June 8, 1937. T. R. JAMES 2,083,067

PACKAGING MACHINE

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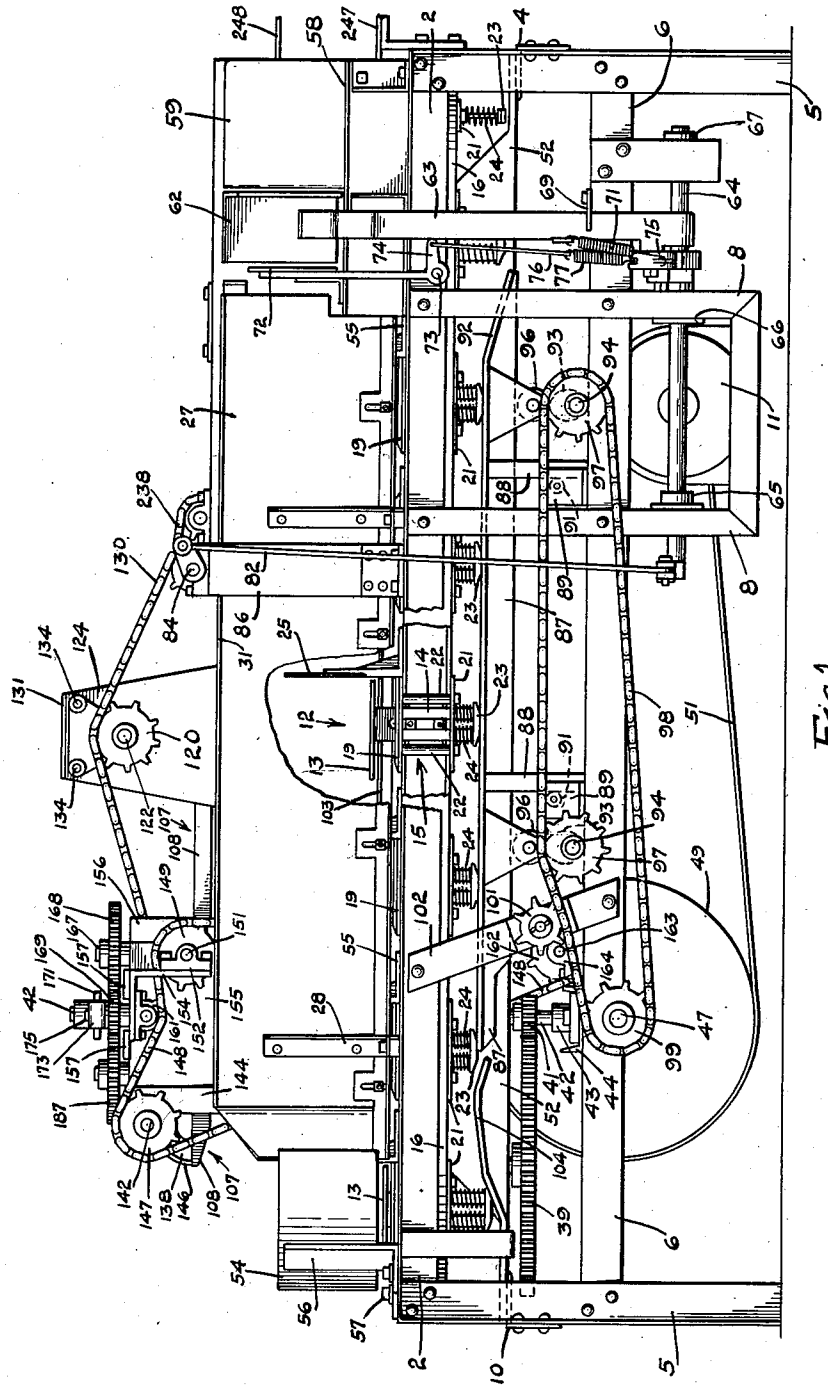

Fig. 1

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June 8, 1937. T. R. JAMES 2,083,067

PACKAGING MACHINE

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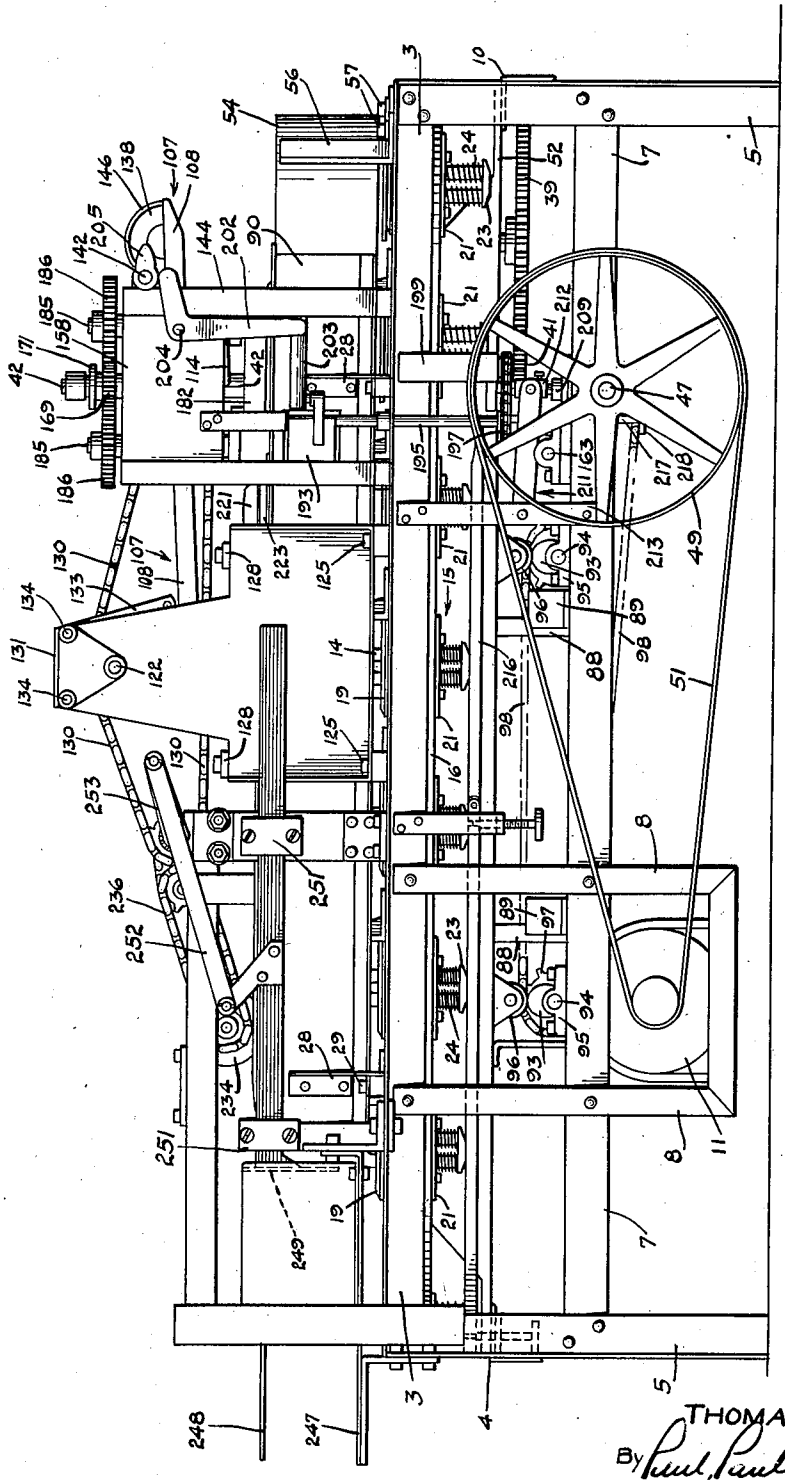

Fig. 2

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PACKAGING MACHINE

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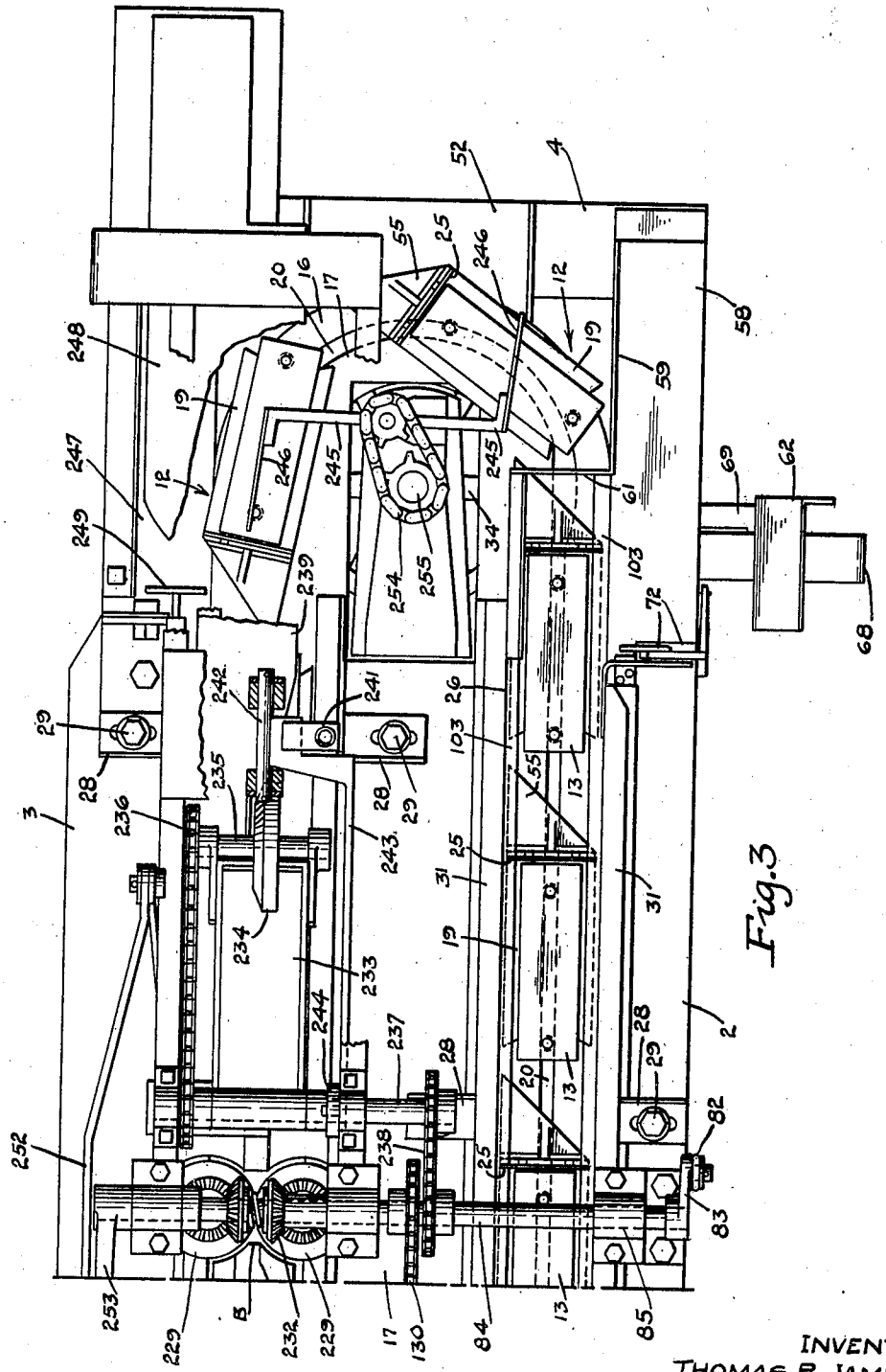

