Feb. 12, 1946. F. D PALMER 2,394,936

PACKAGING APPARATUS

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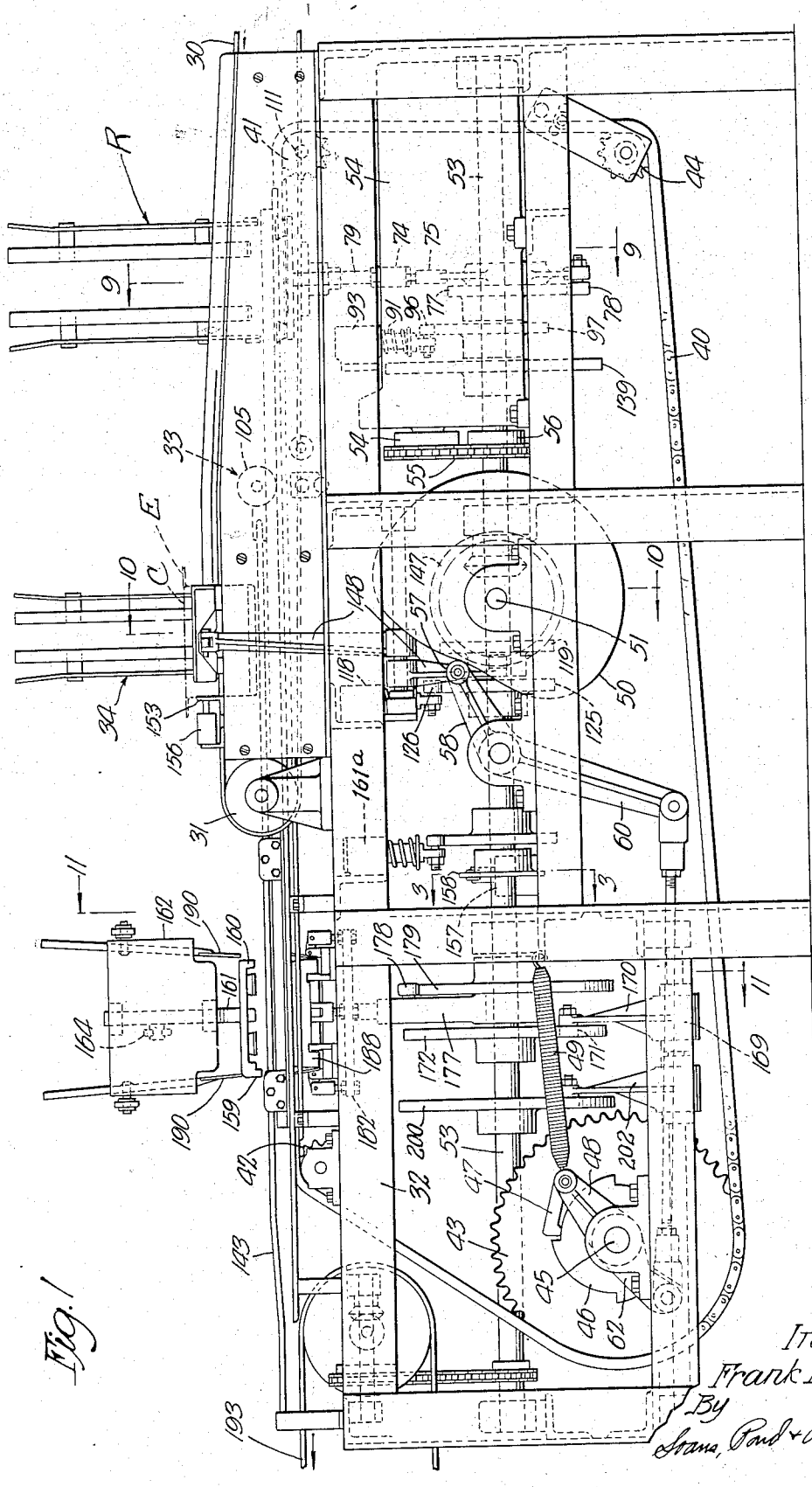


Fig. 1

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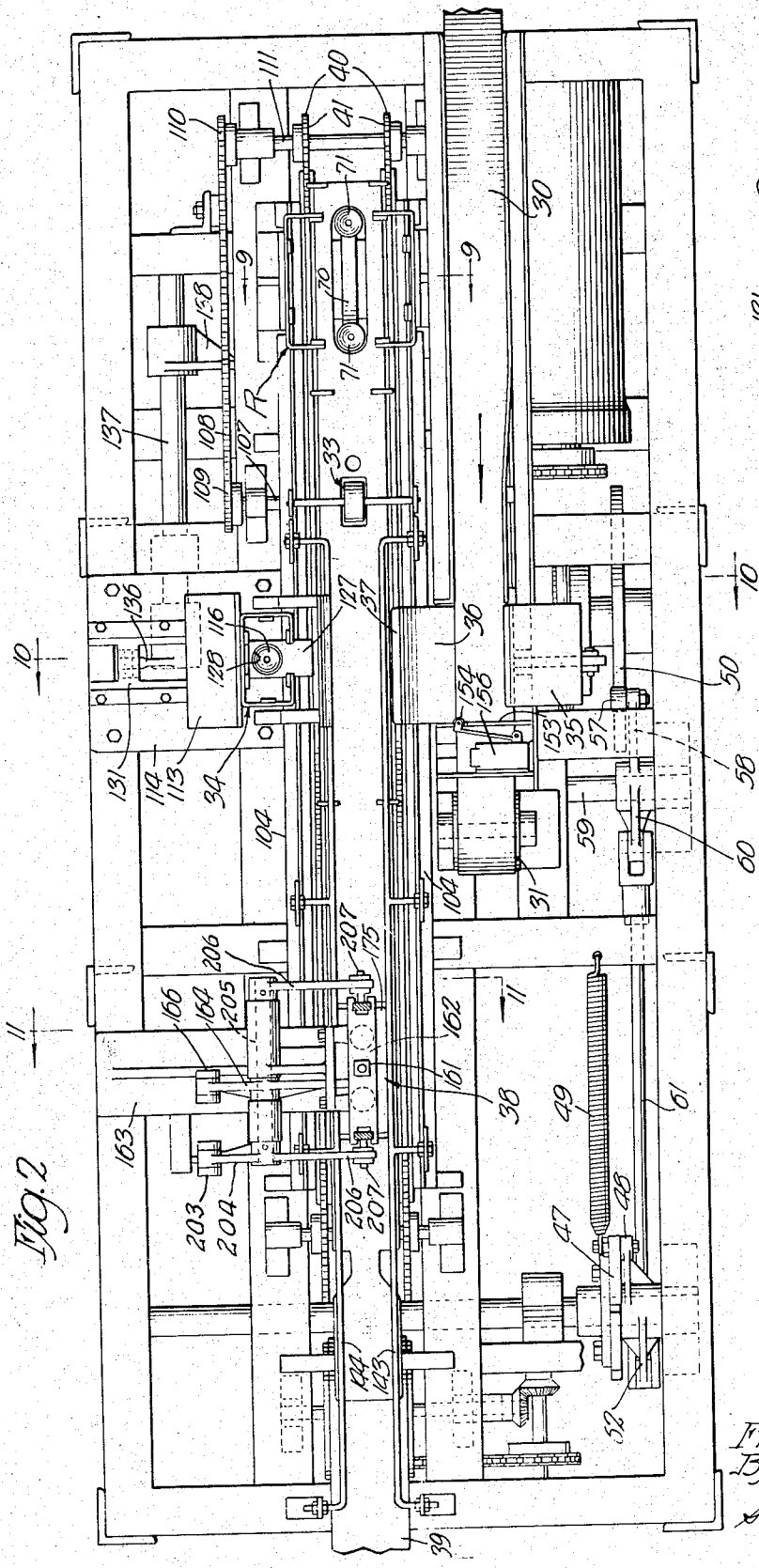


