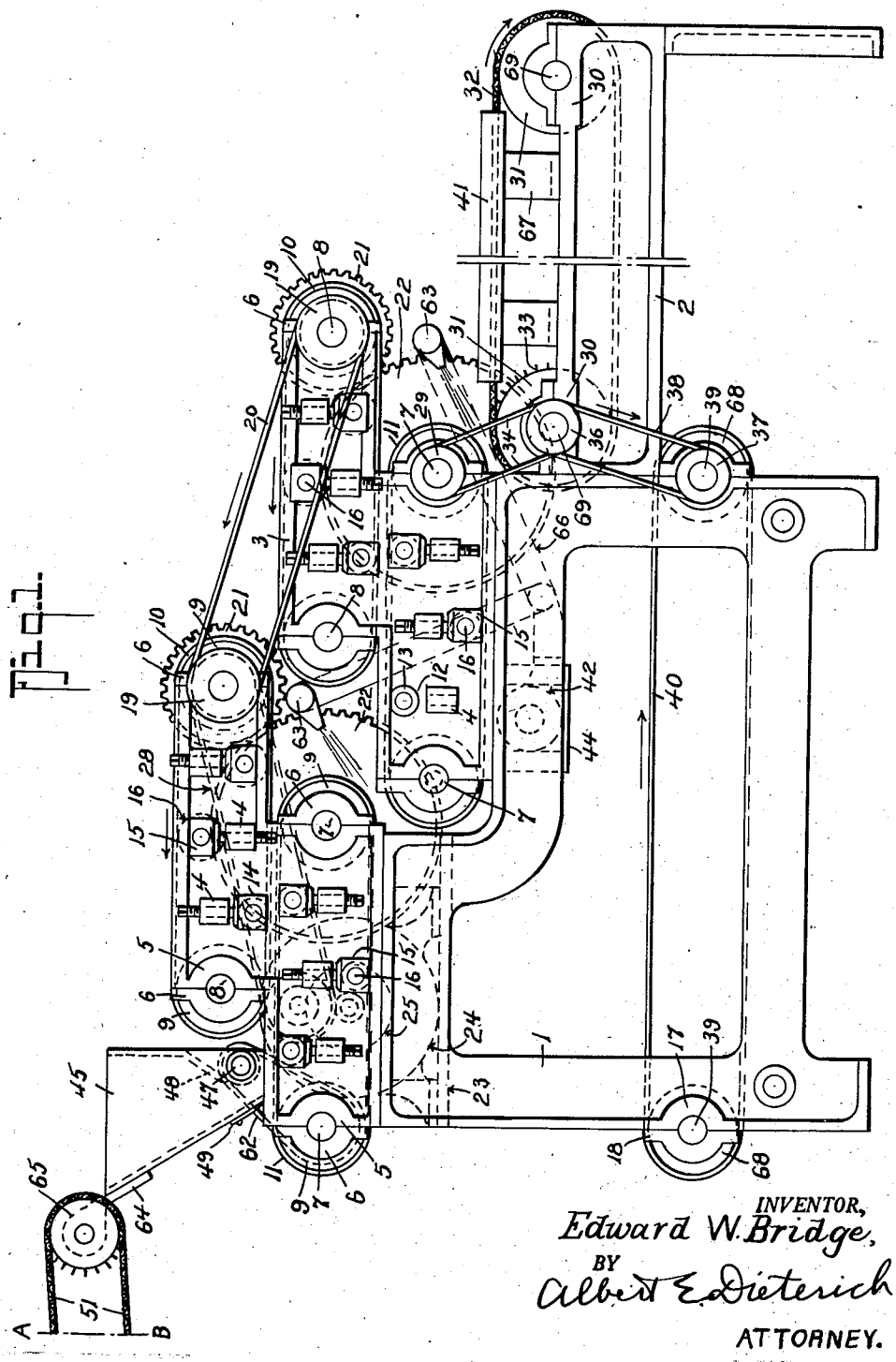
Dec. 30, 1947. E. W. BRIDGE 2,433,730

NUT BLANCHING MACHINE INCLUDING PAIRED RUBBING BELTS

Filed Feb. 25, 1946 3 Sheets-Sheet 1

Fig. 1.



