

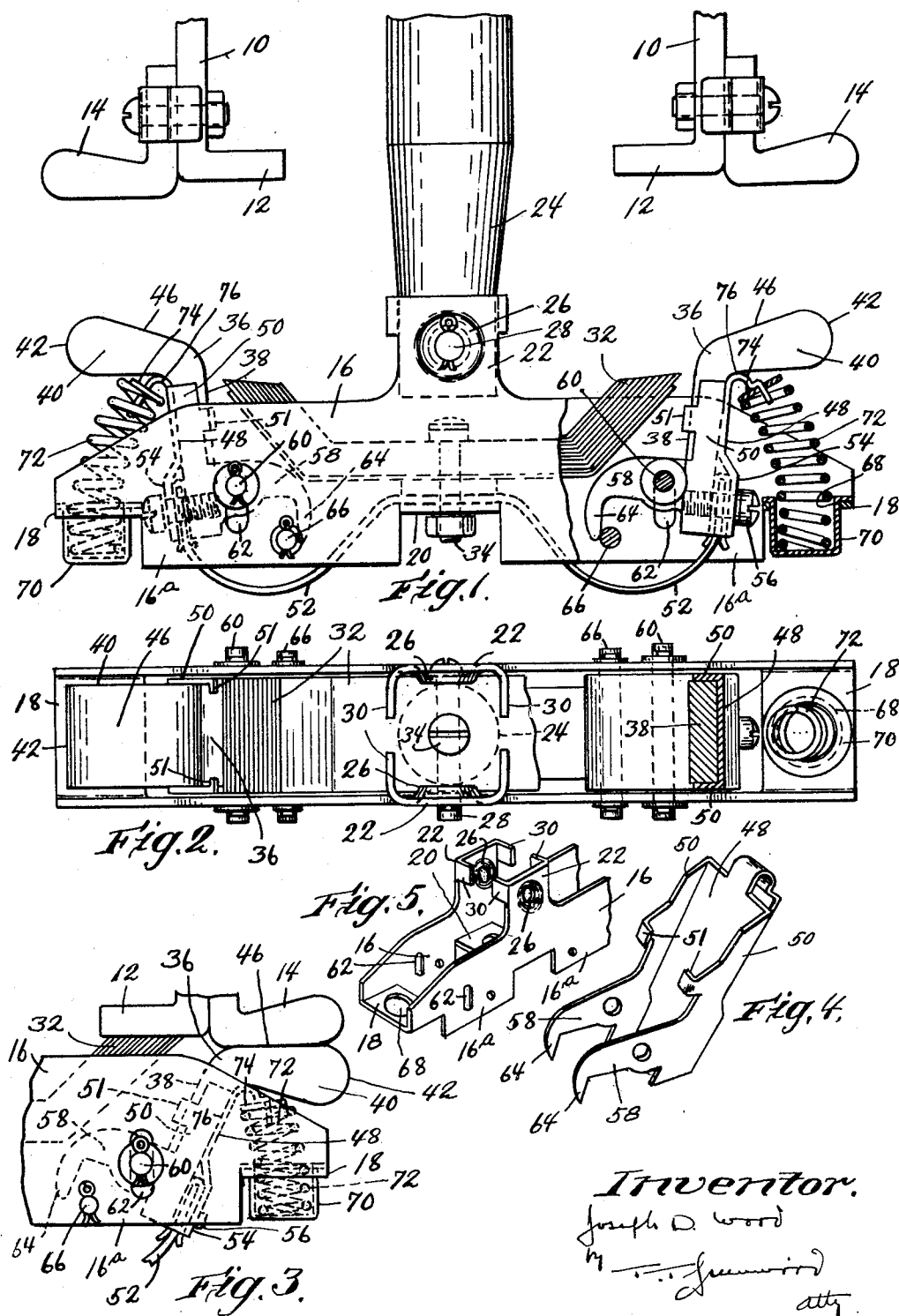
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ELECTRIC SWITCH AND CONTACT STRUCTURE THEREFOR

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ELECTRIC SWITCH AND CONTACT STRUCTURE THEREFOR

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This invention relates to electric switches of the type comprising a pair of stationary switch members and a movable switch member adapted to bridge the stationary switch member and has particular reference to the movable switch member.

