No. 732,703. PATENTED JULY 7, 1903.

R. P. BROWN.

MACHINE FOR FILLING AND CLOSING PAPER BOXES.

APPLICATION FILED FEB. 24, 1899.

NO MODEL. 5 SHEETS—SHEET 1.

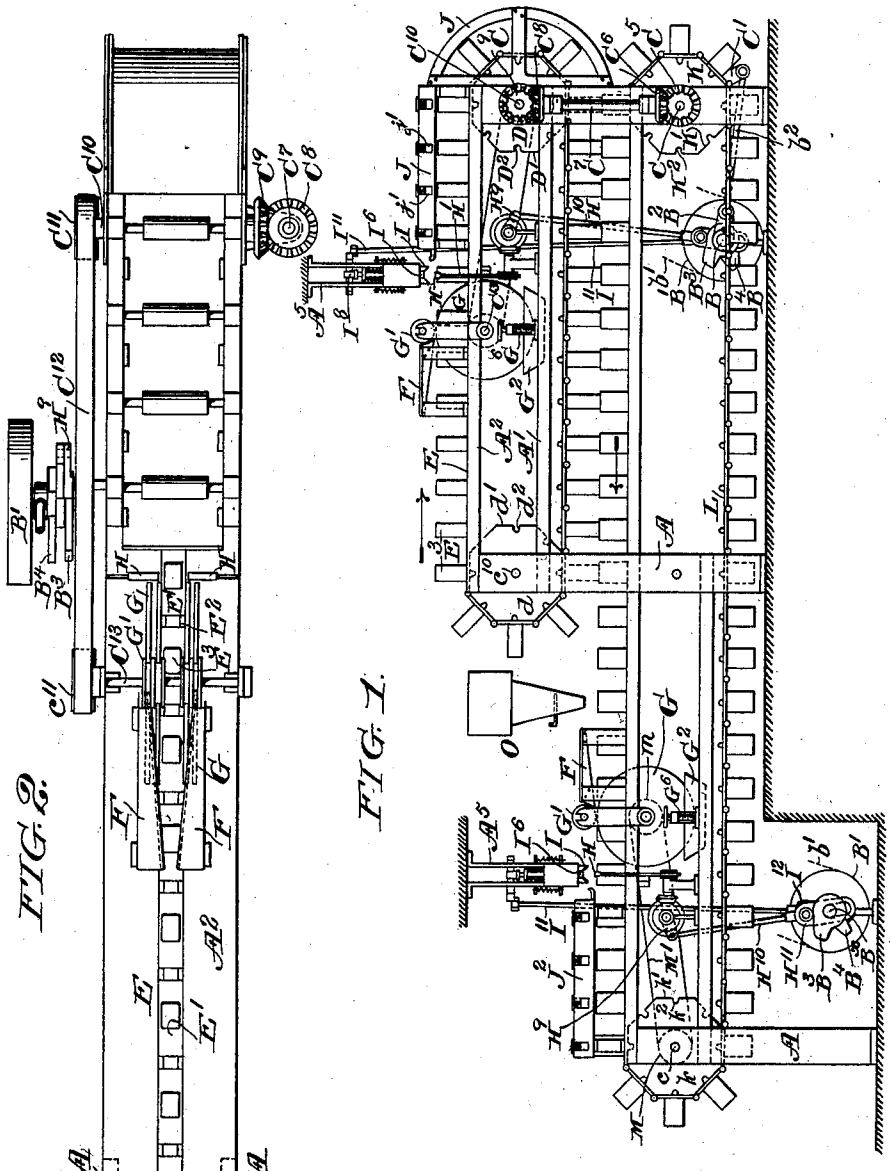

FIG. 2.

FIG. 1.

