April 12, 1949. B. POMERANTZ 2,466,910

FLUORESCENT LINE AND MOMENTARY CONTACT SWITCH

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Fig. 1.

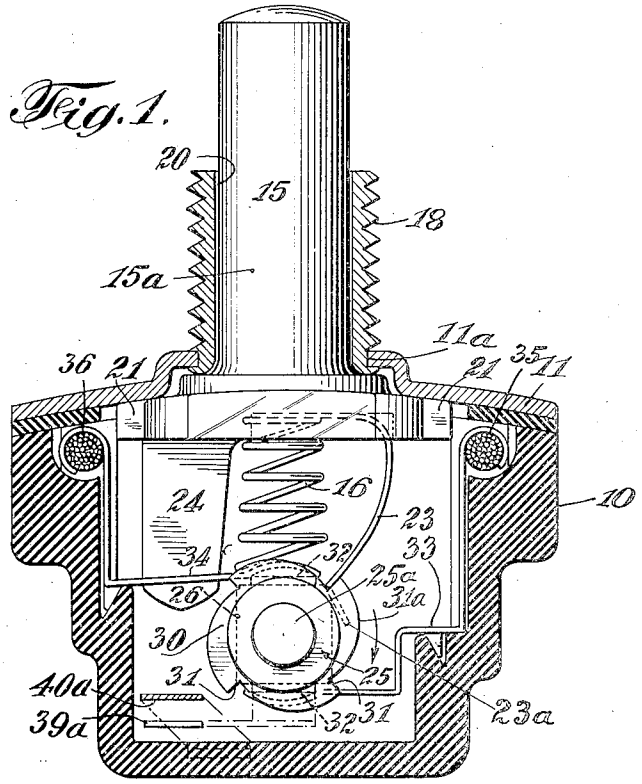
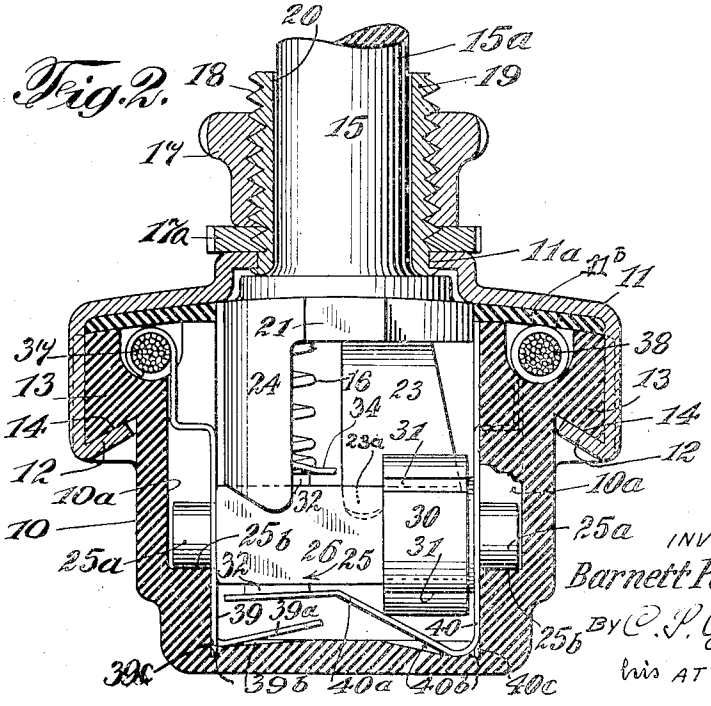


Fig. 2.



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Fig. 3.

