United States Patent [19]

Tringali et al.

[11] **3,849,783**

[45] **Nov. 19, 1974**

[54] **TIME RECORDER**

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[73] Assignee: **Universal Business Machines Incorporated,** Columbia, S.C.

[22] Filed: **July 16, 1973**

[21] Appl. No.: **379,496**

Related U.S. Application Data

[62] Division of Ser. No. 239,124, March 29, 1972, Pat. No. 3,793,641.

[52] **U.S. Cl.** **346/134,** 271/267, 271/DIG. 9

[51] **Int. Cl.** **G01d 15/28,** G07c 1/18

[58] **Field of Search** ..... 346/82, 83, 85, 89, 90, 346/104, 134, 79; 271/54, 55, 267, DIG. 9; 234/130, 128

[56] **References Cited**

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Primary Examiner—Joseph W. Hartary

Attorney, Agent, or Firm—Kemon, Palmer & Estabrook

[57] **ABSTRACT**

A recorder for automatically printing a record receiver, such as a card, with actual time and elapsed time. The recorder includes a chute assembly with cooperating electronic elements for automatically positioning a card therein prior to selectively operating a print actuator assembly. The chute assembly is provided with a gripping apparatus for engaging the record receiver and positioning same in said chute assembly. The chute assembly is provided with a mechanism to effect automatic ejection of the card subsequent to a recording operation.

9 Claims, 19 Drawing Figures

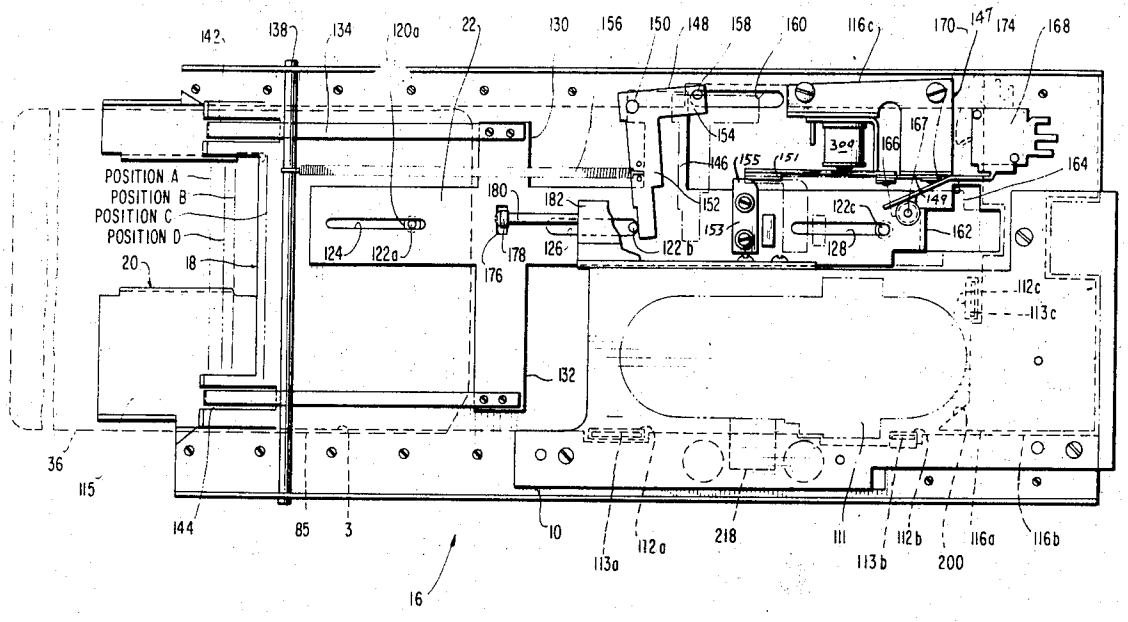


FIG. 1

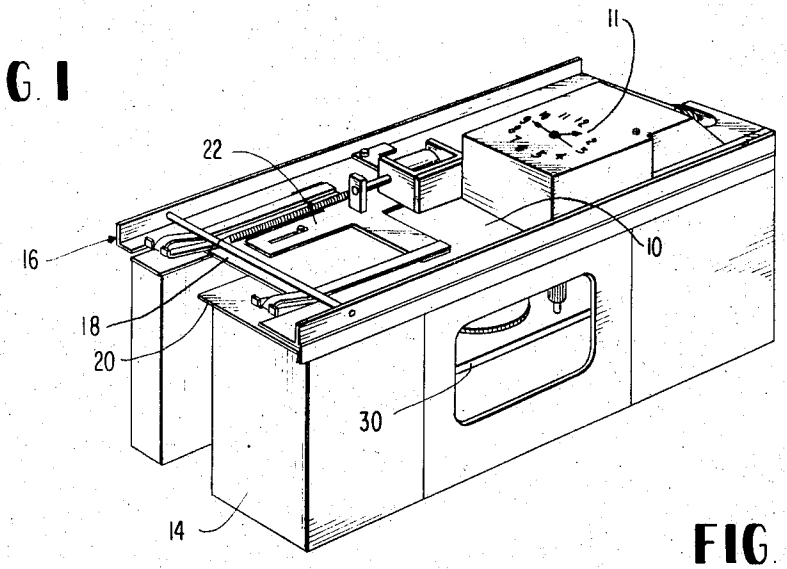

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FIG. 2

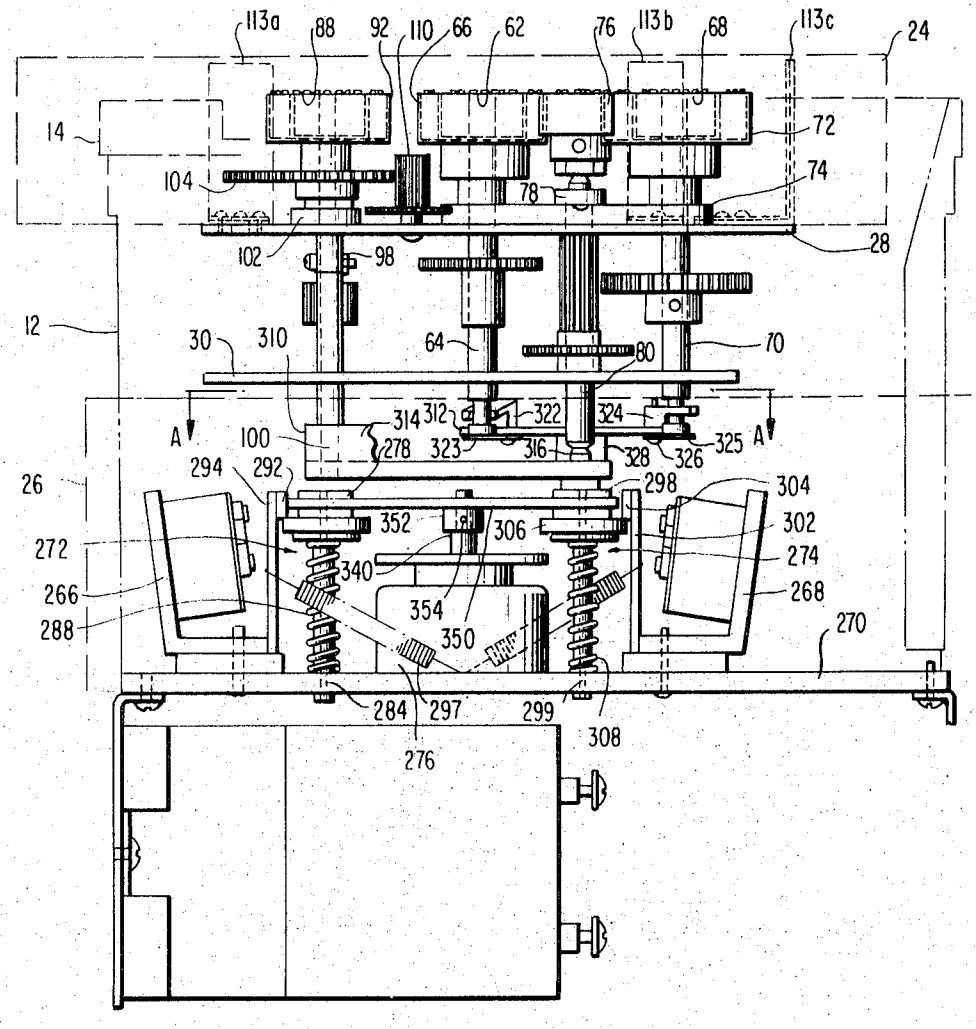
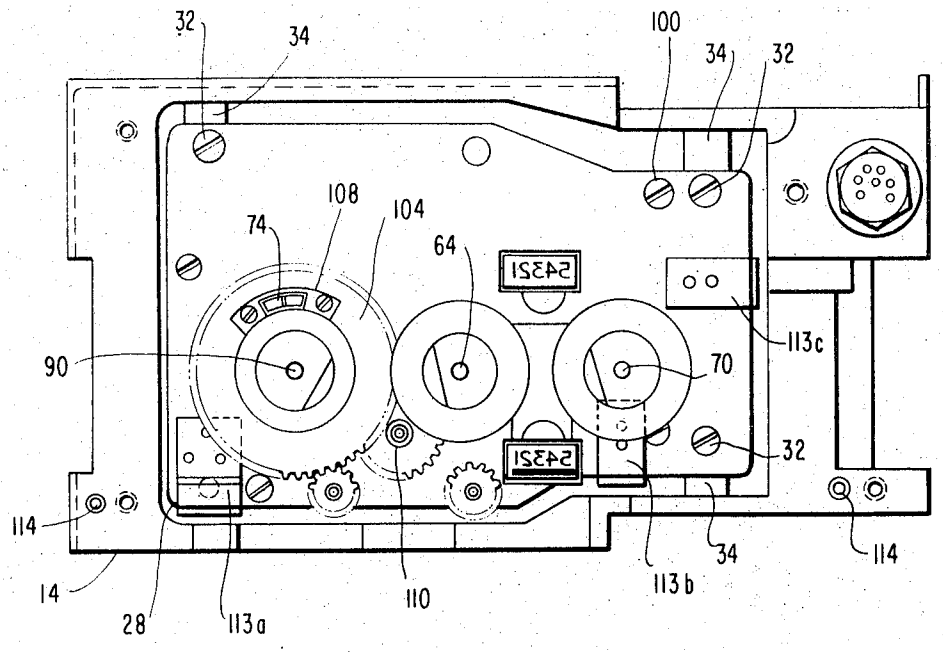

