

No. 641,500.

Patented Jan. 16, 1900.

F. B. DAVIDSON.
PAPER BOX.

(Application filed Oct. 17, 1898.)

(No Model.)

4 Sheets—Sheet 1.

Fig. 1

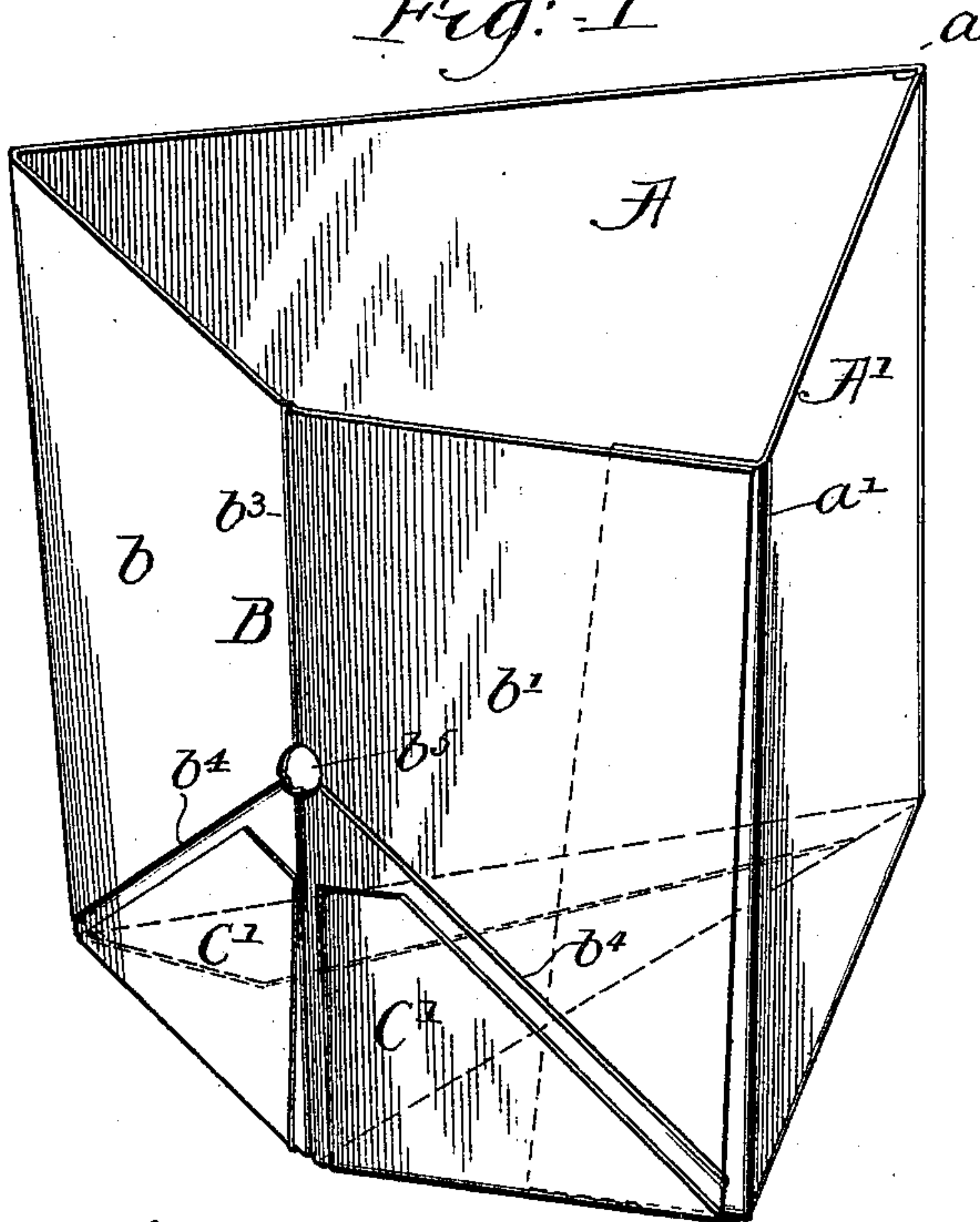


