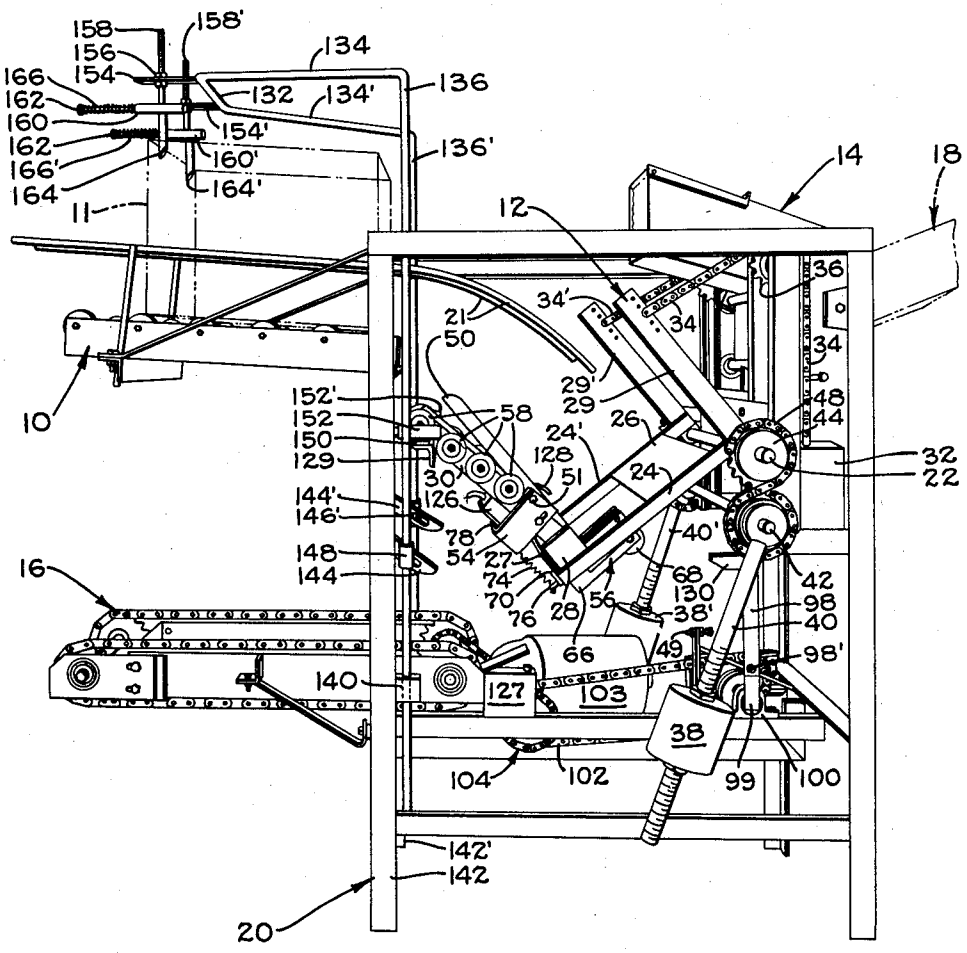
June 26, 1962 C. E. SHEETZ 3,040,826

CONTAINER FILLING APPARATUS

Filed Aug. 28, 1958 4 Sheets-Sheet 1

FIG_1



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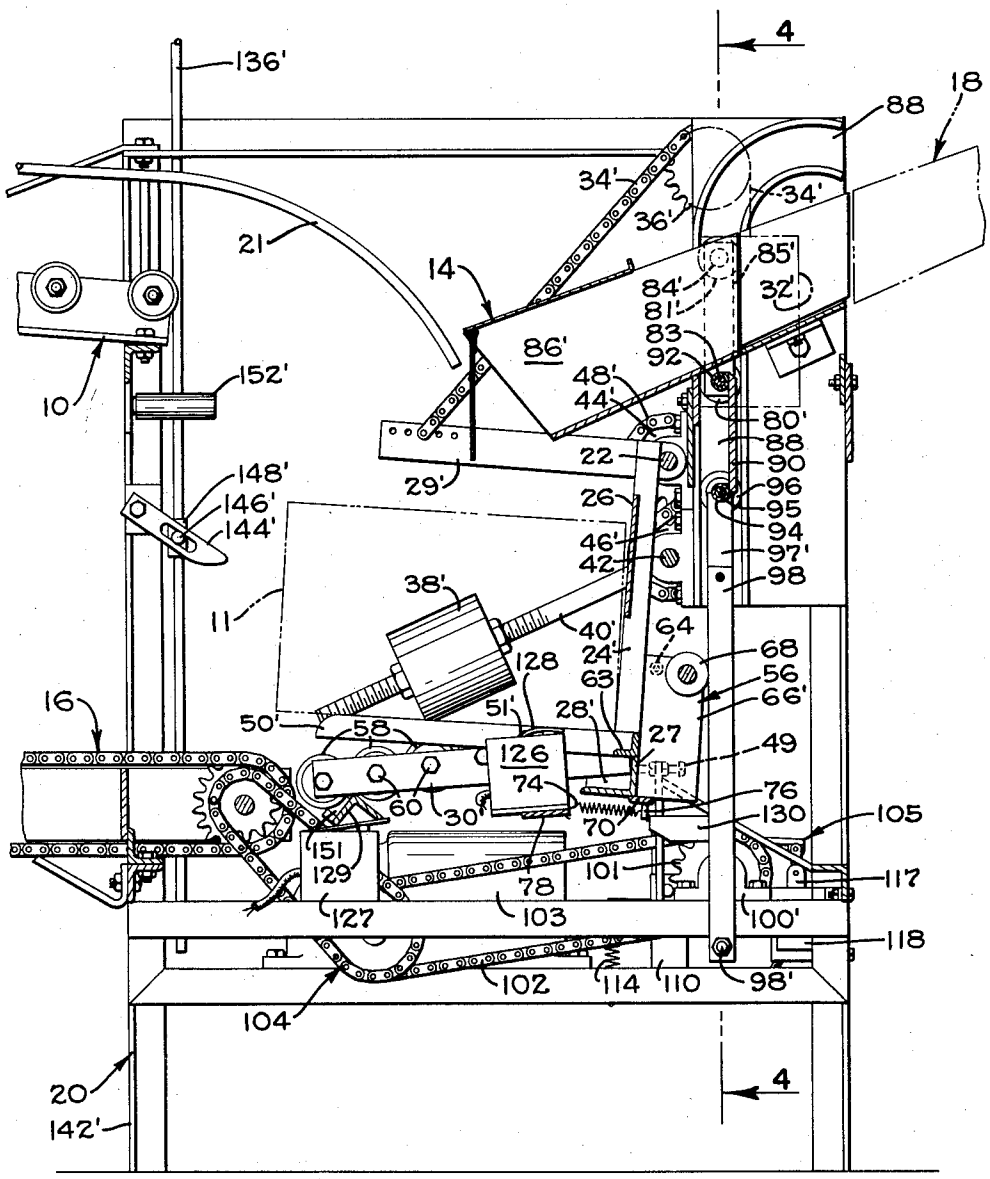
