

A. K. VIRGIL.
EXERCISING KEYBOARD FOR MUSICIANS.
APPLICATION FILED OCT. 20, 1908.

970,144.

Patented Sept. 13, 1910.

3 SHEETS—SHEET 1.

Fig-1-

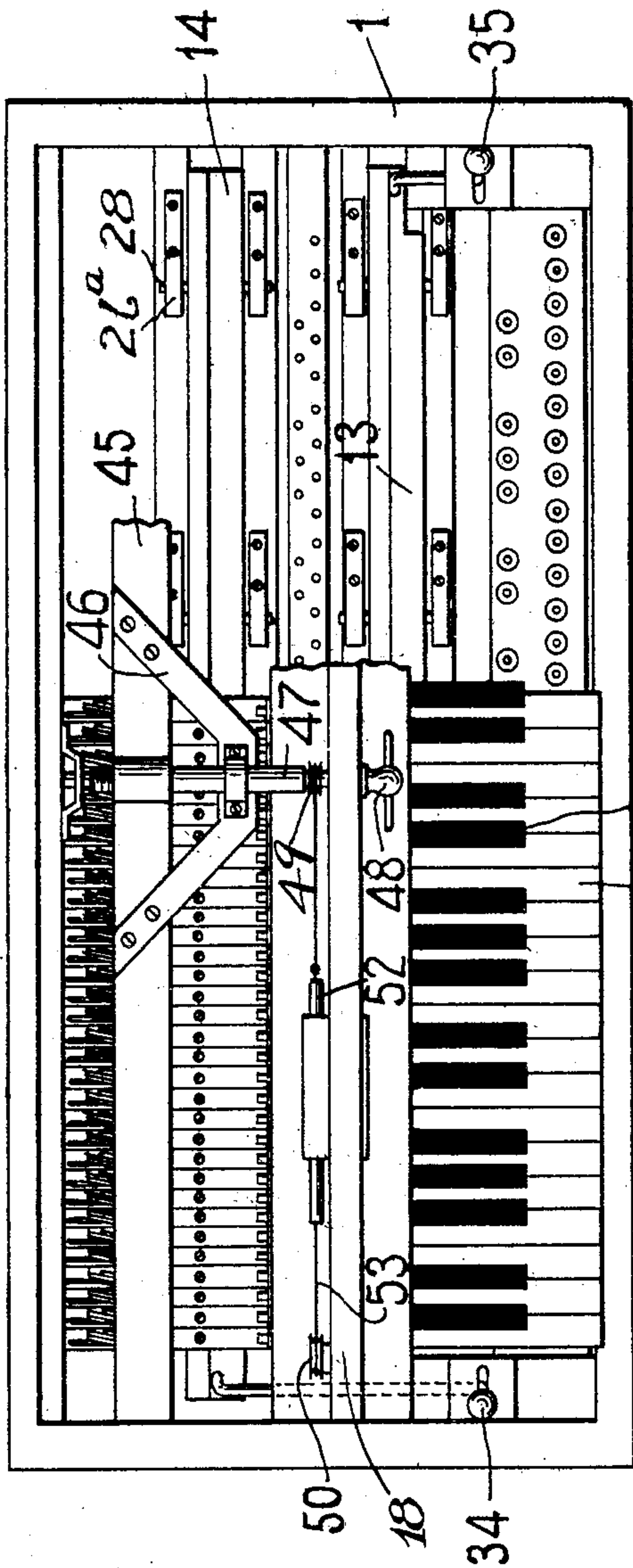
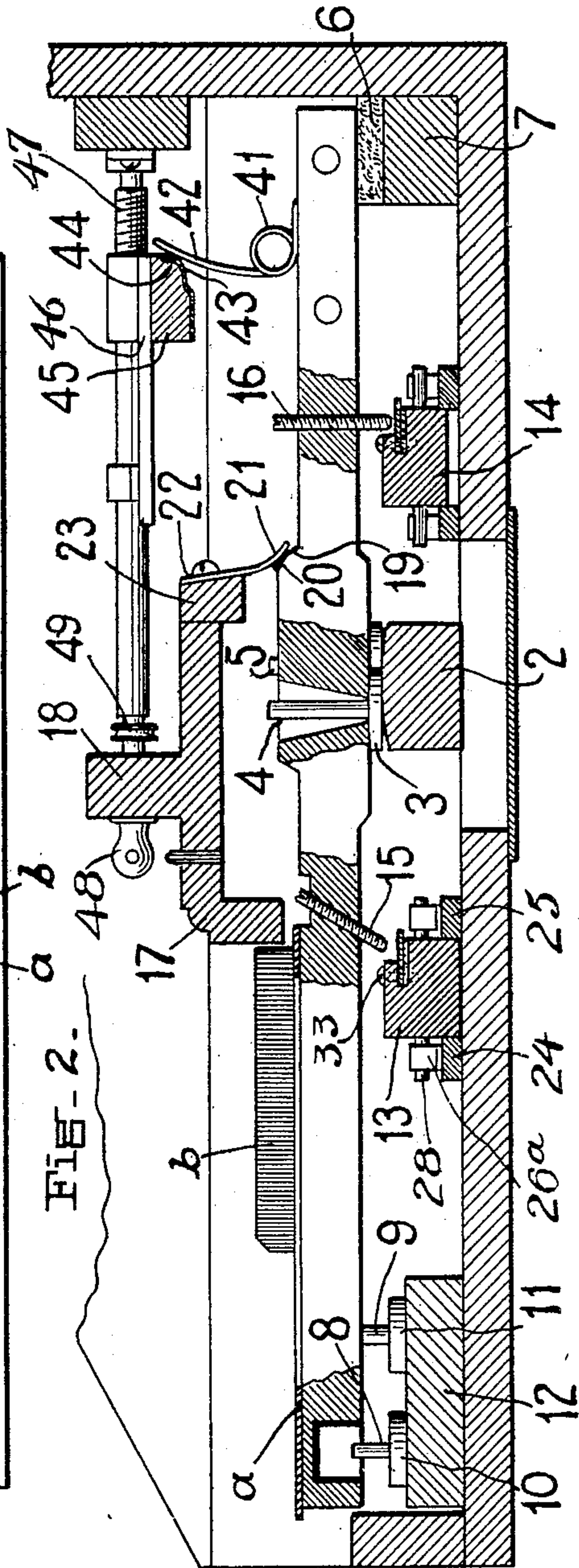


