June 29, 1954 B. H. ROLLINS, JR 2,682,287

SKIN REMOVING DEVICE

Filed March 31, 1949 4 Sheets-Sheet 1

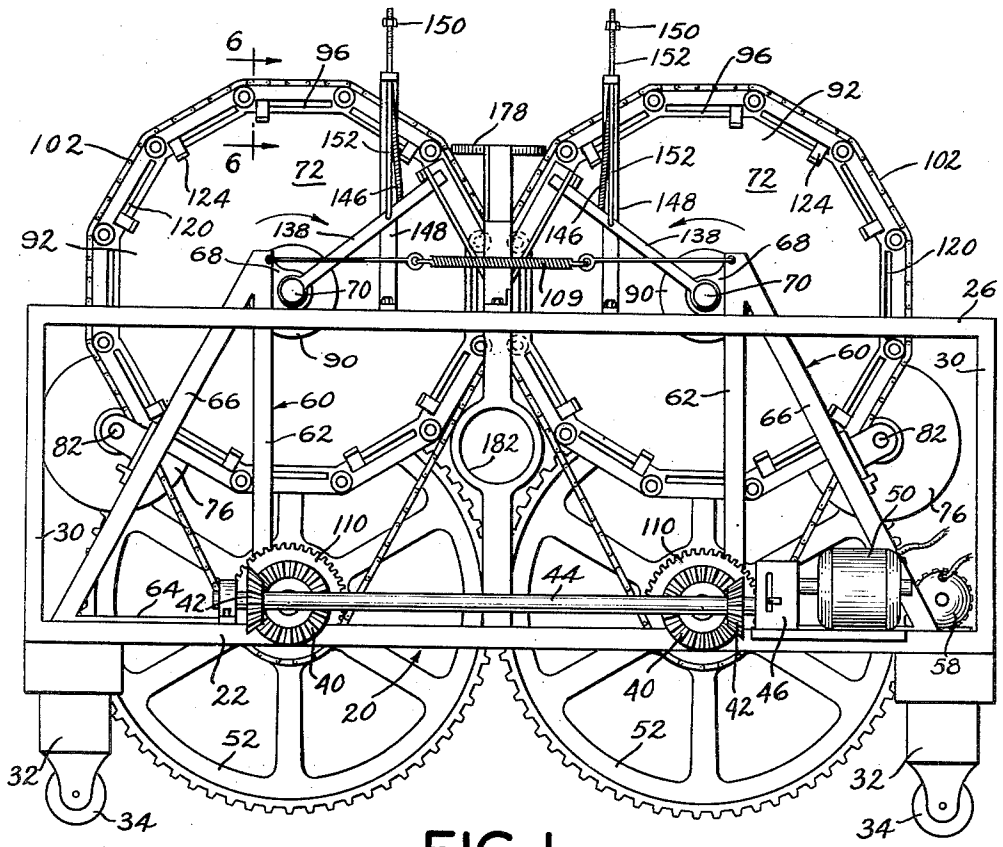


FIG. 1.

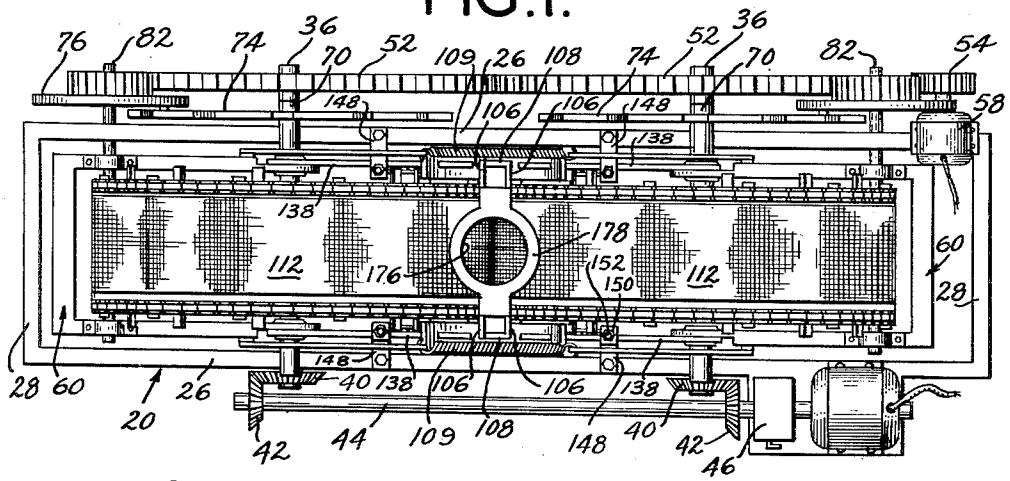


FIG. 2.

