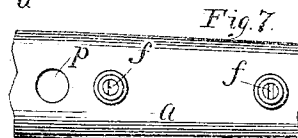
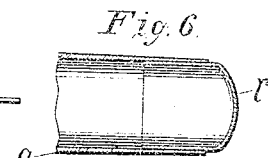
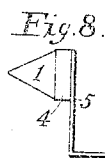
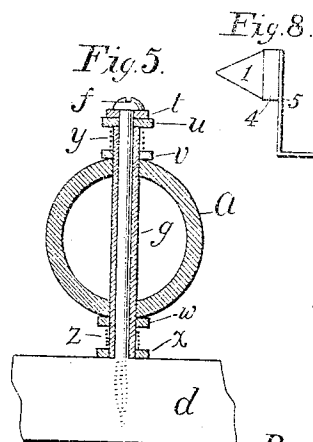
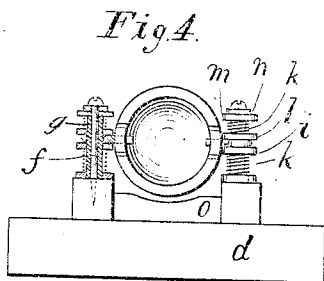
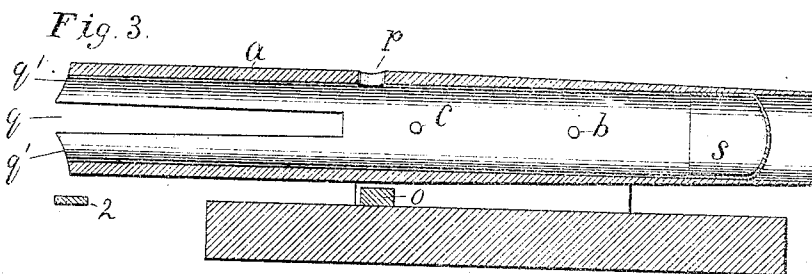
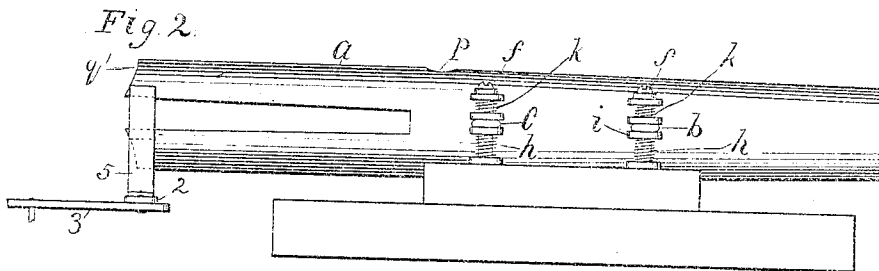
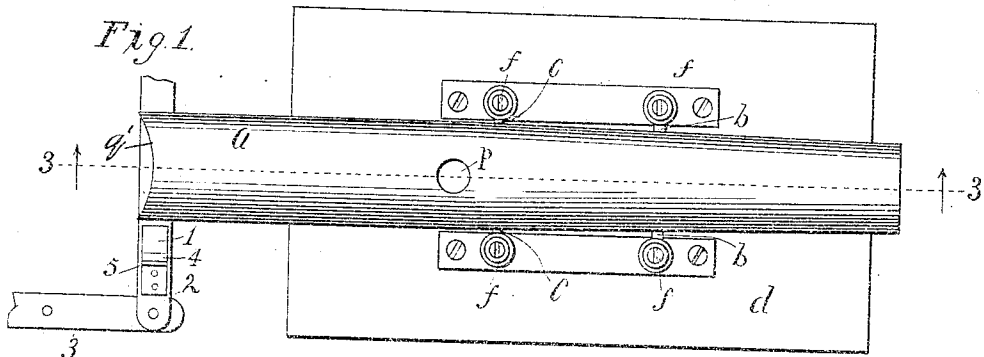


No. 818,874.

PATENTED APR. 24, 1906.

J. C. DEAGAN.
MUSICAL BELL.

APPLICATION FILED OCT. 19, 1904.



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UNITED STATES PATENT OFFICE.

JOHN C. DEAGAN, OF CHICAGO, ILLINOIS.

