April 25, 1939. G. J. MEUER 2,155,765

DOOR-OPERATED ELECTRIC SWITCH

Filed June 10, 1938 2 Sheets-Sheet 1

Fig. 1

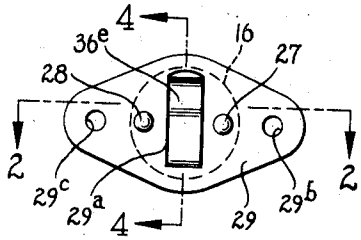


Fig. 2

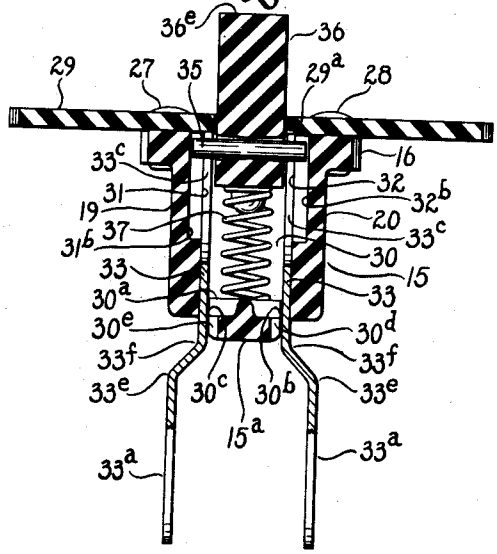


Fig. 3

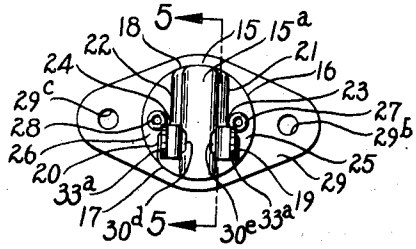


Fig. 5

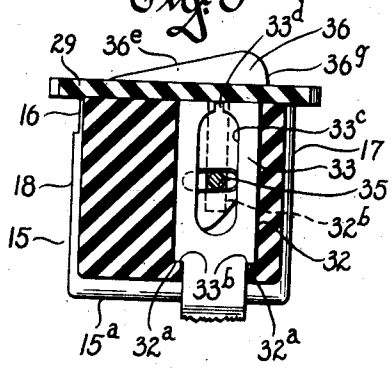


Fig. 4

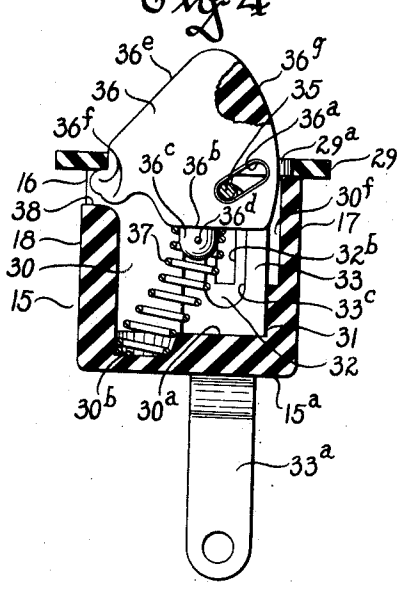
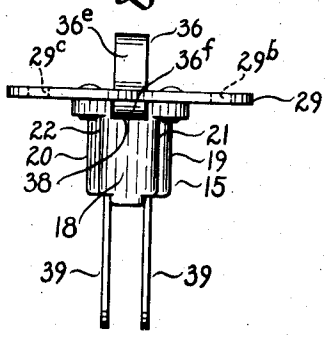


