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CARTON FLAT SET UP MECHANISM

Original Filed Aug. 22, 1962

6 Sheets-Sheet 1

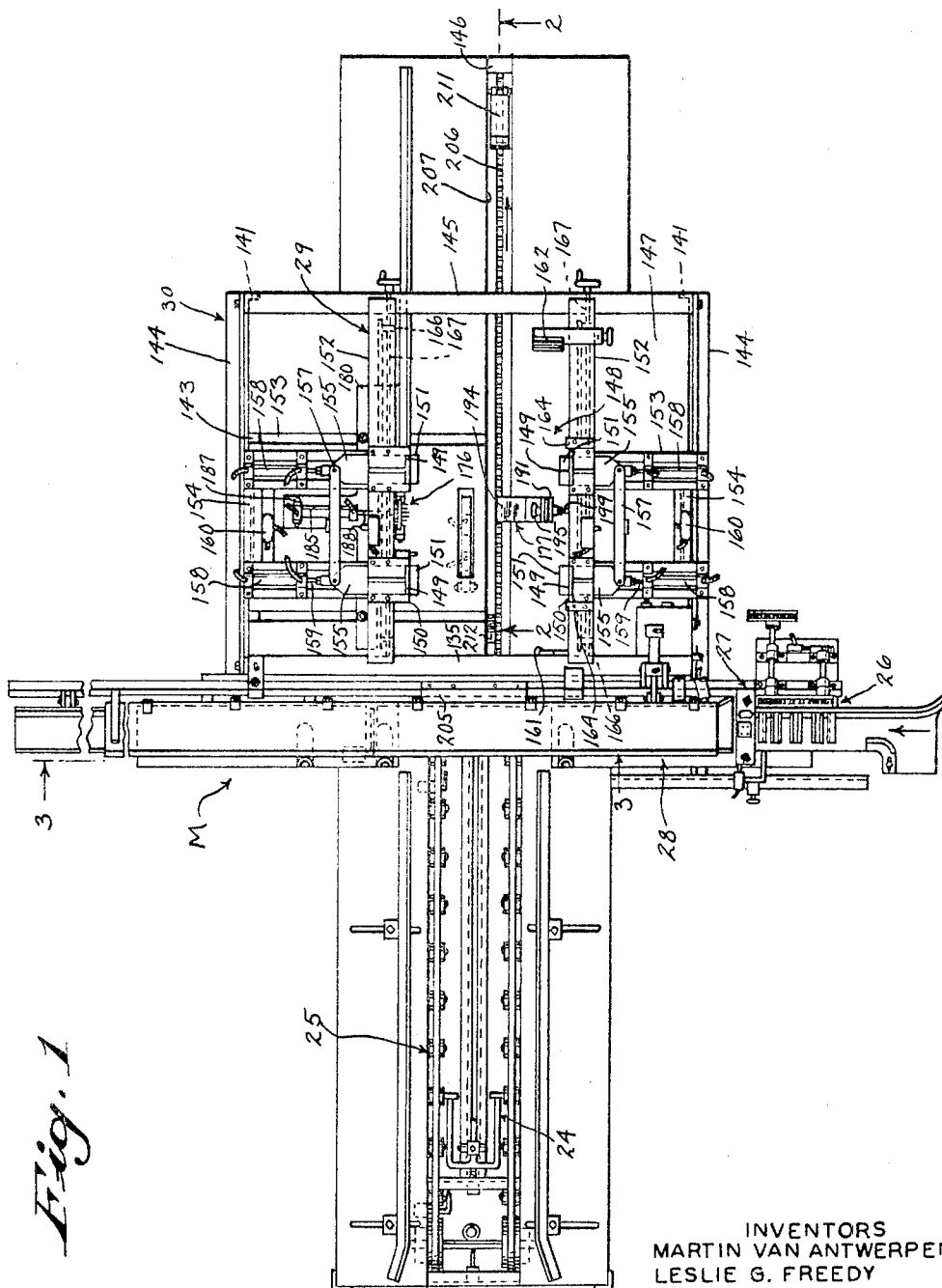


Fig. 1

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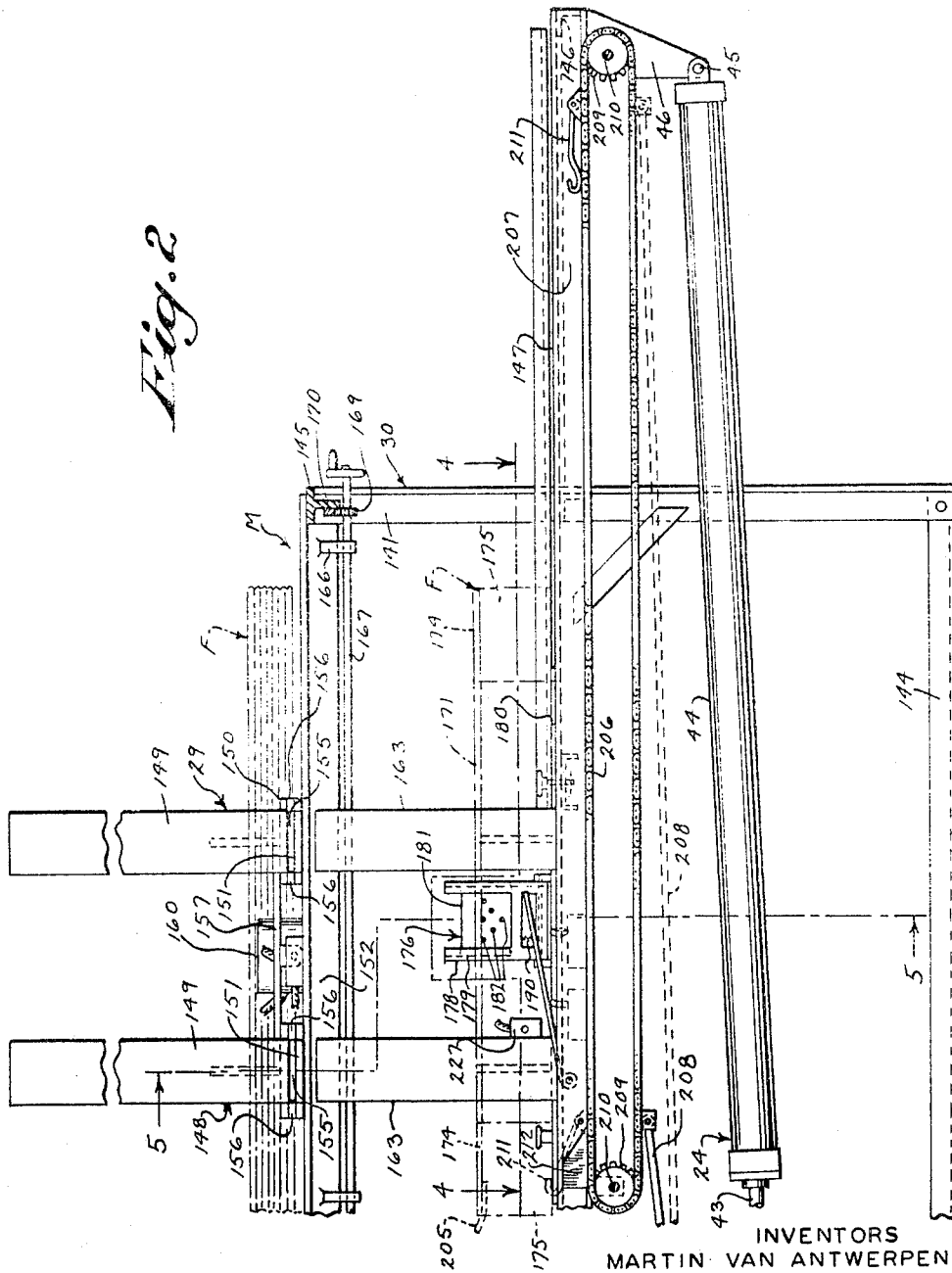
