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[33] **Italy**
[31] **53149.A/67**

[56]

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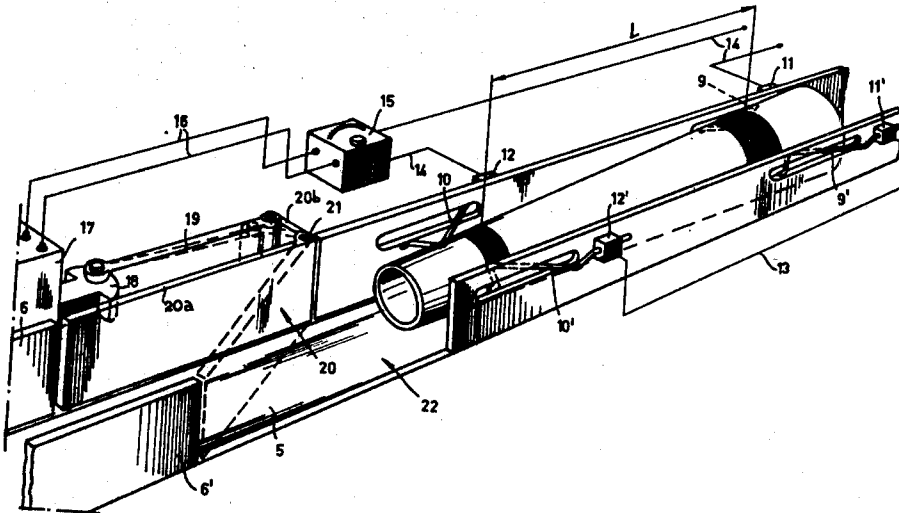
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[54] **PROCESS AND APPARATUS FOR SORTING
ELONGATED ARTICLES SUCH AS BOBBIN TUBES
OF TEXTILE MACHINES**
1 Claim, 4 Drawing Figs.

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209/81**
[51] Int. Cl. **B07c 5/344**
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111.7, 111.6, 111.8, 82, 90; 250/223, 224, 219
(1d), (dc); 209/73**

ABSTRACT: Elongated articles such as bobbin tubes are sorted automatically by providing each tube with two bands having different spacings for different article characteristics, e.g. color. The band spacings of the articles are detected automatically, e.g. electrically where the bands are conductive, by conveying the articles successively past different sorting stations, each responsive to a particular band spacing, at which removal of detected articles is effected automatically.



