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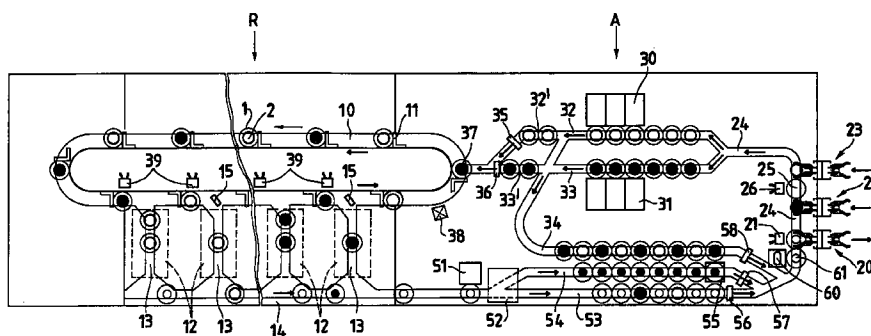
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(54) Method and device for winding a plurality of yarn batches simultaneously

(57) An automatic winding machine for simultaneously winding a plurality of yarn batches to be fed to separate stations (12) of the winding machine, in which the packages (2) are carried by transporting caddies (1) each identified by its own code which distinguishes it from all other caddies, the code being associated with

the identification of the type of package loaded onto it, the winding stations being provided with code readers (39) to identify the caddy in transit and hence its package batch.

Fig.2



Description

This invention relates to yarn production by spinning-winding, ie a combined method of spinning and bobbin winding.

Winding generally has a much higher productivity than spinning, in that the yarn is wound at a much higher rate than the rate at which it is spun. For this reason a small number of winding stations is able to work the yarn produced in a large number of spinning stations, for example of a ring spinning machine, which produce a considerable number of yarn packages wound on tubes, which are unwound and then rewound onto a smaller number of larger-dimension bobbins after eliminating any defective or irregular pieces from the yarn.

This productivity difference between the two stages is such that one and the same winding machine is able to absorb the yarns produced by several spinning machines, and frequently to also operate on yarns of different type produced simultaneously by different spinning machines connected to the winding machine by continuous transport systems.

Spinning-winding requires the handling not only of the full packages between the spinning and winding stages and of the empty tubes returned from the winding to the spinning stages to form new packages, but also of a large number of irregular packages. These irregular packages are generally in the form of tubes from which the wound yarn has not been withdrawn completely and from which the winding station is unable to recover further yarn, for example because it is not able to seize its end to continue winding, using the means with which it is provided. Hence, to reuse these irregular packages, special separate processing circuits are required for depleting or discharging them.

Before the packages are fed to the winding stage they have to be arranged with their yarn end in a predetermined position, for example inserted into the tube on which they wound. The winding station is then able by itself to seize the end from the packages and to initiate their winding by an automatic procedure without the intervention of operators.

Between the spinning and winding machines there is thus a considerable circulation of material to be handled and checked, namely the empty tubes to be returned to the spinning machine for rewinding them as new packages, and the wound packages produced by the spinning machine to be prepared and fed to the winding machine. In winding machines of the latest design, each winding station is able to process fifty or more packages per hour, so that their overall handling involves thousands of pieces per hour.

For these reasons the handling operations and the normal machine control are entrusted as far as possible to automatic devices, operator intervention being limited to supervision and malfunction.

One arrangement for handling packages and tubes which has encountered considerable favour, for exam-

ple as described in the patents FR 1,571,158, JP-A-12128, DE 3,235,442 and DE 3,213,253, consists of transferring them onto support caddies provided with a central vertical mandrel which retains them in an erect position, and moving the caddy into circulation between and within the machines, including during the preparation and unwinding stages.

This expedient enables the packages to be transferred and worked practically without touching them and without the yarn wound on them being able to become soiled by undesirable contact with parts of the machine. The vehicle represented by the caddy is also very useful for simultaneously winding several batches of different yarns, because the packages can be distinguished from each other on the basis of the caddy which transports them and hence directed towards those stations of the winding machine specifically intended for each of the batches being worked.

In the known art the caddies carrying the packages or tubes are generally moved by moving the surface on which they rest, for example conveyor belts for rectilinear movements and rotary discs for circular movements.

Controlling the handling of material in winding machines is even more delicate and complex if several batches are worked simultaneously.

The present invention relates to a method and device for winding packaged yarn for the simultaneous processing of a plurality of yarn batches comprising feeding, working and handling full packages and depleted packages by means of said support caddies.

As already stated, in the known art the type of package is identified on the basis of the caddy on which it is located for feeding, for example as described in Italian patent application 49452A/83 in the name of Murata. In this arrangement the winding machine is provided with caddies of different form, the packages of the different batches being loaded onto said different caddies.

This different form can consist of one or more grooves in the cylindrical surface of the caddy base, or magnetic metal ring inserts, or bar codes which are identical for all the caddies of a certain series provided with the machine.

