

Oct. 23, 1951

J. M. MELICK

2,572,503

KEY EQUIPPED TELEPHONE SET

Filed Dec. 23, 1947

2 SHEETS—SHEET 1

FIG. 1

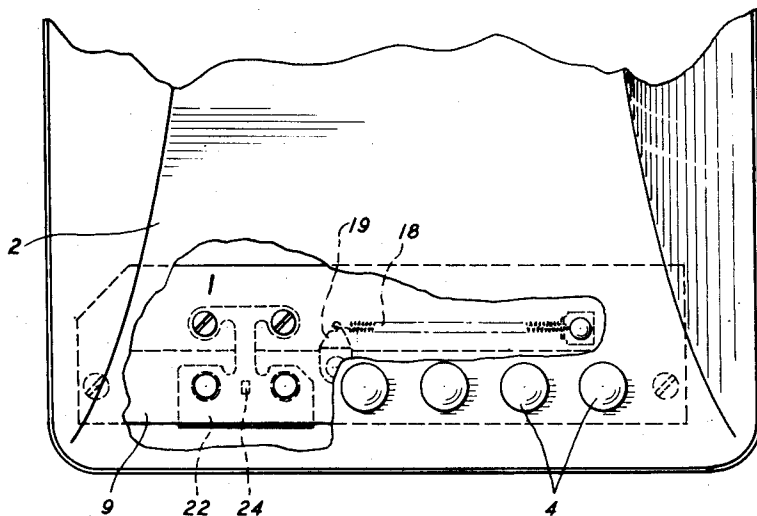
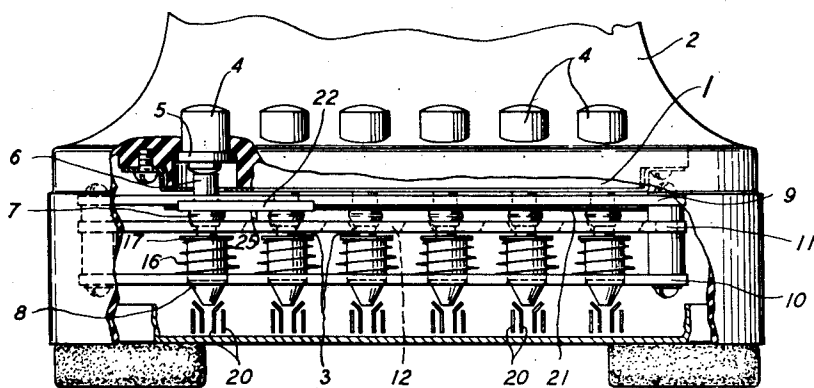


