

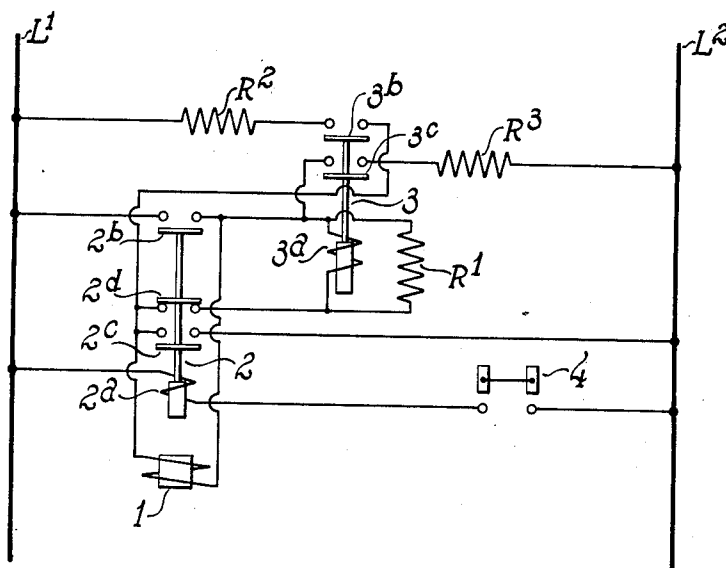
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**1,923,311**

# CIRCUIT CONTROLLER FOR LIFTING MAGNETS

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## UNITED STATES PATENT OFFICE

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CIRCUIT CONTROLLER FOR LIFTING  
MAGNETS

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1 Claim. (Cl. 175—335)

This invention relates to improvements in circuit controllers for lifting magnets or other inductive devices.

Lifting magnet controllers usually provide for temporary reversal of the current supplied to the magnet winding to effect quick dropping of the load and during the interval that the current is reversed a discharge circuit is established to prevent excessive induced voltages in the magnet winding and its associated control circuits.

The present invention has among its objects to provide an improved controller for effecting control of lifting magnets or other inductive devices in the manner above set forth.

Another object is to provide a controller of the aforesaid character which acts automatically upon disconnection of the lifting magnet from its supply circuit to establish a discharge circuit for the magnet winding and to also reverse the current supplied to the magnet winding for a period which varies in accordance with the value of the induced current in the discharge circuit.

Various other objects and advantages of the invention will hereinafter appear.

The accompanying drawing diagrammatically illustrates an embodiment of the invention which will now be described, it being understood that the embodiment illustrated may be modified without departing from the spirit and scope of the appended claim.

Referring to the drawing, the lifting magnet is represented by a winding 1 to be supplied with current from lines  $L^1$ — $L^2$ .

The controller comprises electroresponsive switches 2 and 3, the former switch having an operating winding  $2^a$  under the control of a master switch 4, and the latter switch having an operating winding  $3^a$  to be included in a discharge circuit for the magnet winding 1. Switch 2 is provided with normally open contacts  $2^b$  and  $2^c$  for connecting magnet winding 1 across lines  $L^1$ — $L^2$  during load lifting operations, and said switch is also provided with normally closed contacts  $2^d$  for establishing a discharge circuit for said winding including a resistance  $R^1$ . Switch 3 provides for reversal of the current supplied to magnet winding 1, and the same is provided with normally open contacts  $3^b$  and  $3^c$  for connecting said winding across lines  $L^1$ — $L^2$  through resistances  $R^2$  and  $R^3$  and has its operating winding connected in shunt with resistance  $R^1$ .

The function and operation of the aforesaid controller will now be more fully described. To energize the magnet winding for lifting master switch 4 is moved to closed position

and the operating winding  $2^a$  is then connected directly across lines  $L^1$ — $L^2$  to effect response of switch 2. Upon response of switch 2 magnet winding 1 is energized by a circuit extending from line  $L^1$  through contacts  $2^b$  to and through the magnet winding 1, and through contacts  $2^c$  to line  $L^2$ .

To release a load carried by the lifting magnet master switch 4 is moved to open position and switch 2 then returns to normal position. Switch 2 in its normal position establishes a discharge circuit for magnet winding 1 extending from the left hand terminal of said winding through contacts  $2^d$  and in parallel through resistance  $R^1$  and winding  $3^a$  to the right hand terminal of said magnet winding. The value of the resistance  $R^1$  is such as to prevent excessive induced voltages in the discharge circuit and upon establishment of such circuit winding  $3^a$  is adapted to effect response of switch 3. Switch 3 in responding establishes an energizing circuit for magnet winding 1 extending from line  $L^1$  through resistance  $R^2$  through contacts  $3^b$  to and through said magnet winding and through contacts  $3^c$  and resistance  $R^3$  to line  $L^2$ . The current supplied to the magnet winding 1 is thus reversed to provide for quick dropping of the load and when the current in the above described discharge circuit drops to a given value switch 3 drops out to disconnect said magnet winding from lines  $L^1$ — $L^2$ . The interval during which switch 3 is maintained in closed position is thus dependent upon the time required for the current in the discharge circuit to die down to the value at which switch 3 is adapted to drop out, and as is apparent, such interval varies in accordance with the total flux in the magnetic circuit of the magnet winding at the moment the magnet winding is deenergized by switch 2.

It should be noted in connection with the foregoing that since switch 3 is controlled by current in the discharge circuit the same cannot remain in closed position for a period sufficient to effect reversal of the direction of the flux in the magnetic circuit of winding 1. It should also be noted that while the operating winding of switch 3 is shown as being connected in shunt with resistance  $R^1$  said switch will function in the manner above set forth if its operating winding is connected in series with said resistance.

What I claim as new and desire to secure by Letters Patent is:

The combination with an inductive winding and a supply circuit therefor, of a pair of separately operable electroresponsive switches for selectively

establishing reverse power connections for said winding, each of said switches including a pair of normally open contacts for connecting the terminals of said winding to opposite sides of said supply circuit, and one of said switches having normally closed contacts for establishing a dis-

charge circuit for said winding including the operating winding of the other of said switches, and a two-position master switch for establishing and interrupting the energizing circuit of said first mentioned switch.

HOWARD E. HODGSON.

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| 10 | 85  |
| 15 | 90  |
| 20 | 95  |
| 25 | 100 |
| 30 | 105 |
| 35 | 110 |
| 40 | 115 |
| 45 | 120 |
| 50 | 125 |
| 55 | 130 |
| 60 | 135 |
| 65 | 140 |
| 70 | 145 |
| 75 | 150 |