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CONTACT ADJUSTER

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Fig. 1.

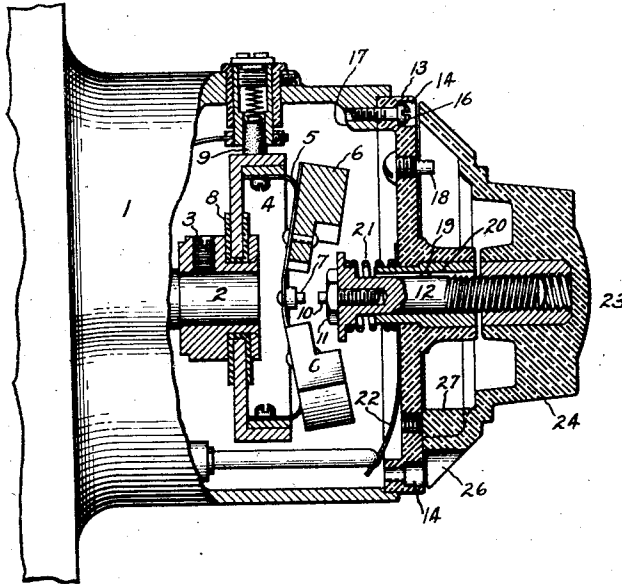
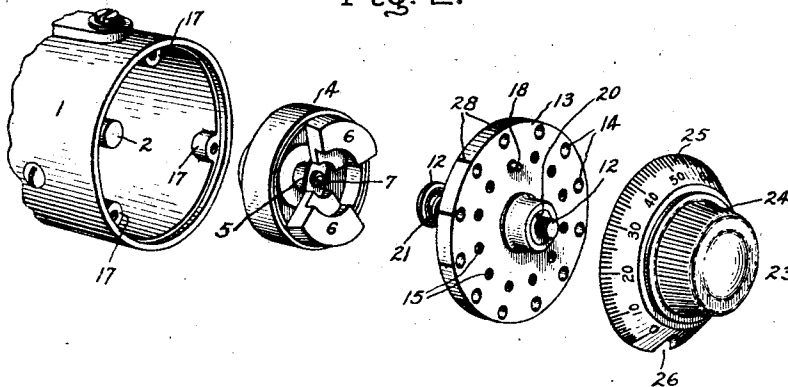


Fig. 2.



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UNITED STATES PATENT OFFICE

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CONTACT ADJUSTER

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My invention relates to electric circuit makers and breakers and more particularly to centrifugal switches wherein one of the contacts is adjustable.

One use to which centrifugal switches have been put is as the speed responsive element in speed regulating systems for electric motors. When used in this manner, the switches are so connected to control circuits that when they are closed the motor operates at one speed and when they are open the motor operates at a different speed, so that the ratio of time open to time closed determines the mean speed of the motor, which is of course a speed somewhere between the two limits. This time ratio is made adjustable by providing the switches with means for manually varying the normal position of one of the contacts, usually the fixed one. A particular application of this kind is in connection with talking motion picture projectors, where it is desired to hold the speed practically constant for any particular kind of projection and yet to be able to adjust the speed, which may be different for different kinds of projection. For the sake of uniformity in the manufactured product, it is desirable that the adjusting means of all these switches should have similar positions for similar motor or projection speeds. It was therefore found necessary to provide auxiliary adjusting means for this purpose, as the manufacturing variations of the various parts of the switches preclude the accomplishment of the end by merely assembling the ordinary standard parts. It is also desirable in the manufacture of these switches to provide means for compensating for contact wear without changing the setting of the speed adjuster.

It is an object of my invention to provide simple and easily operable means for accomplishing both of these ends.

It is a further object of my invention to provide but a single means for accomplishing both of these ends.

It is a further object of my invention to provide a new and improved switch contact adjuster.

My invention will be better understood

from the following description taken in connection with the accompanying drawing, and its scope will be pointed out in the appended claims.

Referring now to the drawing in which Fig. 1 is a part sectional view of my device, while Fig. 2 is a so-called exploded view of the same:

In the drawing, like characters of which refer to like parts in each figure, 1 is the switch casing into which extends the shaft 2 of the driving device (not shown) for the switch. Fastened to shaft 2 by means of a set screw 3 is a centrifugal device 4 comprising essentially a spring 5 to which are attached weight 6 and contact 7. As shown this contact 7 is insulated from the shaft 2 by means of insulation 8 so that it may be connected to the circuit which it controls through brush 9. Cooperating with contact 7 is adjustable contact 10, which as shown is formed on the head of a small stud 11, which in turn is screwed into the head of a bolt 12. Supporting said bolt 12 is a member 13, provided with a plurality of regularly spaced outer holes 14 and another series of inner tapped holes 15. Passing through three of the holes 14 are screws 16, which in turn thread into the three tapped lugs 17 on casing 1, thereby retaining member 13 in position. Threaded into one of the tapped holes 15 is stop screw 18. Means comprising a key 19 on bolt 12 and a keyway 20 in a sleeve in member 13 prevent relative rotation of the bolt 12 and member 13, although permitting axial motion of the bolt. Between the head of bolt 12 and member 13 is a resilient expanding means shown as a spring 21, which serves to tend to move contact 10 toward contact 7 and at the same time clamp in place a conducting strip 22 by which current is fed to contact 10. On the outer end of bolt 12 is a nut 23 comprising essentially a knurled portion 24, a scale 25, a notch 26 and a fin 27. Cooperating with the scale 25 are a plurality of evenly spaced marks 28 on the periphery of member 13, of which one mark will always coincide with a reference point on casing 1. The cooperating threads on bolt 12 and nut 23 are preferably multi threads so

