

No. 675,767.

G. BUCHBERGER.
DRAFTING APPARATUS.

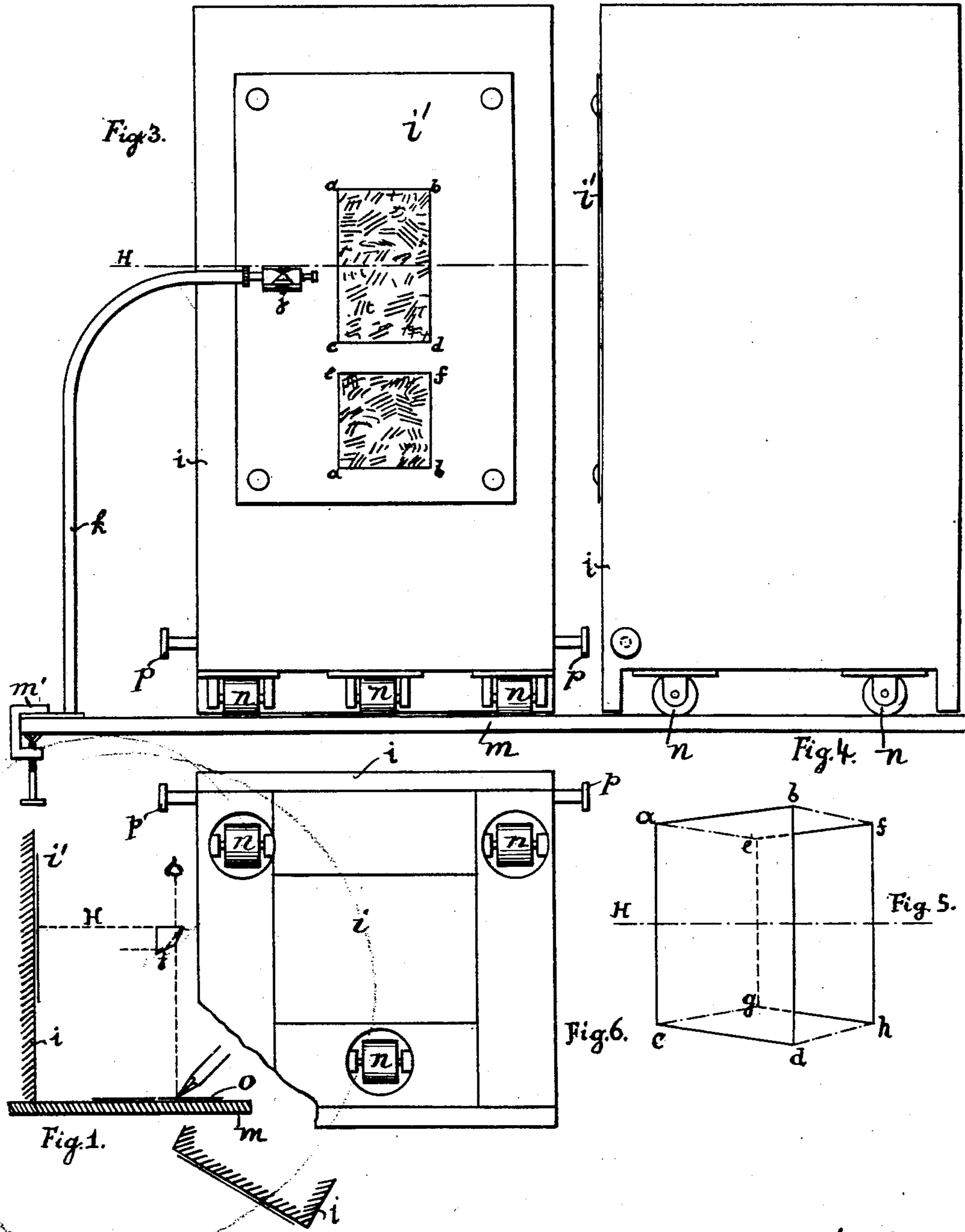
Patented June 4, 1901.

(No Model.)

(Application filed Feb. 14, 1901.)

2 Sheets—Sheet 1.

T-350/17-
350/32



Witnesses:
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Arthur H. [illegible]

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2 Sheets—Sheet 2.

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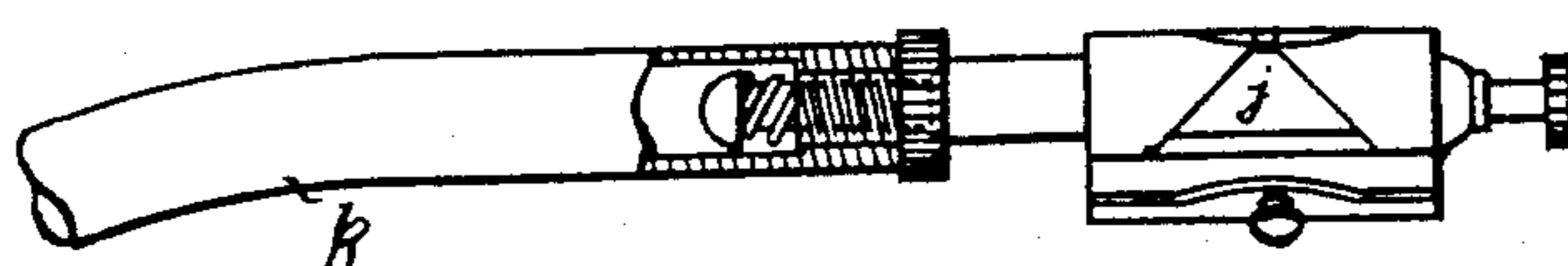


Fig. 7.

