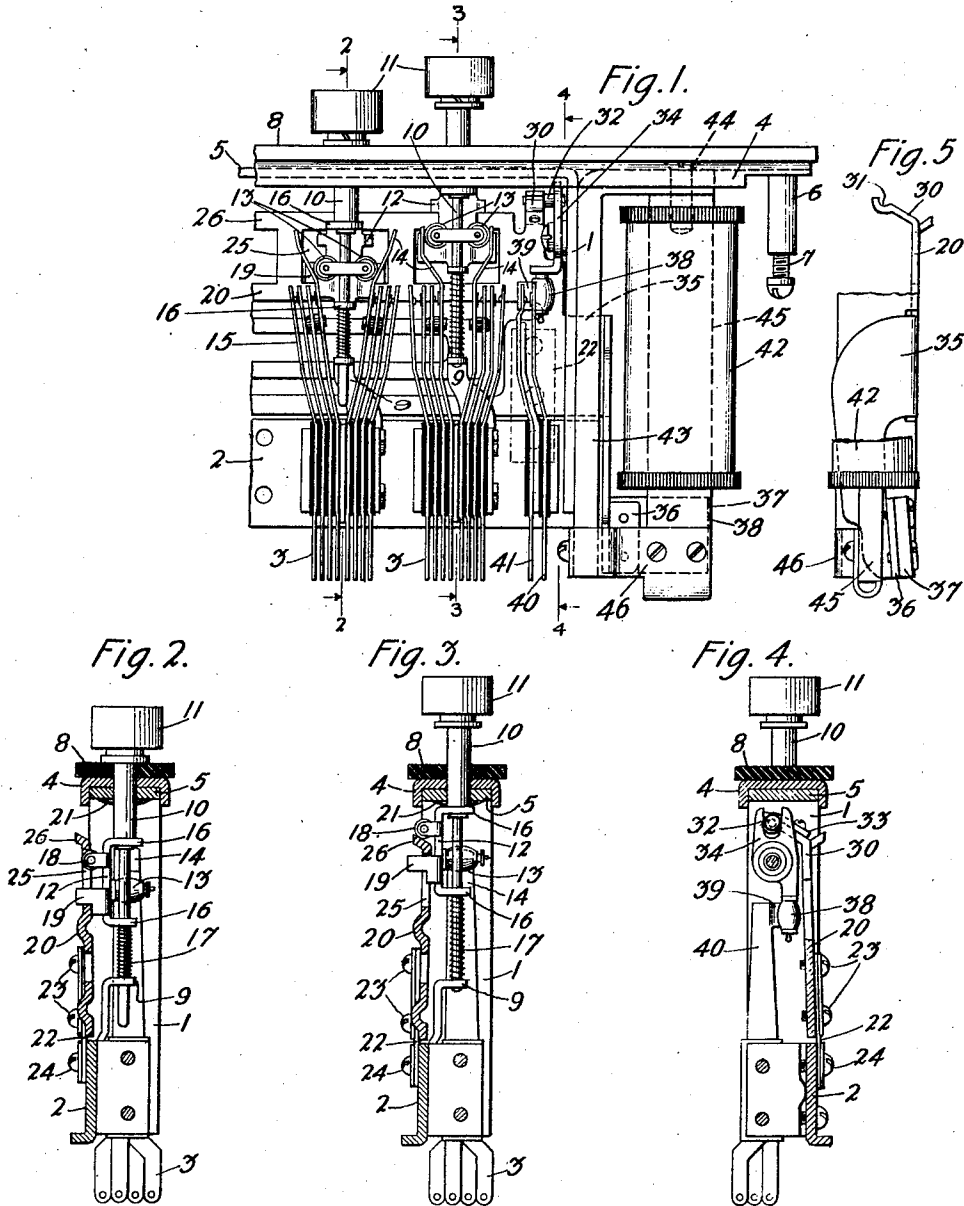


A. D. HARGAN.
RECORDING KEY.
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1,378,950.

Patented May 24, 1921.



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UNITED STATES PATENT OFFICE.

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RECORDING-KEY.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, AUGUSTUS D. HARGAN, a citizen of the United States, residing at Bayonne, in the county of Hudson, State of New Jersey, have invented certain new and useful Improvements in Recording-Keys, of which the following is a full, clear, concise, and exact description.

This invention relates to telephone keys and more particularly to the type known as "recording keys," in which a set of independent keys are so related that any key when actuated, is detained in its operative position to record its operation and is released by the subsequent actuation of another key.

