

(No Model.)

E. RICHTER & C. HOFFMANN.  
ELECTRO MAGNETIC SAFETY COUPLING.

No. 503,727.

Patented Aug. 22, 1893.

Fig. 1.

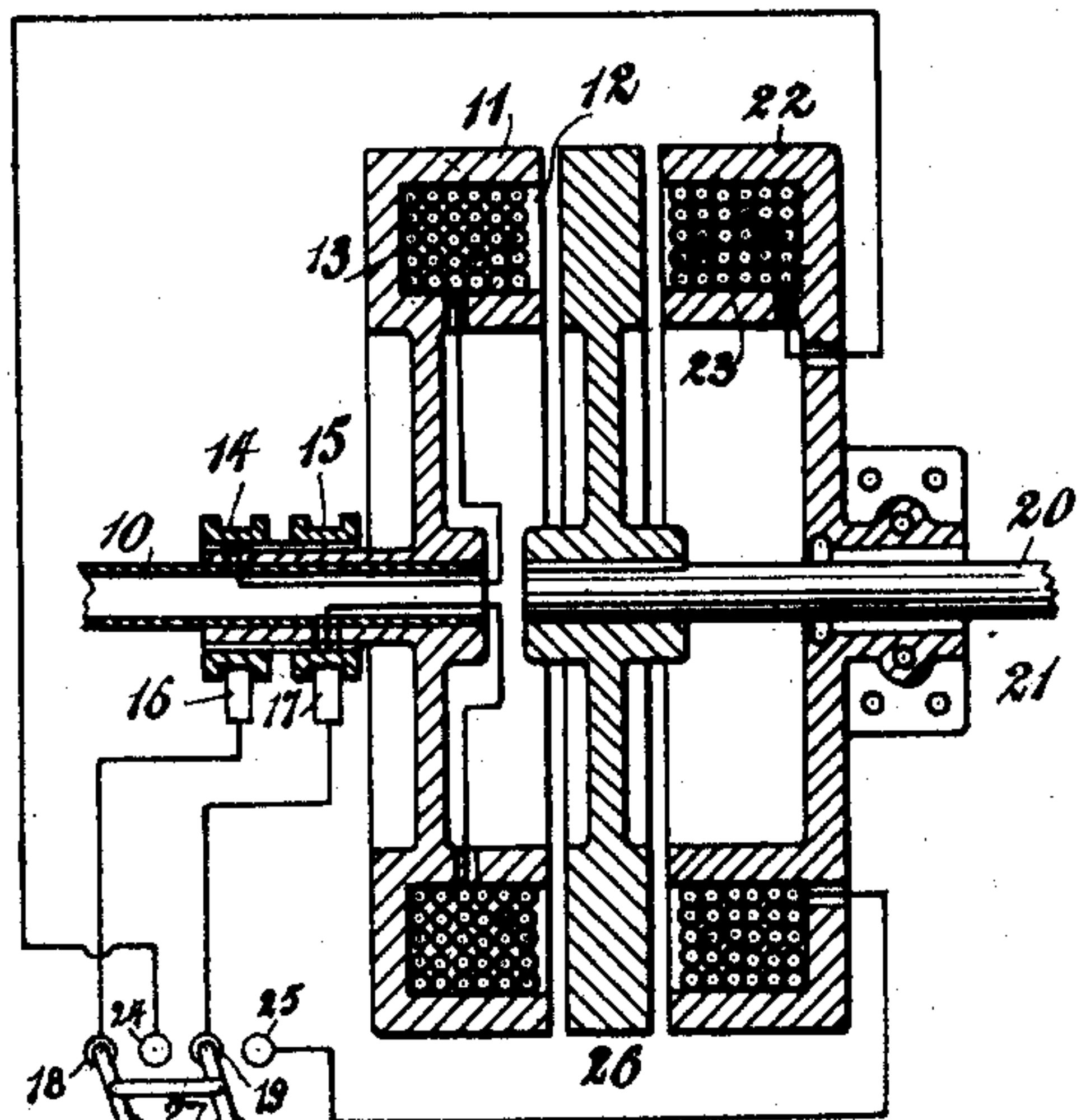


Fig. 2.