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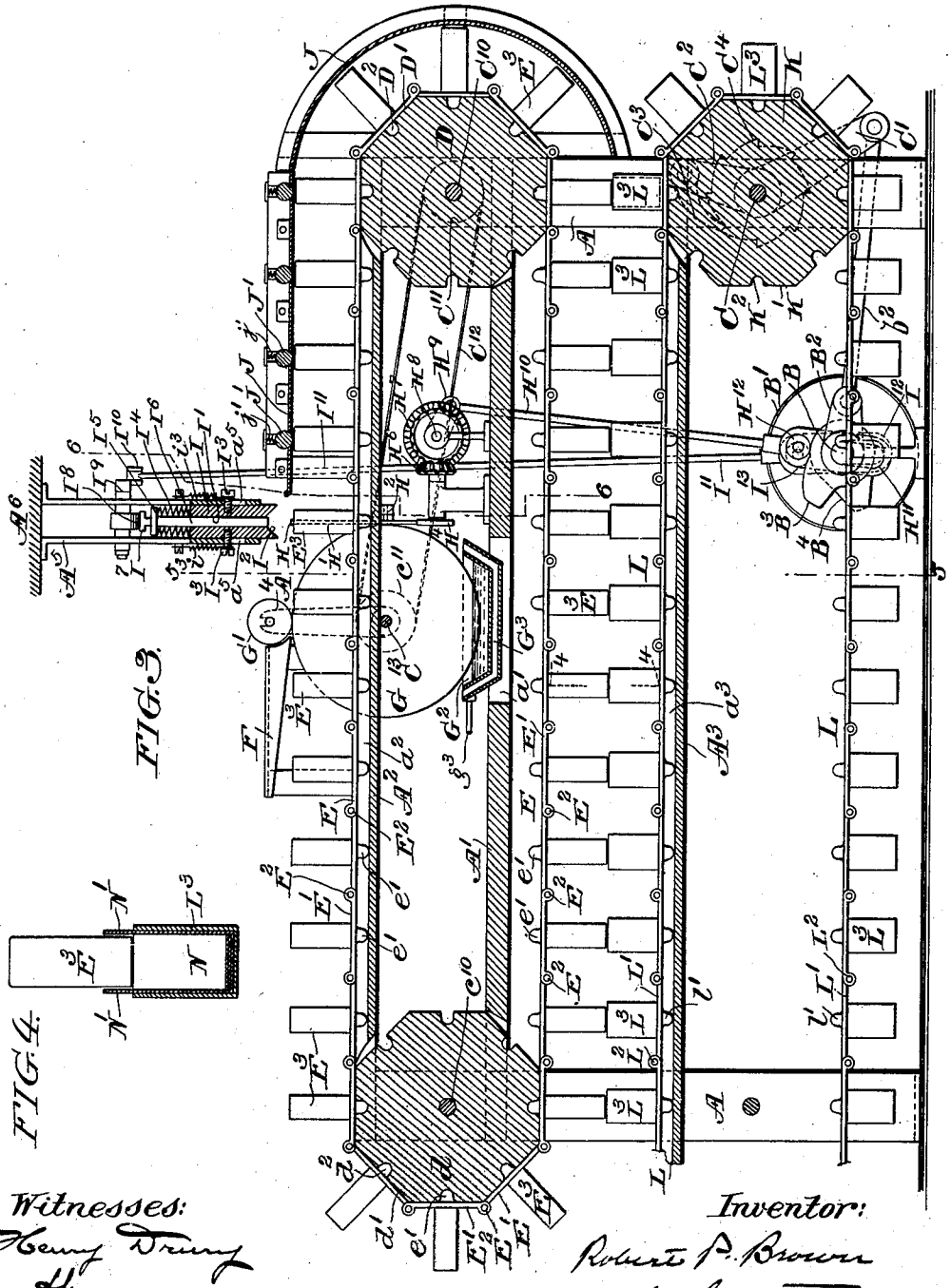

FIG. 3.

FIG. 4.

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NO MODEL. 5 SHEETS—SHEET 3.

FIG. 5.