Keys of this general character have been used in telephone systems for the purpose of bringing about certain circuit changes through contact springs operated by the keys. The particular key disclosed herein as one embodiment of the invention is designed to be used in semi-automatic telephone systems to control the operation of automatic switches. When used with semi-automatic telephone systems, each key set will consist of at least 10 keys and there will be provided as many sets of keys as there are digits in the greatest number assigned to a line in the system. It is obvious that the invention may also be embodied in keys for use in connection with party line ringing and in keys for use in intercommunicating telephone systems.

One object of the invention is to provide a key of the character described, possessing certain novel features of construction, together with a novel arrangement of parts which enable the key to be economically manufactured while leaving it compact and simple in construction and efficient in operation. To obtain these objects, in accordance with a feature of the invention, the latch plate which is common to a plurality of the keys of the set is provided with an aperture for each key. The key stem carries a pair of lugs which slide into the aperture of the latch plate and provides, in connection with the upper and lower edges of the aperture, means for limiting the upward and downward movement of the keys. The key stem is also provided with a roller which is adapted to engage with the latch plate and to pass within the aperture when the key is

in its lowermost position, whereby the latch plate serves to lock the key in its lowermost position. The roller is also adapted to cooperate with a cam surface formed on the latch plate to cause a movement of the latch plate sufficient to release any other key previously locked by the latch plate.

In accordance with another feature of the invention, the movement of the latch plate due to the depression of the key is utilized to operate a lever pivoted near one end of the latch plate on the frame and arranged to be moved in a direction opposite the latch plate to operate a set of contact springs.

In accordance with still another feature of the invention the latch plate is provided with an extension which extends below its point of support and is there attached to an armature which is in operative relation to the pole piece of an electromagnet mounted on the frame parallel to the axis of the key stems and substantially in alinement therewith.

In the accompanying drawing, Figure 1 is a side elevation of a portion of a key structure embodying the invention; Fig. 2 is a cross-section thereof on the line 2—2 of Fig. 1 showing a key in a depressed position; Fig. 3 is a cross-section on the line 3—3 of Fig. 1 showing a key in its normal position; Fig. 4 is a cross-section on the line 4—4 of Fig. 1 showing the master contact construction and the latch plate mounting; and Fig. 5 is an end view with portions broken away to disclose the relation of the latch plate to the frame.

In the embodiment of the invention shown on the drawing, a plurality of keys of the plunger type, are mounted compactly upon an elongated frame. This frame comprises a U-shaped member 1, across the open end of which a cross member 2 is secured.

The cross member forms a support for a plurality of sets of contact springs indicated in general at 3. The U-shaped member is secured to a channel shaped mounting plate 4, the downwardly extending flanges of which embraces the base 5 of the U-shaped member 1 to which it may be secured by rivets or other suitable means. The mounting plate 4 is provided at each end with a tubular projection 6 which is internally threaded to receive a screw 7 by which the entire key structure may be mounted upon

that part of a telephone switchboard known as the key shelf or upon the similar portion of a cabinet or other supporting device in which the keys are to be mounted. Secured to the mounted plate 4 is a face plate 8 which may be of hard rubber or other suitable material.

The cross member 2 in addition to supporting the contact springs 3, also supports a bearing arm 9 for each key, which bearing arm is provided with a horizontal apertured projection through which the lower end of the operating stem 10 of the corresponding key is slidable. The other end of the stem 10 extends through and is slidable in suitable registering apertures provided therefor in the base 5 of the member 1, and in the mounting plate 4 and face plate 8. The upper end of the stem carries an operating button 11 which may be of any usual or well-known type. Rigidly secured to and movable with the stem 10, as more clearly shown in Figs. 2 and 3 is a sheet metal member 12 which serves as a support for a pair of rollers 13, which are adapted to engage with and actuate the operating springs 14 of the corresponding set of contact springs 3. These operating springs 14 cooperate in a well-known manner with a plurality of sets of circuit changing contact springs indicated in general at 15. Surrounding the stem 10 and positioned between the lower one of the lugs 16 of the member 12 and the horizontal projection of the arm 9 is a spiral spring 17, which normally maintains its respective key in its upper position. The supporting member 12 also carries a roller 18, arranged with its axis transverse to the operating rollers 13, and a pair of lugs 19 adapted to cooperate with a latching plate 20 in a manner to be described. Secured to the under side of the base 5 of the member 1 and provided with apertures through which the key stems 10 pass is a spring buffer member 21 against which the upper lug 16 formed on the supporting member 12 contacts when the key is in its uppermost position.

