

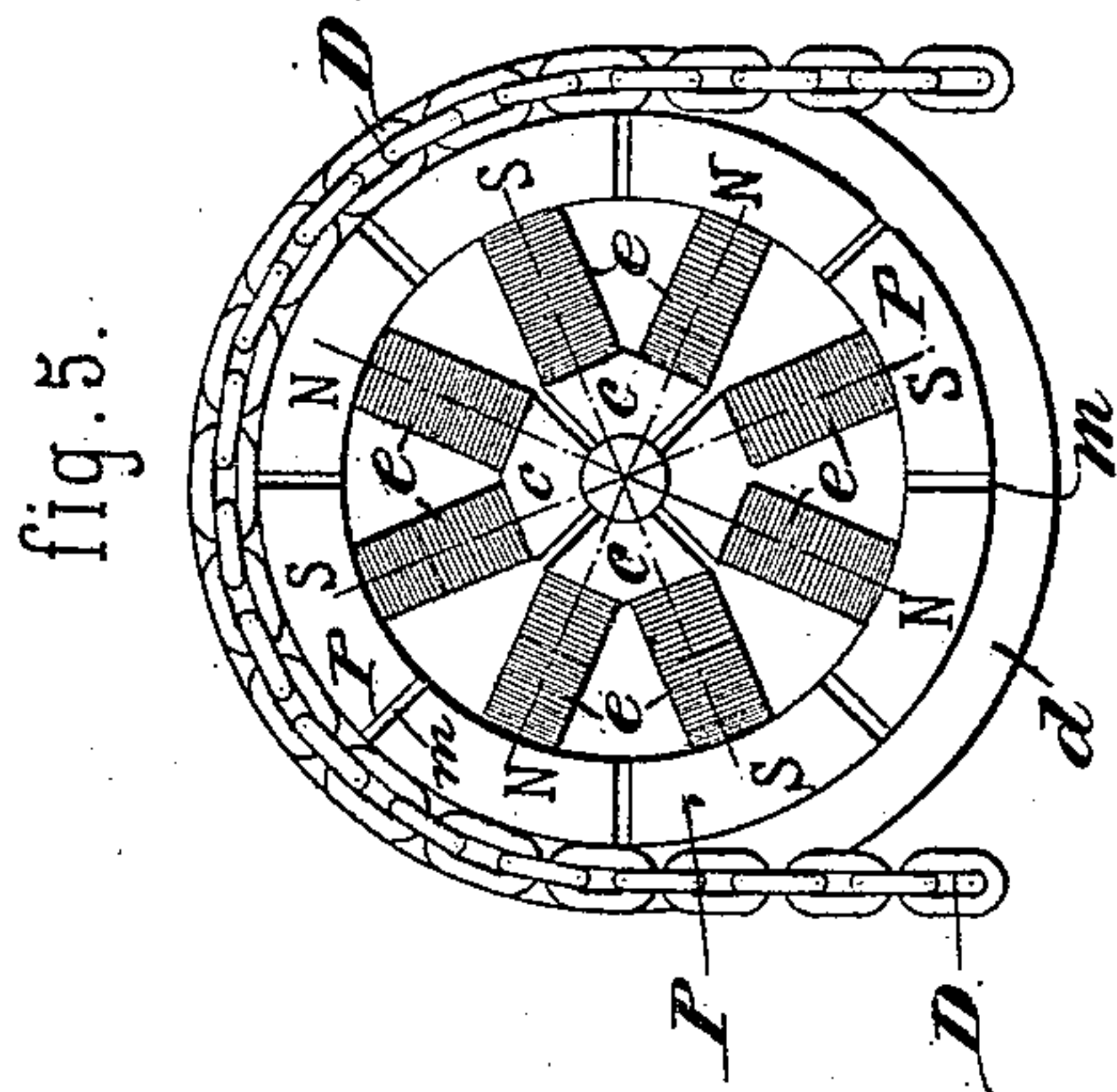
