March 5, 1957 G. J. MUCHER 2,784,283

SWITCH-CONTROL ASSEMBLY

Filed June 7, 1952

Fig. 1

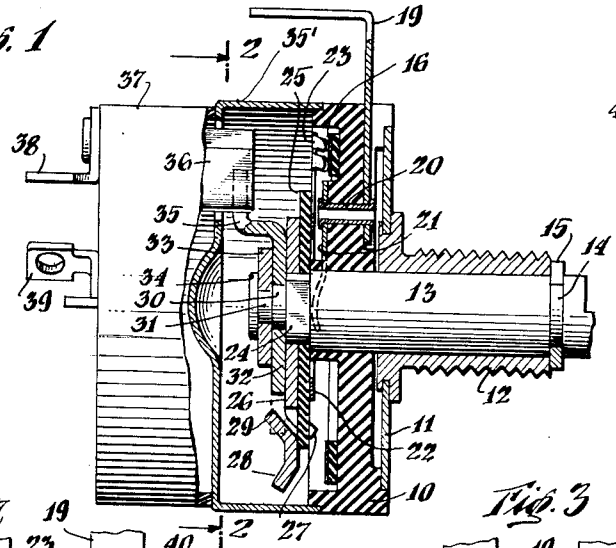


Fig. 6

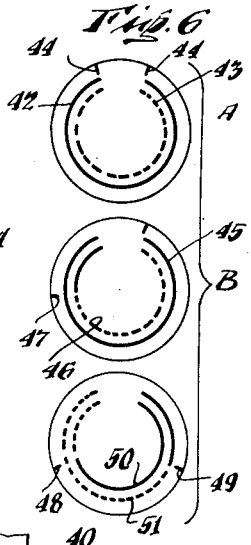


Fig. 2

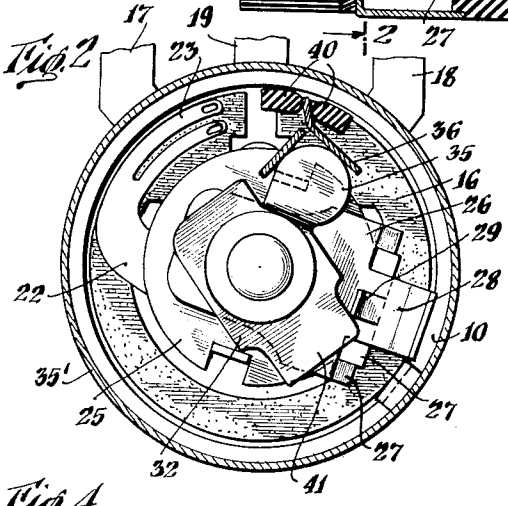


Fig. 3

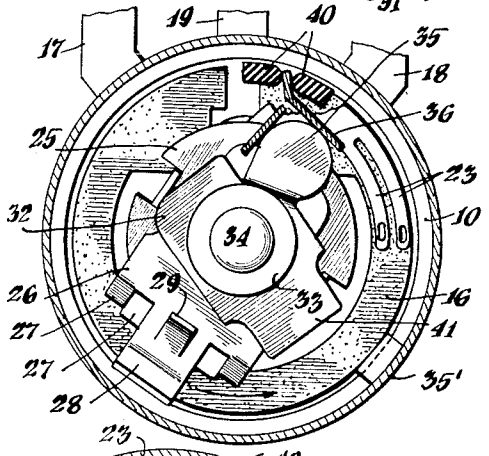


Fig. 4

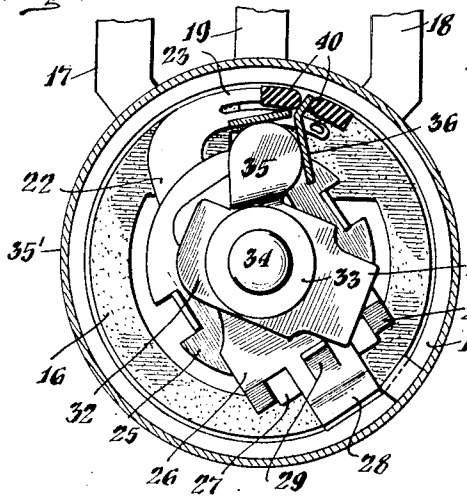
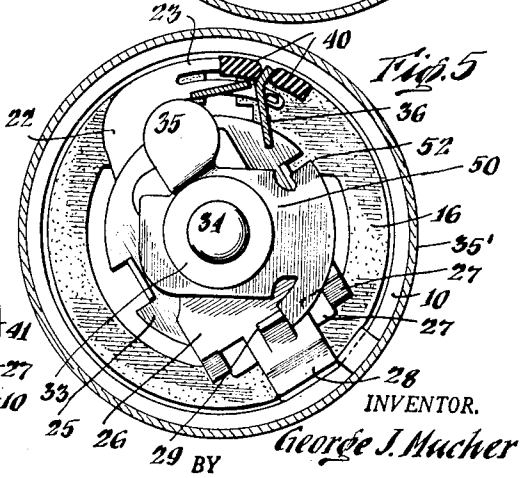


Fig. 5



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SWITCH-CONTROL ASSEMBLY

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2 Claims. (Cl. 201—55)

This invention relates to a structurally and functionally improved switch-control assembly for use in electrical circuits embraced in numerous different forms of apparatus.