Fig. 6



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Fig. 7

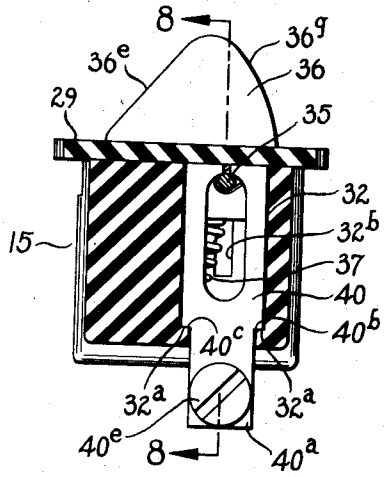


Fig. 8

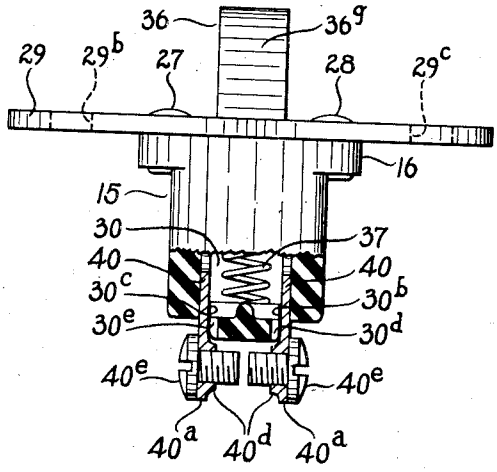


Fig. 9

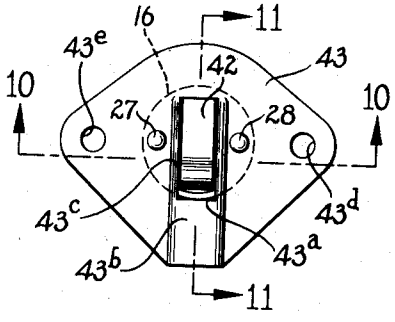


Fig. 10

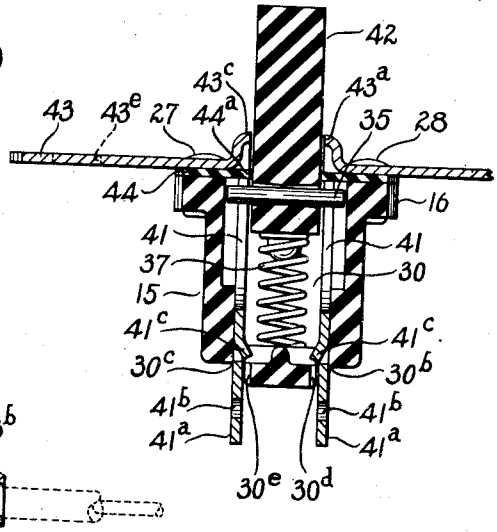
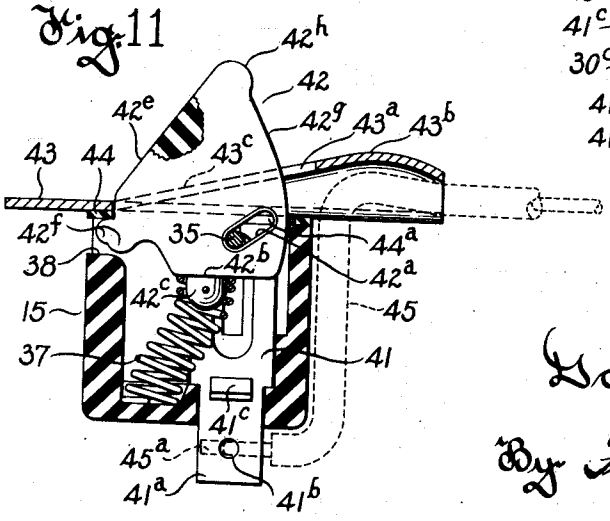


Fig. 11



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UNITED STATES PATENT OFFICE

2,155,765

DOOR-OPERATED ELECTRIC SWITCH

George J. Meuer, Milwaukee, Wis., assignor to Cutler-Hammer, Inc., Milwaukee, Wis., a corporation of Delaware

Application June 10, 1938, Serial No. 213,010

12 Claims. (Cl. 200—54)

This invention relates to improvements in door-operated electric switches.

The invention relates more particularly to improvements in door-operated switches of the character disclosed in my Patent No. 2,065,904, granted December 29, 1936.

An object of the invention is to provide a switch having a pivoted cam type operating lever to be engaged by the beveled edge of a refrigerator door or the like.

Another object is to provide novel means for mounting the operating lever and for maintaining the same in assembled relation to the other parts of the switch.

Another object is to provide a novel form of insulating supporting base for switches of the aforementioned character.

Another object is to provide novel means for mounting the switch and for maintaining the switch parts in assembled relation.

Another object is to provide a novel form of combined switch and plug connector.

Another object is to provide a combination device of the character last mentioned with novel means for affording standard spacing of the plug jacks.

Another object is to provide a novel form of combined switch contact and plug jack for use in combination devices of the aforementioned character.

Other objects and advantages of the invention will hereinafter appear.

The accompanying drawings illustrate certain embodiments of the invention which will now be described,—it being understood that the invention is susceptible of embodiment in other forms without departing from the scope of the appended claims.

In the drawings, Figure 1 is top view (actual size) of a combined door-operated switch and plug as constructed in accordance with my invention,—the operating lever being shown in its normal position to effect closure of a circuit controlled by the switch.

Fig. 2 is an enlarged vertical section, on the line 2—2 of Fig. 1,—the switch contactor and portions of the plug jacks being shown in elevation, and the manner of effecting standard spacing of the plug jacks being illustrated.

