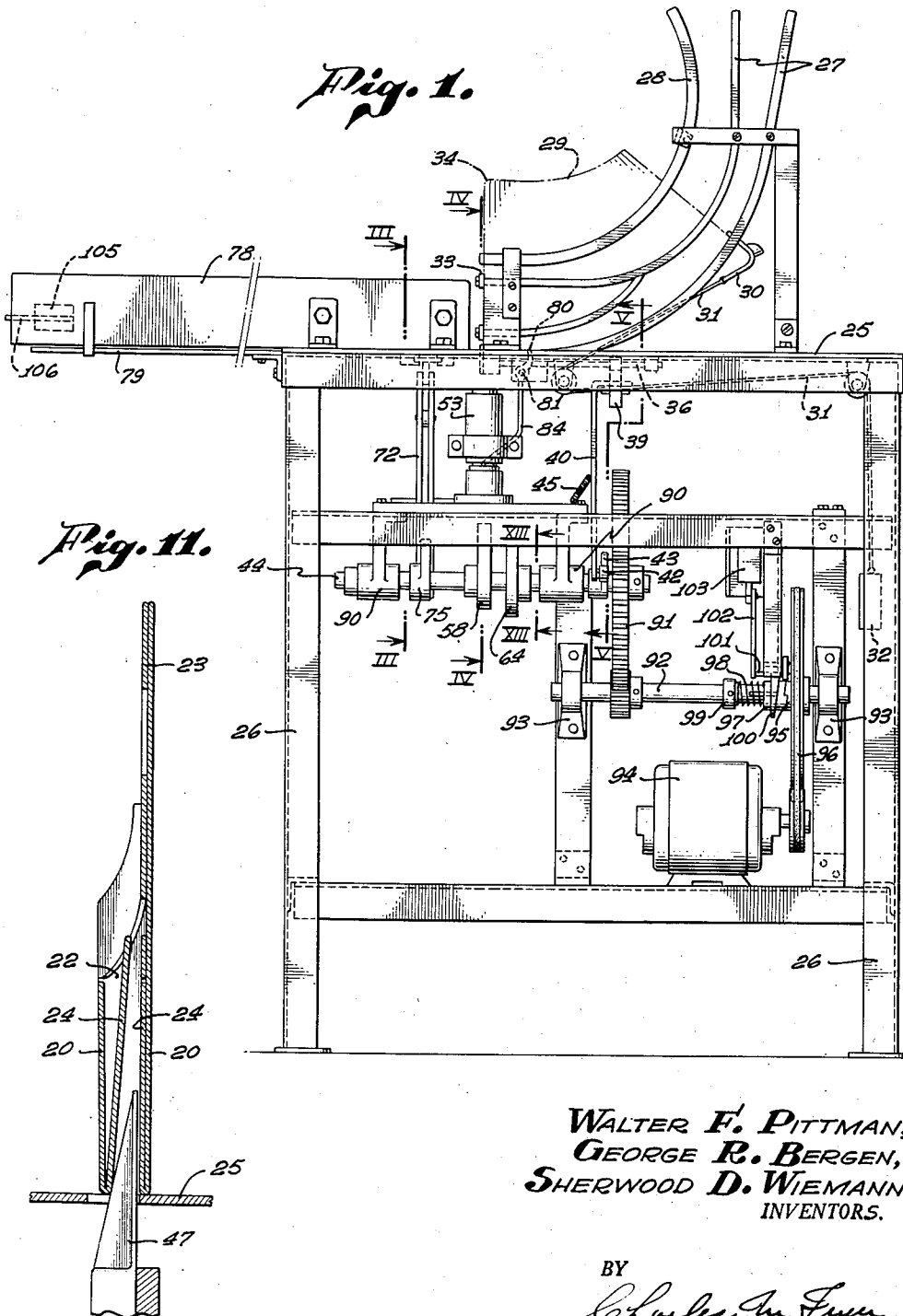


2,831,407

MACHINE FOR OPENING FLAT FOLD CARTONS

Filed Feb. 15, 1954

5 Sheets-Sheet 1



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April 22, 1958

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2,831,407

MACHINE FOR OPENING FLAT FOLD CARTONS

Filed Feb. 15, 1954

5 Sheets-Sheet 2

Fig. 3.

