March 14, 1961 R. C. DEMLER 2,974,461

CARTON PACKAGING MACHINE FOR SHEETS

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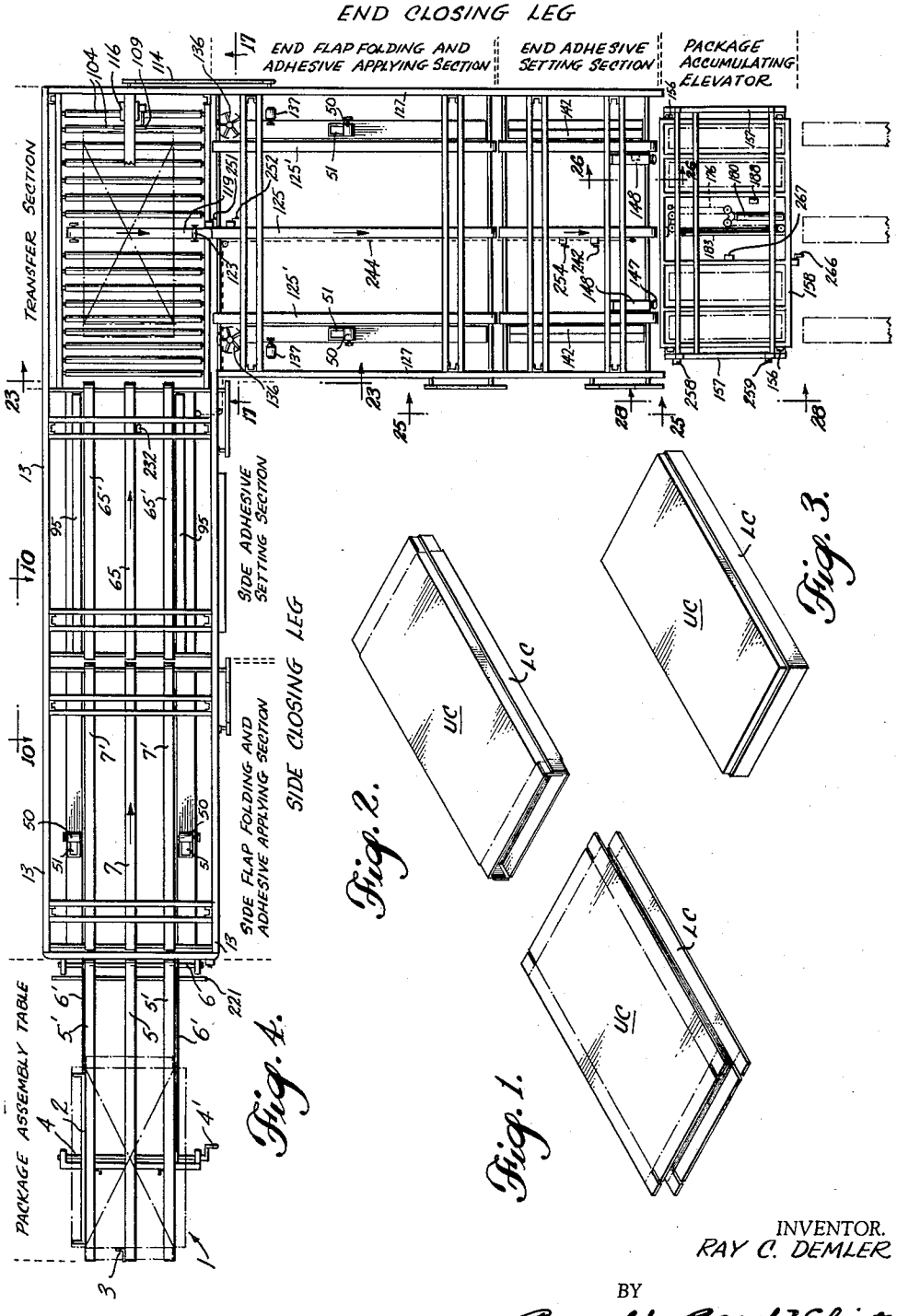


Fig. 4.

Fig. 2.

Fig. 3.

Fig. 1.

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CARTON PACKAGING MACHINE FOR SHEETS

Filed Oct. 7, 1957

13 Sheets-Sheet 2

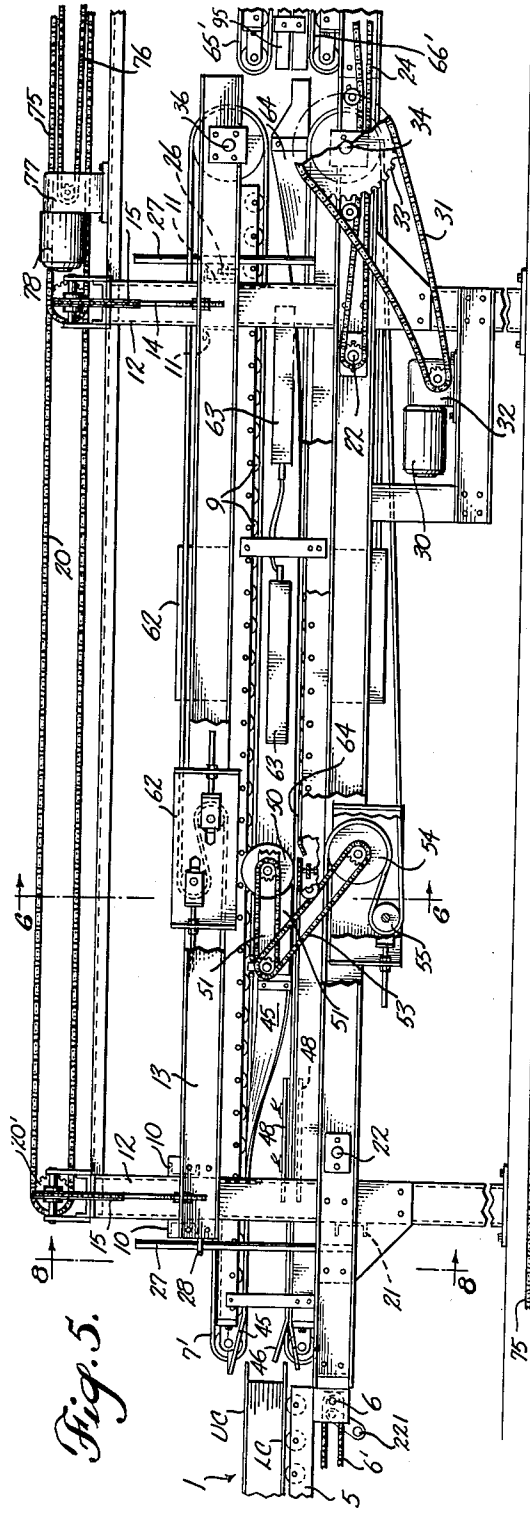


Fig. 5.

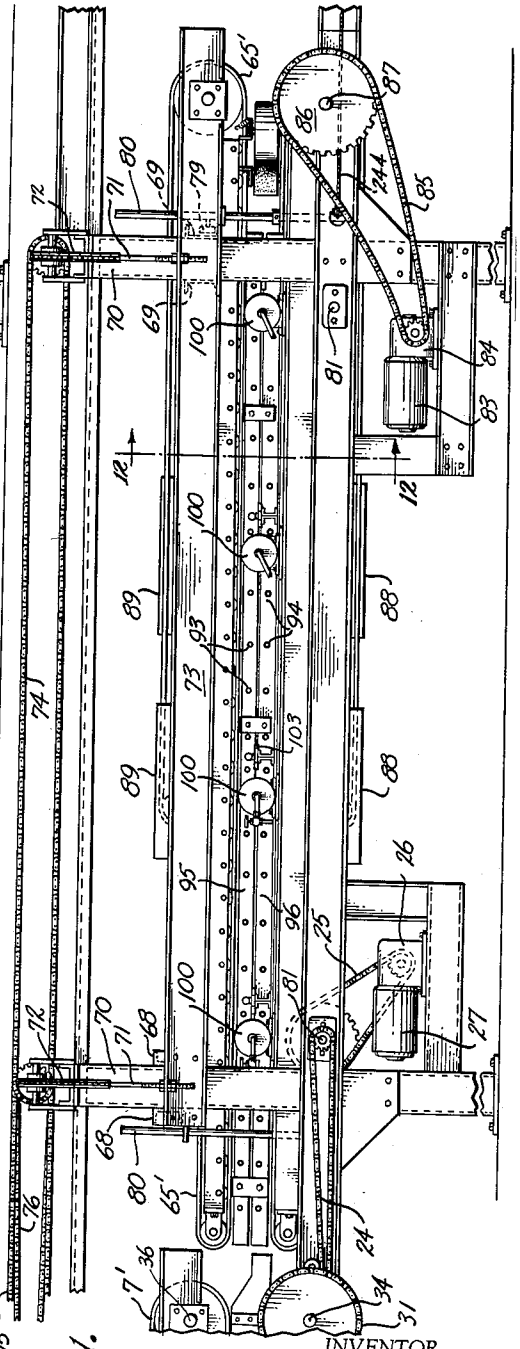


Fig. 11.

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CARTON PACKAGING MACHINE FOR SHEETS

Filed Oct. 7, 1957 13 Sheets-Sheet 3

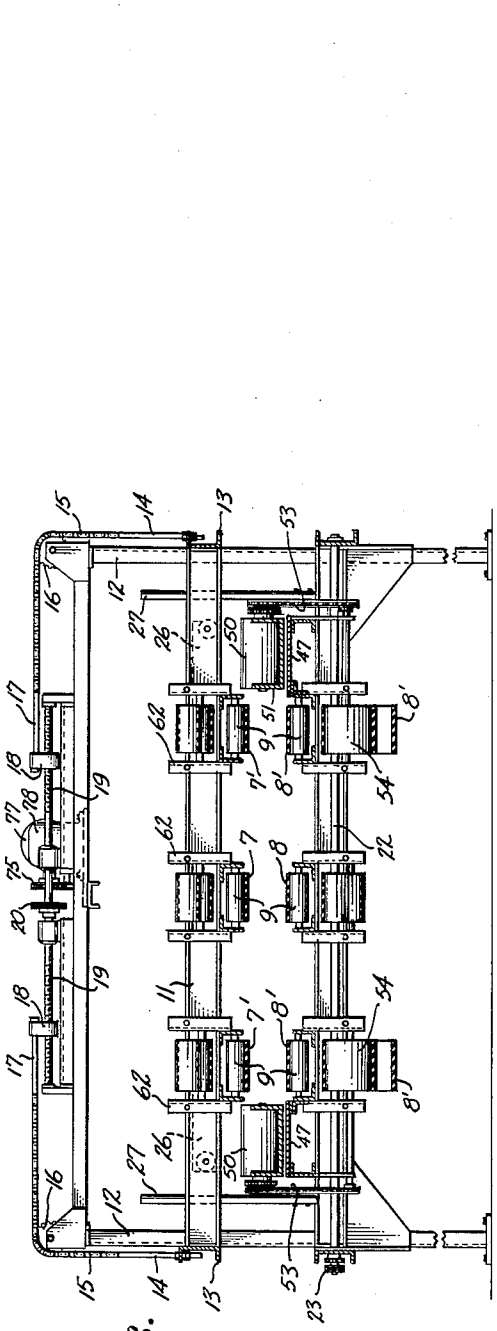


Fig. 6.

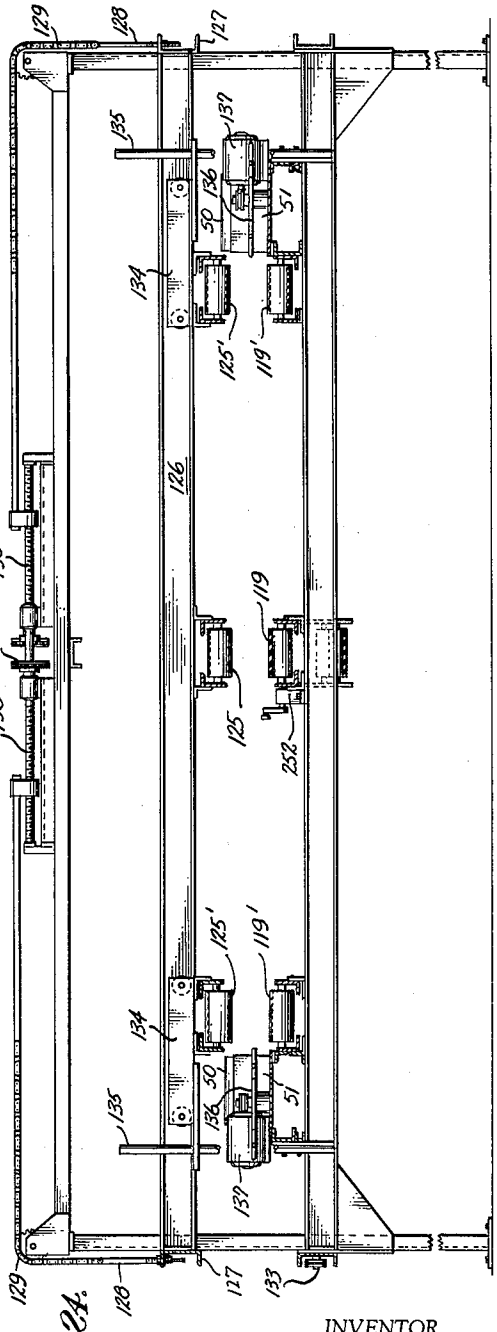


Fig. 24.

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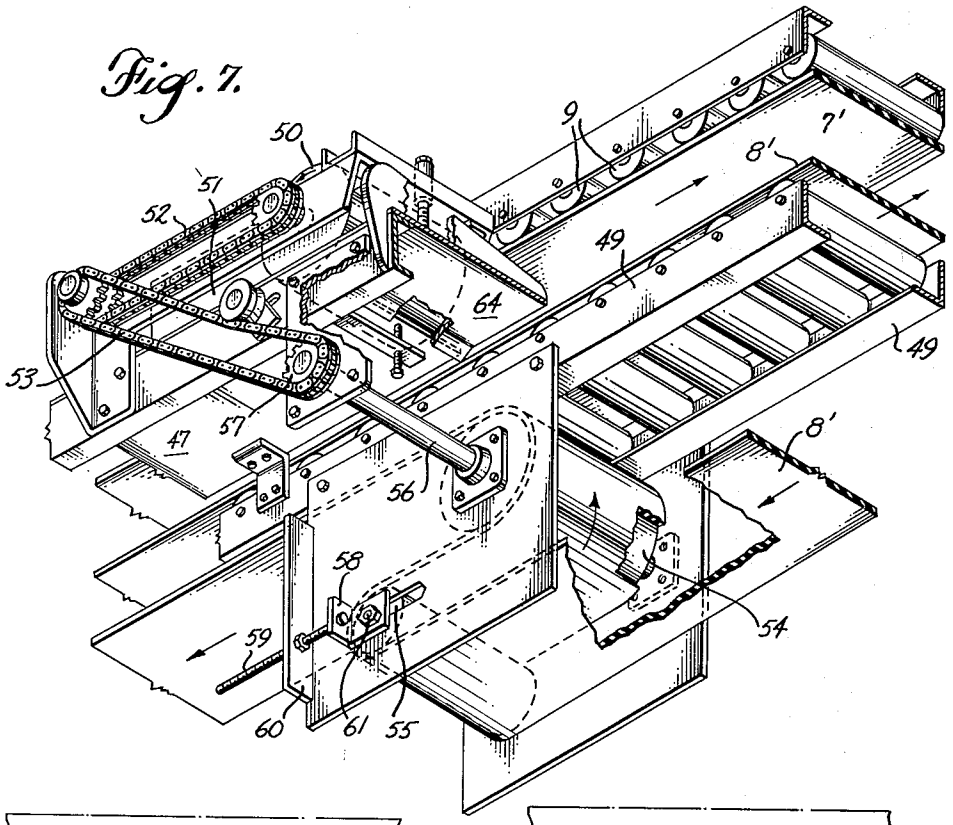
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CARTON PACKAGING MACHINE FOR SHEETS

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Fig. 7.



