(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 270 176**
A1

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **87202323.9**

(51) Int. Cl.⁴: **B65H 54/26**

(22) Date of filing: **25.11.87**

(30) Priority: **01.12.86 IT 2252186**

(43) Date of publication of application:
08.06.88 Bulletin 88/23

(84) Designated Contracting States:
CH DE ES FR GB GR LI

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(54) Process and device for feeding various types of pirns to an automatic coner machine.

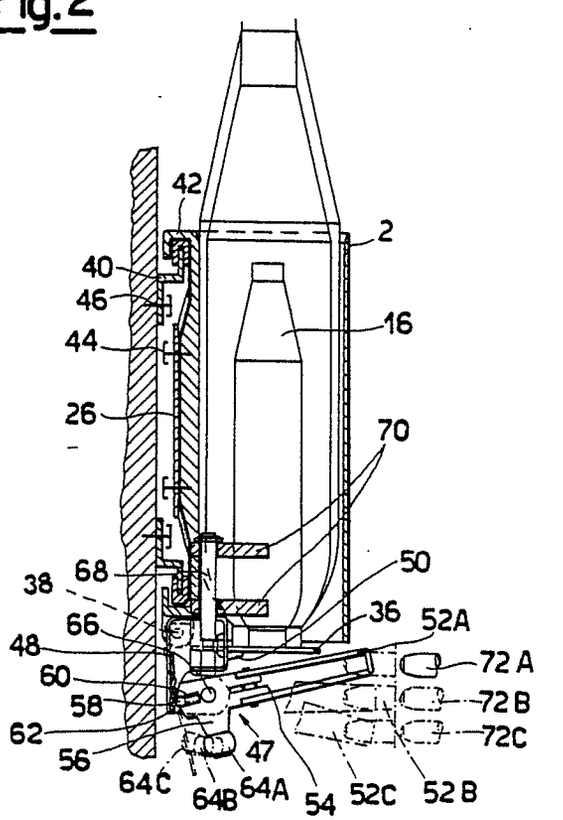
(57) Process and device for conveying and feeding different types of pirns to an automatic coner machine equipped with a plurality of winding units closely approached side-by-side to each other.

More particularly, the present invention relates to a device for the closed-loop continuous conveyance, equipped with discriminator means suitable for simultaneously feeding different types of pirns along the whole winding front.

This latter results to be subdivided into a plurality of sectors prearranged for taking up threads different in count, colour or composition.

Said device comprises a plurality of conveyor trays driven by a belt, or by a similar element, onto which they are fastened. Each tray, which is given a suitable shape for housing spinning pirns of various sizes, is equipped with a mechanical detector of striker-element type which indicates, with its position, the type of thread wound on the transported pirn.

Fig.2



EP 0 270 176 A1

"PROCESS AND DEVICE FOR FEEDING VARIOUS TYPES OF PIRNS TO AN AUTOMATIC CONER MACHINE"

The present invention relates to a process and to a device for feeding pirns to the individual reeling points of a textile machine, e.g., an automatic coner machine, by using a tray conveyor means suitable for feeding a plurality of reeling points of various winding sectors prearranged to reel different threads; thus, the simultaneous processing of taking up of a plurality of thread batches along one single winding front becomes possible.

The pirn, which is formed by a spinning frame, in particular a ring spinning frame, is subsequently unwound, and the thread is rewound on a rigid cone, to produce a cone having suitable shape and dimensions for the following processing steps, such as: knitting, loom feeding, warping, dyeing, or the like.

An automatic coner machine prearranged for the rewinding operation shows a working front constituted by a considerable number of taking up stations positioned closely approached side-by-side to each other.

The thread drawn from a full pirn in feeding step, and fed to a corresponding taking up unit is wound in cross-turns mode on a cone made revolve at a high speed by a drive drum, and during such transfer, possible faulty portions of the thread are removed.

When all of the thread of the pirn has been wound on the cone, the subsequent pirn is fed again, and the end of the thread on the cone side, as well as the thread end on the side of sad new pirn are knotted to each other, to continue the taking up, so that a cone is formed, which is completely filled with threads coming from a large number of pirns filled with the same thread type.

On such an automatic coning machine, the whole taking-up front normally winds one type of thread. Thus, in this case, only one type of pirn is used, and the pirns, belonging to one single thread batch, can be randomly red, without any need for establishing a whatsoever relationship between the taking-up units and the pirns to be fed to them. However, when different thread types are taken up by an individual taking up front of the individual automatic coning machine, specific threads have to be respectively fed to specific taking-up positions, without mixing the fed pirns.

