United States Patent

[11] 3,626,380

[72] Inventor **Gene E. Griffin**
Silver Springs, Md.

[21] Appl. No. **813,121**
[22] Filed **Apr. 3, 1969**
[45] Patented **Dec. 7, 1971**

[73] Assignee **Systems Interface, Inc.**
Washington, D.C.

[54] **SYSTEM FOR TIME RECORDATION**
10 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** ..... **340/172.5,** 346/82, 340/173 R, 235/61.9
[51] **Int. Cl.** **G01d 9/32,** G06k 1/02, G06k 1/12
[50] **Field of Search** 340/173, 172.5; 346/20, 53, 59, 83, 82; 235/61.9

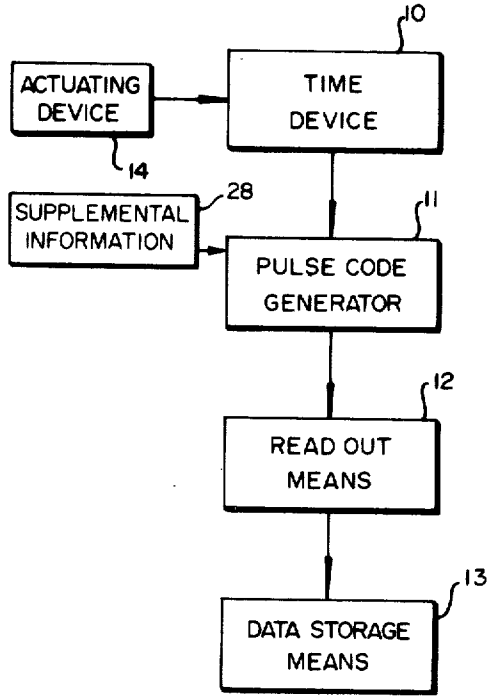
[56] **References Cited**

UNITED STATES PATENTS

3,341,852	9/1967	Kramer et al.	346/53 X

Primary Examiner—Stanley M. Urynowicz, Jr.
Attorney—Markva, Smith & Kruger

ABSTRACT: This disclosure provides a system for the recordation of time on a data storage means including a continuous record medium. The continuous record medium contemplates the use of punched paper tape, magnetic tape, or any other type of continuous record medium for effecting the entry of time and other information to provide a cost analysis for any type of business operation. The system of this invention includes a timekeeping mechanism interfaced with a pulse code generator and a collection information bank which includes the continuous record medium. The pulse code generator translates the time as produced by the timekeeping mechanism to a pulse train upon the energizing of actuating means included in the system. Additional apparatus is provided to prevent entries of two identical bits of information to be sensitively marked on a record card.