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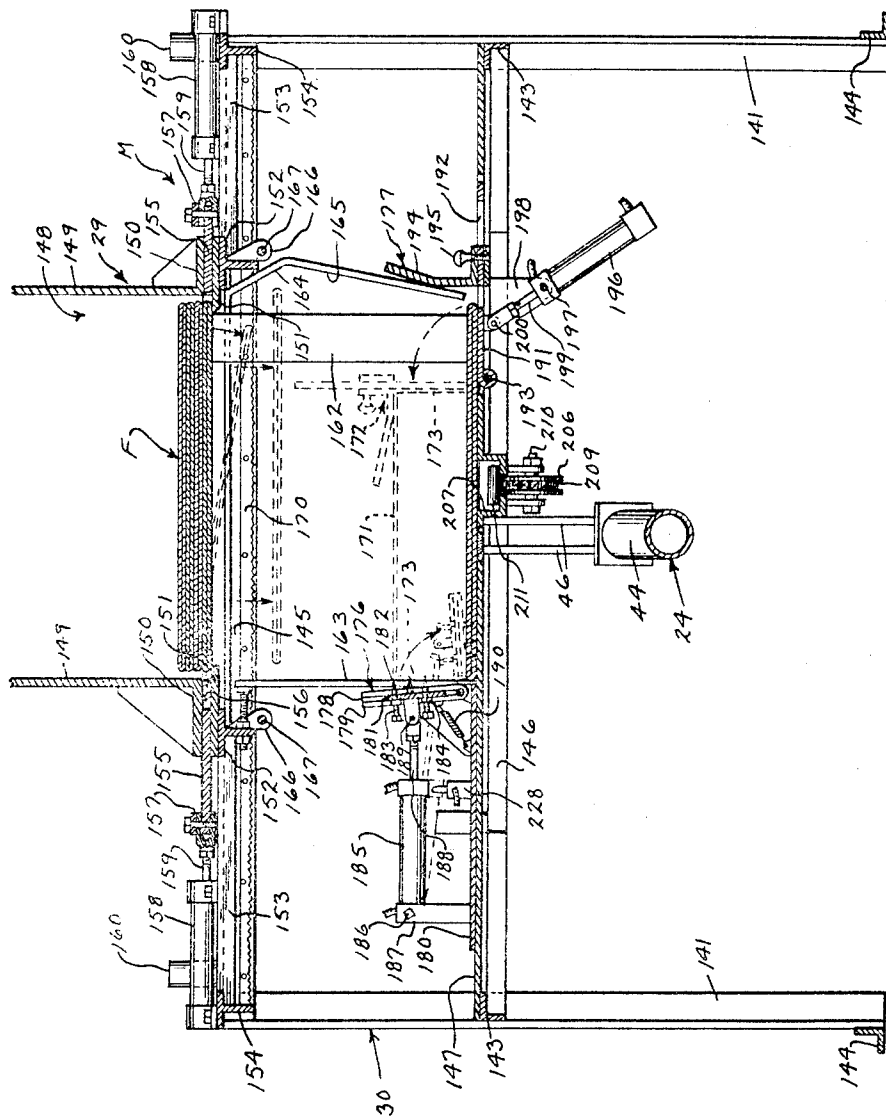
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Fig. 5