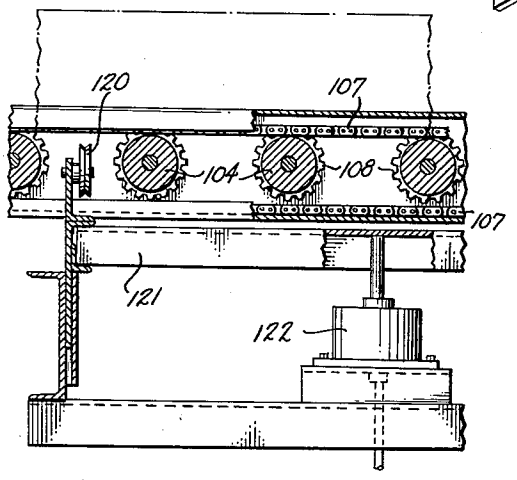


Fig. 21.

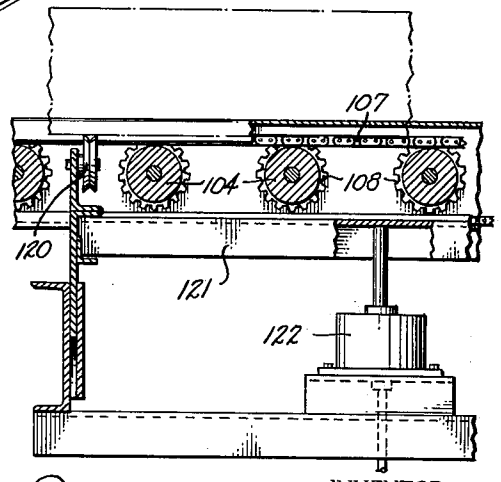


Fig. 22.

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CARTON PACKAGING MACHINE FOR SHEETS

Filed Oct. 7, 1957 13 Sheets-Sheet 5

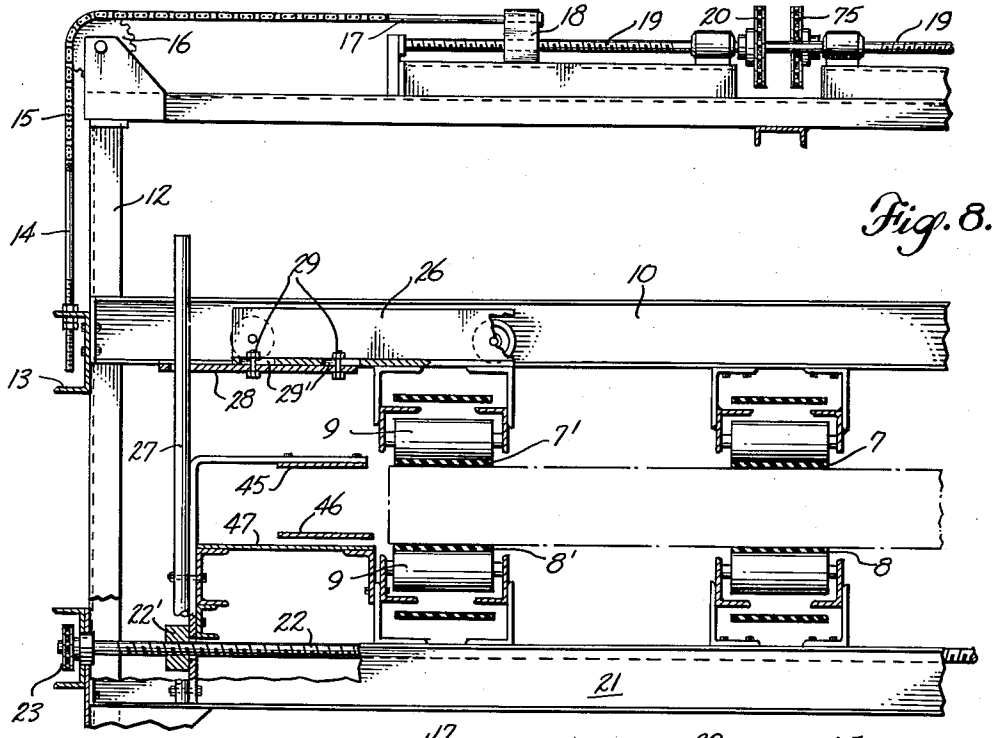


Fig. 8.

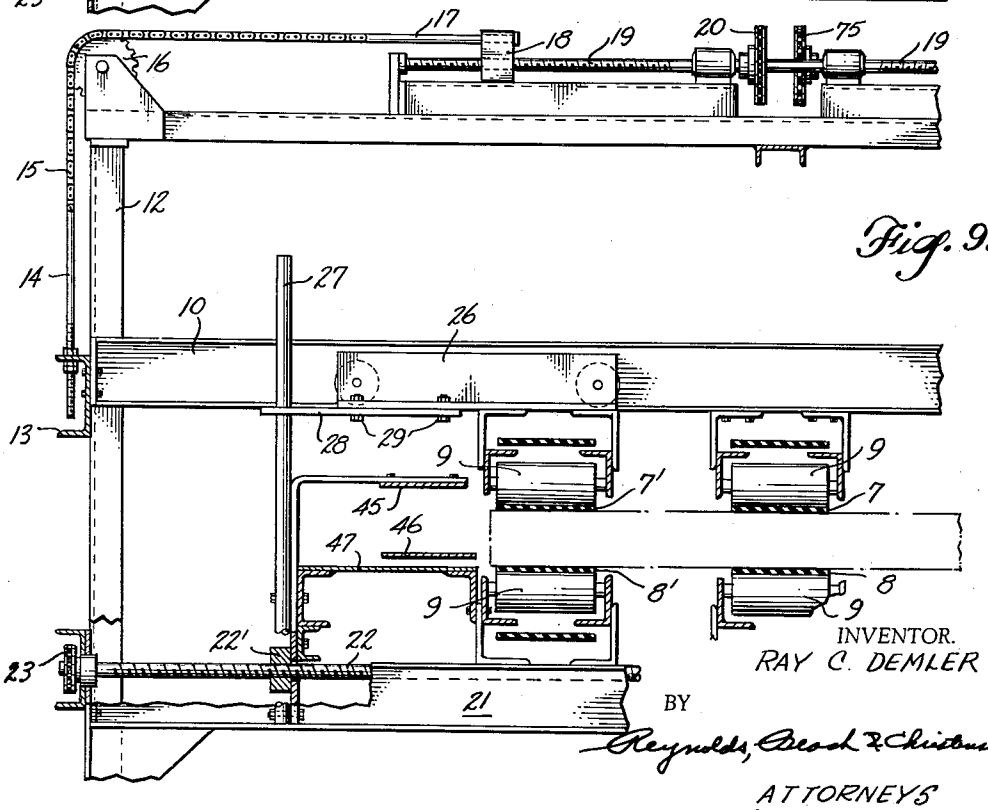


Fig. 9.

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CARTON PACKAGING MACHINE FOR SHEETS

Filed Oct. 7, 1957 13 Sheets-Sheet 6

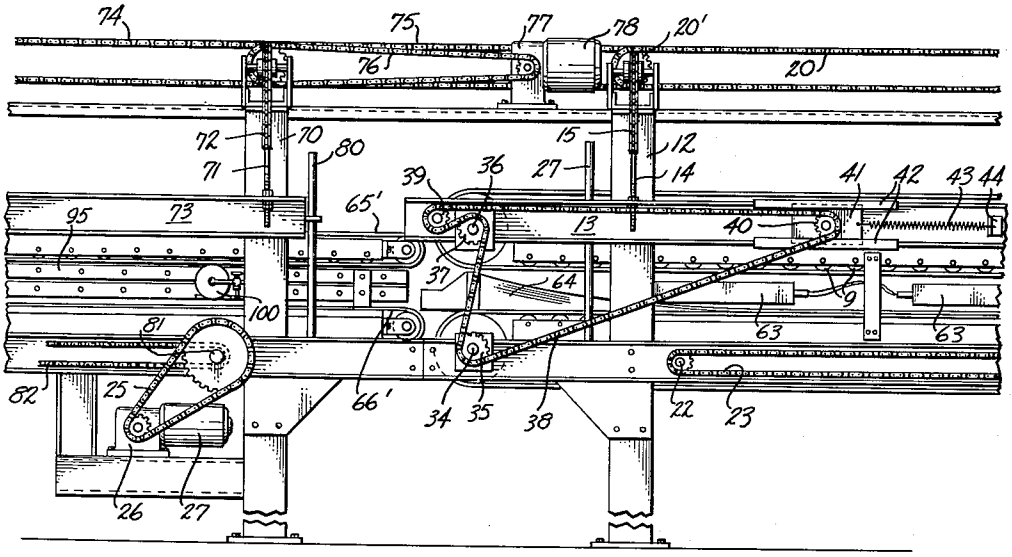


Fig. 10.

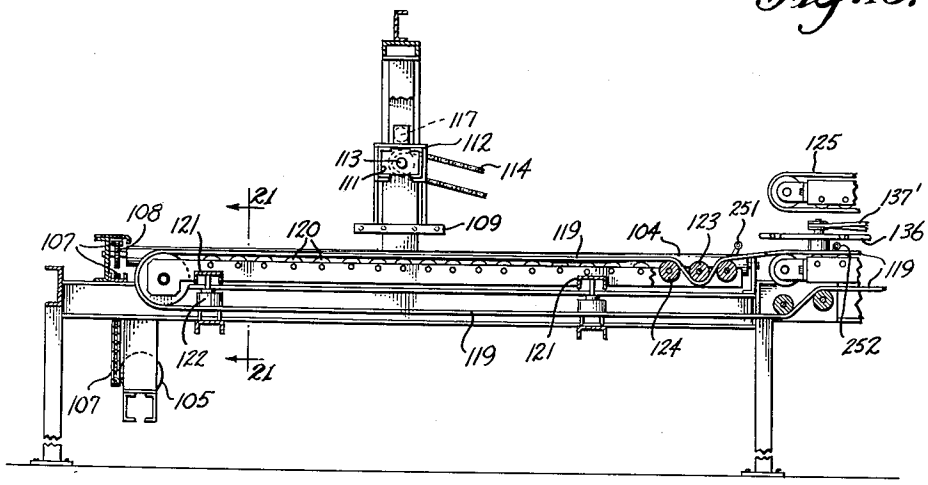


Fig. 20.

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CARTON PACKAGING MACHINE FOR SHEETS

Filed Oct. 7, 1957 13 Sheets-Sheet 7

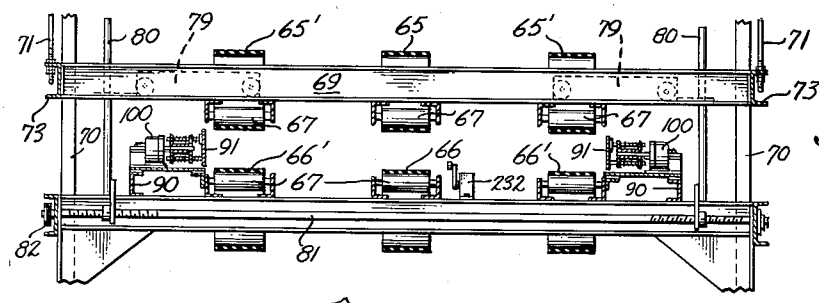


Fig. 12.

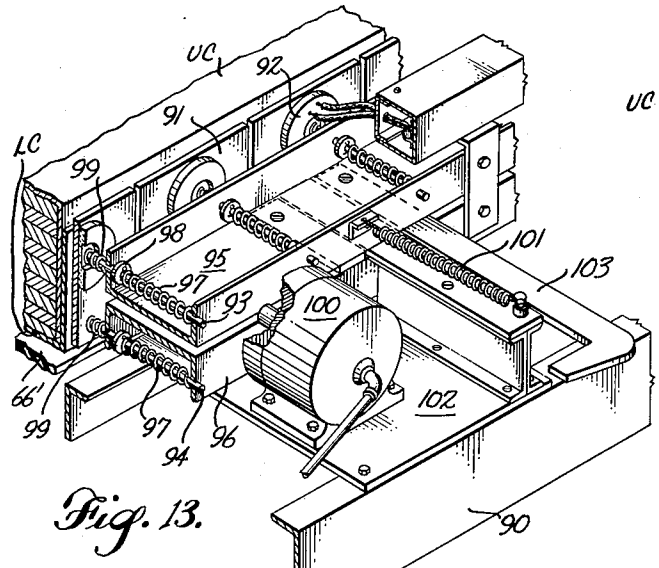


Fig. 13.

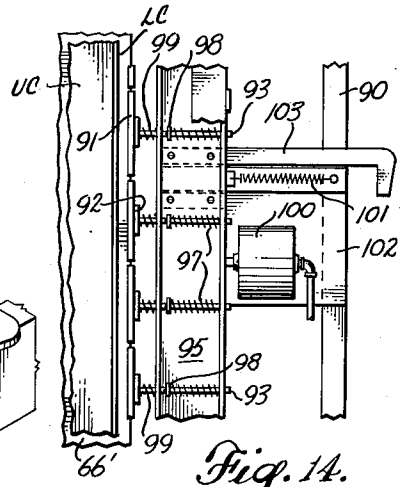


Fig. 14.

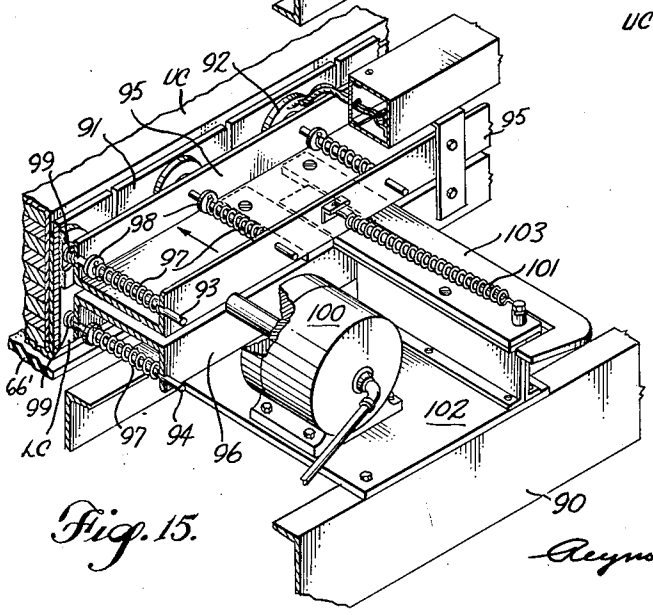


Fig. 15.

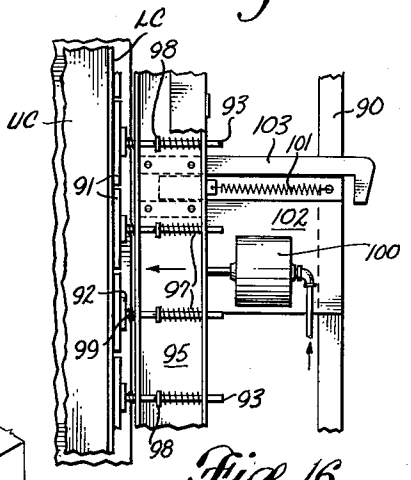


Fig. 16.

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CARTON PACKAGING MACHINE FOR SHEETS

Filed Oct. 7, 1957

13 Sheets-Sheet 8

Fig. 17.

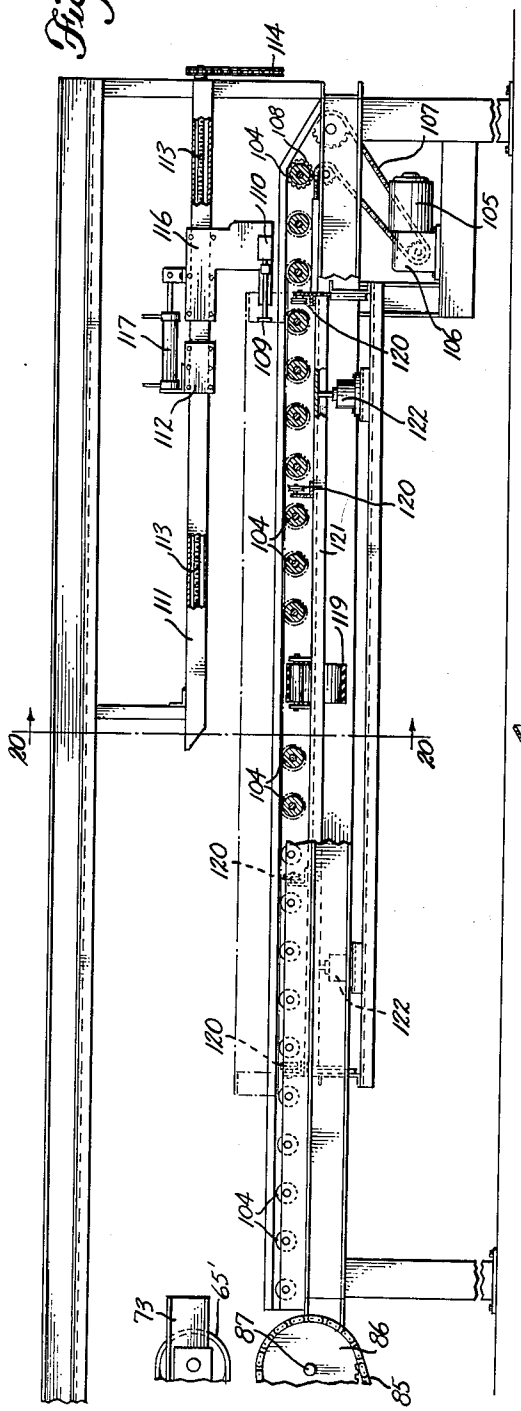


Fig. 18.

