

SPECIFICATION

Method and Apparatus for Packaging Commodities

5 This invention relates to the packaging of commodities and is particularly concerned with an apparatus for and a method of packaging commodities in a flexible bag or wrapper.

10 The method and apparatus of the present invention have particular application to the packaging of commodities, particularly compressible commodities, in flexible bags or wrappers, such as are made of a thermoplastic resin, e.g. polyethylene, polypropylene or the like, and are particularly applicable to the vacuum

15 packing of compressible commodities.

According to the invention, there is provided an apparatus for packaging and sealing a commodity in a bag, comprising a packaging unit and a vacuum packaging and sealing unit, the

20 packaging unit having a support bed comprising an endless belt, means on one side of the belt for storing a supply of tubing, a commodity loading funnel fixed on the other side of the belt, reciprocating means for opening up the leading

25 end of the tubing and for advancing the leading end of a bag length of the tubing in one direction across the belt from the one side to the other side and over the funnel so that a commodity can be loaded into the tubing on the belt through the

30 funnel, the reciprocating means having means thereon operative to cut and seal the said bag-length of tubing at a distance from said leading end to form an open mouth bag while said leading end is engaged on the funnel means for moving

35 the belt in a direction transverse to the one direction to laterally transfer the commodity loaded bag from the packing unit to the vacuum packaging and sealing unit, the vacuum packaging and sealing unit having a support bed

40 to receive the commodity loaded bag, means on the packaging and sealing unit movable in one direction for use in opening up the mouth of the bag, separate means movable to enter the open mouth of the bag and to move into engagement

45 with the mouth of the bag to place the mouth of the bag under tension, and means to vacuum seal the bag while the bag mouth is stretched and under tension.

There is also provided a method of packaging a

50 commodity and sealing the same in a flexible bag using an apparatus as described above, comprising the steps of providing a length of flexible sealable tubing, the tubing having an open leading end, advancing the leading end of a bag

55 length of the tubing from a first position to a second position, opening the leading end of the tubing to form a mouth prior to the second position, passing the leading end over a commodity loading funnel at the second position, inserting a commodity into the tubing through the

60 open mouth, cutting a desired bag length of the tube material and bottom sealing the desired bag length, subsequently removing the loaded bag from the second position, transferring the

65 commodity loaded bag from the second position to a vacuum packaging and sealing position, supporting said commodity loaded bag, opening the mouth of said bag, placing the open mouth of the commodity loaded bag under tension to

70 flatten the open mouth, subjecting the commodity loaded bag to a vacuum, and sealing the open mouth while the bag mouth is stretched and under tension.

The means for supplying a length of flexible sealable tubing may be any suitable component for achieving this purpose and to this end, tubing will normally be provided in a roll form with a continuous length of tubing being drawn off the roll to the packaging unit. At the initial start of the operation, the tubing has an open leading end which is engaged by the said reciprocating means and advanced by a predetermined length from the first position to the second position.

The invention may be employed with various bag sizes and to this end, the apparatus may include several rolls of continuous length of tubing having different widths. Thus, in operation, the bag size could be readily changed merely by having the reciprocating means engage the

90 desired roll of tube material.

The reciprocating means may be provided with a movable assembly composed of any suitable device for engaging the length of tubing, for example, since the tubing is supplied in a lay-flat form, it is normally presented from a roll of the same with a pair of opposed major faces so that the engaging assembly may comprise a pair of spaced apart suction cups engaging both the front and back (or upper and lower) panels of the

100 tubing material. Other alternative arrangements may also be employed where, for example, gripping fingers may engage the length of tubing. The engaging assembly is movable as an entity between the first and second positions or stations, and accordingly, suitable drive means may be provided for advancing the assembly between the spaced-apart stations. Such advancing means may be any suitable drive system such as is accomplished by providing a

110 motor drive for the engaging assembly.

At the second position or station, to which the engaging assembly advances the flexible tubing from the first position or station, the funnel over which the tubing is passed may be arranged to engage and retain the leading edge of the tubing so as to form an open mouth of the tubing at the second station for loading a commodity into the open-mouthed tubing. Preferably, the funnel diverges from the direction of travel of the tubing whereby the tubing, as it is advanced from the first station to the second station, will engage the narrower end of the funnel and expand to its full open mouth width by progressive movement along the funnel.

