July 11, 1967 R. E. SCHORER 3,330,093

BAG LOADING MECHANISMS AND MACHINES

Filed Feb. 27, 1964 3 Sheets-Sheet 1

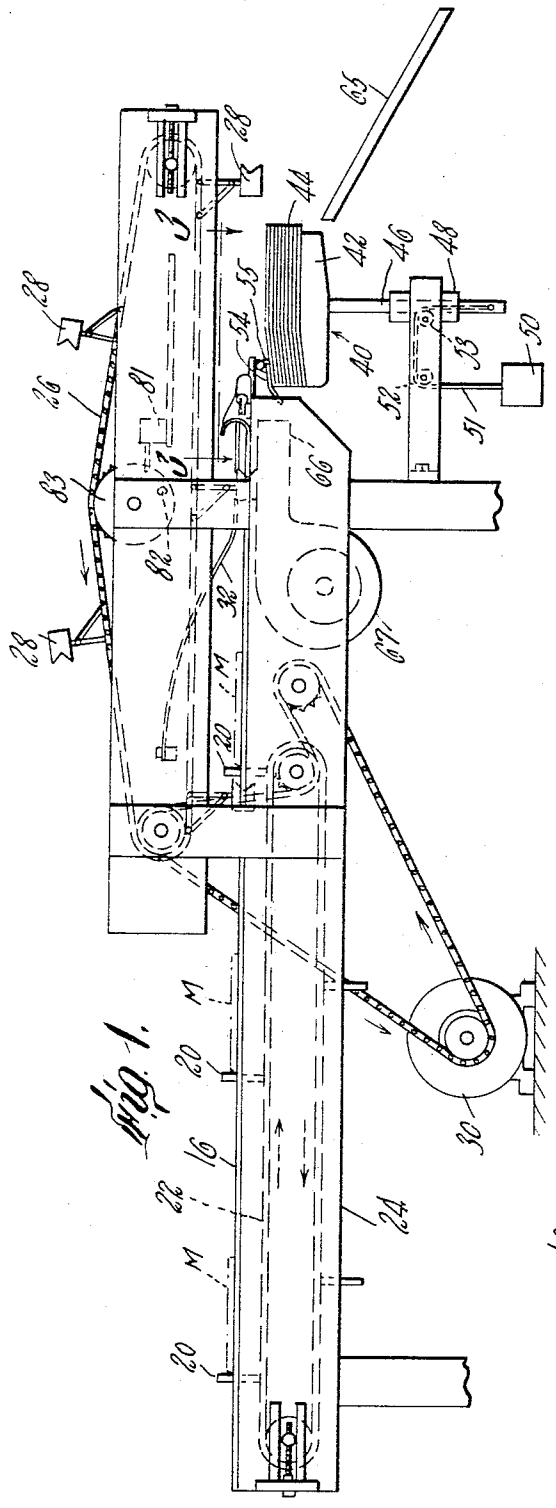


Fig. 1.