INVENTOR
BROOK H. ROLLINS, JR.
BY Raymond Wolfe
ATTORNEY

June 29, 1954 B. H. ROLLINS, JR 2,682,287

SKIN-REMOVING DEVICE

Filed March 31, 1949 4 Sheets-Sheet 2

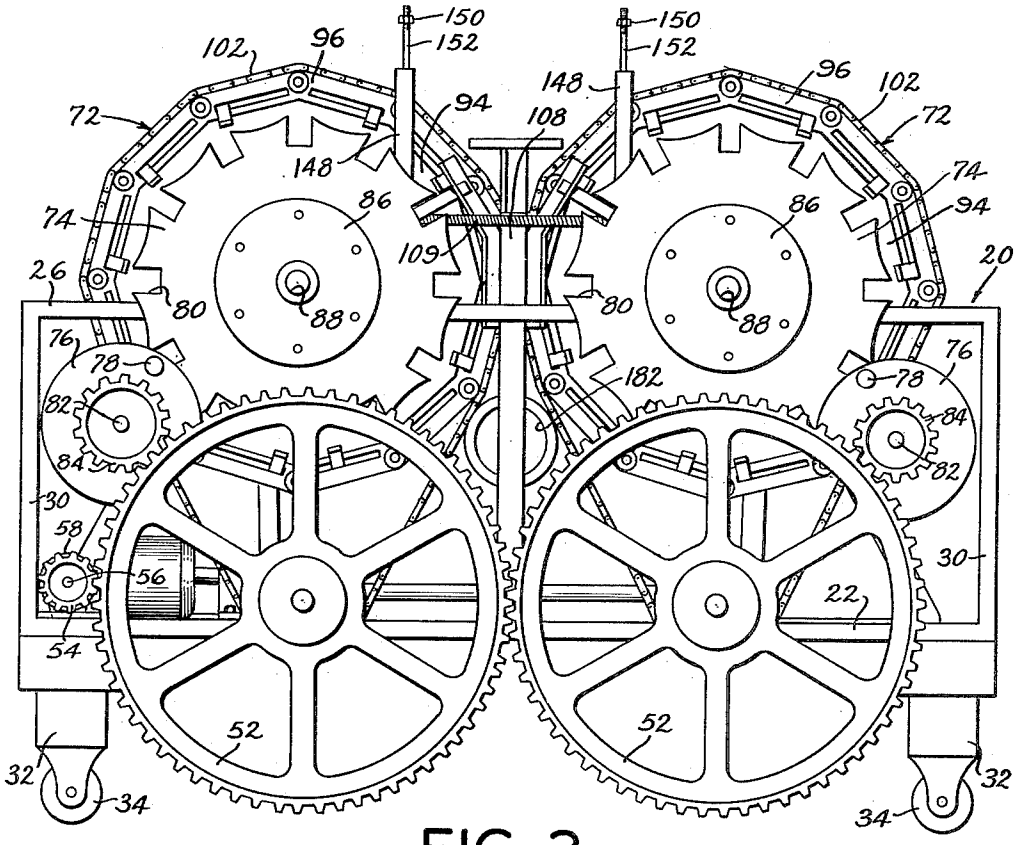


FIG. 3.

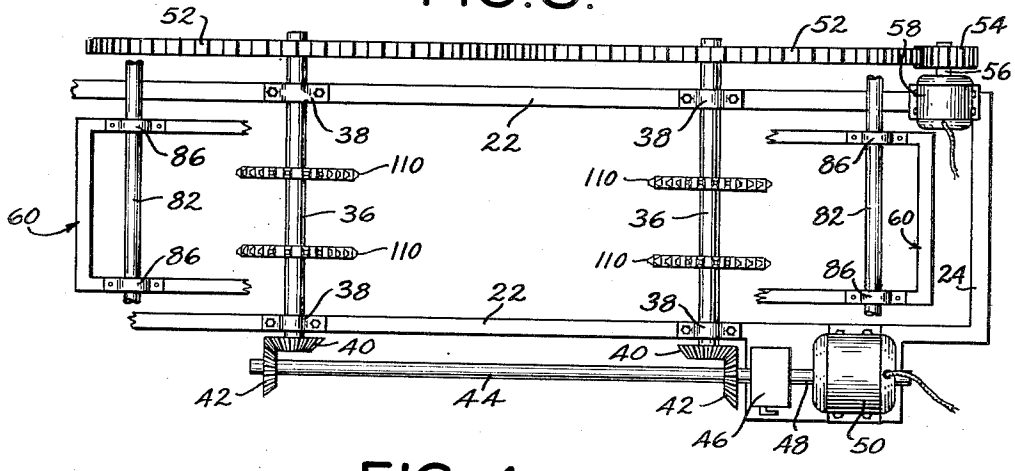


FIG. 4.

