April 18, 1939. K. W. MACDONALD 2,154,950

METHOD OF MAKING BOXES

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Fig. 1.

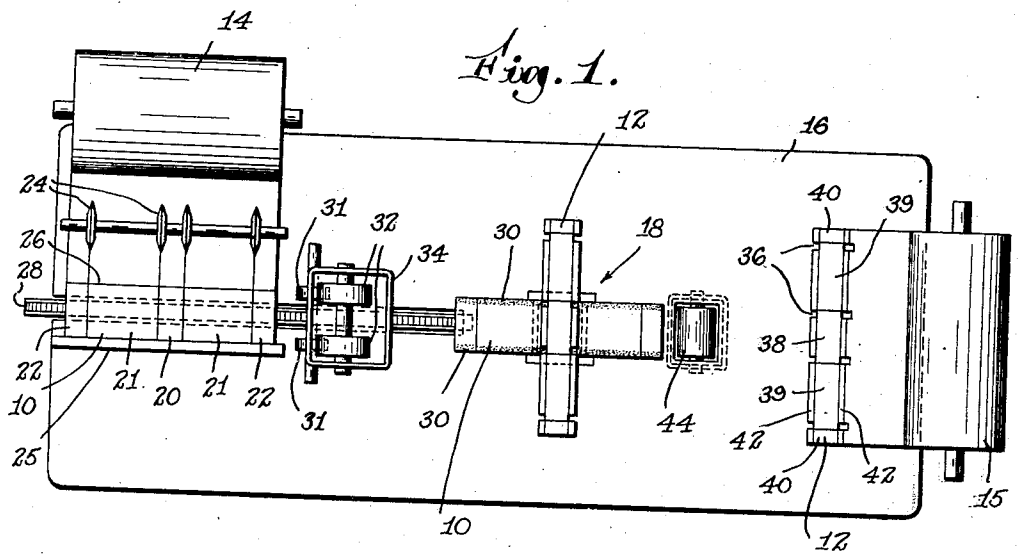
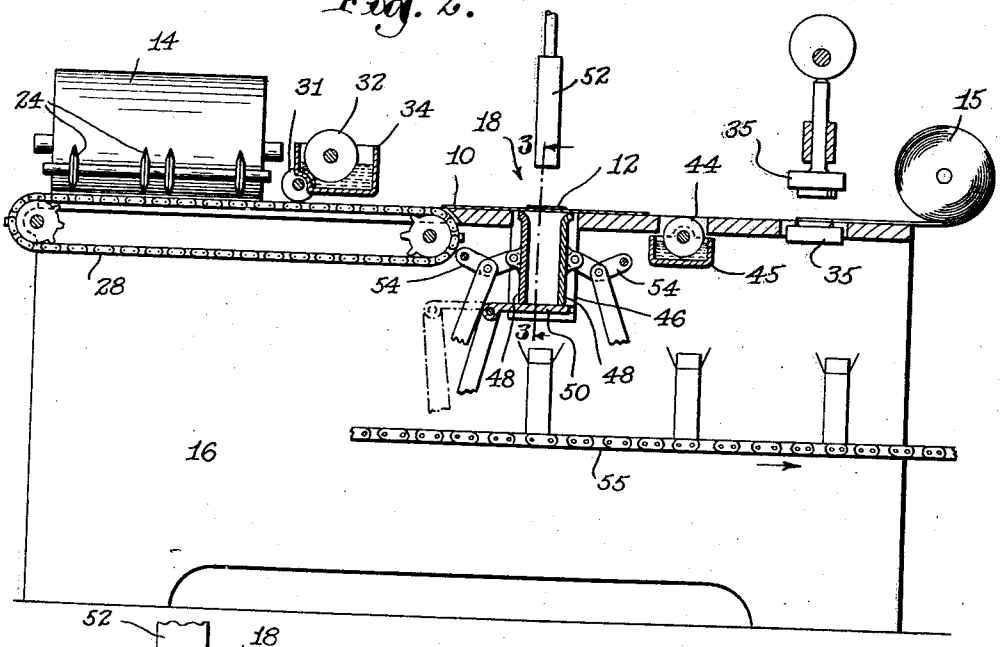


Fig. 2.