FIG. 2



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2 SHEETS—SHEET 2

FIG. 3

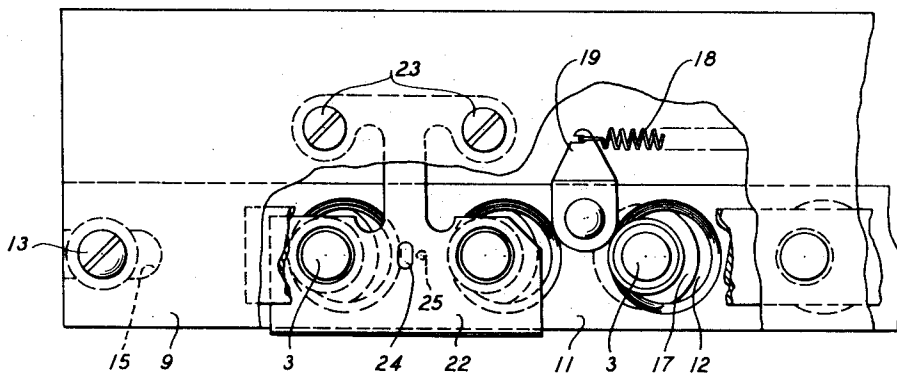


FIG. 4

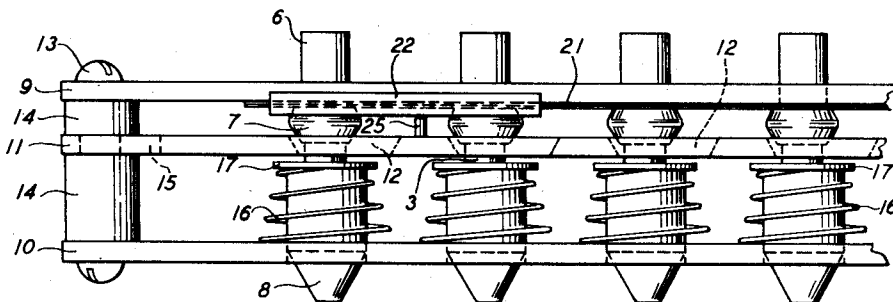


FIG. 5

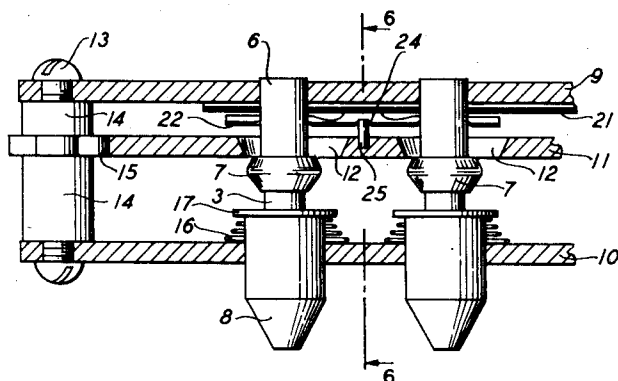
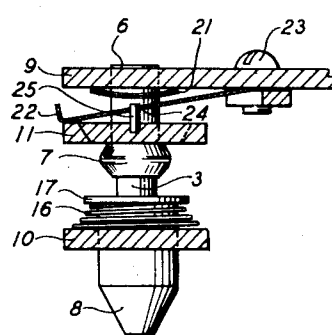


FIG. 6



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KEY EQUIPPED TELEPHONE SET

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9 Claims. (Cl. 74—483)

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This invention relates to switching apparatus and more particularly to mechanically locking keys of the type used in conjunction with telephone sets.

In certain telephone facilities, subscribers' telephone sets are equipped with manually operable keys which function to perform certain switching operations enabling the subscriber to selectively interconnect his telephone with any of the several telephone lines to which the several keys are assigned. Such keys are generally of the mechanically locking type in which the operation of a key locks that key in its depressed position until it is released by the subsequent operation of another key. In the event that a call of the three-party or "conference" type is required, the simultaneous operation of the two keys associated with the desired lines will lock both of those keys in their operated positions until they are subsequently released by the operation of a third key.

The locking and releasing of the individual keys is normally accomplished by a common latch plate having apertures therein through which the key plungers pass. Upon depression of the key, a camming element associated with each of the plungers causes the latch plate to be displaced longitudinally against the action of a restoring spring until the camming element passes below the lower surface of the latch plate, at which time the latch plate is returned to its initial position thereby locking the key in its operated position. The actuation of another key again displaces the latch plate longitudinally and the previously locked key is released.

In the event that the keys are all of this mechanically locking type, it is possible for a subscriber to lock all of the keys in an operated position at one time, thereby requiring the services of a maintenance man to correct the condition.

An object of this invention, therefore, is to render it impossible to lock all of the keys in an operated position simultaneously.

A further object is to render it impossible to lock all of the keys in an operated position simultaneously and yet permit the simultaneous locking of all but one of such keys.

These objects are attained by the association of an apertured spring member with certain of the keys and the affixing of a pin on the latching plate. The apertured spring member is so designed that it will not interfere with the normal operation of any of the individual keys or with the simultaneous operation of all but one

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of the certain keys with which it is associated, but the simultaneous operation of all of the keys with which it is associated causes the pin to engage the aperture in the spring member and thereby prevents the return of the latch plate to the locking position.

The invention may be more fully understood from the following detailed description made with reference to the accompanying drawings in which:

Fig. 1 is a top view of a telephone set partially broken away to show the key unit mounted therein;

Fig. 2 is a front view partially broken away of the key unit shown in Fig. 1;

Fig. 3 is an enlarged top view partially broken away to show the anti-locking device mounted in the key unit and with all keys in the unoperated position;

Fig. 4 is a front view of the key unit shown in Fig. 3;

Fig. 5 is a front view in section showing the position of the anti-locking device when both keys with which it is associated are operated; and

Fig. 6 is a section through 6—6 of Fig. 5.

