

Jan. 7, 1969

H. DEANS ET AL

3,420,035

PACKAGING MACHINE

Filed June 8, 1966

Sheet 1 of 3

Fig. 1

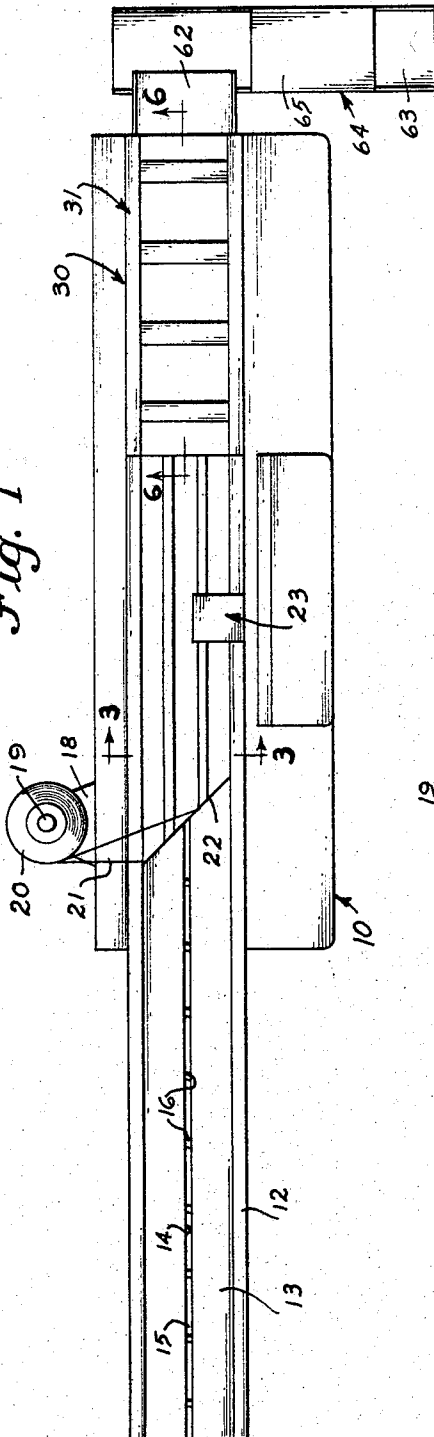
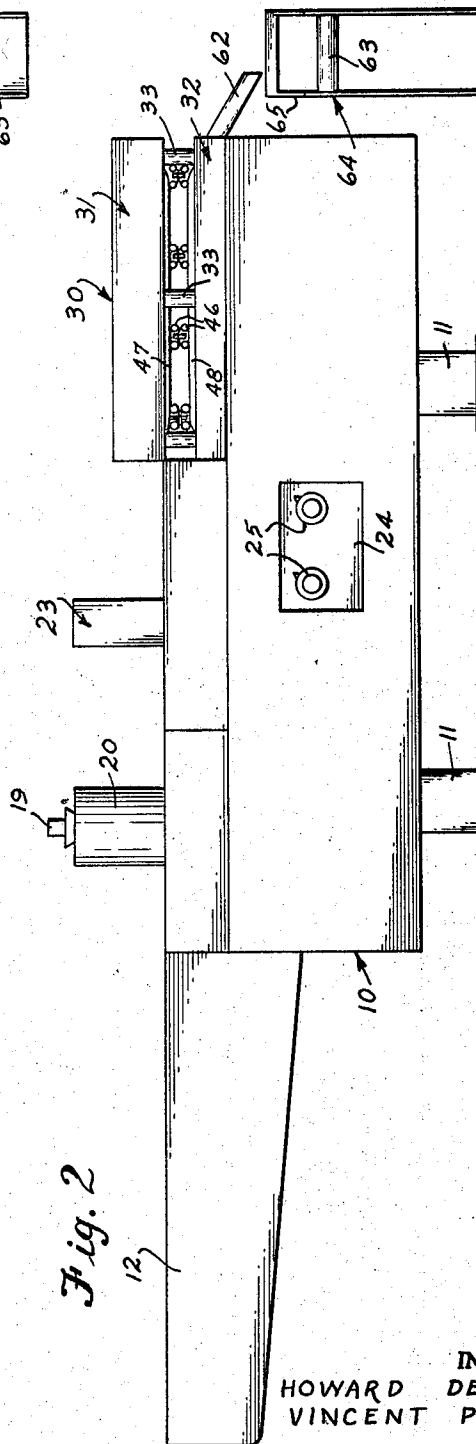