INVENTOR
BROOK H. ROLLINS, JR.
BY Raymond Woolson
ATTORNEY

June 29, 1954 B. H. ROLLINS, JR 2,682,287

SKIN REMOVING DEVICE

Filed March 31, 1949 4 Sheets-Sheet 3

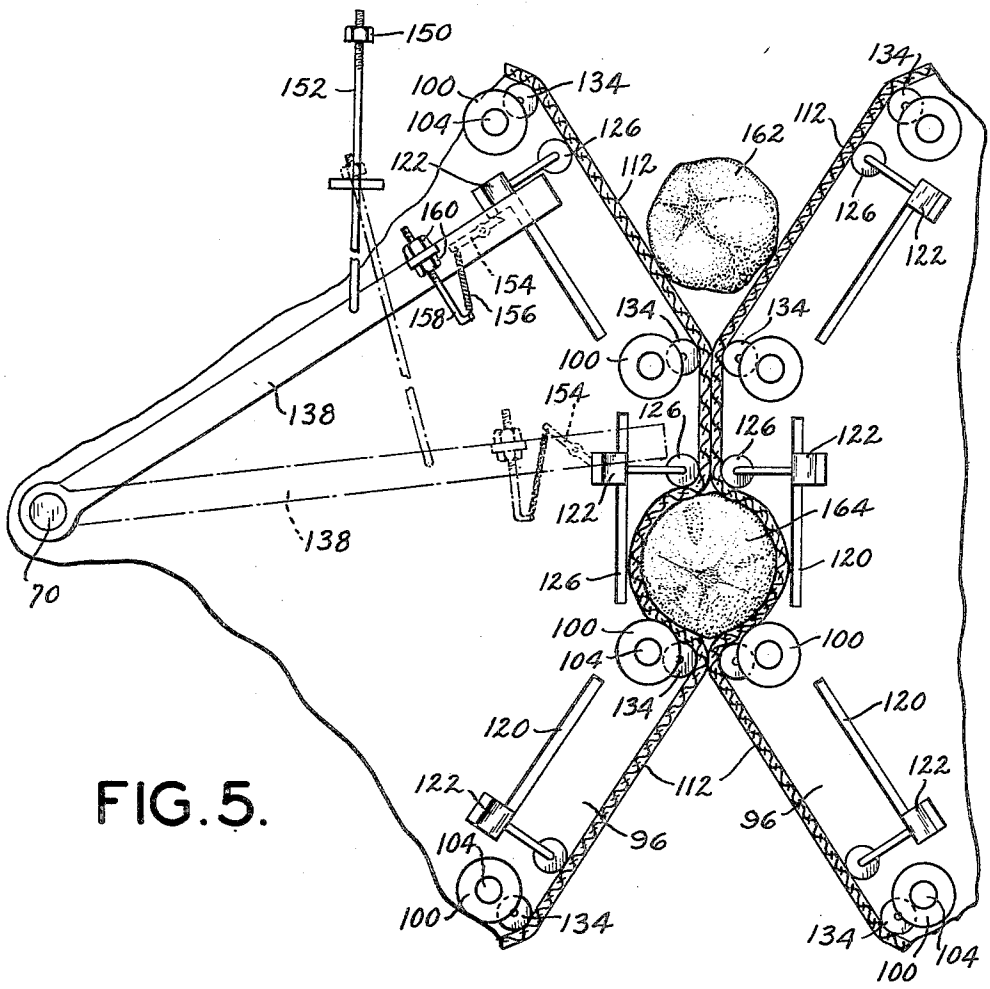


FIG. 5.

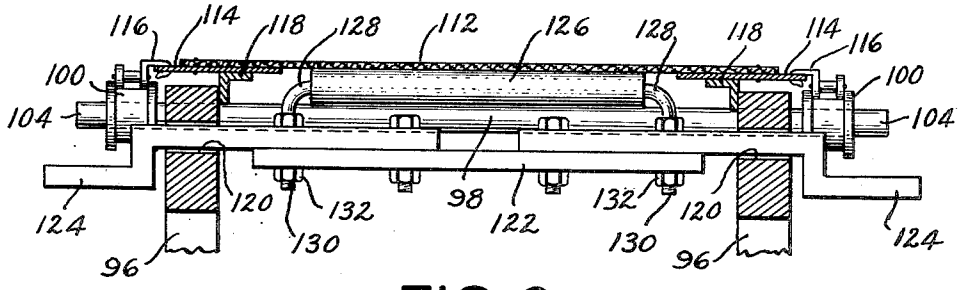


FIG. 6.

