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S. BERGSTEIN

PAPER BOX MAKING MACHINE

Filed Jan. 23, 1925

3 Sheets-Sheet 1

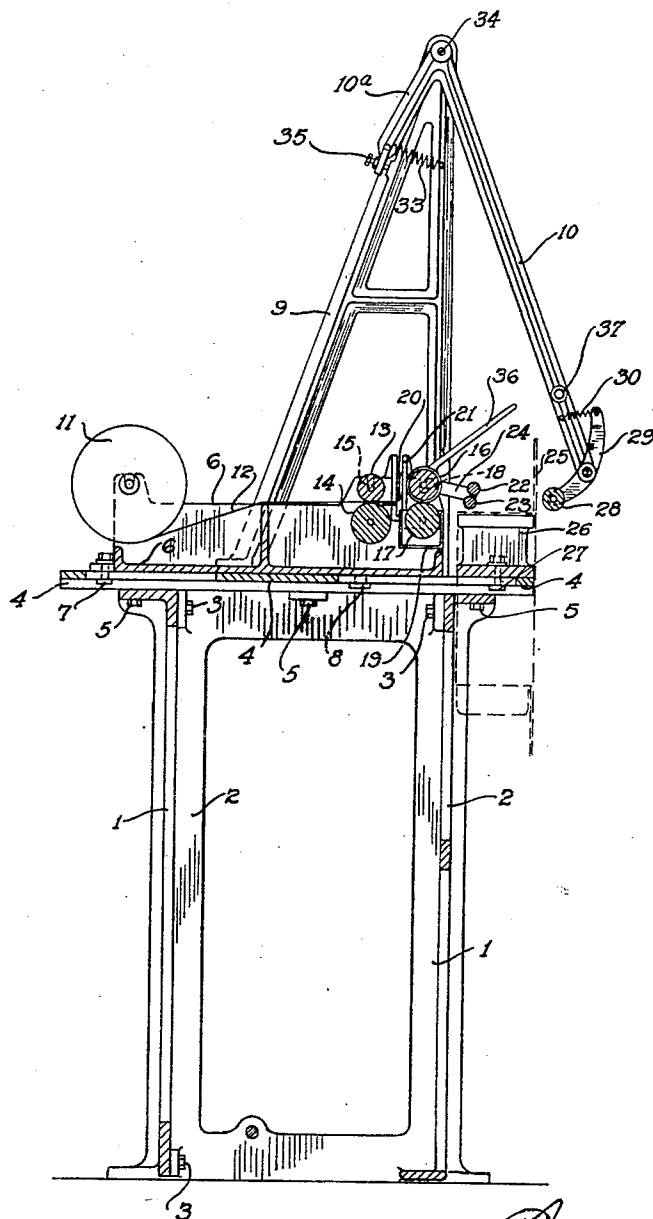


Fig. 1.

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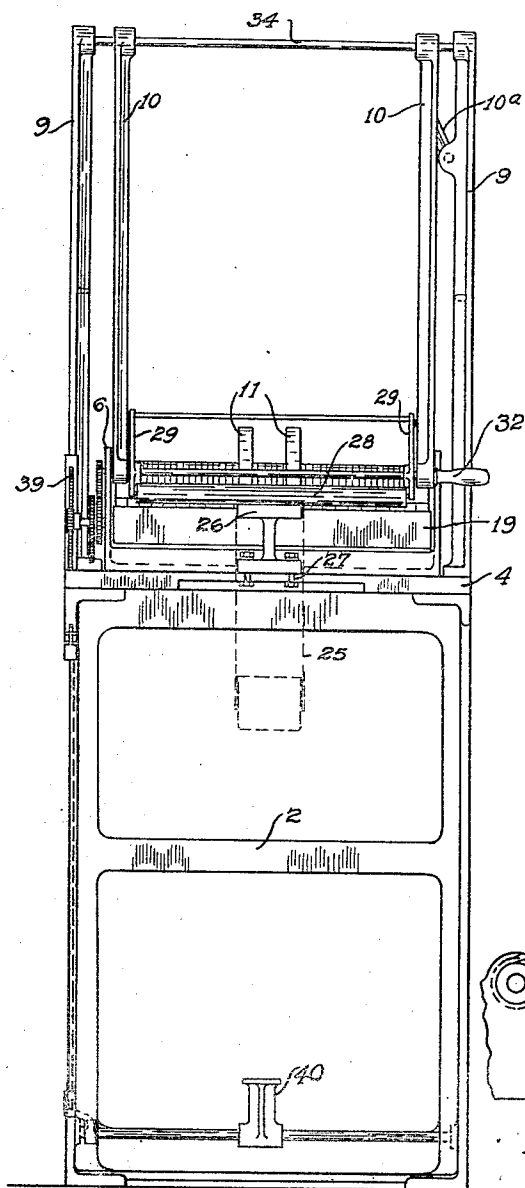


