March 11, 1969 Y. C. VARGAS 3,431,701

ARTICLE-WRAPPING MACHINE

Filed April 27, 1965 Sheet 1 of 2

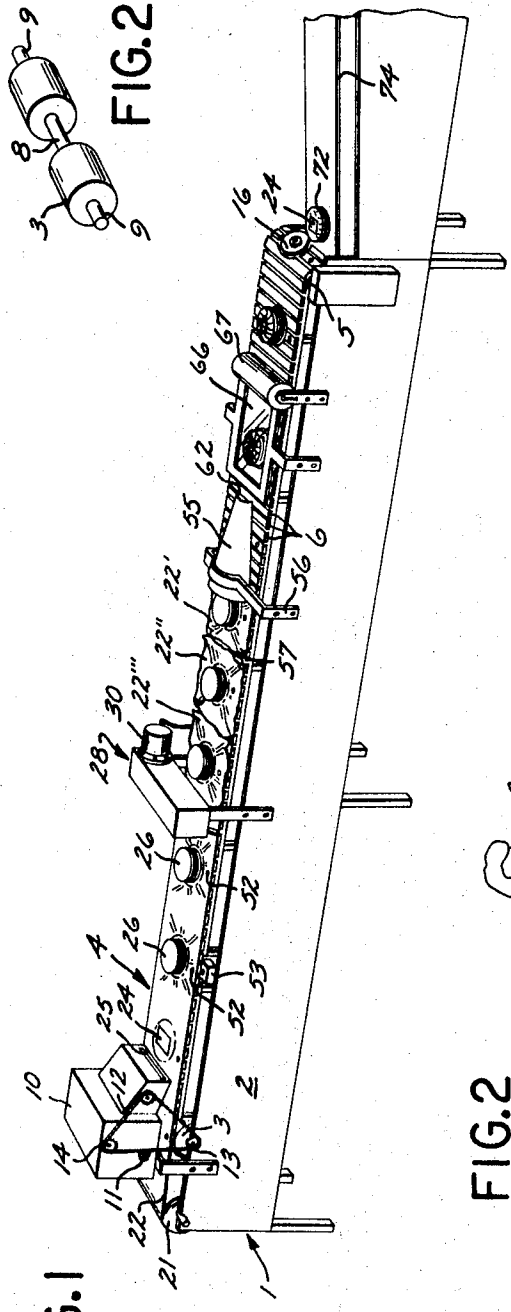


FIG. 1

FIG. 2A

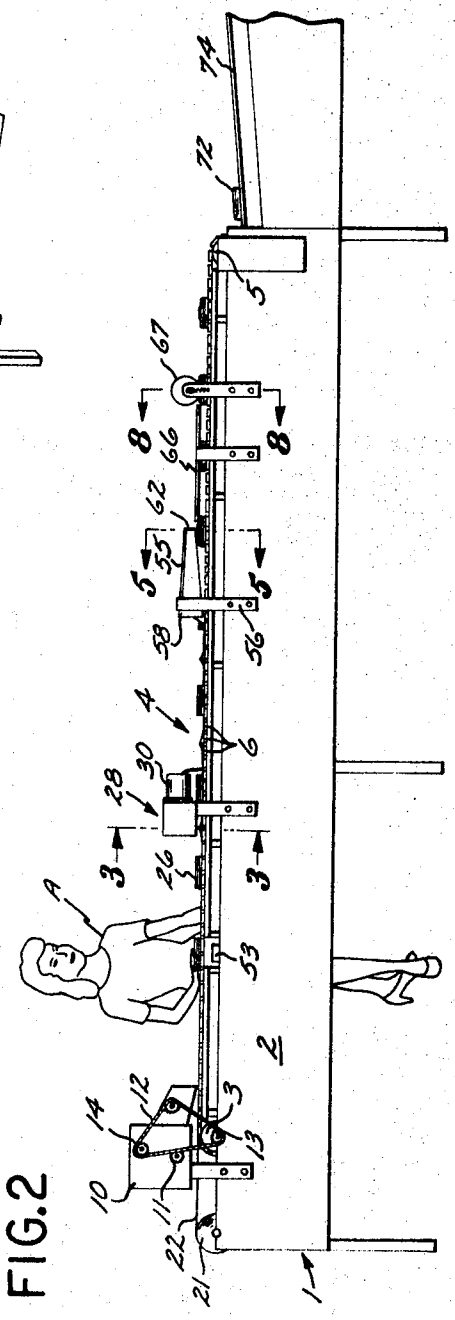


FIG. 2

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