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PIANO SOUNDING BOARD CONSTRUCTION

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Fig. 1

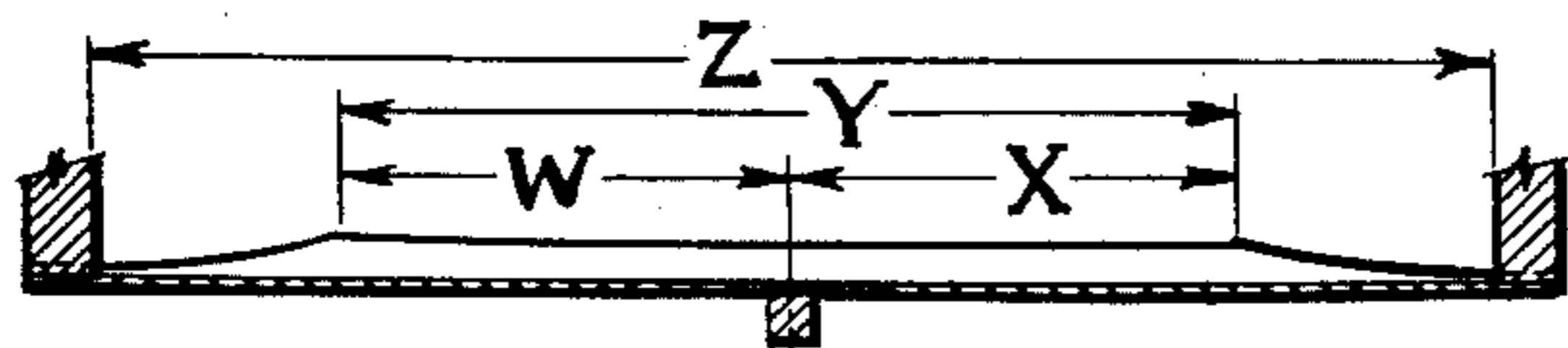
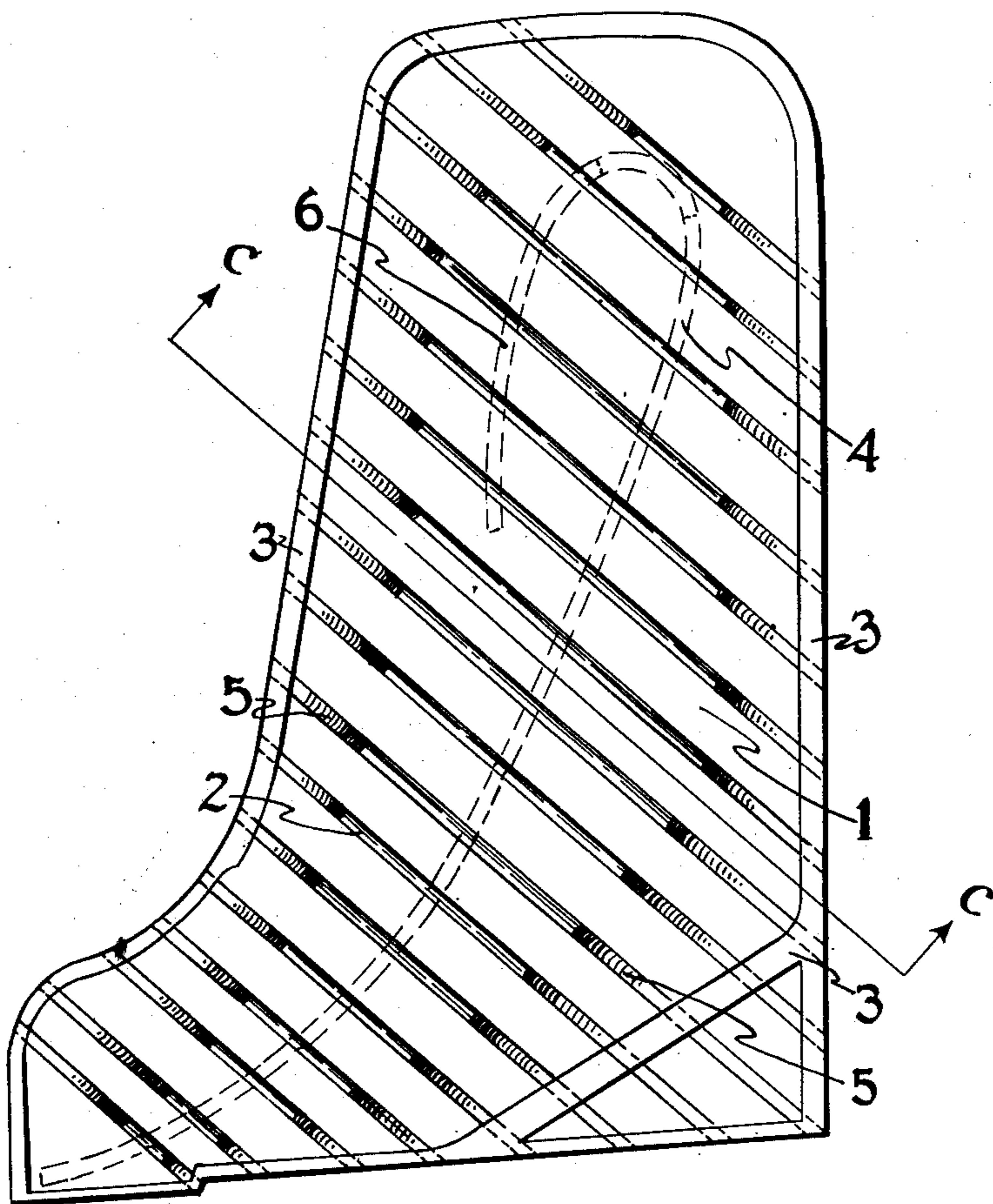


