Feb. 9, 1932. G. O. WILMS 1,844,490

SWITCH

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Fig. 2.

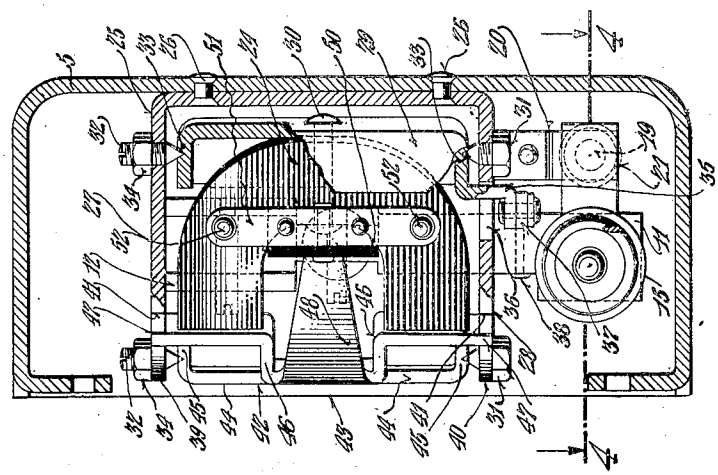
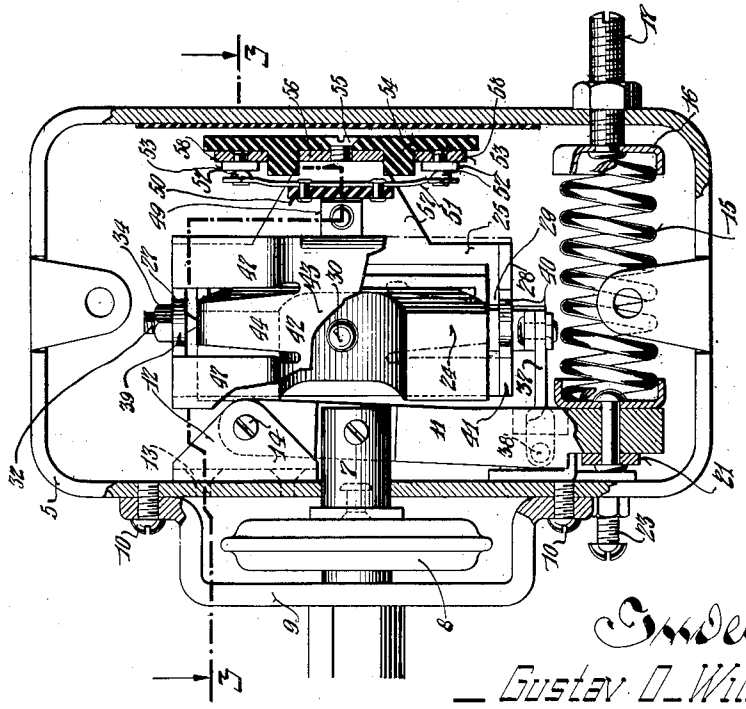


Fig. 1



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Fig. 3.

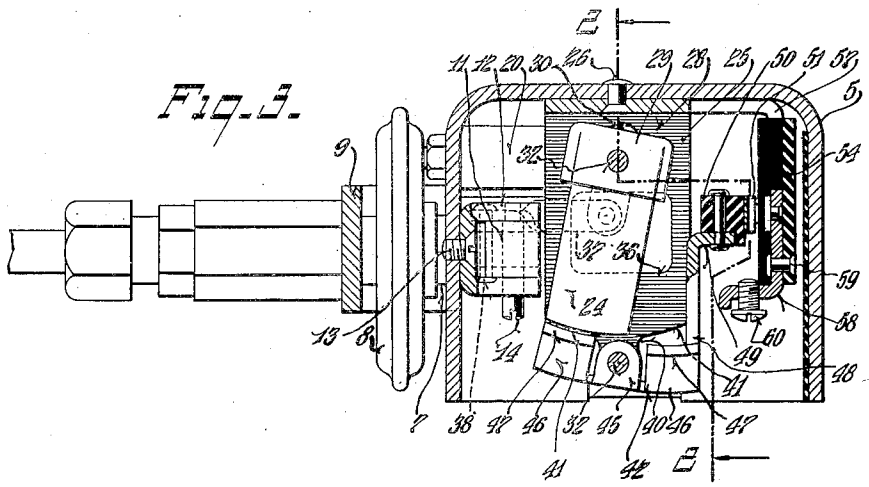


Fig. 4.

