

Oct. 3, 1939.

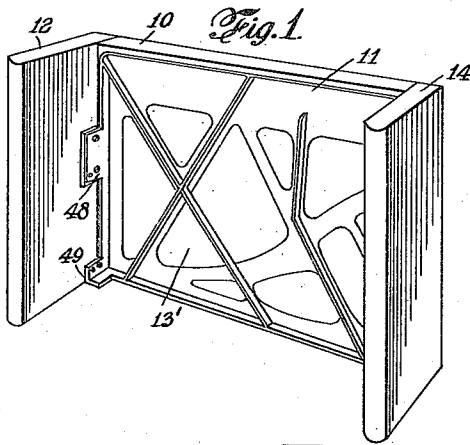
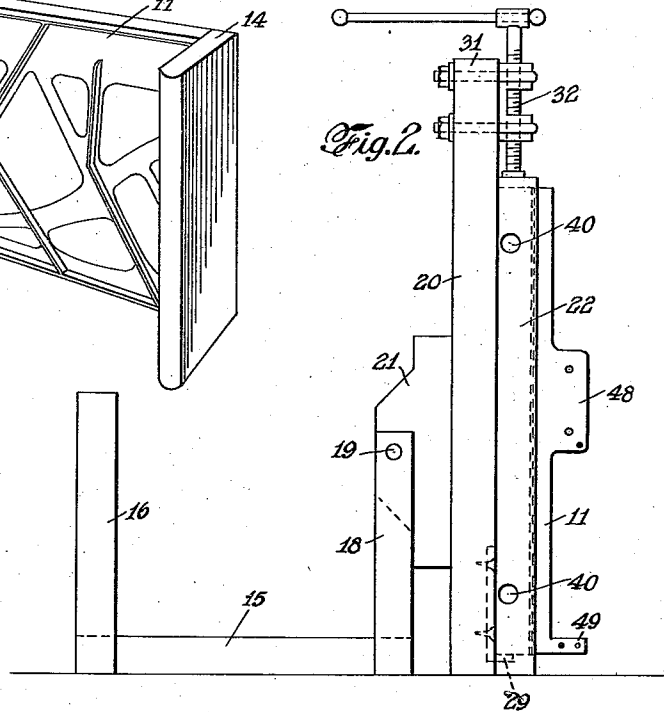
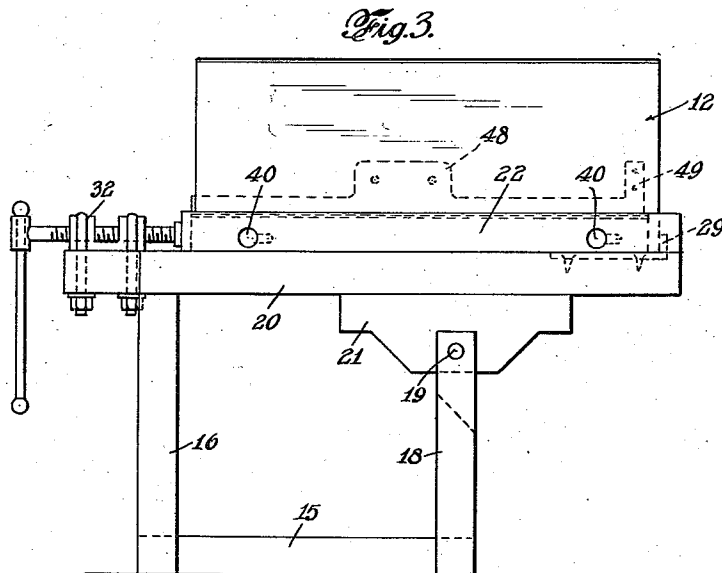
J. SAUERLAND

2,174,670

APPARATUS FOR ASSEMBLING PIANO CASES

Filed Oct. 30, 1936

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 4.