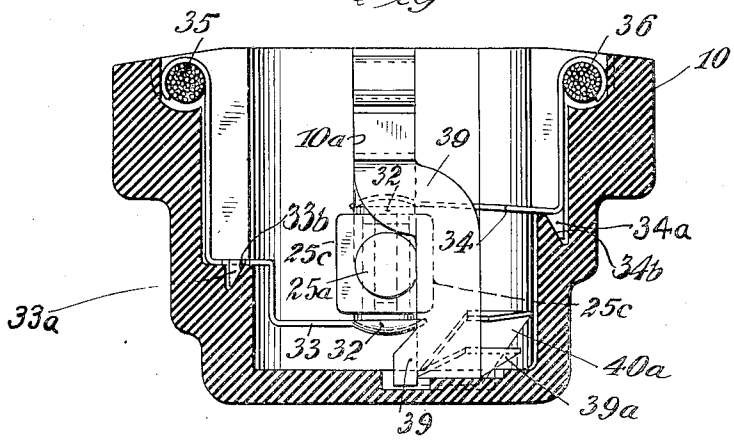
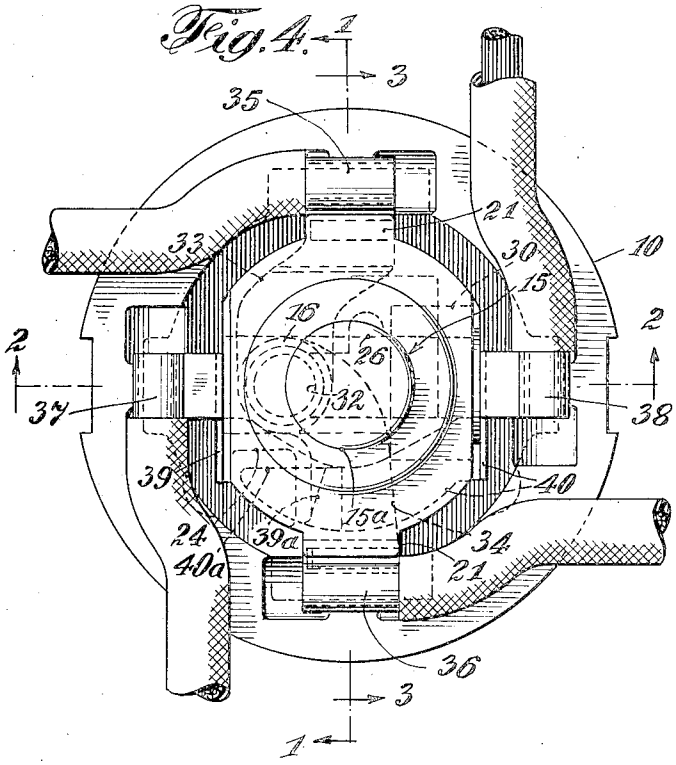


Fig. 4.



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Fig. 5.

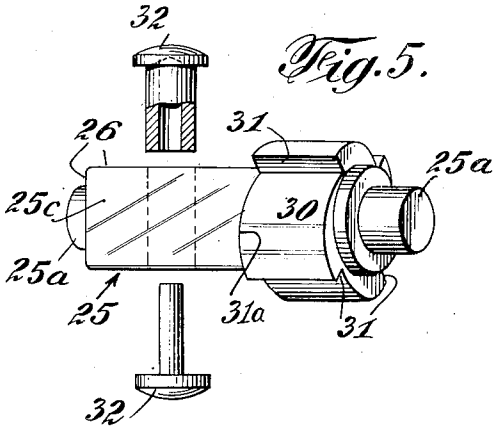


Fig. 7.

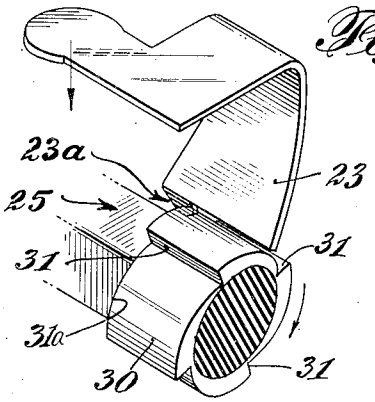


Fig. 6.

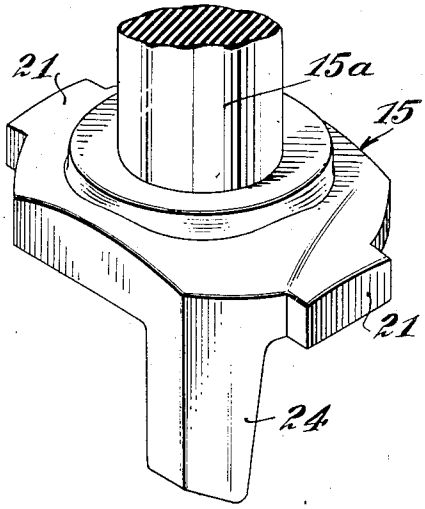


Fig. 8.

