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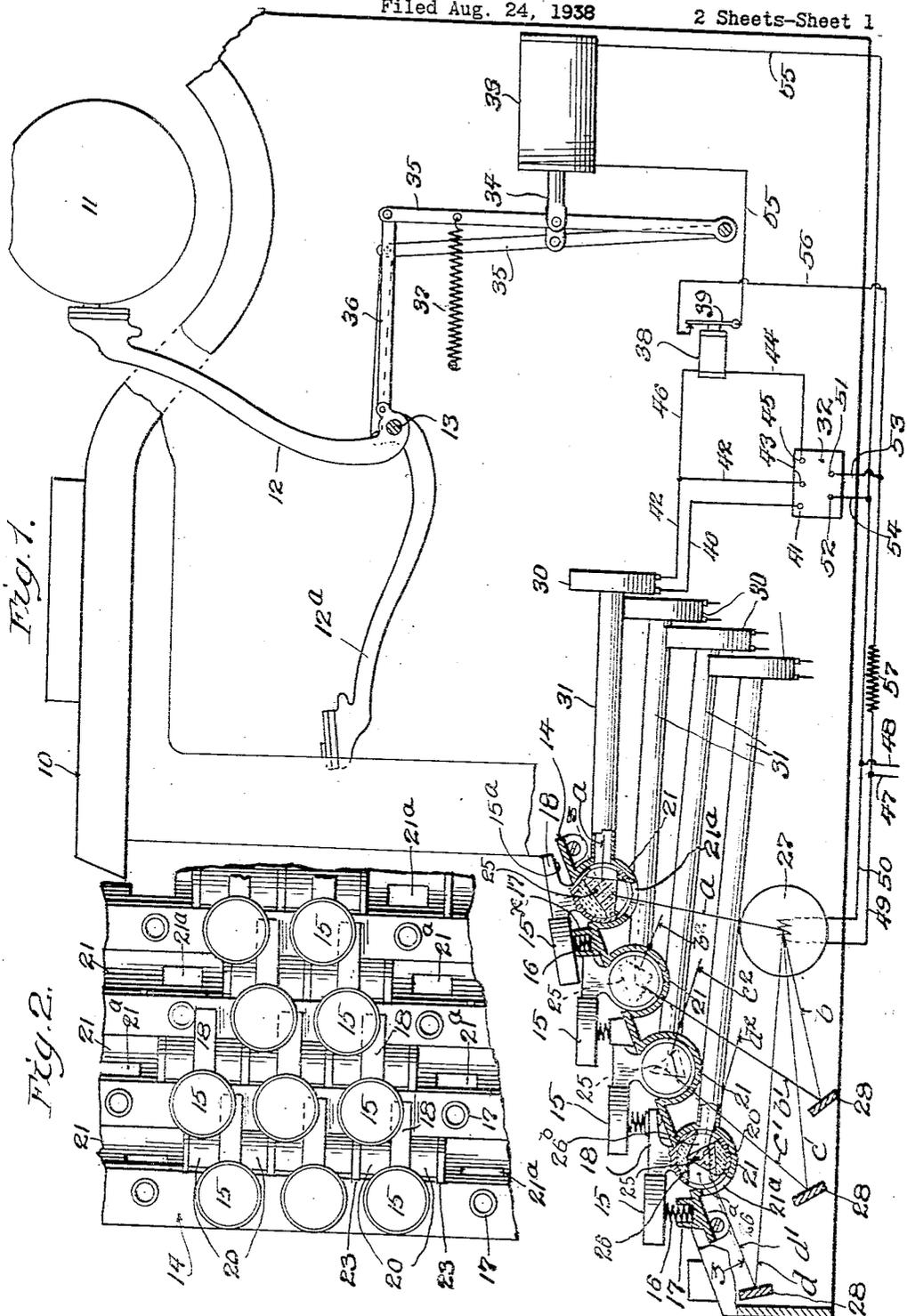
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2,168,886