Fig. 2.

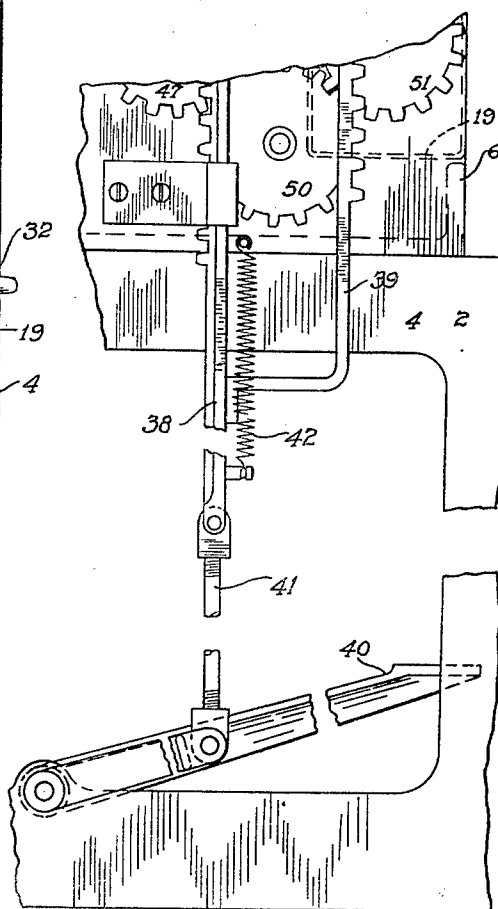


Fig. 3.

