

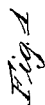
(No Model.)

3 Sheets—Sheet 1.

A. K. VIRGIL.
EXERCISING KEYBOARD FOR MUSICIANS.

No. 479,340.

Patented July 19, 1892.

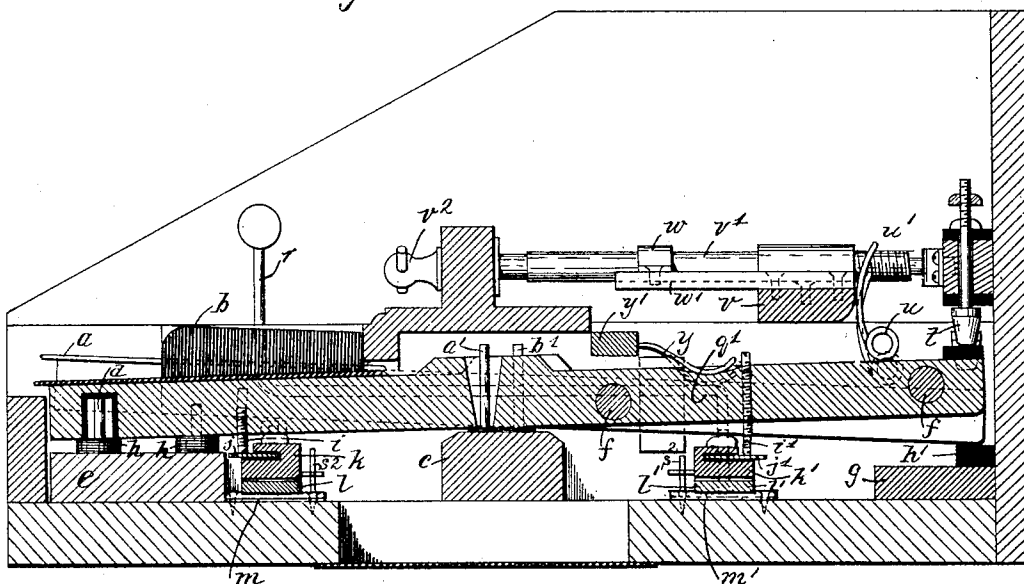


Witnesses
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3 Sheets—Sheet 2.

Patented July 19, 1892.



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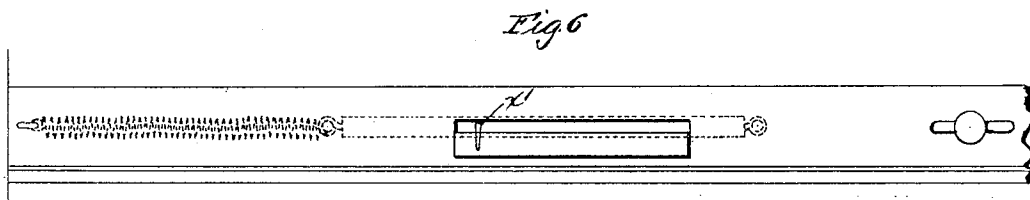
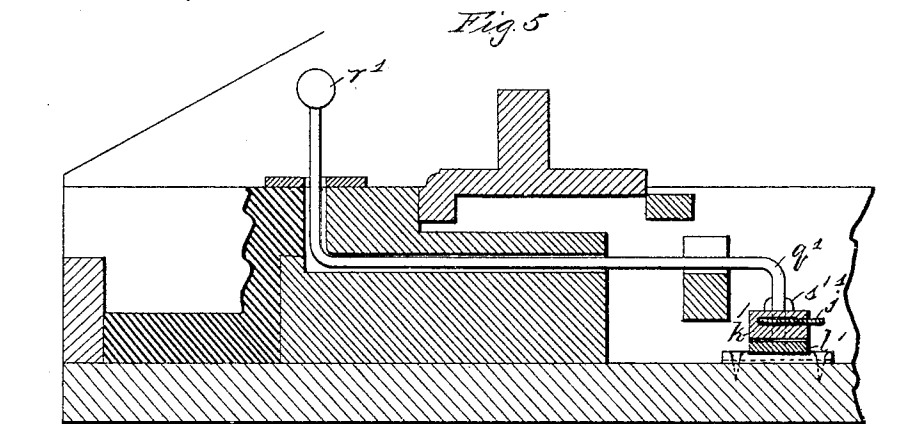
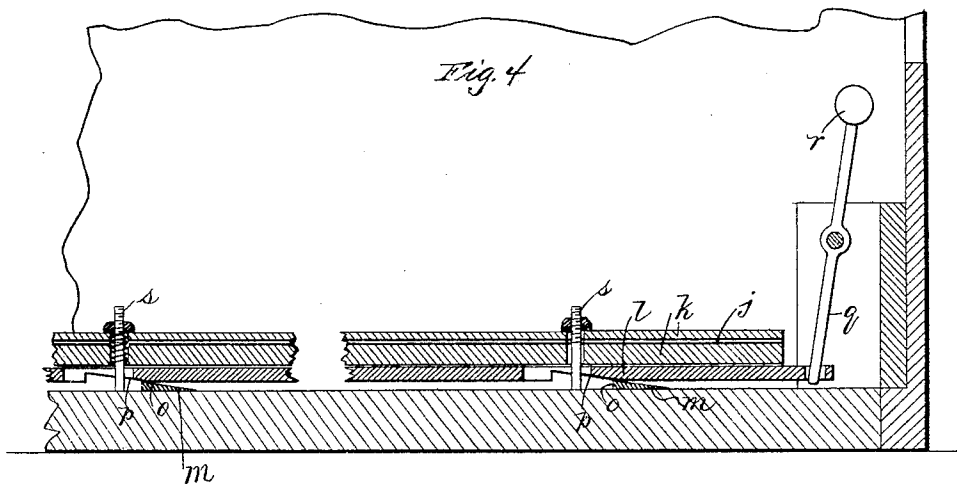
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UNITED STATES PATENT OFFICE.

