United States Patent [19]

Abbott

[11] **3,866,848**

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[54] **END FINDING NOZZLE**

[75] Inventor: **Samuel L. Abbott,** Wilton, N.H.

[73] Assignee: **Abbott Machine Co., Inc.,** Wilton, N.H.

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[21] Appl. No.: **430,470**

Related U.S. Application Data

[63] Continuation of Ser. No. 207,245, Dec. 13, 1971, abandoned.

[52] **U.S. Cl.** ..... **242/35.6 E,** 242/18 R

[51] **Int. Cl.** **B65h 54/22**

[58] **Field of Search** ..... 242/35.6 E, 35.6 R, 35.5 R, 242/18 R, 18 EW

[56] **References Cited**

UNITED STATES PATENTS

3,652,025 3/1972 DiMauro ..... 242/35.6 E

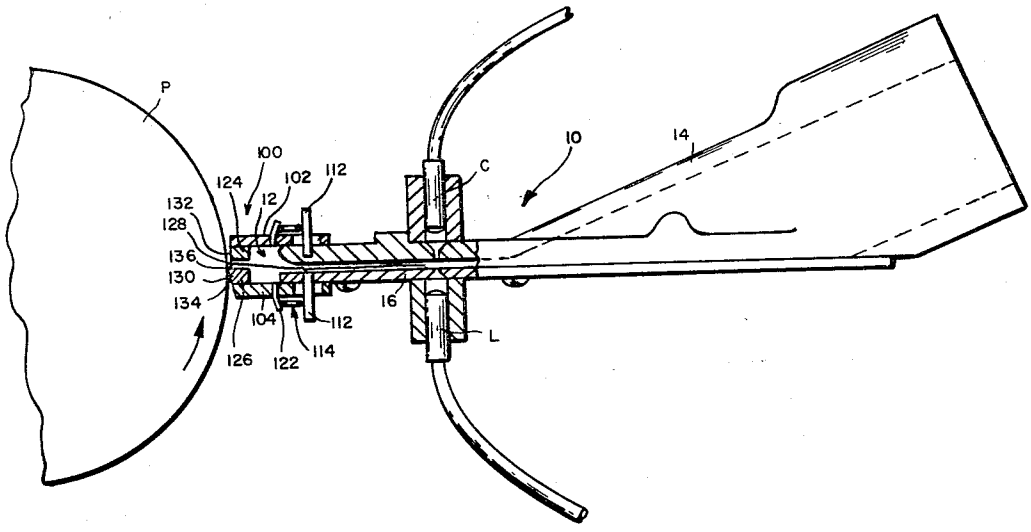
Primary Examiner—Stanley N. Gilreath

Attorney, Agent, or Firm—Dike, Bronstein, Roberts, Cushman & Pfund

[57] **ABSTRACT**

The combination with an end finding nozzle adapted to be supported adjacent the surface of the yarn package on which an end is to be found, spaced parallel lips mounted on the nozzle at the mouth for linear and angular movement relative thereto, and spring members biasing said lips to extend them relative to the mouth of the nozzle.

