(Model.)

3 Sheets—Sheet 1.

A. FELLDIN.

Upright Piano Forte.

No. 232,346.

Patented Sept. 21, 1880.

Fig. 1

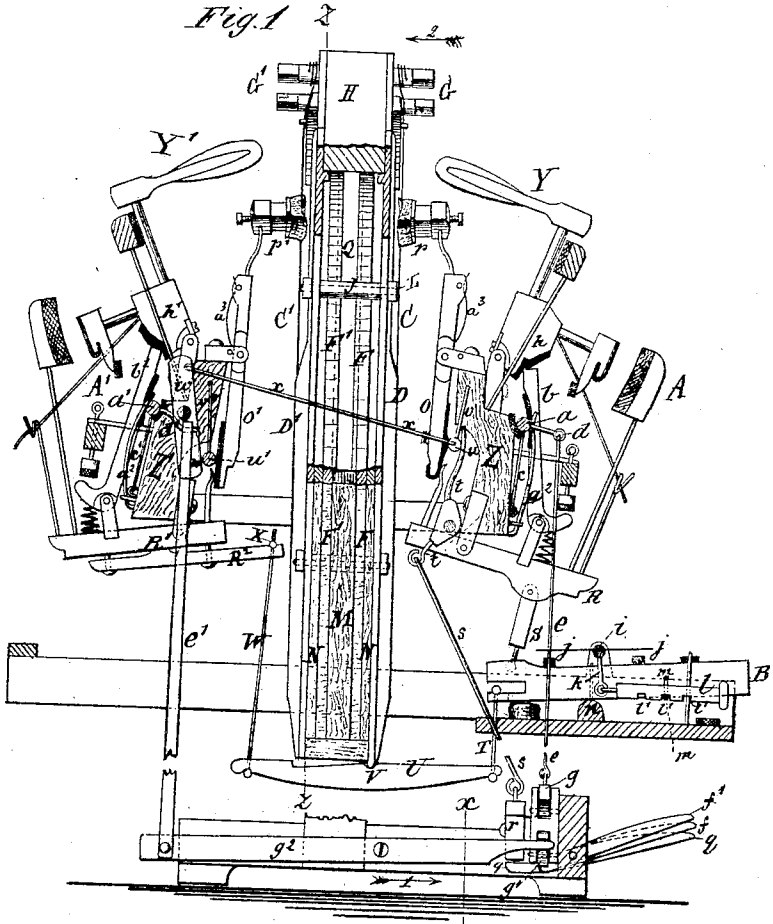


Fig. 2

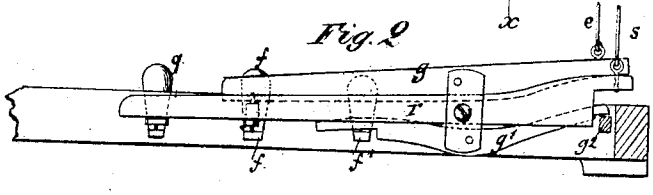
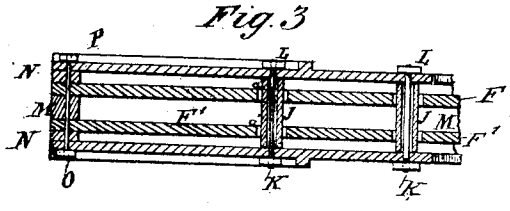


Fig. 3



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(Model.)