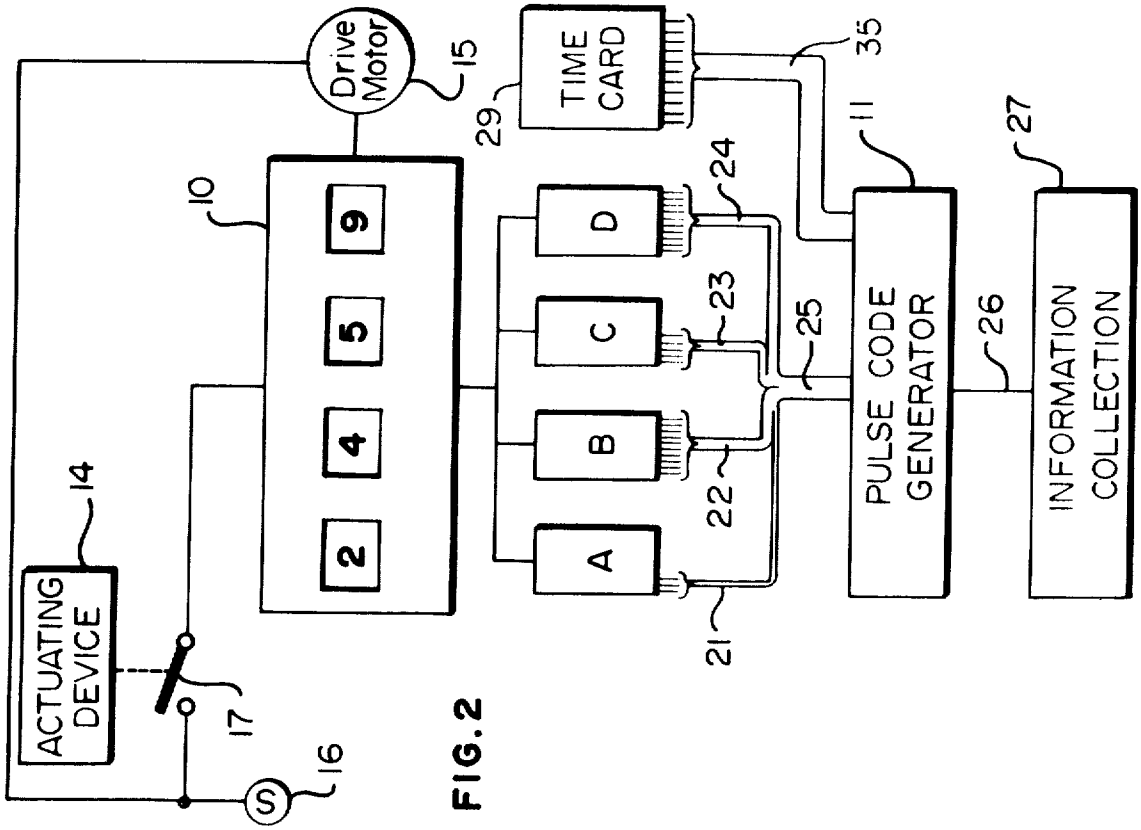


FIG. 2

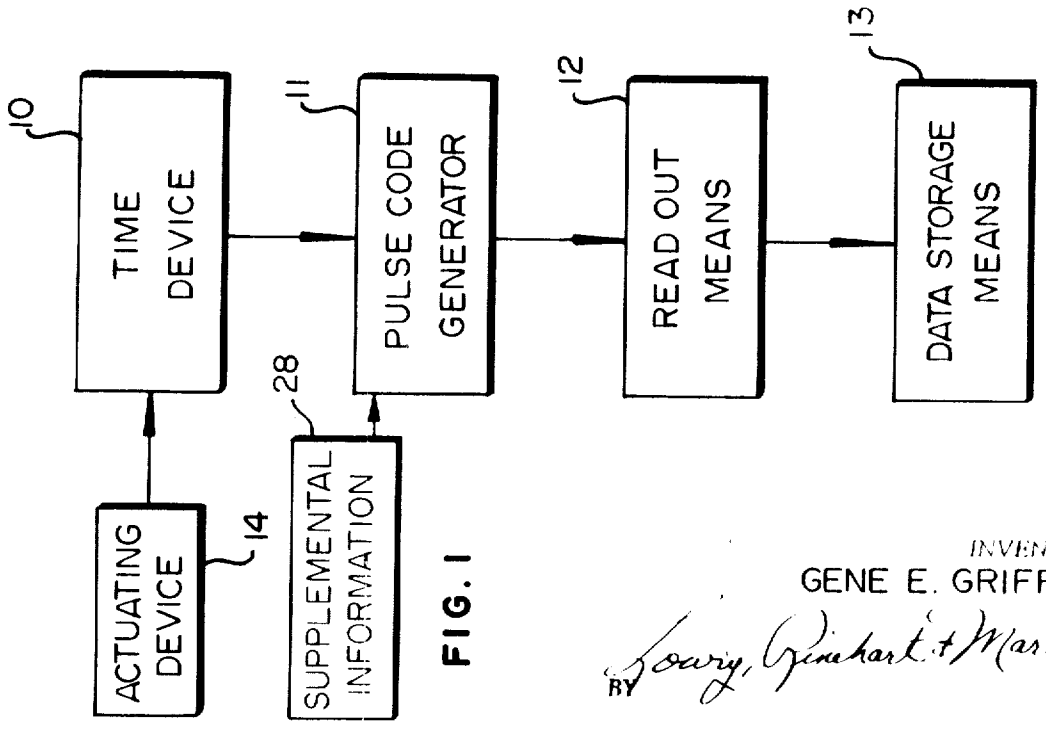


FIG. 1

INVENTOR
GENE E. GRIFFIN

BY Lowry, Gerhart & Markim

ATTORNEYS

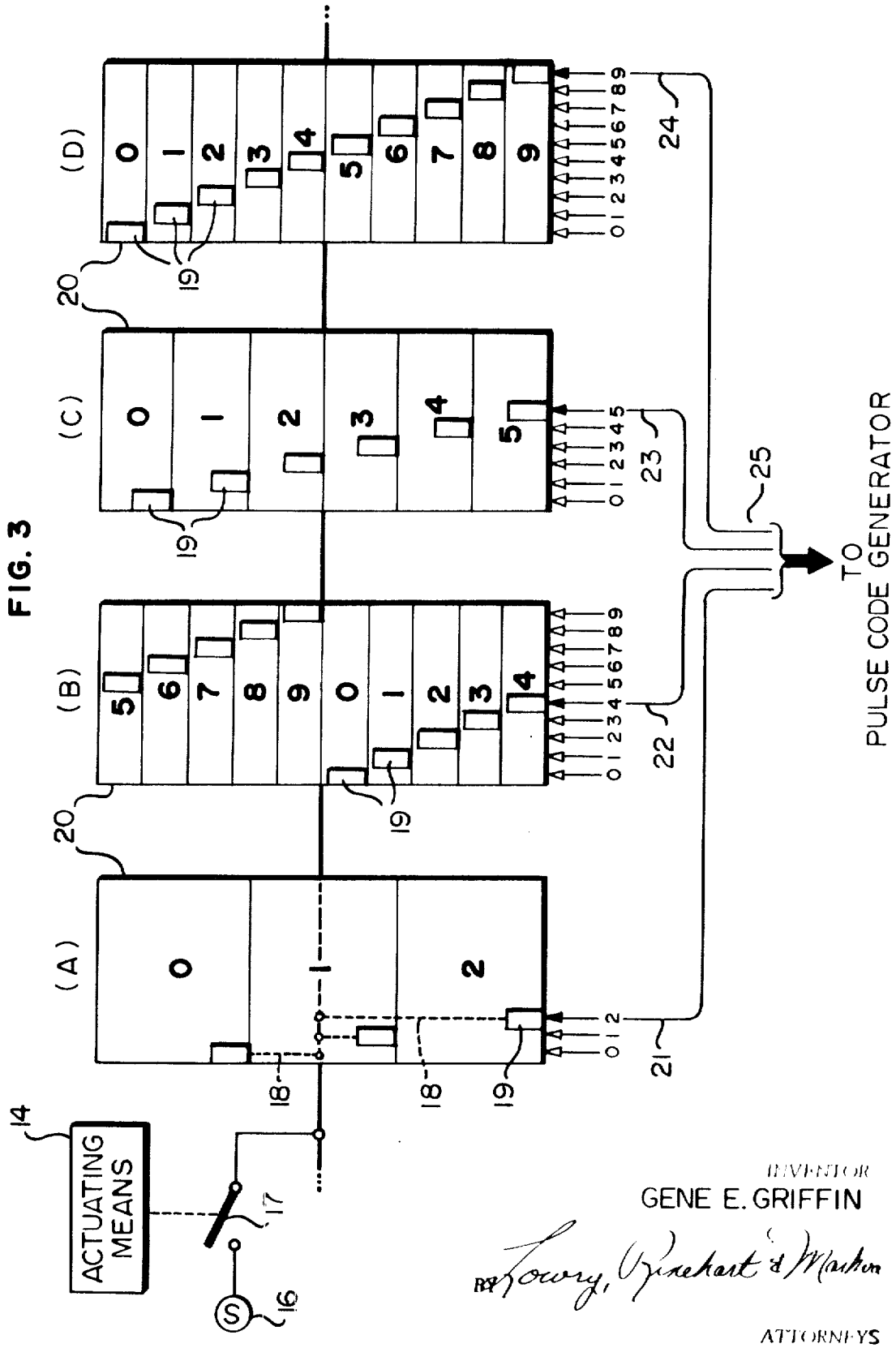


FIG. 3

INVENTOR
GENE E. GRIFFIN

By Lowry, Rinehart & Markon

ATTORNEYS

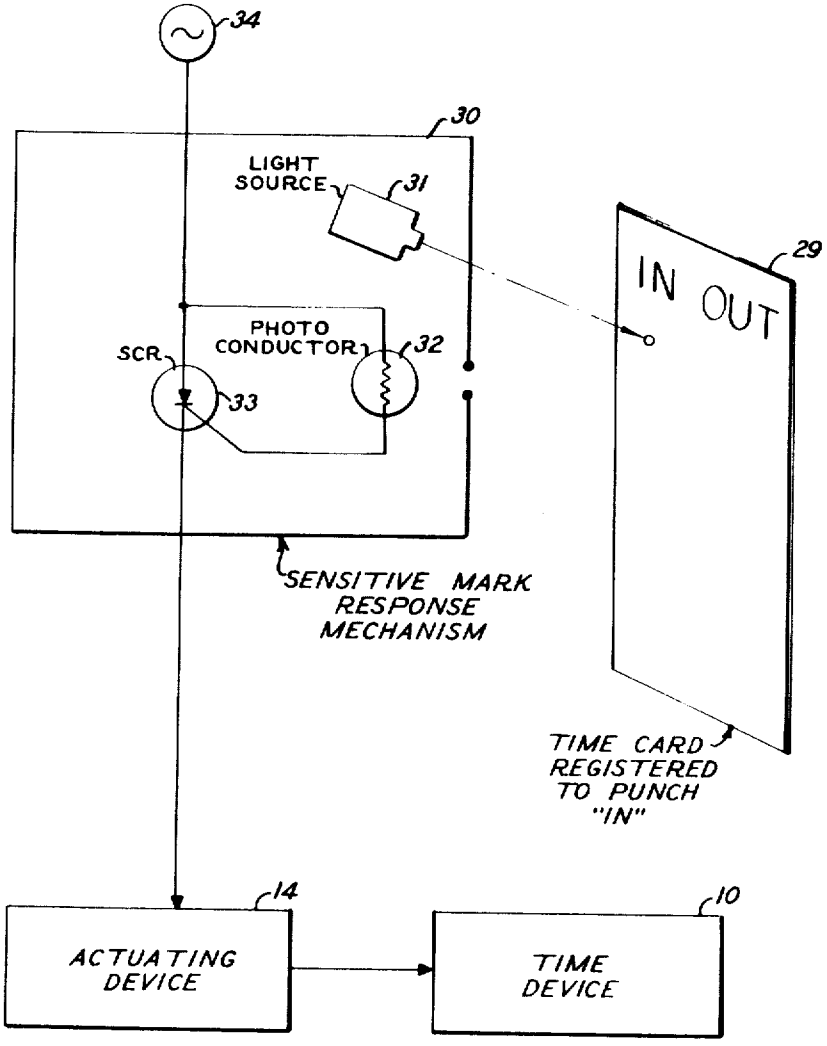


FIG. 4

INVENTOR
GENE E. GRIFFIN

SYSTEM FOR TIME RECORDATION

BACKGROUND OF THE INVENTION

There are numerous prior art time data recording devices available. Some of these prior art devices may be used to punch timecards or make a printed record of the time in response to a person placing a record card therein. Many of the prior art devices not only print the specific time that the person places the card therein but also includes the perforating of the card with a keypunch operation. This timecard having the perforations placed therein may then be transported to a computer, or possibly to another station within the time-recording apparatus for the purpose of computing a period of time between successive punches. Consideration of the computed period of time as a function of the cost rate per unit of time over an extended period provides the possibility of automatic cost analysis.

Where the prior art time-recording apparatus is being used as a timeclock used by employees, the data is taken off of the timecard used by each employee and supplied to a continuous computing operation. This operation involves the carrying of a perforated card to a special purpose or general purpose computer for storing the information located on the perforated timecard. In one prior art operation, the significant data is taken off of each individual timecard and placed onto a continuous supply of punched paper tape which is then sent to a main office for the purpose of computing payrolls for each of the employees of the business operation. The computation of the total amount of time spent on a particular job must be accumulated off the employee's timecard and entered in the records of the business operation to determine the amount to be paid to the specific employee. This operation becomes quite complicated especially where the employee has frequent changes in job classifications over an extended period of time. The rates of pay for each job classification obviously change and also the total amount of time worked in a specific job classification may vary from day to day.