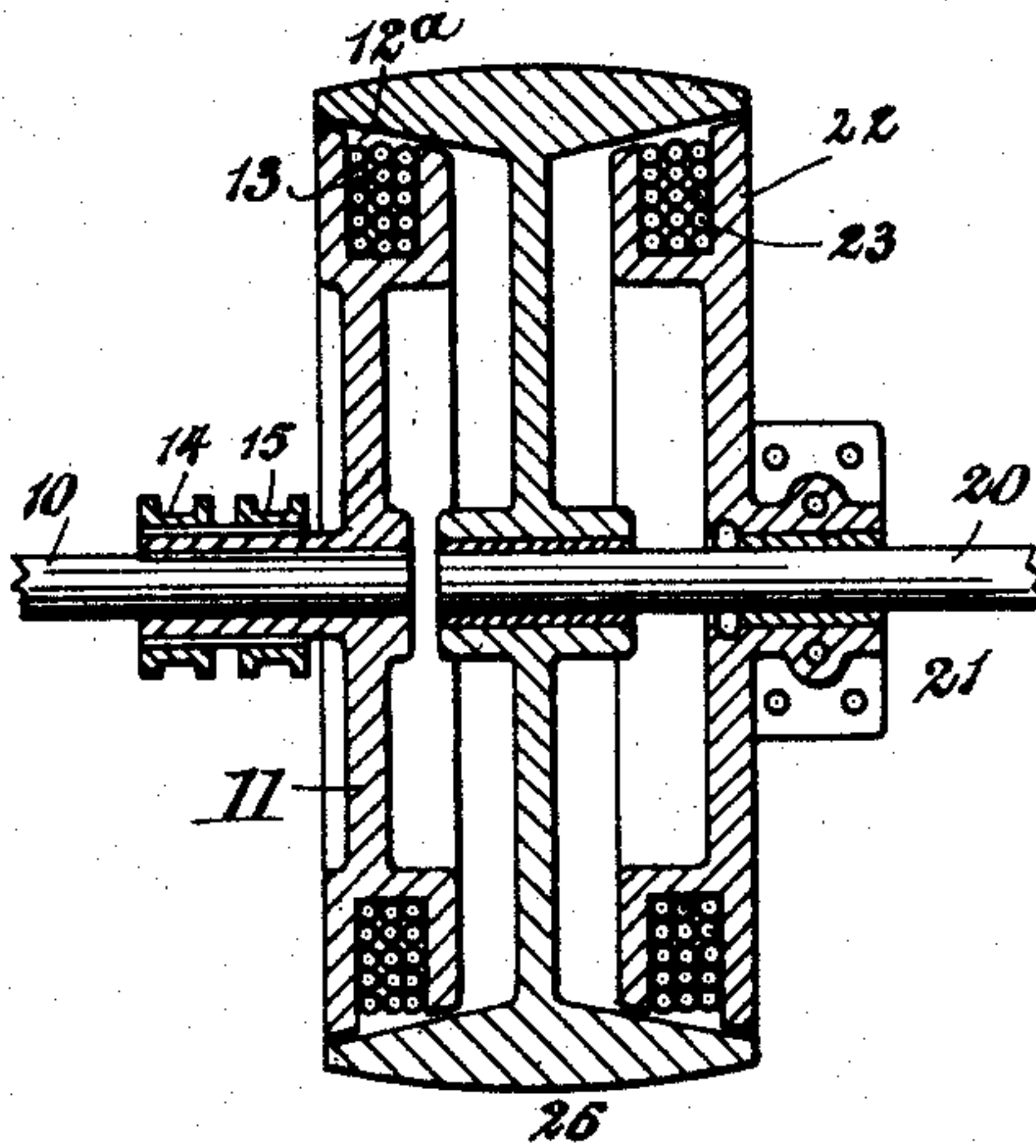


Fig. 3.

