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3,427,729

APPARATUS FOR HEAT TREATING ONE END ONLY OF A PACKAGE

Original Filed April 19, 1963

Sheet 1 of 2

FIG. 1

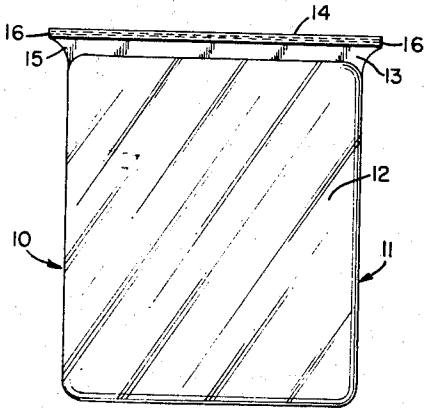


FIG. 2

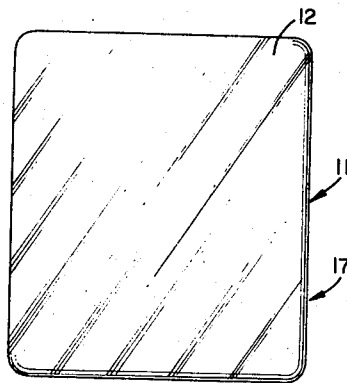


FIG. 3

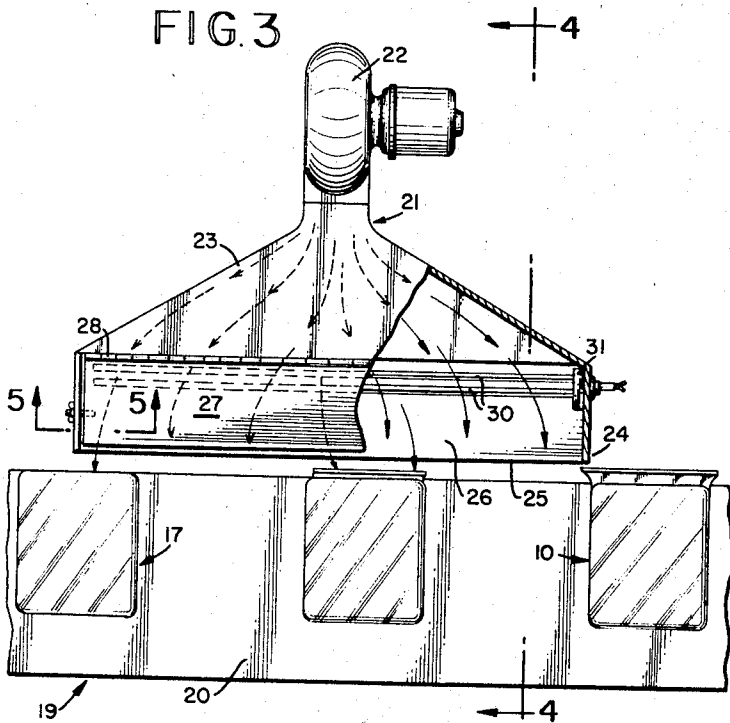


FIG. 4

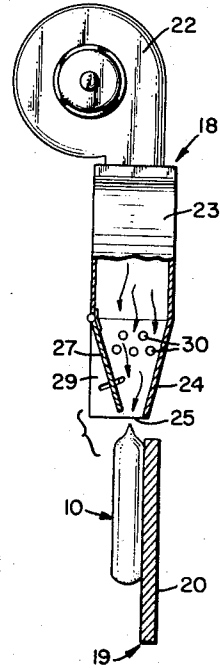
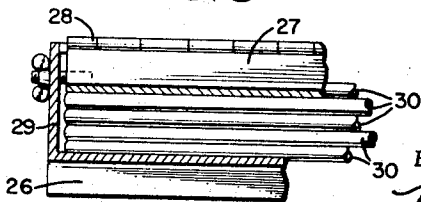