Fig. 3

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PACKAGING MACHINE

Filed Dec. 15, 1932 9 Sheets-Sheet 4

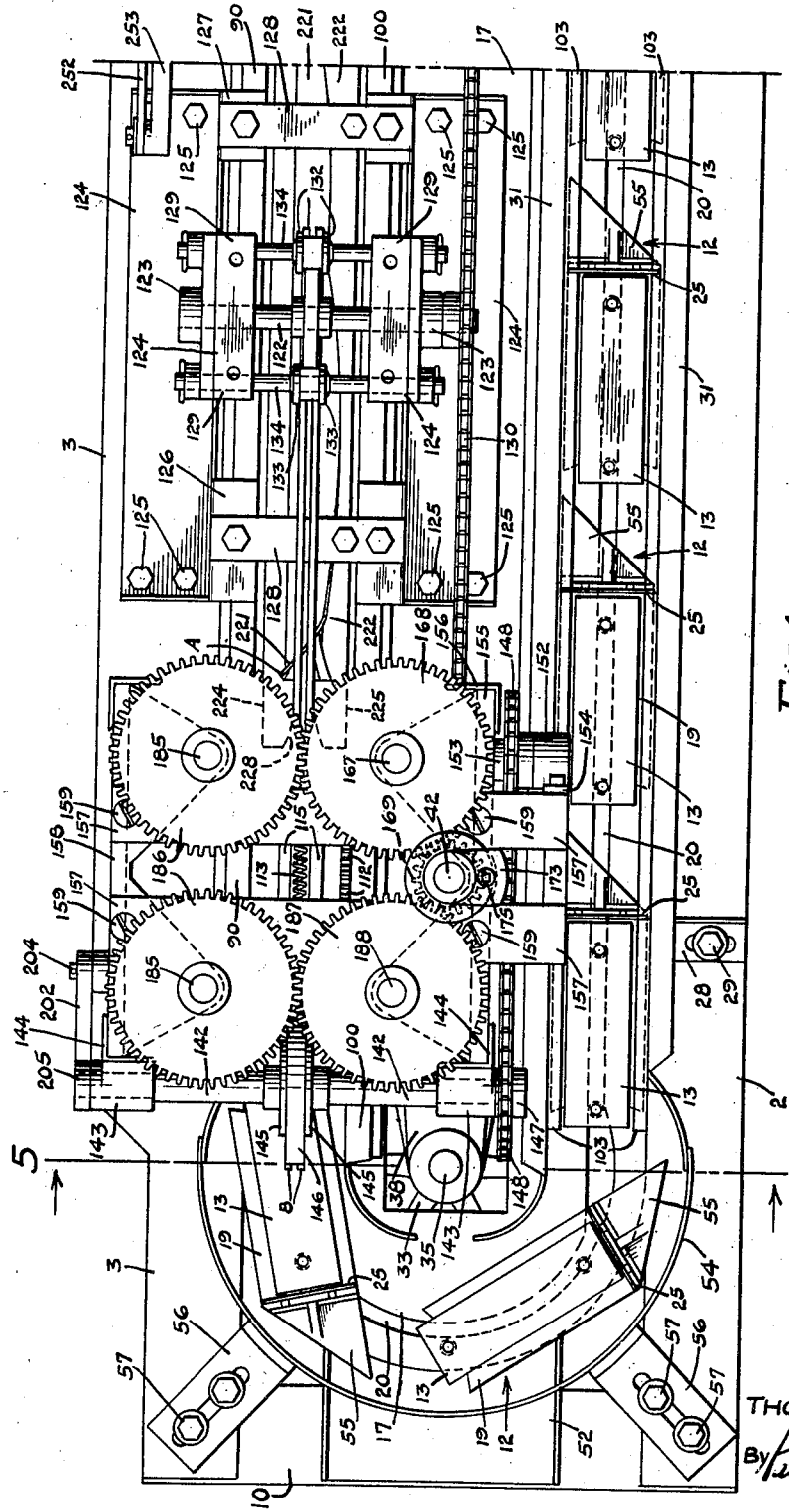

Fig. 4

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PACKAGING MACHINE

Filed Dec. 15, 1932 9 Sheets-Sheet 5

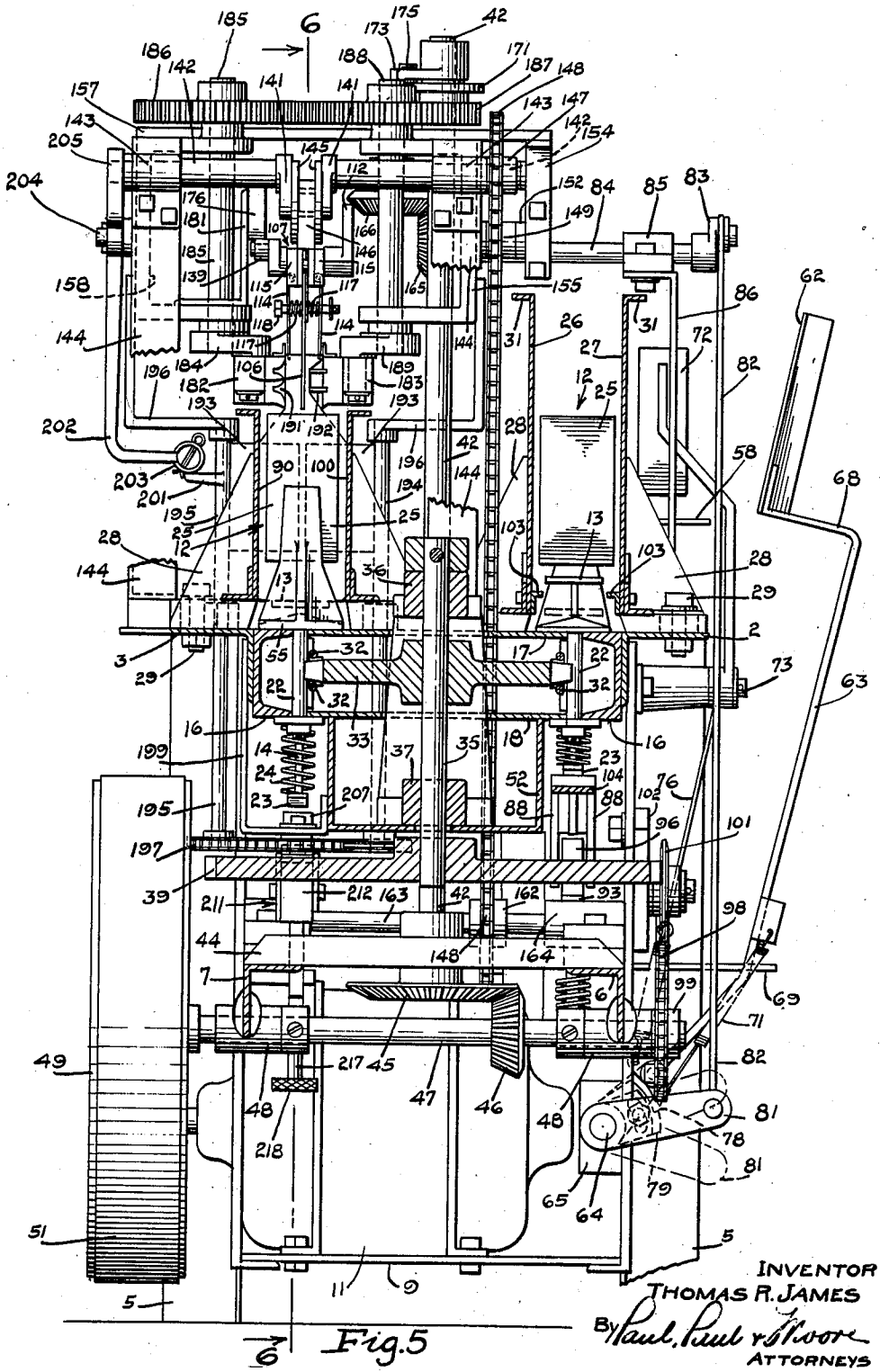

Fig. 5

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June 8, 1937. T. R. JAMES 2,083,067

