United States Patent

[11] 3,576,559

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Continuation-in-part of application Ser. No. 707,723, Feb. 23, 1968, now abandoned.

[54] **CONTROL APPARATUS FOR LAUNDRY SYSTEM**
18 Claims, 12 Drawing Figs.

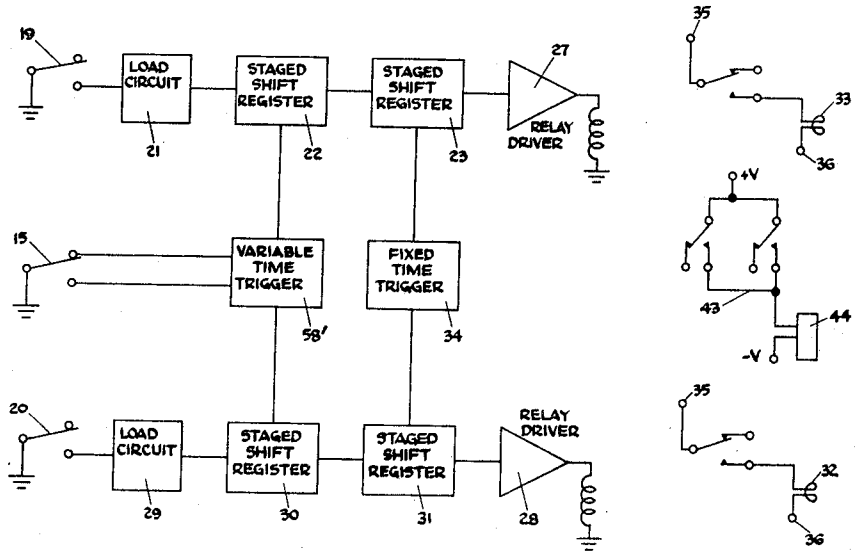
[52] **U.S. Cl.** **340/259,** 340/309.1, 235/92, 214/11
[51] **Int. Cl.** **G08b 21/00,** B65g 43/00
[50] **Field of Search** 340/259, 309.1; 235/92; 214/11

[56] **References Cited**
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3,141,540	7/1964	Burkhardt	214/11X
3,172,219	3/1965	Hajos	214/11X
3,508,242	4/1970	Kamberg et al.	340/309.1

Primary Examiner—John W. Caldwell
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ABSTRACT: A control apparatus for laundry equipment which is actuated at the beginning of the cycle to indicate a particular characteristic of the workpiece; the apparatus stores this information in a memory unit during the cycle and feeds it out in the form of a signal when the workpiece completes its cycle.



PATENTED APR 27 1971

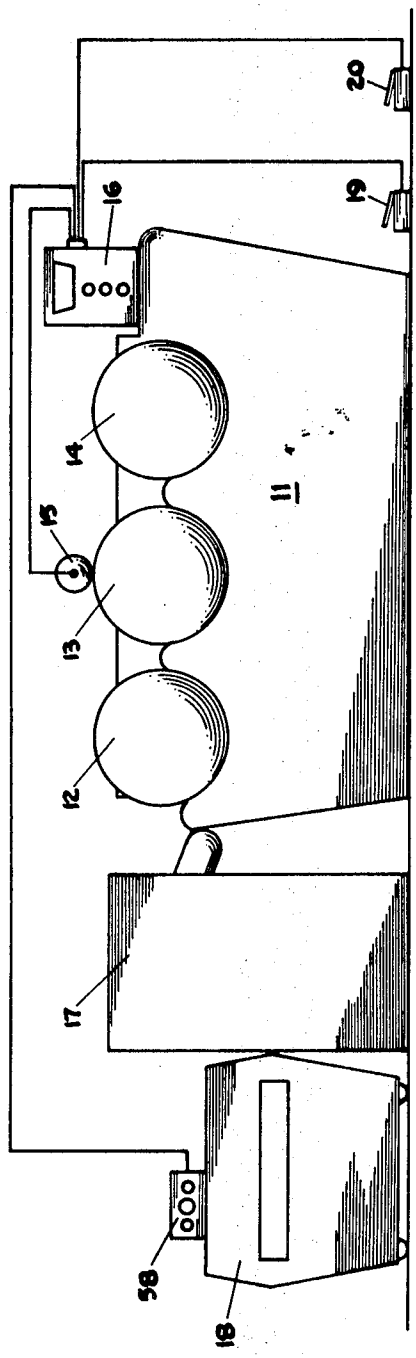


FIG. 1

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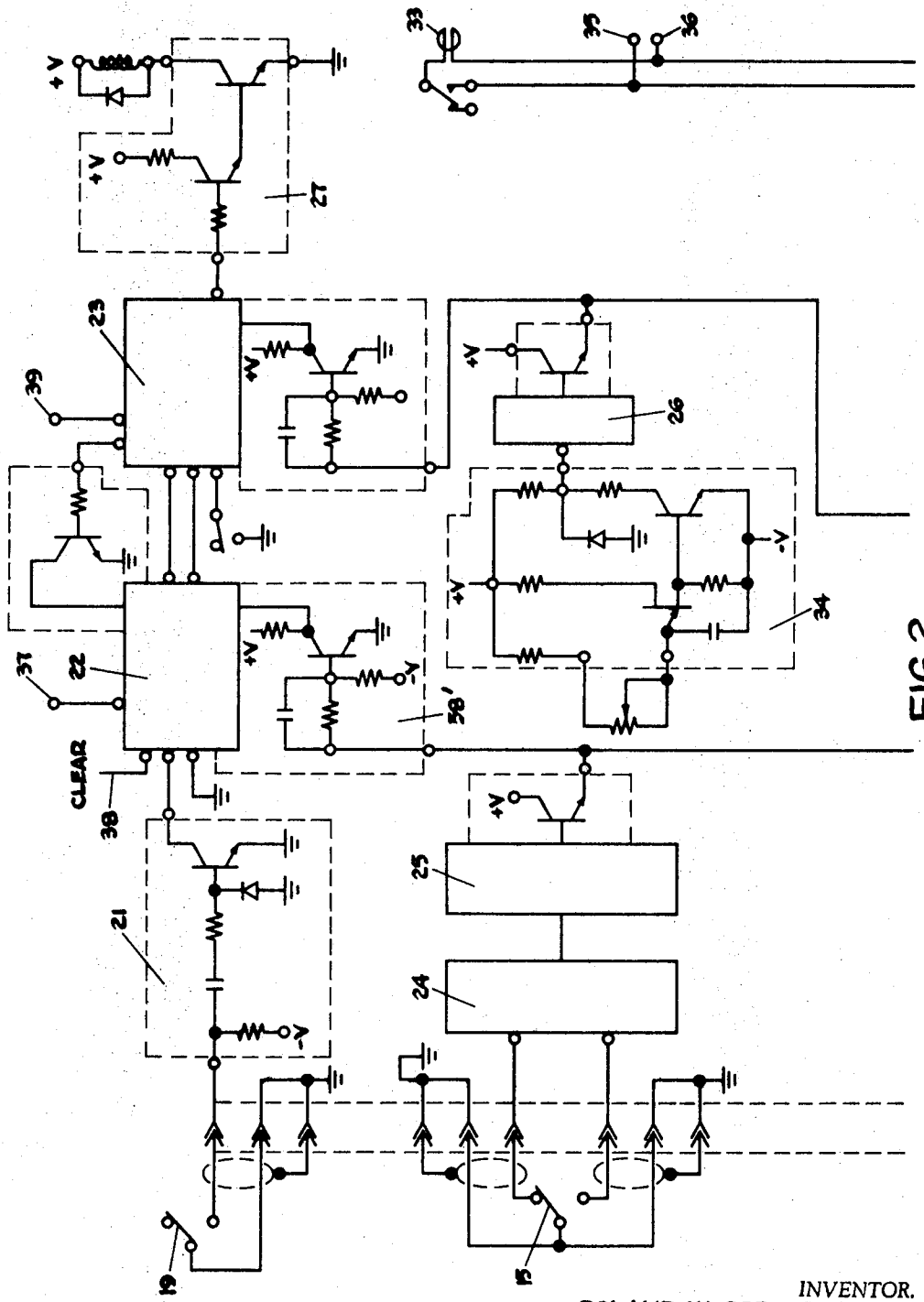