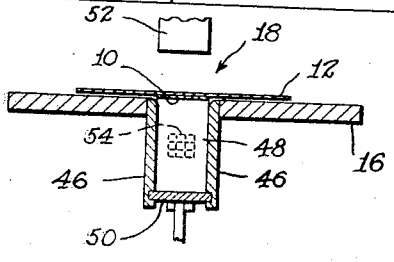


Fig. 3.

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Fig. 6.

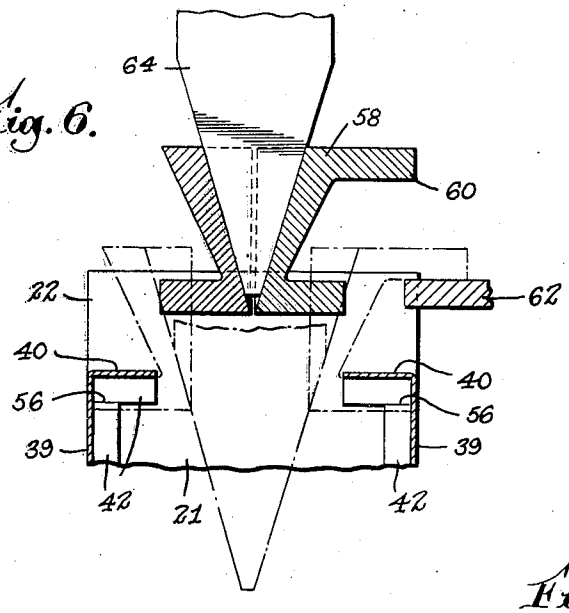


Fig. 4.

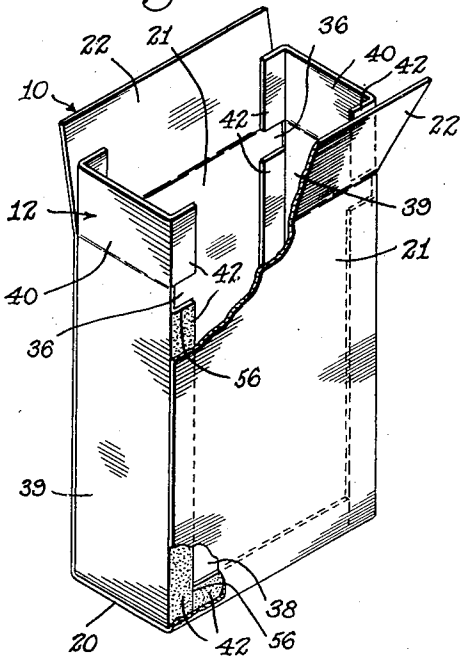
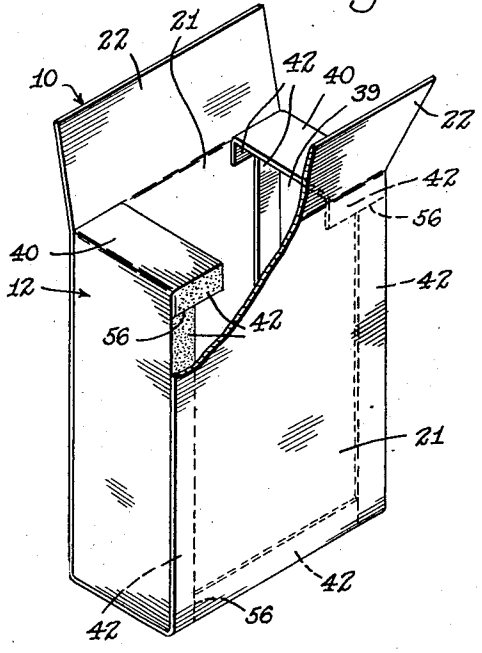


Fig. 5.



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UNITED STATES PATENT OFFICE

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METHOD OF MAKING BOXES

Kenneth W. Macdonald, Watertown, Mass.