Fig. 2

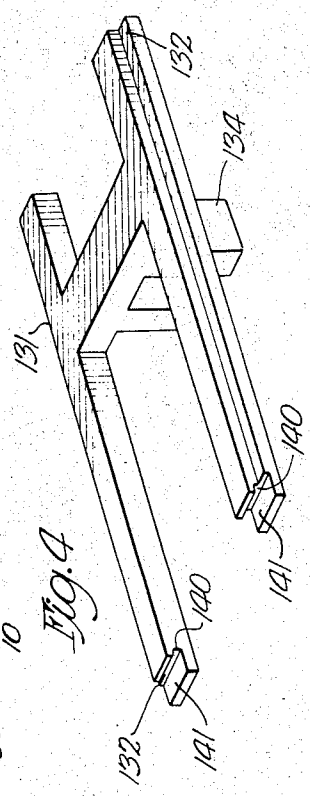


Fig. 4

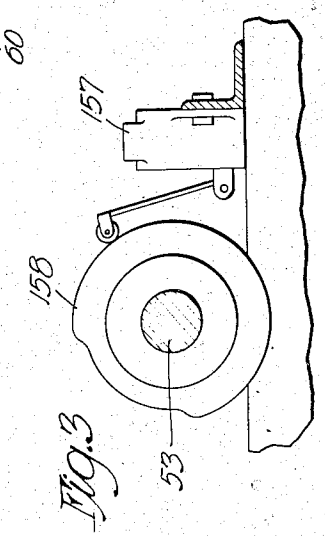


Fig. 3

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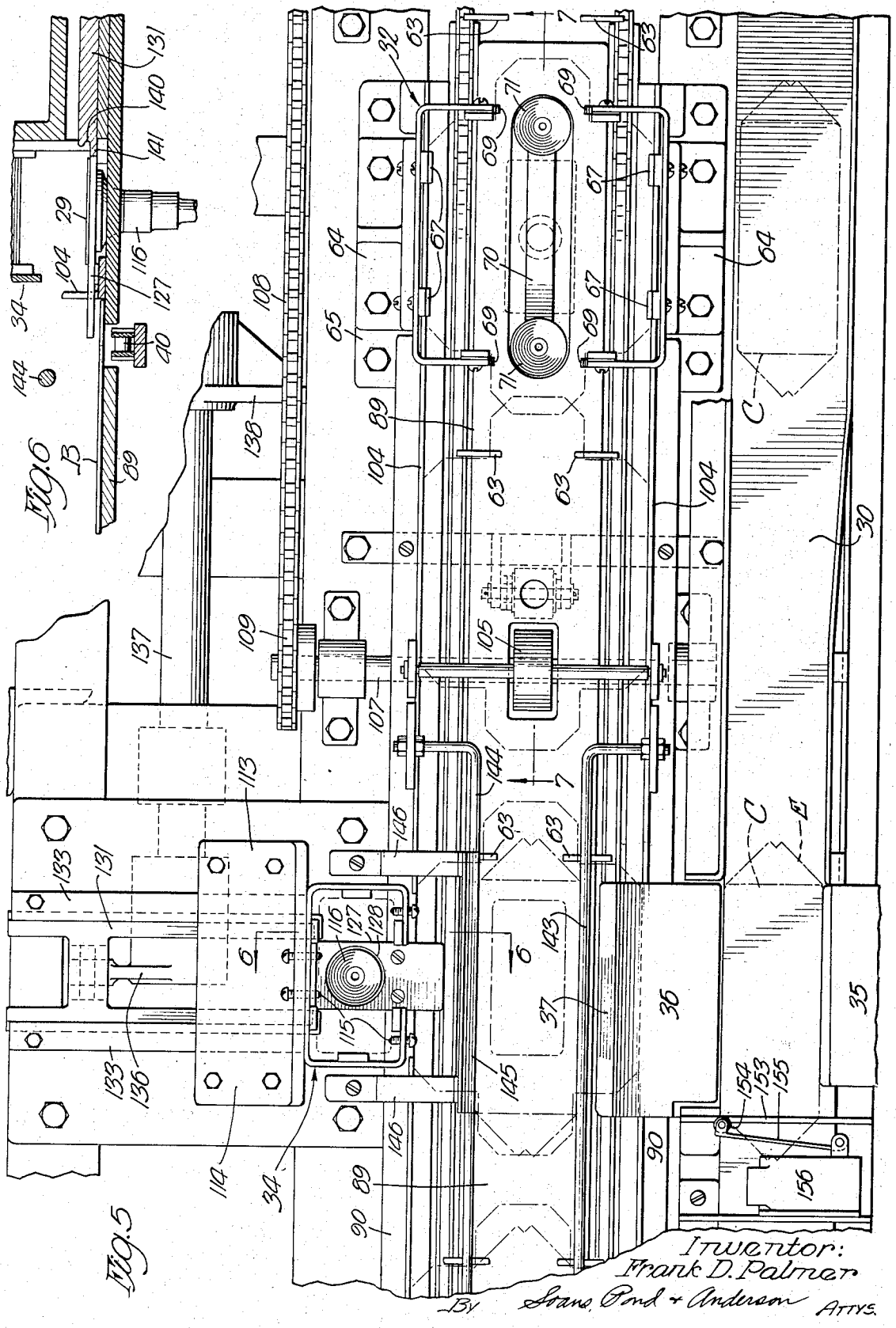


Fig. 6

Fig. 5

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PACKAGING APPARATUS

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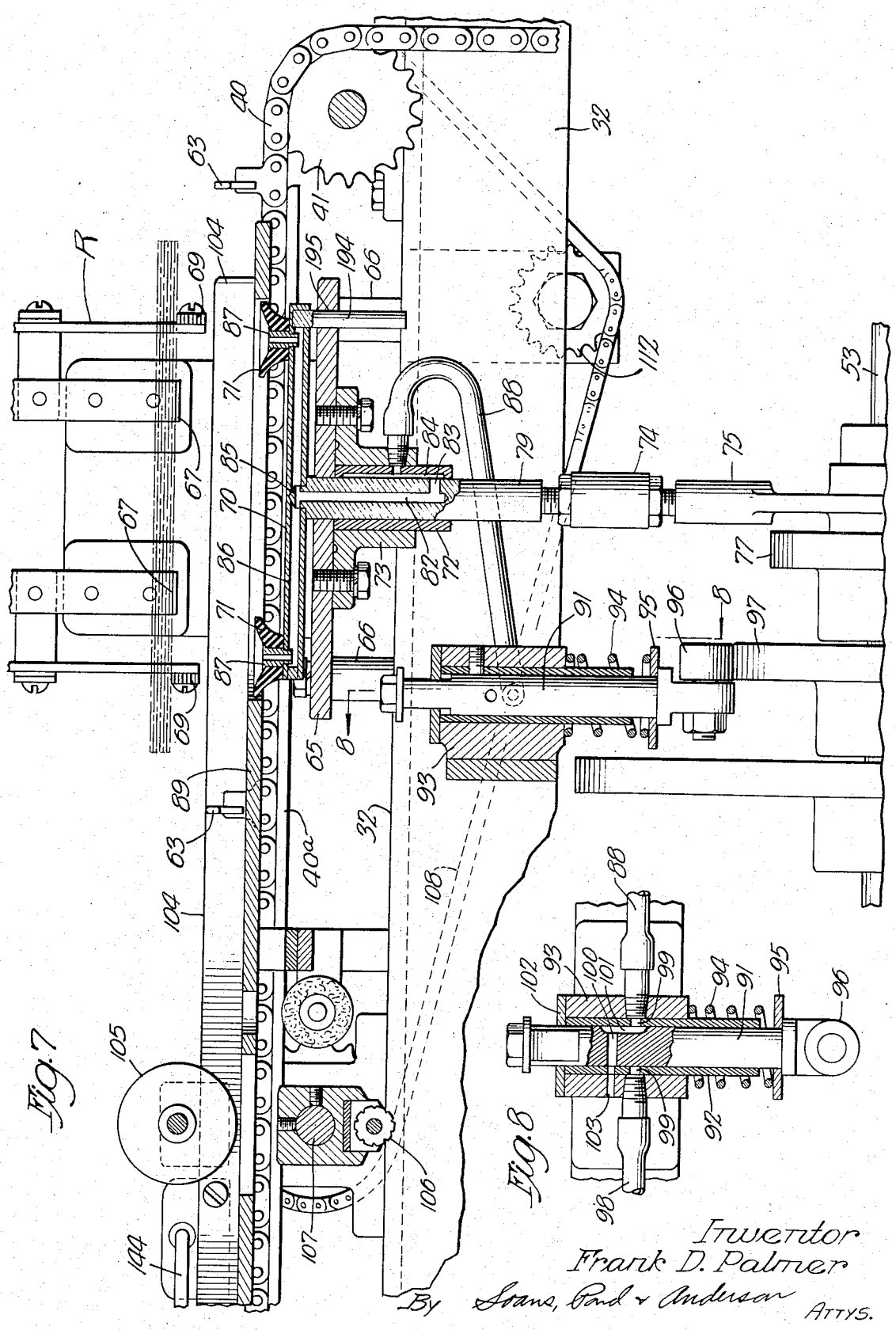


Fig. 7

Fig. 8

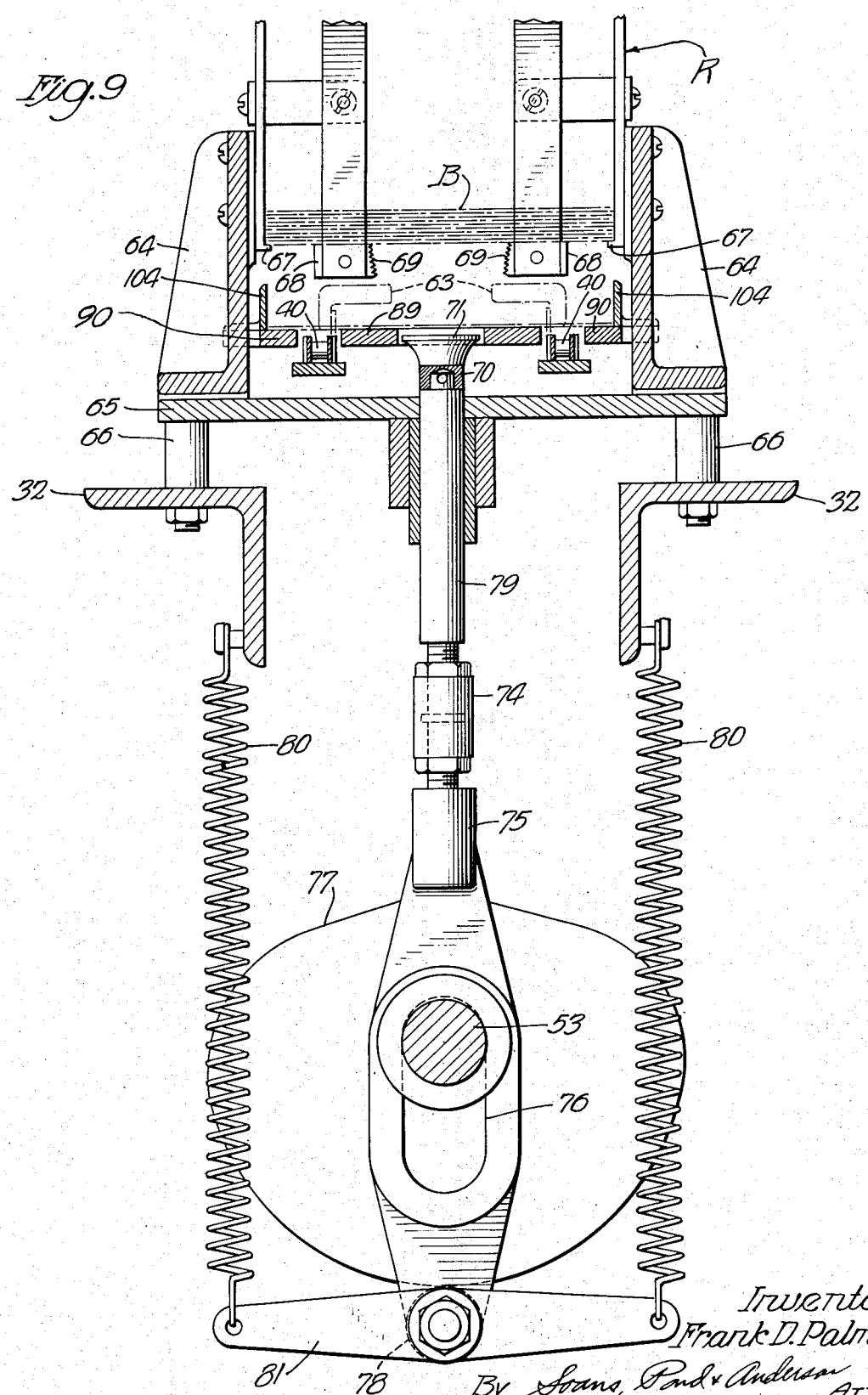
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PACKAGING APPARATUS

