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A. LYNER

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COMPUTING TIME CLOCK

Filed Sept. 19, 1960

2 Sheets-Sheet 1

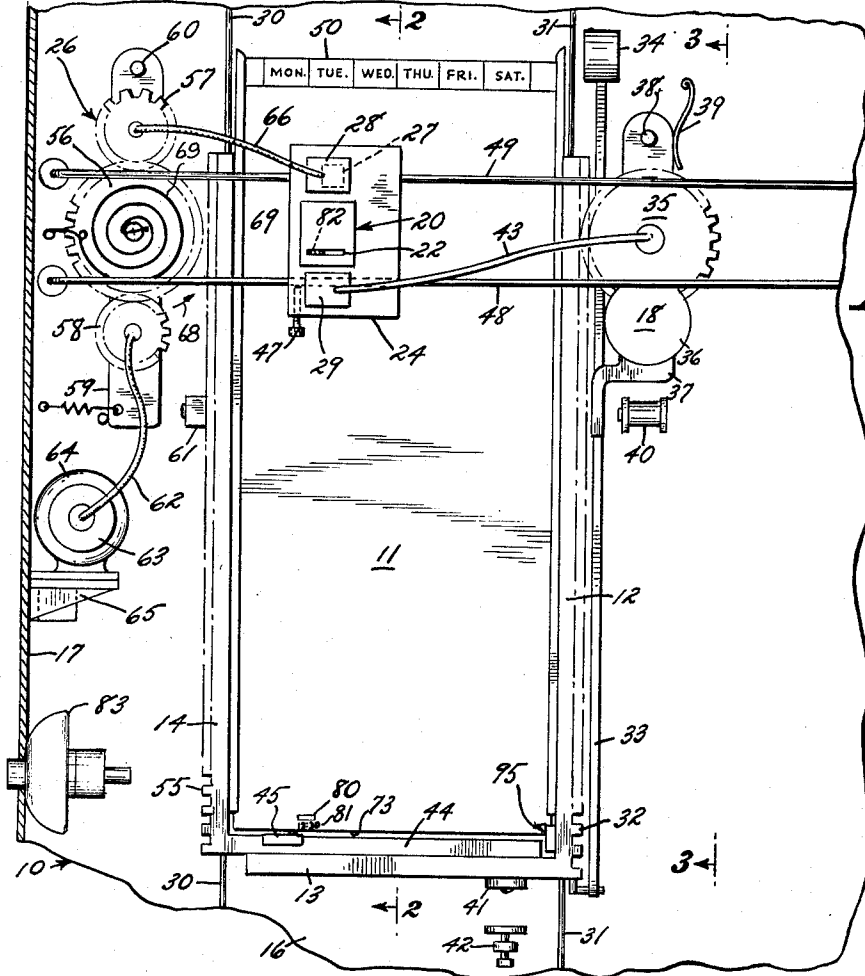


Fig. 1

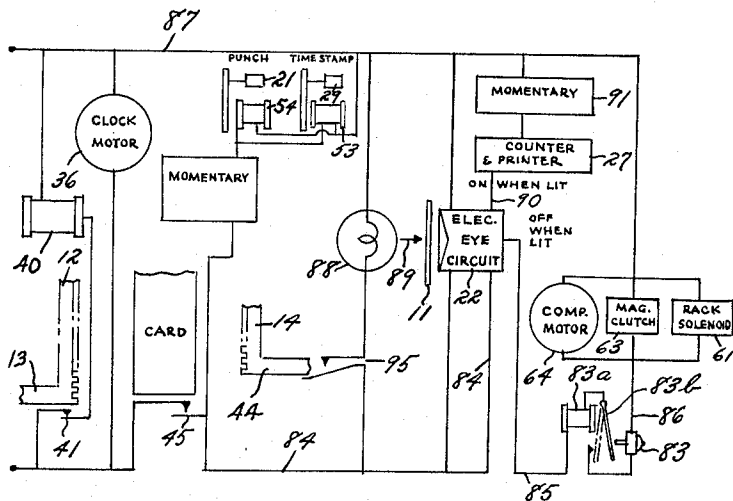


Fig. 4

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FIG. 2.

