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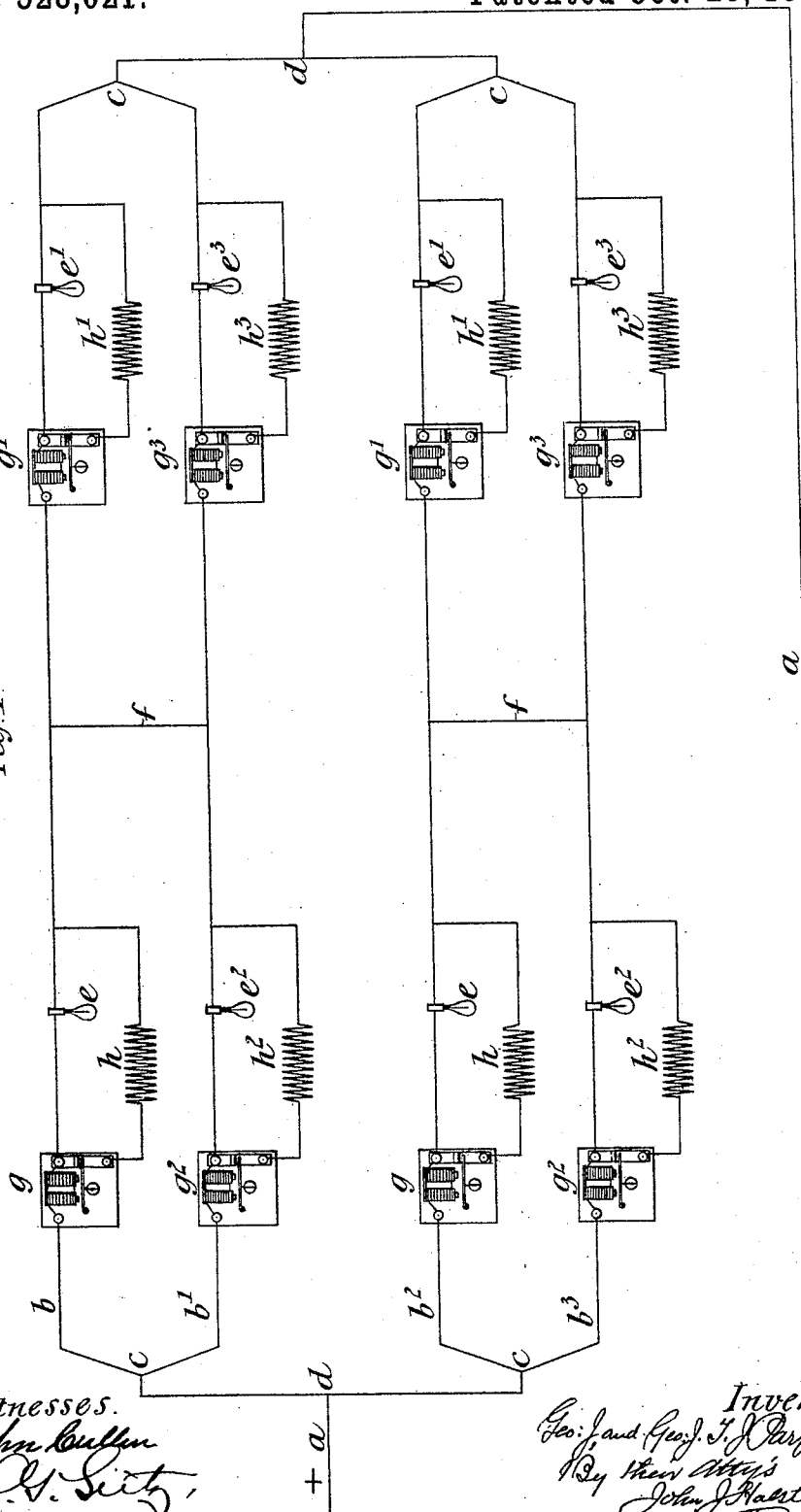
2 Sheets—Sheet 1.

G. J. & G. J. T. J. PARFITT.
ELECTRIC LIGHTING SYSTEM.

No. 528,021.

Patented Oct. 23, 1894.

Fig. 1.



