Dec. 7, 1965 R. J. BROWN 3,221,473

MACHINE FOR SKIN PACKAGING

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Fig. 1.

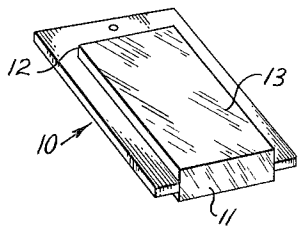


Fig. 2.

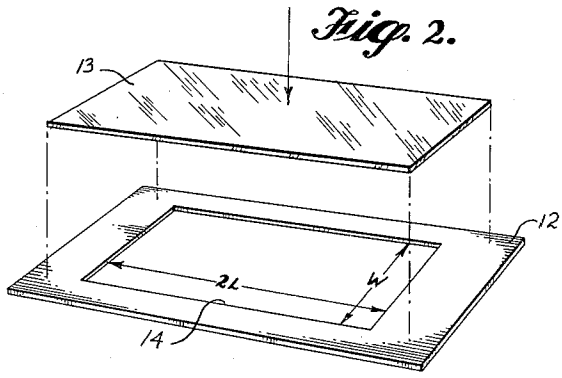


Fig. 3.

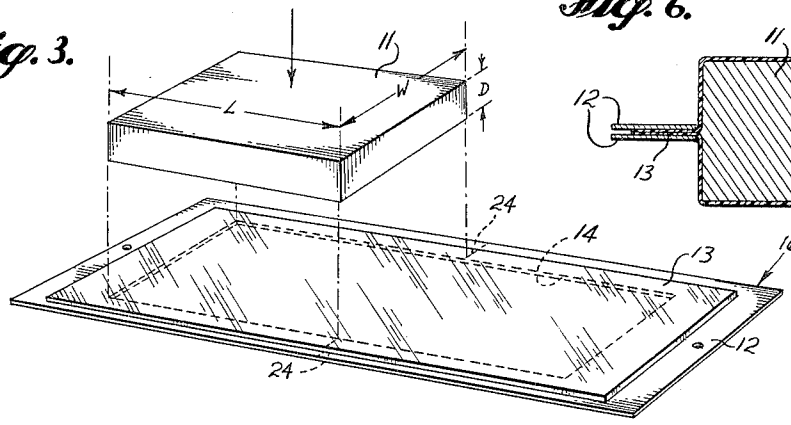


Fig. 6.

Fig. 4.

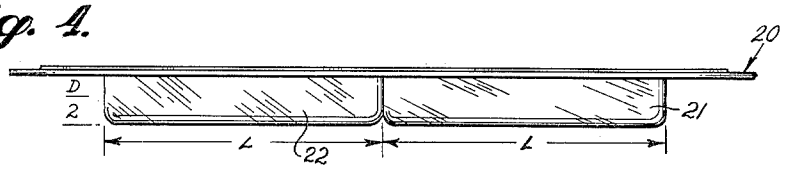
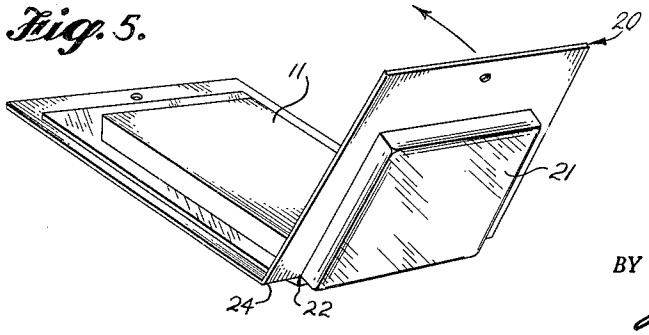


Fig. 5.



