

(No Model.)

4 Sheets—Sheet 1.

W. B. HOWE & F. B. DAVIDSON.
PAPER BOX.

No. 511,080.

Patented Dec. 19, 1893.

Fig. 1.

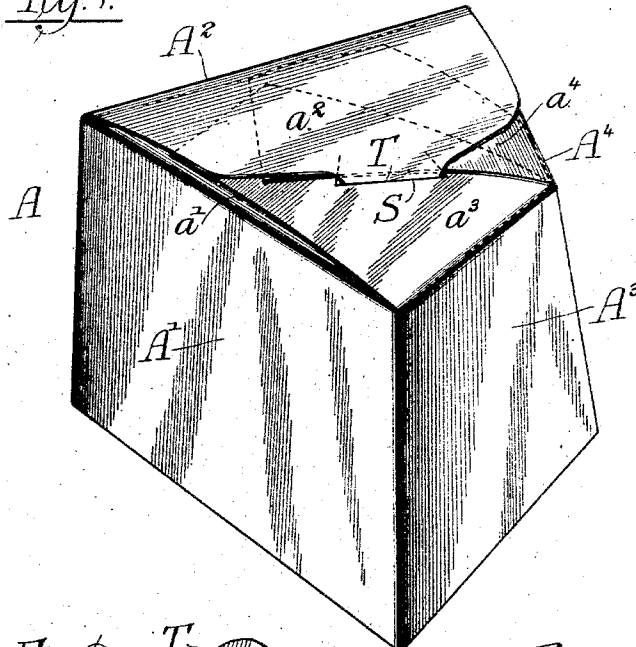
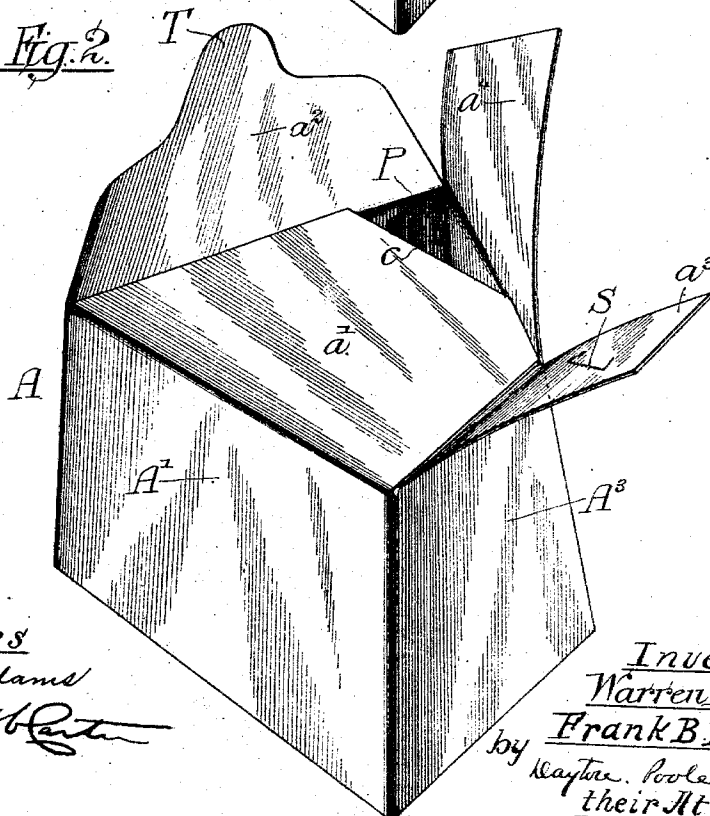


Fig. 2.



