March 18, 1969 M. RÖVER ET AL 3,433,424

APPARATUS FOR SUCCESSIVELY DRAWING OFF, MEASURING, BALLING AND SEPARATING A THREAD

Filed Jan. 21, 1966

FIG. 1

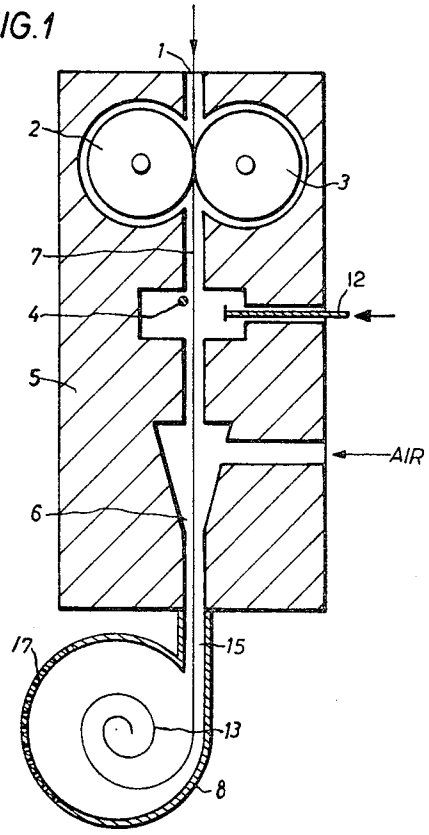


FIG. 2

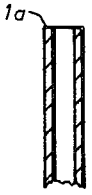


FIG. 3

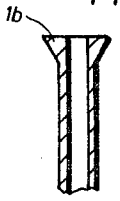
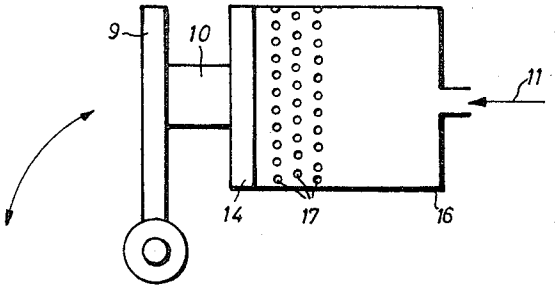


FIG. 4



INVENTORS:

MARTIN RÖVER, ERWIN LÜTH, LAMBERT SCHMITZ, FRIEDRICH LINSERT.

BY Burgess, Dinklage & Sprung

ATTORNEYS

United States Patent Office 3,433,424
Patented Mar. 18, 1969

3,433,424

APPARATUS FOR SUCCESSIVELY DRAWING OFF, MEASURING, BALLING AND SEPARATING A THREAD

Martin Röver and Erwin Lüth, Dormagen, Lambert Schmitz, Hackenbroich, and Friedrich Linsert, Dormagen, Germany, assignors to Farbenfabriken Bayer Aktiengesellschaft, Leverkusen, Germany, a corporation of Germany

Filed Jan. 21, 1966, Ser. No. 522,323
Claims priority, application Germany, Jan. 23, 1965, F 45,045
U.S. Cl. 242—47 8 Claims
Int. Cl. B65h 51/00

ABSTRACT OF THE DISCLOSURE

Apparatus for successively drawing off, measuring, balling and separating a thread by means of suction nozzles adapted to draw off threads, including a closed housing containing a suction path with an entrance nozzle and a discharge nozzle, a friction driven roller adapted to be pressed against a measuring roller to deliver a measured length of thread, and thread cutting means, and including a balling attachment near the discharge nozzle, wherein the housing closely surrounds the two rollers, thereby subjecting the space thereat to the attendant suction and preventing thread from becoming entangled in the rollers.

An apparatus is known for successively drawing off, measuring, balling and separating a thread, in which suction nozzles are used to draw off the thread, are arranged axially one above the other and are separated by a cutting means, whilst a friction-driven roller which is adapted to be pressed against a measuring roller so as to deliver the measured length of thread, is provided in front of one suction nozzle in the direction of travel of the thread. In addition, a balling attachment is provided near the outlet of the nozzle immediately following the cutting means.