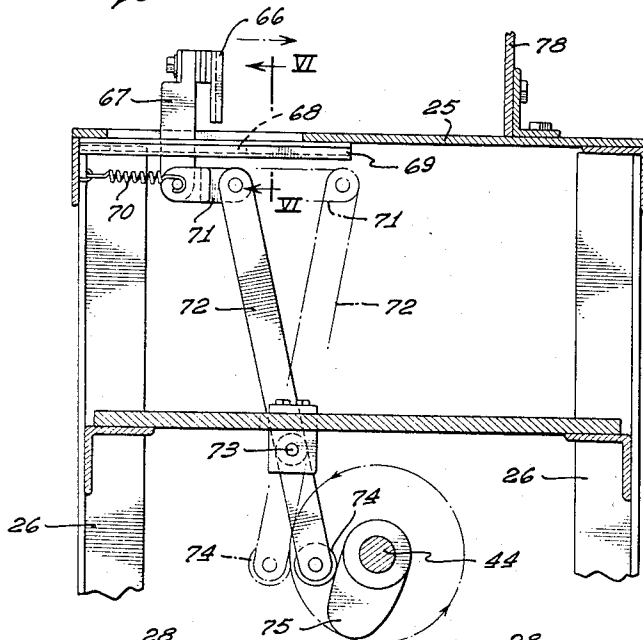


Fig. 6.

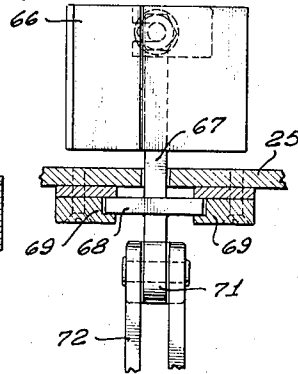


Fig. 7.

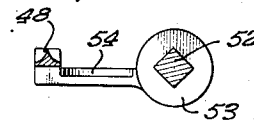
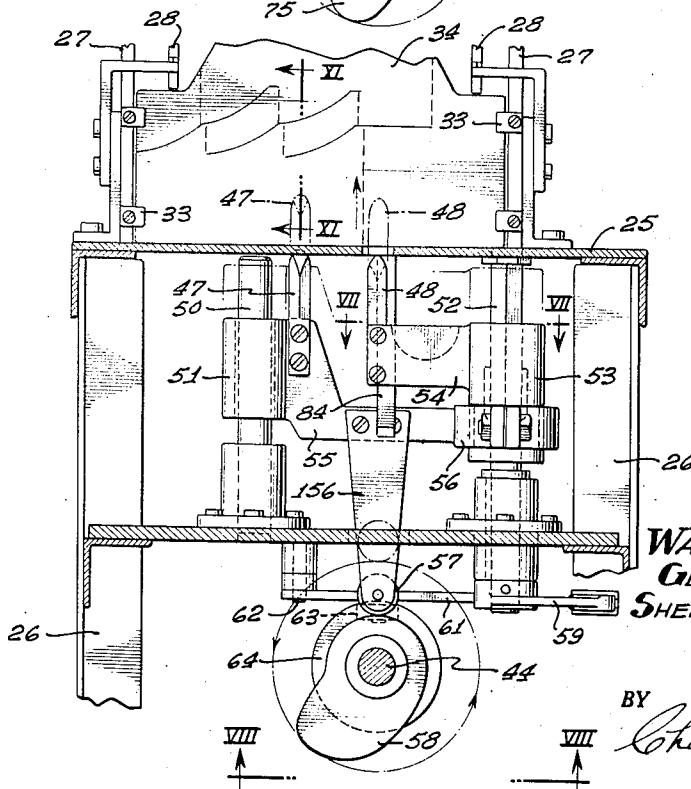


Fig. 4.