It is an object of the invention to provide a unit of this type in which a control and snap-action switch will be combined in a structure such that the switch may be operated in different sectors of the operational arc of the shaft associated with the control.

Thus, the difficulties heretofore arising in a mechanism of this type are overcome and in which earlier mechanisms the switch would operate only at one predetermined point in the operational arc of the control shaft; that point defining the zone in which the parts of the switch would be moved to both circuit-closing, as well as circuit-opening positions.

A further object is that of furnishing a control-switch mechanism in which, for example, the switch may be alternately actuated at two different sectors of the operational arc of shaft rotation. Therefore, that shaft may be oscillated either through clockwise or counterclockwise paths within any degree of its arc of movement without altering the movement of the switch contact.

Still another object is that of furnishing a unit of this type which will include relatively few parts, each individually simple and rugged in construction; such parts being capable of ready manufacture by quantity production methods and being also capable of ready assembly to furnish a unitary and economical mechanism operating over long periods of time with freedom from all difficulties.

With these and other objects in mind, reference is had to the attached sheet of drawings illustrating practical embodiments of the invention and in which:

Fig. 1 is a partly sectional side view of an assembly with certain of the casing portions removed to show underlying constructions;

Fig. 2 is a transverse sectional view taken along the line 2—2 in the direction of the arrows as indicated in Fig. 1;

Figs. 3 and 4 are views similar to Fig. 2 but showing the elements of the mechanism in positions different from that shown in Fig. 2;

Fig. 5 is a still further view similar to Figs. 2, 3 and 4 illustrating an alternative form of structure; and

Fig. 6 is a diagrammatic representation of the operational characteristics which may result from mechanisms of the type shown.

In these views the numeral 10 indicates a base formed preferably of dielectric material and against one face of which a plate 11, conveniently of metal, may seat. This plate has secured to it a bushing 12 which rotatably supports a shaft 13 extending through an opening centrally of base 10 as well as the plate 11. To prevent axial displacement of the shaft in an inward direction, the latter is conveniently formed with an annular groove 14 receiving a retaining ring 15. This bears against the outer edge of bushing 12 thus providing an effective stop.

Mounted upon the inner face of base 10 is an arcuate resistance element 16. This may be of any proper type. Terminals 17 and 18 are conveniently attached to opposite ends or other portions of the resistance 16. That attachment may be effected in any desired manner. Similarly a terminal 19 may be secured to the base 10. As shown, such securing is achieved by, for example, a rivet 20 extending through to the inner face of that base and in electrical engagement with the end of the contact member 21 which wipes against the face of a ring 22. The latter carries a contact 23 which as shown may include a pair of fingers resiliently bearing against the face of resistance 16.

The end of shaft 13 is reduced as at 24 and of non-circular configuration. It supports a shield or plate 25 of non-conductive material and a stop plate 26 which has inwardly extending portions lying to each side of a projecting part 27 of shield 25 to thus further secure these parts. The stop plate is also provided with an outwardly extending portion 28 within which a projection 29 is defined.

At points beyond the flattened end portion 24 of shaft 13 that shaft may terminate in a circular portion 30, the extreme end of which is reduced as at 31; such reduced part being either circular or otherwise as desired. Mounted for rotation upon the circular portion 30 of the shaft is an actuator 32. A spacer 33 is mounted upon portion 31 and serves to supportingly bear against the actuator. Beyond the spacer the shaft is headed as at 34.

The actuator 32 is provided with an operating extension 35 projecting beyond the plane of the assembly. It moves in a path which is obstructed by a switch operating element 36. A casing 35′ extends from base 10 and is provided with an opening through which element 36 extends. The latter connects with a switch mechanism (not shown) within casing portion 37. That portion is attached in any desirable manner to casing 35′. Conveniently extending from the rear face of casing 37 are terminals 38 and 39. These connect with the parts of the switch so that current flow through them may be permitted or interrupted. With a view to simplifying the illustration, only a single pole switch has been shown. It will be understood, however, that a switch involving any desirable number of poles and contacts might be embraced within casing 37.

