H. K. KOUYOUMJIAN.

ELECTROMAGNET CONTROLLING DEVICE.

APPLICATION FILED JAN. 18, 1911.

1,042,691.

Patented Oct. 29, 1912.

FIG. 1.

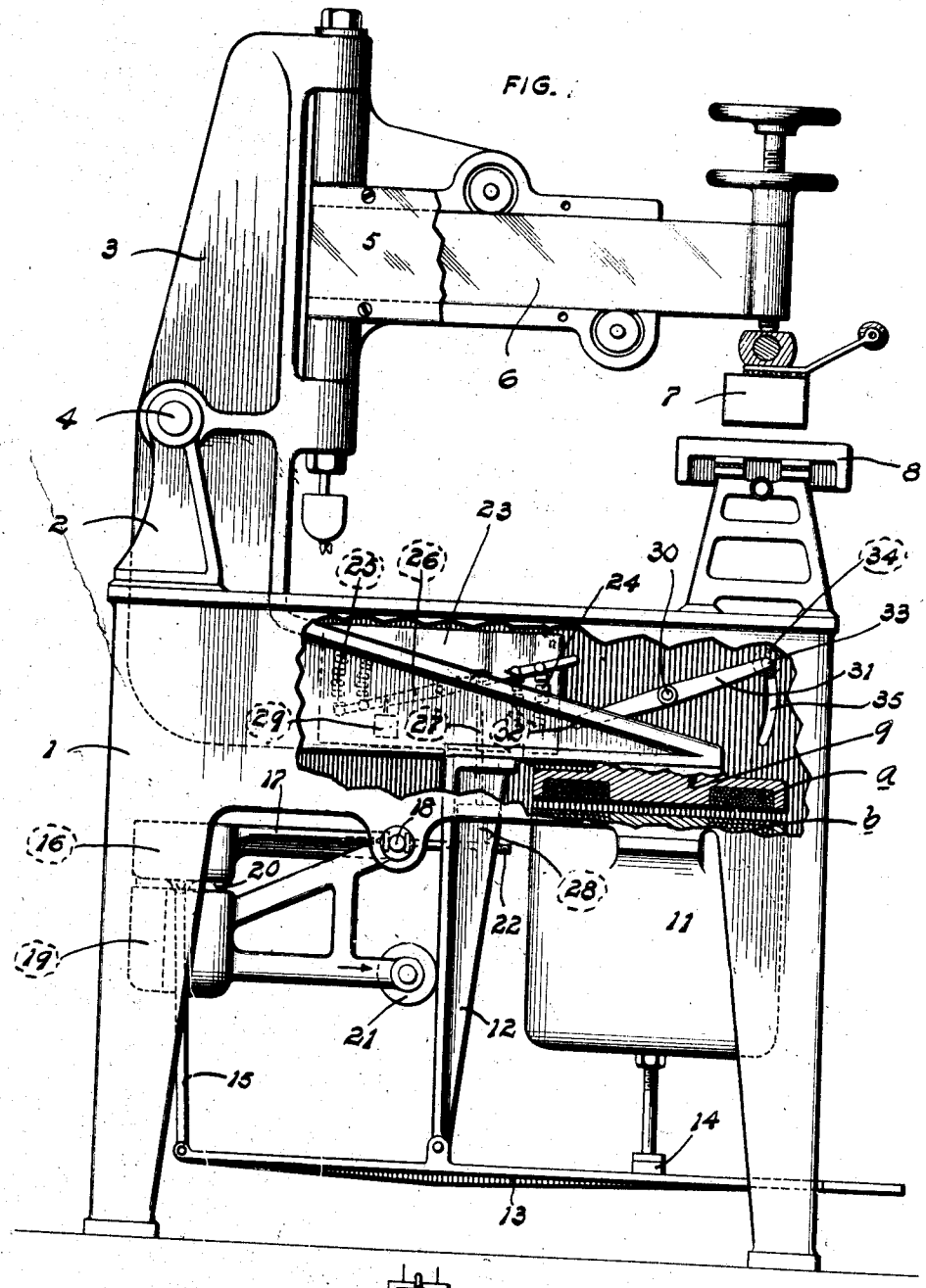
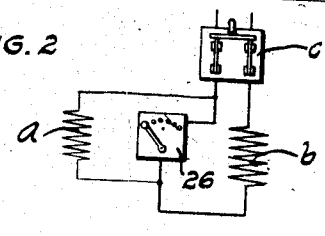


FIG. 2



WITNESSES

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UNITED STATES PATENT OFFICE.

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ELECTROMAGNET CONTROLLING DEVICE.

1,042,691. Specification of Letters Patent. Patented Oct. 29, 1912.

Original application filed January 29, 1910, Serial No. 540,820. Divided and this application filed January 18, 1911. Serial No. 603,388.

To all whom it may concern:

Be it known that I, HAROUTIUN K. KOUYOUMJIAN, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Electromagnet Controlling Devices, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevational view, partly in section, of my improved device as applied to a press; Fig. 2 is a diagrammatic view of the electric circuit.

This invention relates to a new and useful improvement in an electromagnet controlling device.

In the drawings I have shown my improvement as applied to a clothes pressing machine, in which there is an iron capable of being subjected to variable pressure, but it is obvious that in lieu of an iron, a cutting die could be employed, and it is equally obvious that the improved form of electromagnet controlling device illustrated in the drawings could be used in connection with other and very different types of machines.

The object of my present invention is to construct a controlling device actuated by electricity in such a manner that after the controlling device has performed its function, it may be rendered ineffective almost immediately to allow the tool or other device actuated by the controlling means to be operated independently of the electromagnet.

The present application is a division of my application filed January 29, 1910, Serial No. 540,820.

In the accompanying drawings, 1 indicates a supporting frame having standards 2, between which standards is pivoted a main lever 3 on a shaft 4.

5 is an arm swingingly mounted upon a vertical pivot in the upper end of the lever 3, said lever carrying a telescoping member 6, on the outer end of which is positioned an iron die or tool 7.

8 is the work table on which the material to be acted upon is placed.

The lower end of the lever 3 extends forwardly and carries an armature disk 9 in which is arranged a magnetically high resistance coil *a*.

11 is an electromagnet secured in position within the frame 1 and having a coil *b* thereon of comparatively low resistance. When the magnet 11 is energized through a current passing through the coil *b*, it attracts the armature 9 and operates the main lever 3.

12 is a bracket extension on the forwardly extending main lever 3, said bracket extension having a foot lever 13 mounted at its lower end, the forward end of which foot lever is provided with a treadle on which the operator may place his foot. An adjustable rubber buffer 14 limits the upward movement of the foot lever. A link 15 is connected to the rear end of the foot lever and to a box 16 constituting a weight, which box is mounted upon the end of a lever 17 pivoted upon a fulcrum rod or shaft 18. The box 16 is preferably filled with shot so that its weight may be varied. Primarily, the weight 16 serves as a counter-balance for the lever 13, lifting the forward end of said lever, as shown in Fig. 1; secondarily, the weight 16 coöperates with the weight 19 in the form of a box containing shot, and assists in counter-balancing the main lever 3. Weight 19 is preferably immediately under weight 16 and provided with a rubber buffer ring 20. Weight 19 is pivotally supported upon the shaft 18 and provided with an extension in which is mounted a roller 21, which roller bears upon the rear face of the bracket 12. The weight 19 tends to move the roller 21 in the direction of the arrow against the bracket 12, and this movement elevates the foot of the main lever and tends to raise the tool 7. When the operator depresses the forward end of the lever 13, the first action is to swing the main lever 3 and the bracket 12 rearwardly, thus raising the weights 16 and 19. Further pressure of the foot lever 15 causes the weight 16 to elevate which movement actuates the rheostat and cuts in the current. The tool end of the main lever with weight 16 removed overbalances the weight 19. When the operator removes his foot from the lever 13 and permits the weight 16 to descend, it will engage weight 19, and the combined weights 16 and 19 will overbalance the tool end of the main lever and raise said end.