Witnesses

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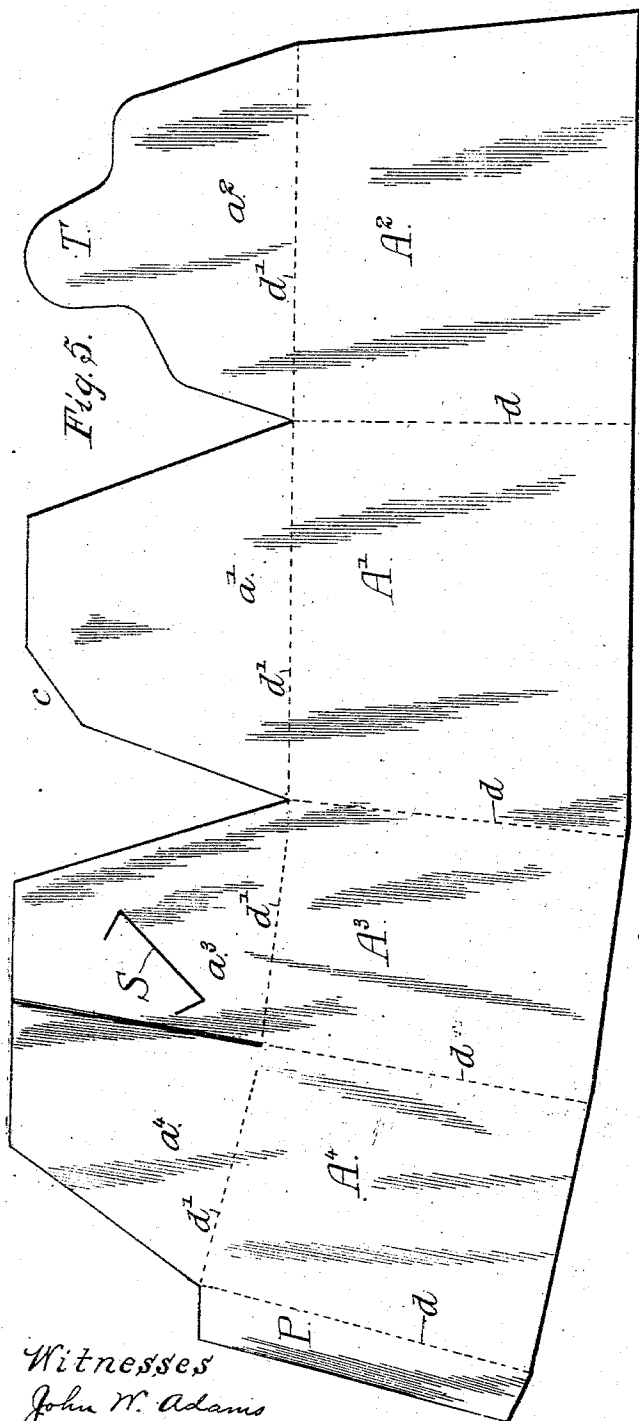


Fig. 5.

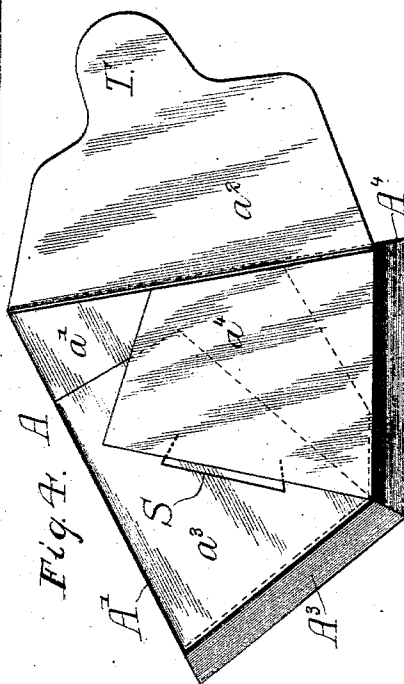


Fig. 4.

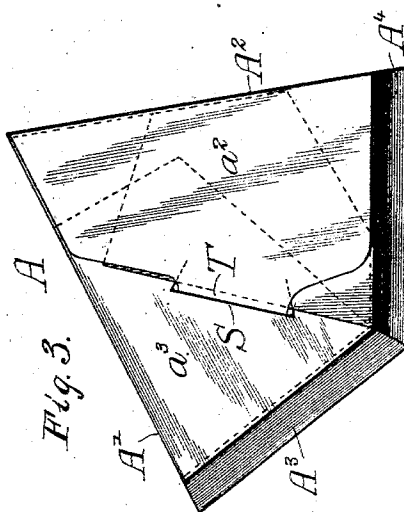


Fig. 3.

