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(54) **Consumable part managing method and system for textile machinery**

Verschleisssteilverwaltungsverfahren und -system für Textilmaschinen

Procédé et dispositif de gestion pour pièce consommable de machine textile

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Description

[0001] The present invention relates to a method and a system for managing consumable parts in textile machinery such as looms, spinning machines and the like.

[0002] In the textile machinery typified by the weaving machine or loom such as a jet loom, there are employed a great number of consumable parts. As typical ones of such consumable parts, there may be mentioned a brake mechanism for a loom driving motor, ropes for driving heald frames constituting a shedding apparatus, supporting shafts for cam levers constituting a cam mechanism, felt layers secured around a peripheral surface of a press roller adapted to be pressed against a surface roller for taking up a woven fabric, cutters for cutting off a weft yarn or selvage for trimming, components of an on/off valve device for controlling air supply for effectuating weft yarn insertion and so forth. On the other hand, in the case of the spinning machines typifying the textile machine, there are employed, such consumable parts as mentioned below. In the fly frame, for example, there may be mentioned mounting pins for a presser of a flyer, while in the spinning frame, rings, travellers and the like may be mentioned as the typical consumable parts. Additionally, in a draft motion employed in the drawing frame, fly frame or the spinning frame, such parts as top rollers, apron and the like represent the consumable parts. Besides, in the open-end spinning machine, combing rollers and driving belts may be mentioned as the typical consumable parts. In a card or carding engine, card clothing and the like represent consumable parts. Needless to say, these consumable parts have to be exchanged or replaced at proper time points. In the present state of the art, the consumable parts are managed by an operator on the basis of information written in a so-called management notebook for replacement of the consumable parts upon lapse of operation or use periods determined previously for every type of the consumable parts, respectively. Alternatively, exchange of the consumable part is performed upon occurrence of abnormality. However, exchange of the consumable part upon detection of abnormality is not preferred because such abnormality may have exerted adverse influence to a textile product already manufactured at the time point of the abnormality detection. On the other hand, management based on the management book is a very troublesome procedure. Besides, there may arise such case that the consumable part is exchanged too early, i.e., before the useful or serviceable life thereof has not been exhausted or consumed, or the consumable part is exchanged after abnormality has taken place in that consumable part without being attended.

[0003] In Japanese U. M. Registration Application Publication No. 92585/1992, there is disclosed a system for displaying information concerning temporal spans during which consumable parts have been installed as well as information concerning inspections. On the basis

of such displayed information, operator or worker can speedily perform exchange of the consumable parts or maintenance and inspection procedures therefor.

[0004] However, in the system described in the publication mentioned above, the temporal span as displayed is given simply in terms of a number of years lapsed from installation of a consumable part of concern in a weaving machine irrespective of whether or not the weaving machine has actually been put into operation during the period as displayed. Thus, in an extreme case, a consumable part employed in a loom may be replaced without being used for operation of the loom. At any rate, with the display of such time lapse information as disclosed in the above-cited publication, it is impossible to determine correctly the residual serviceable or useful life of the consumable part, rendering thus it impossible to carry out the exchange of the consumable part at a proper time point.

[0005] Document WO 92/21804 discloses a method and apparatus for monitoring and possibly replacing travellers on rings of a ring-spinning machine. The presence of travellers is monitored over a given number of spinning points. The presence or absence of a traveller on a ring is detected by means of a sensor. If a predetermined traveller failure rate is exceeded, a signal is generated for indicating the necessity of replacement of travellers.

[0006] In the light of the state of the art described above, it is an object of the present invention to provide a consumable part managing method which makes it possible to determine easily a proper time point at which a consumable part in a textile machine is to be replaced.

[0007] Another object of the present invention is to provide a system for carrying out the method motioned above.

[0008] In view of the above and other objects which will become apparent as the description proceeds, there is provided according to a general aspect of the present invention a consumable part managing system according to claim 1.

[0009] With the arrangement of the consumable part managing system, the consumed lifetime arithmetic means arithmetically determines or calculates the consumed lifetime of a consumable part on the basis of the serviceable life affecting factor detected by the factor detecting means. When the consumed lifetime determined arithmetically has reached the preset lifetime value, the message generating means issues information messaging need for replacement of the consumable part of concern. With the aid of such information, it is possible to determine or decide a proper time point for replacement of the consumable part.

[0010] In a preferred mode, the consumable part managing system may further include a modifying means for modifying an arithmetic expression for arithmetically determining the consumed lifetime by the consumed lifetime arithmetic means. Thus, unless the consumed lifetime calculated in accordance with the arith-

metic expression as defined reflects correctly the actually consumed lifetime, it is possible to alter or correct the expression properly by the modifying means.

[0011] In another preferred mode, the consumable part managing system can further include an exchange decision means for deciding whether the consumed lifetime determined arithmetically by the consumed lifetime arithmetic means has reached a preset lifetime value, to thereby output a corresponding indication signal to the message generating means. With this arrangement, when the consumed lifetime of a consumable part has reached the preset lifetime, the exchange decision means outputs a corresponding signal indicating this fact to the message generating means. Upon reception of this signal, the message generating means gives information messaging necessity for replacement of the consumable part of concern on the basis of the message signal as inputted. With the aid of such information, it is possible to determine a proper time point for replacement of the consumable part.

[0012] In yet another preferred mode, the factor detecting means may include operation time detecting means for detecting a time duration for which the textile machine has been put into operation. By virtue of this arrangement, the consumed lifetime of a consumable part which is affected by the operation time of a textile machine in which the consumable part is installed or mounted can be arithmetically determined on the cumulation or integration value of the operation time of that textile machine. As a typical one of this sort of consumable part, there may be mentioned such a part of the textile machine, which is always put into operation whenever the textile machine is operated.

[0013] In still another preferred mode, the factor detecting means may be provided for each of plural textile machines, wherein the consumed lifetime arithmetic means may be provided in common for determining the consumed lifetimes of consumable parts in the plural textile machines, respectively, on the basis of information obtained from the factor detecting means, respectively. With the arrangement mentioned above, the consumed lifetimes of the consumable parts employed in a plurality of textile machines can be arithmetically determined by the single consumed lifetime arithmetic means provided in common to a plurality of textile machines. Thus, the management system implemented in the arrangement mentioned above can be applied to a system for monitoring or managing a plurality of textile machines with the aid of a single central computer.

[0014] In a preferred mode, the textile machine may be constituted by at least one Jet loom. In that case, the consumable part may be at least one selected from a group consisting of a brake mechanism provided in association with a loom driving motor, ropes for driving a plurality of heald frames constituting a shedding apparatus, supporting shafts for cam levers constituting a cam mechanism for driving the shedding apparatus, an anti-slip felt member provided around a circumferential

surface of a press roller adapted to be pressed against a surface roller for pulling a woven fabric, a cutter for cutting off a weft and on/ off valves for controlling supply of compressed fluid to weft inserting nozzles in the jet loom.

[0015] In yet further preferred mode, the consumable part managing system may further include a preset lifetime storing means for storing preset lifetimes of the consumable parts, and a means for inputting the preset lifetimes to the preset lifetime storing means.

[0016] In still further preferred mode, the factor detecting means may be implemented as a functional part of a loom control computer. The consumed lifetime arithmetic means may then include a time integrating means composed of a timer for counting cumulatively the operation time of the jet loom in response to a time integrating command issued from the loom control computer when the jet loom is in an operation state. The time integrating means may be so adapted as to store latest integrated times as the serviceable life affecting factor for each of the consumable parts.

[0017] Further, the exchange decision means may preferably be so implemented as to compare the preset lifetime stored in the preset lifetime storage means with the consumed lifetime cumulated or integrated by the time integrating means for at least one of the consumable parts. When the consumed lifetime of the consumable part has reached a corresponding preset lifetime, a signal indicating necessity of exchange of the consumable part may be issued to the message generating means.

[0018] Furthermore, the message generating means may include a display means and a display control means connected to the display means. In that case, the exchange decision means may be adapted to output to the display control means a display command signal containing an index indicating the consumable part for which the comparison has been performed. The display control means may then be so implemented as to read the preset lifetime of the consumable part identified by the index contained in the display command signal from the preset lifetime storing means, while reading out the consumed lifetime of the consumable part issued from the time integrating means, for thereby commanding the display means to display an identifier of the consumable part together with the preset lifetime and the consumed lifetime.

[0019] Additionally, the factor detecting means may include an environment sensing means for detecting an environmental factor acting as the serviceable life affecting factor onto the jet loom.

[0020] Besides, the environment sensing means may be so implemented as to include at least one of sensors selected from a group consisting of a temperature sensor, a humidity sensor, a load current sensor, a power consumption sensor, a fluid consumption sensor, an acceleration sensor, a load torque sensor and a displacement sensor.

[0021] According to another aspect of the present invention, there is provided a method of managing at least one consumable part in a textile machine according to claim 13.

[0022] The above and other objects, features and attendant advantages of the present invention will more easily be understood by reading the following description of the preferred embodiments thereof taken, only by way of example, in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] In the course of the description which follows, reference is made to the drawings, in which:

Fig. 1 is a schematic side view showing generally a structure of a jet loom together with a consumable part managing system according to a first embodiment of the present invention;

Fig. 2 is a view showing a display control system;

Fig. 3 is a block diagram showing a configuration of a consumable part managing system according to a first embodiment of the invention;

Fig. 4 is a flow chart for illustrating execution of a consumable part managing program by the consumable part managing system according to the first embodiment of the invention;

Fig. 5 is a block diagram showing a configuration of a consumable part managing system according to a second embodiment of the present invention;

Fig. 6 is a flow chart for illustrating a consumable part managing program executed by the consumable part managing system according to the second embodiment of the invention;

Fig. 7 is a block diagram showing a configuration of a consumable part managing system according to a third embodiment of the present invention;

Fig. 8 is a flow chart for illustrating a consumable part managing program executed by the consumable part managing system according to the third embodiment of the invention; and

Fig. 9 is a block diagram showing a managing system according to a fourth embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0024] Now, the present invention will be described in detail in conjunction with what is presently considered as preferred embodiments thereof by reference to the drawings. In the following description, like reference characters designate like or corresponding parts throughout the several views.

Embodiment 1

[0025] A first embodiment of the present invention applied to a jet loom will be described by reference to Figs. 1 to 4.

[0026] Figure 1 is a schematic side view showing generally a structure of a jet loom together with a control circuit configuration. Referring to the figure, reference character M denotes a loom driving motor, whose operation is under the control of a loom control computer C1. A feed motor 11 constituted by a reversible electric motor is provided separately or independent of the loom driving motor M to serve for driving a warp yarn beam 12. Warp yarns T fed out from the warp yarn beam 12 are caused to pass through a heald 15 and a modified reed 16 under the guidance of a back roller assembly 13 and a tension roller assembly 14. A woven fabric W is wound up by a cloth roller 21 after having undergone operations exerted by an expansion bar 17, a surface roller 18 operatively coupled to the loom driving motor M, a press roller 19 and a crease eliminating guide member 20.

