United States Patent [19]

Sallin

[11] **3,829,037**

[45] **Aug. 13, 1974**

[54] **THREAD WINDING APPARATUS**

[75] Inventor: **Pierre Sallin,** Geneva, Switzerland

[73] Assignee: **Productions Sarcem S.A.,** Geneva, Switzerland

[22] Filed: **June 12, 1972**

[21] Appl. No.: **261,808**

[30] **Foreign Application Priority Data**

June 25, 1971 Switzerland 9325/71

[52] **U.S. Cl.** .... **242/158.2,** 242/158 R, 242/158.4 R

[51] **Int. Cl.** **B65h 54/28**

[58] **Field of Search** ..... 242/158.2, 158 R, 158.4 R, 242/43

[56] **References Cited**

UNITED STATES PATENTS

1,105,453	7/1914	Petersen	242/43
3,097,805	7/1963	Oberly	242/43
3,128,956	4/1964	Schumann	242/158.4 R X
3,171,608	3/1965	Speakman	242/43
3,433,434	3/1969	Latter	242/158 R
3,669,380	6/1972	Caltagirone	242/158 R

FOREIGN PATENTS OR APPLICATIONS

6,712	7/1962	Japan	242/158.2
13,766	9/1962	Japan	242/158.2
18,221	9/1963	Japan	242/158.2

Primary Examiner—Stanley N. Gilreath

Attorney, Agent, or Firm—Young & Thompson

[57] **ABSTRACT**

The invention relates to an apparatus for obtaining a linear displacement of a first element as a function of a rotary movement and can be advantageously used on thread-winding machines. The apparatus comprises means for shifting the lineary displacable element at the end of the reciprocatory stroke.

