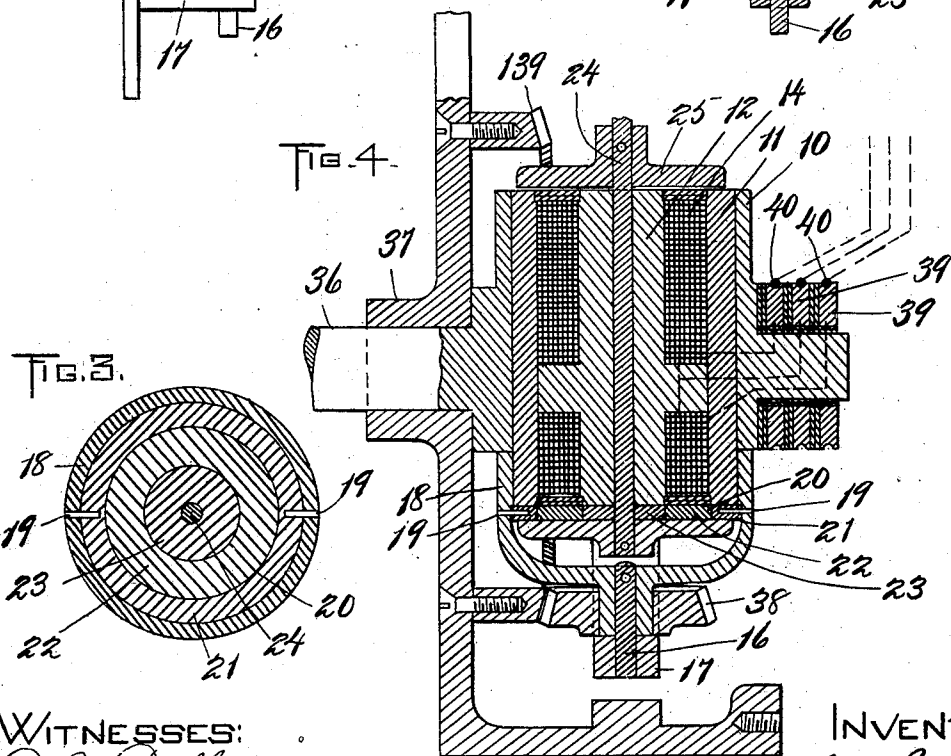
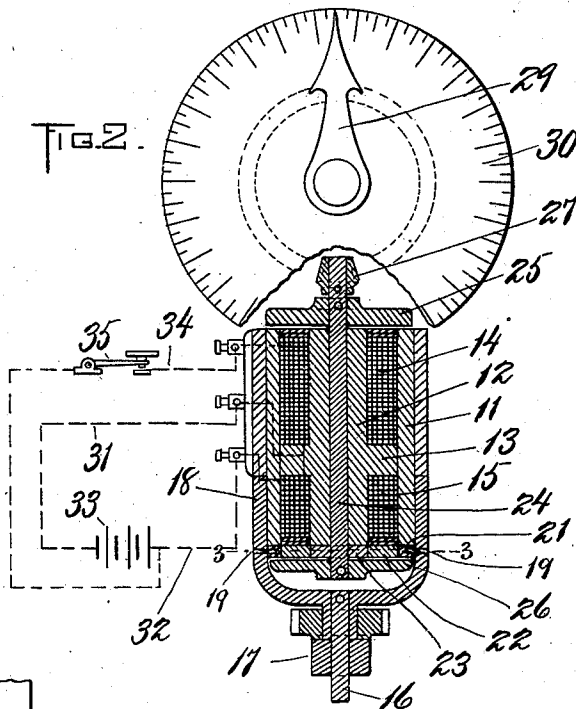
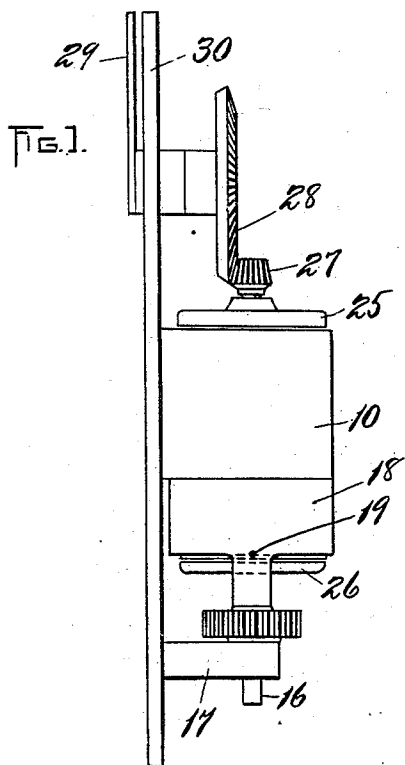


