



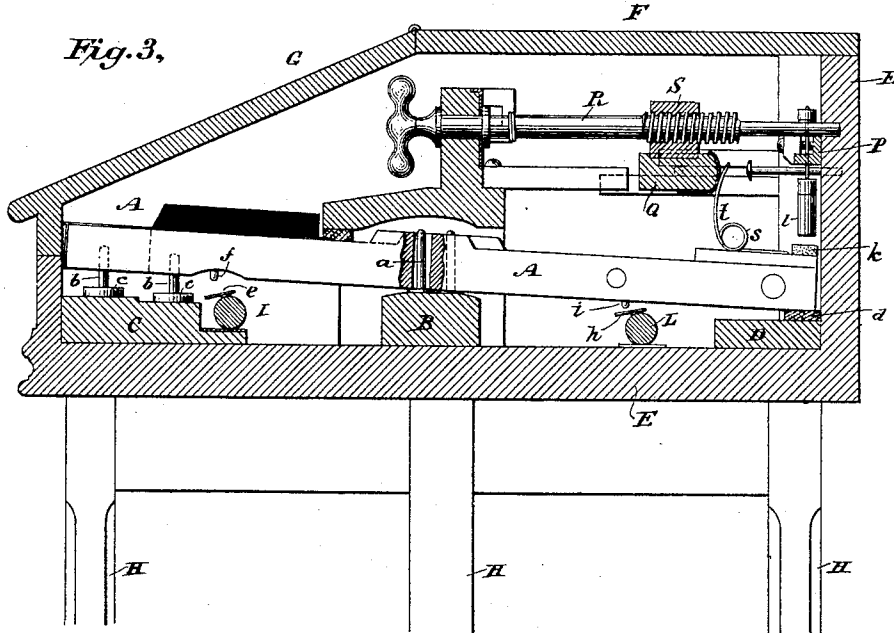
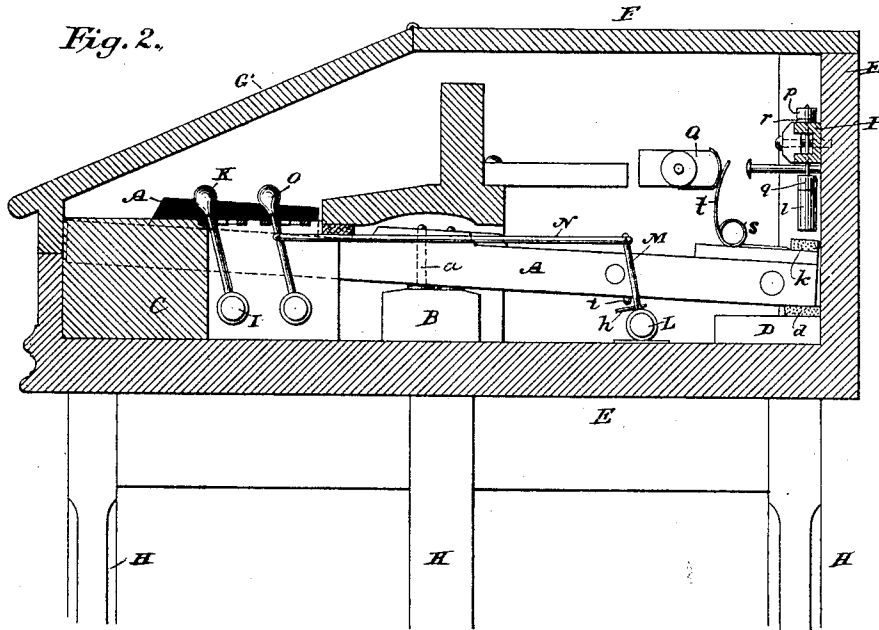
(No Model.)

2 Sheets—Sheet 2.

A. K. VIRGIL.  
EXERCISING KEYBOARD.

No. 479,339.

Patented July 19, 1892.



Witnesses  
Geo. W. Dwyer  
Carrie C. Ashley

Inventor  
Almon K. Virgil  
By his Attorneys Lifford & Brown

# UNITED STATES PATENT OFFICE.

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

## EXERCISING-KEYBOARD.

SPECIFICATION forming part of Letters Patent No. 479,339, dated July 19, 1892.

Application filed March 9, 1889. Serial No. 302,635. (No model.)