ALMON K. VIRGIL, OF NEW YORK, N. Y.

EXERCISING-KEYBOARD FOR MUSICIANS.

SPECIFICATION forming part of Letters Patent No. 479,340, dated July 19, 1892.

Application filed April 15, 1891. Serial No. 389,021. (No model.)

To all whom it may concern:

Be it known that I, ALMON K. VIRGIL, of New York, in the county and State of New York, have invented a new and useful Improvement in Exercising-Keyboards for Musicians, of which the following is a specification.

In an application for Letters Patent filed by me March 9, 1889, Serial No. 302,635, I have described an instrument upon which the subject of this specification is an improvement and designed to accomplish the same results therein described.

In the accompanying drawings, Figure 1 is a plan view of my instrument having the top portion of the case removed for the purpose of displaying the internal construction. Fig. 2 is a section taken longitudinally through one of the keys, showing the key in its depressed condition. Fig. 3 is a similar section showing the key in its raised position. Figs. 4, 5, and 6 are details.

The white keys are lettered *a*, and the black keys are lettered *b*. These keys are constructed like those in an ordinary piano and are arranged and controlled in position by a series of balance or fulcrum pins, (lettered, respectively, *a'* *b'*.) They rest upon the balance-rail *c*, extending under all the keys, and are also furnished with the guide-pins *d*, extending upward from the piece *e*, arranged transversely under all the keys. The rear ends of the keys are so weighted by weights *f* at their extremities remote from the finger ends that the rear ends slightly overbalance the front ends, so that the said keys normally assume the position shown in Fig. 3. Underneath the keys, at the rear end, extends transversely the piece *g*. Cushions *h* are arranged under the forward ends of the keys and cushions *h'* under the rear ends thereof. Each key is provided with a downwardly-projecting metallic spur *i* under its forward end and a corresponding spur *i'* under its rear end, and these spurs are screw-threaded into the key, so that they may be adjusted to project a greater or less distance from the surface of the key. Beneath the series of spurs *i* is arranged transversely of the keys a hard plate *j*, which is fitted into a slot in a bar *k*, being packed in

said slot by felt or other compressible material, whereby rattling is prevented.

j' is a hard plate extending transversely of the keys under the series of spurs *i'*, and which is also packed within a slot of the bar *k'*.

It is essential that the bars *k* and *k'*, carrying the plates *j* and *j'*, should be adjusted vertically, and to that end I provide such mechanism as is shown in Fig. 4. The bar *k* is stationary in a longitudinal direction; but below it is a bar *l*, which is movable longitudinally, and still below that are stationary inclined blocks *m*. The bar *l* and blocks *m* are provided with inverse inclines *o* and *p*, so that when the bar *l* is shoved longitudinally toward the left of Fig. 4 it will be raised vertically by the action of such inclines into the position shown in that figure, whereas when it is moved toward the right of Fig. 4 it will fall vertically. Such longitudinal movements are imparted by the lever *q*, fulcrumed to the case, having a handle *r*, in any suitable position. The bar *k* is held in position and guided vertically by a series of studs *s*. A similar arrangement is provided for raising and lowering the bar *k'*, the same being illustrated in Figs. 3 and 5. The parts for controlling the vertical position of the bar *k'* are moved longitudinally by a lever *q'*, which takes the bent form shown in Fig. 5 in order to extend from the rear position of the bar *k'* to the convenient front position of the handle *r'*. Now it will be understood that the mechanism above described will afford perfect control of the vertical positions of the plates *j* and *j'*, and not only so, but will support and control them in any position which they may occupy, so that they will be held firm and without any substantial tendency to rattle. The extent of vertical adjustment of the plates *j* and *j'* is regulated in accordance with the adjustment of the spurs *i* and *i'* and the position of the cushions *h* and *h'*. When these parts, however, are in proper relative position and adjustment, the key in its descent at either end will strike and commence to compress the cushion *h* or *h'*, as the case may be, before the spur *i* or *i'*, as the case may be, comes in contact with the plate *j* or *j'*, so that a certain amount of power is re-

quired to compress the cushion, especially under the forward end of the key, before the spur will strike the plate. In constructing the machine this power is regulated to a nicety by adjusting the spur i in each of the keys until the same power is required for all the keys in compressing the cushion sufficiently to bring the spurs into contact with the plates. This operation of compressing the cushions is an important feature in the machine, because by virtue of it the strength of touch is insured to the full end of the stroke, and as soon as the touch is released the resilience of the cushion at once raises the key sufficiently to break the contact between the spur and the plate, and thus prevent any rattling.

