J. R. MYERS.

FOLDING BOX.

APPLICATION FILED NOV. 10, 1910.

988,015. **Patented Mar. 28, 1911.**

2 SHEETS—SHEET 1.

Fig. 1.

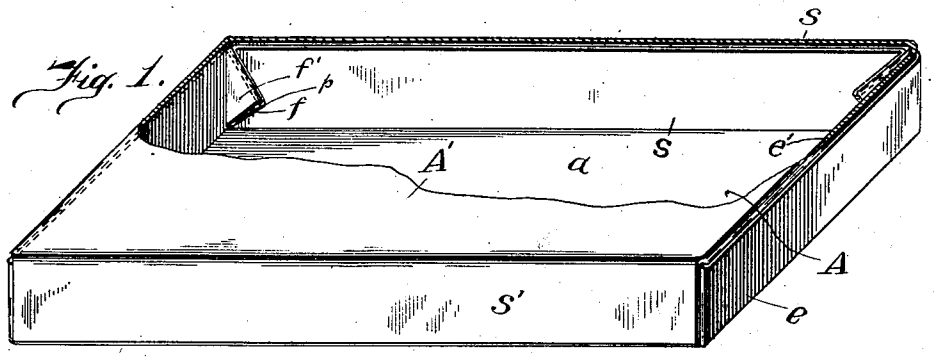


Fig. 2.

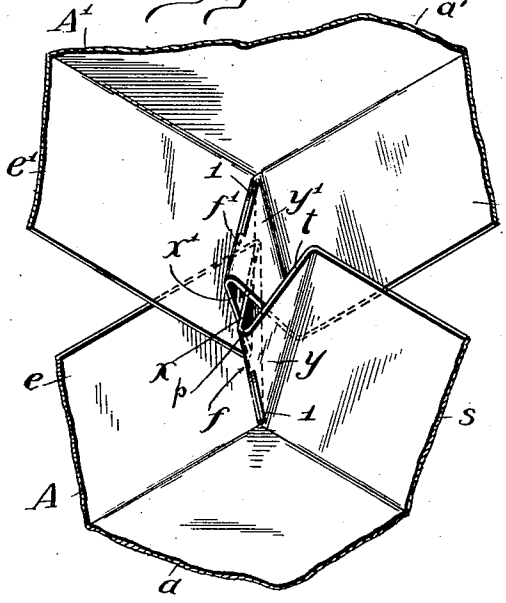


Fig. 3.

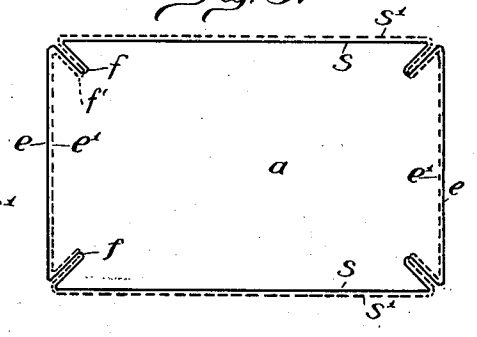


Fig. 4.

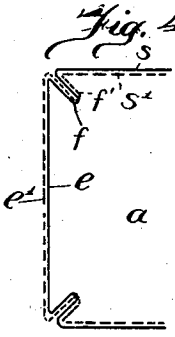
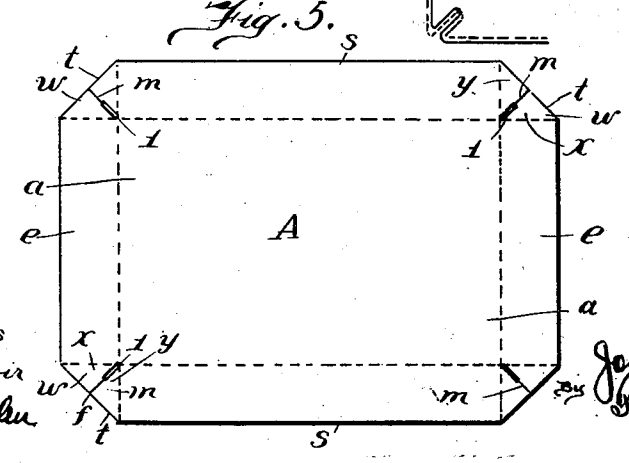


Fig. 5.



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APPLICATION FILED NOV. 10, 1910.

988,015. **Patented Mar. 28, 1911.**

2 SHEETS—SHEET 2.

Fig. 6.

