

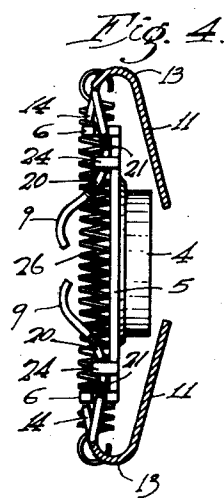
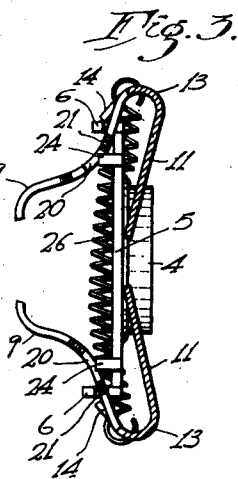
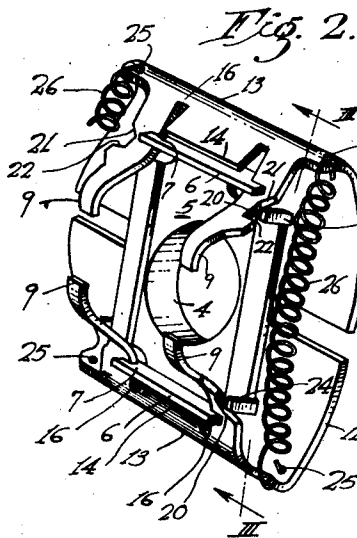
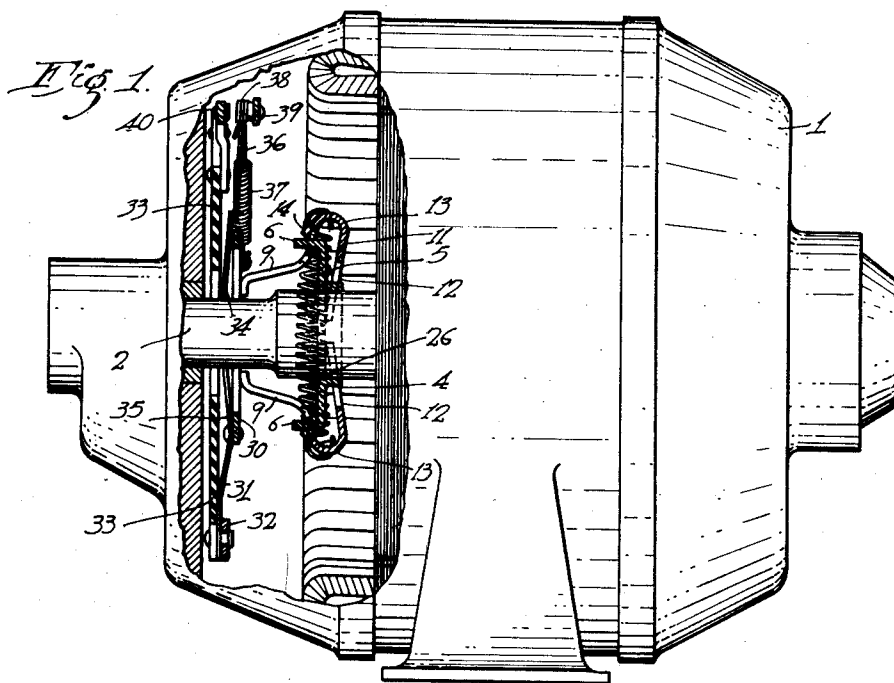
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2,095,755

CENTRIFUGAL SWITCH OPERATING MECHANISM

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CENTRIFUGAL SWITCH OPERATING
MECHANISM

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This invention relates to centrifugally governed circuit changers, and particularly to the type of circuit changers used in connection with the starting circuits for an electric motor.

It is an object of our invention to provide a circuit changer which shall be positive and quick in its action, shall be capable of being manufactured from stamped parts and, therefore, easy of manufacture, and inexpensive.

It is a further object of our invention to provide a centrifugal circuit changer having parts moved by centrifugal force. These parts are provided with knife edges and in the extreme position to which they are moved by centrifugal force, they interlock with stops which prevent sufficient separation of the knife edges from their bearings to cause the device to become disassembled.

Other objects of the invention and details of the structure will be apparent from the accompanying drawing and detailed description. In the drawing:

Figure 1 is a side elevational view of an electric motor, partly in section, showing the application of the circuit changer thereto;

Fig. 2 is a perspective view of the centrifugally actuated device showing the parts in the position which they occupy when the centrifugal force is absent or small;

Fig. 3 is a sectional view taken on the line III—III of Fig. 2; and

Fig. 4 is a section on the same line showing the parts in the position which they assume when the centrifugal force is large.

In the drawing, the electric motor 1 has a shaft 2 upon which the centrifugal device is mounted. The portion of the device which is stationary, relative to the shaft, includes a collar 4 which may be connected to the shaft in any suitable way, preferably by being a press fit thereon. The collar 4 preferably constitutes an annular flange on a plate 5. The plate 5 has two straight flanges 6 at opposite sides thereof. At each end of each flange 6 a notch is provided, as shown at 7 (Fig. 2) into which the edge of an intermediate portion of a tail 9 extends.

The tails 9 are integral with the weight members 11. The rear portions of the weight members are in shape approximately a segment of a semi-circle with a semi-circular recess on an inner straight edge in each. The recesses show at 12 in Fig. 1, but they are hidden by other portions of the device in all of the other figures.

Each member 11 merges with two tails 9, the junction being through a recurved portion 13

which extends along the chord that bounds the segmental portion 11. The length of portion 13 is the full length of the chord and its central part is continuous with a tongue 14, which extends between the tails 9. Between the tongue 14 and each tail 9 a notch 16 is provided, for convenience in bending the tongue 14 into the projecting position illustrated when the device is being made.

The edge of each tongue 14 contacts the corresponding flange 6 and affords an axis about which the weight member 11 can move. Each tail 9 is equipped with a notch 20 in the side thereof farthest from the other tail on the same weight member. An oblique edge 21 forms one side of the notch and the opposite side 22 is at right angles to the length of the tail. At each corner of the plate 5 an upstanding stop 24 is provided. This stop is of square cross-section and so presents a face which can abut the edge 22 of the notch 20 with contact over the whole surface. The opposite face of the stop 24 is close to the oblique face 21 of the notch and limits any movement that may occur at an angle to the intended movement of the weight member providing only the needed clearance.

A hole 25 near each end of the recurved portion 13 of the weight members 11 is provided, into which an end of a spring 26 may be hooked. There are two such springs, each extending from the hole 25 in one weight member 11 to the hole 25 at the corresponding end of the other member 11. The springs 26 exert a force which causes the edges of the tongues 14 to press against the corresponding flanges 6. They thus prevent the weight members 11 from falling away from the plate 5.

An annular plate 30 is mounted in the motor so that it surrounds the shaft 2. The turned-over ends of the tails 9 contact the plate which is secured to a flat spring member 31, mounted at 32 upon a stationary plate 33. The spring member 31 is bowed away from the plate 30 as shown at portion 34 near one end and from the plate 33 as shown at portion 35 near the other end. It is pivotally joined to a contact-carrying member 36, upon which springs 37 act to move it to an extreme or right-hand (as illustrated) position. The member 31 may be flexed, without causing the contact 38 carried by member 36 to separate from contact 39 carried by a stationary support, until member 31 has passed a dead center. Then springs 37 act to move it with a snap to a position in which contact 38 will engage contact 40,

mounted upon the stationary plate 33 and located opposite contact 39.

The mechanism actuated by the annular plate 30 is of a conventional sort and forms no part of this invention. Any suitable contact moving device to be actuated by the plate 30 could be substituted.

In the operation of the device, when the motor is started, centrifugal force causes the members 11 to move outwardly, rotating about the edges of the respective tongues 14 as axes. This movement is against the elastic force of the springs 26. The portions of the tails 9 which are in the notches 7 move only very slightly during this action, and the notches are made large enough to accommodate this movement. The movement brings the oblique surfaces 21 into proximity with the stops 24, so that the stops 24 enter the notches 20.

