(No Model.)

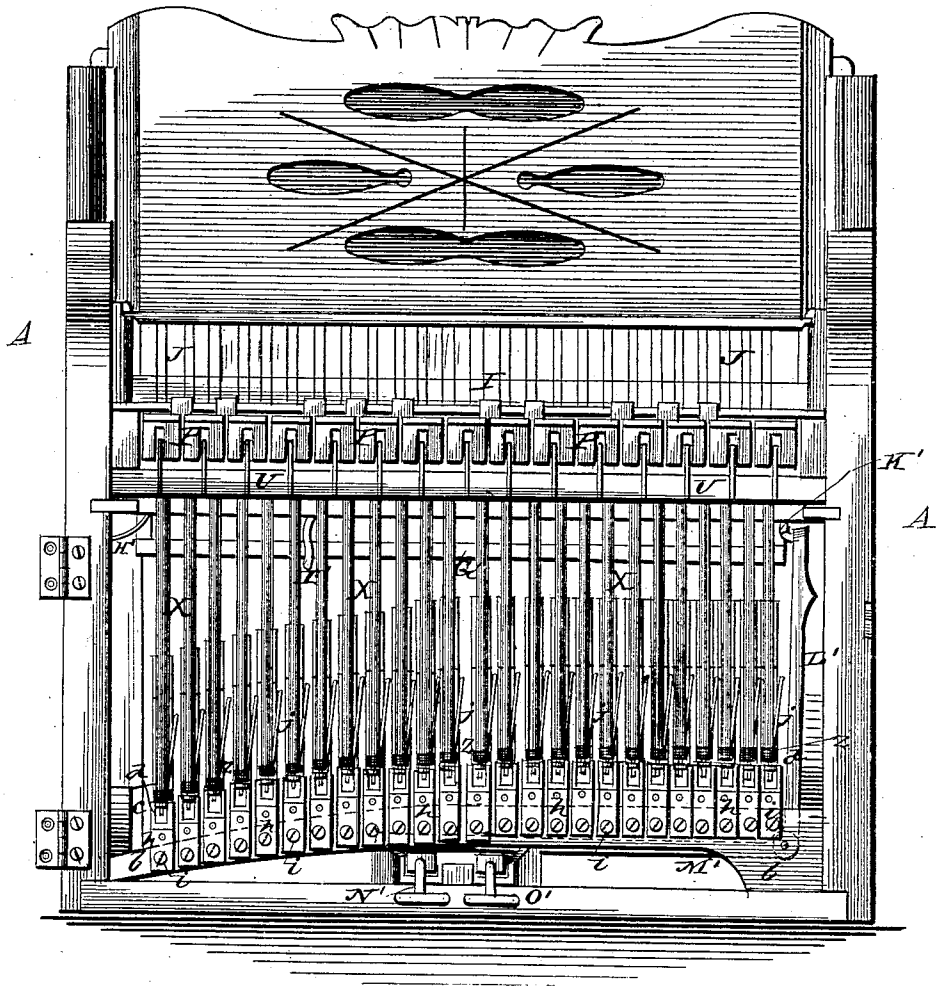
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J. DOYLE.

PIANO FORTE.

No. 293,855. Patented Feb. 19, 1884.

Fig. 1.



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(No Model.)

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PIANO FORTE.

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Fig. 1.

