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[21] Appl. No. **755,317**
[22] Filed **Aug. 26, 1968**
[45] Patented **June 28, 1971**
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[54] **LOOM STOP DATA COLLECTION SYSTEM**
15 Claims, 3 Drawing Figs.

[52] U.S. Cl. **340/172.5**
[51] Int. Cl. **G06f 15/46,**
 G06f 15/30
[50] Field of Search **340/172.5,**
 163; 235/157

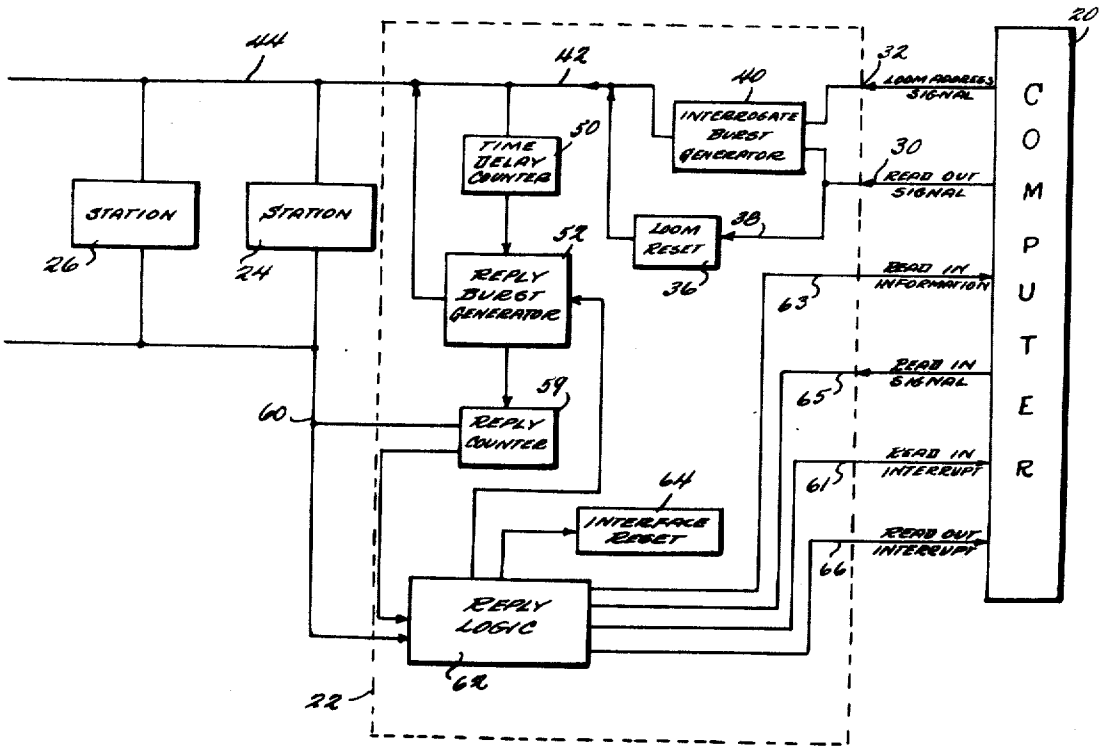
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ABSTRACT: Apparatus and method for conveying information relating to the condition of a given textile machine, chosen from a plurality of machines, to a computer or recorder. In the embodiment disclosed, a given number of cycles of 500-kilohertz signals, the number of such cycles identifying the chosen loom, are sent to all the machines on an address line. Subsequently, 300-kilohertz cycles are sent down the same line after the 500-kilohertz cycles are ended. The chosen loom then allows a given number of 300-kilohertz cycles to pass to a return line which also connects all of the machines to the computer or recorder to inform the computer as to a given condition, each different number of cycles identifying a different condition.



