

[54] **PROCESSING APPARATUS FOR LIQUID SATURATED TOWEL PACKETS**

[72] Inventor: **Donald G. Field**, Trenton, N.J.
 [73] Assignee: **Holland-Rantos Company, Inc.**, Piscataway, N.J.
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 [51] Int. Cl. **B30b 13/00, B30b 5/04**
 [58] Field of Search.....100/151, 152, 153, 154, 118, 100/119, 120; 198/165; 53/124 A, 389, 124 R, 124 B, 124 C, 124 CC

[56]

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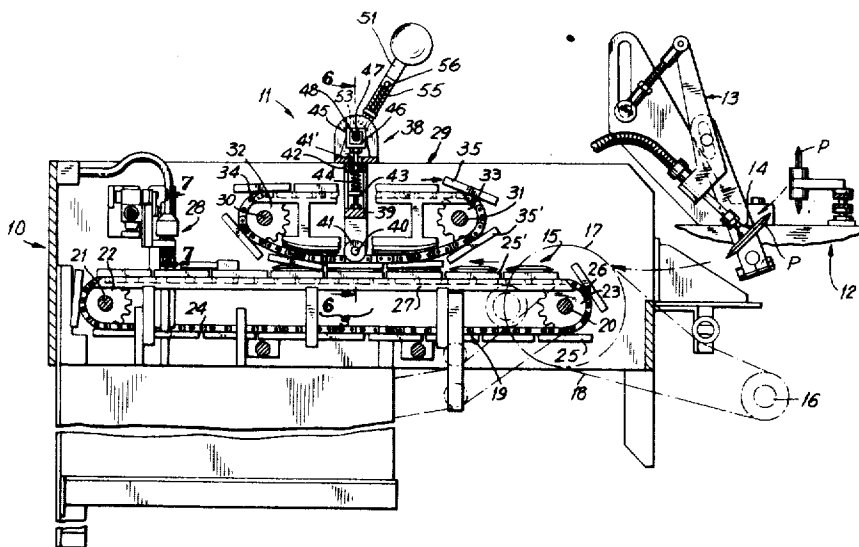
Primary Examiner—Peter Feldman
Attorney—Arthur B. Colvin

[57]

ABSTRACT

Apparatus for flattening, without wrinkling, sealed packets containing liquid saturated towels and for evenly distributing the liquid within the towel component and detecting leaks in said packets.

