

June 29, 1943.

DE WITT R. GODDARD

2,323,126

MULTITHROW RELAY

Filed Dec. 20, 1941

2 Sheets-Sheet 1

Fig. 1.

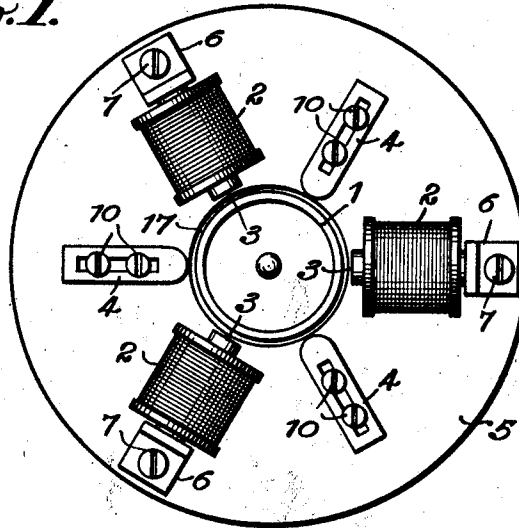
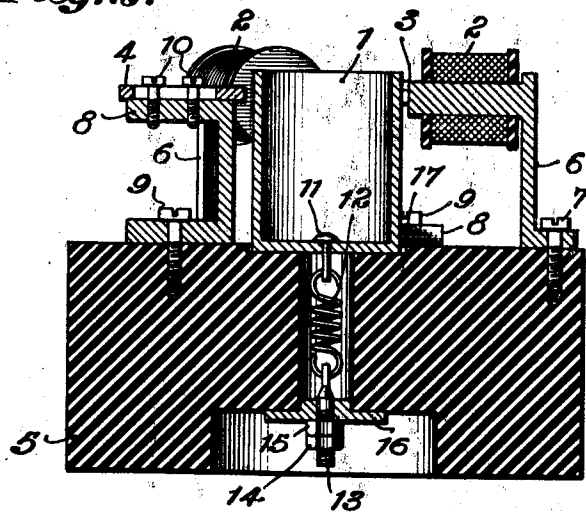


Fig. 2.



INVENTOR
De Witt R. Goddard
BY *H. S. Grover*
ATTORNEY

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DE WITT R. GODDARD

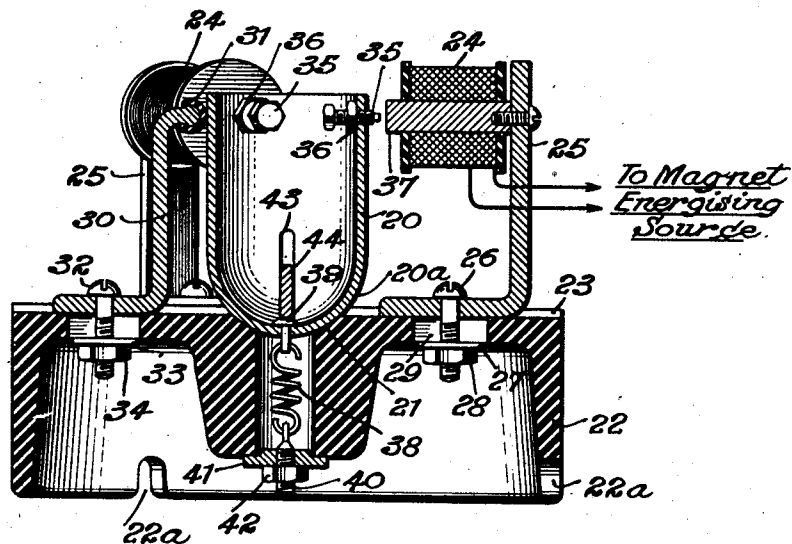
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Fig. 3.



INVENTOR
De Witt R. Goddard
BY *H. G. Grover*
ATTORNEY

UNITED STATES PATENT OFFICE

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MULTITHROW RELAY

De Witt Rugg Goddard, Riverhead, N. Y., assignor to Radio Corporation of America, a corporation of Delaware

Application December 20, 1941, Serial No. 423,711

9 Claims. (Cl. 200—98)

This invention relates to novel and useful multi-throw single pole electro-magnetic relays.