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Fig. 9



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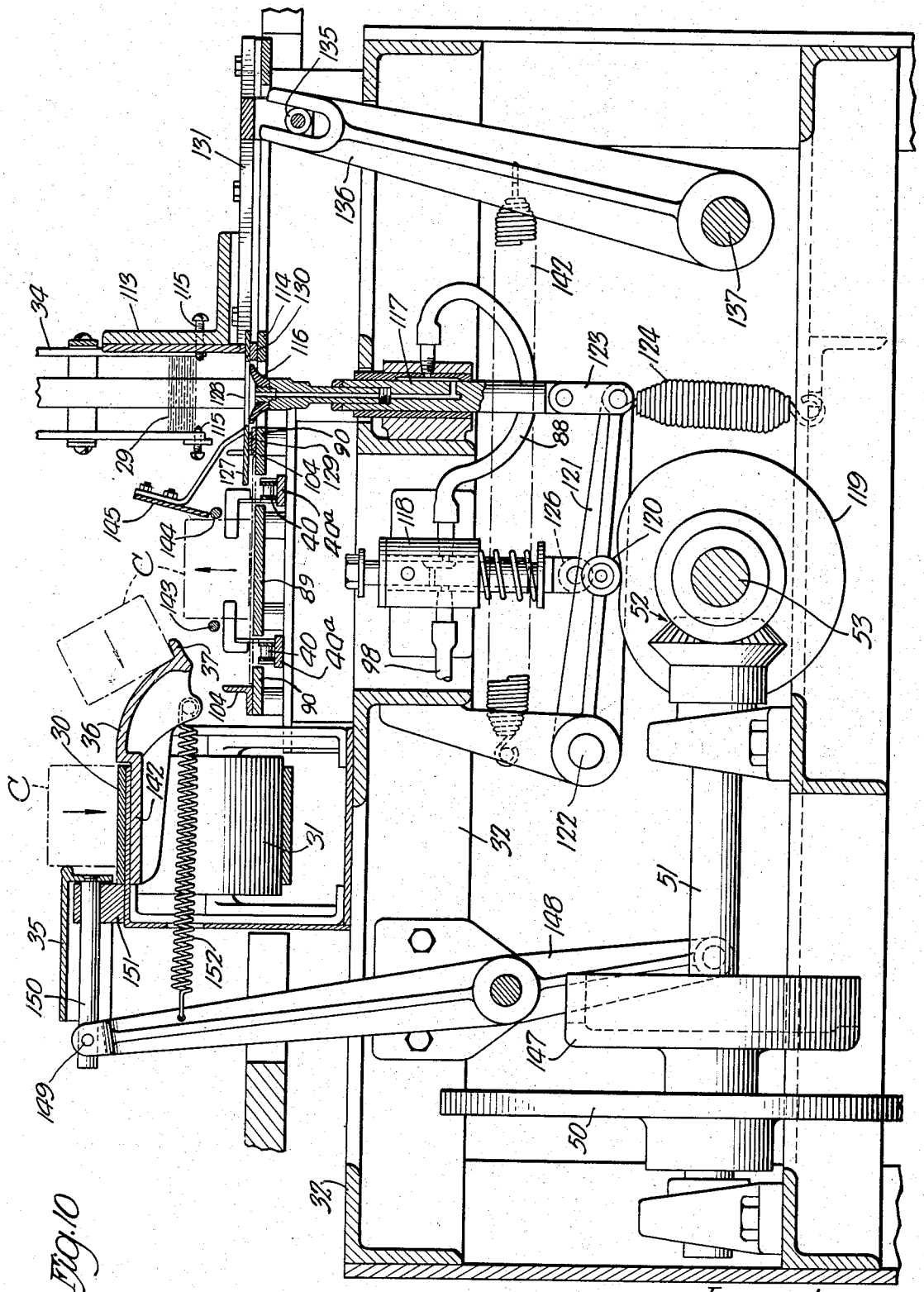


Fig. 10

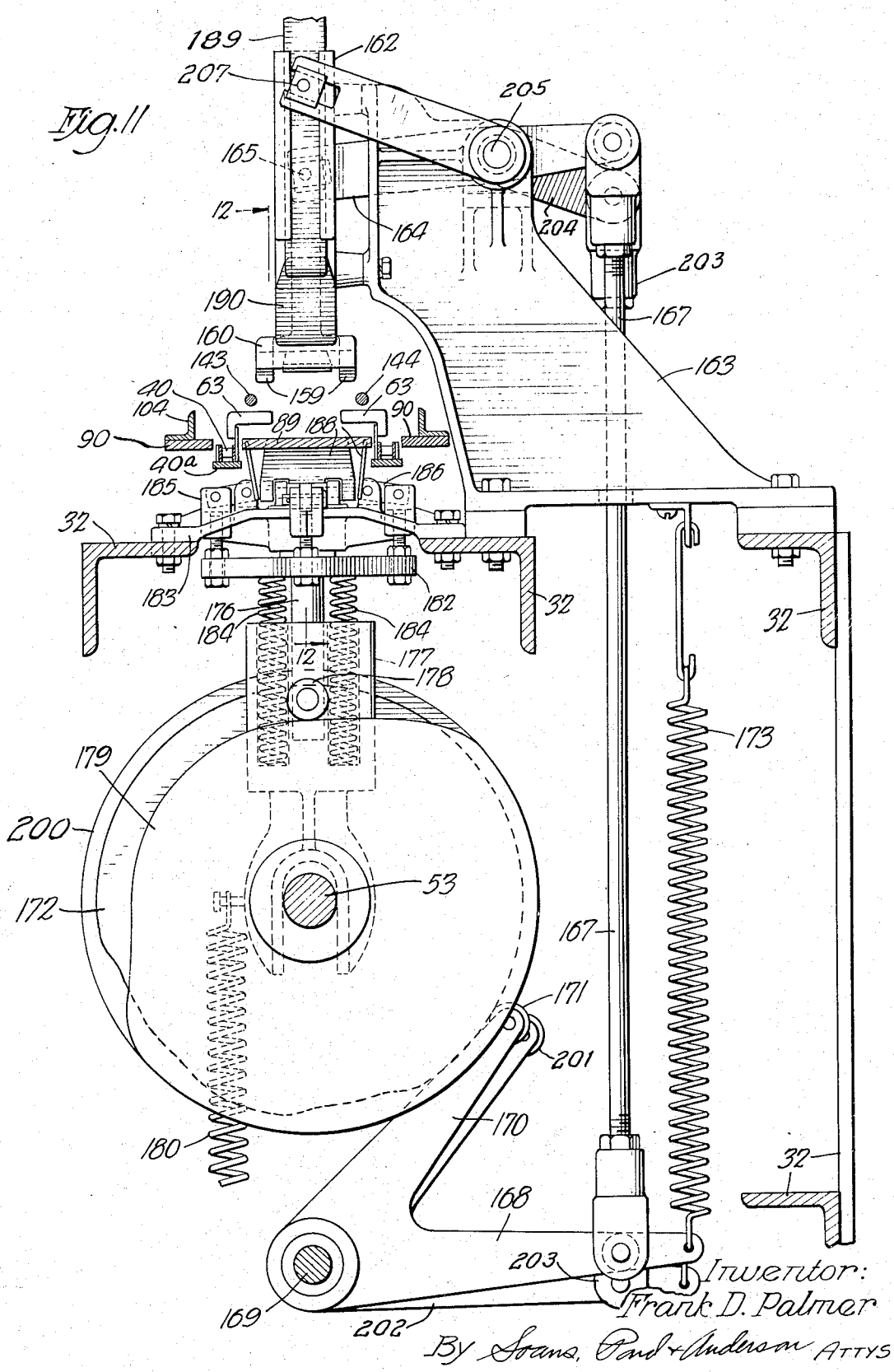
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Fig. 11



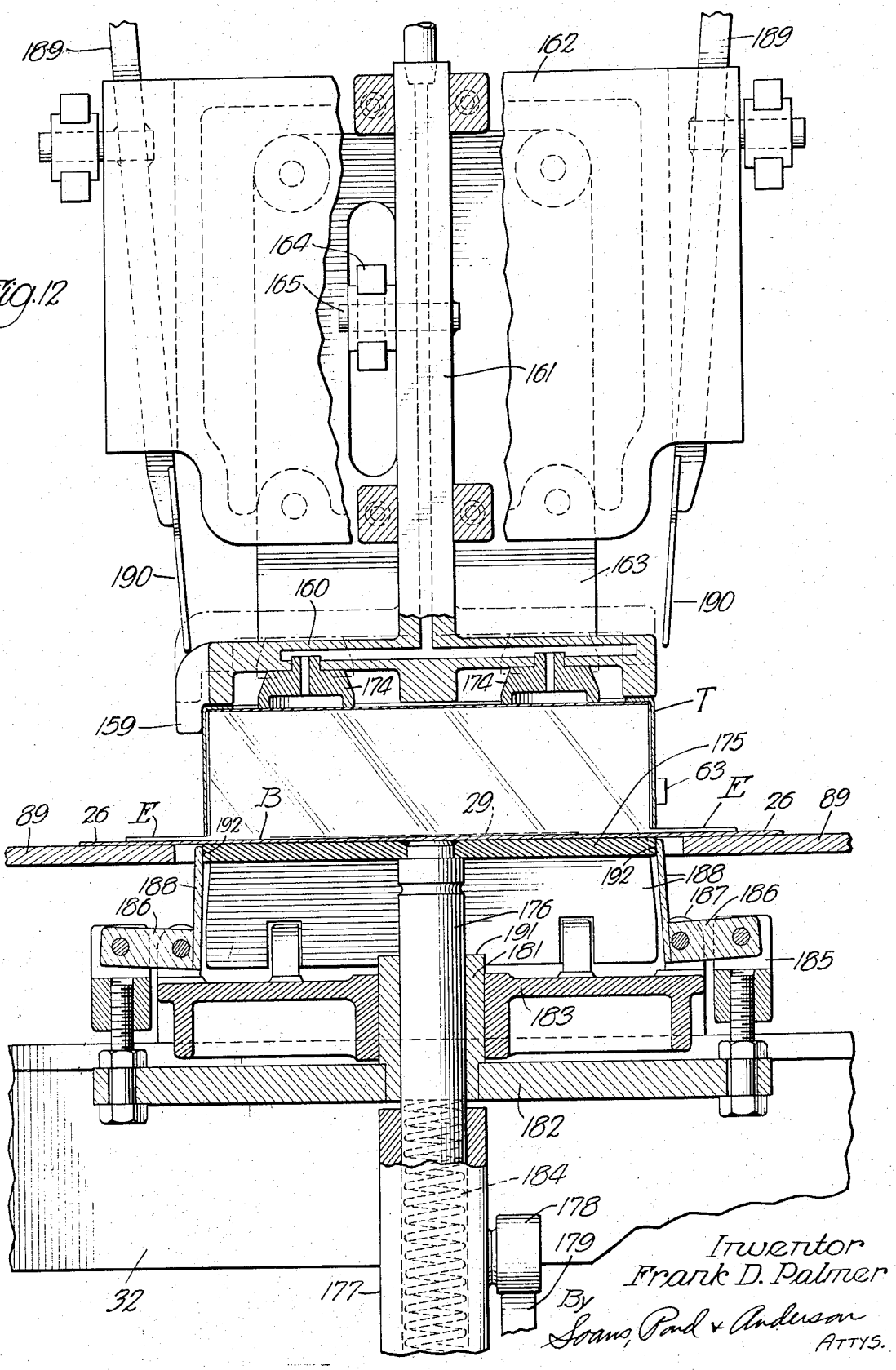
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Fig. 12



