July 6, 1948. H. F. WATERS 2,444,762

BAG AND PROCESS OF MAKING THE SAME

Original Filed May 14, 1940 3 Sheets-Sheet 1

Fig. 1.

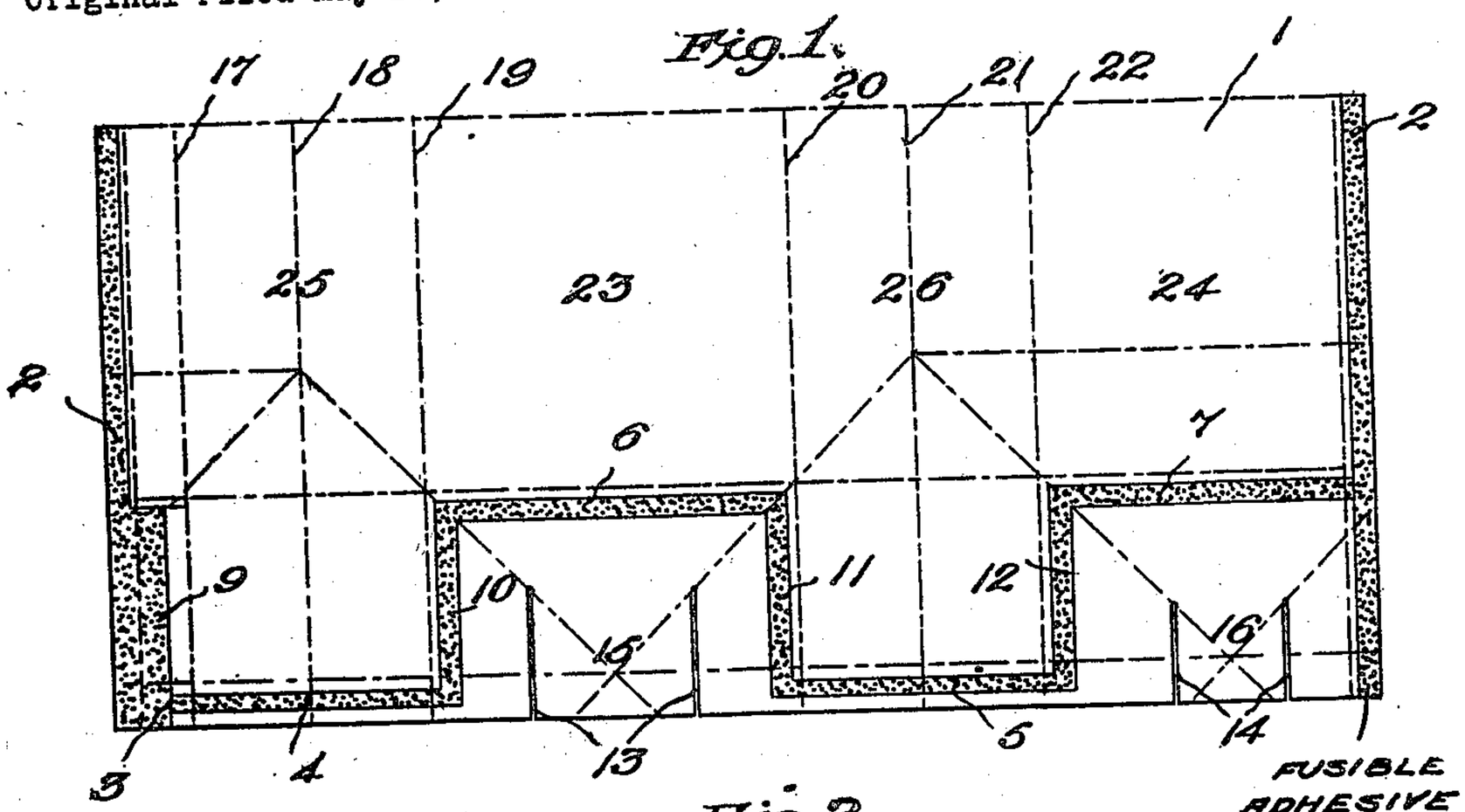

Fig. 2.

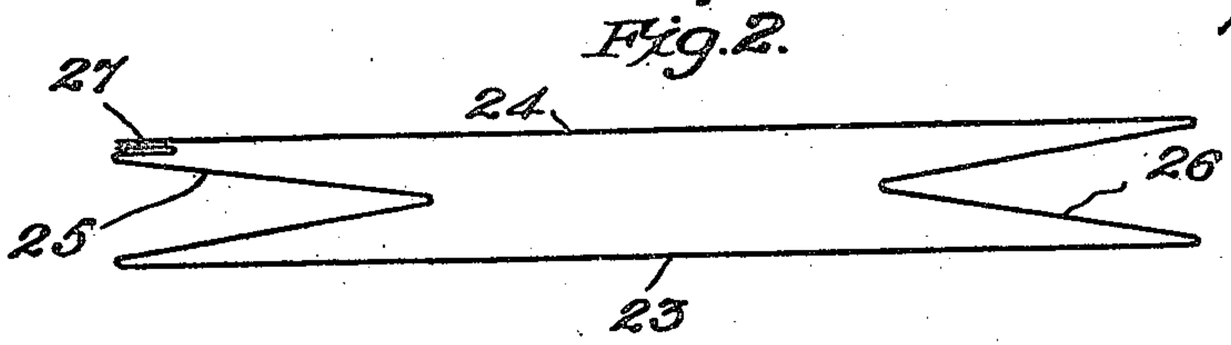

Fig. 3.

