June 9, 1931. L. A. RAMSDEN 1,809,181

ELECTRICAL ILLUMINATING APPARATUS

Filed Jan. 8, 1930 7 Sheets-Sheet 1

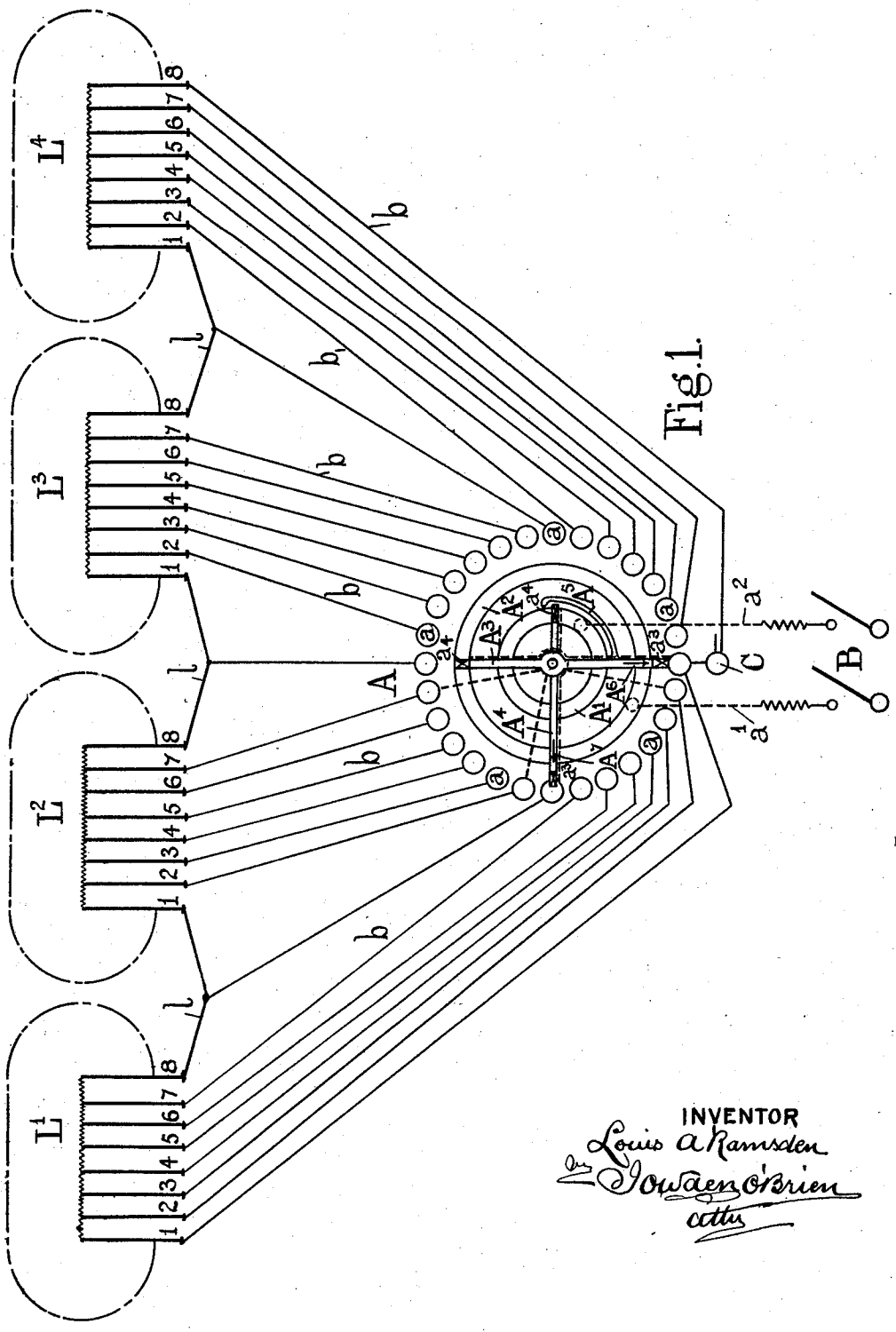


Fig.1.

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ELECTRICAL ILLUMINATING APPARATUS

