May 28, 1929. E. M. SORENG 1,715,014

SWITCH STRUCTURE

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Fig. 1.

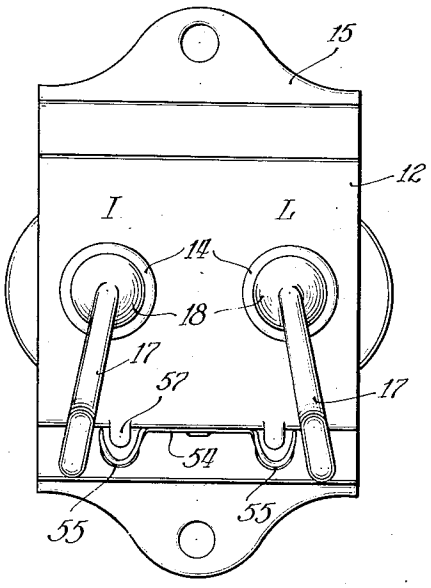


Fig. 2.

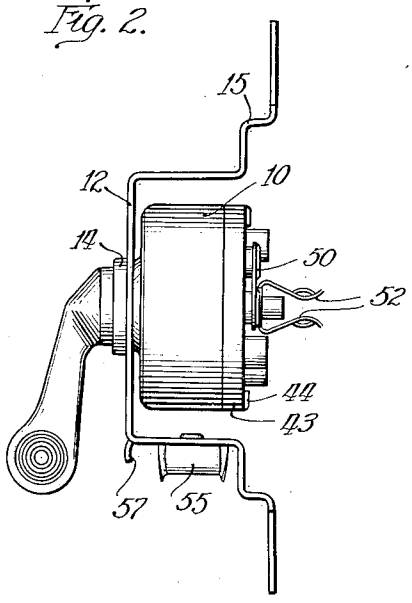
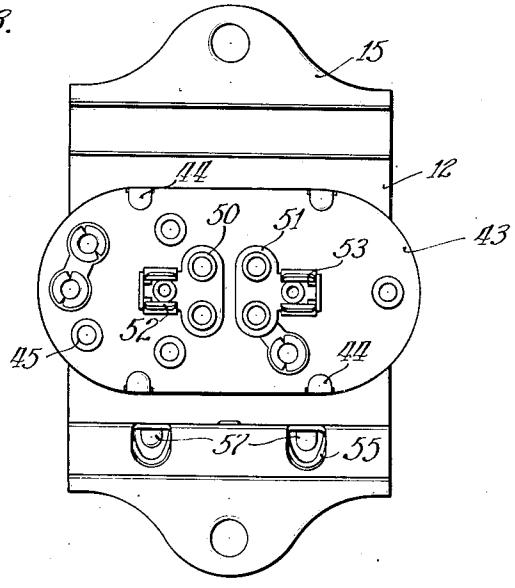


Fig. 3.



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Fig. 4.

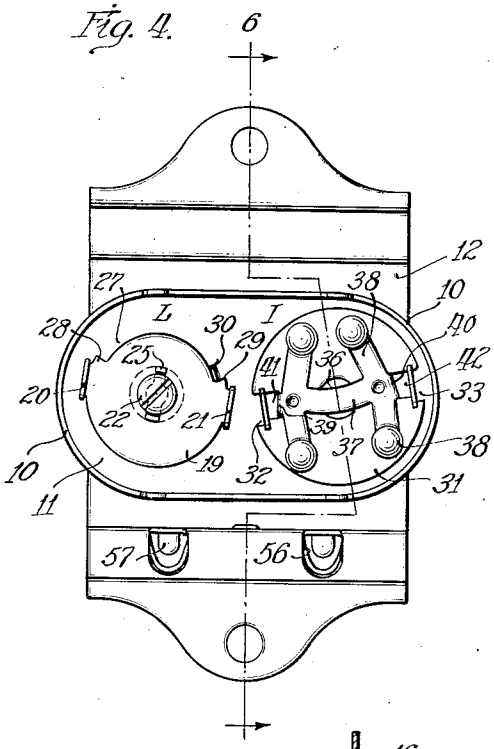


Fig. 5.