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CONTAINER FILLING APPARATUS

Filed Aug. 28, 1958 4 Sheets-Sheet 2

FIG_2



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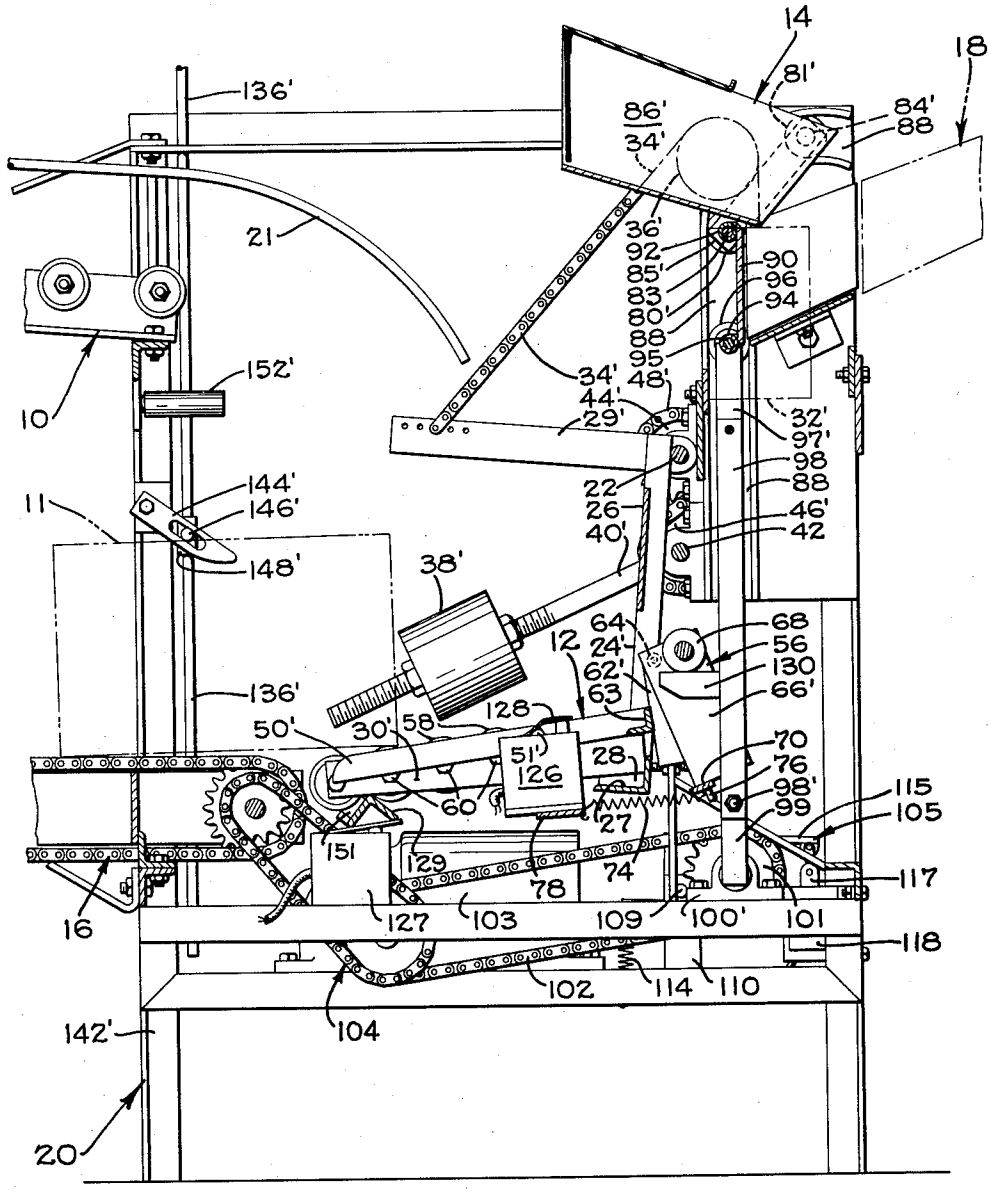
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CONTAINER FILLING APPARATUS

