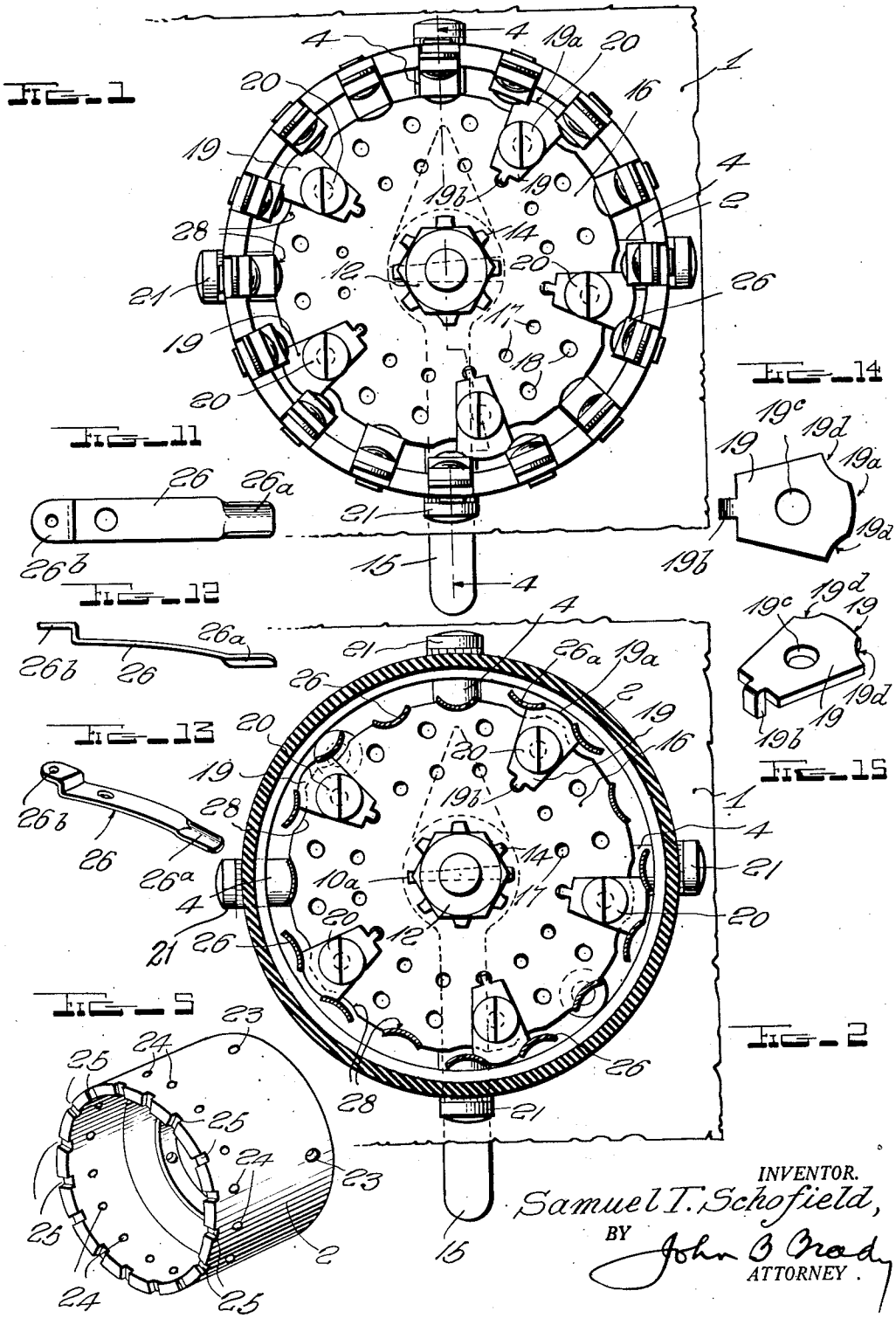
Oct. 1, 1935. S. T. SCHOFIELD 2,015,874

ELECTRIC SWITCH