The packages are distinguished only on the basis of the caddy which transports them, packages carried by the same type of caddy hence being indistinguishable from each other. This distinguishing is achieved by a sensor which identifies the marking on the caddy, discriminates it and then feeds a corresponding operating instruction for sorting. This type of approach to the problem involves previously dividing the winding machine rigorously into a plurality of separate sections which are reached by suitably deviating the paths of the caddies in correspondence with doors which are opened or closed by the identification sensors. In the most simple manner the paths are discriminated on the basis of a geometrical constraint, for example they can be provided with deviator guides with plates positioned at the levels of the grooves, selection taking place on the basis of the

coincidence or non-coincidence of groove levels on the base disc of the caddy and the level of the deviator plate.

This type of solution to the problem is not free of considerable drawbacks, such as the rigorousness of the division of the winding machine into its different working sectors, the need for a very large number of caddies provided with the machine, and the wear and inaccuracies deriving from mutually contacting mechanical selectors.

In a more recent technical solution, for example as described in Italian patent 1,246,225, the caddies or package tubes are provided with magnetic memory elements, such as electronic chips, on which an indication of the type of package fed to them is stored and then cancelled as required. The machine selector elements operate on the basis of information recorded on each caddy which is cancelled and again recorded each time a package is loaded onto it. This technical solution also requires the winding machine to be previously divided rigorously into a plurality of separate sections reached by suitably deviating the caddy paths in correspondence with accesses which are opened or closed on the basis of the identification read on the caddy. Each winding machine section is formed as a winder independent of the other sections and does not communicate with them. Again in this case, the packages of each batch circulate without distinction within their sector, once the deviators have directed them into it. Any recording or reading error can no longer be remedied.

The object of the present invention is to provide a device and method for automatically and simultaneously winding a plurality of yarn batches, which is free from the drawbacks of analogous devices of the known art.

To highlight the characteristics and advantages of the present invention it is described hereinafter with reference to a typical embodiment thereof illustrated in Figures 1 to 3 by way of non-limiting example.

The identifying element for the material circulating within the machine is a package and tube-carrying caddy which contains a memory chip - ie a recordable and readable integrated microcircuit - for encoding, on which an identification code for the individual caddy is permanently recorded in a manner which cannot be modified by the machine. This guarantee of non-modification of the identification code for each caddy is provided, for example, by introducing into the chip program a password for any erasure or new recording on it.

Each caddy can be, and in practice is, physically identical to all the others, but contains in its chip its name, ie its own anagraphic code which distinguishes it from all the others. In its path within the machine, each caddy is hence distinguishable even from the caddies which carry the packages of its own batch.

The caddy structure can advantageously be provided with elastic retention and centering elements for the packages and tubes in accordance with the copending patent application MI96A125.

According to the scheme of Figure 1, the caddy 1 transports the full package 2 wound on the tube 3 and is made to travel along the surface 4. In the base disc 5 of the caddy there is inserted in a protected position the chip 6, on which the identification code has preferably been recorded before its insertion into the caddy.

Caddy identification is effected by a sensor 7 positioned a moderate distance from the caddy in transit in correspondence with a portion of the support surface 4 formed of non-ferromagnetic material.

Essentially the sensor 7 consists of an antenna emitting an electromagnetic pulse which energizes the chip 6 so that it emits a response pulse corresponding to the code recorded on it and which distinguishes each caddy from the others. The signal with the code of the caddy passing by the sensor 7 is transmitted along the line 8 to the machine control unit for the required processing.

Figure 2 shows the overall scheme of the winding machine comprising both the actual winding part R and the part A containing its auxiliary feed, preparation, undepleted package recycling and empty tube discharge units, together with the machine services and control units. The winding machine is provided with a device for moving and positioning the packages being worked by urging them to slide on fixed support surfaces along a path defined by guides and deviators controlled in accordance with the pending European patent applications 96 200006, 96 200007 and 96 200024 in the name of the present applicant, to which reference should be made for further details regarding handling and processing. The remaining parts of the handling circuit for the package and tube-carrying caddies can be formed from conveyor belts or other handling means known in the art.

The circuit part 10 of the handling path is dedicated to feeding the full packages to the winding stations in which a plurality of thrust members 11 circulating along an endless path carry the caddies 1 with their packages 2 of the various batches, maintaining them readily available to those winding stations which require them. For simplicity, the packages are shown black or white to indicate packages of different batches. The path 10 hence represents the only path for feeding all the winding stations 12 for the various yarn batches.

The winding stations 12 are indicated by dashed lines and positioned facing the return path of the packages of the circuit 10, above the passages 13 towards the path 14 for the return of the empty tubes or for the recycling of the non-depleted packages.

Along these stations and within these passages the packages locate themselves in waiting sites, in which the packages lie as stand-by for the package to be unwound, undergoing unwinding and undergoing discharged respectively, from which the depleted packages are removed along the path 14. Within the circuit 10 the packages are continuously in circulation and pass without distinction in front of all the winding stations, as the winding machine is not divided into sepa-

rate sections for the various yarn batches.

