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A weft selector for looms.

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In an electric type weft selector, electric weft information signals stored at selection fixers are read out, one at one cycle of loom rotation, in a programmed sequence for extremely high speed reliable weft selection on a loom by operation of an output designator including a divide by n presetable counter and a random access memory which enables easy restoration of the count value at the counter even after unexpected interception of electric power supply to the loom.

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A WEFT SELECTOR FOR LOOMS

Background of the invention

The present invention relates to a weft selector for looms, and more particularly relates to an improved electric device for selecting wefts following a given programme on weaving looms.

Mechanical type weft selectors have conventionally been used for weaving looms on which fabrics are woven using several wefts of different types. A mechanical type weft selector of this sort is ingeneral accompanied with several drawbacks due to use of a card-peck combination. First, long use of the selector apts to cause abrasion and breakage of the peeks and such often connects to malfunction in weft selection. Secondly, due to the fact that the card in the combination has to be driven for rotation, there is a certain limit to the operation speed of the weft selector and such a limitted operation speed of the weft selector cannot follow the high speed running of weaving looms which is a recent fashion in the field. Thirdly, when the weft selector is not operationally coupled to the shedding motion, it is very difficult to duly match the sequence in weft selection to the shedding pattern after defect mending on looms.

Summary of the invention

It is one object of the present invention to provide a weft selector free of malfunction to be caused by abrasion and/or breakage of its parts.

It is the other object of the present invention to provide a weft selector whose operation speed can ideally follow recent high speed running of weaving looms.

It is a further object of the present invention to provide a weft selector which enables easy matching of the sequence in weft selection to the shedding pattern after defect mending on looms.

In accordance with the basic aspect of the present invention, the weft selector is provided with an electric construction in which a number of weft information signals stored at selection fixers are sequentially taken out therefrom one at one cycle rotation of the loom, and used for generation of weft selection signals following a given programme.

Brief description of the drawing:

The attached drawing is a block diagram of one embodiment of the weft selector in accordance with the present invention.

Description of preferred embodiments

One embodiment of the weft selector in accordance with the present invention is shown in the attached drawing in which eight sorts of different wefts are used for weaving a fabric and, as a consequence, have to be selected properly. Selection of a weft is carried out by activating corresponding one of eight solenoids S1 to S8. That is, upon activation of one solenoid, a known weft control mechanism (not shown) operates to select a corresponding weft for weft insertion.

The weft selector includes an OR-gate 1. One input terminal of the OR-gate 1 is connected to a supply source of clock pulse signals CP whereas the other input terminal is connected to a switch SW1. The clock pulse supply source is of a conventional type which generates one clock pulse signal CP at one cycle rotation of the loom. The output terminal of the OR-gate 1 is connected to the count-up terminal UP of a counter 2 which takes the form of a divide by n presettable counter. The count-down terminal of the counter 2 is connected to a switch W2 whereas the load terminal is connected to a supply

source of lord signals LS.

The other terminals of both switches SW1 and SW2 are connected to supply sources of pulse signals PS1 and PS2, respectively. As a consequence, the counter 2 counts up when the switch SW1 is closed, and counts down when the switch SW2 is closed. Thus, the count value of the counter 2 can be adjusted as required by properly controlling the associated switches SW1 and SW2.

The supply source of the lord signals LS generates one pulse signal when the electric power source for the weft selector is turned on. Every time a lord signal LS is given to the counter 2, the content of the later described random access memory 3 is passed to the read-in terminal Ra of the counter 2.

This read-in terminal Ra of the counter 2 is connected to the read-out terminal Rb of the memory 3 so that the content of the memory 3 should be passed to the counter 2 every time the electric power source is turned on. The latch terminal L of the memory 3 is connected to a supply source of latch signals LaS which generates one pulse signal when the electric power source is turned off. The read-in terminal Rc of the memory 3 is connected to the output terminal Q of the counter 2. The content of the counter 2 always appears at the output terminal Q

so that, when the electric power source is turned off, the current count value of the counter 2 should be stored in the memory 3.

The above-described output terminal Q of the counter 2 is also connected to the input terminal of a decoder 4 so that the content of the counter 2 from the output terminal Q should be decoded to decimal digits. In this way, the decoder 4 generates a signal from one of its output terminals Q_0 to Q_{n-1} depending on the current count value of the counter 2. More specifically, the signal appears at the output terminal Q_0 of the decoder 4 when the current count value at the counter 2 is equal to 0 whereas the signal appears at the output terminal Q_1 when the current count value at the counter 2 is equal to 1.

