May 29, 1956 C. Z. MONROE ET AL 2,747,473

FEEDING AND ERECTING MECHANISM FOR CARTON BLANKS

Original Filed March 30, 1948 8 Sheets-Sheet 1

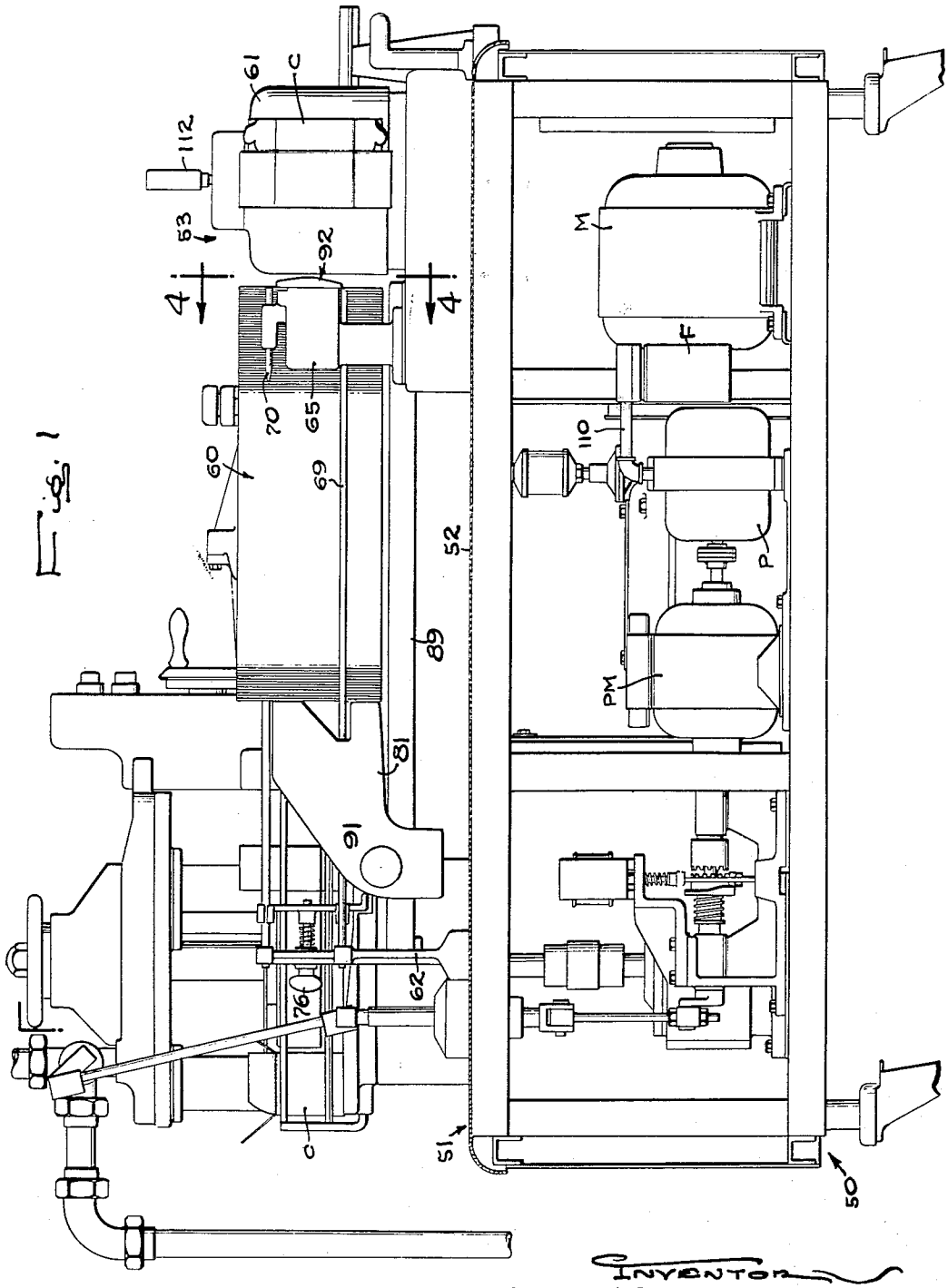


Fig. 1

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FEEDING AND ERECTING MECHANISM FOR CARTON BLANKS

Original Filed March 30, 1948 8 Sheets-Sheet 2