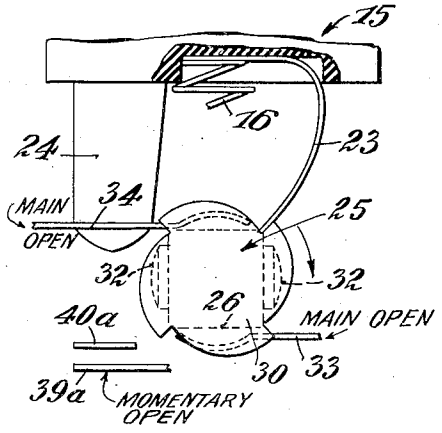


Fig. 9.

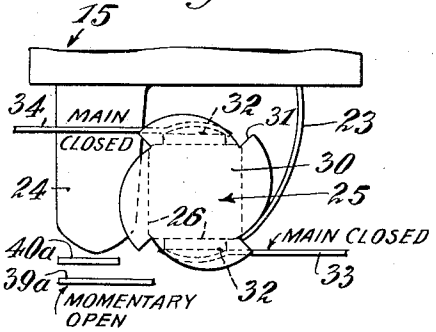
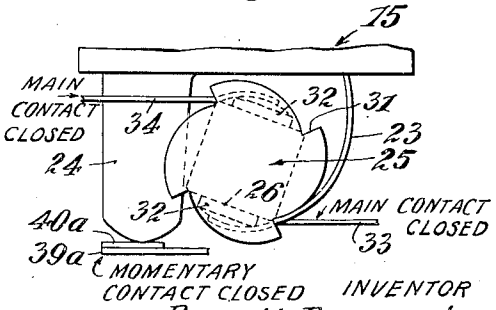


Fig. 10.



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2,466,910

FLUORESCENT LINE AND MOMENTARY CONTACT SWITCH

Barnett Pomerantz, Brooklyn, N. Y.

Application June 28, 1946, Serial No. 679,934

3 Claims. (Cl. 200—5)

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This invention relates to fluorescent line and momentary contact switches.

This invention is characterized by a star wheel arranged in a vertical plane having its periphery acted upon by a plunger, the axis of which is at right angles to the axis of the star wheel, as a result of which a direct and positive action is obtained for the closing of the main circuit promptly upon movement of the star wheel, and also for the closing of the momentary contact switch circuit. The continued movement of the plunger closes the circuit of the momentary contacts; if, however, the plunger action is not followed through then only the main circuit is closed. The improved switch device is thus adapted for use for incandescent lamp circuits only, and ready for use when also connected with a fluorescent lamp circuit. Preferably the star wheel, the contact body for the main circuit, and shaft for the same are combined into one unit by molding, which may be readily inserted into the casing. The main contact switch circuit having been closed by the actuation of the star wheel shaft, and the further movement of a plunger having closed the momentary contact switch circuit, a spring returns the plunger to its initial position, the main contact switch circuit remaining closed though the momentary switch contact circuit is opened. To break the main contact switch circuit, the plunger is again depressed.

The invention will be further described hereinafter, embodiments thereof shown in the drawings, and the invention will be finally pointed out in the claims.

In the accompanying drawings,

Fig. 1 is a central section partly in elevation of the improved switch, showing the plunger acting on the star wheel, the section being taken on line 1—1 of Fig. 4;

Fig. 2 is a section partly in elevation showing the main contacts, closing the circuits, the section being taken on line 2—2 of Fig. 4;

Fig. 3 is a sectional view taken at right angles to Fig. 2, taken on line 3—3 of Fig. 4;

Fig. 4 is a top view after the top cap has been removed;

Fig. 5 is a perspective view of the star wheel molded on the shaft and showing the displaced contact pieces;

Fig. 6 is a perspective view of the plunger;

Fig. 7 is a perspective view of the star wheel and of the operating arm, and

Figs. 8, 9 and 10 are diagrammatic views of the star wheel in different operative positions, to show the action of the plunger.

