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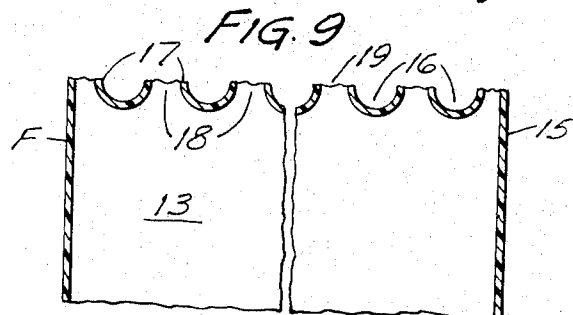
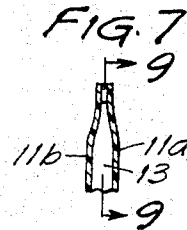
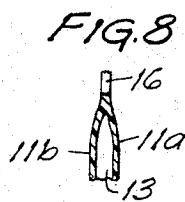
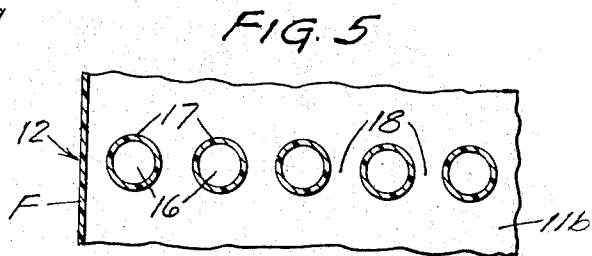
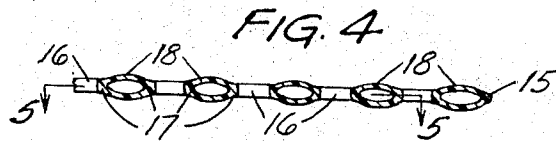
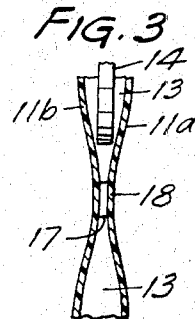
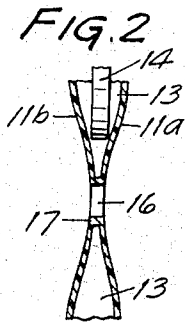
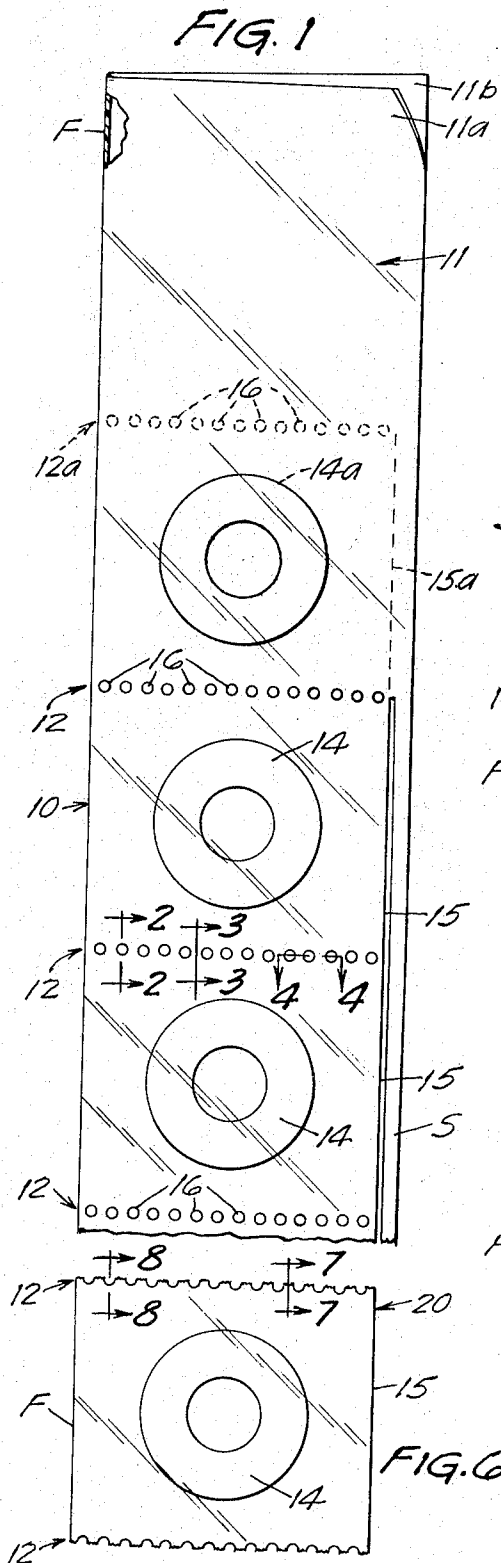
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PERFORATED STRIP PACKAGE AND METHOD OF MAKING THE PACKAGE

