April 8, 1941. R. E. BITNER 2,237,898

PUNCH

Filed June 25, 1940 3 Sheets-Sheet 1

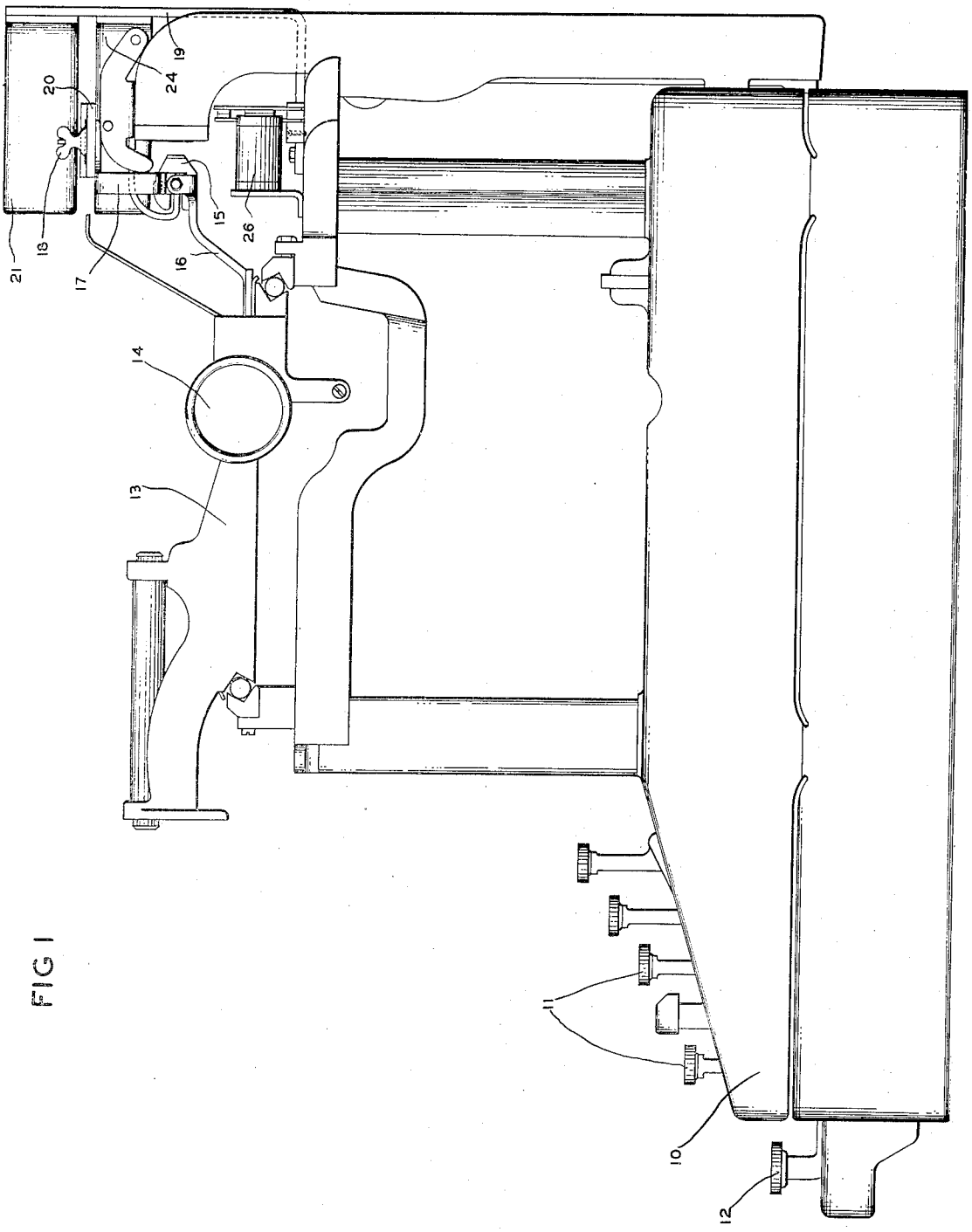


FIG 1

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PUNCH