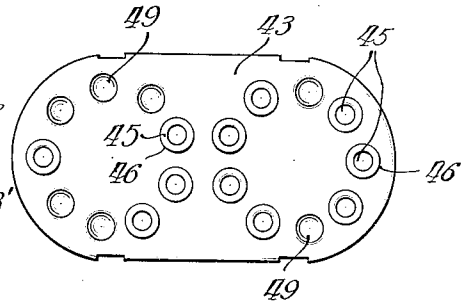


Fig. 6.

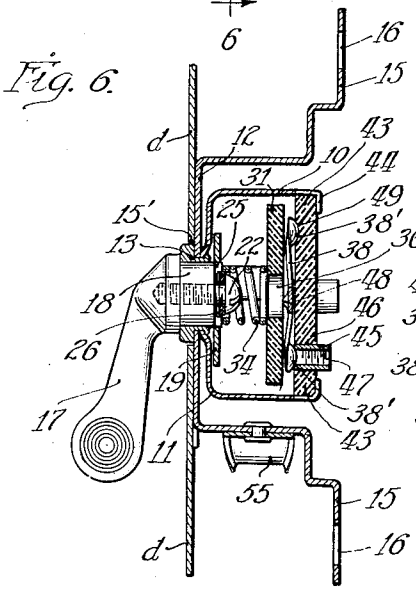
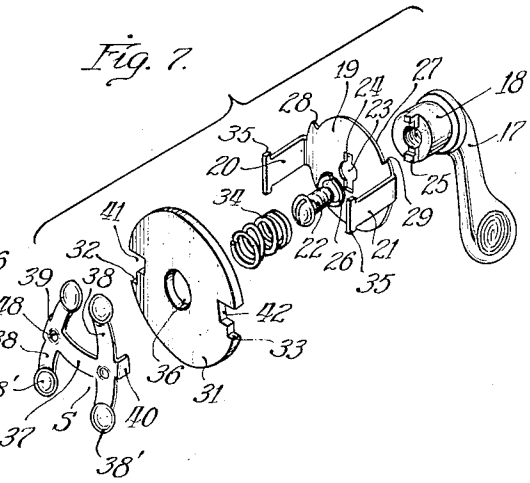


Fig. 7.



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UNITED STATES PATENT OFFICE.

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SWITCH STRUCTURE.

Application filed June 20, 1927. Serial No. 199,959.

My invention relates to switch structures and covers a compact structure to be mounted on the dashboard of automotive vehicles and operable to control the ignition and lighting circuits. The invention relates particularly to a switch structure in which a switch blade frame is interposed between an actuating and pressure member and a terminal member, so that when the actuating member is turned the switch blade structure will be shifted into different circuit controlling positions in connection with circuit terminals on said terminal member. The main object of the invention is to provide more flexible and more efficient switch blade structure, and improved construction and arrangement which will reduce the number of necessary parts to a minimum and which will simplify and reduce the cost of manufacture and assembly.

Referring to the drawings—

Fig. 1 is a front elevational view of the switch structure;

Fig. 2 is a side elevational view;

Fig. 3 is a rear elevational view;

Fig. 4 is a rear elevational view with some of the members removed;

Fig. 5 is a front view of the terminal block;

Fig. 6 is a sectional view on the plane 6—6 of Fig. 4; and

Fig. 7 is a perspective, dissembled view of the blade frame and its operating members.

An oblong sheet metal housing 10 is provided for containing the various switch operating parts. I have shown two sets of such parts designated as a whole I and L, the former for controlling the ignition circuits and the latter for controlling the lighting circuits, the sets being substantially identical in structure and arrangement and the same reference characters being therefore applied thereto.

