United States Patent [19]

Bell et al.

[11] **3,707,825**

[45] **Jan. 2, 1973**

[54] HOSIERY PACKAGING MACHINE

[75] Inventors: **Cecil R. Bell**, Pinnacle; **Jessie E. Swaim**, Winston-Salem; **Horace Paul Gilgo**, Walkertown; **Robert C. Rogers**, Bethania; **Walter Ray Sizemore**; **Samuel M. Orr, Jr.**, both of Winston-Salem, all of N.C.

[73] Assignee: **Hanes Corporation**, Winston-Salem, N.C.

[22] Filed: **Dec. 23, 1970**

[21] Appl. No.: **100,900**

[52] **U.S. Cl.** **53/282**

[51] **Int. Cl.** **B65b 5/04**

[58] **Field of Search** 53/116–120, 235, 53/250, 253, 266, 281, 282

[56] **References Cited**

UNITED STATES PATENTS

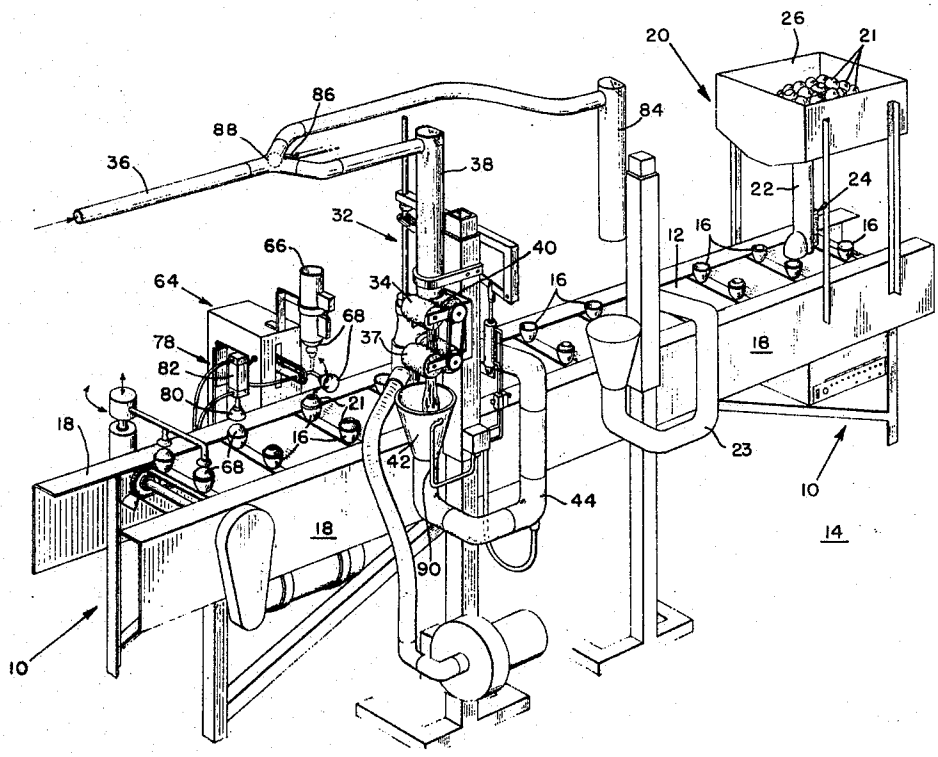
2,841,938	7/1958	Speroni	53/282
2,897,643	8/1959	Byrd	53/281 X
3,503,182	3/1970	Phipps	53/282
3,190,055	6/1965	Povlacs	53/282
2,930,172	3/1960	Pettee et al.	53/250 X
3,263,394	8/1966	Jensen	53/282 X

Primary Examiner—Robert L. Spruill
Attorney—Charles Y. Lackey

[57] **ABSTRACT**

A packaging machine having a frame and an endless conveyor carrying a plurality of package receiving devices. A package feeding mechanism deposits at least portions of packages in the receiving devices, and articles to be packaged are subsequently positioned within the deposited package portions by an article feeding apparatus. A package closing device then provides a closure which is positively positioned to form a finished, and sealed package.