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Fig. 13

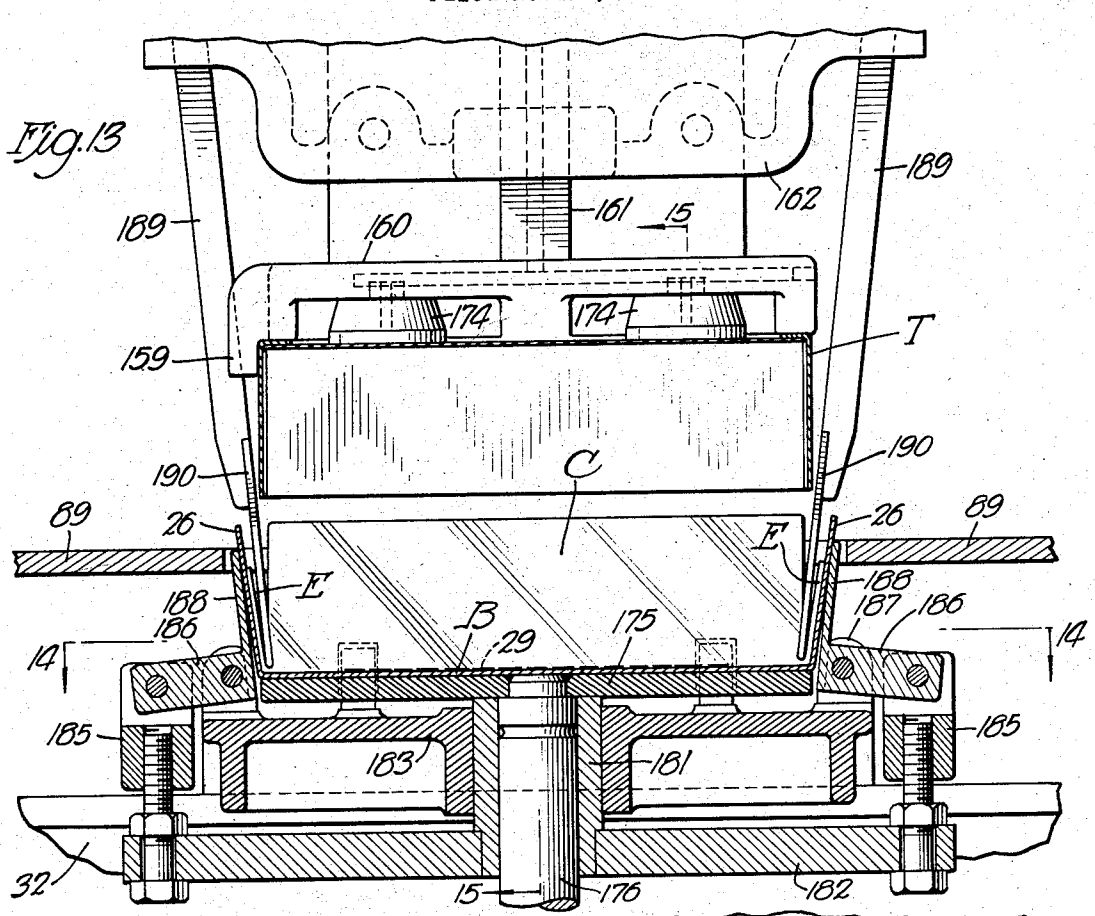
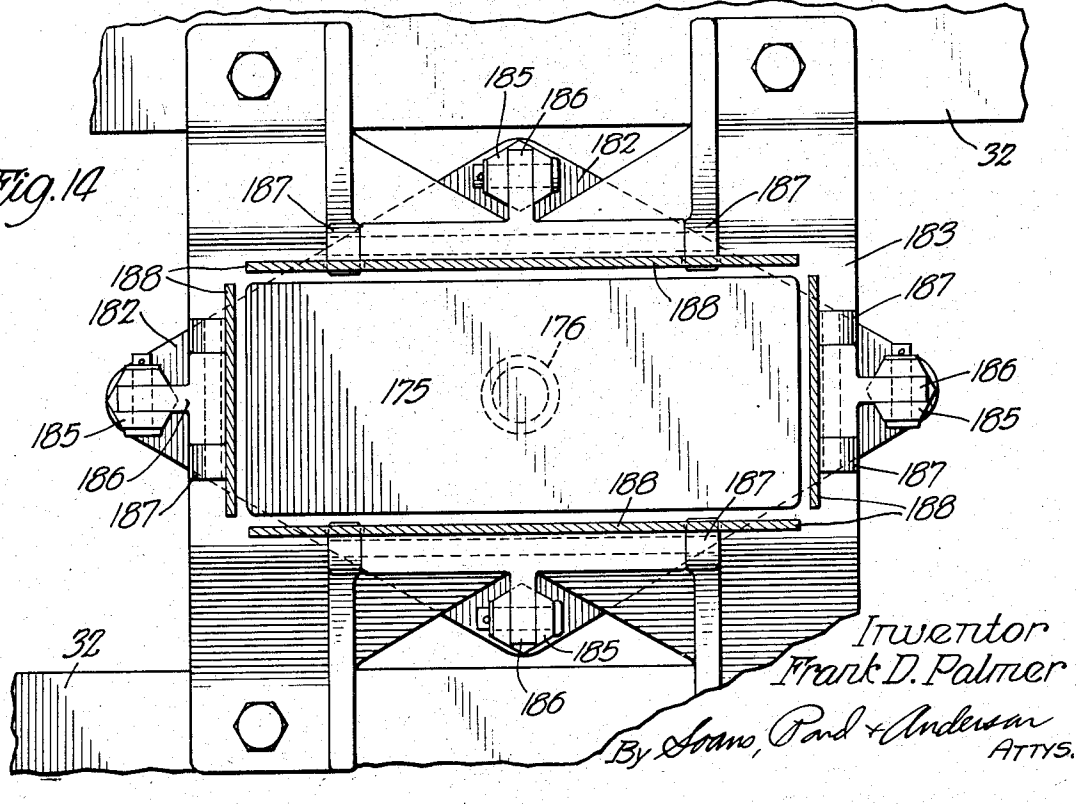


Fig. 14



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Fig. 15

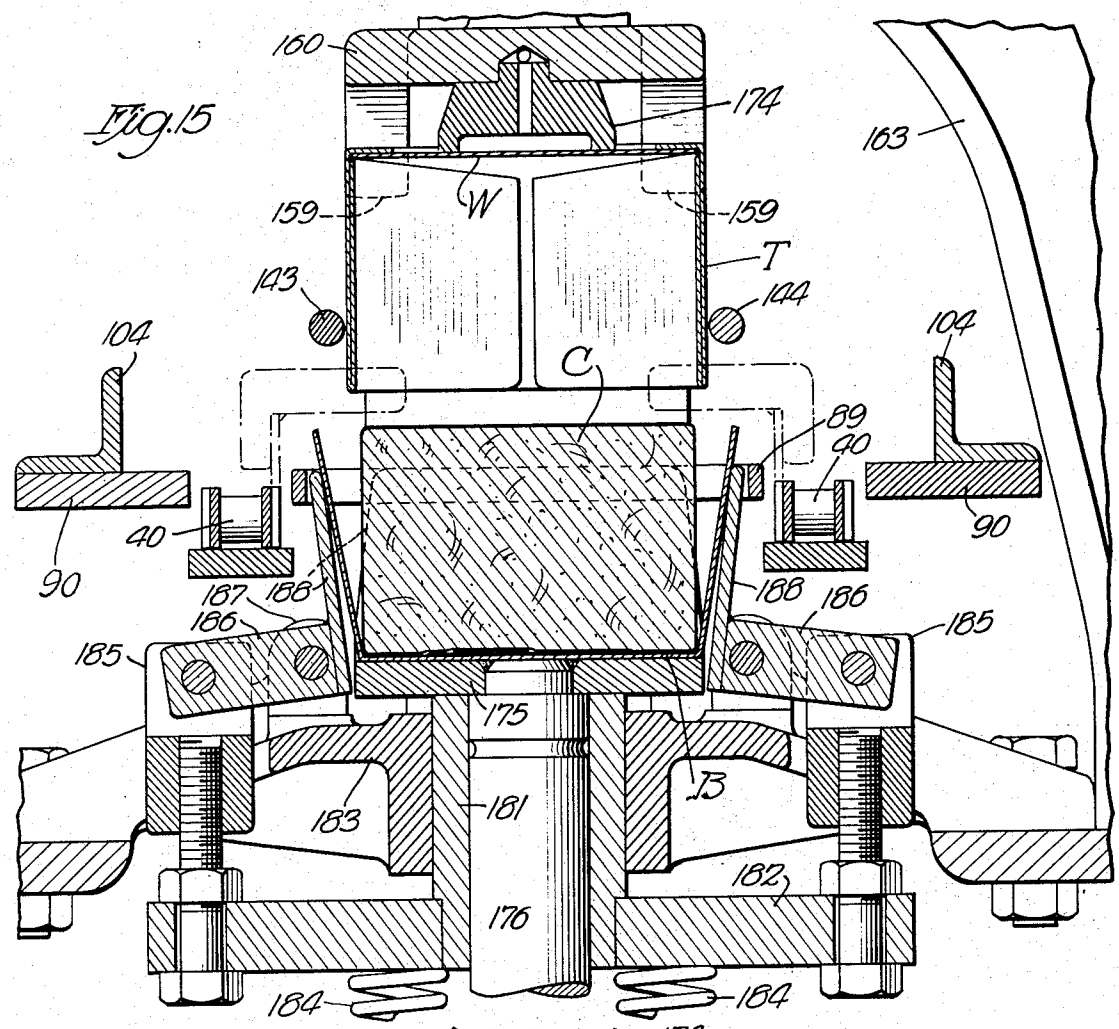
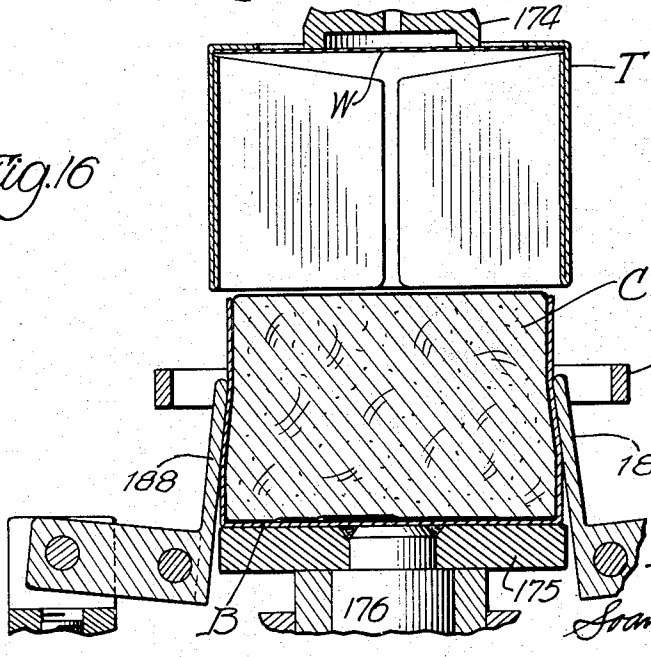


Fig. 16



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PACKAGING APPARATUS

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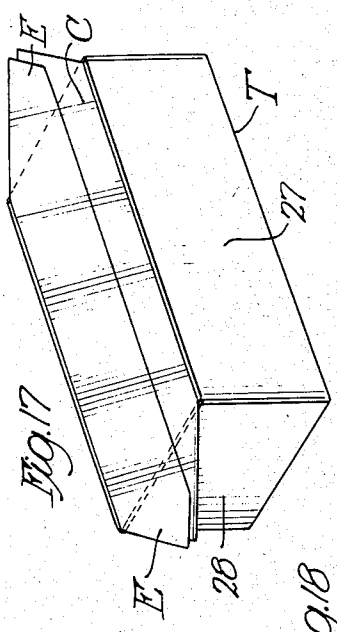