Fig. 2

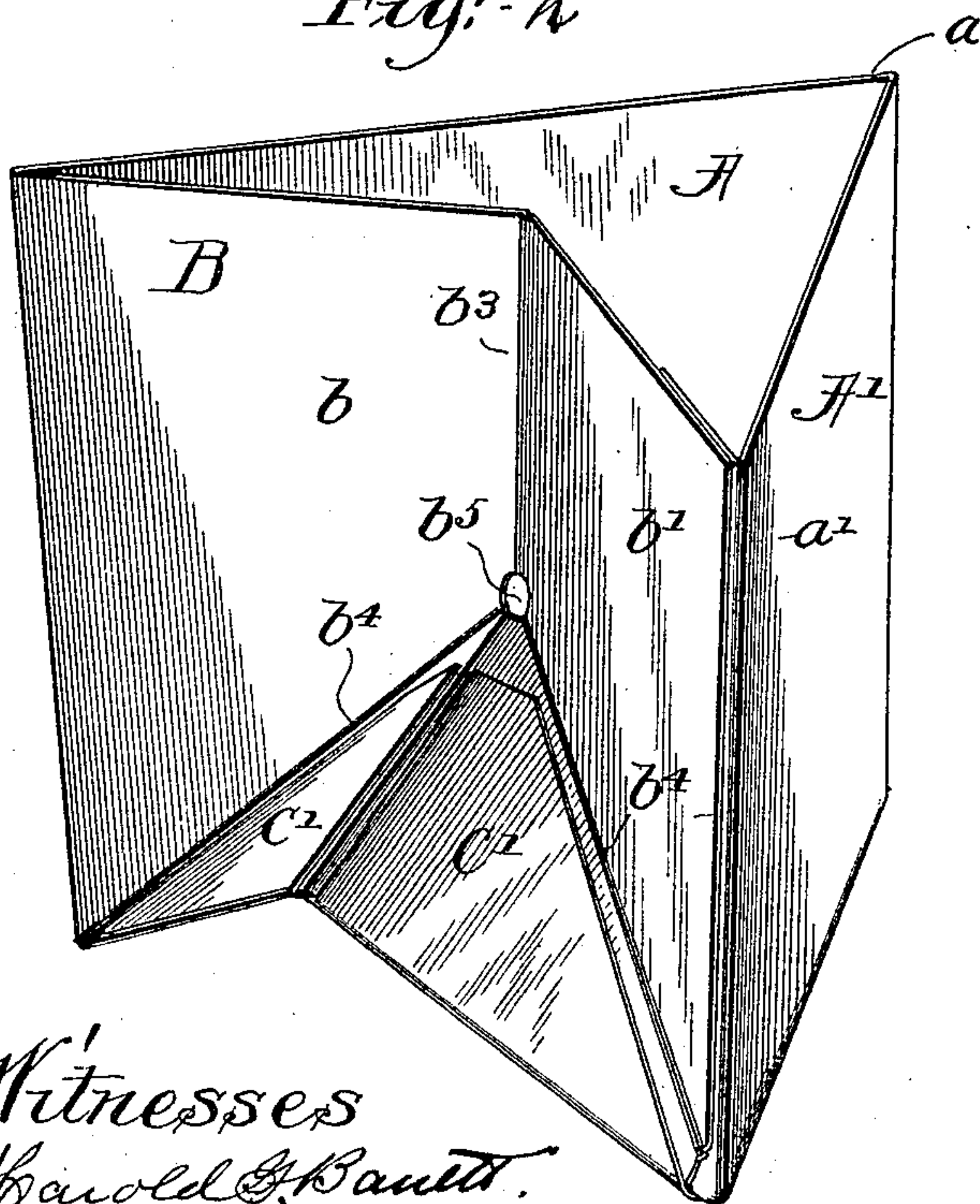
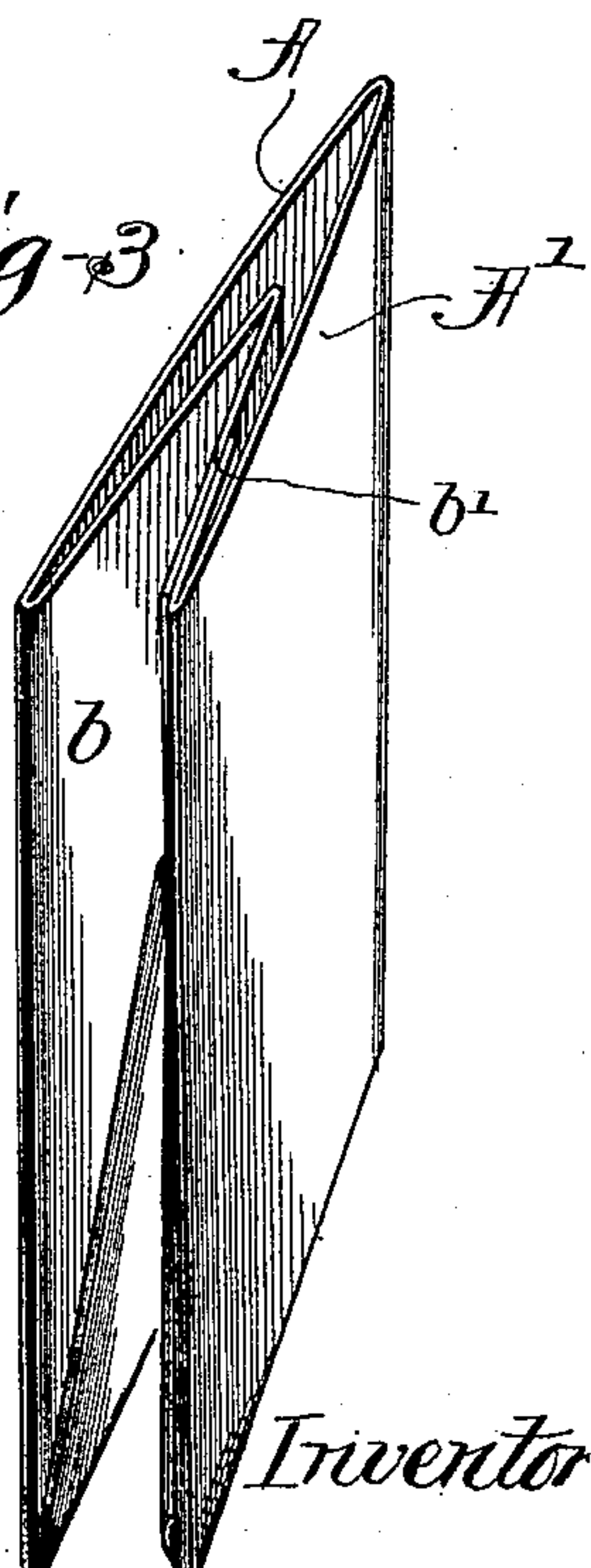


Fig. 3



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No. 641,500.

