

(No Model.)

2 Sheets—Sheet 1.

W. C. ZEIDLER & A. NEWELL.  
METHOD OF MAKING KEY BOARDS.

No. 423,104.

Patented Mar. 11, 1890.

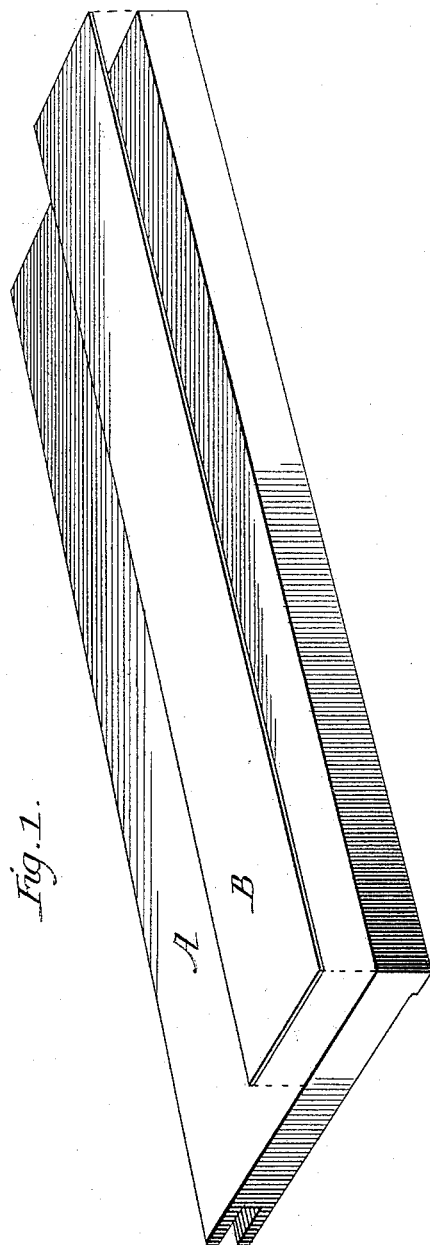
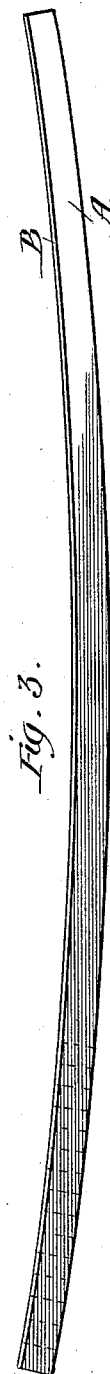
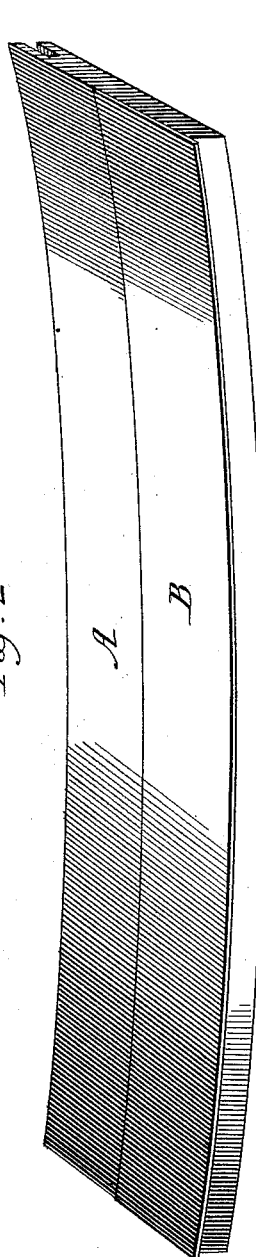


Fig. 2



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Ambrose Risdon  
J. L. Thomas.

INVENTORS:

William C. Zeidler  
Augustine Newell  
by Cyrus K. L. L.  
Atty.

