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[73]	Assignee	W. R. Grace & Co. Duncan, S.C.
Continuation-in-part of application Ser. No. 666,744, Sept. 11, 1967, now abandoned.		

[56]

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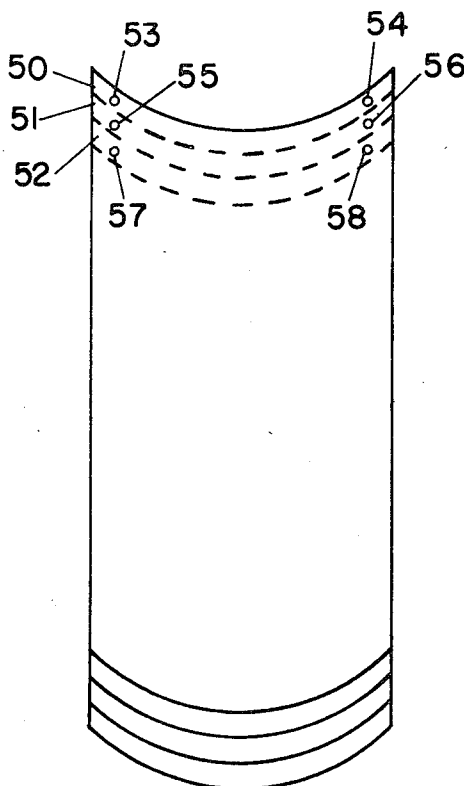
[54] **PACKAGE OF BAGS**
1 Claim, 5 Drawing Figs.

[52] **U.S. Cl.**..... 206/57A,
206/56AB, 206/DIG. 18, 229/69

[51] **Int. Cl.**..... B65d 27/10,
B65d 85/62

[50] **Field of Search**..... 206/57 (A),
56 (A), (Adhesive Digest 18), 59 (C); 229/69, 51
(WB), 48 (T), (Vent & S.C. Digest)

ABSTRACT: This invention is directed to a package of imbricated bags, each of the bags after the bottom bag is offset forward from the next underlying bag and overlies the opening of the underlying bag and the top side of the underlying bag is attached to the bottom of the overlying bag in sequence; in one specie the bags are attached together by adhesive members having adhesive on opposite sides thereof; in other species the bags are attached together by a direct union surface seal of the sides together to provide a wholly self-supporting chain of imbricated bags.



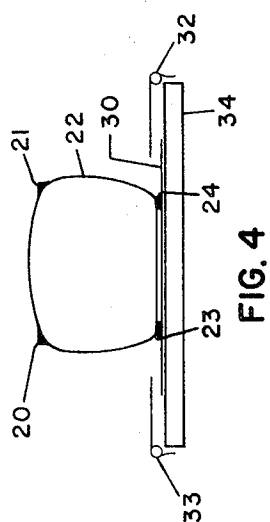


FIG. 4

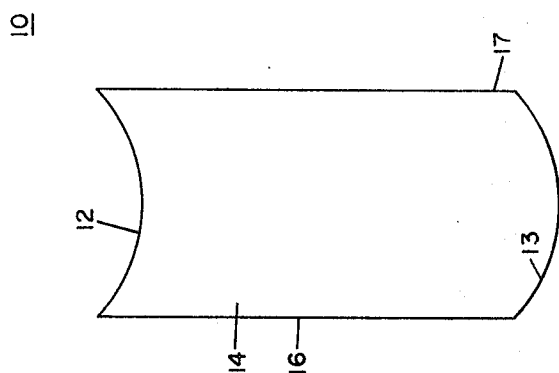


FIG. 1

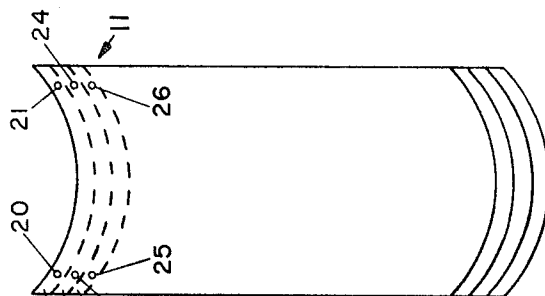


FIG. 2

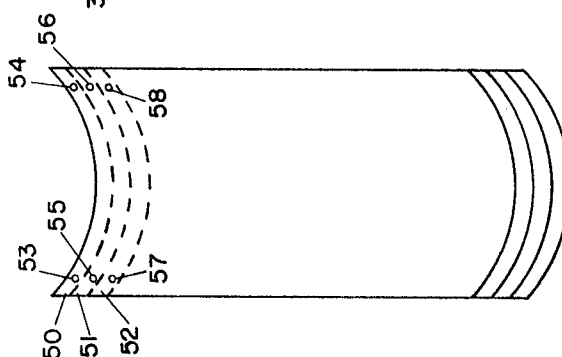


Fig. 5



FIG. 3

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PACKAGE OF BAGS

This application is a continuation-in-part of my copending application Ser. No. 666,744, filed Sept. 11, 1967.

