

Dec. 14, 1943.

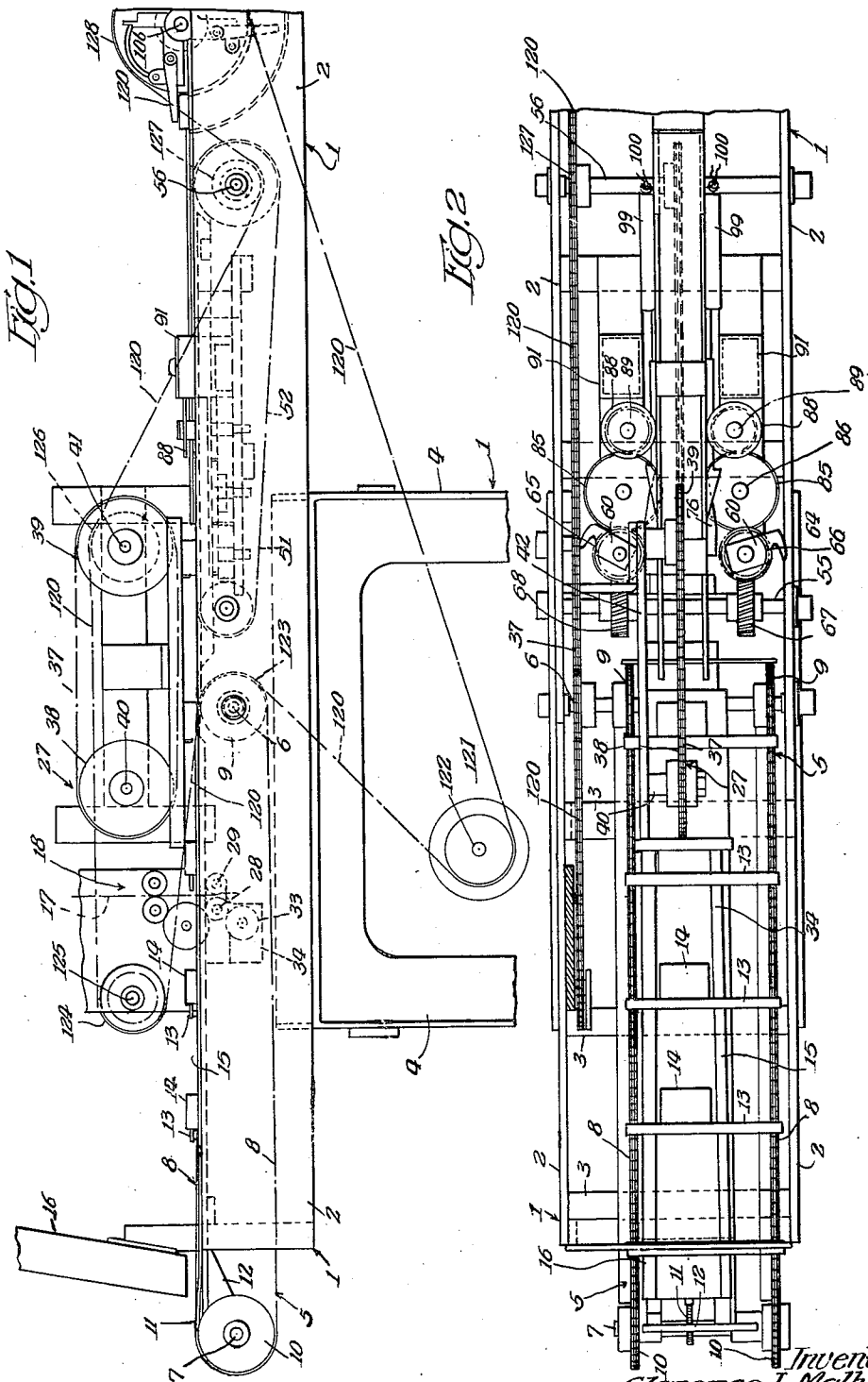
C. J. MALHIOT

2,336,795

WRAPPING MACHINE

Filed Nov. 29, 1940

8 Sheets-Sheet 1



Inventor
Clarence J. Malhiot
By Spencer, Margall, Johnston & Cook
Attys

Dec. 14, 1943.

C. J. MALHIOT

2,336,795

WRAPPING MACHINE

Filed Nov. 29, 1940

8 Sheets-Sheet 2

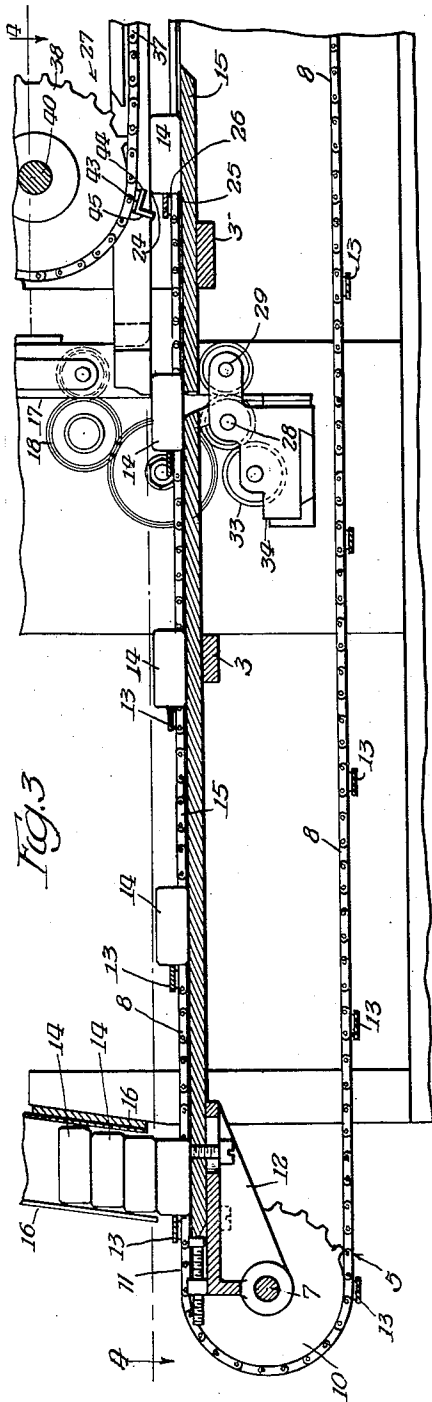


Fig. 3

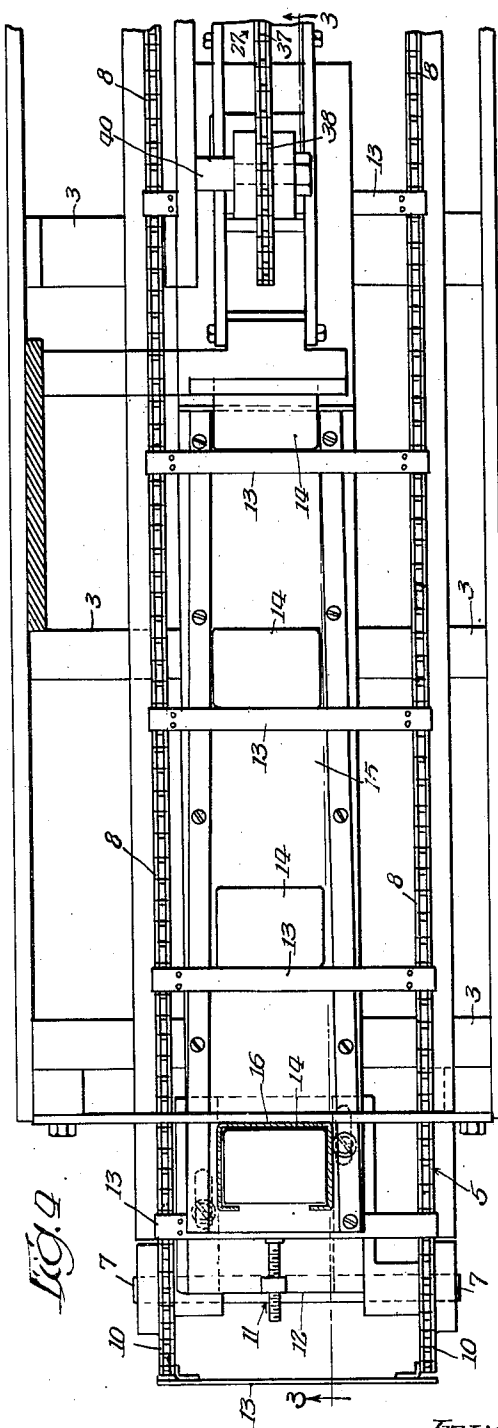


Fig. 4

Inventor
Clarence J. Malhiot
By Spencer, Margall, Johnston & Cook,
Attorneys

Dec. 14, 1943.

