No. 742,573. PATENTED OCT. 27, 1903.

R. S. BOWEN.

PIANO.

APPLICATION FILED FEB. 26, 1903.

NO MODEL.

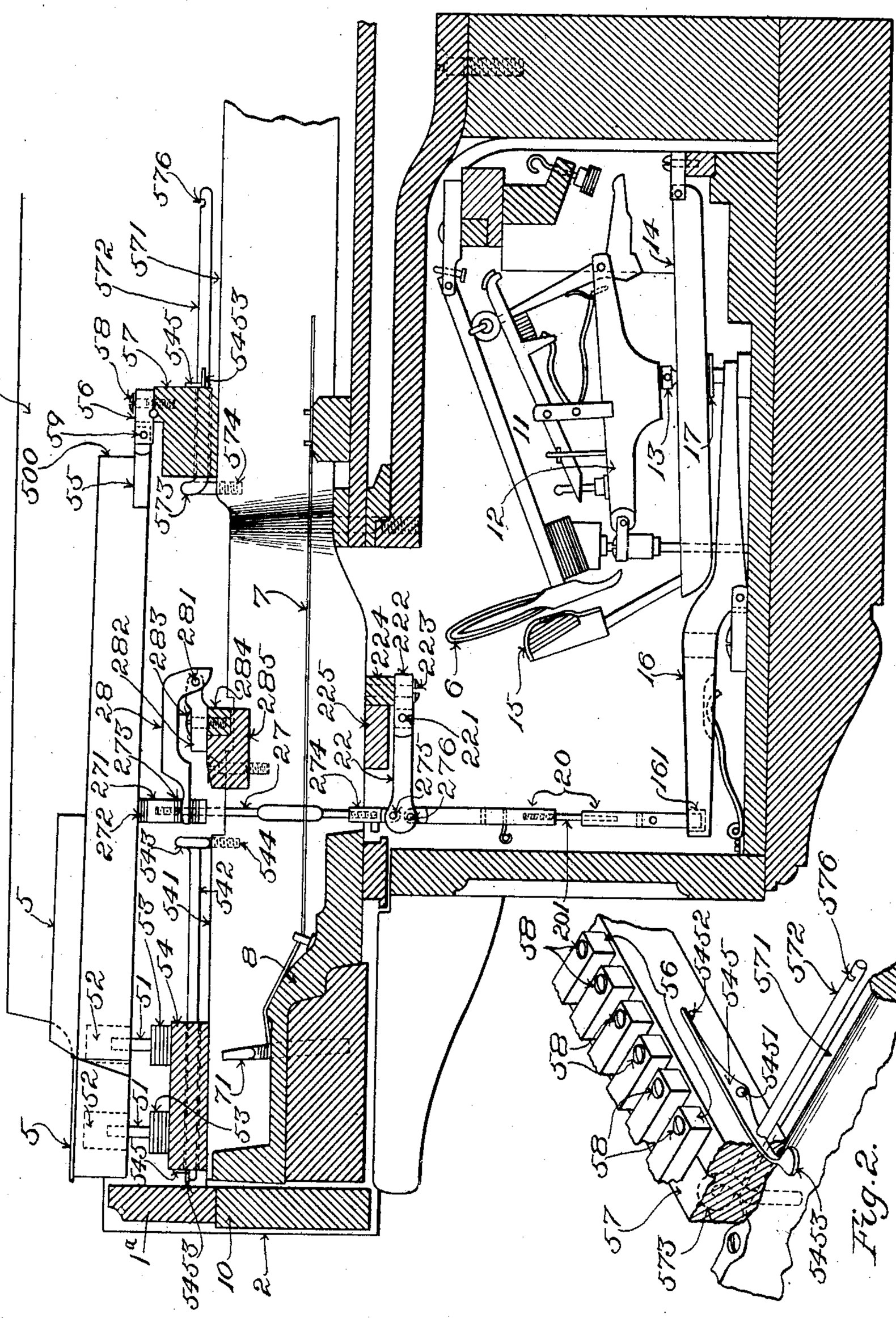

Fig. 1.

