

No. 774,760.

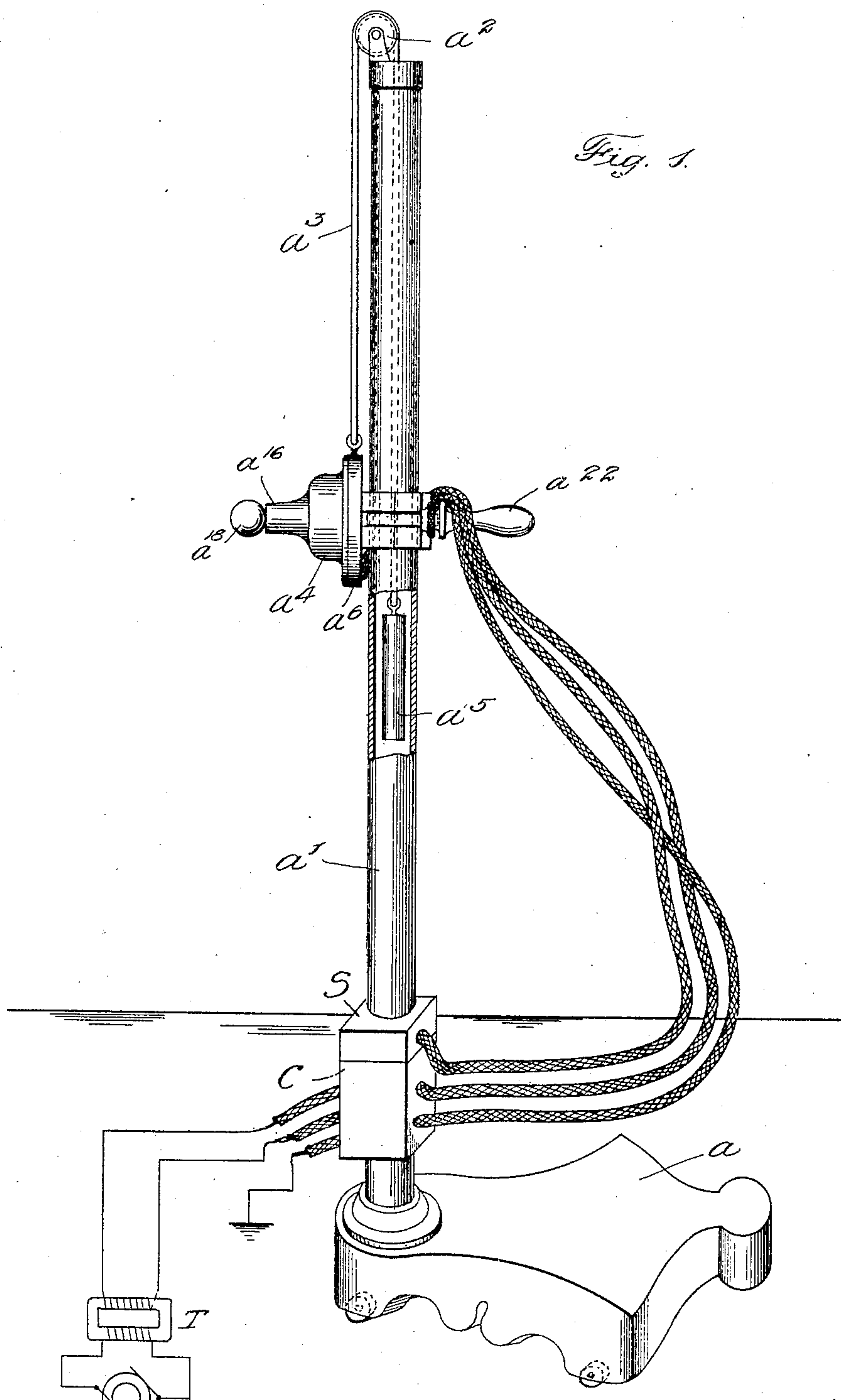
PATENTED NOV. 15, 1904.

T. B. KINRAIDE.  
SELF CONTAINED HAND ELECTRODE.

APPLICATION FILED JULY 5, 1904.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses,  
John E. Portin.  
Robert Ringrose.