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FIG 2

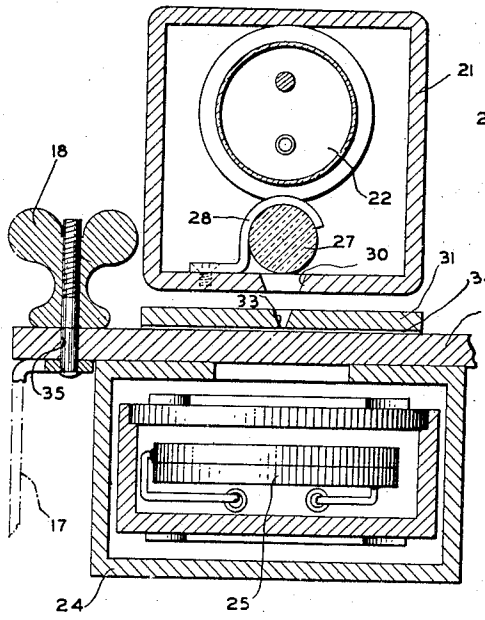
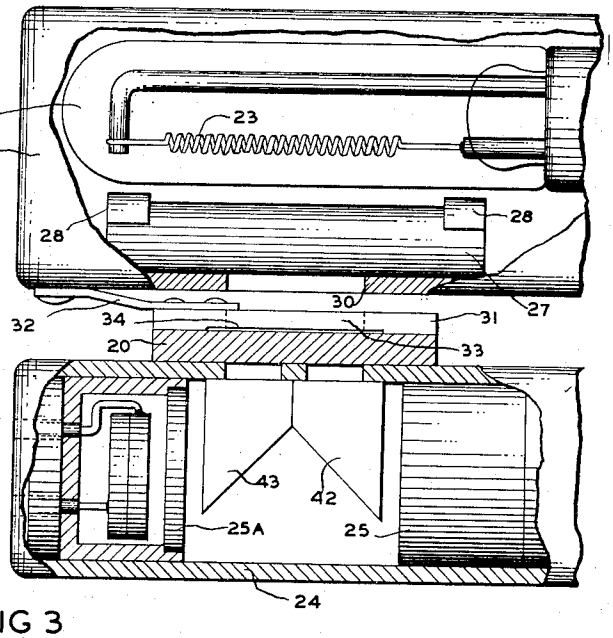