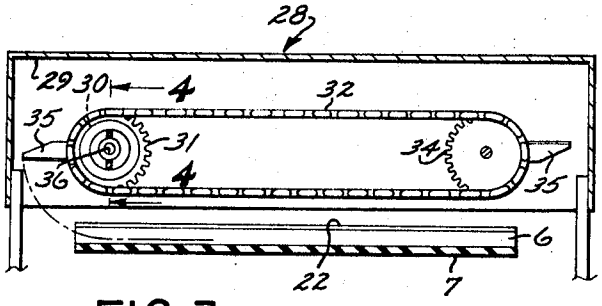


FIG. 3

FIG. 4

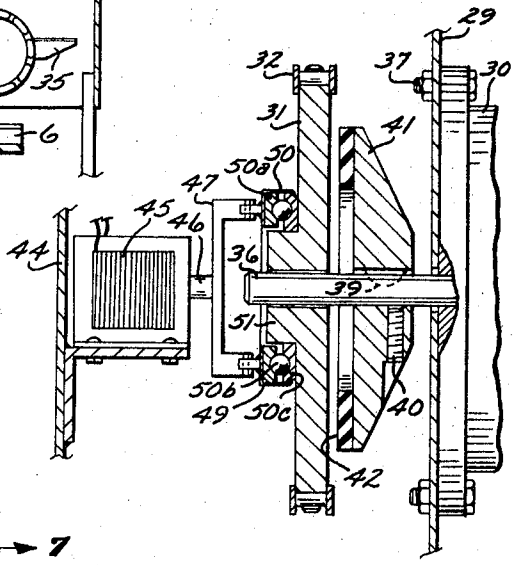


FIG. 5

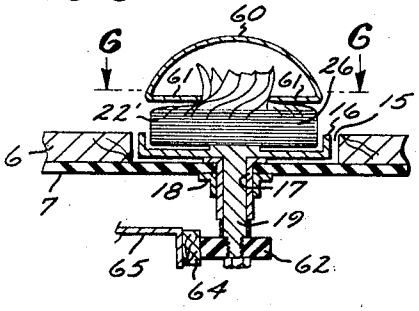


FIG. 8

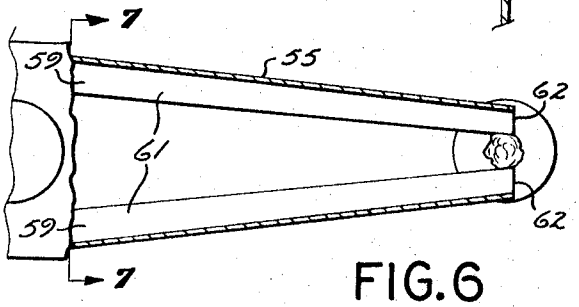
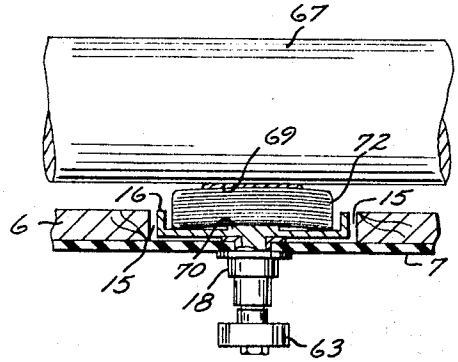


