United States Patent

[11] 3,601,283

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Continuation-in-part of application Ser. No. 798,389, Feb. 11, 1969, now Patent No. 3,531,016.

[54] **BOBBIN TUBE FEED APPARATUS**
6 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **221/264**
[51] **Int. Cl.** **B65h 3/00**
[50] **Field of Search** 221/274, 264, 202, 13, 265, 268, 272, 273

[56] **References Cited**

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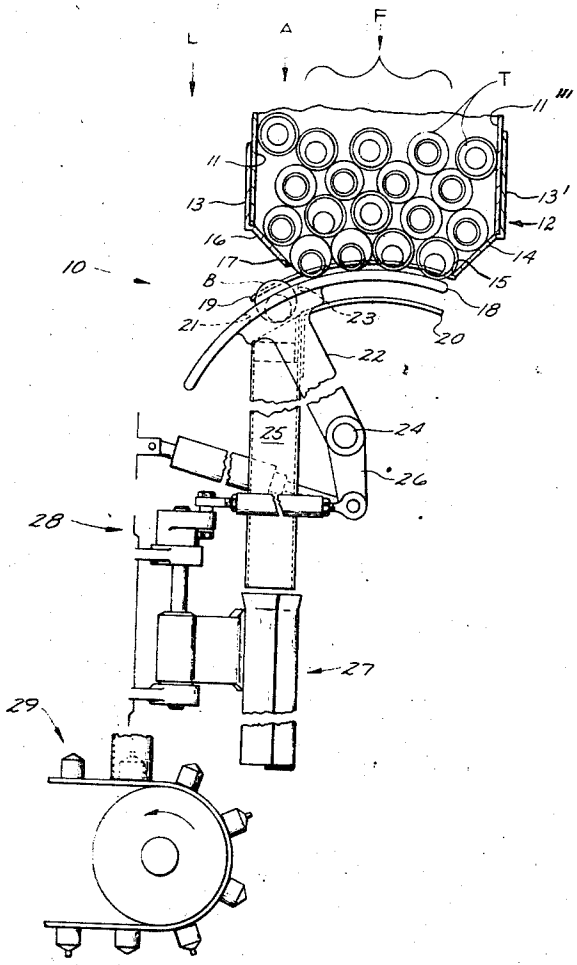
ABSTRACT: An improved bobbin tube feed apparatus is disclosed comprising a slope-walled hopper for containing tubes in an axially horizontal orientation and having at its bottom a slot of size sufficient to present a plurality of tubes exceeding three to a cradle therebeneath. The cradle has a convex nonslippery surface and is adapted for pivotable traverse across the hopper slot and therebeyond to a tube discharge position, and is formed with a receiving slot therethrough intermediate its ends for receiving one tube in horizontal position from the hopper. The received tube is retained within the cradle slot during traverse by a fixed member therebeneath which terminates at the discharge position and fixed guide members on each side of the cradle below the hopper slot and extending therebeyond to overextend the discharge position. Strips of nonslippery material are provided on the convex confronting face of the cradle to aid in the deposition of a tube in the cradle slot.