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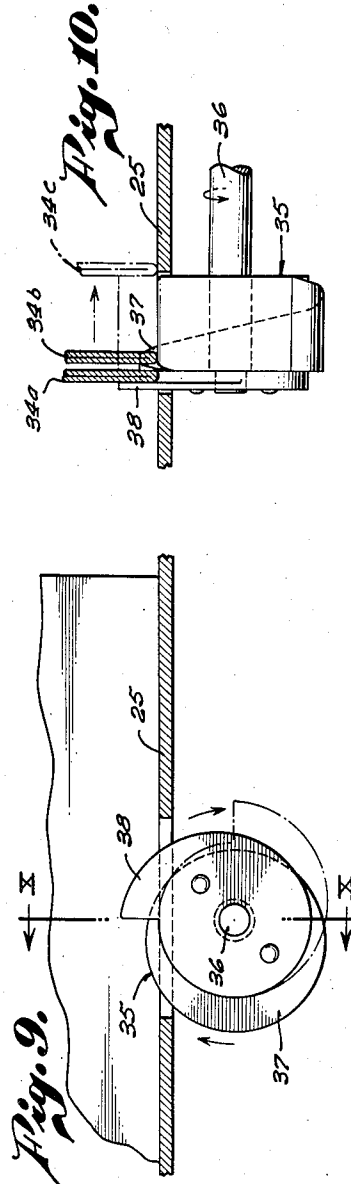
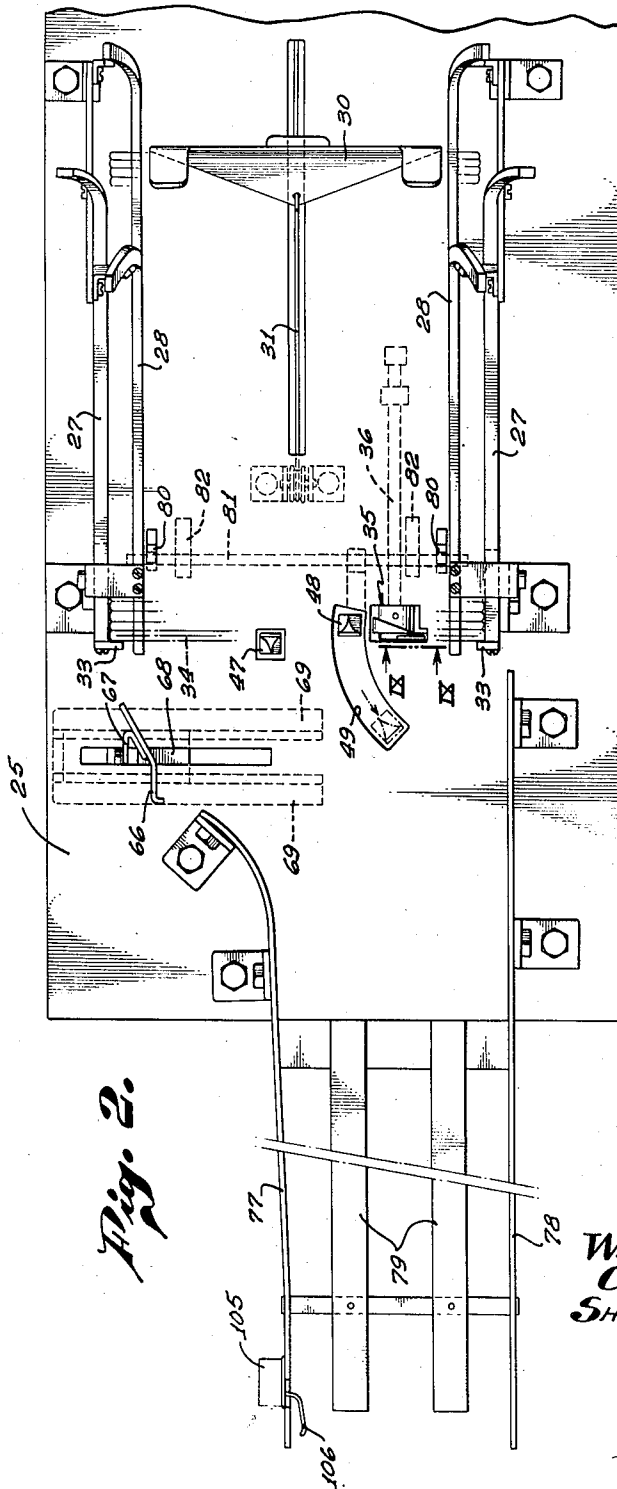
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2,831,407

MACHINE FOR OPENING FLAT FOLD CARTONS

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5 Sheets-Sheet 3



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2,831,407

MACHINE FOR OPENING FLAT FOLD CARTONS

Filed Feb. 15, 1954

5 Sheets-Sheet 4

Fig. 5.

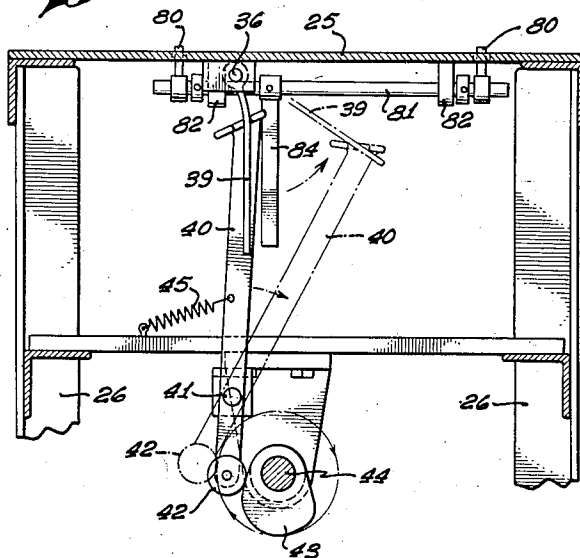


Fig. 8.

