

942,187.

Fig. 1.

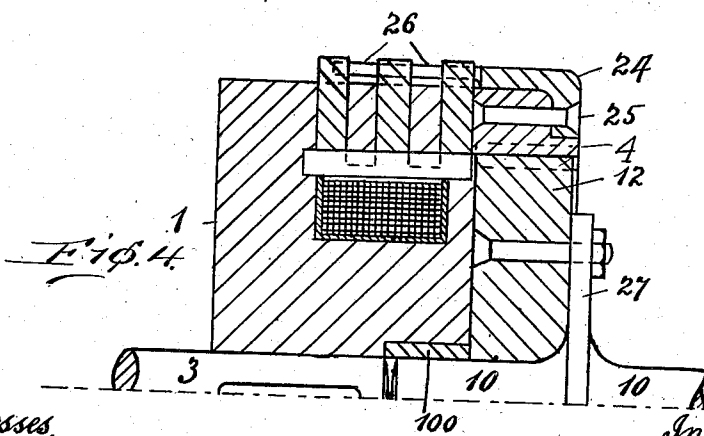
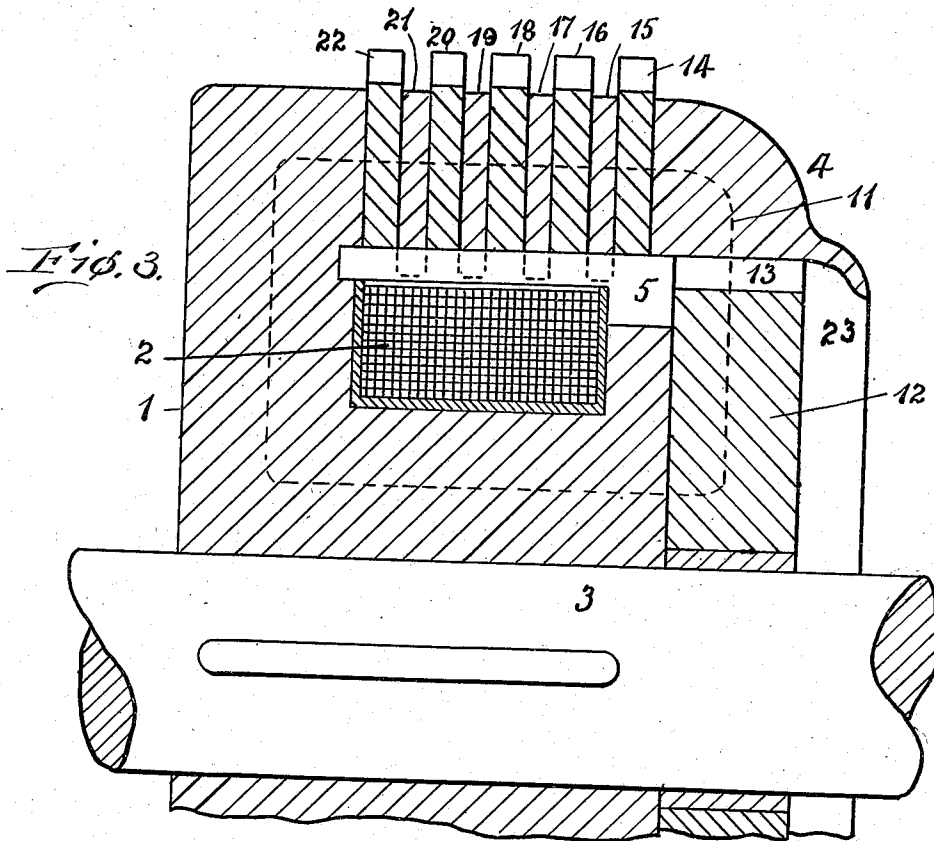
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MAGNETIC CLUTCH.
APPLICATION FILED JAN. 14, 1908.

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Patented Dec. 7, 1909.
3 SHEETS—SHEET 2.