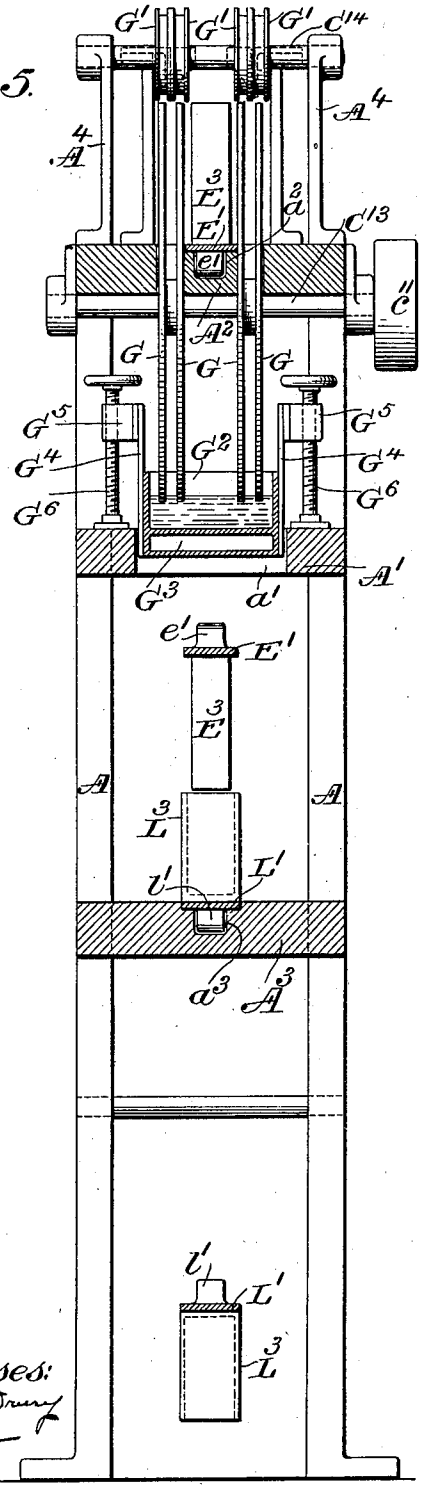
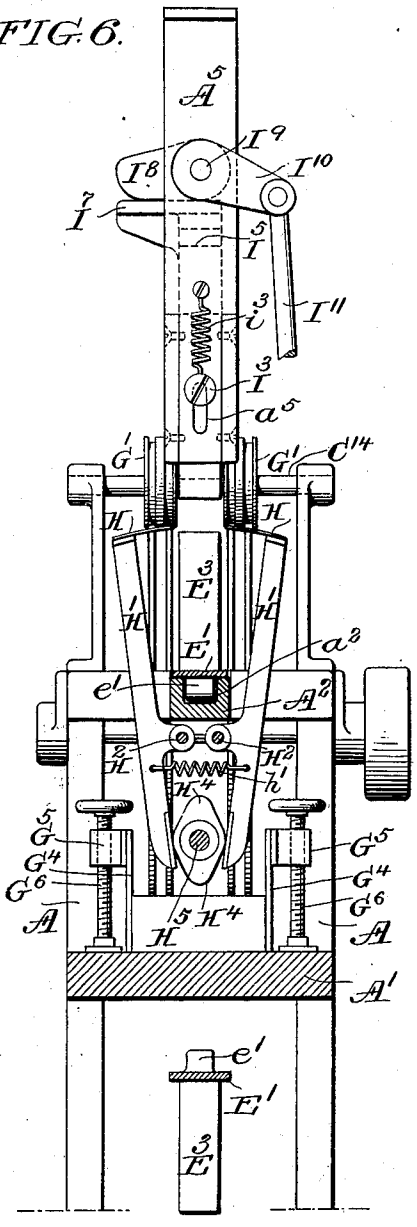


FIG. 6.



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NO MODEL. 5 SHEETS—SHEET 4.

FIG. 7.

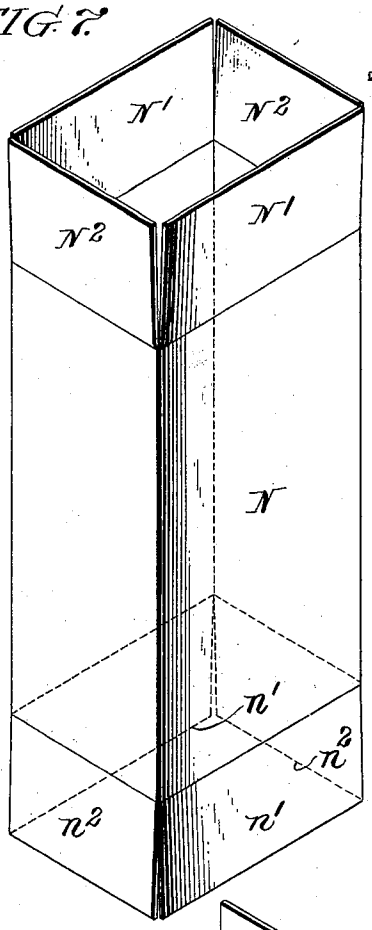


FIG. 8.

