HOT WIND SUPPLYING APPARATUS FOR PACKAGING PRODUCT

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ABSTRACT
A hot wind supplying apparatus having high energy consumption efficiency for packaging a product by use of a heat shrink film, capable of promoting the economics of a packaging work, the hot air supplying apparatus including at least one hot wind unit configured to discharge hot wind to a packaging surface of the product, wherein the hot wind unit includes a body having a discharging hole, at least one blower fan configured to blow air to the discharging hole, at least one fan motor configured to drive the blower fan, a heater configured to heat air that is to be discharged from the discharging hole, and at least one recycling flow path configured to collect the air discharged from the discharging hole and to supply the air collected to an intake side of the blower fan.
FIG. 8
HOT WIND SUPPLYING APPARATUS FOR
PACKAGING PRODUCT

CROSS-REFERENCE TO RELATED
APPLICATIONS


BACKGROUND

[0002] 1. Field
[0003] Embodiments of the present disclosure relate to a hot wind supplying apparatus configured to supply hot wind to a heat shrink film for packaging a product.
[0004] 2. Description of the Related Art
[0005] A heat shrink packaging is a product that has been packaged using a heat shrink film having a shrinking characteristic when applied with heat, and the heat shrink film used for the heat shrink packaging as such is relatively inexpensive when compared to other packaging material. Since an automation of a packaging process may be easily done through the heat shrink packaging, the heat shrink packaging is widely used when packaging several units of packages into a single bundle, or as a method of packaging a large-size product such as various electronic products.
[0006] In accordance with a packaging work using the heat shrink film as such, the shrinkage of the heat shrink film is induced by first covering a product with the heat shrink film configured for a packaging, and then by applying heat on the heat shrink film. The heating process as such is performed by the hot wind having high temperature that is being supplied on the surface of the heat shrink film that is wrapped through a hot wind supplying apparatus.
[0007] However, when the hot wind supplying apparatus as such uses combustion heat of fuel gas as a heat source, a large amount of installment investment may be needed in establishing the facility configured to supply fuel, and risk of fire is increased, and thereby degrading the stability of a production facility as a whole. In addition, in a case when the hot wind supplied to a packaging film is not recycled but discharged to outside air, due to the low energy efficiency of the hot wind supplying apparatus, the reduction in the cost of packaging may be difficult to anticipate.
[0008] Thus, as to promote the economics and the stability of the packaging work using the heat shrink film, a need for developing a hot wind supplying apparatus having high energy consumption efficiency and stability is on the rise.

SUMMARY

[0009] Therefore, it is an aspect of the present disclosure to provide a hot wind supplying apparatus having high energy consumption efficiency for packaging a product to promote the economics of a packaging work using a heat shrink film.
[0010] It is another aspect to provide a hot wind supplying apparatus having high stability of usage for packaging a product.
[0011] Additional aspects will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the disclosure.
[0012] In accordance with one aspect, a hot wind supplying apparatus for packaging a product, the hot wind supplying apparatus includes at least one hot wind unit configured to discharge hot wind to a packaging surface of the product. The hot wind unit may include a body, at least one blower fan, at least one fan motor, a heater, and at least one recycling fan path. The body may have a discharging hole. The at least one blower fan may be configured to blow air to the discharging hole. The at least one fan motor may be configured to drive the blower fan. The heater may be configured to heat air that is to be discharged from the discharging hole. The at least one recycling flow path may be configured to collect the air discharged from the discharging hole and to supply the air collected to an intake side of the blower fan.
[0013] The hot wind unit may further include a guide member provided in a way to be disposed in between the packaging surface and the body in a case when the hot wind is discharged through the hot wind unit, so that the air discharged from the discharging hole is introduced to the recycling flow path.
[0014] The hot wind supplying apparatus may further include a main frame. The main frame may be configured to support the hot wind unit and provide therein with a space to accommodate the product. The hot wind unit may be disposed at each of four side surfaces of the main frame so as to surround four side surfaces of the product that is entered into the space.
[0015] The hot wind unit may be disposed in a way that the discharging hole faces toward the product that is entered into the space.
[0016] The hot wind supplying apparatus may further include a horizontal transfer unit that may be configured to move the hot wind unit forward/backward with respect to the product that is entered into the space.
[0017] The horizontal transfer unit may include a driving motor, and a ball screw configured to convert a rotary movement by the driving motor into a linear movement.
[0018] The hot wind supplying apparatus may further include at least one elevation unit configured to vertically move the hot wind unit.
[0019] The hot wind supplying apparatus may further include a reflection member that may be configured to provide a reflection surface for an idling of the hot wind unit, so that the hot wind discharged from the discharging hole is directed to the recycling flow path.
[0020] The reflection member may include heat insulation material.
[0021] The reflection member may be provided with a plurality of reflection surfaces to correspond to each hot wind unit.
[0022] The hot wind unit may further include a temperature sensor configured to measure the temperature of air being introduced to the blower fan.
[0023] The hot wind unit may further include a temperature sensor configured to measure the temperature of air passed through the heater.
[0024] The hot wind supplying apparatus may further include a product transfer unit that may be disposed at a lower portion of the main frame to transfer the product.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] These and/or other aspects of the disclosure will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings of which:
FIG. 1 is a perspective view of a hot wind supplying apparatus for packaging a product in accordance with one embodiment.