Fig. 17

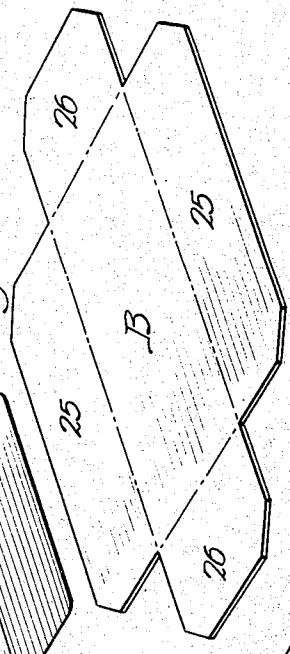


Fig. 18



Fig. 19

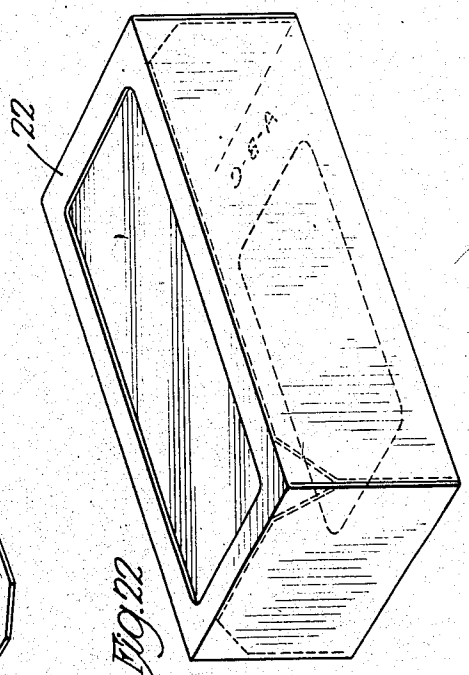


Fig. 22

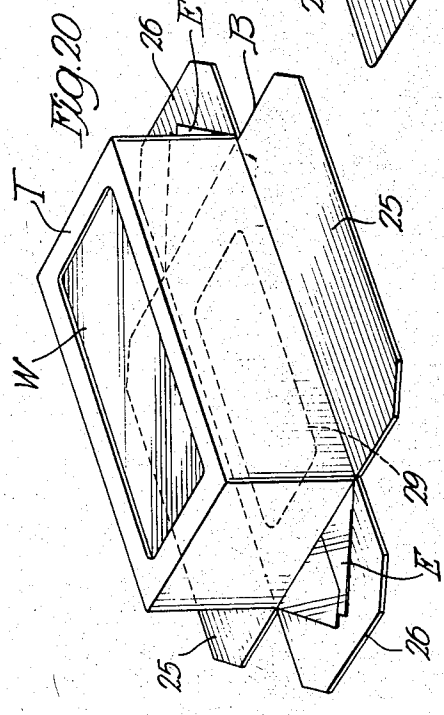


Fig. 20

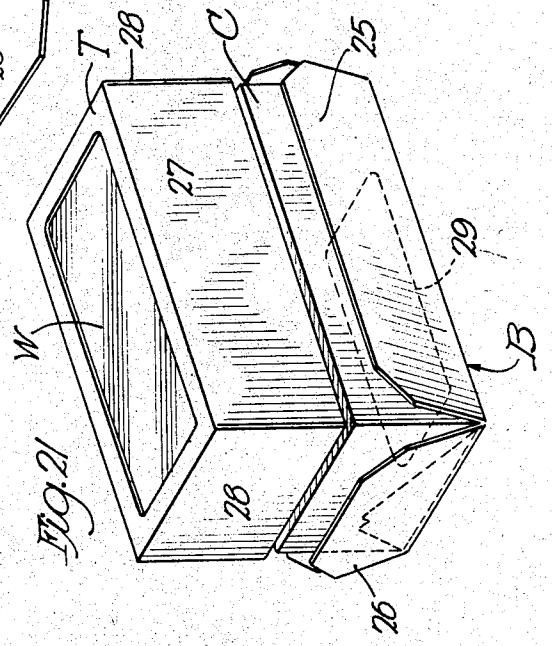


Fig. 21

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UNITED STATES PATENT OFFICE

2,394,936

PACKAGING APPARATUS

Frank D. Palmer, Chicago, Ill., assignor to Kraft Foods Company, a corporation of Delaware

Application November 9, 1942, Serial No. 465,007

13 Claims. (Cl. 93—2)

This invention relates to improved packaging apparatus. The apparatus herein contemplated acts on a package which is delivered by other package-forming and sealing apparatus and which delivers a wrapped content in a boat or tray-like container. The apparatus of the present application receives such package and completes it by the application of a container to close the open side of the tray-like package.

The main object of the present invention is to provide apparatus for packaging materials whereby costs of the package proper may be reduced, both in respect of the material required and the fabrication of the blanks for forming the package, to provide a package-forming apparatus which will operate rapidly and efficiently and which will produce a neat and well formed package of adequate strength and impervious qualities to protect and preserve the packaged material; to provide a simplified package structure which when opened, will give free access to the packaged material, especially when the packaged material is in the form of a loaf of cheese or the like, so as to facilitate slicing of the same; and in general, it is the object of the invention to provide an improved apparatus for producing the same.

Other objects and advantages of the invention will be understood by reference to the following specification and accompany drawings (11 sheets) wherein there is disclosed apparatus for producing a package embodying a selected form of the invention.

In the drawings,

Fig. 1 is a side elevation of the improved apparatus.

Fig. 2 is a plan of the same.

Fig. 3 is a fragmentary section on the line 3—3 of Fig. 1.

Fig. 4 is a perspective of a detail.

Fig. 5 is a plan corresponding to a portion of Fig. 2 but on an enlarged scale.

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

Fig. 7 is a section on the line 7—7 of Fig. 5.

Fig. 8 is a section on the line 8—8 of Fig. 7.

Figs. 9, 10 and 11 are sections respectively on the lines 9—9, 10—10 and 11—11 of Figs. 1 and 2.

Fig. 12 is a section on the line 12—12 of Fig. 11.

Fig. 13 is a section corresponding to a portion of Fig. 12 but showing certain parts in a changed position.

Fig. 14 is a section on the line 14—14 of Fig. 13.

Fig. 15 is a section on the line 15—15 of Fig. 13.

Fig. 16 is a section corresponding to a portion of Fig. 15 but showing the parts in a changed position and Figs. 17, 18, 19, 20, 21 and 22 are perspectives illustrating the improved package and its components.

The package structure herein contemplated comprises a bottom member B having side flaps 25 and end flaps 26 extending therefrom and a top member T which, in this instance, is illustrated as having a transparent window W within its area. The top includes side and end flanges 27 and 28 respectively which depend from the windowed top and are suitably locked in a tray or cover forming condition by means of corner flaps or otherwise, as is well understood in the packaging art. The package content C is initially enclosed or wrapped in a sheet of suitable wrapping material, the wrapper being folded around the package content and sealed in any desired manner. Where the material packaged is of a thermo-plastic nature, cheese for example, the wrapper is preferably of an impervious material, for example, a transparent sheeting coated with thermo-plastic material on one side.

The wrapped content is disposed within the bottom member, the side flaps 25 and 26 of which are folded upwardly against the sides of the wrapped content and the top member is then telescoped over the upstanding sides of the bottom member. Incident to the tendency of the packaged material to spread, there is a tendency for the side flaps 25 and 26 of the bottom member to be forced outwardly into frictional engagement with the walls of the cover member so that cover member will be effectively held in assembled relation to the bottom member.

It will be noted that the described package structure employs only one pre-formed container unit, namely the cover or top member T, and that the bottom member is not prefabricated into the form of a receptacle, and in fact is at no time secured in receptacle-forming position, except so far as the side walls of the cover member serve to hold the side walls of the bottom member in upstanding, receptacle-forming relation to the bottom. Hence, the cost of prefabricating the bottom blanks into container form is eliminated as is also the cost and difficulty of handling set up receptacles to serve as the bottom part of the package. The further advantage of the described package structure is found in the fact that the bottom member, being usually formed of paperboard, may be unfolded to flat position when the cover is removed, to thereby facilitate the slicing of the wrapped package with the bottom member serving as a cushion to stop the cutting knife

without engagement of the table surface on which the package is placed.

Other apparatus which I have developed forms a paperboard blank into the form of a tray (such as the top or cover member of the above described package) or receives such trays and inserts a suitable lining therein and thereafter carries the lined tray to a filling machine which deposits the material to be packaged within the lined tray. Such other apparatus then operates to seal the liner over the open top of the package and delivers the package in the form illustrated in Fig. 17. As there shown, the outer or protective receptacle T is the receptacle which ultimately constitutes the top or cover of the package structure, as shown in Figs. 21 and 22. The liner or wrapper for the package content has triangular ear portions E extending endwise from each end of the then top of the package.

According to the method herein contemplated, the package received in the condition shown in Fig. 17 is automatically inverted and deposited on the central panel of the bottom-forming blank shown in Fig. 18 upon which there has previously been deposited an insert certificate or advertisement **29**, so that the relationship of the parts is substantially as shown in Fig. 20.

Thereafter the top element is raised from the package content and the side flaps **25** and **26** of the bottom member folded upwardly, after which the top member is returned to substantially its initial position relative to the package content, except that the side flaps **25** and **26** of the bottom member are additionally received within the side walls of the top member. As an incident to the folding of the end wall flaps **26** of the bottom member upwardly, the ears E of the wrapper will, of course, be folded upwardly against the ends of the package content.

General explanation of the apparatus

The apparatus herein disclosed embodies a belt conveyor **30**, one end of which is supported by a suitable roller **31** journalled in brackets carried by the framework **32** of the apparatus. The other end of the conveyor **30** may be guided and supported by a roll or the like constituting a part of a unit of apparatus which produces the package structure shown in Fig. 17. Thus it will be understood that packages in the form and condition illustrated in Fig. 17 enter the present apparatus moving endwise with the conveyor belt **30** which may be continuously or intermittently driven as best suits the requirements of the preceding package-forming apparatus. The drive for the belt **30** may also be embodied in the preceding apparatus wherefore no drive for said belt is herein shown. However, if desired, said belt **30** may be continuously or intermittently driven by any well-known form of driving mechanism connected to a driven shaft of the present apparatus, one or more of which will hereinafter be referred to.

Adjacent the receiving end of the present mechanism there is provided a rack R for supporting a stack of bottom member blanks B, such as shown in Fig. 18, together with mechanism for feeding such blanks one by one, and means for conveying the blanks in an endwise direction in a path of travel substantially parallel of the direction of travel of the packages on the conveyor **30**. Suitable dating mechanism indicated at **33** is provided for applying a date or other informative matter on the bottom sides of the members B incident to their said travel.

Another rack **34** is provided with a stack of inserts such as **29** together with mechanism for fitting such inserts one by one to the bottom members B. A reciprocating pusher **35** is operated to move the package sideways from the conveyor **30** to a downwardly inclined or curved bracket or shelf **36** which has a ledge **37** around which the package turns so as to be deposited with its open side down on the insert **29** previously deposited on a bottom member. At a station indicated at **38** certain operations are performed to complete the package by folding the side flaps **25** and **26** of the bottom member into receptacle-forming position and to, in effect, introduce them into the cover or top member T, after which the packages are completed and delivered to a conveyor **39** which carries the packages to other equipment for subsequent handling.

