Feb. 24, 1931. R. PUDELKO 1,794,244

MECHANISM FOR CONTROLLING ELECTRIC CIRCUITS

Filed June 11, 1926

Fig. 2

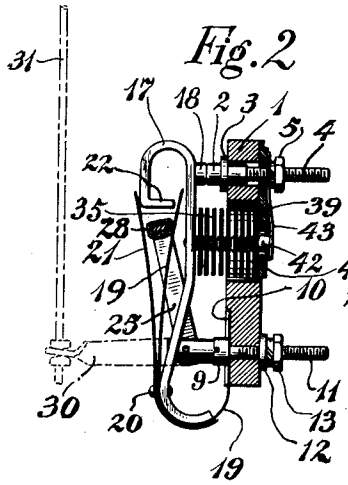
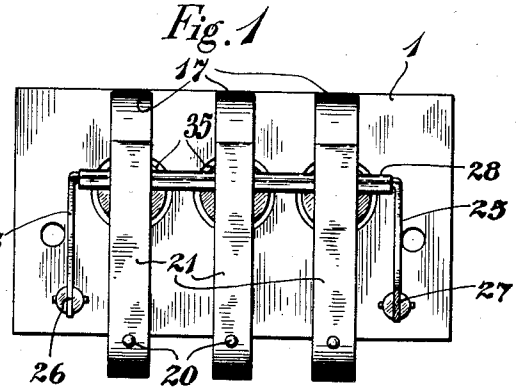


Fig. 1



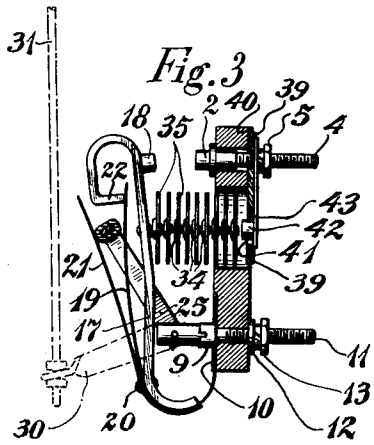


Fig. 4

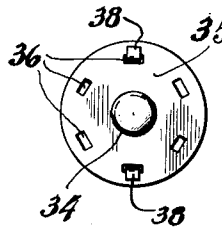


Fig. 5

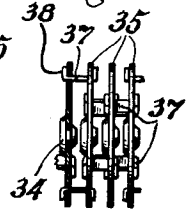


Fig. 6

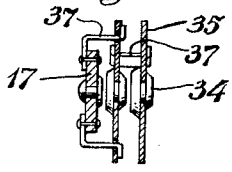
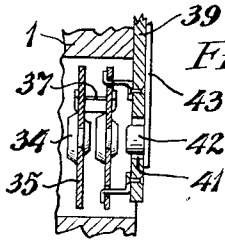


Fig. 7



Inventor:
R. Pudelko
By John D. Morgan
Attorney

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UNITED STATES PATENT OFFICE

RICCARD PUDELKO, OF ZUG, SWITZERLAND

MECHANISM FOR CONTROLLING ELECTRIC CIRCUITS

Application filed June 11, 1926, Serial No. 115,188, and in Switzerland July 1, 1925.

The invention relates to novel and useful improvements in electric switches, and more especially to novel and useful improvements in such switches which are especially designed to prevent arcing.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:—

Fig. 1 is a side elevation of a switch mechanism embodying the invention;

Fig. 2 is a transverse vertical section taken substantially on the line 2—2 of Fig. 1, and showing the switch mechanism in the circuit closing position;

Fig. 3 shows the same mechanism as Fig. 2, but in the open circuit position;

Fig. 4 is a detached detail elevation of one of the series contacts of the auxiliary circuit making and breaking device;

Fig. 5 is a similar Figure, looking at Fig. 4 from the right, but showing the first disc in vertical substantially central section;

Fig. 6 is an enlarged horizontal fragmentary sectional view of the left-hand end of the central part of Fig. 3; and

Fig. 7 is an enlarged, vertical fragmentary sectional view of the right-hand end of the central part of Fig. 3.

Referring now in detail to the embodiment of the invention, illustrated by way of example in the accompanying drawings, the invention is shown applied to a contact switch, although it is applicable to other kinds of switches, and it will be understood that the form of embodiment of the various features of the invention may be widely varied.