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2 Sheets-Sheet 1



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PERFORATED STRIP PACKAGE AND METHOD OF MAKING THE PACKAGE

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ABSTRACT OF THE DISCLOSURE

A strip package with articles contained in compartments separated by rows of closely spaced apertures separated from each other by small rupturable unsealed panels and formed by piercing the laminae with rods moving endwise through the laminae to also heat seal the laminae together at the peripheries of the apertures, and periodically moving the strip to a new location by tension applied along the strip and through the rows.

This invention relates to a strip package of heat sealable material and to the method of forming the strip package.

An object of my invention is to provide a new and improved strip package of simple and inexpensive construction.

Another object of my invention is to provide a new and improved method of making a strip package of thermoplastic sheet material whereby the strip package may be readily formed in a high speed operation.

Still another object of my invention is the provision of a new and novel strip package for readily and easily handling articles which are packaged individually or in small numbers so as to be easy to handle and dispense at their point of distribution or use and which package is so constructed as to withstand handling and substantial manipulation, even immediately after the sealing of the compartments in the strip package and the corresponding placement of articles therein.

A still further object of my invention is the provision of a method of producing a thermoplastic sheet material article confining packages joined together at their ends to facilitate ready and easy handling of the article, wherein the method consists in suspending laminae of the thermoplastic sheet material in strip form and supplying the laminae downwardly under gravity induced tension, orienting the tensioned laminae in face-to-face relation with each other, successively and alternately joining the laminae together and applying articles between the laminae, said joining of the laminae together being effected at spaced intervals along the laminae by heat sealing, and said articles being applied between the laminae to be confined therein and said articles being supported on the heat seals connecting the laminae together and thereby increasing the gravity induced tension on the laminae, said heat sealing being effected by clamping the laminae together and simultaneously applying localized fusing heat at spaced locations oriented in a row extending transversely across the laminae and thereby producing apertures through the clamped laminae and joining by heat sealing the laminae together at the peripheries of said apertures, and preventing application of sealing heat or fusing heat to the laminae between the apertures and thereby maintaining the strength of the laminae between the apertures to prevent deformation of the laminae under influence of gravity induced tension and to permit movement or manipulation of the laminae immediately after sealing.

These and other objects and advantages of the invention will more fully appear from the following description

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made in connection with the accompanying drawings, wherein like reference characters refer to the same or similar parts throughout the several views, and in which:

FIG. 1 is an elevation view of a portion of the strip package, being shown as it is being formed;

FIG. 2 is an enlarged detailed section taken approximately at 2—2 in FIG. 1;

FIG. 3 is an enlarged detailed section view taken approximately at 3—3 in FIG. 1;

FIG. 4 is an enlarged detailed view taken approximately at 4—4 in FIG. 1;

FIG. 5 is an enlarged detail section view taken approximately at 5—5 in FIG. 4;

FIG. 6 is an elevation view of one segment of the strip package after it has been removed from the remainder of the strip;

FIG. 7 is an enlarged detail section view taken approximately at 7—7 in FIG. 6;

FIG. 8 is an enlarged detail section view taken approximately at 8—8 in FIG. 6;

FIG. 9 is an enlarged detail section view taken approximately at 9—9 in FIG. 7;

FIG. 10 is a perspective view of a machine for carrying out the method and for making the strip packages;

FIG. 11 is a detail section view of a portion of the sealing apparatus of the machine as shown in FIG. 10;

FIG. 12 is an enlarged detail perspective view showing a portion of the sealing apparatus employed in the machine and illustrated in FIG. 10.

The strip package is illustrated in FIG. 1 of the drawings and is denoted by the numeral 10. The lower portion of the strip package illustrated is completed and the upper portion thereof is illustrated in the process of being completed.

In the form illustrated, the strip package 10 is formed from a strip of polyethylene sheet material 11 or some similar thermoplastic material which may be heat sealed, and the strip 11 is folded at the side F so that the opposite sides of the strip of heat sealable material 11 confront each other as face-to-face laminae 11a and 11b. Whereas it is convenient to use a single folded strip of heat sealable material, so that the laminae 11a and 11b are joined together along the fold F, the strip package could as well be formed of separate laminae of heat sealable sheet material guided into confronting face-to-face relation with each other. In the fabrication of the strip package 10, it is contemplated that the strip of thermoplastic material 11 which is being made into the strip package will be maintained under some tension, as illustrated in FIG. 10 wherein the strip of thermoplastic material 11 is suspended from a drum or roller R so that gravity induced tension produces a downward movement of the thermoplastic material when the roller R is revolved or permitted to revolve. Similarly, the thermoplastic material may be drawn across a forming table under some tension, but it will be readily understood that if the strip of thermoplastic material is to be moved with any degree of speed or rapidity, the strip of thermoplastic material must be under some tension during the formation of the strip package and immediately after as the strip package is being formed so as to allow manual manipulation of the strip package formed.

