May 18, 1954 W. M. FLEMING ET AL 2,678,591

MACHINE FOR MANUFACTURE OF RECTANGULAR CONTAINERS

Filed June 16, 1950

8 Sheets-Sheet 1

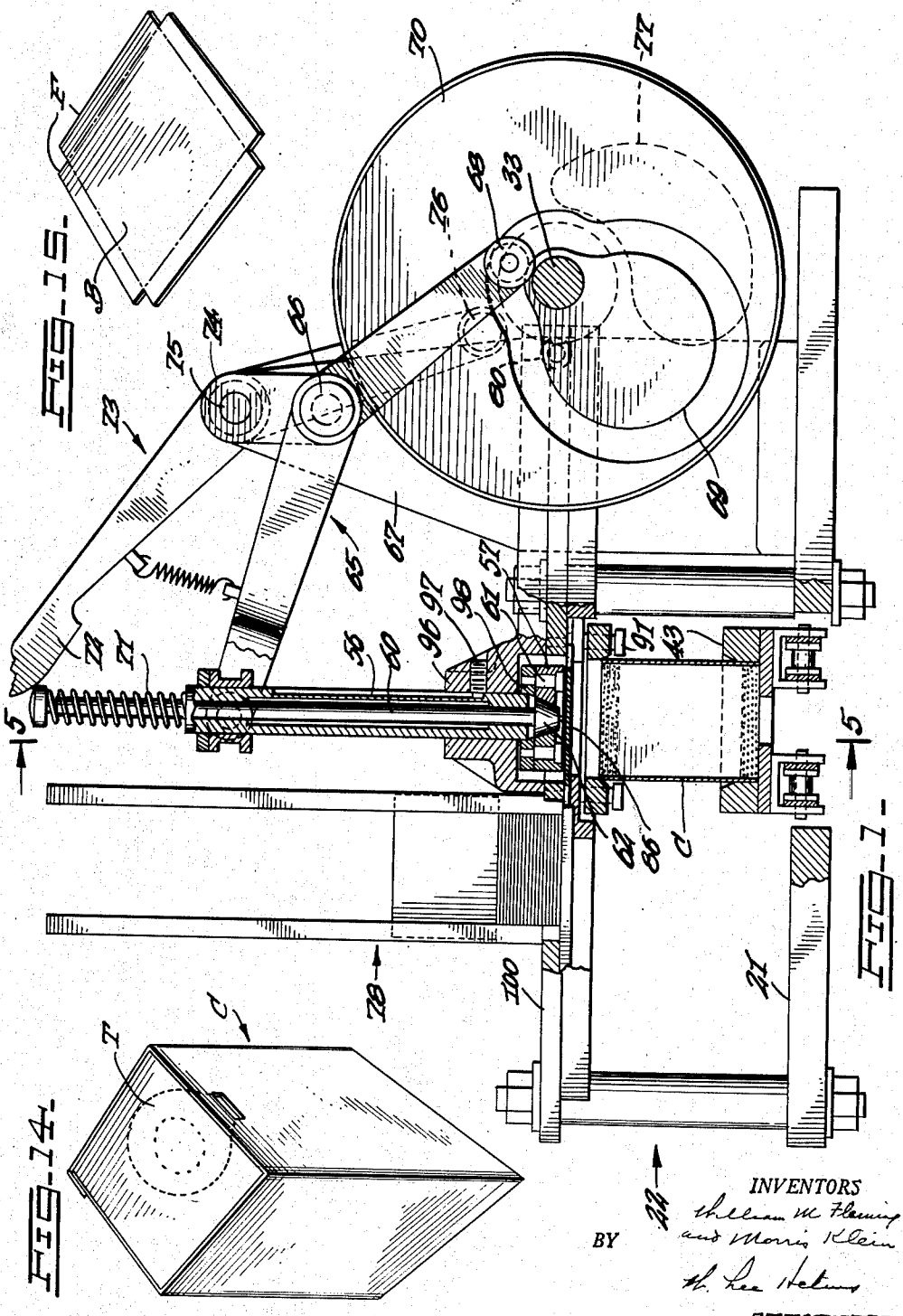


Fig. 15.

Fig. 14.

Fig. 7.