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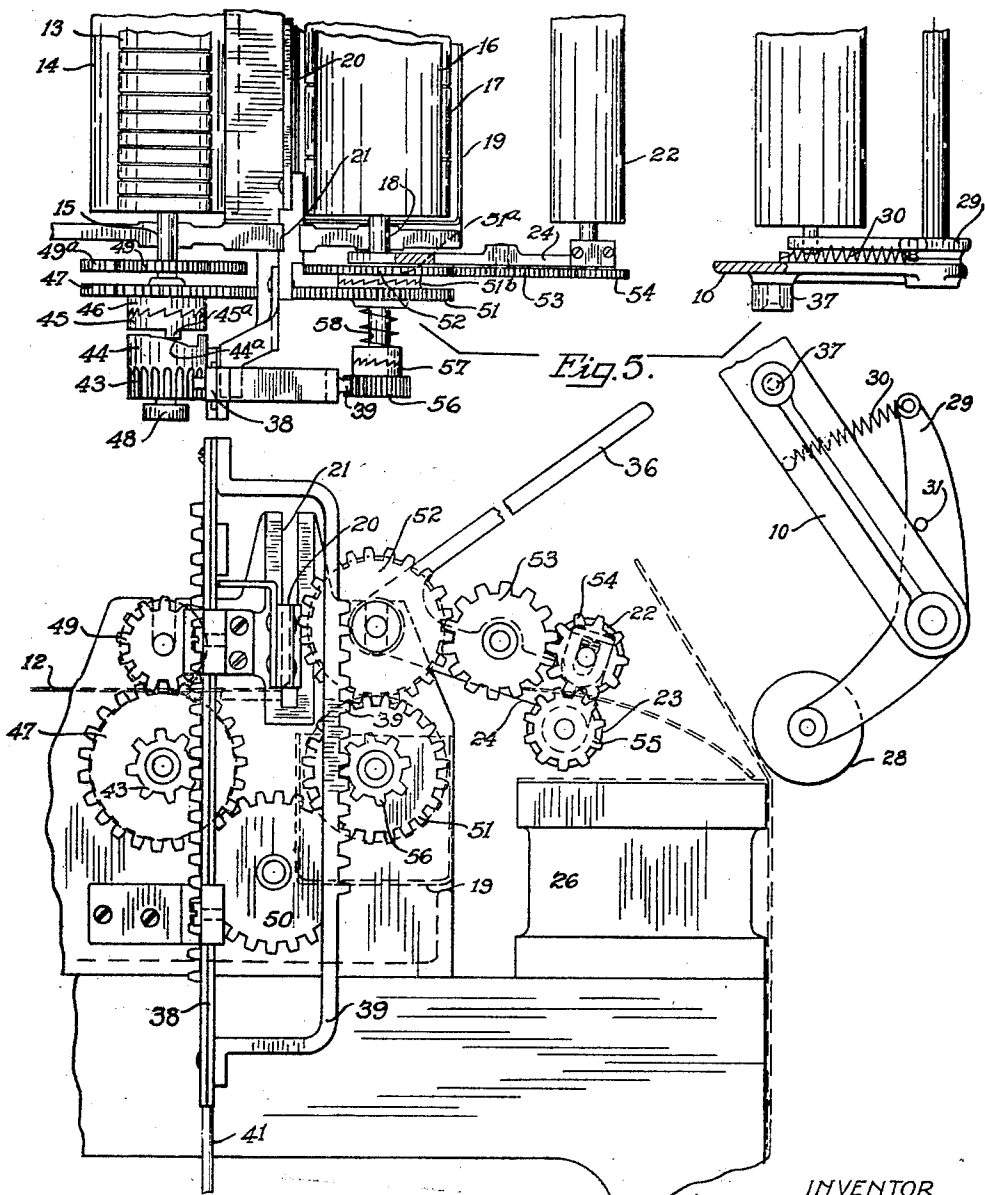


Fig. 4.

Fig. 5.

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PAPER-BOX-MAKING MACHINE.

Application filed January 23, 1925. Serial No. 4,200.

To all whom it may concern:

Be it known that I, SAMUEL BERGSTEIN, a citizen of the United States, residing at Middletown, in the county of Butler and State of Ohio, have invented certain new and useful Improvements in Paper-Box-Making Machines and the like, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to paper box making machines, having particular reference to improved means and a method for forming the joints of the boxes.

The present practice in making paper boxes, in which the joints are glued, with machinery is to use a liquid glue, or other suitable adhesive, which is applied to the parts to be joined together to form the box,—pressure being then applied to effect adhesion between the parts and thus to form the joints of the box.

More or less difficulty is experienced with present methods in applying the adhesive in right proportions and properly distributed over the coacting surfaces of the parts to be joined together, and also in applying sufficient pressure and in regulating the pressure applied in the joint forming operation to insure uniformity and dependability of construction.

The main object sought and attained in my present invention is to overcome both these difficulties and at the same time to simplify and cheapen the mechanical apparatus as well as the processes of production necessary to the practice of the invention.

To this end, as herein shown and described, adhesive tape having adhesive on both sides thereof, is used to form the joints and an apparatus of suitable construction is provided for forming the boxes and supplying the tape as required as the joints are made, the method of operation being either automatic or semi-automatic according to the character of the boxes to be made and production capacity of the machine.

