

No. 676,275.

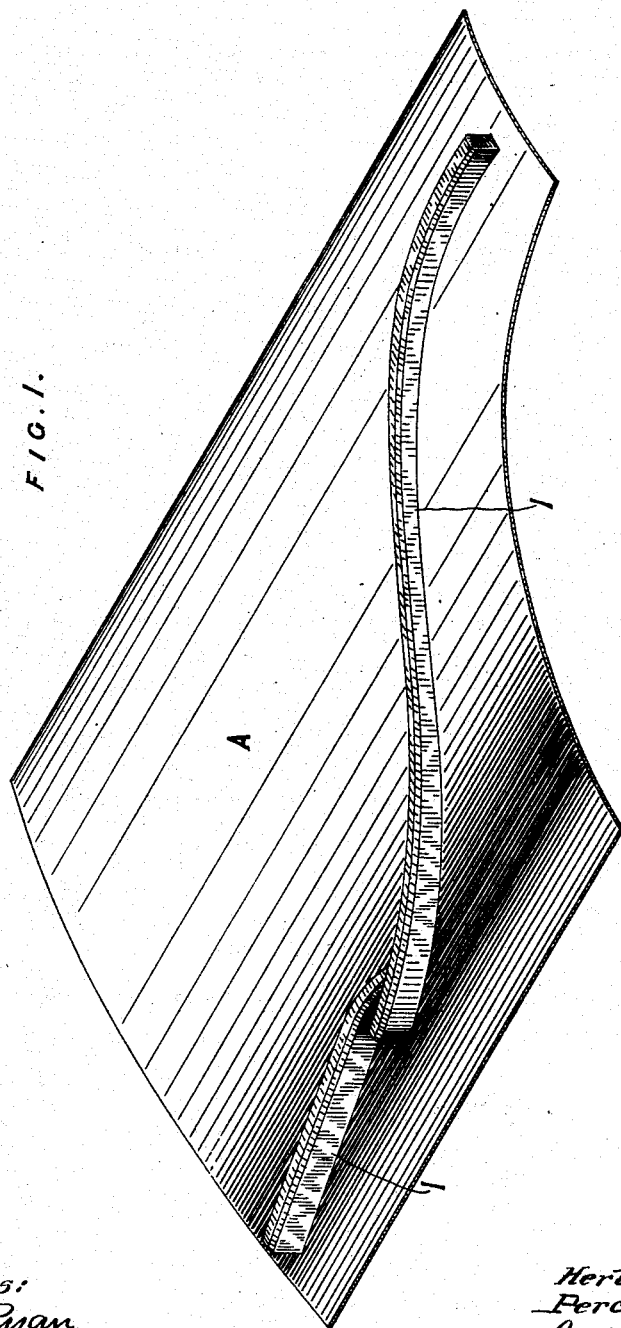
H. S., P. A. & O. E. READING.
PIANOFORTE.

Patented June 11, 1901.

(No Model.)

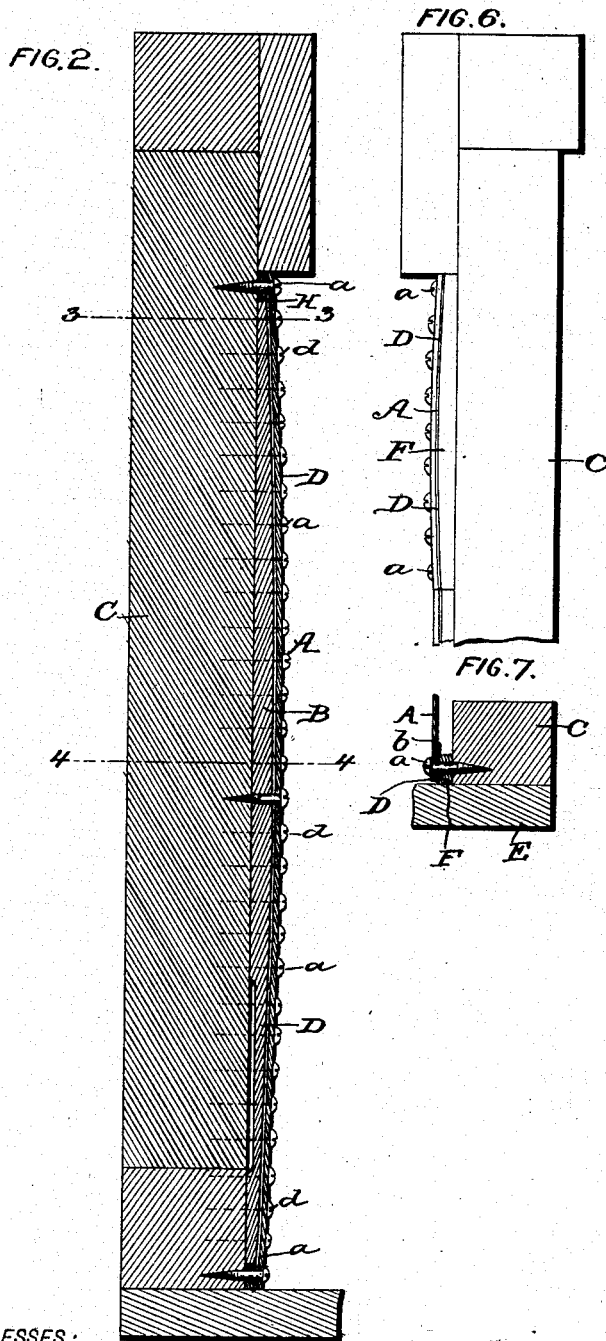
(Application filed Sept. 7, 1900.)

