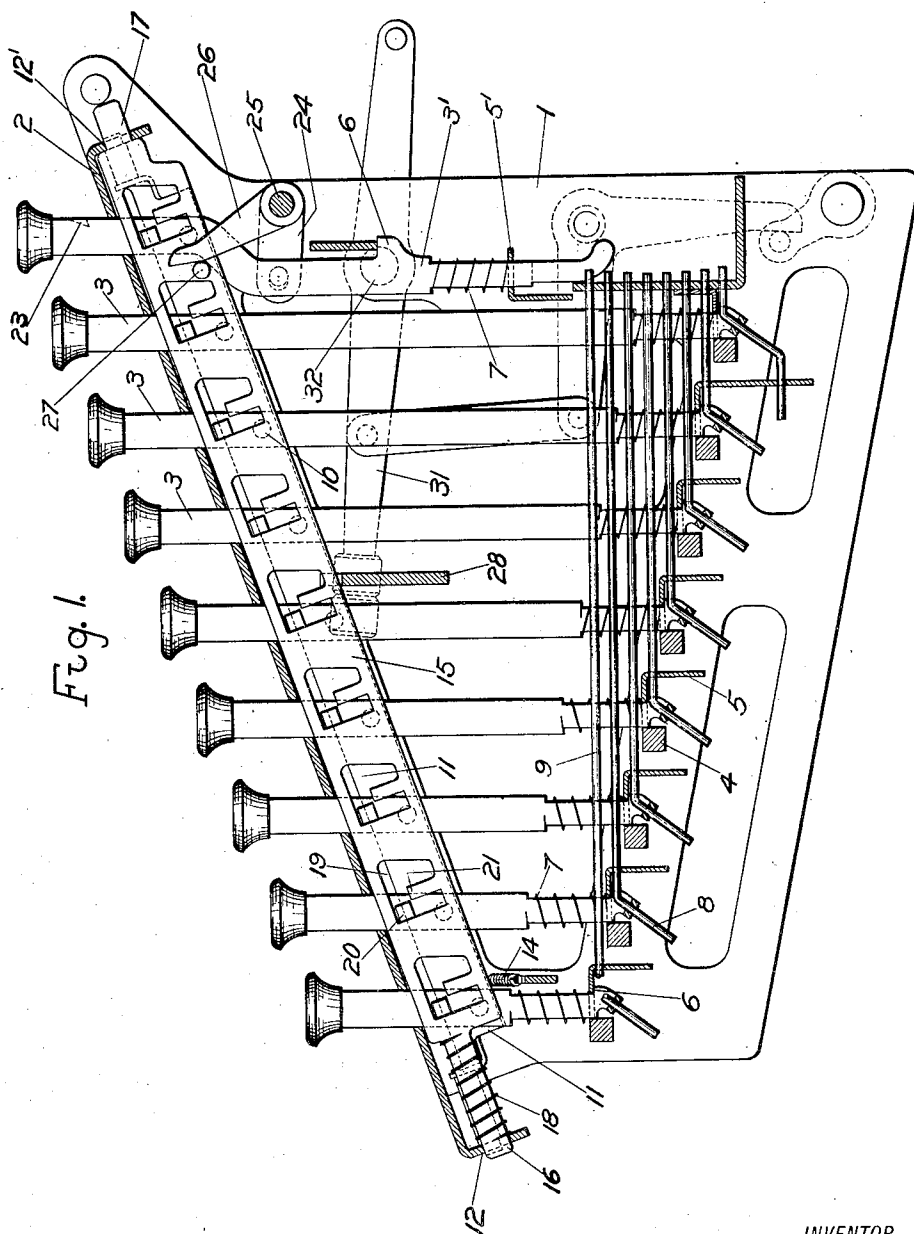


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 KEYBOARD FOR COMPUTING MACHINES.
 APPLICATION FILED JULY 10, 1913. RENEWED NOV. 11, 1914.

1,154,355.

Patented Sept. 21, 1915.