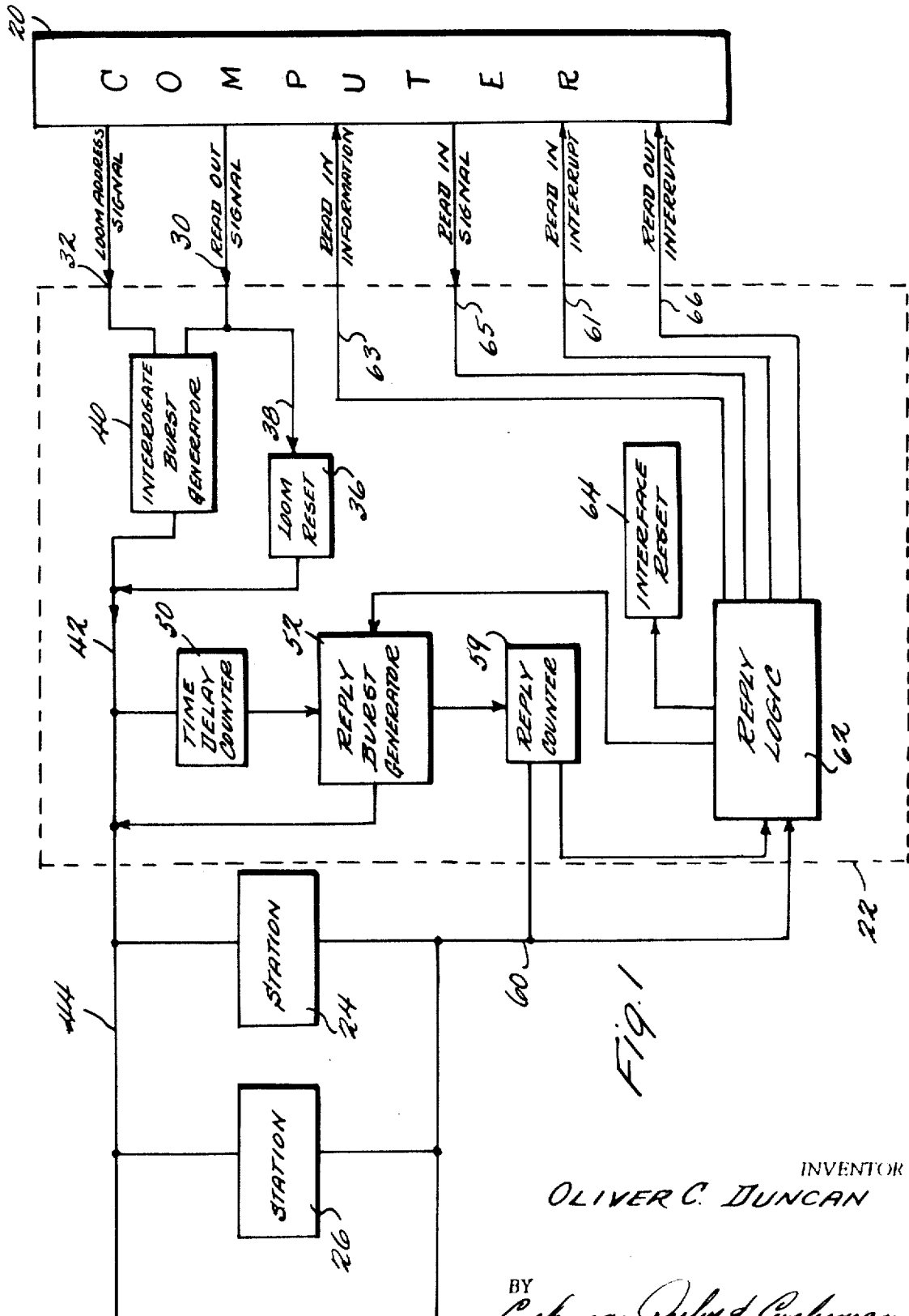
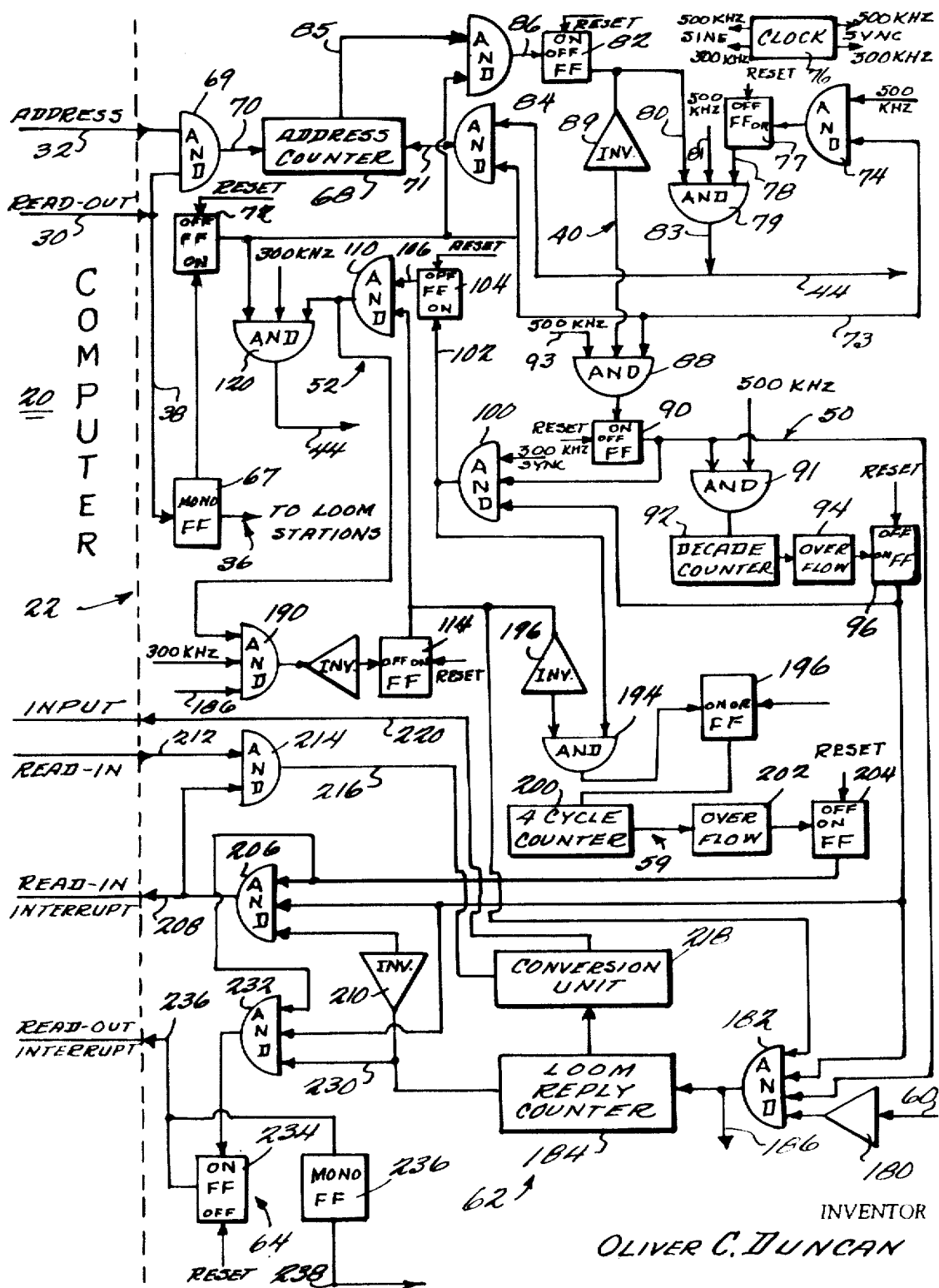