E. V. BEALS.
ELECTROMAGNETIC CLUTCH.
APPLICATION FILED OCT. 8, 1900.

NO MODEL.



WITNESSES:
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UNITED STATES PATENT OFFICE.

ERL V. BEALS, OF BOSTON, MASSACHUSETTS.

ELECTROMAGNETIC CLUTCH.

SPECIFICATION forming part of Letters Patent No. 727,573, dated May 12, 1908.

Application filed October 8, 1900. Serial No. 32,325. (No model.)

To all whom it may concern:

Be it known that I, ERL V. BEALS, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful
 5 Improvements in Electromagnetic Clutches, of which the following is a specification.

This invention relates to electromagnetic clutches; and it has for its object to provide a simple, quick-acting, and positive clutch.

10 The invention consists in the novel features of construction and arrangement hereinafter described and claimed.

Of the accompanying drawings, Figure 1 represents a side elevation of a clutching
 15 mechanism constructed in accordance with my invention. Fig. 2 represents a sectional view with parts in elevation. Fig. 3 represents a section on line 3 3 of Fig. 2 on an enlarged scale. Fig. 4 represents a sectional
 20 view showing a modified method of mounting the clutch.

The same reference characters indicate the same parts in all the figures.

Referring to Figs. 1 and 2, 10 designates a
 25 fixed socket, in which is held a cylindrical soft-iron sleeve 11, within and concentric with which is a core member 12, having a circular flange 13 in magnetic contact with the
 30 sleeve 11 and forming the common base for two oppositely-disposed electromagnets whose pole-pieces are at the two ends of the core member and sleeve, respectively. 14 15 designate the windings or helices of said magnets, which are mounted in the two annular
 35 spaces between the core member 12 and sleeve 11 on opposite sides of the flange 13, the whole structure as thus far described constituting virtually two magnets placed base to base, as will be apparent. 16 is a driving-
 40 stem mounted in a bearing 17 and having a sleeve 18, to which is secured by pins 19 a disk 20, adapted to rotate close to the pole-pieces of the lower magnet. This disk is composed of an outer soft-iron ring 21,
 45 alined with the annular lower edge of sleeve 11, an adjacent ring 22, of non-magnetic material, such as brass, secured to the ring 21 and alined with the magnet-winding 15, and an inner ring or circular section 23, secured
 50 to the ring 22 and alined with the lower end of the core member 12. Through the center of the core member 12 passes a shaft 24,

adapted to rotate in said core as a bearing and to have a limited axial movement therein, said shaft having secured to its upper
 55 end an armature-disk 25, located close to the pole-pieces of the upper magnet, and to its lower end an armature-disk 26, located below and close to the disk 20, both of these armature-disks being made of soft iron. The
 60 shaft 24 may drive any suitable mechanism, depending upon the application which is made of the clutch, it being here shown as provided with a bevel-gear 27 at its end, meshing with a bevel-gear 28 on the shaft of
 65 a pointer 29, rotating in front of a dial 30. The terminals of the lower-magnet winding 15 are in closed circuit through wires 31 32 with a battery 33, the current from which flows continuously through said winding, and the
 70 upper-magnet winding 14 is in parallel circuit with said battery through wire 31 and a wire 34, in which is interposed a key or switch 35, by which the circuit of the upper magnet may be made and broken. The mag-
 75 net-winding 14 is of greater length than the winding 15, making the upper magnet a stronger one than the lower one when an equal current is passed through each.