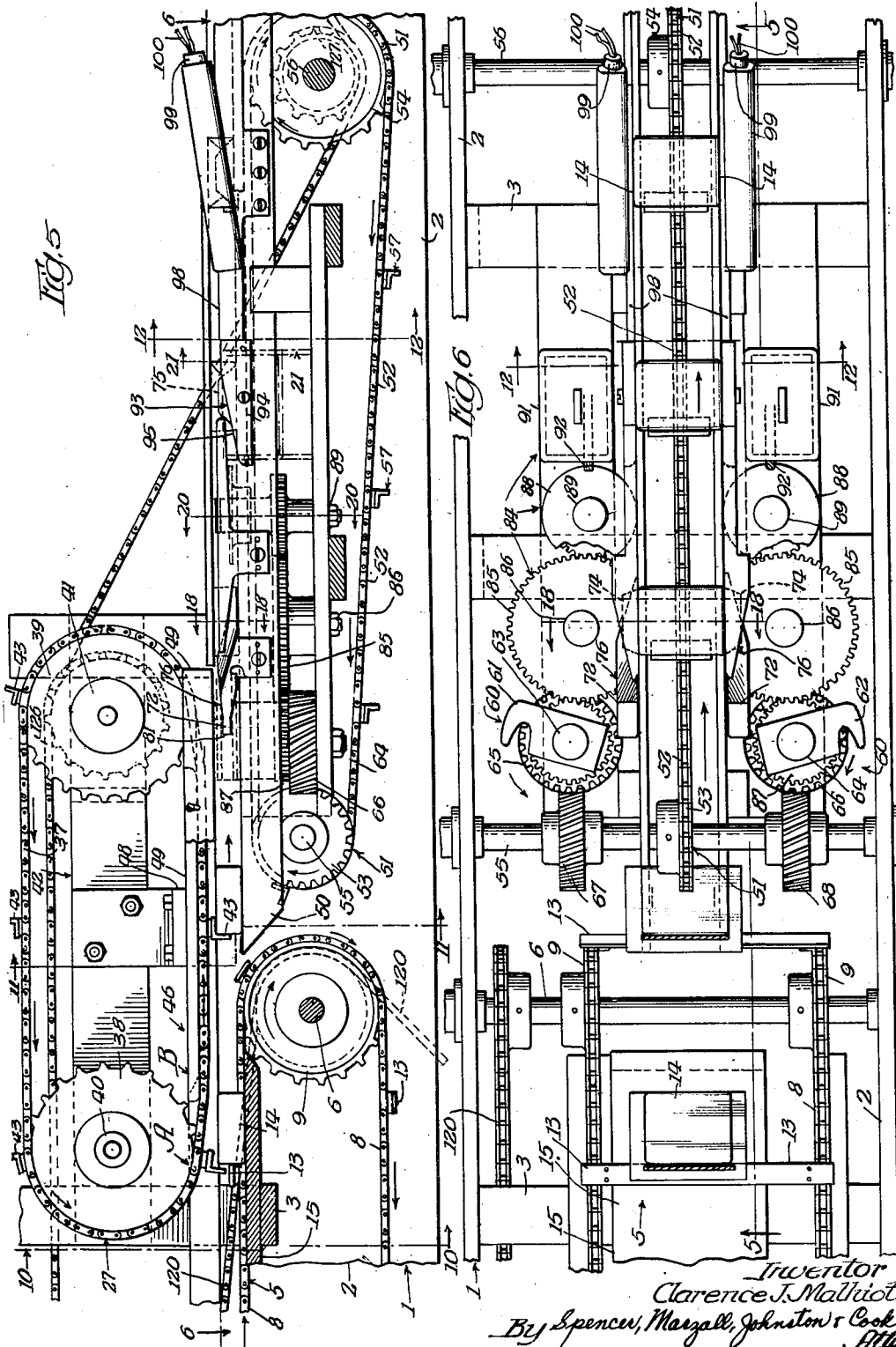
C. J. MALHIOT

2,336,795

WRAPPING MACHINE

Filed Nov. 29, 1940

8 Sheets-Sheet 3



Dec. 14, 1943.

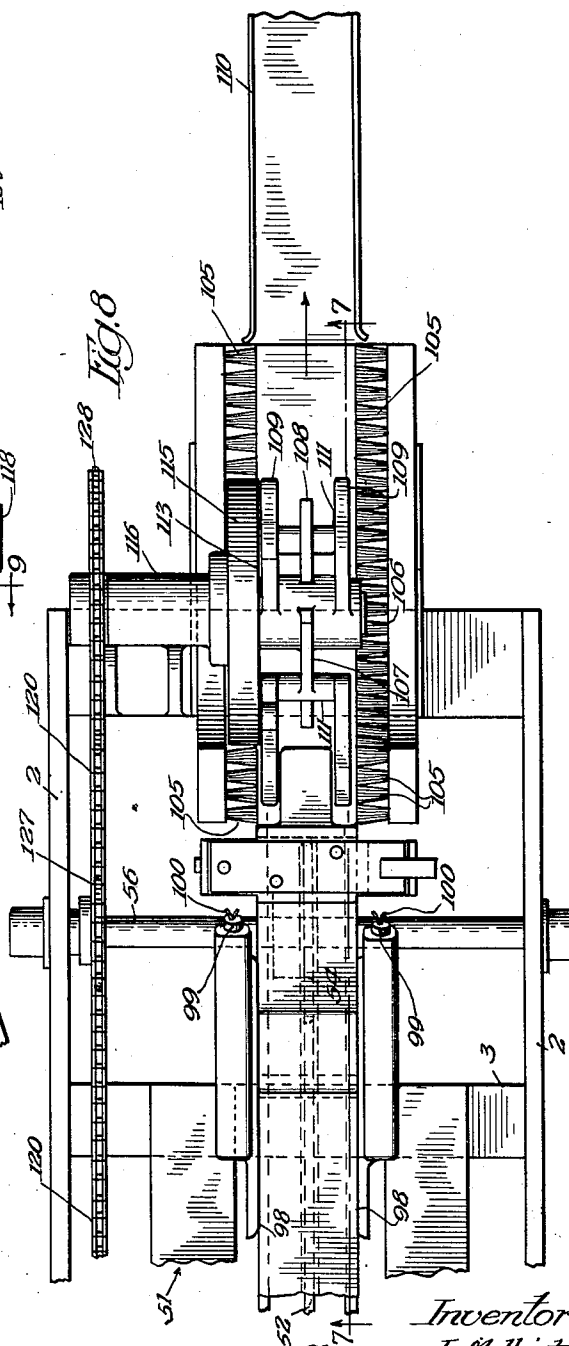
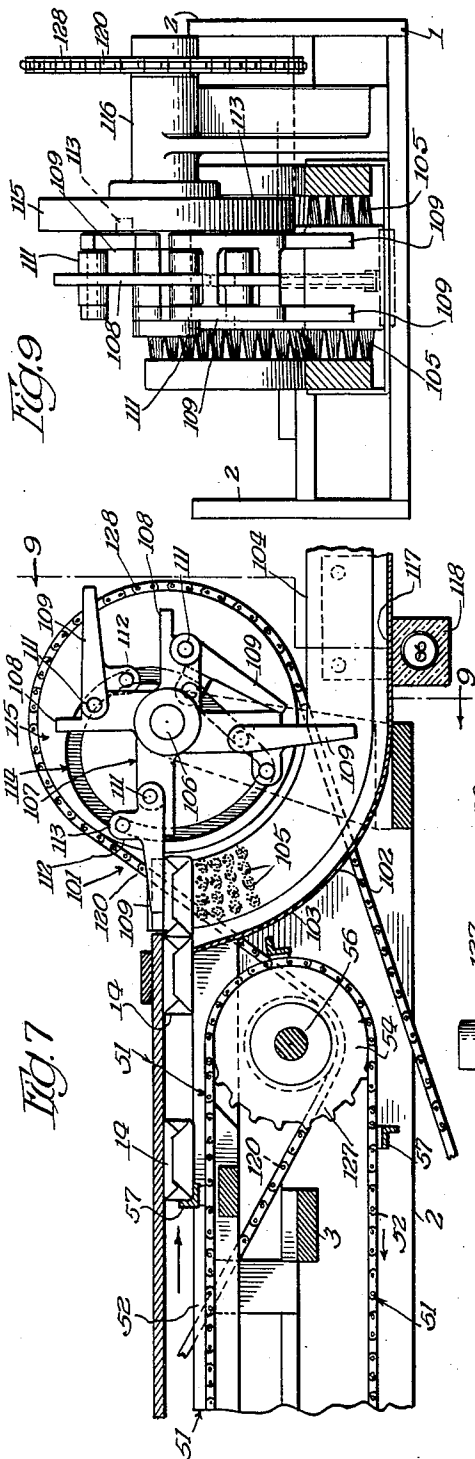
C. J. MALHIOT

2,336,795

WRAPPING MACHINE

Filed Nov. 29, 1940

8 Sheets-Sheet 4



51
52 7
Inventor
Clarence J. Mathiot
By Spencer, Mayall, Johnston & Cook, Attys

Dec. 14, 1943.

