2 Sheets. Sheet 1.

F. Pistonius,

Piano Action.

No. 43,524. Patented July 12, 1864.

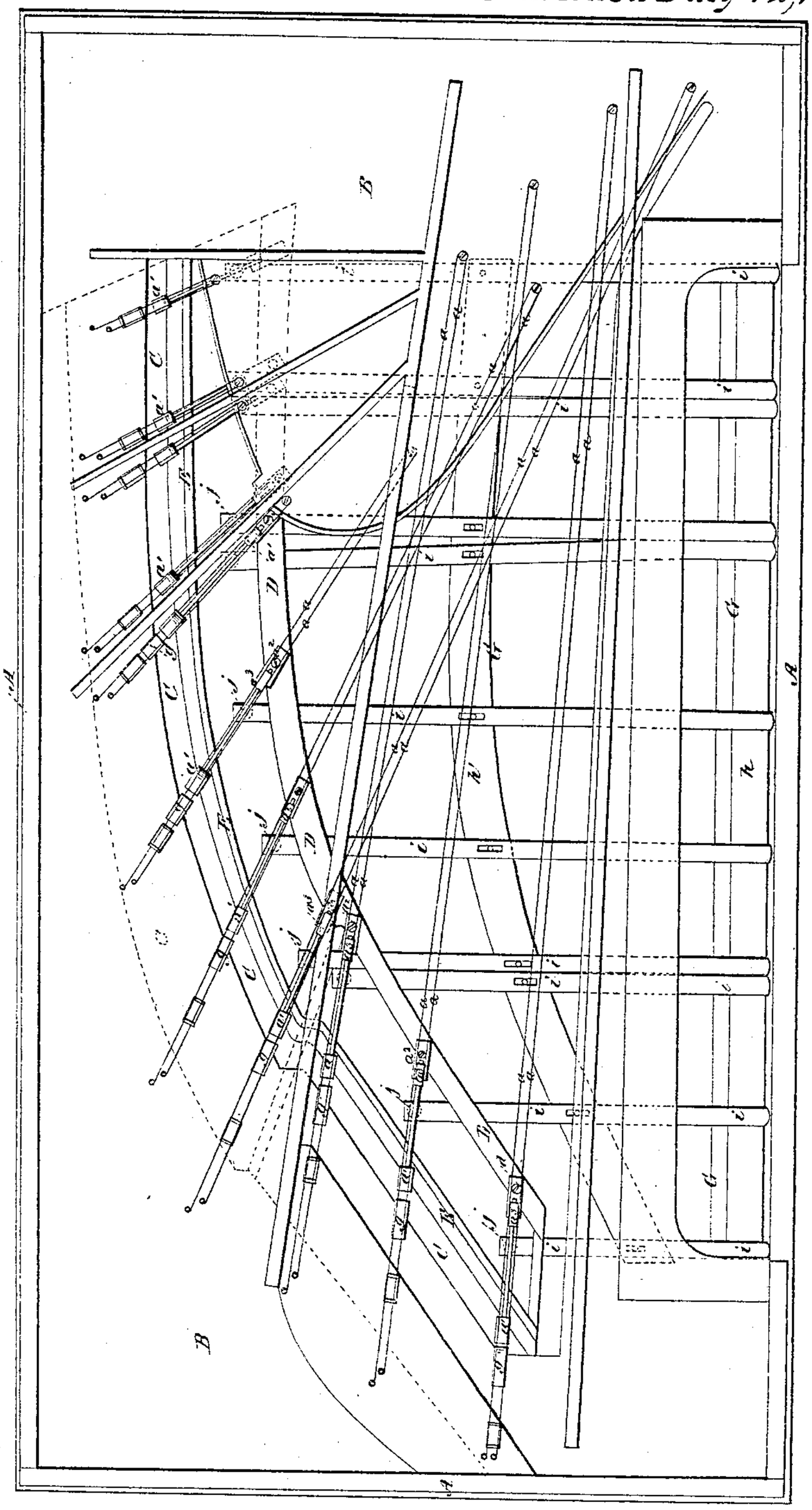

Fig. 1.