[0027] The tension roller 14 is mounted on a tension lever 22 at one end thereof, while a tension spring 23 is mounted at the other end of the tension lever 22, whereby a predetermined tension is constantly applied to the warp yarns T. The tension lever 22 in turn is rotatably supported by a detecting lever 24 at one end thereof, while a load cell 25 is coupled to the other end portion of the detecting lever 24. The tension applied to the warp yarns is sensed by the load cell 25 by way of the tension roller 14, the tension lever 22 and the detecting lever 24. An electric signal indicative of the warp yarn tension is inputted through the load cell 25 to be thereby supplied the loom control computer C1.

[0028] The loom control computer C1 controls the rotation speed of the feed motor 11 on the basis of the result of comparison of the preset tension with the detected tension indicated by the output signal of the load cell 25 and the information concerning the diameter of the warp beam indicated by an output signal of a rotary encoder 26 provided for detecting a rotational angle or angular position of the jet loom. Through the rotation speed control mentioned above, the warp yarn tension is controlled in a normal operation of the jet loom.

[0029] The loom control computer C1 responds to an ON signal generated by a starting switch 27 to thereby issue a command for the forward rotation of the feed motor 11 as detected. A rotary encoder 111 issues a rotation speed detection signal indicative of the rotation speed of the feed motor 11. Thus, the loom control computer C1 can control the rotation speed of the feed motor 11 on the basis of the rotation speed detection signal fed back from the rotary encoder 111.

[0030] A weft yarn is inserted into a shed formed by the warp yarns under injection by a weft yarn inserting main nozzle 28. The weft yarn inserted into the shed is caused to run through the shed under relaying action of

the jets produced by a plurality of weft yarn inserting auxiliary nozzles 29. The weft yarn ejected from the weft inserting main nozzle 28 is cut off from the weft yarn inserting main nozzle 28 by means of a cutter 30 immediately after beating by the reed.

[0031] A consumable part managing system C2 is electrically connected to the loom control computer C1. In this conjunction, it is to be noted that a backup power supply source E is provided for both the loom control computer C1 and the consumable part managing system C2 with a view to preventing information as stored from erasure upon occurrence of service interruption.

[0032] Figure 3 shows an internal arrangement or configuration of the consumable part managing system C2. As can be seen in the figure, the consumable part managing system C2 includes a preset lifetime storage unit 31 for storing preset lifetimes usable durations of a brake mechanism provided in association with the loom driving motor M, ropes for driving a heald frame constituting a part of the shedding apparatus, supporting shafts for cam levers constituting a cam mechanism for driving the shedding apparatus, an anti-slip felt member provided around and over a circumferential surface of the press roller 19 pressed against the surface roller 18 for taking up the woven fabric W, the cutter 30, on/off valves for controlling supply of compressed air to the weft inserting main nozzle 28 and the weft inserting auxiliary nozzle 29. These preset lifetime values or data can be stored in the preset lifetime storage unit 31 through input operation or manipulation of an input unit 32.

[0033] Further, the consumable part managing system C2 includes an operation time integrating circuit 33 which constitutes a consumed lifetime arithmetic means for determining accumulatively the time or period during which the jet loom has been operated. So long as the jet loom is in the operating state, the loom control computer C1 issues a signal commanding the time integrating operation to the operation time integrating circuit 33. A timer 34 is connected to the operation time integrating circuit 33 so that the operation time integrating circuit 33 can determine cumulatively the time lapse on the basis of the output signal of the timer 34 so long as the time integrating command signal is issued by the loom control computer C1. In this conjunction, it should be mentioned that the time integrating operation mentioned above is performed for each of the consumable parts or elements. Thus, the operation time integrating circuit 33 stores the integrated times updated most recently for every consumable parts. The integrated time for each of the consumable parts represents a factor affecting or influencing the serviceable lifetime of the relevant consumable part and may be regarded as the consumed lifetime of the relevant consumable part. Parenthetically, it is to be mentioned that the loom control computer C1 and the timer 34 cooperate to constitute an operation time detecting means which is one of the lifetime affecting factor detecting means.

[0034] Furthermore, the consumable part managing

system C2 includes an exchange decision circuit 35 constituting an exchange decision means for comparing the preset lifetimes stored in the preset lifetime storage unit 31 with the consumed lifetimes arithmetically determined by the operation time integrating circuit 33. When the consumed lifetime of a given consumable part has reached the preset lifetime, the exchange decision circuit 35 outputs an activation signal to an alarm device 36 and at the same time outputs a display command signal to a display control circuit 37. The display command signal contains index information for identifying discriminatively the part or member of concern. The display control circuit 37 serving as a message generating means reads out the preset lifetime information of the consumable part identified by the index information contained in the display command signal from the preset lifetime storage unit 31 and fetches concurrently the consumed lifetime of the consumable part of concern from the operation time integrating circuit 33. Subsequently, the display control circuit 37 commands display of the name of the consumable part of concern, the preset lifetime and the consumed lifetime of that part on the display unit 38. The display unit 38 serving as the messaging means thus displays the name or identifier, the preset lifetime and the consumed lifetime of a consumable part or parts of concern on a display screen 381, as shown in Fig. 2.

[0035] A reset switch 39 is electrically connected to the exchange decision circuit 35. When the reset switch 39 is closed or turned on, a reset signal is generated, to which the exchange decision circuit 35 responds for thereby causing the operation time integrating circuit 33 to reset to zero the consumed lifetime of the consumable part which has reached the preset lifetime, while the corresponding content displayed on the display unit 38 is erased with the alarm generated by the alarm device 36 also being cleared.

[0036] Fig. 4 is a flow chart for illustrating a consumable part managing program executed by the consumable part managing system C2. When a consumed lifetime T_n of a certain consumable part has reached a preset lifetime T_{n0} , the consumable part managing system C2 activates the alarm device 36 and at the same time issues a command for displaying the name or identifier of the consumable part, the preset serviceable lifetime and the consumed lifetime. Thus, the operator can exchange the consumable part whose consumed lifetime has reached the preset lifetime T_{n0} with a fresh one on the basis of the content displayed on the display unit 38 in response to the alarm generated by the alarm device 36. Upon completion of the part exchanging process, the reset switch 39 is closed. Then, the consumable part managing system C2 resets the consumed lifetime T_n being stored to zero and at the same time erases the relevant content displayed on the display unit 38 and deactivates the alarm device 36.

[0037] In this manner, operator or attendant of the jet loom can recognize the consumable part to be ex-

changed with a fresh one by watching the display content displayed on the display unit 38. The consumed lifetime T_n displayed on the display unit 38 represents an accumulated or integrated value of a period for which the jet loom has actually been put into operation. Thus, the accumulated or integrated time can reflect with high reliability or fidelity the consumed lifetime of the consumable part which has actually been consumed, which in turn means that the display content generated on the display unit 38 can reflect with high accuracy and reliability the actually consumed lifetime of the consumable part. Consequently, the operator can easily know the proper time point at which the exchange of the consumable part has to be performed.

[0038] When degree of actual consumption of the consumable part, e.g. degree of actual wearing or abrasion of the cutter 30, is greater or smaller than the predicted one, it is desirable to alter the preset lifetime T_0 so as to match the progress of actual consumption of the consumable part. Such alteration of the preset lifetime T_0 can be realized through input manipulation of the input unit 32.

Embodiment 2

[0039] A second embodiment of the present invention will be described by reference to Figs. 5 and 6, wherein like components as those of the first embodiment are denoted by like reference characters and repeated description thereof will be omitted. In the system according to the second embodiment of the invention, an environment sensor 41 serving as a factor detecting means is electrically connected to an operation time integrating circuit 40 of a consumable part managing system C3. As the environment sensor 41 for detecting the environmental conditions, there may be mentioned, for example, a temperature sensor, a humidity sensor, a load current sensor, a power consumption sensor, an air consumption sensor, an acceleration sensor, a load torque sensor, a displacement sensor and the like. The temperature and the load current representing the lifetime affecting factors will affect the lifetimes of electric capacitors and the backup power supply source E and others, respectively, while the factors such as the acceleration and the load torque exert influence to the lifetime of mechanical parts such as gears, bearings or the like. Furthermore, the consumption power represents indirectly heat generation in the system, while the humidity and other atmospheric factors exert influence to corrosion of metallic parts.

[0040] The loom control computer C1 supplies the operation time integrating circuit 40 with operation information such as loom rotation speed derived from the output of the rotary encoder 26, the number of times the weft has been inserted, the tension of warps and other operation signal indicative of the loom operation state. The operation time integrating circuit 40 arithmetically determines consumed lifetimes of the components or

parts on the basis of the environment information and the operation information in accordance with predetermined arithmetic expression(s). Fig. 6 shows a flow chart for illustrating a consumable part managing program executed by the consumable part managing system C3. As can be seen from Fig. 6, the consumable part managing system C3 fetches the environment information and the operation information at a predetermined timing to thereby determine arithmetically the consumed lifetimes T_n . The succeeding processing is similar to the processing described previously in conjunction with the first embodiment of the invention.

[0041] The display contents generated on the display unit 38 by taking into consideration the operation information and the environment information except for operation time of the jet loom reflect the real or actual consumed lifetimes of the consumable parts with higher accuracy when compared with the system according to the first embodiment of the invention, which allows the operator to determine more easily the proper or appropriate time points at which the consumable parts are to be exchanged.

Embodiment 3

[0042] Next, description will be made of a third exemplary embodiment of the present invention by reference to Figs. 7 and 8. In these figures, like components as those of the second embodiment are denoted by like reference characters and repeated description thereof will be omitted. In the system according to the third embodiment of the invention, an arithmetic expression modifying device 42 is electrically connected to an operation time integrating circuit 40 of a consumable part managing system C3. When the degree of actual consumption of the consumable part, e.g. degree of abrasion of the edge of the cutter 30, is more severe than the predicted degree or less than the latter, the arithmetic method of determining the consumed lifetime of the consumable part should be modified in place of altering the preset lifetime T_0 in conformance with the degree of the actual consumption of the consumable part. To this end, the correcting or modifying device 42 may be provided as a means for modifying the predetermined arithmetic expression(s) employed in the operation time integrating circuit 40.