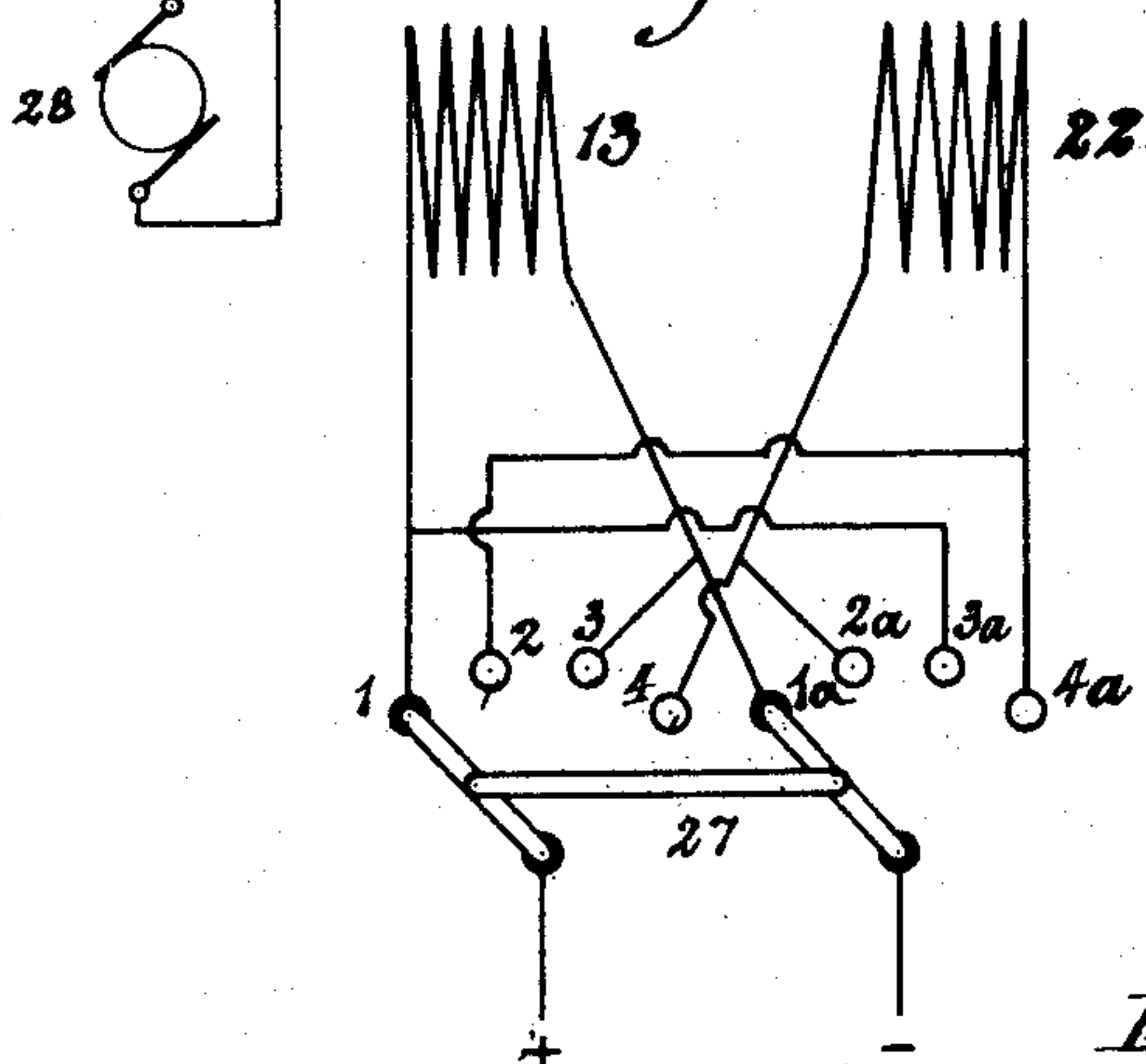


Fig. 4.

