

No. 777,867.

PATENTED DEC. 20, 1904.

E. THOMSON.
PHOTOMETRIC APPARATUS.
APPLICATION FILED JULY 31, 1901.

NO MODEL.

3 SHEETS—SHEET 1

Fig. 1.

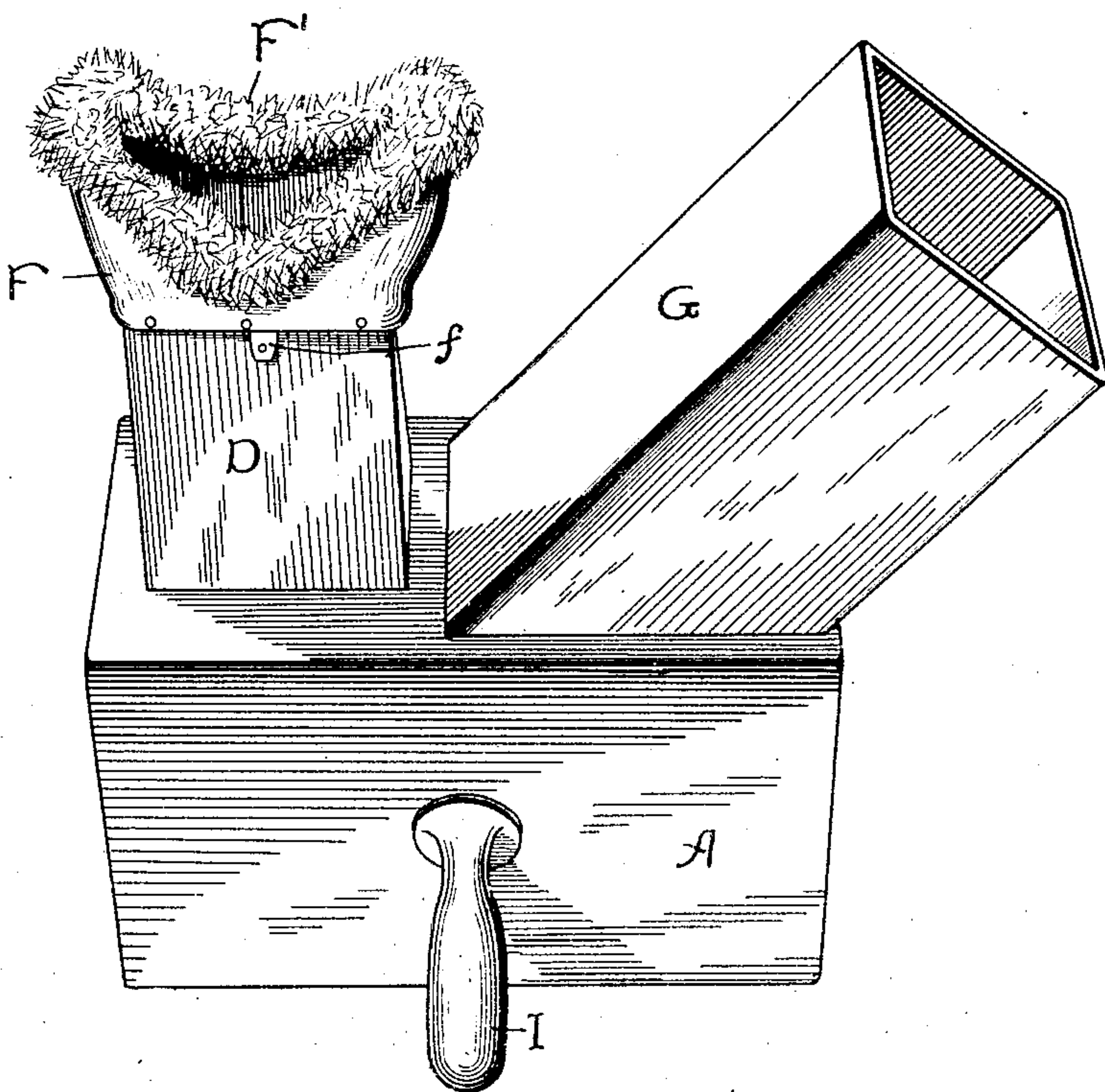
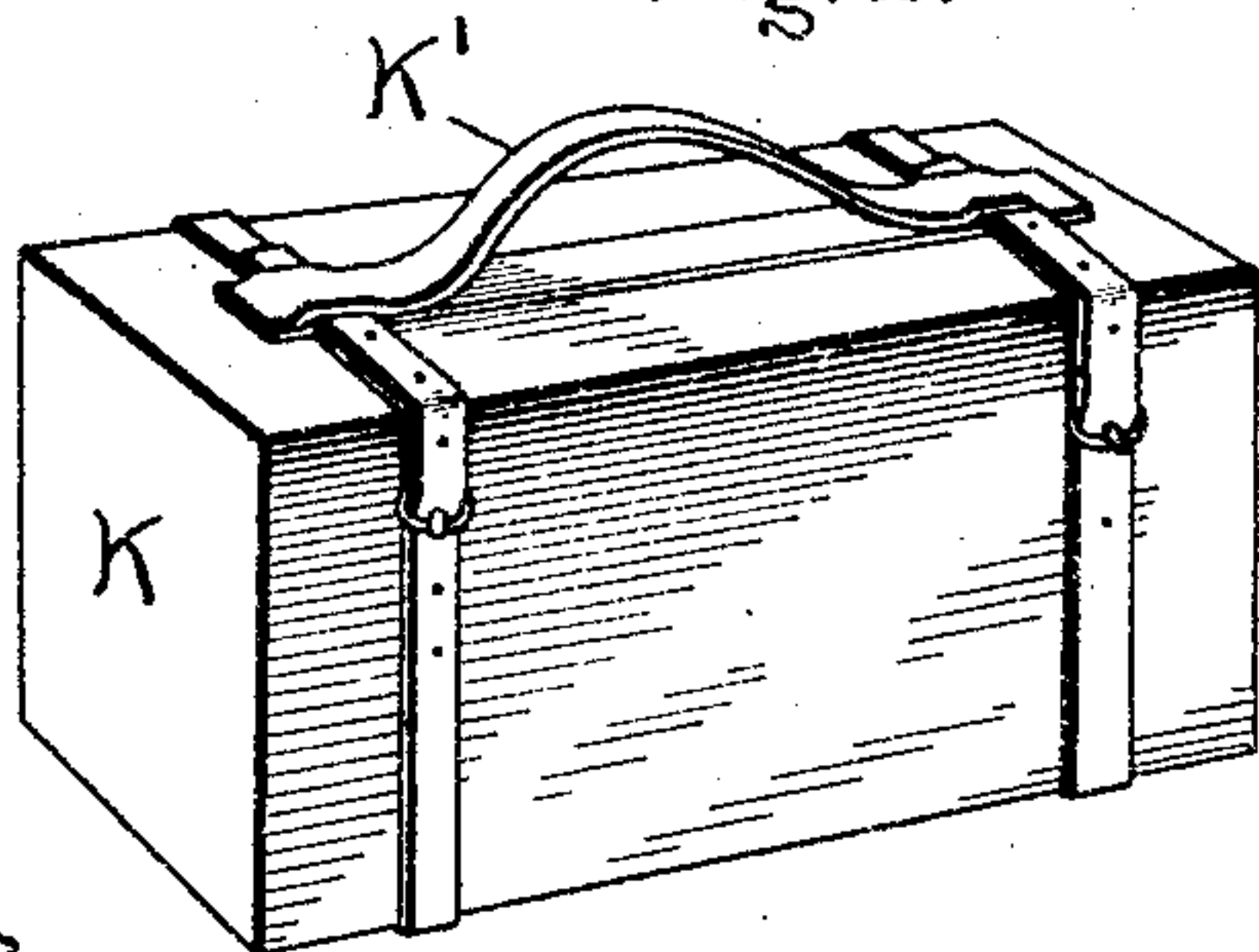