The latch plate 20 is a substantially rectangular sheet metal part pivoted to the cross member 2 by means of hinge members 22 which are preferably resilient sheet metal. The hinge members 22 are secured to the latch plate 20 by means of screws 23 and to the frame member 2 by means of the screws indicated at 24. The latch plate 20 is provided with substantially rectangular apertures 25 for each of the keys and these apertures are sufficiently large to allow the roller 18 and the lugs 19, mounted on the corresponding key stem 10, to project therein when the key is in its depressed position. These apertures in connection with the rollers 18, are adapted to act as latches, thereby holding the keys in depressed position until

released by future operation of the latch plate 20. The lugs 19 are permanently positioned within the apertures 25 and project therethrough at all times. These lugs 19 therefore act as guides for their respective key stems to prevent rotation thereof and also as stops to limit both the upward and downward travel of their respective key stems. The latch plate 20 is also provided with a cam surface 26 upon the upper edge thereof. When the key stems are in their normal position, the rollers 18 thereof are positioned upon the cam surface of the latch plate, but upon the depression of any undepressed key, the roller 18 thereof engages the cam surface and moves the latch plate to release any other key which may be locked in depressed position at this time.

Projecting from the upper right-hand corner of the latch plate 20 is an arm 30 extending inwardly which is provided with a depression or groove 31 which forms a seat for a pin 32. One end of the pin 32 is held in the groove 31 by means of a plate 33, suitably secured to the arm 30, while the other end of pin 32 extends into the bifurcated end of a lever 34 which is pivotally mounted upon the frame 1 as hereinafter described. The latch plate 20 also has an arm 35 projecting from the right-hand lower corner thereof, this arm in turn having a portion extending at right angles thereto and below the point of support of the latch plate. The lower end of arm 35 has an extension 36 formed at right angles to the body portion thereof and in a plane substantially parallel to the latch plate, and supported upon this extension 36 is an armature 37.

The lever 34 is pivotally secured to the right-hand leg of the U-shape frame member 1 adjacent the base 5 thereof and one end of this lever is provided with an insulating roller 38. This roller rests upon an inclined portion 39 of a contact spring 40 which cooperates with another contact spring 41. These springs are supported upon the cross member 2 and are normally disengaged, but upon the movement of the latch plate 20 to releasing position or the position at which it holds the key depressed, the consequent movement of the lever 34, due to the engagement of the pin 32 with the bifurcated end of the lever, forces the spring 40 into engagement with the spring 41 under the action of the roller 38 on the inclined portion 39 of the spring 40. This engagement occurs upon the movement of any key to its depressed position, or upon movement of the latch plate 20 in response to energization of an electromagnet 42. The springs 40 and 41 are accordingly operated in common with the actuation of any of the keys or of the electromagnet 42.

The electromagnet 42 is provided to ef-

fect movement of the latch plate 20 to releasing position irrespective of the actuation of any of the keys and thus serves on energization to release any key which may be depressed at this time. An L-shaped magnetic member 43 has one limb positioned within the channeled mounting plate 4, and the other limb positioned adjacent the right-hand leg of the U-shape member 1, a screw 44 extending through the mounting plate 4, and the first-mentioned limb of the member 43 into the core 45 of the electromagnet 42 serving to secure the member 43 and electromagnet 42 in place. As an aid to maintain the electromagnet 42 in proper position in relation to its armature 37 without impairing its magnetic circuit, a non-magnetic member 46 extends between and is secured to both the lower end of the core 45 and the lower end of the longer limb of the member 43.

Upon energization of the electromagnet 42, the armature 37 thereof will be moved to attracted position, and thus moves the latch plate 20 to releasing position thereby releasing any depressed keys and engaging the contact springs 40 and 41 as previously mentioned.

From the above description, it will be evident that a compact and efficient structure is provided in which either the armature 37, or latch plate 20, or both, can be readily removed from the key structure without interfering with the adjustment of the keys; a

feature of considerable importance in apparatus of this character.

What is claimed is:

1. A key set comprising a frame, a plurality of depressible keys mounted thereon, contact springs for each of said keys, a stem for each of said keys, a pivoted latch plate having apertures therein, means carried by each of said keys and engaged by said latch plate upon depression of its respective key to lock such key in depressed position, and a lug mounted on each of said keys permanently positioned within one of said apertures serving to limit the downward and upward movement of its respective key.

2. A key set comprising a frame, a plurality of depressible keys mounted thereon, contact springs for each of said keys, a pivoted apertured latch plate to engage and lock any of said keys in depressed position upon depression of said keys, a stem for each of said keys, means carried by each of said keys and permanently positioned within an aperture of said latch plate to limit the downward and upward movement of its respective key and to prevent rotation of its respective key stem, and means mounted on each of said keys to effect movement of said latch plate to releasing position upon depression of said keys.

In witness whereof, I hereunto subscribe my name this 22nd day of November A. D., 1918.

AUGUSTUS D. HARGAN.