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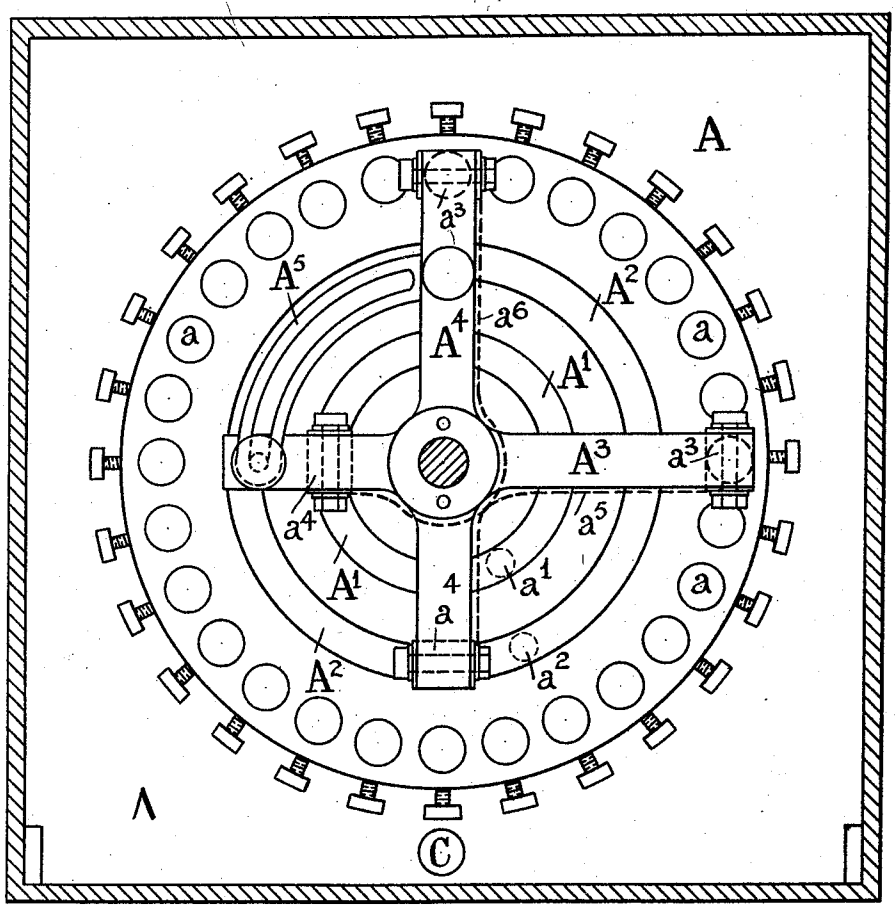


Fig.2.

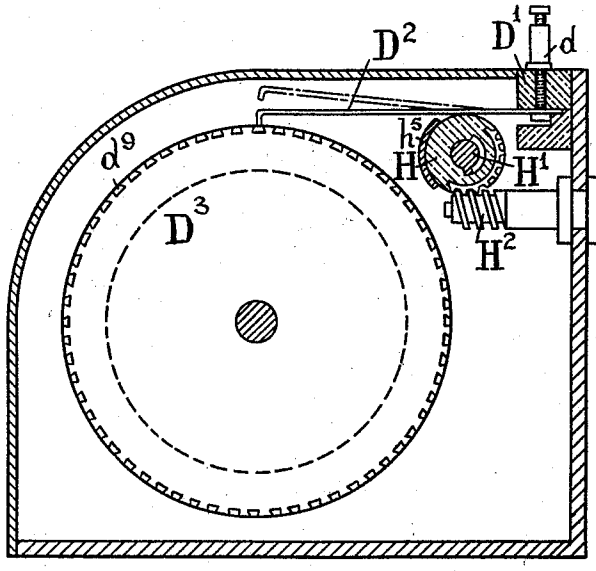


Fig.7.

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ELECTRICAL ILLUMINATING APPARATUS

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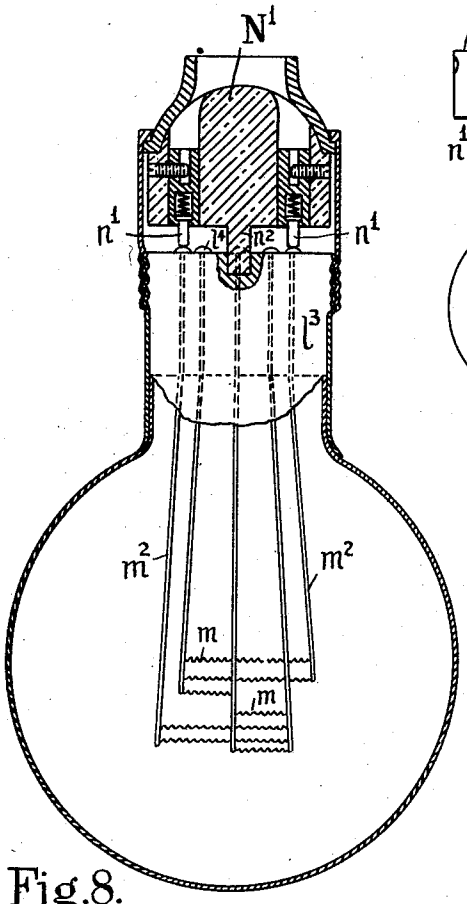


Fig.8.

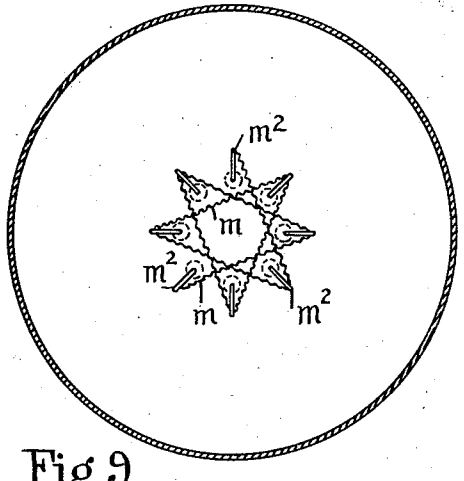


Fig.9.