*To all whom it may concern:*

Be it known that I, ALMON K. VIRGIL, a citizen of the United States, residing in the city 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 Letters Patent granted to me June 29, 1886, and numbered, respectively, 344,462 and 344,464, were described exercising-boards, which were successful. In those instruments the click was produced at a short distance from the extreme up and down positions of the keys, upon the theory that these were the preferable points for the occurrence of clicks in the instruction of pupils, and that they coincided most nearly with the points at which the sound commences and ceases in a piano. For practical purposes this theory is substantially correct; but by a series of delicate experiments I have ascertained that probably by having the clicks occur substantially at the extreme up and down positions of the keys they will still more nearly coincide with the points at which the tones commence and cease in a piano. To attain this end is one of the objects of the improvement on said former instruments, which I am about to describe.

I have, furthermore, ascertained that it is advantageous in instructing pupils on an instrument of this character to be enabled to employ the click upon the downward movement of the key without the click upon the upward movement, and vice versa; and to this end I have in my present improvement separated the sound-producing device referred to in said former patents into two parts, which may be respectively operated independently of each other. I have, furthermore, improved said instrument with respect to the devices for regulating the weight of touch and the character of touch and also in the mechanical details of the device.

The apparatus which I am about to describe, like those described in said patents, is not a musical instrument. It is indispensable for the study of time and touch that a short quick click be heard by the player and instructor at or near the striking of each key—that is, at its downward motion—which I call the “down-

click.” It is equally important that a similar click be produced as the fingers leave the key—that is, in the up movement of the keys—and this latter sound I denominate the “up-click.” Should these clicks be prolonged, as in a musical tone, they would become so blended as to fail in marking with precision the operation of the keys and to render the instruction which is to be accomplished by the instrument an impossibility.

In the accompanying drawings, forming part of this specification, Figure 1 is a plan view of an apparatus embodying my invention, showing several of the keys removed therefrom. Fig. 2 is a section thereof on the line 2 2 of Fig. 1. Fig. 3 is a section on the line 3 3, Fig. 1. Fig. 4 is a face view of the tension-regulating device.

A is a series of keys identically like the keys of a piano and arranged and controlled in position, as are the keys of a piano, by means of a series of balance or fulcrum pins *a* upon the bar B, which serves as a balance-rail for all of said keys, and by the guide-pins *b*, extending from the piece C, which passes beneath all said keys. Cushions *c* are provided upon which the keys impinge when depressed. The rear ends of the keys are so weighted at their extremities remote from the fingering ends that they slightly overbalance the other end, so that said keys normally assume the position shown in Figs. 2 and 3. Underneath the keys extends a piece D, upon which a cushion *d* is placed for the keys to impinge upon as they return to their normal position.

E is the casing for the apparatus, which has a top F and cover G hinged to the same.

H represents the legs or supports which sustain the device.

For producing sound at the down motion of the keys a rail or bar of wood or metal I is placed under the keys transversely to them, extending the entire length of the board parallel with the balance-rail B. This rail I, I call the “downclick-rail.” To it is attached the metal plate *e*, of some hard or metallic substance. The plate *e* is preferably continuous throughout, extending beneath all the keys. The preferable form and material of this plate *e* may be described more particularly as follows: The plate that I have employed

thus far consists simply of a strip of hard brass, three-quarters of an inch wide by a thirty-second of an inch thick. This is screwed to the bar I by a row of screws along one edge, the opposite edge being free and projecting out beyond the bar, as shown in the drawings. The spurs on the keys are arranged to strike the free or overhanging portion of the plate, which thus, having no direct support below, produces a better quality of click and also possesses a certain quality of elasticity.

In each key A, directly over the plate *e*, is fixed a projecting spur or screw *f* of some hard or metallic substance. This spur, acting upon the plate *e*, is intended to produce the click, which must be sufficiently audible to be readily heard in the operation of the instrument. Therefore it will be understood that the nature of this spur and the plate must be such as to produce a short audible sound, preferably similar to the click produced by a telegraphing-key.

Connected with the downclick-rail I, which is mounted in the sides of the frame or casing of the apparatus, so as to be rotated, is a handle K, projecting up through a small plate *g* at the right hand of the keyboard. The plate has notches in it, so that the handle can be held in either one of two positions. The handle should be made of some resilient material, which will keep it in engagement with the notches and allow it to be disengaged therefrom to operate the rail I. The player may thus at will move or partially rotate the rail I, so that the plate *E* is tilted into or out of the range of the spurs *f*.

When the downclick-rail I is set for sound—that is, is in range with the spurs *f* upon the downward movement of a key—the spur *f* should come in contact with the plate *e* at the instant when the key reaches its full depression, producing a short prompt mechanical click at that instant. Thus the click occurs not during the movement of the key, but at the instant the key reaches its lowest point and is down upon the cushions *c*. This point seems to correspond most nearly with the point in the travel of a piano-key at which the sound starts.