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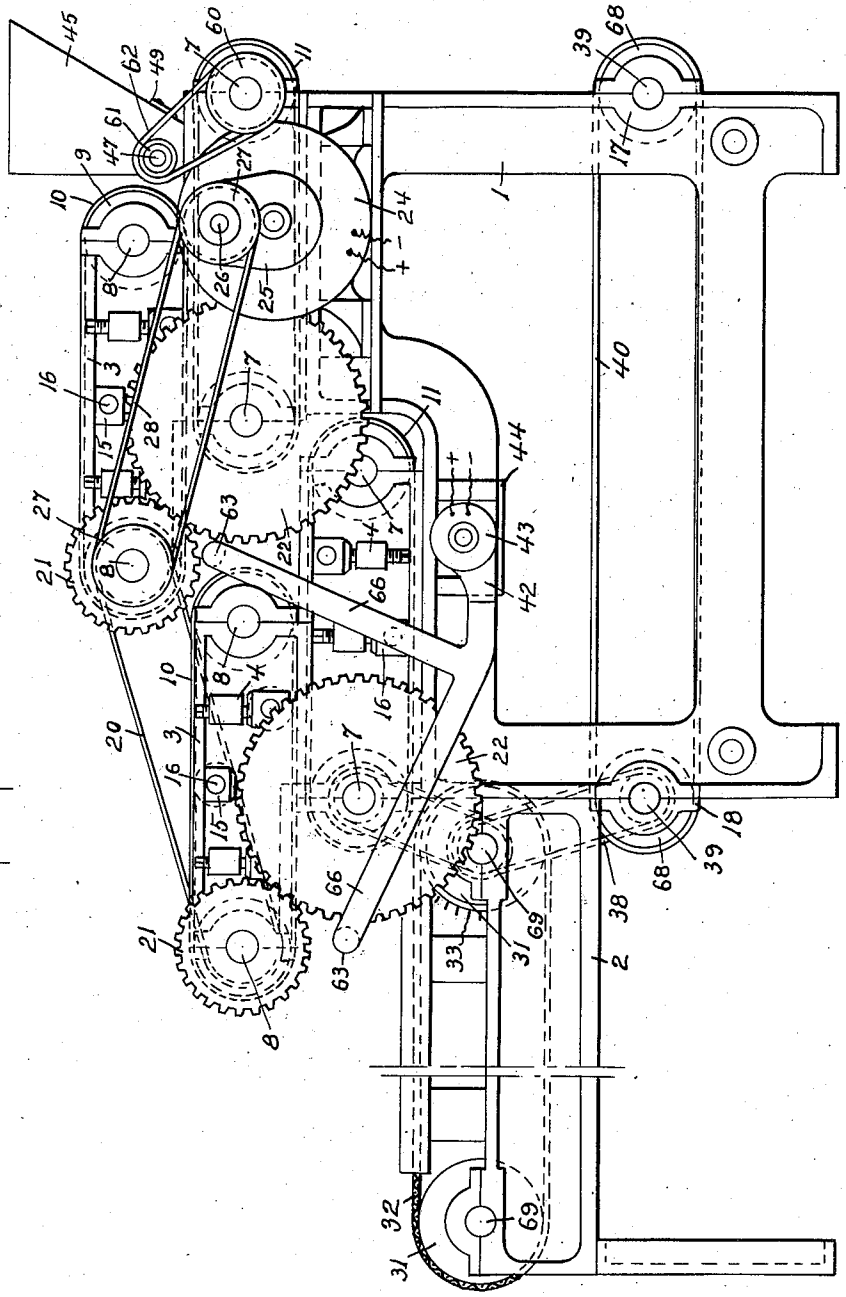


Fig. 2.

