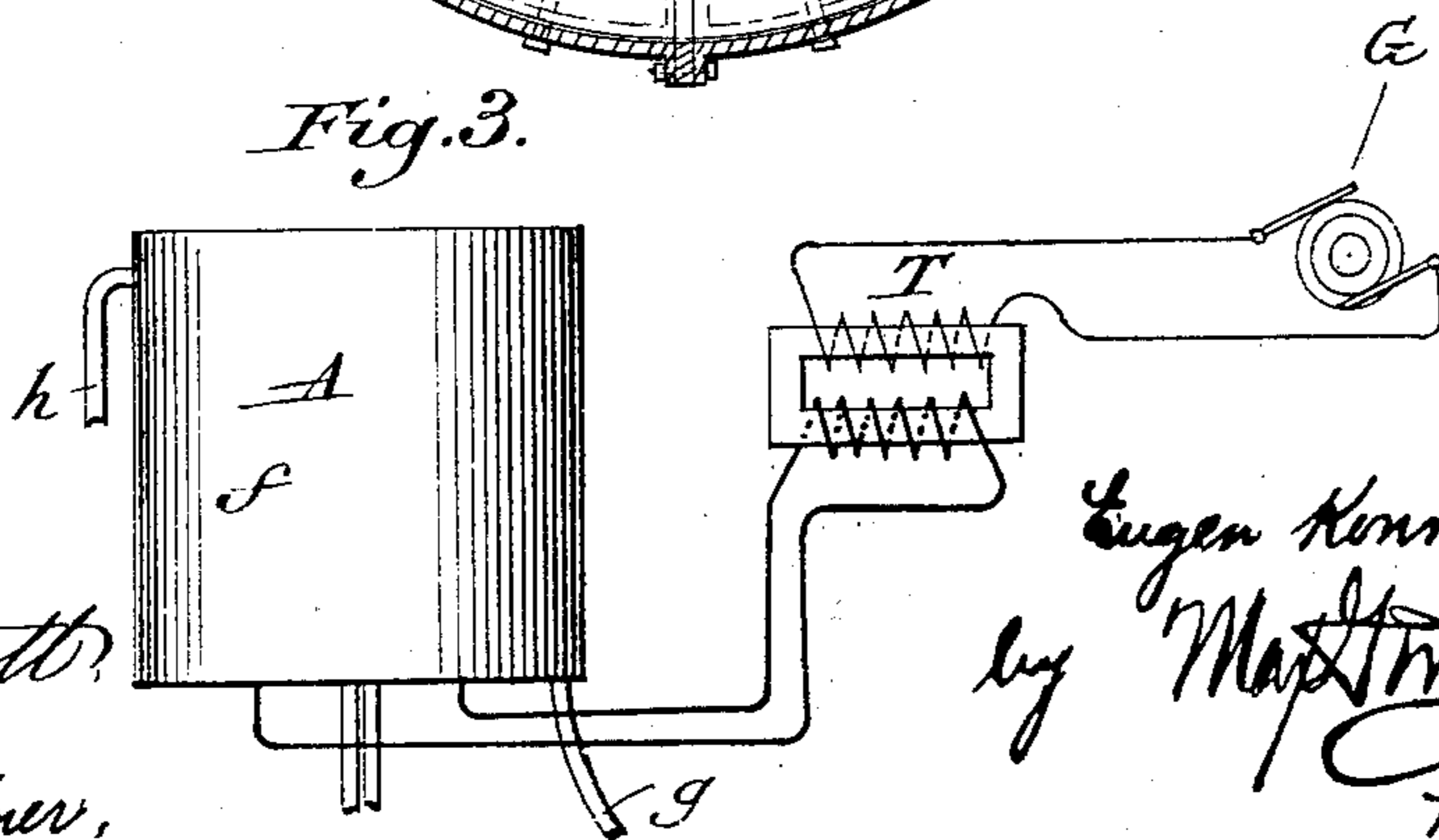
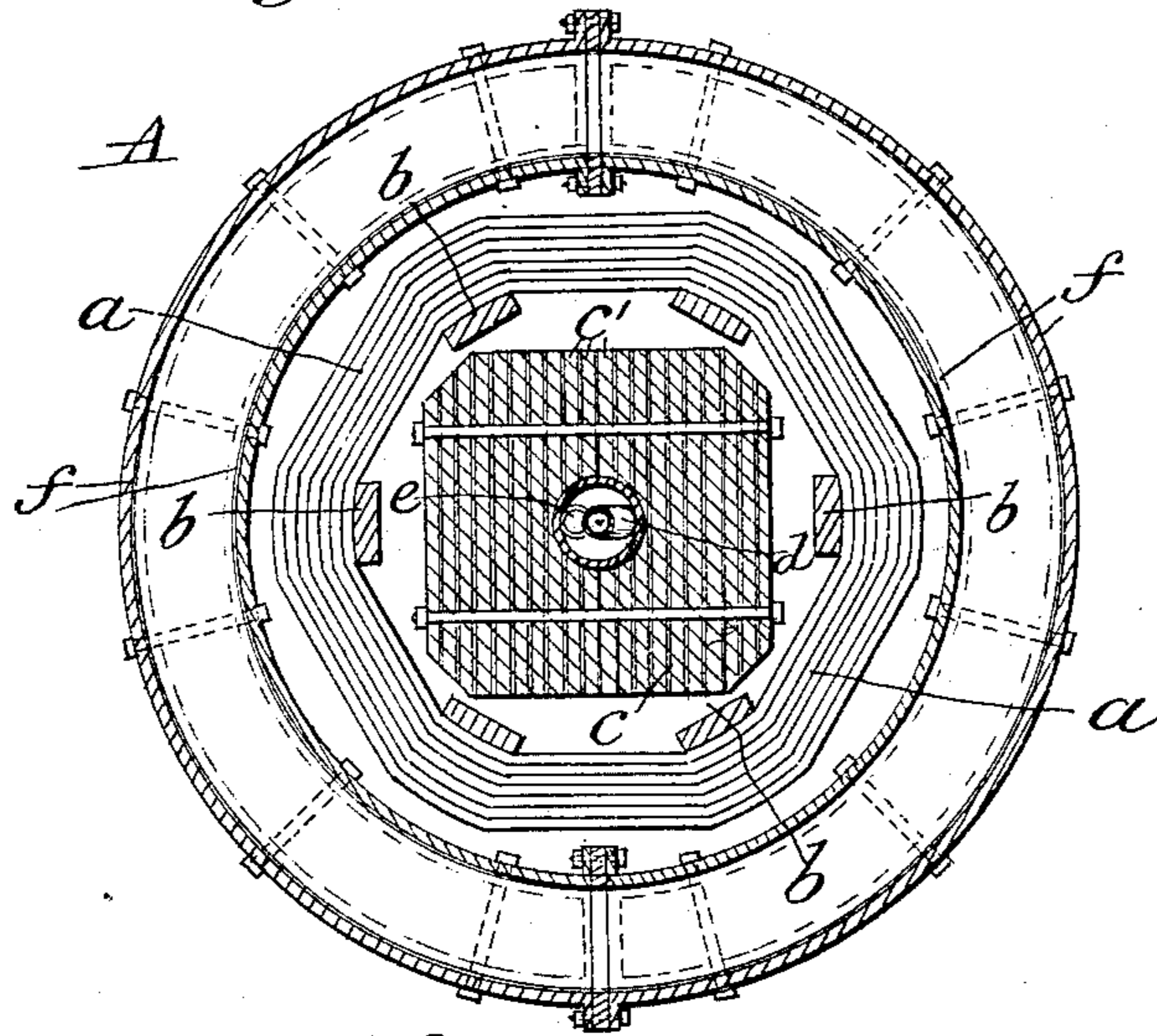