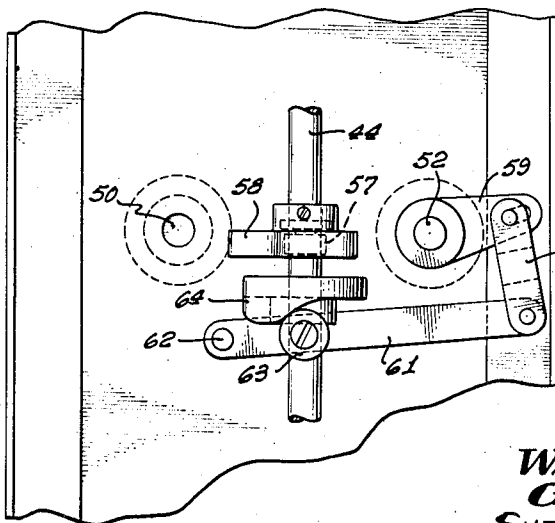


Fig. 12.

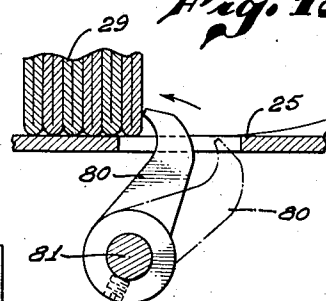
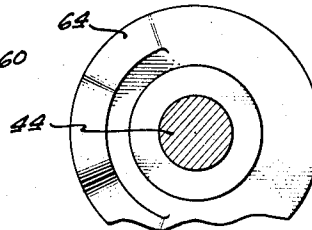


Fig. 13.



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2,831,407

MACHINE FOR OPENING FLAT FOLD CARTONS

Filed Feb. 15, 1954

5 Sheets-Sheet 5

Fig. 14.

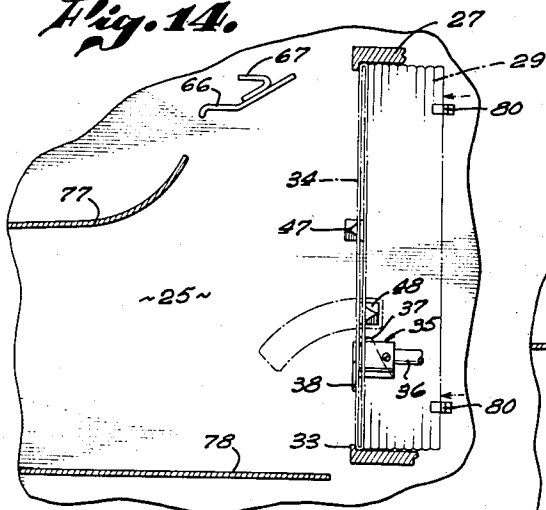


Fig. 15.

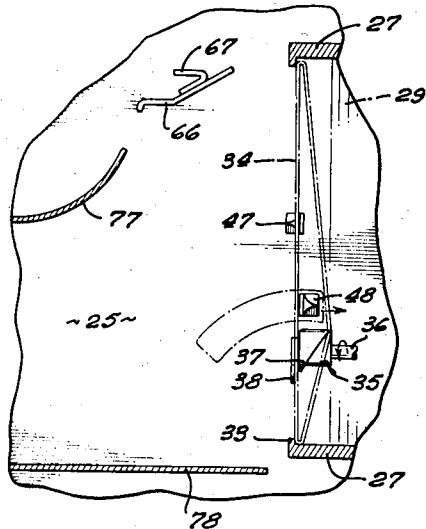


Fig. 16.

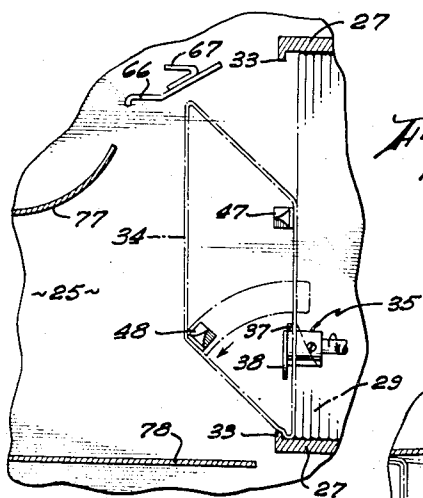


Fig. 17.