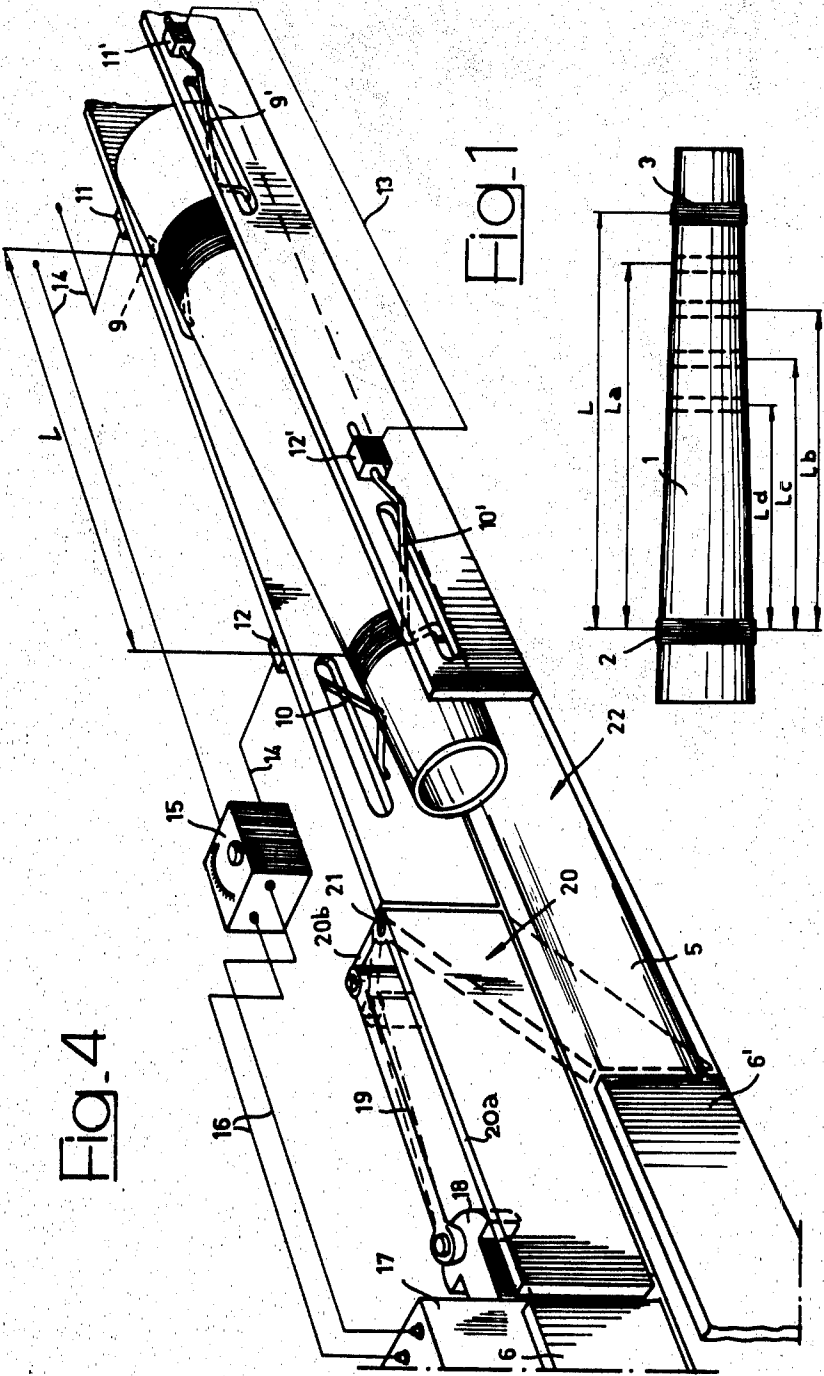


Fig. 2

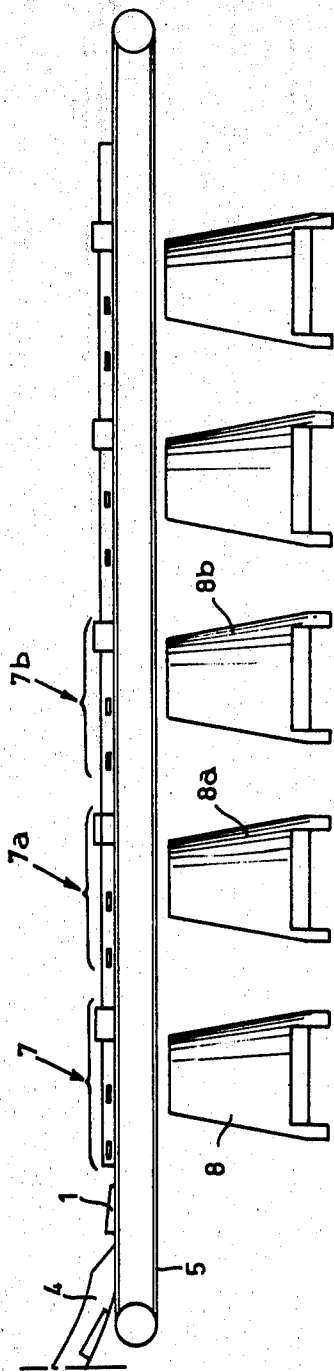
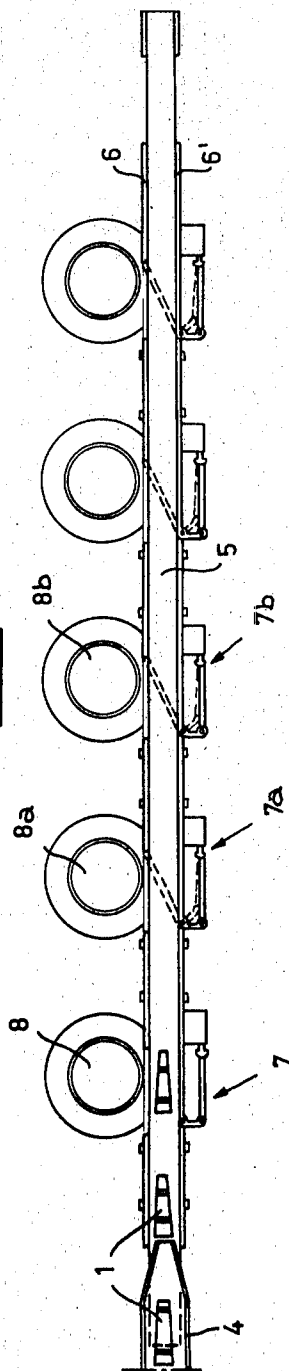