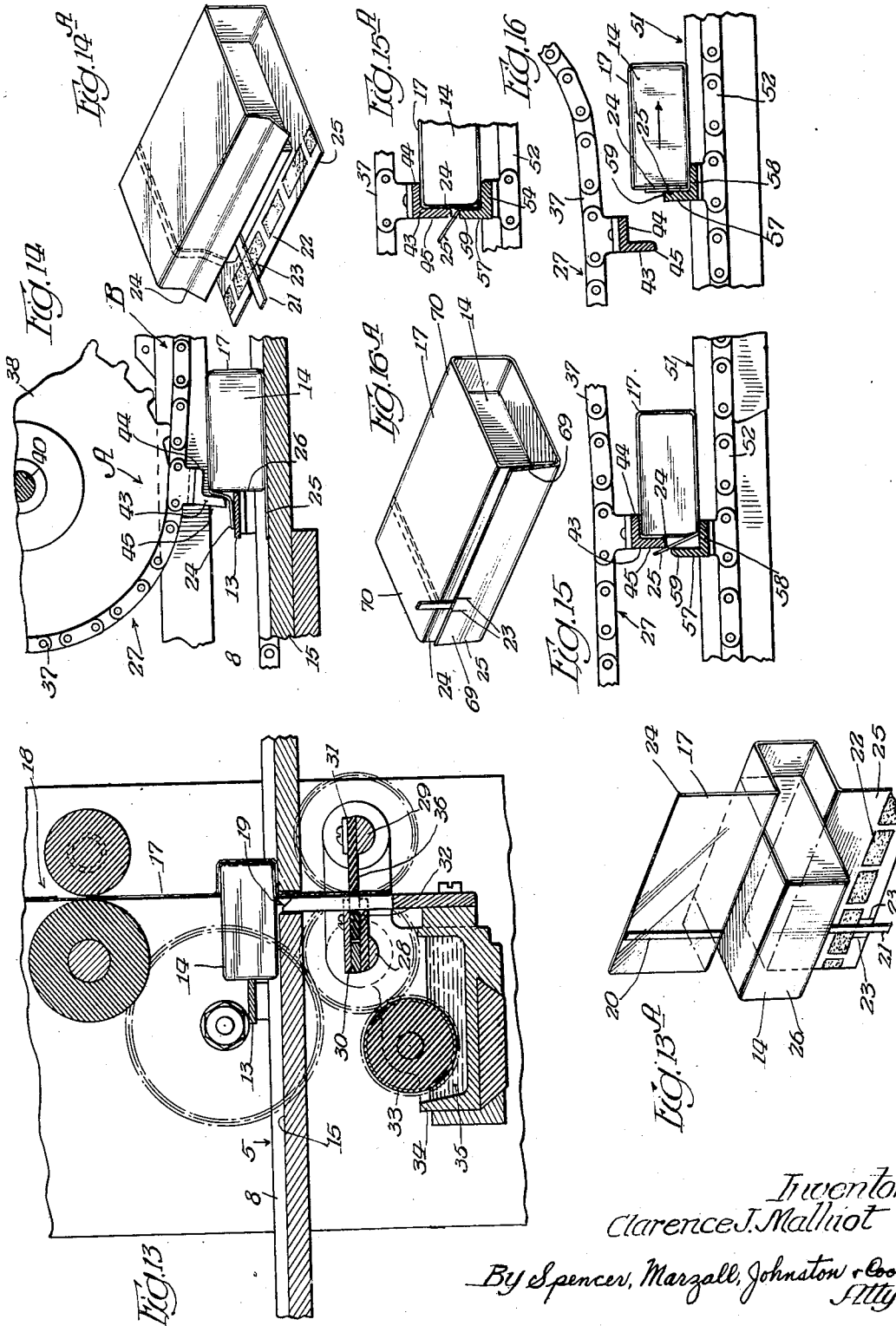
C. J. MALHIOT

2,336,795

WRAPPING MACHINE

Filed Nov. 29, 1940

8 Sheets-Sheet 6



Inventor
Clarence J. Malhiot
By Spencer, Marzall, Johnston & Cook
Attys

Dec. 14, 1943.

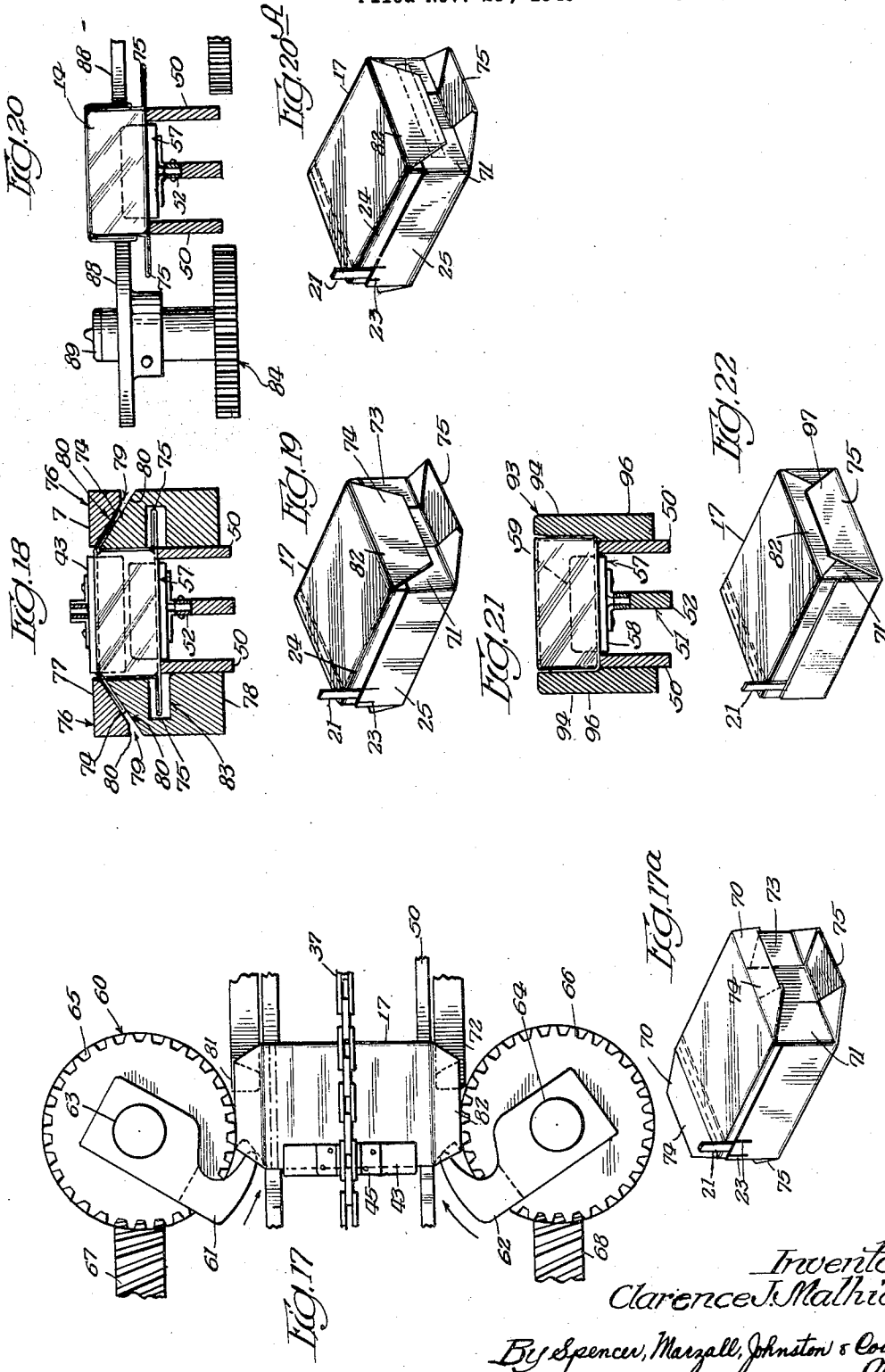
C. J. MALHIOT

2,336,795

WRAPPING MACHINE

Filed Nov. 29, 1940

8 Sheets-Sheet 7



Inventor
Clarence J. Malhiot

By Spencer, Marshall, Johnston & Cook
Attys

UNITED STATES PATENT OFFICE

2,336,795

WRAPPING MACHINE

Clarence J. Malhiot, Oak Park, Ill., assignor to
F. B. Redington Co., Chicago, Ill., a corporation
of Illinois

Application November 29, 1940, Serial No. 367,812

22 Claims. (Cl. 93—2)

This invention relates to wrapping machines and particularly to machines for placing wrappers around packages. More specifically, the invention relates to the application of a Cellophane wrapper about a cigarette package.

An important object of the present invention is the provision of a new and improved wrapping machine embodying novel mechanism constructed and arranged to wrap a wrapper securely about a package and secure the wrapper in air-tight condition about the package, the machine effecting the wrapping operation continuously in a straight line operation.

Another important object of the invention consists in the provision of a machine constructed and arranged so that the parts are properly synchronized and correlated, whereby the wrapping operation is accomplished continuously by continuously operating means.

A further object of the invention is the provision of a new and novel wrapping machine which is adapted to perform a particular wrapping operation in a certain sequence to wrap the package securely and permit the incorporation of an easy-opening tab arranged about the package transversely thereof, the machine including improved mechanism for effecting the particular wrapping operation continuously.

