

May 29, 1945.

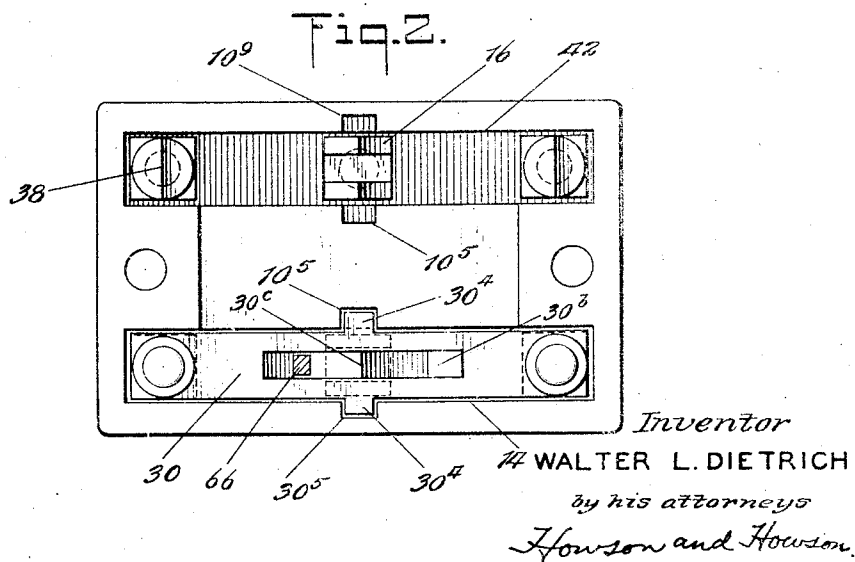
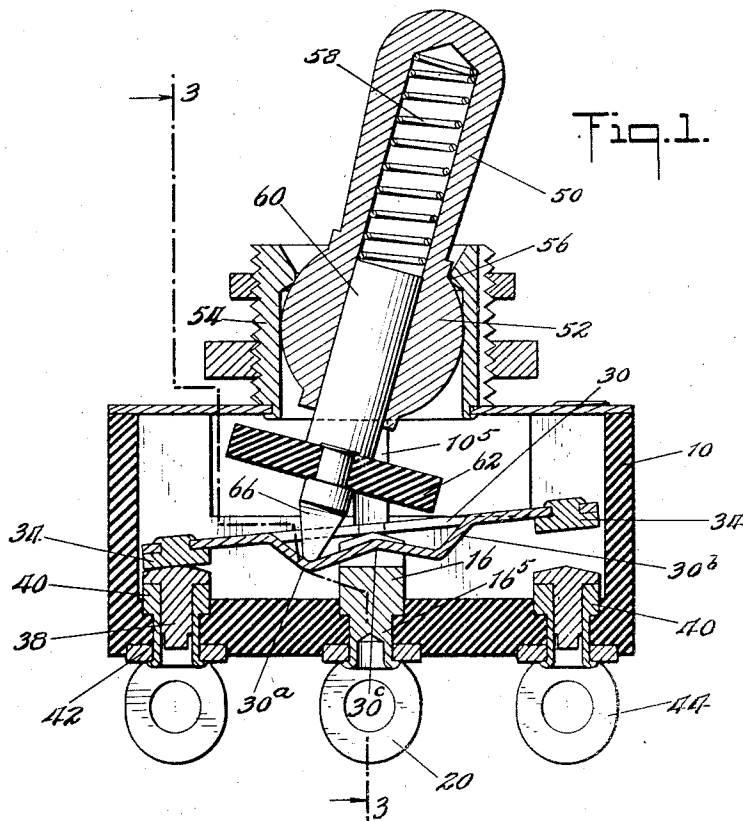
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2,377,134

