No. 896,868. PATENTED AUG. 25, 1908.

A. P. STECKEL.

ELECTRICAL CLUTCH OR THE LIKE.

APPLICATION FILED DEC. 7, 1907.

Fig. 1.

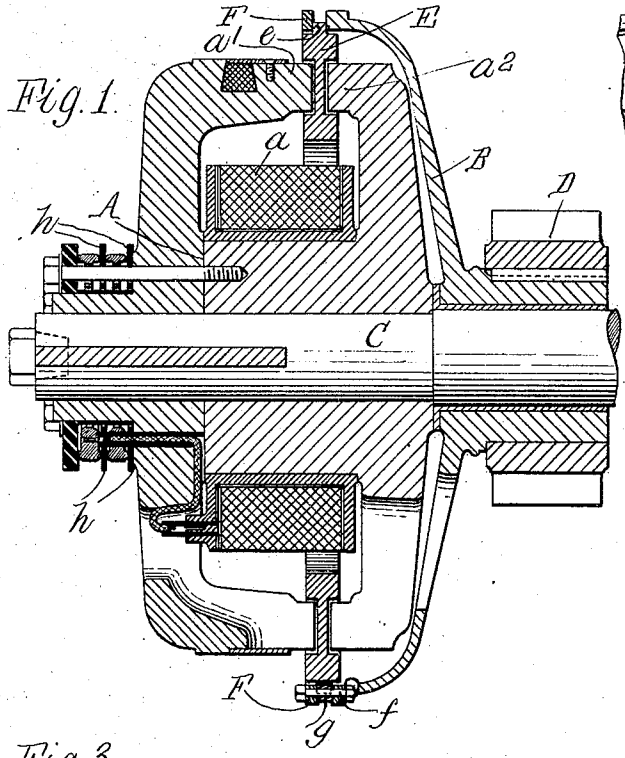



Fig. 2.

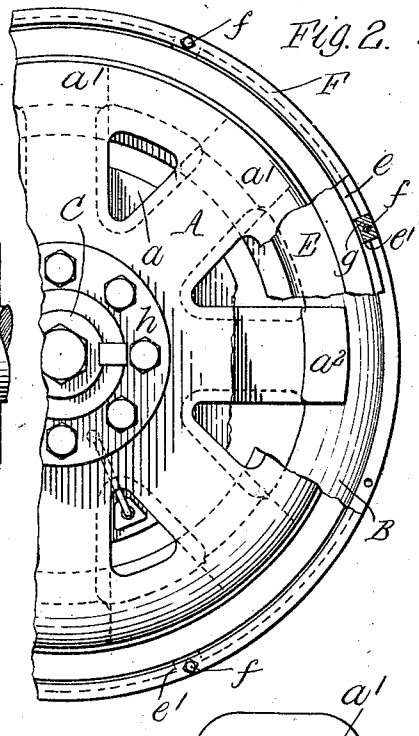



Fig. 3.

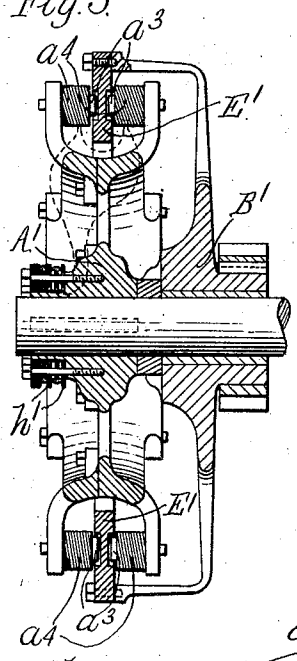



Fig. 4.

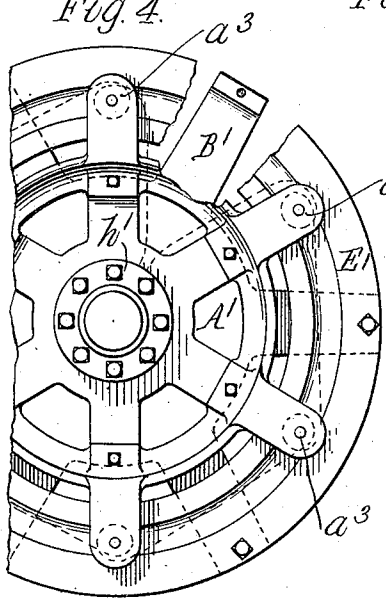



Fig. 5.