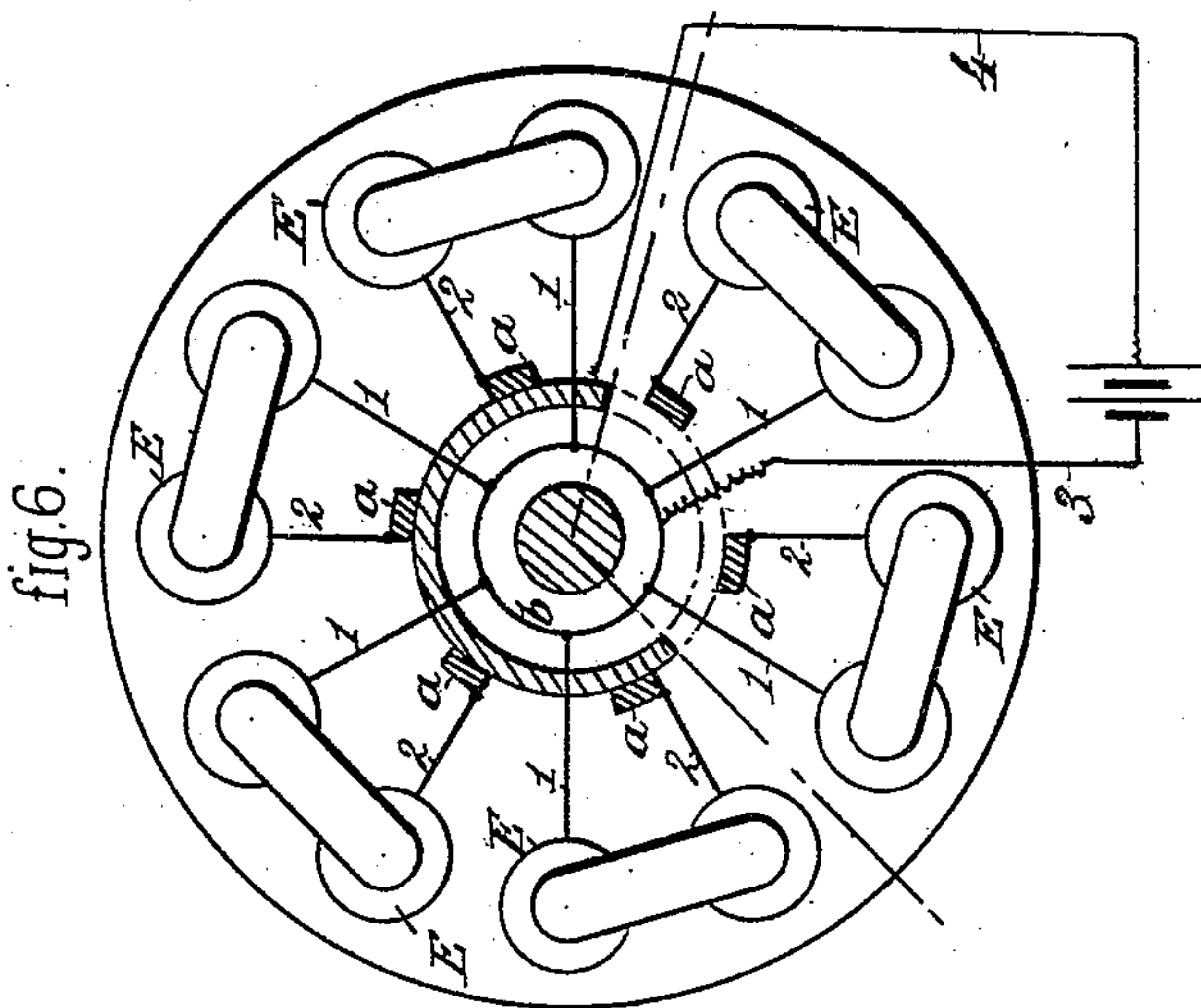
