

Jan. 26, 1932.

W. J. DAY

1,842,963

CIRCUIT CHANGING DEVICE

Filed Nov. 5, 1927

2 Sheets-Sheet 1

Fig. 1.

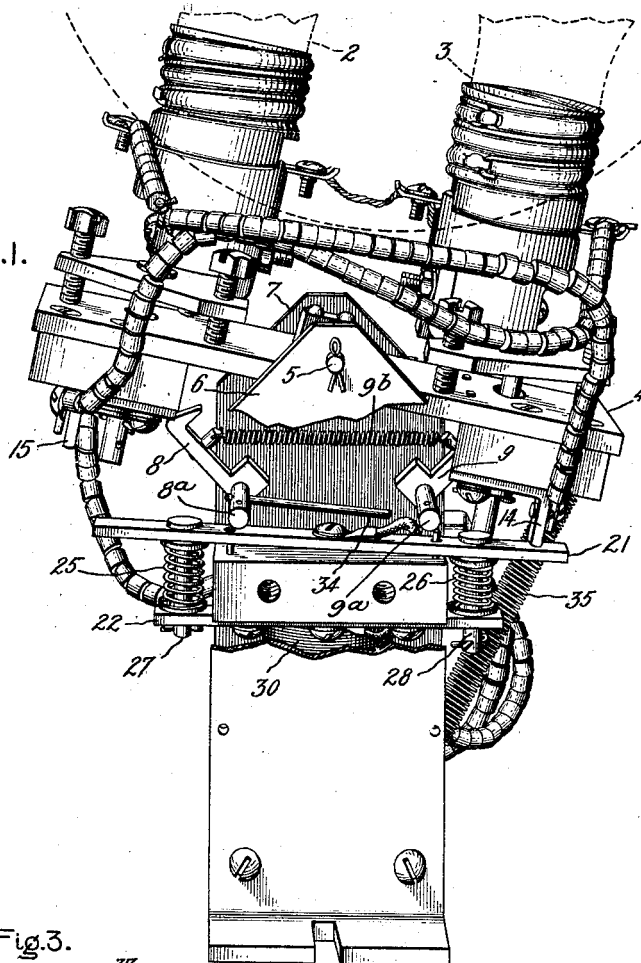
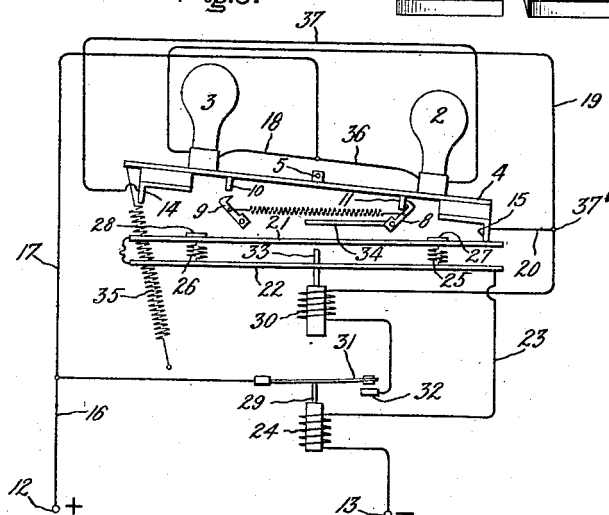


Fig. 3.