A further object of the invention is the provision of a wrapping machine which moves a package continuously through the various steps of the wrapping operation as packages move continuously and successively from delivery position to discharge position, the various folding and tucking operations of the wrapper being accomplished by simple means to provide a particular type of wrapper about the package, and to render the package adaptable for use with an opening tape arranged transversely about the package and extending through a longitudinal side seam.

Still another object of the invention resides in the specific location and arrangement of the various parts and mechanisms to effect a particular type of wrapping arrangement about a continuously moving package, the parts and mechanisms being constructed and situated so as to operate in the proper sequence to effect properly the folding operation as the package moves continuously through the machine.

Numerous other objects and advantages will be apparent throughout the progress of the following specification.

The accompanying drawings illustrate a selected embodiment of the invention, and the views therein are as follows:

Fig. 1 is a detail elevational view of the improved wrapping machine;

Fig. 2 is a top plan view thereof;

Fig. 3 is a detail longitudinal sectional view of the left-hand end of the machine, as viewed in Fig. 1 and taken on the line 3—3 of Fig. 4;

Fig. 4 is a detail plan section of the left-hand end of the machine, as viewed in Fig. 1 and taken on the line 4—4 of Fig. 3;

Fig. 5 is a detail longitudinal sectional view on the line 5—5 of Fig. 6;

Fig. 6 is a detail plan section on the line 6—6 of Fig. 5;

Fig. 7 is a detail sectional view at the extreme right-hand end of the machine on the line 7—7 of Fig. 8;

Fig. 8 is a detail top plan view of the extreme right-hand end of the machine, showing the sealing and discharging mechanism;

Fig. 9 is a detail transverse sectional view on the line 9—9 of Fig. 7;

Fig. 10 is a detail transverse sectional view on the line 10—10 of Fig. 5;

Fig. 11 is a detail transverse sectional view on the line 11—11 of Fig. 5;

Fig. 12 is a detail transverse sectional view on the line 12—12 of Figs. 5 and 6;

Fig. 13 is an enlarged detail vertical sectional view, showing some of the feeding, and glue or solvent applying mechanism;

Fig. 13—A is a detail perspective view, showing the manner in which the package engages the wrapper as depicted in section in Fig. 13;

Fig. 14 is an enlarged detail sectional view showing mechanism employed to perform a certain step of the folding operation;

Fig. 14—A is a perspective view of a partly wrapped package, showing the position it assumes in Fig. 14;

Fig. 15 is a detail sectional view showing a further progressive step in the wrapping operation;

Fig. 15—A is a view similar to Fig. 15, but showing a further step in the advancement of the wrapping operation;

Fig. 16 is a view similar to Fig. 15 showing an advanced step in the operation over Figs. 15 and 15—A;

Fig. 16—A is a detail perspective view of the partly wrapped package shown in Fig. 16;

Fig. 17 is a detail plan section showing some of the folding and tucking mechanism;

Fig. 17—A is a detail perspective view of a package after being folded by the mechanism disclosed in Fig. 17;

Fig. 18 is a detail transverse sectional view on the lines 18—18 of Figs. 5 and 6;

Fig. 19 is a detail perspective view of the package after being folded by the mechanism shown in Fig. 18;

Fig. 20 is a detail transverse sectional view on the line 20—20 of Fig. 5, showing some of the solvent or glue applying mechanism;

Fig. 20—A is a detail perspective view of the package after the solvent or glue applying operation;

Fig. 21 is a detail sectional view on the line 21—21 of Fig. 5;

Fig. 22 is a detail perspective view of a completely wrapped package;

Fig. 23 is a detail sectional view similar to Fig. 7, but showing a modified form of discharging mechanism and being taken on the line 23—23 of Fig. 24;

Fig. 24 is a detail vertical sectional view of the structure shown in Fig. 23, the same being taken on the line 24—24 of Fig. 23;

Fig. 25 is a diagrammatic or schematic view showing a modified form of wrapper feeding mechanism; and

Fig. 26 is a view similar to Fig. 25, but showing the parts in advanced position.

The particular wrapping machine herein shown for the purpose of illustrating the invention comprises a support or supporting frame 1 which includes longitudinal rails or side bars 2, spaced cross bars or posts 3 rigidly connecting the side bars or rails 2 and supporting legs 4, Fig. 2, 4 and 6. A conveyor 5 is operatively supported to appropriate parts of the frame 1 and conveys a package to be wrapped to, and partly through, wrapping position.

The conveyor 5

The conveyor 5 includes a driven shaft 6 and a spaced shaft 7 each mounted in suitable bearings in the frame. Endless chains 8 are trained over sprocket 9 and over idler sprockets 10 on the shafts 6 and 7, respectively. Adjustable means 11 is operatively connected to the frame and to a supporting bracket 12, which carries the idler shaft 7, so as to provide adjustment for the chains 8 to loosen or tighten these chains for proper operation.

The chains 8 are connected together by spaced transverse bars 13 which are adapted to act as carriers or pushers for packages 14 to be wrapped. These transverse bars 13 are arranged a predetermined distance above the conveyor bed 15 and are adapted to engage a package on a longitudinal side edge thereof between its upper and lower surfaces and convey the packages successively along a predetermined path to wrapping position.

A magazine 16 is arranged adjacent one end of the conveyor 5 and carries a supply of packages 14 to be conveyed to wrapping position. The magazine has an open bottom to permit the lowermost package of a stack in the magazine to be engaged by a cross bar 13 and fed toward wrapping position during operation of the conveyor.

The cross bars 13 on the conveyor 5 move the package through a sheet of wrapping material 17, which is fed downwardly by wrapper feeding means indicated generally by the numeral 18, Figs. 1, 3 and 13. As the wrapping material 17 is fed downwardly across the conveyor, it will project into a slot 19 provided in the bed 15 of the machine, Fig. 13, and in position to be engaged by the oncoming package. The package is

thus pushed through the wrapper in the manner shown in Figs. 13 and 13—A whereby the front longitudinal side and the top and bottom surfaces of the package will be covered by the wrapper.

The wrapper is sufficiently long to provide free ends projecting or extending a predetermined distance beyond the rear or trailing side of the package. A strip of tape material 20 may be applied to the wrapper with an end of the tape extending beyond the edge of the wrapper to provide an opening tab 21, Figs. 13—A and 14—A. The specific mechanism for feeding the wrapping material to position to be engaged by the moving package, and the method of feeding the tape 20 to the wrapper 17, is disclosed and claimed in applicant's co-pending application, Serial No. 367,813, filed November 29, 1940, and assigned to the present assignee.

The wrapper 17, as it passes through the slot 19, Fig. 13, to be engaged by the oncoming package 14, is adapted to have either solvent or glue applied thereto, depending upon the kind of material being used. If the wrapping material is Cellophane, then solvent is applied, but if waxine paper or other material is used, glue may be substituted for the solvent. The present machine is designed to employ Cellophane as the wrapping material and therefore the specific adhesive material used herein is solvent. The solvent is applied to the lower free end of the wrapper 17, as indicated at 22, Figs. 13—A and 14—A, so as to secure the inside lower free end of the wrapper against the outside surface of the upper free end after the wrapper is folded properly about the package, Fig. 16—A. During the feeding operation of the wrapper 17, the wrapper is preferably provided with slits 23 formed on each side of the tape at the opening tab 21, as clearly shown in Figs. 13—A, 14—A and 16—A.

The wrapper 17, as it engages the package 14, Figs. 3, 4 and 13, has its free upper and lower extending or trailing ends 24 and 25, respectively, Figs. 3 and 14, extending a predetermined distance beyond the rear side edge 26 of the package 14, as clearly shown in Figs. 3 and 14, the package and wrapper being conveyed by the conveyor 5 in the position shown in Fig. 3 until it reaches a conveyor 27.

Solvent applying means

The means for applying the solvent material 22 comprises a pair of rotating shafts 28 and 29, Fig. 13, having flat surfaces 30 and 31, respectively. The shaft 28 has a flexible wiper 32 fastened to its flat side 30 and is adapted to wipe against a rotating roller 33 operatively mounted in a container 34 of adhesive or solvent material 35, Fig. 13. The roller 33 is continuously rotated and therefore its periphery will be covered with a film of the solvent 35. As the shaft 28 rotates, the wiper 32 is brought into proper relationship with respect to the roller 33 and picks up a sufficient quantity of solvent and applies solvent in a longitudinal strip 22 along the wrapper 17 adjacent one end thereof. The shaft 29 carries a flexible rubber-like projection or finger 36, which operates in unison with the wiper finger 32 so as to provide a backing for the wiper 32 when the wiper is in contacting engagement with the wrapper, Fig. 13.

Folding conveyor 27

The conveyor 27, Figs. 1 and 5, comprises a chain 37 trained over the spaced sprockets 38 and 39 on the idler shaft 40 and drive shaft 41, re-

spectively. The shafts 40 and 41 are suitably mounted in bearings carried by a superstructure or frame extension 42, Figs. 10 and 11, which superstructure is operatively carried by the frame 1 as by securing the same to a rear longitudinal side rail 2.