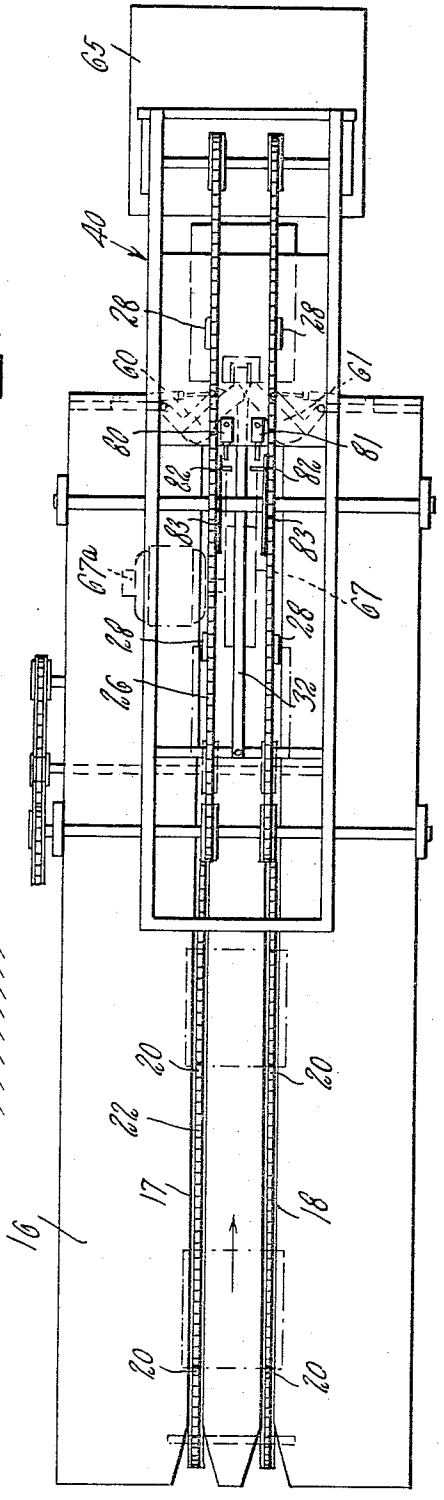


Fig. 2.

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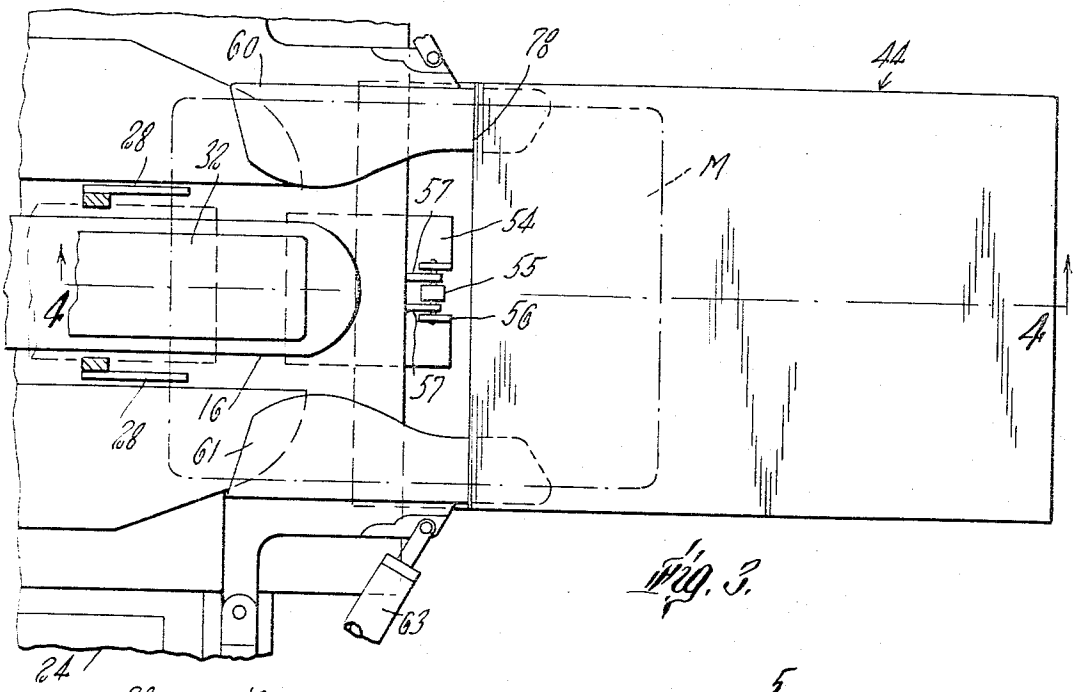


Fig. 3.