Inventor,  
Thomas B. Kinraide.  
by Geo. H. Maxwell  
Attorney.

No. 774,760.

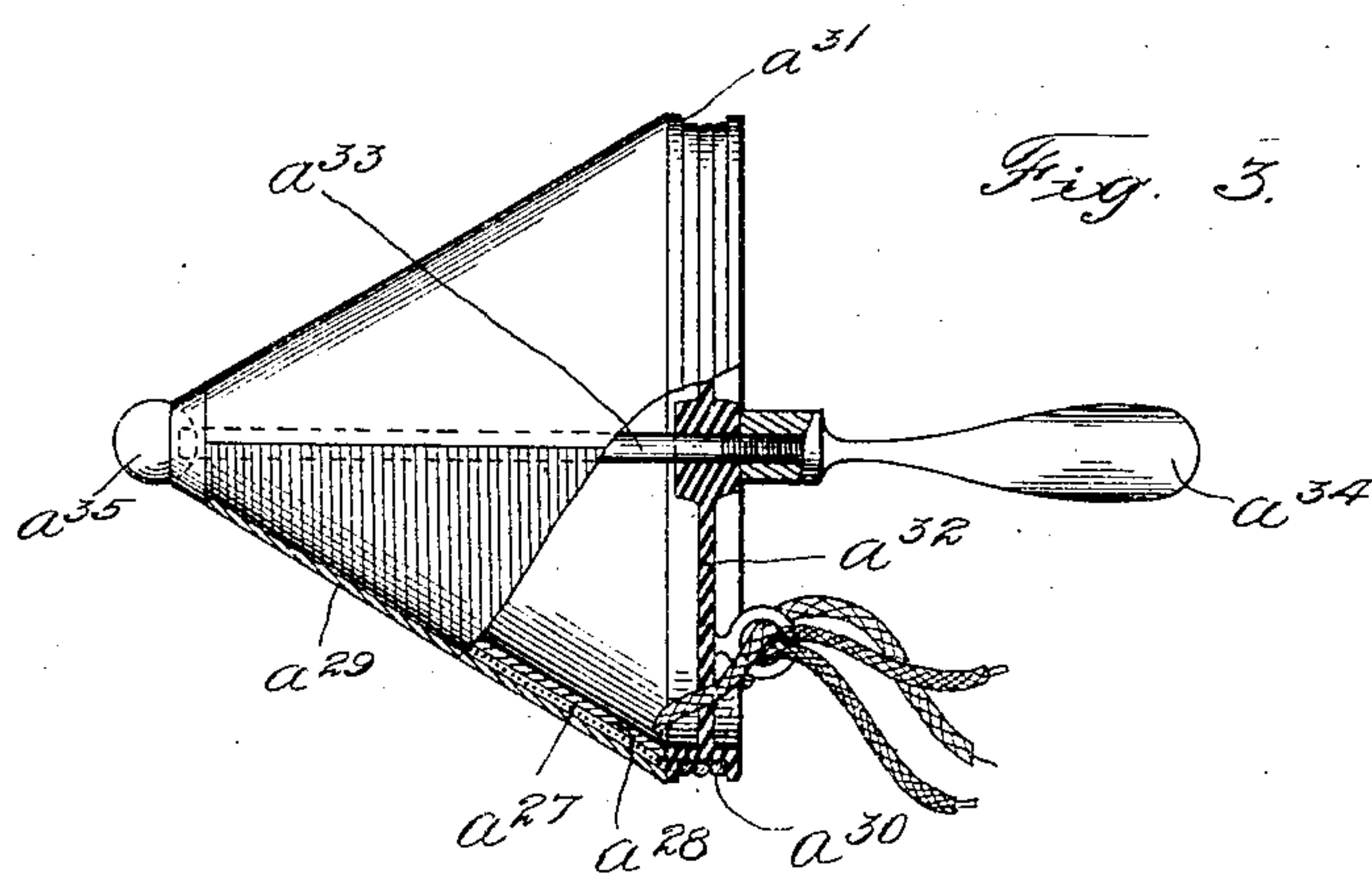
