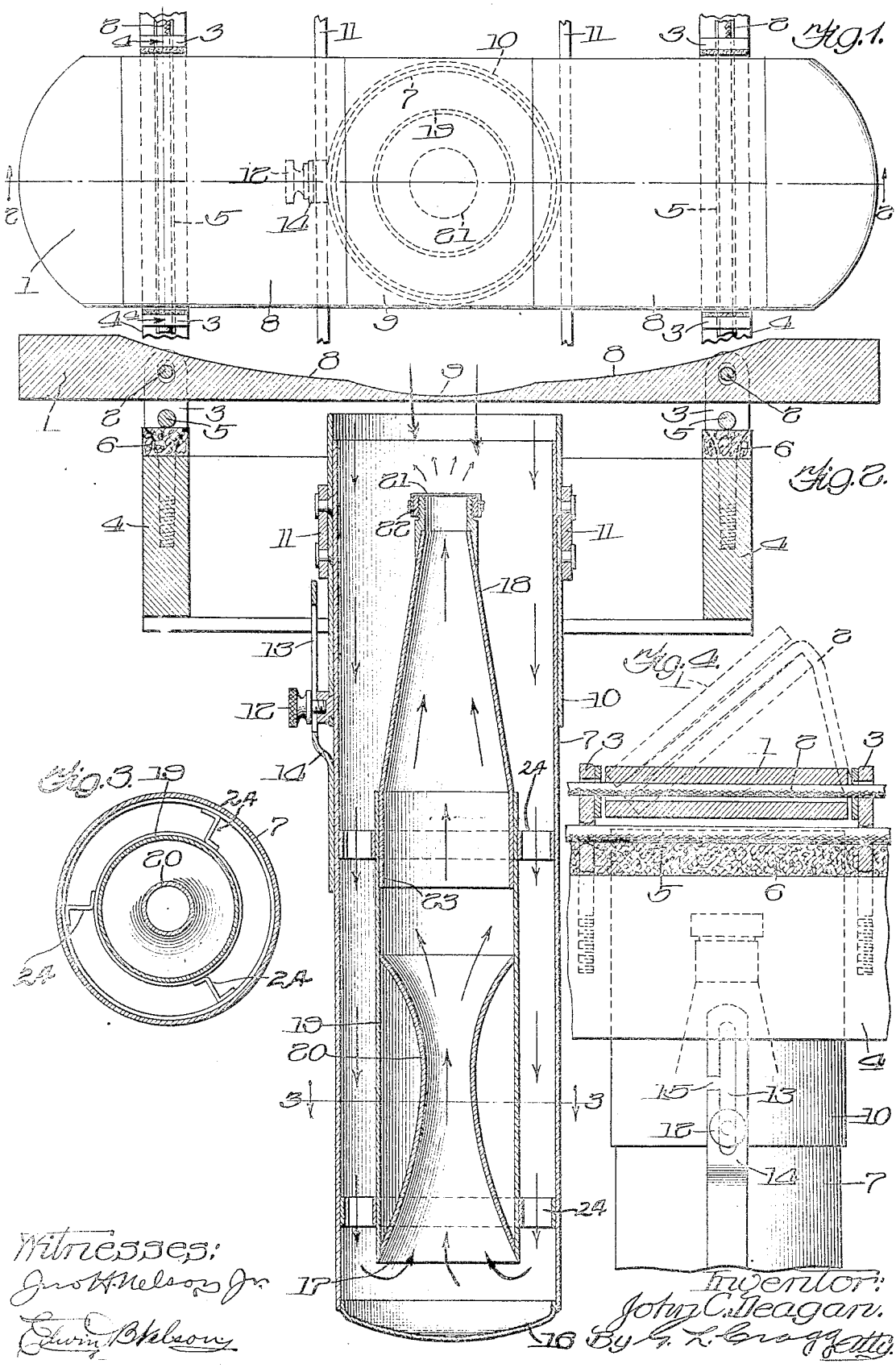
J. C. DEAGAN.

PIANO WITHOUT STRINGS.

APPLICATION FILED DEC. 19, 1913.

1,128,112. Patented Feb. 9, 1915.



Witnesses:
Jno. H. Nelson Jr.
Edwin P. Nelson

Inventor:
John C. Deagan.
By G. L. Craggett
Atty.

UNITED STATES PATENT OFFICE.

JOHN C. DEAGAN, OF CHICAGO, ILLINOIS.

PIANO WITHOUT STRINGS.