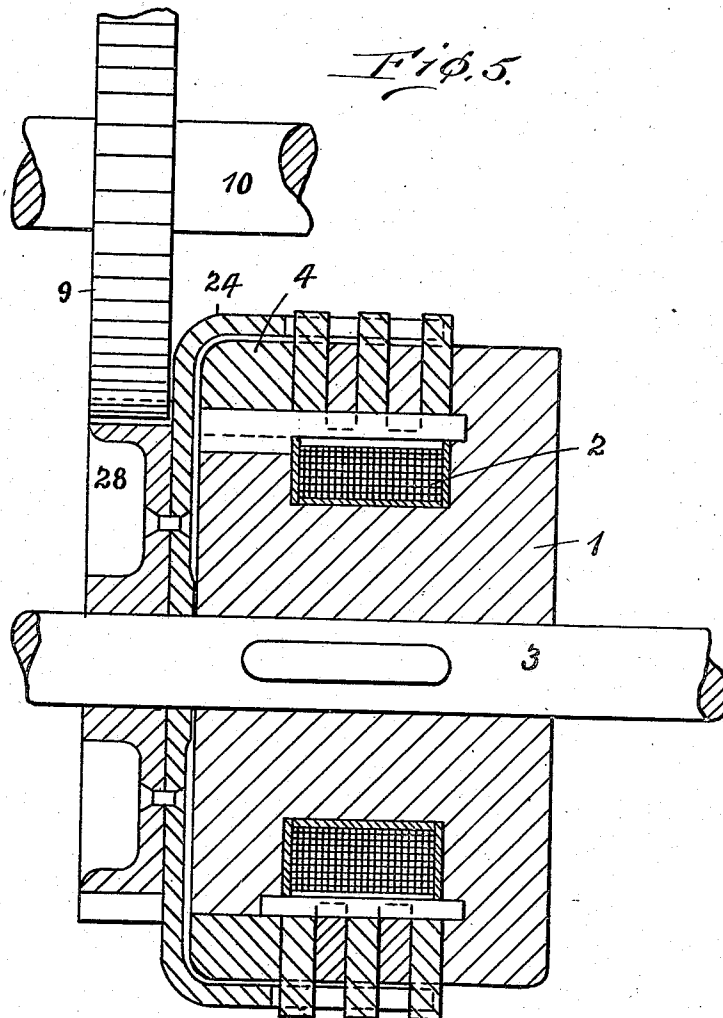
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UNITED STATES PATENT OFFICE.

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MAGNETIC CLUTCH.

942,187.

Specification of Letters Patent.

Patented Dec. 7, 1909.

Application filed January 14, 1908. Serial No. 410,744.

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 invented new and useful Improvements in Magnetic Clutches, of which the following is a specification.

My invention relates to improvements in magnetic clutches of the type (hereinafter termed the intermediate element type) set forth in the specification accompanying my application for Letters Patent of the United States filed 28th February 1907, Serial No. 359,905, by means of which certain advantages are obtained.

In order that my present invention may be more readily understood I shall proceed to describe it with reference to the accompanying drawings.

Figures 1 and 2 illustrate one form of my invention Fig. 1 being a longitudinal (shaft-wise) section and Fig. 2 a transverse section as seen when looking in the direction of the arrow in Fig. 1. Fig. 3 is a longitudinal section of a construction showing a modified form of keeper. Fig. 4 shows a construction in which the shafts are in alignment; and Fig. 5 shows a construction having a spur wheel.

In these figures 1 is the electro-magnet having the coil 2 wound in an annular channel thereon.

3 is the shaft carrying the electro-magnet and 4 is an annular keeper slidably keyed by the keys 5, preferably of non-magnetic material such as gun metal, upon the electro-magnet 1. Supported by and surrounding these keys and the coil are the plates or intermediate elements 6, 7, 8 of magnetic material of which 7 rotates with the electro-magnet 1 while 6 and 8 mesh into the long pinion 9 carried on the shaft 10. The parts are shown in Fig. 1 in the closed up position which they occupy when the electro-magnet is energized. When the electro-magnet is not energized plates 6 and 8 are free. The keeper 4 fits closely around the electro-magnet 1. The course of the magnetic circuit is represented by the dotted line 11.