4 Claims, 7 Drawing Figures



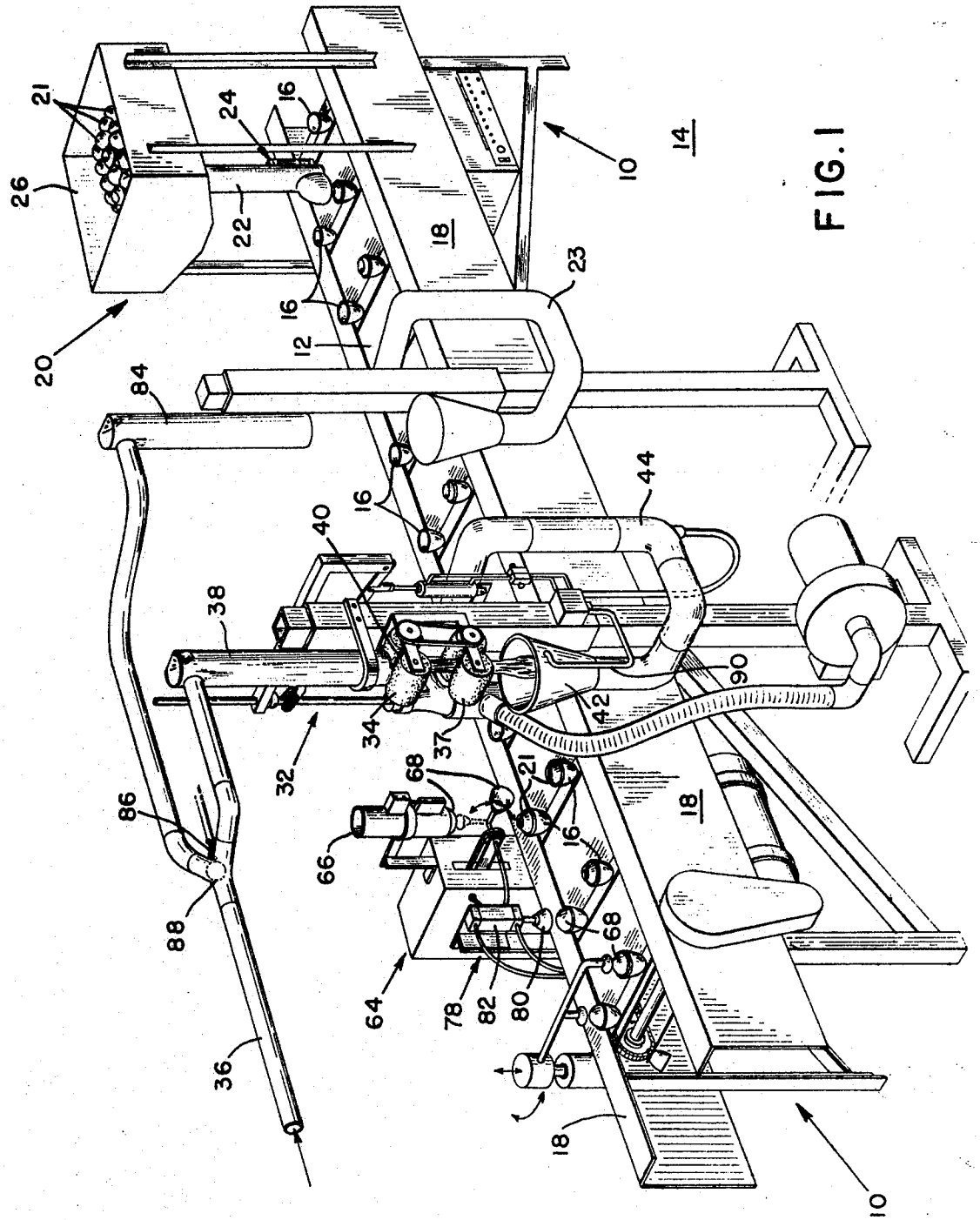

21
24
16
26
22
18
10
14
23
20
12
84
44
40
38
90
42
34
37
32
68
21
86
66
16
88
68
64
78
82
80
36
18
10