Fig. 2

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PIANO SOUNDING BOARD CONSTRUCTION

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11 Claims. (Cl. 84-192)

1

My invention relates to pianos and more particularly to piano sounding boards.

It is a primary object of the invention to increase the initial volume of piano tones through an improved sounding board construction.

Although the design of pianos is far from being an exact science, certain facts are known regarding the acoustic response of sounding-board assemblies. For instance, in the upper or treble range, the higher the frequency of the note played the less the sound is emitted from the sounding board itself, and the more the sound is emitted by the string-supporting metal plate. Also, the more important resonant points of the sounding board occur in the middle frequency range of the keyboard. It is also known that the area of the sounding board corresponding to this middle range is appreciably sensitive to changes in construction.

It is a usual practice in the construction of pianos to employ reinforcing bars or ribs on the opposite side of the sounding board from the string bridge and running transversely thereto. It is a further practice to gradually reduce the cross-sectional area (usually by reducing the height) of the above-mentioned ribs near their ends, this latter practice being commonly known as "feathering." It is an additional practice in the construction of pianos to "feather" the ribs in a manner such that a line joining the starting points of the feathering would describe a shape substantially similar to that of the inner rim of the piano and/or similar to the shape of the piano case.

I have discovered that the initial volume of the piano tones is measurably increased if the ribs are feathered in a manner such that the unfeathered portion of each rib is equally disposed on either side of the bridge. Although I prefer to carry out this equidistance with respect to all ribs, certain practical design considerations may require deviations from said equidistance as will be described hereinafter.

Following is a specific description of my invention, reference being made to the accompanying drawings wherein:

Figure 1 shows the under side of a grand piano sounding board embodying my invention.

Figure 2 is a sectional view thereof taken on the line C-C.