The purpose of the present invention is to cause the production to be easily adjusted, according to the need for a plurality of different batches of thread being simultaneously taken up, in order to be flexible as a function of the various market areas, and to meet all of the users' needs.

In this case, coner machines are prepared, each taking up one or more thread types. This makes it possible the usage rate of the taking up units to be optimized, with said taking up units being advantageously grouped in sectors, whose extensions are related to the amounts, and to the characteristics of the individual thread batches which are simultaneously processed. It is advantageous as well to be able to operate by taking up two different thread types at the batch-end-change time.

For example, for a long time, coner machines have been known in the art, which are equipped with a set of frontally predisposed storage units, a storage unit per each taking up station, to contain the pirns which must be processed. The filling of the storage units is carried out by an attending workman. In order to eliminate such a manual operation, arrangements have already become known, wherein the pirns are fed and charged to the storage units by means of a conveyor tape. From said storage units, the pirns are transferred to the unwinding stations. Conveyance arrangements are also known, wherein the pirns are received inside the trays fastened onto a conveyor belt which runs along a closed-loop path, along the whole working front.

In such structural solutions, the working front of an individual automatic coner machine usually winds one thread type. Thus, in this case, only one type of pirn is fed to the individual coner machine, which can take up, on all of its winding positions, one type of pirn thread each time.

In order to re-wind a plurality of pirn thread types, which are different in count, colour or composition, a plurality of coner machines have to be used, wherein each of said coner machines takes up one thread type, or, when on an individual coner machine a plurality of thread pirn types have to be wound, a different thread type will be taken up after the end of the taking up of a particular, previously fed thread type. In other words, said above described systems are not suitable for simultaneously supplying and feeding different types of threads, which are generally in the form of small-size batches, along an individual taking up front.

On the other hand, it is also known, in some structural solutions, and, e.g., from published Japan patent application No. 143,565/83, to equip the automatic coner machine with conveyance routes which occupy a rather large surface area of the floor in the nearby of the coner machine. In such a structural solution, the conveyance routes extend on a floor surface area which is often larger than the surface area of the base of the same coner

machine. Furthermore, such a solution is also disadvantageous from the view point of the increase in complexity of the base structure which becomes, due to its location at the floor lever, an area wherein the building up occurs of the dust, large amounts of which are always present in a textile factory.

The build-up of dust causes the damaging to start of the drive mechanisms moving the pirn-holder plates and of the various running components of the machinery, due to the effect of an excess of dirt which is generated by the continuous building-up of said dust. All the above is furthermore a factor which considerably increases the contamination of the threads of the pirns, which are moved without being protected by any protecting trays.

On considering the above, as well as analogous drawbacks and disadvantes affecting the presently applied solutions known from the prior art, the present invention aimed at the purpose of providing a solution capable of overcoming such drawbacks.

A purpose of the present invention is to provide a device wherein an individual automatic coner machine can simultaneously take up a plurality of different thread types belonging to batches different in count, colour and composition. More particularly, the present invention consists in a conveyor device equipped with conveyor trays, which are different from one another in the position on them of a witness element, having a lever shape, or a pin shape, or similar shapes, which certifies the type of thread taken up on the pirn carried by the tray. Each tray houses the individual pirn coming from the preparation station. Said preparation station makes it possible to search for, extract and position, in the desired form, the end of the thread contained on the pirns. These latter, after being prepared for undergoing the unwinding, are transferred into their respective housing trays, which are conveyed, in continuous, along the working front, to the taking-up points. Incidentally, it is known in the art to prepare the thread end, e.g., on the top of the pirn tube, or inside the hole of the tube of the same pirn; the device, or the station, for the timed search for the end of the thread of the pirns, in order to prepare them for the subsequent unwinding is known as well, and also known are the lever systems for transferring from said pirn end search station to one of the various devices and processes for the conveyance of the pirns along the taking-up front for the automatic feed of the coner machine.

The device of the invention in no way alters the operating system and the equipment pieces composing the automatic coner machine, so that the traditional winding machine will be not described, but only reference to those parts thereof, which concern and clarify the use of the present invention, will be made, and precisely reference will be made to the continuous belt or chain conveyor system, on which the trays housing the pirns are fastened, as well as to the chutes along which said pirns move from up downwards by gravity, in order to prepare them on their corresponding receiving pins.