FIG. 1

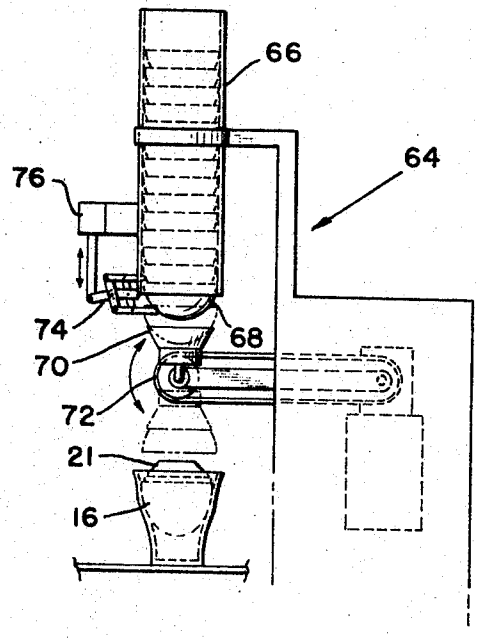


FIG. 6

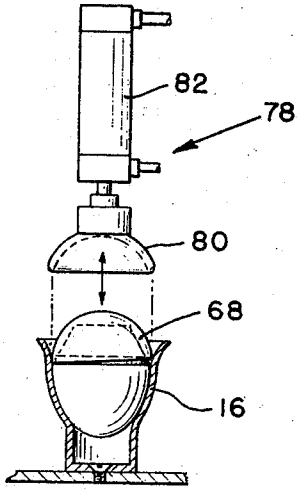


FIG. 7

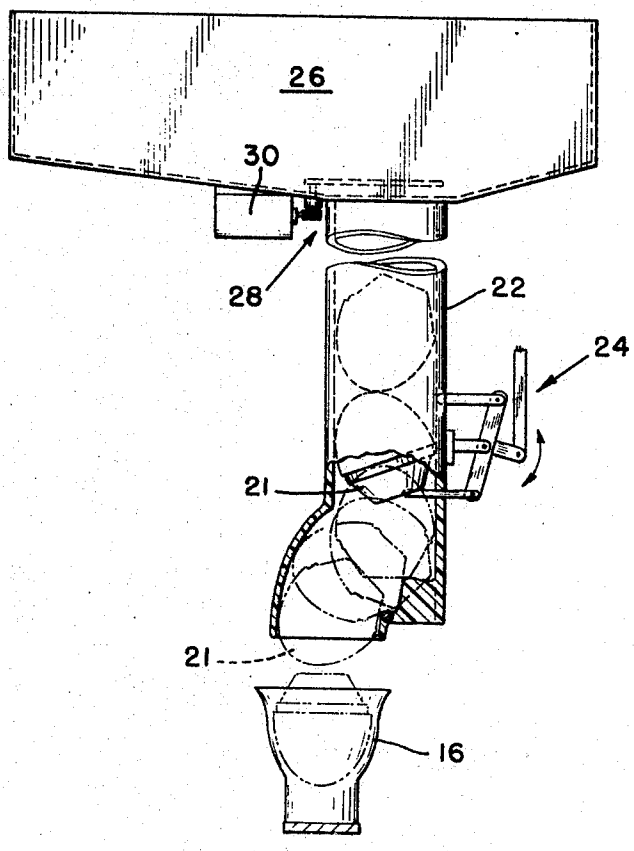


FIG. 2

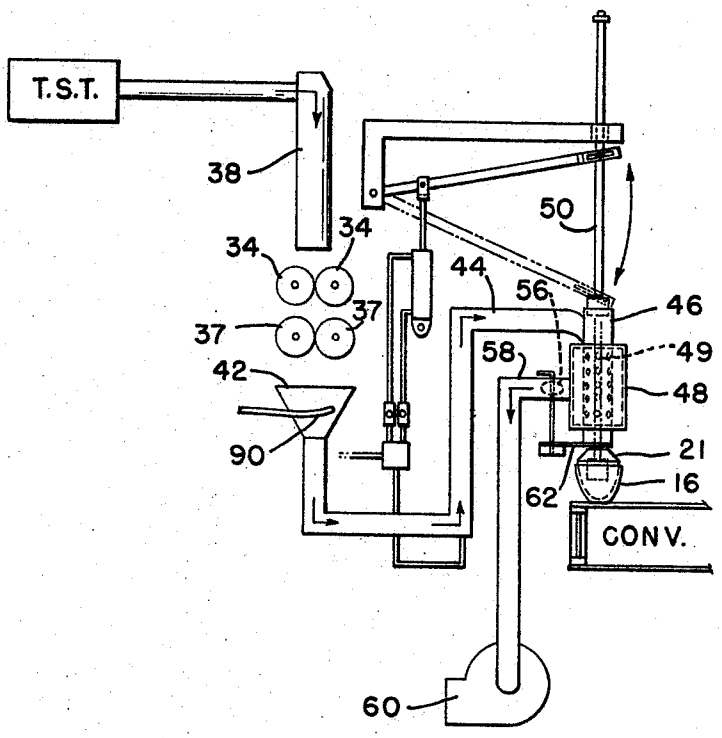


FIG. 3

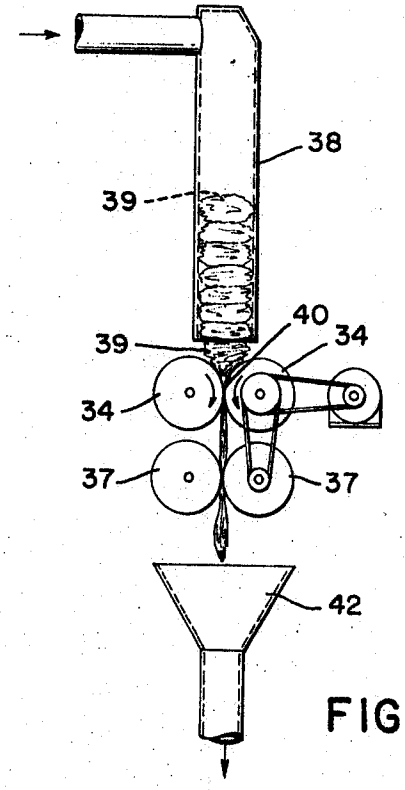


FIG. 4

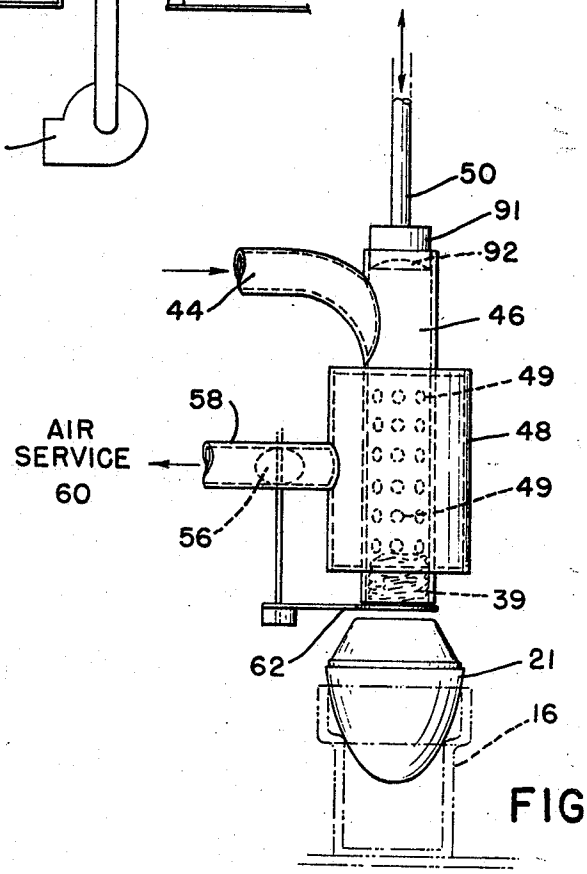


FIG. 5

HOSIERY PACKAGING MACHINE

BACKGROUND, BRIEF SUMMARY AND OBJECTIVES OF THE INVENTION

The present invention relates to packaging machinery and particularly to the continuous packaging of textile articles within appropriately designed packages by the apparatus.

While a considerable number of automatic textile article packaging devices have been developed, these have, for the most part, been directed toward packaging flat, folded garments which are supported or held by cardboard or plastic inserts. Such apparatus is extremely expensive, and for this reason, the packaging function in a garment manufacturing operation is usually accomplished by a plurality of women folding the garments for insertion within an open polyethylene or plastic bag of some suitable design and subsequently sealing this bag with tape, glue or heat.

In the textile industry, the general acceptance of ladies' unboarded stockings and panty hose has emphasized the need for a suitable automatic packaging machine to package hosiery and panty hose garments, as well as other relatively small articles produced in large quantities, without the problems and expense associated with hand packaging flat, folded goods. The unfolded crinkled nature of these garments permits the design and utilization of a relatively simple and inexpensive machine capable of packaging the garments within a variety of shaped containers.