In Fig. 3 I illustrate in longitudinal section a case which differs from that shown in Figs. 1 and 2 mainly in the form of the keeper and in the fact that a larger number of plates or intermediate elements is employed. In this case it will be seen that the keeper consists not only of the open ring 4

but of the ring 12 mounted within the opening of the ring 4 and upon shaft 3 these two rings being slidably keyed together by the keys 13. Of the intermediate plates or elements, 14, 16, 18, 20 and 22 gear with a long pinion such as 9 shown in Figs. 1 and 2. It will be seen that in this case I have a very large number of working surfaces, that is surfaces 4, 14; 14, 15; 15, 16; 16, 17; 17, 18; 18, 19; 19, 20; 20, 21; 21, 22; 22, 1. There is also a working surface 1, 12. 23 is an annular oil flange for lubricating in the well known way.

The case illustrated in Fig. 4 differs from that illustrated in Fig. 3 in that the driving and the driven shafts are in alignment. Here it will be seen that a hood 24 (corresponding with the hood specified in my former application hereinbefore mentioned) is riveted to the annular keeper 4 by rivets 25. This hood differs from that specified in my said former application in that instead of feathering the intermediate elements into channels in the hood I feather them into slots 26 in the hood. These slots are sufficiently long to take all the intermediate elements which are to move with the hood. The annular or open ring-form keeper 4 is in this case slidably keyed to keeper 12 which is mounted within the opening of the ring 4 and which is bolted to the flange 27 on shaft 10. Electro-magnet 1 is keyed as is shown on shaft 3. Shaft 10 has an endwise movement within the bearing 100.

In Fig. 5 I illustrate a case where a spur wheel 28 is riveted to the hood 24 and which with that hood runs loosely on the shaft 3. This spur wheel gears into a short pinion 9 fast on shaft 10.

The action in all these cases will be readily understood. Thus in the case shown in Figs. 1 and 2 when current is not passing through the electro-magnet 1 the annular keeper 4 and the elements 6, 7 and 8 are not in close contact and power is therefore not transmitted between the shafts 3 and 10. As soon as the electro-magnet is energized however these parts close up and are jammed tightly together so that the intermediate elements 6 and 8 rotate with the electro-magnet and power is transmitted from the one shaft to the other. The action in Fig. 3 is similar except that in this case the keeper 12 may move longitudinally along shaft 3 along with the keeper 4. In

Fig. 4 shaft 10 keepers 4 and 12 and hood 24 move together longitudinally. When the electro-magnet is energized the keeper element and the intermediate elements close up as before mentioned and the hood with its attached parts are therefore driven with the electro-magnet. In Fig. 5 the closing up of keeper 4 presses the intermediate elements closely together so that the latter now move with the electro-magnet thus driving the hood 24 and the spur wheel 28 and so transmitting power through the pinion 9 to the shaft 10.

To enable the parts to open out or separate when the electro-magnet is no longer energized separating springs may be employed as in known forms of clutch.

It will be noticed that a spur wheel and a pinion are employed in Fig. 5 for the transmission of the power from one shaft to the other, but it is obvious that I might substitute pulleys for the spur wheel and pinion and transmit power between these pulleys by means of a belt. Or any other equivalent form of power transmitting gear might be employed.

It will be seen that in Figs. 1 and 5 the keeper element consists of the ring or keeper 4 and that in Figs. 3 and 4 it consists of the two concentric rings or keepers 12 and 4. In all the figures the electro-magnet element consists of the electro-magnet 1. The actual form of the elements may be varied within considerable limits.

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 electro-magnet, an annular keeper consisting of an open ring and a concentric ring mounted to slide in the opening of the open ring, and intermediate elements between the magnet and keeper, substantially as described.

2. A magnetic clutch comprising a driving and a driven shaft, an annular electro-magnet, an annular keeper, a slotted hood, and intermediate elements between the magnet and keeper feathered in the slots in the hood through which intermediate elements the magnetic circuit is completed, substantially as described.

3. A magnetic clutch comprising a driving and a driven shaft, an annular electro-magnet, an annular keeper, a slotted hood carrying a power transmitting element, and intermediate elements between the magnet and keeper feathered in the slots of the hood through which intermediate elements the magnetic circuit is completed, 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:

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