Furthermore, the station for the search for, and the charging, of the pirns to be unwound, will not be described: it is in fact already per se known in many structural forms, and a detailed description thereof is not necessary, all the more that it is not an object of the present invention. To the end of the present invention, it is important that such station for pirn searching for, and charging should be equipped with lever systems, also already known from the prior art, to carry out the transfer of the prepared pirns into the trays of the conveyor system which makes it possible them to be automatically fed to the taking up points.

A valuable characteristic of the device of the present invention is its suitability for being applied both on the working fronts of the already existing machines, and on the working fronts of the machines under way of assemblage.

Futhermore, in no way operators attending the device, which operates in a completely automatic way, are necessary.

Another valuable characteristic of the present device is its operating way, which is prevailingly mechanical, in that, besides the drive unit driving the conveyor belt or chain, no electrical, electromechanical or electronic components enslaved to the device exist.

The preferred form of practical embodiment herein illustrated is neither binding nor limitative as to the mutual position of the components and as to the consequent simplifications which could derive from it; said solution is herein illustrated in order to exemplify the device of the present invention in its entirety, precisely resorting to a preferential form of practical embodiment, with what provided for by the disclosure, besides the hereunder indicated variants being safe.

Figure 1 is an elevation front view - schematically showing the configuration of the automatic coner machine coupled with the practical embodiment of a device of the present invention;

Figure 2 is a perspective view showing an example of a device equipped with discriminator means, and with a pirn falling lever device according to the present invention;

Figure 3 is a top plan view of the device of Figure 2;

Figure 4 is a view similar to that of Figure 3, but showing the connection between the pirn housing tray, in its open configuration, and the chute by

means of which said pirn is fed to the receiver pin integral with the pirn carrier plate.

In the Figures, equal components, or components performing an equal or equivalent function are indicated by equal reference mumerals.

In them we have:

1 is an automatic coner machine producing cross-wound pirns;

2 is a conveyance tray housing the individual pirn;

4A is the automatic charging device suitable for drawing the A type of pirns, stored in bulk, prearranging them, in lined-up and parallel positions, on a conveyor belt, to consign them to user means, such as pirn-orienting means, and means suitable for finding out the end of the thread on the same pirn;

4B is the automatic charging device suitable for drawing the B type of pirns, stored in bulk, prearranging them, in lined-up and parallel positions, on a conveyor belt, to consign them to user means, such as pirn-orienting means, and means suitable for finding out the end of the thread on the same pirn;

4C is the automatic charging device suitable for drawing the C type of pirns, stored in bulk, prearranging them, in lined-up and parallel positions, on a conveyor belt, to consign them to user means, such as pirn-orienting means, and means suitable for finding out the end of the thread on the same pirn;

6A is the container wherein the A type of spools are contained in bulk;

6B is the container wherein the B type of spools are contained in bulk;

8 is the station wherein the pirn orientation and the search for the end of the thread on the pirns take place, and wherein said pirns are then prearranged inside the suitable conveyance trays 2, with a running path indicated by the arrow 7;

10 is a belt conveyor which individually transfers the pirns running in the direction shown by the arrow 9, which indicates the running direction of the upper conveyance stretch;

12 is a belt conveyor which individually transfers the pirns of A type to the station 8 which finds, after orienting said pirns, the end of the thread on the individual pirn;

14 is a belt conveyor which individually transfers the pirns of B type, consigning them to the conveyor belt 10;

16 is the spinning pirn of A or B or C type, prepared and conveyed to feed the automatic coner machine 1;

18 is one of A, B or C sectors, each including a plurality of winding units, forming a group taking up a different thread type;

22 is one of taking up stations of A, or B, or C type, which, closely approached side-by-side to each other, form the whole working front of the taking up machine;

20 is the thread collecting reel of A or B or C type, having sizes as established by the production process;

24 is the cover of protection of the conveyor device equipped with the conveyance trays;

26 is a tray-holding conveyor belt which revolves in the direction shown by the arrow 25 in front of the taking up stations;

28 is the pirn-holder plate driven to intermittently, stepwise revolve in order to catch the pirn and to simultaneously eject the empty cone by means of a mechanical system not shown in greater detail, which is anyway per se known;

30 is the pirn-holder pin receiving the pirns;

