

Nov. 27, 1928.

S. BERGSTEIN

1,693,172

MEANS AND METHOD FOR MAKING AND SEALING BOXES AND THE LIKE

Filed June 21, 1926

5 Sheets-Sheet 1

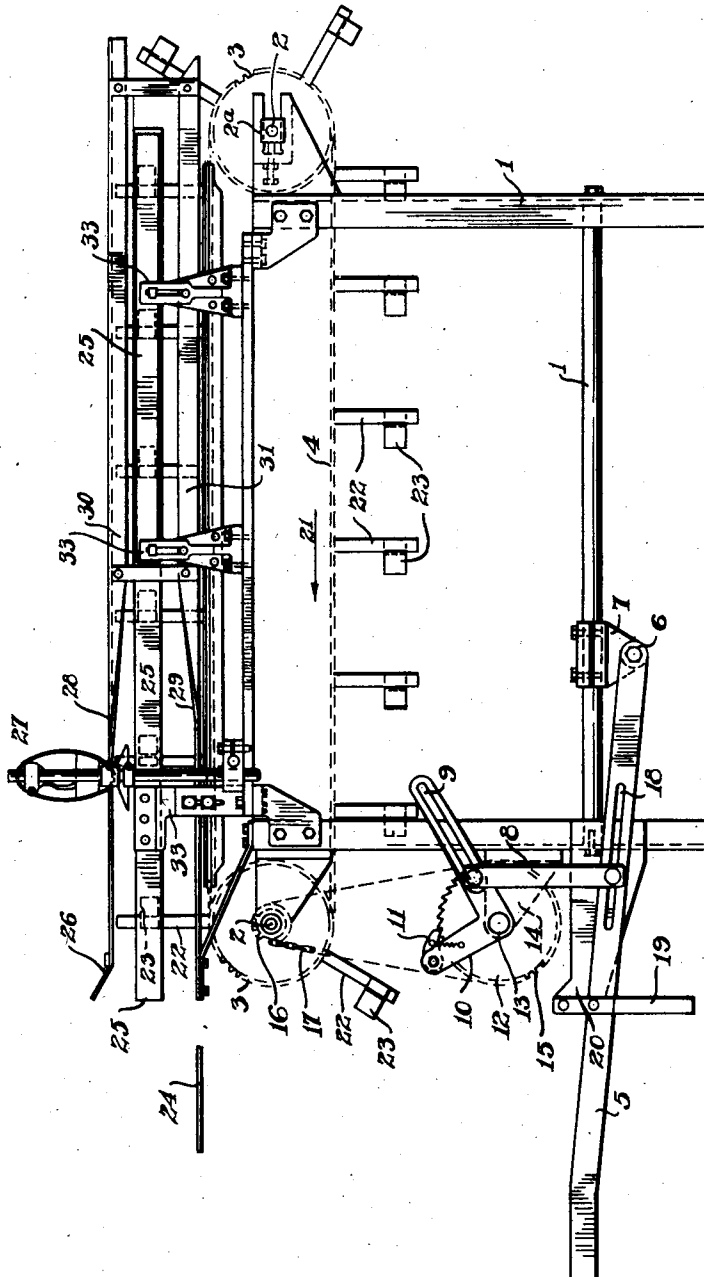


Fig. 1.

INVENTOR.
Samuel Bergstein
Arthur
ATTORNEY

Nov. 27, 1928.