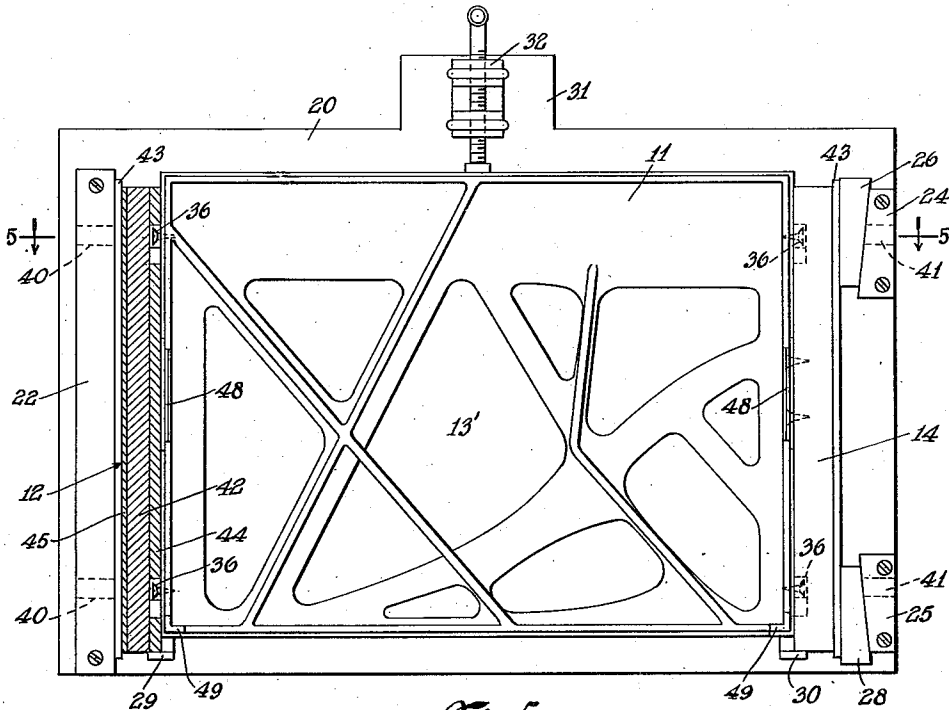


Fig. 5.

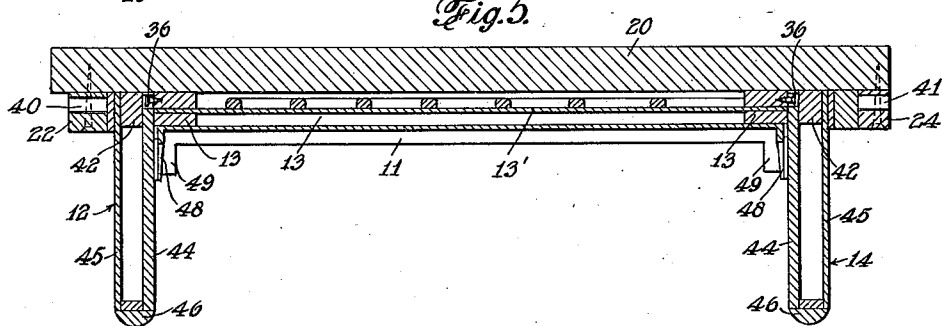


Fig. 6.

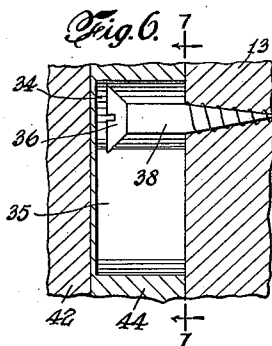


Fig. 7.

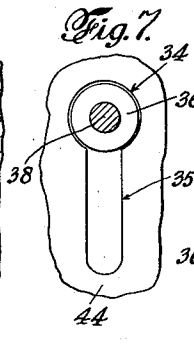


Fig. 8.

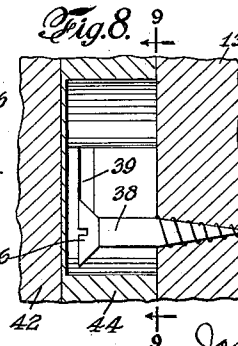
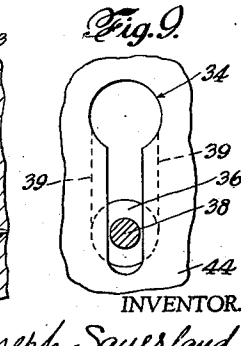


Fig. 9.



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## UNITED STATES PATENT OFFICE

2,174,670

## APPARATUS FOR ASSEMBLING PIANO CASES

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Application October 30, 1936, Serial No. 108,324

1 Claim. (Cl. 144—288)

This invention relates to the manufacture of piano cases and more particularly to cases for so-called "miniature" pianos, that is to say, pianos of the upright type having the keyboard at or near the top of the instrument.