FIG. 2 is a perspective view of a hot wind unit.

FIG. 3 is a cross-sectional view of a hot wind unit.

FIG. 4 is a cross-sectional view of a hot wind supplying apparatus showing a state prior to a product being entered.

FIG. 5 is a cross-sectional view of a hot wind supplying apparatus showing a state of the hot wind being processed with respect to a product.

FIG. 6 is a cross-sectional view of a hot wind supplying apparatus showing a state of idling of a hot wind unit.

FIG. 7 is a cross-sectional view of a hot wind unit in an idling state.

FIG. 8 is a cross-sectional view of a hot wind unit in accordance with one embodiment.

FIG. 9 is a cross-sectional view of a hot wind unit in accordance with one embodiment.

DETAILED DESCRIPTION

Reference will now be made in detail to the embodiments of the present disclosure, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout.

As illustrated on FIGS. 1 to 4, a hot wind supplying apparatus 10 for packaging a product may include a main frame 20 to entirely support the hot wind supplying apparatus 10, a hot wind unit 30 installed at each of four side surfaces of the main frame 20, a product transfer apparatus 40 to transfer a product ‘P’ to an inside of/from the hot wind supplying apparatus 10, a horizontal transfer unit 50 to move hot wind unit 30 forward/backward in a horizontal direction, and an elevation unit 60 to vertically move the hot wind unit 30.

The main frame 20 may be composed in a rectangular shape, and at the main frame 20, a space is formed in which a product packaged with a heat shrink film may be accommodated.

The hot wind unit 30 is disposed at each of the four side surfaces of the main frame 20, and when the product ‘P’ is entered into an inside space of the main frame 20, the hot wind unit 30 may be disposed in a form of surrounding four side surfaces of the product ‘P’. In addition, a discharging hole 35a of each hot wind unit 30 is disposed in a way to face inside the space of the main frame 20 such that a hot wind of the hot wind unit 30 is discharged in a state that the product ‘P’ is entered into an inside space of the main frame 20 as such and thus the shrinking of the heat shrink film packaged around the product ‘P’.

The elevation unit 60 is provided in a way to vertically move the hot wind unit 30 with respect to the main frame 20 to adjust the height of the hot wind unit 30.

In between the hot wind unit 30 and the elevation unit 60, a base plate 55 configured to support the hot wind unit 30 while disposed at an upper portion of the hot wind unit 30 for the coupling with respect to the elevation unit 60, and a supporting bracket 56 configured to connect in between the base plate 55 and the elevation unit 60 are installed.

The elevation unit 60 may be disposed at a vertical frame unit 21 of the main frame 20, and may include a driving motor 61, a pulley 63, and a belt 62 to drive the vertical movement of the hot wind unit 30 through a belt driving method.