INVENTOR
BROOK H. ROLLINS, JR.
BY Raymond Wootton
ATTORNEY

June 29, 1954 B. H. ROLLINS, JR 2,682,287

SKIN REMOVING DEVICE

Filed March 31, 1949

4 Sheets-Sheet 4

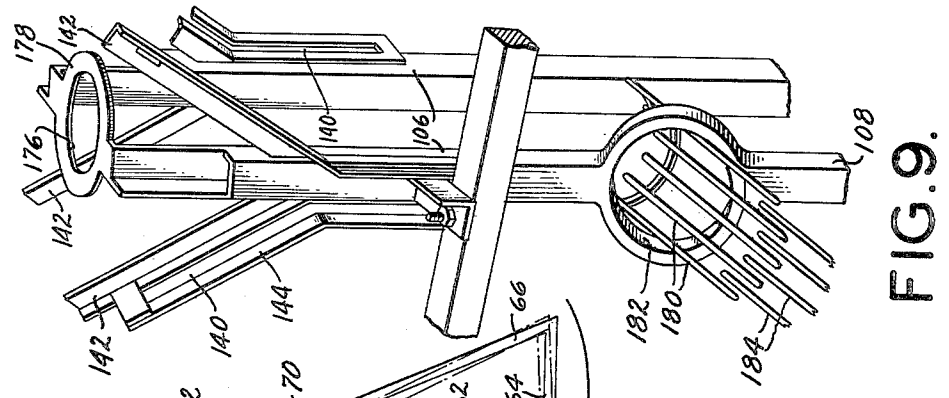


FIG. 9.

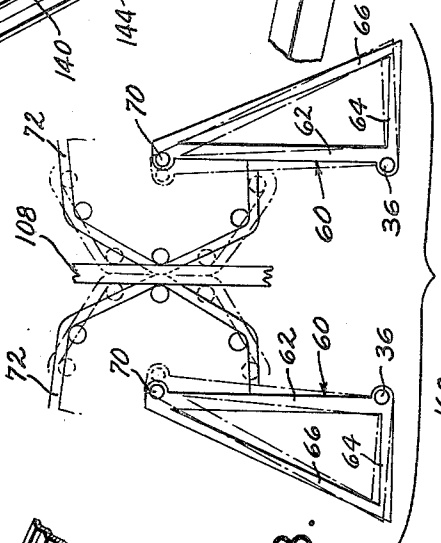


FIG. 8.

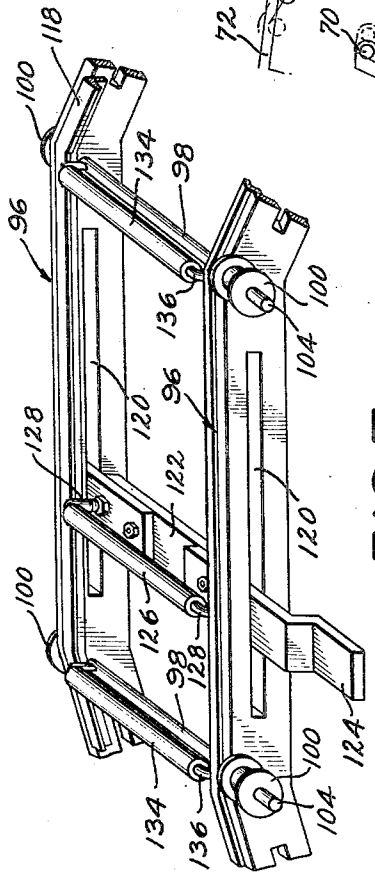


FIG. 7.

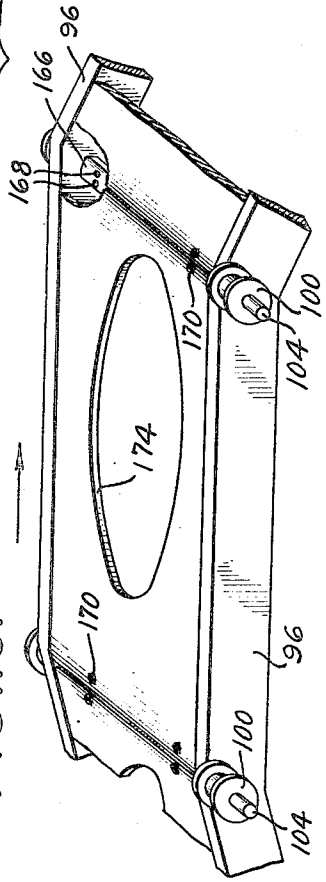


FIG. 10.

INVENTOR
BROOK H. ROLLINS, JR.
BY Raymond Wolter
ATTORNEY

Patented June 29, 1954

2,682,287

UNITED STATES PATENT OFFICE

2,682,287

SKIN REMOVING DEVICE

Brook H. Rollins, Jr., Baltimore, Md.

Application March 31, 1949, Serial No. 84,690

10 Claims. (Cl. 146—43)

1

This invention is directed primarily to apparatus and methods for skinning tomatoes, although it may find application to the removal of skins from other types of food.

