

UNITED STATES PATENT OFFICE.

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MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 644,817, dated March 6, 1900.

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To all whom it may concern:

Be it known that I, JOHN C. DEAGAN, a citizen of the United States of America, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Musical Instruments, of which the following is a specification.

My invention relates to improvements in musical instruments, and more particularly to that class of instruments known as "chimes," wherein the musical tones are produced by vibrating tubes, and has for its object the provision of an instrument of better musical quality and greater strength and durability than those previously known and used. Instruments of this class are most commonly used upon the vaudeville stage and by reason of the necessity of frequent handling and transportation require that the same be constructed as light, strong, and durable as possible, combined with the quality of remaining constantly in tune.

The embodiment of my invention herein shown and described has come to be commonly termed the "aluminium chimes," which instrument may be briefly described as consisting of a plurality of frames or supports carrying several tuned musical tubes, each of which upon being vibrated will give forth a characteristic tone.

The musical tubes are constructed, preferably, of steel tubing, although other materials may be used, and have double sympathetic air-columns, and the lower ends thereof are provided with reinforcing-forks, which serve to set in vibration or sound the tubes. There are preferably mounted in a novel manner in each frame four of such tubes tuned, respectively, to a fundamental note, an octave higher, and a duplicate double octave of the fundamental. To secure both lightness and strength, the frame is made tubular throughout.

My invention will, however, be more fully appreciated by reference to the accompanying drawings, forming a part of this specification, in connection with which I will explain said invention more fully.

Figure 1 is a side view in elevation, partly in section, showing a frame of four musical tubes. Fig. 2 is a partial view of a sup-

porting-rack carrying five such frames arranged to form a portion of a scale. Fig. 3 is a detail of a part of the frame. Fig. 4 is a view showing a modification of the double air-column resonator in a musical tube. Fig. 5 is a view in elevation showing a small tube upon an enlarged scale. Figs. 6 and 7 illustrate the manner of inserting a reinforcing-fork at the lower end of a tube, and Fig. 8 is a detail view showing the adjustable plug or partition within a portion of a tube.

The same letter of reference is used to designate like parts in the several figures.

The musical tubes *a* preferably are constructed of cold-drawn steel tubing, in general characteristics similar to that employed in the manufacture of bicycles, although various classes of materials possessing the proper qualities of resonance may be employed in their construction with satisfactory results. The tubing from which a given musical tube is to be made is selected of a suitable gage and diameter in accordance with the tone which it is desired that said tube shall produce. Said tubing is cut approximately of the proper length, it being understood that the lower-toned tubes are of the greatest length and diameter in accordance with the well-known principles of acoustics. The upper portion of the tube is then cut away longitudinally upon a curvilinear line, as shown in Fig. 1, forming an upper vibrating reed *a*⁵, and diametrically-disposed ears or extensions *a'* are provided upon the lower end of said tube, preferably integral therewith. A plug or partition *b* is inserted within the tube preferably about midway between points *a*² *a*³, or, if desired, it may be disposed at the bottom *a*³ of said tube.

The partition in the larger tubes is in the form of a closely-fitting brass cup which is secured in place by a small screw and made air-tight by the use of a little cement. In the smaller tubes, Figs. 4 and 5, the partition may be of soft metal suitably expanded in position to form an air-tight closure or plug. The partition is adjusted in the tube to secure as nearly as possible perfect sympathy between the double air-columns *d* in the tubular portion thereof. It is found, particularly with the larger tubes, that during climatic changes these columns do not remain

exactly in tune, so I have provided an adjustable plug, Fig. 8, to correct this variation. The musical tube *a*, a detailed portion of which is shown, is provided with a small longitudinal slot, through which the screw *b'* extends, permitting slight longitudinal adjustment of the cup-like partition *b*, whereby the air-column may be brought into sympathy with the vibrating tube.

Between the extensions *a'* of the tube a reinforcing-fork *c*, centrally cut away, as shown in Fig. 6, is riveted and then brazed in position. This fork strengthens the extensions and the tube at its lower end and serves to secure better vibration, forming, with said extensions or ears, a sounding-arch, which when struck produces a loud clear tone from the tube. If desired, the tube is plated with nickel or other metals or is otherwise suitably ornamented and is tuned by filing or grinding the mouth of the upper tubular portion *a²* and the vibrating upper extension at points *a⁴* *a⁵*. This serves to bring the air-columns *d* into sympathy and tunes the vibrating extension in exact accord therewith. Filing the musical tube at *a⁵* serves to sharp its tone, while filing it at *a⁴* flats it. A hole *a⁶* is bored near the upper extremity of the tube exactly at a node, wherein an eyelet is inserted.

