Jan. 30, 1968 A. SCHONFELD ET AL 3,366,216

MECHANICAL INTERLOCK

Filed Aug. 30, 1965

FIG. 1

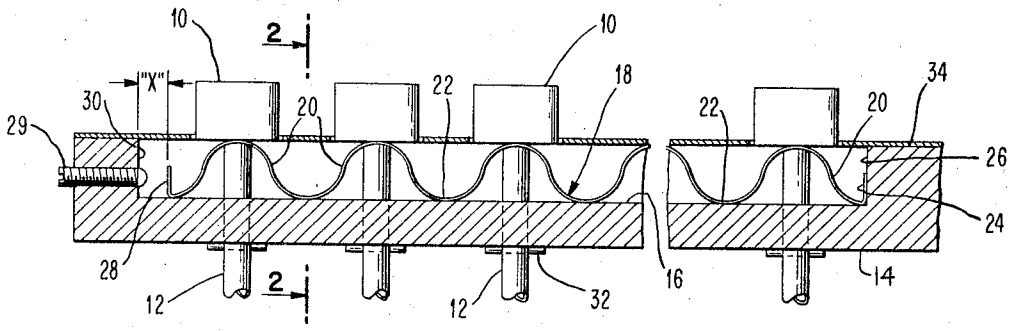


FIG. 2

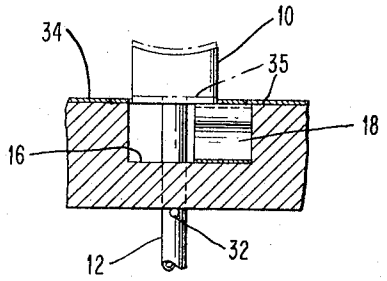
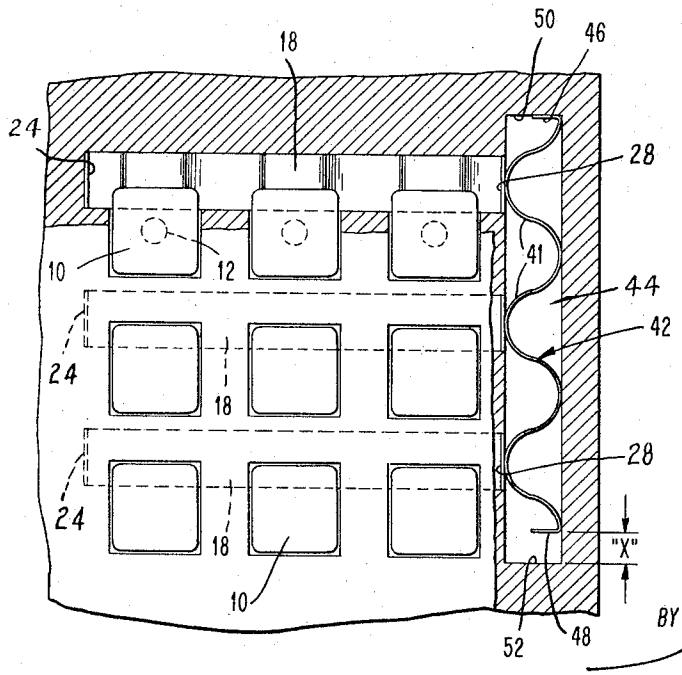


FIG. 3



INVENTORS
ARNOLD SCHONFELD
MARVIN JACOBY

BY

AGENT

United States Patent Office 3,366,216
Patented Jan. 30, 1968

3,366,216

MECHANICAL KEY INTERLOCK

Arnold Schonfeld, Levittown, and Marvin Jacoby, Fort Washington, Pa., assignors to Sperry Rand Corporation, New York, N.Y., a corporation of Delaware

Filed Aug. 30, 1965, Ser. No. 483,715
10 Claims. (Cl. 197—107)

ABSTRACT OF THE DISCLOSURE

A key interlock which utilizes a leaf spring formed in a serpentine shape is disclosed. The spring is located in a channel whose length is slightly longer than the spring length. The hills of the spring are positioned under the keys and are flattened by the actuation of the keys.

This invention relates to keylocks but more specifically to an interlock for preventing depression of more than one key at a time in a keyboard.

While devices for his purpose are well known in the keyboard art, because of their expense and complexity they have not become popular.

Therefore, it is the primary object of this invention to provide an improved keylock for keyboards which prevents the depression of more than one key at a time, and which is characterized by its simple construction and low cost.

In accordance with the above and first briefly described, the invention comprises an elongated thin leaf spring formed in a serpentine shape with alternate hills and valleys. The spring is confined in a channel under a row or column of keys with the hills directly beneath the underside of the keys. The channel confines the spring with sufficient flexibility only to permit one key in the row to be depressed. In another form of the invention wherein a plurality of key rows are provided, serpentine springs are utilized in an arrangement permitting only one key at a time in the whole keyboard to be depressed.

In the drawings:

FIGURE 1 is a sectional view through a row of keys incorporating the invention;

FIGURE 2 is a sectional view taken along line 2—2 of FIGURE 1; and

FIGURE 3 is a somewhat diagrammatic view illustrating the invention as used in a multi-row keyboard.

As seen in FIGURE 1 a row of keys **10** are mounted with their stems **12** extending through a base plate **14**. Snaking under the keys in a channel **16** formed in the base plate is a spring **18** formed from an elongated flat thin spring leaf into serpentine shape with alternate hills and valleys **20** and **22** respectively, one hill under each key. Preferably, the spring passes along the sides of the stems **12**, as seen in FIGURE 2, but this is a matter of choice.