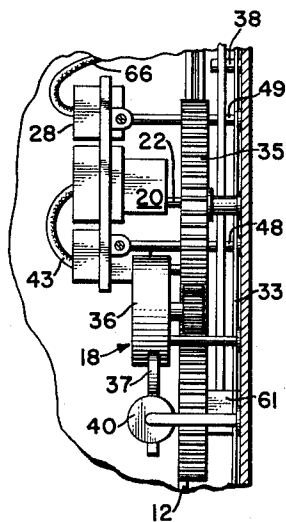
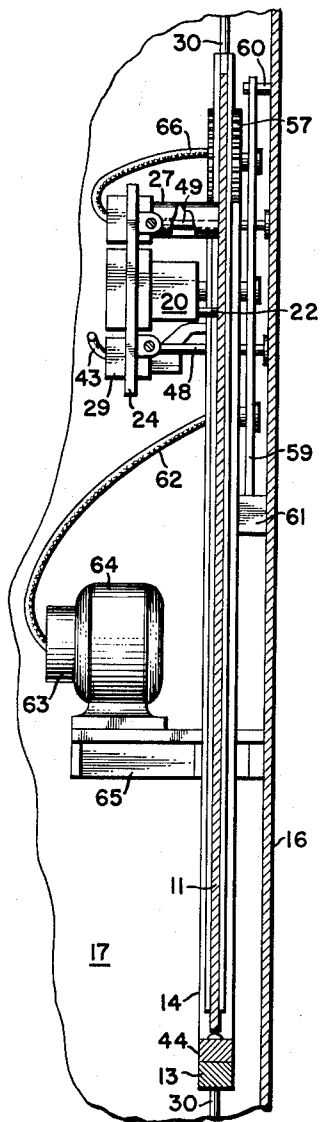


FIG. 3.

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## COMPUTING TIME CLOCK

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5 Claims. (Cl. 235-61.9)

This invention relates generally to time clocks and more particularly to an improved time clock construction capable of acting as a time clock and a time computer.

While the usual time clock serves to imprint on a time card the beginning and end of a work period, in order to compute the elapsed time it is necessary to take off the time indicia and to mathematically calculate the same. This is time consuming and inefficient, resulting in frequent errors.

It is therefore among the principal objects of the present invention to provide structure of the class described which will automatically print the elapsed time on a time card, giving the result in hours and minutes, a fraction of an hour, or the decimal equivalent thereof.

Another object herein lies in the provision of devices of the class described which are automatic in operation and may be manipulated, for example by the employee whose time card is being treated.

These objects and other incidental ends and advantages will more fully appear in the progress of this disclosure and be pointed out in the appended claims.

In the drawings, in which similar reference characters designate corresponding parts throughout the several views:

FIGURE 1 is a fragmentary front elevational view showing an embodiment of the invention.

FIGURE 2 is a fragmentary vertical sectional view as seen from the plane 2-2 on FIGURE 1.

FIGURE 3 is a fragmentary side elevational view as seen from the plane 3-3 on FIGURE 1.

FIGURE 4 is a schematic diagram.

In accordance with the invention, the device, generally indicated by reference character 10, comprises broadly a first card carrier element 12; a second card carrier element 14; a base element 16; timing means 18; punch means 20; card sensing means 22; carriage means 24; time computing means 26; elapsed time printing means 28; and time printing means 29.

The base element 16 is preferably vertically arranged and may be provided with a suitable cover 17. The cover 17 may be provided with a top opening (not shown) through which the card 11 may be inserted and withdrawn as required. Suitably secured to the base 16 and in spaced and parallel arrangement are a pair of vertical guide members 30 and 31 which form ways upon which the first and second card carrier elements 12 and 14 are vertically slidably mounted.