FIG 4



2 — 2

FIG 3

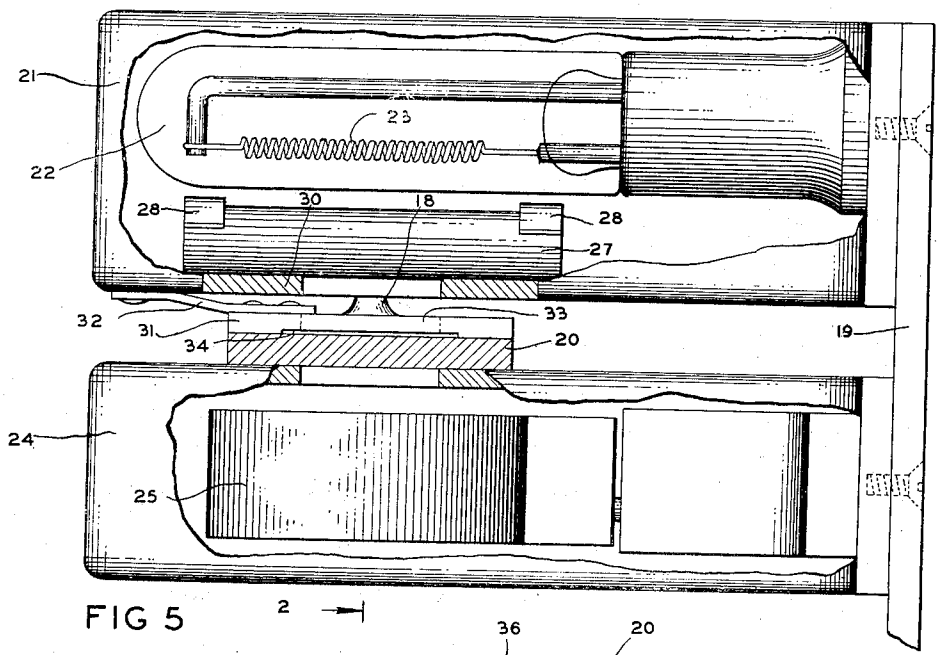


FIG 5

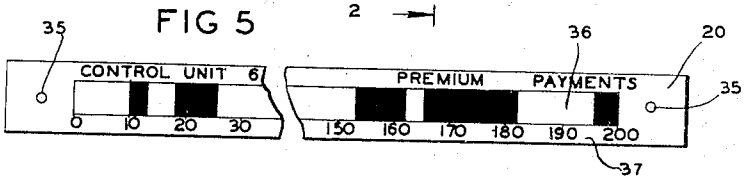
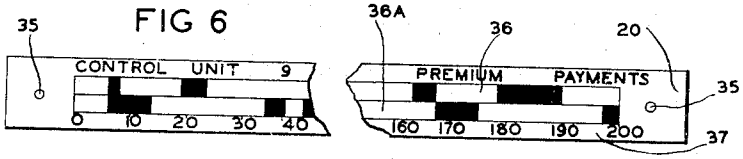