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FIG_3



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CONTAINER FILLING APPARATUS

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FIG_4

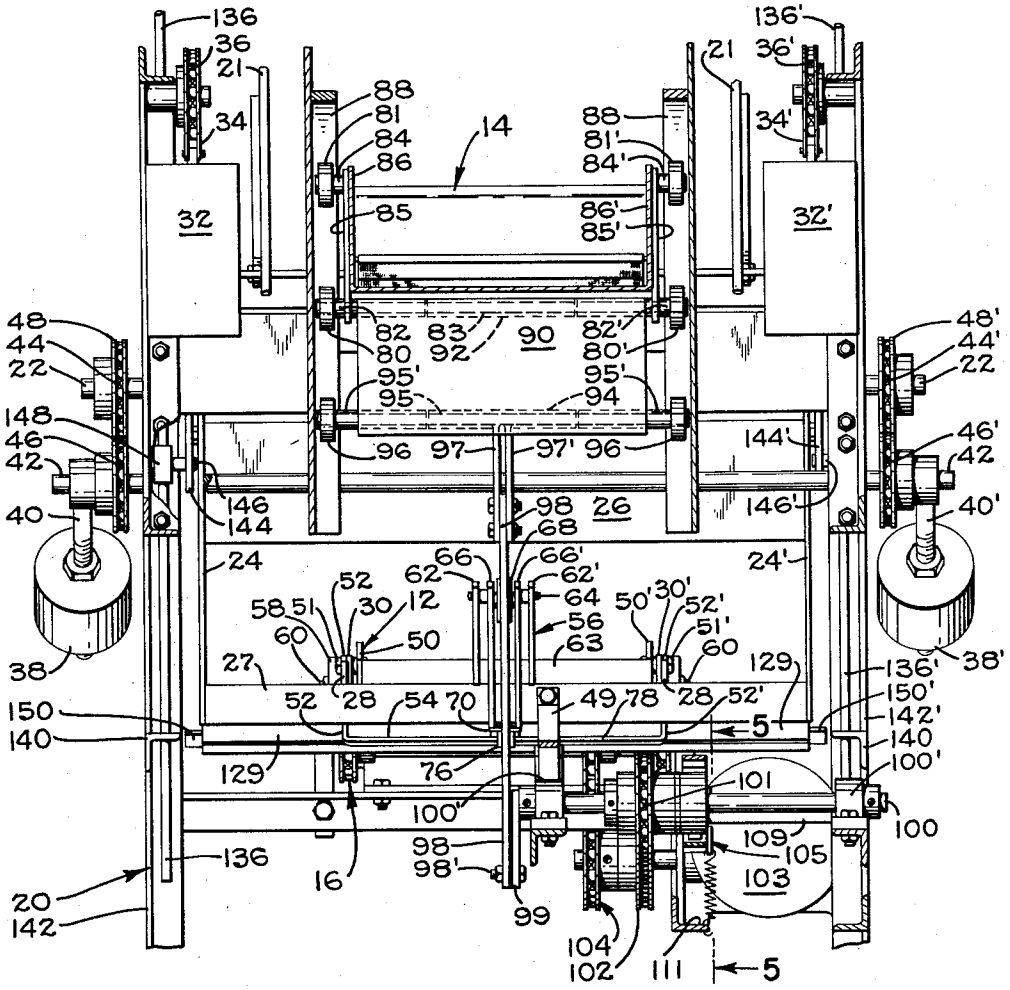
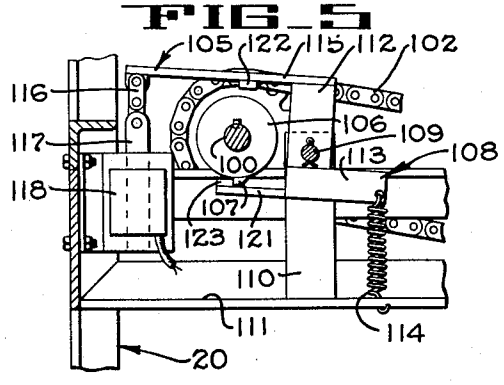


