May 20, 1941. F. C. BEEKLEY 2,242,383

LAMP SWITCH

Filed Feb. 7, 1939

Fig-1

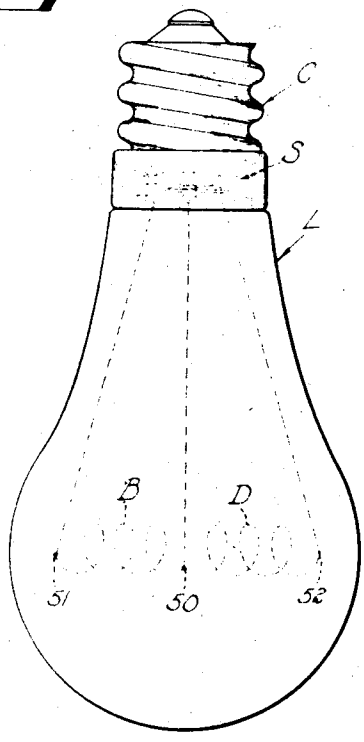


Fig-2

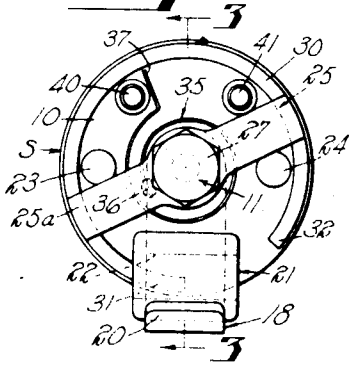


Fig-3

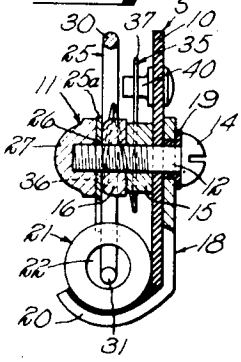


Fig-4

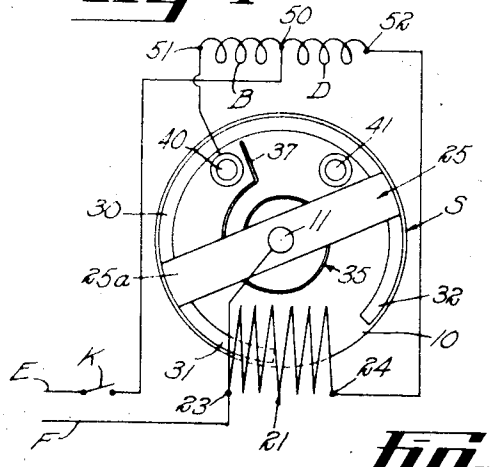


Fig-5

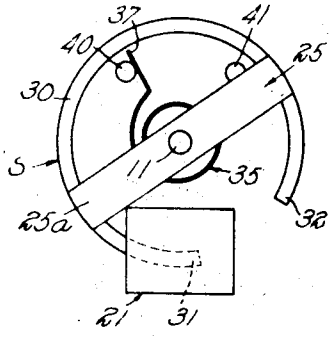


Fig-6

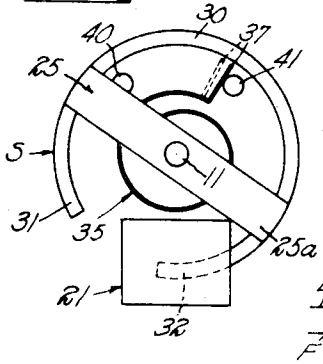
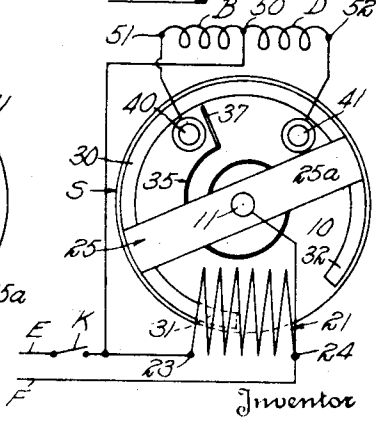


Fig-7



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LAMP SWITCH

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17 Claims. (Cl. 176—27)

This invention relates to electrical switches, and more particularly to a magnetically operated switch adapted for use in incandescent lamps having two filaments; the switch being adapted to cause one of the filaments to be illuminated either alone or together with the other filament and thereby control the lamp to respectively provide a dim light and a bright light.

