

(No Model.)

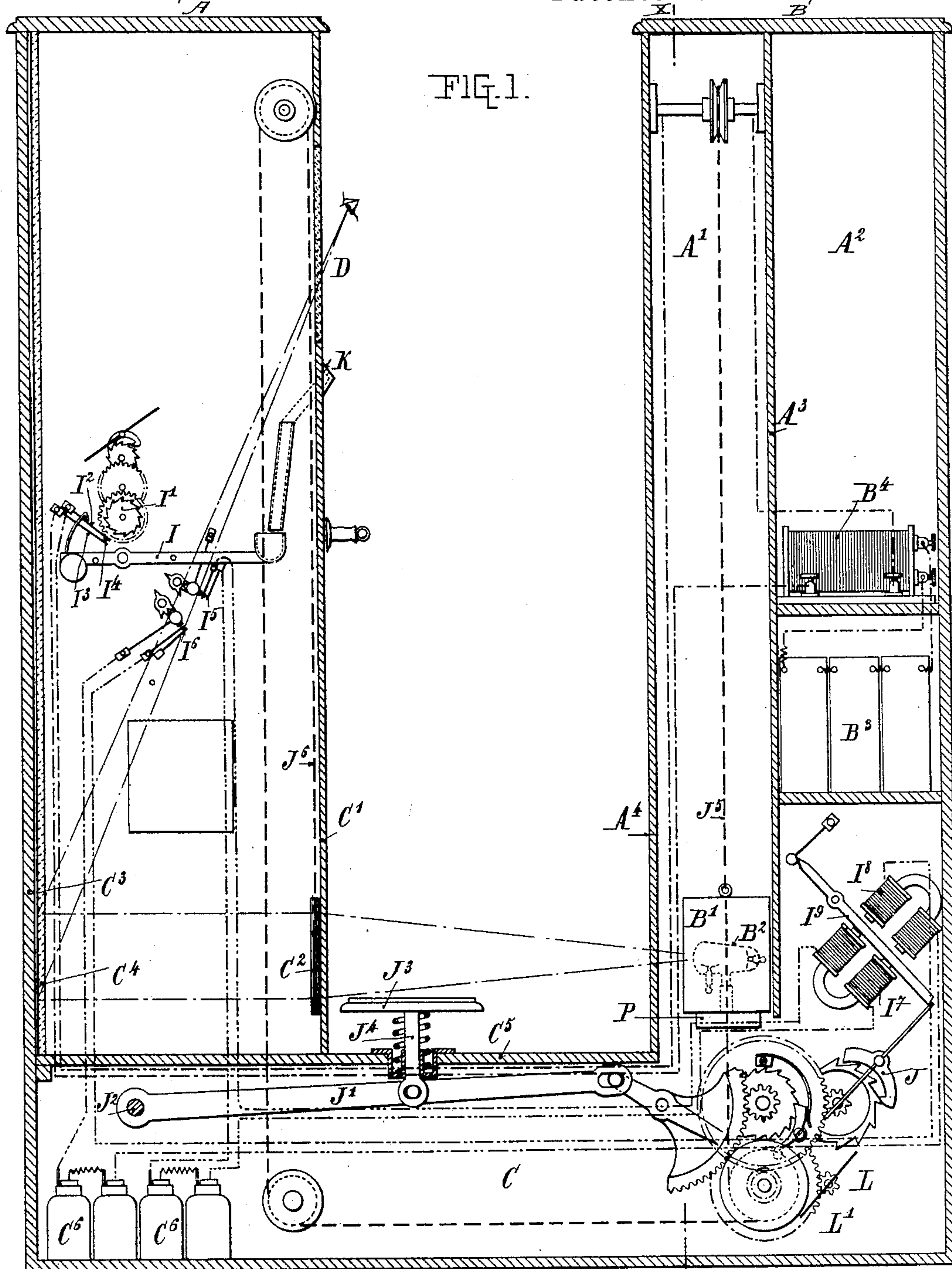
2 Sheets—Sheet 1.

J. WERTHEIMER.

APPARATUS FOR MAKING OBSERVATIONS BY MEANS OF ROENTGEN
OR X RAYS.