FIG_5



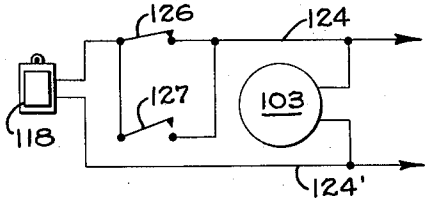


FIG_6

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United States Patent Office 3,040,826 Patented June 26, 1962

3,040,826

CONTAINER FILLING APPARATUS

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2 Claims. (Cl. 177—117)

The present invention relates to material or article handling, and more particularly to apparatus for filling a predetermined quantity of bulk material into each of a succession of containers.

An object of the invention is to provide improved apparatus for handling bulk materials.

Another object is to provide an improved container filling apparatus.

Another object is to provide an improved mechanism for supplying bulk material or articles to a container filling machine or other apparatus.

Another object is to provide an improved mechanism for inactivating an apparatus whereby bulk material or articles are supplied to processing equipment such as a container filling machine.

Another object is to provide a material supply arresting mechanism which is automatically made operative when a predetermined quantity of the material, such as a container load of a certain weight, has been delivered by the supply mechanism.

Another object of the invention is to provide container filling apparatus which is of low cost and requires minimum attendance in operation.

Another object of the present invention is to provide apparatus for continuously filling articles into containers.

Another object of the invention is to provide apparatus for filling articles into containers with minimum danger of injury to the articles being handled.

Another object of the present invention is to provide apparatus for the filling of a uniform, predetermined weight of articles into each of a succession of containers.

These and other objects of the invention will become apparent from the following description thereof, taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective of the container filling apparatus of the invention in readiness for receipt of a container to be filled.

FIG. 2 is an enlarged longitudinal medial section of the apparatus of FIG. 1 after a container has been received and filled.

FIG. 3 is a view similar to FIG. 2, showing the apparatus during discharge of the filled container.

FIG. 4 is a vertical section along lines 4—4 of FIG. 2.

FIG. 5 is a fragmentary vertical section along lines 5—5 of FIG. 4.

FIG. 6 is a wiring diagram illustrating the electrical connections included in the apparatus of the invention.

Referring to the drawings, and particularly to FIGURE 1, apparatus is shown for filling articles such as apples or other fruit into a container, e.g. a wood or fibreboard carton. The apparatus comprises a conveyor **10** for delivering cartons to be filled (one carton being indicated at **11**); a cradle **12** which receives the cartons in succession from the conveyor **10** and supports each carton individually while it is filled from a chute extension **14**; a conveyor **16** for carrying away the filled cartons; and a chute **18** for supplying articles to the chute extension **14**. The elements of the apparatus are mounted on a frame structure **20**.

The conveyor **10** is inclined downward into the apparatus and is provided with rollers for the gravitation therealong of the cartons **11**. Two bars **21** mounted respectively at the sides of the conveyor **10** and curving downwardly beyond the discharge end thereof guide the cartons into the cradle **12**.

The cradle **12** is pivotally mounted on a horizontal shaft **22** journaled at its ends in suitable side members of the frame structure **20**, and is shown in FIG. 1 in its position in which carton **11** is received from the conveyor **10** and filling of the carton from the hopper **14** is initiated. The cradle **12** is formed at its base of two longitudinally extending, spaced parallel bars **24** and **24'** and a flat plate **26** extending therebetween. As best shown in FIG. 2, an angle member **27** is welded at its ends to the lower ends of the bars **24** and **24'**, respectively, and welded to its outwardly extending flange are two spaced upstanding plates **28** and **28'**. Secured respectively to the upper ends of the bars **24** and **24'** are two parallel bars **29** and **29'**, which extend upward from the bars **24** and **24'** perpendicularly thereto, and which at their lower ends support the cradle on the pivot shaft **22**. Two parallel bars **30** and **30'** are welded to the inner surfaces of the plates **28** and **28'**, respectively, and extend upward and obliquely outward therefrom. Thus, the two bars **30** and **30'** lie in a plane that is not quite parallel to that occupied by the bars **29** and **29'**, but which diverges therefrom in the direction in which all four bars project from the base bars **24**, **24'**, as clearly shown in FIGS. 1 and 2.