Similar characters of reference indicate corresponding parts throughout the various views.

Referring to the drawings, the casing 10 is made of cup shape of suitable non-conductive material, as plastics, to receive the operative parts, and has a closing cover or jacket 11 which has circumferential disposed lips 12 bent over to engage a circumferential shoulder 13 having an inclined surface 14 against which the marginal lips 12 of the jacket 11 are clamped. The covering jacket 11 has a central bore 11a through which a plunger stem 15a of a plunger 15 passes. Above the jacket 11 is a locknut 17a and a nipple 17, both engaging the exterior screwthreads 18 of a nipple 19 having a bore 20 guiding the plunger stem 15a (Fig. 2).

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The plunger stem 15a of the plunger 15 has preferably an integral extension in the form of a disc 21 to which three operative parts are secured. One, the star wheel operating arm 23 which has its upper end secured to one side of this disc 21, and another member 24 acting as a momentary circuit contact closer, which is preferably integral with the disc 21, and extends downwardly from the disc 21 and from one side thereof. The third part is a return spring 16 having one end secured to the disc 21 and its other end disposed against a shaft 25.

The casing 10 has at its inner wall surface two diametrically opposed slots or grooves 10a, which are open at their upper ends and serve to receive and to guide the subcaliber ends 25a of a shaft 25. The bottoms 25b of the grooves act as bearing surfaces.

The shaft 25 has an enlarged portion 26 which is rectangular in cross-section presenting two opposed surfaces for the reception of contact pieces, and the other two opposed surfaces are insulated so as to maintain the circuit open, when the upper and lower contact members 34 and 33 contact with the same. The shaft 25 with its enlarged portion 26 is of non-conductive material. The axis of the shaft 25 is horizontal and a star wheel 30 is secured to the shaft 25, so that the plane of the star wheel 30 is vertical, that is, the axis of the shaft 25 and the axis of the star wheel are coincident. The star wheel 30 is preferably integral with the shaft 25 by plastic molding, and has peripheral steps 31 radially disposed, with their perimeters 31a merging into the steps 31.

The operating arm 23 is somewhat resilient and is guided into correct position on the star wheel 30 by the finger 23a at its side, which glides over the contact body of the shaft and hugs the periphery of the star wheel tooth in its downward movement, thus insuring contact with the star wheel step and yet is sufficiently rigid to act as a push lever to rotate the star wheel 30 one step, that is 90°, when the plunger is moved downwardly. When the star wheel 30 has been rotated, let us say, from its circuit open position to its circuit closing position, then the upper and lower contact members 34 and 33, embrace the

contact pieces **32** on the shaft **25**. Preferably, a satisfactory contact is brought about by having the contact pieces **32** of convex shape and the inner surfaces of the contact members **34** and **33** of concave shape, as shown in Fig. 3. The contact members **34** and **33** each extend upwardly in the casing **10**, to main line conductors **36** and **35**, entering from the outside to the inside of the casing **10** and connected as shown in Figs. 3 and 4. When the contact members **34** and **33** close the circuit as described, an incandescent lamp circuit is closed, or one circuit of the fluorescent lamp circuit is closed. These circuits are known and not shown.

Diametrically disposed at right angles to the diametrically disposed main circuit conductor contacts **34** and **33** there are conductors **37** and **38**, and each of these is connected with a momentary contact member **39** and **40**. The upper momentary contact member **40** (Fig. 2) has a resilient arm **40***a* which extends over a resilient arm **39***a* of the contact member **39**. Each of these contact members extends upwardly and has its upper end connected with the contacts of the opposed conductors **37** and **38**.

By a downward movement of the plunger stem **15***a* to an amount to press the upper momentary contact member **40***a* against the lower momentary contact member **39***a* the momentary circuit is closed.