Witnesses.

R. F. Campbell
E. Schaefer.

Inventor.

F. Pistonius
by his Attys.
Marsh Fenwick & Lawrence.

2 Sheets-Sheet 2.

F. Pistorius,

Piano Action.

No. 43,524. Patented July 12, 1864.

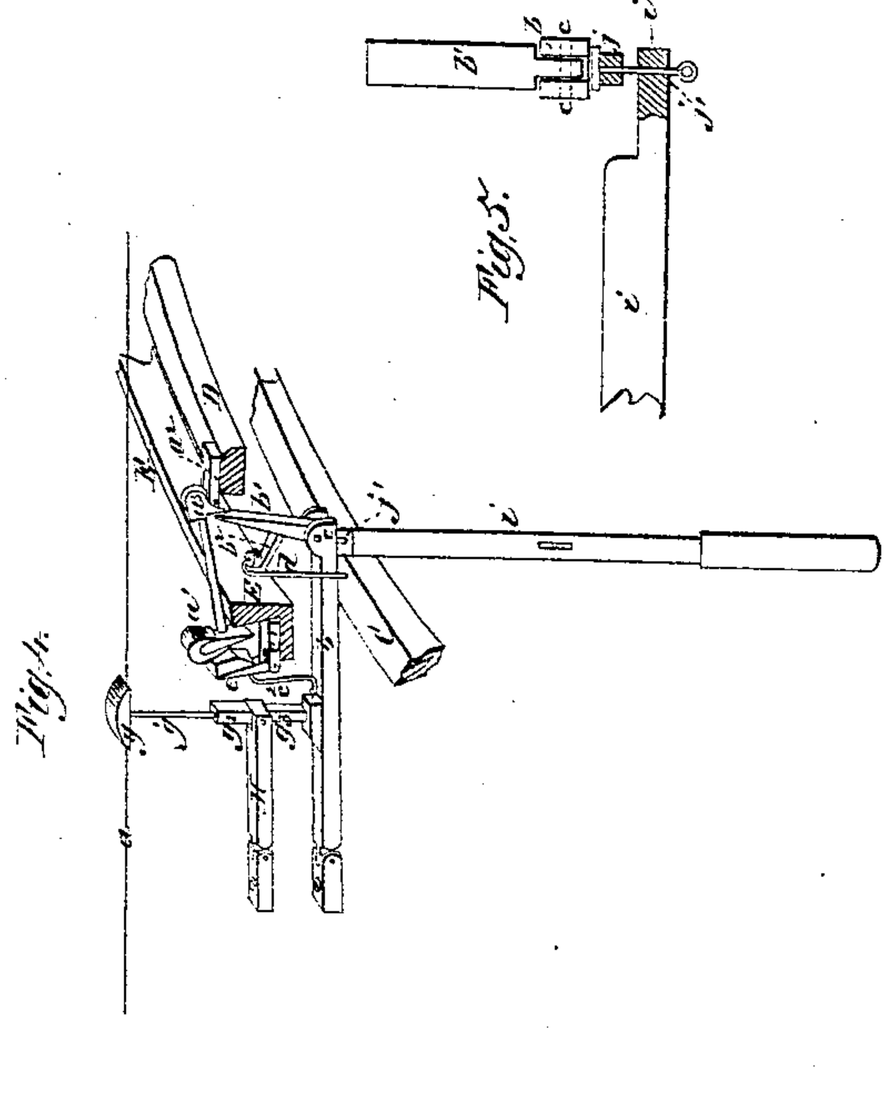

Fig. 1.