A base plate 1 is provided, of insulating material, which serves as a support for the circuit terminals and the cooperating switch mechanism. One of the circuit terminals comprises a main contact 2, supported on the base 1, and constituting the head of a screw-bolt 4, projecting rearwardly through an opening in the base plate. The contact head 2 is provided with a collar 3, which rests against the front face of the base plate, and the screw-threaded rod 4 projects from the opposite face thereof. This screw-threaded rod is provided with a locking nut 5, and the circuit wire may be connected with this terminal in any known or suitable manner. There are other parts cooperating with the foregoing which will be later described.

The other circuit terminal comprises a screw bolt 11, having a head 9 on the front side of the base plate 1. The head of the screw fits into a groove 10, formed in the base plate, and serves to aline the parts and to hold them in position. The screw bolt 11 passes through an aperature in the base plate 1, and projects from the back face thereof, and on the back is provided with a washer 12 and a locking nut 13, which serve as a connection to the other circuit wire.

The various switch units may be mounted singly, or in any number suitable or necessary for the kind of installation, or the other requirements of the plant. As exemplified in the drawings, three switches are mounted together, and may operate as a tripolar unit.

Referring now to the making and breaking means for the main circuit between the terminals 2 and 9, a movable bar or switch member 17 is provided, permanently connected to the terminal 9, and having a contact 18 movable into and out of engagement with the contact 2. In the preferred embodied form, the member 17 is a curved bar of flat metal, the lower part thereof being curved, as shown in Figs 2 and 3, and having electrical connection with, and a spring mounting upon, the circuit terminal 9.

To effect the desired spring action, the lower end of the bar 17 is mounted on a curved flat spring 19, which is apertured at

its free end, and rests in the slot 10, the screw rod 11 passing through the aperture and the head 9 of the screw holding the spring 19 in position. The flat spring 19 is curved, as shown in Figs. 2 and 3, about the lower end of the bar or switch member 17, and is fastened thereto by suitable means, such as one or more rivets 20.

In accordance with one feature of the invention, the spring 19 is utilized to provide spring opening and closing action for the main switch or circuit control. Accordingly, the spring 19 is continued past its point of attachment to the bar or switch member 17, and extends upwardly along the member 17, but spaced away therefrom, so as to have free spring action. A cooperating flat spring member 21 is also provided, to effect the spring action in the reverse movement of the switch, and one end of this spring 21 rests upon the spring 19 and is fastened thereto and to the member 17 by common fastening means 20.

The free ends of the springs 19 and 21 are spaced apart one from the other. To cooperate therewith, the free end of the bar or switch member 17 is curved outwardly and backwardly and is positioned between the free ends of the two springs, and is provided with an angled portion 22, which serves to space the two springs apart, and to participate in the spring-operating switch opening and closing action.

Means are provided for actuating the switch and for maintaining it in open or closed position, said means preferably cooperating directly with the two springs 19 and 21, and as embodied, comprises an angularly shaped bail or actuator 25, pivoted at its ends 26 and 27 in two slotted posts, screw-fastened into the base plate 1. The central reach of this actuating bail or actuator has a cover 28 of insulating material and is located between the springs 19 and 21.

This actuating and positioning means for the bail or switch actuator may be either hand operated or automatically operated, as may be found desirable or convenient. An automatic operating means whereby the bail or member is actuated to open and close and position the circuit are shown in Figs 2 and 3. As shown, said means comprises an arm 30, fixed to one of the arms of the bail, and connected by a rod 31 to a timing mechanism, or any other suitable automatic control.

Means are provided by the invention constituting an auxiliary circuit making and breaking device operated by the same switch and designed to prevent arcing between the main contacts. This device is also, in accordance with one feature of the invention, a delayed action device. In the present instance these features are embodied together.

In the embodied form, a plurality of circuit making and breaking devices, arranged in series, are provided in an auxiliary circuit, and make and break the circuit cooperatively with the main circuit closing and opening means. As embodied, a plurality of conducting bodies 34 are arranged in series, and are simultaneously movable into contact one with another or apart one from another, to make and break the circuit in the manner described.

As embodied, the various contacts 34 are mounted, respectively, in a corresponding series of discs 35, preferably circular, of non-conducting material, and the discs are concatenated or connected together so as to permit the desired movements of the contacts and to preserve them in alinement. In the preferred embodiment of said connecting and alining means, each of the discs 35 is provided with a plurality of pairs of slots 36. The connections between adjoining discs, cooperating with these slots, comprise narrow metal strips 37, passing through alined slots in two adjacent discs. The strips after passing through the slots are bent at right angles, on the opposite sides of the two discs, as shown at 38.

