May 29, 1945. W. F. PITTMAN 2,377,103

METHOD OF FABRICATING CONTAINERS

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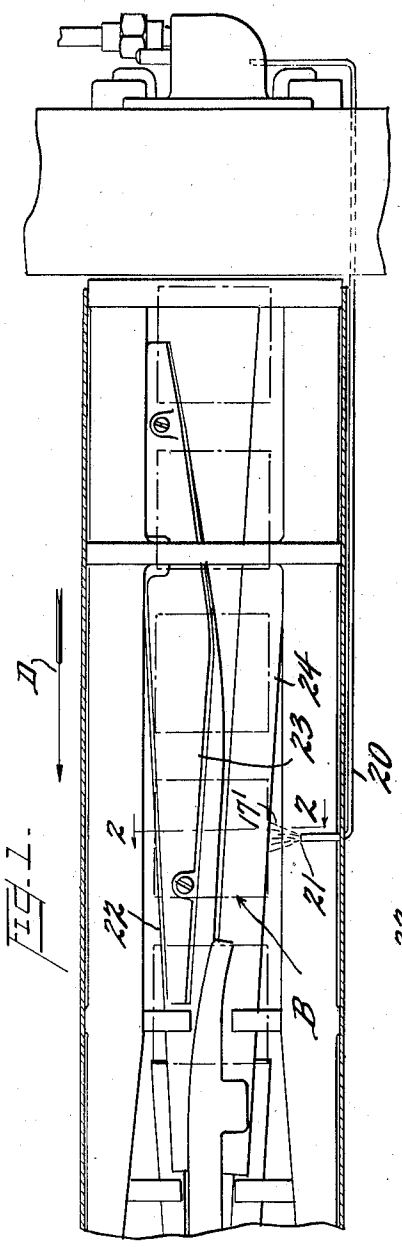


FIG. 1.

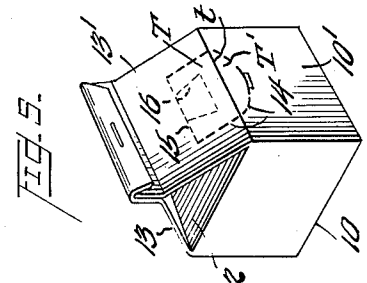


FIG. 5.

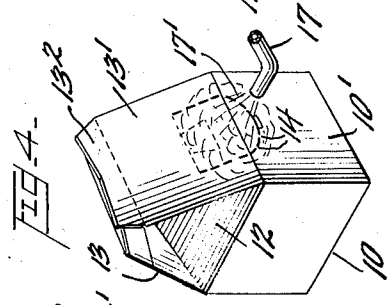


FIG. 4.

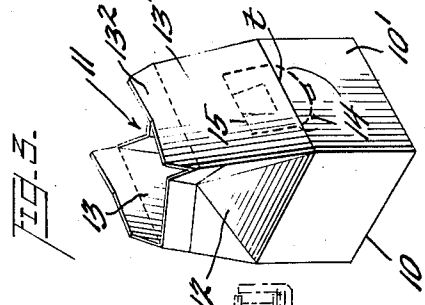


FIG. 3.

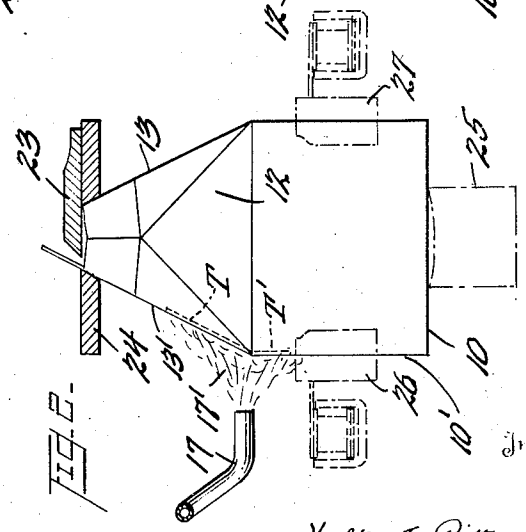


FIG. 2.