The elevation unit 60, as illustrated in the embodiment, is composed in a way that each elevation unit 60 is disposed at each of four units of the vertical frame unit 21 of the main frame 20, so that an end portion 62a of the belt 62 of the elevation unit 60 is coupled to the supporting bracket 56 of the hot wind unit 30, and thereby the four units of the hot wind unit 30 may be moved together. Alternatively, the elevation unit 60 may be composed in a way that each elevation unit 60 is disposed at each hot wind unit 30, so that each hot wind unit 30 may be capable of an independent vertical movement. In addition, one unit of the elevation unit may be installed at an upper portion of the main frame, so that the four units of the hot wind unit 30 may be elevated simultaneously.

By the elevation unit 60 as such, the hot wind unit 30 may be capable of a vertical movement. Thus, in order not to prevent interference of the entry and the exit of the product at the entry and the exit stage of the product, the hot wind unit 30 may be moved to the position that is higher than the position of the product. In a state of the product ‘P’ entered into an inside space of the main frame 20, the hot wind unit 30 may be vertically moved along the side surface of the product ‘P’ to discharge hot wind to the product ‘P’, so that the heat shrink film, which is packaged around the product ‘P’ may shrink by the heat of the hot wind. In addition, the elevation unit 60, in a case of an idling of the hot wind unit 30, enables the hot wind unit 30 to be moved to a reflection member 70, which will be described later.

The horizontal transfer unit 50 may include a driving motor 51 installed in between the base plate 55 and the hot wind unit 30 and configured to generate driving force, and a ball screw 52 configured to convert the rotary movement of the rotation axis of the driving motor 51 into a linear movement. An axis unit 52a of the ball screw 52 is connected to the rotation axis of the driving motor 51, so that the axis unit 52a may be rotated by the driving force of the driving motor 51, and a nut unit 52b of the ball screw 52 is coupled to an upper portion of the hot wind unit 30. The driving motor 51 may be composed of a stepping motor that enables controlling of the rate of rotation and rotating forward and backward. In addition, a guide rail 55a configured to guide the forward/backward movements of the hot wind unit 30 is provided at a lower portion of the base plate 55, and according to the above, the hot wind unit 30 may be moved in a sliding manner in a horizontal direction with respect to the base plate 55, and thus the distance from the product ‘P’ may be adjusted as the hot wind unit 30 is horizontally moved according to the operation of the driving motor 51. Thus, in a case when hot wind is discharged to the product ‘P’, the hot wind unit 30 is moved forward toward the product ‘P’, so that the proper distance in between the product ‘P’ and the discharging hole 35a is maintained, and at the point of time when the discharging of the hot wind with respect to the product ‘P’ is completed, the hot wind unit 30 is moved backward with respect to the product ‘P’, so that the transfer movement of the product ‘P’ to an outside the hot wind supplying apparatus 10 by the hot wind unit 30 may be prevented from being interfered.

The product transfer unit 40 may include a driving motor 41 to generate driving force, and a pulley 42 and a belt 43 driven by the driving motor 41, and is disposed at a lower portion of the main frame 20 to support a lower portion of the product ‘P’.

Thus, according to the operation of the driving motor 41, the product ‘P’ is transferred so that the product ‘P’, which is to be processed with a packaging work, may be entered into an accommodating space for the product ‘P’.
provided at an inside the main frame 20, and when the hot
wind discharging work by the hot wind unit 30 is completed, the
operation of discharging the product 'P' to an outside the
hot wind supplying apparatus 10 may be performed.

[0046] The hot wind unit 30 includes a body 31 forming an
appearance of an interior appearance of the hot wind unit 30, a blower fan 32
configured to generate blowing force to discharge hot wind, a fan motor 33 to drive the blower fan 32, and a heater 34 to heat
air to discharge hot wind. The discharging hole 35a, which is
formed in lengthways in a horizontal direction, is provided at
one side surface of the body 31, and portion an intake hole 36a
of the recycling flow path 36 is provided at an upper portion of
the discharging hole 35a.

[0047] The blower fan 32 is rotatively installed at a fan case
unit 35b provided at an inside the body 31, while the fan
motor 33 may be installed at an upper surface of the body 31,
that is, at an upper portion of the blower fan 32. The blower
fan 32 may be a sirocco fan, which is a type of a cross-flow
fan, and a rotation axis 33a may be connected in between the
fan motor 33 and the blower fan 32 to deliver the force.