FIG. 6



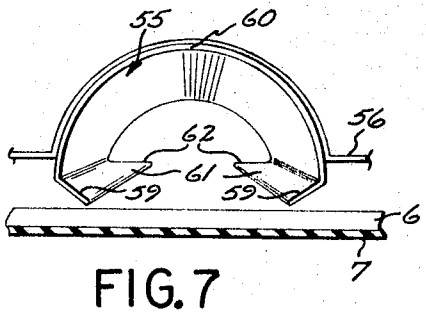


FIG. 7

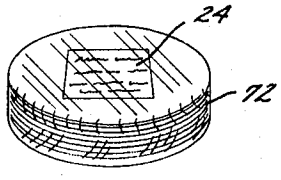


FIG. 9

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3,431,701

ARTICLE-WRAPPING MACHINE

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U.S. Cl. 53—209 8 Claims
Int. Cl. B65b 11/54, 49/12, 41/00

ABSTRACT OF THE DISCLOSURE

The apparatus relates to wrapping items such as stacks of tortillas, in which an endless conveyor belt carries a plurality of rotatably mounted food stuffs supporting cups which are automatically caused to rotate as the particular cup passes through a wrapping housing located on the frame of the apparatus. A supply of wrapping material having a free end extending over said belt and cups is positioned to receive a stack of tortillas on each cup. Knives sever the wrapping material between each adjacent cup, and there is provided in the wrapping housing a frustro-conical upper portion with an in-turned lip which causes the wrapping material to be wrapped around the stack of tortillas as the cup is being rotated. The wrapped package is then smoothed, flattened and heat sealed.

This invention relates to food packaging equipment, and particularly to means for wrapping and sealing uniform quantities of prepared food stuffs such as tortillas.

It is now well known that food stuffs may be packaged in clear thermoplastic or thermosetting materials of polyethylene and equivalent types such as those marketed under the registered trade name "Saran wrap" by the Dow Chemical Company and "Pliofilm" by the E. I. du Pont de Nemours Company.

Such wrappings protect the merchandise from contamination by dirt and other foreign matter, and help to maintain its freshness by keeping out air and deleterious organisms which would tend to spoil it.

In the past, it has been general practice to utilize a separate sheet of wrapping material for each unit package of food, and to wrap the material by hand in each such sheet and then seal the package.

This process is time consuming and expensive, and the use of hand labor affords added opportunity for dirt and foreign matter to be included in the package.

The present invention offers an improvement in the construction and arrangement of automatic packaging equipment which permits more economical and speedier processing and produces a more attractive package.

Preferably, it is comprised of a work table having an endless conveyor belt and a plurality of work stations at which successive steps in the assembly of the final product may be carried out. These steps combine to enclose the tortillas in wrappers formed from an endless sheet of wrapping material. A label describing and identifying the product is enclosed during the wrapping process.

With the foregoing in mind, it is a major object of this invention to provide packaging means for tortillas and the like, which means will automatically wrap and seal desired quantities of the materials.

Another object of this invention is to provide means for protecting prescribed quantities of food stuffs against dirt and other contamination while being delivered and stored for sale to the ultimate consumers.

A further object of this invention is to provide means for automatically enclosing desired quantities of edibles in a container which affords an attractive merchandising display.

Still another object of this invention is to provide a packaging device which requires a minimum of contact between the food and human attendants.

A still further object of this invention is to provide a food wrapping and packaging device of simple construction and minimum cost which will afford substantial economies in the manufacture of processed foods.

It is another object of this invention to provide for a continuous supply of wrapping material to be applied to a succession of separate packages.

These and other objects will be better understood by reference to the detailed description hereafter and to the drawings, which are to be understood as exemplary of a preferred embodiment of the invention, but not as limiting its scope. It will be obvious that the invention is not limited to wrapping food stuffs, but may also be utilized in packaging other related substances.