ACTUATING MEANS FOR TYPEWRITERS AND OTHER MECHANISMS

Filed Aug. 24, 1938

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

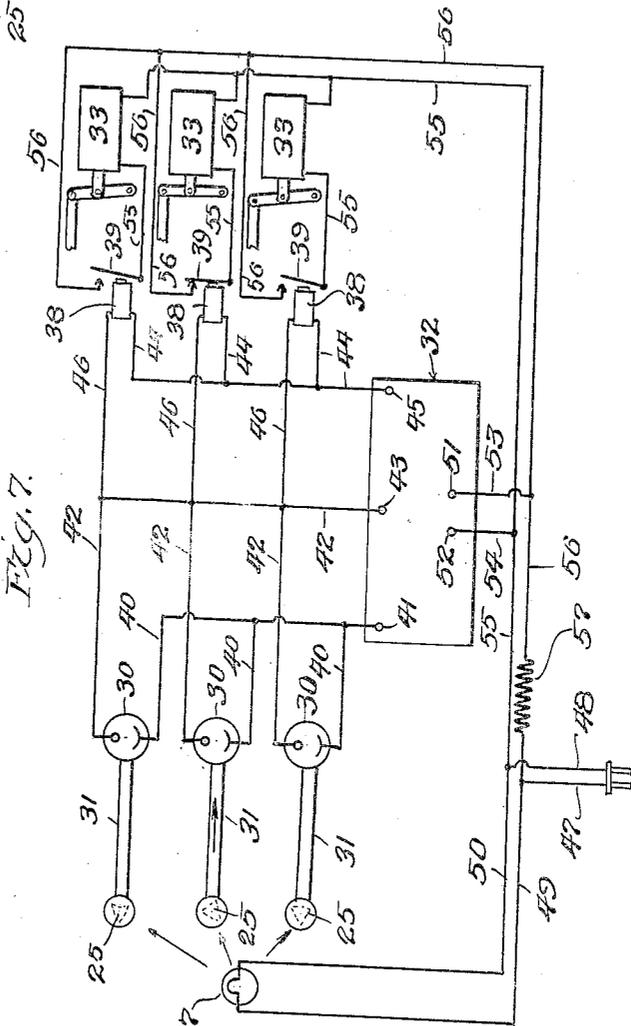
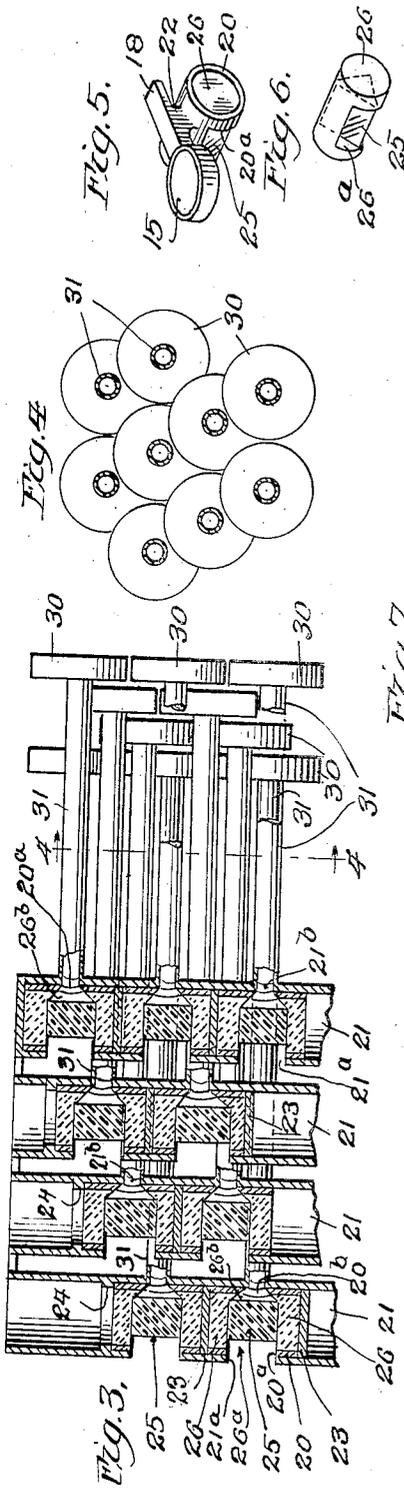


Fig. 8.