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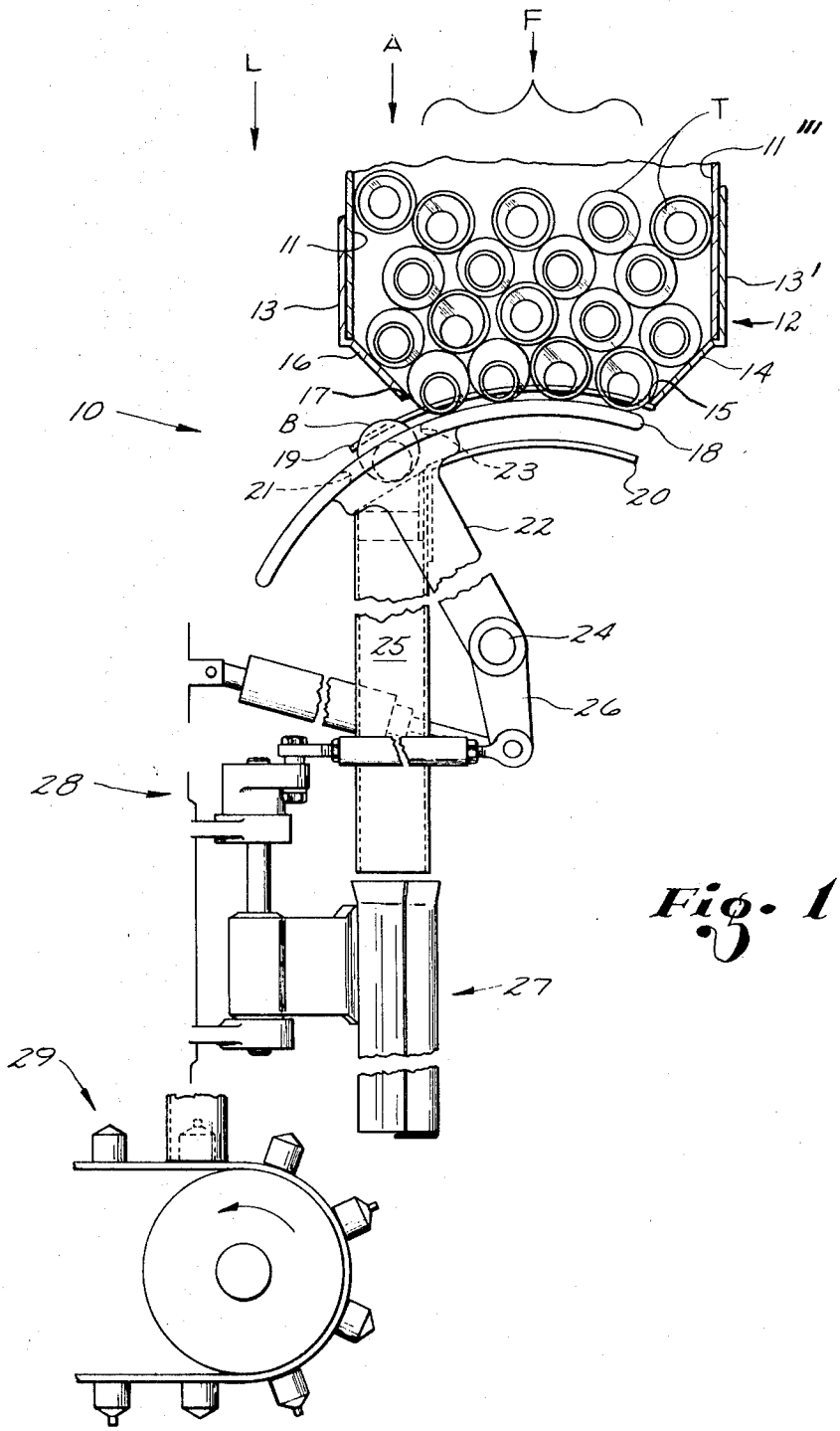

Fig. 1

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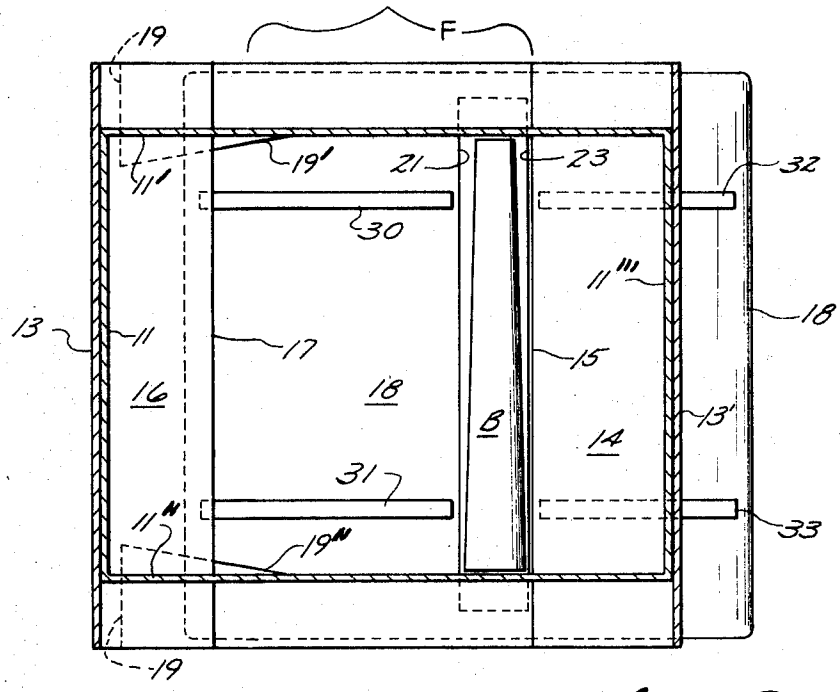