2 Claims, 7 Drawing Figures



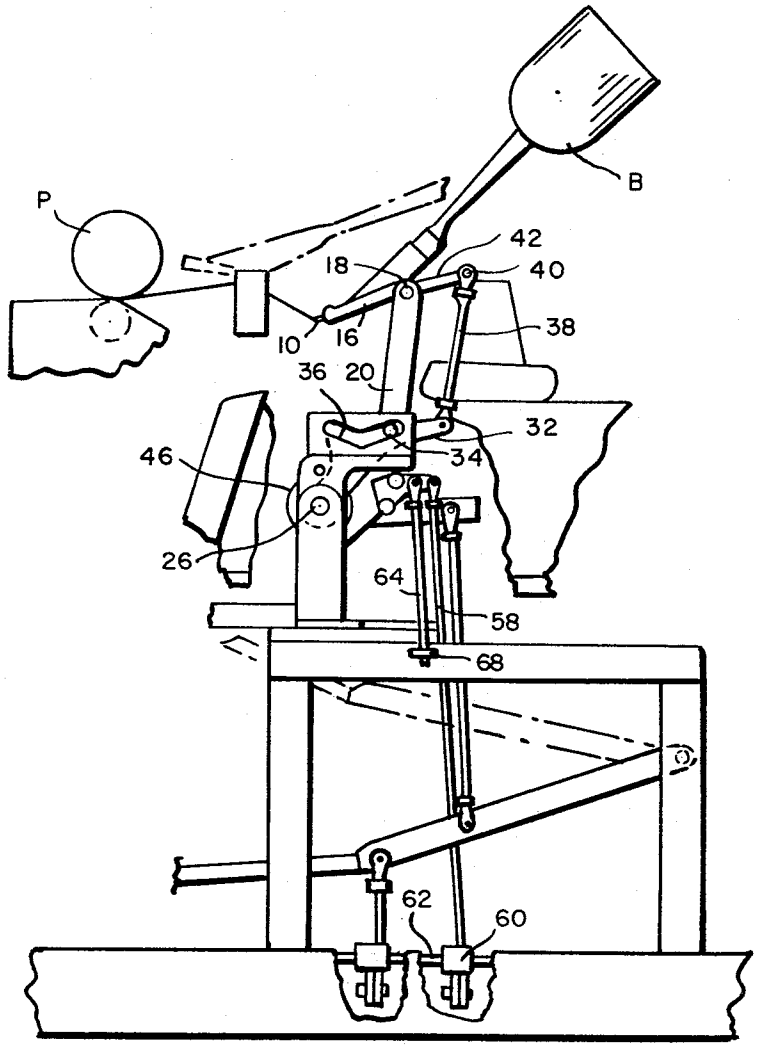


FIG. 1

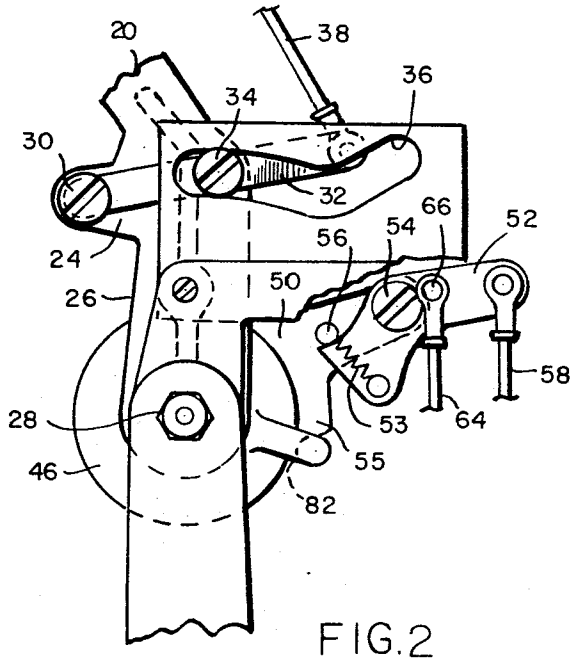

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FIG.2

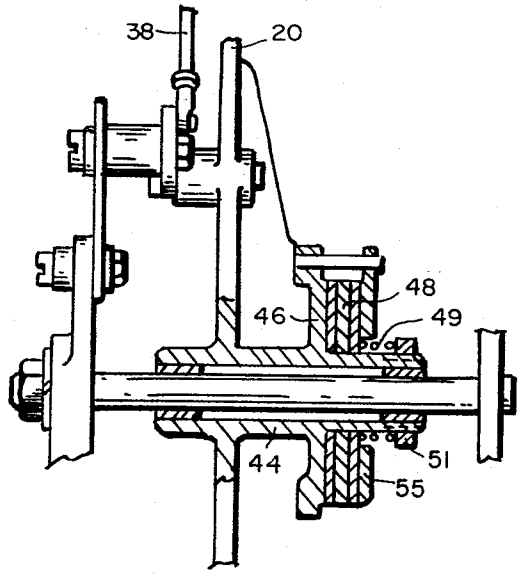
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FIG.3