4 SHEETS—SHEET 1.

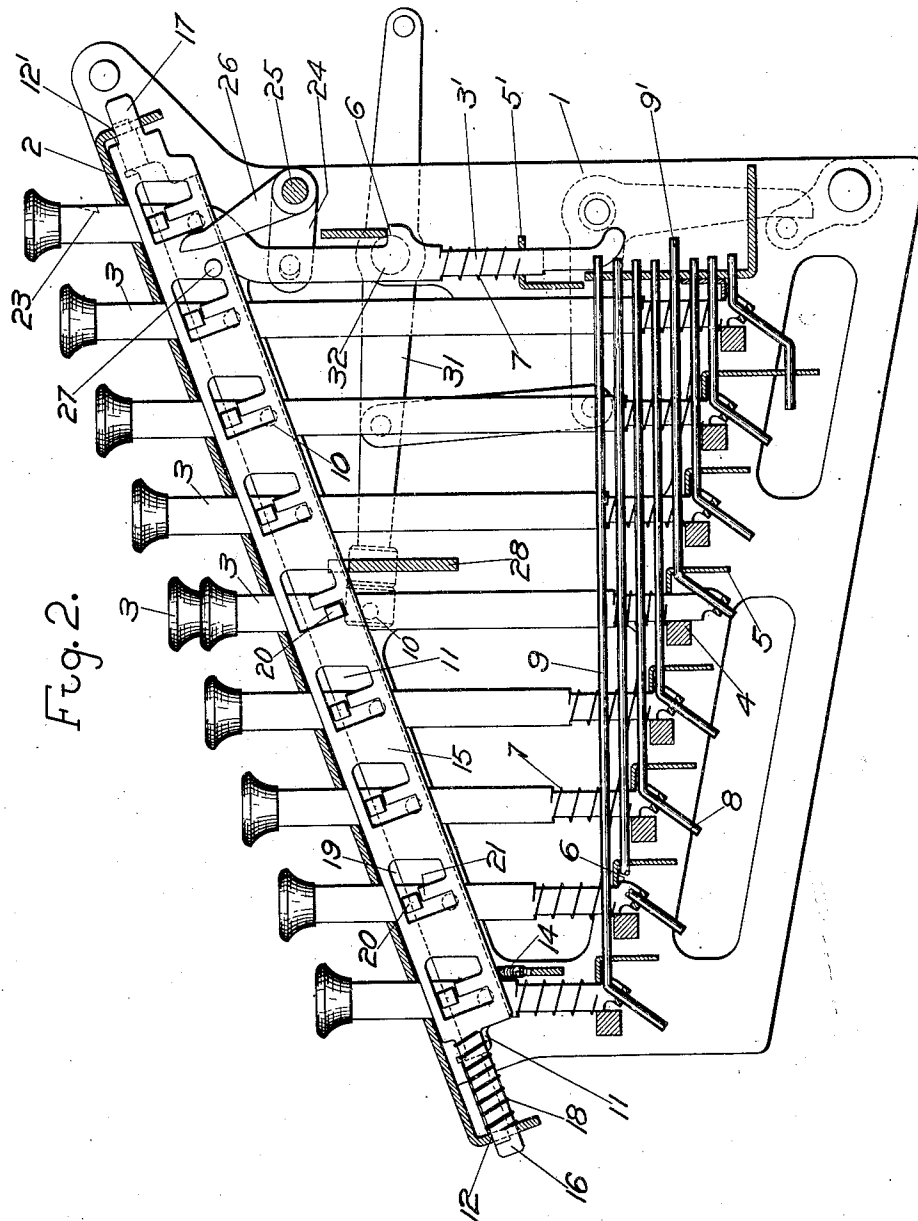


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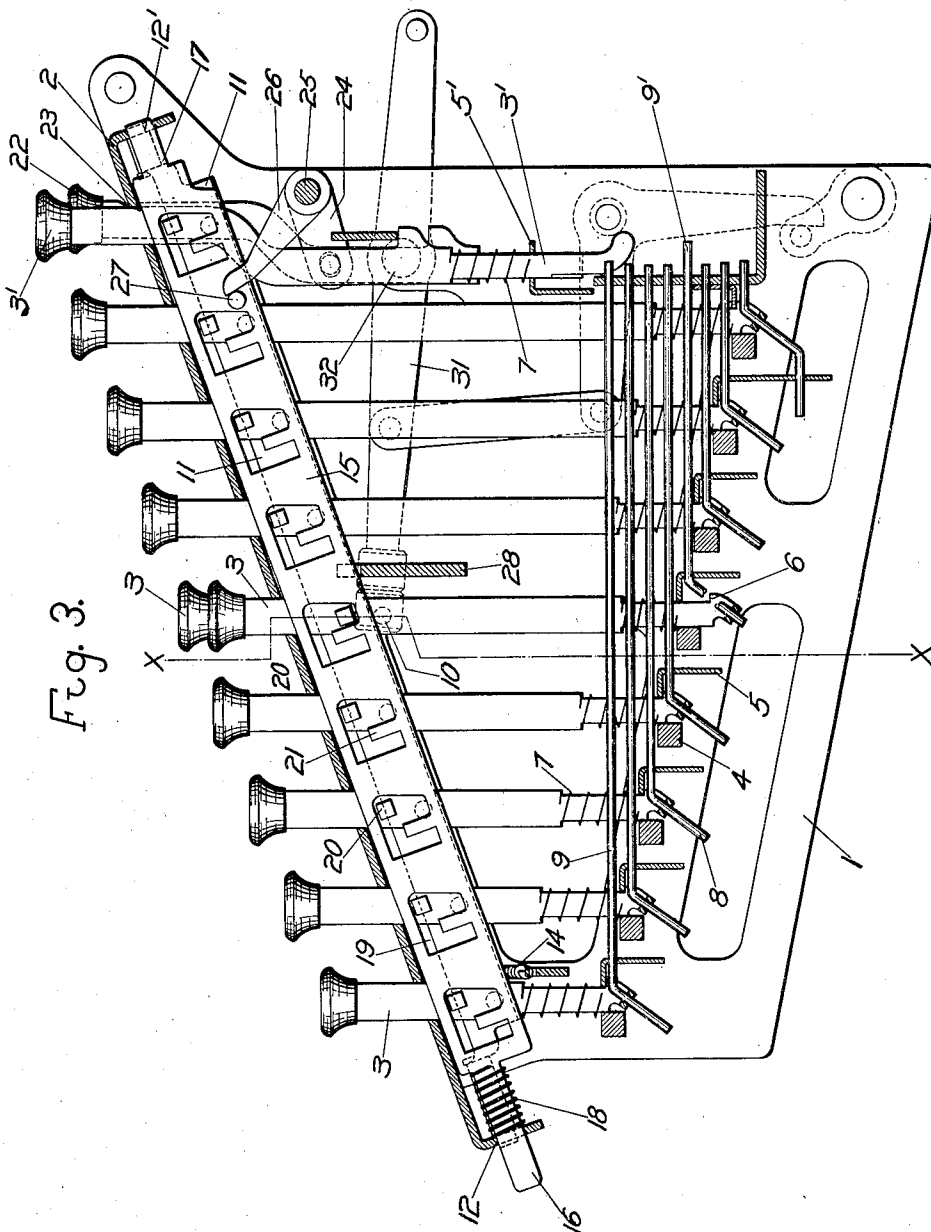