An object of this invention is to simplify and improve multi-throw relays.

Another object of this invention is to provide an improved and sensitive relay which is capable of instantaneously transferring a multiplicity of circuits for a diversity radio receiving system.

Still another object of this invention is the prevention of more than one pair of contacts meeting at a time.

This invention is a further improvement of my copending application Serial No. 420,927, filed Nov. 29, 1941, a feature of this invention being the system of a plurality of electro-magnets which are radially arranged around a single central armature.

Another feature of this invention is the novel supporting arrangement of a central cylindrical armature supported between several electro-magnets which are located in a plane perpendicular to the axis of the cylinder.

Multi-throw single pole relays of the prior art require a separate pivoted armature and a corresponding magnet for each contact throw position, whereas in my invention, only one armature is required, no pivots being employed, and but a single iron cylinder or armature resting on its base constitutes the only moving part.

This invention will best be understood by referring to the accompanying drawings, in which:

Fig. 1 is a plan view of a relay employing a cylindrical armature;

Fig. 2 is a vertical section through the relay indicated in Fig. 1; and

Fig. 3 is a sectional view of another modification of this invention.

Referring now in detail to Figs. 1 and 2, 5 is the insulating base of the triferential relay being described. 2, 2 and 2 are three electro-magnets equi-positioned about a cylindrical iron armature 1 which rests in the small depression 17 in the insulating base, and is held in this position by the action of spring 12, rivet 11 and the adjustable spring tension screw 13 and lock nuts 14 and 15 and washers 16. The motion of the armature is limited in scope by the three adjustable stops 4, 4, 4, one of which is shown in section in Fig. 2, where the stop bracket 8 is fastened to the insulating base 5 by means of screw 9. The adjustable stop, itself, is held on this bracket by screws 10. The electro-magnets are held in position by brackets 6, 6, 6, which in turn are fastened to the insulating base 5 by screws 7, 7, 7. They are located so that their pole faces 3, 3, 3

are in proximity to, but not in contact with, the armature.

Upon energizing any one of the magnets, the armature is drawn toward it till the armature makes contact with the pole face. While in this position, the armature is prevented from making contact with either of the other two pole faces due to the presence of the stops. It should be understood that the motion of the armature should preferably be one of tipping or leaning rather than that of sliding.

To facilitate good electrical contact, it would be desirable to plate or otherwise cover the pole faces and at least a portion of the armature with silver or some other metal of high conductivity.

Wire carrying the circuits to be switched would be connected to the bracket 6 and washer 16. Provisions for these connections are not shown, but may be of any suitable form known in the art.

The modification shown by Fig. 3 is somewhat similar in construction to the device shown by Figs. 1 and 2, except that the armature 20 has a ball-shaped lower end 20a which seats in a socket 21 located in the central portion of a molded insulating base 22 having a plurality of radially located slots 23. The magnets 24 are supported by upwardly extending metallic angle members 25 which are secured in the slots 23 by means of screws 26, washers 27 and nuts 28. Slots 29 provide adjustment for locating the position of magnets 24. Located directly opposite each one of the magnets 24 is an angle-shaped stop member 30 having a resilient end 31 which may be in the form of a rubber tip. Angle stop members 30 are secured in a similar manner to that of the angles 25 by means of screws 32, washers 33 and nuts 34. The upper portion of the central armature is threaded to receive adjustable contact screws 35 which are adjustably arranged and locked in position by means of nuts 36, to make contact with the contact portion 37 of the electro-magnets. To keep the contact screws 35 in line with the contact portion 37, armature 20 is provided with a vertical slot 43 in which is located a strip 44 having an end secured to base 22 by any suitable means, not shown. This arrangement prevents the armature from moving about a vertical axis with respect to the base.

The ball socket portion 20a is retained in operative engagement in the socket portion 21 by means of a cylindrical tension spring 38 which is retained at the upper portion thereof by means of a rivet 39 and at the lower portion is secured

to the insulating base 22 by means of a screw 39, bushing 40 and nut 41. Electrical connections are made to the common pole or armature 20 by means of suitable leads passing through slots 22a and are connected between bushing 40 and nuts 41. The electrical connection for the various throw positions is likewise passed through suitable leads which are clamped between washers 27 and nuts 28.

