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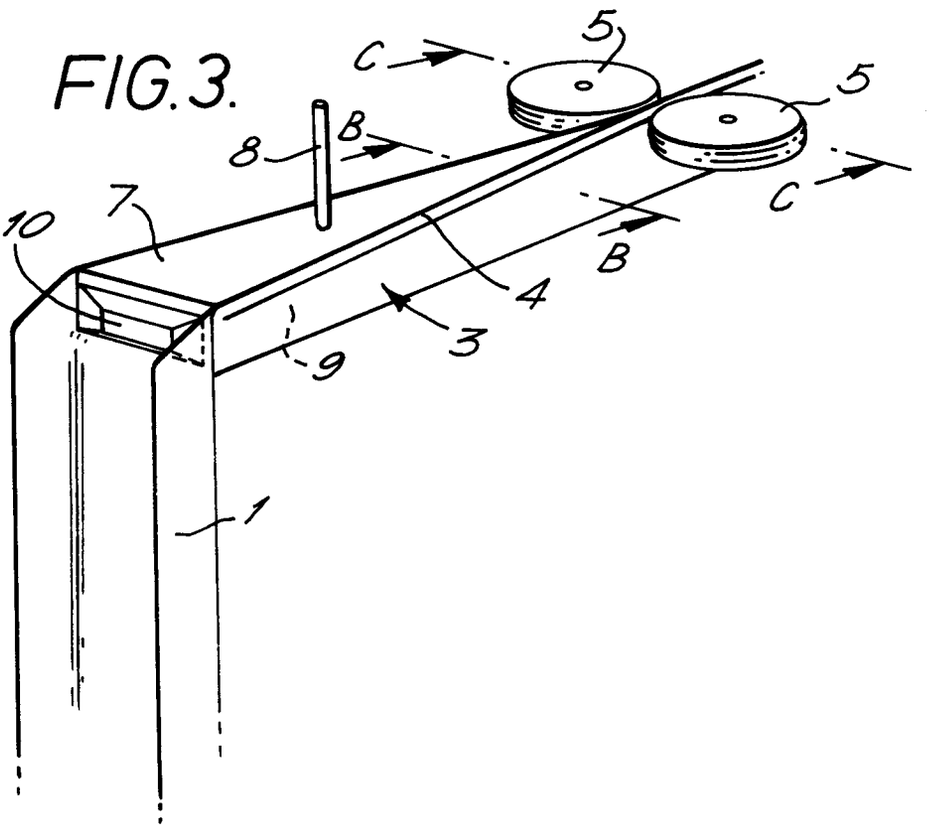
(54) Horizontal form, fill, seal apparatus.

(57) Horizontal form fill seal apparatus for producing sealed packages of items of a product in a controlled atmosphere. The apparatus has a film supply for supplying a sealable polymeric film (1) in which items of product are to be packaged, a product supply for supplying items of the product to be packaged, a gas supply (7,8) for supplying the gas to provide the controlled atmosphere, and a substantially sealed chamber (9) containing gas supplied by the gas supply (7,8) and into which successive items of product are introduced into the controlled atmosphere, the film (1) in part defining the substantially sealed chamber (9).

FIG.3.



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This invention concerns packaging apparatus for packaging products in a controlled atmosphere, and especially to flow wrap horizontal form fill seal apparatus.

Products as diverse as foodstuffs, including biscuits and cheese, and medical products, including syringes and wound dressings, are packaged in controlled atmospheres. Flow wrap horizontal form fill seal apparatus is frequently used to package such products, the products being enclosed in a package formed from a polymeric film which contains the product and the controlled atmosphere.

The packages are formed by passing the polymeric film from a roll and through a device which forms the film into a trough into which individual items of the product are placed, the film being brought around the product and sealed longitudinally to form a tube. The tube is then sealed transversely to form individual packages of the product. Gas flushing in such apparatus is effected by feeding the gas through a lance or pipe which extends into the tube of film beyond the position where the longitudinal seal is formed. The remote end of the tube will, of course, have been sealed, and the flushing gas is forced out of the tube past the product in the tube and into the trough where the product is placed on the film.