TILT-TYPE LEVER-OPERATED SWITCH

Filed Dec. 30, 1943

2 Sheets-Sheet 1



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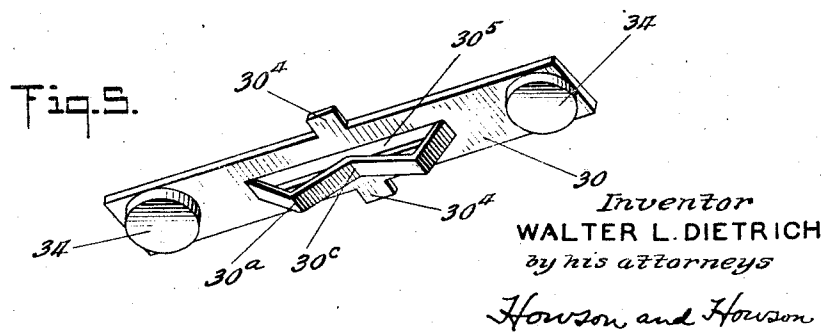
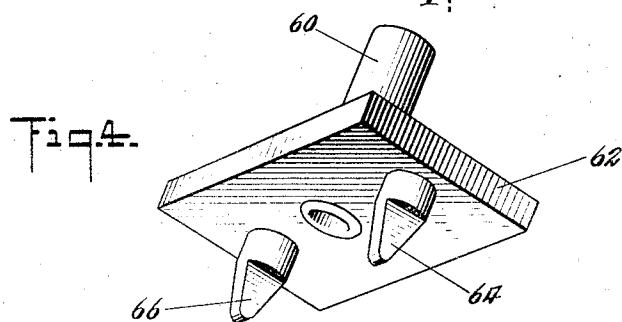
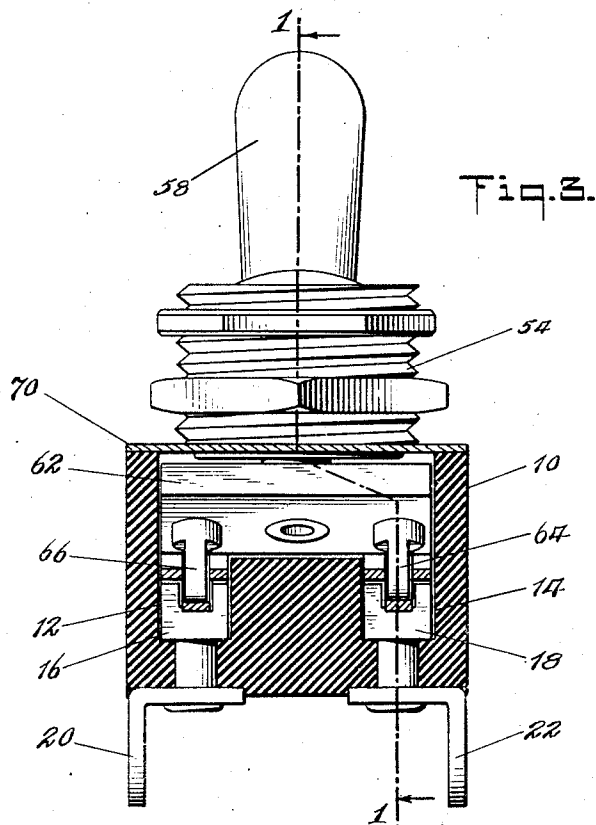
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TILT-TYPE LEVER-OPERATED SWITCH

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UNITED STATES PATENT OFFICE

2,377,134

TILT-TYPE LEVER-OPERATED SWITCH

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Application December 30, 1943, Serial No. 516,311

10 Claims. (Cl. 200—68)

This invention relates to electric switches. More particularly it relates to an electric switch of the multipole type in which the circuit making and breaking are accomplished by the tilting of a movable contact resulting from the pivotal movement of an operating lever.

It is an object of the invention to provide an improved form of the tilt-type lever-operated electric switch composed of a minimum number of parts of simple and economical form, and which will be durable and positive in operation.

Other objects and advantages of the invention will become apparent as it is described in connection with the accompanying drawings.

In the drawings—

Fig. 1 is an elevational section view taken longitudinally through a switch embodying the principles of the invention;

Fig. 2 is a plan view of the interior of the switch casing with the cover and operating mechanism removed;

Fig. 3 is a transverse section view taken along line 3—3 of Fig. 1;

Fig. 4 is a detailed perspective view of the member which engages and tilts the movable contacts simultaneously;

Fig. 5 is a detailed perspective view of the tiltable bridging contact.

Referring to the drawings, a rectangular casing 10, made preferably of molded insulating material, is hollowed out for the reception of the movable switch parts. The casing may be hollowed out in generally H form providing parallel longitudinal channels 12 and 14 for the movable contact members, hereinafter described. In the center of the channels 12, 14 are provided identical fulcrum-bearing members 16 and 18 having stem portions 16s extending through the floor of the casing and peened over on to the surface of identical wire terminal members 20 and 22 through which, also, the stem portions extend. The inner or upper portions of the fulcrum members 16, 18 have inclined or tapered top surfaces, about the apex of which a movable contact 30 may tilt. The movable contact members 30 are preferably stamped from strips of highly conductive sheet metal and have a strip at the central portion thereof lanced out in the form as best illustrated in Figs. 1 and 5, namely, with V-shape valley portions 30a and 30b, between which is an inverted V-shape hill portion 30c over which the actuating member (hereinafter described) must ride in moving from one valley to the other during the operation of the device. At opposite ends of the movable contact 30 are