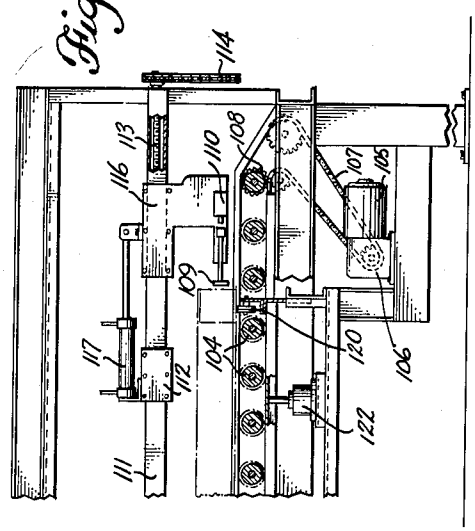
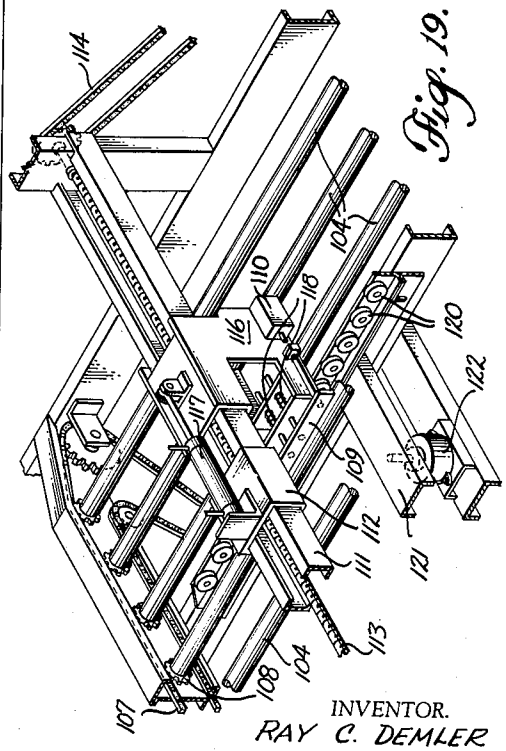


Fig. 19.



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CARTON PACKAGING MACHINE FOR SHEETS

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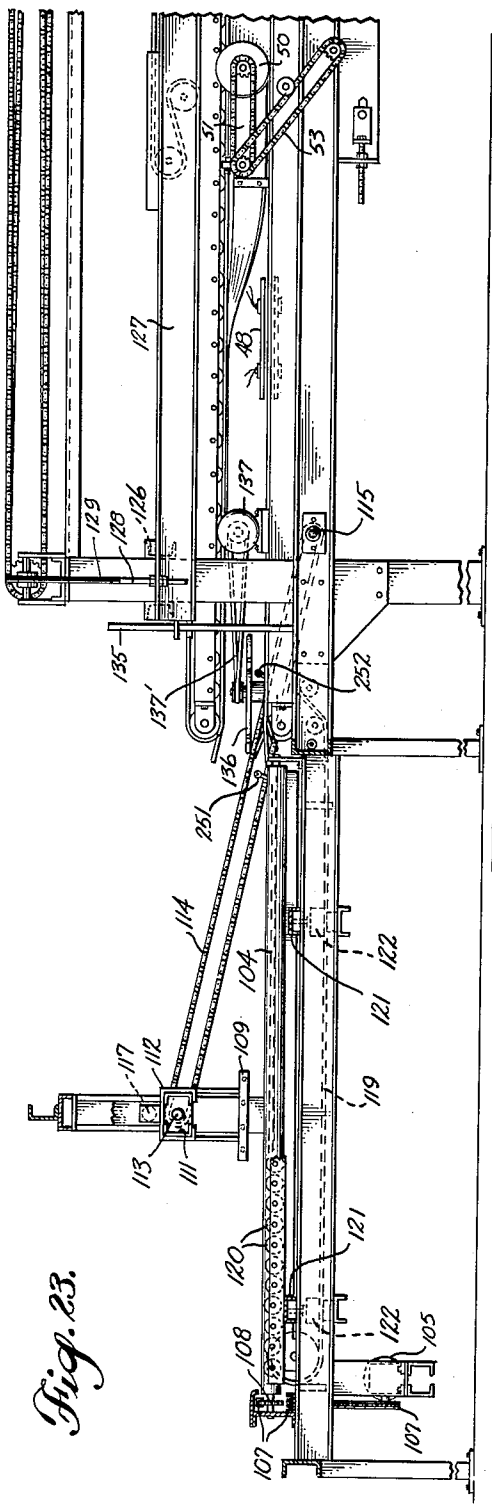


Fig. 23.

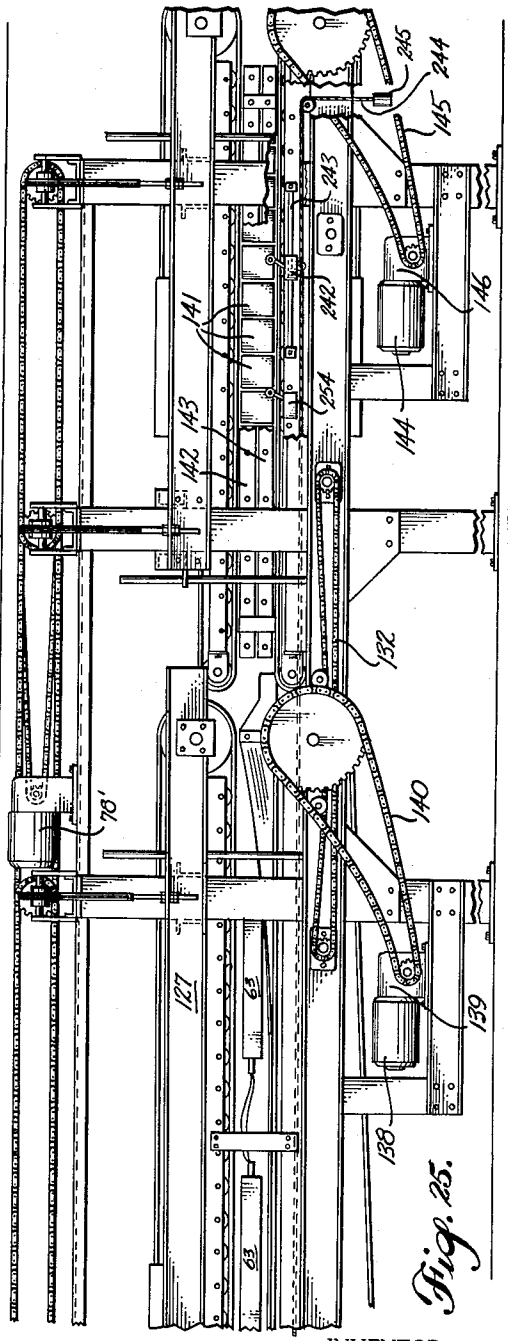


Fig. 25.

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CARTON PACKAGING MACHINE FOR SHEETS

Filed Oct. 7, 1957 13 Sheets-Sheet 10

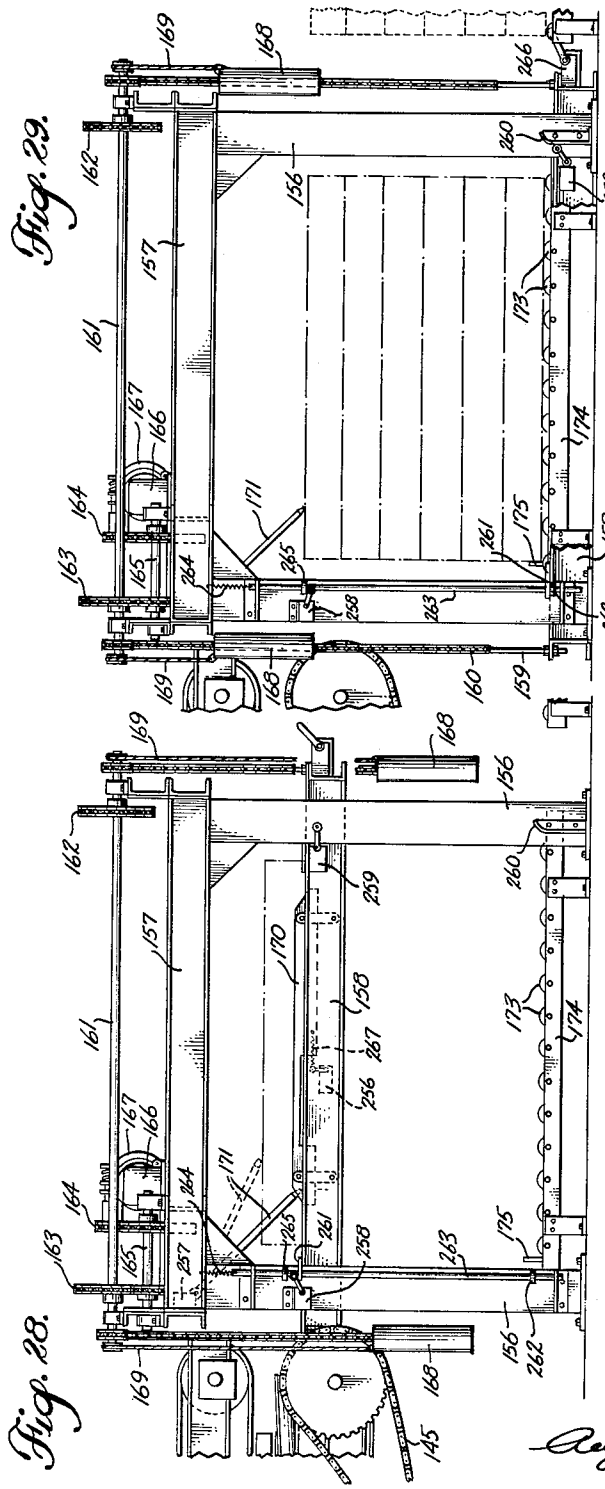


Fig. 28.

Fig. 29.

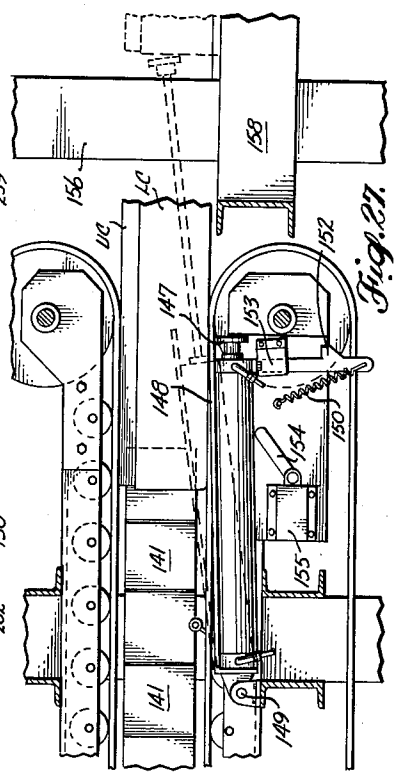


Fig. 27.

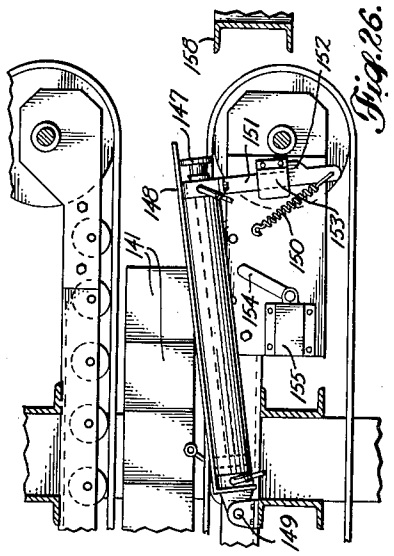


Fig. 26.

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CARTON PACKAGING MACHINE FOR SHEETS

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13 Sheets-Sheet 11

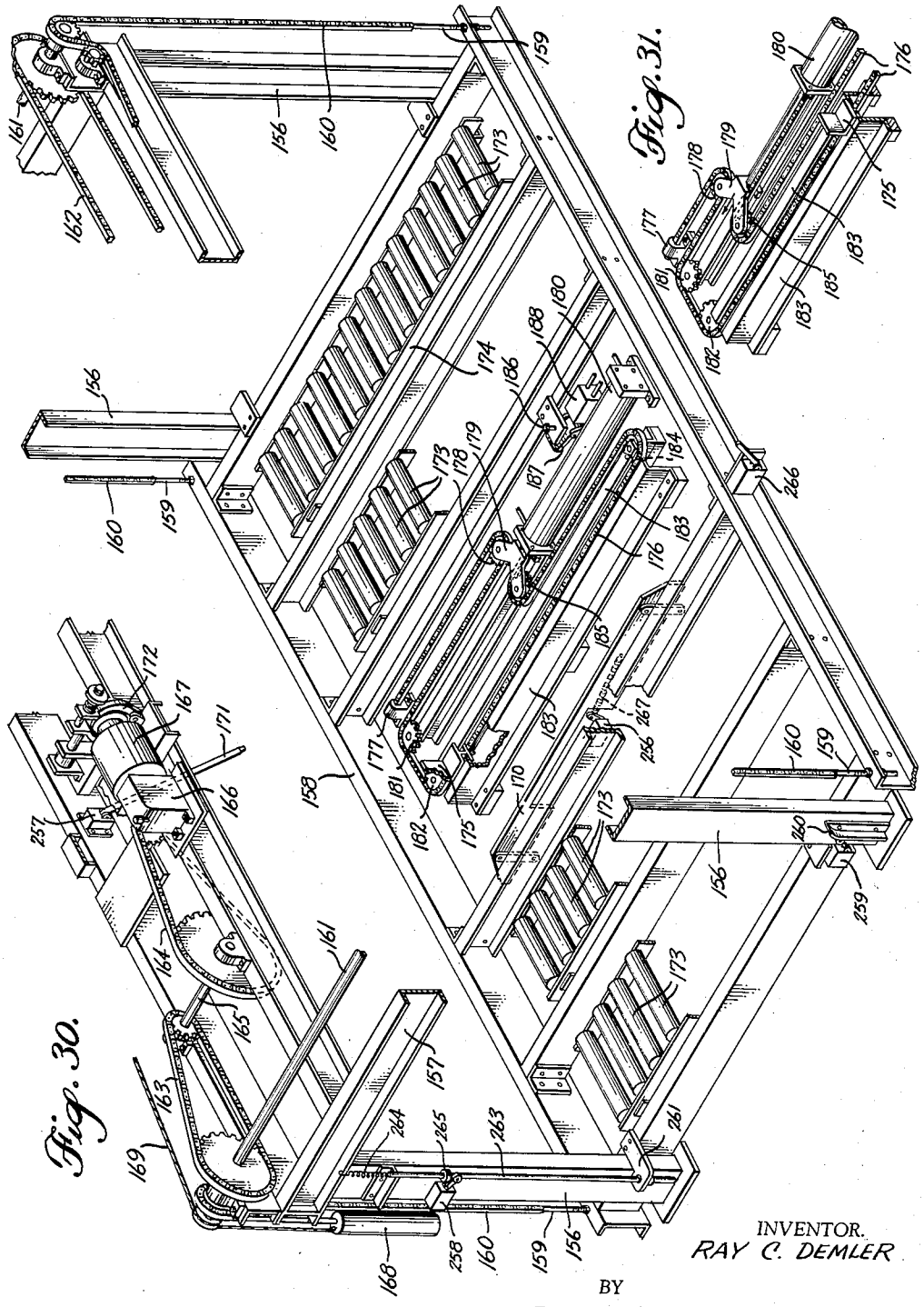


Fig. 31.

