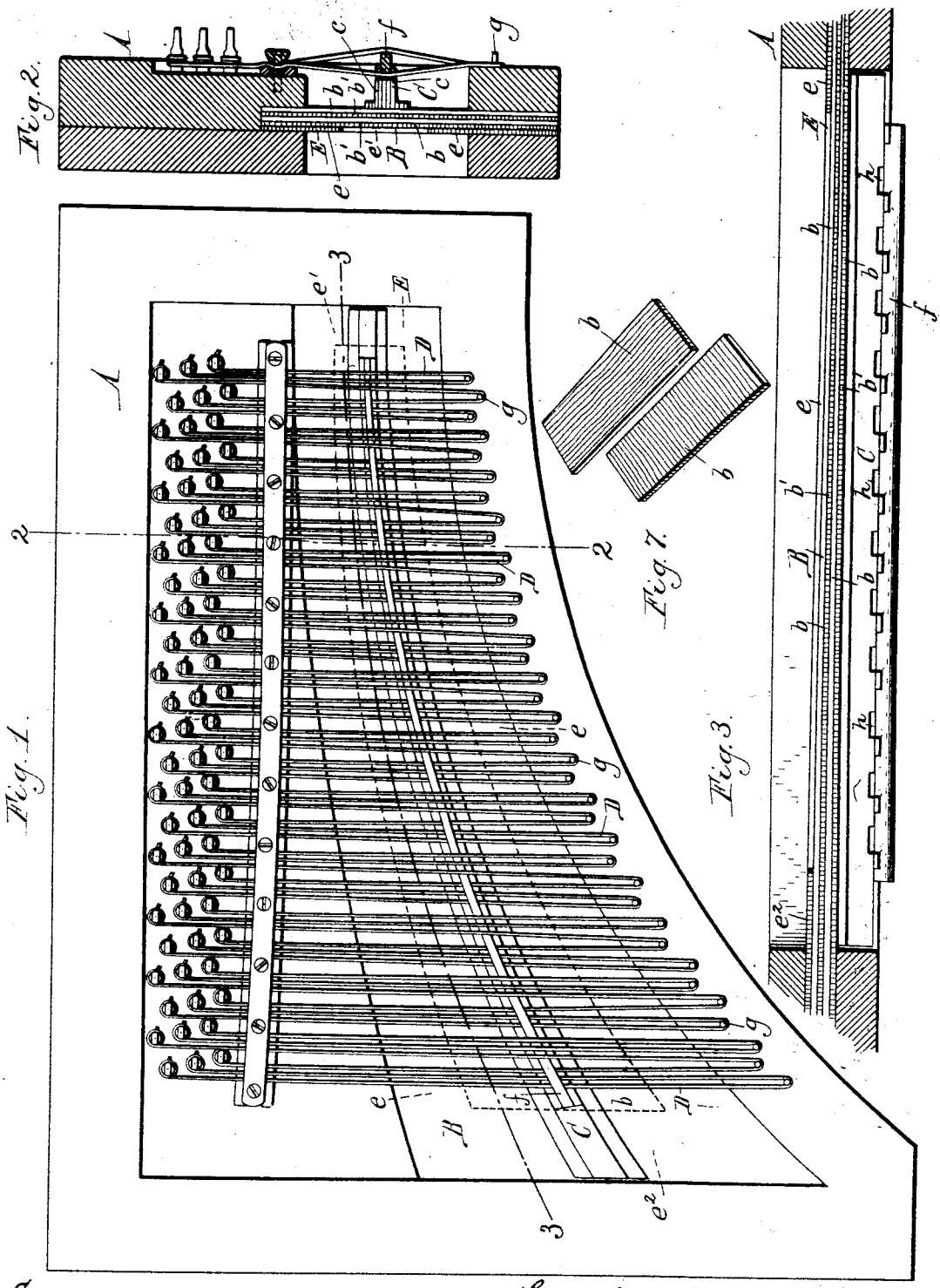
(No Model.)

2 Sheets—Sheet 1.

L. & J. F. MATT.

PIANO.

No. 513,616. Patented Jan. 30, 1894.