The housing 10 is secured with its front wall 11 against the yoke wall of a U-shape sheet metal supporting frame 12 by means of rivet bushings 13. The heads 14 of these bushings serve also to position the switch structure relative to a support such as the sheet metal dashboard *d* of an automotive vehicle, and the supporting frame for the switch mechanism housing 10 has the brackets 15 extending from the ends of its limbs, which brackets have bolt holes 16, and by means of which the supporting frame may be further secured in a desired manner relative to the dashboard.

Each switch train (Fig. 7) comprises an actuating member, shown in this case as a lever 17, from which lever extends a hub or shaft 18 which has journaling fit in the respective bushing 13. The lever hub extends through the bushing into the housing 10, and, at its inner end, carries a supporting frame comprising the sheet metal disc 19 from diametrically opposite sides of which extend the guide arms 20 and 21. The hub 18 has a threaded bore into which engages a screw 22 which extends through the central hole 23 in the respective disc 19, and to further secure the disc against rotation relative to the hub, it has the diametral slot 24 for receiving the diametral tongue 25 extending from the hub, and a lock spring washer 26 is also preferably inserted under the screw head. The circular supporting frame or disc 19 of each switch train has a peripheral notch 27 which provides abutment shoulders 28 and 29 for cooperating with an abutment post 30 which may be formed by deflecting rearwardly a section of the front wall 11 of the housing 10. The engagement of the shoulders with the abutment post will limit the rotational movement of the respective frame 19 by its actuating lever 17.

Each supporting frame 19 supports and guides a pressure plate or disc 31 of suitable insulating material. The disc shown is circular and has the diametrally opposite outer slots 32 and 33 for receiving the guide arms 20 and 21 on the supporting frame 19. Between each supporting frame 19 and the supported disc is interposed a helical compression spring 34 which is concentric with the axis of the frame 19 and associated disc, the spring tending to force the disc away from the frame. The movement of the disc by the frame is guided by the arms 20 and 21 which engage in the notches 32 and 33, and to limit the movement of the disc the ends of the arms may have the lateral stop projections 35 for receiving the disc and stopping its further movement. The screw 22 which secures the frame 19 to the respective actuating lever structure serves also to receive the end of the spring and to hold it in proper position concentric with the frame action so that the pressure of the spring is always applied at the central part of the disc

31. The disc may have a central hole 36 of less diameter than that of the helical spring, but large enough to permit the insertion of a screw driver point for securing or removing the screw 22 during assembly or separation of the switch parts.

Each pressure member or disc 31 supports a switch blade frame designated as a whole S, such frame being of resilient sheet metal of good electrical conductivity. The frame shown is of H-shape and comprises the bar 37 from whose ends extend the sides forming a number of arms 38, each of which is deflected at its end to form a contact bead or button 39. Projecting rearwardly from the ends of the bar 37 of each blade frame are the tongues 39 and 40 which extend into the inner notches 41 and 42 in the disc 31. These notches 41 and 42 may extend from the bottom of the notches 32 and 33 and the distance between the inner walls of the notches is substantially equal to the distance between the tongues 39 and 40 and the width of the notches is equal to the width of the tongues, so that when the tongues engage the notches the blade frame will be held against rotational movement relative to the supporting disc and, in the arrangement shown, the blade frame will also be held to retain all its contact points or beads 38′ in a circular row concentric with the supporting disc. In other words, in the arrangement shown, the contact ends 38′ are all the same radial distance from the disc axis, although it is evident that the radial distances could be different, it depending all upon the arrangement and location of the circuit terminals with which the contact ends engage, as will now be described.