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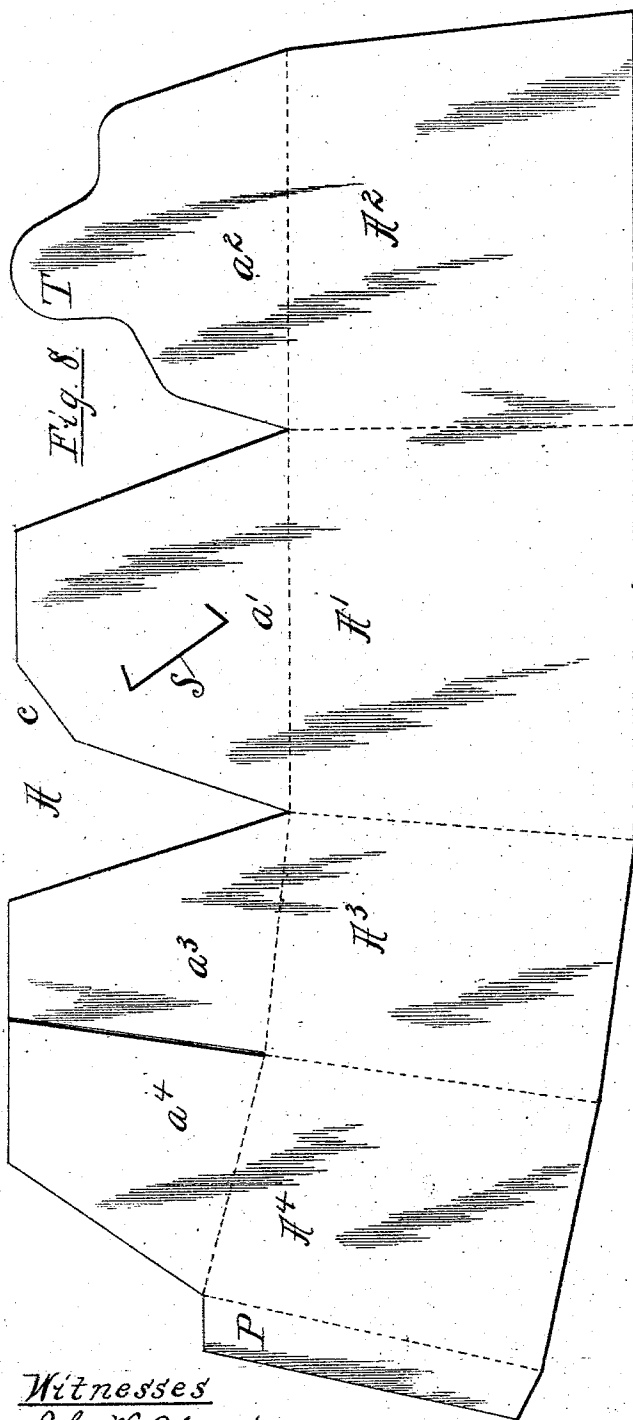
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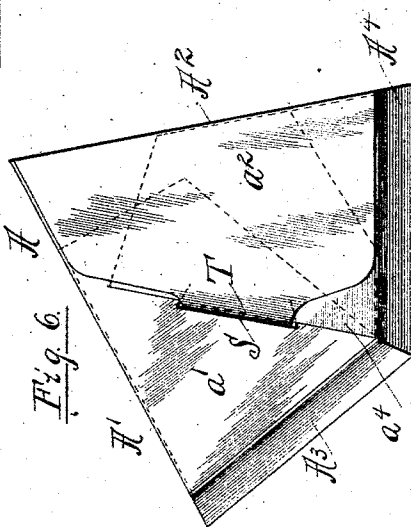
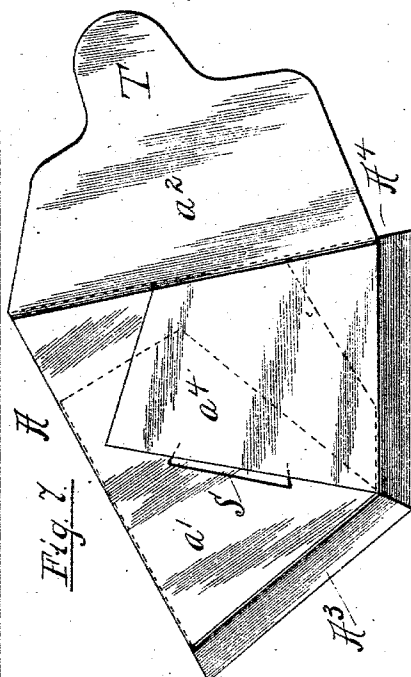
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Fig. 11.