3 Sheets—Sheet 1.



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3 Sheets—Sheet 3.

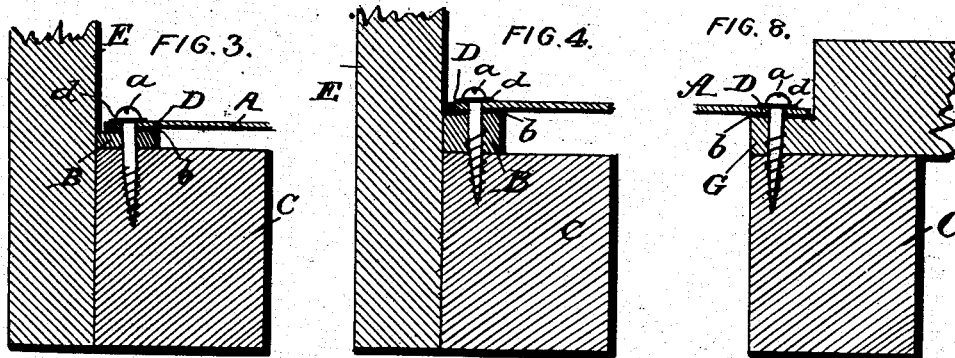


FIG. 5.



FIG. 9.

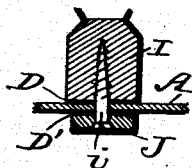
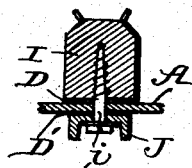


FIG. 10.



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UNITED STATES PATENT OFFICE.

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PIANOFORTE.

SPECIFICATION forming part of Letters Patent No. 676,275, dated June 11, 1901.

Application filed September 7, 1900. Serial No: 29,310. (No model.)

To all whom it may concern:

Be it known that we, HERBERT SAMUEL READING, furniture dealer, PERCY ARCHIBALD READING, pianoforte-tuner, and OWEN ELCOMER READING, manager of paper-mills, residents of 18 Albion road, Tunbridge Wells, in the county of Kent, England, have invented new and useful Improvements in Pianofortes, (for which applications for patents have been filed in Great Britain, dated and numbered February 16, 1900, No. 3,130, and July 4, 1900, No. 12,080, and in France August 18, 1900,) of which the following is a full, clear, and exact description.

Our invention relates to improvements in pianofortes, in which a soundboard formed of a rolled or cast plate or sheet of aluminium or aluminium alloy is employed, so that the instrument is adapted to withstand the effects of a hot damp climate so prejudicial to the ordinary wooden soundboard; and our present invention has for its object to increase the resonance or volume of sound, to obtain a longer sustaining power, and to improve the quality of the tone, and generally to obtain other advantages in the construction of the instrument.

The invention will be described with reference to the accompanying drawings, forming part of this specification, wherein—

Figure 1 is a perspective view of the soundboard alone, arched or cambered, as herein-after described, the degree of arching being exaggerated so as to render it apparent to the eye. Fig. 2 is a sectional side view of the bass end of the frame, showing the curvature of the fillet on which the soundboard is fixed at that end. Figs. 3 and 4 are cross-sections on lines 3 3 4 4, Fig. 2, and on a larger scale. Fig. 5 shows detail views of the top fillet. Figs. 6 and 7 are a face view and cross-section of the fillet at the treble end. Fig. 8 is a cross-section of the "bent-side" fillet. Fig. 9 is a cross-section of the bridge and back strap. Fig. 10 is a cross-section of the bridge with modified form of back strap.