Fig. 2.



Witnesses.

B. B. Hill
Mabel H. Emerson

Inventor.

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by *Alb. B. Davis*
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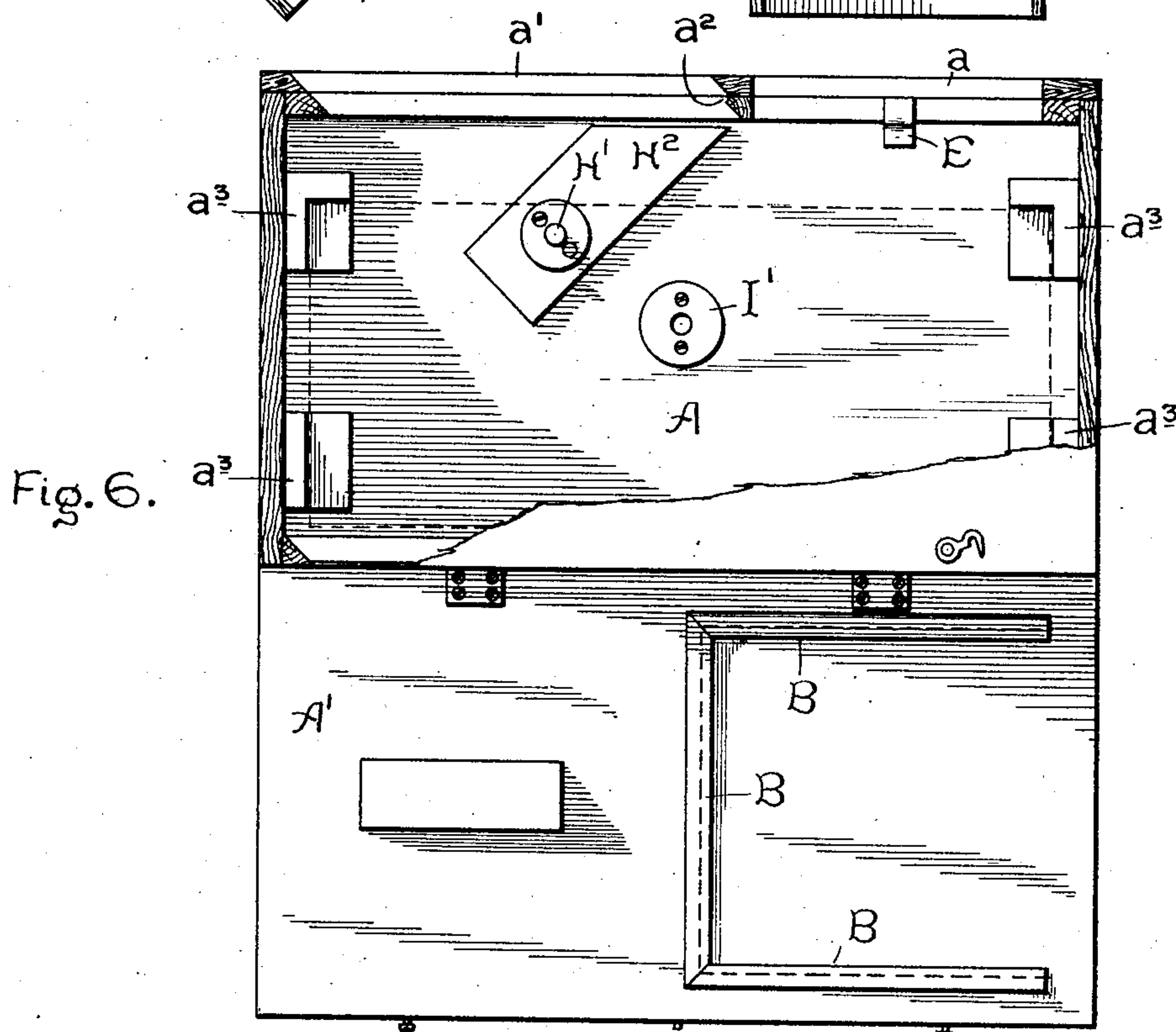
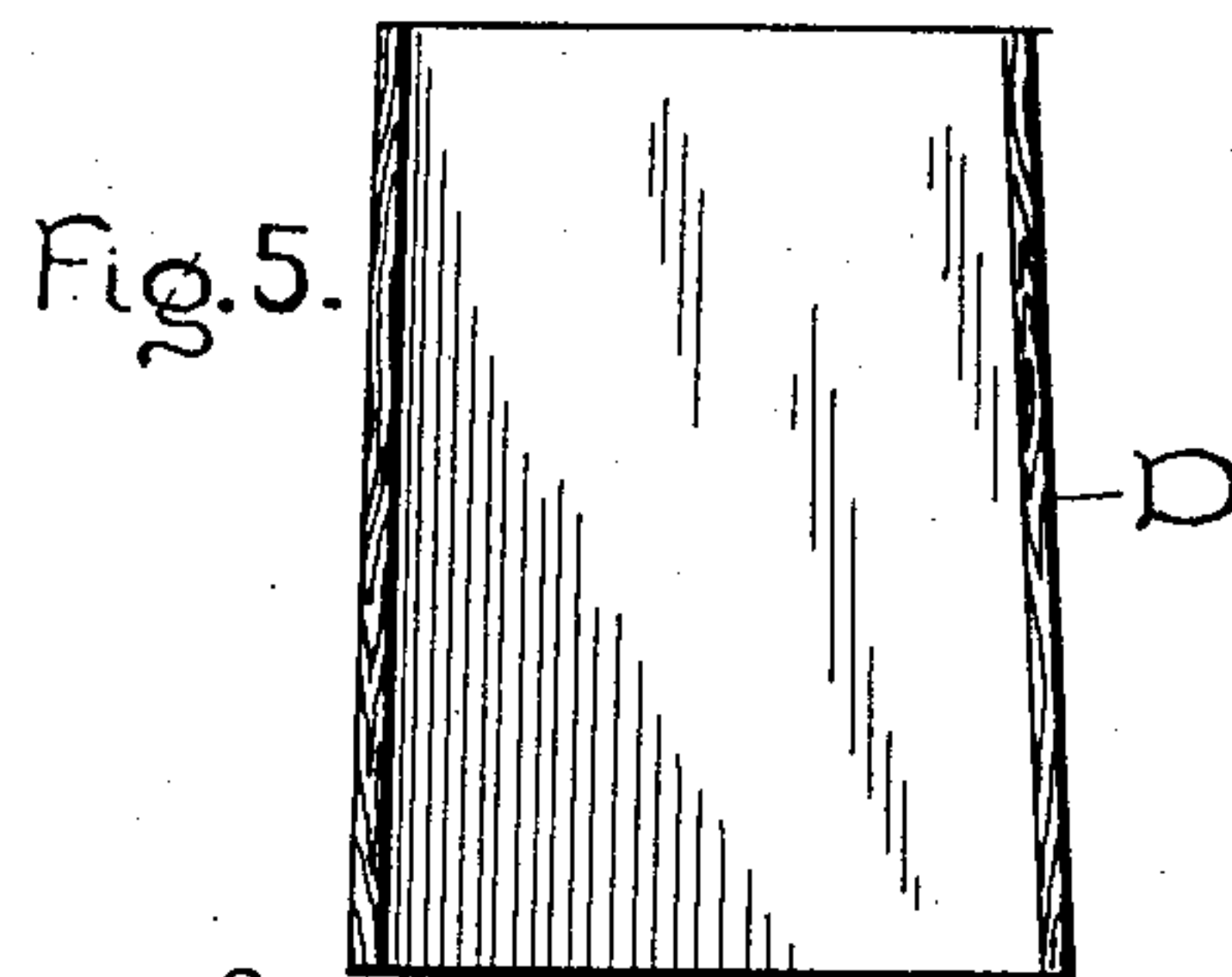