The operation is as follows: At each end of
 80 the structure the core 12 and sleeve 11 are of opposite polarity, so that at the upper end the magnetic lines of force flow from one of the poles through the armature-disk 25 to the
 85 opposite pole, while at the lower end the lines of force flow from one of the poles, as the inner one, through the soft-iron section 23 of disk 20, then through the armature-disk 26 and to the outer pole through the soft-iron
 90 disk 20, the interposed non-magnetic disk 22 preventing the lines from passing directly from the inner section 23 to the outer ring 20. The lower magnet, as before stated, has the
 95 current from battery 33 passing through it continuously. If the switch 35 is closed, the current from the battery will divide and pass partly through each winding; but as the upper
 100 winding is the stronger this magnet will predominate over the lower magnet, and the upper magnet will draw its armature 25 into magnetic and frictional locking engagement with its upper end, thereby destroying the driving connection between driving-disk 20 and armature-disk 26 and locking the shaft

24 against rotation. When the switch 35 is opened, the upper magnet becomes deenergized, and the lower magnet attracts its armature 26 into driving engagement with the rotating disk 20, the locking action being frictional and magnetic. The locking action of the upper disk 25 is simultaneously destroyed, and the shaft 24 and pointer 29 are caused to rotate until the upper magnet is again energized and the rotation of the shaft stopped by the engagement of disk 25 with the upper pole-pieces, as previously described. In practical operation the axial movement of the shaft 24 may be so slight as to be practically negligible. A very quick action of the device takes place when the switch 35 is opened, for the reason that the lower magnet is already energized and the current does not have to overcome the magnetic reluctance of the iron of this magnet. It is evident also that when the switch is opened the strength of the lower magnet is increased by reason of the fact that the whole of the current from the battery then passes through this magnet.

Fig. 4 represents a modification in which the construction and operation of the clutch are the same; but instead of being stationarily mounted the sleeve or bracket 10, carrying the double magnet, is provided with a shaft or journal 36, mounted in a bearing 37, whereby the clutch may be revolved as a whole. In this instance the shaft 16 is carried by a bearing 17, attached to the bracket 10, and is rotated by a bevel-gear 38, meshing with a fixed bevel-gear 139, concentric with the shaft 36. The magnet-terminals are connected to collector-rings 39 39, carried by the bracket 10 and in contact with fixed brushes 40 40.

It will be seen that in both forms of my invention the clutch members 20 26 rotate on their axes, while the magnet which operates them is relatively fixed as respects such rotation.

I claim—

1. In a clutching mechanism, a relatively fixed electromagnet, and a clutch operated

thereby and having a rotary armature member constituting a clutch member, and a complementary rotary clutch member interposed between the magnet and the armature member and provided with magnetic portions in the path of the magnetic lines of force passing between magnet and armature member.

2. In a clutching mechanism, a relatively fixed electromagnet having concentric circular pole-pieces, and a clutch operated by said magnet and having a rotary armature member constituting a clutch member and a complementary rotary clutch member interposed between the magnet and the armature member and provided with concentric circular magnetic portions aligned with the magnet pole-pieces and an interposed non-magnetic portion.

3. In a clutching mechanism, opposed relatively fixed clutch operating and braking electromagnets, a shaft having armature members for the respective magnets and between which the magnets are located, the armature member of the braking-magnet constituting a braking member to arrest the shaft, the armature member of the clutch-operating magnet constituting a driven clutch member, and a complementary rotary driving clutch member.

4. In a clutching mechanism a clutch, an electromagnet to set said clutch, a constantly-closed circuit energizing said magnet, and means to release the clutch.

5. In a clutching mechanism, a clutch, an electromagnet to set said clutch, a second electromagnet to release the clutch, a source of electromotive force, a closed circuit including said source and the first said magnet, a second circuit including said source and the second said magnet, and means to make and break the second said circuit.

In testimony whereof I have affixed my signature in presence of two witnesses.

ERL V. BEALS.

Witnesses:

C. F. BROWN,
A. D. HARRISON.