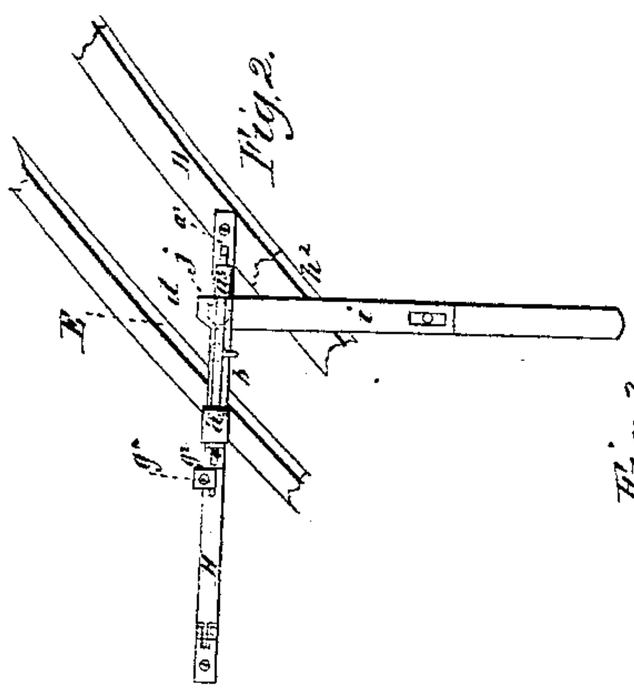

Fig. 2.

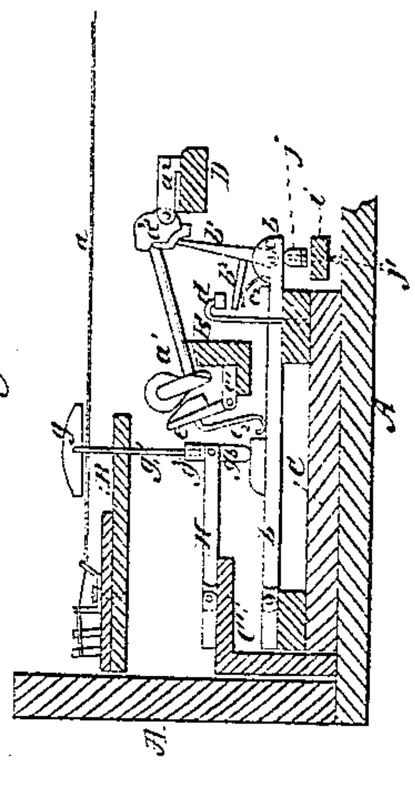

Fig. 3.

Witnesses.
R. A. Campbell.
O. Schofield.

Inventor.
F. Pistorius
by his attys
Mann Janvick & Lawrence

UNITED STATES PATENT OFFICE.

FREDERICK PISTORIUS, OF CHICAGO, ILLINOIS.

PIANO-FORTE ACTION.

Specification forming pa t of Letters Patent No. **43,524**, dated July 12, 1864.

To all whom it may concern:

Be it known that I, FREDERICK PISTORIUS, of Chicago, Cook county, State of Illinois, have invented a new and useful Piano-Forte Action; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accom panying drawings, making a part of this specification, in which—

Figure 1 is a plan view of a "grand square" piano-forte, in which my improved arrangement of hammers and strings is shown. Fig. 2, Sheet 2, is a plan view of the action, having its damper removed. Fig. 3, Sheet 2, is a vertical elevation of my invention, seen by making a cross-section through the case, frame of the action, and string-plate. Fig. 4, Sheet 2, is a perspective view of Figs. 2 and 3, showing the full key and counter-key applied. Fig. 5, Sheet 2, is a view in detail showing the application of my adjustable cushion to a key.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to a new and improved application of double or grand actions to square pianos, and has for its object the arrangement of the hammers in planes parallel to their respective strings, so that each hammer will strike its strings in a more natural and desirable manner and produce a tone of greater volume and melody than can be produced by the grand or square pianos hitherto constructed.