Detailed explanation of the apparatus

The conveyor which carries the bottom member blanks B from the rack R through the various stations above mentioned comprises a pair of chains **40**. The chains **40** are supported by sprockets such as indicated at **41**, **42**, **43** and **44**, all suitably journalled in bearings carried by the frame **32** of the apparatus. As indicated in Fig. 1, the sprockets **44** are journalled in brackets which are adjustably mounted on the frame so as to permit movement of the brackets and sprockets to control the slack in the chain.

The sprockets **43** are of larger diameter than the others and they are carried by a shaft **45** which also carries a ratchet **46**. The chains **40** are moved step by step through the agency of a pawl **47** which acts against the ratchet **46** and is pivoted to an arm **48**, which arm is rockably mounted on the shaft **45**. A spring **49** serves normally to retract the arm **48** and pawl **47** to starting position. Feed movement of the arm **48** and pawl **47** is effected by a rotary cam **50** which is carried by a shaft **51** suitably journalled on the framework of the machine and driven by means of a bevelled gear connection **52** (see Fig. 10) with the main cam shaft **53**. The cam shaft **53** is suitably journalled in bearings carried by the framework of the machine and it is driven preferably by an electric motor indicated at **54** (Fig. 1) which is connected through a suitable speed reducing unit, if desired, and a drive sprocket **54**, a chain **55** and a driven sprocket **56**, the latter being secured to the shaft **53**.

The cam **50** acts against a cam-following roller **57** carried by an arm **58** which is rockably mounted on a suitably supported shaft **59**. The arm **58** constitutes one arm of a bell crank, the other arm **60** of which has pivotally connected to its free end a link or connecting rod **61** which has its other end connected to an arm **62** which is rigid with the pawl-carrying arm **48**. It will be seen that the cam **50** is operative to rock the bell crank arms **58** and **60** and the arms **62** and **48** so as to thereby rotate the ratchet **46**, shaft **45** and sprockets **43**, step by step, whereby said conveyor chains **40** are also advanced step by step.

The conveyor chains **40** are additionally supported by tracks **40a** which are suitably mounted on the machine frame and each chain is provided at properly spaced intervals with special links or with attachments to certain of the links, to provide flights or pusher members **63** (see Fig. 7), which are operative to engage the bottom-forming blanks to propel the same through the machine.

The rack R comprises (see Fig. 9) a series of

vertically disposed bars or guides connected together by transverse straps and supported in fixed position on the framework 32 through the agency of brackets 64. The brackets 64 are mounted on a normal stationary plate 65 which is in turn supported in upwardly spaced relation to the adjacent frame members 32 by means of spacers 66. Suitable fastening screws or bolts connect the plate 65 and frame members 32 to hold the same rigidly in assembled relation.

Certain of the vertical bars of the rack R have their lower ends provided with short, inwardly extending ledges 67 which serve to engage marginal portions of the blanks B to support a stack thereof in the rack. Other of the vertical members of the rack have their lower ends provided with members 68 having downwardly and inwardly inclined serrated edges 69 which serve to insure separation of the lowermost blank from the next following blank upon withdrawal of the lowermost blank.

The ledges 67 are preferably arranged to engage the outer edges of the flaps 25 of the blank, and the serrated edges 69 are preferably so arranged that they will act against the opposite side edges of the end flaps 26.

The blanks B are fed downwardly from the rack R by means of a vertically reciprocated vacuum device comprising a vertically slidably mounted stem or post 79 and a cross-arm 70 which is provided at its opposite ends with rubber or like vacuum cups 71 (see Figs. 7 and 9). The post 79 is slidable in a bushing 72 fixedly mounted in a suitable bracket 73 which is in turn secured to the plate 65. The post 79 is adjustably connected by means of a turn-buckle device 74 to an arm 75, the lower end of which is slotted as indicated at 76 and positioned on the shaft 53 adjacent a cam 77 on said shaft. The cam 77 acts against a roller 78 carried by an extension of the arm 75 to effect downward movement of said arm and said vacuum cup carrying post 79.

Upward movement of the arm 75 and vacuum cup carrying post 79, when permitted by the cam 77, is effected by means of a pair of springs 80 which are connected at their upper ends to the frame member 32 and at their lower ends to a cross-arm 81 which is pivotally secured to the lower end of the arm 75, preferably on the pivot axis of the roller 78.

As best shown in Fig. 7, the post 79 is provided with a passageway 82 having one end 83 communicating with an internal, longitudinally extending slot or recess 84 in the bushing 72 and its other end communicating as shown at 85 with a passageway 86 with the cross-arm 70. Each of the vacuum cups 71 includes centrally disposed anchoring members 87 which secure the members 71 to the cross-arm 86 and said anchoring members are bored out as shown to establish communication with the passageway 86 in said cross-arm. Any suitable arrangement may be employed for preventing turning of the cross-arm about the axis of the stem 79. For example, a pin 194 may be anchored in one end of the cross-arm and slidably fitted in an opening 195 in the plate 65. By means of a suitable vacuum pump connected through a pipe or tubing 88 to the slot 84, air may be drawn inwardly through the openings in the vacuum cup anchoring members through the passageways 86 and 82, so that when said vacuum cups 71 are moved upwardly into engagement with the bottom face of the lowermost blank, said blank will be pneumatically attached to the vacuum cups. Thereupon, downward movement of the vacuum cups will serve to pull the lowermost blank downwardly from the rack, past the ledges 67 and serrated edges 69. The blank withdrawn from the bottom of the rack R is to be deposited on top of elongated guide members 89 and 90—90, the members 90—90 being disposed on opposite sides of the conveyor chains 40 and the member 89 being disposed intermediate said chains.

It is desirable to cut off and relieve the vacuum in the vacuum cups 71 at about the time the lowered blank reaches the guide members 89 and 90, and this may be effected by properly proportioning the length of the slot 84 with reference to the end 83 of the passageway 82 in the post 79. However, more accurate timing may be effected by employing a separate valve structure for that purpose. In this instance such a valve structure is employed and it comprises a stem or post 91 vertically slidably mounted in a bushing 92 which is fixedly mounted in a suitable bracket 93 mounted on a part of the frame 32. The stem 91 is normally urged to move downwardly by means of a spring 94 located between a washer or flange 95 carried by the lower end of the stem and the adjacent end of the bracket 93. The lower end of the stem has a roller 96 secured to it and said roller engages a cam 97 which is carried by the shaft 53 and which cam is operative to move the stem 91 upwardly. The bracket 93 is bored out and tapped to receive pipe connections, one of which may be the conduit 88 and the other of which, indicated at 98, may extend to the vacuum pump. The sleeve or bushing 92 is provided with diametrically disposed ports 99 which establish communication between said conduits 88 and 98 and the interior of the sleeve 92. The stem 91 is also provided with a diametrically disposed passageway 100 and with a longitudinally extending recess or passageway 101 which serves to maintain communication between the passageway 100 and the conduit 88 in all positions of the stem 91. The stem is locked against rotation by means of oppositely disposed flats formed on the upper end of the stem and a disc 102 provided with an opening for snugly but slidably receiving said flattened end of the stem. The disc 102 is fixedly mounted on the upper end of the bracket 93 by screwing the same thereto or in any other suitable manner.

The cam 97 is so timed that at about the time the vacuum cups 71 reach their lowered position, as shown in Fig. 7, communication between the port 99 and the passageway 100 will be broken and a vent 103 may be provided to relieve the vacuum previously developed in said vacuum cups 71. The cam 97 may be so shaped that the valve stem 91 will be lowered to establish communication between the vacuum pump and the vacuum cups just before the vacuum cups come into engagement with the lowermost blank B. The cam may have an inactive portion constituting a rest period during which the valve stem 91 remains stationary and during which the vacuum cup carrying stem 79 is lowered so as to carry the lowermost blank from the rack R downwardly to the guides 89 and 90.

A carton blank delivered to the guide members 89 and 90, as already explained, will be fed edgewise along said guide members between side guides 104, one such side guide being disposed on each of the outside members 90—90. Forward movement of the blank along said guides will, of course, be effected by engagement of a pair of

flights 63 with the rearwardly disposed ends or edges of the side flaps 25 of the blank B. As best shown in Figs. 5, 7 and 11, said flights 63 are so shaped that portions thereof extend inwardly into overlying relation to the end flaps 26 so as to be capable of preventing upward displacement of the otherwise free blanks. The inward extension of said flights 63 also enables the flights to engage the ends of the completed package after the side wall flaps 25 are folded to upwardly extending position, spaced inwardly from the conveyor chains.

During the course of movement of the blanks B on the conveyors 40, they may have a date or other identifying data impressed thereon or applied thereto by the mechanism indicated at 33. Said mechanism comprises a platen roll 105 suitably journalled in bearing brackets supported by the side guides 104 in such position that the carton blank will be held against upward displacement. The identifying data may be applied by means of a printing wheel such as indicated at 106, the same embodying a well known variable or adjustable structure which, in this instance, is mounted on a rotatably driven shaft 107 which is journalled in suitable bearings carried by the framework 32 of the apparatus. The shaft 107 and printing mechanism 106 may be rotated in properly timed relation with the advancement of the carton blanks by means of a drive chain 108 which engages a sprocket 109 secured to said shaft 107, a sprocket 110 carried by the shaft 111 on which the conveyor sprockets 41 are secured, and an idler sprocket 112 suitably mounted on the frame structure and preferably arranged to permit adjustment of the tautness of the chain 108. It will be apparent that timing of the printing mechanism 106 may readily be adjusted by rotary adjustment of the mechanism on its shaft 107.

The printing operation is effected during movement of the carton blank, after which the carton comes to rest in transversely aligned relation to the insert magazine or rack 34. The magazine or rack 34 is in general similar to the magazine or rack R and it is supported in this instance by means of a bracket 113 which is in turn secured to a plate 114 carried by the framework of the apparatus. Also, the magazine 34 is provided with adjustable screw means such as indicated at 115 for supporting the stack of inserts (see Figs. 5 and 10). The insert elements 29 may conveniently be of a thin grade of paper and they are adapted to be fed one by one from the bottom of the rack 34 by means of a vertically reciprocated vacuum cup 116.

The vacuum cup 116 is secured to the upper end of a vertically slidably mounted post 117 which is, in general, similar to the previously described vertically slidable post 79 in respect of the provision of passageways therein and connections through a valve to a suitable vacuum pump. A valve 118, provided for controlling the vacuum to the vacuum cup 116 is similar in construction to the valve previously described for controlling the vacuum to the vacuum cups 87.

Reciprocation of the vacuum cup post 117 is effected by means of a cam 119 which is carried by the shaft 53 and acts against a roller 120 mounted intermediate the ends of an arm 121. The arm 121 is pivoted at one end as shown at 122 in a bracket depending from a part of the framework 32, and the other end of the arm is connected by means of a short link 123 to the lower end of the post 117. A spring 124 connected between the free end of the arm 121 and a conveniently accessible frame part serves to pull the arm and post downwardly and to maintain the roller 120 in engagement with the cam 119.

