARC LIGHTING.

SPECIFICATION forming part of Letters Patent No. 541,290, dated June 18, 1895.

Application filed March 20, 1895. Serial No. 542,462. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL W. RUSHMORE, a citizen of the United States, and a resident of Brooklyn, county of Kings, State of New York, have invented certain new and useful Improvements in Arc Lighting, of which the following is a specification.

My invention relates to arc lighting.

The main object of the invention is to provide a construction of lamp, and a system of connecting several of the lamps, whereby more than one lamp can be successfully used in series on constant potential circuits. This is accomplished by so constructing the lamps, and so connecting them, that the feeding of the carbon or carbons in each lamp is controlled not by a coil or magnet in shunt to its own arc only, but by such coil or magnet and by an extra coil or magnet in shunt to another arc in the series so that the arcs will be kept equal, as hereinafter more fully set forth.

In the drawings, Figures 1 and 2 are diagrammatic views illustrating the invention. Figs. 3 and 4 show other forms and features of the invention.

In Fig. 1 two arc lamps, 1, 2, are indicated in series in the circuit 3. 4 indicates a clutch lever, or other suitable feed controlling device or mechanism for the movable carbon. No attempt is made to show a feeding mechanism in detail, since the invention resides in the controlling coils and connections, rather than in such mechanism, and it should be understood that the invention is not limited to a special type or construction of lamp. Preferably each lamp is provided with four terminals or binding posts 5, 6, 7, 8, for the convenient connection of necessary wires. 9 indicates a series or arc striking coil, which may be located in any well-known or suitable manner, and which is connected on one side to main post 5, and on the other to one of the carbons, as indicated at 10. The opposite carbon is connected to the second main post 6 by wire 11. The posts 5, 6, are double, that is, have means for securing two wires thereto separately, so that the line wire 3 and the wire 16 can be connected as shown in Fig. 3. From the series circuit at each lamp branches a shunt 12, including a shunt coil 13, having a suitable armature connected to the feeding mechanism, and connected by wire 14 to the opposite

post 6 of the lamp. As described thus far the lamp does not differ from lamps now well-known except as to the binding posts. Each lamp is, however, provided with an extra coil 15 connected to posts 7, 8, and arranged so as to act on the feeding mechanism in opposition to the regular shunt coil 13. Coil 15 is shown as acting on the part 4 on the opposite side of its pivot from coil 13, but this particular arrangement is not essential. When two lamps are to be used in series the posts 7, 8, of lamp 1 are connected to the main posts 6, 5, of lamp 2, and posts 7, 8, of lamp 2 are connected to posts 6, 5, of lamp 1. To save one wire between the lamps post 8 of lamp 1 may be connected to post 6, and post 7 of lamp 2 to post 5, thereby utilizing the main circuit wire 3 between the lamps as part of the extra shunt circuits.

The coil 15 may be connected directly to post 6 at lamp 1, and post 5 to lamp 2, as indicated at lamp 1, Fig. 2; but it is more convenient to use said four posts. It will be seen that coil 13 is connected to both main binding posts of its lamp, while coil 15 is disconnected from at least one of said posts, so as not to be in shunt to the arc at that lamp.

Evidently, lamps constructed as described can be used independently of each other as well as in series and interdependent. In the former case the connections 16, 17, 18, would be omitted and coils 15 would be idle, but would not interfere with the operation of the lamps. The extra shunt coils 15, each in shunt to another lamp than its own, can readily be put into lamps already constructed without them.

The operation of the lamps when in series is as follows: The regular shunt coils 13, tend to cause feed of the carbons as the arcs lengthen and the potential thereat increases; but this tendency to feed is opposed by coils 15. If, therefore, one lamp should attempt or tend to draw a longer arc than the other its higher voltage will cause the opposing magnet or coil in the other lamp to prevent its feeding until the lamp having such longer arc shall have fed sufficiently to restore the balance of the arcs. The arcs are therefore kept of practically the same length.

In high voltage systems when more than two lamps are to be used in series, they will be arranged in pairs 1, 2, as indicated in Fig.

2, in which the parts are numbered as in Fig. 1. While this will not entirely overcome the irregularity of feeding because all the lamps are not interdependent, it will largely reduce such irregularity of feeding. With this arrangement a standard lamp is adapted for use without change in different systems. When the number of lamps in series is uneven one lamp will be connected as at 1', the coil 15 being disconnected, or the odd lamp may be without a coil 15.

