

No. 775,869.

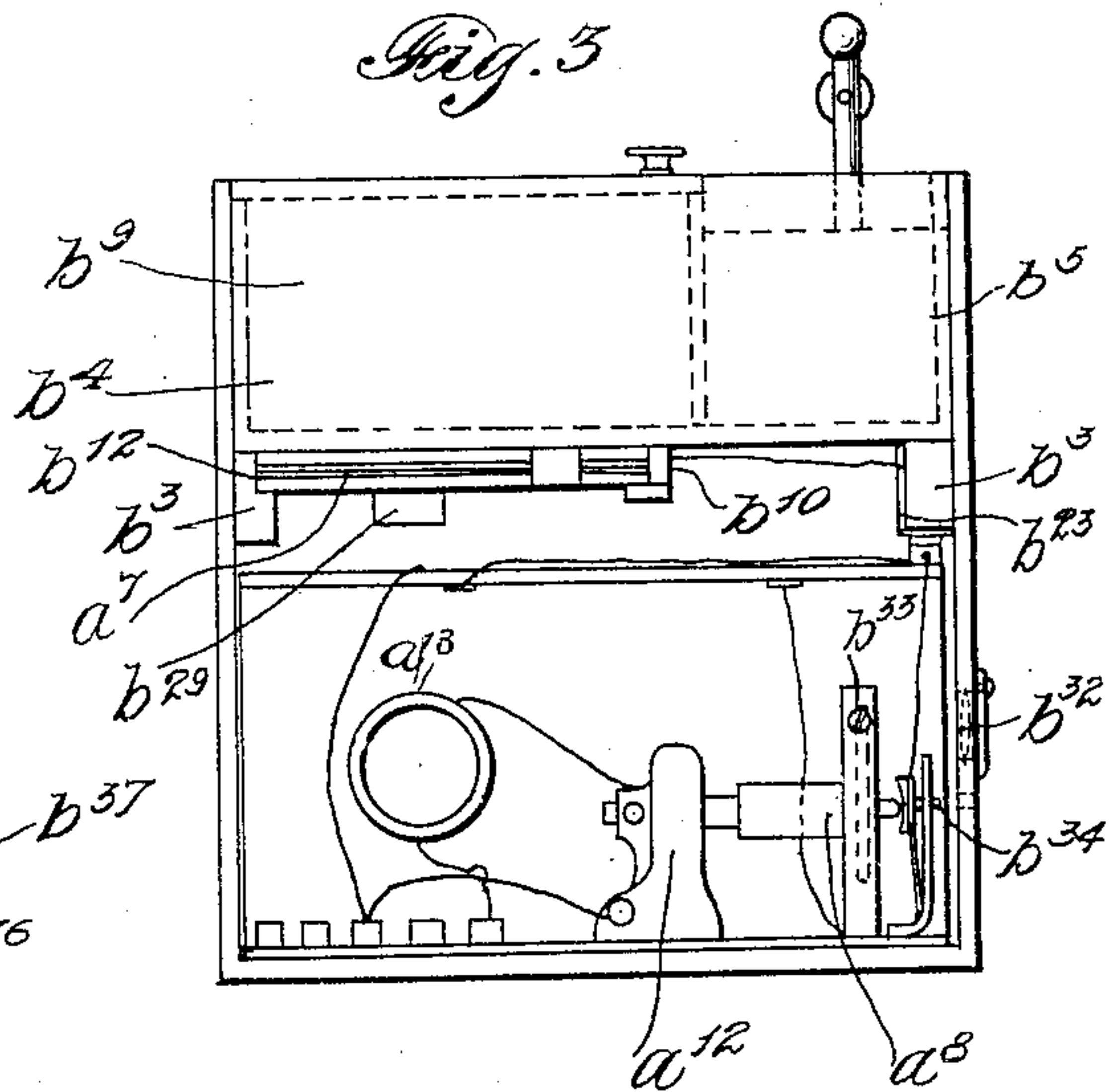