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CARTON FLAT SET UP MECHANISM

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Fig. 6

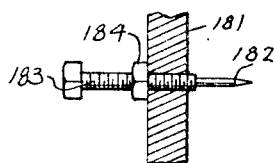
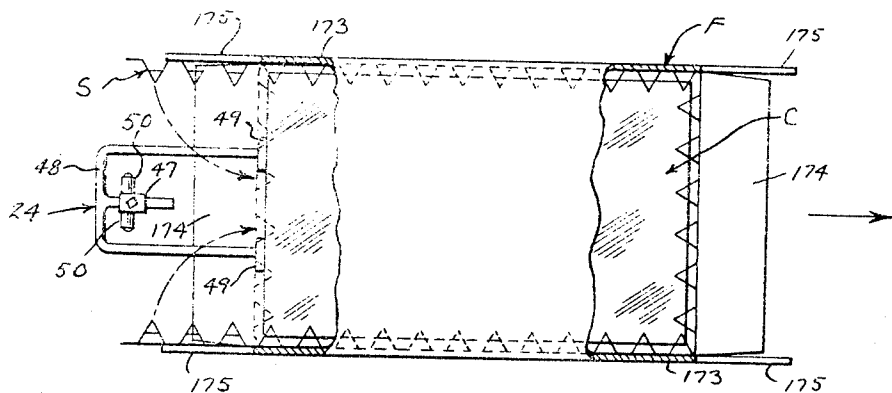


Fig. 7



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CARTON FLAT SET UP MECHANISM

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Original application Aug. 22, 1962, Ser. No. 218,700, now Patent No. 3,247,645, dated Apr. 26, 1966. Divided and this application Oct. 6, 1965, Ser. No. 493,369
3 Claims. (Cl. 93—53)

This invention appertains to packaging machines and more particularly to a novel mechanism for setting up carton blanks so that articles with a cushioning member thereabout can be moved into a set up carton, and this invention is divided out of our co-pending application Serial No. 218,700, filed August 22, 1962, now Patent No. 3,247,645, issued April 26, 1966, and entitled "Automatic Machine for Packaging Cabinets."

The machine shown and described in our co-pending application is designed to package any desired article; however, in the present adaptation, the machine has been shown for handling a bathroom medicine cabinet of the type having a front mirror which projects laterally from all sides of the body of the cabinet. Such cabinets require careful handling and packaging and much difficulty has been experienced in adequately protecting the mirror with its outwardly projecting sides. Usually, the cabinets have been packed by hand and various types of cushioning materials have been utilized with varying success. Obviously, hand packing is a tedious, time consuming and costly operation.

It is, therefore, one of the primary objects of this invention to provide a completely automatic machine for setting up cartons in their tubular form from blanks, in such a way that a cabinet with a cushioning strip about it may be pushed into the waiting set up carton.

A further important object of the invention is to provide a novel mechanism for supporting a stack of cartons in their flat form and for dropping one carton at a time from the stack on a set up table.

A still further object of the invention is to provide a novel and simple means embodying a swinging arm having picking points for setting up the carton on the table in combination with a carton squaring up member and for holding the carton in its set up tubular form during the pushing of a cabinet therein.

Still another object of the invention is the employment of a simplified means for adjusting parts of the machine so that cabinets of various sizes and cartons of different sizes can be used and successfully handled.

A still further object of the invention is to provide a carton set up mechanism which is simple in construction, reliable in its operation and not liable to get out of order.

With these and other objects in view, and to the end of attaining any other advantages hereinafter appearing, this invention consists in certain features of construction, and combination and arrangement of parts, hereinafter described, pointed out in the claims and illustrated in the accompanying drawings, in which drawings,

FIGURE 1 is a top plan view of the complete cabinet packaging machine, shown ready for operation;

FIGURE 2 is a longitudinal section through the rear half of the machine, the section being taken on the line 2—2 of FIGURE 1 of the drawings, looking in the direction of the arrows, the view showing more particularly the

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carton blank supporting means and the carton blank set up means forming part of the present invention;

FIGURE 3 is a transverse sectional view through the machine, taken on the line 3—3 of FIGURE 1, looking in the direction of the arrows, and toward the carton blank dropping mechanism and set up mechanism;

FIGURE 4 is a horizontal sectional view through the machine, the section being taken on the line 4—4 of FIGURE 2 of the drawings, and the view showing in particular, details in the carton setting up and squaring mechanism;

FIGURE 5 is a transverse sectional view taken on the line 5—5 of FIGURE 2, looking in the direction of the arrows, the view showing the carton flat dropping mechanism and the carton setting up and squaring mechanism, with a carton in position ready to be set up and squared;

FIGURE 6 is an enlarged fragmentary detail sectional view through the picker arm and showing one of the picker points for engaging the carton being set up, and

FIGURE 7 is a diagrammatic view, partly in top plan and partly in section, showing a cabinet with the cushioning peaked strip thereabout pushed into a carton.