The invention aims to provide, in lamps of the above character, a magnetically operated switch adapted for two wire circuits which, upon closing of the circuit, causes the lamp to be illuminated at one degree of brightness and upon interruption and reestablishment of the circuit causes the lamp to be illuminated at its other degree of brightness.

An object of the invention is to provide a switch of the above character which is simple in construction, economical to manufacture, is readily assembled and installed, and is efficient in operation.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereafter set forth and the scope of the application of which will be indicated in the appended claims.

In the accompanying drawing;

Figure 1 is an elevational view of an incandescent lamp having a pair of filaments and a switch for controlling the illumination of the filaments, illustrating an embodiment of the invention;

Fig. 2 is a plan view of the switch shown in Figure 1;

Fig. 3 is a sectional view taken along the line 3—3 on Fig. 2;

Fig. 4 is a schematic view, illustrating the position of the switch when the lamp is electrically disconnected and a wiring diagram of the electrical connections;

Fig. 5 is a schematic view, illustrating the switch after the lamp has been electrically connected;

Fig. 6 is a schematic view, illustrating the switch after interruption and reestablishment of the electrical connections; and

Fig. 7 is a schematic view of the switch and a wiring diagram of electrical connections, illustrating a modification of the invention.

Referring to the drawing in detail, there is shown an incandescent lamp L having a pair of filaments B and D, for respectively providing a relatively bright light and a relatively dim light. The lamp is further provided with the usual base C for screwing the lamp in a socket, and mounted in the base is a switch S for alternately electrically connecting one or both of the filaments.

The switch S is illustrated in detail in Figs. 2 and 3, and comprises a mounting disc 10 formed of insulating material and a center post 11 for mounting a movable switch element about to be described. Preferably, the post 11 comprises an electrically conductive screw or bolt having a head 14 located at one side of the disc and a shank 12 extending therefrom through an aperture in the disc and the shank being threaded to receive nuts 15 and 16 to secure the screw to the disc.

The screw further serves to secure a bracket 18 to the disc, the bracket being positioned intermediate the disc and the head of the screw and insulated therefrom by a sleeve or bushing 19. The bracket 18 extends outwardly beyond the outer periphery of the disc and terminates in an arcuate arm 20 for mounting adjacent the post 11 an electric coil or solenoid 21 for producing, when energized, an electric magnetic field.

The coil illustrated herein is relatively short compared to the circumference of the disc and has a central aperture 22 tangentially disposed to the outer periphery of the disc, wherein the maximum strength of the magnetic field set up by the coil is located, which receives and actuates portions of an armature 25 hereinafter described. In the preferred embodiment, the coil 21 has a relatively low electrical resistance and draws a relatively small amount of current. The respective ends of the coil are preferably electrically connected to terminals 23 and 24 which may by suitable rivets be secured to the disc and have electrical leads soldered thereto.

The armature comprises a cross bar 25a which has a central aperture 26 for receiving the shank 12 of the screw and is electrically connected to and mounted for rotation on the screw intermediate the nut 16 and a bearing member 27 threaded to the free end of the screw. Mounted on and secured to the cross bar is a segment 30 of a magnetically attractable ring positioned to rotate through the aperture 22 of the coil 21. The armature segment has spaced free ends 31 and 32 adapted to be alternately drawn within the coil 21 as the circuit is alternately established and broken. The cross bar 25a preferably abuts the ends of the coil upon rotation of the armature segment and is mounted diametrically across the armature ring at points substantially equidistant from adjacent free ends, so that the armature can rotate in either direction the same distance before being stopped. For example, in the embodiment illustrated, the cross bar is arranged to permit the armature to rotate about seventy-five degrees while the cross bar moves from one side of the coil to the other. Also, the armature is balanced to enable the lamp to

be placed in any desired position without effecting the rotation of the segment.

Means are provided so that the free ends 31 and 32 of the armature segment are positioned at unequal distances from the middle of the coil so that the attraction will be greater to the one in closer proximity and thus draw it into the coil. For this purpose there is provided a resilient metal member, such as a spiral spring 35 having its inner end 36 electrically connected and secured to one side of the cross bar adjacent the aperture 26 and mounted for rotation with the armature. The free end 37 of the spring is bent radially outwardly with respect to the mounting post and is positioned to oscillate between a pair of contact members or studs 40 and 41 secured to the disc. These studs are located diametrically opposite the coil and are spaced apart about fifty-five degrees or a suitable distance shorter than the distance the armature can rotate. Thus, upon energization of the coil to attract the end 31 of the armature, the end 37 of the spring abuts the stud 40 and tensions it while the armature continues to rotate until the cross bar 25a abuts the coil 21. When the supply of electrical energy to the coil 21 is interrupted the tension of the spring is effective to rotate the armature in the opposite direction into an off-center position with the other end 32 of the segment in position to be attracted by the coil. In the preferred embodiment, the stud 40 also serves as an electrical contact member cooperating with the spring portion 37 to close an electrical current, as about to be described.