Referring to FIGS. 2, 3, and 4, it will be seen that the cradle **12** is connected to two counterweights **32** and **32'** (FIG. 4) mounted respectively at the outer ends of two chains **34** and **34'** which are trained over rotatable sprockets **36** and **36'** (FIGS. 2 and 4) mounted on the frame structure **20**, and which at their inner ends (FIGS. 2 and 3) are secured to the bars **29** and **29'**, respectively. Two additional counterweights **38** and **38'** (FIGS. 1–4) are adjustably mounted upon two forwardly extending rods **40** and **40'**, respectively, said rods being secured at their upper ends to the outer ends of a horizontal pivot shaft **42** mounted on the frame structure **20** a short distance below the pivot shaft **22**. Two sprocket wheels **44** and **44'** are mounted respectively at the ends of the pivot shaft **22**, and two sprocket wheels **46** and **46'** are mounted respectively at the ends of the pivot shaft **42**. Adjacent sprocket wheels **44**, **46** and **44'**, **46'** are interconnected by a chain, the two chains **48** and **48'** each being trained in opposite directions around the associated sprockets, as seen in FIG. 1. The upper portion of each chain passes part of the way around the associated sprocket wheel **44** or **44'**, and is secured at one end thereto, while the lower portion of the chain passes part of the way around the associated sprocket wheel **46** or **46'**, being secured at its other end thereto. It will be clear that, as a result of the chain and sprocket connection, rotation of the pivot shaft **22** in one direction will produce rotation of the pivot shaft **42** in the opposite direction. After a carton **11** is received by the cradle **12**, and as the weight of its contents increases during filling thereof from the chute extension **14**, the cradle will pivot in a counterclockwise direction as viewed in FIG. 1, causing the sprocket wheels **44** and **44'** to rotate in the same direction. As a consequence, the sprocket wheels **46** and **46'** will rotate in a clockwise direction, causing the rods **40** and **40'** and counterweights **38** and **38'** carried thereby to likewise pivot in a clockwise direction. It will be clear that adjustment of the positions of the counterweights **38** and **38'** on the rods **40** and **40'** will determine the rate of pivotal movement of the cradle for a given rate of flow of articles thereinto from the hopper **14**. An adjustable stop member **49** mounted on the frame structure **20** (FIG. 1) terminates the downward movement of the cradle when the angle member **27** comes into abutment therewith.

The carton **11** when received by the cradle **12** is supported by two arms **50** and **50'** (FIGS. 1–4) located intermediate the bars **24** and **24'** and respectively adjacent thereto. The arms **50** and **50'** are pivotally mounted

upon pivot bolts **51** and **51'**, received in the upper ends of opposed legs **52** and **52'** (FIG. 4) of a U-shaped strap **54** bolted to the bars **30** and **30'**, respectively. Associated with the arms **50** and **50'** is a latch mechanism **56** (FIGS. 2–4) which when disengaged permits the arms **50** and **50'** to pivot under the weight of a filled container from the position thereof shown in FIG. 2 into the position shown in FIG. 3. The bars **30** and **30'** of the cradle are provided with four pairs of oppositely disposed rollers **58** mounted on bolts **60** (FIGS. 1 and 2) projecting outward from said bars, and arranged to form a downwardly inclined conveyor for receiving the filled container when the arms **50** and **50'** are pivoted into their position shown in FIG. 3, and for delivering said container to the take-off conveyor **16**.

Referring to FIGS. 3 and 4, it will be seen that the latch mechanism **56** is mounted between two spaced, vertical plates **62** and **62'** secured to an angle member **63** which interconnects the arms **50** and **50'** (FIG. 4). Mounted between the latch support plates **62** and **62'** and journaled at its respective ends therein is a pivot pin **64** upon which are pivoted the upper ends of two spaced, vertical latch plates **66** and **66'** supporting a roller **68**. Whereas both the pivot pin **64** and the roller **68** are at the upper ends of the plates **66**, **66'**, it is to be observed that the roller is offset rearwardly from the pivot pin. The latch plates **66**, **66'** further support a latch dog **70** which extends between and is rigidly secured to their lower ends. The latch dog **70** is normally maintained in latching relation with the angle member **27** of the cradle **12**, as shown in FIG. 2, by means of a spring **74** secured at one end to a tab **76** carried by the latch dog and at the other end to the transversely extending base **78** of the strap **54**. The latch is adapted to be disengaged by the exertion of upward pressure on the roller **68**, which pressure will cause the latch plates **66** and **66'** to pivot into the position shown in FIG. 3, thereby expanding the spring **74**, removing the latch dog **70** from its position beneath the angle member **27**, and permitting the arms **50** and **50'** to pivot to their carton discharging position, as shown in FIG. 3.

