

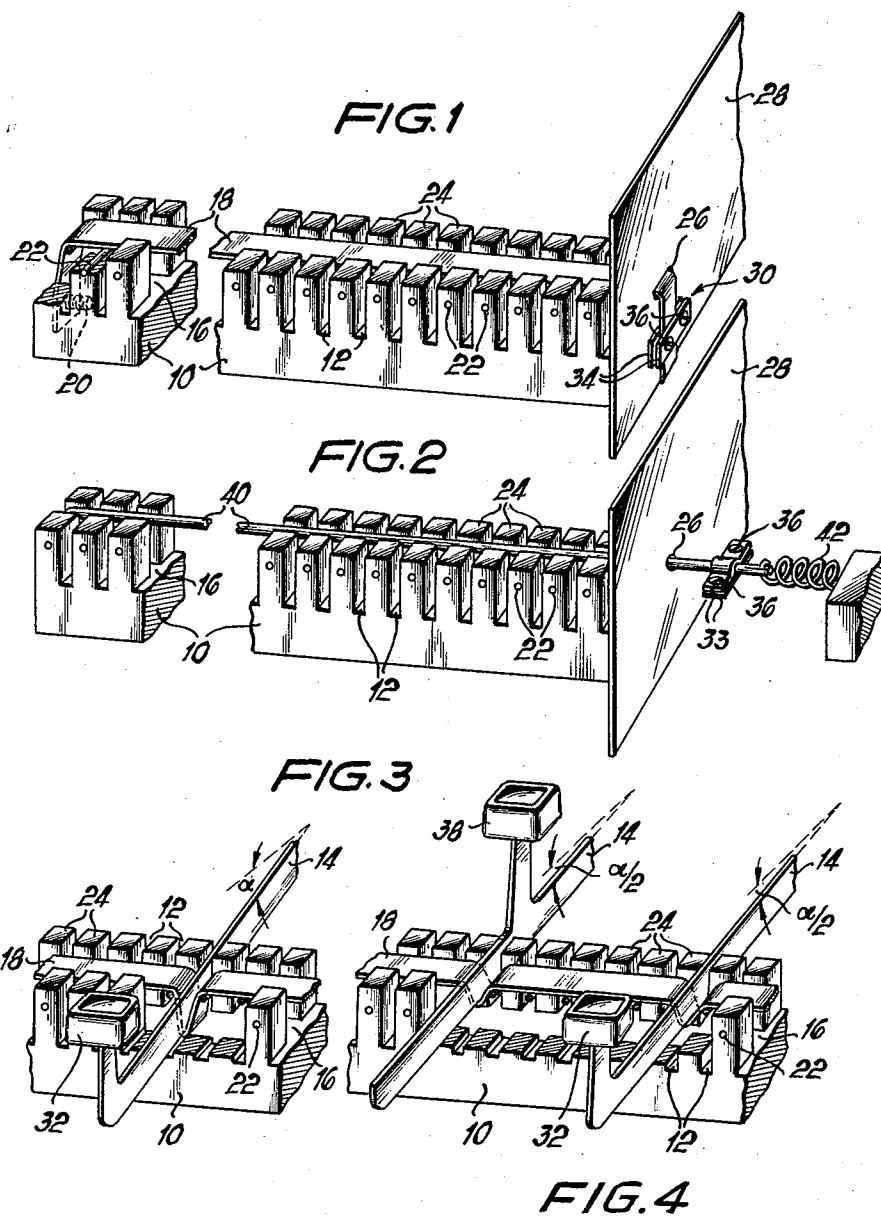
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KEYBOARD LOCK

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INVENTOR

1

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KEYBOARD LOCK

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This invention relates to key locks for keyboards of all kinds, more especially keyboards of typewriters, calculating machines, type-setting machines and similar machines, and perforating machines, the said key locks preventing different keys from being struck simultaneously to the full extent of their travel.

Key locks are known which use rotatable locking levers or locking bars which are slidable in pairs with respect to one another. When a key is struck, adjusting or displacing work is performed, which so sets the locking means that the other keys are opposed by a supporting member which prevents the simultaneous striking of other keys.

This adjusting or displacing work must be performed manually again and again whenever a key is struck, and relatively large masses have to be moved. Although jamming of the key levers cannot occur in comparison with the likewise already known locks, for example ball locks, which have slidably mounted locking pieces, there is the disadvantage that the touch is heavy as a result of the locking means. In addition, key locks requiring such adjusting work are mechanically expensive. A large number of individual parts are necessary, which have to be made to close tolerances in order to ensure that their mutual cooperation will give perfect working. Furthermore, such constructions are restricted to certain minimum sizes which permit subsequent installation only on a restricted scale.