Fig. 1

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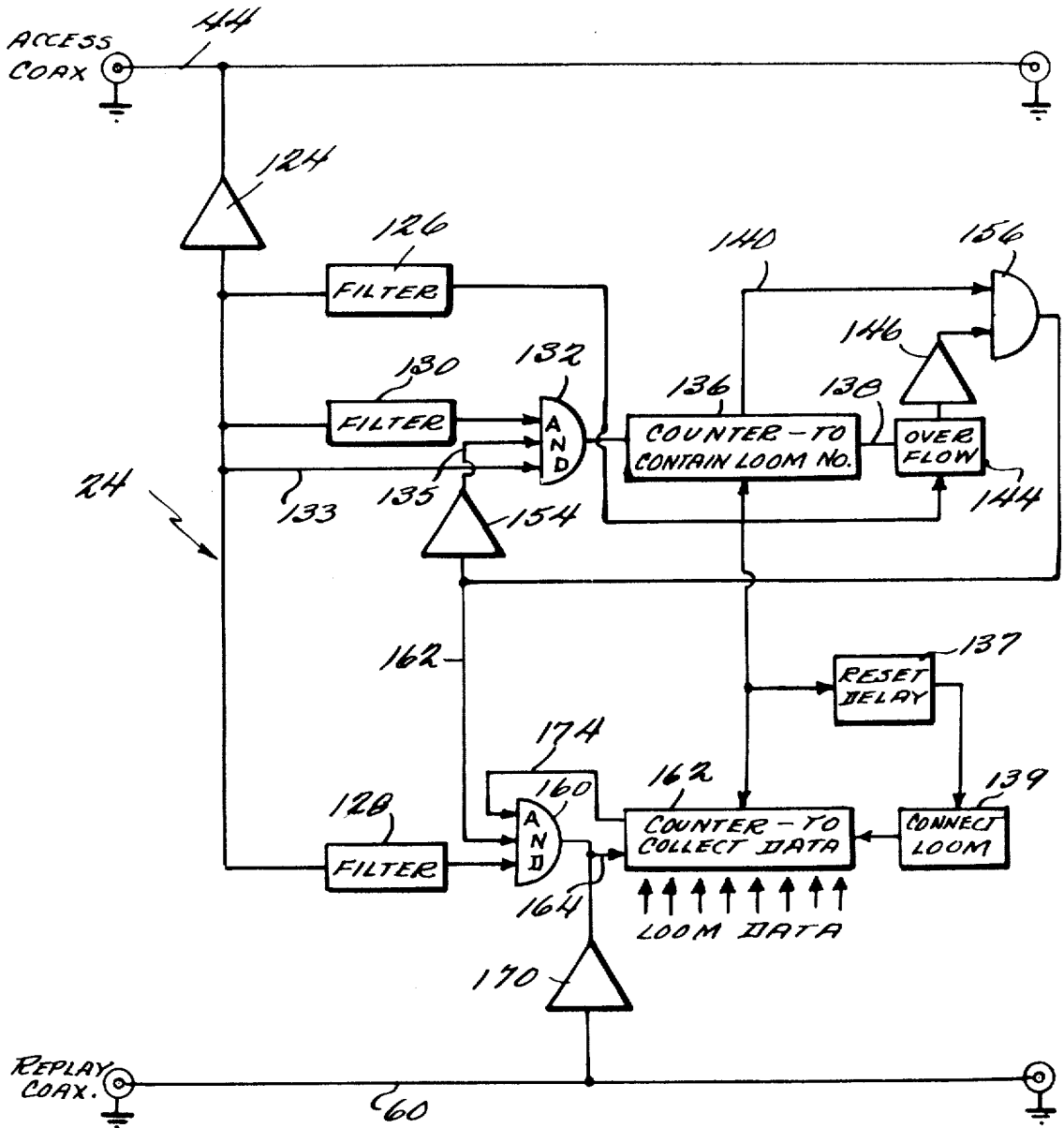


Fig. 3

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LOOM STOP DATA COLLECTION SYSTEM

DESCRIPTION OF PRIOR ART AND SUMMARY OF THE INVENTION

The invention relates to a system for conveying information from a plurality of stations to a computer or recorder.