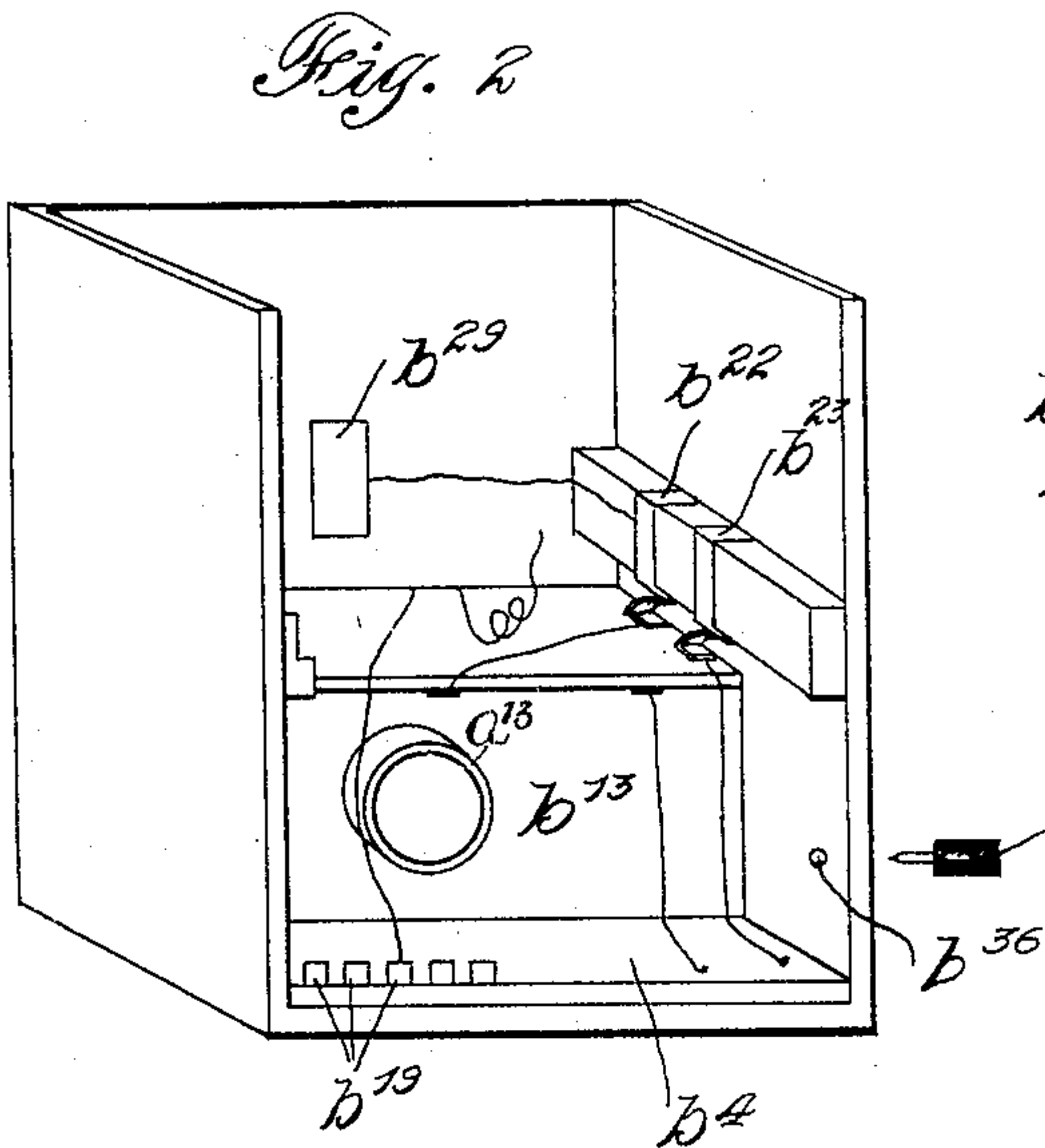
