

Description

FIELD OF APPLICATION

[0001] The present invention relates to a system and method for operating a textile plant. More particularly, the present invention relates to a system and method for operating a plurality of automatic winders.

STATE OF THE ART

[0002] As is known, there are state of the art systems that exploit the data detected during the winding or spinning of a yarn for the management of certain operating parameters of the processes of a textile plant.

[0003] In this discussion the term "thread" or "monofilament" or "continuous thread" means a single filament or continuous strand (for example in the case of silk, artificial, or synthetic fibers), while the term "yarn" means the set of fibrils of variable length that are parallelized and joined by twisting. In the following, one or the other term will be used indistinctly, it being understood that the applications of the present invention are not limited to either type.

[0004] In EP 3305953 A1, a textile plant is described comprising essentially a spinner and a winder, wherein the spinner is provided with a control device, adapted to detect spinning data. The detected data are transmitted via a data transmission module to the winder, which processes and uses said data to manage the winding stages. Among the advantages mentioned is the ability to manage the winding speed based on information on the yarn, which is detected via the spinner control device.

[0005] In EP 2108723 A2, a system comprising a plurality of winders is described, wherein a centralized control unit is not provided for managing the winders. The document describes how each winder is equipped with a ZigBee-type wireless communication unit to attempt to overcome problems related to a possible malfunction of a centralized control unit. Among the other advantages mentioned would be that of being able to reorganize the production site with ease, since there is no need to wire each winder to a centralized control unit, as the communication between the various units is wireless.

[0006] In EP 3305700 A1, a system is described wherein a plurality of winders are arranged with a device for controlling the yarn during winding. In this system, the yarn defect information is detected in the winders and is used to manage the spinners upstream of the winders.

[0007] The management systems of the prior art, although widely used and appreciated, are not without drawbacks.

[0008] First, although a plurality of information that pertains to spinning and winding is provided, this information is not immediately usable by personnel involved in the spinning or winding.

[0009] In other words, the systems of the prior art report issues that are, for example, detected during the winding

stage, but do not ensure timely action by the operator to manage the problematic situation in the winding station or the stations upstream.

DISCLOSURE OF THE INVENTION

[0010] Thus, there is a need to resolve the cited drawbacks and limitations in reference to the prior art.

[0011] Therefore, there is a need to provide a system that allows continuous monitoring of the activities in a textile plant, and that enables an operator to be able to react promptly to a given operating condition.

[0012] In addition, there is a need for a system and method that complements the production process with predetermined operations under certain operating conditions.

[0013] These needs are met by a system according to claim 1, and by a process according to claim 8.

DESCRIPTION OF THE DRAWINGS

[0014] Further features and advantages of the present invention will become more apparent from the following detailed description of preferred, non-limiting embodiments thereof, wherein:

- Fig. 1 depicts a schematic block diagram of a system for operating a textile plant according to an embodiment of the present invention;
- Fig. 2 depicts a schematic block diagram of a portion of a system for managing a textile plant according to an embodiment of the present invention; and
- Fig. 3 represents schematically a possible embodiment of a winding unit of a winder of a textile plant according to an embodiment of the present invention.

[0015] Elements or parts of elements common to the embodiments described hereinafter will be indicated with the same numerical references.

DETAILED DESCRIPTION

[0016] A system 12 for managing a textile plant 14 is shown schematically in Fig. 1.

[0017] The system 12 comprises: at least one control device 16 arranged on the at least one winder 15 and adapted to detect information regarding yarn quality during winding, and a central control unit 18 connected to said at least one control device 16 and adapted to receive information from the at least one control device 16 regarding yarn quality during winding.

[0018] The system 12 comprises at least one peripheral device 20 associated with an operator.

[0019] The central control unit 18 is adapted to compare the received information with predetermined control conditions, and accordingly send operating instructions to a predetermined peripheral device 20 associated with

an operator.

[0020] According to a possible embodiment, the central control unit 18 may be connected to at least one apparatus 22 that is operationally upstream relative to the at least one winder 15. The central control unit 18 based on comparing information received from the at least one control device 16 with predetermined control conditions may be adapted to send operating commands to at least one apparatus 22 operationally upstream relative to said at least one winder 15.

[0021] Advantageously, said operationally upstream apparatus 22 may be, for example, a spinner, in particular a ring spinner.