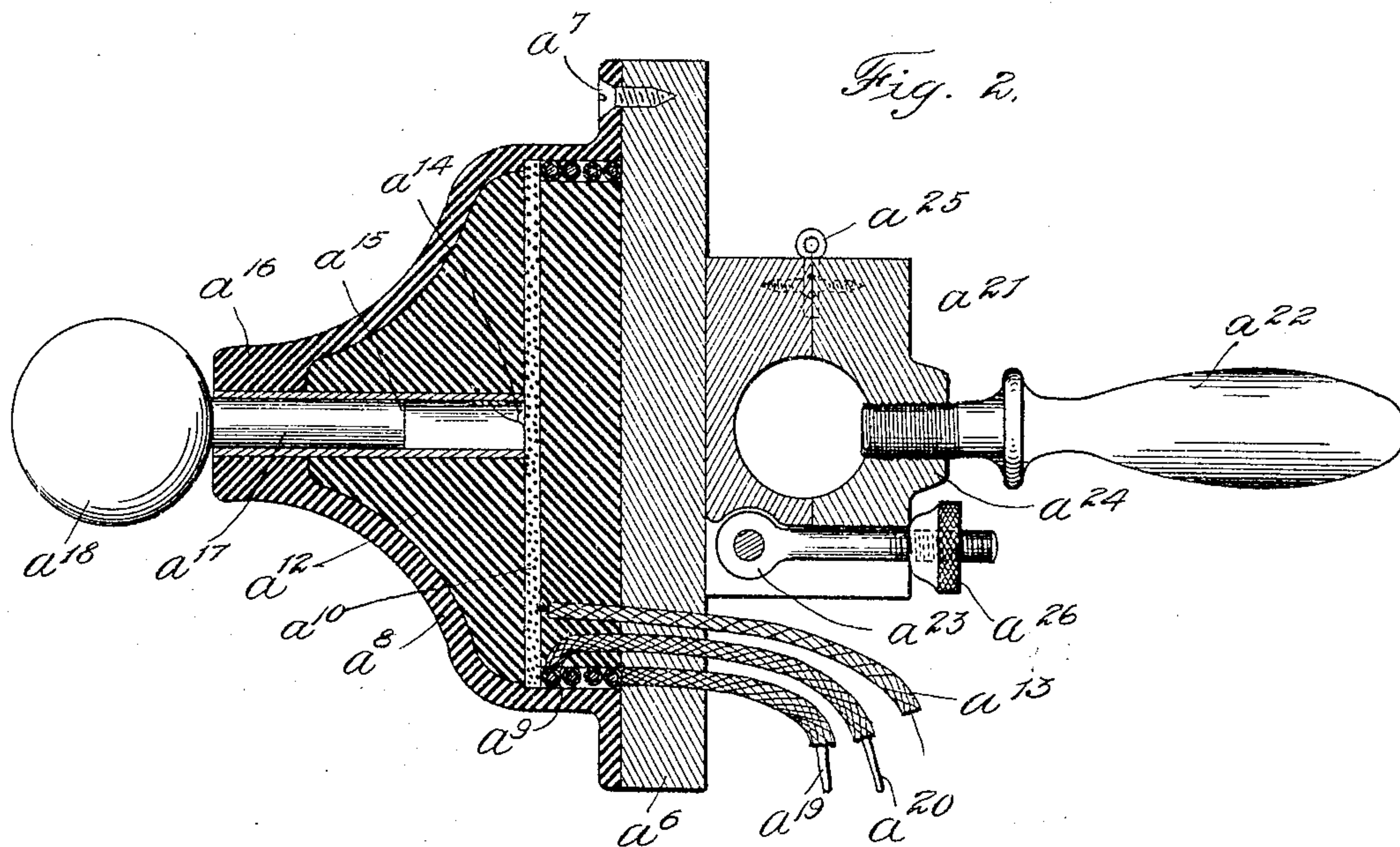
PATENTED NOV. 15, 1904.

T. B. KINRAIDE.  
SELF CONTAINED HAND ELECTRODE.

APPLICATION FILED JULY 5, 1904.

