Jan. 24, 1950 M. H. KRUGER 2,495,266

STARTER SWITCH FOR FLUORESCENT LAMPS

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Fig. 1.

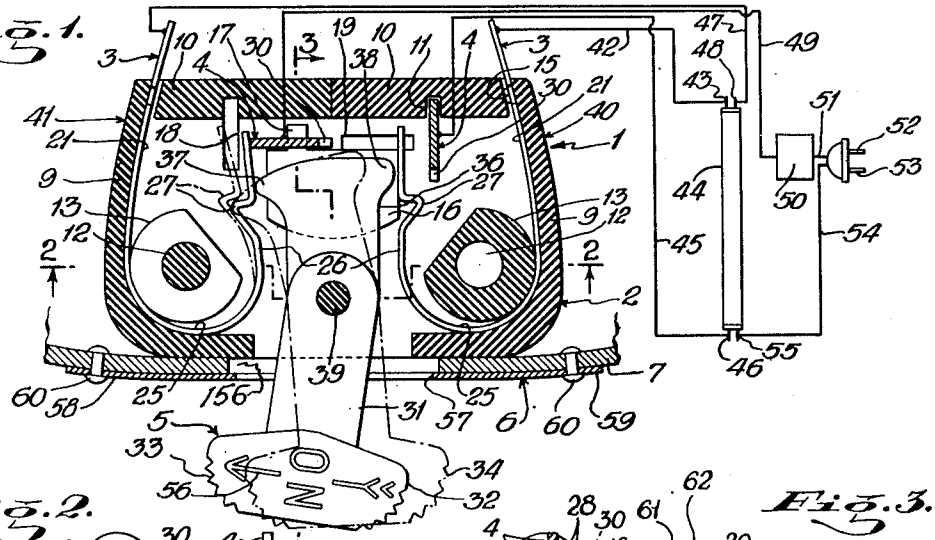


Fig. 2.

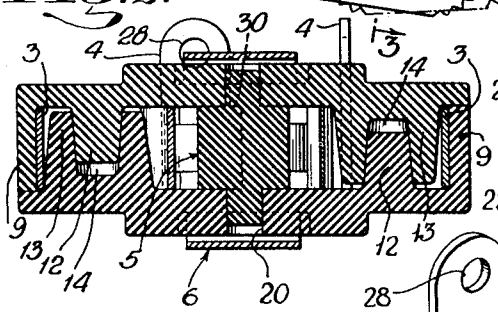


Fig. 3.

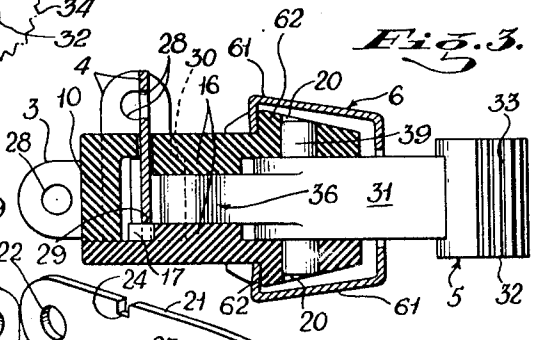
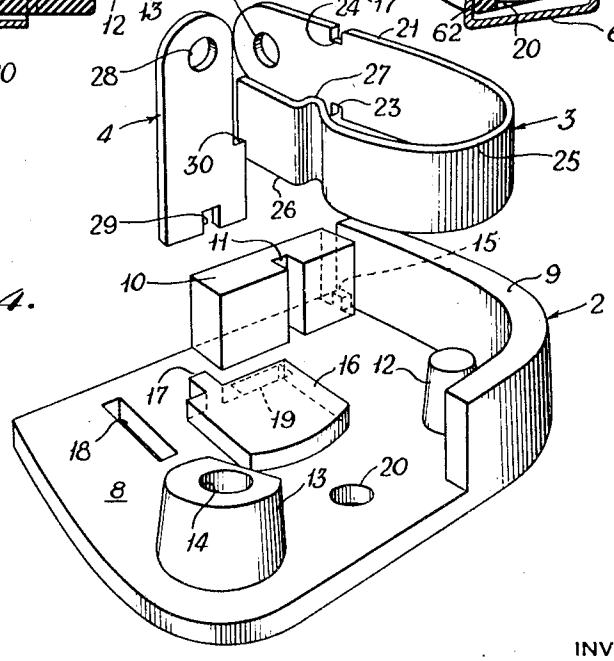


Fig. 4.