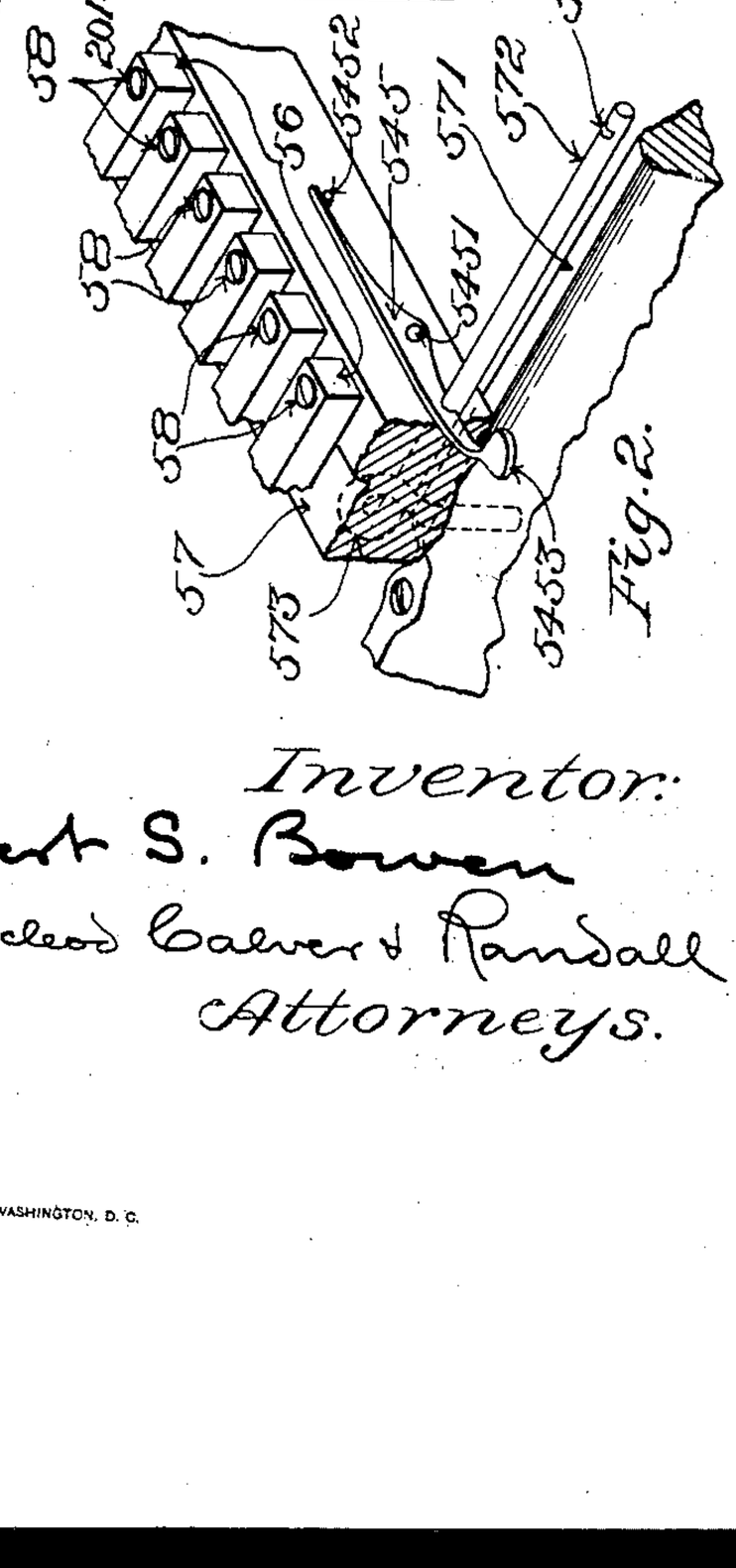

Fig. 2.

