(No Model.)

2 Sheets—Sheet 1.

J. W. MACY.

PIANO.

No. 504,733. Patented Sept. 12, 1893.

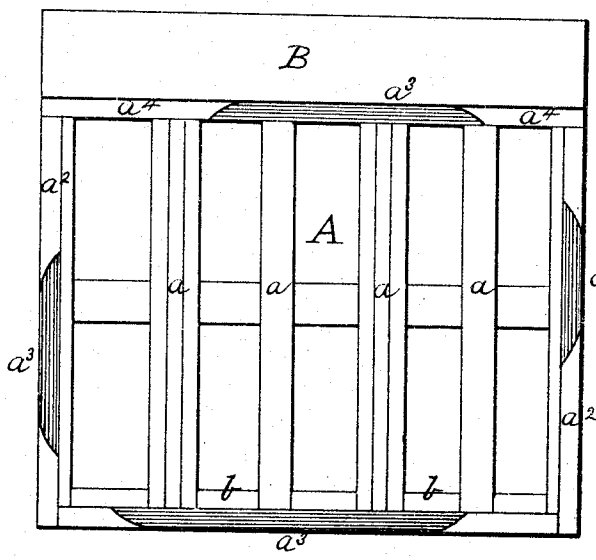


Fig. 1.

Fig. 3.

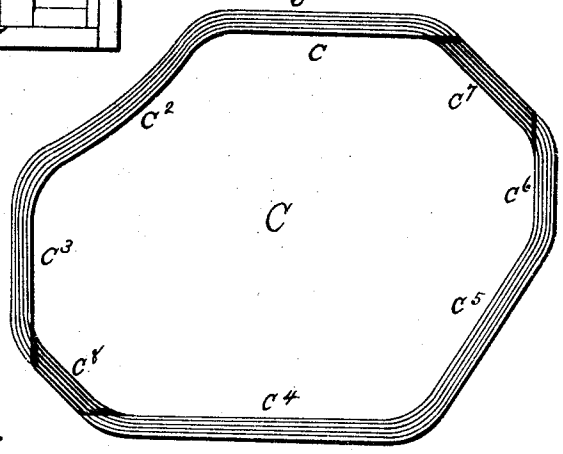


Fig. 9.

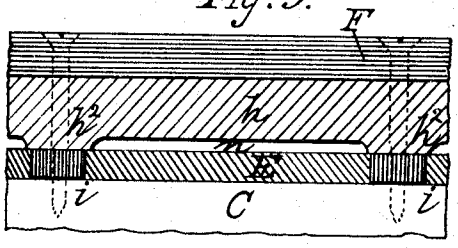
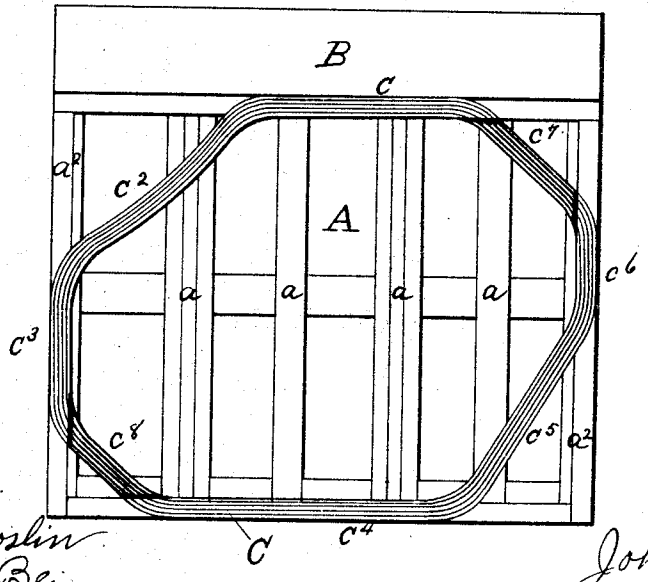


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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No. 504,733. Patented Sept. 12, 1893.