The same letters of reference indicate the same parts in all the figures.

The soundboard is constituted by a rolled or cast plate A, of aluminium or alumi-

um alloy, about No. 12 gage for a rolled (or slightly thicker for a cast) plate.

The invention consists, primarily, in giving the plate or soundboard A an arched or cambered form, the curve being in one direction only and being uniform throughout the plate, the effect of this single curvature or arching of the plate in one direction only (in contradistinction to a dome-like form, as usual) being to enable the use of belly-bars to be dispensed with. Such belly-bars have hitherto been a necessity in order to support the soundboard against the down-bearing of the strings; but in the case of an aluminium soundboard they would have for effect to prejudice the sustaining qualities and tone of the instrument, whereas by the arched formation above referred to the soundboard acquires sufficient strength to resist the down-bearing of the strings without the aid of belly-bars.

We find that an arched plate rising five-sixteenths of an inch from the flat at the summit of the arch gives good results with a plate of No. 12 gage; but a greater or lesser degree of curvature may be used, according to circumstances. The direction of the arch or curve is in the direction of the strings, so that the summit of the arch will extend from bass to treble. If the summit of the arch is at right angles to the direction of the strings, the fillets to which the soundboard is fixed would be curved in the direction of their length both at the bass end and at the treble end, while the other two fillets (the top and bottom fillets in an upright instrument) would be flat, but the summit of the arch may extend diagonally from bass to treble, so as to coincide, approximately, in direction with the belly-bridge.

For a soundboard curved in one direction only, as first mentioned, the curvature of the fillets at the bass end of the soundboard may be such as is shown in Figs. 2, 3, and 4, wherein B is the fillet, curved to a rise of about five-sixteenths of an inch (more or less) at the middle of its length, the fillet being about one inch broad. It is inclined slightly backward in the direction of its width, as shown, (say to the extent of about one-sixteenth of

an inch,) so as to tend to throw the soundboard still farther forward, and so assist it to resist the down-bearing of the strings, as well as to insure that the soundboard A shall bear hard upon the inner edge *b* of the fillet. The soundboard A is fixed to the fillet by screws *a* at a pitch of about one and one-fourth inches apart, screwed through the fillet into the upright C of the frame behind, a layer D, of felt, blotting-paper, or other non-resonating material, being interposed between the plate A and the fillet B, and a washer *d*, of non-resonating material, being interposed between the screw-head and the plate. E is the side cheek of the case of the instrument. By comparing Figs. 3 and 4 the rise of the fillet and soundboard will be apparent.

The fillet F at the treble end (shown in Figs. 6 and 7) is curved to a rise of one-eighth of an inch at the middle of its length above the mean height of the ends, the lower end of the fillet being about one-eighth of an inch higher than the upper end. It is of the same width as and is also backwardly inclined to the same extent as the bass-fillet, and the treble end of the soundboard is screwed to it, with the interposition of non-resonating material D, by screws *a*, as for the bass-fillet.

The bent-side fillet G (shown in Fig. 8) has the same backward inclination as the others, and it is about one inch broad and is curved in the direction of its length to a rise similar to that of the corresponding opposite portion of the bass-fillet B, the soundboard being screwed to it in the same way as to the others, with an intervening layer of non-resonating material D.

The backward inclinations of the bass-fillet B, the treble-fillet F, and the bent-side fillet G in the direction of their width coact to strain the soundboard when it is fixed to those fillets, so as to tend to throw it forward and to enable it the better to resist the down-bearing pressure of the strings on the soundboard-bridge. The top fillet H is flat in the direction of its length, has the same backward inclination as the bass-fillet, and is preferably about one and one-fourth inches wide at the bass end, diminishing to three-fourths of an inch at the treble end, as shown. This fillet is fixed upon bearers or cross-pieces fixed between the uprights C of the frame, and the soundboard is screwed thereto with intervening non-resonating material in the same way as to the bass-fillet. The bottom fillet, which is not shown, has a uniform width of about one and one-fourth inches, is flat throughout its length, is backwardly inclined, and the soundboard is screwed to it with intervening non-resonating material in the same way as to the others. The backward inclination of the top fillet H and of the bottom fillet is slightly in excess of that which would be required in order to conform to the longitudinal curvature of the bass-fillet, so that the backward inclination of the top and bottom fillets will coact with that of the other fillets

to produce the desired effect on the soundboard, as above mentioned.