2 Claims, 10 Drawing Figures



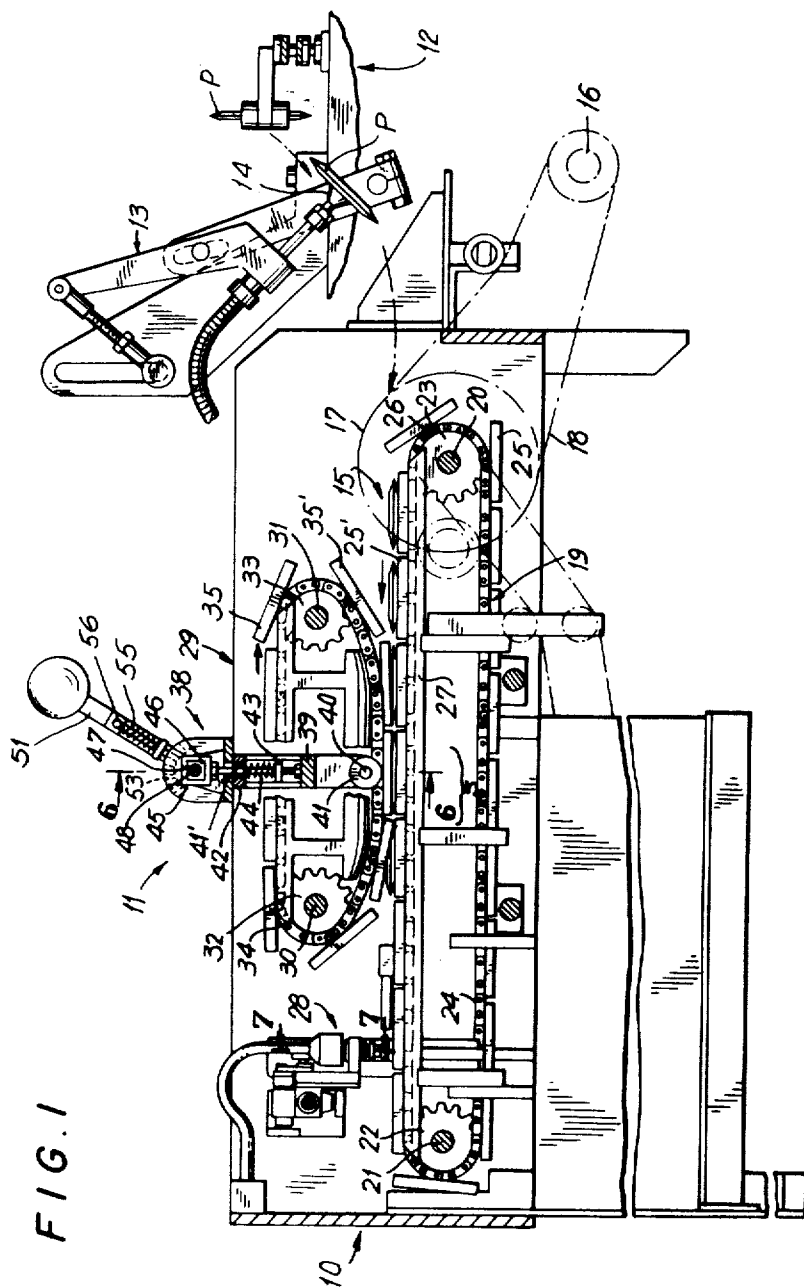


FIG. 1

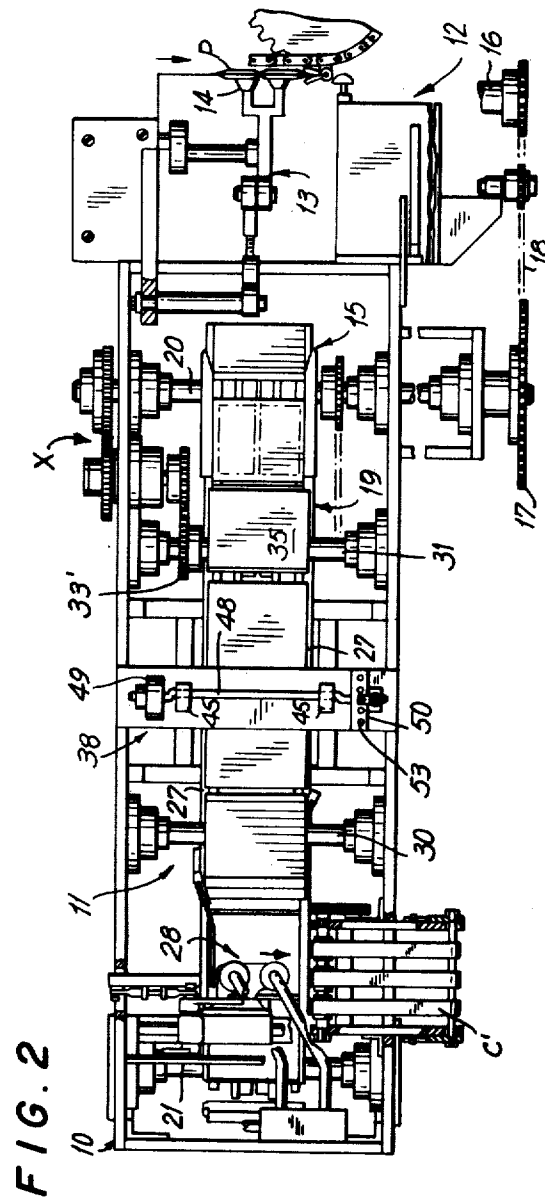
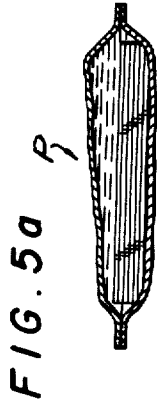
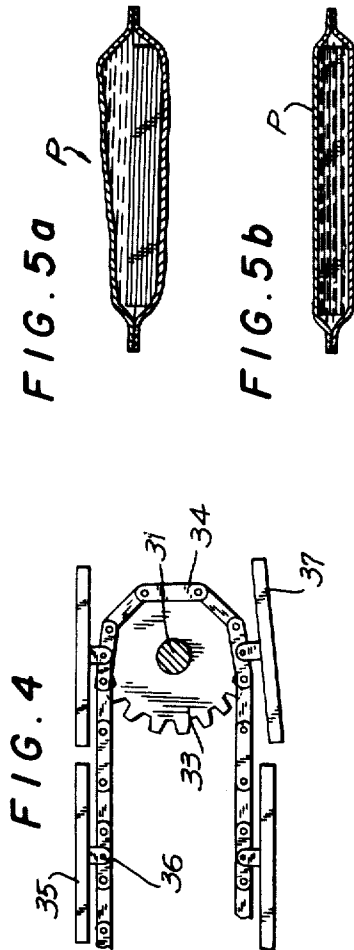