In any factory with a number of independently operating machines and particularly in a textile mill, it is desirable to be constantly aware of which machines are in operation, as well as which machines are not. It is also desirable to know how much of what is being produced where. This knowledge enables the factory or mill supervisors to gauge the future material requirements of each respective machine as well as to judge accurately present and future overall and individual outputs. In a textile mill, this information is especially important since the pay of the workers operating the machines is usually related to the amount of material produced and this can be determined from the total operating time of each machine since the output of each machine as a function of time is known. Also, in the event of stoppage, it is desirable to know the cause thereof so that proper repairmen can be dispatched as required, work loads rearranged to compensate for the breakdown, etc.

In the past, pick counters mounted on each individual textile machine have been employed to record the number of loom running cycles. However, such devices provide data which must be manually and periodically read and which does not supply an immediate indication of loom stoppage nor the reason thereof.

Since the electronic digital computer is a high speed device which is capable of dealing with very large amounts of information in short periods of time, it is a particularly useful device for correlating information on stoppages, machine conditions, machine outputs, etc. from a large number of looms or other textile machines comprising a single convenient group such as a mill. A number of schemes have been utilized in the prior art for conveying to a computer or recorder this type of information which it can then process to produce data in convenient form relating to the operation of the entire mill.

In the prior art, information has been carried from each loom or textile machine to the computer or recorder by means of binary signals on lines connecting the looms and computer. For example, a binary address system, whereby either the computer sends a binary address on address lines to each of the looms in the system identifying a particular loom which then responds with similar binary signals on other lines indicating its condition or the loom station sends its own address to the computer whenever it stops together with the cause of stoppage, is described in a patent application entitled "Loom Data Collection System," Ser. No. 746,962, filed July 23, 1968.

However, such a binary system has a number of drawbacks which are not present in the system described in this application. First, the binary signals which are sent down the address and return lines are subject to considerable distortion in the electrically noisy mill environment. By making use of sinusoidal signals which are less sensitive to such distortion and which can be easily reconstructed even when greatly distorted, the present invention is much less subject to error and is better adapted to operate in an electrically noisy environment. This ability to tolerate a large amount of distortion also reduces the cost of employing this invention since much less shielding is required than in binary systems.

In addition, the present invention has a much greater capability for expansion than typical binary systems. A binary system is directly limited to the fixed number of looms which can be accommodated on its fixed number of address lines. A binary address system with ten lines can then accommodate a maximum of 1,023 looms and further looms can be added only by completely rewiring each address decoder on each loom. In contrast, additional looms can be added to this invention by simply informing the computer that a greater number of looms is now in the system.

In addition, this system requires only two lines connecting the computer to each of the looms in contrast to binary address systems which require many more. In the typical binary system, each condition which is sensed requires an additional wire connecting each of the looms to the computer. In the present invention, only two lines are necessary regardless of the number of conditions which are being reported or the number of looms in the system.

To summarize the operation of the system described in detail below the computer communicates a number equal to the numerical address of the loom to be interrogated to an interface circuit which serves as a link between the computer itself and the various loom stations, each of which gathers information on the operation of single loom. The interface circuit then produces a 500-kilohertz sinusoidal burst which is sent down an address line to all of the loom stations, and which has a number of cycles equal to that number read from the computer into the interface and representing the station chosen to respond. After that number of cycles has been sent, the interface circuitry prevents sending further 500-kilohertz signals.

At each loom station the cycles of the 500-kilohertz burst are counted and a given loom station is allowed to reply only when the number of cycles counted exactly equals the numerical address of that loom station. After the 500-kilohertz burst has ceased, the interface circuit, after a short delay follows the 500-kilohertz burst with a 300-kilohertz burst. This 300-kilohertz burst passes through the chosen station, which has been allowed to reply because the number of cycles of 500-kilohertz cycles equaled the numerical address, and returns directly to the interface circuitry on an appropriate reply line. The number of cycles of the 300-kilohertz burst passing through the chosen station at any time is constantly compared in that loom station with a set number stored in the station, which is coded to indicate to the computer that a given condition is present. When that stored number equals the number of cycles which have passed through the station, the station refuses to pass further 300-kilohertz cycles, and no further signals pass down the reply line.

The 300-kilohertz cycles received from the reply line are then counted in the interface circuitry and the computer is notified that information is available to be read into it. After the computer signals its readiness to accept the information, the information in the form of a coded number representing the number of 300-kilohertz signals received, is then conveyed from the interface circuit into the computer itself and the loom stations and interface circuit are reset in preparation for a repetition of the above operation with another loom station.

Other purposes and advantages of the present invention will become apparent in view of the following detailed description of the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a block diagram of the computer, interface, and loom station;

FIG. 2 shows a logic diagram of the interface circuitry;

FIG. 3 shows a logic diagram of a loom station.

DETAILED DESCRIPTION OF THE DRAWINGS

Reference is now made to FIG. 1 which shows a block diagram of a system with a computer 20, an interface circuit 22, and two typical loom stations 24 and 26. Of course, such a system would normally include many more loom stations but only two are shown for convenience in illustrating. The computer 20 initiates the interrogation by providing an appropriate signal on the readout line 30 and by furnishing the address of the loom to be interrogated on line 32. This loom address signal may simply be a sequential string of electrical pulses resulting from the sequential shifting of a count down register within the computer.