contact buttons 34 of silver or other highly conductive material. These buttons are adapted to engage and disengage identical stationary contact buttons 38 having stem portions which are forced within tubular members 40 which pass through the floor of the casing at opposite ends of the channels 12 and 14 and have their lower ends peened over on to the surfaces of wire terminal members 42, 44 which are or may be identical with wire terminals 20. Square heads on the tubular members 40 seat within square recesses in the ends of channels 12 to prevent rotation. Preferably the contact surfaces of the stationary contact buttons 38 will be tapered or inclined so that as the movable contact member tilts, the surfaces of the movable contact buttons will have a large surface of contact with the stationary contacts.

In order to cause tilting of the movable contacts 30, a lever-operated mechanism is provided, comprising a lever or handle portion 50 with a spherical lower end 52 which is received within an externally-threaded nipple 54 and bears against a reduced neck portion 56 in the upper end of said nipple. The lever 50 is hollowed out axially for the reception, in its upper end, of a coiled compression spring, and for the reception, in its lower end, of a cylindrical plunger member 60. The plunger member 60 has a lower end of reduced section to extend through a central aperture in an insulating plate 62 of fiber, Bakelite, or other suitable insulating material. To secure the plate and plunger together, its reduced end is peened over against the bottom surface of the plate. Symmetrically positioned in the insulating plate 62 on opposite sides of the plunger 60 and extending from the opposite side of said plate from said plunger so as to be directed in the opposite direction to the plunger are identical projection members 64, 66, made preferably from round metal rods. One end of these projections is preferably of reduced section to extend through the insulating plate 62 and be peened over in order to be held securely in place. The opposite ends of the projections are preferably flattened axially and tapered to rounded points or ends. The flattened portions extend into the slots 30s formed by the lancing out of the central strip of the contact members 30.

To hold the contact members against endwise movement as they tilt, aligned oppositely-extending lateral extensions 30s are formed on the side at the central portion of the contact members to fit within vertical slots 10s extending from the top toward the bottom of the casing.

To hold the parts in their assembled position, the nipple 54 is secured in an aperture in a cover plate 70 which is secured by bolts or otherwise to the casing 10.

From the foregoing, it may be observed that the spring 58 within the operating lever 50 tends to force the spherical bearing portion 52 of the operating lever against the neck 56 of the nipple 54 to keep those parts in bearing engagement. At the same time, the spring 58 tends to force the operating member (formed of the plunger 60, the plate 62 and projections 64 and 66) outwardly of the lever 50 to force the projections 64 and 66 in engagement with the movable contact members 30. Normally the projections will seat within one or the other of the valleys 30a or 30b of the movable contact members to hold those contact members in one or the other of their tilted positions.

Upon movement of the operating lever 50 to the left from the position shown in Fig. 1, the projections 64 and 66 ride up over the hill 30c of the contact members as the plunger 60 moves into the lever 50 against the pressure of the spring 58. When the projections 64, 66 pass over-center, the movable contact members 30 will be suddenly shifted or tilted from the position shown, thereby to separate the fixed and movable contacts at the left end of the switch and engage the fixed and movable contacts at the right end.

Thus, it will be observed that I have provided an improved form of tiltable electric switch mechanism wherein the parts may be economically manufactured from standard sheet or rod materials or conveniently molded from insulation and may be fabricated with a minimum amount of labor commensurate with satisfactory operation and durable structure of the invention.

Many modifications within the scope of the invention will occur to those skilled in the art. Therefore I do not limit it to the specific embodiment described and illustrated.

I claim:

1. In a multi-pole electric switch, an insulating casing having parallel channels therein, fixed contacts at opposite ends of said channels, said fixed contacts comprising hollow mounting members and contact buttons having stems closely fitted in said members, movable contact members within and guided by the side walls of said channels and engageable alternately with said fixed contacts, said movable contacts having hill and valley portions formed centrally therein, current-carrying fulcrum members tiltably supporting said movable contact members at their central portions, actuating means for tilting said movable contacts comprising projections slidably engaging said movable contacts and an insulating plate fixedly carrying said projections and a plunger affixed to said plate, in combination with a hand-operable lever having sliding engagement with said plunger, a mounting nipple having a neck against which a spherical portion of said lever bears, spring means urging said spherical portion against said neck and urging said projections into one or another of the valley portions of said movable contacts.