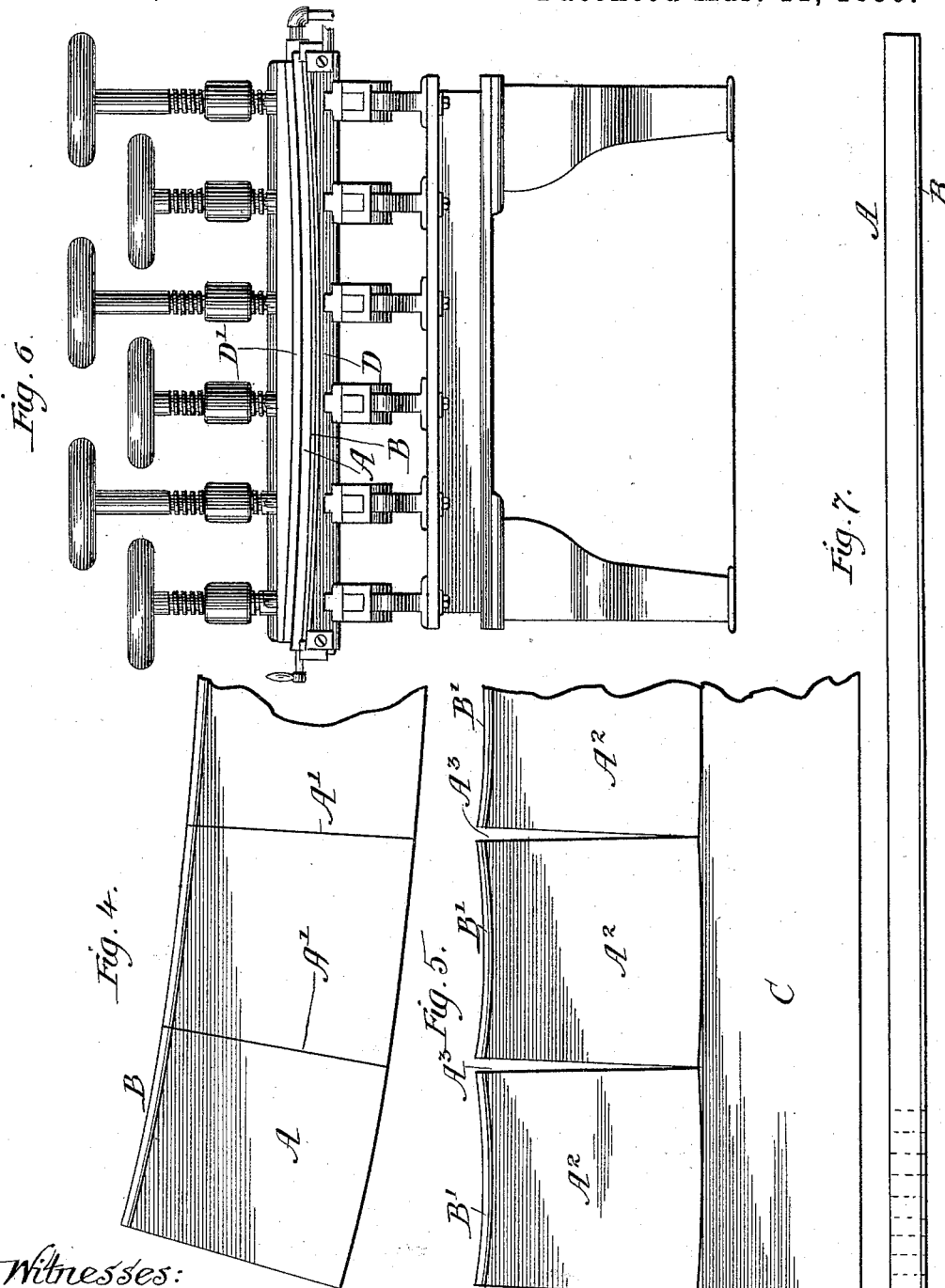
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# UNITED STATES PATENT OFFICE.

WILLIAM CARL ZEIDLER, OF TORONTO, ONTARIO, CANADA, AND AUGUSTUS  
NEWELL, OF CHICAGO, ILLINOIS.

## METHOD OF MAKING KEY-BOARDS.

SPECIFICATION forming part of Letters Patent No. 423,104, dated March 11, 1890.

Application filed January 6, 1890. Serial No. 336,008. (No model.)

### *To all whom it may concern:*

Be it known that we, WILLIAM CARL ZEIDLER, a subject of the Queen of Great Britain, residing at Toronto, county of York, Dominion of Canada, and AUGUSTUS NEWELL, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in the Method of Making Key-Boards; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates particularly to the application of sheets of celluloid to organ and piano key-board blanks preparatory to sawing the blanks into keys. A peculiarity of celluloid is that it shrinks after being applied to the wooden blank. This shrinkage always results in drawing the wooden blank out of its flat shape. This is a difficulty which has been felt by all manufacturers, and so far as we have been informed no one has succeeded in overcoming the same.

Figure 1 shows the wooden blank preparatory to receiving the sheet of celluloid. Figs. 2 and 3 show such blank and celluloid united. Figs. 4 and 5 illustrate in a large way the effect of the warping. Fig. 6 shows the blank and celluloid in a press undergoing our improved method. Fig. 7 shows the blank and a sheet of celluloid after being united by our new method.

A is the blank, and B is the sheet of celluloid. The blank is a board cut of proper width and length to make a set of keys. The sheet of celluloid is of proper width to cover that portion of the upper face of the blank which is exposed after the key-board is placed into the organ or the piano. A suitable adhesive is interposed between the sheet of celluloid and the surface of the blank to which said sheet is to be applied, and then the sheet and blank are pressed together in a press.