FIG. 2

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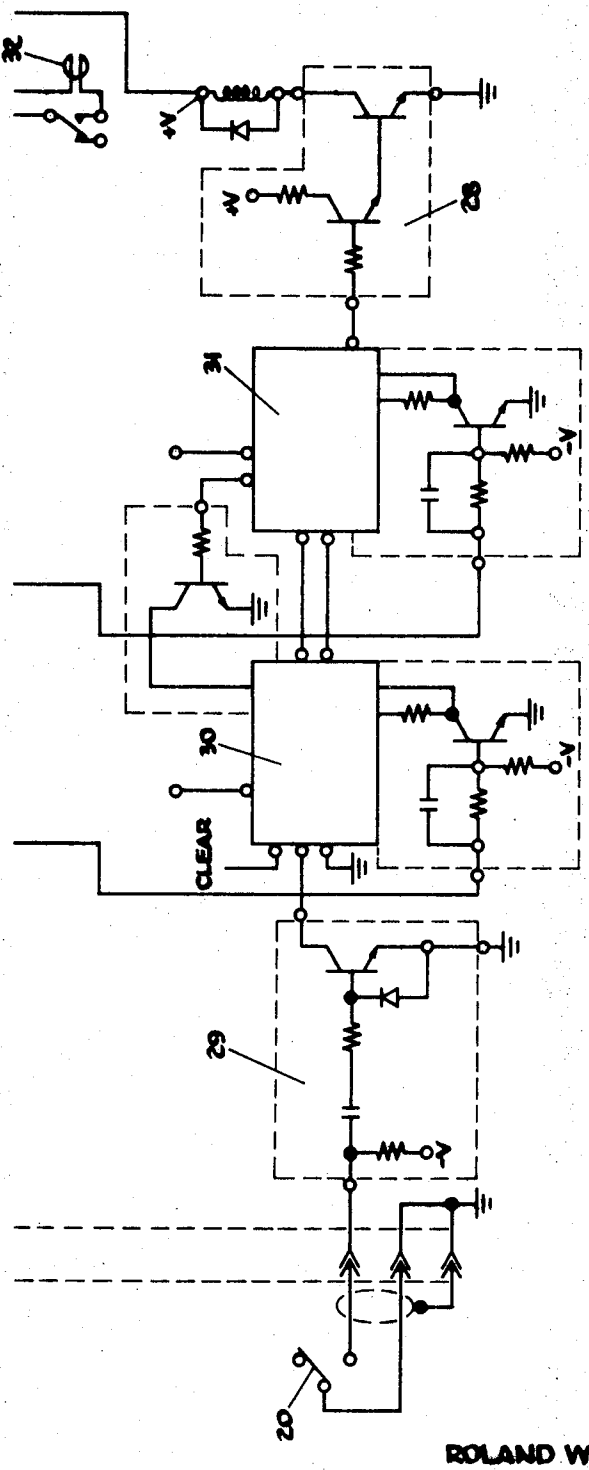


FIG. 3

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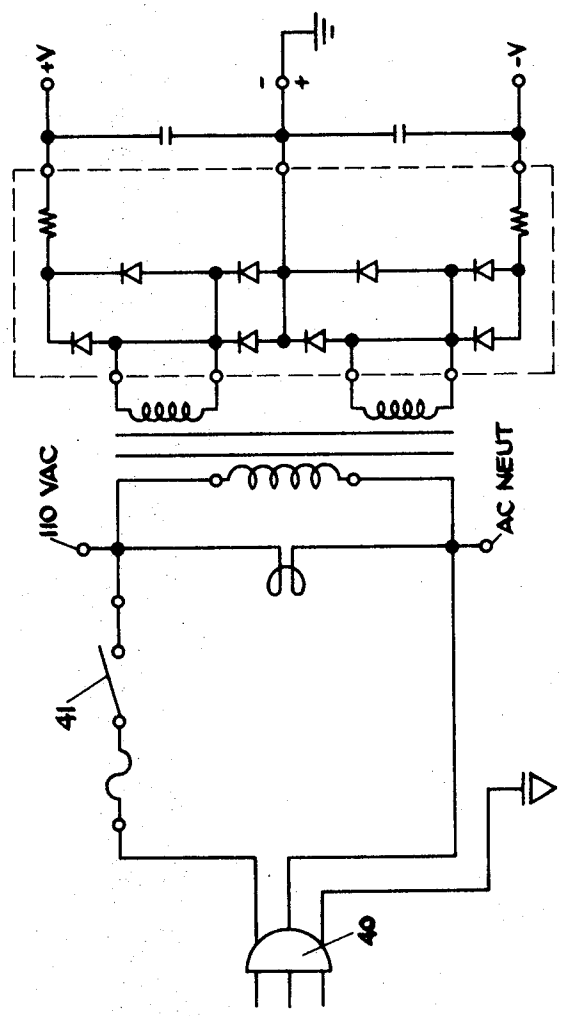


