Nov. 18, 1941. D. SEBOUH 2,263,106

TUNING FORK PIANO

Filed Feb. 3, 1940 2 Sheets-Sheet 1

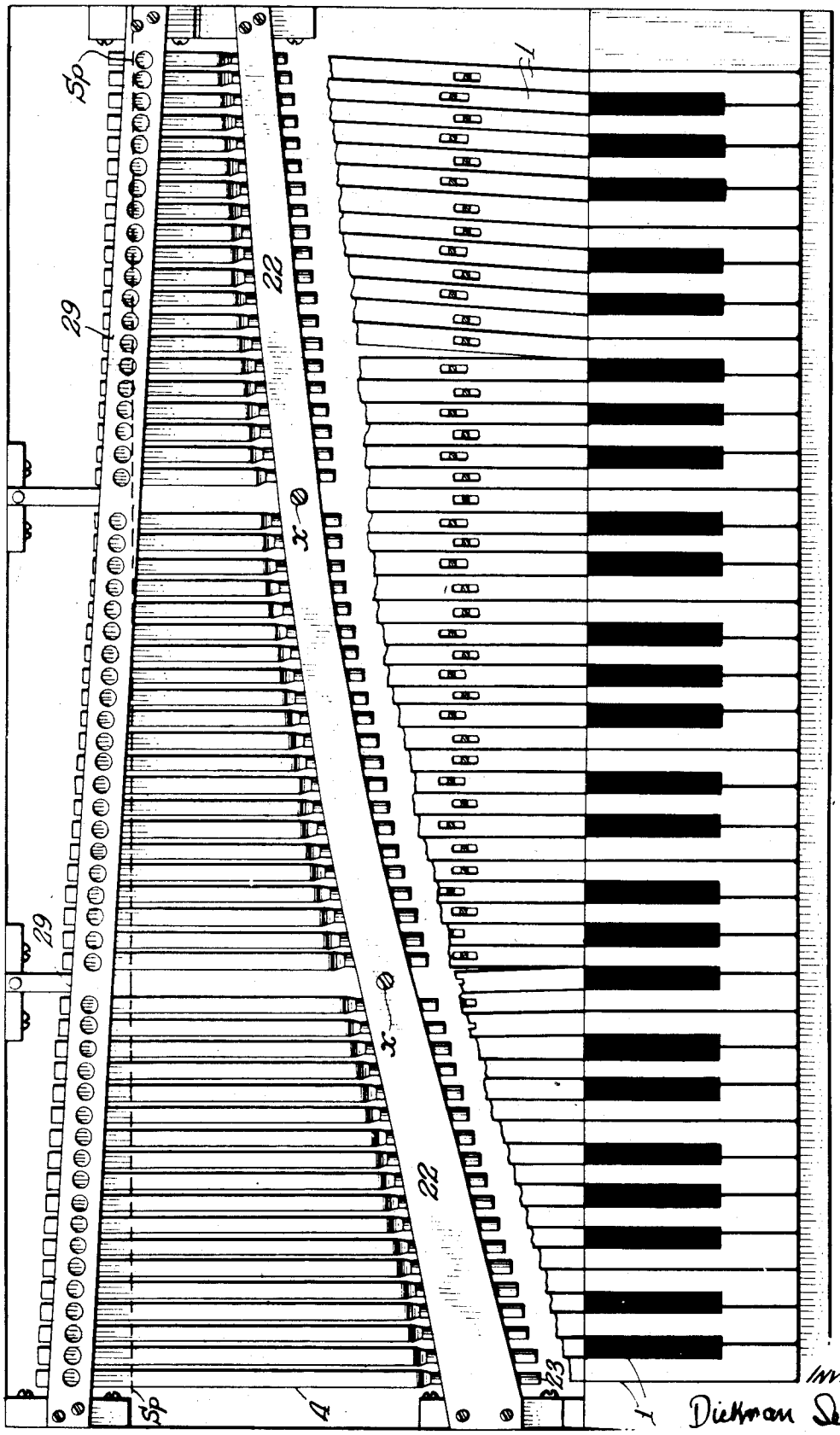

Fig. 1.

