

Feb. 24, 1942.

F. D. PALMER

2,274,345

PACKAGING METHOD AND MACHINE

Filed July 7, 1939

11 Sheets-Sheet 1

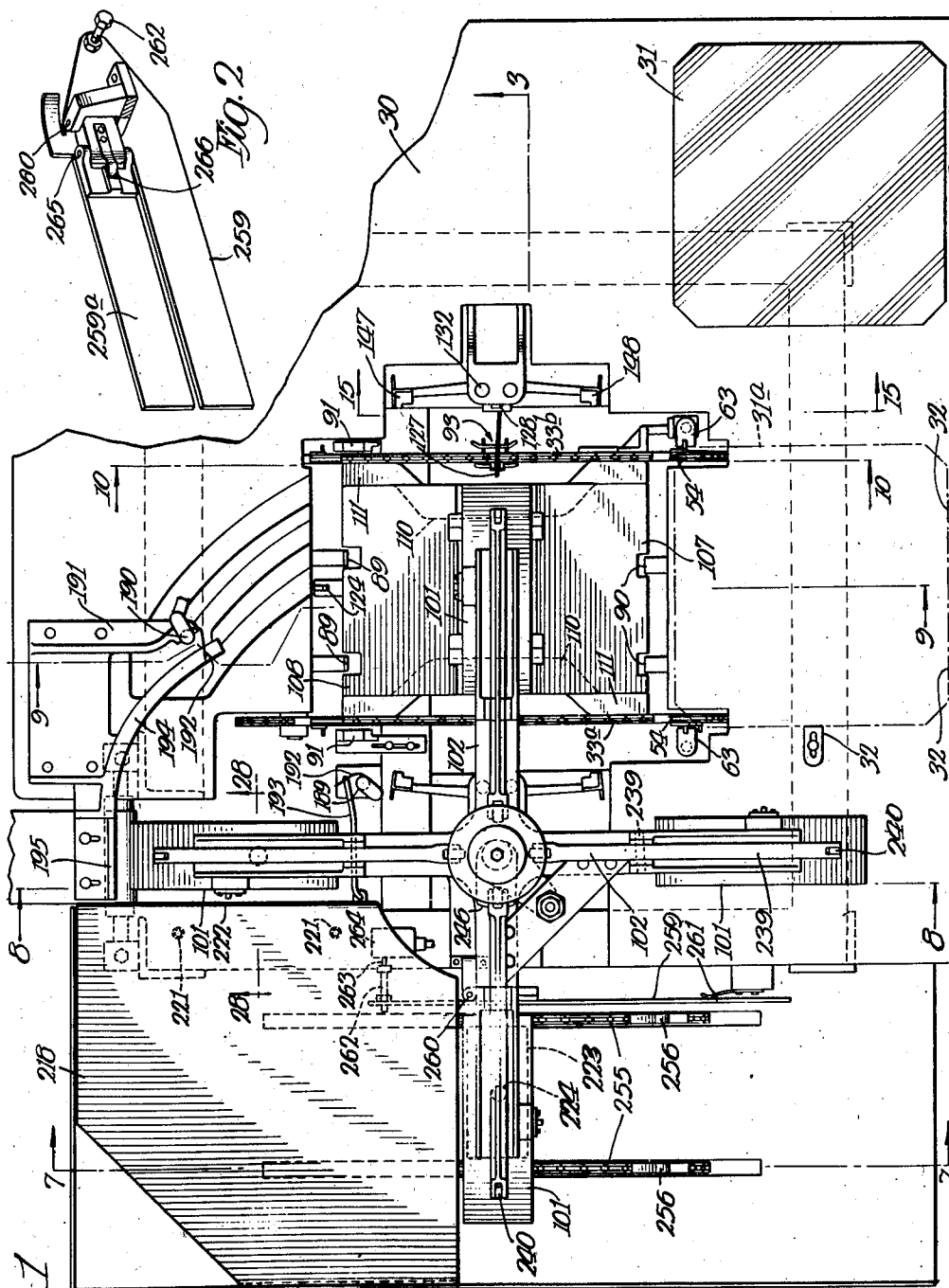


Fig. 1

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Feb. 24, 1942.

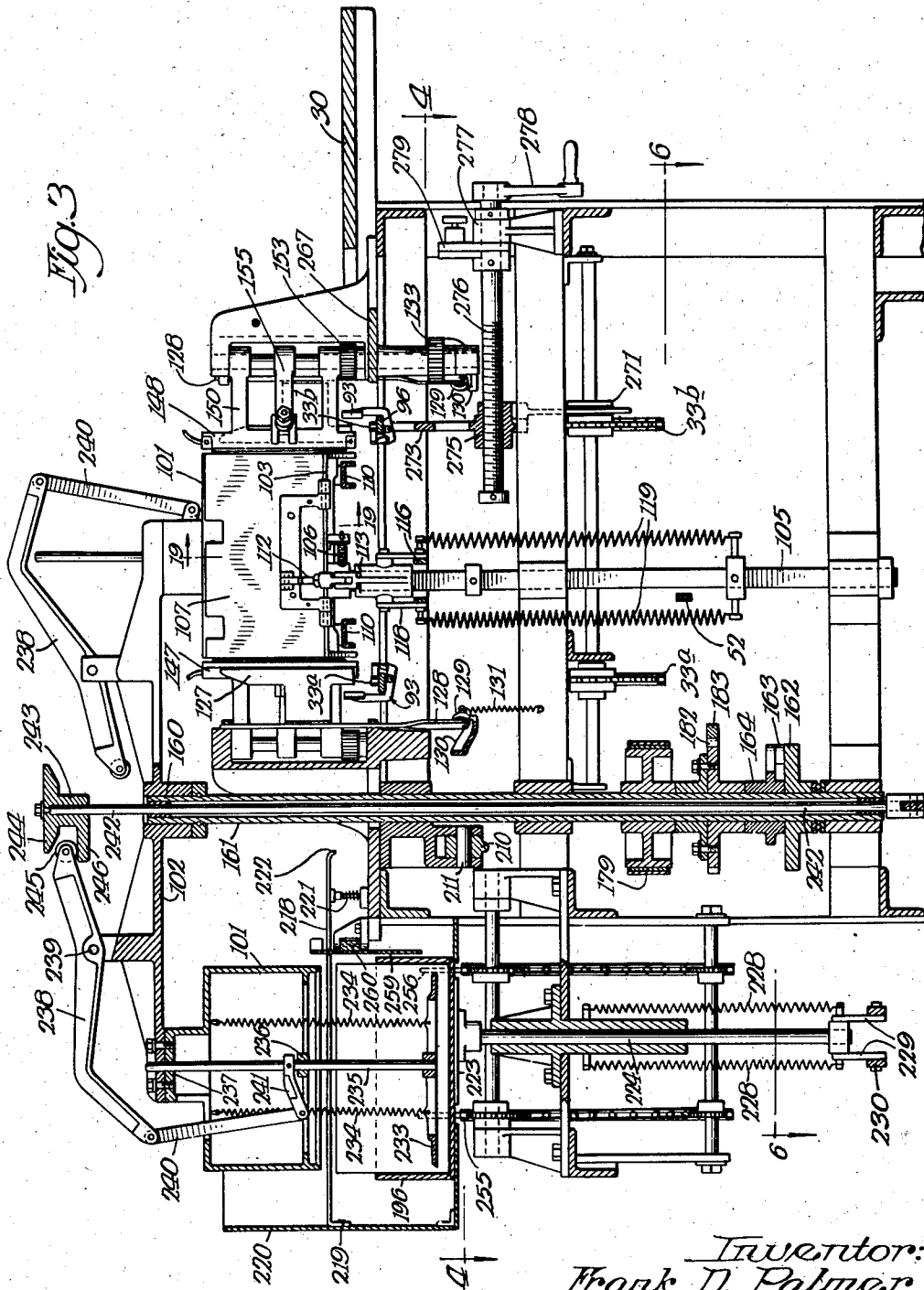
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PACKAGING METHOD AND MACHINE

Filed July 7, 1939

11 Sheets-Sheet 2



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PACKAGING METHOD AND MACHINE

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11 Sheets-Sheet 3

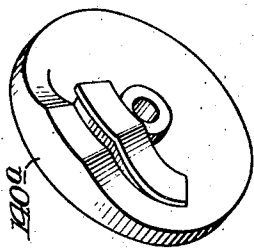
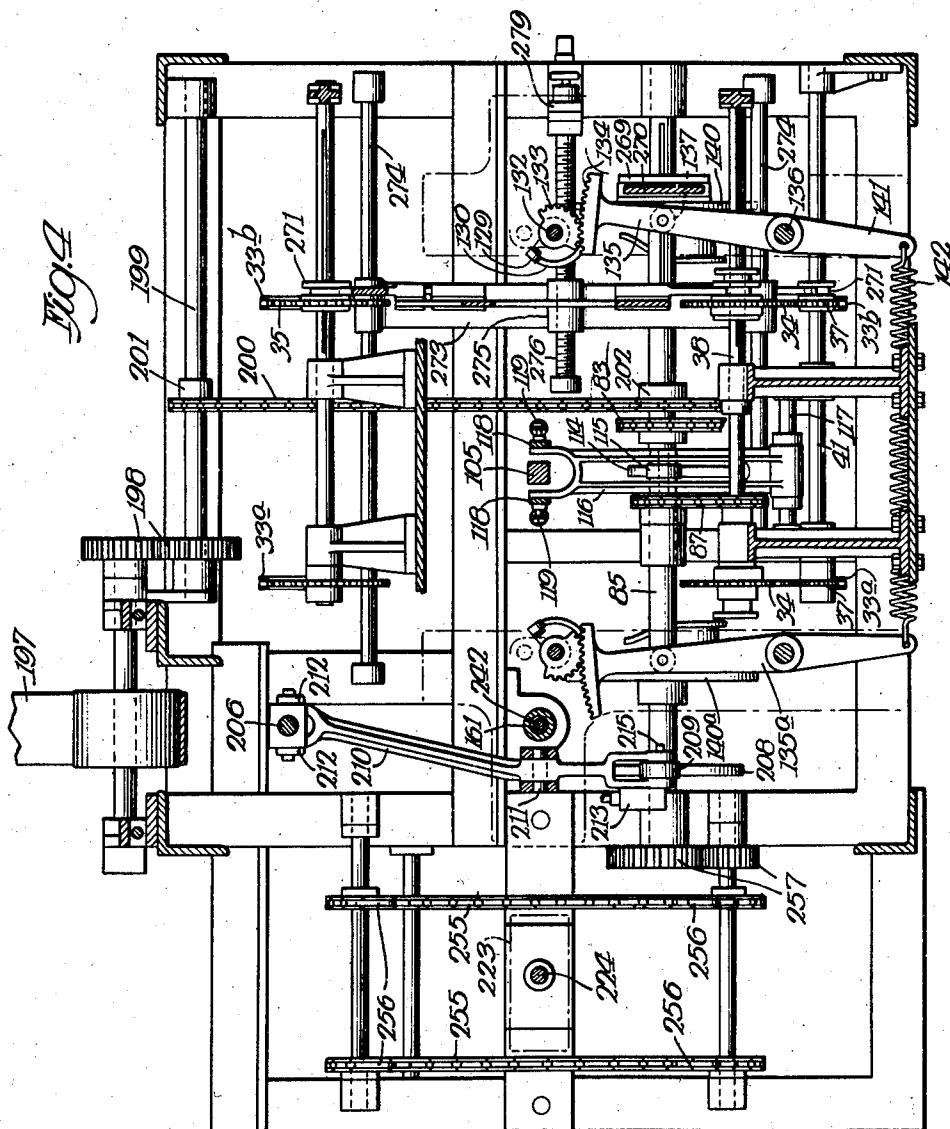