The chain 37 carries spaced folding and conveying fingers 43, and operates at a faster speed than the chains 8 of the conveyor 5 so as to engage the successive packages 14 and move them out of the way of the conveyor 5. The conveyor 27, however, is synchronized and correlated with respect to the conveyor 5 so that the folding and conveying fingers 43 will be in proper position and operate in proper timed relationship with respect to the pusher bars or cross strips 13 on the chains 8 to effect the proper folding and pushing operation at precisely the correct time, Figs. 14 and 15.

The fingers 43 are in the form of angles, each having one leg 44 thereof attached to the chain 37, and its other leg 45 extending outwardly from the chain to effect the required folding and pushing operation. The fingers 43 are adapted to engage and fold downwardly the upper rearwardly extending edge 24 of the wrapper, Fig. 14. The fingers engage this extending part 24 of the wrapper just prior to the time the conveyor 5 delivers the package to a certain position, and at a time prior to the disengagement by the conveyor 5 of a package. The contacting relationship of a finger 43 with respect to the free extending wrapper edge 24, to effect the folding down of this edge, occurs just prior to the retreating movement of a bar 13 on the conveyor 5, and as the conveyor 27 moves faster than the conveyor 5, the folding operation of the fingers 43 will be progressive. As the movement of the fingers 43 gains in speed with respect to the movement of the pusher bars 13, the finger 43 will first engage the free edge 24 in an angular position, Fig. 14, and then press the free edge 24 against the longitudinal rear side edge of the package 14, as shown in Fig. 14. The angular position of the fingers 43 with respect to the upper surface of the package is caused by the chain traveling slightly downhill upon leaving the idler sprocket 38 as indicated at "A," Figs. 5 and 14, until leveling out in a straight line horizontal direction as indicated at "B," Figs. 5 and 14. As the fingers move down the incline the free edge 24 is folded down first, at which time the package begins to leave the pusher bar 13. Continued movement down this incline causes the fingers 43 to exert a wiping action on the wrapper on the longitudinal side edge of the package, tending to stretch the wrapper somewhat and pull out any wrinkles in the top surface, leaving the wrapper smooth and tight against the upper surface of the package. The conveyor 27, therefore, is for the purpose not only of conveying the partly wrapped package from one position to another, but to effect the folding of the upper free edge 24 of the wrapper about a longitudinal side edge of the package, as clearly shown in Fig. 14.

The chain 37 of the conveyor 27 is maintained in proper operative position by means of the guide element 46, shown in Figs. 5 and 11. This guide element comprises a flat horizontal bar 47 which is secured to the arm 48 of a bracket which is part of the superstructure 42. Spaced bars 49 are secured to the ends of the bar 47 by means of fastening members extending through enlarged openings in the members 49

so that they will rest on top of the package 14, Fig. 11, and maintain the package on top of the spaced supports 50 which support the packages along their bottoms. This guide means 46 also maintains the lower reach of the chain 37 in a proper downward position, preventing the chain from moving upwardly, whereby the fingers 43 will always be in proper operative position to engage a package 14. The conveyor 27 moves the package, with its partly folded wrapper, to a folding and tucking conveyor 51, which folds the bottom flap 25 of the package upwardly against the upper previously folded flap 24, in the manner shown in Figs. 15, 16 and 16-A, as well as conveying successive packages through the end tucking and folding mechanism.

Folding and tucking conveyor 51

The folding and tucking conveyor 51, Fig. 5, is arranged below the bed of the machine in alignment with the conveyor 5 and below the conveyor 27, the conveyor 27 spanning the conveyors 5 and 51, whereby the entire wrapping machine assumes a straight line position allowing the packages fed from the magazine to be fed continuously in a straight line through the entire wrapping machine. The conveyor 51 comprises an endless chain 52 passing over sprockets 53 and 54 mounted on shafts 55 and 56, respectively, Figs. 5 and 6. The shafts 55 and 56 are journaled in suitable bearings carried by the frame, the shaft 56 being the driving shaft and the sprocket 54 being the driving sprocket. The conveyor 51 is adapted to operate at a faster speed than the conveyor 27 so as to effect proper folding of the wrapper about the package and move the partly wrapped package away from the conveyor 27 to prevent interference with the package from one conveyor to the other.

The chain 52 is equipped with conveying and folding fingers 57 in the form of angular members having legs 58 attached to the chain and other legs 59 projecting outwardly from the chain to effect the required folding and conveying operation, as shown in Figs. 5, 15 and 16. The fingers 57 are adapted to engage and fold upwardly the lower rearwardly extending part 25 of the wrapper, Fig. 15, engaging this extending part 25 of the wrapper just prior to the time the conveyor 50 delivers the package to a certain position and at a certain time prior to the time the conveyor 27 releases the package and moves toward its return position. The contacting relationship of a finger 57 with respect to the free extending wrapper edge 25, to effect the folding up of this edge, occurs just prior to the retreating movement of a finger 43 on the conveyor 27, and inasmuch as the conveyor 51 moves faster than the conveyor 27, the folding operation of a finger 57 will engage the free flap 25 at a time after the flap 24 is pressed tightly against the side of the package 15. As the movement of the fingers 57 gain in speed with respect to the movement of the fingers 43, the fingers 57 will bend the free flaps 25 upwardly against the longitudinal side edges of the packages and hold the free edges 25 tightly against the side edges to effect the folding operation about the packages, as shown in Fig. 16-A. The folding operation of a finger 57 will commence immediately after the flap 24 is pressed tightly against the side of the package. The folding of the extending side part 25 is progressive because of the faster speed of the conveyor 51 which moves the flap 25 from its normal horizontal position upwardly to the

position shown in Fig. 15, and then finally to the position shown in Fig. 16, whereby the wrapper is completely folded about the top, bottom and two longitudinal side edges of the package, leaving the free ends of the wrapper extending a predetermined distance beyond the ends of the package, as shown in Fig. 16—A. Fig. 15 shows the fingers 57 in engagement with the flap 25 to move the flap upwardly at an angle to the side edge of the package, while Fig. 15—A shows the fingers 57 and 43 in relative alignment. In Fig. 16, the conveyor 51 has moved the package away from the conveyor 27 and is in a position to convey the package to the rotary tucking mechanism 60.

Rotary tucking or folding mechanism

The rotary tucking or folding mechanism 60, Figs. 5, 6, 11 and 17, comprises oppositely disposed tucking fingers 61 and 62 fixed to vertical shafts 63 and 64, respectively. The tucking fingers 61 and 62 each comprise spaced upper and lower fingers having a recess therebetween to permit unobstructed operation of these fingers with respect to subsequent stationary folding mechanism. The shafts 63 and 64 are revolvably mounted in an appropriate part of the machine frame and carry spiral gears 65 and 66, respectively, which mesh with spiral gears 67 and 68, respectively, on the driven shaft 55, Fig. 11. The tucker fingers 61 rotate in a counterclockwise direction on one side of the machine, while the tucker fingers 62 rotate in a clockwise direction on the other side of the machine, Fig. 6. These fingers tuck or fold the rear side edges of the parts 69 of the projecting ends 70 of the wrapper, Fig. 16—A, providing an inturned flap 71 on each end of the package, Fig. 17—A. The tucker fingers 61 and 62 are synchronized with the operation of the conveyors 51 and 27 and therefore act upon the rear side edges 69 of that part of the wrapper which projects beyond the ends of the package, causing these projecting ends to be tucked in, and folded tightly against the ends of the packages, as shown in Fig. 17—A. The tucker fingers 61 and 62 operate continuously in timed relationship with the operation of the conveyor. The tucking operation is accomplished during the continued movement of the package and while the package is being conveyed by the conveyor fingers 57.

While the first tucking operation is being performed by the tucking fingers 61 and 62, the package is moved by the conveyor 51 through a stationary tucker 72, Figs. 5 and 6, which engages the forward side of the wrapper which projects beyond the ends of the package, and as the package with the wrapper thereabout is pushed against the member 72, the forward extending edges of the package are caused to be folded inwardly against the ends of the package, as indicated at 73, Fig. 17—A. The package will thus be partly wrapped, as shown in Fig. 17—A. The continued movement of the package will bring the package to position to have the upper and lower flaps 74 and 75 projecting from the ends thereof folded by stationary folders 76 for folding these end flaps 74 and 75.

Stationary folders

The stationary folders 76 comprise spaced upper and lower members 77 and 78, Fig. 18, which are stationary elements adapted to receive the overhanging upper parts or flaps 74 of the wrapper and cause these flaps to be folded

downwardly against the package, the flaps 74 being received in slots or grooves 79 formed between the upper member 77 and the lower member 78, Fig. 18. The folding surfaces 80 of the folders are so positioned that the overhanging parts 74 in the grooves 79 will move the flaps progressively downwardly against the package, Fig. 20—A, as the package is being conveyed through the folding mechanism.