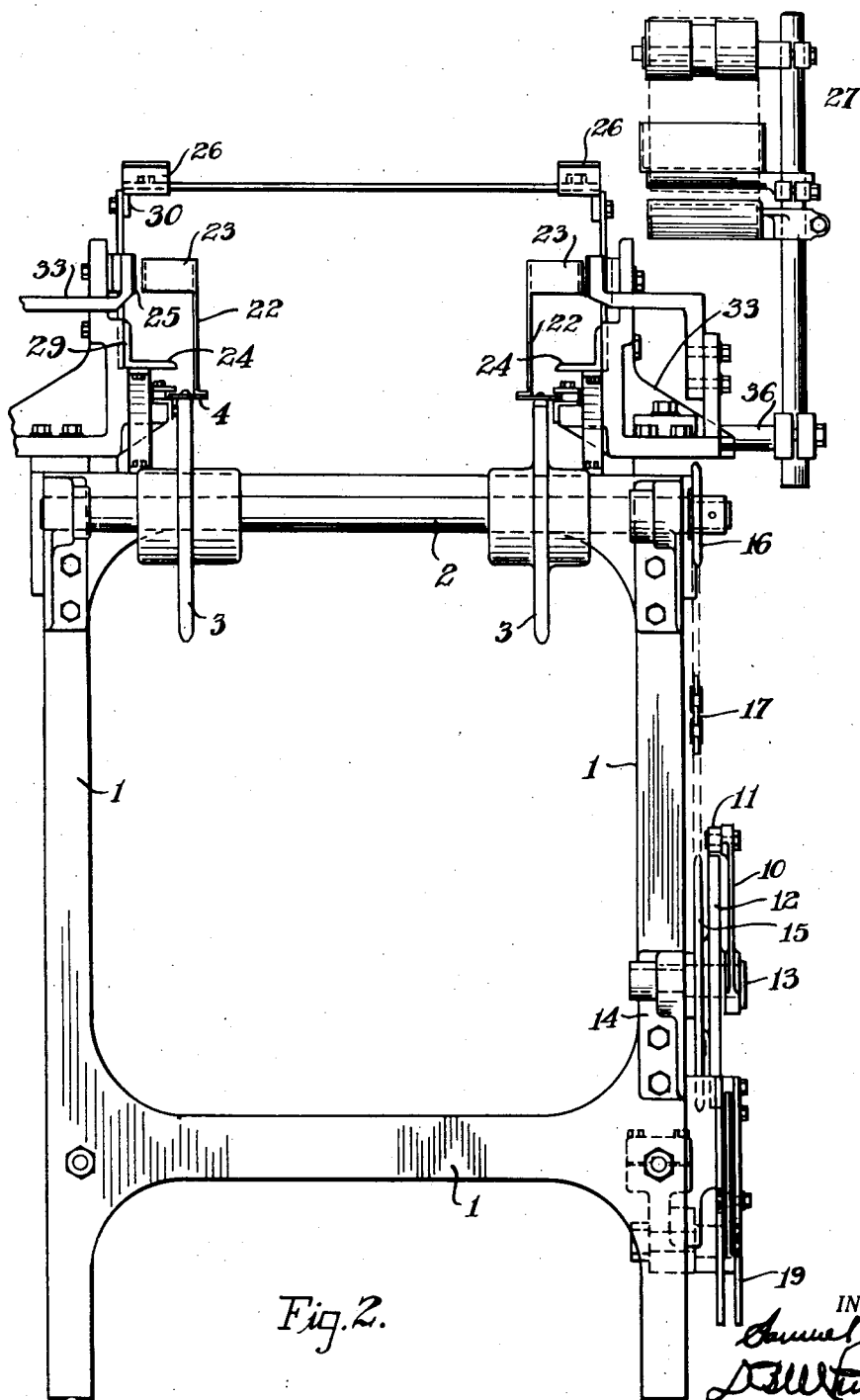
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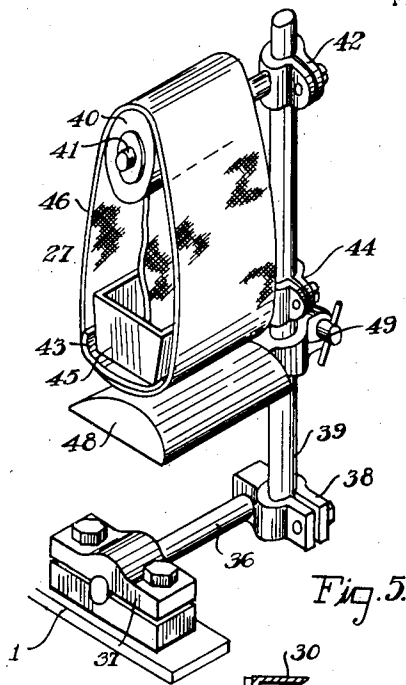


Fig. 5.

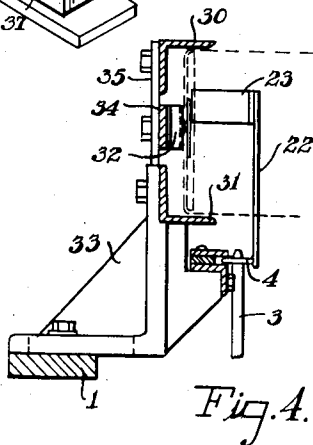


Fig. 4.

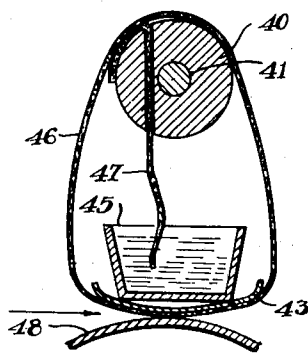


Fig. 6.

