

[72] Inventor **Karl Rutsche**
Bedastrasse 44, Gossau, Switzerland
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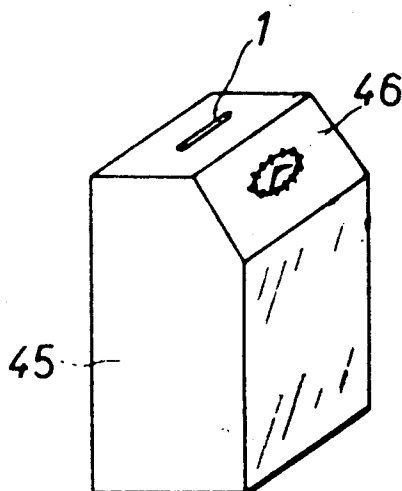
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Primary Examiner—Joseph W. Hartary
Attorney—Flynn & Frishauf

[54] **ELAPSE TIME RECORDER**
6 Claims, 4 Drawing Figs.

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 346/95
 [51] Int. Cl. G07c 1/08
 [50] Field of Search 346/60, 86,
 83, 82, 104, 1, 95

ABSTRACT: A method of, and apparatus for ascertaining time worked on stamped or punched cards wherein markings are made on the card at the beginning and at the end, respectively, of the time worked, the later marking being displaced from the earlier one by a distance which is a directly measurable function of the time elapsed.



