No. 730,621. PATENTED JUNE 9, 1903.

A. C. EASTWOOD.

MAGNETIC CLUTCH.

APPLICATION FILED APR. 2, 1903.

NO MODEL.

Fig. 1.

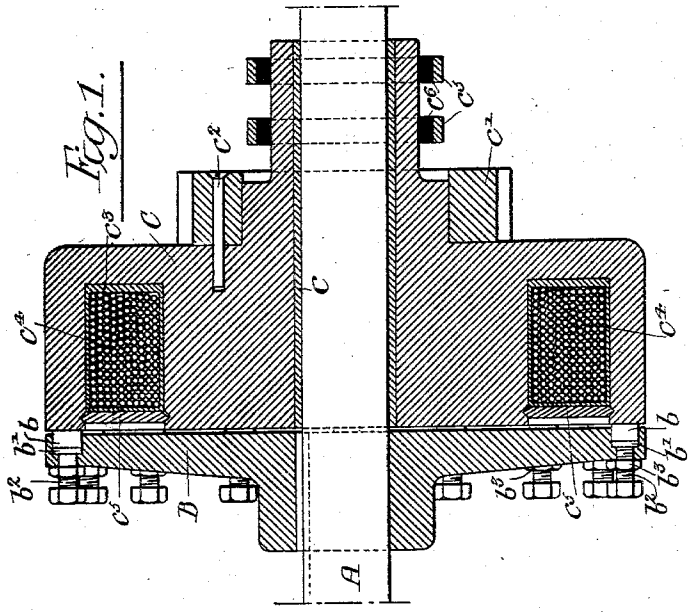


Fig. 3.

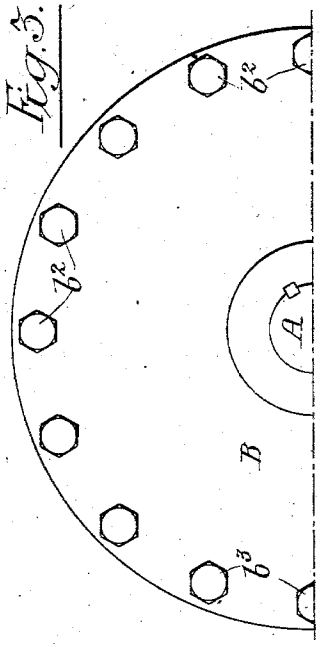
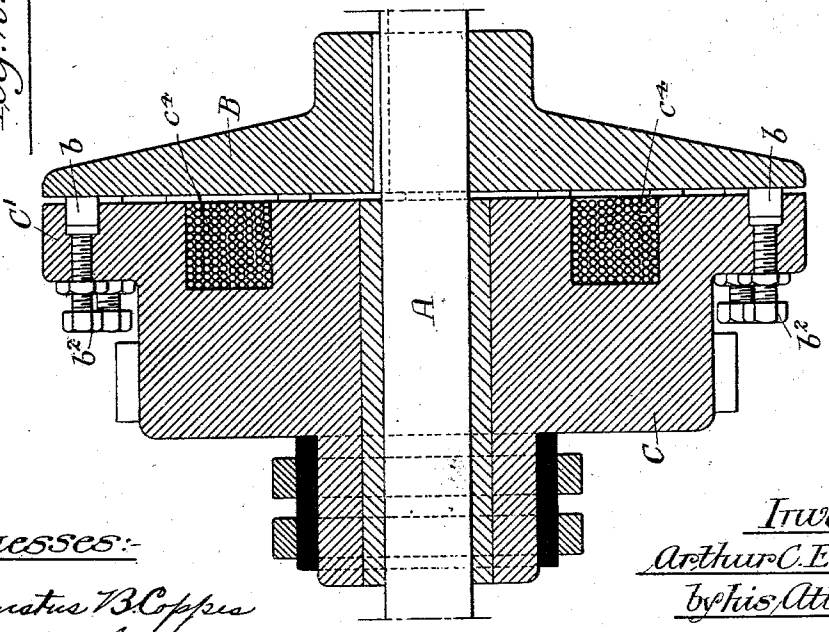


Fig. 2.