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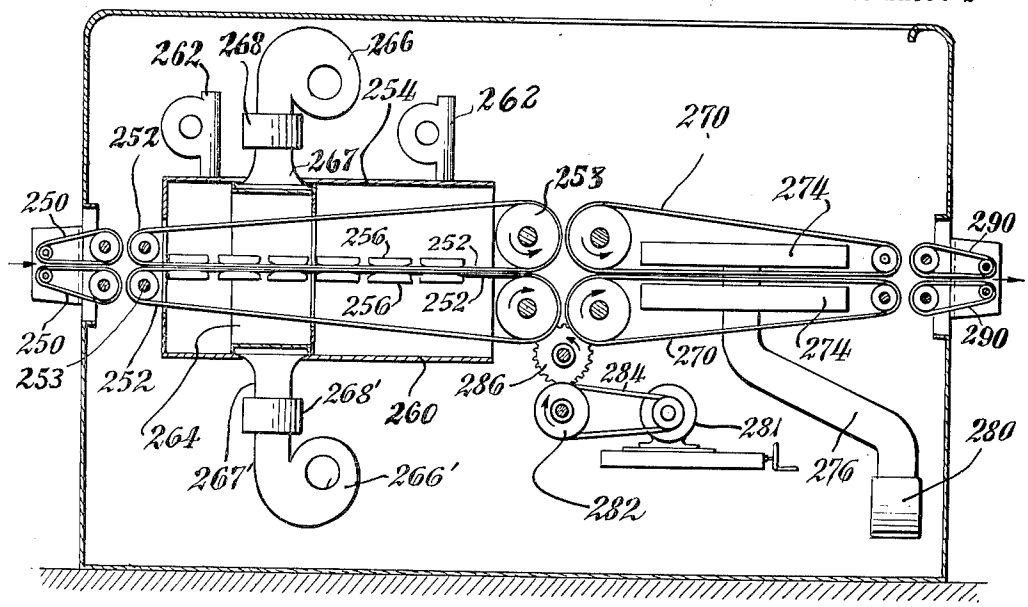


Fig. 7.

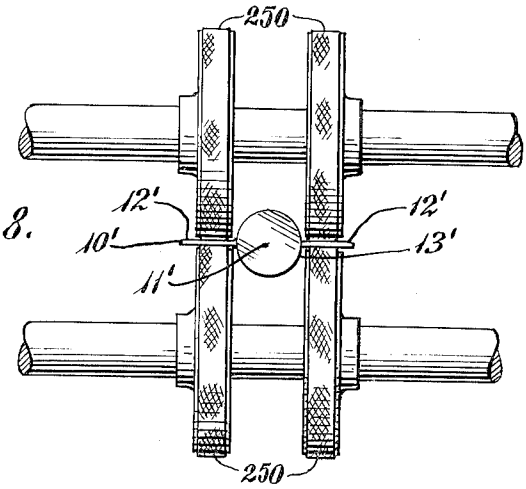


Fig. 8.

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MACHINE FOR SKIN PACKAGING

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5 Claims. (Cl. 53—373)

The present invention relates to means for packaging goods in clear plastic and particularly to structure, means and apparatus for shrinking and sealing a skin package of thermo-stretchable film carried within a cardboard frame.

The typical skin package comprises a die cut card having windowed therein a thin film of clear plastic material which is thermoplastic so that it is both thermo-stretchable and thermo-sealable. Generally, the card is foldable either within or without the windowed area so as to form a surrounding container for the goods placed therein. The windowed area carrying a stretchable film is usually preformed to the general contour of the goods to be carried within the card. Thereupon the goods are placed within the open formed window of the die cut card, the card is folded over on itself to complete the package and the package is subjected to heat and pressure at least for sealing the thermoplastic film to itself.

In the ideal package of this type, the windowed film is stretched thin and tight against the packaged article so as to appear substantially invisible to a viewer at an ordinary distance. To effect this purpose, it is generally necessary to employ a film having a memory which will tend always to re-form the film to its initial state of manufacture. Inasmuch as the initial state of manufacture is a flat state, this type of film, when deformed, will attempt to re-form itself to a flat state while in its thermoplastic temperature range. Thus the use of a thermoplastic material having a memory allows a package to be sealed and re-formed in the same operation.

It is an object of this invention to provide a new and improved apparatus for sealing a package of thermoplastic material.

It is a further object of this invention to provide new and improved apparatus for activating the memory of a thermoplastic material to restore it to its original shape.

It is an object of this invention to provide new and improved apparatus for sealing the package and for returning the plastic to its original state.

Further objects and features of the invention pertain to the particular structure and arrangements whereby the above-identified and additional objects of the invention are obtained.