In the formation of the strip package, the laminae 11a and 11b are joined together at terminal zones 12 spaced from each other at regular intervals along the strip package for defining compartments 13 in which articles 14 such as washers or other similar articles may be confined. In the strip package 10 illustrated, the compartments 13 are substantially entirely closed on the four sides thereof by the terminal zones 12 at the opposite ends of the compartment, by the fold F at one side of the com-

partment and by a seal or weld 15 along the other side of the compartment.

In the formation of the seal 15, a strip of scrap sheet material S is removed so as to make the package the desired size in relation to the size of the article and as to define a straight and true edge along the side of the package.

The strip package is somewhat weakened at each of the terminal zones 12 wherein the confronting face-to-face laminae 11a and 11b are joined together to define the ends of the compartments 13. Accordingly, a plurality of small apertures 16 are provided through the confronting laminae at each of the zones. The weakening through the use of the apertures in the terminal zones 12 permits the segments of the strip package to be severed by tearing from the strip package as a whole so as to supply or dispense the articles contained in one or more of the compartments 13.

At the periphery of each of the apertures 16, seals or welds 17 of the thermoplastic sheet material join the laminae 11a and 11b together. The apertures 16 and seals 17 are disposed close enough together as to adequately support the articles 14 in the compartments 13 without causing undue pressure and without ripping the adjacent thermoplastic sheet material. It has been found successful to space the apertures 16, for small articles 14, at a distance from each other such that approximately eight apertures per inch form the zone 12. Between the apertures 16 and seals 17, panels 18 of the thermoplastic sheet material remain intact without having been heated to fusing temperature or deformed during the formation of the seals 17 and 15. The original strength of the thermoplastic sheet material is maintained in the panels 18 between the apertures 16 as to withstand the tension applied to the strip package, particularly during the formation thereof while the seals 17 may be relatively soft and during the handling or other manipulation of the strip package after it is formed. The maintenance of the strength of the panels 18 is an important aspect of the present invention in order to allow the strip package 10 to be rapidly formed by drawing the strip of thermoplastic material 11 through a forming device at a rapid rate. In the forming of the compartments 13, the terminal zones 12 are progressively formed in the material as the articles 14 are slipped between the laminae 11a and 11b. For instance, in the strip package being formed in FIG. 1, the article 14a has just been slipped between the laminae 11a and 11b and above the uppermost terminal zone 12 already formed. The next stage in the process of forming the strip package is to form the apertures in another terminal zone denoted 12a and illustrated in dotted lines, and simultaneously with the production of the apertures in the zone 12a and the heat sealing of the laminae at the peripheries of the apertures, the strip S of scrap sheet material is removed from the strip package being formed by heat sealing along the longitudinal line 15a which extends between the terminal zone 12a and the next adjacent terminal zone 12 below. The side as well as the top end of the compartment 13 will thereby be simultaneously closed so that the article 14a which has just been inserted cannot thereafter be removed without mutilating the package.

In FIG. 6 is illustrated a segment of the strip package which has been removed from the remainder of the strip package as to dispense one of the articles 14 for the purpose intended. It will be seen that the strip package has been torn at the terminal zones 12 above and below the segment of the package illustrated, and in such a manner that the panels 18 between the apertures 16 have been severed by tearing as indicated at 19 in FIG. 9. When it is desired to remove the article 14 from the package segment 20 illustrated in FIG. 6, the laminae 11a or 11b thereof maybe physically torn, or the laminae maybe ripped apart at the seal 17 at the aperture peripheries. Thus it is a simple matter to remove the article 14 from the compartment when desired.