One end of the spring—the right end **24** as shown here by way of example—preferably is anchored against the right end wall **26** of the channel **16** with its other end **28** spaced from the opposite end wall **30** a distance "X." This space is sufficient to permit the spring to elongate only in response to the flattening of one hill **20** by the depression of one key the amount necessary to actuate its associated apparatus (not shown). The distance "X" may also be adjusted by providing a screw **29** in wall **30** at the end of each key row. If more than one key is depressed simultaneously, neither can be depressed sufficiently to actuate its associated apparatus before the left end **28** of the spring **18** contacts wall **30** and locks the keys against further depression.

As the spring elongates, the hills **20** to the left of the depressed key, if any, move to the left in contact with the underside of the keys which are prevented from lifting by the pins **32** extending through their stems **12** in contact with the underside of plate **14**. If the leftmost key is depressed, only its hill is effected. It flattens until end **28** contacts wall **30**. The ends of the spring may be turned upwardly, as shown, or downward, to provide a bearing surface for contact with the end walls **26** and **30**. A cover plate **34** is provided over channel **16** for decorative purposes.

It will be realized, of course, that the spring **18** can also serve to hold the keys in their normal inoperative positions. If desired, the keys may be urged to an inoperative position just above and out of contact with the hills **20** by other means, such as additional spring means, not shown. In this case, the cover plate **34**, as seen at **35** in FIGURE 2, serves to define the upper limits of the hills.

As shown diagrammatically in FIGURE 3 the ends **24** of the serpentine springs **18** of a plurality of key rows, such as described above, are anchored against one wall while their other ends **28** bear against the hills **41** of a similar spring **42** confined in a channel **44** traversing the other ends. The length of channel **44** is sufficiently longer—by "X" dimension—than the spring **42** to permit the spring to elongate only in response to the elongation of one of the springs **18** by one key, as described above, at which time its ends **46** and **48** are abutting the end walls **50** and **52** of the channel locking the rest of the keys against actuation. Thus only one key at a time in the whole keyboard can be depressed sufficiently to actuate its associated apparatus.

It will be understood that the use of the word "key" throughout, is intended to encompass its broad as well as its narrow meaning. For example, in its broad sense, it would include interconnected links such as are commonly employed in typewriter keyboards, and which as a result of key operation would bear against the spring hills **20**.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A mechanical key interlock comprising:
(A) a base structure having an elongated channel of finite length formed in its top surface;
(B) a plurality of keys;
(C) means arranging said keys over said channel; and
(D) an elongated spring member formed into serpentine shape with alternate hills and valleys, said member being positioned within said channel with its hills beneath said keys and its valleys resting on the bottom of said channel;
(E) said spring member being equal in length to said channel minus a distance "X," wherein "X" is equal to the elongation of said spring member by the flattening of a hill in response to the depression of only one of said keys a distance sufficient to actuate its associated apparatus.

2. A key interlock according to claim **1** wherein:
(A) the hills of said serpentine spring are in contact with the underside of said keys; and further includes
(B) means to prevent the other of said keys being lifted by said spring upon depression of a key.

3. A key interlock according to claim **1** wherein:
(A) said means for arranging said keys comprises,
(1) a stem for each key, and
(2) each stem extends through said channel into said base structure with one end attached to said key.

4. A key interlock according to claim **2** wherein:
(A) the means of claim **2** comprises abutment means

on each of said keys arranged to abut cooperating portions of said base structure.

5. A key interlock in accordance with claim 3, wherein:

(A) said serpentine spring is positioned along the sides of said stems in said channel.

6. A key interlock according to claim 1 wherein:

(A) said serpentine spring is a thin elongated leaf spring.

7. A mechanical key interlock according to claim 1 wherein:

(A) the means for arranging said keys comprises,

(1) a stem for each key, and

(2) each stem extends through said channel and said base structure;

(B) the serpentine spring member is a thin spring leaf positioned in said channel along the sides of said stems with its hills in contact with the undersides of said keys; and

(C) said stems are provided with abutment means arranged to contact the underside of said base structure in a manner preventing said spring member from lifting other of said keys upon the depression of one.

8. A key interlock according to claim 1 and further including:

(A) means for adjusting the "X" distance.

9. A mechanical key interlock for keyboards, comprising:

(A) a base structure;

(B) a plurality of keys;

(C) means supporting said keys spaced above said base structure in a plurality of rows;

(D) a first elongated spring member of serpentine shape with alternate hills and valleys, positioned under each row of keys with a hill under each key and its valleys resting on said base structure;

(E) another similar serpentine spring member traversing the ends of each row of keys along one side of said keyboard with its hills aligned with and facing the key rows and its valleys resting against and butting said base structure;

(F) means anchoring one end of each spring on one side of each row of keys with their other ends bearing against the hills of said traversing spring member; and

(G) means preventing elongation of said traversing spring by more than a distance "X," wherein "X" is equal to the elongation of said traversing spring by the flattening of one of its hills by the elongation of one of said first spring members upon depression of only one key a sufficient distance to actuate its associated apparatus.

10. A key interlock according to claim 9, wherein:

(A) said base structure is provided with an elongated first channel under each key row in which said first spring members are positioned with their hills in contact with the undersides of said keys, and a second channel traversing and in open communication with the ends of said first channels and in which said traversing spring member is positioned with one of its hills aligned with and facing each of said first channels and its valleys against a side wall of said second channel.

References Cited

UNITED STATES PATENTS

1,880,896	10/1932	Doughty	197—98
2,060,431	11/1936	Spicer	197—107 X
3,032,168	5/1962	Reynard	197—107
3,107,771	11/1963	Debus	197—107

FOREIGN PATENTS

15,468	1914	Great Britain.

ROBERT E. PULFREY, *Primary Examiner.*

E. T. WRIGHT, *Examiner.*