2. In a multi-pole electric switch, an insulating casing having parallel channels therein, fixed contacts at opposite ends of said channels, movable contact members within and guided by the side walls of said channels and engageable alternately with said fixed contacts, said movable contacts having hill and valley portions formed centrally therein, current carrying fulcrum members tiltably supporting said movable contact members

at their central portions, actuating means for tilting said movable contacts comprising projections slidably engaging said movable contacts, and an insulating plate fixedly carrying said projections and a plunger affixed to said plate, in combination with a hand operable lever having sliding engagement with said plunger, a mounting nipple having a neck against which a spherical portion of said lever bears, spring means urging said spherical portion against the neck and urging said projections into one or another of said valley portions of said movable contacts.

3. In a multi-pole electric switch, an insulating casing having parallel channels therein, fixed contacts at opposite ends of said channels, movable contact members in said channels engageable alternately with said fixed contacts, said movable contacts having hill and valley portions formed centrally therein, current carrying fulcrum members tiltably supporting said movable contact members at their central portions, actuating means for tilting said movable contacts comprising projections slidably engaging said movable contacts and an insulating plate fixedly carrying said projections and a plunger affixed to said plate, in combination with a hand-operable lever having sliding engagement with said plunger, a mounting nipple having a neck against which a spherical portion of said lever bears, spring means urging said spherical portion against said neck and urging said projections into one or another of the valley portions of said movable contacts.

4. In a multi-pole electric switch, an insulating casing having parallel channels therein, fixed contacts at opposite ends of said channels, movable contact members in said channels engageable alternately with said fixed contacts, current carrying fulcrum members tiltably supporting said movable contact members at their central portions, actuating means for tilting said movable contacts comprising projections slidably engaging said movable contacts and an insulating plate fixedly carrying said projections and a plunger affixed to said plate, in combination with a hand-operable lever having sliding engagement with said plunger, a mounting nipple having a neck against which a spherical portion of said lever bears, spring means urging said spherical portion against said neck and urging said projections into engagement with said movable contacts.

5. In a multi-pole electric switch, an insulating casing having parallel channels therein, fixed contacts at opposite ends of said channels, movable contact members in said channels engageable alternately with said fixed contacts and guiding by the side walls of said channels, current carrying fulcrum members tiltably supporting said movable contact members at their central portions, actuating means for tilting said movable contacts comprising projections slidably engaging said movable contacts and an insulating plate fixedly carrying said projections and a plunger affixed to said plate, in combination with a hand-operable lever having sliding engagement with said plunger, spring means urging said projections into engagement with said movable contacts.

6. In a multi-pole electric switch, an insulating casing, fixed contacts at opposite ends of said casing, movable contact members engageable alternately with the fixed contact members at opposite ends of the casing, current carrying fulcrum members tiltably supporting said movable contact members at their central portions, actuating means for tilting said movable contacts comprising projections slidably engaging said mov-

able contacts and an insulating plate fixedly carrying said projections and a plunger affixed to said plate, in combination with a hand-operable lever having sliding engagement with said plunger, spring means urging said projections into engagement with said movable contacts to hold said movable contacts in engagement with one or the other of the fixed contacts at opposite ends of the casing.

7. In a multi-pole electric switch, a tiltable device comprised of a flat sheet insulation plate, a cylindrical member affixed to the central portion of said plate, a plurality of projections affixed to said plate and extending oppositely to said cylindrical member, movable contacts supported for tilting movement, said movable contacts having depressions into which said projections seat to hold the movable contacts in alternate tilted positions.

8. In a multi-pole electric switch, a tiltable device comprised of an insulating plate, a cylindrical member affixed to the central portion of said plate, a plurality of projections affixed to said plate and extending oppositely to said cylindrical member, movable contacts supported for tilting movement, and means resiliently holding said projections engaged with said movable contacts and permitting sliding therebetween to cause tilting of said contacts from one position to another.

9. In a multi-pole electric switch, a tiltable device comprised of an insulating plate, a cylindrical member affixed to the central portion of said plate, a plurality of projections affixed to said plate and extending oppositely to said cylindrical member, movable contacts supported for tilting movement, said movable contacts each having a strip pressed out from their central portions forming a slot with the expressed portion in hill-and-valley form below, said projections having flattened side surfaces adjacent their tips enabling the projections to extend through the slots into engagement with said hill and valley portions.

10. In a multi-pole electric switch, a tiltable device comprised of an insulating plate, a cylindrical member affixed to the central portion of said plate, a plurality of projections affixed to said plate and extending oppositely to said cylindrical member, movable contacts supported for tilting movement, said movable contacts each having a strip pressed out from their central portions forming a slot, said projections having flattened side surfaces adjacent their tips enabling the projections to extend through the slots.

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