32 is a guide chute guiding, with self-centering, the spinning pirn 16 on the receiver pin 30;

34 is a rigid chute along which the pirn slides from up downwards by gravity, according to the arrow 35, and which is adjacent to the self-centering chute 32;

36 is the movable bottom plate of the conveyance tray 2;

38 is the hinge around which the movable bottom plate 36 of the conveyance tray 2 rotates;

40 is the guide for the conveyance trays;

42 is the counter-guide of the conveyance trays;

44 are the fastening screws for fastening the conveyance trays onto the conveyor belt 26;

46 are the fastening screws which fasten the guides 40 onto the front structure of the automatic coner machine 1;

47 is the operative block of the discriminator lever;

48 is the support element for the discriminator lever 56;

50 is a wing, having a suitable shape, which supports and stops the movable bottom plate 36 of the conveyance tray 2;

52 is the release lever mechanically operated by a striker element, which shifts from its locking position the wing 50, making it possible the bottom plate 36 to revolve;

54 is a safety elastic spring-element, constituting a safety means in the action of mutual mechanical interference between the release lever 52 and the striker element 72 made integral with the taking-up unit;

56 is the discriminator element, whose prearranged position witnesses the type of thread wound on the transported pirn 16 housed inside the tray 2;

58 is the sphere of positioning of the discriminator element 56;

60 is the elastic pusher element acting on the positioning sphere 58;

62 is a hollow partially housing the sphere 58, to keep the discriminator element 56 in a pre-established position;

64 is the roller of the discriminator element 56 positioned in 64A or 64B or 64C, which witnesses the type of thread taken up on the transported pirn 16;

66 is the hinge of the discriminator element 56;

68 is the central hinge of the discriminator lever 47;

70 are the guide elements for the central fulcrum 68;

72 is the mechanical striker element made integral with the structure of the taking up unit, and cooperating in the discriminating action with the release lever 52. The position of the said element 72 is determined by the type of thread, A or B or C, being taken up on the corresponding taking up unit.

The operation is now disclosed of the device of the present invention.

The containers inside which the pirns of A type, of B type or of C type are stored in bulk, feed the automatic charging devices suitable for collecting and conveying the spinning pirns of A type, or of B type, or of C type.

At the upper end of the belt conveyor 14, the individually conveyed pirns are collected by the belt conveyor 10 which transfers said pirns to the station 8, suitable for orienting the pirn and finding out the end of the thread.

In a similar way, the automatic charging device for the C type of spools, will be equipped with advantageously prearranged conveyor belts, to convey said pirns to the station 8.

For the sake of simpleness in the drawing, said belt conveyors are not shown. The pirns of A type, coming from the conveyor belt 12 are directly transferred to the station 8 suitable for orienting the pirns and finding out the end of the thread on the pirns 16.

During the taking-up operation of the operative winding front of the automatic coner machine 1, the automatic charging devices 4A or 4B or 4C feed, with the respective pirns 16A or 16B or 16C, the station 8 suitable for orienting and finding out the end of the thread of the pirns, and transferring them into the suitable conveyance trays 2.

The charging on the station 8 of a spinning pirn of A type, or of B type, or of C type takes place following a request signal coming from a taking up sector 18A or 18B or 18C. The station 8, when receives the spinning pirn 16, memorizes the type of pirn, and the position wherein said pirn is charged, such that, moment by moment, the operation of the same station, which is also a transfer device, is determined in its progressing by the knowledge of the location of the various pirn types it conveys.

Once that it has found out the end of the thread of the pirn 16, the station 8 predisposes it and charges it, by a technique known in the prior art, into the proper conveyance tray 2 and simultaneously, by detecting and memorizing the type of pirn, A or B or C, which it is charging, predisposes the operative block of the discriminator lever 47 in the A or B or C position, which witnesses the type of thread wound on the conveyed pirn. The tray-holder conveyor belt 26 continuously transfers the spinning pirns 16 along the winding front of the automatic coner machine.

The automatic coner machine is subdivided into winding sectors 18A or 18B or 18C, wherein each taking-up unit belonging to a winding sector is provided with a mechanical movable striker element 72 A or 72B or 72C, located in height (see Figure 2) in accordance with the type of pirn to be drawn 16A or 16B or 16C.