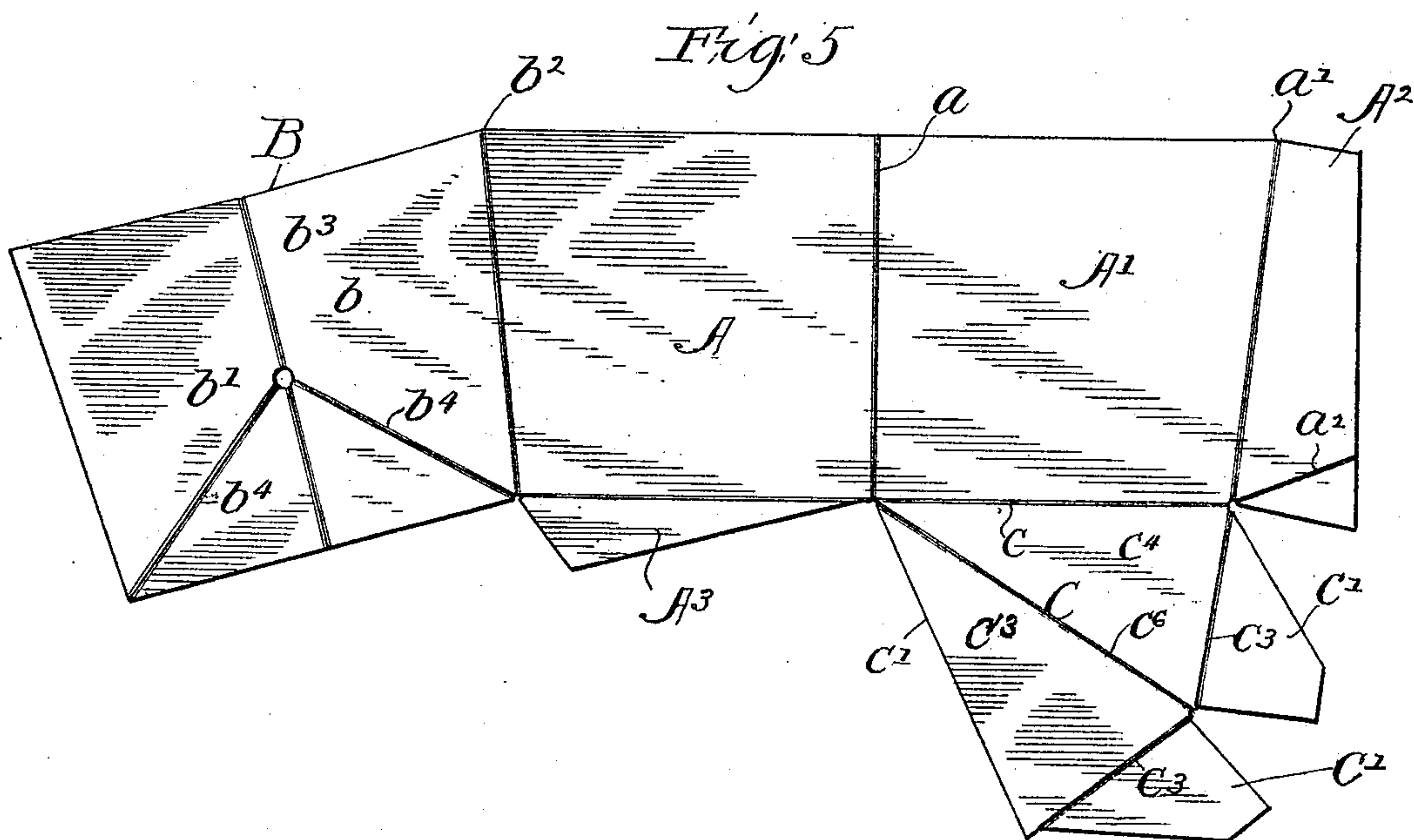
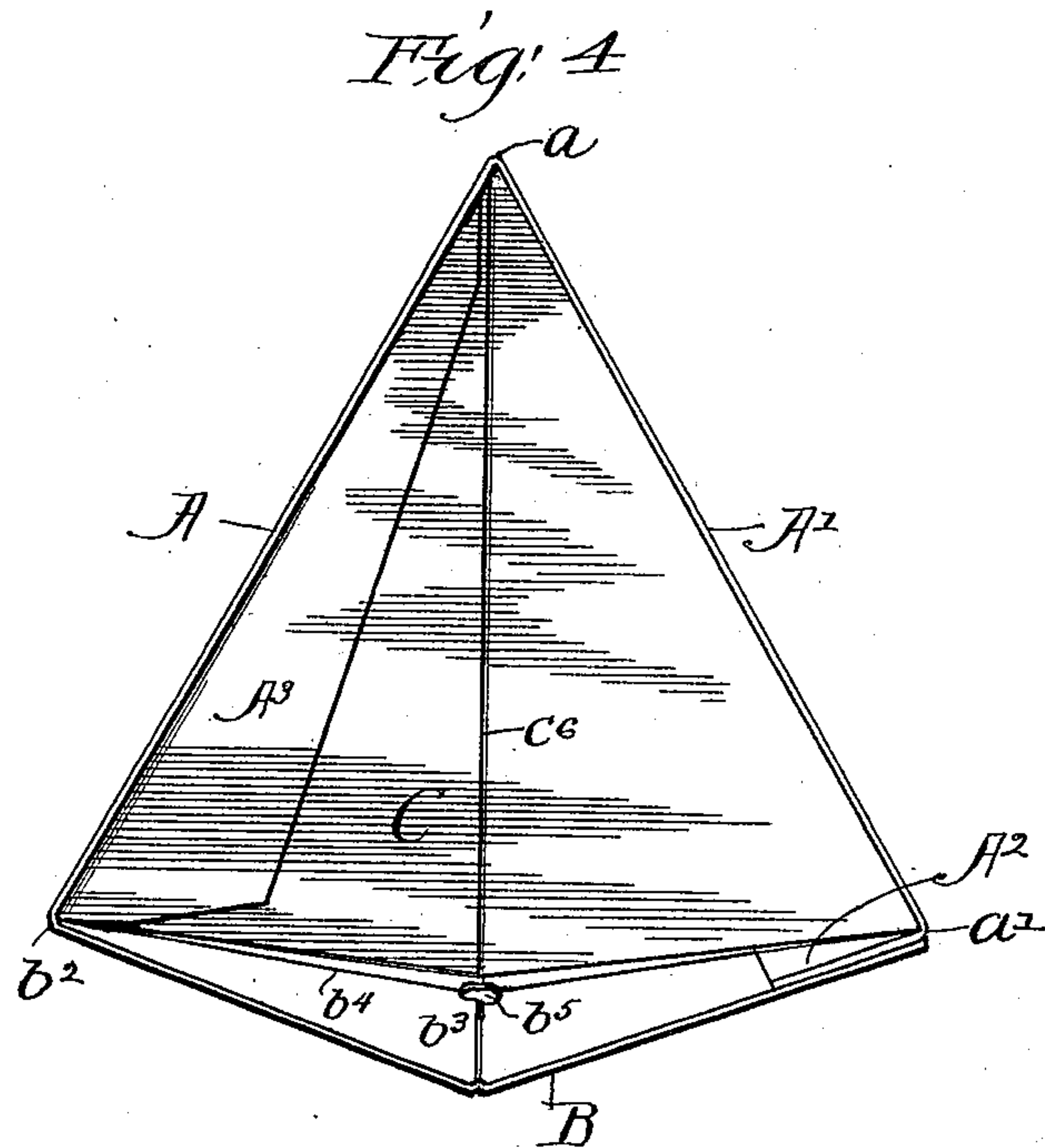
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Fig-6