No. 597,753.

Patented Jan. 25, 1898.



Witnesses:
J. K. Broney
E. H. Hump

Inventor
Jacques Wertheimer
By E. M. B. Boulter,
Attorney

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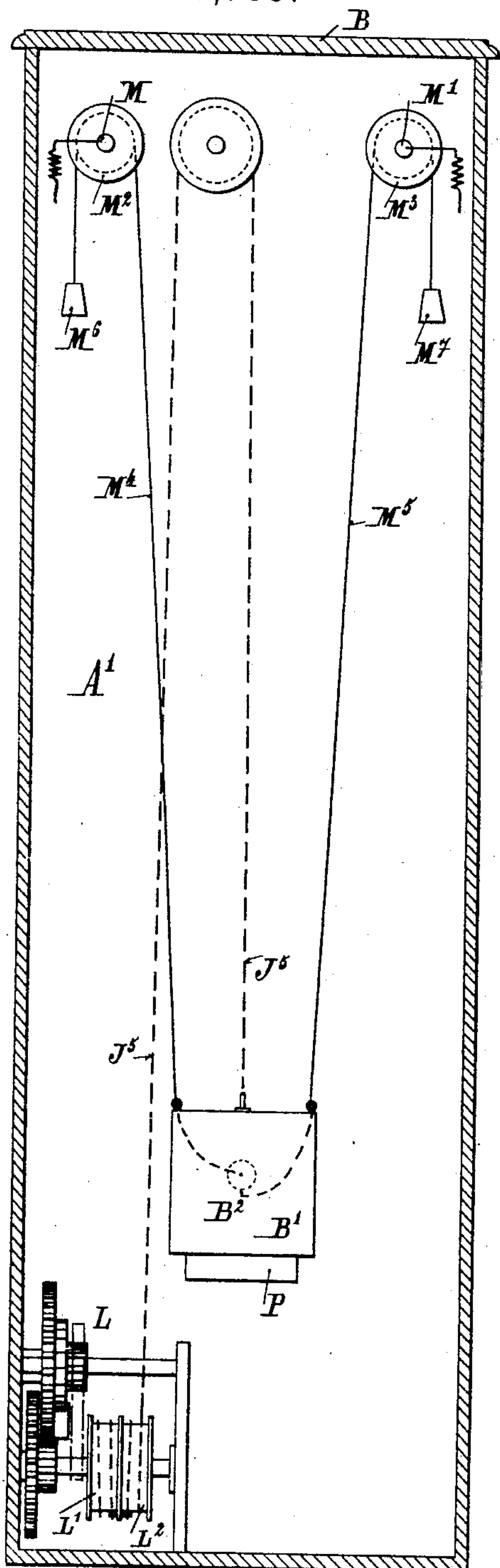


Fig. 2.

FIG. 3.