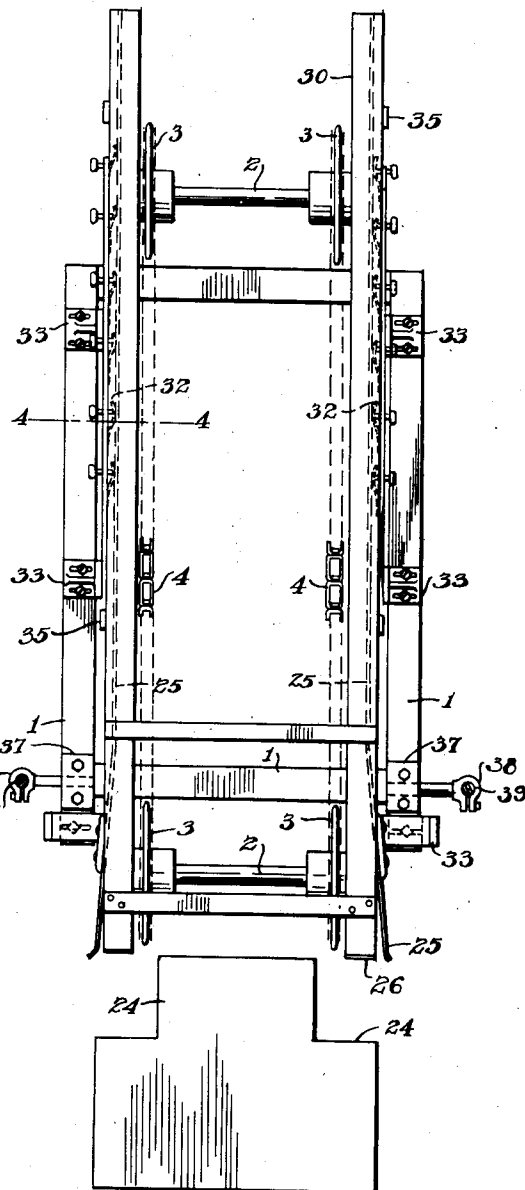


Fig. 3.

INVENTOR.
Samuel Bergstein
BY *Robert H. ...*
ATTORNEY

Nov. 27, 1928.

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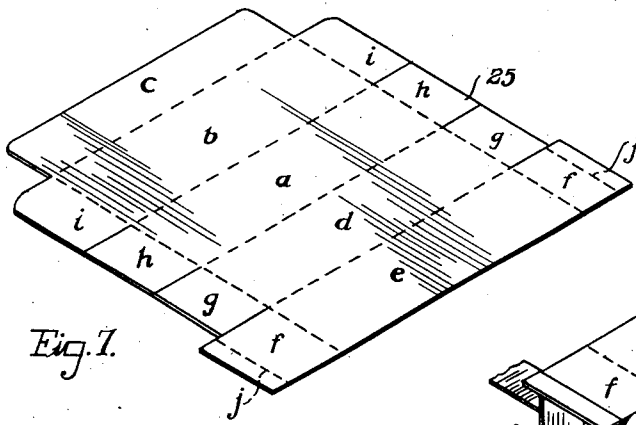


Fig. 7.

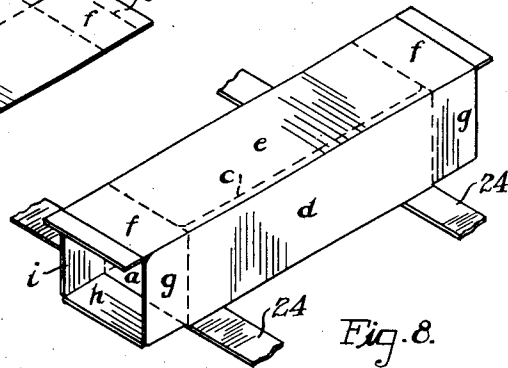


Fig. 8.

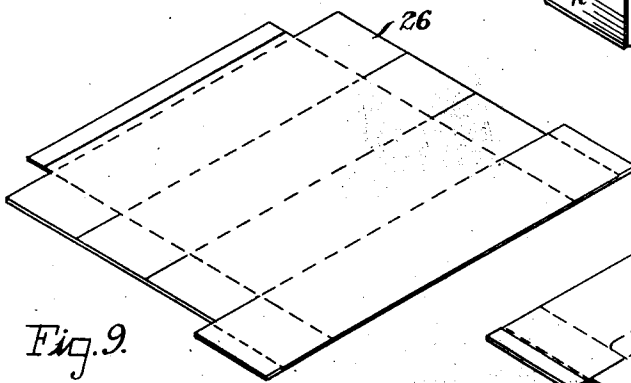


Fig. 9.

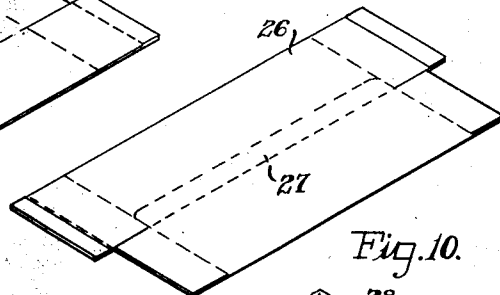


Fig. 10.