FIG. 3

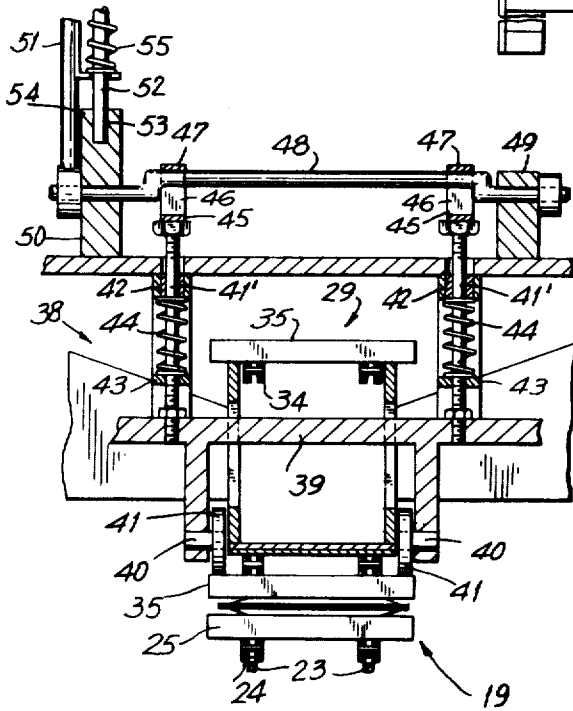
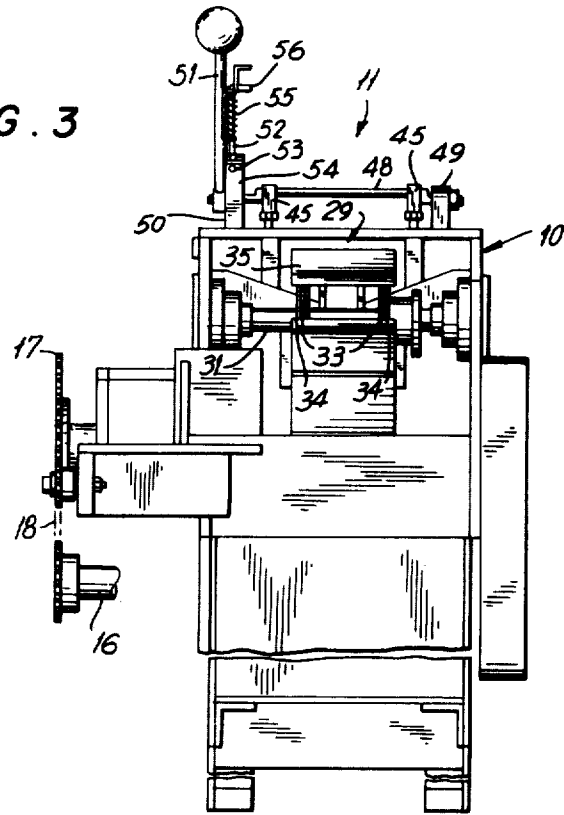