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Fig. 5.

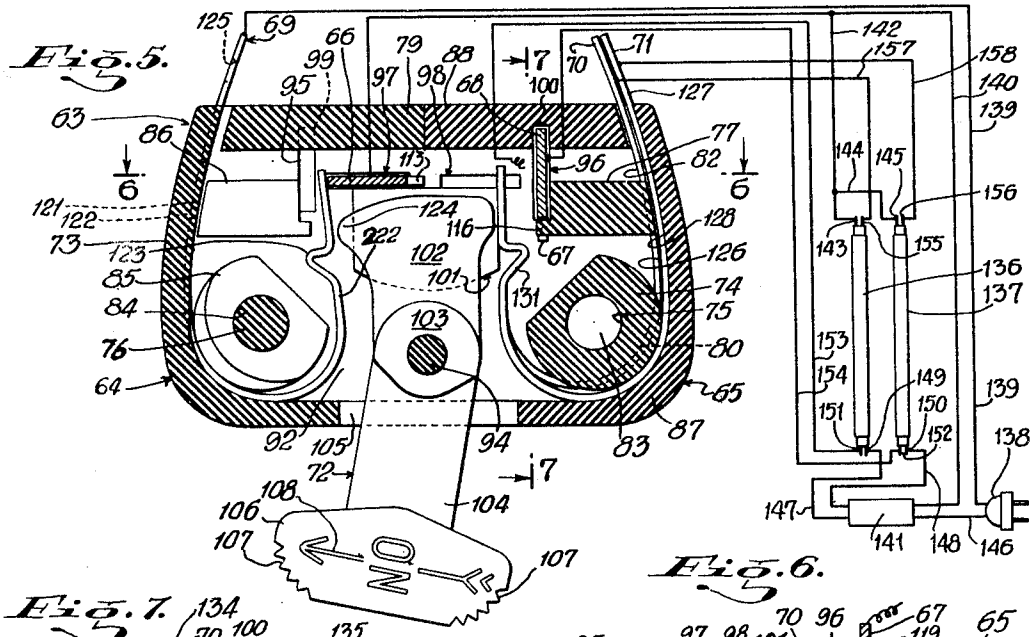


Fig. 6.

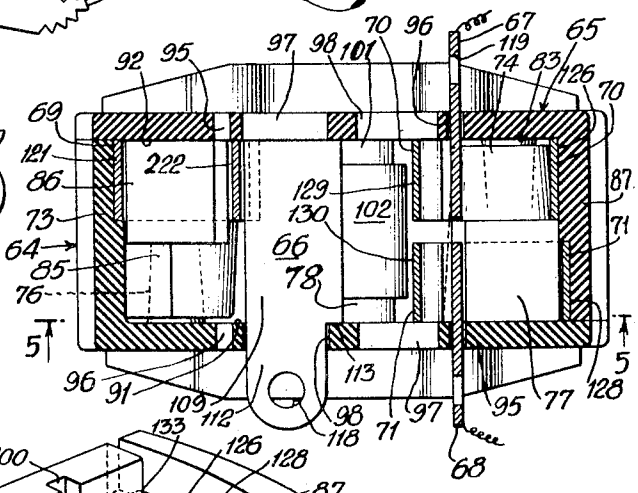
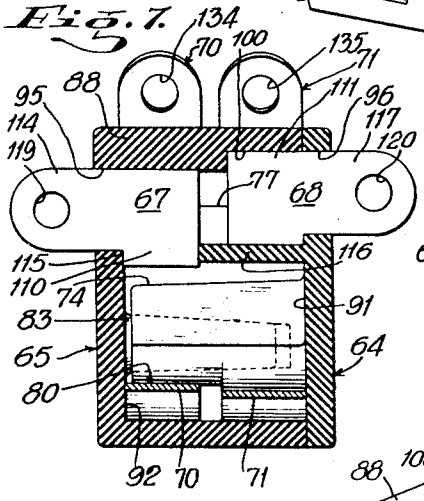


Fig. 7.