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UNITED STATES PATENT OFFICE

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ACTUATING MEANS FOR TYPEWRITERS AND OTHER MECHANISMS

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4 Claims. (Cl. 250—41.5)

This invention relates to actuating means for typewriters and other mechanisms and one of its objects is to provide noiseless means whereby to actuate the usual type bars of typewriters or the actuated means of typesetting machines, computing machines, organs or any other actuated mechanism. The invention has reference more particularly to electric typewriting machines or typesetting machines, and one of its objects is to dispense with the intricate mechanism between the type keys and the electric mechanism which actuates the type bars or the typesetting means.

Another object is to provide actuating means which do not easily get out of order and which are not costing to manufacture or to repair.

Another object is to utilize key actuated light reflecting or refracting means in conjunction with a selenium, photo-electric or other light sensitive cell whereby when a key is depressed, rays of light are projected upon the cell corresponding with the depressed key and as a consequence an electrical connection is made whereby the associated type bar or other associated mechanism is actuated.

Another object is to provide actuating means which act instantaneously when a key is depressed and which are easy to operate and do not tire the operator because it only requires the slightest pressure upon the keys to operate the light valves that control the admission of light to the light sensitive cells.

Other objects and advantages will appear in the course of this specification and, with all of said objects and advantages in view, this invention consists in a typewriting or typesetting machine or other electrically actuated apparatus provided with light sensitive cells for establishing electrical contact through electric circuits of electric means for actuating the type bars or typesetting means or the like, and key operated valves in the form of light refracting or light reflecting means for transmitting light rays, from a suitable source, to the cells.

The invention further consists in the several novel features hereinafter fully set forth and claimed.

The invention is clearly illustrated in the drawings accompanying this specification in which:

Fig. 1 is a fragmentary view partly in side elevation and partly in vertical, longitudinal section of a typewriter of conventional form equipped with a simple form of the present invention.

Fig. 2 is a plan of a fragment of the key board thereof.

Fig. 3 is a detail section taken on the broken line 3—3 of Fig. 1 with the parts laid out flat.

Fig. 4 is a cross-section taken on the line 4—4 of Fig. 3.

Fig. 5 is a perspective view of one of the keys.

Fig. 6 is a perspective view of one of the prisms and the means for locating it in a key.

Fig. 7 is a wiring diagram of the electric apparatus showing its connection with the light control.

Fig. 8 is a detail vertical, longitudinal section through one of the keys and its bearings.

Referring to said drawings, which are not intended as working drawings but are merely schematic, illustrating one embodiment of the invention, the reference character 10 designates a fragment of the frame of the apparatus here shown in the form of a conventional typewriter. 11 designates the platen of the typewriter and 12, 12^a, two of the type bars which are fulcrumed upon axes 13. At the front of the machine is a keyboard comprising a frame 14 extending across the front of the machine, upon which the keys 15 are rotatably mounted and urged to their normal position by springs 16 interposed between sockets 17 on the frame and the underside of the keys. The socket members determine the down position of the keys. Each key is formed with an arm 18 that projects rearwardly from the key and has a bumper 15^a thereon that engages with the frame 14 under the influence of the spring, whereby the key is held in normal or inoperative position.

As shown, each key is provided with a light valve which comprises in part a cylindrical bearing member 20 connected to the arm 18 by a neck 22, and said bearing member extends transversely of the arm and is rotatably mounted in the bore of a stationary bearing member 21 desirably cast on the lower side of the frame 14 with a slot along its upper side through which the neck 22 of the key projects. Desirably, the keys are spaced apart by discs 23 (see Fig. 3) stationarily held in the bores of the stationary bearing members 21. The bearing members of the several keys extend from end to end of the frame 14 and the end bearing members may be held against longitudinal movement by any suitable means such as annular internal shoulders 24.

Associated with each key and as a preference secured within the bearing member of each key is a reflecting or refracting element 25, here shown in the form of a prism, desirably fastened in the bearing member by a self-hardening substance 26, such as wax, cement or the like, where-

by the prism may be accurately located within the bearing member and fastened in place at any angle therein by the self-hardening substance. Light apertures 26^a, 26^b, are provided in said fastening means and registering light apertures 20^a, 20^b, are provided in the walls of the bearing members 20. Registering light apertures 21^a, 21^b, are also provided in the stationary bearing members 21, through which light rays are permitted to pass to and through the prisms and be transmitted thereby upon the light sensitive cells as will be presently explained. The bearing members of the keys with the prisms therein serve as light valves to control the direction of light rays.