While it may be said with substantial accuracy that the tone of the piano commences when the hammer is first thrown against the string, which occurs before the key is fully depressed, yet, more strictly speaking, the tone does not commence until after the hammer has left the string, which it does just about the instant when the key is fully down upon its cushion.

In the piano the tone is given forth at the depression of a key. Thus, naturally, the pupil practicing on the piano directs his attention to the time and manner of making down motions to the almost absolute neglect of up motions, while, in fact, it is equally important that up motions be made quickly and at the right time.

It will be seen by reference to the mechanism I have described that when the handle K is drawn forward and the plate *e* is depressed the downclick will be eliminated. After the pupil has acquired the requisite skill on the downstroke, to which his attention has been undividedly given, he can by the mechanism now to be described acquire perfection in the upstroke. Through its instrumentality after the downclick has been eliminated the upclick may be practiced and the pupil's undivided attention given to the upstroke alone. This feature of my invention I regard as very important, for by it the downstroke may be practiced alone, and similarly the upstroke may be practiced alone and the pupil's attention be given to but one thing at a time.

Having acquired perfection in both the up and down strokes separately, the pupil can then be drilled in both in conjunction by using the instrument so as to produce both the down and the up click.

The facility which my present instrument affords for the course of training just described constitutes one of its chief advantages over the instruments described in my Letters Patent heretofore referred to.

For producing the click at the up motion of the key I arrange a rotatable bar L underneath the keys on the other side of the fulcrum-rail B from the downclick-rail previously described. This bar L, which I will call the "upclick-rail," is arranged precisely as the former click-rail, being provided with a metallic plate *h* similar to the plate *e*, previously described, and extending underneath the keys. The keys are provided with the spurs *i* similar to the spur *f*, previously described, in such position that when the plate *h* is adjusted for the production of sound the spurs *i* will impinge against said plate upon the upstroke of the key.

M is a bar extending from the rail L and is connected by a rod N with a handle O, extending up through a second notched plate *g'* at the right hand of the keyboard, near the handle K. The handle O is pivoted to the side piece of the frame. From this it will appear that when the handle O is pushed inward the plate *h* will be slightly elevated, and when moved in the reverse direction the plate *h* will be depressed, the elevation bringing the clicking plate within range of the spur *i* and the depression removing the plate from such range. The handle O is made of elastic material and engages the notches of the plate *g'* the same as the handle K engages the plate *g*, as before described.

The location of the plate *h* and the spurs *i* is such that the impinging of the latter upon the former occurs at the instant that the key has reached its full elevation or returned to its normal position and the rear end of the key rests upon the cushion *d*. Thus the up-sound will be produced at the extreme elevation of the key, which position I have found to correspond most nearly with the position

of a piano-key when the sound of the piano ceases.

It is practically correct to say that the sound of the piano ceases when the damper comes upon the string, although this occurs slightly before the key is fully elevated; but, more strictly speaking, the vibration of the string and the sound caused thereby are not fully destroyed until the damper has rested upon the string for an instant, which continues to about the instant when the key is fully elevated.

The statements which I have above made in reference to the point at which the tone of a piano commences and ceases and to the effect that those points correspond with the extreme depression and elevation of the key are founded upon delicate experiments which I have tried since the issue of my said patents. It will be noticed that the short quick clicks produced by the instrument being described coincide more nearly with the extremes of the sound of the piano, as indicated by my said experiments, than did the clicks produced by the instruments described in my said former patents, but for general use the points at which the clicks occurred in said former instruments may still be said to substantially mark the extremes of the tones of the piano.

For convenience of describing the mechanical parts I have indicated that in the use of the instrument it will be employed to make the downclicks alone first and afterward the upclicks alone, and some may prefer to instruct in that way; but I prefer to use it for perfecting the upstroke with the downclicks eliminated in the first instance, because I am thus at the outset enabled to correct a most common fault with beginners—namely, exclusive attention to the downstrokes to the total disregard of the time or manner of the upstrokes. By using the upclicks alone I can insure that each key, if required, reaches its upmost position at the instant the next succeeding key is depressed.

Aside from the advantage of producing the click as nearly as possible when the piano tone starts and ceases, there are other advantages in having the clicks occur at the extremes of the key movement. Thus in the present instrument in order to produce the downclick the key must be pressed down firmly to its fullest extent. The pupil cannot acquire a habit of partially depressing the keys, which is destructive to good piano-playing.

Again, in the present instrument the upclick cannot be produced unless the finger is lifted positively and quickly and the pupil necessarily devotes as much attention to lifting his fingers properly as to depressing them.