Application December 16, 1936, Serial No. 116,132

8 Claims. (Cl. 93—39)

This invention relates to boxes of pasteboard or the like which are constructed from blank sheet material folded and sealed into box form. The many and various folding boxes or cartons now in use are commonly constructed from a single sheet blank folded along scored lines and sealed into box form on the joined edges of the blank. The well known tubular folding carton constructed in such manner has both ends open and remains in flat collapsed condition until set up by the consumer at which time the carton is brought to container form and the ends tucked in. Another type is the set-up one-piece box wherein one end is sealed and the other end left open for filling. Such boxes constructed from a single sheet blank entail a considerable waste of material and a considerable amount of work in setting up the boxes for use and the resulting boxes are relatively weak and not sufficiently tight to hold and protect the contents. The primary object of my invention is to produce an improved box of this nature more economically and without waste of material or labor in producing and setting up the box and a box not only having greater strength and greater resistance against crushing but also a sift-proof box wherein the joints are formed so tightly that powder and even liquids or semi-liquids may be contained therein without loss.

My invention contemplates the construction of a box from two rectangular blanks superposed in right angular relation one on the other. Not only can such blanks be cut from strips of material without waste, but such construction also lends itself to the convenient and speedy manufacture of the box automatically. The blanks can be cut from strip stock as required or they may be previously prepared and fed from magazines to the box-forming position. It is necessary that the blanks be creased for folding and that adhesive be suitably applied to the surfaces to be overlapped and sealed, and the method herein disclosed readily adapts itself to the performing of these operations during movement of the blanks to said position.

Sealing flaps are formed preferably on only one of the two blanks, such blank being otherwise of straight rectangular outline. When the two creased and adhesive treated blanks have been brought to the superposed and box forming position they are automatically folded to box form and flat pressure is applied to both opposing surfaces of the overlapping bottom and the corner flaps whereby forming a secure flat seal under high pressure at these joints. Thus a double walled bottom is formed and strong and fully closed seals are effected along the side walls at the junctions of the two blanks. The box may thereupon be passed to the filling machine and filled and top sealed in the usual manner.

The improved box is thus formed most economically from two rectangular blanks and is provided with a double walled bottom and fully closed and reinforced joints providing great resistance to crushing pressure and forming a sift-proof and leak-proof container. It may for some purposes be desirable also to reinforce the box at its top end and my invention is furthermore adapted thus to form a box by sealing the extreme end portions of one of the blanks to and between the other blank at the top end of the box and in such relation as to leave a filling opening therebetween, the extreme ends of the said other blank being left free to fold over and provide a sealing closure for the box end after filling.

These and other features of the invention will be best understood and appreciated from a preferred embodiment of the box and the method of producing the same selected for purposes of illustration and shown in the accompanying drawings in which,

Fig. 1 is a diagrammatic plan view illustrating the manufacture of my improved box,

Fig. 2 is a side elevation thereof,

Fig. 3 is a detailed sectional view taken on line 3—3 of Fig. 2,

Fig. 4 is a perspective view of the box,

Fig. 5 is a like view of the box slightly modified,

Fig. 6 is a fragmentary sectional view illustrating a step in the manufacture of the box shown in Fig. 5.

The primary object of my invention resides in the production of a superior box more simply and economically and without waste of material. Such box will ordinarily be of rectangular shape and in the accompanying drawings I have illustrated a box of this shape constructed from two rectangular blanks 10 and 12 placed in right-angular relation one upon the other. The blanks may be cut from strip stock which stock may be in roll form when the weight and character of the stock permit.

In the drawings I have illustrated the stock as being supplied from two rolls 14 and 15 of paper mounted on the base 16 of a box forming machine. The blanks 10 and 12 are cut from the strips 14 and 15 by any suitable means and are carried to a common center 18 wherein the intermediate portion of the blank 12 is superposed in right-angular relation on the intermediate por-

tion of the blank 10. It will be understood that such mechanism as is illustrated in the drawings is quite diagrammatic and is presented only for the purpose of aiding in disclosing the method.

The bank 10 is of plain rectangular form and is creased transversely to provide an intermediate section 20, two side wall sections 21 and two end sections 22. These folding creases may be conveniently formed by four rollers 24 positioned to crease the stock as it passes from the roll 14. The stock moves into engagement with the stop 25 and is then severed along the line 26. The blank thus produced is then moved longitudinally, as by means of a conveyor 28, to the position indicated at 18. During this movement the marginal edges 30 of the top face of the blank are coated with an adhesive, as by means of two rollers 31 acting against two rollers 32 running within an adhesive box 34.