This downward movement of the plunger **15** serves to move the operating arm **23** and the star wheel **30** a corresponding further distance, while the main switch circuit remains closed as shown in Fig. 10. This further movement of the star wheel is seen in Fig. 10 when it is compared to Fig. 9. The return movement of the plunger by the spring **16**, causes the operating arm **23** to wipe the star wheel periphery hugging the periphery of the tooth due to its resiliency and the friction thus caused returns the shaft **25** an amount equal to that slight advance movement, shown in Fig. 10, and the cup shaped contacts **32** serve to register again with the concave ends of the contact member **34** and **33**, their registration stopping the return rotating movement.

It will be noted that the star wheel **25** in Fig. 10 has been rotated a corresponding amount beyond that position shown in Fig. 9, but that the main circuit is still closed, because contact of the contacts **32** with the ends of the contact members **33** and **34** still is being made. A release of the plunger pressure causes the spring **16** to return the plunger **16** a slight distance, and the contacts **32** again register in full with the ends of the contact members **33** and **34**, the convex-concave relationship assisting in this, together with a certain tension action of the members **33** and **34**.

If it is desired to break the main switch circuit, the plunger is again depressed, and thereby the star wheel is moved 90°, and the ends of the contact arms **34** and **33**, then press against the non-conductive surfaces **25***c* of the shaft **25** and the circuit is broken.

If now, the plunger is again moved downwardly and only partially, that is, so to only close the main line switch circuit, then the improved switch may be used only for incandescent lighting, in which case the conductors **37** and **38** could be dispensed with, though their presence enables the switch to be available for any use.

In Fig. 8 is shown diagrammatically the initial position of the plunger **15** with the actuating arm **23**, contacting with a step of the star wheel.

The main switch circuit is open, because the contacts **32** are out of contact with the ends of the contact members **34** and **33**. The momentary circuit is open, as the parts **39***a* and **40***a* are out of contact.

In Fig. 9, also diagrammatically shown, the plunger **15** has been depressed. The star wheel **30** has been rotated 90° from its Fig. 8 position. The contacts **32** contact with the ends of the members **33** and **34**, and the main switch circuit is closed. The momentary circuit is still open, as the parts **39***a* and **40** are out of contact.

In Fig. 10, also diagrammatically shown, the plunger **15** has been further depressed. The extension **24** has now pressed the momentary contact members **39***a* and **40***a* together, and the momentary contact circuit is closed, the main circuit remaining closed.

It will be noted that the improved switch has a plunger means to actuate a star wheel centrally disposed and to provide a movement beyond that necessary to close the main circuit in order to close the momentary circuit, and which excess movement to close the momentary circuit having taken place, the plunger returns promptly to a position leaving the main circuit closed. The main contacts **32** on the shaft are such that the shaft is held by the ends of the contact members acting on the contacts **32** in a stationary position until the next positive actuation of the star wheel by the plunger takes place, which then opens the main circuit. It will also be noted that the plunger means operate directly upon the perimeter of the star wheel by positive action, which is possible due to the positioning of the star wheel in a vertical plane at right angles to the axis of the shaft, the axis of the shaft being at right angles to the axis of the plunger stem.

Due to incorporation of the momentary contacts and leads connected therewith, the switch eliminates the use of the vacuum starter switch used in fluorescent circuits and the socket used for the same together with fastening means thereof and wiring. Considerable saving in parts, replacements for the same, and difficulty in detecting trouble with fluorescent circuits is achieved due to elimination of these parts.

The described invention is to be primarily used in connection with fluorescent desk and table lamps, bed lamps and other types of lamps wherein a compact switch is desirable.

From the foregoing it is seen that the switch consists of a molded plastic or non-conductive material casing. A star wheel shaft is located in the housing in two vertical grooves which permits same to drop to proper elevation. The shaft is rather unique as it is a combination of shaft, star wheel and main contacts. The contacts are located in the shaft by being pressed into the same or other suitable means. This combination unit is economical due to the fact that three parts are combined into one and is easily assembled to the housing by merely dropping the same in the slots with little care.