Fig. 3 shows another arrangement of the coils and feed mechanism of a lamp. 9' is the series coil for striking the arc. 13'' is a coil in shunt to the arc of its lamp, being connected to the main lamp terminals 5, 6, and adapted to raise the releasing detent *e* to allow the upper carbon to descend. 15'' is an extra coil connected in shunt to another lamp in the manner already described. Coil 15'' acts on the armature lever in opposition to 13''. 19 are contacts carried by but insulated from the pivoted frame 20 of the feed mechanism, and when in the position shown are in contact with contacts 21, closing the shunt circuits. When the series magnet releases its armature these contacts separate, opening the shunt circuits, thereby protecting the shunt coils when the lamp is out of use.

In Fig. 4 are indicated lamps with a shunt arc striking coil, and with no series coil. 13' is the main shunt coil in each lamp and 15' are extra coils wound, connected, or mounted so as to act in opposition to coils 13'. Coils 15' are not in shunt to the arcs of their own lamps, but each is in shunt to the arc of the other lamp for the purpose above indicated.

In view of the number of connections it is of great advantage to employ four separate binding posts on each lamp and to connect the two lamps by a cable *c*, having three wires held in definite relation to each other, whereby correct connections are surely and conveniently made. One of the wires should be as large as the line wire. The others, which only carry the shunt currents, may be small wires. By arranging the binding posts in the manner described, the lamps can be made all alike and any one of the lamps can be on the positive or on the negative side. In one case, wire 16 is placed between posts 6, 8, and in the other case, between 5, 7. In Fig. 4 the regular and extra shunt coils at each lamp are shown on a single core. The coils 13' will preferably be stronger than coils 15' so as to strike the arcs and then be opposed by coils 15'.

I claim—

1. The combination, in an arc lamp having suitable carbons and feeding mechanism, of two shunt coils arranged to act in opposition on said feeding mechanism, one of said coils being connected to both main terminals of the lamp, and the second coil being disconnected from at least one main terminal of the lamp, so that it will not be in shunt to the arc of said lamp, substantially as described.

2. The combination of two arc lamps connected in series, each lamp having suitable carbons and feeding mechanism, a coil at each of the lamps in shunt to its own arc and a second coil at one lamp, but in shunt to the arc of the other lamp, and arranged to act in opposition to the other shunt coil, substantially as described.

3. The combination of two arc lamps connected in series, each lamp having suitable carbons and feeding mechanism, a coil at each of the lamps in shunt to its own arc only, and a second coil at each lamp in shunt to the arc of the other lamp only, substantially as described.

4. The combination with a circuit of four or more arc lamps in series therein, the lamps being arranged in pairs the feeding of one lamp of each pair being controlled or modified by a coil in shunt to its own arc and by a coil in shunt to the arc of the second lamp only of the pair, substantially as described.

5. The combination with a circuit, of an uneven number of arc lamps in series therein, the lamps being arranged in pairs, the feeding of one lamp of each pair being controlled or modified by a coil in shunt to its own arc and by a coil in shunt to the arc of the second lamp only of the pair, and the odd lamp having no operating second shunt coil, substantially as described.

6. The combination, in an arc lamp having suitable carbons and feeding mechanism, of a series arc striking coil, and two shunt coils arranged to act in opposition on said feeding mechanism, one of said coils being connected to both main terminals of its lamp, and the second coil being disconnected from at least one main terminal of the lamp so that it will not be in shunt to the arc of said lamp.

7. The combination, in an arc lamp having suitable carbons and feeding mechanism, of two shunt coils arranged to act in opposition on said feeding mechanism, one of said coils being connected to both main terminals of the lamp and the second being disconnected from at least one main terminal of the lamp, so that it will not be in shunt to the arc of said lamp, there being two main and two extra binding posts on each lamp for making said connection.

8. The combination, in a lamp having suitable carbons and feeding mechanism, of two shunt coils arranged to act in opposition on said feeding mechanism, one of said shunt coils being in shunt to the arc of said lamp, and the other of said coils not being in shunt to said arc, but having connections adapted to connect the coil in shunt to another arc, and means for automatically opening the circuits of said shunt coils when current ceases to pass through the arc.

9. The combination in a lamp having suitable carbons and feeding mechanism, of a series arc striking coil and two shunt coils arranged to act in opposition on said feeding

mechanism, one of said shunt coils being in
shunt to the arc of said lamp, and the other
of said coils not being in shunt to said arc,
but having connections adapted to connect
5 the coil in shunt to another arc, and means
for automatically opening the circuits of the
said shunt coils when the current ceases to
pass through the arc.

In testimony that I claim the foregoing as
my invention I have signed my name, in pres- 10
ence of two witnesses, this 14th day of March,
1895.

SAMUEL W. RUSHMORE.

Witnesses:

ROBT. T. POWELL,
C. M. CATLIN.