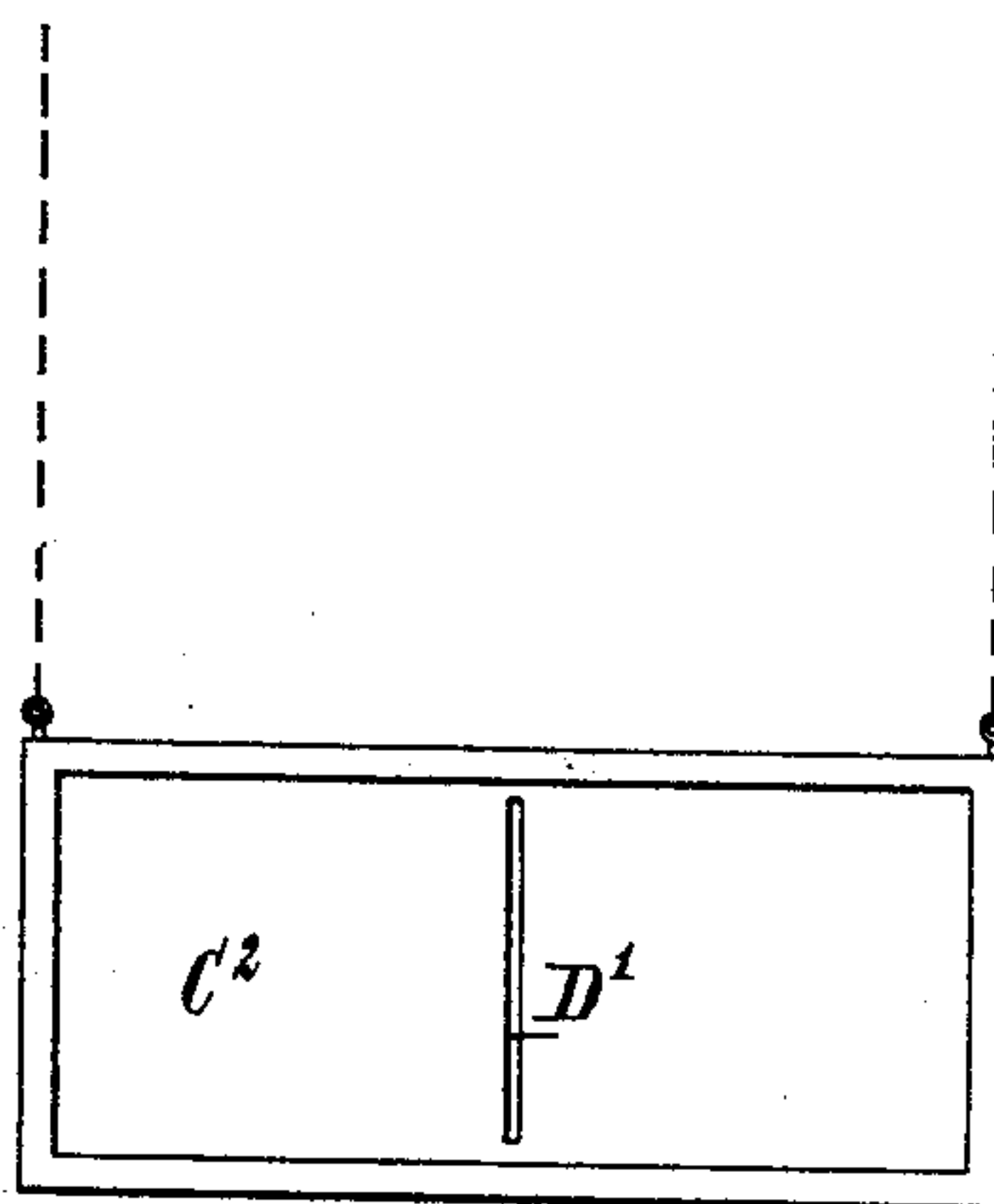
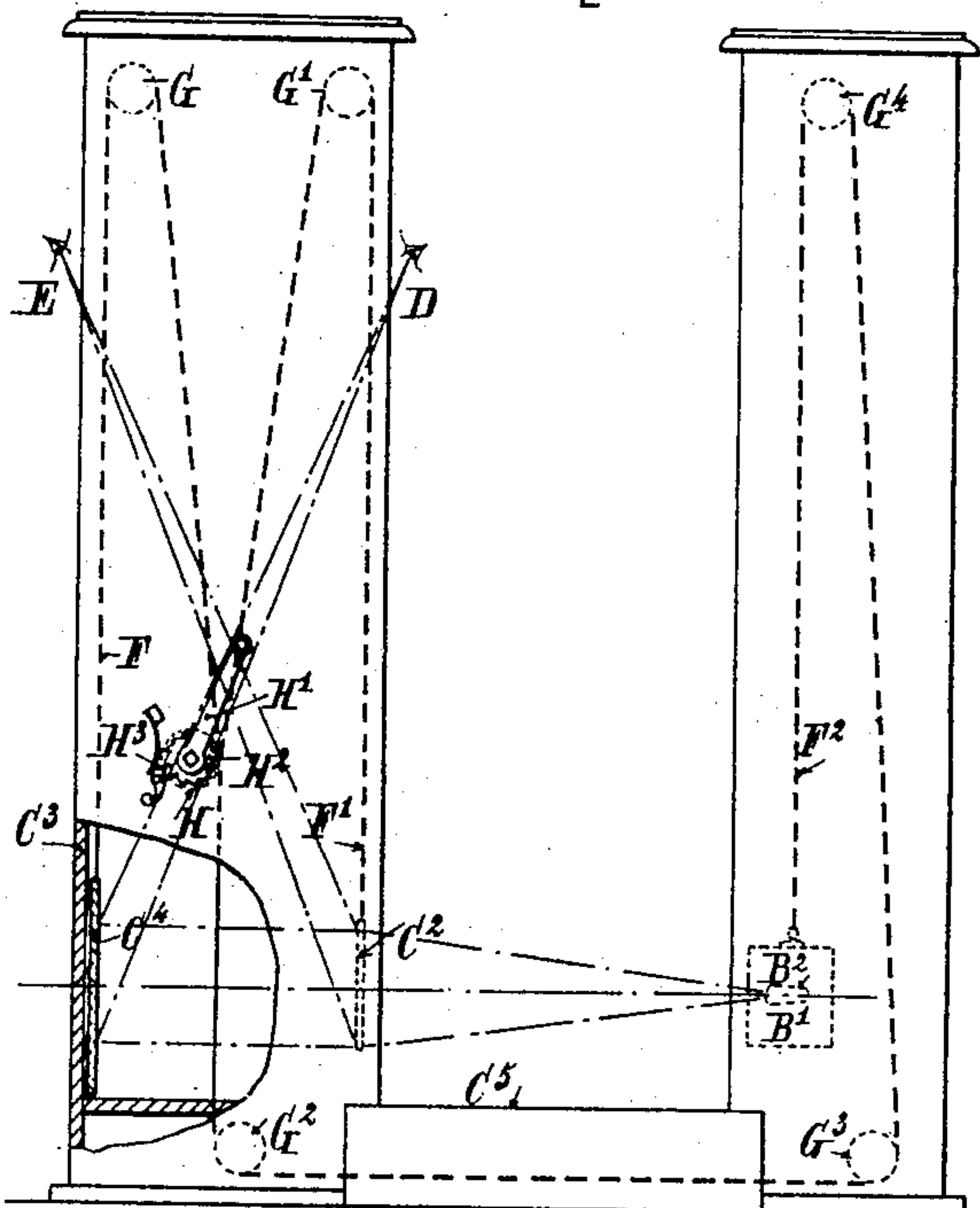