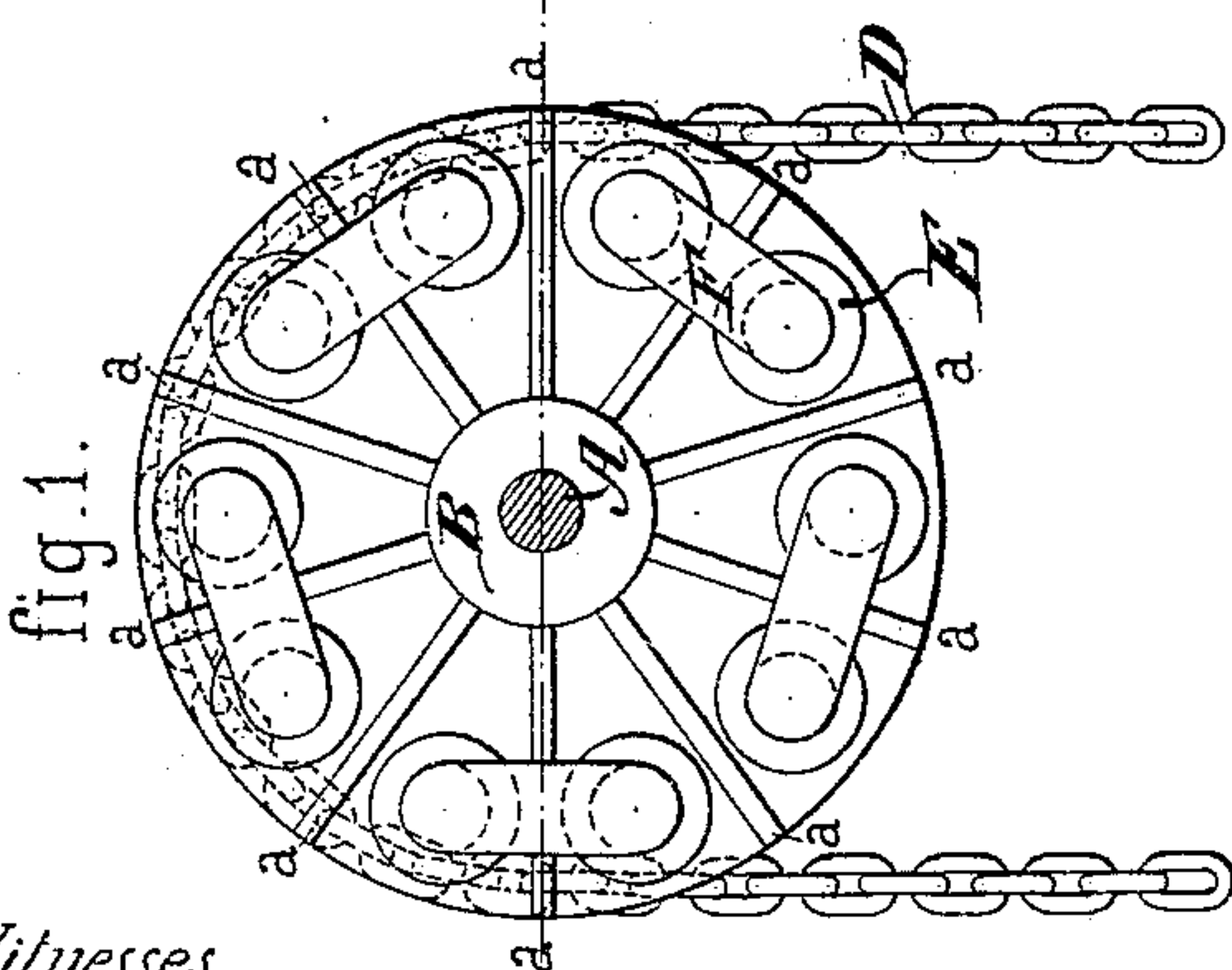