Normally, the mechanical striker element 72 is in its rearwards-moved position. When a winding unit ends the unwinding of a spinning pirn 16, the pirn-holder plate 28 revolves through one step, putting under unwinding the pirn previously charged in reserve position on a receiver pin 30, and makes the mechanical striker element 72A or 72B or 72C come out, with a substantially horizontal shifting, to reach its position of mechanical interference with the corresponding release lever 52 in A or B or C position.

Said release lever 52, running together with the conveyance tray housing the pirn 16, yields by rotating during the interference step, around the central hinge of the discriminator lever 68, simultaneously causing the shifting, from its locking position, of the wing 50 which in its turn releases the movable bottom plate 36 of the conveyance tray 2. The spinning pirn 16, of the type as determined by the position of the above-said interference elements, by being free from its bottom support 36, starts sliding by gravity along the rigid chute 34, running along the direction indicated by the arrow 35, to come to slip, after running along the self-centering guide chute 32, on the receiver pin 30. Said spinning pirn 16 goes to constitute the reserve in the pirn-holder plate 28. The mechanical striker element 72 of the taking up unit is made re-enter through a substantially horizontal shifting by using means known from the prior art, and the release lever 52 places itself, or remains placed, in a position of non-interference with possible subsequent striker elements 72A or 72B or 72C, placed in an interference position by the taking-up units which require a spinning pirn 16. The conveyance

tray returns empty back to the station 8 wherein the search for the pirn thread end is carried out.

Along the path length preceding the area wherein the spinning pirns 16 are charged to the conveyance trays 2, the movable bottom plate 36 of the tray comes back to its closed position, so driven by suitable driving means, not shown in the Figures, because they are per se known. The operative block of the discriminator lever 47 during the step of pirn charging to the tray, by rotatably actuating the discriminator element 56 bearing, at its end, the contact roller 64, will cause the release lever 52 to assume an A or B or C position, corresponding to the type of pirn supplied to its own tray. The rotation of the discrimnator element 56 around the hinge 66 will position the sphere 58 inside a hollow 62A or 62B or 62C, with a stable and safe position of the discriminator element 56 and of the release lever 52 during their movement being obtained thanks to the urging by the spring 60. Said spinning pirn, delivered to, and housed inside, the conveyance tray 2, runs along the winding front, ready to be conveyed on a receiver pin 30, to feed a pirn-holder plate 28 of a whatever winding unit belonging to a taking up sector 18A or 18B or 18C into which the automatic coner machine 1 is subdivided.

In case from the conveyance trays 2 the pirn is not drawn, when this latter runs before the station 8, suitable optical detecting means or sensors, already known from the prior art, provided in the area which precedes the area concerned by the pirn charging operation, recognize the presence of the pirn 16 in the conveyance tray 2, and inhibit the actuation of the cycle of spool charging to the above said tray 2. The charging cycle will be actuated in correspondence of the passage of a subsequent empty tray 2 running before the pirn preparation station 8.

One should observe that although the invention has been disclosed by referring to the practical embodiment wherein the automatic coner machine is subdivided into three winding sectors, i.e., the A, B, C sectors, the number of such winding sectors can anyway be increased to four or more, by positioning the discriminator and detector elements in a plurality of positions, subtantially a position per each individual winding sector.

A preferred solution has been herein disclosed with some variants thereof, but other solutions are anyway possible.

Thus, positions of the operative lever systems can be varied; a tray-holder conveyor belt can be envisaged, which is enabled in its running function at each drawing signal, and hence provided with an intermittent motion; shapes and dimensions of the discriminator element can be varied, together with the release lever and with the mechanical striker element made integral, in a prearranged position, with the structure of the taking up unit. These and still further variants are therefore possible within the scope of the invention.

Claims

1. Process for conveying and supplying types of pirns different in count, colour or composition of the thread, to the many taking up units closely approached side-by-side to each other along the whole working front of an automatic coner machine, characterized in that the pirns are received inside trays fastened onto a continuous, closed-loop conveyor system, of conveyor belt type or of chain type, and that said trays are provided with discriminator means indicating the type of thread wound on the conveyed pirn.

2. Process according to claim 1, characterized in that the belt or chain conveyor device is made run with a continuous and uniform movement.

3. Device for carrying out the process according to claim 1, characterized in that as the discriminator and indicator means a mechanical detector is used, whose position witnesses the type of conveyed pirn.