The present invention relates to packaging and more particularly to a new and improved package of imbricated bags.

It is an object of this invention to provide a compact package of bags that do not leave scrap as they are used.

It is a further object of this invention to provide a compact package of bags in which the bags may be easily loaded from the front end of the package in continuous sequence form the same position without requiring a long reach to gain entrance to the lead bag or a long movement of the package to place the next bag in the loading position.

It is a further object of this invention to provide such a package that is economical.

It is another object of this invention to provide a compact package of bags that allows the top bag to be loaded while it is guarding the underlying bags against contamination.

It is a still further object of this invention to provide a compact package of bags that will naturally inflate to a wide square-type opening.

Another object of this invention is to provide a compact package of bags that will not disassemble readily by accident and yet separate readily when used in hand packaging operations.

In summary, carrying out my invention in one form thereof, a package of imbricated bags is provided with each of the bags after the bottom bag offset forward from the next underlying bag and overlying the opening of the underlying bag. The top side of the underlying bag is attached to the bottom of the overlying bag in sequence. The bags are attached together by two adhesive members of substantially equal size applied to each half of the bag from a medial division of one side of the bag. The top side of the lead bag in the sequence is freed from attachment, after the first bag, by removal of the bag ahead of the lead bag in the sequence and the lead bag will inflate to a relatively square opening when the attached bags are positioned with the lead bag on a flat surface. The bag's attachment strength is sufficient to allow a pull in excess of 2 pounds to separate the bags from one another and to hold the bags securely to one another against a pull of less than one-half pound when the pull is applied at an angle of 30°.

By another aspect of my invention in one preferred form thereof, a package of imbricated bags is provided in which each of the bags after the bottom bag is offset forward from the next underlying bag and overlies the opening of the underlying bag. The top side of the underlying bag is attached to the bottom of the overlying bag in sequence by surface sealing. The surface seals are adjacent to the outer edges of the bags and attach the bags with sufficient strength to allow a pull in excess of 2 pounds to separate the bags from one another and to hold the bags securely to one another against a pull of less than 1 pound when the pull is applied at an angle of 30°.

While two species of the principles of the present invention are illustrated in the accompanying drawings and described in detail in the following specification, it is to be understood that such embodiments are by way of example only and that various modifications may be made without departing from the spirit of the invention, the scope of which is limited only as defined in the appended claims.

FIG. 1 is a diagrammatic front view of a bag suitable for use in the package of bags of my invention.

FIG. 2 is a diagrammatic front plan view of a package of bags.

FIG. 3 is a diagrammatic side plan view of the package of FIG. 2.

FIG. 4 is a diagrammatic front end view of a support surface with the inflated lead bag of the package of FIGS. 2 and 3 shown inflated and the second bag clamped thereagainst.

FIG. 5 is a diagrammatic front plan view similar to FIG. 2 of a different specie of the package of bags of my invention.

Referring now to the drawings and in particular to FIGS. 2-4, a package of imbricated bags is shown therein embodying the invention in one preferred form thereof. FIG. 1 shows a

single bag 10 which is the same as the bags in the imbricated chain of bags 11. Only a small portion of the total chain of bags is shown in the drawing for purpose of illustration, the actual chain of imbricated bags may include 1,000 or more bags.

Each of the bags has a pair of overlying and aligned concave scalloped upper edges of lips 12 at the open end of the bag. The bottom end 13 of each bag is closed. The bags have a top side 14 and a bottom side (not shown in FIG. 1) and two edges 16 and 17. Such a bag construction lends itself to particular utility with bags made from heat shrinkable plastic tubular film with the bottom closed end closure of the bag formed by heat sealing the inside walls of the top side and bottom side of the bag together. The polymers of vinyl chloride, such as saran, are very desirable plastic materials for this use.

