(No Model.)

2 Sheets—Sheet 1.

F. IMHORST.

UPRIGHT PIANO FORTE.

No. 348,629. Patented Sept. 7, 1886.

Fig. 1.

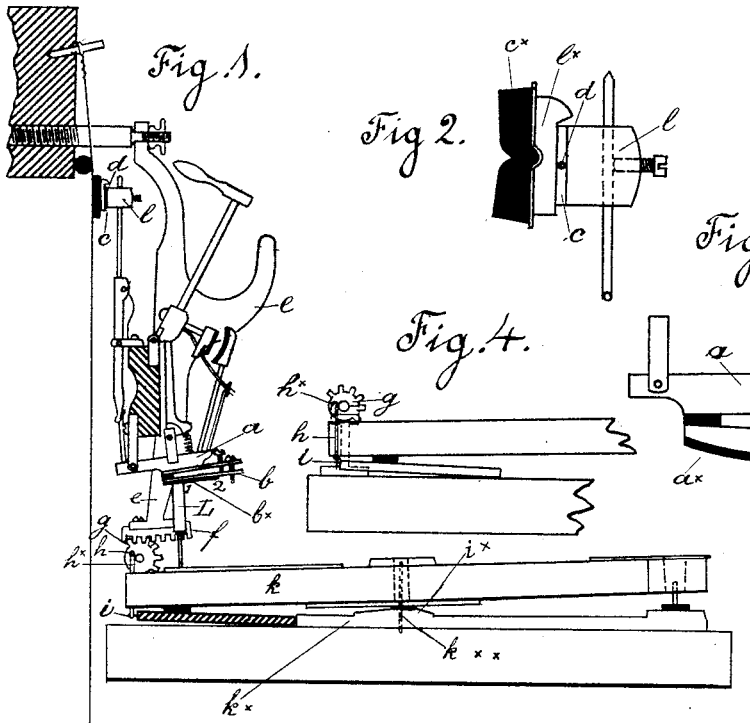


Fig. 2.

Fig. 3.

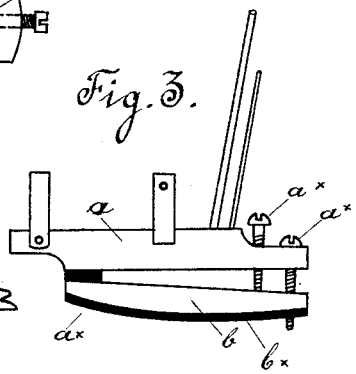
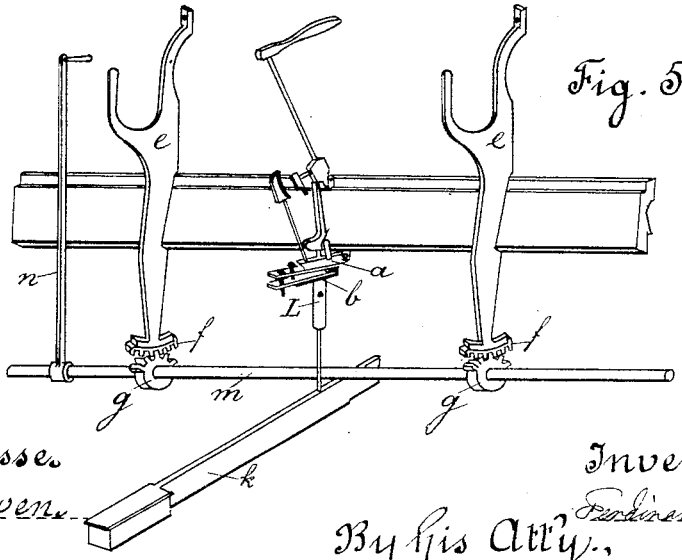


Fig. 4.

Fig. 5.



Witnesses.
S. A. Owen.
Geo. A. Hartford.

Inventor:
Ferdinand Imhorst
By his Atty.,
Alphonso Snider

(No Model.)

2 Sheets—Sheet 2.

F. IMHORST.

UPRIGHT PIANO FORTE.

No. 348,629. Patented Sept. 7, 1886.

Fig. 6.

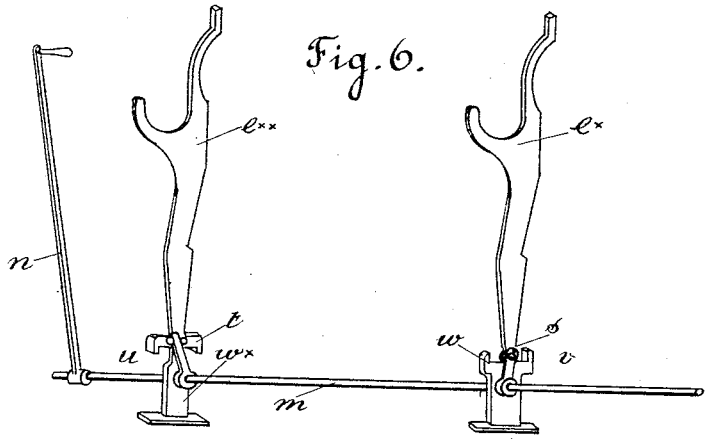


Fig. 7.