MUSICAL BELL.

No. 818,874.

Specification of Letters Patent.

Patented April 24, 1906.

Application filed October 19, 1904. Serial No. 229,145.

To all whom it may concern:

Be it known that I, JOHN C. DEAGAN, a 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 Musical Bells, 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 wherein tubes are employed as bells.

The invention has for one of its objects the provision of an improved construction of the tube forming the bell whereby the tones produced upon striking the tube will be unaccompanied by overtones and will be restricted to tones an octave apart. In practicing this feature of my invention the tubes are preferably formed cylindrical and of such a length as to afford the proper air-column within the same corresponding to the tone to be produced, which tube is made of sufficient weight in order to have the proper resonance, the material of which is sufficiently reduced in cross-section to eliminate the overtones. This reduction in the cross-section of the material of the tube is preferably accomplished by tapering the thickness of the wall of the tube, which taper, preferably, uniformly progresses from one end of the tube toward, but usually not to, the other end of the tube. In practice this taper may end about half-way of the length of the tube, the unmodified portion of the tube being that part which is desirably reserved for the impingement of the hammer. This latter portion of the tube is preferably longitudinally slotted to complete the tube into a substantial perfect instrumentality for producing true and pure tones, for it has been found that a tube having its metal gradually tapered from one end to the middle portion thereof and having the balance slotted produces musical tones that are very true, pure, and resonant.

My invention has for another of its objects the provision of an improved construction of tubular bells that are formed with longitudinal slots, whereby the sounds emanating from the slots do not intermingle with each other to such an extent as to blur the same. Tubular bells having longitudinal slots in forming a musical instrument containing a

plurality of the same have to be placed with the slots side by side, for the metal between the slots of each tube is the portion of the tube that is to be struck by a hammer. In order that the tones may not sufficiently intermingle between adjacent tubular bells, I provide an exit for sound-waves located on the front of each tube, which exit is desirably in the form of a circular hole located in proximity to the planes of the bases of the slots, so that the sound-waves may issue in sufficient volume from the fronts of the bells to prevent the tones from being blurred.

Another feature of my invention resides in providing a double suspension for each tubular bell, which while tending to hold the bell in a given plane will permit a sufficient oscillation or movement thereof to enable the bell to respond properly to the stroke of the hammer without having its tones dampened. Hitherto in providing a single suspension for each tubular bell the motion thereof had to be restricted by some suitable agency, as a pad of felt, which dampened the tones. By providing the double suspension or anchorage a tendency to maintain the bell in a given plane is secured, which tendency, however, is not sufficiently strong to prevent a slight movement of the tube in response to a stroke of the hammer. The mounting is preferably supplemented by a felt block or cushion, so that an undue movement of the tube in response to a hammer blow will be prevented, the suspension of the tube being preferably such as to cause an immediate departure of the tube from any extreme position. These mountings preferably include spring-cushions which tend to maintain the tube in a given plane. These spring-cushions have been provided about the shanks of four screws that pass through four ears provided upon each tube, there being two ears upon each side of each tube. I have also passed two screws, longitudinally displaced with respect to each other, through the front of the tube into a support at the rear of the tube and have interposed coil-springs between the support and the tube and between the heads of the screws and the tube, whereby similar results have been secured.

It will be seen that I have provided a marked improvement in the construction of tubular bells whereby the length of the tubes need not materially be increased to eliminate overtones and whereby the tubular length

may be so regulated as to secure the required air-column that is to be in sympathy with the tone.

Another feature of my invention relates to a dampener for the bell.

I will explain my invention more fully by reference to the accompanying drawings, in which—

Figure 1 is a plan view illustrating one bell of my invention. Fig. 2 is a side view of the structure shown in Fig. 1. Fig. 3 is a sectional view on line 3 3 of Fig. 1. Fig. 4 is an end view of the structure, one of the mountings being shown in section to illustrate its surrounding cushion. Fig. 5 is a sectional view illustrating one of two devices that may be employed for mounting the bell. Fig. 6 is a sectional view of a modification of my device. Fig. 7 is a plan view of a portion of a tubular-bell mounting as indicated in Fig. 5. Fig. 8 is a side view of the dampener.