By my invention I obtain more space for the movements of the hammers in a given area, and avoid the necessity of chamfering or cutting away the sides of the hammer-felt in order to allow the hammers freedom to strike the strings. I am also enabled by my invention to apply the dampers more directly to the strings, and to remove or apply the keys without interfering in any manner with the hammers or the devices applied to operate them—all of which will be hereinafter described.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

Before describing my invention I will state that I do not confine its application to any particular form or construction of string-plate, sounding board or boards, or pedal-movements, as these parts may be made in the usual or any desired manner suitable for square pianos. Nor do I confine myself to any definite arrangement or number of strings of a square piano. It will not, therefore, be necessary for me to particularize any of these parts in the description of my invention.

In the plan view, Fig. 1, A represents the quadrangular case of a "square" piano-forte. B is the string-plate, constructed with strengthening ribs and bars to resist the tension on the strings, and arranged over the piano-movements in the usual manner to receive the strings *a a*, as shown in Fig. 1. Beneath the string-plate B is a curved framework, C, adapted to receive the damper and hammer movements, which are constructed and arranged as follows: D represents the hammer rail, and E the back rail or rest for the hammers a'. These rails are curved in accordance with the arrangement of the scale, and secured to the frame C in any suitable manner. The blocks a^2, to which the hammers a' are pivoted, are secured on top of the rail D, as shown in Fig. 1, so that the hammers will all lie directly under and in planes parallel to their respective strings, as will be hereinafter described. Beneath each one of the hammers a', and lying in planes parallel with the same, are short levers or counter-keys *b*, which are pivoted at their rear ends to the frame C, as clearly shown in Fig. 3, and receive at their forward projecting ends the jacks b', which are pivoted between two ears, *c c*, formed on each counter-key, as shown in Figs. 3, 4, and 5. These jacks b' act upon the notched hammer-butts a^3 in such manner as to give the proper movements to the hammers when the forward ends of their respective counter-keys are quickly raised. Each jack has a short arm, b^2, projecting from it, which is acted upon by a light spring, c^2, Fig. 3, for keeping it in its proper position to act upon the shoulder formed on the hammer-butt, and over each one of these arms b^2 is an escapement, *d*, which consists of a little soft cushion attached to the overhanging end of a short rod projecting up alongside of the counter-key *b* and screwed into the frame C, so that it can be readily adjusted for bringing the jack into quicker or slower action, as circumstances may require. After the hammer is liberated from the jack it falls upon the covered rail E, Figs. 3 and 4, and is prevented

from rebounding against the string by the check *e*, which is pivoted to the rabbeted portion of the rail E, or to a block, *e'*, screwed to this rail. This check is covered with felt, so as to form a soft cushion for receiving the hammer *a'*, and it is actuated by a curved tail, e^2, which bears at its lower end upon the counter-key *b*, Figs. 3 and 4. In rear of this hammer-action is the damper-action, which consists of a damper-pad, *g*, secured to the adjustable rod *g'*, which is screwed into the upper end of a pivoted block, g^2. This block g^2 is pivoted to the projecting end of a pivoted arm, H, which is arranged directly over and in a plane parallel to the counter-key *b* and attached to the overhanging portion C' of the frame C, as clearly shown in Fig. 3. Beneath the pivoted block g^2 is a toe-piece, g^3, resting upon the counter-key *b*, or upon a cushion affixed thereon, as shown in Figs. 3 and 4. The damper rod is passed up through a perforation in the string-plate B, and thus kept in a perpendicular position to the strings, though operated by a vibrating "crank" or lever-arm, H. This action, above described, is supported upon a frame, which is independent of the frame-work (which receives the keys) or key-board G, which is a removable frame so constructed that it can be taken out of the piano, with the keys upon it, without interfering in the least with the action. This key-board consists, mainly, of three rails or bars, *h h' h²*, properly covered with cloth to deaden the sound, and provided with pins for receiving and keeping in place the keys *i i*. The intermediate rail, *h'*, is the highest, and allows the extremities of the keys to rise and fall, in playing, in the usual manner. The inner ends of the keys are furnished with adjustable pads, one of which I have shown enlarged in Fig. 5. These pads *j* are secured to adjustable screw-stems *j'*, which are tapped through the reduced ends of the keys, and when the keys are arranged in their proper places the pads are brought under the projecting ends of their respective counter-keys in such position that when the playing ends of the keys are struck the pads will throw up the counter-keys and cause the hammers to strike the strings, after which the parts will return to their original position by their own gravity. Thus it will be seen that any one of the keys can be removed at pleasure without disturbing the action, as these keys, by my arrangement of the action upon an independent frame, are only indirectly connected with any action or hammer-movement.