It is of course to be understood that the top fillet H and the upper ends of the bass and treble fillets B F correspond in level and similarly with regard to the bottom fillet and the lower ends of the bass-fillet B and the bent-side fillet G, and that the upper end of the bent-side fillet G and the lower end of the treble-fillet F also correspond. The plate would in any case preferably be rolled (or be otherwise made or brought) initially to a more curved or arched form than that of the fillets, so that in forcing it down onto the fillets the plate will be so strained as to cause it to tend to resist the down-bearing of the strings, (which is preferably rather greater than usual,) this tendency thus coacting with the arched form to obtain the desired result. The initial curvature so given to the plate is equal to a rise of, say, three inches, more or less.

The bridge I, Fig. 9, may be made of wood, as usual, or may be made of metal, and it is continuous, being merely notched where necessary to clear the bars of the metal frame. It is fixed to the soundboard, in conjunction with a fillet or back strap J, (corresponding in shape to that of the bridge,) by screws *i*, passing through both, layers D D' of blotting-paper or other non-resonating material intervening between the soundboard and the adjacent surfaces of the bridge and back strap, which surfaces are shaped to correspond to the arched form of the soundboard. The bridge is made of greater depth than usual, (say about one and one-half inches in depth,) so as in cooperation with the back strap to more efficiently stiffen the soundboard and enable it the better to resist the down-bearing of the strings.

The back strap J may be of wood and may be graduated in depth—that is to say, deeper toward the middle of its length—so as to still further strengthen or reinforce the soundboard where required, or the back strap may be of channeled or other suitable cross-section and be made of metal, (say of cast-aluminium,) as shown in Fig. 10, the flanges being deeper toward the middle of the bar, so as to obtain increased stiffness for the purpose of reinforcing the soundboard at that part.

The soundboard may be rolled, cast, or otherwise made of slightly-greater thickness where required to compensate for weakness at any particular part—say toward the center—the extra thickness gradually merging into the normal thickness of the plate. The plate, if cast, may have cast in one with it one or more strengthening-ribs at back, which may follow the direction of the bridge and serve also as the back strap for use in fixing the bridge.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, we declare that what we claim is—

1. In a pianoforte, a soundboard formed of a plate of aluminium or aluminium alloy, arched or cambered in one direction only throughout, so that it will sustain the down-bearing of the strings without the use of belly-bars, the summit of the arch extending from bass to treble transversely of the direction of the strings, and the soundboard being fixed upon fillets longitudinally curved to correspond to the intended curvature of the soundboard, as described.

2. In a pianoforte, a soundboard formed of a plate of aluminium or aluminium alloy, arched or cambered in one direction only throughout, so as to enable it to sustain the down-bearing of the strings without the use of belly-bars, the summit of the arch extending from bass to treble transversely of the direction of the strings, and the soundboard being fixed upon fillets longitudinally curved to correspond to the intended curvature of the soundboard, the soundboard being initially curved to a more curved form than that of the fillets so that it is strained when fixed thereto in such manner that it acquires a tendency to resist the down-bearing of the strings, as described.

3. In a pianoforte, the combination with a soundboard formed of a plate of aluminium or aluminium alloy, initially curved to an arched or cambered form, the curve being in one direction only as described, of fillets backwardly inclined in the direction of their width, so that the soundboard when fixed thereon will rest upon the inner edge of the

fillets and will be subjected to leverage exerted on the margin of the soundboard by the holding-down screws resisted by the inner edge of the fillets as a fulcrum, whereby the soundboard will be strained forward in such manner as to coact with the arched or cambered form in resisting the down-bearing of the strings upon the soundboard.

4. In a pianoforte, the combination with a soundboard formed of a metal plate arched in one direction only throughout, of fillets backwardly inclined in the direction of their width, means of fixing the margin of the soundboard upon the backwardly-inclined faces of the fillets so as to exert leverage thereon tending to cause the soundboard to assume a more forwardly-arched form, a bridge, and a back strap corresponding to the bridge in shape and position, the bridge and back strap being united with the soundboard between them, and having their surfaces adjacent to the soundboard shaped to conform to the arched form of the plate, so that the bridge and back strap will coact with the backwardly-inclined fillets and means of fixing the plate thereon, in maintaining the arched form of the soundboard.

Dated the 27th of August, 1900.

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