The apparatus herein shown and described is for illustration purposes only, and it will be understood that an underlying principle of invention is set forth and claimed rather than details of the means and method employed for practicing the invention.

In the accompanying drawings, a semi-automatic machine of simple construction is

shown for illustrating the principle of the invention as applied in making boxes of a common type, it being understood that it is contemplated in the commercial practice of the invention to use any suitable form of apparatus and to make boxes of variable shapes and sizes thereon.

In the drawings:

Fig. 1 is a vertical sectional view of the machine as shown for illustration purposes;

Fig. 2 is a front end elevation of the machine;

Fig. 3 is a detail view of the operating mechanism;

Fig. 4 is a detail view in side elevation of the gearing for operating the tape-feeding mechanism;

Fig. 5 is a detail plan view of the tape-feeding mechanism and the pressure mechanism for forming the joints in coacting relation one with the other.

As here shown, the box making apparatus consists of a main frame comprising members 1 and 2 which are joined together in any suitable manner, as by means of bolts 3, to form the base of the machine. A machine table frame 4 is secured to frame members 1 and 2 by means of bolts 5. The tape-feeding mechanism is supported on a frame 6 which is mounted on frame 4 by means of bolts 7 and 8 operable in slots in frame 4 in a manner to provide for horizontal adjustment of frame 6, together with the mechanisms supported thereon, to adapt the mechanism to boxes of variable sizes. Opposite vertically extending frames 9 are supported on the table frame 4 and serve to support a depending, swinging frame 10 therein.

As here shown, one or more tape-supply rolls 11 are supported at the rear of the machine in frame 6, the tape web 12 being drawn from the roll by feed rollers 13—14 which are also supported in frame 6, roller 13 being supported in slotted bearings 15 which permits the roller to be in gravity, frictional contact with roller 14. The tape passes from rollers 13—14 to rollers 16—17, also supported in frame 6, roller 16 being supported in opposite slotted bearings 18, the same being thus in gravity frictional relation with roller 17.

As here shown, roller 17 is partially submerged in water in a container 19 which acts to keep the periphery of the roller moist and also to transfer moisture to the periphery of

roller 16 which is covered with a suitable absorbent material, as felt. Thus both sides of the adhesive tape will be moistened as the same passes between rollers 16 and 17. It will be understood that only a relatively small part of the rollers is in engagement with the tape and that the remaining part of the coating peripheries of the rollers contact one with the other, and, therefore, that ample moisture will be taken up by roller 16 to moisten the upper surface of the tape.

As the tape passes from rollers 13—14 to rollers 16—17 the same is severed into suitable lengths by a vertically operable knife 20, supported in slots 21 in frame 6. From rollers 16—17 the severed strips of tape pass to rollers 22—23 which are supported on opposite pivoted arms 24 which are centered on the ends of the shaft of roller 16. Rollers 22—23 act to deliver the tape over the end of the box, shown in dotted outline 25, in position to be interposed between coating parts of the box as the same are folded to form the joints.

As shown in Figs. 1 and 4, a box forming head 26 is supported in frame 4 by means of a bolt 27 at the front of the machine in a manner similar to frame 6 to adapt the same to be adjusted relative to frame 6 and to be set according to the size of the boxes. It is contemplated to use heads 26 of different sizes for different size boxes, the heads being adapted to be used interchangeably on the machine.

A pressure roller 28, supported on a spring-tensioned arm 29, pivoted in swinging arm 10, acts to complete folding of the parts of the box to be joined together at the joints, the first foldings being made, in the use of the apparatus as here shown, by hand as the boxes are placed on the head 27 by the operator of the machine. Arm 29 is rocked on its pivot center in one direction by a spring 30 which acts to exert moderate pressure on roller 28 as the same passes over the end of the box and thus to cause effective adhesion between the parts that are joined together. A pin stop 31 acts to limit the movement of arm 29 under the tension of spring 30. A handle 32 is provided for rocking frame 10 manually and thus to move roller 28 over the ends of the box,—the return movement of the frame being accomplished by means of a tension spring 33 connected to an arm 10^a extended on the opposite side of the pivot center 34 of arm 10. A limit of movement stop 35 acts to regulate the extent of movement of frame 10 on the return stroke of the mechanism.