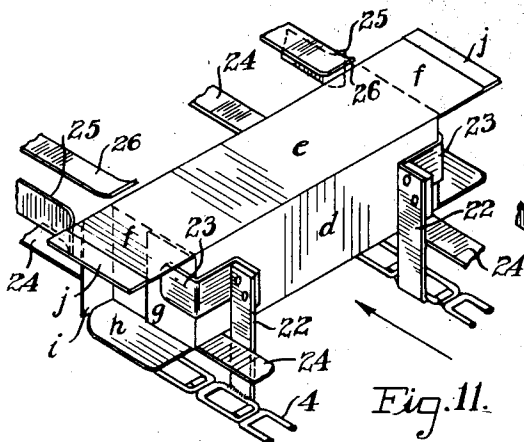


Fig. 11.

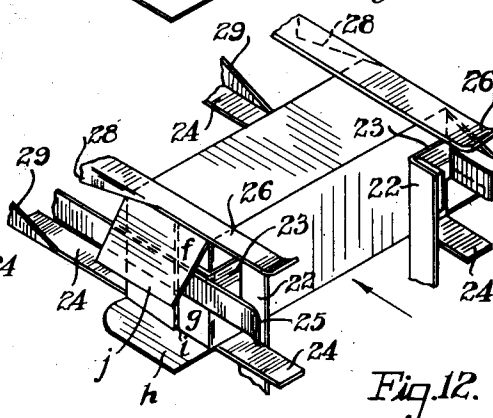


Fig. 12.

INVENTOR.

Samuel Bergstein
BY *Wm. H. Miller*
ATTORNEY.

Nov. 27, 1928.

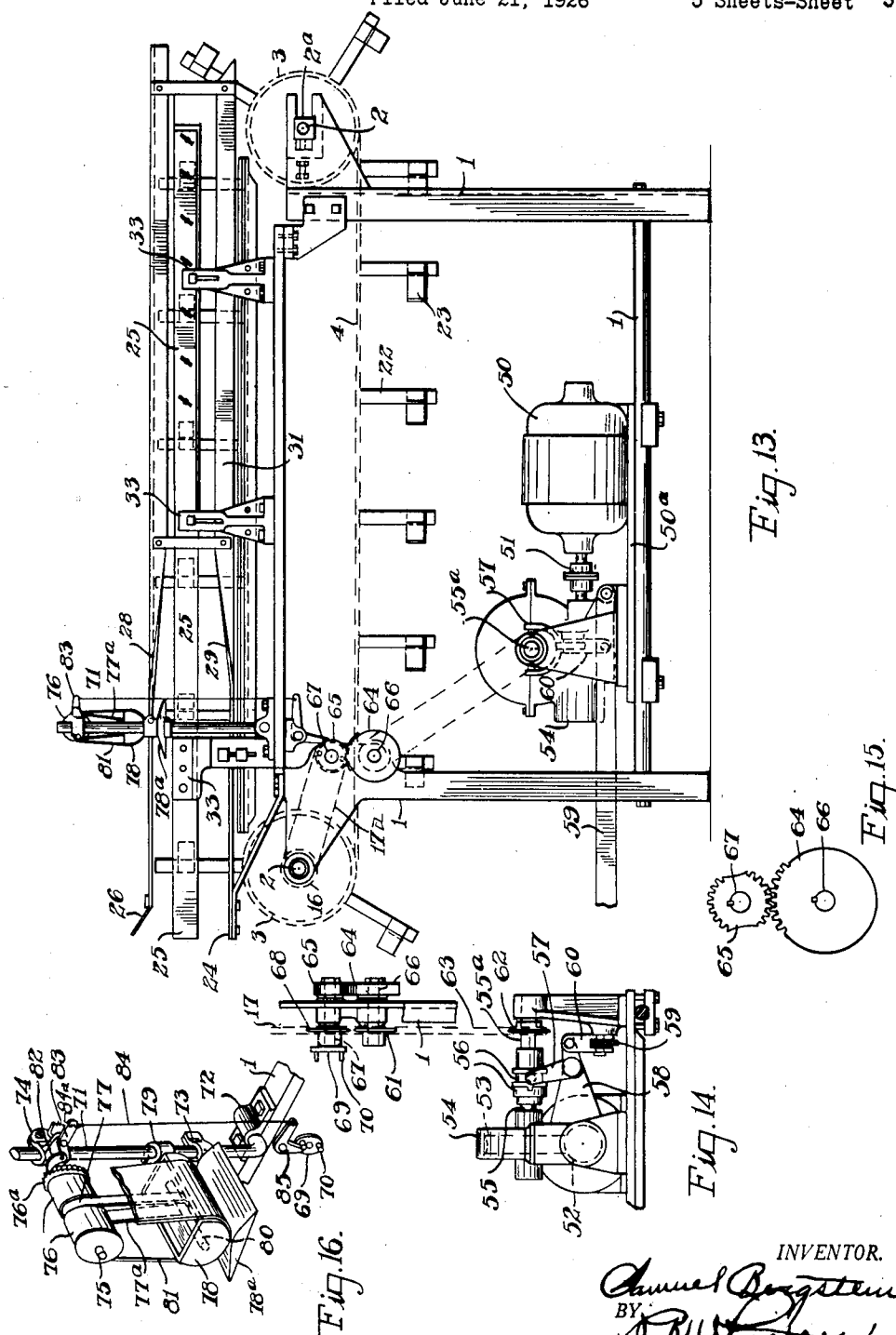
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S. BERGSTEIN

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Filed June 21, 1926

5 Sheets-Sheet 5



INVENTOR.
Samuel Bergstein
BY *Attorneys*
ATTORNEYS.