FIG. 5



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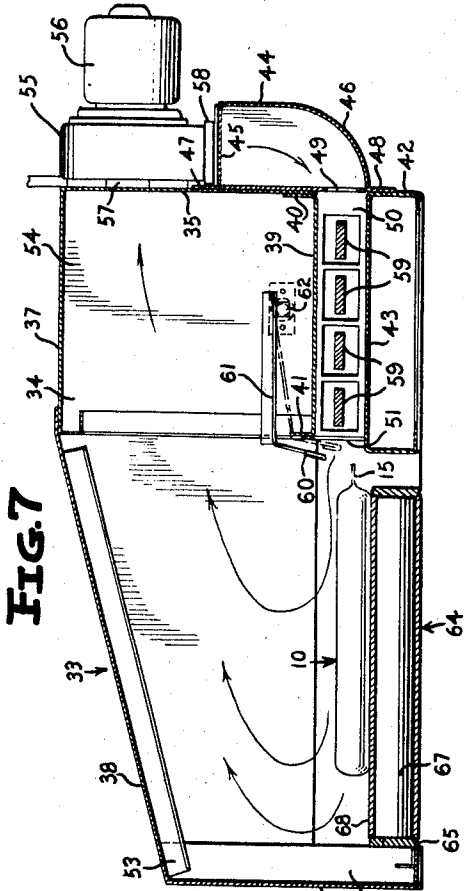


FIG. 7

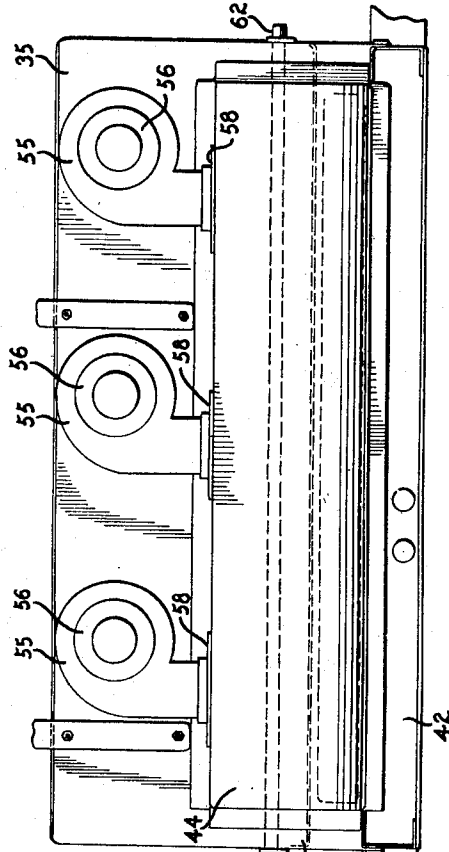


FIG. 8

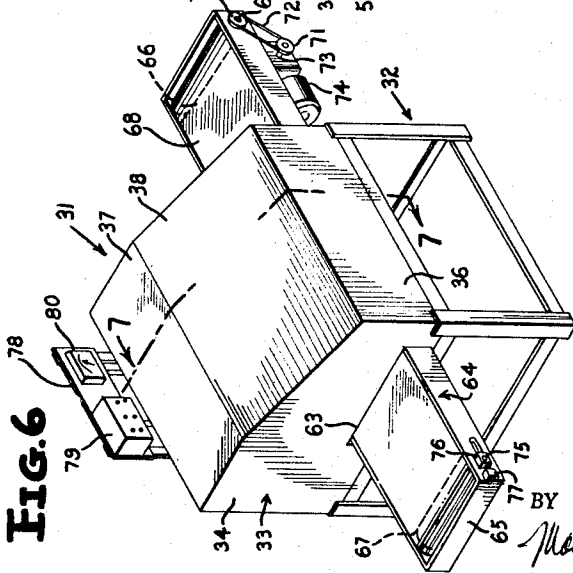


FIG. 6

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APPARATUS FOR HEAT TREATING ONE END ONLY OF A PACKAGE

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Application Apr. 19, 1963, Ser. No. 274,105, now Patent No. 3,347,013, dated Oct. 17, 1967, which is a continuation-in-part of application Ser. No. 221,599, Sept. 5, 1962. Divided and this application Oct. 21, 1965, Ser. No. 499,171