Fig-2-



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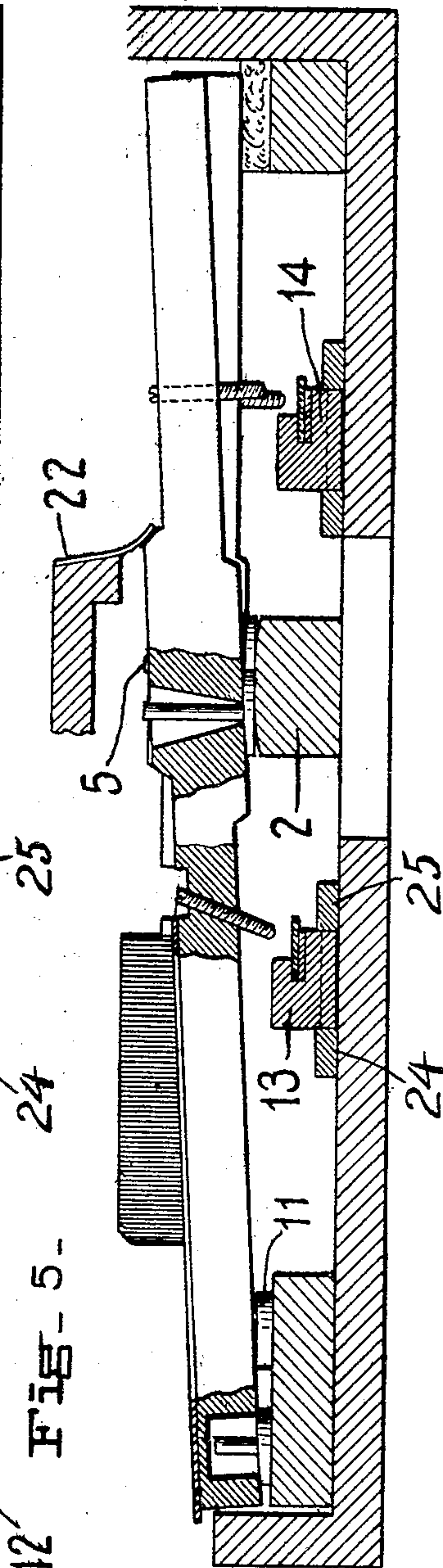
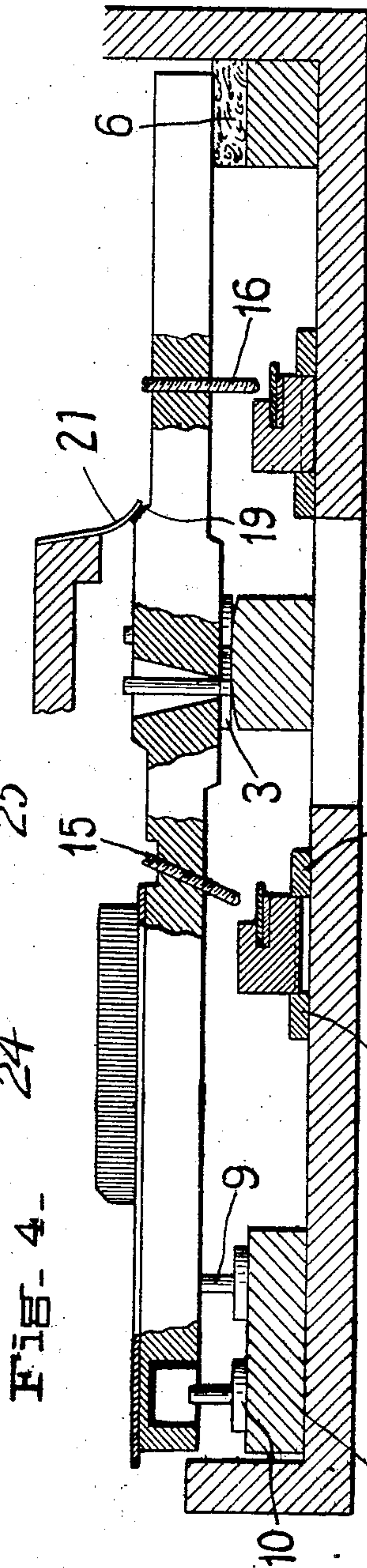
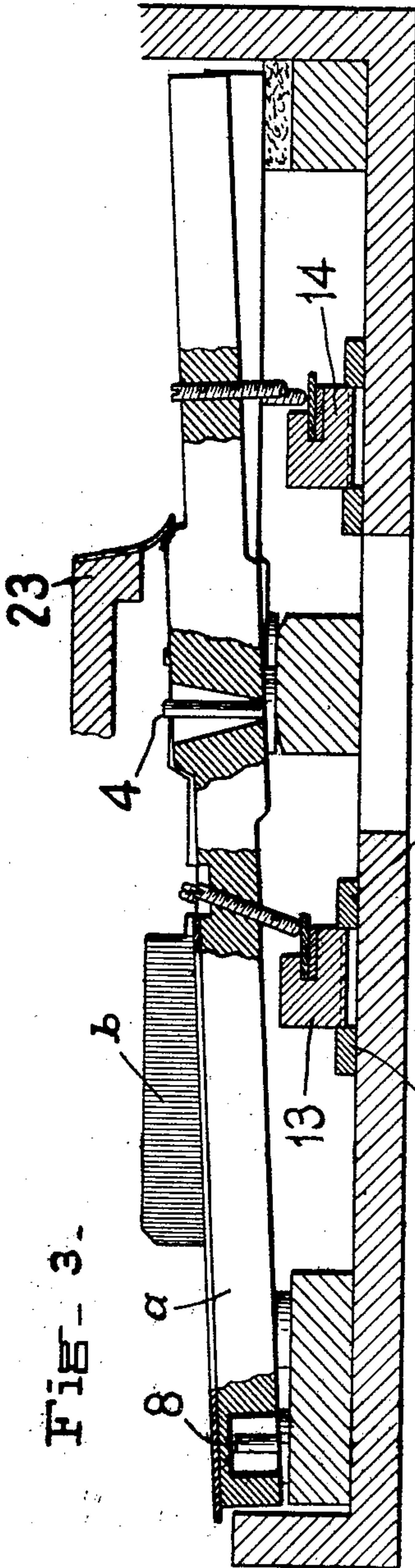
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3 SHEETS—SHEET 2.



