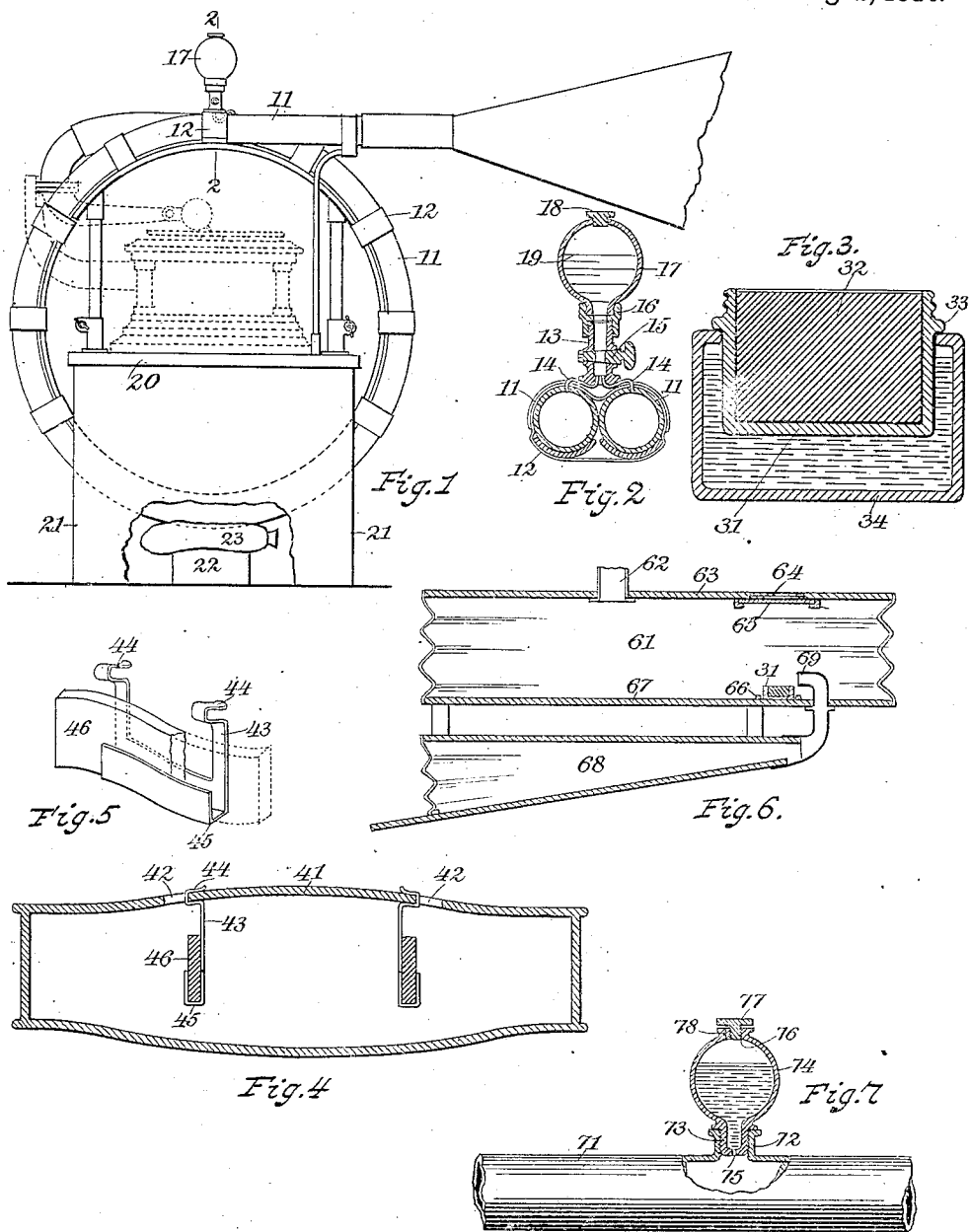


M. G. GRAHAM.
 PROCESS FOR IMPROVING THE TONE OR TIMBRE OF MUSICAL INSTRUMENTS.
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966,010.

Patented Aug. 2, 1910.



Witnesses.

Charles S. Kirk
13, M. D. Olmsted

Miles G. Graham,
 Inventor,

by *Geo. L. Cooper*
 Attorney

UNITED STATES PATENT OFFICE.

MILES G. GRAHAM, OF ALBANY, NEW YORK.

PROCESS FOR IMPROVING THE TONE OR TIMBRE OF MUSICAL INSTRUMENTS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, MILES G. GRAHAM, a citizen of the United States, residing at Albany, New York, have invented a new and useful Improvement in Processes for Improving the Tone or Timbre of Musical Instruments, of which the following is a specification.

