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HOT AIR HEATED SHRINKING TUNNEL

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Fig. 1

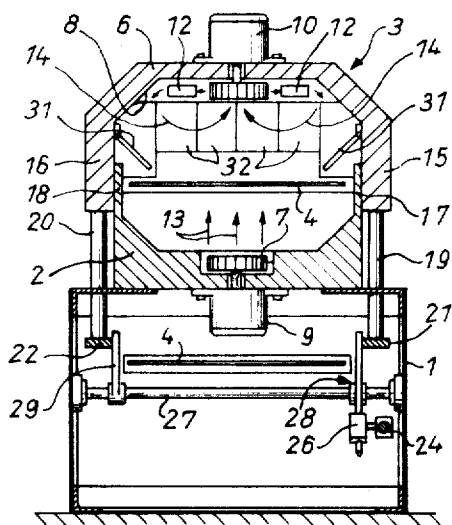
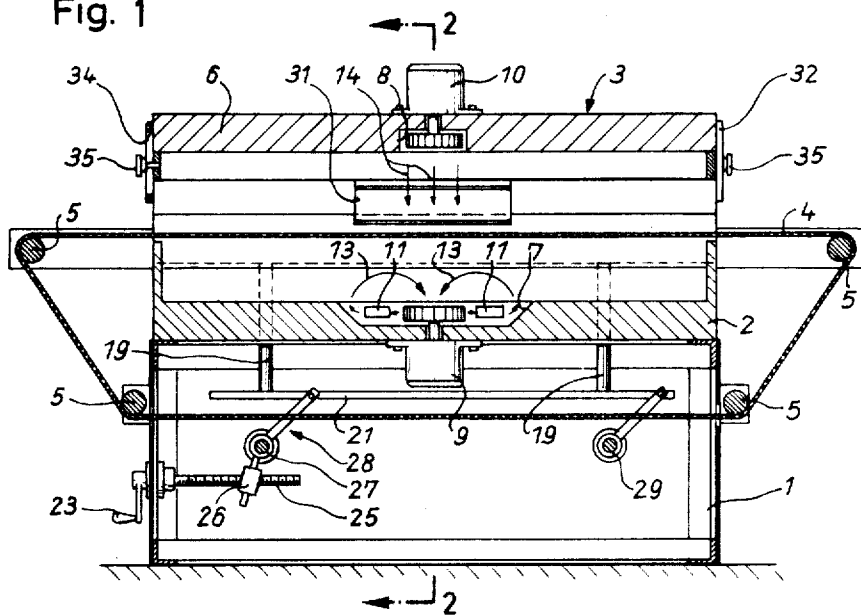


Fig. 2

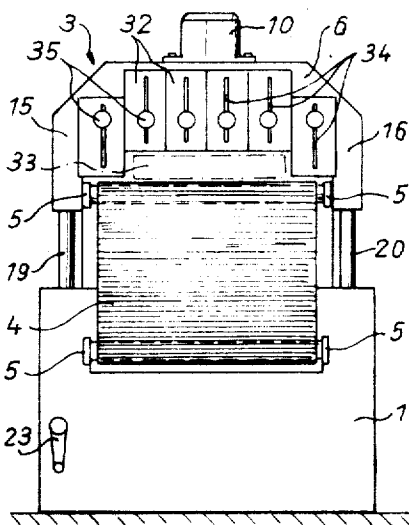


Fig. 3

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HOT AIR HEATED SHRINKING TUNNEL

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7 Claims

ABSTRACT OF THE DISCLOSURE

A hot-air circulating system for a tunnel for heat shrinking plastic foil packaging materials comprises two blower systems for circulating air in closed circular paths, each path being disposed in planes perpendicular to each other, with some of the air in one path being commingled with the air in the other path.

The invention concerns a hot-air heated shrinking tunnel for goods packed in shrinkable plastic foil, with a conveyer belt for the goods passing through the tunnel in longitudinal direction, with at least one hot-air blower each arranged at the ceiling and floor of the tunnel, for production of circular currents of hot air closed within themselves and directed into the tunnel.