The readout signal on line 30 first is applied via line 30 to the loom reset mechanism 36 which then resets the loom stations 24 and 26 so that they are prepared to be interrogated. In

this embodiment, mechanism 36 is connected to the loom stations 24 and 26 via lines 42 and 44 and, upon activation, sends a short, electrical, reset pulse down lines 42 and 44 to reset loom stations 24 and 26. The conjunction of the readout signal and loom address signal on lines 30 and 32 in the interrogation burst generator 40 causes the generator 40 to produce a 500-kilohertz sinusoidal burst and apply it to line 42, following the reset pulse, the burst having a number of cycles equal to the numerical address of the chosen loom and therefore identifying that loom. This 500-kilohertz burst is then sent to all of the stations in the system, in this case stations 24 and 26, on line 44 which may be a simple coaxial cable. After the 500-kilohertz burst has ceased, a time delay counter circuit 50, after a delay of a given time, for example, the time required to count ten 500-kilohertz cycles, activates a reply burst generator 52 which then applies a 300-kilohertz sinusoidal burst to line 44.

The station which has been identified by that number of cycles of 500-kilohertz signals then passes the 300-kilohertz reply burst through itself and couples it to return line 60 so that the 300-kilohertz burst returns to the interface circuit 22. The number of cycles of the 300-kilohertz burst allowed through the chosen station identifies a specific loom condition, for example, that the loom is not operating.

The return signal on line 60 is then received in the interface circuit 22 by appropriate reply logic circuitry 62 which then queries the computer 20 on line 61, after reply counter 59 indicates that the 300-kilohertz cycles on line 60 have ended as to its readiness to receive information, and then conveys the information into the computer 20 on line 63 when the computer 20 signals its readiness to accept such information on line 65. When all available information has been conveyed to the computer 20, the computer 20 is so notified on line 66. In addition, as the information is being transferred to the computer 20, the logic circuitry 62 activates the interface reset mechanism 64 to prepare the interface circuit 22 to repeat the operation described above and causes the reply burst generator to cease producing the 300-kilohertz burst.

Reference is now made to FIG. 2 which shows a detailed logic arrangement for carrying out the functions of the interface circuitry 22. In describing this embodiment, it will be assumed that the flip flops have two states, one arbitrarily called "on" and the other "off." Similarly, the AND gates will be assumed to be "enabled," that is, to produce a given output, when all of their inputs are "positive" or "on." It will, of course, be appreciated that these designations are arbitrary, and that any alternative logic arrangement performing approximately the same functions can be employed.

First, the computer 20, which chooses the loom to be interrogated and receives the information returning from the loom stations through the interface circuit 22, initiates the interrogation of any given loom by applying an appropriate signal to the readout signal line 30 which is then conveyed to the loom reset mechanism 36 on line 38 in the manner shown in FIG. 1. In FIG. 2, this loom reset mechanism 36 includes a monostable multivibrator 67 which is triggered by the signal carried on line 38 from line 30 and which then produces a short electrical pulse of a given duration, for example, one microsecond. This pulse is applied via an appropriate line such as line 44 to each of the loom stations to reset them in preparation for the 500- and 300-kilohertz interrogation and reply bursts which follow in the manner described below.

The pulse from the monostable multivibrator 67 is also used to cause the address counter 68, which, together with the associated logic element and clock 76, comprises the burst generator 40, to begin counting down. The address of the loom to be interrogated is read into the counter 68 as a succession of pulses from the computer 20 via an AND gate 69, which has the signal on line 30 as one input, and the signal on line 32 as the other, so that when the proper signals are present on both lines 30 and 32, AND gate 69 passes the address signals on line 32 to the counter 68 via add line 70. After the address counter 68 begins to accumulate a sum which has

been added into counter 48 on the add line 70, the sum is subtracted from by signals supplied on the subtract line 71, each count subtracted representing one 500-kilohertz cycle applied to line 44. The 500-kilohertz signals are continuously produced during this subtracting and sent down line 44 until the counter 42 reaches zero. The length of time and number of cycles required to subtract the counter 68 to zero then determines the number of 500-kilohertz cycles which are sent out over the coaxial address line 44 to each of the loom stations, namely, loom stations 24 and 26 in FIG. 1.

In the embodiment shown in FIG. 2, this conversion of the number added into counter 68 to a given number of cycles of 500-kilohertz signals on line 44 is accomplished as follows.

The pulse produced by the monostable multivibrator 67 triggers an on/off flip flop 72 from an off to an on position. The signal produced by flip flop 72 in shifting from the off to on position is then conveyed on line 73 to an AND gate 74 which has as its other input the 500-kilohertz signal from the clock 76, which operates continuously producing 500- and 300-kilohertz sine waves, both synchronized and unsynchronized. Thus, the triggering of the flip flop 72 enables the AND gate 74 which in turn is connected to and triggers another flip-flop 77. The output of the flip-flop 77 on line 78 is applied next to an AND gate 79 along with two other input lines 80 and 81. Line 80 emanates from flip-flop 82 and, as will be apparent from the discussion below, is in a positive state until the counter 68 reaches zero. The third input to AND gate 79 on line 81 is merely a 500-kilohertz signal from clock 76 so that AND gate 79 is now enabled with the result that the 500-kilohertz signal now present on line 83 is carried on line 44 to each of the loom stations. This 500-kilohertz output signal on line 83 is also applied to an AND gate 84 along with the output of flip-flop 72 which will, of course, still be positive. Since both of these inputs to AND gate 84 are in an on or positive condition as the 500-kilohertz burst passes through the AND gate 79, and is applied to line 44, the cycles of the 500-kilohertz burst are also applied to the counter 68 on the subtract line 71, so that for each cycle applied to line 71 a single count is subtracted from counter 68. Thus, as the address is being added to the counter 68, on line 70, the sum in counter 68 is being subtracted from on line 71. It is, of course, necessary to ensure that the address counter 68 will not reach zero before the entire address has been added into the counter 68 on line 70.

