

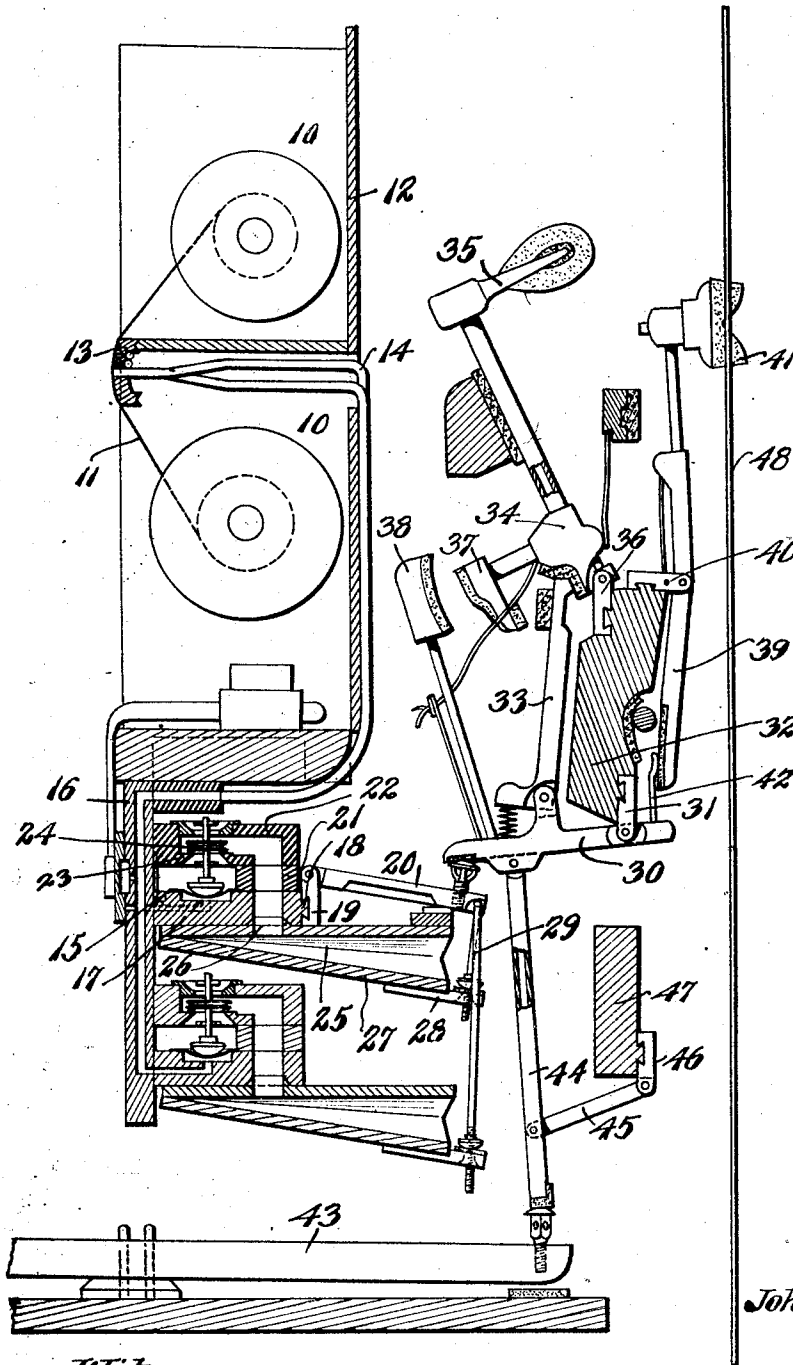
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J. T. RYDBERG

PIANO ACTION

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Inventor
John T. Rydberg

Witness:
E. Wagner.

By Robt. Robb & Steel
Attorneys

UNITED STATES PATENT OFFICE.

JOHN T. RYDBERG, OF HARRISON, NEW JERSEY, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO SUPREME PLAYER ACTION CORPORATION, A CORPORATION OF NEW JERSEY.

PIANO ACTION.

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This invention relates to piano actions and analogous instruments, particularly to those employing pneumatic actuating mechanism.

