June 7, 1966 K. G. CLARK ETAL 3,254,472

PACKAGING APPARATUS

Filed Feb. 8, 1962 5 Sheets-Sheet 1

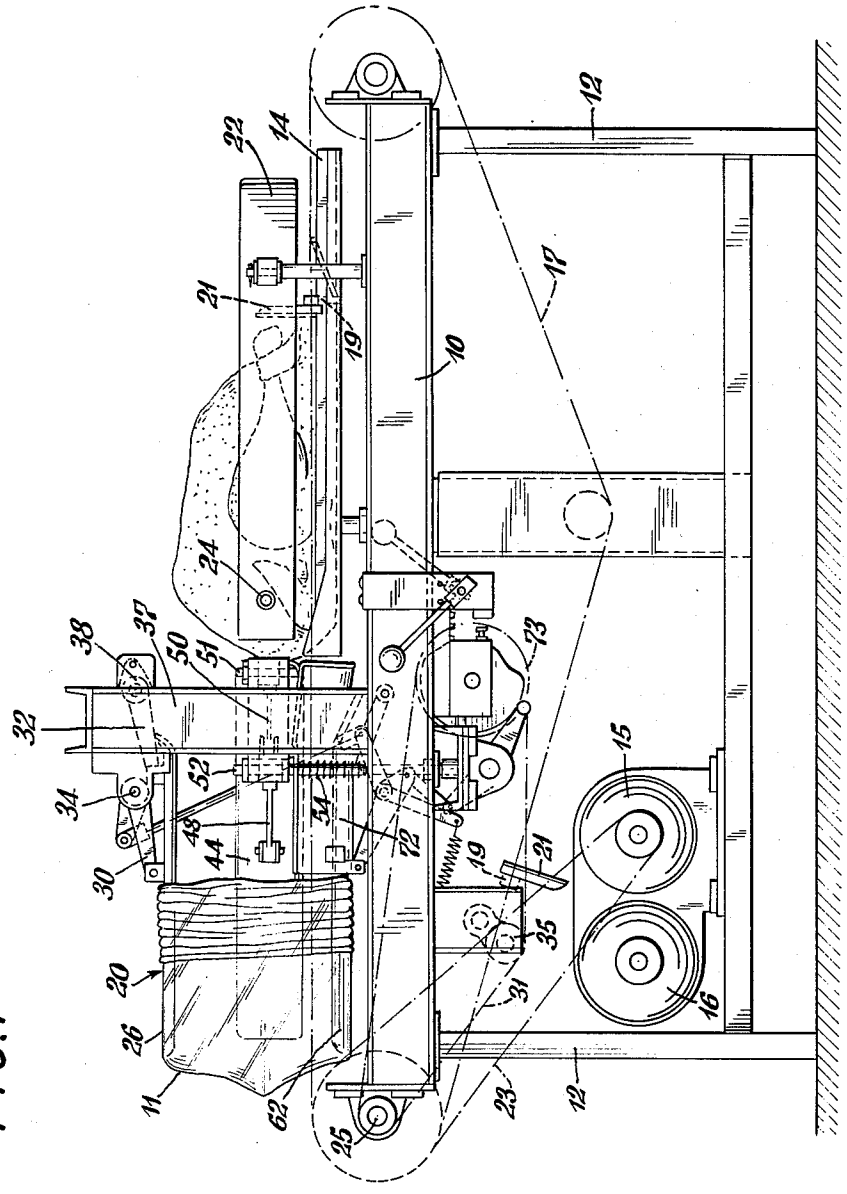


FIG. 1

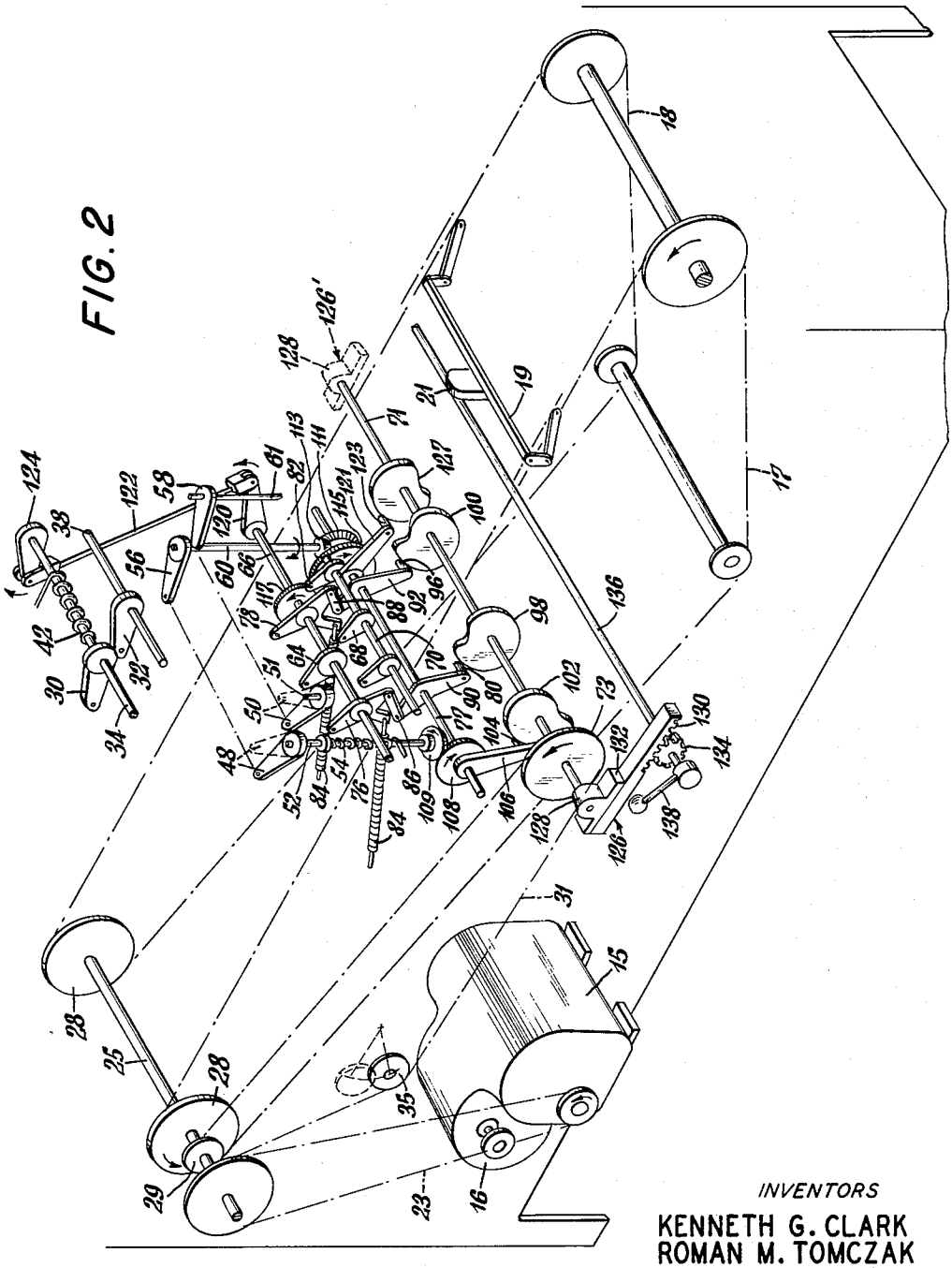
INVENTORS
KENNETH G. CLARK
ROMAN M. TOMCZAK
BY Edmund J. Fischer
ATTORNEY

June 7, 1966 K. G. CLARK ETAL 3,254,472

PACKAGING APPARATUS

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FIG. 2



INVENTORS
KENNETH G. CLARK
ROMAN M. TOMCZAK
BY Elmer J. Fischer
ATTORNEY

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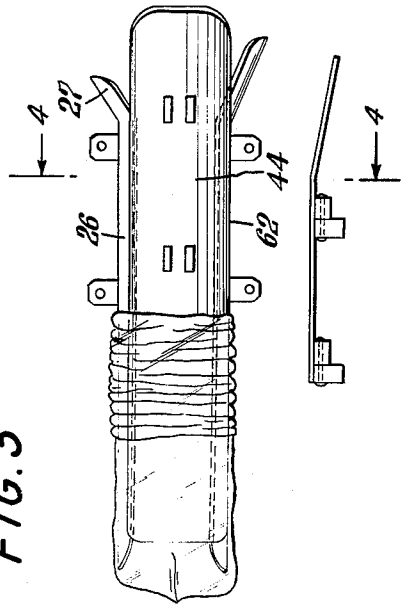