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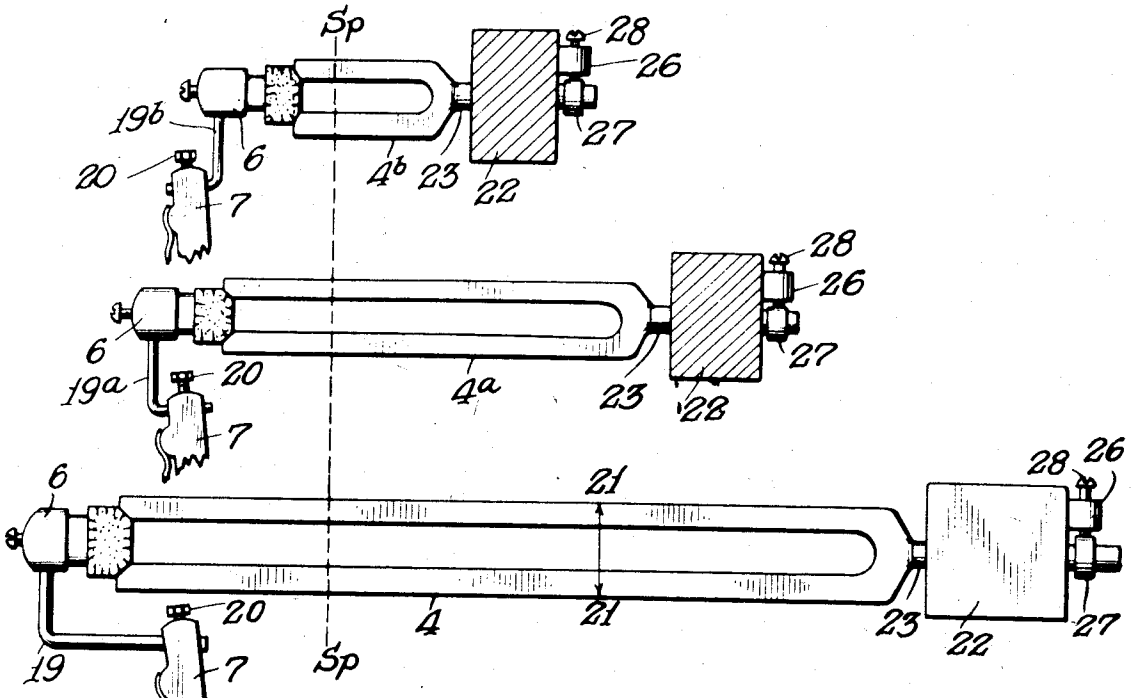


Fig. 2.