PACKAGING MACHINE

Filed Dec. 15, 1932 9 Sheets-Sheet 6

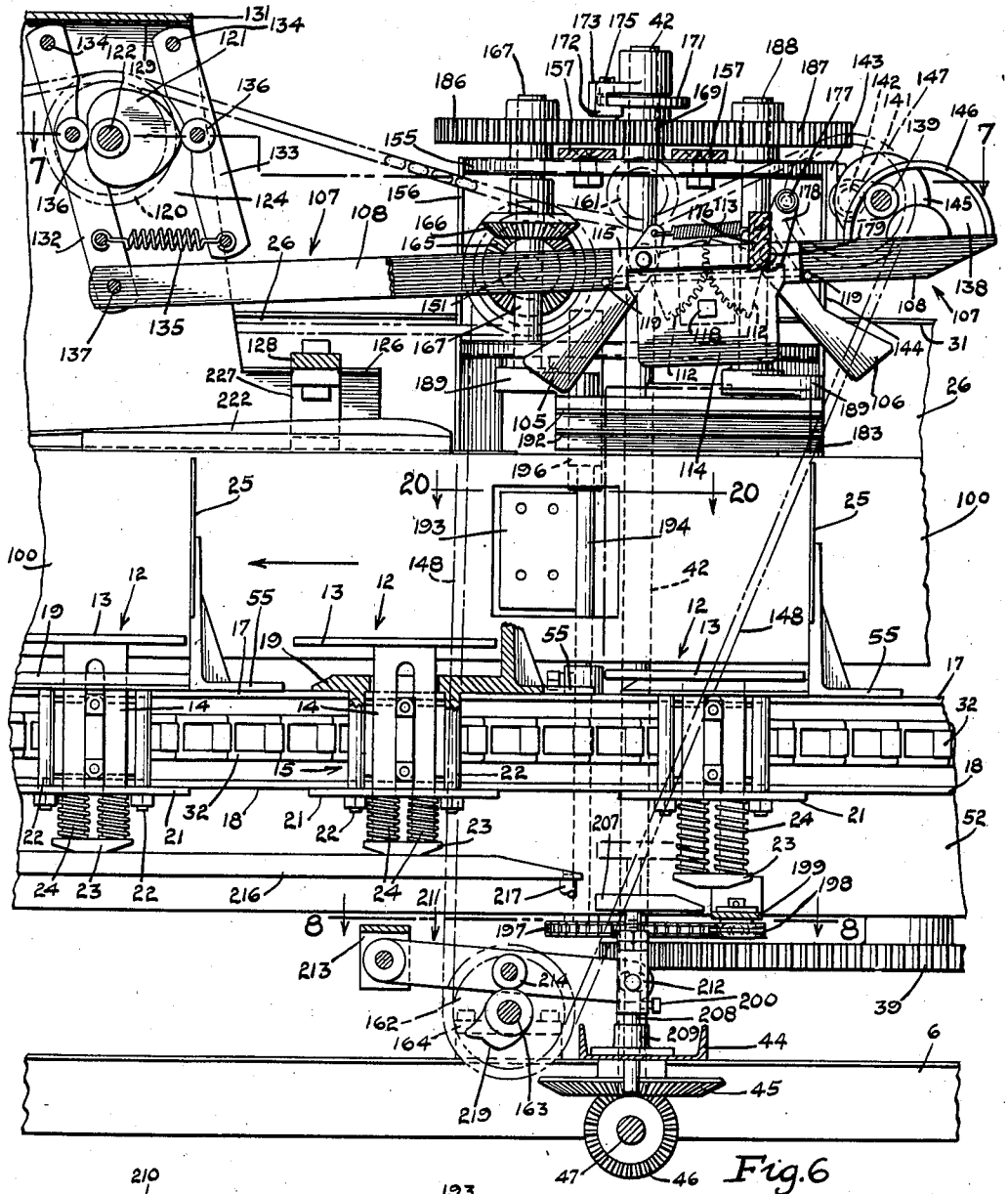

Fig. 6

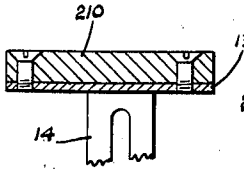

Fig. 19

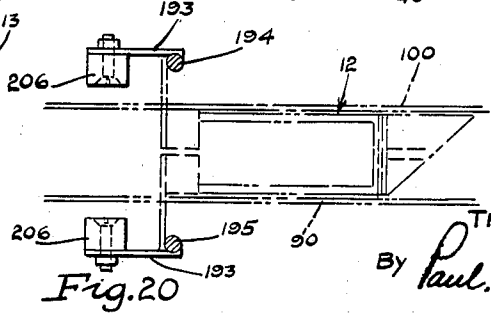

Fig. 20

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PACKAGING MACHINE

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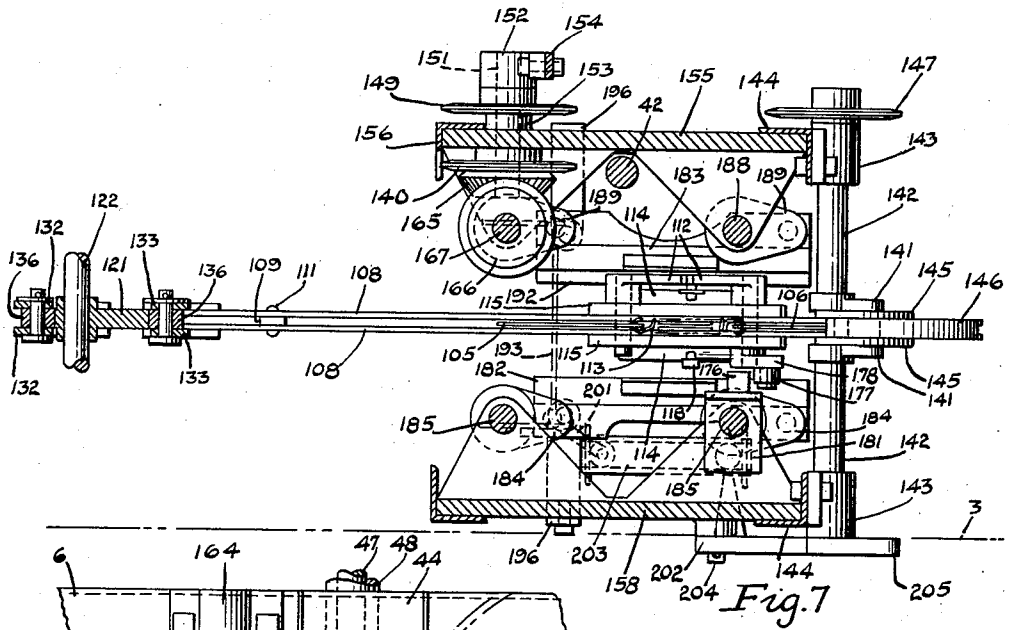