There are basic disadvantages in using the prior art time recordation devices. Individual timecards for each employee have limited use because they have to be replaced at best every week. Consequently, the employer must maintain a large supply of cards for use by the employees in their punching in or out. In addition, the transporting of timecards from a remote location to a main business office presents a handling problem when the information is being taken from the punched card and placed into a data storage device. Any excessive amount of handling involving expended time must be absorbed in the overhead expenses of the particular business operation.

PURPOSE OF THE INVENTION

The primary object of this invention is to effect the recordation of time on a continuous record medium which may be adapted to existing time devices for the purpose of providing a cost analysis for a business operation.

Another object of this invention is to obviate the various disadvantages in using separate timecards which have been perforated for use in a computer device.

Another object of this invention is to provide a continuous record medium which may be sent directly to the home office or is capable of transmitting information recorded thereon electrically by way of telephone or telegraphy.

A still further object of this invention is to provide a system for time recordation which is very easily adaptable to such business operations as payroll computation and time cost analysis in manufacturing processes or production assemblies.

SUMMARY OF THE INVENTION

The system for time recordation as presented herein includes a means for continuously recording time information from a timekeeping mechanism onto a data storage means. A pulse code generator is used to translate the mechanical, electromechanical and visual time information into a pulse train which is subsequently used to record the data on a continuous basis. Any suitable continuous record medium such as a punched paper tape, magnetic tape and the like or a storage cell of a computer is readily adaptable to this system. The desired information is relayed from any location in the system to the data storage means when an appropriate actuating mechanism is energized.

A specific embodiment of this invention involves the placement of an employee's timecard into a timekeeping mechanism for the purpose of printing time information onto the timecard. Substantially simultaneously therewith, the time information is automatically placed on the desired continuous record medium. A further feature of this invention includes the input of information to identify an employee and his job classification for the purpose of computing the total payroll of a business operation.

Another specific embodiment of a system made in accordance with this invention takes source information from two locations. The employee or operation identifying information is introduced into the information collection bank at a first location within the time apparatus. Any time data is obtained from a mechanical movement used to visually produce at a second location in the timekeeping mechanism.

The system of this invention may use prior art time devices and known translator instruments for the generating of a pulse train. The translator instrument is interfaced to the prior art timekeeping device for the purpose of storing information on a continuous record medium. The system of this invention also contemplates the use of a pulse code generator means located within the structure of a time mechanism for the purpose of producing a pulse train. The pulse train may be introduced into a perforating device which may be either interfaced to the timekeeping mechanism or produced as an integral part therewith.

The use of such a simple construction provides a very economical means of providing a cost analysis of any desired operation within a business.

BRIEF DESCRIPTION OF DRAWINGS

Other objects of this invention will appear in the following description and appended claims, reference being made to the accompanying drawings forming a part of the specification wherein like reference characters designate corresponding parts in the several views.

FIG. 1 is a flow diagram showing the system made in accordance with this invention,

FIG. 2 is a flow diagram showing the schematic electrical circuitry existing between the time device and information collection bank, and

FIG. 3 is a flow diagram showing a schematic representation of the change from mechanical movement to electrical pulses within the time device of the system made in accordance with this invention,

FIG. 4 is a diagrammatic representation of a sensitive mark response mechanism which is a specific feature of this invention.

DESCRIPTION OF SPECIFIC EMBODIMENT

MOre specifically, a time device **10** is interfaced with a pulse code generator **11**. The time device **10** indicates the time visually as meridian time 2459. That is, 59 minutes after midnight. The time may also be recorded in terms of the hour and minutes. The time may also be recorded by the decimal system related to the total minutes per day. The pulse code generator **11** translates a surge of electricity, discussed hereinbelow, into a pulse train to code the specific time of the time device **10**. A readout means **12** connected to the pulse code generator **11** transforms the code of pulse train into some type of data storage means such as paper tape, magnetic tape and the like, or any other type of an information collection station **27**. The readout means **12** and data storage means **13** may be

used together to form the information collection station **27**. This information station **27** may include a special purpose computer to store and compute any type of information desired by the user of this system. Other data storage means **13** such as paper tapes, magnetic tapes and the like may accumulate information over an extended period of time and then be sent to a general purpose computer or special purpose computer at some central location to effect the desired computations relating to a function of time.