Despite the large number of patents previously granted for methods and apparatus intended for the removal of skins from tomatoes, it is still the practice, even in the largest canneries, to perform this operation by hand. The cost of this manual operation has always been appreciable, but with the ever increasing labor costs, this operation has become a major item in the purchase price of canned tomatoes.

Inasmuch as tomatoes are ordinarily scalded and cored before their skins are removed, one of the principal difficulties to be overcome is to avoid crushing the tomato during the skinning operation.

The objects of the present invention contemplate apparatus and methods by which tomatoes can be skinned without crushing, even though they have been submitted previously to such scalding and coring operations. The tomato skinning apparatus here under consideration, comprises opposed separable frame members having proximate discontinuous surfaces; and a pair of tomato engaging elements between the members, bridging the surfaces and separable to receive a tomato therebetween; the elements being deformable to define a tomato receiving pocket with the members, and shiftable relative to the members to remove the skin from a tomato in the pocket. The tomato engaging elements are preferably flexible and resilient, and may assume the form of endless webs or belts. The frame members may be pivotally supported in the frame and suitably biased towards one another. These frame members may include rotors containing registrable peripheral discontinuous portions into which the tomato engaging elements are deformable to form the pockets. The discontinuous surfaces may define variable tomato receiving openings, being relatively movable to conform with tomatoes of various sizes. The discontinuous surfaces may also assume the form of perforated plates, in which case the tomato engaging elements will be deformed by a tomato to enter the perforations when they are moved into registry.

The rotary frame members or rotors are preferably intermittently driven in opposite directions, while their peripherally supported tomato engaging elements or webs are driven in the same direction as the rotors respectively, for relative movement with respect to the rotors during at

2

least a portion of the operation of the machine. Separate driving motors may be employed for transmitting the intermittent movement to the rotors and continuous movement to the tomato engaging elements. Tomatoes are introduced between the tomato engaging elements at one side of the rotors to be received in the pockets, whereupon movement of the tomato engaging elements with respect to the rotors removes the skin and discharges it at the other side of the rotors, whereupon movement of the rotors will subsequently discharge the skinned tomato from the latter side of the rotors.

The method comprises embracing substantially the entire surface of a tomato with a plurality of friction surfaces, and advancing the surfaces relative to the tomato at substantially equal speeds. An envelope is formed to flexibly confine the tomato, and the envelope is advanced together with the skin of the tomato while continuing to confine the tomato and restrain its movement. Expressed differently, the method comprises forming a pocket in frictional contact with and substantially conforming to a tomato, and advancing the pocket and the skin of the tomato while maintaining the conformation of the tomato and restraining its movement.

A more complete understanding of the invention will follow a detailed description of the accompanying drawings wherein:

Fig. 1 is a front elevation of a machine embodying the invention, from which the feed and discharge chutes have been removed;

Fig. 2 is a plan view of the machine depicted in Fig. 1;

Fig. 3 is a rear elevation of the machine shown in Fig. 1;

Fig. 4 is a fragmentary plan view of the machine from which most of the upper portions have been removed in order to depict the arrangement of the driving connections;

Fig. 5 is a fragmentary schematic elevation depicting the manner in which the work is engaged for a skin removing operation;

Fig. 6 is a fragmentary sectional elevation along line 6—6 of Fig. 1;

Fig. 7 is a fragmentary perspective of one form of work confining device;

Fig. 8 is a diagrammatic view illustrating relative movement imparted to certain of the parts;

Fig. 9 is a fragmentary perspective of a portion of the frame and a discharge chute; and

Fig. 10 is a fragmentary perspective of a modified form of work confining device.

The machine depicted in the drawings com-

prises a frame 20 having a lower section composed of longitudinal members 22 connected at their ends by transverse members 24. An upper section comprising longitudinal members 26 joined by transverse end members 28, is supported from the lower section by corner columns 30. The frame is supported by legs 32 provided with suitable rollers 34.

A pair of transverse shafts 36 are journalled on the longitudinal members 22 of the lower frame section to which they are rotatably secured by means of bearing caps 38. The forward ends of these shafts have beveled gears 40 keyed thereto which are in mesh with complementary beveled gears 42 keyed to a shaft 44 driven from a reduction gear box 46, driven through a shaft 48 from a driving motor 50 suitably secured to the frame. It will be noted that the arrangement of the beveled gears 40 and 42 will effect opposite rotation of the shafts 36. Loosely mounted on the rear ends of the shafts 36 are a pair of interengaged gears 52 driven by a smaller gear 54 which is secured to a shaft 56 of a driving motor 58, suitably secured to the frame.