FIG. 6

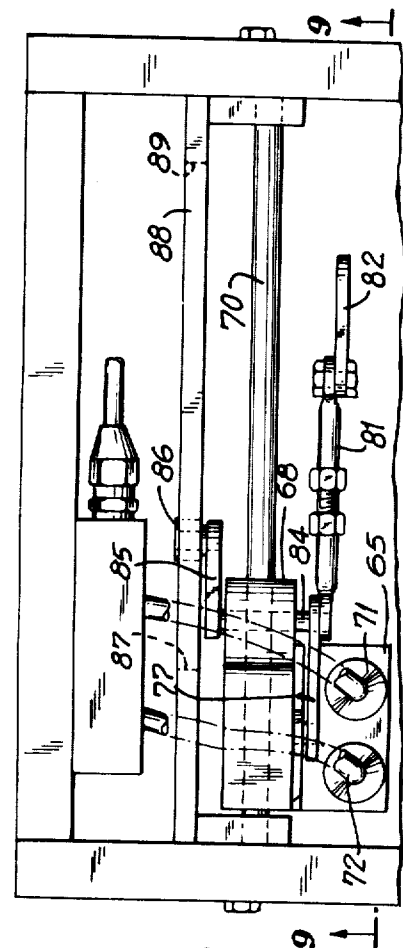
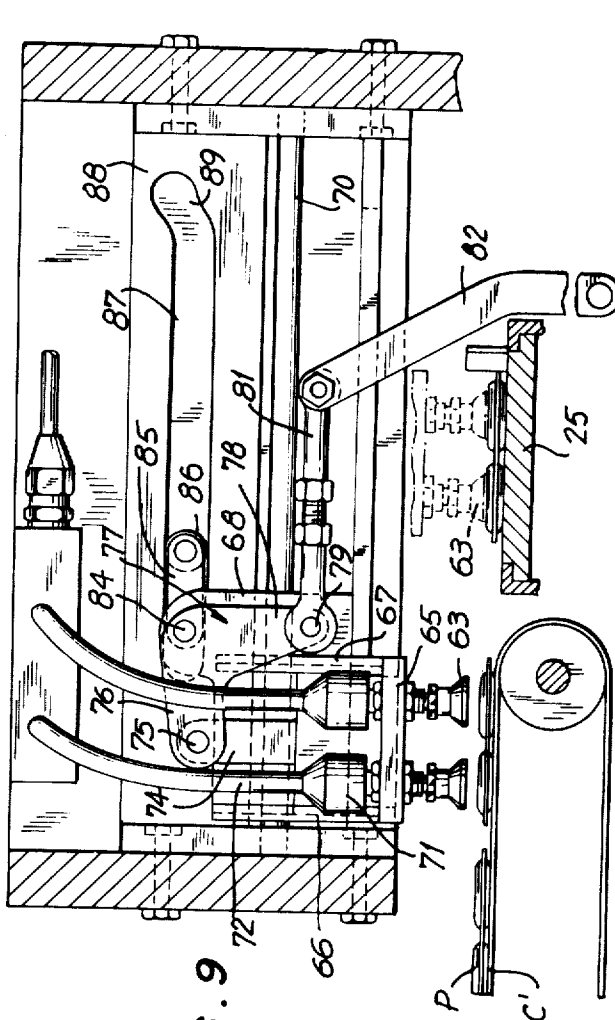


FIG. 7



F1G.8



FIG. 9

PROCESSING APPARATUS FOR LIQUID SATURATED TOWEL PACKETS

This application is a division of copending application Ser. No. 22,274, filed Mar. 24, 1970, now U.S. Pat. No. 3,645,198.

This invention is in the field of manufacturing sealed packets containing liquid saturated towels or the like.

In recent years, packets containing absorbent paper towels or the like saturated with various liquid reagents, have found considerable commercial acceptance.

Commercial quantities of packets are typically supplied in boxes or carton in which the packets are stacked or disposed in side by side position. In order that the space within the boxes or cartons be most advantageously employed, it is desirable that the packets be substantially flat.

In a typical packet, an absorbent paper towel is saturated with a fluid reagent. Usually the towel is initially an elongated web which has been fan-folded about longitudinally extending fold lines, the fan folded web being thereafter transversely folded in advance of insertion into the packet. In such structures, the areas immediately adjacent the transverse fold line or lines contain a greater bulk of paper than the portions of the towel remote from the fold line so that the usual packet immediately after fabrication displays a thicker end portion and a thinner end portion.