FIG.4

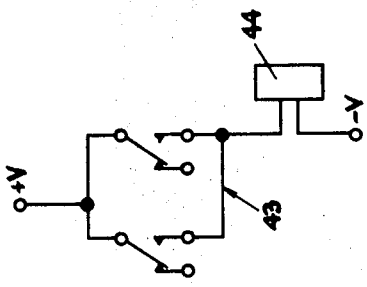


FIG.6

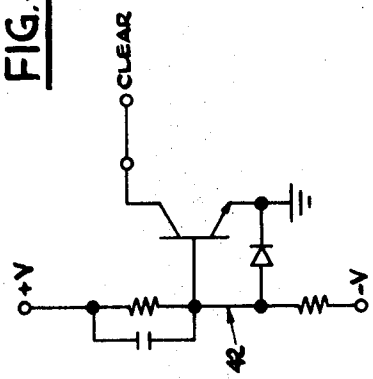


FIG.5

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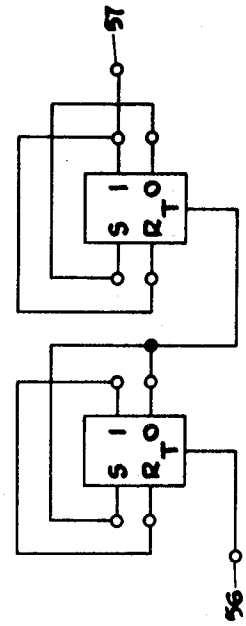


FIG. 9

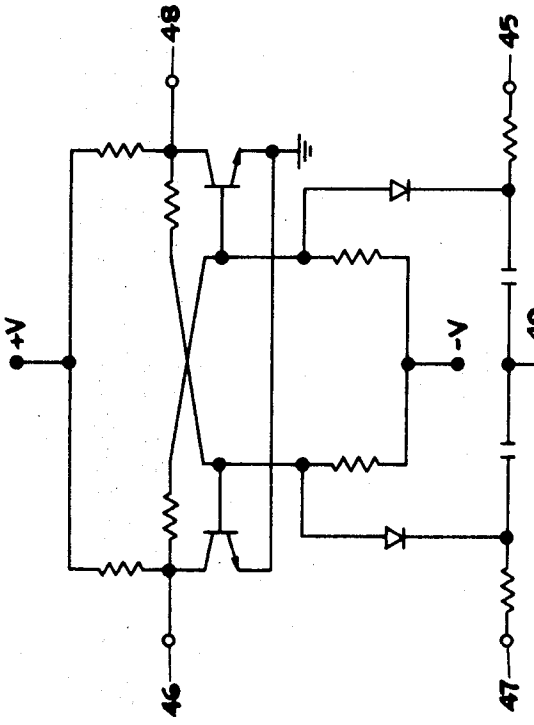


FIG. 7

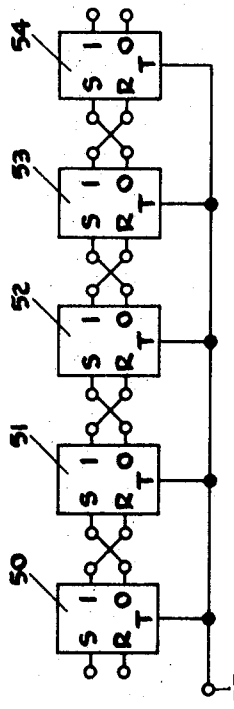


FIG. 8

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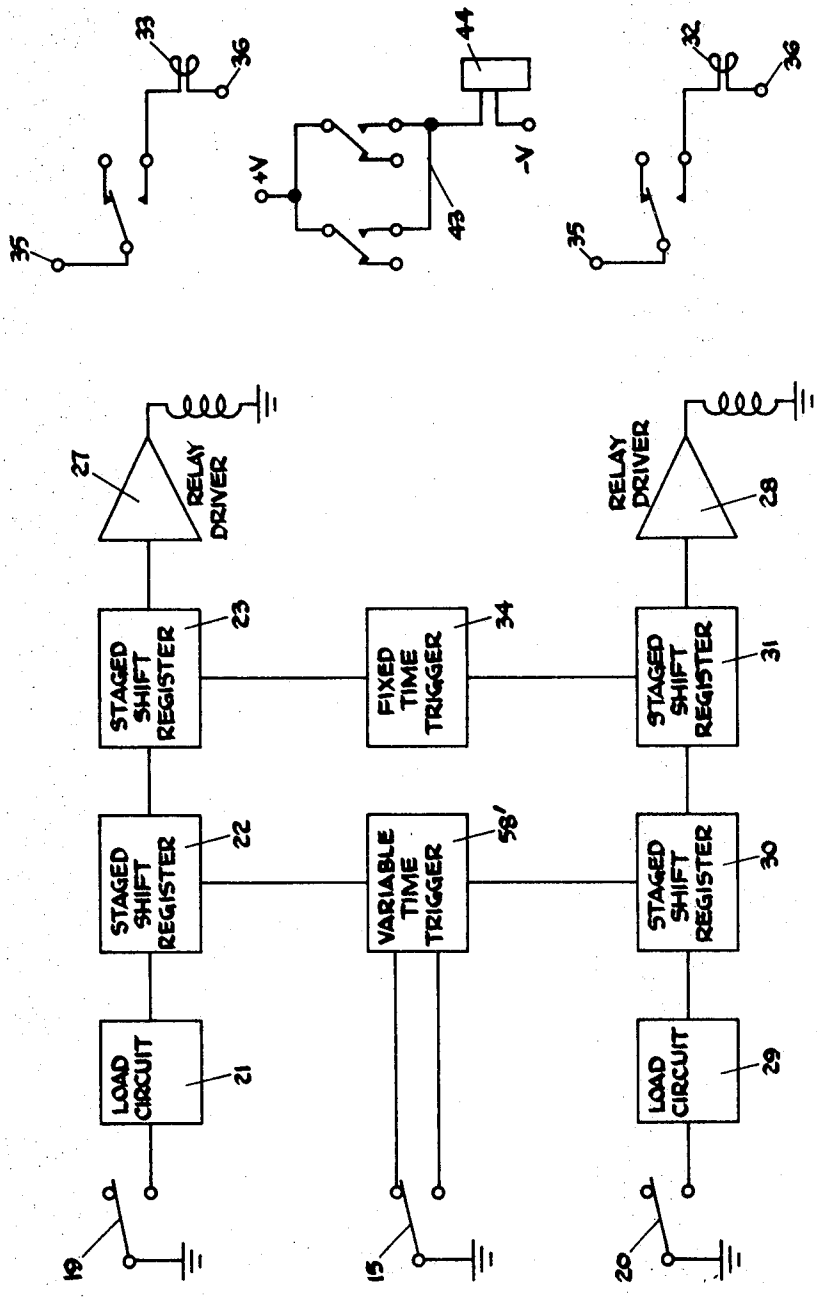