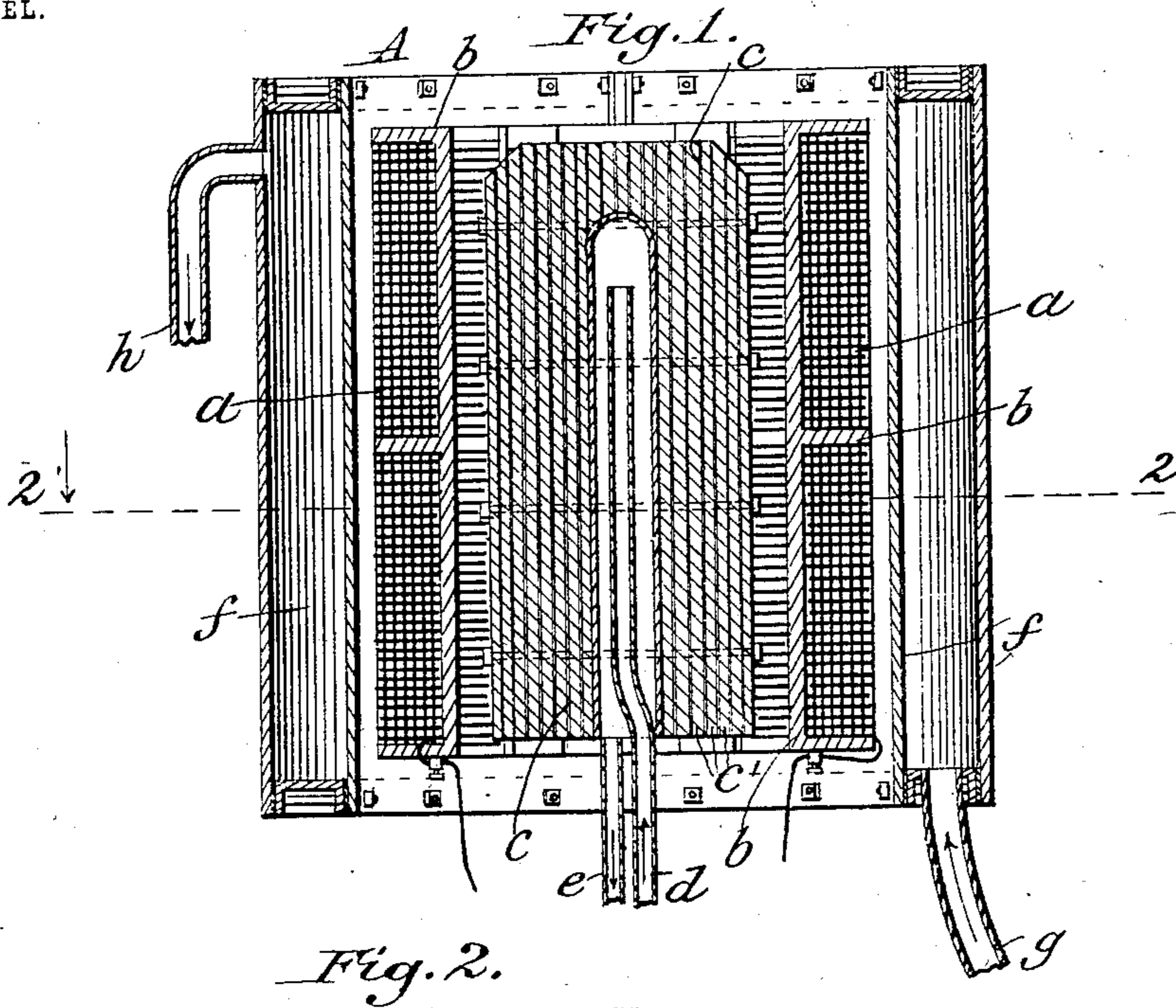