Fig. 7

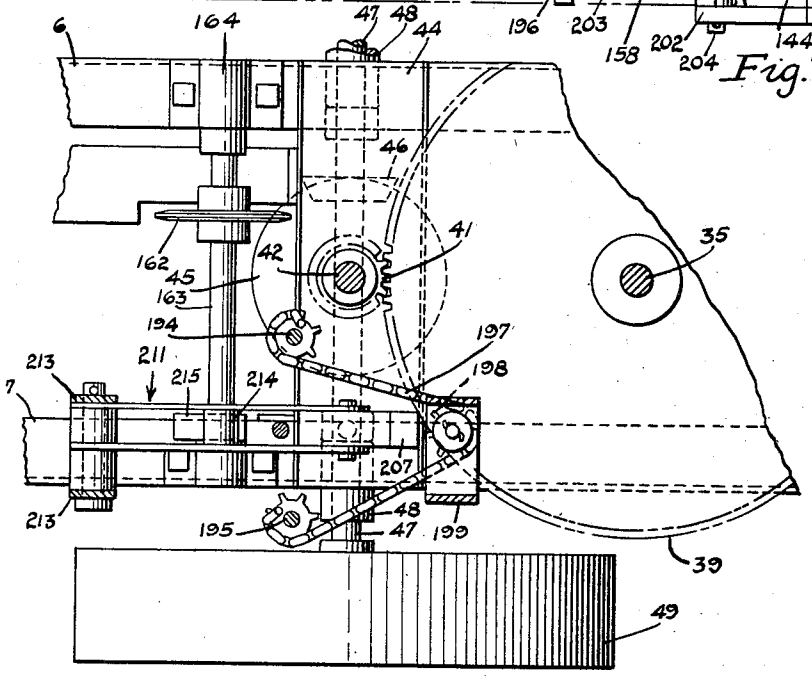

Fig. 8

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PACKAGING MACHINE

Filed Dec. 15, 1932 9 Sheets-Sheet 8

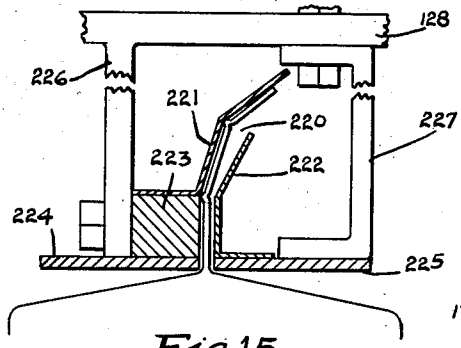

Fig.15

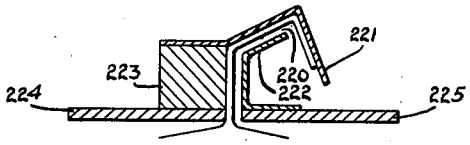

Fig.16

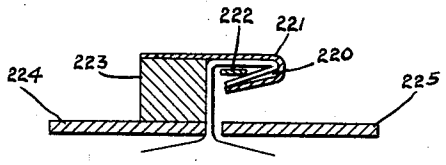

Fig.17

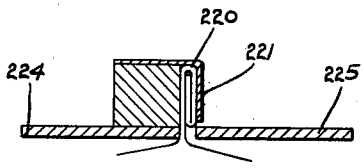

Fig.18

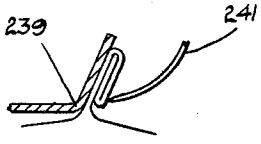

Fig.18A

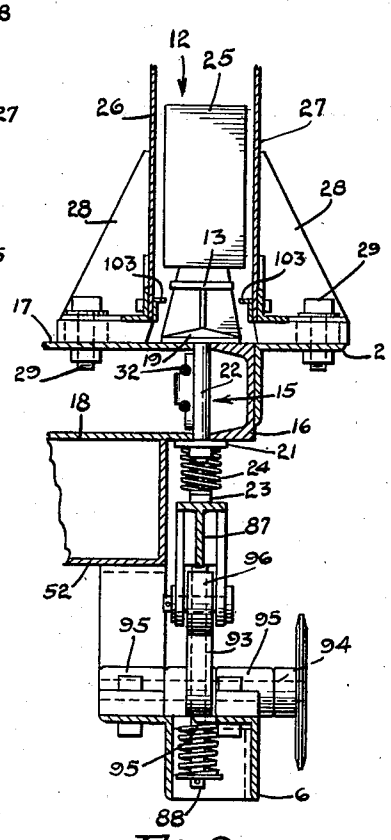

Fig.9

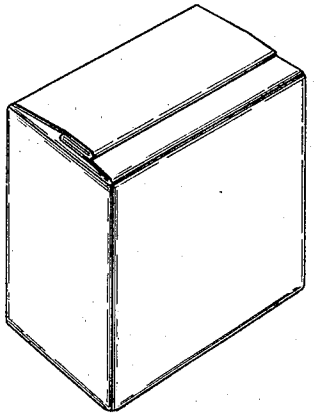

Fig.21

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PACKAGING MACHINE

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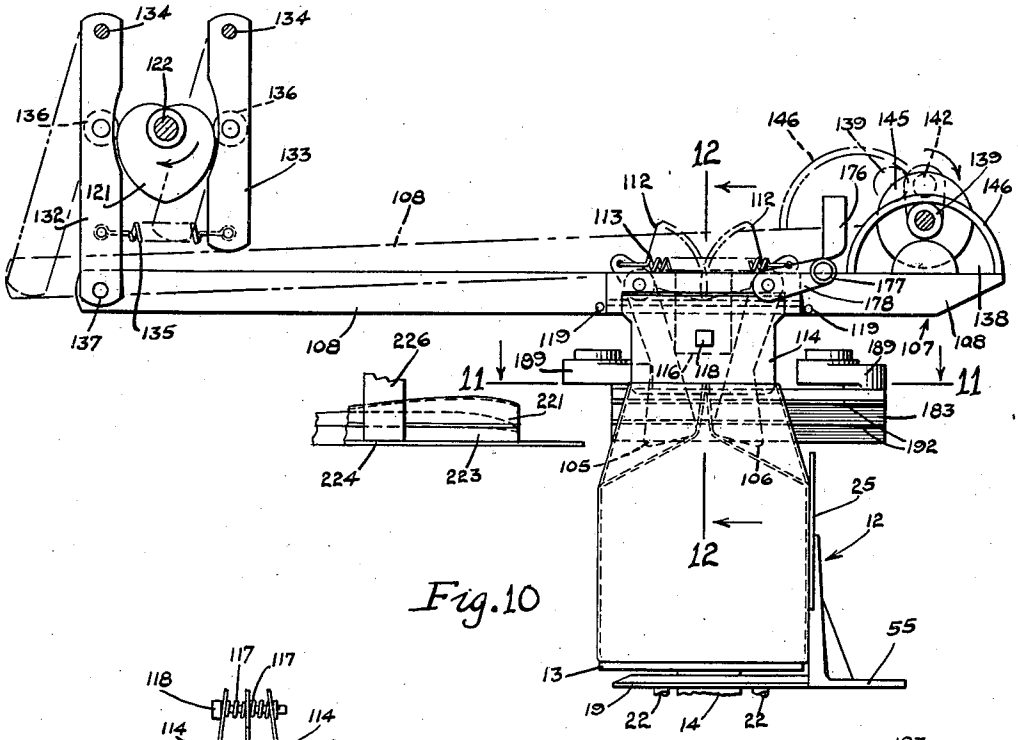

Fig.10

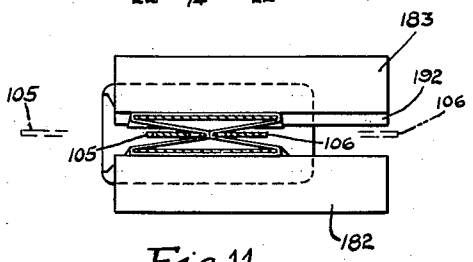

Fig.11

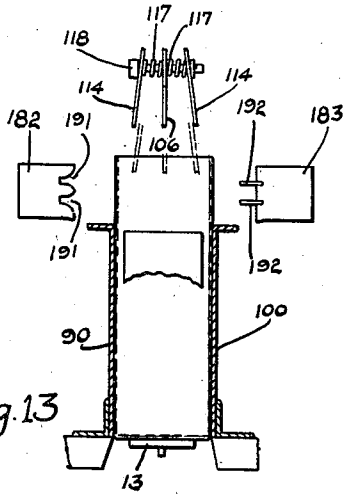

Fig.13

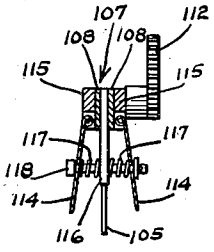

Fig.12

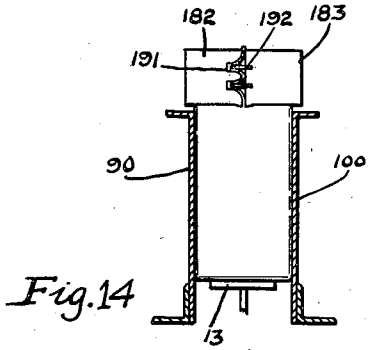

Fig.14

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Patented June 8, 1937 2,083,067

UNITED STATES PATENT OFFICE

2,083,067

PACKAGING MACHINE

Thomas R. James, Minneapolis, Minn., assignor to General Mills, Inc., Minneapolis, Minn., a corporation of Delaware

Application December 15, 1932, Serial No. 647,393

34 Claims. (Cl. 93—6)

This invention relates to packaging machines and has for a general object the provision of improved means for performing the various operations incidental to the packaging of bags or other containers.

More particularly the invention concerns itself with the provision of apparatus for closing and sealing the open tops of filled bags, and it is an object of the invention to provide improved bag shaking means and shaping means, and bag top intucking means, scoring means, folding means, and sealing means, together with novel combinations and arrangements of these means.

The bag closing and sealing machines heretofore in general commercial use are of such nature that the various packaging operations are performed upon the bag while at rest so that the advancement of the bag through the machine is necessarily intermittent. Such intermittent operation has a number of disadvantages, among which an important one is that the development of high speed operation is seriously limited. This invention contemplates a packaging machine which lends itself more readily to high speed operation, and it is a further general object of the invention to provide a packaging machine wherein the various packaging operations are performed upon the bags while in continuous movement whereby the necessity for intermittent operation is dispensed with.

A further object of the invention lies in the provision of such a machine which is adjustable to bags of various shapes and sizes.

These and other objects of the invention will become more readily apparent upon a detailed study of the specification and accompanying drawings in conjunction with the appended claims.

In the drawings:

Figure 1 is a front elevation of the machine partially broken away to more clearly show the means for tapping or imparting a vibratory motion to the bags to settle the material therein;

Figure 2 is a rear elevation of the machine;

Figure 3 is an enlarged plan view of one end of the machine showing the means for successively feeding the containers or bags into the conveyer means, and also the means for discharging the sealed bags or containers from the machine;

Figure 4 is a plan view of the opposite end of the machine showing the driving means for the intucking and scoring mechanisms;

Figure 5 is a cross-sectional view on the line 5—5 of Figure 4, showing the rails for supporting the bags or containers in the conveyer means while they are being operated upon to settle the material therein, and also showing the means for transversely scoring the partially folded bag tops;

Figure 6 is a detail sectional view on the line 6—6 of Figure 5, showing the intucking mechanism;

Figure 7 is a detail sectional view on the line 7—7 of Figure 6, with some of the parts omitted;

Figure 8 is a detail sectional view on the line 8—8 of Figure 6, showing the means for operating the bag shaping mechanism;

Figure 9 is a detail sectional view showing the means for supporting the side walls of the conveyer means, and whereby said walls may be relatively adjusted to vary the spacing therebetween to accommodate bags of different sizes;

Figure 10 is a detail sectional view showing the mechanism for intucking the end walls of the bag mouth before the walls thereof are scored, some of the parts being omitted;

Figure 11 is a detail sectional view on the line 11—11 of Figure 10, showing the bag top positioned between the scoring members, and the end wall folding members in operative positions;

Figure 12 is a detail sectional view on the line 12—12 of Figure 10, showing the means adapted to be inserted into the open bag top to support the bag top walls while the end wall folding members are intucking the end walls thereof;

Figure 13 is a detail sectional view showing the normal inoperative positions of the scoring members and the plates for supporting the bag top walls while being folded to the positions shown in Figure 11;

Figure 14 is a view similar to Figure 13, showing the scoring members engaged with the bag top to form a plurality of transverse score marks therein;

Figures 15 to 18 are enlarged detail sectional views of the spiral means into which the bag tops are delivered from the scoring members, and wherein they are folded into a plurality of transverse folds;

Figure 18A is a detail sectional view showing a means for guiding the transversely folded bag top into engagement with the bag body;

Figure 19 is a detail view showing a filler block secured to one of the carriers to adapt the machine for handling bags of a smaller size;

Figure 20 is a detail sectional view on the line 20—20 of Figure 6, showing the bag shaping means provided with filler blocks to adapt the machine for handling bags of smaller dimensions; and

Figure 21 is a perspective view of a sealed bag.

Machine frame

The supporting frame of the machine is shown comprising upper side rails 2 and 3 having their ends secured to suitable legs 5, and similar angle iron rails 6 and 7 are shown secured to the intermediate portions of the legs 5, as shown in Figures 1 and 2. A cross member 4 secures together the legs 5 at one end of the machine, and a similar member 10 secures together the legs at the opposite end of the apparatus. Upright members 8 are shown secured to the longitudinally extending side rails of the supporting frame and have a plate 9 secured thereto adapted to provide a support for a suitable motor 11 which, in the present instance, provides the source of power for operating the machine.

Conveyer means

The means for conveying the filled bags or containers through the machine while the walls of the open tops thereof are being operated upon to close and seal the bags, is shown in Figures 1, 3, 4, 5, and 6.

The conveyer means comprises a plurality of carriers generally indicated by the numeral 12, each comprising a plate portion 13 having a depending portion 14 slidably supported in suitable guides provided in a slide 15, mounted for traveling movement upon a suitable rail 16 and the marginal edges of spaced plates 17 and 18, as best shown in Figure 5. Each slide 15 comprises an upper plate portion 19 and a lower plate 21 secured together by suitable spacing studs 22, which studs are adapted to travel in the gap or space provided between the adjacent edges of the rail 16 and the plates 17 and 18. The depending portion 14 of the plate 13 is preferably forked, as shown in Figure 1, and the lower ends thereof project through the plate 21 and have a shoe 23 suitably secured thereto. Compression springs 24 are coiled about the forked ends of the depending portion 14 and cooperate to constantly urge the carrier downwardly, as will readily be understood by reference to Figures 1 and 6. The upper plate member 19 of the slide 15 has an upstanding plate portion 25 adapted to engage the bag and thus push it along through the machine, while the bag is supported upon the plate 13. Each carriage thus comprises in effect, a plate 13, depending portion 14, slide 15, upstanding portion 25, shoe 23 and springs 24.

At the receiving side or front of the machine, the carriers are arranged to travel between a pair of upright walls 26 and 27 secured to brackets 28 which, in turn, are adjustably secured to the side rail 2 of the machine frame, and to the upper plate 17, which forms one side of the guide for the slides 15, as best shown in Figure 5. Bolts 29 secure the brackets 28 to the machine frame, and are received in suitable slots provided in said brackets. By thus adjustably supporting the brackets 28, the walls 26 and 27 may be relatively adjusted with respect to each other, whereby the space therebetween may be varied to adapt the machine for handling bags of different sizes. The upper marginal edges of the side walls 26 and 27 are preferably turned outwardly, as shown at 31 in Figure 5.