UNITED STATES PATENT OFFICE.

SAMUEL BERGSTEIN, OF MIDDLETOWN, OHIO, ASSIGNOR TO THE INTERSTATE FOLDING BOX COMPANY, OF MIDDLETOWN, OHIO.

MEANS AND METHOD FOR MAKING AND SEALING BOXES AND THE LIKE.

Application filed June 21, 1926. Serial No. 117,350.

This invention relates to improved means and method for making and sealing boxes having particular reference to paper boxes.

In general practice the invention includes a first step of box making in which an adhesive element is applied to the box blanks or to paper sheets from which the blanks are cut, the application of the adhesive on the sheets being in predetermined positions on the sheet according to the size and shape of the boxes to be made. The box blanks are then cut from the sheets and are shipped flat or assembled knocked-down as box stock to the customer.

The second step of practicing the invention includes the special machine herein set forth used by the customer for assembling and sealing or otherwise closing the boxes, the contents being placed in the boxes incident to the operations for forming and sealing the boxes on the machine.

The main objects attained in the invention are, first, the simplicity and relatively low cost of the machine for assembling the boxes; second, the improved construction of the boxes, having reference to the strength and appearance of the sealed portions; third, the speed of operation in filling and sealing the boxes and the resulting low cost in preparing the articles of merchandise for distribution.

The machine for assembling boxes of a representative type is illustrated, in a preferred form, in the accompanying drawings in which—

Fig. 1 is a side elevation of the machine;

Fig. 2 is an end elevation of the machine;

Fig. 3 is a plan view;

Fig. 4 is a sectional view on line 4—4 of Fig. 3;

Fig. 5 is a perspective view of the adhesive moistening device;

Fig. 6 is a sectional view of the moistening device;

Figs. 7 and 8 are perspective views of a box blank of one type of box and the box as folded preceding sealing;

Figs. 9 and 10 are perspective views of a box blank of a modified type of box and the box knocked-down;

Figs. 11 and 12 are perspective views illustrating progressive steps of folding and sealing the ends of the box.

Fig. 13 is a view in side elevation of a

modification illustrating an adaptation of the machine for motor drive;

Figs. 14 and 15 are detail views of the motor drive;

Fig. 16 is a view in perspective of a modified adhesive moistener.

The box forming and sealing machine as here shown comprises a suitable frame structure 1 which serves to support at its opposite ends shafts 2, a set of sprockets 3 spaced one from another transversely of the machine, and traversed by endless chains or carriers 4, being secured to the shafts, the shaft at the rear end of the machine being supported in a slidable bearing 2^a for adjusting the chain. The front shaft 2 is driven by means of a treadle 5 pivoted as at 6 on a bracket 7 secured to frame 1, the treadle being further connected by a link 8 to the slotted end 9 of a bell crank lever 10, the opposite end of the lever having a pawl 11 coacting with a ratchet 12 secured to a shaft 13 supported in a bracket 14 on frame 1. Shaft 13 is connected to shaft 2 by sprockets 15—16 secured to the respective shafts and a chain 17 traversing the sprockets. The treadle lever is provided with a slot 18 which serves with the slot 9 in the bell crank lever 10 and the link 8 for adjusting the stroke of the treadle, a guide 19 secured to a bracket 20 on frame 1 serving to prevent lateral movement of the same.

From the foregoing description it will be seen that upon operation of the treadle the carriers 4 will be given a step by step movement in the direction indicated by the arrow 21, the extent of movement being determined by adjustment of link 8 relative to slots 9—18. It will be obvious that suitable power means, as the motor illustrated in Fig. 13, may be employed for imparting the step by step movement to the carriers 4, the means for operating the carriers here shown being for the simplest form of the machine adapted for manual operation.

The carriers 4 serve for moving the boxes over the machine to effect closing and sealing of the boxes after the contents have been placed therein. To this end each carrier is provided with a plurality of arms 22 suitably spaced one from another to receive a box therebetween and extended upwardly in the upper course of the carriers to engage the boxes and move the same into engagement

successively with moistening devices for rendering the coating sealing flaps adhesive, folding devices for bringing the flaps together and pressure devices for effecting firm adhesion between the folded portions.