Any suitable source of light may be provided for projecting light rays upon the prisms and said source of light may comprise one or more electric lamps 27 desirably located beneath the keyboard, and either in the form of one long lamp or several smaller ones extending along the entire length of the keyboard. When the invention is applied to standard makes of typewriters, the light source may be placed at the position shown in Fig. 1 and a series of suitable reflectors 28 may be provided to reflect the light rays from the source of light to some of the prisms. It is to be understood that the reflectors should be so disposed as to reflect the light rays from the light source to all of the prisms.

In Fig. 1 the line *a* indicates light rays projected directly from the source of light to the prism of the depressed key which is indicated by 15^x. The lines *b*, *c*, *d*, indicate light rays projected from the source of light upon the reflectors, the lines *b*¹, *c*¹, *d*¹, represent the light rays which are reflected upon the respective prisms, and the lines *b*², *c*², *d*², represent the light rays refracted by the prisms. The arrangement shown is merely for the purposes of illustration of the invention as the source of illumination may be so arranged as to project rays of light directly upon the prisms to be refracted or reflected by them through the hereinafter mentioned tubes upon the light sensitive cells.

Suitably supported in the base of the typewriter behind the keyboard is a series of selenium, photo-electric or other light sensitive cells 30, there being one cell associated with each key and its light valve and for convenience, the cells are staggered as shown in Fig. 4, and arranged in as many rows as there are rows of keys on the keyboard in order that light rays may be transmitted by each prism to its associated cell. Inasmuch as light must be excluded from the light sensitive cells, except at the time they are activated, their casings are made of metal or other material impervious to light, and light excluding tubes 31 are provided between the stationary bearing members and the associated cells, as is best seen in Figs. 1 and 3 for shutting out light from the cells except when the keys are depressed. Apertures are made in the cell casings and the ends of the tubes are fastened to the stationary bearing members and cell casings around the apertures thereof, whereby light rays may be projected from their source through the light valves and the tubes to the active material in the cells whenever the keys are depressed.

It is understood that the prisms or other refracting or reflecting elements are so disposed in the bearing members of the keys that when the keys are in normal position, the rays of light projected against them from the light source are refracted or reflected in a direction out of align-

ment with the tubes, but that when a key is depressed, the associated prisms is partially rotated so as to bring the prism thereof into position to enable the rays of light striking against the prism to be refracted or reflected through the associated tube and upon the active element of the associated light sensitive cell, thereby controlling the action of the cell and setting in operation the electric apparatus for actuating the associated type bar or other actuated mechanism. An amplifier 32 is associated with the several light sensitive cells and transmits electrical energy to the hereinafter described relays for establishing circuits for the electro-magnetic type bar actuating means.

Any suitable electro-magnetic device may be employed for actuating the type bars. As shown, a solenoid 33 is associated with and connected to each type bar and, as here shown, the core 34 of the solenoid is connected to a lever 35 which is connected by means of a link 36 to the associated type bar 12, or 12^a. A spring 37 connected to the lever and to some stationary point serves to retract the lever and type bar after they have been actuated by the solenoid, thus returning the type bar to normal position. Associated with each solenoid is a relay or the like 38, which is interposed in a circuit connected with the amplifier 32. The circuits for the solenoids are controlled by the contacts 39 of the relays.

Describing briefly the circuits between the light sensitive cells and the solenoids in connection with Fig. 7, one line 40, of each light sensitive cell 30 connects with the terminal 41 of the amplifier 32, and the other line 42 from the light sensitive cell connects with the terminal 43 of the amplifier. One line 44 from each relay connects with the output terminal 45 of the amplifier and the other line 46 connects with the line 42 of its associated light sensitive cell and consequently with the output terminal 43 of the amplifier. The electric lamp 27 is connected to the main lines 47, 48, by lines 49, 50, and the terminals 51, 52, of the amplifier are connected by lines 53, 54, with the main lines 47, 48. The lines 55, 56, connect the main lines 47, 48, with the respective solenoids 33, through the contacts 39 of the relays 38. A resistance coil 57 is interposed in the line 56 for the solenoids and the line 53 which runs to the amplifier so as to reduce the voltage to that required in operating the amplifier and solenoids.