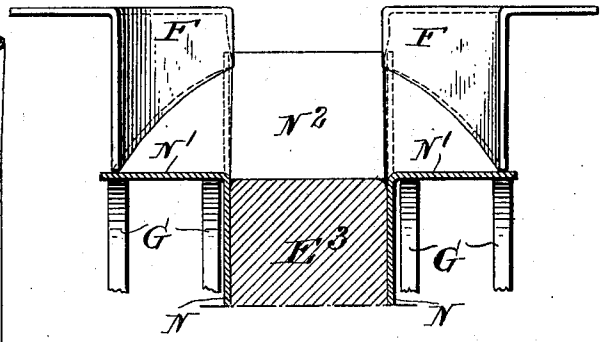


FIG. 9.

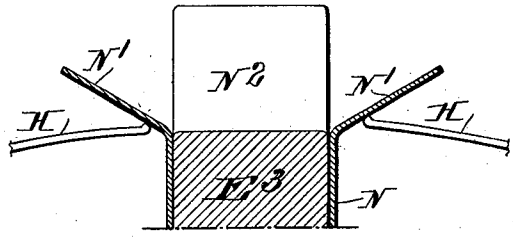


FIG. 10.

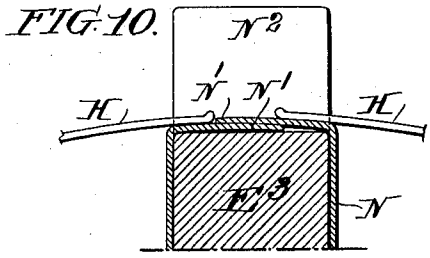
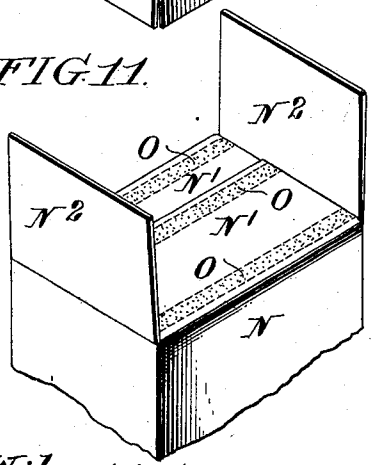


FIG. 11.



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NO MODEL. 5 SHEETS—SHEET 5.

FIG. 12.

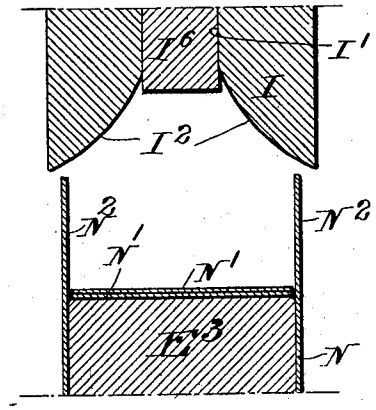


FIG. 13.

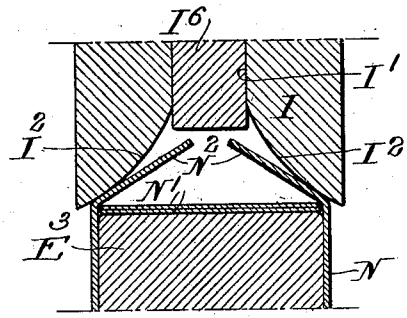


FIG. 14.

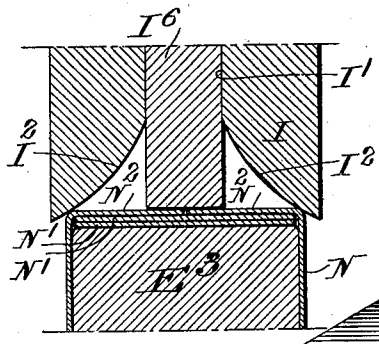


FIG. 15.