In the embodiment of Figure 2 the winding machine is shown divided into two sections, the left section for the white packages and the right section for the black packages, but in reality this physical separation is not absolutely necessary. Each winding station 12 is provided with a deviator 15 which is operated, each time its waiting site has delivered its caddy with the full package to the following unwinding site and is hence free, to intercept the caddy with the package of the specific batch, to which it has been dedicated by a command transmitted by the winding machine control unit as programmed for its working campaign. The winding stations 12 dedicated to the various batches can be divided in any manner, for example by alternating them with each other and dedicating the even stations to the white packages and the odd stations to the black packages. Dividing the machine into sections or groups is done only on the basis of a logic allotment of appurtenance without barriers and separations of physical type, as instead is the case in devices of the known art.

This division can be modified during the working campaign, for example if it is required to dedicate a greater number of stations to one yarn batch and a smaller number to the other batch. As described hereinafter this facility is very advantageous on occasion of the so-called end of batch.

Each winding station 12 is connected to the machine control unit, and is able to give and receive information and to consequently call any package 2 of the totality of packages passing in front of it, choosing the type of package which has been allotted to it and obviously discharging the caddies with depleted packages. This can happen, not only on the basis of the situation in the various sites of the winding station, but also taking account of particular spool distribution logics within the machine, for example by giving preference to those stations operating at greater linear speed or those stations which were the first to request the exchange, or finally those stations which are closest to completing the required bobbin yarn length, and so on.

This logic allotment enables a machine system to be achieved having the following characteristics:

- the number of definable groups of winding stations is limited by the number of machine stations: a winding machine consisting of sixty stations could process sixty different yarn batches simultaneously;
- the number and location of the component stations of the various groups can be varied at any moment, without any mechanical/electrical modification being required and within a time corresponding to the feeding of the modification instructions into the winding machine control unit;
- the stations pertaining to the same group do not have to be adjacent.

The handling circuit of the winding machine accord-

ing to the invention is described starting from the stations in which the packages are loaded onto the tubeless caddies which originate from the tube discharge unit 20.

Said tube discharge unit consists of a caddy intercepting member which bars its path on the conveyor belt and halts it, allowing the conveyor belt to slide under it, and a gripper member which moves on a vertical stepping conveyor analogous to that described in the said EP-A-463,674 in the name of the present applicant for transferring spinning machine packages, which withdraws the tubes, and consigns them to the rightward-travelling return conveyor line towards the spinning machine, not shown in the figure.

This operation is carried out only on those caddies for which it has been verified that the overlying tube is free of yarn, whereas the other caddies are allowed to proceed. A suitable photoelectric cell sensor guard device allows the caddies to depart only after verifying that their tube has been removed. On this occasion the reader 21 reads the name of the discharged caddy and transmits it to the machine control unit. Following this reading, the preceding recording in the caddy/package batch electronic code table is erased and is renewed at the next stage of the machine circuit, consisting of the loading stations. If however the caddy presents itself with a non-depleted package, the tube is not removed from the caddy, its recording is not erased and it is allowed to pass through the loading stations towards the subsequent package preparation stations.

Said loading stations 22 and 23, for the packages indicated as type T (black) and S (white) respectively, but which could be in a much greater number for a greater number of yarn batches to be processed simultaneously, consist of gripper members which move on vertical stepping conveyors similar to the aforesaid, and carry the packages of their own batch to mount them onto the caddies travelling along the path 24 consisting for example of a rectilinear conveyor belt.

The packages are preferably mounted onto the caddy within a single loading segment, for example by delivering the packages of the two or more batches using transporting grippers which mount the packages onto their caddy. Within the loading segment defined by the loading stations 22 and 23 the empty caddy in transit along the path 24 is halted at the loading station, a package is mounted on its respective mandrel, and at a site 25 within the segment it is identified by the code reader 26 which detects the name of the loaded caddy and transmits it to the machine control unit, together with the identification of the type of package on the basis of which of the two stations 22 or 23 has delivered to it the package T or S respectively.

The information "the caddy xxxx carries the package of type S" is used to form the electronic table showing the situation on board the machine.

In this respect, these pairs of data are gradually transmitted to the machine central control unit to form a first association table of the type:

CADDY CODE	PACKAGE TYPE
001	S
002	T
003	T
004	S
...	.
n	T

from which it is possible to unequivocally obtain the type (or batch) of package carried by each caddy in the cycle. For each new caddy/package pairing, the situation is updated, the table forming the main instrument for distributing the packages to their bobbin winding stations.

Further information can be added to the package batch table, relative for example to:

- material, colour, length, type of package (geometry) ...;
- origin, results of the processes to which it has been subjected, ...;
- destination, list of the processes to which it is to be subjected, ...

In the same manner, any combination of the following cases can be simultaneously handled:

- packages which differ in terms of material, colour and/or geometry, quality ...;
- packages which are identical but with different attributes: full package, discarded package, partial package ...;
- packages which are identical but with a different degree of advancement: package ready for unwinding, package to be prepared with yarn end seizure ...