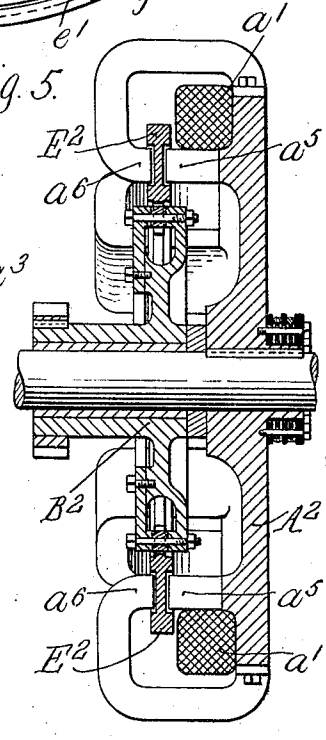
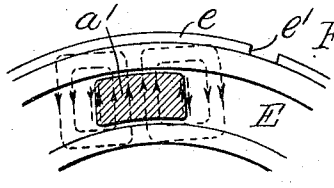



Fig. 6.




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# UNITED STATES PATENT OFFICE.

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## ELECTRICAL CLUTCH OR THE LIKE.

No. 896,868. Specification of Letters Patent. Patented Aug. 25, 1908.

Application filed December 7, 1907. Serial No. 405,513.

*To all whom it may concern:*

Be it known that I, ABRAM P. STECKEL, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Electrical Clutches or the Like, of which the following is a specification.

This invention relates to electrical induction clutches of the type disclosed in U. S. Patent No. 744,423, granted to me November 17, 1903. These clutches, which are especially applicable to power transmission mechanisms in which the driven part is frequently started and stopped or reversed, comprise essentially two members, one having oppositely disposed magnet poles, and the other an annular plate or ring of conducting material arranged in a plane perpendicular to the axis of the clutch between said poles and in the magnetic field established thereby, in such manner that the electrical currents induced in said ring by the relative rotation of said clutch members tend to cause said members to rotate together, or, when the device is used as a brake, and one member is fixed, to oppose the rotation of the other member. It is essential to the efficient operation of such clutches that the conducting body be of annular or ring form so that the density of current and consequent heating and expansion of the same will be approximately uniform throughout the ring, thereby avoiding the warping thereof. The efficiency of the clutch can be still further increased by making the conducting ring of such shape in cross section that it will afford a path of the least resistance for the induced currents and have the maximum mechanical strength without increasing the air gap between the magnet poles, so as to weaken the magnetic field.

The primary object of the invention is therefore to make the conducting ring of a novel shape in cross-section to produce these results, and also to connect the conducting ring to the clutch member carrying it in a novel manner, which will allow the independent expansion of the ring in a plane perpendicular to its axis to further minimize the warping of the ring.

In the accompanying drawings: Figure 1 is a sectional elevation of a clutch embodying the invention. Fig. 2 is a fragmentary side elevation thereof, partly in section. Fig. 3 is a sectional elevation, on a reduced scale, of a modified construction. Fig. 4 is a fragmentary side elevation thereof, partly in section. Fig. 5 is a sectional elevation of another modification. Fig. 6 is a fragmentary transverse sectional elevation indicating the paths of the currents in the conducting ring.

Like letters of reference refer to like parts in the several figures.

Referring first to Figs. 1 and 2, A represents the fast or driving member, and B the loose or driven member of the clutch. The former is keyed or otherwise secured to a drive shaft or other drive element C, and the latter is loose or free to turn on or relative to said shaft and is provided with a gear wheel D or other means for transmitting motion to the part to be driven thereby. The manner of mounting and connecting the driving and driven members to the driving and driven elements, however, forms no part of this invention and this may be accomplished in any suitable way. One clutch member, preferably the driving member A, consists of a magnet body or core surrounded by an electrical winding $a$ for energizing it, and having oppositely facing poles $a'$ $a^2$ located outwardly beyond or surrounding the winding and connected to the opposite ends of the core or body. The other clutch member consists of a supporting wheel or body, and a ring or annular plate E of copper, or other material which is a good electrical conductor, secured thereto and arranged in a plane perpendicular to the axis of the clutch between the opposite magnet poles. This conducting ring is of substantially I-shape in cross-section, that is, it has a relatively thin intermediate portion located between the faces of the opposite poles and flanged or thickened inner and outer rim portions which are disposed respectively within and without the poles. By thus forming the ring it can operate in an air gap only wide enough for its thinnest portion, which insures a strong magnetic field, but the ring is proportionately stronger and has greater conducting area than if it were made of the same thickness throughout its width as its thin intermediate portion. The conducting ring is provided at its outer periphery with a securing rib or flange $e$, which is notched at $e'$, see Fig.