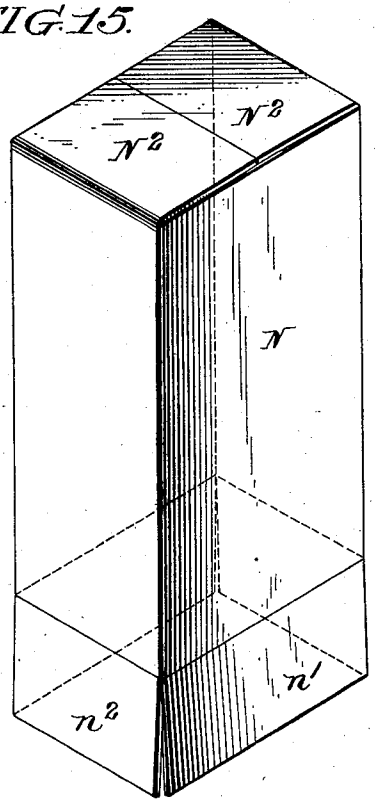
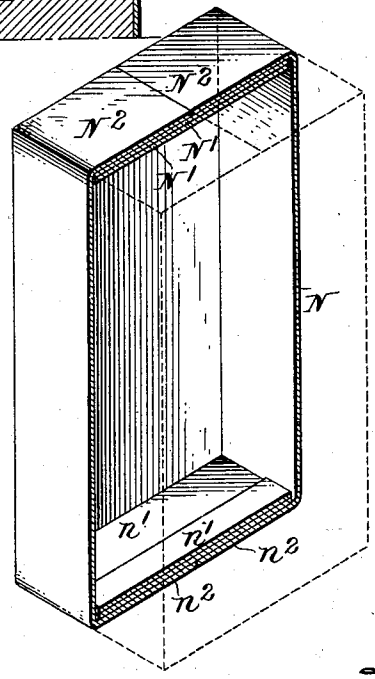


FIG. 16.



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No. 732,703. Patented July 7, 1903.

UNITED STATES PATENT OFFICE.

ROBERT P. BROWN, OF PHILADELPHIA, PENNSYLVANIA.

MACHINE FOR FILLING AND CLOSING PAPER BOXES.

SPECIFICATION forming part of Letters Patent No. 732,703, dated July 7, 1903.

Application filed February 24, 1899. Serial No. 706,661. (No model.)

To all whom it may concern:

Be it known that I, ROBERT P. BROWN, a citizen of the United States of America, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented a new and Improved Machine for Filling and Closing Paper Boxes, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to the construction of mechanism having for its object to close the ends of rectangular box-tubes, first forming the bottom of the box and then after the box is filled closing its top.

The nature of my improvements will be best understood as described in connection with the drawings, in which they are illustrated, and in which—

Figure 1 is a side elevation of my machine as a whole and as I prefer it constructed. Fig. 2 is a plan view of a portion thereof on a larger scale. Fig. 3 is a side view of the right-hand portion of the mechanism as shown in Fig. 1, on an enlarged scale, and so far as the carrier-actuating wheels and the framing between them is concerned on a central longitudinal section. Fig. 4 is a section through a tube-supporting block and a tube-supporting box, taken as on the section-line 4 4 of Fig. 3 and showing the box-blank in position. Fig. 5 is a cross-sectional view taken as on the line 5 5 of Fig. 3. Fig. 6 is a cross-sectional view taken on the irregular section-line 6 6 of Fig. 3. Fig. 7 is a perspective view of the box-blank, showing its construction as it exists before and at the time it is placed in my machine. Fig. 8 is a view, partly in section, illustrating the mechanism for bending outward the lateral flaps of the blank and applying paste thereto. Figs. 9 and 10 are views illustrating progressive steps of the action of closing in over the former the pasted flaps of the tube. Fig. 11 is a perspective view illustrating the condition of the tube as left after the operation illustrated in Fig. 10. Fig. 12 is a view illustrating the relative condition and position of the tube when moved into operative relationship with the next operative device which has for its object to close down the front and back flaps of the tube. Figs. 13 and 14 illustrate progressive steps of the operation of closing down the front and back flaps and completing the bottom of the box. Fig. 15 is a perspective view showing the condition of the box-blank after the operation, the completion of which is illustrated in Fig. 14; and Fig. 16 is a perspective sectional view showing the complete box.

A A, &c., indicate the supporting-frame of the machine.

A′ is a platform supported on the uprights and having preferably, as indicated, an opening a', into which extends the paste-receptacle.

A^2 is a second horizontal platform having formed in it a longitudinal groove, (indicated at a^2.)

A^3 is a third horizontal platform operating in connection with the lower carrier and having, like the platform A^2, a longitudinal groove, indicated at a^3.)

