Dec. 27, 1949 B. F. HERMANN 2,492,286

COMBINATION SWITCH AND RHEOSTAT

Filed Oct. 27, 1947

Fig. 1.

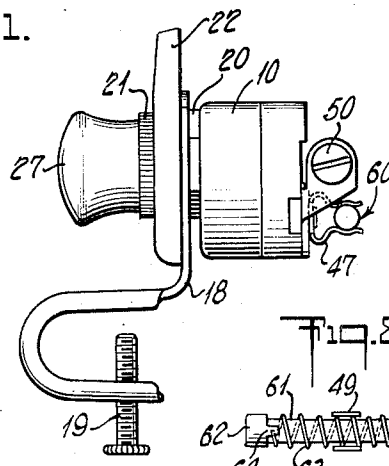


Fig. 2.

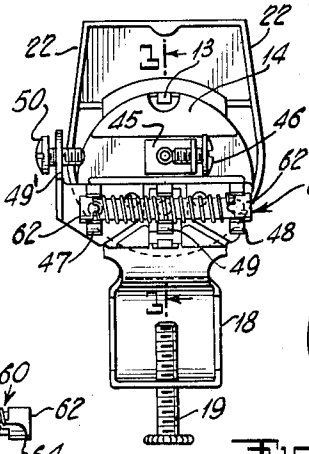


Fig. 8.

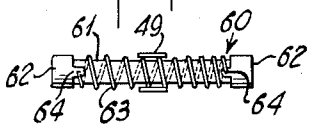


Fig. 9.

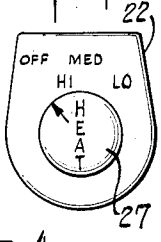


Fig. 3.

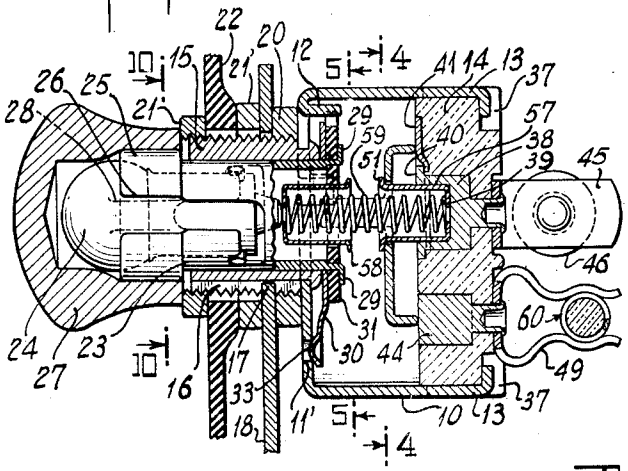


Fig. 4.

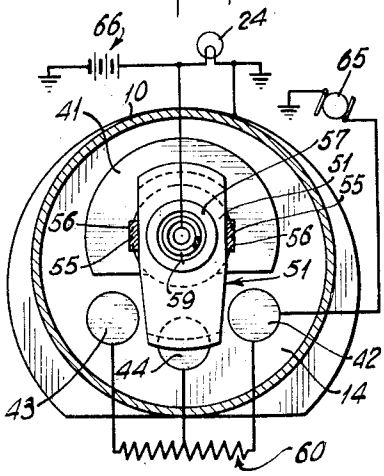


Fig. 10.

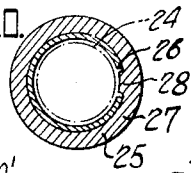
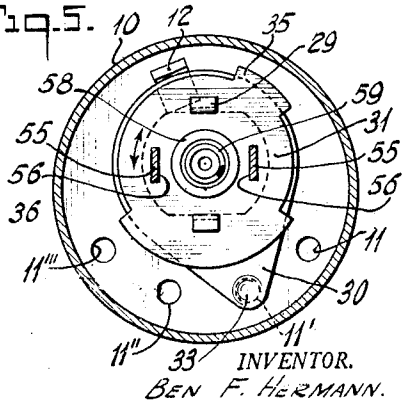


Fig. 5.



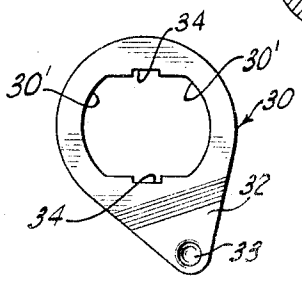


Fig. 6.

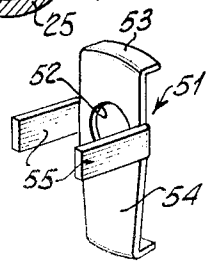


Fig. 7.