The free ends of the tuckers 72 are reduced to form fingers 81, Fig. 5, so that the flaps 74 and 75 will be properly guided, the fingers 81 engaging the end of the package and lying between the flaps 74 and 75 as the package moves to position to have the flaps 74 folded downwardly against the ends of the package, as indicated at 82, Fig. 19. The lower part 78 of the folding mechanism is provided with a groove 83 which receives the lower extending flaps 75 of the package and holds these flaps in position for subsequent operations. As soon as the upper flaps 74 are folded downwardly against the ends of the package, as indicated at 82, Fig. 19, the package is subjected to a solvent applicator 84 for supplying a quantity of Cellophane solvent material entirely across the folded parts of the wrapper which are pressed down against the ends of the package, Fig. 20—A. The solvent applicator 84 comprises gears 85 mounted on shafts 86, which are rotated by gears 87 on the rotary tucking shafts 63 and 64. Applicator wheels or discs 88 which are mounted on shafts 89 are driven by gears on these shafts meshing with the gears 85. The distance between the applicator wheels 88 is such as to permit the package to pass there-through but, at the same time to cause the folded ends of the wrapper to be pressed against the ends of the package. Each applicator wheel 88 is a relatively thin disc, as shown in Fig. 20, and receives its solvent from containers 91, Fig. 6, by means of wicks 92, the wicks extending downwardly into the containers. As soon as solvent is applied to the ends of the package, as indicated in Fig. 20—A, the conveyor 27 moves the packages through lower stationary folders 93 to have the bottom flaps 75 folded upwardly against the other folded parts of the wrapper against the ends of the package.

Second stationary folder

The stationary folder 93, Figs. 5 and 21, comprises spaced members 94 which have inclined upper surfaces 95, Fig. 5, over which the bottom edge of the flaps 75 ride to move the flap progressively against the package. The members 94 terminate into relatively straight side parts 96, Fig. 21, to hold the end folds down tightly against the ends of the package, as shown in Fig. 21, whereby the bottom end flaps 75 will be folded upwardly and against the ends of the package, as indicated at 97, Fig. 22.

After the wrapper has been folded completely about the package, as shown in Fig. 22, the package moves through spaced ironers or hot plates 98 to provide heat which, acting with the solvent treated end of the package, will cause the end flaps and tucks to be sealed securely and tightly in position. The ironers or hot plates 98 have boss portions thereon adapted to receive electric heating elements 99, Figs. 6 and 12, which receive electric energy from conductors 100. The heating element 98—100 may be supported in any desirable manner but are preferably supported on the spaced supports 50. After the packages 14 have passed through the heating

means 98, 99, they are conveyed through suitable discharge mechanism 101, Figs. 7-9.

Discharge mechanism

The discharge mechanism 101, Figs. 7-9, comprises a chute 102 arranged at the extreme end of the conveyor 51 into which the packages are fed flat-side-down. The chute has a downwardly extending curved or elbow part 103 which connects with a straight horizontal part 104. The elbow part 103 is adapted to have its opposing side walls provided with tufts of bristles 105 to support the packages between ends, and press the ends of the package properly and seal the flaps securely in position.

The discharge mechanism 101 also includes a rotatably mounted driven shaft 106 operatively supported in a part of the machine frame. A spider member 107 comprising a plurality of radially extending arms 108 carries a plurality of spaced discharge fingers 109 which are adapted to engage successive packages and carry them down the elbow of the chute 102 and deliver them to discharge position 110, Fig. 8. The fingers 109 are pivotally mounted at 111 to the arms 108, the fingers 109 having projections 112 upon which roller elements or pins 113 are mounted. The rollers 113 engage a cam groove 114 formed in a cam 115 which is located adjacent the spider 107. The cam 115 may be formed integrally with the housing or bearing 116 in which the shaft 106 rotates. The fingers 109, have a two-point bearing, one bearing being with the arms 108 and the other being the rollers 113 engaging the camway 114. Thus, during rotation of the spider 107, the fingers 109 are brought into radial position, moving the packages from the end of the conveyor 51 to a position at the bottom of the chute. After the fingers have moved to a downward position, the camway 114 sharpens at an angle whereby the fingers 109 are moved to a position out of engagement with the package and preventing them from scraping or otherwise engaging the end of a previously positioned package. The fingers 109 move the packages from a flat-side-up position to an edge position where they rest on the longitudinal side which carries the longitudinal side seam. After the packages are positioned in the bottom of the chute part 104, they will be moved progressively by each oncoming package whereby the longitudinal side edge carrying the seam will be over a hot plate 117, Fig. 7, which is heated by a heating element 118 so as to heat-treat the longitudinal seam to cause a proper adhesive bond along the flaps 24 and the flap 25 which had the solvent previously applied thereto. The packages in the horizontal part 104 of the chute are moved progressively to discharge position 110 by the oncoming packages forced through the chute by the action of the fingers 109.

Drive means

The various driving parts of the machine are driven by means of an endless drive chain 120 which passes over and is driven by a driving sprocket 121, Fig. 1. The sprocket 121 is mounted on a shaft 122 which is driven by any suitable prime mover, such as an electric motor (not shown). The chain 120 passes over a sprocket 123 on the shaft 6, Figs. 1, 5, and 6, to drive the conveyor 5. From the sprocket 123 the chain 120 passes over a sprocket 124, Fig. 1, to drive a shaft 125 mounted in a part of the frame superstructure. The chain then passes over a sprocket 126 on the shaft 41 to drive the con-

veyor 27, Figs. 1, 5, and 11, from whence it passes under a sprocket 127 on the shaft 56 to drive the conveyor 51, Figs. 1, 5, 7, and 8. After passing from drive position under the sprocket 127 the chain 120 passes over and drives a sprocket 128 on the discharge shaft 106, Figs. 7 to 9, to drive the discharge mechanism. The lower reach of the chain then returns downwardly at an angle to the drive sprocket 122. The single chain 120, therefore, drives all the operating mechanism of the machine, therefore providing simple, efficient and economical driving thereof.

In such cases where it is desirable to have the discharge means 101 deliver the packages flat-wise-up instead of on end as shown in Figs. 7 to 9, additional means may be provided, Figs. 23 and 24. This additional means comprises spaced rotary conveying wheels 130 having aligned packages supporting fingers 131 cut away, as indicated at 132, Fig. 23, to provide package receiving recesses. The wheels 130 are mounted on a shaft 133 which carries a gear 134 meshing with a gear 135 on a shaft 136. The shaft 136 also carries a driving sprocket 137 over which the driving chain 120 passes to operate this shaft and consequently the wheels 130. The wheels 130 rotate in a clockwise direction, Fig. 23, and pick up the packages as they are resting on their sides in the part 104 of the discharge chute and discharge them on a moving conveyor 138 flat-side-up, as clearly shown in Fig. 23, where they are delivered to a predetermined station for packaging in cartons. The machine is therefore adapted to be arranged in a straight line and discharge in the positions shown in Figs. 7 to 9, or discharge in the manner shown in Figs. 23 and 24.

Instead of employing the wrapper feeding means 18, as shown in Figs. 1 and 13, the feed means may comprise feeding elements disclosed diagrammatically in Figs. 25 and 26, wherein feed rollers 140 feed the wrapper 17 to rotary cutters 141, whereby the wrapping material 17 is cut after the package 14 is pushed through the wrapper by the conveyor 5, as shown in Fig. 26. As the package 14 engages the wrapper, as shown in Fig. 25, the cutters 141 are not yet in cutting relationship, however, as the package continues to be pushed through the wrapper, as clearly shown in Fig. 26, the cutters 141 will be in contacting relationship and sever a cut wrapper from the web of material.

Regardless of whether the feed means 18 are employed, or whether roller and cutter elements shown in Figs. 25 and 26, or whether the cutter and feed arrangement shown in applicant's co-pending application are employed, the timing is such that the web of material or the wrapper per se is released from the feeding or cutting means at precisely the proper time when a package 14 first engages the wrapper or when the package is pushed through the wrapper a predetermined amount. This timing is necessary to prevent a wrapper cut from the web from falling out of proper position. Also the release by the feeding means at this predetermined timing forms a tighter wrap about the package because the movement of the package is faster than the feed movement of the wrapper or web thereby creating a drawing pull on the wrapper.

The invention provides a high speed, continuously operating machine which forms a predetermined wrapper about a continuously moving package in a new and novel way. The wrapper about the package is so constructed that the opening tab is capable of being encircled about the

package transversely with an opening tab extending through the longitudinal seam in a side edge of the package. The conveyor 5 continuously moves the package through the wrapper without in any way coming in engagement with the wrapper. After the package has been pushed through the wrapper, the conveying mechanism 27 moves the package to successive conveyors whereby the longitudinal projecting edges 24 and 25 of the wrapper are folded down against a longitudinal side edge of the wrapper to fold these parts of the wrapper tightly about the package. After the wrapper has been completely folded about the top, bottom and two sides, conveying mechanism 51 moves the packages through the end tucking and folding mechanism whereby the wrapper will be completely folded about the package and moved to discharge position. The invention provides a relatively simple, very efficient machine, all arranged in a straight line so as to provide the greatest efficiency. The present machine is simple in construction, effective in operation, and can be readily and economically manufactured.

Changes may be made in the form, construction and arrangement of the parts without departing from the spirit of the invention or sacrificing any of its advantages, and the right is hereby reserved to make all such changes as fairly fall within the scope of the following claims.

The invention is hereby claimed as follows:

1. A wrapping machine for feeding packages continuously from delivery position to discharge position and comprising first, second and third conveyors arranged in substantially a straight line in parallel overlapping relationship, means for driving each successive conveyor at a different rate of speed, feeding means on said second and third conveyors for engaging packages successively and continuously prior to release thereof by preceding conveyors, and means for wrapping the packages during their continuous movement by said conveyors.