Fig. 5

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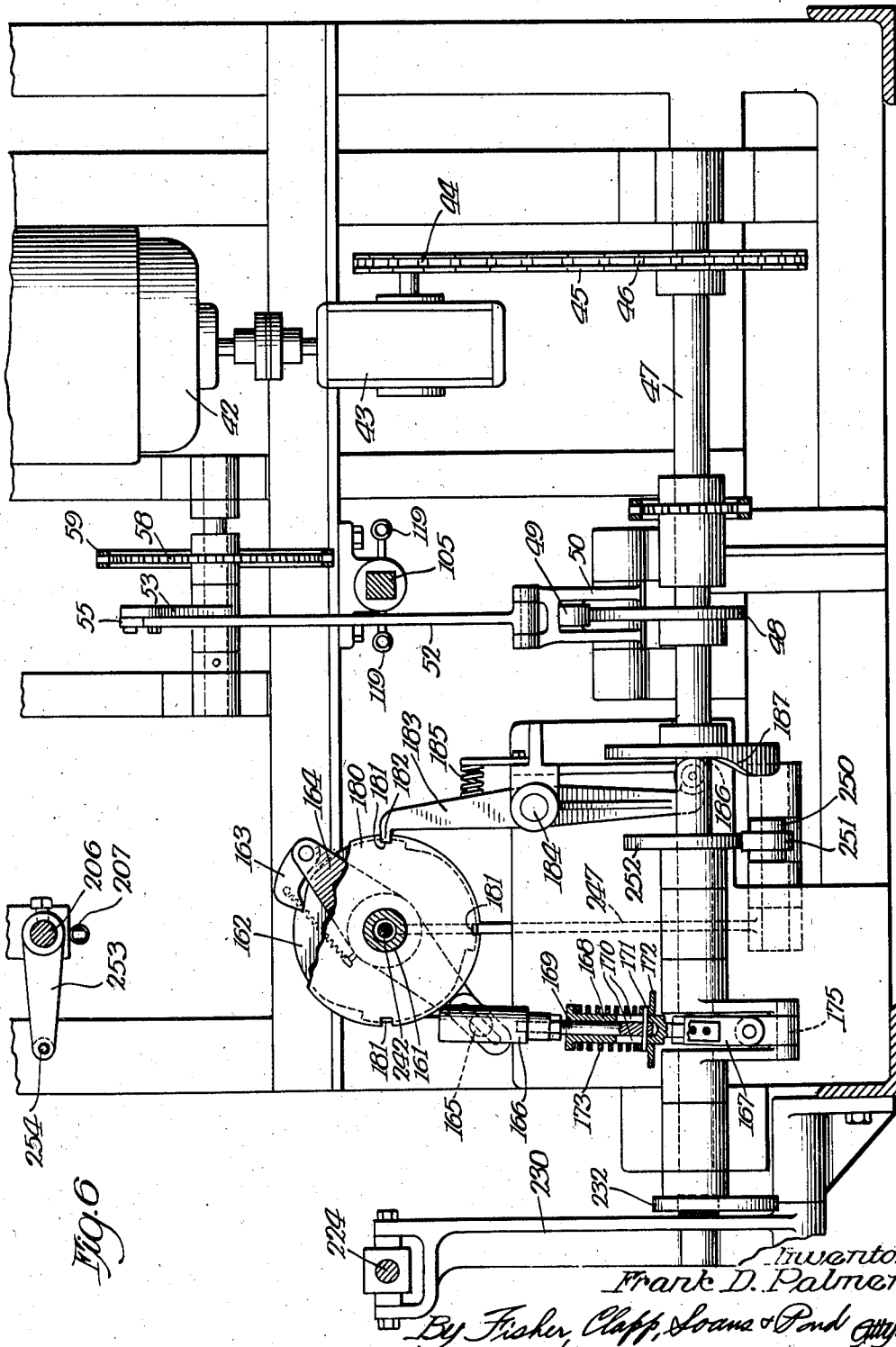
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PACKAGING METHOD AND MACHINE

Filed July 7, 1939

11 Sheets-Sheet 4



Feb. 24, 1942.

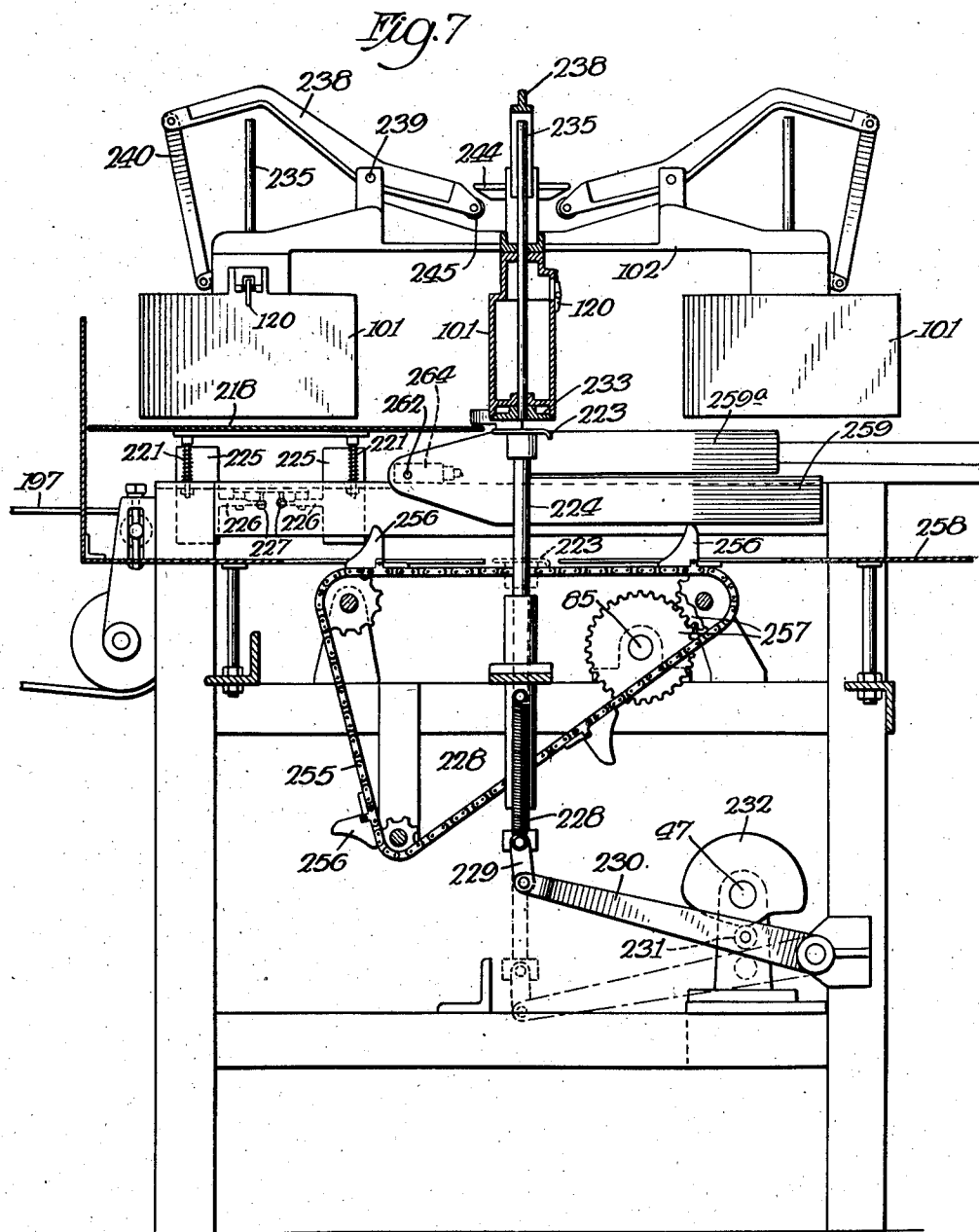
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PACKAGING METHOD AND MACHINE

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11 Sheets-Sheet 5



Inventor:
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Feb. 24, 1942.

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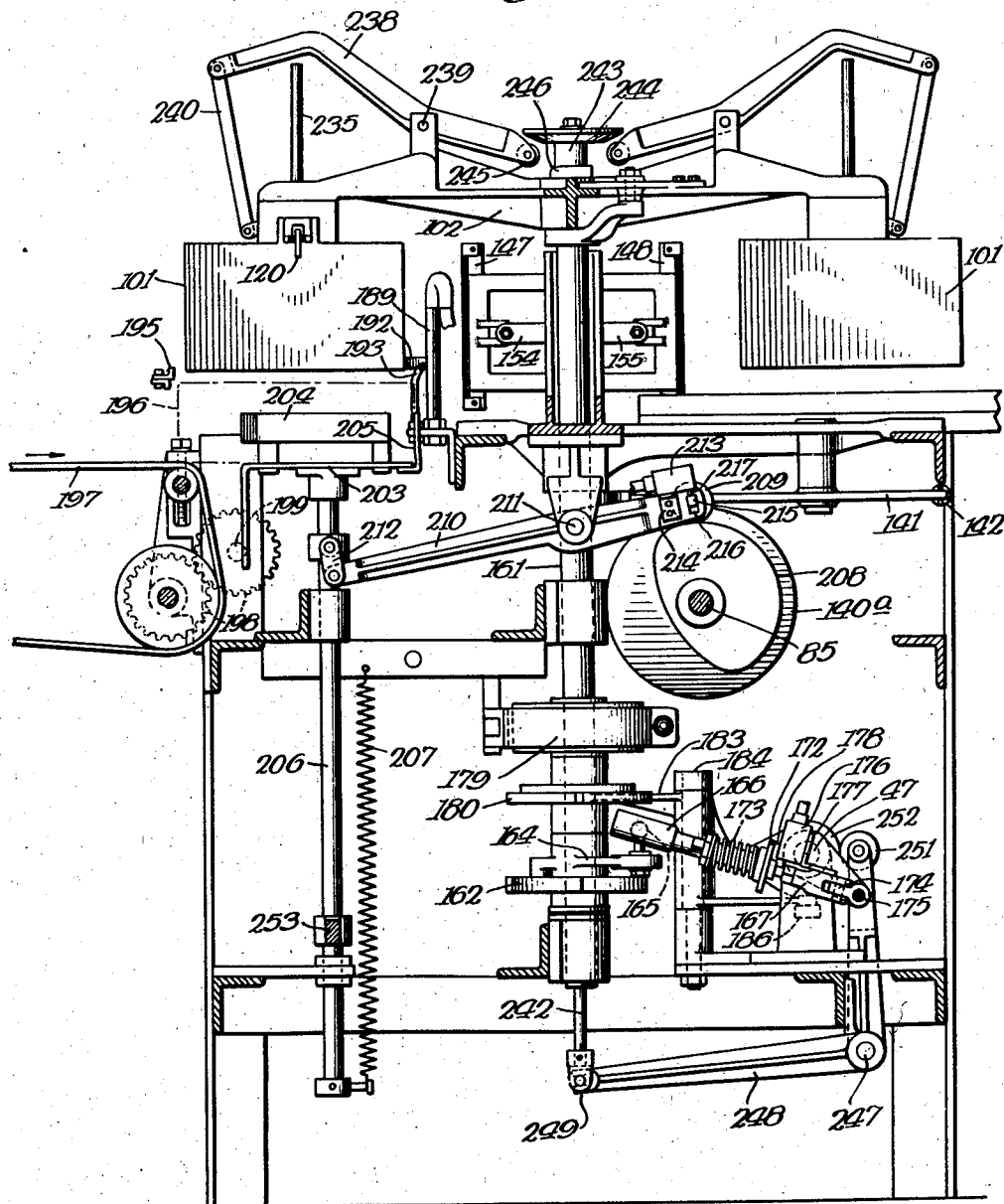
2,274,345

PACKAGING METHOD AND MACHINE

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11 Sheets-Sheet 6

Fig. 8



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Feb. 24, 1942.