B is the driving-shaft of the machine, upon which, as shown, is secured a pulley-wheel B′, driven by a belt—for instance, as indicated at b', Fig. 1. There is also secured on the shaft B a crank-arm B^2 and two cams B^3 and B^4, the function of which cams will be hereinafter described. The crank-pin at the end of the arm B^2 connects, through a rod b^2, with a lever-arm C′, pivotally secured on a shaft C and having extending out from its hub portion another lever-arm C^2, to which is pivotally secured a pawl C^3, (see Fig. 3,) which operates in connection with a ratchet-wheel C^4, attached permanently to the shaft C. There is also attached to the shaft C a bevel-wheel C^5, (see Fig. 1,) which is engaged with a bevel-wheel C^6, attached to a vertical shaft C^7, having at its upper end a bevel-wheel C^8, which engages with a bevel-wheel C^9, attached to and rotating with a horizontal shaft C^{10}, which has upon its end, as shown, a belt-wheel C^{11}, (see Figs. 2 and 3,) which through a belt C^{12} communicates motion to a pulley c^{11}, firmly attached to a shaft C^{13}. It will readily be seen that a constant rotary movement of the shaft B is by the mechanism above described converted into an intermittent rotary movement of the shaft C, C^{10}, and C^{13}.

Attached to the shaft C^{10} is a carrier-actuating drum or wheel D, having, as shown, a series of flat faces D′, each formed with a central tooth-receiving recess or cavity, (in-

dicated at D^2.) The carrier E extends over this drum and over a similar drum *d*, having flat faces *d'* and toothed receiving-cavities d^2 in all respects similar to the parts of the drum D. The carrier E is made up of a series of links E', each corresponding in length with the breadth of the flat faces D' and *d'* of the drums, the links being pivoted together at their ends, as indicated at E^2, and provided with inwardly-projecting teeth *e'*, extending from their centers and adapted to fit into the cavities D^2 and d^2. To the outer face of each link E' is secured a former-block E^3 of a size adapted to receive and hold distended in proper position a box-blank tube, such as is shown at N, Fig. 7, and the operator is supposed to place this tube, such as N, Fig. 7, over each of the former-blocks E^3 as they begin their motion toward the right, as the machine is arranged in Figs. 1, 2, and 3, the height of the former-block being such that the upper end flaps N' N' N^2 N^2 extend beyond its top.

F F indicate guiding-fingers, the function of which is to engage the lateral flaps N' N' of the box-blank tube as the carrier moves it toward the right and press them outward and downward to a substantially horizontal position, as illustrated best in Fig. 8, and I will here remark that any of the well-known equivalent devices for acting upon the flaps of paper boxes, or boxes could be used in place of the devices F F without departure from my invention.

G G are paste-wheels situated immediately to the right of the folding-fingers F and secured on the shaft C^{13}, which, it will be remembered, moves in unison with the shaft C^{10}, immediately above the paste-wheels G' G', &c., which are secured on a shaft C^{14}, supported in turn by upright brackets A^4, the function of the presser-wheels being simply to hold the lateral extending flaps N' in contact with the paste-wheels G.

G^2 is a paste receptacle or receptacles situated immediately below the paste-wheels G and preferably made with a steam-jacket G^3, g^3 indicating the steam-pipe leading thereto. It is desirable that the paste-trough should be adjustable with regard to the paste-wheels, and a convenient way of making them so is best shown in Fig. 5. The trough is supplied with lateral arms G^4 G^4, having at their ends internally-threaded lugs G^5, into which screw adjusting-screws G^6, by turning which the trough can be raised and lowered. To give the trough clearance, I have shown the transverse frame-plate A as cut away at *a'*.