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8 Sheets-Sheet 2

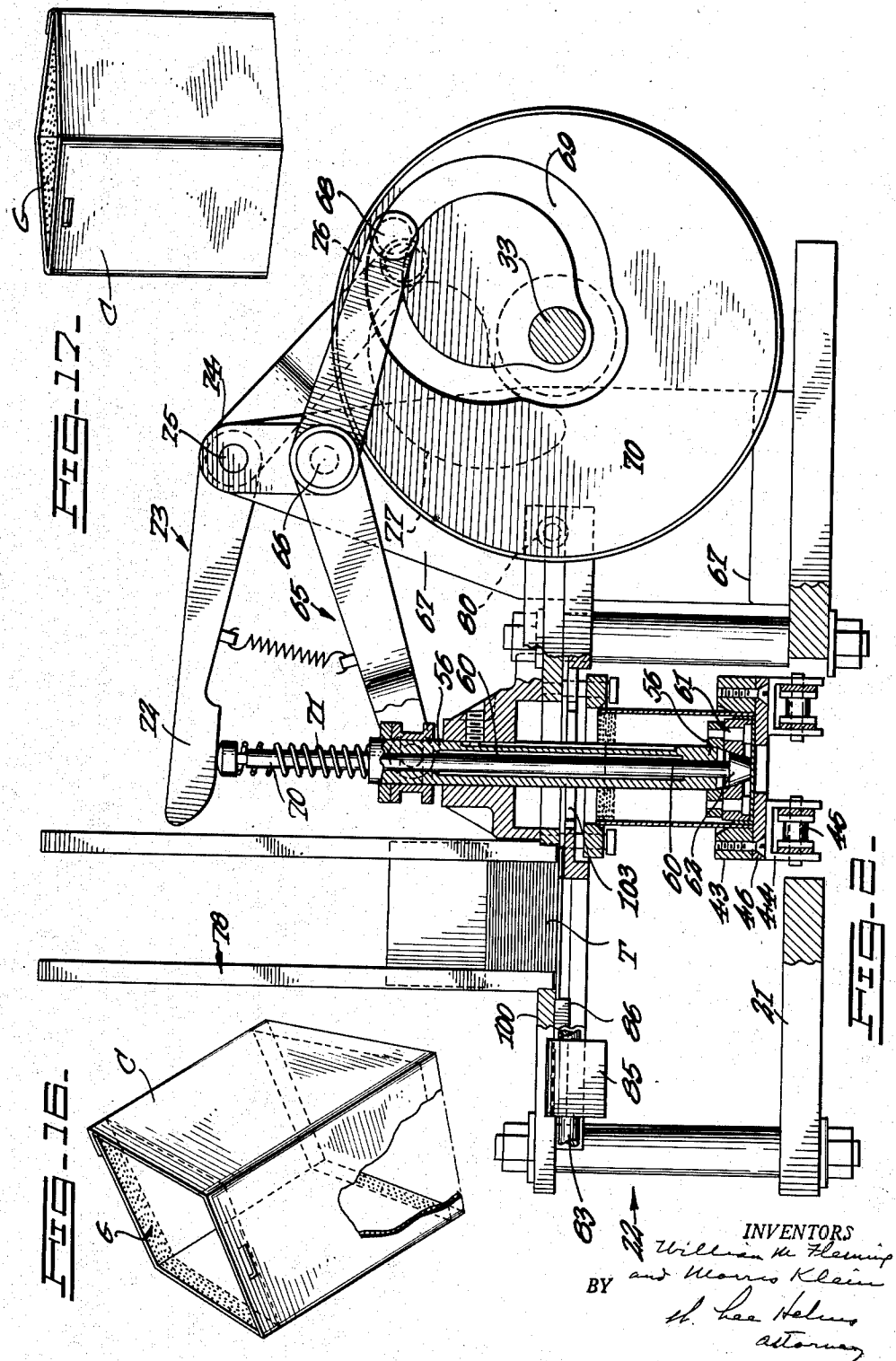


FIG-17-

FIG-16-

FIG-2-

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MACHINE FOR MANUFACTURE OF RECTANGULAR CONTAINERS

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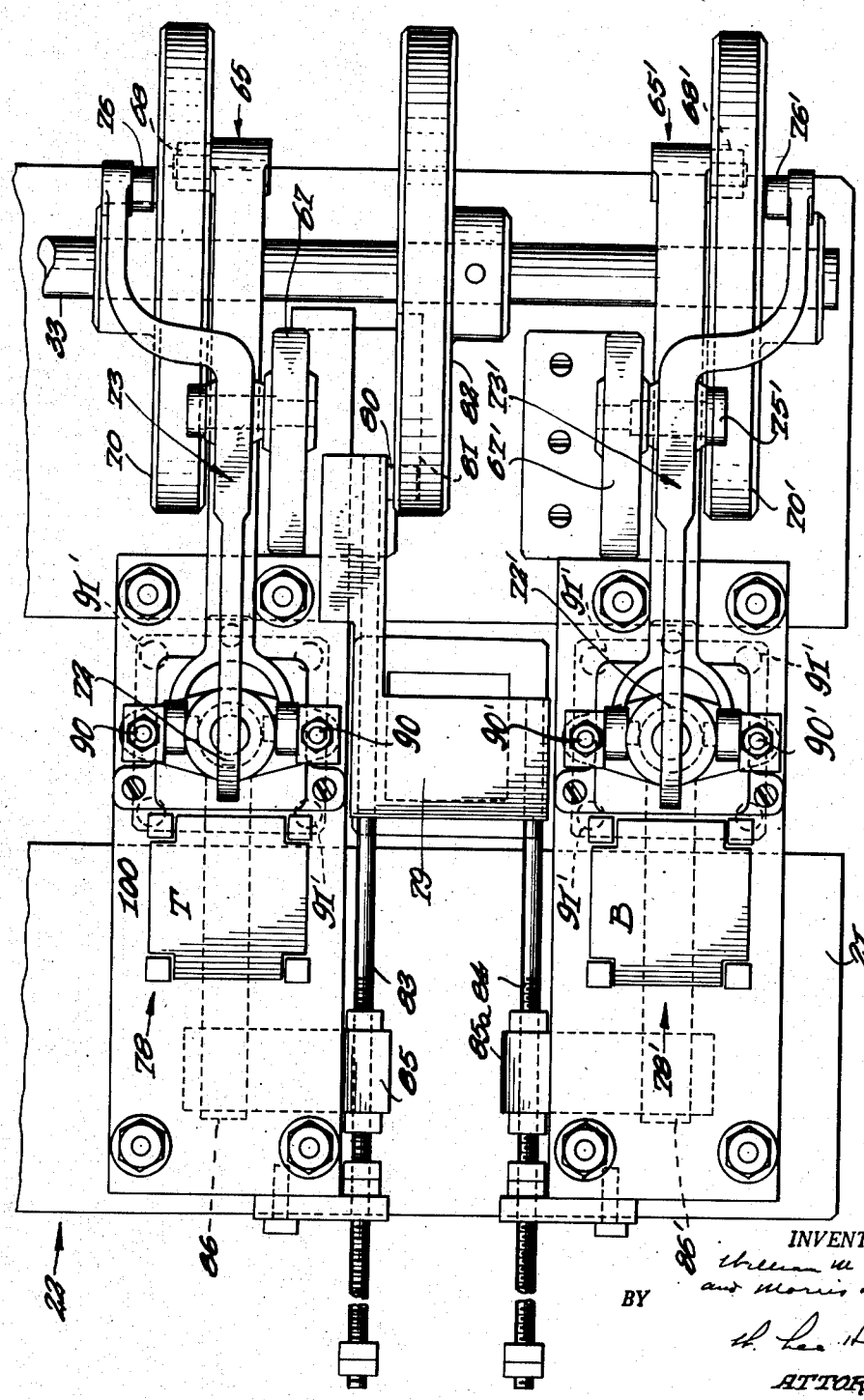


FIG. 3.