FIG 6



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FIG 7

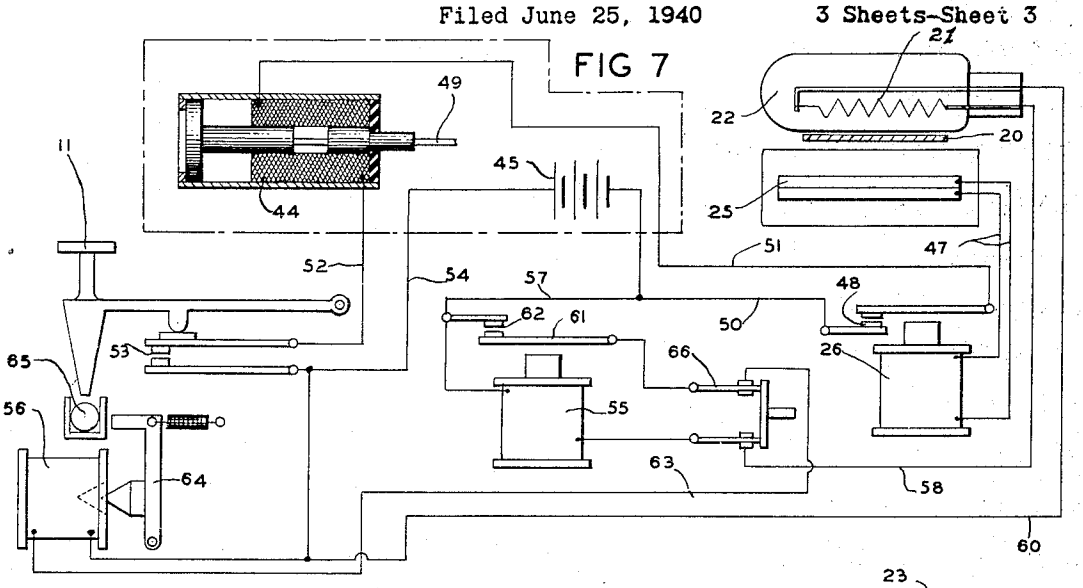
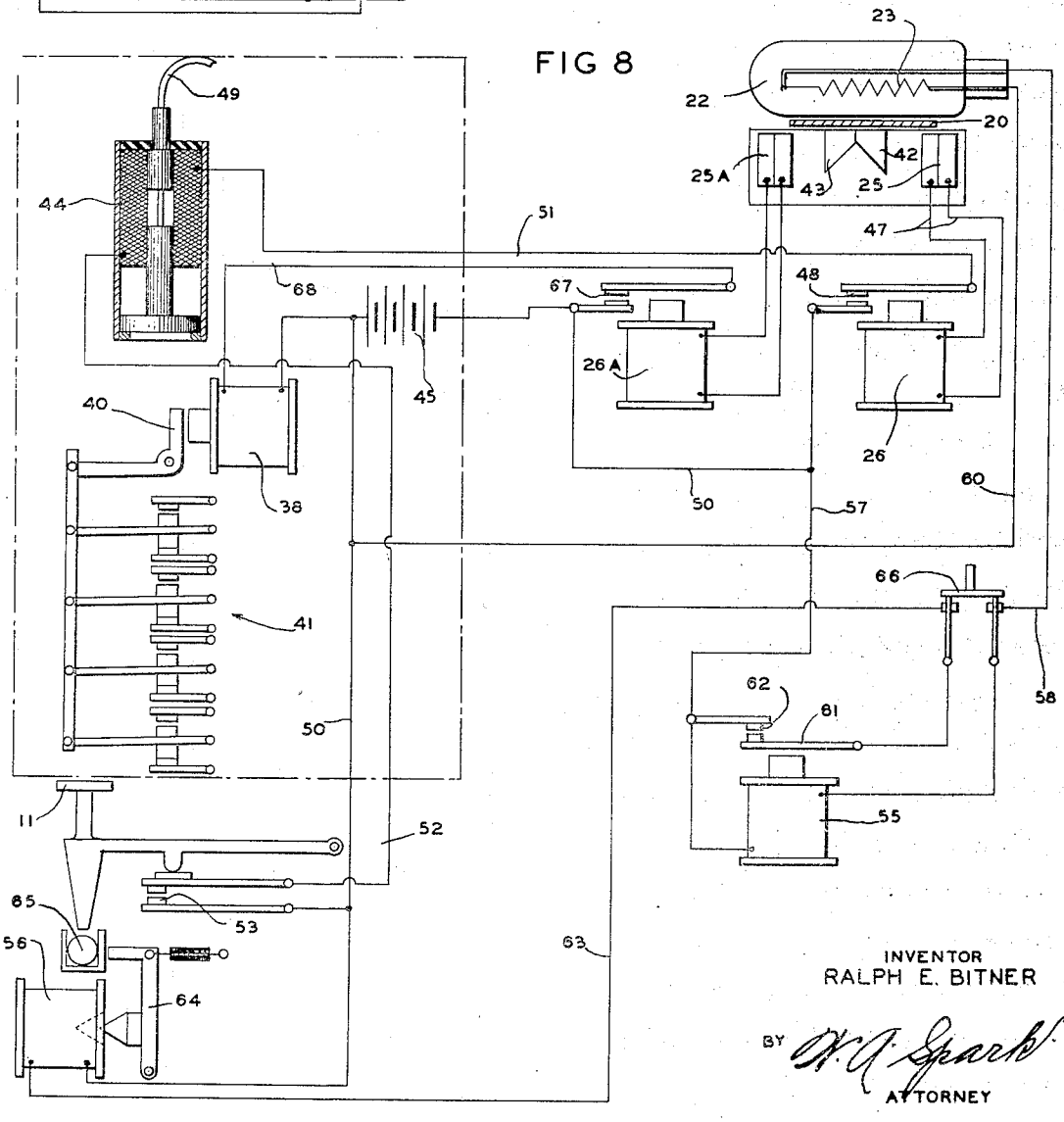