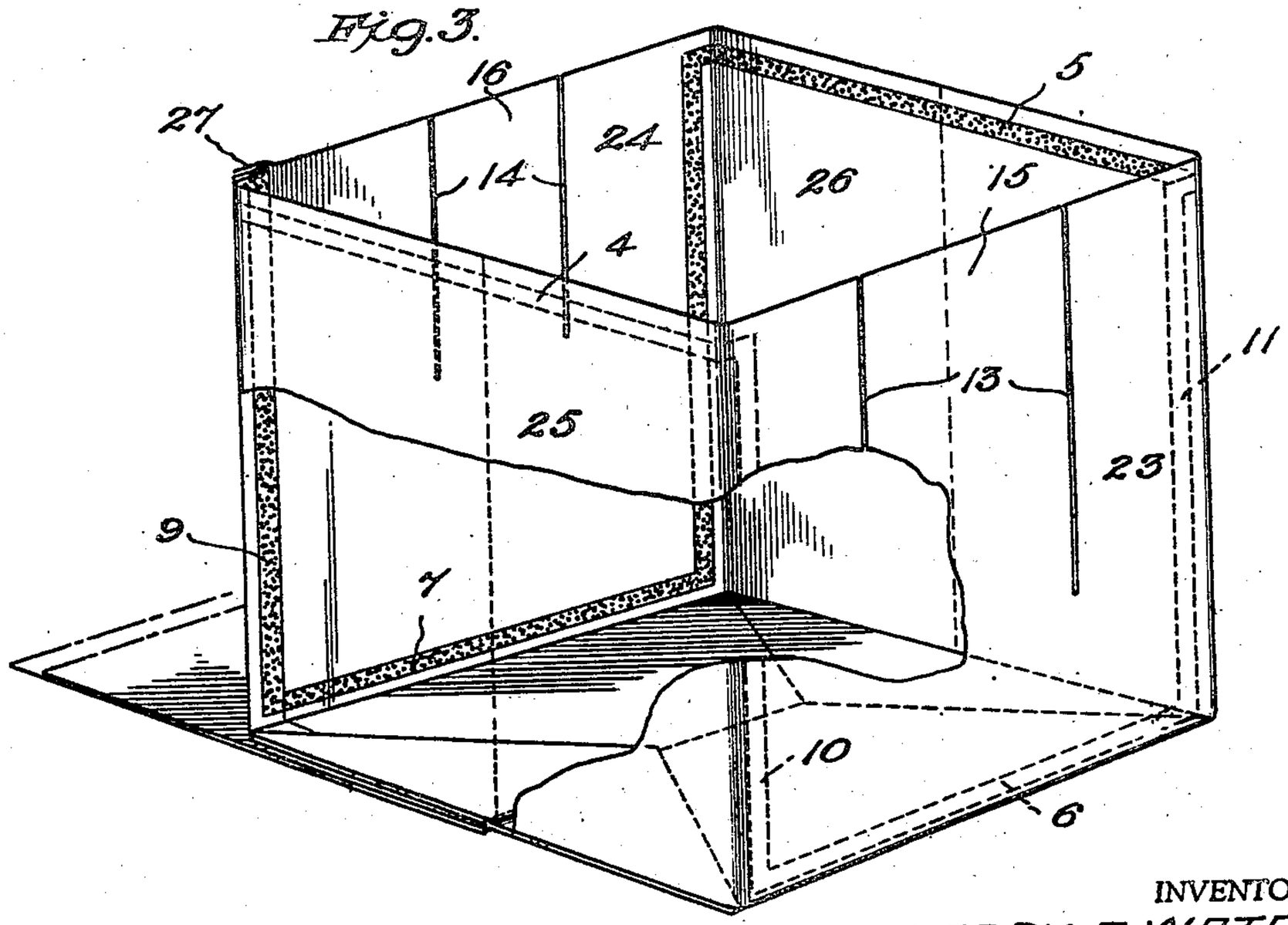

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Fig. 4

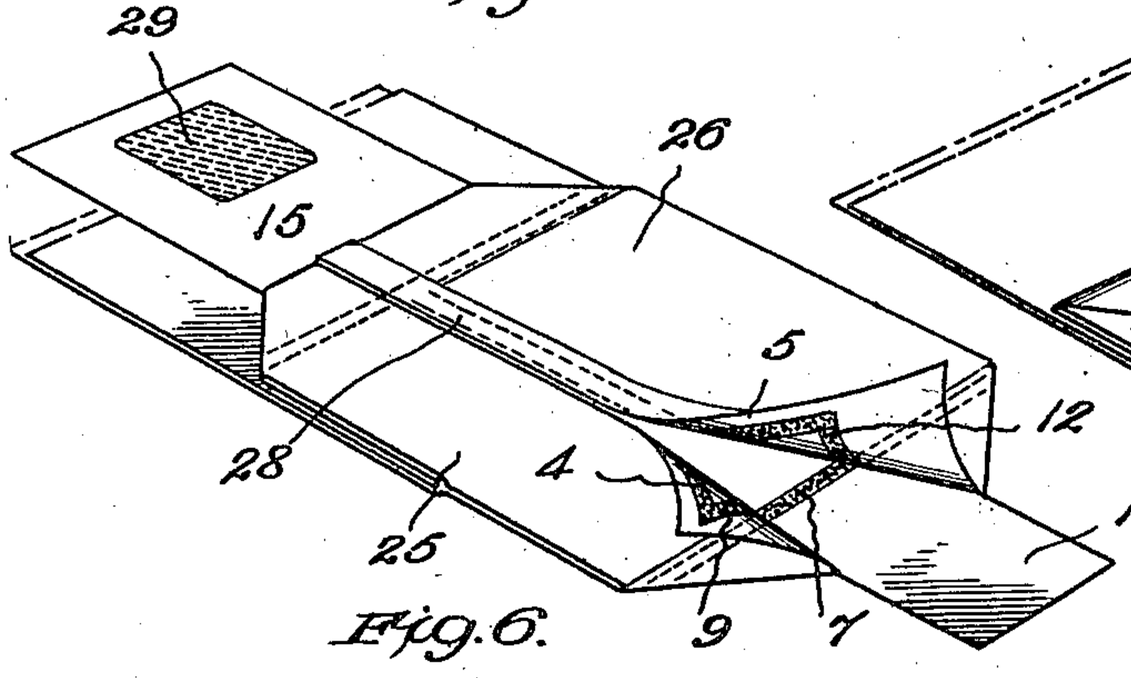


Fig. 5.