Witnesses:-

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UNITED STATES PATENT OFFICE.

ARTHUR C. EASTWOOD, OF CLEVELAND, OHIO.

MAGNETIC CLUTCH.

SPECIFICATION forming part of Letters Patent No. 730,621, dated June 9, 1903.

Application filed April 2, 1903. Serial No. 150,766. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR C. EASTWOOD, a citizen of the United States, and a resident of Cleveland, Ohio, have invented certain Improvements in Magnetic Clutches, of which the following is a specification.

My invention relates to certain improvements in clutches, and more particularly consists in certain improvements in the detail construction of clutches depending for their action upon the holding power of a magnet and of the type commonly known as "magnetic" clutches.

The object of the invention is to provide a structure whose parts shall instantaneously become disconnected when the current by whose action they are held together or coupled is broken, said device being of such a nature that its action is certain and does not permit of the possibility of residual magnetism in the clutch members, causing them to remain coupled, and therefore continue to transmit power after the customary operation has been performed to cause them to become disconnected. This object I attain as hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a sectional elevation of a magnetic clutch constructed according to my invention. Fig. 2 is a sectional elevation of a special form of my invention in which the adjustable shoes are carried upon the member of the clutch on which the actuating-magnet is wound; and Fig. 3 is an end elevation of a portion of Fig. 1, showing the preferred arrangement of bolts for adjusting the shoes.

The great objection to magnetic clutches has hitherto been that owing to the residual magnetism in their members they are uncertain in their action when the energizing-current is broken off, since, while in some instances their members become disengaged instantly the flow of current ceases, at other times they will remain coupled for an appreciable time after such cessation of the current, thereby frequently causing damage, particularly in a case in which they are used in connection with machine-tools, such as planers, which have parts whose direction of motion is frequently reversed and in which it is essential that such reversal should take place at the predetermined moment. I have found that this uncertainty of action could be obviated by providing and maintaining an air-gap between the member of the clutch forming the armature and the member upon which the actuating-magnet was wound, using for this purpose a series of shoes of non-magnetic material carried by and projecting from one of the clutch members, so that even when the actuating-current is flowing the other member of the clutch will be held an appreciable distance away, preferably about one thirty-second of an inch.

In the above drawings, A represents a shaft having fixed to it a disk B, which in the present instance forms the armature of the clutch, whose second member is shown at C. This second member is carried upon a sleeve *c*, freely rotatable on the shaft A, while the armature B is compelled to rotate with said shaft, while being free to move longitudinally thereon.

Power is transmitted from the member C to any desired form of receiving device through the medium of a gear c', which in the present instance is held to the said clutch member by means of a series of bolts, one of which is shown at c^2. In a recess in the body of this member C is contained a casing c^3, having within it a magnet-winding (indicated at c^4) and held in place by means of a body of type-metal c^5, which is cast in the entrance of the recess containing said casing c^3 and extends into the grooves, as shown, so that it cannot become displaced.

At intervals in the outer portion of the disk B is formed a series of recesses, usually circular in form, in which are placed cylindrical blocks of hard wood *b*, or, in fact, of any other suitable material, there also being a washer b' in the bottom of each recess, against which presses a bolt b^2, threaded into the material of the disk member, by which it is possible to force these blocks of wood, which act as holding-shoes, outwardly to any desired extent.

Current is led to the winding c^4 from a pair of metallic rings c^5, supported on a suitable extended portion of the member C and insulated therefrom by rings c^6 of electrically-non-conducting material.