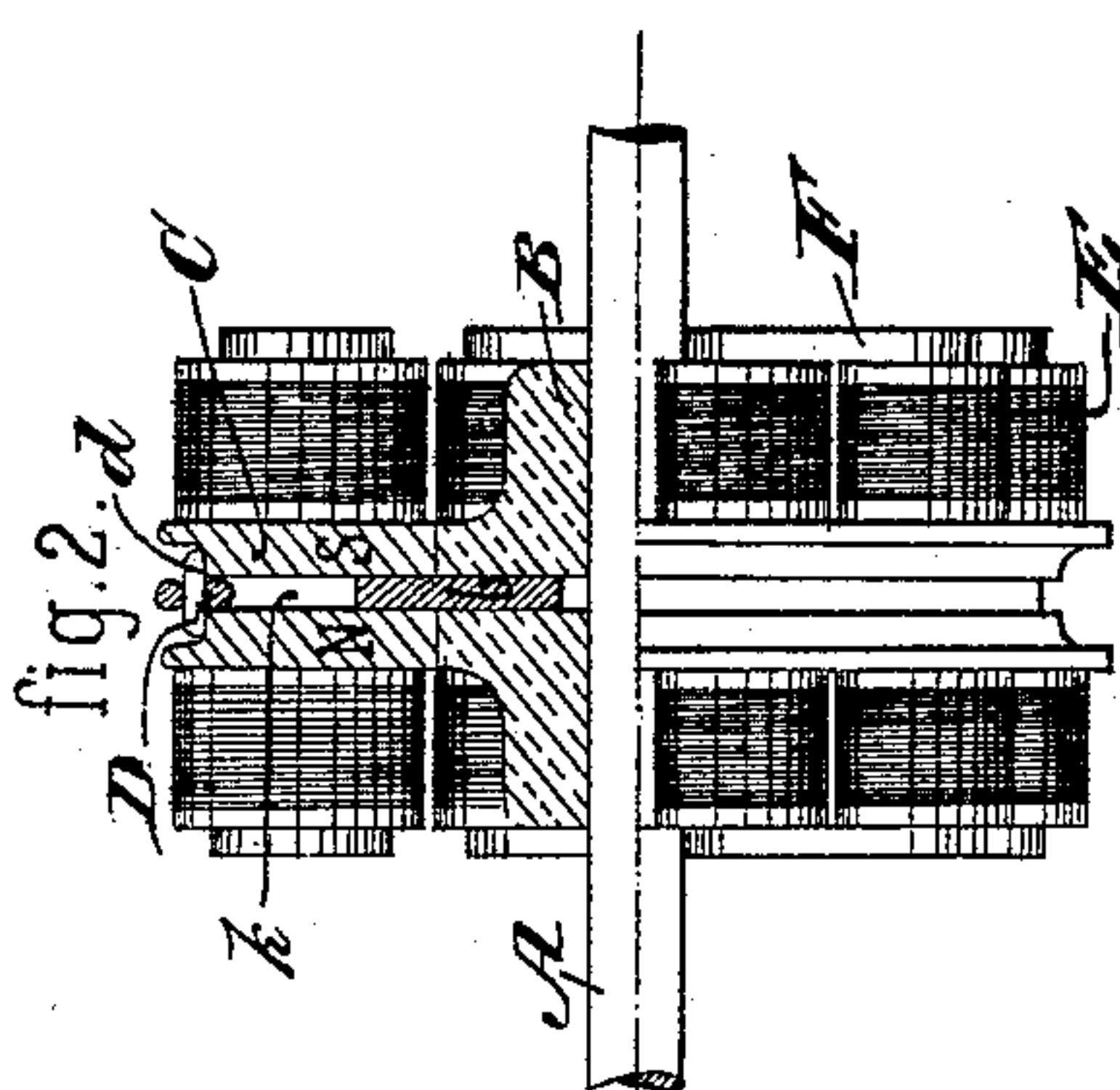