Looking now in particular at FIGS. 2 and 3, the chain of imbricated bags 11 may be seen to be secured together with two small swatches of two-faced adhesive members 20 and 21. Preferably these swatches may be cut from a strip of material having two opposite sides covered with pressure sensitive adhesive. However, other adhesives might be used such as heat activated adhesives, for example. The important thing is that two surfaces facing in opposite directions be exposed for holding the overlying bags together. The chain of bags is shown with the top bag removed to expose the adhesive material on the top side of bag 22 in the chain 11. Other adhesive swatches 23, 24, 25 and 26 may be viewed in broken lines in FIG. 2 securing bags 30 and 31 in sequence from bag 22.

The upper edge of bag 30 is spaced 1 inch below the upper edge of bag 22 and the upper edge of bag 31 is spaced 1 inch below the upper edge of bag 30. In the package the top bag is always the forwardmost so that during filling the forwardmost bag can be opened without detaching the bags and an item inserted directly into the bag without reaching across other gas or the length of the bag. At the same time the top bag would maintain the mouth of the underlying bag closed to prevent contaminants from entering that bag during the loading of the top bag.

It is generally preferable to use a noncuring pressure sensitive adhesive to secure the bag together although other adhesives could be used in certain situations. Pressure sensitive adhesives are particularly beneficial when it might be desired to break up long chains of bags into shorter chains or to join chains of bags together. When a chain of bags is completed the top bag would normally not have any adhesive on its top side. When a new chain of bags is to be added to a chain of bags being used, it is only necessary to strip the top bag off and press the next bag in the sequence against the last bag in the old chain of bags. Preferably the lead bag in the new chain should have its upper edge spaced 1 inch below the upper edge of the last bag in the old chain to keep the sequence continuous and evenly spaced.

When other glues or adhesives are used they should generally be of the type that will not cure to a brittle end, particularly if the bags are of very flexible or supple nature. If the adhesive is brittle it may crack during handling and use of the package of imbricated bags or cause a swatch of the bag to pull out. In some situations a nonpressure sensitive adhesive is preferable because of the characteristic of the small swatches having pressure sensitive adhesive to stick to things after the bag has been filled and separated form the chain. However, the sticky surface is usually quite small and the problem of no moment.

In the usual case two small swatches of adhesive about one-fourth inch across will be sufficient to hold each adjacent bag to the next bag in the chain and in sequence secure the chain together for ordinary careful handling and lifting of the chain for short distances.

The seal strength should be such that from 2-4 pounds, more preferably about 2 pounds, will separate the bags from one another and 1½ pounds, more preferably 1 pound, will not separate the bags from one another when the pull is provided on an angle of 30° in the direction toward which the bags are normally stripped which is from the upper or leading edge toward the closed end of the bag.

The adhesive swatches 20 and 21 are spaced apart on the imbricated bags about one-fourth the width of the bag in from each side within a tolerance of one-eighth the width of the bag so that the bags may open into a wide oval opening in response to inflation by a stream of air directed into the bag. The opening approaches a circular configuration or the somewhat square configuration of FIG. 4. The adhesive swatches are spaced inwardly from their respective sides about an equal distance. Thus in the example shown in FIGS. 2, 3 and 4, the bag is 12 inches wide, the adhesive swatches are 5½ inches from inside edge to inside edge, the swatches are one-fourth inch wide, the distance from the outside of each swatch to the nearest side edge of the bag is 3 inches. The swatches provide an even distribution of adhesive on each half of the bag from a medial division of one side of the bag in the direction of the sequence and spaced inwardly from the sides of each bag about one-fourth the width of the bag within a tolerance of one-eighth the width of the bag.

In special situations, variations in the positioning of the adhesive swatches may be used to change the shape of the bag opening. If the two adhesive swatches are moved nearer to the edges of the bag the bag will open to a low broad oval opening when inflated. If the swatches are moved nearer to the center to of the bag the bag will open into a tall oval. These shapes of bag openings may be useful for packaging articles that have the general shape of the opening. In this manner special chains of imbricated bags can be prepared to accommodate flat wide articles and tall narrow articles. In certain cases it may also be found desirable to use additional swatches of adhesive material, either because the adhesive has low tack or because greater break apart strength is desired. In certain instances it might also be desirable to use lines of adhesive swatches or a continuous long strip adhesive swatch. However, the construction that is most preferable for wide application and usually most preferable in performance is the first described preferred embodiment.

By another aspect of my invention I have provided a chain of imbricated bags in which the bags are not only substantially overlapped as shown in FIG. 5 but they are entirely self-supporting. The chain of imbricated bags 50, 51 and 52 in FIG. 5 is surface sealed together at spots or seals 55, 56, 57 and 58. This procedure is particularly application to bags made of biaxially oriented plastic films and very particularly to those made from vinylidene chloride polymer film.