FIG. 4.



Witnesses:
H. R. Bonnet
C. Thonhup

Inventor
Jacques Wertheimer
By M. E. Boulter
attorney.

UNITED STATES PATENT OFFICE.

JACQUES WERTHEIMER, OF PARIS, FRANCE.

APPARATUS FOR MAKING OBSERVATIONS BY MEANS OF ROENTGEN OR X RAYS.

SPECIFICATION forming part of Letters Patent No. 597,753, dated January 25, 1898.

Application filed July 27, 1897. Serial No. 646,132. (No model.)

To all whom it may concern:

Be it known that I, JACQUES WERTHEIMER, a citizen of the Republic of France, residing at Paris, France, have invented certain new and useful Improvements in or Relating to Apparatus for Making Observations by Means of Roentgen or X Rays, of which the following is a specification.

This invention relates to radiosopic apparatus working automatically on being put into operation by means of a coin or by other mechanical means, or by hand, whereby single, double, or multiple observations may be made by means of Roentgen or X rays of any body or object, especially of the body or part of the body of a person, by the person using the apparatus, or by another person, or by several persons at once.

In the accompanying drawings, Figure 1 shows in elevation and in longitudinal vertical section an apparatus according to the present invention adapted for a single person to make an observation, said apparatus being arranged to act automatically on being released by a coin. Fig. 2 shows the same apparatus in side elevation in vertical section on line X Y of Fig. 1. Fig. 3 is a detail view supplementing Figs. 1 and 2. Fig. 4 shows, on a smaller scale, the apparatus for double or multiple observations in longitudinal elevation, a part being broken off and the apparatus arranged to be worked by hand.