3 Sheets--Sheet 2.

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Fig. 5

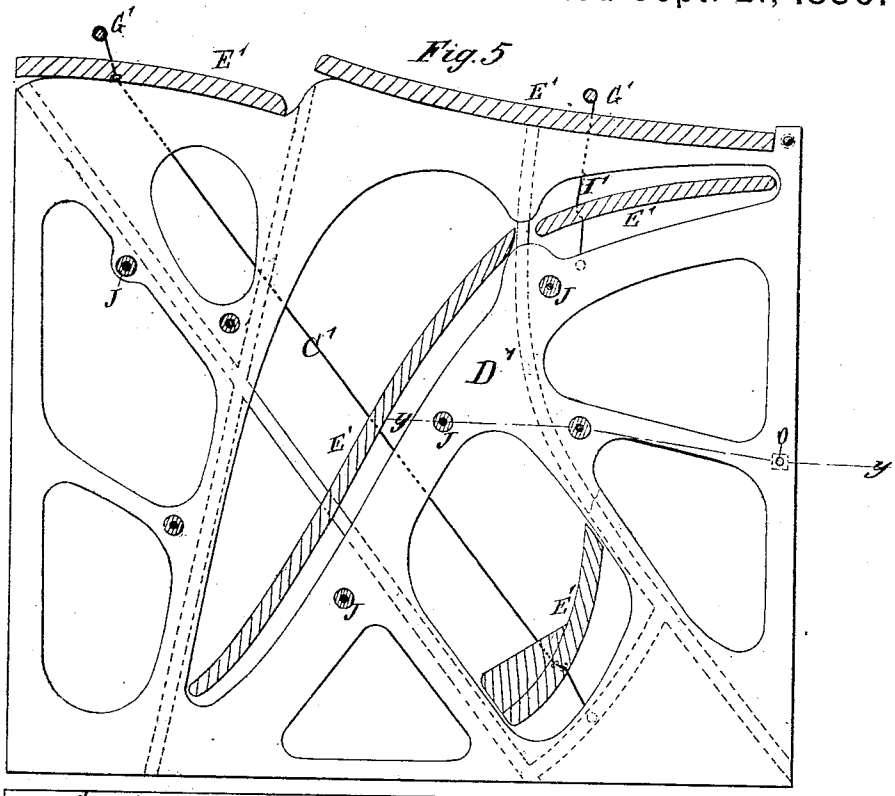
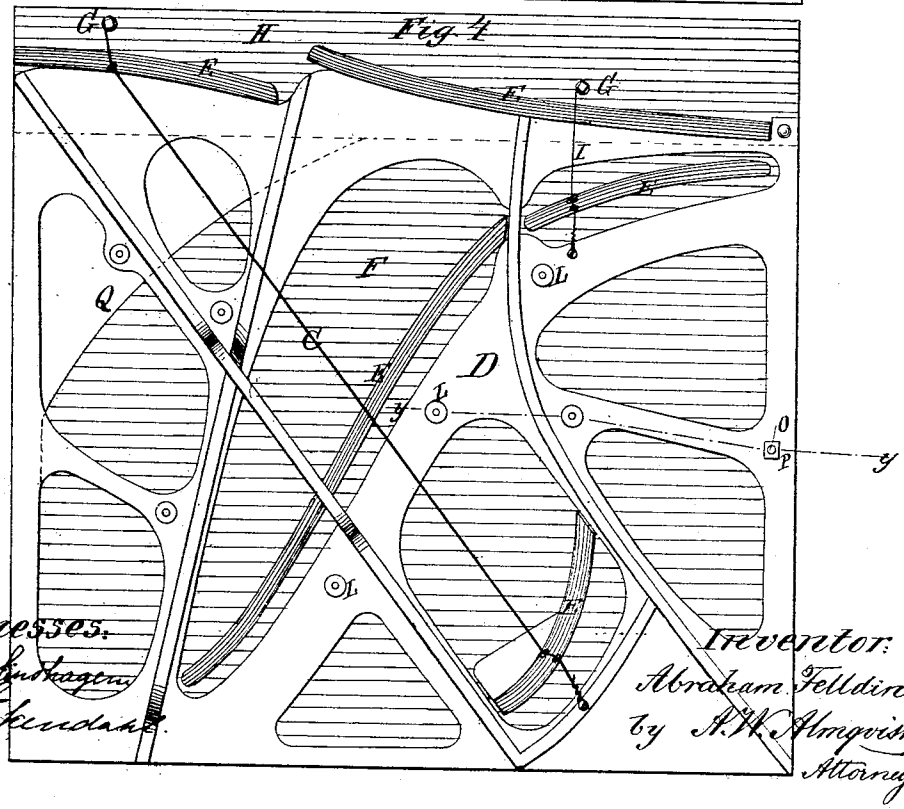


