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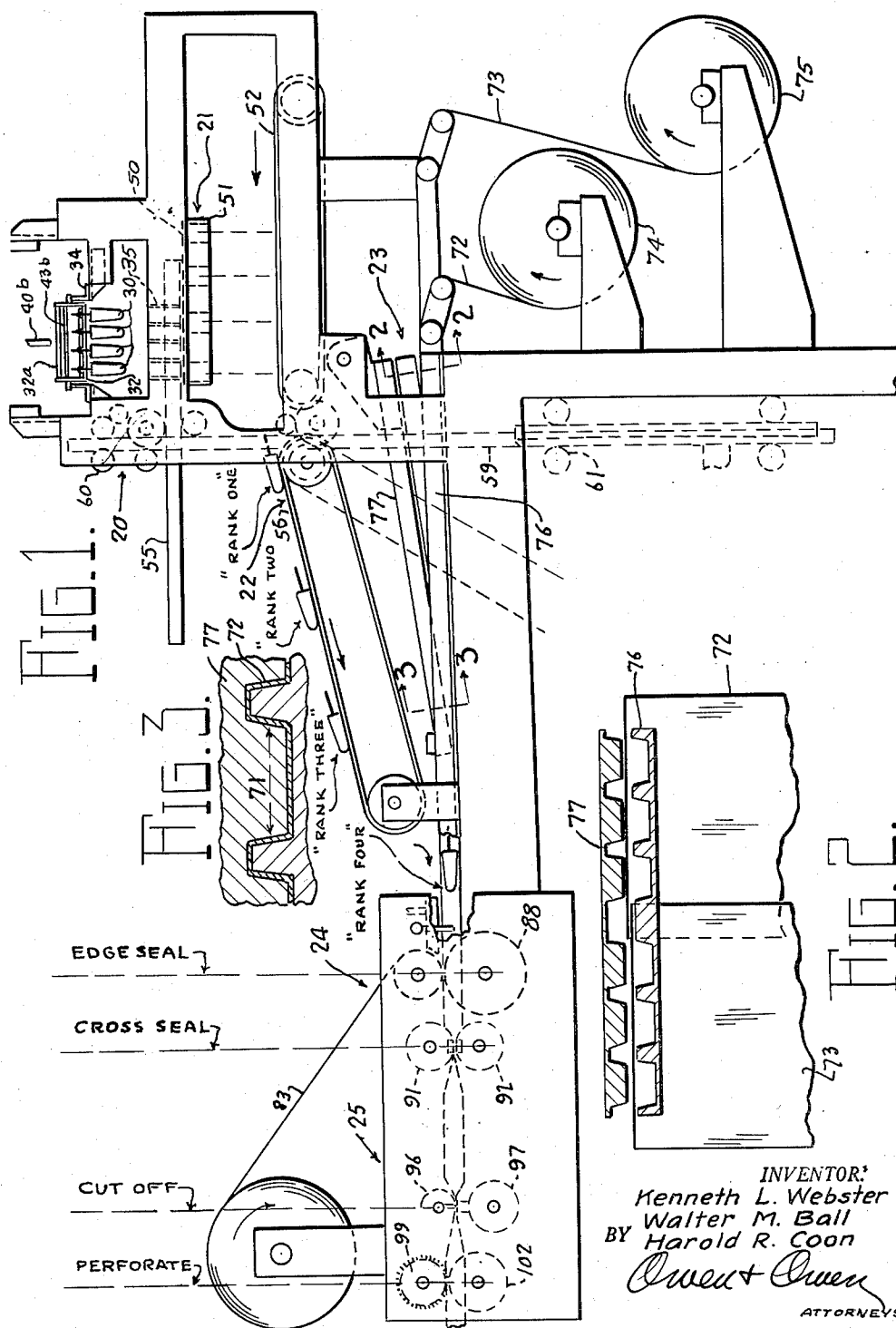
K. L. WEBSTER ET AL

2,971,305

PACKAGING MACHINE

Filed Sept. 8, 1958

9 Sheets-Sheet 1



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PACKAGING MACHINE

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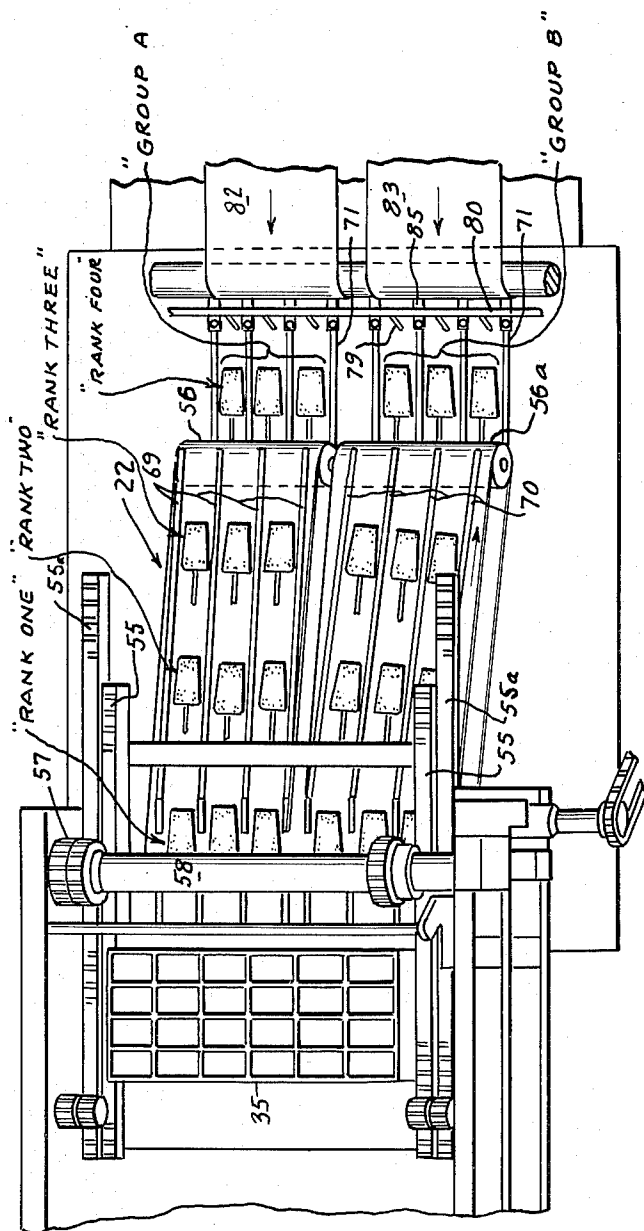


FIG. 4.