The thread is not subjected to any stressing between the measuring roller and the friction-driven roller. Threads of any desired measured length may be accurately drawn off and cut and then pneumatically delivered to a balling attachment. In apparatus of this kind, measurement of the threads is attended by the disadvantage that odd pieces of cut thread and fluff can wind themselves around the friction-driven roller and the measuring roller.

It has now been found that this disadvantage can be obviated if, in accordance with the invention, the two rollers, the suction nozzle following them and the cutting means are all arranged inside a housing closely surrounding the rollers. Since the rollers are then arranged in the suction zone of the nozzle, any loose or detached fibre particles are removed under the effect of the suction nozzle. At the same time, an arrangement such as this enables a small measuring roller and a correspondingly small pressure roller to be used without any danger of the thread or parts of it becoming wound around the rollers. There is no need to provide a suction nozzle in front of the rollers, because the suction nozzle in the housing provides the suction for the thread between the measuring roller and the friction-driven roller.

By virtue of the suction effect of the nozzle, the thread is sucked into the suction opening of the housing if it is brought to within a few millimetres of this opening.

Some embodiments of the invention are diagrammatically illustrated by way of example in the accompanying drawings, wherein:

FIG. 1 is a cross-section through the apparatus.

FIGS. 2 and 3 show two different forms of tube used as the suction opening of the housing.

FIG. 4 is a side view of the balling chamber.

The two rollers **2** and **3** and the cutting means **4**, **12** as well as the suction nozzle **6** are all arranged in the housing **5**.

The shape of the housing opening **1** governs the suction effect. It is intended to be in the form of a thick-walled tube with slightly rounded edges which has been cut perpendicular to its axis as shown in FIG. 2. The suction zone can be enlarged by a nozzle with a thickened rim, as shown in FIG. 3, i.e., in the form of a tube surmounted by a head plate inserted into the opening **1**. A funnel-shaped suction opening is not suitable.

While the thread **7** is under suction, the pressure roller **2** (FIG. 1) is swung away from the measuring roller **3** by suitable means (not shown). The thread is drawn through the gap between the rollers into the suction nozzle **6** and, together with the jet of air (suction source—Bernoulli's principle) entering nozzle **6** in the direction of the air arrow (FIG. 1) so as to generate the suction and forced air flow by which it is moved, leaves the nozzle and, moving past the cutting means **4** and **12**, enters through a bore **15** into the balling chamber **8** attached to the housing by way of an air-tight joint. After a sufficiently great length of thread (lead) has been drawn off, the size of which is not critical, the pressure roller **2** is pressed against the measuring roller **3** which is still stationary, as a result of which the thread is held fast and is made taut to an adequate extent, by the suction nozzle but is not stretched.

The stationary thread is briefly pressed by a lever **12** displaced in the direction of the arrow (FIG. 1) by suitable means (not shown) against an incandescent wire **4** and, depending on its constituent material, is burnt or fused through. In the latter instance, the individual capillaries of multi-filament threads are fused together, thus facilitating further movement of the thread.

After the lead has been cut off, the rollers begin to rotate and, after pushing through the length of thread which can be calculated from the circumference of the measuring roller and the number of revolutions which it completes, are stopped again and the thread cut as described above.

It has now been found that there is no need to provide a rotating plunger in the balling chamber **8**. It is only necessary to gauge the diameter and the depth, i.e. axis length, of the chamber in such a way that the ratio between them is from 1:1 to 1:1.5, and to form in the wall of the chamber, opposite the tangential inlet of the thread, bores **17**, which are 1 to 3 mm. in diameter, which cover an angular area of about $\pm 30°$ and have a total air-outlet cross-section of some 0.8 $cm.^2$.

