United States Patent [19]

Clancy

[11] **3,812,649**

[45] **May 28, 1974**

[54] **AUTOMATIC PACKAGING MACHINES**

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[21] Appl. No.: **307,846**

[52] **U.S. Cl.** **53/187**, 53/385

[51] **Int. Cl.** **B65b 43/36**

[58] **Field of Search** 53/187, 183

[56] **References Cited**

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3,340,679	9/1967	Johnson	53/187 X
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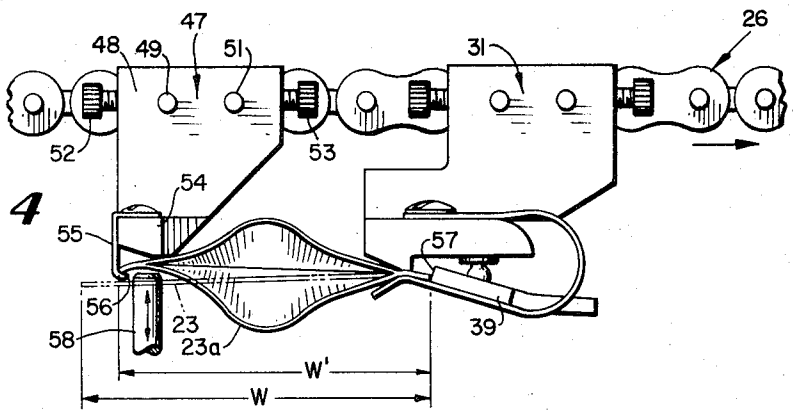
Primary Examiner—Travis S. McGehee

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[57] **ABSTRACT**

An automatic packaging machine wherein empty envelopes carried by a conveyor are each laterally bowed between fixedly spaced carrier and retainer devices on an endless conveyor to ensure full envelope opening while material is being introduced into the envelope.