The blank 12 is cut from the stock as it comes from the roll 15. Any suitable means may be provided for feeding the stock to a die 35 where the blank is formed and for then carrying the blank to the point 18 and in position superposed over the blank 10. The die is constructed not only to sever the blank from the stock and notch longitudinal edge portions at 36, but also to crease the blank transversely to provide an intermediate section 38, two side wall sections 39 and two end sections 40, and longitudinally along the edges to provide sealing flaps 42. During movement of the blank from the die to the position 18, the bottom face of the intermediate section 38 contacts with a roller 44 within an adhesive box 45 whereby a coating of adhesive is applied to such face.

A folding and sealing form, comprising two stationary plates 46, two movable plates 48 and a bottom plate 50, is located directly beneath the position 18, the top ends of the plates 46 and 48 being flared outwardly. When the two blanks have been brought to the superposed position shown in Fig. 1, a form 52 conforming to the interior of the proposed box is brought downwardly on the proposed intermediate section in a manner causing the non-superposed sections of the blanks to fold together substantially to the position illustrated in Fig. 4. The superposed bottom sections 20 and 38, with adhesive therebetween applied by the roller 44, are thereupon sealed by the application of opposed pressure of and between the form 52 and the bottom plate 50. The adhesive treated marginal portions 30 of the side wall sections 21 are in like manner sealed to the flaps 42 of the blank 12 by the application of opposed pressure of and between the form 52 and the movable plates 48, this pressure being provided by toggle joints 54 connected to the plates. The box shown in Fig. 4 is now completed and may be dropped on to the conveyor belt 55 of a filler machine upon lateral movement of the bottom plate 50 to the broken line position and the application of suitable extracting means for engaging and withdrawing the box.

The box shown in Fig. 4 has a fully open top end which may be closed and sealed by folding the end sections 40 inwardly to a horizontal position and then folding and sealing the top end sections 22 in overlapping relation thereonto. The bottom of the box and the overlapped corner portions are double-walled and the side walls 21 are supported against crushing pressure by the walls 39 therebetween and sealed directly to the inner faces thereof. The box as thus constructed is exceedingly strong and rigid. It will also be noted that the notches 36 are so formed that in folded box forming position the ends of the flaps 42 abut squarely into engagement with the adjacent flaps at 56 thereby providing full and complete closure at the junction of the two sections 10 and 12.

In some cases where the box is to carry very heavy contents it may be desirable to provide additional reinforcement at the top end, and in Fig. 6 I have illustrated a further step of thus constructing my box. As thus illustrated a collapsible form 58 is shown in conjunction with the top end of the box. In collapsed condition the form readily passes between the folded-in end sections 40. When the form has reached a position wherein the bottom anvil portions thereof are beneath the sections 40, an outwardly projecting arm 60 engages a stop 62 and prevents further downward movement of the form. Continued downward movement of a wedge 64 located between the two halves of the form thereupon acts to expand these form halves to a position within the folded sections 40. Inward movement of the plates 48 thereupon apply opposed sealing pressure to the flaps of these sections and thereby seal the same securely to the side walls 21. Thus is produced a box which is reinforced on all four sides.

The advantages presented by my invention, both in the box and in the method of producing the same, are numerous. The double-walled bottom and the reinforced corners, all flat-sealed under heavy pressure, produce an exceedingly strong and rigid box having great resistance to crushing pressures. The double-walled bottom in conjunction with the sealing flaps 42 and the closed butt engagement 56 of the flaps at their notched ends provides a tight joint at the junction of the blanks 10 and 12 which joint is not only sift-proof against the escape of powder contents, but furthermore proof against the escape of liquid contents. The walls 39 located between and sealed to the walls 21 reinforce the box against crushing pressure.

In manufacturing the box from the two blanks as described, no material is wasted and the blanks can be cut directly from sheet stock in flat or rolled form. The creasing and adhesive applications are along straight lines whereby these operations can be conveniently performed during the movement of the blanks to the box forming position 18. The use of the two strips permits the manufacture of a box of two different colors or having its side walls of different character. In some cases it may be possible to use relatively thin and cheaper stock for the narrower side walls 12, greater stiffness being required for the broader side walls 10 which might otherwise bulge or buckle. The use of two blanks also simplifies printing and permits the printing of one blank on its inside face and the other blank on its outside face, thus providing for printing interiorly and exteriorly of the box. It will furthermore be understood that the box can be used for various purposes such as breakfast food, soap powders, ice cream boxes, such small hardware as screws, etc.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:—

1. The method of making a box which consists of providing blank stock at two relatively spaced points, moving two blanks respectively from said points along predetermined paths to a common center wherein one blank extends transversely of

and is partly superposed in face to face contact on the other blank, applying adhesive at said paths to certain faces which are in contact with opposed faces of the other blank when the blanks are in box form, folding the non-superposed portions of the blanks into position bringing certain of said faces into contact, and sealing the blanks together by the application of opposed pressure to the overlapped and adhesive treated portions thereof.