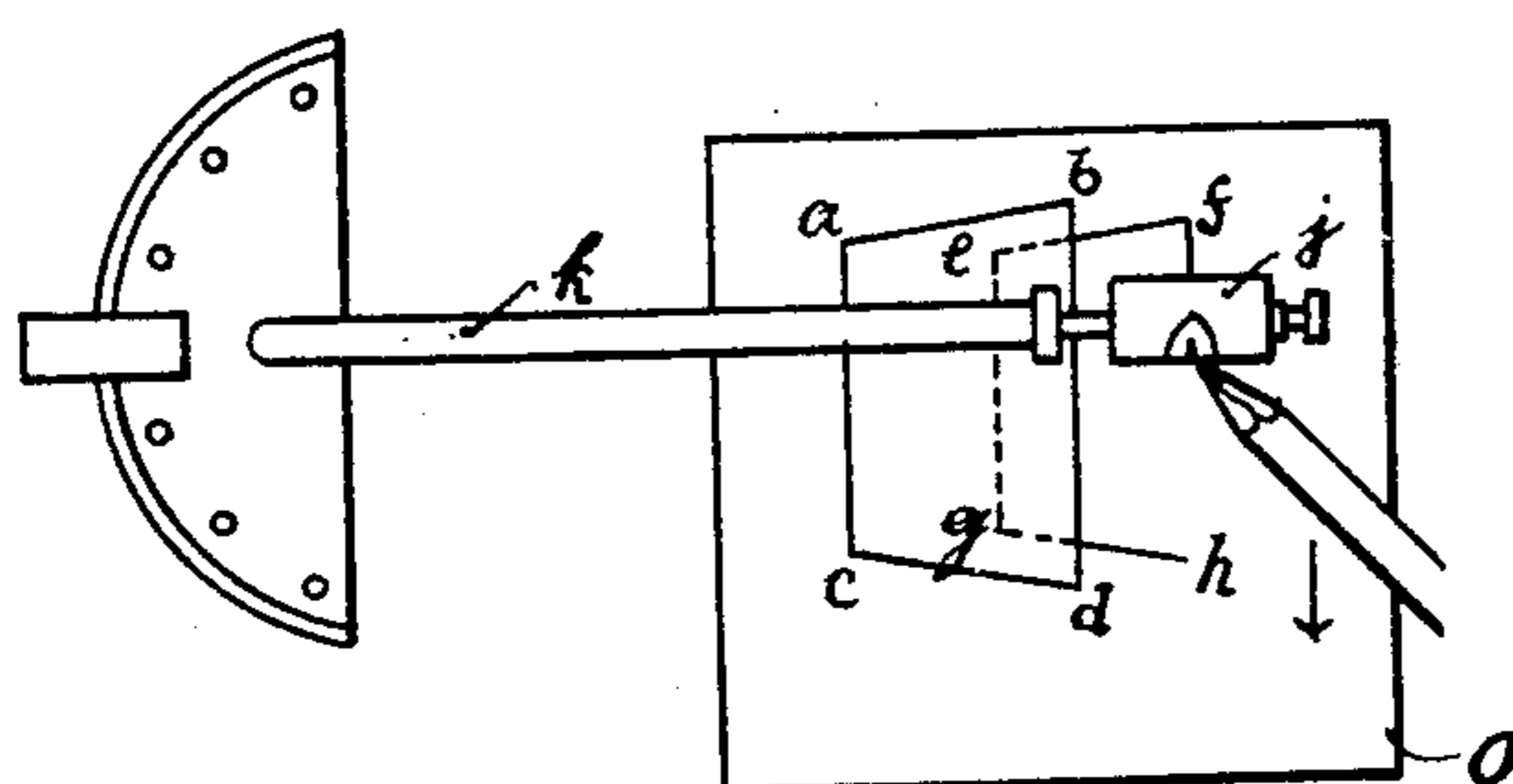
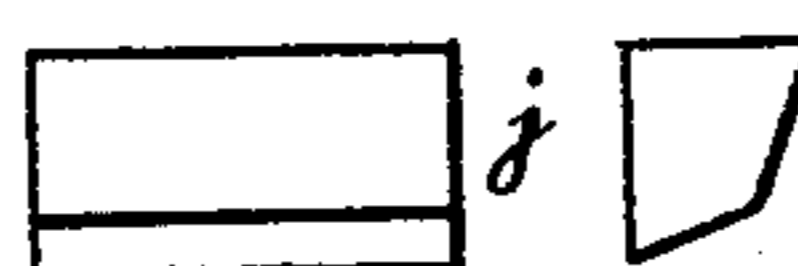


Fig. 2.