The recordation of information related to time is only effected when the system receives a signal from the actuating means **14**. At the desired time, the user of this system energizes the actuating means **14** and the time data is automatically recorded in a continuous manner on the data storage means **13** as generally explained hereinabove.

The electrical source **16** provides power to the motor **15** to drive the time device **10** thereby presenting a visual indication of the time thereon. The time device **10** includes numeral indicating units A, B, C and D. Each numeral indicating unit A, B, C and D has a similar mechanical movement **20** which is mechanically connected to the drive motor **15**. This mechanical connection may be effected in any manner known in the prior art to visually produce any one of the numbers for the indication of time of the time device **10**. The mechanical movement **20** in each numeral indicating unit A, B, C and D includes a contact area **19** associated with each of the numerals visually produced within the time device **10**. Electrical pickups **21**, **22**, **23**, and **24** are located adjacent the units A, B, C and D, respectively, to touch a contact area **19** corresponding to the numeral showing on the time device **10**. An electrical lead **18** provides a path for a surge of electricity to travel from the electrical source **16** to the contact area **19**. The electrical pickups **21**, **22**, **23** and **24**, which are all combined to form the input **25** to the pulse code generator **11**, each receive an electrical impulse by way of a contact area **19** associated with a particular number on the units A, B, C and D respectively. When it is desired to record a specific time, the actuating means **14** is energized and the switch **17** is closed thereby causing a surge of electricity to pass from the electrical source **16** into the pulse code generator **11** by way of the time device **10**. The pulse code generator **11** translates the surge of electricity into a form which may be stored for later computation or can be computed immediately into the desired statistics necessary to provide a simplified method of operation.

It is emphasized that the drawings showing the contact between the pulse code generator **11** and the timekeeping mechanism **10**, or card means **29** are purely schematic. Any type of electromagnetic mechanism available in the prior art is clearly adaptable to the system as described hereinabove. For example, a pawl mechanism might be used to represent any one of the electrical pickups **21**, **22**, **23** and **24** or **35**. This pawl structure would work in conjunction with a ratchet wheel or disk arrangement associated with the numbers which visually show the time in the specific embodiment. That is, the appropriate pawl structure would engage a notch located in a disk corresponding to the said number and thereby form the necessary connection to complete the electrical circuitry between the electrical source **16** and the pulse code generator **11**.

OTHER SPECIFIC EMBODIMENTS

The system for time recordation as disclosed hereinabove has extensive ramifications in the business field. Many unique combinations of components and systems are within the purview of the system as described and claimed herein. The time device **10** may include any existing time device now available in the prior art. The time device **10** may also be a highly developed instrument which performs other operations in addition to that of recording time. Time devices such as are used for the computation of payroll are within the contemplation of this system and fall into this latter category. A time study operation may be efficiently made in a manufacturing or assembly plant with the system of this invention.

The most important aspect of this system is its capability to continuously record information as a function of time. This type of recordation is especially useful in the area of payroll computation. Every time an employee of a business operation would punch in or out on a timeclock, the time information would not only be placed on the timecard for the individual employee but also continuously recorded on a data storage means **13**. In addition to the input of time information, supplementary information **28** might be placed in the system at any desired point as shown in FIGS. **1** and **2**. That is, each employee would have a designated number representing his identity and job classification. The employee identification designation may be put into the system within the timekeeping device. Further supplemental information **28** and/or the employee identification designation may also be put directly into the data storage means **13** from any other source.

The various portions of the system, as disclosed in this invention, may be provided in several different ways. The timekeeping mechanism as disclosed herein may include any time device known in the prior art. Furthermore, the pulse code generator and information collection mechanisms may be well-known prior art devices which are interfaced to any desired time device.