The strips are proportioned to permit the requisite relative movement of the contacts, and preferably also to form a helical series along the line of discs. These parts are omitted from Figs. 2 and 3 for the sake of clearness, but are shown in Figs. 5, 6 and 7. There are preferably two such connections between each pair of adjoining discs and these are preferably diametrally positioned. It will be understood that each of the discs is connected in this manner with the adjoining disc on either side thereof, as appears clearly from Figs. 5 and 6. To support the series of contact discs 34 in position, and to provide them with electrical connections at either end, the left-hand disc of the series, as shown in the drawings is connected to the bar or member 17 in substantially the same manner that the discs are connected to each other.

At the opposite or inner end of the series of contacts, is provided a bar 39 of conducting material, and preferably rigid. This bar 39 is apertured to receive the screw rod 4 of the contact 2, and the bar is set in a groove 40, formed in the back face of the base plate 1, and is thereby held firmly in position by the nut 5. Near the free end thereof the bar 40 is provided with an aperture 41, and through this aperture projects a movable, spring-pressed contact 42. Contact 42 is mounted on a conducting spring member 43, likewise apertured at its other end thereby mounted on the screw rod 4, and held in place by the nut 5. The inner disc 35 is connected to the bar 39 by the strips 37 in the manner already described. Thus the entire series of contacts 34, with their supporting discs, are supported and maintained in alinement, by their connections with plate 39, switch bar 17,

and with each other, and will move into and out of contact with each other during the operation of the switch.

In the operation of the present embodiment of the invention, and assuming the device to be in the circuit-closing position of Figs. 1 and 2, the main circuit is closed at the contacts 2 and 18, and the auxiliary circuit is closed through the series of contacts 34, the spring 21 holding both sets of contacts closed. In this position, it will be noted that the resilient strip 43 is flexed backwardly from the rear face of the base plate 1, with its contact 42 consequently pressing against the right-hand contact 34.

When the actuator 25 is swung to the left from the position of Fig. 2 to that of Fig. 3, spring 21 is moved away from the switch bar 17, and the member 25 is moved away from the spring 19, and spring 19 snaps the main switch open at the contacts 2 and 18. During the backward movement of the curved switch bar 17, as just described, the series of contacts 34 in the auxiliary circuit will move to the left with the bar 17. However, due to the preliminary flexure of the resilient strip 43, it moves to the left in Figs. 2 and 3 during the early part of this circuit-opening movement, and for a brief instant keeps the auxiliary circuit closed after the main circuit has been opening. However, when the strip 43 contacts with the bar 39, and is stopped thereby, the further movement to the left of the switch bar 17 breaks the auxiliary circuit at each of the contacts 34. Thereby, the circuit is interrupted at practically the same instant at a number of contact points, thereby preventing arcing of the current. This is very advantageous especially for direct current circuits, but may be used also for alternating current circuits, particularly those of high voltages.

The invention in its broader aspects is not limited to the particular structure of mechanism herein shown and described, as departures may be made therefrom within the scope of the accompanying claims, without departing from the principles of the invention and without sacrificing its chief advantages.

What I claim is:—

1. In a circuit controlling mechanism, two circuit terminals, one being movable and the other resiliently mounted, a plurality of intervening concatenated conducting bodies in series between said terminals, means for moving one circuit terminal to make and break the circuit between the various conducting bodies, the breaking of the circuit being delayed by said resilient mounting of one of the terminals.

2. In a circuit controlling mechanism a pair of terminals, a spring mounting for one of said terminals, a rigid actuating member for said spring mounted terminal and a spring interposed between said actuator and the spring mounting for said terminal.

3. In a circuit controlling mechanism, a pair of terminals, a rigid carrier for one of the terminals and a spring mounting for said rigid carrier, a rigid actuator for said terminal carrier and a spring interposed between said actuator and said terminal carrier.

4. In a circuit controlling mechanism, a main switch and a delayed action auxiliary switch having a pair of terminals, one of which is movable with the main switch, a plurality of conducting bodies in series between the terminals, the other of said terminals being resiliently mounted to press the conducting bodies into engagement with each other.

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

RICCARD PUDELKO.