[0043] Fig. 8 is a flow chart for illustrating a consumable part managing program executed by the consumable part managing system C3. A consumable part managing system C3 responds to an arithmetic expression modifying command issued by the arithmetic expression modifying device 42 to thereby modify correspondingly the arithmetic expression(s) which is used for determining arithmetically the consumed lifetime of the consumable part in accordance with a modified or renewed arithmetic expression or expressions. The other processing steps are similar to those of the second embodiment except for modification of the processing step

for modification of the preset serviceable life.

[0044] The display content derived from calculation in accordance with the modified arithmetic expression and generated on the display unit 38 which content is corrected by taking the aforementioned lifetime affecting factors into consideration can reflect the actually consumed lifetime of the consumable part with much higher accuracy and reliability when compared with the second embodiment. Thus, the operator can easily know the proper or appropriate time point at which the consumable part has to be exchanged.

Embodiment 4

[0045] Next, description will be made of a fourth embodiment of the present invention by reference to Fig. 9. In this figure, reference characters j , $j+1$, $j+2$ designate jet looms, respectively, and $C(j)$, $C(j+1)$, $C(j+2)$ designate loom control computers, respectively. Each of the loom control computers $C(j)$, $C(j+1)$, $C(j+2)$ is composed of a central arithmetic/ processing unit CPU, a data memory RAM and a program memory ROM. Actuators A_m and environment sensors S_n of the individual jet looms j , $j+1$, $j+2$ are operatively connected via input/output ports I/O to the loom control computers $C(j)$, $C(j+1)$, $C(j+2)$, respectively. On the other hand, connected to the loom control computers $C(j)$, $C(j+1)$, $C(j+2)$ are communication interfaces $I/F(j)$, $I/F(j+1)$, $I/F(j+2)$, respectively.

[0046] The data memory RAM incorporated in each of the loom control computers $C(j)$, $C(j+1)$, $C(j+2)$ stores therein the control data concerning the rotation number or speed of the loom, the warp tension, weft inserting timing, weaving density and other data for the associated jet loom. Furthermore, the data memory RAM incorporated in each of the loom control computers $C(j)$, $C(j+1)$, $C(j+2)$ serves to store temporarily the environment information derived from the output of the environment sensor S_n provided in the associated jet loom. On the other hand, the program memory ROM incorporated in each of the loom control computers $C(j)$, $C(j+1)$, $C(j+2)$ stores a program for controlling operation of the relevant jet loom on the basis of control data stored in the data memory RAM.

[0047] Further, a reference character C_H denotes a host computer for managing or controlling concentratively the jet looms j , $j+1$, $j+2$. The host computer C_H is comprised of a central arithmetic/ processing unit CPU_H , a data memory RAM_H and a program memory ROM_H . Connected to the host computer C_H are an input unit 32, a reset switch 39, an alarm device 36 and a display unit 38 via an input/output port I/O_H as in the case of the first embodiment of the invention. A program memory ROM_H stores therein a program for controlling concentratively the jet looms j , $j+1$, $j+2$. The concentratively controlling program mentioned above contains a consumable part managing program similar to the one executed by one of the consumable part managing sys-

tems $C2$ and $C3$ described hereinbefore in conjunction with the first to third embodiments.

[0048] The host computer C_H is provided with a communication interface I/F_H which is connected to the communication interfaces $I/F(j)$, $I/F(j+1)$, $I/F(j+2)$ of the jet looms j , $j+1$, $j+2$, respectively, via communication lines L . The host computer C_H is in charge of concentratively controlling the jet looms j , $j+1$, $j+2$ by way of the communication interface I/F_H , the communication lines L and the communication interfaces $I/F(j)$, $I/F(j+1)$, $I/F(j+2)$.

[0049] The host computer C_H retrieves scanwise the operation information and the environment information stored in the individual loom control computers $C(j)$, $C(j+1)$, $C(j+2)$ via the communication lines L and the communication interfaces $I/F(j)$, $I/F(j+1)$, $I/F(j+2)$, respectively, at a predetermined time interval. In response to the scanwise inquiry of the host computer C_H , the individual loom control computers $C(j)$, $C(j+1)$, $C(j+2)$ send the operation information and the environment information to the host computer C_H via the communication interfaces $I/F(j)$, $I/F(j+1)$, $I/F(j+2)$, the communication lines L and the communication interface I/F_H . The host computer C_H arithmetically determines the consumed lifetimes of the consumable parts of the jet looms j , $j+1$, $j+2$, respectively, on the basis of the operation information and the environment information as supplied. When the consumed lifetime T_n of a consumable part of a given jet loom has reached a preset lifetime thereof, the host computer C_H activates the alarm device 36 and displays the name or identifier of the relevant consumable part(s), the preset lifetime and the consumed lifetime thereof on the display unit 38.

[0050] By virtue of the system arrangement in which the management of the consumable parts in a plurality of jet looms is performed en bloc by the host computer C_H , there can be achieved advantages mentioned below. Namely, because the arithmetic determination or calculation of the consumed lifetimes of consumable parts as well as storage of the results thereof is performed solely by the host computer C_H , the burden imposed on the individual loom control computers can be mitigated. Thus, the management of the consumable parts can be carried out without need for enhancing the capabilities of the individual jet loom computers. Besides, because the identification numbers of the jet looms of concern, the names of the consumable parts, the preset serviceable life and the consumed lifetimes thereof can be displayed on the single display unit 38, expensiveness involved in the system can be mitigated when compared with the system in which the information mentioned above is displayed on a loom-by-loom basis. Additionally, because the data input for the preset serviceable life of the consumable parts in the individual jet looms as well as determination of the arithmetic expressions to be relied on for determining the consumed lifetime can be realized en bloc by the host computer C_H , operability of plural jet looms can significantly be

enhanced. Additionally, accuracy of the arithmetic prediction of the serviceable lifetimes of the individual consumable parts as well as the data or time points at which they are to be exchanged can be enhanced. Besides, because the environmental sensors for detecting the air-conditioning, electric power consumption state, moisture state and the like can be provided on a shop-by-shop basis, the number of the environment sensors can be decreased when compared with the case where the environment sensors are provided for the jet looms, respectively. Besides, the inventory management of the parts to be reserved for the exchange in the shop as a whole can be facilitated, whereby an effective part exchange schedule can be established for all the shops.

[0051] In a modification of the present invention, such arrangement may be adopted that the preset lifetime and the consumed lifetime are displayed so as to allow the operator to make decision as to the exchange of a consumable part without employing the exchange decision means. Alternatively, the operated periods of individual consumable parts may be arithmetically determined on the basis of specifications of the loom, preset values of the control computer and the operated period of the loom, whereon the consumed lifetimes of the individual parts may be determined on the basis of the individual operation times determined arithmetically.

[0052] Besides, the present invention may be applied to generation of a message indicating an appropriate time point for maintenance and/or inspection of the consumable part. Further, it should be appreciated that the invention can equally be applied to other textile machinery than the loom such as, for example, blowing machinery, card, drawing frame, fly frame, spinning frame, open-end spinning frame, winder or the like textile machinery. Accordingly, the phrase "textile machinery" used herein should be interpreted in the broadest sense.

[0053] As will now be apparent from the foregoing, with the consumable part managing system according to the present invention in which the consumed lifetimes of consumable parts are arithmetically determined on the basis of the information detected by the factor detecting means for detecting factors which affect the serviceable lifetimes of consumable parts, and a corresponding message is issued when the consumed lifetime as determined arithmetically has reached a preset lifetime of that consumable part, it is possible to manage the consumable part concerning the time point appropriate for the exchange thereof.

[0054] Many modifications and variations of the present invention are possible in the light of the above techniques. It is therefore to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

[0055] In a textile machinery, a system and method capable of determining time points appropriate for exchange of consumable parts, respectively. A preset lifetime storage unit 31 stores preset lifetime values of the consumable parts as inputted through an input unit 32.

So long as a jet loom is in operating state, a loom control computer C1 issues a signal commanding a time integrating operation to an operation time integrating circuit 33. The operation time integrating circuit 33 determines consumed lifetime of consumable part on the basis of a time lapse counted by a timer 34 so long as the time integrating command signal is issued by the loom control computer C1. An exchange decision circuit 35 compares the preset lifetime of the consumable part stored in the preset lifetime storage unit 31 with the consumed lifetime determined by the operation time integrating circuit 33. When the consumed lifetime of a given consumable part has reached the preset lifetime, the exchange decision circuit 35 outputs an activation signal to an alarm device 36 and at the same time outputs a display command signal to a display control circuit 37. Subsequently, the display control circuit 37 commands a display unit 38 to display the name of the consumable part of concern together with the preset lifetime and the consumed lifetime thereof.

Claims

1. A consumable part managing system (C2; C3) electrically connected to a textile machinery for managing at least one consumable part in said textile machinery, comprising:

factor detecting means (C1, 34, 41) for detecting a serviceable life affecting factor including operation information and environment information for said at least one consumable part, which factor exerts influence to a serviceable life of said at least one consumable part, wherein said operation information comprises information indicative of an operation state of said textile machinery and said environment information comprises information indicative of environmental conditions of said textile machinery ;

consumed lifetime arithmetic means (C1, 33, 34; 40) for arithmetically determining a consumed lifetime of said at least one consumable part on the basis of said serviceable life affecting factor detected by said factor detecting means (C1 34, 41); and

message generating means (36, 37, 38) for generating a message indicating necessity of exchange of said at least one consumable part on the basis of information concerning the consumed lifetime of said at least one consumable part determined arithmetically by said consumed lifetime arithmetic means (C1, 33, 34; 40), characterised in that

said factor detecting means (C1, 34, 41) includes environment sensing means (41) for detecting said environment information, said