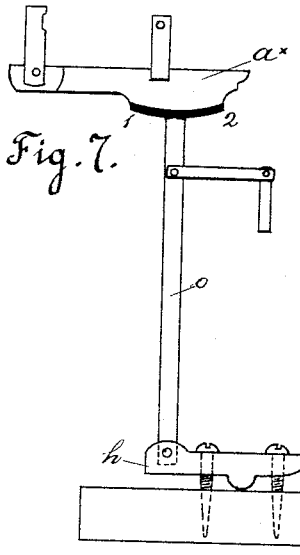


Fig. 8.

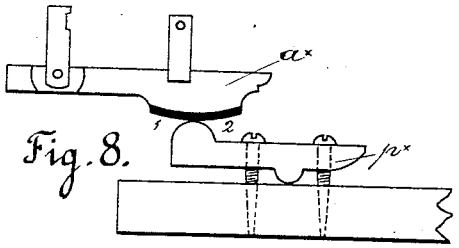


Fig. 9.

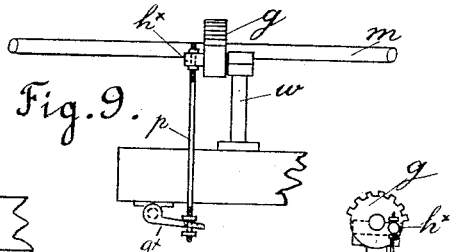


Fig. 10.

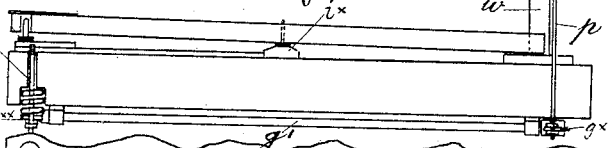
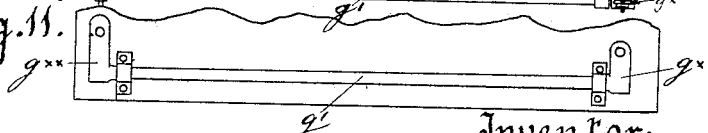


Fig. 11.



Witnesses
S. A. Owen
Geo. A. Hartford

Inventor:
Ferdinand Imhorst
By his Att'y
Alphonso C. Smith

UNITED STATES PATENT OFFICE.

FERDINAND IMHORST, OF SAN FRANCISCO, CALIFORNIA.

UPRIGHT PIANO-FORTE.

SPECIFICATION forming part of Letters Patent No. 348,629, dated September 7, 1886.

Application filed February 19, 1885. Serial No. 156,440. (No model.)

To all whom it may concern:

Be it known that I, FERDINAND IMHORST, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented new and useful Improvements in Upright Pianos, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

My invention relates to an improvement in upright pianos; and it consists in the mechanical arrangements and devices for moving the upper section of the action forward and backward over the upper end of the prolongs, rockers, or props, and also the devices by which the front part of the piano-keys are to be raised and lowered, all for the purpose of obtaining a graduating touch from heavy to light and from light to heavy for the front of the piano-keys.

Figure 1 shows the vertical section of the piano-action, key, key-frame, and devices as applied in an upright piano. Fig. 2 shows a side elevation of the damper. Fig. 3 shows an elevation of the cross-lever and its segment attachment. Fig. 4 shows the lever, sectional cog-wheel, and devices, shown as operating the back rail of the key. Fig. 5 shows a perspective view of the upper brackets, the rod, cog-wheels, or segments thereof, and the lever for operating the mechanism. Fig. 6 is a perspective view of a modification of the upper brackets and devices, also connecting-rod with short levers acting upon the upper brackets, showing also the lower brackets and the long lever as acting upon the connecting-rod and devices. Fig. 7 shows the vertical view of a cross-lever without attachment device, the prolong shown as pivoted to the rocker and being secured to the key. Fig. 8 is a vertical view of the cross-lever and its connection with the rocker. Fig. 9 is an end view of the vertical connecting-rod and its combination with the cog-wheel and key-bottom lever, which is used for lifting either of the rails of the key-frame. Fig. 10 is a vertical elevation of the key, the lower bracket, the section cog-wheel, as shown, connecting one arm of the lever, as placed below the key-bottom, the open arm pressing against a prop or bolt which projects through holes in the key-bottom, thereby raising the rail of the key-frame to the distance as required. Fig. 11 is a plan view of the lever, described as above in Fig. 10.

In Fig. 1, letter *a*, is seen the cross-lever with its sectional attachments or segment *b*, as shown, with its bottom curved or convexed and covered with cloth $b^{\times}$, the bottom of this cross-lever resting upon the top of prop L, secured to key *k* by a screw. *c* is the hanger, to which the wooden rails or metallic frame is secured. The letter *f* are the cogs or teeth as attached to the hanger. These teeth join closely with the teeth of the sectional cog-wheel *g*. Inserted in the cog-wheel is pin *h*, which, being perforated, receives the connecting-rod $h^{\times}$, which connects with and is secured to the back rail, *i*, of key-frame $k^{\times}$ and connecting-rod, which is for the purpose of raising and lowering the back rail and with it the key *k*, thereby increasing or decreasing the distance between the key and the top of the front of the key-frame.

