

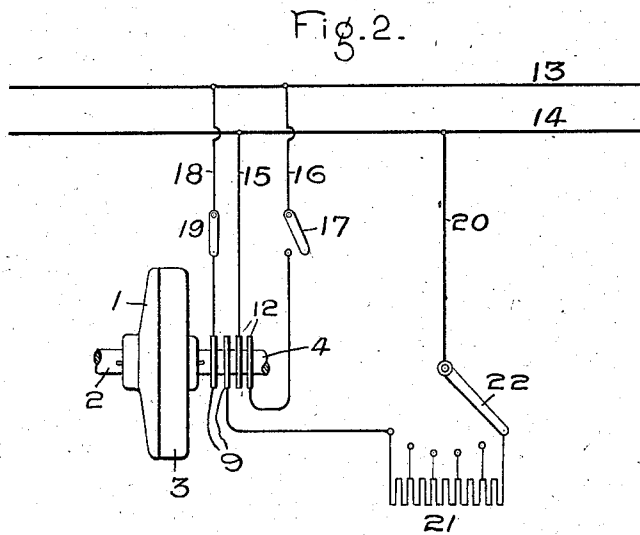
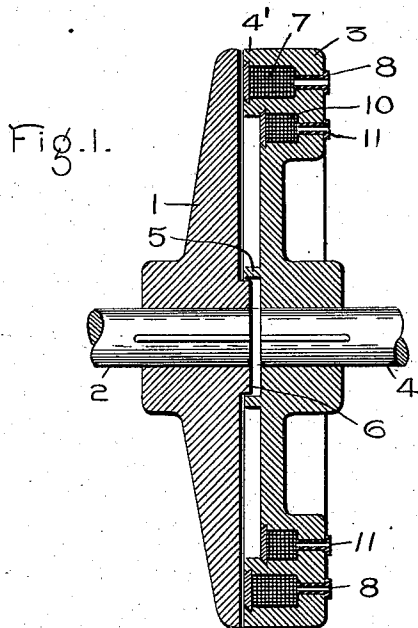
No. 727,689.

PATENTED MAY 12, 1903.

H. G. REIST.
MAGNETIC CLUTCH.

APPLICATION FILED OCT. 3, 1902.

NO MODEL.



Witnesses:

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UNITED STATES PATENT OFFICE.

HENRY G. REIST, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

MAGNETIC CLUTCH.

SPECIFICATION forming part of Letters Patent No. 727,689, dated May 12, 1903.

Application filed October 3, 1902. Serial No. 125,827. (No model.)

To all whom it may concern:

Be it known that I, HENRY G. REIST, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Magnetic Clutches, of which the following is a specification.

It has been found in the operation of magnetic clutches that considerable current is required to draw the two parts together, owing to the magnetic reluctance of the air-gap between the members. Upon the coming together of the two parts there is a sudden decrease in the reluctance and a corresponding increase in the magnetic flux. As a result the two parts are suddenly locked together. When one of the members is running and the other is stationary, this sudden locking shocks or jars the machinery being started as well as that of the motive system. This is especially objectionable in the case where synchronous motors are employed to furnish the motive power, as this jar tends to throw them out of step.

The object of my invention is the provision of means whereby when the two members of the magnetic clutch are drawn together the attractive force between them will not be so great as to prevent a limited amount of slipping, and hence engagement with the two members will take place without the objectionable jar above referred to. The specific means which I have invented for this purpose comprises a plurality of coils, some of which are intended to be used to draw the two members together. The magnetic circuit of the drawing-together coils is arranged so that the contacting of the two clutch members does not produce a very great difference in its reluctance, and hence in the attractive force between the two members. The remaining coils are intended to produce the attractive force which prevents slipping. The current passing through the latter coils may be regulated by a rheostat in circuit therewith. By properly proportioning the parts the slipping between the members at starting can be regulated to any desired amount.

In the accompanying drawings and description, Figure 1 is a sectional elevation of a clutch embodying my invention. Fig. 2 is a

diagram showing an arrangement of the circuit.

In the drawings, 1 represents a disk of magnetic material, forming one of the members of the magnetic clutch. The engaging face of the member 1 is substantially plane, except for a circular raised portion 6 at the center of the disk. This member is keyed on a shaft 2. The other member 3 is likewise disk-shaped and is keyed at the end of a shaft 4, which is in alinement with the shaft 2. The member 3 has an annular portion 4' at its periphery and an annular portion 5 near the shaft, which abut against the face of the member 1. The raised portion 6 on the face of the member 1 is encircled by the annular portion 5 when the members are in contact, the members being centered by these portions.