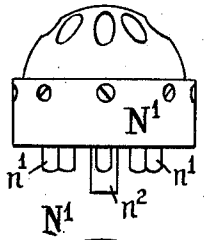


Fig.10.

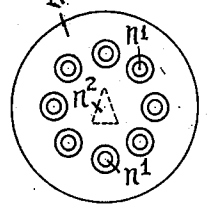
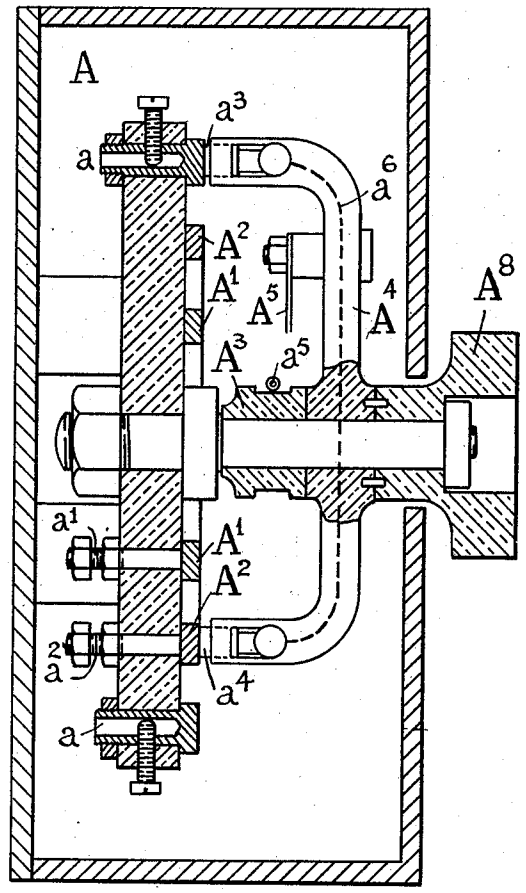


Fig.11.

Fig.3.



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ELECTRICAL ILLUMINATING APPARATUS

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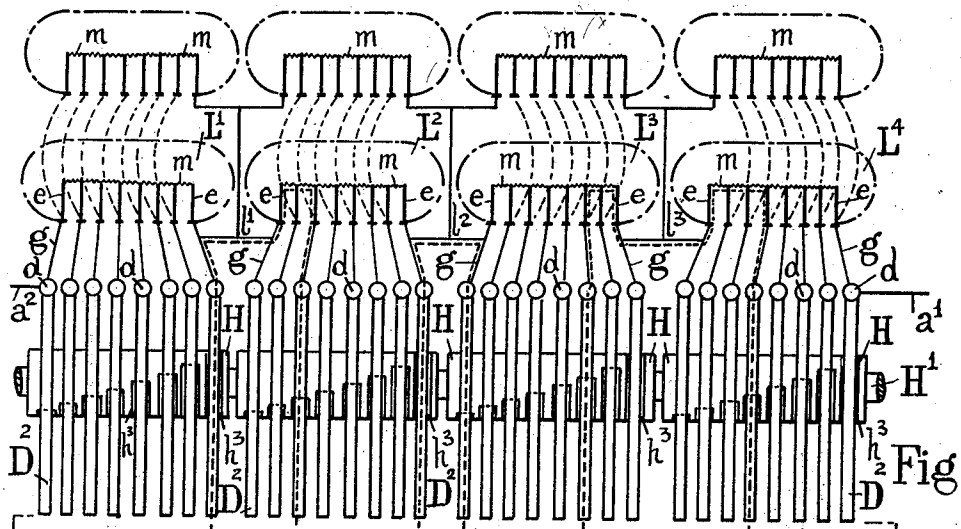
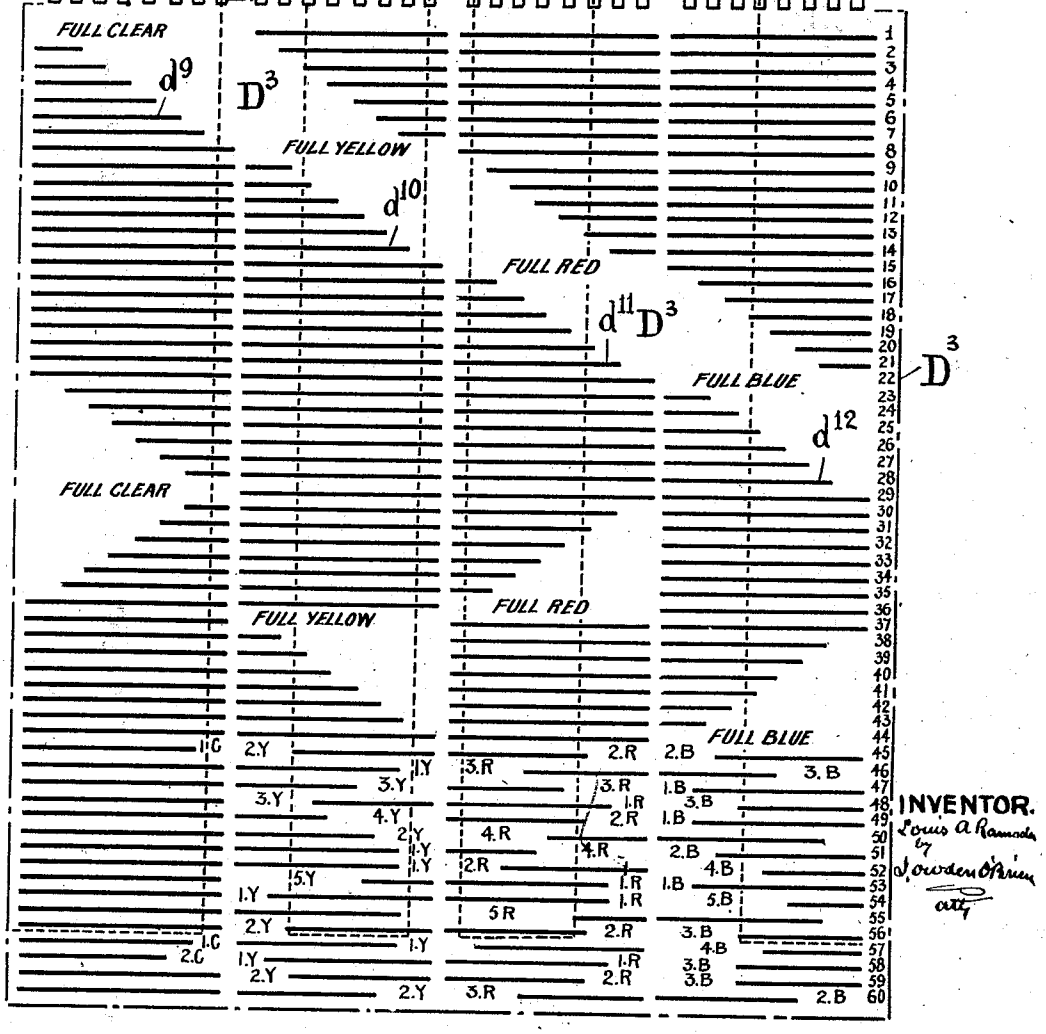