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FIG. 3



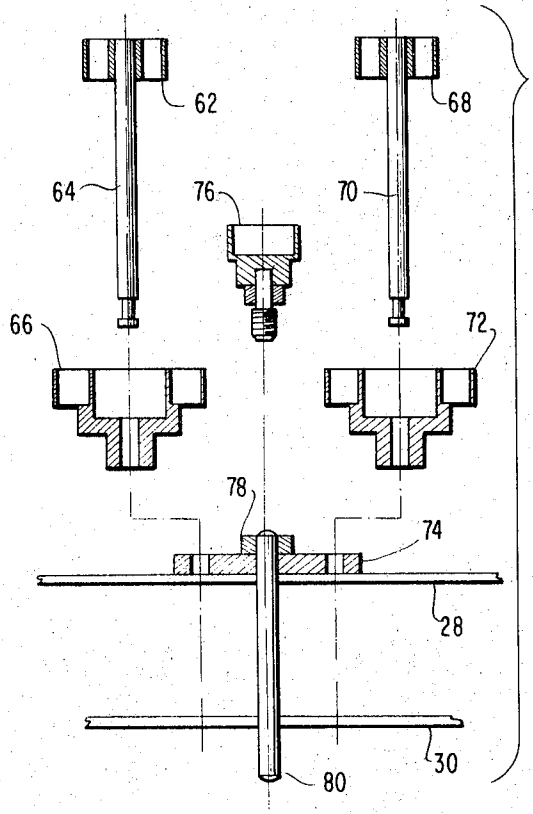


FIG. 4

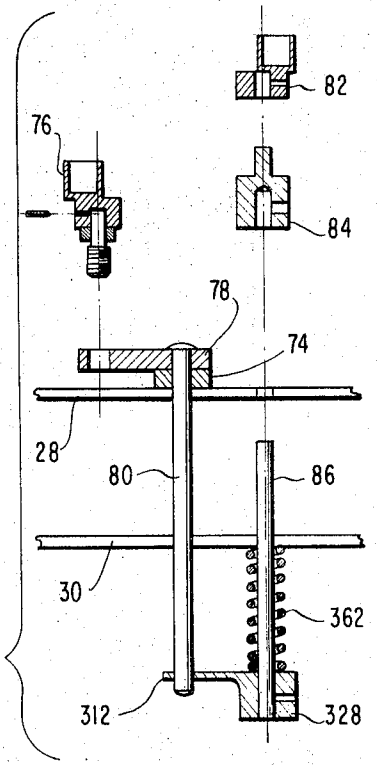


FIG. 5

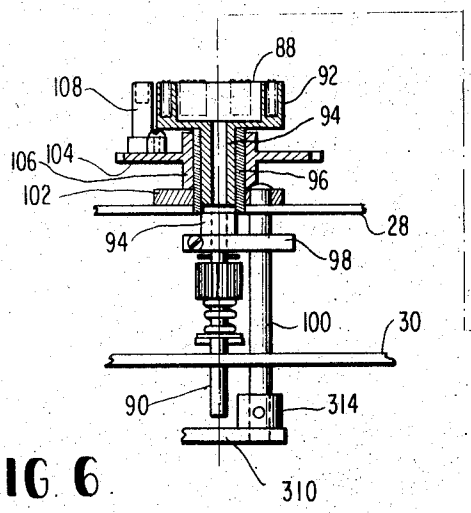


FIG. 6

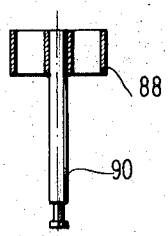


FIG. 6b

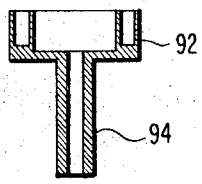


FIG. 6c

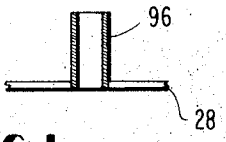


FIG. 6d

FIG. 6e

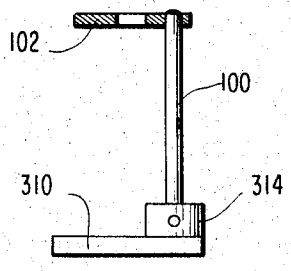
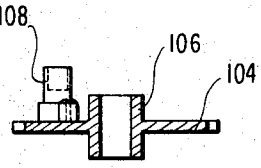