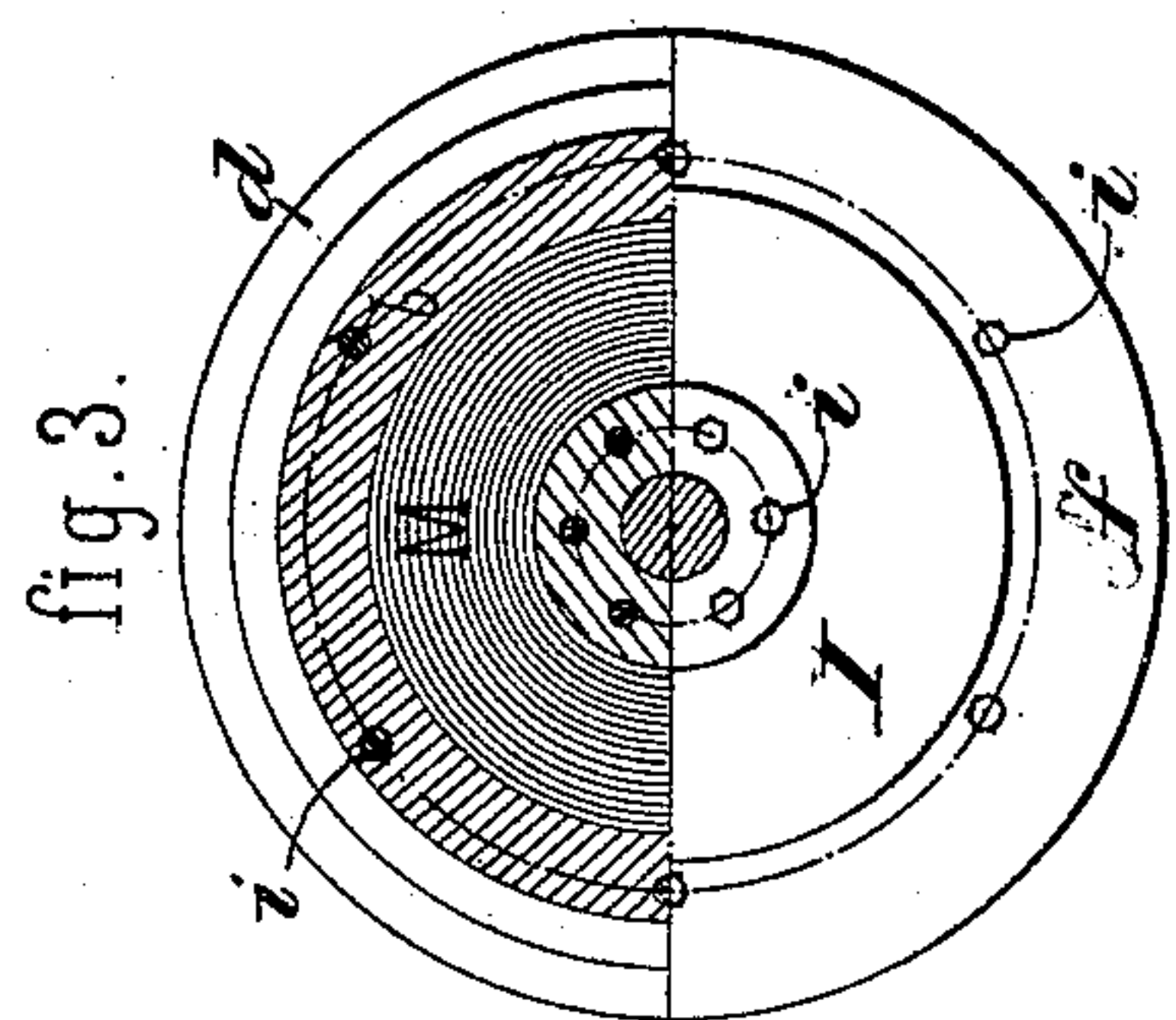