Fig. 2



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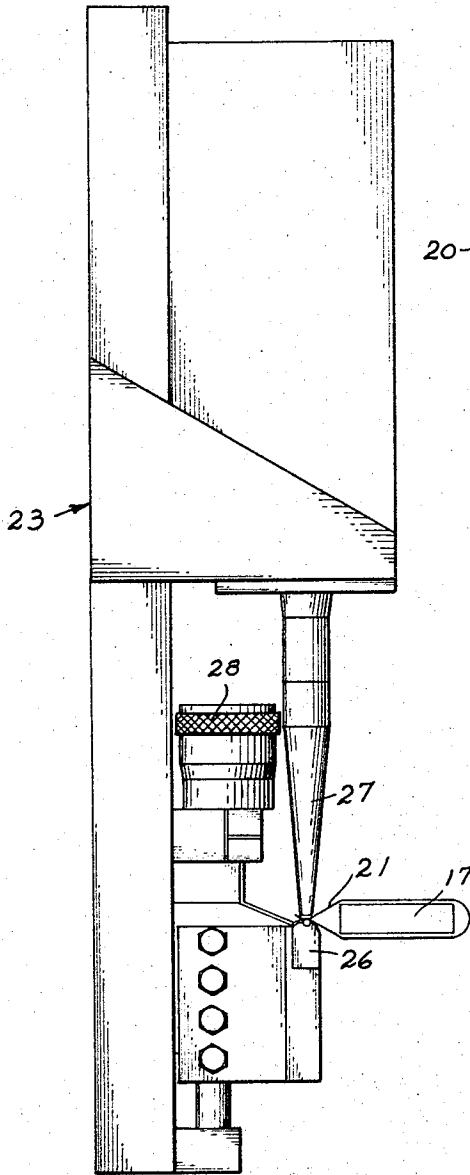


