(No Model.)

A. DE BOVET.

MAGNETIC CLUTCH.

No. 586,006. Patented July 6, 1897.

Fig. 1.

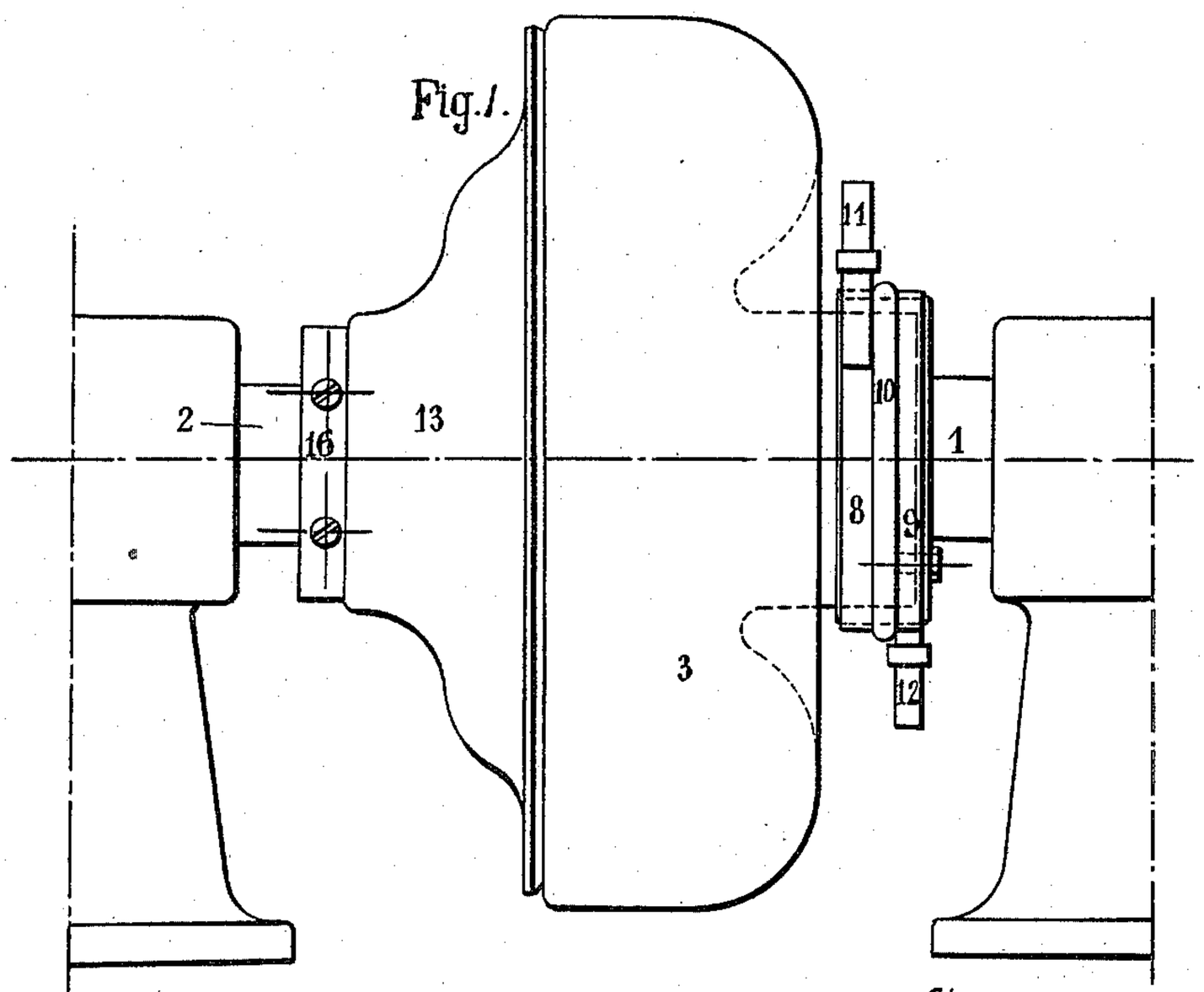


Fig. 2.