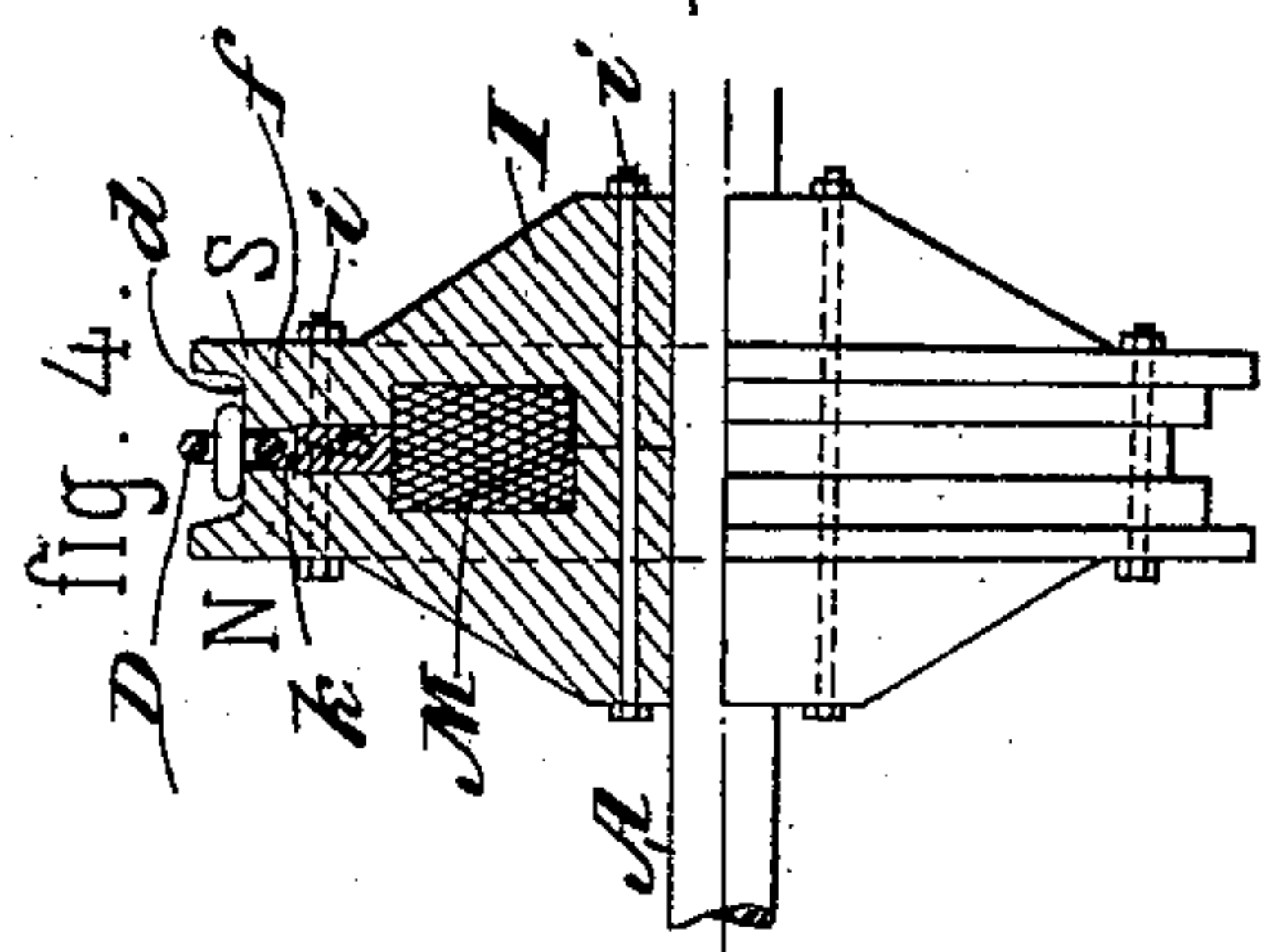
(No Model.)