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COMBINATION SWITCH AND RHEOSTAT

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3 Claims. (Cl. 201—48)

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This invention relates to a combination electric switch and rheostat device for the control of electric motors intended to be operated at varying speeds.

Devices of the type indicated are widely known in the art, and are usually constructed with permanently attached resistance elements, which, when becoming defective, necessitate either a time-taking, and therefore costly replacement of the elements, or the substitution of an entirely new device, either of which procedures entail the removal of the device and the disconnection and the reattachment of the wiring.

The present invention contemplates a device of the kind indicated, which, aside from its simplicity, involves the employment of an exchangeable resistor cartridge which, when defective, may be readily removed and replaced without the use of a single tool and without disconnecting either the device itself or its wiring.

The prime object of the present invention, therefore, is to provide a combination switch and rheostat device of a relatively simple and inexpensive construction, provided with a readily accessible and instantly exchangeable resistance cartridge mounted at the exterior of the device.

The above object and additional objects and advantages of the present invention will become more fully apparent from the following description in conjunction with the accompanying drawings, presenting one of the many possible embodiments of the present disclosure, and wherein:

Fig. 1 is a side elevation of the finished product in accordance with the present invention;

Fig. 2 is a rear view thereof;

Fig. 3 is a fragmental enlarged section taken on line 3—3 through Fig. 2;

Fig. 4 is a partial fragmental section taken on line 4—4 of Fig. 3, and discloses an electric diagram showing the electric connection of the device with a motor;

Fig. 5 is a similar section taken approximately on line 5—5 of Fig. 3;

Fig. 6 is a plan view of a positioning element for the device;

Fig. 7 is a perspective view of the mobile contact member of the device;

Fig. 8 is a detail view of a resistance cartridge showing the adjustability of the resistance element;

Fig. 9 is a front elevation of the knob and dial of the device; and

Fig. 10 is a section taken on line 10—10 through Fig. 3.

Referring now specifically to the figures, nu-

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meral 10 denotes an electro-conductive casing which is provided with a plurality of positioning apertures 11, 11', 11'' and 11''', as clearly seen in Figs. 3 and 5, a stop abutment 12, shown in Figs. 3 and 5, and attaching prongs 13 for engaging and holding a dielectric body 14, which latter forms a closure for casing 10.

In Fig. 3 will be observed at the left hand solid end of casing 10 a tubular, externally threaded extension 15, provided at the bottom with a guide slot 16, for the reception of a guide tongue 17 extending interiorly from a circular opening provided in a bracket 18, which latter serves for the attachment of the device by means of set screw 19 to the dashboard of a car or the like. Tongue 17 is adapted to keep the device in its correct intended position. The position of bracket 18 in respect to extension 15 may be adjusted by means of nuts 20 and 21 between which is clamped not only bracket 18 but also a dielectric plate 22, shown in Fig. 9, provided with suitable indices, and a spacer 21'.

Rotatably mounted within tubular extension 15 is a one-piece resilient bulb socket 23, equipped with bayonet slots for the reception of electric bulb 24. Socket 23 has an outer resilient, cylindrical end enlargement 25, provided with a spacing slot 26. This end enlargement is adapted to be covered by a hollow knob 27, which has a rib 28 adapted to engage spacing slot 26 and thereby transmit rotary motion to socket 23 when the knob is turned. The interior end of socket 23 terminates in two prongs 29 forming guides for a positioning element 30, shown in detail in Fig. 6, and serving for the attachment of a dielectric rotation-limiting member 31, as clearly seen from Figs. 3 and 5. The ends of the prongs pass through suitable apertures in member 31 and are bent over, thereby holding positioning element 30 and member 31 in place. Element 30 comprises a flat stamping having a rounded portion with a triangular, deflected extension 32 provided with a cup-shaped depression 33, which latter is adapted to engage any one of the positioning apertures 11 to 11''' provided in the casing. The rounded portion of positioning element 30 has an opening 30' for the reception of the interior end of bulb socket 23, said opening being provided with recesses 34 which are adapted to be engaged by prongs 29. Dielectric rotation limiting member 31, shown in Fig. 5, comprises a substantially circular disc, cut out peripherally so as to provide stop extensions 35 and 36 adapted to cooperate with stop abutment 12 knocked out from casing 10.

Dielectric body 14 sits with its inner, recessed face against the cylindrical edge portion of casing 10 and is provided with suitable peripheral recesses 37 for accommodating the bent-over attaching prongs 13 of the casing. Imbedded in dielectric body 14 are several electric contact elements, one being disposed in axial alignment with socket 23 and bulb 24 and being indicated at 38. This element has at its interior end a recess 39 and a flange 40, and surrounding that element and held by flange 40 there is provided a contact plate 41 sitting in a suitable recess made in dielectric body 14.