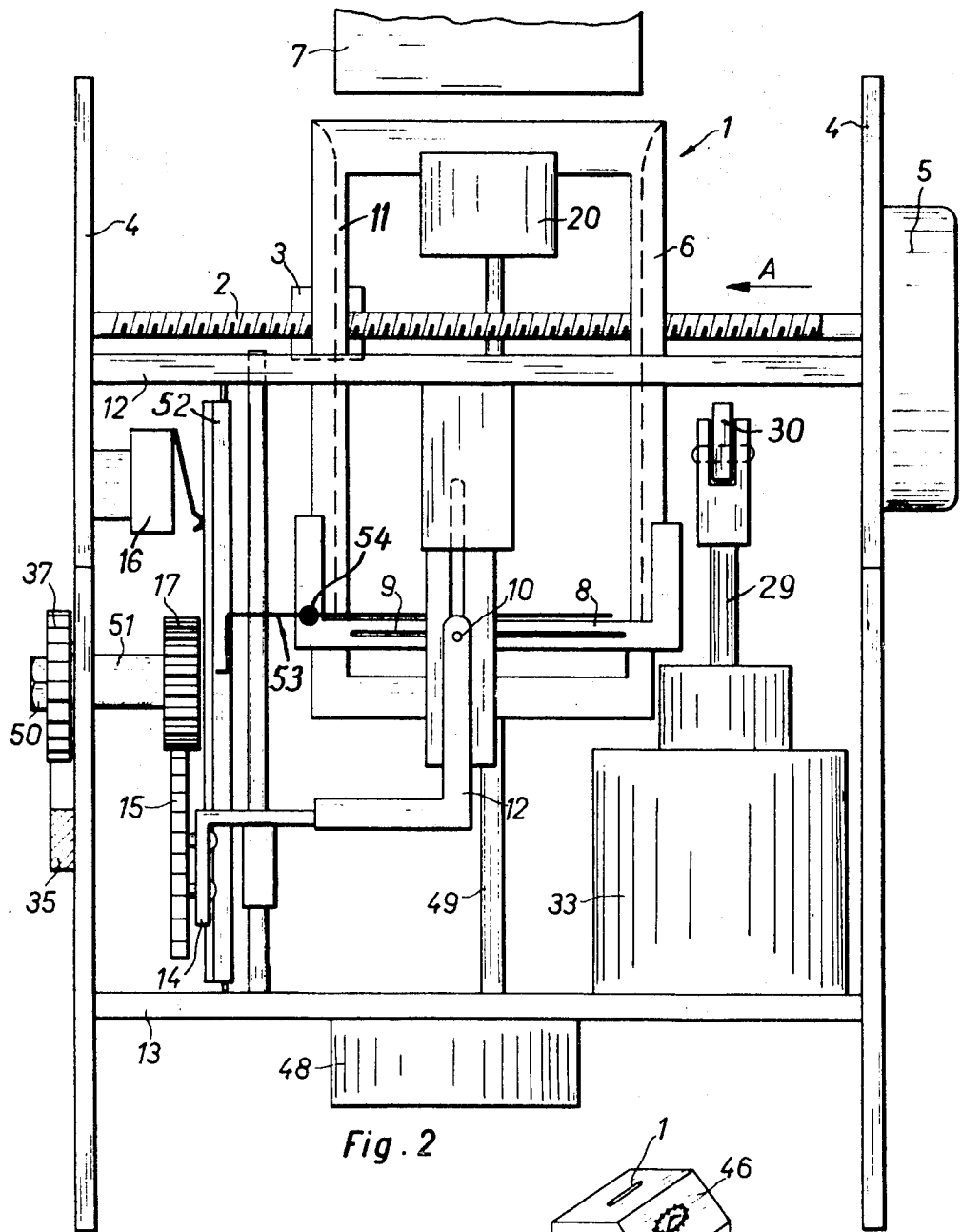


Fig. 2

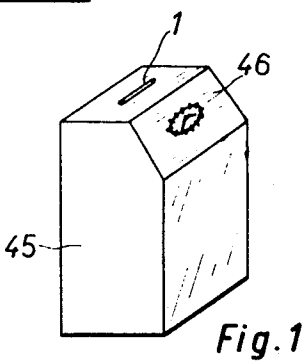
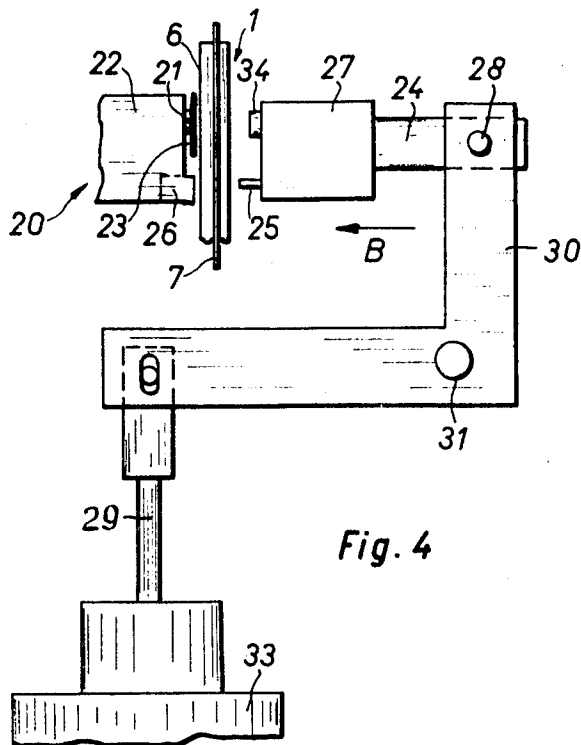
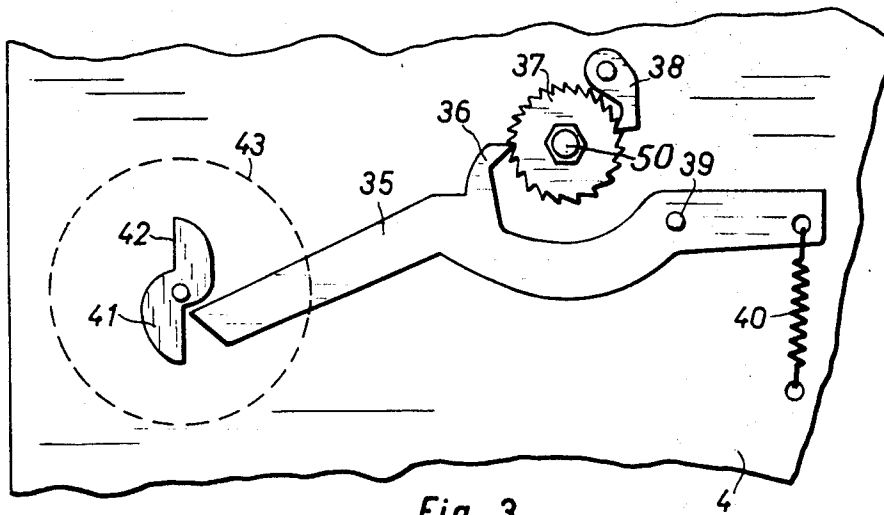


Fig. 1

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ELAPSE TIME RECORDER

The invention relates to a method of and apparatus for ascertaining time worked or a period to be ascertained on stamped or punched cards.