2. A method of making a box which consists in providing blank stock at two relatively spaced points, moving two blanks respectively from said points along predetermined paths to a common center wherein one blank is partly superposed in face to face contact on the other blank, applying adhesive to portions of said blanks during such movement, folding the non-superposed portions of the blanks into overlapping contact to form a box, and sealing the blanks together by the application of opposed pressure to the overlapped and adhesive treated portions thereof.

3. A method of making a box which consists in providing blank stock at two relatively spaced points, moving two blanks respectively from said points along predeterminer paths to a common center wherein the intermediate portion of one blank is superposed in face to face contact on the intermediate portion of the other blank, applying adhesive to the side edge face portions of one blank and to that intermediate surface of one blank which faces the other blank, folding the non-superposed portions of the blanks into box forming position with said adhesive treated side edge portions in surface contact with the other blank, and sealing the blanks by the application of opposed pressure to the adhesive treated portions thereof.

4. A method of making a box which consists in moving a rectangular blank endwise along a predetermined path to an assembling position, moving a second rectangular blank sidewise along a predetermined path to said position, wherein the blanks are in overlapped relation, applying adhesive to certain faces which are in contact with opposed faces of the other blank when the blanks are in box form, folding the non-overlapped portions of the blanks into position bringing certain of said faces into contact, and sealing the blanks together by the application of opposed pressure of the overlapped and adhesive-treated portions thereof.

5. A method of making a box which consists in moving a blank along a straight path, creasing the blank along a plurality of lines during such movement, moving the creased blank along a straight path rightangular to the first named path to an assembling position, moving a second blank along a straight path parallel with the second named path to said position wherein the blanks are in overlapped relation, applying adhesive to certain faces which are in contact with opposed faces of the other blank when the blanks are in box form, folding the non-overlapped portions of the blanks along creased lines including certain of the first mentioned lines and into position bringing certain of said faces into contact, and sealing the blanks together by the application of opposed pressure to the overlapped and adhesive treated portions thereof.

6. A method of making a box which consists in providing two portions of strip stock at points remote from a predetermined assembling position, shearing two rectangular blanks respectively from such stock and creasing the blanks, moving the blanks along predetermined paths to a common center where one blank extends transversely of and is partly superposed in face to face contact on the other blank, applying adhesive at said paths to certain faces which are in contact with opposed faces of the other blank when the blanks are in box form, folding the non-superposed portions of the blanks into position bringing certain of said faces into contact, and sealing the blanks together by the application of opposed pressure to the overlapped and adhesive treated portions thereof.

7. A method of making a box which consists in providing two portions of strip stock at points remote from a predetermined assembling position and with the forward edge of one strip rightangular to the forward edge of the other strip, shearing two rectangular blanks respectively from the forward ends of such stock and creasing the blanks, moving the blanks, one sidewise and the other endwise, along predetermined paths to a common center wherein one blank extends transversely of and is partly superposed in face to face contact on the other blank, applying adhesive at said paths to certain faces which are in contact with opposed faces of the other blank when the blanks are in box form, folding the non-superposed portions of the blanks into position bringing certain of said faces into contact, and sealing the blanks together by the application of opposed pressure to the overlapped and adhesive treated portions thereof.

8. The method of making a rectangular box which consists of providing supplies of blank stock at two relatively spaced points, feeding a blank from one of said supplies into overlapping relation with a blank from the other supply and to a common assembling position wherein said one blank extends transversely of and has an intermediate portion superposed in face to face contact on an intermediate portion of the other blank, folding the non-superposed portions of the blanks into position wherein the edges of one blank overlap the other blank along the side walls and along the top portion of a box thus formed and the bottom of which comprises said superposed intermediate portions of the blanks, and sealing the blanks together by the application of opposed pressure to the overlapped portions thereof which portions have been previously treated with adhesive.

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