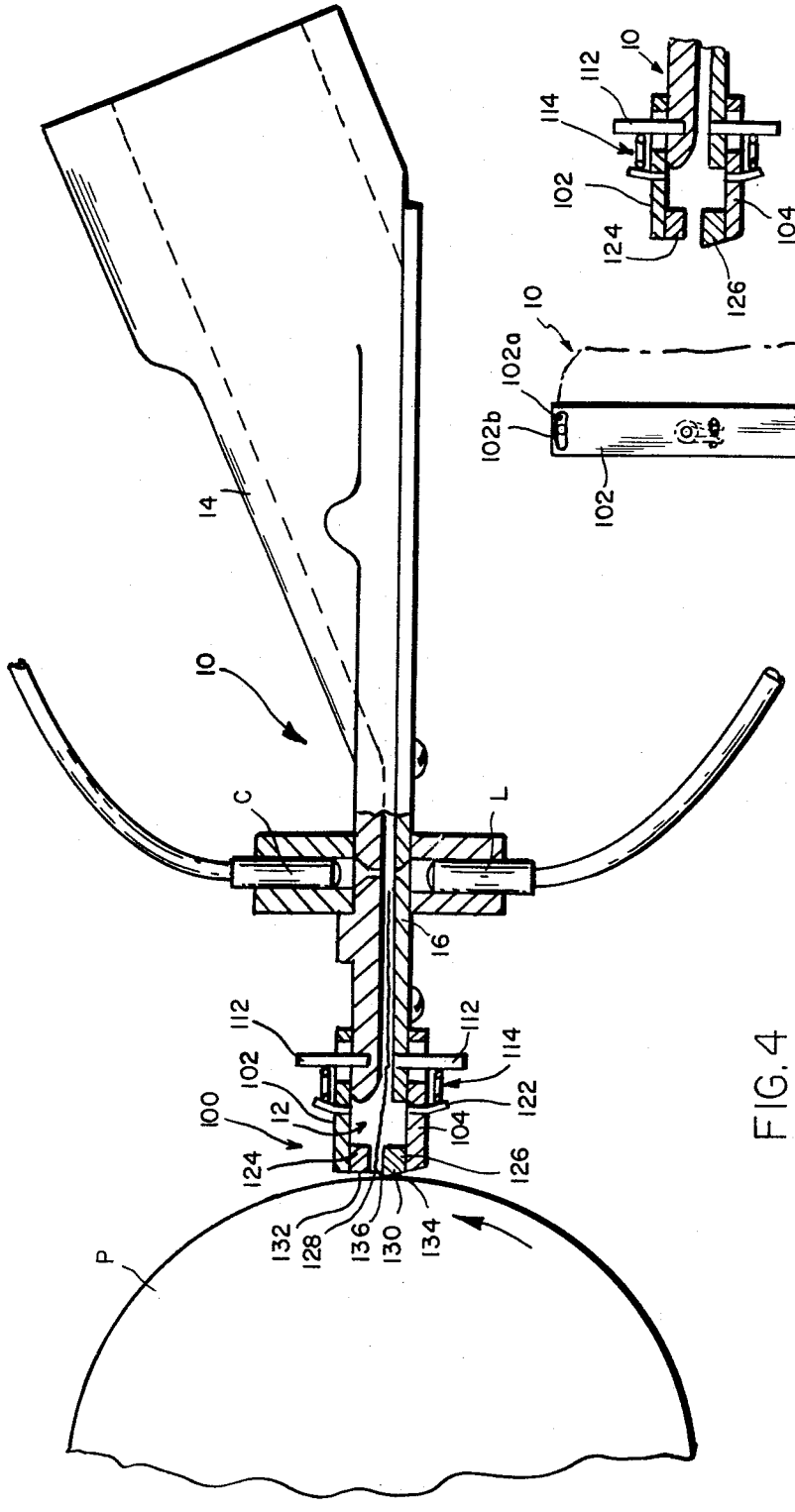

FIG. 4

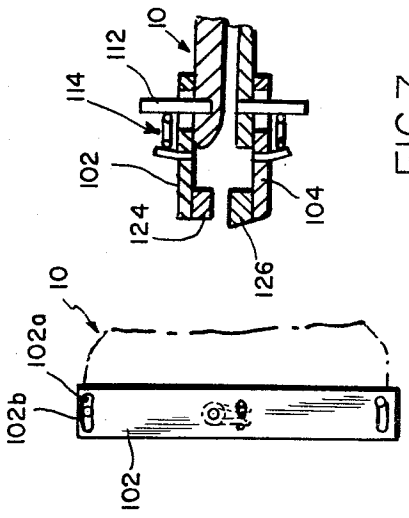

FIG. 7

FIG. 6

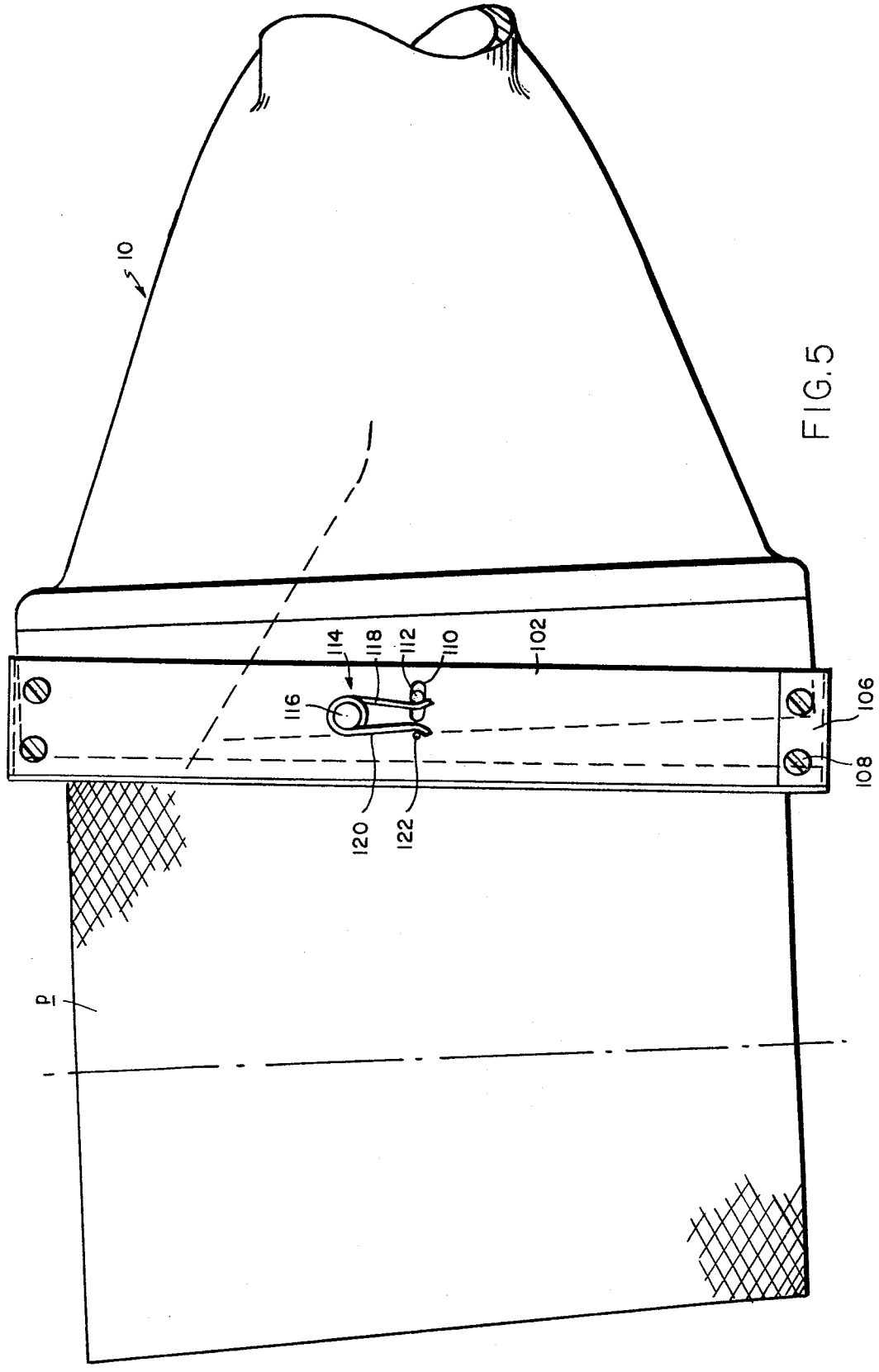

FIG.5

END FINDING NOZZLE

This is a continuation of application Ser. No. 207,245, filed on Dec. 13, 1971, now abandoned.