My invention relates to a process for adding to or impregnating the air contained within or passing through musical instruments or sound producing or reproducing devices with a non-aqueous vapor or gas, by which the air is resonated and the emitted sounds are amplified, purified or enriched in tone and timbre. I preferably produce this result by the evaporation within the instrument of a readily vaporizable solution, whereby gaseous or other molecules are liberated and commingled with the air both within and immediately outside of the instrument. It is found in practice that the sound waves passing through this modified or impregnated air produce on the ear an enriched, mellowed and more pleasing effect than those emitted from the same instrument under normal conditions, the improvement probably arising, in part at least, from a mingling and harmonizing of the produced overtones. After long experiment, I have found the best vaporizable material to consist of an alcoholic solution of resinous gums or oils, which may be perfumed as desired without detriment. I have had excellent results from a mixture composed as follows:

Alcohol	97%
Balsam fir	1%
Balsam tolu	1%
Hemlock-spruce oil	1%
	100%

with a slight addition of oil of rose and tincture of musk as a perfume. The proportions of the less volatile bodies may be considerably increased, or other resinous or like soluble materials may be substituted in whole or part for these, or a different non-aqueous solvent employed, without departing from my invention considered in its broadest sense. By the term "musical instrument" herein used, I include sound resonating devices, as phonograph horns, megaphones and the like.

For the purposes of my invention, musical

instruments may be divided into two classes; static, as percussion instruments and the like, where the vibrating air is practically confined within the casing of the instrument; and dynamic, as wind instruments, where continuous or pulsating air currents pass through the instrument. I will therefore illustrate and describe various forms of devices adapted to secure the results of my invention in typical instruments of each of these classes, it being of course understood that other suitable devices, within the constructive skill of the mechanic, may be employed, either in these instruments or in others not shown or mentioned.

In the drawings, Figure 1 is a side elevation and Fig. 2, a vertical section on an enlarged scale on the plane 2—2, Fig. 1, of a phonograph horn provided with one form of my device; Fig. 3 is a vertical section of a liquid container which is adapted to use in pianos and like instruments; Fig. 4 is a vertical transverse section of a violin body with two of my devices secured therein; Fig. 5 is an elevation of one of the devices of Fig. 4 detached; Fig. 6 is a vertical section of an organ wind chest and bellows provided with my device; Fig. 7 shows a form of my device applied to a piece of tubing which may form a part of any brass instrument, as a horn, cornet, tuba or the like.

The phonograph horn shown in Figs. 1 and 2 is, except for the device of the present invention, like that shown in my pending application for U. S. patent, filed Nov. 24th, 1908, which has received Serial Number 464,203. It consists in part of a tube in two parallel coils conveniently held together by bands, on the uppermost of which is secured a nipple, from which small tubes lead to the interior of each of the coils, see Fig. 2. The nipple is provided with a cock-plug and is threaded at its upper end to engage with a coupling in which is cemented a container, preferably of transparent material, as glass, and having an aperture at its top closed by a stopper. The vessel may be provided with transverse ribs or other marks, forming a series of graduations for indicating the volume of liquid delivered at any given time.

As shown in Fig. 1, the phonograph and novel horn are mounted on a stand having legs or supports spaced apart from each other, so that the lower part of the coiled

tube passes between them. I preferably arrange at a little distance below the coil 11 a shelf 22 or like means for holding means for heating the lower part of the coil, shown as an ordinary hot-water bag 23.

The operation of the device is as follows: The cock 15 being closed, the container 17 is filled with a suitable volatile liquid adapted to produce the desired results already described and the stopper 18 replaced. When it is desired to use the phonograph for reproducing any selection, the cock 15 is momentarily opened to permit the flow of a small amount of the liquid, measured by the graduations 19, into the coils 11. The liquid immediately begins to evaporate, and the vapor or gas thus produced impregnates the air within the horn, greatly improving the tone or timbre of the emitted sounds. In a very cold room, or when it is desired to produce an immediate striking effect, evaporation may be accelerated by the use of the hot-water bag 23, or by any other suitable means.

As a means of impregnating the vibrating air in a piano or similar instrument of the static type, I provide one or more of the devices shown in Fig. 3 of the drawings, which may be placed within the closed case of the instrument. As shown, it consists of a container cup 31 filled with a mass of absorbent material, shown as a block of charcoal 32, although cotton, sponge or the like may be used, which serves to retain the volatile liquid. The cup 31 may be threaded as shown for engagement with a cover, not shown, which is removed when the instrument is being played. The cup may be provided with a circumferential rib 33, for supporting it in the mouth of a vessel 34, which may be filled with hot water or sand to promote vaporization, as explained above. One or more of these previously filled cups 31, ordinarily without the heating device, are placed within the piano at any point where they will not interfere with the vibration of the strings, sounding-board, etc. Obviously, the effect will be to impregnate the air confined in the instrument with the beneficial result already described.

In Figs. 4 and 5 of the drawings, 41 designates the belly of a violin, provided with the usual S-holes 42.