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

In the structures illustrated in Figs. 1 to 4, inclusive, a tubular bell *a* is provided with four ears *b b c c*, the ears *b b* being desirably in the same diametrical plane parallel with the support *d* of the bell, while the ears *c c* are also in a similar horizontal plane, these ears thus being in a plane coincident with the axis of the tube. Screws or guides *f* are passed through these ears, which screws are preferably surrounded by tubes of suitable dampening material, as rubber. The ears *b b c c* rest upon coil-springs *h*, felt washers or washers of other suitable sound-dampening material *i* being interposed between the upper ends of the springs and the ears, the screws *f* passing through these washers. In order that a very effective mounting may be secured, the screws *f* are also surrounded by springs *k*, between the lower ends of which and the ears *b b c c* felt washers *l* are disposed, similar washers *m* being also disposed between the heads of the screws and the upper ends of the springs *k*, the said screw-heads being supplemented, if desired, by washers *n*, of more rigid material than the felt washers. The screws *f* pass through all of the washers. It will be seen that in this way a mounting for the tubular bell is provided which normally maintains the said tubular bell in a given plane, which restores the tubular bell to its normal plane after it has been struck by a hammer and which affords such a support for the bell that the vibrations thereof are not dampened and are not communicated by the mountings to the bell-support. The upper pair of ears *b b* serves in a way to constitute a sort of a pivotal mounting for the tubular bell, as the greatest movement is effected at the lower end of the bell, where it is struck by the hammer. In case

this portion of the tube should move too far from its normal position I provide a felt block or other cushion *o*, that acts to limit the motion of the tube without impairing its vibration, the coil-springs speedily restoring the tube to its normal place. In practicing another feature of my invention each tubular bell is provided with an opening *p* at its front surface, so that the waves of sound are not restricted to passage through the slots *q*, which is an advantage, as the sounds otherwise might issue through the said slots in such large volume as to blur when several tubes side by side are sounded. The opening *p* is desirably circular and is preferably located near the bases of the slots *q*. By placing the opening as indicated the vibration of the split part of the bell and the air-column are not injured in effectiveness.

In order that overtones may be eliminated from the tubular bell, I have tapered the thickness of the wall of the bell preferably from the said opening or the bases of the slots gradually to the upper end of the tube, where the metal becomes much thinner than where the said opening is located. In this way the air-column may properly be suited to the length of the tube to correspond to the tone to be produced thereby, while at the same time the overtones are eliminated, which result is secured without materially, if at all, modifying the length of the tube. This taper, while preferably being gradual from the central portion of the tube toward its upper end, is also circumferentially uniform, so that no improper vibrations are anywhere provided in the structure of the tube that bring forth overtones. While I prefer this gradual modification of the cross-section of the tube longitudinally, I do not wish to be limited thereto, as the construction shown in Fig. 6 may be employed where the cap *r* serves as a continuation of the tubular bell, and projecting from the balance of the bell is a portion of the bell whose cross-section is sufficiently reduced to eliminate overtones, while at the same time contributing to the proper tonal production. It will be seen that the portion of the bell the thickness of whose metal is tapered is substantially a complete tubular wall, this portion of the instrument being unslotted.

In Fig. 3 a plug *s* is inserted within the bell for the purpose of determining its tonal capacity, though I do not wish to be limited to a bell in which the plug is either present or absent.

In Figs. 5 and 7 I have illustrated a mounting comprising two screws *f*, passing into the support *d* of the bell in a plane perpendicular to said support and coincident with the axis of the tube. These screws *f* are surrounded by tubes of rubber or other suitable sound-dampening material *g*. There is disposed

just beneath the head of each screw *f* a washer *t*, comparatively rigid, immediately below which is disposed a washer *u*, of felt, a similar washer *v* being immediately placed over the tube *a*. Similar washers *w* *x* are provided below the tubular bell. Springs *y* and *z* are interposed, respectively, between the washers *u* and *v* and *w* and *x*. By means of the construction illustrated in Figs. 5 and 7 the tubular bells may be more closely assembled in the formation of a musical instrument.

Where it is desired to play the bell with a bow instead of a hammer, the slotted end of the said bell is scalloped, as indicated at *q'* *q'*, there being preferably one scallop concavity in each limb of the bell. The depressed portion of each concavity is preferably midway between the margins of the slots *g*, so that a well-defined path of travel for the bow in a plane perpendicular to the plane occupied by said slots is provided, whereby sound is evenly distributed in its passage through the slots.