Attention being invited to Figs. 2, 3 and 4, it will be observed that the actuator 32 is provided with a further extension 41. This extension lies within the path of movement of the projecting portion 29. The actuator may of course turn with respect to plate 26 which is secured against movement with respect to shaft 13. The switch operating unit or element conveniently includes a pair of portions as indicated at 36 which extend in the form of a V. Therefore, the head of the actuator may ride into the crotch of the operating portion 36 and rock the latter to the right or left with respect to the pivot portions 40 and according to the manner in which the parts are disposed.

Thus, as in Fig. 2, it may be assumed that the switch operating element 36 is in a position at which the parts of the switch are closed so that the circuit from terminal 38 to 39 is closed. With that circuit completed, it is feasible to traverse the resistance 16 by the brush or contact 23 throughout the entire arc of rotation of shaft 13. This will be evident by a comparison of Fig. 2 with Fig. 3. During such traversal, the switch will have remained in closed position. If shaft 13 is rotated in a counterclockwise direction beyond the position shown in Fig. 3, then the projecting portion 29 will bear against the extension 41. Under these circumstances, the lost-motion effect which has heretofore

prevailed will cease and actuator plate 32 will move as a unit with the rotatable parts of the assembly. Accordingly, the head portion or extension 35 will enter the space defined by the operating element 36 and rock the latter from the position shown in Fig. 3 to that shown in Fig. 4.

It will be assumed in the latter figure that the parts of the switch have been shifted to open position. Under these circumstances, the brush 23 may again be caused to traverse the entire face of the resistance 16 without again causing an operation of the switch. A closing of the parts of the latter will occur only as shaft 13 is moved in a counterclockwise direction to a point at which projecting portion 29 again engages the extension 41 and moves the actuator as a unit with the shaft. As is obvious under these circumstances, the head 35 will operatively engage within the legs of the element 36 to shift the latter to the position shown in Figs. 2 and 3.

In Fig. 5 a structure has been shown which is in its major aspects identical to that shown in the earlier figures. However, the actuator 50 corresponding to actuator 32 is provided with extensions 52. These project into the path of travel of projection 29 forming a part of plate 26. By varying the length of these extensions, it is feasible to operate the switch controlling element 36 at different points in the arc of rotation in shaft 13. In this connection, it will be apparent that according to the length of these extensions, projection 29 will engage with them at an earlier or later moment during the rotation of the parts. Otherwise, however, the same lost-motion feature will occur which does not make it necessary that the switch be turned to on and off positions merely at one extreme of movement.

Thus, as in Fig. 6, there has been indicated at A a diagrammatic representation of the operation of the mechanism as occurring in Figs. 1 to 4 inclusive. A pair of energized circuits have been identified at 42 and 43 respectively. In this view, the stop structures functioning to operate the switch have been both indicated as at 44 at the extremes of movements of the parts.

In Fig. 6 at B energization of one lead or assembly has been indicated at 45 and again extending throughout the entire arc of movement of shaft 13. However, by having one of the extensions 41 of sufficient length, energization of the second lead or assembly as indicated at 46 terminates in line with the stop as at 47. Thus, while lost motion of the parts occurs throughout a major portion of the arc of movement, it is feasible to operate the switch structure at a point short of the one extreme of that arc.

Again at C as shown in Fig. 6, by suitably enlarging the extensions 41, stop structures are provided at 48 and 49. Therefore, energized path 56 will extend in

excess of 180° and terminate when the parts reach a position at which stop 48 becomes operative. The energized path or circuit 51 will be interrupted or closed in line with the stop 49.

In all of the several forms described and due to the lost motion between the parts, the operating shaft may be turned to one extreme or predetermined position at which the assembly of the switch is, for example, closed. Now the operating shaft may be turned either throughout its entire operative arc or to a predetermined point in that arc. Only when the stop parts (engagement between the actuator and the projection 29) become operative is the switch shifted to its other position. Therefore, it is feasible to traverse the entire, or part of the resistance path with the switch closed or open.

Thus, among others, the several objects of the invention as specifically aforenoted are achieved. It is apparent that numerous changes in construction and rearrangement of the parts might be resorted to without departing from the spirit of the invention as defined by the claims:

I claim:

1. A control including in combination a mounting, a resistance element supported by said mounting, a shaft rotatable with respect to said mounting, a contact member carried by said shaft and traversing said element, said shaft being rotatable throughout a predetermined arc adjacent the limits of which said member has moved to positions in proximity to the ends of said element, a switch actuator supported by said shaft and rotatable with respect thereto and cooperative means associated with said actuator and shaft and operative to move the two in unison at points intervening said extremes of movement.

2. A control including in combination a mounting, a resistance element supported by said mounting, a shaft rotatable with respect to said mounting, a contact member carried by said shaft and traversing said element, said shaft being rotatable throughout a predetermined arc adjacent the limits of which said member has moved to positions in proximity to the ends of said element, a switch actuator supported by said shaft and rotatable with respect thereto cooperative means associated with said actuator and shaft and operative to move the two in unison at points adjacent said extremes of movement.

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