FIG. 10

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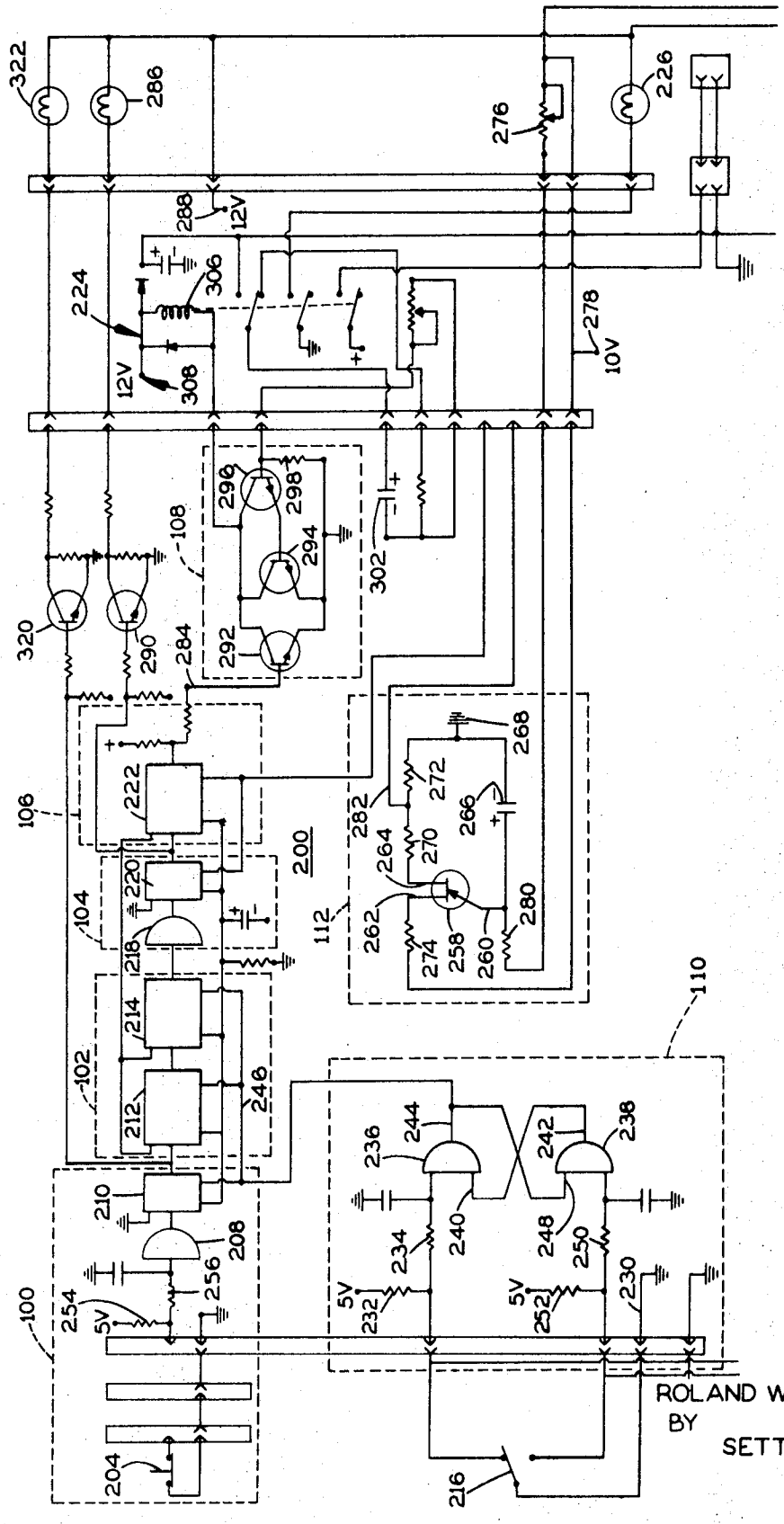


FIG. 11

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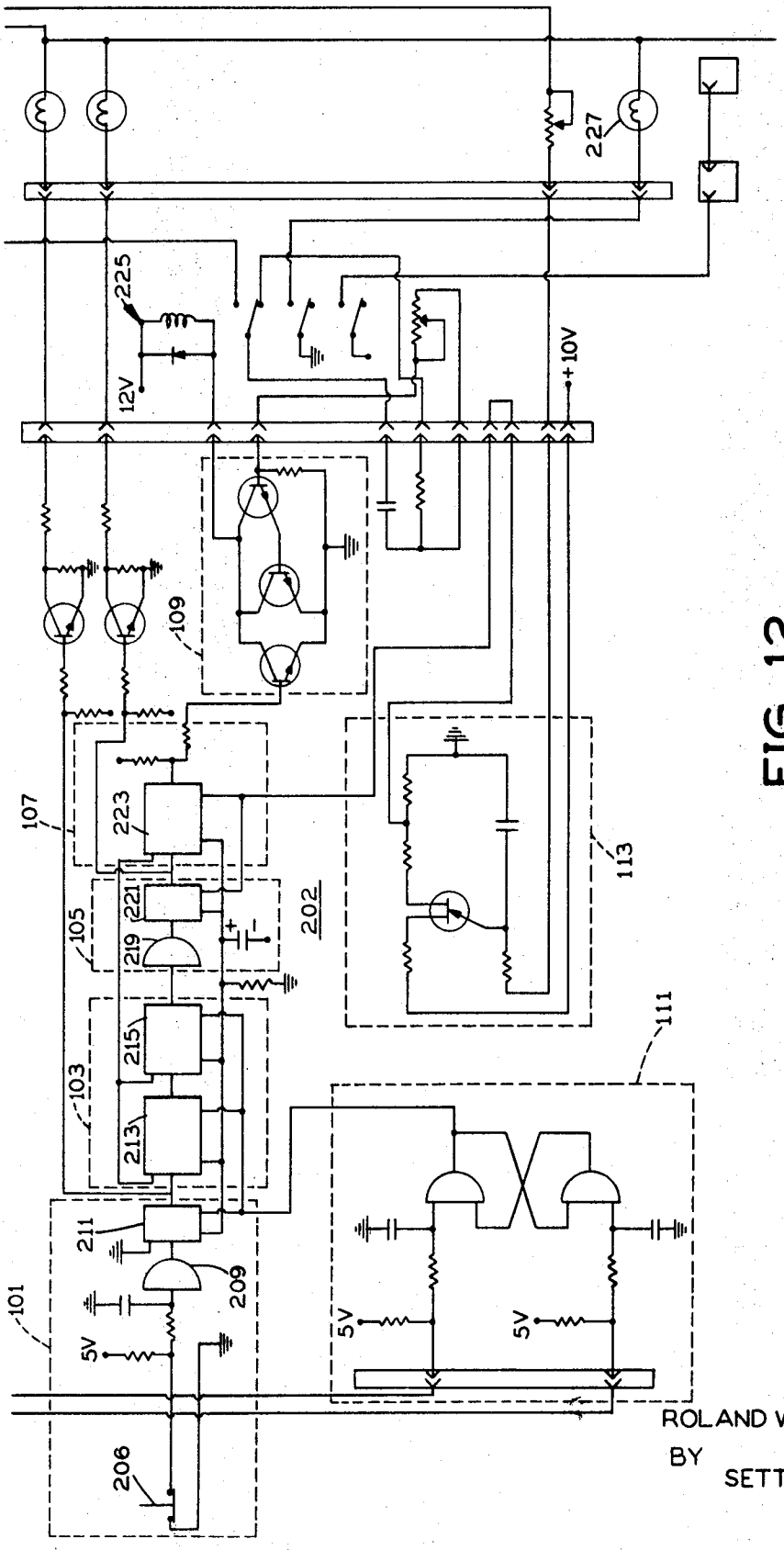


FIG. 12

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CONTROL APPARATUS FOR LAUNDRY SYSTEM

RELATED APPLICATION

This application is a continuation-in-part of copending application Ser. No. 707,723 filed Feb. 23, 1968, now abandoned by the present inventor.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates in general to laundry equipment and in more particularity to laundry ironing and folding equipment.