11 Claims, 7 Drawing Figures



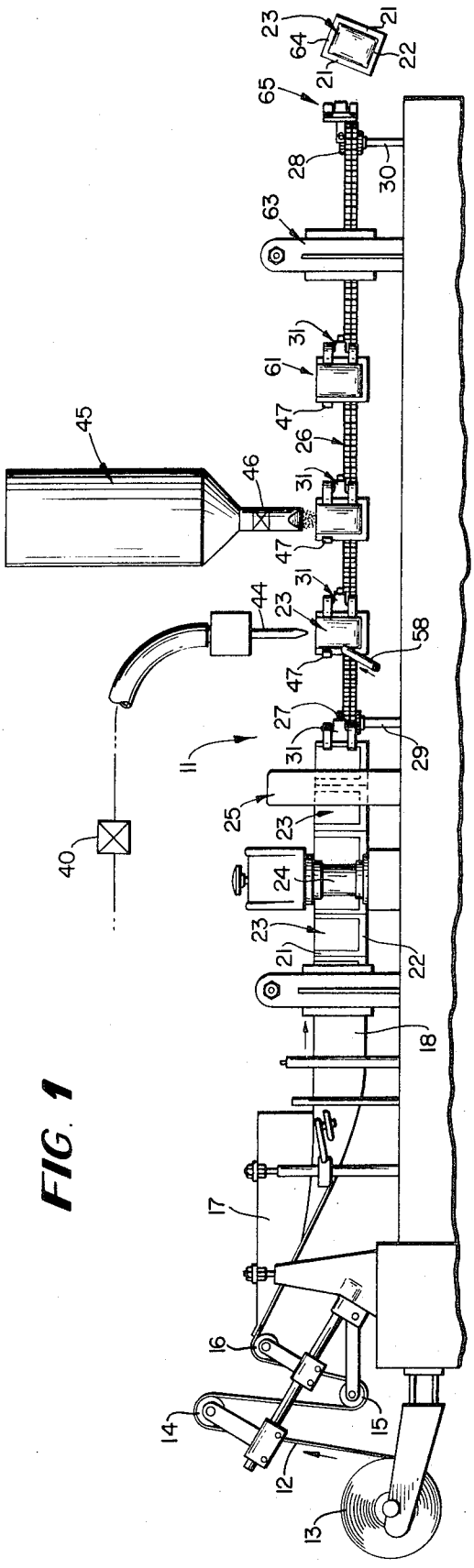


FIG. 1

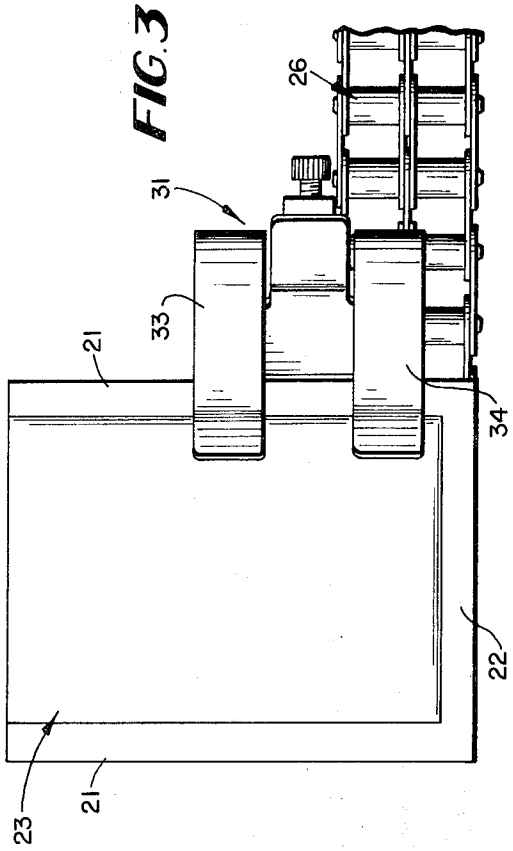


FIG. 3

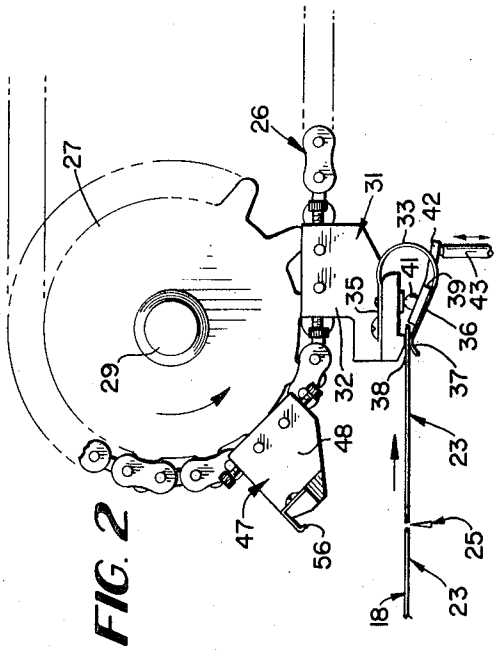


FIG. 2

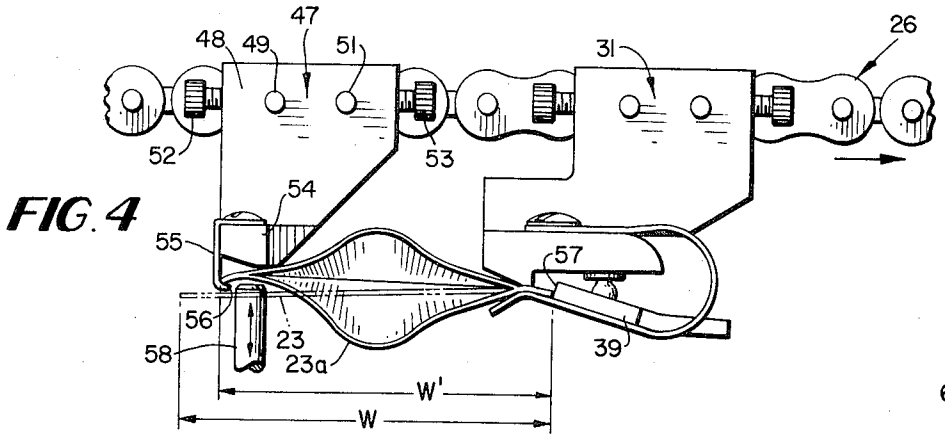


FIG. 4

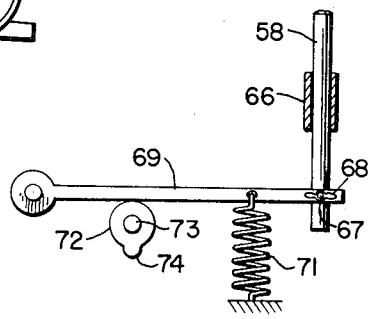


FIG. 7

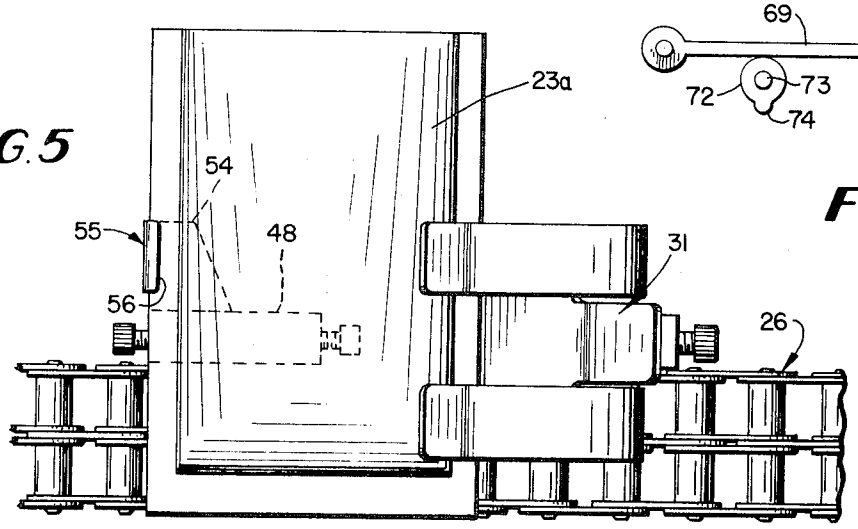


FIG. 5

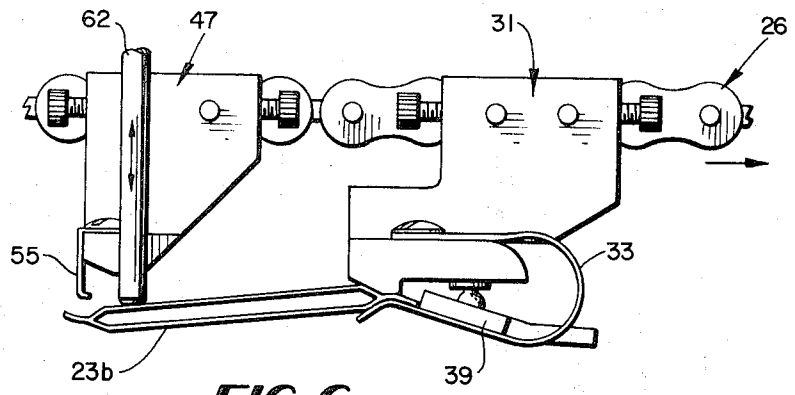


FIG. 6

AUTOMATIC PACKAGING MACHINES

This invention relates to automatic packaging machines and particularly to relatively simple but efficient arrangements for positively maintaining envelopes in reliably open condition during passage through an article or product introduction station.

The art of automatically packaging articles and measured quantities of fluent material in individual envelopes has been well developed and is being constantly improved. Examples of this art are disclosed in Clancy U.S. Pat. No. 3,481,099; Bartelt U.S. Pat. No. 2,649,674; Harker U.S. Pat. Nos. 2,745,583 and 2,899,786 and Johnson U.S. Pat. No. 3,340,679. The invention herein to be disclosed constitutes improvement over such art.

The invention herein will be described, as its preferred embodiment, as incorporated in an automatic packaging machine wherein envelopes are formed from a web of sheet material and disposed in succession at a filling station where a measured change of product is introduced, and then the envelopes are removed from the filling station for closing and further disposition. As will appear an important advantage of the invention herein is that it provides a novel positive arrangement for opening each envelope prior to introduction of the product and positively maintaining it open during introduction of the product.

More specifically with respect to the preferred embodiment, a major advantage of the invention is that each formed open top envelope which is usually relatively flat as a result of the envelope forming operation travels through the product or article introduction station on a conveyor and is first expanded to an opened condition as by an air blast and positively held in that opened condition during product or article introduction by special positive holding means on the conveyor operated in timed association with the opening means. Further important advantages of the invention reside in the particular mechanisms and structural combination and relationships of parts for accomplishing the foregoing as will appear in the claims herein.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is a side elevation showing apparatus for carrying out the invention according to a preferred embodiment;

FIG. **2** is an enlarged fragmentary top plan view showing the envelope carrying and holding devices on the endless chain conveyor;

FIG. **3** is an enlarged fragmentary side elevation showing the envelope carrying device;

FIG. **4** is an enlarged top plan view showing expansion of the envelope between the carrying and holding devices;

FIG. **5** is an enlarged fragmentary side elevation showing the expanded envelope held on the chain;

FIG. **6** is an enlarged fragmentary top plan view showing release of the filled envelope from the holding device; and

FIG. **7** is a rather diagrammatic view showing actuation of the various push rods.