1 Claim, 2 Drawing Figures

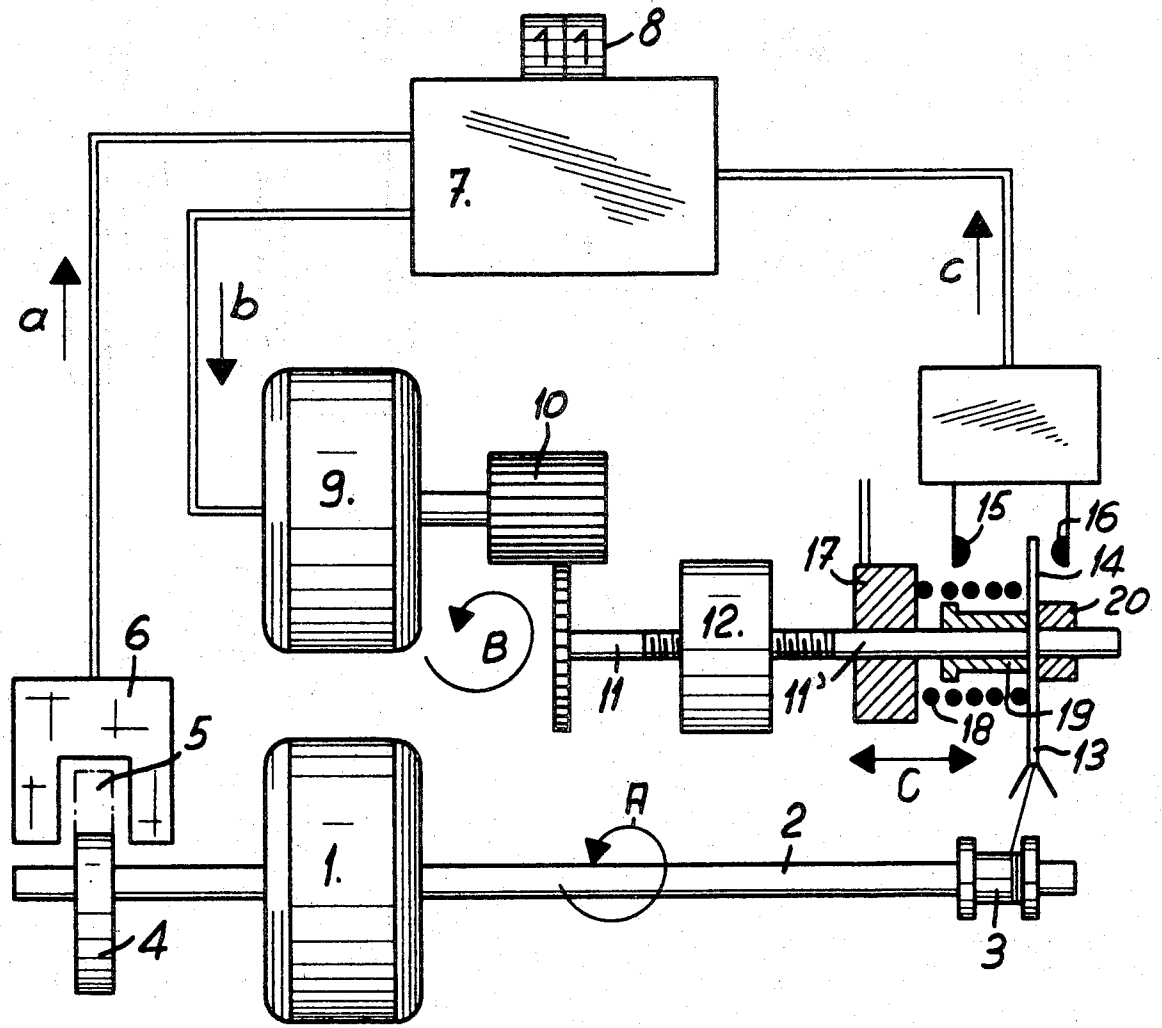
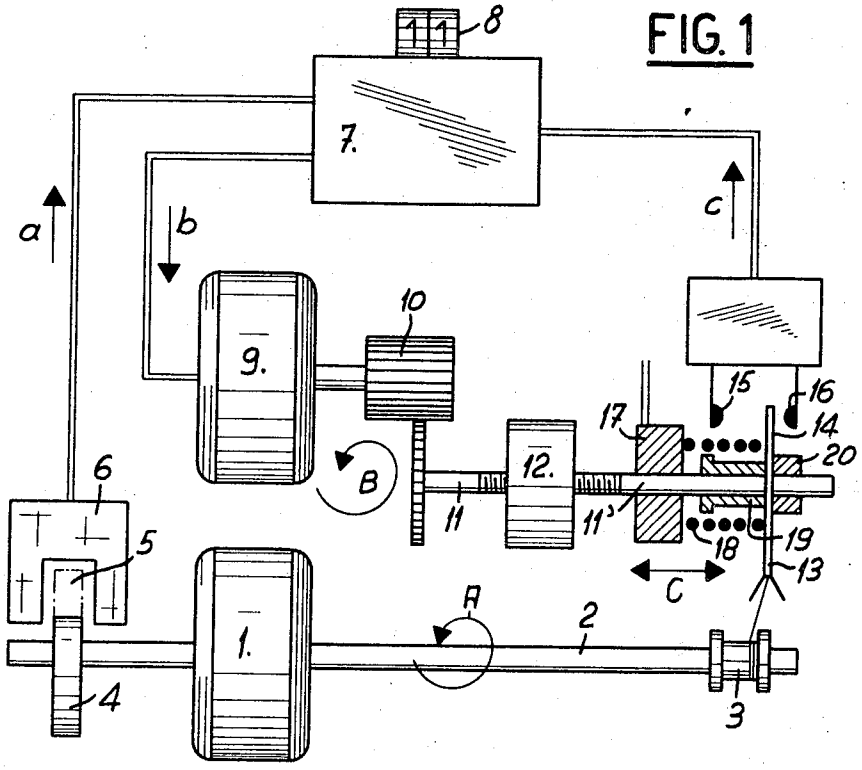