In previously known stamping clocks for ascertaining time worked, usually a first stamp imprint is made at the commencement of work and a second stamp imprint is made beside or beneath the first at the end of work. The calculation of the actual time worked for purposes of wages must then be done by hand, in each separate case, since automated ascertaining of the data of such stamp imprints is either impossible or extremely expensive.

It is a first object of the present invention to simplify the evaluation of stamped or punched cards by being adapted to be inserted into mechanical or electrical evaluating machines.

Another object of the invention relates to a method of ascertaining time on stamped or punched cards, comprising making markings on said card at the beginning and at the end of a period, and displacing the later marking relative to the first marking so that the space between them is proportional to the time which has elapsed.

A further object of the invention relates to an apparatus comprising means for making markings on a card at the beginning and at the end, respectively, of time worked, and means for displacing the later marking relative to the first marking so that the space between them is proportional to the time which has elapsed.

According to a further aspect of the present invention, there is provided an apparatus for ascertaining time worked on stamped or punched cards comprising conveying members for carrying out a relative displacement between a card-receiving member and a marking head in direct dependence on time such that the distance between adjacent markings on a line gives a direct measure of the time to be ascertained, and advancing members for moving the stamped or punched card in a direction at right angles to the direction of the said relative displacement.

Yet an additional object of the invention pertains to an apparatus in which time worked or other periods are applied to a punched or stamped card in such a form that rapid mechanical evaluation is possible without the card format becoming too large or the consumption of cards being substantially greater than in conventional systems, and without making operation by staff more difficult.

Other features, objects and advantages of the invention become apparent by reference to the following detailed description and drawings in which:

FIG. 1 shows a perspective view of the apparatus;

FIG. 2 shows a front view of the apparatus without casing;

FIG. 3 shows a detailed sectional view from the left side of FIG. 1;

FIG. 4 shows a side view of the apparatus in the direction of arrow A of FIG. 1.

The apparatus to be described below for ascertaining time worked or a certain period on stamped or punched cards is located in an apparatus housing 45 which is shown in FIG. 1, and in which a clock is enclosed. The basic construction of the stamping device and of the parts cooperating therewith is moreover the same as that of conventional constructions.

The present invention differs from conventional constructions, however, in that a card hopper 1 is displaced in direct dependence upon time. The horizontal displacement of the hopper 1 takes place by means of a threaded spindle 2, which engages in a bearing support or a flap 3 projecting from the card hopper 1. The threaded spindle 2 is rotatably supported at both ends by walls 4 of the housing. The threaded spindle 2 is arranged to be driven by an electric motor 5. The motor 5 is preferably formed as a polarized step-by-step switching mechanism, which carries out half a rotation of a rotor at each pole change. This rotary movement, having been reduced by gear means, is then transmitted to the threaded spindle 2. Such impulses or pole changes are emitted for instance every minute by a master clock, so that every minute a slight lateral

displacement of the card hopper 1 takes place. It would however also be possible to provide a constantly running synchronous motor the rotation of which is conveyed, greatly reduced, to the threaded spindle 2. Thus, through the rotation of the motor 5 there takes place a displacement of the card hopper 1 in one or other horizontal direction relative to the stationary housing.

The card hopper 1 itself has a frame 6, in which there is a slot 11 for receiving a punched or stamped card 7. This slot 11 is so formed that the card 7 has substantially no play, but is held in the frame 6 so as it falls by its own weight. When the card 7 is inserted into the slot 11 it cooperates at the bottom with a sliding carriage 8 for limiting the dipping distance of the cards and which is formed so as to be adjustable in height and has lateral side legs which are guided on the outside of the frame 6. In the horizontal rail 8 of the sliding carriage there is a longitudinal slot 9, in which there engages a pin 10 of an angle lever 12 having slight play. Thus the card hopper 1 can be laterally displaced by the threaded spindle 2 without hindrance by the pin 10.