Referring now to the drawings in detail, wherein similar reference characters designate corresponding parts throughout the several views, the letter M generally indicates the machine for wrapping and packaging cabinets in cartons and this machine is shown and described in our Patent No. 3,247,645. The machine includes broadly, conveyor means 25 for receiving articles (medicine cabinets C) from an advancing conveyor (not shown) leading from the factory assembly line. The machine M also broadly includes a peaked shock absorbing cushioning strip advancing and measuring mechanism 26, a guillotine or severing mechanism 27 and a strip holding guiding and dropping mechanism 28. The peaked cushioning and shock absorbing strip is indicated by the reference letter S. The machine M further includes means 29 (forming part of the present invention) for receiving a stack of carton flats F, dropping one carton flat at a time, and for setting up and squaring a dropped carton. Correlated means 24 is also provided for pushing an advancing cabinet off of the conveyor 25 past the strip guiding and dropping means and into a set up carton, and for carrying a carton packed with the cabinet and cushioning strip out of the machine. All of these parts are supported on a suitable fabricated framework 30.

The means 29 for receiving a stack of carton flats F for dropping one flat at a time and for setting up and squaring a dropped carton, is as stated, mounted on a part of the framework 30 and this part of the framework is increased in width to take care of the parts of the mechanism 29. Hence, this framework 30 at this point includes rear upright standards 141 which are in longitudinal alignment with the standards 57 and the standards 141 are connected with the standards 57 by angle shaped frame bars 143. To form a stable base the standards 141 and 57 are joined by base angle bars 144. The standards 141 are joined at their top by a transversely extending beam 145 and this beam is parallel with and in the same horizontal plane as the T-shaped beam 135. The standards 141 are further connected by an intermediate rear cross bar 146. The bars 143 and 146 constitute means for supporting a flat horizontally disposed work table 147 which constitutes a part of the mechanism 29.

Arranged above the table 147 is the hopper 148 for re-

ceiving a stack of carton flats F and the hopper carries the means for dropping one carton flat at a time onto the table 147 where the same is automatically set up in its tubular or sleeve form. The hopper 148 includes pairs of upright hopper brackets 149, which in effect constitute side walls for the hopper. These brackets 149 and associated carton flat dropping means can be adjusted transversely of the machine toward and away from one another so as to accurately set the machine for a certain size carton. As can be seen the pairs of hopper side brackets 149 are independent of one another and each pair of brackets is mounted on a carriage 150 to permit the transverse adjustment thereof. Each carriage 150 includes a flat plate 151 on which the lowermost carton rests and the plate of each carriage is rigidly mounted upon a T-shaped supporting beam 152. The plate 151 of each carriage slidably rests upon the upper surface of the rear top frame beam 145 and the beam 135. The beams 152 ride between the frame beams 135 and 145. Each carriage 150 also includes outwardly extending frame pieces 153 which are rigidly secured to plates 151 and the beams 152. The extreme outer ends of the frame plates 153 are rigidly connected together by a short strap 154. This provides a rugged carriage structure for carrying the stack of carton flats F and certain carton releasing mechanism as will now be set forth.