A form of tube differing slightly from that already described adapted for the production of the higher tones is shown in Fig. 5, wherein a single extension *a'* is provided at the lower end of the tube.

In Fig. 4 I have illustrated a modified form of my improved musical tube, wherein two partitions or plugs are employed, disposed near the ends of the tube and serving, as before, to secure a double air-column. The tube is supported at the node and is sounded by striking the central portion preferably midway between the partitions. As stated, the partition may be inserted either in the middle of the tubular portion of each musical tube or otherwise disposed, thus providing two air-columns and greatly improving the quality and augmenting the strength of the tone produced, or said partition may be situated at the bottom of the tube just above the fork *c*, which provides only a single air-column.

The frame wherein the musical tubes are mounted to be played upon consists of a sounding-board *e*, of hard wood, such as hickory, centrally bored out and stopped at its ends. Into this are screwed tubular metal rods *f* of suitable height, threaded at their lower ends, which rods are surmounted by ornamental balls and screws. One of said tubular rods is provided with a hook adapted to be inserted in a loop *g²*, carried upon the rod *g'* of a supporting-rack *g*, Fig. 2.

The musical tubes *a* are hung in the frames upon cross-bars *h*, which are secured in position between the tubular rods by small burs. Each of said cross-bars is provided with a

rubber washer *h'* and rubber spacing-sleeves *h²*, which maintain the tube out of contact with the metal of the rod or any hard material, and thus avoids any sharp or metallic sound, while permitting the free vibration of the tube to produce a clear tone. Said musical tubes are so hung in the frame that their lower extremities or mouths are immediately above longitudinal slots or openings *e'* in the sounding-board, within which slots the extensions *a'*, with the reinforcing-forks of the respective tubes, extend. The side and end walls of said slots are faced with leather *e²*, against which the tips of the extensions *a'* and forks *c* are adapted to strike simultaneously when the frame is vibrated, serving to sound the musical tubes. The instrument may be played by shaking the individual frames or by striking them with the hand or a mallet.

In mounting the musical tubes of my improved instrument I preferably arrange them in the manner I will now describe. The larger tube mounted in the frame is tuned to a fundamental tone. The next is an octave higher, and the two tubes upon the right are of the same tone—a double octave of the fundamental—which arrangement I have found is best calculated to produce the most pleasing musical effect. This is because of the perfect blending of these several tones. The lower tones of a frame ordinarily would greatly diminish the effect of the highest tone, which is most noticeable to the ear, and I have discovered in consequence of this that augmentation of this highest tone is very desirable in an instrument of this class. Hence the necessity for doubling the tubes producing the higher tones.

The several frames are assembled and arranged upon the rack to form a musical scale, and the instrument is capable of producing very beautiful music when properly played. It is of course necessary that the greatest care be exercised in tuning the individual steel tubes, which, however, as regards the higher notes always remain in constant tune, and the lower ones are subject only to minimum climatic variation.

By constructing the tube with two portions or air-columns in sympathy in the manner disclosed a double resonator is secured which produces the finest musical tone to be obtained in such instruments. Moreover, the tubular frame constructed of hard wood and tubular metallic uprights or rods in the manner described combines the qualities of properly reinforcing the tones given out by the musical tubes upon being vibrated and the great strength and lightness required of an instrument of this character. The manner of mounting the musical tubes in the frames also leaves them perfectly free to be vibrated and produce a strong clear tone. If desired, my musical tubes may, however, be supported otherwise than by suspending the same in the manner shown.

Various modifications may be made in the apparatus herein disclosed without departing from the spirit of my invention, and I do not desire to be understood as limiting the same to the precise construction shown and described.

I claim, therefore, and desire to secure by these Letters Patent, the following:

1. In a musical tube for instruments of the class described, the combination with a tubular portion, of an air-tight plug or partition disposed therein producing a double sympathetic air-column or resonator, and means, as an extension a' , whereby the tube may be set in vibration, substantially as described.

2. In a musical tube for instruments of the class described, the combination with a tubular portion, of a vibrating reed a^5 , a partition disposed within said tubular portion, to produce a double sympathetic air-column or resonator, and means, as an extension a' , whereby the tube may be set in vibration, substantially as described.