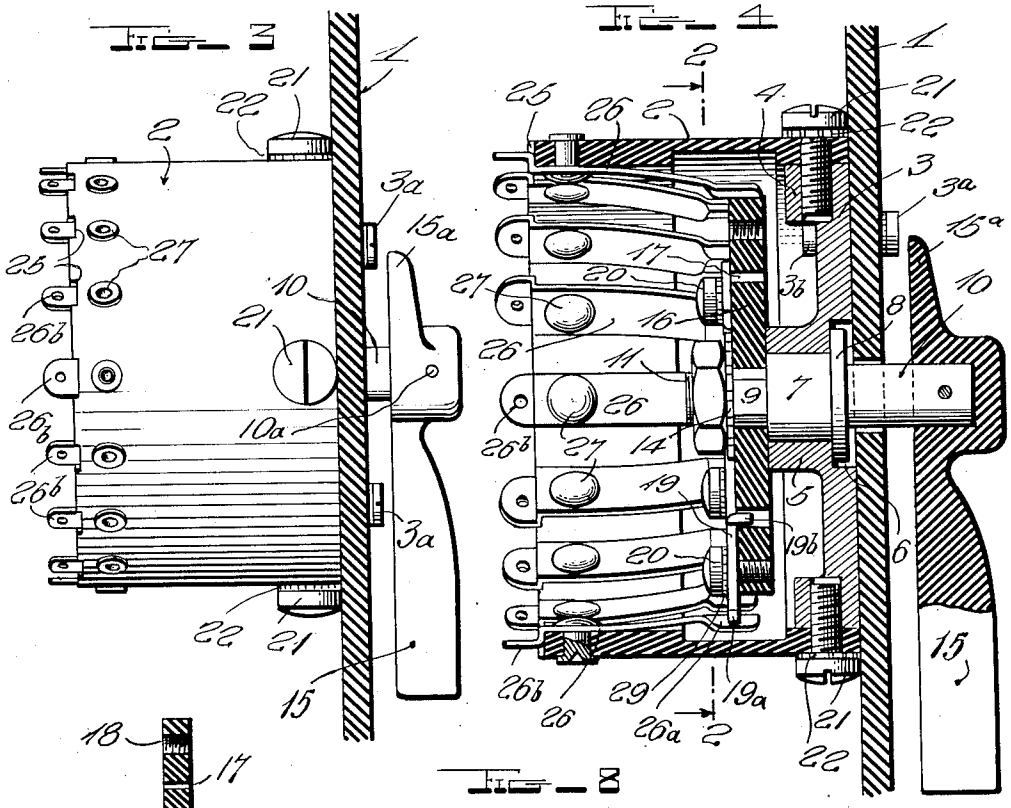
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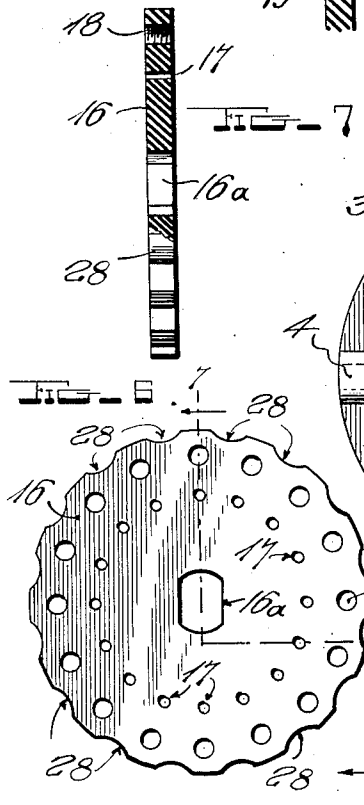


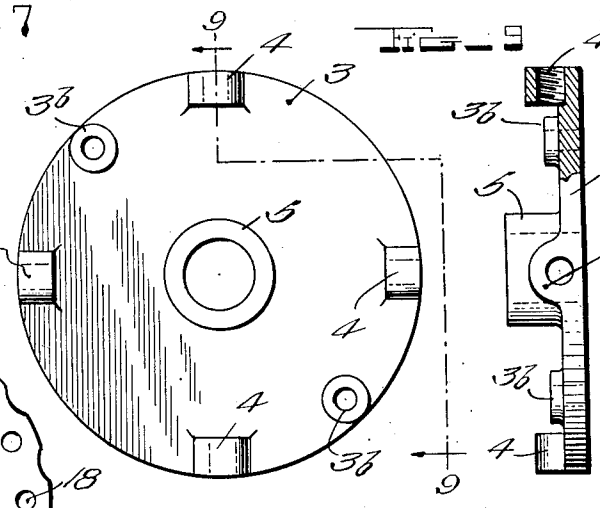
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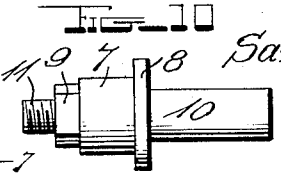
ELECTRIC SWITCH

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Patented Oct. 1, 1935 2,015,874

UNITED STATES PATENT OFFICE

2,015,874

ELECTRIC SWITCH

Samuel T. Schofield, Washington, D. C., assignor to National Electrical Supply Company, Washington, D. C., a corporation of Virginia

Application July 17, 1934, Serial No. 735,640

11 Claims. (Cl. 200—8)

My invention relates broadly to electrical switches and more particularly to a rotary switch for simultaneously controlling a multiple number of electrical circuits.

One of the objects of my invention is to provide a simplified construction of electrical switch which is capable of inexpensive manufacture on a quantity production basis and which is operative to control a multiplicity of electrical circuits.

Another object of my invention is to provide a construction of electrical switch in which the rotary control member of the switch may be moved to any desired angular position and maintained in that position by the inter-engagement of the electrical contacts on the rotary member with coacting stationary contacts.

Another object of my invention is to provide a construction of rotary switch employing a minimum number of parts and yet adapted to control a relatively large number of electrical circuits.

A further object of my invention is to provide the construction of a switch which includes a multiplicity of stationary contacts mounted with respect to the interior surface of an insulated drum support with a disk-like member rotatably mounted concentrically with respect thereto with means for removably mounting contact members on the disk-like member operative to coact with stationary contacts for locking the switch in any selected angular position and at the same time completing selected electrical circuits.

A further object of my invention is to provide the construction of a switch which may be conveniently wired in various positions with respect to associated equipment.

Still another object of my invention is to provide a construction of switch in which all wiring to the parts of the switch is readily accessible, thereby facilitating installation, removal and replacement of the switch in any desired position with respect to associated equipment.

Other and further objects of my invention reside in the construction of an electrical switch set forth more fully in the specification hereinafter following by reference to the accompanying drawings in which Fig. 1 is a rear elevation of a switch constructed in accordance with my invention; Fig. 2 is a transverse vertical section taken on line 2—2 of Fig. 4; Fig. 3 is a side elevation thereof; Fig. 4 is a central, vertical, longitudinal section, taken on line 4—4 of Fig. 1; Fig. 5 is a detail perspective view of the switch blade carrying cylinder; Fig. 6 is a plan view of the contact carrying plate; Fig. 7 is a transverse vertical section taken on line 7—7 of Fig. 6; Fig. 8 is a plan view of the plate, coacting with the contact carrying plate; Fig. 9 is a transverse vertical section taken on line 9—9 of Fig. 8; Fig. 10 is a detail view of the switch actuating shaft; Fig. 11 is a plan view of one of the contact plates; Fig. 12 shows a side elevation thereof; Fig. 13 is a perspective view thereof; Fig. 14 is a plan view of the removable contact plates and Fig. 15 is a perspective view thereof.

The electrical switch of my invention has been developed to meet requirements encountered in electrical equipment of relatively small size in which a relatively large number of electrical circuits must be controlled simultaneously and wherein the physical space available for installation of such a switch is relatively small. The switch of my invention is constructed from a relatively small number of parts which are assembled in compact manner so that the over-all dimensions of the switch are relatively small.

I provide an insulated drum having a bearing plate secured in one end thereof through which a rotary shaft member is journaled. The insulated drum carries a multiplicity of resilient strip members mounted as elements of a cylinder and extending on axes parallel to the central axis of the drum. An insulated disk member is carried by the rotary shaft member in a position adjacent the inwardly projecting ends of the resilient strip members. The insulated disk is provided with a notched peripheral edge where the notches are spaced at distances corresponding to the separation between the spaced resilient strip members. The inwardly projecting ends of the resilient strip members normally tend to engage in the notches in the peripheral edge of the disk for locking the disk in a selected position. However, upon angular movement of the rotatable shaft the disk tends to shift in such manner that the inwardly directed resilient strip members tend to rock out of engaged position thus freeing the disk and allowing the disk to be angularly shifted the next adjacent engaged position or other remote selected position at which time the resilient strip members again lock into the coacting notches for maintaining the disk in a selected position.

The disk is apertured to receive contact members which coact with the inwardly projecting ends of the resilient strip members. The contact members have shaped edge portions which fit intermediate the inwardly directed ends of the resilient strip members to form a good electrical connection therewith and also to serve as a mechanical inter-lock between the disk and the stationary contact members for maintaining the switch in any selected position. The construction of the disk is such that the contact members thereof may be located in any selected position which will permit the wiring of the switch with associated equipment in the most convenient manner. That is to say it is often possible to render the wiring more accessible if the con-

ductors may be run with freedom as to the position required on the switch. In the switch construction of my invention contacts may be selected throughout a peripheral distance of 360° thereby enabling the conductors to the switch to be located in the most accessible positions.

Referring to the drawings in detail reference character 1 designates a panel housing any desired electrical apparatus. The switch housing comprises a drum 2 formed from insulation material. A bearing plate 3 is secured adjacent the rear of panel 1 by means of screw members 3a which pass through the panel 1 and engage in the bearing plate 3 through the tapped portions 3b of the bearing plate 3. The bearing plate 3 is provided with a plurality of radially disposed tapped apertures 4 in which screws 21 are engaged after passing through lock washers 22 and through apertures 23 in drum 2. This provides a simple method of assembling in that the drum 2 may be slipped longitudinally over the peripheral edge of bearing plate 3 and secured in position with respect thereto by the radially disposed screws 21. The drum 2 projects rearwardly from panel 1 and provides mounting means for the plurality of resilient strip members 26. The construction of the resilient strip members 26 is set forth more fully in Figs. 11, 12 and 13. These resilient strip members are secured to the interior surface of drum 2 by means of rivet members 27 which pass through apertures 24 in drum 2. The ends of the resilient strip members 26 are offset and provided with solder terminals 26b projecting beyond the end of the drum 2. In order to provide positive means for spacing the resilient strip members 26 I provide a plurality of notches 25 in the rear peripheral edge of the drum 2 in which the offset ends of the resilient strip members 26 are engaged. This arrangement insures the parallel extension of the resilient strip members which have their inwardly extending ends normally bent toward the central axis of the drum 2. The inwardly directed ends of the resilient strip members 26 are shaped to provide contact portions 26a.

The bearing plate 3 is provided with a central bearing portion 5 projected from the rear of bearing plate 3. The front of the bearing plate 3 is recessed at 6. The rotatable shaft 7 is mounted in the bearing portion 5 of bearing plate 3 and is provided with a flange 8 which is disposed in recess 6 thereby providing an accurate bearing for the rotatable shaft 7. A shaped portion 9 is provided on shaft 7 adapted to receive the correspondingly shaped portion 16a of disk 16. The shaft 7 is threaded at 11 for receiving the nut 12 which bears against lock washer 14 for securing disk 16 rigidly to shaft 7. The shaft 7 has an extension 10 thereon which projects through an aperture in panel 1 and is provided with an operating handle 15 which is secured to shaft 10 by means of diametrically extending pin 10a. The operating handle 15 is provided with an indicator portion 15a by which the position of the shaft 7 with respect to selected resilient strip members may be determined by alignment of indicator 15a with a suitably engraved marking on panel 1 or other surface associated therewith. Operating handle 15 is formed from insulation material. Disk 16 is also formed from insulation material.

The disk 16 has a multiplicity of apertures 17 and 18 arranged in concentric rows, as indicated more fully in Fig. 6. The sets of apertures 17 and 18 are radially disposed and are located intermediate the notches 28. The apertures 17 provide recesses into which tongues 19b of contacts 19 extend. The contacts 19 are shaped as shown in Figs. 14 and 15 and have apertures 19c through which screw members 20 engage. Screw members 20 each pass through the lock washers 29 and through the apertures 19c in the contacts 19 for securing the contacts in position with respect to disk 16. The screw members 20 engage the screw threaded apertures 18 in disk 16. This type of connection insures a firm support for the contacts 19 as displacement of the contacts is prevented by the inter-locking of lugs 19b with the apertures 17 in disk 16. Each contact 19 has the engaging edge portion shaped, that is a central portion 19a is adapted to engage between the contact portions 26a while the edge portions on each side of the central edge portion 19a are rounded as indicated at 19d to conform with the contour of the contact portions 26a of resilient strip members 26. The shape of the contacts 19 is such that movement of the disk 16 to any angular position is restricted by the pressure created as the contacts 19 move from one adjacent set of resilient strip members to the next adjacent set of resilient strip members. That is to say the switch is adapted to be moved to a selected position, in which position the switch will be maintained, ready for instant shifting to another selected position. The peripheral edge of the contacts 19 is such as to conform with the shape of the contact portions 26a of the resilient strip members 26. The contacts 19 may be located in any desired position on disk 16, depending upon the pairs of resilient strip members which are to be bridged. Accordingly, the wiring to the terminal portions 26b of the resilent strip members 26 may be arranged in the most convenient manner with respect to associated apparatus.

The soldering of electrical connections to the solder terminals 26b around the periphery of the drum 2 is very convenient and it is not necessary to grope beneath the switch in effecting an electrical connection to the contacts of the switch, as has been the case with switch constructions of the prior art. The disk 16 may be very readily removed from the interior of the drum for effecting any necessary repair or rearrangement of the contacts thereon.

I have found the switch of my invention highly practical in its construction and capable of inexpensive manufacture on a quantity production basis.

While I have illustrated the preferred embodiment of my invention I realize that modifications may be made and I intend no limitations upon my invention other than are imposed by the scope of the appended claims.

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

1. In an electrical switch, a cylindrical housing constructed of insulation material, a supporting member extending diametrically with respect to one end of said housing, a shaft journaled in said supporting member, a disk of insulation material carried by said shaft in a position disposed within said housing, a multiplicity of resilient strip members supported by said housing and extending in spaced relation on the circumference of said housing and substantially parallel to the central axis of said housing, an electrical terminal for each of said resilient strip members, a contact portion on each of said strip members, and shunting contacts carried by said insulated disk and coacting with

the contact portions of adjacent resilient strip members said shunting contacts being cooperative with different pairs of adjacent resilient strip members as said disk member is angularly shifted under control of said shaft.

2. In an electrical switch, a cylindrical housing constructed of insulation material, a supporting member extending diametrically with respect to one end of said housing, a shaft journaled in said supporting member, a disk of insulation material carried by said shaft in a position disposed within said housing, a multiplicity of resilient strip members supported by said housing and extending in spaced relation on the circumference of said housing and substantially parallel to the central axis of said housing, an electrical terminal for each of said resilient strip members, a contact portion on each of said strip members, and shunting contacts removably mounted on said insulated disk and projecting radially thereof for coacting with the contact portions of adjacent resilient strip members, the coacting portions of said contacts and said strip members being formed for maintaining said switch in selected positions to which said shaft is moved.