The first card carrier element 12 is generally L-shaped, having a horizontal portion 13 and an integral rack 32. The first carrier element 12 is normally urged upwardly by a spring 33, the upper end of which is disposed within a housing 34 which is secured to the base 16. During normal operation, the carrier element 12 completes a course of downward travel preferably during a period of twenty-four hours. While the present device is shown by way of illustration as being adapted for recording time intervals over a twenty-four hour period, as for example where a factory has three eight-hour shifts, it will be obvious to those skilled in the art to which the present invention relates that the structure may be readily modified to accommodate different periods, such as for example eight hours or twelve hours.

The element 12 is driven downwardly by the gear 35 which is in turn driven by the clockwork motor 36, which is preferably electrically driven by a synchronous motor. The gear 35 and the motor 36 are mounted upon an arm

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37 which in turn is pivotally mounted at 38 on the base 16. The gear 35 is urged into engagement with the rack 32 by a spring 39; while the gear 35 may be disengaged upon energization of the solenoid 40. This energization of the solenoid takes place at the end of each complete downward traverse of the carrier element 12 when the sensitive switch 41 presses against the adjustable stop 42. Thus, at the end of each complete cycle, in the present case twenty-four hours, the carrier element 12 is pulled upwardly by the spring 33 when the switch 41 is closed.

The timing means 18 also includes time printing means 29 (as distinguished from the elapsed time printing means 28) which is driven in a suitable manner, as for example by a flexible shaft 43 which is connected to the gear 35.

The time printing means 29 may be in the form of a printing counter well known in this art in which the numerals indicating a particular time automatically advance through a twenty-four hour cycle, and then go back to zero. The printing is caused by the energization of a solenoid which drives the particular numerals against the surface of the card 11 to thereby imprint the exact time at which the card is inserted. This solenoid is indicated by reference character 53, FIGURE 4. Thus, the stamped numbers will correspond not only to the actual time of day but also to a particular displaced position of the first card carrier support 12 and a card supported thereby.

The second card carrier element 14 is of generally L-shaped configuration, having a horizontal arm 44 with a switch 45 mounted thereon. The switch 45 is adapted to be actuated by the bottom edge 73 of the card 11, and this switch closes an electrical circuit to the solenoid 53 actuating the time stamp 29 which is the time printing means, and also closes a circuit to a solenoid 54 which actuates a punch 21 in the punch means 20.

The second card carrier element 14 is provided at the outer edge, thereof with an integral rack 55, which is normally in disengagement with the gear 56. Gear 56 is in engagement with the pinions 57 and 58, and all three are rotatably mounted on the pivotal arm 59 which is pivotally mounted at 60 on the base 16. The arm 59 may be drawn to the right as viewed in FIGURE 1 by the solenoid 61 whereupon the gear 56 will come into engagement with the rack 55. Gear 56 is driven by the pinion 58, in turn driven by the flexible shaft 62 extending from the electrical clutch 63 on the motor 64. The motor 64 is suitably mounted on a bracket 65 secured to the base 16.

Pinion 57 is connected by a flexible shaft 66 to the elapsed time printing means 28 and particularly the counting and printing element 27 thereof.

The element 27 may take the form of a consecutive printing counter which is correlated in its calibration to the amount of vertical movement of the second card carrier element 14 as the same is driven by the motor 64 in response to control by the card sensing means 22. The element 27 is in constant mechanical connection with the gear 56. Gear 56 is driven in a counter-clockwise direction as indicated by the arrow 68 when the motor 64 is energized, but said gear 56 is driven in a clockwise direction by the spring 69 when the gear 56 is disengaged from the rack 55. This serves to restore the element 27 to its original zero reading.