It is to be noted that the plates 151 of each carriage project inwardly a short distance from the brackets 149 and these projecting edges of the plates 151 constitute ledges or seats upon which the side edges of the carton flats F rest. Each pair of brackets 149 of the carriage carry reciprocating pusher plates 155 for the carton flats and the brackets are so formed at their bases to provide guides for these sliding pushers 155. To form the guides, the bases of the brackets at their side edges are separated by spacer plates 156 and the pushers 155 slide between these spacer plates. The pusher plates 155 for each carriage are rigidly connected together by a cross strap 157 so that the pusher plates for each carriage will function in unison. The pusher plates for each carriage are actuated back and forth by air or hydraulic cylinders 158. The cylinders have projecting forwardly therefrom the actuating piston rods 159 which are rigidly connected to the rear ends of the pusher plates 155 for each carriage. The entrance and exit of fluid from the opposite ends of the cylinders 158 for reciprocating the rods back and forth is controlled at proper times by means of a solenoid operated valve 160. The timing of these valves will be later set forth. Briefly, the means for dropping one carton flat at a time operates as follows, and this operation is best shown in FIGURE 5. At the proper time, fluid is admitted to the rear ends of the cylinders 158 for the pusher plates 155 for one carriage on one side of the machine. As these plates at one side move inwardly the same push the lowermost carton flat off of the supporting plate 151 at that side of the machine and the carton flat tilts. The pusher plates on this side return to their normal position and the pusher plates 155 are moved forwardly by their cylinders and the lowermost flat is pushed off of the adjacent plate 151. The pusher plates 155 on this side of the machine are then immediately returned to their normal position. The carton flat then drops onto the work or set up table 147. The carton flat is guided in its falling movement toward the work or set up table 147 by a front vertically disposed guide plate 161 and a rear guide plate 162. The front guide plate 161 can be secured at its lower end to an adjacent part of the frame 30 (see FIG. 4). The rear guide plate 162 can be adjustably carried by the plate 151 of one carriage 150, as best shown in FIGURE 1. This rear guide terminates above the table 147 and above a set up carton so as to be out of the path of a carton when the same is discharged from the machine. Besides the front and rear carton guide and stops 161 and 162, side guides 163 and 164 are also provided for the edges of the carton flats, as will be later set out. However, the side guides 164

are secured to and depend from one carriage 150 and preferably are inwardly and downwardly inclined, as at 165.

To bring about the adjustment of the carriages 150 toward and away from one another to agree with a certain size carton, the beams 152 have mounted on or formed thereon bearing brackets 166 which rotatably support adjusting shafts 167. These adjusting shafts can be turned by means of hand wheels or cranks. Each shaft has keyed or otherwise secured thereto pinions 169 which mesh with rack bars 170 carried by beams 135 and 145 of the frame. By turning these shafts the carriages can be easily moved back and forth.

After a carton flat is dropped onto the work or set up table 147 the novel means employed for setting up the carton is then brought into play, as will be now described. The cartons being handled are of a common type and of a character which includes top and bottom walls 171 and 172 joined by side walls 173. The carton is of course folded in its flat condition along the juncture of the side walls with the top and bottom walls. The opposite ends of the top and bottom walls 171 and 172 carry respectively side sealing flaps 174 and the side walls 173 carry end sealing flaps 175. With the carton in its flat condition these flaps 175 lie in their extended positions. The carton opening means comprises a picker mechanism 176 positioned on one side of the work table 147 and directly below the pair of brackets 149 forming a part of one carriage. On the other side of the table is positioned a carton squaring up mechanism 177.

Now referring to the picking mechanism 176, the same includes a swinging picker arm 178. This picker arm includes a frame 179 pivoted at its lower end to brackets carried by a flat slide plate 180, which is adjustably mounted on the table 147. The frame includes side channels in which is slidably mounted a picker plate 181. The picker plate in turn carries a set of picker points 182. These picker points are provided with threaded stems 183 and the stems can be turned in the picker plate for minute adjustment and can be held in such adjustment by lock nuts 184 (FIG. 6). The entire swinging picker arm 176 is actuated through the medium of an air or hydraulic cylinder 185. This cylinder is pivoted at its outer end, as at 186, to a bracket 187 carried by the slide plate 180. Extending forwardly from the cylinder 185 is the operating piston rod 188 and this rod is pivotally connected, as at 189, to the picker plate 181 of the picker arm 176. When fluid is admitted to the outer end of the cylinder 185 the piston rod 188 is thrust forwardly and the entire picker arm will be swung down moving the points 182 into piercing and picking engagement with the side wall of the carton. During this swinging movement the cylinder 185 swings down and the picker plate slides slightly in its frame to compensate for the swinging movement of the cylinder and swinging of the supporting frame of the swinging picker arm.

