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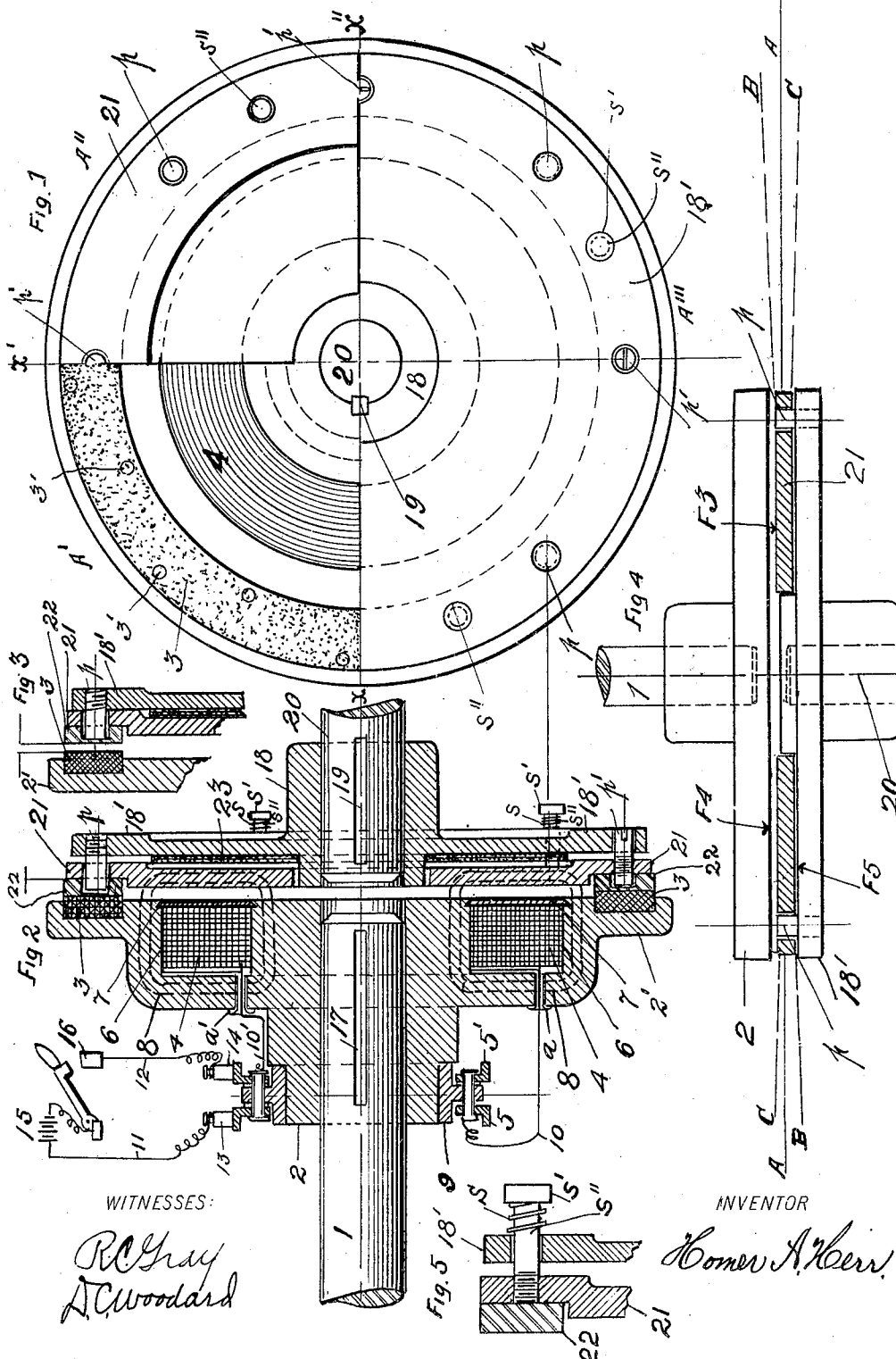
H. A. HERR

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MAGNETIC CLUTCH

Filed Jan. 17, 1923

2 Sheets-Sheet 1



WITNESSES:

R. C. Gray
A. Woodward

INVENTOR

Horner A. Herr

June 24, 1930.