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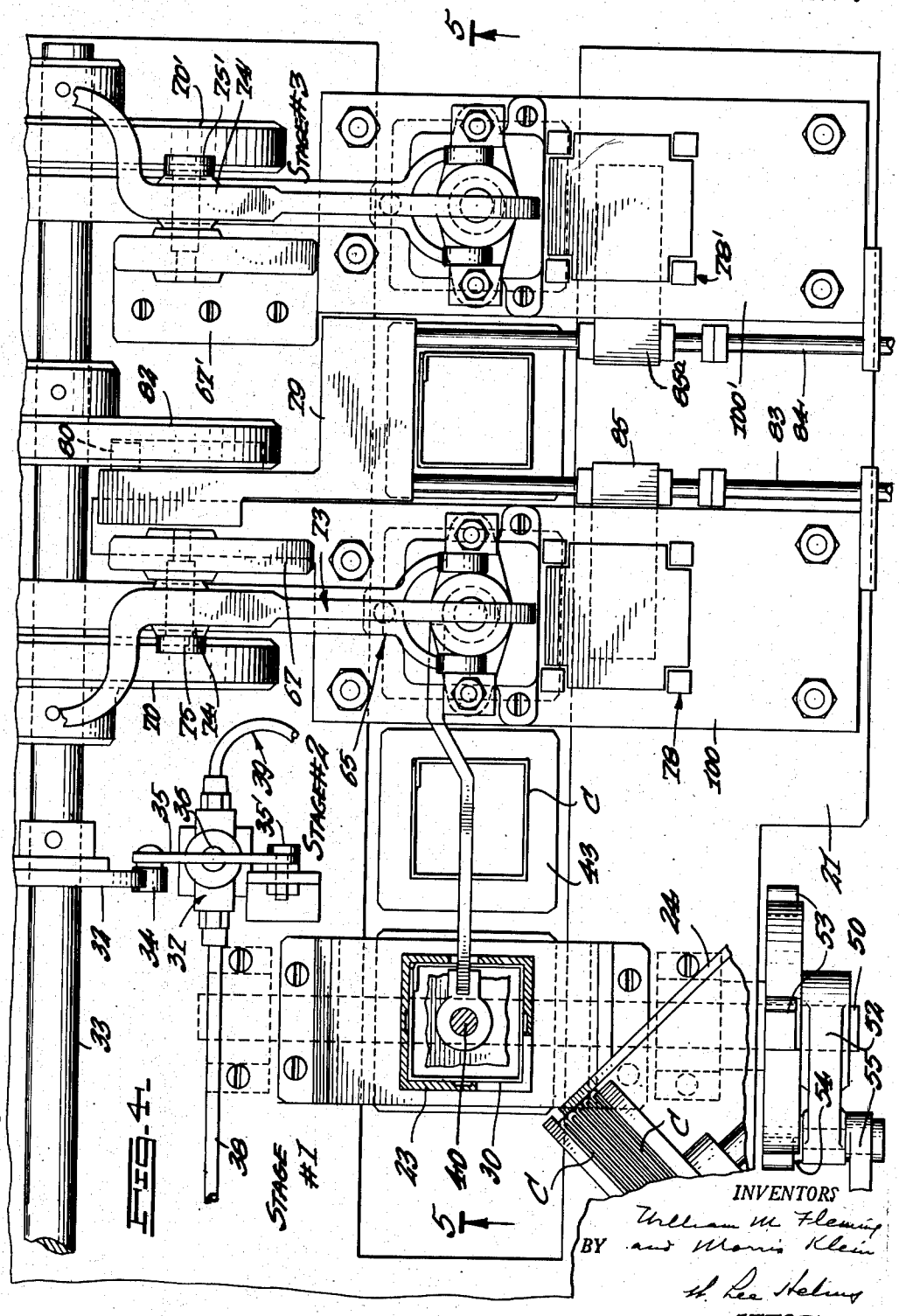


FIG. 4.

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MACHINE FOR MANUFACTURE OF RECTANGULAR CONTAINERS

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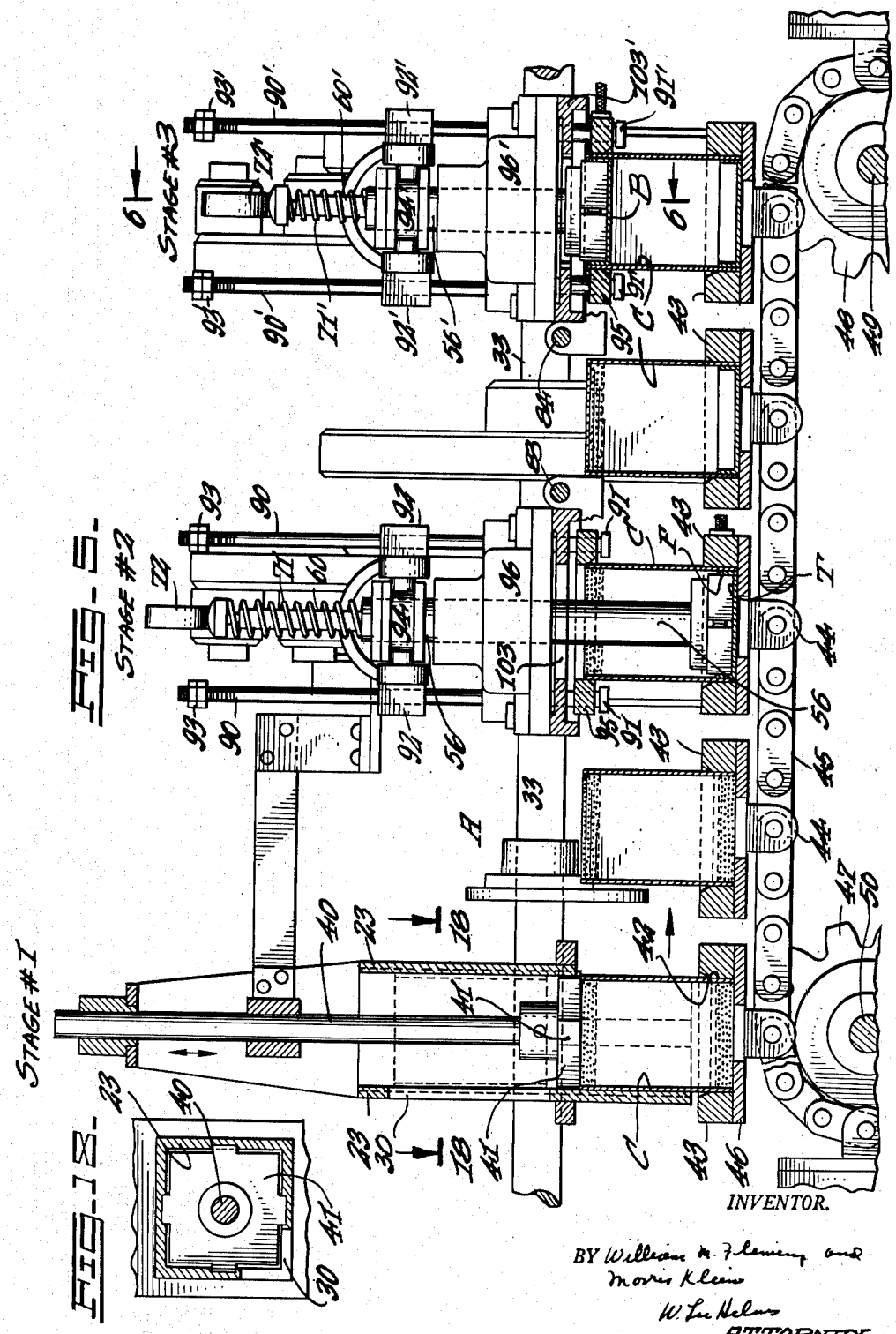


FIG. 5.