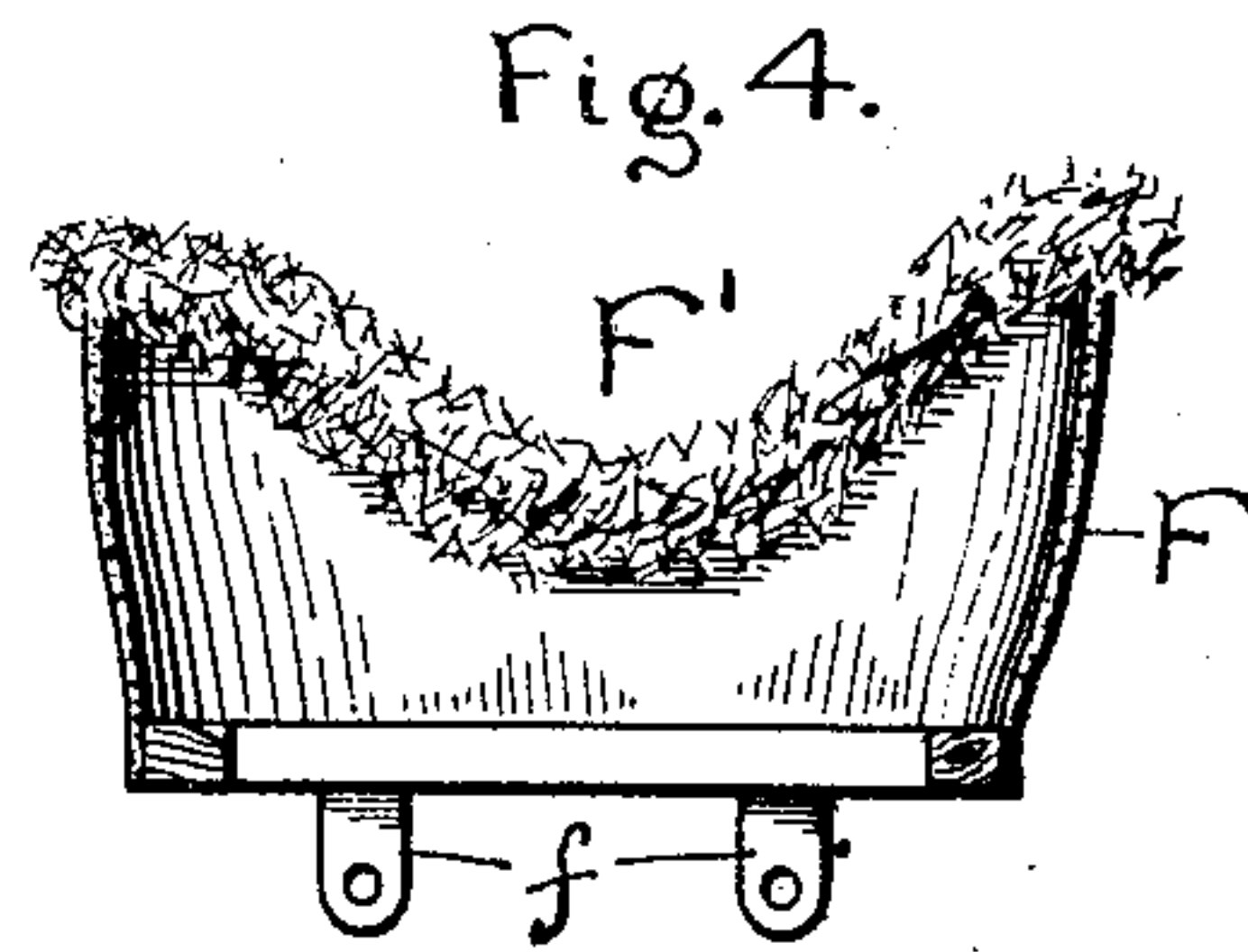
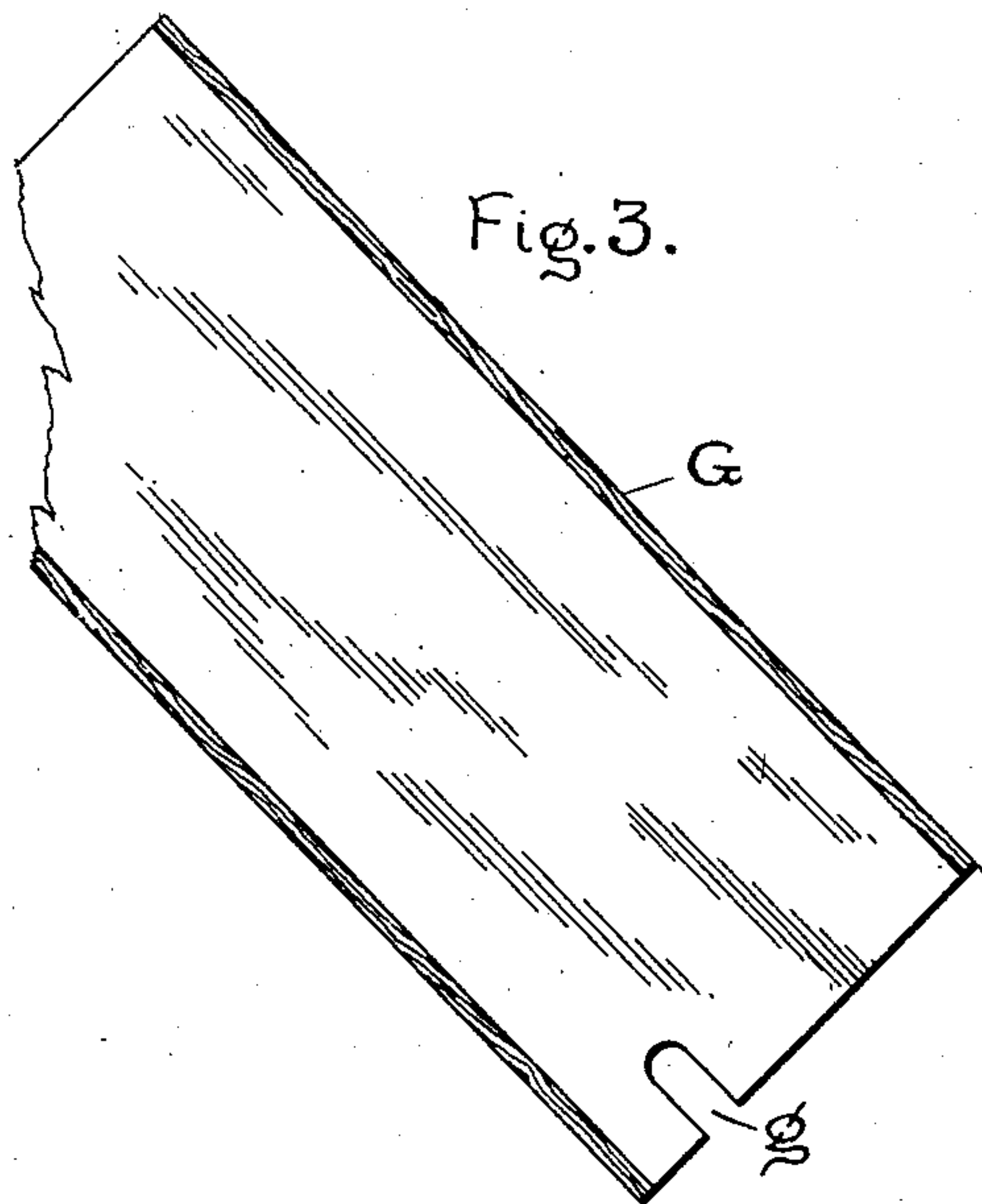
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3 SHEETS—SHEET 2.