It has been known (German Utility Pat. 1,893,045) to use two hot air blowers in the case of a hot air heated shrinkage tunnel of the kind mentioned, which introduces circular currents of hot air, directed in parallel to one another, from above or below into spaces of the tunnel. This guidance of the currents of hot air has the disadvantage that the entire cross sectional width of the tunnel will be fed flowing hot air only in an incomplete manner, so that this will result, especially in the case of relatively wide articles that have to be packed, in imperfectly shrunk packaging foils which have not been drawn tightly around the articles.

An object of this invention is to overcome this disadvantage just described and of proposing an arrangement with the help of which the inside space of a hot-air heated shrinking tunnel can be filled completely with flowing hot air, so that considerably better quality packaging can be achieved.

According to the invention this task is solved through the fact that the direction of flow of one current of hot air will run in parallel to the longitudinal section of the tunnel and that of the other current of hot air will run transversely in relation to this plane, in such a manner that both currents of hot air commingle with each other, at least partially.

In case of a preferred design of the invention, a tunnel hood is arranged above the floor of the tunnel and, in order to change the effective cross section of the tunnel, the hood, in relation to the floor, can be adjusted in height, whereby the lateral walls of the hood encircle the floor at the sides thereof in telescoping fashion. In the case of this design of the invention, the additional advantage will be achieved that the inside cross section of the tunnel can be adapted to the height of the goods that are to be wrapped, which makes possible a further improved quality of the packaging with a saving of heat energy in combination with the currents of hot air introduced in accordance with the invention.

The following description of a preferred design of the invention serves in connection with the attached drawing for further clarification.

FIG. 1 shows a longitudinal section of a shrinkage tunnel in accordance with a preferred form of the invention;

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FIG. 2 shows a cross section of the tunnel along the line 2—2 in FIG. 1 and

FIG. 3 shows a front view of the tunnel as viewed from the left in FIG. 1.

A tunnel floor 2 is mounted fixedly on a supporting frame 1, which floor is covered by a tunnel hood indicated generally numeral 3. In the longitudinal direction of the tunnel, formed by the floor 2 and the hood 3, there is a conveyer belt 4, which is permeable to air throughout, which can consist, for example, of an endless conveyer belt which is preferably perforated, guided over rollers 5 and driven in conventional manner which has not been shown in the drawing in detail. On the air-permeable conveyer belt, the goods wrapped into shrinkable plastic foil are transported through the shrinking tunnel.

The floor of the tunnel and the ceiling 6 of the tunnel, formed by the horizontal part of the hood 3, are provided with recesses 7 and 8, in each of which an impeller of a hot air blower 9 and 10, as well as electrically heating elements 11 and 12 have been arranged. The recesses 7 and 8, whose shapes can be recognized in FIGS. 1 and 2, form guideways for the currents of hot air produced by the blowers 9 and 10. The longitudinal axis of recess 7 in the floor 2 of the tunnel runs in parallel to the longitudinal axis of the tunnel. On the other hand, the longitudinal axis of recess 8 in the ceiling 6 of the tunnel runs transversely in relation to the longitudinal axis of the tunnel. As a result, the direction of flow of the currents of hot air produced by the blower 9 will flow in a circular path, indicated by arrow 13, disposed in parallel to the plane of the longitudinal section of the tunnel, while the direction of flow of the currents 14 of hot air, likewise closed in an circular path and produced by blower 10, is directed perpendicularly in relation to the plane of the longitudinal section of said tunnel. Both currents 13, respectively, and 14, respectively, commingle with each other about in the middle of the tunnel, a fact which has not been especially shown in the drawing. The current 13 of hot air produced by blower 9 fills the tunnel essentially in a longitudinal direction with hot air, while blower 10, on the basis of its cross directed current 14, ensures that the entire cross section of the tunnel is filled with hot air. In the drawing only one blower has been shown arranged on the floor 2 of the tunnel or on the ceiling 6 of the tunnel, but it is self-evident that if required it is also possible to arrange several hot air blowers one behind or one beside another on the floor and on the ceiling.

As shown, the tunnel hood 3 has an approximately U-shaped cross section and it encompasses with its lateral walls 15 and 16 the side walls 17 and 18 standing upwards in a telescoping way from floor 2. In this manner it is possible through lifting or lowering the hood 3 of the tunnel to change the effective cross section of the tunnel and to adapt it in correspondence with the cross sectional shape of a material that is to be packaged, which is of a considerable advantage for the sake of a quick shrinkage and for the saving of heat energy.