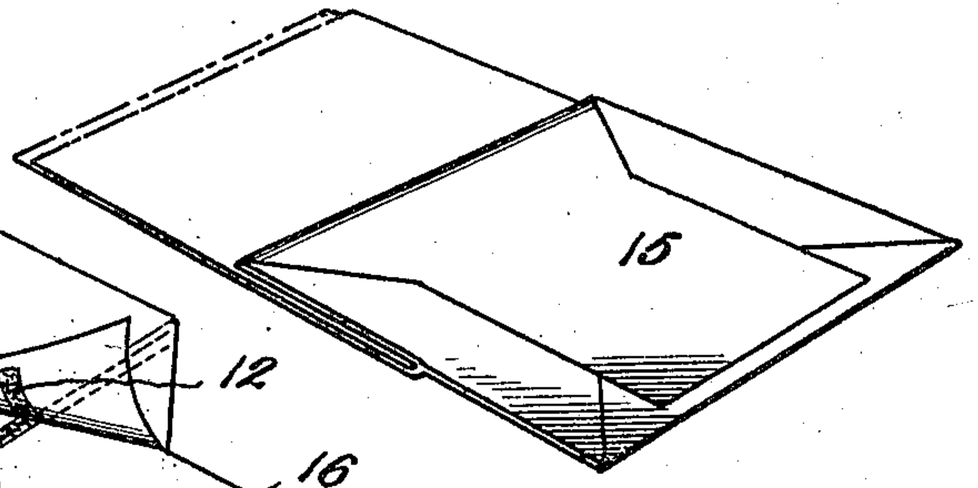


Fig. 6.

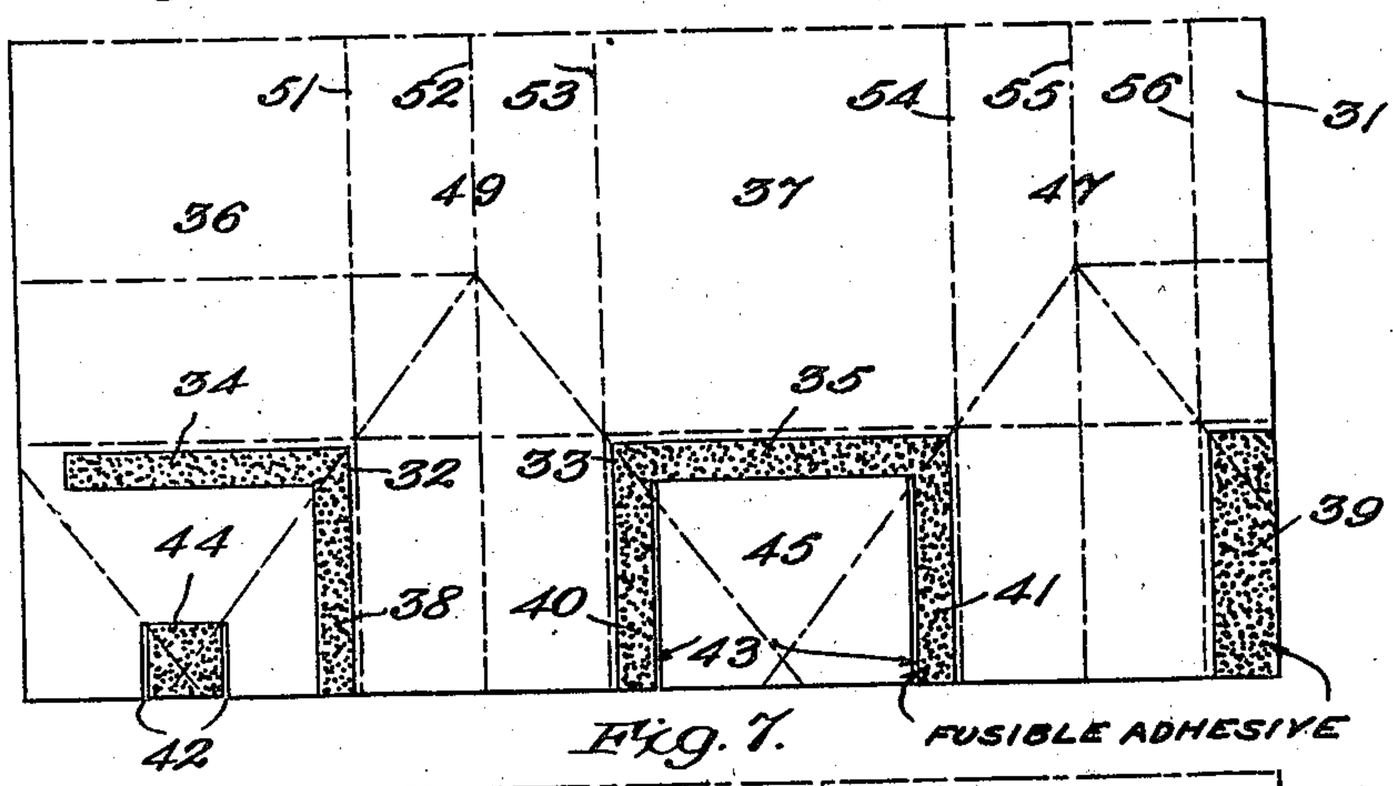
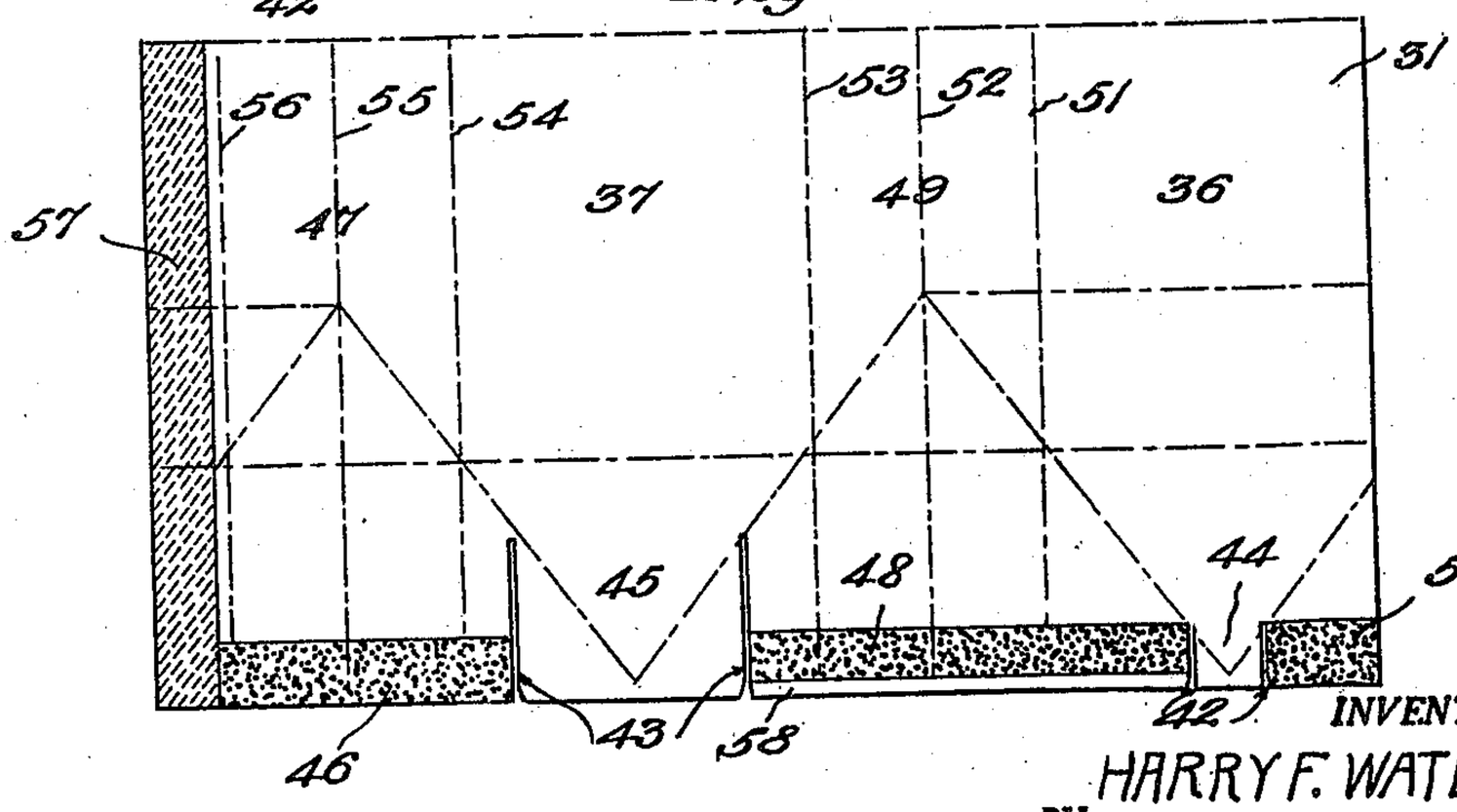