[0022] According to a possible embodiment, the associated peripheral device 20 may be a smartphone, tablet, smart bracelet, and/or smartwatch.

[0023] Advantageously, the at least one control device 16 may comprise at least one yarn clearer associated with at least one winding unit 19 of said winder 15. In this case, it is therefore a device already provided on the winding unit 19, which does not need to be installed at a later stage.

[0024] The method for operating a textile plant 14 according to the present invention essentially comprises the steps of:

- detecting yarn quality during winding by a control device 16 provided on at least one winder 15;
- comparing the received information with predetermined control conditions in a central control unit 18 adapted to receive information from the at least one control device 16 regarding yarn quality during winding; and
- sending operating instructions based on said comparison of the information received with predetermined control conditions to a predetermined peripheral device 20 associated with an operator.

[0025] According to a possible embodiment, the process comprises a step in which the central control unit 18 based on the comparison of information received from the at least one control device with predetermined control conditions, may send operating commands to at least one apparatus 22 operationally upstream with respect to the at least one winder 15.

[0026] Advantageously, the operating instructions may be sent to a peripheral device 20 of one or more of the following types: a smartphone, a tablet, a smart bracelet, and/or a smartwatch.

[0027] According to a possible embodiment, the central control unit 18 may receive yarn quality information from at least one apparatus 22 operationally upstream relative to the at least one winder 15 for an automatic allocation of bobbins according to their quality to said at least one winder 15.

[0028] In the following a possible mode of operation is briefly described, with the obvious understanding that the steps of the described method represent only one pos-

sible mode of operation and embodiment of the system, without any limiting intent.

[0029] At the beginning of the winding process, the peripheral control unit 21 communicates to the yarn clearer that the winding of a new bobbin has begun. As a result, the yarn clearer collects information about the quality of the yarn while it is being wound. When the bobbin is changed, the yarn clearer passes the quality information for the newly processed bobbin to the peripheral control unit 21 which associates the information related to the origin of the bobbin (such as the position of the spinner where the bobbin was produced).

[0030] This information is collected by a related winder control unit 23, which associates it with other information, such as spindle number, yarn count, winding speed, etc.

[0031] The winder control unit 23 communicates information to the central control unit 18, for example, via cable (Ethernet network), or wirelessly in wireless mode.

[0032] Alternatively, the control device 16 may directly send the collected information to the central control unit 18.

[0033] According to a possible embodiment, the system for managing a textile plant according to the present invention may comprise storage means 30 connected to said central control unit 18.

[0034] One of the advantages of saving information within the storage means is, for example, having a history that allows similar processes to be compared, defining minimum working standards and giving indications of preventive maintenance in order to optimize the quality of the yarn produced and the productive efficiency of said plant.

[0035] In addition, said system allows efficient and targeted management of the personnel assigned to the machine, having them effectively intervene on machines that are operating outside of defined or historical plant operating conditions.

[0036] Thus, the advantages that may be achieved by the system and the method according to the present invention are obvious.

[0037] First, the system generates information that may be sent directly to the personnel, in an operating sequence, in a practically automated manner, whereby the textile plant personnel is managed efficiently.

[0038] In addition, once the information is stored in the storage means, the central control unit may process the yarn quality information for each individual bobbin, making comparisons between data from different winding machines processing similar yarns.

[0039] In this way, the system may generate information reports that may be used to improve all the processes upstream of the winder 15.

[0040] In addition, the system may generate information that may be sent directly to upstream machines in order to act immediately on the processes, through appropriate actuators applied on said machines.

[0041] Again, as a result of information processing, the central unit may optimize the management of bobbins

within each winder 15. For example, it may send information to the winder 15 so that it may produce bobbins with two or more quality levels, directing the bobbins to the various units of the machine according to the quality information received.

[0042] A person skilled in the art will be able to make modifications to the embodiments described above and/or substitute described elements with equivalent elements, in order to satisfy particular requirements, without departing from the scope of the accompanying claims.

Claims

1. System (12) for managing a textile plant (14) comprising:

- at least one control device (16) provided on at least one winder (15), adapted to detect yarn quality information during winding; and
- a central control unit (18) connected to said at least one control device (16), adapted to receive information from at least one control device (16) on yarn quality during winding;

characterized in that it comprises at least one peripheral device (20) associated with an operator; said central control unit (18) being adapted to compare the information received with predetermined control conditions, and to send accordingly operating instructions to a predetermined peripheral device (20) associated with an operator.

