PHOTOELECTRIC KEYBOARD FOR DATA INPUT DEVICES OR THE LIKE.

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The following statement is a full description of this invention, including the best method of performing it known to us:

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The present invention relates to a photoelectric keyboard for data input devices or the like in which, by operation of a key, a coded shutter mask is put in the way of light beams extending parallel to each other and directed to photocells.

Keyboards of this kind are already known, but in these the shutter masks are directly linked with one key each, so that with the operation of the keys the associated shutter masks are put in the way of the light beams and remain there as long as the keys are depressed. In order to prevent any superposition of two characters entered in close succession, which would inevitably result in a falsification of the code, such keyboards are provided with so-called "key locks" which lock the other keyboard elements for the duration of a key operation.

These locks, which mostly operate on a mechanical basis, hamper the individual manner of writing, and particularly the so-called "Legato-Writing" (depressing the next key before releasing the previous one), which results in machines with such keyboards being more difficult to operate and requiring special knowledge. In addition, a key lock reduces the ease of operation of a keyboard and unnecessarily raises the price of the device.
According to the present invention there is provided a photoelectric keyboard for data input devices or the like of the kind wherein by operation of a key, a coded shutter mask obturates light beams extending from light sources to photocells, which each key of the keyboard is indirectly connected, via a snap mechanism, with an associated shiftable bistable shutter mask and in which via said snap mechanism, the shutter mask obturates selected ones of the light beams for a short period of time during its travel from one rest position to an alternative rest position, independently of the kind and duration of the respective key operation.

The principle advantages achieved by the invention are that, even if the keys are operated in quick succession, any superposition of the entered characters is practically excluded, so that any special key lock can be dispensed with. This makes possible an individual manner of writing and insures the special ease of operation, which is an inherent characteristic of photoelectric keyboards.

The invention will now be explained in more detail with reference to one embodiment thereof and in connection with the accompanying drawing, in which:
Figure 1 is a schematic side view of a keyboard module, with a shutter mask in one position of rest; and

Figure 2 shows the same keyboard module with the shutter mask in an alternative position of rest.

The basic structure of photoelectric keyboards is well known, so that it need not be specially described here.

The terms "up", "down", "left", "right", "vertically" and the like refer to directions and attitudes as shown in the drawings only, and are not a limitation on the operation or construction of the embodiment of the invention.

A keyboard consists of several key modules, which are arranged side by side, a side view of one of which is shown in figure 1. Located at one end of the assembled modules is a lighting arrangement which consists of one or more light sources and whose light is combined, via combinations of lenses, into parallel light beams which pass through aligned aperture masks of the keyboard modules, to photocells arranged at the other end of the assembled modules. Interrogated at a certain instant, the outputs of these cells represent, in coded form, the character entered by operating a key, which character is evaluated or processed in known manner.
by subsequently arranged electronic circuits.

In the embodiment of a keyboard module as illustrated by way of example in figures 1 and 2, a vertically shiftable key 1 is indirectly connected via a snap mechanism, described in more detail below with a horizontally shiftable shutter mask 7 shiftable from left to right and right to left. The coding of the shutters 7 in accordance with the associated character is effected in known manner by breaking or cutting out the shutters not required (broken lines), so that only certain light beams are momentarily interrupted by the remaining shutters 7a in the course of the key operation.