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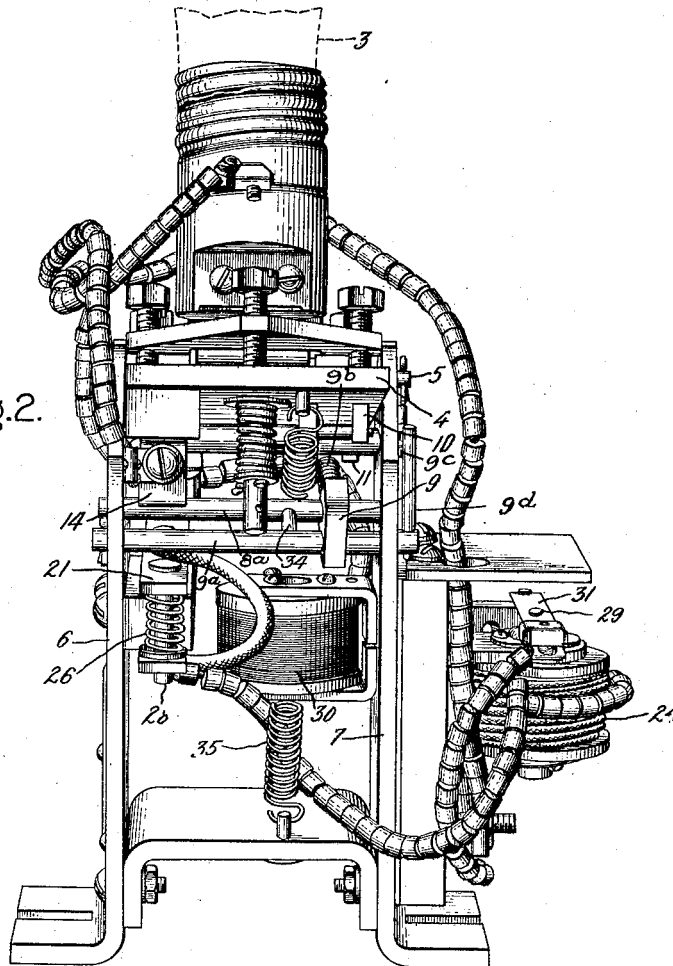
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Fig. 2.



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UNITED STATES PATENT OFFICE

WINTERTON J. DAY, OF ALPLAUS, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK

CIRCUIT-CHANGING DEVICE

Application filed November 5, 1927. Serial No. 231,368.

My invention relates to an automatic circuit-changing device. More particularly it relates to a circuit-changing device especially adapted for use as an automatic lamp changer. Devices of this sort are especially adapted for use in connection with lighthouses, aviation landing fields, and the like.

Among the objects of my invention are, to provide a device of the foregoing character with a plurality of lamps; to provide means whereby if one of the lamps burns out another lamp is automatically substituted for the burned out lamp; and to provide a tripping arrangement under the control of an electromagnetic device, which device is in turn under the control of a relay.

Other objects of the invention will appear from the following specification, in which the means for accomplishing the results of the invention are fully set forth and claimed, reference being had to the accompanying drawings, in which Fig. 1 shows the device in elevation and in perspective, part of the frame of the device being broken away in order to more clearly show the details. This view may be considered as a view from the front of the device. Fig. 2 is a side view of the device of Fig. 1 as viewed from the right, Fig. 1. Fig. 3 is a diagrammatic layout of the circuits of the device.

Referring more in detail to the drawings and in particular to Fig. 1, it will be seen that the device is provided with a pair of lamps 2 and 3 located in front of a reflector X. These lamps are supported on a platform 4, which is mounted to oscillate about a shaft 5. This shaft is supported by the two frame elements 6 and 7. In connection with the platform 4 there are provided a pair of latch dogs 8 and 9 carried by shafts 8^a and 9^a and yieldingly held against suitable stops by a spring 9^b, one of the stops being shown in Fig. 2 as comprising a pin 9^c which projects from the frame 7 and is engaged by an arm 9^d on shaft 9^a. When the platform is in the position shown in Fig. 1, the dog 9 engages the stirrup 10 (see Fig. 3) and holds the platform in the position shown in Fig. 1. In its original position, however, the platform of the device is tilted in the