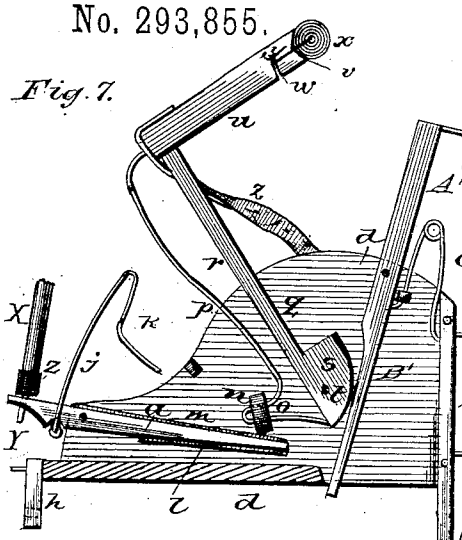
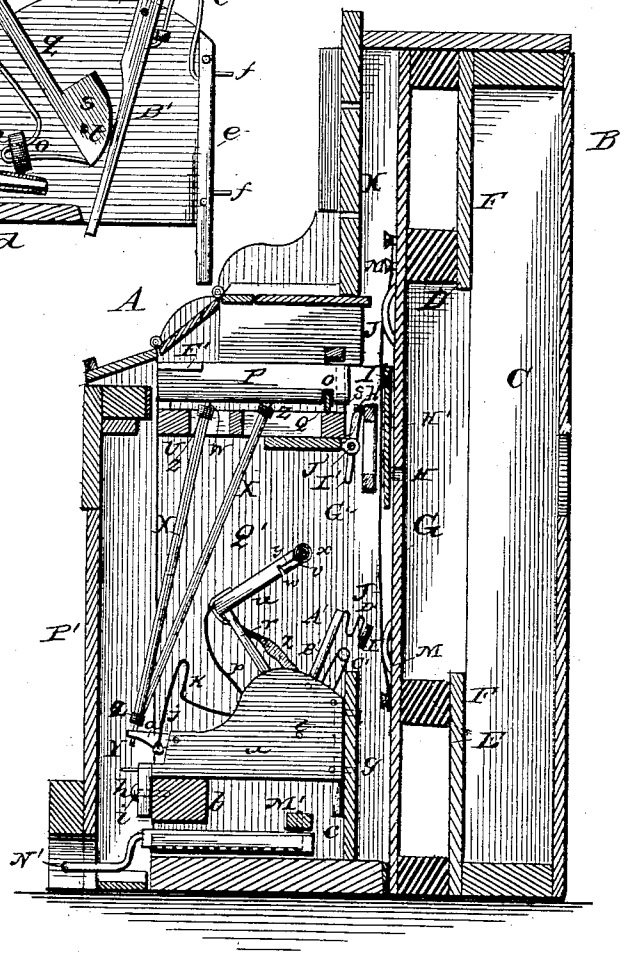


Fig. 2.



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Fig. 3.

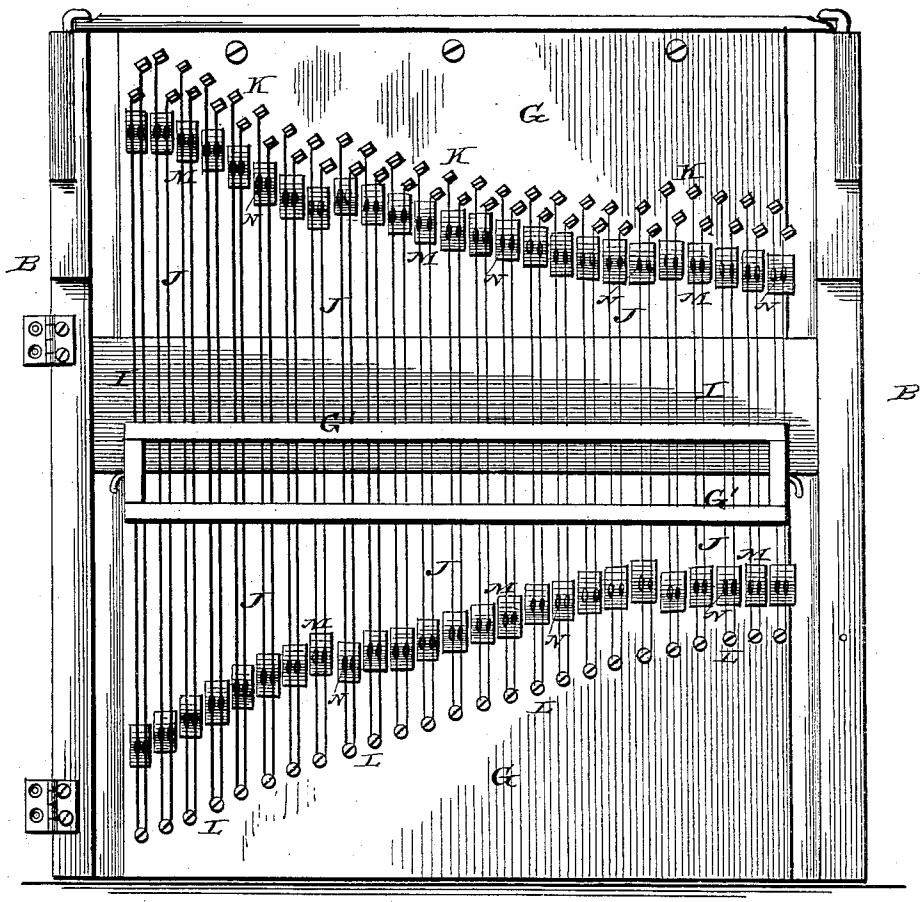
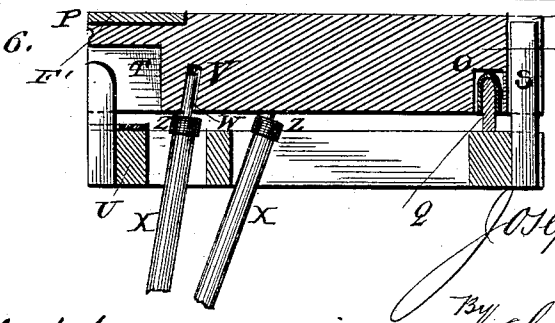


