J. E. SEELEY.

CONTROLLER.

APPLICATION FILED NOV. 30, 1914.

1,174,293. Patented Mar. 7, 1916.

Fig. 1

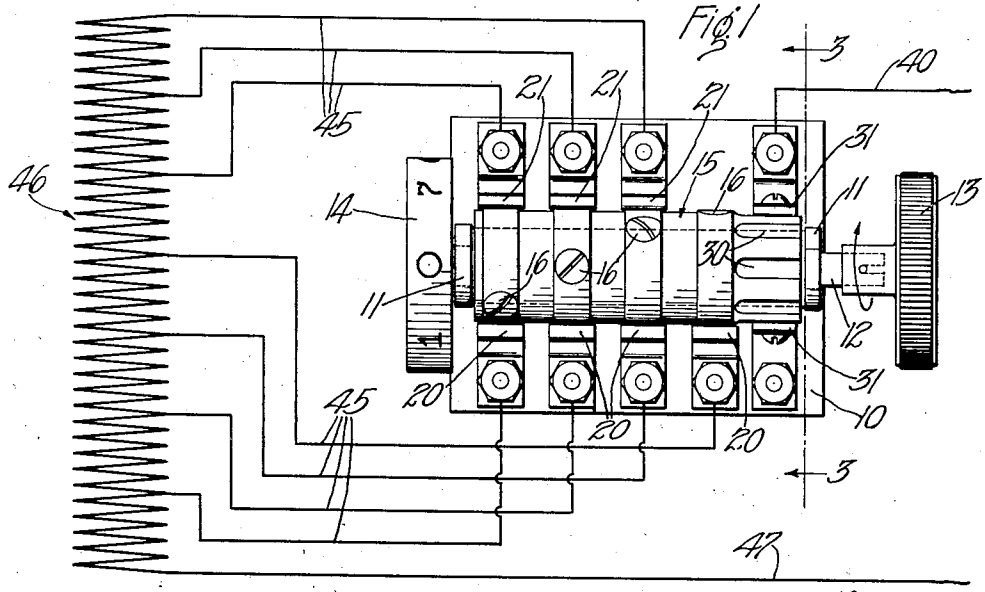


Fig. 2.

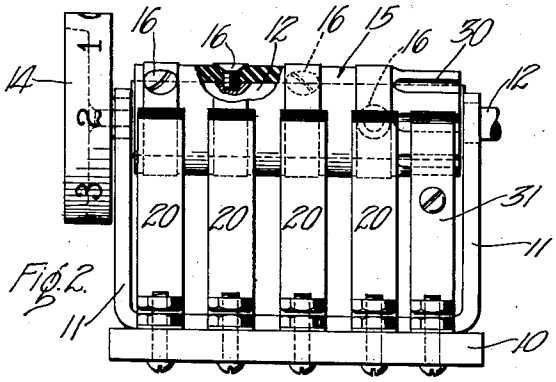


Fig. 3

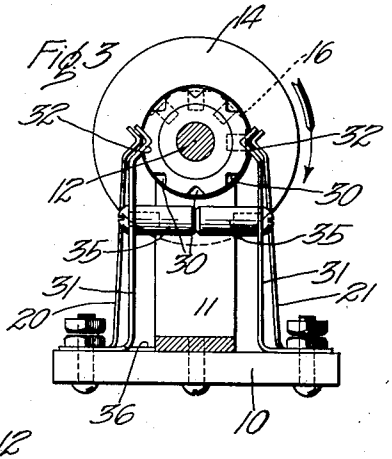
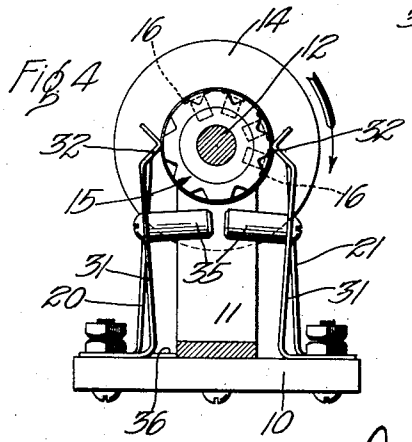


Fig. 4



Witnesses

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UNITED STATES PATENT OFFICE.

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CONTROLLER.

1,174,293. Specification of Letters Patent. Patented Mar. 7, 1916.

Application filed November 30, 1914. Serial No. 874,638.

To all whom it may concern:

Be it known that I, JAMES E. SEELEY, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles, State of California, have invented new and useful Improvements in Controllers, of which the following is a specification.

This invention relates to a controller apparatus or mechanism adapted particularly for use in connection with such an electrical machine as I have set forth in my application Serial No. 744,286 filed January 27, 1913; and the object of the present invention is the provision of simple and efficient means for controlling the current to such a machine, or to any other machine or device, which controller shall be simple and inexpensive in its construction and operation and shall have indefinite life under constant use.

