Feb. 2, 1943. G. B. FIRST 2,309,760

METHOD OF AND APPARATUS FOR CLOSING BAGS

Original Filed July 22, 1938 2 Sheets-Sheet 1

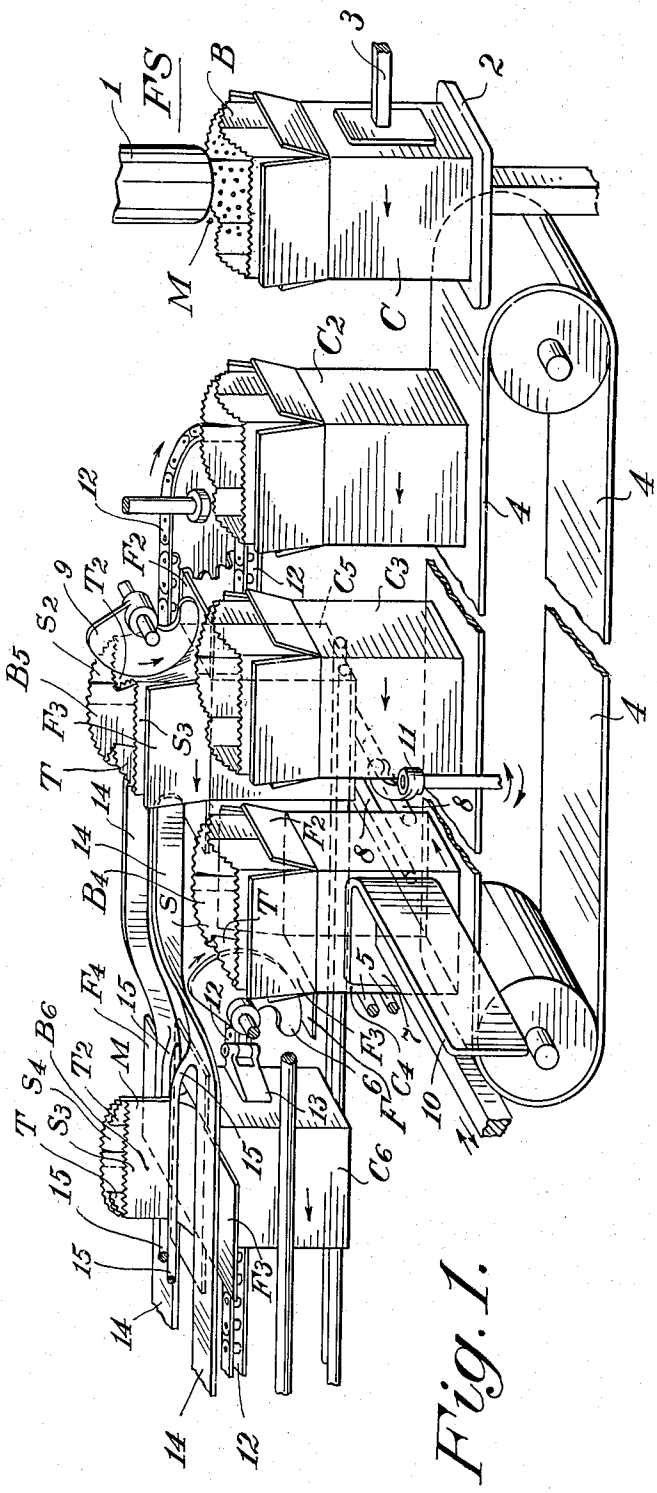


Fig. 1.