Fig. 4



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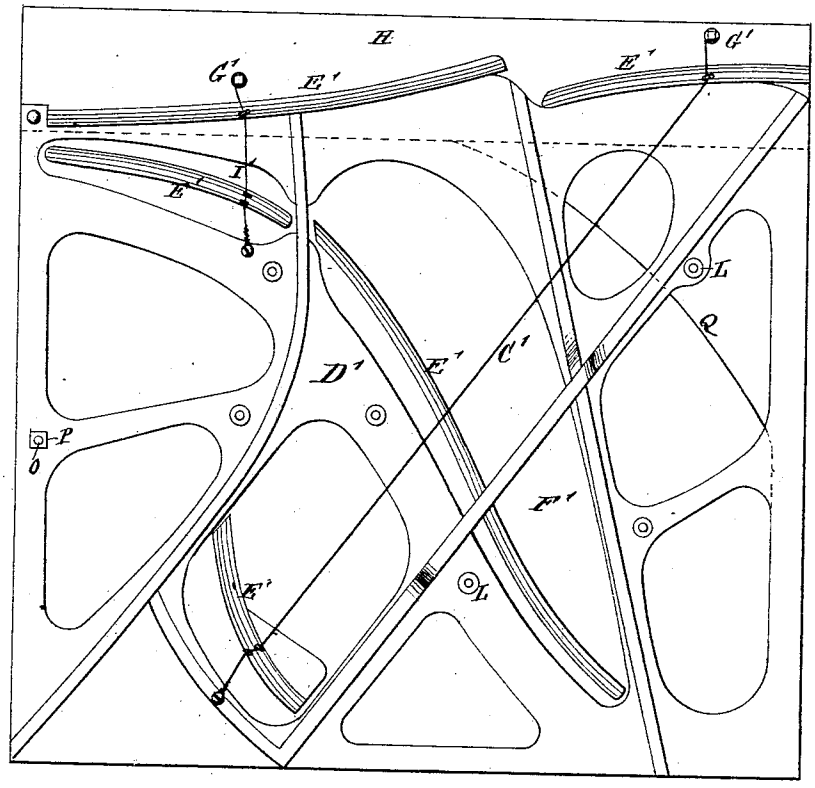
3 Sheets--Sheet 3.

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Fig. 6



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UNITED STATES PATENT OFFICE.

ABRAHAM FELLDIN, OF BROOKLYN, NEW YORK.

UPRIGHT PIANO-FORTE.

SPECIFICATION forming part of Letters Patent No. 232,346, dated September 21, 1880.

Application filed March 9, 1880. (Model.)

To all whom it may concern:

Be it known that I, ABRAHAM FELLDIN, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Upright Piano-Fortes, of which the following is a specification.

My invention relates to improvements in that class of upright piano-fortes in which the downward movement of each key operates two hammers, each striking corresponding strings arranged on opposite sides of a sounding-board; and my invention further relates to the improved means of regulating the touch of the keys; and it consists in the construction and combination of the various parts of the mechanism, as will be hereinafter described and claimed.