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Fig. 3.

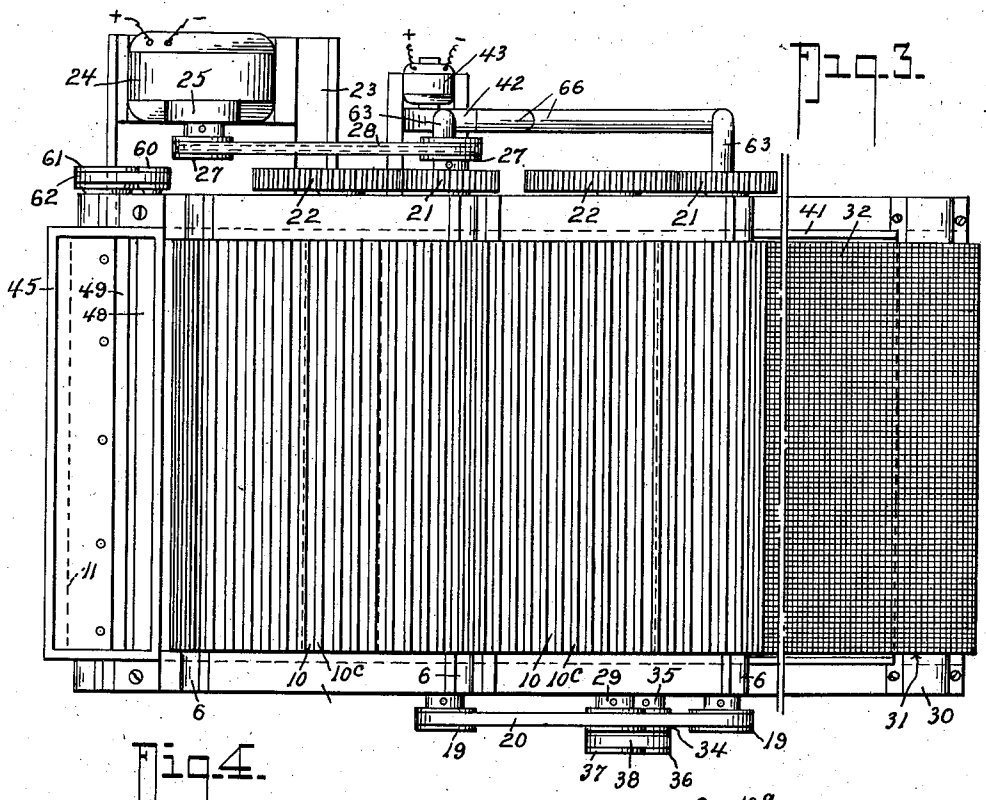


Fig. 4.