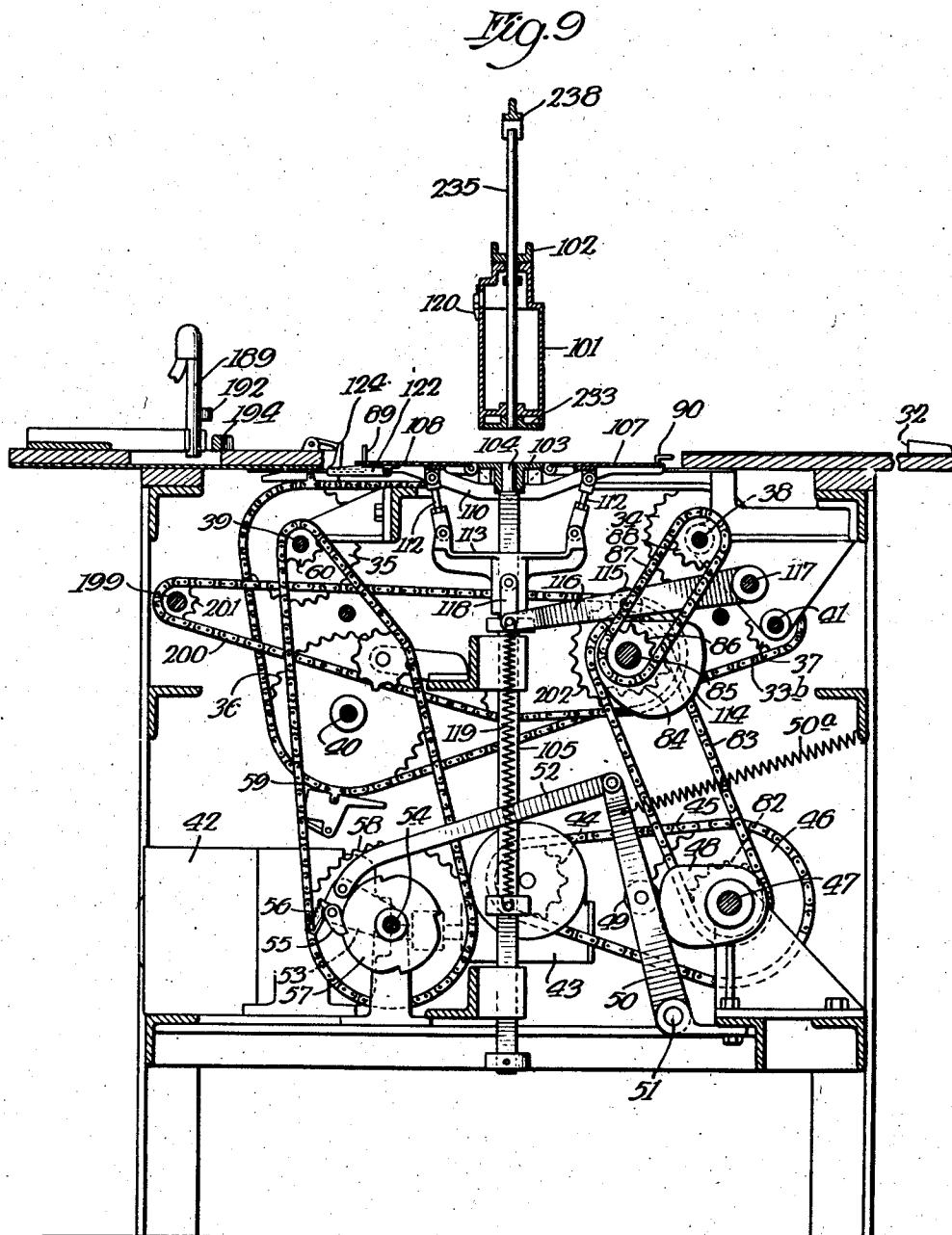
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PACKAGING METHOD AND MACHINE

Filed July 7, 1939

11 Sheets-Sheet 7



Inventor:
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Feb. 24, 1942.

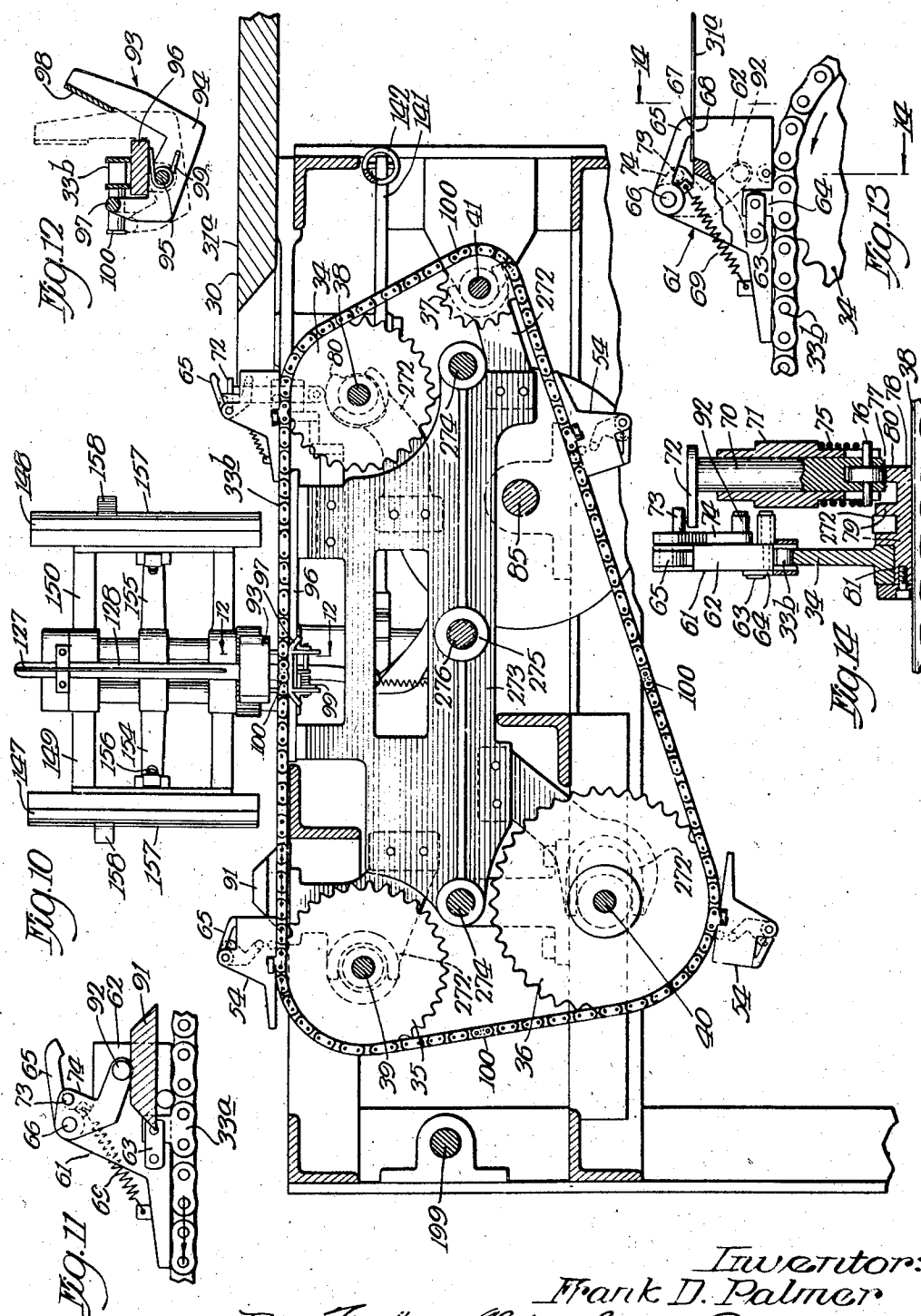
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PACKAGING METHOD AND MACHINE

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11 Sheets-Sheet 8



Inventor:
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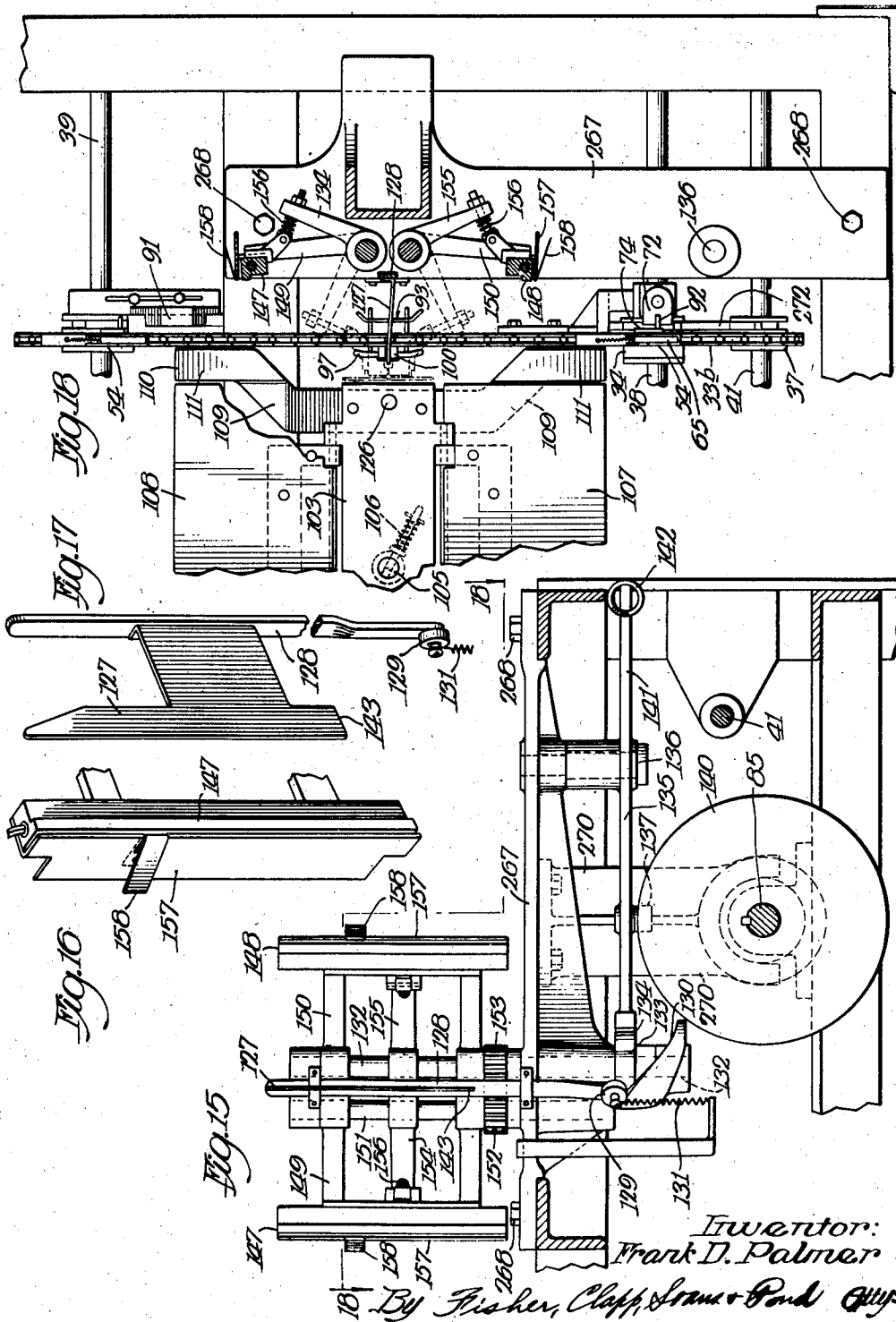
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PACKAGING METHOD AND MACHINE

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PACKAGING METHOD AND MACHINE