2. A wrapping machine for wrapping a continuously moving package and comprising a continuously moving conveyor for moving a package to be wrapped to a predetermined position, means for feeding wrapping material to a predetermined position to be engaged by a package moved by the conveyor, means for forming the wrapper about the package, a second conveyor operating at a faster speed than the first conveyor, means on the second conveyor for partially folding the wrapper about the package, a third conveyor in line with the first and second conveyors and in parallelism therewith, means for pushing the folding of the wrapper about the package while on the third conveyor, and means for operating the third conveyor at a faster speed than the second conveyor.

3. A wrapping machine for wrapping a continuously moving package to be wrapped and comprising feeding mechanism for delivering a wrapper to a predetermined position, a continuously moving conveyor for moving said package to be wrapped through the wrapper and delivering the package and wrapper to a predetermined position, a second conveyor arranged in parallelism with the first conveyor and overlapping the first conveyor, means for operating the second conveyor at a faster speed than the first conveyor, means on the second conveyor and engageable with an upper surface of the wrapper to fold the wrapper against a side of the package and for delivering said package to a predetermined position, and a third conveyor underlapping the

second conveyor to move the package continuously through various folding positions, and means for operating the third conveyor at a speed faster than the second conveyor.

4. A wrapping machine for wrapping a continuously moving package to be wrapped and comprising feeding mechanism for delivering a wrapper to a predetermined position, a continuously moving conveyor for moving said package with a side thereof through the wrapping material to cover said side, the top and the bottom of the package with the material and leaving parts of the wrapper extending a predetermined distance beyond the other side of the package, a second conveyor in line with the first conveyor but arranged in a plane higher than the first conveyor and overlapping the first conveyor, means for operating the second conveyor at a faster speed than the first conveyor, means on the second conveyor for folding one of said wrapper parts against said other side of the package, a third conveyor in line with the first and second conveyors, below the second conveyor and in substantially the same plane as the first conveyor, means for operating the third conveyor at a faster speed than the second conveyor, means on the third conveyor to fold the other of said wrapper parts against said other side of the package.

5. A wrapping machine for wrapping a continuously moving package to be wrapped and comprising feeding mechanism for delivering a wrapper to a predetermined position, a continuously moving conveyor for moving said package to be wrapped through the wrapper, said wrapper being wider than the length of the package and longer than the circumference of the package whereby one side, the top and bottom of the package will be covered with the wrapper with the free ends of the wrapper at the top and bottom of the package projecting beyond the other side of the package with the ends of the wrapper over-hanging the ends of the package, a second conveyor in line with the first conveyor but at a higher plane and operating at a speed greater than the first conveyor, means on the second conveyor to fold one of said free ends against the said other side of the package, a third conveyor in line with said other conveyors but below the second conveyor to receive the package and wrapper from the second conveyor, means to operate the third conveyor at a speed greater than the second conveyor, means on the third conveyor to fold the other of said free ends against the said other side of the package, and means for folding the said over-hanging ends against the ends of the package while the package is moved by said third conveyor.

6. A wrapping machine for wrapping a continuously moving package to be wrapped and comprising feeding mechanism for delivering a wrapper to a predetermined position, a continuously moving conveyor for moving said package with a side thereof through the wrapping material to cover said side, the top and the bottom of the package with the material and leaving upper and lower parts of the wrapper extending beyond the side of the package with end projections extending beyond the ends of the package, a second conveyor, in line with the first conveyor but in a plane higher than the first conveyor and overlapping the first conveyor, means on the second conveyor to fold the upper extending part of the wrapper against said other side of the package, a third conveyor in line with said first

two conveyors but below the second conveyor and in substantially the same plane as the first conveyor, means to operate the third conveyor at a speed faster than the second conveyor, means on the third conveyor to fold the lower extending part of the wrapper against said other side of the package, and means for folding said over-hanging ends against the package ends while the package is conveyed by the third conveyor.

7. A wrapping machine for wrapping a continuously moving package to be wrapped and comprising feeding mechanism for delivering a wrapper to a predetermined position, a continuously moving conveyor for moving said package to be wrapped through the wrapper, said wrapper being wider than the length of the package and longer than the circumference of the package whereby one side, the top and bottom of the package will be covered with the wrapper with the free ends of the wrapper at the top and bottom of the package projecting beyond the other side of the package with the ends of the wrapper over-hanging the ends of the package, a second conveyor in line with the first conveyor but at a higher plane and operating at a speed greater than the first conveyor, means on the second conveyor to fold a top free end of the wrapper downwardly against said other side of the package, rotary means applying an adhesive to the lower free end, means for folding the lower free end of the wrapper upwardly against the said other side of the package, a third conveyor in line with said other conveyors and substantially in the same plane as the first conveyor and upon which said last named means are mounted, means to operate the third conveyor at a faster speed than the second conveyor, and means for folding the wrapper about the ends of the package while the package is moved by the third conveyor.

8. A wrapping machine for wrapping a continuously moving package to be wrapped and comprising feeding mechanism for delivering a wrapper to a predetermined position, a continuously moving conveyor for moving said package with a side thereof through the wrapping material to cover said side, the top and the bottom of the package with the material and leaving upper and lower parts of the wrapper extending beyond the other side of the package with end projections extending beyond the ends of the package, a second conveyor in line with the first conveyor but in a plane higher than the first conveyor and overlapping the first conveyor, means on the second conveyor to fold the upper extending part of the wrapper against said other side of the package, a third conveyor in line with said first two conveyors but below the second conveyor and in substantially the same plane as the first conveyor, means to operate the third conveyor at a speed faster than the second conveyor, means on the third conveyor to fold the lower extending part of the wrapper against said other side of the package, rotary tuckers for tucking inwardly the rear sides of the end projections against the package ends, stationary means for tucking inwardly the front sides of the end projections against the package ends, and means for folding the upper and lower sides of said projecting ends against the package ends.

9. A wrapping machine for wrapping a continuously moving package to be wrapped and comprising feeding mechanism for delivering a wrapper to a predetermined position, a continuously moving conveyor for moving said package

with a side thereof through the wrapping material to cover said side, the top and the bottom of the package with the material and leaving upper and lower parts of the wrapper extending beyond the other side of the package with end projections extending beyond the ends of the package, a second conveyor in line with the first conveyor but in a plane higher than the first conveyor and overlapping the first conveyor, means on the second conveyor to fold the upper extending part of the wrapper against said other side of the package, a third conveyor in line with said first two conveyors but below the second conveyor and in substantially the same plane as the first conveyor, means to operate the third conveyor at a speed faster than the second conveyor, means on the third conveyor to fold the lower extending part of the wrapper against said other side of the package, rotary tuckers for tucking inwardly the rear sides of the end projections against the package ends, stationary means for tucking inwardly the front sides of the end projections and stationary means for folding the upper and lower sides of said wrapper projecting ends as the package is moved by the third conveyor.

10. A wrapping machine for wrapping a continuously moving package to be wrapped and comprising feeding mechanism for delivering a wrapper to a predetermined position, a continuously moving conveyor for moving said package with a side thereof through the wrapping material to cover said side, the top and the bottom of the package with the material and leaving upper and lower parts of the wrapper extending beyond the other side of the package with end projections extending beyond the ends of the package, a second conveyor in line with the first conveyor but in a plane higher than the first conveyor and overlapping the first conveyor, means on the second conveyor to fold the upper extending part of the wrapper against said other side of the package, a third conveyor in line with said first two conveyors but below the second conveyor and in substantially the same plane as the first conveyor, means to operate the third conveyor at a speed faster than the second conveyor, means on the third conveyor to fold the lower extending part of the wrapper against said other side of the package, rotary tuckers for tucking inwardly the rear sides of the end projections against the package ends, stationary means for tucking inwardly the front sides of the end projections, stationary means for folding the upper and lower sides of said wrapper projecting ends as the package is moved by the third conveyor, and rotary means for applying adhesive material to at least one of said last named sides prior to the complete folding of said last named sides.

11. A wrapping machine for wrapping a continuously moving package to be wrapped and comprising feeding mechanism for delivering a wrapper to a predetermined position, a continuously moving conveyor for moving said package with a side thereof through the wrapping material to cover said side, the top and the bottom of the package with the material and leaving upper and lower parts of the wrapper extending beyond the other side of the package with end projections extending beyond the ends of the package, a second conveyor in line with the first conveyor but in a plane higher than the first conveyor and overlapping the first conveyor, means on the second conveyor to fold the upper

extending part of the wrapper against said other side of the package, a third conveyor in line with said first two conveyors but below the second conveyor and in substantially the same plane as the first conveyor, means to operate the third conveyor at a speed faster than the second conveyor, means on the third conveyor to fold the lower extending part of the wrapper against said other side of the package, rotary tuckers for tucking inwardly the rear sides of the end projections against the package ends, stationary means for tucking inwardly the front sides of the end projections, stationary means for folding the upper and lower sides of said wrapper projecting ends as the package is moved by the third conveyor, rotary means for applying adhesive material to at least one of said last named sides prior to the complete folding of said last named sides, additional conveying means including a rotary member for receiving said packages and moving them to a predetermined position, and a pair of opposed brushes for engaging opposite ends of the packages during movement by said rotary member to press said last named wrapper sides into adhesively secured relationship.

