Feb. 28, 1933. J. H. STORTZ 1,899,652

MACHINE FOR MAKING PASTEBOARD BOXES

Filed May 16, 1930 2 Sheets-Sheet 1

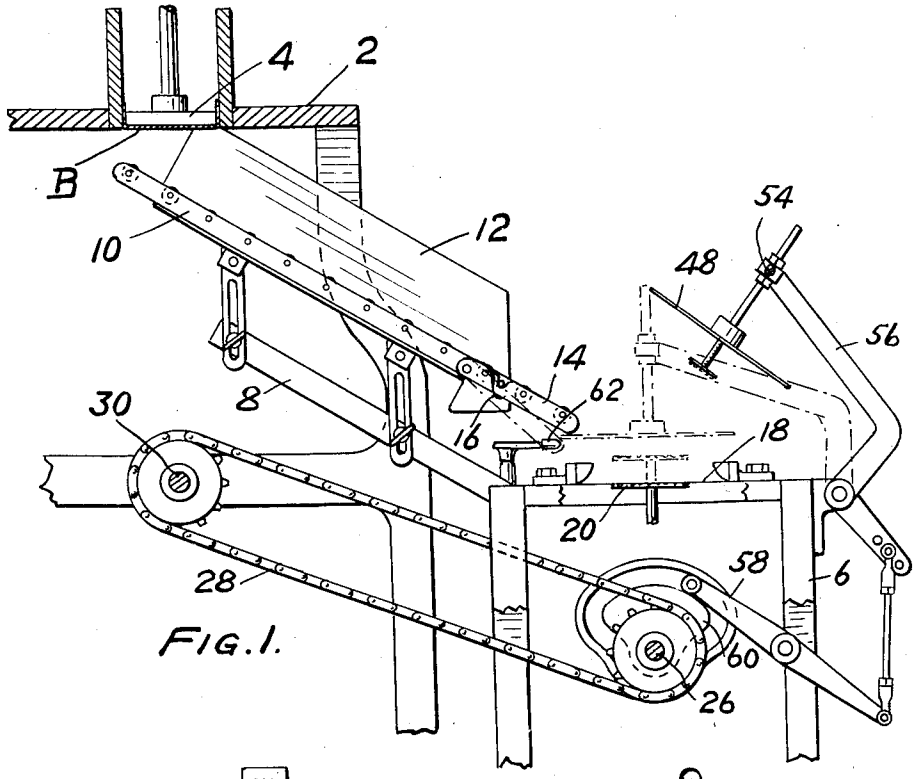


FIG. 1.

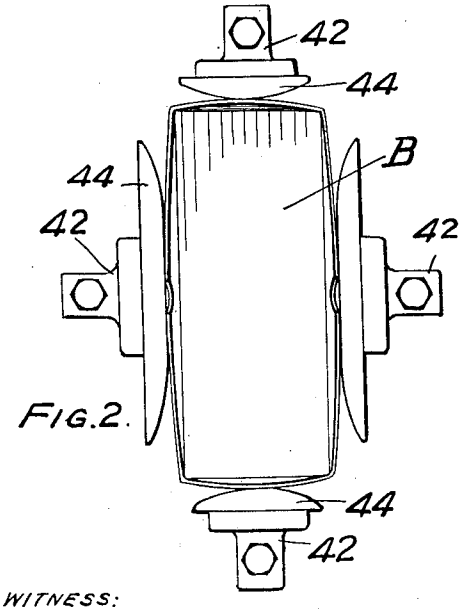


FIG. 2.

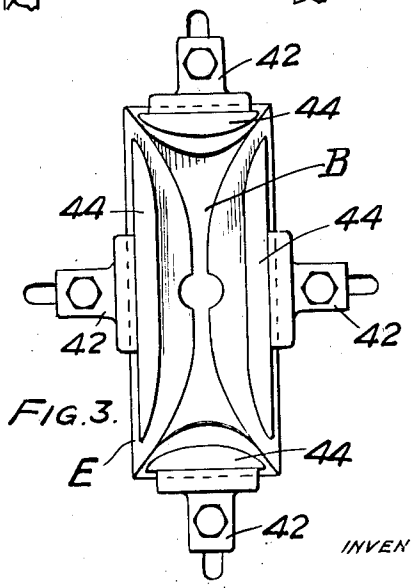


FIG. 3.