FIG. 6f



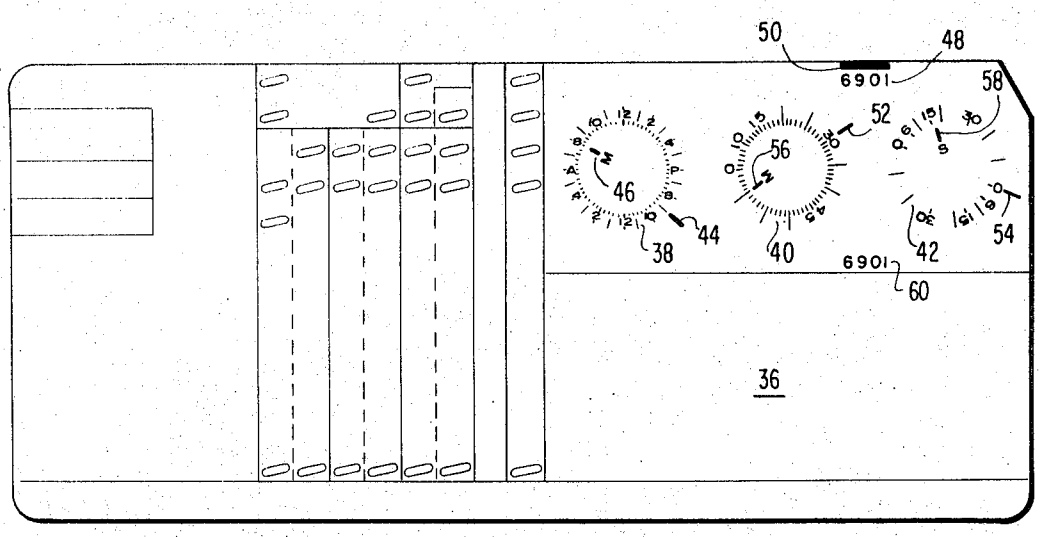


FIG. 7

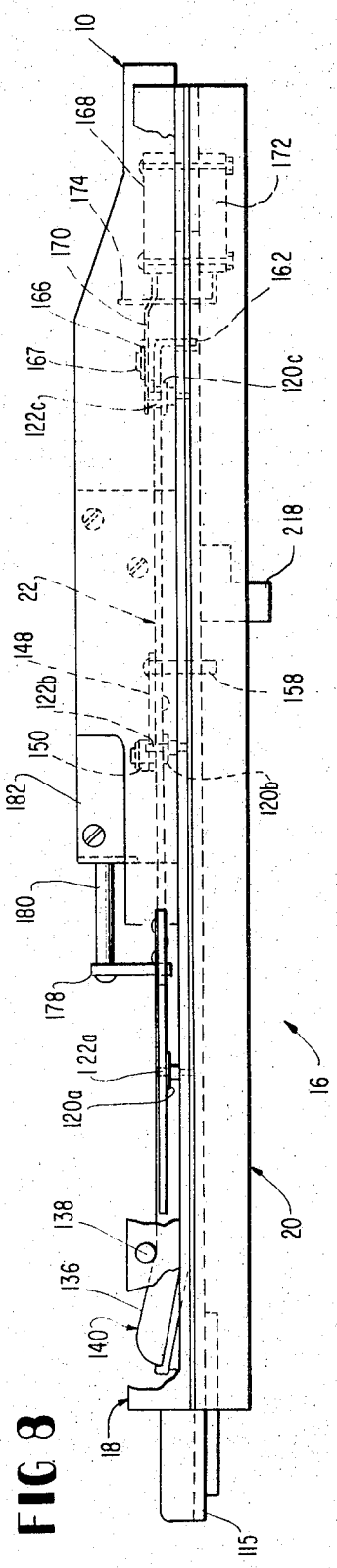


FIG 8

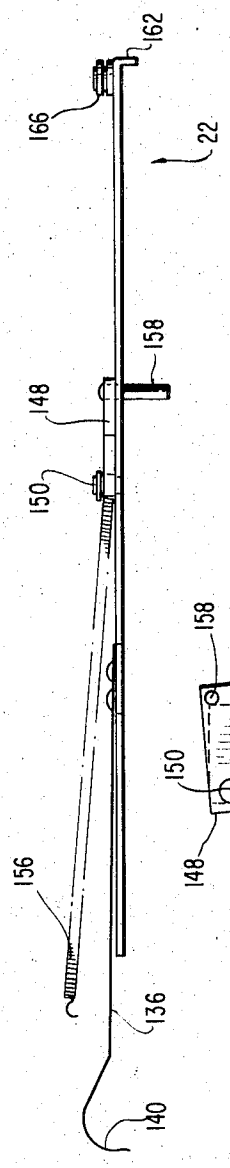


FIG 10a

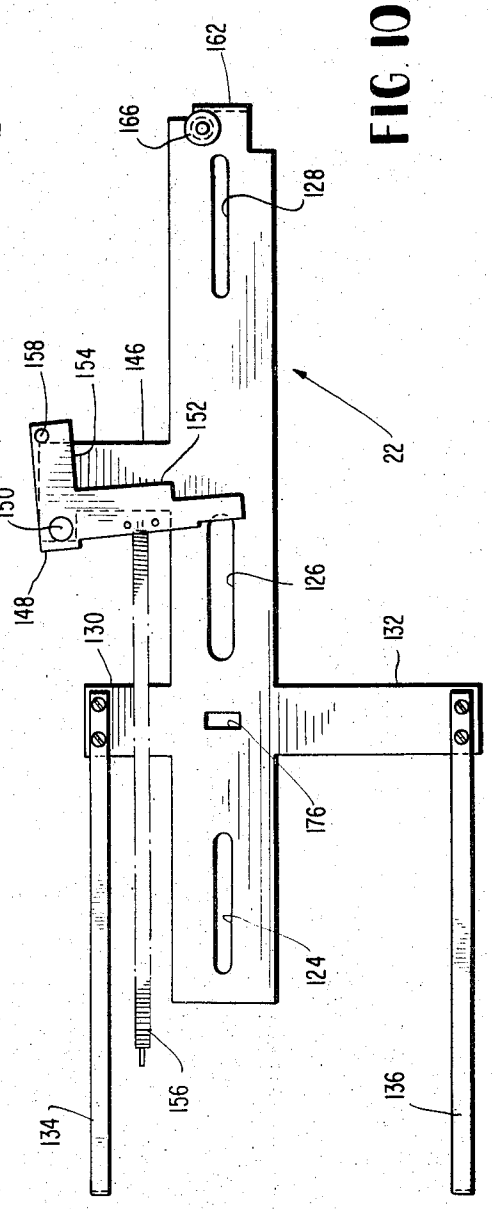


FIG 10b

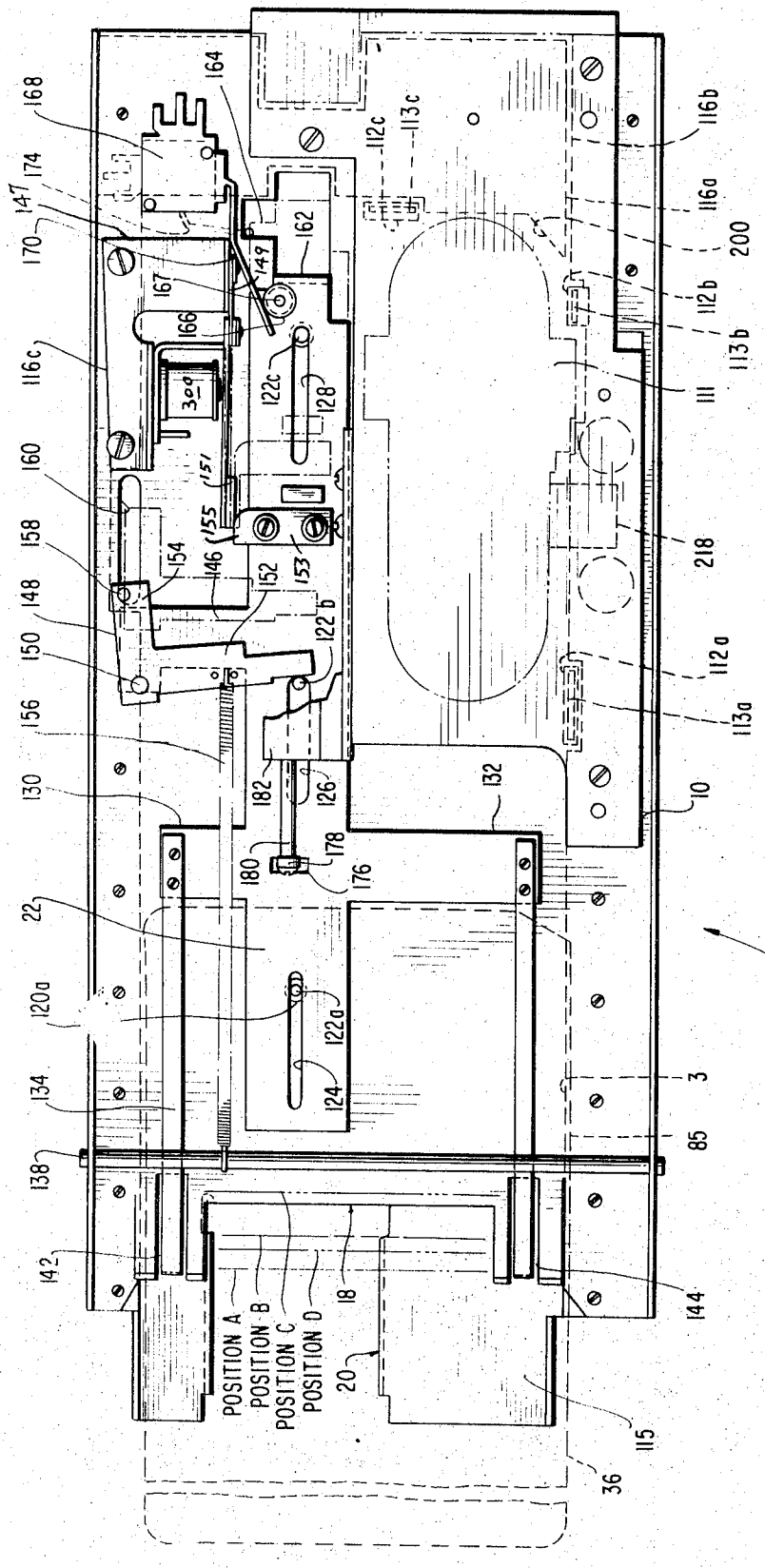

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POSITION A
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FIG. 9

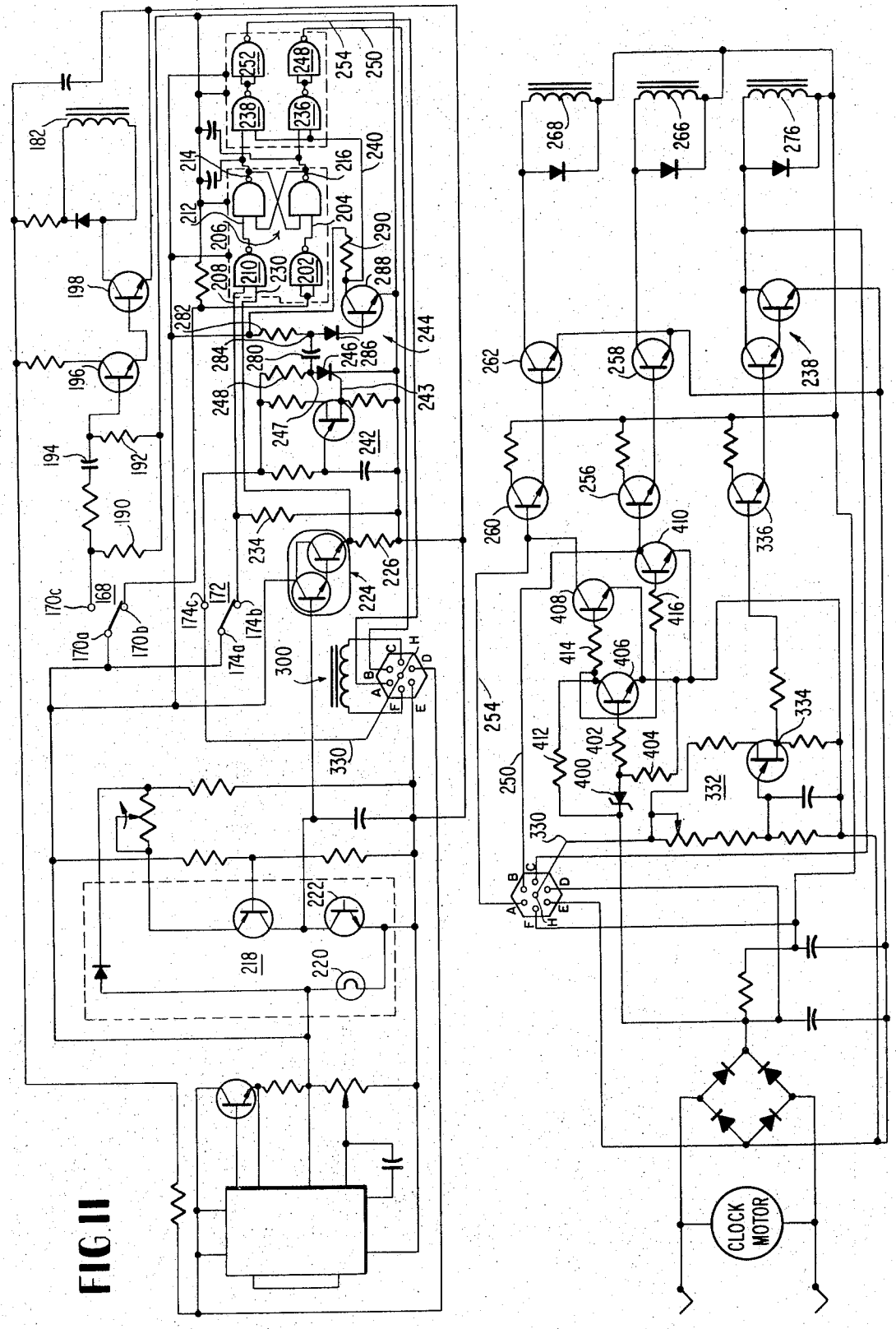


FIG. 11

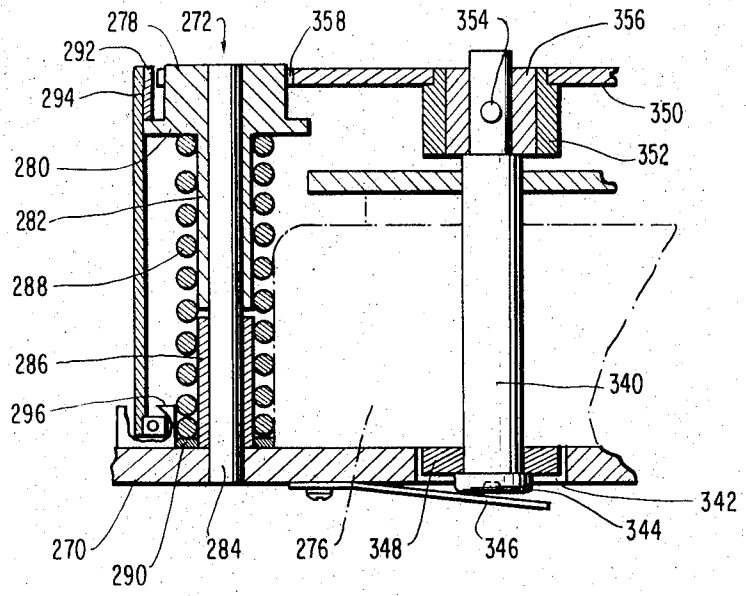

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FIG. 12

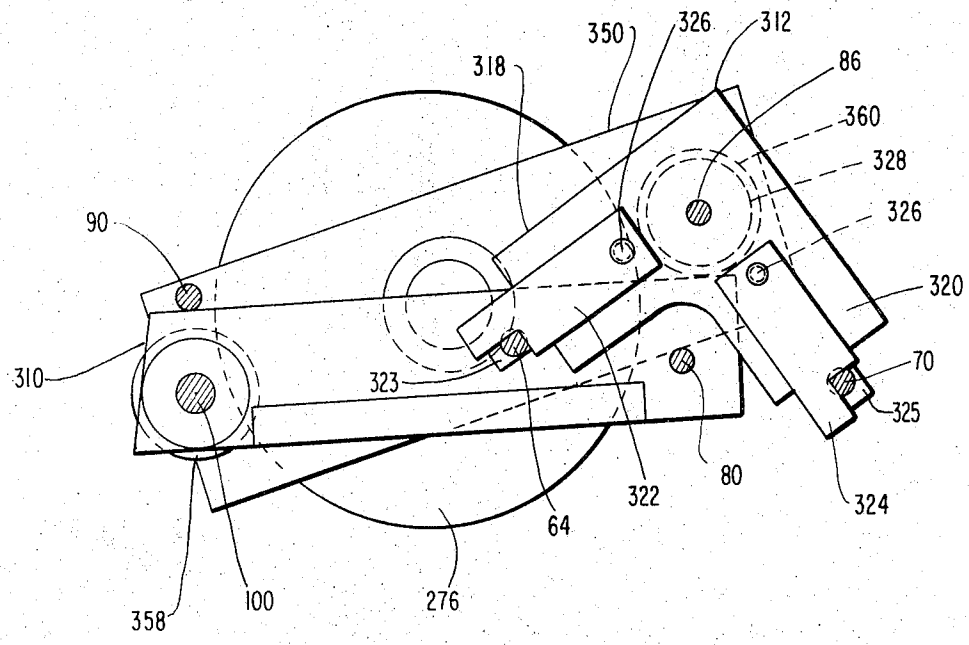

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FIG. 13

TIME RECORDER

This is a divisional application of Ser. No. 239,124 filed Mar. 29, 1972, now U.S. Pat. No. 3,793,641.