As shown in Fig. 1, the blank and the sheet of celluloid are of equal length and both are

straight. By the old method they are united in this form, and after they are removed from the press the celluloid invariably shrinks while the wood does not, or if it does it shrinks less than the celluloid. Consequently the blank is always drawn into the curved form shown in Figs. 2 and 3. All manner of attempts have been made to avoid this; but our intimate acquaintance with this branch of manufacture convinces us that prior to the invention of our improved method no one has been able to avoid this difficulty. This defect remains in the key-board after the blank has been sawed into keys and the key-board placed in the piano or the organ. Figs. 4 and 5 will illustrate this point.

In Fig. 4 a short portion of the key-board is shown, and A' A' indicate the lines upon which the key-board is to be sawed to form the separate keys A<sup>2</sup>.

C is a portion of the frame upon which the keys are to rest. This is straight on its upper surface. When the board, as shown in Fig. 4, is sawed on the lines A' A', then the keys A<sup>2</sup> A<sup>2</sup> A<sup>2</sup> may be brought into a horizontal plane upon the upper surface of the frame C. By thus bringing said keys into a horizontal line their upper portions will separate to form wedge-shaped spaces A<sup>3</sup> between them. Thus the visible joint between the keys is larger than desirable, and the sides of the keys are exposed unnecessarily. The strip of celluloid B' on each key will also be curved on the same radius that the blank shown in Fig. 3 is curved. Thus the upper surface of each key is hollow to a certain degree. Musicians object to this, and the fact that these keys are thus hollow is one of the chief reasons why the better class of musicians have heretofore objected to celluloid key-boards. For an easy action of the fingers they want each key provided with a flat surface. This hollow form of the keys is all the more apparent because the celluloid is highly polished to imitate ivory. In looking obliquely over such a polished board all the defects in its surface are readily seen. These key-boards are manufactured as a specialty by a limited number of manufacturers, who furnish them to manufacturers of organs and pianos. These manufacturers of organs and

pianos are constantly demanding greater perfection in the key-boards furnished them, and the defects herein mentioned and others are taken into consideration in purchasing. The preference is, of course, given to the key-board manufacturer who produces the key-board which is nearest faultless. The elimination of the curvature is then, as a matter of course, an important step.

10 In the practice of our improved method we ascertain approximately how much curvature of the blank is produced by the shrinkage of the celluloid when applied in the ordinary way. We then use this curvature as a guide  
15 in applying the celluloid, bending the blank in the opposite direction to about the same curvature and then applying a sheet of celluloid to the convex side of the blank. In this way we use a greater length of celluloid than  
20 of the wooden blank, and when the celluloid has shrunk it is equal to the length of the wooden blank and the latter has resumed its straight form. Thus the surface of the celluloid is an entirely plain surface throughout,  
25 and when the keys are sawed their upper portions do not separate at the joints and the celluloid surfaces are not concave.

The press shown in Fig. 6 is adapted to the practice of our improved method.

30 D is the bed of the press, and D' is the movable head thereof. The blank A and the sheet of celluloid B are placed between said bed and head to be held together until united. The bed D is concave between its ends to  
35 about the same degree of curvature that the key-board is warped when manufactured by the old method. The lower face of the head D' is made convex in the same degree that the bed D is made concave. The sheet of  
40 celluloid and the wooden blank are placed face to face with the adhesive between them, and then together placed in the press with the celluloid down toward the bed D. On driving the head D' down against the wooden

blank the blank and the sheet of celluloid 45 are driven downward at the middle until they conform to the bed D. The pressure is retained until the adhesive and the celluloid are set upon the wooden blank. On the removal of the key-board from the press the 50 celluloid is allowed to shrink to its full extent, and in so doing it draws the wooden board back to its straight form, as shown in Fig. 7.

The bed D may be made convex, while the 55 head D' is made concave. Then the celluloid and blank must be placed into the press with the celluloid on top. We show the other form because the blank is usually put into the press with the celluloid down. 60

Some musicians, particularly pianists, prefer a slight convexity in the finished keys. Such convexity may be produced by our process by bending the wooden blank and sheet of celluloid a little more than is required to 65 produce the plane surface.

We claim as our invention—

The herein-described method of manufacturing key-boards for pianos and organs, which method consists in applying a sheet 70 of celluloid and a wooden blank face to face, with an adhesive interposed between them, then bending said blank and celluloid with the convexity on the side of the celluloid, then subjecting the celluloid and blank to pressure while so bent until the adhesive and celluloid are set, and then releasing the blank and celluloid from pressure and allowing the celluloid to shrink, substantially as shown 80 and described.

In testimony whereof we affix our signatures, in presence of two witnesses, this 19th day of December, 1889.

WILLIAM CARL ZEIDLER.  
AUGUSTUS NEWELL.

Witnesses:

JAS. R. ROAF,  
RICHARD ARMSTRONG.