A cam 125 also carried by the shaft 53 (see Fig. 1) acts against a roller 126 carried by the lower end of the stem of the valve 118 to operate the latter.

The vacuum cup 116 serves in its downward movement to carry the lowermost insert member 29 downwardly and deposits the same on a normally stationary plate 127 which extends transversely across the central portion of the area of the rack 34. Said plate is provided with an opening 128 through which the vacuum cup 116 moves up and down. Said plate 128 is supported adjacent its inner end on the horizontal flange part of the adjacent guide member 104 (see Figs. 5 and 10) and adjacent its outer end on the plate 114. Suitable spacers or shims 129 and 130 are employed for positioning said plate 127 at the desired level along which the inserts 29 are to be fed.

Edgewise movements of the inserts 29 from the magazine 34 into position on the blanks B are effected by a horizontally movable slide 131 (see Figs. 4, 5 and 10). The slide 131 is in the form of an H-shaped member and its outer sides are provided with longitudinally extending flanges 132 which slidably fit in ways provided between the plate 114 and guide strips 133 which are secured to said plate 114. The plate 114 is provided with an elongated opening through which depending lugs 134 extend and in which said lugs move back and forth. The lugs 134 support a roller 135 which is embraced by the forked end of an arm 136, the opposite end of which is secured to a shaft 137. The shaft 137 is journalled in suitable bearings carried by the frame structure and it is provided with another arm 138 which has operative engagement (not shown) with a cam 139 (Fig. 1) carried by the shaft 53. The cam 139 is so shaped as to effect rocking movement of the shaft 137 for controlling reciprocation of the slide 131 in properly timed relation to the delivery of a blank B in receiving position opposite the insert rack 34. Feed movement of the slide is preferably effected by means of a spring 142 which is connected between the arm 136 and a conveniently accessible rigid frame part or bracket, (see Fig. 10) and return movement is effected by the cam 139.

The front ends of the side members of the slide 131 are provided with recesses 140 which receive the rear edges of the inserts 29 and prevent the same from being displaced upwardly incident to the feed movement of the slide member. The lower front end portions are also extended as indicated at 141 to provide ledges which normally underlie the insert 29 when it is fed downwardly from the bottom of the stack by the vacuum cup 116.

The slide 131 advances the insert until it is positioned over approximately the middle portion of the bottom forming panel of the blank B, the insert being slid over the plate 127 and over the surface of the blank. When the slide 131 begins its rearward or outward movement, the weight of the insert 29 and its frictional contact with the blank B is ample to prevent it from following the slide with which it has only limited contact on the lips 141.

The package delivering and inverting station disposed in transverse alignment with the rack 34 comprises the aforementioned belt 30 and an

underlying bracket 142 which is rigidly supported by being suitably mounted on the frame of the apparatus. The bracket 142 has the aforementioned curved shelf or chute 36 formed integrally therewith, the arrangement being such that the surface of the belt 30 is approximately flush with the uppermost portion of the curved element 36.

After an insert 29 is delivered to the blank B, the plunger 35 is moved inwardly to thereby slide the package (then in the form shown in Fig. 17) onto chute 36 on which it slides downwardly by gravity until it engages the lip or ledge 37, which causes the package to roll over and come to rest in an inverted position on top of the insert 29 and box blank B which is already in place to receive the package. The relationship of the inverted package, the insert 29 and the box blank B is then as shown in Fig. 20.

The box blank and insert are accurately positioned between the side guides 104 and the package is guided into proper relationship to the blank by means of a pair of guide rods 143 and 144 which are suitably mounted at their ends on brackets provided for that purpose, as clearly shown in Fig. 2. To further insure passage of the package into the space between the guide rods 143 and 144, there is provided a guide plate 145, the same being supported in the illustrated angular position by means of suitable bracket arms 146 which are mounted on the plate 141 (see Figs. 5 and 10).

The plunger or pusher 35 is actuated in properly timed relation by means of a cam 147 carried by the shaft 51 (see Fig. 10). Said cam acts against a roller carried by one end of a lever 148 which is pivoted intermediate its ends on a suitable pivot shaft mounted on the frame 32. The other end of said lever 148 is suitably connected as indicated at 149 to a rod 150 which is slidably mounted in a supporting member 151 to which rod the pusher 35 is secured. A spring 152 connected between the lever 148, and a conveniently accessible stationary part serves to effect the forward or operative movement of the plunger, and the cam 147 effects retraction thereof.

The packages carried by the conveyor 30 are stopped in proper position for transverse movement by means of a stop member 153 which may be in the form of a plate suitably mounted on a conveniently accessible stationary part of the apparatus. Said plate may be provided with an opening or terminated at such a point that a roller 154 carried by a switch arm 155 may project into the area which should be occupied by a package when in position for transverse delivery to the blank B. The switch arm 155 is suitably connected to a switch mechanism 156 and is capable of interrupting the electric circuit to the driving motor of the apparatus when the arm 155 and roller 154 are in their out or extended position, wherein the roller 154 projects into the space normally to be occupied by a package. In the event that there is a failure of package delivery, the switch arm 155 will be permitted to remain in its extended position, in which case the operating motor circuit will be broken and the operation of the apparatus stopped.

It will be apparent that the switch 156 must be so arranged as to control the motor circuit only during the intervals in which a package should be in position against the stop 153. This is accomplished by providing a second switch 157 (see Fig. 3) which is controlled by a cam 158 carried by the shaft 53 and so formed as to keep the switch 157 closed during all of the time that a package is not normally against the stop 153. The cam 158 permits the switch 157 to open the circuit only during the intervals that the switch 156 should be closed incident to the presence of a package against the stop 153.

After the package is delivered in inverted position to the blank B, the conveyor chains 40 advance the package to the next operating station, the details of which are best shown in Figs. 11 to 16 inclusive.

The forward movement of the package to the next and last operating stage is terminated by stopping of the conveyor chains 40 and accurate positioning of the package is effected by causing the same to engage depending lip parts 159 which may be formed as an integral part of a vaccum lifter head 160. The vacuum head 160 is formed integrally with or connected to an upwardly extending shaft or stem 161 which is vertically slidably mounted adjacent its upper and lower ends in a member 162 which is supported by a bracket 163 carried by the frame of the apparatus. Vertical reciprocation of the vacuum head 160 is effected by means of a lever 164 which is pivotally mounted intermediate its ends on the bracket 163 and suitably connected at one end, as indicated at 165, to the post or stem 161. The other end of the lever 164 is pivoted, as shown at 166, to a connecting rod or link 167, the lower end of which is pivoted to one arm 168 of a bell crank which is rockably mounted on a shaft 169 suitably supported between portions of the frame structure 32. Said bell crank has its other arm 170 provided with a roller 171 which engages a cam 172 carried by the shaft 53 and so formed as to cooperate with a spring 173 to actuate the vacuum head 160 at the proper times. The spring 173 may be connected between an extension of the bell crank arm 168 and a stationary part of the apparatus, as best shown in Fig. 11, and it serves to affect the downward movement of the vacuum head and to maintain the cam following roller 171 in engagement with the cam 172.

The vacuum head 160 is initially positioned at a slight elevation with reference to the plane of the top of the package being delivered into the zone of operation of the same so that there will be no interference of movement of the package into engagement with the stop ears 159. The cam 172 is so shaped that the vacuum head will first be moved downwardly a slight distance to cause its rubber vacuum cups 174 to engage the top surface of the package, whereupon connection is made through suitable passageways in the vacuum head and stem 161 and through a suitable cam and spring actuated controlling valve 161a of the character already described, to an exhaust pump so as to effect pneumatic attachment of the package cover to the vacuum head 160. Thereupon, the vacuum head 160 is elevated a short distance, approximately as indicated in dotted lines at Fig. 12, where it is held stationary during the performance of other operations on the bottom blank B.

In the station 38, the package is supported on a plate 175 which is secured to the upper end of a vertically reciprocable post 176. Said plate 175 is disposed in an opening in the plate 89, as clearly shown in Figs. 2 and 12, and is normally in the plane thereof. The post 176 is rigidly mounted in a member 177, the lower end of which is forked so as to straddle the shaft 53, as shown in Fig. 11. The member 177 has a roller 178 se-

cured to it and said roller engages a cam 179 and is operative to effect upward movement of the member 177, post 176 and plate 175. A spring 180 connected between a suitable part of the member 177 and a normally stationary part of the apparatus serves to yieldingly pull the member 177 downwardly so as to maintain its roller in engagement with the cam and to effect downward movement of the plate 175 when permitted by the cam 179.

The post 176 is slidably mounted in a sleeve or collar 181, the lower end of which is rigidly secured to a plate 182. The sleeve or collar 181 is slidably supported in a suitable bearing provided in a bracket 183 which is fixedly mounted on the frame elements 32, as best shown in Fig. 11. A pair of springs 184 seated in recesses provided in the member 177 normally tend to urge the member 182 to move away from the member 177.

The vertically movable member 182 has adjustably connected to it a plurality of pivot blocks 185, each of which is pivotally connected by means of an arm 186 to upstanding ears or lugs 187 provided on the stationary member 183. Said arms 186 are rigidly secured at their inner ends to upstanding side presser plates 188, there being one such presser plate for each end and for each side of the package.

When the vacuum cup head 160 lifts up the top member of the package carton, the plates 175 and 182 are moved downwardly to an extent which will effect complete removal of the wrapped package content from the top member.

To insure withdrawal of the package content from the top member T, there is provided for each end of the package, an angularly disposed, generally vertically slidably mounted bar 189 provided at its lower end with a plate 190, slightly smaller in width than the width of the wrapped package content. Said members 189 and 190 are moved downwardly just before or at about the same time that the vacuum cup head 160 starts its upward movement. Such downward movement of the members 190 causes the lower ends thereof to engage the triangular end ears E closely adjacent the bottom end edges of the wrapped package. The arrangement is preferably such that the members 190 will lightly clamp the endwise-extending ears of the package wrapper against the paperboard member B and the plate 175. Said members 190 are also moved downwardly in conformity with the downward movement of the plate 175 so that said members 190 are operative to insure withdrawal of the wrapped package content from the slightly elevated top part T.

The bars 189 are slidably mounted, as best shown in Figs. 11 and 12, in the member 162. Properly timed vertical reciprocation thereof is effected by a cam 200 (see also Fig. 2) which acts against a roller 201 carried by one arm of a bell-crank lever 202. The other arm of the bell-crank lever 202 is connected by a rod 203 to an arm 204 which is secured to a shaft 205, the latter being rockably mounted in the bracket 163. Said shaft 205 serves also as the pivot for the rock arm 164. Arms 206 are rigidly secured to the shaft 205 so as to rock in unison therewith, one of said arms being an integral extension of the arm 204. The free ends of the arms 206 are slidably and pivotally connected to the respectively adjacent bars 189 as shown at 207 and thus, when rocked by reason of their connection to the cam 200, impart the desired reciprocation to the bars 189 and plates 190.