FIG 8



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Patented Apr. 8, 1941 2,237,898

UNITED STATES PATENT OFFICE

2,237,898

PUNCH

Ralph E. Bitner, New York, N. Y., assignor to Remington Rand Inc., Buffalo, N. Y., a corporation of Delaware

Application June 25, 1940, Serial No. 342,206

18 Claims. (Cl. 164—113)

The present invention relates to control means for operating card perforating devices from bookkeeping machines and more particularly relates to control means for disabling data-card punching mechanisms during the movement of a typing carriage through certain predetermined fields.

It has been customary for some time to control punched-card mechanisms from typewriter carriages by electro-mechanical means. United States Patent No. 1,790,479, issued on January 27, 1931, to W. W. Lasker and H. R. Russell, discloses one such means whereby a control bar with cam faces cut thereon was moved by the typewriter carriage and operated electrical contacts to control a card punch.

The present invention resides in the provision of a transparent strip on which there are certain areas which have been rendered opaque. Cooperating with the strip is a source of light and a light sensitive cell. Punch control is effected by means of a relay operated by the light sensitive cell.

One of the objects of the present invention is to improve in certain respects the means for controlling a punch by the position of a type carriage.

According to the present invention a control strip for a bookkeeping machine is provided which will travel with the carriage of that machine without appreciable contact engagement with any stationary mechanism.

The control strip is removably secured to a typewriter carriage, the strip controlling the operation of a card punch because of the strip's variable transparency.

Another object of the invention is to control two phases of operation of a card punching machine at the same time. This is accomplished by the provision of a double marked control strip for a typewriter or bookkeeping machine which will cooperate with two light sensitive cells.

Still another object of the invention is to provision of a control system which may be conveniently altered and adjusted without the use of cutting tools.

Other objects and structural details of the invention will be apparent from the following description when read in connection with the accompanying drawings, wherein

Fig. 1 is a side elevation of a standard bookkeeping machine with one form of the present invention attached thereto;

Fig. 2 is a cross sectional view of the lamp and light sensitive cell taken along line 2—2 of Fig. 3;

Fig. 3 is a side view of the lamp housing, transparent strip, and light sensitive cell with some parts broken away and some parts in section;

Fig. 4 is a side sectional view of an alternate form of the invention wherein two light sensitive cells are used to sense two areas on the transparent strip;

Fig. 5 is a plan view of a sample control strip showing the opaque areas;

Fig. 6 is a plan view similar to Fig. 5 but showing a control strip having two areas designed to be used with the control device shown in Fig. 4;

Fig. 7 is a schematic wiring diagram of the principal parts of the invention when using the strip shown in Fig. 5; and

Fig. 8 is similar to Fig. 7 except it indicates the wiring necessary when using the double strip shown in Fig. 6.

Referring now to Fig. 1, the bookkeeping machine consists generally of a base 10, a plurality of alphabet and numeral keys 11 and ten tabulating keys 12. A carriage 13 is illustrated carrying the usual platen 14 and tabulator stops 15. The tabulator stops 15 are placed on a notched bar extending the full length of the carriage and supported at each end thereof by brackets 16. Secured to the ends of brackets 16 are additional brackets 17 which are turned over at their upper ends to form horizontal flat portions to which are secured bolts with wing nuts 18.

Mounted by said bolts and wing nuts 18 and stretching the entire length of the carriage 13 is a transparent strip of Celluloid or like material 20 (see Figs. 2, 3, 4, 5, and 6). Immediately above the strip is a lamp housing 21 containing a lamp 22 with a long thin filament 23. Below the strip is another closed housing 24, containing a light cell 25, the details of which will be described later. Both the lamp housing and the cell housing are secured to a portion of bracket 19 secured to the framework of the bookkeeper machine and, therefore, remain stationary. A relay 26 (Figs. 1, 7, and 8) is also secured to the bookkeeper frame and serves to translate the voltage generated by the cell into current to operate the punch controls.

Figs. 2 and 3 show the details of the light sensing unit. Within the housing 21, just below the lamp 22, is secured a cylindrical lens 27, held in position by two supports 28. Directly under the lens 27 is a cut out portion 30 which serves as a light gate or diaphragm and cuts off extraneous light rays. In order to further cut down the light rays from outside sources and produce a thin sharp light image on the strip 20, a rider 31 is positioned below the cut-out portion

30 and attached to the lamp housing 21 by a weak spring 32. A slit 33 about .075 of an inch wide is cut in the rider in such a position that the two slits 30 and 33 are in vertical alignment.

As each type impression is made by the bookkeeper machine, its carriage is advanced one-tenth of an inch. The slit 33 is made slightly narrower than this to allow for inaccuracies in the spacing mechanism. On the bottom side of the rider, a flat channel 34 is milled parallel to the strip 20 and wide enough to bridge the markings thereon. The channel 34 need be only .010 of an inch deep, as it is only necessary to clear the blanked-out portions which lie above the entrance diaphragm.

The uncut portions of rider 31 form two sliding rails which lightly press on the sides of the transparent strip 20 and keep the slit 33 in its proper relation at all times. Should there be any warping or bending of the transparent strip, the rider 31 will move in accordance with such variations and keep the slit 33 in a position to cast a sharp image on the upper surface of the strip 20.