In the accompanying drawings, on Sheet 1, Figure 1 represents a sectional end elevation of an upright piano constructed according to my present invention. Fig. 2 is a detail view of the pedal mechanism for raising the dampers and throwing either action out of operation, the detail being shown as when seen from the section-line *x x* of Fig. 1 in the direction of the arrow 1. Fig. 3 is a detail horizontal section, showing the manner of constructing and connecting together the sounding-boards and the metal plates of the two actions, the section being of the size and appearance as if taken on the broken line *y y* of Figs. 4 and 5, though reversed in position, it having been drawn from the rear of the piano. Sheet 2 represents, in Fig. 4, a front view of the metal plate, scale, and sounding-board nearest to the player and above it; in Fig. 5, the rear or reverse plate and scale as they would appear if detached from the frame by a section through the line *z z* of Fig. 1, and seen in direction of arrow 2. Fig. 6, Sheet 3, represents a face view of the reverse plate and scale.

Similar letters of reference indicate corresponding parts.

The key-board, the actions for sounding the strings, the front metal plate, and front scale are similar to those of an ordinary upright piano. In Fig. 1 the front action, A, for sounding one of the bass strings C of the front scale, and the rear action, A′, for sounding the same note C′ on the reverse scale, are shown connected together to be operated simultaneously by depressing the corresponding key B of the key-board.

D is the perforated front metal plate for bracing the structure against the tension of the strings when the latter are stretched across the bridges E over the sounding-board F by the tuning-pins G in the tuning-block H in the usual way.

The scale is made ascending from left to right, as usual, C indicating one of the lower strings or notes in the bass, and I one of the higher strings or notes in the treble.

D′ is the rear metal plate, constructed in every respect similar to the plate D, except that it is reversed, so that the scale is made ascending from the right to the left, as seen in Fig. 6, the string C′, of the same pitch as C, being at the right of the plate D′, and the string I′, of the same pitch as I, in the treble, being at the left of the plate D′, and the bridges E′, sounding-board F′, and tuning-pins G′ being arranged accordingly.

It is evident that were the scale on the string-board of an ordinary piano thus reversed it would be impracticable to properly connect the strings with their respective keys, as a note at the extreme left would have to be sounded by depressing a key at the extreme right; but by reversing the plate D′ from its position in Fig. 6 to that in Fig. 5, and then placing it behind the plate D in Fig. 4, it would be exactly covered by the latter, and all notes of the same pitch on the two string-boards would be placed in exact juxtaposition to each other.

The plates are arranged as just stated, and connected together at the suitable distance apart to inclose between them the sounding-boards by metallic tubes J and bolts K, which latter go through said tubes and plates and are provided outside of the plates with tightening-nuts L, for rigidly securing the plates together by keeping them firmly pressed against the ends of the said tubes J.

The sounding-boards F F′ (of the same width as the plates D D′) are united along their edges by interposed boards or strips of wood M, whereby is formed of the two one double sounding-board or sounding-box. This is secured between the plates in a central position (strips of wood N being interposed along the edges between the plates and the sounding-box to

keep them from contact with each other) by bolts O, as seen in Fig. 3, and nuts P.

Where the tubes J go through the sounding-boards holes *a'* are made in the said boards sufficiently larger than the tubes to prevent contact with the latter.

To facilitate the necessary propagation of sound and allow of free vibration unimpeded by a cushion of inclosed air, the edge of the sounding-box is rounded off and left open at Q, as seen in Figs. 1, 4, and 6.

Between the upper edges of the plates D D' is clamped the tuning-block H.

The combined immense tension of the strings which in ordinary pianos is tending to bend and warp the plate D is here counteracted and exactly equalized by the combined tension of the strings tending to bend the plate D' in opposite direction, and the bending is absolutely prevented by the tubes and bolts J K. The plates therefore may be made much lighter than heretofore, and the strings will keep in tune very much longer.

The key B is connected to the fly-butt R of the action A by the small rod S, the lower end of which is simply resting in a socket on the inner end of the key B. This latter is slotted horizontally, and the wood below this slot is slotted vertically to receive a small T-shaped rod, T, the horizontal arm or cross-head of which is then supported upon the bottom of the horizontal slot in the end of the key, as shown in Fig. 1.