In view of the greater bulk of material at the thicker end portion, when the packet is charge with its liquid content immediately prior to final sealing, there is a tendency toward concentration of the liquid components in the areas of greater bulk, such that when the towel is removed for use, it will contain areas of greater saturation and areas of lesser saturation.

The enclosing or outer skin of packets of the type described are typically fabricated of a material which comprises a metallic foil integrated in or coated with a heat sealable plastic web. Unlike a pure plastic material, such composite foil-plastic has a relatively low plastic memory factor, so that it will tend to take a permanent set or configuration if it is deformed.

Further, the foil-plastic composite will not shed wrinkles or creases pressed into the plastic.

Due in large to the wrinkle retaining and low plastic memory properties of the foil-plastic composite, conventional flattening methods have been found ineffective in their application to foil-plastic packets of the type described. For instance, if a sealed packet is passed between a pair of spaced roller members, the packet exhibits a marked tendency to curl. Also, permanent wrinkles and creases are formed in a considerable percentage of packets thus treated.

The present invention relates to an apparatus for flattening sealed packets containing liquid saturated towels or the like, and at the same time effecting a distribution of the liquid material within the body of the packet, to assure essentially equal saturation of all portions of the towel.

In accordance with the invention, filled packets are placed atop a planar surface forming a moving portion of a conveyer assembly or the like. The packets are advanced, preferably with the thicker end of the packet (containing the transverse fold of towel) as the lead edge of the packet beneath a second conveyer which is advancing at the same speed as the packet supporting conveyer.

The second conveyer likewise includes a series of planar surfaces, which surfaces are led by the second conveyer in a converging path toward the packet supporting surfaces. The packets are sandwiched between the planar surfaces of the first and second conveyers and yielding pressure is applied to the packet through the surfaces. At least one such surface, normally the upper, is free to pivot relative to the other surface, the other surface being slidably supported in a predetermined reference plane.

The aforementioned treatment results in an initial compression of the thickened end of the packet, driving fluid collected at such end into trailing portions of the packet, to assure an equal distribution of the fluid. The packet is at the same time flattened by the application of pressure, the pressure serving to outwardly expand the skin of the packet to eliminate wrinkles and assure full distension of the skin portion.

Since there is no relative longitudinal movement between the packet and the pressure applying apparatus, there is no danger of forming new wrinkles or creases in the packet.

Likewise, since the packet is not passed across a curved surface, there is no possibility that the packets will assume a set or curvature which might distort the packets from a flat configuration and thus prevent their compact nesting within an enclosing box.

By subjecting the parts to pressure, any leak or weakness in the packet is readily detected by the fact that increments of the liquid would be expressed from an imperfectly sealed envelope or packet.

Accordingly, it is an object of the invention to provide an apparatus for flattening and distributing the liquid content of sealed packets.

It is a further object of the invention to provide apparatus of the type described which will accomplish the flattening and distributing effects without distorting the packet of forming wrinkles in the packet.

In the accompanying drawings in which is shown one of various possible embodiments of the several features of the invention:

FIG. 1 is a side elevational view of a packet processing apparatus of the type described;

FIG. 2 is a plan view of the apparatus of FIG. 1;

FIG. 3 is an end elevational view of the packet forming apparatus;

FIG. 4 is a magnified fragmentary view of the packet compressing conveyer.

FIGS. 5a and 5b are longitudinal sectional views through packets, respectively before and after they have been subjected to the operation of the processing apparatus;

FIG. 6 is a magnified vertical section taken on the line 6—6 of FIG. 1;

FIG. 7 is an enlarged detail sectional view of a pick-up nozzle taken along line 7—7 of FIG. 1;

FIG. 8 is a top plane view of the article removal mechanism, and

FIG. 9 is a side elevational view taken along line 9—9 of FIG. 8.

Referring now to the drawings, there is shown in FIG. 1 a frame 10 on which the packet processing apparatus 11 is mounted. To the righthand side, as viewed in FIG. 1, there is shown the terminal end 12 of the packet forming apparatus, the packets P being removed from the forming apparatus by a transfer assembly 13 which

incorporate suction heads 14. The heads receive the packets P from the terminal end of the apparatus 12 and deposit them at the input area 15 of the packet processing apparatus 11, which apparatus 11 is the subject of this invention.