FIG. 3

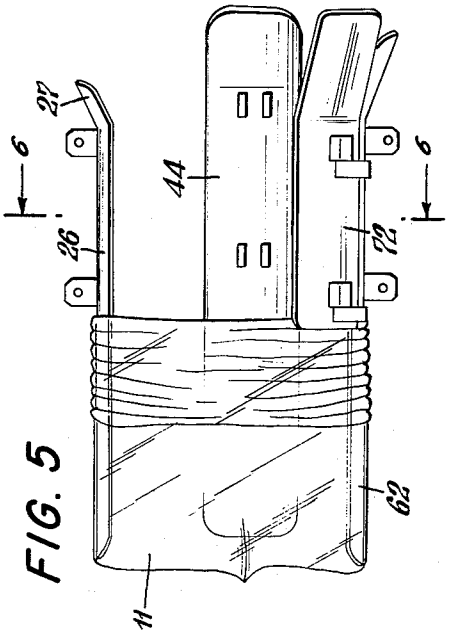


FIG. 5

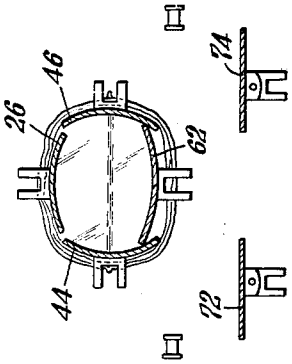


FIG. 4

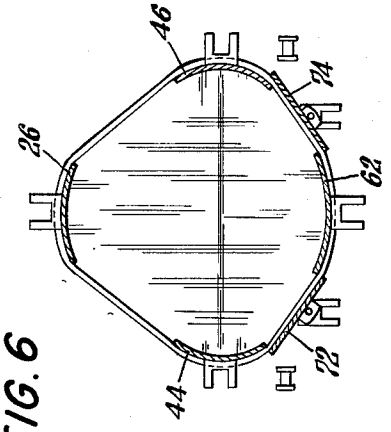


FIG. 6

INVENTORS
KENNETH G. CLARK
ROMAN M. TOMCZAK
BY Edmund J. Fischer
ATTORNEY

June 7, 1966 K. G. CLARK ETAL 3,254,472

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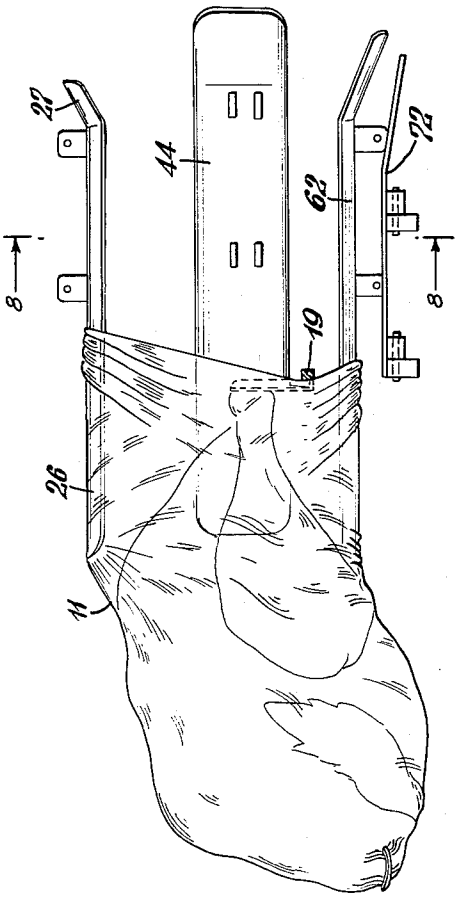