U.S. Cl. 34—223

7 Claims

Int. Cl. F26b 19/00; B65d 33/24

ABSTRACT OF THE DISCLOSURE

An apparatus is provided for directing hot air against an end of each one of a plurality of bags being passed serially therepast, on a moving conveyor. A means for heating the air within an air inlet duct is provided, as well as a hinged member adapted to direct the air as desired, according to the height of the package conveyed therepast. An enclosing hood is provided, enclosing the heater and a major portion of the inlet duct, as well as providing an outlet duct whereby air re-circulation is effected. The packages being conveyed past the open end of the air duct comprise a thermoplastic pocket closely fitting a contained product, one end of which has been heat sealed to completely enclose the product, the heat seal being generally loose and remote from an adjacent end of the product. The direction of the hot air against this loose end of the thermoplastic bag facilitates the shrinkage of the bag, against the contained product end.

This application is a division of my copending application Ser. No. 274,105, filed Apr. 19, 1963, now Patent No. 3,347,013, which application in turn is a continuation-in-part of my application Ser. No. 221,559, filed Sept. 5, 1962, now abandoned.

This invention relates in general to new and useful improvements in the forming of packages utilizing a flexible bag of the type which generally conforms to the contours of the product packaged therein, and more particularly relates to the forming of a package wherein the product containing bag snugly conforms to the contours of the product contained therein at all points.

In the packaging of products within thin flexible bags, it is desirable that the bags snugly encase the product contained therein to provide neat appearing packages. However, when the bags are formed of thermoplastic materials and the open ends of the bags through which the products are passed in positioning the products within the bags are heat sealed, it is not feasible to heat seal closed the open ends of the bags immediately against the products so as to result in a snug fit between the newly sealed end of the bag and the product contained therein. As a result, immediately after the customary package is sealed, the bag has a loose end which does not snugly conform to the contour of the product contained therein and the resultant package is unsightly.

In view of the foregoing, it is a primary object of this invention to provide a neat appearing package wherein the normally loose end thereof is shrunk so as to snugly fit the adjacent contours of the product contained within the bag and thus eliminate the unsightly loose ends normally appearing in packages of this type.

Another object of this invention is to provide a novel apparatus for effecting the treatment of loose ends of packages wherein the package forming material is shrunk to effect the snug engagement of the previously loose end with the product of the package.

Still another object of this invention is to provide a novel apparatus for shrinking the loose ends of packages which include bags formed of heat shrinkable thermoplastic material, the apparatus including a conveyor and a blower having means for heating air delivered by the blower, the blower being provided with a discharge end for directing heated air across the path of the conveyor and against the loose ends of the packages and thus results in the shrinking of the loose ends of the bags to conform to the contours of the products within the packages.

A further object of this invention is to provide a novel apparatus for shrinking the loose ends of packages which include bags of heat shrinkable thermoplastic material, the apparatus being of a type which permits the shrinking to be accomplished on an assembly line basis, and which apparatus includes an upstanding cabinet having a transverse opening therethrough through which a package receiving conveyor passes, the conveyor having a package receiving portion and a package discharge portion disposed on opposite sides of the cabinet, and the cabinet being constructed to provide a discharge duct for directing air onto packages carried by the conveyor, air heating means within the discharge duct, a hood overlying the discharge duct for receiving heated air passing over packages, a return duct overlying at least a portion of the discharge duct and extending from the hood to a point adjacent the air receiving end of the discharge duct and a blower mounted between the return duct and the discharge duct for circulating air therethrough.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims and the several views illustrated in the accompanying drawings.