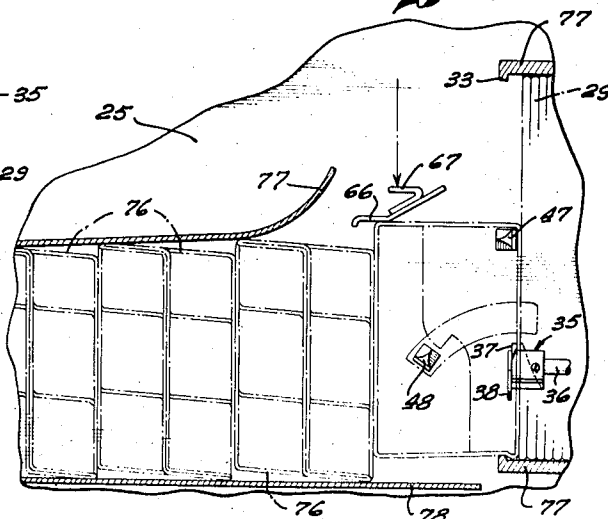
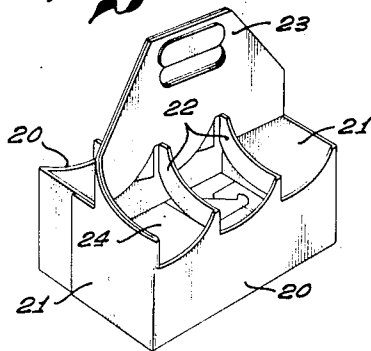


Fig. 18.



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1

2,831,407

MACHINE FOR OPENING FLAT FOLD CARTONS

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Application February 15, 1954, Serial No. 410,239

7 Claims. (Cl. 93—53)

This invention relates to a machine for opening or setting up flat folded cartons or bottle carriers.

Certain cartons, for example those designed for carrying six or more units of bottled or canned beverage are manufactured and shipped in flat form. In this form the four carton walls are permanently joined at the corners while the bottom panels and carton partitions assume flat positions between the flat folded walls. To open or set up the carton for use, the longer or side walls are spread apart and hinged about their corner connections with the end walls so that the four walls assume the configuration of a gradually widening parallelogram until they define a rectangle. As this rectangular position is assumed, the bottom panels have moved into cooperating interlocked positions to form a bottom for the carton and partition and handle members have also assumed their functional positions.

To save space and facilitate handling of these cartons, it is desirable that they be set up immediately before use, preferably a few at a time but with sufficient rapidity to insure a constant supply to the user or packer who inserts the canned or bottle merchandise to produce a marketable package of six units.

It is the object of the present invention to provide a machine that will receive a large number of flat folded cartons and through improved efficient mechanism quickly set up cartons from this supply one at a time.

A further object of the invention is the provision in such a machine of means to stop the setting up action automatically when a predetermined number of set up cartons has been made available and automatically to reinitiate the action when one or more of the available cartons is removed from the machine.

Further and more specific objects and advantages of the invention are made apparent in the following specification wherein reference is made to the accompanying drawings for a detailed description of the invention.

In the drawings:

Fig. 1 is a view in side elevation of a machine embodying the present invention,

Fig. 2 is a plan view of the same machine,

Fig. 3 is a sectional view taken on the line III—III of Fig. 1,

Fig. 4 is a sectional view taken on the line IV—IV of Fig. 1,

Fig. 5 is a sectional view taken on the line V—V of Fig. 1,

Fig. 6 is an enlarged sectional view taken on the line VI—VI of Fig. 3,

Fig. 7 is an enlarged sectional view of certain parts taken on the line VII—VII of Fig. 4,

Fig. 8 is a detail view taken on the line VIII—VIII of Fig. 4,

Fig. 9 is an enlarged detail taken on the line IX—IX of Fig. 2,

Fig. 10 is a view of the detail illustrated in Fig. 9, taken on the line X—X thereof,

2

Fig. 11 is an enlarged detail of a portion of the carton spreading mechanism taken on the line XI—XI of Fig. 4,

Fig. 12 is an enlarged view in detail of a portion of a carton feeding mechanism,

Fig. 13 is an enlarged view in elevation of one of the cams illustrated in Fig. 8,

Figs. 14, 15 and 16 are fragmentary plan views illustrating different positions of the spreading mechanism,

Fig. 17 is a similar view illustrating the final operation of the setting up of a carton, and

Fig. 18 is a perspective view of a set up carton typical of the kind to which this invention pertains.

One of the many types of flat fold cartons that may be opened or set up by the machine of the present invention is shown in Fig. 18 as comprising front and back walls 20, end walls 21, partitions 22 and a handle member 23. Bottom panels for the carton, only partially shown in Fig. 5, are better illustrated at 24 in Fig. 11 wherein they are shown as folded into the space between the front and back panels 20 together with the partition members when the carton is in its flat folded position. In Fig. 11 the carton is shown just as it starts to spread toward its open or set up position.

