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L. T. GIBBS.

MAGNETIC CLUTCH.

APPLICATION FILED AUG. 2, 1905.

Fig. 1

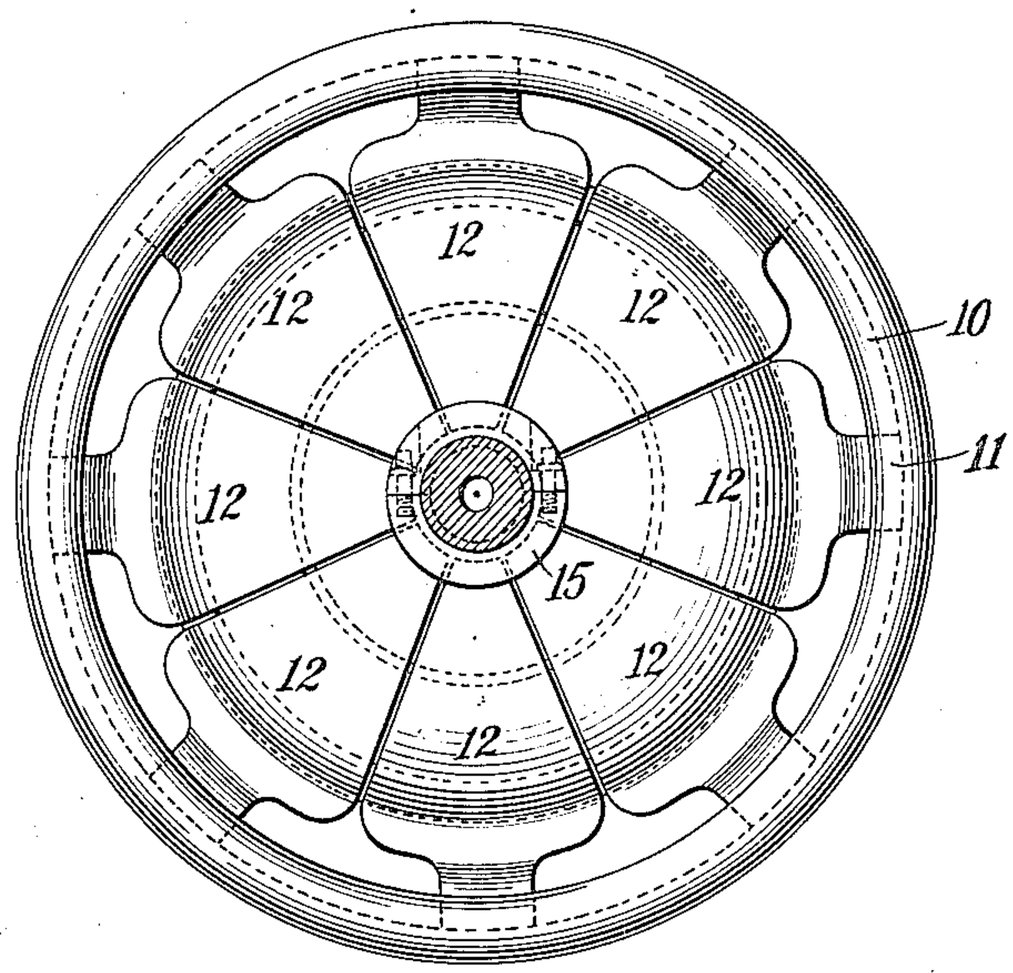
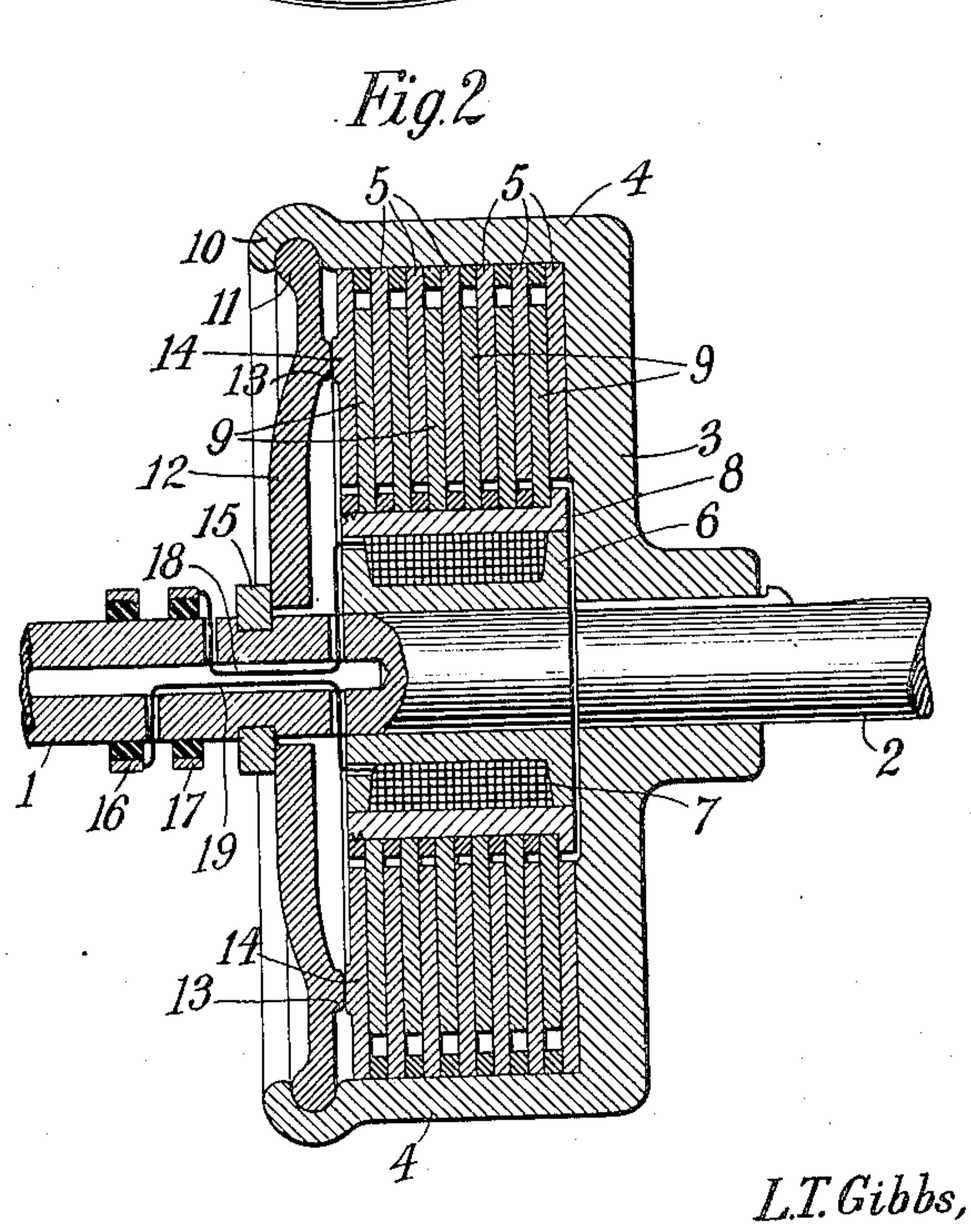


