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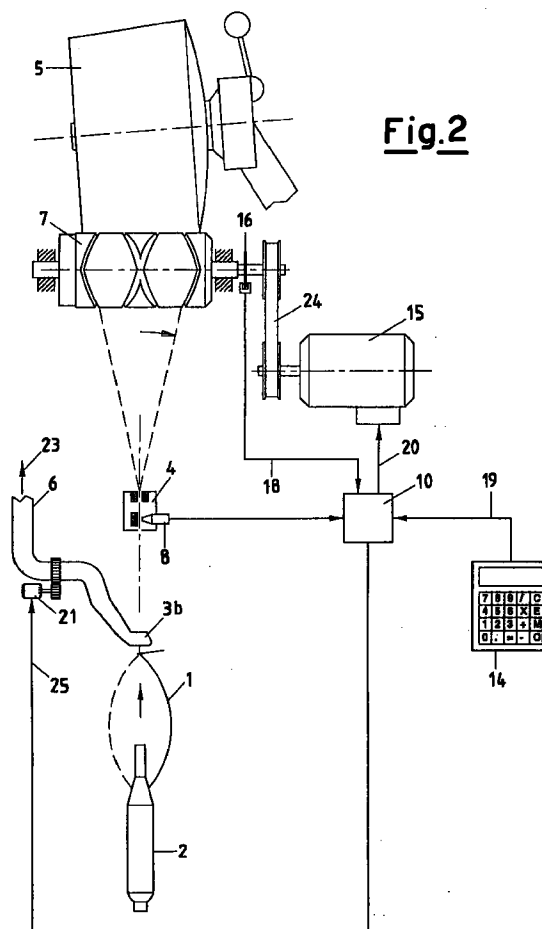
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(54) Method and equipment for eliminating faulty thread wound onto the unwinding pirn

(57) The present invention relates to a method for eliminating a substantial quantity of faulty thread wound onto the cop which feeds the bobbin in formation in a winding station of an automatic bobbin-winding machine wherein said method comprises the identification of the faulty thread, the stopping of the winding process and suction of the whole quantity of faulty thread by means of the lower suction mouth always present in all bobbin-winding stations.



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Description

The present invention relates to a method for eliminating a substantial quantity of faulty thread wound onto the cop which feeds the bobbin in formation in a winding station and said elimination is activated each time the continuous inspection of the thread reveals continual or frequently-revealed defects. It is known that some textile processes consist, first of all, in transferring the thread, at the highest possible speed, from one unit to another. For example a cop produced in a spinning machine, particularly in a ring spinning machine, is fed to a winding station of an automatic bobbin-winding machine for a subsequent operation in which a thread of the cop is rewound in a pre-fixed quantity onto a bobbin with a pre-established form and a defect in the thread is removed thereby.

In particular, in an automatic bobbin-winding machine in which one or more winding stations are adjacent to each other, a thread is pulled from a cop and passed into a quality-control thread cleaner and other devices after which it is wound onto a bobbin which is made to rotate by the grooved cylinder. The thread cleaner is known in the textile industry as a device for controlling the threads in rapid movement whose thick or fine points along the thread itself are revealed by means of optical exploration, being analyzed according to the length and diameter, as well as classified and counted. In this way, from the result of the control, it is possible to identify the causes of the defects in the yarns, for example the quality of the raw material and faulty functioning of the spinning machines. In addition it is known that the electronic thread cleaner first carries out a visual control of the yarn defects and then, on the basis of typical non-acceptable defects memorized, the operation for cutting the faulty yarns is determined. In spite of this, the precision of the determination of the quality and yarn cleaning is not sufficient, in that for economical reasons the frequency of the defects on the thread, i.e. to ascertain the precise numbers of cuts within a pre-established time range, is determinant.

It is well-known that the regulation of the electronic thread-cleaner is not determined only by the desired quality of the yarn, but also by the fact that the number of yarn defects to be eliminated, or cuts of the cleaner, cannot jeopardize the economy of the manufacturing process, for example the bobbin-winding process or winding of the thread onto the bobbin. In fact, each time there is a yarn breakage the winding is stopped to enable the subsequent joining of the yarn.