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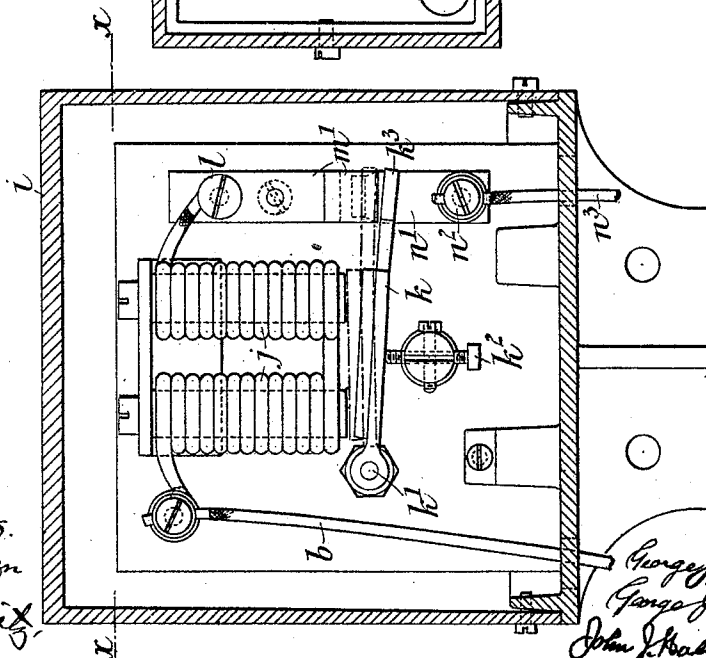
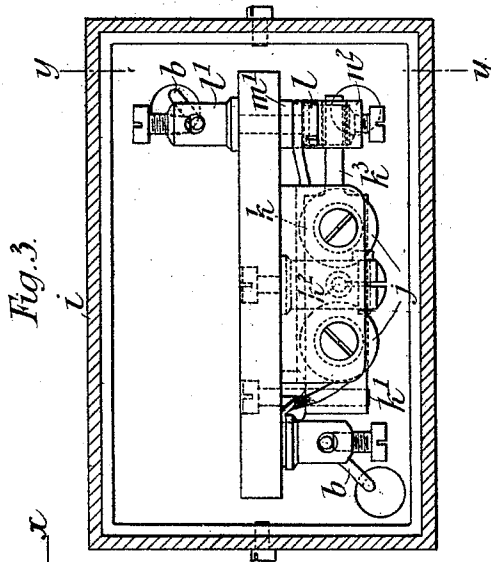
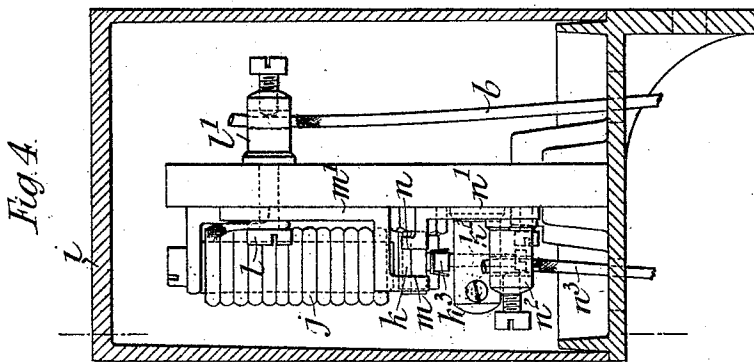
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2 Sheets—Sheet 2.

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ELECTRIC LIGHTING SYSTEM.

No. 528,021.

Patented Oct. 23, 1894.



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UNITED STATES PATENT OFFICE.

GEORGE JOHN PARFITT AND GEORGE JOHN TOM JELLEY PARFITT, OF
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ELECTRIC-LIGHTING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 528,021, dated October 23, 1894.

Application filed July 12, 1892. Serial No. 439,816. (No model.)

To all whom it may concern:

Be it known that we, GEORGE JOHN PARFITT and GEORGE JOHN TOM JELLEY PARFITT, subjects of the Queen of Great Britain, residing at Keynsham, in the county of Somerset, England, have invented a certain new and useful Improved Method of Electric Lighting in Series and Apparatus Therefor, of which the following is a specification.

Our invention relates to series electric lighting.

It is well known that when a number of electric lamps are arranged in series in a circuit if one of these lamps fail either all the lamps of the series are extinguished or if an automatic cut-out is employed the remaining lamps burn with increased brilliancy.

Now the object of our invention is to provide means whereby in case one or more of the lamps in a circuit fail it or they may be cut out and a corresponding resistance or corresponding resistances automatically introduced without the other lamps in the circuit being overrun or otherwise affected.

In carrying out our invention we form the main circuit with two, four or other even number of branches in which the lamps are arranged in groups and in series and we metallically connect the two wires of each group between each pair of lamps.

In connection with each lamp we arrange an automatic switch, consisting essentially of a magnet and an armature. The coils of the magnet are so wound that the ordinary current will pass around them without attracting the armature. If, however, owing to the failure of one of the lamps an extra quantity of current flows through the coils then the armature is attracted and switches in a resistance equal to that of the lamp which has failed. During the time that this is taking place the extra amount of current which flows through the branch containing the lamp which has not failed passes over the bridge so that the other lamps are practically unaffected.