It will be observed that the slotted part of the bell is not circumferentially continuous by reason of the slots and that the balance of the bell is circumferentially continuous.

Referring to that part of my invention that has to do with the dampening of tones so that their duration may be determined, I have employed a wedge element 1, which may be mounted on a reciprocating bar 2. This bar may be pivoted to suit the action. The wedge is normally removed from the bell and is brought in contact with one of the slots by the action of the lever 3. I do not wish to be limited to the use of a wedge to dampen the sound, as other agencies may be employed for the same purpose. To secure the best effect, a felt dampener is mounted on a block 4, that in turn is mounted upon a strip metal spring 5. The wedge-shaped dampener is brought to a sharp point, so that it may enter between the margins of a slot (which are vibrating) to stop their vibration.

It is obvious that changes may readily be made in the precise embodiment of my invention shown in the drawings without departing from the spirit of the invention, and I do not, therefore, wish to be limited to the precise construction herein illustrated; but,

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

1. A musical bell of tubular formation, the wall of which is tapered in thickness uniformly from one end of the tube toward the other, substantially as described.

2. A musical bell of tubular formation which is longitudinally slotted and which is provided with an opening *p* transverse to the plane of slotting to permit a portion of the sound to pass therethrough, substantially as described.

3. A musical bell of tubular formation which is longitudinally slotted and which is provided with an opening *p* where said slotting terminates, substantially as described.

4. A musical bell of tubular formation which is provided with two longitudinal slots and which is provided with an opening *p* opposite the plane in which the said slots lie, substantially as described.

5. A musical bell of tubular formation which is provided with two longitudinal slots and which is provided with an opening *p* opposite the plane in which the said slots lie, the said opening being at that portion of the tube where the slots terminate, substantially as described.

6. A tubular bell having longitudinally-displaced anchorages, an anchorage including a screw or guide *f* and a spring-cushion with which the guide is provided, and provided for yieldingly maintaining the tubular bell in a given plane, substantially as described.

7. A slotted tubular bell provided with a sound-dampener adapted to enter a slot, substantially as described.

8. A slotted tubular bell provided with a sound-dampener adapted to engage opposed longitudinal slot - margins, substantially as described.

9. A musical bell of tubular formation having a circumferentially - continuous tubular wall portion, the thickness of which is tapered uniformly from one end toward the other, substantially as described.

10. A musical bell of tubular formation having a circumferentially-continuous tubular wall portion, the thickness of which is tapered from one end toward the other, the said bell being longitudinally slotted below the complete tubular wall portion, substantially as described.

11. A musical bell of tubular formation having a circumferentially-continuous tubular wall portion, the thickness of which is tapered uniformly from one end toward the other, the said bell being longitudinally slotted below the complete tubular wall portion, substantially as described.

12. A musical bell of tubular formation having a circumferentially-continuous tubular wall portion, the thickness of which is tapered from one end toward the other, the said bell being longitudinally slotted below the complete tubular wall portion, the said taper terminating substantially where the slotting of the bell terminates, substantially as described.

13. A musical bell of tubular formation having a circumferentially-continuous tubular wall portion, the thickness of which is tapered uniformly from one end toward the other, the said bell being longitudinally slotted below the complete tubular wall por-

tion, the said taper terminating substantially where the slotting of the bell terminates, substantially as described.

14. A tubular bell having longitudinally-displaced anchorages, each anchorage including a screw or guide *f* passing through the bell and surrounded by a rubber tube, a coil-spring surrounding the upper part of the screw, and a coil-spring surrounding the lower part of the tube, said springs being provided for yieldingly maintaining the tubular bell in a given plane, said bell being interposed between said springs substantially as described.

15. A musical bell of tubular formation having a circumferentially-continuous tubular wall portion, the thickness of which varies longitudinally, the said bell being longitudinally slotted below the complete tubular wall portion, substantially as described.

In witness whereof I hereunto subscribed my name this 14th day of October, A. D. 1904.

JOHN C. DEAGAN.

Witnesses:

G. L. CRAGG,
LEON STROH.