If the yarn breakage, described above, were to occur frequently, it would certainly reduce both the operating performance of the bobbin-winding station and the quality of the yarn collected, as frequently repeated joinings make both the appearance and resistance precarious for subsequent processing.

One of the purposes of the present invention is to improve the operating performance of the bobbin-winding station of an automatic bobbin-winding machine and

to ensure the production of a high quality bobbin in the bobbin-winder. The present invention has the aim of reaching the above objective with a method which automatically eliminates a substantial quantity of faulty thread wound onto the cop, which feeds a winding-station, in that said method includes first of all the identification of the presence of a substantial quantity of faulty thread, which leads to the interruption of the winding by means of known devices, and subsequently activates the functioning of the suction mouth for the whole time necessary for unwinding the entire length of faulty thread wound. For the practical embodiment of the present invention, the lower suction mouth intervenes to suck the faulty thread at the moment in which the thread-cleaner, which is the device for the quality control of the thread, reveals the present of a continuous defect, or a number of defects which occur with greater frequency than the established limit acceptable for the limit of the quality of thread being wound. In accordance with the present invention control and operating devices are provided such as an electronic thread cleaner with optical exploration, units for counting the frequency of defects of the yarn to be cut in the yarn cleaning, devices for comparison between a pre-established nominal frequency value memorized as being acceptable and the frequency value of defects revealed and driving elements of the lower suction mouth activated when the frequency of defects revealed exceeds the above memorized nominal frequency value.

A description follows, which is illustrative and not limiting, of a preferred embodiment of the invention with the help of the enclosed tables, wherein:

- figure 1 is an overall schematic side view of the structure of a bobbin-winding station and this view illustrates the moment in which the suction mouth begins the suction phase of the faulty thread wound onto the unwinding cop;
- figure 2 is an overall schematic front view of a bobbin-winding station and this view illustrates the suction phase of the faulty thread previously revealed by the electronic thread-cleaner, which is the electronic quality control device of the thread.

For greater clarity, the parts not necessary for the invention are omitted in the figures, as they are already known and do not relate to the functioning of the present invention.

In the enclosed tables:

1 is the thread, or yarn with woollen, cotton or synthetic fibre, which in the winding process is transferred by unwinding it from a cop 2 below an upper bobbin 5; 3a and 3b are the positions of the lower suction mouth of the bobbin-winding station. Position 3a is the non-operating spillover position, whereas 3b is the active suction position through piping 6, the latter situated in depression with a sucking action, according to arrow 23, from collector 9, which develops along the whole winding front to be collected at the centralized sucking driving centre

of the end head of the automatic bobbin-winder; 4 is the electronic thread-cleaner for controlling the yarns in rapid movement by means of optical exploration or other similar explorations already known in the art; 15 is a three-phase motor, or similar motor source, which activates the thread-guide roller 7 through the toothed belt 24. The thread-guide roller is the driving roller which provides both the translatory coming and going movement of the thread 1, and the rotating movement of the bobbin 5 in formation until the desired diameter of the wound thread is reached; 11 is the suction pipe which is shaped at the end to form a suction slot of the thread-end wound onto the bobbin in formation 5.

The suction pipe 11, of the known art, is activated each time there is a controlled or accidental interruption of the thread 1; 12 is the thread-joining device which joins the thread using known means for knotting or joining the thread-end which has been broken; 16 is the probe which reveals, at each moment, the rotating speed of the grooved cylinder 7 and continuously transmits the rotating values to the control block 10 through cable 18; 8 is a sensor or sensors for the presence and control of the thread being wound, and said sensor 8 continuously transmits electric signals to the control block 10. The control or governing block 10 is normally based on a microprocessor, or electronic card suitable for memorizing the operating instructions introduced through the control key-board 14, which transmits through cable 19; 21 is any known activator which operates an angular rotation of the lower suction mouth from position 2a to position 2b and viceversa every time the control block 10 sends out an electric signal, through cable 25, instructing activator 21 to activate the angular rotation of the lower suction mouth; 20 is the cable which joins the governing block 10 to the driving motor 15 which is included in every winding station of the automatic bobbin-winding machine. More specifically, all winding-stations are equipped with a regulating device present in the governing block 10 to regulate the motor 15 to enable the most suitable rotating speed for the winding of the thread, and the rotation speed of the motor 15 of cylinder 7 is preferably established, as is already known, by means of a reversing motion in accordance with a driving signal sent along cable 20 from the above regulating device.