FIG. 1


8
7.
a
b
c
9.
10
15
16
17
14
20
6
B
12.
11
11'
18
19
5
C
13
A
2
1.
4
3

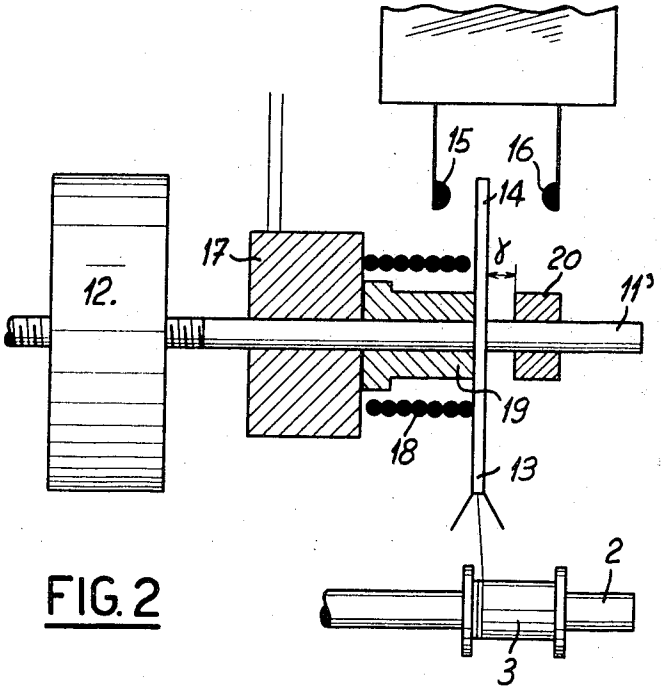

15
16
14
12.
17
γ
20
11'
19
18
13
2
3

FIG. 2

THREAD WINDING APPARATUS

The apparatus for obtaining a linear displacement as a function of a rotary displacement can be used in particular on thread-winding machines.

The known winding machines comprise mechanical adjusting means which do not enable great precision to be achieved in the of the movement of the thread guide, since these adjusting means do not permit the correction made to be determined with great accuracy. This renders the winding of very thin thread practically impossible, since the displacement of the thread guide cannot be adjusted with sufficient precision.

The present invention is aimed at eliminating this disadvantage and comprises a machine for winding very fine threads (in the order of 1 micron) to be provided, which machine can nevertheless be used for threads of greater diameters (of the order of 0.1 mm). The apparatus of the invention comprises two elements, one of which is a rotary element and the other executes a longitudinal reciprocatory movement parallel with the axis of the first, as well as means for regulating the speed of rotation.

The attached drawing illustrates diagrammatically and by way of example one form of construction of the thread-winding machine fitted with the apparatus of the invention.

FIG. **1** shows diagrammatically one form of construction of the winding machine.

FIG. **2** is a view of part of the winding machine, the thread guide being shown in the opposite position to that illustrated in FIG. **1.**

The winding machine illustrated in the drawing comprises a motor **1** which drives a shaft **2** at a regulable speed in the direction of the arrow A; removably mounted on this shaft is the bobbin **3** which is to be loaded with thread and which is located and fixed on the shaft by any known means.

The shaft **2** also imparts rotation to a disc **4** containing at least one radial opening **5,** which when passing between the poles of the pick-up **6,** generates counting impulses *a* in the electronic part **7,** these impulses thus being proportional to the number of radial openings **5** contained in the disc **4,** and therefore to the number of revolutions of the shaft **2** and consequently to the speed of rotation of the bobbin **3.**

The electronic portion **7** comprises means **8** which is a counter device which, after receiving a set number of impulses *a* from pick-up **6,** permits driving impulses *b* emitted from electronic part **7** to be applied to a step-by-step motor **9** which, through a gear **10,** imparts a discontinuous rotary movement in one or other direction to a shaft **11,** as indicated by the arrow B.

The shaft **11** seen in FIG. **1** has a screw-threaded portion cooperating with a fixed part **12** in such manner that the portion **11'** of the shaft undergoes a longitudinal reciprocatory movement in the directions indicated by the arrow C. The speed of this movement is controlled in a conventional manner according to the impulses *a* and *b*. It will be readily appreciated that the illustration provided in the drawing is greatly simplified and that in practice use would be made of a means **12** for converting the rotary movement in the direction of the arrow B into a longitudinal reciprocatory movement in the directions of the arrow C, without the shaft **11'** rotating about its own axis.