125 An expandable funnel can be employed by having a narrower end which is adapted to fit into the mouth of the leading portion of the bag and when the engaging assembly advances the leading portion of the bag into operative

relationship with the funnel, the funnel may expand to tightly retain and open the mouth of the bag at the second station. The construction of an expandable funnel is known in the art.

- 5 When the leading portion of the tubing is engaged by the funnel, control of the tubing is then assumed by the funnel which serves to open the mouth of the bag to the desired degree. Optionally, additional control means can be employed in conjunction with the funnel—e.g., suction cups or the like to retain the leading portion of the tubing in juxtaposition with the funnel. Thereafter, the engaging assembly is reciprocated back towards or to the first station.
- 10 In one embodiment of the present invention, the engaging assembly may also mount the cutting and sealing means as sub-assemblies on the engaging assembly. A suitable severing means such as knife means, hot wires, etc., may be employed to cut a desired length of the tubing to form a bag length from the roll of tubing; in a similar manner, the sealing means appropriate for the type of material employed may be utilized for sealing the tubing—e.g., such sealing means may comprise a pair of spaced apart sealing bars, etc.

- 25 This invention therefore contemplates that the movement of the engaging assembly, with the severing and sealing means mounted on it, may be reciprocated from the second station towards the first to a predetermined length equal to the length desired to form the bag, and which of course, may vary depending on the type of commodity being packaged. But, preselected lengths of tubing material may be sealed and severed by stopping movement of the cutting and sealing assemblies at the desired location as the engaging assembly returns from the second station to the first station.

- 30 In forming a bag length of material, the plastics material is normally severed behind the sealing line so that upon severing the bag length of material from the continuous length of the tubing, there is provided an open mouth (i.e. an open leading end) of the subsequent bag with a closed or bottom sealed end of the bag to be filled, or which has been filled depending on the sequence of filling.

- 40 When the mouth of the bag length has been opened at the second station, a commodity may be inserted into the bag for subsequent processing. To this end, the commodity may be manually inserted or alternatively, a feeding component for feeding a commodity into the bag may be provided. In terms of commodities, the present invention may package a wide range and variety of commodities. Typically, articles of clothing and in general, fabric materials may be packaged, but it will be understood that almost any type of commodity that is required to be packaged in a flexible bag or wrapper may be packaged by the method and apparatus of the present invention.

- 50 A particularly preferred form of the present invention involving advantageous features is the utilization of compressible commodities, when

there is employed in conjunction with the above-described apparatus, a vacuum packaging unit. Such a unit may be of the type as described in U.S. Patent No. 4110954.

- 70 When the commodity has been inserted into the bag or wrapper, the means for engaging and retaining the leading end of the tubing at the second station may then release the leading end and permit the commodity filled bag to be discharged from the second station. The commodity filled bag is discharged onto the support bed which comprises a moving conveyor belt of the vacuum packaging and sealing unit. This unit has a vacuum packaging and sealing chamber of the type in which there is provided means for retaining the open mouth portion of the bag length of tubing under tension so as to provide front and back (or top and bottom) panels of the bag in a lay-flat condition so that upon sealing in the sealing chamber, a proper seal is obtained.

- To this end, there may be provided a pair of spaced apart movable fingers which will engage the open mouth portion of the bag when it is brought into position in the vacuum and sealing chamber; more particularly, in most cases, the commodity in the bag length of tubing will tend to retain the mouth of the bag in an open configuration and by utilizing a pair of spaced apart gripping fingers mounted in proximity to the location at which the bag is located in the vacuum packaging chamber, the fingers can be inserted into the bag mouth, subsequently expanded laterally to put the bag under tension and thereafter, the bag may be sealed after subjecting the bag to vacuum packaging conditions to evacuate the air therefrom.

- The above-described components of the overall assemblies may be operated in time-related sequence either manually or automatically by the use of appropriate initiation devices—e.g., limit switches, etc. In this manner, the apparatus of the present invention may be operated to advance a length of bag material from a supply thereof, following which the leading end of the bag material is opened, a commodity placed into the open bag, the bag subsequently severed and sealed at the trailing end, subsequently discharged to the vacuum and sealing station while the operation can be repeated.