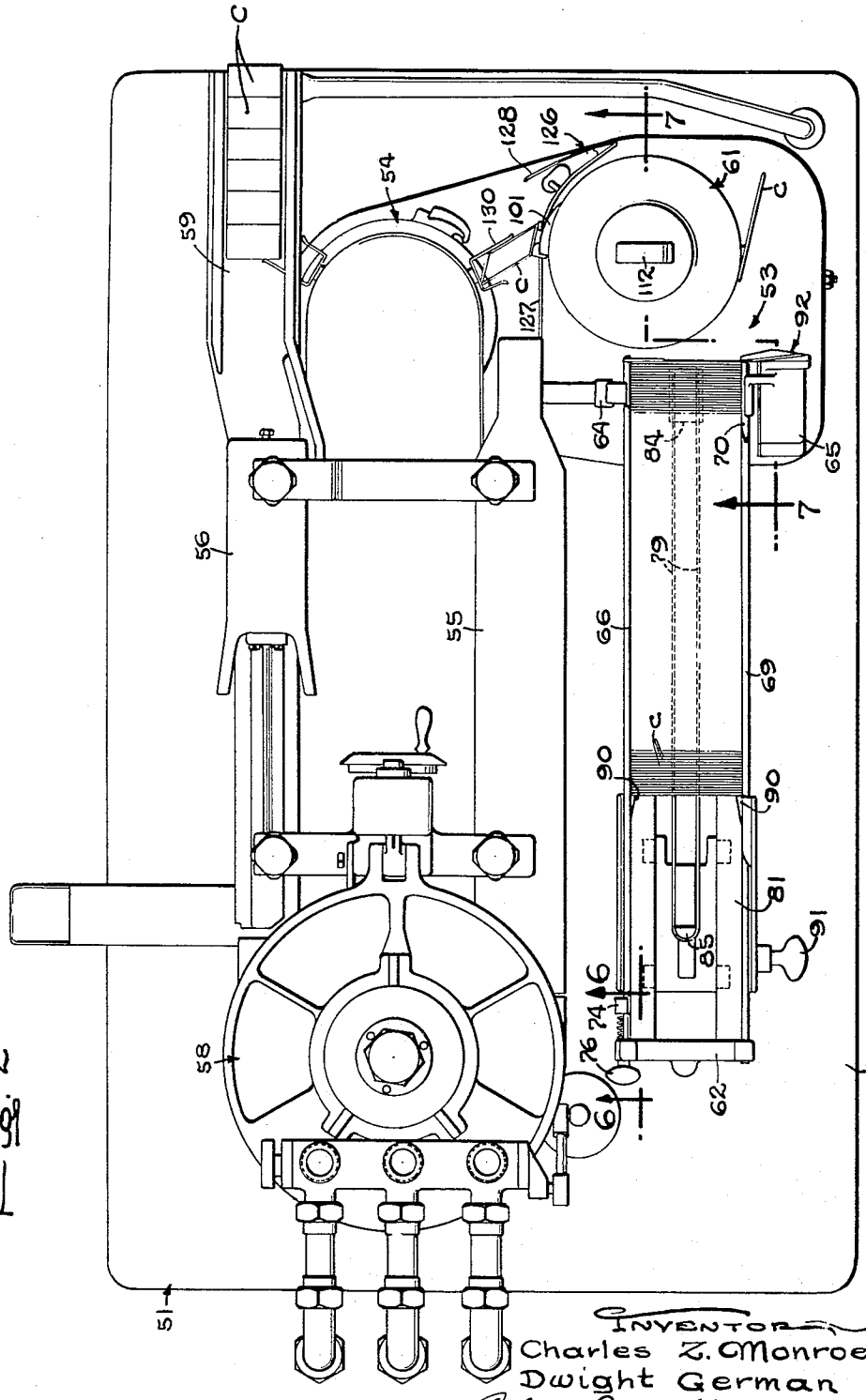


Fig. 2

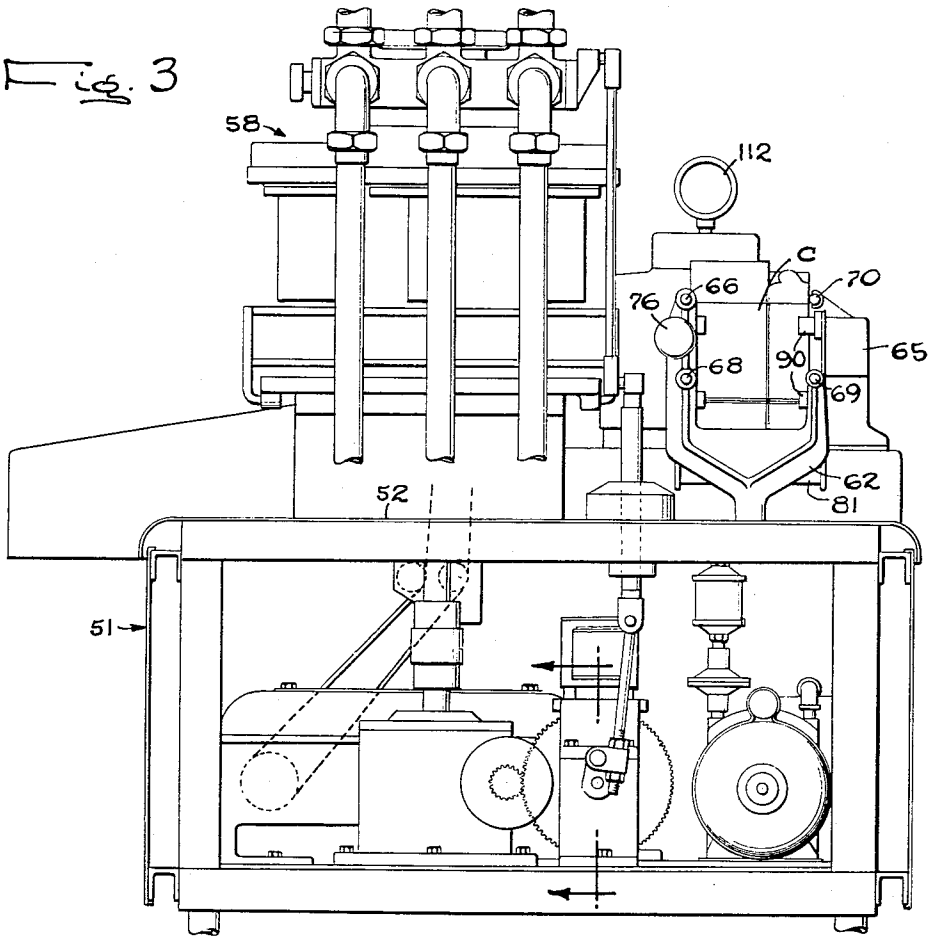
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FEEDING AND ERECTING MECHANISM FOR CARTON BLANKS

Original Filed March 30, 1948 8 Sheets-Sheet 3

Fig. 3



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May 29, 1956 C. Z. MONROE ET AL 2,747,473