With reference to Figure 1 the sounding board 1 is supported in the piano by the inner rim 3. (The piano case has been omitted for simplification.) The string bridge 4, over which the vibratory strings pass, is mounted on the upper

2

surface of the sounding board 1. The reinforcing ribs 2, mounted on the lower surface of the sounding board 1, assist in the transmission of the vibrations from the bridge 4 to the sounding board 1. The feathered portions 5 of the ribs 2 begin at distances W and X, respectively, from a center line through the bridge 4 (see Fig. 2).

According to my invention, the initial volume of the piano tones is measurably increased if W=X on all ribs. In the instance of a grand piano (as illustrated in Fig. 1) where the bridge may be bent double in order to provide a short leg 6 for the bass strings, the feathering is equidistant from the bridge in the sense that the starting point of the feathering on one end of any one rib is the same distance from the nearer bridge section as the starting point of the feathering on the other end is from its nearer bridge section. For practical considerations, exception must be made regarding the feathering of the first one or two ribs where occurs the abrupt change from one bridge section crossing a rib to two bridge sections crossing a rib. Also, for practical reasons I may deviate from the equidistance feature on the first two or three ribs at the treble end of the sounding board. This may be necessary so as to provide more unfeathered length than would be available by maintaining the equidistance because a certain minimum unfeathered length must be retained on the ends of each rib in order to insure the best possible tone for the treble notes corresponding to said ribs.

In view of the previously presented facts regarding the acoustic response of sounding board assemblies, the above-mentioned deviations from equidistance are of no appreciable consequence.

Since rib dimensions are being compared quantitatively when the term "equidistant" is used, and since some sort of manufacturing tolerances are to be expected, I specify the following as being tolerances within which my effects are most perfectly attained, it being understood that departures from them can still be considered as being within the spirit of this invention. (These tolerances should not be confused with the design deviations mentioned above.) The amount of variation from the above-defined equidistance should preferably not exceed 2% of the overall rib length (designated as Z in Fig. 2) as measured between the intersections of the ribs with the inner rim. Expressing this mathematically, the quantity

$$\frac{W-X}{Z} \times 100$$

55

3

should be between -2 and $+2$; for instance, in a 25 inch rib with an unfeathered length Y of 12 inches, the dimensions W and X could differ as much as $\frac{1}{2}$ inch, being $6\frac{1}{4}$ and $5\frac{3}{4}$ or $5\frac{3}{4}$ and $6\frac{1}{4}$, respectively.

Modifications can be made in my invention without departing from the spirit of it. Having described my invention in an exemplary embodiment, what I claim as new and desire to secure by Letters Patent is:

1. In combination in a musical instrument, a sounding board, a bridge structure mounted thereon, and reinforcing ribs mounted on said sounding board on the side opposite from said bridge structure and being arranged transversely thereto, said ribs being feathered toward both ends beginning at points substantially equidistant from said bridge structure for each such rib.

2. In combination in a musical instrument, a sounding board, a bridge structure mounted thereon, and reinforcing ribs mounted on said sounding board on the side opposite from said bridge structure and being arranged transversely thereto, said ribs being feathered toward both ends, the majority of said ribs having an unfeathered portion substantially equally divided in length by said bridge structure.

3. In combination in a musical instrument, a sounding board, a bridge structure mounted thereon, and reinforcing ribs mounted on said sounding board on the side opposite from said bridge structure and being arranged transversely thereto, said ribs being feathered toward both ends, said bridge structure having a part crossing all ribs, and another part crossing certain of said ribs, the majority of said ribs which are crossed singly, having unfeathered lengths substantially bisected by said first mentioned bridge part, and the majority of said ribs crossed by both bridge parts having unfeathered portions which, as to each such rib, extend for substantially equal distances from the adjacent bridge parts.

4. In combination in a musical instrument, a sounding board, a bridge structure mounted thereon, and reinforcing ribs mounted on said sounding board on the side opposite from said bridge structure and being arranged transversely thereto, said ribs being feathered toward both ends in a manner such that an unfeathered portion of each rib extends beyond said bridge structure on one side substantially the same distance that another unfeathered portion of the same rib extends beyond said bridge structure on the other side.