reverse position as indicated in Fig. 3 with the dog 8 engaging the stirrup 11 and holding the platform tilted as indicated in Fig. 3. When the platform is in this position, the lamp 3 is in operative relation with respect to the reflector as indicated in Fig. 1 and in operation, that is, in circuit with the terminals 12 and 13, as may be clearly seen by an inspection of Fig. 3, across which terminals a generator or other source of current may be connected. The platform 4 is provided on its under side with a pair of circuit closing contacts 14 and 15. Contact 14 is connected with lamp 2, whereas contact 15 is connected with lamp 3. The flow of current through the lamp 3 is as follows: from terminal 12 and by way of conductors 16, 17, 18 to the lamp 3, thence by way of conductors 19 and 20 and by way of contact 15 and contact bars 21, 22, to conductor 23, thence through relay 24 to the terminal 13. The contact bar 21 is yieldingly mounted above the bar 22 on a pair of cushion springs 25 and 26, in connection with which pins 27 and 28 are provided to limit the rise of the bar 21. As a result of this construction when the contact 15 strikes the bar 21, Fig. 1, the left hand side of the bar will be depressed just as when the contact 14 strikes the bar 21 the right hand end of the bar 21, Fig. 1, is depressed, as indicated in Fig. 1. While the lamp 3 is burning current is, of course, flowing through the relay 24 with the result that the plunger 29 is raised and the circuit of the trip magnet 30 broken between the contacts 31 and 32 of the relay 24. Therefore, during the period that the lamp 3 is burning current is prevented from flowing through the magnet 30.

Assuming now that the filament of the lamp 3 burns out it follows necessarily that the circuit through the relay 24 will be interrupted. As a result the relay 24 deenergizes and the circuit for the trip magnet 30 is closed when the contacts 31, 32 close. Current will then flow from the terminal 12 through the trip magnet 30 and through the contact 15 and bars 21, 22, and through the relay 24 to terminal 13. As a result the trip magnet 30 is energized and the plunger 33

is raised and caused to strike the trigger 34, to which the dog 8 is attached with the result that the platform 4 is unlatched. As soon as this takes place the tension spring 35 reverses the position of the platform, thus substituting one lamp for the other in the focal region of the reflector and causing the platform to be latched by the dog 9 and causing at the same time the contact 14 to engage the bar 21 thereby closing a circuit through lamp 2, Fig. 3. This circuit extends as follows: from terminal 12 and by way of conductors 16, 17, 36, to lamp 2, thence over conductor 37 to the contact 14, thence by way of bars 21, 22, through the relay 24, and thence to terminal 13.

After the lamp 3 burns out the apparatus remains in its reversed position until a repairman has an opportunity to replace the burned out lamp. When he does so he then manually reverses the platform 4. In order to do so, however, he must, of course, manually trip the dog 9 out of engagement with the stirrup 10.

It will be seen that when the circuit is originally closed through the device, as shown in Fig. 3, where the device is represented in the initial position, that is, in the position in which the lamp 3 is in circuit, the magnet 30 is shunted by the lamp 3. The result is that the magnet 30 receives a very small amount of current. Furthermore, the resistance of the magnet 30 is much greater than the resistance of the relay 24. Under the circumstances, therefore, when the circuit is originally closed for lighting the lamp 3, the relay 24 will energize to break the circuit of the magnet 30 and the magnet 30 is not sufficiently energized to operate the plunger 33. Obviously, therefore, when the circuit is originally closed, the device cannot trip. However, when the lamp 3 burns out the shunt is removed from the magnet 30 and the magnet 30 is energized in series with the relay 24, the relay 24 being of low resistance and the magnet 30 being of high resistance and being free from the shunt mentioned. The magnet 30 will operatively energize while the relay 24 will not. Under the circumstances, therefore, the device will trip, substituting the lamp 2 for the lamp 3.

It will be understood that the device shown in the drawings may be located within the drum of the searchlight, for example, in such position that when the platform 4 is tilted as shown in Fig. 3, the lamp 3 will be located in the focal region, and when the platform 4 is tripped the lamp 2 will be substituted for the lamp 3 in the focal region.