Between the longitudinal frame members 22, triangular frame members 60 are pivotally supported by the shafts 36, each of the triangular members comprising a vertical leg 62, a horizontal leg 64 and a hypotenuse 66. These triangular frames are mounted in properly spaced relationship relative to the longitudinal frame members 22 by means of collars, or otherwise. Near the upper apices of the frame members 60, journals 68 are provided for the reception of shafts 70 to which rotors 72 are secured. Each of these shafts 70 has secured thereto a Geneva gear 74 which is intermittently advanced by a driving member 76 carrying a pin or roller 78 which cooperates with the notches 80 of the Geneva gear. These driving members are secured to shafts 82 to which are also secured spur gears 84 in constant mesh with the gears 52 respectively. The shafts 82 are rotatably supported upon the frame members 60, by means of bearing caps 86. Thus it will be clear that continuous rotation of the motor shaft 56 and its spur 54 will rotate the gears 52, which in turn drive the spur gears 84 and the driving members 76 to produce intermittent equal displacements of the Geneva gears 74.

These Geneva gears are provided with hubs 86 having bores 88 securely attached to the shafts 70 which are also fixed to the hubs 90 of the rotors 72. Each of the rotors comprises a pair of spaced webs 92, 94, having polygonal peripheral members 96, integral therewith as depicted in Fig. 5, or separately formed, as shown in Figs. 7 and 10, for attachment to the webs by welding or otherwise. Near the vertices of the polygonal members, shafts 98 are provided to rotatably support guide rollers 100 for chains 102. These shafts 98 have outwardly projecting ends 104 for engagement with the rear portions of side walls 106 of a pair of guide columns 108, so that as the rotors advance, the shaft ends 104 will ride on the walls 106, causing the triangular frame members 60 to rock about their transverse shafts or pivots 36 and thus maintain sufficient clearance between the vertices of the polygonal peripheral members 96 to assure that they will pass one another in bringing the next pair of complementary faces of the rotor polygons into registry, under the influence of one or more springs 109 secured to the frame members and biasing them towards one another.

The endless chains 102 are threaded over the guide rollers 100 and over spaced sprockets 110 fixed to the shafts 36, and accordingly, the chains will be driven from the motor 50, shaft 48, reduction gearing 46, bevel gears 42, 40, shaft 36 and sprockets 110. Each pair of chains 102 is bridged by an endless tomato engaging web or element 112 of resilient, deformable fabric, whose edges are secured to endless tapes 114 which are in turn secured to the chains 102 by means of hooks 116. These webs, or their tapes, ride on angle members 118 which are suitably secured to the peripheral members 96 and similarly polygonal peripherally.

Parallel with each side of the polygonal periphery of each web member, a slot 120 is formed to receive and guide composite bars 122 whose stepped ends 124 project beyond the webs, and beyond the ends 104 of the shafts 98 for a purpose to be described. Secured to each bar, and reciprocable therewith, is a roller 126 serving to contact the underside of the web 112, the roller being secured to the bar by means of curved brackets 128 whose threaded ends 130 penetrate the bar 122 to receive securing nuts 132. Each of the shafts 98 also rotatably supports a roller 134 by means of brackets 136 secured to the shafts, these rollers also serving to contact the underside of the endless web 112. As the rotors turn, the bars 122 tend to gravitate with their rollers 126 towards the lowermost positions in their slots. Since it is intended that a tomato be introduced into a pocket formed by the webs 112 between opposed vertex rollers 134 and opposed traversing rollers 126, means has been provided to retard the descent of the bars 122 until the rotors have advanced sufficiently to assure that a tomato will receive its proper position in a pocket. This mechanism includes a pair of arms 138 freely pivoted at one end about each of the shafts 70, their opposite ends projecting through slots 140 formed between the flanges of outwardly divergent angular members 142 and spaced guide members 144. These angular members and guide members are suitably joined together and to the guide columns 108 by welding or other suitable means. The arms 138 are resiliently supported by springs 146 suspended from brackets 148, which are secured to the longitudinal members 26. Downward travel of the arms is limited by adjustable nuts 150 threaded on rods 152 which are pivotally received by the arms and slidable in the perforated upper ends of the brackets 148. Each of the arms 138 pivotally supports a trip lever 154 imposed in the path of the bars 122 by a spring 156 attached at one end to the lever and at the other end to a post 158 adjustably secured to the arm 138 by means of nuts 160. With the arm 138 in its uppermost position as depicted in full lines in Fig. 5, the bar 122 engages the trip lever 154. As the rotors advance downwardly from this position the bar 122 carries with it the trip lever 154 and the arm 138 until such time as the tension in the spring 146 is sufficient to cause the spring 156 to yield, a condition indicated by the broken line position of the arm 138 in Fig. 5. As soon as the lever 154 has released the arm 138 to the influence of gravity, the spring 146 will restore the arm to a position in the path of the next successive bar 122.