In Figs. 1 and 2 of the drawings, the machine of the present invention is illustrated as comprising a work surface or table 25 supported at a convenient height by legs 26 and conventional bracing. The table 25 supports a supply magazine for folded cartons, the sides of which are made up of bars shown at 27 with inwardly spaced bars 28 arranged to hold the cartons against upward movement. All of the bars 27 and 28 are suitably curved to follow the contour of a stack of cartons indicated in Fig. 1 at 29 which stack assumes a curved configuration due to the fact that the folded cartons are thicker adjacent their bottom edges than at their top edges. The cartons in the stack 29 are preferably urged downwardly and forwardly by an angular member 30 which engages the rear edge of a stack and is urged to compress the stack by a cable 31 trained over suitable chutes and supporting a weight 32. The lower or forward end of the stack of cartons in the magazine assumes an upright position with the lower carton edges resting on the table 25. The cartons are normally held against forward movement by stops shown at 33 in Fig. 2 on the forward ends of the magazine bars 27.

Upon each cycle of operation of the machine, the first or leading carton, which is illustrated at 34 in Figs. 14 to 15 inclusive, first assumes the position illustrated in Fig. 14. It is then acted upon by a wedge-like member to be slightly spread at its bottom edge as indicated in Fig. 15. At this point, a pair of spreader fingers enter between the separated portions of the carton and spread them further to the position illustrated in Fig. 16 whereupon a pusher plate engages one corner of the carton and forces it into the rectangular position illustrated in Fig. 17. The operation of the mechanisms which accomplish these steps are now to be described.

To effect the initial spreading of the carton which is illustrated in Fig. 15, a separator wheel 35, best shown in Fig. 10, is mounted on a rotatable shaft 36, see also Figs. 1, 5 and 9. This wheel carries a radially projecting wedge-like cam 37 and a stop plate 38 with a radially projecting helical contour, best illustrated in Fig. 9. The leading carton in the supply magazine has its front wall 34a pressed against the stop member 38, see Fig. 10, and as the shaft 36 starts to rotate, the wedge member 37 enters between the front wall 34a and the back wall 34b of the carton until the wedge member spreads the back wall backwardly to the position illustrated at 34c in Fig. 10. The mechanism for effecting this rotation of the shaft 36 is shown in Figs. 1 and 5 wherein the shaft is

shown as having a downwardly depending arm 39 embraced by the bifurcated end of a lever 40 pivotally supported as by a pin 41 and having a roller 42 at its lower end engaged by a cam 43 on the main cam shaft 44 of the machine. A spring 45 urges the lever toward the left as viewed in Fig. 5 but upon each complete rotation of the cam shaft 44, the cam 43 engages the roller 42 to swing the lever toward the right or into the broken line position illustrated in Fig. 5. This swings the arm 39 in a counterclockwise direction and thus rocks the shaft 36 to effect the separation illustrated in Fig. 15 and to retract the stop member 38 by counterclockwise rotation thereof as viewed in Fig. 9.

This first or initial separation of the front and back walls of the carton admits a pair of spreader fingers shown at 47 and 48 in Fig. 4 as normally positioned below the level of the table 25 and also illustrated in Figs. 14 to 17 inclusive. These spreader fingers are projected upwardly into the space between the walls of the carton formed by the wedge 37 and the spreader finger 48 swings through an arc as illustrated in Figs. 14 to 17, there being an arcuate slot 49, see Fig. 2, formed in the top of the table 25 to accommodate this motion. The spreader fingers 47 and 48 are carried on a reciprocable cross head which, as shown in Fig. 4, comprises a cylindrical shaft 50 with a slide 51 thereon to support the finger 47. A square shaft 52 carries a slide 53 which through a radial arm 54 carries the finger 48 (see also Fig. 7). A bridge 55 connects the slide 51 and a split collar 56 disposed beneath the slide 53 so that upon upward movement of the bridge 55 both slides 51 and 53 rise and project the fingers through and above the table top 25 to the positions illustrated in dotted lines in Fig. 4. To obtain this upward movement a bracket 156 extends downwardly from the bridge 55 and has a roller 57 at its lower end engageable by a cam 58. The cam 58 is also on the main cam shaft 44 so that upon each operating cycle of the machine the fingers are raised and lowered by the action of the cam. Immediately after being raised, the finger 48 is swung through the arcuate path illustrated in Figs. 14 to 17 and this is accomplished by partial rotation of the square shaft 52 (see Figs. 4 and 7) with respect to which this finger 48 slides. Oscillation of the square shaft 52 in properly timed sequence is accomplished by mechanism illustrated in Figs. 4 and 8 which comprises a lever 59 fixed to the lower end of the shaft. This lever is connected by a link 60 with a lever 61 pivotally supported as at 62 and having a roller 63 intermediate its ends. This roller 63 is engaged by a face cam 64 also carried by the cam shaft 44 so that upon rotation of the cam shaft, the lever 61 is swung in a manner to effect oscillation of the square shaft 52 and the necessary swinging movement of the finger 48 which spreads the carton to the position illustrated in Fig. 16. Of course upon completion of the cycle, the finger 48 returns to its original position and both fingers 47 and 48 are retracted to their normal position below the level of the table 25.