The invention will be better understood by reference to the following specification and drawings forming a part thereof wherein:

FIGURE 1 is a perspective view illustrating one embodiment of the package, including the article to be packaged thereby;

FIGURES 2 through 5 are perspective views of the embodiment of the invention illustrated in FIGURE 1 during various stages of the formation thereof;

FIGURE 6 is a partial cross-sectional view of the embodiment of the invention illustrated in FIGURE 1, including the article to be packaged thereby;

FIGURE 7 is a front elevational view of one embodiment of the inventive apparatus for thermosealing the inventive structure subsequent to the inventive structure being loaded with the article to be packaged thereby; and

FIGURE 8 is a partial side elevational view of the structure illustrated in FIGURE 7.

FIGURES 1–6 show a package **10** having an article **11** enclosed therein. Package **10** is formed from a windowed card **16** which comprises a die cut board **12** having an aperture **14** which is windowed by a thermoplastic, thermo-sealable film **13**. The film is of a type which may be deformed and may later be activated to return to its original state. Therefore the windowed card **16** becomes preformed card **20** by deforming the film **13** into article receiving pods **21** and **22** which are dimensioned to receive the article **11** as shown in FIGURES 3 and 4. The card **20** is filled by placing article **11** therein, and closed by folding along lines **24** causing portions of film **13** to come into face-to-face contact for subsequent heat sealing. The film may then be activated to return to its original flat state causing it to tightly encase article **11** and the film heat sealed.

One embodiment of the inventive apparatus, the machine for heat sealing the package and activating the memory of the plastic film, is illustrated in FIGURES 7 and 8.

It comprises a frame having attached thereto a plurality of feed belts **250**, specifically four in number, with two of each said feed belts **250** being cooperatively positioned on each side of the loaded cards **20**. The feed belts **250** grasp the non-apertured portion of the cards **12** in a manner illustrated in FIGURE 8. The loaded and folded over package **20** is inserted between the plurality of feed belts **250** and carried along thereby and transferred to a plurality of heating chamber feed belts **252**, also being four in number, driven by feed rollers **253**. The feed belts **252** carry the card **20** to be sealed into the heating enclosure **254**.

Positioned within the heating enclosure **254** is a hot air chamber **264** which is provided to shrink the plastic film **13**. Attached to the hot air chamber **264** are upper and lower air blowers **266** and **266'** which may be suitably selected. The blowers **266** and **266'** recirculate the air through the hot air chamber **264** although the complete duct work is not shown, and constantly supply a stream of hot air to the hot air chamber **264**. In each of the respective upper and lower ducts **267** and **267'** between the hot air chamber **264** and the blowers **266** and **266'**, there may be positioned heater elements, **268'**. The heater elements, **268'** heat the recirculating air so that heat from the heating elements will be transferred to the film **13**. A 6,000 watt element has been found to be suitable for many films.

Also positioned within heating enclosure **254** is a sealing chamber **260**. Within this chamber a plurality of electrical heater elements **256** are positioned immediately adjacent to the feed belts **252** and on either side of the card **20**. The heating enclosure feed belts **252** may be composed of a material such as stainless steel which will readily and suitably transfer heat from the heating elements **256** to the card **20** to be sealed. The loaded card **20** is sealed to form a unit package by welding the contiguous portions of the plastic material **13** spaced adjacent the aperture **14** to one another. This requires pressure as well as heat and the heating enclosure feed belts **252** are so spaced on either side of the card **20** that the portions of the card **20** adjacent the aperture **14** are subjected to pressure as well as heat. The heater elements **256**, which may be brass shoes, may also apply pressure to feed belts **252** and thus subject card **20** to additional pressure. While it is preferred to position heater elements **256** in sealing chamber **260** only, it is permissible to extend heating elements **256** into hot air chamber **264** as illustrated.

The temperature in both the hot air chamber **264** and the sealing chamber **260** is controlled by thermostatically operated blowers **262** which expel hot air from the respective chambers when the temperature within the chamber exceeds a predetermined maximum.

Within the hot air chamber 264 the film 13 positioned in the aperture 14 will be heated to a temperature which will cause the plastic film 13 to tend to return to its original form. Inasmuch as the article to be skin-packaged is positioned within the aperture of the card 12, the film 13 tightly adheres to the conformation of the item which is packaged and will be held under tension inasmuch as a restoring force, i.e., the tendency of the film to return to its initial state, is present.

