Feb. 7, 1950 W. J. CUPO 2,496,336

CARTON AND METHOD OF SEALING THE FLAPS THEREOF

Filed Sept. 1, 1944

Fig. 1

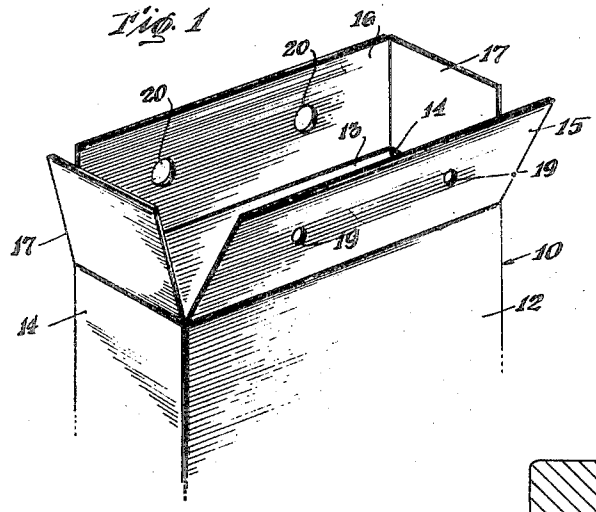


Fig. 3

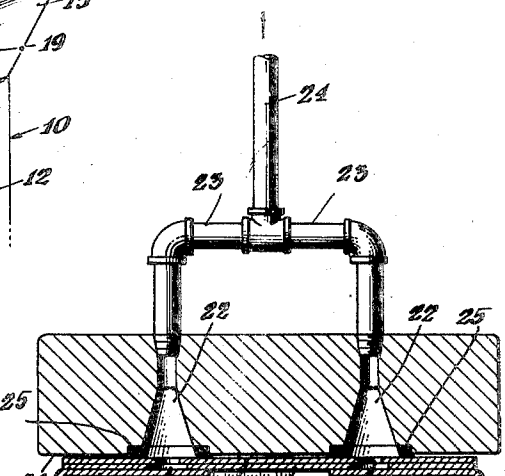
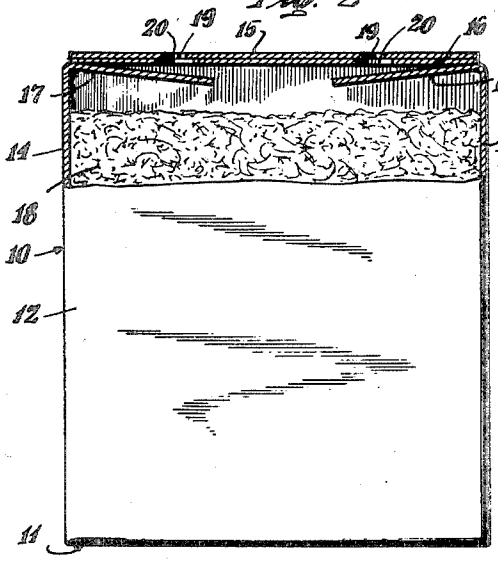


Fig. 2



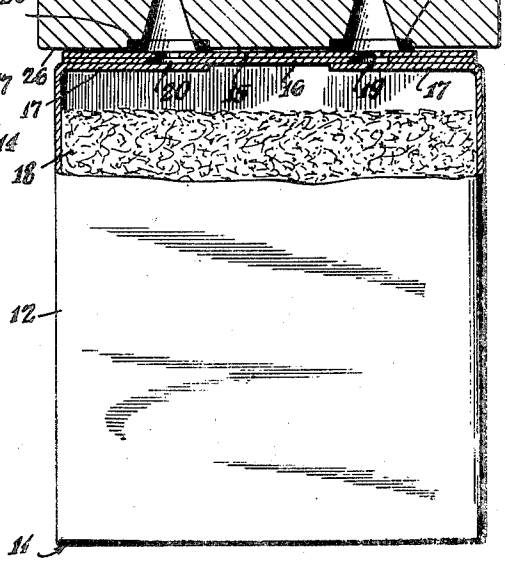
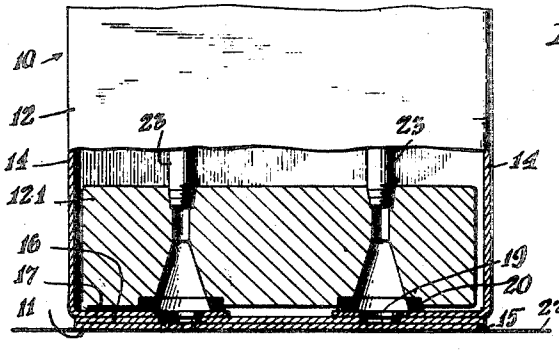


Fig. 4



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Patented Feb. 7, 1950

2,496,336

UNITED STATES PATENT OFFICE

2,496,336

CARTON AND METHOD OF SEALING THE FLAPS THEREOF

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Application September 1, 1944, Serial No. 552,239

2 Claims. (Cl. 229—37)

1

The present invention relates to cartons and carton blanks and to the anchorage of flaps thereof and the method of making such containers and accomplishing the flap anchorage.