When the counter 68 does reach zero indicating that the number of 500-kilohertz cycles which has passed through AND gate 79 and on to stations 24 and 26 via line 44 is exactly equal to the address to the loom chosen for interrogation, a signal is passed via line 85 from counter 68 to AND gate 86, whose other input connects to line 73 from flip-flop 72. The subsequent enabling of AND gate 86 then conveys an appropriate signal to flip-flop 82 turning that flip-flop 82 off and, as a result, immediately disabling AND gate 79. The disabling of AND gate 79 then prevents further passage of 500-kilohertz signals through that gate so that the total number of cycles which have been sent down line 44 is exactly equal to the numerical address of the loom to be interrogated.

Also, after the counter 68 has reached zero, a time delay circuit 50 counts a given number of 500-kilohertz signals before the 500-kilohertz signals which have passed down the line 44 are followed with 300-kilohertz signals. The AND gate 88, which has a total of three inputs, is enabled only after the AND gate 86 operates to turn off the flip-flop 82. The output of flip-flop 82 is then applied to the AND gate 88 through an inverter 89, so that when flip-flop 70 is turned off the output of inverter 89 is on or positive. The other two inputs to AND gate 88 are a 500-kilohertz synchronized signal from clock 76 on line 93 and the output of the flip-flop 72. Therefore, as soon as the flip-flop 82 is turned off, the AND gate 88 passes the 500-kilohertz signal on line 93 to another flip-flop 90 turning it from an off to an on condition. The turning on of flip-flop 90 then enables AND gate 91 which has as its other input 500-kilohertz signals from the clock 76. The output of AND

gate 91 is then applied to a decade counter 92 which counts 10 cycles of the 500-kilohertz signals and, on the 11th cycle activates an overflow circuit 94, which then turns on another flip-flop 96. The decade counter 92 and associated logic elements make up the time delay circuit 50. The output of flip-flop 96, in response to being turned on, then causes the reply burst generator 52 to send a 300-kilohertz burst down the line 44.

In the specific embodiment shown in FIG. 2, the output of flip-flop 96 is applied to AND gate 100 along with the output of flip-flop 90 and the 300-kilohertz synchronized signals from the clock 76. The AND gate 100, therefore, is enabled only after both the address counter 68 has counted to zero and the decade counter 92 has counted its 10 pulses and overflowed. When these two conditions are satisfied, the AND gate 100 applies its output on line 102 to a flip-flop 104 which is then changed to an on condition. The output of flip-flop 104 on line 106 is then applied to an AND gate 110 along with the output of yet another flip-flop 114 on line 116, which at this time is in an on position as will become apparent from the description below. Finally, the output of flip-flop 110 is applied as an input to AND gate 120 along with the output of flip-flop 72 and the 300-kilohertz signal from the clock 76. The AND gate 120 and associated logic elements then comprise reply burst generator 52. The AND gate 120 then passes the 300-kilohertz signal on to the line 44 and hence to stations 24 and 26.

Referring now to FIG. 3 which shows a typical loom station 24, the response of the closed loom station to the 500- and 300-kilohertz signals will now be described in detail. First, the reset pulses, 500-kilohertz signals and 300-kilohertz signals arriving on line 44 are applied to an isolation and power amplifier 124. The filter 126 which is connected to the output of amplifier 124 responds only to the reset pulse from monostable flip-flop 67 and neither the 500-kilohertz nor 300-kilohertz signals successfully pass filter 126. Similarly, filter 128 is tuned for a 300-kilohertz signal and both the 500-kilohertz signals and the reset pulses are blocked. The filter 130 then is tuned to a frequency of 500-kilohertz and blocks the 300-kilohertz signals and the reset pulses.

The reset pulse, arriving first, passes through filter 126 and is applied to counters 136 and 162, and overflow circuit 144 to reset them in preparation for counting the 500- and 300-kilohertz signals. The reset delay flip-flop 137, which is a monostable flip-flop, is also triggered by the reset pulse, producing a short pulse which is conveyed to connect loom circuit 139. The circuit 139 then causes the loom data sensors (not shown) to move a coded number into counter 162.

These loom sensors may be any of a variety of devices. For example, a loom card reader which reads punched cards inserted by the machine operator can be employed. Alternatively, a matrix board with switches which the operator can throw to indicate a given condition or situation can be used. Automatic devices sensing conditions such as warp stops, etc. are another possibility.

The 500-kilohertz signals then pass through filter 130 and are applied to AND gate 132. Another input to gate 132 is the unfiltered 500-kilohertz signal, on line 133, which merely acts as an additional factor to ensure the proper operation of the system. The third input on line 135, as will be apparent below, will be positive provided that the counter 136 has not overflowed since being last reset. The 500-kilohertz signal is then passed through the AND gate 132 and its cycles are individually counted by the counter 136, which then applies an appropriate signal to line 140 when the number of signals counted corresponds exactly to the numerical address of loom station 24 and subsequently applies another signal to line 138 when the number counted exceeds that numerical address. The output on line 138 is then applied to an overflow flip-flop 144 to turn it on when the count exceeds that numerical address. The output of flip-flop 144 is then negated by inverter 146 and applied to AND gate 150 along with the signal on line 140 so that AND gate 150 is enabled only when the final count

in counter 136, which is in fact the address sent on line 144, corresponds exactly with the numerical address of loom station 24. The output of AND gate 150 is then negated by inverter 154, and this inverted signal makes up the third input to AND gate 132 as mentioned above.

