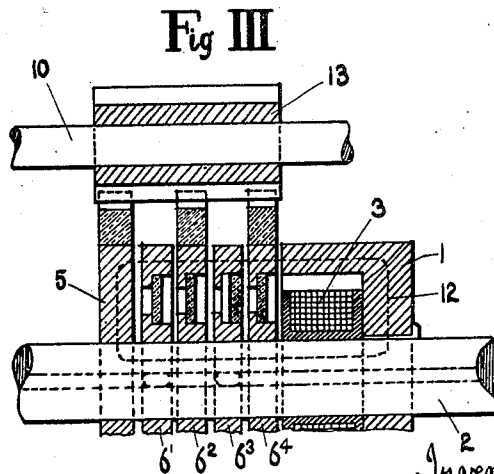
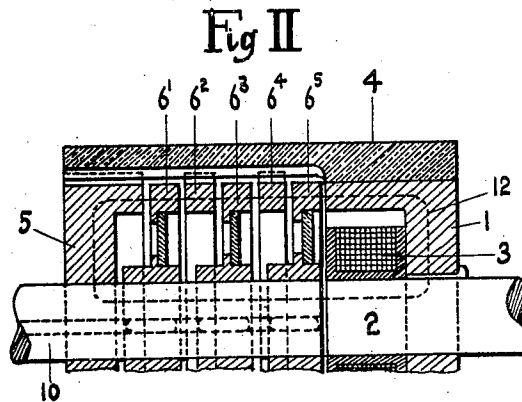
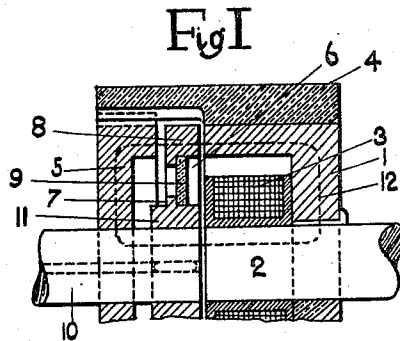


H. W. RAVENSHAW.
MAGNETIC CLUTCH.
APPLICATION FILED MAR. 29, 1909.

942,867.

Patented Dec. 7, 1909.



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UNITED STATES PATENT OFFICE.

HENRY WILLOCK RAVENSHAW, OF HANWELL, ENGLAND.

MAGNETIC CLUTCH.

942,867.

Specification of Letters Patent.

Patented Dec. 7, 1909.

Original application filed February 28, 1907, Serial No. 359,905. Divided and this application filed March 29, 1909. Serial No. 486,640.

To all whom it may concern:

Be it known that I, HENRY WILLOCK RAVENSHAW, of Rutland House, Hanwell, in the county of Middlesex, England, have
5 invented new and useful Improvements in Magnetic Clutches, of which the following is a specification:

This invention embraces an electromagnetic clutch so constructed that the magnetic circuit is completed through the shaft upon which the electromagnet is mounted.

In order that the invention may be readily understood I shall proceed to describe it as applied to a magnetic clutch of the type
15 described in my application for a United States patent filed on 28th February 1907, Serial No. 359,905, of which the present is a divisional application.

The type of clutch above referred to is that in which an annular electromagnet attracts an annular keeper through an intermediate element consisting of two concentric rings of magnetic material attached to each other by a ring of flexible non-magnetic material so that the intermediate element may yield sufficiently to adapt its faces to those of the contiguous parts and to produce in consequence a tighter hold when in clutching position.

The accompanying drawings illustrate my invention as applied to clutches of the type above mentioned.

Referring now to Figure I, 1 is a ring (elbow-shaped in cross section) of magnetic material keyed to the driving shaft 2 and this ring and shaft together constitute the annular trough of magnetic material, the energizing coil 3 being mounted on the shaft 2 as shown. 4 is the hood, preferably of non-magnetic material, fixed to the periphery of the ring 1. 5 is the annular keeper consisting of an elbow-shaped ring of magnetic material which slides on the driven shaft 10 and at its periphery is feathered to the hood 4 so as to rotate therewith but be capable of sliding to and fro in a direction normal to its plane. 6 is the intermediate element consisting of the two concentric rings 7 and 8 of magnetic material attached to one another by the ring of flexible non-magnetic material 9. The element 7 is feathered on the driven shaft 10 so as to be free to slide longitudinally thereon and it is preferably provided with a sleeve 11 so as
55 to have a firm bearing on the said shaft.

When current is transmitted through the energizing coil the keeper 5 and intermediate element 6 are pulled to the right and close up upon the electromagnet, the magnetic circuit from the electromagnet being completed out through the intermediate element and back through the shaft as shown by the closed dotted line 12. The friction between the contacting surfaces then causes the shaft 10 to be driven in the usual way.

In Fig. II I show a case which differs from that shown in Fig. I in that the number of working faces is increased still further, there being now five intermediate elements 6¹, 6², 6³, 6⁴, 6⁵ of which 6¹, 6³ and 6⁵ are slidably feathered on the shaft 10 and 6² and 6⁴ slidably feathered in the hood 4. In other respects this case is similar to that shown in Fig. I.

Fig. III illustrates a case which differs from those shown in Figs. I and II in that the driving and driven shafts, instead of being in alinement, are placed side by side. In this case it will be seen that there is no hood 4 but that instead thereof each alternate element gears with a long pinion 13 upon the driven shaft 10. In this case all the elements except the ring 1 slide upon the driving shaft 2.

I prefer to make the hood 4 of gun metal but I have found that I might even make it of magnetic material although that is disadvantageous.

In all the cases illustrated it will be noted that the energizing coil is mounted directly upon the shaft and between the annular electromagnet and its keeper so that the magnetic circuit is in each case completed through the shaft as shown by the closed dotted lines 12.

It will further be noted that although the cases illustrated all embrace an intermediate element my invention is not limited thereto but may be applied in the case of clutches in which no intermediate element is employed.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:—

1. A magnetic clutch comprising a driving and a driven shaft, an annular electromagnet, an annular keeper and an intermediate element between the electromagnet and the keeper, the arrangement being such that the magnetic circuit is completed out

through the intermediate element and back through the shaft.

2. A magnetic clutch comprising a driving and driven shaft, an annular electromagnet and annular keeper and an intermediate element consisting of two concentric rings of magnetic material secured together by a flexible ring of non-magnetic material, the arrangement being such that the magnetic circuit is completed out through the intermediate element and back through the shaft, substantially as described.

3. A magnetic clutch comprising an annular electromagnet and an annular keeper, an intermediate element consisting of two concentric rings of magnetic material se-

cured together by a flexible ring of non-magnetic material, the outer ring being supplied with gear teeth, and a driving and a driven shaft one of which carries a pinion meshing with the teeth described, the arrangement being such that the magnetic circuit is completed out through the intermediate element and back through the shaft, substantially as described.

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

HENRY WILLOCK RAVENSHAW.

Witnesses:

ROTHA SHEPHERD,
PERCY WILLIAM CLARK.