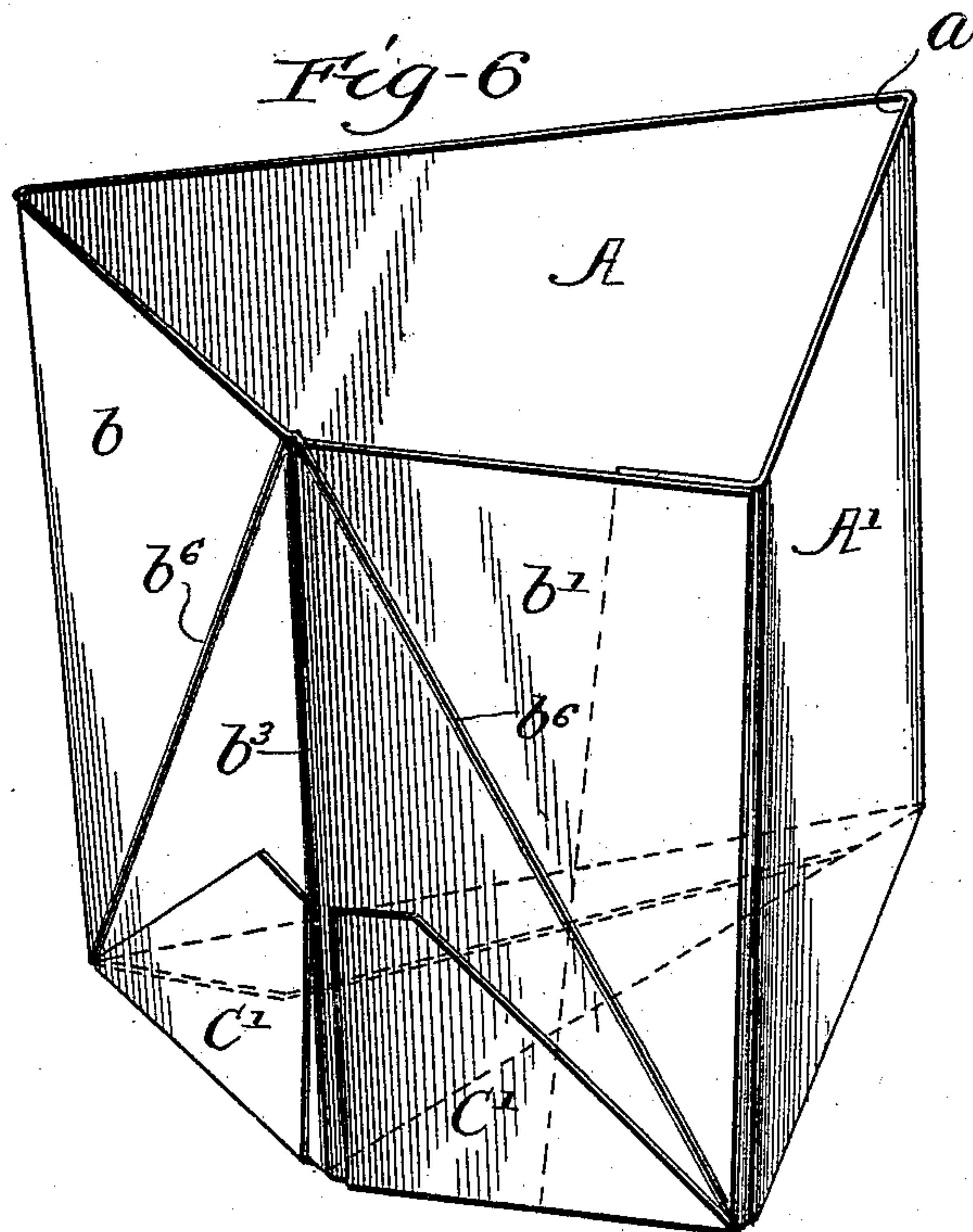
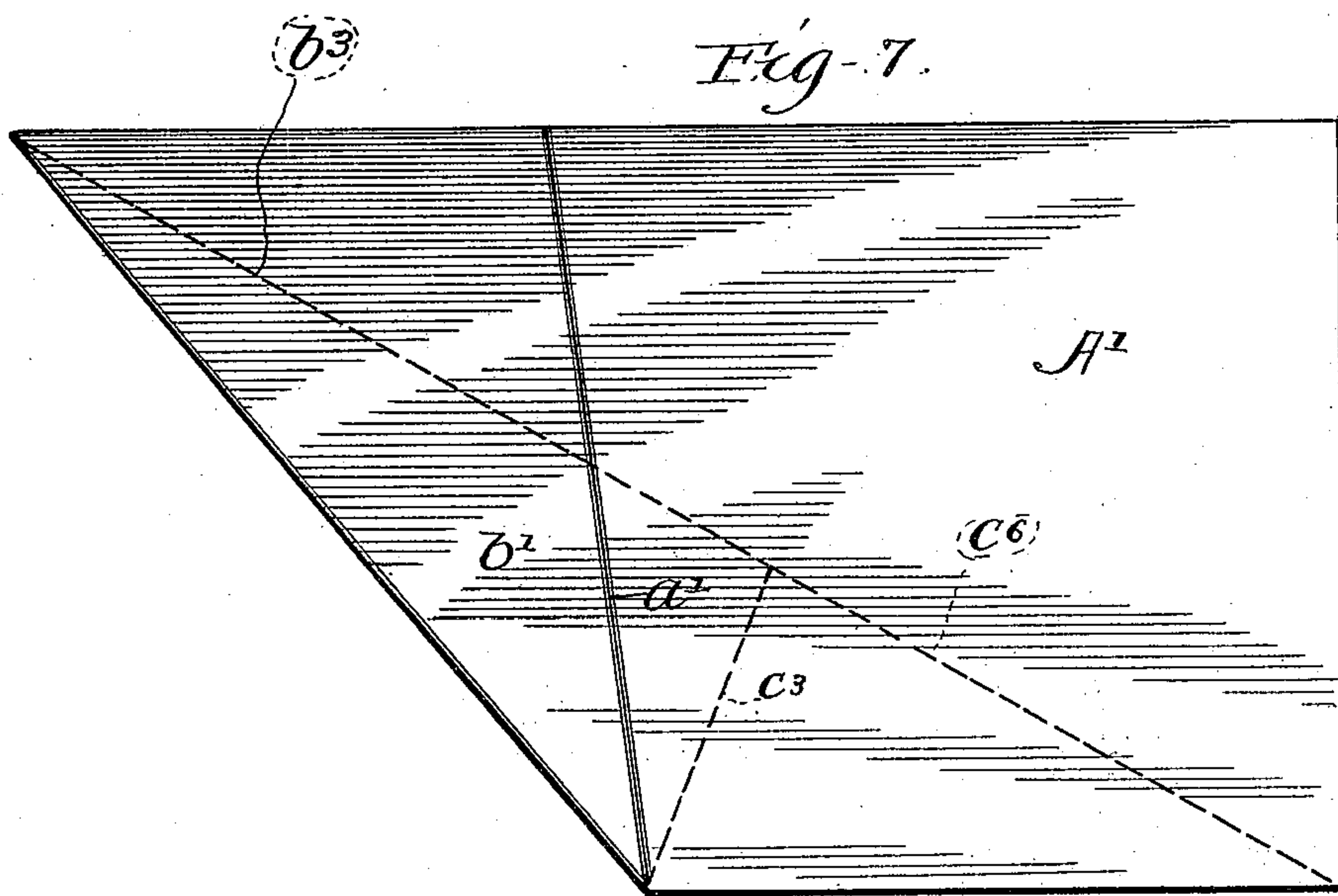


Fig-7.