A small amount or wipe of plasticizer is applied at the spots that are to be sealed together. A suitable plasticizer is, for example, dibutyl sebacate, which is the chosen plasticizer. The plasticizer is applied by wiping the areas to be treated slightly with a wick. After the plasticizer is applied to the top side of bag 52, bag 51 is laid over the plasticizer in the position shown in FIG. 5 and the areas of bags 52 and 51 between which the plasticizer is trapped or sandwiched is subjected to heat and pressure. The heat is applied in a very restricted area to the points between which the plasticizer is sandwiched and it is sufficient to cause the vinylidene chloride polymer film to shrink but insufficient to cause the polymer to melt. In one procedure the film is pressed by hand rolling at 9 pounds/sq. in. after which two heated points on a bar heater are applied. The bar heater was at 190° F. The shear strength of the seal was found to approach that of the film itself and has been tested at 90 percent or greater than that of the film in repetitions tests. The pressure applied should generally be between 1 to 10 p.s.i. and the time of application of heat and pressure is usually less than a second. While a pressure of 15 p.s.i. is satisfactory, a pressure of 200 p.s.i. results in a weaker and unsatisfactory seal. Many advantages are evidenced by this method of sealing and among them is that there is a minimum weakening of the film, a very low tendency toward delamination and the seal is highly flexible. No adhesives are employed in the process and the sealing temperatures are less than the fusion temperatures usually employed which melt the two film interfaces to seal them together. The seal strength at the interfaces using this aspect of the invention is of medium moment allowing for the separation of the two film surfaces with each

surface retaining substantially complete integrity. In other words, the two sheets are sealed together in such a manner that when they are separated they separate exactly at the place of their contact without any portion of one sheet being pulled off by the other sheet.

This aspect of the invention is of particular value because the primary strength of this type of package is with respect to a shear load which is the main load these packages of bags must be resistant to. The bags are entirely self-supporting in the package.

When the bags are attached by surface sealing the top and bottom sides of the bags will usually be sealed together when the bags are sealed or attached to one another. Thus, the seal is usually preferably formed adjacent to the outer edges of the bags to allow the maximum free width for opening the bag. This makes it easier to get a hand or another object into the bag far enough to strip the sides of the bags apart if desired. The bottom side of the bag could be clamped down inside adjacent to the seals, if desired, to prevent the bag that was being opened from separating from the underlying bag. At other times sufficient space may be provided to permit the bag to be loaded by lifting the top lip of the bag with the top and bottom sides of the bag still attached adjacent their edges. At still other times it may be desired sequentially strip the bags one from the other and then hold the bag with one hand and fill it with the other hand.

In certain instances, it might be desirable to seal the bags together at points other than then adjacent the edges or to attach the bags along a line. However, the construction most preferable for wide application with surface seal attachment is the first described surface seal embodiment.

The upper edge of bag 51 is spaced 1 inch below the upper edge of bag 50 and the upper edge of bag 52 is spaced 1 inch below the upper edge of bag 51. In the package the top bag is always the forwardmost so that the bag can be reached for loading or detaching without reaching across other bags or the length of the bag. At the same time the top bags maintain the mouths of the underlying bags closed to prevent contaminants form entering the underlying bags during loading or detaching of the lead bag. The bags are shown in FIG. 5 with the top bag removed exposing two points of breakaway at 53 and 54.

The seal strength should be such that from 2—4 pounds, more preferably about 2 pounds, will separate the bags from one another and 1½ pounds, more preferably 1 pound, will not separate the bags from one another when the pull is provided on an angle of 30° in the direction toward which the bags are normally stripped from the tapes, which is from the upper or leading edge toward the closed end of the bag.

To use the package of bags of FIG. 2 in an expeditious hand operation, the chain of imbricated bags can be laid at the beginning of a long table and drawn out along the table to a flat end thereof as shown at flat surface 30 of FIG. 4. Clamps 32 and 33 are engaged on the second bag 30 and a stream of air is directed against the front end of bag 22 from a blower (not shown) to open or inflate the bag. Generally it is best to direct the airstream so that it passes just across the top of the bag so the stream will act to initially reduce the air pressure above the bag and cause the bag to rise from natural internal air pressure fully into the stream of air. Once the bag is fully opened an article is easily placed in the bag and the bag can then be stripped from the underlying bag 30 which is held in place by the clamps 23 and 33. The bag 22 may be easily stripped from the underlying bag 30 by grasping the bag at its top center and pulling upwardly and rearwardly at the same time at an angle of about 30° from the horizontal and backward over the chain of bags. The bag 22 separates from bag 30 at the point of attachment with a peeling apart separation. The loaded bag can then be passed on to another station for further processing, such as by closing or it can be closed by hand before it is lifted from support 34.