[0048] As illustrated on FIGS. 2 to 3, in order for the hot
wind to be evenly discharged at the discharging hole 35a, the
total of three units of the blower fan 32 and the fan motor 33
may be disposed in parallel along the horizontal direction of
the discharging flow path 35, that is, the width direction of the
discharging flow path 35, and the number of the blower fan 32
and the fan motor 33 may be increased/decreased according to
the width of the discharging hole 35a.

[0049] In between the fan case unit 35b and the discharging
hole 35a, the discharging flow path 35 is provided, and the
heater 34 may be installed at the discharging flow path 35 in
order to apply heat on the air being discharged by the blower
fan 32.

[0050] In between the intake hole 36a and the fan casing
unit 35b, the recycling flow path 36 is provided. The recycling
flow path 36 is configured to collect the air, which is used to
induce the shrinking of the heat shrink film, that is, the pack-
aging material, by being discharged from the discharging hole 35a
to the product 'P', so that the air collected may be circulated
to the blower fan 32. Thus, when compared to the
case in which the hot wind discharged to the product 'P' is
discharged to outside air and there is a need for hot wind to be
formed by heating new air introduced from outside air using a
heater, the energy reduction effect may be anticipated as
much as the amount of the heat contained in the air, which is
collected through the recycling flow path 36.

[0051] In order to reduce the heat loss through a thermal
emission to an outside the body 31, a portion of the inside
space of the body 31 except for a space in which the discharg-
ing flow path 35, the fan casing unit 35b, and the recycling
flow path 36 are formed may be composed of heat insulation
material 31a.

[0052] In addition, at an intake side of the blower fan 32, a
temperature sensor 38 may be installed to measure the tem-
perature of the air being introduced to the blower fan 32, and
also at the discharging flow path 35, which is a discharging
side of the blower fan 32, a temperature sensor 39 may be
installed to measure the temperature of the air being dis-
charged through the discharging flow path 35. Thus, accord-
ing to the temperatures being monitored through the two
temperature sensors 38 and 39, the operation of the heater 34
may be feedback-controlled, thereby is able to control the
temperature of the hot wind being discharged through the
discharging hole 35a, and also able to prevent the overheating
of the heater 34.

[0053] The hot wind unit 30 includes a guide member 37 to
induce the air discharged from the discharging hole 35a to be
collected at the recycling flow path 36. The guide member 37
may be installed along the outer portion of one side surface of
the body 31 having the discharging hole 35a provided thereto,
so that the guide member 37 may be disposed in between the
packaging surface of the product 'P' and the body 31 when hot
wind is discharged through the hot wind unit 30. In addition,
the guide member 37 is provided in a way to make contact
with the packaging surface of the product 'P' in a case when
hot wind is discharged, and may be the material having flex-
ibility and superior insulation performance, so that the air
emission through the in between the packaging surface of and
the guide member 37 and the thermal emission through the
guide member 37 are minimized while preventing the pack-
aging surface from being damaged in a case when making
contact with the packaging surface of the product 'P'. For
example, the guide member 37 may be composed of the fabric
which is formed with the material having superior thermo
resistance and heat insulation performance such as glass fiber.

[0054] The reflection member 70 may be disposed at an
upper portion of the main frame 20, and may be disposed in a
way to be provided with the four units of reflection surface
71, which may correspond to each hot wind unit 30 and may
be configured for idling operation of the four units of the hot
wind unit 30 installed at the main frame 20. In addition, in
order for the four units of the hot wind unit 30 to simultaneously
be in an idling state, the four units of the reflection unit
71 of the reflection member 70 may be disposed at the
same height altogether. The reflection member 70, as same as
the guide member 37, may be composed of the material
having superior thermo resistance and heat insulation perfor-
mance.