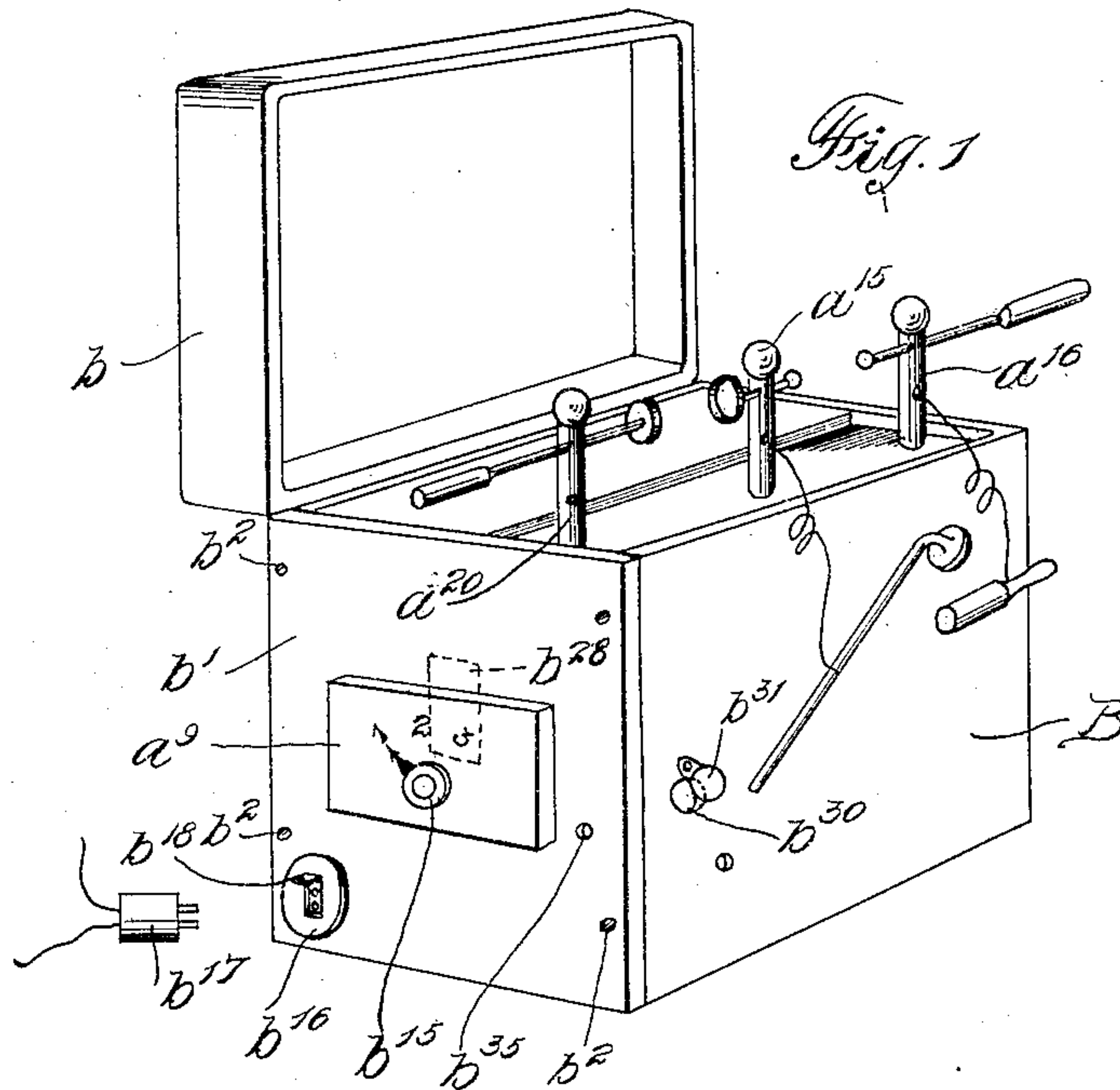
PATENTED NOV. 22, 1904.