FIG. 7

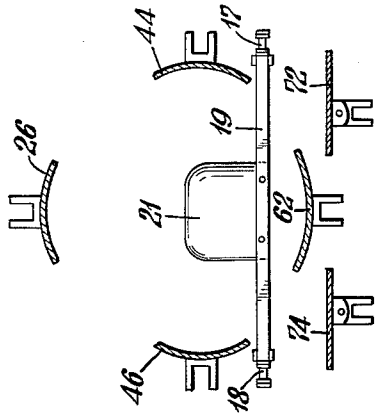


FIG. 8

INVENTORS
KENNETH G. CLARK
ROMAN M. TOMCZAK
BY Edmund J. Fischer
ATTORNEY

June 7, 1966 K. G. CLARK ETAL 3,254,472

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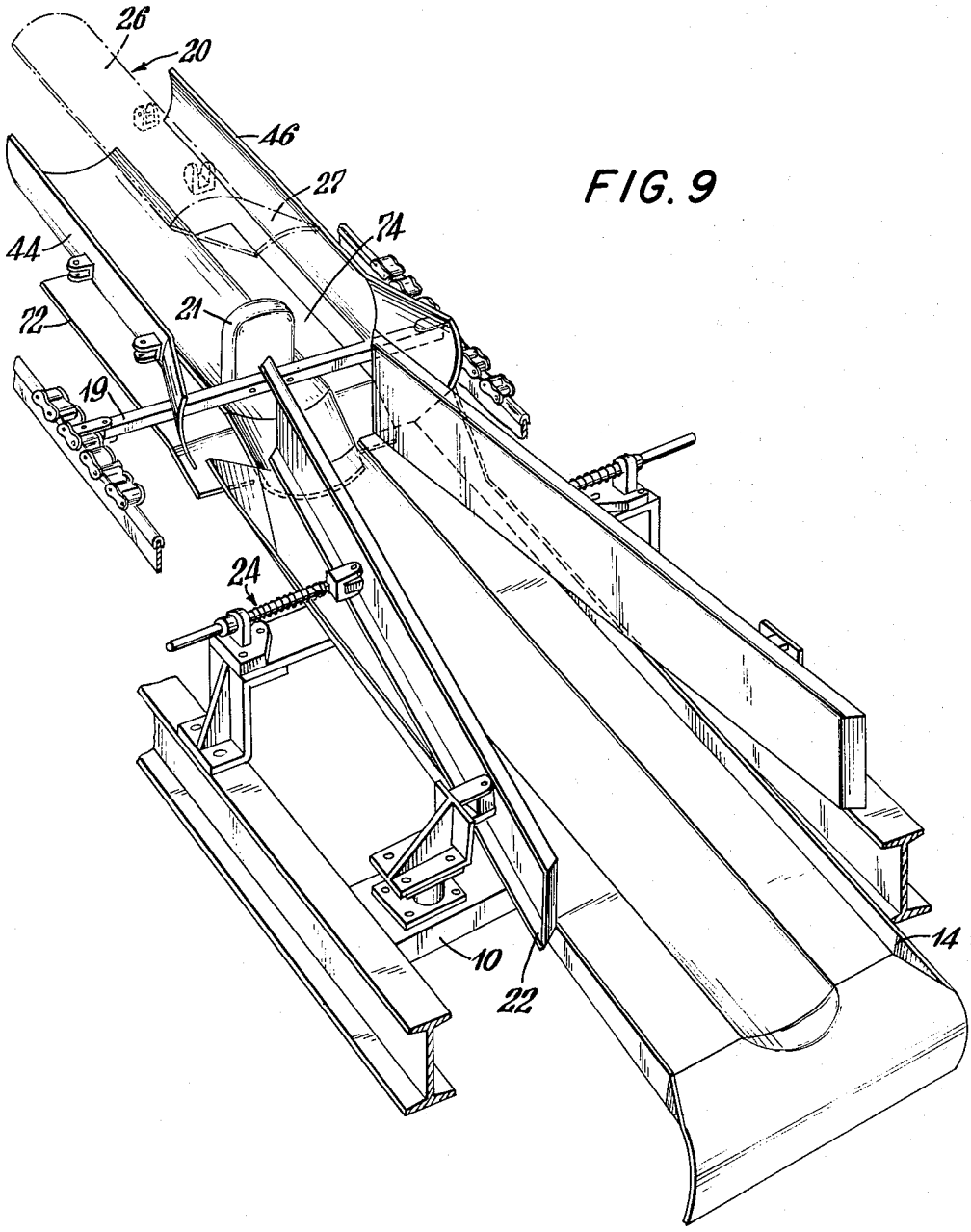


FIG. 9

INVENTORS
KENNETH G. CLARK
ROMAN M. TOMCZAK
BY Edmund J. Fischer
ATTORNEY

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3,254,472

PACKAGING APPARATUS

Kenneth G. Clark, Homewood, and Roman M. Tomczak, Willow Springs, Ill., assignors to Union Carbide Corporation, a corporation of New York

Filed Feb. 8, 1962, Ser. No. 171,927
4 Claims. (Cl. 53—259)

The present invention generally relates to an improved method and apparatus for packaging an item such as poultry in a bag of elastic film. More particularly this invention is concerned with improvements in packaging whereby an item such as poultry is encased within a bag of elastic film whose walls are longitudinally and circumferentially elastically stretched about the encased item to form a tightly adhering, shape-conforming wrap about the item.

An object of this invention is to provide an improved method and apparatus for simultaneously circumferentially stretching the entire length of an elastic film bag to a predetermined larger perimeter to thus enable an item to be freely inserted therein having a maximum perimeter exceeding the normal perimeter of the bag prior to stretching, and for longitudinally elastically stretching the bag over the inserted item as the bag is permitted to circumferentially contract about the item.

A further object of this invention is to provide apparatus having automatically controlled means for simultaneously circumferentially expanding substantially the entire length of an elastic film bag and for maintaining the bag in such expanded condition, means coordinated with said expanding means to convey and insert an item into said bag subsequent to its having been circumferentially expanded and means for longitudinally elastically stretching the bag walls over the inserted item while concurrently removing the circumferentially expanded bag and the item therein from said circumferential expanding means.