- environment sensing means (41) including a temperature sensor and/ or a humidity sensor.
2. A consumable part managing system (C2; C3) according to claim 1, further comprising:
 - modifying means (42) for modifying an arithmetic expression for arithmetically determining said consumed lifetime by said consumed lifetime arithmetic means (C1, 33, 34; 40).
 3. A consumable part managing system (C2; C3) according to claim 1 or 2, further comprising:
 - exchange decision means (35) for deciding that the consumed lifetime determined arithmetically by said consumed lifetime arithmetic means (C1, 33, 34; 40) has reached a preset lifetime value, to thereby output a corresponding indication signal to said message generating means (36, 37, 38).
 4. A consumable part managing system (C2; C3) according to any one of claims 1 to 3, wherein said factor detecting means (C1, 34, 41) includes operation time detecting means (C1, 34) for detecting a time duration for which said textile machine has been put into operation.
 5. A consumable part managing system (C2; C3) according to any one of claims 1 to 4, wherein said textile machinery includes a plurality of textile machines, said factor detecting means (C1, 34, 41) being provided for each of said plurality of textile machines, and wherein consumed lifetime arithmetic means (C1, 33, 34; 40) determines the consumed lifetimes of consumable parts in said textile machines, respectively, on the basis of information obtained from said factor detecting means (C1, 34, 41), respectively.
 6. A consumable part managing system (C2; C3) according to any one of claims 1 to 5, said textile machinery including at least a jet loom, wherein said consumable part is at least one selected from a group consisting of a brake mechanism provided in association with a loom driving motor (M), ropes for driving a plurality of heald frames constituting a shedding apparatus, supporting shafts for.. cam levers constituting a cam mechanism for driving said shedding apparatus, an anti-slip felt member provided around a circumferential surface of a press roller (19) adapted to be pressed against a surface roller (18) for pulling a woven fabric (W), a cutter (30) for cutting off a weft yarn and on/ off valves for controlling supply of compressed fluid to weft yarn inserting nozzles (28, 29) in said jet loom.
 7. A consumable part managing system (C2; C3) according to any one of claims 1 to 6, further comprising:
 - preset lifetime storing means (31) for storing preset lifetimes of the consumable parts ; and means (32) for inputting said preset lifetimes to said preset lifetime storing means (31).
 8. A consumable part managing system (C2; C3) according to claim 7, said factor detecting means (C1, 34, 41) being implemented as a functional part of a loom control computer (C1), wherein said consumed lifetime arithmetic means (C1, 33, 34; 40) includes time integrating means (33; 40) comprising a timer for counting cumulatively the operation time of said jet loom in response to a time integrating command issued from said loom control computer (C1) when said jet loom is in an operation state, said time integrating means (33; 40) being adapted to store latest integrated times as said serviceable life affecting factor for each of said consumable parts.
 9. A consumable part managing system (C2; C3) according to claim 8, said exchange decision means (35) comparing said preset lifetime stored in said preset lifetime storing means (31) with the consumed lifetime determined by said time integrating means (33; 40) for at least one of the consumable parts, wherein when said consumed lifetime of said consumable part has reached a corresponding preset lifetime, a signal indicating necessity of exchange of said consumable part is issued to said message generating means (36, 37, 38).
 10. A consumable part managing system (C2; C3) according to claim 9, said message generating means (36, 37, 38) including display means (38) and display control means (37) connected to said display means (38), said exchange decision means (35) outputting to said display control means (37) a display command signal containing an index indicating the consumable part for which said comparison has been performed, said display control means (37) reading the preset lifetime of the consumable part identified by said index contained in said display command signal from said preset lifetime storing means (31) while reading out the consumed lifetime of said consumable part from said time integrating means (33; 40), for thereby commanding said display means (38) to display an identifier of said consumable part together with said preset lifetime and said consumed lifetime.
 11. A consumable part managing system (C2; C3) according to any one of the preceding claims, wherein said environment sensing means includes at least one of sensors selected from a group consisting of

a load current sensor, a power consumption sensor, a fluid consumption sensor, an acceleration sensor, a load torque sensor and a displacement sensor.

12. A method of managing at least one consumable part in a textile machinery to be carried out by a consumable part managing system as defined in any one of claims 1 to 11, comprising the steps of:

detecting a serviceable life affecting factor including operation information and environment information for said at least one consumable part, which factor exerts influence to a serviceable life of said at least one consumable part, wherein said operation information comprises information indicative of an operation state of said textile machinery and said environment information comprises information indicative of environmental conditions of said textile machinery;

determining arithmetically a consumed lifetime of said at least one consumable part on the basis of said serviceable life affecting factor as detected; and

generating a message indicating necessity of exchange of said at least one consumable part on the basis of information concerning the consumed lifetime of said at least one consumable part as determined arithmetically,

characterised in that said environment information is detected by environment sensing means (41), said environment sensing means (41) including a temperature sensor and/ or a humidity sensor.

Patentansprüche

1. Verbrauchsteilverwaltungssystem (C2; C3), das elektrisch mit einer Textilmaschinenanlage verbunden ist, zur Verwaltung zumindest eines Verbrauchsteils in der Textilmaschinenanlage, mit einer Faktorerfassungseinrichtung (C1, 34, 41) zur Erfassung eines die Nutzlebensdauer beeinträchtigenden Faktors einschließlich Betriebsinformationen und Umgebungsinformationen für das zumindest eine Verbrauchsteil, wobei der Faktor einen Einfluss auf die Nutzlebensdauer des zumindest einen Verbrauchsteils ausübt, wobei die Betriebsinformationen Informationen aufweisen, die einen Betriebszustand der Textilmaschinenanlage angeben, und die Umgebungsinformationen Informationen aufweisen, die die Umgebungsbedingungen der Textilmaschinenanlage angeben, einer Verbrauchslebensdauer-Arithmetikeinrichtung (C1, 33, 34; 40) zur arithmetischen Bestimmung einer verbrauchten Lebensdauer des zumindest einen Verbrauchsteils auf der Grundlage des

durch die Faktorerfassungseinrichtung (C1, 34, 41) erfassten die Nutzlebensdauer beeinträchtigenden Faktors, und

einer Mitteilungserzeugungseinrichtung (36, 37, 38) zur Erzeugung einer Mitteilung, die die Notwendigkeit zum Austausch des zumindest einen Verbrauchsteils angibt, auf der Grundlage von Informationen betreffend der von der Verbrauchslebensdauer-Arithmetikeinrichtung (C1, 33, 34; 40) bestimmten verbrauchten Lebensdauer des zumindest einen Verbrauchsteils,

dadurch gekennzeichnet, dass

die Faktorerfassungseinrichtung (C1, 34, 41) eine Umgebungserfassungseinrichtung (41) zur Erfassung der Umgebungsinformationen aufweist, wobei die Umgebungserfassungseinrichtung (41) einen Temperatursensor und/oder einen Feuchtigkeitssensor aufweist.

2. Verbrauchsteilverwaltungssystem (C2; C3) nach Anspruch 1, weiterhin mit

einer Modifiziereinrichtung (42) zur Modifizierung eines arithmetischen Ausdrucks, um die verbrauchte Lebensdauer durch die Verbrauchslebensdauer-Arithmetikeinrichtung (C1, 33, 34; 40) arithmetisch zu bestimmen.

3. Verbrauchsteilverwaltungssystem (C2; C3) nach Anspruch 1 oder 2, weiterhin mit

einer Austauschentscheidungseinrichtung (35) zur Entscheidung, dass die von der Verbrauchslebensdauer-Arithmetikeinrichtung (C1, 33, 34; 40) arithmetisch bestimmte verbrauchte Lebensdauer eine vorab eingestellten Lebensdauerwert erreicht hat, um dadurch ein entsprechendes Angabesignal zu der Mitteilungserzeugungseinrichtung (36, 37, 38) auszugeben.

4. Verbrauchsteilverwaltungssystem (C2; C3) nach einem der Ansprüche 1 bis 3, wobei die Faktorerfassungseinrichtung (C1, 34, 41) eine Betriebszeiterfassungseinrichtung (C1, 34) zur Erfassung einer Zeitdauer aufweist, während der die Textilmaschinenanlage in Betrieb ist.

5. Verbrauchsteilverwaltungssystem (C2; C3) nach einem der Ansprüche 1 bis 4, wobei die Textilmaschinenanlage eine Vielzahl von Textilmaschinen aufweist, für jede aus der Vielzahl der Textilmaschinen eine Faktorerfassungseinrichtung (C1, 34, 41) vorgesehen ist, und wobei die Verbrauchslebensdauer-Arithmetikeinrichtung (C1 33, 34; 40) die verbrauchten Lebensdauern von Verbrauchsteilen in den Textilmaschinen jeweils auf der Grundlage von Informationen bestimmt, die jeweils aus den Faktorerfassungseinrichtungen (C1, 34, 41) erhalten werden.