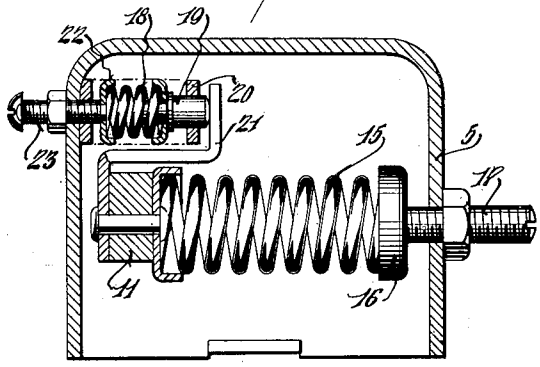
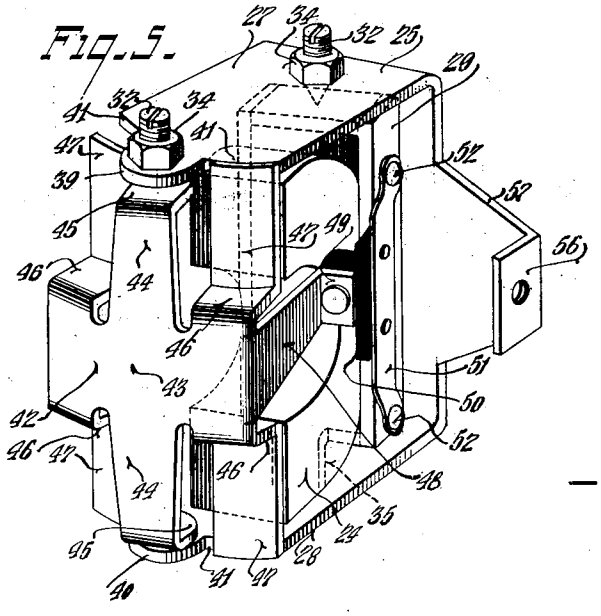


Fig. 5.



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UNITED STATES PATENT OFFICE

GUSTAV O. WILMS, OF MILWAUKEE, WISCONSIN, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ALLEN-BRADLEY COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF WISCONSIN

SWITCH

Application filed July 16, 1928. Serial No. 293,074.

This invention relates particularly to means for translating a relatively slow motion into a quick, positive movement. Many means have been utilized for accomplishing this result in thermostatically and similarly operated switches, all of which have been open to criticism and, therefore, the present invention has as its primary object to provide a device of this type in which an entirely novel principle is employed and which is so constructed as to be positive in its operation at all times.

Another object of this invention resides in the provision of an improved device of the character described embodying a movable magnet.

Another object of this invention resides in the provision of a device of the character described having a magnet pivotally mounted to be slowly actuated by a controlling means to attract an armature, and move it from one position to another whenever the magnet moves beyond a predetermined degree in either of its directions.

A further object of this invention resides in the provision of a device of the character described having a circuit closure adapted to be quickly actuated from one position to its other upon dictation of a slowly moving magnet.

And a still further object of this invention resides in the provision of means for readily adjusting the prime mover so as to regulate the time at which the circuit closure is opened and closed.

With the above and other objects in view which will appear as the description proceeds, my invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the herein disclosed invention may be made as come within the scope of the claims.

In the accompanying drawings, I have illustrated one complete example of the physical embodiment of my invention constructed according to the best mode I have so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a front plan view of the device embodying the invention, parts thereof being broken away and in section;

Figure 2 is a longitudinal, sectional view through Figure 3 on the plane of the line 2—2;

Figure 3 is a transverse, sectional view through Figure 1 on the plane of the line 3—3;

Figure 4 is a transverse, sectional view through Figure 2 on the plane of the line 4—4, and

Figure 5 is a perspective view of the principal parts of the device removed from its housing.

Referring now more particularly to the accompanying drawings, in which like numerals designate like parts throughout the several views, 5 designates a housing of any suitable construction, one side wall of which is apertured to receive a stem 7 of an actuating member 8, which, in the present instance is pressure controlled. The actuating member 8 is supported from a U shaped member 9 secured to the adjacent side of the housing 5 by screws 10 and is connectable with any desired operating medium such as a source of pressure, the fluctuation of which is intended to open and close an electric circuit of a controlling device. As this invention is limited to the switch structure and the means for transferring the relatively slow motion produced by the pressure controlled actuating member 8 into a quick and positive movement, futher description of the pressure controlled mechanism is deemed unnecessary.