It will be understood that while I have disclosed my invention in connection with a specified form of apparatus, I do not wish to be so limited inasmuch as in view of the disclosure, variations and modifications which do not depart from the spirit of the inven-

tion or the scope of the claims herein will readily occur to those versed in the art. For example, while I have shown the relay 24 inserted in circuit between the bar 22 and the terminal 13, this relay may be inserted in series with the conductor 19 between the lamp 3 and the point 37' where the conductor 19 joins the conductor 20. With such an arrangement neither the magnet 30 nor the relay 24 are in circuit when the platform 4 is tripped as a result of the burning out of lamp 3.

The device may be operated not only in connection with a searchlight, but it may also be used in connection with a Fresnel lens, such for example, as used in connection with lighthouses and aeroplane field lighting. In such case, the Fresnel lens constitutes a light modifying element just as the reflector in the searchlight constitutes a light modifying element. In neither case the active lamp is brought into a region in operative relation to the reflector or to the Fresnel lens best suited for obtaining the form of illumination desired.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a signal device, a projector comprising a reflector and a first socket adapted to receive a first electric lamp and a second socket adapted to receive a second electric lamp, a support for said sockets pivoted to rotate about an axis, means for holding said support in one position with the first lamp in the focal region of the reflector and with the second lamp away from said focal region, means for operating said support about its axis toward a new position when the filament of said first lamp breaks whereby the second lamp is substituted for the first in said focal region and whereby a new lamp may be substituted in the first socket for the broken one while the second lamp is burning, means for limiting the rotation of said support about its axis, said means comprising resilient means interposed in the path of said support to retard the rotation of the support as it approaches the limit of its new or second position, a stop element for holding the support in its second position with the second lamp in the focal region of the reflector, said resilient means tending to rotate the support away from its second position and toward the first and against said stop for positively maintaining the lamp in the second socket in the proper position in said focal region.

2. In a lamp changer, a support and a plurality of lamps, means on said support for holding each lamp in a different position, means for moving said support whereby one of the lamps may be substituted for the other in a given position, resilient means located to oppose the motion of the support for bringing the support to a stop, a latch for latching the support in its new position against re-

bound, and resilient means for holding the latch and the support in interlocked relation.

3. In a lamp changer, a pair of lamps mounted on a support, said support being
5 mounted to turn about an axis, a latch mechanism for retaining the support in one position, a relay connected in circuit with one of said lamps and adapted to be energized in series with the lamp, a magnet, a circuit for
10 said magnet, an armature for the magnet for operating said latch to release said support, means for moving the support from one position to another when released whereby one lamp may be substituted in place of the other,
15 the circuit of said magnet being under the control of said support at one point and of said relay at a different point whereby when the lamp in the relay circuit burns out the said armature operates the latch to release the
20 lamp support and to thereby open the circuit of the magnet, a resilient cushion for stopping the movement of the support, and a latch for holding the support in its new position against rebound, and resilient means for
25 holding the support and the last mentioned latch in interlocked engagement.

4. In a lamp changer, a reflector, a support and a pair of lamps mounted thereon, said support being pivotally mounted to oscillate
30 about an axis back and forth between two positions whereby the lamps may be moved back and forth and either lamp substituted for the other in a given position with respect to said reflector, a latch for holding the support in
35 one position and a second latch for holding the support in the other position, and resilient means for retarding the movement of said support as it approaches the limit of either one of its positions, said resilient means
40 operating also to hold the support against either latch.

5. In a lamp changer, a reflector, a support with a pair of lamps located thereon, said support being mounted to oscillate back and
45 forth alternately into either of two positions about an axis whereby either of said lamps may be substituted for the other in the focal region of said reflector, resilient means for retarding the movement of said support as it
50 approaches the limit of either one of its positions, a pair of latches, one for holding said support in one position and the other for holding the support in the other position, said resilient means also for holding either latch in
55 locked engagement with said support, and electromagnetic means comprising a relay and a magnet, said relay being in series with one of the lamps and said magnet being under the control of the relay whereby when the
60 filament of the lamp in series with the relay breaks the relay is operated and the magnet operated in turn to cause the support to move from one position to the other.