The following description of the functioning, with reference to the figures mentioned above, refers to the equipment which embodies the method of the present invention and this functioning can be easily understood from the figures of the enclosed tables.

In a textile winding-machine, for example an automatic bobbin-winder, the thread 1 released and pulled from a cop 2 is passed through various known devices with specific operating functions and is then controlled by a fault-detecting device 4 of thread 1, after which thread 1 is wound onto a bobbin 5, which is rotated by the grooved cylinder 7. During the winding of thread 1 the varying thickness of the thread, which passes through the thread cleaner 4, is transmitted by means of

sensor 8 with an electric signal to the governing block 10 and is compared in unit 10 with a reference value.

If the thickness of the thread is outside the pre-established range acceptable for the type of thread being wound, the governing block 10 deliberates that a fault in thread 1 has passed into the thread cleaner and immediately sends an instruction signal to a knife-activating device, so that a knife can start functioning to cut thread 1.

After thread 1 has been cut, the thread-feed signal is no longer transmitted by thread-cleaner 4, which indicates that the cutting of thread 1 has been registered. As a result the governing block 10 sends an instruction to stop motor 15, in order to stop the rotation of the grooved cylinder 7. An instruction signal is subsequently sent from block 10 to initiate a thread-joining operation on the part of a thread-joining device 12, and in this way a thread-joining operation of thread 1 is carried out with the known knotting devices.

It should be noted that there is an electronic counter in governing block 10, or a similar device for determining the frequency of thread faults and, in the presence of a non-acceptable frequency value of faults which is higher than a reference frequency value limit memorized in unit 10, this device activates a stop in the winding and an instruction signal is subsequently sent from unit 10, through cable 25, to the activator 21, which imposes the angular rotation of the lower suction mouth of position 3a to 3b. The suction of the whole length of faulty thread wound onto cop 2 initiates in this latter position. More specifically the angular rotation of the lower suction mouth occurs after the cutting of thread 1 as described above when a defect has been revealed. The suction lasts until the whole length of the faulty thread wound onto cop 2 has been removed, which in any case is removed by thread 1 itself which has been wound.

The above is a description of a preferred embodiment with some of its variations. It is evident however that other forms of embodiment of the method are possible such as for example partial suction of the wound thread with a subsequent new control of the presence of defects, all of this to avoid the excessive waste of thread removed in the actual situation that after a substantial quantity of faulty thread has been sucked away, the remaining thread wound is of acceptable quality. Other forms of embodiment can be included within the spirit and scope of the present invention.

Similarly the equipment proposed herein for the embodiment of the method of the present invention may also vary still remaining however within the scope of the claims formulated herein.

Claims

1. Method suitable for automatically eliminating a substantial quantity of faulty thread wound onto a cop, which feeds the bobbin in formation of a winding-station, characterized in that upon the identification of the presence of a substantial quantity of faulty

thread, or the presence of the entire quantity of faulty thread wound, the winding is interrupted and the lower suction mouth is put into operation, and this remains in the suction phase for the whole time necessary for unwinding the entire length of faulty thread wound. 5

2. Method suitable for eliminating all the faulty thread wound onto the unwinding cop according to claim 1, characterized in that the lower suction mouth intervenes for the suction of the faulty thread at the moment in which the thread cleaner, which is the quality control device of the thread, reveals the presence of a continuous defect, or a pre-established number of defects which occur with consecutive and repetitive frequency. 10 15
3. Equipment for eliminating substantial quantities of faulty thread present on the unwinding cop in a winding station of an automatic bobbin-winder suitable for the embodiment of the method according to claim 1, characterized in that it includes a thread cleaner operating as an electronic yarn-cleaning device by means of optical exploration, counting devices of the frequency of yarn defects to be cut away in the cleaning of the yarn, devices for comparing a pre-established nominal frequency value of defects which is memorized as being acceptable for the operating performance with the frequency value of defects revealed and a control device of the lower suction mouth activated when the frequency of defects revealed exceeds said memorized nominal frequency value. 20 25 30