A package herein shall be deemed to include any receptacle or container suitable for receiving and retaining, either wholly or partially, an article preferably constructed of fabric so that it can be positively and deformable urged into the package.

The present invention is an apparatus designed to package a wide range of textile articles such as items of wearing apparel and particularly ladies' unboarded stockings and panty hose which heretofore have been manually packaged in a flat, boarded condition. The apparatus is comprised of a frame, an endless conveyor and garment receiving devices situated on the surface of the conveyor maintaining at least a portion of a package to receive an article to be packaged. A package feeding hopper provides a continuous supply of packages within the receiving devices on the conveyor to receive the textile articles, and a garment feeding device is located near the conveyor to provide a large supply of garments that can be sequentially deposited in the packages held by and moving with the conveyor.

From the foregoing, it will be apparent that a primary object of the present invention is to provide a packaging machine of the type described which will permit automatic packaging of textile articles and the like.

Another object of the present invention is to provide a device of the type described wherein a plurality of packages and a plurality of garments are sequentially and automatically combined on a moving conveyor to form a finished, packaged item.

Yet a further object of the present invention is to provide a device of the type described suitable to handle in particular a large volume of relatively small items such as ladies' unboarded stockings and panty hose garments in a manner heretofore unknown in the art.

These and other objectives of the present invention will become more apparent after a consideration of the following detailed specification taken in conjunction with the accompanying drawings wherein like characters of reference designate like parts throughout the several views.

FIGURE DESCRIPTION

FIG. **1** is a perspective view of the packaging apparatus constituting the present invention showing one complete stage and one partial stage of a package and garment feeding station positioned adjacent a conveyor.

FIG. **2** is a side elevational, sectional and isolated view of the package feeding device wherein package portions are sequentially fed to and positioned atop the moving conveyor.

FIG. **3** is a side elevational, schematic view of the apparatus for sequentially positioning an article within at least partial packages carried by the conveyor.

FIG. **4** is a side elevational, sectional and isolated view of the feeding mechanism for sequentially and positively positioning a garment into at least a partial packaging receptacle placed thereunder.

FIG. **5** is a side elevational, sectional, enlarged and isolated view of the receptacle for receiving and subsequently inserting a garment into an appropriate package.

FIG. **6** is a side elevational, sectional and schematic view of the closure providing device and the storage unit for retaining a plurality of package closures.

FIG. **7** is a side elevational, sectional and isolated view of an additional stateion wherein the closure members are positively affixed to the partial package.

