

Nov. 3, 1931.

P. TROMBETTA

1,830,628

SOLENOID MAGNET

Filed Nov. 26, 1929

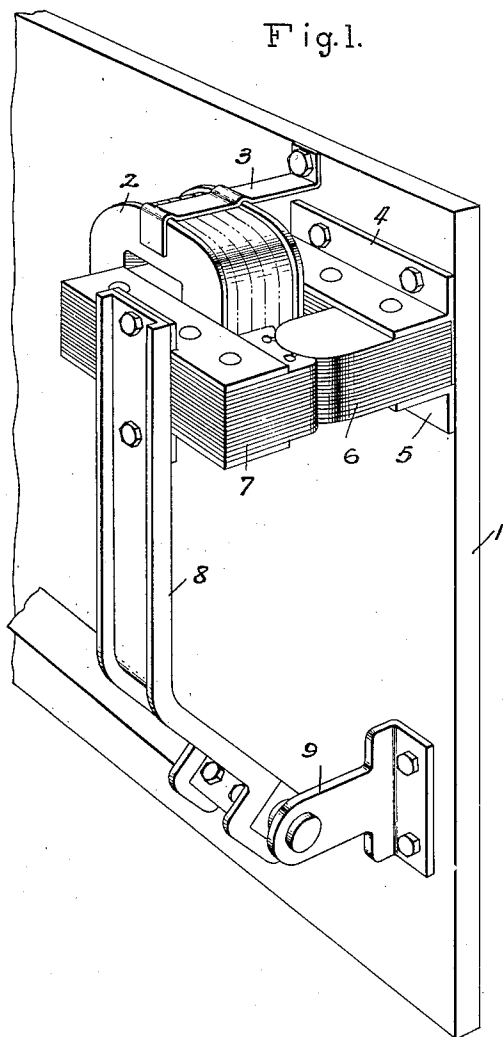


Fig. 2.

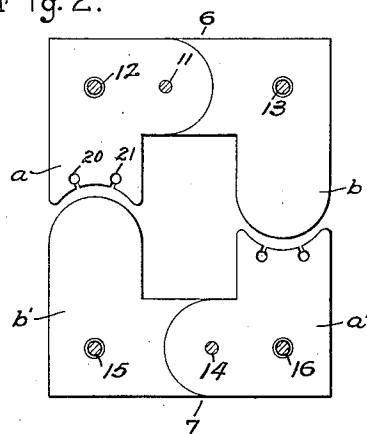
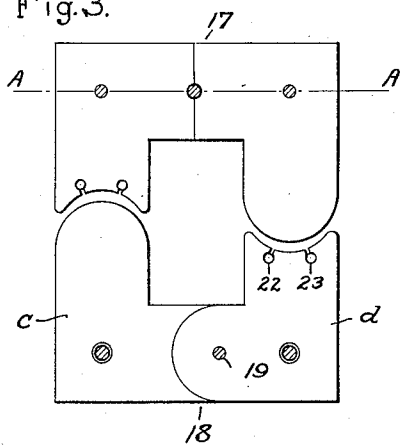


Fig. 3.



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UNITED STATES PATENT OFFICE

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SOLENOID MAGNET

Application filed November 26, 1929. Serial No. 409,970.

My invention relates to electromagnetic devices and particularly to the operating magnets thereof.

In the construction of armatures and cores for use in alternating current electroresponsive devices such as switches, circuit breakers and the like, great care has heretofore been necessary in making the punchings and assembling the same.

Unless the punchings were perfectly aligned in forming the electromagnet during assembly it was necessary to file the faces so that the fit between the movable armature and the stationary frame was very accurate since an uneven fit of these surfaces caused chattering and noise when the armature was operated to closed position. This was quite a task and consumed in large assemblies up to as much as two days by skillful workers. Such a core was, of course, an expensive product.

An object of my invention is to provide an electromagnet with an armature and frame which can be easily constructed and upon which no time need be spent on aligning after assembly of the punchings.

A further object of my invention is to provide an armature which will not chatter upon closing but will be quiet during operation.

Another object of my invention is to provide a self-aligning magnetically operated armature.

In the drawings, Fig. 1 represents an assembly using my invention. Fig. 2 shows a detail of the armature punching. Fig. 3 shows a modification of the device as shown in Fig. 2.

Briefly, in the preferred embodiment of my invention, the electromagnet consists of two similarly shaped magnetic members one of said members being the armature and the other the stationary frame, each of said members being provided with a pair of legs. One of said legs is provided with a convex face and the other of said legs is provided with a concave face. These sections are formed of a plurality of punchings and in the assembly the two legs are pivoted to each other permitting movement of the legs in a plane parallel to the legs. When the armature and

frame are brought together, if there is any unevenness in the fit of the surfaces of the cooperating legs, the pivoted connections permit the legs to adjust themselves about the pivot to provide a close fit of the concave and convex faces thereof. This close fit, of course, eliminates the chatter which was present in previous devices of this kind.