On the other hand, the system of this invention may also be provided in a completely integrated manner by forming the actuating means **14**, time device **10**, pulse code generator **11** and data storage means **13** within one complete housing. In this specific embodiment, the same precise results might be obtained but only one apparatus would be necessary for providing the various existing operations of this system. The actuating means **14** could comprise the mechanism which also operates the printing of the time on the appropriate line of the time card **29** placed inside the timekeeping mechanism. In this situation, the actuating means **14** would include means to register the timecard **29** to receive time information substantially simultaneously with recordation of information on the data storage means **13** or the entire information collection bank **27**. The actuating means **14** may include a mechanism having a button actuating switch which must be pushed after the timecard has been registered into position. Depression of the button by an operator of the system accomplishes at least two operations; namely, placing information on the timecard **29** and actuating the mechanism at a second position in the system for recording the time information on a continuous record medium. That is, as the time is being printed out in one location in the system on a timecard **29**, a continuous paper tape would be punched with the appropriate information substantially simultaneously with the printing on the timecard **29**.

Another novel feature of this invention may be incorporated in a time device which punches a time card **29** with "in" and "out" information. A conventional time device is constructed so that the timecard **29** is registerable for being punched "in" or "out" in adjacent longitudinal columns. Such a conventional prior art time device is also constructed to register the conventional timecard **29** along one of the series of horizontal lines located thereon. Prior art mechanisms for effecting the shifting and lifting of the timecard **29** are disclosed in U.S. Pat. Nos. 2,816,810 and 2,832,662. A system made in accordance with this invention includes such prior art timecard registry mechanisms with means to prevent identical entries of two bits of information to be sensitively marked sequentially on the timecard **29**. A sensitive marking response mechanism **30** would be placed in cooperative relationship with the timecard **29** to determine whether the card **29** had been coded with an "in" punch or an "out" punch on the next previous insertion of the timecard into the time device **10**. This determination may be accomplished in a manner known in the prior art for sensing light presence or absence. As shown in FIG. **4**, a light source **31** would impinge upon the card **29**. The photoconductor **32** is activated when light shines thereon. As shown in FIG. **4**, the presence of a punched hole on the card **29** in the next previous position absorbs light from the source **31**. Thus there is no reflected light to activate the photoconductor **32**. Had the punched hole not been located

on the card 29, the reflected light thereon would activate the photoconductor 32 thereby generating an electrical impulse. The generating of an electrical impulse upon the presence of light is a well-known phenomenon and many prior art structures or circuits would be available to the skilled artisan to reproduce the present invention. At the same time the above determination is made, the sensitive marking response mechanism 30 controls the entry of the bits of information. That is, the mechanism 30 includes means to maintain an electrical circuit in an open condition to keep the system inactive. Many prior art electrical devices may be used to accomplish this particular function. Prior art circuits which include a relay, a thyratron, bias rectifier or a silicon control rectifier known in the art as an SCR may be used to accomplish this result. As shown in FIG. 4, SCR 33 is in a circuit with the photoconductor 32. When an electrical pulse is received from the photoconductor 32 upon activation by light rays, the SCR 33 will allow electrical pulses to travel from the electrical source 34 to the activating device 14. When the photoconductor 32 remains inactive, the SCR 33 maintains the electrical circuit for the activating device 14 in an open condition. In other words, if the photoconductor 32 does not receive light rays reflected from the source 31 by the card 29, the SCR 33 will maintain the circuit in an open condition and an identical bit of information will not be entered on the card 29. That is, when the timecard is registered to receive an "in" punch as shown in FIG. 4, once the aforesaid determination has been made by the sensitive marking response mechanism 30, and found that the next previous insertion had recorded an "in" by the employee, the system could not be activated until the timecard 29 was properly registered to effect an "out" recordation. That is, it would be absolutely impossible for the employee to punch two "ins" or two "outs" sequentially on his timecard 29. Once the timecard 29 is registered, the switch means 17 is closed to energize the system by placing the electrical circuit therein in a closed condition.