Another object of this invention is to provide in a packaging apparatus for packaging an item in an elastic film bag having a normal or relaxed perimeter smaller than the item's perimeter, means for simultaneously circumferentially expanding substantially the entire length of the bag walls extending between its open end and its closed bottom, means for guiding and conveying an item into said circumferentially expanded bag, and means associated with said expanding means and said conveying means to infold against the item, movable parts connected thereto and projecting therefrom, to thereby minimize the maximum periphery of the item immediately prior to its being inserted in the circumferentially expanded bag.

Another object is to provide in a packaging apparatus having means for circumferentially expanding the entire length of an elastic film bag, means for readily and quickly adjusting said expanding means to obtain a desired circumferential stretch which is larger than the maximum periphery of the particular item to be packaged.

Other objects and advantages of this invention will become apparent from the subsequent deailed description taken in conjunction with the accompanying drawings.

According to the present invention which is particularly adapted to the packaging of a poultry item as for example a turkey in a bag of elastic film to yield a packaged item wherein the poultry item is tightly wrapped and snugly conformed within the bag walls comprising the elastically stretched film, the bag, whose normal unstretched perimeter is smaller than the maximum perimeter of the poultry item transverse to its longitudinal axis, is simultaneously elastically stretched circumferentially along its entire length to a larger perimeter than the poultry item. The bag is maintained in such circumferentially stretched state until after the poultry item is longitudinally inserted therein, with its breast portion first, and then is longitudinally stretched by pushing the poultry item's breast portion against the bag bottom while concurrently progressively removing the applied circumferential stretching stress from the bag beginning at the bag bottom whereby initially the bag walls elastically contract circumferentially about the poultry item's breast portion and simultaneously are longitudinally elastically stretched over the breast portion, such progressive conjoint circumferential contraction and longitudinal elastic distention of the bag wall's continuing as the bird is advanced therein to progressively remove the circumferential stress from the bag's bottom to its open end.

In the accompanying drawings like reference characters designate the same or similar parts in the various views, said drawings showing construction details and mode of operation of a typical apparatus embodying this invention and wherein:

FIGURE 1 is a side elevation of an apparatus embodying the invention and generally showing a poultry item being conveyed to an elastic film bag which is circumferentially uniformly stretched throughout its length by a plurality of parallel movably mounted stretching fingers.

FIGURE 2 is a diagrammatic perspective view of the apparatus driving mechanism coordinated for conveying a poultry item to an elastic film bag expanded by the parallel stretching fingers, for expanding and contracting said fingers in parallel movement to each other, and for removing the filled bag from said expanded fingers while concurrently longitudinally elastically stretching the bag over the poultry.

FIGURE 3 is a fragmentary side elevation of the bag stretching fingers of the apparatus in their closed position with an elastic film bag in its relaxed state loosely sheathed thereon with the fingers interiorly extending to the bag bottom, and with a pair of wing guide plates retracted from the stretching fingers.

FIGURE 4 is a section along the line 4—4 of FIGURE 3.

FIGURE 5 is a fragmentary side elevation of the bag stretching fingers in their opened or expanded position with the bag elastically expanded and the paired wing guide plates each advanced upwardly and abutting against the bottom and adjacent side fingers.

FIGURE 6 is a section along the line 6—6 of FIGURE 5.

FIGURE 7 is a view similar to FIGURE 5, illustrating however, the entry of the poultry into the expanded bag and with the wing plates retracted downwardly to permit the passage between the bottom finger and each adjacent side finger of a bar on which is attached a shaped pusher cup.

FIGURE 8 is a section along the line 8—8 of FIGURE 7.

FIGURE 9 is a fragmentary perspective view of the apparatus feed trough and paired vertical guide plates for delivering a poultry item in axial alignment to an elastic film bag circumferentially stretched by a parallel operating stretching finger assembly.

The improved packaging apparatus of this invention as generally shown in FIGURES 1 and 2, comprises a rigid main frame 10 supported by attached legs 12, a poultry receiving and feeding trough 14, a conveyor drive arrangement for transporting a poultry item along said trough and into a circumferentially expanded elastic film bag 11, and a cam actuated finger assembly means generally indicated by 20 for elastically expanding said bag 11. An electric motor 16 housed in a variable speed drive mechanism 15, drives roller chain 23 connected to main drive shaft 25 actuating the conveyor and the finger

assembly 20. On main drive shaft 25 is mounted driving sprockets 28 for the conveyor roller chain and a driving sprocket 29 for the finger assembly drive.

The conveyor means comprises a continuously advancing pair of sprocket driven spaced endless roller chains 17, 18 having attached thereto one or more transversely connected bars 19, each having a centrally mounted pusher plate 21 appropriately cup shaped to engage a poultry item and push it into a circumferentially expanded bag 11, positioned on the finger assembly 20.

