July 26, 1932. R. C. CUNNINGHAM 1,868,567

BOX FORMING AND WRAPPING MACHINE

Filed July 24, 1929

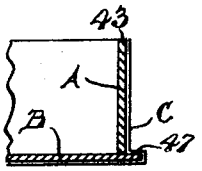



Fig. 6.

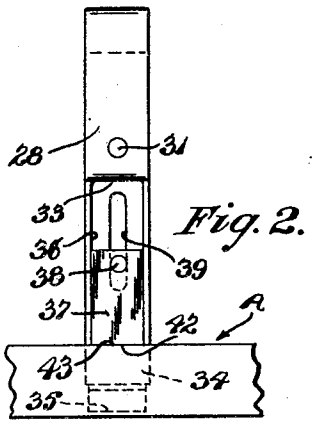



Fig. 2.



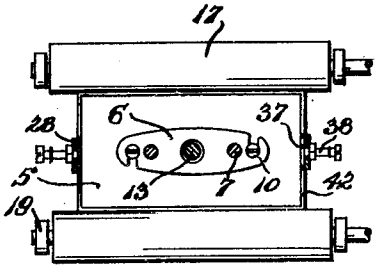




Fig. 3.

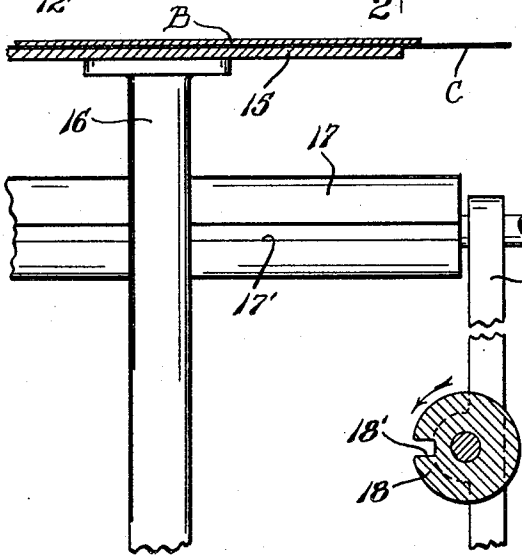



Fig. 1.

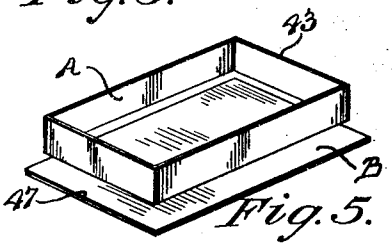



Fig. 5.

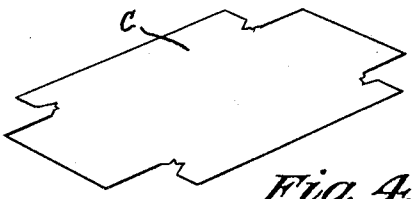



Fig. 4.

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# UNITED STATES PATENT OFFICE

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## BOX FORMING AND WRAPPING MACHINE

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This invention relates to paper box making and wrapping machines, and more especially, to a device of this kind wherein both operations are accomplished simultaneously throughout a cycle of operation of the machine.

An object thereof is the provision of means which may be readily secured to box making apparatus heretofore in use, such, for instance, as illustrated and described in U. S. Patent No. 1,541,036 issued June 9, 1925, in a manner to more readily assemble a paper box.

Another object of the invention is the provision of apparatus of this character whereby the resultant manufactured box is of a considerably lighter weight than has heretofore been found possible.

The invention further has numerous other advantages relative to simplification, cost of production, and symmetry of structure, consisting in the novel construction, adaptation and combination of parts hereinafter described.

In the drawing,—

Figure 1 is a vertical transverse section of apparatus incorporating the present invention, parts being broken away and shown in side elevation and one side only being illustrated to show the preferred form of the invention, the cooperating side not shown, being synonymous thereto. Fig. 2 is a vertical transverse section, taken through 2—2 of Fig. 1, with parts being broken away, and illustrating in front elevation, a portion of a box body and the invention applied thereto. Fig. 3 is a horizontal section through 3—3 of Fig. 1 taken to a reduced scale, the transverse rollers shown in Fig. 1 being omitted. Fig. 4 is a perspective view of the paper wrapper utilized in securing associated parts of a box, one to the other; Fig. 5 is a perspective, indicating disassembled parts of a box blank and bore board; and Fig. 6 is a sectional view taken through an assembled completed box.