In the formation of the strip package 10, tension is maintained on the strip of heat sealable material 11 as previously indicated by suspending the strip of material such that the weight of the articles 14 already packaged apply tension on the strip of material, or if a horizontal packaging arrangement is employed, a tension applying medium is used to draw the strip of heat sealable material along. In the formation of the material weakening apertures 16 in the terminal zones between the next adjacent compartments 13, the apertures 16 are produced by clamping the laminae 11a and 11b together along the terminal zone at the end of the compartment 13 at which location the apertures 16 are to be produced. While the laminae 11a and 11b are clamped together at the terminal zone, fusing heat is applied at spaced locations along the zone so as to produce a fusion or melting of the material in the strip 11 and so as to produce a weld or seal around the entire periphery of the apertures so produced so as to join the laminae 11a and 11b together at the periphery at each of the apertures. The fusing heat in the terminal zone is applied at spaced locations so that the apertures 16 are separate and distinct from each other and so that the seals 17 at the peripheries of the apertures remain separate and distinct from each other. The localized fusing heat is applied only for a short period so that the panels 18 of heat sealable material between the apertures 16 so produced remain intact and without being weakened or subjected to other mutilation or deformation due to the heat which is applied. The panels 18 thereby maintain their strength so that the terminal zone being formed maintains a sufficient strength as to withstand the tension forces applied to the strip of heat sealable material 11 to effect movement thereof as is required in the rapid production of the strip package and in the handling and manipulation of the strip package with the articles therein immediately after a terminal zone has been completed.

It has been found convenient to produce the linear seal and trimming at 15 simultaneously with the formation of the terminal zones 12. Of course it should be understood that if desired, the side edge of the compartment may be left open such that the right hand sides of the compartments as viewed in FIG. 1 are not sealed together. This will vary, depending upon the nature of the package to be produced and the articles to be stored.

A typical apparatus for producing this strip package 10 is illustrated in FIGS. 10, 11 and 12. The machine has a frame 25 with a supply 26 of longitudinally folded strip of heat sealable thermoplastic material such as polyethylene. The strip of material 11 from the supply roll 26 is guided upwardly over the control roller or drum R and then downwardly past a spreader 27, supported on the frame of the machine, and into a sealing station which is indicated in general by numeral 28. The strip of material is pressed against the roller R by a pressure roll 29 so that the strip of heat sealable material 11 may move downwardly only when the roll R is revolved. The roll R is provided with a suitable brake mechanism 30 to prevent undesired rotation of the roll R except when the brake is released, and a roll driving mechanism which maybe a rack and gear construction 31 is provided for revolving the roll through predetermined arcuate increments so as to supply the strip of material downwardly in predetermined lengths. An electric motor or other source of power maybe used to supply motion to the driving mechanism 31 for operating the sealing and clamping mechanism at the station 28.

The clamping and sealing mechanism at the station 28 may employ two sets 29 and 30 of rigid clamping bars to move inwardly and outwardly in the direction of arrows A to clamp the laminae 11a and 11b of heat sealable material together along the terminal zone 12 being produced. The sets of clamping bars 29 and 30 each includes a pair of side-by-side bars 31 and 32 which engage the corresponding bar of the other set in edge-to-edge relation.

with the thermoplastic material therebetween. The open and unobstructed spaces 33 between the bars 31 and 32 provides access to the thermoplastic material for a plurality of heated needle-like rods or bars 34 which are carried on and affixed to a mounting bar 35 which may be provided with an electric resistance heater for transmitting heat to the rods 34. The rods 34 are arranged in a row as seen in FIG. 12 so as to produce the series of apertures 16 in the terminal zone 12 by applying the fusing heat to the thermoplastic sheet material and also producing the peripheral seals 17 thereon the apertures.

The bar 35 is mounted on and carried by suitable control bars 36 which produce a movement of the rods 34 in the direction arrow *a*. In FIG. 12, certain parts of the head assembly have been illustrated, but the rods 34 are shown in relation to the clamping jaw 29 as to illustrate the manner in which the rods 34 move into the unobstructed space 33. In FIG. 12 the clamping jaw 30 is omitted for clarity of detail.

In a similar manner, the jaws 29 and 30 are provided with mounting members or bars 37 which connect to the operating mechanism of the machine as to produce the reciprocating motion thereof in the direction of arrow *a*. In FIG. 11 it will be noted that as the terminal zone 12 is being produced, an article 14 has already been inserted into space between the laminae 11*a* and 11*b* as to permit the article to drop downwardly with the laminae after the apertures and heat seals have been completed.

It will be seen in FIG. 12 that the mounting and heating bar 35 is generally L-shaped and has a depending end portion 35*a* which mounts a continuous sealing bar 38 which is extendible through the unobstructed space between the clamping bars which also are generally L-shaped and have depending end portions 29*a* for clamping the thermoplastic material and permitting the bar 38 to form the seal 15 for closing the side of the compartment 13 in the strip package.