Fig. 6.



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PIANO FORTE.

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Fig. 4.

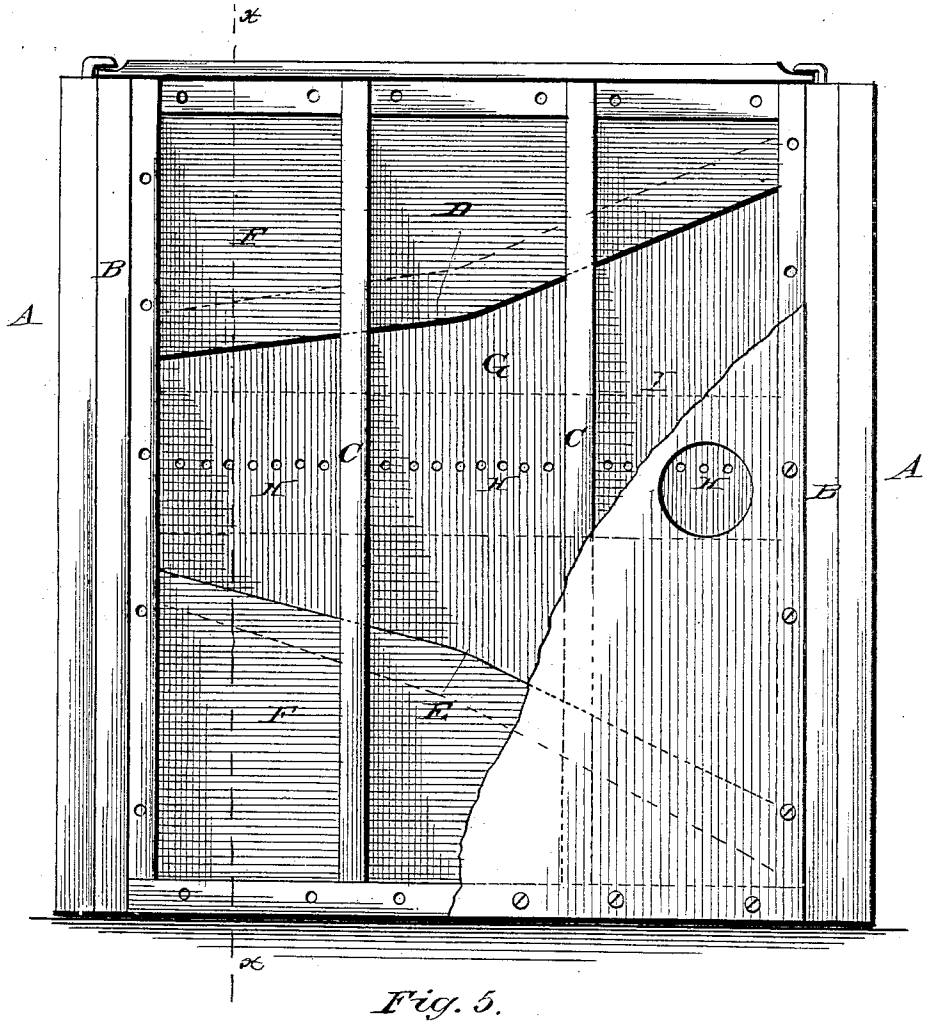
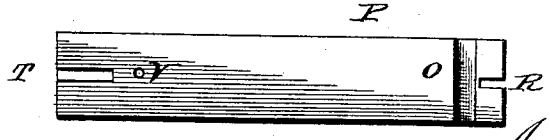


Fig. 5.