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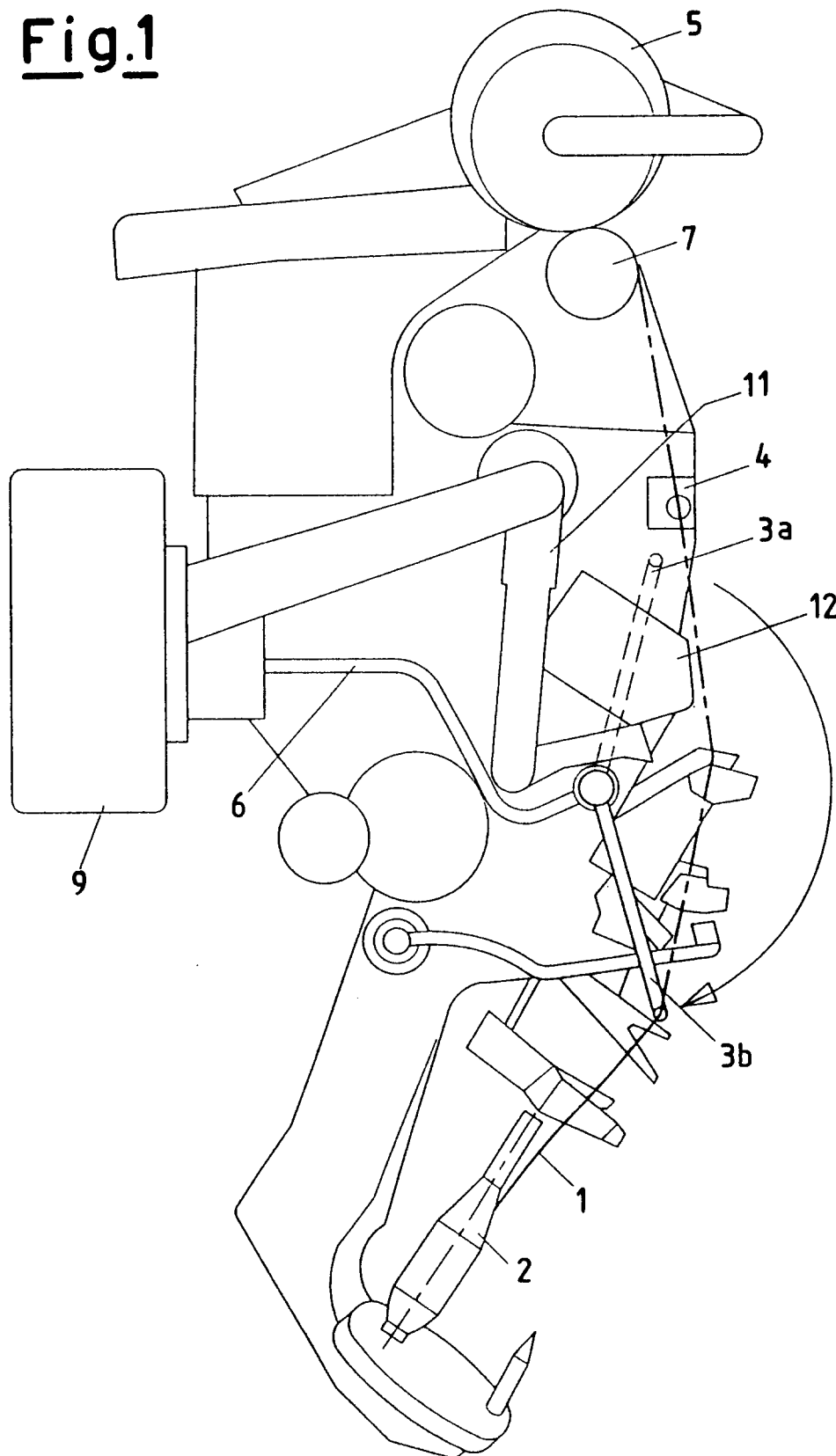
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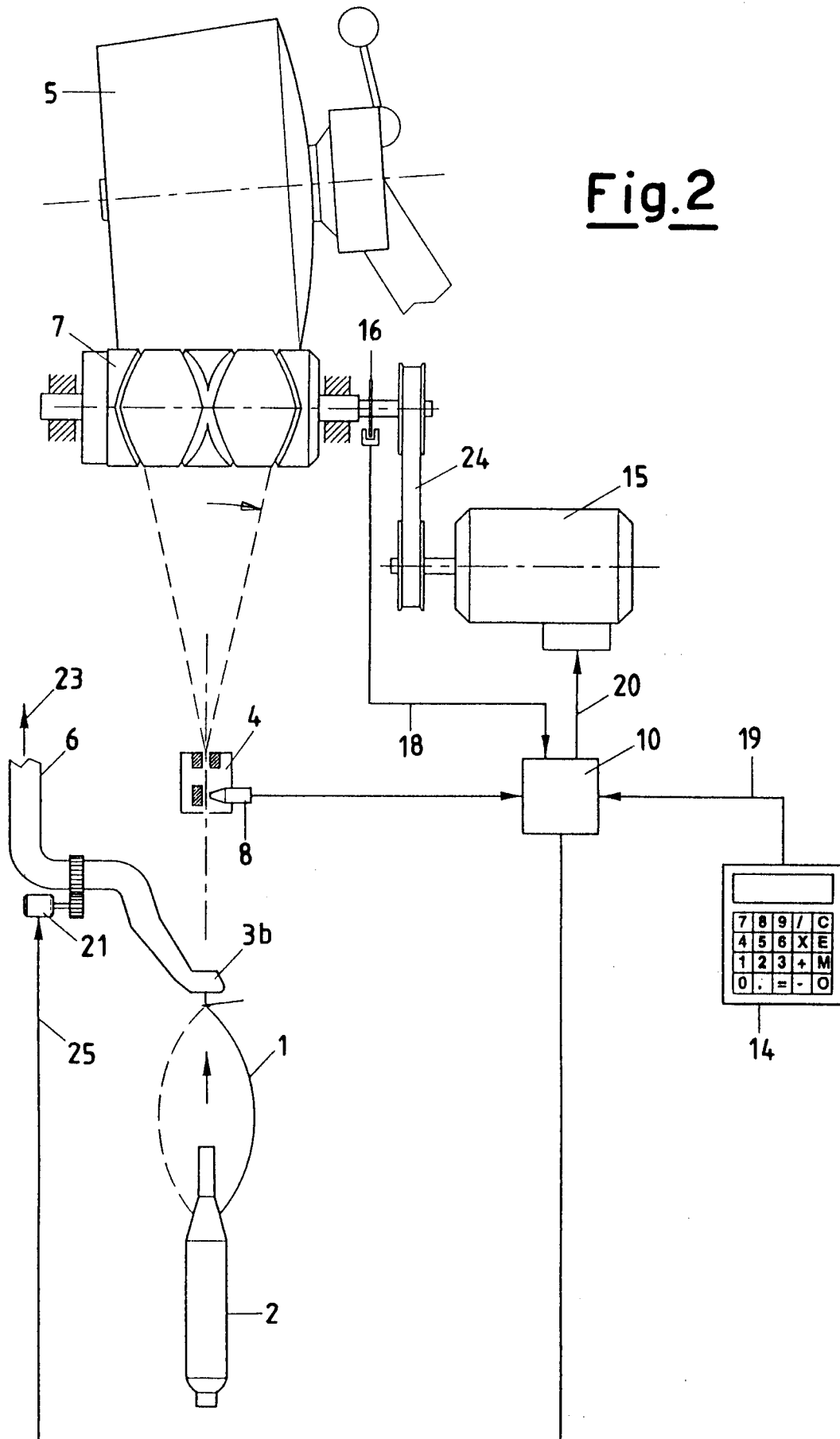
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Fig.1







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EUROPEAN SEARCH REPORT

Application Number
EP 95 20 2120

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)
P,X	EP-A-0 628 509 (MURATA KIKAI KABUSHIKI KAISHA) * the whole document * ---	1-3	B65H63/06
A	EP-A-0 373 324 (W. SCHLAFHORST & CO.) * column 5, line 23 - column 6, line 18 * ---	1-3	
A	DE-A-38 06 165 (MURATA KIKAI K.K.) * column 6, line 54 - column 7, line 9 * ---	1,3	
A	DE-A-39 11 505 (W. SCHLAFHORST & CO.) -----		
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B65H D01H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 27 November 1995	Examiner 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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