A lever 36 is connected to the pivoted frame 24 in which rollers 22—23 are supported and is adapted to be engaged by a roller 37 projecting outwardly from one of the arms 10 and thus to be acted upon to raise the rollers out of the path of roller

28 and the folding plane of the end of the box, as the joints are formed,—the rollers moving to normal relation by gravity upon completion of the operation.

The operating mechanism for the tape feeding mechanism consists of a vertically reciprocable, compound rack comprising racks 38 and 39 operable as an integral part by means of a treadle 40, connected to the rack by a rod 41, the mechanism being returned on the up stroke by a spring 42.

Rack 38 meshes with a spur gear 43, as shown in Figs. 4 and 5, gear 43 being part of a friction clutch comprising the shank 44 of the gear, an intermediate member 45 and the hub 46 of gear 47. On the down stroke of the rack, gear 43 is actuated in clockwise direction, thus effecting a friction driving relation between clutch members 44 and 45 and a full clutch driving relation between members 45 and 46, the driving relation between parts 44 and 45 being effected by means of a shoulder 45^a on part 45 and a cam 44^a on part 44, a stop 48 acting to limit the outward axial movement of part 44 and thus to effect the frictional driving relation between parts 44 and 45.

Thus upon the clockwise movement of gear 43, gear 47 and also gear 48 and roller 14 which are on the same shaft with gear 47, are driven in clockwise direction, roller 13 being rotated in counter-clockwise direction by a gear 49 meshing with gear 48,—thus the tape web will be drawn from roll 11.

An intermediate gear 50 is interposed between gear 47 and a gear 51 which is secured to the shaft of lower roller 17,—thus roller 17 will also be driven in clockwise direction coincident with roller 14, upper roller 16 being driven in counter-clockwise direction by a gear 52 meshing with gear 51,—the web of tape being advanced to an extent equal to the feeding action of rollers 13—14, the tape being severed by the knife 20, which is secured to racks 38—39, at the end of the down stroke of the racks, the tape is also moistened on this feeding action as it passes between rollers 16—17.

Upper roller 22 is driven in counter-clockwise direction on the down stroke of racks 38—39 by an intermediate gear 53 meshing with gear 52^a and a gear 54 secured to the shaft of roller 22, lower roller 23 being driven in clockwise direction by a gear 55 secured to the shaft of roller 23 and meshing with gear 54,—thus the severed strip of tape will be fed forward half its length, the feeding action of rollers 16—17 being in $\frac{1}{2}$ ratio to the feeding action of rollers 13—14 and 16—17.

On the up stroke of racks 38—39, clutch 44—45—46 and also a clutch 51^b associated with gears 51—51^a will be in idle relation and rollers 13—14 and 16—17 will stand at

rest, but rollers 22—23 will again be actuated to feed the tape forward through a gear 56 meshing with rack 39 and a clutch 57 the second half of its length, the tape being delivered between the foldable portions of the box as illustrated in Fig. 4. The driving relation between gear 56 and gear 51^a is through clutch 57 and shaft 58 gear 51 being free on shaft 58 independently of the clutch.

From the foregoing detailed specification and the illustrations of the drawings the novel features of my invention both as to the apparatus and the method of production for practicing the invention will be readily understood. It will be observed that relatively simple mechanism and simple steps of production are characteristics of the invention, and that uniformity of construction, having reference to forming of the joints of the boxes, will result.

It will be obvious, of course, that any suitable width of adhesive tape, and any number of widths may be used as may best suit the size of the boxes and the character of joint to be used; also that tape prepared with adhesive on one or both sides may be used as required to suit the construction of the boxes, that is to say, whether the joints are to be merely sealed externally with tape having adhesive on one side only, or joined together one with another with tape having adhesive on both sides inserted between the folded portions.

