July 15, 1952 C. J. MALHIOT 2,603,047

PACKAGING MACHINE

Filed May 25, 1946 11 Sheets-Sheet 1

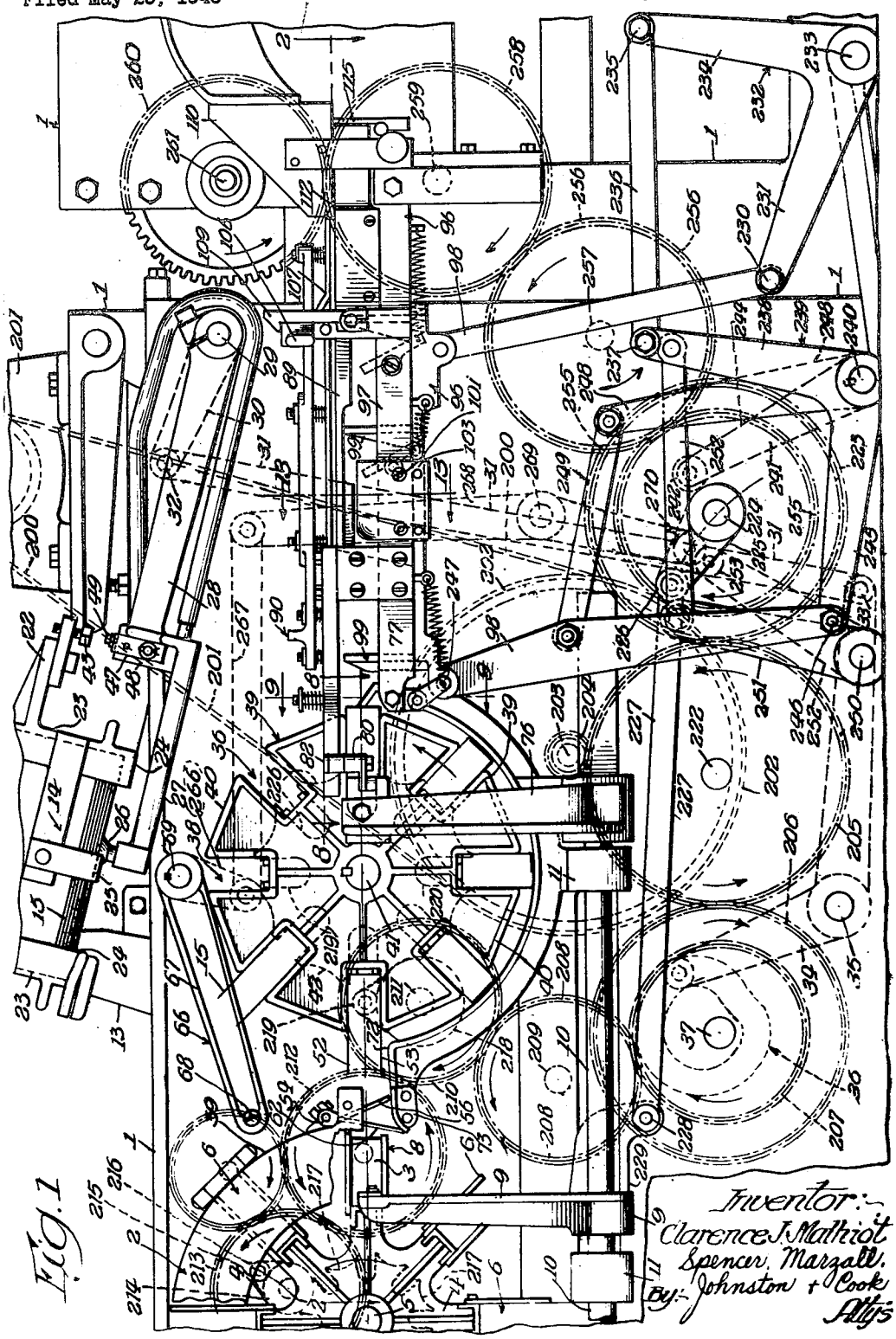


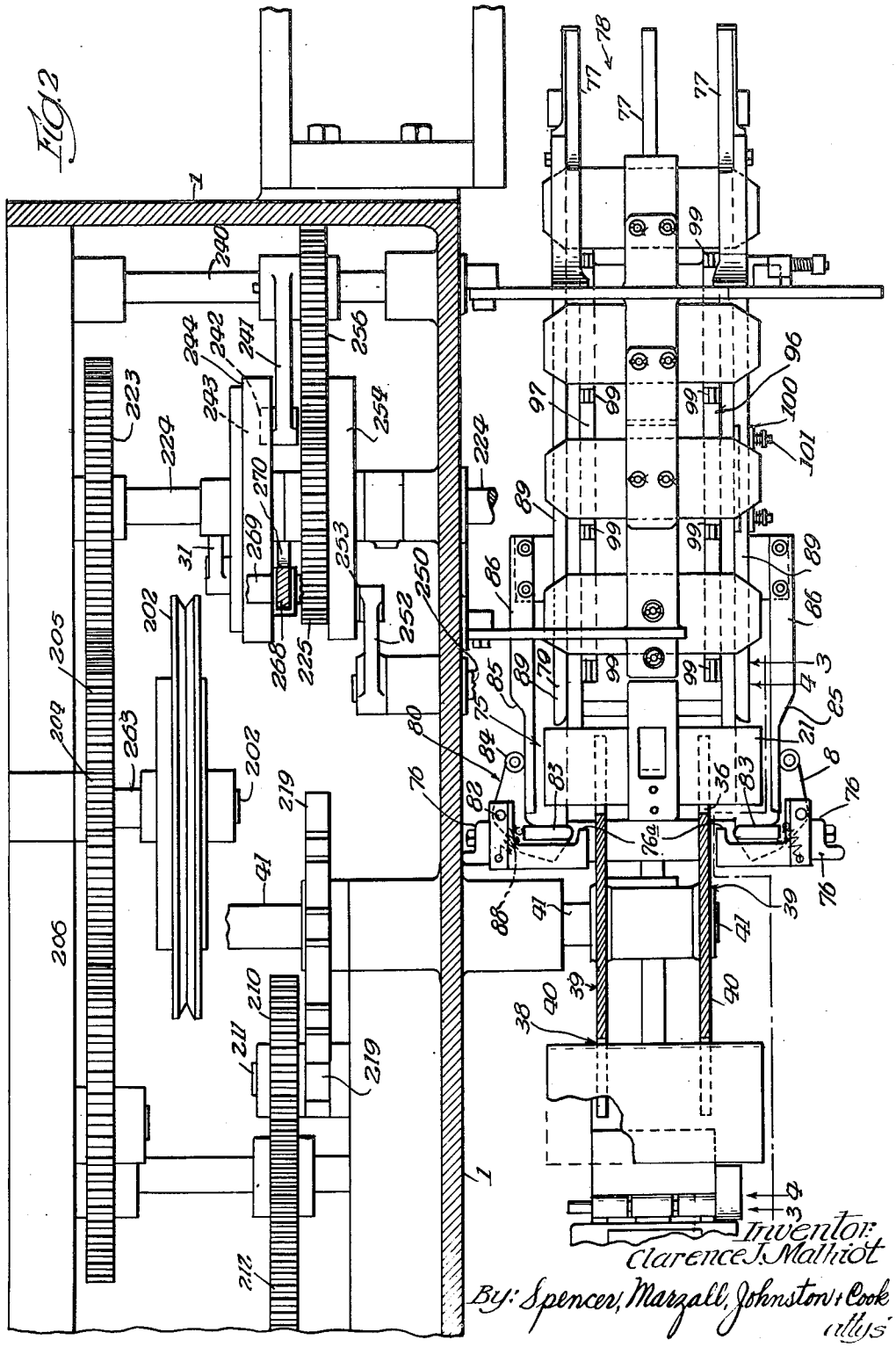
Fig. 1

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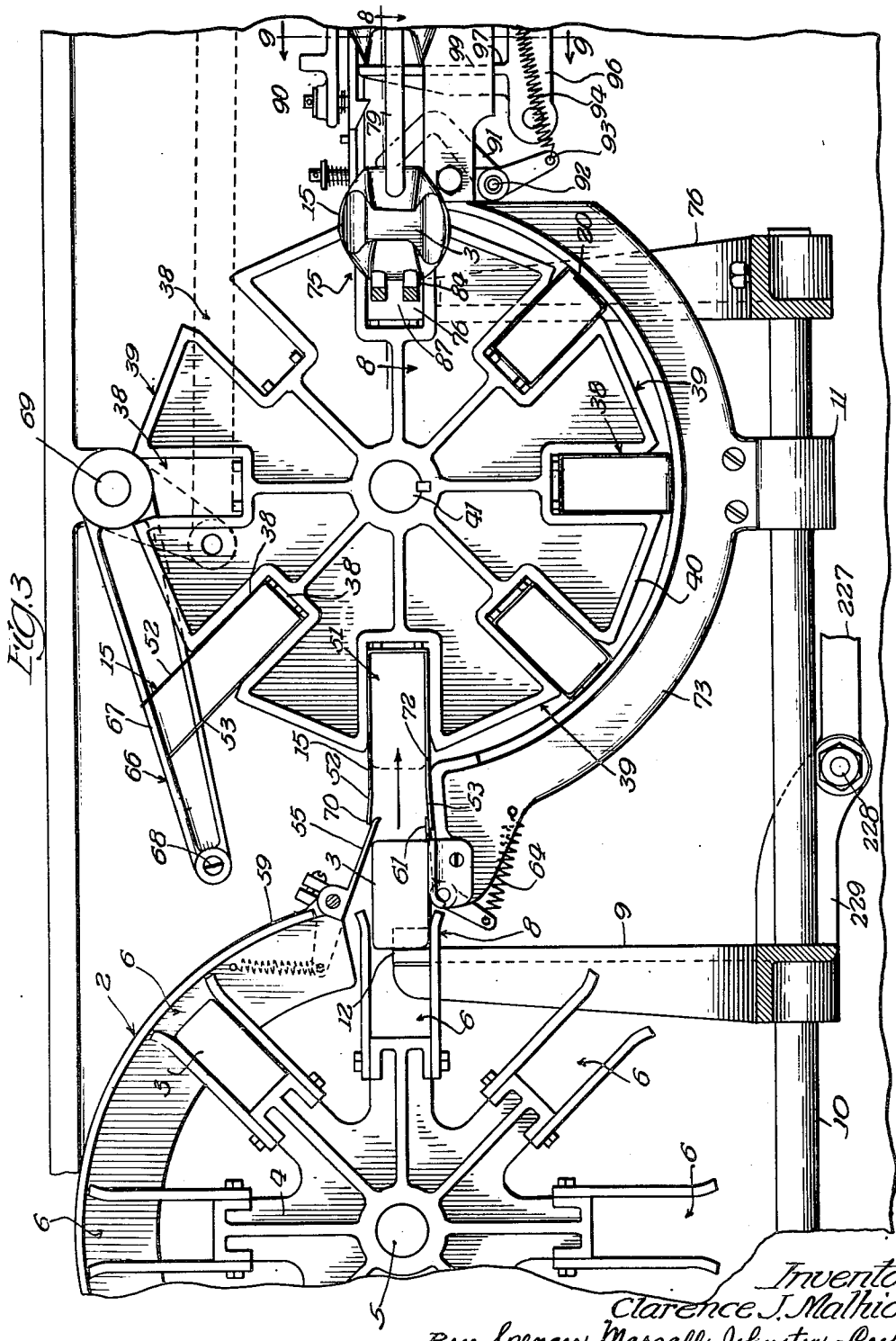