In the process of assuming the position shown in Fig. 16, the carton has easily been withdrawn from behind the stop member 33 on one of the bars 27. At this point and after withdrawal of the fingers 47 and 48 a pusher plate acts against the projecting corner of the carton to urge it to a rectangular position as illustrated in Fig. 17. This pusher plate is shown at 66 in Figs. 3, 6 and 14 to 16 and is supported on a vertical member 67 carried on a plate 68 slidable in a guide way or track 69 disposed beneath the table 25. A spring 70 urges the pusher plate to its retracted position and a link 71 connects it with a lever 72 pivotally supported as at 73. The lower end of the lever 72 has a roller 74 thereon engageable by a cam 75 also fixed to the cam shaft 44. Consequently, during each cycle of operation the cam 75 swings the lever 72 to the broken line position illustrated in Fig. 3 thus causing the pusher plate to advance against

the corner of the carton to urge the carton from the shape illustrated in Fig. 16 to the rectangular shape illustrated in Fig. 17.

Previously set up cartons are illustrated at 76 in Fig. 16 and these cartons are urged forwardly into a delivery chute as each new carton is set up. This delivery chute as shown in Figs. 1 and 2 has side walls 77 and 78 which project beyond the edge of the table 25 and bottom bars 79 which form an extension of the table surface. The chute is preferably sufficiently long to hold five or six cartons after they have been set up.

It is desirable that the leading carton be firmly urged forwardly against the stop 38 on the oscillating member 35 so that the wedge 37 is properly positioned with respect to the carton to enter between the front and back walls as illustrated in Fig. 10. To insure this accurate position of the front carton, a pair of pressure feed dogs are provided, one of these dogs being illustrated at 80 in Fig. 12 as mounted on a shaft 81. The shaft 81 (see also Figs. 1 and 5) is supported in bearing brackets 82 directly beneath the table 25 and may be rocked to swing the dogs upwardly against the leading few cartons as shown in the full line position in Fig. 12 or upon being rocked in the opposite direction will retract the dogs as to the broken line position. This rocking motion is accomplished by a curved lever 84 (see Figs. 1 and 5) which is fixed to the shaft 81 and extends downwardly therefrom with its lower end projecting, as best shown in Fig. 4, to a position between the bridge 55 and the arm 54 which supports the finger 48. In the normal retracted position of the cross head, the lever 84 assumes its downward position and the fingers 80 assume their upward or full line position illustrated in Fig. 12. During the initial upward movement of the cross head, the lever 84 is swung upwardly and the fingers are retracted to their broken line position. After the cross head with its fingers 47 and 48 has accomplished its function and is retracted, the presser fingers again assume their operative position where they remain until the commencement of the next cycle.

The cam shaft 44 which carries all of the cams for effecting the operations hereinbefore described is mounted in bearing brackets 90 (see Fig. 1) and is driven by a train of gears 91 from a clutch shaft 92 supported for rotation in brackets 93. An electric motor 94 drives a clutch dog 95 rotatable on the clutch shaft through suitable pulleys and a belt 96. A cooperating clutch dog 97 is splined against rotation but slidable on the shaft 92 and urged into engagement by a spring 98 which bears against a collar 99 on the shaft. The retractable clutch dog 97 carries a cam 100. A lever 101 cooperating with this cam may be raised and lowered by a link 102 which connects it with an actuating solenoid 103.

When the machine is in operation, the motor 94 is energized and rotates continuously and the clutch is normally engaged. Consequently the cam shaft 44 is continuously rotated and cartons are set up one at a time until a condition arises which disengages the clutch and permits the cam shaft to come to rest. In the position shown in Fig. 1, a condition obtains where the lever 101 has fallen to a position adjacent the cam 100 on the retractable clutch member 97. Consequently upon further rotation of this clutch member, the cam 100 in striking the lever will retract the clutch member 97 and disengage the clutch. The solenoid 103 may, however, be energized to raise the lever 101 and permit engagement of the clutch. A switch to control the solenoid is disposed adjacent the outer end of the discharge chute as shown at 105 in Figs. 1 and 2 and this switch has an actuating finger 106 that projects inwardly of the delivery chute. As cartons are set up and urged through the chute, filling of the chute will cause the foremost carton therein to contact the switch finger 106 to open the switch and deenergize the solenoid 103 through a circuit not shown.