The contents are placed in the boxes manually, as here shown, on a table 24, two forms of boxes as illustrated in Figs. 7 to 10 being used, the box blank 25 as shown in Fig. 7 being flat, and the knocked-down form of the box 26 as shown in Fig. 10 having the first step of assembling made in the sealed joint 27, both forms being equally adaptable for receiving the contents and closing and sealing on the machine. For further describing the invention the box as illustrated in Fig. 8 only will be considered.

The box blank is placed flat on table 24 in the position illustrated in Fig. 7, the contents laid on portion —*a* of the blank, portion *b*—*c* folded upward at right angles to portions —*a* and portion —*c* folded again inward at right angles to portion *b*, portions *d*—*e* being then folded in like manner to portions *b*—*c* thus forming the tubular body of the box around the contents with the opening flap —*c* free inside of portion —*e* with the end flaps *f*—*g*—*h*—*i* extended at both ends of the box, end flaps —*f*, which as here shown have adhesive —*j* applied thereto, being on the upper side of the box. The box is then moved forward on table 24 in position to be engaged by arms 22 of the opposite carriers as the foot treadle is operated.

As the boxes are engaged by arms 22 a laterally and forwardly extended portion 23 of each arm engages the adjacent end flap —*g* on the opposite ends of the box and effects a right angle fold on the same in the forward direction, the opposite end flaps —*i*, as the box is moved forward, being engaged and folded at right angles in inverse direction by the forwardly extended ends of opposite, longitudinally extended, pressure elements 25 which act to first fold the flaps —*i* and then to retain flaps *g*—*i* in folded relation until the folding and sealing of the box is completed.

In the first step of closing the ends of the box, folding the inner flaps *g*—*i*, the outer flaps *f*—*h*, being the upper and lower flaps respectively in the position of the box on the machine, remain extended as the box passed under opposite upper guides 26 with flaps *f* extended in a plane to be brought into engagement with moistening devices 27 arranged on opposite sides of the machine as best illustrated with respect to one of the devices in Fig. 2, which act to render the portions —*j* adhesive. As the boxes are moved out of engagement with the moistening devices the forward curved ends 28—29 of fixed guides 30—31 arranged on opposite sides and extended longitudinally of the machine act successively on flaps *f*—*h* to fold

one toward the other over the pressure guides 25, the curved ends 28 acting to fold flaps —*f* in advance of the folding of flaps *h*, the latter flaps overlapping the portions —*j* of flaps *h* by ample margins to effect firm adhesive joints as the flaps, supported from within by the pressure guides 25, are acted upon by a series of spring tensioned pressure devices 32 arranged on opposite sides of the machine in the plane of the joints as the boxes are moved through the machine on the carriers 4.

The effective sealing of the ends of the boxes which is an object attained in the improved apparatus results from four elements which enter into the practice of the invention, namely, applying a quick acting adhesive, preferably strips of double faced adhesive tape, to the box blanks, rendering the tape adhesive, supporting the sealing flaps within and applying pressure thereto from outside to effect the joints, the means for supporting the flaps as pressure is applied in any desired degree in the sealing operation being a distinct advance and improvement over the common practice in the art of paper box making.

Provision is made on the machine for boxes of different sizes. To this end the brackets 33, upon which guides 30 and 31 and side rails 34, to which the pressure devices 32 are secured, are supported, as best shown in Fig. 4, are each provided with slotted upwardly extended brackets 35 for raising and lowering members 34 and the upper guide members 30 according to the heights of the boxes as the same are disposed horizontally on the machine. Brackets 33 are also slotted at their bases, as best illustrated in Fig. 3 to provide for adjusting the space between parts 30—31—34 on opposite sides of the machine to the length of the boxes as the same are disposed transversely of the machine on the carrier. The pressure members 25 are supported only on the front brackets 33, the rearwardly extended portions of the same being free or floating and thus adapted to be enfolded by the sealing flaps *f*—*h* of the boxes, the sealing being effected, as stated, by compression of the flaps between parts 25 and 32.

In the practice of the invention any suitable means for rendering the sealing flaps adhesive are contemplated. As here shown, strips of double faced adhesive tape *j* are applied on sheets of paper from which the blanks for the boxes are cut. The tape requires only the application of moisture to render the same instantly and effectively adhesive; also the adhesive sets quickly and only slight pressure is required for a relatively short interval to effect a firm joint. As shown the machine is equipped with the moistening devices 27 on opposite sides of the machine, the details of the moisteners being shown in Figs. 5 and 6.