In the operation of the machine, with the current turned on, the lamp 27 is illuminated and when the keys and their light valves are in normal or inactive position, the light rays, which are directed upon the several prisms, are refracted or reflected out of alignment with the tubes. Consequently, no light reaches the light sensitive cells. When a key is depressed, as shown at 15^x in Fig. 1, the light valve thereof is turned to bring its prism into an exact position in which the light rays from the light source are reflected or refracted through the associated tube and upon the cell 30 associated with it, whereupon the circuit through the relay 38 is established and the armature 39 thereof attracted to its core, thereby closing the electric circuit through the associated solenoid 33 whereby it is energized, thereby drawing back the core, swinging back the lever 35 and swinging the associated type bar 12 against the paper upon the platen 11. When the key is released, the associated spring returns it to normal or inactive position thereby turning the light valve back to normal

position where the prism refracts the light rays out of alignment with the tube, whereupon the associated light sensitive cell becomes inoperative and the circuit through the associated relay 38 is broken, thereby opening the electric circuit through the associated solenoid and permitting the spring 37 to return the lever and type bar to normal or inactive position.

While the invention has been shown and described only in connection with electrically operated key bars, it is to be understood that it may be applied to the space bar, the shift key, back spacer and tabulating mechanism, and in fact the invention may be adapted for all of the actuated parts of the typewriter, with slight changes as will readily present themselves to anyone skilled in the art to which this invention pertains.

Furthermore, the invention may be applied to many other electrically operated mechanisms, which require the manipulation of keys to effect the actuation of the mechanism.

While the light valve has been shown and described as shutting off light rays from the light sensitive cells when in inactive position, the prisms or light reflectors may be set normally to transmit light rays to the light sensitive cells whereby closed circuits are maintained, so that by turning a light valve, the light rays are deflected from the light sensitive cell, permitting it to instantly become inactive, thereby opening its associated circuit. Thus light rays may continuously pour upon all of the light sensitive cells, but when a key with its light valve is shifted, the light is excluded from its associated light sensitive cell, thereby rendering it inoperative and breaking its relay circuit and thereby establishing a circuit through its associated solenoid.

More or less variation of the exact details of construction is possible without departing from the spirit of this invention. I desire, therefore, not to limit myself to the exact form of the construction shown and described, but intend, in the following claims, to point out all of the invention disclosed herein.

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

1. The combination with a plurality of manually actuated rotatably mounted keys, prisms, one carried by each key, at the axis of rotation thereof of a light source, light sensitive cells, one associated with each key and upon which rays of light are to be projected from the light source through the prism of the associated key when depressed, means excluding outside light from each of said cells, and electric circuits separately controlled by the associated cells.

2. The combination with a manually actuated key having a hollow bearing member, a stationary bearing member in which the hollow bearing member of said key is rotatably mounted, and a prism mounted in the hollow bearing member of the key at the axis of rotation, said hollow and stationary bearing members having registering light openings, of a light source, a light sensitive cell, upon which light rays are to be projected from said source through said prism when the key is depressed, means excluding outside light from said cell, and an electric circuit controlled by said cell.

3. The combination with a manually actuated key having a hollow bearing member, a stationary bearing member in which the hollow bearing member of said key is rotatably mounted, a prism mounted in the hollow bearing member of the key, said hollow and stationary bearing members having registering light openings, of a light source, a light sensitive cell upon which light rays are to be projected from said source through said prism when the key is depressed, a light excluding tube extending from the light opening in the stationary bearing member to the light sensitive cell and an electric circuit controlled by said cell.

4. A manually actuated rotatably mounted key having a hollow bearing member fixed thereto and provided with light apertures and a prism mounted in the hollow of said bearing member to rotate with the key, said key being movable from an inactive to an active position whereby to rotate the prism from one position to another.

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