Fig. 3

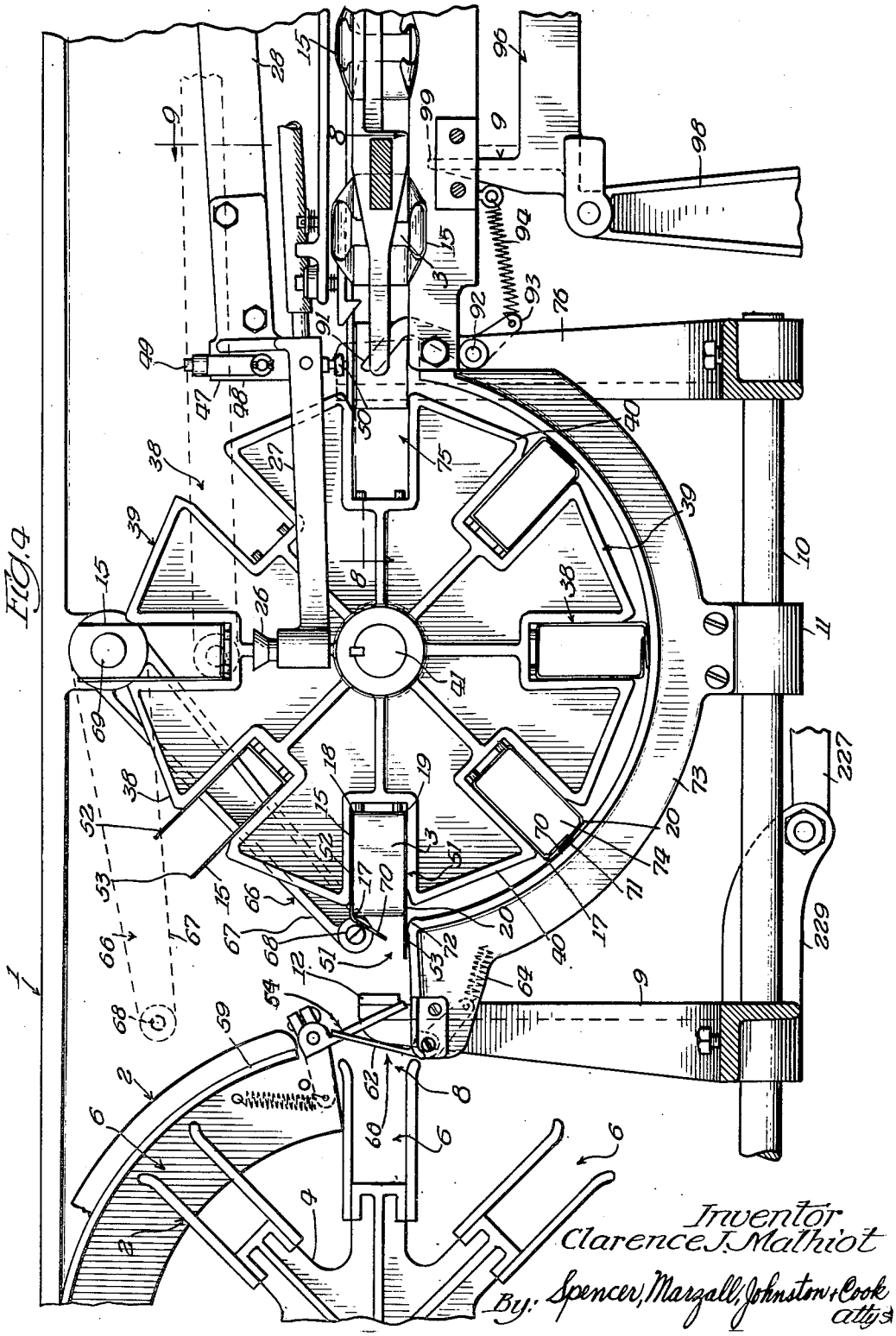
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PACKAGING MACHINE

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FIG. 4

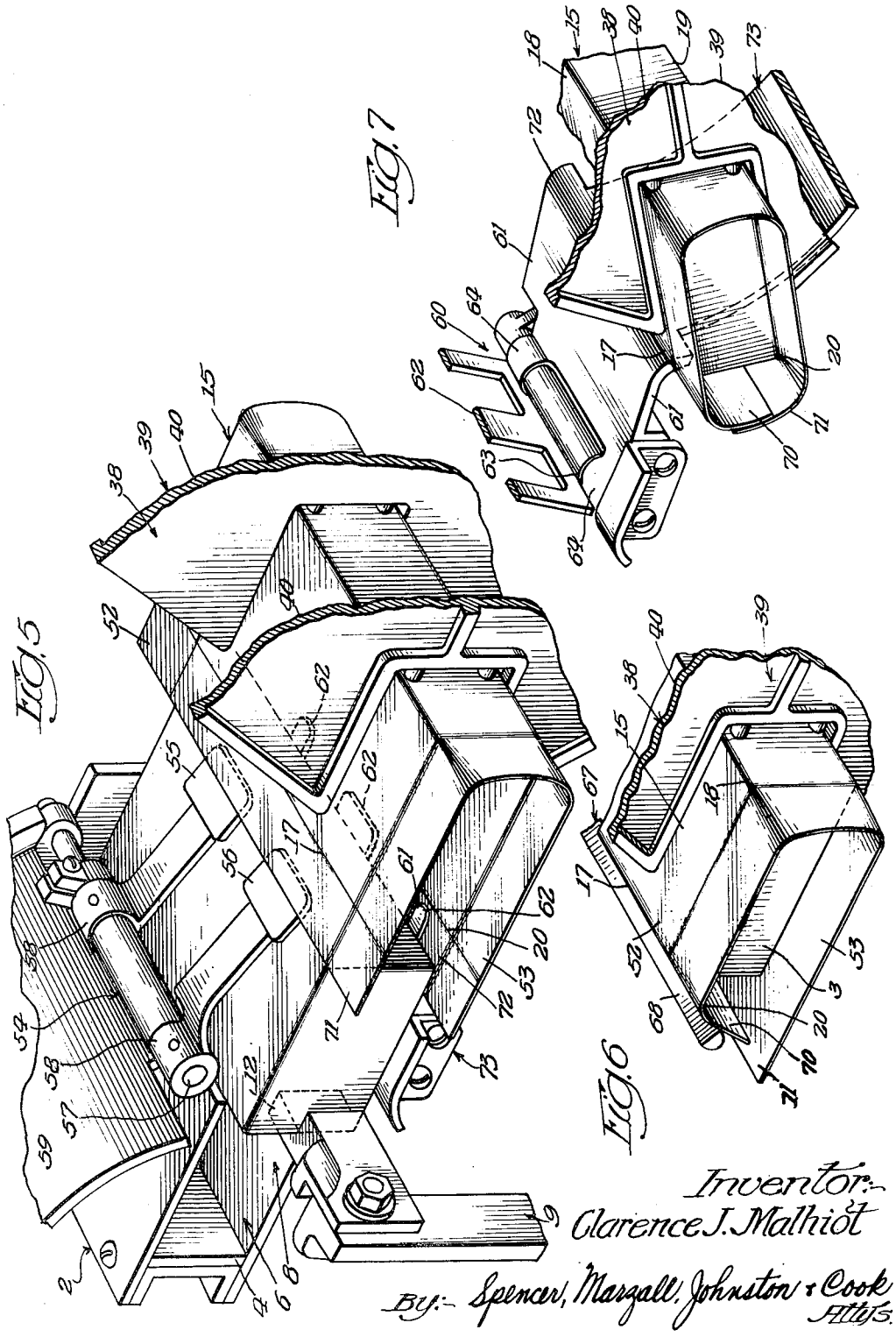


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PACKAGING MACHINE

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PACKAGING MACHINE

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FIG. 9

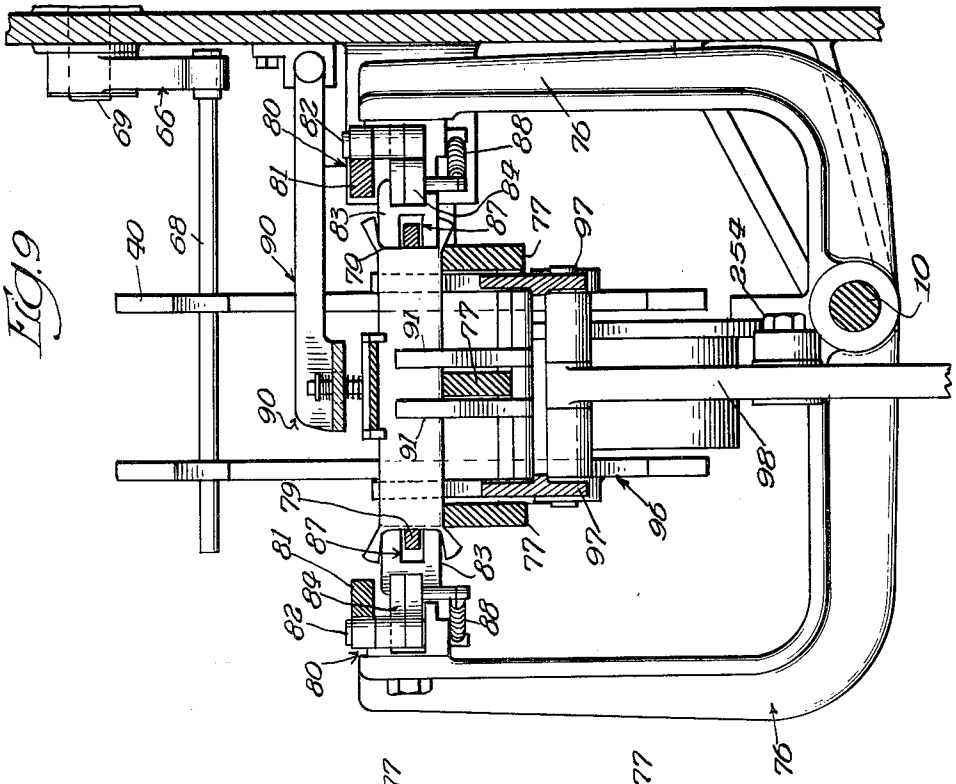
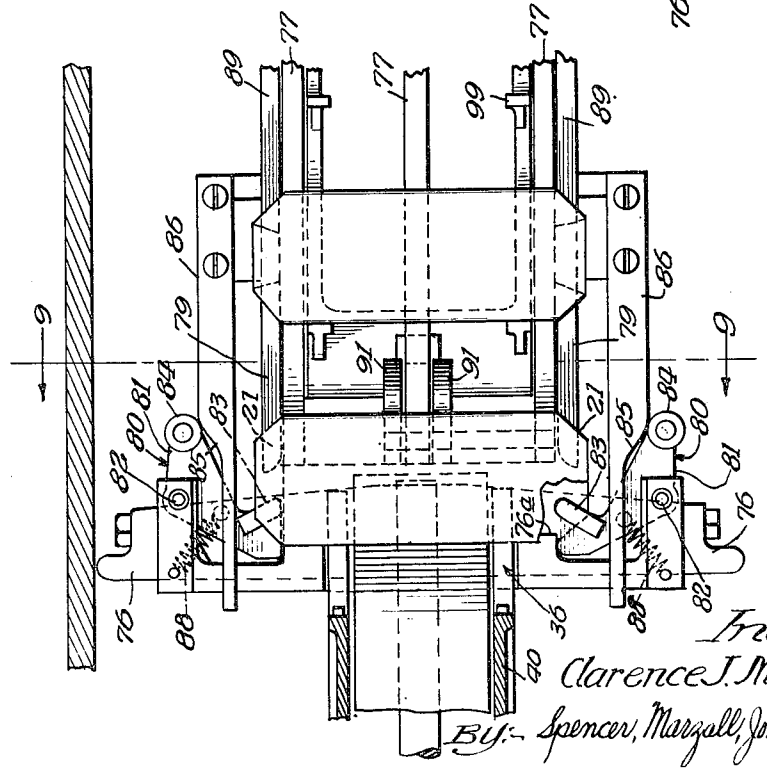