- 105 Using the method and apparatus of the present invention, there is provided a simple and economical expedient for vacuum packaging such commodities. Moreover, use of the present invention simplifies prior art operations and ensures that a steady and even seal is provided for the commodity during the last sealing step despite a commodity tending to distort the configuration of the bag.

- 125 For packaging materials, any suitable material may be employed—generally these are of a plastic nature although plastic backed foils, plastic backed papers, etc. can be used. The particular choice of material is dependent on the type of packaging required for any given purpose
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with plastic material such as polyethylene, polypropylene or laminates of the same or other different polymers being most commonly employed.

- 5 The invention thus permits the use of a tube of plastic material which is advantageous in that this is frequently the form in which the material is supplied. Each package may be used for several items depending on the size thereof. Furthermore, the packaging method described is particularly suitable for use with trays having the material thereon. To this end, trays containing the material to be packaged may be fed individually to the feeding mouth wherein the items on the trays are placed within the package by suitable means.

Having thus generally described the invention, reference will now be made to the accompanying drawings, illustrating preferred embodiments and in which:

- 20 Figure 1 is a top plan view of the bag filling and bottom sealing unit (shown on the left hand side) and of the vacuum chamber and sealing unit (shown on the right hand side);

- 25 Figure 2 is a section taken along the line 2—2 of Figure 1 illustrating in greater detail the packaging station;

Figure 3 is a section taken along the line 3—3 of Figure 2;

- 30 Figure 4 is a section taken along the line 4—4 of Figure 5 illustrating in greater detail a portion of the filling collar or funnel;

Figure 5 is a section taken along the line 5—5 of Figure 4;

- 35 Figure 6 is an enlarged sectional view of the sealing and severing means of the packaging station;

Figure 7 is a partially exploded view of the cutting mechanism of Figure 6;

- 40 Figure 8 is a detailed view of a typical sealing head used in the apparatus of Figure 6;

Figure 9 is a side elevational view of the vacuum packaging and sealing unit;

- 45 Figure 10 is a detailed elevational view of the upper portion of the sealing unit in the vacuum chamber;

Figure 11 is an enlarged view showing the closure for the sealing unit;

- 50 Figure 12 is a cross sectional view of the mechanism for moving the fingers for retaining the bag in a flattened condition for sealing and is taken along the line 12—12 of Figure 13;

Figure 13 is a section taken along the line 13—13 of Figure 12;

- 55 Figure 14 is a detailed view of a portion of the vacuum packaging unit showing lifting of one surface of the tube;

Figure 15 is a view similar to Figure 14 showing movement of the arms of the vacuum unit;

- 60 Figure 16 is a cross-sectional view taken along the lines 16—16 of Figure 15;

Figure 17 is a view taken along the lines 17—17 of Figure 14;

- 65 Figure 18 is a view taken along the lines 18—18 of Figure 15;

Figure 19 is a detailed view of the mounting of the arms carrying the vacuum unit; and

Figure 20 is a view, partially in section, of the vacuum connection.

- 70 Referring initially to Figure 1, there is illustrated an apparatus of the present invention comprising a packaging unit 10 and a vacuum packaging and sealing unit 12. Referring to the packaging unit, there is provided a supply of flattened

- 75 thermoplastic wrapping material in the form of an endless tube 14 mounted on a roll 16 and journaled by shaft 18 onto frame members F (and throughout the specification the reference letter "F" refers to frame members).

- 80 In the forward direction of advancement of the web of wrapping material, a guide roller 20 is provided over which the web W passes, where it is in engagement with a wrapper engaging assembly. The wrapper engaging assembly, shown in greater detail in Figure 3, comprises a pair of suction heads 22 mounted in a spaced apart manner on a suitable frame which in turn is connected to the main frame of the apparatus. The upper suction head 22 is mounted on a plate 24 which in turn is connected to a piston rod 26 of a piston assembly 28 which is thereby effective to move the suction head 22 into and out of engagement with the lower suction head. Guide members 30 serve to guide the plate 24 in a vertical fashion.

- 95 As explained hereinbefore, the cutting and bag sealing means are preferably mounted on the wrapper engaging assembly and as will be seen from Figure 3, there is provided a pair of sealing heads 32 and 34 mounted in a spaced apart manner; preferably, sealing head 32 is mounted on plate 24 with pneumatic cylinders 36, connected to the frame, being adapted to move the upper sealing head 32 into engagement with the lower sealing head 34.

