

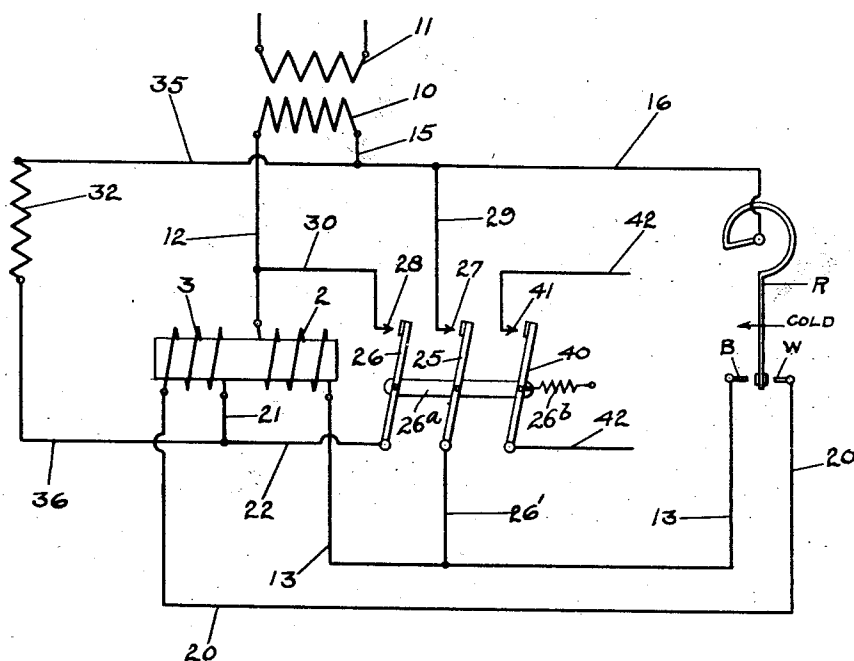
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CONTROL DEVICE

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UNITED STATES PATENT OFFICE

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CONTROL DEVICE

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This invention relates to improvements in control devices and has among its objects to provide a control circuit whereby devices which require different amperages may be operated from a single power source, and the operation automatically controlled by a switch-like device requiring only a minimum of current, and therefore in a manner to prevent fusing of the contacts.

Another object of the invention is to provide a control device in which a double contact thermostatic switch in which the contacts are alternately closable, can operate a relay in a manner to close the relay when one of the contacts is closed, and to cause an opening of the relay when the other contact closes, with an arrangement whereby when the control device is engaging neither contact, and after energization of the electro-magnetic device, said device is held in energized condition.

Features of the invention include the details of construction, although there is no intention to be limited to these details.

Objects and advantages will appear in the description of the drawing forming a part of this application, which drawing illustrates diagrammatically one form of the invention.

The device as now constructed comprises an electro-magnetic device having two coils wound on one core, and connected for opposite polarity. The device has the form of a relay, and includes the core 1 and coils 2 and 3 respectively. The coils are wound in multiple and are connected for opposite polarity. A thermostat or equivalent switch is used to control the coils and comprises a movable member R operating, in this instance, between contacts B—W. A single source of power is indicated at 10, in this instance the secondary of a transformer the primary of which is shown at 11. One side of 10 is connected by a conductor 12 with one end of coil 2, and the opposite end of coil 2 is connected by conductor 13 with contact B. The opposite side of source 10 is connected by a conductor 15 with line 16, which in turn is connected on one side with the movable element R of the switch. The contact W of the switch

is connected by a conductor 20 with one side of coil 3, the opposite side of which is connected by a conductor 21 with line 22. Operable by the electro-magnetic device including the coils 2 and 3, are a pair of switch arms respectively designated 25—26 operating against contacts respectively designated 27—28. These arms are connected as at 26a to move in unison, and are biased by gravity or by means of a spring 27b, acting on the connection 26a. Switch arm 26 may be considered the armature of the relay, the arm 25 being connected for movement by this armature. Contact 27 is connected by conductor 29 with line 16. Switch member 25 is connected by conductor 26' with line 13. Contact 28 is connected by conductor 30 with line 12 and armature 26 is connected with line 22.

The switch including the contact elements 25—27 is arranged to control power to coil 2 independently of the switch or thermostat which includes the elements R, B and W. This switch 25 closes on energization of coil 2, and simultaneously closes the switch comprising the members 26—28. This latter switch controls current from the source 10 to the coil 3, and when it closes, coil 3 is conditioned to receive current.