By the above arrangement the hammers, counter-keys and pedal-movements are all arranged parallel to and in vertical planes with their respective strings, so that each hammer will strike its strings squarely and produce a vertical vibration thereof, in contradistinction to oblique mixed vibrations, produced by striking the strings with hammers moving in the arc of a circle out of a vertical plane parallel to their strings. By supporting and arranging the hammer-actions upon an independent frame, instead of on the keys, and applying the keys indirectly to said movements, I am enabled to adjust the hammers to suit the positions of the strings, instead of adjusting the strings to adapt them to the arrangement of the hammers, and chamfering the sides of the hammer-felt to allow room for the hammers to strike the strings. I avoid the necessity of cutting away the sides of the hammer felt or head, and leave the sides of the heads of all the hammers parallel to their rods, and also to their respective strings throughout the whole scale, and at the same time obtain all the space required for the hammers to move through in their action upon the strings.

In all square-piano-forte actions hitherto constructed the hammer-rods are arranged obliquely to the strings, and consequently in rising in the arc of a circle the strings are struck so as to produce a lateral or oblique vibration, and that string which is nearest the hammer will be struck the hardest. The result of these vibrations is a more or less mixed tone, accompanied by a more or less rattling sound, which is occasioned by the strings transmitting their vibrations improperly to the sound-board; but where the surfaces of the hammers are parallel to the plane of all the strings, and these hammers rise and fall in vertical planes parallel to the length of their respective strings, every string of each hammer will be struck with the same force and at the same time, and the strings will vibrate in vertical planes coinciding with the direction of the blow of the hammers.

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

1. Adapting the action of a square or square grand piano-forte, by means substantially as described, to operate with the hammer or hammers squarely and simultaneously upon the strings and produce a vertical, uniform, and simultaneous vibration thereof, and while this is the result the hammer-action may be at different angles to the keys and upon bearings independent thereof, substantially as set forth.

2. So adapting the action of a square piano-forte and the support thereof that the keys *i* may be applied indirectly to the action in such manner that the entire key-board or any one or more of the keys may be readily removed and replaced at pleasure without disturbing the action, or the action removed without disturbing the keys, substantially in the manner described.

3. Adapting the hammer or the damper movements to operate in conjunction with counter-keys *b* and independent removable keys *i*, substantially as described.

4. The adaptation of counter-keys *b*, independent removable keys *i*, and independent frame C for application to a square piano, in the manner substantially as described, and for the purpose set forth.

5. The horizontal and independent action-

supporting frame C, when constructed so as to be adapted for use with a square piano, in combination with the removable key-board G, substantially as and for the purpose set forth.

6. The arrangement of the hammers *a'* in such relation to an independent action and the strings of a square piano-forte that said hammers operate squarely and simultaneously upon the strings and produce a vertical and simultaneous vibration of all the strings of each hammer that is acted upon, substantially as described.

7. The arrangement of the adjustable pads *j* with the independent action, for the purpose of regulating the amount of movement of the jacks upon the hammer-butts, in the manner described.

8. Arranging the damper crank or lever H upon frame C', directly over and parallel to the counter-key *b*, substantially as described.

9. Applying the hammer-check *e* to the hammer-ruler or back rail, E, and operating said check partly by the counter-key *b* and partly by its own gravity, substantially as described.

10. Adapting the action of a squareor square grand piano-forte to operate when arranged at different angles to the keys and upon bearings independent thereof, substantially in the manner herein described.

FREDERICK PISTORIUS.

Witnesses:

R. T. CAMPBELL,

E. SCHAFER.