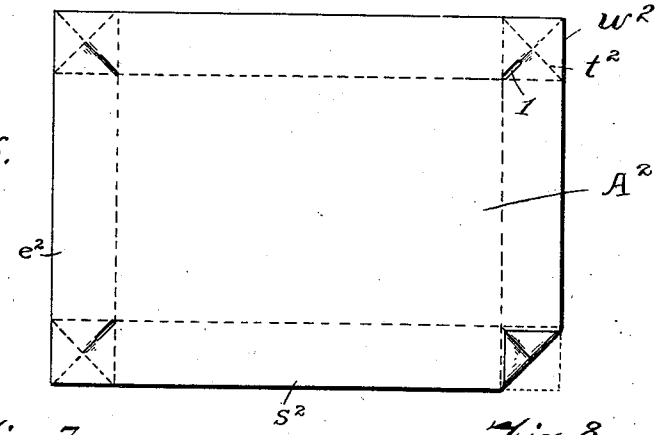


Fig. 7.

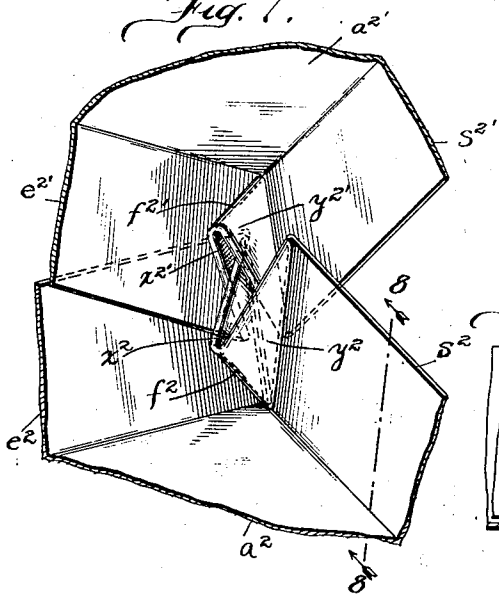


Fig. 8.

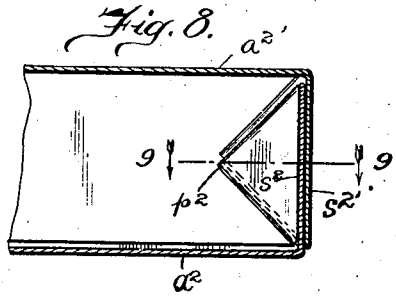


Fig. 10.

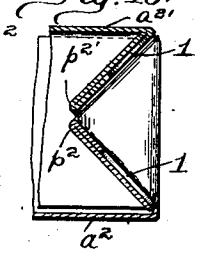
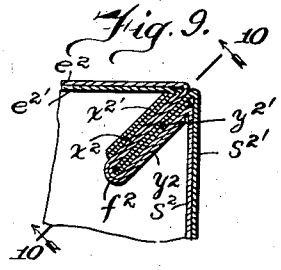


Fig. 9.



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UNITED STATES PATENT OFFICE.

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FOLDING BOX.

988,015. Specification of Letters Patent. Patented Mar. 28, 1911.

Application filed November 10, 1910. Serial No. 591,710.

To all whom it may concern:

Be it known that I, JOSEPH R. MYERS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Folding Boxes, of which the following is a specification.

My invention relates to improvements in paper boxes, and has for its general objects to provide for the construction of such boxes with a minimum amount of material for a given size of package and to provide a box wherein the top and bottom sections coöperate when assembled mutually to maintain the edge walls of each section in proper position, interlocked against spreading, and mutually to stiffen or reinforce the assembled structure.

In general, my invention contemplates the employment of two main sections respectively to constitute the top and bottom members of a complete box, each section formed of a blank, no part of which extends beyond such a rectangle as is necessary for the formation of the planar portion and the edge walls of a receptacle section, so that no waste of material is incurred incident to the formation of locking elements on the blank, or otherwise.

Further, my invention contemplates the folding of the blanks in fashion to provide in each section a planar area or body to constitute the top or bottom proper of the box; to provide the appropriate edge walls to stand at right angles to said body; and to provide at the corners inturned, triangular folds, tending, when the edge walls are set up, normally to stand in position bisecting the right angle formed by the meeting edge walls of the section. The median line of each such fold along which it is creased, therefore, stands at approximately 45° to each of the three meeting surfaces constituting the corner of the box section.

Further, my invention contemplates the interconnection of the corner folds of the top and bottom sections, respectively, mutually to maintain the edge walls of both sections in their elevated or functional position when the sections are assembled, thereby to constitute of the two sections,—neither of which need provide means for self-support of its edge walls,—a complete receptacle whereof the edge walls are mutually sustained through the interlocking coöperation of the corner folds of the opposing sections without the employment of extraneous fastening means of any character. Furthermore, the interrelation of the inturned corner folds is so effected as to impart to each corner great strength to resist crushing strain, and also great resistance to any outward or bursting pressure interiorly exerted upon the box and tending to flatten the sections back into their original, blank form.