In the drawings:

FIG. 1 is a schematic perspective view of a preferred form of the invention;

FIG. 2 is a side view of the embodiment shown in FIG. 1, illustrating the mode of operation;

FIG. 2*a* is an enlarged perspective view of the conveyor belt drums provided at the two ends of the apparatus;

FIG. 3 is a transverse sectional view, taken as indicated by the line 3—3 in FIG. 2 to show details of the means for severing successive units of the wrapping material;

FIG. 4 is a sectional view, taken as indicated by line 4—4 of FIG. 3 to show details of the driving means for the severing equipment shown in that figure;

FIG. 5 is a sectional view, taken from the exit end of the enclosing tunnel as indicated by line 5—5 of FIG. 2, to show details of the operation and construction of the wrapping mechanism;

FIG. 6 is a fragmentary top view, partially in section, taken as indicated by line 6—6 in FIG. 5 to show additional details of construction of the means for wrapping a segment of the wrapping material around the foodstuff;

FIG. 7 is a schematic view, taken as indicated by line 7—7 in FIG. 6 to show the construction of the enclosing tunnel from the entrance end;

FIG. 8 is an enlarged fragmentary cross sectional view taken along by line 8—8 of FIG. 2 to show details of the sealing means; and

FIGURE 9 is a perspective view of a wrapped package of tortillas or the like as delivered at the right hand end of FIGS. 1 and 2.

Referring now to the drawings for a more detailed explanation of the operation of the invention, the device, generally indicated as 1, is shown as having an elongated frame 2 which may be of suitable height to accommodate an attendant. A female operator is shown for reference as standing at A.

At one end of the frame 2 there is rotatably mounted a belt drive drum 3 which supports and drives a continuous belt conveyor, indicated generally by the arrow 4, in a manner which will be described in more detail below. At its other end, the belt 4 is supported by an idler drum 5 so that the belt forms a horizontal support surface which moves the foodstuffs through the wrapping process in the manner to be described.

Belt 4 is made up of a series of parallel slats 6 secured to a flexible backing 7. The slats 6 may be of a material such as wood or metal, while the backing 7 may be a woven fabric reinforced rubber, leather, or the like (see FIG. 3).

As can best be seen in FIG. 2*a*, the drive drum 3 has a reduced central position 8 to provide clearance for a portion of the cup-rotating mechanism described hereafter. The drum 3 is supported on stub shafts 9. The idler drum 5 is of the same shape.

In order to drive the belt 4 at a constant speed, there is located an electric motor (not shown) within housing 10. Sprocket 11 on the shaft of the motor drives the drum 3 through chain 12 engaging sprocket 13 on shaft 9.

Also located in housing 10 is a label dispensing device which is actuated by turning of sprocket 14. The dispensing device is conventional and therefore is not shown. Suffice it to say that the device dispenses a label as the sprocket 14 is turned a certain amount which is correlated to the movement of the belt 4.

At regular intervals, the slats 6 are modified as at 15 to provide a recessed area to receive a cup 16 which supports the food stuffs for a purpose to be described. Centrally disposed in the recess area 15 there is secured a journal bearing 17, which passes through backing 7 and is fixed thereto by a ferrule 18. Depending shaft portion 19 of cup is rotatably mounted in and through the journal bearing 17 and ferrule 18. Each cup 20 is of the appropriate size to receive a stack of tortillas of the desired quantity with adequate marginal clearance for the manipulation of the wrapping material, as will be described below. Means for rotating cups 16 about the vertical axes of the vertical shaft portions 19 will be described later.

At the left end of the frame 2, as seen in FIGS. 1 and 2, is rotatably mounted a wrapping supply roller 21 from which a continuous sheet of wrapping material 22 is drawn over the endless slat array of belt 4. Material 22 is preferably formed of a transparent thermo-plastic, or thermosetting, substance. The material 22 is fed by the weight of the tortilla stacks pressing it against the moving belt 4. As wrapping material 22 progresses to the right in FIGS. 1 and 2 under the influence of the frictional engagement with belt 4, a series of labels 24 are delivered at spaced intervals from the label slot 25. The label 24 is delivered, with printed legend thereon face down, onto the wrapping material 22 at each position of a cup 16.

An attendant, stationed as shown in FIG. 2, places a stack of tortillas 26 on the wrapping material directly over each label, and therefore cup 16. The weight of the tortillas so delivered presses the wrapping material 22 against the conveyor belt 4 causing the material to be fed in direct proportion to movement of the belt.