Fig. 30.

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CARTON PACKAGING MACHINE FOR SHEETS

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Fig. 32.

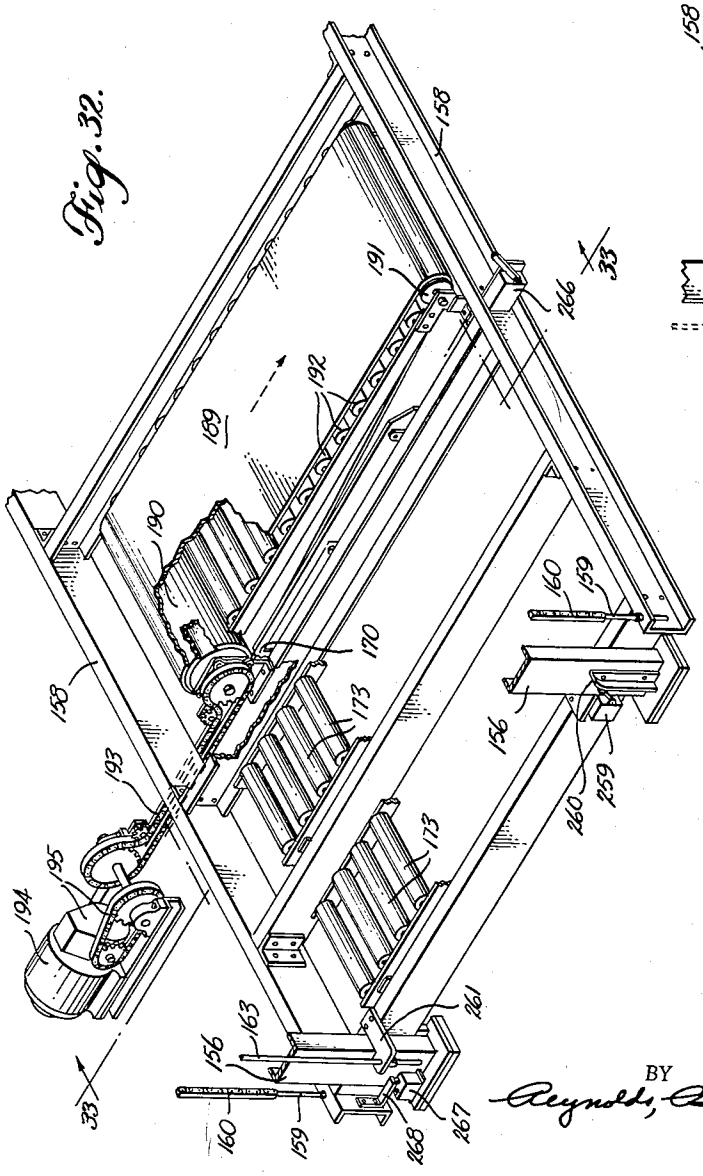
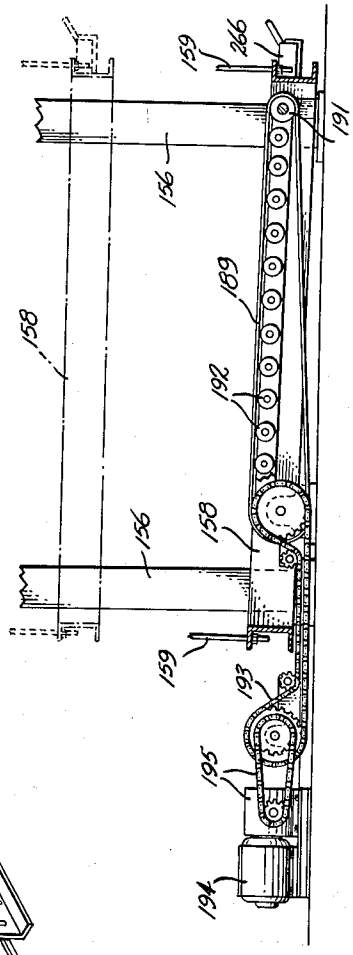


Fig. 33.



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13 Sheets-Sheet 13

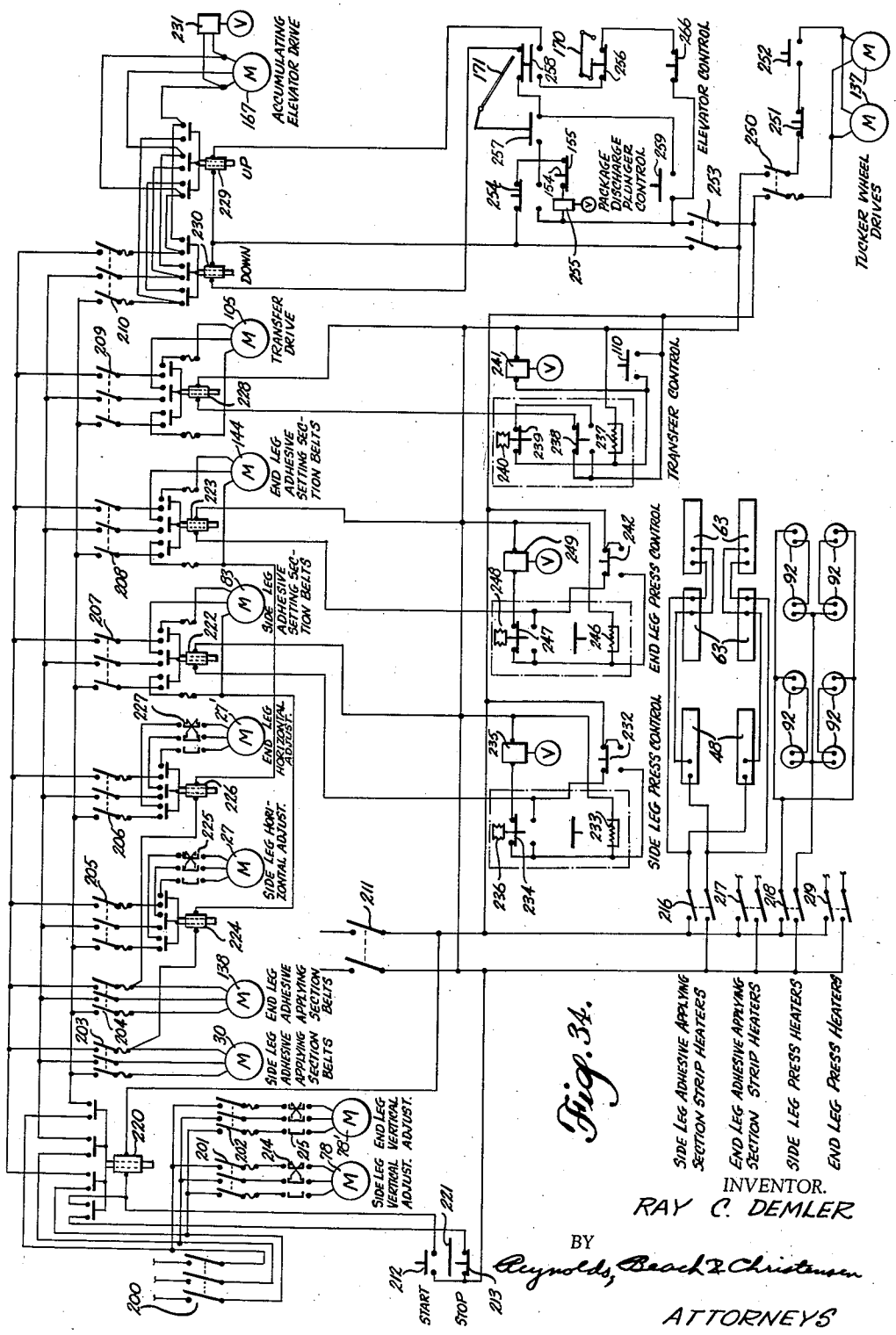


Fig. 34.

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United States Patent Office 2,974,461 Patented Mar. 14, 1961

2,974,461

CARTON PACKAGING MACHINE FOR SHEETS

Ray C. Demler, Tacoma, Wash., assignor to International Packaging Corporation, Tacoma, Wash., a corporation of Washington

Filed Oct. 7, 1957, Ser. No. 688,645

9 Claims. (Cl. 53—388)

The purpose of the present machine is to package sheet material substantially automatically in a carton. The sheets may be of various types such as plywood, veneer, hardboard, insulating board, metal, etc., and will be cut to uniform size, arranged in a stack and placed in a carton of appropriate size to receive such a stack. Stacks of panels have previously been packaged in this manner but the machines utilized for this purpose such as that of my prior Patent No. 2,215,545 have occupied such a large amount of floor space that utilization of such equipment was not very economical.

A principal purpose of the present invention is generally to simplify, to reduce in size and to improve the efficiency of such sheet stack packaging machines.

More specifically it is an object to facilitate adjustment of such a machine to handle packages of different width, length and thicknesses.

In order to reduce the floor area occupied by the machine, mechanism is provided to interrupt movement of the package during the adhesive setting operation which requires more time than any other part of the operation. It is therefore not necessary to provide a long path over which the package travels during setting of the adhesive.

While the machine provides for movement of the package along paths mutually perpendicular as in my prior Patent No. 2,215,545 mentioned above, each leg of such path will be substantially shorter. It is an object to improve the mechanism for transferring the package from one such leg to the other.

It is also an object to provide improved control features in the present machine so as to coordinate automatically operation of various components of the packaging machine.

Additionally it is an object to provide improved mechanism for receiving and stacking completed packages preparatory to removal from the machine of a substantial stack of such packages.

In general such a packaging machine is composed of a side closing leg including a package assembly table on which are assembled a lower carton part, a stack of sheets and an upper carton part ready to be fed through the machine, a folding and glue-applying section in which the inner flaps of the carton sides are folded against the stack of sheets, glue is applied and the outer side flap is folded over the inner side flap while the package is moved along such leg, and the package is then stopped while pressure is applied to the folded flaps of the package and held until the adhesive sets. The second section of the machine effects transfer of the package after having its sides glued from the side closing leg to the end closing leg. During movement of the package along the end closing leg, by successive operations the corners of the bonded sides are folded in, the inner end flap is folded over each end of the sheet stack, glue is applied to the end flaps and the outer end flap is folded over the inner end flap while the package is moving along the end closing leg. The package is then stopped and

pressure is applied to the folded end flaps to set the adhesive. In the next stage of the operation the packages are discharged from the end closing leg and accumulated in stacked relationship.

Figure 1 is a top perspective view of an assembly of package components including a lower carton part, a stack of sheets and an upper carton part assembled in superposed relationship preparatory to being fed into the packaging machine. Figure 2 is a similar view showing the package partially completed by having the side flaps folded over the sheet stack and bonded together in the condition of the package upon reaching the transfer section. Figure 3 is a similar top perspective view of the completed package.

Figure 4 is a plan view of the complete packaging machine.

Figure 5 is a side elevation of the folding and adhesive applying section of the side closing leg of the machine. Figure 6 is a transverse vertical section through this same portion of the machine taken on line **6—6** of Figure 5. Figure 7 is a bottom perspective view of a fragmentary portion of the machine showing drive mechanism details, parts being broken away. Figure 8 is a partial transverse vertical section through the machine taken on line **8—8** of Figure 5 showing parts in one adjusted position and Figure 9 is a similar view showing parts in a different adjusted position.

Figure 10 is a side elevation of the portion of the side closing leg at the junction between the folding and adhesive applying portion and the adhesive setting portion as seen from line **10—10** of Figure 4.

Figure 11 is a side elevation of the adhesive setting portion of the side closing leg of the machine and Figure 12 is a transverse vertical sectional view through this portion of the machine taken on line **12—12** of Figure 11. Figure 13 is a top perspective view of a fragmentary portion of the adhesive setting part of the side closing leg with parts broken away, and Figure 14 is a plan view of such portion. Figure 15 is a fragmentary top perspective view of the same portion of the adhesive setting part of the side closing leg shown in Figure 13 but having parts in different positions and Figure 16 is a plan view of the same portion of the machine with the parts in the same position.

Figure 17 is a vertical section through the transfer section of the machine taken on line **17—17** of Figure 4 with parts broken away and Figure 18 is a fragmentary right end portion of this section showing parts in a different adjusted position. Figure 19 is a top perspective view of the portion of the machine shown in Figure 18. Figure 20 is a vertical sectional view through the same section taken on line **20—20** of Figure 17. Figure 21 is an enlarged fragmentary vertical section on line **21—21** of Figure 20 with parts broken away and Figure 22 is a similar view showing parts in different operative positions.

Figure 23 is a vertical sectional view taken on line **23—23** of Figure 4 showing the transfer portion in section and a portion of the end closing leg in side elevation.

Figure 24 is a transverse vertical section through the machine showing the end closing leg in end elevation looking in the direction of travel of the packages through the machine.

Figure 25 is a side elevation view of the outer end flap folding and end flap adhesive setting portions of the end closing leg as seen from line **25—25** of Figure 4.

Figure 26 is an enlarged fragmentary vertical section on line **26—26** of Figure 4 showing package discharge mechanism in one position and Figure 27 is a similar view showing the mechanism in a different position, such mechanism being shown in broken lines in still another position.

Figure 28 is a side elevation of package accumulating elevator mechanism as seen from line 28—28 of Figure 4 and Figure 29 is a similar view showing parts of such mechanism in different positions.

Figure 30 is a top perspective view of the accumulating elevator portion of the mechanism and Figure 31 is a fragmentary top perspective view of the lower central portion of the mechanism shown in Figure 30.

Figure 32 is a top perspective view of the lower portion of the elevator framework showing a modified type of load discharging mechanism and Figure 33 is a vertical sectional view through such mechanism taken on line 33—33 of Figure 32.

Figure 34 is a wiring diagram of control and operating circuits of the machine.

The package

As has been mentioned above, the purpose of packaging sheet material is to protect it during shipment whatever the type of sheet material. Plywood panels during manufacture are finished by having both principal faces sanded and the edges cut straight, square and smooth along lines accurately reducing the plywood panel to precisely the desired size. Such a plywood panel at the completion of the manufacturing operation is ready for assembly on a wall without any finishing operation except painting. Plywood panels may even have accurately beveled corners in some instances and have one face actually stained, varnished, painted or finished with overlay material so that even painting is not necessary.

Another type of sheet material which may be packaged is veneer which may be of expensive hard wood variety. Such veneer sheets may be from one-fiftieth of an inch to one-eighth of an inch, for example, and the thinner such sheets are the more fragile and subject particularly to endwise splitting. Such veneer sheets may be warped to a greater or lesser extent. Synthetic hardboard made of woody material subjected to great pressure also may vary in thickness from quite thin material such as one-sixteenth of an inch to one-half inch and like the plywood sheets mentioned will have smooth, straight edges and at least one face of the panel will be smooth. Such sheet material also may have a finished principal surface either of the treated or enameled type or covered with a synthetic resin overlay, for example.

A softer material in sheet form which may be packaged by the machine of the present invention is insulating board made of woody material such as wood fiber, bagasse, corn stalks, etc. A further rather fragile type of sheet material is plaster board composed of a plaster core having its opposite faces covered with paper. Such insulating board and plaster board are easily subject to surface damage by engagement with a corner or edge of an object.

Metal sheet material is less subject to damage perhaps than the various types discussed above but even a mild blow can bend the edges of metal sheets in a stack if it is of relatively soft material such as aluminum. Moreover, such sheets are quite limber and therefore comparatively difficult to handle as well as being slick, so that they tend to slide edgewise upon each other.

It therefore will be understood that if sheet material of these various types is bound firmly in a carton package, the sheets will be protected from edge damage, whether by bending, splitting or breaking, and the principal surfaces will be protected against puncture types of injury. In addition, a completed package of such sheets can be stored more compactly because veneer sheets, for example, will be pressed flat in the stack during the packaging process. Also, the completed package will bind the sheets in it tightly together so that they cannot slide edgewise and cannot bend readily so that the package as a whole is relatively stiff to facilitate its handling by a fork lift truck, for example.