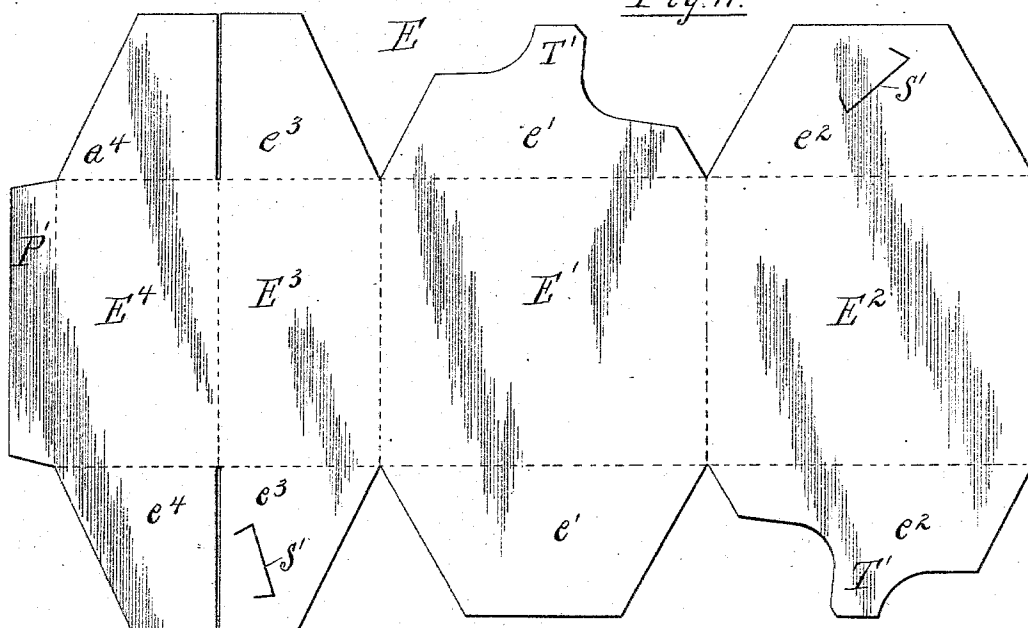


Fig. 10.

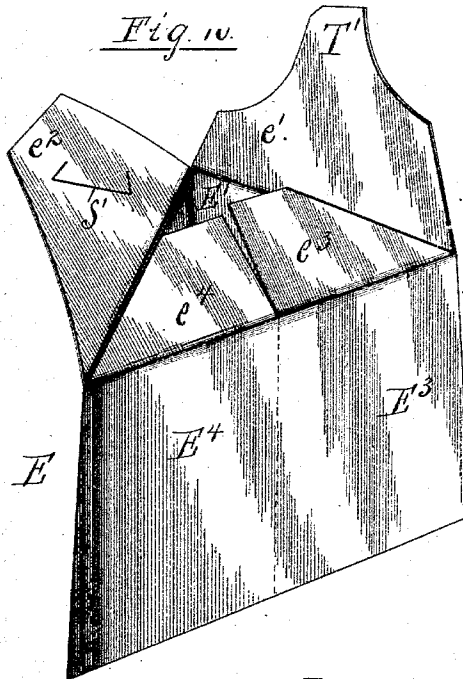
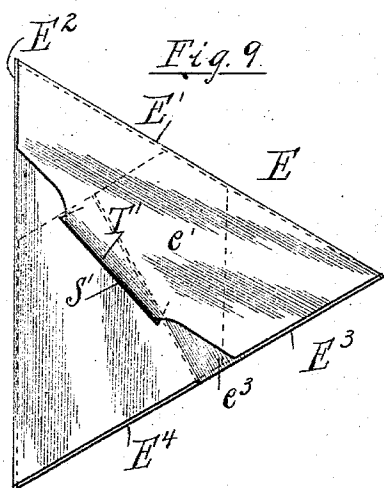


Fig. 9.