THE BACKGROUND OF THE INVENTION

The invention relates to recorders of the type employed to produce elapsed time records on cards or other record receivers.

Elapsed time recorders have been known to the art since at least the latter part of the 19th Century as is evidenced by the U.S. Pats. to H. Abbott, Nos. 449,192; 583,320; and 772,308. These patents and later issued ones such as U.S. Pat. Nos. RE 13,597; 1,582,651; 2,259,677; and 2,796,315, all appear to generally deal with an elapsed time recorder of a type known as the "Calculagraph" (Registered trademark of the Calculagraph Co., of Harrison, N.J.). The said recorder has been used, almost exclusively, by the telephone operating companies of the Bell Telephone System for about the past half century.

The said recorder is provided with mechanical elements for recording the time of day, elapsed time in minutes and seconds, and other matter on toll cards which are used for accounting purposes by telephone operating companies. To accomplish these functions, a printing assembly in the recorder is time driven by a clockworks. The printing assembly is provided with lift shafts that extend from said assembly through the clockworks and which are mechanically linked to mechanical lifting elements. The lifting elements are interconnected by mechanical linkages with a pair of operating levers that are located outside of the recorder's casing.

In use, a telephone company employee, upon the commencement of a toll call, manually positions a toll card relative to the printing assembly, and operates one of the two levers to effect a printing on the card which depicts usually by means of a suitable mark upon a printed dial the time of day as well as a mark on an elapsed minutes dial and an elapsed seconds dial. The card may then be manually removed from the recorder. Thereafter and upon completion of the call, the card is reinserted by the employee and the second operating lever is pulled to imprint suitable marks, such as arrows or the like, at least upon the elapsed minutes and elapsed seconds dials on the toll card.

Thus, it becomes readily apparent that, with "Calculagraph" type of recorders, the control is completely with the operator, and therefore, subject to human error. For example, the operator may err by simply pulling the wrong operating lever. Although only two levers are involved, it will be seen that the operator can err by:

1. pulling the first lever twice;
2. pulling the second lever twice;
3. pulling the first lever for a second printing operation; and
4. pulling the second lever for a first printing operation.

This type of error can and does result in significant annual revenue loss to the telephone operating companies.

It is also possible for the operator to produce an erroneous record in that the toll card must be positioned relative to the printing assembly for each recording operation. Even assuming the card is presented with the correct orientation, it is possible that the card will not be positioned during the second printing operation precisely as it was during the first operation. In such event, the elapsed time indicators probably will not be properly located within the elapsed time dials. Such improper recordings can and do result in revenue losses.

Finally, the said prior art recorders result in operating losses in that they are slow acting by virtue of their mechanical construction. This type of loss may be characterized as a man hours loss for the reason that time spent to supply the energy to operate the mechanical elements represents a time loss for the operation of a switchboard. In addition, the energy loss contributes to operator fatigue.

The skilled artisans working in the art have tried to overcome some of the problems set out above. For example, recorders have been provided with means for notching a card during a first printing operation. Other means are provided to sense the presence of the notch during a second printing operation to thereby prevent operation of the elements used during the first printing. In addition, the art has substituted solenoids as the actuators. However, such substitution is usually a complete substitution such that the solenoids must be energized throughout a printing operation. Prolonged energization results in unacceptable and expensive power drams in installations such as those employed by the telephone companies. Thus up to the present time, recorders of the type described have not been changed significantly. In this regard, see U.S. Pat. No. 3,409,903.

SUMMARY OF THE INVENTION

The present invention is directed to a time recorder that is capable of automatically providing recordings of elapsed time.

It is an object of this invention to provide a new and useful time recorder having means which are responsive to a condition of a record receiver for electronically effecting a printing operation on the receiver with a minimum dissipation of power.

It is another object of this invention to provide a new and useful automatically operable electro-mechanical apparatus for a time recorder.

It is an additional object of this invention to provide a new and useful card chute assembly provided with means for precisely positioning a card in a time recorder.

It is an object of this invention to provide a novel electronically operated mechanical print element lifting assembly for a time recorder.

It is another object of this invention to provide a new and useful time recorder having novel electronic means for controlling the recorder to selectively effect a first or second printing on a record receiver.

These and other objects of the invention should become more readily apparent with a study of the hereinafter described specific embodiment of the invention; the study being made with references to the following drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a pictorial view of the recorder of the invention as seen in elevation and without protective covers;

FIG. 2 is a side elevation of the printing clockworks and print actuating assemblies of the invention;

FIG. 3 is a plan view of the printing assembly shown mounted in a support member;

FIG. 4 is a detail view in side elevation of elapsed time printing members used in the printing assembly of FIG. 2;

FIG. 5 is a detailed view in front elevation of identification number printing members and lifting elements for said members;

FIG. 6 is a detailed view in front elevation of time of day printing members and lifting elements for said members;

FIGS. 6*b* through 6*f* are elevational views of certain of the elements shown in FIG. 6;

FIG. 7 is a view of one side of a typical twice printed record receiver produced by a time recorder of this invention;

FIG. 8 is a side elevation of a card chute assembly usable with the recorder of this invention;

FIG. 9 is a plan view of the assembly shown in FIG. 8;

FIGS. 10*a* and 10*b* are side and plan elevations respectively of a card slide usable in the assembly of FIG. 8;

FIG. 11 is a schematic-logic diagram of the electronics used in the recorder of the invention;

FIG. 12 is a detail sectional view in side elevation of a portion of the print actuating assembly employed to operate the printing assembly; and

FIG. 13 is a plan detail view of the lift members forming a portion of the print actuating assembly.

DESCRIPTION OF PREFERRED EMBODIMENT

A specific embodiment of a time recorder constructed in accordance with the invention is shown pictorially in FIG. 1 of the drawings. The recorder is shown without a protective casing in order that its electro-mechanical features may be shown in general and in assembled form. The recorder includes a clock dial 11 supported and carried by a top casting or member 10, with said dial having an hour hand and a minutes hand. The timing hands are turned by gears extending from a clockworks 12 that is suitably mounted within a main support frame or member 14. When the recorder is provided with a protective casing, the clock dial is visible externally thereof.

The items described thus far are essentially the same items found in the "Calculagraph" employed by the operating companies of the Bell Telephone System. The main support frame or member 14 has been machined differently to accommodate the parts of the present invention. In addition, it is used to support printed circuit component boards, not shown, which are utilized to provide circuit connections and to support circuit components of at least parts of the electronics discussed hereinafter.

As shown in FIGS. 1 and 9, a card chute assembly 16 is fastened to the member 10 by suitable means such as screws. The details of construction of the card chute assembly and its functional interrelationship will be discussed below with respect to FIGS. 8 – 10. Generally speaking, the card chute assembly comprises an upper card plate 18 and a lower card plate 20 which are secured together in spaced apart relationship and a card retract slide 22 with cooperating elements. The card chute assembly constitutes an important part of the present invention in that it functions inter alia to accept a card from an operator, and to automatically remove the card from operator control such that a printing operation may be performed on the card. When the recorder is fully assembled, the protective casing, member 10, and card chute assembly may be secured together by suitable means to form a top assembly. The assembly thus formed may then be secured to the main support member 14 by screws such that it can be conveniently removed for such servicing as may be desired.

Two other main assemblies are shown in FIG. 2. A printing assembly 24 is located immediately above the clockworks 12. The printing assembly will be described in detail below with reference to FIGS. 2–7, and it essentially comprises a number of printing heads mounted and supported for axial movement through the lower card plate 20. The printing assembly differs from that used in the "Calculagraph" in that the prints made on a record receiver such as a card, are susceptible to machine reading by a scanning device of the type described and claimed in a co-pending application of Dominick Tringali, Ser. No. 44,741, filed June 9, 1970., and assigned to the assignee of the present invention. The printing heads are similar to those of the "Calculagraph" in the sense that the recordings produced are humanly readable, as well as machine readable. As with the "Calculagraph" the print heads are mounted on shafts that extend through the clockworks 12 to shaft actuators. In the "Calculagraph," the shaft actuators comprise manually operated mechanical elements arranged to provide selective axial motion to the shafts. In the recorder of the present invention, an electro-mechanical print actuator assembly 26, FIG. 2, is employed to perform the functions of the mechanical assemblies in the "Calculagraph." The print actuator assembly of the recorder of the present invention is operated electronically in cooperation with the movement of a card in the card chute assembly; the details of such operation and of the construction of the print actuator assembly are given below.

The printing assembly 24, clockworks 12, and print actuator assembly 26 are shown mounted within and to the main support 14 in FIGS. 2 and 3 of the drawings. The clockworks, which may comprise in general the same gear assembly employed in the "Calculagraph," with one variation to be mentioned later, is supported by the usual upper and lower register plates 28 and 30. The assembly 24 is carried by the plate 28 which is connected to the brackets 34 by the screws 32, as best seen in FIGS. 2 and 3 and in detail in FIGS. 4–6. As stated previously, the print heads differ from the "Calculagraph" heads in that the record obtained is both machine and humanly readable. To this end, the printing dies employed are provided with type that will print sharply defined bars to provide record indications of hours and minutes and elapsed minutes and elapsed seconds relative to three clock dials.