FEEDING AND ERECTING MECHANISM FOR CARTON BLANKS

Original Filed March 30, 1948 8 Sheets-Sheet 4

Fig. 4

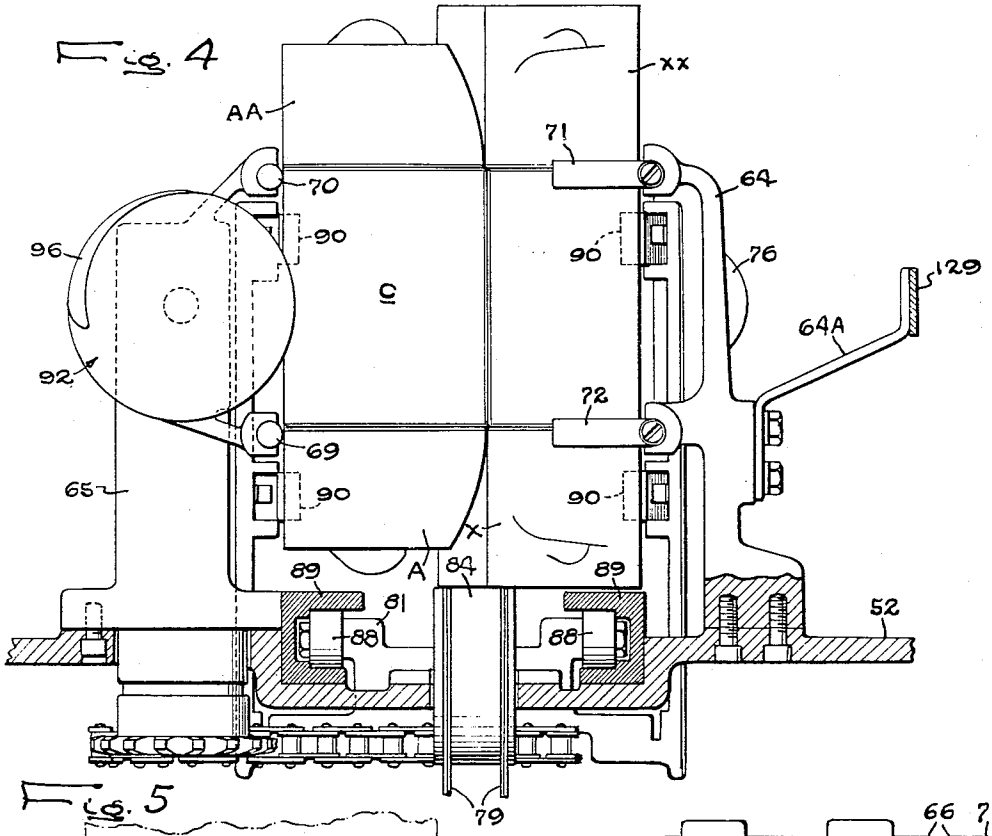
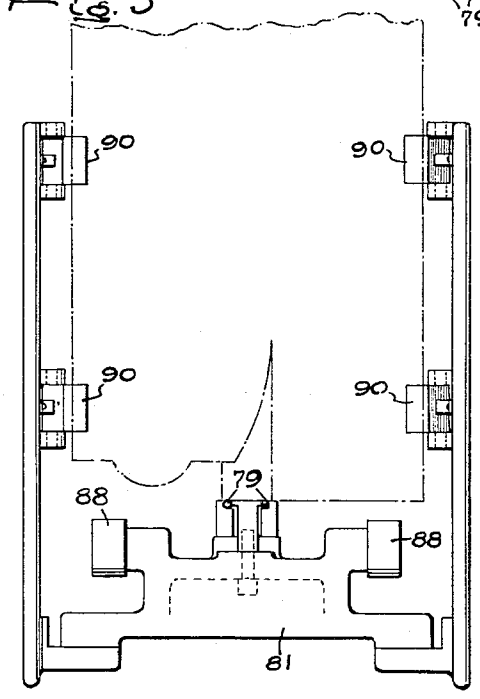


Fig. 5



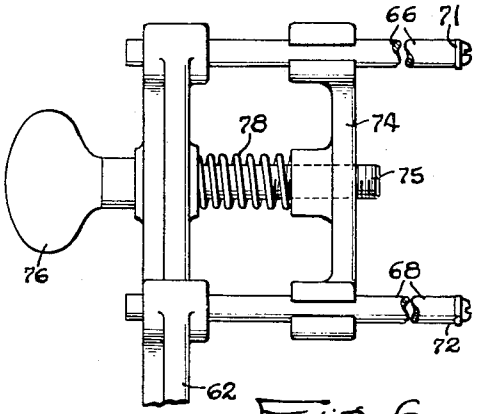


Fig. 6

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May 29, 1956 C. Z. MONROE ET AL 2,747,473