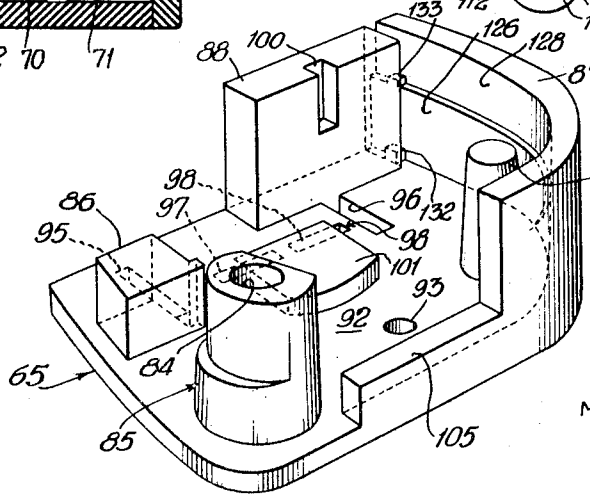


Fig. 8.

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STARTER SWITCH FOR FLUORESCENT LAMPS

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Application June 6, 1947, Serial No. 753,031

4 Claims. (Cl. 200—6)

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This invention relates to starter switches for fluorescent lamps in general.

Among the objects of the present invention it is aimed to provide an improved starter switch for fluorescent lamps which contemplates the use of one switch lever movable in one direction when lighting the lamp, or a plurality of lamps, for initially closing the main switch, thereupon momentarily closing an auxiliary switch or switches, and thereupon releasing the lever to clear the auxiliary switch or switches and thereby again opening the latter without reopening the main switch, and which switch lever, when movable in the other direction to extinguish the lamp, will reopen the main switch and upon release will remain anchored in such position where the main switch will be maintained open.

These and other features, capabilities and advantages of the invention will appear from the subjoined detail description of specific embodiments thereof illustrated in the accompanying drawings, in which

Fig. 1 is a transverse section including the wiring diagram showing a single lamp switch with a single fluorescent lamp associated therewith.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is a section on the line 3—3 of Fig. 1.

Fig. 4 is an exploded view of three of the parts of the switch.

Fig. 5 is a transverse section including the wiring diagram showing a multiple lamp switch with a plurality of fluorescent lamps associated therewith.

Fig. 6 is a section on the line 6—6 of Fig. 5.

Fig. 7 is a section on the line 7—7 of Fig. 5.

Fig. 8 is a perspective of the embodiment illustrated in Fig. 5.

In the embodiment shown in Figs. 1 to 4, inclusive, the switch 1 there shown consists essentially of four different parts, three in duplicate, such as the casting 2, looped contact clip 3, and flat contact clip 4 shown in Fig. 4, and only the handle 5 shown in Fig. 1 not duplicated, making a total of seven parts per switch 1. In some cases the clip 6 for securing the switch 1 to the wall 7 of a housing would constitute an eighth part. However, since any other securing means may be substituted for the clip 6 without departing from the general spirit of the invention, for the purpose of this description it will be assumed that the switch per se consists only of seven different parts, three in duplicate and only one not duplicated, making four different parts, resulting in a material reduction in the cost of

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manufacture and assembly in a switch of this type.