FIG. 8



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PACKAGING MACHINE

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FIG. 11

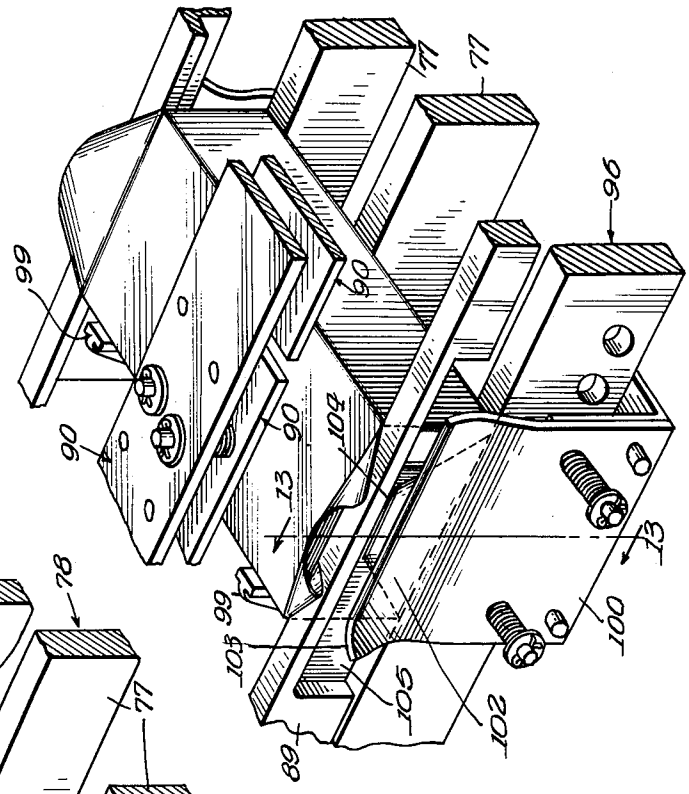
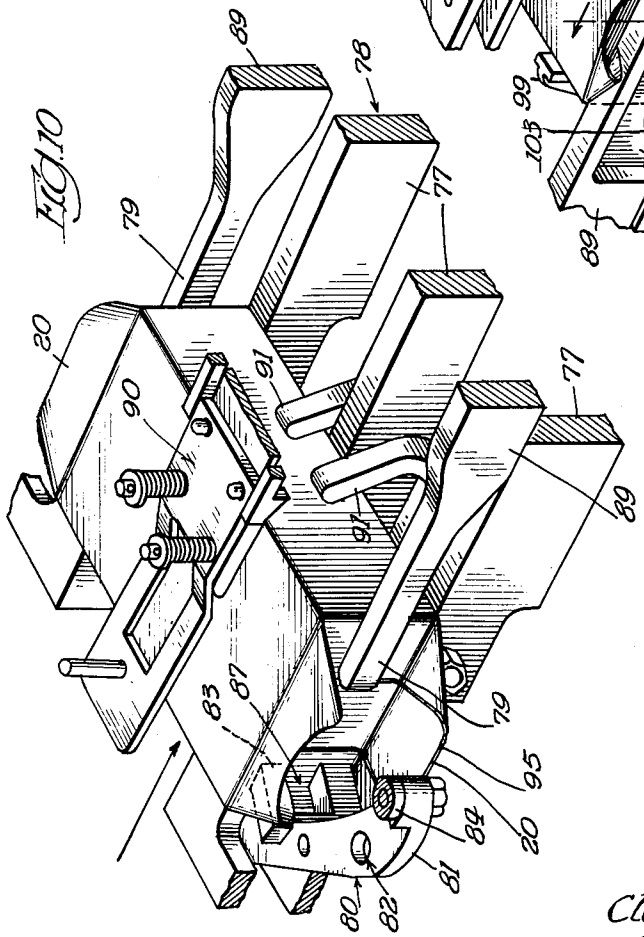


FIG. 10



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FIG. 13

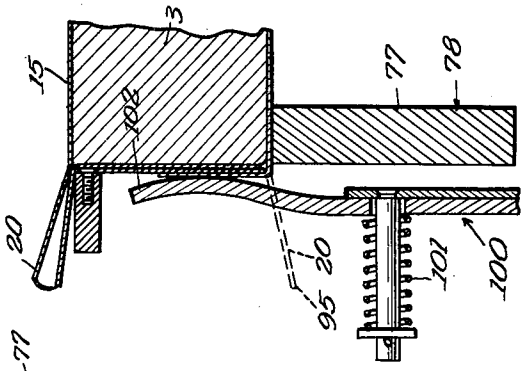
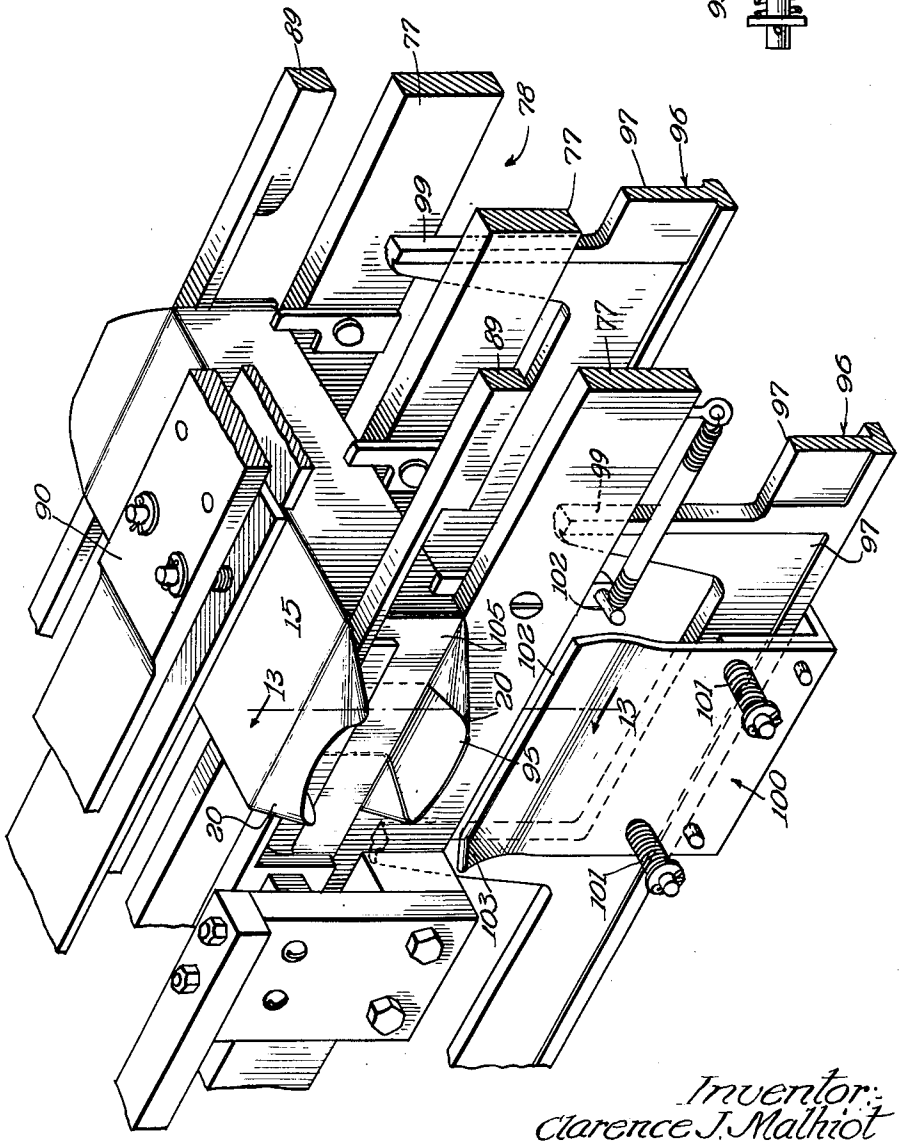