In the drawings:

FIGURE 1 is a plan view of a bag into which a product has been snugly fit and the open end of the bag through which the product was passed has been heat sealed with the sealed end of the bag being loose as compared to the product in the customary manner of forming packages.

FIGURE 2 is a plan view of a neat appearing package formed in accordance with this invention wherein the loose sealed end of the bag has been treated in accordance with this invention and the sealed end now conforms to the contours of the adjacent end of the product.

FIGURE 3 is a plan view of an apparatus with parts broken away, for treating bags of the type shown in FIGURE 1 to shrink the loose ends thereof wherein the treated bag will have the appearance of the bag of FIGURE 2.

FIGURE 4 is a transverse vertical sectional view taken along the line 4—4 of FIGURE 3 and shows in more detail the structure of the apparatus.

FIGURE 5 is an enlarged fragmentary transverse vertical sectional view taken along the line 5—5 of FIGURE 3 and shows the specific means for facilitating the adjustment of the height of the mouth of the discharge end of the blower.

FIGURE 6 is a perspective view of a cabinet form of apparatus in accordance with this invention.

FIGURE 7 is an enlarged fragmentary longitudinal vertical sectional view taken through the upper portion of the apparatus of FIGURE 6 along the line 7—7 and shows the internal construction of the cabinet.

FIGURE 8 is a fragmentary rear elevational view of the apparatus of FIGURE 6 and shows the specific mounting of a plurality of blowers for directing air through the cabinet.

Referring now to the drawings in detail, reference is first made to FIGURE 1 of the drawings wherein there is illustrated a package generally referred to by the numeral

10. The package 10 includes a bag 11 having a product 12 disposed therein. The bag 11, as far as this invention is concerned, is of a prefabricated construction and is formed of a flexible, heat shrinkable, thermoplastic material, such as polyethylene. The bag 11 is provided with an open end 13 through which the product 12 is passed. The open end 13 is sealed by means of a line of heat sealing 14 so as to completely seal the bag 11 about the product 12.

The bag 11, which may be considered an overwrap, is shaped to snugly receive the product 12 and to conform to the contours of the product 12 except for the loose construction of the sealed open end 13. This sealed open end is referred to, for identification purposes, as a loose end 15. It will be apparent that the loose end 15 has unsightly corners 16 resulting from the elongation of the cross-section of the bag as the opposed faces thereof are brought together during the heat sealing operation.

The package 10, as appearing in FIGURE 1, is obviously unsightly and undesirable for the neat packaging of products which to some degree rely upon their appearances for sales appeal.

Reference is now made to FIGURE 2 wherein there is illustrated a second package which is generally referred to by the numeral 17. The package 17 includes an overwrap or bag, generally referred to by the numeral 11, and the product 12. The only difference between the package 17 and the package 10 is that the loose end 15 of the package 10, including the ears 16, have been shrunk so that the loose end 15 no longer exists and the heat seal 14 is brought to bear against the edge of the product 12. The previously loose end 15 is now tight and that portion of the bag 11 snugly engages the contours of the product 12. It will be readily apparent that the package 17 has a neat appearance as compared to the package 10.

Reference is now made to FIGURES 3, 4 and 5 wherein there is illustrated an apparatus for converting the package 10 into the package 17 by the shrinking of the loose end 15 of the package 10 so that the previous loose end tightly engages and conforms to the contour of opposed portions of the product 12 disposed within the bag 11. The apparatus, which is generally referred to by the numeral 18, includes an endless conveyor 19 having a top run 20 on which packages 10 are positioned. A blower, generally referred to by the numeral 21, is mounted adjacent the top run 20 of the endless conveyor 19 for directing hot air onto the loose ends 15 of the packages 10 carried by the top run 20.