PREFERRED EMBODIMENTS

FIG. **1** illustrates an automated assembly **11** wherein a continuous flat web **12** of envelope material is drawn from a rotatable supply roll **13** over guide and loop

forming rollers **14, 15** and **16** to pass beneath a plow **17** which shapes it to an upwardly open trough configuration in the region indicated at **18.** The shaped web enters a heat seal station **19** wherein it is gripped by suitable opposed heating dies that bond opposite sides together in vertical regions indicated at **21** and horizontal lower regions indicated at **22,** thereby providing successive upwardly open envelope sections **23** therealong.

The shaped web now passes between intermittently driven feed rollers **24,** which are periodically actuated (by means not shown) to pull suitable increments of the web off roll **13** and provide dwell periods wherein the foregoing heat seal operation and subsequent envelope severing and other operations are performed, as will appear.

After passing the intermittent feed rollers, the shaped web enters a cutting station **25** wherein individual envelope sections **23** are severed from the web in succession and are transferred to an endless chain conveyor **26.** At the cutting station **25** a knife or the like is automatically actuated during a dwell period of the shaped web to sever the web medially of the vertical heat sealed region **21,** so that each severed envelope **23** has opposite side edges and the bottom heat sealed as best shown in FIG. **3.**

Chain **26** is supported on spaced sprockets **27** and **28** carried by vertical shafts **29** and **30** respectively. One or both of these shafts is intermittently rotated (by means not shown) in timed relation with the intermittent feed rollers at **24,** for synchronous operation as will appear.

A series of envelope carrying devices **31** are mounted on the conveyor chain in fixedly spaced equidistant relation along the chain, and these devices **31** are shown in detail in FIGS. **2** and **3.** Each device **31** comprises a block **32** secured to a chain link and a spring clip arrangement comprising upper and lower leaf springs **33** and **34.** Each leaf spring is of generally U-shape and mounted on the block with one leg **35** fixed rigidly on the block and the other leg **36** relatively free and terminating in a rounded end **37** providing a rearwardly open resilient mouth at **38** for receiving and gripping the leading edge of an empty envelope **23** that has just been severed from the shaped web. At this point the empty envelope is usually in relatively flat condition. Device **31** includes a pivoted spring expanding member **39** pivoted to the block **32** at **41.** The rear end of member **39** engages the inner side of spring leg **36** and the front end **42** of member **39** extends into engagement with a push rod **43** that is reciprocable as indicated by the double arrow in FIG. **2** in timed relation with intermittent advance of the shaped web.

In operation, the intermittent feed at **24** periodically advances the leading edge of the shaped web into a chain mounted carrying device **31** which at that time is stationary during a dwell period of chain **26** and positioned at a front end station of the conveyor in alignment with the web as shown in FIG. **2.** Entry of the leading edge of the web into the spring clip arrangement is facilitated by the periodic action of push rod **43** to rock member **39** a small distance counterclockwise in FIG. **2** to thereby spread mouth **38** to receive the web end. Retraction of rod **43** allows the mouth **38** to resiliently close.

The foregoing arrangements for forming and severing the envelopes and transferring them to carrying devices

on the chain conveyor may be as disclosed in said Clancy and Johnson patents.