In order that a satisfactory airflow may be developed and a solid ball **13** formed, it is important that the cover **14** which swings down axially of the chamber, should close the chamber **8** without leaving any gaps. For this reason, both the rim of the chamber and the cover are machined smooth, whilst the cover is spring mounted on its holder **9**, for example by means of a rubber cushion **10**, so that when pressed down, it automatically assumes a position in which it is exactly parallel to the rim of the chamber. Cover **14** swings down in the direction of the arrow (FIG. 4) as holder **9** is pivoted by suitable means (not shown).

The ball of thread is ejected by means of a jet of compressed air entering through a nozzle **11** formed in the bottom **16** of the chamber **8**, and then weighed.

The direct connection between the suction nozzle **6** and the chamber **8** dispenses with the need for a third nozzle, which means that the thread does not have to

make the passage from one nozzle to another, during which it would be exposed to harmful influences.

We claim:

1. Apparatus for successively drawing off, measuring, balling and separating a thread, which comprises housing means defining an uninterrupted continuously enclosed and closely confined axial suction path for the thread including an entrance nozzle at one end thereof and a discharge nozzle at the other end thereof of correspondingly substantially uniform diameter and having thread length measuring and delivering means closely confined therewithin, such that the adjacent portion of the confining housing means thereat conforms substantially to the configuration of said measuring and delivering means with only slight operative clearance therebetween, said housing means further having cutting means therewithin, and being provided with means defining a source of suction to draw off through said discharge nozzle lengths of thread entering through said entrance nozzle, measured and delivered by said measuring and delivering means and eventually cut by said cutting means, and balling means arranged at said discharge nozzle to receive lengths of thread therefrom for winding such thread into a ball.

2. Apparatus according to claim 1 wherein said balling means includes a cylindrical balling chamber in direct sealed tangential flow communication with said discharge nozzle whereby to receive said thread under suction transport for winding said thread in said cylindrical chamber.

3. Apparatus according to claim 2 wherein said thread measuring and delivering means includes a measuring roller and a friction driven roller movable from a position out of contact with said measuring roller to a position in peripheral contact operative driving engagement therewith at a point substantially intersecting the thread path to permit said thread to be drawn along said path by suction transport from said entrance nozzle past said rollers when said friction driven roller is in out of contact position and thereafter to permit said rollers to measure and deliver said thread along said path to said discharge nozzle when said friction driven roller is in peripheral contact operative driving engagement position, said rollers being closely confined within said housing means at said path with only sufficient operative clearance

therebetween to permit roller movement between said positions, and said rollers being disposed axially between said entrance nozzle and said cutting means.

4. Apparatus according to claim 3 wherein said cylindrical balling chamber has a ratio between the diameter and axis thereof of 1:1–1.5, and is provided with a plurality of radial outlet perforations defined therein for ultimate discharge of suction medium supplied by the suction source means of said housing means, said perforations being disposed substantially perpendicular to the tangential inlet direction of the thread in passing from the discharge nozzle to said cylindrical balling chamber, said perforations further being disposed substantially diametrically opposite the point of entry of said thread, and said perforations covering substantially a peripheral area over an arc of substantially about 30°.

5. Apparatus according to claim 4 wherein said perforations are about 1–3 mm. in diameter and have a total outlet cross-section of about 0.8 cm.^{2}.

6. Apparatus according to claim 3 wherein said cutting means includes an incandescent wire confined within said housing near said thread path and operatively disposed lever means also confined within said path near said thread for pushing said thread into cutting contact with said wire.

7. Apparatus according to claim 6 wherein said entrance nozzle has slightly rounded edges.

8. Apparatus according to claim 6 wherein said entrance nozzle is in the form of an inserted tube disposed in said housing means and surmounted by a head plate.

References Cited

UNITED STATES PATENTS

2,607,418	8/1952	Hebeler	83—402
2,957,065	10/1960	Bundegaard et al.	83—171 X
3,125,052	3/1964	Spivey	83—171 X

FOREIGN PATENTS

1,257,352	2/1961	France.
188,657	4/1964	Sweden.

STANLEY N. GILREATH, *Primary Examiner.*