Thus it will be clear that the tomato 162 deposited in the bight formed by the webs 112 in

Fig. 5, will subsequently assume the position of the tomato 164 in the pocket produced by deformation of the webs between the vertex rollers 134 below, the traversing rollers 126 above, and the angle members 118 forwardly and rearwardly. Since the rollers 126 are self adjusting, the pockets will be formed to suit the size of the tomato engaged. Where tomatoes have been graded for size, a modified pocket forming arrangement such as that shown in Fig. 10 can be employed to support the webs 112. In this case the shafts 98 can be replaced by spacing members 166 provided with tapped openings 168 to receive screws 170 for fastening to the peripheral members 96, the plates 172 having circular openings 174 of a diameter determined by the size of the tomatoes to be handled. It will be noted that the openings 174 are located towards the leading edges of the plates for registry with the tomatoes which naturally gravitate to corresponding positions. In this case, the guide rollers 100 are supported on stub shafts 104.

The tomatoes are introduced to the bight between the deformable webs from a suitable hopper or conveyor, not shown, through the eye 176 formed in a bridging member 178 supported by the upper ends of the guide columns 108. While the rotors are stationary with a tomato 146 enclosed in the pocket or envelope as described with reference to Fig. 5, the webs 112 will continue to advance at substantially equal rates, literally rubbing or wiping the skin from the tomato and dropping it on or through the rods 180, spaced to permit passage of the skin therethrough, yet serving as a chute for the skinned tomato which will be deposited thereupon during the next intermittent movement of the rotors. The rods 180 extend through a discharge eye 182 formed in the forward guide column 108, where they terminate in overlapping relationship with the ends of similar rods 184 defining a delivery chute for the skinned tomatoes. By virtue of this arrangement, any skins which fail to pass through the rods 180 will move downwardly and fall from their ends.

By selecting the ratio of the adjustable gear box 46, or the motor speeds, or by varying the number of sides provided by the polygonal rotors, or by combinations of these variations and others, desired capacities can be achieved and the timing of the intermittent movements of the rotors with respect to the continuous movements of the tomato engaging webs can be adjusted for most satisfactory results.

Briefly summarizing the operation of the apparatus illustrated, the tomatoes to be handled may be graded, cored and scalded, and then fed into the machine through the eye 176 of the bridging member 178. Assuming that both motors 50 and 58 are operating at their proper relative speeds, and with the rotors in the positions depicted in Fig. 1, the continuously moving webs 112 will advance the first tomato into their bight until the intermittent drive becomes effective to advance the rotors. As the rotors advance, the projecting ends 194 ride upon the guide columns 108 causing the frame members 60 to rock about their pivots 36. Downward movement of the traversing rollers 126 is restrained by the trip levers 154 until the tomato has moved to approximately the position assumed by the tomato 164 of Fig. 5, whereupon the rollers 126 are released to close the envelope or pocket tightly about the tomato by the time the rotors come to rest. Continued motion of the webs rubs

or wipes the skin from the tomato, discharging it to or through the rods 180. The next movement of the rotors discharges the skinned tomato to the chute formed by the rods 184 and envelops the next tomato to be skinned which has previously been deposited to the upper bight between the webs.

Many variations of the apparatus will be suggested by this disclosure to those skilled in the art, just as they have occurred already to the present inventor, and accordingly, the invention should not be restricted to the examples illustrated herein beyond the scope of the appended claims.

I claim:

1. Tomato skinning apparatus comprising a frame, opposed separable members pivotally supported by said frame; rotors supported in said members respectively, said rotors having proximate discontinuous surfaces; a pair of tomato engaging webs peripherally supported by said rotors respectively, said webs bridging said surfaces and separable with said rotors to receive a tomato therebetween; said webs being deformable to define a tomato receiving pocket with said rotors, and shiftable relative to said rotors to remove the skin from a tomato in said pocket; intermittent driving means interconnected with said rotors; and driving means interconnected with said webs for advancing them relative to said rotors.

2. Tomato skinning apparatus comprising a frame, opposed separable members pivotally supported by said frame; rotors supported in said members respectively, said rotors having peripheral surfaces containing a plurality of registrable openings; a pair of tomato engaging webs peripherally supported by said rotors respectively, said webs bridging said openings and separable with said rotors to receive tomatoes therebetween; said webs being deformable to define tomato receiving pockets with said openings, and shiftable relative to said rotors to remove the skin from tomatoes in said pockets; intermittent driving means interconnected with said rotors for advancing said openings into registration; and driving means interconnected with said webs for advancing them relative to said rotors.

3. Tomato skinning apparatus comprising a frame, opposed separable members pivotally supported by said frame; rotors supported in said members respectively, said rotors having peripheral surfaces adapted to receive tomatoes therebetween; a pair of flexible tomato engaging webs peripherally engaging said rotors respectively, said webs bridging said surfaces and separable with said rotors to receive tomatoes therebetween; said webs being deformable to define tomato receiving pockets with said rotors, and shiftable relative to said rotors to remove the skin from tomatoes in said pockets; intermittent driving means interconnected with said rotors; and driving means interconnected with said webs for advancing them relative to said rotors.