As can be seen in the figures, the hood 3 of the tunnel has been attached by its lateral walls 15 and 16 to columns 19 and 20, which in turn rest on horizontally disposed supports 21 and 22. A screw spindle drive engages with supports 21 and 22, in order to lift or lower hood 3 of the tunnel.

In the case of the drive, sketched in the drawing, a nut 24 shifts on a screw spindle 25 upon turning of a crank 23. The nut 24 is connected pivotally with a guide element 26, which is slidably seated on an arm of a toggle lever 28 mounted fixedly on a shaft 27. The other arm of this toggle lever 28 has been connected pivotally with support 21. The supports 21 and 22 are furthermore sup-

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ported by levers 29 mounted for rotational movement, one of which likewise is fixedly attached on shaft 27 and is moved with lever 28.

In the operation of crank 23, the toggle lever 28 shifts and carries along the supports 21 and 22 either upward or downward, depending on the direction of rotation of the crank, as a result of which the hood 3 covering the tunnel is moved up or down with columns 19 and 20, which are supported slidably on the supports 21 and 22.

It is self-evident that the change in the cross section of the tunnel described heretofore, through the up and down movement of the hood covering the tunnel, can be used not only in the case of a shrinking tunnel heated by means of hot air blowers but that it can be heated just as well in some different manner, for example, by means of electric heating coils.

It will also be observed from FIGS. 1 and 2 that guide vanes 31 have been arranged inside the tunnel, which can be angularly rotationally adjusted preferably from outside the hood and which serve for the purpose of adjusting the currents of hot air correspondingly and in dependence on the shape of the material that is to be packaged.

On both front sides of the shrinking tunnel, according to the invention, individually adjustable plates 32 have been arranged by means of which the size of the inlet and outlet openings can be adjusted to the shape of the material 33 that is to be packaged (see FIG. 3). In case of the design as shown, these adjustable plates 32 consist of individual sheetmetal plates with longitudinal holes 34 on which the plates are held by means of adjusting screws 35 at the front sides of the hood 3.

I claim:

1. Hot-air heated shrinking tunnel for materials packed in shrinkable plastic foil with a horizontal conveyor belt for the goods passing through in a longitudinal direction of the tunnel and having at least one hot air blower arranged at the ceiling and another hot-air blower on the floor of the tunnel for producing two respective circular closed currents of hot air directed into the tunnel, each of the respective blowers having an inlet means and at least two horizontally spaced outlet means arranged respectively on opposite sides of the inlet means to direct a current of air toward the conveyor belt, characterized in that the direction of flow of one current of hot air runs in parallel to the vertical plane of the longitudinal section of

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the tunnel and that of the other current of hot air runs perpendicularly in relation to this plane, in such a manner that one respective current of hot air commingles with the other respective current of hot air at least partially.

2. Shrinking tunnel according to claim 1, characterized in that for the control of the circular currents of hot air, adjustable sheetmetal guides have been provided in the tunnel.

3. Shrinking tunnel according to claim 1, characterized in that at the inlet and outlet openings of the tunnel, individually adjustable plates (32) are mounted by means of which the size of the openings at the ends of the tunnel can be adapted to the shape of the goods which are to be packaged.

4. Shrinking tunnel according to claim 3, characterized in that the plates are provided with longitudinal holes for attachment by means of adjusting screws at the ends of the tunnel.

5. Shrinking tunnel according to claim 1, characterized in that the tunnel is formed by a hood arranged above the floor of said tunnel, which hood can be adjusted with regard to height as compared to the floor for a change in the effective cross section of the tunnel, and wherein the side walls of the hood engage with the floor laterally in telescoping fashion.

6. Shrinking tunnel according to claim 5, characterized in that means for the adjustment in height of the hood comprises a lever bar with screw spindle drive.

7. Shrinking tunnel according to claim 5, characterized in that the floor of the tunnel is provided with side walls which are arranged for telescoping engagement with the inner sides of the side walls of the hood.

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