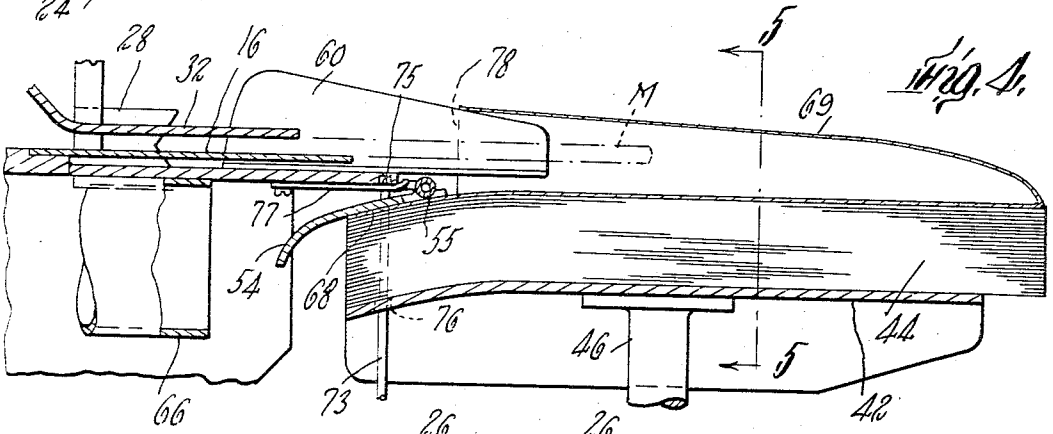


Fig. 4.

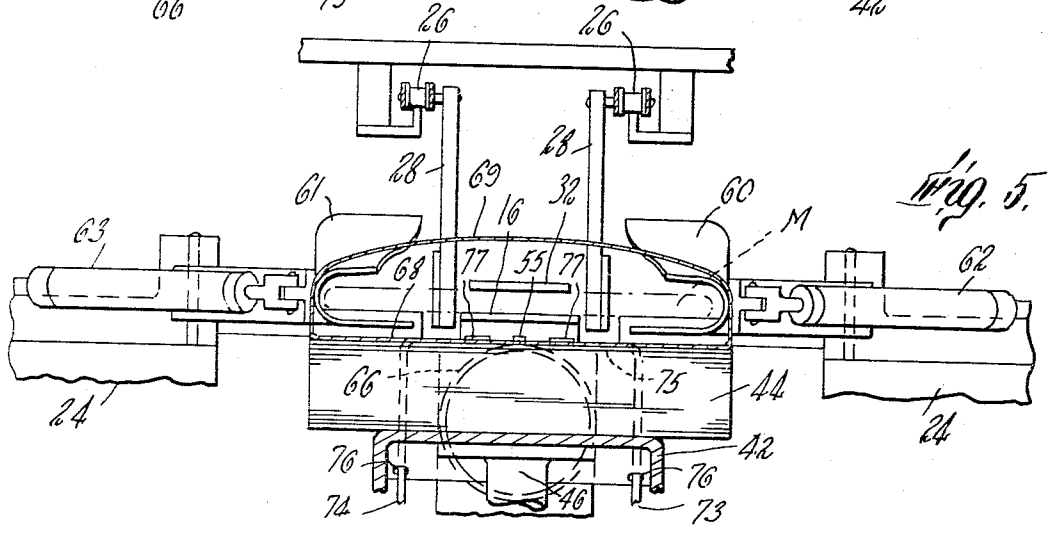


Fig. 5.

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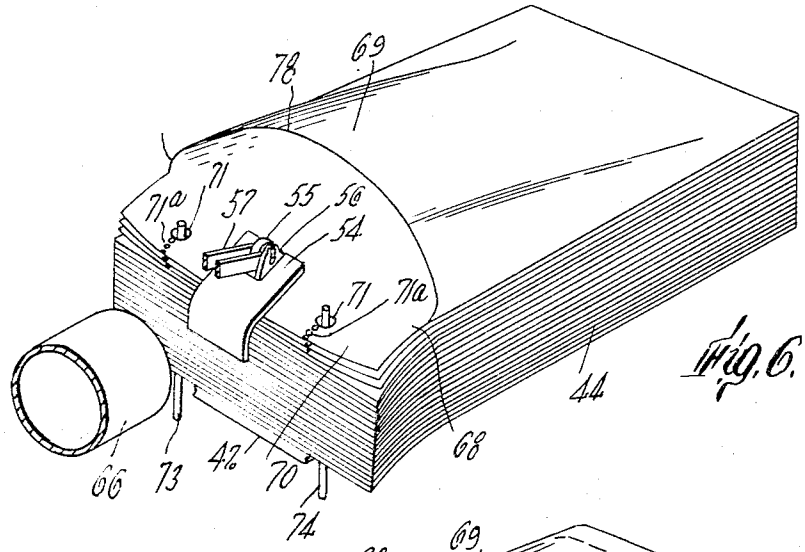


Fig. 6.