For adjusting the height of the sliding carriage 8 and for restricting the depth of insertion of the card 7 there is provided an adjusting mechanism. For this purpose a lever 53 is pivotally supported by the sliding carriage 8. This lever 53 is right-angled and the outer end of which is cooperating with a pivotally mounted vertical bar 52. A microswitch 16 is actuated by this bar 52. A pinion 17, which is driven by a stepwise actuated mechanism 36-42 or a motor, engages in the toothed rod 15. Upon rotation of the pinion 17 the right-angle rail 14 which is connected with the lever 12 is displacing the sliding carriage 8 in height, so that the card 7 can be pushed a greater or lesser distance into the card hopper 1.

The motor 43 is also a step-by-step motor which carries out half a rotation of its rotor each time an impulse is received. The rotor of this motor is connected with a cam 41 with two flat radial portions 42. A lever 35 is pivotally mounted by a pin 39 on the wall 4 and cooperates with the cam 41. A nose 36 of the lever 35 is engaging a ratchet wheel 37 and is moving this wheel 37 step-by-step. A nonreturn finger 38 is preventing the wheel 37 to rotate in the opposite direction. The wheel 37 is fixed on the shaft 51 which is supporting the pinion 17.

At the opposite end of the lever 35 a spring 40 is connected, which tends to urge the lever against the cam.

In the upper region of the frame there is a marking head 20, which makes possible both punching of the card 7 and the making of a colored imprint thereupon. A type wheel 21 (FIG. 3) effecting the imprint is connected to a mechanism 22 driven by a synchronous motor 48 and a rod 49 and produces an imprint via an imprinting rubber stopper 34 and a color band 23, when a hammer 27 is moved from the rear side of the card in the direction of the arrow B. On the hammer 27 there is further secured a punch stamp 25, which can be caused to cooperate with a suitably formed aperture in a matrix 26. The hammer 27 is connected to a right-angle lever 30 via an arm 24. The connection is made by a bolt 28, which engages in a hole in the right-angle lever 30, which itself is pivotable about a bolt 31 mounted in the housing. At the other end of the right-angle lever 30 there is a push rod 29, which cooperates with an electromagnet 33, so that when the electromagnet is excited a hole is punched and simultaneously an imprint is made on the card 7 by the type wheel. The imprint and the hole are closely superimposed. The hammer 27 and the marking head 20 are stationary, in relation to the housing, whereas the card hopper 1 in FIG. 4 is displaceable at right angles to the plane of the sheet.

Thus when a card 7 is located in the hopper 1 and the electromagnet 33 is energized, a perforation is made in the card at a position determined by the height of the right-angle rail 8 and the lateral position of the frame 6 relative to the marking head 20.

The distance between first and second perforations thus gives a direct and proportional measure of the time which has elapsed and can be ascertained mechanically by an evaluating machine.

The operation of this apparatus is as follows:

Let it be assumed that the frame 6 is in the starting position, so that when a hole is made it will be positioned close to the left-hand edge of a card 7. When an employee arrives, at the beginning of work, the card 7 is pushed into the hopper 1 from above, it being assumed that the sliding carriage 8 has been previously located in its lowermost position. When the bottom edge of the card 7 encounters the lever 53, it will be pivoted somewhat about the bolt 54, whereby the vertical bar is tilted and the microswitch 16 is actuated and the circuit of the electromagnet 33 is closed. Thus a hole is punched in the card 7 by the stamp 25 by way of the push rod 32, the right-angle lever 30 and the hammer 27. Simultaneously an imprinting of the type wheel 21 takes place on the card 7, since the hammer 27 presses on the card by way of the rubber stopper 34 and the color band 23. The card 7 is then removed.