Fig. 4

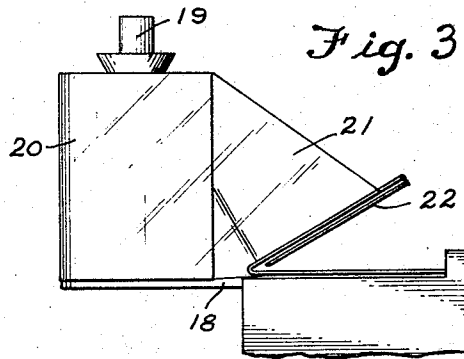


Fig. 3

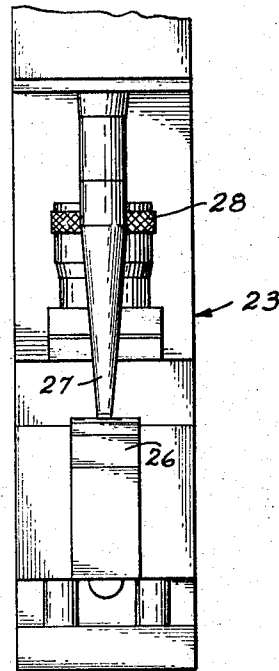


Fig. 5

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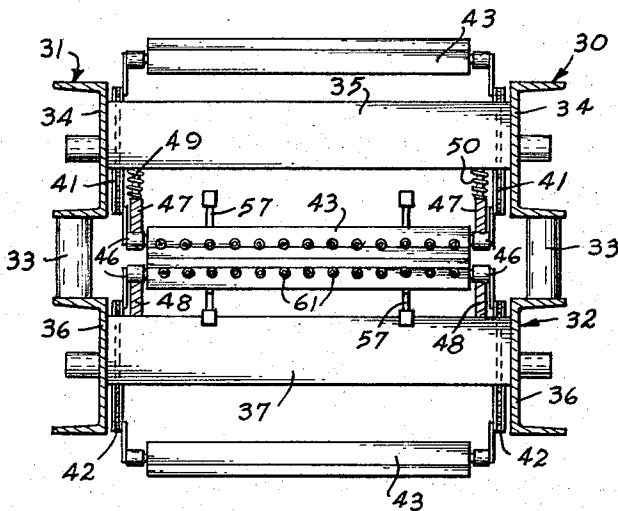
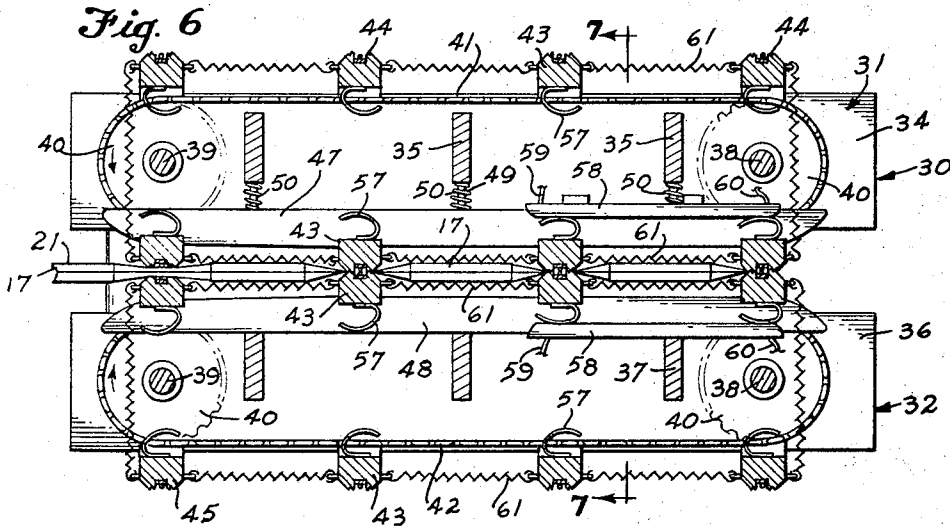
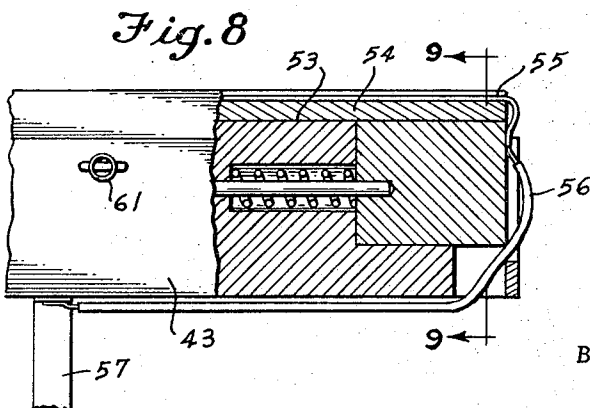
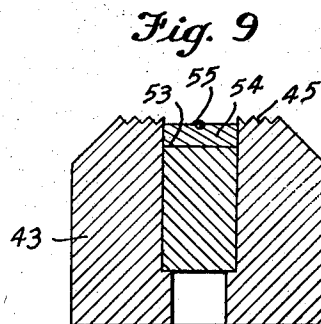


Fig. 7



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3,420,035

PACKAGING MACHINE

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U.S. Cl. 53—182

2 Claims

Int. Cl. B65b 9/12; 51/26

ABSTRACT OF THE DISCLOSURE

An article packaging apparatus having means for spacing the articles to be packaged, inserting the articles into a web of heat sealable material which has been folded substantially in half, sealing the edges of the material to provide a tubular package and thereafter sealing the ends of the package while forcing excess air therefrom.