FIG. 13.

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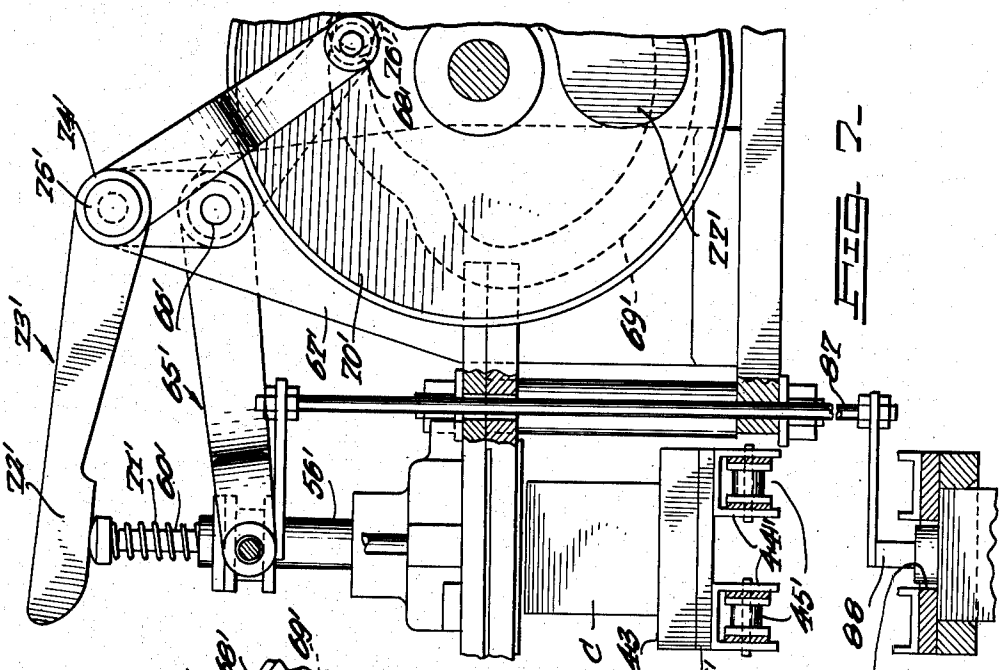


FIG. 7.