NO MODEL.

2 SHEETS—SHEET 2.



Witnesses  
John E. Porter.  
Robert Ringrose.

Inventor,  
Thomas B. Kinraide,  
by  
Geo. S. Maxwell  
Attorney.



# UNITED STATES PATENT OFFICE.

THOMAS B. KINRAIDE, OF BOSTON, MASSACHUSETTS.

## SELF-CONTAINED HAND-ELECTRODE.

SPECIFICATION forming part of Letters Patent No. 774,760, dated November 15, 1904.

Application filed July 5, 1904. Serial No. 215,278. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS B. KINRAIDE, a citizen of the United States, and a resident of Boston, Massachusetts, have invented an Improvement in Self-Contained Hand-Electrodes, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The value and importance of electricity in the treatment of disease have recently gained wide recognition, especially in connection with the employment of high-frequency current. One serious difficulty, however, has been the adaptation or provision of means for rendering it practicable to employ very high frequency currents for local application. One difficulty has been the danger or discomfort likely to attend the application of this kind of current, and another difficulty has been the loss of current due to the action of atmospheric conduction on the conducting-wires leading from the high-frequency device to the patient, and a third serious difficulty has resided in the cumbersome apparatus, it having heretofore been necessary to move the entire generating apparatus to the patient or else move the patient to the apparatus.

It is the object of my present invention to obviate all these difficulties, besides providing various other advantages. I accomplish my object by providing a high-potential high-frequency disruptive discharge device operated by hand and readily movable independently of the generating source of the high-frequency current, so that the operator can manipulate the hand device the same as he has heretofore manipulated the usual hand-electrode and can now do so with my invention without the danger, inconvenience, or loss of current heretofore experienced.

The preferred form of my invention which I have herein shown is especially adapted for prolonged application as a head-terminal or for use above the patient, and I have also shown a form of my invention adapted for short and general application and for delicate manipulation and difficult cases of local application.

In the drawings, Figure 1 is a view in side

elevation of one form of my invention. Fig. 2 is a transverse sectional view thereof on the line 2 2, Fig. 1. Fig. 3 is a view in side elevation of a modified form, parts being broken away for clearness of illustration.

One of the distinctive features of my present invention is the provision of a hand-electrode constituting in itself a high-frequency device, Figs. 1 and 2 showing the same as capable of being moved by hand up and down on a standard or removed therefrom and handled separately and Fig. 3 showing a lighter form of device for hand use only.

I wish it understood that my invention is restricted to high-frequency high-potential current of the kind previously mentioned, by which I mean current of such enormous frequency and high potential that it cannot readily be conducted because of its tendency to discharge into the air in spite of any usual insulation, my invention residing in providing means whereby that portion of the apparatus which is to be carried or moved by the hand of the operator is separated from the rest of the apparatus and contains within itself that portion of the winding or other mechanism which serves to transform the high-frequency transmissible current into the kind of current which is not transmissible and which I have defined as a high-frequency high-potential disruptive discharge-current.

On a suitable base  $a$  is rigidly secured a hollow standard  $a'$ , provided with a pulley  $a''$ , swiveled at its upper end, over which passes a cord  $a^3$ , carrying a hand-electrode high-frequency device  $a^4$  at its outer end and a counterbalance-weight  $a^5$  at its inner end.

The electrode  $a^4$  comprises a back piece  $a^6$ , to which is secured at  $a^7$  a shell of hard rubber or the like  $a^8$ , containing a coarse primary  $a^9$ , wound adjacent the outer turns of a flat secondary  $a^{10}$  of the form shown in my patent, Serial No. 615,653, of December 6, 1898, all embedded in insulating material, such as hard wax  $a^{12}$ , poured therein in melted condition. One terminal,  $a^{13}$ , of the secondary is shown as grounded, and the other or inner terminal, which constitutes the high-potential discharge-terminal of the secondary, is connected at  $a^{14}$  to a tubular contact device  $a^{15}$ , per-