As best seen in FIG. 2, the suction head assembly 14 includes dual suction nozzles for simultaneously handling two packets P. The number of packets which are simultaneously processed is, of course, immaterial to the invention hereof.

It will be appreciated that the transfer assembly 13 is driven in synchronism with the packet fabricating apparatus 12 and the processing apparatus 11. By way of illustration, the processing apparatus is powered from drive shaft 16 of the forming apparatus which shaft is linked in driving connection with input sprocket 17 of the processing apparatus, as by a drive chain 18.

Packets P handled by the transfer assembly 13 are deposited on a conveyer assembly 19, the conveyer assembly including pair of spaced parallel shafts 20, 21, journaled in the frame 10. Each of the shafts 20, 21 carries a pair of spaced sprockets 22, 22, 23, 23, respectively. Each sprocket 22 is linked to a sprocket 23 by a driven chain 24. Shaft 20 is keyed to the input drive sprocket 17, thus to drive the conveyer in the direction of the arrow, FIG. 1.

The drive chains 24, 24 are spanned at regularly spaced intervals by a series of packet support blocks 25. The support blocks 25 extend between the chains, as best seen in FIG. 1, the blocks being mounted to each chain by a bracket member 26 fixed to a link of each of the chains 24, the outer end of the brackets 26 being centrally secured to the support blocks. It will be appreciated that by reason of this manner of connection, the support blocks 25 will lie in a plane tangent to the point of connection of the brackets of the chains 24 as the blocks are advanced by the chains.

As the blocks 25 traverse the horizontal or upper flight of their endless path, the undersurfaces of the blocks are slidably supported on side rails 27, 27, forming a heightwise reference plane for the blocks.

From the foregoing, it will be seen that the support blocks 25 define a conveyer which advances packets along an essentially horizontal path from the entrance 15 of the apparatus to the removing mechanism 28.

Immediately above the conveyer assembly defined by the blocks 25, there is disposed a second endless conveyer which will be referred to as a compression conveyer. The conveyer 29 includes spaced horizontal shafts 30, 31 journaled in the frame 10, which shafts respectively carry spaced pairs of sprockets 32, 33. A pair of chains 34, 34 is extended between the sprockets 32, 33, respectively, the chains carrying a series of compression blocks 35, 35 regularly spaced along the chains 34, to correspond with the spacing of the blocks 25 along chains 24. The compression blocks 35 include depending brackets 36 fixed to the links of the chains 34. The brackets depend from substantially the longitudinal central line of the blocks 35. It will be appreciated that, due primarily to the flexibility of the chains 34, the planar disposition of the undersurfaces 37 of the blocks 35 may be varied, the variation being permitted by articulation of the chain.

Shaft 31 carrying sprocket 33 also carries sprocket 33' which is drivingly connected as at X to shaft 20 car-

rying to sprocket 23 the shaft 20 also carrying the sprocket 17, so that the lower conveyer 19 and upper compression conveyer 29 are driven at the same linear speed with their adjacent runs moving in the same direction. It will be seen that since the upper conveyer 29 is shorter than the lower conveyer, a compression block (i.e., block 35', FIG. 1) will be converging toward a support block 25 of the lower conveyer, i.e., block 25' and that the two noted blocks will thereafter be moved in parallel but spaced paths in the juxtaposed areas of the two conveyers. It will be recalled that in said juxtaposed areas the support blocks 25 are maintained in an essentially horizontal reference plane by the side rails 27 but, as noted above, the compression blocks 35 are permitted a degree of bodily upward and downward movement provided by the slack in the chains 34.

38 is a compression apparatus which functions to bring a yieldable pressure against the upper surfaces of the compression blocks 35 as they are progressively scanned across the juxtaposed areas of the conveyers, also referred to as the compression zone S, see FIG. 1.

The compression assembly includes a generally U-shaped yoke 39 which carries a cross shaft 40. A spaced pair of compression rollers 41 is rotatably mounted on the shaft. The yoke is adjustably carried by a pair of support rods 41' journaled for vertical movement in spaced bearing sleeves 42 formed in the frame, see FIGS. 1 and 6. Threaded tension adjustment collars 43 are threaded over the rods 41', the upper surfaces of the collars 43 forming a support for the lowermost convolutions of a pair of compression springs 44.