To achieve an exact switching behaviour and prevent any kind of trouble caused by scattered light and reflection, each key module has a stationary aperture mask 8 associated with it, which is arranged between the light sources and the shutter mask 7. The aperture masks 8 are provided, in accordance with the bit number of the code used, with a number of equally spaced apertures 8a, through which the light beams pass. A further stroke aperture 8b, which is allocated to an additional light beam, serves in connection with a narrow strobe shutter 7b to produce a strobe pulse.
The key mechanism here shown consists of a key 1, which is vertically shiftable against the action of a leaf spring 2 and to whose shank 1a a tappet 3 is mounted so as to swivel. Held in its vertical position by a resetting spring 3a, the tappet 3 has its downwardly directed tip standing over the centre of rotation of an operating element 4 which is mounted on a stationary pivot 5. Held in one (figure 1) or the other (figure 2) position by a dead-centre spring 6 acting above the centre of rotation, the operating element 4 has two engaging depressions 4a located symmetrically about the centre line of element 4 and on a level with the centre of rotation, with which engaging depressions the tappet 3 engages if the key is operated. At the lower end, the operating element 4 is provided with an operating pin 4b which moves into engagement with a recess 7c of the shutter mask 7. Through the dead-centre spring 6, the associated shutter mask 7 is forced via the pin 4b against stops (not shown).

If the key 1 of figure 1 is operated, the tappet 3 moves vertically downwards, turning to the right, under the influence of the profile of element 4, into the engaging depression 4a of the operating element 4. As the key is pressed further downward, the
operating element 4 turns clockwise, overcoming the dead-centre spring 6. In the process, the operating pin 4b moves away from the right stop position in the recess 7a of the shutter mask 7. Up to this time, the associated shutter mask 7 has not yet changed its position, so that any inadvertent depression of a key down to this depth produces no effect. Only when the operating element 4 has been swivelled so far that the point of application of the force of the spring 6 lies on the right of the centre of rotation of the operating element 4 does the direction of effect of the dead-centre spring 6 change. The result of this is that the operating element 4, under the influence of the spring 6, springs into the position shown in figure 2, taking along the associated shutter mask to the left via the pin 4b. The stroke of the mask 7 corresponds exactly to the spacing of the apertures 8a in the aperture mask 8. Consequently, the light beams are interrupted by the remaining shutters 7a only for a very short period of time, the kind and duration of the key operation having no influence. Thus it is insured that a superposition and, consequently, falsification of characters is practically excluded even if the characters are entered in close succession.
As mentioned hereinbefore, by the strobe shutter 7b, which is narrower that the shutters 7a, a narrow strobe pulse is produced at the moment the shutters are shifted. This pulse, which occurs in the middle of the interruption of the light beams, activates subsequent electronic circuits only for its duration, whereby time variations are eliminated.

As the operated key 1 is released, it returns to its original position under the effect of the spring 2, with the tappet 3 also returning to its normal position under the effect of the spring 3a. Thus, the rest position shown in figure 2 is reached, from which, if the key 1 is operated anew, the operating element 4 is now turned counterclockwise, and, at the moment the direction of effect of the dead centre spring 6 is changed, resets the shutter mask to the right.

The horizontally adjustable shutter mask 7 may be a circular mask which is mounted so as to be rotatable throughout an angular path following from the spacing of the apertures of a likewise circular aperture mask.
The claims defining the invention are as follows:

1. A photoelectric keyboard for data input devices or the like of the kind wherein by operation of a key, a coded shutter mask obturates light beams extending from light sources to photocells, in which each key of the keyboard is indirectly connected via a snap mechanism with an associated shiftable bistable shutter mask and in which via said snap mechanism, the shutter mask briefly obturates selected ones of the light beams for substantially the period of time of its travel from one rest position to an alternative rest position independently of the kind and duration of the respective key operation.

2. A keyboard according to claim 1, in which between each shutter mask and the light sources is situated an aperture mask.

3. A keyboard according to claim 1 or 2, in which the aperture masks have an additional strobe aperture in which the shutter masks are provided with a corresponding additional strobe shutter that said strobe shutters are narrower than the coding shutters and in which the time during which the light beam passing through the strobe aperture is interrupted lies in the middle of the time during which the other light beams are interrupted.

4. A photoelectric keyboard, for data input
devices or the like, of the kind wherein by operation of a key a coded shutter mask obturates light beams extending from light sources to photocells, substantially as described with reference to the accompanying drawings.

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STANDARD TELEPHONES AND CABLES PTY. LIMITED.