Each moistener comprises an adjustable frame structure consisting of a rod 36 secured in a split bearing 37 on frame 1, extended laterally of the machine and having a split bearing 38 at its free end in which a vertically extended rod 39 is supported. Extended laterally from rod 39 is an upper fixed cylindrical member 40 supported on a stem 41 secured to rod 39 by a split bearing 42; a lower member 43 secured to rod 39 by a split bearing 44, being curved upwardly to support the moisture tray 45, the under side of the member being convexed and serving as the lower support for a web 46 of material, as felt, which absorbs and transmits moisture freely, the upper support for the web being part 40. Moisture is transmitted to the web by capillary action by means of wicks supported in part 40 as illustrated in Fig. 6 and having their lower ends suspended in the moisture tray. Coacting with part 43 is a support 48, secured to rod 39 by a split bearing 49, for the sealing flaps —f as the same are brought into position on the carrier for receiving the moisture. The web 46 being in free contact with part 48 acts to distribute the moisture evenly over the taped portion —j, the web moving at random under the frictional action thereon.

For box blanks not prepared in advance with adhesive, suitable adhesive applying devices may be substituted for the moistening devices, glue or gum being applied to the portions of the sealing flaps covered by the adhesive tape —j. For certain types of boxes this method of applying the adhesive to the sealing flaps will be preferred. The practice of the invention contemplates any suitable method of rendering the sealing flaps adhesive as by applying the adhesive to the paper sheets before the blanks are cut, or to the blanks after the same are cut from the sheet, or to the blanks as the same are run on the box forming machine.

The motor drive for the machine illustrated in Fig. 13 consists of the motor 50 supported on a base 50^a, friction drive coupling 51, worm gears 52—53, gear casing 54, shafts 55—55^a, clutch 56, the means for operating the clutch consisting of a bell crank lever 57 pivoted on a bracket 58 and connected to a foot lever 59 by a link 60. A sprocket 51 is connected to shaft 55^a by a sprocket 62 and chain 63 thus serving to transmit the driving movement from the motor, reduced by the worm gears 52—53, to intermittent gears 64—65 supported respectively on shafts 66—67, the connection from the latter to shaft 2 and thence to the box carrier 4 being by a chain 17^a and sprockets 3—16. The driving connection as described is effective for operating the box carrier in a step by step movement at a speed suitable for forming and sealing the boxes.

The intermittent movement from gears 64—65 is also transmitted to the adhesive moistener through a pin wheel 69—70 sup-

ported on shaft 67, bell crank levers 83—85 connected one with the other by a wire 84, the wire being drawn in one direction by a spring 84^a. Lever 83 is connected to the upper web roller 76 by a pawl and ratchet 82—76^a. As best shown in detail Fig. 16 the web roller 76 is supported rotatably on a stem 75 and has a recess 77 formed around it for a travelling wick 77^a which extends into the moisture tray 78, being supported in the tray by a stem 80, and acts to conduct moisture from the tray to the adhesive moistener 81. The brackets 72, 73, 74 and sealing flap support 78^a, all supported adjustably on post 71, are similar to the corresponding parts 38, 49, 44, 42 and 48 of the moistening device illustrated in Fig. 5.

From the foregoing detailed description and from the illustrations of the drawings, the construction and operation of the improved box machine and the method of filling, closing and sealing boxes on the same will be readily understood.

Having described my invention, I claim:

1. The herein described method of forming, filling and sealing boxes consisting in preparing the sealing flaps of box blanks with adhesive in enveloping a content in blank with sealing flaps extended, in causing the box to be acted on successively, to render one of the sealing flaps adhesive, to fold the sealing flaps one relative to another over a supporting element, and to effect adhesion between the flaps by causing opposing pressures to be applied upon the flaps between said supporting element and coacting pressure elements.

2. A machine of the character described comprising a carrier for moving boxes with end flaps extended, a member movable with the carrier acting to fold an inner end flap thereof in the direction of said movement, a fixed supporting member extended along the path of the boxes acting to fold an opposite inner end flap in inverse direction, means disposed in the path of the outer extended end flaps acting to render one of the same adhesive, opposite fixed members disposed in the plane of the outer end flaps acting successively to fold one flap relative to another over said supporting member and pressure means coacting with the supporting member to apply opposing pressures upon the outer end flaps for effecting adhesion therebetween.

3. A machine of the character described comprising a carrier for moving boxes with end flaps extended, a member movable with the carrier acting to fold an end flap thereof in the direction of said movement, a fixed supporting member extended along the path of the boxes acting to fold an opposite inner end flap in inverse direction, means disposed in the path of the outer extended end flaps acting to render one of the same adhesive, opposite fixed members disposed in the plane of the outer end flaps and shaped to deflect the end flaps successively and to fold the same one

flap overlapping another over said supporting member, and pressure means coacting with the supporting member to apply opposing pressures upon the outer end flaps for effecting

adhesion therebetween.

4. A machine of the character described comprising a carrier for moving boxes with end flaps extended, a member acting to engage the boxes on the carrier and to fold an inner end flap in the direction of said movement, a supporting member extended along the path of the boxes acting to fold an opposite inner end flap in inverse direction and disposed over said folded flaps in frictional engagement therewith as the boxes are moved on the carrier, means disposed in the path of the outer extended end flaps acting to render one of the same adhesive, opposite fixed members disposed in the plane of the outer end flaps acting successively to fold one flap relative to another over said supporting member and pressure means coacting with the supporting member to apply opposing pressures upon the outer end flaps for effecting adhesion therebetween.