The casting 2, of which there are two, identical to one another, see Fig. 4, consists in part of a plane base plate 8 having a narrow wall 9 J-shaped in cross section extending along one end and partly along one side of the plate 8 and having a short thick wall 10 along another side of the plate 8, spaced from the adjacent end of the wall 9 and having a recess 11 therein. The plate 8 also has two studs 12 and 13, both conical in shape, the stud 12 being smaller than the stud 13 and the stud 13 having a conical recess 14 conformed to receive a stud 12 of a complemental casting 2. There is also formed between the walls 9 and 10 the projection 15 extending from the plate 8 and the raised plate shaped portion 16 with the projection 17 extending from one side of the portion 16. In addition, the plate 8 is provided with three openings, two substantially narrow elongated slots 18 and 19, and a small round opening 20, the slots 18 and 19 in the present instance being disposed at right angles to one another with the slot 18 in the plate 8 spaced from the portion 16, and the slot 19 disposed immediately adjacent to the portion 16.

The looped contact clip 3 has an arm 21 having an opening 22 near the end thereof and two recesses 23 and 24 in alinement with one another. The arm 21 is connected by the looped portion 25 with the arm 26 which has a recess forming bend 27 therein.

The flat contact clip 4 has an opening 28 near one end thereof, a recess or notch 29 at its other end and an extension at one side to form the shoulder 30.

The lever 5 consists of an arm 31 and a head 32 having knurled or serrated edges 33 and 34 as shown. The arm 31 has an extension 36 provided with two enlargements 37 and 38, the enlargement 38 being more blunt than the enlargement 37, and the extension 36, in the present instance, being slightly inclined relative to the main portion of the arm 31.

When assembling a switch made according to the embodiment illustrated in Figs. 1 to 4, inclusive, each of the clips 3, see Fig. 1, are placed inside of the J-shaped wall 9 of a casting 2, the lower one for the purpose of clarity being designated 40, and the upper casting 41, with its notch 23 receiving a projection 15. Thereupon one of the flat contact clips 4 is placed in the recess 11 of the casting 40 as shown in Fig. 1 with its shoulder 30 extending inwardly toward the stud

12, and the other flat contact clip 4 is positioned on the plate 8 of the casting 40 so that its recess 29 receives the projection 17 of the plate portion 16 with its shoulder 30 adjacent to the slot 18. Thereupon the studs or trunnions 39 of the lever 5 are positioned, one stud 39 extending into the opening 20 of the casting 40, and thereupon the other casting 41 placed upon the first casting 40 to complement the same with its J-shaped wall 9, see the left hand side of Fig. 1 engaging the plate 8 of the casting 40, and the opening 20 of the second casting 41 positioned to receive the other stud 39, the studs 13 fitted upon the studs 12 and the plate 8 of the second casting 41 engaging the shoulders 30 of the flat contact clips 4. The two pairs of clips 3 and 4 are composed of metal and the two castings 40 and 41, and lever 5 with its shaft 39 are composed of a plastic material such as a phenolic. The two castings 40 and 41 may with facility be sealed to one another either by a plastic cement or electronically, depending upon the plastic material used.

The projecting ends of the clips 3 and 4 are connected in the manner now to be described. The projecting end of the clip 3 adjacent the wall 9 of the casting 40 is connected, as an instance, by the conductor 42 to one of the terminals 43 of the fluorescent lamp 44. The projecting end of the flat clip 4 disposed in the recess 11 of the casting 40 is in turn connected by the conductor 45 to the terminal 46 of the lamp 44. The projecting end of the clip 3 adjacent the wall 9 of the casting 41 in turn is connected by the conductor 47 to the terminal 48 of the lamp 44 and the projecting end of the terminal 4 positioned on the projection 17 of the casting 40 is connected by the conductor 49 to the ballast 50, which ballast 50 in turn is connected by the conductor 51 with one of the main leads 52 while the other main lead 53 is connected by the conductor 54 to the terminal 55 of the lamp 44. In the assembled position of these several parts as shown in Fig. 1, when the handle 5 is moved in the direction of the arrow 56, it will initially bring the arm 26 of the clip 3 positioned adjacent the wall 9 of the casting 41 into engagement with the edge of the flat clip 4, positioned on the projection 17, which will constitute the main switch. Thereupon the portion 38 will engage the arm 26 of the other clip 3 and deflect it into engagement with the other flat clip 4 positioned in the recess 11. This latter deflection and contact will only endure momentarily when the lever 5 may be released and due to the tension in the arm 26 of the clip 3 adjacent the wall 9 of the casting 40, it will be moved to clear the clip 4 positioned in the recess 11. This momentary closure of the gap between the conductors 42 and 45 will be sufficient to heat the gas in the lamp 44 and build up sufficient potential so that upon the release of the lever 5 and consequent interruption in the circuit from the conductor 42 to the conductor 45, the current will jump across the lamp and ignite the lamp.