Fig. 7.



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Original Filed May 14, 1940 3 Sheets-Sheet 3

Fig. 8.

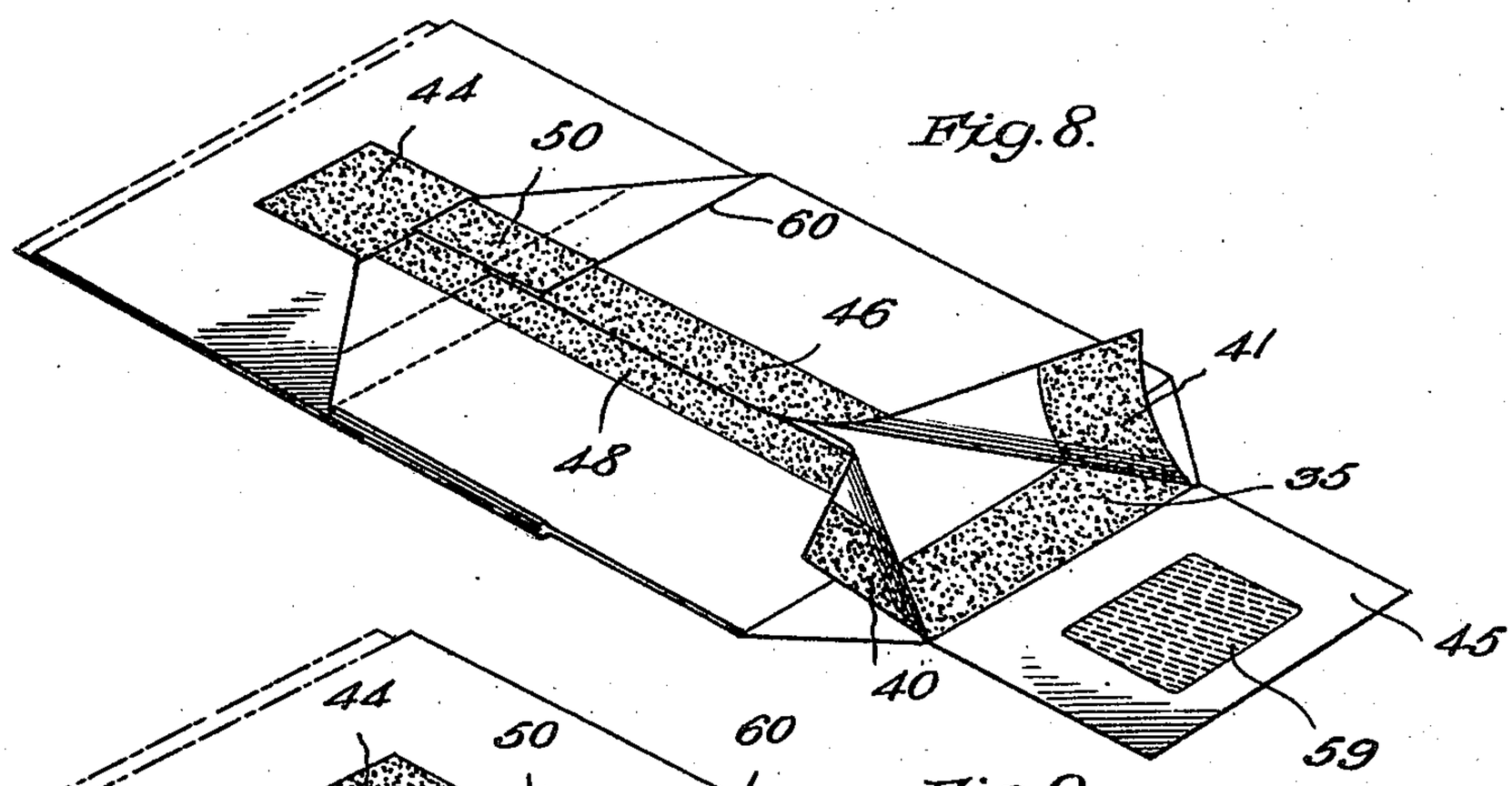
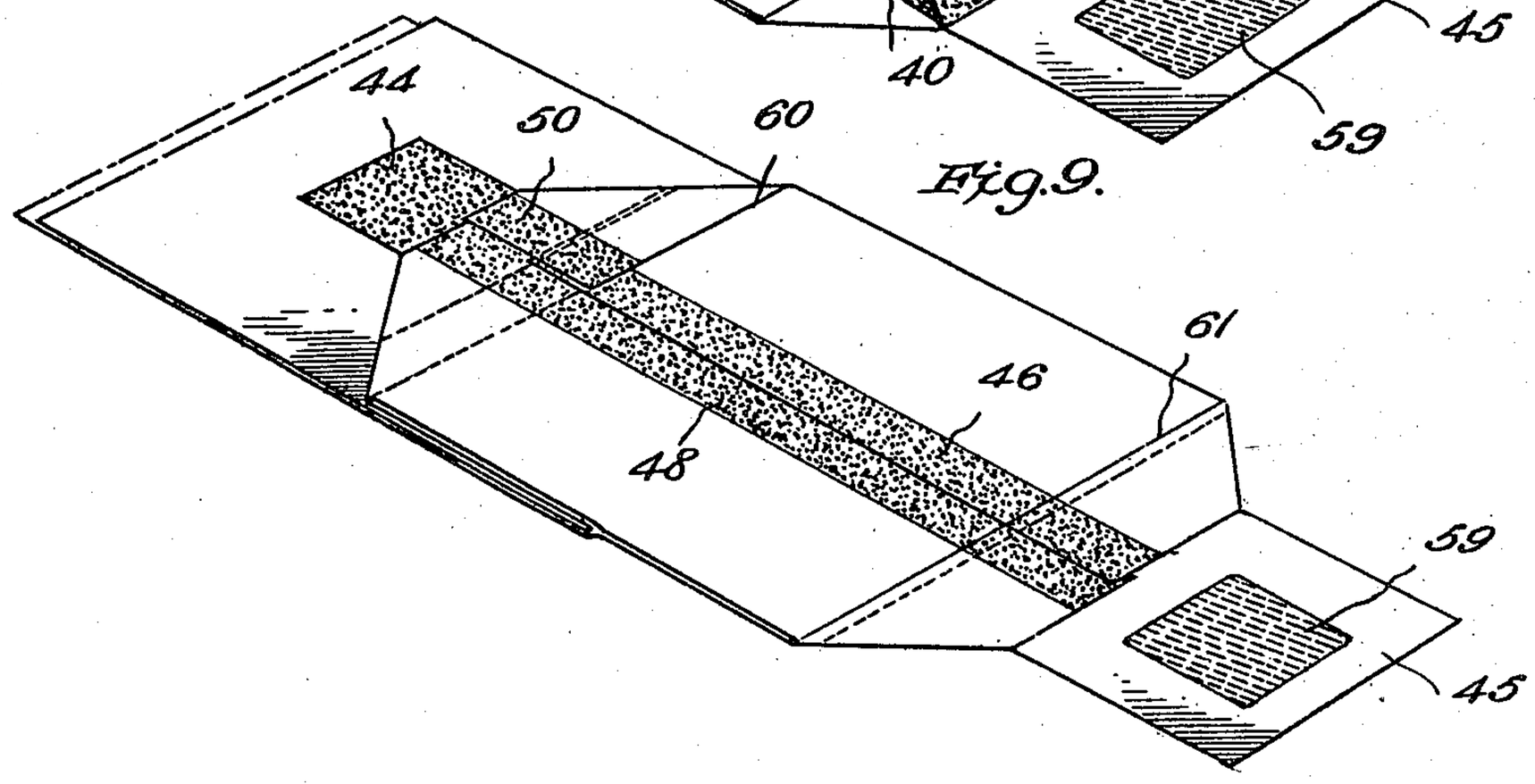