The caddy xxxx with the package of type S mounted thereon proceeds along the path 24 and is transported to the preparation and end-seeking stations 30, 31, which correspond to two alternative paths 32 and 33 respectively, by way of a deviator positioned at the end of the path 24 and not shown in the figure for simplicity, which operates on the basis of which of the two stations 22 and 23 has delivered the package to it.

In a preferred embodiment of the invention, each of these preparation stations is dedicated to a specific yarn batch of the two being processed, because the optimized preparation procedure would require working parameters which differ according to the characteristics of the yarn batches being worked. The two alternative paths through the preparation stations 30 and 31 enable a certain reserve of caddies to be built up, already pro-

vided with packages for the circuit 10 feeding the winding stations.

The preparation stations 30 and 31 for the packages S and T are made to operate using methods and devices known to the art, for example in accordance with the method described in European patent application EP-A-463,695 in the name of the present applicant, to which reference should be made for greater details. Essentially, it consists of scanning the foot and surface of the packages with suction ports for seizing the yarn end while maintaining the package rotating in the opposite direction to the winding direction, followed by exploration with a hook member while the package rotates in the winding direction, then using a curved suction port to grip the thus traced and separated yarn end, then cutting it to size and inserting it by suction into the tube.

Typically, the success of this operation is indicated by a suitable sensor which indicates that the yarn end has been engaged and provides the enabling signal for the procedure to continue.

After its successful preparation, the package proceeds towards the winding machine along the path 32' and 33' for the packages of S type and T type respectively, to form the queue of packages ready and waiting for loading onto the winding machine R. If the preparation has not been successful, the packages concerned are fed along the parking path 34 for the packages waiting to be prepared by hand. This feed to parking is effected by deviators positioned in the paths 32 and 33, of known type and consequently not shown in the figure for simplicity.

At the end of each of the two paths 32' and 33' along which the queues of ready and waiting packages are positioned there are two distributors 35 and 36, which are opened alternatively to release only one package at a time of the batch requested by the delivery site 37, into which a caddy carrying the package is urged by the distributor 35 or 36.

The detailed view of Figure 3 shows the structure and operation of the alternatively opening caddy distributors 35 and 36. On the outside of the paths 32' and 33' there are positioned the two members 35 and 36 each consisting of a horizontal plate 101 and 102 of half-moon shape with its concavity facing said paths. The plates 101, 102 are pivoted on vertical pins 103, 104 and can rotate in the horizontal plane into two alternative positions defined by limit stops not shown in the figure for simplicity, namely the rest position (full lines) in which caddy passage is blocked, and the release position (dashed lines) in which the first caddy of the blocked queue is left free.

Below the guides 105, 106, 107 which define the paths 32' and 33' there is a conveyor belt 110 which is maintained in continuous movement in the direction of the arrow c, to move the caddies towards the circuit 10, to its loading position 37. The conveyor belt 110 has a width 1 sufficient to involve in its movement both the paths 32' and 33'.

A return spring 111, 112 tends to maintain the

plates 101, 102 in their rest position shown by full lines, a single-acting pneumatic piston 113, 114 overcoming the traction of the spring 111, 112 when fed with pressurized fluid, to rotate the plate 101, 102 in the direction of the arrow a.

The distributor 35, 36 operates as follows.

The caddies 1' and 1'' of each of the two types of package being processed are at rest in the queue along the path 32', 33', blocked by the interference with the end 115, 116 of the plate 101, 102, whereas the conveyor belt 110 sides below them in the direction of the arrow c. The situation is that shown by full lines.

When a caddy is required to be released by the distributor 35, 36 the piston 113, 114 (one or the other) is fed with pressurized fluid, to cause the plate 101, 102 to rotate in the direction of the arrow a, to attain the configuration shown by dashed lines.

The two caddies 1' and 1'' of the queue along the path 32', 33' for the two batches move in the direction of the arrow c, dragged by the underlying conveyor belt 110, in accordance with a command fed by the central control unit of the machine, relating to one or alternatively the other batch.

The yarn 1' proceeds freely towards the loading position 37, but the next caddy 1'' moves only as far as its position shown by dashed lines, where it is blocked by interference with the end 117, 118 of the plate 101, 102.

On releasing the pressure in the piston 113, 114, the return force of the spring 111, 112 prevails and the plate 101, 102 rotates in the reverse direction shown by the arrow b. The caddy 1'' then moves from the dashed-line position to the full-line position 1' previously occupied by the caddy which has just been released.

A package with the relative caddy is delivered from said loading position on the basis of the preset logic in the machine control unit for controlling the deliveries. For example, the package delivered to the circuit 10 can be of the same batch as that of the last package delivered to the winding stations 12, or that of the last caddy from which the empty tube was removed at the location 20. Generally, except for transient periods at the beginning and end of a batch, the numerical ratio between the packages of the different batches being worked in the circuit 10 of the machine section R is maintained substantially constant.