In Fig. 2 letter *l* is the damper-block; letter $l^{\times}$, the damper-head; *d*, the pin, wire, or wooden projection; *e*, the leather, which is glued between the wooden blocks; and $e^{\times}$, the damper-felt.

In Fig. 3 the letter *a* shows the cross-lever, to which is secured the segment *b*. The pitch of the segment is to be regulated by screws $a^{\times}$.

In Fig. 4 the letter *g* shows the cog-wheel with the pin $h^{\times}$, to which is secured, by means of nuts, one end of the connecting-rod *h*, the other end of which is similarly secured to the back rail, *i*, of the key-frame.

In Fig. 5 letter *c* is the hangers having the toothed section *f*. The teeth engage with and are moved by cog-wheels *g*. These cog-wheels are secured to rod *m* at proper distances, so that if the rod is moved by lever *n* a uniform motion is imparted to all the cross-levers. Letter *k* shows the key. Attached to it is prop L, pressing against the bottom of the cross-lever *a*, the attached segment being shown by letter *b*.

In Fig. 6 letter $e^{\times}$ is a hanger with bottom rounded, as at letter *s*, which is resting on bracket *w*, the top of which is notched large enough for the bottom of the hanger to give sufficient play in moving forward and back. Letter $e^{\times\times}$ is a hanger the foot of which is notched, as shown at letter *t*. The lower bracket, *w*, has its top pointed, whereby greater play is given to its foot *t*.

In Fig. 7 h is a rocker, to which is pivoted prolong O, the top of which is shown resting against cross-lever $a^{\times}$. The cross-lever, when moved over the prolong from 1 to 2, will invariably lighten the touch on the front of the piano-key.

In Fig. 8 letter $p^{\times}$ shows a rocker as having a rounded head resting against the cross-lever $a^{\times}$, which, when moved from No. 1 to No. 2, will lighten the touch on the key.

In Fig. 9 the letter g shows the cog-wheel. To the pin $h^{\times}$ is secured the connecting-rod p, the other end of pin $h^{\times}$ being secured to the arm of the cog-wheel g, which is set in motion by rod m. The rod m rests upon brackets w.

In Fig. 10 the letter w shows the bracket, g the cog-wheel, $h^{\times}$ the pin, p the connecting-rod. The lever g' lies under the key-bottom, and has a lever, $g^{\times}$, on one end, as clearly shown in Fig. 11, which engages with the pin p, which latter is connected to the segment-cog g, as shown at $h^{\times}$. On the other end of lever g' is formed or placed a lever, $g^{\times\times}$, which engages with the prop y, as shown, which is connected with the bottom of the rail of the key-frame.

Fig. 11 shows the position of lever g' and the arms $g^{\times}$ and $g^{\times\times}$ connected.

I provide the bottom of the hangers, which can either be secured to wood rails or metallic frame, with a number of cogs or teeth for the purpose of producing a more easy and sure movement. The lower cogs or levers are secured to a rod at suitable distances, resting upon a bracket of suitable shape. These brackets are properly secured to the key-bottom. To the rod is also secured a lever, by means of which the operator can easily move the rod.

My object in providing a vibratory motion to the felt section of the damper is to make its face soft and self-adjusting to the piano-strings when the upper section of the piano-action is moved forward and backward.

My object is to provide the cross-lever with a movable attachment, by means of which the pitch of its lower surface can be regulated to suit the requirements of the action. I accomplish this object by means of an additional bottom piece or section of suitable shape and properly secured to the cross-lever. Its pitch is regulated by screws and set-screws placed in proper positions.

I do not claim, broadly, the means for increasing or decreasing the distance between the upper section or face of the front rail of the key-frame and the bottom of the piano-key; nor do I claim, broadly, a means for bringing the hammers nearer the strings and for regulating the height of the key-levers correspondingly.

In operation it will be seen that when the shaft m is turned in one direction the entire upper moving parts will be carried in the direction of the strings, thereby lessening the stroke of the hammer. In this position when the keys are touched the damper will be withdrawn and the hammer carried forward. When it is desired to increase the stroke of the hammer, the shaft m is turned in the opposite direction. By turning the shaft m the moving parts are carried to and from the strings by the gear g engaging the segments at the lower ends of the hangers e, which moves upward the prop L and its supporting parts.

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

1. The combination, with the key, of the back rail, the sector-cogs, pin connecting the sector-cogs with the said rail, the shaft carrying the sector-cogs, and the lever on the said rod, all arranged to operate with the moving upper section of an upright-piano action, substantially as specified.

2. The combination, with the hangers having the segment at lower ends, of the sector-cogs, shaft supporting the same, the lever n, the prop, cross-lever, and segment b, all adapted to operate in an upright piano, substantially as specified.

3. The combination, with the movable upper section of an upright-piano action, of the key-bar, the horizontal shaft and sector-cogs thereon, and the hangers provided with lower segment-racks, substantially as specified.

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Witnesses:

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GEO. A. HARTFORD.