When the switch 1, including two castings 2, two clips 3, two clips 4 and a lever 5, is mounted in a lighting fixture housing, the wall 7 may have an opening 156 cut therein and the fastening or securing clip 6 provided with an opening 57 to permit the lever 5 to be passed therethrough into the position shown in Fig. 1, the end portions 58 and 59 of the clip 6 secured to the housing wall 7 by rivets, such as the rivets 60, or the like, and then the laterally extending jaws 61, see Fig. 3, forced over the shoulders 62 of the castings 40 and 41 when the switch 1 will be anchored to the housing wall 7.

With the embodiment disclosed in Fig. 5 made according to the present invention, a plurality of fluorescent lamps may be ignited. Here too the small total number of parts and the small number of different parts constitute an important feature. As an instance, with this embodiment there are nine main parts, two sets of two of which are identical to one another, one set of three of which is identical to one another and one metal contact clip and the handle or lever of it alone are not duplicated, making a total of five different parts.

The switch 63 of this embodiment has two identical complementary housing castings 64, 65, one long flat metal contact clip 66 and two identical short flat metal contact clips 67 and 68, three identical looped metal contact clips 69, 70 and 71, and one handle or lever 72.

The casting 64, see Figs. 5 and 6, as an instance, has a curved wall 73 J-shaped in cross section, an enlarged conical stud 74 which has a central conical recess 75 and a small conical stud 76. The casting 64 also has a block 77, a raised portion 78, Fig. 6, and a straight wall 79. The wall 73 is spaced from the stud 76. In turn the stud 74 has an arcuate recess 80 substantially crescent shaped so that the outer face of the stud 74 may form two clip seats. The edge of the block 77, see Fig. 5, complements the recess 80 in forming seat portions for the arm 82 of the clip 70. When the two complemental castings 64 and 65 are nested into one another as shown in Figs. 5, 6 and 7, the small stud 83 similar to the stud 76 and formed on the casting 65 will fit in the conical chamber 75 of the large stud 74 of the casting 64, and in turn the small stud 76 of the casting 64 will fit in the conical recess 84 of the large stud 85 of the casting 65. When so assembled, the inner face of the wall 73 will be spaced from the large stud 85 and also from the block 86 formed on the casting 65 to form two seats staggered relative to one another for looped contact clips, such as the clips 69, 70 and 71. In turn, the wall 87 of the casting 65 similar to the wall 73 of the casting 64 will be spaced from the outer faces of the large stud 74 and block 77 to form seats in staggered relation to one another for the long arms of the looped clips 70 and 71. The casting 65 also has a straight wall 88 similar to the wall 79 of the casting 64 which complement one another to close the upper end of the housing as shown in Fig. 5. The wall 79 of the casting 64 is spaced from the wall 73 of the casting 64 to cooperate with the seats formed between the wall 73 and the stud 85 and block 86 of the casting 65 to form seats for the outer portions of the arm of the looped contact clip 69. In turn the wall 88 of the casting 65 is spaced from the wall 87 of the casting 65 to cooperate with the seats formed in the stud 74 and the edge of the block 77 of the casting 64 to form seats for the outer portions of looped clips, such as the clips 70 and 71.