For this purpose, in the circuit 10 immediately upstream of the delivery site 37 there is installed a sensor 38, for example a photoelectric cell sensor, which indicates the arrival of an empty circuit position at the site, or of a thrust member 11 without a caddy, and causes the distributor 35 or 36 to operate, or controls it in accordance with the described control logic.

The packages hence loaded into the handling circuit 10 are maintained in continuous circulation and pass in front of all the machine winding stations 12, gradually filling the empty positions of the circuit 10 with new packages to maintain them occupied to the maximum possible extent.

Each of said stations 12 is provided with a code reader 39 positioned to read the name of the caddy arriving in front of its winding station (or head). As in the case of the other code readers present in the machine, the readers 39 are connected to the winder control unit, for example by a serial line, and exchange information with it in real time, receiving the enabling commands for operation.

In the winding procedure, each winding head 12 in which the waiting site is without a waiting package, having delivered it to the unwinding site - in the embodiment of Figure 2 the second and last heads from left to right are without them - maintains its reader 39 active to "read" the identifying codes for the caddies in transit, consults via the control unit the aforescribed caddy/package association table and, if the arriving caddy carries a package of the batch to which the head in question is dedicated, receives the enabling signal to activate the device for taking in a new package via its caddy deviator 15.

According to a preferred embodiment of the device and method of the invention, each winding head and the other machine processing units can read, add or change information in the association table for the packages conveyed to the transporter caddies.

Within the winding stations 12 the movement of the packages with their caddies between the waiting, unwinding and discharge sites can be advantageously achieved by the device described in said European patent application 96 200024 in the name of the present applicant, to which reference should be made for further details regarding the movement and the processing within the winding station.

At the exit from the winding section R the conveyor 14 carries the depleted packages towards the selector device 51, which is able to distinguish between packages discharged from the winding heads because of lack of yarn-end gripping, half packages, unclean tubes or finally clean tubes.

This device is known in the art and consists for example of a mechanical feeler member which feels the tube surface and which, if a residual winding of yarn about it is detected, is halted by it at a certain distance or at a certain height, as for example described in Italian patent application 491441A/83 in the name of Murata.

On the basis of the observations of the device 51, the deviator 52 deviates the clean tubes and the packages still to unwind along the path 53, whereas the half packages and the unclean tubes - ie those tubes with a winding residue which it is no longer worth unwinding - are fed along the path 54. A tube cleaning device 55 is located along the path 54.

This device is known in the art and consists for example of a tube withdrawal mechanism which withdraws it temporarily from its caddy, carries it to a cutting member which explores a generating line on the frusto-conical surface of the tube to cut away the residual wound yarn and then relocates the tube on the caddy.

The paths 34, 53 and 54 rejoin the main feed path

24 by way of stop and selective alternative release devices 56, 57 and 58, which respectively release towards the device 20 either the packages to be recycled and the clean tubes from the path 53, or the tubes cleaned along the path 54 by the device 55, or finally those packages of the path 34 which have been manu- 5 ally worked by operators. The procedure of feeding one caddy at a time from the queue of waiting caddies along said paths is controlled by the control unit by virtue of the code management logic stored in it. 10

The structure and operation of the devices 56, 57, 58 are analogous to that described, by way of non-limiting example, for the devices 35 and 36 for delivering the caddies to the circuit 10, in the position 37.

The caddies fed to the path 24 from one of the three described paths encounter a selector device 60 analogous to the device 51 which recognizes on the caddy in the position 61 those packages to be allowed to pass to return to the cycle for using the yarn wound on them, and distinguishes them from the empty tubes to be with- 20 drawn by the device 20 which follows in the circuit.

One of the characteristic advantages of the device and method of the present invention, due to the flexibility which the invention allows and which distinguishes it from the known art, is apparent on the occasion of a batch change, ie in the transient stage in which one yarn batch is about to terminate and another is put into oper- 25 ation.

On such an occasion, the facility for modifying the distribution of the winding heads between the two batches, without mechanical or electrical modifications but merely by giving a suitable instruction to the machine control unit, enables those winding heads which have attained the set bobbin yarn length to be excluded from processing the batch which is about to finish, for example the packages S, and to be gradually assigned to processing a different batch, which can for example be the batch T already being processed in the other winding heads or be a new batch V, U In this manner the residual packages S can be reserved for completing those bobbins not yet completed on the remaining winding heads which are still processing the batch S. In this manner the termination of the batch S does not give rise to incomplete bobbins, the process- 40 ing change taking place gradually and without down times, precisely because there is no rigid division of the machine into sectors.