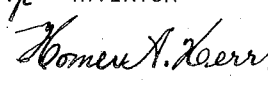
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UNITED STATES PATENT OFFICE

HOMER A. HERR, OF PHILADELPHIA, PENNSYLVANIA

MAGNETIC CLUTCH

Application filed January 17, 1923. Serial No. 613,304.

My invention has reference to magnetic clutches and consists of features fully set forth in the following specification and the accompanying drawing forming part thereof.

5 The object of my invention is to provide a magnetic clutch free from the serious objections in aligning now urged against clutches of this class and which so often defeat their functioning and which make it a difficult matter to properly set up.

10 It consists of the usual magnetic member carrying the magnet coil and the friction lining annularly and concentrically arranged on the magnet member in combination with an armature holder and an armature carried by the said armature holder, said armature being loosely mounted on its said holder and free to adjust itself automatically to any lack of parallelism of the planes of the adjacent and contact surfaces of the armature and the magnet member. Specific features of novelty will be described more at length hereinafter.

15 In the drawings like parts will be referred to by marks or figures of a corresponding kind in the different views.

20 Fig. 1 is a broken elevation of the magnet member.

25 Fig. 2 is a vertical section thru the clutch as assembled.

30 Fig. 3 is a detail section thru the armature, friction ring and armature holder at the point where one of the power transmitting pins is located.

35 Fig. 4 is a diagram showing the principle involved.

40 Fig. 5 is a section thru the armature and its holder, showing one of the spring controlled pins for withdrawing the armature from the magnet face when the coil is demagnetized.

45 Fig. 6 is a section thru Fig. 7 on line 6-6.

Fig. 7 is an elevation of the friction ring.

Fig. 8 is a section on line 8-8 of Fig. 9.

Fig. 9 is an elevation of the friction ring holder.

50 Fig. 10 is an elevation of the fiber or insulating disc.

Fig. 11 is an elevation of the armature holder.

Fig. 12 is an enlarged section of that shown in Fig. 3 and additionally showing the insulating disc in position. 55

Fig. 13 is a section thru the armature and its holder assembled.

Fig. 14 is a section thru the armature holder, armature and friction ring on the line of one of the pins which transmit the speed 60 or motion to the armature holder and there-thru to the shaft.

Figs. 15 and 16 are plan and edge views, respectively, of one of the adjusting shims.

1 is the shaft which carries the magnet 65 holding frame 2. 2 is the frame or case for the magnet coil 4. It has an annular flange 2' which is circumferentially grooved and in which groove is carried the asbestos friction lining 3. This lining is riveted into the groove as shown in Fig. 1 at 3' 3' 3'. 70 The magnet holder aforesaid carries a concentrically machined channel whose outer wall is shown at 6 6, and whose inner wall and base wall being self evident are not numerically indicated. Into this channel is placed the magnet coil 4 formed of insulated wire of suitable section. When this coil is snugly placed in this channel it is set against the action of centrifugal force by pouring 80 over the coil some liquefied material which will thereafter congeal, but of such a nature that the possible temperature of the coil will not at any time melt the same when in service. Babbitt is then poured over the exposed outer face of the coil after which the surface of the babbitt covering is machined true. The magnetic field is indicated by the dotted lines 8. 85

5-5' are the collector rings supported on the ring holder 9 in the usual manner. A detail description of these rings is not considered necessary, such rings being old and well known. 10 is a conductor leading from one end of the magnet coil to the ring 5. 10' is a conductor leading from the other end of the magnet coil to the ring 5'. 14 is the collector for ring 5' and 13 is the collector for ring 5, 15 is the battery, 16 the switch and 11 and 12 conductors respectively 100

for collectors 13 and 14. a and a' are insulating rings for the conductors 10 and 10' respectively. 17 is the key which locks the magnet holding frame to the shaft 1.

5 The magnet member, therefore, as above described includes the coil 4, the holder 2, the friction lining 3, the collector rings 5 and 5' and the several conductors named. Hereinafter, in the specifications and claims, 10 all these elements are included and presumed in the "magnet member". The friction ring should be made of asbestos metallic friction block material—an article of commerce.