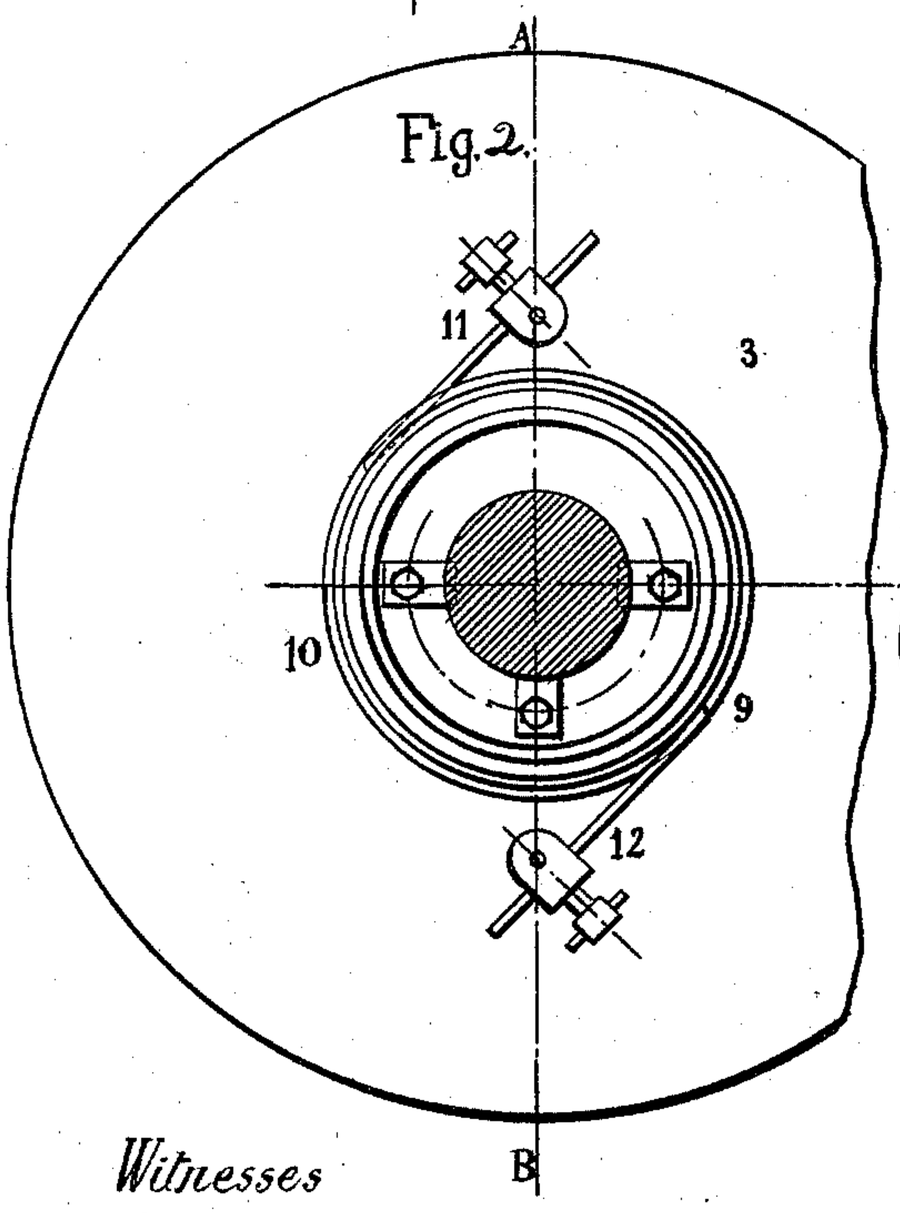
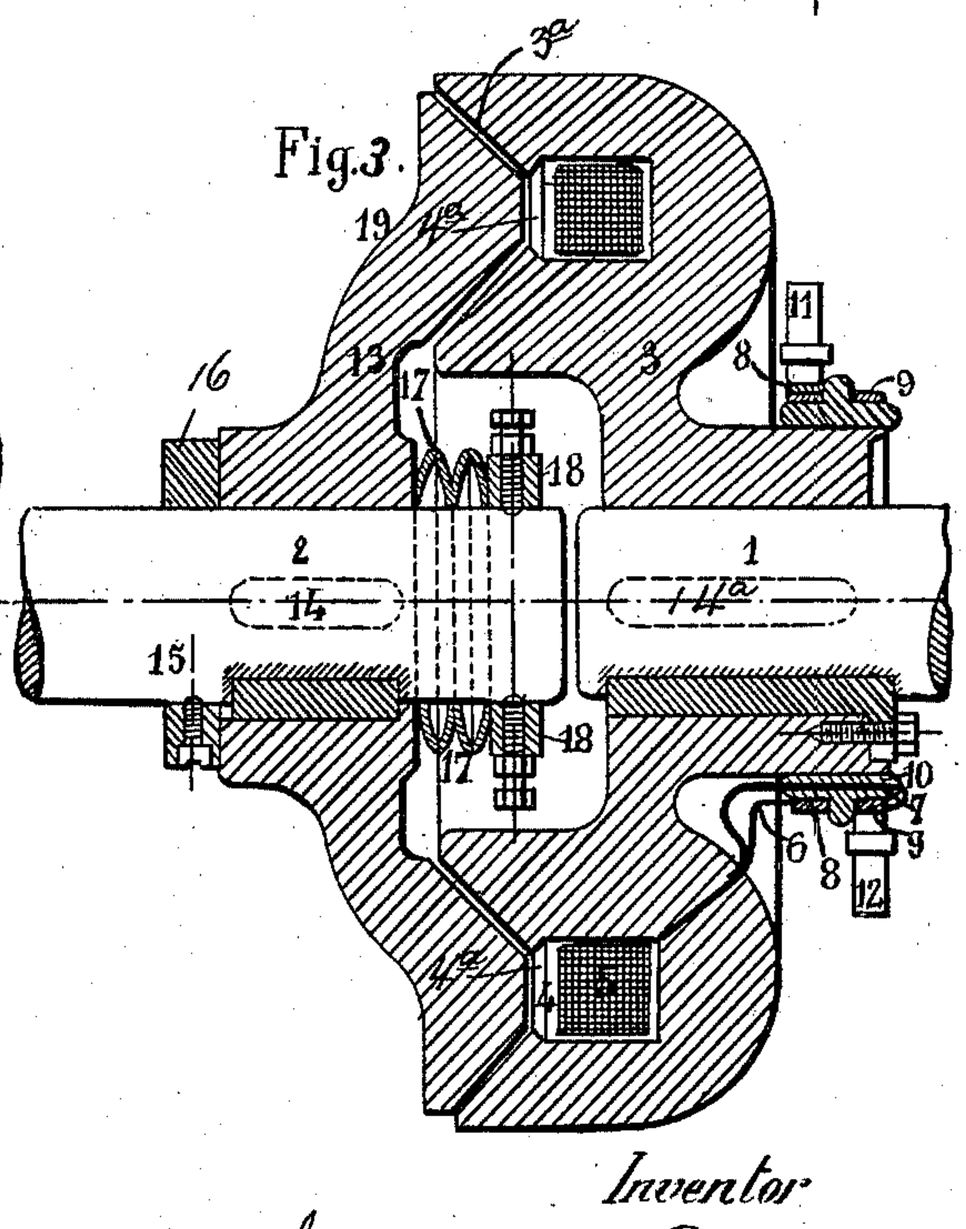