The carriers 12 are operatively connected to a suitable drive chain 32 in spaced relation. This chain is supported upon suitable sprockets 33 and 34 provided at the ends of the machine frame. The sprocket 33 is secured to an upright shaft 35 mounted in suitable bearings 36 and 37 provided in a bracket 38 suitably secured to the machine frame. A spur gear 39 is secured to the lower end of the shaft 35 and meshes with a pinion 41 secured to an upright shaft 42, the lower end of which is supported in a bearing 43 secured to a cross member 44 of the machine frame. The shaft 42 has a bevel gear 45 secured to its lower end which meshes with a pinion 46 secured to a drive shaft 47, shown mounted in suitable bearings 48 suitably secured to the machine frame. The drive shaft 47 has a pulley 49 secured to one end thereof which is driven by a belt 51 from the motor 11, as clearly shown in Figure 2.

The vertically spaced horizontal plates 17 and 18 are secured to an elongated box-like member 52, having its end portions secured to suitable cross members 10 and 4 of the machine frame, as will be noted by reference to Figures 1 and 2. The box-like member 52 and the plates 17 and 18 secured thereto provide, in effect, a portion of the machine frame, as they are suitably secured to the side rails of the frame, and various mechanisms of the machine are supported thereon.

At the ends of the machine frame, the plates 17 and 18 are rounded or curved, as clearly shown by the full and dotted lines in Figures 3 and 4 and, in like manner, the channel member guide rail 16 is curved and has its adjacent edges spaced from the edges of the plates 17 and 18 to provide the gap 20 therebetween, through which the upright studs 22 of the slides 15 of the carriers 12 travel. Suitable guide walls 54 are provided at the left hand end of the conveyer means, when viewed as shown in Figure 4, to support the bags or containers upon the carriers 12, as they travel around that end of the machine. The upright portions 25 of the slides 15 are shown provided with rearward extensions 55 which support said upright portions when pushing bags through the machine. These rearward extensions are shown as being of triangular configuration as will be noted by reference to Figure 4, so that they may adequately clear the curved wall 54 when they travel around the left hand end of the machine. The curved wall 54 is supported upon suitable brackets 56 adjustably secured to the side rails 2 and 3 of the machine frame by suitable bolts 57.

Feeding mechanism

Means is provided for successively feeding bags onto the carriers 12 without interrupting the traveling movement of the carriers. Such means is best shown in Figures 1, 3, and 5, and comprises a horizontally disposed plate 58 which serves as a table upon which the bags may be delivered from a packer or other source of supply. An upright wall 59 is provided at one side of the table 58 and has a member 61 connecting it with the inner wall 26 of the conveyer means, above the line of travel of the carriers. A suitable pusher 62 is secured to the upper end of an arm 63, the lower end of which is loosely mounted upon a shaft 64, shown supported in bearings 65 and 66 secured to the upright members 8 of the motor supporting frame, and a third bearing 67 supported from the lower side rail 6 of the machine frame. The arm 63 is offset adjacent its upper end, as shown at 68 to permit the pusher blade 62 to travel over the top of the table 58 and thereby push the bags from the table 58 onto the carriers 12, as they pass the table 58. The outward movement of the arms 63 may be limited by a suitable stop 69, here shown consisting of a notched plate having one end se-

cured to the side rails 6 of the machine frame, as best shown in Figure 1. A suitable spring 71 normally holds the arm 63 in engagement with the limit stop 69.

The pusher blade 62 is adapted for automatic operation and its movement is controlled by the movement of the bags upon the table 58. At the left hand end of the table, when viewed as shown in Figure 3, there is mounted a trip 72 which is shown longitudinally alined with the table 58 so that when a bag is moved over the top of the table 58, it will engage said trip and cause the operating mechanism of the pusher blade arm 63 to function and operate said arm. The trip 72 is pivoted at 73 to the machine frame, and has an offset arm 74 connected to one end of a dog 75 by means of a rod 76 and a tension spring 77. The dog 75 is pivotally mounted upon the lower end of the pusher arm 63 and is adapted to be engaged by a shoulder 78 provided at the outer end of a short arm 79 which is adjustably secured to the shaft 64 by suitable means such as indicated in dotted lines in Figure 5.

The shaft 64 is rocked continuously, when the machine is operating, by an arm 81 having a connecting rod 82 connecting it with a crank 83 provided upon one end of a shaft 84, one end of which is shown supported in a bearing 85 secured to an upright 86 provided upon the machine frame.

In the operation of the feeding mechanism, a bag is delivered onto the table 58 and moved into engagement with the trip 72, whereupon the pusher blade 62 will be automatically operated to push the bag engaged with the trip into the path of travel of the carriers between the walls 26 and 27, whereby it will drop by gravity onto the ledges 103, because of the table 58 being situated at an elevation above said ledges, as shown in Figure 5. The springs 71 and 77, it will be noted, are secured to opposite ends of the dog 75, and the spring 77 is relatively stiffer than the spring 71, so that when the trip is actuated, the tension in the spring 77 will overcome the tension in the spring 71 and move the dog into position to be engaged by the shoulder 78 of the arm 79. The pusher blade 62 operates in timed relation to the travel of the carriers.

Jarring mechanism

An important feature of the invention resides in the means provided for jarring the bags to cause the material therein to become settled. Such means is best shown in Figures 1 and 9, and comprises a vertically movable track 87 having depending extensions 88 received in vertical guides 89 suitably secured to the machine frame. Each guide has an anti-friction roller 91 adapted to take the thrust exerted on the track 87 as a result of the shoes 23 of the carriers frictionally engaging the upper surface thereof, as shown in Figure 1. The right hand end of the track 87 is inclined as shown at 92 to permit the shoes 23 of the carriers to move into engagement with the upper surface of the track without impinging against the end thereof when the bar is in its uppermost position, as shown in Figure 1. Up-and-down movement is imparted to the track 87 by suitable cams 93 secured to shafts 94 mounted in suitable bearings 95 fixed to the machine frame, as best shown in Figure 9. The upper web of the side rail 6 is cut away, as shown at R in Figure 9, to provide clearance for the cams 93 as they rotate about the axes of the shafts 94. The shaker track is shown provided with suitable anti-friction rollers 96 which ride upon the peripheries of the cams 93, as will be noted by reference to Figures 1 and 9.

The shafts 94 are shown provided with sprockets 97 adapted to be driven by a chain 98 operatively connected to the drive shaft 47 by a suitable sprocket 99 secured to the shaft 47. An idler sprocket 101 is adjustably supported upon a member 102 of the machine frame whereby slack in the chain 98 may be taken up.

The bags, as they travel from the table 58 to the left hand end of the machine, are supported upon a pair of inwardly projecting ledges 103 provided upon the lower portions of the side walls 26 and 27 of the conveyer means. These ledges are located at an elevation intermediate to the upper and lower limits of the vertical movement of the plates 13 of the carriers, so that a tapping action will be exerted upon the bottoms of the bags as they travel through the conveyer means. This will readily be understood by reference to Figure 5, wherein it will be noted that when the shaker track 87 is in its lowermost position, the plates 13 of the carriers will move out of engagement with the bottoms of the bags because of the bags engaging the ledges 103 and being supported thereby. When the track 87 moves upwardly, the plates 13 of the carriers will impinge against the bottoms of the bags, whereby the bags will be thrust upwardly, as will readily be understood by reference to Figure 5, and upon the downward movement of the plates 13, the bags will impinge against the ledges or rails 103, whereby a double tapping action is obtained, which results in the contents of the bags quickly becoming settled therein so that by the time they reach the left hand end of the machine, the material will be thoroughly settled therein. A fixed track 104 is provided at the left hand end of the shaker track 87 adapted to be engaged by the shoes 23 of the carriers 12, as will readily be understood by reference to Figure 1. This fixed track 104 guides the plates 13 downwardly to their lowermost positions, as shown at the left hand side of Figure 5.

From the foregoing, it will be noted that the bags or containers will be constantly tapped or jarred as they travel from the feeding table 58 to the left hand end of the machine, so that by the time they reach the intucking mechanism, which will subsequently be described, the material has become thoroughly settled therein.

Intucking mechanism

Another feature of the invention resides in the means provided for intucking the end walls of the bag between the side walls, before the bag top is transversely folded. Such means is best shown in Figures 4, 5, 6, 10, and 11, and comprises a pair of end wall folding members 105 and 106 pivotally supported upon a bar, generally indicated by the numeral 107, and which will hereinafter be referred to as the supporting bar. This bar is here shown comprising two strap-like members 108 secured together in spaced relation by suitable means such as spacing blocks 109 and rivets or bolts 111. The folding members 105 and 106 may be formed from sheet metal and are supported between the straps 108, as shown in Figure 5. The folding members are operatively connected together by a pair of intermeshing gear segments 112, whereby said members will operate simultaneously in opposite directions, as will readily be understood by reference to Figure 6.

A suitable spring 113 connects together the upper ends of the members 105 and 106 and constantly tends to urge the lower ends thereof in an outward direction to the position shown in Figure 6.

To support the walls of the open bag top during the inward folding of the end walls, a pair of plate elements 114 are pivotally supported upon the bar 107 by means of suitable blocks 115 secured to the opposite sides of the bar 107, and from which the elements 114 depend, as clearly shown in Figures 6 and 12. A member 116 is secured in position between the members 108 of the supporting bar 107, and depends downwardly therefrom between the plate elements 114 to provide a support for the adjacent ends of suitable compression springs 117, the opposite ends of which engage the plate elements 114, as best shown in Figure 12. A bolt or pin 118 is received in suitable apertures provided in the plate elements 114 and the supporting member 116, and provides means for retaining the springs 117 in position, and also limits the outward movement or expansion of the plate elements 114. The plate elements 114 are adapted to be inserted into the mouth of the bag to support the walls thereof while the end wall folding members 105 and 106 are folding the end walls of the bag mouth inwardly between the side walls thereof, as will be clearly understood by reference to Figures 10 and 11. Suitable stop pins 119 limit the outward movement of the end wall folding elements 105 and 106, as shown in Figure 6. The plate elements 114 are removably mounted upon the supporting bar 107, so that they may readily be interchanged, which is usually necessary when changing from one size of bags to another.