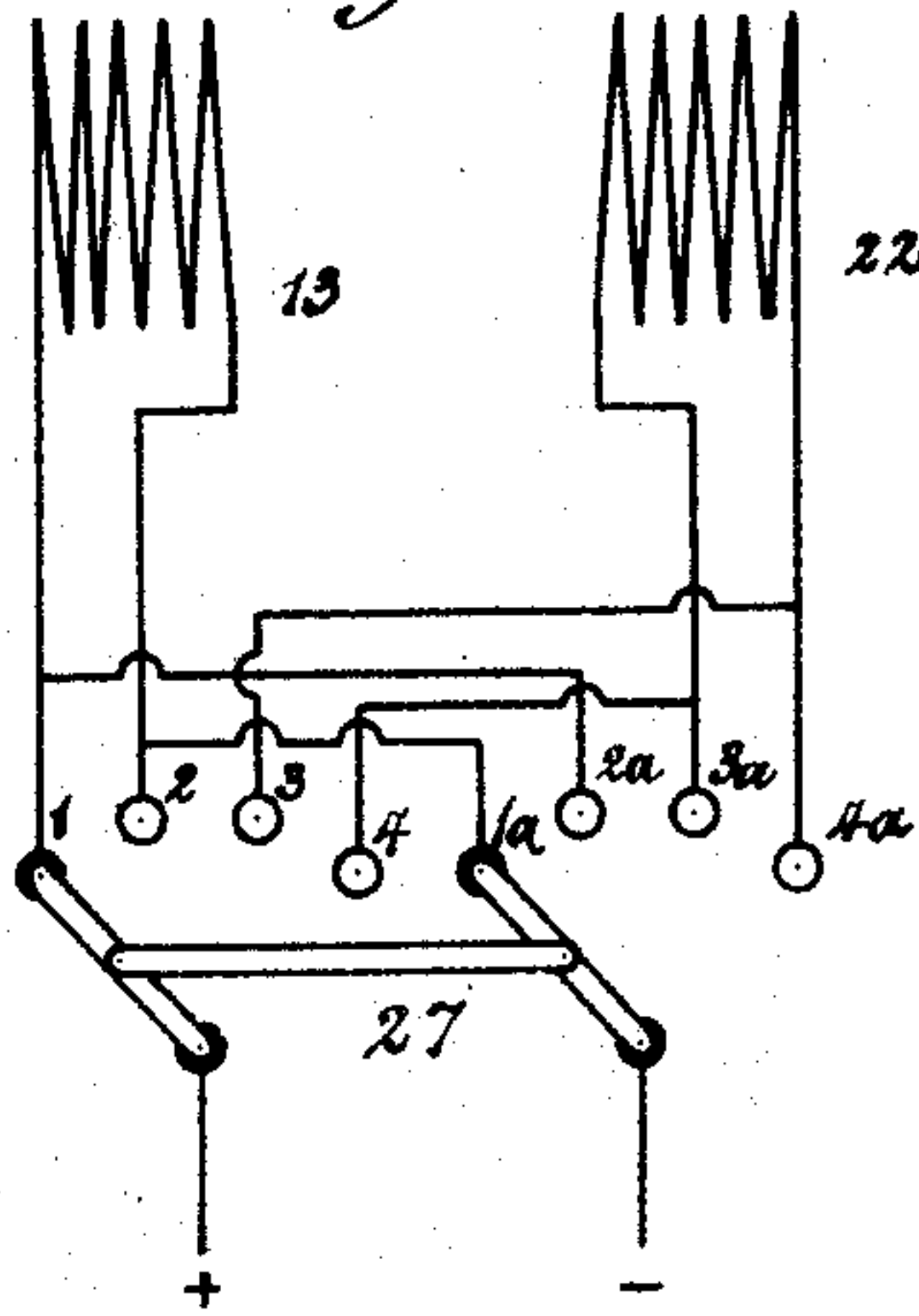