Fig. 3



PROCESS AND APPARATUS FOR SORTING ELONGATED ARTICLES SUCH AS BOBBIN TUBES OF TEXTILE MACHINES

This invention relates to a process and apparatus for automatically sorting elongated articles such as bobbin tubes employed on textile machines.

It is known that, in order to distinguish the various lots of thread being processed in textile machines, variously coloured bobbin tubes of cardboard, plastics or the like are employed. In operations following spinning, twisting or the like, the empty tubes are loosely collected in containers and have therefore to be sorted according to their different colours before reuse. Sorting is tedious, time-consuming work when done by hand.

Depending upon the extent of production, sorting of the tubes has been carried out previously by hand, employing a large number of workers and, since the manual sorting operations are rather time consuming, a very large stock of tubes is required.

An object of this invention is to obviate the above drawbacks by providing a process by which the sorting is carried out automatically without requiring manual workers. A further object of the invention is to provide apparatus for carrying out the sorting process which is simple and inexpensive, accurate and reliable in operation.

According to the invention a process is provided for effecting automatic sorting of elongated articles such as bobbin tubes employed on textile machines in accordance with different characteristics such as colour, the process being characterized by the following steps: (a) affixing to all the articles two spaced-apart annular bands, the spacing of the bands being constant for all the articles having the same characteristic; (b) conveying the articles provided with said bands over an endless conveyor provided with a plurality of spaced-apart sorting stations equaling in number the number of different article characteristics, each sorting station comprising scanning means operable only upon detection of two said bands of the appropriate spacing on a travelling article, and expelling means operatively associated with the scanning means for expelling from the conveyor at said station only those articles which have caused operation of the scanning means, and (c) collecting the expelled articles in a respective container at each said station.

The invention will be more clearly understood from the following description, given by way of example only, with reference to the accompanying drawings, wherein:

FIG. 1 is a side elevational view of a bobbin tube of the kind which is sorted by the sorting process according to a preferred embodiment of the invention;

FIG. 2 13 is a diagrammatic side elevational view of apparatus for carrying out the sorting process according to said embodiment;

FIG. 3 is a plan view of the apparatus shown in FIG. 2, and

FIG. 4 is a diagrammatic perspective view of an enlarged detail of the said apparatus.

Bobbin tubes 1 (FIG. 1) are conventionally made of plastics, cardboard or the like and are generally of a slightly tapered shape.

According to the invention the tubes 1 are each provided with two annular bands 2, 3 of electrically conductive material. The bands 2, 3 may comprise respective bands of electrically conductive paint. One band 2 is spaced by a fixed extent from one tube end, and the second band 3 is arranged at a centerline spacing L from the first band 2, the spacing L depending upon the colour of the tube. Consequently, all the tubes 1 of the same colour have a constant band centerline spacing L , L_a , L_b , L_c , L_d according to the colour of the tube.

The tubes 1 prepared with spaced bands 2, 3 as above may be quickly sorted in accordance with the centerline spacing L of the two conductive bands 2, 3 by the apparatus shown in FIGS. 2—4.

The apparatus has an endless conveyor, such as a belt 5, provided with vertical sidewalls 6, 6'. A plurality of sorting

stations 7, 7a, 7b... are arranged at equal intervals along the conveyor belt 5, each station being capable of identifying the tubes 1 of a given colour and expelling them from the belt 5 by causing them to fall into respective containers 8, 8a, 8b... arranged at the respective stations 7, 7a, 7b... Thus at the end of their travel over the belt 5 all the tubes 1 have been sorted automatically depending upon their colour and collected in the containers 8, 8a, 8b... for direct conveyance to their place of use.

The tubes 1 reach the endless conveyor belt 5 over a chute 4 from a conveying plant known per se, not shown, so as to be admitted onto the belt 5 at a predetermined frequency such as one tube every 3—4 seconds. The tubes 1 are admitted in a longitudinal direction, with their longitudinal axes arranged parallel to the direction of advance of the belt 5.