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Fig. 8

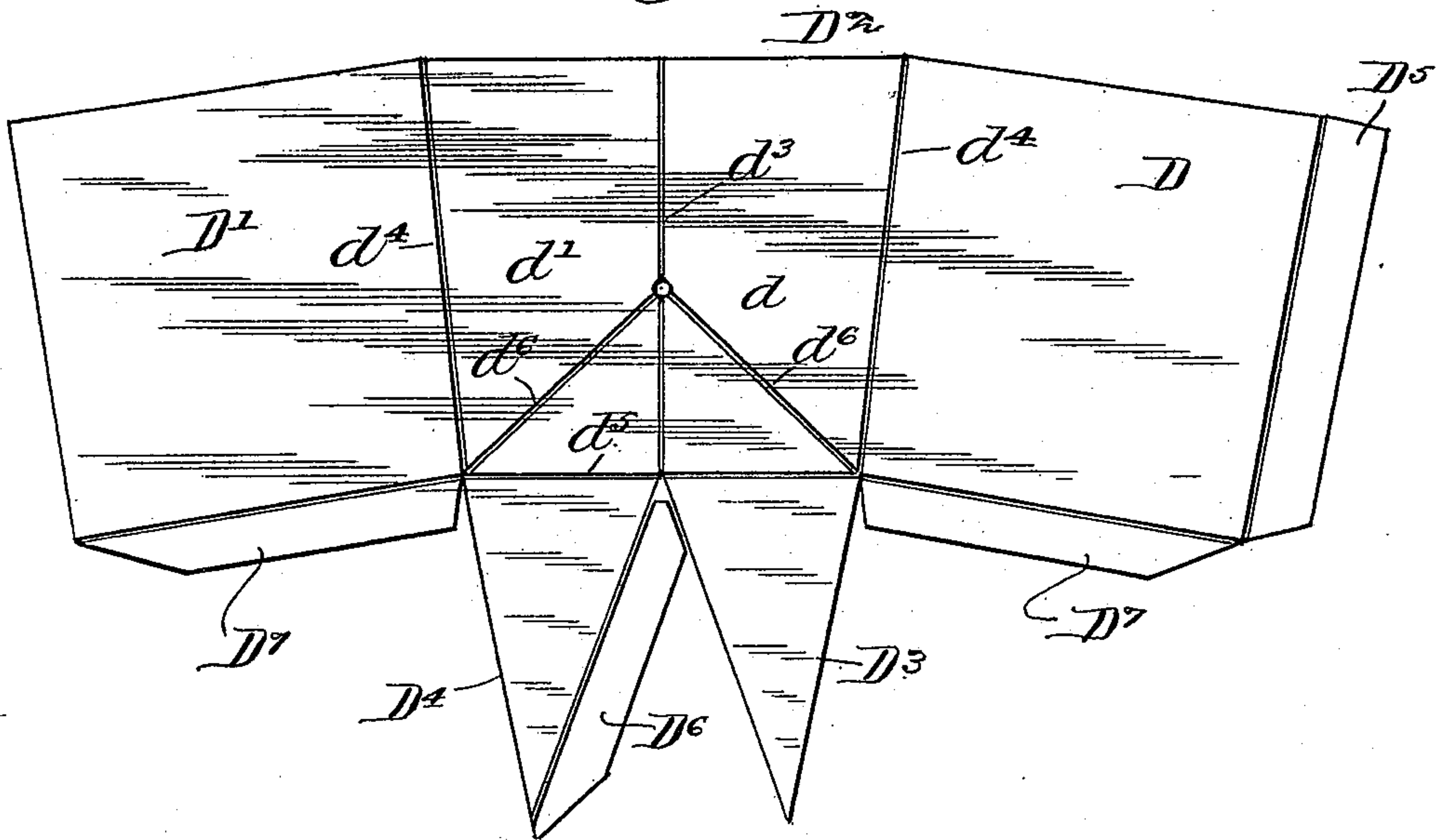
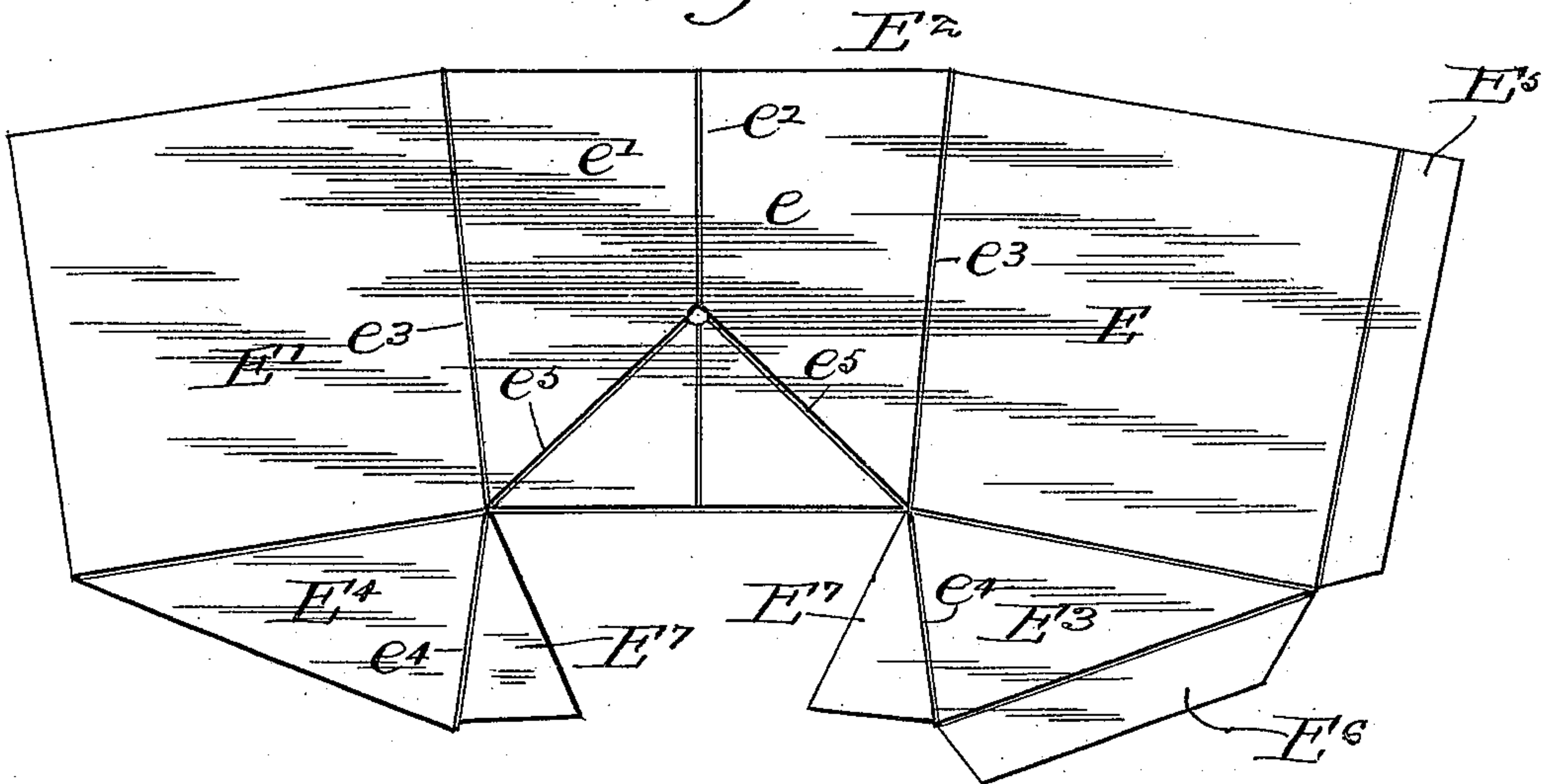