An object of this invention is the provision of a movable switch member for an electric switch having a supporting frame for the current conducting parts of the movable switch member characterized by being composed of a unitary piece of sheet metal, shaped and arranged to provide supports for the current conducting components.

A further object of the invention is the provision of a movable contact member and a supporting structure so arranged that the movable contact member has a tilting or rocking movement in two transverse planes thus to be self-seating on, or self-aligning with, its cooperating contact member, and also to have a sliding engagement with its cooperating contact member into a final engaging position therewith. The arrangement is also such that the supporting structure has provision for continued movement in a switch closing direction without changing the contact engaging position of the movable contact member.

A further object is generally to improve the construction and operation of electric switches.

Fig. 1 is a side elevation partly broken away of the movable switch member embodying the invention.

Fig. 2 is a plan view partly in section of the switch member of Fig. 1.

Fig. 3 is a detail of one of the contact members of the brush member in switch closed position.

Fig. 4 is a perspective view of the supporting frame of the contact member.

Fig. 5 is a perspective detail illustrating the construction of the main frame of the movable switch member.

The electric switch to which this invention relates includes the stationary switch members 10 having main contact members 12 and auxiliary contact or arcing members 14 which are adapted to be engaged by the correspond-

ing members of the movable switch member.

The movable switch member embodying the invention comprises a main supporting frame illustrated particularly in Fig. 5 and formed of a single piece of sheet metal, preferably copper, slit and shaped to form the opposed side walls 16 and the integral shelves 18 connecting said side walls at the ends thereof and the shelves 20 connecting said side walls in the middle thereof. The side walls 16 are provided with extensions 16a disposed between the shelves 18 and the shelves 20 and located below said shelves whereby to provide additional strength to the side walls, the metal composing said extensions originally occupying the spaces between said shelves before the frame is shaped. The side walls are provided with opposed upstanding arms 22 disposed in the middle thereof above said shelf 20 and an insulated switch rod 24 has its lower end received between said arms. Said arms are provided with opposed in-struck bosses 26 against the flat opposed faces of which the switch rod is adapted to bear loosely. A pin 28 is passed through said bosses and through the switch rod and forms a pivotal support for the frame. Said arms have integral ears 30 at their upper ends which are extended inwardly toward each other on opposite sides of the switch rod and serve to limit the extent of pivotal movement of the frame on said switch rod.

A laminated bridging or brush member 32 of more or less usual construction is supported on said shelf 20 and is secured thereto by means including the bolt 34 and is adapted to make contact with the main stationary contact members 12. Said frame is provided with auxiliary contacts or arcing members 36 which are adapted to engage the stationary arcing members 14. Said arcing members 36 are of general L-shape and have shanks 38 and contact sections 40 which lie approximately at right-angles with said shanks. The ends or tips of said contact sections are of general semi-cylindrical shape as indicated at 42 and the contours of said semi-cylindrical sections merge at the top of

the contact members into the flat contact sections 46.

The contact members are so supported that in the open-circuit position of the switch, the semi-cylindrical ends or tips of the contact members are highest. Consequently, the contact members first engage the stationary contact members 14 at the semi-cylindrical end portions. The contact members are so supported that upon further movement for the movable switch member in a switch closing direction, the movable contact members are caused to rock and slide upon the lower flat faces of the stationary contact members 14 and eventually assume a position as shown in Fig. 3 with the flat faces 46 of the movable contact members in engagement with the corresponding flat faces of the stationary contact members.