5. A machine of the character described comprising a carrier for moving boxes with end flaps extended, means acting successively to fold the inner end flaps including a supporting member extended along the path of the boxes in frictional engagement with the outer faces of the folded end flaps as the boxes are moved on the carrier, means disposed in the path of the outer extended end flaps acting to render one of the same adhesive, opposite fixed members disposed in the plane of the outer end flaps acting successively to fold one flap relative to another over said supporting member and pressure means coacting with the supporting member to apply opposing pressures upon the outer end flaps for effecting adhesion therebetween.

6. A machine of the character described comprising, a carrier operable step-by-step for moving boxes with end flaps extended, a table upon which the boxes are folded and filled and moved manually to said carrier interspersed between the stepped movements thereof, a member movable with the carrier acting to engage and move the boxes with the carrier and to fold an inner end flap thereof in the direction of said movement, a fixed supporting member extended along the path of the boxes acting to fold an opposite inner end flap in inverse direction, means disposed in the path of the outer extended end flaps acting to render one of the same adhesive, opposite fixed members disposed in the plane of the outer end flaps acting successively to fold one flap relative to another over said supporting member and pressure means coacting with the supporting member to apply opposing pressures upon the outer end flaps for effecting adhesion therebetween.

7. A machine of the character described

comprising opposite coacting carriers for moving boxes with the end flaps at the opposite ends of the box extended, a member movable with the carriers acting to fold an inner end flap at each end of the box in the direction of said movement, opposite supporting members extended along the path of the box one in frictional engagement with each end of the box and acting to fold another inner end flap at each end of the box in inverse direction, means disposed in the path of the outer extended end flaps acting to render one of the same at each end of the box adhesive, opposite means extended in the path of the outer end flaps at each end of the box acting to fold the flaps over said supporting member one flap overlapping the adhesive portion of the other flap, and pressure means coacting with the supporting members to apply opposing pressures upon the outer end flaps for effecting adhesion therebetween.

8. A machine of the character described comprising means for moving paper boxes progressively with end flaps extended into operative relation with a series of devices acting concurrently on opposite ends of the boxes in the following sequence; to fold an end flap disposed in a vertical plane in the direction of movement of the boxes, to fold an opposite end flap inversely to the direction of movement of the boxes, to render an end flap disposed in a horizontal plane adhesive and to fold the same downwardly, to fold an opposite end flap disposed in a horizontal plane upwardly over the adhesive coated portion of the upper end flap, and to effect adhesion between the last named end flaps by applying opposing pressures thereon.

9. A machine of the character described comprising means for moving paper boxes progressively with end flaps extended into operative relation with a series of devices acting concurrently on opposite ends of the boxes in the following sequence; to fold an end flap disposed in a vertical plane in the direction of movement of the boxes, to fold an opposite end flap inversely to the direction of movement of the boxes, to render an end flap disposed in a horizontal plane adhesive and to fold the same downwardly, to fold an opposite end flap disposed in a horizontal plane upwardly over the adhesive coated portion of the upper end flap, and to effect adhesion between the last named end flaps by applying opposing pressures thereon, and means for effecting adjustments of said devices to adapt the machine for boxes of variable sizes.

10. A machine of the character described comprising an endless carrier for moving boxes disposed horizontally with end flaps extended transversely of the machine, a series of devices arranged on opposite sides of the machine in the planes of the extended end flaps acting concurrently on the opposite

ends of the boxes to close and seal the same in the following sequence: to fold an end flap disposed in a vertical plane in the direction of movement of the boxes, to fold an opposite end flap inversely to the direction of movement of the boxes, to render an end flap disposed in a horizontal plane adhesive and to fold the same downwardly, to fold an opposite end flap disposed in a horizontal plane upwardly over the adhesive coated portion of the upper end flap, and to effect adhesion between the last named end flaps by applying opposing pressures thereon.

11. A machine of the character described comprising an endless carrier for moving boxes disposed horizontally with end flaps extended transversely of the machine, a series of devices arranged along the course of the

carrier, defining a channular passage for the boxes and acting concurrently on opposite ends of the boxes to close and seal the same in the following sequence: to fold an end flap disposed in a vertical plane in the direction of movement of the boxes, to fold an opposite end flap inversely to the direction of movement of the boxes, to render an end flap disposed in a horizontal plane adhesive and to fold the same downwardly, to fold an opposite end flap disposed in a horizontal plane upwardly over the adhesive coated portion of the upper end flap, and to effect adhesion between the last named end flaps by applying opposing pressures thereon.

In testimony whereof, I affix my signature.

SAMUEL BERGSTEIN.