The operative elements of this class of mechanisms have previously been formed of wood or metal and required in their assemblage much time and the use of numerous fastening devices for securing the parts together. When constructed of wood or similar absorbent material the parts were subject to expansion, contraction and warpage, due to the moisture in the atmosphere and the passage of air through the members of the action. Such changes in the assembled members frequently result in air leaks at the joints and if an adhesive be used at this point it is softened and permits separation of the joined members. In an action formed of wood the delicately adjusted parts are affected by the differences in house temperature and the presence of atmospheric moisture, while the use of such material effects a deadening of the tonal effects by the partial absorption of the sound transmitted from the instrument. If metal be used in the construction of the parts of such an action this is liable to sweating owing to differences in temperature, and the resulting moisture collects in and deleteriously affects other parts of the piano or similar action.

It is therefore highly desirable to form the several parts of the piano or player action from a material which is impervious to changes under varying conditions of temperature or the presence of moisture, and which can be molded into any desired shape or conveniently worked and tool finished whenever necessary or desirable. It is also essential that a material be used which effects an air-tight joint or seam between the assembled members forming an integral structure and avoiding the use of separate screws or fastening devices, thus materially decreasing the cost of manufacture in both the expense of labor and material.

With these and other objects in view this invention provides for the construction of the members of the action from a cellulose ester plastic or similar cellulose plastic as such material is not affected by the atmospheric or temperature changes to which the members of the action are ordinarily subjected and is readily moldable and workable into any desired shape so that substantially the entire piano action can be produced from

material of this character. Such a plastic possesses the quality of resonance and is of sufficient rigidity to retain its molded shape and position while its flexibility prevents cracking and facilitates a close contact between abutting parts which are to be joined. It also provides a material which can be finished for valve seats and other contacting parts so as to avoid the necessity of using felts or packings as a close contact can be secured and the incidental noise of contacting members is practically avoided. The non-absorbent character of the plastic material completely eliminates the deadening action upon the tonal effects which results from materials ordinarily used and the resonant characteristics produce a clear and true tone without any metallic sound such as results from the use of metal in an action of this character.

A further object of the invention is to provide for the use of a cellulose ester plastic adapted to be dissolved by a solvent and thus eliminate the use of adhesives or securing devices at the joints between abutting members as when such edges are dissolved and the parts joined an integral solid structure results which is particularly desirable in pneumatic player actions where the escape of air may be thus prevented and the several parts adjusted and secured in position by the use of a solvent between the joined members.

Other and further objects and advantages of the invention will be hereinafter set forth and the novel features thereof defined by the appended claims.

In the accompanying drawing the invention is illustrated as applied to one form of piano action and the novel material applied therein to both the pneumatic action and the hammer action controlled thereby but the invention is not limited to such application and may be used generally in musical instruments to which it is particularly adapted.

In such illustration the rolls 10 carrying the perforated note sheet 11 are mounted in a support 12 formed of the plastic material and to which the tracker bar 13 is secured by a solvent at its joint. From this bar the tubes or channels 14 extend to the pouch boxes 15 through the apertured body 16 which communicates with a board 17 of such box. This board is formed with an integral rib or dove-tail 18 carrying the supports 19

for the fingers 20 disposed to actuate the hammer action. The pouches are formed with the spacer 21 and valve board 22, all of which are molded from the plastic material and joined by a solvent at the joints to form an integral structure.

This invention also permits the molded formation of the seats 23 for the controlling valves 24 for the suction operating the pneumatics 25 which are fixed to the pouch board by a connection 26. These pneumatics are assembled upon the pouch boxes and adjusted in proper position at this connection, after which they are secured by a flowed joint between the material of the members thus rigidly securing the parts in position and effecting a substantially continuous structure in which the joint is absolutely tight. The lower plate 27 of the pneumatic is connected to a finger 20 by an extension 28 secured thereto and carrying a rod 29. The fingers are adjusted upon the dove-tail rib to their proper position relative to the scale of the hammer action and then secured by the use of a solvent which materially reduces the cost of manufacture as it obviates the necessity of boring the parts for the reception of fastening devices and the use of any such extraneous connecting means.