The stem 7 projects into the interior of the housing 5 to be pivotally connected with a lever 11 at a medial point which is pivotally mounted at its upper end between the arms of a substantially U shaped mounting member 12 secured by screws 13 to the wall of the housing, by a pivot stud 14. An expansile spring 15 at all times urges the free end of the lever towards the housing wall in opposition to the force imposed thereon by the pressure of member 8. One end of the spring engages the lever and the other a cup 16 of

an adjusting screw 17 whereby the pressure exerted by the spring is readily adjusted, and cooperating with the member 8 and providing means for taking up all slack is a second or auxiliary spring 18 which is relatively lighter than the spring 15.

The spring 18 has one end seated in a cup carried by a stud 19 slidably positioned in a supporting member 20 secured to the wall of the housing and extending therethrough to abut a laterally projected part of a member 21 carried by the lever 11. The other end of the spring is engaged with a cup 22, similar to the cup 16, and carried by an adjusting screw 23 to regulate the tension of the spring. Thus it will be seen that the response of the lever 11 to pressure by the member 8 is readily adjustable.

Movement of the lever is imparted to a substantially U shaped horseshoe magnet 24 which is pivotally mounted by a bracket member 25 secured to the back of the housing by rivets 26, the ends of the magnet being disposed horizontally to form pole pieces. The bracket 25 is likewise U shaped and has upper and lower arms 27 and 28, respectively, between which the magnet is mounted. A receptacle 29 of substantially box shape is secured to the magnet by a rivet 30 passing through its medial portion and through the back of the receptacle and has its ends provided with recesses 33 within which mounting trunnions 31 and 32 are engaged to pivotally mount the magnet.

The trunnions are threaded in aligned apertures in the upper and lower arms 27 and 28 of the bracket, the trunnion 32 being provided with a lock nut 34 so that the distance between the points of the trunnions may be readily adjusted.

The lower wall of the receptacle 28 has an extension 35 formed thereon which extends downwardly through an aperture 36 in the bracket lower arm 28 and then laterally to be pivotally connected with one end of a link 37, the other end of which is connected with the lever 11, as at 38, to movably connect the magnet 24 with the lever and rock the same on its pivotal mounting.

The outer ends of the bracket arms 27 and 28 have their medial portions projected, as at 39 and 40, respectively, to provide arcuate shoulders 41 at each side of the projected medial portions, the arcs of which are struck from a common point with the axis of the trunnions 32 and 31 as their center. The projections 39 and 40 are in axial alignment and have threaded apertures to receive a second set of trunnions 31 and 32, between which a member 42 stamped from a blank of bendable metal and forming a pair of connected armatures is pivotally mounted to be rocked from one position to its other upon dictation of the magnet. The member 42 while in the blank is formed with a medial portion 43 from which three pairs of arms extend in opposite directions and after being completely formed, as best illustrated in Figure 5, the central pair of arms 44 extend upwardly and downwardly to be directed laterally, as at 45, to provide the means with which the trunnions 31 and 32 engage to pivotally mount the member 42.

The outer pairs of arms are directed inwardly as at 46, from the top and bottom of the adjacent part of the medial portion 43, and then laterally to form offset portions 47 which extend upwardly and downwardly to constitute the pair of armatures with which the magnet cooperates to rock the member 42 on its pivots. The portions 47 further provide stops which abut the shoulders 41 to limit the movement of the member 42 in either direction, the shoulders 41 being disposed slightly outwardly of the arcuate outer ends of the magnet 24 to at all times space the armature or portions 47 of the member 42 from the magnet.

Extended inwardly from one side (the right with respect to Figures 1, 3 and 5) of the medial portion 43, and positioned between the adjacent inwardly directed portions 46 is an arm 48 which has its inner end projected laterally, as at 49, to mount an insulating block 50 on which a switch member or circuit closure 51, formed of a flexible strip of metal is secured, contact points 52 being carried at the ends thereof to engage stationary contacts 53 carried by an insulating member 54. The member 54 is secured by means of a screw 55 to an outwardly extending arm 56 of a projection 57 formed on the bracket member 25, being so positioned that its fixed contacts 53 are in line with the movable contacts 52 to be bridged by the switch member 51 whenever the magnet assumes the position illustrated in Figure 3. The contacts 53 are suitably carried by terminal member 58 secured to the insulating block 54 by rivets 59 and have screws 60 threaded in lateral projections thereon to provide means for attaching leads thereto.