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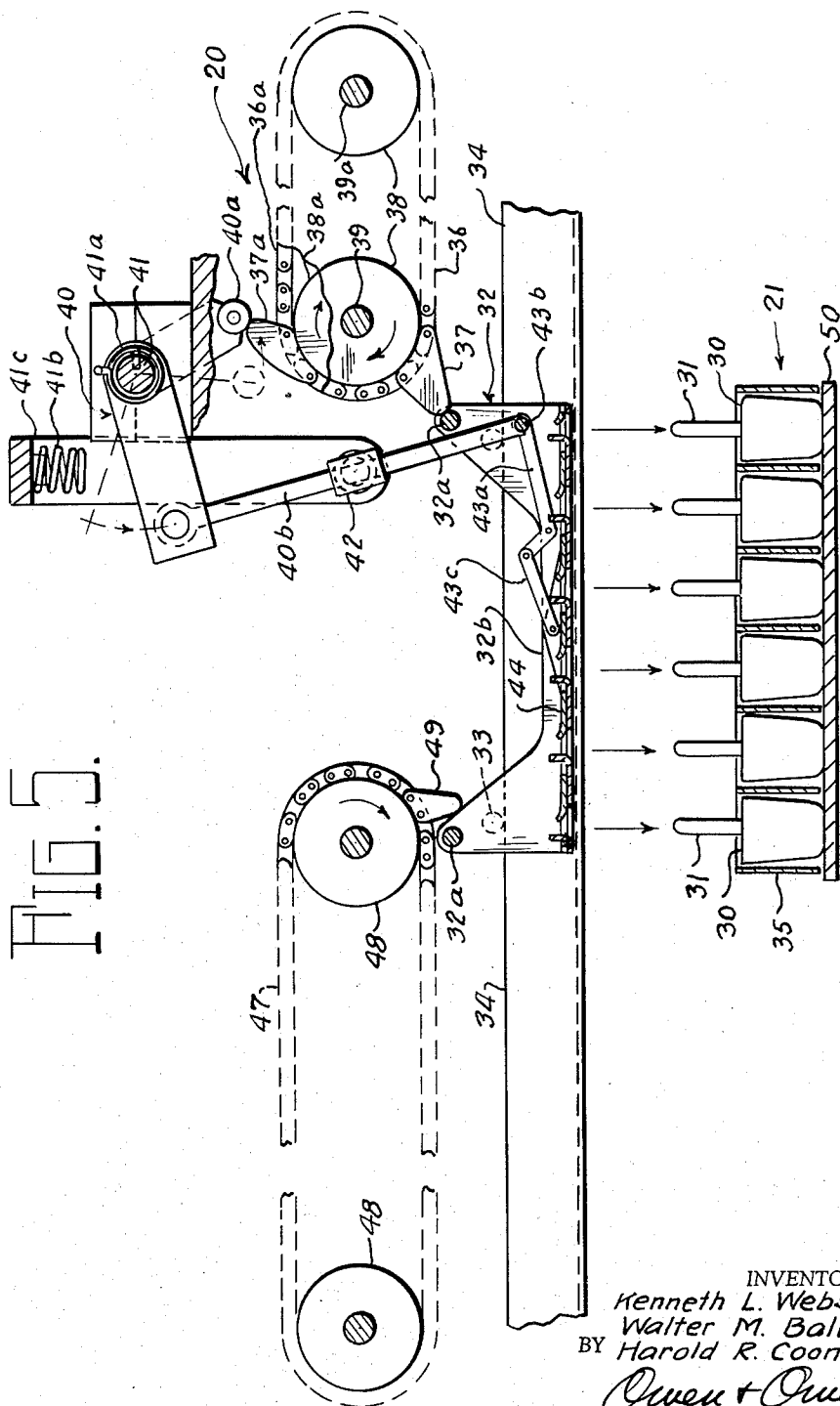
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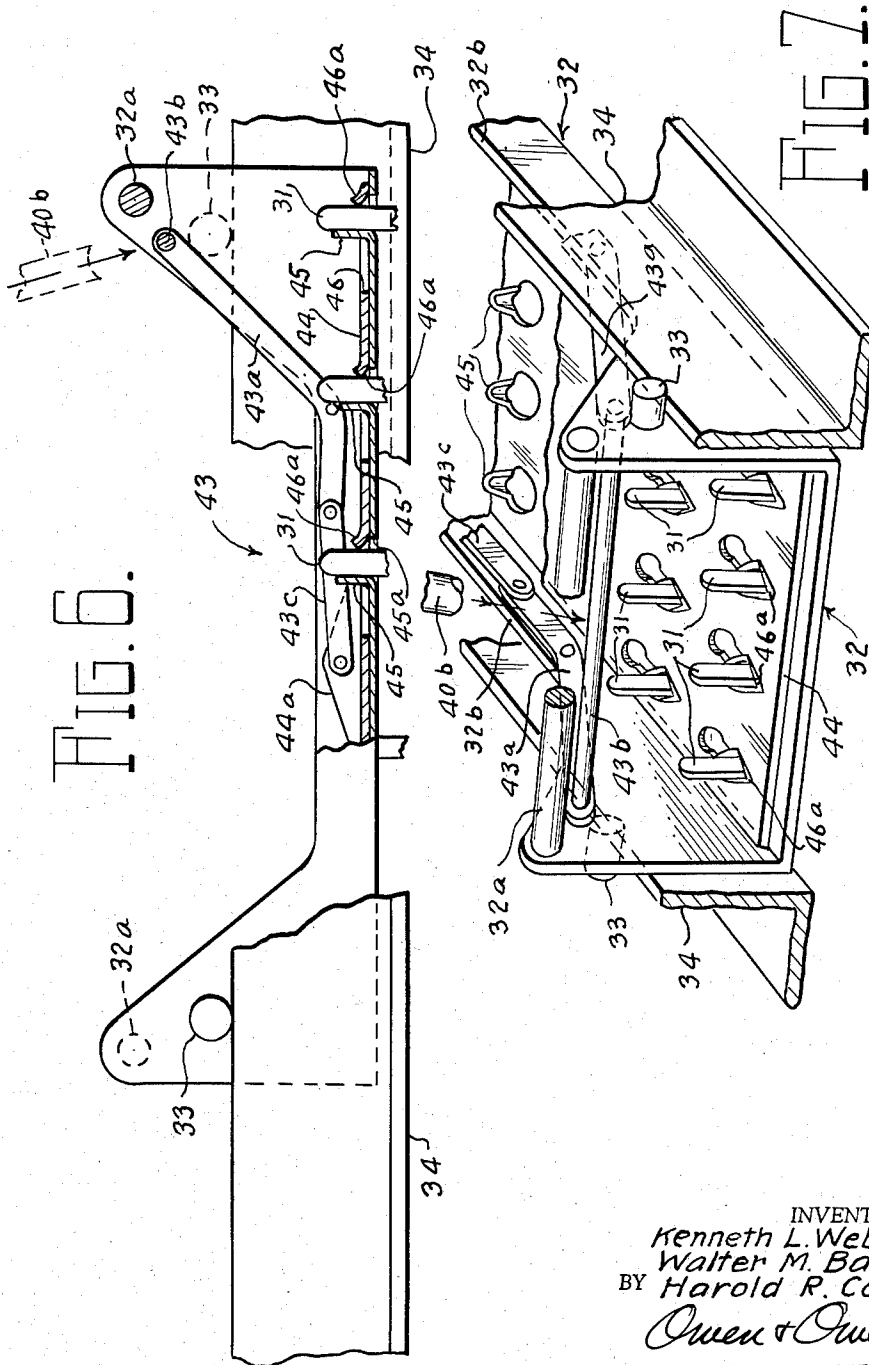
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9 Sheets-Sheet 4