The shaft **11'** slidably carries the thread guide **13** and a stop **14** adapted to move into contact with two limit elements **15** and **16,** constituted for example by micro contacts which, when the thread guide **13** reaches the end of the bobbin, enable reversing impulses *c* to be sent to the electronic part **7.** These reversing impulses *c* are for the purpose of reversing the direction of rotation of the step-by-step motor **9** so that the thread guide moves towards the other end of the bobbin.

It is of course possible to locate at least one of the limit elements **15** or **16** in such a position that reversal takes place at the end of the bobbin whatever its length.

To promote winding of the thread in neat turns, the actuating system also comprises a means for shifting the linearly displaced element. In fact it is necessary, when reversal takes place, for the thread guide **13** to be shifted axially in relation to the shaft **11'** to bring the thread into a favourable position. This means for shifting the thread guide comprises an electromagnet **17** solid with the shaft **11'** and located on one side of the thread guide, and a fixed stop **20** likewise solidly connected to the shaft **11',** and fitted at the other side of the thread guide. A spiral spring **18** bears by one of its ends against electromagnet **17** and by the other against the thread guide **13** or its support and urges it against the stop **20.** A sleeve **19** is fitted around the shaft **11'** and inside the spring **18,** and is secured to thread guide **13,** and is of a length such that when the thread guide is applied to the free end-face of this sleeve, a gap γ is maintained between the other face of the thread guide and the stop **20.**

In FIG. **1,** the shift means is illustrated in the position it occupies when the thread guide is first moved to the left. The position of this means, illustrated in FIG. **2,** corresponds to that occupied when the thread guide is first moved to the right.

In FIG. **1,** the thread guide **13** is applied to the fixed stop **20** with the aid of the spring **18,** and is moved to the left by the effect of the rotation of the shaft **11'.** When the stop **14** moves into contact with the micro contact **15,** the latter not only causes the direction of rotation of the shaft **11'** to be reversed and thus the direction of linear displacement of the thread guide **13** to be reversed, but also results in the electromagnet **17** pulling the sleeve **19** and the thread guide **13,** thereby overcoming the force of the spring **18.** Thus, despite reversal of the direction of movement of the thread guide, the latter is shifted to the left over a distance corresponding to the gap γ, and this ensures correct winding at the left-hand end of the bobbin **3.** By this additional shift at the end of the traverse of the thread guide, it is thereby assured that the thread is tightened by drawing it against the last turn which has been wound, which is desirable in the case of fine filaments such as threads.

When the stop **14** moves on to the micro contact **16,** it causes the direction of movement of the thread guide to be changed, and also causes the electromagnet to be de-energized. The spring **18** shifts the thread guide up to the stop **20.** Thus the winding of the thread on the right-hand end of the bobbin **3** is also properly carried out.

In other variant, the bobbin could also be adapted to be moved longitudinally whilst keeping the thread guide stationary, without thereby departing from the framework of the present invention.

What I claim is:

1. A thread winding apparatus comprising means for rotating a bobbin to receive thread to be wound thereon, a thread guide for guiding thread to be wound on the bobbin, a shaft on which the thread guide is mounted, means for lengthwise reciprocating the shaft parallel to the axis of the bobbin to cause the thread guide to traverse thereby to distribute turns of thread on the bobbin, a pair of stops on the shaft between which the thread guide is reciprocable lengthwise of the shaft relative to the shaft, and means for imparting to the thread guide a linear shift lengthwise of the shaft relative to the shaft at the end of each traverse of the thread guide and in the same direction that the thread guide has just traversed and at a linear velocity lengthwise of the shaft higher than the traversing velocity of the thread guide, said imparting means comprising a sleeve secured to one side of said thread guide and encompassing said shaft and slidable relative to the shaft and engageable with one of said stops, spring means urging said thread guide toward the other of said stops, said one of said stops comprising an electromagnet, means to actuate and deactuate said electromagnet thereby alternately to attract and release said thread guide to effect said linear shifts, and means to reverse the direction of reciprocation of said shaft simultaneously with the actuation and deactuation of said electromagnet.

* * * * *