2. System (12) according to the preceding claim, **characterized in that** said central control unit (18) is connected to at least one apparatus (22) operationally upstream of said at least one winder (15), said central control unit (18) on the basis of the comparison of the information received from said at least one control device with predetermined control conditions, being adapted to send operating commands to said at least one apparatus (22) operationally upstream of said at least one winder (15).
3. System (12) according to any of the preceding claims, **characterized in that** said associated peripheral device (20) is a smartphone, a tablet, a smart bracelet and/or a smartwatch.
4. System (12) according to any of the preceding claims, **characterized in that** said at least one control device (16) comprises at least one yarn clearer, associated with at least one winding unit (19) of said winder (15).
5. System (12) according to any of the preceding claims, **characterized in that** said at least one con-

trol device (16) comprises a peripheral control unit (21), associated with a winding unit (19).

6. System (12) according to any of the preceding claims, **characterized in that** each winder (15) comprises a winder control unit (23) adapted to receive information from said at least one control device (16) and transmitting it to said central control unit (18).
7. System (12) according to any of the claims 2-6, **characterized in that** said at least one operationally upstream apparatus (22) is a spinning machine.
8. Method of managing a textile plant (14) comprising the steps of:
 - yarn quality detection during winding by a control device (16) provided on at least one winder (15);
 - comparison of the information received with predetermined control conditions in a central control unit (18) adapted to receive information from said at least one control device (16) on yarn quality during winding; and
 - sending to a predetermined peripheral device (20) associated with an operator, operating instructions based on said comparison of the information received with predetermined control conditions.
9. Method according to the preceding claim, **characterized in that** it comprises a step in which said central control unit (18) on the basis of the comparison between the information received from said at least one control device with predetermined control conditions, sends operating instructions to at least one apparatus (22) operationally upstream of said at least one winder (15).
10. Method according to any of the claims 8-9, **characterized in that** said operating instructions are sent to a peripheral device (20) of one or more of the following types: smartphone, tablet, smart bracelet and/or smartwatch.
11. Method according to any of the claims 8-10, **characterized in that** it comprises a step in which the central control unit (18) receives information on the quality of the yarn from at least one apparatus (22) operationally upstream of said at least one winder (15) for an automatic allocation of bobbins according to their quality, to said at least one winder (15).
12. Method according to any of the claims 8-11, **characterized in that** said at least one operationally upstream apparatus (22) is a spinning machine.