Fig. 2

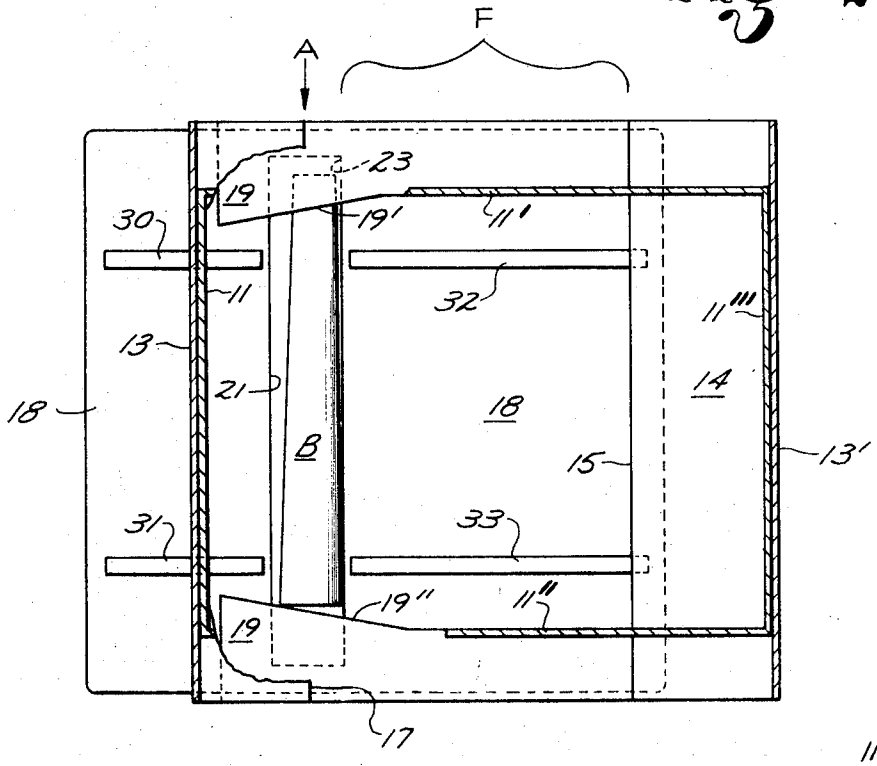

Fig. 3

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BOBBIN TUBE FEED APPARATUS

CROSS-REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of copending and commonly assigned U.S. Pat. application Ser. No. 798,389,filed on Feb. 11, 1969,entitled BOBBIN ORIENTING AND LOADING APPARATUS of Lester W. Pray, a coinventor herein.

BACKGROUND OF THE INVENTION

This invention relates to an apparatus for feeding bobbin tubes, tapered or untapered, preferably to an orienting and loading apparatus, for orienting and conveying bobbin tubes in an on-end or upright orientation to supply such tubes to a textile apparatus for donning thereonto. This invention apparatus is an improved feed mechanism which may be a subassembly of the apparatus as disclosed in the aforementioned copending application, and is an improvement on the feed assembly shown therein.

In general, bobbin tubes from a feed bin disposed therein in an axially horizontal position are fed through a hopper means to a feed cradle adapted to receive but one tube and pivotably movable between a receiving position, at which a tube may be received from the hopper, to a discharge position, at which the tube may be discharged as to an orienting and loading apparatus for subsequent on-end orienting of the tube and its conveyance in such orientation to a textile machine for donning thereonto.

Problems arise, however, in feeding axially horizontal tubes from the hopper to the feed plate, and include occasional bridging of the receiving slot of the cradle by a plurality of tubes thereabove preventing gravity deposition of a tube therein, and thus nonfeed of tubes to the orienting and loading apparatus therebeneath. Thus it is an object of this invention to provide a tube feed apparatus which obviates tube bridging and nonfeed to an orienting and loading apparatus.

This and other desirable objects of the invention will become apparent from or are inherent in the following description and the drawings appended hereto.