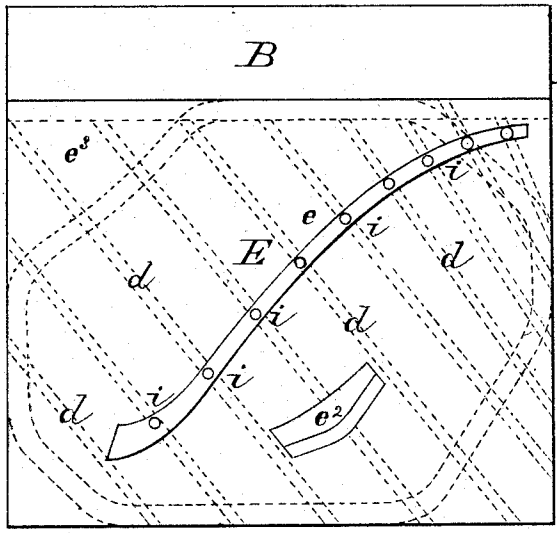


Fig. 4.

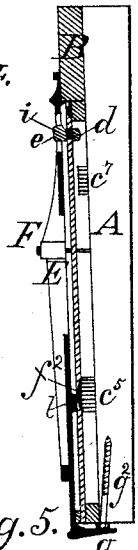


Fig. 7.

Fig. 5.

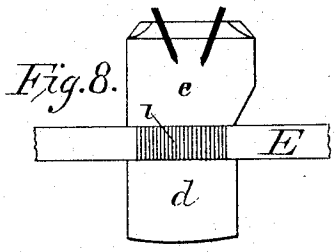


Fig. 8.

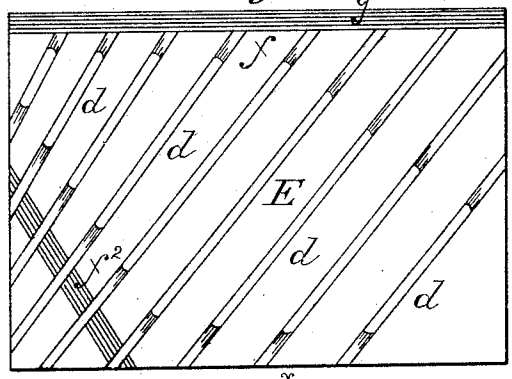
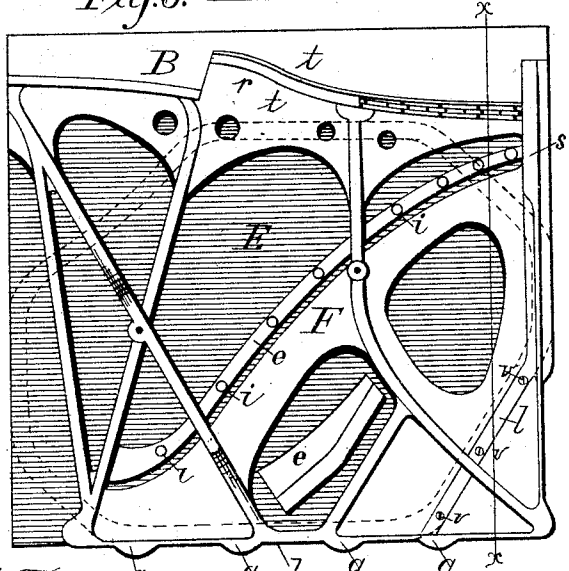


Fig. 6.



WITNESSES,

Chas Joslin

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UNITED STATES PATENT OFFICE.

JOHN W. MACY, OF CINCINNATI, OHIO.

PIANO.

SPECIFICATION forming part of Letters Patent No. 504,733, dated September 12, 1893.

Application filed March 2, 1892. Serial No. 423,544. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. MACY, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain Improvements in both Upright and Grand Pianos, of which the following is a specification.

My improvements relate to the wooden frame, acoustic rim, sounding board, acoustic disk, insulating strips, metal string frame, metal frame supports, and to the mode of incorporating these various improvements into a perfect system of vibration as a whole, whereby the vibratory power in the tone producing medium is greatly enhanced, the most sonorous tone realized, and the capacity of the instrument to remain in tune increased.

While these improvements relate chiefly to upright pianofortes, several of them may be adapted to, and employed in the construction of grand pianos.