The amount of material which will be used to enclose each tortilla stack is determined directly by a cut-off mechanism, indicated generally by arrow 28, located adjacent the transverse plane indicated by line 3—3 in FIG. 2. The mechanism 28 is seen to best advantage in the transverse sectional view of FIG. 3 and sectional view of FIG. 4. The cut-off mechanism 28 is enclosed in a housing 29 extending transversely of the frame 2 and supporting a cut-off motor 30, located directly behind the cut-off driving gear 31 (as seen at the left in FIG. 3). The cut-off motor 30 drives an endless chain 32 engaged with the driving gear 31 and a cut-off idler gear 34. Chain 32 has fixed thereto a number, here shown as two, of projecting slicing knife blades 35. Blades 35 are of sufficient length to project downwardly from the housing 28 and extend between the slats 6 of the endless belt 4, but must not come in contact with the backing portion 7 thereof. This arrangement permits the severance of the wrapping material 22 from one side of the endless belt 4 to the other rapidly and cleanly. The housing 28 is positioned so close to the belt 11 that it would be impossible for the operator to get her fingers in a position of peril from the cut-off knife blades 35.

The cut-off motor 30 is arranged to operate continuously while the apparatus 1 is operating, but the cut-off chain 32 and knife blades 35 are required to function only intermittently. Hence, a clutch mechanism is employed to connect the motor 30 to the cut-off chain drive gear 31 only at the precise time required to sever successive wrapping sheet sections 22', 22'', and 22''', from the continuous web 22. Obviously the blades 35 must be traversed rapidly to avoid interference with successive

ones of the continuously moving slats 6. Therefore, the motor 30 must be driven at a substantial speed, and the clutch connecting it to the cut-off drive chain 32 must operate rapidly.

The details of this clutch mechanism are illustrated in FIG. 4, where the continuously rotating motor 30 is shown secured to the back wall of the housing 29, with its drive shaft 36 extending through the housing wall. Fastening means such as bolt and nut members 37 are used conventionally to secure the motor 30 to the housing wall. Within the housing 29, the motor shaft 36 has fixed thereto, as by key means 39 and set screw 40, a clutch member 41 provided with a friction-resistant facing 42.

It should be noted that drive gear 31 is journaled on shaft 36 so as to permit the motor 30 to run continuously although the gear 31 is not turning.

Housing 29 carries, on the side 44 thereof opposite that to which cut-off motor 30 is secured, a strong electromagnetic repelling member 45. Repelling member 45 operates through an extending shaft 46 carrying a yoke 47. The yoke 47 is fixed to carrier 49 of a ball bearing 50. Inner race 50*c* is pressed onto hub 51 of the cut-off drive gear 31. Hence when magnetic repulsion member 45 is energized, pressure is transmitted through yoke 47 and carrier 49, race 50*a*, bearing balls 50*b*, and race 50*c* of bearing 50 to force cut-off drive gear 31 into driving engagement with the clutch facing 42 of the hub member 41. As motor 30 is operating continuously the pick-up is extremely rapid and the severing of the continuous strip 22 of wrapping material is accomplished with such speed that it is unnecessary to interrupt the forward movement of the endless belt 4.

A preferred method of activating the cut-off mechanism 28 will now be described. As can be seen, there are evenly spaced holes 52 in the belt 4. In the illustrated embodiment each hole 52 is adjacent a recess 15. At the station where the attendant is placing the tortilla stacks on the belt 4, there is located a photoelectric switch 53. This type of switch is conventional and therefore will not be described further. It has the capability that each time the cell is subjected to light, the circuit is closed. In the present machine, each time a hole 52 passes the cell of switch 53, the current is closed and the solenoid 45 is energized.

The length of time and therefore distance, that the knife blade 35 moves can best be controlled by a timing device. However, it can also be controlled by correlating the size of the holes 52 to the speed of the belt 4. In the latter case, the solenoid would be energized during the time that it takes for a hole 52 to be moved past the photoelectric cell. Naturally, other means can be used for activating the blades 35 in response to the movement of the cups 16 past the cut-off station.