The package is composed of upper and lower protective sheets preferably of corrugated core cardboard which are resilient and strong. Such upper and lower carton parts are of an area substantially greater than the area of the sheets in the stack to be packaged and the end and side edges of the carton parts are folded over the stack of sheet material into overlapping relationship and bonded together while pressure is applied to the opposite carton parts to hold the stack of sheets flat. The bonding of the carton edge flaps will hold the carton and its contents in compact flat condition.

Figures 1, 2 and 3 illustrate the sequence of steps in forming the package as it moves through the machine. In Figure 1, the stack of sheets is placed on a lower carton part and this stack is covered by the upper carton part *uc*. In this condition, the package components are fed into the packaging machine shown in Figure 4 to be of angle shape in plan. During travel of the package components along the side closing leg of the machine, the side flaps of the upper and lower carton parts are folded into overlapping relationship with adhesive supplied between them and the package components are then stopped while the adhesive is set, so that it reaches the condition of Figure 2.

The package with its sides thus closed is then transferred to the end closing leg of the machine and while it is moving along such leg, the corner portions of the edge flaps are folded around the corners of the sheet stack and the upper and lower end flaps are folded into overlapping relationship with adhesive between them. The package again is stopped while the adhesive is set to bond together the upper and lower end flaps. The completed packages, as they appear in Figure 3, will then be stacked automatically for removal by a fork lift truck, when a stack of packages of the desired height has been accumulated.

The package side closing leg of the machine

As designed and as will be described the machine of the present invention is composed of two principal legs arranged at an angle, the mechanism of one leg being operative to close the sides of the carton package and the mechanism of the other leg being operative to close the ends of the carton package. In using these designations, it is assumed that the package will be of rectangular shape in plan so that one dimension is greater than the other, but the machine can be used for assembling a package of square shape. Sheet material of the type discussed above ordinarily is longer than it is wide, a very conventional size being four feet wide and eight feet long for plywood panels, for example.

As far as the operation of the machine is concerned, it would also make little difference whether the longitudinal sides or the shorter ends of the package were closed first, but it is somewhat easier to handle the package if the longitudinal longer edges of the package are closed first and the ends of the package are closed subsequently, and a machine functioning in this manner is shown in the drawings and described below. The package components, including the lower carton part, a stack of sheets to be packaged on such part, and an upper covering carton part are assembled on the package assembly table 1 of the side closing leg.

In order to place the sheets in the stack in accurate edge registry, a backing alignment bar 2 is provided lengthwise of the side closing leg and a reference stop member 3 may be provided at an end of the assembly table against which the sides and ends of the sheets, respectively, can be pressed. The end stop member 3 may be in the nature of a post, and if it is located at the end remote from the rest of the side closing leg, it can be of the fixed type or it could be located at the opposite end of the assembly table and be vertically retractable. In order to accommodate sheets of different width for packaging the backing alignment bar can be adjustable transversely of the length of the package by a lead screw 4 operatively engaged with it, which screw can be turned by the hand crank 4'. Such adjustment will enable the com-

ponents of the package to be located accurately in centered position prior to being fed to the package closing components of the machine.

The lower carton part can rest on transport devices which preferably are not powered. Three such devices, including a center device 5 and side devices 5' are shown in Figure 4, and in Figure 5 these devices are shown as lines of roller conveyors. Such conveyors deter movement of the package transversely of its path of movement through the machine. In order to enable the longitudinal edges of the stack of package components to be supported accurately, it is preferred that the two outer lines of roller conveyors 5' be movable simultaneously, and to the same extent toward or away from the central fixed line of roller conveyors. The backing alignment bar 2 may be connected for movement with the adjacent conveyor line 5'. Such conveyor lines will extend to a location adjacent to the side closing section of the machine, and may be carried by a lead screw 6, which is connected by a chain 6' with the lead screw 4 so that these lead screws will be rotated conjointly by turning crank 4'. Simultaneous and equal rotation of the two lead screws 4 and 6 thus interconnected will effect conjoint and equal adjustment of the two side roller conveyor lines 5'.

Side closing and adhesive applying section

The structure of the side closing and adhesive applying section is shown best in Figures 4 to 10, inclusive. When the assembled stack of package components is pushed from the assembly table 1 toward the side folding section, the upper and lower carton parts will be engaged between power driven upper belts 7 and 7' and lower belts 8 and 8'. All of these belts are backed by rollers 9 which hold the belts against deflection by engagement with the package.

It is preferred that each upper and lower set of belts include three belts. The central lower belt 8 is mounted stationarily so that it cannot be shifted either horizontally or vertically, transversely of its length. The upper central belt 7 is mounted so that it can be moved up or down so as to engage tightly packages of various thicknesses supported on the lower belts. The outer belts 8' are mounted for movement conjointly with the upper outer belts 7' toward or away from the central belts so that for packages of different widths the belts 7' and 8', respectively, can engage and clamp tightly the edge portions of the sheet stack and carton members lengthwise of the package.

To enable the upper series of belts 7 and 7' to be moved simultaneously vertically toward or away from the lower belts 8, 8', such upper belts are mounted on transverse beams 10 at one end and 11 at the other end of the belt carrying structure. These beams are slidably guided for vertical movement on frame columns 12 and their ends are secured to the longitudinal beams 13, extending along opposite sides of the frame. The longitudinal beams are supported adjacent to opposite ends by rods 14 connected to the ends of chains 15 shown in Figures 5 and 6. These chains extend upwardly over sprockets 16 mounted on the upper ends of the columns 12 and are then directed toward the center of the machine.

The inner ends of the chains 15 are anchored to rods 17, secured respectively to nuts 18, threaded on horizontal screws 19 rotatably mounted in suitable bearings. The screws at one side of the machine will have left-hand threads and the screws at the other side of the machine will have right-hand threads. The screw shafts adjacent to opposite ends of this section of the machine are interconnected for conjoint rotation by a chain 20 engaging sprockets 20' on the two shafts, so that all the screws 19 will be turned simultaneously to the same degree for raising and lowering all chains 15 and rods 14 equal amounts. When the supporting mechanism for belts 7 and 7' is adjusted, therefore, the entire supporting mechanism including transverse beams 10 and 11 and longitudinal beams 13 will move as a unit.

Since it is desirable for the belts 7' and 8' to engage the longitudinal edge portions of the package, provision is made for adjusting each pair of belts 7', 8' horizontally toward and away from the central belts 7, 8. Moreover, such adjusting mechanism will move the pairs of side belts at opposite sides of the center belts simultaneously toward the center belts or simultaneously away from the center belts to the same degree. Such lateral spacing adjusting mechanism is shown best in Figures 8 and 9, and to some extent in Figures 5 and 11. The lower central belts 8 are fixedly supported on the fixed transverse beams 21 and the mountings for belts 8' are slidably supported on such beams.

A lead screw 22 extends transversely of the machine adjacent to each transverse beam 21 and is engaged with a nut 22' secured to the belt supporting mechanism. The threads on opposite ends of screw 22 are oppositely directed, as shown in Figure 8, and the screws adjacent to opposite ends of this section are interconnected by a chain 23 shown in Figures 8, 9 and 10. One of the lead screws is driven by the chain 24, shown in Figures 5 and 11, and this chain is driven by a driving chain 25 turned by a sprocket on speed reducing mechanism 26 powered by motor 27 which will be of the reversible type.

If it is desired to vary the spacing of the belts 8' therefore, the motor 27 will be energized to drive the chains 25, 24 and 23 in one direction to turn the lead screws 22 so that the belt supports adjacent to opposite ends of the belts will be moved toward each other such as from the position shown in Figure 8 to that of Figure 9, or vice versa, such as from the position of Figure 9 to that of Figure 8. Belts 7' must be moved simultaneously with belts 8' and the belts 7' are supported on carriages 26 which run on transverse beams 10 so that they also can be shifted along such beam. The carriages 26 are interconnected with the lower side belt supports by posts 27 which are secured to the lower mechanism adjustable by rotation of the lead screws 22, as shown in Figures 8 and 9, and which extend upward through apertures in plates 28 secured to the carriages 26. It will be evident that whenever the lower mechanism is moved lengthwise of beam 21 by rotation of screw 22, each post will shift its plate 28 and carriage 26 correspondingly. Because this post extends through a hole in the plate 28 in each instance however, it will not interfere with upward and downward movement of the beams 10 and 11 and upper belt system.

In order to make sure that the upper belts 7' will be in precise registry with the lower belts 8', the post engaging plate 28 can be adjustably secured to the carriage 26, in each instance, by bolts 29 slidable in slots 29' in the carriage as shown in Figure 8. By these connections adjacent to opposite ends of each belt 7' the alignment of such belts can also be altered to bring them into parallelism with the belts 8'.

It is preferred that all of belts 7, 7', 8 and 8' be powered and consequently it is important that they all be driven at the same speed. It is desirable, therefore, for such belts to be driven from the same power source and it will be necessary for the drive arrangement to be effective in various in and out adjusted positions of belts 7' and 8' and various vertically adjusted positions of belts 7, 7'. The upper and lower belts are all driven by the motor 30, shown in Figure 5, which drives chain 31 through a speed reducer 32. This chain drives directly sprocket 33 on shaft 34 on which the belt pulleys at one end of this machine section are mounted for carrying belts 8 and 8'. While the pulley for belt 8 may be secured to this shaft, the pulleys for belts 8' will be slidably keyed to such shaft so that they can be adjusted along it.

In Figure 10 the mechanism for driving the upper belts 7 and 7' from the lower shaft 34 is illustrated. The end of this shaft opposite that carrying sprocket 33 has mounted on it a sprocket 35 shown in Figure 10. The upper shaft 36 carries a sprocket 37 of the same size and these sprockets are interconnected by the chain 38. Idler

sprockets are then provided for maintaining chain 38 sufficiently tight to effect driving engagement with the sprockets 35 and 37 in various adjusted positions of the upper belts relative to the lower belts. For this purpose, an idler sprocket 39 is mounted on an upper channel 13 adjacent to the shaft 36 and another idler sprocket 40 is mounted on a slide 41 guided in ways 42 for sliding lengthwise of the beam 13. A spring 43 connected between the slide 41 and an anchor 44 on the beam 33 urges the sprocket 40 away from the sprocket 39.

As the chains 15 are driven to raise the beams 13, the spacing between shafts 34 and 36 will increase requiring a greater length of chain extending between the sprockets 35 and 37. The vertical component of the length of chain between sprockets 35 and 40 also will increase correspondingly. Such increase in length will be compensated for by the reduction in the length of chain connecting sprockets 39 and 40 and in the horizontal component of the chain connecting sprockets 35 and 40. Such reduction is afforded by movement of the slide 41 to the left, as seen in Figure 10, in opposition to the tension of spring 43. On the other hand, if the chain 15 and rod 14 alongside each column 12 is lowered to lower the beams 13, the vertical length of the chains between sprockets 35 and 37 and between sprockets 35 and 40 will be reduced, while the horizontal length of the chain between sprockets 39 and 40 and between sprockets 35 and 40 will be increased. Such increase will be effected by spring 43 pulling slide 41 to the right, as seen in Figure 10, to maintain substantially a constant tension on the chain 38 in all adjusted positions of the beams 13.

As the carton components are moved from the assembly table 1 into the space between the upper and lower belts 7, 7', 8, and 8', the side flaps of the upper carton part *uc* and of the lower carton part *lc*, as seen in Figure 5, will be moved into engagement with positive guide strips. Thus the side flaps of the upper carton part will be guided beneath the strips 45, shown in Figures 5 and 8, and the flanges on the lower carton part will pass between an upper strip 46 and a lower strip 47, shown in Figures 5 and 8. As seen in Figures 8 and 9, all of these strips 45, 46, and 47 are supported for movement with the adjacent lower belt 8' so that if this belt is adjusted properly to engage the edge portion of the package, the flaps of the carton parts will engage these strips.

It will be noted in Figure 5 that the leading end of the strip 45 is inclined upward to insure that the flap of the upper carton part will ride under this strip even though the package parts are not pressed tightly together. The right end of this strip is twisted from a horizontal position into a vertical position so that the upper carton part flap engaging beneath it will be folded downward progressively alongside the edges of the sheets as the package moves into this portion of the machine. The flap of the lower carton part, on the other hand, received between strips 46 and 47 will be held in a horizontal position, and in such position will be moved between strip heaters 48 to warm the flap before the glue is applied to it.

After the side flap of the upper carton part has been folded downward, adhesive will be applied to the upper surface of the lower carton flap by glue applying mechanism, illustrated in Figures 5 and 7. Such glue applying mechanism is mounted on each beam 49 supporting a belt 8', so that the adhesive applying mechanism will be adjustable simultaneously with the belts 8' and thus always place the adhesive on the carton flap in the same position. Such glue applying mechanism includes a roll 50, seen in Figures 5 and 7, which is supplied with adhesive from a reservoir 51. The roll 50 is rotated by chain 52 in turn driven by chain 53 which is driven by tightener pulley mechanism for the belt 8'. To keep the belt 8' tight, it makes an S-turn around pulleys 54 and 55. The shaft 56 of pulley 54 carries the drive sprocket 57 for the adhesive applying roll drive chain 53.

The actual tightener mechanism for the belt 8' includes the bracket 58 which is carried by the end of a screw 59 adjustably secured in a plate 60 secured to the tightening roll supporting mechanism mounted on the beam 49. Bracket 58 supports an end of shaft 61 on which roll 55 is mounted and a similar mounting arrangement will be provided for the other end of this shaft. By adjusting screws 59 the pulley 55 may be shifted lengthwise of the belt 8' to tighten it to the desired degree. A similar S-curve tightener arrangement is provided for each of the upper belts 7 and 7', designated 62 in Figure 5.

As the side flaps pass the adhesive applying station, the flap of the upper carton part on each side will be pressed against the edge of the sheet stack and warmed by strip heaters 63. The lower side flap will be supported by strip 64, the right end of which, as seen in Figure 5, twists from horizontal position to vertical position, so that the flap moving in engagement with it will be folded upward into engagement with the downwardly folded upper flap with adhesive between them.

Adhesive setting section of side closing leg

From the side flap folding and adhesive applying section of the side closing leg of the machine, the package is transported into the adhesive setting section of the side closing leg by the belts 7, 7', 8 and 8'. It will be understood that such belts have exerted sufficient pressure on the package to maintain it flat and compact during its movement through the flap folding and adhesive applying section. It is important that the package be maintained in such flattened compact condition until the adhesive between the side flaps has been set. Consequently, in the adhesive setting section, upper transport belts 65 and 65' and lower transport belts 66 and 66' are provided in continuation of the belts 7, 7', 8 and 8', respectively, both to maintain the package in its flat compressed condition and to transport it. In general, the belt arrangement in this section is similar to that in the section previously described, both as to the manner in which the belts are supported for adjustment and the manner in which they are driven.

In Figure 12, the belts 65 and 65' and the belts 66 and 66' are backed by rollers 67 and the upper belts are mounted for vertical adjustment on transverse beams 68 and 69, as seen in Figure 11, adjacent to their opposite ends. These beams are guided for vertical movement by columns 70 of the machine frame and are supported by rods 71 carried by the lower ends of chains 72 and attached to the beams 73 extending lengthwise of the machine, to opposite ends of which the transverse beams 68 and 69 are attached. In order to adjust the spacing between the upper belts 65, 65' and the lower belts 66, 66', therefore, the entire beam frame 68, 69, 73 is raised and lowered by movement of chains 72 in synchronism with the movement of chains 15 in the flap folding and adhesive applying section.

The chains 72 pass over sprockets on the upper corners of the machine, as shown in Figure 11, and are connected to screw actuators of the type shown in Figures 8 and 9. The screw actuators at opposite ends of this section are interconnected by a chain 74 and the left lead screw shaft in Figure 11 is connected by a chain 75 to the right lead screw shaft in Figure 5, so that the lead screw shafts for effecting vertical adjustment of the upper rolls 7, 7' of the flap folding and adhesive applying section are positively connected for coordinated turning with the lead screw shafts for adjusting the elevation of the upper belts 65 and 65' in the adhesive setting section. All of these chains 20, 75, and 74 are driven by the drive chain 76, in Figures 10 and 11, which is driven by the speed reducer 77 powered by the motor 78. Elevational adjustment of all of the upper belts in the side closing leg is therefore effected simultaneously by driving motor 78 in one direction or the other, depending upon whether it is desired to raise or to lower such belts.