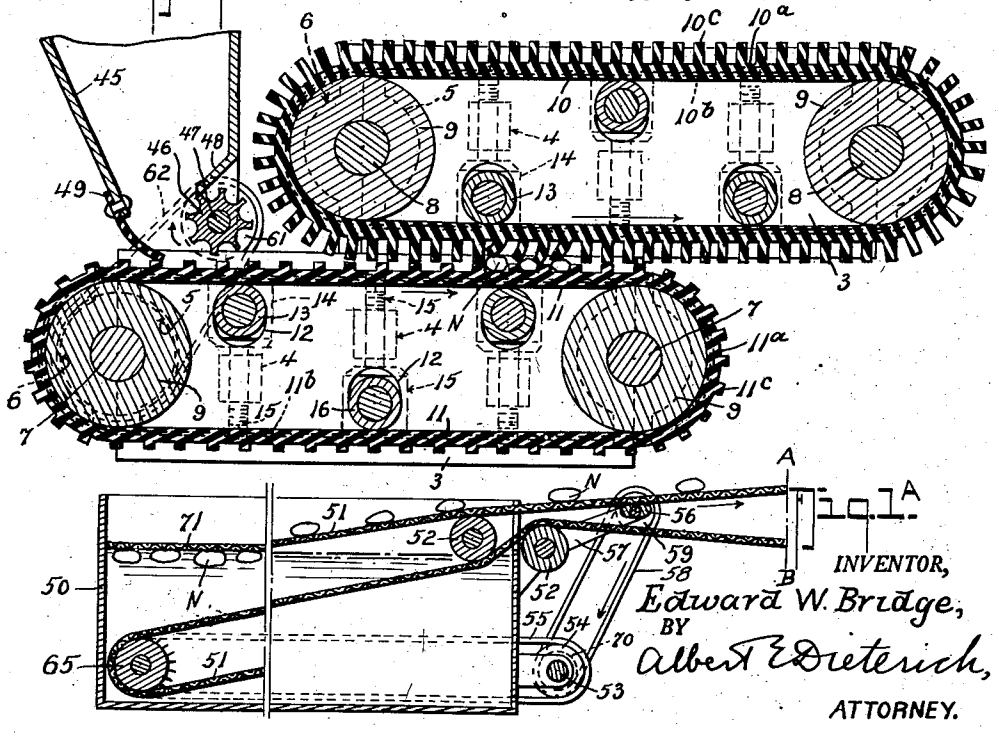


Fig. 1A.

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NUT BLANCHING MACHINE INCLUDING PAIRED RUBBING BELTS

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Application February 25, 1946, Serial No. 649,984

7 Claims. (Cl. 146—32)

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My invention relates to the art of removing the skins and/or hulls from nuts such as almonds, and the like, and it particularly has for its objects: to provide a machine for removing the shells or hulls from nuts in one pass through the machine; to provide mechanism having provisions, first, to give the nuts a hot water or steam bath, convey the nuts from the bath to a machine for removing the hulls or skins, and there loosening and removing the hulls and skins.

A further object of the invention is to provide sets of upper and lower belts, the lower belt having transverse relatively shallow relatively non-flexible transverse ribs spaced apart a distance sufficient to permit a large nut to drop into the groove between an adjacent pair of ribs so as to be carried in said groove through the first section of the machine, while the upper belt being provided with deep easily flexible transverse ribs spaced apart and traveling substantially faster than the lower belt, imparts to the nut a wiping action which breaks the hull. The deep flexible ribs of the upper belt are self-adjusting for various thicknesses of the nuts.

Other objects will in part be obvious and in part be pointed out hereinafter.

To the attainment of the aforesaid objects and ends, the invention still further includes those novel details of construction, combination and arrangement of parts all of which will hereinafter be fully described and then will be specifically pointed out in the appended claims, reference being had to the accompanying drawings, in which:

Figs. 1–1A (joined on the line A—B) is a side elevation of my apparatus, the parts in Fig. 1A being shown in section.

Fig. 2 is a side elevation of the skin and hull removing machine.

Fig. 3 is a top plan view of the same.

Fig. 4 is an enlarged detail longitudinal section of a portion of the same.

In the drawings, in which like numerals of reference indicate like parts in all the figures, 1 is the main frame of the machine to which is attached the nut-offtake conveyor frame 2 and one or more sub-frames 3. The sides of the frames 3 are provided with bosses 4 that are bored and tapped to receive the adjusting screws of belt pressure roller adjusters 14 and belt tightener roller adjusters 15. The belt pressure rollers are indicated by 13 and the belt tightener rollers are indicated by 16.

The sub-frames 3 have upper and lower pairs of bearings 5 with caps 6 for the shafts 8 and 7

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of the upper and lower raised face belts 10 and 11 respectively.