When the operator raises weight 16 to permit the tool end of the main lever to descend, lever 17 causes the shaft 18 to which it is fixed to rock, and a rod 22 on said shaft has its forward end depressed.

Mounted upon the frame 1 is a rheostat 23 provided with oppositely arranged contact points 24 and 25. Pivotally mounted on the exterior of the rheostat is a contact arm 26 adapted to engage with the contact points 24 and 25 at either end. Connected in any suitable manner to the contact arm 26 is a rod 27 passing down through an opening in the rod 22 and having a weight 28 attached thereto in contact with the rod 22. A weight 29 is attached to the contact arm 26 on the opposite side of the pivot point from the connection of the rod 27 to said arm. The parts 26 and 27 are arranged to allow of a slight lost motion therebetween.

Pivoted at 30 on the frame 1 is an adjustable stop arm 31, having one end 32 adapted to be positioned in the path of movement of one end of the contact arm 26. The opposite end 33 of the arm 31 is provided with an end piece and milled nut 34 connected with the arm through a curved slot 35 in the frame 1.

The extent of movement of the rheostat or contact arm 26 is directly under control of the operator through the foot lever 13, so that the operator can apply as little or as much pressure on the tool 7 as desired. The weight 29 will return the rheostat or contact arm so as to cut in resistance when the forward end of the foot lever is raised. The weight 29 is, of course, overbalanced by the weight 28 when the foot lever is depressed.

The stop arm or lever 31 may be adjusted to any desired position by clamping the milled nut 34 so as to determine the amount of movement of the rheostat or contact arm 26 as the end of the arm adjacent said stop lever moves downward. By this means the maximum limit of pressure may be predetermined. For instance, if magnet 11 is sufficiently powerful to exert four thousand pounds pressure on the tool 7, and it is desired to exert not more than two thousand pounds pressure on said tool, then the lever 31 can be adjusted in the proper position to arrest the rheostat or contact arm when sufficient resistance is cut out of the circuit to energize the magnet 11 to the proper amount. Thus, it is not necessary for the operator to hold the foot lever 13 stationary to maintain two thousand pounds pressure on the tool 7. The foot lever may be depressed the full limit, but movement of the rheostat or contact arm 26 will be stopped by engagement with the lever 21, which permits the magnet 11 to be energized only by the necessary amount of current to give the desired pressure. The magnet 11 becomes magnetically saturated, and its action in releasing the armature is tardy. To overcome this saturation so that the magnet 11 will release instantly, I arrange a high resistance coil *a* in the armature 9, which, when energized, repels the core of the magnet 11 and not only neutralizes the magnetic saturation referred to, but by such repulsion assists in separating the armature and the magnetic core. To accelerate this release of the armature, the jar or impact of the weight 16 on the weight 19 is utilized, and when such jar or impact takes place, the armature 9 will be suddenly moved or "kicked" off the magnet 11.

In Fig. 2 is shown the electric circuit connecting the line with the rheostat and the coils on the electromagnet and armature. By this figure it is seen that as the rheostat resistance is cut down, the current flowing through the coil *b* is increased and that through coil *a* is decreased. Likewise, as the rheostat resistance is increased, the current flowing through coil *b* is decreased and that through coil *a* is increased. There is an ordinary hand switch *c* in this circuit, whose purpose is well understood.

The weight 19 is resisted in its upward movement when the tool 7 contacts with the material to be operated upon, and the continued movement of the weight 16 in an upward direction causes the rheostat or contact arm to operate so that the operator has control of this arm independently of any movement of the main lever. When the operator raises his foot to release the foot lever, the first action is to cause the weight 16 to strike the weight 19, whereby a jar is imparted to the armature 9, causing the magnet 11 to lose its magnetic saturation, and provides for a quick separation of the armature and magnet.