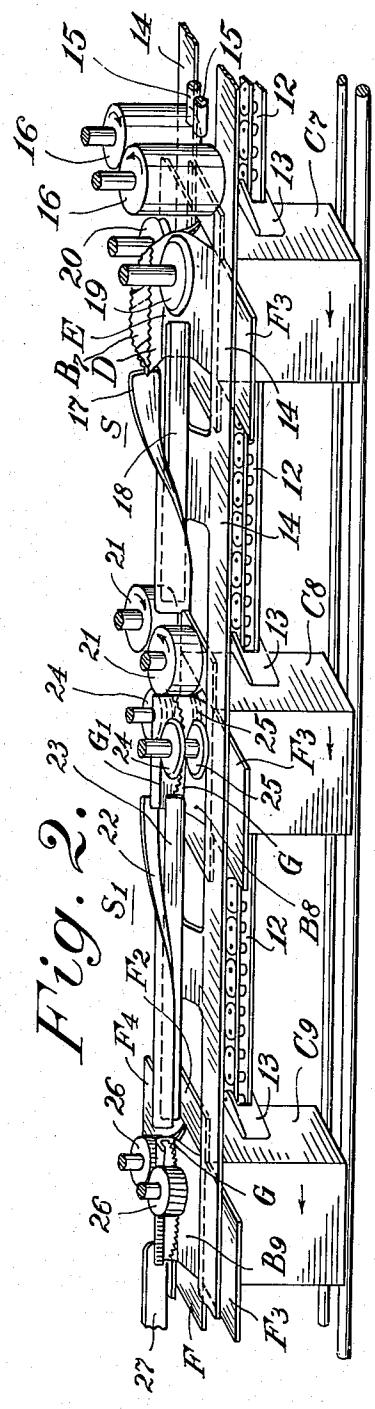


Fig. 2.

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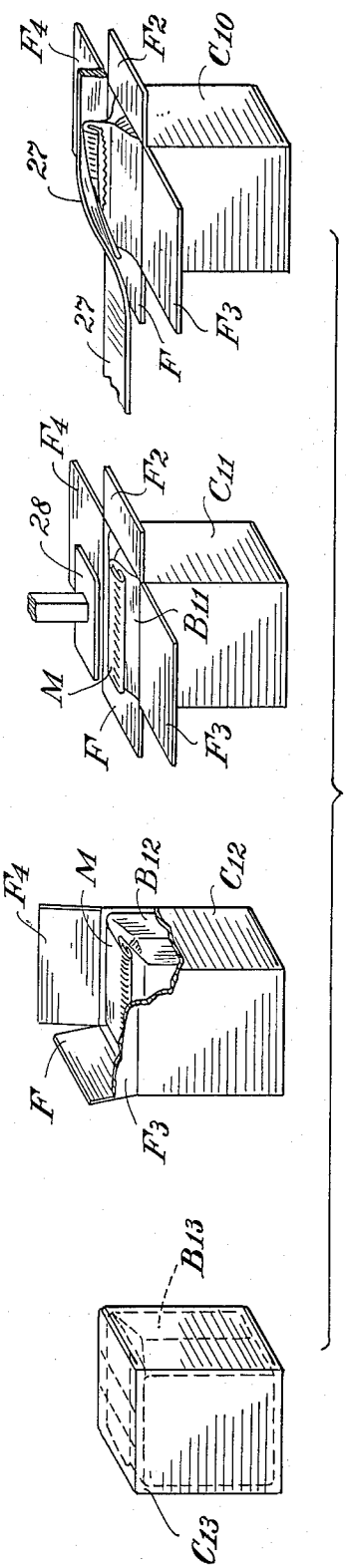


Fig. 3.

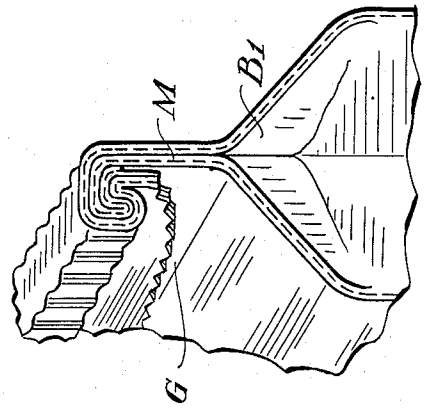


Fig. 7.

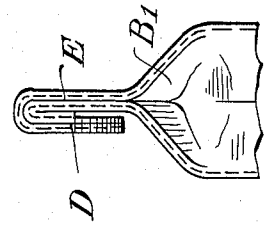


Fig. 6.

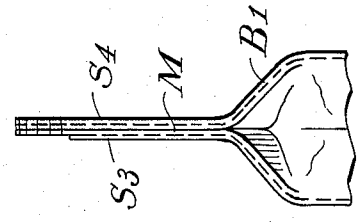


Fig. 5.

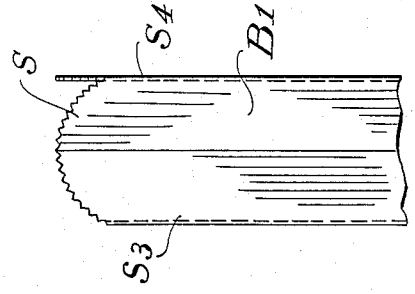


Fig. 4.