Fig. 4.



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ELECTRICAL ILLUMINATING APPARATUS

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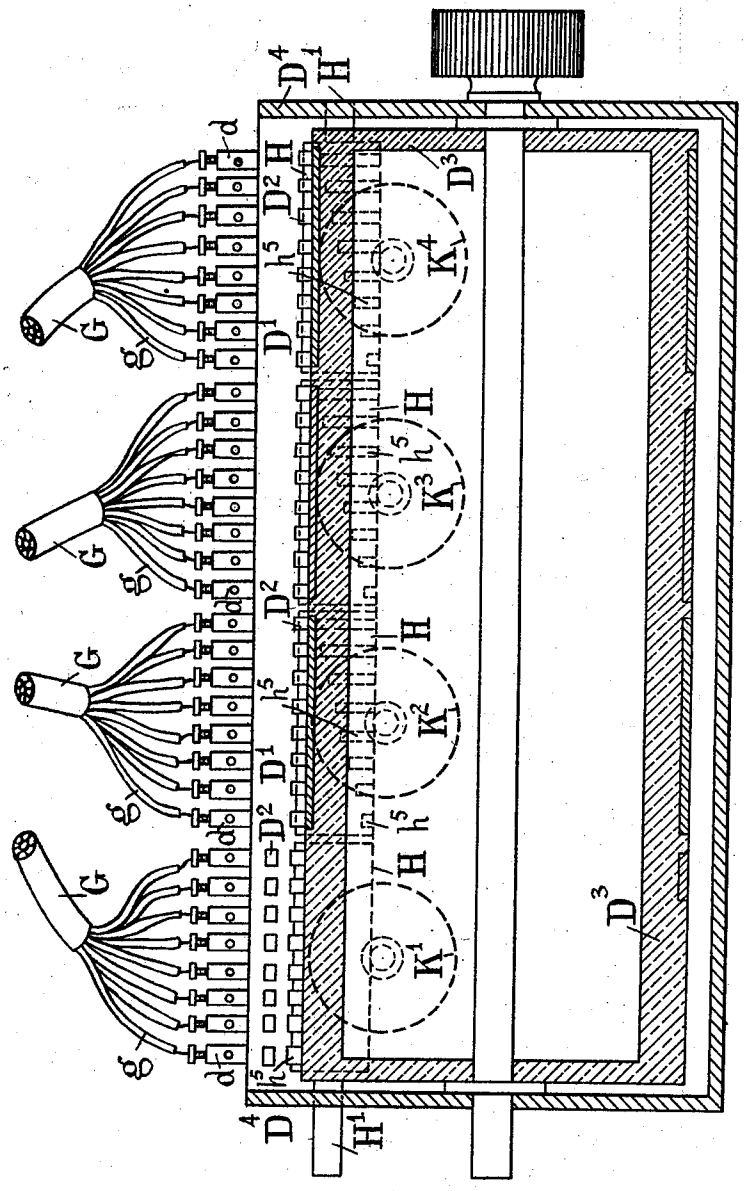


Fig.5.