I prefer to have the number of turns in the high resistance coil *a* equal to the number of turns of the main winding *b* of the main magnet, so that, when the two magnets are in series, which will occur when all of the resistance of the rheostat is cut into the magnet circuit, the repelling action of the high resistance magnet is equal to the attraction of the main magnet, and hence the two forces, one pulling and the other pushing, are practically neutralized and the parts are held in a position of equilibrium. Whenever the rheostat arm is moved to cut down the rheostatic resistance, it is obvious that the current choked back from the high resistance coil *a* will pass through the coil *b*, so that its attraction to the opposing magnet will preponderate, and the opposing magnet, herein described as the armature, will be attracted and the main lever overbalance under this slight pressure. As more rheostatic resistance is cut out, the preponderating influence in coil *b* will correspondingly

increase, until finally, the absence of rheostatic resistance will cause practically all of the current to pass through the coil *b*, the self-resistance of coil *a* preventing the passage of any current therethrough. As the rheostatic resistance is cut in, the preponderating influence of coil *b* is correspondingly decreased, until substantially all of the current is forced through the high resistance coil *a* now in series with the coil *b*, when the repelling and attraction forces before described will equalize each other. In this manner, the armature 9, in effect, becomes a magnet of the repelling force when in series with the main magnet and the extent of this magnetic repulsion is decreased. The said armature becomes increasingly susceptible to the attracting influence of the main magnet.

I claim:

1. In a device of the character described, the combination of a lever having an armature attached, an electro-magnet coöperating with said lever, and weights acting in combined sequence upon said lever to cause a quick separation of the armature and magnet when the current in the magnet is cut down.

2. In a device of the character described, the combination of a lever having an armature attached, an electro-magnet coöperating with said armature, means acting upon said lever to control the position thereof and simultaneously to regulate independent of the position of said lever the current passing through the electro-magnet.

3. In a device of the character described, the combination of a lever having an armature attached, an electro-magnet coöperating with said armature, a rheostat in circuit with said electro-magnet constituting means for controlling the position of the lever, and means operating upon the rheostat independently of the lever to control the current through the electro-magnet.

4. In a device of the character described, the combination of a magnet having a coil wound thereon, an armature having a coil wound thereon, and a rheostat placed in series with the coil on the magnet and in parallel with the coil on the armature.

5. In a device of the character described, the combination of a main magnet, a movable armature containing a high resistance winding, means for introducing resistance into the circuit which includes the main magnet, whereby the high resistance winding becomes effective, and means for cutting out the resistance in the main magnet circuit, whereby the high resistance winding becomes ineffective and said armature is attracted to the main magnet.

6. In a device of the character described, the combination of a lever having an armature attached, an electro-magnet coöperating with said lever, a counterbalancing weight acting upon said lever at all times, means for controlling the flow of current to said electro-magnet, and a second weight operatively connected with certain of said current-controlling means and adapted to cooperate with said first-mentioned weight to cause a quick separation of the armature and magnet when the current in the magnet is cut down.

7. In a device of the character described, the combination of a lever, electro-magnetic means for operating said lever, means for controlling said electro-magnetic means, a counterbalancing weight normally coöperating with said lever, and a secondary weight normally coöperating with said counterbalancing weight, said secondary weight being rendered ineffective when said controlling means is operated.

8. In a device of the class described, a pivoted lever, an armature carried by said lever and including an electro-magnet, a principal electro-magnet coöperating with said armature, mechanically operable means coöperating with said lever to control the position of the armature, and means for simultaneously operating said mechanically operable means and regulating the current in the electro-magnet and the armature.

In testimony whereof I hereunto affix my signature in the presence of two witnesses, this thirty first day of December, 1910.

HAROUTIUN K. KOUYOUMJIAN.

Witnesses:
ROBERT WILLIAMS,
GEO. F. POUTIUS.