In operation when the circuit, including the rings c^5 and the magnet-winding c^4, is

closed the energization of said magnet holds the disk or armature B to the member C, thereby causing any mechanism connected to the gear-wheel c' to be operatively connected to the driving device turning the shaft A. The armature or disk B, while being clutched to the member B, is prevented, by means of the blocks b and the bolts b^2, from coming into actual contact with the face of the member C, being held at a distance therefrom depending on the amount of projection of the blocks as determined by the adjustment of the bolts.

In order to adjust the blocks b so that they shall all project the same distance from the face of the armature B, I insert four metallic spacing-pieces between the member C and the armature B at points ninety degrees distant from one another and then apply current to the magnet-winding c^4. The said metallic pieces are of a thickness the same as the width of the air-gap which is desired between the two clutch members, and while these latter are held apart by said spacing-pieces I screw up the bolts b^2, so as to force outwardly the blocks b until such movement is stopped by their contact with the face of the member C. Jam-nuts b^3 are then set up, so as to hold the bolts in their adjusted positions, and when all of them are so adjusted I cut off the current and remove the spacing-pieces. In this way the air-gap is made uniform at all the points in the clutch.

If desired, the member C, in which is wound the coil c^4, may be provided, as shown in Fig. 2, with a flange or projecting portion C′, in which are formed the recesses for the reception of the cylindrical blocks b and bolts b^2, these acting in such case against the face of the armature B.

It will be understood that the number of adjustable gripping and spacing shoes b may be varied to suit the requirements of each case, since such number will depend upon the amount of power to be transmitted, as well as on the dimensions of the clutch. When the circuit including the magnet-winding c^4 is first closed, there will be necessarily more or less slip between the two members of the clutch, which will naturally cause more or less wear of the shoes b, thus in time diminishing the width of the air-gap. This, however, may be compensated for, as noted above, by adjusting the bolts b^2 so as to maintain the armature B at a predetermined distance from the member C.

I claim as my invention—

1. A magnetic clutch provided with means for maintaining an air-gap between its members while the clutch is in operation, and means for adjusting the amount of said air-gap, substantially as described.

2. A magnetic clutch having two members whereby a load may be connected with driving mechanism at will and including adjustable means whereby said two members are prevented from approaching one another nearer than a predetermined distance, substantially as described.

3. The combination in a magnetic clutch, of a member having a magnet-winding, and a second member constituting an armature for said magnet, with a series of shoes of non-magnetic material carried by one of the members for maintaining an air-gap between said members when the clutch is in operation, and means for adjusting said shoes, substantially as described.

4. The combination in a magnetic clutch, of one member provided with a magnet-winding, and a second member constituting an armature, one of said members having a series of recesses with blocks of non-magnetic material held therein and a series of bolts for holding the said blocks in a predetermined position, substantially as described.

5. The combination in a magnetic clutch of two members, one of which is provided with a magnet-winding, the second member of said clutch being movable toward and from the other member, one of the members having a series of blocks projecting from its face and adjacent to the face of the other member of the clutch, with a series of bolts for said blocks whereby the distance between said two members when the magnet-coil is energized, may be regulated, substantially as described.

6. The combination in a magnetic clutch, of a member having a magnet-winding within an annular recess, a second member free to move toward and from said first member and provided with a series of shoes projecting from its face, said shoes being placed to engage a portion of the first member at a distance farther from its center of revolution than that of the magnet-winding, with means for adjusting the positions of said shoes, substantially as described.

7. The combination in a magnetic clutch of two members, one of the same having a magnet-coil and the other constituting an armature, one of said members having a series of holes whose axes are parallel to the axis of revolution of the clutch, gripping-shoes in said holes, washers bearing on the shoes and bolts engaging the washers for adjusting the position of said shoes, substantially as described.

8. A magnetic clutch having shoes carried by one of its elements for engaging another element, said shoes being placed to fulfil the double function of transmitting power from one of said elements to the other and also regulating the air-gap between the armature and the pole-pieces of the magnet, with means for adjusting the positions of said shoes at will, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ARTHUR C. EASTWOOD.

Witnesses:
LAROY RAUDENBUSH,
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