COLLAPSIBLE FILLING SPOUT FOR BAG FILLING MACHINE

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References Cited
UNITED STATES PATENTS
2,853,842 9/1958 Vredenburg 53/384
3,597,895 8/1971 Jensen 53/29
2,885,846 5/1959 Harker 53/183 X

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ABSTRACT
A collapsible filling spout including a sidewall member constructed such as of spring steel or the like so as to be deformably movable toward and away from a preferably stationary sidewall member disposed oppositely thereto. Such a spout is used cooperatively with opposed continuous belts which pass slidingly about the opposed sidewalls thereof, respectively. Spreadable flaps associated with the bags to be filled are gripped firmly between the sidewalls and the belts, respectively, and are thereby opened automatically accompanying outward deformation of the deformable sidewall.

12 Claims, 4 Drawing Figures
COLLAPSIBLE FILLING SPOUT FOR BAG FILLING MACHINE

BACKGROUND OF THE INVENTION

Collapsible spout means are not fully new to the art that has preceded this invention. For example, "duckbill" type spouts have been developed for use in semi-automatic bag filling machinery of a type as is illustrated in some detail in U.S. Pat. No. 2,853,842.

Collapsible spout constructions as they have been known heretofore, however, are generally inadequate for use in filling bags connected together (as opposed to filling bags individually). For example, the spout when it opens foreshortens the width dimension of the bag underneath the spout. Accordingly, some movement or tugging beneath the bags is virtually inevitable. Correspondingly when the spout closes, the bag last filled must somehow be pulled taut across the top end. Otherwise it may wrinkle badly thereby making subsequent closure sealing of the bag troublesome.

Despite such obstacles, it would be significantly advantageous if an operable collapsible spout construction would be made available to assist filling connectively associated bag elements. Such bag elements, for example, usually are constructed to include spreadable flaps between which the bags are filled. Pursuant to bag size, the height of such flaps as are presently required may vary anywhere from approximately 2 to 5 inches or more. The flaps are customarily trimmed as scrap after bag filling.

By using a collapsible spout, the height of the flaps however can be reduced to a constant 1 to about 2 inches regardless of bag size. In other words, if the spout is collapsible and therefore relatively narrow when collapsed, the flaps move to the opposite sides of the spout even though the flaps may be of minimal height. Otherwise where they are made to pass around a non-collapsible spout of more substantial width, correspondingly greater flap height is understandably required.

Accordingly, it is among the objects of the present invention to provide an improved collapsible spout construction wherein the spout is movable from a closed to an open position without requiring a shortening of the width dimension of the bag underneath the spout.

BRIEF SUMMARY OF THE INVENTION

Briefly, then, the present invention contemplates improved collapsed spout constructions which employ preferably a first or stationary sidewall member defining a generally concave inner surface and disposed oppositely thereto, a second or deformable sidewall member constructed such as of resilient sheeting material like spring steel, for example. The latter member is deformably movable from a position closely adjacent the aforesaid concave surface, to an open position where it is "bowed" or otherwise moved outwardly away from said concave surface. Opposed continuous belts are employed cooperatively with such a point construction and pass slingly about the sidewall members thereof, respectively. Spreadable flaps associated with the bags to be filled are gripped firmly between the belts and the sidewall members, respectively, so that as the deformable member is moved to the open position, the bag underneath the spout is opened automatically for filling.

As will be understood more fully hereinafter, no appreciable change in the width dimension of the bag being filled is required upon opening the spout. Therefore, a collapsible spout of the type as is disclosed herein is particularly applicable for bag elements connected together as in a series which, in turn, permits the bags to be fed automatically to the filling station.

Yet additional objects and advantages of the present invention, and its numerous and cognate benefits, are even more apparent and manifest in and by the ensuing description and specification taken in conjunction with the accompanying drawing, in which wherever possible, like characters of reference designate corresponding material and parts through the several views thereof in which:

FIG. 1 is a side elevational view of filling apparatus including a collapsible filling spout of the type contemplated by the present invention;

FIG. 2 is a top view of the apparatus of FIG. 1, only with certain parts thereof broken away to better illustrate the construction of the aforesaid filling spout;

FIG. 3 is a cross-sectional view of the apparatus of FIG. 1 taken along reference 3—3 thereof; and

FIG. 4 is an enlarged partial view showing an element in which the deformable sidewall member of the filling spout of FIG. 1 is slidably carried along its forwardmost edge portion.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now more particularly to the drawings, there is shown in FIGS. 1 through 3 bag filling apparatus 10 including a continuous bottom conveyor belt 12, and positioned centrally above conveyor belt 12, a collapsible filling spout 14. Filling spout 14 comprises a first or stationary sidewall member 16 defining a generally concave inner surface 18, and opposite to surface 18 is a second sidewall member 20 comprised of deformable sheet material, such as spring steel, resiliently deformable plastic, or the like. Side wall members 16 and 20 are affixed commonly at the back end 22 of spout means 14 such as in rigid bracket means 24, and at the forward end 26 of the spout means, sidewall member 16 is similarly affixed in rigid bracket means 28. Bracket means 28 includes a vertical slot 30 in which deformable sidewall member 20 is slidably movable, as is best viewed in FIG. 4.

