

UNITED STATES PATENT OFFICE.

ELON A. LEE, OF ROXBURY, MASSACHUSETTS.

PIANOFORTE-ACTION.

Specification of Letters Patent No. 10,948, dated May 23, 1854.

To all whom it may concern:

Be it known that I, ELON ALONZO LEE, of Roxbury, in the county of Norfolk and Commonwealth of Massachusetts, have invented certain new and useful Improvements in that Part of Pianofortes commonly called the "Action," thus forming what I designate the "Grand Nerve-Action"; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of the specification, in which—

Figure I is a side elevation and Fig. II is a plan of the same, both of the full ordinary size.

A, B, represents the key of the piano forte, and C, the jack or hopper made in the usual style of the English jack or hopper, with the exception that the fixed arm *a* of the jack is left shorter than the fly or movable arm *c*, in order that the key and the jack may be removed whenever necessary without interfering with the rest of the action. The movable arm *c*, of the jack, is hung by a parchment hinge at one end as is usual, and at its free end strikes the under hammer D. The spring *d* made fast to the base of the jack C and playing against the fly or movable arm *c* together with the regulating screw *e* and its button *f* covered with cloth are the same as in the English jacks. But the button *f* instead of playing against the fixed arm *a* prolonged in the usual manner plays against a wire *g* which comes to it from the under hammer D, so that by the pressure of the button *f* on the wire *g* when the key is raised, the fly and movable arm of the jack is thrown off from the boss of the under hammer *i* to the recess *j* thus forming an escapement of the fly *c* from the under hammer, and thus at the moment the hammer G strikes the string, the under hammer is allowed to fall a little, until the boss *k* of the under hammer which is formed by an extension of the under hammer, or any equivalent strikes the fly *c* where it rests thus allowing the hammer with which this under hammer is connected, in the way hereinafter described, to fall a short distance from the string, and there remain, if required so as to be in readiness for a repetition movement until the finger is removed from the key, when by the falling of the key and the pressure of the spring

d, this movable arm *c* is brought back to its place under the boss *i* of the under hammer. By this arrangement I entirely obviate the necessity of the usual back catch to the hammer and still hold the hammer near the string. The height of the boss *i* above the recess *j* may be of any convenient distance so as not to interfere with the easy play of the other parts of the action, but my own experience is that from the sixteenth to the eighth of an inch is best. The bosses and recess of the under hammer are to be packed and covered with wash leather or other suitable material in the usual manner.

Instead of the wire *g* coming from the under hammer nearly at right angles to the button *f* as represented in Fig. I, this wire may come from the under hammer in the direction represented in Fig. I by the wire *m*, the extremity of which may be armed with a button *f* to play against the button *f*, and also if desired against the packing *b* which covers the short arm *a* of the jack C. By using a wire extending in the direction of *g* or *m* or any equivalent direction armed with a button to play against the short arm *a* of the jack C covered with its cushion or packing *b* I can, if desired, either dispense with that part of the under hammer and its bosses and recess marked in Fig. I with the letters *i*, *j*, and *k*, and produce the same motion of the hammer, or I can retain that part of the under hammer with its said bosses and recess and use said wire and button playing against said arm *a* as auxiliary in producing the motion of the hammer.

The under hammer D, instead of being hung by a flange or parchment joint, at the end opposite the bosses and recess just described, as is usually done, is attached firmly to one arm of an elbow lever E, the fulcrum of which is a supporter K, made fast to a rail M, which is usually called the flange rail. This elbow lever is connected with the supporter K, by a flange joint, the pin or wire of which is *h*, on which it easily turns. The other arm of this elbow lever is attached by a hinge or flange joint to the flange or stem of the hammer F, F. The end of the hammer stem F, F, opposite the hammer is connected with the supporter K by a connector L furnished with flange joints so as to move easily at each extremity. The hammer G is connected with its stem F, F, in the usual manner.

The damper H, I construct by connecting

it with the under hammer D by a wire I and by a wooden rod or any equivalent J, T, by means of a screw or pin *n*, on which it easily turns. This wooden rod J, T, or its equivalent, forms a lever which has a projection that rests on a rail O covered with cloth or on the thick packing *b* which is inserted in a groove in said rail O so as to afford a support to said damper rod; and as the under hammer D falls it carries down with it that extremity of the rod J, T, attached to it by the wire and pin *n*, and raises the other end and carries up the damper wire I and damper H to the string. The head of the damper H may be made and covered in the usual manner, or the wooden part of the damper head may be made in the form of a wedge and covered in the usual manner so as by its stroke to pass between the strings and thus damp the sound.