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11 Sheets-Sheet 11

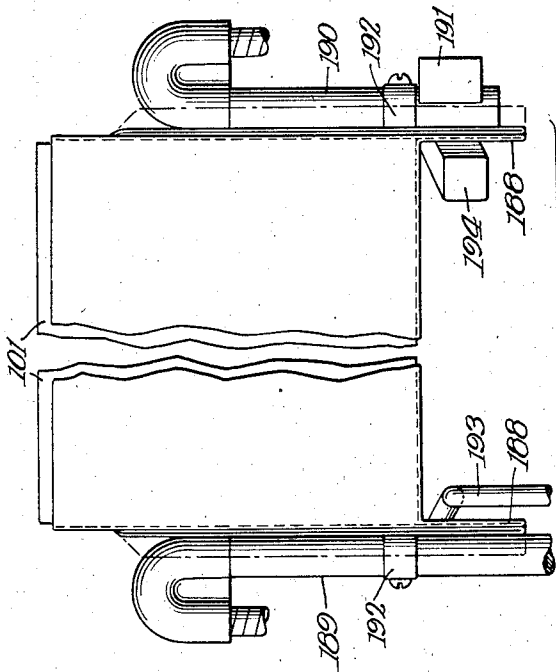


Fig. 26

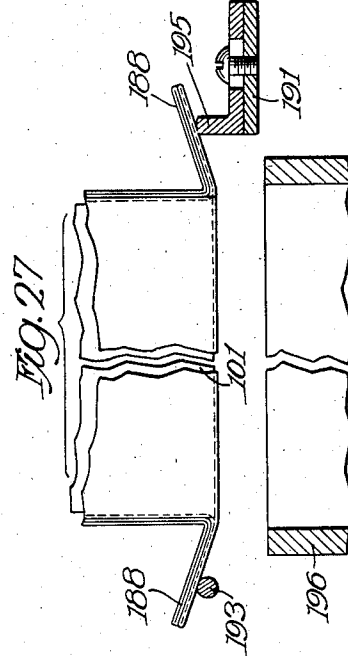


Fig. 27

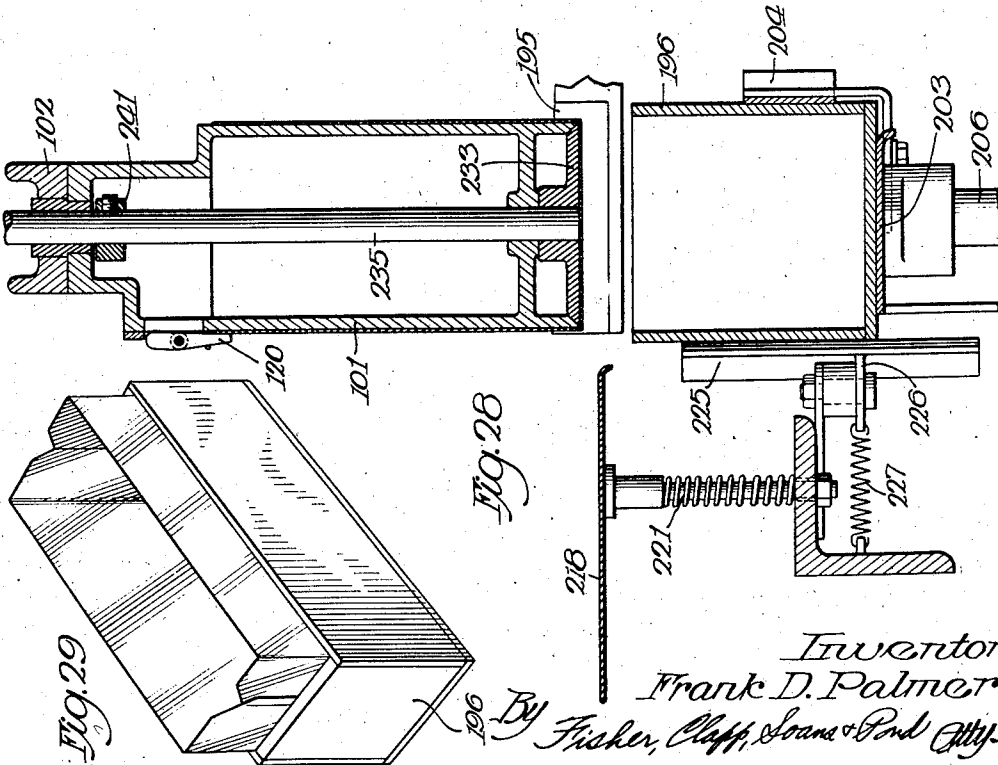


Fig. 28

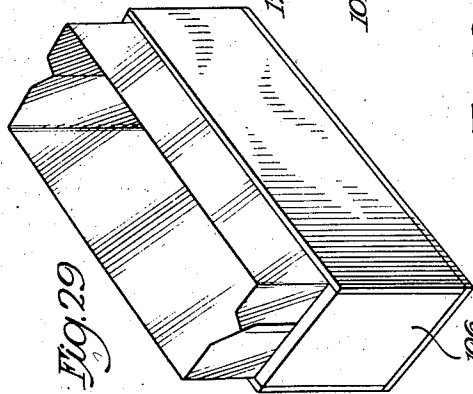


Fig. 29

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UNITED STATES PATENT OFFICE

2,274,345

PACKAGING METHOD AND MACHINE

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

Application July 7, 1939, Serial No. 283,161

16 Claims. (Cl. 93—36.01)

This invention relates to an improved packaging method and machine, and it has particular reference to the formation of a package comprising an inner receptacle and an outer protective container.

The objects of the invention are to provide a method of packaging whereby the formation of an effectively sealed inner wrapper is facilitated; to provide a method and apparatus whereby an effectively sealed inner wrapper may be produced rapidly, automatically and economically so as to maintain the packaging cost at a minimum which is consistent with the character of the packaging; to provide apparatus of the character indicated which will operate efficiently and with a minimum of attention from an operator or attendant; and in general, it is the object of the invention to provide an improved packaging method and apparatus.

Other objects and advantages of the invention will be understood by reference to the following specification and accompanying drawings (11 sheets) wherein there is described and illustrated the improved packaging method and apparatus.

In the drawings:

Figure 1 is a plan;

Figure 2 is a perspective of a safety device employed in the apparatus;

Figure 3 is a section on the line 3—3 of Figure 1;

Figure 4 is a plan section on the line 4—4 of Figure 3;

Figure 5 is a perspective of a cam which actuates certain parts of the machine;

Figure 6 is a plan section on the line 6—6 of Figure 3;

Figures 7, 8, 9 and 10 are sections, respectively, on the lines 7—7, 8—8, 9—9 and 10—10, on Figure 1;

Figure 11 is an enlarged detail of certain mechanism shown in Figure 10;

Figure 12 is a section on the line 12—12 of Figure 10;

Figure 13 is an enlarged illustration of a detail of mechanism shown on Figure 10;

Figure 14 is a section on the line 14—14 of Figure 13;

Figure 15 is a section on the line 15—15 of Figure 1;

Figures 16 and 17 are perspectives, respectively, of certain parts of mechanism shown also in Figure 15;

Figure 18 is a plan section on the line 18—18 of Figure 15;

Figure 19 is a section on the line 19—19 of Figure 3;

Figure 20 is a perspective illustrating the form of the wrapper or lining sheet after the first operation of the machine as completed;

Figure 21 is a fragmentary side elevation illustrating the method and apparatus for closing the ends of the wrapper after it is formed to the shape shown in Figure 20;

Figure 22 is a plan of the mechanism shown in Figure 21;

Figure 23 is a fragmentary side elevation illustrating a further step in the sealing of the closed ends of the inner wrapper or receptacle;

Figure 24 is a plan of the mechanism shown in Figure 23;

Figure 25 is a perspective showing the sealed end of the inner wrapper;

Figure 26 is a side elevation illustrating the method and apparatus for further acting on the sealed ends of the wrapper;

Figure 27 illustrates the arrangement for preparing the wrapper for insertion into a protective box or outer container;

Figure 28 is a section on the line 28—28 of Figure 1; and

Figure 29 is a perspective illustrating the lined box as delivered by the apparatus herein shown.

The machine herein shown is designed to produce packages embodying inner wrappers having the property of being foldable so as to bring portions thereof into face-to-face contact and said portions joinable to each other by the application of heat or pressure or both. One such form of wrapper may embody a sheet of Cellophane or other material coated on one side with a rubber-wax composition such as now known in the trade as "Parawax," the same comprising a mixture of about 20 per cent of latex and 80 per cent wax. Two such coatings, when brought together and subjected to pressure or heat or both will fuse and become inseparably united, and such material has the property of being capable of being spread in a thin film and of adhering tenaciously to a sheet of wrapper material such as Cellophane or even more common paper or metal foil wrappers.

A wrapper made of Cellophane coated with the said composition is admirably adapted to the making of a hermetically sealed package since such coating material is impervious to moisture and adapted to be effectively sealed around a package content. Hence, such wrapper material is especially suited to the packaging of cheese and other food products which should be pre-

served against the loss or absorption of moisture.

Referring now to the drawings, the machine herein shown comprises a table part 30 having a portion adapted to support a stack 31 of wrapper sheets of the character above described. The stack of wrapper sheets 31 is disposed on said table in a position which is conveniently accessible to an operator of the machine who feeds the sheets one-by-one to a position indicated in broken lines 31a, which position may be determined by suitable stops such as shown at 32, and from which position a conveyor carries the sheets to the mechanism for forming wrappers.

The conveyor for advancing the sheets from the position indicated at 31a comprises a pair of conveyor chains 33a and 33b, disposed in spaced relation approximating the corresponding dimension of the sheets 31. Each conveyor chain 33 is supported by a series of sprockets 34, 35, 36 and 37. The sprockets are suitably mounted for rotation through the agency of shafts 38, 39, 40 and 41, the same being suitably supported in brackets or bearings, and a supporting framework as shown in the drawings. It is to be understood that a supporting framework is provided and so formed as to supply such supports as are needed for the table top and other parts of the machine.

The conveyors 33a and 33b are intermittently driven by an electric motor 42 (see Figures 6 and 9) which operates through a suitable speed reducer 43 to drive a sprocket 44 at a pre-determined speed. Power is transmitted from the sprocket 44 by a chain 45 to a sprocket 46, which is carried by a shaft 47. The shaft 47 carries a cam 48 which cooperates with a cam follower 49, carried by an arm 50 on a shaft 51 by means of which the arm is pivotally connected to a suitable bracket or frame part. The arm 50 is normally urged by a spring 50a to follow the cam 48. The upper end of the arm 50 has connected to it a link 52 which is connected at its other end to a rock arm 53, the latter being mounted for rocking movement on a suitably supported shaft 54. The arm 53 carries a pawl 55 which is normally urged by means of a spring such as 56 to engage the teeth of a ratchet wheel 57 which is also rotatably supported by said shaft 54. It will be seen that continuous rotation of the shaft 47 will be transmitted into step-by-step rotation of the shaft 54 by means of the described mechanism.

The step-by-step rotation of the shaft 54 is transmitted to the conveyor chains 33a and 33b by means of a sprocket 58 carried by the shaft 54. A chain 59 and another sprocket 60 which is carried by the shaft 39 which carries the conveyor sprockets 35.

Each conveyor chain 33 is equipped with a series of gripping devices 61 which operate to grip the wrapper sheet disposed in the position indicated at 31a. Said gripping devices (see Figures 10, 11, 13 and 14) comprise a body member 62 which is secured to the chain 33 by means of links such as shown at 63, which are pivoted respectively at their ends to the body 62 and an upstanding ear or extension 64 of one of the chain links. A gripping finger 65 is pivotally mounted, as shown at 66, on a portion of the body member 62 and the free end of said finger and said body member are respectively provided with surfaces 67 and 68 which are adapted to cooperate to grip the wrapper sheet. The finger 65 is normally urged to closed or gripping position by means of a spring 69 and said fin-

ger is automatically opened for a short period of time to permit the insertion by the machine operator of a wrapper sheet to be carried into the machine by the conveyor chains.