Hitherto, in paper-box manufacture, it has been the practice to form a box by securing a previously pasted open top rectangular structure having a flanged bottom integral therewith to an extension bottom, or base board, and following this operation by securing a mucilaged paper wrapper thereabout. The wrapping hence, is superfluous in the box structure, except as giving its ornamental effect to the finished article.

With the present invention, in contradistinction thereto, I have devised means whereby a paper box is constructed of a substantially rectangular blank form A which is open both at the top and bottom respectively. This being adaptably placed over a form, is arranged to drop into seating engagement with a base board B and is secured thereto by the mucilaged paper wrapping C which retains the two piece structure in a secure, compact, finished box article. From the foregoing, it is apparent that, whereas formerly, the practice has been, of necessity, to construct a box of two thicknesses of bottom, the present invention eliminates one thickness with a resultant obviation of excess weight.

It is to be further noted that the present invention obviates the unnecessary ornamental depression of the box bottom before assemblage, the one thickness of material easily allowing of inserting the box entire within a stamp press subsequent to securing cooperating parts together.

Reference being had to the drawing, the numeral 5 represents a form block detachably secured, as by a pivot plate 6, to bifurcated plunger rods 7 rigid thereto, said detaching means comprising a metal backing plate 8 secured to the form as by screws 9, and arranged to have upstanding pins 10 thereof engage in slotted apertures 11 of the pivot plate.

Arranged for vertical reciprocatory movement, individually and collectively therewith, is a form base 12, suitably supported and vertically movable by a plunger 13 freely movable through the apertured opening 14 of the described form block 5.

Cooperative therewith, is a work supporting block 15 which is secured for rotative reciprocatory movement to the upper end of a vertically movable lower spindle 16. The foregoing, namely, plunger rods 7, 13, and spindle 16, have independent cam controlled motivity in vertical movement, independent

of one another, in a manner hereinafter described relative to the machine operation.

In timed rotative activity, relative to the vertical movement of the foregoing blocks, a machine as utilized comprises longitudinally and transversely disposed roller members 17, 18, supported in rigid machine brackets 19, and operable in revoluble action, by suitable gear meshing structure driven from any desired power source (not shown), said rollers being provided longitudinally of the lengths thereof with elongated slots $17^1$, $18^1$. As shown, said rollers are arranged in pairs, diametrically opposite and in horizontally aligned planes and such as to dispose one pair in spaced distance above the other.

The structure described, except as utilized in conjunction with apparatus hereinafter described, is not new, being common to the art and used heretofore in box making machinery.

Reverting from the foregoing to apparatus specific to my invention, I provide, loosely mounted upon the described bifurcated rods 7, a plunger body 20 therefore providing horizontally disposed wing or arm elements 21 at diametrically opposite sides arranged to take box-side engaging members 22, in sleeved securement to the outer extremities.

Said members comprise a mounting or body portion 23 having depending therefrom, stems 24, to which are securably attached, as by a set screw, bracket elements 25. Pivotally secured as at 26, to the inwardly projecting finger portions 27, are dependent hangers 28.

Said hangers are desirably resiliently retained in right angle vertical position to the plane of the form block, as by a compression spring 29 acting in opposition to a depending leg 30 of the bracket 25.

A bolt 31 and regulating nut 32 provide adjustment to the aforesaid hanger plane. Said hanger, as shown, extends downwardly, and outwardly, as by an offset 33, in a manner to provide the effective upward pressure, in a plane approximately vertical to the axial line of the pivot pin 26, the base portion being constructed to afford a yoke 34 adapted to rigidly engage a tapered toe element 35.