3. In a musical tube for chimes, the combination with a metallic tubular portion, of an upper vibrating reed a^5 , a plug or partition disposed midway within said tubular portion, to produce double resonators, and an extension a' provided at the lower end adapted to secure the vibration of the tube for the production of a musical tone, substantially as described.

4. In a musical tube for chimes, the combination with a tubular portion, of an air-tight plug or plugs disposed therein producing double sympathetic air-columns or resonators, and a portion adapted to be struck for the production of a characteristic musical tone, substantially as described.

5. The combination with a musical tube of the class described, of an arched reinforcing-piece c secured to the extremity of said tube, adapted to strengthen the same and thereby obtain a better tone from the musical tube, substantially as described.

6. The combination with a musical tube of the class described, of extensions a' provided thereon, and a reinforcing-piece attached between said extensions, whereby the same are reinforced for the purpose of setting the tube in vibration, substantially as described.

7. In a musical instrument of the class described, the combination with a hollow sounding-board e , of tubular uprights or rods f secured in said sounding-board, and musical tubes a supported by the said uprights above openings in said sounding-board, substantially as described.

8. In a musical instrument of the class described, the combination with a tubular sounding-board e constructed of hard wood, of tubular uprights or rods f secured in said sounding-board, and musical tubes a supported by said tubular rods above openings in said sounding-board, substantially as described.

9. In a musical instrument of the class described, the combination with a tubular sound-

ing-board having openings therein, of leather facing-strips provided upon the walls of said openings, tubular uprights or rods f secured in said sounding-board, and musical tubes a supported by said tubular rods above openings in said sounding-board, substantially as described.

10. In a musical instrument of the class described, the combination with a sounding-board having openings therein, of supporting-rods attached to said sounding-board, and a plurality of musical tubes carried by said rods, having extensions supported in position within the openings and adapted to strike against the walls thereof, the said tubes being tuned to produce different harmonious tones, the tubes producing the highest tones being duplicated, substantially as described.

11. In a musical instrument of the class described, the combination with a tubular sounding-board having cushioned openings therein, of supporting-rods attached thereto, and a plurality of musical tubes carried by said rods in position to strike against the cushioned walls of said openings, the said tubes being respectively tuned to produce a fundamental tone, an octave above the same and a duplicated double octave, substantially as described.

12. In a musical instrument of the class described, the combination with the cross-bar h , of a supporting-frame, of a musical tube, through an opening in which said cross-bar extends, and a covering of yielding material provided upon said bar adapted to engage said tube and to permit its free vibration, substantially as described.

13. In a musical instrument of the class described, the combination with the cross-bar h , of a supporting-frame, of a musical tube, through an opening at a node of which said cross-bar extends, a washer and spacing-sleeves of rubber or other yielding material provided upon the bar engaging and supporting the tube, substantially as described.

14. In a musical tube for instruments of the class described, the combination with a tubular portion inclosing the air-column, of an adjustable air-tight plug or partition disposed therein, and means for securing it in its position of adjustment, substantially as described.

15. In a musical tube for instruments of the class described, the combination with a slotted tubular portion inclosing the air-columns, of an adjustable cup forming the plug or partition therein, and means, as a screw extending through the slot, for securing the partition in its position of adjustment, substantially as described.

16. In a musical instrument of the class described, the combination with a sounding-board e , of hard wood having openings therein, tubular uprights f secured to said sounding-board, a plurality of musical tubes a tuned respectively to a fundamental tone, an octave above, and a duplicated double octave

and extensions a' provided upon said tubes and disposed within said openings adapted simultaneously to strike the walls thereof and set the tubes in vibration, substantially as described.

17. In a musical instrument of the class described, the combination with a sounding-board e , of hard wood having openings therein, tubular uprights f secured to said sounding-board, a plurality of musical tubes a tuned respectively to a fundamental tone, an octave above, and a duplicated double octave

and extensions a' provided with reinforcing-fork c provided upon said tubes and disposed within said openings, adapted simultaneously to strike the walls thereof and set the tubes in vibration, substantially as described.

Signed by me at Chicago, Illinois, this 9th day of September, A. D. 1899.

JOHN C. DEAGAN.

Witnesses:

W. W. W. LEACH,
A. L. LAWRENCE.