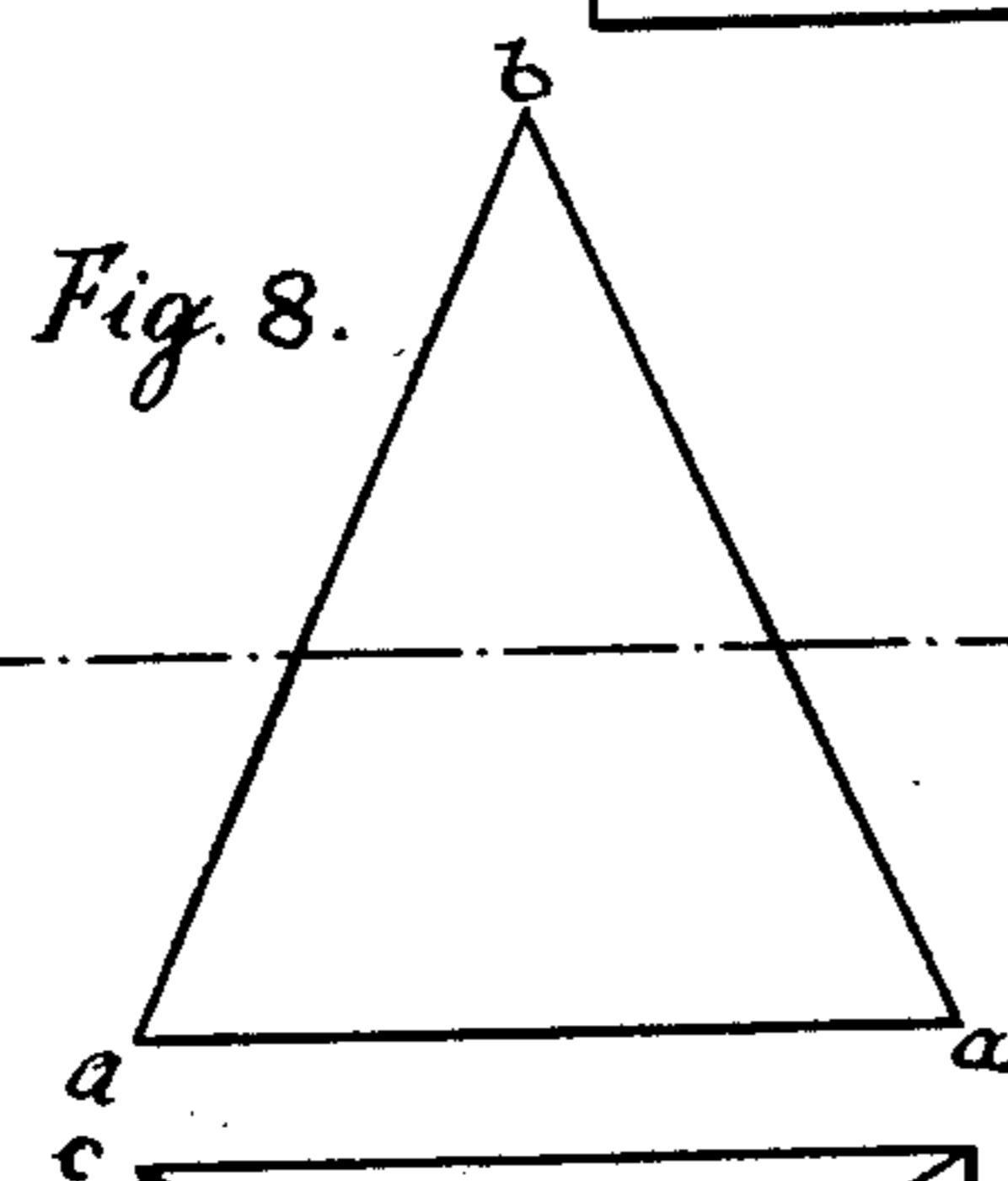


Fig. 8.

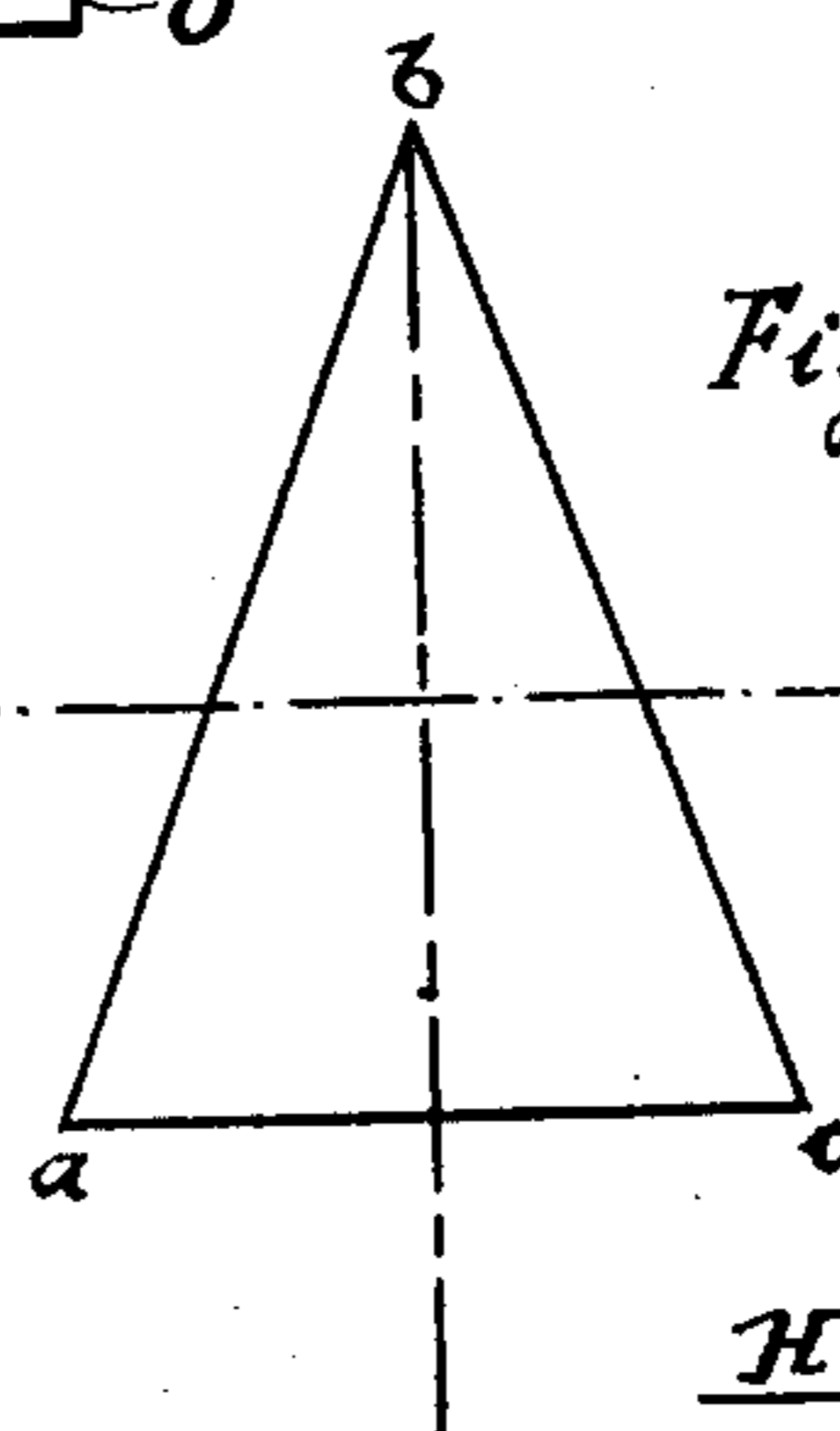


Fig. 9.