E. K. MÜLLER.

APPARATUS FOR RADIOTHERAPEUTIC TREATMENT.

APPLICATION FILED JAN. 10, 1902.

NO MODEL.



WITNESSES:
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UNITED STATES PATENT OFFICE.

EUGEN KONRAD MÜLLER, OF ZURICH, SWITZERLAND.

APPARATUS FOR RADIOTHERAPEUTIC TREATMENT.

SPECIFICATION forming part of Letters Patent No. 730,785, dated June 9, 1903.

Application filed January 10, 1902. Serial No. 89,207. (No model.)

To all whom it may concern:

Be it known that I, EUGEN KONRAD MÜLLER, a citizen of Switzerland, residing at No. 2 Splügenstrasse, Zurich, Switzerland, have
 5 invented certain new and useful Improvements in Processes for Radiotherapeutic Treatment, (patents applied for in England, dated June 10, 1901; in France, dated June 29, 1901; in Germany, dated July 8, 1901; in Aus-
 10 tria, dated July 8, 1901; in Hungary, dated July 27, 1901; in Italy, dated August 2, 1901, and in Russia, dated July 19, 1901;) and I do hereby declare the following to be a full, clear,
 15 as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an apparatus for radiotherapeutic treatment.

20 Up to the present electricity has been employed in different forms as a therapeutic medium—for example, in a static form—by subjecting the patient to the influence of the electric phenomenon called the “electric
 25 bath,” generated by an electrostatical machine; in a dynamic form, such as the operations called “galvanization” and “faradization”—as, for example, by hydroelectric
 30 condensers or currents of high frequency by the use of processes utilizing radiation from the voltaic arc and incandescent lamps by the use of Roentgen rays, and, finally, by the
 35 employment of Tesla currents in Arsonval's treatment.

My apparatus is intended for use in carrying out a new radiotherapeutic treatment which differs from the electrotherapeutic
 40 processes known up to the present time both in its physiological and therapeutic effects and also in the nature of the therapeutic agent employed.

The method of treatment for which my apparatus is designed consists in subjecting the
 45 patient to the action of an undulatory magnetic field the radiations or efflux of which possesses wonderful curative properties. With my apparatus I am enabled to accomplish this result, while at the same time avoid-
 50 ing any direct action of the electric currents upon the patient.

In the method for which my apparatus is

intended the body of the patient is located in the path of the lines of force of the mag-
 netic field preferably in such a manner that 55 the magnetic waves strike the body substantially at right angles to its surface.