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UNITED STATES PATENT OFFICE.

ROBERT S. BOWEN, OF NEWTONVILLE, MASSACHUSETTS, ASSIGNOR TO CHICKERING & SONS, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

PIANO.

SPECIFICATION forming part of Letters Patent No. 742,573, dated October 27, 1903.

Original application filed November 21, 1902, Serial No. 132,183. Divided and this application filed February 26, 1903. Serial No. 145,157. (No model.)

To all whom it may concern:

Be it known that I, ROBERT S. BOWEN, a citizen of the United States, residing at Newtonville, in the county of Middlesex, State of Massachusetts, have invented a certain new and useful Improvement in Pianos, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention has relation to horizontal pianos, and the present embodiment thereof has been designed more especially for application to pianos of the type in which the keys are located above the strings and the action below the latter, with wires or the like extending down between the strings for the transmission of movement to the action proper. The broader features thereof, however, are not necessarily restricted to use in this precise connection.

The invention comprises improvements, as hereinafter defined, whereby the key-bank is rendered movable to afford access to the tuning-pins or other parts adjacent the same when required, as for the purpose of tuning; also in improvements in the manner and means of mounting the keys upon the supporting key-rail; also in the means of mounting the said key-rails.

A convenient embodiment of the various features of the invention is represented in the accompanying drawings, in which—

Figure 1 is a sectional view on a vertical plane extending from front to rear of a piano containing the said embodiment of the invention. Fig. 2 is a view in detail showing portion of the plate, portion of the back key-rail, one of the steadying and guiding rods, and one of the locking devices on the key-rail for engagement with the said rods.

Having reference to the drawings, the case in general of the body of a piano is indicated at 1, one of the cheeks thereof being indicated at 2. Two of the keys are shown at 5 5, Fig. 1, a hammer at 6, the strings at 7, a tuning-pin at 71, and the plate at 8. The main parts of the piano, so far as the same are shown in the drawings, are disposed and arranged in a manner intended to reduce the size of the piano to the utmost limit, as in my application for United States Letters Patent filed August 9, 1902, Serial No. 118,980. Thus, as in the said application, the front edge of the plate 8 is located close to the front of the case, bringing the said edge near the front panel 10. The keys 5 5 are located above the plate 8, and for the purpose of reducing the height of the piano the action is arranged below the plate and strings, the keys above said plate being joined operatively with the said action by means of motion-transmitting connections extending through the spaces between the strings. The action also is set back somewhat from the front of the case, as indicated clearly in Fig. 1, in order to leave a recess below the front portion of the plate 8 and corresponding portion of the case sufficient to admit the knees of the person who plays upon the instrument or to receive a mechanical or automatic player of one of the kinds at present in use.

So far as the parts of the action which are more immediately adjacent the hammer are concerned, they may be of any approved character. I have shown in Fig. 1 an arrangement which in essential respects is the same as that which is at present in extensive use and needs, therefore, no description herein. The jack collectively is designated 11 in the said figure, the jack-bed forming part thereof being designated 12 for convenience in referring to the same. The jack-bed 12 is engaged by the capstan-screw 13, carried by the lever 14, the said lever carrying the back-catch 15 and being termed by me the "back-catch" lever. The back-catch lever 14 is actuated through the lever 16, which from its general function of causing the jack to be lifted I call the "jack-lifting" lever, the rearwardly-projecting arm of the said lever 16 being provided with the button 17, which makes contact with the back-catch lever.