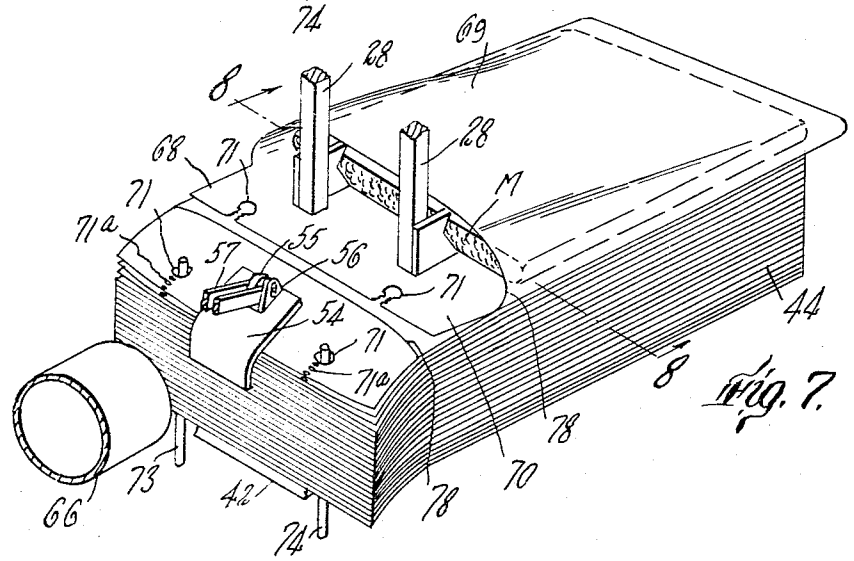
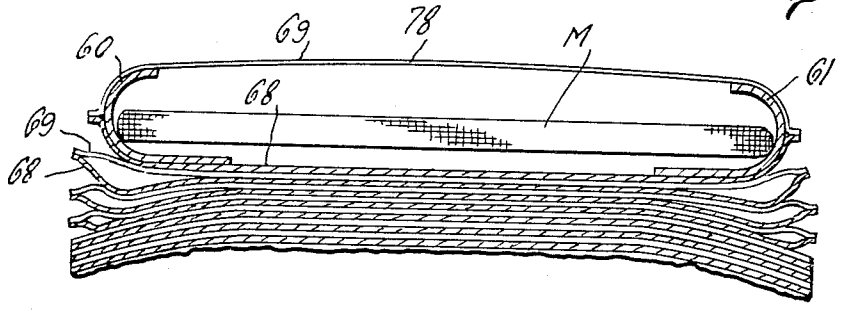


Fig. 7.

Fig. 8.



United States Patent Office

3,330,093

Patented July 11, 1967

3,330,093

BAG LOADING MECHANISMS AND MACHINES

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Filed Feb. 27, 1964, Ser. No. 347,924

2 Claims. (Cl. 53—189)

This invention relates to bag loading machines and more particularly to a bag opening mechanism which is so reliable and of such uniformly rapid operation as, when combined with automatic article feeding and withdrawing mechanism, to provide a continuous automatic machine for loading preformed open-ended bags even when made of highly flexible membranaceous sheet material such as polyethylene or similar smooth films.

Because of the extremely smooth nature of polyethylene and similar film materials, the two contacting internal surfaces of a flattened empty bag made from such materials are not readily separated at the mouth end when it is desired to load the bag with merchandise. Static electricity often tends to enhance the tendency for the opposing walls to stick together at the mouth edges unless prodded apart as a result of the persistency that can accompany human manipulation to ruffle the edges and thereby permit ingress of air or other mouth-expanding means.