In the process carried out by my apparatus there is no electroinductive action on the patient, for the reason that he is situated 60 outside the induction-field of the solenoid in the prolongation of the axis of the latter and at a certain distance from one of the end windings. The magnetic field created by my
 65 apparatus is intended to be of great intensity, so that notwithstanding the relatively remote position of the patient he is submitted to an effective magnetic field. I have found
 70 that this treatment has a calming action on the organism, acting principally on the nervous system, and is therefore suitable for ap-
 plication in all illnesses resulting from shock to the nervous system. Its actions may be
 75 local or distributed, according to the nature of the illness and whether only a circum-
 scribed nervous region or the central nervous system is to be submitted to the desired
 action.

My invention consists in an apparatus which will enable the above method of treat- 80
 ment to be applied.

In the drawings, Figure 1 is a vertical section; Fig. 2, a transverse section of an ex-
 85 ample of a field-creating device embodying my invention; and Fig. 3, a general view of a complete apparatus, showing the said device
 connected with means for sending undulatory electric currents of low frequency and low
 90 tension through the solenoid-coil of said device.

The field-creating device A comprises a so-
 lenoid *a*, mounted on a wooden frame-support
b, inside of which a core of soft iron *c* is situ-
 ated, consisting of the laminations *c'*, insulated
 95 from one another by suitable insulating-
 sheets, such as leaves of paper, parchment, or the like, and clamped together by means of
 bolts. The core *c* is hollow for part of its
 length, and into the cavity in the core a tube
 100 *d* projects for injecting cold water, the water
 thus injected running through a tube *e*. The
 solenoid *a*, its support *b*, and its core *c* are
 enveloped in a cylinder *f* with double walls,
 the annular space formed between these two

walls being connected by a nozzle *g* to the supply of cold water and provided with an outflow-pipe *h*.

As shown in Fig. 3 of the drawings, the solenoid *a* of the field-creating device A is connected with a source of undulatory currents of low tension and low frequency, which source, as in the present example, may comprise a generator of alternating currents G and a transformer T. By these means an undulatory current of the desired frequency and tension may be sent through the solenoid-coil *a*, and the magnetic field may be adjusted to suit the varying requirements of therapeutic treatment.

It is supposed that the solenoid is fed with a low-tension undulatory current of low frequency in such a manner that alternating self-induction currents of great quantity but low frequency are generated in the solenoid, thus creating an undulatory magnetic field of great intensity but low frequency, whose lines of force are concentrated by the soft-iron core in the axis of the solenoid and follow the direction of this axis.

The cavities for injecting cold water both into the core and around the solenoid are provided for preventing the heating of the soft-iron core due the hysteresis caused by the undulatory state of the magnetic fluid. The circulation of water in the cylinder *f* serves at the same time for preventing the solenoid-windings becoming abnormally hot, which might cause the density of the current circulating therein to be increased.

Instead of water air could be circulated through the pipes *d*, *e*, *g*, and *h*.

It is a matter of indifference whether the current supplied to the solenoid be alternating or continuous provided it be undulating—that is to say, that its intensity must periodically be varied without necessarily changing its direction. With an undulatory current, be it alternating or continuous, self-induction alternating currents are always developed in the solenoid, which in their turn create a magnetic undulatory field. Moreover, if it were possible it would only be necessary to pass a primary undulatory current through the solenoid without its being the seat of self-induction alternating currents to produce an undulatory magnetic field. The soft-iron

core, although not indispensable to this magneto-radiotherapeutic process, is still very useful in that it prevents any dispersion of the magnetic waves or effluxions and concentrates them in any circumscribed area for application.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An apparatus for radiotherapeutic treatment, comprising a coil, a core within the coil, means for supplying undulatory electric currents of low frequency and low tension to said coil, and means for cooling the coil.

2. The combination, with a core forming a portion of a magnetic circuit within which the patient may be located, of a coil surrounding said core, means for supplying undulatory electric currents to said coil, and means for cooling the core.

3. The combination, with a core forming a portion of a magnetic circuit within which the patient may be placed, said core having a central opening, of means for supplying a cooling medium to said opening, a coil surrounding the core, means for supplying undulatory current to said coil, and a casing surrounding said coil and arranged to receive a cooling medium.

4. The combination, with a straight laminated core having its end exposed to the outer air, of a coil surrounding said core, means for supplying undulatory currents of low frequency and low tension to said coil, and means for cooling the core and coil.

5. The combination, with a laminated straight core having a central opening, of a wooden framework within which the said core is located, a coil wound on said wooden framework, means for energizing said coil with undulatory currents, means for supplying a cooling agent to the central opening of the core, and a cylindrical casing having open ends whereby the ends of the core are exposed to the air, said casing being arranged to receive a cooling medium.

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

EUGEN KONRAD MÜLLER.

Witnesses:

ADOLF FEDERER,

EDUARD VON WALDKIRCH.