The means for automatically opening the gripping finger 65 against the tension of the spring 69 comprises a plunger member 70 mounted in a suitable bracket element 71 for vertically sliding movement. The upper end of the plunger 70 is provided with a plate or head 72 which is adapted to engage a pin 73 extending laterally outwardly from a part of an arm 74 which is carried by an end portion of the pivot member 66 for the gripping finger 65. The plunger 70 is normally held in its lowered position by means of a spring 75 which, at one end, engages a part of the bracket 71 and at its other end engages a pin 76 which extends transversely through the lower end of the plunger 70 and serves also to support a roller 77.

The shaft 38 which supports the sprockets 34 does so through the agency of a sleeve-like part 78. Said sleeve part 78 is equipped with a pair of flanges 79, 79 and a cam flange 80. The sleeve-like member 78 is keyed to the shaft 38 to rotate therewith and the cam 80 engages the roller 77 carried by the lower end of the plunger 70, and is so shaped that at the proper time the plunger 70 will be moved upwardly to actuate the gripping finger 65. The sleeve-like member 78 is also provided with a seat or bearing surface 81, on which the sprocket 34 is mounted for rotation independently of the rotation of the shaft 38. A suitable retaining collar as shown in Figure 14 may be provided for cooperating with the adjacent flange 79 to hold the sprocket 34 in place on said bearing surface 81.

The shaft 38 which carries the cams 80 is continuously driven by suitable connection to the continuously driven shaft 47. Such connections, as best shown in Figure 9, comprise a sprocket 82 on the shaft 47, a chain 83 and a sprocket 84 on a suitably journaled shaft 85, the latter being thus continuously driven from the shaft 47. The shaft 85 is further provided with a sprocket 86 which cooperates with a chain 87 and a sprocket 88 on the shaft 38 whereby the latter is in turn continuously driven. It will be understood that the sprocket ratios are so selected that the shaft 38 will be driven at the proper speed and in properly timed relation to the other mechanism of the machine, so that said gripping devices will be operated in properly synchronized relation to the other mechanism.

The extent of each step of travel of the conveyor chains 33 is sufficient to carry the wrapper sheet from the initial position 31a to operative position in the machine. Such position may be determined by suitable guides or stops indicated at 89 (see Figures 1 and 9) which are adapted to be engaged by the front or leading edge of the wrapper sheet. Additional rear edge guides indicated at 90 may also be provided. When the sheet 31 reaches the position determined by the stops 89, the gripping finger 65 is automatically opened so as to release the sheet and permit the gripping device to fully release and clear the area of the sheet. The means for releasing the finger 65 is best shown in Figures 10 and 11 and comprises a stationary cam element 91 which is arranged to engage a pin 92 projecting outwardly from a portion of the arm 74. As clearly shown in Figure 11, when the pin 92 rides over the cam

91, the finger 65 will be raised substantially so as to release the wrapper sheet.

To further insure proper positioning of the wrapper sheet in the position to which it is delivered by the conveyor chains, there are provided a pair of buffers indicated in their entirety at 93 in Figures 1, 3, 10, 12 and 18. Said buffer devices 93 comprise bell-crank-like arms 94 arranged in pairs and pivoted as shown at 95 on a normally stationary frame part 96 which constitutes, in effect, a guide or supporting strip for one of the chains 33. Each pair of bell crank members 94 is rigidly connected by means of a rod 97 and by means of a plate element 98. A suitable spring 99 serves to normally hold the plate-carrying part of the buffing device in out position as shown in full lines in Figure 12.

The adjacent chain 33 is provided at proper intervals with an inwardly extending projection 100, which is adapted to engage and ride over the connecting bar 97 and to depress the same against the tension of the spring 99 to thereby rock the plate part 98 inwardly. The plate part 98 is arranged at such a level that it will be adapted to engage the adjacent edge portion of the chain 31 at about the time the sheet is released from the conveyor grippers and in this manner the sheet will be accurately centered between the oppositely disposed edge-engaging buffing devices 93.

When the sheet 31 has been delivered as above explained by the conveyor chains, it is in position to receive the first forming operation of the machine. The first forming operation is to fold the sheet to a trough-like or U-shaped form such as represented in Figure 20. For accomplishing this purpose there is provided a folding plate mechanism which underlies the sheet delivered by the conveyor chains and a plurality of mandrels which come successively into cooperative relation with the said folding plate structure. In the present embodiment, there are four mandrels, each designated 101 and all carried by a rotatable cross-head 102. The cross-head 102 is supported and rotated step-by-step by mechanism which will presently be described.

The folding structure previously mentioned is best shown in Figures 1, 3, 9, 18 and 19, and comprises a central plate element 103 which is removably mounted on the shouldered upper end portion 104 of a non-rotatably but vertically slidably mounted post 105. For removably locking the central plate part 103 in place on the post 105, there is provided a spring-pressed locking pin 106 (see Figures 3 and 18) carried by the plate 103, an end portion of which projects into registering holes in the shouldered post portion 104 and the surrounding boss portion of the plate 103.

Hinged to each side of the central plate member 103, are folding side plates 107 and 108, said folding plates being supported in normal coplanar relation to the central plate 103 by their indicated hinge connections therewith, and by engagement with portions 109 of transversely extending members 110 at each end of the folding structure. The members 110 are, as best shown in Figure 19, secured by means of screws to the bottom side of the central plate element 103, so as to be movable therewith. The outer end portions 111 of said transverse members provide supporting elements for corner portions of the gripping sheets during an initial portion of the first folding operation and thereby prevent such corner portions from dropping downwardly with

possible interference with the proper folding of the sheet.

Each of the hinged folding plates 107 and 108 is connected by means of a link such as 112 to the adjacent end of a cross-head 113, which is vertically slidably mounted on the post 105.

Vertical movement of the post 105 and of the cross-head 113 relative to the post 105 is effected by means of a rotary cam 114 carried by the shaft 85. Said cam operates against a cam-following roller 115 carried by an arm 116 which is pivoted on a shaft 117 carried by suitably located frame parts (see Figures 4 and 9). The free end of the arm 116 is forked and connected by links 118 to the opposite sides of the cross-head 113. The forked ends of the arm 116 are also connected by means of springs 119 to the shaft 105. When the cam 114 effects upward rocking movement of the arm 116, the spring connection 119 between the arm 116 and shaft 105 is effective to transmit the upward movement of the arm to the shaft or post 105 so as to cause the central plate 103 to approach the bottom of the mandrel 101. When the plate 103 is stopped against further upward movement by the mandrel 101, continued upward rocking movement of the arm 116 is permitted by the stretching of the springs 119 and serves through the links 118 to effect upward movement of the cross-head 113 relative to the post 105 and through the links 112, upward folding movement of the folding plates 107 and 108. It will be understood that such upward movement of the folding plates 107 and 108, in cooperation with the mandrel 101, will effect folding of a wrapper sheet to the trough-like or U-form illustrated in Figure 20; the folding position of the mechanism is illustrated in Figure 19.

After certain other operations are completed, the cam 114 permits the arm 116 to be lowered with consequent unfolding of the folding plates 107 and 108 and lowering of the central member 103. It is important, however, that the folded wrapper element be retained in place on the mandrel 101, so that the wrapper will be carried by the mandrel through other operations of the machine.

For gripping the wrapper to hold it in folded condition on the mandrel there is provided on one side of the latter a pivoted finger 120 which is normally urged by a spring 121 to rock in such a direction that the lower end portion of the finger is pressed toward the adjacent face of the mandrel. Said finger is so located on the mandrel that it will be adapted to pinch an upper marginal portion of the folded wrapper against the mandrel. The finger 120 normally occupies a position in which the lower portion of the finger engages the side of the mandrel. In order to move the finger portion out of the way of the wrapper element to permit the folding thereof by the folding plate 108, the latter is equipped with an arm 122 which is pivotally connected as shown at 123 to the plate 108 and provided at its outer or free end with a projection 124. Said projection 124 is adapted to engage the upper end portion of the finger 120 so as to rock the lower portion thereof upwardly and outwardly to the position illustrated in Figure 19, thereby removing said lower finger portion from the area to be occupied by the upper marginal portion of the wrapper when folded by the folding plate 108 to the position illustrated in Figure 19.

The projection 124 is made of sufficient length

to operate the finger 120 before the wrapper reaches its folded position as shown in Figure 19. In order to safeguard the mechanism against injury by possible accidental interference with free movement of the finger 120 or other causes, the arm 122 is yieldingly held in its indicated operative position by a spring 125 which will permit the arm 122 to yield without breaking in the event that the finger 124 should not be permitted to pass to its operative position as shown in Figure 19.

For the purpose of preventing slippage of the wrapper sheet during the described folding operation, the central plate 103 is provided near each of its ends with an upwardly spring-pressed button 126, the same normally projecting somewhat above the top surface of the central plate 103 so that such buttons will engage the sheet and pinch it against the bottom of the mandrel slightly prior to the time that the member 103 reaches its full up-position relative to the mandrel.

While the folding plates 107 and 108 remain in their upwardly folded position as shown in Figure 19, end portions of the trough-shaped wrapper are brought together and sealed in the position shown in Figure 25 so as to form end closures for the trough-like structure to thereby convert it into a receptacle. Such operations are effected by mechanism best shown in Figures 3, 4, 15 to 18, inclusive, and 21 to 24, inclusive. The mechanism referred to comprises a centering plate 127 which is carried by a vertically slidably mounted bar 128, the latter being so mounted in suitably located frame or bracket parts as best shown in Figures 15 and 18 (see Figures 1 and 3, also). Said bar 128 extends downwardly and is provided with a roller 129 which is adapted to be engaged by a cam 130. A spring 131 stretched between the lower end of the bar 128 and a suitable bracket as indicated serves to cause the roller 129 to follow the cam 130.

The cam 130 is an oscillating cam mounted on the lower end portion of a shaft 132 which is suitably journaled in frame and bracket parts provided for that purpose. Said shaft 132 is also provided with a gear segment 133 which meshes with another gear segment 134 which is formed on one end of a rock-lever 135. The rock-lever 135 is pivotally mounted as indicated at 136 on a suitably provided frame part and it is provided with a cam-engaging roller 137 which cooperates with a rotary cam 140 to effect rocking movement of the arm 135. The cam 140 is carried by the shaft 85.

The arm 135 is provided with an extension 141 beyond its pivot 136 and said extension 141 is connected by means of a spring 142 to a corresponding extension of another arm 135a which is actuated by a cam 140a, the latter being a reversed duplicate of the cam 140. The arm 135a is of construction similar to that of the arm 135 and operates a second set of mechanism corresponding to that operated by the arm 135 for closing the other end of the trough-like structure. Hence, it will be understood that the description of the mechanism for closing one end of the structure will also apply to like mechanism similarly operated but located to close the end of the trough-like wrapper. The spring 142 serves to cause both arms 135 to maintain an operative relationship with its operating cam 140 or 140a.

When the cam 130 is turned in one direction

incident to movement of the arm 135, the bar 128 is pulled downwardly by the spring 131 so as to cause the lower end portion 143 of the centering plate 127 to engage the bottom portion 144 of the U-shaped wrapper sheet.

Simultaneous with the downward, centering movement of the centering plate 127, side-engaging sealing devices are swung toward each other so as to engage the opposite side portions 145 and 146 of the U-shaped wrapper structure so as to fold the end portions of said sides across the ends of the mandrel 101 (see Figure 24). Said folding and sealing devices comprise vertically disposed, electrically heated presser bars 147 and 148 respectively carried by the outer ends of arms such as indicated at 149 and 150. The arms 150 are rotatably mounted on the shaft 132 and the arms 149 are similarly mounted on a shaft 151 which is rotatably supported by the same bracket and frame parts as support the shaft 132. The shaft 151 is geared to the shaft 132 by means of meshing gears 152 and 153 which are respectively secured to the shafts 151 and 132, so that rotation imparted to the shaft 132 by the arm 135 will also be imparted to the shaft 151 but in a reverse direction.