The main wall 91, Fig. 6, of the casting 64 and the main wall 92 of the casting 65 each has five openings, an opening 93 for the stud or shaft 94 of the lever 72, and four elongated openings, two openings 95 and 96 parallel to one another, and at right angles to the openings 97 and 98 which latter openings 97 and 98 are in alinement with one another. The opening 95 in the casting 65, see Fig. 5, is in alinement with the

recess 99 in the wall portion 79 and the recess 96 in the casting 64. In turn, the opening 96 in the casting 65 is in alinement with the recess 100 in the wall 88 and the opening 95 in the casting 64, Fig. 7.

The casting 65, in turn, also has a raised portion 101 similar to the raised portion 78 of the casting 64, which raised portions 78 and 101 slidably engage the opposite faces of the arm 102 of the lever 72. Adjacent the shaft 94 of the lever 72, there is formed the enlargement 103 to engage the inner faces of the plate portions 91 and 92 of the castings 64 and 65, respectively, with the arm 104 of the lever 72 extending through the opening formed between the short partitions 105 of the castings 64 and 65. Preferably the arm 104 is provided with the finger piece 106 as shown having outer knurled portions 107, 107, and the arrow 108 with the word "On" impressed thereon to guide the operator in actuating the lever 72.

The flat contact pieces 66, 67 and 68 are substantially identical to one another except that the enlarged portion 109 of the contact piece 66 is much longer than enlarged portions 110 and 111 of the contact pieces 67 and 68, respectively. In assembled position the contact piece 66 has the outer end of its enlarged portion 109 engaging the inner face 92 of the casting 65 with its diminished portion 112 extending through the opening 98 in the casting 64, see Fig. 6, with the shoulder 113 engaging the inner face 91 of the casting 64 adjacent to the opening 98.

The contact piece 67 has its diminished portion 114 extending through the opening 95 in the casting 65 with the shoulder 115 formed by the enlarged portion 110 engaging the inner face 92 of the casting 65. In assembled position the free end of the enlarged portion 110 is engaged by the free end of the projection 116 of the block 77. The enlarged portion 111 of the contact clip 68 is disposed in the recess 100 in the wall 88 of the casting 65 and between the bottom of said recess 100 and the extension 116 of the block 77 of the casting 64 with its diminished portion 117 extending through the opening 96 in the casting 64 and the shoulder formed by its enlarged portion 111 engaging the inner face 91 of the casting 64. The diminished portions 112, 114 and 117 of the contact pieces 66, 67 and 68 are all provided with openings, to wit, the openings 118, 119 and 120, respectively, to receive electric conductors.

The looped contact clip 69, see Fig. 5, has its long arm 121 positioned against the inner face 92 of the casting 65 and adjacent the inner face of the recessed portion 122 of the J-shaped wall 73 of the casting 64. The short arm 222 of the clip 69 has a bend 123 therein to form a seat for the nose 124 of the arm 102 of the lever 72. Normally the free end of the short arm 122 is biased into engagement with the edge of the contact clip 66, as shown in Fig. 5. The free end of the clip 69 extending beyond the casting 64 is provided with an opening 125 to receive an electric conductor in the conventional way. The looped contact clips 70 and 71, in turn, are positioned against the inner face of the J-shaped wall 87 of the casting 65, the long arm 82 of the contact clip 70 engaging the lower face 126, while the long arm 127 of the contact clip 71 engages the inner face of the recessed portion 128 of the wall 87. The long arm 82 of the clip 70 in addition is disposed below the free edge of the block 77 of the casting 64 and in the arcuate recess 80 of the stud 74 of

the casting 64, while the arm 127 is positioned between the enlarged portion of the stud 74 of the recessed portion 128 of the wall 87. The short arms 129 and 130 of the clips 70 and 71 are provided with bends 131, see Fig. 5, similar to the bend 123 of the clip 69. Preferably the clips 69, 70 and 71 are notched to receive projections, such as the projections 132 and 133, Fig. 8.

The arm 102 of the lever 72 is wide enough to engage both of the short arms 129 and 130 of the clips 70 and 71 simultaneously to press the two into engagement with the flat contact clips 67 and 68, respectively, see Fig. 6.

The outer free ends of the long arms 82 and 127 are also provided with openings 134 and 135, respectively, to receive electric conductors.