The blower 21 includes a conventional type of blower element 22 and a flaring hood 23. The hood 23 is provided with a discharge end 24 which terminates in a mouth 25 through which hot air passes. The mouth 25 is of a variable height to conform with variation in the thicknesses of packages 10 carried by the conveyor 19. The mouth 25 of the blower 21 is defined by a lower panel 26, which may be fixed, and an upper panel 27 which is hingedly connected to the remainder of the hood 23 by means of a hinge 28. The ends of the mouth 25 are defined by upstanding plates 29 which may be fixedly secured to the plate 26 or to other portions of the hood 23. It is to be understood that the upper plate 27 moves relative to the plates 29.

A plurality of electrical heating elements 30 are mounted within the hood 23 in the path of air passing through the hood 23 so that the air is heated. The heating elements 30 are coupled to a control box 31 wherein the energization of the heating elements 30 may be controlled to provide the desired hot air temperature of the air discharging from the blower 21 through the open mouth 25.

Referring once again to FIGURE 3 in particular, it will be seen that a package 10 carried by the upper run 20 of the conveyor 19 passes the mouth 25 of the blower 21 and has hot air impinged on the loose end 15 thereof. The hot air impinging on the loose end 15 of each bag 10 causes a heating of the loose end 15 and the resultant shrinking of the loose end 15. In order to produce the shrinking of the loose end 15, it is necessary to expose

the loose end 15 to a continuous blast of hot air at a relatively high temperature for a length of time to cause softening thereof for maximum relaxation, better known as orientation. The heated film of which the bag 11 is formed, with its tendency to shrink, changes in shape and comes to rest in contact with the face of the product 12 in the manner shown in FIGURE 2. The previously undesirable ears 16 completely disappear.

In practicing the invention, the open mouth 25 of the blower 21 has a length of between thirty to thirty-six inches and the product is wrapped in a 0.0015 inch polyethylene film. The upper run 20 of the conveyor 19 moves at the rate of one hundred feet per minute and the temperature of the air is regulated within a temperature range of from 300° F. to 600° F. to conform to the variables of film thickness, package belt speed, degree of film orientation rate, etc.

A primary example of the product which may be packaged in accordance with this invention is linens, including bedsheets and pillow cases. However, the invention is not so limited in that numerous other products may be packaged in accordance with this invention. These other products may include, for example, clothing, toys, food products, etc.

Reference is now made to FIGURES 6, 7 and 8 wherein a compact machine for performing the necessary heat treating and shrinking operation is illustrated. The machine is generally referred to by the numeral 31, and includes a base, generally referred to by the numeral 32. The base 32 supports a cabinet or housing, generally referred to by the numeral 33. It is to be noted that the cabinet 33 sets in the base 32 to form a compact unit of the proper height for operation of the machine 31. The cabinet 33 is formed of a pair of end walls 34 which are connected together at their rear ends by a rear wall 35 and also at their forward ends by a front wall 36. The top wall 37 extends along the upper edges of the side walls 34 forwardly from the rear wall 35 and has a downwardly sloping forward portion 38 which is connected to the front wall 36.

Referring now to FIGURE 7 in particular, it will be seen that the rear lower portion of the cabinet 33 is provided with a horizontal wall 39 having a rear flange 40 secured to the rear wall 35 and a forward upstanding flange 41. A trough 42 underlies the horizontal wall 39 and is secured to the rear wall 35 and the side walls 34. The trough 42 has an upper wall 43 which is parallel to and spaced from the horizontal wall 39.

A discharge duct 44 is secured to the rear wall 35 rearwardly. The discharge duct 44 is generally L-shaped in flow pattern and includes a top wall 45 and an arcuate lower portion 46 directed towards the rear wall 35. The top wall 45 is provided with a mounting flange 47 and the bottom wall 46 is provided with a mounting flange 48, the mounting flanges 47 and 48 being suitably secured to the rear wall 35.

The discharge duct 44 leads through suitable openings 49 in the rear wall 35 into the space between the walls 39 and 43, which space defines a duct 50 which is a continuation of and may be considered a part of the duct 44. The duct 50 has a discharge end 51 which leads into a chamber 52 which is located in the forward lower portion of the cabinet 33.