FIG. 12



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PACKAGING MACHINE

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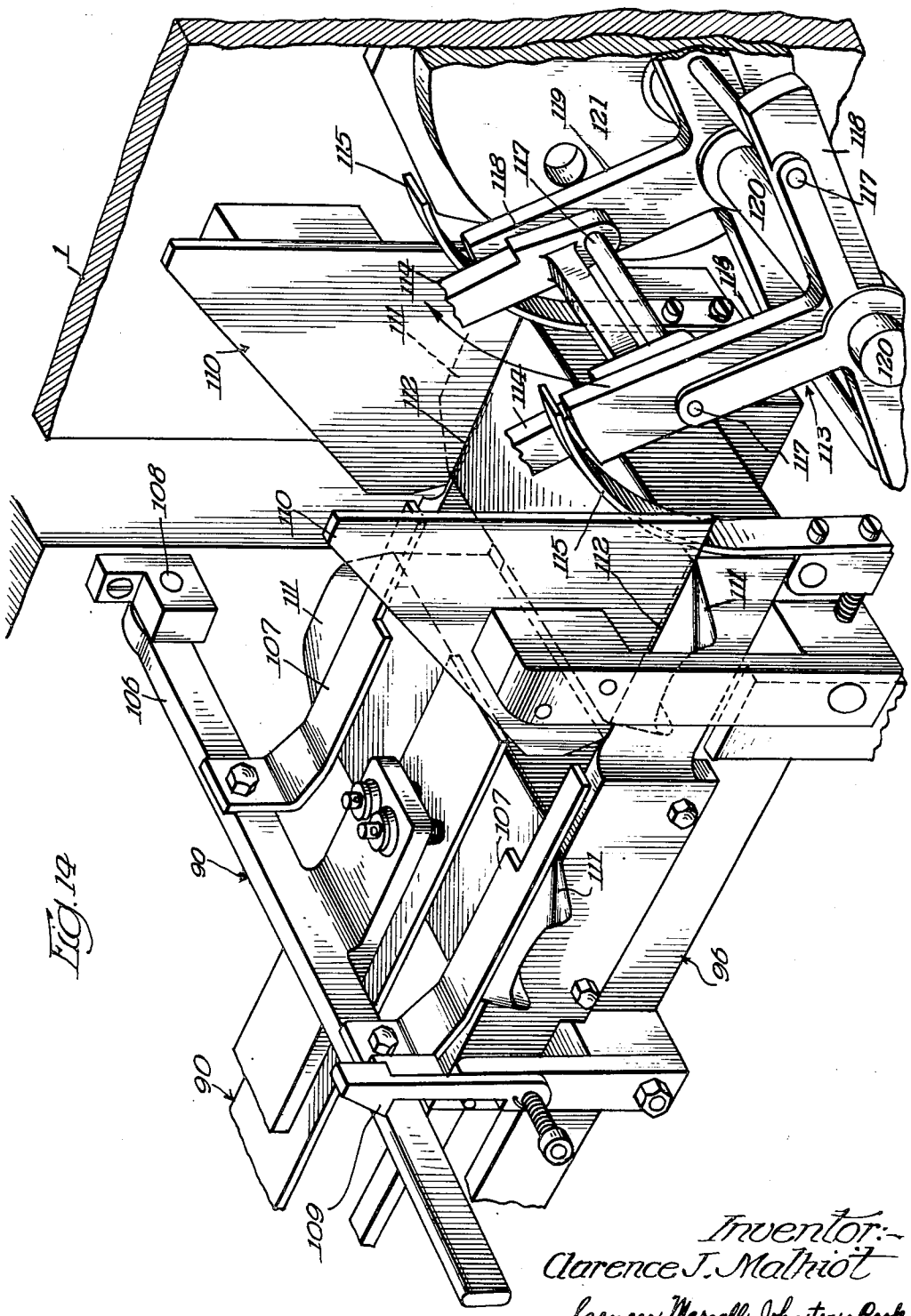


FIG. 12

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PACKAGING MACHINE

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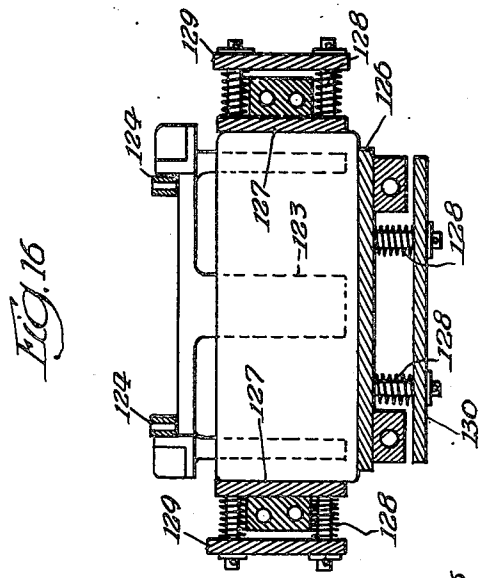


FIG. 16

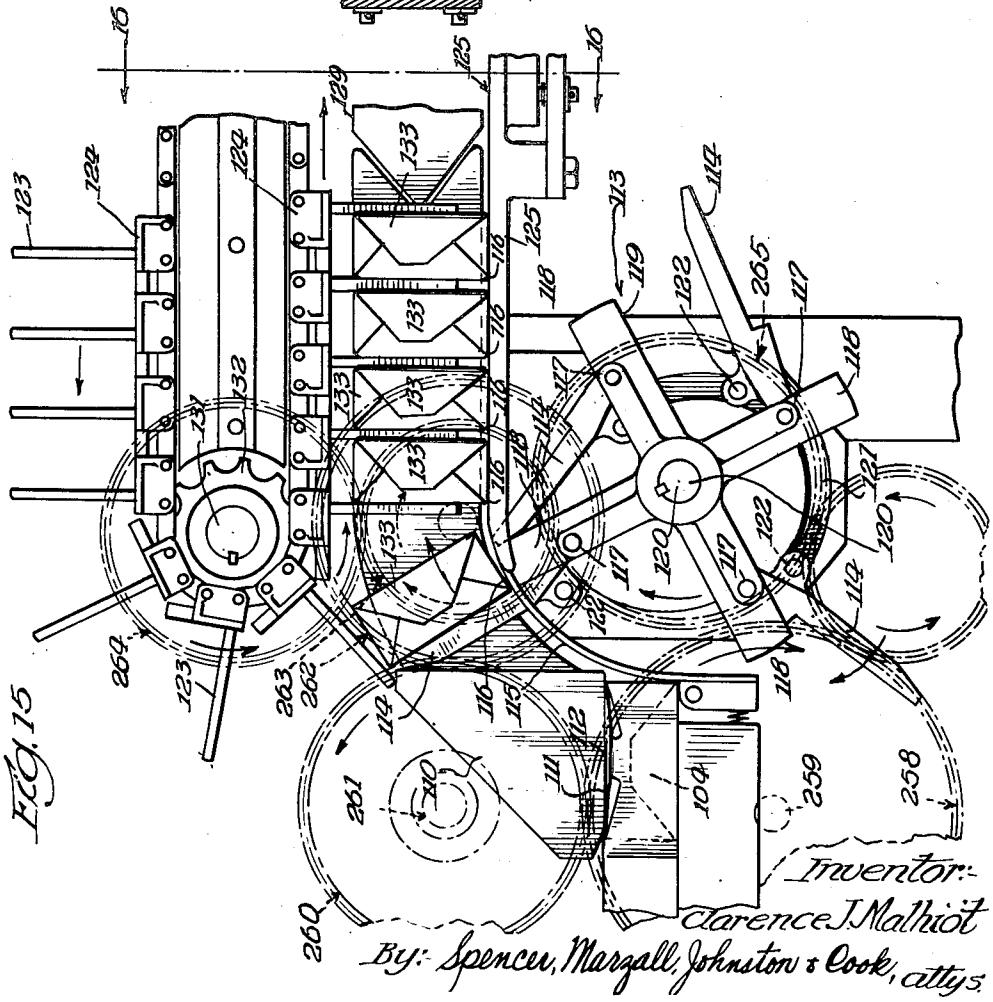


FIG. 15

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PACKAGING MACHINE

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Fig. 17

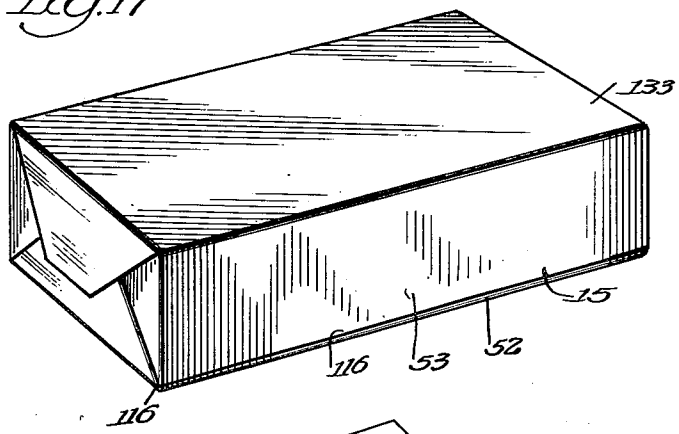


Fig. 18

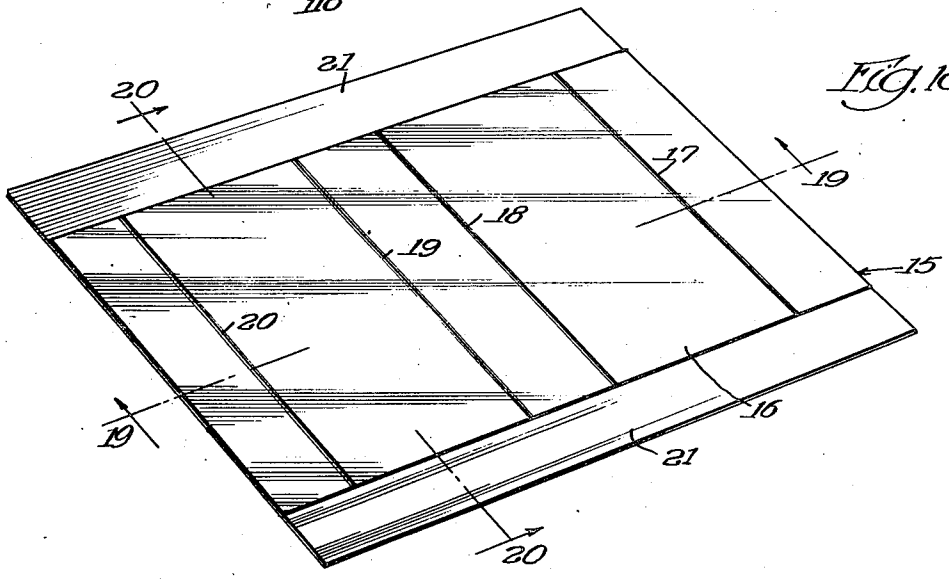


Fig. 19

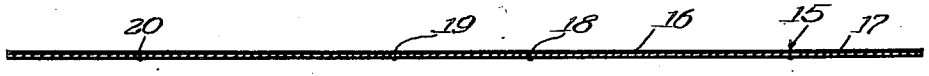


Fig. 20



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2,603,047

UNITED STATES PATENT OFFICE

2,603,047

PACKAGING MACHINE

Clarence J. Malhiot, Oak Park, Ill., assignor to F. B. Redington Co, Chicago, Ill., a corporation of Delaware

Application May 25, 1946, Serial No. 672,199

8 Claims. (Cl. 53—96)

1

This invention relates to a packaging machine, and to the method of packaging articles, especially foodstuffs such as butter, oleomargarine and other products.

The packaging machine, and the method of the present invention, contemplates the use of a moistureproof package of the type disclosed in Patent 2,335,019, issued November 23, 1943, to Charles D. Mullinix. The package disclosed in said patent comprises a laminated blank which is formed of at least one relatively heavy paper sheet, and at least one relatively light sheet of material. The blank is treated with a moistureproof, adhesive substance which secures the heavy sheet throughout its area to the light sheet, and renders the blank substantially impervious to air and moisture. The blank in said patent utilizes spaced parallel fold lines which extend transversely of the laminated central portion of the blank. The heavy sheet is less in width than the light sheet but is preferably made the same length. The sheets of the blank are positioned with their medial longitudinal lines coinciding as disclosed and claimed in said Patent 2,335,019.