This invention relates to the packaging and preserving of materials, and particularly to apparatus and equipment in which the packages are automatically enclosed within a protective shield and sealed in air-tight condition after which the material can be further processed or shipped to a point of distribution.

Heretofore in the packaging industry many efforts have been made to enclose commodities in a polyethylene or other envelope to protect the commodities and to preserve the freshness thereof. This has included packaging machines in which the commodities have been placed between layers of polyethylene or the like, and thereafter the polyethylene has been heat sealed for protection and preservation. However, the prior art processes and equipment have not been satisfactory since they have involved substantial manual labor in placing the commodities within the envelopes and handling envelopes after they have been sealed. Also the heat seals have not always been satisfactory due to varying conditions, such as the seals not being hot enough, motion between the sheets of polyethylene during the sealing processes and for other reasons the seals have not held or have had ragged, burned edges.

According to the present invention, ultrasonic sealing is used and this possesses certain very important differences and advantages over other types of sealing such as heat sealing, for example. The following advantages of ultrasonic sealing are accomplished with the present invention: there is no oxidized build-up or packaging film on tool or anvil and the seal is not affected by variations of film thickness as in heat sealing which causes inconsistent heat sealing. In addition, the present invention provides satisfactory continuous film sealing and severing the selvage, and no puckering or drawback of heat shrink materials takes place. Heat shrinkable materials of various types such as poly-vinyl-chloride may be used.

It is an object of the invention to provide apparatus for automatically placing materials between sheets of heat sealable material and thereafter sealing such material to form an envelope after which the material is discharged from the machine.

Another object of the invention is to provide apparatus for placing articles within a folded strip of heat sealable material, sealing at least one edge ultrasonically and thereafter automatically sealing the remaining open end and discharging the articles from the machine.

Further objects and advantages are to provide improved elements and arrangements thereof in a device of the character described that is economical to produce, durable in form, and conducive to the most economical

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use of materials and uniformity of members formed therefrom.

Still further objects and advantages will become apparent in the subsequent description in the specification.

In the drawings:

FIG. 1 is a top plan view illustrating one component of the present invention;

FIG. 2 a side elevation thereof;

FIG. 3 an enlarged section on the line 3—3 of FIG. 1;

FIG. 4 an enlarged side elevation of the ultrasonic sealer;

FIG. 5 a fragmentary front elevation thereof;

FIG. 6 an enlarged vertical section on the line 6—6 of FIG. 1;

FIG. 7 a section on the line 7—7 of FIG. 6;

FIG. 8 an enlarged fragmentary side elevation of one of the sealing bars with portions broken away for clarity;

FIG. 9 a section on the line 9—9 of FIG. 8.

With continued reference to the drawings, a housing 10 is provided supported by posts or legs 11 and, if desired, such housing may have an outwardly extending table 12 on one side thereof. The table 12 is provided with an upper surface 13 having a slot 14 disposed substantially along the longitudinal center line thereof. An endless conveyor 15 is adapted to have its upper run disposed within the slot 14 and such conveyor is adapted to be operated in any conventional manner such as by a motor (not shown). The conveyor has a series of upstanding lugs 16 spaced apart a predetermined distance along the length thereof so that package or other articles 17 placed on the upper surface 13 will be engaged by the lugs and moved from left to right as illustrated in FIG. 1.

A platform 18 is mounted on the housing 10 and such platform is provided with an upstanding spindle 19 on which a roll 20 of polyethylene sheet material or the like can be placed. The roll 20 is adapted to be rotatably mounted so that a web 21 of material can be continuously pulled from the roll and passed through a folding mechanism 22 which folds half of the web to a position overlying the other half. The folding mechanism is located adjacent to the discharge of the endless conveyor so that articles to be packaged will be discharged onto the web 21 intermediate the two halves and are moved along the top portion of the housing 10 in a manner which will be described later.