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FIG 4.

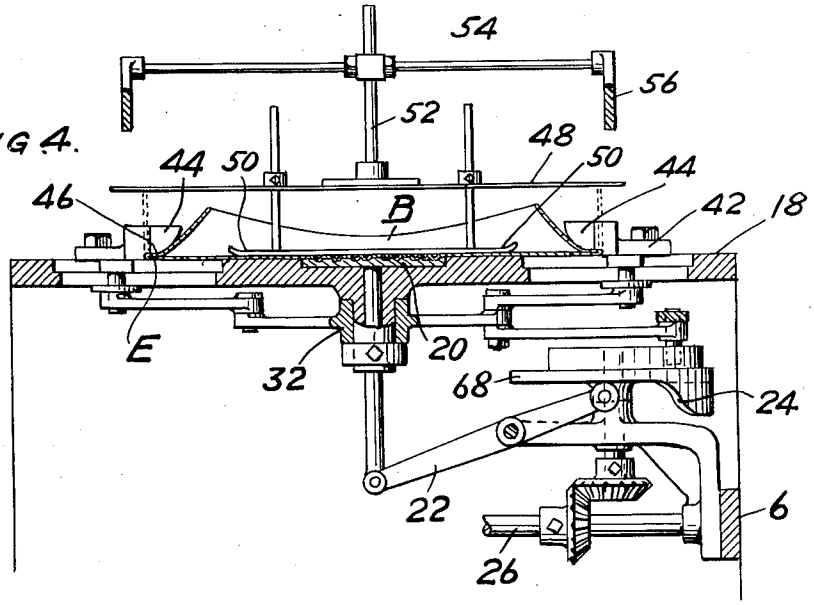


FIG. 5.

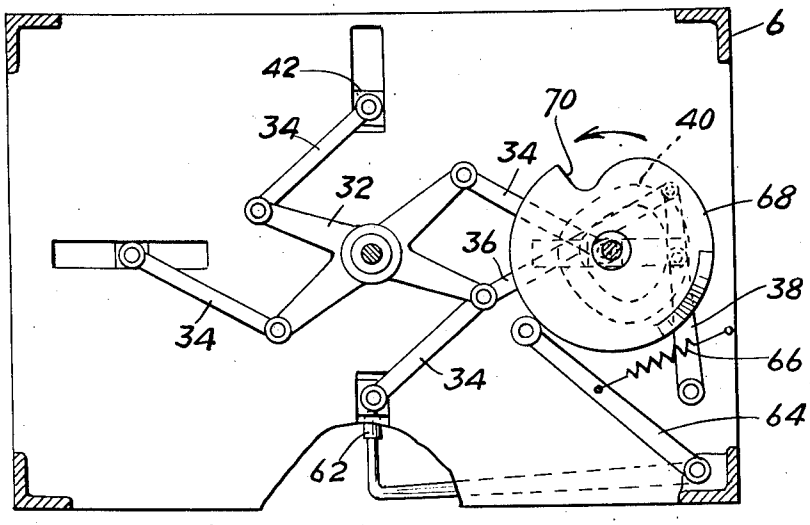
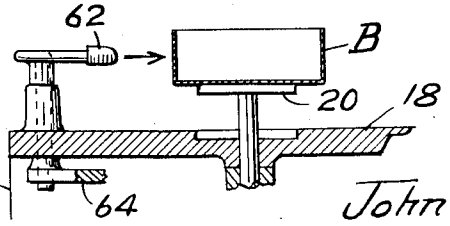


FIG. 6.