The electrical connections of the switch and filaments are illustrated more particularly in Fig. 4. Adjacent ends 50 of the filaments B and D are connected to one side E of an electrical supply line having in its circuit a suitable switch K. The other end 51 of the filament B is adapted to be electrically connected through the contact 40, spring 35, cross bar 25, post 11 and terminal 23 to the other side F of the supply line. The other end 52 of the filament D is connected in series with the coil through terminal 24 to the other side F of the supply line through terminal 23. With this arrangement the filament D, providing a dim light, is electrically connected whenever the switch K closes the circuit. The filament B, providing the bright light, is electrically connected only when the armature is in a position to cause the spring portion 37 to engage the contact 40.

The operation of the switch S will be understood more clearly by referring to Figs. 4, 5 and 6 of the drawing. Prior to closing the line switch K, the armature, for example, may be in an off-center position with the free end 31 of the segment extending into the coil, as shown in Fig. 4. Upon closing the line switch current will flow through the coil and the filament D causing the coil to be energized and the filament D to be illuminated. The coil then is effective to attract the end 31 of the segment and rotate the armature counterclockwise to the position shown in Fig. 5. The end 37 of the spring 35 then engages the contact 40 and electrically connects the filament B to the line whereby both filaments are illuminated.

During the final rotation of the armature the spring, as will be observed from the drawing, will be rolled together and tensioned (Fig. 5). When the switch K is opened the coil is deenergized whereupon the spring 35 will tend to assume its normal position and in so doing rotate the armature to carry spring end 37 past dead center end adjacent the contact 41 as indicated by broken lines in Fig. 6 and simultaneously position the end 32 of the armature segment in close proximity to the coil. Upon reestablishing the supply of electrical energy, the coil is again magnetized to move the end 32 of the segment into the coil and rotate the armature in a clockwise direction to assume the position illustrated in Fig. 6. The dim filament will now be illuminated alone and the spring, by having its end 37 abut the contact 41, is spread outwardly and is again tensioned to render it effective to rotate the armature in a counterclockwise direction. Thus when the switch K is opened, the coil releases the armature and the spring rotates it into the position shown in Fig. 4. When the switch K is closed again the contact 40 will be engaged by the end 37 of the spring to close the circuit for the filament B.

There is shown in Fig. 7, an alternative wiring diagram wherein the switch may be used to alternately control filaments B and D. The coil 21 is connected across the line and must therefore have greater resistance than when in series as in the earlier embodiment. The bright filament B has its inner end 50 connected to one side of the supply line and its other end 51 connected to the contact 40 which, in turn, is adapted to be electrically connected to the other side of the supply line through the spring 35, the cross bar 25, and the armature mounting post 11. The dim filament D likewise has its inner end 50 connected to one side of the supply line, and its other end 52 connected to the contact 41 which is adapted to be electrically connected to the other side of the supply line through the spring 35, cross bar and armature post.

The operation of the modified embodiment is essentially the same as the operation of the preferred embodiment. When the line switch K is closed while the armature, for example, is in the position shown in Fig. 7, the end 31 of the segment will be attracted to rotate the armature and cause the spring portion 37 to engage the contact 40, whereby the filament B will be illuminated. Upon interruption and reestablishment of electrical current the spring portion 37 is moved into engagement with the contact 41 whereby the filament D will be illuminated. With this arrangement it will be noted that the filaments may be selectively connected one at a time instead of one alone or together with the other. The switch is simple and economical in construction; can be readily manufactured; and occupies a minimum amount of space, thereby enabling it to be mounted in the base of a lamp or in the socket for receiving the base. Furthermore, the switch is adapted to dim a lamp without substantial waste of electrical energy, because the amount of current dissipated by the coil is negligible. The parts of the switch are rugged in construction and can readily withstand any rough usage to which they may be subjected. Although the switch has been shown in combination with a double filament lamp it is apparent that it may be utilized for other purposes.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language

used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim as my invention:

1. In combination with a lamp having a pair of filaments, a base therefor, a pair of electrical contacts on said base, a switch positioned in the base comprising an electrically energizable coil having an armature receiving aperture, a rotatably mounted armature segment having spaced free ends and of such size as to enter into the aperture thereof, a pair of spaced contact members, means electrically connecting one of said contact members to one end of one of said filaments, means electrically connecting the other end of said filament and one end of the other filament to one of said base contacts, means electrically connecting the other end of the other filament to one end of the coil, means electrically connecting the other side of the coil to the other of said base contacts, a spiral spring connected to said armature segment for rotation therewith and having a radially outwardly extending contact portion positioned between said contact members, and means electrically connecting said spring to the base contact to which said coil is connected.