6. Verbrauchsteilverwaltungssystem (C2; C3) nach einem der Ansprüche 1 bis 5, wobei die Textilmaschinenanlage zumindest eine Düsenwebmaschine aufweist, wobei das Verbrauchsteil zumindest ein ausgewähltes aus einer Gruppe ist, die einen Bremsmechanismus, der in Zusammenhang mit einem Webmaschinenantriebsmotor (M) vorgesehen ist, Seile zum Antrieb einer Vielzahl von ein Fachbildeggerät bildender Schafrahmen, Stützwellen für Nockenhebel, die einen Nockenmechanismus zum Antrieb des Fachbildeggeräts bilden, ein Antirutschfilzteil, das um einer umlaufende Oberfläche einer Andruckwalze (19) vorgesehen ist, die eingerichtet ist, gegen einer Oberflächenwalze (18) gedrückt zu werden, um ein gewobenes Textilerzeugnis (w) zu ziehen, eine Schneideeinrichtung (30) zum Abschneiden eines Gewebegarns und Ein-/Aus-Ventile zur Steuerung der Zufuhr einer komprimierten Fluids zu Gewebegarneinführungsdüsen (28, 29) in der Düsenwebmaschine aufweist.
7. Verbrauchsteilverwaltungssystem (C2; C3) nach einem der Ansprüche 1 bis 6, weiterhin mit einer Voreinstellungslebensdauer-Speichereinrichtung (31) zum Speichern vorab eingestellter Lebensdauern der Verbrauchsteile, und einer Einrichtung (32) zur Eingabe der vorab eingestellten Lebensdauern in die Voreinstellungslebensdauer-Speichereinrichtung (31).
8. Verbrauchsteilverwaltungssystem (C2; C3) nach Anspruch 7, wobei die Faktorerfassungseinrichtung (C1, 34, 41) als ein funktionelles Teil eines Webmaschinensteuerungscomputers (C1) implementiert ist, wobei die Verbrauchslebensdauer-Arithmetikeinrichtung (C1, 33, 34; 40) eine Zeitintegriereinrichtung (33; 40) aufweist mit einem Zeitgeber zum summierenden Zählen der Betriebszeit der Düsenwebmaschine in Reaktion auf einen Zeitintegrierbefehl, der aus dem Webmaschinensteuerungscomputer (C1) ausgegeben wird, wenn sich die Düsenwebmaschine in einem Betriebszustand befindet, wobei die Zeitintegriereinrichtung (33; 40) eingerichtet ist, zuletzt integrierte Zeiten als einen die Nutzlebensdauer beeinträchtigenden Faktor für jeden der Verbrauchsteile zu speichern.
9. Verbrauchsteilverwaltungssystem (C2; C3) nach Anspruch 8, wobei die Austauschentscheidungseinrichtung (35) die in der Voreinstellungslebensdauer-Speichereinrichtung (31) gespeicherte vorab eingestellte Lebensdauer mit der durch die Zeitintegriereinrichtung (33; 40) bestimmten verbrauchten Lebensdauer für zumindest einen der Verbrauchsteile vergleicht, wobei, wenn die verbrauchte Lebensdauer des Verbrauchsteils eine entsprechende vorab eingestellte Lebensdauer erreicht, ein die Notwendigkeit eines Austausches des Verbrauchsteils angegebendes Signal der Mitteilungserzeugungseinrichtung (36, 37, 38) zugeführt wird.
10. Verbrauchsteilverwaltungssystem (C2; C3) nach Anspruch 9, wobei die Mitteilungserzeugungseinrichtung (36, 37, 38) eine Anzeigeeinrichtung (38) und eine mit der Anzeigeeinrichtung (38) verbundene Anzeigesteuerungseinrichtung (37) aufweist, die Austauschentscheidungseinrichtung (35) der Anzeigesteuerungseinrichtung (37) ein Anzeigebefehlssignal mit einem Index zuführt, das den Verbrauchsteil angibt, für den der Vergleich durchgeführt wurde, die Anzeigesteuerungseinrichtung (37) die vorab eingestellte Lebensdauer des durch den in dem Anzeigebefehlssignal enthaltenen Index identifizierten Verbrauchsteils aus der Voreinstellungslebensdauer-Speichereinrichtung (31) liest, während sie die verbrauchte Lebensdauer des Verbrauchsteils aus der Zeitintegriereinrichtung (33; 40) liest, um dadurch die Anzeigeeinrichtung (38) zur Anzeige eines Identifizierers des Verbrauchsteils zusammen mit der vorab eingestellten Lebensdauer und der verbrauchten Lebensdauer anzuweisen.
11. Verbrauchsteilverwaltungssystem (C2; C3) nach einem der vorangehenden Ansprüche, wobei die Umgebungserfassungseinrichtung zumindest einen Sensor aufweist, der aus einer Gruppe mit einem Laststromsensor, einem Energieverbrauchssensor, einem Fluidverbrauchssensor, einem Beschleunigungssensor, einem Lastdrehmomentsensor und einem Versatzensensor ausgewählt ist.
12. Verfahren zur Verwaltung zumindest eines Verbrauchsteils in einer Textilmaschinenanlage, das durch ein Verbrauchsteilverwaltungssystem nach einem der Ansprüche 1 bis 11 auszuführen ist, mit den Schritten
- Erfassen eines die Nutzlebensdauer beeinträchtigenden Faktors einschließlich Betriebsinformationen und Umgebungsinformationen für das zumindest eine Verbrauchsteil, wobei der Faktor einen Einfluss auf die Nutzlebensdauer des zumindest einen Verbrauchsteils ausübt, wobei die Betriebsinformationen Informationen aufweisen, die einen Betriebszustand der Textilmaschinenanlage angeben, und die Umgebungsinformationen Informationen aufweisen, die die Umgebungsbedingungen der Textilmaschinenanlage angeben,
- arithmetisches Bestimmen einer verbrauchten Lebensdauer des zumindest einen Verbrauchsteils auf der Grundlage des erfassten, die Nutzlebensdauer beeinträchtigenden Faktors, und
- Erzeugen einer Mitteilung, die die Notwendigkeit zum Austausch des zumindest einen Verbrauchsteils angibt, auf der Grundlage von Informationen betreffend der arithmetisch bestimmten ver-

brauchten Lebensdauer des zumindest einen Verbrauchsteils,

dadurch gekennzeichnet, dass

die Umgebungsinformationen durch eine Umgebungserfassungseinrichtung (41) erfasst werden, wobei die Umgebungserfassungseinrichtung (41) einen Temperatursensor und/oder einen Feuchtigkeitssensor aufweist.

Revendications

1. Système de gestion d'un consommable (C2 ; C3) relié électriquement à une machine textile pour gérer au moins un consommable dans ladite machine textile, comprenant :

un moyen de détection de facteur (C1, 34, 41) pour détecter un facteur affectant la durée de vie utile, englobant des informations concernant le fonctionnement et des informations concernant l'environnement pour ledit au moins un consommable, ledit facteur exerçant une influence sur la durée de vie utile dudit au moins un consommable, dans lequel lesdites informations concernant le fonctionnement comprennent des informations indiquant l'état de fonctionnement de ladite machine textile et lesdites informations concernant l'environnement comprennent des informations indiquant les conditions environnementales de ladite machine textile ;

un moyen de calcul arithmétique de la durée de vie consommée (C1, 33, 34 ; 40) pour déterminer, à l'aide d'un calcul arithmétique, la durée de vie consommée dudit au moins un consommable sur base dudit facteur affectant la durée de vie utile, détecté par ledit moyen de détection de facteur (C1, 34, 41) ; et

un moyen de génération de message (36, 37, 38) pour générer un message indiquant la nécessité de remplacer ledit au moins un consommable sur base des informations concernant la durée de vie consommée dudit au moins un consommable, déterminée à l'aide d'un calcul arithmétique par ledit moyen de calcul arithmétique de la durée de vie consommée (C1, 33, 34 ; 40) ;

ledit moyen de détection de facteur (C1, 34, 41) englobant un moyen de détection de l'environnement (41) pour détecter lesdites informations concernant l'environnement, ledit moyen de détection de l'environnement (41) englobant un détecteur de la température et/ ou un détecteur de l'humidité.

2. Système de gestion d'un consommable (C2 ; C3) selon la revendication 1, comprenant en outre :

un moyen de modification (42) pour modifier une expression arithmétique pour déterminer à l'aide d'un calcul arithmétique ladite durée de vie consommée par ledit moyen de calcul arithmétique de la durée de vie consommée (C1, 33, 34 ; 40).

3. Système de gestion d'un consommable (C2 ; C3) selon la revendication 1 ou 2, comprenant en outre :

un moyen de décision de remplacement (35) pour décider que la durée de vie consommée déterminée à l'aide d'un calcul arithmétique via ledit moyen de calcul arithmétique de la durée de vie consommée (C1 33, 34 ; 40) a atteint une valeur de durée de vie préétablie, pour ainsi transmettre un signal indicateur correspondant audit moyen de génération de message (36, 37, 38).

4. Système de gestion d'un consommable (C2 ; C3) selon l'une quelconque des revendications 1 à 3, dans lequel ledit moyen de détection de facteur (C1, 34, 41) englobe un moyen de détection de temps de fonctionnement (C1 34) pour détecter un laps de temps correspondant à la mise en service de ladite machine textile.

5. Système de gestion d'un consommable (C2 ; C3) selon l'une quelconque des revendications 1 à 4, dans lequel ladite machine textile englobe plusieurs machines textiles, ledit moyen de détection de facteur (C1, 34, 41) étant prévu pour chacune desdites plusieurs machines textiles, et dans lequel le moyen de calcul arithmétique de la durée de vie consommée (C1, 33, 34 ; 40) détermine les durées de vie consommées de consommables dans lesdites machines textiles, respectivement, sur base d'informations obtenues à partir dudit moyen de détection de facteur (C1, 34, 41), respectivement.

6. Système de gestion d'un consommable (C2 ; C3) selon l'une quelconque des revendications 1 à 5, dans lequel ladite machine textile englobe au moins un métier à tisser à injection, dans lequel ledit consommable représente au moins un membre choisi parmi le groupe constitué par un mécanisme de frein prévu en association avec un moteur d'entraînement de métier à tisser (M), des câbles pour entraîner plusieurs cadres de lisses constituant un appareil de formation de foule, des arbres de support pour des leviers à cames constituant un mécanisme à came pour entraîner ledit appareil de formation de foule, un élément de feutre antiglisement prévu autour d'une surface circonférentielle d'un rouleau presseur (19) conçu pour être pressé contre un rouleau de surface (18) pour exercer une traction sur un tissu tissé (W), une lame (30) pour découper un

fil de trame et des soupapes d'ouverture/fermeture pour commander l'alimentation en fluide sous pression de buses d'insertion de fils de trame (28, 29) dans ledit métier à tisser à injection.

7. Système de gestion d'un consommable (C2 ; C3) selon la revendication 1 à 6, comprenant en outre :

un moyen de mémorisation de durée de vie préétablie (31) pour mémoriser des durées de vie préétablies des consommables ; et
un moyen (32) pour entrer lesdites durées de vie préétablies dans ledit moyen de mémorisation de durées de vie préétablies (31).

8. Système de gestion d'un consommable (C2 ; C3) selon la revendication 7, ledit moyen de détection de facteur (C1, 34, 41) étant mis en oeuvre sous la forme d'un élément fonctionnel d'un ordinateur de commande de métier à tisser (C1), dans lequel le moyen de calcul arithmétique de la durée de vie consommée (C1, 33, 34 ; 40) englobe un moyen d'intégration du temps (33 ; 40) comprenant un compteur de temps pour compter de manière cumulative le temps de fonctionnement dudit métier à tisser à injection en réponse à une commande d'intégration du temps émise par ledit ordinateur de commande du métier à tisser (C1) lorsque ledit métier à tisser à injection est en état de marche, ledit moyen d'intégration du temps (33 ; 40) étant conçu pour mémoriser les temps intégrés les plus récents sous la forme dudit facteur affectant la durée de vie utile pour chacun desdits consommables.

9. Système de gestion d'un consommable (C2 ; C3) selon la revendication 8, ledit moyen de décision de remplacement (35) comparant ladite durée de vie préétablie mémorisée dans ledit moyen de mémorisation de durée de vie préétablie avec la durée de vie consommée déterminée par ledit moyen d'intégration du temps (33 ; 40) pour au moins un des consommables, dans lequel, lorsque ladite durée de vie consommée dudit consommable a atteint une durée de vie préétablie correspondante, un signal indiquant la nécessité du remplacement dudit consommable étant émis par ledit moyen de génération de message (36, 37, 38).

10. Système de gestion d'un consommable (C2 ; C3) selon la revendication 9, ledit moyen de génération de message (36, 37, 38) englobant un moyen d'affichage (38) et un moyen de commande d'affichage (37) relié audit moyen d'affichage (38), ledit moyen de décision de remplacement (35) transmettant audit moyen de commande d'affichage (37) un signal de commande d'affichage contenant un indice désignant le consommable à propos duquel ladite comparaison a été mise en oeuvre, ledit moyen de

commande d'affichage (37) consultant la durée de vie préétablie du consommable identifiée par ledit indice contenu dans ledit signal de commande d'affichage émis par ledit moyen de mémorisation de durée de vie préétablie (31) tout en consultant la durée de vie consommée dudit consommable à partir du moyen d'intégration du temps (33, 40) pour ainsi ordonner audit moyen d'affichage (38) d'afficher un identificateur dudit consommable de manière conjointe avec le ladite durée de vie préétablie et ladite durée de vie consommée.