The major parts of the piano case are the back assembly, which includes the wooden framework, the sounding board and the metal string frame, and the two sides. These sides are of a hollow, box-like construction, serving not only as parts of the cabinet but also as sound chambers for the improvement of the tone of the instrument. An object of the invention is to provide a piano case of the type described which shall be of simple construction yet strong, and shall have the desired acoustic characteristics. The back assembly and the sides are constructed as separate units and a further object of this invention is to provide a method of and apparatus for assembling them together quickly, accurately and with a minimum of labor. This invention makes it possible for one man to perform all of the operations of assembling without assistance, as will more fully appear hereinafter.

Other objects and advantages will be apparent from the following detailed description of the present preferred embodiment of the invention, taken in connection with the drawings, in which:

Fig. 1 shows in perspective the assembled back and sides of a piano case for a "miniature" piano;

Fig. 2 is a side view showing the apparatus used for assembling the case with the table in vertical position and the back of the piano case in place thereon;

Fig. 3 is a view corresponding to Fig. 2, but with the table in horizontal position and showing the sides of the piano case in place;

Fig. 4 is a top plan view, partly in section, of the table with the back and sides of the piano case in position thereon;

Fig. 5 is a cross-section taken on the line 5—5 of Fig. 4;

Fig. 6 is a detailed cross-section showing the means for securing the side to the back of the piano, and

Fig. 7 is a view taken on the line 7—7 of Fig. 6.

Figs. 8 and 9 correspond with Figs. 6 and 7, respectively, but show the position of the fastening means after relative movement of the back and side into locking position.

The construction of the piano case will be described first, followed by descriptions of the apparatus used for assembling it and the method of assembling.

Referring to Fig. 1, it will be seen that the main parts of the piano case are the back assembly 10 and the sides 12 and 14. Many detailed parts such as strings, bridges, tuning pins, etc., are omitted for greater clarity, being no part of the invention. The back assembly 10 (see Figs. 4 and 5) includes the iron string frame 11, which is of such rigidity and strength as to require no support from the wood parts. To the frame 11 a rather light, rectangular wooden frame structure 13 is secured by screws (not shown), in which is held the sounding board 13'. The frame 11 is provided at its two lower corners with short angular extensions 49 and midway of its sides with flat lugs or brackets 48, these extensions and brackets being provided with holes for screws.

The sides 12 and 14, it will be noted, are hollow and are built up of the base pieces 42, inner panels 44, outer panels 45, front pieces 46, tops and bottoms. The panels are preferably of plywood. The box-like construction of these sides greatly improves the tone of the piano as the sides act as sound chambers or resonators for the vibrations transmitted to them from the back.

The sides, after being built, are prepared for assembling by cutting in them the openings illustrated in Figs. 6-9, the locations of which may be seen in Figs. 4 and 5. These openings are generally in the shape of a keyhole and consist of a round hole or boring 34 into which opens an elongated slot 35. The hole 34 is of such a size as to receive freely the head 36 of a large flat-head screw. The slot 35 is of a size to receive freely the shank 38 of the screw. The sides may be completely finished with varnish or lacquer prior to assembling.

It will, of course, be understood that after the case has reached the stage shown in Fig. 1, the piano is completed by installing the action, keyboard, top, baseboard, front, etc. The present invention does not relate to any of these parts or subsequent operations.

Referring to Figs. 2-5, the apparatus used in assembling the piano case consists of a standard having a base 15, rear uprights 16 and front uprights 18. Secured to the front uprights 18 by suitable pivots 19 is the table 20 provided with bracket members 21 which are attached to the pivots 19. The table 20 is so mounted that it will remain either in the vertical or horizontal position and in the latter position, as shown in Fig. 3, it rests upon the rear uprights 16.

On the top of the table, as is best shown in Figs. 4 and 5, clamping means are provided for applying pressure to the units in assembling them

consisting of the stationary block 22 at the left and the bevelled wedge blocks 24 and 25 at the right. A pair of wedges 26 and 28 cooperate with the wedge blocks to clamp the parts. Secured to the lower edge of the table are a pair of metal stops 29 and 30 which are preferably sunk into the top of the table so as to have their body portions flush with the surface. On the opposite side of the table, and preferably mounted on a tongue 31 provided for that purpose, is a screw clamp 32 adapted to press against the upper side of the back 10 and force it toward the stops 29 and 30.

Figs. 6 and 7 show the position of the sides relative to the back and fastening screws during the first step of the assembly. After being thus positioned and while the sides are held securely against the edges of the back by the wedges 26 and 28, the back and sides are moved relative to one another so that the screws move into the position shown in Figs. 8 and 9. As shown in those figures, this movement causes the head 36 of the screw to cut a groove 39 into the wood surrounding the slot 35, which results in securely locking the sides to the back.