The lower end of the rod T is pivoted to one end of a lever, U, fulcrumed at V to the structure, and to the other end of the lever U is pivoted the lower end of a rod, W, the upper end of which is inserted in the slotted end of an extension, R^2, to the fly-butt R' of the action A', and is supported (and thus pivoted) to the said extension by a cross-head, X, having a threaded hole in it, so that the cross-head may be screwed up or down upon the threaded upper end of the rod W to adjust the distance between its pivoting-points, and thereby to regulate the impact of the hammer Y' to occur simultaneously with that of the hammer Y. By these or substantially similar connections any two opposite strings, C C', of the front and reverse scales may be struck at the same time by depressing one key, B, thus producing together the same power of sound as if two ordinary pianos were played upon at the same time.

When it is desired to produce the effect of a single piano only, or if a string or other part be broken, either action A or A' may be thrown out of operation, and the other alone used by the following or a substantially similar mechanism. Rods *a a'* are arranged along the entire actions A A', one on either side, between the fly-jacks *b b'* and the respective rails Z Z' of the actions, and are hinged at both ends by downward-projecting arms *c c'* to the said rails, and provided with lateral arms *d d'*, connected by rods *e e'* to the levers, operated by depressing the pedals *f f'*, the rod *e* being attached directly to the lever *g*, which is pressed by the pedal *f*, and the rod *e'* being connected indirectly to the lever *g'*, (which is pressed by the pedal *f'*,) by means of the intermediate lever, g^2, which latter transmits the motion of the pedal *f'* from the front to the rear side of the piano.

The pedal-levers are ordinary levers of the first class, and their arrangement and operation, as well as of the rods connected with them, are easily understood with reference to Figs. 1 and 2, where they are plainly shown. When the pedal *f* alone is depressed the rod *a* will be swung out a little toward the player, thereby throwing all the fly-jacks *b* of the action A out of contact with the butts *h* of the hammers Y, so that the latter in playing will not be raised by the fly-jacks *b* to strike the strings, and thus only the rear action, A', will be operative.

When the pedal *f'* alone is depressed the rod *a'* will likewise be swung back to throw all the fly-jacks *b'* of the action A' out of contact with the butts *h'* of the hammers Y, thus leaving only the front action, A, operative. The rods *a a'* are held in position when at rest by springs a^2.

In order to maintain as near as practicable the same touch on the key-board whether one or both actions are in operation, I have thus arranged the rods *a a'* to act on the fly-jacks, as thereby the resistance to the touch will be lessened only by that caused by the final impact of the hammers on the side where the flies are off, all the other parts moving together as when both actions are in operation; otherwise the whole action A may be thrown out of operation and kept at rest by a simple rod and levers connected to raise all the little rods S out of their sockets in the keys B, and the whole action A' may be similarly disconnected by detaching the rods T from the key B. In order, however, to regulate the touch to a nicety, I have pivoted just above the keys, at both ends of the key-board, a rod, *i*, to which I attach, over each key, a small spring, *j*, projecting horizontally at both sides of the rod *i*; and to the ends of the rod *i*, I attach, at an angle to the springs, an arm, *k*, and connect the latter to a pull, *l*, having notches *l'*, to engage with a stop, *m*, in such a manner that the spring *j* will be brought to press upon the inner end of the key at the rear of its fulcrum *n* to make the touch heavier, when the pull *l* is drawn out to bring an inner notch, *l'*, in contact with the stop *m*, and when the pull is pushed in to bring an outer notch in contact with the stop the spring *j* will press on the key outside of its fulcrum *n* to make the touch lighter.