43 is a clip, preferably of sheet metal, with a jaw 44 at its upper end for tightly grasping the wood of the violin belly and having an outwardly and upwardly turned flange 45 at its lower end for holding an absorbent block 46, which may be of charcoal, for retaining the volatile liquid. It will be seen that the clip and the block are so shaped as to be readily passed downward through the S-hole 42 and then moved laterally so as to engage the jaw 44 with the belly 41, see Fig. 4. The block 46, when dry, is

readily removed for refilling, which may be done by merely dipping it in the liquid for a few moments. It is obvious that, as before, the evaporation of the liquid will impregnate the air in the violin, with the desired result. It is also clear that in any instrument of the static type, like those so far described, the contained air may be impregnated by other means. Thus, the liquid may be sprayed into the horn, piano, violin or other instrument by means of an ordinary perfume atomizer, which is too well known to require illustration.

To impregnate the air in an instrument of the second, dynamic, class, where the vibrating air passes through and is emitted from the instrument, it is necessary to provide for a continuous supply of the vapor or gas.

In Fig. 6, 61 is the wind chamber of an organ, from which tubes, one of which is shown at 62, pass to the different reeds or pipes; as the case may be. The upper board 63 of the chamber is formed with an opening 64, closed by a slide 65, for inserting and removing a container 31, such as is shown in Fig. 3, and of any desired capacity. The cup 31 may be held in position by cleats 66 on the bottom board 67 of the chamber. Beneath the chest or chamber 61 is a bellows 68, the nozzle of which is bent at 69 within the chest 61, so that the air forced there-through passes directly over the container 31. The vigorous movement of the air from the nozzle 69 will act to rapidly volatilize the liquid in the container 31, so that all the air supplied to the organ reeds or pipes will be impregnated as before described. It will be clear without further illustration that the heating vessel 34 may be here used with the container 31 to promote evaporation.

Referring to Fig. 7 of the drawings, 71 is a part of a tube forming a portion of any "brass" wind instrument, preferably located near the mouthpiece. On its upper side it has a threaded nipple 72 for engaging with a co-acting nipple 73 on a liquid container 74, having a small aperture 75 at its lower end and a threaded opening 76 at its upper end, closed by a flange-headed stopper 77. Through the upper wall of the container 74 is pierced an air duct 78, closable by screwing down the stopper 77. When a musician plays upon the instrument, he slightly unscrews the stopper 77, thus permitting air to enter at the duct 78, when the liquid will issue, drop by drop, from the aperture 75 and fall into the tube 71, the frequency of the drops being regulated by the stopper 77. The resonating liquid will of course be assisted in its volatilization by the strong air current passing through the tube 71, and the tone or timbre of the instrument will be improved by the vapor thus produced.

I am aware that it has heretofore been proposed to form a vibrating portion of a

musical instrument with a container for a mass of water. This is entirely foreign to my invention, as neither the insignificant quantity, nor the quality, of the vapor thus accidentally produced would serve to resonate or modify the emitted sound waves in the advantageous manner above described.

As I have already suggested, the process of impregnating the air contained in or passing through a musical instrument with a vapor or gas distinct therefrom, which process forms the subject of my invention, is quite independent of any means for producing such vapor or gas by volatilization. I do not therefore limit my invention except as set forth in the claims.

What I claim is:

1. The art or process of improving the tone or timbre of a musical instrument by impregnating the air therein with a non-aqueous vapor or gas.
2. The art or process of improving the tone or timbre of a musical instrument by impregnating the air therein with a non-aqueous vapor or gas produced by the evaporation of a volatile substance.
3. The art or process of improving the tone or timbre of a musical instrument by impregnating the air therein with a non-aqueous vapor or gas produced by the continuous evaporation of a volatile substance.
4. The art or process of improving the tone or timbre of a musical instrument by impregnating the air therein with a vapor or gas produced by the evaporation of a volatile non-aqueous solution of vegetable products.
5. The art or process of improving the tone or timbre of a musical instrument by impregnating the air therein with a vapor or gas produced by the evaporation of a volatile non-aqueous solution of resinous materials.

6. The art or process of improving the tone or timbre of a musical instrument by impregnating the air therein with a vapor or gas produced by the evaporation of an alcoholic solution of resinous or like materials.

7. The art or process of improving the tone or timbre of a musical instrument by impregnating the air therein with a vapor or gas produced from a volatile non-aqueous liquid.

8. The art or process of improving the tone or timbre of a musical instrument by impregnating the air therein with a vapor or gas produced from a continuously supplied volatile non-aqueous liquid.

9. The art or process of improving the tone or timbre of a musical instrument by impregnating the air therein with a vapor or gas produced from a continuously supplied alcoholic solution of vegetable products.

10. The art or process of improving the tone or timbre of a musical instrument by impregnating the air therein with a vapor or gas produced from a continuously supplied alcoholic solution of resinous or like materials.

11. The art or process of improving the tone or timbre of a musical instrument by impregnating the air therein with a vapor or gas produced from an alcoholic solution of balsam fir, balsam tolu and hemlock-spruce oil.

12. The art or process of improving the tone or timbre of a musical instrument, which consists in supplying to the interior thereof a quantity of volatile material and assisting the evaporation thereof by artificial heat.

MILES G. GRAHAM.

Witnesses:

GEO. L. COOPER,
CHARLES SELKIRK.