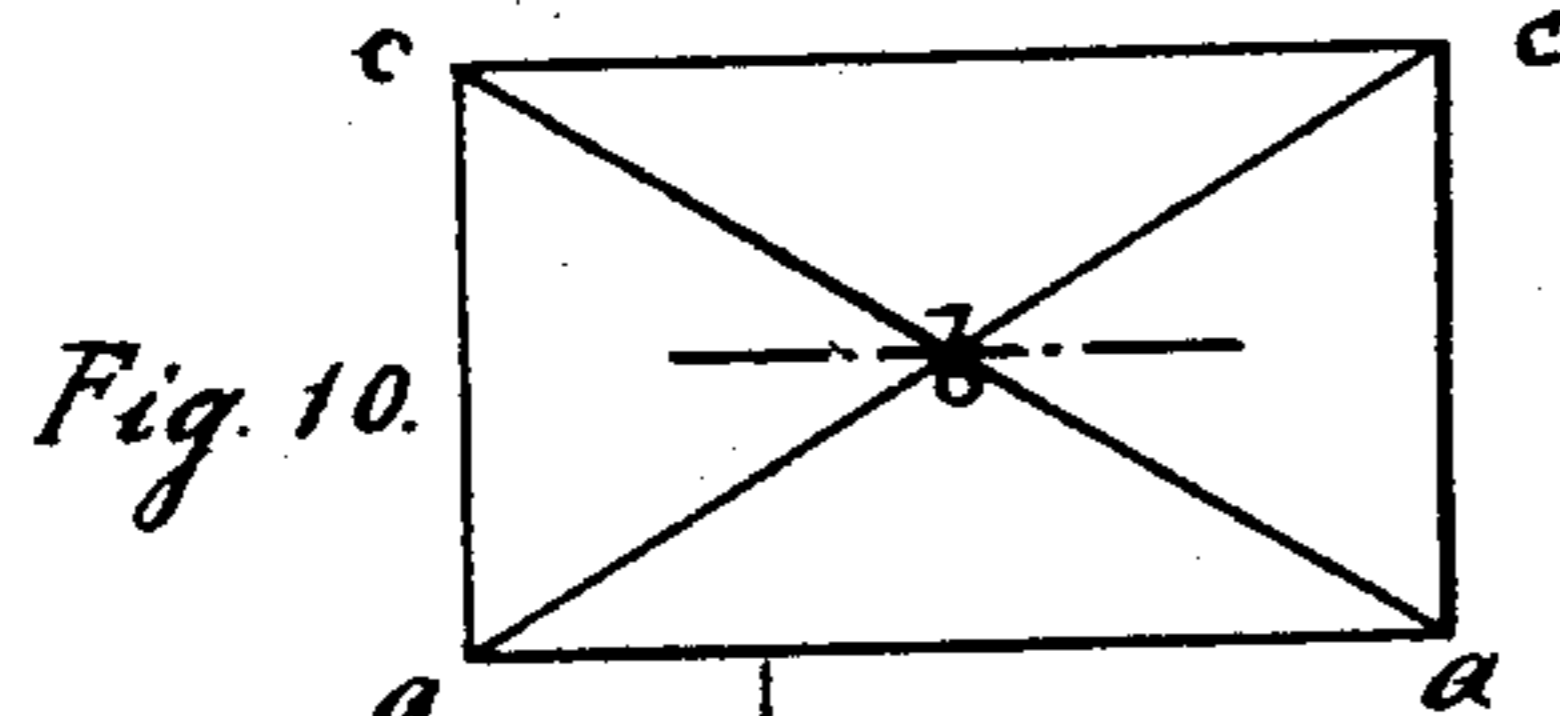


Fig. 10.