- 100 A knife assembly 40 is provided to sever a bag length of wrapping material from the web W, as described hereinafter in greater detail.

- 105 The wrapper engaging assembly is movable along guides 46 by suitable means, such as for example, with the use of a cylinder head 48 located on each side of the device. This assembly is movable between first and second stations—that is, as will be seen from Figure 1, where the wrapping assembly is located, the first station represents the point at which the bag enters between the spaced apart vacuum heads and is effective to move it to a second station where the bag is held by means of a funnel, to be described hereinafter in greater detail.

- 120 Between the first and second stations, there is provided a supporting bed indicated generally by reference numeral 50, and the construction of this is shown in greater detail in Figure 2. The supporting bed actually comprises a movable belt 54, of an endless nature, rotating about rollers 56, one or more of which are driven by suitable drive means, e.g. motor 58. A rigid plate 60, connected to the frame, serves to support the upper portion of the belt 54. As viewed from Figure 2, it will be

noted that the belt 54 is movable from left to right, so as to transfer a wrapper stuffed with a commodity, to the vacuum packaging and sealing unit, as described hereinafter.

5 Referring again to Figure 1, in a preferred form, there is illustrated a funnel designated by reference numeral 62, generally, which funnel is used for the purpose of providing an entrance for loading a commodity into an open bag. Funnel 62
10 is of a type capable of expanding to accommodate different widths of a bag, and to this end, reference will be made to Figures 4 and 5 illustrating the funnel in greater detail.

The funnel comprises a pair of sections 64 and
15 66, which together, form a rectangularly shaped opening through which a commodity is fed. One or both of the upper sections of the funnel 62 are provided with guide brackets 68 to align the sections of the funnel; each section includes a
20 bottom plate which overlaps the other or lies in juxtaposition with the same as indicated by reference numeral 70 in Figure 5. As will be noted, the funnel has a tapering or narrower facing in the direction of advancement of the
25 bag material onto the funnel—to be described hereinafter. Thus, there is a wider mouth portion as will be seen from Figure 4. Each plate 70 is mounted on a bracket 74 which in turn, is mounted on a pair of guide rods 76. Guide rods
30 76 are mounted by means of brackets 78 to frame F of the apparatus. A hydraulic cylinder 80, of a double acting type, with a pair of piston rods 84, is connected to the brackets 78 in a rigid manner, while the piston rods 84 are mounted at
35 their opposite end to brackets 74 which, as described above, carry the movable portions of the funnel whereby the funnel may be expanded or contracted to different sizes as desired.

Referring now to Figure 6, the severing and
40 sealing mechanism of the wrapper engaging assembly of Figure 3 are illustrated in greater detail. It will be appreciated by those skilled in this art that the particular arrangement of the cutting and sealing means may be varied whereby, for
45 example, the cutting and severing means may be located downstream of the direction of feeding of the web W from the vacuum heads 22—i.e., in a reverse arrangement to that illustrated. Each of the vacuum heads 22 is provided with a plurality
50 of apertures 86 communicating with the interior of the vacuum head, and which interior in turn is connected by means of a conduit 88 to a vacuum pump (not shown). The severing knife, or cutting knife, as illustrated in greater detail in Figure 7, is
55 of the type known as an "Oregon" as known to those skilled in the art. To this end, there is provided a free floating knife blade 94 mounted on a cylindrical member 96, which in turn slides in a chamber 98 of the cylinder 100. A slot 102 is
60 provided in the cylinder 100 for the knife to project from and sever transversely of the web W as the knife slides from one side to the other.

Actuation of the knife assembly is accomplished by means of a pneumatic system, with air conduit
65 104 being connected to chamber 100 at one end

and a similar conduit (not shown) being connected to the other end of the chamber 102.

The sealing heads illustrated in Figure 8 in greater detail comprise a base 106 of solid
70 material, there is provided a rubber insulator 108 located in a groove 110 of the housing 106; a wire mesh functioning in a protective manner (reference numeral 112) overlies the rubber strip 108; on top of the wire mesh 112 there is
75 provided a backing member or layer 114 with an electrically conductive element 116 lying on top of layer 114. An outer covering 118 is provided and the whole assembly is held together by means of strip 120 securing the layer 118 to the
80 housing 106.