My invention may be embodied in many specifically different forms and the interrelation of the essential parts may be effected in various ways, and for the purpose of full disclosure of these facts, I have specifically illustrated in the drawings several forms of construction, all embodying the broader features of my invention.

In the drawings, Figure 1 is a perspective view, with parts broken away, showing a complete receptacle constructed in accordance with my invention; Fig. 2 is a perspective detail of corner fragments of two box sections partially assembled; Figs. 3, and 4, are diagrammatic views, illustrating different modes of assemblage in cross section; Fig. 5 is a plan view of a bottom blank for a box shown in Fig. 1; Fig. 6 shows a specifically different blank to provide doubled corner folds; Fig. 7 is a similar view to Fig. 2 of corner fragments of box sections employing such doubled corner folds; Fig. 8 is a section on line 8—8 of Fig. 7; Fig. 9 is a section on line 9—9 of Fig. 8; Fig. 10 is a section on line 10—10 of Fig. 9.

First, specifically to describe the embodiment of my invention shown in Figs. 1 to 5, A and A′ represent respectively the bottom and top sections of the box. Each is formed from a blank, generally as indicated in Fig. 6, the blanks being substantial duplicates. It will be understood, of course, that in commercial practice slight allowance for thickness of material may be made in the dimensions of parts of the blanks properly to fit overlapping parts together, but this is so well understood in the art that for brevity I will hereafter neglect such slight variations and consider such allowances always to be made where necessary, in parts which I will term duplicates. The blank A is suitably attenuated on lines for folding or creasing to present the planar portion or body *a*, end walls *e*, side walls *s*, and, between the proximate edges of the walls integral webs *w* to be developed into corner folds. Each

web, w, of the blank is cut away on a transverse diagonal line t, which connects the outer corners of the contiguous end- and side-walls, and the web is creased on its axial diagonal or median line m, so as to fold inwardly. Thus, each web when set up constitutes a corner fold f which presents two triangular legs, which I will respectively term the "end leg," x, and the "side leg," y, accordingly as they adjoin the end wall, e, and the side wall, s, of the section. For ease in manipulating the blank, the inner end of the fold m may be cut clear through the material as indicated at l.

It will be apparent that when the blank is folded on the crease lines indicated in Fig. 5 (creases on the exterior of the bottom being indicated in dotted lines and the interior corner creases m in full lines), its edge walls will stand at right angles to the body a, and meet at the corner of the section, and the folds f will be inturned each to stand at approximately an angle of 45° to both the side and end walls, and with its median crease-line m at an angle of 45° to the body a, the point p of each fold, formed by the juncture of the median line m with the cut edge t standing midway of the depth of the edge walls. The section A′ is similarly constructed, parts thereof being designated by the character applied to section A, distinguished by the exponent prime (′). It will be noted that when a single blank is thus folded no means are provided therein to maintain the parts in their working position or to prevent complete or partial return of the blank members to unfolded or original position. In the formation of a receptacle from two such blanks, however, the inturned corner folds f and f' of opposite sections, are capable of mutual coaction to prevent the sides and ends of either blank from spreading outwardly, and to hold the sections together in proper functional relation. This coaction between the corner folds may be effected in various ways. For many purposes it is preferable that the end walls of one section and the side walls of the other section be positioned exteriorly, but if desired such assemblage may be made that both the end and side walls of either section may be exteriorly positioned, the walls of the other member being embraced within them. Briefly, the relation of the walls first mentioned may be secured by arranging the legs of the corner folds of one section to alternate with the legs of the corresponding folds of the other section, or otherwise stated, by straddling the legs of each corner fold of one section across one leg only of the corresponding fold of the opposite section. The arrangement with all of the walls of one section standing exteriorly may be secured by positioning the corner folds of that section to be embraced bodily within, or between the legs of, the opposing corner fold.