A general object of the present invention is to provide a simplified procedure which can be readily and economically practiced in commercial production of closed cartons containing commodities, such as particulate or granular products, and, more particularly, an efficient method for forming an effective closure thereof, as well as the provision of the carton blanks structurally so constituted as to permit the efficient practice of the method and the resulting cartons.

The art of packaging commodities in so-called "seal-end" cartons, formed of paperboard or the like, has been highly developed and widely practiced. Such cartons commonly are of rectilinear construction having front and back wall panels joined together by side wall panels to form a tubular structure. These panels are provided with end flaps which when folded into stacks of overlapping plies and suitably adhered together form end closures. After one end is so closed a charge of commodity is placed therein and the other end is closed by a lapping of end flaps and adhesive anchorage thereof.

Such packages, however, are all too frequently featured by an insecure end closure or sealing of the overlapping flaps, usually at the bottom of the carton. This normally results from the widely practiced method of forming the end closure that has been adopted as being the most commercially practicable method of accomplishing this end. Such closures are usually formed after the other end of the carton, such as the top thereof, has been closed and the resulting open container charged with a quantity of commodity. Usually two opposed foreshortened end flaps which may be provided on the side walls are folded inwardly above the charge of commodity to lie in a common plane substantially across the open end of the carton. A suitable adhesive material or glue is applied either to the upper surfaces thereof or the surfaces of other flaps which are to be lapped down over these side wall flaps. Thereafter opposed end flaps provided on the opposed front and back walls are folded down in overlapping relation, after which the closed carton is fed to a device intended to hold the flaps in their proper relative positions while the adhesive sets.

Such device commonly comprises a long traveling belt under which the cartons are moved to travel therewith while the belt presses down upon

2

the carton and overlapped flaps for the purpose of maintaining the latter in proper relative positions. This, in some instances, may effectively maintain the two uppermost overlapped flaps in proper position, but is ineffective, at least in most instances, for holding the lowermost foreshortened side flaps in full face-to-face engagement against the under-surfaces of the intermediate flap since there is no upward support of the lowermost flaps except at the carton walls. As a result, the downward pressure of the belt is effectively exerted chiefly at the points of greatest resistance, such as in the vicinity of the juncture between the carton walls and the end flaps. Due to the fragility of the carton stock, the amount of pressure that may be applied by the pressure belt is quite critical since too much pressure will crush the carton and too little pressure will prevent the formation of any effective degree of bond between overlapped flaps.

Thus usually the adhesive bond of the intermediate flap to the lowermost flaps is effectively accomplished only in areas in the vicinity of the side walls of the carton, and not infrequently the bond between the intermediate and topmost flaps is incompletely formed throughout the entire areas of overlapping. As a result, the so-formed closures frequently permit sifting out and loss of the contained commodity and entrace of foreign matter such as dust and, in the case of food products, vermin into the packages. Such conditions have in many instances made necessary the employment of additional wrappers which constitute an additional undesirable item of expense.

In addition to the incomplete effectiveness of so forming the closures, such equipment greatly increases the space necessary to and the expense attendant upon the employment thereof.

It is a more specific object of the present invention efficiently to eliminate these difficulties of prior art practices by simplifying the equipment necessary, thereby conserving space, eliminating in many instances the necessity of outer wrappers, and economizing in packaging expense.

Another object of the invention is to provide means whereby a differential in pressure may be readily created on opposite sides of a stack of overlapped flaps so that they are effectively held in face-to-face engagement substantially throughout their entire areas of surface contact while the adhesive adheres sufficiently to anchor them in their relative positions, such end being accomplished in a manner so that all operations necessary to the sealing of the end of a filled

carton may be carried out exteriorly of the carton.

An additional object of the invention is the provision of such a method adapted to carton structure generally wherein carton parts are to be adhesively secured together characterized by rendering one of the carton parts porous or permeable to air, such as in the manufacture of the carton stock or thereafter as by perforating, coating one of two carton parts with adhesive and juxtaposing the two parts, and then applying suction to the permeable part effectively to draw air therethrough efficiently to cause the parts to be held in face-to-face engagement while the adhesive forms a bond.