Witnesses.

Benjamin B. Hill,
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NO MODEL.

3 SHEETS—SHEET 3.

Fig. 7.

1	Men	-----
2	Further	-----
3	Year	-----
4	Good	-----
5	Textile	-----
6	Operative	-----
7	There are	-----
8	Earnings	-----

Fig. 8.

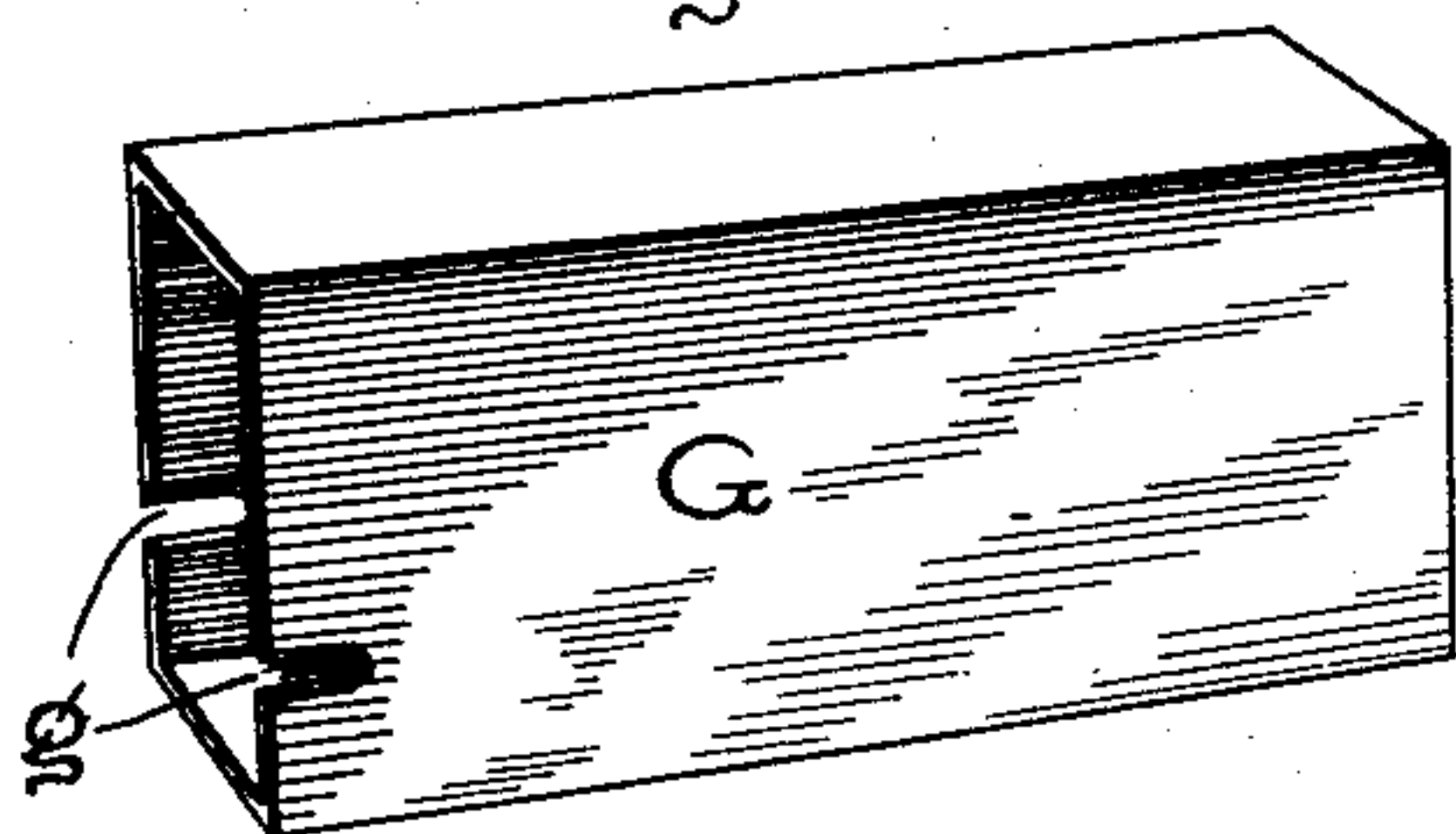


Fig. 9.