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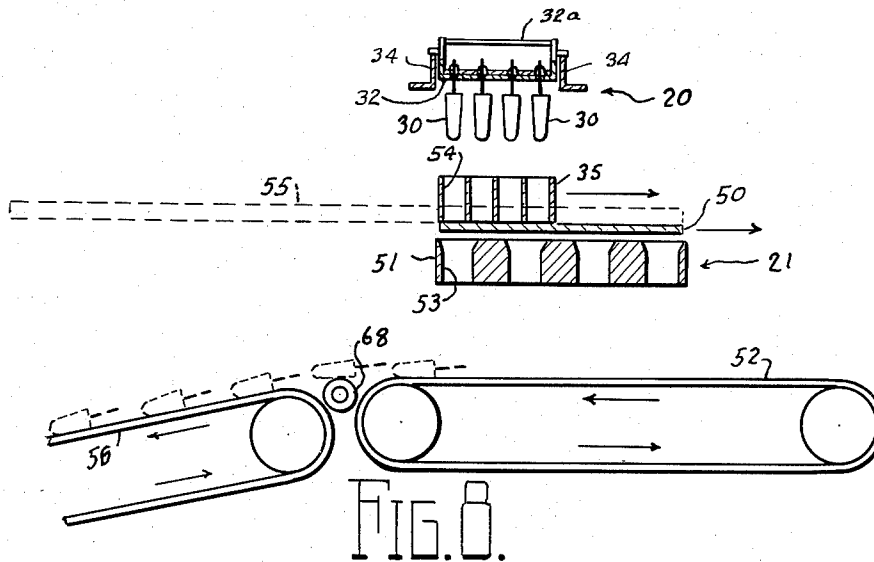
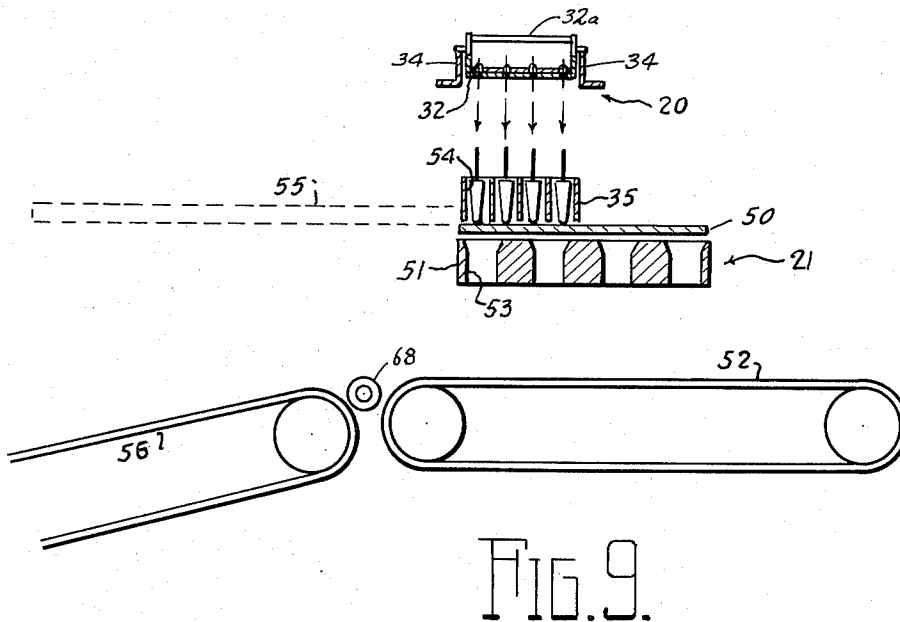
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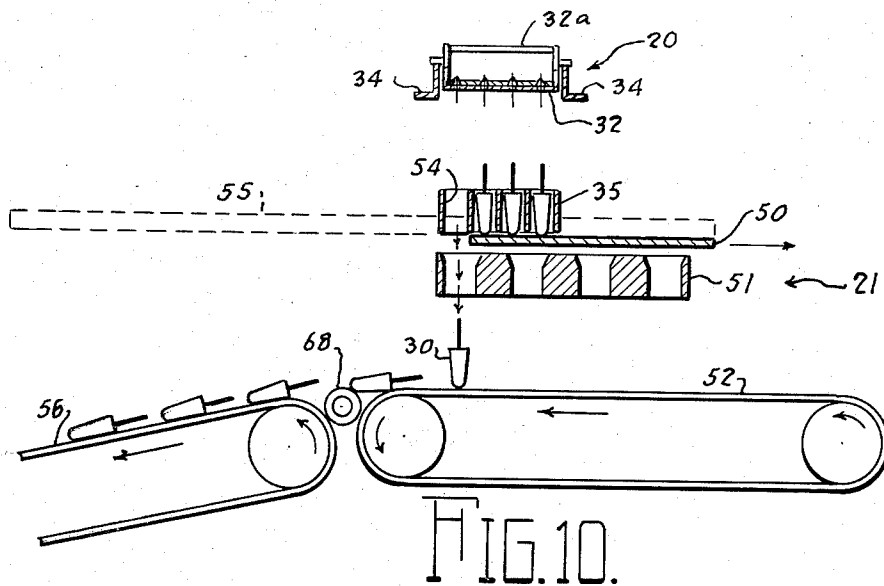
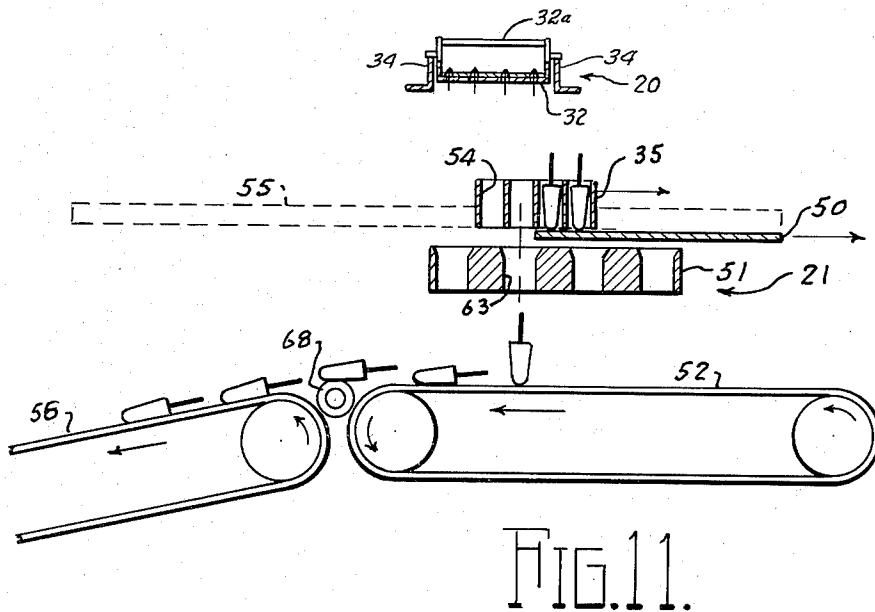
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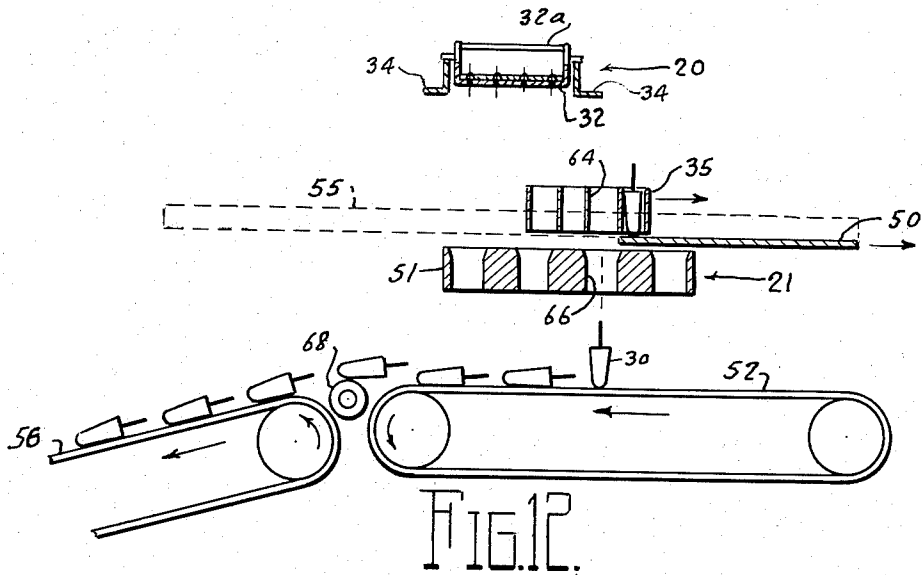
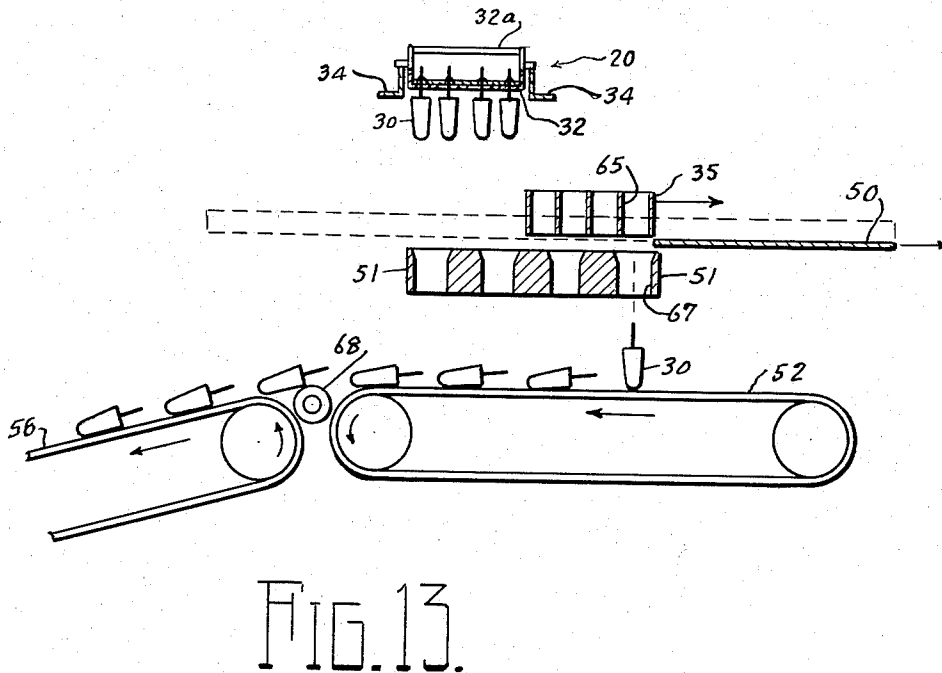
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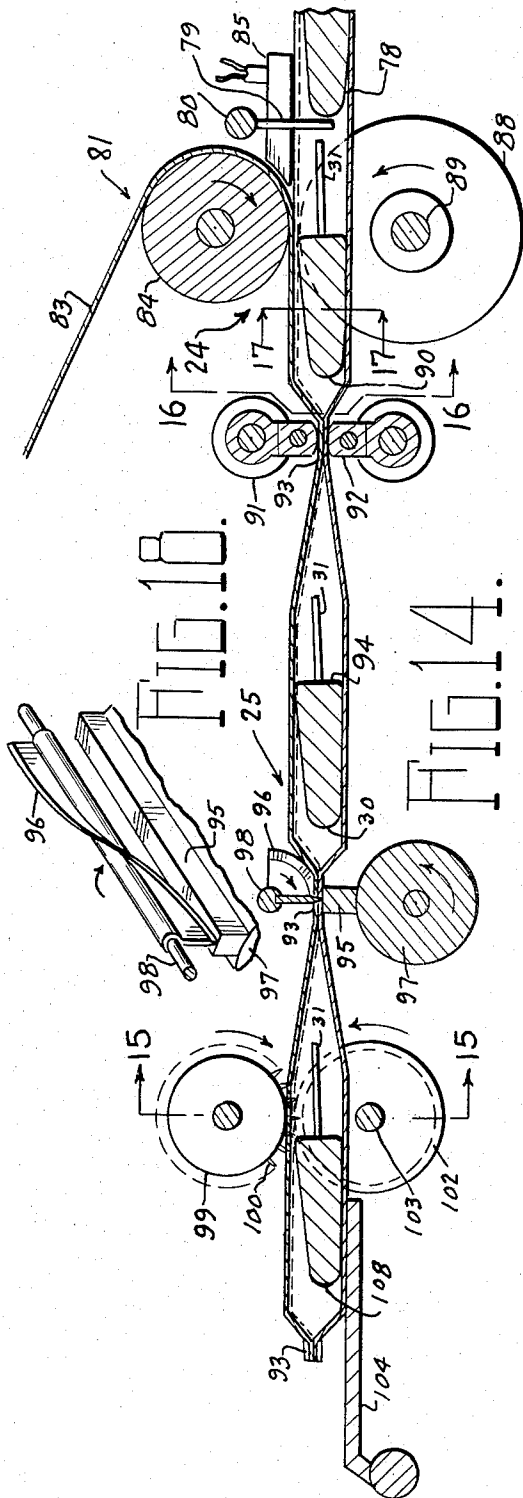
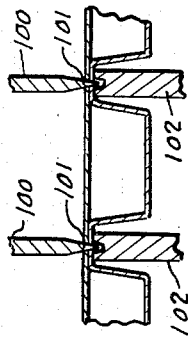
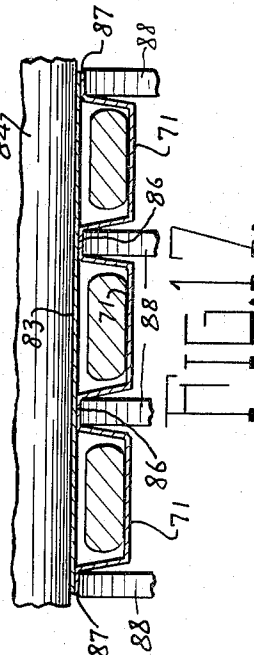
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9 Sheets-Sheet 8