Fig. 9.



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Patented July 6, 1948

2,444,762

UNITED STATES PATENT OFFICE

2,444,762

BAG AND PROCESS OF MAKING THE SAME

Harry F. Waters, New York, N. Y.

Original application May 14, 1940, Serial No. 335,045. Divided and this application July 10, 1944, Serial No. 544,185

5 Claims. (Cl. 93—35)

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The present invention relates to improvements in the bag making art and, more particularly, to an improved form of bag of the type having automatically opening bottoms, and to a method of producing the same.

As those skilled in the art know, in the manufacture of bags used for packaged products, particularly food products, bags were used to a substantial extent which were provided with those automatic opening types of satchel or diamond-fold bottom bags. The manipulations of the material in these types of bags make it extremely difficult, if not impossible, to produce a bottom which is sift-proof. In the past various attempts were made to make the bottom of these types of bags sift-proof, either by using a supplemental patch member or by providing additional folds in the bottom to obtain the same result. These attempts were not satisfactory due to the fact that they were expensive and in the latter instance resulted in the utilization of more material than can economically be allowed for such purposes. Moreover, the methods involved in these procedures were rather complicated and could not be carried out by means of conventional machinery. Although from time to time various other suggestions and proposals were made to solve the outstanding problem, none, as far as I am aware, of these prior suggestions and proposals was completely satisfactory and successful on a practical and commercial scale.

It is an object of the present invention to eliminate the foregoing difficulties and disadvantages experienced in the manufacture and use of bags of the automatically opening bottom type.

It is another object of the present invention to provide a bag having a bottom of the automatically opening type in which complementary lines of adhesive are provided along predetermined lines of the material of the bag which is subsequently going to form the bottom in such a manner that these lines of adhesive are brought into cooperating relation and form a continuous dam or wall interposed between the folds of the bottom and the exterior of the bag.

It is a further object of the present invention to provide a sift-proof and substantially fluid-tight bag having lines of a suitable adhesive provided in predetermined regions thereof, said adhesive being adapted to be fused after the formation of the bottom structure to convert it into a sift-proof and in some cases substantially fluid-tight structure.

The invention also contemplates the provision of predetermined regions on the fusible surface

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of a bag having a non-fusible layer or coating thereon which in the formed-up condition of the bag prevents such regions from fusing and adhering to each other upon the application of heat and pressure thereto.

It is also within the contemplation of the present invention to provide a novel and improved method for the quantity production of sift-proof bags of the automatic opening bottom type which is simple in character and which may be carried out with great facility on a practical and industrial scale by means of existing machinery without requiring any complicated and expensive changes.