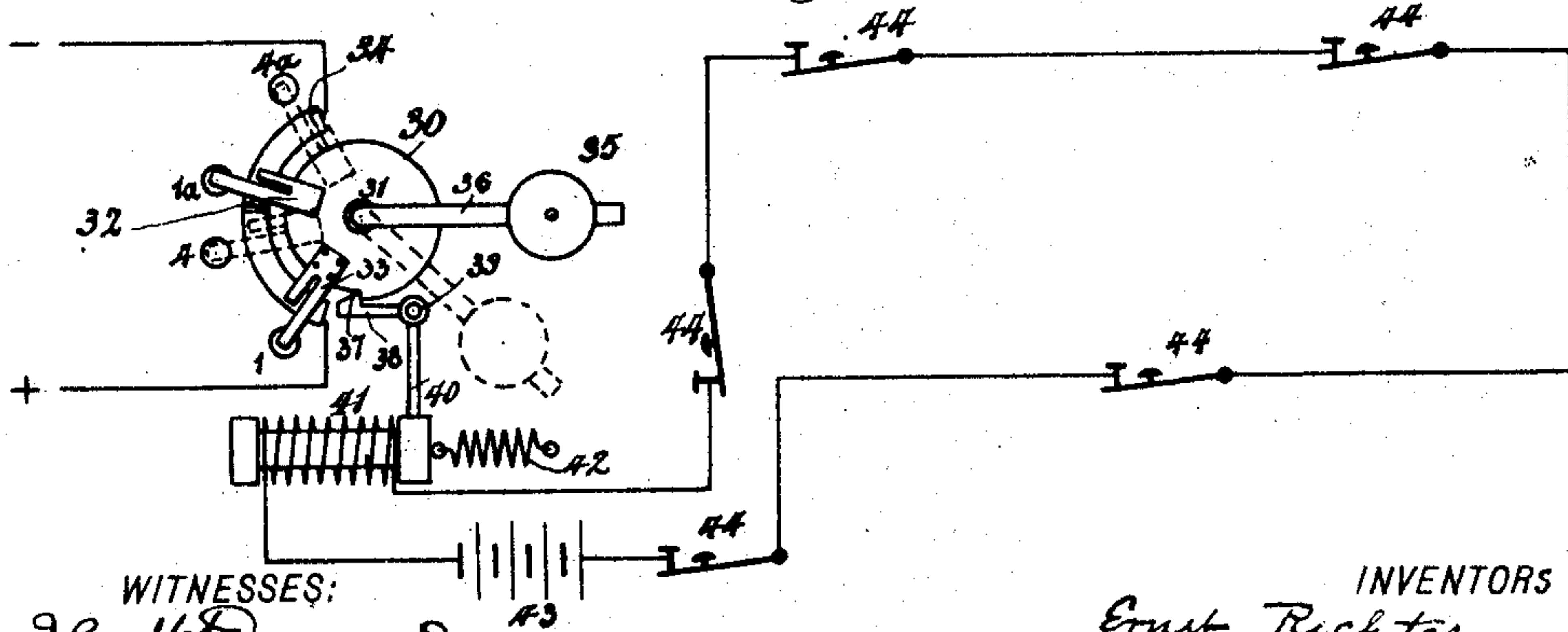