When the leading edge of the leading envelope on the shaped web is disposed in the spring clip on the carrier, forward feed of the web stops and the severing means at station **25** acts in timed relation to sever the leading envelope **23** from the web. This condition is indicated in FIG. **2.** Now the conveyor **26** is actuated to incrementally displace the carrier **31** to the right in FIGS. **1** and **2** for a distance sufficient to locate the envelope on the carrier beneath the discharge end of an air blast nozzle **44.**

At this point the envelope is laterally expanded by a blast of air entering the upwardly open end thereof. A suitable periodically actuated valve **40** controls delivery of air under pressure from a supply source to nozzle **44.** It will be noted that the envelope is mounted on the carrier with one side edge retained in the resilient mouth so that it is free to laterally expand under air pressure. After the envelope has been expanded the conveyor is again incrementally actuated to locate the expanded envelope beneath a powder discharge station **45.**

It has been found however, that while the air pressure will suitably temporarily expand the envelope by the time the envelope reaches the powder fill station, the inherent resiliency of the envelope material may have caused the envelope to return back toward the more or less flattened condition it exhibited when part of the shaped web and just after severing. Thus some of a measured change of powder discharged by periodic actuation of a powder control valve **46** may not all enter the partly closed upper end of the envelope. Not only is this a waste of powder, but the incompletely filled envelope must be discarded with further waste of powder and envelope material.

The present inention is primarily directed to solving this problem of waste, and in the preferred embodiment this is done by providing on the chain conveyor a retainer device **47** mounted in fixedly spaced relation to each carrier device **31.** As shown in FIG. **2,** the location of each device **47** is such that while the leading envelope **23** is being positioned in a carrier device **31** on a straight section of the chain the associated holding device is on an arcuate portion of chain at sprocket **27** so as to be out of alignment with the carrier device and hence out of the path of the web. However, when the chain has moved to locate each carrier device at the envelope expansion station at **44** the associated retainer device **47** has moved into the straight section of the chain in alignment with the carrier device, this condition being shown in FIG. **4.**

Retainer device **47** comprises a block **48** having bores receiving upstanding extended link pins **49, 51** of the chain, and set screws **52, 53** for fastening the block to the pins. Upstanding from block **48** is a rigid arm **54** mounting a sheet metal clip **55** having a forwardly turned edge **56** providing a forwardly facing socket that in the straight section of the chain is in alignment with resilient mouth **38.**

As shown in FIG. **4** the leading edge of the envelope abuts a stop surface **57** which may be on member **39.** After the envelope has been laterally expanded to the condition shown at **23a** in FIG. **4,** a reciprocable push rod **58** is actuated to engage the trailing edge of the envelope and push it toward the chain and into the socket which, since its distance *w'* from stop surface **57** is less than the flattened width *w* of the envelope, traps the expanded envelope positively in opened condition between the devices **31** and **47.**

As a result, when the opened envelope moves to the powder fill station, its upper end is positively held open to receive the entire discharge of powder and the filling station is more accurate.

After the envelope receives the powder charge, conveyor **26** may be again actuated to advance an increment to dispose the filled envelope at the station indicated at **61** in FIG. **1.** Here a reciprocable push rod **62** is actuated to engage the trailing edge of the filled but still open envelope **23b** and push it out of the socket, as shown in FIG. **6,** the forward edge of the envelope still being gripped in the carrier **31.** In this condition the envelope may tend to return to flat sided condition as illustrated in FIG. **6.**

The chain **26** is again incrementally actuated to locate the envelope at the final heat seal station indicated at **63** in FIG. **1** where the envelope is formed with the upper seal region **64** that closes it and seals in the contents. Upon the next incremental movement of chain **26** the filled sealed envelope is moved to the conveyor rear end station **65** where it is removed from the conveyor **26** and further processed or packaged.

FIG. **7** shows a manner of reciprocating push rod **58.** Rod **58** is mounted in a slide guide **66** and its end is connected by a pin **67** and slot **68** to a pivoted lever **69** biased by spring **71** against cam **72** on a power driven shaft **73.** Cam **72** has a projection **74** that once each revolution of shaft **73** rocks lever **69** to push rod **43** toward the chain and trap the trailing end of the envelope as each expanded envelope is stopped at the expansion station. A similar cam on the same shaft may actuate push rod **43.** Push rod **62** is similarly actuated but of course from the opposite side of the straight section of the chain than the push rod **58.**

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by Letters Patent is:

1. A packaging machine comprising means for introducing material into open envelopes at a discharge station, a conveyor mounted for movement in said machine, means including spaced envelope carrying devices on said conveyor for carrying a series of normally flat open top envelopes to said discharge station, each envelope being carried in edgewise spaced succession to adjacent envelopes by one side edge by one of said envelope carrying devices on said conveyor, envelope opening means for laterally bowing the open top of each envelope whereby the opposite sides are spread apart and the opposite side edge thereof is displaced toward said first mentioned side edge, a series of holding means mounted on said conveyor between said carrying devices, each holding means being mounted in fixed relation to said conveyor and adapted with an adjacent carrying device to engage and hold said displaced opposite side edges effectively spaced apart a distance corresponding to the spacing of the side edges

of the bowed envelope, and means operated in timed relation with said envelope opening means for disposing each envelope after it has been opened in operative association with one of said holding means preparatory to introduction of material into the open envelope.