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ELECTRICAL ILLUMINATING APPARATUS

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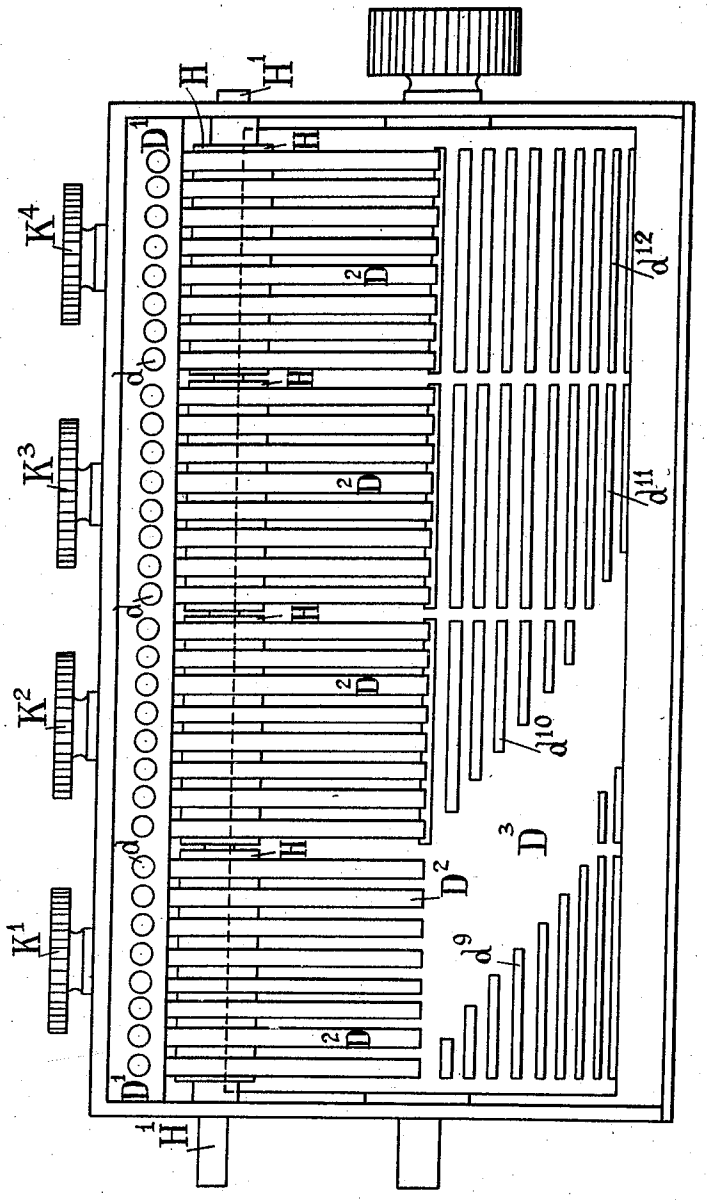


Fig.6.

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ELECTRICAL ILLUMINATING APPARATUS

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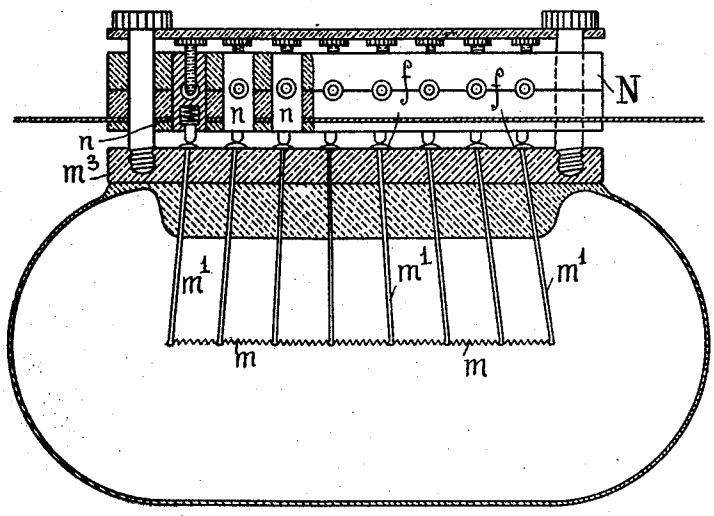


Fig.12.

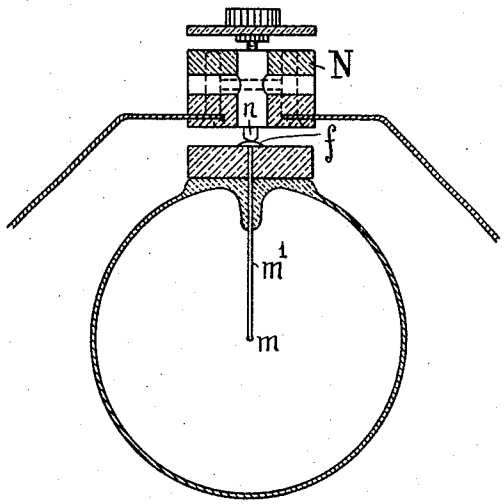


Fig.13.