As a result, loading of such bags has generally heretofore been done by hand so that the operator can regulate the intervals between advance of the articles to be inserted into the bags according to how long it takes each individual bag to attain an expanded mouth position. For example, in one system the empty bags are presented to and held one-by-one in front of an air stream, but oftentimes it is necessary for the operator to rumple the mouth of the bag or wait for a considerable period of time for the air stream to separate the mouth edges of a bag so presented to the air stream. With an operator always present and manipulating the advance of the articles by hand, one can be assured that no attempt will be made to insert the article into the bag until the mouth is expanded to a satisfactory extent to receive the merchandise. All attempts, however, to mechanize the article feed in such devices have been failures due to the fact that even when the operation is slowed down to give each bag a large amount of time in which to open, complete failures of many of the bags to open satisfactorily have always occurred, rendering the machine inefficient and uneconomical in the absence of a controlling operator.

It is thus an object of the invention to provide bag opening means which is completely reliable and so fast that automated rapid delivery of merchandise at a constant rate has become feasible without encountering misloadings or other interruptions caused by misoperation.

With such bag opening mechanism a machine may include structure operable to deliver merchandise at a constant continuous rapid rate to a bag loading station and remove the loaded bags from the loading station at the same constant rate.

To this end, while an air blast is relied upon for initial opening of the bag mouth, the apparatus herein so disposes a stack of bags that an underlying bag mouth can start to expand before the overlying bag has been fully removed from the stack and usually has portions of its mouth edges in separated relation even before the overlying bag starts to be removed from the top of the stack. By this means the time interval during which the air is effectively operating to start separation of the mouth edges of each bag can be made even longer than the cycle of the merchandise feed. The sooner closed mouth edges which are not completely restrained against initial separation are exposed to a flowing air stream, the sooner the chance exists of their separating. Hence, in operation of the present machine, there is much greater chance that the mouth edges of every bag will be expanded before the deadline in the cycle is reached, when it must be expanded to prevent misoperation. A much greater safety factor is thus provided by exposing the mouth edges of a lot of bags in the stack to the air stream all together instead of one-by-one as in prior art devices.

In any event, in the embodiment of the apparatus shown in the drawings, polyethylene bags of a conventional construction have been successfully loaded in commercial operations at a rate of 60 per minute without any failures, and over a time period of several hours with less than .1% failures due to non-opening of a bag. This performance is extremely gratifying when viewed from the standpoint that previous commercial hand loading rarely approached 30 per minute for any extended period of time.

A typical machine embodying the invention is shown in the accompanying drawings, wherein:

FIG. 1 is an elevational view of the machine;

FIG. 2 is a plan view thereof;

FIG. 3 is an enlarged plan view of the loading station contained within the machine;

FIG. 4 is a cross-sectional view taken along the line 4—4 of FIG. 3;

FIG. 5 is a cross-sectional view taken along the line 5—5 of FIG. 4;

FIG. 6 is an isometric view of certain parts at the loading station in their positions at a given point in the machine cycle;

FIG. 7 is an isometric view, similar to that of FIG. 6, showing certain of the parts at the loading station at a later stage of the machine cycle; and

FIG. 8 is a cross-sectional view taken along the line 8—8 of FIG. 7.

As shown in FIG. 1, articles of merchandise M are fed into the machine successively, being pushed along a stationary bed 16 which has a pair of spaced parallel slots 17 and 18 to accommodate pusher fingers 20 carried by an endless conveyor 22. The machine is presently being utilized to package knit garments which are folded about a cardboard insert to give a degree of rigidity desirable for best appearance of these garments when packaged.

The machine frame 24 also carries an overhead endless conveyor 26 having pairs of pusher fingers 28 spaced therealong, the spacing of the fingers 28 being so related to the spacing of the fingers 20 on the conveyor 22 that the successive pairs of pusher fingers 28 pass downwardly into the slots 17 and 18 behind the fingers 20 as the latter reach the inner end of their upper traverse, so that, as the fingers 20 move downwardly around their inner pulleys to their return traverse, the pusher fingers 28 on the overhead conveyor pick up each article M and push it towards a loading station. For this purpose the two conveyors are driven in synchronism from a common motor 30 through appropriate chains and sprockets.