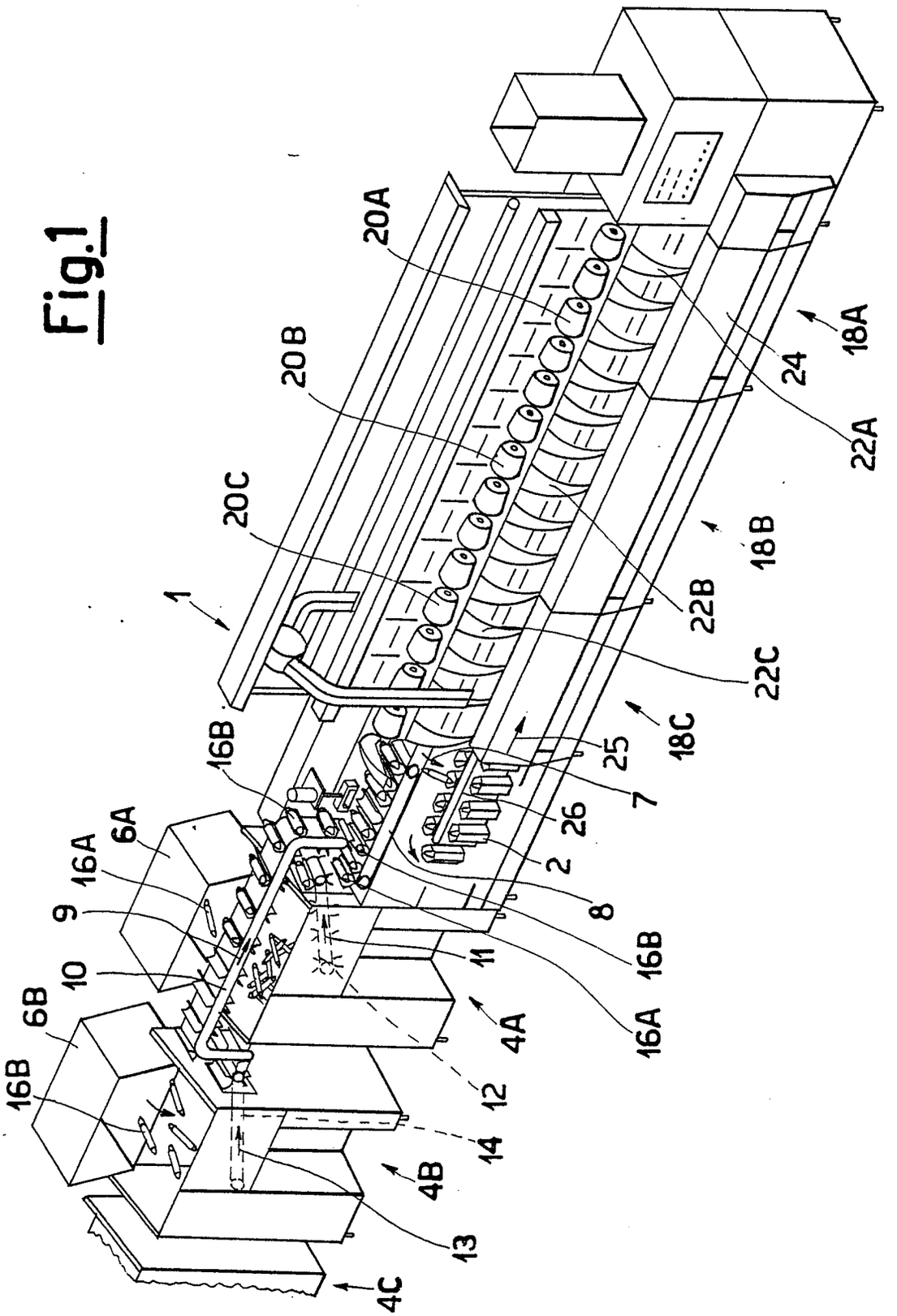
4. Device for carrying out the process according to claim 1, or claim 3, characterized in that each pirn housing tray is equipped with a mechanical detector as the element indicating the type of conveyed pirn.

5. Device for carrying out the process according to claim 1, or according to claims 3 and 4, characterized in that the differentiated positions of the mechanical detector of striker-actuated type as the indicator element coincide in number with the number of the different thread types belonging to batches different in count, colour and composition simultaneously taken up on the individual automatic coner machine.

6. Device for carrying out the process according to claim 1, or according to claim 3, characterized in that the mechanical detector as the indicator element cooperates with a mechanical striker element provided on each taking up station, such to be able to liberate the pirns from the pirn housing conveyance trays on request by the winding units of the automatic coner machine.