BACKGROUND OF THE INVENTION

In U.S. Pat. No. 3,168,257, dated Feb. 2, 1965 and pending application Ser. No. 176,132, filed Aug. 30, 1971, now U.S. Pat. No. 3,816,743 there are shown end finding nozzles. In the patented structure the nozzle is supported for movement from a retracted position to an operative position for the finding operation, such movement being effected by moving the nozzle into engagement with the surface of the package and then retracting it a predetermined distance. The linkage for effecting such movement is essentially a spring-controlled friction clutch so that when the nozzle is moved into engagement with the surface of the package slippage occurs, - the package providing the stop for such movement and retraction takes place with respect to the position at which the nozzle is brought to a stop by engagement with the package. Since the density of packages is different from package to package the setting of the clutch becomes quite critical because if the setting is too high the nozzle will compress the package and withdrawal of the nozzle will be less than the desired amount. If, however, the setting is not high enough the inertia of the nozzle may be so great as to cause slippage in the clutch and the nozzle may fail to reach the surface of the package. The purpose of this invention is to cure the aforesaid difficulties in a nozzle finding apparatus such as shown in the aforesaid patent and, in particular, in its combination with the sensing means for detecting the presence of the found yarn as shown in my pending application.

SUMMARY

An end finder comprising a flat, transversely elongate nozzle containing a passage into which the found end of yarn is adapted to be drawn, means supporting the nozzle with the mouth of the passage adjacent the surface of the package on which an end is to be found, and means telescopically engaged with the mouth of the nozzle spring-biased toward the package such as to maintain uniform engagement with the surface of the package in spite of minor variations in distance between the mouth of the nozzle and the surface of the package. The means telescopically engaged with the mouth of the nozzle comprises a sleeve mounted on the nozzle for linear movement in a radial plane with respect to the axis of the package and angular movement about an axis perpendicular thereto. There is means for limiting the extent of telescoping movement and spring means for effecting extension of the sleeve toward said limiting movement. The extension has upper and lower spaced parallel lips along its entire transverse width, the lower lip extending forwardly with respect to the upper lip such as to establish an initial engagement with the surface of the package and to hold the upper lip spaced from the surface by the extent of the extension. The face of the lower lip is rearwardly inclined such as to have substantially line contact with the surface of the package at a level corresponding to the bottom of the entrance between the lips. Alternatively, the extension may comprise separately mounted lips supported at the mouth of the nozzle so that each is spring-biased independently of the other.

The invention will now be described in greater detail

with reference to the accompanying drawings wherein:

FIG. **1** is a diagrammatic elevational view of a winding machine showing the finding nozzle in its inoperative position;

FIG. **2** is a fragmentary elevation, to larger scale, showing part of the linkage for effecting movement of the nozzle into and out of operative position;

FIG. **3** is a fragmentary vertical section taken through the same axis as FIG. **2** but looking from the left to the right in FIG. **2**;

FIG. **4** is a fragmentary plan view, to much larger scale, showing the relation of the finding nozzle to the package in its operative position with the nozzle sectioned in part and embodying the improvement of this invention also shown in section;

FIG. **5** is a plan view of FIG. **4**;

FIG. **6** is a plan view of an alternative structure wherein the upper and lower lips are independently supported; and

FIG. **7** is a section taken on the line **7—7** of FIG. **6**.

Referring to the drawings (FIGS. **1, 4** and **5**), the end finding nozzle **10** comprises a generally triangular, transversely flat structure having at its wider end a transversely extending narrow entrance opening **12** which is substantially as long as the package p on which the yarn is wound and at its narrower end a hollow coupling **14** by means of which it is connected to a bag B for collecting yarn ends. The nozzle **10** is supported for movement toward and from the surface of the package on an underlying mounting plate **16** (FIG. **1**) on which it is adjustable angularly to conform to various tapers on the packages of various degrees of completion. The mounting plate is pivoted at **18** to the upper end of a lever **20,** the lower end of which is provided with three arms **22, 24** and **26.** The lever **20** is pivoted at **28** (FIG. **2**) so that the pivot point **18** is movable arcuately about the pivot **28.** The arm **24** of the lever has pivoted thereto at **30** one end of a lever **32** carrying near its middle a cam roll **34** engaged within a cam groove **36.** The other end of the lever **32** is connected by a link **38** to a pivot point **40** on an extension **42** which is rigid with the mounting plate **16** to the nozzle.