[0055] When the hot wind unit 30 is made to perform an
idling operation through the reflection member 70, the fol-
lowing advantages may be anticipated. If the operation of
the hot wind unit 30 is completely stopped in a case when an
interruption of a manufacturing process is occurred for about
a few minutes or about tens of minutes as in an occurrence of
an interruption of a production line, then when the hot wind
unit 30 is needed to be operated again, a considerable amount
of time and power may be used for a pre-heating of the heater
34 and the body 31 to reach at a proper temperature of the hot
wind that is needed to induce the shrinking of the heat shrink
film. However, if the hot wind unit 30 is able for idling
through the reflection member 70, the reduction of the time
used for the pre-heating may be possible in a case when a
production line is needed to be operated again, and accord-
ingly, the power consumption may be reduced. In addition, in
the process of operating the heater 34 again after the operation
of the heater 34 is placed at stop, the heating and the cooling
of the heater are repeated, thereby decreasing the factors that
reduce the life cycle of the heater, and thus the extension of
the life cycle of the heater may be possible.

[0056] Hereinafter, by referring to FIGS. 4 to 7, the move-
ment process of the hot wind supplying apparatus 10 will be
described.

[0057] In accordance with FIG. 4, in an entry stage of
the product 'P', by the product transfer unit 40, is transferred
from a production line (not shown) to an accommodating
space provided at an inside the hot wind supplying apparatus
10. At this time, each hot wind unit 30, in order for the interference of the product 'P' is not occurred in the entry movement of the product 'P', is moved to a higher position than an upper end of the product 'P' by the elevation unit 60.

[0058] Next, as illustrated on FIG. 5, in a state that the product 'P' is positioned at a correct position of the accommodating space, the transfer movement by the product transfer unit 40 is stopped, and the hot wind discharging process with respect to the packaging surface of the product 'P' is proceeded by the hot wind unit 30. At this time, the hot wind unit 30, in order for a front end of the guide member 37 to make contact with the packaging surface of the product 'P' as illustrated on FIG. 3, is moved forward by the horizontal transfer unit 50 to be approached at the product 'P', and in the state as such, by the elevation unit 60, the descending and the ascending movements of the hot wind unit 30 are proceeded, and the discharging of the hot wind with respect to the packaging surface is performed. As the discharging of the hot wind with respect to the packaging surface is sufficiently proceeded, the hot wind unit 30 is moved backward by the horizontal transfer unit 50 so that the guide member 37 and the packaging surface are spaced apart from each other, and is moved to an upper portion of the product 'P' as illustrated on FIG. 4. Then, by the product transfer unit 40, the product 'P' is discharged to a product line by the reverse movement of the product entry movement, and a single cycle of the hot wind discharging work with respect to the product 'P' is completed.

[0059] As described above, in a case when an idling of the hot wind unit 30 is needed, as illustrated on FIG. 6, the hot wind unit 30 is ascended through the elevation unit 60 to the position at which the reflection member 70 is installed, and as illustrated on FIG. 7, in order for the guide member 37 to be completely attached to the reflection member 70, the hot wind unit 30 is approached to the reflection member 70 through the horizontal transfer unit 50, the thermal emission through in between the reflection member 70 and the guide member 37 may be prevented.

[0060] FIG. 8 shows the structure of the hot wind unit in accordance with one embodiment. The difference of the present embodiment from the earlier embodiments is that the recycling flow path 36 is provided at a lower portion of the discharging flow path 35, as well as at an upper portion of the discharging flow path 35. Thus, the intake hole 36a of a recycling flow path 36a is provided at an upper portion and at a lower portion of the discharging hole 35a, and the hot wind may be collected.

[0061] At this time, a blower fan 320 may be composed of a sirocco fan, which is capable of intaking air through both sides thereof, so that air may be taken in through an upper portion and a lower portion of the blower fan 320 and then be discharged through the discharging flow path 35.

[0062] FIG. 9 shows the structure of the hot wind unit in accordance with one embodiment. In accordance with the present embodiment, as same as the embodiment in accordance with FIG. 8, the recycling flow path 36 is provided at a lower portion of the discharging flow path 35, as well as at an upper portion of the discharging flow path 35. However, in accordance with the present embodiment shown in FIG. 9, a blower fan 321 is composed of a propeller fan, which is an axial-flow fan, and accordingly, the fan motor 33 configured to drive the blower fan 321 may be disposed at a rear surface of the body 31 that corresponds to the discharging hole 35a.

[0063] Although a few embodiments of the present disclosure have been shown and described, it would be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the disclosure, the scope of which is defined in the claims and their equivalents.