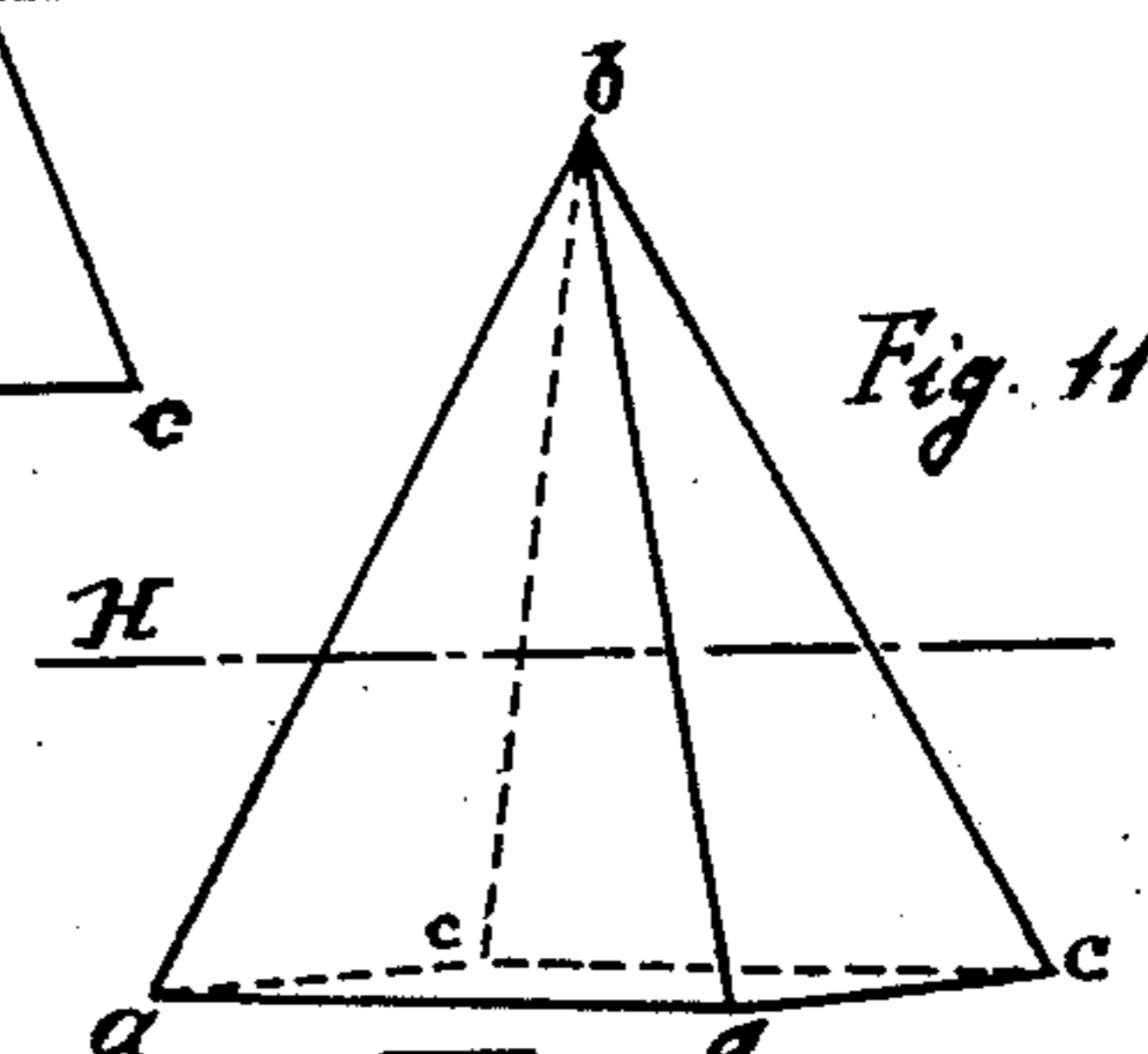


Fig. 11.

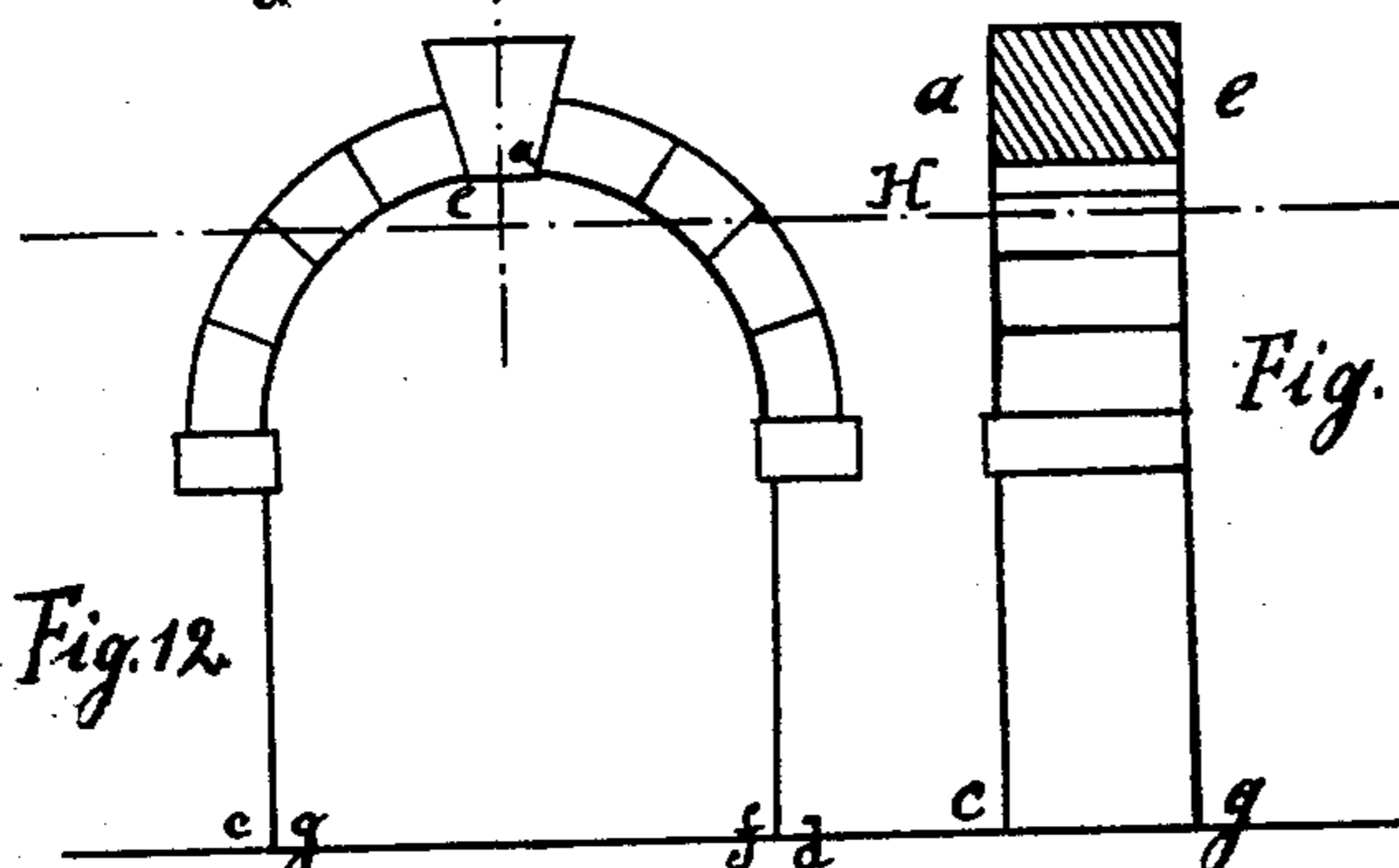


Fig. 12.