To enable our invention to be fully understood we will describe the same by reference to the accompanying drawings, in which—

Figure 1 is a diagram showing the main circuit divided into four branches for two

groups of lamps. Fig. 2 is an elevation of the automatic switch which we employ, one side of the casing being removed. Fig. 3 is a section on the line x, x Fig. 2; and Fig. 4 is a section on the line y, y , Fig. 3.

Similar letters of reference indicate corresponding parts in the several figures.

a indicates the main line circuit, and b, b' b^2, b^3 indicate four branches into which the same is divided, the two wires b, b' of one pair and the two wires b^2, b^3 of the other pair being united at c, c while the wires connects ing the two pairs unite at d, d .

e, e', e^2, e^3 indicate the lamps of each group, and f, f are the connecting pieces or bridges between the wires of each pair of branches.

g, g', g^2, g^3 are the automatic switches arranged in connection with the lamps e, e', e^2, e^3 respectively, and h, h', h^2, h^3 are the resistances which the switches g, g', g^2, g^3 are respectively designed to throw into circuit in case of the failure of the corresponding lamp.

It is to be understood that in practice the lamps may be of uniform resistance or of varying resistance (provided they are arranged in pairs in the two branches of a pair) in order that the main current shall be sub-divided and flow equally through all the branches.

The operation of the apparatus is as follows, that is to say, if all the lamps are in perfect order the current will flow equally through all of them. Assume, however, that the lamp e on the branch b, b' should fail then an extra quantity of current would commence to flow through the lamp e^2 on the branch b' , whereby the same would momentarily brighten. As soon, however, as this current reached the bridge f it would again divide and be equally distributed to both of the lamps e', e^3 . Immediately the excess of current commences to flow through the lamp e^2 the magnet of the automatic switch g^2 is energized sufficiently to move its armature, whereby the resistance h^2 is switched into the circuit so that the current then flows partly through the lamp e^2 and partly through the resistance h^2 . If on the contrary the lamp e^2 were to fail, the excess of current passing through the lamp e would cause the introduction of the resistance h .

The resistance may be in the form of a

lamp so that in case one lamp fails another is substituted therefor.

The construction of the automatic switch will be understood by reference to Figs. 2, 3 and 4.

i indicates the case of the instrument. j, j indicate the coils of the magnet, and k indicates the armature which is pivoted at k' and adapted to be adjusted relatively to the poles of the magnet by means of a screw k^2 . Normally the current flows through, say, the wire b , the coils of the magnet and the screw l connected to the binding-post l' again onto the wire b . When, however, an excess of current passes through the wire b and the magnet coils, the armature k is attracted so that its free end k^3 enters between the two surfaces m, n , the former of which is upon a plate m' in electrical connection with the screw l , as shown in Fig. 4, while the other is upon a plate n' in connection with a binding-post n^2 to which the wire n^3 leading to the resistance to be introduced is connected.

It will be noticed that when the end k^3 of the armature is between the surfaces m, n the current is divided, part of it continuing to flow through the wire b as heretofore and part flowing through the plate n' , binding-post n^2 and wire n^3 to the resistance as hereinbefore described.

It is to be understood that we may substitute arc lamps for incandescent lamps or that we may use arc lamps and incandescent lamps together in the same group.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is—

1. In a multiple series circuit, each of the branches of the main line having a separate electro-magnet and a light or other electric apparatus connected in series, and each of said branches having also a resistance circuit around said lamp or apparatus, and each of said magnets adapted for operating a switch to bring said resistance into multiple with the lamp circuit when an excess of current

passes through the same, and to break the resistance circuit when the lamp circuit is broken, or when no excess of current passes through the lamp circuit, all as and for the purposes set forth.

2. In a multiple series circuit, each of the branches of the main line having a separate electro-magnet and a light or other electric apparatus connected in series, and each of said branches having also a resistance circuit around said lamp or apparatus, and the armature of each of said magnets constituting a switch, for bringing the resistance into multiple with the magnet and light or other apparatus of its particular branch when attracted by its magnet, and for breaking said resistance circuit when not attracted by its magnet, all as and for the purposes set forth.

3. In a multiple series circuit, each of the branches of the main line having a separate electro-magnet and a light or other electric apparatus connected in series, and each of said branches having also a resistance circuit around said lamp or apparatus, and each of said magnets adapted for operating a switch to bring said resistance into multiple with the lamp circuit when an excess of current passes through the same, and when the lamp circuit of any branch is broken, to cause the resistance circuit of said branch to be broken also, and to cause the current from the same to pass through the other branches of the line, and the excess of current then made to pass through the other branches causing the magnets of such branches to operate their switches and to bring their resistances into multiple with the lamps or other devices on said branches, all as and for the purposes set forth.

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