Operation

Again referring to the drawing: Assume a call for heat by the room thermostat, that is assume the element R sufficiently cold to move toward the left and engage the contact B. Energization of coil 2 will take place in the following manner: 10, 12, 2, 13, B, R, 16, 15, to 10. At the same time switches 25 and 26 will close. Now assume that element R is heated and moves, for instance to the position shown in the figure where it does not engage either of the contacts. Under these conditions, coil 2 will remain energized through the following circuit: 10, 12, 2, 13, 26', 25, 27, 29, 16, 15 to 10. Now suppose the thermostat to heat sufficiently to engage contact W. Coil 3 will be energized in the following manner: 10, 12, 30, 28, 26, 22, 21, 3, 20, W, R, 16, 15 to 10. However on energization of coil 3, the magnetic effect of coil 2 is sufficiently an-

nulled to permit the biased switches 25 and 26 to open. As the result, the system will again assume the condition shown in the drawing, except that element R under these conditions will be engaging contact W. Upon re-cooling of element R there is no action until R makes at B, when the cycle will be repeated as above described.

The device also provides means whereby a room thermostat can control an electrically operable device such as a valve having a coil 32, to furnish fuel to a combustion apparatus whenever, for example, the switch 26 is closed, and to interrupt fuel supply whenever the magnetic effect is annulled, for example if the element R of the room thermostat is sufficiently hot to engage at W. Fuel is supplied whenever the room thermostat is sufficiently cold to make contact at R—B. This is a valuable feature of the invention, but it will be understood that the device may be used for other purposes.

Another feature of the invention is the arrangement whereby the thermostat, handles only the loads of coils 2, 3, which loads are relatively small, in this instance about one-fourth of an ampere, while the valve coil 32 carries about two amperes. In other words, the larger loads are arranged in this circuit so that they are never handled through contacts B—W but through switch 26. Therefore, the thermostatic control circuit is never operated at an amperage sufficiently high to fuse the contacts of the thermostat, notwithstanding the fact that all circuits are operated from a common power source. Tracing the circuit for the coil 32 of the valve when the switch 26 is closed: source 10, 15, 35, 32, 36, 22, 26, 28, 30, 12 to 10.

It is also conceivable that the armature or switch arm 26 can operate an auxiliary contact or switch arm 40 which operates against a contact 41 to control any other kind of a circuit generally indicated at 42. Although the element 40 has been shown in a position to close when the switch arms 25 and 26 close, it is evident that the contact could as well be made to open. It is also evident that the character of all contacts may be varied, and the number changed to suit conditions.

Although in the present instance two coils have been wound in multiple on one core, or in one relay, and have been connected for opposite polarity, it is conceivable that other arrangements may be had in which electromagnetic effects can be produced to operate the switches, and that other means may be used for annulling these effects through operation of a separate contact of a thermostatic switch or equivalent device through a contact corresponding in the present circuit to contact W. There is no intention to be limited to the exact construction shown.

I claim as my invention:

1. A device of the class described compris-

ing an electric power source, a relay having an operating and a bucking coil, a contact controlled by the relay, a switch having first and second contacts respectively controlling initial energization of said relay by energization of said operating coil, and de-energization of said relay by energization of said bucking coil, an electric load, and circuit connections adapted to initially energize said operating coil independently of said relay contact, and energize said load circuit through said relay contact, and on closure of the second contact to energize said bucking coil also through said relay contact.

2. A device of the class described comprising an electric power source, a relay having an operating and a bucking coil, a contact controlled by said relay, a switch having contacts respectively adapted to control initial energization of said relay by energization of said operating coil, and de-energization of said relay by energization of said bucking coil, an electric load, and circuit connections adapting one switch contact to initially energize said operating coil independently of the relay contact and energize said load through said relay contact as the result of relay closure, and adapting the other switch contact to energize said bucking coil also through said relay contact.

3. A relay having an operating and a bucking coil and controlling two contacts first and second, a switch having first and second contacts, an electric load, an electric power source, an initial energizing circuit for the operating coil including the first contact of said switch, a holding circuit for said operating coil including the first contact of said relay, a circuit for said electric load which includes the second contact of said relay, and an energizing circuit for said bucking coil which includes therein said second relay contact, and the second contact of said switch.

In witness whereof, I have hereunto set my hand this 26th day of June, 1928.

GEORGE D. BOWER.