The shafts 132 and 151 are thus adapted to be simultaneously oscillated in opposite directions. The movement of the shafts is transmitted to the arms 149 and 150, respectively, and the sealing bars carried thereby by means of arms 154 and 155 which are respectively secured to the shafts 151 and 132, so as to oscillate therewith. The outer ends of the arms 154 and 155 are suitably connected to the sealing bar-carrying arms so that rocking movement of the arms 154 and 155 inwardly and toward each other will be transmitted through springs such as indicated at 156 to the sealing bars 147 and 148, whereby the latter are caused to move inwardly and toward each other. As a result of such movement of the sealing bars, the end portions of the side walls 145 and 146 of the U-shaped wrapper element (which project beyond the ends of the mandrel 101) will be engaged and folded as indicated in Figure 24 across the end of the mandrel.

The end portions of the wrapper project to such an extent beyond the mandrel 101 that relatively narrow marginal portions there, 145a and 146a, will continue to extend laterally from the end of the mandrel as shown in Figure 24 and be pinched between heated sealing bars 147 and 148, so as to avoid more than necessary contact of the heated sealing bars 147 and 148 with end portions of the wrapper which are folded across the ends of the mandrel. Each of the folding members 157 may further be equipped with relatively narrow spring mandrel wings 158 which serve to press the end portions of the wrapper against the ends of the mandrel to hold them firmly in place while the sealing operation is effected.

By reference to Figures 21 and 23, it will be understood that the downward movement of the centering plate 127 serves to bend or fold the end portion of the bottom wall 144 of the wrapper downwardly across the end portion 159 of the bottom plate 103, and that the lower end of said centering plate serves to facilitate the formation of a sharp fold at the bottom of the united marginal portions of the wrapper. As an incident to the inward folding movement of the wrapper end portions, the latter move transversely across said centering plate 127 and upon completion of

the end-folding operation, leave the centering member 127 as indicated in Figure 23, so that the heated sealing bars may press the marginal wrapper portions together. Upon completion of the sealing operation, i. e. after a suitable interval of rest to permit the desired fusion of the thermo-plastic coatings as determined by the shaping of the cams 140 and 140a, the parts are moved in reverse directions to restore them to their initial positions in which they are illustrated in Figures 15 and 18. It will be observed that the movements of the wrapper-engaging parts are effected by spring power but that the reverse movements are positively effected by cam action. This is a desirable arrangement in that it avoids the necessity for fine adjustments which are difficult to make and maintain.

After the end-folding operation is completed and the parts restored to their initial positions, or during the return movement of the parts, the side-folding plates 107 and 108 are also restored to their initial positions and the gripping finger 120 permitted to pinch the upper marginal portion of the receptacle-shaped wrapper against the mandrel to hold the wrapper thereon during subsequent movement of the mandrel for further operations on the wrapper.

The next step is to rotate the cross-head 102 and the parts carried thereby through an arc of 90° so as to advance the newly formed receptacle to the next operating stage and to bring into the first operating position a new mandrel.

The mandrel 102 is removably mounted on the upper end portion 160 of a tubular shaft 161 which is journaled in suitable bearings provided in the frame-work of the machine as best shown in Figure 3 and supported against vertical movement in any conventional manner. Said tubular shaft 161 has secured to it a ratchet wheel 162 which is acted upon by a pawl 163 carried by one end of an arm 164 which is mounted for oscillation on the shaft 161. The other end of the arm 164 is provided with an adjustably mounted upstanding ball element 165 to which is connected one end 166 of an extensible link structure. Said link structure comprises said end portion 166 and an end portion or clevice 167. The clevice part 167 has connected to it a tubular stem element 168 and the end part 166 has connected to it a rod part 169 which telescopes within the tubular stem part 168. The tubular part 168 is slotted as indicated at 170 and a transversely extending pin 171 carried by the inner end of said rod 169 extends through the slots 170 and into the hub of a flange element 172. A coil spring 173 is interposed between the flange 172 and a shoulder formed at the free end of the tubular stem part 168. The clevice 167 is connected by means of a bearing element 174 to a crank arm 175 formed on or interposed in the length of the driven shaft 47.

It will be seen that incident to rotation of the shaft 47, the crank arm 175 will effect oscillation of the lever or arm 164 so as to cause the pawl 163 to engage successive teeth of the ratchet 162 to rotate the tubular shaft 161 step by step. The throw of the crank 175 and the lever arm length of the rock arm 164 are so proportioned that the pawl 163 will be actuated through the required arc to effect rotation of the shaft 161 through an arc of 90° for each forward movement of the pawl 163.

In the event that some unexpected obstruction should prevent or obstruct rotation of the shaft

161, the crank arm 175 may nevertheless continue its rotary movement, in that case pulling the tubular stem part 168 outwardly along the rod 169 and incidentally compressing the spring 173. An electric switch 176 (see Figure 8) is carried by a bracket 177 which is secured to the clevice 167 and said switch is controlled by a pin or button 178 which engages the flange 172. In the event that the connecting rod structure is lengthened incident to stopping of the rotation of the shaft 161 by a foreign body, the switch body 176 and its controlling pin 178 will be pulled away from the flange 172, thereby permitting the switch button 178 to move outwardly to either open or close an electric circuit which may be utilized to control the operation of the main driving motor 42. The electric circuit controlled by the switch 176 may control suitable relays which in turn control the main driving motor 42 in such a way that in case of an obstruction preventing rotation of the cross-head 102, the motor 42 will be de-energized to permit the machine to come to a stop without injuring any of the mechanism.

To insure a prompt stop and to prevent overthrow resulting from momentum, the shaft 161 is provided with a brake structure indicated at 179 of any conventional construction.

To positively lock the shaft 161 and the cross-head 102 and parts carried thereby in operative position, there is provided on the shaft 161 a locking disc 180 provided with notches such as 181, each of which corresponds to one of the operative positions of the mechanism carried by the shaft 161. The notches 181 are adapted to receive the toothed end 182 of an arm 183 which is mounted as indicated at 184 intermediate its ends for rocking movement. A spring 185 is provided for normally urging the toothed end 182 of the rock arm into engagement with one of the notches 181 and the other end of the rock arm is provided with a cam-engaging roller 186 which cooperates with a cam 187. The cam 187 is carried by the shaft 47 and is so shaped that at proper intervals the rock arm 183 will be disengaged from the toothed wheel 180 so as to permit the shaft 161 to be rotated by the mechanism above described.

During the movement of the mandrel 101 on which a lining material receptacle is formed from the first operative stage to the second stage of operation, the endwise extending, joined flange portions 145a and 146a are folded to flatwise condition against the end of the mandrel and the depending triangular end portions indicated at 188 are turned upwardly to approximately horizontal position.

The mechanism for turning the united endwise extending marginal portions to flatwise position comprises a pair of substantially vertically disposed, electrically heated rods 189 and 190 (see Figures 1, 8 and 26), the said heated rods being disposed in such relation that the ends of the mandrel and wrapper carried thereby will just clear the respective rods. As best shown in Figure 26, the sidewise travel of the mandrel between the heated rods 189 and 190 will cause the endwise extending, united marginal portions 145a and 146a to engage the said heated rods and to be thereby folded rearwardly into flatwise position on the receptacle ends. The rods 189 and 190 are preferably heated as stated for the reason that such heating has the effect of softening the thermo-plastic or other cementitious material carried by the wrapper and thus facilitates

folding of said united marginal portions as explained. Also, incident to the softening of the cementitious material, the formation of sharp folds is facilitated and upon cooling and setting of the cementitious material, the folds will remain sharp and substantially permanent. This is contrasted with the normal tendency of ordinary folded wrapping materials to spring open from any folded condition. The sharpness and permanence of the folds here provided is probably due at least in part to the ability of the overlapping folded portions to slip flatwise on each other to a slight but sufficient extent, when the thermo-plastic material is soft, to avoid stretching of one portion when folded over the other.

The heated rod 189 may conveniently be secured at its lower end as shown in Figure 8 to a bracket carried by a frame part of the mechanism, and the heated element 190 may be secured at its lower end to an adjacent portion of a bracket structure 191.

The folding rods 189 and 190 are respectively provided with spring wings such as indicated at 192, the said wings being so located as to wipe across the ends of the receptacle on the mandrel with the lower edges of said wings approximately registering with the bottom of the receptacle. The said spring wings have more or less of a creasing effect on the wrapper ends in a zone which facilitates subsequent upward folding of the depending triangular portions 188.

To effect folding of the said triangular portions 188, there is provided a guide rod element 193 for acting on the triangular portion at the inner end of the receptacle and a cam element 194 for acting on the triangular part at the outer end of the receptacle. The guide rod 193 first engages the inside of the adjacent depending triangular portion 188 and is so shaped and arranged that incident to the continued movement of the mandrel to the second operating stage, the said triangular portion will be folded to an outwardly or generally horizontally extending position as illustrated in Figure 27.

The cam element 194 is formed as a part of the bracket 191 and similarly acts on the triangular portion 188 at the outer end of the mandrel. For purposes which will presently appear, it has been found convenient to provide the cam 194 with a terminal piece 195 which may be adjusted laterally, i. e. toward or from the end of the mandrel to permit accurate control of the final position to which the triangular portion 188 will be folded by the cam structure.

Outer protective containers, for example cardboard, or wooden boxes such as indicated at 196 in Figure 29, are fed one by one to the machine by a conveyor belt 197 which may be suitably driven by means of inter-meshing gears 198, of which one is carried by a shaft 199. The shaft 199 may be continuously rotated by means of a driving chain 200, which engages sprockets 201 on the shaft 199 and 202 on the driven shaft 85 (see Figures 4 and 9).

A box advanced by the conveyor 197 is received on a platform 203 which is equipped with side and end guides 204 and 205 for accurately positioning such box on the platform. The platform 203 is mounted on the upper end portion of a vertically slidably mounted shaft 206 which is normally urged to move upwardly by a tension spring 207. To prevent the support 206 from rotating, the shaft is provided with a laterally extending arm 253 which is apertured adjacent its free end to slidably fit on an upstanding pin 254

which is carried by a frame part as best shown in Figure 6.

Upward movement of the shaft 206 under the influence of the spring 207 is controlled by a cam 208 which acts against a roller 209 carried by one end of a rock arm 210 which is pivotally mounted intermediate its ends as shown at 211. The other end of the rock arm 210 is connected by means such as links 212 to the shaft 206 or to a collar carried thereby. It will be seen that when the cam 208 permits the roller-carrying end of the arm 210 to move downwardly, the spring 207 will be enabled to move the shaft 206 upwardly to thereby elevate the platform 203 and the box positioned thereon. Incident to the upward movement of the box 196, which is then properly registered with respect to the overlying wrapper-covered mandrel 101, the box will be caused to telescope over the wrapper and incidentally to fold the then more or less horizontally extending triangular end portions 188 upwardly and inwardly against the ends of the mandrel (see Figure 27).

In the event that the box should for some reason or other be out of register with the mandrel or in the event that some other damages should prevent the proper upward movement of the platform or elevator 203, provision is made for promptly stopping the driving motor 42 so as to prevent damage to the machine. Such means comprises a so-called "micro-switch" 213 which controls the electric circuit to the driving motor 42. Said switch 213 is mounted by means such as a bracket 214 on the rock arm 210 adjacent the roller 209. The roller 209 has its shaft ends as indicated at 215 extended into slots such as shown at 216 in the arm 210, and the normal position of said shaft ends is in the upper ends of the slots 216. In that position one of the shaft ends engages a pin 217 which actuates the switch 213.

In the event that upward movement of the platform 203 is prevented, the arm 210 will come to a stop and the receding surface of the cam 208 will permit the shaft ends 215 to move downwardly in the slots 216 with the result that the switch-pin 217 is released and the switch 213 actuated for the purpose indicated.