SUMMARY OF THE INVENTION

It is now discovered that the objects of this invention may be realized and the problems attendant to nonfeed of bobbin tubes to an orienting and loading apparatus are obviated by a feed apparatus wherein a plurality of bobbin tubes exceeding three are presented to an arcuate feed cradle bearing a convex, nonSlippery surface and adapted for pivotable movement in a generally horizontal direction having therein a slot for receiving one bobbin tube in an axially horizontal orientation during the course of its travel or traverse from a tube receiving position to a tube discharging position.

Apparatus of the present construction comprises, generally, a feed hopper means having flanges directed downwardly in a sloping angle from the horizontal; and formed with a slot between such flanges of width sufficient to permit a plurality of bobbin tubes exceeding three to confront the convex face of the cradle in an axially horizontal side-by-side orientation and an arcuate feed cradle spaced below the hopper plate adapted for pivotable movement traversing the hopper slot and beyond to index over a receiving end such as of a bobbin tube orienting and loading apparatus, formed with a slot therethrough of size sufficient to receive a bobbin tube in axially horizontal orientation intermediate its ends and positioned such that in traverse of the feed cradle the slot traverses the slot in the hopper means and indexes in its delivery position whereat the tube is discharged by gravity therethrough. Spaced below the cradle is a fixed plate of similar arcuity extending laterally the area of the hopper slot to retain within the cradle slot a bobbin tube received from the hopper slot during the cradle's traverse thereunder. Spaced to each side of the cradle between the hopper and cradle is a fixed guide means for retaining the tube laterally within the cradle slot during traverse.

Thus according to the invention, bobbin tubes arranged in an axially horizontally position in a generally sloping hopper having a slot therethrough wide enough to receive a plurality of greater than three tubes widthwise, as the cradle is moved from beneath the hopper slot in arcuate traverse thereby, fall, one at a time during a traverse cycle into the cradle slot, to be retained therein by the fixed retaining plate thereunder, and guide means to each side thereof and moved away from the hopper slot to a delivery position such as above an entry to a tube orientating and loading apparatus, thence to fall through the cradle slot into the orifice to be oriented and loaded on-end and moved in that orientation to a textile machine or the like for donning thereon.

The cradle along its convex surface may be fitted with one or more strips of a material, such as say felt, rubber, plastic or the like which is not slippery, in the direction of its path of traverse, to help provide the aforesaid nonslippery surface and thus to assure that bobbin tubes touching the nonslippery surface be rotated during cradle traverse as an aid in feeding by gravity one tube to the cradle slot and in facilitating the fall and positioning of a tube in the hopper thereabove or therealongside to take the place of the tube received by the cradle slot and thus confront the cradle surface for a subsequent feed thereto.

BRIEF DESCRIPTION OF THE DRAWINGS

Constructional features of an apparatus of the present invention will more readily be understood through reading the following description of a preferred embodiment thereof in conjunction with the accompanying drawings in which:

FIG. **1** is a side elevation of the present apparatus, partially in section and including general features of a tube orienting and loading apparatus of which it may be used as a subassembly.

FIG. **2** is a top plan view of the hopper means and cradle of the invention partially in section, wherein the cradle is at one end of the tube receiving position of its traverse.

FIG. **3** is similar to FIG. **2** but wherein the cradle is in the tube delivery position as above the receiving entry to a tube orienting and loading apparatus, with a portion of one of the hopper means flanges broken away to disclose more clearly underlying constructional features and elements.

PREFERRED EMBODIMENT OF THE INVENTION

Referring to FIG. **1**, a bobbin tube feed apparatus of the invention is generally designated by numeral **10**, and includes a tube hopper means **12**, which may have integral therewith upstanding hopper walls **13,13'**, which walls retain a bobbin tube bin or box containing bobbin tubes T in an axial, horizontally oriented side-by-side position therein, and which bin has been either up-ended onto means **12** and retained thereon by hopper walls **13,13'** or has a removable bottom which has been opened to permit tubes T to be supported by hopper means **12** in their axially horizontal side-by-side orientation, said bin having walls **11,11'''** and as shown in FIGS. **2** and **3** walls **11'** and **11''**. Tubes T in contact with hopper **12** roll down sloped flanges **14, 16** thereof, and present a plurality greater than three to the convex nonslippery surface of a bobbin tube feed cradle **18** located beneath and somewhat spaced from the leading edges **15,17** of flanges **14,16**, which therebetween define a hopper slot. Cradle **18**, in FIGS. **1** and **3**, is shown in its tube delivery position, with a slot formed therein defined by leading edges **21,23** thereof containing a bobbin tube at one end of its pivoted course of traverse beneath and across the hopper slot and being indexed at position A for discharge as above the receiving end of a tube orienting and loading apparatus **25,27,29**. Tube B therein is in position to fall through cradle slot **21,23** into and through an orienting device and chute **25** into a bobbin tube cage **27** for subsequent pivoting to position L for loading in an on-end or