The output of AND gate 156 is also applied as one input to another AND gate 160 via line 162 along with the output of the filter 128 which passes only the 300-kilohertz signals. The third input to AND gate 160 is line 174 from the counter to collect data 162, and line 174 assumes a negative state disabling gate 160 only when counter 162 has been completely emptied as described below. The 300-kilohertz signals which follow the 500-kilohertz signals down line 44 now pass through AND gate 160 since all three inputs are positive and then are applied to counter 162 via subtract line 164. Counter 162 has already accumulated a given count which reflects information about a loom condition upon which the computer can then operate to provide data on the condition of any and all of the looms. At the same time that each cycle of the 300-kilohertz signal is being subtracted from the counter 162, the same 300-kilohertz cycles are also being applied to return line 60 via another isolation amplifier 170. When the counter 162 reaches a count of zero, the line 174, which is an input to AND gate 160, assumes a negative state so that AND gate 160 is disabled and no further subtraction takes place and no further cycles are sent to the interface circuitry 22 on the reply line 60.

Referring again to FIG. 2, the reply line 60 entering the interface 22 passes the 300-kilohertz return signals to an amplifier 180, which in turn passes the signals to an AND gate 182. The other three inputs to the AND gate 182 are at this time respectively the outputs of the flip-flops 114, 90 and 96 and are in a positive state, so that the AND gate 182 is enabled. Flip-flop 90 was turned on by the address counter 68 upon reaching zero and flip-flop 96 by the overflow of the decade counter 92 while flip-flop 114 was turned on by interface reset and is turned off only subsequently by the logic reply circuit 62 as described below.

The 300-kilohertz signals received on line 60 then pass through AND gate 182 and are stored in a loom counter 184 which counts the number of cycles received and which is part of the reply logic 62. The enabling of gate 182 also enables gate 190 which has line 186 as one input, line 189 from gate 110 as another and the 300-kilohertz signal from clock 76 as a third. As soon as the 300-kilohertz signals are cut off as described for loom station 24, then the AND gate 182 is disabled and its output on line 186 assumes an off condition. Since line 186 in turn makes up one input to the AND gate 190, the disablement of gate 182 causes the output of gate 190, inverted by inverter 191, to turn off flip-flop 114. The turning off of flip-flop 114 in turn disables gate 110 which provided one of the inputs to AND gate 190, so that further signals on line 60 will not cause gate 190 to be enabled until the entire interrogation is completed. The disabling of AND gate 110 also disables gate 120 thus preventing the sending of further 300-kilohertz cycles down the line 44.

Moreover, the turning off of flip-flop 114 enables AND gate 194 which is connected to flip-flop 114 via an inverter 196. The other input to AND gate 194 is the output of flip-flop 104 which remains in an on condition until it is reset. The enabling of AND gate 194 then causes a 4-cycle delay between receipt of all the signals on line 60 and the time that logic circuit 62 operates to notify the computer 20 that information is ready to be conveyed into it. The enabling of AND gate 194 then on a flip-flop 196 allowing a 4-cycle counter 200, which together with the attendant logic elements comprises reply counter 59, to count the 300-kilohertz cycles. At the end of counting 4 cycles, the overflow circuit 202 operates thereby turning on the flip-flop 204.

The turning on of flip-flop 204 enables AND gate 206 and applies a signal to line 208 which is conveyed into the computer 20, informing the computer 20 that information is available to be given to it. The other two inputs to AND gate

206 are the output of flip-flop 96 and a signal from loom reply counter 184 indicating that a zero is not stored in the counter 184. When the computer 20 decides that it desires the information available, it passes an appropriate signal on line 212 to AND gate 214 which has as its other input the output of AND gate 206 which indicated to the computer 20 that information was available. The output of AND gate 214 is then applied to a conversion unit 218 into which the loom counter 184 now passes the stored information and which operates to make whatever serial parallel conversions are necessary depending on the nature of the computer 20. The output of the conversion unit 218 is then conveyed to the computer on line 220.

When the loom reply counter 184 has read all of its information into the computer 20, the zero indication line 230 assumes a positive condition, enabling the AND gate 232. The AND gate 232 has as its other inputs the outputs of flip-flops 204 and 96. The enabling of AND gate 232 then turns on flip-flop 234 sending an appropriate signal on line 236 to the computer informing it that all information available has been sent to the computer. The turning on of flip-flop 234 also causes a monostable multivibrator 236 to produce an appropriate pulse signal which is applied to interface line 238 to reset all of the flip-flops in the interface 22 as shown in FIG. 2, namely flip-flops 72, 77, 82, 90, 96, 104, 114, 196, 204 and 234. Flip-flops 82 and 114 are turned on by this resetting while the remainder of the flip-flops are turned off. The system is now prepared to repeat the entire cycle as soon as computer 20 provides the appropriate signals on lines 30 and 32.