5. In combination in a musical instrument, a sounding board, a double bridge structure mounted thereon, and reinforcing ribs mounted on said sounding board on the side opposite from said double bridge structure and being arranged transversely thereto, said ribs being feathered at both ends in a manner such that the unfeathered portion of each rib is equally disposed on either side of the area lying between the longitudinal center line of said double bridge structure.

6. In combination in a musical instrument, an inner rim, a sounding board supported thereby, a bridge structure mounted on said sounding board, and reinforcing ribs mounted on said sounding board on the side opposite from said bridge structure and being arranged transversely thereto, said ribs being feathered toward both ends in a manner such that the difference between the length of unfeathered rib-portion dis-

4

posed on one side of said bridge structure and the length of unfeathered rib-portion disposed on the other side of said bridge structure does not exceed two per cent of the total length of said rib as measured between the intersections of said rib with said inner rim.

7. In combination in a musical instrument, an inner rim, a sounding board supported thereby, a bridge structure mounted on said sounding board, and reinforcing ribs mounted on said sounding board on the side opposite from said bridge structure and being arranged transversely thereto, said ribs being feathered at both ends, the majority of said ribs being feathered in a manner such that the difference between the length of unfeathered rib-portion disposed on one side of said bridge structure and the length of unfeathered rib-portion on the other side of said bridge structure does not exceed two per cent of the total length of said rib as measured between the intersections of said rib with said inner rim.

8. In combination in a musical instrument, an inner rim, a sounding board supported thereby, a bridge structure mounted on said sounding board, and reinforcing ribs mounted on said sounding board on the side opposite from said bridge structure and being arranged transversely thereto, said ribs being feathered toward both ends, said bridge structure having a part crossing all ribs, and another part crossing certain of said ribs, the majority of said ribs which are crossed singly being feathered in a manner such that the difference between the length of unfeathered rib-portion disposed on one side of said first mentioned bridge part and the length of unfeathered rib-portion on the other side of said first mentioned bridge part does not exceed two per cent of the total length of said singly crossed ribs as measured between the intersections of said singly crossed ribs with said inner rim, and the majority of said ribs crossed by both bridge parts having unfeathered portions which, as to each rib, extend from the adjacent parts for distances which differ by not more than two per cent of the total length of said ribs crossed by both bridge parts as measured between the intersections of said rim with said inner rim.

9. In combination in a musical instrument, an inner rim, a sounding board supported thereby, a single bridge structure mounted on said sounding board and reinforcing ribs mounted on said sounding board on the side opposite from said single bridge structure and being arranged transversely thereto, said ribs being feathered toward both ends in a manner such that the difference between the length of unfeathered rib-portion disposed on one side of said single bridge structure and the length of unfeathered rib-portion disposed on the other side of said single bridge structure does not exceed two per cent of the total length of said rib as measured between the intersections of said rib with said inner rim.

10. In combination in a musical instrument, an inner rim, a sounding board supported thereby, a double bridge structure mounted on said sounding board and reinforcing ribs mounted on said sounding board on the side opposite from said double bridge structure and being arranged transversely thereto, said ribs being feathered at both ends in a manner such that the difference between length of unfeathered rib-portion disposed on one side of the area lying between the longitudinal center lines of said double bridge structure and the length of unfeathered rib-

portion on the other side of said area does not exceed two per cent of the total length of said rib as measured between the intersections of said rib with said inner rim.

11. In a piano a frame, a sounding board extending across said frame, a bridge structure non-symmetrically disposed on one side of said sounding board, and ribs on the other side of said sounding board extending from side to side thereof and transversely of said bridge structure, said ribs being feathered towards their ends, and central, unfeathered portions of said ribs being sym-

metrically disposed with respect to said bridge structure.

EDWARD J. SCHNEIDER.

REFERENCES CITED

The following references are of record in the file of this patent:

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