A. DE BOVET.

APPLICATION OF MAGNETIC ATTRACTION.

No. 486,393.

Patented Nov. 15, 1892.



Witnesses

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# UNITED STATES PATENT OFFICE.

ARMAND DE BOVET, OF PARIS, FRANCE.

## APPLICATION OF MAGNETIC ATTRACTION.

SPECIFICATION forming part of Letters Patent No. 486,393, dated November 15, 1892.

Application filed August 31, 1891. Serial No. 404,296. (No model.) Patented in France March 3, 1891, No. 211,852.

*To all whom it may concern:*

Be it known that I, ARMAND DE BOVET, a citizen of France, residing at Paris, in the Department of the Seine, France, have invented a new and useful Improvement in the Application of Magnetic Attraction, (for which I have obtained a patent in France, No. 211,852, dated March 3, 1891,) of which the following is a specification.

My invention has for its purpose the provision of means whereby the electro-magnetic attraction may be utilized for the purpose of effecting an operative engagement between a belt and pulley without necessitating the use of a sprocket-wheel and its chain. It is my object, in other words, to provide a simple construction and arrangement whereby the peripheral portion of a pulley, in which the groove for the belt is formed, may constitute one of the poles of an electro-magnet and exert an attractive power upon the metallic belt or upon a belt provided with metal which is subject to magnetic attraction, and thereby cause a close adherence of said belt to the pulley.

It is my purpose, also, to so organize and construct devices of this type that the electro-magnetic circuit shall, if desired, be established only in that part or those parts of the peripheral face of the pulley in actual contact at the moment with the belt, the field of magnetic attraction being constantly shifted when the parts are in action, traveling circumferentially around the pulley, one terminal being at or near the point where the belt leaves the pulley, in order that the adherence of the former shall not tax the power too severely in drawing the belt off the surface.

The invention consists in the novel parts and combinations of parts hereinafter described, and then particularly pointed out in the claims concluding this specification.

To enable others to clearly understand and to practice my said invention, I will now describe the same in detail, reference being had for such purpose to the accompanying drawings in which—

Figure 1 is a side elevation of a pulley constructed in accordance with my invention. Fig. 2 is a central vertical section of part of the same, taken in the axial line, the other part being shown in face elevation. Fig. 3 is

a sectional elevation of a pulley, showing a modified construction, the point of view being upon one side. Fig. 4 is a sectional face-elevation of the parts shown in Fig. 3. Fig. 5 is a side elevation of a pulley, showing a further modification. Fig. 6 is a side elevation, partly in section, showing an arrangement whereby the separation of the chain from the face of the pulley is assisted by restricting the extent of the magnetized portion of the pulley by which that part of the face upon which the chain actually has contact is the only portion saturated. The arrangement of the electro-magnets and the construction of the sectional face of the pulley are substantially the same as shown in Fig. 1 of the drawings.

In the drawings the reference-letter A indicates the shaft of a pulley or traction-wheel of any ordinary construction, the form shown in this instance being composed of the two similar parts B, having the circular disk-flanges C, which are separated from each other by an interposed plate *b* of non-conducting metal. Each of the disk-flanges is built up or composed of a series of segmental plates separated one from another by radial strips *a*, formed of bronze or any other suitable material having insulating qualities. The groove *d* for the belt or chain D is formed by removing the contiguous angles of these disks, as shown in Fig. 2. Upon each of the segmental pieces I mount one electro-magnet E, the entire series being connected in pairs by soft iron bars F, attached to the cores at their exterior end, the whole structure presenting an appearance resembling the fixed portion of a Siemens alternating-current machine. The magnetic circuit is arranged in any well-known manner to effect the close of said circuit by the contact of the chain D as it lies in the groove *d*.