Claims

1. A method for simultaneously winding automatically a plurality of yarn batches by handling the full feed packages, the packages under processing and the depleted packages on transporting caddies which contain information able to identify the different batches being processed, said caddies being provided with the winding machine, characterised in that: 55

- the feed packages of the various batches are loaded onto the caddy in transit in the respective loading stations (22, 23), said caddy being identified by its own permanent anagraphic code unmodifiable by the machine, which distinguishes it from all other caddies, a code reader (26) identifying the caddy together with the type of package loaded, these pairs of data being transmitted to the machine central control unit to compile a caddy/package association table which is updated for each pair;
- the packages of the various batches are distributed to the various winding stations or heads (12) via a single circuit (10) for feeding the packages to all the winding stations (12) in which the packages pass without distinction in front of all the winding stations (12);
- distribution taking place on the basis of the identification of the caddies in transit in front of the readers (39) of the winding heads (12), on the basis of consulting the caddy/package association table and, if the arriving caddy carries a package of the batch to which the head in question is dedicated, on the basis of an enabling command for taking-in this package via the deviator (15) for the head in question.

2. A method for simultaneously winding automatically a plurality of yarn batches as claimed in claim 1, characterised in that the packages loaded into the circuit (10) are maintained in continuous circulation, gradually filling the empty positions of the circuit (10) with new packages to maintain them occupied to the maximum possible extent.

3. An automatic winding machine for simultaneously winding a plurality of yarn batches to be fed to separate stations of the winding machine, in which the full feed packages, the packages under processing and the depleted packages are carried by transporting caddies containing information able to identify the different batches being processed, said caddies being provided with the winding machine, characterised in that each of said caddies (1) for transporting the packages is identified by its own permanent anagraphic code unmodifiable by the machine, which distinguishes it from all other caddies in its travel within the machine, even from those which carry packages (2) of the same batch.

4. An automatic winding machine for simultaneously winding a plurality of yarn batches as claimed in claim 3, characterised in that the identifying element of the caddy consists of a memory chip (6), in the form of a recordable and readable integrated microcircuit, on which an identification code for the individual caddy is permanently recorded.

5. An automatic winding machine for simultaneously

winding a plurality of yarn batches as claimed in claim 4, characterised in that the identification code is recorded on the chip (6) before its insertion into the caddy in a protected position.

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6. An automatic winding machine for simultaneously winding a plurality of yarn batches as claimed in claim 3, characterised in that the winding machine comprises a single circuit (10) for feeding the packages to all the winding stations (12), within which circuit the packages are in continuous circulation and pass without distinction in front of all the winding stations (12), the winding machine not being divided into separate section for the various batches.
7. An automatic winding machine for simultaneously winding a plurality of yarn batches as claimed in claim 3, characterised in that the winding machine comprises a central machine control unit in which there is compiled a table indicating association between the identification codes for the caddies (1) and the type (or batch) of package (2) with which these are loaded in the package loading stations (22, 23), which is updated with each new caddy/package pair, and forms the instrument by which the packages are distributed to their winding stations.
8. An automatic winding machine for simultaneously winding a plurality of yarn batches as claimed in claim 7, characterised in that the constituent winding stations (12) of the winding machine are provided with code readers (39) to read the codes identifying the caddy in transit, to consult - via the control unit - the caddy/package association table, and to receive the enabling command to activate the device for taking-in a new package via the caddy deviator (15).