1,128,112. Specification of Letters Patent. Patented Feb. 9, 1915.

Application filed December 19, 1913. Serial No. 807,663.

To all whom it may concern:

Be it known that I, JOHN C. DEAGAN, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Pianos Without Strings, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to musical instruments and particularly to that class of musical instruments employing sounding bars and reasonating tubes located beneath the sounding bars.

My invention in its various characteristics will be fully explained by reference to the accompanying drawing showing the preferred embodiment thereof and in which—

Figure 1 is a plan view illustrating a portion of a xylophone constructed in accordance with the invention; Fig. 2 is a sectional view on line 2 2 of Fig. 1; Fig. 3 is a view on line 3—3 of Fig. 2; and Fig. 4 is a sectional view on line 4 4 of Fig. 1.

Like parts are indicated by similar characters of reference throughout the different figures.

A vibrating body 1 of the instrument, in this case a xylophone, is made of wood, metal, or other suitable vibrating material. This vibrating body is mounted in any suitable manner as for example upon cordage 2 which is preferably elastic and which passes through supporting posts 3 mounted upon rails 4, the cords 2 thus constituting cushion supports permitting of the vibration of the bars, these cushion supports being located at nodal points. Supplemental cushion supports 5 which are preferably in the form of cords that are not materially elastic underlie the bars 1 at their nodal points, that is they underlie the elastic cords 2, the supplemental cushions 5 closely approaching the nether surfaces of the bars 1 and being preferably in contact with the top surfaces of the strips 6 of cushion felt which are placed upon the tops of the rails 4 to act as cushions yieldingly to limit the extent to which the supplemental cushions 5 may be depressed by the sounding bar 1 above the same, the supplemental cushions 5 being in such close proximity to the bar and cushion strips 6 as to enable the said cushion strips yieldingly to oppose the downward movement of the bar through the intermediation of the supplemental cushions 5. Normally however, slight clearance desirably intervenes between said supplemental cushions and the lower surfaces of the bars, while said supplemental cushions 5 are desirably permanently in contact with the cushion strips 6. The supplemental cushions 5 also operate as emergency cushions to support the bars in the event of the breakage of the main cushion cords 2, such breakage being of frequent occurrence.

The instrument illustrated includes a resonating tube 7 which underlies the bar 1 and which is open at its upper end to permit of the entry therein of sound waves set up by the bar when set into vibration. The bar may be set into vibration by any suitable means, as for example, by means of a padded hammer impinged thereupon at the center of the bar which is in line with the axis of the resonating tube. The vibrations set up in the bar are desirably intensified at the middle portion of the bar which is made very thin as compared with the thicker vibrating portions of the bar and in order further to insure a concentration of such vibration the main concavity 8 is provided with a supplemental depression 9 in the form of an additional concavity, this additional concavity 9 being centrally located immediately over the mouth of the resonating tube 7 and making the middle portion of the bar reed-like in its tonal effect.

The resonating tube is desirably telescopically received within the bore of a supporting tube 10 directly secured to metallic fastening rails 11 which are supported at their ends in the usual way upon the framework of which the side rails 4 form parts. The receiving tube 10 carries a clamping screw 12 whose stem passes through the vertical slot 13 in a clip 14 extending upwardly and carried by the resonating tube 7, the clip 14 having an entrance opening 15 (Fig. 4) for receiving the stem of the screw 12 when the parts are to be assembled. The relative telescopic adjustment effected between the tubes 7 and 10 when the screw 12 is loose is secured by tightening the screw. The bottom of the resonating tube is desirably closed by a curved bottom 16. A supplemental resonating tube is disposed within the resonating tube 7 and is co-axial therewith, the supplemental resonating tube having an entrance opening 17 at its lower end. The upper end of the supplemental tube has a conical form

indicated at 18. There is a throat structure 20 within the cylindrical portion 19 of the inner tube. The wall of the throat structure is gradually curved as indicated in Fig. 2, the throat structure tapering upwardly from the opening 17 to about the middle of the throat structure whereafter such throat structure expands. The part of the cylindrical portion 19 of the inner tube located above the throat structure 20 constitutes, together with the upper portion of the throat structure 20, an expansion chamber. The conical portion 18 of the inner tube gathers or concentrates the sound waves and directs the same against a vibrating diaphragm 21 desirably formed of very thin split sheepskin, this diaphragm being preferably imperforate.

