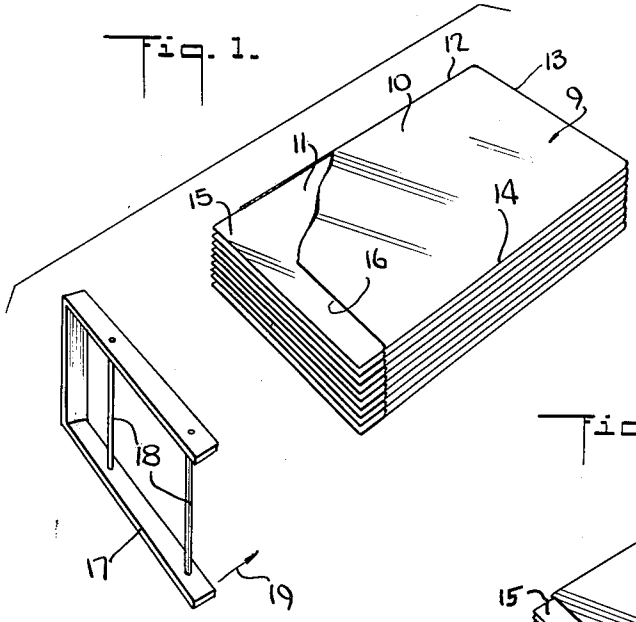
Feb. 20, 1962 J. D. SYLVESTER ET AL 3,021,947

FUSED-TOGETHER UNIT OF STACKED ARTICLES

Filed Feb. 27, 1959

Fig. 1.



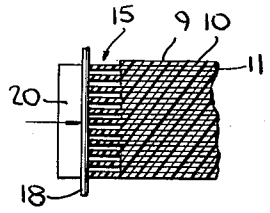
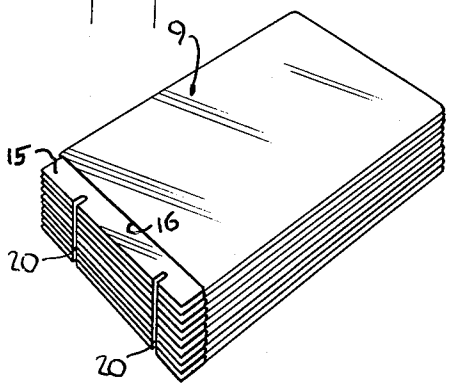


Fig. 2.

Fig. 3.



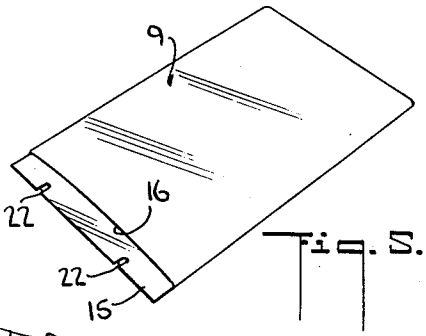


Fig. 5.

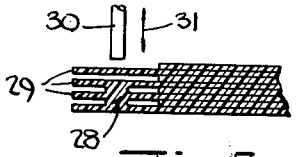


Fig. 7.

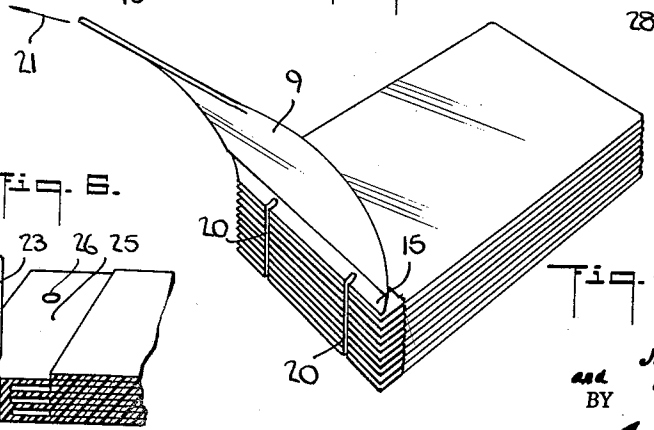


Fig. 4.

Fig. 6.

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United States Patent Office 3,021,947 Patented Feb. 20, 1962

3,021,947

FUSED-TOGETHER UNIT OF STACKED ARTICLES

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Filed Feb. 27, 1959, Ser. No. 796,022
3 Claims. (Cl. 206—57)

This invention relates to bags intended to be filled with merchandise, and has particular reference to the maintenance of a plurality of bags in a predetermined proximity and orientation between the time they are manufactured and the time they are used. Coordinately, the invention relates to an improved bag supply unit comprising a plurality of joined but readily separable bags, useful in facilitating bag-loading operations, especially where air-type bag-loading machines are employed.