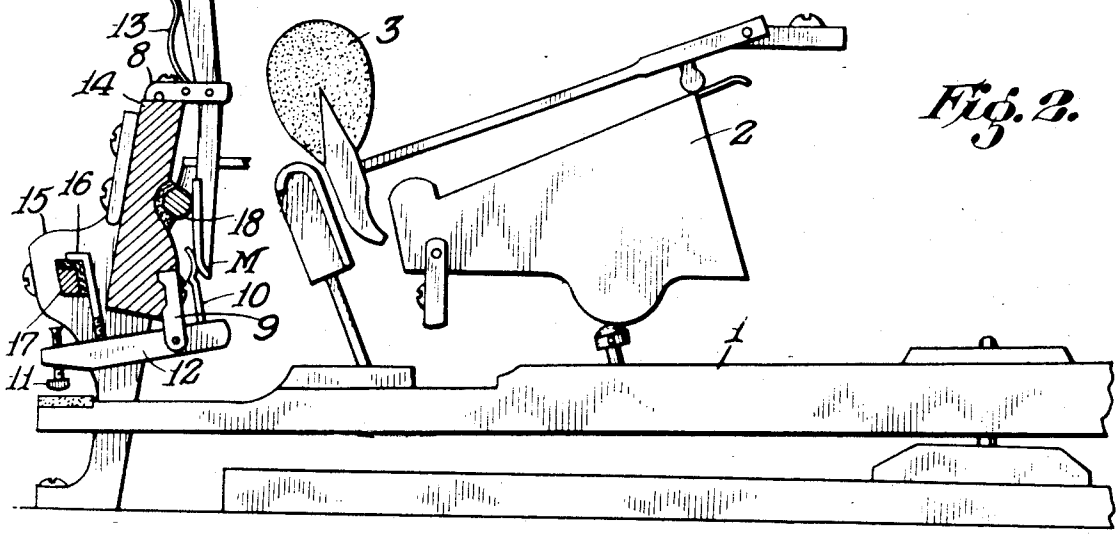


Fig. 3.

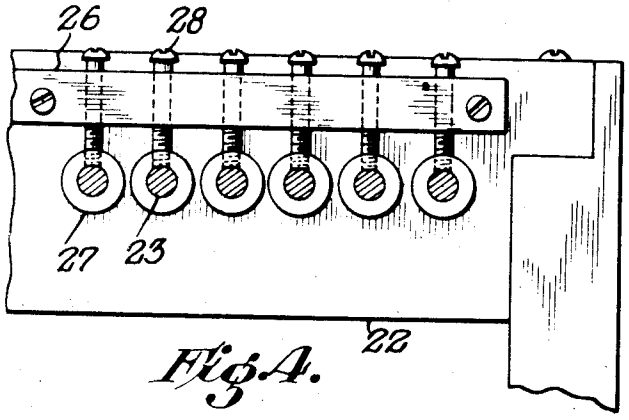
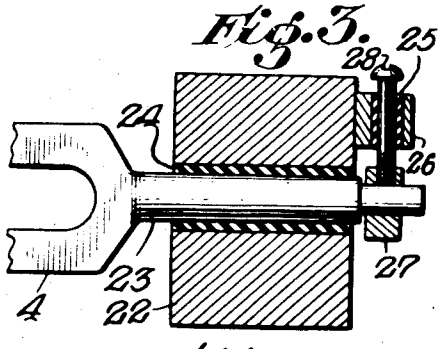


Fig. 4.



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2,263,106

TUNING FORK PIANO

Dickran Seboub, New York, N. Y.

Application February 3, 1940, Serial No. 317,070

3 Claims. (Cl. 84—409)

My invention relates to a piano, and, more particularly, to a piano which employs tuning forks as vibration producing hence sound producing agents, and electrical amplification. These elements take the place of strings and sounding board respectively of the conventional piano. The elimination of the sounding board, the plate, the bridges and the strings, and the introduction of tuning forks and electrical amplification in their place makes it possible to make a piano that is small in its dimensions and has at the same time a pure and powerful tone, the quality and the pitch of which is not affected by changes in temperature or by other causes operating to affect the pitch and the tone of standard pianos. My improved piano will not require tuning.

The following is the description of the invention. Reference is had to the accompanying drawings forming a part of this specification wherein like numerals of reference indicate corresponding parts through the several views in which:

Fig. 1 is the top plan view of the scale of a 60-note piano embodying my invention, as installed in a conventional piano case.

Fig. 2 is a side elevational view showing a tuning fork mounted in relation to a hammer action and a damper action used in the scale illustrated in Fig. 1 and showing the position of two smaller mounted forks in relation to the line formed by the striking points of the hammers.

Fig. 3 is a cross-sectional view of the mounting rail showing the method of mounting.

Fig. 4 is a front plan view of a section of the mounting rail.

Referring now to the drawings: in Fig. 2 is shown the key 1 and the hammer action 2 of a standard grand piano. The details of this action are omitted as they do not concern this invention. In my improved piano the hammer action and the keys function exactly the same as they do in an ordinary grand piano. The hammer 3 here strikes the tuning fork 4 as it would strike the string in an ordinary piano. The damper mechanism however forms a part of this invention.