In order to maintain the box firmly against the side guide 204 of the platform 203 during the upward movement thereof, there is provided a pair of presser plates 225, 225 (see Figures 7 and 28) which are carried by the outer ends of arms 226, 226, which are pivotally mounted intermediate their ends and connected at their other ends by means of tension springs 227 against the side of the box 196 so as to hold the latter against the guide element 204 during the upward movement of the platform 203. In this manner the box 196 is maintained in proper alignment with the overlying mandrel so as to readily telescope over the same upon continued upward movement of the platform 203.

The platform 203 remains elevated until the next step of rotation of the cross-head 102 and parts carried thereby has been effected to such an extent that the box-carrying mandrel 101 has moved the box thereon from the platform 203 to a supporting table 218. The table or plate 218 is rigidly secured at its outer edge as indicated at 219 to an upstanding end casing member 220 and the inner portion of said supporting plate 218 is yieldingly supported by means of spring-supported pins or plungers 221 (see Figures 1, 3 and 7). The inner edge of said

supporting plate 218 is preferably beveled or rounded as indicated at 222, so as to facilitate the moving of a box across said edge in the event that the box is not carried at a sufficient elevation by the mandrel to clear the surface of said supporting plate 218.

When the box-carrying mandrel reaches the third operating position, it is located directly above a supporting member 223 which is secured to the upper end portion of a vertically slidably mounted shaft 224. Said shaft 224 and its supporting member 223 are normally maintained in elevated position.

By spring means such as indicated at 228 (see Figures 3 and 7), the lower end of the shaft 224 is connected by means of links such as 229 to the adjacent end of a rock arm 230 which is pivoted at its opposite end on a portion of the frame. Said rock arm 230 is provided with a roller 231 which engages a rotary cam 232 carried by the shaft 47. Said cam 232 is so shaped that at properly synchronized intervals the shaft 224 and its top plate 223 will be lowered to support the lined box which is then being stripped from the mandrel 101.

For stripping the lined box from the mandrel 101, the bottom 233 of the mandrel is made separate from the sides thereof and said bottom is normally held in its operative position relative to the side walls of the mandrel by such means as springs 234 located within the mandrel. Vertical movement of the bottom element 233 is, however, guided by means of a guide rod 235 which is secured at its lower end to the mandrel bottom 233 and slidably mounted as indicated at 236 and 237 near the bottom and top of the mandrel.

Downward movement of the mandrel bottom to effect the box-stripping operation is produced by means of a cam-controlled rock lever 238 pivotally mounted intermediate its ends as shown at 239 on the cross-head 102. The outer end of the rock arm 238 is connected by means of a link 240 to one end of an arm 241 which is secured at its other end to the guide rod 235.

Rocking movement of the rock arm 238 is controlled by means of a shaft 242, which is vertically slidably mounted within the tubular shaft 161 (see Figure 3). Said slidably mounted shaft or rod 242 is provided at its upper end with a cam head 243 which has a top flange portion 244 which overlies the horizontal path of travel of the inner ends of the rock levers 238, which are equipped with anti-friction rollers 245. Said cam head 243 is also provided with a lip 246 which extends only toward the third operative stage or position of each mandrel as indicated in Figures 1, 3 and 8, the purpose of such uni-directional position of said lip 246 being to act on the inner ends of the rock arms 238 only when in the box-stripping position of the mandrel.

The vertically slidably mounted shaft 242 is actuated by means of a bell crank pivotally mounted as indicated at 247 and comprising an arm 248 connected at its free ends as indicated at 249 to the lower end of said shaft 242. The bell crank also comprises an upwardly extending arm 250 which is provided with a roller 251 for engagement with a cam 252 carried by the driven shaft 47. The cam 252 is so shaped that in properly synchronized relation to the other movements of the machine mechanism, the shaft 242 will be moved upwardly with the result that the cam lip 246 at the upper end of the shaft will engage the roller 245 carried by the inner

end of the rock arm 238 which is located in box-stripping position. The movement of the rock arm thus effected effects downward movement of the mandrel bottom 233 and consequently strips the lined box 196 from the mandrel. The downward movement of the mandrel bottom 233 progresses at the same rate of speed and simultaneously with the downward movement of the supporting member 223, the latter being controlled by the cam 232.

The cam 232 is operative to hold the support 223 with the lined box thereon in lowered position while the cam 252 permits the central rod or shaft 242 to be lowered so that the springs 234 within the mandrel may return the mandrel bottom 233 to normal position, thereby withdrawing said mandrel bottom from within the lowered lined box.

When the box is thus freed from the mandrel and the mandrel bottom, it is ready to be conveyed to filling machinery and it is started on its way by means of a conveyor 255 which is equipped with pusher members 256 in properly spaced relation to engage each lined box deposited on the support 223. As best shown in Figures 4 and 7, the conveyor 255 comprises a pair of chains each of which is equipped with the said pusher members 256 for engaging the sides of the lined boxes adjacent their respective ends. The conveyor is driven by means of inter-meshing gears 257, one of which gears is secured to a shaft of the conveyor 255 and the other of which gears is connected to the driven shaft 85. The conveyor 255 is thus driven continuously and it will be understood that the pusher members 256 are so located on the conveyor that they will occur in properly synchronized relation to the deposition of successive lined boxes on the support 223. The boxes are propelled from the lowered support 223 to a platform 258 from which they are delivered to the filling machine or other apparatus either manually or by suitable conveyor means.

In the event that a box lining or even a lined box should inadvertently adhere to the mandrel when it begins its next step of rotary movement, the mechanism, if not brought to a stop because of the safety switch arrangement 176—178 previously described, will be stopped by another safety device which is best shown in Figures 1, 2 and 7.

Said extra safety device comprises an elongated gate structure 259 which is pivoted intermediate its ends as indicated at 260 on a suitable bracket carried by the framework of the machine. The outer end of the gate 259 engages a spring element 261 which serves to resist swinging movement of the plate in the direction of rotation of the cross-head 102 and the mandrels carried thereby.

The opposite or inner end of the gate structure 259 is provided with an adjustable pin 262 which engages a pin or button 263, of an electric switch 264. In the event that any part of a box or box lining should be carried by the mandrel from the lined box discharging station, such part will engage a part of the gate 259 and cause the same to swing against the spring 261 with the result that the switch 264 will be actuated to promptly stop the further movement of the mechanism. In order to prevent possible bending or other damage to the upper edge portion of the gate 259, said upper edge portion as indicated at 259a is made as a separate part hinged as indicated at 265 to the main gate 259 and normally held by a spring 266 in co-planar relation to the gate

259. It will be apparent that the upper gate portion 259a may yield slightly before its movement is transmitted to the main gate 259 so as to actuate the switch 265.

The mechanism above described is operative to form an impervious sheet material receptacle of a pre-determined size and to insert such receptacle in an outer protective box of appropriate size. In some industries where the mechanism may be employed, it is customary to provide similar but different sizes of packages of the same material. For example, in packaging cheese it is customary to provide a so-called "five-pound loaf," "five-pound long loaf" and a "two-pound loaf." The mechanism as shown in the drawings is arranged for filling receptacles and lining boxes for the regular five-pound loaf package. However, the mechanism may be readily changed to package either the long loaf or the smaller two-pound loaf.

To change the machine for packaging the so-called five-pound long loaf, the cross-head 102 with its associated mandrels and mechanism is removed from the upper end of the shaft 161, and another cross-head with appropriately sized mandrels is substituted. The folding plates 103, 107 and 108 are also replaced by folding plates of suitable size. Such changing of folding plates is readily permitted by the spring locking device 106 which facilitates removal of the folding plate structure from the upper end of the shaft 105. The guides 89 and 90 are also suitably adjusted if necessary, and the outer end closing mechanism is also adjusted outwardly to increase the spacing between it and its complementary inner end closing mechanism, the latter being mounted in fixed position. Also, the sheet conveyor 33b is adjusted outwardly to increase the spacing between the conveyors 33a and 33b to accommodate the wider wrapper sheets required for the longer packages.

Adjustment of the outer end closing device comprising the swinging sealer members 147 and 148, the centering device 127 and parts for operating the same, is facilitated by mounting all of such parts on a bracket member 267 which is bolted as indicated at 268 to stationary frame parts of the mechanism (see Figures 3, 15 and 18). It will be apparent that by removing the bolts 268, the bracket element 267 and all of the folding mechanism and operating parts carried thereby may be adjusted outwardly to a new location. Suitable openings for receiving the bolts 268 to properly locate the structure in adjusted position may be provided.

As indicated in Figures 4 and 15, the cam 140 which actuates the rock arm 135 for operating the sealing devices is keyed to the shaft 85 so as to be rotatable therewith while also being slidable longitudinally of the shaft. The cam is also provided with a grooved hub 269 which receives a fork 270 which depends from the bracket plate 267 so that adjustment of the latter outwardly also effects adjustment of the operating cam 140 outwardly to a suitable position on the shaft 85.

For convenience in adjusting the conveyor 33b outwardly, the various sprockets which support the conveyor chain 33b are keyed to their respective shafts where necessary to rotatably connect such sprockets and shafts and they are also mounted so as to be slidable lengthwise on said shafts. Such sprockets are provided with grooved hubs 271 for receiving suitable fork formations such as indicated at 272 carried by a frame bracket 273 which is slidably mounted on a

pair of stationary shafts or rods 274. Said bracket plate 273 is also provided with a hub having a threaded opening indicated at 275 which receives an adjusting screw 276 which is suitably supported in a bracket 277 (see Figure 3). The screw 276 is also provided with a crank handle 278 by means of which it may be manually rotated to effect corresponding adjustment of the bracket plate 273 and thereby shifting of the sprockets and conveyor 33b to the required new location. Any suitable micrometer adjustment indicated generally at 279 may be provided if desired to facilitate accurate setting of the structure and to lock the same in adjusted position. As shown in Figure 3, one of the side buffers 93 is carried by the adjustable bracket member 273 so as to be adjusted in unison with the conveyor 33b, and may require adjustment as to location to cause the same to release the sheet at the proper point in accordance with the size thereof.

From the foregoing description it will be understood that an operator feeds the wrapper sheets with their thermo-plastic coatings on their uppermost faces successively to a pre-determined position. The pre-determined position referred to is such that the forward edges of the sheet will be positioned within the open grippers carried by the conveyor chains, which grippers will be automatically closed so that upon forward movement of the chains, the sheet will be carried forwardly until the grippers are automatically opened and the sheet deposited in proper position between one of the mandrels and the preliminary folding plates.

The folding plates are next operated to fold the sheet into U-shaped form around the bottom and one pair of opposite sides of the mandrel, the sheet being of such width that end portions of the U-shaped or trough-like form of the wrapper then project beyond the opposite ends of the mandrel. The projecting end portions of the sheet are then folded and sealed to form a receptacle having impervious bottom, side and end walls, it being understood that the joints in the end walls are also of such character that they, too, are impervious. The end folding and folding plate devices are then returned to initial position and the mandrel advanced, the wrapper-formed receptacle being held on the mandrel by the described gripping finger. During the forward movement of the mandrel with its wrapper-receptacle, certain portions of the wrapper or receptacle are folded in preparation for the insertion of the wrapper into a box or its equivalent, the telescoping of the box over the wrapper. The latter folding operations are effected as an incident to the travel of the mandrel and receptacle.

When the mandrel reaches a second stopping place, a box, usually a heavy cardboard or as herein shown, a wooden box, is moved upwardly and telescoped over the receptacle on the mandrel, after which the mandrel, now carrying both a receptacle and a box, is again advanced, the box being supported by riding on a yieldable table-like plate. The mandrel then comes to a third stopping position and the bottom of the mandrel is pressed downwardly so as to strip the receptacle and box from the mandrel, the receptacle and box being, during the stripping operation, supported from below by a vertically movable plunger which moves in unison with the downward or stripping movement of the mandrel bottom. When the box and mandrel reach a pre-determined lowered position free of

the mandrel, the mandrel bottom returns to its normal position, whereupon another conveyor structure engages and moves the lined box forwardly, usually to a further conveyor forming a part of a filling machine which delivers the material to be packaged to the lined box.