This prior art method of gas flushing has a number of disadvantages. Thus packaging speeds are often limited by the speed at which the atmospheric air in the tube of film is displaced by the flushing gas. Increased packaging speeds cannot necessarily be achieved by increasing the flushing gas flow since the increased gas flow can cause severe gas turbulence within the tube resulting in disruption of the product and even its displacement within the tube, the product acting as a piston within the walls of the tube. Low residual levels of atmospheric air within the finally sealed packages necessitate large volumes of the desired gas being lost to the atmosphere as the flushing technique displaces air by dilution. In addition, in order for the packages to have a good appearance with the film tight on the product, the lance or pipe for the flushing gas has to be in close proximity to the moving product. Despite the product being in contact with the film, contact of the product with the lance can hold the product back causing mislocation of the product within the tube. In the case of some types of product, for example cheese, contact of the lance with the product can cause the product to become smeared on the lance and this in turn can be transferred to the film. This can result in weak seals and unsightly packages.

According to the present invention there is provided horizontal form fill seal apparatus for producing sealed packages of items of a product in a controlled atmosphere, the apparatus comprising film supply means for supplying a sealable polymeric film in which items of product are to be packaged, product supply means for supplying items of the product to be packaged, gas supply means for supplying the gas to provide the controlled atmosphere, and a substantially sealed chamber containing gas supplied by the gas supply means and into which successive items of product are introduced into the controlled atmosphere, the film in part defining the substantially sealed chamber.

In accordance with the invention, successive items of product are introduced into a chamber containing the desired gaseous atmosphere, thereby avoiding the necessity for flushing air from the packages before they are sealed.

The substantially sealed chamber has to allow successive items of product to enter it without the ingress of atmospheric air. This can be achieved in a variety of ways, for example by the use of a resilient sealing member which either partially or completely seal the chamber, the resilient sealing member being openable by items of product entering the chamber, In the former case, the items of product will in general form an integral part of the seal, successive items of product abutting to maintain the seal as they are moved in turn into the chamber, the sealing member thereafter closing behind the items of product to seal the substantial sealed chamber once the item has entered the chamber. In the latter case, however, successive items of product can be separated from each other before entering the chamber so that the resilient sealing member closes the chamber between successive items of product. However, it will be appreciated that the substantially sealed chamber can have a doorway through which successive items of product pass, the doorway being of a size which allows the items of product to enter the chamber with a small clearance.

It is generally preferred that successive items of product which have entered the substantially sealed chamber should be separated within the chamber from the item of product immediately following until the required inter product space has been obtained for effecting a transverse seal forming the desired packages, This particularly so where the items of product enter the chamber in contact.

Apparatus of the present invention preferably includes carrier means for supporting successive items of product whilst they in turn seal the substantially sealed chamber, and so that the film can be advanced relative to the item of product without the item contacting the advancing film. This enables the desired inter product spacing to be achieved without the film being slid along the surface of the product. The carrier means is, however, preferably in sealing engagement with the film to prevent the ingress of atmospheric air to the substantially sealed chamber.

The film in which the items of product are packaged defines a part of the substantially sealed chamber, and it can be formed into the shape of a trough or into a tunnel shape.

The sealable film can be sealed in the in known manner, depending upon the nature of the material forming the seal. Thus the film can be heat sealable and sealed by heat, or it can be provided with a cold seal adhesive.

Apparatus of the present invention is particularly suitable for the packaging of items of product which are of uniform cross section considered in their direction of flow through the apparatus. It is also preferred that the items of product are such that when successive items abut, no space is left between them. Rectilinear items of substantially uniform cross section are therefore preferred, for example blocks of cheese.

An embodiment of horizontal form fill seal apparatus in accordance with the present invention will now be described, by way of example, with reference to the accompanying diagrammatic drawings in which:-

Figure 1 is a perspective view of hitherto proposed flow wrap form fill seal apparatus;

Figure 2 is a section on line A-A of Figure 1;

Figure 3 is a perspective view of apparatus in accordance with the present invention corresponding to the view in Figure 1;

Figure 4 is a section on line B-B of Figure 3; and

Figure 5 is a section on line C-C of Figure 3.