Fig. 9



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UNITED STATES PATENT OFFICE.

FRANK B. DAVIDSON, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE HOWE & DAVIDSON COMPANY, OF SAME PLACE.

PAPER BOX.

SPECIFICATION forming part of Letters Patent No. 641,500, dated January 16, 1900.

Application filed October 17, 1898. Serial No. 693,742. (No model.)

To all whom it may concern:

Be it known that I, FRANK B. DAVIDSON, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful
5 Improvements in Paper Boxes; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which
10 form a part of this specification.

This invention relates to improvements in paper cartons or boxes of that kind known as "knockdown," or those which are adapted to be folded flat for transportation or storage
15 and to be opened by the user at the time of filling the same.

The invention relates more specifically to sector-shaped boxes which are designed for use for packing merchandise in buckets, pails,
20 barrels, or other receptacles of circular form; and the invention consists in the matters hereinafter set forth, and more particularly pointed out in the appended claims.

In the drawings, Figure 1 is a perspective view of a carton made in accordance with my invention opened in readiness for use. Fig. 2 is a perspective view of the same when partly folded or collapsed. Fig. 3 is a perspective view thereof when entirely collapsed. Fig. 4
30 is a top plan view of the carton when opened in readiness for use. Fig. 5 illustrates a form of blank from which the carton shown in Figs. 1, 2, 3, and 4 may be made. Fig. 6 is a perspective view of a carton of slightly-modified construction. Fig. 7 is a perspective view of the same when folded ready for transportation. Figs. 8 and 9 show modified forms of blanks.

In Figs. 1 to 4, inclusive, is shown one form
40 of my improved carton made up in readiness for use, and in Fig. 5 is shown an approved form of blank from which said carton is constructed. Said blank and the other forms of blanks herein shown are made from a single
45 sheet of material properly cut and scored and adapted to be folded to the required form, but may obviously be made of a plurality of properly-shaped sections joined together in such relation as to produce the form of carton desired when folded and set up. Said carton
50 may be made of paper, strawboard, wood veneer, or other suitable material.

Referring now to the construction of the carton shown in Figs. 1 to 5, inclusive, more especial reference being had to the blank
55 shown in Fig. 5, said carton comprises two equal and similar radius-walls A A', separated in this instance by a line of fold located at their line of juncture a, an arc-wall B, composed of two equal and similar sections b b',
60 separated from the radius-wall A by a line of fold b² at one margin thereof and adapted for attachment at its opposite margin to the margin of the radius-wall A' remote therefrom, and a bottom wall C. Said arc-wall is se-
65 cured in the present instance to a free flap A², which is flexibly connected to said radius-wall A' by means of a line of fold a'. While the wall B is termed an "arc-wall," it will be understood that such term is not strictly de-
70 scriptive thereof, it being composed of two plane sections which are disposed in angular relation to the radius-walls and to each other, said term, however, being sufficiently accurate for practical purposes, as said wall is in-
75 tended to approximately fit the curvature of a pail or barrel and approximate the arc of a circle having its center at the intersection or line of fold of the radius-wall when the box is set up, as shown in Figs. 1 and 4. 80

The bottom wall C of the carton conforms to the shape of the end of the carton when bent into tubular form. Said end wall has two margins c c', arranged at an angle with respect to each other corresponding to the an-
85 gular distance between the radius-walls A A' of the carton when set up in readiness for use, and two margins C³ C³, which approximate the arc of a circle having its center at the intersection of the edges c c' of said end wall and corresponding with the shape of the arc-wall, to the lower edge of which latter
90 said bottom wall is designed to be permanently attached. Said bottom wall is provided with a weakened or scored line c⁶, which
95 bisects the angle formed by the oblique edges c c' thereof and which divides said bottom wall into two and similar sections c⁴ c⁵, said line in the end wall intersecting at one end, when the carton is set up, the transverse line
100 of fold b³ of the arc-wall. Said bottom wall C is shown as made continuous with the radius-wall A', and the edge c of said end wall is formed by a line of fold along which said

end wall is bent or folded upon the radius-wall. The edge c' of said bottom wall is in the blank left free and adapted to be permanently attached to the adjacent edge of the radius-wall A. In the blank illustrated the adjacent edge of the wall A is provided with an angular flap A^3 , which when the radius-walls are folded about their line of fold a in a proper angular relation with respect to each other (so as to bring the free edge of the end wall in the plane of the radius-wall A) is adapted to be permanently secured to the free edge of the end wall C. To the edges C^3 C^3 of the bottom wall are connected two generally triangular flaps C' C' , which when the box is set up are bent at right angles to the bottom wall and secured to the arc-wall, the said flaps being joined to the end wall by lines of fold which define the edges of the bottom wall. Each of said flaps extends approximately from one of the outer oblique edges c c' of the bottom wall to said line of fold c^6 , and their adjacent edges are arranged at such an angle with respect to each other that when the blank is folded and said flaps are bent at right angles to the body of said bottom wall said edges will be substantially parallel with and separated a slight distance from each other, said flaps when the carton is set up being securely attached to the arc-wall on either side of the central line of fold therein and serve to greatly strengthen the carton as a whole. Moreover, said construction serves to provide a tight joint between the arc and end walls, as is necessary when the carton is to be used for merchandise of a granular nature. The location of the line of fold c^6 in the bottom wall and the line b^3 in the arc-wall is such that when the carton is set up in readiness for use said lines are in the same plane and in the plane of the line of juncture a of the radius-walls.