The upper ends of the compression springs bear against frame portions surrounding the sleeves 42 the springs serving to press the collars and hence, the yoke and rollers, in a downward direction. It will be appreciated that the force exerted by the springs 44 is a function of the adjusted position of the collars 43 along the rods 41'.

Each of the upper ends of the rods 41' is fixed to a cage 45, the cages 45 defining internal clearance areas 46, the upper ends of the cages 45 are defined by horizontal follower bars 47. A cam rod 48 has its opposite ends journaled within spaced coaxial bearing portions 49, 50, it being understood that the axis of the bearings 49, 50 is offset from the axis of the cam rod 48.

The undersurfaces of the follower bars 47 of the cages bear against upper surfaces of the cam rod 48. The cam rod is made fast to cam operator lever 51.

From this arrangement it will be appreciated that rotation of the lever 51 will rock the cam rod about the pivot axis defined by bearings 49, 50 and, depending upon the rotated position of the lever, will lift or lower the cages 45 by reason of the engagement of the rod with the follower bars 47. Since, in all rotated positions of the lever 51, the clearance areas 46 within the cages provide considerable space beneath the cam rod 48, it will be evident that the cages and the associated yoke assembly carrying the rollers 41 may be forced upwardly against the compression forces of springs 44 within the limiting confines of the clearance areas.

The lever 51 may be locked in any of a selected series of indexed position by engaging retainer pin 52 carried by the lever in any one of the series of detent aper-

tures 53 formed on a quadrant head 54 surrounding the bearing 50. The pin 52 is normally pressed downwardly into the apertures 53 by a compression spring 55. A lift finger 56 enables the pin to be withdrawn from an aperture to thus allow the lever to be pivoted to a selected different indexed position by releasing the finger 56, whereupon the pin 52 will again enter the selected aperture.

As best seen in FIG. 1 and 6, the lowermost surfaces of the rollers 41 engage against the upper surfaces of compression blocks 35 as these blocks scan compression area S.

The operation of the apparatus will be evident from the preceding description. Packets P are fed to a support block 25 by the transfer mechanism 13. The blocks 25, carrying packets P are continuously moving from right to left as viewed in FIG. 1, carrying the packets beneath a compression block 35 of the upper or compression conveyor assembly. The compression block 35' of the compression conveyor 29 progressively converges toward a synchronously moving block 25' of the conveyor 19, the packets preferably being arrayed on the blocks 25 in such manner that the thicker end of a packet P, i.e., the end having the transverse fold, is in leading or downstream relation as respects the direction of movement. As the blocks 25' and 35' continue to advance from right to left toward the compression station S, increasing pressure is exerted on the packet or packets disposed between the aforesaid blocks, the pressure being first applied at the lead edge which, as noted, is the thicker portion of the packet.

The concentration of pressure at the lead edge is the result of the additional thickness of the packet at such lead edge, and the fact that, due to the converging relation of the blocks 35' and 25', the lead edge of said block 35' is inclined toward the support block 25' in the area approaching the compression zone S. As the juxtaposed blocks 25' and 35', with a packet sandwiched therebetween, traverse the compression zone S, the rollers 41 will scan across the upper surface of the block 35'.

As previously noted, the lower block 25' is fixed in a predetermined reference plane, the combined thickness of the packet and block serving to lift the roller against the pressure springs 44, such lifting movement being accommodated by the clearance arcs 46 with the cages 45. The pressure which is exerted in the area S is a function of the adjustment of the collars 43 along the rods 41', enabling the processing apparatus to be readily adjusted to apply a range of compressive forces. Packets of different thicknesses may be readily accommodated by modifying the adjusted position of the lever 51 in the manner previously set forth.

From the foregoing it will be understood that packets passing beyond the compression zone S will have been flattened, the liquid components within the said packets having been distributed substantially evenly within the confines of the packet.

In the event of a faulty seal, it will be evident that liquid will be expressed from the defective packet as the same traverses the compression zone S, thereby permitting improperly formed packets to be detected and removed. Automatic detection apparatus may be employed, which apparatus may be made responsive either to expressed fluid or preferably to the degree of

upward movement of the rollers 41, in which latter instance the apparatus may also be used to detect under or over filled packets.