Gripping belts 32 and 34, horizontally operated, are disposed on each side of spout 14 so that the inner runs 36 and 38 of the belts pass slingly about the exterior surfaces of sidewall members 16 and 20, respectively. Belts 32 and 34 can be operated at one end such as by drive pulleys 40 and 42, and at their opposite end travel around idler pulleys 44 and 46. A first set of idler squeeze pulleys 48 and 50 are disposed adjacent forward end 26 of spout 14. Squeeze pulleys 48 and 50 cooperate with a second set of idler squeeze pulleys 52 and 54 disposed rearwardly thereof to assist belts 32 and 34 to snugly engage sidewall means 16 and 20, respectively.

Affixed generally to the mid-region of the sidewall member 20 is a reversibly movable bar 56 slidably guided at a region remote from member 20 in a stationary hollow guide piece 58. Rigidly attached to the upper extent of guide piece 58 is an air cylinder means 60 or the like which movably operates rod 56 such as through suitable lever means 62. Rod 56, in turn, deformably moves sidewall member 20 toward and away
from sidewall member 16 to open and close spout 14 in a manner as will be described more fully hereinafter. Rotatably attached to the underside of bar 56 adjacent sidewall member 20 is idler pulley means 64 which engages belt 32 to thereby assist the belt to follow any deformation movement of sidewall member 20.

Spout 14 further includes a first upper sidewall portion 66 displaced upwardly of sidewall member 20, and which is rigidly affixed in place such as by fixed attachment to hollow guide piece 58. A flexible connecting piece 68 of fabric or rubber web material, for example, is attached between upper sidewall portion 66 and sidewall member 20. A second upper sidewall portion 70 is affixed to the upper edge of sidewall member 16, and extends generally upwardly and outwardly therefrom as to cooperatively, with portion 66 and connecting piece 68, define the upper regions of spout 14.

OPERATION

To operate apparatus 10, bag elements 72 are fed connectively into the apparatus assisted most preferably by suitable bag infeeding means of a type as is disclosed in copending application Ser. No. 816,588, filed Apr. 16, 1969 now U.S. Pat. No. 3,583,127, or other suitable infeeding means as is disclosed in U.S. Pat. No. 3,559,874, issued Feb. 2, 1971. As may be noted by my reference to the aforesaid applications, the bags may initially include a tunnel across their top end, the tunnel being receivable in suitable mandrel means to guide the bags into the filling apparatus generally in a curtain-and-rod-like fashion (not shown). In any event, the tunnel is thereafter longitudinally slit to open the bags for filling thereby leaving freely spreadable flaps across the top end of the bag chain as denoted generally at 74 and 76 in FIGS. 2 and 3.

The bags in this condition are ready to be advanced to filling spout 14, preferably one bag at a time, or alternately in groups if a large filling spout relative to bag size is employed. To accomplish this end, belts 32 and 34 grip between them flaps 74 and 76 and assisted by bottom conveyor belt 12 advance the bags in intermittent fashion. Accompanying such movement, flaps 74 and 76 are continuously plowed apart from each other by the tunnel extent of bracket means 28.

The initial position of spout 14 is the collapsed or rest position as shown in full lines in FIG. 2. Once the bag is in place beneath the spout, however, rod 56 is operated outwardly by air cylinder means 60, thereby moving sidewall member 20 to the open position as is shown in dotted lines in FIGS. 2 and 3. In moving between the rest and open position, sidewall 20 passes through an intermediate position where the same must shorten in the machine direction, or else it will tend to "buckle" or warp irregularly. To avoid this result sidewall member 20 is permitted to first move inwardly in slot means 30 as it passes through the aforesaid intermediate position, and then outwardly in slot means 30 as it approaches the position in dotted lines.