The construction and the mechanism of said damper action resembles the standard upright damper action with the exception that here the direction of the motion is contrary to that of the upright damper action. The damper head 6, the damper lever 7, the damper flange 8, the underlever flange 9 and the spool 10 are essentially the same as used in the standard upright action and serve similar purposes.

When the key 1 is pressed down to make the hammer 3 to strike the fork 4, by engaging the capstan screw 11 it lifts up the under-lever 12 which in turn, thru the spoon 10 moves the damper lever 7 forward at point marked M. This action causes the damper head 6, which is fitted between and in contact with the free ends of the prongs, to move from the fork and remain out of contact with its prongs allowing the latter to vibrate freely. As soon as the key 1 is released the spring 13 brings the damper head 6 back to its original position against the prongs and the vibration ceases. The fixed and desired position of the under-lever 12 and the spoon 10 in relation to the damper lever 7 is effected thru regulating the hook 16 to the proper height. The straight end of this hook is threaded and screws to the under-lever 12. The hooked end is supported by the hook-rail 17. Because of this support of the under-lever 12 by the hook-rail 17 it is also possible to move the entire damper action assembly out of and into the piano without disturbing the damper action in any way.

The hook-rail 17 is fastened to the action bracket 15 and threads thru all the brackets as shown. The hook-rail is covered with felt where it comes in contact with the hooks 16 to insure quiet action. The rail 14 holds various parts of the action together and is also supported by the action brackets 15. The loud pedal rod 18 is installed and functions exactly the same as in the upright piano action. The damper wire 19 is fastened to the damper lever 7 and the length of its horizontal section is regulated by the set screw 20.

The vertical section of the damper wires (19, 19*a*, 19*b*) are all of even length except in the extreme base section where they are slightly longer in proportion to the larger base forks. In the other sections (except the extreme base) the widths of the forks, taken from the line 21—21, Fig. 2, are even throughout the scale. The horizontal section of said wires however varies. The reason for this is in the following explanation.

In order to produce a fundamental tone as free from undesired harmonics as possible the hammer must strike the fork at a certain striking point. (See the line SP in Figs. 1 and 2.) The line formed directly above the hammers by these striking points of all the forks of the scale must naturally extend in parallel spaced relation to the line formed underneath by the tips of all the hammers of the action. The distance between the striking point SP on the fork and its free ends is directly proportional to the entire length of its prongs. The striking point considered best is a position on the prongs located at a distance from the free ends of the fork equivalent to one-fourth of the prongs. The longer the prongs the longer the distance between their striking point and their free ends, and in consequence the longer the horizontal section of its corresponding damper wire (19, 19*a*, 19*b*, Fig. 2). In this connection it should also be stated here that this parallel spaced relation-

ship between the line of striking points of the forks and the line of hammers below is one of the factors determining the design of the entire scale, i. e. the selection of the size of the forks, the position of the mounting rail (Fig. 1) and the angle of the borings on the latter etc. These will be referred to again further down.

The forks are mounted on a continuous mounting rail 22, Fig. 1, made of wood or metal, which is fastened at both ends to the sides of the case. Although the mounting rail does not need additional support, it can be given by fastening it to the bottom or top cover of the case at points marked X, if this is found to be necessary.

Holes are bored thru the mounting rail, Figs. 1, 3 and 4, on horizontal level and at right angles or nearly so to its length to receive the stems 23 of the forks. The design of the scale determines the degree of the angle at which the mounting rail is set which setting in turn determines the exact angle of the borings. The spacing of the borings corresponds exactly to the spacing of the hammers on the hammer rail of the action.

Referring to Fig. 3—a cross-section in actual size of the mounting rail 22 and the stem 23 set in place—the purpose of the rubber bushing 24 is to prevent the fork from vibrating bodily as a whole and producing another audible frequency in addition to the frequency of the prongs proper. In other words, if the hole housing the stem 23 was not bushed with rubber, felt or similar material and the said stem was fitted and set tight against the wood or metal walls of the hole, each time the prongs were struck, we would hear simultaneously two tones of different pitches, the one corresponding to the frequency of the prongs proper and the other to the frequency of the entire fork vibrating bodily as a whole.