FEEDING AND ERECTING MECHANISM FOR CARTON BLANKS

Original Filed March 30, 1948 8 Sheets-Sheet 5

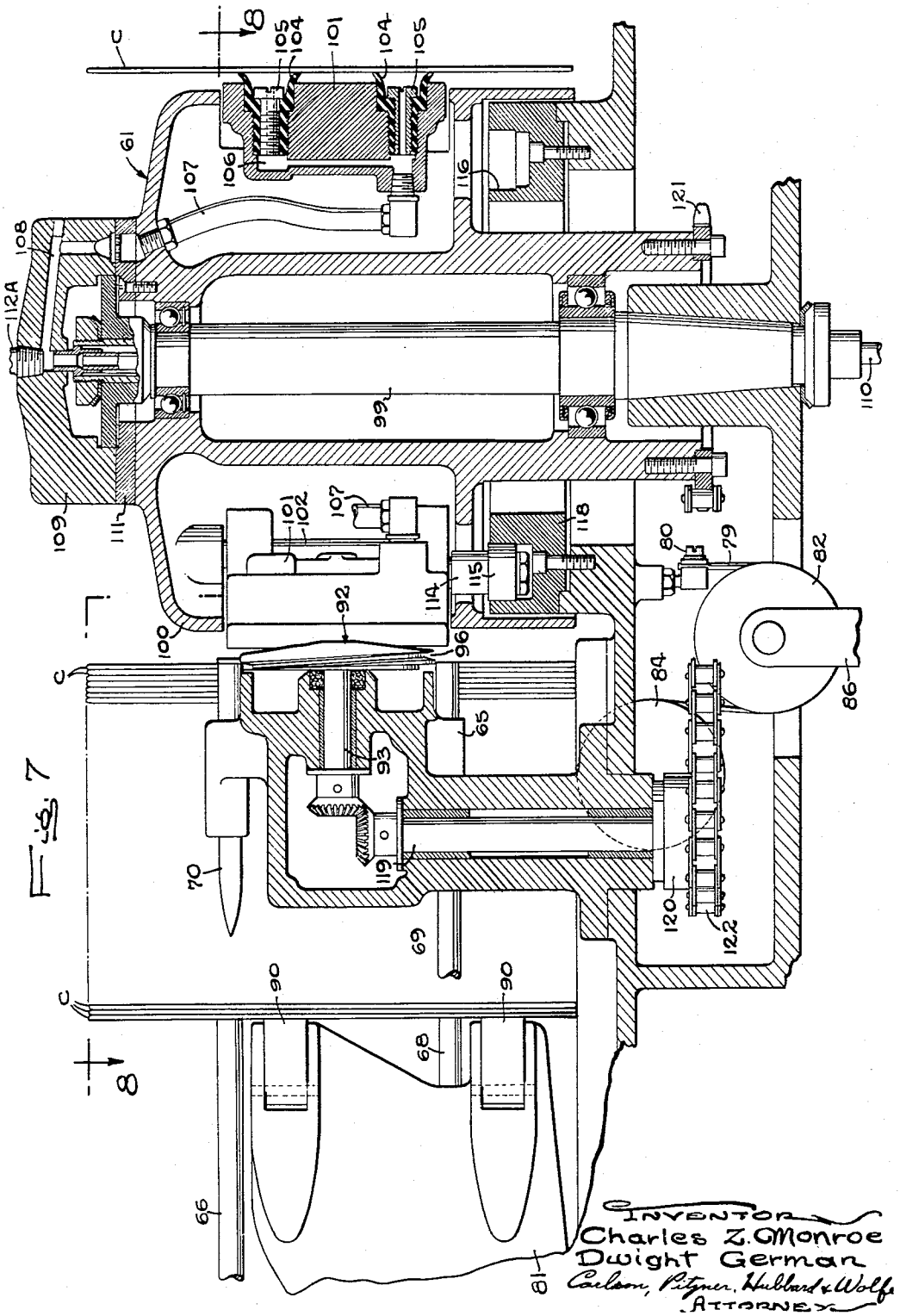


Fig. 7

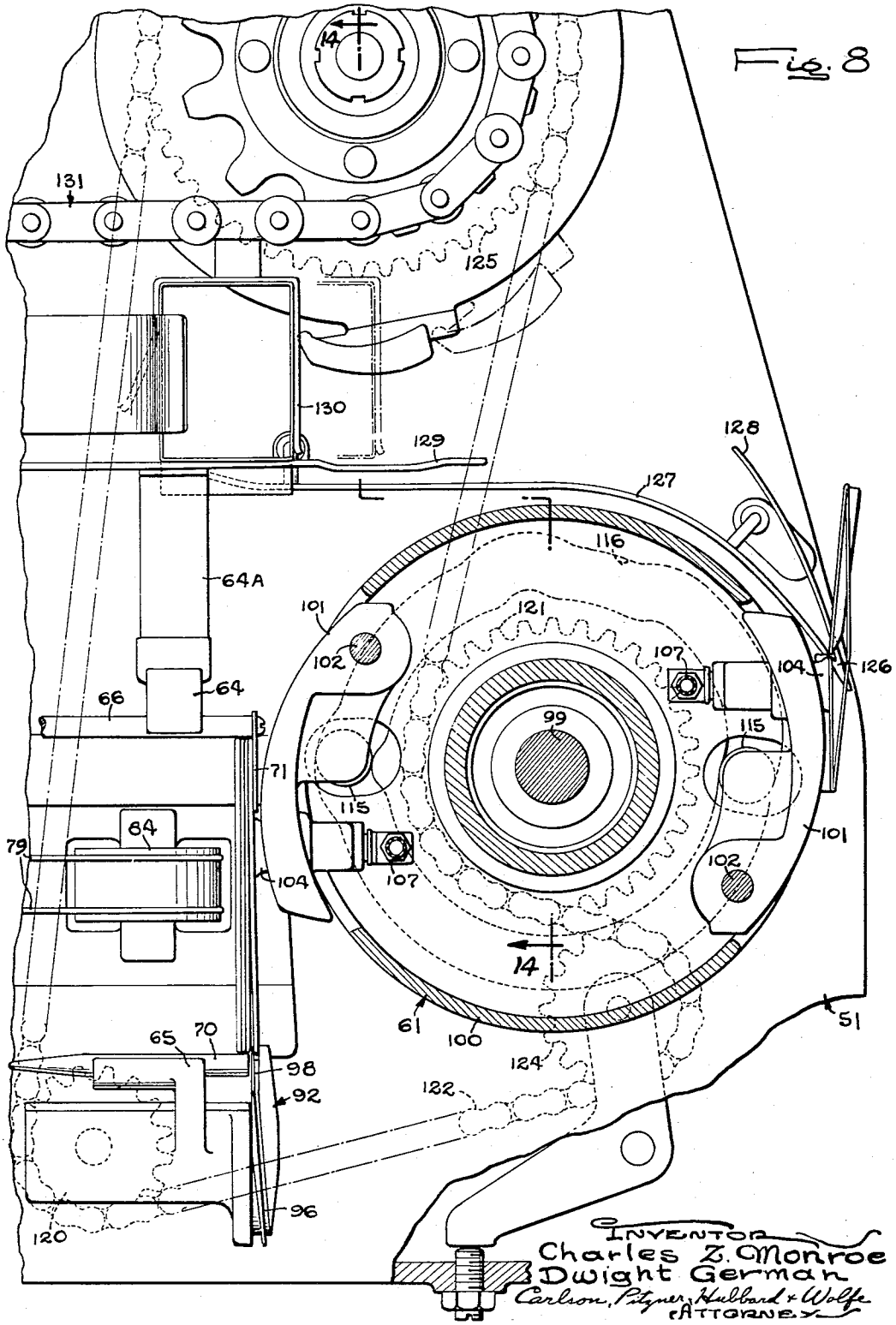
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FEEDING AND ERECTING MECHANISM FOR CARTON BLANKS

Original Filed March 30, 1948 8 Sheets-Sheet 6

Fig. 8



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May 29, 1956 C. Z. MONROE ET AL 2,747,473