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METHOD OF FABRICATING CONTAINERS

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3 Claims. (Cl. 93—36.8)

This invention relates to methods of fabricating containers and particularly to methods of and apparatus for fabricating paper containers of the self-supporting type adapted to contain liquids, comprising relatively stiff flat interconnected panels, and provided with normally closed pouring openings in the side walls thereof, such as for instance disclosed in Patent No. 2,218,670 to Racy D. Bennett and Patent No. 2,263,957 to Walter E. Sooy.

In the fabrication of containers of the types disclosed in the patents referred to a relatively stiff paper of superior grade is employed and the container which is ultimately formed from a blank fashioned from paper of this quality includes a tubular body of rectangular cross section and a top portion or upper end closure which comprises two upwardly and inwardly inclined flat panels the upper edges of which terminate in a relatively stiff central rib. Underlying at least one of these inclined top panels is a parallel inner panel and, in these two superposed panels there are formed by incisions two registering openings, the opening in the outer panel being considerably larger than the opening in the inner panel and both openings being normally closed by the tabs defined by the incisions which form the respective openings, these tabs being secured to each other by an adhesive and being adapted to be simultaneously lifted, when the outer tab is lifted, swinging about substantially coincident hinge lines. When lifted in this manner by one grasping that edge of the outer tab which is remote from the coincident hinge lines of the two tabs, the pouring opening in the inner member of the two-ply container wall is exposed and there is likewise exposed a substantial area of the outer face of the inner ply of the container disposed immediately adjacent to the pouring opening.

The relatively large outer tab normally covers and protects against contamination both the actual edges of the pouring opening and the outwardly facing areas of the inner paper panel adjacent the pouring opening, the arrangement being such that the contents of the container may be readily discharged through the pouring opening provided adjacent its top, by a consumer desiring access and who grasps and lifts, as previously explained, that end of the outer tab which is remote from the hinge line, and who thereafter tilts the container bodily. Accidental dislocation or opening of the container is prevented by the utilization of minor uncut portions or bridging elements connecting the edges of the outer tab with the main body of the container, these bridging elements being relatively weak, however, so that they may be readily severed or broken when the outer tab is deliberately pulled by one desiring access to the container.

In the usual case containers of the type just above described are fabricated automatically from previously cut blanks on complete automatic container forming, coating, charging, and sealing machines, the foldable top or upper end portion of the container being acted upon and closed by suitable folding mechanism as the container advances from station to station through such machine after having been charged. During the closing operation two opposed panels of the charged tubular container which are ultimately to extend upwardly and inwardly toward the base of the central rib are angularly deflected through substantial angles during such folding operations. Where the outer of the two tabs of the pouring means is formed wholly from sheet paper incised from a top panel to be deflected the bending over of this top panel has no tendency to sever the uncut portions or bridging elements which normally tie the edges of the tab to the body of the panel from which it is formed. It is preferred, however, to so form the outer tab of the pouring means that its lower end, remote from the hinge, is cut from the upper end of the adjacent wall panel and, in this event, the inward deflection of the adjacent top panel sometimes causes that portion of the tab which is cut from the side panel to break the tying connections by means of which the end of the tab is attached to the remainder of that panel, due to the stiffness of the paper and its resistance to bending at the scoring defining the upper end of the side panel, any coating material present having a tendency to increase the resistance to bending of the tongue or tab. Naturally the premature dislocation of the lower end of the tongue is highly undesirable, the projecting end being unprotected and readily catching on parts of the machine or other article with the result that the container may be prematurely opened.

I have discovered that, by treating those portions of the outer or lift tab of the pouring means which are subjected to the folding strains just referred to during the top closing operation with a gaseous heating medium, simultaneously with or just before the application of the folding forces, the folding operations may be carried out without danger of severance or rupture of the bridging elements which normally retain the lower portion of the outer tab of the pouring

structure in proper position. The application of the heating medium is particularly helpful in case the container has, prior to the top folding operation, been coated with a liquid-proof substance such for instance as paraffin and particularly also in the event that the container has been charged with a chilled substance such as refrigerated milk, the presence of the chilled coating substance upon the surface of the paper imparting increased stiffness to it and giving it an increased tendency to sever the frangible bridging elements at the free end of the outer tab of the pouring structure.