as to provide a plurality of starting positions for nut 23 on bolt 12.

The operation of my device is as follows. As the speed of rotation of shaft 2 varies the centrifugal force on weights 6 varies accordingly causing spring 5 to be deflected so as to move contact 7 toward or away from contact 10. The position of contact 10 is determined by the angular position of adjusting nut 23, for as nut 23 cannot move axially as it bears against the surface of member 13, the action of the threads causes bolt 12 to be moved axially in response to a turning movement of the nut. Due to manufacturing variations, perhaps the greatest of which are in the characteristics of spring 5, it is impossible to have the contacts of each switch just touch each other at the same speed of rotation of shaft 2, with the adjusting nut in the same position on each switch, as for example a normal position where the midpoint 50 of its scale is uppermost, unless some auxiliary adjusting means is provided. As heretofore pointed out, however, such a result is desirable and I attain it through the plurality of holes 14 and 15 in member 13, whereby this member is adjustable. Thus, when the switches are assembled, they may be operated at the desired normal speed, nut 23 may be placed in its desired normal position and held there while member 13 is turned in the proper direction, so that the axial movement of bolt 12 in nut 23 causes contact 10 to engage contact 7. The three screws 16 may then be inserted through the three holes 14 which most nearly register with the tapped holes in lugs 17. As holes 14 are close together, the increments of movement of contact 10 for each shift from one hole to the adjacent one are exceedingly small, so that an accurate setting is possible. However, my invention is not limited to the use of a plurality of closely spaced holes but obviously includes any equivalent means for adjustably securing member 13 in place, and it will occur to those skilled in the art that one may substitute arcuate slots for holes 14 or employ a circumferential clamping member in place of screws, without departing from my invention in its broader aspects. Notch 26 is provided for the purpose of allowing the insertion and withdrawal of screws 16 which are otherwise covered by scale 25. Thus by turning nut 23 each of the heads of screws 16 may in turn be uncovered. It will be obvious to those skilled in the art, however, that three notches placed 120 degrees apart might be provided, so that screws 16 may all be removed without turning nut 23, without departing from my invention in its broader aspects.

Another and an equally important function of the adjustable feature of member 13 is that it provides means for compensating for contact wear without disturbing the normal setting of the adjusting nut 23. Thus, as the

contacts wear, member 13 may be turned in the proper direction, counter-clockwise in the embodiment illustrated in the drawing as bolt 12 and nut 23 are provided with left hand threads, by small increments so that the normal setting of nut 23 continues to correspond to the normal speed of rotation of shaft 2 when the contacts touch. A rough auxiliary adjustment may also be secured, without the necessity of turning member 13, by merely removing nut 23 and starting it on bolt 12 from another starting position, which is made possible because of the multi-threads.

Stop screw 18 is provided so as to limit the range of adjustment of contact 10 to one turn of nut 23 because otherwise there could be a plurality of angular positions of the nut and a plurality of speeds for each scale reading. Thus, as nut 23 is rotated fin 27 thereon engages screw 18 thus preventing more than one revolution of the nut. To allow for the rotational adjustment of member 13, screw 18 is threaded into different holes 15 so that the amount of adjustment of nut 23 on each side of its normal position may remain the same, which of course would not be the case were screw 18 to be non-adjustable in member 13.

While I have shown and described a particular embodiment of my invention it will be obvious to those skilled in the art that changes and modifications may be made without departing from my invention, and I, therefore, aim in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a circuit maker and breaker, a pair of contacts, means for causing engagement and disengagement of said contacts, means, having a normal position, for adjusting the space relationship between said contacts, and means for taking up wear between said contacts so that the relation between the normal position of said adjusting means and the corresponding normal space relationship of the adjacent surfaces of said contacts remains substantially constant.

2. In a circuit maker and breaker, a pair of contacts, means causing one of said contacts to engage the other contact, means, having a normal position, for adjusting the position of said last mentioned contact along the path of movement of said first mentioned contact, and means for taking up wear between the contacts so that the relation between the normal position of said adjusting means and the corresponding normal relative positions of said contacts remaining substantially the same.