The finger assembly 20 is actuated by roller chain 31 driving a sprocket 73 keyed on cam containing shaft 71. An idler sprocket assembly 35 is used to eliminate slack in roller chain 31.

The elongated poultry receiving trough 14 as more particularly shown by the perspective illustration in FIGURE 9 is affixed to the top of frame 10. The trough 14 terminates at the entrance to the bag stretching finger assembly means 20. A pair of vertically mounted guide plates 22, are each pivotally attached on frame 10 to extend a substantial distance along trough 14. The vertical guide plates form a tapered passage with its smaller end terminating at the entrance to finger assembly 20, to position the bird into longitudinal alignment with this trough, as it is being conveyed breast portion first, to the passage formed by finger assembly 20 in its expanded position. The vertical guide plates 22 are inwardly pivotally urged toward each other by a compression spring loaded clevis pin assembly 24, said spring loading yielding to permit the plates to swing away from each other upon passage therethrough of a bird of larger dimensions than the tapered passage.

The bag stretching finger assembly 20 comprises an upper, arcuate shaped, extended metal finger 26 preferably having smooth polished surfaces to avoid abrasion and/or tearing of the bag film and poultry item, and having sanitary surfaces, as for example stainless steel or chromium plated surfaces.

As more particularly shown in FIGURES 3, 4, 5, 6, 7, 8, the entry end 27 of upper finger 26 is curved upwardly, which in conjunction with similar curved entrance portions of the cooperating bottom finger and side fingers provides a tapered entrance to the passageway formed by said fingers. The upper finger 26 is clevis pin attached to an actuating link bar 30 and parallel idler link bar 32 of equal dimensions to provide a vertical parallel movement of the finger 26 with respect to the longitudinal axis of the passage formed by the several fingers through which the poultry item is conveyed into the elastic film bag. Actuating link bar 30 is fixedly attached to a movable shaft 34 supported in end bearings located in a pair of opposed upright frame members 37. Idler link bar 32 is fastened to a movable shaft 38 rotatably supported by end bearings integral with upright frame members 37. A torsion actuating coil spring 42 is affixed to the upright frame member 37 and its other end is affixed to actuating link bar 30 in such manner that it normally urges the upper finger 26 in a downward parallel direction.

A pair of side fingers 44, 46, similar in shape and length to upper finger 26 coact with the upper finger 26 and a bottom finger 62, to form a central passage for the poultry item. Side finger 44 is parallel mounted and is parallel horizontally movable with respect to the longitudinal axis of the central passage by a pair of equal length link bars pivotally connected thereto, one of which is an actuating link bar 48 and the other is an idler link bar 50, rotatably supported on a vertically mounted shaft 51. The actuating link bar 48 is affixed to a vertical mounted driven shaft 52 rotating in bearings (not shown) affixed to upright frame member 37. A torsion actuating coil spring 54 coaxially mounted on shaft 52, normally tends to resiliently urge the actuating link bar 48 and its attached stretching finger 44 horizontally toward the central passage. Similarly side stretching finger 46 is pivotally affixed in parallel relationship to an actuating link bar 56 and an idler link bar 58. Actuating link bar 56 is affixed to a vertically mounted driven shaft 60 rotating in bearings affixed to the other upright frame member 37.

A lower or bottom finger 62 having a length and an arcuate cross-sectional shape similar to the previously described fingers is parallel pivotally supported on its bottom side by pin fasteners to a pair of equal length link bars, actuating link bar 64 being driven by its connection to a driven shaft 66 and idler link bar 68 functioning as a parallel idler which is freely rotatably mounted on horizontal shaft 70.

Reference is now made to FIGURES 1, and 3 to 8 inclusive. In order to prevent normally projecting wing parts of the poultry item from being snagged or caught in the open spaces between the bottom finger 62 and each adjacent side finger 44, 46, when they are in their expanded position, such spaces, during the interim that the wing portions are moving between the tapered entrance formed by the curved end portions of fingers 26, 44, 46 and 62 and the open end of the stretched bag are bridged over or spanned by a pair of transversely tiltably mounted flat metal wing plates 72, 74, also having outwardly curved end portions similar to those on the bag stretching fingers 26, 44, 46 and 62 and mating therewith.

As shown in FIGURES 7 and 8, the wing plates 72, 74 are retracted downwardly in parallel movement from their tilted mating position with the bag stretching fingers 46, 62, 44 after the winged portion of the poultry item has entered the bag's open end. The open spaces between bottom finger 62 and side fingers 44, 46 provide for a clearance passage at this operational sequence, through which the connecting bar 19 can pass. Moreover, it should be noted that as shown in FIGURE 7, the connecting bar engages the open end terminal edges of the elastic film bag 11 and provides a positive stripping action in removing the balance of the bag from the finger assembly 20. This positive stripping action by connecting bar 19, prevents excessive longitudinal stretching of the bag walls or occasional breakage thereof in those instances where the bag has been excessively circumferentially stretched or otherwise elastically clings to the outer surfaces of the fingers with such force as to resist slidable movement thereover by the pushing action exerted thereon by the encased poultry item.