A supporting structure for each movable contact member is provided to carry out the above result and said structure includes a channel frame having a bottom wall 48 and opposed upstanding side walls 50 between which the shank 38 of the contact member is adapted to be received. Ears 51 of said walls 50 are reflexed over the shanks, whereby to hold the contact members in the frame. A flexible conductor 52 serves electrically to connect the movable contact members and the ends thereof are received between the shanks and struck out portions 54 of the contact supporting frames. A screw 56 serves to secure each end of the conductor and the shank of the contact member to the supporting frame. The intermediate portion of said conductor is disposed upon the shelf 20 and is clamped on said shelf by the brush member 32 and attaching bolt 34. Said contact supporting frame is disposed between the side plates 16 of the main supporting frame and is provided with a pair of parallel inwardly-extended arms 58. The pivot pin 60 is passed through and is carried by said arms and the ends thereof are disposed in vertically-extended aligned slots 62 in the side plates 16 of said main frame, thereby securing the contact supporting frame to the main frame in such a manner that the contact supporting frame can pivot about the pin 60 and also move in a vertical direction. Said arms 58 are provided with depending projections 64 that are adapted to engage a pin 66 extended transversely between the side plates 16 of the main frame thereby to limit the pivotal movement of the contact supporting frame in a counterclockwise direction.

Each shelf 18 is provided with an aperture 68 in which a flanged cup 70 is received. A compression spring 72 has its lower end received in said cup and has a retaining plate 74 at its upper end which is formed with a slot therein through which an ear 76 integral with and outstanding from the upper end of the bottom wall 48 of the con-

tact supporting frame is received. Said compression spring serves constantly to urge the contact member for movement in an upward direction and also for rotation in a counterclockwise direction, or toward the brush rod, and normally supports the contact member in the position illustrated in Fig. 1.

When the movable switch member is moved upwardly into engagement with the stationary switch members the tips of the contact members first engage the flat lower faces of the contact members 14. Further movement of the movable switch member in the same direction serves to rock the movable contact members and slide them on the stationary contact members and ultimately to bring the flat contact faces into engagement with the corresponding faces of the stationary switch members, as illustrated in Fig. 3, the contact supporting frames both rocking on their pivots 60 and sliding downward in the slots 62. In the closed position of the switch, the pivot 60 will occupy some intermediate position in the slots as illustrated in Fig. 3. The compression springs 72 serve to apply pressure directly under the contact faces of the movable contact faces whereby to hold them on their flat engaging faces so that a substantial amount of movement of the movable switch member is permitted without changing the contacting position of the cooperating stationary and movable contact members.

I claim:

1. An electric switch having a stationary contact member providing a horizontal contact face, a cooperating movable contact member including a vertically-movable support, a vertical contact-supporting frame carried by said support having a vertical section which at the bottom has a pin and slot connection with said support, the slot being vertical, a contact member carried by the top of said vertical section having a vertical leg secured to said section and a contact-leg at right angles thereto which extends horizontally away from said pin and slot connection, a spring bearing in a vertical direction upon said frame under said horizontal contact-leg to rotate the frame in one direction about said pin and slot connection and also to press said contact-leg against said stationary contact member, and inter-engaging abutment-means carried by said frame and support to limit the rotary movement of said frame in one direction.

2. In a vertical break electric switch, the combination of a stationary arcing contact member having a horizontal flat bottom face, a vertically movable switch member having a co-operating arcing contact member having a flat upper face cooperating with said stationary contact member and terminated in a rounded tip, a vertical supporting frame for said second contact member having at its

lower end and at one side of its vertical axis a pin and slot connection with said movable switch member, the slot being vertically elongated and means yieldingly holding said supporting frame and contact member in a position wherein the flat face of said contact member is angularly disposed with respect to the horizontal bottom face of said stationary contact member, said contact members and supporting frame characterized by providing initial contact between the tip of said movable contact member and the face of said stationary contact member and a combined rocking and sliding engagement of said movable contact member on said stationary contact member commencing at the tip of said movable contact member and continuing progressively until final engagement between the flat faces of both members.