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UNITED STATES PATENT OFFICE

2,309,760

METHOD OF AND APPARATUS FOR CLOSING BAGS

George B. First, Philadelphia, Pa., assignor to Stokes and Smith Company, Summerdale, Pa., a corporation of Pennsylvania

Original application July 22, 1938, Serial No. 220,860. Divided and this application March 13, 1940, Serial No. 323,679

10 Claims. (Cl. 93—6)

My invention relates to methods of and apparatus for closing filled bags, more particularly those which during filling and closure are disposed within cartons.

In accordance with my invention, while a bag is moving away from a station at which it has been filled, it is flattened above the filling to form a closure member which during subsequent movement of the bag is folded, and preferably refolded, at previously produced crease or creases.

Further in accordance with my invention, aforesaid creasing and folding are effected progressively from one to the other end of the flat closure member as the bag moves beyond the stage in which the closure is formed; more particularly, the folded closure member is corrugated, as by passage between ribbed or corrugated rolls which may be heated substantially to reduce or eliminate the tendency of the closure member to unfold.

Further in accordance with my invention, each of the bags before filling is disposed in an open carton whose flaps are held away from the filled bag during formation and folding of aforesaid closure member, and the carton flaps are thereafter folded into adhesive engagement with each other without attachment to the bag or its aforesaid closure member.

This application is a division of my co-pending application Serial No. 220,860, filed July 22, 1938.

For an understanding of my invention, reference is made to the accompanying drawings in which:

Figs. 1 to 3 illustrate the various operations performed upon bags to effect their closure;

Fig. 4 is a fragmentary side elevational view on enlarged scale of a bag;

Fig. 5 is an end elevational view of the bag of Fig. 4 after flattening of its sides to form a closure member;

Fig. 6 is an end elevational view illustrating the closure member of Fig. 5 after the first folding operation;

Fig. 7 is a perspective view on enlarged scale showing the appearance of the closure member after performance of all the operations of Figs. 1 to 3.

Referring to Fig. 1, it is assumed for purposes of explanation that the bags at or before their arrival at the filling station FS are, either manually or by any suitable automatic means, opened and disposed within open cartons. At the filling station, each of the bags receives a charge of material M which may be directed thereinto by the duct 1 or equivalent which may extend from a hopper containing the material, or may be interposed between the bag and the scale pan of a weighing machine such, for example, as disclosed in United States Letters Patent #2,111,921 to Bleam. The platform or support 2 upon which the bag rests during filling may be a stationary element or may be the scale platform of the filling machine, movable downwardly when a predetermined weight is received, automatically to interrupt flow of the material into the bag, all as more fully described in Bleam Patent #2,082,567.

In any event, after each bag has received a certain volume, or predetermined weight, of material, it is moved, manually, or automatically, as by reciprocating plunger 3, from the position of bag B at the filling station onto a conveyor 4 which may operate either continuously or intermittently to transport the open carton C with bag B disposed therein to the position defined by the stops 5. While the bag is in this position, the tool 6, which may rotate continuously or intermittently in timed relation to the mechanism of the filling machine, engages the side S of the bag, now in the position of bag B4, Fig. 1, to produce an inturned tuck T and to swing the flap F of the carton outwardly and away from the projecting top of the bag.

The bag is then transferred to a second tucking station, as by the reciprocating plunger 7 which pushes it from the conveyor belt 4 along the supporting rods 8 or equivalent, and, during this transfer movement, the flap F may be held in the position shown in Fig. 1, by a rod or guide structure not shown. While the bag is at the second tucking station, in the position of bag B5, Fig. 1, the second tucking tool 9 engages the side S2 of the bag to produce the inturned tuck T2 and to turn the flap F2 of the carton downwardly and away from the projecting top of the bag.

After transferring a bag to the second tucking station, the plunger 7 returns to the position shown in Fig. 1 so that the stop plate 10, movable therewith, is withdrawn, permitting another carton and bag unit to move with conveyor 4 to the position of carton C4, Fig. 1. The swinging stop 11 biased by a light spring to the position shown in Fig. 1 is controlled by a latch, not shown, which is timed to prevent the next carton C3 on the conveyor 4 from moving until after or during the next forward movement of the plunger 7 to transfer carton C4 to the second tucking station. Each unit comprising a bag and its associated carton progressively assumes the

positions of the cartons C2, C3, C4, C5 so that at any given time there is a series of cartons along the path from the filling station to the second tucking station. Each carton and bag unit is in turn arrested by the stop 11, subsequently pushes stop 11 aside when its latch so permits, and moves with conveyor 4 into engagement with the stop 10, thereafter upon withdrawal of stop 10 is engaged by stops 5 at the first tucking station, and is thereafter transported by the plunger 7 to the second tucking station for formation of the second tuck T2.