The device for applying the paste operates, as shown, while the carrier is in motion. The next device to operate upon the blank operates, on the contrary, during one of the dwells in the motion of the carrier, and consists of a pair of fingers H H. (Best shown in Fig. 6, but on a larger scale in Figs. 9 and 10.) These fingers are given an intermittent reciprocatory movement, such as is indicated in Figs. 9 and 10, and by means of which they push the pasted flaps N' N' inward over the end of the box, preferably lapping them on each other, as shown. While such reciprocatory fingers can be operated by a great variety of mechanical structures, I believe that shown in the drawings to be of a most satisfactory character, both for simplicity and accuracy of operation. The fingers H H are attached to the upper ends of two levers H' H', pivoted at H^2 H^2, and having their other ends in operative relation to a rotary cam or rather pair of cams H^4 H^4, which are secured on a shaft H^5, which shaft runs in a suitable bearing, as indicated in Fig. 3, and has attached to its end a bevel-gear H^6, engaged with a bevel-gear of larger diameter H^7, which in turn is secured on a shaft H^8, a lever-arm H^9 being attached to the same shaft and having pivotally connected with its free end a rod H^{10}, formed with a slotted end H^{11}, which extends over the shaft B and has at its upper end a cam-roller H^{12}, arranged in operative relation with the cam B^3. (See Fig. 3.) It will thus be seen that as the shaft rotates the rotating cam B^3 gives an intermittent reciprocatory movement to the rod H^{10} and through it and the lever-arm H^9 to the shaft H^8 and bevel-gear H^7, said movement being communicated with accelerated angular velocity through the gear-wheel H^6 and shaft H^5 to the cams H^4 H^4, which in turn act upon the fingers for folding in the lateral flaps, and it will be understood that the proportion and arrangement of the parts is such that the fingers are operated during a period when the carrier is motionless. Preferably during the same dwell in the motion of the carrier I close also the front and back flaps of the box-blank over its end. The device illustrated for doing this consists of a reciprocating plunger I, (best shown in Fig. 3,) arranged immediately over the position in which the former lies at rest and having front and rear fingers I^2 with converging inner faces which are adapted to engage the ends of the front and back flaps and when the plunger moves downward to press them in, as shown in Figs. 12 and 13. The plunger is made with a central slot I' and provided on each side with projecting pins I^3, which may conveniently consist of screws, as shown, and which project through slots a^5 a^5 in guide-bars A^5, between which the plunger moves and which in turn are fastened to some support A^6, rigid with the frame of the machine.

i^3 i^3 are springs attached to the guide-bars A^5 and to the pins I^3, the action of which is to normally hold the piston in its uppermost position, as shown in Fig. 3. Moving in the slot I' of the plunger is a presser-plunger I^6, having a lateral projecting head I^5 and a cam contact projection I^7.

I^4 indicates a spring or springs arranged between the lateral projecting head I^5 and the top of the plunger I.

I^8 (see Figs. 3 and 6) is a wiper lever or finger resting in contact with the head I^7 of the presser-plunger and pivoted on a shaft I^9, to which is also attached a lever-arm I^{10}, having pivotally attached to its free end a rod or link I^{11}, provided with a slotted end I^{12}, which extends over the shaft B, and having a cam-roller I^{13} secured to the top of the slot in position to be acted on by the rotary cam B^4. The action of this cam occurs during a dwell in the motion of the carrier, and by pressing down the wiper-finger I^8 it presses down the presser-plunger I^6, carrying with it the plunger I by reason of the head I^5 communicating the downward motion through the springs I^4 to the said plunger until the parts assume the position indicated in Fig. 13, the fingers I^2 pressing inward the flaps N^2, as illustrated in said figure. At this point the downward motion of the plunger I is arrested by reason of the pins I^3 coming in contact with the bottom of the slots a^5; but the presser-plunger I^6 continues to move down, the springs I^4 being now compressed to the position shown in Fig. 14, pressing and compacting the flaps N^2 N^2 down upon the flaps N' N', upon the upper face of which the paste lies, having been applied as above described.

While the dwell in the motion of the carrier still continues the cam B^4 leaves contact with the cam-roller I^{13}, and the flap-folding mechanism described at once returns to the position shown in Fig. 3, after which the carrier makes another movement in advance, carrying the box-blank, with its bottom now completed, under the guide J, which is continued around the drum D, as shown, and which performs the double function of preventing the flaps from coming loose and also, as the formers E^3 assume a downwardly-inclined position, of preventing the boxes from falling off from them. I prefer at the beginning of the guide J to provide a series of presser-rolls J', pressed downward by means of springs j', as shown in Fig. 3, and the function of which is to aid in compacting the pasted folds of the box-bottom.