The various circuit terminals of both switch sets are supported by a block 43 of suitable insulating material, this block fitting into the primarily open rear end of the housing 10 and forming a closure for the housing, the block being detachably held in place by tongues 44 which extend from the rear edge of the housing and are bent over against the back of the block, as clearly indicated in Figs. 3 and 6. The circuit terminals 45 are shown in the form of metal bushings secured in the holes 46 in the terminal blocks. I have shown two sets of terminals, one set for the ignition controlling switch mechanism I and the other for the lighting circuit controlling mechanism L. The terminals of each set are arranged in a circular row which will be concentric with the axis of the respective switch mechanism when the terminal block is in position within the housing 10 and the terminals will then be in the path of the contact ends 38′ of the respective blade frame. When the terminal block is secured in the housing, it will force the blade frames and their supporting discs a distance forwardly to compress the springs 34 so that the pressure of the springs will thereafter tend to keep the blade frames in intimate engagement at their contact ends with the terminals.

The terminals are bored as indicated at 47, and are preferably countersunk a distance at their inner ends to form concave seats of ample engaging surface for the substantially semi-spherical contact ends 38′ of the blade frames, as clearly shown in Fig. 6. The terminal bores may also be threaded so that terminal screws may be secured therein to accurately connect conductors with the terminals.

To insure accurate and good contact at all times between the blade frames and the terminals, and to compensate for wear of the members, the blade frames are made resilient as before explained and are mounted so that they can readily rock and flex to the necessary degree to maintain good contact. The blade frames are therefore fulcrumed on their supporting discs and, as shown, fulcrum points or beads 48 are formed by deflecting the metal at the ends of the bar 37. These fulcrum points engage against the respective supporting disc and permit rocking and flexure of the frame and its arms so that the pressure of the spring 34 will be communicated to the supporting disc through the fulcrumed points and the blade frames and through the frame arms to the contact ends 38′, which ends will then be yieldingly held against the terminals to establish and maintain the proper electrical connection. The circuit terminals engaged by the contact ends 38′ of a blade frame will be electrically connected together through the frame. At points in the circular terminal rows at which there are no contact terminals, depressions 49 may be formed in the terminal block to receive the contact ends 38′ and assist the terminals in holding the switch blade frame in any set position for any desired circuit control. Turning of a switch blade by means of this lever 17 will, under slight pressure, release the corresponding blade frame from one setting and transfer it to another and the switch parts will then be again locked in set position.

On the back of the terminal block 43 I have shown brackets 50 and 51 for supporting the spring clips 52 and 53 in which a circuit fuse (not shown) may be inserted in the well known manner. I have also shown a frame 54 secured to the bracket 12 and deflected at its ends to form troughs 55 registering with holes 56 in the brackets 12 to receive spare fuses (not shown). Stop tongues 57 may be deflected from the brackets 12 in alignment with the spare fuse supports to properly position the fuses in the supports when they are inserted.

To facilitate accurate assembly or replacement, so as to insure proper circuit control, I make it possible to apply the blade frames

to their respective supporting discs in only one position. To accomplish this, the coupling tongues 39 and 40 on each frame and the corresponding inner sides of the notches 40 and 41 are deflected or slanted so as not to be parallel. Such arrangement will always insure proper locationing of the blade frame on its supporting disc with the contact ends 38′ at the proper radial distances from the disc axis.

The switch structure which I have described is a very simple, yet highly efficient structure. The number of parts has been reduced to a minimum and each part can be readily and inexpensively formed by ordinary dies. The assembly or separation of parts can be readily and quickly and accurately accomplished and the assembled structure can be readily applied to a supporting wall, such as the dashboard *d*, by projecting the levers 17 through the holes 15′ in the dashboard and then drawing the heads of the bushings 13 into the holes, whereafter the supporting bracket 12 may be firmly secured to the dashboard.