And another object of the invention is to provide such method of adhesively anchoring carton flaps characterized by the formation of a passageway in flap-overlying structure, an interposing of adhesive material between the surface of an imperforate flap and the flap-overlying structure, and withdrawal of air through the passageway to cause the flap surface to be held in face engagement with the flap-overlying structure by the creation of a differential in pressure on opposite sides of the imperforate flap until the interposed adhesive material has set sufficiently to anchor effectively the flap to the overlying structure throughout extended areas thereof.

While another object of the invention is the provision of carton structure having at least one closing and sealing flap to lap and adhere to a portion of the carton body after the carton is filled, the accessible one of the lapping parts being provided with an air suction aperture whereby suction may be applied effectively to hold the parts together in adhesive sealing of the carton.

A still further object of the invention is to provide a carton structure of the "seal-end" type which has certain end flaps thereof apertured in a manner to form passageways partially through a stack of the folded end flaps for permitting, by air-withdrawal through the passageways during the formation of a closure, the creation of a differential in pressure on opposite sides of the stack effectively to hold the flaps together while they are being adhesively joined.

Still another object of the invention is the provision of a closed "seal-end" carton containing a charge of commodity, characterized by an efficient and secure end seal in which adjacent areas of overlapped flaps are effectively adhered together substantially throughout the entire areas thereof and in which the closure is so effective as efficiently to minimize sifting out or loss of contained product and effectively to preclude entrance of dust, vermin, etc.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the several steps and the relation of one or more of such steps with respect to each of the others, and the article possessing the features, properties, and the relation of elements, which are exemplified in the following detailed disclosure, and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawing, in which:

Fig. 1 is an isometric view of an end portion of a carton structure of the present invention showing the end flaps thereof extending upwardly to leave the carton end open, and with a pair of opposed end flaps specifically designed in accordance with one embodiment of the invention.

Fig. 2 is a front elevational view, with parts broken away and in section, of the carton structure shown in Fig. 1, showing the same after filling and after the end flaps have been folded into a closure stack;

Fig. 3 is a front elevational view similar to Fig. 2 of the same carton structure shown therein, showing a suction head being applied thereto in the adhesive sealing together of the end flaps; and

Fig. 4 is a partial front elevational view of the other end of the carton structure shown in Figs. 1, 2 and 3, with parts broken away and in section, showing the adaptation of another embodiment of the present invention to the formation of a sealed closure for the other end of the carton.

Referring to the drawings, like numerals identify like parts throughout, in Fig. 1 of which a carton is shown which may have the lowermost end thereof closed to provide an open-ended container. It is common practice first to form one end closure of the package and then place a charge of commodity therein or fill it and finally close the other end of the container. The carton in Figs. 1, 2 and 3 comprises a tubular structure 10 closed at its lowermost end, as at 11 in Fig. 2, in any suitable manner and is formed of panels of suitable material such as paper board or the like suitably joined together. The tubular structure 10 preferably consists of a front wall panel 12, a back wall panel 13 and opposed side wall panels 14, 14 joining the panels 12 and 13 together. Each of these panels is provided with an end flap, the edge of the front wall panel 12 at the open end of the carton being extended to provide an end flap 15, the back wall panel 13 being similarly provided with an end flap 16, and the opposed side wall panels 14, 14 being similarly provided with end flaps 17, 17.

It will be noted that the side wall end flaps 17, 17 are foreshortened so that when they are bent inwardly across the open end of the carton they will not overlap, and that these end flaps are imperforate, for a purpose to be explained later.

As is usual, the end flaps 15 and 16 preferably extend the complete width of the front and back wall panels and are also preferably substantially as wide as the depth of the carton so that as they are folded inwardly they will overlap to extend substantially completely across the end of the carton.

To close the carton in the manner indicated in Fig. 2, after a charge of commodity such as that indicated at 18 has been placed therein, the side wall end flaps 17, 17 are folded inwardly above the charge of commodity as shown and then the remaining pair of end flaps 15 and 16 are folded down upon the end flaps 17, 17 with the end flaps 15 and 16 overlapped with respect to each other.

The resulting stack of end flaps provides a temporary closure for the container. However, to secure these end flaps in stacked relation, adhesive material, such as glue, must be interposed between adjacent surfaces of engagement. This may be accomplished by applying adhesive or glue to the outer surfaces of the end flaps 16 and 17, 17 before they are folded together as is usual.