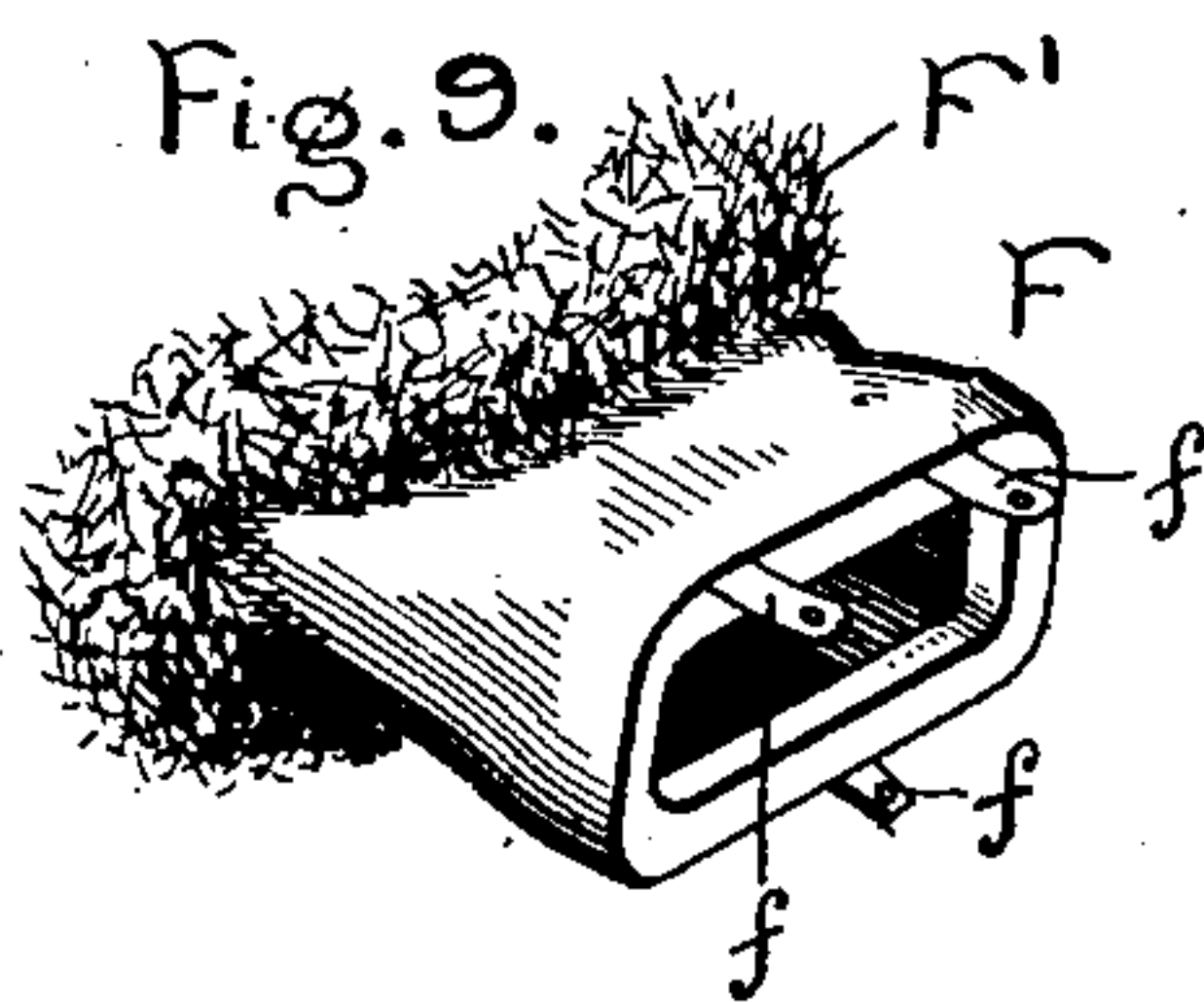


Fig. 11.