It is well known to use a scored carton in which butter and other foodstuffs are cartoned, the carton being bent along certain scored lines to provide a pocket into which the article is received. The carton is folded along certain scored lines to partly pre-form a carton to receive the article. Finally the closure ends are bent and then the tuck flaps are inserted into the carton. A machine for packaging butter utilizing the conventional carton is disclosed in Patent 2,171,131, issued August 29, 1939, and assigned to the present assignee.

It is also well known to employ a wrapping machine to wrap articles in a sheet of wrapping material. The wrapper is folded about the article and then the ends of the wrapper are folded to form a wrapped package.

An entirely different principle presents itself when an article to be packaged utilizes a scored blank of the type disclosed in said Mullinix Patent 2,335,019, wherein there is not only employed the principles of a cartoning machine and the principles of a wrapping machine, but certain elements must be omitted from each, certain new elements or devices added, and proper synchronism and correlation must be maintained with respect to the mechanical elements for effecting the forming, folding and packaging steps in proper order.

The primary object of the present invention, therefore, resides in the provision of a new and

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novel packaging machine which is adapted to package articles in package form in a blank of the type disclosed in said Mullinix Patent 2,335,019.

Another important object of the invention resides in the provision of a new and novel method for causing the blank to be bent or folded along certain scored or fold lines, then forming folds at the ends of the blank where the material is of a single thickness only, then finally forming bends or folds so as to completely encase the article in package form, and finally heat sealing the seams to form an airtight and moistureproof package.

A further object of the invention resides in the provision of a new and improved machine having certain parts correlated with other certain parts so as to effect the proper folding and packaging operations in a step by step manner, the various elements of the machine for performing the certain steps required in packaging, being synchronized properly so that articles are intermittently fed packaged continuously, and then the packaged article heat sealed before it it finally discharged from the machine.

Still another object of the invention consists in new and improved apparatus, properly synchronized, having parts correlated with other operating parts so that an article may be fed into the machine and packaged in a so-called "Mullinix" wrapper to form a moistureproof, airtight, sealed package.

Numerous other objects and advantages will be apparent throughout the progress of the specification which follows.

The accompanying drawings illustrate a selected embodiment of the invention, and the views therein are as follows:

Fig. 1 is a detail elevational view of the right hand side of a machine embodying the invention, certain parts being broken away for the sake of clearness;

Fig. 2 is a detail plan section on the line 2—2 of Fig. 1;

Fig. 3 is a detail elevational view, partly in section;

Fig. 4 is a detail elevational view similar to Fig. 3 but showing the parts in a further advanced position;

Fig. 5 is a detail perspective view of a part of the machine showing the manner in which the article is being inserted in a partially creased or folded blank;

Fig. 6 is a detail perspective view showing the manner in which the article is arranged in the

partly folded blank with a fold finger in engagement with a part of the blank to fold a longitudinal part of the blank along a score line and against a rear face of the article being packaged;

Fig. 7 is a detail perspective view of certain of the machine mechanism and showing the article encased within a blank, the blank being folded about the sides and edges of the article;

Fig. 8 is a detail plan sectional view on the lines 8—8 of Figs. 1, 3 and 4, showing the manner in which both edges of the packaging means are folded against the body of the article;

Fig. 9 is a detail vertical sectional view on the lines 9—9 of Figs. 1, 3, 4 and 8;

Fig. 10 is a detail perspective view of a part of the machine showing a part of the transport mechanism, and the manner in which the side edges of the blank are folded against the ends of the article;

Fig. 11 is a detail perspective view of another part of the machine, including a part of the transport mechanism, and showing the manner in which a lower extending fold of a blank is folded against the ends of the article;

Fig. 12 is a detail perspective view of some of the mechanism disclosed in Figs. 10 and 11, but showing the article to be packaged in the position intermediate the positions shown in Figs. 10 and 11;

Fig. 13 is a detail sectional view on the line 13—13 of Fig. 12;

Fig. 14 is a detail perspective view of certain of the machine parts situated at the front of the machine and showing mechanism for effecting the last fold of the blank by folding the projecting ends of the blank against the ends of the article and over a previously folded end, the view also showing delivery mechanism for delivering the packaged article to heater elements on a conveyor where the seams and folds of the blank are sealed;

Fig. 15 is a detail vertical sectional view of certain conveying mechanism showing the article completely packaged and arranged in heater elements to effect sealing of the package;

Fig. 16 is a transverse sectional view on the line 16—16 of Fig. 15;

Fig. 17 is a perspective view of the completed improved, airtight and moistureproof package;

Fig. 18 is a perspective view of a blank with which the present invention deals, the blank being of the kind disclosed in said Mullinix Patent 2,335,019;

Fig. 19 is a longitudinal sectional view on the line 19—19 of Fig. 18; and

Fig. 20 is a transverse sectional view on the line 20—20 of Fig. 18.

The machine of the invention comprises a supporting structure or frame 1 which is supported by, or mounted upon, any suitable base. An article conveying mechanism 2, Figs. 1 to 4, delivers articles 3 to position so as to be packaged in the new type blank. The article conveying mechanism 2 may be of any practical type desired, but is shown herein in the form of a wheel 4 which is mounted on a driven shaft 5. The wheel 4 has a plurality of peripherally spaced pockets 6 in which articles 3, to be packaged, are positioned. The articles 3, to be packaged, may be any type or kind of article or material, but are referred and shown herein as being of a relatively soft material such as butter, lard, oleomargarine and the like.

The description of the machine and the method of packaging will be referred to in this specification as a machine for packaging oleomargarine, and the article will be referred to as oleomargarine, because machines constructed in accordance with the present invention, and in actual use in commerce, have operated successfully in packaging oleomargarine.

The oleomargarine articles 3, being delivered from the pockets 6 of the delivery wheel 4 are packaged in folded blanks and are relatively rectangular in shape, preferably in one pound blocks. The shape and size of the article to be packaged may, of course, vary depending upon the kind and weight of the article to be packaged.

The delivery wheel 4 is driven synchronously with other operable parts of the machine so as to deliver each article 3 at a proper time, and in a proper position, to effect proper packaging thereof. Articles 3 are fed properly into the pockets 6, and inasmuch as the means for feeding articles 3 into the pockets 6 is not pertinent to the present invention herein claimed, reference in connection with the feed of the articles need not be made.

The article delivery wheel 4 is intermittently rotated by a Geneva wheel 217 on a transverse shaft 5, each article 3 (such as a parchment packaged rectangular pound of oleomargarine) is moved to delivery position designated at 8, Figs. 1, 3 and 4. The length of each pocket 6 is less than the length of the article, so that each end of the article may project or extend a predetermined distance beyond the side edges of each pocket 6.

A guided, relatively U-shaped ejector member 9 is secured to a reciprocating rod 10 which is suitably mounted in bearings 11 secured to the machine frame. The arms of the ejector member 9 are provided with inwardly extending ejector fingers 12 which engage a rear face of the article at the point where the article extends beyond the sides of the pockets, and ejects or pushes the article out of a pocket 6 after the delivery wheel 4 has delivered the article to delivery position 8, Figs. 1 and 3.

A supporting structure 13, Fig. 1, is carried by the machine frame and carries a magazine 14 which supports a plurality of blanks 15, Fig. 1. Each blank 15 comprises at least one relatively heavy paper sheet, and at least one relatively light sheet of material such as cellulose. The blank 15 is treated with a moistureproof, adhesive substance which secures the heavy sheet throughout its area to the light sheet and renders the blank substantially impervious to air and moisture. The blank 15 is provided with a plurality of spaced parallel fold lines which extend transversely of the laminated central portion 16 of the blank, Figs. 18–20. The heavy sheet of the blank is preferably less in width than the light sheet but is of the same length. The two sheets which constitute the blank are positioned with their medial longitudinal lines coinciding. The laminated central section of the blank is relatively stiff. The blank is adapted to be readily bent or folded along the scored lines so that the central laminated portion of the blank constitutes a relatively rigid body part having a rectangular section along the top, sides and bottom of the article to be packaged. The light sheet extends marginally beyond the side edges of the heavy sheet, and these marginally extended portions are adapted to be folded to close the ends of the package. The overlapping folds are then sealed to make the package substantially impervious to air, moisture and other deleterious

influences which might affect the contents of the package. Each blank, therefore, comprises an outer sheet upon which there is secured in laminated fashion a stiff central portion 16 which is narrower in width but substantially as long as the outer, thinner sheet. Four scored lines 17, 18, 19 and 20 are formed in the blank so that the blank may be folded along these scored lines during the packaging of the article or product, Figs. 18 to 20. The material of the blank between the score lines 18 and 19 forms one edge of the package. The space between the score lines 17 and 18 defines one side of the package; the space between the score lines 19 and 20 defines the other side; and the material extending outwardly from the score lines 17 and 20 forms the closure for the other edge of the package. Free ends 21, Figs. 18 and 20, extend outwardly from the central rigid portion 16, and these free ends 21 are adapted to be folded to form folds which are later pressed together and sealed so as to complete the airtight package.

The magazine 14 is arranged in an inclined position, as shown in Fig. 1, and comprises a supporting yoke 22 to which upstanding vertical corner guides 23 are secured. Supporting bars, strips or ledges 24 for the blanks are secured to the guides 23 of the yoke 22 in any desired manner, the ledges 24 extending beneath and supporting the bottommost blank 15 of the stack of blanks arranged in the magazine 14. A centrally positioned blank supporting ledge 24, Fig. 1, extends downwardly to support and guide a bottom blank during its discharge from the stack. These members 24 have engaging fingers 25 which extend beneath the stack of blanks near the center of the magazine and assist in supporting the stacked blanks in proper position. The fingers 25 are inclined downwardly from a point at the bottom to facilitate withdrawal of a bottom blank.

Means are provided for removing the blanks one by one from the bottom of the stack in the magazine, and this means comprises pneumatic or suction means, including a plurality of spaced suction heads 26, Figs. 1 and 4, which are carried by a yoke or frame 27. This suction frame or yoke 27 is operatively secured to a support or bar 28, and is adapted to be fixed to a shaft 29, suitably carried by a part of the machine frame or superstructure, Fig. 1. A lever 30 is also rigidly secured to the shaft 29 and is operated by a link 31 being pivoted thereto, as indicated at 32, Fig. 1.

The link 31 is also pivoted at 33 to one arm of a bell-crank 34 which is pivoted to a part of the machine frame, as indicated at 35, Fig. 1. The other end of the bell-crank 34 comprises a cam follower cooperating with one of the cams 36 which is operated by a shaft 37. The operation of the bell-crank 34 by the cam, causes vertical movement of the suction yoke or frame 27 to move the suction heads 26 into engagement with the lowermost blank 15 of the stack of blanks in the magazine 14, moving this blank into position into one of a plurality of pockets 38 of a blank receiving transfer wheel 39, Figs. 1, 3 and 4. The lowermost blank, as it is being removed from the magazine by the suction heads 26, is caused to be bended or folded along the score lines 18 and 19 as the blank is being inserted in a pocket 38 of the transfer wheel 39.