The lower belt 11 is formed of rubber 11a having a fabric backing 11b. It is provided with relatively thick shallow transverse ribs 11c which are spaced apart a distance sufficient to constitute transverse troughs to receive the nuts N between them. The upper belt 10 is also formed of rubber 10a fabric back as at 10b, and provided with relatively long or deep flexible transversely disposed ribs 10c, the ribs 10c being spaced apart preferably a lesser distance than the spacing of the ribs 11c. The ribs 10c and 11c preferably have their opposed faces disposed in close juxtaposition along their operative flights as is best shown in Fig. 4.

The shafts 8 and 7 carry rollers 9 about which the belts 10 and 11 travel. The sub-frames 3 have slots 12 to permit adjustments of the rollers 13 and 16 respectively.

The frame 1 may be provided with bearings 17 and caps 18 for the shafts 39 of a skins-and-hulls offtake conveyor rollers 68 about which rollers the endless belt 40 passes.

The driving ones of the shafts 8 (right hand ones in Fig. 1) have pulleys 19 about which an endless belt 20 passes, and each said driving shaft 8 also has a small spur gear 21 which meshes with a large spur gear 22 on the shaft 7 below the shafts 8, 8. The shaft 7, which has the gear 22, carries a driving roller 9 around which, and a second roller 9 on the other shaft 7, the lower raised-face belt 11 passes.

A frame 3 and the parts 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 19 and 21 constitute a complete assembly or unit. As many of these units may be included in the machine as may be found necessary (usually two) in order completely to free the nuts of their skins and hulls.

A bracket 23 is secured to the main frame 1 and supports the drive motor 24 and reduction gear mechanism in a housing 25. The motor and reduction gearing may be of any approved type. The drive shaft 26 of the motor-gearing is connected to drive shaft 8 of the first unit by a belt 28 and pulley 27, as best shown in Fig. 2.

The driven shaft 7 of the second unit carries a pulley 29 over which an endless belt 34 takes. The belt 34 also takes over a pulley 35 on a shaft 69 of the nut offtake conveyor. A second pulley 36 on shaft 69 is provided to receive a belt 38 that in turn passes over a pulley 37 on a shaft 39 of the hull and skins conveyor. The frame 2 is provided with bearings 30 for the shafts 69. The shafts 69 carry rollers 31 over

which the endless foraminous (preferably wire) belt 32 passes. The driving one of the rollers 31 is provided with driving pins 33.

An inspection table 41, mounted below the upper flight of the conveyor belt 32, is provided as shown.

A blower 42 and a drive motor 43 therefor are mounted on a bracket 44 secured to the main frame 1. Blower pipes 66 convey the air from the blower 42 to the nozzles 63 whose outlets are directed downwardly at an angle to blow between the discharge end of the lower conveyor 11 of one unit and the intake end of the lower conveyor of the next unit below, to blow the loosened hulls and skins from the nuts as they leave one unit and pass onto the next succeeding unit.

45 designates a hopper into which the nuts, which have previously been steamed or subjected to a hot water bath, are delivered. The hopper is mounted on the first unit at its entrant end so as to deliver the nuts onto the lower conveyor of the unit in advance of the upper conveyor of the same, as best shown in Fig. 4, by reference to which it will be seen that the bottom of the hopper is open and there is provided a corrugated roller 46 whose shaft 47 carries a pulley 61. A baffle 48 deflects the nuts and prevents their being carried over by the roller 46. A flexible flap 49 drags on the belt 11 and deflects the nuts toward the roller 46.

As a part of my continuous process of blanching nuts, I provide a tank 50 and a foraminous conveyor (preferably wire) 51 for conveying the nuts from the tank 50 to the hopper 45. The conveyor 51 includes rollers 65 mounted in suitable bearings in the tank 50 and on a bracket 64 which may be attached to the hopper 45.