axially vertical orientation onto conveyor **29**. Cradle **18** is adapted for traverse from its broad slot loading position designated F under hopper slot **15,17** to its tube delivery position A by any suitable mechanism, and as shown in FIG. **1** by linkages **22,24,26** connected to a programmed mechanism for pivotable movement designated **28**, which latter mechanism may also provide pivotable movement of tube cage **27** from a receiving position A to a delivery position L for transfer of tube B to conveyor **29**.

With reference to both FIGS. **1** and **2**, once tube B is delivered or discharged to chute **25** from cradle slot **21,23**, cradle **18** is pivotably swung back to the right, once again bringing its slot **21,23** into index with hopper slot **15,17** along its slot loading position F during traverse thereacross. During such traverse, tubes T in contact with cradle **18** are rotated by its movement aided by their contact with contact strips **30,32,31,33**, encouraging one such tube to fall into cradle slot **21,23**, to be retained therein by a retaining plate **20**, and encouraging another tube T thereabove to move into hopper slot **15,17**. Retaining plate **20**, of similar arcuity to cradle **18** but spaced therebeneath along position F, is fixed to some nonmoving member such as orienting chute **25**, and is also spaced from flange edge **17** at least one tube diameter but not more than one tube diameter plus the distance between flange edge **17** and cradle **18** so as to retain a tube within cradle slot **21,23**, and to permit such tube to pass beneath flange **16** to its discharge position. In instances when the tube is tapered, as shown, the tube diameter indicated is its largest or base end diameter.

In embodiments of the apparatus for feeding tapered tubes to an orienting and loading apparatus, referring to FIGS. **1, 2** and **3**, a camming plate **19** having opposing camming lead edges **19'** and **19''** is provided at opposite sides of hopper flanges **14,16** and is fixed therebetween to extend from position A through position F and to provide a track to retain tube B in cradle slot **21,23** during its traverse. Further upon reaching discharge position A, tube B is cammed by camming edges **19'** and **19''** by contact therewith of its large diameter end into a position more suitable for orientation on-end upon dropping into orienting chute **25**. In this instance, the small diameter end does not contact plate **19** but passes therebeneath permitting displacement axially to take place. In other embodiments, when a nontapered tube is fed, plate **19** acts as a guide track alone and has no flared camming edges **19'**, **19''**. Plate **19** may be bifurcate or may be in the form of two guide and camming rods or plates as hereinabove indicated.

It has been found, generally, that when the hopper slot is of such size that less than four tubes presented to the cradle, that tube bridging will occur from time to time during continuous feed operations resulting in nonfeed to the cradle slot and thus necessitating down time to clear the bridge of tubes before resumption. This is an intolerable circumstance, now corrected through the present apparatus.

It will also be appreciated that the present apparatus may be used by itself for one-by-one tube feeding for any of the many instances where such is desired in textile or other operations requiring such, and thus is not limited to use with a tube orienting and loading apparatus as described herein.

It will be further appreciated that the present construction provides far greater advantage than that disclosed in the aforesaid copending application in assuring tube feed to the feed cradle from the hopper, first in that the hopper no longer has dead spaces at its ends wherein tubes may lodge and form the base for tube bridging over the hopper slot but sloping flanged sides, second that the hopper slot is so widened that more tubes are presented to the cradle slot during its passage thereacross. With regard to the latter, in the instance where the hopper slot is wide enough to present four tubes to the cradle surface, in its traverse across the hopper slot from the tube delivery position the cradle slot has four times the opportunity to receive a tube as the feed apparatus of the copending application, and in the event that in such traverse no tube is fed to the cradle slot, an unlikely circumstance, in its traverse once again to the tube delivery position the cradle slot has an additional four opportunities to receive a bobbin tube from those confronting it in the hopper slot, or in all eight times the opportunity to receive a tube more than that of the apparatus of the aforesaid copending application. With a present apparatus having a hopper slot of such size as to present five tubes to the cradle surface, the opportunity for the cradle slot to admit a tube is increased to ten times that of the copending application feed apparatus. Although a specific embodiment of the invention has been shown and described, it will be appreciated that this was for the purpose of illustration only and was not intended to be limiting, the scope of this invention being defined by the following claims.