This blank receiving transfer wheel 39 comprises spaced spider members or wheels 40, Fig. 2, each of which is arranged in alignment to provide the pockets 38, Fig. 2. The blank receiving transfer wheel 39, which comprises the spaced members or wheels 40, is rigidly secured to a shaft 41, Figs. 1 to 4, which is driven by a gear 42, Fig. 1, secured to the shaft 41, Figs. 1 and 2. The gear 42 may be a Geneva wheel and is driven intermittently in any suitable manner. Therefore, the blank receiving pockets 38 of the transfer wheel 39 will be moved synchronously and in timed relation with the operation and movement of the suction heads 26.

The suction yoke or frame 27 is provided with bores in the arms thereof leading to the suction heads 26 so as to permit or cause suction as desired. Instead of providing bores in the arms of the frame 26, the arms may be channel members which carry tubes leading to the suction heads 26. The suction yoke or frame 27 has mounted thereon a suction valve 47, Figs. 1 and 4, to turn on, or shut off, the suction as required. This suction valve 47, being rigidly mounted on the suction frame or yoke 27, moves up and down along with the yoke 27 and the guiding arm 28. The suction valve 47 comprises a casing 48 having a bore in which a plunger 49 is slidably mounted. The valve 47 and plunger construction 49 are preferably of the type disclosed in Patent 2,171,131 and comprises a cut away or notched portion into which a friction member or pin is received to guide the plunger in the casing 48, as disclosed in said patent. There is provided a spring pressed friction member bearing against the outer end of the pin and frictionally retarding the plunger, thereby preventing it from operating too freely within the valve casing bore and restraining it against inadvertent movement. The valve casing 48 is also provided with a bore extending therethrough and communicating with the bore in which the plunger 49 operates. This latter bore has one side thereof connected to a suction source and its other side connected to the bores or passages in the suction yoke or frame 27 leading to the suction heads 26. The plunger 49, Figs. 1 and 4, is provided with a bore or passage which is adapted to align with the last mentioned passage or bore. The plunger 49, therefore, which has limited movement in the casing, is adapted to close the last named passage when the plunger is in one position and permit a continuous passage when the plunger is in another position so that the last named passage aligns with the aforesaid, previously mentioned passage. Thus, during vertical movement of the plunger 49 in the casing, suction is permitted, or is shut off, depending upon the position of the plunger 49. The plunger is operated by an upper plunger operating member 43, Fig. 1, and by a lower plunger operating member 50, Fig. 4, which is arranged in fixed position. When the suction frame or yoke 27 is raised to its uppermost position due to the operation of the parts 28—34, the upper end of the plunger 49 will engage the upper plunger operating member 43 and move the plunger to position to permit a suction to occur in the suction heads 26. While the suction frame 27 is in its uppermost position, Fig. 4, the suction heads 26 will engage the lowermost blank of the stack between the score lines 18 and 19 and draw the blank against the suction heads by the suction created therein. As parts 28—34, inclusive, cause the suction frame 27 to lower, the suction will still be on. The suction will continue until the blank has been received within a pocket 38 in the transfer wheel 39, at which time the suction heads will be near the end of their down-

ward movement. As the suction heads approach the end of their downward movement, the lower end of the plunger 49 will engage the lower plunger operating member 50 and cause the plunger 49 to be moved upwardly in the casing and cut off the suction.

When the suction has been totally cut off, the blank will be arranged in a pocket 38, and the suction heads will be away from the bottom of the blank. The pulling of a blank by the suction heads 26 into the pockets 38 will cause the blank to be in partly folded or pre-formed position, as shown in Fig. 4, wherein the blanks are properly arranged in cooperating pockets 38, and the suction heads are away from the blank being positioned. When the suction heads have reached the limit of their downward travel, the blank receiving transfer wheel 39 will operate in a counter-clockwise direction, Figs. 1, 3 and 4, to bring another pocket 38 into position to receive the next succeeding blank 15, Fig. 4.

The machine may also be provided with means to effect the insertion of an article within the package after a partly folded blank is in position and moved to receiving position. This article may comprise an advertising slip or folder, or it may comprise an envelope containing coloring matter when the machine is used for packaging oleomargarine. The means which may be employed for inserting the article into the package may be of the type disclosed in the aforesaid Milmoe and Malhiot Patent 2,171,131, particularly in Fig. 1 of said patent.

The blank receiving transfer member 39 rotates intermittently and receives blanks 15 in the pockets 38 in substantially U-shaped form, as shown in Figs. 1, 3 and 4. A blank 15 arrives at article receiving position 51, Figs. 1, 3 and 4, particularly Figs. 1 and 3, which position is opposite article discharge position 8. The arms of the ejector member 9 push an article 3, Fig. 3, into a pocket 38 between the extending legs 52 and 53 of U-shaped blank 15, Figs. 1, 3 and 4. The moving of an article 3 from discharge position 8, out of a pocket 6 of the wheel 4, toward receiving position 51 of the wheel 39, will cause an upper blank spreader 54 to operate, Figs. 1, 2, 4 and 5, particularly Fig. 5.

The operation of the upper blank spreader 54 causes it to be moved upwardly into engagement with the upper ledge or leg 52 of the now pre-folded blank 15, and raises this ledge 52 upwardly so that an opening will be provided which will be large enough for the article to move into position without bending, breaking or otherwise fouling the upper leg or ledge 52 of the blank. This upper blank spreader 54 comprises spaced fingers 55 and 56 rigidly fixed to a pin or rod 57 which is pivotally mounted in bearings 58 secured to a guide 59 surrounding the delivery wheel 4. The weight of the fingers 55 and 56 holds the spreader downwardly normally, but they are free to pivot, and when engaged by an article 3 will move upwardly, from the position shown in Figs. 1 and 4 to the position shown in Figs. 3 and 5, to hold the upper projecting ledge or leg 52 of a blank 15 in position. After an article 3 has passed into a pocket in wheel 39, the fingers 55 and 56 will drop downwardly in normal position, as shown in Figs. 1 and 4.

A lower blank spreader 60, Figs. 3, 4 and 7, is carried by a rigid flange 61 located adjacent delivery position 3. This lower spreader 60 moves downwardly when an article 3 is passing out of a pocket 6, and as article 3 passes out of a pocket 6, it will depress the normally upstanding spreader 60 to cause the lower part of a blank 15 to be pushed downwardly. The lower blank spreader 60 has a flat, relatively thin three fingered element 62, Fig. 7, which is rigidly secured to a pin 63 pivotally supported in bearing 64 on the rigid flange 61. The three fingered element 62 is urged by springs 65, Figs. 3 and 4, to maintain it normally in its upper position, as shown in Figs. 1, 4 and 7. The element 62 is returned to normal position by the spring 65 after the article has been inserted in a pocket 38 in the blank transfer wheel 39, Figs. 1 and 4. The blank transfer wheel 39 and the delivery wheel 4 are stationary during the period of transferring an article 3 from the wheel 4 to the wheel 39. The upper and lower spreaders 54 and 60 operate to hold the upper and lower edges 52 and 53, respectively, of a blank 15 in spaced apart position, as clearly shown in Fig. 3.

A side holder or folding element 66, Figs. 1, 3 and 4, is adapted to fold the upper flap or ledge 52 of a blank 15 as soon as an article 3 is received in the blank receiving wheel 39, the wheel 39 being caused to move another intermittent step as soon as an article 3 is positioned in a partly pre-formed blank in the transfer wheel 39. The side folder member 66 comprises an arm 67 which carries a folding and holding finger 68, Figs. 1, 3, 4 and 6. The arm 67 is secured rigidly to an oscillating shaft 69, Figs. 1, 3 and 4. The arm 67 operates in proper timed relation with respect to the blank receiving transfer wheel 39, and its purpose is to bend the blank 15 along the score line 17 and force the ledge 52 against a side (the rear side) of the article 3, in the manner shown in Fig. 4. The finger 68 engages the part 70 of the blank, Fig. 4, which extends rearwardly beyond the edge of the article 3 and beyond the score line 17, Figs. 4 and 6. The folder and holder member 67 operates in timed relation with respect to the transfer wheel 39, so that just before the wheel 39 starts to rotate another intermittent step, the folding and holding finger 68 will come down and engage that part 70 of a blank 15 which extends beyond the score line 17 and bend the blank along that score line against a side of the article 3. The finger 68 holds the part 70 of the blank against the article 3 during the beginning of the movement of the transfer wheel 39. The transfer wheel 39, when turning, causes the lower projecting end 71 of the blank to be bent along the score line 20; the part 71 of the blank being engaged by the edge 72 of the rigid flange 61, Fig. 7. The movement of the wheel 39, therefore, causes the blank 15 to be bent or creased along the score line 20, whereby the lower side edge 71 of the blank is forced against the outside of the upper ledge or part 70 of the blank, the part 70 having been previously bent into position and held in position by the folding and holding finger 68. The finger 68 is timed to come down and bend the part 70 of the blank and then hold the blank in its bent position until the wheel 39 starts its next intermittent step. The rotation of the wheel causes the lower part 71 of the blank to be forced against the outside of the previously folded part 70 of the blank, by the movement of the wheel passing over the rigid flange 72. The flange 72 is preferably an integral part of a curved guide 73 which partly surrounds the transfer wheel 39, Figs. 1, 3 and 7. The steps of feeding the article into the partly pre-formed blank and then bending the blank along the score line 17 by the finger 68, and then later bending

the blank along the score line 20 over the rigid flange 72, as the wheel turns, occur successively. During each intermittent movement of the wheel 39, a new blank is received in pre-formed position in a next succeeding pocket 38. Therefore, from the time a blank is first inserted into a pocket 38, four steps have occurred until the blank is folded to the position shown in package form, as indicated at 74, Fig. 4. After the creasing of the blank along the score lines 17 and 20, the parts 70 and 71 of the blank are held in position by the curved guide member 73 which surrounds the lower part of the transfer wheel 39, Fig. 4. The successive steps occur intermittently with respect to the wheel 39, and the partly packaged article is discharged from the blank receiving wheel at a discharge point station indicated generally by the numeral 75.

A guided, relatively U-shaped ejector member 76, like the ejector member 9, also is fastened to the reciprocating rod 10. This ejector member 76 pushes the partly packaged article out of the transfer wheel 39. The ejection of the partially wrapped article out of a pocket 38 at delivery position occurs simultaneously during the time an article 3 is moved from discharge position 8 to receiving position 51. The ejector member 76, and the ejector member 9, being both secured to the same reciprocating rod 10, move simultaneously, whereby an article 3 is fed on one side of the wheel 39, while a partly packaged article is removed from the opposite side of the same wheel 39. As the arms of the ejector member 76 push or eject the article from the wheel 39, they are received on the top of the spaced bars 77 of a stationary supporting member 78. Stationary fold fingers 79 mounted on opposite sides of the bars 77, of the support 78, are spaced apart a distance equal to the length of the article, and crease, or fold over, the thin ends 21 of that part of the blank which extends outwardly from the central laminated part. The ends 21 of the blank are forced inwardly by the fingers 79 as the partly packaged article is moved out of the transfer wheel 39 on to the bars 77 of the support 78, as clearly shown in Fig. 11. The forward ends of the blank are thus folded inwardly against the edges of the article, as shown in Fig. 10 (the forward end now being what was formerly the rear end, because the article has been turned 180 degrees from receiving position 51 to discharge or delivery position 75). The stationary supporting member 78 includes the spaced bars 77 which are secured rigidly to stationary parts of the machine frame or support.