Referring to Figure 1, the prior art flow wrap horizontal form fill seal apparatus with gas flushing includes a film supply device (not shown) which feeds a heat sealable polymeric film 1 from a reel (not shown), the film 1 being shown very schematically as it will be clear to those skilled in the art. A device (not shown) forms the film 1 into a trough 3, again shown very schematically, into which individual items of product 2 are introduced at intervals along the length of the trough, by means not shown. The two outer edge portions 4 of the film 1 are brought together and heat sealed around the items of product using ribbed heated rollers 5 to form a fin sealed tube of film around the product.

A gas lance 6 extends from the trough 3 past the heated rollers 5 into the longitudinally sealed tube of film. Gas supplied through the lance 6 displaces atmospheric air in the tube, air in the tube and excess flushing gas passing beneath the rollers 5 into the trough 3 past the items of product 2 in the tube. The position of the lance 6 in relation to the tube can be seen more clearly from Figure 2. As the tube of film is advanced through the apparatus items of product 2 in the tube pass the end of the lance 6, and the tube of film is heat sealed transversely to form packages containing the product in a controlled atmosphere.

Referring now to Figure 3, the illustrated apparatus in accordance with the invention is of similar construction to the prior art apparatus of Figure 1, including a mechanism for forming the film 1 into a trough into which items of product are inserted.

However, instead of the lance 6, the apparatus of Figure 3 has a substantially sealed chamber 9 containing the desired atmosphere for the packages into which the items of product are introduced. The chamber 9 is formed by a substantially "V"-shaped barrier plate 7, which tapers inwardly to a point in the direction of movement of the film 1, the trough shaped portion of the film 1, and a resilient rubber door 10 which is itself sealed by an item of product entering the chamber (not shown). A gas supply conduit 8 supplies the desired atmosphere to the chamber 9. Edge portions 4 of the film 1 are held in light but firm sealing but sliding contact with edge portions of the plate 7 by brushes or rods (not shown), thereby providing a moving seal between the film 1 and the plate 7. Supplying gas through the conduit 8 at above atmospheric pressure serves to prevent atmospheric air from entering the chamber 9.

In use, gas from the conduit 8 is fed to the chamber 9 until it is full of the desired atmosphere, displaced air escaping for example between the edge portions of the film 1 and the plate 7. The film 1 and items of product 2 are then fed into the apparatus, items of product 2 passing through the door 10 and entering the trough 3 which is full of the desired atmosphere. Continuous flushing of atmospheric air from the trough 3 is unnecessary as the door 10 forms a seal around the product as it enters the trough 3. The product is therefore surrounded by the desired atmosphere at this position in the apparatus, unlike the prior art apparatus where the controlled atmosphere is formed after making the longitudinal fin seal.

The plate 7 and the path of the items of product 2 are arranged to converge so that when the edge portions 4 of the film 1 enter the nip between the heated rollers 5, the film 1 forms a tight fit on the product 2. This enables the film to be sealed much tighter on the product 2 than with the prior art apparatus where space has to be left for the lance 6.

The resulting longitudinally sealed tube of film having items of product therein has the desired atmosphere between the individual items, and it can then be sealed and cut transversely in known manner to form separate packages of product held in the desired atmosphere.

In an alternative, and preferred, embodiment of the present invention, the under surface of a carrier plate (not shown) forms a gas tight seal with the film 1 as it forms the trough 3, the door 10 being across the carrier plate. Items of product 2 are slid along the carrier plate and through the door 10 into the trough 3, one item of product pushing an item of product already on the carrier plate.

The hereinbefore described embodiments of apparatus in accordance with the present invention have the plate 7 above te film, the latter being formed into a trough 3 into which the product 2 is introduced. It will be appreciated that the position of the plate 7 and the film 1 can be reversed so that the film is for-

med into a tunnel, edge portions of the film similarly cooperating with the plate 7 to form a substantially sealed chamber containing the desired atmosphere in which the items of product are to be packaged. Sealing of the film edges can then be effected in a similar manner to that shown in the accompanying drawings, but with sealing being effected from below.