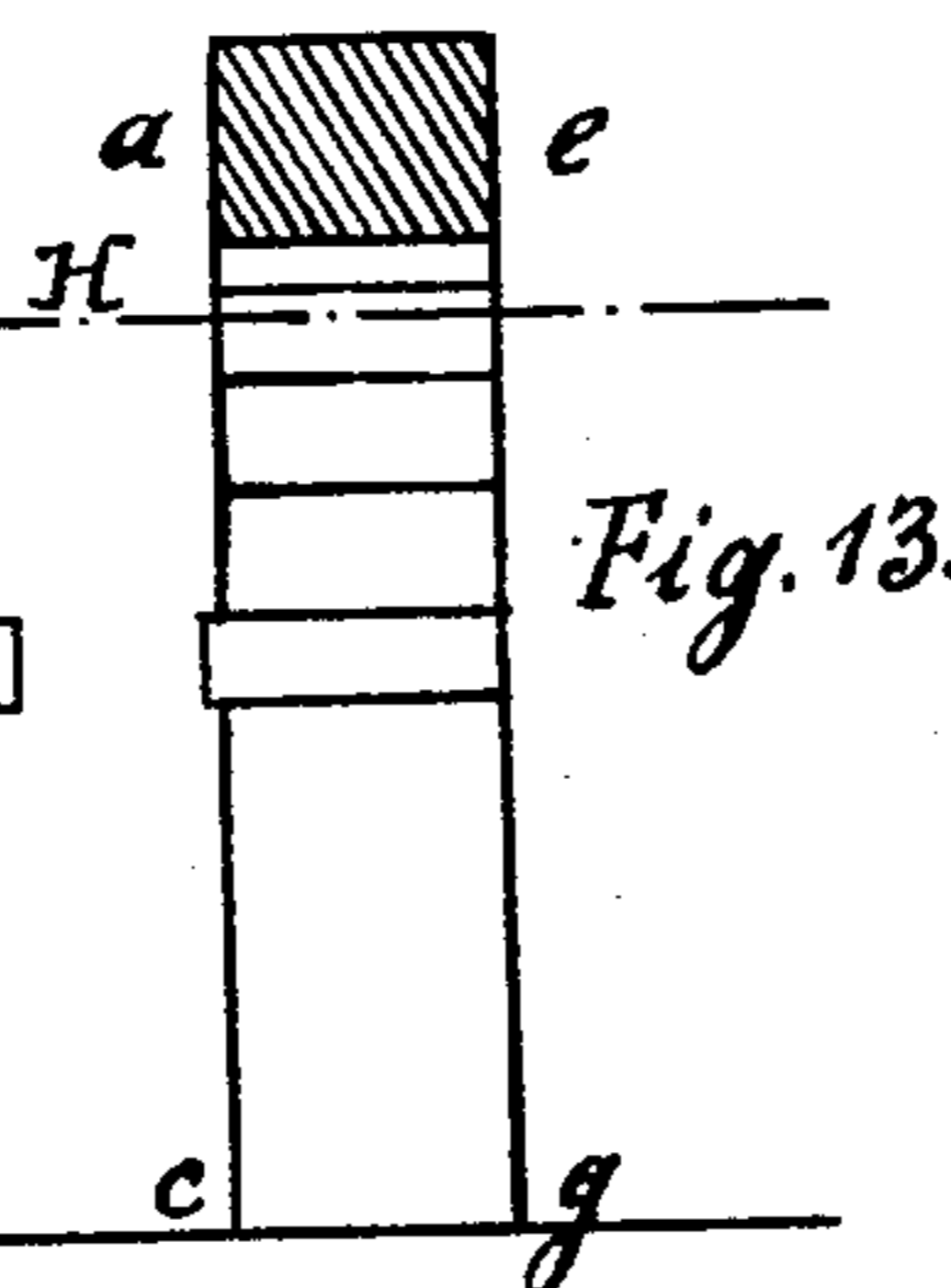


Fig. 13.

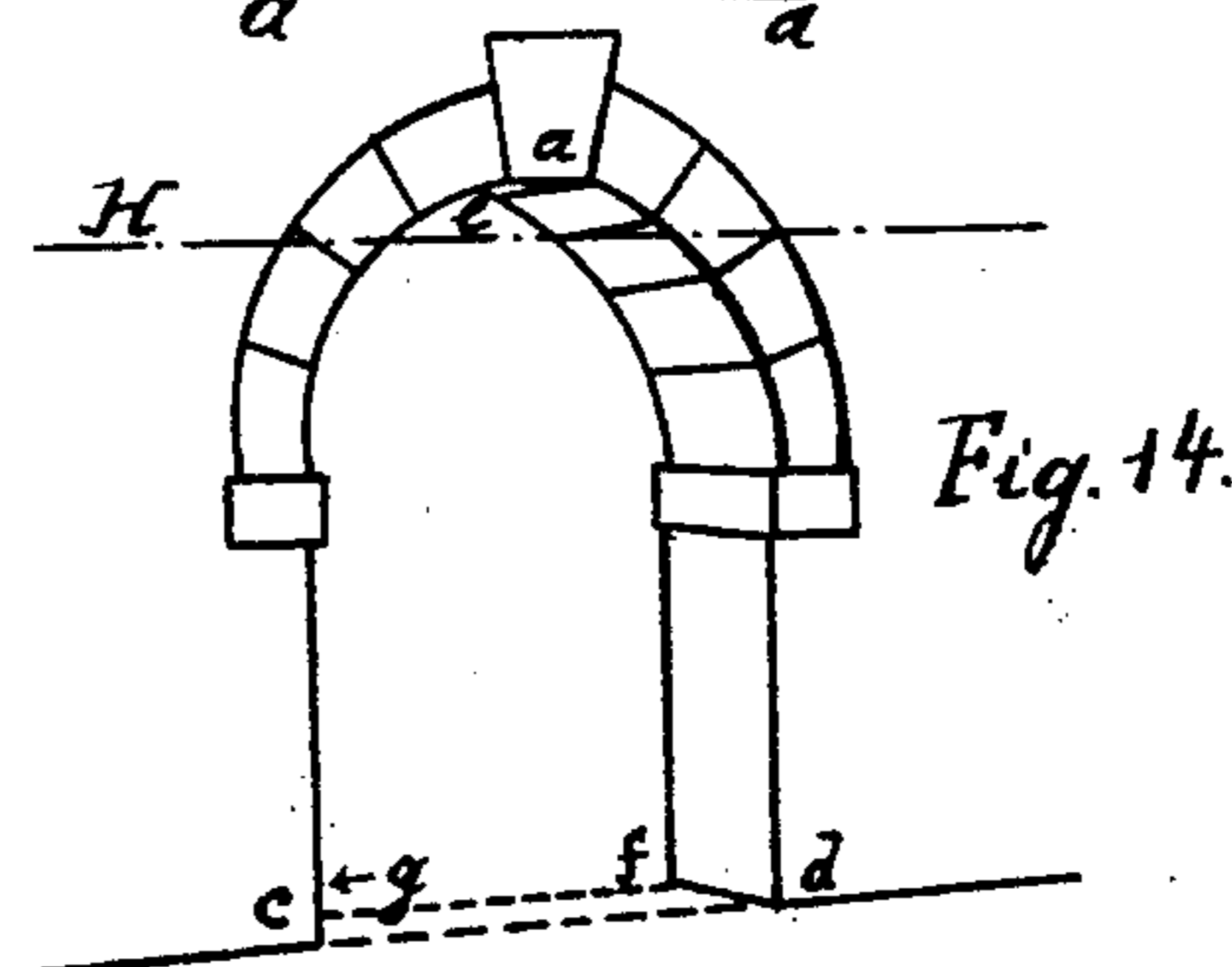


Fig. 14.