The card 11 may be provided with markings 50 indicating the several days of the week, and the carriage means 24 may be laterally manually adjusted so that all of the printing and punching may occur along an imaginary vertical line which is aligned with the particular day of the week on which the time clock is operating. Carriage 24 may be maintained in any adjusted position thereof, for example by tightening the set screw 47 which engages against the lower of the parallel track members

48 and 49, the latter being suitably secured upon the base 16.

### Operation

By way of example, one manner of operation is here given.

At the beginning of a twenty-four hour cycle, the arm 13 will be in a position which is its highest vertical position and at the beginning of its downward travel. If shortly after such point in time, a user inserts a card 11 into the device 10, the bottom edge 73 striking against the switch 45 (which will have likewise been elevated by the arm 44 resting upon the arm 13) will cause the punch-in orifice 80, and simultaneously there will have been made an imprint as, for example, that indicated by reference character 81 corresponding to the exact time at which the orifice 80 was produced.

The card 11 is now removed by the user, and subsequent to that any number of other cards may be inserted into the device 10 to be similarly treated to indicate the exact time of insertion by a punch-in and an imprint.

Now the clock motor 36 will continue to operate, causing the arm 13 to be lowered and hence the arm 44 which is resting by gravity thereon. This will be against the elevating action of the spring 33.

At some later time, the card 11 for a second time is inserted, and as soon as the edge 73 reaches the switch 45 another punch-out orifice and imprint will occur giving the then exact time. In the present illustration in FIGURE 1 the second punch-out is indicated by the dotted line at 82.

If now it is desired to obtain the figure for the elapsed time interval, the user depresses the button 83 (FIGURE 4) which closes a circuit via the conductors 84-87, inclusive, to the motor 64, the magnetic clutch 63, and the solenoid 61 but through relay 83a. This circuit is completed through the card sensing means 22 which preferably takes the form of an electric eye circuit. The electric eye circuit is affected by a source of illumination 88, which projects a beam of light 89 through any aligned opening or punch-out in the card 11. The electric eye circuit contains a relay which opens the circuit between conductors 84 and 85 when a light beam passes through an opening in a card 11. As will be seen on FIGURE 1, the cut-out 82 provides an opening which is aligned with respect to the sensing means 22. Thus the motor 64 begins to rotate and to move the arm 44 upward independently of the arm 13. This elevates the card 11 until the punch-in opening 80 becomes aligned with the sensing means 22. When this occurs, light reaches the electric eye circuit which then completes a circuit via conductors 84 and 90 to the counting and printing element 27, which by means of the momentary make circuit 91 prints on the card figures indicating the elapsed time between the two respective punched holes. It should be noted that this device 27 was driven simultaneously by the shaft 66 as the arm 44 was being elevated by the gear 56, so that the printed elapsed time figure is exactly correlated to the upward travel distance of arm 44.

The switch 95 is disposed a distance above the arm 44 (in the latter's lowermost position) at least equal to the height of the orifice 82 so that the source of illumination 88 does not come on until the orifice 82 has moved up away from the sensing device 22. This prevents a printing from occurring until the computing means 26 has finished its computation. At the same time that the circuit is closed through conductor 90, the current to conductor 85 is discontinued; this allows relay 83a to release its circuit closing keeper armature 83b so that it returns to its original open position, ready for the next actuation thereof.

While I have chosen to produce the time indications on the card 11 by putting orifices in the card, as will be understood by others skilled in the art, other comparable means may be employed, such as, for example, by an electric eye reading circuit which reacts to printed in-

dicia; by contact brush which completes a circuit through the orifices; or across a conductive mark; or by magnetic ink imprinting.

Where desired, the card 11 may have the predetermined dimensions of known computer card systems such as "IBM," Remington Rand, or the like, so that my device could punch such cards and thereafter such cards could be fed through appropriate translation computing devices so that with the addition of rate of pay information punched on the cards, complete payment figures would be supplied by automation.

I wish it to be understood that I do not consider the invention limited to the precise details of structure shown and set forth in this specification, for obvious modifications will occur to those skilled in the art to which the invention pertains.