An ultrasonic sealer 23 is mounted on the upper portion of the housing 10 and is provided with energy from an ultrasonic generator 24 carried within such housing 10 under the influence of controls 25. The web 21 passes between an anvil 26 and an ultrasonic sealing tool 27 in a continuous process which seals the side of the web opposite the fold and, if desired, will sever and remove excess material. The spacing between the anvil 26 and the tool 27 can be adjustably controlled by a mechanism 28 depending upon the thickness of material of the web 21.

After the web has been sealed along one edge, the web with the package 17 is fed into an end sealer mechanism 30. The end sealer mechanism includes upper and lower housings 31 and 32, respectively, connected by spacers 33. The upper housing 31 includes side members 34 connected by a plurality of braces 35 intermediate the ends thereof while the lower housing includes side members 36 connected by braces 37 in a similar manner. Each of the housings is provided with a drive shaft 38 at one end and a driven shaft 39 at the opposite end. The drive shafts 38 are driven in any desired manner (not shown) so that such shafts rotate in opposite directions. Each of the shafts is provided with a sprocket 40 located adjacent to the side members 34 and 36 and the sprockets of the upper housing are adapted to drive a pair of

endless conveyors 41 and the sprockets of the lower housing are adapted to drive a pair of endless conveyors 42. Each pair of conveyors are connected by a plurality of sealer bars 43 with the sealer bars of the upper conveyor having a serrated surface 44 which cooperatively meshes with a serrated surface 45 of the lower sealer bars. The bars are arranged on the conveyors so that when they pass through the central portion of the end sealer mechanism, such bars will be in an opposed relation with each other and the serrated surfaces will be substantially meshed with two thicknesses of the web 21 therebetween.

In order to move the bars 43 into cooperating relation with each other, each of the bars is provided with a pair of rollers 46 on each and which will engage cam plates 47 and 48 carried by the upper and lower housings 31 and 32, respectively. The lower cam plates 48 are supported by the braces 37 while the upper cam plates 47 are provided with guide pins 49 slidably received within openings in the braces 35.

Springs 50 are disposed about the guide pins 49 and urge the cam plates 47 downwardly under a predetermined tension. When the bars 43 pass around the sprockets 40, at the driven end of the housings, such bars are spaced a slight distance apart and as the bars progress through the end sealer mechanism the cam plates move the bars into meshing engagement to grip the web 21 to hold the same firmly during the sealing process as well as to pull the entire web back to the roll 20.

Each of the bars 43 is provided with a groove or recess 53 along the length of the serrated surface for the resistance, nickel chrome heating wire 55 mounted thereon. The heating wire 55 is supplied with electrical energy from a conductor 56 connected to a wiper type contact 57 mounted on each of the bars 43 adjacent each end and such contacts are adapted to engage buss bars 58 located adjacent to the discharge end of the sealer mechanism and supplied with electrical energy from any suitable source (not shown) by means of conduit 59 and 60. With this construction the electrical energy is supplied to the heating wires 55 intermittently to seal the web 21 just prior to the discharge thereof from the machine. The wiper type contacts 57 are in engagement with the buss bars just long enough to heat the wire 55 to the point where it will seal the web 21 and sever an envelope from the web and the remainder of the time the heating wire can cool to preserve the life of the wire as well as to prevent too much heat being applied to the web.

Preferably the sealer bars 43 of each of the conveyors are connected to adjacent sealer bars of the same conveyor by a plurality of springs 61 or other resilient members which will cause the web 21 to conform to the configuration of the package 17 and expel any excess air prior to the sealing of the ends of the web.

After the web has been sealed the package is discharged from the end sealer mechanism 30 onto a chute 62 which will discharge the packages from the housings 10 for further processing. As illustrated, the packages are discharged onto an endless conveyor 63 of a shrinking machine 64 which has an oven 65 where the packages are subjected to a source of heat, such as steam or the like, which causes the polyethylene material to shrink into close proximity with the package or other article being processed.