Packets passing beyond the compression zone are withdrawn from the conveyor by the removal mechanism 28, which mechanism optionally but preferably incorporates articulated suction heads 61 clearly shown in FIGS. 7 to 9. More particularly, each of the suction heads comprises a hollow stem 62 having a suction cup 63 secured to its lower end. The stem 63 extends slidably through a bushing 64 mounted on the horizontal leg 65 of a support member 66 which has a vertical wall 67 rigid therewith mounted for vertical movement on a carrier plate 68, slidably mounted for movement in a horizontal plane on guide rod 70.

The stem extends into the cavity 69 of a housing 71 to the upper end of which a suction pipe 72 is connected. The downward movement of stem 62 is limited by a collar 73 which abuts against the top of bushing 64.

The upper end of wall 67 carries a vertical arm 74 which is pivotally connected as at 75 to the end of the leg 76 of a bell crank lever 77, the free end of the other leg 78 of lever 77 being pivotally connected as at 79 to a pitman 81 which is actuated by lever 82.

The lever 77 is pivoted to the carrier plate 68 as by being secured to one end of a rod 84, the other end of which is secured to one end of a lever 85, the other end of which mounts a roller 86 riding in a horizontal slot 87 in a wall 88, the end 89 of slot 87 being upwardly inclined.

In operation of the removal mechanism, when the lever 82 is actuated to rotate in a clockwise direction, referring to FIG. 9, the carrier plate 68 will move to the right. When the roller 86 rides up the inclined portion 89 of slot 87, this will cause lever 77 to pivot in a counterclockwise direction causing support member 66 to move downwardly so that the suction cups 63 will be moved against the packets on block 25 at the discharge station. As a result of the suction applied to the cups 63, the stem 62 and the packets P will be lifted slightly from the block 25, leading space for the packets P carried by the next block 25 to move thereunder.

Movement of lever 82 is a counterclockwise direction will simultaneously cause lever 77 to pivot in a clockwise direction as a result of the movement of roller 86 down inclined portion 89 so that the heads 61 will be lifted further, and also cause carrier plate 68 to move to the left so that the suction heads 61 will move to the position shown in full lines in FIG. 9 over the discharge conveyor C'. Thereupon, the suction is broken and the packets P will be deposited on conveyor C' and the cycle is repeated.

From the foregoing it will be evident that there is provided a novel processing apparatus for liquid filled, sealed packets which automatically flattens the packets to permit the compact array within an enclosure, while evenly distributing the liquid within the packet.

Unlike prior devices, the apparatus will not result in the formation of wrinkles in the packets and, indeed, by reason of the development of pressure of a hydraulic nature within the packets, effects a removal of such wrinkles or unfilled portions as may exist in the packets prior to the application of compressive forces thereto, resulting in the production of a more attractive and compact product.

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Having thus described my invention, what I claim as new and desired to secure by Letters Patent of the United States is:

1. A device for evenly distributing the liquid contents of sealed packets containing liquid saturated towels or the like comprising a first endless conveyor, a plurality of flat support block members fixed to said conveyor, anti-friction means disposed in the path of said support blocks for aligning the upper surfaces of the blocks traversing said means in a predetermined horizontal plane, a second endless conveyor having a lower flight in parallel spaced relation to the upper flight of said conveyor, a plurality of compression blocks carried by said second conveyor, drive means for moving said conveyors in a converging path toward said anti-friction means, said conveyors being advanced in timed relation whereby the support and compression blocks are in registry at said anti-friction means, and adjustment means yieldably urging said compression blocks

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toward said anti-friction means with a selected force, said adjustment means including a rotatable cross shaft disposed in parallel spaced relation to said anti-friction means, said cross shaft including an eccentric member shiftable toward and away from said anti-friction means responsive to rotation of said cross shaft, roller means positioned to engage said compression blocks as the same traverse said anti-friction means and spring means compressed between said rollers and said eccentric member, the degree of compression of said spring means being varied responsive to the rotated position of said cross shaft, said compression blocks being tiltably mounted relative to said anti-friction means.

2. The apparatus of claim 1 and including an adjustment lever mounted to said cross shaft, and indexing means operably connected to said adjustment lever for securing said indexing means in a selected one of a plurality of indexed positions.

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