Although it is shown in the drawing and described in this disclosure as being used with a flatwork ironer and folder for sheets, tablecloths, and other large items, it may be used with any type of ironing and folding equipment desired.

In ironing and folding sheets in commercial laundries the torn sheets and stained sheets are always a problem. It is desirable that they be separated from the good sheets but the production and quality control is impossible to maintain without a control apparatus. Due to the size of the machines and the length of the path of travel during the cycle, a visible check on a particular sheet being processed is impossible. It would be a simple matter of having the operator keep an eye on the soiled workpiece and removing it if the operation were a short one-step matter. However, in flatwork machinery to which my invention is particularly suitably adapted, the workpiece travels through a plurality of roller elements in the ironing unit and then through a multistage folding apparatus so that it is impossible for an operator to keep a visual check on a particular item as it is being processed. Even if visual control were possible, it would tie up several operators for as one workpiece was being observed during its path of travel, all those following would have to be individually inspected and observed also.

2. Description of the Prior Art.

There have been control mechanisms for indicating flaws in work being processed in a flatwork ironer in which a memory unit consisting of a mechanical timer is preset to direct the work out of the normal flow path. Such a device is disclosed in Lash, et al., U.S. Pat. No. 2,971,660. There have also been laundry sorting mechanisms which automatically sort pieces of work as they are fed through the cycle according to a particular characteristic of the workpiece. Such devices are typically disclosed in patents to Myers 2,318,252, and to MacKechnie, Jr., U.S. Pat. No. 2,490,071.

U.S. Pat. No. 3,172,219 to Hajos discloses a control apparatus for laundry equipment in which a signal is fed into the control at the beginning of the processing cycle and stored in a time delay storage apparatus and produces an output signal as the defective piece is fed from the machine. My invention is an improvement on the type of control illustrated by the Hajos patent in several respects, but particularly in that the amount of time which the signal is stored in a first storage apparatus is controlled by the actual speed of the particular piece going through the flatwork ironer, whereas the amount of time which the signal is stored in a second storage apparatus is set and is adjustable without any connection to the laundry processing equipment.

SUMMARY OF THE INVENTION

It is the primary object of my invention to provide a control apparatus for classifying articles on the basis of a detected flaw in the article.

Another object of my invention is to provide a control apparatus into which a signal indicative of a detected flaw is fed and which stores the signal for the period of time during which the workpiece is being processed and which produces an output signal at the end of the cycle of the defective piece.

A still further object of my invention is to provide a control apparatus which may be attached to existing laundry equipment without significant change thereto, to thereby provide product and quality control not now available in the equipment. A control apparatus, according to my invention, may either be made as a part of the original equipment or may be attached at any time to existing equipment.

Another object of my invention is to provide a control apparatus in which the time in which a signal is stored in a storage device is substantially equal to the time it takes an article to pass through the laundry equipment, the storage time being controlled responsive to the speed of the article in one storage apparatus and being controlled independently of the laundry equipment in another storage apparatus.

Another object of my invention is to provide outputs from the storage device which facilitate setting up of the control apparatus.

Another object of my invention is to provide a control apparatus utilizing microminiature circuitry.

Further features, objects, and advantages will either be specifically pointed out or become apparent when, for a better understanding of the invention, reference is made to the following written description taken in conjunction with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an elevational view of a typical laundry installation with a control apparatus according to my invention;

FIG. **2** is a schematic diagram of a portion of a typical electrical circuit which may be employed in the control apparatus;

FIG. **3** is a schematic diagram of another portion of the circuit illustrated in FIG. **2**;

FIG. **4** is a schematic diagram of the electrical circuit of the power supply to the control unit;

FIG. **5** is a schematic diagram of the electrical circuit in the automatic reset portion of the control apparatus;

FIG. **6** is a schematic diagram of the electrical circuit in the audible alarm signal;

FIG. **7** is a schematic diagram of a typical flip-flop switch which makes up the stages in the staged shift register;

FIG. **8** is a schematic diagram of the circuit in the multistage shift register;

FIG. **9** is a schematic diagram of the circuit for a typical counting down signal in the shift register;

FIG. **10** is a block diagram of the entire electrical circuit;

FIGS. **11** and **12** together are a circuit diagram of another embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. **1** of the drawing, an ironer **11** is illustrated as being used in connection with a primary folder **17** and a cross-folder **18**. This is a typical arrangement in use today by commercial laundries.

Ironer **11** has a plurality of padded rollers **12**, **13** and **14** which serve to iron the items as they pass through the ironers.

Control unit **16** is mounted in any convenient location desired and is connected to foot control **19**, the torn object control, and also to foot control **20**, the stained object control. The two characteristics used in this disclosure are tears and stains, however it is to be understood that any other characteristics could be used as control-responsive information.

Also connected to control unit **16** is speed sensor **15** and signal box **58**. The signal box **58** may contain either a visual or an audible signal or both dependent upon the particular needs of the installation.

Referring now to FIGS. **2** and **3**, which when joined together form a complete schematic diagram of the circuitry, the torn sheet switch is shown at **19**, the stained sheet switch is shown at **20** and the roller speed sensor is shown at **15**. When the machine is turned on, the sensor wheel is activated and a pulse is transmitted through flip-flop switches **24** and **25** and into the first stage of shift register **22**. Each of the shift registers is illustrated as being comprised of five stages, however, the number of stages depends upon the accuracy needed. The greater the number of stages the more accurate the control becomes as the speed sensor is sending signals through at shorter intervals as the workpiece travels through the ironer.

When torn sheet switch 19 is activated, it feeds a pulse into the first stage of shift register 22. When this pulse combines with the continuous pulse from sensor 15 it moves the signal over to the second stage of shift register 22 and the first stage returns to its original state of receiving the speed sensor pulse and waiting to receive a pulse from the torn sheet switch 19. The same is true of staged shift register 30, if it is a stained sheet situation.

When the last stage of shift register 22 is activated by the speed sensor 15, it will mean that the sheet is through the ironer portion and is entering the folder 17. Whereas the signal from sensor 15 varied in time according to the travel of the sheet through the ironer, the signal tracing the path through the folder is a fixed time signal.