F. F. STRONG.
PORTABLE HIGH FREQUENCY APPARATUS.

APPLICATION FILED MAY 23, 1904.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses:
John E. Porter.
Robert Ringrose.

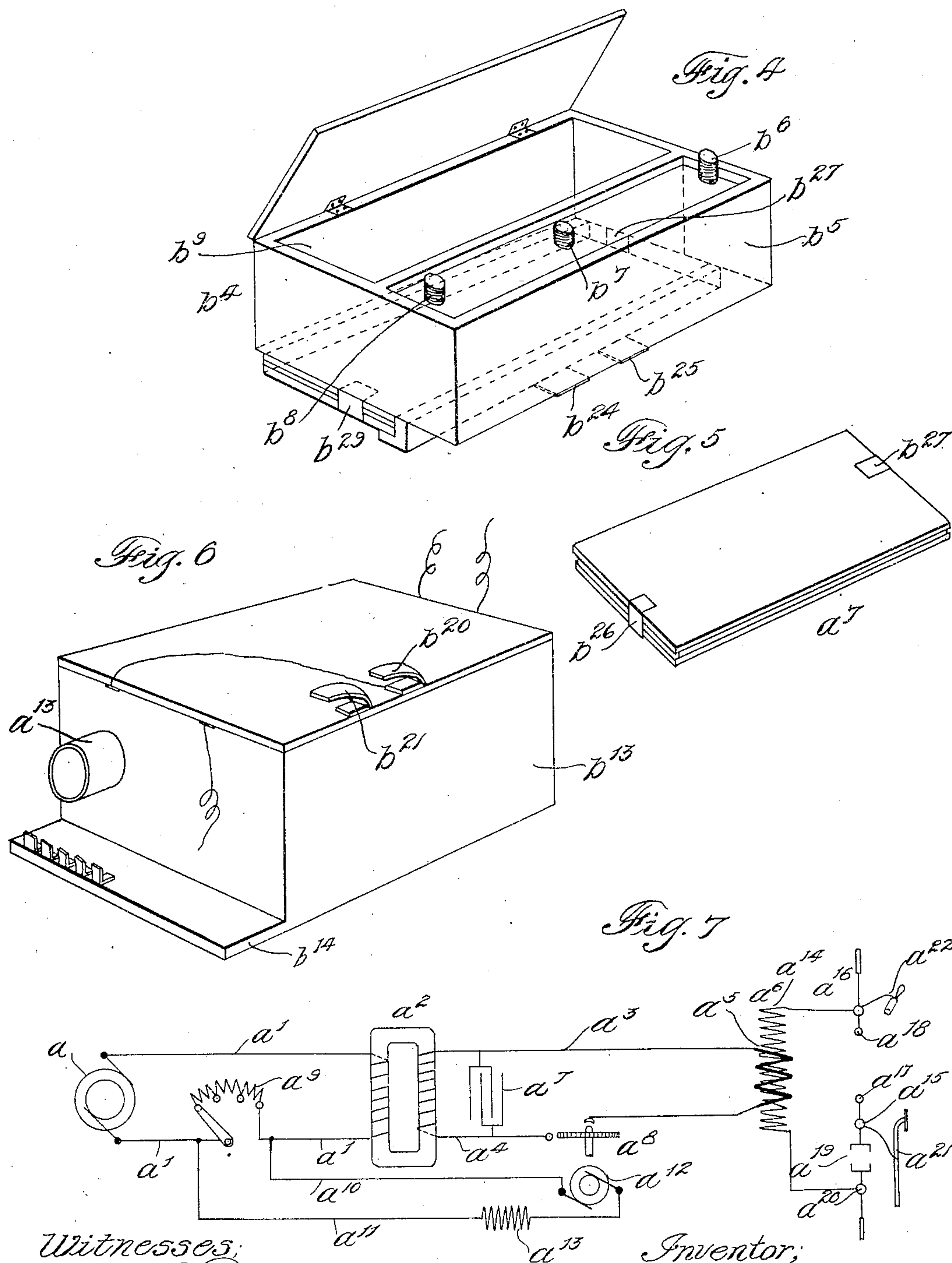
Inventor:
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PORTABLE HIGH FREQUENCY APPARATUS.

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NO MODEL.

2 SHEETS—SHEET 2.



Witnesses:
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UNITED STATES PATENT OFFICE.

FREDERICK F. STRONG, OF BOSTON, MASSACHUSETTS.

PORTABLE HIGH-FREQUENCY APPARATUS.

SPECIFICATION forming part of Letters Patent No. 775,869, dated November 22, 1904.

Application filed May 23, 1904. Serial No. 209,297. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK F. STRONG, a citizen of the United States, and a resident of Boston, in the Commonwealth of Massachusetts, have invented an Improvement in Portable High-Frequency Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates to high-frequency apparatus, and is principally intended for therapeutical uses, my object being to provide a compact simple outfit adapted to the practical requirements of the ordinary physician and surgeon.

To this end my invention resides, so far as relates to the present application, (certain novel portions contained herein being separately described and claimed in copending applications,) in arranging each of the segregable parts by itself or, in other words, providing a series of units independently removable from the cabinet without requiring any skill or technical knowledge on the part of the user and when all assembled automatically connecting themselves in proper operative relation to produce with the utmost efficiency all the results desired by the most exacting user of high-frequency apparatus, including the X-ray and ultra-violet light.

The various constructional details and arrangement of parts of my invention will be pointed out in the course of the following description, reference being had to the accompanying drawings, in which I have illustrated one embodiment of my invention, and the latter will be more particularly defined in the appended claims.