I have described what I believe to be the most convenient construction, arrangement, and location of the sound-producing devices; but I do not wish to limit myself to the construction, arrangement, and location shown, as I am aware that it may be varied to a very considerable extent; nor do I wish to limit myself to the particular means employed for

adjusting the sounding-plates and spurs with reference to each other, for the purpose of eliminating the click when desired.

Upon the rear end of each key is a cushion *h*, and directly over each of these cushions is a pendent lead weight *l*, which is preferably suspended over said cushion by a thin wire reaching up through a bracket *P*. This weight is held in its suspended position by a nut *p*, that is screwed onto the end of the wire above the bracket *P*. The cushion *r* is provided between the nut *p* and the bracket and likewise the cushion *q* between the weight *l* and the bracket. The wire is of such length as to allow a certain vertical play and as to suspend the weight at such a distance above the key that it is struck by the key just before it completes its course. The wire on which the weight is suspended working freely through the bracket permits said weight to be thrown upward as the key comes in contact with it, and permits the weight to move a little higher than the key lifts it. By the sudden stroke given to the weight by the flying up of the rear end of the key the bottom of the weight is thrown a little higher than the key ascends and quickly drops back upon the key, causing a back-stroke and giving to the key two distinct shocks—one when the key strikes the weight and the other when the weight strikes the key—producing a vibratory sensation like that found in the piano by the slipping off of the jack as the hammer is thrown upon the string. The lead weight also gives a slight increase to the weight of touch, similar to the check which produces the let-off in the action of a grand piano. It will be seen, therefore, that the touch produced by these keys very closely resembles that of a piano-key.

In addition to the mechanism described, I provide means for regulating the key resistance. This key-resisting-regulating arrangement is of general application, as it may be applied to any keyboard apparatus. It consists of a bar *Q*, arranged above the keys and sliding in ways attached to the sides of the box. Each key is provided with a spring. Each of these springs consists of a coil *s*, secured to the key at a short distance—say two inches—from its rear extremity, and the free end of the coil projects upward, so as to form an arm *t*. There is practically no spring in this arm, it serving merely to connect the coil in which the spring occurs with the sliding bar *Q*. When the keys are in position, the vertical arms of the springs for all the keys will stand as nearly as possible in parallel positions, forming a series extending across the instrument. A horizontal motion is given to the bar *Q* by means of a screw *R*, which engages a nut *S* upon the sliding bar *Q*. The screw *R* is provided with a handle at its outer end, arranged about midway of the apparatus, so that the said handle is within easy grasp of the operator. By rotating this handle in one or the other direction the sliding

bar Q is slid so as to increase or decrease the tension upon the spring, and thus impart greater or less resistance to the downward motion of the keys. For any given position of the bar Q the tension produced upon the key will be substantially constant throughout its movement.

T is an index carried by a sliding plate and projecting through the front of the apparatus above the keyboard, upon which the scale U is arranged.

The string V is attached to the plate bearing the index and is wrapped around the screw R, so that when the bar is rotated in one or the other direction the string will be wound or unwound upon said screw. The coil-spring W is attached to the other end of said plate, so as to return the index to position when the string is unwound. The index-scale indicates the number of ounces required for depressing the keys for each adjustment. The plate bearing this index, the string, and coil-spring are arranged in the interior of the apparatus and are not visible, except upon removing the cover.

Among the advantages of the described mechanism for adjusting the touch may be mentioned that the adjustment depending, as it does, upon the angular position of the extension *t* is most sensitive and comprehensive, extending through the smallest gradations from an adjustment where the extension, though still in contact with the bar, does not compress the spring by the downward movement of the key to an adjustment involving any required strength of touch which will be registered by the index; also, that the spring action being obtained substantially from the coil the available length of spring remains practically constant, while the pressure of the spring, being in an oblique direction and involving the slipping of the arm *t* upon the face of the bar Q, produces a peculiar quality, avoiding abruptness of action.

Believing, as I do, that my present invention is of a radical character, accomplishing new results and introducing a departure in the theory and practice of instruction, I wish it to be understood that I do not intend to limit myself to the particular mechanism which I have herein described.

I claim—

1. In combination, a series of keys and a series of sound-producing devices adapted to produce a short quick sound, (not a musical tone,) arranged in position to be operated when the depression of the key is substantially completed, whereby a distinct sound commences and occurs at the moment when the key is down, substantially as described.

2. In combination, a series of keys and a series of sound-producing devices adapted to produce a short quick sound, (not a musical tone,) arranged in position to be operated when the ascent of the key is substantially completed, whereby a distinct sound commences and oc-

curs at the moment when the key is up, substantially as described.