The invention is directed primarily to a solution of the specific problem presented by bags composed of slippery material of which polyethylene is an example. During the course of manufacture of such bags they are arranged in a stacked relationship. Before the stack reaches the point of ultimate use, where the bags are filled with merchandise, it is usually subjected to considerable handling, for example, during loading, storage, or transportation. Because of the slippery nature of the material of which the bags are made, they have a strong tendency to slide upon one another and to become disorganized. To restore the bags to an orderly stacked relationship is a difficult and time-consuming procedure, often almost impossible. This is a serious problem with which bag manufacturers and bag users have been confronted, since it is important, for bag-loading efficiency, that successive bags of a stack be readily accessible, in orderly relationship, and with the filling openings always facing in the same direction.

It is a specific objective of this invention to afford a simple and thoroughly practical solution for this problem. Briefly stated, the invention involves a method of temporarily joining the bags together, in the form of an oriented stack, by means of integrally formed connecting bridges between adjacent bags, each bridge establishing a firm bonding between adjacent bags, yet being of such restricted dimensions that it is sufficiently weak to allow the bags to be individually separated in succession, by application of a sudden pulling force.

The invention is particularly useful with bags of the type in which one of the walls of the bag is elongated to form an extension beyond the filling opening of the bag. If a multiplicity of bags of this character are stacked with the extensions in registry, the fusing together of these extensions along a narrow area transverse to the planes in which the bags lie will establish a connected relationship suitable for the purpose. The fused area is clear of the filling opening, which remains unimpaired, and lies in an area of the bag that is discarded during the course of the usual bag-sealing operation.

Several methods of achieving the objective of this invention are illustrated in the accompanying drawings, in which:

FIG. 1 is an exploded view showing a stack of newly-manufactured bags, and an illustrative mechanism that may be employed in fusing the bags together;

FIG. 2 is a fragmentary cross-sectional view of the edge of the stack during the course of treatment indicated in FIG. 1;

FIG. 3 is a perspective view of the bag-supply unit into which the original stack has been converted;

FIG. 4 is a view similar to FIG. 3 showing how the uppermost bag of the stack may be separated;

FIG. 5 is a perspective view of a separated bag;

FIG. 6 is a perspective view, partly in section, of a stack of bags treated in a modified manner; and

FIG. 7 is a view similar to FIG. 2 illustrating a further alternative procedure.

The stack of bags chosen for illustration in FIG. 1 is substantially rectangular. Each bag consists of a pair of opposed walls joined along three of their edges and open at the fourth. Thus, the uppermost bag of the stack has walls **10** and **11** fused together along the edges **12**, **13** and **14**. The wall **11** is somewhat longer than the wall **10**, thus forming an extension **15** adjacent to the filling opening **16** of the bag. All the bags of the stack are constructed in the same way, and arranged in orderly fashion with all of the extensions **15** in registry.

Heretofore, a stack of polyethylene bags of this kind has been troublesome in that the bags tend to shift with respect to one another. During handling, the stack tends to become disheveled, and a restoration of the bags to an orderly stacked relationship is difficult. This is due in part to the slippery nature of the material of which the bags are made, and in part to the circumstance that this material is relatively limp, and the bags will not respond to pressure applied to projecting edges.

In accordance with this invention, the stack of bags is subjected to the fusing action of one or more attenuated heated elements. In FIG. 1 the fusion heat is applied to the edge of the stack in a direction transverse to the planes in which the bags lie. A holder **17** may be employed within which two substantially parallel heating elements or wires **18** are mounted. These wires may be electrically heated in any suitable fashion, and it is to be understood that the representation of FIG. 1 is schematic, since it is thought to be unnecessary for the present purpose to show the specific manner in which the elements **18** are supported in properly insulated fashion and connected to a source of power for heating them. The elements **18** are brought against the edge of the stack in the direction of the arrow **19** of FIG. 1, whereby the superposed extensions **15** are fused together along a narrow reentrant area **20** in the region contacted by each of the elements **18**.

It will be understood that under certain circumstances a single heating element will suffice, but a fusing together of the bags along the spaced substantially parallel regions **20** (see FIG. 3) has proven to be most effective in practice. Obviously, if desired, fusion along more than two lines, or along obliquely disposed areas, may be employed. It will also be readily understood that the fusion may be created either by moving the heated elements against the stack, or by moving the stack against a positionally fixed heated area or device. In any case, the duration of contact is very short, and is maintained only long enough to achieve the desired bonding together of the elements of the stack.

These bridges are of restricted cross-sectional dimensions, and at the point of use of the bags it is a relatively simple matter to separate the bags from the stack in succession by exerting a sudden pull upon each bag as it is to be removed. For example, the uppermost bag **9** may be lifted as shown in FIG. 4 and then torn away by exertion of a pulling force **21**, the bag after separation being indicated by itself in FIG. 5. It will be understood that the pulling force need not necessarily be applied in the specific direction indicated at **21**.

