Feb. 18, 1930. F. R. LELAND ET AL 1,747,307

SOUNDING BOARD

Filed July 24, 1925

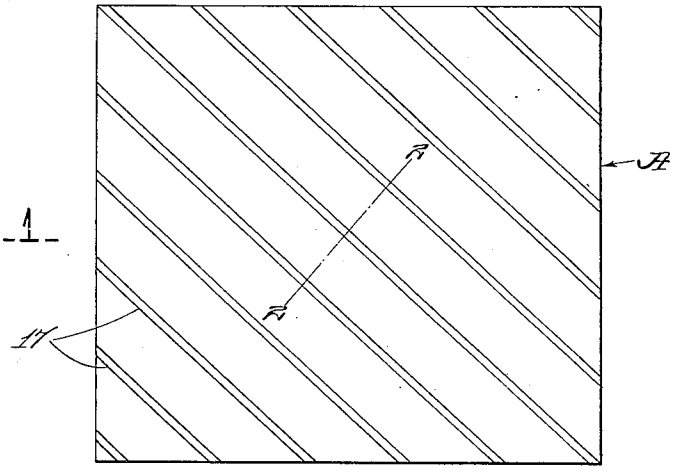


Fig. 1.

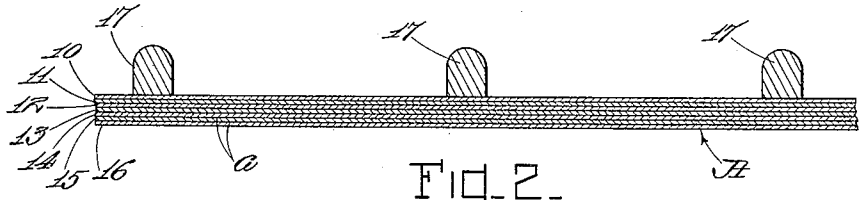


Fig. 2.

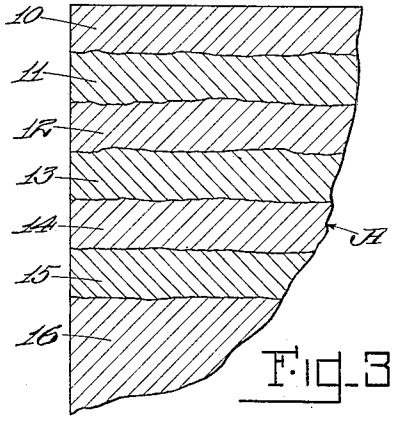


Fig. 3.

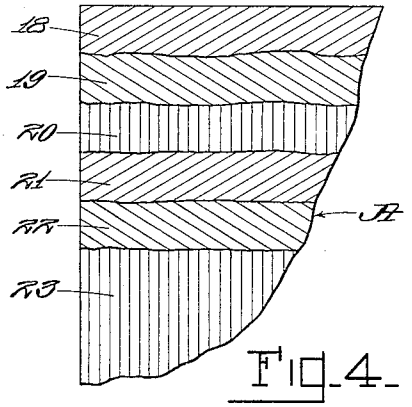


Fig. 4.

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UNITED STATES PATENT OFFICE

FRANK R. LELAND AND EDMUND C. CHARLES, OF NEW WESTMINSTER, BRITISH COLUMBIA, CANADA, ASSIGNORS TO LAMINATED MATERIALS COMPANY, LTD., OF NEW WESTMINSTER, BRITISH COLUMBIA, CANADA, A CORPORATION OF BRITISH COLUMBIA

SOUNDING BOARD

Application filed July 24, 1925. Serial No. 45,804.

Our invention relates to an improved sounding board for musical instruments such as pianos, harps, dulcimas, guitars, and the like. It has for its object to provide a sounding board which will improve the quality of the tone while at the same time greatly increasing the volume. The board embodying our invention greatly increases the durability of the instrument without increasing its cost.

Heretofore, sounding boards, particularly for pianos and the like, have been made from narrow strips of some long grained wood such as spruce or pine glued together, the strips being arranged diagonally, in most cases, of the board. On the back of the sounding board are usually secured ribs or braces also on the diagonal but transversely of the strips composing the sounding board, but the sounding board proper does not include the braces.

We have found by observation that the strips of spruce or pine composing the sounding board expand or contract under the influence of moisture and changes in temperature, and that this causes strains due to the fact that the board tends to move independently of the main structure of the piano and of the strengthening ribs. These strains tend to crack or split the sounding board or buckle it and break it loose from the main structure of the piano. They also result in the breaking of the glue joints or the cracking of strips particularly in warm or moist climates. The result of this buckling or splitting is a structural break which is costly to repair since the entire piano has to be taken apart. If the break is not repaired, the sounding board rattles or buzzes and the tone qualities of the piano are seriously injured.

We have found that very much better results may be obtained by making a sounding board from a soft wood as free as possible from alternate hard and soft grains, said sounding board being composed of several layers with the grain running in two or more directions, the pores or cells of which have been permanently deformed by heat and pressure. While the causes of the improved results which we obtain cannot be stated with absolute certainty, we believe that they are due to the freedom of the board embodying our invention from alternate hard and soft grains which we believe interfere with the vibrations of the sounding board, and also to the fact that the board is nearly uniform in all directions so that the tendency of the wood to dampen the vibrations in one direction is not greater than its tendency to dampen them in another direction. Furthermore, the increased strength which is obtained, as hereinafter described tends to increase the volume of tone, it being well understood that a diminishing of the thickness of the sounding board increases the volume of tone.