The period of application of the gaseous heating medium need only be brief and its effect upon the temperature of the container and its contents is superficial and transitory only. It should be maintained for a sufficient period, however, to effect the desired result, that is, the application of the heat should be maintained for such period as to soften the coating substance which has been deposited upon the outer tab of the pouring structure and to preferably raise the temperature of the underlying paper. Various devices may be employed for accomplishing the desired result, but I preferably make use of a steam jet, the steam jet being caused to impinge upon the described surfaces of the container at or just prior to the instant of folding. When this is done the folding operation can be performed as rapidly as may be desired and the downward bending of the upper panel may be continued to any desired angular extent without causing the objectionable detachment of the lower end of the outer tab of the pouring structure from the container body.

In the accompanying drawing a container top folding mechanism is illustrated and by successive views of the container the several steps of the process are indicated.

In the drawing:

Figure 1 is a top plan view of portion of a mechanism for folding and closing the foldable or collapsible upper end portion of a tubular paper container;

Figure 2 is a section on line 2—2 of Figure 1;

Figure 3 is a perspective view of a container of the type contemplated as it appears after having received its coating of liquid-proofing substance, and after having been charged with a substance such as chilled milk, but before the relatively foldable panels of its top closure portion have been finally acted upon to effect the closure thereof;

Figure 4 is a similar view, the foldable top of the container, however, being shown in a stage considerable further advanced toward closure; and

Figure 5 is a further perspective view of the finally closed and sealed container.

The details of construction of the container are fully disclosed in the patent to Walter E. Sooy, No. 2,263,957, previously referred to, but it will be understood that the problem to be dealt with may arise in connection with containers of slightly different type, providing that there is present in such container a tab which is cut partially from one panel of the container and partially from a second panel, these panels being ultimately moved angularly with respect to each other. The body of the container is generally indicated by the numeral 10, and is square in horizontal or cross section. The foldable top portion is indicated by the numeral 11 and this portion includes opposed inwardly collapsible sections generally indicated at 12 and downwardly foldable opposed sections generally indicated at 13, the downwardly foldable opposed sections 13 including the rectangular panels 13' which ultimately form the top panels of the gable-like upper end closure of the completed container, and the elongated narrow panels 13^2 which ultimately form portions of the rib of the completed container.

It is not necessary to further describe in detail the various advantageous features of the container other than to say that, after it has been finally closed and sealed or has reached the condition in which it is shown in Figure 5, it is transmitted to a consumer who, when he desires access to its contents, lifts or grasps the lower end T' of the lift tab T and pulls this lower end outwardly and upwardly, severing the minor relatively weak bridging elements 14 which are the sole means for maintaining the lower end T' of the lift tab T in the plane of the side panel 10' of the body, the lift tab T being formed in part in top panel 13' and in part in side panel 10' and being adapted to be swung upwardly and outwardly in the container opening operation about the scored connecting or hinge portion 15 at the top of the lift tab. As the tab is lifted and swung upwardly about the hinge line 15 it also lifts and carries with it the inner tab 16, formed in an inner ply of the container or panel directly underlying, contacting with and secured to the inclined panel 13', and at least the upper part of panel 10', displacement of the inner tab 16 uncovering a pouring opening formed in this inner ply, through which the liquid contents of the container will flow when the container is suitably tilted, all as disclosed in the prior patents referred to, the two-ply construction being shown particularly in the previously mentioned Sooy patent. By comparing the angular relationship of panels 13' and 10' in Figures 3 and 5, it will be observed that the angularity of these two panels is very substantially increased during the top closing operation.

In Figure 2, in which panel 13' is shown in an intermediate position, there is diagrammatically illustrated means 17 for directing a jet of steam 17' against the side surface of the container and particularly against the lift tab T and those portions of the container adjacent the lift tab. The effect of this is to soften the coating material temporarily and permit the relative folding movement of the top and side wall panels to proceed freely without danger of breakage or rupture of the tying or bridging elements 14 previously referred to. The application of the heating jet is only continued so long as necessary to achieve the desired result, which is very quickly attained, and hence the softened coating substance resumes its original state or condition almost immediately after the completion of the folding operation.