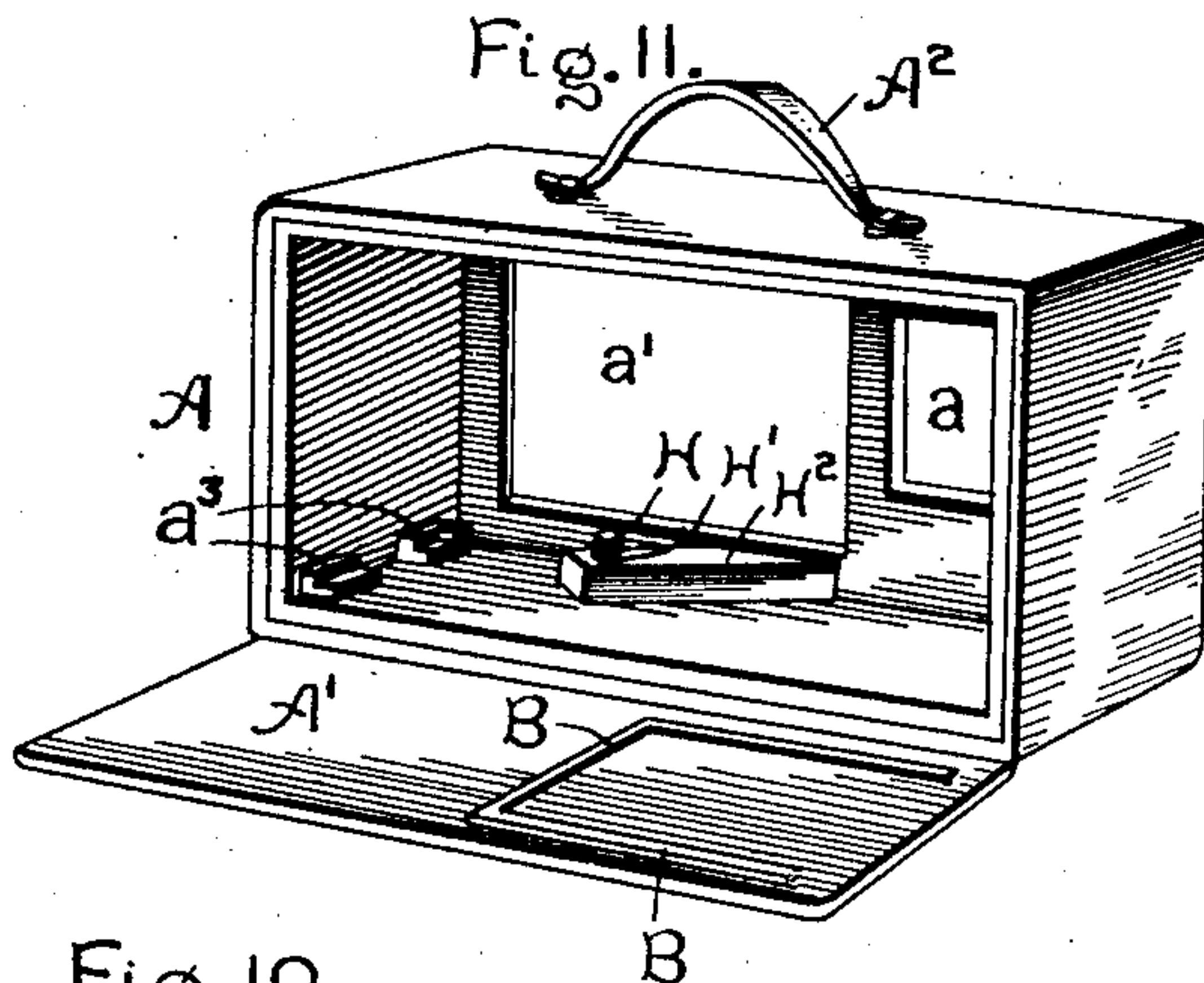
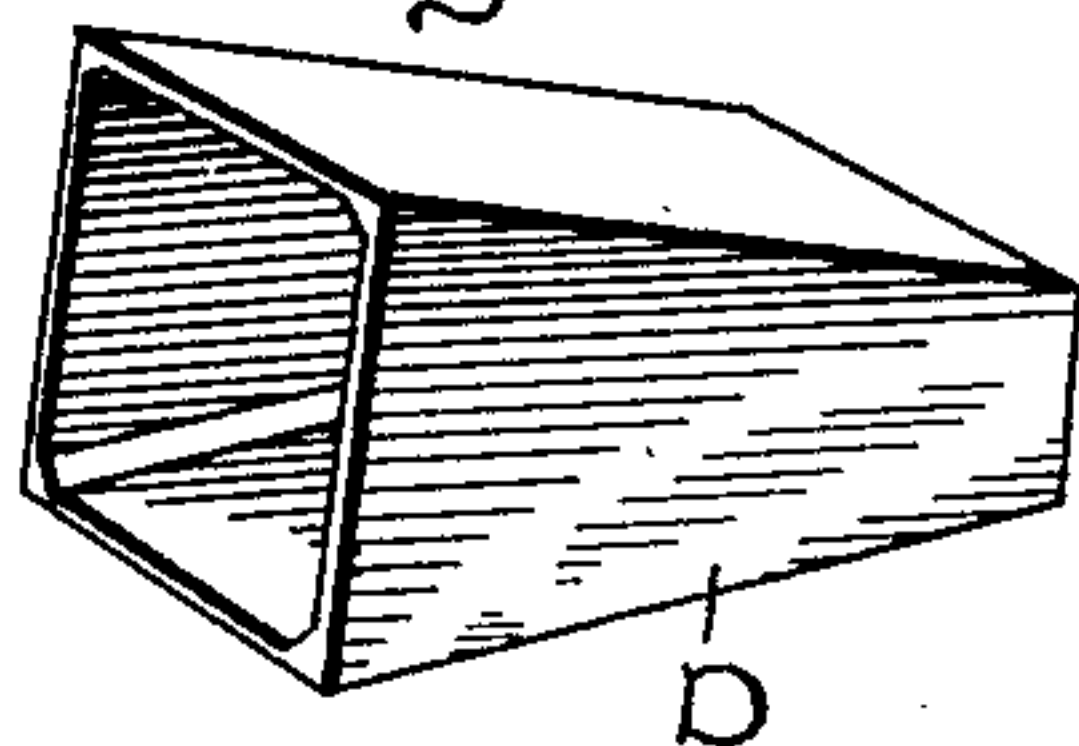


Fig. 10.



Witnesses.

Benjamin B. Hill,
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UNITED STATES PATENT OFFICE.

ELIHU THOMSON, OF SWAMPSCOTT, MASSACHUSETTS, ASSIGNOR TO
GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

PHOTOMETRIC APPARATUS.

SPECIFICATION forming part of Letters Patent No. 777,867, dated December 20, 1904.

Application filed July 31, 1901. Serial No. 70,351.

To all whom it may concern:

Be it known that I, ELIHU THOMSON, a citizen of the United States, residing at Swampscott, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Photometric Apparatus, of which the following is a specification.

This invention relates to optical devices for comparing the intensities of light emitted from different sources. Its object is to enable such comparison to be made at any desired place, and to this end the apparatus embodying my invention is so constructed as to be light and portable. For easy transportation it is preferably made to knock down into a compact and convenient shape.

The apparatus consists of a light-proof box in which is placed some object to be observed, preferably a card bearing several rows of printed matter, each row printed in type of a size different from the other rows. The box is provided with a light-tube through which the light to be tested is permitted to shine upon the card or other object. The box also has an observing-tube through which the observer can look at the card. By noting which size of type is legible at a given distance, first from one light and then from another, he can readily determine which light has the greater intensity. The instrument is of especial value in rating electric lamps.

In the accompanying drawings, Figure 1 is perspective view of the apparatus ready for use. Fig. 2 is a similar view showing it knocked down and packed for transportation. Fig. 3 is a longitudinal section of the light-tube. Fig. 4 is a similar section of the screen for the observing-tube. Fig. 5 is a similar section of the observing-tube. Fig. 6 is a similar section of the box with the lid thereof open. Fig. 7 shows a testing-card. Fig. 8 is a perspective view of the light-tube. Fig. 9 is a similar view of the screen. Fig. 10 is a similar view of the observing-tube. Fig. 11 is a similar view of the box.