My invention embraces the following features: first, the wooden frame of an upright piano, consisting of the rims, blocking, wrest-plank and stiffening braces, combined with a continuous acoustic rim the form of which will be hereinafter described; second, a continuous acoustic rim built up of hard wood veneers, bent into shape, said rim being an irregular polygon, consisting in its relation to the construction of two main portions, which act conjointly in supporting parts of the top, sides, and bottom of the sounding board, and maintaining the crown of the same; third, a sounding board having at the intersection of the string bridge and ribs, what I term an acoustic disk, making a hard wood connection through the board, between the string bridge and ribs, for the purpose of bringing the ribs into more perfect sympathy with the sounding board; fourth, a sounding board having a convex groove on the back of the same, in a straight line across the upper edge, also a similar groove in a line diagonally, from the treble side to the bottom of the board, and these grooves are filled to a surface flush with the board with strips of hard wood, which bind the fibers of the board, and increase its power of conducting vibrations; fifth, the improvements consist further in mounting the sounding board in connection with the acoustic rim, and metal frame, so that the crown of the board is perpetually maintained; sixth, a sounding board provided with an insulator applied to the edge of that portion of the board that supports the metal frame, the office of which is to avoid contact between the board and metal frame; seventh, a device for stiffening the metal string frame of upright pianos, consisting of heavy bolts, making a direct connection between the end wood of the stiffening braces of the wooden frame, and a series of lugs cast on the bottom of the metal frame; eighth, a metal string frame for upright pianos in which the weight and solidity of the treble portion are increased by the projection of a wide heavy flange from the upper treble side of the frame. Also a metal frame having a rib on the reverse side of the same diagonally across the lower right hand corner. Further, a metal frame provided with a series of lugs cast on the bottom edge which project under and bear upon the ends of the stiffening braces, through the medium of heavy bolts.

In the accompanying drawings Figure 1, represents the wooden frame of an upright piano; Fig. 2, the wooden frame with the acoustic rim in position; Fig. 3, the continuous acoustic rim; Fig. 4, the sounding board in position, showing bridges and acoustic disks; Fig. 5, the reverse side of the sounding board with hard wood bindings; Fig. 6, the metal string frame in position; Fig. 7, a sectional view of the same through the line x, x; Fig. 8, a view in detail of the acoustic disk and its relation to the string bridge and ribs; Fig. 9, the insulator and its relation to the sounding board and metal frame.

In the drawings similar letters of reference indicate corresponding parts.

The perpendicular braces a, rims a^2, wrest plank B, and the necessary blocking b, constitute the wooden frame A, of an upright piano; the side braces or rims a^2, consist of an outer piece of maple or other hard wood, and an inner piece of spruce glued together, the maple portion of the rim being somewhat wider than the inner piece of spruce they form with the acoustic rim a plain surface to which a portion of the sounding board is glued. Portions of the supporting strips a^4, and the rims a^2 are cut away at a^3 to a level with the braces a, for the reception of my acoustic rim, which is glued down to the

wrest plank B, rims a^2 and braces a; it is further secured in position by screws or wooden dowels; it offers in combination with the rims and supporting strips, a plane surface for the continuous support of the sounding board.

The acoustic rim C, as applied to upright pianos is polygonal in shape, having irregular and unequal sides, seven of the sides are straight, one is slightly curved toward the center of the rim. It is known that vibrations in a wooden body are conducted in the direction of the fiber with the greatest facility, it is upon this principle that my acoustic rim is constructed, the fibers of the rim are continuous, it is built up of hardwood veneers bent into the proper form, it supports the sounding board in combination with the rims and binds every fiber of the same, so that vibrations starting from any part of the board cannot disperse but are instantly propagated to every other part, to the board as a whole, and to the wooden frame whereby the whole construction becomes a vibratory system; thus augmenting the resonance and increasing the sustaining power of the tone. I am aware that bent rims are in use and applied to both upright and grand pianos. I do not claim broadly this feature in pianoforte construction.

My improvement consists in a supporting rim, the same being continuous in one piece built up of bent veneers, supporting the sounding-board in combination with the rims proper and other portions of the wooden frame. The sounding board is glued to the entire acoustic rim C, except the sides c^7, and c^8, which are cut away to a sufficient depth to clear the board, these portions of the acoustic rim are not in contact with the sounding board, but are suspended across the corners of the same, in its relation to the board the rim is in two parts, joined at the upper treble side and the lower bass side by the suspended portions of the rim, which, in addition to conducting vibrations to all parts of the sounding board, maintains its crown, and greatly strengthens the system of construction. The sounding board is mounted with the fiber running parallel with the longest diameter of the acoustic rim, viz., from c^7 to c^8, the ribs are placed in a transverse direction from c^2 to c^5, which indicates the direction of the crown, the pressure of the strings upon the board has a tendency to spread apart the rim in the direction of the crown, this tendency is resisted by the curved portion of the rim c^2, in combination with the side c^5 which is supported by contact with the metal frame, it will be seen that by this system of construction the crown of the sounding board is made perpetual, it will never lose its energy from climatic influences.