A completed recording made on the so-called front face of a card 36 is shown in FIG. 7 where the time of day is shown relative to a dial 38, while elapsed minutes and elapsed seconds are respectively shown related to dials 40 and 42. The three dials are printed along with an hours indicator 44 and a minutes indicator 46 during a first printing operation. In addition, an identification number 48 and a black bar 50 are printed at the top edge of the card 36 approximately between the dials 40

and 42 during the first printing operation. The bar 50 is printed on the card for the purpose of generating a signal for the electronics of the recorder of the present invention as will be discussed below.

The die used for printing the dial 40 includes type or its equivalent for printing a reference mark 52 adjacent the 30-minute calibration line. Similarly, the die for printing the dial 42 includes type for printing a reference mark 54 adjacent one of the two zero calibration lines on the dial the dial is a 120 second dial. It was mentioned above that the clock gears in the clockworks differ from the "Calculagraph's" clockworks in one particular. Specifically, the seconds gear rotates at ½ revolution per minute or such that it makes ½ revolution per minute. Thiis change is deemed important for it increases the resolution of the elapsed minutes recording that may be obtained both visually and automatically by a machine. Specifically, during a second printing operation, an elapsed minutes indicator 56 is printed within the dial 40, and an elapsed seconds indicator 58 is printed within the dial 42. In the event that the elapsed minutes value is an even value, i.e., 0,2,4, etc., the seconds indicator should be located relative to the first 60 seconds of the dial 42. The first 60 seconds may be counted clockwise from the zero indicator not adjacent the reference indicator 54. Similarly, if the elapsed minutes value is odd, i.e., 1,3,5, etc., the indicator 58 should be located relative to the last half of the dial 42. The resolution obtained is important particularly if elapsed time is used for accounting purposes. Error can occur in the elapsed minutes recording by virtue of gear backlash in the clockworks and for similar mechanical factors. Electronic means may be utilized for automatically cross comparing the two recordings to correct for such error. Finally, during the second printing operation, a second identification number 60 is printed. As with the first such printing, the record 60 is made between the dials 40 and 42, however, it is made approximately near the longitudinal center of the card 36. This number should be the same identification number as the number 48; if it is not, then the card has been recorded with an erroneous value of elapsed time.

Referring to FIGS. 2, 4 and 5, the elapsed minutes indicator print die is supported within a container 62. The die, as with all the print dies referred to hereinafter, may be of the ink transfer type as manufactured and sold by the National Cash Register Company. Alternatively, the dies may conveniently be pads made out of ink pad material. In either case, such dies are preferred over metallic dies in that either type eliminates the need for an ink ribbon and a ribbon transfer or advance mechanism. The pad container 62 is fixedly attached to one end of a minutes shaft 64 and it is dimensioned such that it is normally seated within a second pad container 66. The container 66 comprises a support for the printing die used to produce the dial 40 and the reference indicator 52. A third pad container 68 is attached to one end of a seconds shaft 70, and it is dimensioned such that it is normally seated within a fourth pad container 72. The containers 68 and 72 respectively support the ink pads used to produce the elapsed seconds indicator 58 and the dial 42 with reference indicator 54. The elapsed time dial pad containers 66 and 72 are respectively keyed to the containers 62 and 68 such that the containers may be rotated by the respective shafts 64 and 70. The keying and construction are such that the containers 66 and 62 may be moved in the axial direction of the shaft 64 relative to each other. The same type of keying and construction is employed for the containers 68 and 72. The containers 66 and 72 are normally seated on a lift plate 74. The shafts 64 and 70 extend through the respective containers and through spaced apart clearance holes in the lift plate 74. In addition, the shafts extend through the clockworks plates 28 and 30, and are respectively engaged by the clockworks' gearing to turn the container 62 at a minutes rate and the container 68 at one-half of a seconds rate. A pad container 76 for supporting an ink pad capable of producing the identification number 48 and bar 50 is carried by a bracket 78 which is mounted on and secured to the plate 74 by a lift shaft 80. The shaft is so affixed to the lift plate that movement of the shaft in one direction along its axis is effective to lift both the plate 74 and bracket 78 and thereby effect movement of the containers 66, 72 and 76. The shaft 80 extends through the clockwork plates 28 and 30, but unlike the shafts 64 and 70, it is not engaged by the clockworks. As shown in FIG. 5, a second identification number print pad container 82 is supported in spaced relation to the first such container 76 by a lift member 84, which is provided with a cavity or recess for receiving one end of a lift shaft 86. The shaft 86 may conveniently be locked to the container by any suitable means such as a set screw. The member 84 is normally supported on the top plate 28 of the clockworks, while the lift shaft extends through the bottom plate 30.

The time of day portion of the printing assembly is best seen in FIGS. 2, 3 and 6. A minutes print pad container 88 is supported by a shaft 90 for rotation within a cavity in a second container 92, which has a depending hollow tubular portion 94 that in turn extends through a collar 96 mounted on the plate 28. The shaft 90 extends through the portion 94 and collar 96 as well as the plates 28 and 30, and is engaged by the clockworks to rotate the container 88 at a minutes rate. The container 92 is used to support a print pad for producing the dial 38 (FIG. 7), while the tubular portion 94 is secured against rotation by a clamp 98 attached to a non-rotating lift shaft 100. The lift shaft 100 extends through the plates 28 and 30 and terminates in a lift bracket 102 that is supported on top of the plate 28 with said bracket having a clearance hole for the collar 96. A gear 104 with a hub 106 that encompasses the collar 96 is supported by the bracket for rotative movement with respect thereto. The gear 104, in turn, is used to support a print pad container 108 on its upper surface and near its outer periphery, i.e., just outside of the container 92. This last noted container supports the print pad for marking the hours indication 44 (FIG. 7). The gear 104 is engaged and rotated at the rate of one revolution per 24 hours by a pinion 110, FIG. 2, where the pinion is provided with an extension into and in engagement with the clockworks. The description thus far has dealt with a time printing assembly and clockworks that is generally known. Changes from and improvements in the known assembly were noted. The description that follows deals with the major assemblies and circuits of the present invention.

THE CARD CHUTE ASSEMBLY

It is the function of the card chute assembly to accept a card from an operator, to remove the card from the

operator's control, to automatically position the card for a printing operation, and to thereafter eject the card from the recorder. Electronic triggering and print operation selection means are operatively associated with the card chute assembly and operate as hereinafter described.

As noted above, the card chute assembly **16** includes an upper card plate **18** and a lower plate **20.** The details of the assembly, the plates and other apparatus may be best viewed in FIGS. **8** through **10.** Each of the plates **18** and **20** is shaped and provided with slots and holes as hereinafter discussed. The plates may be provided with upwardly directed and downwardly directed side flanges respectively if desired to thereby provide additional area for mounting electrical components. The lower plate **20** is provided with a slotted shaped area **111,** FIG. **9,** into which the printing assembly **24** extends. In addition, both of the plates **18** and **20** are slotted at locations **112***a* and **112***b* along one side and at a right hand end location **112***c* to receive card guides **113***a*, **113***b*, and **113***c*. The guides are, in the preferred embodiment, mounted on the upper plate **28** of the clockworks (FIGS. **2** and **3**) and extend upwardly through the respective slots in the plates **18** and **20.** In addition, the plates **18** and **20** may be provided with a sufficient number of clearance holes to receive guide pins **114,** FIG. **3,** mounted on the upper surface of the main support member **14.** As will be seen hereinafter the location of such pins is not critical to the operation of the recorder in that the guides **113***a* through **113***c* are employed for positioning a card relative to the printing assembly. The guide pins **114** may be employed to facilitate the assembly of the card chute assembly with the main support member. The plate **20** is also provided at one end with a card receiving shelf **115.**

As shown in FIGS. **8** and **9,** the card chute plates **18** and **20** are secured together in spaced relation by any suitable means, not shown, with the spacing being determined by a plurality of shim members **116***a*, **116***b*, and **116***c* that are interposed between the plates. The shims should be of sufficient thickness to allow the card **36** to be easily inserted into the space between the plates, and the shims should be dimensioned to allow all around clearance for the cards. A card slide **22** shown in detail in FIGS. **10***a* and **10***b*, is mounted for reciprocating motion above the upper surface of plate **18** on three bearing surfaces. The bearing surfaces may be provided by annuluses **120***a*, **120***b*, and **120***c* supported on guide pins secured in the plate **18,** where the pins are provided with projections **122***a*, **122***b*, and **122***c* that extend into slots **124, 126,** and **128** respectively in the slide **22.** The bearing surface portions of the annuluses are preferably of small area so as to minimize friction.

For the purpose of this description, the left hand portion of the slide as viewed in the drawings will be termed the front part. This terminology is adopted for the reason that such portions extend in the direction of the card input. The slide is provided with arms **130** and **132** extending laterally of front-center, where each arm supports a forwardly extending leaf spring **134** and **136** respectively, at its terminal portion. Each of the springs passes under a cam bar **138** supported by upwardly extending side flanges of the plate **18.** The springs are further provided with hooked end portions **140** that extend over grooves **142** and **144,** FIG. **9,** located in the plates **18** and **20** at the front portion thereof. When the slide is located in its forward position, as shown in FIGS. **8** and **9,** the hooked end portions **140** are clear of the opening to the cavity between the plates **18** and **20.** A third laterally extending arm **146** is located at the center-rear portion of the slide **22** and is used to support a card positioning operator **148** that is pivotally mounted, by a pin **150,** upon the upper surface of the arm **146.** The operator **148** may have an L-shaped configuration embodying a longer leg **152** and a shorter leg **154.** In the preferred embodiment, the slide **22** is held in the forward position by a slide return spring **156** that is attached to the cam bar **138** and the leg **152** of the operator **148.** The short leg of the operator is used to support, on its lower surface, a card seating pin **158.** The pin **158** projects downwardly from the leg **154** and through a slot **160** in the plates **18** and **20.** When the slide is in the above mentioned position, the long leg **152** engages the guide pin **122***b* to bias the card seating pin **158** counterclockwise out of the card insertion area between the plates **18** and **20.**