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UNITED STATES PATENT OFFICE.

WARREN B. HOWE AND FRANK B. DAVIDSON, OF CHICAGO, ILLINOIS.

PAPER BOX.

SPECIFICATION forming part of Letters Patent No. 511,080, dated December 19, 1893.

Application filed February 28, 1893. Serial No. 464,089. (No model.)

To all whom it may concern:

Be it known that we, WARREN B. HOWE and FRANK B. DAVIDSON, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Paper Boxes; and we 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 form a part of this specification.

Our invention relates to improvements in paper boxes or cartons of that class in which the side walls are provided at their edges with integral flaps which interlock to form the end of the box, the whole being adapted to "knock down" or fold flat when such interlocking flaps are disengaged.

The object of the invention is to provide an improved construction in paper boxes of the class referred to, and to this end it consists in the matters hereinafter described and particularly pointed out in the appended claims.

Our improvements are especially applicable to sector-shaped boxes used in packing some kinds of merchandise, for example, stick candy, for shipment in buckets, pails, barrels or other receptacles the circular cross section of which renders it necessary that the boxes to be packed therein should be sector-shaped in order that there may be no loss of space. In boxes of this character the sides of the box which correspond with the radii, and which will hereinafter be spoken of as the radius sides, are straight. The third or arc side however, must approximate a curve and to this end is usually composed of a plurality of sections made of equal width and standing in the same relation to the theoretical arc of the sector that the sides of a regular polygon do to the circumscribing circle. For example, in one sector-shaped box heretofore made the arc side of the box is made up of three sections, the center one of which carries the tuck for securing the flaps forming the end of the box. This box, however, cannot be collapsed and laid flat for packing and shipment in "knock-down" form without the formation of an extra crease extending the full length of the center section and of the tuck carried thereby; such crease ob-

viously rendering the box less rigid and operating to materially weaken the tuck.

In our improved construction we form the arc side of the box of two connected sections of equal width whereby the box may be collapsed without the formation of any crease other than those necessarily occurring at the corners of the box and whereby also a much more simple and better construction and arrangement are rendered possible.

Our improvements are also applicable, however, to other forms of knock down paper box or carton besides that hereinabove referred to, as will be better understood from the following description of constructions embodying our invention, taken in connection with the accompanying drawings illustrative thereof, in which—

Figure 1 is a perspective view of a sector-shaped box or carton with the bottom flaps closed. Fig. 2 is a similar view with the flaps open. Fig. 3 is a bottom plan view with the bottom flaps closed. Fig. 4 is a bottom plan view with one of the flaps open. Fig. 5 shows the blank from which the sector-shaped box is made. Figs. 6, 7 and 8 are views identical with Figs. 3, 4 and 5 respectively, except that the tuck-engaging slit is in a different flap. Figs. 9 and 10 are respectively an end and a perspective view of a "knock down" triangular box or carton; and Fig. 11 shows the blank from which the triangular box is made.

In the construction illustrated in Figs. 1 to 8 inclusive A designates a sector-shaped paper box or carton, which, although herein referred to as a "paper" box, may be made of paper, strawboard, wood-vaneer, or other thin sheet material, and which, as shown in this instance, is closed at one end only. The sides of the box comprise two equal and similar radius sides $A^1 A^2$ and an arc side composed of two equal and similar sections $A^3 A^4$, the radius sides being usually wider than the sections forming the arc side. In the approved form of box shown the angle between the radius sides is about seventy-two degrees or one fifth of a full circle, so that five such boxes exactly suffice to form one horizontal layer in the packing pail or receptacle without waste of space. It is obvious, however, that the boxes might be so proportioned, if

desired, that instead of five there would be six, eight, or any other preferred number to a layer.