It will be seen that I have provided a new and improved strip package having a plurality of compartments for confining articles at spaced increments along the length of the package wherein the compartments are separated from each other by terminal zones which have been weakened through the use of apertures which also provide peripheral seals in the terminal zones for separating the compartments from each other. The segments of the strip package may be readily and easily severed by tearing from each other so as to permit the ready and easy dispensing and supplying of articles contained in the various compartments of the strip package.

It will also be seen that I have provided a new and improved method of forming the strip package which includes the applying of tension to the strip of thermoplastic sheet material 11 so that laminae confront each other in face-to-face relation and then clamping these laminae together along terminal zones wherein localized fusing heat is applied to produce apertures through the confronting laminae in the zones and produce seals around the peripheries of the apertures while maintaining panels of the thermoplastic material between the apertures and in the zones in separate and distinct relation with each other and without heat sealing these panels so as to maintain the strength of the panels to withstand the tension applied to these strips during the formation of the strip package and the handling and manipulation of the package immediately after the formation thereof.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the various parts without departing from the scope of the invention.

I claim:

1. A strip package, comprising a pair of elongate and face-to-face laminae of thermoplastic material secured together along their longitudinal edges, said laminae adjoining each other

along terminal zones extending transversely across the laminae and thereby defining compartments between said zones and between said laminae, a plurality of articles disposed in said compartments, the laminae having a single row only of closely spaced and minute material weakening apertures there-through in said zones, and said laminae being heat sealed together at the peripheries of said apertures whereby to maintain said compartments in physical separation,

said laminae also having rupturable panel portions in said terminal zones and between said apertures, the panel portions of the opposite laminae being adjacent each other, but separate and distinct from each other to contribute materially to the strength of the strip package independently of the heat sealed aperture peripheries for resisting deformation of the package under influence of tension of the articles in said compartments of the strip package.

2. In the art of producing thermoplastic sheet material article-confining packages joined together at their ends to facilitate ready and easy handling of the articles, the method steps consisting in

orienting laminae of such thermoplastic material in face-to-face relation,

heat sealing across the laminae and at spaced intervals along the laminae to join the laminae together and define article-confining compartment, said heat sealing being effected by clamping the laminae together and simultaneously applying localized fusing heat by piercing the clamped laminae with elongate heated rods moving endwise through the clamped laminae at closely spaced locations oriented in a row extending transversely of the laminae and thereby producing apertures through the clamped laminae and heat sealing of the laminae together at the peripheries of said apertures,

and preventing application of sealing heat to the laminae between the apertures and thereby maintaining the strength of the laminae between the apertures to permit movement or manipulation of the laminae immediately after sealing.

3. In the art of producing thermoplastic sheet material article-confining packages joined together at their ends to facilitate ready and easy handling of the articles, the method steps consisting in

supplying the thermoplastic laminae in strip form, orienting the tensioned laminae in face-to-face relation with each other,

successively at transverse zones spaced along the tensioned strip laminae, heat sealing across the laminae to join the laminae together and define article-confining compartments, said heat sealing being effected by clamping the laminae together and simultaneously applying localized fusing heat by piercing the clamped laminae with elongate heated rods moving endwise through the clamped laminae at spaced locations spaced from each other by distances approximating the diameter of the rods, said locations being oriented in a row extending transversely across the laminae and thereby producing apertures through the clamped laminae and heat sealing of the laminae together at the peripheries of said apertures,

preventing application of sealing heat to the laminae between the apertures and thereby maintaining the strength of the laminae between the apertures to withstand said tension for preventing deformation and to permit movement or manipulation of the laminae immediately after sealing,

and drawing the laminae from the supply by tension transmitted through such zones.

4. In the art of producing thermoplastic sheet material article-confining packages joined together at their ends to facilitate ready and easy handling of the articles, the method steps consisting in

suspending the laminae in strip form and supplying the laminae downwardly under gravity-induced tension, orienting the tensioned laminae in face-to-face relation with each other,

successively and alternately joining the laminae together and applying articles between the laminae, said joining together being effected at spaced intervals along the laminae by heat sealing, and said articles being applied between the laminae to be confined therein and said articles being supported on the heat seals connecting the laminae together and thereby increasing the gravity induced tension on the laminae, said heat sealing being effected by clamping the laminae together and simultaneously applying localized fusing heat by piercing the clamped laminae with elongate heated rods moving endwise through the clamped laminae at closely spaced locations oriented in a row extending transversely across the laminae and thereby producing apertures through the clamped laminae and joining by heat sealing the laminae together at the peripheries of said apertures,

and preventing application of sealing heat to the laminae between the apertures and thereby maintaining the strength of the laminae between the apertures to prevent deformation of the laminae under influence of the gravity induced tension and to permit movement or manipulation of the laminae immediately after sealing.

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