The clamps 32 and 33 are then released from bag 30 and the chain of imbricated bags is drawn forward on the supporting surface 34 until the edges of bag 31 are in position under

clamps 32 and 33. The clamps are then secured and the process is repeated.

To use the package of bags of FIG. 3 in an expeditious hand operation the chain of imbricated bags can be laid at the beginning of a long table and drawn out along the table to a flat end thereof as shown at flat surface 30 of FIG. 4. Clamps 32 and 33 are slipped under bag 50 and engaged over bag 51 just back of seals 55 and 56 which would be approximately over seals 57 and 58. Bag 50 is then grasped by its edges and they are pulled toward the center and upward at an angle of about 30° from the horizontal to break the seal by a peeling separation. If this action has not entirely broken the inside seal between the top and bottom sides of the bag and it is necessary to have the bag fully open to load it then the hands may be inserted into the bags and spread apart toward each side edge of the bag to break these seals apart.

The clamps 32 and 33 are released from bag 51 after the bag has been filled and removed and the chain of imbricated bags is drawn forward on the supporting surface 34 until bag 51 is in position and then the clamps are engaged under bag 51 and on bag 52 just back of seals 57 and 58 and the process is repeated.

For a better understanding of the invention of this application the constructions of the parent application U.S. Ser. No. 666,744, filed Sept. 11, 1967, is incorporated herein in its entirety for disclosure by reference. The two species of the application are briefly described below. In the first specie a package of imbricated bags is provided with each of the bags after the bottom bag offset forward from the next underlying bag and overlying the opening of the underlying bag. The top side of the underlying bag is attached to the bottom of the overlying bag in sequence. The bags are attached together by an adhesive applied, directly and without an intermediate carrying material, in substantially equal amounts to each half of the bag from a medial division of one side of the bag. The preferred type of adhesive is a noncuring pressure sensitive adhesive. The top side of the lead bag in the sequence is freed from attachment after the first bag, by removal of the bag ahead of the lead bag in the sequence and the lead bag will inflate to a relatively square opening when the attached bags are positioned with the lead bag on a flat surface. The bag's attachment strength is sufficient to allow a pull in excess of 2

pounds to separate the bags from one another and to hold the bags securely to one another against a pull of less than one-half pound when the pull is applied at an angle of 30°. In the other specie, a package of imbricated bags is provided in which each of the bags after the bottom bag is offset forward from the next underlying bag and overlies the opening of the underlying bag. The top side of the underlying bag is attached at the bottom of the overlying bag in sequence by fusion with point seals. This fusion may be brought about by heat sealing the bags together. The interfaces of the two bags are melted where they are sealed together. The point seals are adjacent to the other edges of the bags and attached the bags with sufficient strength to allow a pull in excess of 2 pounds to separate the bags from one another and to hold the bags securely to one another against a pull of less than 1 pound when the pull is applied at an angle of 30°. Taken together, a melt seal and a surface seal are herein defined as a union seal, there being no intermediate attaching medium, only a union between the attached bags themselves.

I claim:

1. A package of imbricated bags comprising a plurality of bags, each of said bags having a top side and a bottom side of substantially identical dimension with the top side overlying the bottom side, each of said bags after the bottom bag offset forward from the next underlying bag and overlying the opening of said underlying bag; two swatches of material having an adhesive on opposite sides attaching the top side of said underlying bag to the bottom of said overlying bag in sequence, said adhesive being a noncuring pressure sensitive adhesive present in substantially equal amounts on each half of the bag from a medial division of one side thereof in the direction of the sequence and having tack strength when adhered to the bags sufficient to allow a pull in excess of 4 pounds to separate the bags and to hold the bags securely against a pull of less than one-half pound when the pull is applied at an angle of 30° and each swatch spaced inwardly from the sides of each bag about one-fourth the width of the bag within a tolerance of one-eighth the width of the bag and the top bag of said plurality of bags opening to a relatively square opening when inflated with the underlying bag held in fixed position on a flat surface at least in the region of said two swatches of material.

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**UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION**

Patent No. 3,587,845

Dated June 28, 1971

Inventor(s) Ralph L. Wing

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the first page, left column, fourth line of data opposite the code heading "[73] Assignee", delete ", now abandoned" in the phrase "Continuation-in-part of . . . now abandoned."

Signed and sealed this 14th day of January 1975.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents