Jan. 20, 1948. G. B. SOLOVIEFF 2,434,870

POSITION INDICATING DEVICE

Filed Aug. 31, 1945

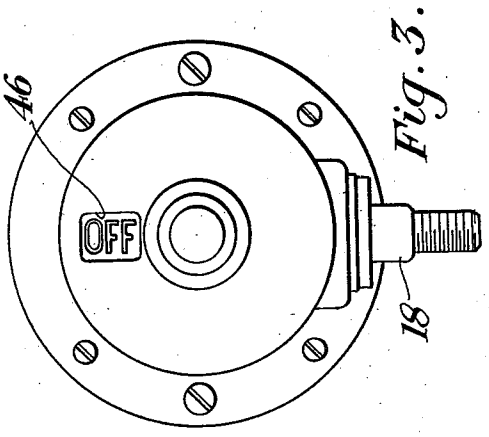


Fig. 3.

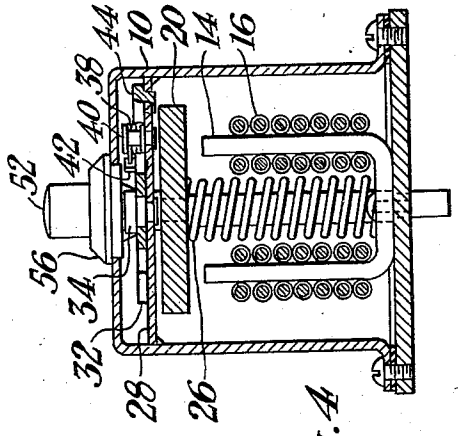


Fig. 4

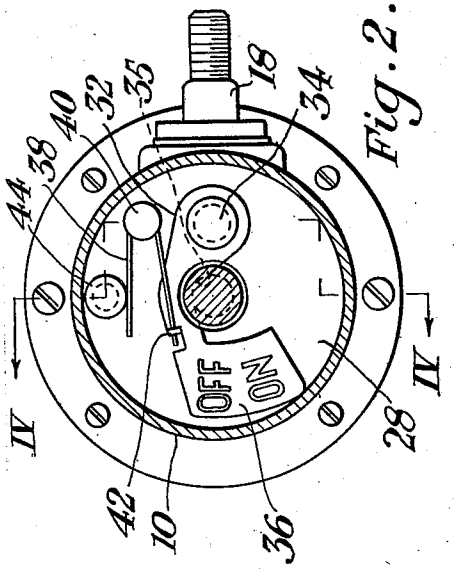


Fig. 2.

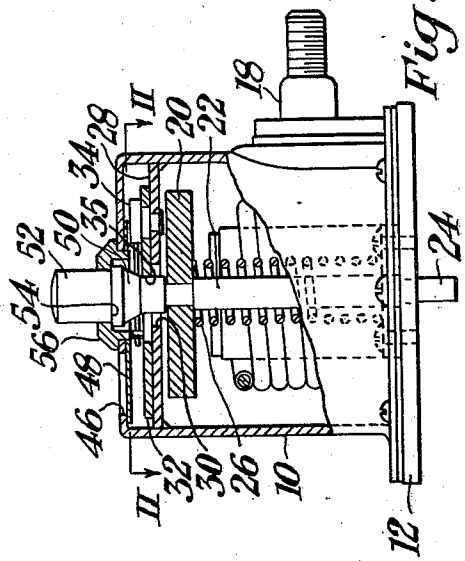


Fig. 1.

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Patented Jan. 20, 1948

2,434,870

UNITED STATES PATENT OFFICE

2,434,870

POSITION INDICATING DEVICE

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Application August 31, 1945, Serial No. 613,781

3 Claims. (Cl. 177—329)

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This invention relates to position indicating devices for manually resettable mechanisms such as electromagnetic controls.

In controls of the type indicated it is common practice to provide for energizing the electromagnet from a thermoelectric source. The energy so generated is usually insufficient to attract the armature from the released position in which it is biased. Consequently, manual resetting means are employed to move the armature into engagement with the electromagnet where it can be retained if the electromagnet is energized. The electromagnet and resetting means are usually enclosed in a housing and only an operating button projects on the exterior. A slight movement of the button is usually all that is required to effect the resetting operation. Hence, it is difficult to determine by visual inspection whether the armature is in attracted or released position unless an indicator is employed.

An object of this invention is to determine readily the position of a manually resettable mechanism.

Another object of the invention is to simplify the construction and operation of the indicating device making its application to manual resettable mechanisms an economical matter.

Another object of the invention is to construct the device of few parts which are effective for the purpose and not liable to become out of order.

Other objects and advantages will become apparent from the following description taken in connection with the accompanying drawing, wherein:

Fig. 1 is a front elevation, partly in section, of a manually resettable mechanism embodying means for indicating the position thereof;

Fig. 2 is a cross section taken on the line II—II of Fig. 1;

Fig. 3 is a plan view of the mechanism with the indicating means in one position; and

Fig. 4 is a section taken on the line IV—IV of Fig. 2.

Referring more particularly to the drawing, the manually resettable mechanism is enclosed within a housing 10 of inverted cup-shaped form having the open end thereof closed by a detachable base 12. Secured to the base 12 and projecting into the interior of the housing 10 is a horseshoe magnet 14 having a winding 16 thereon. A spud connection 18 is provided on one side of the housing 10 for reception of the leads of the winding 16. An armature 20 is cooperable with the pole faces of the horseshoe magnet 14 and is supported upon a resetting stem 22 having an operating end 24 projecting from the base 12. A coil spring 26 is operable between the armature 20 and the bottom of the horseshoe magnet 14 for biasing the armature 20 away from the pole faces of the horseshoe magnet 14.

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The means for indicating the position of the manually resettable mechanism comprises a stationary support in the form of a plate 28 which is secured by welding or other suitable means to the inner wall of the housing 10 beyond the armature 20. The plate 28 is provided with a central aperture 30 of greater area than the resetting stem 22 which is adapted to project therethrough. A lever 32 is fulcrumed at one end on a pin 34 projecting from the plate 28 and is adapted to rotate in a plane substantially normal to the axis of the resetting stem 22. The lever 32 is of generally V-shape conformation with the notch portion 35 intermediate the fulcrumed and free ends located on one side of the resetting stem 22. The free end of the lever 32 carries an arcuate flag portion 36 of sufficient area to bear indicia "off" and "on."

Yieldable means are employed to rotate the lever 32 in a counter-clockwise direction relative to the plate 28. The yieldable means in this embodiment takes the form of a hairpin spring 38 supported on the plate 28 by a pin 40 and having one free end secured in an upstanding lug 42 on the lever 32 and the other free end bearing upon a pin 44 projecting from the plate 28. It will be apparent that the spring 38 is operative substantially in the plane of the lever 32 and is adapted to maintain the notch portion 35 intermediate the fulcrumed and free ends in abutting relation with the resetting means 22. A window 46 is formed in the end face of the cup-shaped housing 10 and may be closed against the entrance of dirt and the like by the usual glass 48 or other transparent material.

In order that the lever 32 may be rotated in a clockwise direction when the armature 20 is moved into attracted position relative to the pole faces of the magnet 14, means are provided for overcoming the bias of the spring 38. To this end, the resetting stem 22 carries cam means in the form of a tapered enlargement 50 which is positioned beyond the plane of the lever 32 when the armature 20 is disengaged but which is operatively engageable with the lever 32 upon axial movement of the resetting stem 22. Such axial movement of the resetting stem 22 may be effected by manual pressure applied to a button 52 which adjoins the tapered portion 50 and projects from the casing 10. The shoulder 54

formed at the junction of the button 52 with the tapered portion 50 is engaged by a cap member 56 secured in the housing 10 and serving to limit the outward movement of the resetting stem 22 under bias of the spring 26.