Movement of belts 65' and 66' toward or away from the

central belts 65 and 66 simultaneously is effected in much the same manner as the corresponding adjustment of belts 7' and 8' as described above. Thus the belts 65' will be mounted on frames supported on carriages 79, indicated in Figure 11, and these carriages will be moved in and out by posts 80 which are secured to the slides supporting the lower adjustable belts 66'. Such lower adjustable belts are moved transversely of their lengths by rotation of shafts 81, driving lead screws similar to the lead screws 22 shown in Figures 8 and 9. The lead screws at opposite ends of this section are interconnected by chains 82, shown in Figure 10. Because of the interconnection between the lead screws 81 and the lead screws 22 by chain 24, Figure 11, the belts 7', 8', 65' and 66' will all be moved transversely simultaneously and to the same extent.

The belts 65, 65', 66 and 66' of the adhesive setting section of the machine are driven by the motor 83 through the speed reducer 84 and chain 85. This chain drives sprocket 86 which turns shafts 87 on which the belt drive pulleys are mounted. Belt tighteners 88 maintain the lower belts 66 and 66' under proper tension. The upper belts 65 and 65' are driven from the lower belt drive by mechanism like that shown in Figure 10. Belt tighteners 89 are also provided for each of the upper belts.

When the package with its side flaps folded has been moved into the side sealing section while still held compacted by the upper and lower belts 65, 65', 66 and 66', the drive motor 83 is stopped so that the side closing operation may be completed. Such operation is completed by simultaneously heating and pressing the flaps along the entire length of each side. The mechanism for accomplishing this operation is shown in Figures 11 to 16, inclusive. The heating and pressure applying mechanism is carried by a slide 90 at each side of this section which is connected to the slides for belts 66' so that the heating and pressure mechanism is adjusted outwardly and inwardly with transverse adjustment of the belts 66'. Such mounting will insure that the heating and pressure mechanism will always be disposed in proper relationship to the side of a package compacted between the upper and lower belts.

The heating and pressure mechanism is composed of a gang or series of short plates 91 arranged close together along the length of the package. Each plate carries an electric resistance heating element 92 which will heat the plate. Each plate is supported by upper and lower rods 93 and 94 slidably supported in the flanges of upper and lower channel beams 95 and 96. A compression spiral spring 97 encircles each of these rods and reacts between a collar 98 on the rod and the flange of the channel beam remote from the heating plate 91. If desired a second compression spring 99 may be provided around each rod between the heating plate and the flange of each channel closer to the pressure plate.

The channel beams 95, 96 supporting the pressure plate assembly are mounted for movement transversely of the direction of movement of the package and relative to the belts 66'. Such movement is effected by a plurality of spaced hydraulic piston and cylinder actuators 100 connected at intervals to the channel beams as shown in Figure 11. While such actuators may be of the double acting type so as to operate both to move the beams away from the actuators and to draw the beams toward the actuators, the mechanism is somewhat simpler if the actuators are of the single acting type so as to move the beams only away from them. The beams may be returned toward the actuators by tension springs 101 secured between the beam frame and the support 102 for the actuators 100. While the fluid pressure actuators can be of either the hydraulic or pneumatic type, the pneumatic type is preferred.

Figures 12 to 16, inclusive, illustrate the operation of the pressure mechanism. In Figure 12, the side pressure mechanism is shown retracted and there is no package in the adhesive setting section of the machine. In Figures 13 and 14, a package has been moved into the adhesive setting section, but the pressure plates are still in retracted position. In Figures 15 and 16, fluid under pressure has been supplied to the actuators 100, which have shifted the channel beams 95, 96 to the left so that the pressure plates 91 are pressed against the folded side flaps of the package. The degree of pressure thus exerted by the individual plates 91 is indicated by the fact that both the springs 97 and the springs 99 are compressed, and the actuator 100 has not been extended to the left its full stroke. Pressure will thus be exerted for a predetermined period established by suitable timing mechanism.

It is desirable for the pressure plates 91 to be tiltable slightly relative to the guide rods 93 and 94 to insure that they seat flat on the side of the package. In addition, the pressure along the package side throughout its length will be uniform despite slight irregularities, because each plate can move in or be held out or tilt relative to adjacent plates. The series of heating plates will be long enough to accommodate the longest package which can be handled by the machine, and those plates beyond the ends of the package simply will not be altered in position relative to the beams 95, 96 as these beams are reciprocated by the actuators. It is desirable to provide hooked limit stop arms 103 secured to beam 95 to engage the actuator supporting structure 102 if the actuators 100 should be energized when there is no package in the side sealing section of the machine. For short packages one end actuator can be turned off.

When the side sealing operation has been completed and the beams 95, 96 have been returned to their outer positions, the drive motor 83 for belts 65, 65', 66 and 66' may again be energized to move the package out of the side sealing section and onto a transfer section for passage through the end closing leg of the machine.

Transfer section

The transfer section of the machine is shown best in Figures 17 to 23, inclusive, although this section is shown generally in plan in Figure 4. The package is moved from the belts of the side adhesive setting section onto the rolls 104 of the transfer section. Because the carton sides have now been bonded together securely it is not necessary that compacting pressure be maintained on the package. The rolls 104 are driven by the motor 105 and speed reducer 106 which drives the chain 107 meshing with sprockets 108 on all the roll shafts. Such movement of the rolls carries the package to the right as seen in Figure 17 until the edges of the sheets within the package end engage the plunger 109. This plunger is shifted to the right by such package engagement to actuate the stop switch 110 seen in Figure 17 for deenergizing roll drive motor 105.

Prior to discharge of the package from the side adhesive setting section the position of plunger 109 will have been set by the operator depending upon the length of the packages being handled. Thus the position of this plunger can be established by moving along beam 111 a box 112 containing a nut which is threaded on lead screw 113 extending longitudinally through the beam. This lead screw can be rotated by the chain 114 driven by shaft 115 shown in Figure 23 which may be rotated by power means described hereafter.

Also slidably mounted on the beam 111 is the slider 116 which is connected to the box 112 by the double acting fluid pressure piston and cylinder actuator 117 which preferably is of the pneumatic type. The plunger 109 is mounted on the slider 116. When the package engages the plunger to actuate switch 110, not only does such switch actuation deenergize motor 105 but the actuator 117 will also be energized to shift the slider 116 to the right along beam 111 from the position shown in Figure 17 to that of Figure 18. Such movement will

retract the plunger 109 out of the end of the stopped carton package even though the plunger is returned toward the left relative to the slider 116 by return springs 118 in Figure 19 to release switch 110. The package will then be ready for movement in a direction perpendicular to its previous path of movement so as to proceed along the end closing leg of the machine.

The box 112 will have been adjusted along the beam 111 so that the package will be stopped with its center disposed immediately above belt 119. This belt and ball bearing wheel conveyors 120 extending parallel to the rolls 104 are mounted on beams 121 movable vertically by fluid pressure piston and cylinder actuators 122, preferably of the pneumatic type. Such actuators, also controlled by switch 110, will lift the beams 121 from the position shown in Figure 21 in which the belt 119 and ball bearing wheel conveyors 120 are located below the upper surfaces of rolls 104 to positions in which such ball bearing wheel conveyors and belt are disposed above the upper sides of such rolls so as to lift the package off the rolls. When it is desired to feed the package into the end closing leg of the machine, therefore, the belt 119 will effect such package movement.

End flap folding and adhesive applying section

The end flap folding and adhesive applying section mechanism is much the same as the mechanism of the side flap folding and adhesive applying section. A principal difference is that the center lower transport belt constitutes a continuation of the belt 119 which extends through the transfer section as described above. In order that this belt may be depressed below the upper sides of the rolls 104 the belt is guided under the backing roll 123 as shown in Figure 20 and over the backing rolls 124. Movement of the center belt 119 will shift the package into the space between the three lower belts 119 and 119' and the three upper belts 125 and 125' as seen in Figure 24.

Prior to such entrance of the package between these upper and lower belts the vertical spacing between such belts will have been adjusted appropriately to conform to the thickness of the package by vertical adjustment of the transverse beams 126 which are carried by the longitudinal beams 127 supported by the rods 128 and chains 129. These chains are adjustable by rotation of the lead screws 130 effected by the chains 131 in a manner similar to the vertical adjustment described for the upper rolls in the side flap folding and adhesive applying section and in the side adhesive setting section.

Also the belts 119' and 125' will have been adjusted to the proper spacing from the central belts 119 and 125 to accommodate a package of the particular length being handled by suitably driving chains 132 and 133 to move the lead screws for shifting the slides carrying lower side belts 119'. The upper side belts 125' will be moved correspondingly because they are supported on carriages 134 connected to the lower slides by posts 135 which type of structure has been described in greater detail in connection with the side flap folding and adhesive applying section mechanism. The drive shaft 115 shown in Figure 23 may be that carrying the lead screw at one end of belts 119' so that the chain 114 will be driven in synchronism with the chains 132 and 133 to turn lead screw 113 for shifting the box 112 to the same extent inward or outward that belts 119' and 125' are shifted relative to belts 119 and 125.

In the end flap folding and adhesive applying section in addition to folding the end flaps and applying adhesive between them, it is necessary to tuck in the corner flaps. For this purpose tucker wheels 136 are provided which are mounted on the slides carrying the belts 119'. These wheels are driven by motors 137, also mounted on such slides, through twisted V-belts 137'. When the package is first pushed into the end closing leg the wheels 136 are stationary and movement of the leading corner flaps past them will tuck the corner flaps in so that downward folding of the upper flap will hold it in place. As the trailing side of the package reaches the trucker wheels they will be rotated briefly to kick the corner flaps in until they are held by the upper end flaps being deflected downward.

In passing through the end flap folding and adhesive applying section the upper flaps will engage twisted strips to fold them downward, the lower flaps will be held horizontal initially, glue will be applied to them and finally the lower flaps will be engaged with a twisted strip to fold the lower flaps upward into position overlapping the downwardly folded upper flaps just as in folding the side flaps in the side flap folding and adhesive applying section. Consequently, the flap folding strips and adhesive applying mechanism has not been shown in detail in the end flap folding and adhesive applying section. The adhesive applying roll will be driven by the belts 119' in a manner corresponding to the drive of adhesive applying rolls by the belts 8' in the side flap folding and adhesive applying section.

As in the side closing leg of the machine, the upper and lower belts in the end closing leg of the machine will be adjusted simultaneously and equal in amounts in the end flap folding and adhesive applying section and in the end adhesive setting section. The belt supporting mechanism and adjusting mechanism shown in Figure 25 is entirely comparable to that described previously and it is believed to be unnecessary to repeat that description here. Moreover, the drive mechanism for the belts 119, 119', 125 and 125' effected by the motor 138 through speed reducer 139 and chain 140 is the same as shown in Figures 5 and 10 for the side flap folding and adhesive applying section belts.

End adhesive setting section

As has been mentioned, the belts of the end adhesive setting section will be adjusted both vertically and transversely of the path of package movement in synchronism with the belts in the end flap folding and adhesive applying section and by mechanism like that described above in connection with the side closing leg of the machine.

In addition the end adhesive setting mechanism is quite comparable to the side adhesive setting section mechanism in that a series of pressure plates 141 is provided along each end of the package which is comparable to the series of pressure plates 91 shown in Figures 13 to 16. Moreover, the plates of this series are mounted on upper and lower beams 142 and 143 of channel shape comparable to the beams 95 and 96 of the mechanism shown in Figures 13 to 16. The pressure plates of the end adhesive setting section are heated and actuated in the same manner as described in connection with the side adhesive setting mechanism. The drive mechanism for the upper and lower transport belts for the end adhesive setting section will be separate from the drive mechanism for the other sections and such belts will be driven by motor 144 driving chain 145 through the speed reducer 146. Again the drive for the upper and lower belts will be comparable to that shown in Figure 10.

When the package ends have been sealed the belt driving motor 144 again will be energized to discharge the completed package from the end closing leg of the machine. It will be difficult for the belts to move the package completely beyond the end adhesive setting section and to effect such movement package discharge plungers 147 shown in Figures 26 and 27 are provided. As a package is moved through the end adhesive setting section by the transport belts it will ride on plates 148 overlying the plungers 147 and depress them.

Each plunger 147 and plate 148 are mounted on pivot 149 to swing between the full line position shown in Figure 26 and the full line position shown in Figure 27. Normally the plunger and plate are held in their upper positions by spring 150 pulling upward on the lower end of arm 151. The upward movement of the plunger and

plate thus effected is limited by a stop lug **152** engaging with a stop bracket **153**. Downward swinging of the plate will cause the plunger to engage switch arm **154** of switch **155** which will control the supply of fluid under pressure to the cylinder of the plunger **147**. The plunger actuator is preferably of the pneumatic type.

When the trailing end of the package has passed over the end plate **148** the spring **150** will return the plunger and plate from the lower position of Figure 27 to the upper position of Figure 26. By such movement the switch arm **154** will be released which will effect supply of fluid under pressure to the plunger actuator for driving the plunger outward into the broken line position of Figure 27 which will complete the discharge of the package from the end closing leg of the machine. When the plungers have thus been extended fully the supply of fluid to their actuators will not be reversed to retract the plungers again to the position of Figure 26 until the following package approaches such discharge mechanism but before it has depressed plate **148**.

Package accumulating elevator

Each package discharged from the end closing leg of the machine by the plungers **147** will be expelled into an accumulating elevator mechanism. This elevator is composed of four columns **156** carrying superstructure **157** on which is mounted mechanism for supporting and for raising and lowering the vertically movable platform **158**. As shown in Figure 30 this platform is supported at its corners by rods **159** connected to the ends of chains **160** which pass upward over sprockets on parallel shafts **161** at opposite ends of the machine. These shafts are connected for conjoint rotation by chains **162** and one of these shafts is rotated positively by the drive mechanism including chains **163** and **164** connected through a countershaft **165** to the speed reducer **166** driven by motor **167**.

To assist the drive mechanism **163**, **164**, **166** and **167** in carrying the weight of the platform **158** and a load on it two or more counterweights **168** may be provided. These counterweights are shown supported jointly by the ends of two chains **160** opposite the ends of such chains attached to rods **159** and by cables **169** connected to the ends of the chains **160**, respectively, at the opposite end of the elevator. Alternatively, a separate counterweight could be supported by each of the chains **160**.

A load of completed packages will begin to be accumulated on the elevator platform **158** when it has been raised to its uppermost position shown in Figure 28. The first package discharged from the end closing leg will be pushed by the plungers into the position shown in dot and dash lines in Figure 28 which will result in shifting control bar **170** to the right and downward as seen in this figure and swinging control arm **171** upward from the full line position of Figure 28 to the broken line position. Such swinging of arm **171** will initiate downward movement of the elevator and such movement will continue downward until the arm **171** has dropped again from the broken line position of Figure 28 to the full line position. Downward movement of the elevator platform will then be interrupted until the next package has been discharged from the end closing leg of the machine onto the first package which will have again raised the control arm **171**.

Successive packages are thus discharged onto the elevator platform and it is moved downward step by step until a stack of packages has been accumulated to the full extent desired as shown in Figure 29. At that time further downward movement of the elevator will be interrupted by suitable limit switch mechanism. As the elevator platform reaches the limit of its downward movement the brake mechanism **172** will also be applied to terminate downward movement of the elevator platform abruptly. As indicated in Figure 29, however, the platform will have descended far enough to located its upper surface below the upper surfaces of rolls **173** mounted on stationary bars **174** so that the stack of packages will be resting upon and supported by such rolls.

When the stack of packages is thus supported on the rolls pusher mechanism will push the stack of packages out of the elevator framework so that the platform **158** can be raised again to begin accumulating a further stack of packages. Such pusher mechanism includes the lug **175** preferably of angle shape which is mounted on chain **176**. One end of this chain is secured by anchor **177** and from such anchor the chain passes around a sprocket **178** carried by the plunger **179** of a fluid pressure piston and cylinder actuator **180**.

From sprocket **178** the chain passes around two fixed sprockets **181** and **182**. Such latter sprocket is mounted on the end of guide ways **183** in which the pusher lug **175** is guided for movement. The chain then passes around sprocket **184** mounted on the opposite end of the ways **183** from sprocket **182** whence the chain passes in a return bend back alongside ways **183** and around a second sprocket **185** carried by the plunger head **179**. The other end of the chain is then anchored to the actuator **180**. As the plunger is moved from the position shown in Figure 30 to the position shown in Figure 31 in the direction indicated by the arrow, the lug **175** is moved twice as far as the plunger moves so as to eject the stack of packages from the rolls **173** and out of the frame of the elevator to the broken line position shown in Figure 29.