Claims

1. Horizontal form fill seal apparatus for producing sealed packages of items of a product in a controlled atmosphere, the apparatus comprising film supply means for supplying a sealable polymeric film in which items of product are to be packaged, product supply means for supplying items of the product to be packaged, gas supply means for supplying the gas to provide the controlled atmosphere, and a substantially sealed chamber containing gas supplied by the gas supply means and into which successive items of product are introduced into the controlled atmosphere, the film in part defining the substantially sealed chamber.

2. Apparatus as claimed in claim 1, wherein successive items of product seal the substantially sealed chamber.

3. Apparatus as claimed in claim 2, wherein the successive items of product abut to maintain the seal as the items of product are moved in turn into the chamber.

4. Apparatus as claimed in claim 2 or claim 3, wherein an item of product which has entered the substantially sealed chamber is separated from the item of product immediately following until the required inter product space has been obtained for effecting a transverse seal forming a package.

5. Apparatus as claimed in any of the preceding claims, wherein the substantially sealed chamber includes a resilient sealing member, the sealing member allowing the items of product to enter the chamber without the ingress of atmospheric air to the chamber.

6. Apparatus according to claim 5, wherein the resilient sealing member is openable by items of product entering the chamber, the sealing member thereafter closing to the seal of the substantial sealed chamber once the item has entered the chamber.

7. Apparatus as claimed in claim 5 or claim 6, wherein the resilient sealing member engages successive items of product in sealing engagement therewith whilst the inter product space is increased in size to that required to seal the packages transversely.

8. Apparatus as claimed in any of the preceding claims, including carrier means for supporting successive items of product whilst they in turn seal the substantially sealed chamber, the film being advanced relative to the item of product without the item contacting the advancing film.

9. Apparatus as claimed in claim 8, wherein the carrier means is in sealing engagement with the film to prevent the ingress of atmospheric air to the substantially sealed chamber.

10. Apparatus as claimed in any of the preceding claims, wherein the film is formed into a trough defining part of the said substantially sealed chamber.

11. Apparatus as claimed in any of claims 1 to 9, wherein the film is formed into a tunnel shape defining part of the said substantially sealed chamber.

FIG.1.

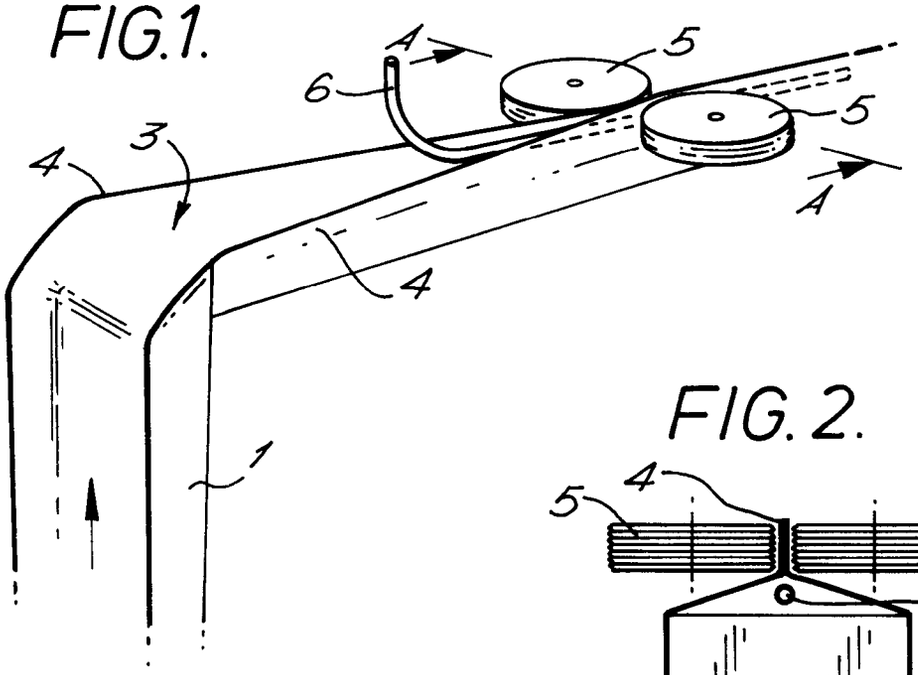


FIG.2.