That which is claimed is:

1. A bobbin tube feed apparatus comprising:

hopper means for holding a plurality of bobbin tubes in axially horizontal position, having two sloped downwardly directing flanges at its bottom, and formed with a slot between said flanges of size sufficient to admit a plurality exceeding three of said tubes side by side;

tube feed cradle means, adapted for pivotable traverse across said hopper slot and therebeyond from a tube receiving position to a tube discharge position, and formed with a slot of size sufficient to receive one bobbin tube in axially horizontal position located intermediate the ends of said cradle means, slot

said cradle means being of arcuate configuration lying beneath said hopper means, spaced therefrom, and bearing thereon a convex, nonslippery surface for confronting said bobbin tubes in said hopper slot in the direction of said traverse; and

tube-retaining means for retaining said one bobbin tube within said cradle during said traverse thereof.

2. An apparatus as in claim **1** wherein said arcuate cradle means includes a strip of nonslippery material along its surface confronting said bobbin tubes in said hopper slot and in the direction of traverse movement.

3. An apparatus as in claim **1** wherein said tube-retaining means comprises

a retaining plate of similar convexity to said surface of said cradle means, and lying therebeneath in fixed relation to said hopper means at least one diameter of said tube and at most one diameter of said tube plus the distance of spacing of said cradle means surface from said hopper means slot, and

guide means located at opposite ends of said cradle means for guiding said bobbin tube during traverse and extending between and adjacent said tube receiving and tube discharge positions.

4. An apparatus as in claim **1**, wherein said tube-retaining means includes a plurality of camming edges adapted to cam a tapered bobbin tube within said cradle slot axially as it approaches said tube discharge position in the course of traverse thereto.

5. In a bobbin tube orienting and loading apparatus which comprises a tube feed subassembly, a tube orienting assembly and a tube loading assembly, an improved tube feed subassembly comprising:

hopper means for holding a plurality of bobbin tubes in axially horizontal position, having two sloped downwardly directing flanges at its bottom, and formed with a slot between said flanges of size sufficient to admit a plurality exceeding three of said tubes side by side;

tube feed cradle means, adapted for pivotable traverse across said hopper slot and therebeyond from a tube receiving position to a tube discharge position, and formed with a slot of size sufficient to receive one bobbin tube in axially horizontal position located intermediate the ends of said cradle means,

said cradle means being of arcuate configuration, lying beneath said hopper means, spaced therefrom and bearing thereon a convex, nonslippery surface for con-

fronting said bobbin tubes in said hopper slot in the direction of said traverse; and

tube-retaining means for retaining said one bobbin tube within said cradle slot during said traverse thereof.

6. A tube feed subassembly as in claim 5,

wherein said arcuate cradle means includes a strip of non-slippery material along its convex surface confronting said bobbin tubes in said hopper slot and in the direction of traverse;

wherein said tube-retaining means comprises a retaining plate of similar convexity to said surface of said cradle means, and lying therebeneath in fixed relation to said

hopper means at least one diameter of said tube and at most one diameter of said tube plus the distance of spacing of said cradle means surface from said hopper means slot, and guide means for guiding said tube during traverse located at opposite ends of said cradle means and extending between and adjacent said tube receiving and said tube discharge positions; and

wherein said tube-retaining means includes a plurality of camming edges adapted to cam a tapered bobbin tube within said cradle slot axially as it approaches said tube discharge position in the course of traverse thereto.

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,601,283 Dated August 24, 1971

Inventor(s) Carey A. Glazener and Lester W. Pray

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the cover sheet "Attorney-Donald H. Feldman" should read -- Agent-Donald H. Feldman --.

Col. 1, line 10, following "herein" the following insert should be made -- , now U. S. patent 3,531,016 --.

Col. 2, line 4, "horizontally" should read -- horizontal--; line 12, "orientating" should read -- orienting --.

Col. 3, line 39, "and" should read -- or --; line 50, insert -- are -- following "than four tubes".

Col. 4, line 28, delete "slot".

Signed and sealed this 29th day of February 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

ORM PO-1050 (10-69)

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* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334