The mating and retracting movement of wing plates 72, 74 is controlled by their parallel pivoted connections to actuating bell crank levers 76, 78, respectively, and by idler bar links 80, 82, respectively. Bell crank levers 76, 78 are each freely rotatably pivoted on driven shaft 66. The idler bar links 80, 82 are freely rotatably pivoted on horizontal shaft 70. Coiled tension springs 84 connected to bell cranks 76, 78 resiliently urge the wing plates 72, 74 to their mating position with the side fingers 44, 46 and bottom finger 62. Bell cranks 76, 78 are respectively pivotally connected through intermediate links 86, 88 to cam actuated bell cranks 90, 92 which are freely pivoted on shaft 77. Cam followers 94, 96 respectively attached to bell cranks 90, 92 rotatably bear against the contoured surfaces of cams 98, 100 which are keyed to a driven cam shaft 71.

Also attached to near one end of and driven by cam shaft 71 is a contoured cam 102 against whose contoured surface rides a cam follower 104 which is connected to a bar lever 106 that is fastened to a bevel gear 108 keyed on horizontal shaft 77. Bevel gear 108 mates with a bevel gear 109 keyed on the lower end of vertical shaft 52. Rotation of cam shaft 71 in the indicated counterclockwise direction results in bar lever 106 rotating bevel gear 108 and shaft 77 in a clockwise direction and with mating bevel gear 109 and its shaft 52 rotating in a counterclockwise direction, thus causing the driven link bar

48 attached to side finger 44 to move the finger outwardly and away from the other fingers.

Opposite side finger 46 is concurrently moved outwardly by means of a bevel gear 111 keyed to horizontal shaft 77 and mating with a bevel gear 113 keyed to vertical shaft 60 to which is attached driven link bar 56 that is pivotally connected to side finger 46.

As the side fingers 44, 46 are being moved parallel outwardly, the bottom or base finger 62 and upper or top finger 26 are also being moved parallel away from each other by means of a spur gear 115 freely rotatable on horizontal shaft 77 and mating with a spur gear 117 keyed to horizontal shaft 66. Spur gear 115 is attached to and driven by lever arm 121 having a cam follower 123 bearing against the contoured cam surface of a cam 127 keyed to cam shaft 71. Counterclockwise rotation of shaft 66 moves link bar 64 attached thereto downwardly, whereby bottom finger 62 is moved away and parallel downwardly from top finger 62. The same horizontal shaft 66 moves a lever arm 120 attached thereto in an upward direction. The upward motion of lever arm 120 is transmitted by a connecting bar 122 clevis pin fastened at one end of lever 120 and at its other end to a lever arm 124 fastened to horizontal shaft 34, which accordingly rotates in a clockwise direction to cause actuating link 30 to move upper finger 26 in an upward and parallel direction with respect to bottom finger 62.

Means for quickly adjusting the extent to which the stretching fingers on the assembly 20 are outwardly moved is provided for by two spaced rack and pinion assemblies generally indicated by 126, 126' each comprising a pillow block bearing 128 fastened to a rack slide plate 130 which is gibbed in a slide block 132. Cam shaft 71 is rotatably supported by pillow block bearings 128. Pinions 134 keyed to a horizontal shaft 136 meshes with the rack surface of slide plate 130. Pinion shaft 136 is turned by hand lever 138 fastened thereto. Counterclockwise rotation of hand lever 138 moves rack slide plate 130 and cam shaft 71 toward cam actuated levers 90, 92, 106, 121, thereby increasing their rotational amplitude and correspondingly the extent to which all the stretching fingers are moved outwardly; whereas clockwise rotation of hand lever 138 correspondingly reduces the extent of the parallel expansion movement of the fingers. Locking means (not shown) are provided to maintain a selected adjustment position of the rack slide plate 130.

An important feature of the herein described apparatus is the parallel movement of the several stretching fingers with respect to each other and the passage therethrough. Thus, with the fingers in their parallel collapsed position, as shown in FIGURE 3, the entire length of an elastic film bag having a normal or relaxed circumference larger than the collapsed or retracted fingers can be fully sheathed over fingers of considerably shorter length than the bag. As a consqeuence, no longitudinal movement of the bag occurs along the fingers when the bag is circumferentially expanded, nor is there any requirement for the operator to manually hold the bag in position during the bag expansion step to prevent it from slipping off the fingers. Moreover, due to the absence of any significant longitudinal movement by the bag, it is substantially uniformly circumferentially expanded throughout its length. This has not been possible heretofore with non-parallel mounted and/or movable stretching fingers.