2. In combination with a lamp having a pair of filaments mounted on a base, a switch located in said base comprising a disc member, an electrically energizable coil mounted on said disc member and having an armature receiving aperture, a pair of contacts on the base for electrically connecting said coil to an electrical supply line, a center post secured to said disc member, a cross bar rotatably mounted on said center post and electrically connected thereto, an armature segment carried by said cross bar and having spaced free ends actuated by said coil, a pair of spaced contact members on said disc member substantially diametrically opposite said coil, one of said contact members being electrically connected to one end of one of said filaments and the other contact member being electrically connected to one end of the other filament, means electrically connecting the other ends of said filaments to one of the base contacts, a resilient member electrically connected and mounted on said cross bar for rotation therewith and having a contact portion positioned intermediate of and engageable with said contact members, and means electrically connecting said post to the other of said base contacts.

3. In combination with a lamp having a pair of filaments mounted on a base, a pair of electric contacts on said base, a switch located in said base comprising an electrically energizable coil electrically connected with the contacts on said base and having an armature receiving aperture, a rotatably mounted armature segment having spaced apart free ends actuated by said coil and attractable into the aperture thereof, a pair of spaced contact members within the base, one of said contact members being electrically connected to one end of one of said filaments and the other contact member being electrically connected to one end of the other filament, means electrically connecting the other ends of said filaments to one side of the contacts on the base, a spiral spring connected to said armature segment for rotation therewith and having a radially outwardly extending contact portion intermediate and selectively engageable with said contact members within the base, and means electrically connecting said spring to the other of said contacts on the base.

4. In combination with a lamp having a pair of filaments mounted on a base, a pair of electric contacts on said base, a switch located in said base comprising an electrically energizable coil having an armature receiving aperture, a rotatably mounted armature segment having spaced free ends magnetically actuated by said coil and attractable into the aperture thereof, a pair of spaced contact posts within the base, one of said contact posts being electrically connected to one end of one of said filaments and the other contact post being electrically connected to one end of the other filament, means electrically connecting the other ends of said filaments to one of said base contacts, a resilient member connected to said armature segment for rotation therewith and having a contact portion positioned intermediate of and engageable with said contact posts and means for electrically connecting said resilient member to the other of said base contacts.

5. A switch comprising an electrically energizable coil having an armature receiving aperture, a rotatably mounted substantially annular armature segment having spaced free ends magnetically actuated by said coil and attractable into the aperture thereof to rotate said segment, means permitting said segment to be rotated a predetermined distance, a pair of contacts spaced apart a distance shorter than the distance said segment can be rotated, and a spiral spring carried by said armature segment for rotation therewith and having a laterally outwardly extending contact portion on its free end positioned intermediate said contacts, said contact portion engaging said contacts to tension said spring upon rotation of said armature by said coil.

6. A switch comprising a disc member, an electrically energizable coil for producing a magnetic field mounted on said disc member and having an armature receiving aperture, a post on said disc member, a cross bar rotatably mounted on said post, an armature segment carried by said cross bar and having spaced free ends actuated by said coil and attractable into the aperture thereof, a pair of spaced contact members on said disc member, and a spiral spring freely carried by said cross bar for rotation therewith and having a radially outwardly extending contact portion on its free end positioned intermediate of and engageable with said contact members.

7. A switch comprising an electrically energizable coil having an armature receiving aperture, a rotatably mounted substantially annular armature segment having spaced free ends actuated by said coil and attractable into the aperture thereof, a pair of spaced contact members, and a spiral spring freely carried by said armature segment for rotation therewith and having a radially outwardly extending contact portion on its free end positioned intermediate of and engageable with said contact members.

8. In an electric magnetically operated switch, an energizable coil for producing a magnetic field, a movable armature having magnetically attractable ends, said ends being alternately and positively attracted and held by the magnetic field when the coil is energized following successive interruptions of the current supplied to the coil, means to move the attracted end away from the coil and position the other end closer to the coil when said coil is deenergized, a pair of contact posts, and contact means engageable with

one of said posts when one armature end is attracted, and engageable with the other post when the second armature end is attracted by the field of the coil.