In the types of controllers ordinarily used for high tension apparatus, the life of the contacts is comparatively short. The contacts are usually of a sliding nature, and the arcing which takes place between the stationary contacts and the movable contact arm is destructive of the contacts in a comparatively short time. Even under the best of conditions the contacts are usually in such a state as to make relatively poor electrical connections.

In overcoming these difficulties it is my object to provide a simple and effective mechanism wherein all arcing is eliminated from the sliding contacts and wherein a make and break switch is interposed in the controller circuit and operated in such a manner as to cut off the current during the movement of the sliding contacts. This make and break switch is constructed and operated, in such a manner that arcing and the ill effects caused thereby are practically eliminated.

I have shown a preferred form of my controller mechanism in the accompanying drawings in which—

Figure 1 is a plan and diagram showing my controller and illustrating typical electrical connections therefor. Fig. 2 is a side elevation of the controller. Fig. 3 is a section taken as indicated by line 3—3 of Fig. 1, and Fig. 4 is a similar section showing the controller in another position with the make and break switch open.

In the drawings the numeral 10 designates a suitable base upon which the controller is mounted, this base being preferably of some insulating material, as vulcanized fiber. Upon this base a pair of metallic standards 11 is mounted, these standards carrying the shaft 12 in their upper ends. A small hand wheel 13 is provided for rotating the shaft and an indicator disk 14 is provided showing the position of the shaft, and showing the connective conditions of the controller at any time. Mounted upon the shaft 12 I provide a drum 15 of suitable insulating material, as vulcanized fiber. In the surface of this drum I set a plurality of contacts 16 which are arranged on a spiral line as illustrated. In the present device I have four of these contacts 16 and they are spaced circumferentially apart one eighth of the total circumference. Each of the contacts, preferably formed by the head of a screw, reaches down through the drum 15 and makes electrical connection with the shaft 12 within the drum.

On one side of the drum I mount upon the base 10 four contact fingers 20, spaced apart so as to be each opposite one of the drum contacts 16. On the opposite side of the drum I provide only three contact fingers 21 which are arranged opposite three of the drum contacts 16. These opposite sets of contact fingers press against the drum along diametrically opposite longitudinal lines. In the position shown in Fig. 1, it will be seen that no contact 16 is engaging with any of the contact fingers 20 or 21. If the drum is rotated one eighth of a revolution in the direction indicated then the contact 16 which is opposite the right hand contact finger 21 in Fig. 1, will pass into engagement with the contact finger; and upon successive rotations of the drum through steps of one eighth of a revolution the next two contacts 16 to the left will successively engage with the next two contact fingers 21 to the left. Another successive rotation of one eighth of a revolution will bring the contact 16 which is farthest to the right in Fig. 1 into engagement with the contact finger 20 which is farthest to the right in Fig. 1; and successive rotations through steps of one eighth of a revolution will bring remaining contacts 16 into successive engagement with the contact fingers 20 from right to left; until, in the last position, the contact 16 farthest to the right will be in engagement with the contact finger 20 farthest to the left. An-

other rotation through an eighth of a revolution will bring the apparatus back to the position shown in Fig. 1 with none of the contacts in engagement with any of the contact fingers. This position is called the zero position, and is so indicated by the indicator disk 14, while the other successive positions are designated by the numbers 1 to 7 in the order named.

One end of the drum 15 is provided with longitudinal indentations 30, eight in number and spaced equally about the drum. The contacts 16 are arranged on longitudinal lines with four of these indentations 30. A pair of springs arms 31 are mounted upon the base 10 and their upper ends at 32 bear against the drum diametrically oppositely and on the same longitudinal lines of bearing as the upper ends of the contact fingers 20 and 21. The arrangement is such that when the drum is in the position shown in Fig. 1, or is in any position in which one of the contacts 16 engages one of the contact fingers 20 or 21, then the upper ends of the spring arms 31 will press into opposite indentations in the drum. The arrangement is also made so that, as the drum is rotated, the upper ends of the arms will be first forced out of the indentations before a contact has moved far enough to pass out of engagement with a contact finger; and also so that the next contact will move into engagement with its corresponding contact finger before the ends of the spring arms drop into the next indentation. The make and break switch comprises a pair of switch contacts 35 carried on the arms 31 opposite each other and adapted to be pressed against each other when the upper ends of the arms are pressed into the opposite indentations and to be separated from each other when the upper ends of the arm are forced out of the indentations. The contact faces of these contacts 35 are carefully prepared so that good contact is assured and so as to minimize the arcing between the two contacts 35. Elimination of sliding engagement between the two contacts 35 does much toward the elimination of arcing; and the quick opening and closing movement between the contacts also assists in elimination of arcing. It will be noticed that the indentations 30 and the upper ends 32 of the arms 31 are so formed that a very slight rotation of the drum suffices to move the arms 31 and the contacts 35. In other words, when the contacts are opened, they are moved apart from each other very quickly and they are held wide apart until the drum is rotated almost to its next position, when they are quickly moved toward each other. The contacts 35 are always in the open position shown in Fig. 4 when any one of the contacts 16 are either making or breaking connection with any of the contact fingers 20 or 21. One of the spring arms 31 is connected, as at 36, with the standard 11 and thence with the shaft 12 and with the contacts 16. One of the terminal wires of the controller is connected to the other spring arm 31, as shown at 40 in Fig. 1. So that any current which passes through the contacts 16 and the contact fingers 20 and 21 must pass through the make and break switch composed of the contacts 35; and this make and break switch opens and closes in such manner, as hereinbefore described, as to cut the current off from the contacts 16 while those contacts are either making or breaking connection with contact fingers 20 or 21. In this manner all possibility of arcing at the sliding contacts of the controller is entirely eliminated; the current is only turned on to the contacts 16 when those contacts are in good electrical engagement with the contact fingers.