In any event, flaps 74 and 76 of the bag element beneath the spout are separately gripped between belts 32 and 34 and the sidewall members, respectively, and thus the bag is opened automatically by movement of sidewall 20 to the open position. The bag is thus immediately ready to receive the product fill, and at the completion of the filling step, rod 56 is reversely operated moving sidewall portion 20 to the closed position. The bag chain is then advanced one position forward by belts 32 and 34 and conveyor belt 12 to repeat the filling cycle. Alternately bar 56 can be reversely moved to deform sidewall member 20 to the closed position generally simultaneously with the forward movement of the bag chain, as will be appreciated by those skilled in the art.

Referring now particularly to FIG. 2, spaced apart points X and Y are indicated adjacent the opposite ends of spout 14. The length of the path between points X and Y following the profile of sidewall member 20 in the closed position, can be made precisely equal the length of the same in the open position. For example, such can be accomplished by controlling the amount the spout opens. Accordingly, the width of the bag underneath the spout remains unchanged in moving the spout between the open and closed positions. In other words, the bag is not appreciably foreshortened by such movement of spout 14. Thus it is particularly evident that the type collapsible spout construction disclosed herein is particularly applicable for bags of a type connected together in chain form.

The configuration of sidewall member 16 can be concave to sidewall member 20, and the distance along this side of the spout between points X and Y, following the profile of member 16, should be as closely approximate as possible to that of sidewall member 20 in the closed and open positions, respectively. Obviously other configurations of sidewall member 16 can be readily substituted for the concave configuration shown, however, to accomplish this latter objective.

While certain representative embodiments and details have been shown for the purpose of illustrating the invention, it will be apparent to those skilled in the art that various changes and modifications can be made therein without departing from the spirit and scope of the invention.

What is claimed is:
1. In a filling apparatus the combination of: a pair of movable endless belts, a filling element having oppositely disposed first and second sidewall portions interposed between said belts whereby the belts pass slidingly about said first and second sidewall portions thereof, said first sidewall portion defining a concave inner surface, said second sidewall portion being deformable, and means to deformably bow said second sidewall portion inwardly toward said concave surface of said first sidewall portion thereby placing said filling element in a non-filling position, and to deformably bow said second sidewall portion reversely to define a second concave surface to place said filling element in a filling position.
2. The combination of claim 1 wherein said second sidewall portion comprises resiliently deformable material like sheet metal.
3. The combination of claim 1 wherein said second sidewall portion includes leading and trailing edges, at least one of said edges being reversely movable responsive to operating the filling element between said non-filling and filling positions.
4. The combinations of claim 3 wherein said filling element includes opposed stationary members disposed adjacent its leading and trailing edges, respectively, said movable edge being slidably carried adjacent one of said stationary members, the opposite edge of said filling element being fixedly secured adjacent said other stationary member.
5. The combination of claim 4 wherein said first sidewall portion defines an inner surface disposed generally concave to said second sidewall portion, said second sidewall portion being deformably movable to a position closely adjacent said concave surface to assume said non-filling position.

6. The combination of claim 6 wherein in the non-filling position said deformable second sidewall portion defines a configuration which is in intimate relation with respect to said concave inner surface defined by said first sidewall portion.

7. The combination of claim 6 wherein the filling position, said second deformable sidewall portion defines a configuration which is a mirror image of said concave inner surface defined by said first sidewall portion.

8. A filling element comprising first and second opposed sidewall portions, at least a part of said second sidewall portion being deformably movable toward and away from said first sidewall portion, said first sidewall portion defining a stationary inner concave surface disposed opposite said deformably movable part of said second sidewall portion, and means to deformably move said part toward and away from said first sidewall portion to operate said filling elements between non-filling and filling positions.

9. The filling element of claim 8 wherein said second sidewall portion includes a movable and a stationary edge affixed to bracket means respectively, said movable edge being movable in one direction to place said filling element in a filling position and movable in a second direction to place said filling element in a non-filling position, said bracket means affixing said movable edge including means for receiving said movable edge when in a non-filling position.

10. A filling spout comprising first and second sidewall portions, said first sidewall portion having an inner surface portion defining a hollow region disposedly opposite to at least an area of said second sidewall portion, said second sidewall portion being deformably movable, and means to deformably move said second sidewall portion into said hollow region to operate the filling element to a non-filling position, and deformably outwardly from said non-filling position to operate said spout to a filling position.

11. The filling element of claim 10 wherein in the non-filling position said means deformably moves said second sidewall portion such that the profile thereof closely assumes the configuration of said inner surface portion.

12. The spout of claim 11 wherein in said filling position, said means deformably moves said second sidewall portion to closely assume the mirror image of the configuration thereof in the non-filling position.