Referring now particularly to Figs. 1 and 2, a key unit 1 is mounted in the housing 2 of a standard telephone set. The switching keys 3 of the key unit 1 are operated by a plurality of key buttons 4 which pass through apertures in the housing 2 and are provided with shoulders 5 thereon to limit their upward movement. The switching keys or contact operating plungers 3 (Figs. 2 and 4) each comprise a shank portion 6, a locking cam 7, and an operating cam 8, and are operated by the key buttons 4. The switching keys 3 are controlled and guided in their movement by an upper mounting plate 9 suitably apertured to accept the shank portions 6, a lower mounting plate 10 suitably apertured to accept the operating cams 8, and a latching device or latch plate 11 having tapered apertures 12 therein through which the locking cams 7 may pass. The upper and lower mounting plates 9 and 10 are held in fixed, spaced, parallel relationship by means of screws 13 and sleeves 14 (Fig. 4). The latch plate 11 which is free to move longitudinally through a short distance is supported in parallel relationship to the mounting plates 9 and 10 by means of a slot 15 freely engaging an indented portion of the sleeves 14. Coil springs 16 are compressed between the lower mounting plate 10 and shoulders 17 on the individual keys 3, and serve to return the keys to

their normal, unoperated positions. A restoring spring 18 (Figs. 1 and 3) is tensioned between the upper mounting plate 9 and a hook 19 secured to latch plate 11 to serve to return the latch plate 11 to its normal position.

The operation or depression of any one of the buttons 4 forces the locking cam 7 downwardly against the side of the aperture 12, forces the latch plate 11 to the left until the locking cam 7 has passed below the under surface of the latch plate 11 at which time the latch plate 11 is returned to its normal position by the restoring spring 18 and the switching key 3 is securely locked in its operated position. The insulated operating cam 8 then serves to close an electrical circuit through contacts 20 (Fig. 2). The operation of any other switching key 3 again forces the latch plate 11 to the left and the operated key is released and forced upwardly by the coil spring 16 against the shock-absorbing spring plates 21 (Figs. 2, 5 and 6).

Without special provision, therefore, it may be seen that upon the simultaneous depressing of all switching keys 3, the latch plate 11 can return to its normal position and lock all keys in their operated positions. It is for the obviating of this condition to which the present invention is directed.

Referring now particularly to Figs. 3 and 4, a substantially H-shaped flat spring member 22 is affixed to the upper mounting plate 9 by means of screws 23, and has two properly located apertures therein to freely accept the shank portions 6 of the two adjacent switching keys 3 with which it is associated. The spring member 22 is tensioned so as to press downwardly, but is normally held against the upper mounting plate 9, as shown in Fig. 4, by the locking cams 7 on the switching keys 3 with which it is associated. A small aperture 24 is approximately aligned with and centered between the two apertures which accept the switching keys 3. A pin 25 is mounted on the latch plate 11 and extends upwardly therefrom. The pin 25 is properly positioned in lateral alignment with the aperture 24 in the flat spring member 22 and is positioned longitudinally so that when the latch plate 11 is forced to the left the pin 25 and aperture 24 are in exact registry.

In operation, whenever any of the switching keys 3 are operated, the movement of the latching plate 11 to the left places the aperture 24 and the pin 25 in vertical alignment, but the flat spring member 22 is prevented from moving downwardly to engage the pin 25 as long as either of the two switching keys 3 with which it is associated is in the unoperated position. Therefore, as long as one of these two switching keys remains in its unoperated position, all of the remaining keys may be depressed and locked in the operated position simultaneously. However, as may be seen in Figs. 5 and 6, upon the simultaneous operation of the two keys 3 with which the anti-locking device is associated, the flat spring member 22 is permitted to spring downwardly, the pin 25 on the latch plate 11 engages the aperture 25, and the latch plate is prevented from returning to its locking position. Release of either or both of these keys 3 will move the flat spring member 22 upwardly and permit the latch plate 11 to return to its normal position.