The output terminals Q_0 to Q_{n-1} of the decoder 4 are connected to the input terminals I_a to I_n of corresponding selection fixers 5a to 5n, respectively. The selection fixers 5a to 5n take the form of digital switches. Each selection fixer generates an output signal at one of its output terminals which corresponds to the value fixed. In other words, the output signal appears at the first output terminal when the value fixed at the selection fixer involved is equal to 1, at the second terminal when the value fixed is equal to 2, and at the ninth output terminal when the value fixed is equal to

0. In the case of the illustrated embodiment, each selection fixer is provided with nine output terminals.

The first to eighth output terminals of the selection fixers 5a to 5n are connected, respectively, to the input terminals of drivers 6a to 6h which take the form of tri-state elements. The control input terminals of the drivers 6a to 6h are connected to the above-described supply source of clock pulse signals whereas the output terminals of the drivers 6a to 6h are connected, respectively, to the solenoids S1 to S8. By activating one of the drivers 6a to 6h through supply of a clock pulse signal, the timing of signal passage to the corresponding one of the solenoids S1 to S8 can be adjusted so that weft selection should take place at a required crank angle within a loom rotation cycle.

The ninth output terminals of the selection fixers 5a to 5n, which correspond to the value fixed equal to 0, are connected to the clear terminal CLR of the counter 2 so that the count value at the counter 2 should become to zero upon receipt of an input signal at the clear terminal CLR. The output terminal Q of the counter 2 is connected to an indicator 7 which indicates the current count value of the counter 2 and a selection fixer currently in operation.

The weft selector with the above-described construction operates as follows. The number of the selection fixers to be used should be chosen in accordance with the number of operational steps within a cycle which is determined by the sequence of weft selection. It is herein assumed that n sets of selection fixers are prepared and necessary number of selection fixers are sorted out therefrom properly.

At the outset, the numbers of selection are designated by allotting them as the values fixed (0 to 8) to the selection fixers $5a$ to $5n$. That is, when one cycle of weft selection includes i ($i < n$) operational steps, the value fixed for each of the selection fixers $5a$ to $5i$ is allotted to one of 1 to 8 and at least the value fixed for the selection fixer 5_{i+1} is set to 0 among the selection fixers 5_{i+1} or below.

In this state, the electric power source of the loom is turned on to generate a clock signal which passes the content of the memory 3 to the counter 2. Since the content of the memory 3 is unknown at start of the loom running, the count value of the counter 2 has to be checked by referring to the indicator 7. When necessary, the switch SW1 or SW2 is operated to match the count value to the given sequence. Assuming that the count value of the counter 2 has been set to 0, a signal appears at the output terminal Q of the decoder 4 in order to be passed to the input terminal Ia of the selection fixer $5a$.

Thereupon, an output signal appears at one of the first to ninth output terminals of the selection fixer 5a which corresponds to its value fixed. For example, when the value fixed for the selection fixer 5a is equal to 1, the output signal appears at the first output terminal of the selection fixer 5a, and is passed to the input terminal of the driver 6a. Nevertheless, the corresponding solenoid S1 is not yet actuated due to no input of the clock pulse signal CP.

The clock pulse signal CP is also given to the count up terminal of the counter 2 via the OR-gate 1 and the count value at the counter 2 becomes equal to 1. As a result, the output signal at the output terminal Q_0 of the decoder 4 disappears, and an output signal now appears at the output terminal Q_1 . This output signal is then passed to the input terminal Ib of the selection fixer 5b which in turn generates an output signal at one of its first to ninth output terminals corresponding to the value fixed allotted thereto. If the value fixed for the selection fixer 5b is equal to 8, an output signal is passed to the input terminal of the driver 6h. The above-described clock pulse signal CP is concurrently assigned to the control terminals of the drivers 6a to 6h, the driver 6h generates an output signal which activates the solenoid S8 for selection of a corresponding weft.

As the loom performs i cycles of rotation, the count value at the counter 2 becomes equal to i and the decoder 4 generates an output signal at its output terminal Q_i which is passed to the selection fixer $5i$. When the value fixed for the selection fixer $5(i+1)$ is set to 0, a signal is assigned from the ninth output terminal of the selection fixer $5(i+1)$ to the clear terminal CLR of the counter 2 and the count value at the counter 2 becomes equal to zero. As a consequence, the signal at the output terminal Q_i of the decoder 4 disappears and a new output signal appears at the output terminal Q_0 . Then, a signal is passed again from the first output terminal of the selection fixer $5a$ to the driver $6a$ which activates the solenoid $S1$ for selection of a corresponding weft.

In the case of the above-described example, the value fixed for the i -th selection fixer $5i$ ($i < n$) is set to 0. When the selection fixers $5a$ to $5n$ are all given values fixed other than 0, signals are in sequence assigned, one at one cycle rotation of the loom, from the decoder 4 to the input terminals Ia to In of the selection fixers $5a$ to $5n$ for sequential selection of different wefts in accordance with the allotted value fixed. The moment the count value of the counter 2 reaches n , it returns to zero so that weft selection should repeat cyclically whilst each cycle including n sets of operational steps in the programmed sequence.

