May 4, 1926. 1,582,986

P. F. HARRIS

ALTERNATING CURRENT ELECTROMAGNET

Filed April 9, 1924

Fig. 1.

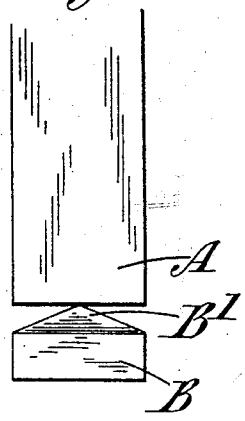


Fig. 2.

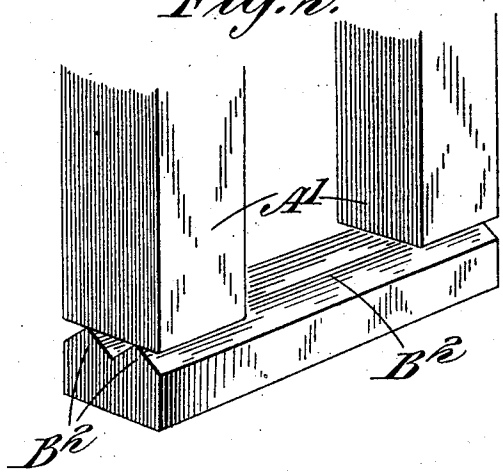


Fig. 3.

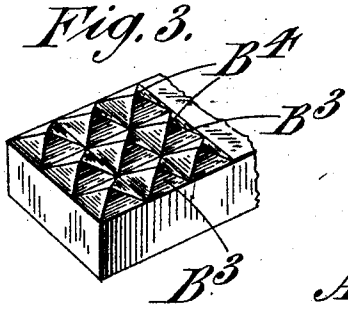


Fig. 4.

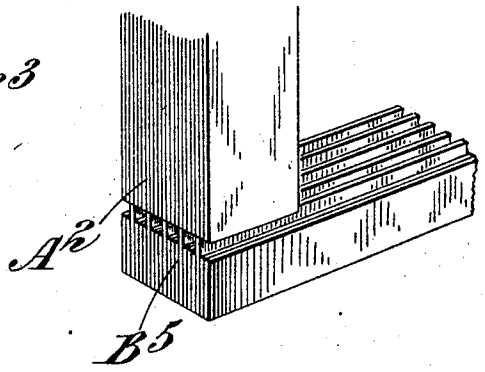


Fig. 5.

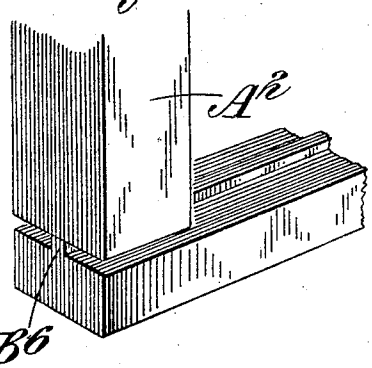
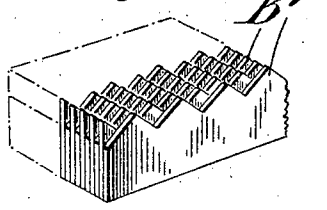


Fig. 6.



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UNITED STATES PATENT OFFICE.

PERCIVAL FRANK HARRIS, OF SOUTH SHIELDS, ENGLAND, ASSIGNOR TO A. REYROLLE & COMPANY LIMITED, OF HEBBURN-ON-TYNE, DURHAM, ENGLAND, A BRITISH COMPANY.

ALTERNATING-CURRENT ELECTROMAGNET.

Application filed April 9, 1924. Serial No. 705,311.

To all whom it may concern:

Be it known that I, PERCIVAL FRANK HARRIS, a subject of the King of England, and residing at South Shields, in the county of Durham, England, have invented certain new and useful Improvements in Alternating-Current Electromagnets, of which the following is a specification.