Situated immediately below the carrier E is another carrier-drum K, having flat faces K' and tooth-receiving cavities K^2, similar to those of the drum D, and at a proper distance is the coacting carrier-drum k, of a similar character. The drum K is attached to the shaft C, and therefore, it will be obvious, must move in absolute synchronism with the drum D, the dwells in the motion of which drum being simultaneous. Actuated by the drum K and extending over it and the drum k is a carrier L, made up of links L', hinged at L^2 and provided with inwardly-extending teeth l', in all respects like the similar construction of the carrier E. On the outer faces of the links L', however, I secure in place of the former-blocks E^3 a series of box-blank-holding boxes L^3 L^3, &c., which are arranged as shown, so that they will be in correct alinement with the box-blanks E^3 on the under side of the carrier E and so that as the formers E^3, carrying the boxes with their bottoms formed, come into registry with the boxes L^3 the boxes, being no longer held in position by the guide J, will fall or can be pushed off, if necessary, into the boxes L^3, and the carrier L extending considerably beyond the carrier E the boxes will be entirely freed from the formers E^3, when said formers move upward over the drum d. The open tops of the boxes next move beneath some filling mechanism, (conventionally indicated at O in Fig. 1,) where the material with which it is desired to fill the box is dumped into it, and the filled boxes are then carried, as indicated at the left hand of Fig. 1, through a series of devices consisting of fingers F, paste and presser wheels G and G', fingers H, and plungers I and I^6, in all respects similar to the similar parts operating in connection with the carrier E and already fully described. The paste-wheels G are, as shown, operated from the drum k, which is secured on a shaft c, to which is also secured a pulley-wheel M, which through a belt M' acts on a pulley m, to which is also attached paste-wheels G. The fingers H and plungers I and I^6 are operated through mechanism precisely similar to that described in connection with the similar parts above, except that the cams B^3 and B^4 are attached to a shaft $B^\times$, having secured to it a belt-wheel B', driven by an independent belt b'.

At J^2, I have shown a guide similar to the guide J already described, except that it is not necessary to carry it around the drum c, as the filled and sealed packages will conveniently be withdrawn from the boxes L^3 at this point.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A rotary flexible carrier, moving in a vertical plane over suitable supports, and so that its upper and lower portions will move in horizontal planes, in combination with, a series of box-tube-supporting blocks, secured on the outer face of the carrier and adapted to support box-tubes on their outer surfaces, means for pasting and closing down the end flaps of the blanks to form box-bottoms, said means being arranged to act on the upwardly-extending blocks of the carrier, a second flexible carrier, moving also in a vertical plane over suitable supports, and so that a portion of its upper portion will move in a horizontal plane directly beneath the lower portion of the first carrier, and another portion of its upper face will project beyond the end of the first carrier, a series of hollow boxes, secured to the outer face of the second carrier and arranged to register with blocks on the first carrier and to automatically receive the blanks therefrom, and means for pasting and closing down the ends of the boxes projecting from the boxes secured to the second carrier.

2. The combination with a carrier and a series of box-supports secured thereon, of fingers arranged to bend the lateral flaps of a box-blank outward, paste and presser wheels, as G and G′, arranged to apply paste to said flaps, a pair of intermittently-reciprocating fingers H H arranged to act on the pasted flaps and fold them in over the end of the box, a pair of fingers, as I^2 I^2, arranged to engage and bend inward the front and rear flaps of the box-blank and a plunger, as I^6, arranged to press down and compact the folded flaps.

3. In a box-folding machine, the combination with means for holding a box-blank in position, of reciprocating fingers I^2 I^2 having their inner faces inclined inwardly from the bottom and a presser-plunger, as I^6, moving between said fingers I^2 I^2 and arranged to operate upon the box-flaps after they have been bent inwardly by said fingers.

4. In a box-folding machine, the combination of laterally-reciprocating fingers, as H H, arranged to act upon the lateral flaps of a box-tube and with vertically-reciprocating fingers, as I^2 I^2, arranged to act upon the front and back flaps of the blank, a presser-plunger, as I^6, moving between the fingers I^2 I^2, constantly-rotating cams, as B^3 B^4, and means as described whereby said cams actuate in turn the fingers H H and the fingers and plungers I^2 I^6.

5. In a box-folding machine, the combination with an intermittently-moving carrier having a series of box-blank holders symmetrically disposed along its length, of lateral flap-spreading fingers as F F, paste-applying wheels G G arranged to act on the outwardly-spread flaps as they move over said wheels, laterally-moving flap-closing fingers, as H H, arranged to act on the pasted flaps while the carrier is at rest, vertically-moving flap-closing fingers, as I^2 I^2, arranged to act on the front and rear flaps of the blank during the same dwell in the carrier's movement as the fingers H H and immediately after said fingers have operated, a presser-plunger, as I^6, moving between fingers I^2 I^2 and operating on the blanks immediately after said fingers, a driving-shaft, means actuated by said shaft for imparting an intermittent rotary motion to the carrier, cams, as B^3 B^4 on the driving-shaft and means, as described, whereby said cams actuate the fingers and plunger aforesaid during a dwell in the movement of the carrier.

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