Other and further objects and advantages of the invention will become apparent from the following description taken in conjunction with the accompanying drawings in which:

Fig. 1 illustrates a plan view, somewhat fragmentary in character, of a continuous web or strip of paper showing the manner in which the lines of adhesive are applied thereto before it is made into bags;

Fig. 2 depicts an end view of the tube formed from the web illustrated in Fig. 1;

Fig. 3 shows a perspective view of the end or bottom portion of the bag during the initial step of forming the bottom;

Fig. 4 is a perspective view showing a further step in making the bottom structure of the bag;

Fig. 5 is a similar view of the resulting bottom structure;

Fig. 6 illustrates a plan view of a web of flexible material having lines of adhesive provided thereon for the provision of a sift-proof bottom structure;

Fig. 7 depicts a plan view of the other side of the web illustrated in Fig. 6;

Fig. 8 shows the portions of the bag forming the bottom in their partially completed form;

Fig. 9 is a similar view of the bottom portion of the bag shown in Figs. 6 to 8 in its completed form prior to folding over the resulting tabs.

Broadly stated, according to the principles of the invention I obtain the desired sift-proof quality of the bottom by providing a suitable adhesive, preferably of the reactivable or fusible type, along predetermined lines on the material of the bag which is to form the bottom. This adhesive is provided in such regions and in such a manner that as soon as the web or strip is converted into a tube with a preformed bottom, these regions of adhesive will be brought into a contacting or cooperating relationship and a continuous dam or wall will be interposed between the folds of

the bottom and the exterior of the bag. This desirable result may be accomplished in various ways. Thus, when for simplicity of manufacture it is preferred to provide all of the adhesive regions on one side of the web, the web may be provided with longitudinal strips of adhesive adjacent to the side edges thereof. These longitudinal lines of adhesive are supplemented by a continuous line or strip of adhesive extending across the web in such a manner that upon the formation of the bottom structure these lines of adhesive will be brought into complementary or cooperative relation and into a single plane. After the bottom has been formed, these cooperating lines of adhesive may be fused by the application of a heated pressure surface against the exterior of the bottom structure whereby a continuous dam of fused adhesive will be interposed between the interior and the exterior of the bag. As a modification of this concept, a web of non-fusible sheet material may be provided with reactivable adhesive in predetermined regions of both sides thereof, said regions being constructed and arranged to be automatically brought into registering and cooperating position during the formation of the bottom structure. It is also possible to apply the principle of the invention to bags of the so-called duplex type, in which generally a non-fusible external sheet or web and a fusible internal liner web are arranged in superposed position. In these types of bags the complete inner surface of the bag is fusible and in order to obtain the desired selective adhesion, it is necessary to render predetermined regions thereof non-fusible. This may be accomplished in various ways such as by applying a layer, or coating, of non-fusible material to such regions. This non-fusible layer may be constituted by a patch of paper, or of a coating material which is either non-fusible or, in case it is fusible, has a melting point which is higher than that of the fusible liner material. In this case, when after the formation of the bottom structure a heated pressure surface is applied to the bottom surface, only those regions will be fused together where a dam or fusion seam is desired while the other regions of the inner surface of the bag remain unaffected. It will be noted that in all of these various forms of my invention the essential concept is to provide an automatically opening bottom in a bag which is originally not sift-proof and to finally convert this imperfect bottom structure into a completely sealed and sift-proof bottom structure by the application of heat and pressure to predetermined regions of the finished bottom surface.

Referring now more particularly to Figs. 1 to 5 of the drawing, a preferred embodiment of the invention will be described. A web 1 of suitable, non-fusible sheet material having a width determined by the dimensions of the bag to be produced is provided with longitudinal lines of a suitable adhesive 2 adjacent to the lateral edges thereof. In addition, a transverse line 3 of similar adhesive extends across the complete width of web 1 and connects longitudinal lines of adhesive 2. As it will be noted in Fig. 1, this transverse line of adhesive has horizontal portions 4 and 5 extending across the portions of the web subsequently forming the end panels of the finished bag and similar horizontal lines 6 and 7 extend across the portions of the web which are going to form the main panels thereof. These horizontal lines of adhesive are connected by means of longitudinal lines of adhesive 9, 10, 11

and 12. The object of these lines of adhesive will be more fully explained as the description proceeds. Conventional incisions or cuts 13 and 14 are provided in the terminal regions of the main panels and are adapted to form tabs 15 and 16, the object of which is well known to those skilled in the art. Although in practical operation these incisions are generally provided at a later stage in the manufacture of the bag, their provision has been shown already in web 1 for convenience of description and illustration.

The first step in converting web 1 into a bag is to fold it along a plurality of longitudinal lines 17, 18, 19, 20, 21 and 22 and thereby to convert it into a tube having main panels 23 and 24 and reentrant end panels 25 and 26. At the same time longitudinal lines of adhesive 2 will be brought into a face to face relation and may be fused by means of a heat-sealing device. The general appearance of the tube thus formed will be readily seen in Fig. 2 of the drawing showing main panels 23 and 24, reentrant end panels 25 and 26, and turned-down longitudinal fin 27 provided by the union of adhesive lines 2. After the tube having the dimensions of the desired bag is obtained, its terminal regions are squared-up to form the structure shown in Fig. 3, this being part of the conventional procedure in forming a bag of the automatically opening bottom type. The terminal portions of end walls 25 and 26 may now be folded down flat towards each other. This will result in the structure illustrated in Fig. 4 showing the terminal regions of end walls 25 and 26 folded towards each other and the terminal portions of main panels 23 and 24, including tabs 15 and 16, extending flat into opposite directions. It will be readily appreciated that in this position of the bottom structure, adhesive lines 6 and 7 of the main panels will be in a cooperating and contacting relation with adhesive lines 10 and 11, and 12 and 9, respectively. Likewise, adhesive lines 4 and 5 extending across the terminal edges of end panels 25 and 26 will be brought into a cooperating and contacting position and may be turned down flat to form a bottom fin 28. In other words, all of these cooperating lines of adhesive have been brought into a single plane, to wit: that of the main panels. After these preliminary steps have been accomplished, tabs 16 and 15 may be folded into an overlapping position and may be secured together by a spot of adhesive 29 provided on the larger tab 15. This step completes the bottom structure and provides a conventional automatically opening bottom of the so-called ABC type depicted in Fig. 5. Of course, this bottom would not be any more sift-proof or leak-proof than that of a bag made by the conventional procedure. However, this bag having an imperfect closure at the bottom region thereof may be converted in a simple and completely satisfactory manner into a bag having a completely and positively sift-proof bottom structure by the application of heat and pressure to the upper surface of the bottom structure. This may be accomplished in various ways well known to those skilled in the art such as for example, by applying a heated pressure plate against the upper surface of the flattened bottom structure. I prefer to apply a resilient and yielding backing surface to the other side of the resulting structure as this is more fully described in my U. S. Patent No. 2,125,758 issued to me on August 2, 1938. The effect of heat and pressure will fuse the cooperating lines of adhesive together and these fused lines of adhesive will form positively

leak-proof and sift-proof seams between the folds of the bottom. It will be readily understood that these seams will positively seal the bottom structure and will prevent the leakage of material from the bag.