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UNITED STATES PATENT OFFICE

JOHN H. STORTZ, OF PHILADELPHIA, PENNSYLVANIA

MACHINE FOR MAKING PASTEBOARD BOXES

Application filed May 16, 1930. Serial No. 452,849.

This invention relates to a machine for making pasteboard boxes, and more particularly to a mechanism for bending inwardly the sides of a rectangular box so that they will maintain an upright position.

Heretofore it has been customary to form a pasteboard box, or to provide a formed pasteboard box with a cover of glazed or decorated paper or the like in one machine and to thereafter manually transfer the box to a machine adapted to bend inwardly the sides thereof so as to maintain them in upright position at right angles to the main portion of the box bottom or lid. By means of the machine described and claimed in my Patent No. 1,730,543, dated October 8, 1929, it is possible to effect the automatic transfer of boxes from the forming machine in which the boxes are formed into shape or formed and covered with the glazed paper to a machine in which the sides are bent inwardly so that they will thereafter maintain the desired upright position.

It is the broad object of the present invention to improve the machine disclosed in said patent. More specifically, it is one object of this invention to modify my prior machine so that it will properly handle boxes and lids of relatively thin pasteboard and which are not wrapped with cover paper, and which have therefore but little rigidity.

It is a further object of the invention to provide means for marking the boxes by embossing or the like during the bending operation.

Other objects of the present invention relate to details of construction and will become apparent from the following description, read in conjunction with the accompanying drawings, in which:

Fig. 1 is a side elevation of the improved machine partly in section;

Fig. 2 is a diagrammatic plan view illustrating the cooperation of the movable jaws with a box or lid;

Fig. 3 is a view similar to Fig. 2 showing a later stage of the operation;

Fig. 4 is a vertical section through the central portion of the bending mechanism;

Fig. 5 is a bottom plan view of the operating mechanism; and

Fig. 6 is a sectional view taken at right angles to Fig. 4 illustrating the discharge mechanism.

It will be understood that the present mechanism is arranged to handle not only box bottoms, but also box lids and where the term "box" is used hereafter, it is intended to include the lid, and similarly the word "bottom", as applied to the box bottom, is intended to include the word "top", as applied to the lid.

There is indicated at 2 a portion of the forming machine wherein the box is formed. In the case of the thin boxes which the mechanism is designed to handle it is not usual to cover the boxes with paper; but the improved mechanism is, of course, applicable to boxes of heavier type. This machine 2, which is of a usual type, includes a plunger 4 which moves the box B downwardly and ejects it from the machine. These boxes ejected by the plunger 4 are operated upon by the bending mechanism as will be hereinafter pointed out.

The bending mechanism in its improved form comprises a frame 6 which carries the bracket 8 on which is adjustably supported the chute 10 provided with antifriction rollers at its bottom and laterally adjustable side guide members 12. The chute is provided at its lower end with an extension 14 which is yieldingly held upward in the full line position indicated in Fig. 1 by a light spring 16, being movable to the dotted line position for a reason hereafter pointed out. Boxes received from the machine 2 are discharged by the chute 10 upon the table 18 of the bending machine in which is located the plunger plate 20 which normally has its upper surface in the plane of the surface of the table. This plate is connected, through a rod slidably mounted in the table as indicated in Fig. 4, with the end of the lever 22, the opposite end of which carries a follower roller acted upon by a cam 24 on a stub shaft driven through suitable gearing from the main shaft 26 of the bending machine, which is driven in timed relationship with the forming ma-

chine by a chain 28 trained about sprocket wheels of the shaft 26 and the main shaft 30, or other suitable continuously driven shaft of the forming machine. By reason of this drive, the two machines are driven in properly timed relationsihp so that upon discharge of a box from the forming machine it is acted upon at the proper time by the bending machine.