Next, the operatin is explained with regard to the situation in which the electric power source for the loom is turned off for some reasons.

In this case, a latch signal LaS is passed to the latch terminal of the memory 3 and the output signal from the counter 2 is stored at the memory 3 via the read-in terminal Rc. When the electric power source is again turned on under this condition, a lord signal LS is given to the lord terminal of the counter 2 which thereupon catches the content of the memory 3 via the read-in terminal Ra. In this way, the count value at the counter 2 before the turning-off of the electric power source can be restored when the electric power source is again turned on in order to restart the loom running immediately after the electric power source has been turned on. This is enabled by use of the random access memory 3 connected to the counter 2.

As is clear from the foregoing, wefts are selected in any programmed sequence in accordance with the present invention by properly allotting values fixed to the selection fixers 5a to 5n.

In the case of the foregoing embodiment, selection fixers

are used for storing weft information signals which are read out therefrom, one at one cycle rotation of the loom, in programmed sequence by use of the clock pulse supply source, the counter and the decoder. The weft selector of the present invention may be provided with a further construction in which weft information signals are stored in a tape recorder tape, a card tape reader or a mark card reader, and read out therefrom in programmed sequence by use of a drive and read-out mechanism including a pulse motor. The selection fixers may take the form of random access memories each provided with a reader. In this case, it is advantageous to prepare a weft selection pattern which should be read in random access memories of a number of looms. As a substitute for the random access memory used for provisional storage of the content of the counter when electric power supply is unexpectedly stopped, a random access memory with battery back-up may be used for same purposes. Further, the indicator may be replaced by a device provided with luminescent diodes the number of which corresponds to that of the selection fixers used for the above-described embodiment.

The weft selector of the present invention assures reliable operation with minimal malfunction inherent to conventional mechanical weft selectors using card-peck combinations. In addition use of the electronic system in accordance with the present invention enables the weft selector to well follow high speed running of looms. Use of the selection fixers

enables easy shift in type of fabrics to be woven. Since the number of operational steps in one cycle can be rendered considerably large, troubles previously needed for control of cards for so-called long repeats can be greatly alleviated.

Claims

1. A weft selector for looms comprising

means for storing a prescribed number of electric weft information signals,

means connected to the input side of said storing means and for designating weft information signals to be read out from said storing means, one at one cycle of loom rotation, in a programmed sequence, and

means connected to the output side of said storing means and for generating a weft selection signal at a prescribed moment upon receipt of each said weft information signal read out from said storing means.

2. A weft selector as claimed in claim 1 in which

said storing means includes a plurality of selection fixers each having an input terminal connected to said designating means and a plurality of output terminals connected to said

generating means, and

each said selection fixer generates one said weft information signal at one of said output terminals upon receipt of an input signal from said designating means.

3. A weft selector as claimed in claim 2 in which

each said selection fixer is given in the form of a digital switch.

4. A weft selector as claimed in claim 2 in which

each said selection fixer is given in the form of a random access memory provided with a reader.

5. A weft selector as claimed in claim 1 in which said designating means includes

a divide by n presettable counter,

a supply source of clock pulse signals connected to the count-up terminal of said counter and generating one said clock pulse at one cycle of loom rotation,

a supply source of load signals connected to the load terminal of said counter and generating one load signal at one time turning-on of a electric power source for said loom,

a random access memory connected to the read-in and output terminals of said counter,

a supply source of latch signals connected to the latch terminal of said memory and generating one said latch signal at one time turning-off of said electric power source, and

a decoder connected to said output terminal of said counter and to said input side of said storing means.

6. A weft selector as claimed in claim 5 further comprising

means for adjusting the count value of said divide by n presettable counter.

7. A weft selector as claimed in claim 6 in which said adjusting means includes

an OR-gate interposed between said supply source of clock pulse signals and said count-up terminal of said counter,

a normally open, hand operable first switch connected at one terminal to the input terminal of said OR-gate and at the other terminal to a first supply source of pulse signals, and

a normally open, hand operable second switch connected at one terminal to the count-down terminal of said counter and at the other terminal to a second supply source of pulse signals.

8. A weft selector as claimed in claim 5 further comprising

means for visibly indicating the count value at said divide by n presettable counter.

9. A weft selector as claimed in claim 8 in which said indicating means includes

an indicator connected to said output terminal of said counter.

10. A weft selector as claimed in claim 1 in which said generating means includes

a plurality of drivers, each in the form of a tri-state element, connected to the output side of said storing means and to said supply source of clock pulse signals, and

a corresponding number of solenoids each connected to the output terminal of an associated driver.