If there is no spacing between the successive units, the stop 11 is held by them in succession out of the position shown in Fig. 1, and the sliding stop 10 permits each unit in turn to advance in front of plunger 7.

The bags are moved from the second tucking station by a conveyor of any suitable construction, shown for purposes of explanation as comprising an endless chain 12 having extending therefrom a series of pusher elements 13 for engaging the cartons or bags and moving them to the left as viewed in Figs. 1 and 2. As the bag B5, for example, is moved from the second tucking station, the top of the bag, comprising the aforesaid sides S and S2 having the inturned tucks T and T2, and the other pair of opposite sides of the bag, is embraced by or passes between the bars or plates 14, 14 which are so shaped that during continued movement of the carton the flaps F3, F4 thereof are swung downwardly away from the projecting top of the bag, finally assuming the horizontal position of flaps F3, F4 of carton C6, Fig. 1. The bars or rods 15, 15 which, in effect, form a continuation of the bars 14, 14, converge in the direction of movement of the bag to effect engagement of the sides S3, S4 and so flatten the projecting top of the bag to form the closure member M, including at the ends thereof the inturned tucks T and T2.

Preferably the flattening action of the rods 15, 15 is supplemented by rolls 16, 16, between which the closure member M of the bag passes on its way to the folding zone S in which the curved plate 17 progressively folds over the top section or panel D of the closure member M against the bar 18 which engages the lower section or panel E of the closure member. The bag B7 is shown in Fig. 2 as just entering the first closure folding zone. Preferably before arrival of the bag at the folding zone S, the closure member M thereof is creased progressively from end to end as by the complementarily shaped rolls 19, 20 to insure folding along a predetermined definite line substantially parallel to the top of the bag.

Preferably, as the bag continues its movement to the left, Fig. 2, the folded closure member M passes between the pressing rolls 21, 21 beyond the ends of the folding bars 17, 18. The relation to each other of the components or panels of the closure member of the bag at this stage is most clearly shown in Fig. 6.

As each bag in turn passes through the second folding zone S1, the folded closure member is again folded into engagement with itself by the bars 22, 23, generally similar to the bars 17 and 18 of the first folding zone. Bag B8 is shown in Fig. 2 as just entering the second folding zone. Preferably before arrival of each bag at the second closing zone, the closure member M thereof is creased by the pairs of rolls 25, 25 and 24, 24 to produce the crease G defining the lower edge of the panel E, and the crease G1 which defines the line of fold intermediate the upper and lower boundaries of panels D, E and along which the folded closure member is again folded as it progresses through the second folding zone.

As each bag in turn passes beyond the second folding zone, the doubly folded closure member is engaged by the corrugated rolls 26, 26, preferably heated, to corrugate the folded structure to minimize or eliminate the tendency for the closure member to unfold. Bag B9, Fig. 2, is shown part way through the corrugating rolls.

The sharp folding and refolding of the closure member along the creasing is itself sufficient, for the less resilient bag materials, to preclude unfolding or self-opening of the closure without need for recourse to adhesive, applied to or comprised in the bag material, clips, staples, or the like, all herein for brevity termed extraneous means; for the more resilient bag materials, corrugating the closure member, after it has been folded and refolded sharply, prevents self-opening thereof without need to use extraneous means.

Particularly when the bags are not enclosed in cartons subsequently sealed, they may be made of material which consists of, or is surfaced with, a thermo-plastic so that by heating any one or more of the pairs of rolls 16, 16, 21, 21, or 26, 26, the closure member when folded one or more times forms an effective seal.

After the closure member M has been completely formed, assuming the appearance most clearly shown in Fig. 7, with the refolded portion thereof in face-to-face engagement with the original top portion (Fig. 5) it is turned over into engagement with the top of the bag, as by the bar 27, Fig. 3, along the line of fold G previously defined by the creasing wheels 24, 24. Preferably before the flaps of the carton are manipulated to close the top of the package, the bag is squared up, as by reciprocating plunger 28 disposed along the path of movement of the cartons beyond the folding station S2 at which the bar 27 is disposed.