3. In a centrifugal switch, a pair of contacts, centrifugal means for moving one of said contacts, means, having a normal position, for adjusting the position of the other

contact along the path of movement of said first mentioned contact, and means for compensating for wear between the contacts so that the normal setting of said adjusting means remains substantially constant.

4. In a centrifugal switch, a pair of contacts, centrifugal means for moving one of said contacts, means having a normal position, for adjusting the position of the other contact along the path of movement of said first-mentioned contact and means cooperating with one of said contacts and said adjusting means for compensating for wear between the contacts, so that the normal setting of said adjusting means remains substantially constant.

5. In a centrifugal switch, a pair of contacts, centrifugal means for moving one of said contacts, means, having a normal position, for adjusting the position of the other contact along the path of movement of said first-mentioned contact, and means between said adjustable contact and said adjusting means for compensating for wear between the contacts so that the normal setting of said adjusting means remains substantially constant.

6. In a circuit maker and breaker, a pair of contacts, a two element threaded means, one of whose elements has a normal position, for adjusting the position of one of said contacts with respect to the other and means for adjusting the position of said other element, to compensate for contact wear, while said first-mentioned element remains in its normal position.

7. In a circuit maker and breaker, a pair of contacts, means for adjusting the relative positions of said contacts comprising a two element threaded means, one of said elements carrying one of said contacts, means normally preventing said element from turning about the axis of its threads, said other elements having a normal angular position, means for preventing motion of this element along the axis of its threads and adjustable means permitting rotation of said means for normally preventing said first-mentioned element from turning, whereby said last-mentioned element may remain in its normal position while compensation is made for contact wear.

8. In a circuit maker and breaker, a pair of contacts, means for causing one of said contacts to engage and disengage the other contact, means for adjusting the position of said last-mentioned contact comprising a bolt, means for mounting said last-mentioned contact on the head of said bolt, supporting means for said bolt permitting axial motion thereof along the path of movement of said first-mentioned contact and preventing relative rotational movement thereof, resilient means between the head of said bolt and said supporting means and a nut on the other end

of said bolt, said nut having a normal position, and means for preserving the relation between the normal position of said nut and the corresponding normal relationship between the contacts, regardless of wear therebetween, comprising means for permitting rotational adjustment of said supporting means about the axis of said bolt.

9. In a speed responsive switch, a pair of contacts, rotatable means, means responsive to the speed of rotation thereof for moving one of said contacts into engagement with the other, a bolt whose axis is along the path of movement of said first-mentioned contact and whose head is adjacent thereto, means mounting said last-mentioned contact on the head of said bolt, a nut on said bolt, supporting means between said head and said nut for permitting axial movement of said bolt, means for preventing relative rotation between said bolt and said supporting means, resilient expanding means between said supporting means and the head of said bolt, whereby rotation of said nut produces a relative displacement of said contacts, said nut having a normal position corresponding to a normal relationship between said contacts, means for preserving the relation between said normal position and said relationship regardless of wear between said contacts comprising means for permitting independent rotation of said supporting means about the axis of said bolt, means on said supporting means for limiting the rotation of said nut to one revolution and means permitting the adjustment of said last-mentioned means whereby the relation between the limits of the revolution of said nut and said normal position is constant regardless of the angular position of said supporting means.

10. In a circuit maker and breaker, a pair of contacts, centrifugal means for moving one of said contacts toward the other, resilient means opposing said motion, movable means for controlling the position of the other contact with respect to the first-mentioned contact, and auxiliary adjusting means for the last-mentioned contact whereby a given position of said first-mentioned adjusting means may be made to correspond to a given speed of rotation of said centrifugal device at which said contacts are in a given position regardless of the manufacturing variations in the elements of said circuit maker and breaker.

11. In a circuit maker and breaker, a pair of contacts, a rotatable element, means for moving one of said contacts with respect to the other in response to changes in the angular motion of said rotatable element, means, including a nut and bolt having cooperating multi-threads whereby said nut has a plurality of angular starting positions on said bolt, for adjusting the position of the other contact relative to the first-mentioned contact, said nut having a normal angular posi-

tion and said contacts having a normal relative position, said nut being started in the angular position which most nearly results in the coincidence of said two normal positions.

12. In a circuit maker and breaker, a pair of contacts, a rotatable member, means for moving one of said contacts with respect to the other in response to changes in the rotational speed of said member, two cooperating multi-threaded elements for adjusting the position of the other contact with respect to the first-mentioned contact, means for preventing the angular movement while permitting the axial movement of one of said elements, means for preventing the axial movement, while permitting the angular movement of said other element, each of said elements having a normal position in the plane of its respective movement, said multi-threads permitting said angularly movable element to have a plurality of angular positions for any given position of said axially movable element, whereby said elements may be so assembled that regardless of contact wear and manufacturing variations, said angularly movable element may always be placed within 360° divided by the number of multi-threads of its normal position when said angularly movable element is in its normal position.

In witness whereof I have hereunto set my hand this 14th day of November, 1929.

ALFRED L. ULMER.

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