The chute extension **14** is mounted for movement between the operative position shown in FIG. 2, in which its outlet end is downwardly inclined and its inlet end is in registry with the chute **18** for filling a carton within the cradle **12**, and the idle position shown in FIGS. 1 and 3, in which it is upwardly inclined and its inlet end is raised above the chute **18**. To enable such movement, the chute extension is provided with two pairs of transversely aligned rollers **80**, **80'** and **81**, **81'** (FIG. 4). The lower two rollers **80** and **80'** are mounted on two sleeves **82** and **82'**, respectively, said sleeves being carried at the respective ends of a transversely extending shaft **83**. The upper two rollers **81** and **81'** are carried by two stub shafts **84** and **84'** welded to and projecting laterally outward from two plates **85** and **85'** secured to the chute extension side walls **86** and **86'**, respectively. The said plates have bores therethrough adjacent their lower ends, through which pass the ends of the shaft **83** bearing thereon the sleeves **82** and **82'**, respectively, the latter being welded to the plates. The rollers are adapted for movement along opposed tracks **88** (FIGS. 2, 3 and 4) mounted on the frame structure **20**.

A chute closure gate **90** is also mounted for movement along the tracks **88**, along with the chute extension **14**. Secured to the outer surface of the gate **90** adjacent the upper end thereof is a sleeve **92** carried by the shaft **83** intermediate the sleeves **82** and **82'** (FIG. 4). The chute closure gate **90** is at its lower end mounted by means of a sleeve **94** welded thereto and carried by a transversely extending shaft **95**, said latter shaft bearing at its respective ends two sleeves **95'** (FIG. 4) each which mounts a roller **96**, each of which is movable along one of the tracks **88**.

The gate **90** is movable with the chute extension **14** between a position below the chute **18** when the chute extension is in operative position (FIG. 2) to a position for closing the chute when the chute extension is in idle position (FIG. 3).

The chute extension **14** is raised and lowered between its idle position shown in FIG. 2 and its inoperative position shown in FIGS. 1 and 3 by means of a device now to be described. The sleeve **94** is seated approximately midway between its ends within the convex upper distal end surfaces of two links **97** and **97'** (FIGS. 2 and 4) which at their lower ends are bolted to a rod **98**. The rod **98** is at its lower end pivotally connected by a crank pin **98'** to the outer end of a crank arm **99** which at its inner end is secured to a transversely extending rotatable shaft **100** journaled in suitable bearing members **100'** supported by the frame structure **20**. The shaft **100** is rotated by means of a friction drive connection (not shown) to a sprocket wheel **101** which is constantly driven by means of a chain drive **102** connected to a motor **103** (FIGS. 1, 2 and 3) mounted on the frame structure **20**. The motor **103** is also utilized to operate the conveyor **16** by means of a chain and sprocket drive **104** (FIGS. 3 and 4).

A releasable stop mechanism **105** (FIGS. 4 and 5) is provided for preventing rotation of the shaft **100**, except when movement of the crank arm **99** is desired. This mechanism operates in the manner of a half-revolution clutch. It includes a disk **106** which is secured to the shaft **100**, and which bears a lug **107** projecting outwardly from its circumferential rim. A release member **108** is mounted for pivotal movement adjacent the disk **106** by means of a pivot pin **109** projecting horizontally from a vertical post **110** carried by a shelf portion **111** of the frame structure **20**. The member **108** comprises an L-shaped portion having a generally vertical leg **112** pivotally supported on the pin **109**, and a generally horizontal leg **113** connected at its outer end to the upper end of a tension spring **114** which at its lower end is secured to the shelf portion **111**. A generally horizontal leg **115** is at one end secured to the upper end of the leg **112**, and is at the other end connected by a link **116** to the plunger **117** of a solenoid **118** mounted on the frame structure **20**, said leg **115** passing directly over the disk **106**. Another generally horizontal leg **121** is secured to the lower end of the leg **112**, and passes directly beneath the disk **106**. The members **115** and **121** carry projections **122** and **123**, respectively, which are adapted to alternately engage the lug **107** carried by the disk **106**, and thereby interrupt rotation of the shaft **100**.

The release member **108** is pivoted about the pin **109** when the solenoid **118** is either energized or de-energized, as will be explained hereinbelow. As seen in FIG. 6, the solenoid is in a circuit including two conductors **124** and **124'** connected to a source of electric power, which circuit includes therein two switches **126** and **127** connected in parallel. The switch **126** is normally closed, and is adapted to be opened when a carton is received within the cradle **12**, said switch **126** being mounted on the base **78** of the strap **54** and having an actuator arm **128** projecting upwardly into position to be held in switch-opening position by a carton within the cradle **12**. The switch **127** is normally open and is supported by the frame structure **20** in a position for closing by a transversely extending angle member **129** which is welded to the bars **30** and **30'** of the cradle **12** adjacent the outer ends thereof (FIGS. 1, 2 and 3).