11. Système de gestion d'un consommable (C2 ; C3) selon l'une quelconque des revendications précédentes, dans lequel ledit moyen de détection de l'environnement englobe au moins un détecteur choisi parmi le groupe constitué par un détecteur du courant de charge, un détecteur de la consommation d'énergie, un détecteur de la consommation de fluide, un détecteur de l'accélération, un détecteur du couple de charge et un détecteur du déplacement.

12. Procédé de gestion d'au moins un consommable dans une machine textile à mettre en oeuvre via un système de gestion d'un consommable, comme défini dans l'une quelconque des revendications 1 à 11, comprenant les étapes consistant à :

détecter un facteur affectant la durée de vie utile englobant des informations concernant la fonctionnement et des informations concernant l'environnement pour ledit au moins un consommable, ledit facteur exerçant une influence sur la durée de vie utile dudit au moins un consommable, dans lequel lesdites informations concernant le fonctionnement comprennent des informations indiquant l'état de fonctionnement de ladite machine textile et lesdites informations concernant l'environnement comprennent des informations indiquant les conditions environnementales de ladite machine textile ; déterminer à l'aide d'un calcul arithmétique une durée de vie consommée dudit au moins un consommable sur base dudit facteur affectant la durée de vie utile, à l'état tel que détecté ; générer un message indiquant la nécessité de remplacer ledit au moins un consommable sur base des informations concernant la durée de vie consommée dudit au moins un consommable, comme déterminé en se basant sur un calcul arithmétique ;

caractérisé en ce que lesdites informations concernant l'environnement sont détectées par un moyen de détection de l'environnement (41), ledit moyen de détection de l'environnement (41) englobant un détecteur de la température et/ou un détec-

teur de l'humidité.