This invention relates to alternating current electromagnets and has particular reference to the iron cores and armatures or like cooperating parts of electromagnets used in alternating current relays or contactors.

The object of the invention is to avoid what are often called "chattering" and "sticking" between the two members between which mutual attraction exists when the electromagnet is energized. The chattering whilst objectionable on account of the noise produced is also disadvantageous as it may involve bad electrical contacts when, as in a relay, a circuit is controlled. Unnecessary wear of the moving parts is also liable to occur. The sticking introduces inaccurate operation of the device.

The use of a small pin or point of non-magnetic material as a separator between the armature and the pole of an electromagnet is a well known device for preventing sticking but it does so by preventing the two magnetic members from coming into actual magnetic contact and thus increases the power necessary to produce the requisite operating magnetic flux.

According to the present invention one or both of the surfaces of the cooperating magnetic members is formed with one or more points, ridges or small area surfaces which whilst making magnetic contact with the cooperating surface, prevent the two main surfaces from touching over their main areas.

The points, ridges or small area surfaces may be formed in any convenient way. For instance if a core is laminated, some of the laminations may be made to project slightly beyond the main face of the pole or poles, the ridges thus produced being divided in their length or not.

Again the points, ridges or the like may be tapered in vertical section so that the length of the air gap around the points of contact is not uniform over the whole face area.

The accompanying drawings show by way of example various ways in which the invention is applied to alternating current electromagnets.

Figure 1 is a side elevation of one construction, and

Figures 2, 3, 4, 5 and 6 are perspective views of portions of other constructions.

In all the figures only the magnetic members, i. e. the cores and armatures or portions thereof, are shown, the windings of the magnets being omitted as the invention is not concerned with them.

With reference first to Figure 1, A is the pole of an electromagnet and B its armature. The surface of the armature adjacent to the pole is so formed that there is only contact between them at the point B′.

In Figure 2 two poles A′ are indicated and the armature is formed with ridges B^2 so that there is only line contact between the cooperating surfaces of the poles and the armature.

The portion of the armature shown in Figure 3 has intersecting V-shaped grooves B^3 which have the effect of forming a series of pyramidal projections B^4 on the surface of the armature. Thus the armature will touch the pole face at a number of points over its surface.

In Figure 4 the armature has certain of the strips or laminations B^5 of which it is formed of greater depth than the rest so that they project from the surface adjacent to the pole A^2.

The arrangement shown in Figure 5 is similar to that described with reference to Figure 4 except that the laminations or strips which are of greater depth than the rest are grouped together as at B^6 to form a central ridge.

In the armature of which a portion is shown in Figure 6 the strips or laminations are formed with serrations or teeth B^7 and as shown these points are staggered in adjacent strips so that the operating surface of the armature has a large number of tooth-like points projecting from it.

It will be understood that as the invention is intended for application to alternating current electromagnets the cores and ar-

matures are preferably always laminated although the laminations are only shown in Figures 2, 4 and 5 of the drawings.

It will be appreciated that in all the constructions there are what may be regarded as two or more magnetic circuits, one or more being iron circuits, i. e. circuits with no air gap but with limited contact areas when the armature is against the pole, and one or more other circuits having air gaps. This arrangement gives excellent results in practice in reducing chattering and vibration.

What I claim as my invention and desire to secure by Letters Patent is:—

1. An alternating current electromagnet in which magnetic contact between the main surface of the pole and that of the armature is prevented by forming one of such surfaces with a lamination of magnetic material which projects beyond such main surface.

2. An alternating current electromagnet in which magnetic contact between the main surface of the pole and that of the armature is prevented by forming one of such surfaces with a plurality of laminations of magnetic material which project beyond such main surface.

3. An alternating current electromagnet in which magnetic contact between the main surface of the pole and that of the armature is prevented by forming one of such surfaces with a plurality of toothed or serrated laminations of magnetic material which project beyond such main surface.

In testimony whereof I have signed my name to this specification.

PERCIVAL FRANK HARRIS.