15 18' is the armature holder having an integral shaft engaging boss 18, it is fixed to the shaft 20 by the key 19 and they rotate in unison. 21 is the armature and 22 an adjustable steel friction ring carried by the armature 21. 23 is an insulating fiber disc 20 interposed between the armature 21 and the armature support. The armature support or holder consists of a shaft engaging boss 18 and an integral annular flange or disc 18' shown in Figs. 2, 11, 12, 13 and 14. This 25 holder carries a series of pins p , p , p , p . These pins are tight in the armature holder disc 18' and can be threaded therein or be a driving fit, as may be elected, shown in Figs. 2, 12 and 13. These pins pass through 30 the holes of the armature 21, the holes being of a diameter larger than the pins, so they are free. This, it will be noted, permits of armature reciprocation and oscillation. The reciprocation is of course longitudinal to the face of the armature holder 35 18, 18'. The magnet member is fixed against such movement. The pins p thus become the elements which transmit the rotative motion of the armature 21 to the said holder 18'—18 and therethru to the shaft 20 by the 40 key 19. When assembled the armature 21 is in the magnetic field as shown in Fig. 2; therefore when the magnet coil 4 is energized the armature 21 is drawn tightly against the asbestos ring 3 and the friction 45 thus induced between the steel ring 22 carried by the armature 21 and the said asbestos ring 3 transmits the rotary speed of the magnet case or holder 2 to the armature 21 50 and shaft 20, as set out.

Now there will be wear in service between the friction ring 22 and the lining 3. I, therefore, provide a take up for this wear 55 as follows: In Figs. 2, 3, 6, 12, 13 and 14 the ring 22 is shown in section on the holes where the pins p enter. It will be noted that these holes do not go entirely thru the ring forming material. The screws p' of 60 2 and 14 are threaded into the armature 21 tightly. When the wear between the face f of the friction ring 22, or the wear on the lining 3, or the combined wear of these two contact surfaces is sufficient that the friction 65 therebetween is interfered with to such a

degree that the clutch will not function then I insert ring shims R, as shown in Fig. 14. Details of these shims are shown in Figs. 15 and 16. I insert these shims by withdrawing the screws p' sufficiently to permit 70 me to pass the shims in place as indicated in Fig. 14. I insert as many shims as may be necessary to properly adjust the friction contact and take up the wear between the contact faces of the rings 22 and 3. The exclusive function of the screws p' is to hold 75 these shims in position against centrifugal force.

In a horizontal clutch of this type it is best not to rely on windage to separate the 80 armature and the magnet members; in a vertical clutch we can so rely; of course this separation is only necessary when the magnet is inert. To accomplish this separation I provide the following: S'', best shown in 85 Fig. 5, is a screw having a head S'. This screw passes thru a hole in the armature holder 18' and is threaded into the armature 21. The head S' projects beyond the outer face of the armature holder 18' and, interposed 90 between this outer face and the inner face of the screw head is a spring S. When the coil 4 is magnetized the spring is compressed (of course there are a series of these 95 springs) permitting the ring 22 to frictionally engage the lining 3. When the coil 4 is demagnetized the springs S, of which there can be any number, will pull the armature 21 against its holder 18' and hold it 100 free from possible contact with the magnet member at any point. In Fig. 1, section A' shows the magnet member with the armature and its holder entirely removed, section A'' shows the armature holder only removed and section A''' is a general elevation 105 being one half.

Fig. 4 is diagrammatical—this is to show the principle involved. 2 is the magnet member, 18' the armature holder and 21 the 110 armature. In practice it is recognized in engineering circles that the aligning of the two shafts for the two clutch members to a sufficient degree of perfection is an expensive method of applying clutches of this class, and unless they are aligned perfectly 115 the clutch faces will not engage continuously at their friction contacts and the functioning will not be satisfactory. This has caused great trouble, much expense and annoyance. It is to overcome this annoyance 120 and expense that I avoid this excessive accuracy in shaft alignment by my oscillatory armature mounted on a fixed holder, which latter is carried by the driven shaft. I overcome this serious trouble by interposing the 125 armature 21 between a fixed carrier 18' and the magnet member 2 and mounting it on a series of pins p , or in any other practical manner so the rotation of the armature 21 will rotate its holder 18' regardless of the 130

imperfect parallelism of the faces F4 and F5, because the face F3 will always assume perfect parallelism to face F4 regardless of the imperfect parallelism of the two shaft ends 1 and 20.