As shown in the drawings, there are in the described apparatus four mandrels, one being in each of the three operating positions and a fourth being located in idle position. Hence the machine is simultaneously performing three different operations on as many wrappers respectively located in the three operating positions.

The described structure may be varied considerably in respect of many of its structural details and operating mechanisms. Hence, the scope of the invention as defined by the following claims should not be limited, unless required by the prior art, to the specific details and arrangements herein disclosed, but should be interpreted as broadly as is consistent with the state of the prior art.

I claim:

1. In a machine of the class described, the combination of a laterally movably mounted mandrel, wrapper-folding mechanism disposed in downwardly spaced relation to said mandrel and comprising bottom and side members pivotally connected to opposite sides of said bottom member, actuating means for effecting relative vertical movement of said mandrel and said folding mechanism and upward folding of said side members so as to embrace said mandrel thereby to fold a wrapper upwardly around the bottom and opposite sides of said mandrel, said actuating means being such as to cause said folding mechanism and mandrel to be restored to their respective initial positions upon completion of the folding operation of said wrapper folding mechanism, and means for effecting lateral movement of said mandrel with said folded wrapper thereon to another position.

2. In a machine of the class described, the combination of a laterally movably mounted mandrel, wrapper-folding mechanism disposed in downwardly spaced relation to said mandrel and comprising bottom and side members pivotally connected to opposite sides of said bottom member, actuating means for effecting relative vertical movement of said mandrel and said folding mechanism and upward folding of said side members so as to embrace said mandrel, thereby to fold a wrapper upwardly around the bottom and opposite sides of said mandrel, said actuating means comprising means for yieldingly effecting said relative upward folding of said side members and being such as to cause said folding mechanism and mandrel to be restored to their respective initial positions upon completion of the folding operation of said wrapper folding mechanism, and means for effecting lateral movement of said mandrel with said folded wrapper thereon to another position.

3. In a machine of the class described, the combination of a laterally movably mounted mandrel, wrapper-folding mechanism disposed in downwardly spaced relation to said mandrel and comprising bottom and side members pivotally connected to opposite sides of said bottom member, actuating means for effecting relative vertical movement of said mandrel and said folding mechanism and upward folding of said side members so as to embrace said mandrel, thereby to fold a wrapper upwardly around the bottom and opposite sides of said mandrel, said actuating

means being such as to cause said folding mechanism and mandrel to be restored to their respective initial positions upon completion of the folding operation of said wrapper folding mechanism, means for holding the folded wrapper sheet on the mandrel after restoration of said folding means to initial position, and means for effecting lateral movement of said mandrel with said folded wrapper thereon to another position.

4. In a machine of the class described, the combination of a laterally movably mounted mandrel, wrapper-folding mechanism disposed in downwardly spaced relation to said mandrel and comprising bottom and side members pivotally connected to opposite sides of said bottom member, conveyor means for delivering wrapper sheets successively to said folding mechanism and comprising a uni-directionally driven endless chain and a plurality of gripping devices carried by said chain, means for actuating said gripping devices so as to grip a wrapper sheet delivered thereto, thereby to cause said chain to propel such wrapper sheet, means for opening said gripping devices so as to release and deliver the wrapper sheet in a pre-determined position, actuating means for effecting relative vertical movement of said mandrel and said folding mechanism and upward folding of said side members so as to embrace said mandrel, thereby to fold a wrapper upwardly around the bottom and opposite sides of said mandrel, said actuating means being such as to cause said folding mechanism and mandrel to be restored to their respective initial positions upon completion of the folding operation of said wrapper folding mechanism, and means for effecting lateral movement of said mandrel with said folded wrapper thereon to another position.

5. In a machine of the class described, the combination of a laterally movably mounted mandrel, wrapper-folding mechanism disposed in downwardly spaced relation to said mandrel and comprising bottom and side members pivotally connected to opposite sides of said bottom member, conveyor means for delivering wrapper sheets successively to said folding mechanism, automatically actuated means for engaging the side edges of the wrapper sheets to adjust the same transversely of the direction in which the same are propelled by said conveyor, actuating means for effecting relative vertical movement of said mandrel and said folding mechanism and upward folding of said side members so as to embrace said mandrel, thereby to fold a wrapper upwardly around the bottom and opposite sides of said mandrel, said actuating means being such as to cause said folding mechanism and mandrel to be restored to their respective initial positions upon completion of the folding operation of said wrapper folding mechanism, and means for effecting lateral movement of said mandrel with said folded wrapper thereon to another position.

6. In a machine of the class described, the combination of a laterally movably mounted mandrel, wrapper-folding mechanisms disposed in downwardly spaced relation to said mandrel and comprising bottom and side members pivotally connected to opposite sides of said bottom member, actuating means for effecting relative vertical movement of said mandrel and said folding mechanism and upward folding of said side members so as to embrace said mandrel, thereby to fold a wrapper upwardly around the bottom and opposite sides of said mandrel, said wrapper being so positioned on said mandrel

that marginal side portions of the wrapper project endwise from the opposite ends of the mandrel, and means for folding said projecting marginal portions of the wrapper over the respectively adjacent end walls of said mandrel so as to form said wrapper into a receptacle, said actuating means being such as to cause said folding mechanism and mandrel to be restored to their respective initial positions upon completion of the folding operation of said wrapper folding mechanism, and means for effecting lateral movement of said mandrel with said receptacle thereon to another position.

7. In a machine of the class described, the combination of a mandrel, means for folding a wrapper sheet around the bottom and the oppositely disposed side walls of said mandrel, means for simultaneously folding end portions of such wrapper inwardly toward each other over an end wall of the mandrel and marginal strips of said portions into face-to-face contact in a plane extending transversely of said end wall, and means for adhesively uniting said marginal strips in face to face relation while extending transversely as aforesaid.

8. In a machine of the class described, the combination of a mandrel, means for folding a wrapper sheet around the bottom and the oppositely disposed side walls of said mandrel, means for folding an end portion of the bottom wall part of said wrapper downwardly, means for folding end portions of the opposite side wall parts of the wrapper inwardly toward each other over an end wall of the mandrel and marginal strips of said side wall end portions into face-to-face contact in a plane extending transversely of said mandrel end wall, said wrapper being thereby formed into a receptacle about said mandrel, and means for uniting said contacting marginal portions while extending transversely as aforesaid so as to form a sealed end closure for said receptacle.

9. In a machine of the class described, the combination of a mandrel, means for folding a wrapper sheet around the bottom and the oppositely disposed side walls of said mandrel, means for folding an end portion of the bottom wall part of said wrapper downwardly and corresponding end portions of the opposite side wall parts of the wrapper inwardly toward each other over an end wall of the mandrel, marginal strips of said folded wrapper end portions being thereby incidentally brought into face-to-face contact in a plane extending transversely of said mandrel end wall and said wrapper being thereby formed into a receptacle about said mandrel, means for uniting said contacting marginal portions so as to form a sealed end closure for said receptacle, means for effecting lateral movement of said mandrel with said receptacle thereon, and means operative as an incident to said lateral movement for turning said downwardly folded bottom wall portion upwardly toward a wall of the receptacle.

10. In a machine of the class described, the combination of a mandrel, means for folding a wrapper sheet around the bottom and the oppositely disposed side walls of said mandrel, means for folding an end portion of the bottom wall part of said wrapper downwardly and corresponding end portions of the opposite side wall parts of the wrapper inwardly toward each other over an end wall of the mandrel, marginal strips of said folded wrapper end portions being thereby incidentally brought into face-to-face con-

tact in a plane extending transversely of said mandrel end wall and said wrapper being thereby formed into a receptacle about said mandrel, means for uniting said contacting marginal portions so as to form a sealed end closure for said receptacle, means for folding said united marginal strips toward the end wall of the receptacle from which said strips extend, and means for turning said downwardly folded bottom wall portion upwardly toward a wall of the receptacle.

11. In a machine of the class described the combination of a mandrel, means for folding a wrapper sheet around the bottom and the oppositely disposed side walls of said mandrel, means for folding an end portion of the bottom wall part of said wrapper downwardly and corresponding end portions of the opposite side wall parts of the wrapper inwardly toward each other over an end wall of the mandrel, marginal strips of said folded wrapper end portions being thereby incidentally brought into face-to-face contact in a plane extending transversely of said mandrel end wall and said wrapper being thereby formed into a receptacle about said mandrel, means for uniting said contacting marginal portions so as to form a sealed end closure for said receptacle, means for effecting lateral movement of said mandrel with said receptacle thereon, means operative as an incident to said lateral movement for folding said united marginal strips toward the end wall of the receptacle from which they extend, and means operative as an incident to said lateral movement for turning said downwardly folded bottom wall portion upwardly toward a wall of the receptacle.

12. In a machine of the class described, the combination of a mandrel having bottom, side and end walls, means for folding a wrapper sheet around the bottom and side walls of the mandrel so as to cause an end portion of the wrapper to project beyond an end of the mandrel, means for folding said projecting wrapper portion over the adjacent end of the mandrel comprising a vertically movable centering member engageable with the wrapper end portion which projects from the bottom wall of the mandrel, means for effecting downward movement of said centering member so as to fold said last-mentioned wrapper portion downwardly, and a pair of folders engageable respectively with the end portions of the wrapper which project from the side walls of the mandrel, means for effecting movement of said folders inwardly toward each other simultaneously with the downward movement of said centering member so as to fold said last-mentioned wrapper portions inwardly over the adjacent end of the mandrel, and means for uniting said last-mentioned folded portions to thereby maintain the same in folded position.

13. In a machine of the class described, the combination of means for forming a wrapper sheet into a receptacle and a pair of chain conveyors for delivering wrapper sheets successively to said forming mechanism, sprockets rotatably mounted for supporting and guiding said conveyor chains, the sprockets for one of said chains being mounted for both rotary and lateral movement, a laterally movable member connected with said laterally movable sprockets, and means for locking said laterally movable member in predetermined position of lateral adjustment so as to maintain the corresponding conveyor chain in correspondingly adjusted position, said conveyor chains being thereby relatively adjustable to ac-

commodate wrapper sheets of a plurality of different widths.

14. In a machine of the class described, the combination of a mandrel, means cooperating with said mandrel for folding a wrapper sheet about the bottom, side and end walls of said mandrel so as to form the wrapper into receptacle having an open top and ears extending downwardly from the opposite ends of the receptacle, means for folding said ears outwardly, means for positioning an open box in pre-determined relation to said receptacle, and means for effecting relative movement of said box and receptacle to position the latter within the former, the arrangement being such that said outwardly extending ears are folded upwardly and inwardly into position against the respective end walls of the receptacle as an incident to engagement of said ears with portions of said box upon said relative movement between said box and receptacle.

15. In a machine of the class described, the combination of a laterally movably mounted mandrel, means cooperating with said mandrel for folding a wrapper sheet about the bottom, side and end walls of said mandrel so as to form the wrapper into a receptacle having an open top, means for positioning an open box in pre-determined relation to said receptacle, means for

effecting upward movement of said box to telescope the latter over said mandrel and the receptacle thereon, means for effecting lateral movement of the mandrel with said box and receptacle thereon to thereby convey the same to another position, and means operative in such other position for stripping the receptacle and box as a unit from said mandrel, thereby to deliver in such other position, a lined box ready for filling with material to be packaged.

16. The method of packaging which comprises the steps of forming a thermo-plastically coated wrapper sheet into a trough-shaped form with the thermo-plastic coating on the inside of the form, folding end portions of the side walls of said form inwardly toward each other in coplanar relation and bringing marginal portions of said side walls and of the bottom wall into face to face relation to each other in a plane extending laterally from said inwardly folded end portions, applying heat and pressure to said marginal portions so as to soften the thermo-plastic coatings thereon and to effect union thereof so as to thereby adhesively unite said marginal portions, and, while said coatings remain in a softened condition, effecting folding of said united marginal portions substantially into the plane of said inwardly folded end portions.

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