Having reference now to the keys 5 5 and the parts which are immediately adjacent the same, at 51 51 are shown the pins extending upward from the front key-rail 54, which last is located beneath the front ends of the said keys, the upper portions of the said pins being received in the slots or chambers 52 52, which are formed in the under side of the

keys 5 5, as indicated in dotted lines in Fig. 1. At 53 53 are shown the puncheons or disks of felt which cushion the downstroke of the keys. The front key-rail 54, on which the said pins and puncheons or disks are mounted, is supported by the plate 8. One feature of the invention is the manner in which the keys are mounted, so as to facilitate turning the same backward to uncover the parts below the same and afford free access to such parts. Thus each of the keys 5 5 has secured to its rear end, at the under side thereof, a small flange 55. One end of the said flange projects rearwardly beyond the end of the key and enters between forwardly-extending lugs of a flange 56, mounted upon the back key-rail 57, the flange 56 being attached to the said key-rail 57 by means of a screw 58. The flange 55 is connected with the said lugs of the flange 56 by means of a pivot, as 59. This mode of mounting the keys enables them to be swung upwardly and rearwardly upon their pivots 59 until the parts which are located below the keys and more or less covered thereby are exposed and rendered accessible. The keys may be turned back until the center of gravity has been passed, after which they will remain naturally in their elevated and rearward position. The latter may be determined by contact of the shoulder at 500 on the rear end of each key with the top of the flange 56. In order, further, to facilitate access to the parts below the keys and key-rails, the key-rails 54 and 57 are mounted with capacity for movement in a direction from front to rear between the cheeks 2. The respective key-rails are supported by the surfaces 571 and 541 of the plate 8, upon which surfaces they rest. For the purpose of steadying and guiding the key-rails 57 54 they are fitted to rods 572 and 542, respectively. In connection with each key-rail a series of the said rods is employed, the respective series extending from side to side of the piano. The main portion of each rod extends horizontally, and each of the said key-rails is bored transversely and fitted upon the horizontal portions of the corresponding rods. The rods 572 serve to prevent the back key-rail from tilting under the stresses which are communicated thereto when the keys are struck and depressed in playing the piano.

For the purpose of holding the respective key-rails 54 and 57 in firm contact with the supporting-surfaces 541 and 571 of the plate, so as to prevent the production of noise by the vibration of the parts and also of causing the said key-rails to be held from undesired transverse movement upon the said surfaces by their frictional engagement with the latter when not otherwise locked or held from such movement, I arrange the rods 542 and 572 to be forced by spring-pressure toward the surfaces 541 and 571, so as to press the under sides of the key-rails 54 and 57 against the said surfaces. The spring-pressure may be variously produced and applied; but preferably it is produced and applied by forming each rod with an attaching portion, whereby it is connected with the plate, and arranging so that in use a portion of the rod shall be placed under tension by its engagement with the key-rail, this tension tending to carry the key-rail 54 or 47 into contact with the corresponding surface 541 or 571. In the present case each rod 542 and 572 at the extremity thereof is bent at right angles to its length and then is formed into a partially-closed loop 543 or 573, the said eye or loop having a depending screw-threaded stem 544 or 574, which is driven into a screw-threaded hole that is tapped in the plate 8. The height of the holes through the key-rails above the bottom surfaces of said key-rails is such that when the key-rails 54 and 57 are caused to rest upon the surfaces 541 and 571 and are fitted upon the horizontal portions of the rods 542 and 572 the said portions of the rods are thereby raised sufficiently from their normal positions to slightly strain the rods at the loops 543 573, thereby bringing the elastic power of the material of the rods at such loops into play. For the purpose of locking the key-rails 54 and 57 positively in place against movement longitudinally of the horizontal portions of the rods 542 572, after having been placed in the desired position, suitable locking devices are employed. A convenient form of locking device is illustrated in the drawings, (see more particularly Fig. 2,) it comprising a movable plate or strip, as 545, mounted upon the key-rail by means of a pivot 5451, each of the rods 542 and 572 being notched, as at 546 576, to receive the edge of the said locking plate or strip. Each locking plate or strip is movable upon its pivot 5451 on the corresponding key-rail to enable it to move into one of the notches of the rod upon which said key-rail moves, so as to lock the key-rail in a given position, or to be raised from the said notch, so as to render the key-rail movable. The tail of the locking device is reduced in thickness to render it yielding and bears upon the pin 5452. When the engaging end of the locking device rests upon the upper surface of the corresponding steadying and guiding rod, the tail thereof is flexed, and thereby placed in a state of tension, so that when the locking device comes in line with a notch in said rod the said engaging end springs into the notch. A thumb-lug is provided upon the locking device at 5453 for convenience in operating the locking device. Each rod is provided with a notch in position to be engaged by the locking device of the corresponding key-rail when the latter is in its normal or operative position, and with a second notch upon another portion of the rod for the purpose of receiving the locking device when the key-rail has been shifted out of its normal or operative position for the purpose of permitting access to parts below, which are covered or more or less concealed by the key-