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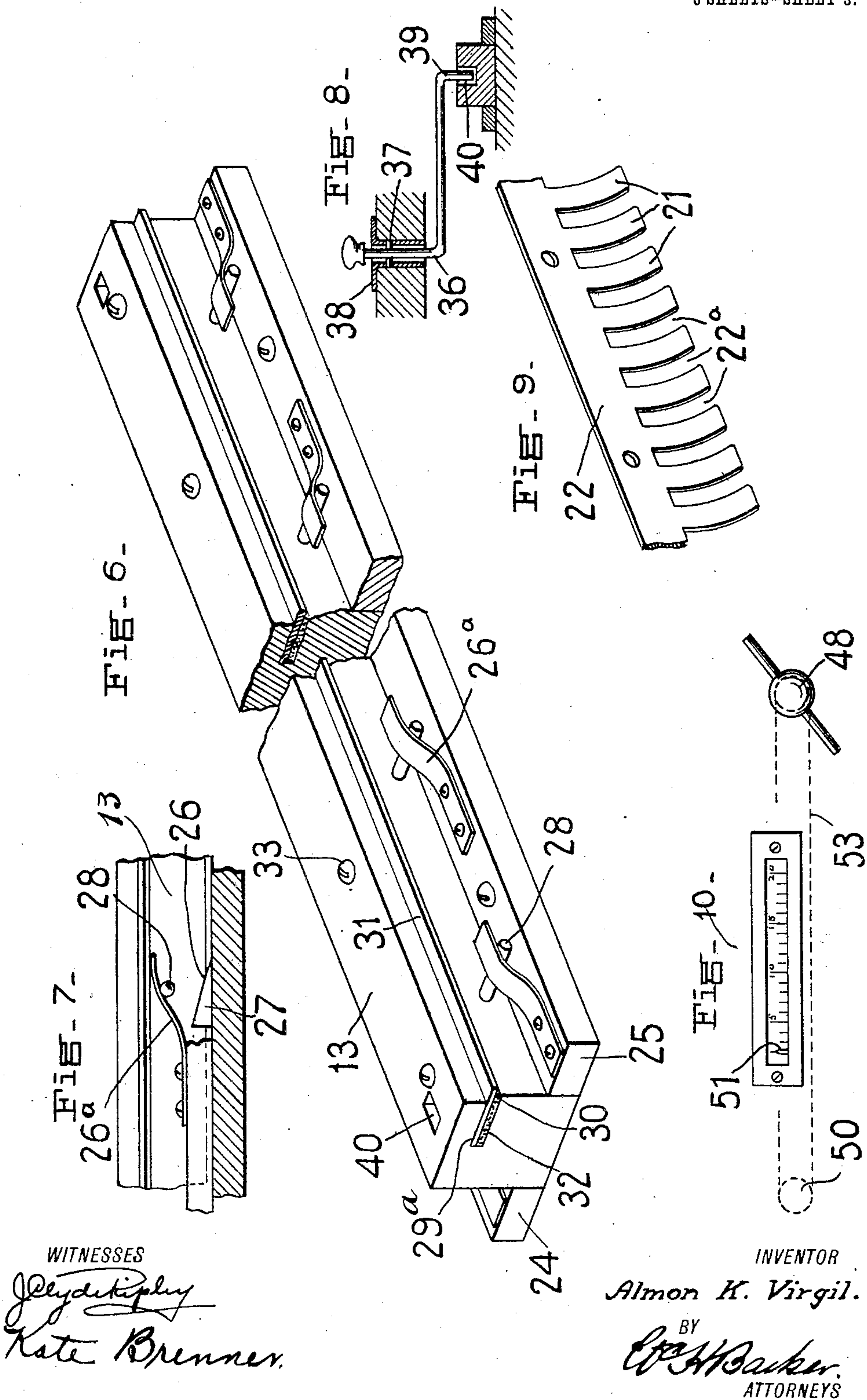
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

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

EXERCISING-KEYBOARD FOR MUSICIANS.

970,144.

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To all whom it may concern:

Be it known that I, ALMON K. VIRGIL, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, whose post-office address is 949 Broadway, New York city, New York, have invented certain new and useful Improvements in Exercising-Keyboards for Musicians, of which the following is a full, clear, and exact description, whereby anyone skilled in the art may make and use the same.

The invention relates to exercising keyboards and more particularly to a keyboard in the form of a pianoforte, although it is entirely a non-musical instrument.