12. A wrapping machine comprising a flat straight machine bed, a conveyor beneath the bed and having conveying arms above the bed to move successive packages along the bed to a predetermined position, means for feeding a wrapper to said position, said arms forcing the package through the wrapper, a second conveyor arranged above the bed, means on the second conveyor to partly fold the wrapper about the package and to convey the package to a second predetermined position, means to operate the second conveyor faster than the first conveyor, a third conveyor arranged beneath the bed, means on the third conveyor to further fold the wrapper about the package and convey the package and wrapper to discharge position, said last named means engaging the wrapper prior to release thereof by the next to last named means to stretch the wrapper to remove wrinkles therefrom, means to operate the third conveyor faster than the second conveyor, and means to complete the folding operation of the wrapper about the package prior to its attaining discharge position and while the package is moved by the third conveyor.

13. A wrapping machine comprising a flat straight machine bed, a conveyor beneath the bed and having conveying arms above the bed to move successive packages along the bed to a predetermined position, means for feeding a wrapper to said position, said arms forcing the package through the wrapper, a second conveyor arranged above the bed, means on the second conveyor to partly fold the wrapper about the package and to convey the package to a second predetermined position, means to operate the second conveyor faster than the first conveyor, a third conveyor arranged beneath the bed, means on the third conveyor to further fold the wrapper about the package and convey the package and wrapper to discharge position, said last named means engaging the wrapper prior to release thereof by the next to last named means to stretch the wrapper to remove wrinkles therefrom, means to operate the third conveyor faster than the second conveyor, and means to complete the folding operation of the wrapper about the package prior to its attaining discharge position and while the package is moved by the third conveyor, said last named

means comprising spaced rotary tucking means and spaced stationary folding means.

14. A wrapping machine comprising a flat straight machine bed, means to feed a wrapper to a predetermined position, a conveyor to move a package through the wrapper to cover the top, front side and bottom of the package with the wrapper, said wrapper being wider than the length of the package and longer than the circumference of the package whereby the free ends of the wrapper will project a predetermined distance beyond the rear side of the package and the sides of the wrapper will project a predetermined distance beyond the ends of the package, a second conveyor arranged in a plane above the first conveyor and above the machine bed to convey the package and wrapper, means on the second conveyor to fold one of said free ends of the wrapper against the rear side of the package, means to operate the second conveyor faster than the first conveyor, a third conveyor arranged in a plane below the second conveyor and in substantially the same plane as the first conveyor to convey the package and wrapper, means on said third conveyor to fold the other free end of the wrapper against the rear side of the package, means to operate the third conveyor faster than the second conveyor, and means to fold the ends of the wrapper projecting beyond the ends of the package against the ends of the package.

15. A wrapping machine comprising a flat straight machine bed, means to feed a wrapper to a predetermined position, a conveyor to move a package through the wrapper to cover the top, front side and bottom of the package with the wrapper, said wrapper being wider than the length of the package and longer than the circumference of the package whereby the free ends of the wrapper will project a predetermined distance beyond the rear side of the package and the sides of the wrapper will project a predetermined distance beyond the ends of the package, a second conveyor arranged in a plane above the first conveyor and above the machine bed to convey the package and wrapper, means on the second conveyor to fold one of said free ends of the wrapper against the rear side of the package, means to operate the second conveyor faster than the first conveyor, a third conveyor arranged in a plane below the second conveyor and in substantially the same plane as the first conveyor to convey the package and wrapper, means on said third conveyor to fold the other free end of the wrapper against the rear side of the package, means to operate the third conveyor faster than the second conveyor, and means to fold the ends of the wrapper projecting beyond the ends of the package against the ends of the package, said second conveyor having one end overlapping the first conveyor and its other end overlapping the third conveyor.

16. A wrapping machine comprising a flat straight machine bed, means to feed a wrapper to a predetermined position, a conveyor to move a package through the wrapper to cover the top, front side and bottom of the package with the wrapper, said wrapper being wider than the length of the package and longer than the circumference of the package whereby the free ends of the wrapper will project a predetermined distance beyond the rear side of the package and the sides of the wrapper will project a predetermined distance beyond the ends of the package, a second conveyor arranged in a plane above the

first conveyor and above the machine bed to convey the package and wrapper, means on the second conveyor to fold one of said free ends of the wrapper against the rear side of the package, means to operate the second conveyor faster than the first conveyor, a third conveyor arranged in a plane below the second conveyor and in substantially the same plane as the first conveyor to convey the package and wrapper, means on said third conveyor to fold the other free end of the wrapper against the rear side of the package, means to operate the third conveyor faster than the second conveyor, and means to fold the ends of the wrapper projecting beyond the ends of the package against the ends of the package, said last named means comprising a pair of rotary tuckers and oppositely disposed stationary folders.

17. A wrapping machine comprising a flat straight machine bed, means to feed a wrapper to a predetermined position, a conveyor to move a package through the wrapper to cover the top, front side and bottom of the package with the wrapper, said wrapper being wider than the length of the package and longer than the circumference of the package whereby the free ends of the wrapper will project a predetermined distance beyond the rear side of the package and the sides of the wrapper will project a predetermined distance beyond the ends of the package, a second conveyor arranged in a plane above the first conveyor and above the machine bed to convey the package and wrapper, means on the second conveyor to fold one of said free ends of the wrapper against the rear side of the package, means to operate the second conveyor faster than the first conveyor, a third conveyor arranged in a plane below the second conveyor and in substantially the same plane as the first conveyor to convey the package and wrapper, means on said third conveyor to fold the other free end of the wrapper against the rear side of the package, means to operate the third conveyor faster than the second conveyor, means to fold the ends of the wrapper projecting beyond the ends of the package against the ends of the package, a curved passageway for receiving wrapped packages from said third conveyor, means cooperating with said passageway for moving the packages therethrough and turning the packages from a flat side position to an edge position, means for sealing overlapping portions of said wrapper during movement through said passageway, and means for thereafter turning said packages to a flat side position and discharging the wrapped and sealed packages in said flat side position.

18. A wrapping machine comprising a plurality of conveyors to move a package continuously along a predetermined path, means for operating successive conveyors at faster speeds, means to wrap the package in a wrapper during continuous movement thereof by said conveyors and providing overlapping ends of the wrapper at a side portion of the package, a curved chute to receive wrapped packages, conveyor means to turn packages delivered in said chute from a flat position to an upright position in which the package stands on one side portion thereof, means to apply heat to said overlapping wrapper ends at said side portion while in the chute and in said upright position, and means to again turn the packages to a flat position and discharge the packages.

19. A wrapping machine having a machine bed comprising means to feed wrapping material to a predetermined position, a pair of lower conveyors, an intermediate upper conveyor overlapping the other conveyors, a drive shaft for each conveyor, a drive shaft for the feed means, a rotary mounted package discharge member, a drive shaft for the last named member, a drive sprocket on each shaft, a prime mover, and a single endless chain driven by the prime mover and passing over each of said sprockets to drive each of said shafts.

20. In a package wrapping machine for applying wrappers to packages in which the wrapper has folded and adhesively secured portions at the ends of the package, a curved chute for receiving wrapped packages, means for feeding said packages to said chute, rotary means coordinated with said feed means for moving packages through said chute and cooperating with the chute to turn the packages from a relatively flat position to a position in which the packages stand upright on a side thereof, flexible means mounted on said chute in position to engage the opposite ends of the packages to press said adhesively secured wrapper portions together, and means coordinated with said feeding and rotary means for turning the packages to a flat position and then effecting discharge thereof.

21. In a package wrapping machine for applying wrappers to packages in which the wrapper has folded and adhesively secured portions at the ends and at a side of the package, a curved chute for receiving wrapped packages, means for feeding said packages to said chute, means coordinated with said feed means for moving packages through said chute and cooperating with the chute to turn the packages from a relatively flat position to a position in which the packages stand upright on a side thereof, flexible means mounted on said chute in position to engage the opposite ends of the packages to press said adhesively secured wrapper end portions together, means for sealing said adhesively secured portions at the side of the packages while the packages are in said upright position, and continuously rotating means coordinated with said feeding and rotary means for turning the packages to a flat position and then effecting discharge thereof.

22. In a package wrapping machine for applying wrappers to packages in which the wrapper has folded and adhesively secured portions at the ends and at a side of the package, a curved chute for receiving wrapped packages, means for feeding said packages to said chute, rotary means coordinated with said feed means for moving packages through said chute and cooperating with the chute to turn the packages from a relatively flat position to a position in which the packages stand upright on a side thereof, flexible means mounted on said chute in position to engage the opposite ends of the packages to press said adhesively secured wrapper end portions together, means for sealing said adhesively secured portions at the side of the packages while the packages are in said upright position, and means including a continuously rotating box therein for then turning the packages to a flatwise position and discharging the packages.

CLARENCE J. MALHIOT.