Fig. 3.



Witnesses
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UNITED STATES PATENT OFFICE.

ARMAND DE BOVET, OF PARIS, FRANCE.

MAGNETIC CLUTCH.

SPECIFICATION forming part of Letters Patent No. 586,006, dated July 6, 1897.

Application filed November 18, 1893. Serial No. 491,371. (No model.) Patented in France January 15, 1891, No. 216,469; in Belgium October 3, 1891, No. 96,657; in Switzerland April 22, 1892, No. 5,083, and in Italy July 30, 1892, LX, 84.

To all whom it may concern:

Be it known that I, ARMAND DE BOVET, a citizen of France, and a resident of Paris, in the Department of the Seine, France, have invented a new and useful Improvement in Magnetic Clutches, (for which I have obtained Letters Patent in the following countries: France, No. 216,469, dated January 15, 1891, with certificate of addition, No. 216,469, dated April 14, 1892; Belgium, No. 96,657, dated October 3, 1891, with certificate of addition, No. 99,271, dated April 15, 1892; Switzerland, No. 5,083, dated April 22, 1892, and Italy, 84, Vol. 60, dated July 30, 1892,) of which the following is a specification.

My invention relates to means for producing a strong adhesion between two pieces of iron, cast-iron, or steel, and the utilization of the adhesion thus obtained for the production of a clutching engagement.

The invention consists in the novel mechanism whereby such purpose is carried into effect, all of which is fully described hereinafter and then specifically pointed out in the claims annexed to this specification.

To enable others skilled in the art to understand and to practice said invention and to make, construct, and use the mechanism comprised therein, I will proceed to describe both, reference being had for such purpose to the accompanying drawings, in which—

Figure 1 is an elevation showing one form of clutch mechanism embodying my invention. Fig. 2 is a sectional end elevation of the same, taken from the right hand of Fig. 1. Fig. 3 is a vertical longitudinal section taken in the plane A B, Fig. 2.

In the said drawings the reference-numerals 1 and 2 indicate two separate shafts or arbors, which can be coupled and uncoupled at will by my means of clutching. Upon the end of the shaft 1 is rigidly keyed a head or fixed disk 3, of soft cast-iron or other suitable magnetizable material. In the mass of this disk is formed a circular concentric chamber 4, in which is placed the solenoid or electrocoil 5, by which the disk 3 is magnetized. The terminals 6 and 7 of the wire forming this coil are fastened to the metallic rings 8 and 9, respectively, upon an annulus 10, of non-conducting material, fitted upon the hub of the disk 3, by which the rings are isolated electrically from the shaft, while a central rib on said annulus 10 separates and insulates the two rings from each other. It is by means of these two rings that the electric current enters and leaves the coil 5 by way of the brushes 11 and 12, which rest upon said rings. To the said brushes are connected the terminals of wires leading from and to the opposite poles of a battery, either primary or secondary, or any other suitable source of electric energy.