The system of this invention includes the additional capability of entering other data or supplemental information 28 into the records being continuously taken by the information collection bank 27. This supplemental information 28 may be placed into the system within the time device 10 itself or at another location therein such as the readout means 12. Such information includes a numerical designation for the employee's identification, job classification and any other classifying data. This information may be placed directly on the timecard 29 to be inserted in the time device 10. The time device 10 would then include means to read and transmit the information to the collection bank 27 by way of the pulse code generator 11. This is accomplished very simply by producing electrical impulses from within the time device 10 much in the same manner as the time data itself is transmitted. For example, a timecard 29 punched to indicate any supplemental information 28 is registered at a readout station located within the tim device 10. The supplemental information 28 would be automatically read from the punched timecard 29 and relayed to the continuous data storage means 13 via the contacts 35 as shown in FIG. 2. This reading and relaying of supplemental information 28 would take place at about the same time that the time data was being printed on the timecard 29 and the continuous data storage means 13 was being fed the time information through the pulse code generator 11. Since all of this time data and supplemental information 28 on the card means 29 is desired to be entered at approximately the same time, there is simply the necessity for using the well-known method of interrupting the printing out or the punching of the information in its proper sequence on the continuous data storage means 13. This process is well known in the prior art and may be readily included in the system of this invention.

Instead of putting the supplemental information 28 directly onto the timecard 29, it may be punched out on a carrier portion that is detachably mounted on the timecard. This carrier portion may include a plastic card attached to the timecard of an employee.

The plastic card punched with information might also be used in a system as provided in this invention to effect a complete cost control analysis of a progressive assembly operation or manufacturing process. The identifying card would be punched with specific information as to the part being worked on. It would thereafter be placed into the system to record the beginning and end of the processing step being analyzed. In this way, the total time expended for effecting the processing step could be recorded. The continuous data storage means 13 would then be used to provide time information with respect to manufacturing capability and efficiency.

While the system for time recordation has been shown and described in detail, it is obvious that this invention is not to be considered as being limited to the exact form disclosed, and that changes in detail and construction may be made therein within the scope of the invention, without departing from the spirit thereof.

I claim:

1. A system of time recordation comprising
a. a timekeeping mechanism,
b. means connected to said timekeeping mechanism to produce a pulse train corresponding to information including time and supplemental information,
c. a sensitively marked card means including space to receive time information,
d. data storage means to receive said pulse train and provide a continuous record of information including time and supplemental information,
e. actuating means having an open condition and a closed condition and being in aid closed condition to effect recordation entry of information to said data storage means,
f. means to register said card means to receive said time information, and
g. means to prevent entries of two identical bits of information to be sensitively marked sequentially on said card means,
h. said entry preventing means including a mark sensitive means to determine the presence of a sensitive mark corresponding to a first bit of information located on the card means and means to maintain said actuating means in an open condition to prohibit activation of the system whereby entry on said card means of a second bit of information that is identical to the first bit of information is prevented.

2. A system as defined in claim 1 wherein said card means is sensitively marked by holes located therein.

3. A system as defined in claim 1 wherein
said actuating means includes a switch means for closing the electrical circuit to energize said system.

4. A system as defined in claim 1 wherein
said data storage means includes a punching means to perforate a continuous record medium.

5. A system as defined in claim 1 wherein
said data storage means includes a magnetic storage medium to record said pulse train.

6. A system as defined in claim 1 wherein
said system includes means to introduce supplemental information into said pulse train producing means.

7. A system as defined in claim 6 wherein
said timekeeping mechanism includes means to register said card means to receive time information substantially simultaneously with recordation of information on said data storage means.

8. A system for time recordation comprising
a. a timekeeping mechanism,
b. means connected to said timekeeping mechanism to produce a pulse train corresponding to information including time and supplemental information,
c. card means having space to receive time information and being sensitively marked with a first bit of information,
d. data storage means to receive said pulse train for providing a continuous record of information including time and supplemental information,

e. actuating means for effecting recordation of information to aid data storage means and having an open position and a closed position,

f. said actuating means being in closed position to effect said recordation of information,

g. a sensitive marking response mechanism disposed in cooperative relationship with said card means,

h. said sensitive marking response mechanism including means for locating sensitively marked bits of information on said cards means and means responsive to said locating means to maintain said actuating means in said open condition when said first bit of information is located by said sensitive marking response mechanism.

9. A system as defined in claim 8 wherein

said card means includes a supplemental information carrier portion detachably mounted on an information recording portion,

said carrier portion includes said indicia of supplemental information.

10. A system as defined in claim 9 wherein said indicia are holes located in said carrier portion.

* * * * *