All these difficulties and disadvantages are obviated in a surprisingly simple manner according to the present invention by disposing a band, a cord, or a cable without any inherent elasticity and having a predeterminable effective length in such manner with respect to the key levers which are to be locked with respect to one another that stretching of the band or the like occurring during the striking of a key prevents other keys from being struck simultaneously to the full extent of their travel. The key lever which is first struck first bears on the band. On further depression the band is increasingly stretched. In these conditions, the effective length of the band, cord or cable is so dimensioned by means of an adjustable limiting means that the band, cord or cable is tensioned to the limit by the full travel of a key lever that has been struck. The band or the like which is completely stretched in this position prevents the simultaneous striking of a second key. Deflection of the key levers of two or more simultaneously struck keys is thus only possible until half the maximum angle of deflection is reached or until the sum of the individual angles of deflection of a plurality of key levers is equal to the maximum angle of deflection of one key lever.

Since as a rule only the full key travel corresponding to a maximum deflection is utilized for the striking of a type lever or in order to initiate a control pulse, it is thus ensured that a full double striking and hence jamming of the type levers or a simultaneous multiple release of control pulses is impossible.

In these circumstances the light touch of the original keyboard without any key lock is retained practically completely. If a sufficiently flexible material is selected for the band, cord or cable, and has practically no inherent elasticity, the additional force required for known mechanical key locks is reduced to a minimum. This advantage is not affected by keeping the band, cord or cable taut by the action of a weight or by an initial tensioning

2

means, for example by means of a tension spring or rubber band. The force required is kept uniform in this way, particularly if a key is struck repeatedly. Moreover, according to the invention, the band, cord or cable is preferably inserted directly beneath the key levers in a comb longitudinally and transversely to the comb teeth, and is held in this position by the stretching. The comb at the same time guides the key levers at a point where maximum deflection of the key lever occurs when the associated key is struck. The insertion of a band or the like disposed in a comb enables the dimensions of this comb to be kept small because the mounting and supporting means required for the small mass of the band or the like used as locking means need not be very strong or expensive. The comb can therefore easily be provided at a point where the key travel used for the key locking process permits the maximum tolerances in the limiting of the deflection of the key levers by means of the band or the like.

According to the invention, this advantage is also improved by arranging the band, cord or cable inserted in the comb to bear on supports, the free width between which is as large as possible. The larger the free width between the supports, the less the band or the like is deflected when the key is struck and hence the lower the stresses to which it is subjected.

One considerable advantage of the new key lock is that it can be subsequently installed in existing keyboards or the like without undue expense.

Specific embodiments of the invention will now be described by way of example with reference to the accompanying drawings, in which:

FIGURE 1 is a perspective view of a comb with a band inserted,

FIGURE 2 is a perspective view of a comb with a cord inserted,

FIGURE 3 shows a part of a comb with a band inserted, and a key lever which has been struck to the full extent of its travel cooperating with the band, and

FIGURE 4 shows part of a comb, and two key levers that have been struck simultaneously cooperating with the band.

A comb 10 has a number of transverse slots 12 corresponding to the number of keys to be locked. These slots serve to guide the key levers 14. The depth of the transverse slots 12 is preferably so selected that the key levers 14 do not strike the comb 10 when they are fully struck.

In the middle of the comb is a longitudinal slot 16. According to FIGURE 1, a very flexible and thin band 18 with practically no inherent elasticity is inserted in the longitudinal slot 16. By way of example, high-strength plastic films similar to the materials known as coating supports for sound-recording tapes are suitable. The width of the band 18 determines the somewhat larger width of the longitudinal slot 16.

The band 18 is fastened on one side of the comb by means of a screw 20. In the longitudinal slot 16 the band bears on pins 22 mounted in the top of the teeth 24 of the comb 10. The upper edges of the teeth 24 are situated above the band 18 and also below the bottom edges of the key levers 14 in the position of rest.

At the other end of the comb the free end of the band 18 is taken through an opening 26 in a wall 28 (FIGURE 1). The band is kept taut by a weight 30 which hangs down and which is so constructed as to constitute an adjustable means of limiting the required effective band length.

To adjust the effective band length the end of the band hanging loosely out of the opening 26 is stretched taut by hand. Any key 32 is then struck to the full extent of the travel of its key lever. The angle of deflection of

3

the key lever 14 may be assumed to be α (FIGURE 3). During striking a band loop forms beneath the struck key lever 14, and the length of this loop is equal to the required extension of the band to its effective length, i.e. the band 18 is drawn by this amount into the opening 26. In this position the two clips 34 of the weight 30 are fixed directly at the opening 26 on the band 18 by means of the screws 36.

The weight 30 thus at the same time forms a stop for the movable end of the band against the wall 28. If the weight 30 is in this position, because a first key has been struck to the full extent of its travel, striking of a second key is prevented by the already completely stretched band.

If, however, a second key is struck when the previously struck first key has already been released, the second striking very advantageously accelerates the return of the first key to its position of rest. This advantage is admittedly already given by known devices but according to the present invention is distinguished by particular ease of motion.

If two keys, for example the keys 32 and 38, are simultaneously struck to half the angle of deflection

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(compare FIGURE 4), the striking of the weight 30 against the wall 28 also limits any further deflection of the key levers so that in this case no type impression will form or any pulse be initiated.