The upper portions of the side walls 34 and the front wall 36, together with the sloping top wall 38, define a hood 53 which overlies the chamber 52 for receiving and returning air directed through the discharge opening 51 into the chamber. The rear end of the area defined by the hood 53 opens into a duct 54 which is considered a return duct and is defined by the top wall 37 and the horizontal wall 39, together with the side walls 34. Accordingly, there is a circulation of air through the cabinet 33 in the manner generally defined by the arrows shown in FIGURE 7.

In order to effect a circulation of air through the

cabinet 33, a plurality of blowers are mounted in the rear upper portion of the cabinet 33. Each blower is referred to by the numeral 55, and is provided with a suitable electric motor 56. Each blower 55 is provided with an inlet 57 which is connected to the upper portion of the rear wall 35 for receiving air passing through suitable openings (not shown) in the rear wall. Each blower 55 is also provided with a discharge 58 which is connected to the top wall 45 of the duct 44 for discharging air from the blower 55 into the duct 44 through suitable openings (not shown) in the top wall 45.

In order that air passing through the discharge opening 51 may be heated, a plurality of heating elements 59 extend transversely across the duct 50. The heating elements 59 are preferably of an electrical type, although any type of heating element may be utilized. When the heating elements 59 are of the electric type, the trough 42 may be utilized for receiving the necessary electrical wiring.

The flow of air through the discharge opening 51 is controlled by means of an adjustable plate 60 which depends within the chamber 52 generally in front of the discharge opening 51. The plate 60 is carried by a horizontal plate 61 which extends into the return duct 54 and is carried by suitable hinge fittings 62 secured to the side walls 34. It is to be understood that the plate 60 is frictionally held in an adjustable position although, if desired, suitable positive securing means may be provided.

The side walls 34 are provided in the lower forward portions thereof with openings 63 which are aligned transversely of the cabinet 33 and which open through the lower portion of the chamber 52. A horizontal conveyor, generally referred to by the numeral 64, extends through the openings 63 and transversely of the cabinet 33. The conveyor 64 may be of any conventional type and is illustrated as including a suitable frame 65 which is rectangular in outline and which is supported by the frame 32. The frame 65 is provided at the right end thereof with a drive roller 66 and at the left end thereof with an idler roller 67. An endless conveyor belt 68 is entrained over the rollers 66 and 67.

The drive roller 66 is provided with a drive shaft 69 having a pulley 70 mounted thereon which is driven from a pulley 71 by means of a drive belt 72. The pulley 71 is carried by a drive shaft 73 of a suitable power unit 74.

The idler roller 67 is carried by a shaft 75 which is mounted in support blocks 76 which are adjustable longitudinally of the conveyor 64 by an adjusting mechanism 77 to control the tension of the conveyor belt 68.

In accordance with this invention, packages 10 are placed on the left end of the conveyor 64 and are moved by the conveyor belt 68 through the cabinet 33. In the movement of the package 10 through the cabinet 33, hot air is directed against the loose end 15 of the bag to effect the shrinkage thereof. The width of the cabinet, combined with the effects of the blowers 55 and the heating units 59, is such to provide the necessary heat and heating time required for the various packages for which the machine is adapted. It is to be understood that the packages shrinking operation is automatic and neatly formed packages 17 exit from the right side of the cabinet 33 on the conveyor 64. The packages may be fed to and removed from the conveyor 64 either automatically or manually. No attempt is made here to specifically illustrate or describe an automatic mechanism, as this may be varied in accordance with the existing equipment of the ultimate user and the requirements of the user.

The upper rear portion of the cabinet 33 is provided with a control panel 78 on which there is mounted a suitable switch unit 79 and a temperature indicator 80. The switch unit 79 may be used for controlling the operation of one or more of the blowers 50 and one or more of the heating units 59. It is to be understood that once the ma-

chine 31 is set for operation, it is merely necessary to place the packages 10 on the conveyor 64 and remove the completed packages 17 off of the conveyor.