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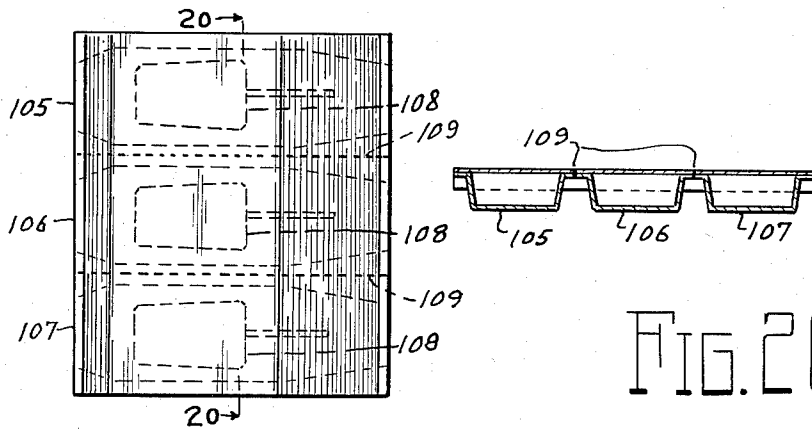
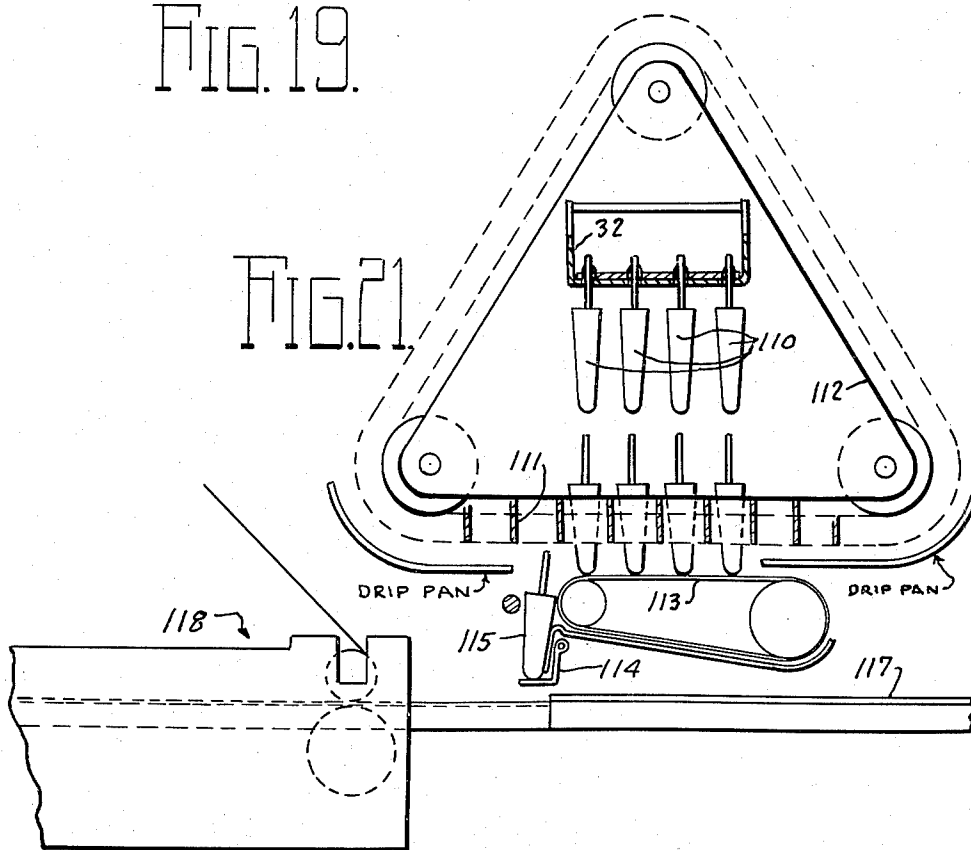
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2,971,305

PACKAGING MACHINE

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Filed Sept. 8, 1958, Ser. No. 759,533

5 Claims. (Cl. 53—59)

This invention relates to a machine for the continuous packaging of individual objects of a regular shape in waterproof, sealed packages, and will be discussed and illustrated as it is embodied in a machine for the automatic packaging of ice cream confections having sticks, such as "Popsicles," and similar objects.