Figs. 5 and 6 show two forms of transparent strips in detail. At each end there is a perforation 35 for attachment to the end brackets 17. A central area 36 is used for the control portion. Above the central area is a space for printing the strip number and its designated use. Below the control area a graduated scale 37 is printed to aid in correctly positioning the opaque areas on the strip when it is first made or when it is changed to another control schedule.

The control area 36 of the strip 20 is left transparent when it is desired to have the punch record data in its set-bar field at the same time the bookkeeper machine is printing it. If there is some data or information which is to be typed by the bookkeeper and not set in the punch, the corresponding spaces on the strip are blacked out by printing or painting with black ink.

Fig. 5 illustrates a control strip which has only one control feature causing the punch to work with the bookkeeper or else be disengaged. For some types of punches, however, an additional control is necessary because two data codes are used. These may be the ninety column numeric code described in lines 62–70, page 4 (see Fig. 6) of U. S. Patent No. 1,780,621, issued to W. W. Lasker on November 4, 1930, and the forty-five column alphabet code described in U. S. Patent No. 2,034,104, page 4, col. 1, lines 29 to 43 issued to W. W. Lasker on March 17, 1936. In order to switch from one code to another, a transfer switch is used which operates a large number of contact springs to perform the required circuit changes. Such a transfer switch is described in detail in U. S. Patent No. 2,160,152, issued on May 30, 1939, to W. F. Kelley (see Figs. 8, 9, 10 and 41) and is indicated in Fig. 8 of the instant application by a magnet 38, an armature 40, and a series of contacts 41.

To operate the transfer switch as well as the punch, a second control area is provided on the strip 20 and two light sensitive cells are provided to sense the blacked out areas. Such a strip is illustrated in Fig. 6 where the areas 36 control the punch operation and the areas 36A control the operation of the transfer switch. Fig. 4 shows how the strip of Fig. 6 may be used. The same lamp housing and rider are employed but there are two internal-reflection prisms 42 and 43 to redirect the two light beams after transversing the areas 36 and 36A. The light beams are sensed by light sensitive cells 25 and 25A and currents generated by them operate relays 26 and 26A as will be explained later.

Referring now to the wiring diagrams in Figs. 7 and 8, the control circuit is arranged to control a plurality of solenoids 44 by means of a corresponding number of keys 11. Each solenoid contains a core which, when actuated, moves a Bowden wire 49 connected to the set-up mechanism of the card punch. After all set-ups have been made for a data card, the punch mechanism is actuated and the card is perforated. Only one of the solenoids and one key are shown in each figure for the purpose of simplified description.

The output of the light sensitive cell 25 is connected directly to the winding of relay 26 by conductors 47. When current flows in this winding due to light from the filament 23 shining through a transparent area of strip 20, contacts 48 close and a circuit is partly completed from a battery 45, over conductor 50, through contacts 48, over conductor 51, through the winding of solenoid 44, over conductor 52, through contacts 53 which are closed when key 11 is depressed, over conductor 54, to battery 45. The conductor 54 is common to all key contacts and conductor 51 is common to all solenoids, hence closing contacts 48 places the punch in condition to be operated by the bookkeeper, and breaking these contacts renders the punch inoperative.

If the above circuit were the only controlling feature and the lamp 22 should happen to burn out or be otherwise disabled, the contacts 48 would not close no matter what area of the strip passed over the cell housing. For this reason an additional locking circuit has been added, consisting of a series relay 55 and a locking solenoid 56. The relay 55 is mounted beside the relay 26 and the solenoid 56 is mounted in the base of the bookkeeping machine close to the key locking unit. During normal operation the lamp 22 receives its current from battery 45, over conductor 57, through winding of the relay 55, over conductor 58, through the lamp filament 23, back over conductors 60 and 54, to the battery 45. Current through the winding 55 pulls down armature 61 and breaks contacts 62. If the lamp should burn out, the absence of current through the series relay 55 will make the contacts 62 and send current over conductor 63, to the locking solenoid 56, and back to the battery 45 over conductor 54. Energizing the winding of solenoid 56 pulls in armature 64 and inserts a flat end portion into a ball lock 65 and prevents further actuation of the keys 11. By the use of this safety circuit, an operator will know at once by the locking up of the keyboard that the lamp has burned out or a lamp wire has been disconnected.