Fig. 3.

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Fig. 4.

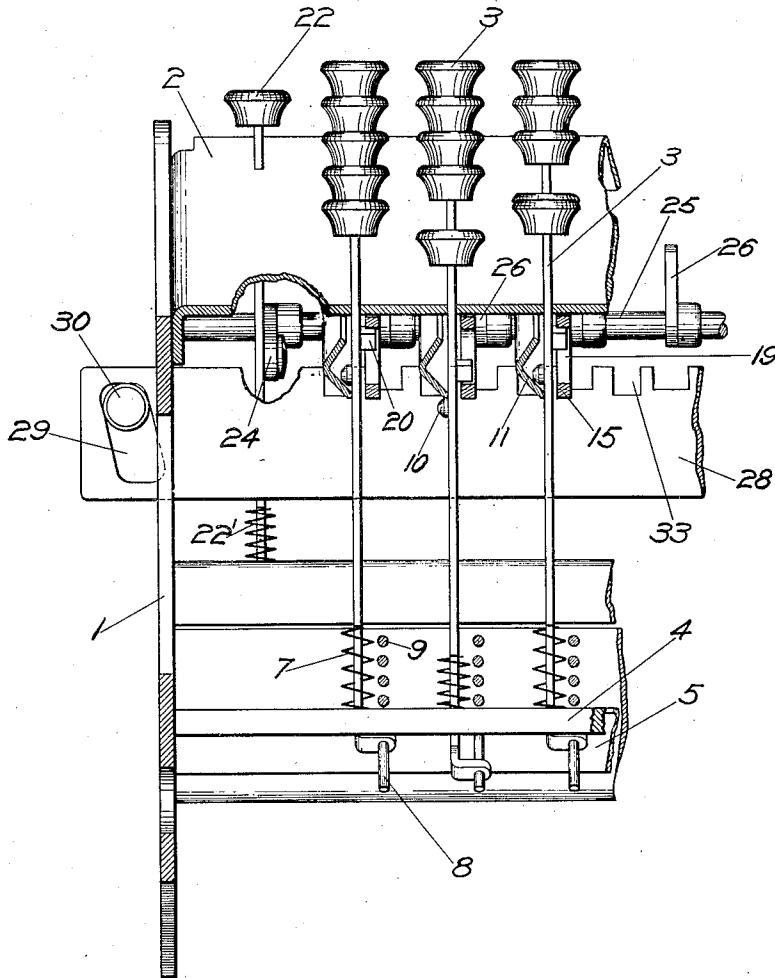
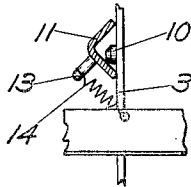


Fig. 5.