The packaging of irregular objects such as ice cream confection having a generally rectangular body and a protruding stick which serves as a handle, is difficult because of the fragility of the product and the extreme irregularity of its shape. Heretofore products of this kind have usually been packaged by merely being inserted in open-ended bags. Obviously such open packages are undesirable for sanitary reasons.

Confections of this general type usually are manufactured by known equipment in molds having a plurality of pockets, the most frequent arrangement being in four, parallel rows of six pockets, for a total of twenty-four pockets per mold.

This invention consists of an apparatus into which the products are fed from a product carrier which is part of the mold in which the products are formed. The apparatus comprises article handling mechanisms by which the products are spaced from each other and guided into wrapping position, and mechanisms which automatically and continuously form packages for the products, which seal the packages around the products and which deliver the sealed packages from each other in groups or individually as may be desired.

The operative and structural advantages of a machine embodying the invention will be better understood from the specification which follows, and from the drawings, in which—

Fig. 1 is a side view in elevation and schematic in nature, showing a machine embodying the invention;

Fig. 2 is a fragmentary, vertical, sectional view on an enlarged scale, taken along the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary, detailed, vertical, sectional view on a further enlarged scale, taken along the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary, top view, in perspective, taken from the above Figure 1, and showing a portion of the article handling mechanism;

Fig. 5 is a fragmentary, enlarged, vertical, sectional view of portions of the machine designed for the purpose of feeding trays of frozen confections into position in the machine and releasing the confections from the carrying trays;

Fig. 6 is a fragmentary view in elevation, with parts broken away, of a conventional carrying tray for frozen stick confections shown on an enlarged scale;

Fig. 7 is a fragmentary view in perspective illustrating how the stick handles of the confections are held in place in the carrying tray, taken from the right end of Fig. 6;

Fig. 8 is a schematic, vertical, sectional view illustrating the operation of the article handling portions of a machine embodying the invention in first position;

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Fig. 9 is a view similar to Fig. 8 but illustrating the apparatus after articles to be handled have been discharged into article handling means;

Figs. 10, 11, 12 and 13 are views similar to Figs. 8 and 9, each illustrating the operation of the article handling elements of the machine in a successive stage;

Fig. 14 is a fragmentary, vertical, sectional view on an enlarged scale, illustrating the article wrapping portions of a machine embodying the invention;

Fig. 15 is a fragmentary, vertical, sectional view taken along the line 15—15 of Fig. 14;

Fig. 16 is a fragmentary, detailed, vertical, sectional view taken along the line 16—16 of Fig. 14;

Fig. 17 is a view similar to Fig. 16, but taken along the line 17—17 of Fig. 16;

Fig. 18 is a detailed, perspective view showing the package cross-cutting means illustrated in Fig. 14;

Fig. 19 is a plan view of a package as produced by the apparatus embodying the invention;

Fig. 20 is a vertical, sectional view taken along the line 20—20 of Fig. 19, and

Fig. 21 is a schematic view illustrating a modified form of article handling apparatus with which a machine embodying the invention may be equipped.

A machine embodying the invention may conveniently be divided, for purposes of description, into several main sub-combinations including an article release mechanism, generally indicated at 20 in Fig. 1; an article spacing mechanism, generally indicated at 21; an article delivery mechanism, generally indicated at 22; a paper feeding and pleat forming mechanism, generally indicated at 23; a package forming mechanism, generally indicated at 24; and a packaging severing mechanism, generally indicated at 25.

The article release mechanism 20 is shown in detail in Fig. 5, and a conventional carrying tray for the frozen confections prior to packaging is shown in Figs. 6 and 7. The articles selected for illustration in this specification are frozen ice cream confection equipped with flat sticks which are used for handles. They may be of the type generally called "Popsicles" in the trade, i.e., consisting of frozen fruit juices, etc., with a handle extending from one end, or they may be chocolate covered ice cream bars similarly equipped with a stick handle, or other similar objects. In any event, each of the articles which the embodiment of the invention described is designed to package, comprises a generally rectangular body 30 and a flat stick handle 31. Some types of confections may have separable two-part bodies and, in such cases, a pair of stick handles may be used.

The bodies 30 usually are formed in a mold (not shown) having twenty-four, or forty-eight, compartments, each compartment being open at the top and the vertical walls of the compartments being slightly inclined inwardly so as to give the body 30 a wedge-shape to facilitate withdrawal of the body 30 from the mold. In the following description, single part confections having only one stick handle will be referred to in describing the invention and as frozen in a mold with twenty-four compartments. Before the bodies 30 are frozen, the handles 31 are inserted downwardly through properly spaced holes in a tray 32 which overlies the mold. When the mold of frozen confections is removed from the freezing machine, the tray 32 is utilized as a carrier for the twenty-four frozen confections which are suspended therefrom by their respective sticks 31.

Each group of twenty-four items is delivered to a packaging machine embodying the invention by placing its suspension tray 32 between and with tray guide pins 33 resting upon, a pair of transverse guide rails 34 and moving it laterally into the upper portion of the release mechanism 20. Each of the trays 32, with its load of

twenty-four confections, is slid across the guide rails 34 into discharge position in the machine by the mechanism 20. Discharge position in the machine is located immediately above a grid 35 (see also Fig. 4) which has twenty-four openings corresponding to and spaced in accordance with the spacing of the twenty-four confections suspended by the tray 32. When the tray 32 with its twenty-four confections is positioned above the grid 35 by the mechanism 20, the sticks 31 are released and the confections 30 drop into the openings in the grid 35.

The release mechanism 20 comprises a pair of timing chains 36 and 36^a (Fig. 5) each of which carries one or more lugs 37 or 37^a, respectively. The two chains 36 and 36^a are mounted upon pairs of sprockets 38 and 38^a, respectively, which are driven together by their common shafts 39 and 39^a. The chain 36 is approximately centered between the guide rails 34 and the chain 36^a is spaced laterally thereof. Each of the lugs 37 is adapted to engage with a cross bar 32^a extending between the side walls of the tray 32 and to slide a tray 32 along the rails 34 to the discharge position shown in Fig. 5. The sprocket shaft 39 is so located relative to the discharge position that the lug 37 swings away from behind the bar 32^a when the tray 32 reaches position.

A bell crank 40 having a downwardly extending arm which carries a roller 40^a, and a second arm pivotally connected to a sliding rod 40^b, is mounted above the chain 36^a with its roller 40^a in line to be engaged by the lug 37^a. The lug 37^a is located on the chain 37 so that it strikes the roller 40^a immediately after the tray 32 reaches discharge position. Engagement of the lug 37^a with the roller 40^b, swings the bell crank 40 in a counter-clockwise direction on its pivot pin 41 and against the action of a return spring 41^a to drive the rod 40^b downwardly.