In my electrical machine I use my controller as a resistance or impedance controller; and in a typical installation the contact fingers 20 and 21 are connected by wires 45 to different sections of a coil 46, and the end of the coil is connected to a terminal wire 47. The operation of turning the hand wheel 13 will throw the controller to successive positions which will successively cut out portions of the coil 46 from the circuit, the seventh position of the controller being that in which the minimum part of the coil is in circuit. In the zero position of the controller, there is no circuit made at all.

Having described my invention, I claim:

1. A controller, comprising a rotary drum, contacts on said drum, contact fingers adapted to be engaged by the drum contacts during rotation of the drum, and a make and break switch independent of said contacts and fingers and operated by the same rotation of the drum which engages the contacts with the fingers.

2. A controller, comprising a rotary drum of insulating material, contacts on the drum, contact fingers adapted to be engaged by the drum contacts during rotation, one end of the drum being longitudinally grooved around its circumference, and a make and break switch connected with the drum contacts embodying a pair of switch contacts, and a spring arm carrying one of said contacts and adapted to move into and out of the grooves on the drum when the drum is revolved.

3. A controller comprising a base, a drum of insulating material rotatively mounted thereon, contacts arranged in a spiral line of the face of the drum, a plurality of contact fingers on the base bearing against the drum to engage with the contacts thereon when the drum is rotated, the bearing points of the fingers and the relative positions of the contacts being so arranged that the different contacts will be brought into engage-

ment with the different fingers upon rotation of the drum step by step, a series of indentations in the end of the drum spaced apart by distances equal to said step by step movement of the drum, and a make and break switch embodying a pair of switch contacts and a pair of spring arms carrying said contacts and having their ends engaging the indented end of the drum.

4. A controller comprising a base, a plurality of spaced material rotatively mounted on the base, a plurality of spaced contact fingers bearing against the drum along a longitudinal line, a plurality of contacts on the drum surface one opposite each finger arranged in a spiral line and spaced circumferentially by an integral portion of the circumference, one end of the drum being indented at circumferential spacings equal to the spacings of the contacts, a pair of spring arms mounted on the base with their ends pressing diametrically oppositely against the indented end of the drum, and switch contacts carried by said spring arms opposite each other so that the contacts will press against each other when the arm ends are in opposite indentations, one of said switch contacts being electrically connected with the drum contacts.

5. A controller comprising a base, standards thereon, a metallic shaft rotatively mounted in said standards, a drum of insulating material on the shaft, a plurality of spaced contact fingers bearing against the drum along diametrically opposite longitudinal lines, there being one more of said fingers on one side of the drum than on the other, contacts on the drum surface equal in number to the larger number of contact fingers arranged one opposite each of said contact fingers and arranged in a spiral line being spaced circumferentially by the arc determined by the division of the whole circumference by the total number of contact fingers plus one, the end of the drum being indented with indentations equal in number to twice the number of drum contacts spaced equally around the circumference and the drum contacts being on longitudinal lines with one half the indentations, a pair of spring arms mounted on the base and bearing diametrically oppositely against the indented part of the drum on the longitudinal bearing lines of the contact fingers, switch contacts carried on said arms opposite each other to be pressed against each other when the arms press into the indentations, and electrical connection between one of said switch contacts and the drum shaft.

6. A controller, comprising a rotary drum, contacts thereon, contact fingers adapted to be engaged by the drum contacts during rotation of the drum, a make and break switch independent of the contacts and fingers and electrically connected thereto, and means whereby the make and break switch is opened and closed by virtue of the same rotation that engages the contacts with the fingers.

7. A controller, comprising a rotary drum, contacts thereon, contact fingers adapted to be engaged by the drum contacts during rotation of the drum, a make and break switch independent of the contacts and fingers and electrically connected thereto, and means whereby the make and break switch is opened and closed by virtue of the same rotation that engages the contacts with the fingers, said means embodying a corrugated peripheral portion of the drum and switch operating members adapted to coöperate therewith.

In witness that I claim the foregoing I have hereunto subscribed my name this 10th day of November, 1914.

J. E. SEELEY.

Witnesses:
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