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METHOD OF AND APPARATUS FOR MAKING CONTAINERS

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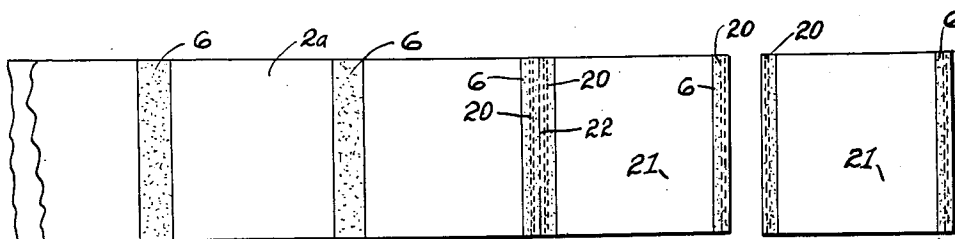
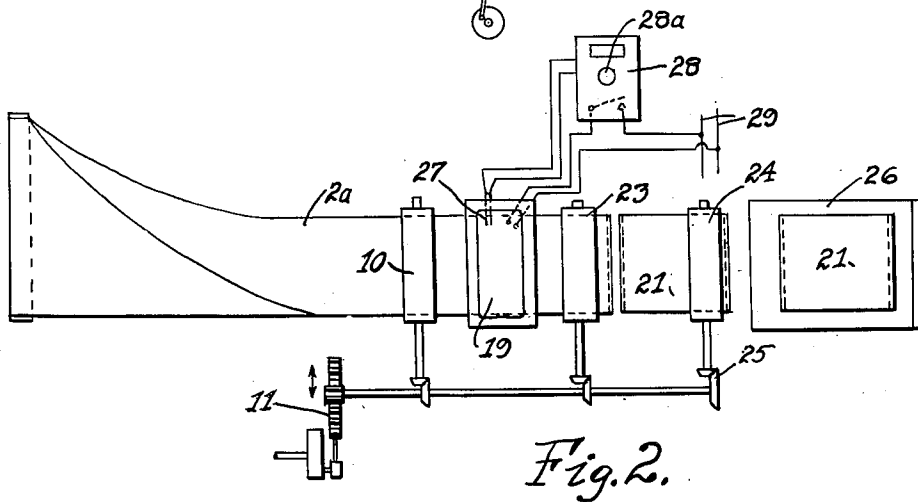
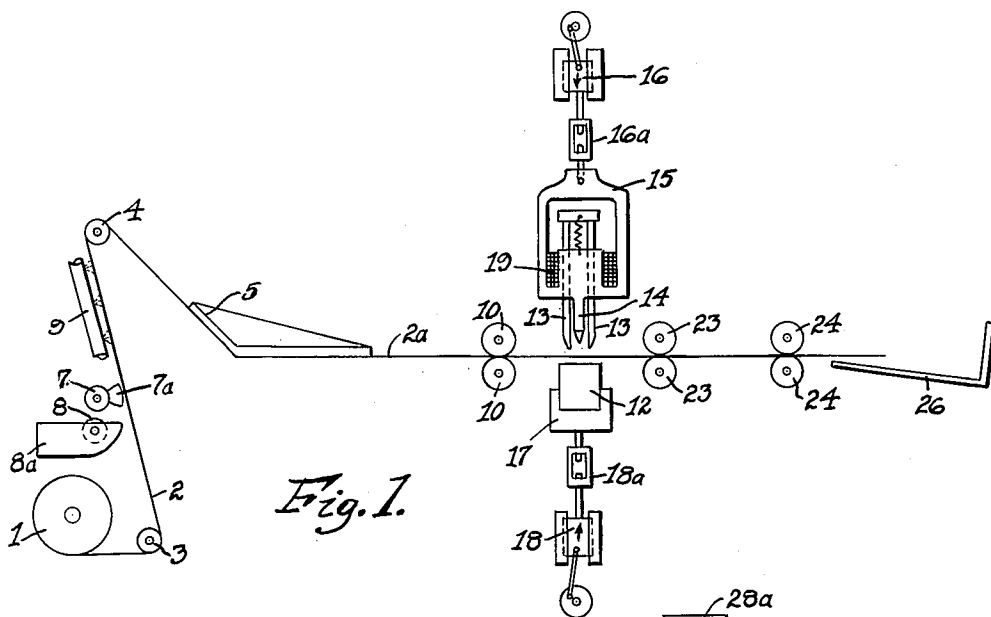


Fig. 3.

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METHOD OF AND APPARATUS FOR MAKING CONTAINERS

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3 Claims. (Cl. 93—18)

The present invention relates to an improved method of and apparatus for producing containers, such as bags or envelopes, from thin, flexible moisture-proof material, having the characteristics of being rendered adhesive through application of heat. One such material is known commercially as "Pliofilm," although other materials possessing similar characteristics are available and are commonly employed for the packaging of food products and other articles of merchandise.