The improved box making machine in which adhesive tape is used is much cleaner in operation than machines using a liquid adhesive which are more or less unsanitary due to the spreading of the adhesive over other parts of the mechanism; also the boxes in which the joints are bound together with tape are cleaner at the joints than boxes formed with liquid adhesive because of the fact that there is no excess of adhesive material and therefore no spreading of adhesive over adjacent surfaces of the boxes over parts of the machine.

As far as I am aware, I am the first in the art to which my invention relates to use adhesive tape in any form to form the joints of machine-made paper boxes. I wish it understood, therefore, that the spirit of my invention relates to a broad, comprehensive principle upon which the form of apparatus and method of operation for practicing the invention are predicated. In the appended claims, the invention is defined in these broad comprehensive terms and it is contemplated in the practice of the invention to make such modifications in details of construction of the apparatus and in the method of production as will best adapt the same to the character of the product and as will readily seem to those skilled

in the art of paper box making by machinery.

Having described my invention, I claim:

1. The herein described method of making paper boxes consisting in positioning a box to effect foldings of portions thereof, in folding certain of said portions, in supporting a supply of adhesive tape coated on both sides, in drawing the tape forward, in moistening and severing the same into measured lengths, and disposing the severed portions over the folded portions of the box, and in folding other portions of the box over the adhesive to effect a joint.

2. A paper box making machine including in combination, box supporting means interchangeable and adjustable on said machine for boxes of variable sizes means to effect foldings of portions of the boxes, means to deliver adhesive tape relative to said folded portions, means to effect foldings of other portions of the boxes relative to the first folded portions with the adhesive material therebetween, and means acting to effect adhesion between said folded portions and said tape.

3. A paper box making machine including in combination, means for supporting a box to effect foldings of portions thereof, means comprising a series of gear-entrained rollers operable to feed a web of adhesive tape forward, means for actuating the rollers comprising a rack for driving said gear train and a treadle for actuating said rack, means for severing said tape, means for moistening the severed portion and means for delivering said severed portion relative to said folded portions of the boxes, means acting to effect adhesion between said folded portions and said tape.

4. A paper box making machine including in combination, means for supporting a box to effect foldings of portions thereof, means comprising a series of gear-entrained rollers operable to feed a web of adhesive tape forward, means for actuating the rollers comprising a compound rack operatively connected to different units of said gearing, means for severing said tape, means moistening the severed portion and means to deliver said severed portion relative to said folded portions of the boxes, means acting to effect adhesion between said folded portions and said tape.

5. A paper box making machine including in combination, means for supporting a box to effect foldings of portions thereof, means to position a portion of adhesive tape relative to said folded portions, and means comprising a pressure roller adapted to effect adhesion between said folded portions and said tape.

6. A paper box making machine includ-

- ing in combination, means for supporting a box to effect foldings of portions thereof, means to position a portion of adhesive tape relative to said folded portions, and means
5 consisting of a reciprocable frame comprising a pressure roller adapted to act upon said foldable portions of the box to effect adhesion between said portions and said tape.
- 10 7. A paper box making machine including in combination, means for supporting a box to effect foldings of portions thereof, means to position a portion of adhesive tape relative to said folded portions, and means
15 comprising a spring-tensioned reciprocable frame and a pressure roller supported in said frame and adapted to act upon said foldable portions of the box to effect adhesion between said portions and said tape.
- 20 8. A paper box making machine including in combination, means for supporting a box to effect foldings of portions thereof, means to position a portion of adhesive tape relative to said folded portions, and
25 means comprising a reciprocable frame and a spring-tensioned pressure roller operably supported in said frame and adapted to act upon said foldable portions of the box to effect adhesion between said portions and
30 said tape.
- In testimony whereof, I affix my signature.
SAMUEL BERGSTEIN.