Fig. 2



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MAGNETIC CLUTCH.

No. 828,647. Specification of Letters Patent. Patented Aug. 14, 1906.

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To all whom it may concern:

Be it known that I, LUCIUS T. GIBBS, a citizen of the United States, residing at Hempstead, in the county of Nassau, State of New York, have invented certain new and useful Improvements in Magnetic Clutches, of which the following is a specification, reference being had to the drawings accompanying and forming part of the same.

My invention relates to friction-clutches of the type in which the friction-surfaces are pressed together by the energy of an electromagnet under the control of the operator.

The chief object of my invention is to provide mechanism of this kind which shall be extremely compact, as well as thoroughly efficient, so that large power can be transmitted without the necessity of employing inordinately large clutch devices.

A further object of the invention is to provide a device of this kind which can be readily assembled and readily taken apart to permit quick access to its various parts, and also to provide means whereby the centrifugal force of the rapidly-revolving clutch will release the clutch devices when the circuit of the electromagnet is broken.

To these and other ends the invention consists of the novel features of construction, arrangements of parts, and combinations of elements hereinafter described, and more particularly set forth in the claims.

Referring now to the drawings for a more complete explanation of my invention, Figure 1 is an end view of the preferred embodiment, and Fig. 2 is a central longitudinal section.

1 and 2 are shafts arranged end to end, as shown in Fig. 2, either of which is connected with the driving engine or motor and the other with the apparatus, to which power is to be delivered. On one of the shafts—as, for example, that indicated by 2—is rigidly mounted a disk 3, provided with an axially-extending flange 4. Inwardly extending from the flange 4 is a series of spaced disks or plates 5, loosely keyed to the said flange. The disks or plates 5 are in the form of rings, and within the openings thereof, rigidly secured to the shaft 1, is an iron spool 6, constituting the core of an electromagnet, the winding of which is indicated by 7. Surrounding the spool and firmly secured thereto is a sleeve 8, and extending outwardly from the latter between the disks 5 are friction-disks 9. It will now be clear that if the disks 5 and 9 be firmly pressed together, so as to develop great friction between them, the effect will be the same as if the two shafts 1 and 2 were rigidly connected and the motion of the shaft, which is driven by the engine, will be transmitted to the other. For the purpose of thus forcing the disks or plates 5 and 9 together the following devices are provided: Inside of the edge of the flange 4 is a curved groove 10, providing a bearing for the outer ends 11 of a plurality of sector-shaped armature-levers 12. The armature-levers extend radially inward toward the shaft 1 and are arranged to swing longitudinally of the case. Each lever is provided with an arc-shaped boss or rib 13 to bear against a similar rib 14 on the outermost plate 5.

The armature-levers stand normally, when the electromagnet is not energized, in the position shown in Fig. 2—that is, with their inner ends abutting against a stop formed by a removable collar 15 on the shaft 1. When the electromagnet 6 is energized by a suitable source of current, (not shown), the inner ends of the armatures are drawn toward the magnet, causing the armatures to bear with great force against the outermost disk 5, with the result that all the disks are firmly pressed together. As soon as the circuit of the electromagnet is broken the centrifugal force of the revolving armatures, which force has, of course, been exerted all the time on them, becomes effective and causes them to fly outward to the position shown in Fig. 2 against the stop-ring 15. The pressure on the friction-disks 5 and 9 being thus relieved the shaft which carries the load speedily comes to rest, while the other may continue to revolve. The release of the clutch by centrifugal force is very quick, and being perfectly automatic it is effected merely by breaking the magnet-circuit.

The winding of the electromagnet may be connected with its source of current in any suitable way—as, for example, by means of slip-rings 16 17. The latter are insulated from the shaft 1 and are connected with the magnet-winding by wires 18 19 through a bore in the shaft, as shown in Fig. 2. Suitable brushes (not shown) connected with the terminals of the source of current are provided to bear on the slip-rings in the usual way.

In order to permit the clutch to be assembled easily and quickly, the grooved edge of the flange 4 is made of larger diameter than

the rest of the flange, so that when the armature-levers are not in place the disks 5 and 9 may readily be slipped in position from the open side of the casing or box formed by the disk 3 and its flange 4. The armature-levers 12 may be quickly removed by taking off the stop-collar 15 and then swinging the levers directly out of their groove. To replace the levers, the operation is simply reversed and the stop-collar then secured in position. Any number of armature-levers may be provided, eight of them being shown in Fig. 1, each being substantially one-eighth of the circumference in extent, to provide only sufficient clearance between them to permit free action. The casing of the clutch is thus substantially closed and the armature-levers cannot become displaced relative to each other by moving to one side or the other as the clutch revolves, as might be the case if they were not wide enough to engage one another. It will be understood, of course, that the bearings or pivots 11 of the armatures do not fit the groove 10 perfectly, as in that case the peripheral curvature of the groove would bind the levers and prevent them from swinging freely. Instead the pivots 11 are slightly smaller in cross-section than the groove, or they may be perfectly straight, so as to engage the groove only at their ends. If desired, the groove may be specially formed at the proper points to give the best bearings for the armature-pivots, as will be readily understood.

