H. AST.

ELECTROMAGNETIC CLUTCH.

APPLICATION FILED JUNE 15, 1906.

903,945. Patented Nov. 17, 1908.

4 SHEETS—SHEET 1.

Fig. 1.

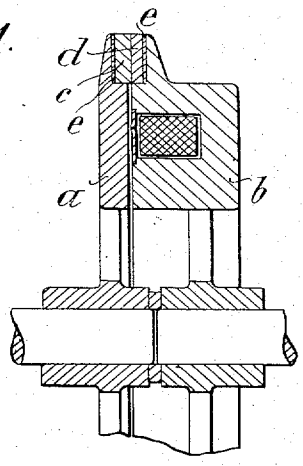


Fig. 1ª.

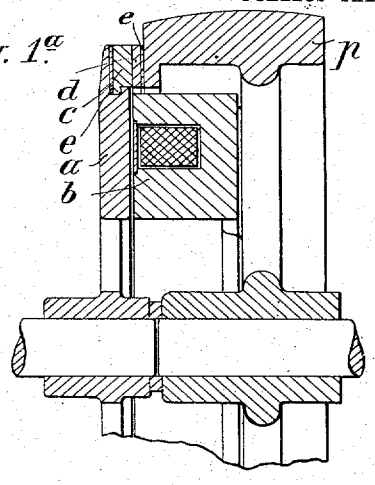


Fig. 5.

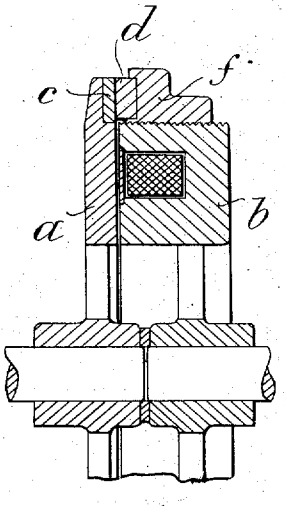
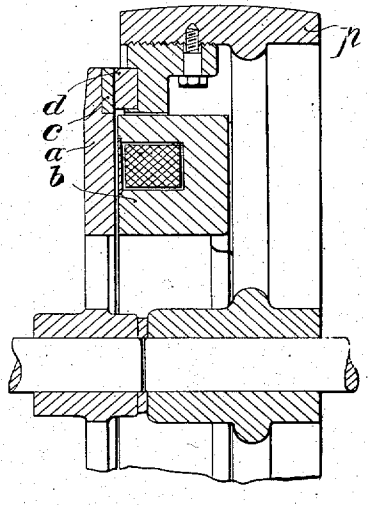


Fig. 5ª.



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4 SHEETS—SHEET 2.

Fig. 2.

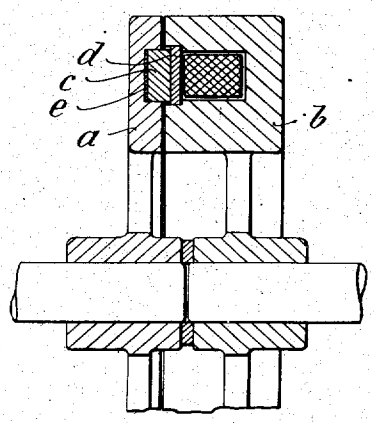


Fig. 3.

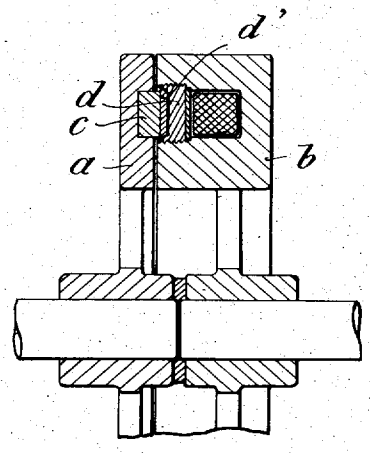
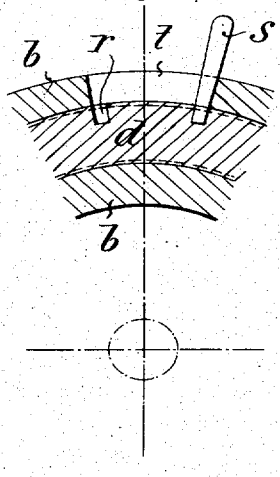


Fig. 4.



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4 SHEETS—SHEET 3.

Fig.6.

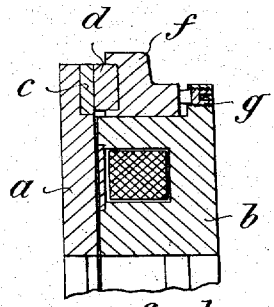


Fig.7.