In the operation of the device packages 17 are delivered to one end of the machine and are placed on the conveyor 15 either manually or automatically and such conveyor will move the packages along the upper surface of the table 12 and discharge such packages between a folded web 21. The side of the web opposite the fold is sealed by an ultrasonic sealer 23 and thereafter the web is passed into an end sealer mechanism 30. The end sealer mechanism is provided with a plurality of sealer bars mounted on endless conveyors and such sealer bars grippingly engage the web to move the web through the

machine and simultaneously during the last part of the travel through the machine, heating wires carried by the bars 43 are supplied with a source of electrical energy to seal the ends of the web into envelopes each of which contains one of the packages 17.

It will, therefore, be seen that according to the present invention there is provided a method of, and means for, accomplishing ultrasonic sealing which is advantageous to, and superior to, heat sealing processes. The ultrasonic method and apparatus of the present invention insures that there will be (1) no oxidized build-up or packaging film on tool or anvil; (2) that seal is not affected by variations of film thickness as in heat sealing, which causes inconsistent film seal; (3) satisfactory continuous film sealing and severing the selvage; (4) no puckering or drawback of heat shrink materials.

Various types of heat shrinkable materials, such as poly-vinyl-chloride, can be used with the present invention.

The parts can be made of any suitable material and in different shapes or sizes as desired or required.

Although the invention has been herein shown and described in what is conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of the invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices and apparatus.

What is claimed is:

1. A packaging machine for automatically enclosing and sealing packages within an envelope of heat sealable material comprising a housing, an endless article conveyor on said housing, means on said article conveyor for spacing articles a predetermined distance apart, means for mounting a roll of heat sealable material on said housing, means for removing a web of material for the roll and for folding said web substantially in half with one-half overlying the other half, said means for folding said web being positioned so that articles from said conveyor will be discharged onto said web and between the halves thereof, an ultrasonic sealer mounted on said housing in a position to engage and seal the open edges of said web in a continuous process, an end sealer mounted on said housing, said end sealer including generally parallel upper and lower endless conveyors, means for driving said upper and lower conveyors so that the lower run of the upper conveyor is moving in the same direction as the upper run of the lower conveyor, a plurality of equally spaced sealer bars carried by said upper and lower conveyors, a roller mounted adjacent each end of each of said bars, a pair of cam plates mounted adjacent to each of said upper and lower conveyors and located in a position to be engaged by said rollers during a portion of the movement of said conveyors to move said sealer bars toward each other, at least one pair of said cam plates being spring mounted to accommodate materials of different thicknesses, heating wire means carried by each of said sealer bars, and means for intermittently applying electrical energy to said heating wire means, whereby articles will be placed between halves of the web of material and will be sealed in an envelope by said ultrasonic sealer and said end sealer.

2. An end sealer mechanism for sealing heat sealable material in tubular form comprising generally parallel upper and lower endless conveyors, a plurality of equally spaced sealer bars mounted on each of said conveyors, means for driving said conveyors so that the lower run of the upper conveyor and the upper run of the lower conveyor are moving in the same direction, a roller mounted adjacent each end of each of said sealer bars, a pair of cam plate means mounted adjacent to each of said conveyors and located in a position to be engaged by said rollers during a portion of the movement of said conveyors to cause the sealer bars to move substantially into engagement with each other, at least one pair of said cam plate means being flexible to accommodate

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materials of different thicknesses, a heater wire carried by each of said sealer bars, a wiper type electrical contact carried by each of said sealer bars, buss bar means engageable with said contacts for supplying electrical energy thereto, resilient means interconnecting said sealer bars for forcing air from said tubular material prior to sealing, and said sealer bars of each conveyor having a serrated surface with the surface of one bar adapted to mesh with the serrated surface of the cooperating bar to positively grip said heat sealable material, whereby said conveyors will move said material through said end sealer mechanism and said heating wires will seal and separate the material into individual envelopes.

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