As an article M proceeds toward the loading station, it passes beneath a compressor bar 32 which extends downwardly between the paths of the fingers 28 and presses down the center of each package so that successive packages will not exceed a maximum height.

The loading station is indicated generally at 40. It includes an elevating platform 42 adapted to carry a vertical stack of empty, collapsed polyethylene or similar bags 44. The platform is mounted on a pedestal 46 which extends downwardly through a bearing 48 and is urged continuously upwardly as by a weight 50 connected by a cord 51 running over pulleys 52 and 53 to the pedestal 46.

The bags are clamped on the platform 42, and its upward movement is limited by an anchoring means in the

form of a shoe **54** (best shown in FIG. 6) which rests on top of the inner end of the vertical bag stack through the interposition of a small roller **55** journaled between trunnions **56** having vertical slots carrying a pin which loosely connects the shoe **54** to the frame of the machine through a pair of rigid arms **57**, as shown in FIGS. 3 and 6.

Pivoted on the frame just ahead of the loading station **40** are a pair of gate-like horns **60** and **61** which swing about vertical axes from a closed transverse position ahead of the loading station into opened parallel position extending into and holding open an open bag mouth, as shown in FIGS. 3 and 4, by the actuation of separate fluid motors **62** and **63**, respectively, in timed relation to the passage of the articles M, as will be hereinafter described.

Beyond the loading station a chute **65** (FIG. 1) is positioned to receive the loaded bags as they pass beyond the loading station in a manner to be described.

The opening of each bag at its mouth end facing the approaching article M to permit insertion of the horns is accomplished initially by a continuous blast of air directed through nozzle **66** of an air blower **67** positioned beneath the bed **16** and driven by motor **67***a*.

The particular machine embodiment shown in the drawings is intended to operate with the use of polyethylene bags of the wicket type. These are conventional commercial bags which are folded or heat-sealed on three sides, leaving an open mouth on the fourth side, but one of the opposing walls **68** (FIG. 6) is longer than the other wall **69** forming a lip **70** provided with a pair of holes **71** so that a stack of the bags may be readily handled by impaling them on two rods such as **73** and **74**, the two rods being normally connected at their tops by a crosspiece **75** (FIG. 4) wherefrom the name wicket is derived. Preferably, the bags have longitudinal perforations **71***a* extending from the holes **71** to the edge of lip **70**.

The shoe **54**, previously described, is thus so dimensioned and so positioned that, when a stack of the wicketed bags is placed on the elevating platform **42**, the bottom ends of the wicket legs **73** and **74** pass through apertures **76** in the platform **42**, as shown in FIG. 4, and the cross upper leg **75** of the wicket is caught over a pair of spring catches **77** to hold it up, straddling but out of the way of the shoe **54**. The wicket therefore functions, as well as the shoe **54**, as means for restraining the bags at the loading station during advance of each article M through the bag mouth.

It will also be noted that the supporting surface of the elevating platform **42** preferably slopes upwardly beneath the shoe **54**, as shown in FIG. 4, and is narrower, as shown in FIG. 5, than the width of the bags. This configuration helps to keep the lip **70** below the level of the remainder of the top bag and compensates for any increased bulk at the side-sealed edges of the stacked bags and prevents "middle sag" in the stack by allowing the side edges to drape laterally over the platform **42**, as shown in FIGS. 6, 7 and 8.

Air propelled by the blower through the nozzle **66** thus impinges against the entire front wall of the stack not covered by shoe **54** which retains the lip **70** of the topmost bag, but not the inwardly offset mouth edge **78** of the upper wall **69** of the top bag, so that the air inflates the top bag so that its upper wall assumes more or less the configuration shown in FIG. 6, after which the horns **60** and **61** are pivoted into the opened mouth to gently stretch and hold it fully open mechanically and surrounding the path of the advancing articles M.