manently secured in the pointed end  $a^{16}$  of the high-frequency device for receiving any desired form of discharge-electrode, the shank  $a^{17}$  of a ball-discharge electrode  $a^{18}$  being here-  
 5 in shown as mounted therein. The terminals of the primary are connected by suitable flexible conductors  $a^{19}$   $a^{20}$  to a suitable source of electrical energy, shown as comprising a gen-  
 10 erator A of alternating current, whose conductors lead to a transformer T, connecting with a condenser C and spark-gap S. In my copending application, Serial No. 214,266, I have explained more at length the advan-  
 15 tages of having the high-frequency device separated from the generating source, and in the present arrangement I have separated the parts still farther, the alternator and trans-  
 20 former, which serve to generate the low-frequency high-voltage current and which con-  
 25 stitute the heavier portions of the generating apparatus, being separated a long distance from the movable portion of the apparatus, and the condenser and spark-gap, which serve to raise the low-frequency current to a high-  
 30 frequency current, being mounted, preferably, directly on the standard  $a'$ , thereby bringing as near to the discharge-electrode as practicable all that portion of the current which has  
 35 any tendency to dissipate itself in the atmosphere by conduction. This also brings all the adjustable parts of the apparatus directly to the hand of the operator.

The arrangement as thus described is of great importance in therapeutical work, be-  
 35 cause it makes it possible to use the highest frequency and most powerful and efficient current without deterioration wherever it is desired to quickly shift the electrode, as the surgeon can readily move the standard  $a'$  here  
 40 and there about the room without any inconvenience, the heavy generating parts being connected by long conductors and located in a closet or other convenient place, and as the operator is using the apparatus he can in-  
 45 stantly adjust the hand-electrode up or down or sidewise and likewise adjust the spark-gap or condenser, all without leaving the patient or otherwise interrupting the treatment.

The back  $a^6$  of the high-frequency device is  
 50 provided with a clamp  $a^{21}$  and operating-handle  $a^{22}$ , said clamp being shown as consisting of two blocks  $a^{23}$   $a^{24}$ , hinged at  $a^{25}$  and locked together by a thumb-nut  $a^{26}$ , although I do not restrict myself in any way to the means  
 55 which may be provided for retaining the high-frequency device movably upon its standard.

From the above description it will be understood that the high-frequency generator may be located in the corner of the room or  
 60 elsewhere, as desired, transmitting the current generated thereby to the high-frequency device over the conductors  $a^{14}$   $a^{20}$  without danger or material loss of current, inasmuch as the form of the current as delivered from the  
 65 source mentioned is of such well-known char-

acter that it is readily restrained by the ordinary insulation provided with good conductor-wires. The current having been delivered properly to hand-electrode  $a^4$ , which I have denominated the "high-frequency device," is raised  
 70 by the latter to the enormous frequency and high voltage required for the disruptive discharge desired in this class of apparatus, and by my invention the high-frequency device  
 75 itself is the electrode and is movable directly to the position required for local application. The truck or standard is readily moved to the operating-table or wherever required, and the hand device is swung on the rod  $a'$  to any di-  
 80 rection desired and is readily raised or lowered. This, for instance, enables it to be used with a head-terminal for prolonged application, which would otherwise be practically impossible with the ordinary apparatus  
 85 because of the fatigue resulting to the operator, whereas by my invention the operator is relieved of all fatigue and also the element of danger, and hence nervous anxiety on the part of the operator is practically eliminated,  
 90 inasmuch as there are no conductor-wires from the high-frequency device, (which have heretofore constituted the source of danger.)

In case the application of the high-frequency disruptive discharge is to be of short duration, and especially if the application is to be with  
 95 reference to an awkward position, the operator simply unclamps the device  $a^4$  from its standard and holds it in his hand to the spot desired. For the latter purpose I also provide a lighter form of construction, as shown  
 100 in Fig. 3, where it will be seen that I have provided a conical secondary  $a^{27}$ , wound on a light supporting-shell  $a^{28}$ , and preferably inclosed by an outer cone  $a^{29}$ , the primary  $a^{30}$   
 105 being wound in a peripheral recess or groove  $a^{31}$ , provided in a base  $a^{32}$ , the parts being held together in any desired manner, as by a rod  $a^{33}$ , having threaded engagement with the handle  $a^{34}$  and adapted to receive any kind of  
 110 a discharge-electrode at its opposite end, as a ball  $a^{35}$ . This form of hand device is light and well adapted to general use and lends itself to more delicate manipulation than the heavier form of hand devices previously de-  
 115 scribed.