The motor 5 receives one pulse per minute from a master clock or other pulse emitter, so that it carries out a predetermined rotation each time and thus displaces the hopper 1. Preferably, the motor is formed as a direct current step motor, which carries out a half rotation when the poles are reversed. The master clock is so formed that after each pulse the poles are reversed. Through this step-by-step rotation of the motor 5, and thus of the spindle 2, which is purely dependent upon time, the hopper 1 is displaced in a lateral direction. When the card 7 is again inserted in the hopper 1 after a certain time has elapsed, e.g. at the end of work or at the end of a certain period, a further punching takes place in a similar manner. This is spaced from the first hole in the horizontal direction—i.e. lying on the same line—by a certain distance, which is in direct proportion to the time which has elapsed. This distance can be mechanically evaluated in a machine or apparatus. When the end position of displacement has been reached on the right-hand side, the motor 43 is caused to rotate by means of a switching member not shown, so that it rotates the cam 41 in a stepwise manner. Thus the sliding carriage 8 is moved a certain distance, i.e. one line upwards. It is advantageous for the motor 43 to be of similar construction to that of the step motor 5. When after this card 7 is again inserted into the hopper 1, the new punched hole and the new imprint are made one line higher up, since the card 7 cannot be pushed in as far as before. When the sliding carriage 8 has been lifted up one line, the movement of the hopper 1 takes place in the opposite direction, so that a zigzag path is described. In this way, it is possible to establish the daily time worked for two weeks on a conventional punched card with the usual dimensions of approximately 3×8 inches.

Instead of a zigzag displacement of the card 7, it would also be possible, by means not shown, when the right-angle rail 8 has been lifted up one line, to provide for a rapid return of the hopper into the left-hand starting position, so that the new line will again begin at the left-hand edge.

It would also be possible, by means not shown, to arrange for the hopper to be stationary and to allow the marking head with the punching arrangement to move along the card in dependence upon time or to substitute the lateral adjustment for the height adjustment and vice versa, so that a line would thus run in the vertical direction instead of in the horizontal direction.

It would further be possible to substitute a toothed rod for the threaded spindle 2, and a threaded spindle for the toothed rod 15.

What is claimed is:

1. Apparatus for ascertaining time elapsed, or worked, or another period, on stamped or punched cards having means for making markings on said card at the beginning and at the end, respectively, of the time period, and means for displacing the later marking relative to the first marking, so that the space between two predetermined markings is an analog of elapsed time, said apparatus comprising

an electrically operated marking head (20);

a card-receiving member (1) having means (8) locating the vertical position of the card (7) with respect to the marking head (20);

a motor (5);

a spindle (2) connected to said motor, said spindle being connected to said card-receiving member and effecting relative displacement of the card-receiving member in a horizontal direction with respect to the marking head;

means (15, 17) stepwise adjusting the position of said vertical position locating means (8) with respect to said marking head (20);

card presence-sensing means (53) located adjacent the bottom of said card-receiving member and sensing insertion of a card (7);

and switch means (16) operated by said sensing means (53) said switch means (16) being connected to said marking head (20) and causing impression of a mark on the card spaced by a horizontal distance determined by elapsed time as measured by rotation of said spindle and hence relative horizontal displacement of the card-receiving member and the marking means, and having a vertical location controlled by the stepwise position of said vertical position-locating means.

2. Apparatus according to claim 1 wherein the marking head (20) includes a hole-punching device and at least one type wheel for imprinting time indicia.

3. Apparatus according to claim 1 wherein the marking head (20) includes a punch and matrix formed with a punch-receiving opening to provide accurate positioning of a hole being punched in the card.

4. Apparatus according to claim 1 wherein the means stepwise adjusting the position of said vertical position-locating means comprises a toothed rod (8) connected to an advancing said locating means in a vertical direction;

a pinion;

and a ratchet interruptedly operating said pinion.

5. Apparatus according to claim 1 wherein the marking head (20) carries a hole matrix;

a punching stamp cooperating with said hole matrix for punching said card, and electromagnetic means operated by said switch;

and a mechanical interconnection interconnecting said electromagnetic means and said punch.

6. Apparatus according to claim 1 wherein said means locating the vertical position of said card in said card holder comprises

a horizontal rail (8) mounted for vertical displacement;

and said means stepwise displacing said rail comprises a motor;

cam means driven by said motor, pivotally mounted lever means cooperating with said cam means, a ratchet engaged by said lever means and a rack and pinion means driven by said ratchet in stepwise manner and connected to said rail to advance said rail, in steps, in a vertical direction.