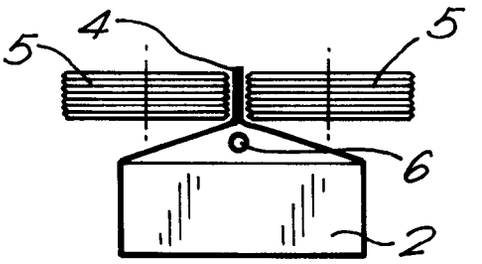


FIG.3.

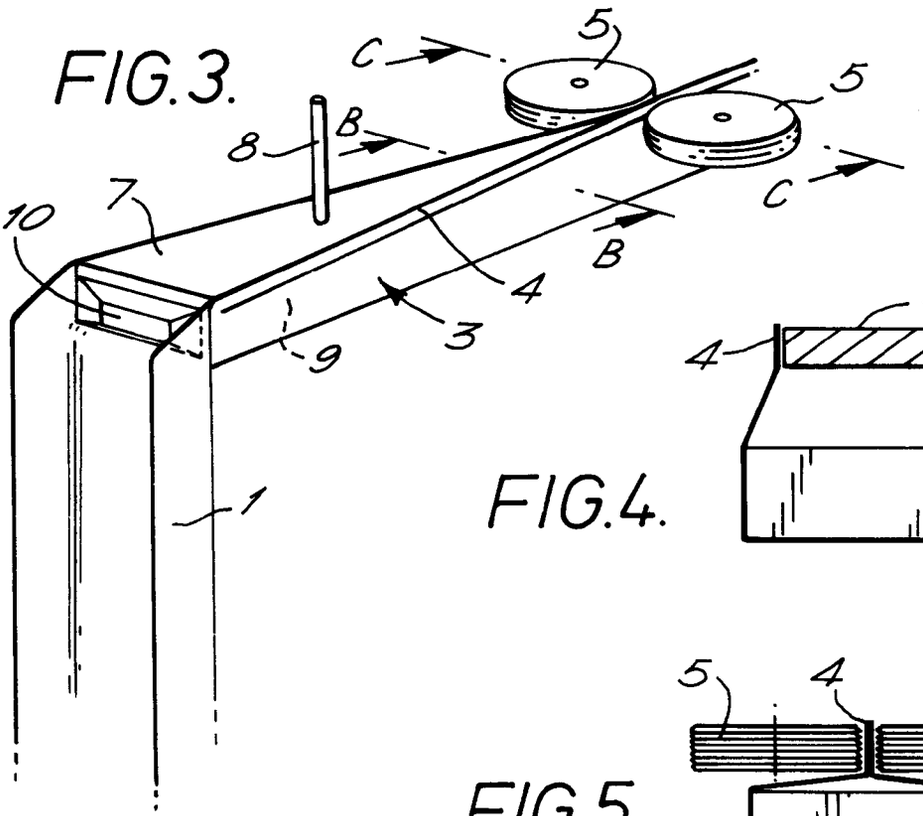


FIG.4.

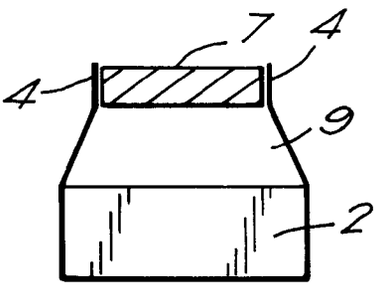
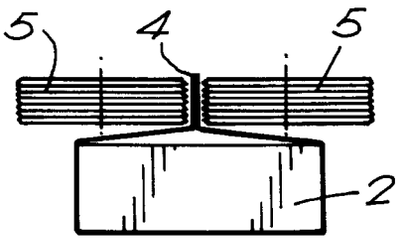


FIG.5.



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EUROPEAN SEARCH REPORT

Application Number

EP 91 30 7585

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-3 930 350 (REID , P.L.) * the whole document * ---	1	B65B9/06
A	US-A-3 958 390 (PRINGLE , JR. , F.E.) * the whole document * -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	25 NOVEMBER 1991	NGO SI XUYEN G.

CATEGORY OF CITED DOCUMENTS

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