Referring now to the vacuum unit 12, illustrated in greater detail in Figures 1 and 9 through 13, the vacuum unit comprises a generally rectangular shaped chamber 130
85 defined by a pair of spaced apart side walls 132 and a pair of spaced apart end walls 134 which mount a membrane of a flexible nature, and which membrane is indicated by reference numeral 136. The membrane 136 is free to move downwardly
90 in the manner shown by the dotted lines in Figure 10; the membrane is held in place by means of mounting blocks 138. A sealing gasket is provided about the lateral edges of the walls 132 and 134, and indicated by reference numeral
95 140. The bottom portion of the vacuum chamber is formed, in this instance, by means of a rotatable conveyor belt 150 rotating it about a plurality of rotatable rollers 152, at least one of which is driven by a motor (not shown) and each of which
100 is journaled on a shaft 154 connected to a frame F. A rigid supporting plate is located beneath the lower surface of the upper portion of the belt 150, which plate is indicated by reference numeral 158. The belt is designed to rotate in the same
105 direction of rotation as the belt 54 of the wrapper engaging assembly whereby a commodity filled wrapper may be transported by the rotation of belt 54 onto belt 150 and positioned in the vacuum packaging and sealing unit. If desired, the
110 bottom portion of the vacuum chamber may be formed by a flexible membrane, or simply a rigid plate without a movable conveyor, depending on the type of commodity being packaged, etc.

The upper portion of the vacuum chamber 130
115 is brought into engagement with the lower portion by the arrangement shown in Figure 9. To this end, the upper portion is journaled on guide rods 168, whereby it is freely movable between upper and lower engaging positions with the
120 lower portion of the vacuum chamber. A piston assembly 170 is fixedly secured to the upper portion 130 of the vacuum chamber, and is effective to raise and lower the same into and out of operative relationship with the lower portion of the vacuum chamber. Braces 172 aid in
125 stabilizing the upper portion of the chamber 130.

Located within the upper portion of the vacuum chamber 130 is a sealing head 180, cooperating with an opposed sealing head 182
130 located in the lower portion of the vacuum

chamber. Sealing head 180 is mounted by means of a bracket 184 to a piston rod 186 of a piston assembly 188, which is thereby effective to raise and lower the sealing head 180 into engagement with the sealing head 182, when the piston assembly 188 is actuated.

Air is evacuated from the vacuum chamber, when the two halves are brought into operative relationship. If desired, and optionally, a pair of gripping members may be employed to stabilize the commodity filled bag during a sealing operation but these are not essential. These gripping heads are indicated by reference numerals 200 and these may be spring loaded as illustrated to provide for different tensions. Apertures or recesses 204 in the upper gripping head 200 provide for the air escape from the vacuum chamber during evacuation of the air.

In accordance with this invention, during the sealing of the front leading end of the bag, there is provided a device for retaining the open leading portion of the bag under tension during the sealing operation to provide an improved seal. More particularly, in accordance with this invention, such a device in a preferred form is illustrated in Figures 12 and 13 in particular and comprises a pair of spaced apart movable fingers 300, each finger being mounted on a supporting arm or bracket 302 with each bracket being connected to a piston assembly 304. The support members 302 are slidably mounted on guide rods 310. A piston assembly for each support plate is provided, as indicated by reference numeral 312. This assembly 312 is mounted on a support plate 314, which extends between the side walls and is rigidly mounted thereto. Except for the fingers 300, this assembly is enclosed within a housing 322 with the fingers 300 projecting from a slot 324 in the housing.

Operating in conjunction with the means for retaining the wrapper under tension is a pneumatic cylinder 340 for moving the housing into and out of operative relationship; the housing sliding along guide rods 344 (Figure 1). In this manner, the fingers may be brought into engagement position with the open mouth of the leading portion of a bag located in the vacuum chamber by actuation of the piston assembly 340, whereafter actuation of the piston assemblies 312 will cause lateral movement of the fingers into engagement with the walls of the bag wrapper so as to put them under tension and thereby flatten the mouth of the bag so as to permit sealing by the sealing bars 182 and 184.

The device also includes, in the illustrated embodiment, means for separating the opposed surfaces of the tube at the open mouth prior to insertion of the fingers into the bag wrapper. The device is suitably mounted on the interior of wall 134. The device is illustrated in Figures 14 through 21 which will now be referred to.