Trigger 34 feeds a constant fixed time pulse, through flip-flop switch 26, to each of shift registers 23 and 31 and as a pulse is received from either shift register 22 or 30 it activates the various stages in the second set of shift registers.

When all five stages of shift register 23 have been traversed, the signal will turn on relay driver 27 which will light lamp 33 and activate audible alarm 44. Any combination of lamps and alarms may be used and the block diagram illustrated in FIG. 10 shows a lamp 33 for indication of a torn sheet from switch 19, a lamp 32 for indication of a stained sheet from switch 20 and an audible signal 44 which may be activated by either switch 19 or switch 20.

The signal circuit is powered by an alternating current connection 35 and a neutral connection 36.

Each of shift registers 22, 23, 24 and 25 may be supplied with an automatic reset circuit 42 as illustrated in FIG. 5.

FIG. 4 illustrates a typical power supply circuit with plug 40 being utilized to connect the unit to a source of alternating current. Switch 41 is utilized to turn the control unit on or off.

FIG. 7 illustrates the circuitry for one of the flip-flop circuits which are used as buffers 24, 25 and 26 and also in the shift registers 22, 23, 30 and 31. In this FIG., 45 indicates the set input and 46 the set output whereas 47 is the reset input and 48 the reset output. The trigger is designated as 49.

FIG. 8 illustrates how the various stages of the staged shift register are connected. Each of stages 50, 51, 52, 53 and 54 is comprised of a circuit such as that illustrated in FIG. 7.

FIG. 9 illustrates the specific circuitry between two stages of the register with 56 indicating the input and 57 indicating the output.

SUMMARY OF OPERATION FIGS. 1—9

To operate the control apparatus the operator will activate either of the foot switches 19 or 20 when a workpiece is started through ironer 11. For illustrative purposes, we will use foot switch 19 indicating that the item is torn. Variable time trigger 58' is constantly feeding a signal to staged shift register 22 and when it combines with the signal from switch 19 the signal progresses across shift register 22 according to the speed with which the item is passing through the ironer. As the last stage of shift register 22 is activated, the sheet will pass to the folder 17 and the signal from fixed time trigger 34 will combine with the signal from the torn sheet switch 19 to activate stage one of shift register 23. The sheet will emerge from the folding operation at the same time that the signal reaches the last stage of shift register 23; at this point the relay driver 27 is turned on and lamp 33 will light and alarm 44 will sound. This indicates to the operator at the end of the folding operation that the article just finished should be removed and placed in the torn sheet pile.

If desired, relay drivers 27 and 28 may be connected to a kick-out device which will automatically remove the torn or stained article when it reaches the end of the operation.

FIGS. 11 and 12 together illustrate a circuit diagram for another circuit embodiment of the invention. In this embodiment, there are two channels 200 and 202 which are substantially identical to each other. One of these channels might be used to provide an output indicating a torn article, and the other channel might be used to provide an output indicating a stained article. Alternatively, the channels may be used in connection with an ironer and a folder into which articles are fed side by side and pass through the machine side by side so that the ironer really has two channels and the control circuit is used to provide one output for defective articles in one ironer channel and another output for defective articles in the other ironer channel.

Switch 204 is actuated by an operator when a defective article enters the ironer. It will be assumed that this switch is actuated only when a torn sheet passes into the ironer. Switch 206 is actuated when a stained sheet passes into the ironer. However, it should be understood that the switches 204 and 206 may be used to indicate other conditions, for example in connection with dual channel operation of the ironer and folder as described above. Switches 204 and 206 are connected to amplifiers 208 and 209 which in turn are connected to flip flops 210 and 211. The switches, amplifiers and flip-flops make up the load circuits 100 and 101.

Flip-flops 210 and 211 are connected respectively to shift registers 102 and 103 each of which contains two stages. The stages of shift register 102 are 212 and 214, and the stages of shift register 103 are 213 and 215. In the illustrated embodiment, each stage is in itself an eight bit shift register, and with two stages such as 212 and 214 in series, there is a shift capacity of 16 bits. The number of bits in the shift registers 102 and 103 is substantially the same as the number of pulses delivered by the ironer clock switch 216 as one sheet travels through the ironer. Thus, the number of bits in the shift registers corresponds to the length of the ironer and may be varied. The proper relationship may be established by using a sped sensor such as a roller 15 driven by the sheet or other article as it passes through the ironer, the roller having a cam on it which reciprocates the switch 216 once for each revolution of the roller. The circuitry associated with switch 216 produces one clock pulse for each revolution of the roller.

Shifting stages 214 and 215 are connected respectively to amplifiers 218 and 219 which in turn are connected to flip-flops 220 and 221. Amplifier 218 and flip flop 220 make up a load circuit 104 and amplifier 219 and flip-flop 221 make up a load circuit 105 for loading information into the second shift registers 106 and 107. These latter shift registers each contain a single stage 222 and 223 having an eight bit capacity.

The outputs from the shift registers 222 and 223 are supplied to the relay driver and time delay circuits 108 and 109. The latter circuits are connected to relays 224 and 225 which in turn are connected to output lights 226 and 227. It is to be noted that an output from the two channels could be used for other purposes than lighting a lamp such as the lamps 226. For example, it could be used to provide automatic control of a folding machine to cause the folding machine to separate defective articles from good articles and deliver them to a particular output for defective articles. However, the output will be described in connection with the illustrated embodiment which is an output for lighting the lamps 226.

The switch 216 is connected in parallel to two variable time trigger circuits 110 and 111, one being provided for each channel. These variable time trigger circuits supply clock pulses to the first shift registers 102 and 103 for shifting the stages thereof. Two fixed time trigger circuits 112 and 113 are provided to supply clock pulses to the second shift registers 106 and 107 for shifting the stages 222 and 223.

The operation and further details of the construction of the circuitry of FIGS. 11 and 12 will be described with reference only to channel 200, it being understood that channel 202 operates in an identical manner. The variable time trigger circuit 110 is pulsed once for each revolution of the ironer roller or sensor 15 so as to actuate the switch 216 once for each revolution of the ironer sensor. It will be assumed that the ironer clock switch 216 is initially in the up position as shown. Switch 216 is connected to ground at 230. Thus, with switch 216 up as shown, a resistor 232 which receives 5 volts at its upper end is grounded at its lower end. This supplies ground voltage to the input resistor 234 of an NAND gate 236 which

is cross-coupled with a NAND gate 238. When either gate 236 or 238 receives two high inputs (logical 1's) a low output (logical 0) is produced (nand function). When either input is low (0) a high output (1) is produced (nor function). Thus, the gates are inverting gates. Gate 236 has another input 240 which is connected to the output 242 of gate 238. The output 244 of gate 236 is connected via line 246 to the clock inputs of the shifting stages 212 and 214. The gate 238 has an input 248 connected to the output 244 of gate 236, and the gate 232 also has another input 250 in the form of a resistor which is connected via resistor 252 to the terminal at five volts as shown. Resistor 252 is connected back to the ironer switch 216. With switch 216 in the up position, the lower end of resistor 252 is not grounded, and therefore a positive voltage which may be considered as a logical 1 is applied to the input resistor 250.