When it is desired to use the bookkeeper machine alone without the light sensitive control, a switch 66 is opened. This switch has two blades, one of which cuts off the lamp current and a second which opens the circuit to the locking solenoid 56.

Fig. 8 shows the application of the double strip illustrated in Fig. 6 to the control of the transfer switch. The circuit which controls the operation of the punch is the same as shown in Fig. 7 and the reference characters are also the same. The control of the transfer switch is made possible by the second light sensitive cell 25A which operates the relay 26A and closes contacts 67. This completes a circuit from the

battery 45, over conductor 50, through contacts 67, over conductor 68, through the winding of relay 38, and back to the battery 45. This action operates the armature 40, changes the contacts 41, and alters the code of the punch from any predetermined characteristic values to any others. This change is accomplished automatically without any additional action by the operator.

In Figs. 7 and 8 the dotted lines enclosing the battery 45 and solenoid 44 denote the apparatus attached to the punch. All other components are a part of the bookkeeping machine.

While the foregoing description has referred specifically to a bookkeeping machine, it is to be understood that such reference is merely illustrative of one application of the invention because broadly the invention is applicable to many other machines and where in the claims the term "bookkeeping machine" occurs, it is to be taken as generic, meaning a typewriter, a tabulating machine, a recording machine, or any other machine capable of coordination with a card perforating mechanism through the medium of the present invention.

What I claim as new and desire to secure by Letters Patent is:

1. In the combination of a bookkeeping machine comprising a carriage, and a punching mechanism; means for causing a set-up to be made in the punching mechanism as a set-up is made in the bookkeeping machine, a transparent strip supported on said carriage for movement therewith, and means on the transparent strip for controlling the effectivity of said set-up causing means.

2. In the combination of a bookkeeping machine comprising a carriage, and a punching mechanism; means for causing a set-up to be made in the punching mechanism as a set-up is made in the bookkeeping machine, a transparent strip supported on said carriage for movement therewith, and opaque areas on the face of said strip for controlling the effectivity of said set-up causing means.

3. In the combination of a bookkeeping machine comprising a carriage, and a punching mechanism; means for causing a set-up to be made in the punching mechanism as a set-up is made in the recording mechanism, a transparent strip mounted for movement with said carriage, and opaque areas of different lengths on said strip for controlling the effectivity of said set-up causing means for variable extents of carriage movements.

4. In the combination of a bookkeeping machine comprising a carriage, and a punching mechanism; means for causing a set-up to be made in the punching mechanism as a set-up is made in the recording mechanism, a detachable transparent strip mounted on said carriage, a source of light on one side of said strip, a light sensitive cell on the other side of said strip, said source of light and said cell mounted on the frame of the bookkeeping machine, and electrical means actuated by said cell for controlling the effectivity of said set-up causing means.

5. The combination of a bookkeeping machine comprising a carriage and a keyboard, a card perforating machine with punches, an electro-magnet for each punch for controlling it for operation, electrical contacts for each key to energize a magnet when its corresponding key is depressed, a common circuit closer for all of said magnets, and a transparent strip movable with said carriage for controlling the transmission of a beam of light to control said common circuit closer for predetermined carriage positions.

6. The combination with a bookkeeping machine comprising a carriage and a keyboard, a card perforating machine with punches, an electro-magnet for each punch for controlling it for operation, a circuit closer for each key to energize a magnet when its corresponding key is depressed, a common circuit closer for all of said magnets, and a transparent strip movable with said carriage and provided with opaque areas for masking a light beam to open said common circuit closer for predetermined positions of the carriage.

7. The combination with a bookkeeping machine comprising a carriage and a keyboard, a card perforating machine having punches, an electro-magnet for each punch for controlling it for operation, a circuit closer for each key to energize a magnet when its corresponding key is depressed, a common circuit closer for all of said magnets and a transparent strip movable with said carriage and provided with opaque areas of different lengths for masking a light beam for opening and closing said circuits for different positions of the carriage and for maintaining said circuits opened and closed for different extents of movement of said carriage.