According to the invention, material having the above mentioned characteristics is first folded to form a web providing continuous overlying areas, which web is then heat sealed and severed at predetermined intervals, to produce complete containers. In carrying out the invention, it is proposed to provide the folded web at intervals, in advance of the heat sealing operation, with thin, non-tacky coatings of a readily applied material, such as lacquer or a similar substance, which coatings will have the property of transmitting heat to the web to cause internal sealing thereof, while effectively preventing overlying containers from becoming stuck along their heat-welded seams by reason of the inherent tackiness of the welds, even when cooled. Furthermore, the invention contemplates control of both temperature and pressure during the combined heat sealing and severing operation, such as to result in only partial severance of the web, coincidentally with formation of the welds without adherence to the severing means, so that complete containers still in partial web form can be conveyed away from the heat sealing zone for separate severance, at a point where the adhering effect of static electricity is not troublesome. The above and other advantageous features of the invention will hereinafter more fully appear with reference to the accompanying drawing, in which:

Fig. 1 is a diagrammatic view in side elevation, illustrating apparatus embodying the invention.

Fig. 2 is a plan view of a portion of the apparatus shown in Fig. 1.

Fig. 3 is a plan view on an enlarged scale, illustrating the appearance of the web, after being acted upon by the apparatus of Figs. 1 and 2.

Referring first to Fig. 1, a supply of thin flexible material having the general characteristics of "Pliofilm" is indicated at 1, in the form of a roll from which the material 2 is led upwardly around guide rolls 3 and 4 to a suitable

former 5, which folds the material into a continuous web 2a of double thickness. As will hereinafter appear, the width of the folded web determines the depth of the pockets in the bags or containers which are subsequently severed from the web, with the former 5 being of any suitable type to produce a folded web of the desired width.

Before the material 2 is acted upon by the former 5 to provide the web of double thickness, it is provided at predetermined intervals with spaced coatings or bands 6 of a readily applied material presenting a non-tacky surface, such as lacquer or similar substance. These bands may be applied to the material 2 either before or after it is made into the roll 1 and may be applied, if desired, in the form of a printed design or border. For purposes of illustration, the lacquer is shown as being applied to the material 2 as it moves between the guide rolls 3 and 4 by means of a roll 7, providing a printing segment 7a cooperating with a transfer roll 8 rotating in a supply tub 8a. The rotation of the roll 7 will cause bands 6 to be applied transversely of the material 2 at predetermined intervals, as indicated in Fig. 3, with the distance between the center lines of adjacent bands being regulated to substantially correspond to the width of the containers that are to be formed from the web 2a. In order that the lacquered bands 6 will be thoroughly dried before the material is subjected to the action of the former 5, a suitable drier 9 is provided which is adapted to direct one or more jets of heated air against the material as it passes to the upper guide roll 4 and the former 5.

The web 2a of folded material, presenting on opposite sides and at regular intervals, the transverse non-tacky bands 6, then enters between a pair of pull rolls 10 which, as indicated in Fig. 2, have imparted thereto an intermittent rotative movement in one direction only through the operation of a suitable intermittent driving means 11, such as a reciprocatory feed rack cooperating with a pinion having a one-way clutch. The operation of the intermittent drive 11 is such that each rotative movement of the rolls 10 feeds a predetermined length of folded web 2a, substantially corresponding to the distance between center lines of adjacent bands 6.

The above described operation of the pull rolls 10 is such as to intermittently feed the web over an anvil 12, for operation upon by a pair of spaced heat-sealing elements 13 and a severing element 14. The elements 13 and 14 are mount-

ed in a head 15 and reciprocatory movement is imparted to the head by a suitable slide 16, having an adjustable connection 16a with the head 15. The anvil 12 is similarly mounted on a head 17, and reciprocatory movement is imparted to the anvil 12 by means of a slide 18 having an adjustable connection 18a with the head. By reason of the above described connections, the degree of pressure which the sealing and severing elements 13 and 14 exert on the web 2a as they approach the anvil 12, can be closely controlled.

The head 15 provides a heating coil 19, whereby the elements 13 may be heated to such a degree as to cause welding between the overlying layers of the web 2a, when the elements engage the web as supported by the anvil 12. The elements 13 are yieldably mounted on the head 15, so that they will retract slightly, after engaging the web 2a, to permit the edge of the severing element 14 to engage and partially penetrate the web as supported by the anvil, which is preferably composed of slightly yieldable material, such as medium-hard rubber.

Each operation of the intermittently driven rolls 10 is adapted to feed just the right amount of web 2a so as to center a non-tacky band 6 over the anvil 12. Therefore, when the head 15 descends towards the web as supported by the anvil, the sealing elements 13 make spaced parallel welds 20 through the band 6, without affecting the non-tacky surface of the web over the welds, as indicated by the dotted lines in Fig. 3. Therefore, successive operations of the elements 13 on the web 2a will result in the formation of a series of containers 21, each closed along three sides by the web fold and the parallel edge welds 20.