Referring specifically to the drawings, Fig. 1 represents an assembly the base of which is designated by the numeral 1. An electromagnet coil 2 which operates the device is mounted on the base 1 by means of a bracket 3. The stationary frame is mounted on the base 1 by means of brackets 4 and 5. The cooperating armature 7 is attached to the pivoted member 8 which is supported by bracket 9 mounted on the base 1. Upon excitation of the electromagnetic device 2, the armature 7 is pivoted into contact with the frame 6, the self-adjusting feature of the armature and magnet permitting a close fit which eliminates chatter.

Referring to Fig. 2 it will be seen that the frame 6 and the armature 7 comprise the legs *a* and *b* and *a'* and *b'* respectively which are built up of similar shaped punchings. The legs of the frame 6 are pivotally connected by means of the pin 11 extending therethrough. Pins 12 and 13 assist in holding the assembled punchings in the brackets 4 and 5. The armature 7 consists of the legs *a'* and *b'* which are pivotally connected by means of the pin 14. The pins 15 and 16 have the function of holding the punchings in the brackets in the assembly. Around pins 12, 13, 15 and 16 are small clearances to permit pivotal movement of the legs during adjustment. Of course the pivotal movement takes place with much resistance due to friction, thereby making it unlikely that the frame and armature will return to unadjusted position.

Fig. 3 shows a modification of the frame and armature used with this device. The parts *c* and *d* of the armature 18 are pivoted at 19 permitting the legs to pivot in a plane parallel to the legs. Frame 17 is mounted to pivot about the axis A—A which permits this section to take care of any slight amount

of twist which may exist between the frame and armature.

The usual pole shaver elements, such as 20, 21, 22, and 23 are shown in the pole faces.

When the armature and frame are brought together during operation if the faces on the legs do not fit exactly, the legs will assume a position automatically to form a close fit between the faces. The frame and armature are forced together and the pivot permits the two legs of each to move so that the surfaces on the legs will slide over each other until a position of equilibrium has been reached. The shape of the faces results in a close fit because they tend to cause the legs to move to a position of equilibrium. It will be readily seen that if the concave and the convex faces come into contact such that only the point is in contact, the unbalanced forces will cause the two faces to slide over each other into close engagement. The movement necessary for this operation is permitted by the pin which joins the two pivoted legs together.

The embodiment of the invention illustrated and described herein has been selected for the purpose of clearly setting forth the principles involved. It will be apparent, however, that the invention is susceptible to being modified to meet different conditions encountered in its use and I, therefore, aim to cover by the appended claims all modifications within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. An electromagnet having a pair of cooperating magnetic members, each of said members comprising a pair of legs, one of said legs being provided with a concave surface and the other with a convex surface, a supporting means for one of said members for permitting movement of said member to engage and disengage the convex surface of the leg of one member and the concave surface of the leg of the other, the legs of each member being pivotally joined together to permit self alignment of said surfaces when said members are brought into engagement.

2. An electromagnet for contactors having a pair of members of magnetic material each member comprising a pair of legs, one of said legs being provided with a convex surface and the other with a concave surface the legs being pivotally joined the convex surface on one member cooperating with the concave surface on the other member to align said members when said members are brought together.

3. An electromagnet for eliminating chatter having a pair of members of magnetic material, means for mounting one of said members to move toward and from the other, each member comprising two legs pivotally joined and having a convex surface and a concave surface, the convex surface of one

member cooperating with the concave surface of the other member the pivotal joint of said legs permitting a self-adjusting action of said surfaces when said sections are brought together.

4. An electromagnet having a plurality of members of magnetic material, means for mounting one of said members to move toward and from the other member, each member being provided with a pair of legs one leg having a concave face thereon and the other leg having a convex face thereon, means for mounting the two legs to permit pivotal movement with respect to each other, the concave face of each member cooperating with the convex face of the other so that when the members are brought together a close fit results from the self adjustment thereof.

5. An electromagnet having a pair of cooperating members, means for mounting one of said members to move toward and from the other, each member comprising a pair of legs provided with faces, and means for pivoting said legs together to permit movement in a plane parallel to the legs so that when the members are brought together the faces on the legs of each member will form a close fit with the faces on the legs of the other by self-alignment permitted by the pivoted connections.

6. An electromagnet having a pair of cooperating members of magnetic material having legs thereon, means for mounting one of said members to move toward and from the other, and one of said members having means pivotally connecting said legs to permit pivotal movement in a plane parallel to the legs said pivoted connections permitting a close self-adjusted fit of the legs when the members are brought together.

7. An electromagnet having a pair of cooperating members, one fixed and the other movable toward and from the first, each of said members comprising a pair of legs, said legs formed of a plurality of punchings and pivotally joined, one of said legs being provided with a convex face and the other of said legs being provided with a concave face, the concave face of one member cooperating with the concave face of the other, said pivoted joint permitting a self-adjusting close fit of said faces when the two members are brought together.

In witness whereof, I have hereunto set my hand this 23rd day of November, 1929.

PANFILO TROMBETTA.

CERTIFICATE OF CORRECTION.**Patent No. 1,830,628.****Granted November 3, 1931, to****PANFILO TROMBETTA.**

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 18, for the word "the" read one; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 8th day of December, A. D. 1931.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.