The object of the invention is to provide an adjustable click mechanism free from resonance or prolongation and to provide means for adjusting said mechanism positively into and out of operative position.

A further object is to provide a key action which will be smooth and even in its movements and which may be adjusted to various tensions.

In Letters Patents granted to me July 19, 1892 and numbered respectively 479,339 and 479,340, I have described an instrument for the same general purpose, namely, that of providing an exercising keyboard for musicians and learners. The subject of this invention embodies improvements upon said prior devices and while designed to accomplish the same results described therein, obtains further and better results in operation.

One of the principal objects of the present invention is to provide mechanism which will give clicks at certain intervals upon the depression or release of the keys which are free from resonance and sustaining quality and serve as a sure and perfect guide to the ear in directing the movements of the fingers.

Referring to the drawings: Figure 1 is a plan or top view of the instrument with the cover removed. Fig. 2 is a cross sectional view through Fig. 1 illustrating in enlarged scale the arrangement of the key clicks and appurtenant parts, and showing the "down click" out of operating position and the "up click" raised into operating position. Fig. 3 is a sectional view through the casing illustrating one of the keys depressed. Fig. 4 is a view similar to Fig. 3 with the key in normal position and the "down click" rail raised and the "up click" rail depressed.

Fig. 5 is a view similar to Figs. 3 and 4 showing the key depressed with both the "down click" and "up click" rails depressed. Fig. 6 is a detail perspective view of one of the click rails and appurtenant holding devices. Fig. 7 is a detail side view of a portion of the click rail. Fig. 8 is a detail view of the controlling lever for the click rail. Fig. 9 is a perspective view of a portion of the key-spring. Fig. 10 is a detail view of the tension indicator.

In the accompanying drawings the numeral 1, denotes a casing of suitable form which supports a balance rail 2, upon which rest the several keys of the keyboard. The white keys are indicated as *a*, while the black keys are indicated as *b*. These keys rest upon the balance rail 2, which extends below the entire series of keys and provides a rest or support through the medium of noise deadening cushions 3. The keys are held in place and controlled as to position by a series of balance or fulcrum pins 4, 5, and in normal position the inner-most end of the key or that most remote from the finger ends, rests upon a resilient cushion 6 supported by a rail 7, and extending across the casing. The keys are further guided by pins 8, 9, arranged below the finger ends of the keys and surrounded by cushions or buffers 10, 11, supported upon a bar 12, extending across the instrument below the keys. The keys normally assume a position such as indicated in Fig. 2 with the inner end of the key resting upon the cushion 6.

Extending across the instrument below the keys and on opposite sides of the balance rail 2, are arranged click rails 13, 14. These rails are arranged, as hereinafter described, to be raised or lowered so that they will be brought into position to be engaged by adjustable spurs 15, 16, upon the depression and release of the key. The spurs 15, 16, are preferably in the form of screws passing through the key and adjustable from the upper side thereof. The forward spurs 15, are arranged below a hinged cover 17, which is supported upon the rail 18, extending across the top of the instrument and forming a part of the inclosing casement.

In order to secure the return of the keys to normal position as indicated in Fig. 2, and at the same time to provide a certain pressure upon said keys, which will not vary during the depression of the key, shoulders 19, are provided adjacent to the central por-

tion of the keys and the fulcrum pins 4, 5. These shoulders are preferably covered with a buffer 20, which underlies spring fingers 21, said spring fingers bearing with some
 5 force against the buffers. In order to secure uniformity of tension on all of the keys, the spring fingers 21, are preferably formed integral with a spring bar 22, which extends
 10 through a block 23, with the bridge or cover section 18. The form of this depression spring is illustrated in Fig. 9, where the body part 22, is cut away as at 22^a, to form the spring fingers 21. The body portion is
 15 firmly screwed to the block 23, and as the keys are all definitely located and of the same configuration, accuracy in assembling is easily secured.

It is to be noted that the shoulders 19, are
 20 so formed and curved that they ride under the curved ends of the fingers 21, and are so designed that in the movements of the key the tension of the spring fingers upon the shoulders will not be materially increased,
 25 the action being more nearly that of a rubbing or rolling action beneath the curved spring fingers. This arrangement is particularly well adapted to simulate the key movements employed in modern piano con-
 30 structions and the "feel" of the key in use will be soft, easy and uniform in its movements.