What is claimed is:

1. A hot wind supplying apparatus for packaging a product, the hot wind supplying apparatus comprising:
   at least one hot wind unit configured to discharge hot wind to a packaging surface of the product, wherein the hot wind unit comprises:
   a body having a discharging hole,
   at least one blower fan configured to blow air to the discharging hole,
   at least one fan motor configured to drive the blower fan, a heater configured to heat air that is to be discharged from the discharging hole, and
   at least one recycling flow path configured to collect the air discharged from the discharging hole and to supply the air collected to an intake side of the blower fan.

2. The hot wind supplying apparatus of claim 1, wherein:
   the hot wind unit further comprises a guide member provided in a way to be disposed in between the packaging surface and the body in a case when the hot wind is discharged through the hot wind unit, so that the air discharged from the discharging hole is introduced to the recycling flow path.

3. The hot wind supplying apparatus of claim 1, further comprising:
   a main frame configured to support the hot wind unit and provided therein with a space to accommodate the product, wherein the hot wind unit is disposed at each of four side surfaces of the main frame so as to surround four side surfaces of the product that is entered into the space.

4. The hot wind supplying apparatus of claim 3, wherein:
   the hot wind unit is disposed in a way that the discharging hole faces toward the product that is entered into the space.

5. The hot wind supplying apparatus of claim 3, further comprising:
   a horizontal transfer unit configured to move the hot wind unit forward/backward with respect to the product that is entered into the space.

6. The hot wind supplying apparatus of claim 5, wherein:
   the horizontal transfer unit comprises a driving motor, and a ball screw configured to convert a rotary movement by the driving motor into a linear movement.

7. The hot wind supplying apparatus of claim 3, further comprising:
   at least one elevation unit configured to vertically move the hot wind unit.

8. The hot wind supplying apparatus of claim 3, further comprising:
   a reflection member configured to provide a reflection surface for an idling of the hot wind unit, so that the hot wind discharged from the discharging hole faces is directed to the recycling flow path.

9. The hot wind supplying apparatus of claim 8, wherein:
   the reflection member comprises heat insulation material.

10. The hot wind supplying apparatus of claim 8, wherein:
   the reflection member is provided with a plurality of reflection surfaces to correspond to each hot wind unit.
the hot wind unit further comprises a temperature sensor configured to measure the temperature of air being introduced to the blower fan.

12. The hot wind supplying apparatus of claim 1, wherein: the hot wind unit further comprises a temperature sensor configured to measure the temperature of air passed through the heater.

13. The hot wind supplying apparatus of claim 3, further comprising:

a product transfer unit disposed at a lower portion of the main frame to transfer the product.

14. A hot wind supplying apparatus for heat shrinking packaging a product comprising:

a frame;

a conveyor unit to move the product into and out of the frame;

at least four hot wind units, wherein at least one unit is mounted on each side of the frame;

wherein the hot wind units are able to move in both a horizontal and vertical manner allowing the hot wind units to contact the product as the hot wind is being applied; and

wherein the hot wind units each comprise a guide unit that contacts the products and creates a closed void space between the hot wind unit and the product that allows to hot air to be circulated back into the hot wind unit.

15. The hot wind supplying apparatus of claim 14, wherein the heat wing unit further comprises:

a body having a discharging hole,

at least one blower fan configured to blow air to the discharging hole,

at least one fan motor configured to drive the blower fan,

a heater configured to heat air that is to be discharged from the discharging hole, and

at least one recycling flow path configured to collect the air discharged from the discharging hole and to supply the air collected to an intake side of the blower fan.

16. The hot wind supplying apparatus of claim 14, wherein the heat wing units can be moved simultaneously or individually.

17. The hot wind supplying apparatus of claim 14, further comprising:

a reflection member configured to provide a reflection surface for an idling of the hot wind unit, so that the hot wind discharged from the discharging hole faces is directed to the recycling flow path.

18. The hot wind supplying apparatus of claim 17, wherein: the reflection member comprises heat insulation material.

19. The hot wind supplying apparatus of claim 17, wherein: the reflection member is provided with a plurality of reflection surfaces to correspond to each hot wind unit.

20. The hot wind supplying apparatus of claim 14, wherein: the hot wind unit further comprises a temperature sensor configured to measure the temperature of air being introduced to the blower fan.

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