J. F. MOTZ.

LIFTING MAGNET CONTROLLER.

APPLICATION FILED DEC. 17, 1907.

960,995. Patented June 7, 1910.

FIG. 2.

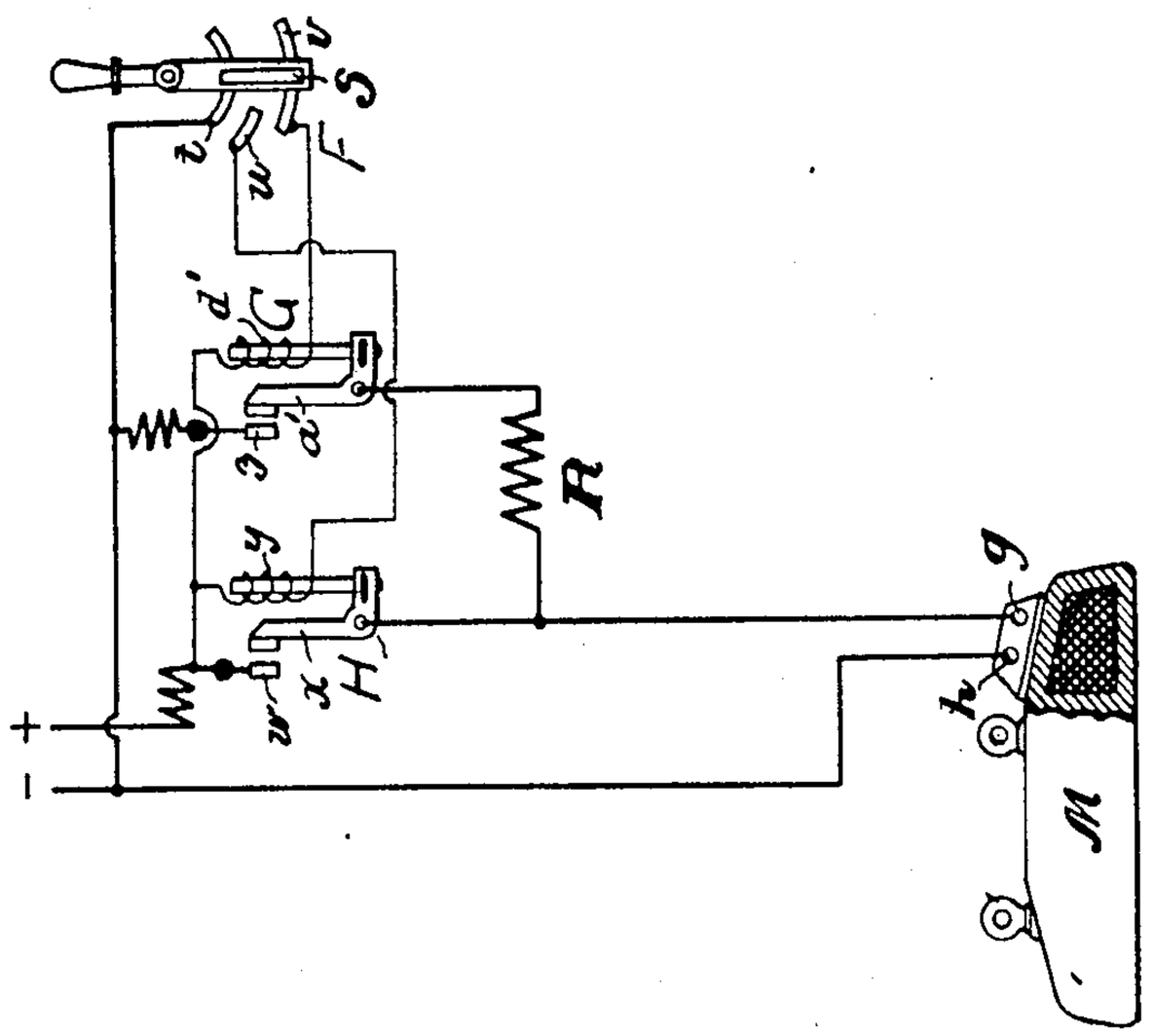
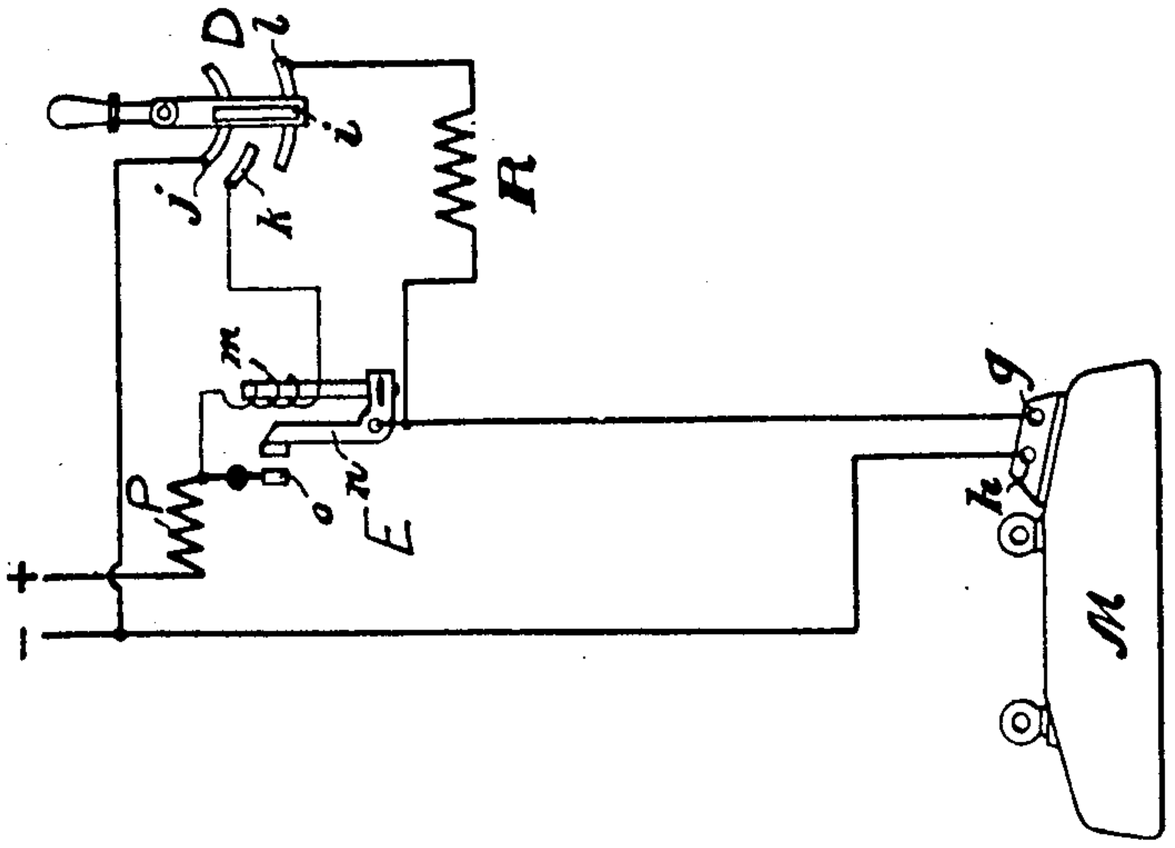