Input 234 is a logical 0, and therefore the output 244 is a logical 1 in the starting condition. It follows that input 248 is also a logical 1 and output 242 and input 240 are both logical 0's.

When switch 216 is opened so that neither resistor 232 nor resistor 252 is grounded, inputs 234 and 250 are both logical 1's. The output 242 remains a logical 0. When switch 216 reaches the down position ground is supplied to the junction between resistors 252 and 250, so input 250 becomes a 0. The output 242 shifts to a logical 1 making both inputs 234 and 240 at 1. Output 244 shifts to 0 which produces the leading edge of a clocking pulse for the shift register stages 212 and 214. This condition produces the flat top of a clocking pulse for the shifting stages 212 and 214. The switch 216 is reciprocated by the ironer clock cam, so almost immediately returns to the open condition in which inputs 234 and 250 are both logical 1's. The output 242 remains a logical 1, so both inputs 234 and 240 for the gate 246 are logical 1's and the output 244 remains a logical 0. The latter output changes back to a logical 1 only when switch 216 again reaches the up position. When this happens, input 234 reverts to a logical 0, and input 250 remains a logical 1. Output 244 shifts to logical 0 and output 242 also shifts to logical 0. This produces the trailing edge of a clocking pulse for the shifting stages 212 and 214, and this trailing edge causes any information stored in the shift register stages 212 and 214 to be shifted.

Information is loaded into the shift register storage 212 through the load circuit 100 when the switch 204 is depressed. This grounds the junction between the resistors 254 and 256 to provide an input to an inverting amplifier 208 which sets a flip-flop 210 to momentarily store the input information. Then when the first clock pulse is supplied from the variable time trigger circuit 110 in the manner described above, the input bit is shifted from the flip-flop circuit 210 to the shift register stage 212. Each successive clock pulse will then shift this bit one step so that after sixteen steps the bit will have shifted through both stages 212 and 214 producing an output which is fed to an inverting amplifier 218 to the loading flip flop 220 for the second shift register 106.

It may be noted that the rate of the clock pulses from the variable time trigger circuit 110 is directly related to the speed at which an article travels through the ironer. The number of bits in shift register 102 is a direct function of the length of the ironer so the shift register 102 has sufficient capacity to allow an article to pass through the ironer in the time it takes to shift a data signal through the shift register. Thus, an output will be supplied to the flip-flop 220 whenever the article reaches the end of the ironer, regardless of the speed at which the article travels.

Clock pulses are fed to the second shift register 106 from the fixed time trigger circuit 112. In the illustrated embodiment, this fixed time trigger circuit includes a unijunction transistor 258 having an emitter 260 and two bases 262 and 264. Emitter 260 is connected through a capacitor 266 to ground at 268, and base 264 is connected through resistors 270 and 272 to ground. Base 262 is connected through a resistor 274 to a terminal 278 which is at 10 volts. The emitter 260 is also connected through a resistor 280 and a variable resistor 276 to the terminal 278 which is at 10 volts.

It will be assumed that the capacitor 266 is initially discharged. Current flows from terminal 278 through resistor 276 and 280 and capacitor 266 to charge up capacitor 266. As the charge builds up on capacitor 266, it reaches the offset voltage of the transistor 258, and this renders the transistor conductive so that capacitor 266 quickly discharges through emitter 260 and resistors 270 and 272 to ground at 268. This produces a voltage pulse on line 282 which is connected to the clock input of shifting stage 222 and also to the clock input of flip-flop 220. The information bit which was previously stored in flip-flop 220 is shifted by this clock pulse into the shifting stage 222. The trigger circuit keeps repeating the operation described above to produce clock pulses on line 282 at a fixed rate. Thus, clock pulses are continuously supplied to shifting stage 222. This shifts the information bit through stage 222 to produce an output on line 284. The number of clock pulses required to shift a bit completely through shifting stage 222 is adjusted to be exactly the same as the time required for a sheet to pass through the folder of the laundry equipment. The rate of the fixed time trigger can be adjusted by adjusting the variable resistor 276.

The adjustment of resistor 276 is carried out with the air of an output lamp 286. This lamp 286 is connected to 12 volts at terminal 288 and is also connected through an amplifier 290 to the flip-flop 220. When a bit arrives at the flip-flop 220, an output passes through amplifier 290 causing lamp 286 to light up. The information bit is then shifted through shifting stage 222 producing an output on line 284. This output causes the lamp 226 to be lit in a manner which will be described further. It may be seen that the time difference between the lighting of lamp 286 and the lighting of lamp 226 represents the time it took for the bit to be shifted through the shifting stage 222. This time should be the same as the time required for a sheet to pass through a folder. The latter time is a fixed and known quantity so all that is necessary to adjust the fixed time trigger circuit is to time the difference between the instant when light 286 comes on and the instant when light 226 comes on and adjust resistor 276 until the time interval is the same as the time required for a sheet to pass through the folder.

The relay and time delay circuit operates in the following manner. An output on line 284 turns on a transistor 292 which is connected in parallel with another transistor 294. The emitters of these transistors are grounded, and the collectors are connected together to the collector of still another transistor 296.

The base of transistor 296 is connected through resistor 298 to ground and also is connected through a resistor 300 and a capacitor 302 to a movable contact 304 of the relay 224. Coil 306 is connected to terminals 308 which receive plus 12 volts.

When the transistor 292 is turned on by the output appearing on line 284, its collector goes negative. This causes current to flow through relay coil 306 and transistor 393, thus pulling in movable contacts 304, 310 and 312. When movable contacts 310 pulls in, it applies ground to lamp 226, so current flows from terminal 288 through lamp 226 to ground causing lamp 226 to light. However, the pulse on line 284 is only momentary. When transistor 292 turns on, the collector of transistor 296 goes negative causing this transistor to draw base current. The base current flows from terminal 308 through fixed contact 304, capacitor 302, resistor 300, to the base of transistor 296. While capacitor 302 is charging, transistor 296 is turned on and this turns on transistor 294 to hold the relay in an actuated condition. As capacitor 302 charges up, it tends to make the collector voltage for transistors 294 and 296 go positive and eventually this turns off transistors 294 and 296 after a predetermined time delay determined by the charging constants of capacitor 302.

It may be noted that another output is derived from the first channel. This output is taken form flip-flop 210 and applied to an amplifier 320 to light a lamp 322. This output gives an indication that the load circuit at the beginning of the channel has received a bit of information.