The forward face of said hanger provides a grooved channel 36 within which a plate 37 is adapted for vertical sliding engagement. A pin 38 of said plate projects outwardly to extend through a vertically disposed slot 39, being adaptably screw threaded to accommodate a nut 40 in engageable relation to the rear face 41 of the hanger, said nut providing containing retention of the plate within the channel and, in a manner to allow vertical activity to the plate, resultant of the upward thrust exerted against the lip portion 42 by the lateral edge 43 of a box plank A. An extension spring 44, interengaging the projecting head 45 of said pin 38 and an eye extension 46 of the hanger, resiliently secures said plate in a normal disposition adjacent the base of said yoke 34.

Operation: A box bottom B subsequent to being placed by the operator over a wrapping sheet C, the upper surface of which is coated with a film of adhesive, is inserted on the supporting block 15, and centered with respect to the form bodies 5, 12.

A box blank A is placed or inserted about the plunger form bodies, in a manner to have the upper lateral peripheral edge in abutting engagement to the tip 42 of the hanger plate 37. The motive power effecting operation to the associated cylindrical cams, produces a collective downward movement of the form blocks 5, 12 and hanger 28 in pressing the lower peripheral edges of the box blank A to the body of the box bottom, in a disposition providing a flange 47 extending circumferentially thereabouts, the mucilaged wrapping projecting beyond.

The pressure of the plate lip resistently affords pressure to the box blank lateral edges, yieldingly retaining the same to associated box parts with an elimination of material crushing or depressions to the box body.

Under the further collective downward travel of the forms 5, 12, hanger 28 together with the supporting block 15, longitudinally disposed rollers 17 engage the wrapping to effect a side turn up of the mucilaged wrapping about the longitudinally disposed projecting flange and box sides the slots $17^1$ affording admission of the box flange in securing the mucilage thereabout.

As the rollers 17 complete a rotative activity in comprising projecting adhesive portions of the wrapping to longitudinal box sides in a manner to retain blank A and bottom B, one to the other, the downstroke activity of hangers 28 is arrested, continuation of travel of forms 5, 12 and block 15 progressively feeding the box body past rollers 18 to effect an adhesive compression of the laterally projecting adhesive wrapping in a side turn-up to flange and box sides.

While said latter rollers are rendered operative to the box body sides, upstroke activity is afforded plunger 20 in returning hangers 28 to their extreme upper position as shown in Fig. 1.

Succeeding upstroke activity of the box-supporting members, subsequent arresting of block 15, and continuation of forms 5, 12, contacts the box edge 43 retained on said forms against plate lip 42 in affording a stripping activity for dislodging the box. Falling to the surface of block 15, the kicking action of a horizontally movable rod is customarily utilized in removing the finished box, such latter action depositing the completed article in an inclined runway communicatively feeding to a receiver.

The hanger, as shown, is so constructed as to provide a spring resistant tapering toe to

guide said plate lip in a manner to accurately dispose associated parts into operative position.

It is to be understood that any suitable means of controlling the movement of associated members might be had, conventional practice utilizing a plurality of pivoted levers, one extremity engaging a respective plunger rod, and the levers controlled through rollers journaled in opposite extremities and arranged for tracking engagement in cam slots grooved circumferentially about the periphery of rotative cylindrical drums.

The construction shown and described is illustrative of the form now preferred by me, it being evident that numerous changes might be made within the scope of the appended claims.

What I claim, is,—

1. In a machine for forming and wrapping boxes, the combination with a form block and a work supporting block, of a plunger mounted for vertical movement, individually and collectively with said blocks, laterally projecting arm elements secured to said plunger and disposed at diametrically opposite sides thereof, mountings secured at the ends of said arms, hangers pivotally depending therefrom, a compression spring carried between said hanger and said mounting and arranged to resiliently secure said hanger in a substantially vertical plane, and outwardly and downwardly tapering toe and a vertically arranged slide carried by said hanger, said slide being adapted to provide a yieldable downward thrust to a box blank inserted over said form block.

2. In apparatus as described in claim 1, wherein said yieldable downward thrust of said slide, comprises vertically arranged spring means acting between said slide and the hanger.

3. In a machine for forming and wrapping boxes, the combination with a form block and a work supporting block, of hangers supported at diametrically opposite sides of said form block, means for vertically reciprocating said hangers individually and collectively with said form block and said supporting block, a channel disposed in the face of said hanger, a slide for said channel, said slide having a lip projecting beyond the face of said channel adapted to contact a box blank inserted over said form block, and resilient means for retaining said lip in yieldable engagement with said form blank.