Many changes and modifications can be made in the embodiments described herein without departing from the spirit of the invention. Accordingly, the scope of the invention is intended to be limited only by the scope of the appended claims.

I claim:

1. A textile machine operation sensing system for conveying data relating to the condition of a given textile machine from each of a plurality of textile machines, each having a numerical address, to recording means comprising:

an address line connecting each of said textile machines to each other textile machine and to said recording means for carrying any one of a plurality of coded address signals, each identifying one of said machines;

means for producing said address signals so that each said address signal is a sinusoidal electrical waveform having a number of cycles relating to the address of the machine chosen to respond;

means for applying said address signal to said address line to choose the machine to respond;

a return line connecting each of said textile machines to each other textile machine and to said recording means for carrying coded return signals;

means for producing said coded return signals so that each said return signal is a sinusoidal electrical waveform containing information relating to said condition of the said chosen machine; and

means for causing said return signals to be applied to said return line after said address signal is applied to said address line to choose the machine to respond.

2. A machine as in claim 1 including a textile station associated with each said machine and wherein said return signal is applied to said address line following said address signal and is conveyed to said return via the station associated with the machine identified by said address signal.

3. A system as in claim 2 including means for sensing a given machine condition associated with each station and producing a given signal having information about said condition and means for using said given signal associated with each said station so that the number of cycles of said return signal conveyed via said station associated with the machine identified by said address signal is a function of said condition.

4. A system as in claim 3 where said machines are looms and including said plurality of looms.

5. A system as in claim 4 including said recording means and wherein said recording means is a digital computer.

6. A system as in claim 5 wherein said return and address signals are at different frequencies.

7. A system as in claim 6 wherein each said station includes first filter means for passing said address signal and blocking said return signal, first counting means for counting the number of cycles of said address signal passed by said first filter means and producing a first signal only when the total number of said cycles at said address signals is equal to a number representing the address of said chosen loom second filter means for passing said return signal and blocking said address signal, logic means connected to said second filter means for further passing said return signal, after said first signal is produced, to said return line, and second counting means for counting the number of cycles passes by said logic means to said return line and preventing said logic means from passing further cycles of said return signal whenever the count of said return cycles is equal to a number related to the condition of said loom.

8. A system as in claim 7 including interface circuitry connected between said return and address lines and said computer, said interface circuitry including clock means for continually producing said return and address signals, means for receiving from said computer signals representing a loom chosen for interrogation, means for causing said clock to be connected to said address line after said computer signals are received for a given time so that a given number of cycles of said address signals identifying said chosen loom are applied to said address line, means for applying said clock to said address line after said given number of said cycles of said address signal has been applied so that said return signal is applied to said address line, means for causing a delay of a given time between when the last cycle of said given number of cycles of said address signals is applied and when the first cycle of said return signal is applied means for receiving said return signal on said return line and counting the number of cycles of said return signal, means for preventing said clock from applying further cycles of said return signal to said address line after said return signal has ceased to be received on said return line, means for applying the number of return cycles counted to said computer and means for causing a delay of a chosen time between when the last of said return signals is received and when said number of return of cycles is applied to said computer.

9. A system for interrogating any of a plurality of stations and for conveying information within said any station from said any station to recording means comprising:

an address line connecting each of said stations to each other of said stations and to said recording means for carrying coded address signals having a sinusoidal waveform and a number of cycles identifying the station chosen for interrogation;

means for producing said address signals and applying said address signal to said address line so as to be received by all of said stations,

a return line connecting each of said stations to each other of said stations and to said recording means for carrying coded return signals having a sinusoidal waveform and a number of cycles relating to said information being conveyed from said any station to said recording means;

means for producing said return signals and applying said return signal to said address line after said address signal so as to be received by all of said stations; and

logic means associated with each said station for coupling said return signal from said address line to said return line only when said logic means is associated with the station identified by the address signal preceding said return signal and for preventing further coupling of said address line to said return line when the number of cycles of said return signal coupled to said return line is equal to a given number conveying information relating to the state of said station.

10. A system as in claim 9 including a textile loom associated with each said station.

11. A system as in claim 10 wherein said recording means is a digital computer.

12. A method of conveying information from any of a number of textile machines to a recording means comprising the steps of:

applying an address signal having a sinusoidal waveform and a number of cycles identifying one of said number of textile machines to an address line connecting each of the textile machines with each other and with said recording means;

applying a return signal having a sinusoidal waveform to said address line following said address signal;

coupling said return signal to a return line through the textile machine identified by said address signal connecting each of said textile machines with each other and with said recording means so that said return signal moves on said return line to said recording means; and

preventing further coupling of said return signal to said return line after a certain number of cycles, said number containing said information, have been coupled to said return line.

13. A method as in claim 12 including the step of coding

said information as a number equal to the number of cycles of said return signal coupled to said return line.

14. A method as in claim 13 including the step of causing a delay of a given time between when the last cycle of said address signal is applied and when the first cycle of said return signal is applied.

15. A method of interrogating any of a number of textile machines comprising the steps of:

applying to a station associated with each of said machines a sinusoidal address signal having a number of cycles identifying the station which is to respond;

applying to each of said stations a sinusoidal return signal following said address signal;

allowing said return signal to be applied to a return line which connects all of said stations to each other through the station which is to respond; and

limiting the number of cycles of said return signal applied to said return line to a number equal to a number stored in said station representing coded information relating to the condition of the machine associated with said station.

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