In the drawings, Figure 1 is a perspective view of the cabinet complete. Fig. 2 is a perspective view thereof, omitting the end and top and also portions of the interior. Fig. 3 is an end view thereof, simply omitting the end and top, but leaving all the contained parts in proper position. Figs. 4, 5, and 6 are perspective views of the separate units removed from the cabinet. Fig. 7 is a diagrammatic view illustrating the wiring and relation of the parts.

Referring to Fig. 7, in order to present con-

cisely the general arrangement of parts it will be seen that from a suitable source of energy a conductors a' lead to a step-up transformer a^2 , whose secondary terminals a^3 a^4 lead to the primary a^5 of a high-frequency transformer or inductor a^6 , a condenser a^7 being interposed across the wires a^3 a^4 and a high-frequency spark-gap a^8 being interposed in the wire a^4 in series therewith. A variable inductance or resistance a^9 is interposed in the wire a' , and from the opposite sides thereof conductors a^{10} a^{11} operate a motor a^{12} for driving the rotary spark-gap a^8 , a resistance a^{13} being interposed in the wire a^{11} . The inductor or oscillator a^6 has the terminals of its secondary a^{14} connected at a^{15} a^{16} , respectively, to pillars containing opposite electrodes a^{17} a^{18} , and in connection with the former I employ a variable air-gap a^{19} , to the opposite side of which at the pillar a^{20} a hand-electrode a^{21} , herein shown as a vacuum-electrode adapted to be applied directly to the body, is connected, the circuit being completed by means of an opposite hand-electrode a^{22} , secured to the post a^{16} .

The variable air-gap a^{19} and special form of rotary spark-gap a^8 , herein disclosed, form the subjects-matter of concurrently-pending applications, in which they are duly claimed and their special advantages and operation fully set forth.

The cabinet consists of an outer case or rectangular box B, having a hinged top b and a removable end b' , which may be secured in any suitable manner, as by screws b^2 . Within the cabinet opposite ledges or ways b^3 are provided, on top of which is removably seated a receptacle b^4 , having a compartment b^5 extending lengthwise thereof at its front side, in which is mounted the inductor or electrostatic transformer a^6 , being embodied therein in wax or other suitable permanent insulation and containing three threaded stubs or terminal posts b^6 b^7 b^8 for receiving, respectively, the pillars a^{16} , a^{15} , and a^{20} , the middle post, b^7 , being insulated or acting as a dummy, simply supporting the pillar a^{15} . At the rear of the compartment b^5 is a compartment b^9 for holding the pillars, the X-ray tubes, electrodes, and removable parts of the apparatus when not in use. On the under side of the box or

receptacle b^1 is a cleat b^{10} , having a slideway on its inner side in alinement with a similar slideway b^{12} , provided on the inner side of the rear ledge b^3 . These two slideways serve re-
 5 movably to receive the condenser a^7 . In the lower part of the cabinet is removably mounted a receptacle b^{13} , containing the electromagnetic transformer a^2 , and on a platform or ledge b^{14} , projecting at the lower front edge
 10 thereof, is mounted the spark gap or wheel a^8 and motor a^{12} , the resistance a^{13} being shown as formed in the shape of a spool or tube projecting from said receptacle b^{13} .

The variable inductance or main resistance
 15 a^9 may be mounted in any convenient position in or on the box, being herein shown as mounted on the removable end b^2 thereof and operated by a rotary handle b^{15} . Adjacent thereto is a socket b^{16} of any usual kind to co-
 20 operate with a plug b^{17} , said socket being normally closed by means of a hinged plate b^{18} . (Shown as open in Fig. 1.)

Each unit is provided with contact plates or devices, the ledge b^{14} carrying contacts b^{19} for
 25 connection from the resistance a^9 to the transformer in the receptacle b^{13} and to the motor a^{12} and box b^{13} , carrying spring-contacts b^{20} b^{21} for slidably engaging contacts b^{22} b^{23} , permanently fastened to the front slideway b^3 . The
 30 receptacle b^5 is provided with contact-plates b^{24} b^{25} on its under side adapted to engage with the strap-contacts b^{22} b^{23} , just mentioned, and the condenser has its opposite terminals connected by plates b^{26} b^{27} for contacting with op-
 35 posite plates b^{28} b^{29} at the opposite ends of the cabinet. All of these parts are connected by suitable wires, as shown, each wire, however, being confined to one of the unitary parts and
 40 the contacts made by the plates already mentioned.