The lever **20** is provided with a hub **44** (FIGS. **2** and **3**) carrying integrally therewith a disc **46** adapted to be driven frictionally by a friction driving disc **48** having an operating arm **50.** Adjustment of the friction is effected by a spring **49** and nut **51.** A lever **52** is pivoted at **54** to the operating arm **50** and is urged by a spring **53** in a clockwise direction so that its left end abuts a stop pin **56** on the arm **50.** To move the nozzle to end finding position the right end of the lever **52** is raised by a lifter rod **58** (FIG. **1**) which is operated by a cam **60** on a horizontal cam shaft **62.** The driving connection for the nozzle **10,** however, will yield when the nozzle meets the package because the friction drive to the disc **46** can slip thus the nozzle will stop at the surface of the package regardless of the size of the package. The stroke of the cam **60** is made sufficient so that even with the longest travel of the nozzle to meet the smallest package there would be some remaining stroke of the cam in the direction to continue raising the lifter rod **58.**

It is desirable that the nozzle should not press hard against the surface of the package during the end finding rotation of the package but on the contrary should be moved back a little so that its open entrance end is slightly spaced from the surface of the rotating pack-

age. Accordingly, a rod **64** is pivotally attached at one end to the lever **52** at **66** and has at its other end a collar **68.** Near the end of the upward movement of the lifter rod **58** the collar **68** strikes a fixed part of the frame causing the rod **64** to detain the lever **52** at the point **66.** With the lever **52** detained at **66** further rise of the lifter rod **58** rotates the lever **52** in a counterclockwise direction causing the pivot point **54** to be depressed and accordingly rotate the friction disc operating lever **50** a little in the clockwise direction and so rotating the nozzle away from the surface of the package. The aforesaid structure is disclosed in U.S. Pat. No. 3,168,257 for which reference may be had to a more detailed description if found necessary.

In the aforesaid patented machine at the finding position of the nozzle a blast of high pressure air is admitted to produce a subatmospheric pressure at the entrance opening of the nozzle to draw a found end thereinto and in order to minimize the length of the finding operation so that as quickly as the end is found it is detected and the winding operation resumed, sensing means was provided in combination with the aforesaid nozzle as described and claimed in pending application Ser. No. 176,132, filed Aug. 30, 1971.

The aforesaid sensing means as shown herein in FIG. **4** comprises a light sensitive cell *c* and lamp *l* arranged in alignment with openings in the nozzle so that the presence of a yarn within the passage will intercept the light beam and through suitable electrical connections, as described in said application, effect retraction of the nozzle and resumption of the winding operation.

As disclosed in the aforesaid application the mouth of the nozzle is spaced from the surface of the passage and a baffer is employed which is oscillated with respect to the surface of the package to assist in freeing the yarn end from the surface so that it will be taken into the passage by the suction established therein. The spacing of the entrance to the nozzle from the surface of the package is quite critical and it is difficult with the aforesaid arrangement for moving the nozzle into operative position according to the patented structure to obtain the same spacing from package to package because of the varying densities in packages. Thus while the aforesaid linkage could be adjusted to repeatedly provide the same spacing for all packages if all of the packages were of the same density, if a package of lesser density is being processed the nozzle may actually depress the surface of the package and so when retracted the spacing will be less than desired for optimum finding. If the friction clutch is set lower so as not to cause depression of the package the inertia of the nozzle to movement may be so great as to cause slippage with the end result that the nozzle may not reach the package.

The improvement herein illustrated is designed to overcome the disadvantages referred to and comprises, as shown in FIGS. **4** and **5,** mounting an extension **100** on the nozzle between it and the surface of the package so that it is yieldably biased in a direction such as to be held engaged with the surface of the package throughout the finding operation. The extension **100** comprises an elongate rectangular sleeve telescopically mounted on the end of the nozzle comprising spaced parallel upper and lower plates **102** and **104** joined at their opposite ends by end members **106 106** of U-shaped cross-section fastened to the ends by means of screw bolts **108.** The plates **102** and **104** contain substantially midway between their opposite ends elongate slots **110** 110 through which extend pins **112 112** set into the upper and lower walls of the nozzle. The slots and pins limit the telescoping movement of the extension relative to the end of the nozzle in a plane parallel to the nozzle and permit angular movement about an axis perpendicular thereto. The extension is biased to extend it toward the limit of its permitted movement by springs **114 114** mounted on pins **116 116** secured to the plates **102** and **104,** the springs having arms **118** and **120** constrained between pins **122** fixed to the plates and the pins **112** fixed to the nozzle.

The extension comprising the sleeve is slidable linearly on the nozzle in the plane the nozzle makes with the package, here shown as a plane passing through the axis of the package and is movable angularly about axes perpendicular thereto so that the forward end of the sleeve is free to come and go with respect to the surface and is also free to accommodate itself to the slope of the surface to compensate for irregularities in the surface or variations in positions of the package caused by imperfect or worn bearings and/or cones.