The locking pins p will hold the armature to its holder 18' at any angle of non-parallelism. My clutch contact surfaces are in perfect parallel alignment at all times under magnetic influence. In this diagram Fig. 4, A is the normal line of perfect surface union, which is the parallel line of needed union for clutch functioning between the armature and the magnet. The least parallel distortion or delignment will defeat the operation of the usual or ordinary clutch as B or C. My armature prevents this possibility and gives a perfect frictional grip between the friction surfaces of the ring 3 and the ring 22 regardless of the non-parallelism of the holder 18' with the magnet member flange 2', or the nonparallelism of the friction ring 3 which it carries.

Having now described my invention what I claim and desire to secure by Letters Patent is.

1. In a magnetic clutch the combination of a magnet member, an armature, a friction disc on the said armature, mounted free and loosely thereon, a fixed support for the said armature and a means for locking the armature, the disc and the support together in a manner to permit the said disc to reciprocate longitudinally on the support and oscillate axially permitting the disc and the contacting face of the magnet member to engage in uniform parallelism when magnetically united comprising a series of pins passing thru enlarged holes in the armature and into enlarged holes of the disc of the armature and rigidly fixed to and held by the armature support.

2. In a magnetic clutch the combination of a magnet member, an armature, an armature support, a friction disc, loosely mounted on the armature, a series of screws threaded into the armature support, passing thru the armature, suitable holes being provided therefor, and into the said disc, but not threaded to the said disc, whereby the said friction disc is supported in a manner to permit axial and longitudinal movement and whereby the said pins transmit the rotary motion of the magnet member, the disc, the armature proper to the armature support.

3. In a magnetic clutch the combination of a magnet member, an armature, an armature support, a friction disc carried on the said armature, pins threaded into the armature support and passing thru the armature and into the friction disc, but not threaded into the two latter, whereby rotary motion is transmitted from the disc and armature to the armature support, a second series of

pins passing thru the armature support but not threaded therein, and thru the armature holder and threaded thereto and into the said disc with no threads, the said latter pins being for shim adjustment.

4. In a magnetic clutch the combination of a magnet member, a shaft means for holding the said magnet member to the said shaft, a secondary shaft in alignment with the said former shaft, a fixed armature support carried on the said secondary shaft, an armature means for loosely supporting the armature to the armature support comprising a series of pins tight in the armature support, but loose in the armature, a friction disc carried by the said armature loosely and means for adjusting the said friction disc variably in its relation to the armature which supports it and the magnet with which it engages magnetically consisting of a series of pins carried by and threaded to the armature their ends resting in registering holes in the friction disc, said last named pins adapted to hold shims whereby adjustments can be made positively to take up wear.

5. In a magnetic clutch the combination of a magnet member, a shaft holding the said magnet member, an armature, an armature support, a shaft to which the said support is fixed wherethru power is transmitted to service points, a friction disc carried loosely on the said armature having a series of holes in but not thru its section, power transmitting pins threaded into the armature support and passing thru the armature and into the holes of the disc, as and for the purpose set out.

6. The combination in a magnetic clutch of a magnet member, an armature, an armature holder, a shaft supporting the said holder, a friction disc mounted loosely on the said armature, power transmitting pins in the armature holder passing thru the armature and into suitable and coinciding holes in the friction disc and means for adjusting the wear of the friction disc in its relation to the supporting armature therefor and the contact surface of the magnet member.

7. In a magnetic clutch the combination of a magnet member, a shaft carrying the said member, a secondary shaft, an armature support carried on the said secondary shaft, an armature carried on the said armature support loosely, a friction disc carried on the said armature, said disc and armature forming the armature proper, means for variably adjusting the friction disc of the armature and comprising a series of pins, loose in the armature support, threaded into the armature and loose in the friction ring forming part of and carried by the body of the armature.

8. The combination in a magnetic clutch of a magnet member, a shaft which sur-

ports it and to which it is connected, an armature holder, a secondary shaft on which the said armature holder is carried and to which it is connected operatively, an armature comprising a loose adjustable friction disc and a friction disc holder and means to lock the disc and its holder to the armature holder comprising a series of pins, tight in the armature holder and passing thru enlarged holes in the disc supporting member of the armature and into enlarged holes of the friction disc ring of the armature, whereby the disc and the armature and its holder are operated when the disc is in magnetic engagement with the magnet member and the motion and power of the first named shaft is transmitted to the secondary, as and for the purpose set out.

In testimony whereof I affix my signature.
HOMER A. HERR.