A horizontally projecting finger **130** is rigidly mounted on the rod **98** in position to engage the roller **68** of the latch mechanism **56** when the rod is moved from its position shown in FIG. 2 to that shown in FIG. 3. In this manner the latch plates **66** and **66'** are pivoted so as to disengage the latch dog **70** from the angle member **27** when the rod **98** moves upward, permitting the carton supporting arms **50** and **50'** to pivot to their FIG. 3 position for discharge of a filled carton **11** from the

cradle 12. The roller 68 is released from the finger 130 when the rod 98 returns to its lower position. Since this occurs after the carton has left the cradle and the arms 50 and 50' have been returned by gravity to their position shown in FIGS. 1 and 2, the dog 70 of the latch mechanism is then returned by the spring 74 to latching engagement with the angle member 27.

Associated with the carton delivery conveyor 10 is a mechanism for controlling the movement of empty cartons 11 from the conveyor 10 into the cradle 12. This mechanism comprises a U-shaped metal rod portion 132 positioned above and extending transversely of the conveyor 10 (FIG. 1), which rod portion merges at its ends with two longitudinally extending rod portions 134 and 134', the latter merging at their outer ends with two downwardly extending rod portions 136 and 136', respectively. The rod portions 136 and 136' are slidable adjacent their lower ends within bores through two guides 140 welded to vertical members 142 and 142', respectively, of the frame structure 20. Also mounted on the frame members 142 and 142' and located above the guides 140 are two pivotable slotted levers 144 and 144', each lever being normally downwardly inclined toward the cradle 12, having a curved undersurface, and terminating at its outer end in a point. As shown in FIGS. 3 and 4, levers 144 and 144' receive two pins 146 and 146' which pass through collars 148 and 148' carried by the downwardly extending rod portions 136 and 136', respectively.

The levers 144 and 144' are actuated by two abutment members 150 and 150' (FIG. 4), which project laterally from the ends of the angle member 129. The abutment members 150 and 150' are at their inner ends hingedly mounted on the forwardly projecting flange of the angle member 129, as shown at 151 (FIGS. 2 and 3), and at their outer ends project a short distance laterally outward from the angle member, as seen in FIG. 4. When the cradle 12 pivots upwardly, the abutment members 150 and 150' engage the undersurfaces of the levers 144 and 144', respectively, and are pressed flat against the surface of the supporting flange of the angle member 129. This enables them to lift the vertical rod portions 136 and 136' together with the longitudinal rod portions 134 and 134' and the lateral rod portion 132. As the cradle continues its upward pivotal movement, the abutment members 150 and 150' slide past the pointed outer ends of the levers 144 and 144', allowing the latter to return to their original positions, and said abutment members then come into contact with two stop bars 152 (FIG. 1) and 152' (FIG. 2), mounted on the frame members 142 and 142', respectively. The stops 152 and 152', therefore, prevent the cradle from moving upward past the position (FIG. 1) in which it is adapted to receive an empty carton from the conveyor 11. When the cradle 12 pivots downward, the abutment members 150 and 150' are swung freely about their hinges by the levers 144 and 144', respectively, and thus slide past the latter without effect.

Projecting in an upstream direction from the transverse rod portion 132 are two spaced support straps 154 and 154' (FIG. 1) through which extend vertical rods 158 and 158', respectively. Each rod 158, 158' is adjustably secured to its associated strap by two nuts 156, one above and the other below the strap. The rods 158 and 158' support at their lower ends two longitudinally extending, horizontal tubes 160 and 160', which tubes slidably receive through their upstream end bolts 162 and 162', respectively. To the inner ends of the bolts 162, 162' are attached vertically extending stop fingers 164 and 164', respectively, which extend downward through slots (not shown) in the bases of the tubes. Compression springs 166 and 166' encircling the bolts 162 and 162', respectively, are compressed between the outer ends of the tubes 160 and 160' and the heads of the bolts, said springs urging the stop fingers 164 and 164' upstream of the conveyor 10 and providing a resilient stop for cartons 11 proceeding along the conveyor.

Before beginning operation of the apparatus of the invention, the counterweights 38 and 38' are adjusted in their positions along the rods 40 and 40', so that they will, in cooperation with the counterweights 32 and 32', regulate movement of the cradle 12 during filling of the carton 11, whereby a desired weight of articles will have been filled into a carton when the cradle 12 has been pivoted into its discharge position. The chute extension 14 is, to begin with, in its idle position shown in FIGS. 1 and 3, the chute closure gate 90 being disposed in closing relation across the lower end of the chute 18 as seen in FIG. 3. The motor 103 is placed in operation and articles such as apples are then fed into the chute 18 by any suitable means (not shown). The cradle 12 is initially positioned as shown in FIG. 1, and an empty carton 11 is placed manually therein, a supply of empty cartons also being placed on the delivery conveyor 10. The cartons on the conveyor are held back by the stop fingers 164 and 164', which engage the rear wall of the forward carton on the supply conveyor 10.