3. In an electric switch, a vertically movable supporting frame having a pair of spaced side plates, a contact member having a vertical shank disposed between said plates and a contact face laterally extended at the top of said vertical shank, and a pivot pin disposed at and connected with the bottom of said shank and extended loosely through aligned vertical slots of said slide plates, by which said contact member is supported on said frame for combined rocking and vertical linear movement.

4. In an electric switch, a vertically movable supporting frame having a pair of spaced side plates, a contact member having a vertical shank disposed between said plates and a contact face laterally extended at the top of said vertical shank, and a pivot pin disposed at and connected with the bottom of said shank and extended loosely through aligned vertical slots of said slide plates by which said contact member is supported on said frame for combined rocking and linear movement, and spring means parallel to said vertical shank bearing against said contact member under said laterally-extended contact face.

5. In an electric switch, a vertically movable supporting frame having a pair of spaced side plates, a contact member having a vertical shank disposed between said plates and having a contact face laterally extended at the top of said vertical shank, and a pivot pin disposed at and connected with the bottom of said shank and extended loosely through aligned vertical slots of said side plates by which said contact member is supported on said frame for combined rocking and linear movement, and spring means bearing against said contact member, said shank having a downwardly extended ear engaging one of side plates to limit the movement of said contact member in one direction.

6. In an electric switch, a vertically movable switch member having a supporting frame comprising a pair of spaced side plates,

a channel-shaped contact-supporting frame disposed between and extended vertically above said side plates and having a pivot pin connected therewith extended loosely through aligned vertical slots in said side plates, a contact member secured in the channel of said contact-supporting frame and having a horizontal contact section which overlies and extends laterally beyond the top of said channel frame and a spring urging said contact-supporting frame for movement in one direction.

7. In an electric switch a vertically movable supporting frame comprising a pair of spaced side plates, a vertical channel-shaped contact-supporting frame disposed between said side plates and having a pivot pin connected therewith extended loosely through aligned vertical slots in said plates and having a channel extended vertically above said pivot pin, a contact member secured in said vertical channel of said contact-supporting frame, a spring disposed beneath said contact-supporting frame and having a bearing thereon and on said main frame, and means including a horizontally-extended hook of said contact supporting frame limiting the pivotal movement of said contact-supporting frame in one direction.

8. In an electric switch, a vertically movable main supporting frame having a pair of spaced side plates, a vertical channel-shaped contact-supporting frame disposed between said side plates and having outstanding spaced arms, a pivot pin carried by said arms and extended loosely in aligned vertical slots in said side plates, at least one of said arms having an extension engageable with said main frame to limit the pivotal movement of said contact-supporting frame in one direction, a shelf carried by and extended between said side plates at one side of said contact-supporting frame, and a compression spring bearing upon said shelf and having a connection with said contact-supporting channel frame.

9. In an electric switch, a horizontal main supporting frame comprising a pair of spaced side walls having a supporting shelf carried by and disposed between them, a generally vertical contact-supporting frame disposed above said shelf and between and having a pivotal connection with said side walls, a compression spring having a bearing on said shelf and extended thereabove alongside said contact-supporting frame, and the upper end of said contact-supporting frame having integral therewith a reflexed depending projection bearing against the upper end of and disposed within said spring.

10. In an electric switch, a movable switch member including a main supporting frame comprising a pair of spaced side walls having a supporting shelf carried by and disposed between them, a generally vertical con-

tact-supporting frame disposed above said shelf and between and having a pivotal connection with said side walls, said shelf having an aperture therein, a cup received in said aperture and seated on said shelf, and a compression spring having its lower end disposed in and having a bearing on the bottom of said cup and extended upwardly thereabove alongside and having a bearing at its upper end against said contact-supporting frame.

11. In an electric switch, a channel-shaped contact-supporting frame having a bottom wall and upstanding side walls, said bottom wall having a struck-out portion which is disposed below the general face of said bottom wall, a flat conductor received in said struck-out portion, a contact member having a shank received on said bottom wall and overlying said conductor, and means securing said contact member against said bottom wall also constituting means securing said conductor in said struck-out portion.