Thus, successively severed sections 22', 22'', and 22''' are carried from the cut-off mechanism 28 to the wrapping station housing 55. Each severed section will carry a label 24, as delivered from the label slot 25, and a stack of 26 tortillas superimposed theron prior to passing under the cut-off housing 29.

As the loaded and severed sheets approach the wrapping station housing 55, which is secured to the frame 2 by clamp means 56, the leading portions 57 of each severed wrapping sheet 22', etc., will engage pick-up lips 59 which extend down toward the belt 4, just clearing the slats 6. As the successive sheet sections, 22', etc., leave the cut-off housing 29, the longitudinal tension imparted by the frictional drive is removed, and the sheets will pucker somewhat, as shown in FIG. 1. This makes it easy for the pick-up lips 59 to guide the wrapping sheets into the entrance end of the wrapping station housing 55, as seen in FIG. 7.

The wrapping station housing 55 has a frustro-conical top portion 60 with the in-turned lips 59 formed at the lower portion thereof. The in-turned pick-up lips 59 are placed very close to the endless belt 4 at the entrance

end 58 to wrapping station housing 55. The spacing from the belt increases as the distance from the entrance end of the housing 55 increases, and the pick-up lips merge into converging forming guides 61 which terminate substantially horizontally at the discharge end 62.

As each cup 16 is moved through the housing 55, the cup and wrapper section on which the stack 26 of tortillas has been placed is rotated about a vertical axis. This is accomplished by the engagement of a resilient friction roller member 63, fixed on the lower end of the shaft portion 19 of the package-carrying cup 16, with a driving rail 64. The latter is secured to the frame 2 by bracket means 65. As the belt 4 progresses along frame 2, the roller member 63 rotates the cup 16, and simultaneously the wrapping material sheet 22' is twisted and constricted by the forming guides 61 so that it is tightly closed over the tortilla stack 26.

On leaving the discharge end 62 of the housing 55, the wrapped stack passes under a glass plate 66 which accomplishes a smoothing and flattening action on the wrapping, and permits visual inspection by the attendant.

The smoothed package then passes under a heated transverse roller 67 which applies pressure and heat sufficient to accomplish the final sealing of the package.

FIG. 8 shows how the roller 67 applies greater pressure centrally of the wrapped package to insure proper closing and sealing of the wrapping material where the twisting has produced a thickened portion 69. The cup 16 is formed with a central boss 70 raised above the remainder of its bottom. This projecting portion causes an increase in the unit pressure developed in the central area over that developed at the periphery of the cup 16 when the heated roller 67 is encountered.

The cup 16 thereafter travels to the end of the forward progression of the endless belt 11, and over the idler drum 5 for return to the driving drum 3. As the cup 16 passes around the end, the sealed package 72 is discharged by gravity onto a succeeding conveyor belt 74 or equivalent means for removing the packaged goods to a suitable storage area or to be packed for shipment. It will be seen in FIG. 1 that the sealed package 72 is delivered to a subsequent work station, which may be a conveyor belt 74, with the label 24 upright and plainly visible.

It has been felt to be unnecessary to include electrical wiring diagrams, since the circuitry is conventional and it is well within the scope of any qualified electrician to connect the electrical elements described.

It will be seen from the foregoing that there has here been presented an improved form of packaging equipment well adapted to produce a clean, sanitary and attractive package, the quality of the product being visibly apparent to a consumer or other purchaser.

I claim:

1. An article wrapping machine having a plurality of operating stations where sequential operations in the wrapping of articles with wrapping material may take place, the machine comprising:
an elongated frame having two ends;
a plurality of spaced article carriers;
means on said frame for successively moving such carriers from a first end toward a second end past a plurality of operation stations;
means for supplying a web of wrapping material at said one end on top of at least one of said article carriers so that an article placed on top of the material and carrier will feed the material with the movement of the carrier, said material being supplied in a long strip;
cutter means on a frame operatively connected to the movement of a carrier so as to sever said material crosswise to the length of the strip between each of said carriers;
folding means on said frame located at an operation station and operating with the movement of each carrier as the same passes that station to fold the wrapping material around the article enclosing the same;
and sealing means on said frame for sealing the material to hold it in the position caused to be assumed by said folding means.