rail in its normal position—as, for instance, in order to permit tuning to be effected. Preferably one end of each of the rods 542 and 572 is left straight and unattached, as shown in the drawings, in order to enable the key-rails 54 and 57 to be applied to the rods at such ends or removed thereat. This enables the back key-rail 57 to be removed and again applied whenever required after the overlying parts of the piano have been removed. So, also, the front key-rail 54 may be withdrawn or restored to place after the key-strip 1^a has been removed.

The means employed for the transmission of movement from a key 5 to the corresponding jack-lifting lever 16 forms no part of the present invention. In the drawings I have represented a wire 27, a post 20, adjustable as to its length, and radius-arms 28 and 22. The upper end of the wire 27 has applied thereto a head or button 271, which is furnished with a puncheon or disk 272, of felt or the like, making contact with the under side of the key. The wire is held in vertical position and guided in its movements by means of the radius-arms 28 and 22. The stem of the wire adjacent the said head or button 271 passes through a hole in the free extremity of the radius-arm 28, the puncheon or disk 273 of felt intervening between the said head and the upper side of the said end of the radius-arm 28. To the lower end of the wire 27 is applied the foot 274, which latter is pivotally connected, as at 275, with the free extremity of the radius-arm 22. The upper extremity of the post 20 is pivotally connected, as at 276, with the radius-arm 22, while the lower extremity of the said post is received in a socket 161, which is formed in the forward arm of the jack-lifting lever 16. The radius-arm 28 is pivoted, as at 281, to the flange 282, which last is secured, as by a screw 283, to the iron bar 284, resting in a rabbet of the wooden cross-bar 285, connected with the plate. The radius-arm 22 is pivoted, as at 221, to the flange 222, which is secured by screw 223 to the iron bar 224, carried by the wooden cross-bar 225, connected with the plate 8. The wire 27 at an intermediate point in its length passes between the strings 7. In those cases in which a key does not lie fairly vertically above the space between strings through which the corresponding wire 27 passes the upper portion of the wire is bent laterally to the extent which may be required in order to place the head or button 271 at its upper end in proper position beneath the said key. In order that the wire 27 may have the requisite stiffness to prevent it, notwithstanding the bend or inclination of the upper part thereof, from springing or becoming further bent by reason of the pressure that is applied to the same by the key when the said key is struck in playing, the said wire is formed of a large gage, and in order to enable the same to fit and work between the strings without contact with the strings during the vibrations of the latter the wire is flattened for a sufficient portion of its length to clear the strings when vibrating in all of the usual positions of the wire. The upper and lower ends of the wire 27 are screw-threaded and are received in screw-threaded holes, which are tapped in the head 271 and foot 274, respectively. The adjustable post 20 is composed of upper and lower sections and an intermediate connecting portion 201, the said connecting portion consisting of a section of wire one end of which is secured in the lower section, the upper end of said wire being screw-threaded and fitting a screw-threaded hole, which is tapped in the lower end of the upper section. Rotation of the said lower portion, so as to screw the wire into or out of the upper section, enables the post to be lengthened or shortened, as required in practice.