At equal radial distances from contact element 38 are arranged within body 14 two end contact elements 42 and 43, while between these end contact elements there is disposed an intermediate contact element 44, see Figs. 3 and 4.

At the outer end of contact element 38, which may be considered the central contact element, there is secured a bracket 45 provided with a wire attaching screw 46. The interior faces of contact elements 42, 43 and 44 are smooth and are flush with the interior face of dielectric body 14. To the exterior ends of these contact elements are secured spring clips 47, 48 and 49, and which clips are aligned with one another as clearly seen in Figs. 1, 2 and 3. Clips 47 and 48 may be considered end clips, while clip 49 constitutes a resistance tap clip, as will be presently explained. Electrically connected with end clip 47 is a bracket 49' provided with a wire attaching screw 50.

Referring now to Figs. 3, 4, 5 and 7, there is disclosed a mobile or sliding contact member 51 comprising a longitudinal body provided with a central aperture 52, and having a shorter glide extension 53 adapted for engagement with contact plate 41, and a longer glide extension 54 adapted for engagement with any one of the contacts 42, 43 and 44. From the body of the contact member extend connecting arms 55 registering with and engaging suitable slots 56 provided in dielectric rotation limiting member 31, as clearly seen in Fig. 5. Through central aperture 52 of contact member 51 passes a cup 57 and projects into recess 39 provided in central contact element 38. A similar cup 58 is arranged opposite cup 57 and passes through the central aperture provided in dielectric rotation limiting member 31 and through aperture 33' of positioning element 30. Lodged within the two oppositely mounted cups is an expansion spring 59 adapted to hold both contact member 51 as well as bulb 24 under tension, whereby glide extensions 53 and 54 of contact member 51 are forcibly pressed, respectively, against plate 41 and against the inner surface of dielectric body 14.

Exchangeable resistance cartridge

Clips 47, 48 and 49 extending from the end and intermediate contact elements 42, 43 and 44, respectively, are designed to receive and firmly but detachably hold a resistance cartridge 60, shown in detail in Fig. 8. This cartridge comprises a relatively smooth-bodied dielectric support or body 61, provided with conductive end caps 62. Wound about the outer surface of body 61 is a resistance element 63, the ends of which are firmly engaged by suitable attaching lugs 64 forming parts of end caps 62. The convolutions of the resistance element are so designed as to be movable in respect to body 61 so that the spacing of different sections of the resistance element may be changed, when desired, as indicated in Fig. 8, wherein the convolutions of the right hand portion are spaced at lesser distances than those of the left hand portion. End caps 62 are adapted to be held by end clips 47 and 48, while intermediate clip 49 is adapted to engage the resistance wire between the end caps, as shown in Figs. 2 and 8. Due to the fact that the resistance element 63 is exposed and is movable in respect to insulating body 61, clip 49, serving as a tap for the resistance element, also provides means for holding the adjusted resistance wire in its desired position. Thus the resistance wire shown at the left side in Fig. 8 will provide less resistance than the resistance element portion on the right side.

As already stated, resistance cartridge 60 is intended to be readily removable so that it may be exchanged when becoming defective or when a different resistance value is desired. Such exchange may be made without the use of any tools, without in any other way affecting the device itself, and without the requirement of changing the wiring leading to the device.

Wiring diagram

Referring now to Fig. 4, in this illustration there are diagrammatically indicated the wiring connections as applied to the device. The resistance element is graphically indicated at 60 and is shown connected to end contacts 42 and 43 and to central contact 44, by means of end clips 47 and 48 and intermediate clip 49, respectively, as shown in Fig. 2. A wire, attached to screw 50 of Fig. 2, leads from contact 42 to one terminal of motor 65, whereas the other motor terminal is grounded. Another lead, secured to screw 46 of central contact element 38 of Fig. 3, is shown extending from spring 59 of Fig. 4 to one terminal of an electric source, such as a battery 66, its other terminal being grounded. From the battery lead extends a branch to one end of the light element in bulb 24, while the other end of the light element is connected with casing 10, which latter is again grounded.

Operation

When mobile contact member 51 engages contact element 42, the full current passes from electric source 66 to the motor. When contact member 51 engages contact element 44, a portion of the resistance cartridge is shunted into the motor circuit, while, when contact member 51 engages contact element 43, the current passes through the full resistance wire of the cartridge.