A substitute construction is shown in Figs. 3 and 4, in which the reference-letters I I denote the separable similar parts of the pulley, which in this instance are not insulated from each other, save at a point near the groove *d* in its peripheral face, where an annular plate *b*, of bronze or other insulating material, is interposed, through which I usually pass the outer series of insulated bolts *i*. In the portion of the pulley lying between



the shaft and the peripheral face I form a chamber or annular space of suitable size in which is placed the coil of wire M, which is wholly inclosed when the two similar symmetrical parts of the pulley are placed together with the insulating-annulus between them. In this construction the peripheral portions *f* of the pulley will constitute the magnetic poles. I may, however, in some instances prefer to arrange the electro-magnets as shown in Fig. 5, in which the cores are substituted for the spokes of the pulley, and each core is provided with a pole-piece P, the series of these pole-pieces constituting the periphery of the pulley and being insulated from each other by interposed plates *m*. Each pair of magnets *e* is mounted upon an iron block *c* of segmental form, the united parts constituting the hub of the pulley. The arrangement of the magnets in this form of construction resembles those of the movable members of the Gramme alternating-current machine.

I may use a chain similar to that shown in the drawings, the alternate links thereof projecting into the narrow space K between the two parts of the pulley. A flat belt may, however, be employed, if preferred, and may either be constructed of a suitable flexible or elastic metal or it may be formed of leather or textile material and provided with thin narrow longitudinal strips of ferro-magnetic or paramagnetic metal suitably attached to either surface of the belt or embedded in the body thereof, or I may in place of such strips substitute small pieces of such metal of any preferred form arranged at proper intervals and attached to or embedded in the belt.

In order that the power applied to the shaft of the pulley shall not be too greatly taxed in separating the chain from the magnetized periphery, the circuits of the several electro-magnets may be established consecutively and broken in like manner, so that the parts having actual contact with the chain shall be saturated with magnetism, while those portions not in contact with said chain exert no attraction. This result will not be compatible with the construction shown in Figs. 3 and 4, as the coil in that construction extends entirely around the axis of the pulley, and the whole mass of the latter is saturated by its magnetism. In the other forms, however, wherein separate parts of the periphery are saturated by independent electro-coils it is a very simple matter to connect the terminals of said coils to contact-pieces upon the pulley, which shall during a certain part of the revolution have electrical contact with curved pieces connected with the poles of the battery or source of electric energy. For example, in the form of pulley shown in Fig. 1 I may use the arrangement illustrated in Fig. 6, in which one terminal 1 from the coils of each electro-magnet

E may be attached to a contact-annulus *b*, turning with the pulley-hub B, the other terminals 2 being connected to the contacts *a*, which move with the revolution of the pulley upon the surface of a concentric contact-plate *b'*, having an extent of less than an entire circumference. The extremities of this contact are arranged at the points where the chain comes upon the working face of the pulley and where it leaves the same or approximating these points. A wire 3 connects the contact-annulus *b* with one pole of a battery and a wire 4 connects the curved contact-plate *b'* with the other pole. Suitable insulating-pieces are inserted on the contact-annulus and in the concentric contact-plate at such points that the current will be compelled to traverse each alternately, and thus flow through all the coils which have terminals 2 and contacts *a* in electrical connection with the contact-plate *b'*.

What I claim is—

1. The combination, with a pulley composed of two symmetrical parts, the peripheral portions thereof being separated and containing the groove, of a chain lying therein and one or more electro-coils by which the peripheral portions of the pulley are excited and become the pole-pieces, substantially as described.

2. The combination, with a pulley formed of similar parts having the peripheral portions separated and insulated, of electro-coils mounted on cores supported by said parts, two of the terminals of said coils being connected, contacts to which the other terminals are connected, and a battery connected with said contacts, substantially as described.

3. A pulley or traction wheel composed of similar sector-shaped parts, the peripheral grooved portions separated slightly, in combination with an insulating-annulus interposed between said electro-coils arranged upon cores projecting from said sector-shaped pieces, a battery, and means intermediate of said battery and coils whereby the current shall only traverse the said coils during a certain arc of revolution of the pulley, substantially as described.

4. The combination, with a pulley, of electro-coils on cores forming parts of separate but adjacent portions, contacts to which the terminals of the coils are connected, and contact-plates having connections with the poles of the battery and arranged to engage said contacts during a part of the revolution of the pulley, substantially as described.

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

ARMAND DE BOVET.

Witnesses:

R. JORN,

G. DELORN.