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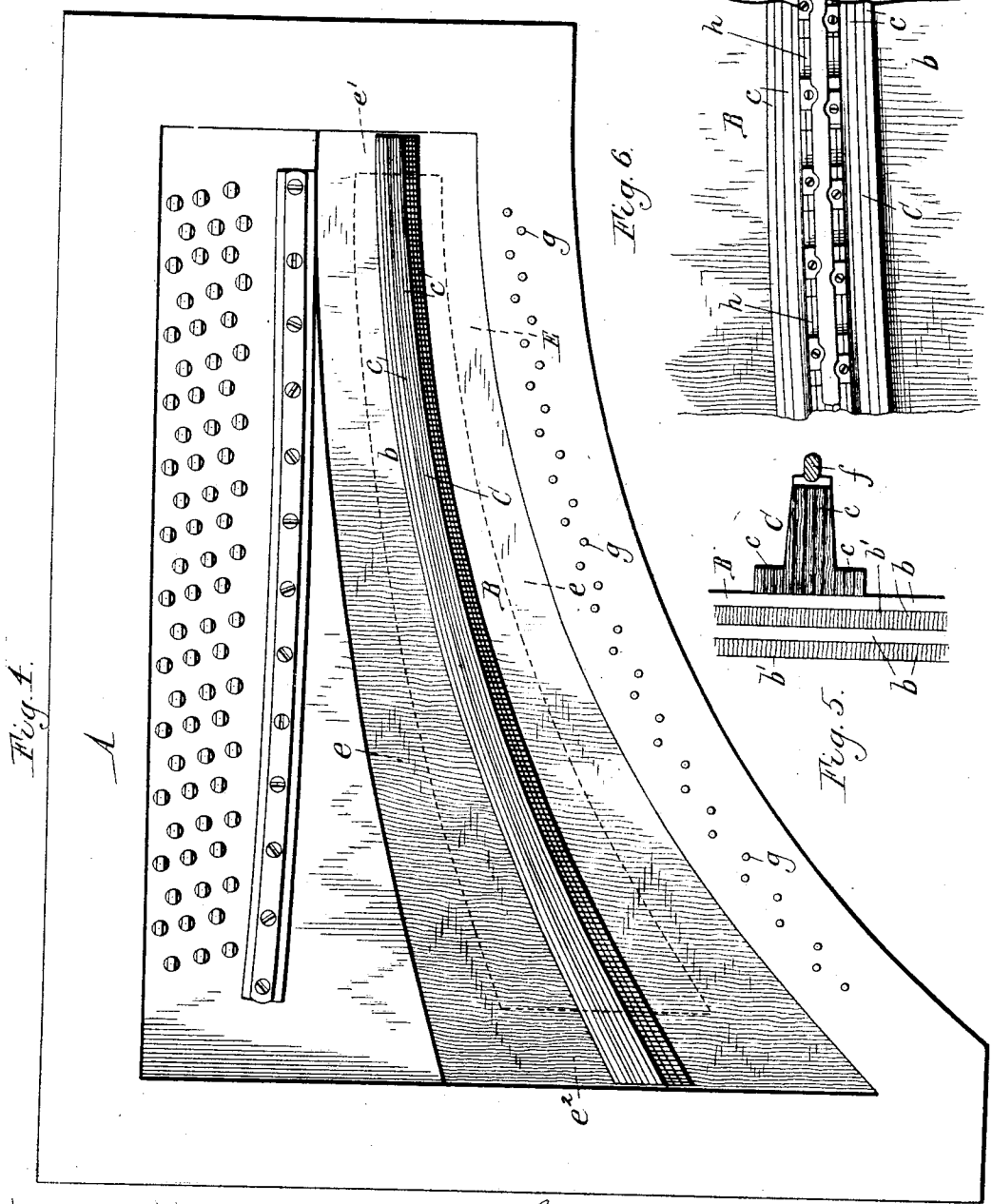

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UNITED STATES PATENT OFFICE.

LORENZ MATT AND JOSEPH F. MATT, OF BUFFALO, NEW YORK.

PIANO.

SPECIFICATION forming part of Letters Patent No. 513,616, dated January 30, 1894.