When fluid is admitted to the inner end of the cylinder 185 then the piston rod moves rearwardly and the entire picking arm is swung back to its raised position and this is aided by a contractile coil spring 190. The main purpose of the spring 190 is to retard the forward movement of picker arm 176 so that cylinder rod will force picker plate 181 to its maximum forward position when the picker points contact the carton. The opposite ends of the spring 190 are secured to the picker arm 176 and to the slide plate 180. As the picker arm swings back to its normal position the side wall of the carton will be raised against the side stops and guides 163 and the top wall 171 will be swung up carrying the other side wall therewith to a carton set up position, namely, in its tubular or sleeve form. The side guides and stops 163 are carried by the slide plate 180 and the upper ends thereof abut adjacent adjustable stops 163 carried by an adjacent carriage 150. As the carton flat is being opened up by the picker arm 176 the squaring up mechanism 177 comes into play.

This carton squaring up mechanism 177 includes a flat arm 191 which normally lies within an opening 192 in the table top 147 so that said arm will be flush with the table top and a dropped carton flat normally rests on said arm 191. The inner end of the arm is pivoted, as at 193, to the table top at a point adjacent to the point of the juncture of the side wall of the carton with its bottom wall. Hence, as the squaring up arm 191 is raised this arm pushes up on the side wall of the carton which is opposite to the side wall raised by the picker arm. The squaring up arm carries a top squaring up plate 194 and this top squaring up plate extends at right angles to the squaring up arm 191. If desired an adjusting means 195 can be provided for locating the top squaring up plate 194 in an exact position on the arm 191. The means employed for actuating the squaring up mechanism 177 preferably consists of an air or hydraulic cylinder 196 and the cylinder 196 is pivoted, as at 197, to a bracket 198 carried by the lower face of the table 147. Extending upwardly and forwardly from the cylinder 196 is a piston rod 199 which is in turn pivoted as at 200 to the squaring up plate 191. It can be seen that when fluid is admitted to the outer end of the cylinder the piston rod will be forced forwardly moving the squaring up mechanism to a raised position and carrying the carton therewith into its tubular form. When the direction of fluid is reversed the piston rod 199 is pulled inwardly and the squaring up mechanism is then pulled down to its normal position.

The flow of fluid to the opposite ends of the cylinder is controlled by a suitable solenoid operated valve.

With the carton in its set up condition (FIG. 4), the same is now ready to receive a cabinet C (FIG. 7) and at this time the pusher 47 moves forwardly and pushes a cabinet between the space of the platform sections 56 into engagement with the cushioning strip S and as the cabinet is further advanced the strip is folded around the sides of the cabinet. Means is provided for facilitating the guiding of the cabinet out into the open carton with the strip thereabout. While this guide means is not critical to the present invention, it will be described in detail, for a better understanding of the same, and therefore, this guide means includes swinging spring pressed guide gates 201 rockably mounted on posts 202 carried by the platform sections 56 adjacent to their inner edges. The gates are spring urged to a normal position across the space between the platform sections 56 and hence an advancing cabinet will push these gates inwardly and the gates will press against the cushioning strip S and help to hold the folded sides of the strip against the side edges of the mirror portion of the cabinet. As the guide gates swing inwardly the same engage and push out on the side carton flaps 175 and the gates and the flaps cooperate to guide the cabinet into the set up carton. By referring to FIGURE 4, it can be seen that the gates at their lower ends and adjacent to their pivot posts are provided with ears 203 to which are attached contractile coil springs 204. The outer ends of the springs are secured to the platform sections 56.

Suspended from the T-beam 135 is a flexible curtain 205 and this curtain extends directly in the path of a forwardly moving carton. The curtain can be made from heavy rubber sheeting or a desired plastic material. Hence, when an advancing cabinet is swinging back the guide gates 201 the same is also swinging back the flexible curtain and this curtain swings under and helps to lift up the top carton flap 174 and the carton, and this flap also acts to guide the cabinet into the carton.