2. In a machine for packing articles,
means for supplying a web of wrapping material of predetermined width past a first operating station on said machine and a second operating station on said machine;
means located above said material at said first operating station for successively depositing labels on said material at spaced positions thereon;
said machine adapted at said second operating station to receive on top of said web of material for the purpose of being wrapped successive stacks of circular tortillas of a diameter substantially less than one half of the width of said web of material;
transport means to move said stacks from said second station past a fifth station;
cutting means located at a third operations station on said machine, said cutting means being operatively connected to the movement of said transport means to sever the web between successive stacks of tortillas;
folding means located at a fourth operation station on said machine for folding said material up around the side of the stack in contact with the side of the stack and over the top of the stack as each stack is moved past said fourth station, said folding means including means on said transport means for successively rotating said tortilla stacks about a vertical axis during said folding operation;
and sealing means at a fifth operation station on said machine for sealing said material in the folded condition as each stack is moved past the fifth operation station.

3. In a device for packaging articles:
a frame;
transport means for transporting along said frame spaced stacks of tortillas and wrapping material received thereon;
means for supplying a web of wrapping material, said means being located adjacent a first operation station on the machine where stacks of tortillas are received on the web of the wrapping material;
said web of material resting on the transport means at said first operation station whereby the weight of a stack of tortillas engages the material against the transport means, and the movement of the engaged portion of the transport means feeds the material away from the supply roll toward a second opeartion station;
and cutting means located at second operation station on said machine for severing said web of wrapping material between each stack of tortillas as the stacks are successively moved past the second operation station;
actuator means operatively connecting said cutting means for actuating said cutting means in response to light being received into a portion of said actuator means;
and means on said transport means for blocking light from said portion of said actuator means except when said cutter means is at a point on said web between two adjacent stacks of tortillas.

4. In combination, in an article wrapping machine:
an elongated frame having two ends;
an endless belt supported by said frame;
means for driving said belt continuously over said frame;
means for supplying a continuous sheet of wrapping material at one end of said frame;
means for supplying labels at spaced intervals to said wrapping material;

a work station on said machine where a predetermined quantity of articles to be wrapped is placed on top of each label passing the work station, the weight of the quantity of articles pressing the wrapping material against said belt;

transverse severing means on said frame for severing said web of wrapping material;

switch means for actuating said severing means at such time in relation to the movement of the belt that said severing means severs the web between the labels, said switch means being responsive to the movement of said belt;

means for bending upwardly and forcing together the outer edges of a severed portion of said wrapping material while simultaneously rotating said material to form an enclosure over and around said material to be wrapped;

means for smoothing and flattening said rotated materials;

and means for subjecting said smoothed and flattened material to heat and pressure to seal the wrapping material about the enclosed material in a separate package.

5. In combination, in an article wrapping machine having an elongated frame with two ends, means for supplying a continuous strip of wrapping material thereover:

means for carrying a plurality of article-receiving cups at spaced positions on said belt;

said machine having a work station where a predetermined quantity of articles are placed on each of said cups as the cup passes said work station;

transverse severing means for severing a section of said material for each of said cups;

means for folding over and constricting said wrapping material about each of said defined quantities of articles to be wrapped, including means for inducing rotation of said cups about vertical axes while passing certain positions along said frame;

means for flattening and smoothing said wrapping material after such twisting of said material about said articles to be wrapped;

means for heating and applying sealing pressure to said wrapping material after such flattening and smoothing;

and means for discharging such wrapped and sealed packages in sequence.