As previously pointed out, the connection 16a between the head 15 and slide 16 is adjustable, and the pressure exerted by the severing element 14 can be so regulated that the heated edge of the element 14 will only partially sever the web 2a. As a result, there is a light bond between each finished container 21, as indicated by the dot-and-dash line 22 extending between the welds 20 in Fig. 3. The partially severed containers 21 are removed from the anvil 12 by pull rolls 23, driven in exact synchronism with the rolls 10, so that when the sealing and severing elements 13 and 14 move away from the anvil 12, following completion of the welds 20, any tendency for the web 2a to adhere to the heated elements, or to the anvil, is overcome by the fact that the web still remains in a partially severed condition between the then stationary rolls 10 and 23. Furthermore, the fact that the web is only partially severed, prevents the containers from following around either pull roll 23, due to the effect of static electricity, instead of passing to the delivery rolls 24.

In order to complete the severance between the welded containers 21, the delivery rolls 24 are driven at a higher speed than the rolls 23, through suitable step-up gearing 25, or the rolls 24 may be continuously driven. Therefore, as each container 21 enters between the more rapidly rotating rolls 24, while still held between rolls 23, it is easily separated from the web, due to its partial severance along the line 22, and is then delivered separately to a suitable stacker 26.

As the completed containers 21 pile up in the stacker 26 with their overlying edge welds 20 in engagement, there is no tendency for the con-

tainers to stick along these welds by reason of their tackiness, due to the presence of lacquered bands 6, which constitute a continuous border running along the welded edges of both sides of each container. While it is a characteristic of "Pliofilm" and similar material to present a certain amount of tackiness after heat welding, it has been found that the presence of the border bands 6 absolutely overcomes any tendency towards tackiness along the outside edges, due to the glossy and relatively hard surface of the lacquer films through which the welds 20 have been made.

In order to prevent overheating of the material when being welded and severed by the elements 13 and 14, the invention also contemplates automatic control of the temperature of these elements. To this end, a thermocouple 27 is provided in the heating head 15, with leads extending to a suitable temperature-responsive, electrical control device, such as a potentiometer 28. Since such potentiometer controllers are well known in the art, it is unnecessary to describe in detail the construction and operation of the same, other than to state that for a given setting of the dial 28a, a substantially constant temperature can be maintained within the heater head 15, due to automatic connection and disconnection of the heating coil 19 to the current source 29. In this way, a temperature best suited for formation of the welds 20 and for partial severance of the web at 22, can be constantly maintained for the welding and severing elements 13 and 14.

Furthermore, it has been found that by means of the potentiometer 28, a welding temperature can be maintained which will insure the formation of non-tacky welds, provided that the time intervals between welds are of sufficient duration. Such control would eliminate the necessity for utilizing the lacquer bands 6 to overcome tackiness, although the higher welding temperatures required for shorter intervals between welds would still necessitate the use of a non-tacky medium over the welds.

From the foregoing, it is apparent that by the present invention there is provided an improved method of and apparatus for making containers from heat sealing material, so functioning as to produce complete containers of uniform dimensions that may be conveniently handled without exhibiting any tendency to stick together when packed in overlying relation.

We claim:

1. Apparatus for making containers from flexible sheet material having the property of being rendered adhesive, by the application of heat, comprising means for intermittently feeding overlying layers of said material, means for supporting said material in the intervals between feeding thereof, a heated element including a severing member, means for causing relative movement between said supporting means and said heated element to cause heat welding of said layers of sheet material accompanied by engagement of said severing member with the welding material, and means for adjusting the connections which cause relative movement between said heated element and said supporting means to so regulate the pressure exerted by said severing member on the welded material, while positioned on said supporting means, as to cause only partial severance of the material along the weld between said layers.
2. Apparatus for making containers from flex-

ible sheet material having the property of being rendered adhesive by the application of heat, comprising means for intermittently feeding overlying layers of said material, means for applying a liquid to said material at spaced intervals in its feed, said liquid being of a character which dries with a non-tacky surface, means for supporting said material in the intervals between feeding thereof, with said non-tacky applications presented externally with relation to said overlying layers of material, a heated element, a severing member, means for causing relative movement between said supporting means and said heated element and severing member to cause heat welding of said layers internally through said applications, and the subsequent severance of separate containers from the material along the internal welds, with the edges of said containers exhibiting no external tackiness along said welds and lines of severance due to the non-tacky nature of said external applications.

3. A method of making containers from flexible sheet material having the property of being rendered adhesive by the application of heat, which consists in intermittently feeding said material with separate layers thereof in overlying relation, applying a liquid at uniformly spaced intervals to said material, subjecting said applications to a drying action to produce spaced bands having non-tacky surfaces extending transversely to the direction of material feed, subjecting said overlying layers of material, with said non-tacky bands presented externally, to the action of a heated element to weld said layers internally through said bands and severing separate containers from said material along the welds, with the edges of said containers exhibiting no external tackiness along said welds and lines of severance, due to the non-tacky nature of said external bands.

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