Two main line contacts are housed in the casing for opening and closing the main circuit, and likewise, two momentary contacts for closing the fluorescent circuit. At the terminus of each contact there is permanently fastened, a lead of insulated wire, the covering of which is colored, in order to differentiate the main line from the momentary. The momentary contacts are inserted into the casing and located thereto by means of the vertical slots which accommodate the star wheel shaft. The housing contains

grooved valleys for locating the wire. Inside of the casing, at the bottom thereof are located two small notches or pockets **39***b* and **40***b*, for locating the momentary contacts **39** and **40**, and the contact members **39** and **40** have projections **39***c* and **40***c* which prevent their becoming dislocated. The main line contacts have similar projections **33***a* and **34***a* to enter grooves **33***b* and **34***b*, respectively for the same, whereby there is a foolproof connection so that no mistake can be made in inserting an incorrect contact. The contact ends of the contacts **33** and **34** are cupped in order to obtain a good wiping contact from the convex contacts **32** located in the shaft **25**.

A stamped metal jacket, into which a threaded nipple has been spun, accommodates the plastic or non-conductive plunger, a fibre insulator **11***b*, nut and lock nut. The jacket has two protruding ears which fit into casing grooves. The ears are formed under two lips by stamping the same on to the casing. This makes a compact simple assembly. The plunger houses the operating arm and reset spring. In one corner of the plunger and a part thereof is located an extension of the proper shape and height which is utilized for operating the momentary contacts at the proper time interval after the main line has been closed. The operating arm is so fashioned as to fit into the notch base of star wheel and is guided thereon by means of a small finger which is part thereof. By pushing the plunger downward the operating arm turns the star wheel 90 degrees which short circuits the main line by means of the shaft contacts through the main contact members. This is accomplished in part of the stroke of the plunger. By continuing to push the plunger, the upper momentary contact touches the lower momentary contact thereby completing the momentary fluorescent circuit making the total main line and the momentary contact circuit complete, which in turn lights the fluorescent lamp. The plunger is reset by means of a tapered helical spring which is housed in the plunger and has its lower end located on the spherical surface of upper main line contact **32** on the shaft, when the shaft is in that position.

The same switch minus momentary contact springs and momentary leads may be used for incandescent lighting purposes.

The improved switch provides a neat, streamlined, radically new device which utilizes a vertical star wheel of unique construction together with momentary contacts for operation of fluorescent lamps. The switch is so designed as to be economical, simple of construction, accessible, easily assembled, inexpensive, and the parts fairly simple to manufacture in mass production quantities.

I have described several forms of my invention, but obviously various changes may be made in the details disclosed without departing from the spirit of the invention as set out in the following claims.

I claim:

1. In a fluorescent line and momentary contact switch having a circular casing with an open end, a top for the casing having a centrally disposed bore, and a plunger including a plunger stem passing through said bore, and having a disk within the casing, the combination of an extension on said disk at one side of its center, a curved blade spring operating arm on said disk at the other side of its center, said extension being longer than the arm, a centrally disposed spring on said disk, and a horizontal shaft supported within and by the casing below the plunger disk and having its axis at right angles to the axis of the plunger stem and diametrically disposed to the casing and to the plunger disk, and supporting said centrally disposed spring, a star wheel on one end of said shaft and at one side of said spring and in a plane at right angles to the axis of the shaft and engaged by said operating arm at one side of the axis of said shaft at a step above said axis at the beginning of its descent and engaging said step below said axis at the end of its descent and rotatable step by step with each descent of the arm, electrical contact members at diametrical opposite sides of the shaft at the other side of the spring, the intervening sides of said shaft being electrically non-conductive, electrical conductors forming a main circuit having terminals exterior to the casing with their other terminals adapted to contact with the said contact members on the shaft to close the main circuit, and electrical conductors forming the momentary contact circuit having terminals exterior to the casing with their other ends in overlapping spaced relationship below the level of the lower end of said arm, and adapted to be brought in contact to close the momentary circuit by said extension pressing said last named conductors together after the operating arm has moved the star wheel to closed circuit position, the centrally disposed spring returning the plunger disk with its extension and arm to its initial position on release of the pressure on the plunger.

2. The structure of claim 1, in which the length of the arm in relation to the length of the extension is such as to move the step of the star wheel beyond its position closing the main circuit without breaking the main circuit, when the extension closes the momentary circuit.

3. The structure of claim 1, in which the operating arm has a lateral extension extending along the side of the star wheel to hold the arm in position on the star wheel.

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The following references are of record in the file of this patent:

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