Accordingly, we prefer to make our improved sounding board as shown in the accompanying drawings in which our invention is shown as embodied in a sounding board for a piano.

The invention will be fully understood from the following description when taken in connection with the accompanying drawings, and the novel features thereof will be pointed out and clearly defined in the claims at the close of this specification.

In the drawings:

Fig. 1 is a rear elevation of a sounding board embodying our invention.

Fig. 2 is an enlarged section on the line 2—2, Fig. 1.

Fig. 3 is an enlarged view of a portion of the sounding board showing the arrangement of the several plies.

Fig. 4 shows another arrangement of plies.

Referring now to the drawings, at A is shown the sounding board complete, being composed of several plies or layers, as, for instance, seven,—10, 11, 12, 13, 14, 15 and 16, secured together by glue or cement films *a*, *a*. As will be seen in Fig. 3, the grain or adjacent plies or layers runs in opposite directions. In this figure, the plies are shown as having the grain running in two directions at right angles to each other. It will therefore be seen that sound waves may travel in two directions at right angles to each other with equal freedom. The plies are preferably made of some porous homogeneous wood which is as free as possible from alternate hard and soft grains as is the case in spruce, fir, and the like. Cottonwood is, as far as we

know, the best wood for the purpose, since it is very porous and homogeneous with relatively uniform density of grain. Furthermore, the pores or cells are of such a character as to respond readily to the heat and pressure treatment hereinafter described. The best results are obtained by employing a veneer cut circumferentially from the log since this increases the homogeneity of the wood by lessening the frequency with which alternate hard and soft areas occur, as compared with veneers which are cut diametrically of the log. We also find that the acoustic properties of the sounding board are very much improved by permanently deforming the pores or cells of the wood which is done by subjecting the sounding board to heavy pressure and to heat while the walls of the cells are in a soft condition due to the presence of moisture and holding the board under pressure until the moisture has dried out and the cells have taken on a permanent shape.

In making our improved sounding board, we cut circumferential sheets of veneer from a moist or green cottonwood log, spread the veneers with a suitable glue or cement made from a suitable animal or vegetable albumen, lay the veneers in suitable relations to each other and then subject the whole to high temperatures in a hydraulic press which will exert sufficient pressure to collapse the cells of the several layers. The pressure and heat are continued until a sufficient amount of moisture is evaporated to render the deformation of the cells permanent. This treatment greatly increases the tone qualities of the finished sounding board. Thereafter, the edges of the panel may be trimmed off and ribs 17, 17, etc. are glued to the back of the board in the proper position if it is decided to use ribs, but the superior strength of our sounding board makes it possible to reduce the size and number of the ribs or perhaps to omit them altogether. This material also admits of a larger crown being put into the sounding board.

In Fig. 4 I have shown a portion of a sounding board composed of six plies, 18, 19, 20, 21, 22, and 23. The plate 18, 19 and 20 are arranged at 120° from each other, and the other three plies in similar positions.

We find that instruments fitted with sounding boards embodying our invention have greater volume of tone than those having sounding boards of ordinary construction due, we believe, to the uniformity and speed with which the sound waves can travel in all directions. These facts are readily ascertained by comparing two boards by means of a tuning fork, when the greater sweetness of tone and the increased volume are at once apparent. They are also clearly apparent when a sounding board embodying our invention is placed in a small piano, which will then be found to have the tone qualities and volume of sound of a piano of considerably larger size. The increase in the volume and the improvement in quality are particularly valuable in small pianos in which the upper notes are usually thin, weak and harsh.

We find also that a piano provided with a sounding board embodying our invention will stay in tune much longer, and that the sounding board embodying our invention is practically uninjured by varying conditions of heat and moisture. Apparently, also, the sounding boards embodying our invention are considerably stiffer for the given thickness than spruce sounding boards, as it is found that after a considerable and equal number of tunings the boards embodying our invention will have sprung or changed form very much less, frequently only a third as much as the spruce sounding board. This is an important characteristic, since change of form inevitably results in a loss of tune.

We also find that it is possible to use a thinner sounding board than has heretofore been possible. As a thin sounding board gives greater volume of sound than a thick one, this is a great improvement.

What we claim is:

1. The method of making a sounding board which comprises cementing together a plurality of plies of open-pored and relatively homogeneous wood arranged with the grain of adjacent plies at an angle to each other, and permanently deforming the cells of said plies by the application of heat and pressure.

2. The method of making a sounding board which comprises cementing together a plurality of circumferentially cut plies of veneer arranged with the grain of adjacent plies at an angle to each other, and permanently deforming the cells thereof.

3. The method of making a sounding board which comprises securing together with a waterproof cement a plurality of circumferentially cut plies of cottonwood arranged with the grain of adjacent plies at an angle to each other, and permanently deforming the cells thereof by the application of heat and pressure.

In testimony whereof we affix our signatures.

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