A coil 7 is mounted in a recess formed in the portion 4' of the member 3. The terminals of this coil are brought out through insulating-bushings 8, extending outward from the coil to the back side of the member 3. These terminals are secured to slip-rings 9, carried by the shaft 4, Fig. 2. The coil is inserted from the face side of the member 3 and is retained in place by a layer of soft metal which is poured on top of it and extends into grooves in the side walls of the recess formed to receive the coil, as clearly shown in Fig. 1. Other methods may be employed for retaining the coil in position.

A coil 10 is inserted in an annular recess formed in the member 3 adjacent to the inner side of the portion 4'. This coil is similar in its general construction to the coil 7 and may be retained in the same way and has its terminals brought out through bushings 11, similar to the bushings 8. The terminals of this coil are connected to slip-rings 12, carried by the shaft 4. The connections between the slip-rings 9 and 12 and the coils 7 and 10, respectively, have not been illustrated in the drawings, as they are details of construction which form no part of my invention and which may be readily provided by any one skilled in the art.

In the diagram shown in Fig. 2, 13 and 14 represent conductors leading from a source of current. The slip-rings 12 are connected to these lines by conductors 15 and 16. A

switch 17 is shown in the line 16. One of the slip-rings 9 is connected with the conductor 13 by a line 18, in which a switch 19 may be placed. The other slip-ring 9 is connected to the line 14 by a line 20, in which an adjustable rheostat 21 is placed. The resistance in the line 20 is varied by oscillating an arm 22 in the usual manner.

The operation of my clutch is as follows:
 10 Supposing one of the shafts and the clutch member carried thereby to be turning and it is desired to impart motion to the other member, the switch 17 is first closed. This causes current to flow through the coil 10. The passage of current through the coil 10 produces a magnetic flux, and the members 1 and 3 are drawn together in a manner well known to those skilled in the art. On the coming together of the members 1 and 3 the reluctance of the magnetic circuit of the coil 10 is not very largely decreased, owing to the air-gap between the member 1 and that portion of the member 3 which is embraced by the coil 10. If now the switches 19 and 22 be closed, current passes through the line 20 and the coil 7. The reluctance to the passage of the flux due to the coil 7 is not great, as the magnetic circuit is a closed one of considerable cross-section. By properly proportioning the rheostat 21 and by proper manipulation of the switch-arm 22 the increase of attractive force between the members 1 and 3 can be regulated so that any desired amount of slipping between the members before they become rigidly locked together can be secured.

35 The switch 17 may be opened after the clutch members are drawn together. Preferably the switch will not be opened until the members are locked together, though it may be desirable in some cases to open this switch immediately after the members are drawn together or in other cases to allow it to remain closed so long as the clutch members are coupled together.

45 The advantages of this construction will be readily apparent to any one experienced in the art.

50 While I have illustrated and described the best form of my invention which is now known to me, I do not intend to be limited to the exact construction here shown and described. It is apparent that modifications in design

and construction can be made without departing from the spirit of my invention.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a magnetic clutch, a pair of clutch members formed of magnetic material, and a plurality of magnetizing-coils therefor, the reluctance of the magnetic circuit for one of said coils being considerably greater than that of the magnetic circuit for another coil.

2. In a magnetic clutch, a disk-shaped clutch member having a raised portion on one face, said raised portion being provided with a recess, a magnetizing-coil located in said recess, the other portion of said clutch member also being provided with a recess, and a second magnetizing-coil mounted in the recess formed in said second portion.

3. In a magnetic clutch, a pair of clutch members, the face of one of said clutch members being substantially plane, the face of the other clutch member having a raised portion formed on it near its periphery, said second clutch member being provided with a pair of recesses, one of said recesses being formed in said raised portion, the other of said recesses being formed adjacent to the inner side of said raised portion, and magnetizing-coils placed one in each of said recesses.

4. In a clutch, a pair of members of magnetic material rotatably and longitudinally movable with respect to one another, a magnetizing-coil to move said clutch members longitudinally with respect to one another, and another magnetizing-coil to prevent relative rotation of said members.

5. In a magnetic clutch, a pair of clutch members adapted to engage one another, and a pair of magnetizing-coils for said members, the coils and members being so arranged that when the clutch members engage one another the magnetic circuit for one of said coils is closed and the magnetic circuit for the other of said coils includes an air-gap.

In witness whereof I have hereunto set my hand this 2d day of October, 1902.

HENRY G. REIST.

Witnesses:

BENJAMIN B. HULL,
HELEN ORFORD.