In accordance with the invention the sleeve is yieldably held against the surface of the package during the finding operation and for optimum finding the sleeve has at its forward side longitudinally extending upper and lower lips **124** and **126** having spaced parallel confronting surfaces **128** and **130** which define a passage situated at substantially the same level as the passage within the nozzle. The face **132** of the upper lip is perpendicular to the plate **102** and the face **134** of the lower lip extends forwardly of the face **132** and inclines downwardly and rearwardly so that it has a leading edge **136** which establishes an initial contact with the surface of the package and by such contact holds the face **132** of the upper lip at a predetermined distance from the surface of the package. As thus constructed, the leading edge **136** of the lower lip restricts the passage of air between it and the surface of the passage and produces an increase in velocity of the flow of air between the surface of the package and the upper lip in a direction downwardly with respect to the upwardly moving surface of the package and so in a direction which assists in detaching the end from the surface and carrying it into the opening between the lips. This arrangement removes the necessity for making the extension longer than the width of the passage in order to produce the necessary suction across the entire length of the package which naturally is always higher at the center and/or increasing the vacuum to such an extent that it becomes prohibitively expensive. In fact, as thus constructed, the suction required for this apparatus may be substantially lowered from that previously employed. The distance between the face of the upper lip and the surface of the package can be maintained at approximately 1/64 of an inch without variations and since the sleeve is perfectly free to move both linearly and rotationally and the spring means for effecting its extension need not be stiff for the purpose of holding it extended beyond the end of the nozzle it follows the surface of the package closely without disturbing the surface.

It has been found that a movement of approximately ⅜ of an inch is quite satisfactory. According to the invention the nozzle is moved up to the package in the same way as disclosed in the aforesaid patent by means of the friction clutch as far as it will go into engagement

with the surface of the package and then retracted about ⅛ of an inch so that the extension bears against the surface and is free to move in either direction. In this position the spring will hold the extension lightly and uniformly engaged with the package and since it is relatively small and is comprised of a light-weight material it will yield to variations in taper and diameter of the package and to bearing slop without disturbing the surface.

An alternative construction of the extension is shown in FIGS. **6** and **7,** wherein the plates **102** and **104** are not connected at their ends and are independently spring-biased into engagement with the surface of the package. When so constructed the opposite ends of the plates are provided with slots **102***a*–**102***a* and pins **102***b*–**102***b* to guide the plates. Thus the spacing and pressure of the lips at the upper and lower edges may be individually adjusted by making the slots **110** of different length and by employing spring **114** of different resistance. So little air enters to the ends of the nozzle that it is possible to use the related structure without providing end members at opposite ends of the plates. As thus constructed somewhat more precise adjustment is possible; for example, it is possible to bring both the top and bottom lips into engagement with the surface of the package in spite of the difference in radius of large and small packages.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents falling within the scope of the appended claims.

I claim:

1. End finding apparatus for finding an end of yarn on a package of yarn and withdrawing it therefrom, said apparatus comprising means for supporting a package of yarn for rotation about a predetermined axis, means supporting an end finding nozzle adjacent the package at a predetermined fixed distance from the surface of the package for directing a flow of air across the surface of the package to carry an end of yarn into the nozzle, said nozzle having a narrow elongate mouth confronting and extending along the surface of the package substantially parallel to the axis of rotation thereof, a pair of lip plates each comprising a single elongate rigid flat plate having a uniformly straight leading edge, said lip plates being mounted on the roof and bottom of the mouth for movement with the nozzle toward and from the package, pins fixed to the roof and bottom of the mouth with their axes perpendicular to the said lip plates on which the lip plates are pivotally mounted, said lip plates containing slots disposed at right angles to their leading edges in which the pins are received such that the lip plates are capable of moving angularly about the axes of the pins and linearly at right angles to the leading edges and springs mounted on the pins yieldingly urging the lip plates to distended positions with respect to the mouth such that when the mouth is moved up to said predetermined position adjacent the package for a finding operation the lip plates are yieldingly held engaged with the surface of the package and wherein at said position the lip plates are freely pivotal about the axes of said pins.

2. Apparatus according to claim **1** wherein the lower lip plate extends forwardly of the upper lip plate and has a downwardly and rearwardly inclined leading edge.

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