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Patented June 9, 1931 1,809,181

UNITED STATES PATENT OFFICE

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ELECTRICAL ILLUMINATING APPARATUS

Application filed January 8, 1930, Serial No. 419,444, and in Great Britain January 16, 1929.

This invention relates to electrical apparatus for obtaining clear and/or coloured illuminating effects for stage, scenic, advertising and other purposes from a series of clear and/or various coloured electric incandescent lamps.

According to the invention a plurality of multi-contact electric incandescent lamps have each section of filament connected to a controlling device by the operation of which all the section filaments of one lamp or an equivalent number of section filaments taken from a plurality of lamps can be placed in circuit with means for varying the specific sections of filament in the circuit.

The invention consists further in providing means whereby a greater or less number of section filaments than those of one lamp or set of lamps can be brought into circuit to obtain dimming or brilliancy effects and also of means whereby the section filaments of one lamp or set of lamps or more than one lamp or set of lamps can be rapidly brought into and out of the circuit to obtain flashing effects.

The invention will be described with reference to the accompanying drawings:—

Fig. 1 is a diagrammatic view of one form of the invention in which the lighting effects are controlled by a controller having an arm rotating over a number of fixed contacts electrically connected to the different filaments of the lamps or parallel sets of lamps.

Fig. 2 is a front elevation of the controller shown diagrammatically in Fig. 1.

Fig. 3 is a transverse section of same.

Fig. 4 is a diagrammatic view of another form of the invention which will give more varied effects than the simpler form of controller shown in Figs. 1 to 3.

Fig. 5 is a side elevation partly in section of the controller shown in Fig. 4.

Fig. 6 is a plan of same.

Fig. 7 is a transverse section of same.

Fig. 8 is a transverse section through one form of multi-filament lamp and lamp holder for use with the invention.

Fig. 9 is a plan of same.

Fig. 10 is an elevation of the lamp holder.

Fig. 11 is a plan of same.

Fig. 12 is a transverse section of another form of multi-filament lamp and lamp holder for use with the invention.

Fig. 13 is a section of same at right angles to the section shown in Fig. 12.

In the form of the invention shown in Figs. 1 to 3 the controller A is constructed for the purpose of controlling four multi-filament electric incandescent lamps L^1, L^2, L^3 and L^4 or four parallel sets of multi-filament lamps according to the capacity of the controller. The lamps are of different colours and for the purpose of describing the invention the lamp L^1 is a clear lamp, the lamp L^2 is coloured yellow, the lamp L^3 is coloured red and the lamp L^4 is coloured blue. Each lamp is formed with seven filaments each connected to the controller A in such a manner that one or more section filaments from each lamp, to give a total of seven in series, can be placed in circuit to vary the light effect. In such a combination it is possible to obtain twenty four combinations of seven filaments and in addition dimming and flashing effects may be obtained.

The four lamps L^1, L^2, L^3, L^4 are connected in series with each other by loop wires l and where a further series of a similar number of lamps are employed these are connected in parallel with the preceding series. The controller A is provided with a number of terminal contacts a corresponding to the number of filament tapping points the same terminal contact being employed for the last tapping point in one lamp and the first in the next since these are short circuited by the loop wires l. In the example illustrated there are therefore twenty eight contacts a each connected by a conductor b to a filament tapping point.

A rotary switch C is connected to the contact terminal with which the last conductor of the fourth lamp or blue lamp is connected to allow for inserting and cutting out the filament sections of the four lamps in rotation. The terminal contacts a are arranged in the form of a circle, concentric with which are two continuous metal rings

A^1 and A^2 to which the positive and negative feeder wires a^1 and a^2 of the source of current supply B are attached.

Two current carrying contact arms A^3 and A^4 each carrying two contact makers or brushes a^3, a^4 one a^3 making contact with the terminal contacts a, the second on the arm A^3 making contact with the positive ring A^1, and the second on the arm A^4 making contact with the negative ring A^2 are arranged to traverse the terminal contacts a and are governed in positional relation to each other by an adjustable slider device A^5, which is permanently fitted to the arm A^4 so that normally the arms move in unison the same angular distance apart, thus ensuring against any excess of current being applied to the lamps, but which will permit each arm to be moved independently apart in order to obtain dimming or flashing effects. The two arms A^3 and A^4 each carry a conductor a^5 and a^6 connecting the contacts thereon so that when the main switch at B is closed and the arms are in the position as indicated by the pointers A^6 and A^7 current passes from the source of supply B through the respective rings and through the respective contact makers a^3 and a^4 terminal contacts a of the controller A, conductors b and filament tappings 1 and 8 of the first or clear lamp, or paralleled set of lamps, thus the whole length of the filament of the clear lamp or lamps is or are directly in circuit with the source of current supply, and are operated at maximum efficiency, the intermediate filament tappings 2, 3, 4, 5, 6 and 7 of the clear lamp being open circuited.