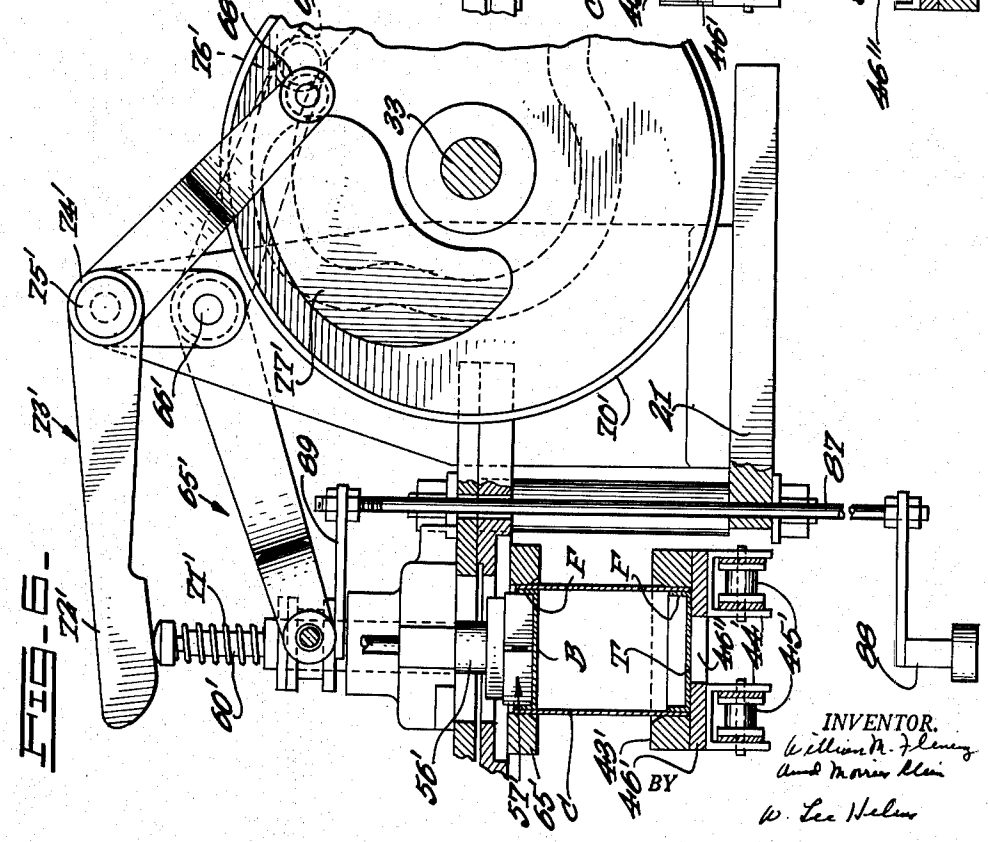


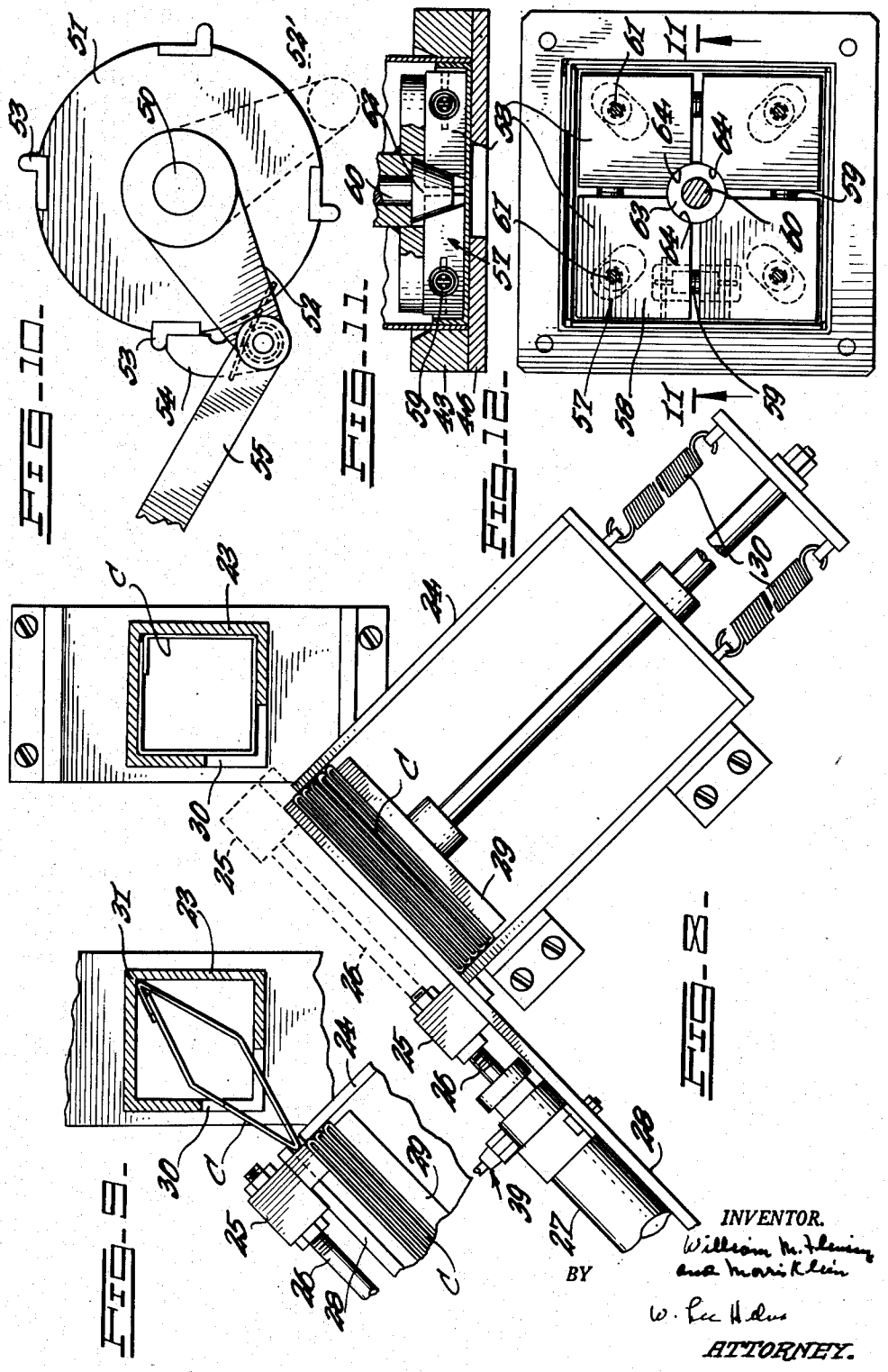
FIG. 8.

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MACHINE FOR MANUFACTURE OF RECTANGULAR CONTAINERS

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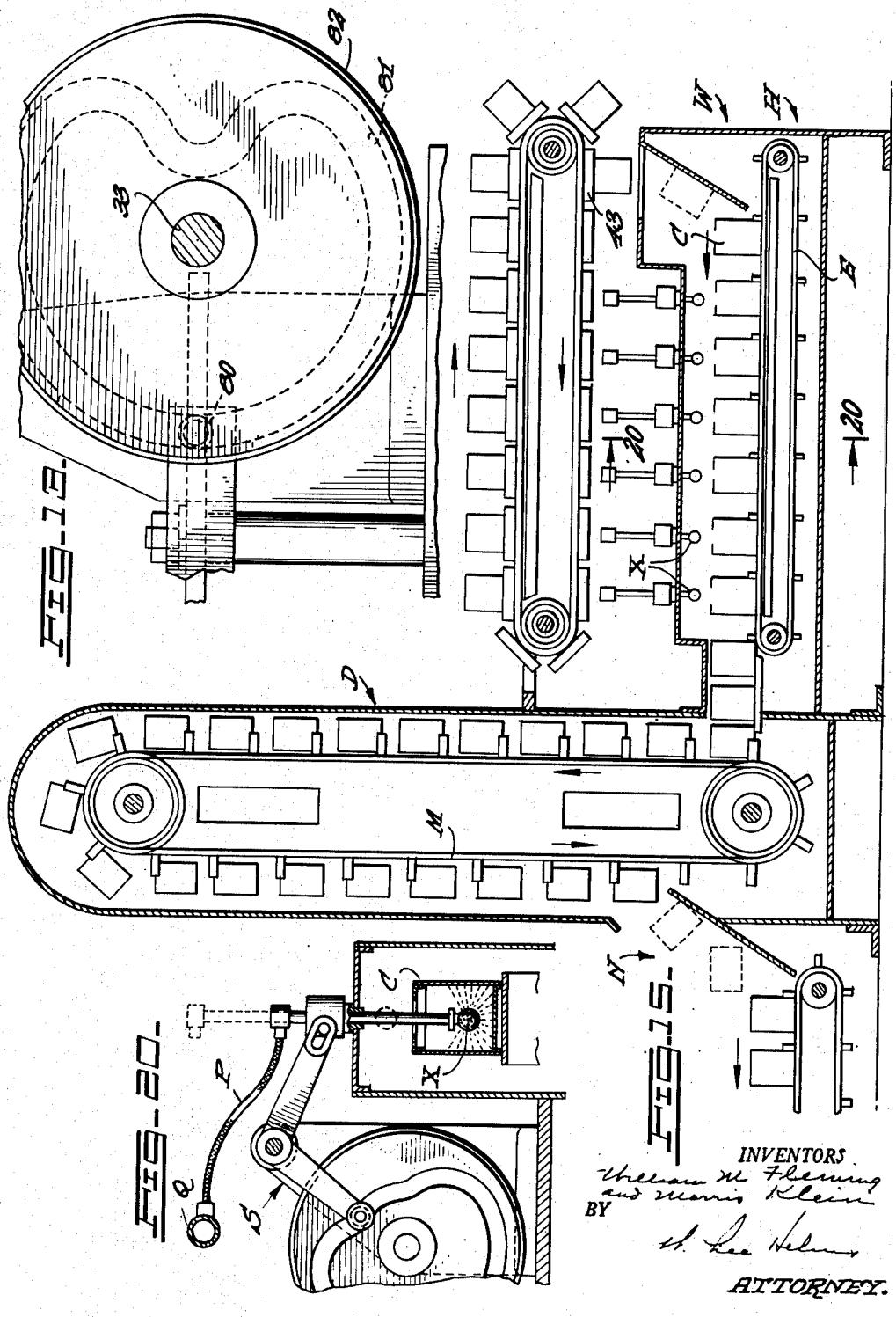