The conveyor 51 passes over guide rollers 52 and is driven from a shaft 53 by a belt 55 passing over a pulley 54 on shaft 53 and a similar pulley on the shaft of the tank pulley 65, and outside the tank (see Fig. 1A). The shaft 53 is preferably driven by a third motor (not shown) so that the speed of the conveyor 51 may be regulated independently of the speeds of the conveyors of the two complete assemblies or units on frame 1, for purposes later clearly understood. There is also provided an agitator 56 on a suitable support 57, driven by belt 58 and pulleys 59 and 70 from shaft 53. The agitator serves to shake the belt 51 to throw off water from the nuts, hulls and skins as they are carried from the tank 50 to the hopper 45.

To hold the nuts below the water line in the tank 50 I provide a screen 71, as shown in Fig. 1A.

The forward shaft (left hand one in Figs. 1 and 4) 7 of the first unit has a pulley 60 over which, and over the pulley 61 on shaft 47, an endless belt 62 passes. When belts and pulleys are used for the various drives, I prefer to use V-type belts and pulleys. However, if found desirable, sprocket and chain drives may be substituted.

The width of the machine will depend on the width of the belts 10 and 11, whose widths may be from one to twelve inches or more for mass production.

Operation

The nuts to be blanched are placed in the soaking tank 50 where they are subjected to hot water or steam treatment for a time sufficient to loosen the hulls and skins. From the tank 50 the nuts, etc. are conveyed to and dumped into the hopper 45. The interval of time the nuts are retained in tank 50 will be determined by the nut being

treated, which time varies slightly in various kinds of nuts. After the nuts have emerged from tank 50, the vibrating device 56 vibrates the wire mesh belt 51 to remove some of the excess water from the belt and from the nuts. The belt 51 is of sufficient length to permit the nuts to cool somewhat before entering the grooved-face rubber blanching belt 11. The roller 46 of the feed hopper 45 turns in a clockwise direction in Fig. 4 and forces the nuts back away from the lower grooved face rubber belt. This feed regulating roller is to prevent choking the mouth of the feed hopper, and regulate the layer of nuts to pass through and between the aforesaid grooved face rubber belts.

The grooved-face rubber belts 10, 11 are provided for each unit of the machine, one running over the top of the other. Both belts of a unit run in the same direction to carry the nuts forward, the upper and lower belts being adjustable to apply the proper pressure on the nuts that pass between the two moving belts. The rubbing or blanching action takes place while one belt is travelling at a higher rate of speed than the other. The slower moving belt is merely a pressure belt for retarding the forward travel of the nuts, while at the same time acting as a means for transporting the nuts from one end to the other of the grooved face rubber belts. The upper belt of each unit is placed somewhat ahead of the lower belt to leave room to permit feeding the nuts on a flat surface of the lower belt. The upper belt 10 being provided with deep flexible rubber ribs and traveling fast over the top of the lower belt permits the transverse rubber ribs of the upper belt to flex or yield according to the thickness of the nuts. This high flexible transverse rubber rib becomes self-adjusting for the various thicknesses of the nuts or in other words, take three nuts, one directly in back of the other, going through the machine, the flexible rubber transverse ribs of the upper belt fan or brush across the tops of the nuts. The thickest nut will get sufficient pressure applied to break the hull in one pass. Then the nuts are transferred to the second and third stages of the machine. Here the nuts have the tendency to turn over on their opposite sides. This turning over action is not 100 per cent, but a great many will turn over. From here we continue the same process, going through the second stage rubbing the nut with a light flexible rubber transverse rib. The more passes and the more rubbing of the flexible ribs the nearer 100 per cent blanching we will get, eliminating shoveling the nuts back into the machine or having a lot of nuts crushed from too much pressure applied on the top and bottom sides of the nut. The same arrangement is carried out in each series of double belts.

Each pair of grooved face rubber belts 10, 11 is arranged so that the discharge end of one pair of belts is higher than that of the next succeeding pair. This allows the nuts to drop from one pair of belts to the next succeeding pair. In the course of dropping from one pair of belts to the next pair, the air blowing in the machine at this place will blow the light-weight skins and hulls away from the nuts, down to a lower accumulating belt 40 that removes the detritus from the machine. Another reason for dropping the nuts from one belt to the other is to give the nuts an opportunity to turn over.