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FIG. 1

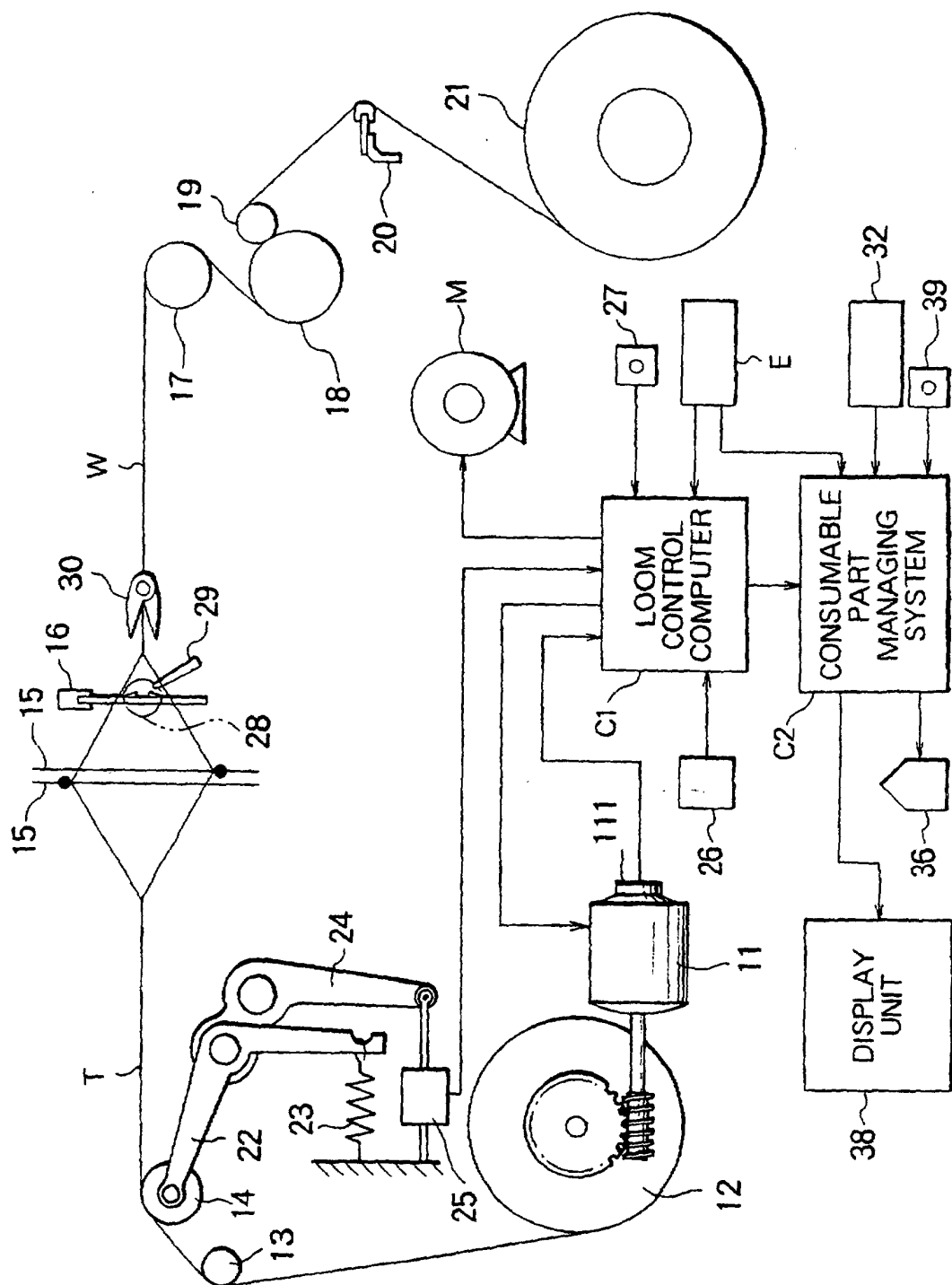


FIG. 2

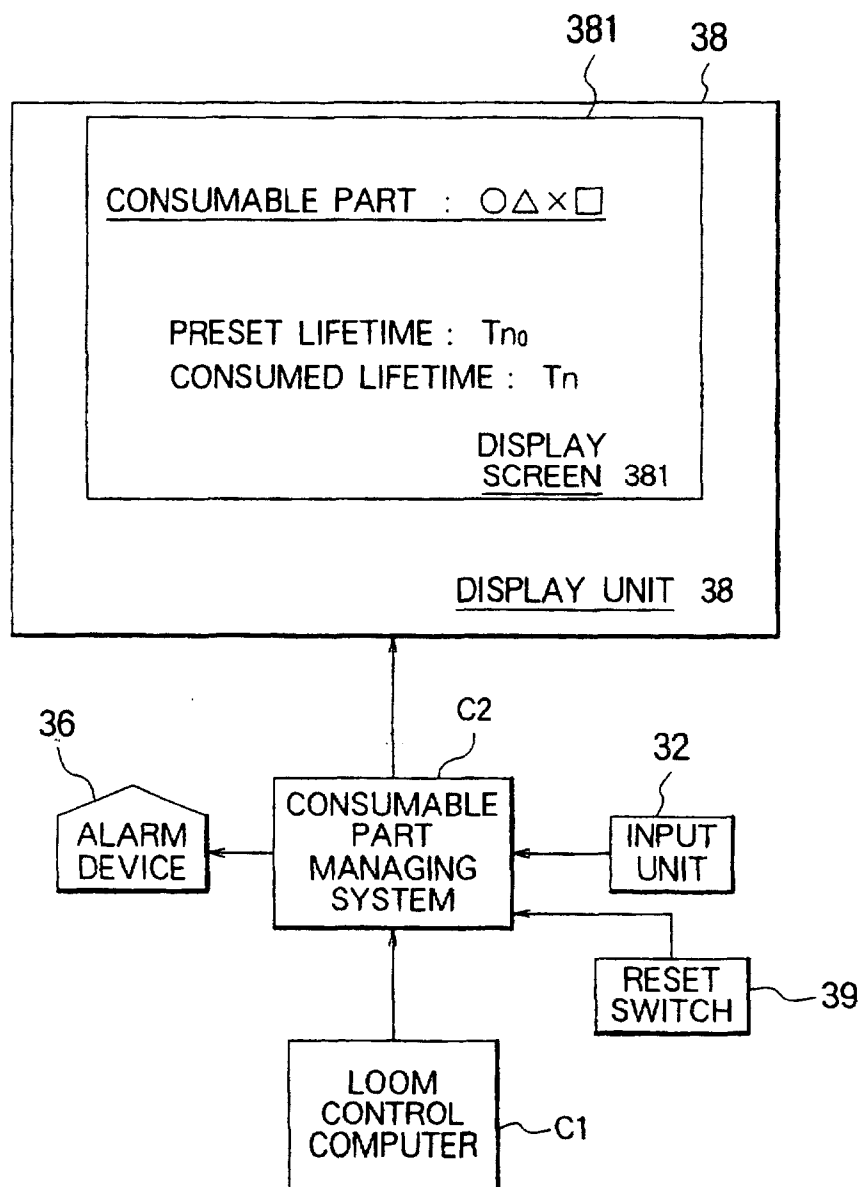


FIG. 3

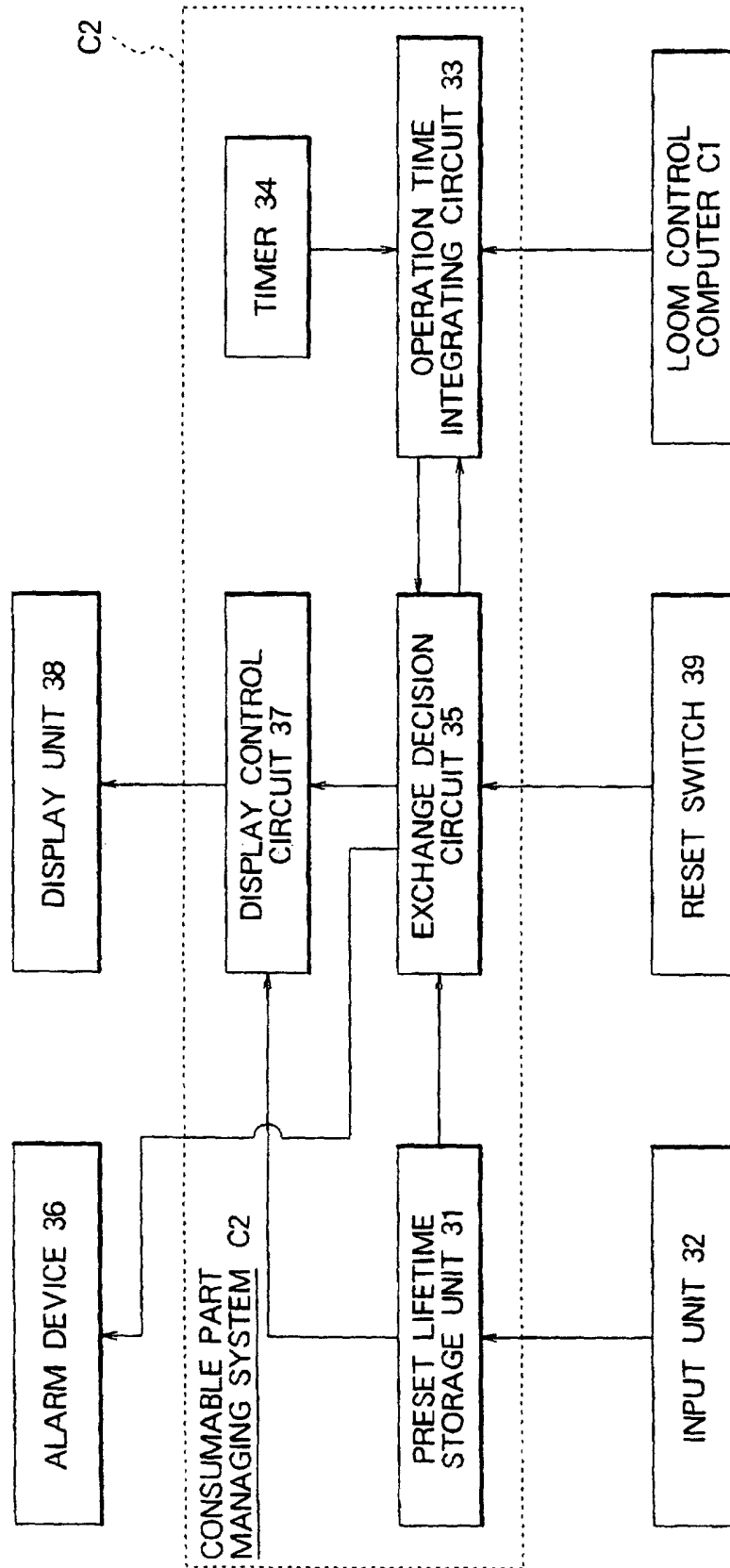


FIG. 4