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2,678,591

UNITED STATES PATENT OFFICE

2,678,591

MACHINE FOR MANUFACTURE OF RECTANGULAR CONTAINERS

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Application June 16, 1950, Serial No. 168,492

7 Claims. (Cl. 93—55.1)

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This invention relates to machines for manufacture of rectangular containers, and more particularly to such machines which will produce simply and inexpensively paper containers used for fluids, particularly milk, although the container might contain other liquid substances, semi-fluid substances, and granular material.

One object of this invention is to provide a simple and inexpensive machine which will produce a medium sized paper container consisting of four upright flat side surfaces, a top closure member and a bottom closure member.

Another object of this invention is to form up a container body from the flat, which will be delivered to top and bottom closure assembly units of the machine, which units include a horizontally reciprocating plunger acting upon top and bottom members.

An additional object is to provide means facilitating said plunger to affix a top closure member securely to the top margin of said container and then to withdraw, permitting the container to be moved to another stage where the bottom closure member is brought into place in the body.

Another object is to provide the top and bottom affixing mechanism with expanding means facilitating the application of pressure against flanges provided upon the top and bottom closure members, thus producing a tight grip of such end closures upon the glued top and bottom margins of said containers.

The machine can be operated in conjunction with a waxing station and with means for drying the formed containers preliminary to delivering them to a fluid filling machine, all in unison and timed relation.

Further objects will appear in the following specification, with reference to the accompanying drawings in which:

Fig. 1 is a vertical transverse section through an embodiment, showing details at the stage in which the top member blanks are delivered in register with a plunger.

Fig. 2 is a view similar to Fig. 1 showing the position of the plunger and associated parts after insertion of the top blank.

Fig. 3 is a top plan view, partly broken away, showing construction details of the machine.

Fig. 4 is a plan view, partly broken away, showing the container forming stage in its proper relation to the two succeeding stages.

Fig. 5 is a vertical section, partly broken away, taken on the line 5—5 of Fig. 1, showing all three stages; the container forming stage, the top affixing stage and the bottom affixing stage.

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Fig. 6 is a section taken on the line 6—6 of Fig. 5 showing details of the bottom forming stage and the means for ejecting the container.

Fig. 7 is a view similar to the view in Fig. 6 showing details of the bottom forming mechanism and the units by which the container ejecting means is operated.

Fig. 8 is a plan elevation showing one container basket and the means for delivering the folded containers prior to the top and bottom affixing operations.

Fig. 9 is a schematic view, partly in section, showing a folded container partly introduced into the container form-up stage of the machine.

Fig. 10 shows details of the ratchet for operating the machine in timed relation with the automatic delivery of prefolded containers to the second and third stages.

Fig. 11 is a fragmentary section taken on the line 11—11 of the Fig. 12, showing details of the expanding shoe-means to facilitate a better hold of the top and bottom members to the container.

Fig. 12 is a detail top elevation of the expanding shoe-means shown in Fig. 11.

Fig. 13 is a fragmentary view, partly in dotted lines, showing the cam means used to operate the delivery for the top and bottom blanks preliminary to the forming and affixing operations.

Fig. 14 is a perspective view of the ready made container.

Fig. 15 is a perspective view of one of the closure blanks.

Fig. 16 is a perspective view showing the container body with glue applied to the top and bottom inside margins thereof.

Fig. 17 is a perspective view showing the container blank in folded position as it is delivered to the machine.

Fig. 18 is a horizontal section on the line 18—18, Fig. 5, showing details of the plunger plate in the first stage.

Fig. 19 is a diagrammatic view, partly in vertical section, showing a liquid wax applicator unit and a container drying unit.

Fig. 20 is a sectional view, on the line 20—20, Fig. 19, showing means by which the inside of the container is wax coated and the waxing nozzle moved into and out of the container.

Referring to Figs. 1, 2, 3, 4 and 5 inclusive, numeral 21 indicates a base upon which the entire mechanism of the container manufacturing machine is mounted, including all three stages; stage #1 for unfolding the container preliminary to assembling to it the top and bottom members; stage #2 in which the top member is affixed to

one end of the container, and finally stage #3 in which the bottom member is affixed to the other end of the container. (See Figs. 2 and 3.)

Referring more particularly to Fig. 4, showing a plan view of all three stages and Fig. 5, showing a cross-section on the line 5—5 of Fig. 4, numeral 23 represents an upright guide member of rectangular form into which the upfolded container member C has been beforehand inserted from the stock of folded container blanks C.

A plurality of blanks C (see Figs. 8 and 9) are housed within the basket member 24 and are ejected into the rectangular guide member 23 by means of the sliding movement of the block 25 and the shaft and piston 26. The shaft and piston 26 are operated by air pressure from the air pressure cylinder 27, which is secured to two spaced supporting plates 28. A pressure plate 29 under the influence of the coil springs 30 holds the container blanks C upright within the plates 28.

Referring more particularly to Fig. 9, it will be seen that as the container blank C is shoved through the opening 30 and into the rectangular guide member 23, it is forced to open up when it strikes the inside corner 31 of the member 23. The blank C continues to unfold under the pressure of the block 25 until it entirely fills the rectangular guide member 23 (see Fig. 8). With its work accomplished, the piston within the air cylinder 27 retracts the shaft 26 and the block 25 back to their original starting position shown in Fig. 8 and preliminary to the delivery of a new container blank into the form 23.

The operation of the piston within air cylinder 27 is regulated by means of a cam member 32 (Fig. 4) which is secured to the rotating shaft 33. The cam member 32 works upon a roller 34 secured to one end of an arm 35, pivoted at 35'. The arm later contacts the operating plunger 36 of the air valve 37. Air pressure is supplied to the air valve 37 through the piping 38 and therefrom is distributed to the cylinder 27 by means of the tubing and nipple 39.