The hammer action is also adapted to be formed from the plastic material and in the form shown the finger 20 engages a rocker 30 pivoted in the hanger 31 adjustably carried upon the support 32. This rocker is provided with a jack 33 disposed to engage the butt or heel 34 of the hammer 35 adjustably mounted upon the support 32 by the interlocked connection at 36. The hammer shank is formed tubular to facilitate its production from the plastic material, and such tubular structures may also be used for the air conduits, such as those shown at 14 extending from the tracker bar to the pouch box. The hammer is provided with the usual back stop 37 cooperating with the back check 38 having its shank of wire as usual. The support 32 also carries the damper levers 39 formed with dampers 41 and these levers are adjustably mounted upon the support by a flange 40 which is secured when set in proper position by a joint formed by dissolving the contacting surfaces by a solvent. This damper lever is actuated to withdraw the damper by a spoon 42 upon the jack rocker, as usual, and the rocker is also connected for operation by the key 43 through the lifter 44 carried by the swing link 45 mounted upon the flange 46 adjustably secured to the lower flange rail 47. Both the hammer and damper cooperate with a piano string 48 in the ordinary manner.

It is recognized in this art of pneumatic player actions that in the use of a porous medium, such as wood, provision must be made in the pressure mechanism to compen-

sate for the loss of air pressure or suction through the pores of such medium. Such loss is effectually prevented by the use of the plastic composition which is practically impervious to air leakage at ordinary pressures used in this type of mechanism and thereby secures more efficient operation while eliminating the necessity of providing an excess air pressure to compensate for leakage.

No claim is herein made to the novel construction of the pneumatic and hammer actions as such will form the subject of a separate application, the claims herein being directed to the use of a cellulose ester plastic in the construction and assemblage of such parts. The invention is not confined to the use of any specific composition of material or solvent therefor, but a plastic composition of substantially seventy-five per cent pyroxylin, twenty-three per cent camphor, or substitute therefor, and two per cent of solvent such as denatured alcohol or fusel oil, may be used.

The shanks of the hammers and connections are formed from tubes of the plastic while the several other members of the action may be formed by molding so that a large amount of hand and tool work is eliminated and the cost of production correspondingly reduced, with the material advantages incident to the use of a pyroxylin plastic in the formation of the several parts. This is furthermore an important element in securing abutting members in contact with each other which is effected by the application of a solvent, such as denatured alcohol, which softens the contacting surfaces to effect a merged adherence resulting in an integral structure having air tight and positively set joints which are not affected by moisture nor atmospheric conditions. The plastic material used possesses the qualities of resonance, imperviousness to air moisture, non-sweating, practically non-expansive or contractive at ordinary temperatures, workability, and rigidity with sufficient elasticity to prevent injury in assemblage and use.

The invention therefore constitutes an article of manufacture produced from a cellulose ester plastic and the method of using such material in the production of piano actions and analogous instruments.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A piano player action formed of cellulose ester plastic, the several members thereof being joined to form an integral structure.

2. A piano player action formed of cellulose ester plastic, the several members thereof being joined to form an integral structure by dissolving said plastic at the point of contact between said members.

3. A player action having assembled 130

members formed of cellulose ester plastic and joined by a solvent at their points of contact to provide an integral structure at the point of joinder.

4. A pouch box for a pneumatic player action having its separate members formed of a pyroxylin plastic and joined at their contacting faces by the application of a solvent.

5. A piano player action formed of separate members adapted to be adjusted upon each other and secured at such adjustment by dissolving the adjacent abutting faces of the members when in adjusted position.

6. A piano hammer action having pyroxylin hammer heads and their shank members formed of a pyroxylin plastic in tubular formation.

7. The method of assembling a piano action consisting in forming the parts of a soluble plastic material and joining said parts by dissolving the contacting faces of such material.

8. The method of assembling a piano action consisting in forming the parts of plastic material and mounting the same for relative adjustment, and joining said parts to each other after such adjustment by dissolving the contacting faces. 25

9. The method of assembling a piano action consisting in forming the parts of a soluble plastic, adjustably mounting thereon actuating fingers formed of similar material, and joining the supports for said fingers to the action after their adjustment by the application of a solvent to the contacting faces. 30 35

10. The method of assembling a piano action consisting in forming a member of soluble plastic material, further forming an associated member for such action with a jointed connection with said first member, and securing the latter and the associated member in contact after adjustment by the application of a solvent at said joint. 40

In testimony whereof I affix my signature.

JOHN T. RYDBERG.