The arc-wall B is provided with two oblique weakened or folding lines b^4 b^4 , which extend from the outer and lower angles formed by the side and bottom margins of said arc-wall to a point of intersection on the central line of fold b^3 in said arc-wall. In the approved form said oblique lines intersect each other at a point on the line b^3 near the center of said line b^3 . Preferably the outer or oblique edges of the flaps C' are made at such angle that when the latter are bent at right angles to the body of the end wall and attached to the arc-wall they will be closely adjacent to and approximately parallel with said oblique lines b^4 , as clearly indicated in Figs. 1 and 2. By reason of the presence of the weakened or scored lines b^4 in the arc-wall, in connection with the line of fold b^3 therein, when pressure is applied to said arc-wall at a point adjacent to the intersection of said oblique lines said wall will be collapsed inwardly and will be bent or folded upon said lines b^3 b^4 b^4 , so that the portions of the sections b b' of said wall between said oblique lines and the upper edge of said wall will assume an angular

relation with respect to each other, while the lower portions of said sections b b' of those below said oblique lines will assume an angular relation to the upper portions of said wall. Upon pressing the radius-walls together said upper portions of the sections b b' will be folded between the radius-walls with the line of fold b^3 adjacent to the intersection of said radius-walls, while the lower portions of said sections will be folded upwardly on said oblique lines, as clearly shown in Fig. 2, and the point in said arc-wall at the intersection of the line of fold b^3 therein with the weakened line c^6 of the bottom wall will move upwardly about the point of intersection in said line b^3 of the oblique lines b^4 and in the same plane therewith. This will cause the sections forming the bottom wall to assume an angular relation with respect to each other and to be folded together on the weakened line a^6 as the radius-walls are moved inwardly. The arc and bottom walls are thus folded flat about the lines b^3 , b^4 , and c^6 and between the radius-walls until the carton is in a completely-collapsed condition, as shown in Fig. 3.

In preparing the blank it will be desirable to provide the lower end of the flap A^2 with an oblique weakened line a^2 , which when the carton is set up comes opposite the adjacent oblique weakened line b^4 and is folded thereon when the carton is collapsed. The location of the outer or oblique edges of the flaps c' , closely adjacent to and parallel with the oblique lines b^4 in the arc-wall, serves to make more certain the proper folding of said arc-wall upon said lines. When the box is to be used for merchandise of other than a fine granular character, the arc-wall may be provided at the intersection of the oblique lines b^4 with a small aperture b^5 , which serves to prevent any strain on the material forming the wall at the intersection of said lines when the carton is folded.

With the construction described it will be seen that when the carton is collapsed, as shown at Fig. 3, it will be contained entirely within a space occupied by the radius-walls, so that when in such condition the same may be most advantageously stored or packed for transportation. The carton may be used in connection with a generally circular receptacle of any desired form. That herein shown, as clearly illustrated in Fig. 4, is adapted to be used in connection with a packing-pail which is larger at its top than at its bottom and for this purpose is made of tapered form, larger at the top than the bottom. The arc-wall only, however, is inclined, as the radius-walls must necessarily be perpendicular to the plane of the bottom of the box, in order that contiguous boxes may come closely in contact with each other when packed in a pail or other tapered receptacle. The radius-walls are therefore of trapezoidal form, with their top edges longer than their bottom edges, while the arc-wall is made long at its top edge and

has its edges equally inclined from its center line.

In Figs. 6 and 7 is shown a modified form of construction whereby the carton containing the same features of construction described is adapted to be folded in a manner different from that heretofore illustrated and described. The blank from which the carton shown in said figures is made is essentially like that previously described, and the several parts of the carton are designated by the same reference-letters. In the construction shown in said Figs. 6 and 7, however, the arc-wall is provided with two oblique weakened lines b^6 b^6 , which are in intermediate angular relation with the side and bottom margins of the arc-wall; but said lines are made of such length as to intersect on the line of fold closely adjacent to the top margin of said wall instead of near the center of said line. With this arrangement the carton is collapsed by folding the corner thereof at the intersection of the line of fold b^3 and the weakened line c^6 inwardly and upwardly. This causes the portions of the arc-wall between the oblique lines b^6 and the line of fold b^3 on each side of the latter to be folded inwardly and upwardly simultaneously about the line of fold b^3 and the oblique lines b^6 with the outer surfaces of said portions in contact with each other. Moreover, the portions of said arc-wall outside of said line b^6 will be each moved outwardly into the plane of the radius-wall to which it is attached when the latter are brought together and with the inner surfaces thereof in contact with the inner surfaces of the portions of said wall inside of said oblique lines. The two halves of the bottom wall on opposite sides of the weakened line b^6 will be simultaneously folded inwardly between the radius-walls about the said weakened line c^6 , with the outer surfaces thereof in contact when so folded. The lines b^3 and c^6 will form together a straight line extending from the line of fold a between the radius-walls and the intersection of the line b^6 in the arc-wall, as clearly indicated in dotted lines in Fig. 7. The edges C^3 of said bottom wall, when the carton is collapsed in the manner described, will be brought together and arranged at an acute angle to the lines of fold and juncture between the arc and radius walls, as shown in dotted lines in Fig. 7.

The carton herein shown and described is provided with a bottom wall only and the open end thereof may be covered in any suitable manner when the carton is filled and packed in a receptacle. Said carton might be provided with a second end wall, permanently secured at one of its edges to one of the walls of the same, and adapted to have detachable interlocking connection at its other edges to the remaining walls of the carton in such manner as to be folded flat together when the carton is collapsed.

The main or principal advantage gained by the use of the construction described is that

the flat or knockdown carton may be set up in readiness for use with the least possible amount of time and labor, and when set up in readiness for use, as shown in Fig. 1, is permanently secured together in all its parts, and at the same time is so constructed as to be folded flat in a minimum space.