Rear holders or folding mechanism 80, Figs. 2, 8, 9 and 10 are carried on each of the spaced arms of the ejector member 76 so as to fold the protruding parts 21 of the blank against the ends of the article; the protruding parts 21 of the blank now being at the rear of the package.

Each folder 80 comprises an arm 81 which is pivotally mounted at 82 to a part connected to the spaced arms of the ejector member 76. Each folder arm 81 is provided with a folding finger 83 which is adapted to move inwardly to fold the thin material 21 at the rear edge of the article and against the ends thereof. The forward end of each arm 81 is provided with a cam roller 84, each of which is adapted to contact a camway 85 on spaced rigid cam bars 86. The normal inoperative position of the folder arm 81 and the folding finger 83 is that shown in Fig. 2 where the face of the folding finger 83 is substantially flush with the face 76a on the ejector 76. The rollers 84 are adapted to engage the camway 85 on the cam bars 86 during the forward movement of the ejector member 76 and cause the arms 81 to turn on their pivots 82 to bring the folding fingers 83 forwardly to their position shown in Fig. 8 and begin to crease in, or fold, the rear protruding edge of the thin part 21 of the blank 15 after the ejector member 76 begins its forward movement. The pivotal movement of the arms 81, therefore, cause the fingers 83 to effect a folding and wiping action against the blank, and press and fold the rear side edges of the protruding part 21 of the blank against the ends of the article, as clearly shown in Figs. 8 to 10. The fingers 83 are bifurcated, as indicated at 87, Fig. 9, so as to permit the fingers to pass over the stationary fold fingers 79. The camways 85, acting on the cam rollers 84 during a forward movement of the ejector 76, causes the folding fingers 83 to be moved to fold the now rear end of the blank. Springs 88 are provided to return the arms 81 to their normal inoperative position upon movement of the ejector member 76 during its return reciprocating movement.

The partly packaged article, with the forward and rear side folds pressed against the ends of the article, is guided between side guides 89 which may constitute forward extensions on the stationary fold fingers 79, Figs. 9 to 11. The partly packaged article, therefore, has its lower surface mounted on top of the bars 77 and its ends confined between the side guides 89. Pivotally mounted spring pressed top presser members 90 are mounted to bear against the top of the package, as clearly shown in Figs. 8 to 12, inclusive. Plurality of pairs of longitudinal spaced spring finger members 91, Figs. 3, 8 and 10, are provided to bear against the forward edge of its package on its travel from the transfer wheel 39 so as to maintain the overlapping edges of the wrapper along its forward side along the guideways or members 77. These presser fingers 91, Figs. 3 and 4, are pivotally mounted, at 92, to a rigid part of the machine structure and include a tail piece 93 to which a spring 94 is attached for urging the spring fingers toward the package, as shown in Figs. 3 and 4. The package, having been ejected from the transfer wheel 39, is now mounted on the supporting bars 77.

The next step in the operation consists in folding the bottom forward protruding part at the bottom 95 of the package, Figs. 10 and 12. To effect this folding operation the package is adapted to be moved along the guideways 77 by means of transport mechanism 96, Figs. 1, 3, 9 and 12. This transport mechanism 96 comprises spaced side bars 97 which are connected to driving arms, or links, 98, Figs. 1 and 9. The driving arms 98 are operated so as to move in a parallel orbital path so that they will first move in a longitudinal direction, then in a vertical direction, then in a parallel longitudinal direction and then in a vertical direction. The spaced side bars 97 are provided with spaced fingers 99, Fig. 12, so that when the transport mechanism moves in a forward direction, the spaced fingers 99 will come up behind a package, engage a rear side thereof, and move the package in a forward direction for a predetermined distance. The transport mechanism then will move downwardly away from the package, then move rearwardly and upwardly to engage the rear of the next succeeding package to move the succeeding package forwardly. At the same time the succeeding package is being

moved forwardly, another set of fingers 99 on the transport mechanism will engage the previous package and shove it forwardly along the rods 77 a distance equal to the distance the succeeding package is being moved. There are preferably at least four sets of these fingers 99, as shown in Fig. 2, whereby four packages are being moved along the supporting guide rods 77 of the stationary guideway 78. The fingers 99, on the bars 97, of the transport mechanism 96, are arranged on opposite sides of the central bar 77, as shown in Fig. 9. The transport mechanism 96 has mounted on the outer face of the side bars 97 a plate 100, Figs. 12 and 13, which is urged by spring means 101 against the outer face of the package so as to exert a pressure against the ends of the package. The plate 100 is curved outwardly as shown at 102, Figs. 11, 12 and 13, and has its forward edge turned outwardly, as indicated at 103, Figs. 11 and 12, so that when the transport mechanism moves upwardly and longitudinally, it will engage the protruding end 95 on each end, Fig. 12, and force each lower protruding end 95 of the blank, Figs. 10, 12 and 13, and fold it over on each end thereof, as indicated at 104, Fig. 11. Each end 95, Fig. 12, extends over the outside of an outer bar 77 and, therefore, when the transport mechanism moves upwardly, it will engage the lower protruding edge 95 on each end and fold it upwardly, and inasmuch as the transport mechanism also moves longitudinally, it will have a wiping, pressing action against the outside of the folded element 104, Fig. 11. In order to maintain the sharp crease along the bottom edge of the package and to prevent damage to the ends of the article during the folding operation of the protruding part 95 at each end of the blank, there is provided on opposite sides of the package a rigidly mounted, relatively thin plate 105, Fig. 12. Each plate 105 is arranged in a cutout in each bar 89, Fig. 12. Each plate 105 presses against the outside of the package against the previously formed folds, the protruding part 95 of the blank, at each end, being bent over the plate 105. The continued operation of the transport mechanism, in effecting its cycle, moves the partly packaged article to the end of the transport mechanism and beneath a bar 106, Fig. 14. The bar 106 is part of the presser means 90. The bar 106, Fig. 14, carries spaced, flexible presser fingers 107, which are secured to the cross-bar 106 and may be pivotally mounted at 108, and locked into position by a locking dog 109, Fig. 14. The transport mechanism 96 moves the package beneath a pair of oppositely disposed, relatively triangular shaped folding members 110, Figs. 14 and 15, so that the still remaining unfolded upper flap 111, on each end of the package will be arranged beneath the bottom edges 112 of the members 110. Delivery mechanism 113, Figs. 14 and 15, removes the packaged article from the transport mechanism.

The delivery mechanism 113 comprises a plurality of fingers 114, Figs. 14 and 15, which engage the now underside of the package and carries it up along curved guideways 115. The upward movement of the package along the guideways 115 causes the bottom edges 112 of the members 110 to fold the remaining flaps 111 against each end of the package. The package is shifted 90 degrees by the delivery mechanism 113 so that the package will rest on its side with the longitudinal seam 116 at the rear bottom edge of the article on the delivery mechanism 113.

The conveyor mechanism 113, Figs. 14 and 15, comprises the fingers 114 which are pivotally mounted on pins 117 carried by the arms 118 of spider members 119. The spider members 119 are mounted on a shaft 120, Fig. 15, which is adapted to be driven. Rigidly mounted to a part of the machine frame is a stationary cam 121 which has cam grooves therein to operate the fingers 114 on the spiders 119, Fig. 15. The pins 117 upon which the fingers 114 are pivotally mounted, extend through the opposite legs of the spider and engage a groove in a cam 121, Fig. 15. The fingers 114 each carry a pin 122, Fig. 15, which also engages a groove in the cam 121 so that the arms may be successively folded or extended in the manner shown in Fig. 15. The fingers 114 pick up the package and move it from the lower position shown in Figs. 14 and 15 to the upward position shown in Fig. 15. Near the upper end of the transferring or delivery movement, whereby the package is moved from side supporting position, Fig. 14, to edge supporting position, Fig. 15, the outer or rear side of the package is engaged by a plurality of spaced fingers or arms 123, Fig. 15. The arms 123 are mounted on an endless chain conveyor member 124, whereby individual packages are moved continuously along a guideway 125.

The guideway 125, Figs. 15 and 16, has mounted on its bottom a hotplate 126, so that the longitudinal seam 116 of the package will engage the hotplate and melt the wax or other adhesive of the package, and later after the wax becomes cooled, cause the bottom seam 116 to become sealed in moisture and airproof condition. A side hotplate 127, Fig. 16, is mounted on opposite sides of the guideway 125, so as to engage the ends of the packages and seal the ends thereof. The hotplates 126 and 127 have a resilient bearing against the bottom and the ends of the package, there being springs 128 interposed between outer rigid plates 129 at the sides and a rigid plate 130 at the bottom.

The chains 124 carrying the pusher arms 123 are driven by shafts 131, Fig. 15, (only one of which is shown, the other being an idler shaft) carrying sprockets 132 (only one of which is shown). The conveyor chain 124 is driven in synchronism with the operation of the shaft 120 and the shaft 131 to effect a synchronized drive.

The package with all folds completely made and sealed is indicated generally by the numeral 133.

Each package 133 when it is discharged from the delivery conveyor will be in the form of an airtight, moistureproof package, Fig. 17, and delivered to a continuously operating conveyor (not shown) by the fingers 123.

Driving mechanism

The driving mechanism for operating the various parts of the machine comprises a belt 200, Fig. 1, driven by an electric motor indicated generally by the numeral 201. The belt 200 drives a wheel 202 which is fixed to a shaft 203, Fig. 1. A pinion 204 is mounted on the shaft 203 and drives a gear 205, Figs. 1 and 2. The gear 205 meshes with a gear 206 on the shaft 37 and rotates the cam 36. The cam 36 drives the suction means 27 as previously described. The shaft 37 carries a gear 207 which meshes with a gear 208 on a shaft 209. The gear 208 meshes with a gear 210 on a shaft 211. The gear 210, on the shaft 211, drives a gear 212 which meshes with, and drives an idler, the idler meshing with a gear 213. The gear 213 carries, rearwardly thereof, a disc mem-

ber 214 carrying an arm 215 and a pin 216. The pin 216 engages the grooves in a Geneva wheel 217. The Geneva wheel is mounted on the shaft 5 and causes the shaft 5 to be driven intermittently, to intermittently rotate the delivery wheel 4.

The gear 210 on the shaft 211, Fig. 1, carries a disc 218 which carries a pin 219, the pin 219 meshing with the openings in the Geneva wheel 42 and thereby causing intermittent rotation of the blank receiving transfer wheel 39.