4. In a machine for forming and wrapping boxes, the combination with a form block and a work supporting block, of hangers arranged for vertical reciprocatory movement individually and collectively with said blocks, a slide carried by and adapted to contact a box blank inserted over said form block, means interconnecting said hanger and said slide providing a yieldable downward thrust of said box blank in opposition to a box bottom supported by said supporting block, and means rendered operable by a collective downward travel of said blocks whereby the box blank and said box bottom are secured together.

5. In a machine for forming and wrapping boxes, a form block adapted to carry a box blank inserted thereon, a supporting block adapted to carry a box bottom superimposed over an adhesively coated sheet of wrapping, means for yieldingly retaining said box blank against said box bottom, and means rendered operable by a collective downward travel of said blocks and retention means, for affixing the sheet of wrapping material to the blank sides in securing said blank and box bottom together.

6. In a machine having form and supporting blocks for forming and wrapping boxes, said form block being adapted to carry a box blank mounted thereon, the supporting block being adapted to carry an adhesively coated sheet of wrapping and a box bottom superposed and centered thereon, the wrapping presenting side and end flaps projecting laterally in excess of the bottom, of means for successively turning up and wiping sides and ends of the wraping to sides and ends of the blank, and resilient means cooperating with the form block and adapted to be rendered inoperative subsequent to an initial securement of the side flaps of the wrapping over the sides of the blank for affording a yieldable depression of said box blank to the bottom in retaining the blank and bottom in engagement, one to the other.

7. In apparatus as defined in claim 6, wherein said last named means is adapted to dislodge the wrapped box from the form block responsive to upstroke activity of the latter.

8. The method of uniting an open top and bottom box blank and a box bottom in the production of a box, consisting in the successive steps of centering the box bottom with respect to a sheet of adhesively coated wrapping to present flaps projecting laterally beyond the bottoms, yieldably depressing the box blank into contactual engagement with the bottom, effecting a side turn-up and wiping of the flaps to sides of the box blank while continuously retaining pressure contact between the blank and bottom, removing the pressure between the blank and bottom, and finally affecting a side turn-up and wiping of the flaps to the remaining sides of the blank.

9. The method of uniting an open top and bottom box blank and a box bottom in the production of a box, consisting in the successive steps of centering the box bottom with respect to a sheet of adhesively coated

wrapping to present flaps projecting laterally beyond the bottom, yieldably depressing the box blank into contactual engagement with the bottom, and effecting a side turn-up and wiping of the flaps to two sides only of the box blank while continuously retaining pressure contact between the blank and bottom.

10. The method of uniting an open top box blank with a box bottom in the production of a box, consisting in the successive steps of centering the box bottom with respect to a sheet of adhesively coated wrapping to present flaps projecting laterally beyond the bottom, depressing the box blank into contactual engagement with the bottom, yieldably retaining said blank and bottom in contactual engagement, one with another, and effecting, co-incident with said yieldable retention, a turn-up and wiping of projecting flaps of said wrapping over the blank sides sufficient to maintain said bottom and box blank, one to the other.

11. The method of uniting an open top box blank with a box bottom in the production of a box, consisting in the successive steps of centering the box bottom with respect to a sheet of adhesively coated wrapping to present flaps projecting laterally beyond edges of the bottom, yieldably bringing said box blank and bottom into contact, one to the other, and retaining said box blank and the bottom in said yieldable contact while affording a turn up and wiping of said projecting flaps over walls of the box blank sufficient to maintain said box blank and bottom, one with the other.

12. In a machine for forming and wrapping boxes, blocks adapted to respectively carry a box blank and a bottom therefor, said bottom having a sheet of adhesively coated wrapping affixed to the same to present flaps projecting laterally beyond edges of said bottom, means for bringing the box blank and said box bottom into yieldable engagement, one with the other, and means operable co-incident with said yieldable engagement for affixing projecting flaps of said wrapping over the box blank in attaching said bottom thereto.

Signed at Seattle, Washington, this 18th day of July 1929.

RAYMOND C. CUNNINGHAM.