Actuation of the fluid pressure actuator **180** which preferably is of the pneumatic type is accomplished automatically by lowering of the elevator to its lowermost position. The elevator platform carrying the package stack has a pin **186** mounted beneath it on a plate. This pin will engage and swing the valve control arm **187** when the elevator reaches its lowermost position and thus actuate the control valve **188** to supply fluid under pressure to the actuator **180** in a direction to project the plunger **179**. When the lug **175** has travelled to the end of its path on ways **183** the stack of packages will have been pushed far enough to coast on out of the elevator frame to a location where it can be picked up by a fork lift truck. The plunger can engage a limit switch to return the valve **188** to the position in which the fluid under pressure will be admitted to the opposite end of the actuator **180** for retracting the plunger and the package stack ejecting lug **175** again to the positions of Figure 30 from the positions of Figure 31 or farther projected position; or such return can be effected by control mechanism operated by raising of the elevator.

Automatic control

It is desired that the packaging machine described above be operated automatically as far as possible. In order to operate the machine at its maximum capacity it is preferred that simultaneously one package be stopped in the end adhesive setting section of the end closing leg of the machine, a second package be on the transfer section ready to be started into the end flap folding and adhesive applying section of the end closing leg, a third package be in the side adhesive setting section of the side closing leg and a fourth package be in the process of being assembled on the package assembly table.

With packages thus located the timing should be as follows.

(1) The setting of the adhesive having been completed in the end adhesive setting section the transfer belts in the end closing leg will be energized to discharge the package from the end adhesive setting section and feed the package from the transfer section into the end flap folding and adhesive applying section.

(2) When the package has thus been cleared from the transfer section the transfer belts of the side closing leg will be started to move the package from the side adhesive setting section to the transfer section and to move the newly assembled package from the package assembly

table into the side flap folding and adhesive applying section.

(3) By the time the package from the side adhesive setting section has reached the transfer section belt **119** and ball bearing wheel conveyors **120** will have been depressed again to allow the package to come to rest on the transfer section by deenergization of the roll drive motor **105**.

(4) When the package moving through the end closing leg of the machine has reached the end adhesive setting section the drive motors **138** and **144** for the transport belts in the end closing leg will be deenergized and the pressure plates will be clamped against the package ends.

(5) When the package being moved through the side closing leg of the machine by the transport belts has reached the side adhesive setting section the belt drive motors **30** and **83** will be deenergized to arrest movement of the package in the side adhesive setting section and the pressure applying actuators **100** will be energized to clamp the package in that section for setting the adhesive.

(6) As soon as the assembled package components have been moved from the package assembly table into the side flap folding and adhesive applying section of the side closing leg to clear the package assembly table, components for the next package including a lower carton part, a stack of plates, and an upper carton part will be assembled on the package assembly table ready for movement into the side flap folding and adhesive applying section. The circuit diagram for supplying power to the various drive motors and operating components is shown in Figure 34 but it is preferred that the timing sequence of the operations discussed above be effected by proper location of the various control switches in the machine rather than relying primarily on timing devices although it is necessary to provide certain interlocking controls so that movement of the packages cannot be effected until after the required time interval for setting the adhesive in the side adhesive setting section and in the end adhesive setting section has expired.

Turning to the wiring diagram of Figure 34 a master switch **200** is provided which will control positively all of the motor circuits. In addition individual switches are provided for the various motors which can be disengaged when it is desired to work on a particular motor. Thus switch **201** is the safety switch for the side leg vertical adjustment motor **78** and switch **202** is the safety switch for the end leg vertical adjustment motor **78'**. Switch **203** is the safety switch for the side leg adhesive applying section belt drive motor **30** and **204** is the safety switch for the end leg adhesive applying section belt drive motor **138**. Safety switch **205** will control the side leg horizontal adjustment motor **27** and safety switch **206** will control the end leg horizontal adjustment motor **27'**. Safety switch **207** will control the drive motor **83** for the side leg adhesive setting section belts and safety switch **208** will govern the drive motor **144** for the end leg adhesive setting section belts. Safety switch **209** will control the motor **105** for the transfer rolls. Switch **210** is the safety switch for the accumulating elevator drive motor **167**. Normally all of these switches **200** to **210**, inclusive, will be closed even though no motor is in operation.

Energization of the various drive motors is controlled by either manual push-button switches or by relay switches energized through a separate control circuit having in it a master switch **211**. The main starting switch **212** and the main stop switch **213** are the principal switches in the control circuit but certain components of the machine may be operated without closing this main control switch. Thus the vertical adjustment of the belts in the side leg of the machine can be varied by moving reversing switch **214** in one direction or the other to control motor **78** and the vertical spacing between the belts in the end leg can be adjusted in one direction or the other by manipulation of the manual reversing switch **215** to control motor **78'**. Also, either or both of switches **216** and **217** can be closed to cause the strip heaters **48** and **63** in the side leg adhesive applying section and in the end leg adhesive applying section to be heated. Similarly either or both of switches **218** and **219** may be closed to cause the resistance heaters **92** for plates **91** in the side leg pressing section and in the end leg pressing section to be heated.

The starting switch **212** controls all the moving parts of the machine with the exception of the motors for adjusting the vertical spacing of the belts. Preferably this switch is of the momentary contact type and control relays are relied upon to maintain the circuit energized. Thus, closing of starting switch **212** will energize the main relay **220** which includes a circuit for each of the motor conductors and a holding circuit in the control circuit so that when the switch **212** is released the holding circuit will maintain the relay energized. Immediately motors **30** and **138** will be energized to drive the belts in the side leg adhesive applying section and in the end leg adhesive applying section. These motors will continue in operation until the circuit through relay switch **220** is deenergized.

Deenergization of the circuit through the main motor control relay **220** is effected by opening the normally closed push-button stop switch **213** which is in the holding circuit of the relay. In addition to being able to push the push-button switch **213** at will to shut down the machine, it is highly desirable to provide an emergency stop arrangement which is readily accessible to the workman feeding packages to the machine. Normally this workman will control operation of the machine so that the start-stop switch **212**, **213** should be located adjacent to the package assembly table **1**. An emergency stop switch actuating device can be provided at this location in the form of a bar **221** extending entirely across the machine as shown in Figures 4 and 5 at a location convenient for operation either by a hand, arm, leg or body of the workman. Movement of this bar would immediately deenergize the motors **30** and **138** and any other motors which might be operating with the exception of the motors **78** and **78'** for setting the vertical spacing between the belts which normally would not be operated while a package is being fed into the machine.

When there is no package in the machine relay **222** normally will be energized through a control circuit so that the belts in the side leg adhesive setting section will be driven by energization of motor **83** as soon as the starting switch **212** is closed. Similarly, the relay **223** normally will be energized through a control circuit so that as soon as the start switch **212** is closed the belts in the end leg adhesive setting section will be driven by energization of motor **144**. Energization of relay **222** will also energize relay **224** in the circuit of motor **27** which will condition it for operation in either direction by manipulation of switch **225** to adjust the lateral spacing of the glue applying, flap folding and pressing mechanism at opposite sides of the side closing leg. Similarly, energization of relay **223** will energize relay **226** conditioning motor **27'** for energization by closing of switch **227** in one direction or the other for the purpose of varying the spacing of the glue applying, flap folding and press mechanism at opposite sides of the end closing leg.

Also, if the machine is started with no package in it relay **228** will be energized by a control circuit so that the transfer drive motor **105** driving rolls **104** shown in Figure 17 will be energized. Relays **229** and **230** controlling the energization of elevator drive motor **167** for upward and downward movement, respectively, will, however, not be energized unless the machine had previously been shut down while the elevator was in operation. The brake **172** shown in Figure 30 will, however, be in its applied condition because this brake is released

by energization of solenoid valve **231** only when the circuit of motor **167** is energized and otherwise the brake is held applied by the spring shown in Figure 30.

As previously mentioned, automatic control mechanism is provided for stopping the belts **65**, **65'**, **66** and **66'** of the side adhesive setting section. When a package of sheets has been moved into it fully the actuators **100** are energized to move the plates **91** into engagement with opposite sides of the package, such actuators are thus maintained energized for a predetermined time interval, thereafter the actuators are deenergized and the plates **91** are returned outward by the springs **101** shown in Figures 13 to 16, and finally the belts are restarted to move the package on into the transfer section. The wiring to effect such control is designated "side leg press control" in Figure 34.

This control sequence is initiated by the leading end of a package of sheets engaging switch **232** shown in Figures 4 and 12 and shifting it from a position closing one circuit in the up position of Figure 34 into a position closing the lower circuit in that figure. When in its upper position switch **232** completes a control circuit to maintain relay **222** energized for energizing in turn motor **83** to drive the belts in the side leg adhesive setting section. Depression of this switch, however, immediately deenergizes relay **222** and motor **83** so that these belts stop.

Shifting of switch **232** to its lower position will energize the relay coil **233** of a time delay relay and through the delayed opening switch **234** will energize the solenoid valve **235** which controls supply of air under pressure to the press actuators **100**. Thus the belts in the side leg adhesive setting section will stop and the heated press plates **91** will immediately be moved inward to clamp the sides of the package for setting the adhesive as previously explained. While relay coil **233** is acting on switch **234** its movement is retarded by a bellows **236** connected to the switch and such bellows will delay movement of switch **234** for the length of time during which it is desirable to maintain the heated plates **91** in engagement with the sides of the package.

When the period of delay for which the relay switch **234** has been designed or set has expired this switch will move into the lower position of Figure 34 and thereby complete a circuit by way of the lower contacts of switch **232** to reenergize the relay **222** and start the motor **83** again. Breaking of the upper circuit of switch **234** will, however, have deenergized the solenoid valve **235** so that the plates **91** will have been retracted prior to such restarting of the belts. Such movement of the belts by the motor **83** thus energized will continue until the trailing end of the package passes beyond switch **232** whereupon it will rise to its upper position, deenergizing the coil **233** of the time delay relay and allowing switch **234** to be reset from its lower position to its upper position. Even though the circuit to motor control relay **222** has thus been broken by upward movement of switches **232** and **234** a circuit will still be completed to this relay through the upper contacts of switch **232** so that the belts will continue to be driven by the motor **83**.

When the package of sheets is moved by the energized transfer rolls into engagement with the plunger **109** the switch **110** will be shifted from the position shown in Figure 18 to that of Figure 17 so that the switch will be moved from its upper position in Figure 34 into its lower position. Such movement will cause this normally open switch to close and energize coil **237** of a relay having both an instantaneously moved switch **238** and a delayed action switch **239** which delay is occasioned by a bellows **240** connected to such latter switch. Motor **105** for driving the transfer rolls **104** normally is maintained in operation by a circuit through switch **238** being closed as shown.

As soon as the relay coil **237** is energized by depression of switch **110**, switch **238** will be moved into its lower position effecting deenergization of relay **228** and motor **105** to stop the transfer rolls. At the same time solenoid valve **241** will be energized to supply fluid under pressure such as compressed air to the actuators **122** for raising the belt **119** shown in Figures 17 and 23. At the same time fluid under pressure will be supplied to the actuator **117** to shift the slider **116** for withdrawing the plunger **109** out of the end of the package. Such movement of the plunger will of course permit switch **110** to be opened again to the position shown in Figure 34 but such movement is not objectionable because relay coil **237** will remain energized through the holding circuit effected by switch **238** in its lower position and switch **239** in its upper position.

Raising of belt **119** will effect movement of the package from the transfer section toward the end closing leg of the machine and the time delay mechanism **240** of relay switch **239** will be coordinated with the speed of belt **119** so that the actuators **122** will remain in their raised positions by continued energization of solenoid valve **241** until after the package has been moved into gripping engagement with the belts of the end leg adhesive setting section. When the period of delay has expired switch **239** will be shifted by relay coil **237** into its lower position which will deenergize the relay coil **237** immediately. Breaking of the circuit through switch **239** also effects deenergization of the solenoid **241** through the relay switch circuit in parallel with the circuit controlled by switch **110** which will have opened previously upon shifting of the slider **116** to the right as seen in Figure 17 by the actuator **117**.

When a package reaches the end leg adhesive setting section the package is stopped again while the end flaps are pressed to set the adhesive behind them. To effect such package stopping and clamping the end leg press control circuit shown in Figure 34 is provided. The leading edge of the package engaging switch **242** will move it from its upper position shown in Figure 34 into its lower position. Such movement will interrupt the circuit through this switch to relay **223** controlling operation of motor **144** which drives the belts in the end leg adhesive setting section and consequently, the package will stop. It is desirable for the package when thus stopped to be located approximately centrally between the ends of the end leg adhesive setting section irrespective of the width of the package. Consequently, it is preferred that switch **242** be mounted adjustably as shown in Figure 25.

While it would be quite practical to locate switch **242** manually and directly in the desired position depending upon the width of package being processed, the location of this switch can be established more accurately and automatically by connecting it to the width adjustable members of the side closing leg. Thus, for example, the switch **242** can be slidably mounted on a guide rod **243** and a line **244** connected to it. As shown in Figures 4 and 11, one end of this line can be connected to an adjustable support **90** for a side adhesive setting section press means. A weight **245** shown in Figure 25 can be connected to the other end of this line to keep it tight. As the width of the side closing leg mechanism is reduced, therefore, switch **242** will be slid more toward the center of the end adhesive setting section. Conversely, as the width of the side closing leg mechanism is increased the weight **245** will draw the switch **242** farther from the center of the end adhesive setting section.

The adjustable arrangement for switch **242** will thus insure that when the leading edge of the package engages it to deenergize the control relay **223** of motor **144** the end leg adhesive setting section belts will stop to locate the package substantially centered in this section. Movement of switch **242** to its lower position as seen in Figure 34 not only will deenergize motor control relay **223** but simultaneously will energize coil **246**

of a time delay relay including switch **247**, movement of which is retarded by bellows **248**. Through this switch solenoid valve **249** will be energized immediately upon depression of switch **242** so as to energize the actuators of press plates **141** to clamp the package ends. Such clamping will continue until the predetermined delay period has expired and switch **247** has been shifted from its upper position of Figure 34 into its lower position.

Such movement of switch **247** will deenergize solenoid valve **249** immediately to release the press plates **141** so that they will be retracted by their retracting springs. Movement of switch **247** into its lower position will complete an energizing circuit to relay **223** through switch **242** in its lower position for reenergizing motor **144** to resume driving of the end leg adhesive setting section belts. The package will then continue to be moved by these belts until its trailing edge passes beyond switch **242** whereupon this switch will shift to its upper position shown in Figure 34 and deenergize relay coil **246**. Although switch **247** will thus be reset to its upper position breaking the circuit to relay **233** through the lower position of this switch, such relay will remain energized because a parallel circuit will be completed through contacts engaged by switch **242** in its upper position. The end leg adhesive setting section belts will therefore continue to be driven until the next package again depresses switch **242** but the press mechanism will remain deenergized because of the interruption in the circuit between the lower contacts of switch **242**.

During the movement of the package through the end closing leg of the machine it is necessary that the corner flaps at the trailing edge of the package be bent forward and tucked beneath the end flaps before they are turned as will be evident from a comparison of Figures 2 and 3. This operation is accomplished by the tucker wheels **136** shown in Figures 4 and 23 which have been described previously. These wheels are only rotated by motors **137** for a very brief interval, however, as the trailing edge of the package is passing them. Automatic control mechanism for energizing these motors at the proper time and for an appropriate period of time is illustrated at the lower right of Figure 34.

A safety switch **250** is provided for this control mechanism which may be opened to prevent energization of the motors **137** when desired. Since these motors are small, control switches **251** and **252** in series arrangement can be included directly in the energizing circuits for these motors. Also, the motors are connected in parallel so that both will operate simultaneously. Switches **251** and **252** are spaced apart lengthwise of the direction of travel of the package through the end closing leg as shown in Figures 4 and 23. Switch **251** is of the normally closed type and switch **252** is of the normally open type. Switch **251** is located a short distance ahead of the tucker wheels **136** and switch **252** is located in alignment with these tucker wheels transversely of the direction of travel of the package.