This modification, as well as that of the showing of Figs 1 and 2, should not be limited to three positions, for as mentioned in my copending patent application Serial No. 420,927, filed Nov. 29, 1941, any reasonable number of circuits may be used by adding the corresponding number of electro-magnets and stops. Where a large number of positions are desired, it may be necessary to slightly increase the outside diameter of armature 1 and in the case of Fig. 3, armature 20. Therefore, this invention should not be limited to the precise arrangement shown.

What is claimed is:

1. A relay device comprising a base member, a hollow cylindrical armature centrally located on said base member, spring tension means for retaining said armature to said base member, a plurality of electro-magnets surrounding said armature, and circuit-closing means electrically connected to said armature and to one of said electro-magnets whereby a circuit is completed therebetween when the electro-magnet is energized.

2. A multi-throw single pole relay comprising a base member, a hollow cylindrical armature centrally located on said base member, spring tension means for retaining said armature to said base member, a plurality of electro-magnets surrounding said armature, and circuit closing means electrically connected to said armature and to one of said electro-magnets whereby a circuit is completed therebetween when the electro-magnet is energized.

3. A relay device comprising a base member having a central depressed portion, a hollow cylindrical armature centrally located in the depressed portion on said base member, spring tension means for retaining said armature to said base member, a plurality of electro-magnets surrounding said armature, a plurality of adjustable contacts acting as circuit closing means for connecting said armature to one of said electro-magnets whereby a circuit is completed therebetween when said electro-magnet is energized.

4. A relay device comprising a base member, a hollow cylindrical armature centrally located on said base member, spring tension means for retaining said armature to said base member, a plurality of electro-magnets surrounding said armature, a plurality of adjustable contacts acting as circuit closing means for connecting said armature to one of said electro-magnets whereby a circuit is completed therebetween

when said electro-magnet is energized, and an adjustable armature stop located opposite each one of said electro-magnets.

5. A three-position single pole relay comprising a base member, a hollow cylindrical armature centrally located on said base member, spring tension means for retaining said armature to said base member, three electro-magnets radially surrounding said armature, said armature arranged to tip against said electro-magnets, a plurality of adjustable contacts acting as circuit closing means for connecting said armature to one of said electro-magnets whereby a circuit is completed therebetween when said electro-magnet is energized.

6. An electro-magnet relay device for a diversity receiving system comprising an insulating base member having a plurality of radially arranged slots on the outside surface thereof, spring tension means for retaining said armature to said base member, a plurality of electro-magnets located in said slots, a hollow cylindrical armature centrally located on said base member, and circuit closing means connecting said armature to one of said electro-magnets whereby an electrical circuit is completed therebetween when one of said electro-magnets is energized.

7. A relay device comprising a base member, a hollow cylindrical armature centrally located on said base member, a plurality of electro-magnets surrounding said armature, a stop member located opposite each one of said electro-magnets, spring tension means for retaining said armature to said base, and circuit closing means connecting said armature to one of said electro-magnets whereby an electrical circuit is completed therebetween when one of said electro-magnets is energized.

8. A multi-contact single pole relay device comprising a base member, a vertically arranged hollow cylindrical armature located on the central portion of said base member, a plurality of horizontally arranged electro-magnets surrounding said armature, and circuit closing means connecting said armature to one of said electro-magnets whereby an electrical circuit is completed therebetween when one of said electro-magnets is energized.

9. A relay device comprising a base member, a vertically arranged hollow cylindrical armature having a semi-spherical-shaped lower end located in the central portion of said base member, a plurality of horizontally arranged electro-magnets surrounding said armature, means secured to said base for preventing said armature from moving about a vertical axis, spring tension means securing said armature to said base, and circuit closing means connecting said armature to one of said electro-magnets whereby an electrical circuit is completed therebetween when one of said electro-magnets is energized.

DE WITT RUGG GODDARD.