12. In an electric switch, a channel-shaped contact-supporting frame having a bottom wall and upstanding side walls, said bottom wall having a struck-out portion which is disposed below the general face of said bottom wall, a flat conductor received in said struck-out portion, a contact member having a shank received on said bottom wall and overlying said conductor, and an attaching screw passed through said struck-out portion, said conductor, and the shank of said contact member.

13. A supporting frame for the conducting components of a movable switch member comprising a pair of integral side plates having a bridging-member supporting-shelf integral with said plates and extended therebetween at the bottom and midway between the ends thereof, said side plates having integral opposed upstanding arms disposed above said shelf, and a switch rod connected with said arms.

14. A supporting frame for the contact structure of a movable switch member including a pair of spaced upstanding arms having opposed instruck bosses formed with opposed flat faces, and a switch rod disposed between said arms and the flat faces of said bosses and having a connection with said arms.

15. A supporting frame for the contact structure of a movable switch member including a pair of upstanding spaced arms having instruck bosses provided with opposed flat faces, a switch rod disposed between said arms and the flat faces of said bosses, and a pivot pin extended through said bosses and said switch rod, said arms having integral ears at the upper ends thereof above said pin, which ears extend inwardly toward each other and lie on opposite sides of said switch rod and provide stops to limit the pivotal

movement of said frame on said switch rod.

16. A supporting frame for the contact structure of a movable switch member comprising opposed side plates having a bridging-member supporting-shelf integral with said side plates adjacent the bottom thereof and integral connecting members at the ends of said side plates, said frame being open at the bottom thereof between said end-connecting members and said shelf.

17. A supporting frame for the contact structure of a movable switch member comprising opposed side plates having a bridging-member supporting-shelf integral with said side plates adjacent the bottom thereof and integral connecting means at the ends of said side plates, said frame being open at the bottom thereof between said end connecting members and said shelf, said side plates having integral extensions depending below said end connecting members and shelf.

18. A stamped supporting frame for the contact structure of a movable switch member comprising a pair of spaced integral vertical side plates having integral therewith horizontal shelves which are disposed between said side plates near the bottom thereof at the ends and also at the middle thereof, said shelves being approximately in a common plane and the spaces between the shelves being open.

19. In an electric switch, a vertically extended and vertically movable supporting frame, a contact member having a vertical shank secured to the frame and a contact face laterally outstanding from the frame at the upper end of said shank, and a pin and slot connection between said frame and the lower end of said shank, the slot being vertically-elongated, said connection constituting means by which said contact member is both pivotally connected with and vertically movable in said frame.

20. In a movable switch member, a contact support, a brush member having upstanding ends carried thereby, and an auxiliary contact structure including a vertical frame located adjacent an upturned end of said brush member having a pivotally and vertically-movable pin and slot connection at its bottom with said support, an auxiliary contact member having a vertical shank secured to said frame and a horizontal contact-section which extends over the top of said frame away from said brush member, a spring for urging said frame upwardly and also for rotating it in one direction, and abutment-members carried by said frame and support for limiting pivotal movement of said frame in one direction.

21. The combination of a support having spaced side walls formed with aligned and vertically-elongated slots therein, a pivot pin received loosely in said slots, a contact-supporting frame received between said side

walls having a generally vertical channel-section through the lower end of the side walls of which said pivot pin is passed, said side walls at the bottom of the channel having extensions which project in the same direction beyond said pivot pin, an abutment carried by said support engageable with at least one of said extensions, whereby to limit pivotal movement of said frame in one direction, a contact member having a vertical shank secured in said channel section and having a contact leg which extends horizontally over the top of said section in the opposite direction to the walls of said section, and a spring carried by said support bearing upon said frame under said horizontal leg to hold said frame yieldingly in engagement with said abutment, and said pivot pin in the upper end of said slots.

In testimony whereof I have signed my name to this specification.

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