FEEDING AND ERECTING MECHANISM FOR CARTON BLANKS

Original Filed March 30, 1948 8 Sheets-Sheet 7

Fig. 9

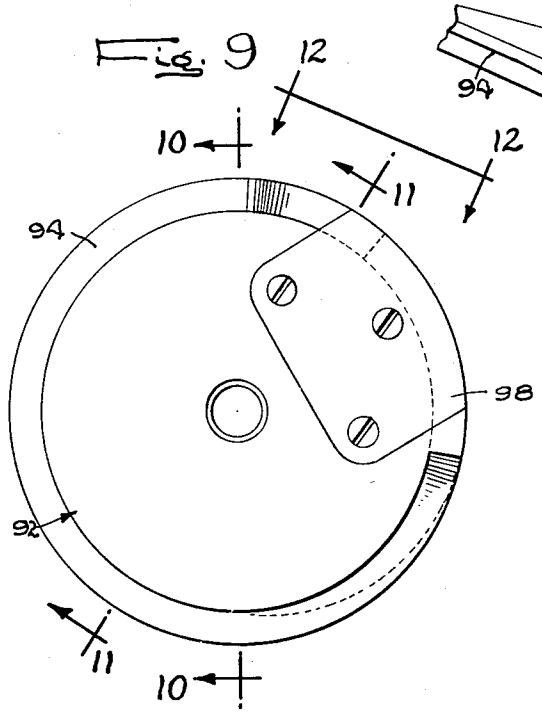


Fig. 12

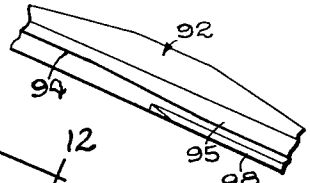


Fig. 10

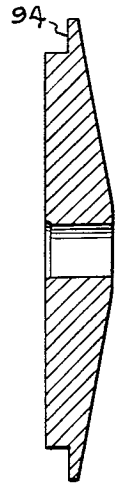


Fig. 11

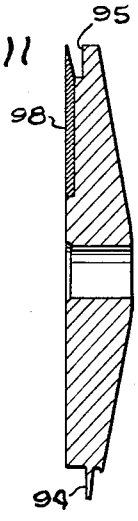
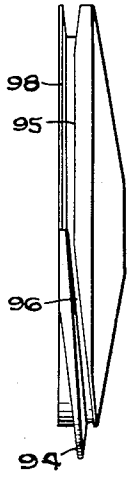


Fig. 13



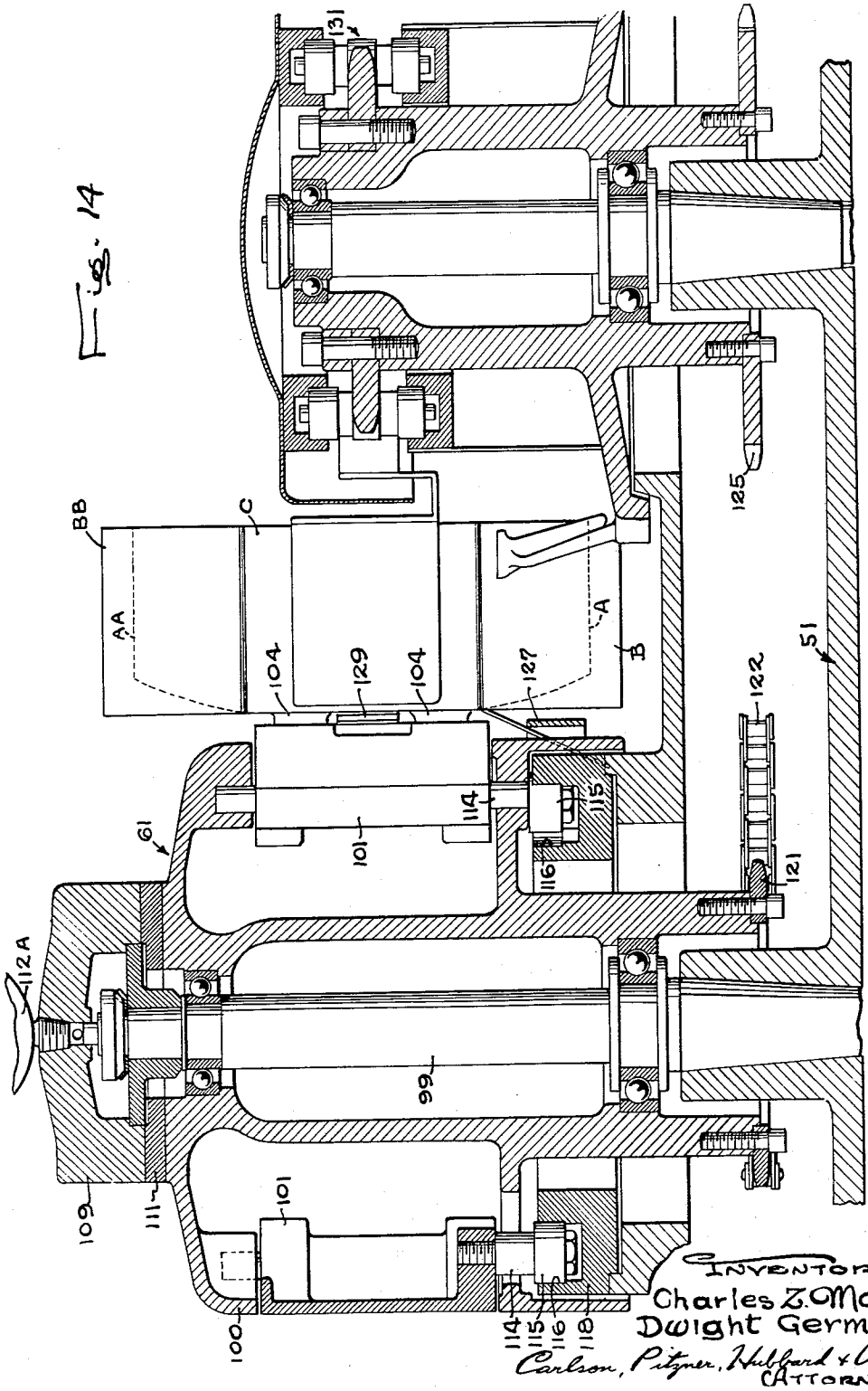
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FEEDING AND ERECTING MECHANISM FOR CARTON BLANKS

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Fig. 14



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FEEDING AND ERECTING MECHANISM FOR CARTON BLANKS

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Original application March 30, 1948, Serial No. 18,034, now Patent No. 2,665,044, dated January 5, 1954. Divided and this application November 6, 1951, Serial No. 255,074

7 Claims. (Cl. 93—53)

The present invention relates generally to the field of packaging machinery and, more specifically, to a novel and improved mechanism for feeding and erecting carton blanks preparatory to filling them. This application is a division of our copending application Serial No. 18,034, filed March 30, 1948, entitled Machine for Packaging Fluent Material, now U. S. Patent No. 2,665,044, issued January 5, 1954.

One object of the present invention is to provide an improved feeding and transfer mechanism including means for positively separating or peeling one carton blank at a time from a stack of blanks regardless of possible warpage in the separated blank.

Another object is to provide a mechanism of the foregoing character and having a novel arrangement for erecting knocked-down carton blanks separated from the stack as an incident to transferring them to a receiving means.

A further object is to provide a mechanism of the type set forth and including a holding means for the stack of blanks whereby additional blanks can be added from time to time without interfering in any way with the operation of such mechanism.

Further objects and advantages of the invention will become apparent as the following description proceeds, taken in connection with the accompanying drawings, in which:

Figure 1 is a side elevation of an illustrative feeding and transfer mechanism embodying the present invention and mounted on a particular form of packaging machine.

Fig. 2 is a plan view of the mechanism and machine of Fig. 1.