Fig. 3 is a bottom view of the device shown in Figs. 1 and 2.

Fig. 4 is a vertical section, on the line 4—4 of Fig. 1,—the major portion of the insulating operating lever being shown in elevation.

Fig. 5 is a vertical section, on the line 5—5 of Fig. 3,—the operating lever being shown depressed to effect disengagement of the switch contactor from the contacts.

Fig. 6 is a view, in elevation, of a modified form of combined switch and plug wherein a close spacing of the plug jacks is provided to restrict the same to use with a plug receptacle of special construction.

Fig. 7 is a vertical sectional view of a device quite similar to the devices of Figs. 1 to 6,—but with binding screw type bottom wiring terminals instead of the plug jacks aforementioned.

Fig. 8 is a view partly in elevation, and partly in vertical section on the line 8—8 of Fig. 7.

Fig. 9 is a top view of a switch similar to that illustrated in Figs. 7 and 8, but showing a special form of metal supporting plate.

Fig. 10 is a vertical section, on the line 10—10 of Fig. 9, showing the manner of insulating the switch parts from the top plate, and showing a special form of wiring terminal portions formed integrally with the switch contacts, and

Fig. 11 is a sectional view, on the line 11—11 of Fig. 10, showing the slightly modified form of operating lever employed in this switch, and showing the conductor guard formation of the supporting plate.

Referring first to Figs. 1 to 5, the numeral 15 designates a molded insulating base (which identical part is preferably employed in all forms of devices herein disclosed). Base 15 is produced by a straight line molding operation from a suitable insulating material, such as the phenol formaldehyde condensation product sold under the trade name of "Bakelite". Base 15 is provided with an upper end portion 16 of substantially circular form in transverse cross section. Base 15 is provided with diametrically opposite exterior wall surfaces 17 and 18 of arcuate contour and arranged in flush or alined relation to the portion 16 throughout the depth of said base (Figs. 3, 4 and 5). Wall surface 17 is preferably of substantially greater arcuate area than the surface 18, as best illustrated in Fig. 3. Extending inwardly from surface 17 for a relatively short distance are a pair of parallel side wall portions 19 and 20; and extending a relatively long distance inwardly from surface 18 are a pair of parallel side wall portions 21 and 22,—the adjacent side wall portions being connected by integral connecting wall portions or fillets 23 and 24 (Fig. 3).

As shown in Fig. 3 the side wall portions 19, 21, 23 and 20, 22, 24 are offset inwardly from the periphery of portion 16,—thus providing by the

latter a pair of diametrically opposite flange portions 25 and 26 of substantially segmental contour. Flange portions 25 and 26 are provided with openings to accommodate the hollow shanks of headed rivets 27, 28 to provide for rigid attachment of base 15 to the supporting top plate 29, which preferably consists of an insulating punching of the approximately diamond-shaped contour best illustrated in Figs. 1 and 3.

As best illustrated in Figs. 2 and 4, base 15 is provided with a recess 30, of substantially oblong shape in transverse cross section, which extends throughout the major portion of the depth of said base and opens to the upper end of the latter. The opposed side walls of recess 30 are provided with lateral extensions or auxiliary recesses 31 and 32, in substantial alinement with the aforementioned relatively short side wall portions 19 and 20, respectively. Extensions 31 and 32 are of rectangular channel form in transverse cross section, whereby the same are adapted to accommodate, in a substantially flush relation to the side walls of recess 30, the flat upper end portions 33 of a pair of combined switch contact and plug jack members of like form,—the plug jack portions of which are designated by numerals 33^a.

As shown in Fig. 5, said upper end portions 33 of the combined switch contact and plug jack members are of greater width than the lower portions thereof, whereby horizontal downwardly facing shoulders 33^b are provided for engagement with the cooperating shoulders formed at the lower ends of recess extensions 31 and 32 (see 32^a in Fig. 5). In this manner downward displacement of the combined switch contact and plug jack members relatively to base 15 is prevented. Portions 33 of said members are preferably provided with relatively long slots 33^c having straight parallel sides which merge into substantially semi-circular ends. Portions 33 are preferably provided with slits 33^d (Fig. 5) which lead from slots 33^c to the upper edges of said portions. Slits 33^d are preferably of a width substantially less than the diameter of the cylindrical bridging contactor 35 which I prefer to employ, whereby the latter when in bridging relation is adapted to engage the corners or edges formed at the junctions of the respective slits 33^d with slots 33^c.