The upper plate **18** adjacent the slot **160,** FIG. **9,** has mounted thereon an angle bracket or support member **147** which has affixed thereto one end of a flat spring **149.** The free end of the spring **149** carries a trigger assembly that includes a protruding segment or sear **151** which is designed to engage a latch member **153** that is secured to the card slide **22** adjacent the forward end of the slot **128.** The latch member **153** is mounted upon the slide **22** so that an end portion **155** projects beyond the side of said slide **22.** The end portion **155** of the latch member **153** is formed with a flat forward edge or surface which is engaged by the rear or trailing edge of the sear **151** so as to retain the slide **22** in its retracted or card inserting position. The rear edge or surface of the projecting end portion **155** of the latch member **153** is rounded or curved to facilitate the movement or passage of the latch member along the lower or bottom surface of the sear **151.** The spring **149** continuously urges the protruding segment or sear **151** into engagement with the projecting end portion **155** of the latch member while a coil **300** mounted on the bracket **147** will, upon being energized, attract the spring **149** and trigger assembly. This action by the coil will cause the sear **151** to be withdrawn from engagement with the forward edge of the latch member **153** and thus release the card slide **22** whereby it may be returned to its initial or starting position by the spring **156.**

At its rearward end, the slide **22** is provided with a depending arm **162.** The said arm extends into a cavity **164** created by slotting the plates **18** and **20,** and when the slide is in its forward position, the arm **162** is located at the front end of the cavity. The rear end portion of the slide **22** carries a switch operator **166** that is rotatably supported on a pin **167** adjacent the depending arm **162.** A card seating switch **168,** FIG. **9,** may be supported by the plate **18** such that a movable contactor **170** engages the operator **166.** A card print switch **172,** FIG. **8,** may be supported by the lower plate **20.** In the preferred embodiment, a movable contactor **174** for the print switch **172** extends into the cavity **164** at a location spaced rearwardly of the downwardly projecting arm **162** of the slide **118.** Finally, the card slide **22** has formed in the forward portion thereof between the arms **130** and **132** a slot **176** which receives a slide operator **178.** The slide operator **178** is designed to have a loose fit in the slot **176** when in an

inoperative condition and said operator is carried by a movable armature **180** of a card seating solenoid **182.**

OPERATIONAL DESCRIPTION INCLUDING THE PRINT ACTUATOR ASSEMBLY

In operation, the card **36** is placed face down on the shelf **115** and inserted by an operator into the opening defined by the plates **18** and **20** until it engages the depending arm **162** at the end of the slide **22.** At this point in operation, the trailing edge of the card will be located approximately one-half inch (position A in FIG. **9**) from the opening between the plates. As the operator continues insertion of the card, the slide **22** will be moved in a rearward direction against the force of the slide return spring **156.** As a result of such movement, the card springs **134** and **136** mounted on the arms **130** and **132** respectively of the slide are gradually cammed down by the cam bar **138** such that their hooked end portions **140** are positioned in non-touching relation behind the trailing edge of the card. Movement of the slide **22** in the rearward direction also causes the card positioning operator **148** to be pulled by the spring **156** in a clockwise direction about its pivot pin **150.** The card seating pin **158** mounted on the underside of the leg **154** of the operator **150** is rotated clockwise such that it engages a side edge of the card **36.** The amount of rotation within the slot **160** is such that the card seating pin **158** urges the opposite side of the card **36** firmly against the card guides **113***a* and **113***b*.

Movement of the slide **22** in the rearward direction also cause the rotary switch operator **166** to disengage from the movable contactor **170** of the card seating switch **168** thereby causing the contactor **170** to break connection with a stationary terminal **170***b* and make electrical connection with a second stationary terminal **170***c;* see FIG. **11.** The switch is operated in the preferred embodiment when the trailing edge of the card is approximately one-quarter inch from the chute assembly opening, i.e., at position B in FIG. **9** The contactor **170** is connected to a regulated source of d.c. voltage such that operation of the switch **168** places the terminal **170***c* at the source level. The terminal **170***c* is connected to a pulse forming timing circuit **190** comprised of three resistors and a capacitor, at least one of the resistors **192** and a capacitor **194** forming a differentiator circuit having its output connected to the base electrode of a transistor **196.** The emitter electrode of the transistor **196** is connected directly to the base electrode of a second transistor **198** which has the card seating solenoid **182** connected to its collector as a load. So long as the contactor **170** makes with the stationary contact **170***b* the transistors **196** and **198** are non-conducting such that the card seating solenoid **182** is unenergized. When the contactor **170** makes with the terminal **170***c*, a pulse is formed by the circuit **190** and applied to the base of the transistor **196** causing the said transistor to current saturate and thereby cause the transistor **198** to break into conduction. With the transistor **198** conducting the card seating solenoid **182** is energized to effect movement of its armature (see FIGS. **8** and **9**) in a rearward direction. With such operation, the slide operator **178** is carried by the armature in a rearward direction to thereby power the slide **22** rearwardly.

As the slide **22** continues to travel in the rearward direction, the hooked end portions **140** of the springs **134** and **136** engage the trailing edge of the card to carry or propel the card into the recorder completely out of reach of the individual who initially inserted the card for recording. In the preferred embodiment, the trailing edge is located approximately one-tenth of an inch into the area between the plates **18** and **20,** or that is, at position C in FIG. **9** of the drawings. When the card is located as described, its leading edge is lodged firmly against the front end card guide **113***c* and, as previously noted, the movement of the card seating pin was effective to lodge a side edge of the card **36** against the guides **113***a* and **113***b*. The rearward movement of the slide **22** causes the curved surface of the projecting end portion **155** of the latch member **153** to move under the trigger assembly so that the sear **151** will engage the forward edge of the latch member **153** as the card is being completely positioned for the printing operation. The use of the latch mechanism to hold the card slide in its final or operation position enables the card to properly settle into position immediately prior to initiating the printing operation. This arrangement or combination of operations tends to insure that there will be precise seating and optimum print operation upon each and every card that is properly positioned within the recorder.

It will be noted that the card **36** is notched or beveled at one corner, FIG. **7.** If no provision is made within the recorder for rejecting the card in the event that it was improperly placed on the slide **115,** i.e., if it was placed face upward instead of face downward, then the automatic movement of the slide **22** as described will, in cooperation with the card, cause a printing operation to be carried out on the card, as hereinafter described. It may be desirable to make provision to prevent a printing operation in such a case. To that end, the shim **116***b* may be provided with a forwardly extending projection **200** which should be configured to cooperate with the beveled corner of the card **36.** The projection **200** as will be seen in FIG. **9,** extends forwardly of the contactor **174** for the print switch **172.** Accordingly, if the card is placed in any but the correct position in the recorder, then the notched or beveled portion of the card will be so located that the projection **200** intercepts a squared off corner of the card to thus prevent operation of the print switch. Under such circumstances, the latch member **153** will not have moved completely under the sear **151** of the trigger assembly so that the card slide will not be held in a latched position whereby the springs **134** and **136** will flex while the card is held between the plates **18** and **20** solely by virtue of the operation of the card seating solenoid **182.** After the period of time defined by the timing circuit **190** (FIG. **11**) expires, the transistors **196** and **198** cease to conduct such that the card seating solenoid **182** de-energizes, thus restoring the force of the spring **156,** which returns the slide **22** to the position shown in FIG. **9.** The downwardly extending operator **162** being in engagement with the leading edge of the card during the return of the slide **22** permits the slide to effect ejection of the card from the recorder. It will be noted that as the spring **156** returns the slide forwardly, the arm **152** of the operator **148** engages the pin **122***b* such that the card seating pin **158** is rotated out of engagement with the edge of the card. The restoring force of the spring **156** should be sufficient to cause the trailing edge of the card **36** to be ejected or returned to position A. When the trailing edge of the card is approximately

three-eighths of an inch from the opening between the plates **18** and **20** or, that is, at position D, as shown in FIG. **9**, contactor **170** is restored in connection with the terminal **170***b* of the switch **168.**

The following description deals with the situation where the card **36** is properly oriented in the opening between the plates **18** and **20** of the card chute assembly. Referring to FIG. **11** of the drawings, it will be noted that the contact **170***b* of the card seating switch **168** is connected directly to an input of an inverter **202** and the inverter is connected on its output to a reset input **204** of a NAND latch **206.**

The latch **206,** gate **210,** and inverter **202** comprise together a print operation selector circuit composed in the preferred embodiment, of positive NAND logic. With the switch **168** in the position shown, the latch **206** is accordingly, in its reset condition for the reason that the contactor **170** is effective when made with the terminal **170***b* to send the reset input **204** of the latch to a low potential level, e.g., ground. As in the usual case, then, the latch is at a high potential level on a reset output **216.**

The circuits are arranged to cooperate with a photocell assembly **218** comprising a lamp **220** and a photo transistor **222** only after the switch **168** has been operated such that the contactor **170** breaks with the terminal **170***b*. To this end, the assembly **218** is mounted, see FIGS. **8** and **9,** relative to the opening between the plates **18** and **20** such that a black bar **50** printed in the position shown on the card **36** in FIG. **7** will interrupt the normal transmission of light from the lamp **220** to the photo transistor **222** after operation of the switch **168.** As shown in FIG. **11,** the collector of the photo transistor **222** is connected to the base electrode of a Darlington amplifier **224.** The Darlington is connected by its collector to the regulated d.c. supply and its emitter electrode is connected through a load resistor **226** to ground. The emitter of the amplifier **224** is also connected to a second input **230** of the NAND gate **210.** With these connections, so long as the photo transistor **222** receives light from the lamp **220,** the base electrode of the Darlington **224** and hence, its emitter electrode will be at effective ground. The input **208** for the gate **210** is connected to a stationary terminal **174***b* of the print switch **172,** and the terminal **174***b* is connected to ground through a resistor **234** having the same value as the load resistor **226** for the Darlington amplifier **224.** The movable contactor **174***a* of the print switch **172** is connected directly to the regulated d.c. supply such that when the switch is in its unoperated condition, the terminal **174***b* is connected through the contactor **174***a* to the positive supply. The potential thus established between the terminal **174***b* and ground is sufficient in and of itself to send the input **208** to the NAND gate **210** high. In a like manner, a positive potential on the emitter of the amplifier **224,** i.e., a supply voltage established between the emitter and ground across the load resistor **226** is sufficient to, in and of itself, send the input **230** of the NAND **210** high.