Near the inner extremity of the shaft 2 is mounted a second disk 13, movable longitudinally upon the shaft and having a cup form, or, in other words, concaved upon the face next the disk 3. This disk 13 is caused to turn with the shaft 2 by means of the ribs or splines 14 on the shaft 2, and the disk 3 is similarly engaged with the shaft 1, the splines, which are shown by dotted lines in Fig. 3, being adapted to engage the hub of the disk, compelling its revolution without obstructing its longitudinal adjustment on the shaft. This longitudinal movement is limited in one direction by the collar 16, fastened by set-screws to the shaft 2, and in the other direction by one or two pairs of elastic annular plates 17 or other elastic media, which abut against a fixed collar 18, surrounding the end of the shaft 2.

The periphery of the disk 13, as seen in Fig. 3, is in cross-section nearly a wedge-shaped body, the surface adjacent to the disk 3 being a double incline intersecting a plane face which is parallel with the plane of rotation. The outline of this side face, for it cannot properly be termed a "periphery," resembles a truncated cone, and the annulus, thus shaped, lies near the vertical face of the disk 3, in which a circular channel 3^a is formed suitable for the admission of the wedge-shaped face of the disk 13.

When the current is thrown into the electrocoil 5, the disk 13, displaced upon the shaft 2 by the magnetic attraction, is drawn against the disk 3 and into the channel 3^a, to which it adheres with more or less strength, according to the greater or less intensity of the current, thereby coupling the shafts 1 and 2 together. If the flow of the current is inter-

rupted, the elastic devices interposed between the disk 13 and the collar 18 and compressed by the movement of the disk force the latter back to the position it originally occupied, the two shafts being thereby uncoupled.

The space between the two engaging faces of the disks 3 and 13 may be made very small, so that if the mechanism acts automatically a magnetic field too feeble to produce a locking engagement will be sufficient to attract the disk 13. It is certain also that the operative engagement will be such as to prevent shock to the parts, as this engagement is effected, so to speak, progressively in proportion to the intensity of the current, there being always more or less slip, whereby the mechanism will operate as smoothly as desired.

Regarding the disk 3 as an electromagnet and the disk 13 as the armature, it should be understood that either one may be made the movable element. The mechanism may also be rendered automatic throughout without material increase in cost.

I am aware that electromagnetic clutches have been devised in which the two surfaces brought into frictional contact are inclined at an angle to the plane of rotation. In my invention, however, I provide the disk 3 with an annular channel 3^a, formed in the vertical face of said disk as near its periphery as possible. The walls of this channel converge from the outer face of the disk toward an annular opening 4^a, just beyond which is the chamber 4, containing the coil of wire 5.

By forming the channel 3^a in the disk 3 with its sides converging toward the opening 4^a there is an annular mass of iron on each side of said channel and the aggregate mass available for effective saturation is greater than would be attainable with a construction of the type shown in patent to C. H. Veeder, No. 439,213, or to G. A. Brown, No. 505,025. Moreover, these annular masses are distributed almost equally on both sides of the annular channel 3^a, besides polarizing the circular bodies of metal oppositely upon opposite sides of the channel 3^a. I obtain in this manner a more powerful attraction of the disk 19, as the magnetic attraction is applied to greater advantage, besides increasing the area of frictional contact of the disk 13 without enlarging the diameters of the disks.

What I claim is—

1. An electromagnetic clutch consisting of a disk 3, splined on a shaft 1 and provided with an annular channel 3^a in its vertical face, said channel having two surfaces converging from the outer face of the disk to an annular opening 4^a between the chamber 4 and the channel 3^a, a coil of wire 5 lying in said circular chamber 4, a non-conducting annulus 10, conducting-rings 8 and 9 mounted thereon and connected to the terminals of the coil 5, brushes 11 and 12, a disk 13 having its side face formed to enter and fit the channel 3^a in the disk 3, said disk 13 being splined to and adjustable on the shaft 2, and means for separating said disks 3 and 13, substantially as described.

2. An electromagnetic clutch, consisting of a disk 3 having an annular channel 3^a formed in its vertical face, said channel having two faces converging toward an opening 4^a, a coil of wire 5 lying in a circular chamber 4 just beyond the opening 4^a, conducting-rings 8 and 9, a non-conducting annulus 10 supporting said rings, which are connected to the terminals of the coil 5, brushes 11 and 12, a disk 13 having a side face adapted to fit the channel 3^a, a shaft 2 on which said disk is splined and adjustable, and elastic plates 17 lying between the inner face of the disk 13, and a collar 18 fast on the end of the shaft 2, the metal being distributed upon both sides of the channel 3^a and oppositely polarized on the respective sides, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

ARMAND DE BOVET.

Witnesses:

ROBT. M. HOOPER,

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