During the passage of the cartons through the closure-forming and closure-folding zones, the flaps thereof are maintained in a substantially horizontal position by the guide bars 14, or equivalent, which terminate at or beyond the station at which the squaring plunger 28 is disposed to permit folding of the carton flaps F, F2, F3, F4 into engagement with each other in any desired sequence to form the closed package C13 at the left of Fig. 3. The movement and joinder of these flaps to close the top of the package may be effected in any suitable way, preferably automatically by mechanism of the character disclosed in Delamere et al. Patent #1,527,030.

What I claim is:

1. The method of closing a bag after filling which comprises producing inturned tucks in opposite sides of the bag above the filling, progressively moving the other sides of the bag toward each other from end to end to form a flattened closure member with said tucks inturned at opposite ends thereof, progressively creasing the flattened closure member from end to end, and, during movement of the bag, progressively folding the closure member sharply upon itself along the line of fold defined by the creasing to maintain the bag closed above the filling without recourse to extraneous means.

2. The method of closing a bag after filling which comprises producing inturned tucks in

opposite sides of the bag above the filling, moving toward one another the other sides of the bag to form a flattened closure member with said tucks inturned at opposite ends thereof, and, in avoidance of use of extraneous means to maintain said closure member effective to seal the bag above the filling, creasing the flattened closure member transversely of the bag, progressively folding the closure member sharply upon itself along the line of fold defined by the creasing, and corrugating the folded closure member substantially to reduce its tendency to unfold.

3. A system for closing filled bags of square type comprising two conveyors, means for effecting transfer of filled bags from one of said conveyors to the other, and means for tucking in folds of the bags above their fillings comprising tucking devices disposed adjacent said conveyors respectively to operate upon each bag just before and immediately after its transfer by said transfer means.

4. A system for closing bags of square type comprising two conveyors, reciprocating means for effecting transfer of a filled bag from one of said conveyors to the other, means adjacent one of said conveyors and one limit of reciprocation of said transfer means to tuck in one side of the bag above the filling, and means adjacent the other of said conveyors and the other limit of reciprocation of said transfer means to tuck in another side of the bag above its filling.

5. A system for closing bags of square type comprising a conveyor for transporting bags from a filling machine, means adjacent said conveyor for tucking in the leading side of each bag in succession above its filling, a second conveyor, means for transferring the bags in succession from said first to said second conveyor, and means adjacent said second conveyor for tucking in the trailing side of each bag delivered thereto by said transfer means.

6. A system for closing bags of square type comprising a conveyor, means for delivering thereto filled bags each having one side tucked in above the filling, and means adjacent said conveyor for tucking in the opposite side of each bag above its filling.

7. A system for closing bags of square type comprising a conveyor, means for delivering thereto filled bags each having one side tucked in above the filling, means adjacent said conveyor for tucking in the opposite side of each bag above its filling, and structure extending along said conveyor for engaging and progressively flattening each bag from end to end above the filling to form a closure member including said tucked in sides at opposite ends thereof.

8. A system for closing square bags comprising a conveyor for transporting filled bags, a second conveyor, reciprocating means for transferring filled bags to said second conveyor from said first conveyor, devices adjacent the limits of reciprocation of said transfer means for tucking in sides of a bag above its filling, and a series of tools along said second conveyor for operating in succession upon each of the bags during movement by said second conveyor to flatten the bag above its filling, to form a closure member having said tucked-in sides at opposite ends thereof, to fold and refold the closure member thereof, and to corrugate the refolded closure member.

9. A system for closing square bags disposed in open cartons comprising means for tucking in a side of a bag for formation of a closure member and for turning away therefrom the adjacent top flap of its carton, a conveyor for transporting the cartons, mechanism for transferring each carton in turn from said tucking and turning means to said conveyor including means for restraining said flap in its turned position, and stationary elements above the conveyor effective upon each carton in turn to flatten the closure member of the bag therein, to restrain said flap of the carton in its turned position, and to turn other flaps of the carton top away from said closure member.

10. A system for closing square bags disposed in open cartons comprising means for tucking in opposite sides of a bag for formation of a closure member and for turning back an adjacent top flap of the carton enclosing the bag, a conveyor for transporting the cartons with bags therein, stationary elements above the conveyor effective upon each carton in turn to flatten the closure member of the bag therein, to restrain said flap thereof in its turned back position, and to turn back another top flap of the carton, means for folding said closure members comprising stationary members above said stationary elements and spaced along said conveyor in succession to engage each of said closure members, and means for creasing said closure members in advance of their folding and for pressing them after folding comprising rolls disposed above said stationary elements between said folding elements.

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