When these several contacts are connected to the two lamps 136 and 137, as hereinafter set forth, then when the lever 72 is moved to the right in the opposite direction to that indicated by the arrow 108, its nose 124 will be positioned in the bend 123 and space the short arm 122 from the contact clip 66 when the circuit will be interrupted. When it is desired to ignite the two lamps, the lever 72 is merely urged in the opposite direction, that indicated by the arrow 108, initially to release the short arm 122 and enable it to engage the flat contact piece 66 and then momentarily press the two short arms 129 and 130 into engagement with the flat contact clips 67 and 68, respectively. After so bringing the short arms 129 and 130 into engagement with the contact clips 67 and 68, the lever 72 may be released when the bias in the short arms 129 and 130 will clear the contact clips 67 and 68 and permit the potential so built up to ignite the gas in the fluorescent lamps 136 and 137. When it is desired thereupon to extinguish the lamps 136 and 137, it will only be necessary again to swing the lever 72 so that its nose engages the bend 123 and spaces the short arm 22 from the contact clip 66.

From the wiring now to be described with regard to the embodiment illustrated in Figs. 5, 6, 7 and 8, it will appear that the outlet plug 138 is connected by the main lead 139 with the contact clip 69, that the flat contact clip 66 is connected by the conductor 140 to one terminal at the right hand end of the ballast 141, that the conductor 140 in turn is connected by the conductor 142 to the terminal 143 at one end of the lamp 136, and that the conductor 142 is connected by the conductor 144 with the terminal 145 at one end of the other lamp 137. In turn, the other main lead 146 of the plug 138 is also connected to the right hand end of the ballast 141, and the left hand end of the ballast 141 is connected by the conductors 147 and 148 to the terminals 149 and 150 of the lamps 136 and 137, respectively. The terminals 151 and 152 adjacent the terminals 149 and 150, respectively, are in turn connected to the flat contact clips 67 and 68, respectively, by the conductors 153 and 154, respectively, and the looped contact clips 71 and 72 are connected to the terminals 155 and 156, respectively, adjacent the terminals 143 and 145, respectively, by the conductors 157 and 158, respectively.

From the foregoing it will appear that the clips 69 and 66 will constitute the main switch to be initially closed by moving the lever 72 in the direction of the arrow 108 to clear the loop 123 and allow the clips 69 and 66 to engage one another as shown in Fig. 5, and then upon the continued movement of the lever 72, cause the clips 70 and 71 momentarily to engage the clips 67 and

68, respectively, when upon the release thereupon of the lever 72 the bias in the clips 70 and 71 will enable the clips 70 and 71 to clear the clips 67 and 68, respectively, and enable the lamps 136 and 137 to be ignited. When it is desired thereupon to extinguish the lamps 136 and 137, it will only to necessary to swing the lever 72 in the opposite direction to that indicated by the arrow 108 until the nose 124 of the lever 72 engages the loop 123 and is anchored thereby when it will again interrupt the circuit by opening the main switch, that is, by separating the clips 69 and 66.

It is obvious that the various changes and modifications may be made to the details of construction without departing from the general spirit of the invention as set forth in the appended claims.

I claim:

1. An electric switch for starting and operating a fluorescent lamp comprising a body composed of insulating material, a pair of stationary contact plates fixed in said body having two fixed terminals, a pair of looped plates mounted in said body, each looped plate having one fixed terminal and one yieldable terminal, one of said yieldable terminals being normally in yieldable engagement with one of said stationary plates and the other yieldable terminal being normally biased clear of said other stationary plate, and a lever composed of insulating material pivotally mounted in said body having an arm operatively associated with said yieldable terminals to enable said arm in one position to anchor said one yieldable terminal out of engagement with said one of said stationary plates in "off" position, in a second position to clear said one yieldable terminal to enable said one yieldable terminal under its own bias to engage said one stationary plate, and at the same time momentarily press said other yieldable terminal into engagement with said other stationary plate in "starting" position, and in a third position under the bias of said other yieldable terminal to clear said other stationary plate in "on" position, said contact plates, looped plates and the axis of said lever extending perpendicular to a common plane with the two yieldable terminals disposed to either side of said arm.