The click rails 13, 14, are identical in construction and operation and it is there-
 35 fore only necessary to describe in detail one of said rails. The main object secured through the click rail herein defined is to secure a simple and efficient structure which may be positively and accurately controlled
 40 as to position, and which will be entirely free from resonance and tone-sustaining quality, so that the clicks will start and stop instantly and will not confuse the operator in rapid fingering of the keyboard.
 45 The click rail 13, is mounted directly on the base-board of the casing between two guide bars 24, and 25, the latter being removably attached to the base-board and forming be-
 50 tween them a groove in which the rail 13, may be moved longitudinally. At various points along the under side of the rail, beveled openings are formed as at 26, see Fig. 7, and in these beveled openings and secured to the base-board, are beveled blocks or cams
 55 27, upon which the rail 13, may slide, and when moved longitudinally, will rise as the beveled surfaces 26, ride upward on the beveled blocks or cams 27. The arrange-
 60 ment is such as to always keep the click rails level in any position. Adjacent to each beveled opening and block or cam is arranged a pin 28, which pins are engaged by stiff
 65 springs 26^a as best illustrated in Figs. 1, 2, 6 and 7. They do not appear on the dia-
 grammatic views in Figs. 3 to 5 inclusive.

The pins 28, are secured in the rail 13, while the springs 26, are secured to the guide rails 24, 25, and over-lie the projecting pins. As indicated in Fig. 6, the springs are opposed
 70 in directions so that the guide rail is always firmly held in either position of its throw by the springs and these springs have suffi-
 75 cient tension to bind the rail firmly against the base-board. On one side of the rail see Fig. 6 there is a longitudinal opening 29^a,
 80 extending the entire length of the rail and in the same horizontal plane with the shoulder 30. Within this opening is arranged a metallic strip 31, which surmounts a cushion
 85 32. Both the metal strip and cushion are firmly held in the groove of the rail by screws 33, which may be adjusted to clamp both the strip and its cushion with more or
 90 less pressure as desired. The above described parts are not indicated by references in each
 95 of the figures, but are best shown in Fig. 6. From this construction it will be seen that the metallic rail 31, extends the entire width of the keyboard below the keys and in posi-
 100 tion to be struck by the spurs 15, or 16. In Figs. 1 and 8, there is shown an actuator for moving the click rail. At the left of Fig. 1 is a lever 34, for controlling the posi-
 105 tion of the click rail 14, while at the right, there is shown a lever 35, for controlling the
 110 position of the click rail 13. These levers are identical in operation and are provided with a downwardly extending shank 36, pivoted as at 37, in a socket piece 38, and have a crank arm 39, engaging an opening 40,
 115 in the sliding click rails.

It is all important in a device of the character described to provide against pro-
 120 longed sounds or resonance of the click, that is, the click must have no sustaining quality
 125 and must start and stop at substantially the same instant, to prevent confusion of sounds. For instance, when both rails are in raised position to effect a click on the down-stroke
 130 of each key and a second click on the up- stroke of each key, if the click is not sub-
 135 stantially instantaneous, there will be a confusion of sounds as between two keys when rising and falling. Of course, when a key is depressed, it gives a down click, when it
 140 is released it gives the up-click, but should two keys be considered, one rising and the other falling, there is the liability of confusion or continuation of the click, unless
 145 said click is to all purposes and intents an instantaneous sound. Obviously, the pur-
 150 poses and benefits to be derived from the use of the instrument will be defeated unless the clicks are arranged as described to give
 155 such an instantaneous sound.

In the prior devices made as indicated in the patents above referred to, there are a
 160 number of movable parts and complications which tended to prevent the sharp clean
 165 click of a non-resonant and non-prolonged

quality, but the devices herein described are free from complications and the click rails are most substantially and firmly mounted with reference to the frame of the instrument and may be raised and lowered with great accuracy, providing a perfect impact for the spurs of the keys against the metallic portions of the rails. Furthermore atmospheric or climatic changes cannot so disarrange the solid click rails as to cause imperfect operation and there is therefore no cramping or binding of the parts.