Referring initially to Figures 14 and 15, the device includes a vacuum head 400 which is operatively connected to a flexible conduit 402 in turn connected to a vacuum source (not shown).

Vacuum head 400 is mounted on a pair of arms 404 and 406. As may be seen in Figure 1, arm 404 in turn is mounted to a slidable block 405 which in turn is connected to piston 408 of cylinder 410. Thus, actuation of cylinder 410 causing movement of piston 408 and block 405 will in turn cause arm 404 to rotate about pin connection 403 to effect a downward movement of vacuum head 400. Block 405 may be slidable in a suitable channel 412 as shown in Figure 16.

Operating in conjunction with moveable vacuum head 400 is a further vacuum gripping means generally designated by reference numeral 420. Vacuum gripping means 420 is adapted to grip and retain the lower side of the flexible tube. To this end, there is provided a plurality of apertures 422 communicating with the interior of vacuum chamber 424 with conduit 426 leading to the source of vacuum (not shown).

Vacuum head 400 has, on the wall on which arms 404 and 406 are mounted, a shoulder 430 as shown in detail in Figure 19. As may be seen from Figure 14, shoulder 430 is operative as a stop member or abutment to limit the upward movement of vacuum head 400.

Vacuum head 400 includes a plurality of apertures 401 therein, one of which is shown in Figure 20. As may be seen, vacuum conduit 402 is suitably connected to interior conduits 411 such that the vacuum may be applied through apertures 401.

In operation, a web W of tubular plastic material, such as polyethylene or the like, is initially placed between the vacuum or suction heads 22 of the wrapper engaging assembly, at start-up. Following start-up, the drive means (piston rods 48) will move the wrapper engaging assembly from the first station (at the point where it engages the leading end of a web) to a second station, at which point the leading end of the wrapper is placed about the funnel 62. Prior to or during movement of the wrapper assembly from the first to the second station, the piston rod 28 is actuated to open the mouth of the leading end of the bag so as to permit it to surround the periphery of the funnel 62—or in other words, the funnel 62 is permitted to enter into the open mouthed portion of the wrapper as the wrapper advances to the second station. Thereafter, the respective portions of the funnel 62 are opened by means of piston assembly 80 to engage the leading mouth portion of the wrapper. At this point, the funnel then takes control of the tube. A sensing device may be provided for determining when the tube is placed under control of the expanded funnel, and thereafter, the wrapper engaging assembly is returned to the first station after releasing the vacuum from the suction heads 22. The wrapper engaging assembly can, as previously described, move back a predetermined distance, corresponding to the length of the bag desired, whereafter, the cutting blade 94 and the sealing heads 32 and 34 are actuated to seal and sever an appropriate bag length. Prior to or during this latter operation, a commodity may be fed in

through funnel 62 and placed in the bag. This may be accomplished manually or through an automatic feeding machine (not shown). In this respect, the wrapper engaging assembly, and more specifically, the vacuum heads 22 may be operated in such a manner so as to still engage the flattened sheets of the web while the funnel retains control of the leading portion of the wrapper and after the commodity has been inserted into the wrapper, the drive means for the wrapper engaging assembly may be "jerked" backwards to release the weld from the sealing heads 32 and 34, whereafter the wrapper engaging assembly then returns to its original position at the first station.

The funnel is then closed in or returns to its original position whereby the open mouthed portion of the now filled plastic bag is no longer retained by the funnel and the charged plastic tube is now free to be moved by the conveyor belt 54, in conjunction with conveyor belt 150, into the vacuum and sealing assembly 62.

Subsequently, vacuum head 400 is lowered into juxtaposition with the upper surface of the bag. The vacuum circuits are then actuated and vacuum head 400 lifted so that the mouth of the bag is open as shown in figure 14. The lower portion of the bag is retained in position due to the lower vacuum. Subsequently, upon actuation of cylinder 340, the fingers 300 are brought into the open mouth of the bag by movement of the housing 322. Thereafter, actuation of cylinders 312 will cause lateral movement of the fingers 300 to bring the same into engagement with the sides of the bag; pressure sensors (not shown) connected or associated with the fingers 300, can be utilized to place a predetermined tension on the mouth of the bag to cause the desired degree of flatness of the bag prior to vacuum packaging and sealing. As will be appreciated, the fingers 300 are inserted into the mouth of the bag a distance less than the point at which the sealing heads are adapted to seal the bag across the mouth thereof so as to avoid interference with the sealing operation. If desired, following sealing, and removal of the fingers thereafter, any excess material may be severed by means of a cutting assembly (not shown).