It remains to describe the mechanism whereby the key-resistance is determined and the character of the touch is still further controlled. Over the back end of each key is located a vertically-movable weight t in such position as to be struck by the upward movement of the rear end of the key and to be thrown by its momentum above the key, so as to drop back upon the key and cause a back-stroke. This feature is the subject of Patent No. 391,439, granted to me October 23, 1888. The springs by which the key-resistance is principally produced are lettered u , being coil-springs mounted upon the tops of the keys. These coil-springs are extended into the upward-projecting spring-arms u' , which when the tension is increased bear against a bar v , extending clear across the instrument. The rear ends of the keys cannot rise so as to approach the bar v without causing the compression of the springs u ; but the extent of this compression is varied by the adjustment of the bar v upon the screw-shaft v' , which extends out through the main board of the instrument and is provided with the handle v^2 . By turning this screw-shaft v' in one direction the bar v is moved toward the back of the instrument and by turning the screw-shaft in the opposite direction the bar is moved toward the front of the instrument, in the first case producing greater compression of the springs and in the latter case less. The spring-arms u' are, however, so formed, as shown in the drawings, and the surface of the bar v , against which these spring-arms act, is so formed that, while the tension of the spring tends to force the rear end of the key downward, the friction between the spring-arm and the surface of the bar v , caused by the sliding of such spring-arm on the surface of the bar, is in a direction opposed to either the downward or the upward motion of the rear end of the key. Thus the sensible action and reaction of the springs upon the keys is deadened.

It is very important that the screw-shaft v' should move the bar v squarely, and to this end an additional bearing w is provided for the screw-shaft, which is braced to the bar v

in both directions by the braces w' and w^2 . In order that the adjustment of the screw-shaft v' may be indicated, I connect it by a flexible connection x with an index-finger x' , which is pulled in the opposite direction by a spring x^2 . This index-finger x' extends out through a slot in the name-board, as shown in Fig. 6, and moves adjacent to a scale placed on the name-board. A series of springs (lettered y) extends rearward from a fixed bar y' and rests upon the rear of the keys adjacent to the spurs i' , the tendency of these springs being to press downward the rear extremities of the keys; but these springs are very weak in comparison with those before described.

The operation of the instrument is as follows: Starting with the keys in their normal position, as shown in Fig. 3, the first thing to do is to adjust the instrument by means of the screw-threads on the spurs i and i' , so that they will strike the plates j and j' after the cushions have been compressed, when (if it is desired to produce a click both at the down-stroke and upstroke of the keys) the bars k and k' are adjusted to their uppermost positions. When one key is depressed, it will press the cushion beneath it, and then the spur i will strike against the plate j , so as to give a sharp distinct sound, commencing and occurring the moment when the key is down, and immediately the expansive force of the cushion will raise the key, so as to break the contact between the spur i and the plate j . When, now, the key is released from the finger, it will return to its normal position, (shown in Fig. 3;) but the momentum that it acquires in making the movement will cause the rear end of the key to compress the cushion h' sufficiently to permit the spur i' to strike the plate j' and produce a click which commences and occurs when the key is up. The momentum of the key being exhausted, the expansive force of the cushion h' will immediately break the connection between the spur and the plate.

The operation of the means for regulating the key-resistance will be apparent from the description of the construction thereof.

I claim—

1. In a key-exercising apparatus containing click-producing devices adapted to be operated by the keys, in combination with such devices, a sliding bar having an inclined surface, whereby as the bar slides one member of the click-producing device is raised, substantially as described.

2. In a key-exercising apparatus containing a series of keys and a series of springs connected therewith operated upon by a compressing-bar, in combination with such bar, a screw-shaft, a supplemental bearing for said screw-shaft, and braces connecting said supplemental bearing with said bar, whereby the said bar is compelled to move squarely to and from said springs, substantially as described.

3. In a key-exercising apparatus containing
a series of keys, in combination with said keys,
a series of springs extending into approxi-
mately-vertical spring-arms, a bar adapted to
5 bear against said spring-arms in an approxi-
mately-horizontal direction, and another se-
ries of springs adapted to press downward
upon said keys, substantially as described.

4. In combination with the click-producing
devices, the bar *k*, supporting one member of 10
the same, the slide *l*, and the inverse inclines
o and *p*, substantially as described.

ALMON K. VIRGIL.

Witnesses:

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