More delivered heat will be required to cause the contacting surfaces of the plastic film 13 to adhere to one another than to cause the non-contacting surfaces of the film 13 to retain their memory and attempt to shrink back to their initial flat position. This is provided in sealing chamber 260. As the card 20 to be sealed is moved into the sealing chamber 260 by the heating enclosure feed belts 252, the portions of the film 13 adjacent the windowed aperture 14 in the card 12 are heated by a conduction process. The heat is transferred from the plurality of heaters 256 through the stainless steel feed belts 252 and the card 12 to the film 13. The film becomes pliable and tacky, and the opposing and contacting surfaces of the folded card 20 to be sealed adhere to one another, thereby welding the folded card 20 along the length dimension and adjacent the windowed aperture 14 to form package 10.

After the package 10, which has now been finally sealed, emerges from the insulated heating enclosure 254, it is permissible but not necessary to cool it by moving it through a cooling chamber 274 by means of the cooling chamber feed belts 270. A cooling chamber, such as chamber 274, would be supplied with cooled air from duct 276. Duct 276 may be connected to refrigerating means or may be connected to air blowers contained within housing 280.

The finished skin package 10 is then transferred from belts 270 to belts 290 and removed from the sealing machine to be boxed for shipment.

The belts 250, 252, 270 and 290 may be driven by any convenient means, and these means form no inventive part of this invention. However, in FIGURE 7 the feed belts 252 and 270 are shown to be driven by an electric motor 281 which drives a shaft (not shown) through the pulley-belt arrangement comprising the pulley 282 and the belt 284. Rotation of pulley 282 in turn causes gear mechanisms 286 to be rotated. The gear mechanisms are attached to a plurality of drive shaft gears (not shown) which drive the feed belts 252 and 270.

What has been described is what is believed to be the preferred embodiments of the invention. However, various modifications and alterations may be made without departing from the true spirit and scope of the invention, as defined in the appended claims.

I claim:

1. Apparatus for skin-packaging of items which have been inserted into a preformed article of manufacture comprising an apertured sheet having a thermo-stretchable, thermo-sealable plastic material adhered thereto covering said aperture and overlapping the edges thereof and wherein said plastic material within said aperture has been stretched to a configuration corresponding to said item to be skin-packaged and wherein said apertured sheet has been folded upon itself such that portions of said plastic material overlapping the edges of said aperture are in contact, comprising

a plurality of oppositely paired feed rollers and a corresponding plurality of heat conductive transversely spaced contiguously paired feed belts drivably associated with said feed rollers and adapted to pressurably engage said apertured sheet on opposite sides of said aperture,

a heating enclosure surrounding and enclosing said feed belts and including a hot air chamber and means for directing and controlling the temperature of a heated stream of hot gases therethrough and over and around said plastic material within said apertured sheet, said heated stream of gases within said hot air chamber capable of heating said plastic material within said aperture to a first temperature at which said plastic material within said aperture will regain its memory and tend to return to its original shape,

a plurality of opposingly spaced heater elements spaced along said conductive feed belts to transfer heat energy to said contiguous feed belts, said plurality of heater elements capable of heating said plastic material adjacent and overlapping said aperture to a second temperature at which portions of said plastic material overlapping said aperture and in contact will adhere to one another,

said plurality of feed belts transversely spaced such that said portions of said plastic material overlapping said aperture and in contact are under a pressure which will cause said portions of said plastic material in contact to adhere to one another after said portions of plastic material in contact have been heated to said second temperature,

a drive mechanism to drive said feed rollers and said associated feed belts so that said item to be skin-packaged and said apertured sheet are driven into and out of said apparatus, whereby said plastic material within said aperture regains its memory and tends to return to its original shape and thereby stretches taut against said item within said apertured sheet and said plastic material overlapping said aperture and in contact adhere to one another and seal said item to be skin-packaged within said apertured sheet.

2. The apparatus of claim 1 in which said heater elements spaced along said feed belts extend through and beyond said hot air chamber.

3. The apparatus of claim 1 in which said heater elements spaced along said feed belts are in a chamber following said hot air chamber.

4. The apparatus of claim 1 in which means is provided to exhaust hot air from said enclosure whereby said chamber is held at a predetermined temperature.

5. The apparatus of claim 1 in which means are provided for substantially cooling the sealed package after it emerges from the heating enclosure.

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