The supporting bar 107 is mounted for reciprocal movement lengthwise of the conveyer means, and travels at substantially the same speed as the carriers 12, when moving forwardly. The means for reciprocating the bar is shown comprising a cam 121 secured to a shaft 122 supported in suitable bearings 123. These bearings may be secured by bolts 125, to the upper ends of a pair of uprights 124 supported upon the side rails 2 and 3 of the machine frame. The uprights 124 are here shown as being formed of sheet metal, and have inwardly bent portions 126 and 127 to which suitable tie bars 128 may be secured, as best shown in Figure 4. The upper ends of the uprights are also shown provided with inwardly turned flanges 129 to which a plate 131 may be secured to brace the upper portions of the uprights.

An arm 132 has one end pivotally supported upon a suitable rod 134 and has its lower end pivotally connected to the supporting bar 107, as shown at 137. An anti-friction roller 136 is mounted on the bar and engages the periphery of the cam 121. To prevent backlash or play between the roller 136 and the periphery of the cam 121, a relatively shorter arm 133 is supported from a similar rod 134 at the opposite side of the cam and has its lower end connected to the arm 132 by a suitable tension spring 135, as shown in Figure 6. An anti-friction roller 136 is also provided on the arm 133 adapted to ride upon the periphery of the cam 121. The periphery of the cam 121 is so shaped as to cause the supporting bar 107 to travel at a constant speed the full length of its stroke, and the speed of its forward stroke is substantially synchronized with the travel of the carrier.

The opposite end of the supporting bar 107 is shown provided with an arcuate slot 138 adapted to receive an anti-friction roller 139 secured to a crank 141 provided on a shaft 142, mounted in suitable bearings 143 secured to upright angles or posts 144, having their lower ends suitably secured to the side rail 2 and plate 17 of the machine frame. Suitable disks 145 are interposed between the cheeks of the crank 141 and the portion 146 of the bar 107, for obvious reasons, as may be noted by reference to Figures 7 and 10. The roller 139 traveling in the arcuate slot 138 controls the vertical movement of the supporting bar 107, so as to cause the plate elements 114 to be inserted into and removed from the bag mouth at the proper periods during each cycle of operation of the intucking mechanism. The slot 138 also causes the bar 107 to travel forwardly in substantially a horizontal position.

A sprocket 147 is secured to one end of the shaft 142 and has a chain 148 operatively connecting it with a sprocket 149 secured to a short shaft 151 mounted in suitable bearings 152 and 153, the former being secured to a suitable angle bracket 154, and the latter being provided in a bracket 155 having one of its vertical edges secured to the post 144 and its opposite edge to a corresponding post 156. The angle bracket 154 is supported by a pair of cross members 157 secured to the upper edge of the bracket 155, and to the upper edge of a similar bracket 158 provided at the opposite side of the machine, as shown in Figure 7. The cross members 157 may be secured to the side brackets 155 and 158 by suitable bolts 159, as shown in Figure 4. A suitable idler 161 is mounted on the angle bracket 154 to guide the chain 148 between the sprockets 147 and 149, as best shown in Figure 1. The chain 148 has a running connection with a sprocket 162 secured to a shaft 163 mounted in suitable bearings 164 secured to the lower longitudinal side rails 6 and 7 of the machine frame, as will be noted by reference to Figures 5, 6, and 8.

The shaft 122 upon which the cam 121 is secured, has a sprocket 120 adapted to be driven by a chain 130 which is operated from a sprocket 140 secured to the shaft 151, as best shown in Figures 6 and 7.

The shaft 151 is provided at its inner end with a bevel gear 165 which meshes with a gear 166 secured to an upright shaft 167 mounted in bearings provided in the bracket 155. A gear 168 is secured to the upper end of the shaft 167 and meshes with a pinion 169 loosely mounted upon the upper end of the vertical shaft 42. The upper end portion of this shaft is supported in a suitable bearing provided in the bracket 155.

The hub of the pinion 169 has a flange at one end spaced from the adjacent face of the pinion to provide an annular groove adapted to receive an inwardly turned flange 172 provided upon a lateral extension 173 of a hub 174, secured to the upper end of the shaft 42, as shown in Figure 6. A suitable set screw 175 is received in threaded engagement with the extension 173 and provides means for locking the hub 174 to the flange 171 of the pinion 169, whereby the pinion will be secured for direct rotation with the shaft 42. By thus adjustably securing the pinion 169 to the shaft 42, the operation of the intucking and scoring mechanisms may be conveniently timed to the travel of the bags so as to insure that the bags will be alined with said mechanisms before the latter engage the bag top walls.

The means provided for actuating the end wall folding members 105 and 106 is best shown in Figures 5, 6, and 7, and may consist of a cam 176

positioned to be engaged by a roller 177 provided upon an arm 178 secured to the shaft 179 which supports the end wall folding member 106. The cam 176 is shown supported upon a suitable bracket 181 secured to the lower portion of the bracket 158, as shown in Figure 5.

The intucking mechanism operates continuously when the machine is operating, regardless of whether bags are being fed through the machine or not. In other words, its operation is not dependent upon the delivery of the bags thereto.

Scoring and shaping mechanism

Another feature resides in the means provided for scoring or creasing the partially folded bag top walls and shaping the bag bodies. Such means is best shown in Figures 5, 6, 7, 8, and 10 to 14, inclusive. The means for scoring the bag tops comprises a pair of complemental jaws 182 and 183 adapted for movement towards and away from each other, as shown in Figures 13 and 14. The jaw 182 is supported upon crank arms 184 secured to the lower ends of a pair of upright shafts 185, having gears 186 secured to the upper ends thereof, one of which meshes with the gear 168, as shown in Figure 4. The other gear 186 meshes with a similar gear 187 secured to the upper end of a shaft 188. Similar cranks 189 are secured to the lower ends of the shafts 167 and 188 and pivotally support the jaw 183, as will readily be understood by reference to Figures 5 and 7. The shafts 167, 185, and 188 are supported in suitable bearings provided in the brackets 155 and 158.

The jaw 182 is shown provided with a pair of longitudinally extending grooves 191 adapted to receive a pair of spaced tongues or blades 192 provided upon the jaw 183, when the jaws are moved into scoring engagement with the bag top, as shown in Figure 14. The scoring jaws operate continuously and simultaneously with the end wall folding members 105 and 106, and in such a manner that when the jaws engage the bag top, as shown in Figure 14, they travel at substantially the same speed as the bag tops so as to prevent slippage between the jaws and bag top, when the jaws grip the latter.

The means for shaping the bag body is shown in Figures 6 and 8, and comprises a pair of wings 193 secured to a pair of rock shafts 194 and 195 having their upper ends supported in suitable brackets 196, as shown in Figure 5. The intermediate portion of the rock shaft 194 is supported in the plate 17, which constitutes a portion of the machine frame. The rock shaft 195 is similarly supported in the horizontal web of the side rail 3 at the rear of the machine.

The lower ends of the rock shafts 194 and 195 are operatively connected together by means of a chain 197 which has a running connection with an idler sprocket 198 supported in a bracket 199 secured to the machine frame, as shown in Figure 5. The ends of the chain 197 are shown secured to suitable disks or sprockets fixed to the lower ends of the rock shafts in such a manner that said shafts rotate in opposite directions.

The rock shaft 195 has an arm 201 secured thereto which is connected to the lower end of a bell crank 202 by means of a suitable connection 203. The bell crank 202 is pivotally supported upon a stud 204 secured to the bracket 158, as shown in Figures 2 and 5, and is operated by means of a cam 205 secured to one end of the crank shaft 142, as shown in Figure 7. By thus operatively connecting the plates 193 with the crank shaft 142, said plates will be actuated each time the intucking mechanism goes through a cycle of operation. The operation of the plates 193 is so timed with respect to the operation of the intucking mechanism, that each time a bag is delivered in position beneath the intucking mechanism, said plates will be moved into the path of the bag, as indicated in dotted lines in Figure 20, whereby the bag will be momentarily compressed between the plates 193 and the pusher 25 of a carrier. By thus compressing the bag between the wings 193 and the pushers 25, the bodies thereof will be substantially squared cross-sectionally, before the folding operation is started. To adapt the shaping mechanism for bags of different sizes, suitable adaptor blocks 206 may be secured to the plates 193, as shown in Figure 20.

During the creasing of the bag top, the bag is moved upwardly so as to square the upper portion thereof, as will readily be understood by reference to Figure 14. To thus elevate the bags, means is provided for vertically moving each carrier 12 when it reaches a position beneath the intucking mechanism.

Such means is best shown in Figure 6, and comprises a vertically movable rail section 207 secured to the upper end of a rod 208 mounted for sliding movement in a suitable guide 209 secured to the cross member 44 of the machine frame. One end of an arm 211 is pivotally connected to a sleeve 212 and its opposite end to a bracket 213 secured to the machine frame, as shown in Figure 6. In the drawings, the arm 211 is shown comprising two members spaced apart to receive the sleeve 212 and an anti-friction roller 214 which is adapted to ride upon the periphery of a cam 215 secured to the shaft 163. The periphery of the cam 215 is so shaped that when the machine is operating, the high point thereof will engage the roller 214 and oscillate the arm 211, whereby the rail section 207 will be elevated from the full to the dotted line position shown in Figure 6. It is to be understood that the rail section 207 is not elevated until the shoe 23 of one of the carriers is positioned thereover, so that when the rail section 207 is actuated, it will elevate the carrier plate 13, whose shoe 23 may be engaged therewith, whereby the bag top will be compressed against the lower faces of the creasing members 182 and 193, as best shown in Figure 14. The rail section 207 is adapted for vertical adjustment in the sleeve 212 by suitable means such as a set screw 200, whereby the upper portion of the bag may be properly positioned with respect to the scoring members. Suitable adaptor blocks 210 may be secured to the plates 13 of the carriers 12 to adapt the latter for bags of different heights.

As soon as the bag top has been transversely scored, as shown in Figure 14, the shoes 23 of the carriers will move out of engagement with the vertically movable rail section 207 and onto a rail 216, having one end supported upon an upright post 217 mounted for vertical adjustment in the machine frame, whereby said rail may be relatively adjusted to properly position the bags with respect to the folding mechanism, which will subsequently be described. The lower end of the post 217 may be provided with a knurled head 218, whereby it may be conveniently rotated.

The periphery of the cam 215 is provided with a substantially flat portion 219 which engages

the roller 214 and supports the arm 211 in substantially a fixed position, whereby the vertically movable rail section 207 will be temporarily retained in alinement with the rail 216, to allow the shoe 23 of the carrier 12 to pass therefrom onto the rail 216.