Consequently when the machine is set in operation by

5

energization of the motor 94, it will, under normal circumstances start to open or set up cartons advancing them through the delivery chute until five or six cartons have been set up, depending upon the length of the chute, and until the first carton contacts and opens the switch 105. This drops the lever 101 to effect disengagement of the clutch and the machine, with the exception of the motor, comes to rest. As packers remove cartons from the delivery chute for use and specifically when the foremost carton in the chute is removed, the switch lever 106 is released to effect energization of the solenoid 103 and raising of the lever 101 and the clutch is again engaged to effect operation of the machine until the delivery chute is again filled with set up cartons. In this manner, at least one carton is always available in the delivery chute and the instant that this carton is removed operation of the machine is initiated to set up further cartons so that the supply of cartons ready for use is never depleted though most of the cartons remain in their flat folded form in which they occupy a minimum of space.

We claim:

1. In a machine for opening flat folded cartons the combination with a magazine for supporting a supply of folded cartons of means to spread the folded walls of one of said cartons which comprises, a rotary member with a radially projecting wedge positioned to enter between said walls upon rotation thereof, said wedge increasing in thickness in the direction of the periphery of said rotary member.

2. In a machine for opening flat folded cartons the combination with a magazine for supporting a supply of folded cartons of means to spread the folded walls of one of said cartons which comprises, a rotary member with a radially projecting wedge positioned to enter between said walls upon rotation thereof and a stop member projecting radially from one side of the rotary member in a position to engage one side of the leading carton in said supply to position the carton for reception of the wedge between its folded portions, said stop member being withdrawn from such engagement upon rotation of the rotary member, the position of said wedge being such as to progressively spread the carton walls upon rotation after it enters between them.

3. In a machine for opening flat folded cartons the combination with a magazine for supporting a supply of folded cartons of means to spread the folded walls of one of said cartons which comprises, a rotary member with a radially projecting wedge positioned to enter between said walls upon rotation thereof, a pair of fingers, means to insert said fingers in the space between the carton walls provided by said wedge, and means to move one of said fingers while the other remains relatively stationary to effect further spreading of the walls.

6

4. In a machine for opening flat folded cartons the combination with a magazine for supporting a supply of folded cartons of means to spread the folded walls of one of said cartons which comprises, a rotary member with a radially projecting wedge positioned to enter between said walls upon rotation thereof, a pair of fingers, means to insert said fingers in the space between the carton walls provided by said wedge, means to move one of said fingers while the other remains relatively stationary to effect further spreading of the walls, and means to apply pressure against a corner of the partially opened carton to urge it to assume a rectangular shape.

5. In a machine for opening flat folded cartons the combination with a magazine for supporting a supply of folded cartons of means to spread the folded walls of one of said cartons which comprises, a rotary member with a radially projecting wedge positioned to enter between said walls upon rotation thereof, a pair of fingers, means to insert said fingers in the space between the carton walls provided by said wedge, means to move one of said fingers while the other remains relatively stationary to effect further spreading of the walls, means to withdraw said fingers, and means to apply pressure against a corner of the partially opened carton to urge it to assume a rectangular shape.

6. In a machine for opening flat folded cartons the combination with a magazine for supporting a supply of folded cartons with a leading carton therein, a rotary member with a radially projecting wedge positioned to enter between the walls of said leading carton, a pair of finger-like members, means to insert said members into the space between the carton walls provided by said wedge, and means to cause spreading apart of said members to effect spreading apart of the carton walls.

7. In a machine for opening flat folded cartons the combination with a magazine for supporting a supply of folded cartons of means to spread the folded walls in the leading carton in said supply which comprises, a rotary member with a radially projecting wedge positioned to enter between and gradually spread said walls when it rotates, a stop member projecting from one side of the rotary member in a position to engage the leading side of the leading carton in said supply, and means operable while said stop member is so positioned to press said leading carton against the stop member to hold it in position for reception of the wedge between its walls.

References Cited in the file of this patent

UNITED STATES PATENTS

1,355,488	McKenney	Oct. 12, 1920
1,495,192	MacNaughtan	May 27, 1924
2,359,384	Poole et al.	Oct. 3, 1944
2,572,800	Carkhuff	Oct. 23, 1951
2,665,044	Monroe et al.	Jan. 5, 1954