To produce "fortissimo" the levers *o o'* of the dampers *p p'* of both actions are so connected that all the dampers may be raised from the strings simultaneously by depressing the forte-pedal *q*, which is, as usual, connected,

by the lever *r*, rod *s*, and lever *t*, with the damper-rod *u*, hinged by arms *v* at the ends of the action-rail Z, in contact with the damper-lever *o*. For this purpose a lever, *w*, is pivoted at either end of the rail Z′ of the action A′ and connected at its upper end by a rod, *x*, to the damper-rod *u* of the action A, while the lower end of the lever *w* is in contact with the damper-rod *w*′, hinged by arms *v*′ at the ends of the rail Z′ of the action A′. Consequently, when, by depressing the forte-pedal *q*, the lever *t* actuates the damper-rod *u*, the lever *w* will at the same time actuate the damper-rod *u*′, and all dampers *p p*′ of both actions be raised from the strings simultaneously.

If, after operating the forte-pedal *q* when playing with heavy touch with both actions connected, one of the pedals *f f*′ be suddenly depressed to disconnect one action and a lighter touch applied to the keys, it is evident also that a much greater contrast will be produced between fortissimo and pianissimo than in pianos as heretofore constructed.

I am aware that movable blocks with springs attached to their upper faces have heretofore been arranged below the keys of a piano to lessen their tension, and I therefore lay no claim to such construction.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In an upright piano, the combination of the metallic plates D D′, sounding-boards F F′, having apertures through which the bolts K pass without touching, and the two scales of strings C C′, arranged on opposite sides of the metallic plates, substantially as described, and for the purpose set forth.

2. In an upright piano, the combination of the single tuning-board H, provided with pins G G′, metallic plates D D′, bridges E E′, sounding-boards F F′, provided with an air-opening, Q, and holes *a*, larger than the diameters of the connecting-tubes, and connecting-tubes J, substantially as described, and for the purpose set forth.

3. In an upright piano, the combination, with the metallic plates D D′, sounding-boards F F′, having apertures through which the bolts K pass without touching, and the two scales of strings C C′, arranged on opposite sides of the metallic plates, of the two actions A A′, arranged to face each other, and connected to the same key B, substantially as described, and for the purpose set forth.

4. The combination, with two scales of strings arranged on opposite sides of a frame, substantially as described, of the key B, fly-butts R R′, fly-jacks *b b*′, butts *h h*′, hammers Y Y′, rods S T, lever U, and rod W, substantially as described, and for the purpose set forth.

5. The combination, with the key B, rod T, and lever U, of the adjustable rod W, screw-threaded at its upper end, slotted extension R^2, cross-head X, fly-butt R′, fly-jack *b*′, butt *h*′, and hammer Y′, substantially as described, and for the purpose set forth.

6. The combination, with the pivoted rods *a a*′, arranged along the entire actions A A′, and provided with lateral arms *d d*′, of the fly-jacks *b b*′, butts *h h*′, hammers Y Y′, spring *a*′, rods *e e*′, levers *g g*′ g^2, and pedals *f f*′, substantially as described, and for the purpose set forth.

7. The combination, with two scales of strings arranged on opposite sides of a frame, substantially as described, of the levers *o o*′, carrying the dampers *p p*′ of both actions, springs a^3, damper-rods *w w*′, hinged by arms *v*′ *v*′ to the rails Z Z′, lever *w*, connected at its end by a rod, *x*, to the damper-rod *w*, lever *t*, rod *s*, and forte-pedal *q*, substantially as described, and for the purpose set forth.

8. The combination, with a piano-key having its fulcrum between its ends, of suitable mechanism adapted to press a spring-arm on either side of the fulcrum of the key or to raise the spring above the key, as desired, substantially as described, and for the purpose set forth.

9. The combination, with a piano-key having its fulcrum between its ends, of the rock-shaft *i*, carrying the spring-arm *j*, and suitable mechanism whereby the spring-arm may be made to press against either side of the fulcrum of the key, substantially as described, and for the purpose set forth.

10. The rod *i*, provided with the spring *j* and arm *k*, in combination with the notched pull *l*, stop *m*, and the key B, to regulate the touch of the latter, substantially as specified.

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