Fig. 3 is an end elevation of the mechanism and machine shown in Fig. 1, taken from the end adjacent the filler head assembly.

Fig. 4 is an enlarged fragmentary sectional view of the feeder mechanism taken in the plane of the line 4—4 in Fig. 1.

Fig. 5 is an end view of the pusher carriage shown in Fig. 4, the relative position of the carton stack being indicated in dot-dash outline.

Fig. 6 is an enlarged fragmentary sectional view detailing the adjusting means associated with the feeder magazine, such view being taken in the plane of the line 6—6 in Fig. 2.

Fig. 7 is an enlarged broken vertical sectional view taken through the separating means and the transfer turret and in the plane of the line 7—7 in Fig. 2.

Fig. 8 is an enlarged horizontal sectional view taken in the plane of the line 8—8 in Fig. 7.

Figs. 9 to 13, inclusive, are various elevations and sectional views detailing the peeler wheel which separates carton blanks from the stack in the magazine.

Fig. 14 is a fragmentary vertical sectional view through the transfer turret and the carrier idler spool, taken in the plane of the line 14—14 in Fig. 8.

While the invention is susceptible of various modifications and alternative constructions, a preferred embodiment has been shown in the drawings and will be herein described in some detail, but it is to be understood that there is no intention to limit the invention to the specific form disclosed, the intention being, on the contrary, to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

Referring more specifically to the drawings, the invention is there exemplified in an illustrative carton feeding and transfer mechanism mounted on a packaging machine 50. The latter is adapted in this instance to receive ice cream in semi-fluent form from a continuous freezer and to pack the same into paper cartons for retail distribution. The machine 50 is organized upon a caster-supported frame structure or table 51 having an enclosure which houses a main driving motor M and a pump driving motor PM, together with associated power transmitting mechanisms. The top 52 of the table 51 supports the novel carton feeding and transfer mechanism 53 which is adapted to present folded or knocked-down carton blanks C to an appropriate conveyor 54, the blanks being erected as an incident to such transfer. The mechanism 53 and the conveyor 54 are driven in timed relation from the motor M via suitable gearing. Operatively associated with the conveyor 54 and also mounted on the table top 52 are carton flap closing devices 55 and 56, a carton filler head assembly 58, and a discharge chute 59.

In general, the carton feeding and transfer mechanism 53 comprises a feeder rack or magazine 60, carton blank separating means, and a rotary transfer turret 61 (Figs. 1 and 2). Considering first the magazine 60 per se, it will be noted upon reference to Figs. 1, 2 and 4, that such magazine in this instance comprises an upstanding yoke-shaped bracket 62 supported upon the table top 52 in spaced apart relationship with a pair of brackets 64, 65 also fixed to the table top. Spanning the brackets 62 and 64, and relatively slidable with respect thereto, are a pair of vertically spaced guide rods 66, 68. Spanning the brackets 62 and 65, but rigidly fixed thereto, is another guide rod 69. In addition to the latter, the bracket 65 also carries a relatively short guide rod 70 disposed in vertically spaced relationship with the rod 69. The purpose of the rods 66, 68, 69 and 70 is merely to maintain the vertical edges of the folded carton blanks C in close alinement to facilitate feeding them to the transfer turret 61.

For the purpose of positioning the foremost carton blank in the stack, the guide rods 66 and 68 are provided with stop means in the form of a pair of stop lugs 71, 72 (Figs. 4 and 6) screwed or otherwise rigidly fastened to the ends of the rods adjacent the transfer turret 61. In order to render the carton stack adjustable relative to the turret 61, the position of the stop lugs 71 and 72 with respect to the brackets 62 and 64 can be altered by means of an adjusting bracket 74 which is pinned or otherwise secured to the rods 66 and 68. The bracket 74, in turn, can be positioned relative to the bracket 62 by means of a suitably threaded adjusting stud 75 having a hand knob 76 unitary therewith. Any lost motion between the stud 75 and the bracket 74 is taken up by means of a coil compression spring 78 interposed between the brackets 62 and 74.

Provision is made for supporting the weight of the carton blanks stacked in the magazine 60 upon a member which has no motion relative to the blanks as the latter are fed from the magazine. This is accomplished in the present instance by the use of a flexible cable 79 anchored to the table top 51 as at 80 (Fig. 7) and running longitfiudinally under the magazine 60 to a reciprocable pusher carriage 81. As indicated in the drawings, the cable 79 is arranged as an elongated loop running from the anchorage 80 around a floating pulley 82 and thence to a guide pulley 84 and finally around a semi-circular anchor

post 85 mounted on the pusher carriage 81. To obtain sufficient tension in the cable 79 so as to offset the weight of the cartons in the magazine, a relatively heavy weight (not shown) is suspended from the floating pulley 82 by means of a yoke 86 (Fig. 7).

The pusher carriage 81, which is adapted to maintain the stack of carton blanks in compression against the stop lugs 71, 72 and the separating means, comprises a generally U-shaped member equipped with supporting rollers 88 adapted to run in a pair of spaced apart parallel guide rails 89 (Figs. 4 and 5). The tension in the cable 79 urges the pusher carriage 81 toward the transfer turret 61 and, as the blanks are fed from the magazine, such tension maintains the carriage in constant abutment with the lattermost carton blank in the stack.

Provision is made for adding to the supply of carton blanks in the magazine 60 without disturbing the operation of the machine in any way. This is achieved in the present instance by equipping the carriage 81 with a plurality of pivotally mounted pusher fingers 90. These fingers are normally urged inwardly of the carriage by means of suitable biasing springs and their pivot points are so located that they will engage the stack of blanks when the carriage moves in one direction only. Thus, if it be desired to add carton blanks to the stack in the magazine, it is only necessary for the operator to place the additional blanks inside the pusher carriage 81 and to hold them fast against the lattermost blank in the magazine. At the same time, if the pusher carriage be moved manually away from the turret 61 by means of a handle 91, the fingers 90 will simply cam over the vertical edges of the additional blanks and upon release of the pusher carriage will then spring inwardly and engage the lattermost additional carton blank which then becomes the lattermost blank in the magazine.