The rail O covered with cloth or with thick packing inserted into a groove as above described extends the whole length of the piano action, and at its extremities is hung by arms which swing or slide back and forth, one of which is represented by N in Fig. I, and these arms are connected with the pedal movement of the piano in any convenient mode; so that by swinging or sliding down these arms, the rail O is allowed to fall a short distance when the object is to take the damper off the strings in playing, or it may fall a greater distance so as to allow the damper to fall below the wires and sounding board, so that the entire action may be readily removed from the case and replaced without striking or disarranging any of its parts.

The dampers may be constructed in the usual manner if that should be preferred by any one, the damper lever playing on the extremity B of the key A, B, and its wire passing between the strings and damping from above as in common piano fortes.

The key A, B, being raised, the fly arm *c* of the jack C strikes the boss *i* of the under hammer D and raises that extremity of it which it touches. The other extremity of the under hammer D being connected with one arm of the elbow lever as before described, by its motions causes that lever to turn on its fulcrum *h* and while it depresses the extremity to which the under hammer D is attached as above described, at the same time it forces up the other extremity of the elbow lever E, thus also forcing up the hammer stem F, F', which, on account of its connection L, can only move in that direction, carrying up the hammer, of course, until the hammer strikes the string, at which moment the fly arm *c* of the jack, which has been properly adjusted by means of the adjusting screw *e* and the button *f*, has been by the motion of the wire *g* or the wire *m* with the button *f*, forced off the boss *i* and by

means of the recess *j* the under hammer is allowed to fall a little, which also brings down the hammer G a short distance from the string and holds it in readiness for the repetition stroke as often as needed. The same construction substantially of the action will apply to any of the varieties of piano fortes with such modifications as the size or form of the instrument may require without the addition of any new principle.

Having thus described my invention and improvements in the action of piano fortes, what I claim as new and my invention and desire to secure by Letters Patent is as follows, to wit:

1. I claim the arrangement of the adjusting screw *e* and button *f* in such a manner that instead of acting against the fixed arm *z* of the common jack, it is brought to act on a wire or rod or button placed in the same manner with the wire *g* or *m* with its button as represented in Fig. I, or in any manner which is equivalent, so that as the under hammer is raised this wire or rod by itself or by means of its button moving in connection with the under hammer assists, by pressing against the button of the adjusting screw, to throw off the fly or movable arm *c* of the jack to the recess *j* of the under hammer at the moment the hammer reaches the string, thus giving a free hopping motion to the hammer within diminishing the force of its blow against the string; and as the tendency of the spring *d* is at all times to bring back the button *f* against the wire *g* or button *f* (whichever is used) the extremity of the fly *c* and the under hammer are kept in contact so that the loose and uncertain movement which in trilling is often experienced in common piano fortes is avoided.

2. I claim the combination of levers, connectors and supporters by means of which the motion is communicated from the under hammer to the hammer substantially in the manner represented in the accompanying drawings, or in any equivalent manner, by which I am enabled to dispense with the hammer-rails and back-catches of common piano forte actions.

3. I claim the use of the movable connector L with its flange joint substantially in the manner represented in the accompanying drawing or in any equivalent manner for connecting the hammer stem F, F', with the supporter K which shall allow the hammer stem as it is moved to be carried backward and upward (or in equivalent directions,) at the same time, so that the whole course of the hammer stroke shall be nearly at right angles to the string instead of forming an arc of a circle and producing what is called the drawing movement of common piano fortes.

4. I claim the connection of the damper

through the under hammer and the hammer
with the opposite arms of a lever turning
on a fixed fulcrum so as to give an oppo-
site motion to each, that is, to throw up the
3 damper while the hammer falls, and vice
versa, thus enabling me, by the forces which
act at the different extremities of this lever
to put the hammer and damper in equipoise
with each other, or otherwise at pleasure,
10 without affecting the key, so that the touch
of the key may be made as delicate as de-
sired.

5. I claim the arrangement of the damper

and the wire or rod and the lever connecting
it with the under hammer substantially in 15
the manner described in the accompanying
drawings, or in any equivalent manner, so as
to dispense with all sockets for the damper
wires or lifters to pass through, and also
with the damper levers, damper covers and 20
damper buttons of common piano fortes.

ELON ALONZO LEE.

Attest:

ISAAC AMES,
LYMAN MABON.