6. In a light projector, a reflector, a pair
65 of electric lamps mounted on a support, said

support being pivoted to oscillate about an axis between two positions whereby one of said lamps may be substituted for the other in a given position with respect to the reflector, latching means for holding the support
70 in either of the two positions regardless of the current for either lamp while their filaments are intact, means independent of the light of either lamp for operating said support about its axis to substitute one of said lamps for
75 the other when the filament of one of said lamps breaks whereby the second lamp may be substituted for the first, and resilient means for retarding the movement of said support as it approaches the limit of either
80 one of its positions.

7. In a lamp changer, a support and a plurality of lamps, means on said support for holding each lamp in a different position, means for moving said support whereby one
85 of the lamps may be substituted for the other in a given position, resilient means located to oppose the motion of the support for bringing the support to a stop, a latch for latching the support in its new position against re-
90 bound, said resilient means to hold the latch and the support in interlocked engagement, a pair of switches one for each lamp interposed between the support and the said resilient means and comprising part of said means. 95

8. In a light projector, a frame, a reflector, a support pivotally mounted intermediate its ends on said frame for oscillation in a plane parallel to said reflector, a lamp carried by said support at either end thereof, contacts
100 depending from said support at either end thereof, a contact bar secured to said frame adjacent to and below said support, releasable means for maintaining one of the contacts on said support in engagement with
105 said contact bar to maintain one of said lamps in focused relation to said reflector, a circuit including said contact and said contact bar for supplying current to said lamp, means responsive to the failure of said lamp
110 for actuating said releasable means to permit said contact to be disengaged from said contact bar, means for moving said support about its pivot to bring the other lamp into
115 focused relation to said reflector, and said other contact into engagement with said contact bar, and means for securing said support in said last named position.

9. In a lamp changer having a reflector, a support pivotally mounted for oscillation in
120 a plane parallel to said reflector and a lamp carried by said support at either end thereof, whereby said lamps may be interchangeably moved into focus relative to said reflector, contacts carried by said support at either
125 end thereof, a contact bar adapted to be engaged by one of said contacts when the support is at one limit of its oscillation and by the other of said contacts when the support is at the other limit of its oscillation, a latch
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for releasably holding one of said contacts in engagement with the contact bar to normally maintain one of the lamps in focus relative to said reflector, means operable upon the release of said latch for moving said support to its other limit of oscillation to move the other lamp into focus relative to said reflector and to engage the other of said contacts with said contact bar, means for securing the support in said last named position, and a circuit for supplying current to said lamps when in focused position, said circuit including said contact bar and the contact in engagement therewith.

10. In a lamp changer having a reflector, a support pivotally mounted for oscillation in a plane parallel to said reflector and a lamp carried by said support at either end thereof whereby said lamps may be interchangeably moved into focus relative to said reflector, contacts carried by said support at either end thereof, a contact bar adapted to be engaged by one of said contacts when the support is at one limit of its oscillation and by the other of said contacts when the support is at the other limit of its oscillation, a latch for releasably holding one of said contacts in engagement with the contact bar to normally maintain one of the lamps in focus relative to said reflector, a normally closed circuit including said contact bar and the contact in engagement therewith for supplying current to the focused lamp, a relay in said circuit, a normally open circuit in shunt with said first-named circuit, an electromagnet in said normally open circuit adapted when energized to release said latch, said relay being adapted, on the failure of the focused lamp in the closed circuit, to close said normally open circuit to energize said electromagnet, means for moving the support to its other limit of oscillation to move the other lamp into focus, and to engage the other of said contacts with said contact bar, and means for securing the support in said last named position whereby said normally closed circuit is again closed and said normally open circuit is again opened.

In witness whereof, I have hereunto set my hand this 4th day of November, 1927.

WINTERTON J. DAY.

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