In this embodiment, the flat spring member 22 has, for convenience, been shown to be associated with but two of the switching keys 3. It is obvious that a similar result could be obtained by associating a suitably shaped member 22 with

more than two of the keys 3. If the individual requirements necessitate that any combination of three-party or "conference" calls be made, it will be necessary to associate the anti-locking device with all of the switch keys 3. The embodiment depicted and described herein is to be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. In combination, a key unit, a plurality of switching keys included in said unit, a latch plate, means associated with each of said keys for moving said latch plate when each of said keys is operated, means for returning said latch plate to lock each of said keys in an operated position, and means associated with certain of said keys and with said latch plate for holding said latch plate from returning when said certain keys are simultaneously operated, said latter means comprising a flat spring member having an aperture therein and a pin secured to said latch plate and engageable with the aperture in said flat spring member.

2. In combination, a key unit, a plurality of switching keys included in said key unit, a latch plate, means associated with each of said keys for moving said latch plate when each of said keys is operated, means for returning said latch plate to lock each of said keys in an operated position, a flat spring member associated with two of said keys and having an aperture therein, and a pin associated with said latch plate and engageable with the aperture in said flat spring member whereby said latch plate is held from returning when said two keys are simultaneously operated.

3. In a switching device, a plurality of contact operating plungers, means for locking said plungers in their operated positions comprising an apertured latch plate which is displaced longitudinally during the downward passage of said plungers through their respective latch plate apertures by a locking cam associated with each of said plungers and restored to normal by a restoring spring when the locking cam is depressed below the level of the latching plate, whereby the depressed plungers are held and locked in their depressed positions, a flat spring member associated with certain of said keys and normally restrained by the camming elements on said certain keys and having an aperture therein, a pin associated with said latch plate and engageable with the aperture in said flat spring member whereby said latch plate is held in its longitudinally displaced position when said certain keys are simultaneously depressed.

4. In a switching device, a plurality of contact operating plungers, means for locking said plungers in their operated positions comprising an apertured latch plate which is displaced longitudinally during the downward passage of said plungers through their respective latch plate apertures by a locking cam associated with each of said plungers and restored to normal by a restoring spring when the locking cam is depressed beyond the level of the latching plate, whereby the depressed plungers are held locked in their depressed positions, a flat spring member normally restrained by the locking cams on two of said keys and having an aperture therein, a pin associated with said latch plate and in vertical alignment with the aperture in said flat spring member when said latch plate is in its longitudinally displaced position, whereby when said two keys are simultaneously depressed, said pin is engageable with the aperture in said flat spring

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member thereby holding the latch plate in its longitudinally displaced position.

5. In a key unit, a plurality of switching keys, all of said keys being movable to an operated position concurrently, first means for locking each of said keys in an operated position, and mechanical means for permitting the simultaneous locking of all but one of said keys comprising means connected to said first means and means common to at least two of said keys.

6. In a key unit, a plurality of switching keys, all of said keys being movable to an operated position concurrently, a latching device for locking each of said keys in an operated position, and mechanical means for preventing the simultaneous locking of all of said keys comprising means common to at least two of said keys and means connected to said latching device.

7. In combination, a key unit, a plurality of switching keys included in said unit, all of said keys being movable to an operated position concurrently, a latching device for locking each of said keys in an operated position, and means engageable with two of said keys and operatively connected to said latching device for disabling said latching device when said two keys are concurrently operated.

8. In combination, a key unit, a plurality of switching keys included in said unit, all of said keys being movable to an operated position concurrently, a latch plate, means associated with each of said keys for moving said latch plate when each of said keys is operated, means for re-

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turning said latch plate to lock each of said keys in an operated position, and mechanical means engageable with two of said keys and connected to said latch plate for holding said latch plate from returning when said two keys are concurrently operated.

9. In combination, a key unit, a plurality of switching keys included in said unit, all of said keys being movable to an operated position concurrently, a latch plate, means associated with each of said keys for moving said latch plate when each of said keys is operated, means for returning said latch plate to lock each of said keys in an operated position, and mechanical means engageable with certain of said keys and connected to said latch plate for holding said latch plate from returning when said certain keys are concurrently operated.

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