For the purpose of effecting a positive separation between the foremost carton blank and the remaining blanks in the magazine 60, means is provided in the form of a peeler wheel 92 (Figs. 5, 7 and 8) drivingly carried upon a shaft 93 which is journaled in the bracket 65 for rotation on an axis substantially parallel to that of the magazine 60. The peeler wheel 92 in this in this instance (Figs. 9 to 13) is fashioned with a radial shoulder 94 which runs for an angular distance in the neighborhood of 270 degrees. The shoulder 94 is, of course, adapted to contact the adjacent marginal edge portion of the foremost carton in the stack without imparting motion to the carton blank. During the remaining 90 degrees of peripheral distance, the shoulder 94 gives way to an axial cam portion 95 having an initial cam slope which terminates in a radial face substantially parallel to the face 94. The cam portion 95 then gives way to a relatively deep single helical thread 96 which cuts completely across the outer periphery of the wheel 92. Adjacent the area where the cam portion 95 flattens out, there is provided a knife blade 98. The latter is spaced axially from the radial face of the cam portion 95 a distance approximately equal to the thickness of one folded carton blank (Figs. 8, 12 and 13). In operation, the peeler wheel will initially rotate with its face 94 in contact with the foremost carton without applying motion to the latter. Upon further rotation of the wheel 92, the cam portion 95 will exert a positive thrust against the marginal edge portion of the foremost carton, compressing the same against the remaining carton blanks in the magazine. While the marginal edge portion of the foremost carton is thus compressed, the separator knife 98 will wedge between such portion and the next blank in the magazine. Upon still further rotation of the wheel 92, the separated edge portion will enter the thread 96 and thereby effect a separation of the major portion of the foremost carton blank from the stack in the magazine.

It will readily be appreciated that the foregoing construction completely eliminates inaccuracy in counting and separating one carton at a time from the supply in the magazine 60. Such inaccuracy is commonly due to warping of the carton blank so that the same no longer occupies a planar surface. The positive compression of the marginal edge portion of the foremost carton blank against the remaining blanks in the stack completely offsets any warpage effect and makes it possible to peel off even a badly warped carton blank for presentation to the rotary transfer turret 61.

The turret 61 is, in the present instance, journaled for rotation upon an upstanding stationary shaft 99 carried by the frame 51 of the machine. The turret is formed with a depending skirted wall portion 100 having a pair of relatively large diametrically opposed openings therein to accommodate a pair of swingable gates 101, each of which is pivotally mounted on a turret body as at 102. In order to enable the gates 101 to carry the separated carton blanks from the magazine to the conveyor means, each gate is provided with a pair of vertically spaced vacuum cups 104. Each of the cups 104 is made of rubber or other resilient material and is secured to its associated gate by means of a hollow screw 105. Internally, the gates 101 are each formed with passageways 106 communicating with the vacuum cups, such passageways being in turn connected by flexible tubes 107 to an evacuated passageway 108 in a stationary head 109 fixed to the upper end of the shaft 99. The latter is of hollow construction and thus provides communication between the passageway 108 and the vacuum pump P via an evacuated line 110 (Figs. 1 and 7). For the protection of the pump P, a filter F may be interposed in the line 110.

Fixed to the upper surface of the turret 61 for rotation therewith is a hardened valve disk 111 having suitable ports to effect evacuation of the cups 104 upon initial contact with a separated carton blank and to break the vacuum in such cups after they have been moved by the turret into carton releasing position. This makes it possible to utilize a continuously running vacuum pump, the performance of which can readily be ascertained by means of a vacuum gage 112 having a stem 112A which is threadedly attached to the station head 109.

For the purpose of obtaining the necessary outward radial swing of the gates 101 incident to engagement with the forwardmost carton in the magazine, suitable cam and follower means is utilized. Thus, each of the gates is formed with a depending stud 114 carrying a roller 115 adjacent its lower end. The roller 115 is arranged to ride in a cam track 116 cut in a stationary annular member 118 housed within the skirt 100 of the turret. The cam track 116 is, of course, formed with the necessary contour to produce an outward swing of each gate immediately prior to picking up a carton blank and to produce an inward swing of the gate as such blank is presented to the conveyor 54.

To insure proper registration between the gates 101 and the carton blanks separated from the magazine 60, the peeler wheel 92 is driven in timed relation to the turret 61 and at twice the speed of the latter. This is accomplished in the present instance by the use of a vertically disposed shaft 119 drivingly connected to the peeler wheel shaft 93 through a pair of identical bevel gears. Keyed to the shaft 119 for rotation therewith is a sprocket wheel 120 which is half the diameter of the sprocket wheel 121 fixed to the underside of the turret 61. The sprocket wheels 120 and 121 are connected by a common driving chain 122 which passes over an adjustable idler 124, the chain 122 being driven by means of a sprocket 125 rotatable with the conveyor 54 (Fig. 8).

Provision is made for erecting the folded carton blanks C as an incident to their transfer to the conveyor 54 by the turret 61. This is accomplished in part by the use of a stationary spreader 126 (Figs. 2 and 8) mounted adjacent the turret 61. The spreader 126 is fashioned with a curved guide 127 which follows the periphery of the turret 61 for an angular distance somewhat less than 90 degrees, eventually straightening out tangentially and

terminating at the bottom flap latching device **55**. At the opposite end of the guide **127**, the latter forms an apex with a relatively short outwardly diverging guide **128**. Accordingly, as the turret **61** carries a folded blank C into engagement with the spreader **126**, the apex of the latter will enter between one of the inner bottom flaps A and the slitted outer bottom flap X (Fig. 4). As indicated in the drawings, the flap A has an arcuate vertical edge portion to facilitate entry of the spreader **126**. The action of the spreader is also augmented by a slight radial inward motion of the gate **101** carrying the carton blank, such motion being produced by the contour of the cam track **116**. Upon further rotation of the turret **61**, the action of the spreader **126** forces the slitted flap X between the turret **61** and the guide **127**, at the same time expanding the carton to a partially erected condition. Upon still further rotation of the turret **61**, the carton blank is presented to an adjacent open rectangular or three-sided receptacle **130** which moves with the conveyor **54**, the receptacle **130** being one of a series carried by conveyor chain **131**. Since the conveyor and the turret **61** rotate in timed relation to each other due to engagement with the driving chain **122** (Fig. 8), the partially erected carton blank is gradually pressed against the back wall of the rigid receptacle **130**. This pressure is augmented by an outward thrust of the gate **101** imparted by the cam track **116** shortly before the vacuum cups **104** release their hold, such action serving to square up the blank into a fully erected condition within the receptacle **130**. At this point, the gate **101** recedes radially toward the turret **61** and the receptacle **130** takes full charge of the carton blank. In order to obtain lateral support for the outermost side of the blank C and thus retain the same in a fully erected or squared condition within the receptacle **130**, a stationary horizontal side rail **129** is provided (Figs. 8 and 14), the leading end of such rail being supported upon an extension **64A** of the magazine bracket **64**. The rail **129** is located so as to lie between the vacuum cups **104**, thus permitting contact between the former and the outermost side of the carton blank before the cups **104** release their hold.