During the sealing operation, following stretching of the bag, the upper portion of the vacuum chamber is lowered into sealing engagement with the lower portion of the vacuum chamber and a vacuum created so as to evacuate the air with the membrane 136 serving to evacuate the air in the manner described in the aforementioned copending application. In this manner, utilizing compressible commodities, the commodity may be compressed and the air evacuated, following which the sealing operation takes place. The fingers are then removed and the bag subsequently discharged from the vacuum and sealing station 12 by means of the conveyor 150.

The apparatus has substantial advantages for the packaging of various commodities. Thus, as

will be appreciated, different bag sizes may be employed merely by mounting a plurality of tubes of varying widths. As may be seen, changeover to any desired bag width would be simple for the operator of the machine. Furthermore, the length of the bag may easily be varied by the distance the wrapping assembly moves. One or more items may be fed to the funnel for wrapping and if desired, a tray arrangement may be employed.

75 Claims

1. Apparatus for packaging and sealing a commodity in a bag, comprising a packaging unit and a vacuum packaging and sealing unit, the packaging unit having a support bed comprising an endless belt, means on one side of the belt for storing a supply of tubing, a commodity loading funnel fixed on the other side of the belt, reciprocating means for opening up the leading end of the tubing and for advancing the leading end of a bag-length of the tubing in one direction across the belt from the one side to the other side and over the funnel so that a commodity can be loaded into the tubing on the belt through the funnel, and reciprocating means having means thereon operative to cut and seal the said bag-length of tubing at a distance from said leading end to form an open mouth bag while said leading end is engaged on the funnel, means for moving the belt in a direction transverse to the one direction to laterally transfer the commodity loaded bag from the packaging unit to the vacuum packaging and sealing unit, the vacuum packaging and sealing unit having a support bed to receive the commodity loaded bag, means on the packaging and sealing unit movable in one direction for use in opening up the mouth of the bag, separate means movable to enter the open mouth of the bag and to move into engagement with the mouth of the bag to place the mouth of the bag under tension, and means to vacuum seal the bag while the bag mouth is stretched and under tension.

2. Apparatus as claimed in claim 1, wherein the funnel is adjustable as to size.

3. Apparatus as claimed in claim 1, wherein the support bed in the vacuum packaging and sealing unit includes a conveyor belt movable away from the packaging unit.

4. Apparatus as claimed in claim 1, wherein the means for opening up the mouth of the bag comprises a vacuum head movable between a raised stored position and a lowered operative position, and a vacuum means in the sealing unit support bed.

5. A method of packaging a commodity and sealing the same in a flexible bag, using an apparatus as claimed in claim 1, comprising the steps of providing a length of flexible sealable tubing, the tubing having an open leading end, advancing the leading end of a bag length of the tubing from a first position to a second position, opening the leading end of the tubing to form a mouth prior to the second position, passing the leading end over a commodity loading funnel at



through funnel 62 and placed in the bag. This may be accomplished manually or through an automatic feeding machine (not shown). In this respect, the wrapper engaging assembly, and more specifically, the vacuum heads 22 may be operated in such a manner so as to still engage the flattened sheets of the web while the funnel retains control of the leading portion of the wrapper and after the commodity has been

inserted into the wrapper, the drive means for the wrapper engaging assembly may be "jerked" backwards to release the weld from the sealing heads 32 and 34, whereafter the wrapper engaging assembly then returns to its original position at the first station.

The funnel is then closed in or returns to its original position whereby the open mouthed portion of the now filled plastic bag is no longer retained by the funnel and the charged plastic tube is now free to be moved by the conveyor belt 54, in conjunction with conveyor belt 150, into the vacuum and sealing assembly 62.