When, as is usually the case, the packing pail flares toward the top it is necessary, in order that the boxes may fit the pail closely, to make them of tapered form but with the are sides only inclined, the radius sides being necessarily perpendicular to the planes of the top and bottom ends of the box in order that the contiguous boxes may come closely in contact with each other when packed within the pail. To this end therefore, the radius sides are made of trapezoidal shape with their top edges longer than their bottom edges and with their acute angles toward the arc side of the box (see Figs. 1 and 2), while the sections forming arc side are made of the shape of truncated isosceles triangles with their top edges also longer than their bottom edges; the result being that the box is larger at its top or open end than at its bottom or closed end, as clearly shown in Figs. 1 to 8 inclusive. Said bottom or closed end of the box is formed by folding together the flaps a' a^2 a^3 attached respectively to the sides A' A^2 and sections A^3 A^4 , one of said flaps being provided with a tuck and another with a slit for engaging said tuck; such engagement serving both to lock the flaps in place and to aid in resisting distortion of the box.

To further stiffen the box and to secure a firmer smoother bottom, one of the remaining flaps (one which is adjacent to the tuck flaps) is so shaped that when the flaps are turned down to form the bottom it will engage with one edge the side to which the tuck flap is attached and with its opposite edge will engage the tuck at the place where the latter enters the slit, said remaining flap being folded over the outer end of the slit flap and under the tuck flap. This improved construction and manner of folding the end flaps we regard as a most important feature of our invention because of the superior rigidity of the box thus formed. Such rigidity is due both to the more intimate interlocking of the tuck and slit flaps with the third flap than when said tuck and slit flaps are, as is usually the case, both folded over said third flap, and to the additional engagement secured between the edge of the third flap and the tuck at the place where it enters the slit. Furthermore, the end thus produced is of unusual smoothness owing to the flaps being more fully prevented from sagging or bulging. In this instance the tuck T is provided on the flap a^2 attached to the radius side A^2 while slit S with which it engages is provided either in the flap a^3 attached to the opposite arc side section A^3 , or in the flap a' attached to the adjacent radius side A' , the former construction being shown in Figs. 1, 2, 3, 4 and 5, and the latter in Figs. 6, 7 and 8. Said flap a' attached to the radius side A' is in both cases made of the general sector shape of the body of the box and (except for one small corner which, to save stock, is prefer-

ably cut off, as shown at c) is of the exact dimensions desired for the bottom of the box so that when folded down, as shown in Fig. 2, its margins engage the side walls and it acts as a form to determine the relative positions of the said side walls and tending to prevent lateral distortion in any direction.

The flap above referred to as folding over the outer end of the slit-bearing flap and under the tuck-bearing flap, is, in this instance, the flap a' attached to the arc side section A^4 adjacent to the tuck bearing flap a^2 , said flap a' being shaped to engage, when the flaps are folded down to form the bottom, at one of its edges with the radius sides A^2 and with its opposite edge the tuck T at the place where the latter enters the slit S, as shown in Figs. 1, 4, 6 and 7. In folding in the flaps to form the bottom, flaps a' and a^3 are first folded in, the one bearing the slit S being on the outside. The flap a' is then folded over the outer end of the slit bearing flap, as shown in Figs. 4 and 7. Finally the tuck flap a^2 is closed down and its tuck T inserted in the slit S, thus locking the whole in position.

Constructed and folded in the above manner the flaps form a bottom which holds the box in shape and strongly resists distortion thereof. When the flaps are disengaged the box may be readily collapsed for packing in "knock-down" shape by bringing together the corners formed by the juncture of the radius with the arc sides. The similar and equal radius sides will then lie face to face and in the same plane with the equal and similar arc sides which will also lie face to face, and obviously, as hereinbefore stated, no additional crease need be formed to allow the blanks to be thus folded.