As before intimated, the number of belt assemblies or units is optional, depending upon the condition of the nuts.

One of the improved features of my machine is that the use of two rollers with an endless grooved face rubber belt increases the time of friction on the nuts over what is possible in those machines using round rollers where the friction on the nuts is applied only at the time when the nuts are directly in a center line of the main axes on which the rollers turn.

While rubber belts 10 and 11 are preferable, canvas belts with suitable cleats may be used if desired.

When the upper belt is driven faster than the lower belt, the relatively deep flexible or resilient ribs 10c will tend to throw or flip the nuts from the lower belt at the discharge place of the lower endless conveyor, onto the receiving place of the next unit's lower conveyor and thus counteract any tendency of the blast from nozzles 63 driving the nuts meats with the hulls and skins back between the adjacent units. Attention is called to the fact that the spaces between the transverse ribs or cleats 11c serve as transverse gutters or troughs in which the nut kernels lie freely. Further the movement of the upper belt serves to push the kernels against the advance rib 11c, giving the nut a popping squeeze; the contact of the kernel with the advance rib 11c prevents the kernel from being merely rolled along the slower moving belt by the movement of the faster moving belt and insuring sufficient squeeze to be applied to the kernel to pop the kernel loose from the skin.

I also prefer to provide more ribs 10c per unit of length than there are ribs 11c thereby increasing the effectiveness of the wiping or rubbing action on the nuts.

The flap 49 being flexible-resilient and long enough to extend into the transverse grooves of the conveyor 11, as the conveyor moves the flap will vibrate and exert an agitating action on the nuts within the hopper thereby assisting roller 46 in preventing bridging in the hopper.

This application is a continuation in part of my application filed June 13, 1944 Serial No. 540,159 now abandoned.

From the foregoing description, taken in connection with the accompanying drawings, it is thought the construction, operation and advantages of my invention will be clear to those skilled in the art.

What I claim is:

1. In a machine for removing hulls and skins from nuts wherein the nuts are passed between endless belts, the improvement which comprises: a main frame; at least one unit mounted on said main frame and itself comprising a sub-frame; a lower endless conveyor belt having transverse ribs spaced apart to receive nuts in the spaces between the ribs, the ribs being of a depth less than the thickness of the smallest nut to be processed; two rollers journalled in said sub-frame about which rollers said lower belt passes; belt pressure rollers mounted on said sub-frame between the upper end lower flights of the belt; an upper endless nut-rubbing belt passing about two rollers mounted in said sub-frame; said upper endless belt having flexible ribs of greater depth than the depth of the ribs of the lower belt; belt pressure rollers mounted in said sub-frame and located between the upper and lower flights of the upper belt, the lower flight of the upper belt and the upper flight of the lower belt lying, in part at least, in close juxtaposition; means to drive said upper and lower belts at different speeds, by virtue of all of which the ribs of the upper belt on engaging a nut on the lower belt will flex and exert a wiping action on the nut to remove hulls and skin.

2. In a nut blanching machine: a main frame; a plurality of units, each including a sub-frame mounted on said main frame, an upper and a lower endless horizontally disposed belt conveyor mounted in the sub-frame, one conveyor above the other and set in advance of the lower conveyor, conveyor belt tighteners and pressure rollers carried by the sub-frame, gear connections between the upper and lower conveyors by means of which one conveyor travels faster than the other; said units being mounted in stepped relation so that the nuts from one unit are dropped on to the lower conveyor of the next succeeding unit; a hopper and nut feeding means mounted to deliver nuts onto the lower conveyor of the first unit; an inspection belt onto which the nuts are delivered by the last unit in turn; means between adjacent units for blowing away the skins and hulls as the nuts pass from one unit to the next succeeding unit, and means on the upper belts tending to flip the nuts from one unit to the other for purposes described.