Figs. 6 and 9 illustrate a modified embodiment of the invention. While in the embodiment described in the foregoing all of the lines of fusible adhesive have been applied to one face of the web from which the bag is formed, in the embodiment now to be described a portion of the adhesive lines is provided on one face of the web and another portion thereof is provided on the other face of the web. The appearance of the web is shown in Figs. 6 and 7 illustrating a portion of the web in proximity to the terminal regions thereof. Of course, in actual practice the web is provided in substantial lengths and the lines of adhesive arranged in the proper and suitable configuration are repeated at predetermined distances corresponding to the length of the individual bags to be formed. As it will be noted in Fig. 6, essentially a web 31 of non-fusible sheet-like and flexible material is provided. In the terminal regions of web 31, I provide U-shaped lines 32 and 33 of an adhesive of suitable character, the horizontal portions of which 34 and 35, respectively extend transversely across the portions of web 31 which are subsequently forming main panels 36 and 37. The longitudinally or downwardly extending portions of the U-shaped adhesive lines are denoted by reference characters 38, 39, 40 and 41. Conventional incisions 42 and 43 are provided in the terminal regions of main panels 36 and 37 and provide conventional tabs 44 and 45. A deposit or coating of fusible adhesive is also provided on the inner surface of tab 44. Due to the fact that this type of bag is contemplated with a lap type seam, one of the longitudinal lines of adhesive 39 appears at the right lateral extremity of the web but will be brought into a position in which it will form continuation of adhesive line 34 after web 31 has been converted into a tube.

The other side of web 31 which is subsequently going to form the outer surface of the bag is depicted in Fig. 7. It will be noted that the web is provided with transverse lines of adhesive extending throughout the width of the web with the exception of tabs 45 and 44. Thus, transverse line of adhesive 46 extends across end panel 47 and a portion of main panel 37. A similar transverse line of adhesive 48 extends across the remaining portion of main panel 37, the complete width of end panel 49 and part of the width of main panel 36. Adhesive line 50 extends through the remaining portion of main panel 36. Adhesive line 48 is somewhat narrower than lines 46 and 50 and provides a narrow, uncoated margin 58, the object of which will appear more fully hereinafter.

In forming the bag, web 31 is folded along a plurality of longitudinal lines 51, 52, 53, 54, 55 and 56 to form a tube having main panels 36 and 37 and end panels 47 and 49, respectively, and the lateral marginal portions thereof are secured together in the form of a lap seam by means of a longitudinal line of adhesive 57. Of course, this adhesive may be of any suitable type, such as ordinary glue, and does not have to be of a fusible character. Due to the fact that the steps in forming the bag and its bottom structure from the web are identical with those described in connection with the previous embodiment of the invention, no detailed description thereof will be necessary. It is sufficient to state that after folding the terminal regions of the end panels together and folding the terminal portions of the main panels into opposite directions, the structure in Fig. 9 is obtained. The arrangement and the cooperation of the various strips of fusible adhesive will be best understood from Fig. 8 showing portions of the bottom structure lifted up for the sake of clarity. It will be noted that in this assembled position of the bottom structure, the transverse portions 34 and 35 of the U-shaped lines of adhesive have been brought into a face to face relation with their corresponding longitudinal portions 38 and 39, and 40 and 41, respectively. Likewise, the transverse strips of adhesive 46, 48 and 50 are brought into adjacent positions and are exposed to the exterior. Preferably the length of these portions is so determined that the marginal portions bearing the adhesive lines 46 and 50 slightly overlap line 48 and are resting on the narrow and clear strip 58. This will prevent any adhesive leaking into the interior of the bag during the subsequent heat-sealing operation. Hereafter, the extensions of main panels 36 and 37 ending in tabs 44 and 45, respectively, are folded into an overlapping position to complete the bottom structure and may be secured in such position by means of a spot of adhesive 59 provided on the inner surface of tab 45. In this completed position of the bottom structure, the portions of adhesive lines 46 and 48 beyond fold lines 60 and 61 will cover the portions of such adhesive lines between said fold lines and thereby will be brought into a face to face relation therewith. Thus, all of the folds in the bottom structure are provided with cooperating lines of adhesive at the terminal regions thereof and such cooperative lines of adhesive may be fused together by the application of a heated pressure surface against the outer surface of the finished bottom structure. This will provide a plurality of heat-sealed seams and will convert the bottom structure into one of positively leak-proof and sift-proof character.

The materials employed in the bags embodying the invention may be of various character according to the packaging problem contemplated. The non-fusible web is generally constituted of paper although other materials of a non-fusible character, such as metal foils, may be employed with equal or similar results. The fusible adhesive may be constituted of a suitable rubbery material, such as rubber hydrochloride, a chlorinated rubber compound sold under the name Pliofilm, and various synthetic resins of which a vinyl resin sold under the name of Vinylite is an example. These fusible adhesives are preferably applied to the surface of the non-fusible web by means of a printing, coating or spreading process in the form of a solution in a volatile solvent. The preferred material for the fusible liner of the duplex bag embodying the invention is Pliofilm.

It will be noted that the present invention provides various novel types of bags of the automatically opening bottom type having a completely sift-proof and in many cases even fluid-tight character. Of course, these important new results and advantages could not be obtained by means of conventional bags of the automatically opening bottom type all of which are subject to leakage to a lesser or greater extent.

Other important advantages of the present in-

vention reside in the circumstance that as far as actual mechanical manipulations of the sheet-like material are concerned, these are similar to the manipulations followed in making conventional bags of the automatically opening bottom type so that existing machinery may be used with slight changes. The critically important difference resides in the provision of my adhesive lines or non-fusible regions of special arrangement which are subsequently brought into complementary and cooperating position and which may be subsequently fused together into a sift-proof or fluid-tight structure by the simple expedient of applying a hot pressure surface thereto. Therefore, my novel bags may be readily manufactured on a quantity production scale with existing machinery which only has to be supplemented with a heat sealing device of appropriate character.

