Nov. 5, 1929. W. BEETZ 1,734,193

METER DAMPING MAGNET

Filed Jan. 27, 1927

Fig.1.

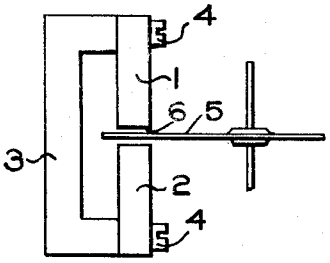


Fig.2.

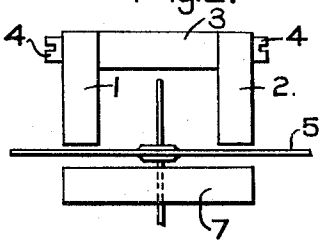


Fig.3.

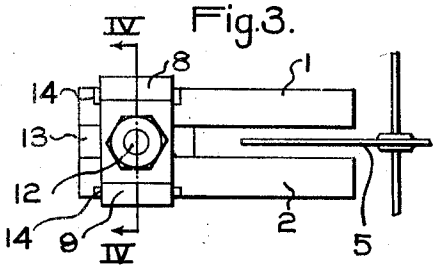


Fig.4.

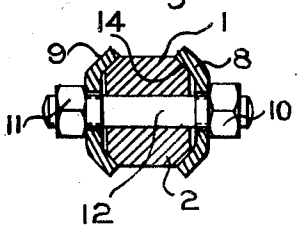


Fig.5.

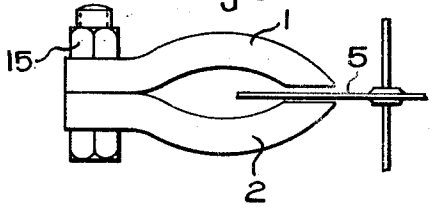
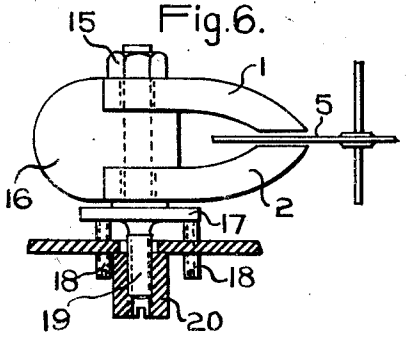


Fig.6.



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UNITED STATES PATENT OFFICE

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METER-DAMPING MAGNET

Application filed January 27, 1927, Serial No. 163,918, and in Germany February 16, 1926.

My invention relates to damping magnets for electrical meters and more particularly to cobalt-steel damping magnets for induction watt-hour meters.

My invention has for its object to provide an improved form of composite permanent magnet.

A further object of my invention is to provide a damping magnet that will be characterized by low leakage and lasting magnetic qualities.

Cobalt steel is extensively used for permanent magnets because of its ideal magnetic qualities. Serious difficulties are encountered, however, in utilizing such steel in the manufacture of drag magnets, one of the more serious of such difficulties being encountered in bending the material to a substantially C-shape. Cobalt steel breaks when subjected to bending and is, therefore, not suitable for the manufacture of magnets as heretofore constructed. Moreover, when a cobalt-steel magnet is threaded to receive a supporting member, the threads become weak from vibration and age, permitting the magnet to slip with respect to the disk, with resulting improper damping and incorrect registration.

In order to avoid these difficulties, I provide a damping magnet comprising a plurality of cobalt-steel sections secured in series-circuit relation by such means that it embodies all of the essential characteristics of a magnet composed entirely of cobalt steel.

Several modifications of my invention are shown in the accompanying drawings, of which;

Figs. 1, 2, 3, 5 and 6 are elevational views of drag-magnet structures embodying my invention, and

Fig. 4 is a cross sectional view of Fig. 3 taken along the line IV—IV.

In Fig. 1, a cobalt-steel section 1 and a cobalt steel section 2 are secured to a soft-iron structure 3 by suitable means, such as bolts 4. A disc 5 rotates in an air gap 6 between the sections 1 and 2.

In Fig. 2, the sections 1 and 2 are secured to the soft-iron structure 3 by means of bolts 4 to form a horse-shoe magnet. The magnetic path of the cobalt-steel sections 1 and 2 is partially closed by a yoke member 7 located on the opposite side of the disc 5.

In Fig. 3, the cobalt-steel sections 1 and 2 are secured together by two clamping members 8 and 9 supported on a stud 12 which extends through an intermediate spacing member 13. The clamping members are held in position by suitable means, such as hexagonal nuts 10 and 11. Oblique surfaces 14 are provided at the outer edges of the sections 1 and 2 in order to insure a tight fit and proper seating of the clamping members 8 and 9. The disc 5 rotates between the sections 1 and 2.

In Fig. 5, the two cobalt-steel sections 1 and 2 are bent slightly and are held together by a clamping screw 15 without the use of any intermediate member. In this form, the area of contact of the two magnets, the seats for the head and the nut on the bolt and the end surfaces of the pole pieces may be accurately planed or ground.

In Fig. 6, the cobalt-steel sections 1 and 2 are clamped against an intermediate member 16 that is suitably shaped to balance their weight. The shank of the bolt 15 is provided with a flange 17 that is in engagement with three supporting screws 18 and is secured by a lower end 19 and the nut 20.

The position of the sections 1 and 2 with respect to the disc 5 may be adjusted vertically by means of the screws 18 and horizontally by means of the nut 20. In this manner, a very accurate adjustment of the retarding torque may be effected. The member 16 removes strains from the adjusting screws by virtue of the fact that the weight of the assembly is balanced about the supporting means.

In all of the above forms, cobalt steel has been utilized to form the main part of the damping magnet without subjecting it to damaging bends or threading, thereby reducing leakage and inactive iron to a minimum and providing an assembly lending itself readily to the formation of an air gap of accurate predetermined length.

While I have shown both cobalt-steel magnet sections of a similar shape, it is, of course,

possible to combine different shapes, such as a straight and a slightly bent section, all possible combinations of which I have endeavored to cover by the following claims.

I claim as my invention:

1. A drag magnet for meters comprising a plurality of cobalt-steel members, a separating member suitably slotted therefor and adapted to balance the weight of the steel members, and means for securing the steel members and the separating member together.

2. A drag magnet for an electric meter comprising a plurality of cobalt-steel sections having a predetermined weight, a relatively soft-iron member having a portion thereof adapted to balance the weight of the cobalt-steel sections and means for securing the steel members to the iron member.

3. A drag magnet for a rotatable meter disc comprising pole pieces of cobalt steel and means connecting said pole pieces and secured thereto in series-magnetic relation.

4. A drag magnet having portions of high coercive force and low malleability and a portion of relatively lower coercive force and higher malleability for maintaining said pole portions in operative spaced relation.

5. A drag magnet for an induction disc instrument comprising portions of cobalt steel disposed in operative relation with respect to said disc, and magnetic means of lower coercive force and higher malleability than said cobalt steel portions for establishing a magnetic circuit therebetween.

In testimony whereof, I have hereunto subscribed my name at Nuremberg this 16th day of November, 1926.

WILHELM BEETZ.