Folding mechanism

Another feature of the invention resides in the construction of the folding mechanism, which is best shown in Figures 4, 6, 10, and 15 to 18, inclusive. This mechanism comprises a spiral groove 220 into which the scored bag tops are delivered from the intucking mechanism.

The groove 220 is best shown in Figures 15 to 18, and is formed by complemental plate members 221 and 222, the former being shown secured to a longitudinally extending bar 223 which is secured to an elongated plate 224. The plate member 222 is secured to a similar elongated plate 225. The plates 224 and 225 have their adjacent edges spaced apart, as shown in Figure 15 and may be suitably supported from the cross pieces 128 by suitable connections 226 and 227, respectively, as shown. The adjacent edges of the plates 224 and 225 at the receiving end of the spiral groove 220, provided between the complemental members 221 and 222, are curved outwardly, as shown at 228 in Figure 4, whereby the scored bag tops are guided into the groove provided between said plates, from the intucking mechanism.

The plate members 221 and 222 extend from A adjacent to the intucking mechanism, to B, adjacent to a pair of pressure rollers 229, as shown in Figures 4 and 3. Figure 15 shows the formation of the complemental members 221 and 222 at the receiving end of the groove, and shows a scored bag top positioned therebetween. Figures 16 and 17 show cross-sectional views of the plate members 221 and 222 at different points between the receiving and discharge ends thereof, to show how the bag top is transversely folded as it passes through the groove 220, formed by said members. Figure 18 shows the position of the bag top when discharged from the spiral groove, and in which position it is delivered to the pressure rollers 229 which firmly press the folded wall portions together.

Gumming mechanism

Suitable means is provided for securing the folded bag top walls in sealing relation and, in the present instance, I have shown a gumming mechanism for applying a coating of gum to the folded bag top and bag body, which is similar to the gumming mechanism disclosed in the pending application of Helmer Anderson, Serial No. 615,827, filed June 7, 1932. The gumming mechanism comprises the pressure rollers 229 between the peripheries of which the folded bag top walls are delivered from the spiral groove 220 while in the position shown in Figure 18, as hereinbefore stated. The pressure rollers are shown driven from the shaft 84 by suitable bevel gear drives 232. Suitable tension means, not shown, are provided for urging the rollers 229 into peripheral engagement with each other, whereby said rollers may yield to permit the folded bag top to pass therebetween. The shaft 84 is driven by the chain 130, as will be noted by reference to Figure 1.

From the pressure rollers 229, the partially folded bag top passes under a gum container 233 through a suitable guide, which supports it in the upright position in which it is received from the pressure rollers 229. The container 233 is adapted to contain a suitable gum which is applied to the partially folded bag top and to a portion of the bag body by a suitable gumming wheel 234, shown mounted on a shaft 235 driven by a chain 236 from a jack shaft 237 which, in turn, is shown driven from the shaft 231 by a chain 238. When the gummed bag leaves the gumming wheel 234, it passes under a suitable guide 239 which folds the gummed bag top downwardly against the bag body. Suitable means such as a pivoted finger 241 may be provided for guiding the folded bag top into position against the bag body, as indicated in Figure 18A. This finger is briefly illustrated in Figure 3, and may be supported upon a short shaft 242 having an arm 243 adapted to be actuated by a cam 244 secured to the shaft 237. The gumming mechanism, including the finger 241, forms no part of the present invention, and it is therefore thought unnecessary to further describe the same in detail. Obviously, other types of sealing mechanisms may be employed without departing from the scope of the invention.

Ejector

The means for ejecting the sealed bags from the conveyer means is shown in Figure 3, and comprises a pair of arms 245 carrying blades 246 which are adapted to engage the bags and eject them from the carriers 12, when the latter reach the position shown at the right hand side of Figure 3.

From the carriers, the bags are ejected onto a suitable receiving means such as a table 247 over which a plate 248 is mounted. This plate engages the folded bag tops and presses them into sealing engagement with their respective bag bodies. The plate 248 may be a continuation of the guide plate 239, under which the sealed bags are delivered from the gumming mechanism.

The bags may be discharged from the machine by a suitable pusher 249 mounted for reciprocal movement in suitable guides 251, and adapted to be actuated by a connection 252 having one end connected to a crank arm 253 secured to the shaft 84, as shown in Figures 1 and 3. The ejector arms 245 may be driven by a chain 254 from a shaft 255 carrying the sprocket 34, which supports the main conveyer chain at the right hand end of the machine.

Operation

The filled bags are delivered onto the receiving table 58, and when they engage the trip 72, the feed member 62 which operates in timed relation to the travel of the carriers 12, will deliver a bag into the conveyer means in the path of travel of the carriers, whereby each carrier will engage a bag and convey it through the machine provided, of course, that the bags are delivered to the table 58 at a speed commensurate to the travel of the carriers. Because of the up-and-down movement imparted to the track 87 by the cams 93, the bottoms of the bags will be constantly tapped by the carriers 12, as they travel from the right to the left hand end of the machine, whereby the material will become settled therein, as hereinbefore described. As the carriers reach the left hand end of the machine, when viewed as shown in Figure 1, the shoes 23 thereof will engage the track 104, at which time the bags will move out of engagement with the ledges 103, and the plates 13 of the carriers will descend to their

lowermost positions, as shown at the left hand side of Figure 5.

Following the jarring or shaking of the bags at the front side of the machine, they are delivered to the intucking mechanism, shown in Figures 6 and 10, and as each bag reaches a position substantially directly beneath the blades 114 of the supporting bar 107, the bag body shaping wings 193 will move into the path of the approaching bag, as indicated in the dotted lines in Figure 20. The wings 193 swing through suitable openings provided in the side walls 90 and 100 of the conveyer means, as shown in Figure 6. The wings 193 are actuated by the cam 205, as hereinbefore described, and the periphery of said cam is so shaped that the bag is momentarily compressed between the wings 193 and the upright blade 25 of the carrier, without interrupting the movement of the latter.

At substantially the same instant that the wings 193 are swung into operative positions, the supporting bar 107 is lowered by the action of the crank 141 so as to cause the plate elements 114 to enter the mouth of the bag, as indicated by the dotted lines in Figure 13. Because of the bar 107 being moved forwardly at the same time, by the action of the cam 121, the roller 177 on the arm 178 of the end wall folding member 106 will engage the fixed cam 179, whereupon the end wall folding members 105 and 106 will be moved inwardly between the plate elements 114, as best shown in Figure 11, and thus fold the end walls of the bag top inwardly between the side walls thereof, whereby the bag top walls are folded into flatwise relation.

The scoring or creasing members 182 and 183 are then actuated to press the partially folded bag top walls together, as shown in Figure 14, it being understood that before they reach the positions shown in said figure, the plate elements 114 will be withdrawn from the bag mouth. The bag top is thus transversely scored as will be understood by reference to Figures 14 and 15.

As hereinbefore stated, at about the time the scoring members 182 and 183 reach the positions shown in Figure 14, the vertically movable rail section 207 will be thrust upwardly by the action of the cam 219, whereby the plate 13 of the carrier positioned over the rail section 207 will also be elevated and cause the top of the bag positioned thereon to be moved into engagement with the bottom faces of the scoring members, as shown in Figure 14. The rail section 207 is then partially lowered and is temporarily retained in a partially elevated position to allow the shoe 23 of the carrier to engage the track 216, as will readily be understood by reference to Figure 6. From the intucking mechanism, the partially folded bag top is delivered into the spiral groove 220 formed by the complemental members 221 and 222, as shown in Figure 13, and as the bag top passes through this groove, it is transversely folded over and over upon itself until it reaches the point B at the discharge end of the groove, wherein it will be folded substantially to the position shown in Figure 18.

The partially folded bag top then passes between the pressure rollers 229, and is guided into engagement with the gumming wheel 234 and receives a coating of gum. It is then folded over against the bag body by the action of the guide plate 239 assisted by the finger 241, whereby it is folded flatly against the bag body, as shown in Figure 21. The bag top is held in this position by the plates 239 and 248, and is ejected from the carriers by the ejectors 245 onto the receiving table 247. From this table, they may be delivered onto a suitable receiving means, not shown, by the action of the pusher 249.

From the foregoing, it will be noted that the machine is automatic in operation. The conveyer means travels continuously and, in like manner, the shaking, intucking, and scoring mechanisms operate continuously, regardless of whether bags are being fed through the machine or not.

I claim as my invention:

1. In a bag closing machine, means for effecting a continuous movement of the bags along a predetermined path of travel, said means comprising spaced guides between which the bags are fed, means on said guides for supporting the bags while in motion, and means for tapping the bottoms of the bags to settle the material therein.

2. In a bag closing machine, a conveyor adapted for continuous movement and comprising a plurality of carriers each adapted to support a bag, guides adjacent to said conveyor having means adapted to support the bags independently of said carriers, and means for imparting a jarring motion to the bags while supported on said last mentioned means and without interrupting traveling movement of the bags.

3. In a bag closing machine, a conveyor comprising a plurality of carriers each adapted to support a bag, each carrier comprising a support adapted for traveling movement in a horizontal plane, plates mounted on said supports and adapted for vertical movement, fixed walls between which said carriers travel, inwardly projecting ledges on said walls adapted to support the bags while being advanced by said carriers, and means for imparting up-and-down movement to said plates whereby they will impinge against the bottoms of the bags and impart a jarring motion thereto to cause the material therein to become settled.

4. In a bag closing machine, a conveyor for the bags mounted for continuous movement, cooperating members engaging and folding the bag top walls into flatwise relation and simultaneously scoring them while in motion on the conveyor, and means for bodily moving said members in the direction of the conveyor and at a speed commensurate thereto.

5. In a bag closing machine, a conveyor mounted for continuous movement and comprising a plurality of carriers, each adapted to support a bag, cooperating elongated elements engaging and folding the bag top walls into flatwise relation, and means for horizontally moving said elements at a speed commensurate to the travel of the carrier.

6. In a bag closing machine, means for effecting a continuous movement of the bags along a predetermined path of travel, a member mounted for movement over said path of travel in a plane substantially parallel thereto and comprising means adapted to engage and fold the bag top walls into flatwise relation, while the bags are in motion, the horizontal movement of said member being synchronized with the traveling movement of the bags, and crank means for vertically moving one end of said member.

7. In a bag closing machine, means for effecting a continuous movement of the bags along a predetermined path of travel, a supporting member mounted for horizontal and vertical movements over said path of travel and comprising means adapted to operate upon the walls of the

bag top to fold them into flatwise relation, and the horizontal movement of said supporting member being substantially synchronized with the travel of the bags.