The bushing 25 serves the same purpose, i. e. also to prevent any solid connection between the stem 23 and the mounting rail 22 thru the set screw 28 the set screw rail or bar 26. The latter is fastened tight to the mounting rail 22 as shown in Fig. 4. The second purpose of the bushing 24, while gripping the stem 23 firmly in place, is to prevent the dissipation of the energy of the vibration of the fork thru the mounting rail and the case to which said rail is fastened. Thus the prongs will be able to vibrate for a longer period.

The fork is permanently set in place by a metal collar 27 and set screw 28 as shown Figs. 3 and 4. The collar 27 fits around the extreme end of the stem 23 emerging from the mounting rail 22. The diameter of this end of the stem is turned smaller than the rest as the walls of the collar 27 need a certain thickness to be effective and as the space for them is limited (Fig. 4). The set screw 28, after passing down thru the bushed hole of the set screw rail 26 and into the threaded hole in the collar 27, connects itself fast to the stem of the fork. Thus, once set, the fork cannot move backward or forward and cannot rotate. The fork is held in place firmly in the same manner as holding the stem with one's hands without having at the same time any solid or fast connection to the mounting rail.

Fig. 4 is the front view of a section of the mounting rail attached to the case at one end. It shows the relative connections and positions of the set screw rail 26, set screw 28, collar 27 and the fork stems.

The principles of construction and mechanism, mounting of the forks, the damping system, etc., of my improved upright piano are essentially the same as that of my grand piano described above, except that in the upright modification a standard upright piano action is used, which circumstance makes it necessary to mount the forks in a vertical position and the mounting rail, the speaking tube rail, etc., in a respectively changed position. Another exception is the damper action. This is similar to the damper actions used in the old square pianos and need not be described here as its mechanism is well known.

Having thus concluded the description of my invention I claim:

1. A non-rigid mounting for tuning forks adapted for use in musical instruments which comprises a mounting rail, a plurality of apertures in said rail corresponding in number to the number of tuning forks to be mounted therein, a resilient bushing in each of said apertures adapted for snugly holding the stems of said tuning forks, and means for preventing longitudinal and angular displacement of said stems in the bushings, thereby providing a resilient mounting for tuning forks to prevent vibration of said tuning forks bodily as a whole and to prevent the dissipation of energy of the vibrating prongs whereby a single tone can be produced corresponding to the frequency of the prongs and whereby said prongs can vibrate for a relatively long period.

2. A non-rigid mounting for tuning forks which comprises a mounting rail, a plurality of apertures in said rail corresponding in number to the number of tuning forks to be mounted therein, a resilient bushing in each of said apertures adapted for snugly holding the stems of said tuning forks, a bar associated with said mounting rail, a plurality of orifices therein substantially perpendicular to the axes of the apertures in the mounting rail, a resilient bushing in each of said orifices, and a set screw snugly mounted in each of said orifices and adapted to engage the stem of a tuning fork protruding from said mounting rail, thereby providing a resilient mounting for tuning forks to prevent vibration of said tuning forks bodily as a whole and to prevent the dissipation of energy of the vibrating prongs whereby a single tone can be produced corresponding to the frequency of the prongs and whereby said prongs can vibrate for a relatively long period.

3. In a musical instrument comprising a frame, a plurality of tuning forks having prongs of varying size, means for separately striking the prongs of said tuning forks to set up vibrations therein whereby sound waves are produced, means for damping said vibrations whereby production of sound waves is stopped, means adjacent the prongs for collecting said sound waves, a microphone for amplifying and reproducing said sound waves, and means for conveying the sound waves to said microphone, thereby providing reproduction of the sound waves in amplified form whereby a succession of musical notes can be produced, the improvement which comprises a mounting rail attached to said frame, a plurality of apertures in said rail corresponding in number to the number of tuning forks provided, a resilient bushing in each of said apertures adapted for snugly holding the stems of the tuning forks, means for preventing longitudinal and angular displacement of said stems in said bushings whereby a non-rigid mounting for tuning forks is provided.

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