In order to provide for varying the tension upon the keys and thus require a greater muscular action of the fingers, each of the keys at its innermost end is provided with a coil spring 41, having an upwardly projecting arm 42, arranged to engage a buffer 43, mounted upon the curved edge 44, of a rail 45. This rail 45, is supported to slide in the casing and has a supplemental support 46, of yoke form embracing a screw shaft 47. The thread of the screw shaft 47, engages the rail 45, and by turning a handle 48, the rail 45, may be advanced toward the spring arms 42, increasing the tension thereof. The same system of contact between the rail and spring arms is employed as in connection with the keys and spring fingers 21. The rounded edge 44, of the rail bearing against the spring arms 42, will permit a sliding movement of the springs, which will not materially change the pressure upon the keys as they are moved through a complete cycle of operation. When the rail is set for a given pressure, the keys will all operate smoothly and with freedom throughout both the downward and upward movements, there being no point in the depression of the key which has greater resistance than another.

In order to accurately indicate the pressure required to depress the keys, a pulley 49, is mounted upon a shaft 47, and a second pulley 50, is mounted on the rail 18. An indicating pointer projects through an opening in the rail 18, from a sliding bar 52. The latter is in an endless cord connection 53, with the pulley 49. The indicating finger 51, will thus be moved as the shaft 47, is rotated and will accurately indicate the pressure to be overcome on the keys induced by the pressure of the spring rail 45, against the spring arms 42.

It is, of course, to be understood that in the normal position of the keys, the spurs 15, 16, must be just out of contact with the metallic plates of the click rail, so that a clear sharp metallic click will be secured when the parts are brought together. The cushions 10, 11, and 6, have sufficient resiliency to permit a depression of the key to such an extent that the spurs may be brought forcibly into engagement with the metallic portions of the click rails and these cushions will immediately raise the key until the con-

tacting parts are barely separated. It is, of course, apparent that either or both click rails may be set in raised position to provide for a "down click" which occurs on depression of the key, and an "up click" which occurs on the return movement of the key, provided both click rails are raised or simply the "down click" or the "up click" when the respective rails are moved into raised or lowered position.

What I claim as my invention and desire to secure by Letters Patent is:

1. In an exercising apparatus, in combination with a series of keys, a click producing device consisting of a spur operatively mounted on each key, a click rail extending below the keys and mounted to move in a channel, said click rail bearing a metal bar cooperating with the spurs of the keys, springs for holding said click rail in its groove and means for raising and lowering said rail.

2. In an exercising apparatus in combination with a series of keys each bearing one member of a click device, a click rail extending below the keys and mounted to slide in a groove, said click rail bearing a hard plate to cooperate with the click members of the keys, a series of cam openings formed in the body of the click rail, a series of cams located in the grooves and cooperating with the cam openings and a series of springs arranged on opposite sides of the rail groove and operatively connected with the click rail to hold the latter within the groove with the cams and cam openings in contact.

3. In an exercising apparatus in combination with a series of keys, each provided with one member of a click device, a groove extending beneath the keys, a click rail mounted to slide in said groove and bearing a click plate cooperating with the click members of the keys, a series of cam openings formed in the body of the click rail, a series of cams mounted in the groove and cooperating with said cam openings, pins extending from the click rail adjacent to the cam openings and a series of spring bars cooperating with said pins to hold the click rail firmly within its groove and upon the cams.

4. In an exercising apparatus in combination with a series of keys, each provided with one member of a click device, a groove extending beneath the keys, a click rail mounted to slide in said groove and bearing a click plate cooperating with the click members of the keys, a series of cam openings formed in the body of the click rail, a series of cams mounted in the groove and cooperating with said cam openings, pins extending from the click rail adjacent to the cam openings and a series of spring bars cooperating with said pins to hold the click rail firmly within its groove and upon the cams, a portion of said springs extending in one

direction over the pins and a portion extending in the opposite direction.

5 5. In an exercising apparatus, a balance rail, a series of keys mounted to rock there-
on, each key provided with a curved shoulder, and a series of springs mounted above said keys and provided with curved ends bearing against said shoulders whereby said keys are under uniform pressure of the
10 springs in all positions of movement.

6. In an exercising apparatus, a balance rail, a series of keys mounted to rock there-

on, each key provided with a curved shoulder, and a spring plate extending across the apparatus above said keys and provided 15 with curved spring fingers bearing against said shoulders whereby said keys are under uniform pressure of the springs in all positions of movement.

ALMON K. VIRGIL.

Witnesses:

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