The operation of assembling the piano case is as follows: The table 20 is placed in the vertical position shown in Fig. 2, so as to make it possible to place the back assembly against the table, requiring it to be lifted only a few inches from the floor, as can easily be done by one man. Initial engagement of the rear edge of the back assembly with the stops 29, 30 is accomplished by tilting said assembly away from the table 20 on the extensions 49 of the string frame, which elevates the rear edge to the level of the stops 29, 30, onto which it can be moved by sliding it along the floor. Tilting the back assembly toward the table then lifts it off the floor with expenditure of very little effort. In this operation, the back is rested on the stops 29 and 30 and held temporarily against the table 20 by the clamp 32. The table is then turned into the horizontal position shown in Fig. 3. The clamp 32 is then released and the back is moved away from the stops 29 and 30 a short distance, as shown in Fig. 4. The positions for the four screws 36 are marked on the back, holes drilled, and the screws are inserted. To enable this to be done easily two holes 40 are cut in the stationary block 22 and similar holes 41 are cut in the wedge blocks 24 and 25, opposite the screw positions through which drills and screw drivers may be inserted. The sides are then painted with glue on the surfaces which will abut the back, and the sides are put in position with the screw-heads 36 inserted into the holes 34, as shown in Figs. 6 and 7. The bottoms of the sides rest against the stops 29 and 30 and, as is obvious, the back is above these stops by the distance through which the screws 36 will travel from their initial to their fastening positions, as shown respectively in Figs. 6 and 8.

Fillets 43 of smooth wood are put in place against the sides to protect their finish and the wedge blocks 26 and 28 are then driven into position to clamp the sides securely against the back. While the parts are maintained under this clamping pressure the screw clamp 32 is turned to force the back toward the stops 29 and 30 until it engages them. During this operation the glue, which is still wet, serves as a lubricant. The screw heads cutting into the wood of the sides during this operation lock the sides securely to the back.

Due to slight variations in the size or shape of

the string frame, which inevitably result from the fact that it is a casting, the string frame is made of such a size that it does not quite reach the sides 12 and 14. After the operations described above are completed and after the sides have been squared up, wooden shims are inserted to fill the spaces between the sides and the lugs 48 and extensions 49, after which the sides are securely screwed to these lugs and extensions.

The piano case may then immediately be removed from the table, although the glue has not yet dried, as the sides will be securely held accurately in position on the back assembly. The case is removed from the table by returning it to its vertical position as shown in Fig. 2, releasing the clamp 32 and sliding the case off onto the floor.

It will be seen that great economy of time is effected by not having to wait for the glue to dry before the further operations of assembling a complete piano are proceeded with. Further economy is effected by reason of the fact that the entire assembly may be done by one man without assistance. Moreover, he initially fastens both sides in place by a single movement between the back and sides produced by the screw clamp 32.

The construction of the piano case described above is the subject of my copending application, Serial No. 184,169, filed January 10, 1938.

The foregoing description pertains only to what is now considered the preferred embodiment of the invention and it is obvious that many changes in detail might be made therein. For example, the screw clamp 32 might be replaced by any means performing the equivalent function, such as an hydraulic jack or a device working from pneumatic pressure. Similarly, the wedges might be replaced by any devices performing the equivalent function. While flat-head screws are the means disclosed for fastening the sides to the back, any suitable fastening member may be used. Instead of using a fastening which will cut its own groove a fastening not capable of so doing might be used in conjunction with a groove preformed to receive it.

What is claimed is:

Apparatus for use in joining the sides to the back assembly in the making of an upright piano wherein the sides are locked to the back by fastenings rendered operative by relative sliding movement between the back and the sides, comprising a table upon which the sides and back assembly are supported while being locked together, a support upon which the table is tiltable into either a horizontal or vertical position and so arranged that the table will be maintained in either position by gravity and when in the vertical position will have an edge adjacent the floor, outwardly extending stop means carried by the table adjacent the edge which is lowermost when the table is in vertical position whereby the back assembly may be engaged by said means while still partially resting on the floor, clamping means secured to the table in opposing relation to said stop means and adapted to temporarily engage the back assembly to hold it while the table is moved into horizontal position and to forcibly move said assembly toward said stop means during the joining operation, means for clamping the sides against the back cooperating with said stop means to retain the sides in fixed positions while the back assembly is moved into abutting engagement with said stop means under the action of the first-mentioned clamping means.