Although a preferred embodiment of the invention has been illustrated and specifically described herein, it is to be understood that minor modifications in the example apparatus disclosed herein may be made in accordance with the spirit and scope of the invention, as defined in the appended claims.

I claim:

1. An apparatus for heat treating sealed ends of product containing bags formed of heat shrinkable materials to conform to the contour of the product contained therein, said apparatus comprising a conveyor, a blower having a discharge and an intake, a first duct extending from said blower discharge end opening toward said conveyor for directing air onto articles carried by said conveyor past said discharge end, heating means within said first duct adjacent said conveyor for heating air prior to the passage of air over said conveyor, and a hood overlying only a portion of said conveyor and overlying said heating means for receiving the heated air after the air passes over said conveyor, said hood having a return duct connected to said blower intake end whereby the heated air is recirculated to reduce heat loss, said conveyor including means for moving said product bags from a first location removed from said hood, first duct and return duct, past said hood, first duct and return duct and to a second location removed from said hood, first duct and return duct.

2. The apparatus of claim 1 wherein said first duct and said return duct have parallel portions separated by a common imperforate wall.

3. The apparatus of claim 1 wherein said discharge end has a variable cross-sectional mouth opening adjacent one side of the conveyor defined in part by a hinged wall to compensate for variation in package thicknesses.

4. The apparatus of claim 1 wherein said discharge end has a variable cross-sectional mouth defined in part by a hinged wall to compensate for variation in package thicknesses, said hinged wall being mounted within said return duct.

5. An apparatus for heat treating sealed ends of product containing bags formed of heat shrinkable materials to conform to the contours of products contained therein, said apparatus including an upstanding cabinet having a transverse opening adjacent one end thereof, a transversely extending conveyor passing through said transverse opening and extending to opposite sides of said cabinet for the reception and discharge of packages, said cabinet including a discharge duct therein having a discharge end disposed for directing air across said conveyor in alignment with the path of packages carried thereby, heating means within said discharge duct for heating air passing therethrough, a hood overlying said cabinet opening for receiving heated air passing over said conveyor, a return duct overlying at least a portion of said discharge duct and extending from said hood to a point adjacent an entrance end of said discharge duct for recirculating the heated air, and a blower coupled between said return duct and said discharge duct.

6. An apparatus for heat treating sealed ends of product containing bags formed of heat shrinkable materials to conform to the contour of the product contained therein, said apparatus comprising a conveyor, a blower having a discharge and an intake, a first duct extending from said blower discharge end opening towards said conveyor for directing air onto articles carried by said conveyor past said discharge end, heating means within said first duct for heating air prior to the passage of the air over said conveyor, and a hood overlying only a portion of said conveyor for receiving the heated air after the air passes over said conveyor, said hood having a return duct connected to said blower intake end whereby the heated air is re-circulated to reduce heat loss, and wherein said discharge end has a variable cross-sectional mouth opening

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adjacent one side only of the conveyor, defined in part by a hinged wall to compensate for variation in package thicknesses, said conveyor including means for moving said product bags from a first location removed from said hood, first duct and return duct, past said hood, first duct and return duct and to a second location removed from said hood, first duct and return duct.

7. An apparatus for heat treating sealed ends of product containing bags formed of heat shrinkable materials to conform to the contour of the product contained therein, said apparatus comprising a conveyor, a blower having a discharge and an intake, a first duct extending from said blower discharge end opening towards said conveyor for directing air onto articles carried by said conveyor past said discharge end, heating means within said first duct for heating air prior to the passage of the air over said conveyor, and a hood overlying said conveyor for receiving the heated air after the air passes over said conveyor, said hood having a return duct connected to said blower intake end whereby the heated air is re-circulated to reduce heat loss, wherein said discharge end has a

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variable cross-sectional mouth defined in part by a hinged wall to compensate for variation in package thicknesses, said hinged wall being mounted within said return duct.

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