8. In a bag closing machine, a conveyor for the bags mounted for continuous movement, cooperating members engaging and folding the bag top walls into flatwise relation, means for scoring the partially folded bag top walls, an elongated member disposed over the conveyer and supporting said folding members and scoring means, and means for operating said supporting member in timed relation to the travel of the conveyer.

9. In a bag closing machine, means for effecting a continuous movement of the bags along a predetermined path of travel, a support mounted for horizontal movement over said path of travel and comprising folding members adapted to engage and fold the bag top walls into flatwise relation, while the bags are in motion, the horizontal movement of said support being synchronized with the traveling movement of the bags, and means on said folding members for scoring the bag top simultaneously as it is folded into flatwise relation.

10. In a machine for sealing the open tops of filled paper bags, a conveyor for the bags, means for simultaneously folding the bag tops into flatwise relation, while in motion upon the conveyor, means for transversely scoring the bag tops, and means for bodily moving said folding and scoring means in a direction lengthwise of the conveyer while operating upon the bag tops.

11. In a bag closing machine, a conveyor mounted for continuous movement over a predetermined path of travel and adapted to convey the bags through the machine without interruption, a supporting bar mounted for reciprocal movement over the conveyer and lengthwise thereof; means on said supporting bar for simultaneously folding the bag top walls into flatwise relation and scoring them, while in motion, and means for operating said supporting bar.

12. In a bag closing machine, a conveyor for advancing the bags along a fixed path of travel, means synchronized with the conveyor for compressing the bags to shape the same during movement of the conveyor, and means for folding the walls of each bag top into flatwise relation and simultaneously scoring it while the bag is in motion.

13. In a bag closing machine, a conveyor mounted for continuous movement and comprising a plurality of bag-supporting means, bag shaping means temporarily moved into the path of travel of each bag and against which the bag body is compressed by said bag supporting means to shape the same without interrupting the traveling movement of the bag, said bag-shaping means moving out of the path of the bag when the bag-shaping operation is completed.

14. In a bag closing machine, a conveyor mounted for continuous movement and comprising a plurality of bag-supporting means, means adapted to be momentarily moved into the path of travel of each bag and against which the bag is compressed by said bag-supporting means to shape the bag body horizontally, and means for applying pressure to the bag body to shape it vertically, the operation of said shaping means being synchronized with the traveling movement of the conveyor.

15. In a machine for closing bags, means for effecting continuous movement of the bags along a predetermined path of travel, means for scoring the bag tops, and means associated with the scoring means and acting simultaneously therewith for shaping the bags.

16. In a machine for closing bags, means for effecting continuous movement of the bags along a predetermined path of travel, means for folding the bag tops into flatwise relation, means for scoring the partially folded bag tops, means associated with said scoring means for applying pressure to the bag bodies to shape them vertically, and means associated with the conveyor for applying pressure to the bag bodies to shape them horizontally.

17. In a bag closing machine, means for effecting continuous movement of the bags along a predetermined path of travel, movable means for scoring the bag tops in the course of said movement, means associated with said scoring means for shaping the bag bodies, complemental members arranged along said travel path and cooperating to provide a spiral groove adapted to receive each scored bag top and fold it into a plurality of transverse folds, and the receiving ends of said complemental members being flared outwardly to provide an enlarged mouth adapted to receive and guide the bag tops into said groove.

18. In a machine for closing bags, means for effecting continuous movement of filled open bags along a predetermined path of travel, means for shaping the bags, means associated with said shaping means for scoring the bag tops, and means for folding the scored bag tops, said shaping, scoring and folding means operating upon the bags while they are in motion in said travel path.

19. In a bag closing machine, a conveyor mounted for continuous movement over a predetermined path of travel and adapted to convey the bags through the machine without interruption, bag top folding means adjacent to said conveyor adapted to engage and fold the walls of the open bag top into flatwise relation, means for scoring the bag tops, and means associated with said scoring means for shaping each bag body without interrupting the traveling movement of the bag.

20. In a bag closing machine, a conveyor adapted to feed the bags through the machine over a predetermined path and without interruption, elongated supporting member mounted over said conveyor and adapted for horizontal and vertical movements and having means thereon engaging the walls of the bag tops and folding them into flatwise relation and scoring them, stationary means adapted to receive the scored bag tops and fold them into a plurality of transverse folds, and means for securing the folded bag tops to the bag bodies in sealing relation.

21. In a machine for closing open filled bags, means for effecting an uninterrupted movement of the bags along a predetermined path of travel, means for shaking the bags to settle the material therein, shaping means for horizontally and vertically shaping said bags, means for folding the bag tops into flatwise relation, means associated with said shaping means for scoring the bag tops, means for transversely folding the scored bag tops over and over to provide a plurality of transverse folds, and means for securing the folded bag tops, said shaping, shaking, folding, scoring and securing means operating upon the bags while they are in motion along said travel path.

22. In a packaging machine, means for effect-

ing a continuous movement of the bags along a predetermined path of travel, means for jarring the bags to settle the material therein, means mounted for movement lengthwise of said path of travel and engaging the walls of the bag tops and folding them into flatwise relation, means for transversely scoring the partially folded bag tops, means associated with said scoring means for shaping the bag bodies, stationary folding means comprising complemental members cooperating to provide an elongated spiral groove through which the scored bag tops are fed and transversely folded into a plurality of folds, and means for securing the folded bag tops to the bag bodies.

23. In a packaging machine, spaced side members defining a path of travel for the bags, means for advancing the bags between said members, means on said members for supporting the bags independently of said advancing means, and means independent of the bag supporting means for tapping the bottoms of the bags, thereby to settle and compact the contents of the bag.

24. In a packaging machine, spaced members defining a path of travel for the bags, means for advancing the bags along said path of travel, inwardly projecting ledges on said members for supporting the bags, and means for imparting a shaking motion to the bags to settle the material therein.

25. In a packaging machine, spaced members defining a path of travel for the bags, means for advancing the bags along said path of travel, inwardly projecting ledges on said members for supporting the bags independently of said advancing means, and means for engaging the bottoms of the bags to impart a shaking motion thereto to settle the material therein.

26. In a packaging machine, members defining a path of travel for the bags, means for advancing the bags between said members, inwardly projecting ledges on said members for supporting the bags independently of the advancing means, said ledges having their inner edges spaced apart, and means mounted for vertical movement beneath said bags adapted to engage the bottoms thereof and impart a shaking movement thereto.

27. In a packaging machine, members defining a path of travel for the bags, means for advancing the bags between said members, inwardly projecting ledges on said members for supporting the bags independently of the bag advancing means, said ledges having their inner edges spaced apart, and means mounted for up and down movement between said ledges adapted to engage the bottoms of the bags and thereby impart a shaking movement to the bags.

28. In a packaging machine, spaced members defining a path of travel for the bags, conveying means for advancing the bags along said path of travel, means between said members for supporting the weight of the bags independently of said conveying means, means associated with said conveying means for tapping the bottoms of the bags to settle the material therein, and mechanisms for closing the bag tops.

29. In a bag closing machine, spaced members defining a path of travel for the bags, conveying means for advancing the bags along said path of travel, means on said members for supporting the bags independently of said conveying means, means associated with said conveying means for tapping the bottoms of the bags to settle the material therein, a mechanism for folding the open bag top walls into flatwise relation and simultaneously scoring them, and means for completely closing the bag top and securing it against accidental opening.

30. In a packaging machine, a conveyer for advancing a filled open bag along a predetermined path, plate elements insertable into the open bag mouth, means for engaging the end walls of the bag top and intucking them between said plate elements and the side walls of the bag top to thereby partially close the bag mouth, cooperating members engaging and pressing the partially folded bag top walls into flatwise relation and simultaneously scoring the same, and means operating in timed relation to said pressing and scoring members for moving said plate elements and intucking means out of engagement with their respective bag top walls before the latter are pressed into flatwise relation by said members.

31. In a bag closing machine, a conveyer for advancing a filled open bag along a predetermined path, plate elements insertable into the open bag mouth whereby they may engage the side walls of the bag top, means for engaging the end walls of the bag top and intucking them between said plate elements and the side walls of the bag top to thereby partially close the bag mouth, cooperating elongated members engaging and pressing the partially folded bag top walls into flatwise relation and simultaneously scoring the same, means operating in timed relation to said pressing and scoring members for moving said plate elements and intucking means out of engagement with their respective bag top walls before the latter are pressed into flatwise relation by said members, means for receiving the flattened bag top and folding it into a plurality of transverse folds, and means for securing the closed bag top to the bag body to prevent accidental opening thereof.

32. In a packaging machine, a conveyer for advancing a filled open bag along a predetermined path, plate elements insertable into the open bag mouth, spring means for normally retaining said plate elements in spaced relation, means for engaging the end walls of the bag top and intucking them between said plate elements and the side walls of the bag top to thereby partially close the bag mouth, cooperating members engaging and pressing the partially folded bag top walls into flatwise relation against the tension of said spring means, and means operating in timed relation to said pressing members for moving said plate elements and intucking means out of engagement with their respective bag top walls before the latter are pressed into flatwise relation by said members.

33. In a bag closing machine, a conveyer for advancing a filled open bag along a predetermined path, plate elements insertable into the open bag mouth whereby they may engage the side walls of the bag top, yieldable means normally retaining said plate elements in spaced relation, means for engaging the end walls of the bag top and intucking them between said plate elements and the side walls of the bag top to thereby partially close the bag mouth, cooperating elongated members engaging and pressing the partially folded bag top walls into flatwise relation against the tension of said resilient means, means operating in timed relation to said pressing members for moving said plate elements and intucking means out of engagement with their respective bag top walls before the latter are pressed into flatwise relation by said

members, means for receiving the flattened bag top and folding it into a plurality of transverse folds, and means for securing the closed bag top to the bag body to prevent accidental opening thereof.

34. In a bag closing machine, means for advancing a filled bag along a predetermined path without interruption, means for transversely scoring the bag top, folding mechanism comprising complemental closely spaced members forming therebetween a narrow continuous spiral channel adapted to receive and, without interruption, gradually transversely fold the bag top in one direction on the score lines into a plurality of flat vertical plies during advance of the bag from the inlet to the outlet end of the channel, final folding mechanism adapted to fold the plied top portion in the same direction down into sealing contact with the horizontal portion of the bag body, and means operative before the final folding operation for rendering one of the surfaces which are to be secured in sealing contact adhesive.

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