Pivoted to the under side of the table 18 is a spider 32 having four arms which are link connected through links 34 with the jaws 42 slidable toward a common center in slots in the table 18. Oscillatory movements are imparted to the spider 32 through a link 36 connected to a lever 38 which carries a follower in a cam groove 40 also mounted on the stub shaft, which carries the cam 24. This cam groove 40 is so shaped that dwells are imparted to the jaws 42 at the inward and outward extremes of their movements, each of the dwells lasting preferably during about one fourth of a revolution of shaft 26. By the provision of the dwells there is provided a sufficiently lengthy period during which the jaws are retracted and the box may be received therebetween; and also the jaws maintain the sides pressed inwardly sufficiently long to insure permanent distortion resulting in proper positioning of the sides. These dwells are accordingly very advantageous for rapid operation.

The jaws 42 contain replaceable portions 44 adapted to contact with the sides of the box, which portions are preferably formed of wood which may be readily shaped to proper form. Various shapes of portions 44 may be supplied to take care of different types of boxes. The carrying portions of the jaws are formed of metal. As illustrated most clearly in Fig. 4, the wooden portions 44 of the jaws are undercut as indicated at 46, whereby there are formed between these portions and the table, openings in which may be received the bottoms and sides of boxes adjacent their junctions when the sides lie substantially flatwise against the bottoms. It is preferable to so arrange the parts that the sides and bottoms are brought into extended contact, as shown at E, particularly when the boards are thin, although it will be understood that for satisfactory operation the sides need only be brought into substantial flatwise engagement with the bottoms so long as the angle between the side and the bottom is made sufficiently small and acute so that a permanent distortion occurs which will serve to maintain the sides at substantially right angles to the bottom when the box is released. It will be noted that the jaws terminate a short distance in front of the opening 46 so that the free upper edges of the sides may form larger angles with the bottom than the portions of the sides at the junction. This is particularly desirable when deep boxes or lids are operated upon, since breakage of the vertical junctions between the sides is thereby avoided and the free ends of the sides are not brought into contact. This will be clear from an inspection of Fig. 3.

It is desirable to place and maintain the boxes in properly fixed position upon the table 18 during operation of the jaws. Accordingly there is provided a holding means comprising a plate 48 which carries either one or a plurality of presser feet 50 adapted to press the bottom of the box against the table, as indicated in Fig. 4. The adjustment is made such that the plate 48 engages the tops of the sides of the box or lid prior to the operation of the jaws 44 as is indicated in dotted lines. The plate 48 is carried by a rod 52 adjustable in a rod 54 extending between two levers 56 carried by a shaft pivoted in the frame, the shaft also having an arm link-connected to the lever 58 which is provided with a cam follower operating in the groove of the cam 60 which operates to positively oscillate the lever to move the presser feet and plate 48 towards and from the table.

When the boxes are formed of thin material, the fold lines are defined only by scored lines. Accordingly the bottoms of the boxes discharged from the forming machine are generally convex outwardly. It is the object of plate 48 to force the sides downwardly so as to flatten the bottom by pressing the scored lines into contact with the table. The presser foot 50, besides its function hereafter described, prevents the bottom from bulging upwardly during inward movements of the jaws 42.

After the operation of the jaws is completed, that is, after they have been held inwardly in engagement with the sides for a period determined by the dwell in the cam groove 40, the jaws are retracted and the plunger plate 20 is moved upwardly to carry the box above the table 18 into the position indicated in Fig. 6, the box being then above the tops of the jaws. The box is ejected from the machine by a lever 62 which is mounted on a shaft carrying an arm 64 having a cam follower maintained in engagement with the periphery of a cam 68 by a spring 66, the cam being provided with a depression 70 into which the follower may drop suddenly under the action of the spring and thereby cause the ejection of the box B from the machine.

By the above arrangement there is provided a machine which will not only handle boxes having sides of relatively slight height but also deep boxes, these latter being properly manipulated by reason of the creasing imparted at the junctions E between the sides and the bottoms.

The purpose of the yielding extension 14 of the chute is to enable the plate 48 to be

moved into its operative position, since the plate should engage the top edges of the box and since the chute desirably extends inwardly to such position that the box in following will clear the nearest jaw. By so arranging the chute it is unnecessary to provide stops to properly align the boxes between the jaws.