As the switch C is rotated, to obtain a merging effect the arms A^3 and A^4 move over the contacts a and in the example chosen (see dotted position on Fig. 1) the current passes the contacts a on the controller through the appropriate conductor b to the tappings 2 and 2 of the lamps L^1 and L^2 the circuit being closed by the intervening section filaments of both lamps. In this case six section filaments of the clear lamp and one section filament of the yellow lamp. By further rotation of the switch C in a clockwise direction the section filaments are successively cut out from the lamps L^1 and lamp L^2, L^3, L^4 are illuminated in turn the voltage across any illuminated section filament being maintained constant.

If the arm A^3 remains stationary and the arm A^4 is moved over the terminal contacts a as indicated by the dotted arm, the intermediate section filaments of the yellow lamp or lamps are interposed in sequence into the circuit in addition to the section filaments of the clear lamp or lamps, or alternatively, the arm A^3 may be moved apart from the arm A^4 traversing the contacts of the blue lamp or lamps or as a second alternative, each arm may be moved apart as from a centre point, thereby interposing variable members of section filaments, exceeding those already in circuit and so diminishing the light intensity or conversely cutting out some filaments to increase the light intensity. Flashing is effected by means of moving either arm apart from the other quickly.

Instead of employing a single independent conductor connecting the tappings of the lamp L^1—L^4 to the terminals a of the controller A it is preferred to employ a multi-core cable for each lamp, such multi-core cable being formed with the requisite number of conductors for each lamp.

In the form of the invention shown in Figs. 4 to 7 the combination contact and movement controller D is designed to control a series of four lamps L^1, L^2, L^3, L^4 or a series of four lamps wired in parallel with the preceding four lamps.

The lamps L^1, L^2, L^3 and L^4 shown are clear, yellow, red and blue respectively as previously described. As shown in the drawings there are thirty two controller terminals d one to each of all the section filament supports e of each lamp or parallel set of lamps, each tapping d being connected to a conductor wire g of a multiple core cable or cables G, the other ends of the conductors g being connected into their respective controller terminals d of a multiple terminal block D^1 fitted on the side of a controller cover D^4. The positive and negative feeder wires a^1 and a^2 are connected respectively into the end tappings e of the clear lamp L^1 and e of the blue lamp L^4 thus the current passes through all the section filaments of each lamp.

A loop conductor l^1 connects the end tappings d of the lamp L^1 to the first of the lamp L^2, similar loop conductors l^2 and l^3 connecting the end tappings d of the lamps L^2 and L^3 to the first of the lamps L^3 and L^4 respectively.

The current carrying conductors D^2 formed from spring metal strips are permanently affixed at one end to their tappings d and at their other ends are in contact with the surface of a rotor D^3 of non-conducting material. The rotor D^3 is dovetail slotted as shown to facilitate the fixing of the variable lengths of metal strips d^9, d^{10}, d^{11} and d^{12} the function of which is to short circuit various of the section filaments of the lamps L^1, L^2, L^3 and L^4 respectively.

For example when point 1 of the rotor D^3 is in contact with the contact makers D^2 contact is made with the corresponding metal strips d^{10}, d^{11}, d^{12} current therefore passes through the section filaments of the lamp L^1 and along the strips short circuiting the lamps L^2, L^3 and L^4.

As the rotor D^3 is rotated the section filaments of the lamp L^1 are short circuited

one or more at a time and equal numbers of section filaments of the other lamps L^2, L^3 or L^4 inserted in the circuit in their place leaving the total number of section filaments in circuit constant.

As will be seen from the diagrammatic view shown in Fig. 4 as the rotor R is rotated from points 1 to 29 the illuminated lamp will gradually merge from clear into yellow, from yellow into red, from red into blue and from blue back again to clear and further rotation from point 29 to point 44 would give merging effects from clear into red and from yellow into blue.

The remaining points give different arbitrary combinations of colours which are indicated on the diagram but which can be varied on different controllers as desired.

For example when the point 56 is in contact with the conductors D^2 the lamp L^1 is short circuited, two section filaments of the lamp L^2, two of the lamps L^3 and three of the lamps L^4 being in circuit whilst the other section filaments of these lamps are also short circuited.

Dimming or flashing effects are produced by increasing or decreasing the number of section filaments in the circuit above or below the normal number. A regulator H is provided for each lamp L^1, L^2, L^3 and L^4 for raising the contactors D^2 from the drum D^3 and allowing them to fall back to produce the aforesaid effects. The regulators H are cylindrical and formed with a series of circumferential raised strips h^5 of varying lengths raised above the surface of the cylinder to lift the conductors D^2 from the drum D^3 as the regulator H is rotated. The regulators H are mounted on a shaft H^1 and are provided with a toothed quadrant engaging worms H^2 each controlled by a knob or dial K^1, K^2, K^3 or K^4 respectively.

In operation by rotating any of the knobs or dials from left to right, the strips h^5 lower the contact makers D^2 in sequence on to the surface of the rotor D^3 completing the circuit through the required metal strips d^9, d^{10} d^{11} and/or d^{12} and the corresponding filament tappings.

Conversely by rotating the dials from right to left the contact makers D^2 are raised in sequence.