2, and is embraced on opposite sides by or is confined between the circular edge of the supporting wheel B and a fastening ring F which is secured to the wheel by bolts *f* passing through spacing blocks *g* clamped between the wheel B and the securing ring F in the notches *e'* of the conducting ring. These spacing blocks are slightly thicker than the securing flange *e* of the conducting ring and prevent the ring from being clamped between the wheel and the fastening ring F, but they cause the ring and wheel to turn together. While, therefore, the conducting ring is free to expand in a plane perpendicular to its axis on the supporting wheel, it cannot turn on the wheel but rotates with the wheel as a rigid part thereof. *h h* represent collector rings of ordinary construction for leading the electrical current to the magnet winding from the supply circuit. As this invention relates only to the construction of the conducting ring E and the means for securing it to the clutch member or wheel carrying it, the other features of the clutch are not described in detail.

In the construction above described the magnet poles are all energized by the single winding *a* and the conducting ring is connected to the clutch member or wheel B outwardly beyond the magnet poles. The invention is not, however, restricted to this form, as the clutch could be of other constructions of which examples are shown in Figs. 3–5 of the drawings.

Figs. 3 and 4 illustrate a construction better suited for more powerful clutches, ranging, for example, from one hundred horsepower upward. In this construction each pole $a^3$ is energized by a separate surrounding electrical winding $a^4$. In other words, separate magnets are employed for the several poles at each side of the conducting ring E', and these magnets are connected by radial arms to the continuous circular rim of the clutch member A'. The electrical current is led to the several magnets by conductors from suitable collector rings *h' h'* on the hub of the clutch member A'. The conducting ring E' is of similar shape in cross-section to the ring E before described. It could be secured in the manner described, to the clutch member B' carrying it, to permit the expansion of the conducting ring, but the ring E' is shown as rigidly bolted to lateral extensions of the arms of the member B', which extensions can yield radially to permit the expansion of the ring but are sufficiently rigid crosswise thereof, or in the direction of the plane of rotation of the ring, to cause the ring to turn with the clutch member B' as a rigid part thereof.

Fig. 5 illustrates another construction in which the conducting ring $E^2$ is of the character or shape described. The ring in this instance, however, is carried by a clutch member $B^2$ which is arranged concentrically within instead of surrounding the ring, and the other clutch member $A^2$ is provided with magnet poles $a^5$ $a^6$ between which the ring is located and one set of which extend outwardly beyond said ring for connection to the supporting wheel or body. The magnet poles in this instance are all energized by a single circumferential winding *a'*, but manifestly separately energized magnets or poles could be employed if desired. The conducting ring is attached to the clutch member $B^2$ carrying it in the same manner as the clutch ring E in the first construction described, whereby the ring is caused to turn with the member supporting it as a rigid part thereof but is adapted to expand in the plane of the ring.

The action of the conducting ring is similar in the several constructions described. In the use of the clutch the induced currents flow through the thick inner and outer portions of the ring, as indicated by the arrow lines in Fig. 6, and have a path of less resistance than they would have were the ring made of the same thickness throughout its width as the thickness best suited to be used in the air gap between the magnet poles.

I claim as my invention:

1. An electrical clutch or the like comprising a member having oppositely disposed magnetized poles separated by an air gap, a second clutch member, and a conducting ring supported thereby in a plane perpendicular to the axis of the clutch and having a thin portion located between said opposite poles, and thicker portions located inwardly and outwardly beyond said poles with respect to the axis of the clutch, substantially as set forth.

2. An electrical clutch or the like comprising a member having oppositely disposed magnetized poles separated by an air gap, a second clutch member, and a conducting ring supported thereby in a plane perpendicular to the axis of the clutch and having a thin portion located between said opposite poles, and thicker portions located inwardly and outwardly beyond said poles with respect to the axis of the clutch, said conducting ring being connected to the supporting clutch member by means which allow said ring to expand in the plane thereof independently of the supporting clutch member, substantially as set forth.

3. An electrical clutch or the like comprising a member having oppositely disposed magnetized poles separated by an air gap, a second clutch member, and a conducting ring supported thereby between said opposite poles in a plane perpendicular to the axis

of the clutch, said ring having a notched securing portion, spacing blocks located in said notches, and means embracing said securing portion of said conducting ring and said spacing blocks and rigidly securing the blocks to said supporting clutch member, substantially as set forth.

Witness my hand, this 2d day of December, 1907.

ABRAM P. STECKEL.

Witnesses:
C. B. HORNBECK,
C. W. PARKER.