Stage #1 of the machine is equipped with a vertically reciprocating plunger shaft 40 (Fig. 5) carrying a flat plate 41. When the container blank C enters the guide 23 the plate 41 is located at its uppermost position permitting the container blank to be completely received and formed within the said guide. Once the blank has been inserted the plate 41 descends. This operation ejects the container member C out of the guide 23 and locates its lower end within the square chamber formed by a frame 43. A plurality of such frames are secured by means of brackets 44 to an endless chain 45. The frames 43 are held upon flat plates 46 secured to brackets 44 on chain 45. The chain is moved by means of a pair of sprocket wheels 47 and 48. The sprocket wheel 48 is an idler and rotated upon a stationary supporting shaft 49, while the sprocket wheel 47 is rotated by the shaft 50. The shaft 50 has an intermittent motion. It remains stationary while the container C is inserted by the plunger plate 41 into the frame 43 and rotates upon the completion of this operation.

The immediately above referred to motion is accomplished by means of the ratchet wheel 51 and the ratchet arm 52 (see Fig. 10). The ratchet wheel 51 is supplied with four ratchet teeth 53 and the ratchet arm 52 is supplied with a ratchet pawl 54. When the ratchet arm is moved from the dotted position 52' to its full line position 52, as indicated in Fig. 10, the ratchet pawl contacts one of the ratchet teeth 53. Further motion in an arc, of the ratchet arm 52 rotates the wheel 51 one quarter of its circumference, transmitting in turn its motion to the shaft 50, sprocket wheel 47 and chain 45.

The ratchet arm 52 is operated by the reciprocating connecting bar 55 which in turn is operated by any suitable prime mover for the entire machine (not shown).

Between stages #1 and stage #2 there is an idle intermediate stage A (Fig. 5) or there can be a number of intermediate stages (not shown). In stage #2 the container C is now ready to receive a top member T which is inserted into the container unside down.

Referring more particularly to stage #2, the action elements comprise a reciprocating hollow upright shaft 56 (see Figs. 1, 2, 4 and 5) which is secured at its lower end to an expanding shoe member 57, the latter being detailed in Figs. 11 and 12. It consists in the main of four separate rectangular blocks 58. All four blocks 58 are normally held close together by coil springs 59 and are made to move away from the center shaft member 60 upon studs 61. The center shaft 60 carries at its lower end a tapered wedge 62 which is fitted within tapered ways 63 in the inside corners 64 of the blocks 58.

The downward motion of the center shaft 60 exerts an expanding force upon the four blocks 58, by means of the tapered wedge 62. This force is utilized to apply pressure against the upturned flanges F of the top member T.

The container may be provided interiorly with an adhesive G (see Fig. 16) so that the flanges of the top T are readily bound to the container body to facilitate a better hold of the flanges F upon the container. The frames 43 may be equipped with electric heating pads or be heated by means of a gas flame or otherwise.

The hollow reciprocating shaft 56 is moved up and down by means of a pivoted arm 65 (Figs. 1 and 2) which rocks upon a stub shaft 66 secured to an upright support 67. One end of the pivoted arm 65 carries a roller 68 which rides within a cam groove 69 in the cam wheel 70. The opposite end of the pivoted arm 65 carries the studs which enter an aperture channel in a collar 94 fixed to hollow reciprocating shaft 95. It will be seen that the hollow shaft 56 reciprocates within a guiding head 96, the formation of the latter being best shown by cross section in Fig. 1. The limits of movement of hollow shaft 56 will be controlled not only by stroke of pivoted arm 65 but by a stop screw 97, the end of which enters a vertical channel, as shown in Fig. 1, the channel having stop shoulders at its ends.

The guiding head 96 is formed with a chamber to receive the expanding shoe member generally indicated at 57, Fig. 1, and detailed in Figs. 11 and 12, together with the head 98, which supports the expanding shoes through the headed stud 61, the latter being carried by said member 98.

The wheel 70 is secured to the shaft 33, which is in turn rotated by the prime mover hereinafter referred to (not shown).

While the hollow shaft 56 reciprocates, a center shaft 60 moves in unison under the influence of a coil spring 71. The latter tends to force the shaft 60 upwards and in contact with the lower surface 72 of a secondary lever arm 73 pivoted at 74 upon a pivot pin 75 secured to the upright 67. The other end of the lever arm 73 carries

a roller 76 which contacts a cam surface 77 (shown by dotted lines in Fig. 17) located upon one side of the cam wheel 70.

The actions of the cam surfaces 69 and 77 are so arranged as to work in unison during the rotation of the cam wheel 70, outside of the position shown in Fig. 2 where only for a short distance the cam 77 applies extra motion to the forked arm 73, for the purpose of expanding the blocks 58 of the expanding shoe as described above.

In moving into stage #2, the carbon body must clear an upper frame 95 and the frame must be elevated to permit a previously positioned carton body therein to move to the intermediate stage preceding stage 3. To this end frame 95 will be supported in its lower position by the heads 91 at the lower ends of two rods 90. Slidably mounted on the rods are blocks 92 which, in their uppermost positions, engage nuts 93 threaded on the tops of the rods, and in the continued upward movement of the blocks the rods are raised and their heads elevate frame 95 above the path of movement of the container body.

Blocks 92 are carried by and at the ends of the pivoted arms 65.

The flat top closure blanks T (see Fig. 15) are placed into an upright container 78 and are delivered one at a time to the second stage of the machine. The container is composed of four rectangular rods supported by a plate 100, which plate is cut through with an opening which conforms to the shape of the top closure member T. In Fig. 3 there is shown one of the top closure blanks in position and underneath will be an opening which will permit the said blank to pass below plate 100. The delivery of these top closure blanks is accomplished by means of horizontal reciprocating member 79 (see Figs. 3 and 4) which is operated by means of the roller 80 fitted within the cam groove 81 in cam wheel 82 (see Figs. 3, 4 and 13) which in turn is rotated by the shaft 33.

When the member 79 is reciprocated, it carries its motion to a pair of rods 83 and 84 each carrying sliding members 85 and 85a, respectively. The member 85 is (see Fig. 2) secured to a pusher plate 86. The reciprocating horizontal motion of the plate 86 moves into position one top blank at a time preliminary to the downward motion of the horizontal reciprocating sleeve shaft 56.

While in stage #2 the top blank T is inserted and is made fast to the top portion of the container blank C, and in stage #3 the bottom member B is secured in a similar manner as described above but in this latter case, to the bottom portion of the container.