It will be noted from Figs. 1 and 2 that both

the end flaps 15 and 16 are provided with a pair of apertures and that the pair in one end flap are preferably larger than those in the other end flap, for example, apertures 20, 20 in the intermediate end flap 16 may be made larger than apertures 19, 19 in the end flap 15. In any event, whether these two pair of apertures are of substantially equal dimension or whether larger apertures are provided in the intermediate end flap or the outermost end flap, they should be so placed as to permit communication between the apertures in the two overlapped flaps to provide passageways therethrough to the underlying imperforate flaps. Making the apertures in one end flap larger than those in the other end flap assures the attainment of proper registry, as to insure the desired communication between the apertures of the overlapping flaps, despite possible variance in relative positioning of apertured end flaps due to flexibility of the carton stock and carton walls formed therefrom and to pressure which in packaging may be applied at various points on the latter.

The folding of the flaps into a stack usually results in a closure of the type indicated in Fig. 2 wherein it is shown that end flaps 17, 17 tend to diverge away from the under-surface of the intermediate flap 16. This is particularly true when pressure is applied to the top of the stack of overlapped flaps, such as by an overhead traveling belt, when final closure is attempted in accordance with prior practice. This undesirable condition is effectively eliminated in accordance with the present invention wherein final closing operations are accomplished with the use of a suction head of any suitable construction. This, as is shown in Fig. 3, may comprise a body or plate 21 adapted to be placed down over the outermost end flap 15 to bias it to its folded position. Suction head 21 preferably is provided with a pair of ducts 22, 22 each of which communicates by means of suitable conduit means 23, 23 with a suction pipe 24 connected to any suitable suction device such as the intake of a blower (not shown). It will be noted that ducts 22, 22 are positioned so that their open orifices are in communication with the two passageways each formed by communicating apertures 19 and 20. In order to avoid undue leakage at the connection between the orifices of the ducts 22, 22 and the passageways 19, 20 and 19, 20 the head 21 may be provided about the orifice of each duct 22 with a gasketing ring 25 of rubber or other suitable resilient material. Preferably each gasket ring 25 is suitably seated in a groove or counterbore circumambient of the orifice of the duct 22, with the outward face thereof projecting only a slight distance beyond the face 26 of the head 21 so that the latter may, upon compression of the resilient gaskets by application of additional pressure to the suction head, contact the outer surface of the uppermost end flap 15 substantially throughout its entire area beyond the circumferential edges of the gaskets so as effectively to bias a major portion of that outermost flap. For purposes of clarity the suction head 21 is shown in Fig. 3 to be in the position wherein gaskets 25, 25 first contact end flap 15, prior to application of additional pressure to the suction head to bring its surface 26 down into contact with outermost end flap 15.

In operation, with the end flaps arranged as shown in Fig. 2 for closure of the end of the carton, the suction head 21 is moved down to the position shown in Fig. 3 and pressure applied to

cause its face 26 to make contact with the uppermost end of the carton, or the stack of lapped end flaps constituting the same. Air is then withdrawn from the interior of the carton, by suction created in the pipe 24, through the passageways 19, 20 and 19, 20 to cause the imperforate end flaps 17, 17 to be quickly drawn up into tight face engagement with the under-surface of the intermediate end flap 16 by passing currents of air with a resulting creation of a differential in pressure on opposite sides of the imperforate end flaps. The outermost flap 15 being biased by the suction head 21, all of the end flaps in the stack are caused to be tightly drawn together and suitably there held in position by this differential in pressure, until the interposed adhesive has set sufficiently to anchor the end flaps together. Any vacuum that may be created in the carton by this operation is soon relieved by leakage of air through the walls due to porosity of the carton stock.

It will be obvious that the apertures 19, 19 and 20, 20 may be of any suitable size or shape, and of course may be arranged in reverse order if desired, and it has been found in the closure of cartons for a certain product common to the household trade, which cartons are about six inches wide and about two inches thick, that effective seals may be formed in mass production by the use of apertures in each of the outermost end flaps of about one-quarter of an inch in diameter and apertures in each of the intermediate end flaps of about seven-sixteenths of an inch in diameter.

It may be found to be desirable to employ a suction head which has a contact face of greater area than the area of the end of the carton, as is proposed in Fig. 3, so that the suction head may be employed to apply pressure to the end of the carton at all points of the stack of end flaps, including the parts thereof which are in the vicinity of the side walls of the carton where there is less tendency for the differential in pressure to force the lapped end flaps together toward the suction head.