The diaphragm 21 is desirably stretched upon a ring 22 that is in threaded connection with the upper end of the cone 18 whereby the amplitude of vibration of the diaphragm may be adjusted, a result which is secured by varying the degree of the pressure with which the diaphragm bears upon the upper mouth end of the cone 18. The conical portion 18 is provided with a cylindrical continuation 23 which is in direct telescoping engagement with the cylindrical portion 19. Struts 24 (Figs. 2 and 3) are permanently secured to the elements 7 and 19. The elements 7, 18, 19 and 23 are desirably of metal which is sufficiently rigid as to have no material vibration.

The elastic cushion supports 2, in addition to performing their novel function, also add a tremolo to the tones and permit each resonating bar threaded thereby to be tilted as indicated by dotted lines at the upper part of Fig. 4 whereby access may be had to the interior of the tube 7 for the purpose of adjusting the elements 18 and 22, the elastic cord, by means of its resilience, serving to restore the bars to the normal condition illustrated by full lines at the upper part of Fig. 4. In the drawing I have shown but one unit of a musical instrument, it being understood that a plurality of bars 1 with their associate parts are assembled into a single instrument, the bars in combination with their associate parts serving to produce the various musical scale tones of the musical instrument.

By means of my invention the length of the tubular structures underlying the bars is very short as compared with the length of single resonating tubes performing similar sound modifying functions. By means of the various features of construction and the various adjustments herein set forth tones are produced which are similar to those produced by other musical instruments such as horns, reeds and stringed instruments.

Claims respecting sounding bars and other novel characteristics not herein claimed are contained in my co-pending applications 807,664, filed December 19, 1913, and Serial No. 818,773, filed February 14, 1914.

Those features of construction which include the elastic resilient cordage threading the bars and operating yieldingly to position the bars normally out of contact with the supplemental cushions below the bars and claims based thereupon will be included in another application.

While I have herein shown and particularly described the preferred embodiment of my invention I do not wish to be limited to the precise details of construction shown as changes may readily be made without departing from the spirit of my invention.

Having thus described my invention I claim as new and desire to secure by Letters Patent the following:

1. A musical instrument including a resonating tube; a subsidiary resonating tube in the former tube, the sound-receiving end of the subsidiary tube being open to bring the bores of these tubes into communication, the inner tube being tapered adjacent the sound-receiving opening of the outer tube and a thin vibratory diaphragm stretched across the opening which is at the other end of the subsidiary tube.

2. A musical instrument including a resonating tube; a subsidiary resonating tube in the former tube, the sound-receiving end of the subsidiary tube being open to bring the bores of these tubes into communication, the inner tube being tapered adjacent the sound receiving opening of the outer tube, and having its bore constricted at its opposite end to constitute a throat and a thin vibratory diaphragm stretched across the opening which is at the other end of the subsidiary tube.

3. A musical instrument including a resonating tube; a subsidiary resonating tube in the former tube, the sound-receiving end of the subsidiary tube being open to bring the bores of these tubes into communication, the inner tube being tapered adjacent the sound receiving opening of the outer tube, the tapered portion of the inner tube being adjustable longitudinally of the inner tube and a thin vibratory diaphragm stretched across the opening which is at the other end of the subsidiary tube.

4. A musical instrument including a resonating tube; a subsidiary resonating tube in the former tube, the sound-receiving end of the subsidiary tube being open to bring the bores of these tubes into communication, the inner tube being tapered adjacent the sound receiving opening of the outer tube, and having its bore constricted at its opposite end to constitute a throat, the tapered portion of the inner tube being adjustable longitudinally of the inner tube and a thin vibratory diaphragm stretched across the opening

which is at the other end of the subsidiary tube.

5. A musical instrument including a resonating tube; a subsidiary resonating tube in the former tube, said inner tube having its bore constricted near the base of the inner tube to constitute a throat; and a thin vibratory diaphragm stretched across the opening in the throat through which the sound is propagated from the throat.

6. A musical instrument including a resonating tube; a subsidiary tapering resonating tube in the former tube; and a thin vibratory diaphragm stretched across the tube opening through which the sound is propagated.

7. A musical instrument including a resonating tube a portion of whose bore is constricted to constitute a throat, the bore of said tube gradually converging toward and gradually diverging from its constricted portion; and a thin vibratory diaphragm stretched across the opening at the end of the throat through which sound is propagated.

In witness whereof, I hereunto subscribe my name this 20th day of November A. D., 1913.

JOHN C. DEAGAN.

Witnesses:
G. L. CRAGG,
ETTA L. WHITE.