By examining Figs. 1, 2, and 3 it will be seen that the apparatus, according to the present invention and shown in the figures, is mainly constituted by two vertical casings A and B, connected at the bottom by a horizontal box or casing C, the casing B being transversely divided into two compartments A' A² by means of a vertical partition A³.

In the compartment A' of the casing B is arranged and works a box or frame B', containing the glass bulb B², in which the X rays are produced and in such manner that the rays emitted by said bulb are directed toward the front of the apparatus—that is to say, so that they pass through the front partition A⁴ of the casing B. In the other compartment A² of the casing A is arranged the electrical apparatus—accumulators B³ and transformer B⁴—operating the tube or bulb B². At the bottom, partly in the casing B and partly

in the box C, there is arranged the mechanism for releasing the parts automatically operating the apparatus and also the operating parts themselves. Finally, in the casing A there are arranged as near as possible to the back partition C' a fluorescent screen C², and against the wall C³ of said casing A a reflecting-glass C⁴, arranged so as to receive and reflect the image produced on the screen C² by the X rays emitted by the tube B², said rays having then passed through the front wall of its casing B', through the wall A⁴ of the casing B, through the object or body placed on the platform C⁵ of the lower horizontal box C, through the wall C' of the casing A, and, finally, onto and through the screen C² itself. The casing A, moreover, contains the disengaging mechanism actuated by a coin and starting the automatic working of the apparatus, said disengaging or releasing action being transmitted to the different parts by an electric current supplied by cells C⁶, placed in the lower part of the box C.

The box B', with the bulb B², is arranged so that it can move vertically behind the wall A⁴ of the casing B, so as to bring the rays emitted by the inner tube B² to any desired height. In the same manner the screen C², of sufficient surface and corresponding at least to the surface covered by emitted rays directed onto it by the bulb B², is vertically adjustable behind the wall C' of the casing A, its vertical movement taking place exactly in the same manner as that of the bulb B², so that the screen is always opposite to and receives the rays emitted by the bulb B² whatever be the vertical position of the latter.

At a suitable height there is formed in the wall C' of the casing A an opening or window D of sufficient size to enable a person standing on the platform C⁵ to look through the window in order to observe on the surface of the inner mirror C⁴ the images projected onto it from the screen C². It will be understood that with the arrangements hereinbefore described different portions of the body of a person standing on the platform C⁵ and looking through the eyehole D will be successively, from bottom to top, traversed by the rays emitted by the bulb B² and observed by the user.

As the screen C^2 when on the level with the head of the person observing would come between the eyes and the mirror C^4 , thus preventing observation by the user, the screen C^2 is provided, as may be seen in Fig. 3, with a vertical slot D' , said slot D' being of sufficient size to enable the rays from the eye passing through the window D to pass through said slot and continue to observe on the mirror C^4 the images projected through the fluorescent screen C^2 , and this in spite of the interposition of said screen between the mirror and the eye of the observer. The only part impossible to observe will be that coinciding exactly with the slot D' of the screen C' ; but as this slot is in practice made as narrow as possible it will not seriously interfere with the observation.

This apparatus hereinbefore described and illustrated by way of example in the accompanying drawings in Figs. 1 and 2 allows only an observation to be made by one person—that is to say, the projections cannot be conveniently observed on the mirror C^4 except by the person looking through the eyehole D . In certain cases, however, especially for medical purposes, it will be advisable to enable not only the person—for instance, a patient—placed on the platform C^5 and looking through the eyehole D , but also another person—for instance, his doctor—to observe in a convenient manner the projected images, so that the doctor can explain to the patient and examine in a most complete manner his constitution or the cause of his illness, &c., the portion of the body under examination being visible to both.

In other cases it may be desirable to be able to rapidly and comfortably examine certain objects the interior of which is to be checked and verified. For instance, in custom-houses it would be very convenient to be able to examine the contents of a parcel of whatever dimensions without having to open it and to take out the contents.

It is evident that the casings A B may be arranged at a variable distance, so as to enable the position of the box B' with the bulb B^2 to be adjusted according to circumstances and to the object to be examined.