FIG. 1.




WITNESSES:

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# UNITED STATES PATENT OFFICE.

JACOB F. MOTZ, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO THE ELECTRIC CONTROLLER AND SUPPLY COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

## LIFTING-MAGNET CONTROLLER.

960,995. Specification of Letters Patent. Patented June 7, 1910.

Application filed December 17, 1907. Serial No. 406,851.

*To all whom it may concern:*

Be it known that I, JACOB F. MOTZ, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered new and useful Improvements in Lifting-Magnet Controllers, of which the following is a specification.

In the operation of lifting magnets, I have found that when the current is quickly broken, a high inductive voltage is generated in the magnet windings. This voltage I have measured and found it to be several times the normal voltage with which the magnet is excited. The presence of this high voltage I have found puts a strain on the insulation of the magnet winding and on the wires going to the magnet. In the past it has been the practice to introduce a resistance in series with the magnet before opening its circuit. This decreases the current in the magnet and this reduces the inductive voltage generated when the circuit is finally opened. To introduce resistance in series with a magnet as described above, requires the use of some form of controller having a rather large number of steps and a bank of resistance with a corresponding number of sub-divisions. Even then the purpose of the controller can be defeated by a careless operator who may open the circuit of the controller so quickly that the current cannot be reduced to its proper value (due to the inductive effect of the magnet) and a severe flash will occur in the controller and a high inductive voltage be generated in the magnet. To overcome these difficulties, I have devised for magnets a controller that is independent of the speed, with which the operator moves the controller. This controller is simpler and smaller than a controller which inserts resistance in series with the winding of a magnet before opening the circuit of the same.