Flashing is effected by rapidly rotating the rotor D^3 so that the contact terminals D^2 come into contact alternately with the metal bars and with the insulated portions of the rotor R.

In another method a square shaft of non-conducting material may be arranged below the contact makers to raise and lower them when desired for the purpose of obtaining flashing effects.

The shape of the lamps L^1, L^2, L^3, L^4 may be of tubular, bulb or any suitable form and any number of tappings for the section filaments may be employed but for general purposes and also for illustration, the lamps as indicated in Figs. 8 and 9 also Figs 10–13 are particularly adaptable.

The filament of the lamp may be of such specific permeability that it will function either in a vacuum or gas filled lamp and the whole length of filament of one lamp L must be constructed for the line voltage when directly in circuit with any available source of current supply also where very gradual diminishing or establishing effects are required, the filament m must be of such specific permeability that the maximum incandescence is successively attained.

The lamp shown in Figs. 8 to 11 is of bulb form the section filaments m being carried on supports m^2 passing through an insulated foot l^3 hermetically sealed into the bulb and terminating in tappings l^4. The lamp is carried in a lamp holder N^1 each tapping l^4 being provided with a spring contact device n^1 into which the contactors D^2 of the controller are affixed so that each section filament m can be put in circuit independently of the others.

The support N^1 is formed with a triangular locating member n^2 so that when affixed to the lamp it will always assume the correct position in relation thereto.

The lamp L shown in Figs. 12 and 13 is of tubular shape the filament being divided up into a series of sections m of equal length each carried on supports m^1, mounted in an insulated foot m^3 and connected in series. Each support m^1 is hermetically sealed into the foot m^3 and provided with a tapping f. The lamp is carried in a lamp holder N each tapping f being provided with a spring contact device n into which the contactors D^2 of the controller are affixed so that each section filament m can be put in circuit independently of the others.

What I claim as my invention and desire to protect by Letters Patent is:—

1. Electrical apparatus for obtaining clear and/or colored illuminating effects for stage, scenic advertising and other purposes comprising a plurality of multi-contact electric incandescent lamps, a plurality of section filaments connected in series within each lamp, a controller, a cylindrical rotor within the controller, a plurality of contact bars insulated from each other let into the surface of the rotor and a plurality of contact makers bearing on the surface of the rotor each connected to a contact terminal to vary the specific filaments in the circuit.

2. Electrical apparatus for obtaining clear and/or colored illuminating effects for stage, scenic, advertising and other purposes comprising a plurality of multi-contact electric incandescent lamps, a plurality of section filaments connected in series within each lamp, a controller, a cylindrical rotor with-

in the controller, a plurality of longitudinal contact bars insulated from each other let into the surface of the rotor, a plurality of contact makers bearing on the surface of the rotor each connected to a contact terminal, means to raise the contact makers out of contact with the rotor.

3. Electrical apparatus for obtaining clear and/or colored illuminating effects for stage, scenic advertising and other purposes comprising a plurality of multi-contact electric incandescent lamps, a plurality of section filaments connected in series within each lamp, a controller, a cylindrical rotor within the controller, a plurality of longitudinal contact bars insulated from each other let into the surface of the rotor, a plurality of contact makers bearing on the surface of the rotor each connected to a contact terminal and a worm and worm wheel to raise and lower the contact makers out of and into contact with the rotor to give flashing effects.

4. Electrical apparatus for obtaining clear and/or colored illuminating effects for stage, scenic advertising and other purposes comprising a plurality of multi-contact electric incandescent lamps, a plurality of section filaments connected in series within each lamp, a controller to insert a predetermined number of section filaments in circuit, a cylindrical rotor within the controller, a plurality of longitudinal contact bars insulated from each other let into the surface of the rotor, a plurality of contact makers bearing on the surface of the rotor each connected to a contact terminal, means to raise the contact makers out of contact with the rotor and means to increase the number of section filaments in the circuit above the predetermined number.

5. Electrical apparatus for obtaining clear and/or colored illuminating effects for stage, scenic, advertising and other purposes comprising a plurality of multi-contact electric incandescent lamps, a plurality of section filaments connected in series within each lamp, a plurality of leads one from each contact, a controller, a cylindrical rotor within the controller, a plurality of longitudinal contact bars insulated from each other let into the surface of the rotor, a plurality of contact makers bearing on the surface of the rotor each connected to one contact lead to vary the specific filaments in the circuit.

6. Electrical apparatus for obtaining clear and/or colored illuminating effects for stage, scenic, advertising and other purposes comprising a plurality of multi-contact electric incandescent lamps, a plurality of section filaments connected in series within each lamp, a plurality of filament supports, a plurality of spring contacts one for each filament support, a plurality of leads one from each spring contact, a controller, a cylindrical rotor within the controller, a plurality of longitudinal contact bars insulated from each other let into the surface of the rotor, a plurality of contact makers bearing on the surface of the rotor each connected to one contact lead to vary the specific filaments in the circuit.

In testimony whereof I have hereunto set my hand.

LOUIS ALFRED RAMSDEN.