2. An electric switch for starting and operating two fluorescent lamps in parallel to one another comprising a body composed of insulating material, three stationary contact plates fixed in said body, each stationary contact plate having two fixed terminals, three looped plates, each looped plate having one fixed terminal and one yieldable terminal, one of said yieldable terminals being normally in yieldable engagement with one of said stationary plates and the other two yieldable terminals being normally biased clear of said other two stationary plates, and a lever composed of insulating material pivotally mounted in said body having an arm operatively associated with said yieldable terminals to enable said arm in one position to anchor said one yieldable terminal out of engagement with said one of said stationary plates in "off" position, in a second position to clear said one yieldable terminal to enable said one yieldable terminal under its own bias to engage said one stationary plate and at the same time momentarily press said other yieldable terminals into engagement with said other stationary plates in "starting" position, and in a third position under the bias of said other yieldable terminals to clear said other stationary plates in "on" position, said contact plates, looped plates and the axis of said lever extending perpendicular to a common plane, said one yieldable terminal disposed adjacent to one side of said arm and said two other yieldable terminals disposed adjacent to the other side of said arm.

3. An electric switch for starting and operating a fluorescent lamp comprising a body composed of two identical complemental parts of insulating plastic material cemented to one another and each having a main wall parallel to the other, a pair of stationary contact plates fixed in said body having two fixed terminals, a pair of looped plates mounted in said body, each looped plate having one fixed terminal and one yieldable terminal, one of said yieldable terminals being normally in yieldable engagement with one of said stationary plates and the other yieldable terminal being normally biased clear of said other stationary plate, and a lever composed of insulating plastic material pivotally mounted in said body having an arm, said contact plates, looped plates and the axis of said lever extending perpendicular to said main walls with the two yieldable terminals disposed to either side of said arm to enable said arm in one position to anchor said one yieldable terminal out of engagement with said one of said stationary plates in "off" position, in a second position to clear said one yieldable terminal to enable said one yieldable terminal under its own bias to engage said one stationary plate, and at the same time momentarily press said other yieldable terminal into engagement with said other stationary plate in "starting" position, and in a third position under the bias of said other yieldable terminal to clear said other stationary plate in "on" position, the complemental parts having projections, the two stationary contact plates being identical to one another and the two looped contact plates being identical to one another, said stationary and looped plates having notches to receive such projections and having portions corresponding to the distance between said parallel walls to facilitate anchoring said plates in position.

4. An electric switch for starting and operating two fluorescent lamps in parallel to one another comprising a body composed of two identical complemental parts of insulating plastic material cemented to one another and each having a main wall parallel to the other, three stationary contact plates fixed in said body, each stationary contact plate having two fixed terminals, three looped plates, each looped plate having one fixed terminal and one yieldable terminal, one of said yieldable terminals being normally in yieldable engagement with one of said stationary plates and the other two yieldable terminals being normally biased clear of said other two stationary plates, and a lever composed of insulating plastic material pivotally mounted in said body having an arm, said contact plates, looped plates and the axis of said lever extending perpendicular to said main walls with one of said yieldable terminals disposed adjacent to one side of said arm and said two other yieldable terminals disposed adjacent to the other side of said arm to enable said arm in one position to anchor said one yieldable terminal out of engagement with said one of said stationary plates in "off" position, in a second position to clear said one yieldable terminal to enable said one yieldable terminal under its own bias to engage said one stationary plate and at the same time momentarily press said other yieldable terminals into engagement with said other stationary plates

in "starting" position, and in a third position under the bias of said other yieldable terminals to clear said other stationary plates in "on" position, the complemental parts having projections, two of said stationary contact plates being identical to one another but shorter than the third stationary contact plate, and said three looped contact plates being identical to one another, said stationary and looped plates having notches to receive said projections and having portions corresponding to the distance between said parallel walls to facilitate anchoring said plates in position.

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