Fig. 5.



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# UNITED STATES PATENT OFFICE.

ERNST RICHTER AND CARL HOFFMANN, OF BERLIN, GERMANY, ASSIGNORS  
TO SIEMENS & HALSKE, OF SAME PLACE.

## ELECTRO-MAGNETIC SAFETY-COUPLING.

SPECIFICATION forming part of Letters Patent No. 503,727, dated August 22, 1893.

Application filed January 14, 1893. Serial No. 458,428. (No model.) Patented in Germany January 16, 1890, No. 53,879; in Switzerland April 24, 1890, No. 2,208; in Austria-Hungary April 25, 1890, No. 19,109 and No. 42,521; in France May 1, 1890, No. 205,394; in England May 2, 1890, No. 6,793, and in Belgium September 19, 1890, No. 92,039.

*To all whom it may concern:*

Be it known that we, ERNST RICHTER and CARL HOFFMANN, subjects of the King of Prussia, German Emperor, residing at the city of Berlin, in the German Empire, have invented new and useful Improvements in Electro-Magnetic Safety Couplings and Brakes, (for which we have obtained Letters Patent as follows: in Germany, No. 53,879, dated January 16, 1890; in France, No. 205,394, dated May 1, 1890; in Belgium, No. 92,039, dated September 19, 1890; in Switzerland, No. 2,208, dated April 24, 1890; in England, No. 6,793, dated May 2, 1890, and in Austria-Hungary, No. 19,109 and No. 42,521, dated April 25, 1890,) of which the following is a specification.

Our invention relates to a device which is intended to act both as an electro-magnetic coupling and brake.

The object of our invention is a device by which the power of a driving shaft may be communicated to a separate driven shaft, and the speed of rotation of the separate shaft modified at will.

Referring to the accompanying drawings and diagrams, which illustrate our invention, similar figures of reference indicate like parts.

Figure 1 is a vertical section showing one form of our improved safety coupling, brake, and circuit connections. Fig. 2 is a similar section showing a modified form. Figs. 3 and 4 are diagrams illustrating the circuit connections which may be employed. Fig. 5 is a diagram illustrating the apparatus which may be employed to switch in and out different circuits in the apparatus from a distance.

Referring to the drawings, 10 represents a shaft connected to any suitable source of power, so as to be positively driven. Located upon and fixedly attached to this shaft, is a disk 11, which may be made as shown in Fig. 1, provided with a recess 12 in its side, or as shown in Fig. 2, with a recess 12<sup>a</sup> in the top portion. Within this recess is wound a wire coil 13, the respective ends of which are suitably connected to the collecting rings 14 and 15 mounted upon and fixedly attached to the

shaft 10, upon which bear the brushes 16 and 17, connected to the contact plates 18 and 19. 50

20 is a shaft connected to the device to be driven, and carried in the bearing 21.

22 represents a disk exactly similar to the disk 11, and suitably secured to the bearing plate 21, so as not to rotate. The respective 55 ends of the coil 23 on this disk are connected to the contact plates 24 and 25. 26 represents an iron disk fixedly attached to the shaft 20.

27 represents a double contact switch connected to the respective poles of the dynamo-electric machine 28, or source of electric energy. 60

The construction of the disks 11 and 22 and the coils thereon as shown in the figures is that which we prefer to use, although various 65 other forms may be employed which will serve the same purpose without in any wise departing from the intent of our invention.

In the arrangement of circuits shown in Fig. 1, provision is only made for sending the 70 current through the coils and disks 11 and 22 in one direction.

In the diagrams, Figs. 3 and 4, provision is made for changing the current from one coil to the other, and also for reversing the direction of the current in the coils. For instance, 75 if the switches bear on the points 1 and 1<sup>a</sup>, Fig. 3, the current will flow from 1 to 1<sup>a</sup> through the coil 13; if on the points 2 and 2<sup>a</sup>, from 2 to 2<sup>a</sup> through the coil 22; if on the 80 points 3 and 3<sup>a</sup>, from 3 to 3<sup>a</sup> through the coil 13,—that is in a direction the reverse to where the current flows from 1 to 1<sup>a</sup>,—if on the points 4 and 4<sup>a</sup>, from 4 to 4<sup>a</sup> through the coil 22, the direction of the current will be the reverse to 85 that from 2 to 2<sup>a</sup>. In Fig. 4, if they bear on the points 1 and 1<sup>a</sup>, the current will flow in one direction through coil 13; if on the points 2 and 2<sup>a</sup>, in the opposite direction through coil 13; if on 3 and 3<sup>a</sup>, in one direction through 90 the coil 22; and if on 4 and 4<sup>a</sup>, in the opposite direction through the coil 22.