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UNITED STATES PATENT OFFICE.

GEORG BUCHBERGER, OF LANDSHUT, GERMANY.

DRAFTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 675,767, dated June 4, 1901.

Application filed February 14, 1901. Serial No. 47,320. (No model.)

To all whom it may concern:

Be it known that I, GEORG BUCHBERGER, a citizen of Germany, residing at Landshut, in the Empire of Germany, have invented certain new and useful Improvements in Drafting Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to apparatus for making drawings in perspective; and its object is particularly to enable such drawings to be made from orthogonal projections with the aid of a camera lucida.

An apparatus embodying my invention will enable the draftsman to convert geometrical views or projections of buildings, furniture, machines, &c., into perspective without any previous knowledge of the theory of perspective and in a purely mechanical way.

As in the usual process of making perspective views, the practice of my invention requires the existence of two orthogonal projections or views of the object to be drawn in perspective. Of these one view is an elevation, while the other view will give the depth proportions. These measurements of depth may be given by means of a side elevation, a section, or a plan view. To carry out the conversion into a perspective view, a camera lucida is employed.

In order to describe my invention in such full, clear, and exact terms as will enable those skilled in the art to practice the same, I will now give a detailed description thereof, reference being had to the accompanying drawings, in which—

Figure 1 represents a diagrammatic view, in vertical section, of apparatus embodying my invention; Fig. 2, a plan view of the same; Figs. 3, 4, and 6, a front elevation, side elevation, and bottom plan view of an apparatus shown more in detail and embodying the said invention; Fig. 7, detail views of the camera lucida employed; Figs. 5 and 8 to 14, inclusive, views illustrating the drafting-work performed by the apparatus involving my invention.

It will be noted that the apparatus involv-

ing my invention consists of a vertical support *i*, upon which the geometrical views of the object to be shown in perspective are mounted. (See Figs. 1, 3, and 4.) The sheet upon which such views (*a b d c* and *a b f e*, Fig. 3) are made is represented in the drawings by the reference-letter *i'*. This vertical support *i*, as shown in the drawings, Figs. 3 and 4, is adapted to be slid back and forth in all directions upon the work-table *m*, preferably by being provided at its bottom with casters or rollers *n*. At a proper point in front of this vertical support is mounted a camera lucida *j*, which is carried by an arm *k*, secured to the work-table by any suitable means, such as a clamp *m'*. The camera lucida in the present instance comprises a prism *j*, Fig. 7, (which is shown in bottom plan and section, respectively, at the lower part of said figure,) held in a suitable casing *J*, which consists of a prismatic box whose cross-section corresponds to that of the prism *j* in order that the latter may fit snugly in its casing. That side of the casing which is intended to be presented toward the object whose perspective view is to be drawn is fenestrated for the admission of light-rays to the prism, and this fenestrated side is made removable and is secured in place by means of a lip *j'*, which is flanged upward onto the face of the adjacent lower side of the casing, through which lip passes a screw *j²*, threaded into the said lower side of the casing. The upper side of the casing is provided with a slit, as indicated at *j³*, to which the draftsman may apply his eye in using the apparatus. That side of the prism-casing which is opposite the upper part of the fenestrated side is cut away substantially in the form of a triangle whose apex joins the slit *j³*, as shown at *j⁴*.

In the use of the device the light-rays from the object whose perspective is to be drawn pass through the opening in the fenestrated side of the casing and then are refracted upward through the slit *j³* to the eye of the draftsman, who thereby apparently sees the outlines of said object upon the drawing-surface. Furthermore, the point of the pencil which is being moved over the drafting-surface in order to trace the picture can be seen

by the eye of the draftsman, the light-rays from said pencil coming upward through the triangular opening j^4 and through the slit j^3 .

The prism-casing J is fixed to a stud K, which has its end reduced in diameter and passed through a bushing K', the reduced end of the stud being extended beyond the said bushing and surrounded by a spring k' , which bears against the end of the bushing and against the head of a screw k^2 , threaded into the end of the stud. The bushing K' is screw-threaded onto the tubular standard or support k and is provided with a milled head k^3 for convenience in removing the camera lucida from the support k . The outer end of the camera lucida may conveniently be provided with a stem k^5 , having a milled head, whereby the camera lucida may be rotated about its axis, as may be necessary to bring the image to its proper position on the drafting-surface.