2. The packaging machine defined in claim 1, wherein said carrying device comprises a spring clip into which the leading edge of an envelope is inserted for mounting it on said conveyor and each holding means is in the form of an abutment for engaging the trailing edge of that envelope.

3. A packaging machine comprising means for introducing material into open envelopes, means providing a series of normally flat open top envelopes mounted in edgewise spaced succession on a moving conveyor, envelope opening means for laterally bowing the open top of each envelope whereby the opposite sides are spread apart and the opposite edges thereof are displaced toward each other, holding means on the conveyor for engaging said displaced opposite side edges effectively spaced a fixed distance corresponding to the spacing of the side edges of the bowed envelope, said holding means comprising a carrier device in the form of spring clip into which the leading edge of an envelope is inserted for mounting it on said conveyor and a retainer device in the form of a stationary abutment for engaging the trailing edge of that envelope, and means operated in timed relation with said envelope opening means for disposing each envelope after it has been opened in operative association with said holding means preparatory to introduction of material into the open envelope comprising means reciprocable in a direction normal to movement of the conveyor for engaging and moving the trailing edge of said envelope into contact with said abutment.

4. A packaging machine comprising means for introducing material into open envelopes, means providing a series of normally flat open top envelopes mounted in edgewise spaced succession on a moving conveyor, envelope opening means for laterally bowing the open top of each envelope whereby the opposite sides are spread apart and the opposite edges thereof are displaced toward each other, holding means on the conveyor for engaging said displaced opposite side edges effectively spaced a fixed distance corresponding to the spacing of the side edges of the bowed envelope comprising a carrying device on the conveyor for gripping the leading edge of the envelope and a fixedly spaced associated retainer device on the conveyor for engaging the trailing edge of the opened envelope and means operated in timed relation with said envelope opening means for disposing each envelope after it has been opened in operative association with said holding means preparatory to introduction of material into the open envelope including means for automatically displacing the trailing edge of the envelope into holding engagement with said associated retainer device after the leading edge of the envelope has been gripped by said carrier device and said envelope has been moved by operation of the conveyor into an expansion station containing said envelope opening means.

5. The packaging machine defined in claim 4, wherein means is provided for automatically displacing the trailing edge of the envelope from holding engagement with said retainer device after the material has been introduced into said envelope.

6. The packaging machine defined in claim 4, wherein said carrying device is a resilient clip on said conveyor and said retainer device provides a socket open toward said clip.

7. The packaging machine defined in claim 4, wherein said conveyor comprises as periodically actuated endless conveyor having at one end an arcuate section followed by a straight section and wherein during each dwell period of the conveyor a carrying device on the straight section is disposed to receive the leading edge of an envelope, and the associated retainer device is on said arcuate section out of the path of said envelope, said retainer device moving into said straight section in alignment with the associated gripping device when the conveyor is next actuated.

8. A packaging machine comprising means for discharging material into open envelopes, means providing a series of normally flat open top envelopes mounted in edgewise spaced succession on a moving conveyor, envelope opening means for laterally bowing each envelope whereby the opposite sides are spread apart and the opposite side edges thereof are displaced toward each other, holding means on the conveyor for engaging said displaced opposite side edges, and means reciprocable in a direction normal to movement of the conveyor for engaging and moving the opened envelope into the holding means.

9. The packaging machine defined in claim 8, wherein said holding means comprises a carrying device on the conveyor for gripping the leading edge of the envelope and a fixedly spaced retainer device on the conveyor for engaging the trailing edge of the opened envelope.

10. The packaging machine defined in claim 1, wherein each said carrying device is longitudinally fixed on said conveyor.

11. The packaging machine defined in claim 10, wherein each carrying device is a flexible clip that is open rearwardly with respect to the direction of conveyor movement to accept insertion of the leading edge of an envelope, and each said holding means coacting with an adjacent clip to carry an envelope therebetween is a longitudinally fixed socket open toward said adjacent clip.

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