Application filed May 8, 1893. Serial No. 473,425. (No model.)

To all whom it may concern:

Be it known that we, LORENZ MATT and JOSEPH F. MATT, citizens of the United States, residing at the city of Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Pianos, of which the following is a specification.

This invention relates to the sounding board of the piano and the bridge supported thereon.

Heretofore sounding boards have been constructed of a single layer or thickness and also of a number of thicknesses of veneers, but in order to permit such boards to be made sufficiently thin, to obtain the desired resonance, it has been necessary to reinforce them by stiffening bars or cleats extending across the same. These bars necessarily impair, in a measure, the vibrating capacity of the board and correspondingly diminish its resonance.

One object of our invention is the production of a sounding board which shall be sufficiently thin to insure the desired vibrating quality, and which shall at the same time possess the necessary strength to resist the strains to which it is subjected, without requiring stiffening bars or similar reinforcing parts which extend across the board and restrain its vibrations.

Our invention has the further objects to relieve the sounding board from the pressure of the bridge and thus give the same greater freedom of vibration, and to improve the construction of the board in other respects, with a view of increasing the volume of the sound and improving its quality.

In the accompanying drawings consisting of two sheets:—Figure 1 is a front elevation of a portion of the sounding board of an upright piano embodying our improvements. Fig. 2 is a cross section thereof in line 2—2, Fig. 1. Fig. 3 is a longitudinal section of the same in line 3—3, Fig. 1. Fig. 4 is a front elevation thereof, with the strings and the bearing bar of the bridge omitted. Fig. 5 is a cross section of the bridge and the sounding board, on an enlarged scale. Fig. 6 is a fragmentary front view of said parts. Fig. 7 is a perspective view of two superposed layers of the sounding board separated and showing the direction of the grain in the same.

Like letters of reference refer to like parts in the several figures.

A is the frame or case of the piano, which is of the usual rigid construction.

B represents the sounding board, C the bridge and D the strings.

The sounding board is composed of a number of veneers or thin layers of wood, *b*, which are glued together, one upon the other, and are so arranged that the grain of one layer crosses the grain of the contiguous layer or layers about at right angles, the grain of the first layer, or that nearest the strings, running crosswise of the bridge. Four of such layers are preferably employed, and they are made so thin that the thickest portion of the sounding board does not exceed one fourth of an inch. The veneers or layers are cut in such a manner that the grain extends through each layer at right angles to the plane of the layer, or substantially so, as shown at *b'*, in Figs. 2, 3, 5 and 7. By employing layers with the grain running in this manner, the layers offer their greatest resisting power in the most effective manner, which renders their strength so great as to permit the use of a comparatively thin sounding board, without requiring any stiffening bars. The board can therefore vibrate with much less restraint than a board having such stiffening bars, and produces a sound of correspondingly greater volume.

The sounding board is made of gradually increasing width and thickness from the portion thereof opposite the high or treble strings toward the portion thereof opposite the lower or bass strings, as shown in Fig. 3, the dimensions of the board increasing in the same measure as the strings increase in length and thickness. By thus proportioning the sounding board with reference to the size of the strings, the power of the various tones is rendered more uniform and the bass and the treble of the instrument are evenly balanced. We have obtained satisfactory results by making the sounding board about three-sixteenths of an inch in thickness opposite the string producing the highest tone, and increasing its thicknest one thirty second of an inch for each octave from the treble toward the bass.

E is a support against which the sounding board rests and which is in turn supported in the main frame or case. This support con-

sists of a thin open frame of wood which bears against the marginal portions only of the sounding board, as shown in Fig. 2, and by dotted lines in Figs. 1 and 4, so as to leave the central portion of the board free to vibrate, while it supports the sounding board for a certain distance inwardly from the inner edge of the main frame. The longitudinal side members *e* of this support are made of gradually increasing width and thickness from the treble toward the bass strings. Satisfactory results have been obtained by constructing this support of the following dimensions: The side members *e* of the support should be one inch wide opposite the highest string and increase in width one half of an inch for each octave toward the bass and should be one sixteenth of an inch thick opposite the highest string and increase in thickness one thirty second of an inch for each octave. The inner edges of these side members should be one half of an inch from the adjacent longitudinal edges of the bridge base, at a point opposite the highest string, and this distance should gradually increase toward the bass strings at the rate of one fourth of an inch for every octave. The inner edge of the upper member *e'* of the support should be half an inch from the highest string and the corresponding edge of the lower member e^2 one inch from the lowest string. The grain of these upper and lower members preferably runs at right angles to the grain of the contiguous layer of the sounding board, while the grain of the side members of the support runs parallel with the grain of said layer.