In restringing it may be necessary to remove the key-rails. The construction which has been described herein provided for this removal by enabling the front key-rail to be drawn forward to effect the removal thereof and the back key-rail to be moved in the other direction.

The features in general which are shown in the drawings, including the means of transmitting motion from the keys to the action herein described, form the subject of claims in my application for United States Letters Patent for improvement in pianos, filed November 21, 1902, Serial No. 132,183, of which the present case is a division.

I claim as my invention—

1. In a piano, in combination, the key-rail, the key, and the flange secured to the rear end of the key and mounted in connection with said key-rail by means of a pivot located beyond the rear end of said key, the said end having a stop to engage the rear end of the key and support it in an upright position, substantially as described.

2. In a piano, in combination, the key, the flange secured to the said key and projecting beyond the rear end of the same, the key-rail, the flange attached thereto and having the first-mentioned flange connected therewith by a pivot located beyond the rear end of the key, the said end having a stop to engage the rear end of the key and support it in an upright position, substantially as described.

3. In a piano, in combination, the keys, a key-rail on which the said keys are mounted, and a support on which said key-rail is movable to enable the key-bank to be shifted rearward in the piano from the normal position thereof, to afford access to parts below the same, substantially as described.

4. In a piano, in combination, the strings, the tuning-pins, a support therefor, and the key-bank overlying at the front thereof the said tuning-pins and movable rearwardly in the piano from the normal position thereof to afford access to the tuning-pins, substantially as described.

5. In a piano, in combination, the keys, the movable back key-rail on which the said keys are mounted, and the movable front key-rail beneath the forward portions of the keys, the said key-rails and keys being movable rearward in the piano from the normal positions thereof, substantially as described.

6. In a piano, in combination, the action, devices for transmitting motion thereto from the keys, the strings, the tuning-pins, and a key-bank extending above the tuning-pins and movable rearwardly to afford access to the same, substantially as described.

7. In a piano, in combination, the action, motion-transmitting connections therefor terminating adjacent said keys to receive the pressure of the latter, the strings, the tuning-pins, and a key-bank overlying said connections and tuning-pins and movable rearwardly to afford access to the tuning-pins, substantially as described.

8. In a piano, in combination, the action, motion-transmitting connections therefor having heads or buttons to be engaged by the keys, the strings, the tuning-pins, and a key-bank overlying said heads or buttons and tuning-pins, and movable rearwardly to afford access to the tuning-pins, substantially as described.

9. In a piano, in combination, the keys, a key-rail, movable substantially as described, and the rods passing through openings in the key-rail and along which the key-rail is adapted to slide, substantially as described.

10. In a piano, in combination, the keys, the front and back key-rails, movable substantially as described, and the rods passing through openings in the respective key-rails and along which the latter are adapted to be moved, substantially as described.

11. In a piano, in combination, the keys, a key-rail, a support on which said key-rail is mounted, and the steadying and guiding rods passing through openings in the key-rail and along which the key-rail is adapted to slide, substantially as described.

12. In a piano, in combination, the keys, the front and back key-rails, a support on which said key-rails are mounted, and the steadying and guiding rods passing through openings in the respective key-rails and along which the latter are adapted to be moved, substantially as described.

13. In a piano, in combination, the keys, a key-rail, a support on which said key-rail is mounted, and a steadying and guiding rod lengthwise of which said key-rail is movable, operating under spring-pressure against the key-rail, substantially as described.

14. In a piano, in combination, the keys, a key-rail, a support on which said key-rail is mounted, and a steadying and guiding rod fitting an opening through said key-rail, along which the key-rail is movable, and operating under spring-pressure to hold the key-rail pressed against the support, substantially as described.

15. In a piano, in combination, the keys, a key-rail to which the rear portions of the keys are pivotally connected, a support on which said key-rail is mounted, and a steadying and guiding rod fitting an opening through said key-rail, along which the key-rail is movable, and operating under spring-pressure to hold the key-rail pressed against the support, substantially as described.