E, (Fig. 4) shows the sounding board in position, with the string bridges e and e^2. The upper edge is glued to the acoustic rim at c, and to the supporting strips a^4, the sides to the acoustic rim at c^5 and c^6 and to the rims a^2, the bottom to the acoustic rim at c^4, and to the supporting strips. The board is also glued to the acoustic rim at c^2 and c^5. The broken lines indicate the ribs d. They continue beyond the limits of the curved portion of the acoustic rim c^2 and in the diagonal portion of the board are reduced in thickness; while the sounding board as a whole is limited by the acoustic rim a c^2, the smaller portion becomes secondary and sympathetic in its relation to the main portion of the board.

At the intersection of the ribs d, and the bridges e and e^2, I place what I term an acoustic disk, i, consisting of a small block of hard wood, circular in shape although it may be of any suitable form, having a diameter not to exceed the width of the ribs, its thickness is equal to the thickness of the sounding board; it is let into suitable openings through the board, the grain being placed transverse to that of the board, when the ribs and bridges are glued in place the disks form an end wood connection between them, conducting the vibrations of the strings directly to the ribs thus assisting the sounding board in propagating vibrations to the acoustic rim and increasing the sonorous qualities of the instrument.

On the reverse side of the sounding board E, I place two binding strips of hard wood f and f^2, they are set into suitable grooves, one along the top of the board, the other diagonally across the corner in a position parallel with and directly over the acoustic rim at c^5, when the board is in place the binding f is glued down to the acoustic rim at c, and to the supporting strips a^4, the binding f^2, is glued to the acoustic rim at c^5; by this device I connect and bind every fiber of the sounding board so that the board as a whole becomes more sensitive to vibrations set up in any part of the same; there follows a greater reinforcement of the tone particularly in the treble.

The metal frame F, cast in one piece with suitable braces, is secured in position over the sounding board, the upper portion is supported by the wrest-plank B, to which it is secured by means of screws; the bottom of the frame is supported by heavy inwardly projecting lugs g, which extend back and under the stiffening braces a, these braces are provided with heavy bolts g^2 with which the lugs g, are brought in contact in such a manner that the braces a, assist the metal frame in resisting the tension of the strings; the bottom of the metal frame is further supported by an insulating strip of hard wood placed between the metal frame and the sounding board, the insulating strip h, is provided with wide recesses n, on the under side, separated by points h^2 that come in contact with the sounding board; at the center of each brace a, the screws that secure the metal frame in position pass through the points h^2, leaving the sounding board free from any objectionable contact with the metal frame.

In applying the insulator to grand pianos

it follows the contour of the bent rim, the points of contact with the sounding board, through which the screws pass that secure the metal frame, are placed at the termination of the ribs; each point of contact rests upon one of my acoustic disks, making a solid bearing for the metal frame independent of the board. The metal frame F, is further secured to the acoustic rim at c^5, the back of which is provided with a rib l, placed diagonally across the corner, this rib rests upon the binding strip f^2 and is secured to the acoustic rim and wooden frame by the screws v; by this device I greatly stiffen the construction and assist the curved portion of the acoustic rim c^2 in maintaining the crown of the board. The treble side of the metal frame is strengthened by the brace s, which extends above the upper edge of the metal frame and rests upon the wrest plank B, this brace is made as heavy as the construction will allow and is tapered to the surface of the plate at the beginning of the rib l, this enables me to suspend the metal frame over the treble side of the sounding board, while the solidity of construction greatly increases the brilliancy of the treble.

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

1. The combination in a wooden frame for upright pianos, of the vertical braces a, wrest plank B, the blocking b, and the composite rim a^2, consisting of an outer piece of hard wood, and an inner piece of soft wood substantially as described.