Each sorting station 7, 7a, 7b... arranged along the belt 5 comprises two pairs of symmetrically arranged electrical contacts 9, 9', 10, 10' projecting through respective slots in the opposite respective sidewalls 6, 6'. The first pair of contacts 9, 9' in the direction of advance of the belt 5 is spaced from the second pair 10, 10' by a distance equal to the respective centerline spacing L between the respective bands 2, 3 of the respective tube 1 to be selected at that station 7. Each pair of contacts 9, 9', and 10, 10' comprises a pair of spring elements extending symmetrically from both sides of the belt 5 towards the longitudinal centerline thereof and carried by respective stationary supports 11, 11' and 12, 12' attached externally to the respective sidewalls 6, 6'.

In operation of the apparatus, the spring elements of each pair of contacts 9, 9' and 10, 10' are spread apart by the travelling tubes 1 carried by the belt 5, each tube 1 being thereby scanned by the contact pairs successively. If the centerline spacing L of the two conductive bands 2, 3 on a tube 1 corresponds to the spacing of two respective contact pairs 9, 9', 10, 10' at a sorting station 7, a respective circuit 14 (FIG. 4) is completed, the said circuit 14 including the two said contact pairs 9, 9', and 10, 10' in series. The contacts 9', 10' situated on the same side of the belt 5 are interconnected by a lead 13.

Completion of the respective circuit 14 causes energization of a relay and timer unit 15, which in turn closes a further circuit 16 including the coil of an electromagnet 17 having a movable armature 18. The armature 18 is connected by a pivoted link 19 to an expelling device 20 comprising a hinged flap 20a, which, when the electromagnet 17 is deenergized, forms a smooth continuation of one of the sidewalls 6, and an integral lever arm 20b, to which one end of the link 19 is attached, the arm 20b extending outwardly from a vertical hinge 21 at one end of the flap 20a.

The electromagnet 17 is energized when said further circuit 16 is closed, retracting its armature 18 and causing the flap 20a to swing diagonally over the belt 5 into the position shown in broken lines. The device 20 is arranged downstream of the contacts 10, 10', the flap 20a being disposed opposite an opening 22 in the sidewall 6'. When the flap 20a has been moved into the broken line position, the tube 1 which initiated the energization of the electromagnet 17 is deflected from the belt 5 by the flap 20a to pass through the side opening 22 and fall into the respective underlying container 8, not shown in FIG. 4.

If, however, the tube 1 travelling between the two contact pairs 9, 9' and 10, 10' of a station 7 has a centerline spacing L of its conductive bands 2, 3 different from the spacing of the respective contact pairs, the respective circuit 14 is not completed and the tube 1 travels undeflected through the station 7 on the belt 5 until it reaches the one station at which the spacing of the respective contact pair corresponds to the centerline spacing of the bands 2, 3 on the tube 1.

The sorted tubes 1 are withdrawn from the respective containers 8, 8a, 8b... into which they fall after sorting and are conveyed to their place of use.

The above described process dispenses with the need for an attendant for sorting the tubes manually, the sorting operation

being capable of being carried out at high speed and therefore permitting a reduction in the total number of tubes 1 required in circulation.

It will be understood that constructional details may be widely varied with respect to the above-described specific disclosure and drawing without departing from the scope of the invention as defined in the claims. Thus, for example, the tubes 1 may be provided with highly reflective bands rather than the conductive bands 2, 3; the sorting would then be effected photoelectrically, the bands cooperating with photoelectric sensing devices instead of the mechanical contacts 9, 9' and 10, 10'. The use of other scanning means for the tubes 1, such, for example, as magnetic or fluidic means, also falls within the scope of the invention as defined in the claims.

We claim:

1. Process for effecting automatic sorting of bobbin tubes of different colors comprising the steps of: providing each bobbin tube with two longitudinally spaced-apart regions separated by a predetermined distance selected in accordance with the colors of the bobbin tube, the inter-region spacing being the same for all bobbin tubes of the same color; conveying the bobbin tubes singly in succession in the direction of their length on a conveyor through successive spaced-apart sorting stations equaling in number the number of different bobbin tube colors and scanning the bobbin tubes at each sorting station by automatic scanning means responsive upon detection of a bobbin tube having the appropriate inter-region spacing to cause removal of that bobbin tube from the conveyor at the station.

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