Although the present invention has been described in connection with a few preferred embodiments thereof, variations and modifications may be resorted to by those skilled in the art without departing from the principles of the present invention. Thus, although I have shown principally bags having reentrant end walls, which are generally referred to in the art as ABC bags, obviously, the same inventive concept may be employed for bags of the type in which the end walls are folded outwardly along their medial lines and which are referred to in the trade as satches type or diamond fold type bags. I consider all of these variations and modifications as within the true spirit and scope of the present invention as described in the foregoing description and defined by the appended claims.

This application is a division of application Ser. No. 335,045, filed May 15, 1940, issued as Patent No. 2,353,606, July 11, 1944.

I claim:

1. A bag of the automatically opening bottom type which comprises in combination a tube of non-fusible sheet material folded longitudinally along a plurality of lines to form a pair of side panels and a pair of main panels connected to said side panels, a preformed rectangular bottom structure flattened in the plane of said main panels constituted of extensions of said side panels folded towards each other and of the resulting tabs folded over each other, U-shaped lines of fusible adhesive on the inner surface of the portions of said bottom structure forming extensions of said main panels, said U-shaped lines opening toward the outermost free edges of the main panel flaps, and lines of adhesive on the outer surface of the end marginal portions of the extensions of said side panels, said lines of adhesive being in register with each other and to be fused together by the application of a heated surface to a substantially fluid-tight and sift-proof bottom closure of the automatically opening type.

2. A bag of the automatically opening bottom type which comprises in combination a tube of non-fusible sheet material folded longitudinally along a plurality of lines to form a pair of side panels and a pair of main panels connected to said side panels, a pair of incisions in each of said main panels providing a tab at the end of each of said panels, a preformed rectangular bottom structure flattened in the plane of said main panels including the lower marginal edges of said side panels folded towards each other

into a slightly overlapping position and the lower ends of said main panels and tabs folded over each other, a U-shaped line of fusible adhesive surrounding each of said tabs on the inner surface of said tube and opening towards the outermost free edge of the main panel flaps, and transverse lines of fusible adhesive on the lower marginal edges of said side panels on the outer surface of said tube, said U-shaped lines of adhesive and said transverse lines of adhesive being folded into a cooperating and face to face position and being fused to a substantially fluid-tight structure by the application of heat against the surface of said bottom structure.

3. The process of making a bag of the automatically opening bottom type which comprises providing a web of flexible non-fusible sheet material, applying a strip of a fusible adhesive adjacent to each of the longitudinal edges of said web, folding said web along a plurality of longitudinal lines to bring said longitudinal strips of adhesive into a face to face relationship and to form a tube having a pair of main panels and a pair of reentrant side panels connecting said main panels, fusing said strips of adhesive to form a longitudinal fin-type seam, applying spaced continuous lines of fusible adhesive transversely extending across said main and said side panels in a staggered position and having longitudinally extending portions connecting the same, folding the terminal portions of said panels into a rectangular overlapping bottom-forming position and thereby bringing said transversely extending lines of adhesive into a cooperating and face to face position in the plane of the resulting bottom structure, applying heat and pressure against the outer surface of the resulting bottom structure to simultaneously fuse said cooperating lines of adhesive and to convert them into dams effectively preventing the escape of fluid from said tube through the intervals of the superposed layer in said bottom structure, and severing the resulting bag from said tube.

4. The process of making a bag of the automatically opening bottom type which comprises providing a web of non-fusible sheet material, applying a strip of a fusible adhesive adjacent to each of the longitudinal edges of said web, folding said web along a plurality of longitudinal lines to bring said strips of adhesive into a face to face relationship and to form a tube having a pair of main panels and a pair of reentrant side panels connecting said main panels, fusing said strips of adhesive to form a longitudinal fin-type seam, applying spaced continuous lines of fusible adhesive connecting said longitudinal strips of adhesive across said web, said lines of adhesive extending transversely across said main and said side panels in a staggered relation and having longitudinal connecting portions, making a pair of spaced incisions in each of said main panels to provide a closure flap therein, folding the terminal portions of said panels and said flaps into an overlapping rectangular bottom-forming position and thereby bringing the transverse lines of adhesive on said side panels into registering position with each other and the transverse lines of adhesive on said main panels into a registering and face to face position with said connecting portions of adhesive substantially in the plane of the resulting bottom structure, severing the resulting bag from said tube, and subsequently applying a heated pressure plate against the upper face of said bottom structure and a

resiliently yielding backing plate against the other face of said structure whereby said cooperating lines of adhesive are fused and form dams interposed between the folds of said bottom structure and the exterior of the bag.

5. The process of making a bag of the automatically opening bottom type which comprises providing a web of non-fusible sheet material, folding said web along a plurality of longitudinal lines and adhesively securing together the side edges thereof to form a tube having a pair of main panels and a pair of reentrant side panels connecting said main panels, applying downwardly directed U-shaped lines of fusible adhesive to the terminal regions of the inner surface of said main panels, applying transverse lines of such adhesive to the terminal edges of the outer surface of said panels, squaring up the terminal portions of said panels at right angles to the plane of said main panels, folding over said side panels into an overlapping position whereby the longitudinal portions of said U-shaped lines of adhesive will be brought into a registering position with the transverse portion thereof and said transverse lines of adhesive on the other side of said web will be brought into an adjacent position, folding the terminal regions of said main panels over each other to bring the

end portions of said adjacent lines of adhesive in contact with their intermediate portions, severing the bag thus formed from said tube, and subsequently applying a heated pressure surface to the outer face of the bottom structure to fuse said cooperating lines of adhesive together and to convert them into dams effectively sealing the interior of said bag from the exterior.

HARRY F. WATERS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
519,916	Lorenz et al.	May 15, 1894
520,587	Claussen	May 29, 1894
1,158,042	Genest	Oct. 26, 1915
1,264,497	Field	Apr. 30, 1918
1,484,383	Appel	Feb. 19, 1924
1,605,481	Taggart	Nov. 2, 1926
1,903,286	Coty	Apr. 4, 1933
1,973,391	Reynolds et al.	Sept. 11, 1934
1,988,265	Collings et al.	Jan. 15, 1935
2,177,894	Lakso	Oct. 31, 1939
2,353,311	Karlson	July 11, 1944
2,353,605	Waters	July 11, 1944