As shown in Fig. 2, contactor 35 preferably comprises a suitable length of a straight conducting rod of circular cross section,—the opposite ends of said contactor extending through slots 33^c for substantial distances beyond portions 33. The aforementioned lateral extensions 31 and 32 of recess 30 (Figs. 2, 4 and 5) are provided, in centered relation thereto, with further lateral extensions in the form of relatively narrow vertical recesses 31^b and 32^b which open to the upper end of base 15. Recesses 31^b and 32^b afford clearance for and prevent substantial endwise displacement of the opposite ends of contactor 35 and serve to limit the latter to vertical movement in a single plane.

The switch operating member preferably consists of a flat-sided insulating element 36 adapted to be produced by a straight line molding operation. As best illustrated in Fig. 4, element 36 is of approximately triangular contour,—the same having a slot 36^a formed therein through which the contactor 35 is adapted to extend. The parallel walls of slot 36^a act upon contactor 35 to effect vertical movement of the latter to opposite extreme positions upon oscillatory movement of element 36 to its opposite extreme positions,—the length and angle of slot 36^a being such as to permit oscillatory movement of element 36 during movement of contactor 35 in said single vertical plane. Element 36 is provided at its lower edge 36^b (Fig. 4) with an integral, substantially cylindrical stud or protuberance 36^c having a rounded lower end, which stud serves as an abutment for the upper end of a coiled compression spring 37.

Stud 36^c is preferably provided on opposite sides thereof with relatively small lateral projections (one of which is shown at 36^d in Fig. 4) which necessitate forcible fitting of the upper end of spring 37 around said stud against the aforementioned surface 36^b of element 36; said projections 36^d thereupon acting to restrain spring 37 from accidental displacement from stud 36^c, notwithstanding a substantial degree of buckling or distortion of said spring. As shown in Fig. 4, the lower end of spring 37 is adapted to seat within a depression or recess 30^b provided at the left hand end of bottom wall 30^a of recess 30.

Element 36 is provided with an upper or cam edge 36^e (Fig. 4) which is adapted to be engaged by the beveled edge of a refrigerator door or the like (not shown) for movement of element 36 to the depressed position thereof shown in Fig. 5,—the contactor 35 being thus disengaged from the aforementioned portions 33 to interrupt the circuit of the refrigerator light or the like (not shown) controlled by the switch.

Base 15 is provided, in centered relation to the arcuate surface 18 (Fig. 6), with an upwardly opening rectangular notch 38 (see also Fig. 4) which serves as a bearing for the pivot lug formation 36^f provided substantially at the point of convergence of edges 36^b and 36^e of member 36. The aforementioned plate 29 is provided with a substantially rectangular opening 29^a which provides oscillating clearance for element 36,—whereas a portion of plate 29 overlies notch 38 and the lug 36^f positioned therein to assist in restraining element 36 against upward displacement beyond the extreme position thereof shown in Fig. 4,—the contactor 35 likewise acting under these conditions to limit upward displacement of element 36 under the bias of spring 37 and to restrain lug 36^f against lateral displacement from notch 38. As will be apparent from Figs. 2, 4 and 5, plate 29 overlies the upper ends of portions 33 to restrain the latter against substantial upward displacement relatively to base 15.

In practice the combined contact and plug jack members are assembled with respect to base 15 by inserting the plug jack portions 33^a downwardly through parallel openings 30^b, 30^c (Fig. 2) provided in the bottom wall 30^a (Fig. 4) at the right hand end of the latter; said openings 30^b, 30^c preferably having extensions 30^d, 30^e at the adjacent sides thereof, Figs. 2 and 3, to render base 15 adaptable for use with parts providing bottom wiring terminal members of the binding screw type, as hereinafter described in connection with Figs. 7 and 8. As shown in Figs. 2, 3 and 4, the combined switch contact and plug jack members, although of identical form, are assembled with respect to base 15 in reverse relationship to each other,—each member having been previously bent in opposite directions along parallel lines 33^e, 33^f to provide a standard spacing of plug jack portions 33^a in offset relation to contact portions 33, whereby said plug jacks will cooperate with a plug receptacle of usual form.

As shown in Fig. 4, the edge 36g of member 36 is preferably of arcuate contour,—the right hand end wall of recess 30 having an auxiliary recess 30f to provide clearance for member 36 and to assist in limiting the latter to oscillatory movement in a single plane. By reason of the arcuate formation of edge 36g it will be apparent that the upper end of recess 30 is substantially closed by element 36 in all positions of the latter, thus tending to prevent entrance of dust or other foreign matter into the switch chamber. As shown in Figs. 2 to 5, inclusive, base 15 is provided at its lower end with a relatively narrow, integral, downward extension 15a which provides an insulating barrier between the adjacent areas of the plug jack portions 33a, while at the same time providing a sufficient thickness of bottom wall 30a of recess 30 to accommodate the depression 30b in the latter (Fig. 4.)

Plate 29 is provided adjacent to opposite ends thereof with openings 29b, 29c to accommodate the shanks of screws or similar fastening elements for mounting the switch in a flush relation to the angled surface of the top liner or bevel of a refrigerator door or the like.

The modified form of combined switch and plug connector illustrated in Fig. 6 is substantially like that shown in Figs. 1 to 5, and corresponding parts have been given like numerals of reference. In Fig. 6, however, the plug jack portions 39 are located in relatively close parallel relationship to each other; that is, in the same planes as the respective contact portions associated therewith. This arrangement is advantageous when it is desired to insure against insertion of the plug into a receptacle other than that specially designed to receive the same.

In the modification shown in Figs. 7 and 8, most of the parts are identical with the parts of Figs. 1 to 5, and the same have been given like numerals of reference. In Figs. 7 and 8, however, I provide combined switch contact and wiring terminal members of the binding screw type. The contact portions 40 of said members are preferably of the same shape as the portions 33 in Figs. 1 to 5. The lower end portions 40a of said members are of reduced width, whereby shoulders 40b, 40c are provided for cooperation with the shoulders 32a aforedescribed. Said lower ends 40a are provided with inward extrusions 40d having tapped openings formed therein to accommodate the threaded shanks of binding screws,—it being understood that members 40, 40a are assembled with respect to base 15 prior to insertion of binding screws 40e. As will be noted, the extensions 30d, 30e of openings 30b, 30c respectively provide clearance for the inward extrusions 40d upon downward insertion of the combined contact and terminal members into assembled relation to base 15.

In Figs. 9, 10 and 11 I have shown a further modified form of the invention involving use of base 15, contactor 35, spring 37, and rivets 27, 28. The combined switch contact and wiring terminal members 41, 41a may be formed from metal blanks identical with those employed for producing the combined contact and terminal members 40, 40a in Figs. 7 and 8. The flat terminal portions 41a of said members are provided with relatively small openings 41b, which are adapted to receive the bared ends of conductors (not shown) which bared ends are looped about portions 41a and twisted preparatory to soldering; or the bared wire ends may be welded, brazed or soldered to portions 41a without looping, as shown in Fig. 11. Portions 41b are preferably provided with partly severed and inwardly bent lugs 41c the primary purpose of which is to overlie the extensions 30d, 30e of openings 30b, 30c to substantially prevent entry of dust or other foreign matter into recess 30.

The switch actuating member 42 of Figs. 9 to 11 is in most respects like the member 36 aforedescribed,—as will be apparent from a comparison of Figs. 11 and 4. The cam surface or edge 42e of member 42 is preferably slightly longer than the cam edge 36e of member 36,—the straight edge 42e being connected with the arcuate edge 42g as by means of the extension 42h of curved contour.

A metal top plate 43 of the contour best illustrated in Fig. 9 is attached to base 15 as by means of the rivets 27 and 28,—a circular punched plate 44 of insulating material being interposed between the upper end of base 15 and plate 43. Plates 43 and 44 are provided with substantially rectangular openings 43a and 44a which afford oscillating clearance for member 42. The intermediate portion of plate 43 is pressed or stamped upwardly to provide an inverted channel-shaped portion 43b, the upper wall 43c of which is angled upwardly from the forward end of member 42, as best illustrated in dotted lines in Fig. 11. The rear end portion of wall 43c is curved downwardly, as shown in Fig. 11, to provide a channel or guard for the two-wire cord shown in dotted lines at 45. The bared ends of the wires in cord 45 are passed outwardly through the respective openings 41b, bent flat against the outer surfaces of terminal portions 41a, and then welded to the latter, as indicated at 45a in Fig. 11, or brazed, soldered or otherwise attached to said terminal portions.

Plate 43 is provided with openings 43d, 43e to provide for attachment of the complete device to the beveled or angled surface of the liner of a refrigerator door opening or the like. The portions 42a, 42b, 42c and 42f of member 42 (Fig. 11) are preferably of the same shape as the corresponding portions 36a, 36b, 36c and 36f of member 36 (Fig. 4) and perform like functions. Inasmuch as the insulating base 15 is identical in all forms of the devices herein illustrated, it is obvious that the various forms of combined switch contact and wiring terminal members or combined contact and jack members may be utilized in any of the respective devices. Similarly, either form of supporting cover member 29 or 43 may be employed,—with the exception that actuating member 36 will always be associated with member 29 and actuating member 42 will always be associated with member 43.

Referring again to Fig. 5, it should be noted that the provision of slits 33d in the upper ends of portions 33 affords the additional function of insuring against accumulation or accidental interposition of non-conducting or other foreign matter between the cooperating surfaces of contactor 35 and contact portions 33, whereby proper electrical engagement of these parts is insured in the upper extreme position of the contactor.

What I claim as new and desire to secure by Letters Patent is:

1. In a door-operated electric switch, in combination, a molded insulating base having a portion of substantially circular form in cross section at one end thereof, said base having a recess of approximately oblong form in transverse cross section extending throughout the major portion of its depth and opening to said end, an actuat-

ing element pivotally supported within said recess, a contactor carried by said actuating element, said recess having a pair of substantially rectangular openings formed therein at one end of the bottom wall thereof and in planes parallel to the opposed side walls thereof, an abutment formed integrally with said bottom wall adjacent to the other end of the latter, a coiled compression spring interposed between said abutment and said actuating element to normally bias the latter for pivotal movement outwardly of said recess, a pair of combined switch contact and plug jack members having portions located within said recess and extending substantially throughout the depth of the latter in parallel relation to each other, said portions and the walls of said recess having cooperating shoulders formed thereon to prevent downward displacement of said members, and said members having plug jack portions extending through said pair of openings and exposed below the lower surface of said base.

2. In an electric switch, in combination, a one-piece molded insulating base having a recess formed therein and opening to the upper surface thereof, said base having a notch formed in the upper surface thereof and communicating with said recess, an insulating actuating member having an end portion positioned within said notch for pivotal movement with respect thereto, an insulating member secured to the upper end of said base and overlying said notch to restrain said end portion against substantial upward displacement, a pair of spaced contact members positioned within said recess at opposite sides of said actuating member, said contact members having cooperative engagement with the walls of said recess to restrain the former against downward displacement, said insulating member overlying said contact members to restrain the latter against substantial upward displacement, a contactor loosely carried by said actuating member and projecting from opposite sides of the latter for movement thereby into and out of bridging engagement with said contact members, a coiled compression spring interposed between the bottom wall of said recess and said actuating member to bias the latter outwardly from said recess, said contactor cooperating with said contact members and said actuating member to limit the degree of outward movement of the latter, and said contact members having conductive portions formed integrally therewith and exposed below the lower surface of said base.

3. In a door-operated electric switch, in combination, an insulating base adapted to be produced by a straight line molding operation, said base having an upper portion of substantially circular form in transverse cross section and a reduced lower portion of approximately rectangular form in transverse cross section, whereby segmental flanges are formed by said upper portion, said base having a recess extending throughout the major portion of its depth and opening to the upper end thereof, said upper end having a peripheral notch formed therein and communicating with said recess, an insulating actuating member of approximately triangular form adapted to be produced by a straight line molding operation, one end of said actuating member being pivotally engaged with the bottom wall of said notch, an insulating plate secured to the upper end of said base and overlying said end of the actuating member to restrain the same from displacement relatively to said notch, a pair of contact members positioned within said recess on opposite sides of said actuating member and restrained against downward displacement relatively to said base, said insulating plate overlying said contact members to restrain the latter against substantial upward displacement, a contactor carried by said actuating member and projecting from opposite sides of the latter for movement thereby into and out of bridging engagement with said contacts, a coiled compression spring interposed between the bottom wall of said recess and said actuating member to normally bias the same and said contactor to one extreme position, and an upwardly angled edge portion of said actuating member being exposed in the last mentioned position thereof for engagement by a door, said contact members having portions conductively associated therewith and exposed below the lower surface of said base.

4. In a door-operated electric switch, in combination, a one-piece molded insulating base having an upper end portion of substantially circular form in transverse cross section, the lower portion of said base having diametrically opposite sides offset inwardly with respect to the contour of said upper end portion, whereby the latter provides a pair of diametrically spaced flanges of segmental form, said base having therein a recess of approximately oblong form in transverse cross section opening to the upper end thereof, the bottom wall of said recess having at one end thereof a pair of parallel rectangular openings, said bottom wall having at the other end thereof an abutment for a spring, a pair of combined switch contact and plug jack members supported within said recess, the contact portions of said members being positioned adjacent to the upper end of said recess and the plug jack portions extending below said bottom wall thereof, the upper end of said base having a peripheral notch formed therein and communicating with said recess, a molded insulating actuating member of approximately triangular contour positioned within said recess and guided by the side walls of the latter for oscillatory movement in a single plane, one end of said actuating member being pivotally engageable with the bottom wall of said notch, the lower edge portion of said actuating member having an abutment formed thereon intermediate the length thereof, a coiled spring interposed under compression between said abutments and tending to eject said actuating member from said recess, a contactor carried by said actuating member and extending a substantial distance beyond each side thereof, said contactor being movable by said actuating member into and out of bridging engagement with said contact portions, said contact portions cooperating with said contactor to limit the degree of movement of said actuating member outwardly from said recess, and means comprising an insulating plate secured to the upper end of said base and overlying said contact portions to restrain the latter against substantial upward displacement, said insulating plate having an opening formed therein to provide oscillatable clearance for said operating member.