8. In the combination of a bookkeeping machine having a carriage, and a card-perforating machine controlled by said bookkeeping machine; light modulating means traveling with the carriage of the bookkeeping machine for repeatedly making and breaking the control to the perforating machine.

9. In the combination of a bookkeeping machine having a carriage, and a card-perforating machine; means for causing a set-up to be made in the perforating machine as matter is being recorded in the bookkeeping machine, and light controlling means carried by the carriage of the bookkeeping machine for disabling the aforesaid means so as to prevent the perforated card from forming a record of a predetermined portion of the matter recorded after the carriage has performed its function in the recording of other matter.

10. In the combination of a bookkeeping machine having a carriage, and a card-perforating machine; a system of punches in the perforating machine, punch selecting devices, and light controlling means which comprise relatively movable components mounted on the bookkeeping machine and by which the desired transmission and non-transmission of light is made dependent on the position given to one of those components by the carriage of the bookkeeper machine.

11. In the combination of a bookkeeping machine having a carriage, and a card perforating machine; a system of punches in the perforating machine; and light sensitive means to predetermine that a card-record of certain matter which is recorded by the bookkeeping machine and of which a card-record is not wanted shall not be punched, said light sensitive means having relatively movable components mounted on the bookkeeping machine and its action being dependent on movements imparted to one of those components by the carriage of the bookkeeping machine.

12. In the combination of a bookkeeping machine having a carriage, and a card perforating machine; a system of punches in the perforating machine, and light sensitive means which com-

prises relatively movable components mounted on the bookkeeping machine and by which the punching of a record of matter recorded in any predetermined field on a record sheet is made dependent on motion imparted to one of said components by the carriage of the bookkeeping machine.

13. In a combination of a bookkeeping machine having a carriage, and a card-perforating machine; a system of punches in the perforating machine, and light sensitive means which comprises a component mounted on the frame and another component mounted on and extending across the carriage of the bookkeeping machine and by which means the punching of a record of matter recorded in any predetermined field on a record sheet is made dependent on movement with the carriage of the latter component and its action on the other.

14. In the combination of a bookkeeping machine having a carriage, and a card-perforating machine; a system of punches in the punching machine, and light sensitive means which comprises a component mounted on the frame and another component mounted on and extending across the carriage of the bookkeeping machine, the latter component including opaque areas on a transparent strip corresponding to the different fields in which matter is recorded on a record sheet, and by said light sensitive means punching of data recorded in any predetermined field of the record sheet is prevented.

15. In the combination of a bookkeeping machine having a carriage, and a card-perforating machine; a system of punches in the perforating machine and light sensitive means which comprises a component mounted on the frame and another component mounted on the carriage of the bookkeeping machine, one of these components traversing the other and being approximately as long as the carriage is wide and including opaque areas on a transparent strip corresponding to the different fields in which matter is recorded on a record sheet, and by said light sensitive means the punching of data recorded in any predetermined field of the record-sheet is prevented.

16. In the combination of a bookkeeping machine having a carriage, and a card-perforating machine; a system of punches in the punching machine arranged for punching coded data in a card, a transfer switch for changing the code for said data, light sensitive control means for operating said transfer switch, light sensitive control means for disabling the card-perforating machine, both of said light sensitive control means contained in a transparent strip with a double alignment of opaque areas and two light sensitive cells, said transparent strip mounted on and traveling with the carriage of the bookkeeping machine.

17. In the combination of a bookkeeping machine having a carriage, and a card-perforating machine; a system of punches in the punching machine arranged for punching coded data in a card, a transfer switch for changing the code for said data, light sensitive control means for operating said transfer switch and light sensitive control means for disabling the card-perforating machine, both of said light sensitive control means having cooperating relatively movable components mounted on the bookkeeping machine, one of said components mounted on the carriage of the bookkeeping machine.

18. In the combination of a bookkeeping machine having a carriage, and a card-perforating machine; a system of punches in the punching machine arranged for punching coded data in one field, a transfer switch for changing the field into which data may be punched, light sensitive control means for operating said transfer switch, and light sensitive control means for disabling the card-perforating machine, both of said light sensitive control means having cooperating relatively movable components mounted on the bookkeeping machine, one of said components mounted on the carriage of the bookkeeping machine.

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