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5 Sheets—Sheet 5.

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No. 293,855. Patented Feb. 19, 1884.

Fig. 8

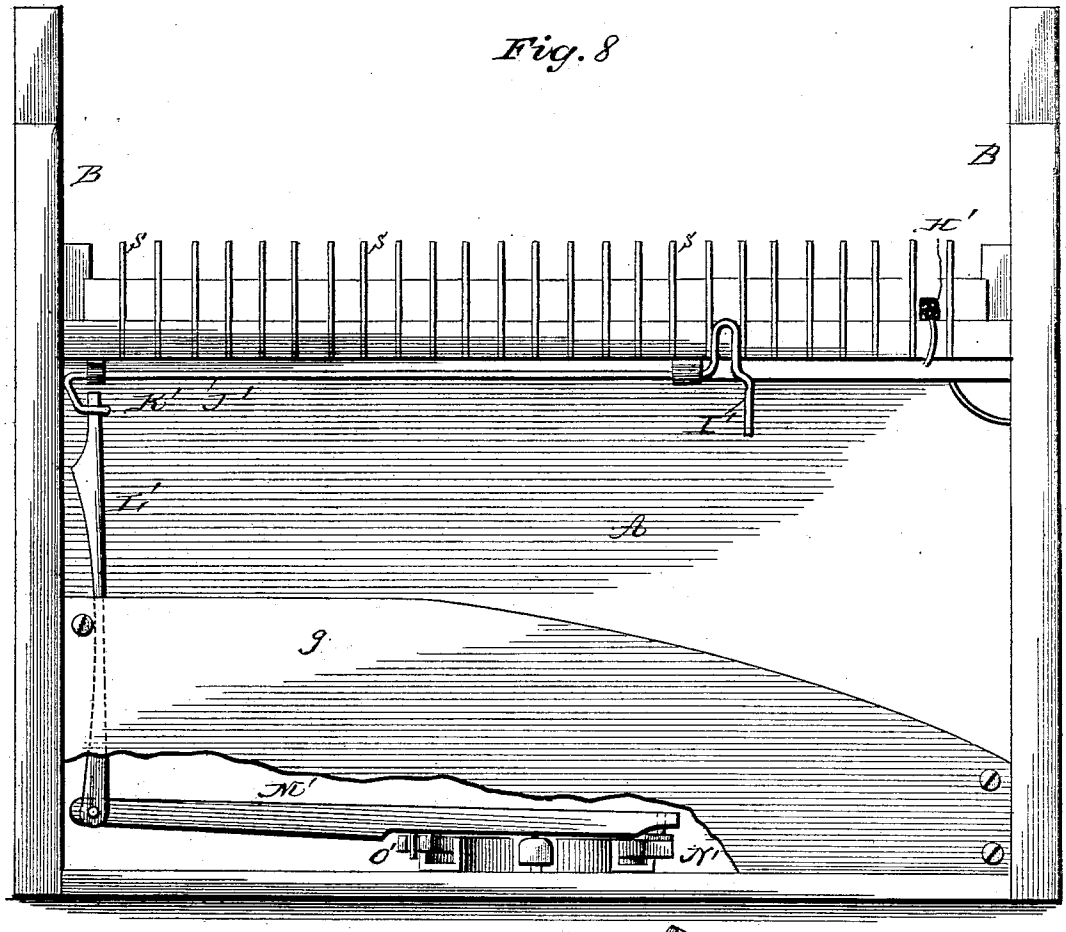
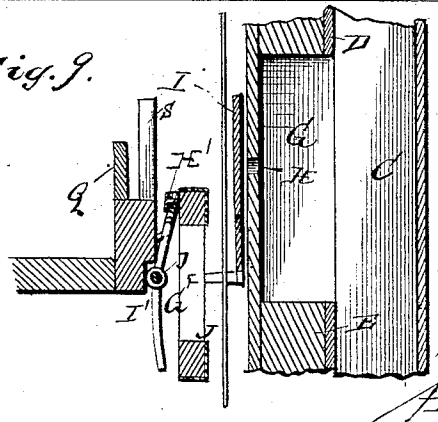


Fig. 9.