DETAILED DESCRIPTION OF THE DISCLOSURE.

Referring now to the drawings and particularly to FIG. **1**, a frame shown generally as **10** supports an endless conveyor **12** a suitable distance above a working surface **14** to permit the conveyor to move through a substantially horizontal plane. A plurality of package receiving devices **16** are fixedly secured, preferably in pairs, at spaced intervals along conveyor **12** so that they can move in a substantially horizontal plane through various operating stages subsequently to be described. Two L-shaped side plates **18** shield and cover the open ends of the conveyor **12** as well as the upper surface edges of that conveyor to prevent the collection of foreign material in the drive mechanism of the belt.

A package feeding unit shown generally as **20** is utilized to supply the package receiving devices **16** with at least a partial package **21** to subsequently receive an article. For purposes of discussion, only a single package feeding device and other related components are described, however, it will be readily apparent to those skilled in the art that duplicate stations such as partially shown as **23** in FIG. **1** can be provided adjacent thereto for the handling of the second parallel row of package receiving devices.

The package feeding unit in preferred form includes a storage column **22** suitably designed to retain one or more packages or partial packages **21** and a pivotal linkage shown generally as **24** (FIG. **2**) for controlling the placement of packages or partial packages in a

predetermined relationship and order. A storage bin **26** is provided to retain a large quantity of package portions, while a trap shown generally as **28** and operated by a solenoid **30** or other suitable means is selectively actuated to fill the storage column **22** to the extent desired.

A garment feeding device **32** is schematically illustrated in FIG. **3** to demonstrate its function. The device consists of a first pair of soft, cushiony drive rollers **34** which are preferably covered with a nylon or other synthetic knitted fabric to avoid damage to the articles contiguous therewith and pulled thereby. Finished garments **39**, for example, ladies' hosiery or panty hose, are chuted, preferably by a vacuum system, through tubing or conduit **36** (FIG. **1**) from a remote sewing or other finishing operation to a collecting column **38** wherein a plurality are collected in a substantially vertical arrangement such as shown in FIG. **4**. The lowermost garment **39** in the storage column is thus introduced to the nip **40** of the upper pair of drive rollers **34** so that it is pulled from the collecting column **38** and urged positively and downwardly through a second pair of rollers **37** to a collecting funnel **42** as illustrated. Note that roller pair **37** rotate at a greater speed than pair **34**.

The funnel provides a relatively large entranceway to a tubular member **44** that will, by forced air flow (see arrows), move the garment into a chamber **46** and position it for subsequent insertion within a package portion. Chamber **46** is provided with a plurality of perforations or apertures **49** and is surrounded by an encircling and closed tubular section **48**. To insure proper positioning within the package, a plunger **50** is reciprocally movable within the member **46** to engage the garment **39** and urge it downwardly within package portion **21**.

A butterfly valve **56** fills an exhaust conduit **58** which connects to a suction producting device **60** so that actuation of the valve **56** will displace a closure member **62**, and together with an air blast produced in member **44** by air line **90** through the perforations of member **48**, and will deposit a garment within or near the package so that the plunger **50** can urge it downwardly therein.

A package closing device shown generally as **64** including a storage column **66** and a mechanism for sequentially removing closures **68** therefrom comprises yet another work station of the present invention. The mechanism for removing these closures comprises a suction unit **70** suitably connected to a belt driven linkage **72** so that a vacuum can be selectively induced to grip a closure member **68** in an appropriate fashion from the column **66**. The suction unit **70** will maintain the member until the linkage has positioned it over the larger package portion **21** at which time it will be terminated by appropriate means to position the closure member over the bottom portion of the package. A release mechanism **74** controls the sequential removal of closures **68** from the column **66** when a solenoid **76** displaces a linkage **78** normally retaining the closures within the column.

A separate station **78** located adjacent the package closing device **64** completes the package closing operation when a closure engaging element **68** is urged downwardly by the operation of an air cylinder **82** so that the closure **68** is latched to partial package **21** either by friction or other assisting elements (not shown).