The box A can be opened on one side, being preferably provided with a hinged lid A' for this purpose. At a suitable point inside the box and preferably on the inside of the hinged

lid is a device for holding the object to be observed, preferably a clamp for a printed card composed, for example, of two or three undercut strips B, forming a rectangular frame open on one side, so that the card C can be easily slid into the frame and removed therefrom. In the side of the box opposite the frame B is a hole *a*, into which fits one end of the observing-tube D, which preferably tapers slightly, so that when thrust outward through said hole the lower end will make a tight joint therein. Suitable fastenings on the box, such as spring-catches E, hold the observing-tube in place. The outer end of this tube is surrounded by a screen F, preferably detachable and secured by spring-catches *f* or the like and having its edge guarded by a fringe F' of felt or fur or some other soft substance. This edge of the screen is shaped to fit snugly against the face of the observer around his eyes. The light-tube G is inserted in a hole *a'* in one side of the box, preferably near the observing-tube, as shown. For convenience the light-tube may be oblique to the side of the box, one edge resting against a shoulder *a''*. The end of the tube extends into the box and is there detachably secured, as by clamping-nuts H, meshing with screw-studs H', projecting from blocks H², secured to the inside of the box and received in longitudinal slots *g* in the end of the tube G. The axial line of the light-tube intersects the axial line of the observing-tube at the frame B when the lid is closed, so that the light entering through the tube will fall directly on the card C and render it legible to the observer. The light-tube is preferably of uniform cross-section and long enough to effectually screen out substantially all rays of light other than those radiating from the lamp under observation. The box is preferably provided with convenient means for holding it, such as a handle I, having a screw-threaded shank engaging with a nut I', secured in one side of the box.

The mode of using the apparatus is as follows: Place a card in the frame and close the lid. Select a given size of type and go to a point so far distant from the lamp that this type cannot be read. Direct the light-tube toward

the lamp and press the screen close to the face so as to cut out all extraneous light. Wait a few seconds until the eyes adjust themselves to the light in the box and then walk slowly backward, stopping at short intervals until a point is reached at which the selected type can be read. Note the distance from the lamp, and then repeat this operation for the other light or lights being compared. By squaring the distances the relative value of the lights will be ascertained. In order to avoid any error due to familiarity with the reading matter on the card, a number of cards may be used having the same sizes of type corresponding with the several numbers, but with different reading matter, so that when changing from one lamp to another a different card may be used for each. A less accurate test can be made by taking a position midway between two lamps and noting the size of the type which can be read first by the light from one lamp and then by that from the other, taking care to make the reading when the arc (if arc-lamps are being tested) is on the observing side.

Other modes of using this instrument will suggest themselves to those skilled in the art.

In order to prevent any alteration in the integrity of the surface of the test-cards, they may be made of some absolutely permanent material, such as porcelain, which will not darken with age or retain dust.

When the device is to be knocked down, the nuts H are removed and the light-tube pulled out. The spring-catches *f* are released, allowing the screen to be taken off the observing-tube, which is then pushed into the box on pressing back the spring-catches E. The observing-tube, screen, handle, and nuts are then placed inside the light-tube, which is then slid into the box, resting on blocks *a*³, which may be covered with felt and retain the tube in place, as indicated by dotted line in Fig. 6. The lid is then closed, and the box may be carried by a handle A², secured to it, as shown in Fig. 11, or in a casing K with straps and bands K', as shown in Fig. 2.

I am aware of the patent to Houston and Kennelly, No. 552,371, December 31, 1895; but my invention differs from theirs in that it does not have any translucent plate for diffusing the light or any focusing-eyepiece, and does have a light-tube for screening out all rays of light save those emitted by the lamp to be tested. In the claims herewith annexed I have included these novel features in order to properly differentiate my invention from that of the patent aforesaid.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A portable photometric apparatus, consisting of a light-tight box provided with a light-tube, an observing-tube, and an object to be observed located in said box at the intersection of the axes of said tubes.

2. A portable photometric apparatus, consisting of a light-tight box provided with a light-tube, an observing-tube, and means within the box at the intersection of the axes of said tubes for removably holding an object to be observed.

3. A portable photometric apparatus, consisting of a light-tight box provided with a light-tube of uniform cross-section, an observing-tube, and means for removably holding a printed card at the intersection of the axial lines of the two tubes.

4. A portable photometric apparatus, consisting of a light-tight box provided on its inside with means for holding a printed card or the like, and an observing-tube and a light-tube both entering the same side of said box.

5. A portable photometric apparatus, consisting of a light-tight box provided with a lid having on its inner surface means for holding a card, and an observing-tube and a light-tube entering the side of the box opposite the lid.

6. A portable photometric apparatus, consisting of a light-tight box having a hinged lid carrying on its inner surface undercut strips, and an observing-tube and a light-tube entering the side of the box opposite the lid.

7. The combination with a box having a hole in one side, of a light-tube projecting through said hole into the box and detachably secured therein, and an observing-tube whose axial line intersects that of the light-tube within the box.

8. The combination with a box having a hole in one side, of clamping-screws adjacent to said hole, a light-tube having slots in one end to engage with said screws when the tube is inserted through said hole, and an observing-tube whose axial line intersects that of the light-tube within the box.

9. A portable photometric apparatus, comprising a box, an observing-tube, and a light-tube; said tubes being detachable and adapted to pack one within the other and inside of said box.

In witness whereof I have hereunto set my hand this 29th day of July, 1901.

ELIHU THOMSON.

Witnesses:

DUGALD McK. McKILLOP,
JOHN J. WALKER.