7. Device according to claim 6, characterized in that the mechanical striker element made integral, in a pre-arranged position, with the structure of the winding unit, assumes a differentiated position as a function of the winding sector prearranged for being fed by one type only of pirn under unwinding.

Fig.1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20B
20C
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16B
6A
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16B
4C
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4B
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Fig.2

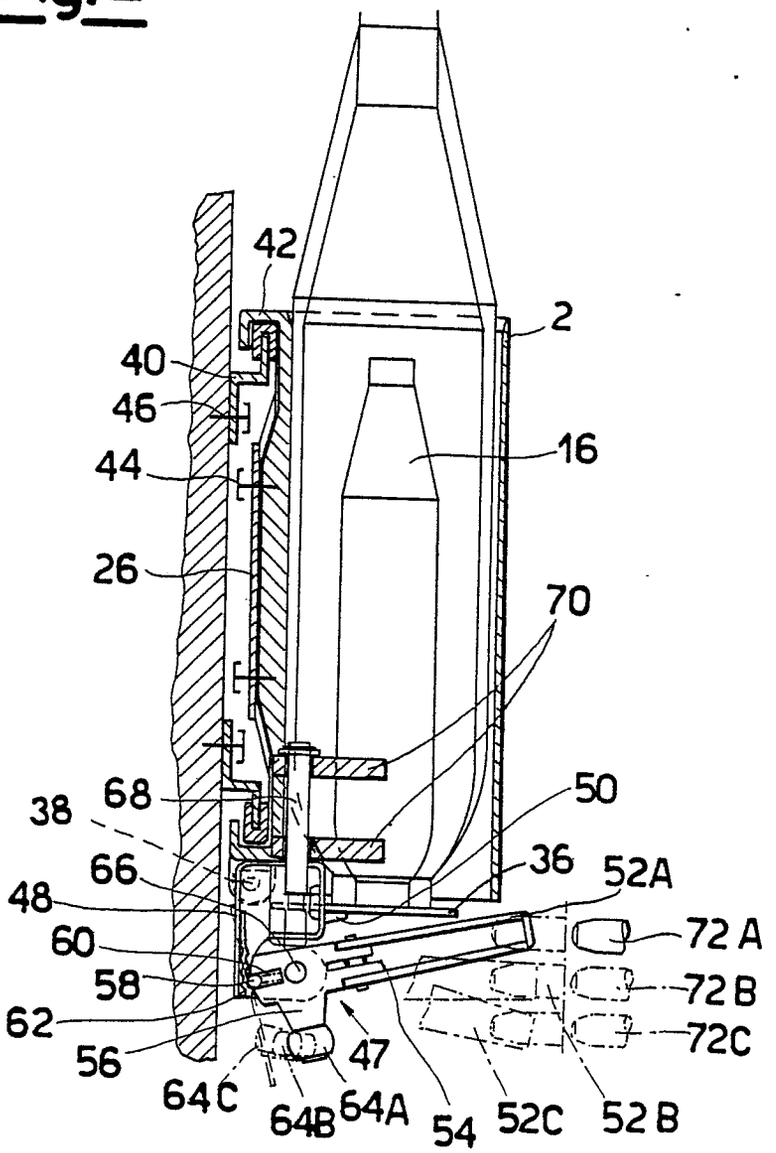
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Fig.3