5. As an article of manufacture, a one-piece molded insulating base for electric switches of the door-operated type, said base having an upper end of substantially cylindrical form and a lower end having substantially parallel side wall portions offset inwardly with respect to the contour of said upper end at diametrically opposite sides of the latter, said upper end thus providing flanges of substantially segmental

form, said flanges having openings formed therein to provide for attachment of said base to a suitable support, said base having a substantially rectangular recess formed therein and opening to the upper surface thereof, the bottom wall of said recess having a pair of spaced openings formed therein to provide for insertion into said recess of contact members of suitable form whereby conducting portions of the latter are exposed below the lower surface of said base, the walls of said recess having shoulders formed thereon to insure against accidental downward displacement of the contact members, and the bottom wall of said recess being also formed to provide an abutment for one end of a coiled compression spring.

6. As an article of manufacture, a one-piece molded insulating base for electric switches of the door-operated type, said base having an upper end portion of substantially circular contour in transverse cross section, a pair of diametrically opposed exterior wall surfaces alined with the periphery of said upper end portion throughout the depth of said base, said diametrically opposed walls having substantially different arcuate dimensions, a pair of flat side wall portions extending in parallel relation from each of said diametrically opposed wall surfaces, the adjacent flat side wall portions being offset from each other with integral connecting portions therebetween, said side wall portions being offset inwardly from the periphery of said upper end portion whereby diametrically opposed flanges are formed by the latter, said flanges having perforations formed therein to provide for attachment thereof to a suitable support, said base having a recess extending throughout the major portion of its depth and opening to the upper surface thereof, the vertical walls of said recess being located adjacent to said diametrically opposed exterior wall surfaces and to said flat side wall portions respectively, the bottom wall of said recess having a pair of openings formed therein in parallel relation to the relatively more widely spaced side wall portions, said openings providing assembling clearance for contact members of suitable form having conducting portions to be exposed below the lower surface of said base, and the bottom wall of said base being formed to provide an abutment for a coiled compression spring.

7. In a door-operated electric switch, in combination, a one-piece molded insulating base adapted to be produced by a straight line molding operation, said base having a portion of substantially circular form in transverse cross section at one end thereof, said base having a recess of approximately rectangular form in transverse cross section extending throughout the major portion of its length and opening to said end, said recess having a pair of openings formed therein at one end of the bottom wall thereof at points adjacent to the opposed side walls thereof, said bottom wall having an abutment formed thereon adjacent to the other end thereof, a pair of combined switch contact and terminal members having portions located within said recess and extending substantially throughout the depth of the latter in parallel relation to each other, said portions and the walls of said recess having cooperating shoulders formed thereon to prevent downward displacement of said members, said portions having wiring terminal portions formed integrally therewith, said wiring terminal portions extending through said pair of openings and exposed below the lower surface of said base, and an insulating plate secured to the first mentioned end of said base, said insulating plate overlying said first mentioned portions of said members to prevent substantial upward displacement of the latter.

8. In an electric switch, in combination, a one-piece molded insulating base having a recess formed therein and opening to the upper surface thereof, said base having a notch formed in the upper surface thereof and communicating with said recess, an insulating actuating member of approximately triangular contour having an end portion positioned within said notch for pivotal movement with respect thereto, an insulating plate secured to the upper end of said base and overlying said notch to restrain said end portion against substantial upward displacement, a pair of spaced contact members positioned within said recess at opposite sides of said actuating member, said contact members and the walls of said recess having cooperating shoulders formed thereon to restrain the former against downward displacement, said insulating plate also overlying said contact members to restrain the latter against substantial upward displacement, said actuating member having an elongated slot extending transversely therethrough, a contactor positioned within said slot and having portions projecting beyond opposite sides of said actuating member for movement by the latter into and out of bridging engagement with said contact members, the walls of said recess having vertical grooves formed therein and the ends of said contactor extending into said grooves, the walls of said grooves acting to prevent substantial endwise displacement of said contactor and to limit the latter to vertical movements in a single plane, said contactor cooperating with said contact members and said actuating member to limit the degree of movement of the latter outwardly from said recess, and said contactor cooperating with said vertical grooves and said actuating member to restrain said end portion of the latter against lateral displacement in either direction from said notch.