When the centrifugal movement has gone far enough to bring the faces 22 of the notches 20 in proximity to the stops 24, the back of the tails 9 will contact with the plate 5, stopping the rotational movement of the weight members. If the centrifugal force exceeds that corresponding to this position, a slight movement will occur in which tails 9 slide along the plate 5 until each face 22 contacts with the corresponding stop 24 taking up the needed clearance provided during the rotational part of the movement. This will cause the edges of tongues 14 to separate slightly from the flanges 6, but this movement is not sufficient for the tails 9 to disengage the notches 7 to permit the weight members 11 to become disengaged from the plate 5.

In the position of the device illustrated in Figs. 1 and 2, when the motor is at rest, the tails 9 contact the plate 30, pushing it into a position in which the contacts 38 and 39 are closed. As the motor speeds up, centrifugal force causes the weight members 11 to rotate about the edges of tongues 14 as axes, which moves the tail members 9 nearer to the plate 5 and permits the plate 31 to move under the influence of its elasticity until it passes the dead center. The springs 37 will then move the contact 38 away from contact 39 and into engagement with contact 40. The circuit changes which result are such as will adapt the motor to running at full speed. They do not form any part of the invention because the device described herein can actuate contacts to control any circuit changes needed for the motor.

It will be obvious to those skilled in the art that many variations are possible within the spirit of this invention. We, therefore, desire that the foregoing description and the drawing be regarded as illustrative only and not as limiting the claims beyond the limitations actually expressed therein.

We claim as our invention:

1. In a centrifugal device, a weighted member having a bearing edge, a supporting member presenting a bearing surface to said bearing edge, resilient means confining said edge to said surface when the device is stationary, said means opposing the action of the centrifugal force upon the weighted member, and additional means interlocking with the weighted member under centrifugal force for preventing further movement there-

of when a predetermined movement thereof has been produced by such force.

2. In a centrifugal device, a weighted member having a bearing edge, a supporting member presenting a bearing surface to said bearing edge, springs confining said edge to said surface when the device is stationary, said springs opposing the action of the centrifugal force upon the weighted member and additional means interlocking with the weighted member under centrifugal force for preventing further action thereof when a predetermined movement thereof has been produced by such force, said edge being confined to said surface by only the action of said springs.

3. In a centrifugal device, a weight member having a pivotal edge, a member with a bearing surface against which said edge contacts, spring means for holding said edge in contact with said surface, and means responsive to a predetermined degree of centrifugal force for effecting interlocking of said weight member with a member fixed with respect to said bearing surface to prevent the disassemblage of the device under the action of centrifugal force.

4. In a centrifugal device, a weighted member having a bearing edge, a supporting member presenting a bearing surface to said bearing edge, springs confining said edge to said surfaces when the device is stationary, said springs opposing the action of the centrifugal force upon the weighted member, and additional means for preventing further action of the weighted member under centrifugal force when a predetermined movement thereof has been produced by such force, said edge being confined to said surface by only the action of said springs and that only when said additional means is inoperative.

5. In a centrifugal device, a weight member mounted to move rotationally about an axis under centrifugal force, said axis being at an angle to the axis of the rotation producing said centrifugal force, and means for limiting the rotation about the first-named axis, the mounting of said member permitting a motion of translation thereof under centrifugal force when said limit of rotation has been reached.

6. In a centrifugal device, a weight member mounted to move rotationally about an axis under centrifugal force, said axis being at an angle to the axis of the rotation producing said centrifugal force, means for limiting the rotation about the first-named axis, the mounting of said member permitting a motion of translation thereof under centrifugal force when said limit of rotation has been reached, and means for limiting said translation.

7. In a centrifugal device, a weight member having a projecting portion with a notch therein and also having a pivotal edge, a support member with a bearing surface therefor, spring means for holding said edge in contact with said surface, and a projection on said support member for engagement with said notch under a predetermined degree of centrifugal force on said weight member.

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