In the construction shown in Fig. 1, the side walls s of the top section, and the end walls e of the bottom section are exteriorly presented, and in Fig. 2 is shown the interrelation of the corner folds productive of such arrangement. In such view, it will be observed that the bottom fold of bottom section A straddles only the side leg y' of the corner fold of the top section A′, while said fold f' of the top section straddles the end leg x of the coacting fold f. In practically assembling two blanks in this manner, the desired interrelation may facilely be secured by superposing end member e' of the top section on end member e of the bottom section, raising the end wall e of said bottom blank part way toward the vertical position, and then pressing the side walls s of the bottom section inwardly toward vertical position. As the sides move inward, pressure of the leg x of each affected corner fold f against the opposing leg x', serves to draw the side walls s' of the top section inward after the side walls of the bottom section A, and to throw the side legs y' of each of the affected folds of the top section A′ into the angle between the legs x and y of the corresponding fold f of the bottom section. Assemblage of the box is then completed by working on the opposite end in the same general fashion. Obviously, when the remote ends are brought close together, the side walls of the partly-assembled sections all stand in substantially raised position, and the remaining end members are easily brought together in proper relation by pressing in the end wall e' of the bottom section A′, so causing legs y' of the affected folds of the top section to press upon the legs y of the opposing folds of the bottom section, so raising the end wall e of the bottom section with its fold-legs x embraced in the angle between legs x' and y' of the top section. It will be obvious that when the box is fully closed and the opposing corner folds f and f' are fully interlocked, the free or cut edge t and t' of each fold will substantially coincide with the median line m' or m constituting the crease-edge of the opposing fold, the points p and p' of the two folds meeting or coinciding.

The resultant box has many advantageous characteristics, a few of which are capability to be assembled and knocked down a large number of times without deterioration; absence of projecting parts or tabs of any description; easy restoration to flat blank form for storage; and great strength to resist internally applied pressure or exteriorly applied crushing strain when assembled. Touching the matter of strength, it will be observed that the interlock arrangement with the plies of the folds alter-

nating as described makes it practically impossible for the edge walls to spread at the corners under internal pressure without rending the material apart, because not only do the folds appurtenant to each exterior wall point inwardly behind the corresponding wall of the other section at an angle of 45°, but, further, each fold appurtenant to an exterior side wall embraces the end leg of the coöperating fold of the other section. Furthermore, it will be observed that the interlocked, infolded corners constitute strong trusslike struts or pillars extending in four-fold thickness from the top plane to the bottom plane of the box, effectually to resist crushing strains upon the receptacle.

While I have specifically described, the arrangement indicated in Figs. 1, 2, and 3, wherein the end walls e of the bottom section A and the side walls s' of the top section A′ are exteriorly positioned, it will be apparent that such arrangement may be reversed, as diagrammatically illustrated in Fig. 4, the end walls e' of the top section A′ and the side walls s of the bottom section A being respectively exteriorly positioned.

As a refinement of my invention, particularly advantageous where maximum strength is desired, I find it practical to increase the strength of each corner fold without the use of any extraneous part by the form of construction illustrated in Figs. 6 to 10. In such embodiment of the invention, I use blanks as shown at A^2, Fig. 6, instead of cutting away the corner web of each blank on its transverse diagonal t, I fold the square web w^2 along its diagonal t^2 as shown in the lower right corner of Fig. 6, thereby to double the material to be incorporated into the corner fold f^2. The blank with its corners thus double may be employed in any of the arrangements shown in Figs. 3, 4, and 5, the arrangement indicated in Figs. 7 to 10 corresponding with that shown in Figs. 2 and 3 of the views heretofore described. Like parts are indicated by the same characters used in Figs. 1 to 5, but with the exponent 2.

The susceptibility of my invention to embodiment in different forms is herein shown, and in any of its embodiments illustrated, it provides a cheap, strong, durable, and easily manipulated construction, but it will be understood that by such showing of several embodiments of my invention, I do not intend to limit its application to the few specific forms shown, but that to the contrary, many other changes might be made in the embodiment of the invention without departure from its spirit and within the scope of the appended claims.

What I claim is:

1. A paper box comprising top and bottom sections providing at corresponding corners inturned interengaging corner folds, each fold having its two legs straddling one leg of the corresponding fold of the other section.

2. A paper box consisting of a top section and a bottom section, each having in an integral structure a body, an end wall, a side wall, and a corner web inturned to constitute a corner fold having its fold edge lying in an axial diagonal of the web, and its free edge not extending beyond the transverse diagonal of said web, said corner folds of opposite sections interengaging with the folded edge of each fold straddling the free edge of one leg of the opposite fold.

3. A paper box consisting of a top section and a bottom section, each having in an integral structure a body, an end wall, a side wall, and a square corner web folded upon itself on its transverse diagonal and folded inwardly on its axial diagonal to form a corner fold presenting opposing triangular legs each of double thickness, each said corner fold of a box section interengaging with the opposite corner fold of the other box section to straddle one leg of said opposite corner fold and to have one of its legs straddled by said opposite corner fold.

4. A paper box consisting of a top section and a bottom section, each having in an integral structure a body, an end wall, a side wall, and a corner web, the corner webs of the two sections of the box being duplicates, each constructed and arranged to straddle one leg of the corresponding web of the opposite section.

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

JOSEPH R. MYERS.

In the presence of—

W. LINN ALLEN,

MARY F. ALLEN.