It is frequently desirable to mark, by embossing, printing, or application of letters of metallic leaf, either the inside or outside of the lid or bottom of a box with a trade-mark, merchant's name, or instruction or other information. This marking may be readily accomplished during the bending of the sides. For example, embossing may be performed by forming the upper and lower faces of plate 20 and foot 50, respectively, with cooperating depressions and projections to form cooperating die members adapted to impress a trade-mark, or the like, in the lid as illustrated in Fig. 4. To perform a printing operation, it is only necessary to provide a suitable inker to apply ink to type formed on the plate 20 or die 50. Metallic leaf may be applied by moving the leaf over the table above the plate 20 which may be formed with suitable projecting type and be heated, for example, by an internal electrical coil, to effect adhesion of the portions of leaf corresponding to the type to the box.

Instead of merely marking the box with characters, the foot 50 may be convex and the plate 20 concave, or vice versa, to form a convex or concave lid or bottom, or, in other words, emboss the entire lid or bottom. Partially or totally domed lids are particularly attractive and may be readily produced, suitable heating devices being provided where necessary to insure permanent distortion.

What I claim and desire to protect by Letters Patent is:

1. Mechanism for bending inwardly the sides of a box of flexible material including a support for the box, a plurality of inwardly movable jaws arranged to engage the sides of the box, and means for holding the box in engagement with the support during operation of the jaws.

2. Mechanism for bending inwardly the sides of a box of flexible material including a support for the box, a plurality of inwardly movable jaws arranged to engage the sides of the box, and means for holding the box in engagement with the support during operation of the jaws, said means being arranged to engage the sides of the box prior to their inward movement under the action of the jaws.

3. Mechanism for bending inwardly the sides of a box of flexible material including a support for the box, a plurality of inwardly movable jaws arranged to engage the sides of the box, a chute for guiding boxes to the support between the jaws, and means for holding the box in engagement with the support during operation of the jaws.

4. Mechanism for bending inwardly the sides of a box of flexible material including a support for the box, a plurality of inwardly movable jaws arranged to engage the sides of the box, a chute for guiding boxes to the support between the jaws, and means for holding the box in engagement with the support during operation of the jaws, said chute having a yielding end adapted to be moved to permit the location of the holding means in operative position.

5. Mechanism for bending inwardly the sides of a box of flexible material including a support for the box, a plurality of inwardly movable jaws arranged to engage the sides of a box, and means for imparting inward and outward movement to the jaws, said means including a cam arranged to impart a dwell to the jaws in their inner positions.

6. Mechanism for bending inwardly the sides of a box of flexible material including a support for the box, a plurality of inwardly movable jaws arranged to engage the sides of a box, and means for imparting inward and outward movement to the jaws, said means including a cam arranged to impart a dwell to the jaws in their outer positions.

7. Mechanism for bending inwardly the sides of a box of flexible material including a support for the box, a plurality of inwardly movable jaws arranged to engage the sides of a box, and means for imparting inward and outward movement to the jaws, said means including a cam arranged to impart a dwell to the jaws in both their inner and outer positions.

8. Mechanism for bending inwardly the sides of a box of flexible material including a support for the box, a plurality of inwardly movable jaws arranged to engage the sides of a box, and means for marking the bottom of the box during the operation of the jaws.

9. Mechanism for bending inwardly the sides of a box of flexible material including a support for the box, a plurality of inwardly movable jaws arranged to engage the sides of a box, and means for embossing the bottom of the box during the operation of the jaws.

10. In combination, a machine for forming a box of flexible material, means for bending inwardly the sides of a box including a plurality of movable jaws, and a chute for guiding boxes from the forming machine to a position between the jaws, said forming machine discharging boxes vertically directly into the chute.

In testimony of which invention, I have hereunto set my hand, at Philadelphia, Pennsylvania, on this 14th day of May, 1930.

JOHN H. STORTZ.