In the front side of the box opposite the high-frequency spark-gap a^8 I have provided a window b^{30} , which may be closed by a shutter b^{31} and is provided with a quartz lens b^{32}
 45 for use with the ultra-violet light. The electrodes of the spark-gap a^8 are regulated by very small screws b^{33} b^{34} . Opposite these screws are small openings b^{35} b^{36} , the object of this construction being to make it im-
 50 possible for the user to come in contact with the current. In order to adjust the interrupter, he must use a small special tool b^{37} , adapted only to enter the small opening b^{35} or b^{36} , as the case may be, and as all the separate
 55 parts of the mechanism are permanently retained in their various receptacles and when in operative circuit with each other are inclosed entirely within the cabinet it results that no accident can possibly occur to the user
 60 by getting in circuit with the active current. This feature of my invention is of considerable practical importance when it is remembered that this apparatus is liable to get into the hands of unskilled persons and also that

there is considerable danger from short-cir- 65
 cuiting the apparatus at an improper point.

If any portion of the apparatus gets out of order, all that the user has to do is to remove the box or unit containing said portion of the apparatus and ship it to the factory for re- 70
 pair without disturbing the rest of the apparatus. When the repaired portion is sent back to him, he needs no skill whatever to place it properly in circuit with the rest of the apparatus, inasmuch as it is impossible for 75
 him to put it in any but the correct position and relation.

In use having taken the three pillars from their compartment b^9 the operator mounts them in position on the posts b^6 b^8 , as shown 80
 in Fig. 1, and then inserts the plug b^{17} , thereby connecting the apparatus to a convenient source of alternating-current supply, where-
 upon the apparatus is ready for use.

One of my objects is to provide an appa- 85
 ratus which cannot be used improperly, and from the foregoing it will be seen that practically all that the operator can do is to vary the resistance, (by turning the handle b^{15} .) Moreover, the construction is simple and in- 90
 expensive, and all the parts must remain the same as adjusted at the factory.

If desired, the small motor a^{12} and adjacent mechanism may be carried on a platform separate from the transformer-case b^{13} ; but for 95
 convenience of wiring I have made the latter and the platform or ledge b^1 removable together.

Various other changes and substitutions may be resorted to without departing from the 100
 spirit and scope of my invention.

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

1. A portable high-frequency apparatus, 105
 comprising a cabinet containing a transformer, condenser, high-frequency inductor, each of said parts being constructed and inclosed as a separate unit, independently mounted in and removable from said cabinet, each of said units 110
 having fixed contacts, coöperating with adjacent fixed contacts for automatically placing the apparatus in proper circuit relations when all the units are mounted in the cabinet.

2. A portable, high-frequency apparatus, 115
 comprising a cabinet having longitudinal slideways, a receptacle mounted on said ways, containing a compartment provided with a high-frequency inductor, an independently-removable condenser, slideways normally support- 120
 ing the same, and a transformer carried by said cabinet beneath said before-mentioned parts.

3. A portable high-frequency apparatus, 125
 having all its different sets of mechanism constructed as separate units independently removable and provided respectively with plate-contacts for automatic electrical connection in

proper relation when the separate units are placed in the cabinet.

4. A portable high-frequency apparatus, comprising a cabinet provided with a receptacle containing a high-frequency inductor embedded therein and having three posts projecting therefrom, two of said posts being connected respectively with terminals of the secondary thereof and removably supporting pillars containing opposite discharge-terminals, the third post being insulated from the rest of the apparatus and containing a terminal coöperating with an opposite terminal provided in one of the adjacent pillars, a hand-electrode for completing the circuit about said secondary through said insulated terminal.

5. A portable high-frequency apparatus, including a cabinet, containing a high-frequency spark-gap and coöperating mechanism for generating a light at the discharge-terminals of the said spark-gap, and a window opposite said discharge-terminals provided

with means for transmitting the said light, said mechanism being constructed in units removably mounted, independently of each other in said cabinet.

6. A portable high-frequency apparatus, having its various parts independently inclosed in separate unitary receptacles, and a spark-gap having small regulating-screws, and small openings in said cabinet opposite said screws, limited in area to the size of said screws, so that an operating-tool entering said openings can contact only with said screws, thereby rendering regulation of the apparatus convenient without any possibility of injury from the current.

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

FREDERICK F. STRONG.

Witnesses:

T. M. STRONG,

GEO. H. MAXWELL.