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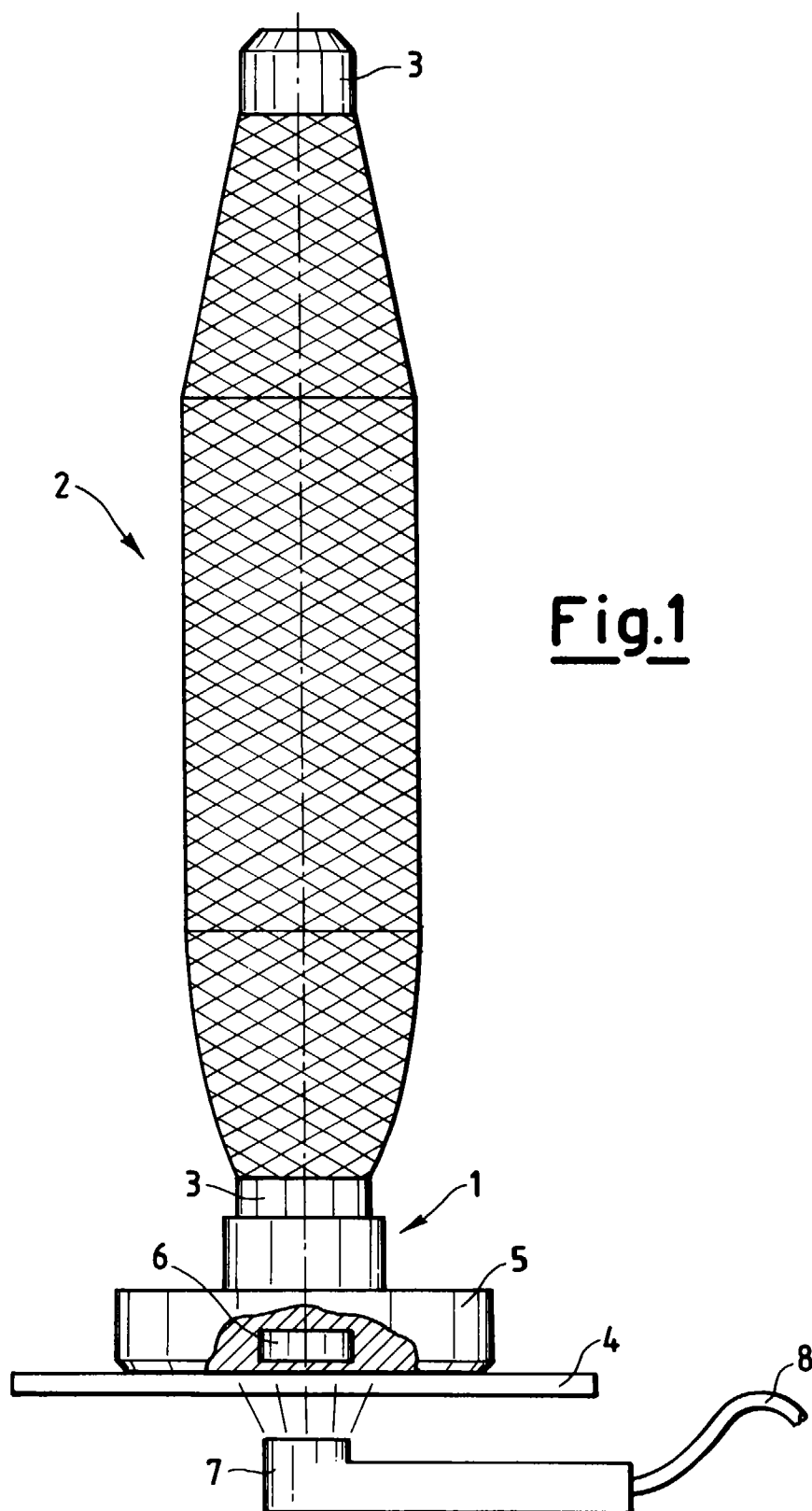