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KEYBOARD FOR COMPUTING-MACHINES.

1,154,355.

Specification of Letters Patent.

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Application filed July 10, 1913, Serial No. 778,329. Renewed November 11, 1914. Serial No. 871,631.

To all whom it may concern:

Be it known that I, CHARLES WALES, a citizen of the United States, residing at New Haven, New Haven county, Connecticut, have invented certain new and useful Improvements in Keyboards for Computing-Machines, of which the following is a full, clear, and exact description.

My invention relates to improvements in key-boards, more particularly, keyboard for computing machines.

The object of my invention is to provide a keyboard which can be easily converted from what is known as a "flexible keyboard" to what is known as a "locked keyboard", and vice versa. A flexible keyboard is one in which if one key is operated so as to be mechanically held in depressed position, the other keys of that series are free to be operated, and upon the operation of any other key of that series the first key will be released. A locked keyboard is a keyboard such that if one key is actuated so as to be held in depressed position, all the other keys are locked against movement until the locking means is released by other means than one of the other keys of the same series. Some operators prefer one type of keyboard, while other operators prefer the other type of keyboard. By my invention a single keyboard can be converted from one type to the other, so that a single machine will meet the requirements of various operators who have different preferences in regard to the two types of keyboard.

The following is a description of an embodiment of my invention, reference being had to the accompanying drawings, in which—

Figure 1 shows a longitudinal section of a key-board embodying my invention, so adjusted as to be of the locked type. Fig. 2 shows a similar section of the keyboard with the same adjustment, one key having been actuated and the other keys being locked against movement. Fig. 3 shows a longitudinal section of the same keyboard so adjusted as to be of the flexible type, one key being in actuated position and releasable upon the actuating of any other key of the same series. Fig. 4 is a transverse section of a portion of the keyboard on the line $x-x$ Fig. 3. Fig. 5 shows a detail.

Referring more particularly to the drawings, the frame of the keyboard is made up

of two side members, one of which is represented by the numeral 1. These side members carry a top plate 2 having openings therein constituting upper guides for the key stems 3. The side frames 1 also carry cross bars 4 and cross plates 5, the latter having slots embracing the lower ends of the key stems 3, and, together with the cross bars 4, constituting guides for the lower ends of those stems. The plates 5 also act as stops to limit the upward movement of the key stems, the key stems being provided with projections 6, which, when the stems are in their uppermost positions, engage the under sides of the horizontal portions of the plates 5. The key stems are surrounded with springs 7 resting on the upper surfaces of the bars 4 and plates 5 and tending to move the key stems upwardly. The lower ends of the key stems are provided with sockets through which pass the bent ends 8 of index wires 9 serving to release the initial stops (not shown) of the machine and to define the downward movement of the indexing sectors (not shown). The key stem 3' does not actuate an index wire and has its retracting spring engaging a plate 5'. Each numeral key near its upper end is provided with a stud 10. Adjacent to these studs and extending below them when the keys are in their highest position, is a shutter 11, shown in section in Fig. 4 and in dotted lines in the other figures. This shutter is flexible because it releases a depressed key whenever a second key of the same series is depressed. It is pivoted at 12—12' in the downturned upper and lower edges of the top plate 2, and is provided with an arm 13 to which a spring 14 is connected so as to tend to keep the flexible shutter in the depressed position shown in Fig. 4. Whenever a numeral key is depressed, the stud 10 carried thereby moves the flexible shutter sidewise and passes beneath it, whereupon the flexible shutter returns to normal position, and, engaging the upper side of the depressed stud which has passed beneath it, retains its key in depressed position. If the keyboard is adjusted so as to be of the flexible type, the depression of any other key of the same series causes the shutter 11 to release the stud of the key already depressed, so that it returns to normal position, the second depressed key being retained in depressed position.