The box above described is made in the usual manner from a single blank cut to the proper outline to fold into the shape desired. Such blank, shown in Figs. 5 and 8 comprises a continuous strip of generally rectangular shape, which forms the side walls of the box and which is provided along one of its edges with two pairs of angular projections forming the several flaps hereinbefore described, the two flaps forming each pair being of equal length on their base lines, i. e. the lines of juncture between the flaps and the side forming strip. One pair of projections constitute the tuck bearing flap a^2 and the flap a' which is substantially the same shape and dimensions desired for the bottom of the box the latter flap being separated from the former and from the adjacent flap a^3 of the other pair by V-shaped notches. The tuck engaging slit S is provided, as desired, either in the flap a^3 , as shown in Fig. 5, or in the flap a' as shown in Fig. 8. The flaps a^3 and a' forming the second pair are separated by any desired form of cut, preferably by a mere slit as shown, it being only necessary that such cut should leave the edge of the flap a' of proper shape to engage with the tuck at the place where the latter engages the slit

when the flaps are folded in to form the bottom. The angles of both edges of the flaps of the first pair and of the remote edges of the flaps of the second pair equal the angles desired at the adjacent corners of the box. In order to reduce the necessary width of the blanks and so save stock, the extreme end of the sector shaped flap a' is preferably cut short at c , which may be done without seriously impairing the effectiveness of the flap. The parts of the blank embraced by the first pair of flaps form the radius sides and those embraced by the second pair the two sections of the arc side of the box, the blank being preferably creased on the lines of division d and on the base line d' of the flaps to facilitate the bending of the stock on these lines.

When the box is made flaring the portions of the blank forming the radius sides are, as before described, of trapezoidal shape and those forming the two sections of the arc side are of tapered form, so that the blank in this case, being composed of such shaped figures lying side by side, is necessarily curvilinear in outline, as shown.

For securing the ends of the blank to form the body of the box one of said ends is provided with the usual paste strip P . Such strip may, however, be dispensed with, if desired, and the ends secured by any of the other ways known to box makers. In this instance the line of juncture will occur between the radius side A^2 and the section A^4 of the arc side, but it is obvious that the blank might be shaped to bring such line of juncture between any other two adjoining sides or sections, if preferred.

Figs. 9 and 10 show a "knock down" triangular box constructed on the same general principle as the sector shaped box hereinbefore described, and provided with end forming flaps shaped and folded after the same manner. Such triangular box E is provided with two plain sides $E^1 E^2$, corresponding to the radius sides of the sector shaped box, and with a third side formed in two sections $E^3 E^4$, corresponding to the arc side of said sector shaped box; the proportions of the parts being such that the perimeter of the box at each end is divided into two equal parts by the intersection therewith of the line separating the plain sides and the line separating the two sections of the third side, the box being thereby collapsible on these lines. In this instance the plain sides $E^1 E^2$ are made similar and of equal size and the two sections $E^3 E^4$ of the third side are likewise similar and of equal size. Moreover, in this instance, the said sides are all of rectangular shape so that the ends of the box are perpendicular to its sides. Said box is also, in this instance, closed at both ends by end forming flaps $e^1 e^2 e^3$ and e^4 . As in the sector shaped box, one of the flaps at each end is provided with a tuck, another with a slit for engaging the tuck, and a third (one adjacent to the tuck-

bearing flap) is so shaped that when the flaps are folded in to form the end, one edge of said third flap will engage with the side to which the tuck bearing flap is attached and the other edge will engage the tuck at the place where the latter enters the slit, said third flap folding over the slit bearing flap and under the tuck flap. This method of forming and folding the flaps produces a box of superior rigidity with ends which are of the usual smoothness and which are less liable to bulge or sag; as has been hereinbefore explained in connection with the description of the sector shaped box shown in Figs. 1 to 8 inclusive. Thus, in this instance, at one end the tuck T is provided on the flap e^1 and engages with the slit S in the flap e^2 , the flap e^3 being the third flap above referred to, engaging with one edge the side E^1 , as shown in Fig. 10, and with the other the tuck as it enters the slit, as shown in Fig. 9. At the other end the arrangement is slightly different, the tuck being on the flap e^2 , the slit in the flap e^3 and the flap e^4 folding between the two in the manner described. In folding in the flaps at the first end the flap e^1 is first brought down followed by the slit flap e^2 , the flap e^3 and the tuck flap e^4 in the order enumerated. At the other end the flap e^2 comes first followed in order by the slit flap e^3 , the flap e^4 and the tuck flap e^1 .