The bags can be formed from seamless tubing the the closed bottom made by a straight across or arcuate heat-seal. The invention, however, is not restricted to the use of bags made from seamless tubing but is equally applicable to bags made from film having a longitudinal seam obtained by overlapping the film's marginal edges, as well as bags made by sealing the edges of two superimposed film layers.

It will be observed as shown in FIGURE 8, that the circumferentially stretched bag, by virtue of the arcuate

shape of the stretching fingers and the spacings therebetween, assumes a cross-sectional shape in close simulation of the largest cross-sectional portion of the poultry item. In the decribed embodiment, the bottom finger 62 is parallel moved from the central axis of the passage proportionally less than the side fingers 44, 46, whereas the top finger 26 is parallel moved fore than the side fingers. Such differential movement of the fingers forms the shaped passage and the bag, with a relatively high top arch (conforming to the keelbone or breast bone portion of a tom turkey), equally spaced curved sides and gently rounded bottom. By modifications of the fingers' arcuate cross-section, and adjustment of the radial throw of the lever arms attached to the fingers, the shaped passage can be readily changed to conform with the largest cross-sectional area of the item to be packaged.

The principles of this invention are not restricted to the packaging of poultry items, but are also applicable to the elastic film packaging of numerous other items including hams, rib roasts, pork loins, banana hands and melons, that are characterized by sufficient rigidity to be conveyed through the passage formed by the expanded fingers and to forcibly remove the elastically expanded bag from the stretching fingers.

What is claimed is:

1. An apparatus adapted for packaging an item having attached projecting movable parts in a bag of elastic film, comprising, a plurality of parallel movable fingers forming a conforming passage therethrough for the food items, means for parallel moving said fingers away from each other to circumferentially expand simultaneously substantially the entire length of an elastic film bag sheathed over the terminal end of said fingers to a larger perimeter than the item to be packaged therein, parallel pivotally mounted members movable inwardly and towards said fingers to bridge the spaces formed between the fingers upon their being moved apart to expand the bag and extending from the fingers' end opposite the terminal end to at least the open end of the sheathed bag, means for conveying the item through the passage and into the sheathed bag, and means to remove the bag and its inserted item from the terminal ends of the fingers.

2. The apparatus of claim 1, wherein said parallel movable fingers comprise, top and bottom, vertically movable fingers and a pair of horizontally movable side fingers, said bottom finger being movable proportionally less than said side finger, and said top finger being movable proportionally more than said fingers.

3. An apparatus adapted for packaging a food item having attached projecting movable parts in a bag of elastic film, comprising, a plurality of parallel movable fingers forming a conforming passage therethrough for the food items, means for parallel moving said fingers away from each other to circumferentially expand simultaneously substantially the entire length of an elastic film bag sheathed over the terminal end of said fingers to a larger perimeter than the item to be packaged therein, said fingers each having an outwardly curved portion on its end opposite the terminal end to guide the item into the passage leading into the bag sheathed over the fingers terminal ends, parallel pivotally mounted plates movable inwardly and towards said fingers to bridge the spaces formed between the fingers upon their being moved apart to expand the bag and extending from the fingers' outwardly curved portion to at least the open end of the sheathed bag, said bridged spaces being in the line of movement of the item's projecting movable parts, means for conveying the item through the passage and into the sheathed bag, and means to remove the bag and its inserted item from the terminal ends of the fingers.

4. An apparatus adapted for packaging a food item in a bag of elastic film, comprising, a plurality of parallel mounted fingers forming a conforming passage therethrough for the food item means for parallel outwardly moving said fingers away from each other to circumferen-

tially expand an elastic bag sheathed over said fingers, means for bridging spaces between the outwardly moved fingers, a trough terminating at the entrance to said passage, a pair of pivotally mounted vertical guide plates affixed to said trough and resiliently urgable towards each other to form a tapered passage having its apex adjacent the entrance of said passage, means for conveying the item along said trough and between the vertical guide plates and into the finger passage, means for pushing the item from the passage into the expanded bag and for removing the bag and its contained item while longitudinally elastically stretching the bag over the item.

References Cited by the Examiner

UNITED STATES PATENTS

2,033,238	3/1936	Geyer	53—34 X
2,561,410	7/1951	Peters	53—261
2,843,984	7/1958	Dunning	53—184
2,885,850	5/1959	Smith	53—258

FRANK E. BAILEY, *Primary Examiner.*

BROMLEY SEELEY, *Examiner.*

L. S. BOUCHARD, *Assistant Examiner.*