In many instances the bags are loaded before they are separated from the stack, or the separation takes place as an incident to the loading operation, but for the sake of simplicity of illustration the bag separation has been depicted only in connection with empty bags.

It will be noted that the filling opening **16** is unimpaired by the bonding together of the bags of the stack. Accordingly the loading procedure may be carried on in

any usual or desired manner, either by hand or by merchandising-loading machinery. Where air-type loaders are employed the assured orientation of the successive bag mouths greatly facilitates and speeds up the procedure.

The bag **9**, after separation, is indicated in FIG. 5. Its filling opening **16** is available in the usual way for the reception of merchandise.

After the bags have been filled it is customary practice to subject each bag in the region of the filling opening to a bag-sealing operation which fuses together the two walls of the bag mouth and leaves the projecting area to be discarded. The finished merchandise-containing sealed bag is therefore unaltered in appearance, and the presence of the re-entrant nicks **22** along the edge prior to sealing, has no effect upon the ultimate appearance of the package.

In FIG. 6 a modification of the procedure is illustrated. In this case a heated element or tool **23** is mounted for movement in the direction of its axis, as indicated at **24**. If this tool is pierced through the stack of superposed bag lips or extensions **25** it will form a series of tubular connecting bridges as shown, as a result of the fusion of the bag material in the annular region directly around the tool. These bridges are in alignment along a line which is transverse to and penetrates through the planes in which the bags lie. They are of restricted cross-sectional dimensions, and readily tearable when the bags are to be separated.

It is preferable to apply and withdraw the tool **23** in spaced areas so as to form at least two sets of connecting bridges. A second set is indicated at **26** in FIG. 6.

In FIG. 7 the connecting bridges **28** between the adjacent bag mouth extensions **29** are formed by a kind of spot-welding operation. By applying the heated (and relatively blunt) tool **30** in an endwise direction, as indicated at **31**, the bags may be fused or spot-welded together in successive stages at the time of delivery of the bags from the bag-making machine. If desired, this fusion may be performed bag by bag. Also, the areas at which the welds are formed need not necessarily be successively in alignment. In FIG. 7, for illustrative purposes, three of the bag lips are shown in spot-welded connected relation as the result of a previous descent of the tool **30**, and the uppermost lip **29** is still to be welded to the group beneath it.

In the bag units formed in accordance with the procedures depicted in FIGS. 6 and 7, the restricted areas at which the bags of the stack are bonded lie inward from the edges of the stack. This may be advantageous under certain circumstances. The connecting bridges are in any case still within the confines of the bag-mouth lips or extensions, and the appearance of the ultimate packages is thus unimpaired, since these extensions may be discarded during the bag-sealing operation.

Whichever of the alternative procedures may be employed, the resultant bag-supply unit is one in which a disorganized relationship of bags cannot develop. As a result of the maintenance of the bags in oriented condition, valuable time can be saved during the course of handling of the bags, losses can be minimized, and efficiency in loading procedures can be increased.

It will be understood that the drawings are exaggerated, dimensionally, for clearness of illustration, and that the bag material is in practice extremely thin. While polyethylene has been mentioned as the mtaerial which is presently troublesome, it will be understood that the invention is applicable to bags composed of other materials of heat-fusible nature. In general, many of the details herein described and illustrated may be modified by those skilled in the art without necessarily departing from the spirit and scope of the invention as expressed in the appended claims.

What is claimed is:

1. An article of manufacture comprising, in combination, a plurality of articles formed at least in part from heat fusible material, said articles being arranged in a stacked relationship with their marginal edges in vertical alignment, all of said articles being breakably interconnected by a heat fusion of adjacent articles at one or more overlying locations common to all of said stacked articles to thereby maintain said articles in aligned relationship, said stacked articles having minute openings at said common locations with said openings extending through all of said articles and defining an inner wall and said articles being fused together at the inner wall of said openings, said fusion being of a limited extent to permit said articles to be forcibly torn apart at said fused locations without otherwise damaging said articles.

2. An article of manufacture in accordance with claim 1 wherein said articles are bags formed from thermoplastic material.

3. An article of manufacture comprising, in combination, a plurality of bags of thermoplastic material arranged in a stacked relationship with their marginal edges in vertical alignment, each of said bags having an open end and an outwardly extending end flap adjacent said open end, all of said vertically aligned end flaps having minute openings at one or more overlying common locations, said openings defining an inner wall, and said openings being fused together along the inner wall of said openings to interconnect and maintain said bags in said stacked relationship, said material being fused to a limited extent to permit said bags to be readily torn apart forcibly at said fused locations without otherwise damaging said bags.

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