I claim as follows:—

1. In a switch structure of the class described, the combination of a housing, a shaft journaled in the rear wall of said housing, an operating member on the outer end of said shaft, a supporting frame detachably secured to the inner end of said shaft, a pressure plate registering with said supporting frame, said plate being of insulating material, a switch blade frame, said blade frame being of resilient metal, means holding said blade frame against the rear face of said pressure plate but permitting bodily rocking movement thereof, contact projections on said blade frame arranged in a circular row concentric with the axis of rotation of said pressure plate and supporting frame, a terminal block disposed in the mouth of said housing and forming a closure therefor, circuit terminals on said block in the path of the contact projections on said blade frame, and a spring interposed between said supporting frame and pressure plate to yieldingly force said plate on said terminal block to thereby yieldingly press said blade frame against said terminal block.

2. In electrical switch mechanism of the class described, the combination of a housing, a supporting frame rotatable within said housing, an actuating member at the exterior of said housing for turning said supporting frame, a pressure plate in axial alignment with said supporting frame, guide means locking said plate against rotational movement on said frame but permitting axial movement relative thereto, an integral elastic sheet metal switch blade structure against the front face of said pressure plate, means locking said blade structure against rotational movement on said pressure plate, fulcrum points on said blade structure engaging said pressure plate to permit limited bodily rocking movement of said structure and flexure under pressure, contact projections on said blade structure arranged in a circular row concentric with said pressure plate, a terminal block seated in said housing in front of said pressure plate and having circuit terminals thereon in the path of said blade structure contact projections, and a spring located in axial alignment between said supporting frame and pressure plate for forcing said pressure plate outwardly to yieldingly press said blade structure contact points against said terminal block and the terminal thereon during rotation of said supporting frame by said actuating member.

3. In electrical switch structure of the class described, the combination of a housing, a circular plate rotatable within said housing, means operable from the exterior of said housing for rotating said plate, a contact frame of resilient sheet metal having contact ends, a connection causing said contact frame to rotate with said plate, said frame having fulcrum engagement on said plate for permitting independent yielding movement of said contact ends when said frame is subjected to pressure, a terminal block secured to said housing and having circuit terminals arranged in the path of said contact ends, and a single spring engaging at the center of said plate for forcing said plate towards said terminal block to thereby press said contact frame yieldingly against said block.

4. In electrical switch structure of the class described, the combination of a supporting disc, means for rotating said disc, a blade frame of flexible sheet metal connected with said disc to rotate therewith, said frame having contact points and having fulcrum engagement with said disc between said points, a terminal block having terminal contact thereon in the path of said contact points, and means yieldingly pressing said disc to hold said blade contact points in electrical engagement with said terminals during rotation of said disc.

5. In electrical switch structure of the class described, the combination of a supporting disc, means for rotating said disc, an H-shaped switch blade of resilient sheet metal having coupling connections with said disc to be rotated thereby, contact points at the ends of said frame, said frame being fulcrumed on said disc between said points permitting limited rocking movement of said frame, a terminal block having circuit terminals arranged in the path of said blade frame points, and means exerting yieldable pressure against said disc for yieldably holding said blade frame against said circuit terminals during rotation of the disc.

6. In electrical switch structure of the class described, the combination of a supporting

member, means for rotating said member, a sheet metal switch blade having extensions, said supporting member having openings for receiving said extensions to thereby connect said blade frame for rotation with said supporting member, contact arms on said frame terminating in contact points, said frame having fulcrum engagement with said supporting member for limited rocking movement, circuit terminals arranged in the path of said contact points, and means yieldably pressing said supporting member to yieldably hold said blade frame in electrical engagement with said terminals during rotation of said supporting member.

7. In electrical switch structure, the combination of a supporting disc, a switch blade structure comprising a body part and arms extending therefrom and terminating in contact points, fulcrum points between said body part and said disc permitting rocking of said frame, means for rotating said disc, tongues on said blade frame engaging in notches in said disc for causing said frame to rotate with said disc, a terminal block having circuit terminals arranged in the paths of said contact points, and means pressing against said disc for causing said blade frame to be held against said terminal block.

In witness whereof, I hereunto subscribe my name this 17th day of June, 1927.

EDGAR M. SORENG.