The construction of all operating parts in stage #3 is very similar to the parts described in stage #2, differing only in the length of the upright hollow shaft 56' and the center shaft 60'. Inasmuch as the reciprocating throw of both shafts in stage #3 is shorter than that of the shafts 56 and 60, accordingly the active throws of cam members 69' and 77' are more shallow. All other details and manner of operation are alike. In the drawings, parts of stage #3 corresponding with the parts of stage #2 have the same numerals but with a prime mark attached for differentiation,

To facilitate the ejection or rejection of the container, stage #3 is equipped with an ejector arm 87. The vertical motion of the arm 87 in connection with the ejecting shoe member 88 enters within an opening 46'' of the plate 46 to

press the container from the frame member 43 and when said frame member is facing downwardly (see Figs. 6, 7 and 19). The ejector arm 87 is secured to the reciprocating hollow shaft 56' by means of a bracket plate.

The plates 103 with their rectangular openings serve as guiding and supporting members for the container blanks C and as flange forming members for the top and bottom blanks. As these are forced through the center square opening in the plates 65 the flange portions F of the blanks (Fig. 15) are forced upwards and in this final form the blanks are pressed into the container and are made fast.

In Fig. 19 there is shown how the container forming machine described above is operated in conjunction with a wax applicator W and a drying unit D. The wax applicator consists of an enclosed housing H having an endless belt E upon which the containers C are laid with their tops facing upwards, as they are carried along by the belt E, a series of wax applicators X are automatically inserted into the container C through a hole in its top member T and wax is sprayed within. Wax in spray form may also be applied by other spray guns (not shown) to the outer body of the container. Within the drying unit D the containers are delivered by means of the moving belt M to the filling end of the machine after the containers have entirely dried out.

The spray nozzles X are moved in and out of the container C by a cam operated lever S and the cam arrangement shown in Fig. 20. The liquid wax is supplied to the nozzles X by means of flexible piping P from a source Q, under pressure.

In case hot melt or heat activating adhesive is used then the plan would be to use a gas flame to heat or activate the adhesive in the stage between #1 and #2. In case an adhesive is applied at the machine this same stage would be used to apply adhesive at least for the top closure and for the stage between #2 and #3 for the bottom closure, in which case the heat applied to the frames 43 would be to facilitate drying or setting if found needed. Heat may be applied to the adhesive directly or through a plunger.

Having described our invention, it will be understood that various modifications may be made in the form and arrangement of the elements constituting the embodiment shown without departing from the spirit of the invention, what we claim and desire to secure by Letters Patent being as follows:

1. A machine for the manufacture of a three piece rectangular container having a body wall and a top insert and a bottom insert, comprising a movable belt having individual spaced apart frames thereon adapted to receive rectangular expanded vertical container walls, a guide box vertically disposed and adapted to receive a folded container blank, said guide box having a corner aperture for receiving a folded blank, the walls of said corner aperture being in suitable spaced relation to permit expansion of an inserted folded blank to assume the inner contours of said guide box, said guide box being disposed over one of said frames, reciprocal means for inserting said expanded blank into said frame disposed on said belt, means for inserting a top container member into said expanded rectangular blank and including a shoe member composed of a plurality of expansible blocks, a hollow shaft for operating said shoe member, a secondary shaft disposed within said hollow shaft adapted to expand the

plurality of blocks of said shoe away from the axis of said secondary shaft, and cam and lever means for actuating said shafts successively for inserting said top member with expansion of said top member to adhesively engage the interior of the expanded rectangular container, and means for inserting with expansion a bottom member into the container provided with an inserted top member, said means for inserting said bottom member being substantially similar to said means for inserting said top member.

2. The apparatus of claim 1 wherein the shoe member consists of four diagonally disposed blocks, said blocks being secured to adjacent blocks by means of expandable members and provided at their interior with inwardly sloping edges adapted to engage a tapered wedge disposed at the base of said secondary shaft whereby downward movement of said tapered wedge will effect outward and radial movement of said four blocks so that each block forces the respective corner flanges of the inserted top member into adherence with the interior of said rectangular container.

3. A machine for the manufacture of a three piece rectangular container having a body wall and a top insert and a bottom insert, comprising a movable belt having individual spaced apart frames thereon adapted to receive rectangular expanded vertical container walls, a guide box vertically disposed and adapted to receive a folded container blank, said guide box having a corner aperture for receiving a folded blank, the walls of said corner aperture being in suitable spaced relation to permit expansion of an inserted folded blank to assume the inner contours of said guide box, said guide box being disposed over one of said frames, reciprocal means for inserting said expanded blank into said frame disposed on said belt, means for inserting a top container member into said expanded rectangular blank and including a shoe member composed of a plurality of expansible blocks, a hollow shaft for operating said shoe member, a secondary shaft disposed within said hollow shaft adapted to expand the plurality of blocks of said shoe away from the axis of said secondary shaft, cam and lever means for actuating said shafts successively for inserting said top member with expansion of said top member to adhesively engage the interior of the expanded rectangular container, means for inserting with expansion a bottom member into the container provided with an inserted top member, said means for inserting said bottom member being substantially similar to said means for inserting said top member, and

means for inserting a folded container into said guide box and having a basket member adapted to hold a plurality of folded blanks, and means for urging said folded blanks out of said basket member and having reciprocating means for individually pushing a folded container blank through said aperture and into said guide box.

4. The apparatus of claim 3 having a ratchet wheel provided with a ratchet arm and a plurality of ratchet teeth, said teeth being adapted to be moved by a ratchet pawl associated with said ratchet arm whereby intermittent movement of the belt having spaced-apart frames thereon is obtained.

5. A machine for making three piece rectangular containers, said pieces being adhesively secured, comprising a movable carrier having a plurality of spaced apart vertically disposed frame members thereon, a first reciprocating plunger adapted to insert an expanded container body member into a frame member, a second reciprocating plunger for inserting a top member into an expanded container body member, a third reciprocating plunger adapted to insert a bottom member into a container provided with a top member, and means for operating said plungers simultaneously from a common power source, the plungers being successively arranged and activated to effect successive addition of members in the formation of a container.

6. The apparatus of claim 5 wherein a guide box containing an expanded container body member is vertically disposed over a frame member so that the first reciprocating plunger may vertically push a container body member into the frame member disposed on said movable carrier.

7. The apparatus of claim 6 provided with means for inserting a wax applicator adapted to spray the interior of a prepared container with molten wax, said wax applicator having a vertically movable plunger head and lever-cam means for moving said plunger head in the vertical direction.

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