The operation of the device is simple and positive, as the member 42, which constitutes the pair of armatures and controls the opening and closing of the circuit, remains in either of its positions until the magnet is moved a sufficient distance by the prime mover 8 to enable its attraction to the then outward armature members 47 to over-balance the inertia and attraction of the magnet to the inward armature members 47 to quickly move the member 42 to its opposite position. Chattering or hesitating of the member 42 mid-way between its limits of movement never exists as the magnet moves a considerable distance to the opposite side before its atraction thereto becomes great enough to overcome the inertia of the parts

and as its power of attraction rapidly increases as the outward armature approaches it.

From the foregoing description, taken in connection with the accompanying drawings, it will be readily apparent to those skilled in the art to which an invention of this character appertains, that I provide a novel and improved means for transforming a slow creeping motion into a quick, positive movement capable for making and breaking an electric circuit.

What I claim as my invention is:

1. A device of the character described, comprising a control element having means providing spaced armatures, a magnet, common means for movably mounting the control element and the magnet with the magnet positioned to influence the armatures, and means for moving the magnet to attract one or the other armature toward it to produce a corresponding motion on the part of the control element.

2. A device of the character described, comprising a frame member, a control element movably mounted from said frame member, a magnet movably mounted from said frame member, means carried by the control element and providing spaced rigidly connected armatures each of which is adapted to be attracted toward the magnet to move the control element as the magnet is moved toward it, and means for moving the magnet.

3. A device of the character described, comprising a frame member, a control element, means pivotally mounting the control element from the frame member for movement to and from a predetermined position, a magnet, means pivotally mounting the magnet from the frame member, armatures carried by the control element and adapted to be influenced by the magnet as the same is moved to cause the control element to move correspondingly, and means for moving the magnet.

4. A device of the class described, comprising a mounting frame, a control element pivotally mounted from said frame for movement between predetermined limits, a magnet, means pivotally mounting the magnet from said mounting frame, spaced armatures carried by the control element and adapted to be influenced by the magnet as the same moves about its pivotal mounting and whereby the control element is moved from one limit of movement to the other in correspondence to the movement of the magnet, and means for moving the magnet.

5. A device of the character described, comprising a mounting frame having spaced arms, a control element pivotally mounted between said arms, a magnet pivotally mounted between said arms, means carried by the control element to provide spaced armatures adapted to be attracted toward the magnet as the magnet is moved whereby the control element is moved to and from a predetermined position, and means for moving the magnet.

6. A device of the character described, comprising a mounting frame having spaced arms, a magnet disposed between said arms, means pivotally mounting the magnet so that its pole piece is movable transversely on the mounting frame, a control element disposed between the arms on the mounting frame, means pivotally mounting the control element from said arms, means carried by the control element providing spaced armatures adapted to be attracted toward the pole piece of the magnet as the same is moved, means for moving the magnet to effect a corresponding movement on the part of the control element through the attraction of the magnet for one or the other armature, and cooperating means carried by the control element and the mounting frame for limiting the movement of the control element.

7. A device of the character described, comprising a supporting frame having spaced arms, a magnet disposed between the arms of the frame, means pivotally mounting the magnet from said arms so that its pole piece may be swung transversely on the frame, a member disposed between the outer ends of the arms, means pivotally mounting said member from said outer ends of the arms, spaced armatures carried by said member and adapted to be influenced by the magnet, means for limiting the movement of said member and defining two positions of rest, and means for moving the magnet, whereby the member carrying the armatures is moved from one position to another as the attraction of the magnet for one armature overbalances that for the other.

8. A device of the character described, comprising a frame having spaced arms, a magnet disposed between said arms, means pivotally mounting the magnet from said arms to permit its pole piece to be swung transversely of the frame, a control element disposed between the outer ends of the arms, means pivotally mounting the control element between the said arms, spaced armatures carried by the control element, said armatures being adapted to be influenced by the magnet to move the control element as the magnet is moved and engaging the arms of said frame to limit the movement of the control element and maintain the armatures at all times spaced from the magnet pole piece, and means for moving the magnet.

9. In a device of the character described, a permanent magnet, a control element having spaced armatures adapted to be influenced by the magnet, common supporting means for the magnet and the control element, means pivotally mounting the magnet and control element from said common supporting means

whereby the magnet may be moved to swing its pole piece in an arc to substantially align the same with either of the armatures and whereby the control element moves as the attraction of the magnet pole piece for one armature overcomes that for the other armature, and means for moving the magnet.

In testimony whereof I have hereunto affixed my signature.

GUSTAV O. WILMS.