As will be noted from Fig. 5, positioning element 30 is adapted to engage any one of the four positioning apertures 11, 11', 11'' and 11'''. At the position of element 30 shown in that figure, its cup 33 engages aperture 11' and contact member 51 engages intermediate contact 44. When positioning element 30 engages the right hand end aperture 11, contact member 51 is in engagement with end contact element 43. When cup 33 is moved into engagement with aperture 11'', contact member 51 comes to rest against contact element 42. When positioning element 30 is turned so that its cup 33 registers with aperture 11''', contact member 51 slides into contact with the dielectric body 14, whereby current is cut off from motor 65.

Conclusion

In the drawing the device is shown provided with but one intermediate clip 49 for engaging approximately the center of the cartridge resistance.

Consequently only one intermediate contact element 44 is required. It is quite obvious, however, that more than one tap clip and a corresponding number of intermediate contact elements may be arranged to provide additional speed variations for the motor controlled by the device.

It is self-evident that the employment of a replaceable resistance cartridge in combination with a switch and rheostat device offers distinct advantages. Similarly, the provision of resistance taps in the form of clips adds to the usefulness of the device. Moreover, the adjustability of the resistance element for different values between the several clips enhances the applicability of the device for the most varied uses.

Thus, while in the foregoing only one embodiment of the present invention is dealt with, it is quite obvious that changes and improvements may have to be incorporated to render the device suitable for different uses, all without departing from the basic idea of employing a readily exchangeable resistance cartridge removably held externally to the device body by clips or the like, and wherein at least one of the clips constitutes a tap in the resistance element of the cartridge, as clearly set forth in the annexed claims.

I claim:

1. In a combination switch and rheostat structure, a dielectric body, a plurality of spaced contact elements passing through and being held within the body, cartridge holding clips extending from the outer ends of the contact elements and being disposed exteriorly to the body and comprising two end clips and a least one intermediate clip disposed between the end clips, all clips being aligned with each other, and a resistance element cartridge removably held by said clips, said resistance cartridge comprising a substantially smooth-faced dielectric resistance support having conductive end caps adapted to be detachably held in said end clips, a helical resistance element carried by said support and being loosely wound about the latter with the convolutions spaced from each other and shiftable along the support longitudinally thereof and relative to said end caps and to said intermediate clip, said intermediate clip being adapted to conductively engage selected ones of the windings of the resistance element according to the shifted position of the resistance and thereby regulate action of the resistance.

2. In a combination switch and rheostat structure, a conductive casing having a tubular, externally threaded extension, a split, resilient bulb socket rotatable in said extension and having an exterior, resilient end enlargement provided with a recess, a hollow knob removably associated with and tensionally held by said enlargement, an interior rib provided in said knob for engaging said recess for turning the socket by way of said knob, a plurality of positioning apertures and a stop abutment provided in said casing, a positioning element adapted for engagement with said apertures and a dielectric rotation limiting member for cooperation with said stop abutment fixedly attached to the interior end of the socket and being operative within the casing, a dielectric body closing the casing; a plurality of contact elements provided in and extending through said body, one contact element being disposed opposite

said socket, the other contact elements being arranged at equal distances from said one element, a contact plate extending from and surrounding the interior end of said one element, the exterior end of that one element terminating in means for securing a conductor thereto, said other contact elements having smooth interior faces, their outer ends terminating in aligned, spaced resilient clips, there being two end clips and at least one intermediate clip; means for attaching an electric conductor provided with one of the end clips; an electric bulb held in said socket and extending into the knob interior; a contact member fixedly engaging but being detachable from said limiting member and having one contact arm for engaging said contact plate and another arm for engagement with said other contact elements; a spring interposed between said contact member and said bulb, holding both these instrumentalities under tension; and a resistance cartridge removably held by said clips and comprising a dielectric support having conductive end caps, the latter being adapted to be held by the end clips, a resistance element wound about the support, its ends being conductively secured to said end caps, the portion of the resistance element between the end caps being held by a least one intermediate clip, said resistance element being adjustable relative to said support.

3. In a combination switch and rheostat structure, a dielectric body forming a part thereof, a plurality of contact elements mounted through said body with their ends exposed at inner and outer surfaces of the body, a contact member held under tension and being movable to adjusted positions for engagement with the inner end of a selected one of said contact elements, a resilient clip carried by the outer end of each of said contact elements and extending exteriorly to said body and being aligned with one another, and an adjustable resistance element cartridge removably held by said clips, at least one of the clips constituting a tap for the resistance element of the cartridge, said resistance cartridge comprising a dielectric support having conductive end caps, the resistance element of the cartridge being coiled about the support with its convolutions spaced from each other longitudinally of said support, the ends of the element being fixedly connected with said end caps, while the convolutions between the end caps are shiftable longitudinally upon the body into position for engagement of selected ones of its convolutions by the clip constituting the tap.

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