Referring to the drawings, Figures 1 and 2 are diagrammatic views showing two of the many forms which my invention may assume.

Referring now to Fig. 1, I use a master switch or controller D and an electro-magnetically operated switch E. To energize the magnet, the handle of the switch D is moved to the right so that the blade *i* makes connection with the contacts *j* and *k* and leaves connection with contact *l*. Current will then flow from plus line through the coil *m* of switch E, the contact *k* of the switch D, the blade *i*, and the contact *j* to the negative main. This will energize the coil *m* of the switch E and cause the arm *n* to make connection with the contact *o*, which is joined to the positive main through the blow-out coil P. Current will then flow as follows: from the positive main through the contact *o*, the arm *n*, and the magnet M to the negative main. To deënergize the magnet, the handle of the switch D is placed in the position shown and the magnet discharges as follows: from the terminal *g* to the lower terminal of the switch E, through the resistance R to the contact *l* of switch D, through the blade *i* to the contact *j*, and thence to the terminal *h* of the magnet. It is to be noted that contacts *k* and *l* overlap so that the resistance R is inserted before the switch E is opened. Switch E can be made to open quickly and may have the blow-out coil P attached to extinguish quickly any arc formed at its contacts. Thus it will have a longer life than a switch with the time of opening dependent on the operator, who may cause it to open slowly and the arc to endure for a longer time.

Still another arrangement of my invention is shown in Fig. 2. In this arrangement I use two electro-magnetically controlled switches, a master switch or controller, and a bank of resistance. To energize the magnet the handle of switch F is moved to the right so that the blade *s* makes connection with terminals *t* and *u*. Current then flows as follows: from the positive main through the coil *y* of the switch H, the contact *u* of switch F, the blade *s*, and the contact *t* to the negative main. This closes the switch H and the current flows through the magnet as follows: from the positive main through the contact *w* of the switch H, the arm *x*, and the magnet to the negative main. To deënergize the magnet, the handle of the switch H is moved to the left until it assumes the position shown, when the blade *s* makes connection with the contacts *t* and *v*. The current then flows from the positive main through the coil *d'* of the switch G, the contact *v* of the switch F, the blade *s*, and the contact *t* to the negative main. The magnet then discharges as follows: from the terminal *g* through the resistance R, the arm *a'* of the switch G,

the contact *z* to the terminal *h* of the magnet.

In both of the figures and description, I have shown and spoken of the contacts on the master controller or switch as overlapping. It is obvious that this is not absolutely necessary.

I claim—

1. The combination of a lifting magnet having therein an energizing winding, a magnetically operated switch for connecting the winding of the lifting magnet to a source of current, a bank of resistance, and a manually operated controlling switch, said controlling switch being provided with contacts whereby, when it is moved from its off-position, the winding of said magnetically operated switch is energized and the circuit closed through the winding of said lifting magnet, and when said controlling switch is moved to its off-position, the said bank of resistance is connected across the terminals of the winding of said lifting magnet through certain of the contacts of said controlling switch.

2. The combination of an electric apparatus having an inductive winding, a magnetically-operated switch connecting a source of electric energy to the said winding, a resistance, and a controlling hand-operated switch having contacts arranged to close a circuit across the line whereby, when it is moved from its off-position, the winding of the magnetically operated switch is energized and circuit closed through the said inductive winding, and when said controlling switch is moved to its off-position, the said resistance is connected across the terminals of the said inductive winding.

3. The combination of an electric device having an inductive winding, a magnetically-operated switch connecting a source of energy to the said winding, a resistance, a second magnetically-operated switch having contacts arranged to connect the said inductive winding and the resistance in a closed circuit, and a hand-operated switch having contacts for closing the first magnetically-operated switch to energize the said electric device and for closing the second magnetically operated switch to connect the said winding and resistance in said closed circuit when the contacts of the first magnetically operated switch are opened.

Signed at Pittsburg, Pa., this 9th day of December, 1907.

JACOB F. MOTZ.

Witnesses:
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ANNA R. BEATTY.