The operation of the device is as follows: The electromagnet is assumed to be energized through its winding 16 insufficiently to attract the armature 20 from released position in which the indicia "off" appears in the window 46. The button 52 is then manually depressed to cause an axial movement of the resetting stem 22 and engagement of the armature 20 with the pole faces of the magnet 14 against the bias of the spring 26. If the magnet 14 is sufficiently energized to retain the armature 20 against the pole faces of the magnet 14 then the button 52 will remain in its depressed position. During this resetting operation, the tapered portion 50 will be moved into engagement with the notch portion 35 of the lever 32 and cause it to rotate on its fulcrum 34 in a clockwise direction. The indicia "off" will be moved from its position opposite the window 46 and the indicia "on" substituted therefor by corresponding movement of the flag portion 36. During the time that the magnet remains energized the engagement of the armature 20 with the pole faces thereof will retain the lever 32 in the limiting position to which it has been moved by operation of the button 52. It will be understood that the operating end 24 of the resetting stem 22 is effective for operating a controlled device such as a valve or switch by the axial movement.

When the action of the electromagnet is discontinued, as by insufficient energization of the winding 16 or complete deenergization thereof, then the armature 20 will be released from the pole faces of the magnet 14 and the button 52 will be returned by action of the spring 26 to its original position as limited by engagement of shoulder 54 with the cap 56. During this return movement the tapered portion 50 on the resetting stem 22 will be moved out of the plane of the lever 32 permitting the flag movement to return the indicia "off" to a position opposite the window 46.

It will be apparent that the spring 26 between the armature 20 and the bottom of the horseshoe magnet 14 could be dispensed with in places where a return spring is incorporated in the device to be controlled by the electromagnetic control. That is, the projecting end 24 of the resetting stem 22 is adapted for engagement with such a device as described and would serve to transmit the biasing action thereof to the armature 20 in such instances. While a preferred embodiment of the invention has been shown and described, it is apparent that many modifications in the form and arrangement of parts will occur to those skilled in the art. Hence, the invention is not to be deemed limited to the form shown and described or otherwise than as included within the scope of the claims appended hereto.

I claim:

1. The combination with a housing having a window, a pair of relatively movable members in the housing, of means projecting from the housing and operatively associated with the members for causing movement thereof upon an axial movement of said means, means for indicating the position of the members comprising a lever fulcrumed at one end on the housing and carrying indicia at the opposite free end, yieldable means adapted to rotate said lever to a limiting position wherein one of said indicia is positioned opposite the window, and cam means carried by the first said means and operatively engageable upon said axial movement with a portion of said lever intermediate said fulcrumed and free ends for overcoming said yieldable means and rotating said lever to another limiting position wherein another of said indicia is positioned opposite the window.

2. The combination with a housing having a window, a pair of relatively movable members in the housing, of means projecting from the housing and operatively associated with the members for causing movement thereof upon an axial movement of said means, means for indicating the position of the members comprising a lever fulcrumed at one end on the housing for rotation in a plane substantially normal to the axis of the members and carrying indicia at the opposite free end, yieldable means operative substantially in the plane of said lever and adapted to rotate said lever to a limiting position wherein one of said indicia is positioned opposite the window, and cam means carried by the first said means and operatively engageable upon said axial movement with a portion of said lever intermediate said fulcrumed and free ends for overcoming said yieldable means and rotating said lever to another limiting position wherein another of said indicia is positioned opposite the window.

3. The combination with a housing having a window, a pair of relatively movable members in the housing, of means projecting from the housing and operatively associated with the members for causing movement thereof upon an axial movement of said means, means for indicating the position of the members comprising a stationary support secured in the housing and having an aperture through which the first said means is adapted to project, a lever fulcrumed at one end on said support for rotation in a plane substantially normal to the axis of the first said means and carrying indicia at the opposite free end, yieldable means operative substantially in the plane of said lever and adapted to rotate said lever in one direction relative to said support, said lever rotation being limited by engagement of a portion of said lever intermediate said fulcrumed and free ends with the first said means to a position wherein one of said indicia is positioned opposite the window, and cam means carried by the first said means beyond the plane of said lever and operatively engageable with said intermediate portion upon said axial movement for overcoming said yieldable means and rotating said lever in an opposite direction to another limiting position wherein another of said indicia is positioned opposite the window.

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