9. In an electro-magnetic switch, a coil having an aperture wherein a magnetic field is produced when the coil is energized, an arcuated armature rotatably mounted and having the ends thereof alternately and positively attracted into the aperture, a plurality of electrical contact posts, means engaging one of said contact posts when the coil is energized, and means which break the contact when the coil is deenergized and position the other end of the armature within the aperture whereby a second electrical contact post is engaged by the contact engaging means when the coil is reenergized.

10. In combination a base member, an armature segment movably journalled relative to the base member and having magnetically attractable free ends, an electrically energizable means for magnetically attracting the armature ends, the armature end nearer said means being positively attracted upon energization thereof, and resilient means for moving the armature relative to the magnetic means and reversing the proximity of the armature ends relative to said means upon each successive deenergization thereof.

11. A switch comprising a base member, an armature segment rotatably journalled relative to the base member and having magnetically attractable free ends, an electrically energizable coil for magnetically attracting the armature ends, the end nearer the coil being attracted upon energization thereof, resilient means for rotating the armature so that upon each successive deenergization of the coil the proximity of the armature ends relative to the coil is reversed, a pair of spaced contact members, and a third contact member movable between the spaced contact members and engageable with one of them when one armature end is attracted and engageable with the other of them when the other armature end is attracted.

12. A switch comprising a disc member, an armature segment rotatably mounted on said disc and having spaced magnetically attractable free ends, an electrically energizable coil mounted on said disc for magnetically attracting the armature ends, the nearer of said ends being attracted upon energization of the coil, a resilient member freely carried by the armature for moving the attracted end away from the coil upon interruption of the current and for positioning the other end of the armature nearer the coil so that said other end is attracted upon reenergization of the coil, a pair of spaced contact members on said disc, and a contact portion carried by the resilient member and alternately engaging said contact members as the armature ends are alternately attracted by the coil.

13. A switch comprising a disc member, an electrically energizable coil mounted on said disc member and having an armature receiving aperture, an armature segment rotatably mounted on said disc and having spaced free ends alternately attracted by said coil into the aperture thereof, one of said ends being attracted upon energizing of the coil and the other of said ends being attracted upon the reenergizing of the coil following an interruption of the current supplied thereto, a pair of spaced contact members on said disc, and a resilient member carried by said armature segment and having a contact portion alternately engaging said contact members as the armature ends are alternately attracted by the coil, said resilient member moving the attracted end away from the coil upon interruption of the current and at the same time positioning the other end of the armature adjacent the coil so that said other end is attracted by the coil when the coil is reenergized.

14. A switch comprising an electro-magnetic coil having an armature receiving aperture, a movable armature segment having spaced free ends alternately and positively attracted by said coil into the aperture thereof upon successive energizations of the coil, a pair of spaced contact members, and a resilient member freely carried by said armature segment for movement therewith and having a contact portion alternately engageable with said contact members as the armature ends are alternately attracted.

15. In an electro-magnetic operated switch an energizable coil for producing a magnetic field, a movable armature having magnetically attractable ends, said ends being alternately attracted and positively held by the magnetic field when the coil is energized following each interruption of the electric current supplied thereto, and means for moving the attracted end of the armature away from the coil upon deenergization of the coil and simultaneously moving the other end to a position adjacent the coil so that the latter end is positively attracted by the coil when the coil is reenergized.

16. A switch comprising a base member, an armature journalled on the base and having magnetically attractable ends, an electrically energizable magnetic field producing means for positively attracting the armature end located nearer the field producing means upon energization thereof, a resilient member for moving the attracted armature end away from the field producing means upon deenergization thereof and positioning the other armature end nearer the field producing means so that said other end is attracted upon reenergization of the electromagnetic means, a pair of spaced contact members fixed relative to the base, and a contact portion on the resilient member engageable with one of the contact members when one end of the armature is positively attracted by the field producing means and engageable with the other of said contact members when the other armature end is positively attracted whereby the contact members are alternately engaged by the resilient member upon successive energizations of the field producing means.

17. The combination of a movable armature having magnetically attractable ends, electrically energizable magnetic field producing means for positively attracting the armature ends to thereby move the armature in either of two directions, the armature end nearer the field producing means being attracted when said means is energized and resilient means for moving the attracted armature end away from said means and for positioning the other end adjacent said means when said magnetic means is deenergized whereby said other end is attracted upon reenergization of the magnetic means.

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