The flaps in the triangular box as well as in the sector shaped construction have their edges cut to engage, as far as possible, the adjacent sides of the box and this together with the engagement of the tuck with the slit and the locking of the third side between the slit flap and the tuck flap in the manner described, effectively resists distortion and maintains the shape of the box. The blank from which such triangular box is made is illustrated in Fig. 11 and like the sector shaped box blank shown in Fig. 5, it comprises a continuous strip of rectangular shape which forms the side walls of the box and is provided with angular flap forming projections located along two sides of the strip (instead of only one as in the sector shaped box blank) since the box is, in this instance, to be closed at both ends. Such projections form the flaps $e^1 e^2 e^3 e^4$ and the parts of the blanks embraced thereby form respectively the sides $E^1 E^2$ and sections $E^3 E^4$ of the third side. The blank is usually creased on the lines of division between the several sides, sections and flaps to render the bending of the same on these lines easy and natural. A paste strip P usually provided at one end of the blank enables the ends to be readily secured together in forming the box.

Our improved construction of and manner of folding the end forming flaps may be applied to other varieties of paper box or carton than those herein set forth, and we have accordingly claimed the same broadly in addition to claiming the improved constructions specifically set forth. As for instance such

feature may be applied to a rectangular box in which two opposite flaps may be engaged with the tuck of a common overlapping flap, in the same manner, as does the single flap
5 herein shown.

We claim as our invention—

1. A knock down paper box or carton, having sides provided with flaps folding together to form its end wall, one of said flaps being provided with a tuck, a second flap with a slit
10 for engaging the tuck and a third flap folding over the slit flap and under the tuck flap, and engaging at one edge with the tuck at the point where the latter enters the slit, substantially as described.

2. A knock down paper box or carton, having sides provided with flaps folding together to form its end wall, one of said flaps being provided with a tuck, a second flap with a slit
20 for engaging the tuck and a third flap folding over the slit flap and under the tuck flap and engaging with one edge the side to which the tuck flap is attached and with the opposite edge the tuck at the place where the latter enters the slit, substantially as described.

3. A knock down paper box or carton having sides provided with flaps folding together to form the end, one of said flaps being provided with a tuck, a second with a slit for engaging the tuck and a third flap on a side adjoining the side to which the tuck flap is attached folding over the slit flap and under the tuck flap and engaging with one edge the said side to which the tuck flap is attached, and
30 with the opposite edge the tuck at the place where the latter enters the slit, substantially as described.

4. A knock down paper box or carton having three sides one of which is made in two sections, the relative proportions of the parts being such that the perimeter of the box at each end is divided into two equal parts by the line of juncture between the first two sides and the line of juncture between the two sections
40 of the third side, whereby the box may be collapsed on said lines of juncture, flaps on the first two sides and on the sections of the third side, said flaps folding together to form

the end, one of said flaps being provided with a tuck, a second flap with a slit for engaging
50 the tuck and a third flap folding over the slit flap and under the tuck flap and engaging with one edge the tuck at the place where the latter enters the slit, substantially as described.

5. A knock down paper box or carton having two equal and similar sides, and a third side composed of two equal and similar sections, flaps on the first two sides and on the sections
60 of the third side, said flaps folding together to form the end of the box, one of said flaps being provided with a tuck, a second flap with a slit for engaging the tuck and a third flap folding over the slit flap and under the tuck flap and engaging with one edge the tuck at
65 the place where the latter enters the slit, substantially as described.

6. A sector shaped carton comprising two radius sides and an arc side made in two sections, a flap on one of the radius sides shaped
70 to fit the adjacent angles of the box and flaps on the other sides, one provided with a tuck, another with a slit to engage the tuck, and the third adapted to fold between the slit flap and tuck flap and engage the tuck where it
75 enters the slit, substantially as described.

7. A sector shaped carton comprising two equal and similar trapezoidal radius sides, and an arc side made of two equal and similar tapered sections, each of the radius sides and
80 each section of the arc side being provided with a single flap, one of the flaps being provided with a tuck, another with a slit to engage the tuck and a third being adapted to fold between the slit flap and tuck flap and engage the tuck
85 where it enters the slit, substantially as described.

In testimony that we claim the foregoing as our invention we affix our signatures in presence of two witnesses.

WARREN B. HOWE.
FRANK B. DAVIDSON.

Witnesses:

ALBERT H. GRAVES,
G. W. HIGGINS, Jr.