The shift registers 102, 103, 106 and 107 may be like those illustrated in FIG. 8 with additional bits added. It is preferred

to use shift registers in the form of integrated circuits, and these are available commercially. The flip-flop, amplifiers and gates described above are also available in the from of integrated circuits.

While illustrative embodiments of the invention have been shown and described, it will be understood that modifications may be made within the scope of the invention.

I claim:

1. Control apparatus for a laundry processing system including a variable speed portion followed by a fixed speed portion, said control apparatus comprising:

a. means for generating a data signal upon detection of a defective article being processed by said system,

b. a sensing device for continuously generating a variable rate clock signal which is a direct function of the speed of the variable speed portion of the processing system,

c. a first shift register,

d. means to combine the data signal and the variable rate clock signal in said first shift register to shift said data signal through said shift register and produce a first output,

e. first output means responsive to said first output,

f. means for generating a fixed rate clock signal,

g. a second shift register,

h. means to combine the first output of said first shift register with said fixed rate clock signal in said second shift register to shift said first output through said second shift register and produce a second output, and

i. second output means responsive to said second output.

2. The control apparatus as claimed in claim 1 in which said first output means includes a first indicator and said second output means includes a second indicator.

3. The control apparatus as claimed in claim 2 in which said means for generating the fixed rate clock signal is adjustable to set the rate of the fixed rate clock signal.

4. The control apparatus as claimed in claim 3 in which the time between actuation of said first and second indicator means is set by said adjustment to substantially equal the time required for an article to pass through the fixed speed p9rtion of the system.

5. The control apparatus as claimed in claim 1 in which said first and second shift registers are integrated circuits.

6. The control apparatus as claimed in claim 1 in which said first shift register has sufficient capacity to allow the data signal to be shifted through the same in substantially the time taken for an article to pass through the variable speed portion of the processing system.

7. The control apparatus as claimed in claim 6 in which said second shift register has sufficient capacity to allow said first output to be shifted through the same in substantially the time taken for an article to pass through the fixed speed portion of the processing system.

8. Control apparatus for a laundry processing system including a variable speed portion followed by a fixed speed portion, said control apparatus comprising, data input means supplying signals representing defective articles being processed by said system, means for generating a variable rate clock signal which is a direct function of the speed of the variable speed portion of the processing system, first shift register means, means to supply the input signals and the clock signals to said first shift register means to shift said input signals serially through said first shift register means and produce a first output, first utilization means responsive to said first output, means for generating a fixed rate clock signal, second shift register means, means to supply the output from said first shift register means and said fixed rate clock signal to said second shift register means to shift the first output through said second shift register means and produce a second output, and second utilization means responsive to said second output.

9. The control apparatus as claimed in claim 8 in which each of said shift register means has sufficient capacity to shift a signal through the same in the time taken for an article to pass through a respective portion of the processing system.

10. The control apparatus as claimed in claim 9 in which said fixed rate clock generating means is adjustable to set the time between actuation of said first and second utilization means substantially equal to the time taken for an article to pass through said fixed speed portion of the system

11. The control apparatus as claimed in claim 8 including an additional utilization means deriving an output from said input signals.

12. Control apparatus for a laundry processing system including a variable speed portion followed by a fixed speed portion, said control apparatus comprising:

a. means for generating a data signal upon detection of a defective article being processed by said system,

b. a sensing device for continuously generating a variable rate clock signal which is a direct function of the speed of the variable speed portion of the processing system,

c. a first shift register in the form of integrated circuit means,

d. means to combine the data signal and the variable rate clock signal in said first shift register to shift said data signal through said shift register and produce a first output,

e. means for generating a fixed rate clock signal,

f. a second shift register in the form of integrated circuit means,

g. means to combine the first output of said first shift register with said fixed rate clock signal in said second shift register to shift said first output through said second shift register and produce a second output, and

h. output means responsive to said second output.

13. Control apparatus for a laundry processing system including a variable speed ironer portion followed by a fixed speed folder portion, said control apparatus comprising:

a. means for generating a data signal upon detection of a defective article being processed by said system,

b. means responsive to the speed of the variable speed portion of the laundry processing system to generate a variable pulse rate shifting signal having a pulse rate which is a direct function of the speed of said variable speed portion,

c. a first shift register having an input means for serially receiving said data signal and a plurality of bistable simiconductor shifting stages having input means for receiving the shifting signal,

d. means to feed the data signal and the shifting signal to said respective input means to shift a pulse of said data signal serially through said first shift register and produce a first output, with said first shift register having sufficient stages to produce said first output at approximately the time a defective article leaves the variable speed portion of the system,

e. clock pulse generator means independent from and unresponsive to said laundry processing system for generating a constant pulse rate shifting signal,

f. a second shift register having an input means for serially receiving said output of said first shift register and a plurality of bistable semiconductor stages having input means for receiving said constant rate shifting signal,

g. means to feed said first output and said constant rate shifting signal respectively to said input means of said second shift register to shift a pulse of said first output serially through said second shift register and produce a second output, with said second shift register having sufficient stages and the rate of said constant rate shifting signal being such as to produce said second output at approximately the time a defective article leaves the fixed speed portion of the system, and

h. output means responsive to said second output.

14. The control apparatus as claimed in claim 13 in which said output means has an indicator.

15. The control apparatus as claimed in claim 13 in which said stages of said shift register each comprise a flip-flop circuit means.

16. Control apparatus for a laundry processing system including a variable speed ironer followed by a fixed speed folder, said control apparatus comprising:

a. means for generating a data signal upon detection of a defective article being processed by said system,

b. means responsive to the speed of the ironer of the system to generate a variable pulse rate shifting signal having a pulse rate which is a direct function of the speed of said ironer,

c. a first shift register having a plurality of serially connected bistable semiconductor shifting stages, said shift register having an input means for receiving said data signal and each of said shifting stages having an input means for receiving the shifting signal, the number of bistable stages in said first shift register being selected relative to said shifting signal to shift a data pulse serially through said first shift register and produce a first output at approximately the time a defective article leaves the ironer,

d. means to feed the data signal and the shifting signal to said respective input means,

e. adjustable clock pulse generator means independent of and unresponsive to the laundry processing system for generating a constant pulse rate shifting signal,

f. a second shift register having a plurality of serially connected bistable semiconductor stages, said second shift register having an input means for receiving said first output and each of said bistable stages having an input means for receiving said constant rate shifting signal, the rate of the pulses in said constant rate shifting signal and the number of stages in said second shift register being selected to shift a first output pulse serially through said second shift register and produce a second output at approximately the time a defective article leaves the folder of the system, said clock generator means including means setting the same at said selected pulse rate,

g. means to feed said first output and said constant rate shifting signal respectively to said input means of said second shift register, and

h. output means responsive to said second output.

17. The control apparatus as claimed in claim 16 in which said output means has an indicator.

18. The control apparatus as claimed in claim 16 in which said bistable stages of said first and second shift registers each comprise a flip-flop circuit means.