It has been found that a secure bonding of adjacent surfaces of lapped end flaps is attained by the maintenance of suction for a period of about from three to ten seconds during which period the adhesive may form at least a temporary bond. Suction may then be discontinued, and after removal of the suction head the closed carton can be inverted so that the weight of the contents will continue to hold the stacked flaps in face engagement as the adhesive takes its final set. Obviously, the suction may be maintained throughout the period of complete setting of the adhesive, but this time-consuming procedure has been found to be unnecessary since any tendency of the moistened innermost end flaps to curl out of face contact is eliminated by the weight of the contents when the carton is inverted.

Obviously, the procedure of the present invention is not limited to the closure of filled cartons. A variation of the procedure may be employed to close the other or lowermost end of the carton, such as that indicated at 11 in Figs. 2 and 3. In Fig. 4 it is proposed to stack the end flaps 15, 16 and 17, 17 in a manner similar to the stacking proposed in Figs. 1, 2 and 3. However, with the carton empty, the so-closed end is preferably positioned on any suitable support such as a biasing base plate diagrammatically indicated at 27, and in this instance the outermost ply 15 is retained in imperforate condition. The interme-

diate ply 16 is, as previously proposed, provided with apertures 20, 20 and the two side wall end flaps 17, 17 are provided with the apertures 19, 19. Differential in pressure is created on opposite sides of the resultant stack of end flaps by a suction head 121 similar to the suction head 21 which, in accordance with this embodiment of the invention, is of such lateral dimension as to be readily slipped down inside the carton to rest upon the end flaps 17, 17. In the practice of this variation of the procedure of the invention the force with which the lapped end flaps are held together due to suction may be augmented by the weight of the suction head 121 which presses the stack of end flaps down against the biasing base plate 27. If desired, suction may be terminated prior to final setting of the adhesive, and the downward pressure of the suction head 121 may be relied upon until final set is accomplished.

Further it is to be understood that, although it is preferred to provide apertures in carton parts as passageways for air-withdrawal to cause the carton parts to be held together during adhesive bonding thereof, porosity or permeability of the overlying part, accomplished either during the manufacture of the carton stock or thereafter by perforating over an extended area thereof as by piercing with a small instrument at a plurality of points, may serve the desired ends of the invention within the scope thereof.

It will thus be seen that the objects set forth above have been efficiently attained in a surprisingly simple manner as has been proven by exhaustive tests, and since certain changes in carrying out the above process, and certain modifications in the article which embody the invention may be made without departing from its scope, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The method of sealing open ends of cartons having side and front and back wall end flaps adapted to be folded together to form a closure, comprising providing the two opposed side wall end flaps each with at least one aperture and the end flap of the two opposed back and front walls which is to be folded into engagement with the side wall flaps with apertures adapted to communicate with the first-mentioned apertures when those flaps are folded into overlapping relation, retaining the imperforate condition of the remaining end flap, applying adhesive material to inner flap surfaces so as to provide adhesive interposed between adjacent surfaces of all of the flaps when folded in overlapping relation, folding the apertured side wall flaps inwardly to extend in opposed relation substantially in the plane of the open end of the carton, folding the other apertured flap in overlapping relation against the side wall flaps with the apertures in registry, folding the imperforate flap in overlapping relation against the apertured overlapped flaps, biasing the opposed side wall flaps to their folded positions, withdrawing air through passageways formed by the apertures in registry from exteriorly of the carton toward the interior thereof to create a differential in pressure on opposite sides of the stack of overlapped flaps, and maintaining such pressure differential until said flaps are anchored together to seal the carton end.

2. A filled carton comprising, in combination, opposed front and back wall panels joined together by opposed side wall panels forming a tubular structure, means closing one end of said tubular structure, and a stack of end flaps closing the other end of said tubular structure, said stack comprising a pair of foreshortened end flaps provided on the side wall panels and folded inwardly to lie in opposed relation in a common plane across the end of said tubular structure and another pair of end flaps with one provided on said front wall panel and the other on said back wall panel folded inwardly in overlapping relation against said side wall flaps, adhesive material joining adjacent faces of the flaps in said stack, said pair of side wall end flaps and the one flap of said pair of front and back wall end flaps which lies adjacent said side wall end flaps being provided with air-withdrawing passageways formed by registering apertures therein and the remaining outermost side wall end flap being imperforate for creation of a differential in pressure on opposite sides of the stack to hold the flaps together during adhesive joining together, the resulting closure having the adjacent surfaces of the flaps adhered together substantially throughout the entire areas thereof with the passageways closed by said outermost imperforate flap.

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