The bridge C is constructed of a number of layers or veneers *c* of spruce, or similar soft wood, firmly glued together. These layers extend lengthwise of the bridge, and stand at right angles to the plane of the sounding board. The layers are preferably cut in such a manner that the grain extends through the same parallel with the plane of the layers, as shown in Fig. 4. The bridge is made of gradually increasing dimensions from the treble toward the bass strings in accordance with the increasing dimensions of the sounding board. A bridge of soft wood thus constructed, while possessing the requisite strength, has been found to produce a more pleasing tone than a bridge constructed of maple or other hard wood.

The following dimensions for the bridge have been found satisfactory and are preferably employed: Its base should be one inch wide opposite the highest string and should gradually increase in width at the rate of one sixteenth of an inch for each octave toward the bass. The height of the bridge may be about one inch and one eighth and its ends should be about an inch and a half from the highest and lowest strings, respectively.

f represents a bearing bar or rod of metal or any other hard substance which is arranged upon the bridge and against which the strings bear. The strings are attached at their ends to the usual pins *g* and are strung in two groups or series, the strings of one series bearing against the front side of the bar *f* and the strings of the other series against the rear side thereof, as clearly shown in Fig. 2. The strings of the two series are preferably arranged to bear alternately against opposite sides of the bar, as shown, and the points of attachment of the strings are substantially in line with the middle or axis of the bearing bar, so that the strings of both series are deflected at about the same angle. The bearing bar is secured to the top of the bridge by perforated ears, and the bridge is provided in its top with notches or recesses *h*, as shown in Fig. 3, for the passage of the rear or lower strings. By thus arranging the strings to impinge against opposite sides of the bearing on the bridge, the opposing pressures of the two series of strings counteract each other, so that the bridge and the sounding board are practically relieved from pressure, thereby allowing the sounding board to vibrate with much greater freedom and greatly increasing its resonance.

By the use of our improvements, the resonance of the entire sounding board is not only materially increased, but the higher treble tones, which in ordinary instruments are dull and unmusical, have a sweet, singing quality that renders them as pleasing to the ear as the lower tones.

We claim as our invention—

1. A sounding board for pianos, made of increasing thickness from the treble toward the bass strings of the instrument, in accordance with the increasing size of the strings, substantially as set forth.

2. A sounding board for musical instruments, made of increasing width and thickness from the treble toward the bass strings of the instrument, substantially as set forth.

3. The combination with the main frame and a sounding board composed of a number of layers, of a thin support extending inwardly beyond the main frame and bearing only against the marginal portions of the sounding board, substantially as set forth.

4. The combination with the main frame and a sounding board composed of a number of layers, of an open supporting frame extending inwardly beyond the main frame and composed of thin members bearing only against the marginal portions of the sounding board, substantially as set forth.

5. The combination with a sounding board composed of a number of layers and constructed of gradually increasing dimensions from the treble toward the bass strings of the instrument, of an open supporting frame composed of thin layers bearing only against the marginal portions of the sounding board, and made of correspondingly increasing dimensions, substantially as set forth.

6. The combination with a sounding board made of gradually increasing dimensions from the treble toward the bass strings of the instrument, of a bridge made of correspondingly increasing dimensions, substantially as set forth.

7. The combination with the sounding board and the bridge resting thereon, of a bearing bar arranged on top of the bridge, and strings arranged in two series, impinging against the front and rear sides of said bar, respectively, substantially as set forth.

Witness our hands this 6th day of May, 1893.

LORENZ MATT.
JOSEPH F. MATT.

Witnesses:
CARL F. GEYER,
FRED. C. GEYER.