When the leading edge of an inserted article M engages the closed opposite end of the top bag held in the stack, after being pushed into the bag by the pusher fingers **28**, the continued motion of the pusher fingers will tear the topmost bag from the wicket legs **73** and **74**, as shown in FIG. 7, and move it out from beneath shoe **54** and roller **55**. The topmost bag will then be carried off the stack. As soon as it is free of the stack, it drops by gravity into the chute **65** (FIG. 1), falling off the pusher fingers **28** as it accelerates due to the drop, thereby freeing the fingers **28** to continue their path of movement up and over the overhead conveyor in their return motion.

While the top bag is being loaded, as seen in FIG. 8, the turbulent air stream tends to separate the mouth edges of the next underlying and sometimes several of the underlying bags, particularly because they are free to flutter at their side portions. When the uppermost bag is straightened widthwise by the horns **60** and **61**, the air gets in between the upper and lower walls of the underlying bag and starts to open it, except as restrained by the bottom wall of the overlying bag.

However, as soon as the fingers **28** have cleared the horns **60** and **61**, the horns are retracted, and as soon as the top bag clears the inner mouth edge of the next underlying bag, the air almost instantly inflates the underlying bag to the position shown in FIG. 6 ready to receive the horns and the next oncoming article M.

The motion of the horns **60** and **61** is so timed with respect to the advance of the fingers **28** that they will swing into the top bag just prior to or as they are contacted by the advancing article of merchandise M and will be retracted as soon as they can clear the advancing fingers **28**. This actuation is accomplished by a pair of switches **80** and **81** (FIG. 2) actuated by pins **82** carried by the upper sprocket **83**, a mechanical operation which need not be further described.

It is to be understood that the loaded bags may progress to a mouth sealing machine which can and usually does sever off the marginal portions of both walls beyond the original mouth edges, so that the unsightly torn lip **70** is not retained in the final package.

What is claimed is:

1. An automatic bag loading machine having means for successively advancing a series of articles of merchandise along a plane, during which advance the articles pass through a loading station whereat they are inserted into open-ended bags which are successively positioned in opened-mouth configuration facing and surrounding the path of advance of said articles and thereafter carry the successive bags in which they are inserted out of and beyond the loading station, the improvements which comprise, in combination, an elevating platform for urging a stack of collapsed bags having unsealed mouths, formed between an inwardly offset edge of one wall and the opposing longer wall laid on said platform with their mouths facing the advancing articles and their inwardly offset edges uppermost, said platform being of less width than the width of said bags in said stack, anchoring means for said bag stack engaging the center portion of the longer wall only of the top bag in the stack to limit the upward movement of said platform and maintain the top bag in the stack at a level adjacent to the plane of article advance, said anchoring means being of less width than the width of the bags, and an air nozzle facing the mouth side of said stack of bags for directing air continuously blown through said nozzle towards a plurality of the uppermost bags in said stack simultaneously to lift the unrestrained inwardly offset edge of, and inflate, the top bag mouth into a configuration surrounding the path of said articles and separating mouth edge portions of the underlying bags in side areas beyond the side edges of said platform, to define inflated side air channels in underlying bags for insuring reliable inflation of the immediately underlying bag as it is progressively exposed as an article carries a top bag off said stack, disengaging the top bag from said anchoring means and progressively exposing the top of said immediately underlying bag.

2. Bag-loading mechanism comprising a nozzle for directing a stream of air blown through said nozzle, a magazine for supporting collapsed open-ended flexible

film bags in a vertical stack with their open ends disposed in the path of an air stream emanating from said nozzle, said magazine including an elevating platform of less width than the width of said bags whereby the side areas of said bags sag over the side edges of said platform, means urging said platform upwardly, and central anchoring means between said nozzle and said stack extending over the top surface of a central marginal portion of the bottom wall of the top bag in said stack, to clamp the bag stack on said platform and limit upward motion of said bags, said anchoring means being of less width than said bags, and portions of the bag mouth edges, on both lateral sides of said central anchoring means, of a plurality of the bags near the top of said stack being simultaneously in the path of said air stream and separating vertically beyond the side edges of said platform while they are still beneath the top bag in said stack, said

separated lateral side portions defining internal inflated air channels beyond the edges of said platform for insuring reliable inflation of the next underlying bag when the top bag is removed from said stack.

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