Since the operation of the novel mechanism embodying the invention has already been discussed in detail, a lengthy summary is unnecessary. However, it is believed that a brief synopsis will be found helpful at this point. To start with, carton blanks in collapsed or knock-down form are inserted in a stack in the magazine 60. One blank at a time is positively separated from the stack by the peeler wheel **92** and presented to the swingable gate of the transfer turret **61**, being retained thereon by the vacuum cups **104**. As the turret rotates, the carton blank is partially erected by contact between certain of its bottom flaps and the spreader **126**. With further rotation of the turret **61**, the blank is presented to an adjacent three-sided receptacle **130** carried by the chain **131** of the conveyor **54**, the blank being pressed into a fully erected position as it enters the receptacle.

We claim as our invention:

1. In a feeding and erecting mechanism for carton blanks, the combination of a feeder magazine for holding a stack of folded carton blanks, a peeler wheel disposed in proximity to the discharge end of said magazine, one face of said wheel overlying the exposed marginal edge portion of the foremost blank in the stack, means on said peeler wheel for engaging the rear face of said marginal edge portion so as to effect positive separation of said foremost blank from the stack, a power driven carton conveyor, a rotary transfer turret having means for holding a separated blank and carrying it through an arcuate path to present the separated blank to said conveyor, a stationary V-shaped spreader having a relatively long curved guide spaced radially from and following the periphery of said transfer turret and a relatively short diverging guide for partially erecting the separated blank while the latter is carried by said turret, and a rigid three-sided rectangular receptacle on said conveyor, said receptacle being open on one side and having the partially erected blank pressed therein to square up the blank into a fully erected condition as an incident to its presentation from said turret to said conveyor.

2. In a feeding and erecting mechanism for carton blanks, the combination of a feeder magazine for holding a stack of folded carton blanks, a peeler wheel disposed in proximity to the discharge end of said magazine, one face of said wheel overlying the exposed marginal edge portion of the foremost blank in the stack, cam means on said peeler wheel for compressing said marginal edge portion against the stack, blade means on said peeler wheel spaced from said cam means and disposed for engaging the rear face of said marginal edge portion so as to effect positive separation of said foremost blank from the stack, a power driven carton conveyor, a rotary transfer turret driven in timed relation to said peeler wheel and said conveyor, said turret being adapted to present the separated blank to said conveyor, and means associated with said turret and with said conveyor for squaring up the blank into a fully erected condition as an incident to its presentation from said turret to said conveyor.

3. In a mechanism for feeding and erecting folded carton blanks, the combination comprising a feeder magazine for holding a stack of folded carton blanks, a rotatable peeler wheel disposed in proximity to the discharge end of said magazine, one face of said wheel overlying the exposed marginal edge portion of the foremost blank in the stack and being adapted to cyclically compress the stack in an axial direction, knife means on said peeler wheel for engaging the rear face of said marginal edge portion when the stack is axially compressed so as subsequently to effect positive separation of said foremost blank from the stack, a power driven carton conveyor, and a rotary transfer turret driven in timed relation to said peeler wheel and said conveyor and adapted to present the separated carton blank to said conveyor.

4. In a carton blank feeding and erecting mechanism, the combination comprising a feeder magazine for holding a stack of folded carton blanks, a rotating wheel having a plane annular shoulder adapted to abut the marginal edge portion of the foremost blank in the stack, a cam rise in the annular shoulder adapted to compress said marginal edge portion tightly against the stack and axially thereof, said cam rise terminating in a deep helical thread formed in the periphery of said wheel, a knife blade mounted on said wheel adjacent said cam rise but axially spaced therefrom by a distance approximating the thickness of one folded carton blank, said knife blade being adapted to positively separate the edge portion of the foremost blank thereby permitting the same to enter the thread and effect further separation from the stack.

5. In a carton blank feeding and erecting mechanism, the combination of a feeder magazine for holding a stack of folded carton blanks, a peeler wheel disposed in proximity to the discharge end of said magazine, one face of said wheel overlying the exposed marginal edge portion of the foremost blank in the stack, a first abutment in said face adapted to compress said exposed marginal edge portion of said blank axially against said stack, and a second abutment on said wheel face spaced from said first abutment by approximately the thickness of said blank, said second abutment being disposed in at least partially trailing relation with said first abutment, said second abutment being adapted to wedge between the reverse side of said exposed marginal edge portion and the next succeeding blank in the stack.

6. In a carton blank feeding and erecting mechanism, the combination comprising a feeder magazine for holding a stack of folded carton blanks, a peeler wheel disposed in proximity to the discharge end of said magazine,

a helical thread on said peeler wheel adapted to wedge between the foremost blank in the stack and the next succeeding blank to separate the former from the latter, and a cam abutment on said wheel disposed in spaced but partially overlapping relation with the initial portion of said thread, said cam abutment being adapted to compress the exposed marginal edge portion of said blank axially against said stack as the initial portion of said thread wedges behind the same.

7. In a mechanism for feeding and erecting folded carton blanks, the combination comprising a feeder magazine for holding a stack of carton blanks, means for positively separating one blank at a time from the stack, a power driven conveyor having rigid, three-sided carton receptacles rectangular in shape with one side open mounted thereon, a rotary transfer turret driven in timed relation to said conveyor, radially swingable gripping devices carried by said turret, each of said devices being adapted to pick up a separated carton blank and to urge the same into an associated receptacle on said conveyor, a stationary V-shaped spreader disposed adjacent said turret and adapted to partially erect each blank as it is

carried past the spreader by the turret, said spreader including a relatively long curved guide following the periphery of said turret for a predetermined angle and a relatively short guide diverging away from said turret, cam means for swinging each of said gripping devices in a radial outward direction as the blank is inserted into said associated receptacle, the outward swing of said gripping devices serving to squeeze each blank into a fully erected condition as an incident to its transfer from said turret to said receptacle, and a side rail disposed adjacent the path of the open sides of said receptacles for retaining erected cartons therein after release by said gripping devices.

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