The rod 40^b is guided by a swivel 42 into engagement with a latch mechanism 43 in the tray 32. The latch mechanism 43 comprises a pair of levers 43^a pivoted in side walls 32^b of the tray 32. The levers 43^a are connected by a cross bar 43^b which the rod 40^b engages during its down stroke.

After the lug 37^a passes the roller 40^a, the spring 41^a swings the bell crank 40 in a return stroke against a cushioning spring 41^b carried by a bracket 41^c by which the swivel 42 and the entire mechanism of the bell crank 40 is supported.

Downward movement of the cross bar 43^b, from the position shown in Fig. 6 to the position shown in Fig. 5, pulls on a pair of links 43^c which are connected to ears 44^a of a tray slide 44 lying on the bottom of the tray 32. A plurality, in this case twenty-four, of stops 45 are punched out of and bent upwardly from the bottom of the tray 32 leaving apertures 45^a in the bottom of the tray 32. The stops 45 extend upwardly through openings 46 in the slide 44. At one side of each of the openings 46 in the slide 44, the slide 44 is punched up to form tangs 46^a, opposed to the stops 45.

As can best be seen in Fig. 6, when the slide 44 is in retaining position, the sticks 31 are pressed tightly against the stops 45 by the tangs 46^a and the tangs 46^a bite into the sticks 31.

During the freezing operation, the confections and their sticks 31 are held in a freezing mold by the tray 32 which serves as a cover for the mold. After freezing, the tray 32 is lifted from the mold by its cross bar handles 32^a and placed on the guide rails 34 laterally of the discharge position (to the right of Fig. 5). During removal from the mold and transfer, the confections are held in place by the grip between the tangs 46^a and the stops 45.

When the latch mechanism 43 is actuated (Fig. 5), the confections drop down into the grid 35 and onto a horizontal slide 50 which forms the bottom of the grid 35.

After the actuation of the latch mechanism 43 to re-

lease the confections from the tray 32, the tray 32 is engaged by a removal chain 47 (Fig. 5) which is mounted on sprockets 48, at the left (Fig. 5), of the discharge position, the chain 47 carries one or more lugs 49 which engage the leading one of the handle bars 32^a of the tray 32 for moving the tray 32 away from discharge position immediately after the confections are discharged from the tray. The mechanism is shown in this position in Fig. 5. The shafts 39 and 39^a for the sprockets 38 and 38^a and the sprockets 48 are, of course, driven in timed relation to the other mechanism of the machine by the main drive (not shown).

The article spacing mechanism 21 is inclusive of the slide 50 and the grid 35 and the mechanism for differential and relative movement of the grid 35 and slide 50 relative to the position of the support tray 32 and confections 30 before they are released therefrom. The article spacing mechanism 21 also includes a stationary spacing guide 51 located beneath the slide 50 and above a horizontal delivery belt 52. As can be seen in Figure 8, when the tray 32 with its load of twenty-four confections is first moved into position as described above, the grid 35 is positioned immediately below and in line with the twenty-four confections. The slide 50 is in position beneath the grid 35 and closes off the open bottoms of the compartments in the grid 35. The spacing guide 51 is stationary in the machine and is positioned with its first row of guide slots 53 in line with a first row of openings 54 in the grid 35.

After the rod 40^b actuates the latch mechanism 43 as described above, the twenty-four confections drop into the grid 35, this position being shown in Fig. 9. Thus far in the operation, neither the grid 35 nor slide 50 has moved. The grid 35 and slide 50 are horizontally moved by means of feeding racks 55 and 55^a (see also Fig. 4) which extend horizontally and longitudinally of the machine on opposite sides of the grid 35 and slide 50. Immediately after the twenty-four confections reach the position illustrated in Fig. 9, the rack 55 is actuated to move the slide 50 one step to the right as shown in Fig. 10. This opens the bottom of the first row 54 of pockets in the grid 35 and allows the six confections 30 in those pockets to fall through the guide 51 downwardly onto the upper surface of the moving belt 52. Each group of six confections which falls onto the belt 52 is carried forward on that belt and delivered to a downwardly inclined second belt 56.

At a speed timed in relation to the speed of the belt 52 and to the operation of subsequent assemblies of the machine, the racks 55 and 55^a are driven (see Fig. 4) by pinions 57 mounted upon horizontal drive shafts 58 by the main drive and timing mechanism of the machine. The shafts 58 are illustrated in Fig. 1 as being driven by means of vertical racks 59 extending upwardly from the base of the machine through suitable pairs of guide rollers 60 and 61 at their upper and lower ends, the racks 59 being moved vertically by the main machine drive. After the first group of six confections is carried away by the belt 52, rack 55 is again actuated as shown in Fig. 11 to move one or more stations to the right, and the rack 55^a is actuated to move the grid 35 one station to the right, so that a second row of pockets 62 in the grid 35 is aligned with a second row of openings 63 in the guide 51 and the slide 50 is removed from beneath the row of pockets 62. As in the case of the first row of confections, the six confections occupying the row of pockets 62 then fall by gravity through the opening 63 in the guide 51 and onto the upper span of the belt 52.

In similar successive steps the grid 35 and slide 50 are moved to the right so as to permit third and fourth rows of confections to drop from their respective pockets 64 and 65 in the tray 32 through their respective guide openings 66 and 67 in the guide 51 and onto the top span of the belt 52.

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As can be seen in Fig. 13, by the time the grid 35 and slide 50 have reached the fourth station and the confections in the fourth row of pockets 65 in the grid 35 have been released, a subsequent tray 32 carrying a subsequent group of twenty-four of the confections has been moved into discharge position in the release mechanism.

The belt 52 runs at a constant speed so that successive groups of six of the confections thereon are spaced from each other longitudinally of the belt a distance determined by the timing of their successive release and the speed of movement of the belt 52. The downwardly inclined delivery belt 56 runs at the same lineal speed as the belt 52 and confections are transferred from the belt 52 to the belt 56 by a transfer roller 68 extending horizontally across the machine between the spans of the belts 52 and 56. The belt 56 inclines downwardly and longitudinally over the main bed of the machine and at its end delivers each group of six confections into pre-formed packaged pleats to be later described.

In order to facilitate the subsequent packaging in cartons of dozens of the packaged confections, it is desirable that they be packaged in groups of three, i.e., one-quarter dozen each. A package of a dozen may then be made up of four of the individual three-confection groups and the package may be made more nearly symmetrical by reversing the positions of the sticks 31 and bodies 30 in each successive layer of three. The machine illustrated in the drawings and embodying the invention is, therefore, designed to package the confections in groups of three laterally adjacent packages.

The group of six confections which is discharged at each of the four station arrangements illustrated, respectively, in Figs. 10, 11, 12 and 13, lands upon the feeding belt 52 and is moved down the feeding belt 56 in a transversely spaced rank. Such a group of six confections is indicated in Fig. 4 by the arrow and legend "Rank One," and the corresponding rank of confections is similarly indicated in Fig. 1. This group of six confections is shown as passing over the transfer roller 68 and being engaged with the upper end of the inclined feeding belt 56.

In order that the groups of three each of the confections may be packaged as a group, apparatus embodying the invention, and particularly the delivery mechanism 22, is provided with confection guides 69 and 70 arranged in two laterally spaced groups of four each. In Fig. 4 it will be seen that the upper group of three of the confections is guided between four evenly spaced guides 69 and that the upper group of three is separated from the lower group of three which is guided by the guides 70. In Fig. 4, two of the inclined feeding belts 56 and indicated by the reference numbers 56 and 56^a are shown as being employed with the surfaces of the belts 56 and 56^a slightly diverging in a horizontal plane and each serving to feed one group of three from each of the ranks of confections. The transverse spacing between the groups of three confections, i.e., the groups indicated by the bracket "Group A" and the bracket "Group B," is sufficient to accommodate an extra width of the bottom packaging sheet to permit the packages to be formed in the pleat forming mechanism 23, as will be later described.