Subsequently, vacuum head 400 is lowered into juxtaposition with the upper surface of the bag. The vacuum circuits are then actuated and vacuum head 400 lifted so that the mouth of the bag is open as shown in figure 14. The lower portion of the bag is retained in position due to the lower vacuum. Subsequently, upon actuation of cylinder 340, the fingers 300 are brought into the open mouth of the bag by movement of the housing 322. Thereafter, actuation of cylinders 312 will cause lateral movement of the fingers 300 to bring the same into engagement with the sides of the bag; pressure sensors (not shown) connected or associated with the fingers 300, can be utilized to place a predetermined tension on the mouth of the bag to cause the desired degree of flatness of the bag prior to vacuum packaging and sealing. As will be appreciated, the fingers 300 are inserted into the mouth of the bag a distance less than the point at which the sealing heads are adapted to seal the bag across the mouth thereof so as to avoid interference with the sealing operation. If desired, following sealing, and removal of the fingers thereafter, any excess material may be severed by means of a cutting assembly (not shown).

During the sealing operation, following stretching of the bag, the upper portion of the vacuum chamber is lowered into sealing engagement with the lower portion of the vacuum chamber and a vacuum created so as to evacuate the air with the membrane 136 serving to evacuate the air in the manner described in the aforementioned copending application. In this manner, utilizing compressible commodities, the commodity may be compressed and the air evacuated, following which the sealing operation takes place. The fingers are then removed and the bag subsequently discharged from the vacuum and sealing station 12 by means of the conveyor 150.

The apparatus has substantial advantages for the packaging of various commodities. Thus, as

will be appreciated, different bag sizes may be employed merely by mounting a plurality of tubes of varying widths. As may be seen, changeover to any desired bag width would be simple for the operator of the machine. Furthermore, the length of the bag may easily be varied by the distance the wrapping assembly moves. One or more items may be fed to the funnel for wrapping and if desired, a tray arrangement may be employed.

75 Claims

1. Apparatus for packaging and sealing a commodity in a bag, comprising a packaging unit and a vacuum packaging and sealing unit, the packaging unit having a support bed comprising an endless belt, means on one side of the belt for storing a supply of tubing, a commodity loading funnel fixed on the other side of the belt, reciprocating means for opening up the leading end of the tubing and for advancing the leading end of a bag-length of the tubing in one direction across the belt from the one side to the other side and over the funnel so that a commodity can be loaded into the tubing on the belt through the funnel, and reciprocating means having means thereon operative to cut and seal the said bag-length of tubing at a distance from said leading end to form an open mouth bag while said leading end is engaged on the funnel, means for moving the belt in a direction transverse to the one direction to laterally transfer the commodity loaded bag from the packaging unit to the vacuum packaging and sealing unit, the vacuum packaging and sealing unit having a support bed to receive the commodity loaded bag, means on the packaging and sealing unit movable in one direction for use in opening up the mouth of the bag, separate means movable to enter the open mouth of the bag and to move into engagement with the mouth of the bag to place the mouth of the bag under tension, and means to vacuum seal the bag while the bag mouth is stretched and under tension.

2. Apparatus as claimed in claim 1, wherein the funnel is adjustable as to size.

3. Apparatus as claimed in claim 1, wherein the support bed in the vacuum packaging and sealing unit includes a conveyor belt movable away from the packaging unit.

4. Apparatus as claimed in claim 1, wherein the means for opening up the mouth of the bag comprises a vacuum head movable between a raised stored position and a lowered operative position, and a vacuum means in the sealing unit support bed.

5. A method of packaging a commodity and sealing the same in a flexible bag, using an apparatus as claimed in claim 1, comprising the steps of providing a length of flexible sealable tubing, the tubing having an open leading end, advancing the leading end of a bag length of the tubing from a first position to a second position, opening the leading end of the tubing to form a mouth prior to the second position, passing the leading end over a commodity loading funnel at

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- the second position, inserting a commodity into the tubing through the open mouth, cutting a desired bag length of the tube material and bottom sealing the desired bag length;
- 5 subsequently removing the loaded bag from the second position, transferring the commodity loaded bag from the second position to a vacuum packaging and sealing position, supporting said commodity loaded bag, opening the mouth of
- 10 said bag, placing the open mouth of the commodity loaded bag under tension to flatten the open mouth, subjecting the commodity loaded bag to a vacuum, and sealing the open mouth while the bag mouth is stretched and
- 15 under tension.
6. A method and apparatus for packaging and sealing a commodity in a bag substantially as described herein with reference to the drawings.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1983. Published by the Patent Office,
25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained



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