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UNITED STATES PATENT OFFICE.

JOSEPH DOYLE, OF MOUNT LIBERTY, INDIANA.

PIANO-FORTE.

SPECIFICATION forming part of Letters Patent No. 293,855, dated February 19, 1884.

Application filed June 8, 1883. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH DOYLE, of Mount Liberty, in the county of Brown and State of Indiana, have invented certain new and useful Improvements in Piano-Fortes; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a front view of my improved piano-forte with part of the casing removed. Fig. 2 is a vertical cross-section of the same. Fig. 3 is a front view of the stringed frame and the sounding-board. Fig. 4 is a rear view of the frame with the back of the casing broken away, showing the bridge and the wrest-plank. Fig. 5 is a bottom view of one of the keys. Fig. 6 is a detail view of the fastening for the keys, and Fig. 7 is a detail view of the action. Fig. 8 is a rear view of the damper-operating mechanism seen from the strings, looking forward, the action and the keys being removed; and Fig 9 is a vertical sectional view on line *x x*, Fig. 4, showing the damper-frame in section and the operating mechanism in side view.

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

My invention has relation to upright piano-fortes; and it consists in the improved construction, combination, and arrangement of parts of an instrument of that class which will occupy but little space, possess a strong tone, and be durable and inexpensive of manufacture, as hereinafter more fully described and claimed.

In the accompanying drawings, the letter A indicates the outer casing of the instrument, and the rear portion of this casing incloses a rectangular upright frame, B, having at equal intervals two, or more or less, upright stanchions, C, which serve to brace the frame against the strain upon the same caused by the strings. The bridges D and E pass divergently from the treble side of the instrument between the side pieces of the frame, the ends at the bass side reaching nearly to the extreme ends of the side piece of the frame, and the said bridges, of which the upper one, D, forms the wrest-plank, are slightly curved, starting from points at equal distances from the ends of the side piece at the treble side of the instrument, and fastened to the frame at the bass side at equal distances from the ends of that side piece, and the rear faces of the bridges are covered and connected to the top and bottom pieces of the frame by thin boards F, the grain of which runs in a transverse direction to the piano, and these boards and the bridges are secured to the stanchions C by means of glue and screws, forming a secure union between them. The entire front of the frame B and the bridges is covered by the sounding-board G, which is of heavier board than usually employed for this purpose, and the grain of which runs vertically, so as to offer resistance to the strain of the strings, and a horizontal row of small apertures, H, is bored in the sounding-board, which, without affecting the strength of the board materially, will emit the sound-waves from the space in the sound-box, one hole being between each string, and the row being equidistant from both bridges. A thinner sounding-board, I, is fastened transversely across the heavier board, its ends being fastened to the side pieces of the frame and its grain running transversely to the instrument, and it serves to strengthen the tone of the instrument, in addition to the heavier sounding-board, thus producing very strong tones out of an instrument occupying but very little space.

J are the strings, which are doubled, fastened at their ends to the wrest-pins K, and passed around the studs L upon the lower bridge, the wrest-pins and the studs passing through the heavy sounding-board into the wrest-plank and the lower bridge, and the thin sounding-board lies exactly across the center of the under side of the strings, slightly above the points where the hammers strike the strings. Each pair of strings, which are tuned in unison, rests at its upper and lower end inside the wrest-pins, and the studs upon small bridges or agraffes M, formed by a strip of spring-steel bent to form a bulge at its center, and having two shallow notches, N, in its upper surface, in which the strings rest. These metallic bridges serve to give the strings a clear round