While the invention may be used with great advantage in the treatment, during folding, of containers the walls of which are one ply only in thickness it is particularly helpful in the fabrication of containers in which the outer and inner tabs of the pouring device are formed, respectively, in separate plies of relatively stiff paper and where, as a preliminary step, the paper has been coated and at least partially impregnated with a paraffin-like substance which is relatively stiff when in a solid state. Steam applied to such a container, in the manner and over the area indicated in the drawing, has the effect not only of

softening the surface coating, but also of softening the paraffin which has been absorbed by the fibers of the paper. Melting of the paraffin results in softening of the fibers of the paper itself, with the result that the two-ply wall of the container is momentarily rendered quite flexible, thus greatly facilitating folding by reducing stress between the paper plies during the folding operation.

As a result no great amount of tension in the outer ply is caused by the bending of the paper wall and but little strain imposed on the bridging elements. Likewise the incisions intermediate the bridging elements **14** will not be enlarged by the stretching of such elements. Ordinarily, when the gaseous heating medium is not employed the relatively hard and brittle paraffin in these incisions tends to break during folding, increasing the likelihood of leakage. The application of steam in the specified manner averts this danger.

In Figure 1 of the drawing, and likewise in Figure 2, a folding mechanism is disclosed, the details of which may be readily perceived from an inspection of Patent No. 2,156,037, issued to J. E. Wollenweber, April 25, 1939, and need not be herein particularly described. In these views also, there is disclosed a means for conducting steam to the proximity of the container against which the steam jet is to be directed, this means comprising the duct **20** terminating at **21** a short distance from the side of that container shown in position B in Figure 1, and indicated in chain lines. The container top folding means includes stationary cam elements three of which are indicated at **22**, **23** and **24** in the drawing and a conveyor, portions of which are shown in Figure 2, including a supporting member **25** upon which the containers rest as they are moved past the folding means, portions of the container advancing mechanism being indicated diagrammatically at **26** and **27**, respectively. As the containers advance past the top closing mechanism, in the direction indicated by the arrow D in Figure 1 the stationary blades or cams **22**, **23** and **24** affect the folding operations in the manner fully described in the Wollenweber patent referred to, charged containers substantially in the condition indicated in Figure 3 entering the closing mechanism from the right (Figure 1) and issuing from the closing mechanism substantially in the condition shown in Figure 5, ready for the application of the final sealing pressure to the rib and the insertion of a securing staple. During the folding operation the current of heating medium is applied in the manner previously described and the folding operation is so facilitated that the bending or folding of the previously incised lift tab T, along the intermediate scoring *t* freely proceeds without danger of rupture of the bridging elements **14**.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. The method of fabricating containers which comprises forming a paper blank having an access tab defined by incisions, the tab comprising portions of two adjacent relatively foldable panels with one end hingedly connected to one panel and the other end connected to the other panel by relatively weak bridging elements, coating the blank with a liquid-proofing substance which is solid at ordinary temperatures and plastic at higher temperatures, directing a current of a gaseous heating medium against the tab to soften the coating thereon and while the coating is in softened condition, relatively folding the panels and at the same time bending the tab intermediate its ends.

2. The method of fabricating containers which comprises forming a paper blank having an access tab defined by incisions, the tab comprising portions of two adjacent relatively foldable panels with one end hingedly connected to one panel and the other end connected to the other panel by relatively weak bridging elements, coating the blank with a liquid-proofing substance which is solid at ordinary temperatures and plastic at higher temperatures, partially folding the coated blank along a scored portion intersecting the tab, directing a gaseous heating medium against said scored portion of the tab and, while the coating is in plastic condition, effecting further folding of the said panels relatively to each other.

3. The method set forth in claim 1 in which the container is charged with a body of chilled liquid prior to the application of the current of gaseous heating medium, and the heating medium is supplied in sufficient volume and at sufficiently high temperature to soften the coating of the charged container.

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