16. In a piano, in combination, the front and back key-rails, a support therefor, and steadying and guiding rods lengthwise of which the said key-rails respectively are movable, operating under spring-pressure against the respective key-rails, substantially as described.

17. In a piano, in combination, the keys, front and back key-rails, a support for said key-rails, steadying and guiding rods fitting through openings in the respective key-rails, along which the latter are movable, and operating under spring-pressure to hold them pressed against the support, substantially as described.

18. In a piano, in combination, the keys, a key-rail, a support on which said key-rail is mounted, and an elastic rod attached by one end to said support, along a portion of which rod said key-rail is movable, and exerting spring-pressure upon the key-rail to press it toward its support, substantially as described.

19. In a piano, in combination, the keys, a key-rail, a support on which the key-rail is mounted, and the elastic rod, attached to said support, having the loop and bend and the portion along which the key-rail slides, the said rod acting to bear the key-rail with spring-pressure against the support, substantially as described.

20. In a piano, in combination, the keys, the front and back key-rails, a support on which the key-rails are mounted, and the elastic rods attached to the said support, each having a loop and bend and also having the portion along which the corresponding key-rail slides, the said rods acting to bear the key-rails with spring-pressure against the support, substantially as described.

21. In a piano, in combination, the keys, a key-rail, a support on which said key-rail is movable to enable the keys to be shifted rearward to afford access to parts adjacent the same, and means to lock the key-rail in place, substantially as described.

22. In a piano, in combination, the keys, a key-rail, movable to enable the keys to be shifted to afford access to parts adjacent the same, a steadying and guiding rod operating under spring-pressure against the key-rail, and means to lock the key-rail in position, substantially as described.

23. In a piano, in combination, the keys, a key-rail, a support on which said key-rail is mounted, a steadying and guiding rod fitting an opening through said key-rail, along which the key-rail is movable, and operating to hold the key-rail pressed against the support, and locking means to retain the

key-rail in position, substantially as described.

24. In a piano, in combination, the keys, a key-rail, on which said keys are mounted, movable rearwardly to afford access to adjacent parts, a rod along which said key-rail moves, and locking devices connecting the key-rail and rod to retain the former in position, substantially as described.

25. In a piano, in combination, the keys, a key-rail on which said keys are mounted, movable to afford access to adjacent parts, a rod along which said key-rail moves, and latching or locking devices carried by the key-rail and engaging with the rod to retain the key-rail in position, substantially as described.

26. In a piano, in combination, the keys, a key-rail on which said keys are mounted movable to afford access to adjacent parts, a rod along which said key-rail moves, having notches at points corresponding with the different positions of the key-rail, and latching or locking devices carried by the key-rail to engage with the said notches, substantially as described.

27. In a piano, in combination, the keys, a key-rail on which said keys are mounted, a support on which said key-rail is movable to afford access to adjacent parts, a notched steadying and guiding rod operating under spring-pressure to hold the key-rail against the support, and latching or locking devices carried by the key-rail to engage with the notches of the rod to hold the key-rail in its different positions, substantially as described.

28. In a piano, in combination, the keys, the front and back key-rails, a support on which the said key-rails are movable to shift the key-bank and thereby afford access to adjacent parts as for tuning, steadying and guiding rods operating under spring-pressure to hold the key-rails against the support, and latching or locking devices engaging with the notches of said rods to hold the key-rails and keys in their normal position and in the position for tuning, respectively, substantially as described.

29. In a piano, in combination, the key-rail, movable substantially as described, the guiding and steadying rods, a support, said rods being fixed to one of said parts and passing through holes in the other thereof, and the keys mounted upon the said key-rail, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ROBERT S. BOWEN.

Witnesses:
CHAS. F. RANDALL,
WILLIAM A. COPELAND.