3. In a nut blanching machine, the improvement which comprises: a frame; an upper pair of rollers with shafts journalled in bearings in said frame; a lower pair of rollers with shafts journalled in bearings in said frame; endless transversely grooved rubber belts passing, respectively, around said pairs of rollers and forming between them a pass for the nuts, the upper pair of rollers and belt being offset with respect to the lower pair of rollers and belt, the grooves and the upper belt being deeper than the grooves of the lower belt to provide ribs of greater resiliency and flexibility than the ribs formed between the grooves on the lower belt; a gear connection between an upper roller and a lower roller; means for delivering the nuts onto the lower belt, said means comprising a hopper, a feed roller in the hopper adjacent the lower belt, means for turning said feed roller in a direction to oppose movement of the nuts with the lower belt, and a flexible flap on the hopper opposite said feed roller and engaging the ribs of the belt beneath to prevent the nuts from crowding out that side of the hopper; and means for blowing away the hulls and skins as the nuts are delivered from the lower belt.

4. In a nut blanching machine: a main frame having stepped portions a nut rubbing and conveying unit mounted on each step, each unit comprising an upper endless belt conveyor and a lower endless belt conveyor parallel to one another, the upper conveyor at the discharge end of the unit overhanging the lower conveyor and the lower conveyor at the entrant end of the unit lying free of the adjacent end of the upper conveyor; a feed hopper over the free end of said lower conveyor; a blowing means at the discharge end of said upper and lower conveyors; means forming a part of the upper conveyor tending to throw or flip the nuts from one lower conveyor to the next lower conveyor, past the blowing means; and means for operating the aforesaid conveyors and blower.

5. In a nut blanching machine: a main frame having stepped portions; a nut rubbing and conveying unit mounted on each step; an extension frame secured to the main frame; an endless inspection belt and an inspection table mounted on said extension frame; a hull and skin offtake conveyor mounted on said main frame below said units; and means for blowing the hulls and skins

from the nuts onto said hull and skins offtake conveyor at the places where the nuts are passed from one unit to the next unit, and means in each unit for flipping the nut meats past said blowing means from one unit to the next.

6. In a nut blanching machine wherein is provided upper and lower longitudinally off-set horizontally disposed endless belts between which the nuts pass and onto the lower belt the blanched nuts are deposited, the improvement which comprises flexible belts for the machine, said belts being transversely grooved to leave transverse ribs, said belts being spaced apart a substantially greater distance than the thickness of a rib, the grooves being adapted to receive the nuts between two ribs and the ribs of the upper belt being flexible and resilient and being adapted to exert a wiping action on the nuts when one belt is running faster than the other, said lower belt at its front end passing through a feed hopper, said hopper where the belt enters being provided with a flexible resilient flap that engages the lower belt within the grooves thereof, and a feed roller spaced from said flap and located at the exit end of the hopper.

7. In a machine for removing hulls and skins from nuts wherein the nuts are passed between endless belts, the improvement which comprises: a frame; a lower endless conveyor belt having transverse ribs spaced apart to receive nuts in the spaces between the ribs, the ribs being of a depth less than the thickness of the smallest nut to be processed; two rollers journalled in said frame about which rollers said lower belt passes;

belt pressure rollers mounted on said frame between the upper and lower flights of the belt; an upper endless nut-rubbing belt passing about two rollers mounted in said frame; said upper endless belt having flexible ribs of greater depth than the depth of the ribs of the lower belt; belt pressure rollers mounted in said frame and located between the upper and lower flights of the upper belt, the lower flight of the upper belt and the upper flight of the lower belt lying, in part at least, in close juxtaposition; means to drive said upper and lower belts at different speeds, by virtue of all of which the ribs of the upper belt on engaging nuts on the lower belt will flex and exert a wiping action on the nuts to remove hulls and skins.

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