With the cabinet pusher 47 (FIG. 7) in its extreme advanced position and with a cabinet in a carton the loaded carton is now ready to be moved out of the machine. The means for moving a loaded carton out of the machine cooperates with and is actuated by the cabinet pushing mechanism, and includes an endless chain 206,

The chain is located under the work table 147 and directly beneath a longitudinally extending slot 207 formed on the table top. The lower stretch of the chain is operatively connected to the pusher arms by a forwardly extending connecting rod 208. Hence, as the pusher is reciprocated back and forth the upper stretch of the endless chain is also moved back and forth. The chain can be trained about spaced sprocket wheels 209 rotatably mounted upon cross shafts 210 carried by depending brackets formed on or secured to the lower face of the table 147. The other stretch of the chain has pivotally connected thereto a carton grappling hook 211. The hook 211 normally lies down on the upper stretch of the chain. As the pusher mechanism moves forwardly the lower stretch of the chain 206 is pushed rearwardly and the upper stretch forwardly, carrying the hook 211 therewith. At the end of the pusher stroke the hook rides up on a cam shoe 212 to a position with the hook terminal thereof disposed above the table top. As the cabinet pusher moves forwardly to its normal returned position the same through the medium of the connecting rod 208 pulls the lower chain stretch forwardly and the upper chain stretch rearwardly. With the hook 211 riding forwardly with the chain the same engages a loaded carton and moves the loaded carton out of the machine.

Thus, it can be seen that the entire machine M forming a part of our co-pending application, provides means for receiving cabinets from a factory conveyor system, for advancing the cabinets one at a time by conveyor and pusher toward a cushioning strip and holding mechanism and for folding the strip around the mirror portion of a cabinet, and that novel mechanism as described in the present invention is then provided for dropping a carton flat, for setting up the carton flat in its tubular form and for then pushing a cabinet with the strip thereabout into the carton, and finally, pulling a loaded carton from the machine.

While we have shown and described certain specific embodiments of the invention, it will be understood that these embodiments are merely for the purpose of illustration and description, that various other forms may be devised, and changes made in proportions and minor details of construction without departing from the spirit of the invention or scope of the appended claims.

What is claimed as new is:

1. A carton flat set up mechanism including a table for receiving a carton flat, said carton being of the type including top and bottom walls and connecting side walls and closure flaps carried by the ends of the top and bottom walls and end walls, a swinging picker plate carried by said table and disposed adjacent to one edge of a carton flat on the table, said carton flat being received on said table with its top wall and respective side wall uppermost and with said respective side wall adjacent said picker plate means for swinging the picker plate back and forth over one side wall of a carton on the table, and picker points carried by said plate adapted to penetrate said side wall of the carton when the picker plate is swung over the flap for raising said side wall upon upward swinging movement of the picker plate for lifting said flap to a raised set up position.

2. A carton flat set up mechanism as defined in claim 1, and a carton squaring up mechanism pivotally carried by the table and located on the other side of the table from the picker plate and movable to a raised and lowered position with the hinged point thereof disposed directly below the juncture of a side wall with the bottom wall of the carton flat.

3. A carton flat set up mechanism including a set up table, a hopper for receiving a stack of carton flats disposed above the table, means for dropping one carton flat at a time on the table, squaring up and guide arms on said table projecting toward the hopper and against which the edge of a carton flat is adapted to rest when the same is on the table, a picker plate hingedly mounted upon the table

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between the squaring up and guide rods movable downwardly over a carton and movable upwardly to a raised position beyond the squaring up arm, penetrating picker points carried by the plate adapted to penetrate the side wall of a carton flat when the plate is in its lowered position and for moving the side wall to a raised position upon its upward swinging movement, and a pivoted squaring up plate carried by the table in spaced relation to the picker plate for engaging the side wall of the carton opposite to the wall engaged by the picker plate, said picker points being withdrawn from said carton side wall when the

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pivoted squaring up plate engages the opposite side wall and with the picker plate in its fully raised position.

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