2. The combination in a wooden frame of the vertical braces a, wrest plank B, blocking b, and composite rims a^2, having a portion of the rims a^2 and blocking cut away at a^3 to a level with the face of the vertical braces a for the reception of the acoustic rim C, substantially as set forth.

3. A composite rim a^2 in a wooden frame for upright pianos formed of an inner piece of spruce and an outer piece of hard wood, the outer part supporting a portion of the sounding board and acoustic rim, substantially as set forth.

4. The combination in a wooden frame for upright pianos of the vertical braces a, wrest plank B, blocking b, composite rims a^2 and acoustic rim C, the whole forming a continuous support for the sounding board as herein described and set forth.

5. The combination in an upright piano of the sounding board E, with the acoustic rim C, and rims a^2, to portions of which the sounding board is continuously glued substantially as herein set forth.

6. A sounding board in an upright piano, glued at the top to a portion of the acoustic rim C, and supporting strip a^4. at the sides and bottom to the acoustic rim C and rims a^2 substantially as described.

7. A continuous acoustic rim C, built up of hard wood veneers bent in one piece, a polygonal figure having seven straight sides and one side c^2 curved toward the center of the sounding board, a rim consisting of two main portions c, c^2, c^3, and c^4, c^5, c^6 which support the sounding board, and two suspended portions c^7 and c^8, connecting the main portions of the rim, substantially as shown and described.

8. A continuous acoustic rim C, built up of hard wood veneers, having a straight side at c^5 opposed by a curved side a c^2 in lines nearly parallel, with the bridge maintaining the crown of the sounding board substantially as described.

9. The combination of the sounding board in an upright piano. with the parallel sides c^2 and c^5 of the acoustic rim substantially as set forth.

10. A sounding board for upright pianos in combination with a continuous acoustic rim C, to which the board is glued at c, c^2, c^3, c^4, c^5, c^6, the suspended portions c^7 and c^8 being free from contact with the same substantially as set forth.

11. A sounding board E, having blocks of hard wood set into openings in the same at the intersection of the string bridges e and e^2 and the ribs d, connecting the bridges directly with the ribs substantially as shown and described.

12. An acoustic disk i consisting of a circular piece of hard wood set into openings in the sounding board the grain of which is placed transverse to that of the board substantially as described.

13. A sounding board E, having hard wood bindings set into grooves on the back of the same at f and f^2 uniting the fibers of the board substantially as set forth.

14. The combination of the acoustic disk i, ribs d, and string bridges e and e^2 conducting vibrations from the bridges to the ribs substantially as set forth.

15. The combination of the sounding board E, hard wood bindings f, and f^2, and the acoustic rim C, uniting the fibers of the sounding board and conducting more freely the vibrations from the board to the acoustic rim substantially as set forth.

16. A metal string frame F, for upright pianos having a series of lugs cast at the bottom of the same extending back and under the stiffening braces a, of the wooden frame A, substantially as set forth.

17. A metal string frame F for upright pianos having a rib l, placed diagonally across the lower right hand corner on a line with and over the acoustic rim at c^5, substantially as described.

18. A metal string frame for upright pianos having a heavy flange s, projecting to the front along the treble side of the same substantially as described and set forth.

19. The combination of the rib l, of the metal frame F, with the binding f^2, and the acoustic rim at c^5, thereby maintaining the crown of the sounding board substantially as set forth.

20. The combination of the flange s, of the metal frame F, with the wooden frame A, sus-

pending the metal frame from the wrest plank B to the acoustic rim at c^5, substantially as described.

21. The combination of the lugs g, of the metal frame F, with the stiffening braces a, through the medium of the bolts g^2 substantially as described and set forth.

22. An insulating strip of hard wood h, placed between the metal frame F and sounding board E substantially as herein described.

23. An insulating strip of hard wood h, recessed as described and having points of contact h^2 resting upon the sounding board E and supporting the metal frame F, substantially as set forth.

24. The combination of the insulating strip h, recessed and having points of contact h^2, the sounding board E acoustic disk i at the edge of the board and at the termination of the ribs d, and the metal frame F, substantially as described.

25. A sounding board having blocks of hard wood set into suitable openings along the edge of the same, said blocks being placed at the termination of the ribs, with the grain transverse to that of the board each block supporting a point of contact h^2 substantially as set forth.

JOHN W. MACY.

Witnesses:
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HORACE K. BLINN.