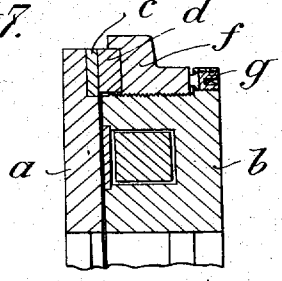


Fig.8.

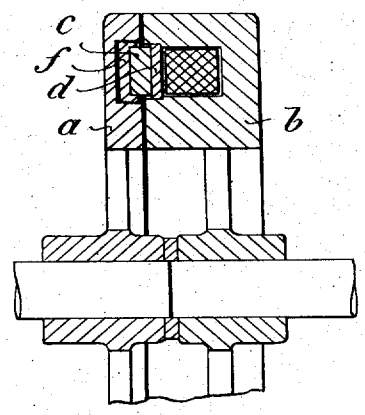
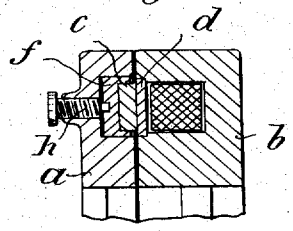


Fig.9.



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903,945. Patented Nov. 17, 1908.

4 SHEETS—SHEET 4.

Fig. 10.

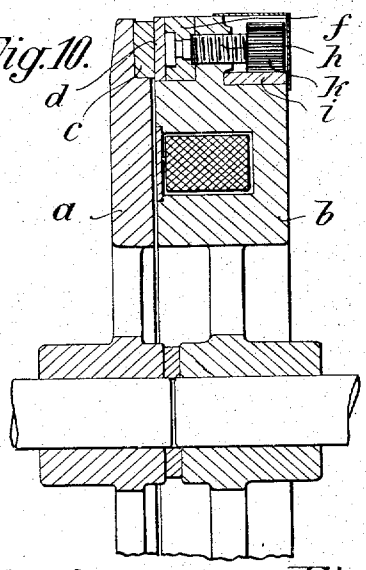


Fig. 11.

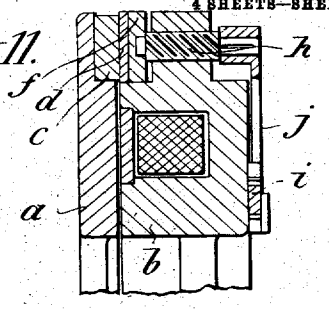


Fig. 12.

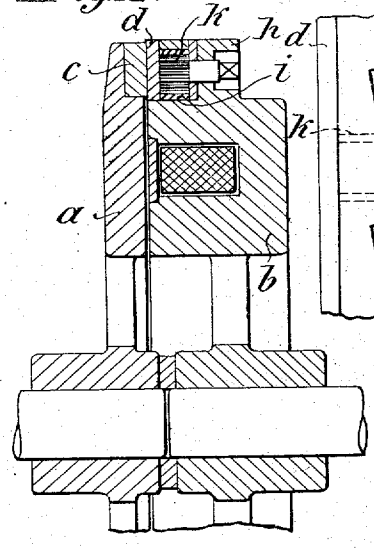


Fig. 13.

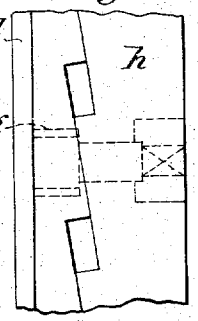


Fig. 14.

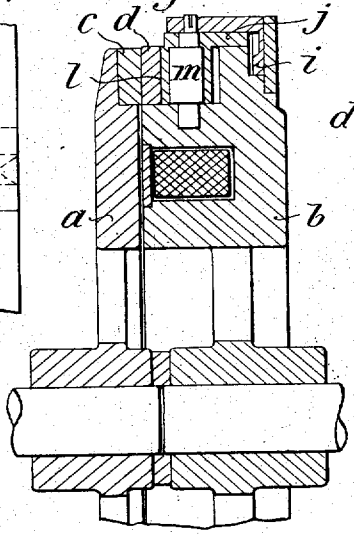
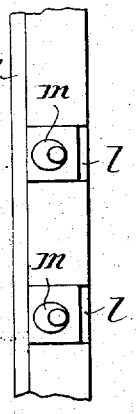


Fig. 15.



Witnesses
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G. W. Eisenbrey

Heinrich Ast Inventor
By his Attorney Rudolf P. Schuetz.

UNITED STATES PATENT OFFICE.

HEINRICH AST, OF VIENNA, AUSTRIA-HUNGARY, ASSIGNOR TO THE FIRM OF VULKAN MASCHINENFABRIKS-ACTIEN GESELLSCHAFT, OF VIENNA, AUSTRIA-HUNGARY.