It is customary in clutches of this character to inclose the entire device in a liquid-tight casing filled with oil, and, in fact, if it is desired that the clutch should have long life it is practically essential that it be immersed in oil. It will be understood, of course, that my clutch may be provided with such an oil-casing, if desired; but inasmuch as the same is a well-understood expedient it need not be illustrated herein.

As already explained in the embodiment shown in Fig. 2, one of the shafts is connected with the driving engine or motor and the other with the load which is to be driven. In other words, the clutch is constructed for "direct" transmission. Where the clutch is to be used to transmit power to a load which is to be driven at a speed greater or less than the engine speed, the disk 3 will be rigidly connected with a gear-wheel and will be mounted to revolve upon instead of with its shaft. The gear-wheel just mentioned will then mesh with a gear connected with the load which is to be driven. In this case it will of course be understood that the shafts 1 and 2 form one continuous shaft, which is connected with or driven by the engine.

The arrangement of gears just described is very common in this art, and hence need not be further described or illustrated herein.

The devices specifically described in this specification constitute merely the preferred embodiment of my invention, and it will be understood by those skilled in the art that the same may be embodied in widely-varying forms without departure from its proper scope.

What I claim is—

1. In a magnetic clutch, the combination of one or more friction-disks arranged transversely about a power-driven shaft and connected with a load to be driven, one or more friction-disks arranged transversely about the same shaft and connected therewith, the first-mentioned disk or disks being arranged alternately with the last-mentioned, a plurality of radial armature-levers arranged to swing longitudinally of the shaft, and adapted to press the said friction-disks together, and electromagnetic means for actuating the armature-levers, as set forth.

2. In a magnetic clutch, the combination of one or more friction-disks arranged about a power-driven shaft and connected with a load to be driven, one or more friction-disks arranged about the same shaft and connected therewith, the first-mentioned disk or disks being arranged alternately with the last-mentioned, a plurality of radial armature-levers adapted to press the said friction-disks together, and electromagnetic means at the axis of the clutch for actuating the armature-levers, as set forth.

3. In a magnetic clutch, the combination of one or more friction-disks arranged about a power-driven shaft, and connected with a load to be driven, one or more friction-disks arranged about the same shaft and connected therewith, the first-mentioned disk or disks being arranged alternately with the last-mentioned, a plurality of radial armature-levers pivoted at the periphery of the disks and adapted to press the disks together, and electromagnetic means for actuating the armature-levers, as set forth.

4. In a magnetic clutch, the combination of one or more friction-disks arranged about a power-driven shaft and connected with a load to be driven, one or more friction-disks arranged about the same shaft and connected therewith, the first-mentioned disk or disks being arranged alternately with the last-mentioned, a plurality of radial armature-levers pivoted at the periphery of the disks and arranged to press the disks together, and electromagnetic means at the axis of the clutch for actuating the armature-levers, as set forth.

5. In a magnetic clutch, the combination of one or more friction-disks arranged about a power-driven shaft and connected with a load to be driven, one or more friction-disks arranged about the same shaft and connected therewith, the first-mentioned disk or disks being arranged alternately with the last-mentioned, a plurality of radial armature-le-

vers pivoted at the periphery of the disks and adapted to press the disks together, and a single electromagnet at the axis of the clutch for actuating all the armature-levers, as set forth.

6. In a magnetic clutch, the combination of a plurality of radially-arranged armature-levers, electromagnetic means for actuating the levers in one direction, and a stop for limiting their movement in the opposite direction when the electromagnetic means is deënergized, as set forth.

7. In a magnetic clutch, the combination of a cylindrical casing containing friction devices, said casing having a bearing-groove at one edge, an armature-lever extending inwardly from the edge of the casing and having its end fitting the groove to permit the lever to swing on the said end as a pivot, said groove and pivot end being constructed to permit the latter to be released from the groove when the lever is swung outwardly from the casing, and a removable stop to engage the lever and prevent such release, as set forth.

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