To prepare a perspective view with the aid of this apparatus, the vertical drawing-support i is placed in the proper position with respect to the camera lucida j , and its front surface, which carries the drawing i' , is inclined or placed obliquely with reference to the camera at a greater or less angle, according as the article to be designed in perspective is to be viewed more from the side or more from the front. The sheet of paper or other material o upon which the perspective is to be produced is attached or mounted on the work-table m below the camera in any desired or usual way. When the draftsman now looks toward the drawing-paper through the camera, the reflected image of the elevation $a b d c$, Fig. 3, will appear upon the drawing-surface as indicated at $a b d c$ in Fig. 2—that is to say, in distorted form, so that the lines $a b$ and $c d$, which are parallel in the elevation, appear to converge in the image. This image is now traced on the paper or drawing-surface o , and all the lines and points belonging to the surface are similarly traced with a pencil, crayon, or the like, as indicated in Figs. 1 and 2. Thereafter in order to obtain the proper image in perspective of all those points, lines, or surfaces which according to the plan are either in advance of or behind the surface $a b c d$ just traced the vertical drawing-support i is properly adjusted so that the lines on the orthogonal projection which it supports and which it is desired to trace upon the drawing-surface will be seen in their proper positions upon said drawing-surface relative to the lines already drawn thereon. The reflected image of these lines, &c., appears on the drawing-surface o when looking through the camera and will then appear reduced or foreshortened with relation to the image of the surface first drawn. Thus as indicated in Fig. 2 the image $e f g h$ appears foreshortened with relation to the image $a b d c$ by the distance $a e$, (see the plan view $a b f e$

on the vertical support i in Fig. 3,) by which the drawing-support i has been adjusted backward upon the plan view. This reflected image is now also traced with a pencil or stilus, as shown at $e f g h$, Fig. 5. If now the various outlines of the reflected images upon the drawing-surface are suitably connected by lines, as indicated in dot-and-dash lines $a e$, $b f$, $c g$, and $d h$ in Fig. 5, (which shows the perspective view of the rectangular prismatic stone represented by elevation and plan on the vertical support, Fig. 3,) a correct perspective view of the object which has been represented in orthogonal projections upon the vertical drawing-support will be readily obtained.

In working with this apparatus the height of the prism of the camera lucida constitutes the horizon of the perspective view to be prepared, while the distance of the vertical drawing-support i from the prism constitutes the principal distance of such perspective.

In Figs. 8 to 14 further examples illustrating the mode of operating under my invention are given.

In order to draw a perspective of the pyramid represented in front, side elevation, and plan in Figs. 8, 9, and 10, I proceed as follows: Placing the vertical drawing-support i , which carries the orthogonal views, just described, of the pyramid, obliquely before the camera, the reflected image of the base-lines $a a$ upon the drawing-surface o will appear inclined, as in Fig. 11. Having fixed or traced this line upon the paper or drawing-surface o , the vertical support i is moved backward parallel until it coincides with the vertical parallel plane passing through the apex b of the pyramid. The distance that the front of the said vertical support is moved backward may be taken either from the plan view, Fig. 10, or from the side elevation, Fig. 9. Thereupon the image of the point b reflected through the camera is fixed or penciled in on the drawing-surface or paper o . Then the points $a a$ are connected with the point b by straight lines, as indicated in Fig. 11. Then the vertical support i is again moved backward parallel to the line $c c$, which then will appear on the drawing-surface, as indicated in Fig. 11, by virtue of the its reflection through the camera j . The image-lines $c c$ are then traced on the drawing surface, and thereupon the points a and c are connected by straight lines and also the points $c c$ with the point b . This completes the perspective view of the pyramid as shown in Fig. 11.

In order to obtain the perspective view shown in Fig. 14 of a portal arch from the front elevation, Fig. 12, and transverse section, Fig. 13, I proceed in a manner analogous to that employed in preparing the perspective of the prismatic stone, Fig. 5, with the exception that the depth of the perspective view—that is, the distance that the vertical support i is moved backward—is of necessity

taken from the transverse sectional view, Fig. 13.

According as the orthogonal projections of the object are raised more or less on the vertical support *i* with respect to the horizon *h* the complete perspective will appear as taken more from above or more below.

The apparatus which is employed with the greatest advantage in carrying out my invention comprises the following parts:

First, a vertical support *i*, which is adjustable horizontally. This support, as indicated in Figs. 3, 4, and 6, is preferably in the form of a case or box *i*, supported on casters or rollers *n* and having lateral knobs or handles *p p* for the purpose of readily shifting the position of the case. The horizon is indicated by a line *H* on the vertical support, as shown in Fig. 3.

Second, a camera lucida *j*, supported on the standard *k*, as indicated in the Figs. 3 and 7, in such a manner that attaching the support to the work-table *m* by the clamp *m*, or the like the prism of the camera lucida will be in the proper horizontal position coincident with the horizon *H*.

In consequence of the fact that by means of this perspective apparatus not only single points may be determined, but an entire vertical plane with all of the points, lines, and designs upon the same all simultaneously and reflected upon the drawing-surface *o* in the correct perspective relations, and may be immediately traced upon the said drawing-surface, it is evident that a very valuable aid for preparing perspective views is afforded in all those cases where orthogonal projections or geometrical views of the same are available.

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

1. In a drafting apparatus for drawing perspective views, the combination with a work-table, of a support having a surface at right angles to the plane of the work-table and arranged to hold an orthogonal projection of the object to be drawn in perspective, said support being movable in a direction parallel to the plane of the work-table, and means

for deflecting the visual rays from the said orthogonal projection into a direction at an angle to the plane of the work-table.

2. In a drafting apparatus for drawing perspective views, the combination with a work-table having a drafting-surface, of a support having a surface at an angle to the plane of the work-table and arranged to hold an orthogonal projection of the object to be drawn in perspective, said support resting upon and arranged to move over the drafting-surface, and means for deflecting the visual rays from the said orthogonal projection, into a direction at an angle to the plane of the work-table.

3. In a drafting apparatus for drawing perspective views, the combination with a horizontal support having a drafting-surface, of a vertical support movable in all directions parallel to the horizontal support, and a camera lucida arranged above the horizontal support and opposite the vertical support.

4. In a drafting apparatus for drawing perspective views, the combination with a work-table having a drafting-surface, of a rectangular support having surfaces to receive orthogonal projections of the object to be drawn in perspective, said rectangular support being movable in all directions upon the work-table, and a camera lucida arranged above the work-table and opposite the rectangular support.

5. In a drafting apparatus for drawing perspective views, the combination with a work-table having a drafting-surface, of a rectangular support having a vertical surface to receive an orthogonal projection of the object to be drawn in perspective and provided with rollers arranged to run on the work-table, a camera lucida, and a standard arranged to support said camera lucida from the work-table and opposite the rectangular support.

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

GEORG BUCHBERGER.

Witnesses:

KARL KAMMERER,
RUDOLPH W. KIEHL.