tone, their springiness adapting them especially to convey the vibrations of the strings to the sounding-board, and at the same time to slightly cushion or yield to the severe strain of the strings, taking a certain amount of the strain away from the bridges and their supporting-stanchions. The keys P are arranged at the height and order usual in upright pianos; but in place of being pivoted upon wires or lugs, as usually is the case, they rest with their inner ends, which are notched from the under side, as shown at O, upon a bridge or plank, Q, which is covered with felt or other soft yielding textile material, while their ends inside the notch are notched vertically at R, into which notches thin upright strips S of wood project to guide the inner ends, and the outer ends are notched from the under side, the said notches T extending to within a short distance of the upper side and to the outer end, as plainly shown in Figs. 5 and 6, and thin upright strips projecting from a plank or bar, U, in the front portion of the frame, project into these notches and guide the outer ends of the keys. In the under side of the keys, near the outer ends of the same, are small holes V, into which pass wires or pins W, which are inserted into the upper ends of a series of thin light wooden rods, X, the lower ends of which are likewise provided with similar pins, Y, both pins being provided at their inner portions with rubber buffers Z, which prevent rattling of the pins. The lower pins project into holes in the hoppers *a* of the action, which is arranged upon curved bridges *b* and *c* in such a manner that the hammers will all strike at the same distance from the lower ends of the strings, the curve of the bridges being the same as the curve of the lower bridge of the string-frame. The action for every key is separate, and is inclosed between two thin boards, *d*, which are connected at their lower edges by means of strips, and at their inner edges by means of strips *e*, which extend a short distance below the lower edges, and are provided with two (more or less) projecting pins, *f*, which project into corresponding holes in a board, *g*, which forms an inner wall for the space in which the action is inclosed. The lower outer corner of the small casings formed by the inclosing-boards is provided with downwardly-projecting blocks *h*, the lower ends of which are secured to the front one of the bridges *b* by means of screws *i*, and in this manner each separate casing containing the action for one string may be removed when the front wall of the outer casing of the instrument has been removed. The action consists of a straight hopper, *a*, which is pivoted at the lower front corner of the casing, and is provided with a notch upon the under side of the outer end, into which notch the lower upwardly-bent end of a spring, *j*, fits, said bent portion of the spring being lined with felt, buff, or other soft material, to prevent rattling, and the spring passes thereupon upward, when it is again bent downward, forming a knee, *k*, the lower inwardly-bent end of which is fastened into the outer edge of one of the boards *d*. The inner portion of the hopper is provided upon the under side with a strip of cloth or felt, *l*, which prevents it from rattling against the bottom strip of the casing, and prevents it from rebounding when it strikes the said bottom strip; and the upper side of the hopper is likewise covered with a strip, *m*, of cloth or felt, near the inner end, which touches a rubber block, *n*, fastened upon the doubled portion *o* of a spring-wire, *p*, the upper and lower ends of which are secured in the rear edge of the hammer *q*, the said spring being bent near its lower end to form the doubled portion. The hammer consists of a straight piece, *r*, of light wood, the lower end of which forms a flat cam, *s*, pointing inward, and through the lower portion of which the pin *t*, upon which it is pivoted, passes. The head *u* of the hammer consists of a straight piece of wood fastened at one end to the inner end of the piece *r*, and having at its outer end a transverse groove, *v*, and a notch, *w*, in the under side, the said groove serving to receive a roll of cloth or felt, *x*, which is held in place by a string or cord, *y*, which passes through the center of the roll and is inserted into the notch, the said roll serving to touch the string when the hammer is struck by the hopper. A strip, *z*, of textile material, is attached to the upper end of the hammer and to the upper edge of the casing *d d*, and prevents the hammer from flying too far back from the strings.

The damper A′ consists of a straight stick, B′, of light wood, pivoted at the upper edge of the casing, and the lower end of the same bears against the rounded edge of the cam *s*, forced by a bent spring, C′, which bears with one end against the stick slightly below the pivotal point, while its doubled portion forms a spiral coil, and its other end bears against and is fastened into the strip, forming the inner end of the casing. Upon the upper end of the stick is a zigzag-bent spring, D′, upon the outer end of which the damping cloth or felt E′ is fastened, which bears against the string after the hammer has struck it, damping or suppressing the tone and preventing it from sounding too long time after it has been struck. It will be seen that when the key is struck the vertical rod will rock the hopper, which will lift the hammer, and the cam upon the hammer will bear against the lower end of the damper-stick and lift the damper from the string, and upon the finger being removed from the key the spring upon the damper will force the damper against the string and the hammer back, while the spring *j* will raise the hopper, allowing the hammer to fall back and raising the key, and it will be seen that the lower end of the damper-stick bearing against the cam upon the lower end of the hammer will raise the hammer the moment it has struck the string a short distance from