In order to provide a keyboard, convertible from the flexible type to the locked type, or vice versa, I provide for each series of keys a lock shutter 15. This lock shutter 15 consists of a sliding plate parallel to the series of keys which it controls, and having extensions 16 and 17 sliding in openings in the lower and upper downturned edges of the top plate 2. It is also provided with a spring 18 which normally tends to move it toward the rear of the keyboard. In this lock shutter I provide a series of openings 19, preferably of an inverted U-shaped form. The front limbs of these openings lie with the upper end of their axes pointing forward relatively to the axes of the adjacent key stems. The front edge of this limb provides a thrust surface used in moving the shutter. Each key stem is provided with a lateral projection 20, which, when the lock shutter is in its rearmost position, lies in the upper part of the front limb of the corresponding inverted U-shaped opening, and provides a thrust surface coacting with the thrust surface of that opening and normally in alinement therewith. Whenever a key is depressed, its lateral projection 20 engages the slanting front edge of the corresponding U-shaped opening and causes the lock shutter to move forward against the action of its spring 18. This causes the upwardly projecting tongues 21 to move forward beneath the lateral projections 20 of all the keys of a given series other than the depressed key of that series, locking all these other keys out of action. The projections 20 and tongues 21, it will be seen, have stop surfaces which are normally out of alinement, but are brought into alinement when a key is depressed. The rear limbs of the U-shaped openings 19 are so shaped that when the shutter is thrown forward sufficiently, the downward movement of any key stem with its lateral projection 20 will not have any effect upon the lock shutter, or at least will not move the lock shutter into key-locking position. When the lock shutter is thus moved forward, the upper ends of the tongues 21 lie well in front of the lateral projections 20 so as not to block their movement. When the lock shutter is held in this forward position, the keyboard becomes a flexible keyboard. In order to control the position of the lock shutter manually so as to convert the keyboard into a flexible keyboard, I provide a key 22, which on its rear face is provided with a notch 23. When this key 22 is depressed, the notch 23 can be brought in engagement with the under side of the top plate 2, thus holding the controlling key in depressed position. This controlling key acts upon a lever 24 connected to a universal bar 25 carrying lever arms 26 corresponding in number to the number of series of keys.

Each lever arm 26 engages a stud 27 upon the corresponding locking plate. When the key 22 is depressed, the lever arms 26 engaging the studs 27, force the lock shutters forward against the action of the springs 18 so as to bring them into the position shown in Fig. 3, and hold them in that non-coöperating position so long as the key 22 is held depressed by the engagement of the notch 23 with the top plate 2. When the key 22 is depressed, neither the thrust surfaces or the stop surfaces are in alinement and the lock shutter is therefore no longer in operative position. When the key 22 is released, the springs 18 return the lock shutters to their normal coöperating position. The spring 22' restores the key 22 to its normal position. When the key 22 is actuated and the lock shutter thereby moved to the position shown in Fig. 3, the lock shutter is in such position that the tongues 21 are all in front of the corresponding lateral projections 20 and these lateral projections do not act upon the lock shutter to move the same, that is, the lock shutter is thrown entirely out of action and the keyboard becomes a flexible keyboard.

In order to release the flexible shutters 11, I provide a slide 28 carried by the side frames and having an oblique slot 29 in which the end 30 of a lever 31 acts. This lever is pivoted at 32, and when its forward end is depressed, moves the slide 28 to the right. The slide 28 is provided with notches 33 in which the downward edges of the flexible shutters lie, and when the slide is moved to the right, the right hand edges of these notches engage the flexible shutters so as to move them to the left, releasing any studs 10 that are carried by any depressed keys, so as to permit the keys to return to their normal position. This same slide may be used to simultaneously release all depressed keys, both when the keyboard is adjusted so as to be of the flexible type and when it is adjusted so as to be of the locked type. The depression of a numeral key causes its lower end to act upon the bent end of the corresponding index wire 9 and force that index wire to move toward the rear, as shown at 9' in Figs. 2 and 3, so as to release the initial stop (not shown) and define the movement of the indexing sector (not shown). The slide 28 has portions lying directly beneath the lock shutters 15 and in close proximity thereto about midway between the two ends of the lock shutter and therefore acts to prevent injury to any lock shutter in case an attempt should be made to force down a second key when one has already been depressed and the keyboard is adjusted so as to be of the locked type.

The rear limbs of the openings 19 in the lock shutter should be of such shape that when the keyboard is adjusted so as to be of

the flexible type, the lateral projections 20 will not in any way engage the sides of these rear limbs. The rear edges of the rear limbs of these openings may be parallel to the 5 axes of the key stems.