With the operation of the card seating switch **168,** the terminal **170***b* becomes open thus sending the output of the inverter **202** high such that the reset input to the latch **204** is high. At this time, however, the set output **214** of the latch is low and consequently, the reset output of the latch **216** will remain at a high potential level. After operation of the switch **168,** if the photo transistor **222** responds to a bar **50,** it will send the base and consequently the emitter of the amplifier **224** high such that the input **230** to the NAND gate **210** will go high. Input **208** of the NAND gate **210** will remain high until the print switch **172** is activated breaking the connection between contacts **174***a* and **174***b* of **172.** Consequently, the input **212** for the latch **206** will be at a low potential to thereby send the set output **214** of the latch to a high potential level. Under these conditions, both inpputs to the reset portion of the latch will be at a high potential to drive the reset output **216** to a low or zero potential level. It should be noted that operation of the print switch **172** removes the positive d.c. potential from the terminal **174***b* such that after such operation, the input **208** to the NAND gate **210** cannot go high and the latch **206** cannot thereafter be set. Accordingly, the latch **206** can only be set during the interval between the operation of the card seating switch **168** and the operation of the card printing switch **172.**

The reset output **216** of the latch is connected to a first input of a two input NAND gate **236,** and the set output **214** is connected to one input of a second two input NAND gate **238.** The other inputs for each of the gates **236** and **238** are connected in common to a pulse line **240** where the line is connected to receive pulses from a timing circuit comprised of a Unijunction Transistor (UJT) Time Delay Circuit **242** and a Pulse Forming Network **244.** Time Delay Circuit **242** is comprised of a UJT circuit of the usual manner arranged to receive power and begin the timing cycle when Print Switch **172** is activated to connect movable contact **174***a* to contact **174***c*. The UJT circuit acts to deliver a positive pulse on line **243** at the end of its timing cycle. The Pulse Forming Network **244** is comprised of a Silicon Controlled Rectifier (SCR) **246,** resistor **248,** capacitor **280,** resistor **282,** diode **286,** transistor **288** and resistor **290.** In the normally unoperated condition, Print Switch **172** has its movable contact **174***a* connected to contact **174***b*. Thus contact **174***c* has no voltage source connected to it and is at ground potential. Consequently UJT circuit **242** and the anode circuit of SCR **246** are unpowered. The base of transistor **288** is driven through resistor **282** and diode **286** thus keeping the transistor turned on which keeps the collector and line **240** at ground potential. Upon activation of Print Switch **172** power is applied through contact **174***b* to the UJT circuit **242** and to the anode of SCR **246.** Since SCR **246** is turned off, capacitor **280** is charged through resistor **248.** The displacement current flows through diode **286** and the base of transistor **288.** Since transistor **288** is already saturated this extra base current has no effect on the potential of line **240.** At the end of its timing cylce of the UJT circuit **242** fires. The pulse appearing on line **243** turns on SCR **246** dropping line **247** to ground potential. In the usual manner the potential of line **284** drops by the same amount as line **247** cutting off current flow through diode **286** and the base of transistor **288.** Transistor **288** is therefore turned off and the potential of line **240** raised to the high logic level. Capacitor **280** is recharged through resistor **282** in the usual manner until the potential of line **284** raises sufficiently to turn transistor **288** back on, thus again lowering the potential of line **240.** Thus it is shown that the duration of the high potential on line **240** is limited by the RC time constant of resistor **282** and capacitor **280.**

Since the card is latched into place by latch **153** after operation of Pull Solenoid **182**, the delay time of UJT circuit **242** may be of any duration but in this embodiment was chosen to give sufficient time for the card to settle into place. The pulse duration on line **240** was chosen to be of sufficient time to actuate print coil **266** or **268** as required. Under the above conditions, one input for each of the gates **238** and **236** will go to a high potential level whenever the line **240** is pulsed and the inputs will remain at said level so long as the pulse persists on the line **240**. Accordingly, the outputs of the gates **236** and **238** are solely determined by the condition of the outputs **214** and **216** of the latch **206**, and the outputs of the gates **236** and **238** will change state only during the existence of a pulse on the line **240**. At all other times, the outputs of both NAND gates are at a high potential level. The NAND gate **236** is connected through an inverter **248** to a first print operation signal line **250**, and the NAND **238** is connected through a second inverter **252** to a second print operation signal line **254**.

It should be apparent that the print operation signal lines **250** and **254** are normall at a low potential. The line **250** will be pulsed whenever the reset output **216** of the latch **206** is simultaneously high with a pulse on the line **240**, and similarly, the line **254** is pulsed whenever the set output **214** of the latch **206** is simultaneously high with a pulse on the line **240**. The line **250** is connected to a base electrode of a transistor current switch **256** where the switch is connected by its emitter to the base electrode of a transistor driver **258**. Similarly, the second print operation signal line **254** is connected to the base electrode of a second transistor current switch **260** having its emitter connector to drive the base of a transistor **262**. Each of the switches **256** and **260** are connected to a positive current supply line **264** through current limiting resistors connected in their collector circuits. The transistor **258** is connected by its collector through a first print actuator electromagnet **266** to the supply line **264** and the transistor **262** is connected through second print actuator electromagnet **268** to the line **264**. Accordingly, a pulse on the line **250** is effective to cause the transistor **256** to conduct in current saturation to thereby turn on the transistor **258** and energize the electromagnet **266**. Similarly, a pulse on the line **254** is effective to cause the second print actuator electromagnet **268** to be energized. From what has been said, it will be seen that one of the electromagnets **266** or **268** is energized only so long as the timing circuit provides an output on the line **240**. Further, the electromagnet **266** is operated as a result of a high potential level existing on the reset output of the latch **206** which potential exists by virtue of the photo transistor **222** seeing white, and the electromagnet **268** is operated by a high potential level output on the set output of the latch which occurs when the photo transistor sees a bar **50** between the operation of the card seating switch **168** and the operation of the print switch **172**.

In order to prevent spurious activation of either the first print actuator electromagnet **266** or the second print actuator electromagnet **268** upon removal of electrical power from the Elapsed Time Recorder, means for clamping the potential on lines **250** and **254** at ground potential during the critical period after power removal has been provided. Zener diode **400** and resistor **402** conduct during normal operation maintaining transistor **406** in the on state and, consequently, transistors **408** and **410** in the off state. Upon removal of power from the Elapsed Time Recorder the voltage on the cathode of Zener diode **400** drops below the Zener voltage of the device. At this point base current drive to transistor **406** is removed and transistor **406** cuts off. Base current then flows through resistors **412** and **414** to transistor **408** which turns on and clamps the potential of line **254** to ground. Likewise base current through resistors **412** and **416** drives transistor **410** to maintain line **250** at ground potential. Transistors **408** and **410** are held on until the charge on the power supply filter capacitor drops below the critical level.

The first and second print actuator electromagnets **266** and **268** are physically located in the print actuator assembly **26** as is best seen in FIG. **2** of the drawings. The electromagnets are supported on a plate **270** in spaced apart relation relative to first and second print actuators **272** and **274** respectively. The plate **270** may be removably attached to the main support member **14** to serve as a bottom wall for such member, and the electromagnets are preferrably supported at angles relative to the vertical by brackets, the latter named members being supported by the plate **270**.

The first and second print actuators **272** and **274** are duplicates of each other, and they are physically located on opposite sides of a recock solenoid **276**, which is supported on the plate **270**. The first print actuator **272** is best seen in FIG. **12** of the drawings and a description of the parts of said actuator will suffice to describe the parts of the second print actuator. The actuator **272** comprises a cylindrical print hammer **278** which terminates at its lower end in a radially extending flange **280**. The actuator **272** is also formed with an axially depending tubular projection **282** which is slidably mounted upon a vertically extending guide shaft **284** carried by the plate **270**. The guide shaft **284** is supported in a fixed vertical position by the plate **270** such that it is coaxial with and spaced from the lift shaft **100**. A print actuator stop member in the form of a collar or sleeve **286** is freely mounted upon the guide shaft **284** between the plate **270** and the tubular projection **282**. The stop member is preferrably spaced slightly from the tubular projection when the print acutator is in cocked or, that is, non-operating position. The stop member **286** and tubular projection **282** are disposed within a coil spring **288** that is interposed between the print hammer **278** and the plate **270**. If desired, the spring may be seated on a suitable supporting or spacer member **290** that is resting on the upper surface of the plate **270**. When the print actuator is in a nonoperated position, as shown in FIGS. **2** and **12**, the spring **288** is in a state of compression.

The first print actuator **272** is held in a nonoperated or cocked position by a trigger assembly which includes a sear **292** carried by one end of a trigger **294** that has its other end supported by suitable pivot mountings **296** located adjacent the base of the first print electromagnet **266** and the print operating spring **288**. The trigger **294** is held by a bias spring **297** that is attached to the plate **270** so that the sear **292** will engage and retain the flange **280** of the print hammer **278**. The trigger is made out of a magnetically attractable material. As previously stated, the second print actuator **274** is comprised of precisely the same type of parts employed for the first print actuator. Thus, a print hammer **298** is

supported for sliding movement on a guide shaft **299.** The shaft **299** is supported by the plate **270** such that it is coaxial with and spaced from the lift shaft **86.** The print hammer **298** is held in the cocked position by a trigger assembly including a trigger **302,** and a sear **304** where the sear engages a flange **306** of the print hammer. A second print operating spring **308** is compressed between the plate **270** and print hammer **298** when the actuator is cocked.