9. In an electric switch, in combination, a one-piece molded insulating base having a recess formed therein and opening to the upper surface thereof, said base having a notch formed in the upper surface thereof and communicating with said recess, an insulating actuating member of approximately triangular contour having an end portion positioned within said notch for pivotal movement with respect thereto, an insulating plate secured to the upper end of said base and overlying said notch to restrain said end portion against substantial upward displacement, a pair of spaced contact members positioned within said recess at opposite sides of said actuating member, said contact members and the walls of said recess having cooperating shoulders formed thereon to restrain the former against downward displacement, said insulating plate also overlying said contact members to restrain the latter against substantial upward displacement, said actuating member having an elongated slot extending transversely therethrough, a contactor positioned within said slot and having portions projecting beyond opposite sides of said actuating member for movement by the latter into and out of bridging engagement with said contact members, the walls of said recess having vertical grooves formed therein and the ends of said contactor extending into said grooves, the walls of said grooves

acting to prevent substantial endwise displacement of said contactor and to limit the latter to vertical movements in a single plane said contactor cooperating with said contact members and said actuating member to limit the degree of movement of the latter outwardly from said recess said contactor cooperating with said vertical grooves and said actuating member to restrain said end portion of the latter against lateral displacement in either direction from said notch, and said contact members having plug jack portions formed integrally therewith and exposed below the lower surface of said base.

10. In combination, an insulating cam lever for electric switches of the door-operated type, said lever being of approximately triangular contour and the same being adapted to be produced by a straight line molding operation, said lever having an integral lug formed at one end thereof for bearing engagement with a supporting base of suitable form, the lower edge of said lever having an integral projection formed thereon intermediate the ends thereof for engagement by the end of a coiled compression spring, said lever having an elongated slot extending transversely therethrough and arranged at an angle to said lower edge thereof, a bridging contactor of circular cross section freely insertable through said slot, the end portions of said contactor extending substantial distances beyond opposite sides of said lever, said lever having an upwardly angled straight edge adapted for engagement by a door or the like to effect pivotal movement of said lever about the center defined by said lug, and said lever having an outwardly curved edge extending between the outer ends of said straight and lower edges.

11. In a door-operated electric switch, in combination, a one-piece molded insulating base having a recess formed therein and opening to the upper surface thereof, said base having a notch formed in the upper surface thereof and communicating with said recess, a molded insulating actuating member of substantially triangular contour having an end portion formed to provide a pivot lug, said lug being positioned within said notch for pivotal movement with respect thereto, an insulating member secured to the upper end of said base and overlying said notch to restrain said lug against substantial upward displacement, a pair of punched sheet metal contact members positioned within said recess at opposite sides of said actuating member, said contact members having cooperative engagement with said base to restrain the former against downward displacement, said insulating member overlying said contact members to restrain the latter against substantial upward displacement, a contactor comprising a metal rod of substantially circular form in cross section loosely carried by said actuating member at a substantial distance from said pivot lug, said contactor having its end portions projecting from opposite sides of said actuating member for movement by the latter into and out of bridging engagement with said contact members, a coiled spring having end portions thereof respectively engaged with the bottom wall of said recess and with the lower edge of said actuating member between said pivot lug and said contactor to thereby bias said actuating member outwardly from said recess, said contactor cooperating with said contact members and said actuating member to limit the degree of outward pivotal movement of the latter, and said contact members having conductive portions formed integrally therewith to provide for attachment of terminal wires.

12. In combination, an insulating cam lever for electric switches of the door-operated type, said lever being of approximately triangular contour and the same being adapted to be produced by a straight line molding operation, said lever having an integral lug formed at one end thereof for direct pivotal bearing engagement with an insulating supporting base of suitable form, said lever having an opening extending transversely therethrough adjacent to the lower edge thereof a substantial distance from said bearing lug, a bridging contactor loosely mounted in said opening and projecting a substantial distance beyond each side of said lever, said lower edge of the lever being formed between said lug and said opening for compressive engagement with the free end of a coiled spring adapted to bias the lever for pivotal movement in a given direction with respect to the center defined by said bearing lug, said lever having an upwardly angled straight edge portion adapted for engagement by the beveled edge of a door to effect pivotal movement of said lever in the opposite direction, said lever having an outwardly curved edge between the outer ends of said straight and lower edges, and an insulating plate having an opening providing relatively close clearance for said lever during pivotal movement of the latter between extreme positions, said plate overlying said lug to assist in restraining said lever against bodily displacement.

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