As can be best seen in in Fig. 4, the previously described delivery and timing mechanisms operate to deposit each successive group of six confections in transversely extending, longitudinally spaced ranks such as the already indicated "Rank One," and "Rank Two," "Three," "Four," etc.

As each rank of confections drops off the end of the downwardly inclined feeding belts 56 and 56^a, it is received in six parallel grooves 71, three in each of the groups "A" and "B," and each three being formed in one of a pair of longitudinally moving, parallel webs of packaging paper 72 or 73 (Fig. 1). The two webs of paper 72 and 73 are fed from supply rolls 74 and 75 which are mounted on suitable brackets at the starting end of

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the apparatus. The webs 72 and 73 are coated on their upper surfaces with heat or pressure sensitive adhesive coatings. The main bed of the machine has a six grooved, pleat former 76 (Fig. 2) over which the two webs of paper 72 and 73 are longitudinally fed. An upper pleat former 77 is mounted above the bed of the machine and inclined downwardly into the grooves in the pleat former 76. As the webs of paper 72 and 73 are fed longitudinally between the upper and lower pleat formers 77 and 76, the approach of the pleat formers to each other, i.e., their change in position from that indicated in Fig. 2 to that indicated in Fig. 3, forms pleats in the two webs 72 and 73, shaping the two webs of paper 72 and 73 to form the six longitudinally extending grooves 71.

It will be observed particularly in Fig. 2 that the inner edges of the two webs of paper 72 and 73 overlap in the space between "Group A" and "Group B" of the groove 71 and that each of the webs 72 and 73 extends laterally an equivalent distance beyond the outer edge of the pleat formers 76 and 77. This extra width of the two webs 72 and 73 permits them to be gradually drawn inwardly by the converging pleat formers 76 and 77 as the webs 72 and 73 are gradually pleated to form the grooves 71. After the webs 72 and 73 have left the ends of the upper pleat former 77, each of them is formed into three parallel, laterally spaced grooves 71 (see Fig. 17). It will be observed in Fig. 17 that the edges of the web, for example the web 72, have been pulled inwardly as the web has been deformed downwardly to form the three grooves 71.

A more complete description of the manner of operation of the pleat formers 76 and 77 for shaping the two webs of paper 72 and 73 into the respective Groups "A" and "B" of grooves 71 may be found in Rebecchini Patent No. 2,384,492, issued September 11, 1945, and reference is made thereto for a further explanation of this operation.

Immediately after each rank of the two Groups "A" and "B" of the confections drops off the inclined feeding belts 56 and 56^a and into the six grooves 71 in the two webs of paper 72 and 73, the movement of the webs of paper 72 and 73 (which is continuous) begins to carry that respective rank of confections along with the paper webs 72 and 73. The particular rank of confections moves along with the webs 72 and 73 until the individual confections, for example those indicated by the reference number 78 in Fig. 14, strike retaining pins 79 which are mounted upon a cross rod 80 and which extend downwardly into the groove 71 to obstruct the progress of the confections with the paper webs 72 and 73. The fingers 79 retard the movement of the confections as at 78 even though the webs 72 and 73 continue to move until the timing mechanism (not shown) rotates the rod 80 to swing the fingers 79 upwardly in a clockwise direction. This timing mechanism is so operated that it releases each group of six of the confections, i.e., the rank indicated by the number 78, so that they may again travel with the webs 72 or 73 in timed relation to the operation of cross sealing and cutoff mechanisms to be described below.

Just beyond the position of the stop pins 79, there is located a package-top sealing station, generally indicated at 81 in Fig. 14, and which forms a part of the package forming mechanism 24. Two top webs of paper 82 and 83 which are coated to adhere to the lower webs 72 and 73 (Fig. 4) are guided downwardly into contact with the flat ridges between the grooves 71 in each of the base webs 72 and 73 by a pressure roller 84. If the webs 72 and 73 are coated with heat sensitive adhesive, a plurality of ridge riding heaters 85 are located just ahead of the pressure roller 84. The heaters 85 soften the coating on the upper surfaces of the webs 72 and 73 on the areas of the ridges between the grooves 71 (such ridges being indicated by the reference numbers 86 in Fig. 17) and on the edges of the bottom sheets 71 or 72 (indicated

by the reference number 87). The ridges 86 and edges 87 of the lower sheet 71 or 72 are pressed tightly against the under surface of the upper sheet 82 or 83 and the upper roller 84 by four laterally spaced, lower pressure rollers 88, all of which rotate on a shaft 89. If the coating on the webs 72 and 73 or 82 and 83 is pressure sensitive, the heaters 85 may, of course, be omitted.

The upper roller 84 and the four lower rollers 88 not only function to seal the webs 72 and 73 or 82 and 83 together enclosing the confections in the continuous tubes, but they also provide the tractive effort for feeding the webs of paper 72, 73, 82 and 83 through the machine. It is thus apparent that the drive mechanism (not shown) must be so designed as to feed the paper webs at a constant speed and to actuate and control the other mechanisms in timed relation to the speed of the paper.

While only one group of three is indicated in Figs. 14-20, it will be appreciated that the mechanism employed for forming, sealing and severing the packages of each group of three is identical with the mechanisms employed in the other group of three.

Continuing longitudinal movement of the lower web 72 and upper web 82 or the lower web 73 and the upper web 83, as the case may be, through and between the upper sealing roller 84 and the lower sealing rollers 88, produces three tubular bodies with confections spaced therealong at distances determined by the release pins 79. A next preceding confection is indicated in Fig. 14 by the reference number 90.

Immediately beyond the location of the longitudinal sealing rollers 84 and 88, a machine embodying the invention is equipped with a transversely extending, opposed pair of cross sealers 91 and 92. If the paper carries a heat sensitive adhesive, the cross sealers 91 and 92 are heated, for example by electrical units, and actuated in time with other mechanisms so that their sealing surfaces are swung together to form a cross seal 93 which closes off the three individual tubes just ahead of the confections passing through between the sealing rollers 84 and 88 and just after the sticks 31 of the next preceding confections 90. This mechanism is shown in the just described position in Fig. 14. As can be seen by reference to Fig. 16, the median plane of the end seals of each group of three packages is approximately at the median horizontal plane of the three packages involved. In Fig. 16, the upper web 82 is shown as being flat and horizontal and the lower web 72 as being crushed upwardly although the section line of Fig. 16 does not permit the continuous cross seal to be shown therein. The cross seal 93 acts as both a rear seal on one package and the front seal on the next package. For example, in Fig. 14 the cross seal 93 is shown as forming the rear seal on a group of three packages containing confections indicated by the reference number 94 as well as the front seal for the next group of confections 90. At this position in the operation of the machine, a group of three individually sealed packages each containing one of the confections 94 and with the three confections arranged in lateral parallelism, is now completely closed.

Continued longitudinal feeding of the now joined webs 72 and 82 or 73 and 83, respectively, carries the individual confections grasped therein along with the webs. The next in the sequence of operations takes place in the package severing mechanism 25 and consists in cross cutting through the center of the seal 93 to separate a preceding group of three packages from a succeeding group of three packages. The cross cutting mechanism, as illustrated in Fig. 14, consists of a rotary anvil 95 and a rotary helical knife 96. The anvil 95 is a protrusion on a roller 97 rotated by the timing mechanism so that the anvil 95 comes up beneath each cross seal 93 during the period of time when the helical cutting knife 96 is swept thereacross. The knife 96 is mounted upon a shaft 98 and rotated at a speed greatly in excess of the speed of rotation of the anvil 95 or the lineal speed of the

webs and packages being fed through the machine. When the anvil 95 is in position, mechanism is actuated to rotate the shaft 98 and the knife 96 through a complete half revolution so that a cut is made cleanly across the particular end seal 93 during the time when the anvil backs up the cross seal 93.