The operation of my device, so far as described, is as follows: When the driving shaft 10 is rotated, the disk 11 is rotated with it. If 95 now a current is transmitted through the coil



13, the current flowing will magnetize the disk 11 and attract the disk 26 on the driven shaft 20, and this will cause the disk 26 to rotate in unison with the disk 11. If it is now desired  
5 to apply the brake, the switch 27 is thrown so as to include the coil 23 on the disk 22. This disk then attracts the disk 26 and, as the disk 22 is fixed, it will gradually stop the motion of the shaft 20.

10 In practice, we prefer to first reverse the current in the coil of the disk 11, so as to get rid of the residual magnetism of that disk, as better results will thereby be attained, and, in order to accomplish this result, we arrange  
15 the circuits as shown in Figs. 3 or 4.

In carrying our invention into practical effect, it is frequently necessary to provide means for operating the safety coupling and brake from a distance, and in order to do this  
20 and to throw the switch, we make use of the arrangement shown in Fig. 5, in which 30 indicates a disk pivoted at 31 and carrying the switch plates 32 and 33, which correspond to those shown in the switch 27. These switch  
25 plates move over the divided sector 34, one side of which is connected to the positive pole of the source of energy and the other, to the negative. The switch plates are arranged to contact with the contact points 1, 1<sup>a</sup> or 4, 4<sup>a</sup>  
30 which correspond to the similarly numbered contact points of Figs. 3 and 4.

Connected to the disk 30 is a weight 35 adjustable on the arm 36. Instead of using this weight, a retractile spring may be employed. The disk 30 has a notch 37 cut in one side, and taking in this notch 37, is a pawl  
35 38, pivoted at 39, and connected to an armature 40, the end of which is in front of an electro-magnet 41. 42 is a retractile spring connected to the pawl-armature 40. The electro-  
40 magnet 41 is in circuit of the battery 43. 44 represents points in the circuit including the electro-magnet at which the continuity of the circuit may be broken at will.

45 The operation of this device is as follows: The battery current, which is supposed to be maintained practically constant, energizes the electro-magnet 41, which attracts the pawl-

armature 40, and thereby serves to hold the disk 30 in the position shown in the full lines. 5  
When the circuit is broken, which it may be by depressing any one of the points 44, the spring 42 retracts the pawl-armature, the disk 31 rotates, and the switch plates 32 and 33 are thereby carried into contact with the contact  
5 points 4, 4<sup>a</sup>, to shunt the current into the stationary coil, to shunt the current into the opposite coil, or reverse it in the same coil, as desired. The switch may be reset by restoring by hand the arm 36 to the position shown  
6 in the full lines in Fig. 5.

We do not wish to limit ourselves to any special form of device for operating the switches, as many well known devices may  
6 be used for the purpose.

Having thus described our invention, we claim—

1. An electro-magnetic coupling and brake comprising a driving or power shaft, a shaft to be driven, a portion carrying a coil mounted on the driving shaft, a portion mounted on the shaft to be driven, a stationary portion carrying a coil, a source of electricity, and means for transmitting a current of electricity in either direction through either the  
7 coil on the driving or on the stationary portion of said device.

2. In combination with an electro-magnetic coupling and brake, constructed as described, means for shunting the current from the rotating portion into the stationary portion, comprising a weighted and pivoted disk carrying contact plates, a circuit of conductors including a magnet and a battery furnishing a constant current, circuit rupturing devices  
8 in said circuit, a pawl adapted to be actuated by said magnet, and a retractile spring connected to the pawl.

In testimony whereof we have affixed our signatures in the presence of two witnesses.

ERNST RICHTER.  
CARL HOFFMANN.

Witnesses:

MAX WAGNER,  
GEORGE H. BENJAMIN.