ELECTROMAGNETIC CLUTCH.

No. 903,945. Specification of Letters Patent. Patented Nov. 17, 1908.

Application filed June 15, 1906. Serial No. 321,865.

To all whom it may concern:

Be it known that I, HEINRICH AST, subject of the Emperor of Austria-Hungary, residing at Vienna, Austria-Hungary, have invented certain new and useful Improvements in Electromagnetic Clutches, of which the following is a specification.

In electro-magnetic clutches which act by the pressure of friction surfaces against one another the perfect adjustment of these surfaces to compensate for their wear, which is necessary to insure permanently satisfactory working, has hitherto not been possible without appreciable interruption of the work and without taking the clutch to pieces. The arrangement heretofore employed for this purpose in which friction bodies are located in recesses formed in one of the clutch parts, separate adjustment of these friction bodies being effected by means of individually adjustable screws, has not proved satisfactory because uniform adjustment of all the friction bodies in the same plane cannot be accomplished by these means and therefore, in spite of the time spent on the work, one-sided adjustment and consequent jamming, incomplete contact, rapid wear and considerable loss of efficiency are unavoidable.

The object of the present invention is to provide an electro-magnetic clutch, in which the said disadvantage is obviated. For this purpose the friction bodies of one or of each of the two parts of the clutch are arranged as a uniformly movable whole so that the friction surfaces may be effectively adjusted. This uniform advance for adjustment of the friction body or friction bodies of one or both parts of the clutch can be effected in a variety of ways and several constructional forms of such clutches are shown in the drawings as examples.

The invention will be best understood in connection with the accompanying drawings, in which

Figures 1, 1^a, and 2 illustrate in section a portion of an electro-magnetic clutch and show one means of advancing the friction member or members. Figs. 3, 4, 5, 5^a, 6, 7, 8 and 9 are similar views showing an adjustable carrier for advancing the friction member or members. Figs. 10 to 15 are similar views illustrating modified means of advancing the friction member or members.

In all cases *a* and *b* denote the two parts of the clutch which are drawn towards one another; *c* and *d* denote their friction bodies.

As shown in Fig. 1 the friction bodies *c* and *d*, which consist of rings of non-magnetic material, are arranged upon the annular flange-like marginal portions of the two parts *a* and *b* of the clutch. The uniform advance of each such friction ring *c* or *d*, as a whole, is effected by backing the ring with material *e* of uniform thickness, applied in the form of a complete ring or of ring segments. In the first case it is only necessary to slightly draw back the externally accessible attachment screws of the friction rings for the purpose of applying the backing ring, while in the second case the ring segments can be pushed in from the periphery between the annular flange of the corresponding clutch part and the corresponding friction body. In the first case, holes are formed in the backing rings for passage of the attachment screws, and in the second case slots are formed in the ring segments for such screws.

As shown in Fig. 2 the friction bodies of non-magnetic material are placed between the attraction surfaces of the clutch parts *a* and *b*, and the backings *e*, which effect the advance of the friction bodies, are constructed as rings or ring segments, as hereinbefore described. In this construction the clutch parts need be only slightly pushed apart to enable the backing to be placed in place.

Fig. 3 illustrates a construction, in which a non-magnetic annular friction body *d* is provided on its outer and inner peripheral surface with screw threads of equal pitch and suitably different inclination whereby the body *d* is screwed into the part *b* of the clutch. The adjustment of the friction body *d* with respect to the other friction body *c* of the part *a* of the clutch (which body may be rigidly fixed for example) may be effected by turning the friction body *d*. For this

purpose, as shown in Fig. 4, a pin *s* acting as a handle can be arranged to extend through slots *t* in the magnet body *b* into one or other of recesses *r* in the periphery of the friction ring *d*. This latter may with advantage be made of several parts and be arranged to receive a filling ring d^1 of special wear resisting material. The part *d* may be secured in the magnet body after each adjustment by filling pieces adapted to enter the slots *t* and engage the recesses *r* of the part *d*.

In the example shown in Figs. 5, 6 and 7 the annular non-magnetic friction body *d* is fixed in a carrier *f* in the form of a ring which surrounds the magnet body *b* and is movable endwise thereon. The uniform advance of the friction body *d* can then be effected by turning the carrier *f* (Fig. 5) which is formed with an internal or external screw thread and is adapted to be screwed to the part *b* of the clutch or the part *p* of the machine connected therewith; or by moving it upon the smooth magnet body *b* by means of adjusting screws *g* (Fig. 6) the heads of which are provided with indicating marks for the purpose of uniform movement. When the carrier *f* is adapted to be screwed to the magnet body and screws *g* are provided, as in Fig. 7, then the screws serve to take up the pressure.