The receipt of the empty carton by the cradle 12 results in opening the switch 126, consequent deenergization of the solenoid 118, and release of the disk 106 by the upper projection 122 of the stop mechanism 105. The drive shaft 100 is thus permitted to rotate through one-half of a revolution, and the crank arm 99 and rod 98 draw the chute extension 14 and chute closure gate 90 downward into their positions shown in FIGURE 2. Articles are thus fed into the carton 11 from the chute extension 14, and the cradle 12 is pivoted downward under the increasing weight of the carton. During the downward movement of the carton, the abutment members 150 and 150' swing ineffectively on their hinges upon contact with the levers 144 and 145.

When the desired weight of articles has been filled into the carton, the cradle 12 will reach the position thereof shown in FIG. 2, in abutment with the stop member 49, and the angle member 129 will close the switch 127. Since at this time the switch 126 is open, the closure of the switch 127 will energize the solenoid 118. As a result, the disk 106 will be released by the lower projection 107, drive shaft 100 will rotate through one-half of a revolution, and the crank arm 99 and rod 98 will raise the chute extension 14 and the chute closure gate 90 into the positions thereof shown in FIG. 3. This upward movement of the rod 98 will bring the finger 130 into engagement with the latch roller 68, and will thus pivot the latch plates 66 and 66' into their position shown in FIG. 3, in which the latch dog 70 is disengaged from the angle member 27. The carton supporting arms 50 and 50' on the cradle 12 will then be free to pivot so as to allow the carton 11 to move under its own weight along the rollers 58 and onto the take-off conveyor 16.

When the cradle 12 is thus relieved of the weight of the carton, the cradle will be pivoted upwardly by the counterweights 32, 32' and 38, 38' into its starting position shown in FIG. 1. As it is so pivoted, the abutment members 150 and 150' will be brought to bear against the slotted levers 144 and 144', respectively. Thus, the box stop fingers 164 and 164' will be raised, permitting an empty carton 11 to be delivered into the cradle 12. At the same time, the upward pivotal movement of the cradle will be arrested by the stop members 152 and 152', and the empty carton received to begin a new cycle.

While a particular embodiment of the present invention has been described, it will be understood that various changes and modifications can be made without departing from the spirit of the present invention and the scope of the appended claims.

The invention having thus been described what is claimed as new and desired to be protected by Letters Patent is:

1. Apparatus for filling articles into a container, com-

prising a supply chute for feeding articles to the apparatus including an extension adapted to receive the articles, said extension being movable between an operative position for filling the articles into the container and an inoperative position for withholding the articles therefrom, a rotatable shaft, means interconnecting said chute extension and said rotatable shaft and adapted to move the chute extension from one of its said positions to the other with each one-half revolution of said shaft, friction drive means for rotating said shaft, a releasable stop mechanism for preventing rotation of said shaft and operable to release said shaft for movement in increments of one-half of a revolution, a container support member movable between a first position for receiving the container to be filled and a second position for discharging the container after filling thereof, means for operating said releasable stop mechanism in response to receipt of a container by said container support member to release said shaft and thereby move said chute extension into its operative position, and means for operating said releasable stop mechanism in response to movement of said container support member into its said second position to release said shaft for another one-half revolution and thereby move said chute extension into its inoperative position.

2. Container filling apparatus, comprising supply means movable between an operative position for filling articles into a container and an inoperative position for withholding articles therefrom, a rotatable shaft, means for rotating said shaft, means including a crank arm rotatable by said shaft and adapted to move said supply means from one

of its positions to the other with each one-half revolution of said shaft, a rotatable disc secured to said shaft and having a radially projecting lug mounted on the circumferential rim thereof, a release member having two spaced parallel legs extending adjacent diametrically opposed points along the circumferential rim of said disc, said release member being pivotally mounted for movement in one direction to position one of said legs for engagement of the projection carriage thereby with said lug and in another direction to position the other of said legs for engagement of the projection carried thereby with said lug, whereby said disc and shaft will be rotated through one-half of a revolution when said release member is pivoted in either direction, and means for pivoting said release member.

References Cited in the file of this patent

UNITED STATES PATENTS

556,258	Doble et al.	Nov. 10, 1896
618,384	Richards	Jan. 24, 1899
887,343	McNeal	May 12, 1908
1,162,002	Webber	Nov. 30, 1915
1,558,668	Carter	Oct. 27, 1925
1,893,622	Howard	Jan. 10, 1933
2,027,261	Wright	Jan. 7, 1936
2,116,895	Howard	May 10, 1938
2,888,961	Haver et al.	June 2, 1959
2,896,384	Carlsen et al.	July 28, 1959