The blank shown in Fig. 8 consists of two radius-walls $D D'$, an arc-wall D^2 , and a bottom wall consisting of two triangular sections $D^3 D^4$, which are formed integral with said arc-wall. Said arc-wall consists of two similar sections $d d'$, separated by a line of folds d^3 extending from the upper to the lower edges thereof. Said arc-wall in this instance is made from the central part of the blank and is connected integrally on the opposite sides thereof with the radius-walls, being separated therefrom by lines of folds $d^4 d^4$. The free edge of the wall D is provided with a flap D^5 , which is adapted to be secured to the free edge of the wall D' when the blank is folded in tubular form. The flaps $D^3 D^4$, constituting the bottom wall, consist of two equal triangular sections made integral with the radius-wall and separated therefrom by lines of fold d^5 , which constitute the bottom edge of the arc-wall. The base-lines of each of said sections extend from the side edges of the arc-wall to the central line or fold d^3 thereof. The inner oblique edge of one of said sections (in this instance the section D^4) is provided with a flap D^6 , by which said sections are joined permanently when the blank is folded to bring said edges of the sections together. The arc-walls $D D'$ are provided at their lower edges with flaps $D^7 D^7$, which are adapted to be permanently attached to the outer oblique edges of the sections $D^3 D^4$ when the box is set up. The flap D^6 is attached to the section D^4 by a line of fold, so that when the sections of the bottom are joined together in the manner described said section may be folded on said line, as in the construction shown in Figs. 1 to 5. Said arc-wall is provided with oblique lines of fold $d^6 d^6$, which intersect the angles formed between the side and bottom margins of said wall and meet each other on the central line of fold d^3 , adjacent to the middle point of said line. The manner of folding a carton made from the blank shown in Fig. 8 is like that described in connection with the construction shown in Figs. 1 to 5, inclusive.

The blank shown in Fig. 9 is similar to that shown in Fig. 8, so far as the relation of the arc to the radius walls is concerned. Said blank consists of radius-walls $E E'$ and a central arc-wall E^2 and a bottom wall consisting of two triangular sections $E^3 E^4$. In this instance the sections forming the bottom wall are attached to or made integral with the radius-walls and are adapted to be attached to the arc-wall by pasting or other means. Said arc-wall consists of two similar sections $e e'$, separated by a central line of fold e^2 , extending from the upper to the lower edge of said wall. Said arc-wall is separated from the ra-

dius-walls by lines of fold $e^3 e^3$, about which said radius-walls are folded when the box is set up in tubular form. The free edge of the radius-wall E is provided with a flap E^5 , by which it is adapted to be secured to the free edge of the wall E' when the carton is folded in tubular form by which the said walls are joined in angular relation. The outer edge of one of the sections of the bottom wall (in this instance the section E^3) is provided with a flap E^6 , which is adapted to be attached to the free edge of the section E^4 when the carton is set up. The line of juncture between said sections when the carton is set up is in the same plane with the line of fold e^3 of the arc-wall and bisects the angle formed between the radius-walls. The inner margins of the sections $E^3 E^4$ are provided with flaps $E^7 E^7$, which when the carton is set up are adapted to be bent at right angles to the bodies of the sections and attached to the vertical arc-wall E^2 . The lines of fold $e^4 e^4$ between said flaps and the bodies of the sections are, when the carton is set up, moved into the planes of the sections $e e'$ of the arc-wall and constitute the arc side of the bottom. The arc-wall is provided with two oblique lines e^5 , arranged as are the lines d^6 of the blanks shown in Fig. 8, and the carton made from the blank shown in Fig. 9 is adapted to be folded in the same manner as a carton made from the blank shown in Fig. 8.

It will of course be understood that the oblique lines d^6 and e^5 of the blanks shown in Figs. 8 and 9 may be arranged like those shown in Figs. 6 and 7 and the cartons folded in the same manner shown in said last-mentioned figures. It will further be understood that blanks of other configuration than that shown may be employed which will produce the same results as to form of carton and manner of folding as herein described. While the several parts of the blank are shown as secured together by means of flaps which are adapted to be permanently attached by pasting or otherwise, it will be obvious that said parts may be secured together by other means—as, for instance, stay-strips secured over the meeting edges thereof.

I claim as my invention—

1. A collapsible sector-shaped carton comprising connected radius arc and bottom walls, said arc and bottom walls being provided centrally thereof with score-lines which divide each of said walls into similar and equal sections and the arc-wall being provided with two oblique score-lines which extend from the outer and lower angles formed by the side and bottom margins thereof and meet each other at a point on the central score-line of said arc-wall, said bottom wall being formed on one of the radius-walls and attached to the other radius-wall and the arc-wall by flexible pasting-flaps.

2. A collapsible sector-shaped carton comprising connected radius, arc and bottom

walls, said arc and bottom walls being provided with central score-lines, said arc-walls being provided with two oblique score-lines which extend from the outer and lower angles formed by the side and bottom margins thereof and meet each other at a point on the central score-line of said arc-wall, and the bottom wall being provided with flexible flaps which are folded upwardly over the lower margin of the arc-wall on either side of the central score-line therein and passed to said arc-wall.

3. A collapsible sector-shaped carton comprising connected radius, arc and bottom walls, said arc and bottom walls being provided with central lines of fold, said arc-wall being provided with two oblique lines of fold which extend from the outer and lower angles formed by the side and bottom margins thereof and meet each other at a point on the central line of fold in said arc-wall, and the bottom wall being provided with flaps which are permanently attached to the arc-wall on either side of the central line of fold therein, with their outer edges adjacent to and generally parallel with said oblique lines of fold.

4. A blank for sector-shaped cartons, divided by score-lines into radius, bottom and arc walls, said bottom wall being provided on one side with two flaps for attaching it to the arc-wall, a flap on one of the arc-walls for attachment to the bottom wall, and the bottom and arc walls being provided with central score-lines and the arc-wall having also two oblique score-lines which extend from the outer and lower angles formed by the side and bottom margins thereof and meet each other on the central score-line of said arc-wall.

5. A blank for sector-shaped cartons divided by lines of fold into sections forming radius, bottom and arc walls, a pasting-flap on one end of said blank for uniting the ends thereof when bent into tubular form, said bottom wall being formed on a section constituting one of the radius-walls, a pasting-flap on the section constituting the other radius-wall for permanently attaching one edge of said bottom wall to the said radius-wall and pasting-flaps on said bottom wall for permanently attaching the same to the arc-wall, said bottom and arc walls being provided with central lines of fold and the arc-wall being provided also with two oblique weakened lines which extend from the outer and lower angles formed by the side and bottom margins thereof and meet each other on said central line of fold.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two witnesses, this 4th day of August, A. D. 1898.

FRANK B. DAVIDSON.

Witnesses:

WILLIAM L. HALL,
CHARLES W. HILLS.