4. Vegetable skinning apparatus comprising a frame, opposed separable members movably supported by said frame; vegetable carriers movably supported in said members respectively, said carriers having proximate discontinuous surfaces; a pair of vegetable engaging webs supported by said carriers respectively, said webs bridging said surfaces and separable with said carriers to receive a vegetable therebetween; said webs being deformable to define a vegetable receiving pocket with said carriers, and shiftable

relative to said carriers to remove the skin from a vegetable in said pocket; intermittent driving means interconnected with said carriers; and driving means interconnected with said webs for advancing them relative to said carriers.

5. Tomato skinning apparatus comprising a frame, opposed separable members pivotally supported by said frame; tomato carriers movably supported in said members respectively, said carriers having proximate discontinuous surfaces; a pair of resilient tomato engaging webs supported by said carriers respectively, said webs bridging said surfaces and separable with said carriers to receive a tomato therebetween; said resilient webs being deformable to define a tomato receiving pocket with said carriers, and shiftable relative to said carriers to remove the skin from a tomato in said pocket; intermittent driving means interconnected with said carriers; and driving means interconnected with said webs for advancing them relative to said carriers.

6. Tomato skinning apparatus comprising a frame, opposed separable members pivotally supported by said frame; means biasing said members towards one another; rotors supported in said members respectively, said rotors having proximate discontinuous surfaces; a pair of tomato engaging webs peripherally supported by said rotors respectively, said webs bridging said surfaces and separable with said rotors to receive a tomato therebetween; said webs being deformable to define a tomato receiving pocket with said rotors, and shiftable relative to said rotors to remove the skin from a tomato in said pocket; intermittent driving means interconnected with said rotors; and driving means interconnected with said webs for advancing them relative to said rotors.

7. Tomato skinning apparatus comprising a frame, opposed separable members pivotally supported by said frame; rotors supported in said members respectively, said rotors having proximate discontinuous surfaces defining variable tomato receiving openings; said surfaces being relatively movable to vary the size of said openings; a pair of tomato engaging webs peripherally supported by said rotors respectively, said webs bridging said surfaces and separable with said rotors to receive a tomato therebetween; said webs being deformable to define a tomato receiving pocket with said rotors, and shiftable relative to said rotors to remove the skin from a tomato in said pocket; intermittent driving means interconnected with said rotors; and driving means interconnected with said webs for advancing them relative to said rotors.

8. Tomato skinning apparatus comprising a frame, opposed separable members pivotally supported by said frame; rotors supported in said members respectively, said rotors having proximate discontinuous surfaces; a pair of tomato engaging webs peripherally supported by said rotors respectively, said webs bridging said surfaces and separable with said rotors to receive a tomato therebetween; said webs being deformable to define a tomato receiving pocket with said rotors, and shiftable relative to said rotors to remove the skin from a tomato in said pocket; intermittent driving means interconnected with said rotors and with said frame members; and driving means interconnected with said webs for advancing them relative to said rotors.

9. Tomato skinning apparatus comprising a frame, opposed separable members pivotally supported by said frame; rotors supported in said members respectively, said rotors having proximate discontinuous surfaces; a pair of tomato engaging endless webs peripherally supported by said rotors respectively, said webs bridging said surfaces and separable with said rotors to receive a tomato therebetween; said webs being deformable to define a tomato receiving pocket with said rotors, and shiftable relative to said rotors to remove the skin from a tomato in said pocket; intermittent driving means interconnected with said rotors; and driving means interconnected with said webs for advancing them relative to said rotors.

10. Tomato skinning apparatus comprising a frame, opposed separable members pivotally supported by said frame; rotors supported in said members respectively, said rotors carrying peripheral plates containing tomato receiving openings; a pair of tomato engaging webs peripherally supported by said rotors respectively, said webs covering said openings and separable with said rotors to receive a tomato therebetween; said webs being deformable to define a tomato receiving pocket with said rotors, and shiftable relative to said rotors to remove the skin from a tomato in said pocket; intermittent driving means interconnected with said rotors; and driving means interconnected with said webs for advancing them relative to said rotors.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
902,428	Milhado	Oct. 27, 1908
1,033,154	Collins	July 23, 1912
1,118,547	Griffin	Nov. 24, 1914
1,122,859	Chase et al.	Dec. 29, 1914
1,350,506	Kennedy	Aug. 24, 1920
1,467,616	Forry	Sept. 11, 1923
1,743,858	Kruse	Jan. 14, 1930
1,976,710	Carpentieri	Oct. 16, 1934
1,991,324	Keech	Feb. 12, 1935
2,166,883	Wehr	July 18, 1939
2,207,278	Albrecht	July 9, 1940
2,448,229	McDowell	Aug. 31, 1948