Normally the tucker wheel motors **137** will remain deenergized because of the open circuit at switch **252** even when switch **250** is closed. The leading edge of a package entering the end closing leg of the machine will depress and open switch **251** before it reaches switch **252**. Opening of switch **251** will, of course, have no effect on motors **137** nor will the subsequent closing of switch **252** by the leading edge of the package engaging it because switch **251** will still be held open by the package. As the trailing edge of the package moves off switch **251**, however, this switch will reclose and because the package will still be holding switch **252** closed the motors **137** will be energized to rotate the tucker wheels rapidly. When the trailing edge of the package has moved the short distance necessary to pass beyond switch **252** this switch will open and deenergize motors **137**. Consequently, these motors will be energized only during the short interval between movement of the trailing edge of a package beyond switch **251** and movement of such trailing edge beyond switch **252**. Rotation of the wheels **136** during such period, however, is sufficient to tuck in the corner flaps of the package so that the end flaps can be folded into overlapping relationship as shown in Figure 3.

The control circuits for the plungers **147** which discharge the packages from the end closing leg and for the elevator drive are to some extent interdependent as shown at the right of Figure 34. A safety switch **253** is provided for these circuits so that their deenergization may be assured while working on such package discharge mechanism or elevator. Both of these devices are under the control of switch **254** which, as shown in Figures 4 and 25, is located in the end adhesive setting section of the machine. Normally this switch is in its upper position in which event with switch **155** in the position of Figure 26 with its lever released will cause the solenoid valve **255** to be energized so that it will be positioned to supply fluid under pressure to the cylinders of plungers **147** for maintaining them projected as illustrated in broken lines in Figure 27. When a package reaches pressing position in the end adhesive setting section, however, it will have engaged switch **254** and moved it into its lower position thus breaking the circuit to solenoid valve **255** so that the plungers **147** will be retracted into the position shown in Figure 26 either by fluid under pressure being supplied to the other end of the plunger cylinder or by spring action.

The switch **254** will be held in its depressed position while the package is stopped during the end adhesive setting action described above so that when the package resumes its travel the plungers will remain in such retracted position. The switch **254** is located sufficiently close to the plates **148** shown in Figure 26 so that these plates will be depressed from the solid line position shown in Figure 26 to the solid line position shown in Figure 27 by the leading edge of the package before its trailing edge passes beyond switch **254**. When the leading edge of the package engages plates **148** to swing the plungers downward the arm **154** of switch **155** will be depressed to the position of Figure 27 to open switch **155**. Even though the trailing edge of the package has passed beyond switch **254** when it has reached the position of Figure 27, therefore, the solenoid valve **255** will remain deenergized because of switch **155** being held open as long as the trailing edge of the package remains in engagement with plates **148**.

As the trailing edge of the package passes beyond the ends of plates **148**, spring **150** will raise each plunger **147** releasing switch lever **154** and allowing switch **155** to close. Since by that time another package will not have reached switch **254** to open it a circuit will be completed to solenoid **255** causing fluid under pressure to be supplied to the cylinders of plungers **147** for projecting them into the broken line position shown in Figure 27 which will discharge the package fully from the end adhesive setting section onto the elevator. The plungers will then remain in such projected positions until the next package has moved into the end adhesive setting section far enough so that its leading edge will engage and depress switch **254** to effect retraction of plungers **147** again as described above.

If at the time the package is discharged from the end closing leg into the elevator as indicated in Figure 27 there are no other packages on the elevator platform **158**, which is the condition shown in Figure 28, switch **256** will be closed as indicated in Figure 34. The package moving into the elevator will engage the control bar **170** and shift it to the right as seen in Figure 28 which will effect opening of switch **256**. Since this switch is in circuit with relay switch **229** controlling energization of motor **167** to raise the elevator, this relay switch cannot be energized to effect upward movement of the elevator as long as the package remains on the elevator platform.

If the elevator is to move at all, therefore, it can only move downward until such package has been discharged from the elevator.

As the package is moved onto the elevator platform **158** in its position substantially level with the lower belts of the end adhesive setting section the package will engage the depending control arm **171** and raise it from the full line position shown in Figure 28 to the broken line position. Such upward movement of this control arm will move switch **257** from the open position of Figure 34 downward to its closed position and the switch will be retained in this position as long as switch arm **171** remains swung upward.

With switch **257** thus closed by the package entering the elevator, if switch **258** is in its upper position as shown in Figure 2 and at the left of Figure 28 the elevator will be conditioned for energization of relay switch **230** to effect energization of the elevator drive motor **167** in a direction to move the elevator downward when switch **254** is depressed into its lower position. Such downward movement of switch **254** will be effected to close in its lower position when the next package moving into the end adhesive setting section engages this switch. Such switch engagement will have the dual function of breaking the circuit to solenoid valve **255** as previously explained to effect retraction of package discharge plungers **147** and of energizing the down drive elevator motor relay switch **230**.

Downward movement of the elevator will continue until the upper surface of the package on the elevator is moved downward far enough so that the control arm **171** will have swung from its broken line position of Figure 28 substantially into its solid line position of Figures 28 and 29. At this time switch **257** will have been allowed to open thus interrupting the circuit to down relay switch **230** even though switch **254** remains held in its lower circuit closing position by the next package which is in the end adhesive setting section. The upper surface of the top package on the elevator will thus be disposed approximately level with the lower belts in the end closing leg of the machine.

When the dwell of the package in the end adhesive setting section provided for setting of the adhesive on the package ends has expired the press plates **141** will be retracted and the end adhesive setting section belts will be started again to continue movement of the package as has been explained previously. This package will be moved onto and across the plates **148** covering the plungers **147** shown in Figures 26 and 27 until the plungers eject the package from the end closing leg onto the package stack in the elevator. Such package movement again will raise control arm **171** from the full line position in Figures 28 and 29 to the broken line position of Figure 28 which again will close switch **257** to condition the down relay switch circuit for energization by the next package moving switch **254** from its upper position of Figure 34 to its lower position.

When the next package entering the end adhesive setting section shifts switch **254** downward the elevator motor again will be energized by closing of relay switch **230** to continue the downward movement of the elevator until the upper surface of the top package has been moved downward far enough to allow control arm **171** to swing downward and open switch **257**. This procedure continues step by step with the elevator moving downward an increment equal to the thickness of a package each time an additional package is discharged from the end closing leg onto the elevator package stack. When the elevator platform has thus been moved downward by stages so far that the arm of switch **259** at the right of Figures 28 and 29 engages the shoe **260** as shown in Figure 29, a circuit will be completed in parallel with switches **254** and **257** through switch **259** in its lower position so that the circuit of relay switch **230** will continue to be energized and the motor **167** will continue to move the elevator downward.

As such movement of the elevator platform **174** continues downward, arm **261** eventually will engage the collar **262** on upright rod **263** and move this rod downward in synchronism with the elevator. Such shifting of rod **263** in opposition to spring **264** which normally urges the rod upward will cause its upper collar **265** eventually to engage double-acting switch **258** and shift it into its lower position from its upper position shown in Figure 32. Such movement will interrupt the circuit to down relay switch **230** and deenergize motor **167** so that the elevator will be stopped in its lowermost position.

As long as switch **258** remains in its lowermost position the circuit through the down relay switch **230** cannot be energized. On the other hand, the circuit through the up relay switch **229** cannot be energized as long as the stack of packages remains on the elevator platform and holds control bar **170** depressed and switch **256** open. As has been mentioned previously, however, downward movement of the elevator to its lowermost position causes the lowest package on the elevator stack to engage pin **186** which effects supply of fluid under pressure to the actuator **180** for effecting movement of the pusher lug **175** in a direction to roll out of the elevator the stack of packages which has been lowered onto the rolls **173**.

As the pusher lug **175** moves the stack of packages from the elevator along the roller conveyors **173** the leading edge of the lowest package will engage the arm of switch **266** and open this switch so that irrespective of the condition of the remainder of the circuit to relay switch **229** this circuit cannot be energized as long as the arm of this switch remains depressed. As the movement of the packages off the elevator continues the trailing edge of the lowermost package will pass beyond the control bar **170** so that it will be raised into its upper position of Figures 28 and 30 by the spring **267** connected to the arm of switch **256**. Closing of this switch in the circuit of up relay switch **229** will not energize this relay switch, however, because of the open circuit being maintained by switch **266**.

As movement of the packages is continued along the roller conveyors **173** by the pusher lug **175** the trailing end of the package stack will pass beyond the pin **186** to enable the control valve **188** to reverse. Movement of the actuator **180** is quite rapid, however, and the pin **186** is located close to the discharge side of the elevator so that the pusher lug **175** will be moved quite close to the sprocket **184** before the valve **188** is reversed, so that the movement of the stack of packages will have acquired considerable momentum by that time.

When the package has rolled far enough beyond roller conveyors **173** by the momentum effected by the travel of pusher lug **175** to the end of its stroke adjacent to sprocket **184** the arm of switch **266** will be released permitting this switch to return to closed position. Since switch **256** has returned to its closed position and switch **258** remains in its downwardly shifted position the circuit through relay switch **229** will be completed and it will energize motor **167** to drive the elevator in the upward direction.

As the elevator moves upward a short distance the arm of switch **259** will move off shoe **260** so that this switch will return to the open position of Figure 34. Opening of this switch **259** will not interrupt upward movement of the elevator, however, because this switch is in circuit with the down relay switch **230**. The elevator platform **158** continues to be driven upward, therefore, until bar **261** carried by it engages the arm of switch **258** to reverse the position of this switch into the upper position shown in Figure 34. Such movement deenergizes the circuit of up relay switch **229** stopping the motor **167**

with the elevator platform **158** in the position shown in Figure 28 substantially level with the lower belts of the end closing leg of the machine.

The switch **171** will now remain in its upper position until the elevator platform again has been moved downward step by step in the manner previously described. It will be appreciated that each time the motor **167** is energized in one direction or the other the solenoid valve **231** also will be energized to release the brake **172**. Each time the motor circuit is deenergized, therefore, by deenergization of relay switch **229** or relay switch **230**, the solenoid **231** also will be deenergized so that the brake will be applied promptly to minimize coasting of the motor **167**. When the elevator has thus been returned to its uppermost position again it will be ready to receive additional packages which will effect automatic loading of the elevator and eventual discharge of a stack of packages of predetermined height accumulated on it in the manner described above.

Alternative load discharging mechanism

In Figures 32 and 33 mechanism is illustrated which is an alternative to the mechanism for discharging from the lower portion of the elevator an accumulated load of stacked packages after the elevator has descended to its lowermost position. In this mechanism the rollers **173** mounted in the lower portion of the elevator mechanism are the same as previously described. In this instance, however, in the central portion at the bottom of the elevator is a wide endless belt **189** which runs about a powered roller **190** and an idler roller **191** turning on parallel axes and located respectively adjacent to opposite sides of the elevator platform **158**. The powered roller **190** preferably has a rubber covered periphery to afford a good friction grip on the belt. The upper stretch of the belt between the rollers **190** and **191** is supported at rather closely spaced intervals by rollers **192** beneath it which rotate about axes extending parallel to the rotative axes of rollers **190** and **191**. The upper portions of the peripheries of rollers **190**, **191** and **192** are disposed coplanar and substantially coplanar with or slightly above the upper peripheries of the rollers **173** at opposite sides of the belt **189**.

The roller **190** is driven by a chain drive **193** which is powered by motor **194** through reduction gearing and chain drive **195** which drives the belt **189** quite slowly. Energization of this motor is controlled by switch **267** mounted at the lower end of one of the columns **156** and arm **268** is mounted on the elevated platform **158** in a position such that when this platform reaches its lowermost position the arm **268** will engage the normally open switch **267** to close it. By such switch closure the motor **194** will be energized to drive the roller **190** and belt **189** in the direction indicated by the arrow in Figure 32. Since descent of the elevator platform **158** far enough to engage arm **268** with switch **267** will have retracted the upper surface of the platform downward below the upper surfaces of rollers **173** and belt **189**, the load of stacked packages will be resting on such belt and rollers and movement of the belt will carry the load out of the elevator framework.

As shown in Figure 33 the belt **189** and rollers **173** preferably are inclined somewhat so that the load achieves a reasonable momentum so that when the trailing edge of the load has passed beyond the belt **189** it will continue to move outward until such trailing edge has passed beyond switch **266**. As explained previously release of this switch following discharge of the load from the elevator will condition the elevator for upward movement again. When the elevator has moved upward sufficiently to withdraw arm **268** from switch **267** such switch will return to open position and deenergize motor **194** until the elevator platform has again been lowered completely bearing another load of stacked packages.

I claim as my invention:

1. In a carton-packaging machine, deenergizable conveying means for conveying a package including spaced parallel carton members having cooperating edge flaps folded into overlapping relationship with thermosetting adhesive therebetween, heated clamping plate means engageable with the outer one of such overlapping flaps while said conveying means are deenergized, for setting the adhesive between such overlapping flaps, and clamping plate moving means connected to said heated clamping plate means and movable after said conveying means are deenergized to move said heated clamping plate means into engagement with such flaps and movable to retract said heated clamping plate means from engagement with such flaps prior to reenergization of said conveying means.

2. In a carton-packaging machine, deenergizable conveying means for conveying a package including spaced parallel carton members having cooperating edge flaps folded into overlapping relationship with adhesive therebetween, a gang of individual presser plates engageable with the outer one of such overlapping flaps while said conveying means are deenergized, for setting the adhesive between such overlapping flaps, and fluid-actuated means connected to all of the individual presser plates of the gang for shifting the gang of individual presser plates as a group relative to the package.

3. The carton-packaging machine defined in claim 1, the heated clamping plate means including individual presser plates, common presser plate supporting means supporting all of said presser plates for independent movement of each presser plate relative to said supporting means, and spring means interposed between each presser plate and said supporting means urging the presser plate away from said supporting means, the clamping plate moving means being connected to said supporting means and operable to move said supporting means relative to the conveying means for resilient engagement of the individual presser plates with a package flap.

4. The carton-packaging machine defined in claim 3, in which the clamping plate moving means effects movement of the supporting means through a stroke of predetermined definite length between a retracted position and a position projected toward the package.

5. In a carton-packaging machine, clamping means engageable with the outer one of flaps of spaced parallel carton members folded into overlapping relationship with adhesive therebetween, and including a gang of individual presser plates, presser plate supporting means supporting all of said presser plates and movable through a stroke of predetermined definite length between a retracted position and a position projected toward such overlapping flaps, fluid-actuated means connected to said presser plate supporting means for shifting said presser plate supporting means in one direction, and spring means connected to said presser plate supporting means and operable to shift said presser plate supporting means in the opposite direction when said fluid-actuated means are deenergized.

6. In a carton-packaging machine, conveying means for conveying a package including spaced parallel carton members having cooperating edge flaps folded into overlapping relationship with adhesive therebetween, clamping means engageable with the outer one of such overlapping flaps for setting the adhesive between such overlapping flaps, control means including switch means operatively connected to said conveying means and actuated by a package moved by said conveying means into registry with said clamping means to deenergize said conveying means while said clamping means are engaged with the package flap, and time delay means operatively connected to said clamping means and operable to retract said clamping means from engagement with the package at the end of a predetermined time interval

following movement of said clamping means into engagement with the package flap.

7. In a carton-packaging machine, conveying means for conveying a package including spaced parallel carton members having cooperating edge flaps folded into overlapping relationship with adhesive therebetween, clamping means engageable with the outer one of such overlapping flaps for setting the adhesive between such overlapping flaps, and control means including switch means operatively connected to said conveying means and to said clamping means and actuated by a package moved by said conveying means into registry with said clamping means to deenergize said conveying means and to effect movement of said clamping means into engagement with the package flap.

8. In a carton packaging machine, conveying means for moving edgewise a package of rectangular shape, clamping means engageable with opposite edges of such package, means operable to adjust the effective width of said conveying means, and means actuated by said conveying means moved to adjust the width thereof to effect deenergization of said conveying means when such package reaches a predetermined position in said clamping means corresponding to the width adjustment of said conveying means.

9. In a carton packaging machine, conveying means for moving edgewise a package of rectangular shape, first clamping means engageable with first opposite edges

of such package, second clamping means farther along said conveying means than said first clamping means and engageable with second opposite edges of the package, means operable to adjust the effective width of said first clamping means, and means actuated by said first clamping means moved to adjust the width thereof to effect deenergization of said conveying means when such package reaches a predetermined position in said second clamping means corresponding to the width adjustment of said first clamping means.

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