According to FIGURE 2, in a modified embodiment of the invention, a cord or cable 40 is used instead of the band. The mode of operation is the same, and the effective length of the cord or cable is determined in the same way as described above for the band.

A modified embodiment of keeping the band, cord or cable taut is shown on the right in FIGURE 2.

Instead of the weight 30, a spring 42 is provided. In this case it is advantageous for the band, cord or cable not to be bent down after passing through the opening 26. Other embodiments wherein the stretching of the band, cord or cable is effected, for example, by means of deflecting rollers, are also possible. When a spring-loaded take-up roller is used, the stop limiting means at the wall 28 is replaced by rotation of the take-up roller against spring tension as far as an adjustable stop.

FIGURE 4 shows the arrangement of two keys 32 and 38 situated in two different rows of a keyboard. By lengthening one key lever 14 in the forward direction in this case it is ensured that this key is also guided in the comb and when struck performs a stroke equal to that of all the other key levers. Instead of extending the key lever in the forward direction it would, of course, be possible to take other equivalent steps. For example, the band can also be so guided over deflecting rollers that it is simultaneously subjected to different rows of keys in different planes.

The distance between the pins 22 is advantageously made as large as possible. While the distance between them remains the same, the diameter of the pins 22 should be made small.

The band, cord or cable is thus not sharply deflected, and this reduces wear. For the same reason, sharp edges are avoided at the supports and at the key levers which come into contact with the band or the like.

I claim:

1. A keyboard arrangement comprising, in combination, a plurality of keys extending spaced from and substantially parallel to each other and being each tiltable from a rest position to a downwardly inclined active position and vice versa; an elongated block having a top face and a bottom face and extending transversely to and beneath said plurality of keys, said block being formed with a plurality of slots extending in direction of said keys and respectively aligned therewith from said top to

4

ward but short of said bottom face of said block for guiding said keys respectively during tilting between said positions thereof and with an elongated slot extending in direction of elongation of said block from one to the other end thereof so as to form two rows of teeth with the teeth in each row respectively located on opposite sides of said keys and the teeth in said two rows aligned in pairs with each other; an elongated flexible and substantially non-stretchable member extending in said elongated slot transversely to said keys beneath the same; a plurality of support pins respectively fixed at opposite ends thereof to aligned teeth in said two rows beneath the top face of said block and extending transverse to said elongated flexible member for supporting the same in said elongated slot beneath the top face of said block and in engagement with bottom edge faces of said keys so that during tilting of any one key from said rest to said active position thereof a portion of said elongated flexible member engaged by said edge face of said one key and having a length substantially equal to twice the travel of the engaging edge face portion will be pulled between the support pins adjacent said one key while shifting of said elongated flexible member in direction transverse to its elongation will be prevented during tilting of said one key; means operatively connected to one end of said flexible member for holding said one end in fixed position onto one end of said elongated block; and means operatively connected to the other end of said flexible member for limiting the movement of said other toward said one end to the length of said deflected portion so that when one of said keys is tilted from said rest to said active position thereof all of the other keys will be prevented from being moved to the active position thereof.

2. A keyboard arrangement comprising, in combination, a plurality of keys extending spaced from and substantially parallel to each other and being each tiltable between a rest position and an active position inclined at an angle to said rest position, the paths for tilting of said plurality of keys being parallel to each other; an elongated flexible and substantially non-stretchable member extending transversely to said keys and crossing all paths thereof spaced from those points of said paths in which said keys are in active position respectively, so that said elongated flexible and substantially non-stretchable member is engaged by any one key during its movement from said rest position into said active position thereof; a plurality of support means located spaced from each other along said elongated flexible and substantially non-stretchable member and between adjacent keys and supporting said elongated flexible and substantially non-stretchable member while permitting deflection of said elongated flexible and substantially non-stretchable member between adjacent support means during tilting of the respective key located between said adjacent support means from said rest into said active position; mounting means at opposite ends of said elongated flexible and substantially non-stretchable member cooperating with said plurality of support means for holding said ends in such a manner that when one of said keys is tilted from said rest position into said active position thereof all of the other keys will be prevented from being moved from their rest to their active positions; a plurality of first guide means each associated with one of said keys and guiding the respective key during its entire tilting between rest and active positions thereof, each of said first guide means arranged on one side of said elongated flexible and substantially non-stretchable member; and a plurality of second guide means each associated with one of said keys and guiding the respective key during its entire tilting between rest and active positions thereof, each of said second guide means arranged on the other side of said elongated flexible and non-stretchable member each corresponding pair of first and second guide means thus being located spaced from each other firmly guiding one of the keys and forming be-

tween themselves a free space limiting transversal movement of said elongated flexible and substantially non-stretchable member.

3. A keyboard arrangement as set forth in claim 10 in which said plurality of support means are respectively connected at one of the ends thereof to said plurality of first guide means and at the opposite ends thereof to said plurality of second guide means. 5

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