3. In combination, a series of keys, a series of sound-producing devices adapted to produce a short quick sound, (not a musical tone,) arranged in position to be operated when the depression of the key is substantially completed, whereby a distinct sound commences and occurs at the moment when the key is down, and a series of cushions arranged under the forward ends of the keys in such position as to be in contact with the key when the sound-producer is struck, substantially as described.

4. In combination, a series of keys, a series of sound-producing devices adapted to produce a short quick sound, (not a musical tone,) arranged in position to be operated when the ascent of the key is substantially completed, whereby a distinct sound commences and occurs at the moment when the key is up, and a series of cushions arranged under the rear of the keys in such position as to be in contact with the key when the sound-producer is struck, substantially as described.

5. In combination, a series of keys, a series of cushions for said keys, and a series of sound-producing devices adapted to produce a short quick sound, (not a musical tone,) arranged in position to be operated when the key is in contact with said cushion, substantially as described.

6. In combination, a series of keys and two series of sound-producing devices adapted to give a short quick sound, (not a musical tone,) one series arranged in position to be operated when the depression of the key is substantially completed and the other series arranged in position to be operated when the ascent of the key is substantially completed, whereby one distinct sound commences and occurs at the moment when the key is down and another distinct sound commences and occurs at the moment when the key is up, substantially as described.

7. In combination, a series of keys, two series of sound-producing devices adapted to produce a short quick sound, (not a musical tone,) and a separate means for adjustment for each series of sound-producing devices, whereby the same may be thrown out of operation independently of the other, substantially as described.

8. In combination, a series of keys and a series of sound-producing devices adapted to produce a short quick sound, (not a musical tone,) one member of each sound-producing device consisting of a rigid projection from the key and the other member consisting of a rigid piece in position to be struck by the projection when the key has completed its movement, substantially as described.

9. In a key-exercising apparatus containing a series of keys, in combination with each key, two independent click-producing devices constructed and arranged to be operated

by said key, one of the same producing said click upon the upward movement of said key, the other of the same producing said click upon the downward movement thereof, and each of the same provided with independent means of adjustment, whereby either may be disconnected from the operation of said key, substantially as described.

10. In a keyboard-exercising apparatus having a series of keys, the combination, with said series of keys, of a hard or metal plate extending continuously adjacent to the various keys of said series, whereby it may be struck by mechanism connected with each of said keys to produce a short quick click, substantially as described.

11. In a keyboard-exercising apparatus having a series of keys, the combination, with said series of keys, of a hard or metal plate extending continuously adjacent to each of said keys, secured substantially as described, whereby it has an overhanging portion to be struck by mechanism connected with each of said keys to produce a short quick click, substantially as described.

12. In a key-exercising apparatus, the combination, with a series of keys, of a hard or metal plate extending continuously adjacent to said keys and secured by one of its edges to an adjustable bar, whereby it may be adjusted into or out of position to be struck by mechanism connected to said keys, substantially as described.

13. The combination, in a key-exercising apparatus, of a series of keys, a continuous hard or metal plate extending beneath the forward end of said keys, and a hard or metal spur secured to each of said keys in position to strike said plate upon the descent of its key and thereby produce a sharp quick click, substantially as described.

14. In a key-exercising apparatus, the combination, with a series of keys having counterbalance extensions, of a hard or metal

plate extending continuously transversely to said extensions, and a hard or metal spur connected with each of said keys and arranged in position to impinge upon said plate upon the upward movement of its key and thereby produce a quick sharp click, substantially as described.

15. In combination, a series of keys, an adjustable bar, mechanism whereby the same may be adjusted, a spring-arm interposed between said bar and each key and extending approximately in the direction of motion of said key, whereby as said key moves the friction produced by the sliding contact of said spring-arm is in a direction opposed to the action or reaction of said spring, substantially as described.

16. In combination, a series of keys, the coil-springs *s*, the extensions *t* of the same, and the adjustable bar *Q*, bearing against said extensions, whereby the strain of the springs upon the keys is regulated, substantially as described.

17. In combination, a series of keys, an adjustable bar arranged behind the name-board, a screw-shaft extending through the name-board and connecting with said adjustable bar, and a spring interposed between said adjustable bar and each of the keys, substantially as described.

18. In combination, a series of keys, the name-board running transversely above the same, a scale on said name-board, a vibrating finger, a shaft extending through said name-board and connected with said finger, an adjustable bar connected with said shaft, and a spring interposed between said bar and each key, all substantially as described, whereby the pressure exerted by said springs will be indicated.

ALMON K. VIRGIL.

Witnesses:

J. E. GREER,

WM. H. ROBINSON.