The downward movement of the package on the plate 175 occurs within the surrounding plates 188 which are initially in the position illustrated in Fig. 12. By examination of Fig. 12, it will be seen that downward movement of the package as mentioned will cause the members 188 to turn the end ears E upwardly into substantially overlapping relation to the members 190. A sharp fold is thus made at the junction of the ears E with the corner of the wrapped package.

The bars 189 and plates 190 are then moved upwardly and withdrawn from between the package end and the ears E.

The withdrawal of the members 190 in the manner explained preferably occurs at about the time that the plate 175 approaches its lowermost position. During the main part of the downward movement of the plate 175, the plate moves in unison with the member 182. Just before the lowermost position of the plate is reached, it comes into engagement with the upper end 191 of the collar 181 and serves to transmit downward movement to said collar and to said member 182, whereby, in the final stages of the downward movement of the plate 175, the arms 186 are rocked downwardly and the plates 188 rocked outwardly. Thus, the members 190 are permitted to freely escape from between the ears E and the adjacent package ends.

Incident to the downward movement of the wrapped package and the folding of its ears upwardly, in the manner explained, the package bottom blank B is also moved downwardly, so as to cause its side end flaps 25 and 26 to be folded upwardly into engagement with the sides and ends of the wrapped package.

The members 189 and 190 having been withdrawn, the plate 175 and shaft 176 begin their upward or return movement. The first portion of said upward movement embodies relative movement of the member 182 and sleeve 181 upwardly relative to the fixed member 183, so that the pivot pin supports 185 are moved upwardly relative to the stationary member 183. Such upward movement results in outward rocking of the connection links 186 and inward rocking of the end and side members 188. The condition thereby produced is best shown in Fig. 16, wherein it will be seen that the upper portion of the package, as it emerges from between the oppositely disposed members 188, is slightly reduced in horizontal dimensions so that it will more readily fit into the cover member T. Inward movement of the members 188 is limited by the engagement of the members 188 with the respective side walls of the package content or in any event by engagement of the plate 182 with the bottom of the hub part of the plate 183, the springs 184 serving to more or less cushion the application of force to said members 188.

As best shown in Fig. 16, the plates 188 serve to reduce the area of the upper portion of the wrapped package content sufficiently to insure entrance of the package into the top member T without interference from the sides of the latter. When the plate 175 approaches its fully elevated position it acts as a spreader for the plates 188 by engaging the same as indicated at 192 (Fig. 12) so as to thereby fully release the package from said side pressers 188.

As the package approaches its fully elevated position on the plate 175, the top or cover thereof is also lowered so as to complete the relative telescopic movement between the top and bottom parts of the package. The cam 172 is appro-

priately shaped to effect downward movement of the vacuum cup head **160** and the package cover to the extent indicated, at which time the vacuum is cut off and relieved and the head **160** again moved upwardly to approximately the same elevated position it had occupied when holding the package cover member in elevated position.

When the head **160** is so elevated, the lower ends of its ears **159** are above the top of the package so that the package may move forwardly with the next step of movement of the conveyor chains **40**.

The packages thus completely enclosed are then delivered to a conveyor **193** which may be driven by a suitable gear and chain connection to the driven shaft **53**, as shown at the lefthand end of Fig. 1. Said conveyor **193** serves to carry the completed packages to other apparatus or inspection or storage tables, as may be desired.

Changes in the described mechanism may be made without departing from the spirit of the invention, the scope of which should be determined by reference to the following claims, the same being construed as broadly as possible consistent with the state of the art.

I claim:

1. Packaging apparatus comprising means for receiving a package, and means for moving said package laterally and inverting the same comprising a chute arched convexly in the direction of movement of said package, and an upstanding ledge for engaging the forward bottom edge portion of a package moving downwardly on said chute to cause the package to roll over said ledge to inverted position incident to its movement down said chute.

2. In packaging apparatus, the combination of a conveyor, means for depositing a box blank on said conveyor, means for depositing a filled receptacle having an open side on said box blank with its open side down, and means for effecting folding of said box blank into an open-topped receptacle formed around the content of said first-mentioned receptacle and with the side wall forming portions of said blank disposed within the side wall portions of said first-mentioned receptacle, said last-mentioned means comprising means for lifting the first-mentioned receptacle from the content thereof while the latter remains on said box blank, means for folding side wall forming portions of the latter upwardly around said content, and means for effecting relative telescopic movement between said receptacle and the folded side wall portions of the blank to enclose the latter within said receptacle.

3. In apparatus of the class described, the combination of an intermittently actuated conveyor, means for depositing a box blank on said conveyor, means spaced laterally from and in elevated relation to said conveyor and box blank thereon for receiving a package embodying a package content and an open topped receptacle, means for delivering said package in inverted position from said laterally spaced and elevated means to said box blank on said conveyor, said delivery being effected during a period of rest of said conveyor and box blank, and means operative during a subsequent period of rest of said conveyor to effect upward folding of portions of said box blank and enclosure of the portions so folded within the inverted receptacle to thereby complete the package.

4. In packaging apparatus means for removing a receptacle from an article contained therein and folding portions of a box blank around said article and then telescopically assembling said receptacle and the folded portions of said box blank, comprising pneumatic means for engaging and withdrawing said receptacle from the article, means for effecting movement of said article oppositely to said withdrawing movement of the receptacle, means surrounding said article and operative upon said movement thereof to effect folding of said box blank portions into overlapping relation to the sides of said article, means for effecting movement of said article and the folded box blank toward and into said receptacle, and means for effecting release of said receptacle from said pneumatic means.

5. In apparatus for applying a flanged bottom closure to a package embodying a receptacle and a fill of material therein, a conveyor, means for depositing a box blank on said conveyor, means for depositing an open sided package on said box blank with the open side of the package down, means for engaging said package to position the same in a predetermined location in the path of travel thereof on said conveyor, means for engaging said receptacle so as to support the same independently of the support of said material, means for effecting withdrawal of the material from said receptacle, means for folding portions of said box blank upwardly over the sides of said material as an incident to the withdrawal thereof from said receptacle and means for effecting return movement of said material and the folded box blank so as to assemble said folded box blank and receptacle in completed package form.

6. In packaging apparatus of the class described, the combination of a conveyor, means for depositing a box blank on said conveyor, means for depositing on said box blank an incompleted package embodying an open-sided receptacle and a wrapped package content having wrapper ears extending laterally from the opposite ends of the package at the open side thereof, the package being deposited in inverted position with said ears flatwise on said box blank, means for effecting vertical separation of said receptacle from said package content and said box blank, said means embodying devices operative to engage said wrapper ears so as to hold said wrapped content in place on said blank, thereby to insure withdrawal of the wrapped content from said receptacle, means for folding portions of said box blank upwardly around the sides of said wrapped package content, and means for telescopically assembling said folded box blank with the wrapped package content therein into said receptacle.

7. In packaging apparatus of the class described, the combination of a conveyor, means for depositing a box blank on said conveyor, means for depositing on said box blank an incompleted package embodying an open-sided receptacle and a wrapped package content having wrapper ears extending laterally from the opposite ends of the package at the open side thereof, the package being deposited in inverted position with said ears flatwise on said box blank, a vacuum head movable vertically, means for effecting engagement of said vacuum head with the top of said receptacle for pneumatically attaching said receptacle to said head, a downwardly movable support for said package, means for effecting downward movement thereof when said receptacle is attached to said vacuum head, downwardly movable means operative to engage said ears of the wrapped package adjacent the

ends thereof and to move downwardly in unison with said support to thereby withdraw the wrapped content from the receptacle, means surrounding the wrapped content during its downward movement for engaging and folding upwardly portions of said box blank and said ears to form bottom member side walls around said package content, and means for effecting return movement of said wrapped package and the folded carton blank into said receptacle so as to thereby complete the package, and means for releasing the pneumatic attachment of said receptacle to said vacuum head to thereby permit removal of the completed package.

8. Packaging apparatus according to claim 7 wherein the means surrounding the package for folding portions of the carton blank upwardly comprise pivotally mounted plate members, and means for effecting inward rocking movement thereof so as to compress the package at its upper end to facilitate reinsertion of the wrapped content in the receptacle.

9. In packaging apparatus, the combination of a conveyor, means for depositing a box blank on said conveyor, means for depositing a filled receptacle having an open side on said box blank with its open side down, and means for ejecting the content of said receptacle from said receptacle and as an incident thereto, effecting folding of said box blank into an open topped box around said content, said last mentioned means being also operative to replace said receptacle around said content and the side wall portions of said box.

10. In packaging apparatus, the combination of a conveyor, means for depositing a box blank on said conveyor, means for depositing a filled receptacle having an open side on said box blank with its open side down, means for successively effecting relative vertical movement of said receptacle and its content to first expose the sides of said content, and then to return the content into the receptacle, and means operative intermediate the operations of said last mentioned means to fold portions of said box blank into side wall positions over the exposed sides of said content, whereby a box is formed around said content and said box and content are telescoped into said receptacle.

11. In apparatus of the class described, a driven conveyor for receiving and propelling a package embodying an open sided receptacle and a package content, means for stopping the movement of said package on said conveyor at a predetermined location, a second driven conveyor disposed in substantially parallel, laterally spaced relation to said first mentioned conveyor, means for depositing a box blank on said second conveyor whereby said box blank is propelled, means for stopping the movement of said box blank on said second conveyor in predetermined, laterally spaced relation to said predetermined package location, means for effecting lateral movement and inversion of said package to deposit the same in predetermined inverted position on said box blank, and means for successively effecting relative vertical movement of said receptacle and its content to first expose the sides of said content and then to return the content into the receptacle, and means operative intermediate the operations of said last mentioned means to fold portions of said box blank into side wall position over the exposed sides of said content, whereby the box is formed around said content and said box and content are telescoped into said receptacle.

12. In apparatus of the class described, the combination of an intermittently actuated conveyor, means for depositing a box blank on said conveyor, means spaced laterally from and in elevated relation to said conveyor and box blank thereon for receiving a package embodying a package content and an open sided receptacle, and means for delivering said package in inverted position from said laterally spaced and elevated means to said box blank on said conveyor during a period of rest to said conveyor and box blank, said last mentioned means comprising a convexly arched chute extending laterally and downwardly from said elevated package receiving means, means for feeding said package laterally from said receiving means to said chute so as to cause the package to slide down said chute, and an abutment associated with said chute for engaging the lower front portion of the package sliding down said chute, whereby the momentum of the package will cause the same to roll over said ledge and to drop downwardly in inverted position to predetermined position on said box blank.

13. Apparatus for applying a box bottom to a partially completed package embodying an open sided receptacle and a content enclosed in a wrapper having end ears extending laterally from the receptacle over the open side edges of one pair of oppositely disposed side walls, comprising means for receiving a box blank with said partially completed package thereon with its open side and ears in engagement with said blank, means for effecting vertical separation of said receptacle from said package content and said box blank, said means embodying devices operative to engage said wrapper ears so as to hold said wrapped content in place on said blank, thereby to insure withdrawal of the wrapped content from said receptacle, means for folding portions of said box blank and incidentally folding said ears, upwardly over the sides of said wrapped package content, and means for reversing said vertical separating movement so as to effect insertion of said folded box blank with the wrapped package content therein into said receptacle.

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