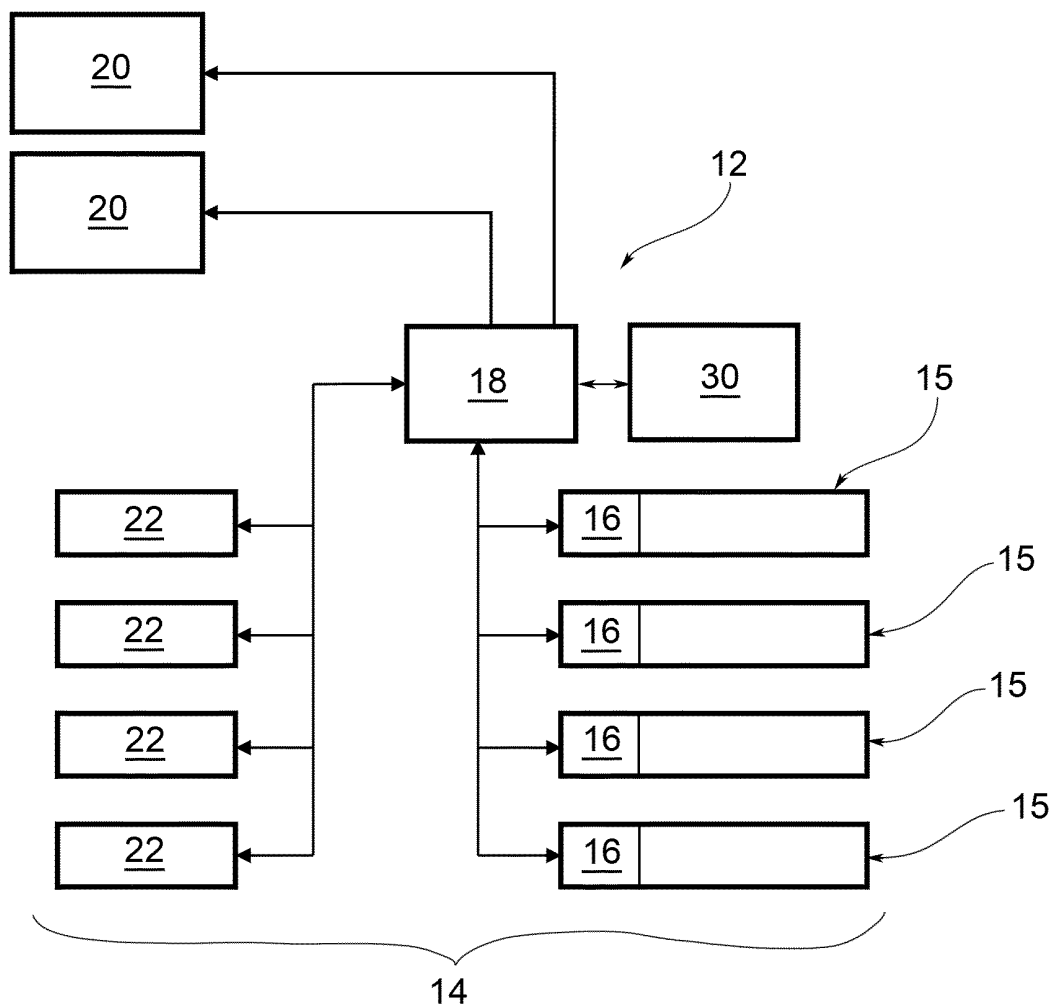


FIG.1

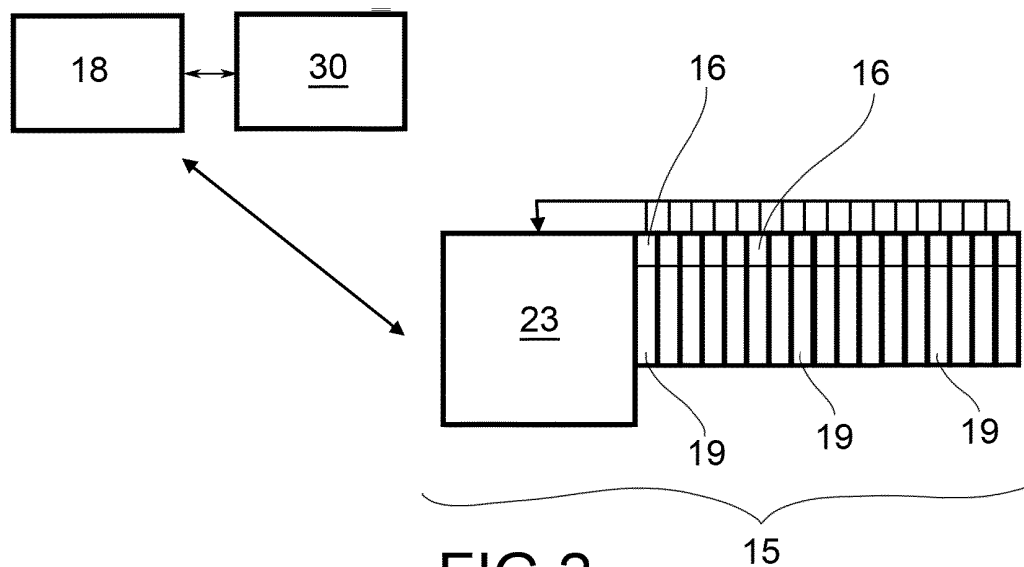


FIG.2

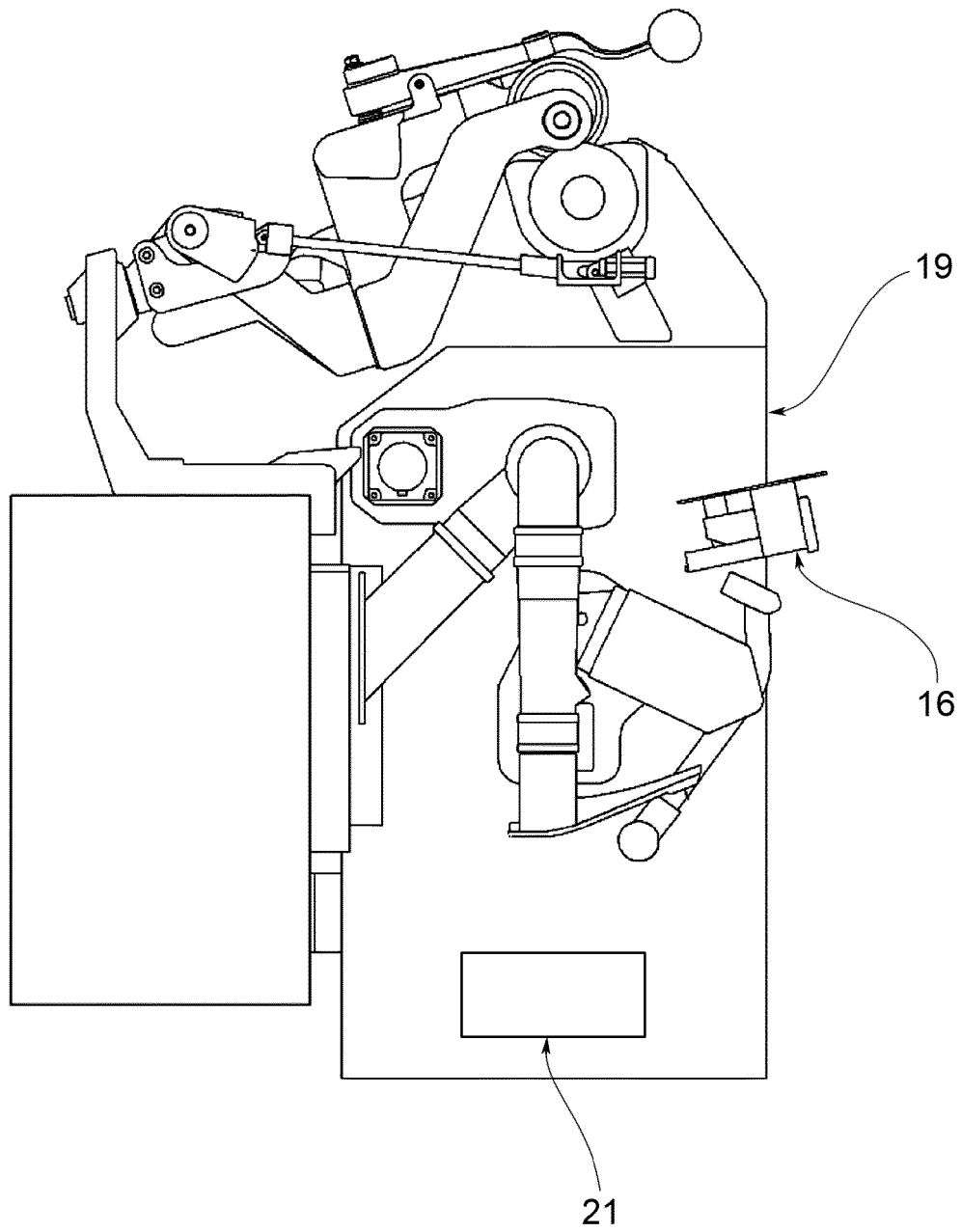


FIG.3



EUROPEAN SEARCH REPORT

Application Number

EP 21 20 2508

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EPO FORM 1503 03.82 (P04C01)

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X	EP 3 672 207 A1 (MURATA MACHINERY LTD [JP]) 24 June 2020 (2020-06-24) * paragraphs [0023] - [0046]; figures 1-3 *	1-12	
X	EP 2 573 635 A1 (MURATA MACHINERY LTD [JP]) 27 March 2013 (2013-03-27) * the whole document *	1, 3-6, 8, 10	
X	US 5 224 047 A (KITAGAWA IKUO [JP] ET AL) 29 June 1993 (1993-06-29) * the whole document *	1, 3, 6, 8, 10	
			TECHNICAL FIELDS SEARCHED (IPC)
			B65H D01H
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 3 February 2022	Examiner Pussemier, Bart
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			

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

EP 21 20 2508

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