The gear 205 which is mounted on a stub shaft 222 meshes with a gear 223 on a shaft 224. The shaft 224 carries an arm 225 to which there is pivoted at 226 a link 227. The link 227 is pivotally connected at 228 to an arm 229 on the ejector member 9, and inasmuch as the ejector member 9 is rigid with the slide shaft 10, the shaft 10 will be caused to reciprocate in the bearing 11. The ejector arm 76 is also rigidly connected with the shaft 10 and is therefore caused to reciprocate along with the reciprocation of the ejector member 9.

The transport mechanism 96 to which the arms 98, 98 are pivotally connected is driven from the shaft 224, Fig. 1. The arm 98 (to the right, Fig. 1) is pivotally connected at 230 to an arm 231 on a bell-crank 232, the bell-crank 232 idling on a stub shaft 233. The other arm 234 of the bell-crank 232 has pivotally connected thereto, at 235, a link 236. The link 236 is pivotally connected at 237 to an arm 238 of a bell-crank 239. The bell-crank 239 idles on a driven rock shaft 240. The rock shaft 240 is rocked by an arm 241 keyed to the shaft 240. The arm 241 carries a roller 242 which operates in a camway 243 of a cam 244 on the rotating shaft 224, Fig. 2.

The bell-crank 239, Fig. 1, has its other arm 245 pivotally connected at 246 to the left arm 98 of the transport mechanism 96, the upper end being pivotally connected at 247 to an end of the transport mechanism 96, to the left, Fig. 1.

A rocker arm 248 is fixed to the rock shaft 240 and is rocked thereby. The upper end of the rocker arm 248 is pivotally connected to a link 249, which link is also pivotally connected to the left arm 98 of the transport mechanism 96. A rock shaft 250 rocks a rocker arm 251, Fig. 1, and a link 252 connects this rocker arm 251 to the arm 238 of the bell-crank 239. The rock shaft 250 is rocked by an arm 252 which is fixed to the shaft 250. A cam roller 253, Figs. 1 and 2, engages a camway in a cam 254 which is driven by the shaft 224, Fig. 2. The shaft 224 thus rocks the shafts 240 and 250 through the medium of the rocker arms 241 and 252 which are rocked by the cams 244 and 254, respectively. The bell-cranks 232 and 239 are rocked, and by the connection from the bell-cranks to the transport mechanism 96, the transport mechanism is moved in a parallel orbit as previously described.

The shaft 224 carries and drives a gear 255, Fig. 1, which meshes with a gear 256 on a stub shaft 257. The gear 256 meshes with a gear 258 on a shaft 259. This gear 258 may mesh with a gear 260 on a shaft 261, the gear 260 meshing with a gear 262 which drives a gear 263 on the shaft 131, Fig. 15. The gear 262 carries an integral smaller gear 263 which meshes with a gear 264 on the shaft 131 and drives the chain 124. The gear 258 drives a gear 265 on the shaft 120 through the medium of an idler gear. Whereby, the chain 124 and the arms 118 operate in the direction of the directional arrows shown in Fig. 15. The mechanism 113 and the chain conveyor 124 are thus driven in proper timed relation with the other operating parts of the machine.

The mechanism which drives the holder and folder finger 68 comprises a rocker arm 266 fixed to the shaft 69 and rocks this shaft. A link 267 has one end (to the left, Fig. 1) pivotally connected to the rocker arm 266, and its other end (to the right, Fig. 1) connected to an arm 268 which is pivoted at 269 to a part on the machine frame structure 1. The arm 268 has a cam roller 270 fastened thereto which may engage a camway in the cam 244, Fig. 2. The finger 68 is therefore reciprocated in an arc, and is adapted to operate in timed relationship with other parts of the machine, so as to effect the proper operations at the particular proper time intervals.

Operation

Articles are delivered at station 8 out of pockets in the wheel 2 by the ejector member 9 which deposits the article into a partially folded blank 15 between the legs 52 and 53 of the blank. Just prior to the insertion of the article into the prefolded blank, the members 54 and 60 operate to spread the legs 52 and 53 apart so as to permit easy insertion of the article into the prefolded blank.

Blanks 15 are separated from a stack of blanks arranged in a magazine 14. A lowermost blank is engaged by a suction head 26 and placed in a pocket 38 of the wheel 39, successively. The folder finger 68 operates to press inwardly extending part of the leg 52, just prior to the rotation of the wheel 39, and holds the bent part against the article at the beginning of the movement of the wheel 39. The rotation of the wheel 39 causes the bottom edge 53 of the blank 15 to be folded by the flange 72. The top part of the blank is thus against the article and the bottom edge of the blank is pressed over the prescored part 52, Fig. 1. The ejector mechanism 76 ejects the articles from the wheel 39 onto a guideway. The forward sides of the blank will engage a stationary folding finger 79 to fold the forward ends. A cam operated structure 80 is then operated to fold the material of the blank at the rearward side on each end. The transport mechanism 96 then moves the article successively along the guideway, the bottom projecting part of the blank on each end being folded upwardly by the member 100, the member 100 causing the upward folding during the upward movement of the transport mechanism. The folding is done against the relatively thin plate 105 so as to insure a sharp, square bend at the bottom of the article.

The remaining upper projecting part of the wrapper is folded by raising the article upwardly against the bottom edges 112 of triangularly shaped members 110. The article is moved by transfer mechanism 113 and deposited on a guideway 125. The articles are moved along the guideway 125 by means of arms 123 carried on an endless chain 124. The article travels along the guideway 125 and is engaged by hotplates 127 and 128 so as to seal the seam and the end folds. The arms 123 move the completely sealed packages off the guideway 125 to delivery position, particularly to an endless belt conveyor.

The invention provides a machine which is properly synchronized and the parts are correlated so as to effect a proper operation intermittently, and in proper sequence, at the proper time, whereby all the steps of performing the operation are in proper timed relation. The in-

vention employs the use of a particular type of package whereby a blank is first bent along certain score lines to encase the article and then other parts of the blank are formed into folds or flaps that are sealed. The blank to which the invention applies is preferably a laminated sheet of the type disclosed in said Mullinix Patent No. 2,335,019.

Changes may be made in the form, construction and arrangement of the parts, and the method may be varied to certain degrees without departing from the spirit of the invention or sacrificing any of its advantages, and the right is hereby reserved to make all such changes as fall fairly within the scope of the following claims.

The invention is hereby claimed as follows:

1. A packaging machine for packaging an article in a package blank having a central laminated scored portion extending throughout the full length of the blank but narrower in width so as to provide thin projecting side edges of the blank at the ends, means to fold said blank along certain of said score lines to form the blank into U-shaped form to provide a side and spaced legs, operable means to spread the legs of the U-shaped formed blank to permit easy insertion of an article between said legs, means to insert an article in the U-shaped formed blank, means for folding the blank along other score lines to bring the free outer edges of the blank into engagement with a side of the article into contacting overlapping relationship, and means to fold the thin projecting side edges of the blank against the article.

2. A packaging machine for packaging an article in a package blank having a central laminated scored portion extending throughout the full length of the blank but narrower in width so as to provide thin projecting side edges of the blank at the ends, means to deliver a blank to a predetermined position relative to an operable member having pockets, said means while delivering the blank in a said pocket causing the blank to be bent along certain score lines to form the blank into an article receiving pocket, means to insert an article into the article receiving pocket of the blank, means to crease the blank along other score lines to encase the article, means to eject the blank encased article from the operable member, rigid means to effect folding of the projecting thin edges of the blank at one side against the article, cam operated means to effect folding of said thin edges at another side against the article, transport mechanism movable in a parallel orbital path to effect folding of the thin side edges at another side against an end of the article, and means to effect folding of the other remaining thin side edges against the ends of the article.

3. A packaging machine for packaging an article in a package blank having a central laminated scored portion extending throughout the full length of the blank but narrower in width so as to provide thin projecting side edges of the blank at the ends, means to deliver a blank to a predetermined position relative to an operable member having pockets, said means while delivering the blank in a said pocket causing the blank to be bent along certain score lines to form the blank into an article receiving pocket, means to insert an article into the article receiving pocket of the blank, means to crease the blank along other score lines to encase the article, means to eject the blank encased article from the operable member, rigid means to effect folding of the projecting thin edges of the blank at one side against the article, cam operated means to effect folding of said thin edges at another side against the article, transport mechanism movable in a parallel orbital path to effect folding of the thin side edges at another side against an end of the article, and rigid means for folding the remaining thin edges against the ends of the article during a cycle of operation of the transport mechanism.

4. A packaging machine for packaging an article in a package blank having a central laminated scored portion extending throughout the full length of the blank but narrower in width so as to provide thin projecting side edges of the blank at the ends, means to deliver a blank to a predetermined position relative to an operable member having pockets, said means while delivering the blank in a said pocket causing the blank to be bent along certain score lines to form the blank into an article receiving pocket, means to insert an article into the article receiving pocket of the blank, means to crease the blank along other score lines to encase the article, means to eject the blank encased article from the operable member, rigid means to effect folding of the projecting thin edges of the blank at one side against the article, cam operated means to effect folding of said thin edges at another side against the article, transport mechanism movable in a parallel orbital path to effect folding of the thin side edges at another side against an end of the article, rigid means for folding the remaining thin edges against the ends of the article during a cycle of operation of the transport mechanism, conveyor means to engage the articles at a rear surface thereof, and heating elements engageable with the ends and bottom of the articles which are being moved by the conveyor means.

5. A packaging machine for packaging an article in a package blank comprising means to carry an article with the blank encasing the article on four sides and with end margins of the blank extending beyond the ends of the article, ejector means to eject the blank containing the article from said carrying means, folding members mounted on said ejector means for movement with respect thereto for folding marginal edges of the blank, and means operable to actuate said folding members after the ejection has started.

6. A packaging machine for packaging an article in a package blank comprising means to carry an article with the blank encasing the article on four sides and with end margins of the blank extending beyond the ends of the article, ejector means to eject the blank containing the article from said carrying means, folding members pivotally mounted on said ejector means for folding marginal edges of the blank, and means operable to actuate said folding members after the ejection has started.

7. A packaging machine for packaging an article in a package blank comprising means to carry an article with the blank encasing the article on four sides and with end margins of the blank extending beyond the ends of the article, ejector means to eject the blank containing the article from said carrying means, folding members pivotally mounted on said ejector means for folding marginal edges of the blank, and cam means operable to actuate said folding members after the ejection has started.

8. A packaging machine for packaging an article in a package blank comprising means to carry an article with the blank encasing the article on four sides and with end margins of the blank extending beyond the ends of the article, ejector means to eject the blank containing the article from said carrying means, folding members mounted on said ejector means for movement with respect thereto for folding marginal edges of the blank, and stationary cam means operable to actuate said folding members after the ejection has started.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,330,354	Smith	Feb. 10, 1920
1,426,429	Weightman et al.	Aug. 22, 1922
1,784,835	Harris	Dec. 16, 1930
1,955,331	Howard et al.	Apr. 17, 1934
1,984,850	Van Buren	Dec. 18, 1934
2,171,131	Milmoe et al.	Aug. 29, 1939
2,400,682	Bronander	May 21, 1946
2,407,313	Malhiot	Sept. 10, 1946