6. In combination in an article wrapping machine:

a work table having an endless belt of bendable material and a plurality of slats secured at spaced intervals thereto;

a plurality of cup members rotatably journaled in said belt at regularly spaced intervals;

a shaft extending downwardly from each of said rotatable cup members and having a driving roller secured thereto;

a drive rail fixed to said frame and adapted to be frictionally engaged by said driving rollers to rotate said cups as the cups are moved by the rail;

means for supplying an endless strip of wrapping material feeding from one end of said table over said belt and said cup members;

means for applying a succession of labels onto said strip of wrapping material in spaced positions overlying said cup members, said labels being adapted to receive over each of them a desired quantity of material to be wrapped;

means operable transversely of said table for successively severing said wrapping material at a position intermediate each pair of adjacent cups to provide independent wrapping material sections;

a frusto-conical housing having a tapered opening on the lower portion thereof with pick-up lips adapted to engage under, and lift, outer portions of said successively severed sections of said wrapping material;

means for rotating each of said cups, the wrapping sheet and the material carried thereon as said assembly is carried along said tapered opening;

means for applying smoothing pressure over said rotated wrapping sheet;

and means for applying sealing heat and pressure over said assembly while increasing pressure over the central portion thereof.

7. In an article wrapping machine:

an elongated frame having a plurality of work stations;

said device having a flexible conveyor belt extending along said frame and between said work stations;

an endless supply of wrapping material feeding over said conveyor belt;

means responsive to the placing of a desired quantity of material to be wrapped over a label at a loading station to initiate traverse of said wrapping material with said conveyor belt and means for severing successive wrapping sheets from said endless wrapping supply between successive label carrying portions thereof;

means for lifting the leading portions of said severed sheets and guiding them upwardly while rotating them and constricting them to enclose said material to be wrapped;

means for smoothing and flattening said rotated and constricted sheets over the material being enclosed thereby;

and means for sealing said flattened wrapped material by the application of heat and pressure.

8. A device for preparing foodstuffs or the like for sale, comprising:

an elongated frame;

an endless conveyor belt disposed on said frame, said belt including a bendable backing having fixed thereto a plurality of slat members disposed crosswise of the belt at regular intervals;

a pluarity of foodstuff supporting cups disposed at regular intervals on said belt, said cups each having a shaft extending through a journal bearing in said backing;

a resilient driving roller fixed to each said shaft and arranged to be engaged against a rotation-inducing rail secured to the frame;

means for traversing said belt along said frame;

a rotation-inducing rail extending from said frame to engage said driving roller as the latter is moved past the rail by the belt;

means on said frame for supplying an endless supply of wrapping material having a free and extending feeding over said belt and cups, said wrapping material being drawn along said conveyor belt by the friction induced by the weight of said material to be packaged;

severing means for severing said wrapping material into sheets of uniform size, said severing means comprising:

a housing mounted transversely over said conveyor belt;

an endless chain extending around a pair of sprockets disposed within said housing at right angles to the length of said frame;

a plurality of severing knives mounted on said chain and, during movement, extending below said housing sufficiently to pass between adjacent ones of said conveyor belt slats but not enough to touch said backing;

a severing motor mounted on said housing and rotating continuously during operation of said belt;

and magnetically operated clutch means responsive to movement of said belt for intermittently connecting one of said sprockets to said severing motor, whereby said severing motor will drive said knives rapidly across said conveyor belt

and wrapping material to sever a section of said wrapping material;

means on one of said respective cup and the conveyor belt around said cup located above the elevation of the center portion of the cup for lifting the forward portions of each successively severed section of wrapping material when a foodstuff is resting on the cup and the wrapping material at that area is free of tension;

a wrapping housing located on said frame displaced from the severing means in the direction of travel of the belt, said housing having a frusto-conical upper portion and in-turned lip defining the lower portion thereof, said frusto-conical portion decreasing in diameter as the distance from the severing means increases, said housing being disposed so that said lifted sheet portions are guided and compressed by said lips over the foodstuffs to be wrapped while being traversed on said belt and simultaneously rotated with said cup by the co-action of said rail and said driving roller;

menas for smoothing and flattening said rotated and compressed wrapping;

and means for applying sealing heat and pressure to said smoothed and flattened wrapping material.

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U.S. Cl. X.R.

53—389; 83—355