Figs. 8 and 9 show constructional forms in which the friction bodies *c* and *d* are located between the attractive surfaces, as in Fig. 3, the friction body *d* being rigidly connected to one part of the clutch and the friction body *c* being mounted on a carrier *f* which is adapted to be either screwed into the magnet body *a* (Fig. 8) or to slide therein (Fig. 9) the movement in the latter case being effected with the aid of screws *h*.

Figs. 10 and 11 show clutches in which the uniform advance of the one friction body with respect to the other is effected by a number of screws *h*, which are in connection with one another by a toothed ring *i* and pinions *k* (Fig. 10); or by a toothed ring *i* and toothed segments *j* (Fig. 11); or are connected by a chain and chain wheels or similar transmitting means. The threaded holes for the screws *h* are in the magnet body *b* and the screws act upon a carrier *f* mounted in the friction body *d*.

Fig. 12 is a vertical section and Fig. 13 an external view of a piece of the part *b* of the clutch, showing a constructional form based upon the action of wedge surfaces. The wedge surfaces are arranged to extend in the same direction, on the face of the part *b* of the clutch and on the juxtaposed face of the carrier *f*, and, on the rotation of the carrier, by means of a toothed ring *i* and toothed pinions *k*, the carrier and clutch part so slide along one another that the carrier together with the friction body *d* held therein are pushed forward towards the other fixed friction body *c*.

In the construction shown in Figs. 14 and 15 eccentrics *m* are provided for effecting the advance. These eccentrics are mounted to rotate in the part *b* of the clutch and can be rotated, for example by a toothed ring *i* and toothed segments *j*. Placed round the eccentrics are pressure pieces or blocks *l* which are caused to slide forward in guide grooves in the part *b* of the clutch, against the friction body *d*, or a carrier connected therewith, when the eccentrics are suitably rotated. In all cases, where the adjustment is described for only one friction body, the other friction body may also be arranged to move so as to render a better wear of the material possible. The friction surfaces may be flat or suitably curved or be wedge shaped. Instead of being applied to the parts of the clutch they may be applied to the driving device *p* of the clutch, *e. g.* to a wheel, a belt pulley or the like, as in Figs. 1^a and 5^a and be arranged to advance for the purpose of adjustment in any of the ways described.

What I claim as new is:

1. In electro-magnetic clutches: two clutch members having a predetermined maximum air gap and adapted to be drawn toward each other; a friction member or members therein adapted to act together; means to uniformly advance one or both of said friction members independently of and relatively to said clutch members to compensate for wear of said friction members and to control the air gap between the clutch members.

2. In electro-magnetic clutches: two clutch members having a predetermined maximum air gap and adapted to be drawn toward each other; a friction member or members therein adapted to act together; a carrier or carriers for one or both of said friction members; said means to uniformly advance one or both of said carriers independently of and relatively to said clutch members to compensate for wear of said friction members and to control the air gap between the clutch members.

3. In electro-magnetic clutches: two clutch members having a predetermined maximum air gap and adapted to be drawn toward each other; a friction member or members therein adapted to act together; and an adjustable carrier for said friction member or members adapted to uniformly advance said friction members or members independently of and relatively to said clutch members to compensate for wear of said friction members and to control the air gap between the clutch members.

4. In electro-magnetic clutches: two clutch members having a predetermined maximum

air gap and adapted to be drawn toward each other; a friction member or members therein adapted to act together; a carrier or carriers for one or both of said friction members, adapted to be turned so as to adjust said friction member or members independently of and relatively to said clutch members to compensate for wear of said friction member or members, and to control the air gap between the clutch members; and means to lock said carrier or carriers against turning.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HEINRICH AST.

Witnesses:
JOSEF RUBASCH,
ALVESTO S. HOGUE.

Correction in Letters Patent No. 903,945.

It is hereby certified that in Letters Patent No. 903,945, granted November 17, 1908, upon the application of Heinrich Ast, of Vienna, Austria-Hungary, for an improvement in "Electromagnetic Clutches," an error appears in the printed specification requiring correction, as follows: In line 107, page 2, the word "said," second occurrence, should read *and;* 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 12th day of January, A. D., 1909.

[SEAL.]

C. C. BILLINGS,
Acting Commissioner of Patents.

air gap and adapted to be drawn toward each other; a friction member or members therein adapted to act together; a carrier or carriers for one or both of said friction members, adapted to be turned so as to adjust said friction member or members independently of and relatively to said clutch members to compensate for wear of said friction member or members, and to control the air gap between the clutch members; and means to lock said carrier or carriers against turning.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HEINRICH AST.

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