At the conclusion of the cut, the group of three packages, each containing one of the confections, is severed from the continuous webs from which it has been formed. There would, therefore, be no way to move the separated group of three packages further along the machine except for the engagement therewith with a pair of perforating rolls 99. The perforating rolls 99 have a plurality of sharp perforating fingers 100 extending radially therefrom and into close engagement with grooves 101 (Fig. 15) in a pair of grooved backup rollers 102 rotating on a shaft 103 and located beneath the packages being formed. Perforating engagement of the fingers 100 through the longitudinal seals formed by the rollers 88 (Fig. 17) at the ridges 86, between the grooves 71, not only perforates longitudinally between each individual package, but also feeds the package forwardly onto a delivery table 104 at the output end of the machine.

After the completion of these operations, a group of three packages, as indicated by the reference numbers 105, 106, 107 in Fig. 19, is produced with a confection 108 in each of the packages 105, 106, 107, and with longitudinal perforations, as indicated by the reference numbers 109, between each adjacent packages 105 and 106 or 106 and 107. Each confection 108 is thus hermetically and sanitarily sealed within its own individual waterproof package. Each group of three packages can be handled as a unit in the assembly of cartons of one-quarter, one-half, or one dozen capacity, for example. Cartons may readily be assembled in compact size by reversing the positions of the confections 108, i.e., by placing the sticks 31 thereof extending to the right in one layer and to the left in a subsequent layer. Each package 105, 106 or 107 may readily be detached from an adjacent package by tearing along the perforations 109 yet each of them retains its own individual sanitary characteristics.

The modification of the item spacing mechanism 21, as illustrated in Fig. 21, substitutes a continuous spacing mechanism for the horizontally movable differential mechanism comprising the grid 35, slide 50 and guide 51 of the earlier described embodiment of the invention. In the embodiment diagrammatically illustrated in Fig. 21, a conveying tray 32 is shown as supporting four confections 110. After the actuation of the latch mechanism 43 as illustrated in Fig. 5, the confections 110 drop down between cross-bars 111 extending horizontally between two sides of a slowly moving chain-like conveyor, generally indicated at 112. The confections 110 bottom against the upper web of a support belt 113 traveling at the same linear speed as the chain 112. As the chain 112 and belt 113 move forwardly, i.e., moving the confection 110 to the left in Fig. 21, each rank or group of six of the confections 110 drops off the end of the belt 113 and downwardly onto a paddle receiver 114. In Fig. 21 a confection numbered 115 is shown in this position. Again, in timed relation to the operation of other portions of the machine, the paddle receivers 114 are withdrawn to release the rank of confections 115 into grooves such as the grooves 71 in lower webs of paper, for example the web indicated by the reference number 116 in Fig. 21, which has been formed by a pleat former 117 similar in nature to the mechanism 23 of the earlier described embodiment. Subsequent to the receipt of the rank of confections 115 in the grooves in the web 116, the packages are completed by package forming and package severing mechanisms such as the mechanisms 24 and 25 and generally indicated in Fig. 21 by the reference number 118.

We claim:

1. In a packaging apparatus having means for feeding

a continuous web of paper at a constant speed and means for forming laterally spaced pleats therein, article handling mechanism comprising, in combination, an article receiving grid having a plurality of article receiving pockets arranged in longitudinally spaced, laterally extending ranks, a slide forming a bottom for said grid, an article conveying belt extending beneath said grid and into overlying relationship with the pleats in said web of paper, means for driving said belt at a constant speed related to the speed of movement of said web of paper, mechanism for differentially moving said grid rearwardly and withdrawing said slide rearwardly from beneath said ranks of pockets successively for dropping the group of articles from each rank of pockets at a different point on said belt rearwardly spaced from a preceding group, whereby such progressively rearward dropping cumulates with the constant forward movement of said belt for spacing said groups of articles longitudinally from each other on said belt.

2. In a packaging apparatus having means for feeding a continuous web of paper at a constant speed and means for forming laterally spaced pleats therein, the improvement comprising, in combination, article handling mechanism for depositing individual articles in said pleats spaced from each other along said pleats including a spacing member having a plurality of article pockets arranged in longitudinally spaced ranks corresponding in number of pockets to the number of pleats in the web of paper and delivery means for receiving the articles of each rank simultaneously and spaced longitudinally from the articles of a preceding rank, means for forming ridges in said paper between said pleats and for aligning the edges of said paper in the same plane as said ridges, a timing device protruding into said pleats for retarding articles deposited therein, means for feeding and sealing a closing web of paper onto said ridges and edges of said first web, means for cross sealing said webs of paper to each other in advance of and behind each of said individual articles, said timing device being operable to release said articles in timed relation to the operation of said cross sealing means for the prevention of cross sealing except between spaced articles, and means for cutting off packaged articles from the end of said sealed webs of paper.

3. Apparatus according to claim 2 including differentially actuated mechanism for transferring articles from the spacing member to the delivery means in ranks and for increasing the longitudinal spacing of such ranks of articles during transfer.

4. An apparatus for automatically wrapping articles having generally oblong bodies and longitudinally protruding stick handles in individual sealed packages, said apparatus comprising, in combination, means for pleating a continuous web of sheet material into a plurality of laterally spaced, longitudinally extending continuous grooves, article handling mechanism including means for receiving and supporting a plurality of said articles with their stick handles extending upwardly and in longitudinally adjacent, laterally extending ranks, the number of articles in each rank corresponding to the number of grooves in said web of sheet material, an article delivery belt extending longitudinally beneath said article receiving means and overlying the area of formation of said grooves, means for driving said belt at a lineal speed the same as the lineal speed of said web, differentially actuated article transfer means for transferring ranks of articles from said article receiving means from longitudinally spaced points above said belt onto said belt, and means for restoring said transfer means to article receiving position after the transfer of the last rank of articles therefrom, means for depositing one of such articles from said belt in each of

said grooves with the bodies thereof and the stick handles extending similarly therein, means for feeding said sheet material through said pleating means, said articles being carried along by said sheet material, a timing device protruding into said pleats for retarding articles deposited therein, means for longitudinally feeding a flat covering web of sheet material over said pleats, means for sealing said webs of sheet material to each other longitudinally between said grooves and at the edges, means for cross sealing said webs of sheet material to each other between successive ones of said articles for closing the ends of said pleats in said first web of sheet material at both ends of each of said articles, said timing device being operable to release said articles in timed relation to the operation of said cross sealing means for the prevention of cross sealing except between spaced articles, and means for severing each closed article package from the ends of said webs of sheet material.

5. An apparatus for packaging frozen confections having stick handles in individual sealed packages, said confections being frozen in molds having a plurality of individual article pockets arranged in a plurality of closed adjacent ranks and a carrying tray-cover for said mold including means for grasping said sticks and supporting said articles when removed from their mold, said apparatus comprising, in combination a guide for each tray of articles, means for receiving said articles from said tray, there being spaces for the same number of articles in said article receiving means as there are articles suspended by said tray, means for pleating a continuous web of sheet material into a plurality of laterally spaced, longitudinally extending continuous grooves, an article delivery belt extending longitudinally beneath said article receiving means and overlying the area of formation of said grooves, mechanism timed in relation to the speed of movement of the web of sheet material and the article delivery belt for moving a tray of articles into position above the article receiving means and in alignment therewith, a mechanism for releasing all of said confections from their tray simultaneously into said article receiving means, means for transferring articles from said article receiving means onto said belt, means for depositing one of such articles from said belt in each of said grooves with their bodies thereof and the stick handles extending similarly therein, means for feeding said sheet material through said pleating means, said articles being carried along by said sheet material, a timing device protruding into said pleats for retarding articles deposited therein, means for longitudinally feeding a flat covering web of sheet material over said pleats, means for sealing said webs of sheet material to each other longitudinally between said grooves and at the edges, means for cross sealing said webs of sheet material to each other between successive ones of said articles for closing the ends of said pleats in said first web of sheet material at both ends of each of said articles, a timing device being operable to release said articles in timed relation to the operation of said cross sealing means for the prevention of cross sealing except between spaced articles, and means for severing each closed article package from the ends of said webs of sheet material.

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