The modification of the apparatus according to the present invention shown in Fig. 4 fulfils all these conditions. In this modification the mirror C^4 , instead of being fixed and occupying the whole surface of the wall C^3 of the casing A , is movable up and down said wall C^3 and is of sufficient size to enable the images produced on the fluorescent screen C^2 to be always completely reflected in the mirror. The movable mirror C^4 follows the screen C^2 and the box B' with the bulb B^2 in their vertical ascending and descending movements, so that it always receives the projected images produced by the rays emitted by the bulb B^2 . In these conditions the person placed on the platform C^5 will observe, as before, the projections on the mirror C^4 through the win-

dow D , and another person will be able by standing facing the wall C^3 of the apparatus to observe through an eyehole at E made at a suitable height in said wall the projections produced on the fluorescent screen C^2 , this observation then taking place directly on said screen. In order not to hinder the passage of the rays from the eyes of the observer at E to the surface of the screen C^2 , when the reflecting-mirror arrives at the line of sight between the observer's eyes and the screen, the mirror C^4 , similarly to the screen C^2 , is provided with a vertical slot enabling the observer always to see the screen C^2 whatever be the height of said screen and of the mirror C^4 , which follows all the movements of the screen.

It is evident that the apparatus shown in Fig. 4 could also be utilized for a single observation at E , directly on the screen C^2 , of a person or object suitably placed on the platform C^5 of the apparatus.

The apparatus according to the present invention, whether it be arranged for a single observer, as in Figs. 1 and 2, or for double or multiple observations, as in Fig. 4, can be arranged to work automatically on being disengaged by means of a coin or any other device or by hand, as has been hereinbefore explained.

In the modification shown in Fig. 4 the apparatus is supposed, by way of example, to be worked by hand. This is effected simply by connecting the box B' , carrying the bulb B^2 , the screen C^2 , and the movable mirror C^4 , together by means of cords F F' F^2 , guided over guide-rollers G G' G^2 G^3 G^4 , the cords F F' respectively supporting the mirror C^4 and the screen C^2 and being wound together in the same direction on a drum H , whereby the cord F^2 supports the box B' and is wound on the same drum H with the same speed as the cords F F' , so that said mirror C^4 and screen C^2 and box B' never alter their relative position. A crank or handle H' serves for operating the drum H from the outside. A ratchet-wheel H^2 , with a pawl H^3 , enables the drum H to be stopped, so as to retain the parts at any desired height. The lighting and extinguishing of the bulb B^2 can be effected by means of any suitable switch device arranged within reach of the operator.

The apparatus shown in Figs. 1 and 2 is arranged with the necessary devices for automatically working on being disengaged by a coin. This mechanism, which may of course be varied, comprises, chiefly, a lever I , adapted to turn under the weight of a coin and engaging with a ratchet-wheel I' , controlled by an anchor movement in order to retard its return motion, to which corresponds the period of observation, so that the time allowed for the observation may be sufficiently long. When turning, the lever I closes by means of rods I^2 I^3 an electric circuit at I^4 , whereby the bulb B^2 is lighted and is kept lighted during the time that the apparatus is operative. The le-