3. In an electrical switch, a cylindrical housing constructed of insulation material, a supporting member extending diametrically with respect to one end of said housing, a shaft journaled in said supporting member, a disk of insulation material carried by said shaft in a position disposed within said housing, a multiplicity of resilient strip members supported by said housing and extending in spaced relation on the circumference of said housing and substantially parallel to the central axis of said housing, an electrical terminal for each of said resilient strip members, a contact portion on each of said strip members, and contacts removably mounted on said insulated disk, said contacts having their peripheral edges shaped to engage the contact portions of adjacent resilient strip members for effecting an electrical shunt between said adjacent resilient strip members and maintaining said switch in selected positions.

4. An electrical switch comprising a cylindrical housing of insulated material, means for supporting said housing from one end thereof, a shaft rotatably mounted through said means and terminating in a position within said housing, a disk of insulation material carried by said shaft, shunting contacts removably mounted on said disk, resilient strip members disposed in spaced relation and extending parallel to each other substantially as elements of a cylindrical structure, said resilient strip members having contact portions directed inwardly toward the periphery of said disk in the path of the contacts carried by said disk whereby said contacts are operative to shunt adjacent strip members.

5. An electrical switch comprising a cylindrical housing, a shaft member rotatably mounted with respect to said housing, an insulated carrier supported by said shaft member, shunt contact members removably mounted adjacent the periphery of said carrier, and contact members mounted on the entire circumference of the interior wall of said cylindrical housing and coacting in pairs with the contact members on said insulated carrier.

6. An electrical switch comprising a cylindrical housing of insulation material, a shaft member journaled with respect to one end of said housing, an insulated carrier mounted on said shaft member interiorly of said cylindrical housing, resilient strip members mounted on the entire periphery of the interior wall of said housing, and contact members removably carried by said insulated carrier and coacting with pairs of said resilient strip members for effecting an electrical shunt between adjacent resilient strip members while maintaining said carrier in predetermined positions.

7. An electrical switch comprising a cylindrical housing of insulation material, a shaft member journaled with respect to one end of said housing, an insulated carrier mounted on said shaft member interiorly of said cylindrical housing, resilient strip members mounted on the interior wall of said housing, said insulated carrier having the peripheral edge thereof notched in spaced positions for receiving portions of the resilient strip members for normally locking said carrier against rotation, and removably mounted contacts supported by said carrier in positions operative to bridge pairs of adjacent resilient strip members for establishing electrical shunts therebetween.

8. A universal electrical switch adaptable for use in effecting any desired switching arrangement, comprising a drum-like housing, a multiplicity of resilient strip members mounted in spaced relation around the interior wall of said drum-like housing, an insulated carrier journaled within said drum-like housing, a shaft connected with said insulated carrier for imparting step-like angular movement thereto, and removable contacts selectively positioned on said carrier and coacting with contact portions of pairs of adjacent resilient strip members for shunting said adjacent resilient strip members.

9. An electrical switch comprising a drum-like housing, means for supporting said housing from one end thereof, a shaft rotatably mounted with respect to said housing, an insulated carrier mounted on said shaft, removable contacts selectively disposed circumferentially on said carrier, a plurality of resilient strip members disposed in equally spaced relation and supported from the interior peripheral wall of said housing, the ends of said resilient strip members being disposed for coaction in pairs of adjacent members with the contacts on said carrier, and the opposite end of each of said resilient strip members forming a solder terminal for effecting an electrical connection with the resilient strip members.

10. An electrical switch comprising a drum-like housing, resilient contacts mounted interiorly of said housing on the periphery thereof, an insulated carrier rotatably mounted within said housing, and contact members removably supported by said carrier in selected position thereon and operative to establish inter-locking and wiping electrical connections with pairs of said resilient contacts.

11. An electrical switch comprising a drum-like housing, yieldable strip members secured to the interior of said housing and extending parallel with the central axis thereof, arcuate contact portions on the free ends of said strip members, an insulated carrier rotatably mounted within said housing, and contact members supported by said carrier and each operative to establish an inter-locking and wiping electrical connection with the contact portions of a pair of said strip members, each of said contact members having the peripheral edge thereof shaped to conform with the shape of the contact portions of said pair of yieldable strip members.

SAMUEL T. SCHOFIELD.