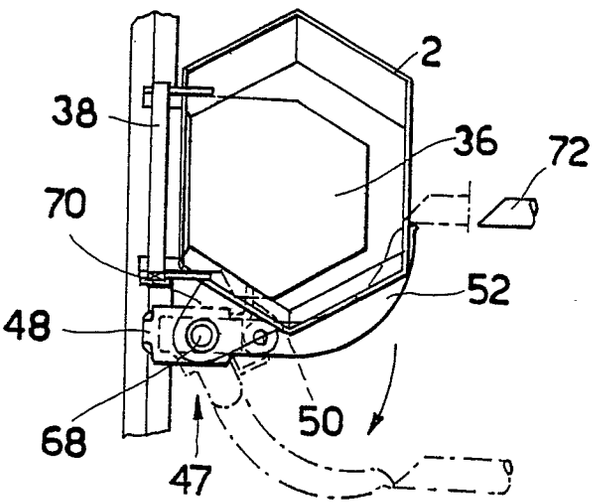
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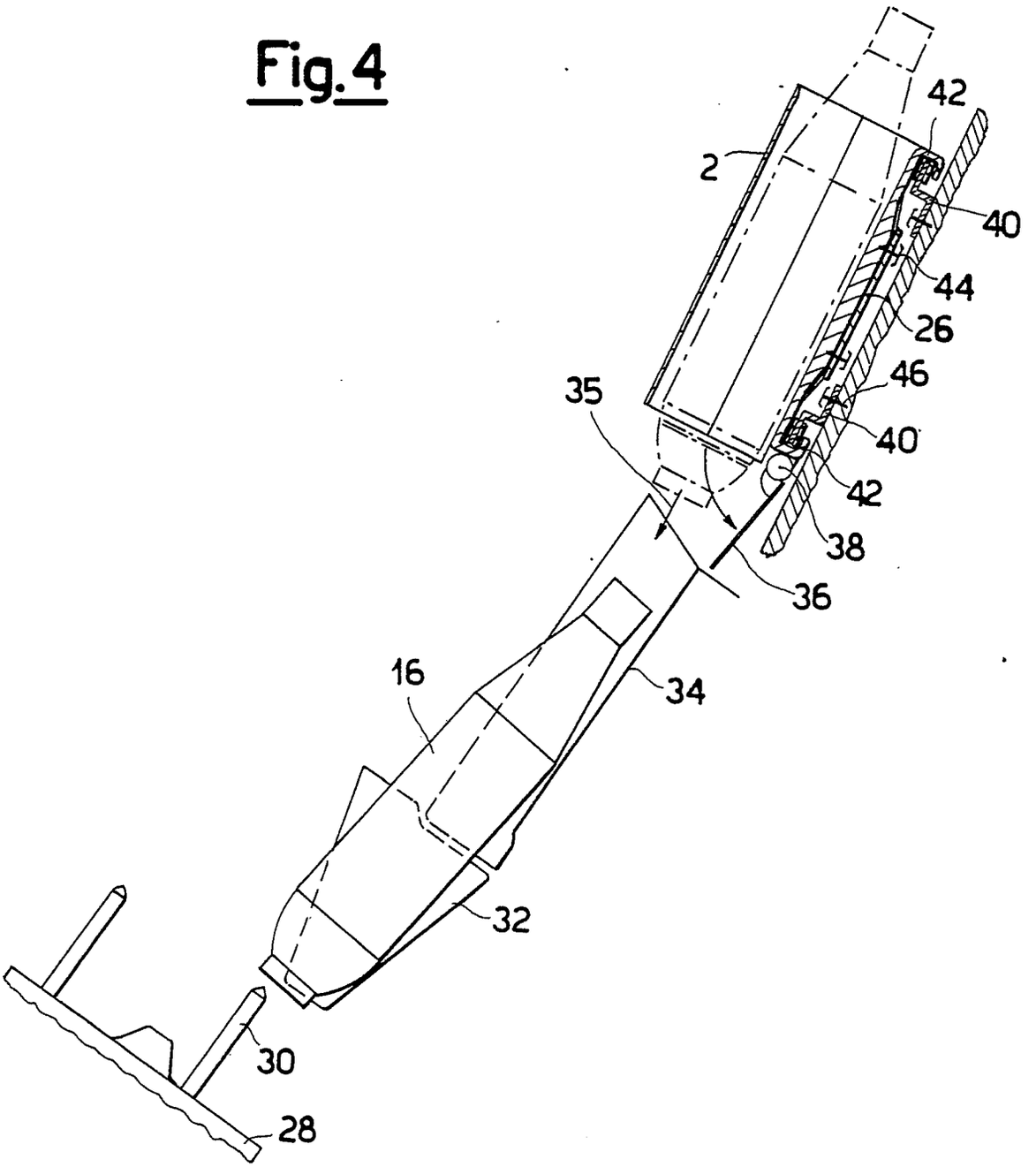
Fig.4



European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 87202323.9

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	US - A - 3 774 859 (C.W. BROUWER) * Claim 7 * --	1,2,3,4	B 65 H 54/26
A	DE - B2 - 2 833 273 (MURATA KIKAI K.K.) * Claims * --	1,2,3,4	
A	DE - A - 2 341 273 (NIHON SPINDLE SEIZO K.K.) * * Totality * ----		

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

B 65 H 54/00
B 65 H 49/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	05-02-1988	JASICEK

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
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