The operation of the packaging machines thus involves positioning selectively and sequentially a plurality of package portions **21** within receiving devices **16** fixedly secured to a substantially horizontal moving conveyor belt **12**. As the package portions are positioned within the devices mounted on the belt, they are moved through a garment feeding station **32** where a single or selective number of garments is placed therein. The packages are then moved to a closing station **64** where closures **68** are sequentially, by a suction device, positioned atop the packages. The packages then pass through a final station **78** where the closures are secured to the partial package **21** under pressure.

To facilitate the smooth operation of the feeding mechanism, it is desirable to position a photoelectric cell on or near conduit **36** so that garments can be alternately deposited into storage columns **38** and **84** communicating therewith. A solenoid **86** suitably positioned will actuate a butterfly valve **88** when triggered by the photocell's sensing the presence of a garment to alternately admit garments to each of the columns **38** and **84**.

It has been found desirable in the packaging process to provide a twist in the garment as it is urged toward the package or container, and an air blast creating a vortex through a nozzle **90** tangentially communicating with funnel **42** so that a swirl of air created therein causes the garment to twist or spiral in a rope-like manner and thus facilitates the entrance of that garment into the partial package **21**.

Note that the piston **91** of plunger **50** has substantially the same diameter as the opening of the package **54**. Superior packaging results when the lower end of the piston **91** has a recess **92** to assist in placing the garment within the package.

The hopper **26** is preferably designated for 4 to 8 hours of continuous operation without refilling. Utilizing conventional construction techniques, one packaging machine of the type described herein having **4** stations will service approximately 40 turn-sew-turn operations, the output for these **4** stations being approximately 1,000 units per hour. One girl packaging by hand through the total packaging operation can complete only about 18 dozen or 216 units per hour.

It is contemplated that a photoelectric scanner be provided on the package feeding unit **20** to insure that the package is proper positioned within the receiving unit **16**. Otherwise, it is possible that the package might contact the structure of the garment feeding device **32** thus causing damage.

To provide additional storage capacity, the conveying conduit **36** can be formed in a spiral or snake-like configuration so that a surplus of garments can be accumulated when finished, for example, by the turn-sew-turn operator. This spiral-like arrangement eliminates the tendency of garments to cling together when they are placed in storage bins and thus prevents a fill-up of individual garments within the loading structure.

While there has been described a preferred embodiment of a garment packaging machine, it will be apparent to those skilled in the art that modifications may be made in the various loading stations as well as in the

conveyor and related components without departing from the spirit of the present invention. Such changes and alterations are contemplated.

We claim:

1. A textile fabric article packaging machine comprising: a frame, an endless conveyor associated with said frame; package portion receiving means carried by said conveyor; package portion feeding means proximate said conveyor depositing package portions in said receiving means; garment supply means; garment feeding means proximate said conveyor for frictionally and sequentially extracting a predetermined number of fabric garments from said garment supply means and for depositing said garments in said package portions; means closing the package portions; package portion supply means associated with said package portion feeding means; said receiving means including at least one receptacle movably positionable with respect to said package portion feeding means and said garment feeding means, and said package portion feeding means including a storage column holding one or more package portions in a random relationship each with the other, means adjacent said column controlling the movement of the randomly positioned package portions within said columns so that package portions are ejected therefrom in a predetermined and uniform relationship.

2. A machine as claimed in claim 1, said garment feeding means including a garment storage column holding one or more garments, said feeding means frictionally and sequentially extracting a predetermined number of garments from said column, and means receiving and positioning the extracted garments within the packages.

3. A machine as claimed in claim 2, further comprising package supply means associated with said package feeding means and garment supply means associated with said garment feeding means.

4. A machine as claimed in claim 1, said closing means including storage means for one or more package closures, means sequentially removing closures from said storage means and positioning the closures in an inverted relationship contiguous the packages and pressure means securing the closures to the packages.

* * * * *