the same, allowing it to be struck immediately afterward. The keys may be marked with small plates F′, of glass or other material, and the said plates are marked with the name of the note to which it belongs, thus making it easier for beginners to find the right notes. A rectangular frame, G′, is pivoted at its ends in bearings upon the sides of the stringed frame, and the inner surfaces of its side pieces are covered with cloth or felt, and may be brought to bear against the strings, when tilted, in such a manner that when the upper side piece is brought to bear against the strings it will bear against the center of the same and cause them to give a tone one octave higher than their original tone when struck, while the lower side piece, when brought to bear against the strings, will damp the sound without having any influence upon the pitch of the notes. The outer cushioned end of a spring, H′, which is fastened upon the rear bridge of the key-board, bears against the upper portion of the frame G′, and the frame is operated by a cross-head, I′, upon a rock-shaft, J′, which rocks in bearings upon the rear bridge of the key-board, and has an arm, K′, upon its outer end, which is connected to the upper end of an upright rod, L′, the lower end of which is hinged to the outer end of a lever, M′, pivoted upon a pin or bolt in the center of the instrument, and the inner ends of two pedals, N′ and O′, pivoted in the usual manner at the center of the instrument, bear against the under side of the lever, one upon each side of the pivotal point of the same, in such a manner that the lever will be rocked when one of the pedals is depressed, which will rock the rock-shaft J′ and press either side piece of the frame against the strings.

To make access easy to the strings and to the action of the instrument, the front board, P′, is hinged at one side and may be opened like a door, while it has suitable fastenings at its free end, giving, when opened, access to the action, while the portion of the casing Q′ which contains the action is hinged to the side of the stringed frame and may be swung out, giving access to the strings, and is secured at its free end by suitable means.

The remaining portions of the casing are removable, as in the usual construction of upright piano-fortes, and slide in grooves.

Having thus described my invention, I claim and desire to secure by Letters Patent of the United States—

1. In an upright piano-forte, the combination of the upright rectangular frame in the rear portion of the casing, the upright stanchions, the bridge and the wrest-plank, extending in two divergent curves from near the middle of the side piece of the frame at the treble side to near the ends of the side piece at the bass side, and having their rear surfaces connected with the upper and lower side pieces of the frame by the thin boards, as described, the thick sounding-board having the transverse series of perforations at its center, and the thin sounding-board fastened across the center of the thick sounding-board, as and for the purpose shown and set forth.

2. The bridges or agraffes, each consisting of a small strip of spring-steel bent to form a transverse bulge at the center, and adapted to support the strings at their ends, as and for the purpose shown and described.

3. The bridge or agraffe consisting of a small strip of spring-steel bent to form a transverse bulge at the center, and having the longitudinal notches upon the upper surface of the bulge, and adapted to support the strings at their ends, each string resting in one of the notches, as and for the purpose shown and set forth.

4. The combination of the upright casing, open at the top and at the front side, in which the action is pivoted, the straight hopper having the notch in its lower edge pivoted in the front portion of the upright casing, and having the felt strips upon the upper and lower edge of its inner end, the hammer having the eccentric cam at its lower end, at which it is pivoted, and having the wire spring bent double at its lower end, forming a projecting arm provided with a rubber head and fastened at the upper and lower end of the hammer, and having the strip of cloth attached to the top of the hammer and to the upper edge of one of the sides of the casing, the bent wire spring fastened to the front edge of one of the sides of the casing and passing under the outer end of the hopper, resting in the notch in the same, with its lined hooked free end, and the damper consisting of a straight stick pivoted at the upper edge of the upright casing, and having the zigzag-bent wire at its upper end, upon which the damper-pad is fastened, as and for the purpose shown and set forth.

5. The hammer having the straight head having the transverse notch or recess at its outer end and the transverse notch cut from its under side near the outer end, and provided with the roll of textile material placed in the transverse recess, and held in place by the string or cord passing through the center of the roll and into the notch in the under side of the head, as and for the purpose shown and set forth.

In testimony that I claim the foregoing as my own I have hereunto affixed my signature in presence of two witnesses.

JOSEPH DOYLE.

Witnesses:

JOHN LAWRIE,

RICHARD A. EDDY.