It will be understood my invention is capable of a wide variety of embodiments, as I believe it is broadly new to provide a hand device or electrode which itself produces the  
 120 high-potential high-frequency current that causes the disruptive discharge delivered by the electrode.

The current supplied to this hand device or hand-electrode is a high-frequency current, but is not of that quality which renders it  
 125 dangerous and practically non-transmissible, the mechanism which transforms said current into the latter kind of current being contained within the electrode itself, whereby all  
 130 necessity for further conductors, and hence



loss of current and danger, &c., are eliminated, the current not being permitted to assume this condition until it reaches the device which is to be carried or manipulated by the operator directly at the applying-point. I have already pointed out that the current to which my invention relates is not the ordinary current, and I wish to repeat that my invention relates to the most advanced type of high-frequency current known to therapeutical practice at the present day, being distinguished by its ability to produce a disruptive or brush discharge into the air from spherical conductors of one inch to one and one-half inches in diameter. I take this means of defining the character of the current, although it will readily be understood that it can be recognized by various other distinctive features and characteristics, and accordingly I do not intend to restrict myself by these definitions to any arbitrary frequency or potential, but have undertaken merely to explain the field of usefulness and kind of current with sufficient clearness to enable those skilled in the art to apprehend with certainty what my invention is, the difficulties it is intended to overcome, and the advantages effected thereby.

I am aware that it has long been common to employ hand-electrodes; but so far as I am aware these have either been remote from the producer of the form of current discharged or else they have not been capable of delivering the kind of discharge herein provided for. It will therefore be understood that I am not restricted in any way (excepting as specified in the claims) to the constructional details herein set forth.

Having described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A hand device or electrode for hand manipulation at the point of application, comprising a portable inclosure provided with a carrying device adapted to be grasped by the hand, said portable inclosure adapted to be connected to a source of high-frequency current, and containing within itself means for developing from said current a high-frequency high-potential disruptive discharge-current of the kind described.

2. A source of high-frequency current, and portable means for producing therefrom a high-potential high-frequency disruptive discharge-current of the kind described, said means being connected to said source by a long flexible conductor and being light in

weight and small in size for carrying by hand and for hand application and manipulation.

3. A standard, provided with a hand-electrode movable up and down on said standard and containing a high-frequency induction device.

4. A portable standard or support, carrying a disruptive discharge-electrode provided within itself with a high-potential high-frequency coil.

5. A portable standard or support, carrying a disruptive discharge-electrode provided within itself with a high-potential high-frequency coil, said electrode being freely movable by hand with relation to said standard.

6. An electrode, containing an induction-coil, a hollow support therefor, on which said electrode is freely movable, and counterbalancing means within said support for said electrode.

7. A high-frequency induction device for therapeutical work, comprising a portable standard, a hand-electrode, containing a high-frequency high-potential induction-coil, mounted movably on said standard, and a generating source comprising a source of alternating current, transformer, condenser and spark-gap, the latter two being mounted on said portable standard and having a short connection to said hand-electrode, and said transformer and source of alternating current being remote from said standard.

8. A high-frequency induction device for therapeutical work, comprising a portable standard, a hand-electrode containing within itself means for producing from an ordinary high-frequency current a high-frequency, high-potential disruptive discharge-current, a condenser and spark-gap in the circuit thereof, mounted adjacent thereto, and a remote source of current therefor including a transformer.

9. In an apparatus in the kind described, a stationary alternator and transformer located remote from the rest of the apparatus, and a high-frequency translating device, spark-gap and condenser located close to each other connected by short conductors for operation in connection with said remote alternator and transformer.

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

THOMAS B. KINRAIDE.

Witnesses:

GEO. H. MAXWELL,  
E. G. PROCTOR.