I claim:

1. In a computing time clock construction for use with a card, a base element, first and second card carrier elements arranged for movement in generally parallel planes upon said base element, clock means for driving said first card carrier element in a first direction in relation to elapsed time, means for moving said first card carrier element in a second opposite direction at the completion of a time cycle, time computing means selectively engageable with said second card carrier element for driving said second card carrier element in said second direction in relation to marked indicia upon said card, and cooperative means on said first and second card carrier elements for limiting movement of said second card carrier element in said first direction to the corresponding position of said first card carrier element.

2. In a computing time clock construction for use with a card, a base element, first and second card carrier elements arranged for movement in generally parallel planes upon said base element, clock means for driving said first card carrier element in a first direction in relation to elapsed time, means for moving said first card carrier element in a second opposite direction at the completion of a time cycle, time computing means selectively engageable with said second card carrier element for driving said second card carrier element in said second direction in relation to marked indicia upon said card, and cooperative means on said first and second card carrier elements for limiting movement of said second card carrier element in said first direction to the corresponding position of said first card carrier element, said second card carrier element being shiftable under the action of gravity to follow the path of said first card carrier element during disengagement of said time computing means.

3. In a computing time clock construction for use with a card, a base element, first and second card carrier elements arranged for movement in generally parallel planes upon said base element, clock means for driving said first card carrier element in a first direction in relation to elapsed time, means for moving said first card carrier element in a second opposite direction at the completion of a time cycle, time computing means selectively engageable with said second card carrier element for driving said second card carrier element in said second direction in relation to marked indicia upon said card, and cooperative means on said first and second card carrier elements for limiting movement of said second card carrier element in said first direction to the corresponding position of said first card carrier element, said second card carrier element being shiftable under the action of gravity to follow the path of said first card carrier element during disengagement of said time computing means, and marking means disposed adjacent said card carrier elements for placing a pair of spaced indicia on a card disposed in one of said card carrier elements, the distance between spaced indicia corresponding to a period of elapsed time.

4. In a computing time clock construction for use with

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a card, a base element, first and second card carrier elements arranged for movement in generally parallel planes upon said base element, clock means for driving said first card carrier element in a first direction in relation to elapsed time, means for moving said first card carrier element in a second opposite direction at the completion of a time cycle, time computing means selectively engageable with said second card carrier element for driving said second card carrier element in said second direction in relation to marked indicia upon said card, and cooperative means on said first and second card carrier elements for limiting movement of said second card carrier element in said first direction to the corresponding position of said first card carrier element, said second card carrier element being shiftable under the action of gravity to follow the path of said first card carrier element during disengagement of said time computing means, and marking means disposed adjacent said card carrier elements for placing a pair of spaced indicia on a card disposed in one of said card carrier elements, the distance between spaced indicia corresponding to a period of elapsed time, and scanning means disposed in the area of said second card carrier element for controlling operation of said time computing means.

5. Computing clock construction for use with a card, comprising: a fixed base element, first and second card carrier elements movably mounted upon said base element, clock means for shifting said first card carrier

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element in relation to elapsed time, marking means adjacent said card carrier elements for placing a pair of spaced marks on a card, the distance between said marks corresponding to a period of elapsed time, means for making said marking means operative upon the placing of a card upon one of said card carrier elements, said second card carrier element being mounted in juxtaposed parallel relation with respect to said first card carrier element, and having a portion thereof resting upon a portion of said first card carrier element to move with the first card carrier element under the action of gravity as driven by said clock means, time computing means including motor means selectively driving said second card carrier element in a direction opposite the driven direction of said first card carrier element, card sensing means controlled by marks placed upon a card positioned adjacent said second card carrier means, and controlling the operation of said time computing means, and means for disconnecting said time computing means from said second card carrier element at the completion of a time computing cycle to permit said second card carrier element to return under the action of gravity to again rest upon said portion of said first card carrier element.

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