As will be evident to those skilled in the art, my invention permits of various modifications without departing from the spirit thereof or the scope of the appended claims.

10 What I claim is:

1. In a keyboard, the combination of a series of keys, a flexible shutter holding any manually depressed key in depressed position, a lock shutter holding the other keys 15 against depression when one key is depressed, and movable into and out of operative position, means for locking said lock shutter in non-operative position, means for releasing all keys controlled by either of 20 said shutters, and a single actuator for said means.

2. In a keyboard, the combination of a series of keys, means for preventing the depression of a second key when one is already 25 in depressed position, the depressed key actuating said means but not restrained thereby, means for throwing said preventing means into and out of operation, and flexible means for holding any of said keys, when 30 actuated, in depressed position.

3. In a keyboard, the combination of a plurality of series of keys, means for preventing the depression of a second key of any series when one key of that series is 35 already depressed, the depressed key actuating said means but not restrained thereby, means for throwing said preventing means into and out of operation, flexible means for holding any of said keys, when actuated, in 40 depressed position, and means for simultaneously releasing the flexible means from the depressed keys of all of said series.

4. In a keyboard, the combination of a plurality of series of keys, a plurality of 45 flexible shutters for holding any of said keys in depressed position, a plurality of locking shutters each preventing the depression of a second key in its series when any key of that series is already in depressed position, 50 the depressed key actuating said shutter but not restrained thereby, and having a co-operating position and a non-cooperating position, means normally tending to move said locking shutters to one of said positions, 55 means for manually throwing said locking shutters into the other of said positions, and means for mechanically holding said locking shutters in non-operative position.

5. In a keyboard, the combination of a 60 plurality of series of keys, a plurality of flexible shutters for holding any of said keys in depressed position, a plurality of locking shutters each preventing the depression of a second key in its series when any key of that 65 series is already in depressed position, the

depressed key actuating said shutter but not restrained thereby, and having a coöperating position and a non-coöperating position, means normally tending to move said locking 70 shutters to operative position, means for manually throwing said locking shutters into non-coöperating position, and means for mechanically holding said locking shutters in non-coöperating position.

6. In a keyboard, the combination of a series of keys, a pivoted flexible shutter having its axis parallel to said series, a sliding 75 lock shutter parallel to said series preventing the depression of a second key when any key of the series is already in depressed position, the depressed key actuating said lock 80 shutter but not restrained thereby, said lock shutter being movable into an operative position and into a non-operative position, means for moving said lock shutter from 85 one of said positions to the other, and means for mechanically holding said lock shutter in non-operative position.

7. In a keyboard, the combination of a series of keys, a pivoted flexible shutter having its axis parallel to said series, a sliding 90 lock shutter parallel to said series preventing the depression of a second key when any key of the series is already in depressed position, the depressed key actuating said 95 lock shutter but not restrained thereby, said lock shutter being movable into an operative position and into a non-operative position, a spring normally tending to move said lock 100 shutter into operative position, manual means for moving said lock shutter into non-operative position, and means for mechanically holding said lock shutter in non-operative position.

8. In a keyboard, the combination of a 105 series of keys, a lock shutter for said keys, said keys and shutter each having coacting stop surfaces and coacting thrust surfaces, the stop surfaces being normally out of 110 alinement and the thrust surfaces normally in alinement, but acting when a key is depressed to move the stop surfaces into alinement, and means for moving said shutter so that both the stop surfaces and the thrust 115 surfaces are out of alinement.

9. The combination of depressible spring-sustained keys, detent means for detaining them singly when depressed, with provisions for releasing one key by depression of another, and locking means rendered effective, 120 through the medium of said detent means in depression of one key, to lock out other keys, with provisions for disabling said locking means at will whereby to permit release of one key by depression of another. 125

10. The combination of several series of depressible spring-sustained keys; detent means for each series to detain any one key thereof with provisions for releasing a depressed key by depression of another of the 130

same series; locking means for each series of keys and rendered effective by depression of a key of the series to lock out all other keys of that series; and manipulative means
5 common to the locking means of all series, for disabling the same collectively.

11. The combination of several series of depressible spring-sustained keys; detent means for each series to detain any one key
10 thereof with provisions for releasing a depressed key by depression of another of the same series; locking means for each series of keys and rendered effective by depression

of a key of the series; to lock out all other keys of that series; and manipulative means 15 common to the locking means of all series for disabling the same collectively, said locking means when moved into locked position by a depressed key being retained in locked position by the combined action of said de- 20 tent means and said depressed key.

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Witnesses:

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