The print hammers **278** and **298** are positioned directly below a pair of lift members **310** and **312** respectively; the said members are shown in FIGS. **2,5,6,** and **13.** The member **310** comprises essentially an angle bracket that is provided on its upper surface at one end thereof with a lock collar **314** within which the lift shaft **100** is firmly secured. In addition, the bracket **310** is also provided with a hole at its other end which hole is preferrably tapped to receive a lift screw **316.** The screw extends from the upper surface of the member or bracket **310** and engages the lift shaft **80.** The lift member **312** consists of an L-shaped element having arms **318** and **320,** FIG. **13,** of equal dimensions. In the preferred embodiment of the invention the elapsed minutes shaft **64** and the elapsed seconds shaft **70,** FIGS. **2, 4** and **13** are of a shorter length than the lift shaft **100** and the lower end portions of said shafts **64** and **70** are positioned in notches or cut-outs formed in the outer ends of clip members **322** and **324.** The clip members **322** and **324** have flat elongated spring elements **323** and **325** positioned along the bottom surface thereof with the outer end portions of said spring elements engaging the lower ends of said shafts **64** and **70.** The clip members **322** and **324** together with the spring elements **323** and **325** are secured to the upper or top surface of the arms **318** and **320** by screws **326.** Thus the force delivered to the print hammers by way of the shafts **64** and **70** is delivered through the spring elements **323** and **325** engaging the lower ends of the shaft **64** and **70.** The left member **312** is provided with a downwardly depending lock collar **328** at the junction of the arms **318** and **320.** The lift shaft **86** extends into the collar **328** and may be firmly secured therein, by suitable means, such as a set screw, not shown. From the foregoing description, it should be apparent that each of the lift members **310** and **312** float and are held in fixed vertical positions by virtue of being locked to the lift shafts **100** and **86** respectively. In the preferred embodiment, the elapsed time shafts are of shorter length than the lift shaft **100** such that the arms **318** and **320** are vertically spaced from the lift member or bracket **310.**

Returning now to the operational description, it will be recalled that when the photo transistor **222** does not see a black bar **50** during the interval between operation of the card seating switch **268** and the print switch **172,** the first print operation signal line **250** is pulsed when the switch **172** is operated. It will be noted that the switch **172** is operated before the card **36** is firmly seated against the rear end card guide **113***c*. This fact is of no operational importance for the reason that the card is actually seated before a print acutator is effective to lift the selected print pad containers whereby the printing pads will effect a recording on the card. When the line **250** is signaled, the first print electromagnet **266** is energized aa described above and as a result of energization, attracts the trigger **294** so that the sear **292** is pulled away from the flange **280.** The print hammer **278** is thereby released and it is driven by its print operating spring **288** against the bottom of the lift member or bracket **310,** thereby causing the member to be lifted. The member **310** upon being lifted effects the lifting of the shafts **100** and **80** such that the lift plates **102** and **74** are raised. From the description previously given, it should be evident that the raising of the plates **102** and **74** is effective to raise the print pad containers **108, 92, 88, 66, 72** and **76** such that the card is printed with the time of day; elapsed time dials; and first identification number **48** and bar **50** respectively.

In the event that the photo transistor **222** had seen a black bar during the proper interval, the second print signal line **254** would have been pulsed to actuate the second print electromagnet **268** as described. In such event, the trigger **302** is attracted to release the print hammer **298** under the force of the second print operating spring **308.** The print hammer **298** engages the lock collar **328** of the lift member **312** causing the said member, and consequently, the elapsed time shafts **64** and **70** and the lift shaft **86** to be raised. It will be recalled that the elapsed time indicator pad containers are affixed to the upper ends of the shafts **64** and **70.** Consequently, the containers are driven upwards by the shafts such that the print pads mark the card with the elapsed time indicators. It will also be recalled that the second identification number pad container **82** is supported by a lift member attached to the upper end of the shaft **86.** Consequently, the container **82** is raised through the cooperation of the print hammer **298** and lift member **312** to effect the marking of the card with the second identification number.

Referring to FIG. **11,** it will be noticed that the stationary terminal **174***c* of the print switch is connected by a line **330** to the input of a unijunction transistor (UJT) timing circuit **332.** The said timing circuit is of the usual configuration, and causes a pulse to be generated at the output base electrode of the UJT after the time interval determined by the RC components connected to the emitter of the UJT. For the present invention, the time interval should be sufficiently long beyond the time interval of UJT circuit **242** to permit the print pads to make a distinct or optimum recording on the card **36.**

The circuit **332** is connected by an output terminal **334,** the output base of the UJT, to the base electrode of a transistor switch **336.** The said switch like the transistors **256** and **260,** is connected by its collector to the d.c. supply line **264,** and it is connected by its emitter to the input base electrode of a transistor driver amplifier **238.** The driver amplifier **238** comprises a pair of transistors connected in a Darlington configuration, and its common collector is connected to the supply line **264** through the recock solenoid **276.** Accordingly, solenoids **276** and **300** are pulse energized after the energization of an electromagnet **266** or **268** and they are energized in a similar manner.

In the preferred embodiment of the invention, the time constants of the timing circuit **190,** FIG. **11,** for the card seating solenoid **182** are shorter than those of the timing circuit **332** for the activation of the recocking solenoid **276.** Consequently, the card seating solenoid deenergizes before the print pads are retracted and the card is retained in place solely by virtue of the engagement of the latch member **153** with sear **151.** Since the card is held in place, the slide **22** must be held at its rearmost position.

Referring to FIGS. 2, 12, and 13, the recock solenoid 276 is provided with a vertically movable armature 340. The armature projects through both ends of the solenoid 276 with the lower end of the armature also extending through a clearance hole 342 in the plate 270. The lower end of the armature 340 has a screw 344 axially secured therein which is engaged by an end of a leaf spring 346 that is attached to the bottom surface of the plate 270. The spring is effective to urge and hold the armature in an upper position with respect to the plate 270. It may be found desirable to interpose a washer 348 in the hole and between the screw 344 and the bottom of the recock solenoid. A recocking plate 350 is mounted on a collar 352 that is pivotably supported by a pin 354, upon the upper end portion of the recock armature 340. A resilient bushing or member 356 may be interposed between the armature 340 and the collar 352 to stabilize the recock plate 350 in a horizontal plane. The plate 350 is generally rectangular in shape and is provided with clearance holes 358 and 360 at its respective end portions, FIGS. 12 and 13. The plate is supported by the armature 340 when the armature is in its uppermost position such that the print hammers 278 and 298, FIG. 2, extend into and through the holes 358 and 360 respectively. The diameter of each of the holes should be such that the flanges on the print hammer cannot pass therethrough and the plate 350 should be spaced vertically above the flanges.

When the recock solenoid 276 is pulsed as described, the armature 340 moves downwardly against the leaf spring 346 until the recock plate engages the flange of the operated print hammer; assuming operation of the print hammer 278, the plate will engage flange 280 first since the hammer 278 is vertically higher than the second print hammer 298. The recock plate pivots around the pin 354 until it engages the flange of the print hammer 298. Accordingly, as the plate 350 descends, it exerts a differential recocking force on the two print hammers. However, downward movement of the hammer 298 is limited by its stop member. The print hammer is lowered by this action until its tubular projection 282 engages its stop member 286. When the print hammer 278 is in its lowermost position, the sear 292 for its trigger assembly re-engages the flange 280 for the reason that the timing circuits are designed such that the electromagnet 266 de-energizes before the recock solenoid is energized and the trigger is therefore restored by the spring 297 to its non-operated position. The sear should be shaped such that it is cammed outwardly by the flange 280 as the print hammer descends to the cocked position.

As the operated print hammer is recocked, the operated lift plate 310 free falls from its lifted position thus disengaging the print pads from the card 36. Referring to FIG. 5, it may be desirable to interpose a spring 362 between the top surface of the lift member 312 and the bottom surface of the clockwork plate 30. If this is done, when the member 312 is raised by the print hammer 298, the spring 362 will be compressed. When the print hammer is recocked, the compressed spring will provide a positive downwardly directed force for the member 312, and it, in turn, will provide a positive return for the elapsed time shafts if they are engaged by the clips 322 and 324. A positive return as described may be deemed desirable particularly if the print pads have any tendency to stick to the card. A similar spring return can be provided for the member 310, and a clip for engaging the minutes shaft 90 may be supported by the plate 310.

Actuator electromagnet 300 releases latch 153 to allow the card to exit from the read station. This occurs upon activation of cock solenoid 276 since actuator electromagnet is parallel to cock solenoid 276 and is driven by Darlington Transistor Pair 238.

The card is ejected from the card chute assembly in generally the same manner as described above. It will be noted that as the card moves out of the chute assembly, the switch contactors 174 and 170 restore the card print and card seating switches respectively and in the stated order. The printing, recock, and ejection operations should be timed such that the print switch is normally restored prior to the generation of a second recock pulse by the UJT time 332. As the card seating switch restores, the input to the inverter 202 (FIG. 11) goes high to thereby reset the latch 206.

The embodiment of the invention disclosed above was described as being a time recorder particularly useful for producing records on a telephone toll card. It should be obvious that the said recorder may be modified to produce time records of the type used in industrial accounting, i.e., those used for pay purposes among other things. Further, although a particular form of logic circuitry was described, those skilled in the art will be aware that they need not be held to the form of logic, i.e., it may be desired to employ other positive or, indeed, it may be desirable to employ negative logic.

I claim:

1. In a record receiver printing device having an upper and a lower plate arranged in spaced parallel relation to one another to define a chute assembly, said plates being slotted adjacent one end thereof, a record receiver gripping and positioning apparatus mounted above said upper plate for reciprocatory movement with respect thereto, said apparatus terminating in a depending arm arranged to extend into the slots adjacent an end of said plates, a record receiver manually insertable into said chute assembly with an end thereof engaging said depending arm for initiating manual movement of said apparatus with respect to said chute assembly, and means actuated by the initial movement of said apparatus over and above said upper plate for automatically causing said apparatus to be moved with respect to said chute assembly.

2. In a record receiver printing device as set forth in claim 1 wherein said chute assembly is provided with a plurality of spaced guides engaged by said record receiver for positioning said record receiver in said chute assembly.

3. In a record receiver printing device as set forth in claim 1 wherein said record receiver has a portion thereof configured to engage a complimentary configured projection in said chute assembly to insure that said record receiver has been properly positioned and inserted into said chute assembly.

4. In a record receiver printing device as set forth in claim 1 wherein said means includes a switch mechanism that is energized by the initial movement of said apparatus for powering the movement of said apparatus.

5. In a record receiver printing device as set forth in claim 4 wherein said chute assembly has a solenoid mounted thereon with the armature of said solenoid

being connected to said apparatus for moving said apparatus under the power of said solenoid.

6. In a record receiver printing device as set forth in claim **1** wherein said gripping and positioning apparatus includes an elongated plate member that terminates at one end in said depending arm, said plate member being mounted for reciprocatory movement of suitable bearing surfaces carried by said upper plate.

7. In a record receiver printing device as set forth in claim **6** wherein said plate member is provided with at least one resilient arm, a camming member carried by said chute assembly and engaging said arm upon the movement of said plate member for moving said arm into engagement with the trailing end of said record receiver to propel said record receiver into said chute.

8. In a record receiver printing device as set forth in claim **7** wherein said plate member has pivotally mounted thereon a record receiver positioning element for engaging an edge portion of said record receiver and urging said record receiver laterally of said chute assembly into engagement with suitable guides provided in said chute assembly.

9. In a record receiver printing device as set forth in claim **8,** wherein said positioning element is maintained in engagement with said record receiver by a spring.

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