ver I also closes during both its forward and return movements electric contacts I⁵I⁶, which by means of corresponding electromagnets I⁷I⁸ disengage or engage through a pivoted lever I⁹, operated by said electromagnets, an anchor-escapement J, which by means of ratchet-wheels, toothed wheels, and segments comprised in the apparatus L releases a lever J', pivoted at J², which lever is operated by the weight of a person or object placed on a platform J³ outside the box C and above the floor C⁵ of said box, the platform being connected to the lever J' by a rod J⁴. For instance, when the circuit of the electromagnet I⁸ has been completed at contacts I⁶ the pivoted lever or armature I⁹ is attracted to the poles of electromagnet I⁸. This disengages the anchor movement or escapement J and allows the lever J' to descend through the medium of the ratchet-wheels, toothed wheels, and segment designated at L. The anchor-escapement is so balanced that when disengaged from the lever I⁹ it will oscillate like an ordinary clock-escapement under the force of the weight on the platform J³ and is prevented from acting when the armature I⁹ is attracted to the poles of electromagnet I⁷. According to these arrangements, which may be replaced by others operating in a similar manner, a person or an object having been placed on the platform J³ and a coin being placed in K the apparatus will be caused to act owing to the lever I turning, whereupon the bulb B² is lighted, and the disengaging of the anchor-escapement enables the lever J' to descend under the influence of the weight of the person or object placed at J³, and consequently permits the rotating of the series of wheels L, causing the rotation of drums L' L², Fig. 2, on which are wound the supporting and operating cord J⁵ of the box B' and the supporting and operating cord J⁶ of the screen C², this winding up taking place simultaneously and in an equal manner, so that a perfect alignment of the screen C² and the bulb B² is preserved during their movement. On the return of the lever I into its original position, which takes place at a desired speed regulated by the anchor-escapement I' in such manner that it is not completed until sufficient time has elapsed for a complete ascent of the screen C² and the box B', carrying the bulb B², and for a perfect observation on the mirror C⁴ during said ascent, said lever I interrupts the before-mentioned electric contacts and thus extinguishes the light in the bulb B² and effects the engagement of the escapement J, controlling the action of the wheels at L, corresponding to working of the apparatus. These wheels then enable the drums L' L² to rotate in the opposite direction under the influence of a balance-weight P, Fig. 2, on the box B', and consequently the cords J⁵ J⁶ are unwound—that is to say, the box B' descends, together with the screen C² and the mirror C⁴, if the latter be movable,

to the position of rest. The platform J³ being freed from the weight of the person or object which it supported returns under the action of a spring surrounding its rod J⁴ into its original position, and the lever J', connected to the platform by the rod J⁴, and the wheels in L, controlled by the lever J', also return to their original position.

In order to insure the conducting-wires supplying current to the bulb B² being constantly stretched, the current for this tube is passed through the spindles M M' of two pulleys M²M³, over which pass wires M⁴M⁵, supplying current to the tube B², the free ends of these wires being provided with balance-weights M⁶M⁷, which insure their constant tension whatever be the position of the tube B².

I claim—

1. Apparatus for making observations by means of Roentgen rays, comprising two vertical casings between which the object to be examined is placed, one of said casings containing a vertically-movable vacuum-bulb, and the other casing containing a correspondingly-movable fluorescent screen, and a mirror, and an observation window or eyehole, in combination with mechanism for moving said bulb and screen, substantially as described.

2. Apparatus for making observations by means of Roentgen rays, comprising two vertical casings between which the object to be examined is placed, one of said casings containing a vertically-movable vacuum-bulb, and the other casing containing a correspondingly-movable fluorescent screen, and a correspondingly-movable mirror and observation window or eyehole, in combination with mechanism for moving said bulb, screen and mirror, substantially as described.

3. Apparatus of the character described comprising two vertical casings between which the object to be examined is placed, one of said casings containing a vertically-movable vacuum-bulb and means for lighting the latter, and the other casing containing a correspondingly-movable fluorescent screen, and a mirror and an observation window or eyehole, and a coin-admission opening, in combination with mechanism adapted to be operated by the weight of a coin to effect the lighting and extinguishing of the bulb and to move the bulb and screen vertically.

4. Apparatus of the character described comprising a casing A, provided with a vertically-movable fluorescent screen C², and mirror C⁴, a casing B provided with a vertically-movable vacuum-bulb B², a central platform J³, provided with a spring-controlled raised part J², hinged to a pivoted lever J', connected to a series of wheels for operating the drums carrying the cords for effecting the vertical movement of the bulb and screen, substantially as described.

5. Apparatus of the character described comprising a casing A, provided with a ver-

tically-movable fluorescent screen C², and mirror C⁴, a casing B, provided with a vertically-movable vacuum-bulb C³, a central platform J³ provided with a spring-controlled
5 raised part J² hinged to a pivoted lever J' connected to a series of wheels for operating the drums carrying the cords for effecting the vertical movement of the bulb and screen in combination with electrical means for con-

trolling the duration of movement of the parts 10 substantially as described.

In testimony whereof I have hereunto set my hand in the presence of the two subscribing witnesses.

JACQUES WERTHEIMER.

Witnesses:

LOUIS SULLIGER,
EDWARD P. MACLEAN.