Fig.2

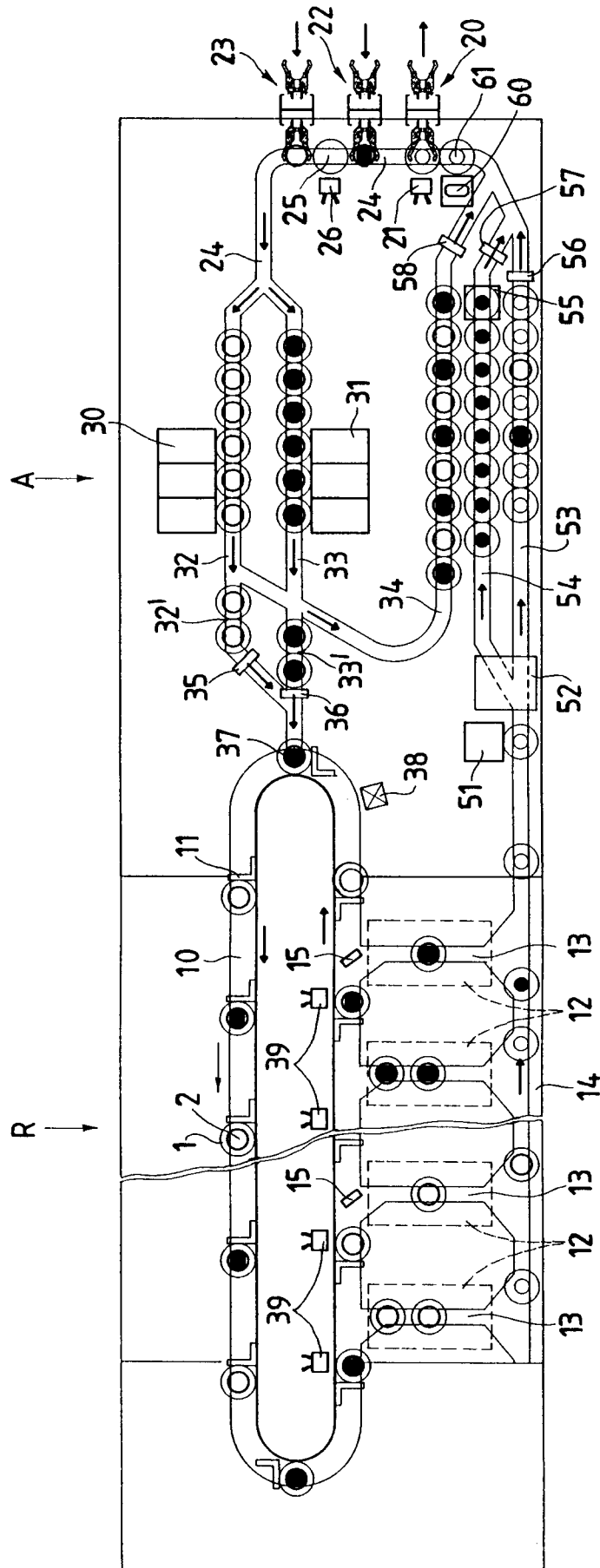
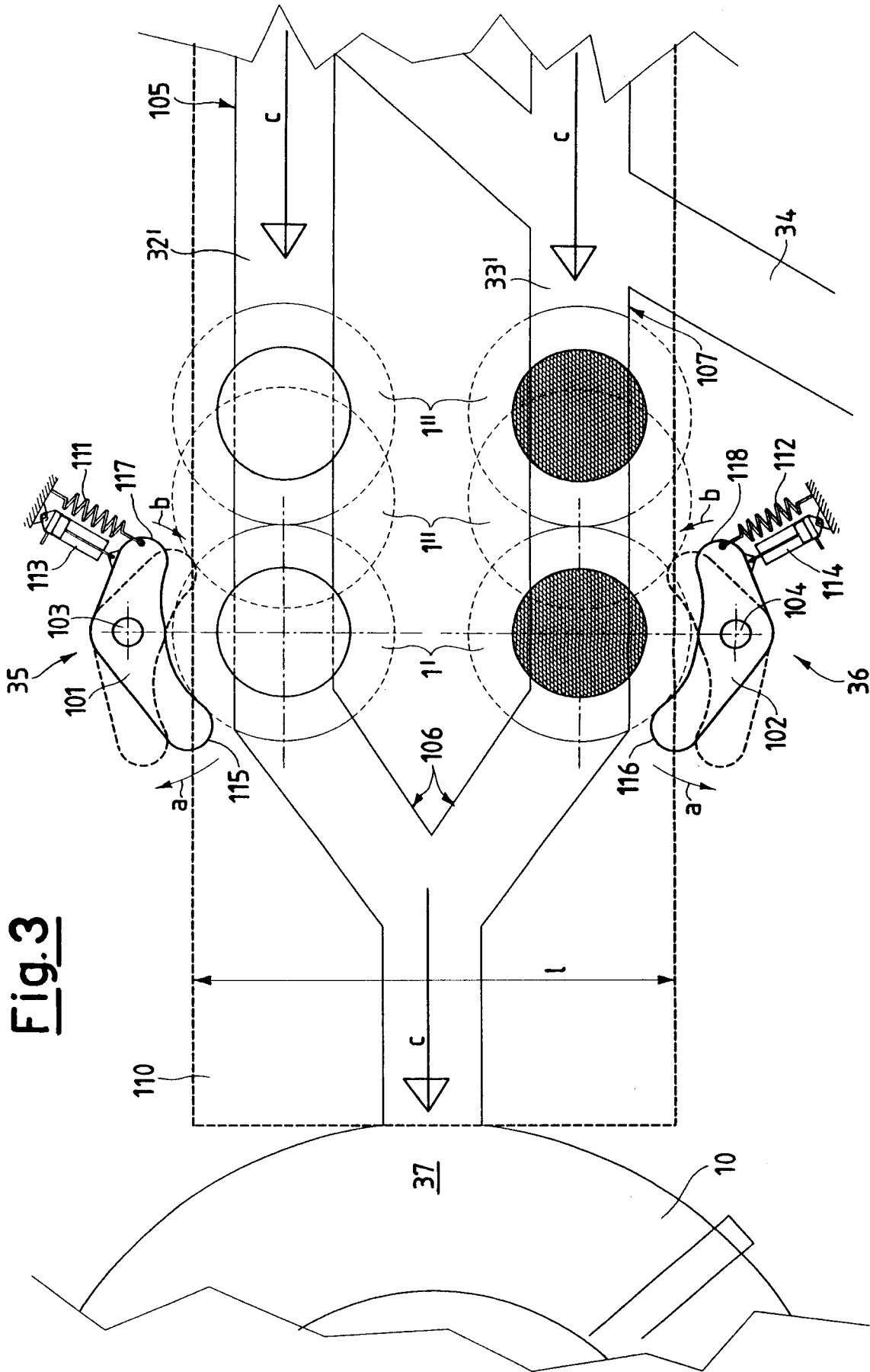


Fig.3





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 20 0735

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.6)
Y	EP 0 593 808 A (W. SCHLAFHORST & CO.)	1	B65H67/06 D01H9/18
X	* column 5, line 40 - column 6, line 31 *	3-8	
	* column 7, line 28 - line 34 *		
A	* column 8, line 23 - column 9, line 19 *	2	

Y	DE 43 17 266 A (MURATA KIKAI K.K.)	1	
	* column 2, line 66 - column 4, line 12 *		
	* column 8, line 18 - column 9, line 22 *		

Y,D	FR 1 571 158 A (GIDDINGS & LEWIS-FRASER LIMITED)	1	
	* page 4, line 2 - line 42 *		

A	DE 41 13 092 A (MASCHINENFABRIK RIETER AG)	1,2	
	* column 5, line 56 - column 6, line 6 *		
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	* claims *		B65H D01H

The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		24 June 1997	D Hulster, E
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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