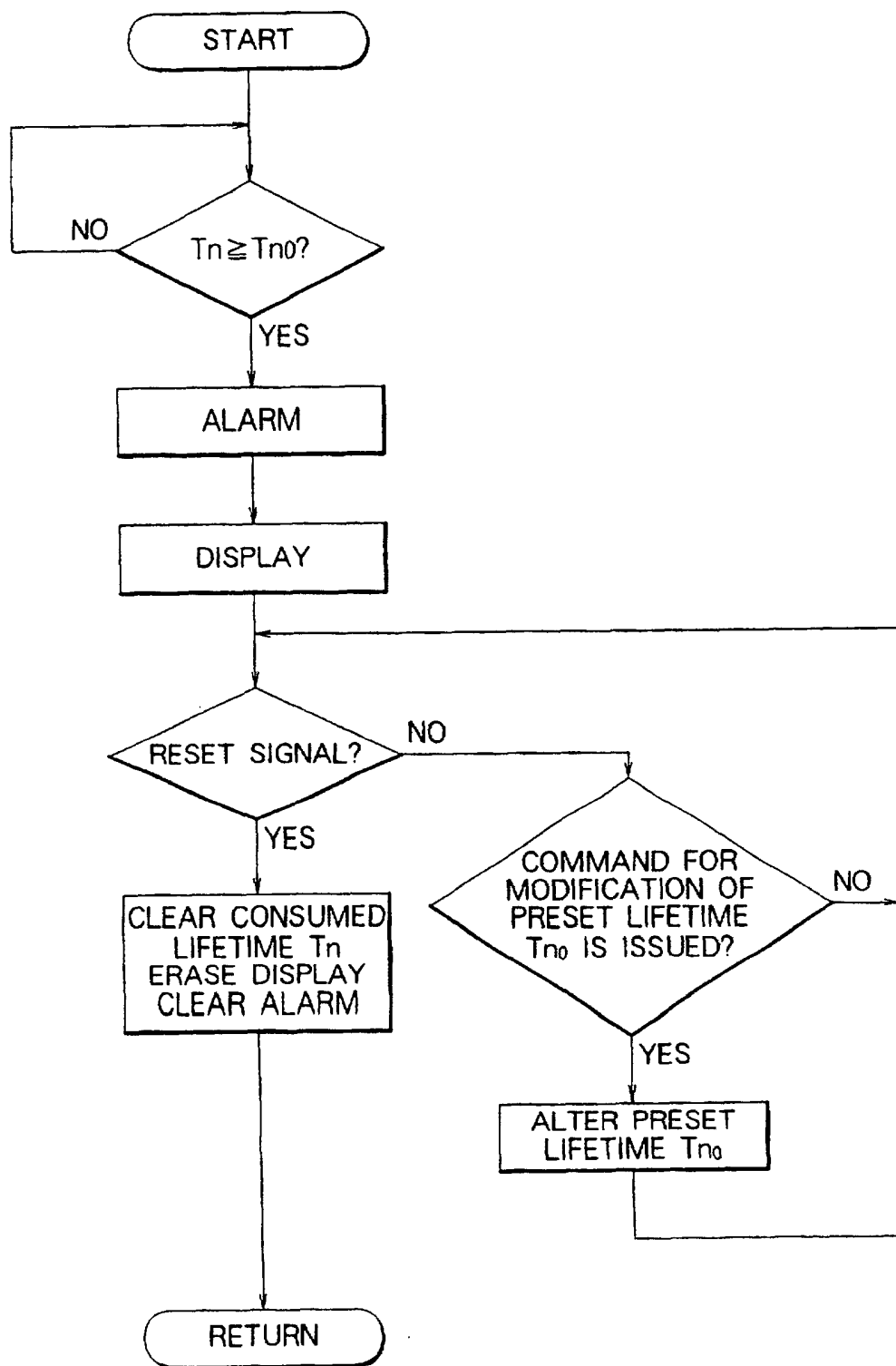


FIG. 5

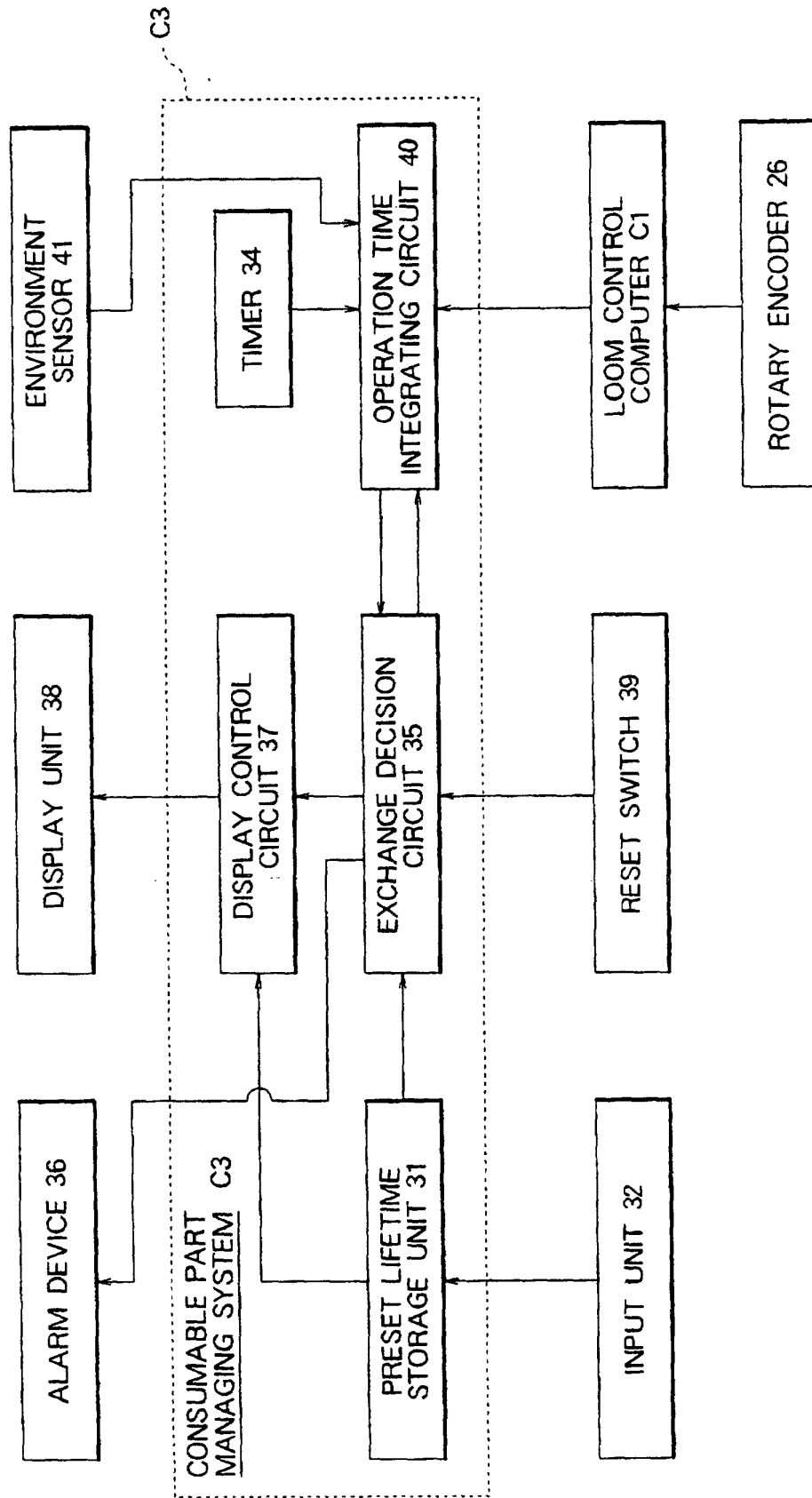


FIG. 6

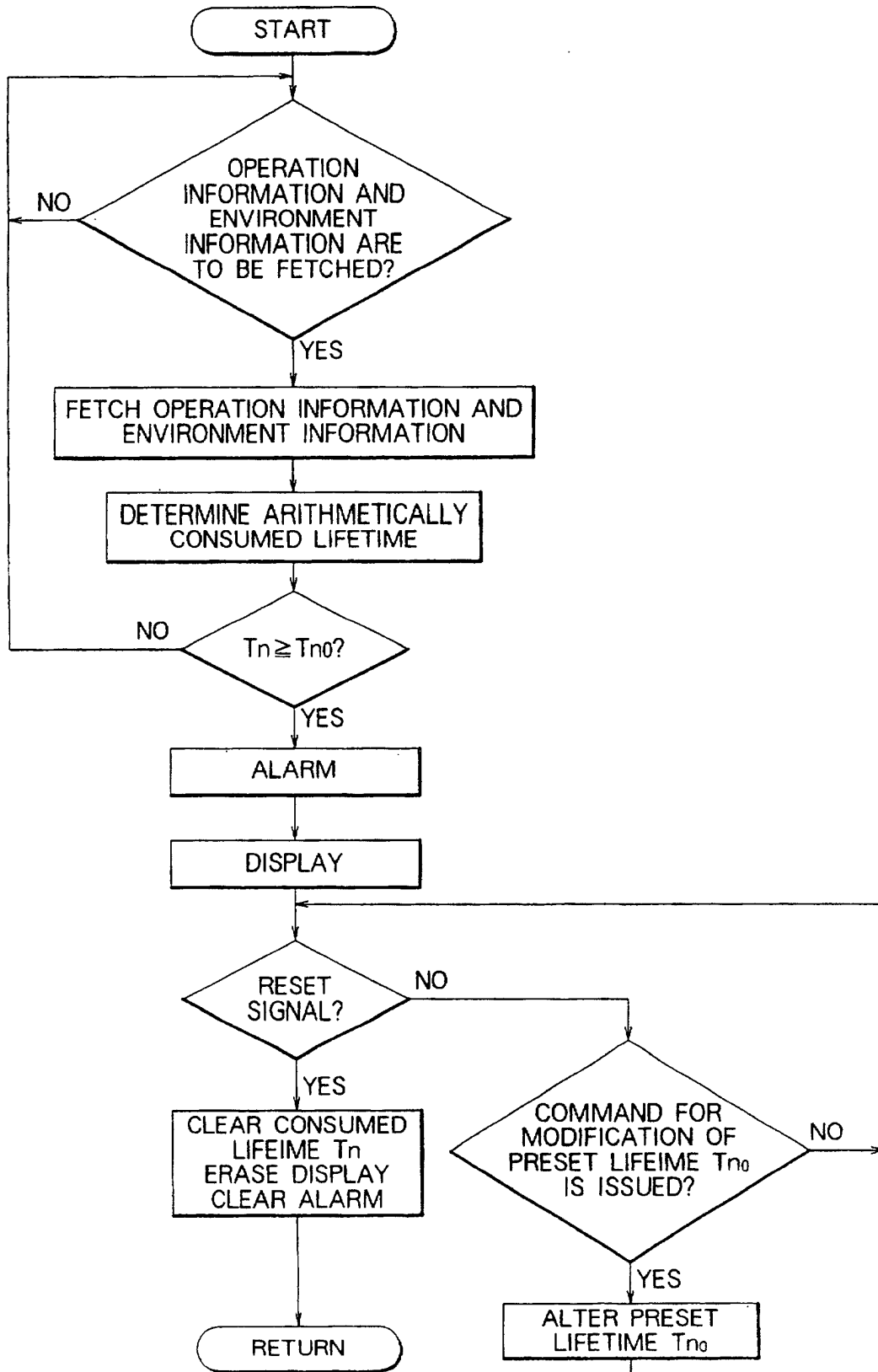


FIG. 7

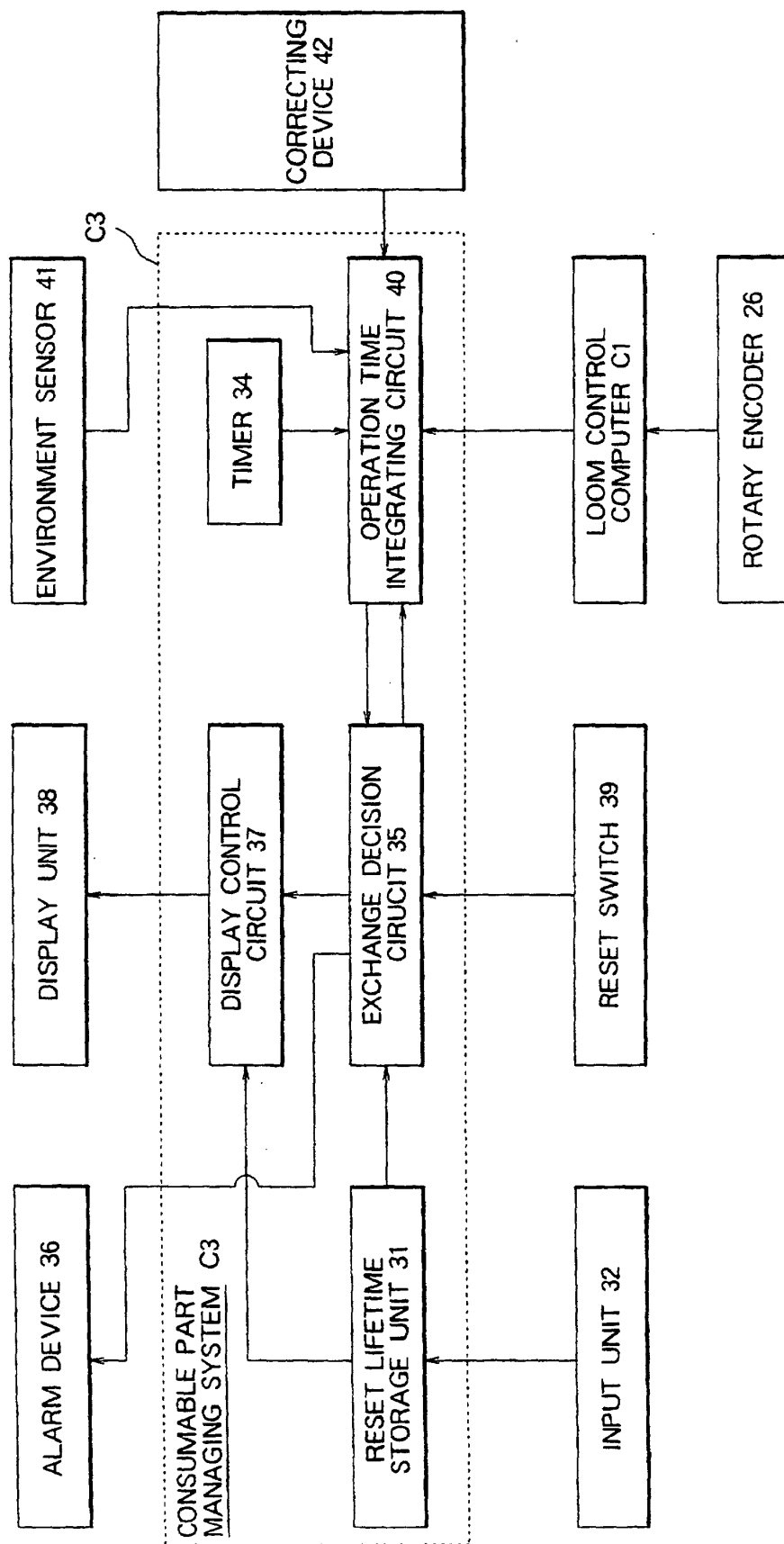


FIG. 8

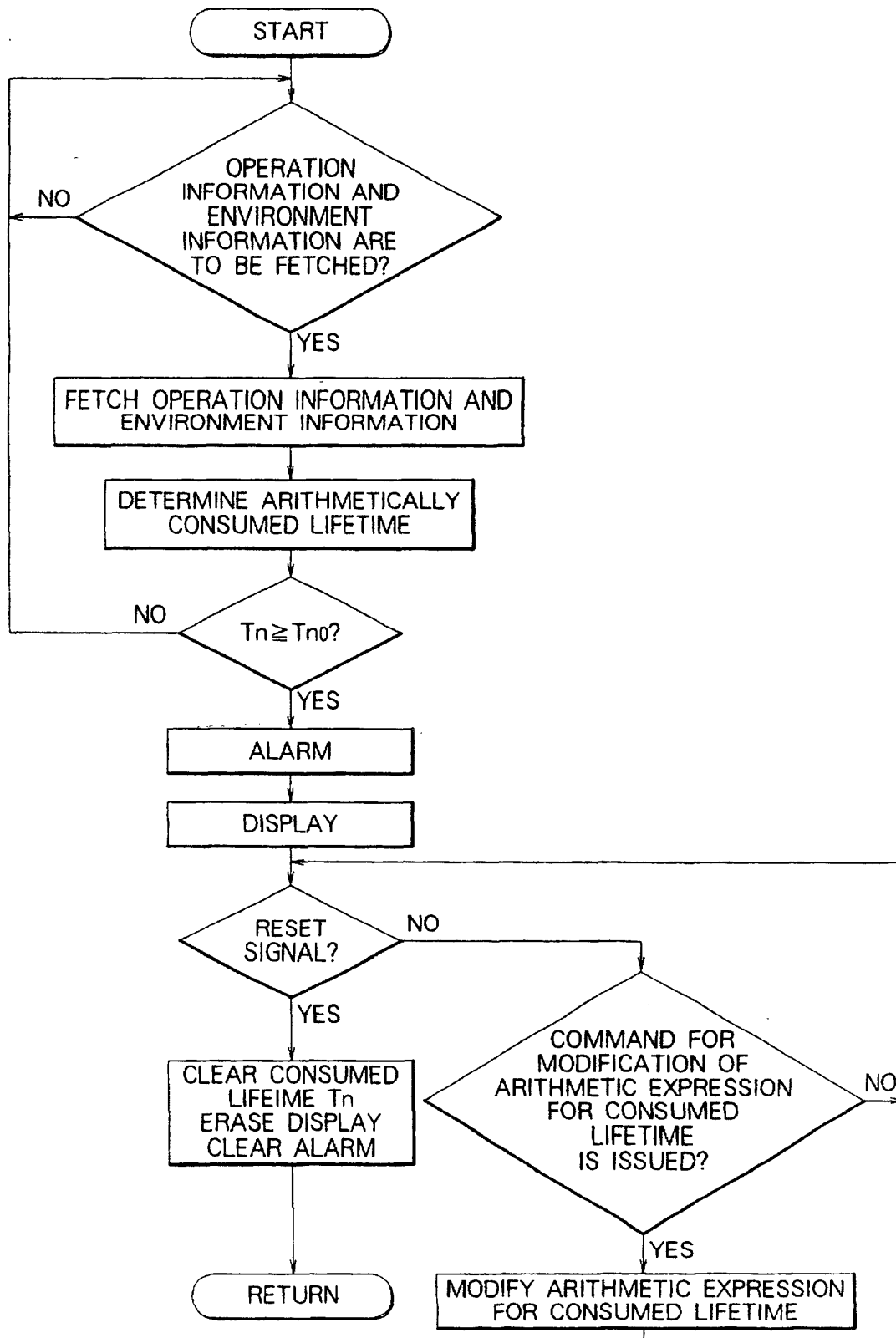


FIG. 9

