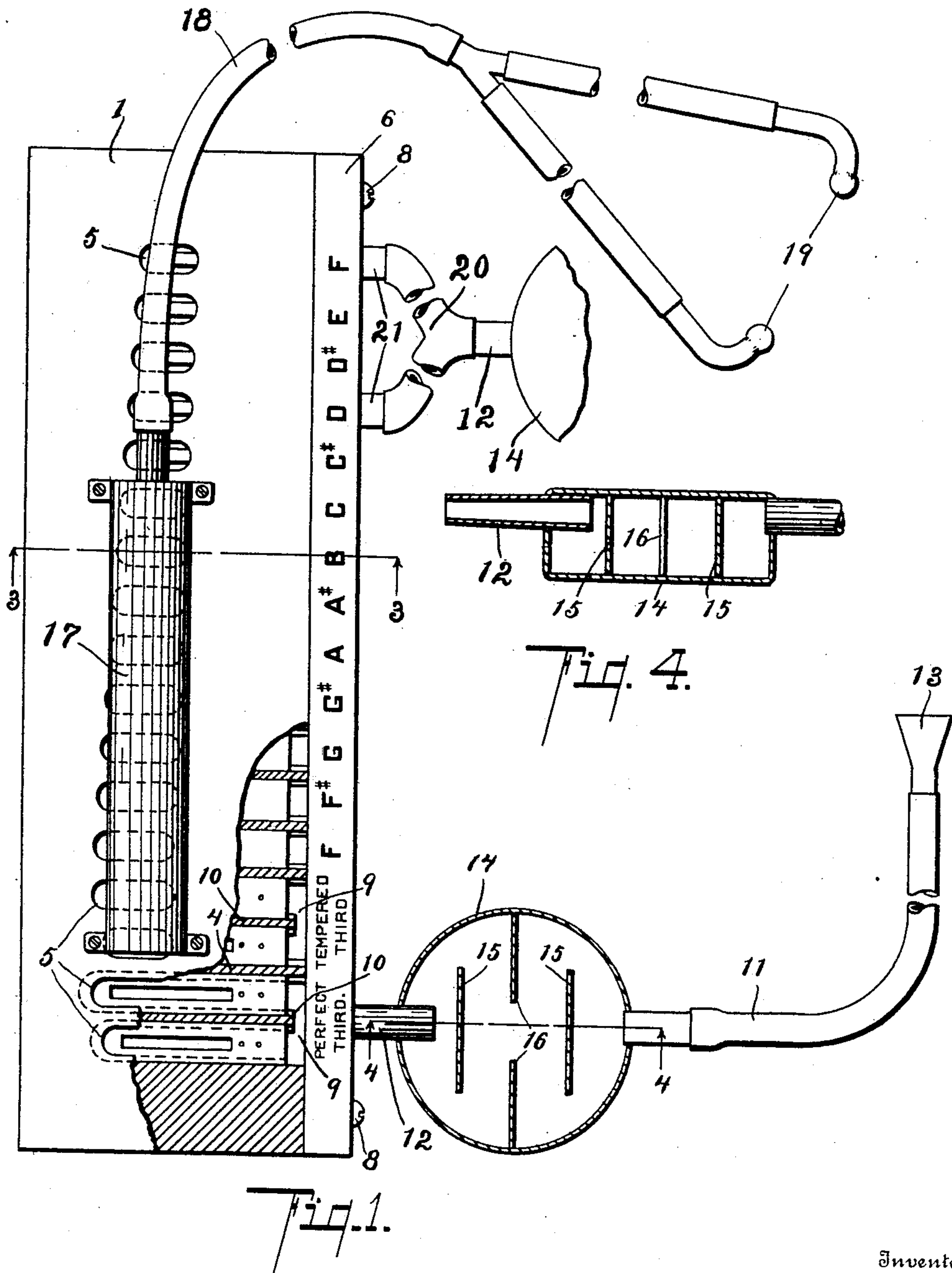


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 DEVICE FOR USE IN TUNING MUSICAL INSTRUMENTS.
 APPLICATION FILED JAN. 9, 1908.

906,608.

Patented Dec. 15, 1908.

2 SHEETS—SHEET 1.



Witnesses
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 Lulu Greenfield

By

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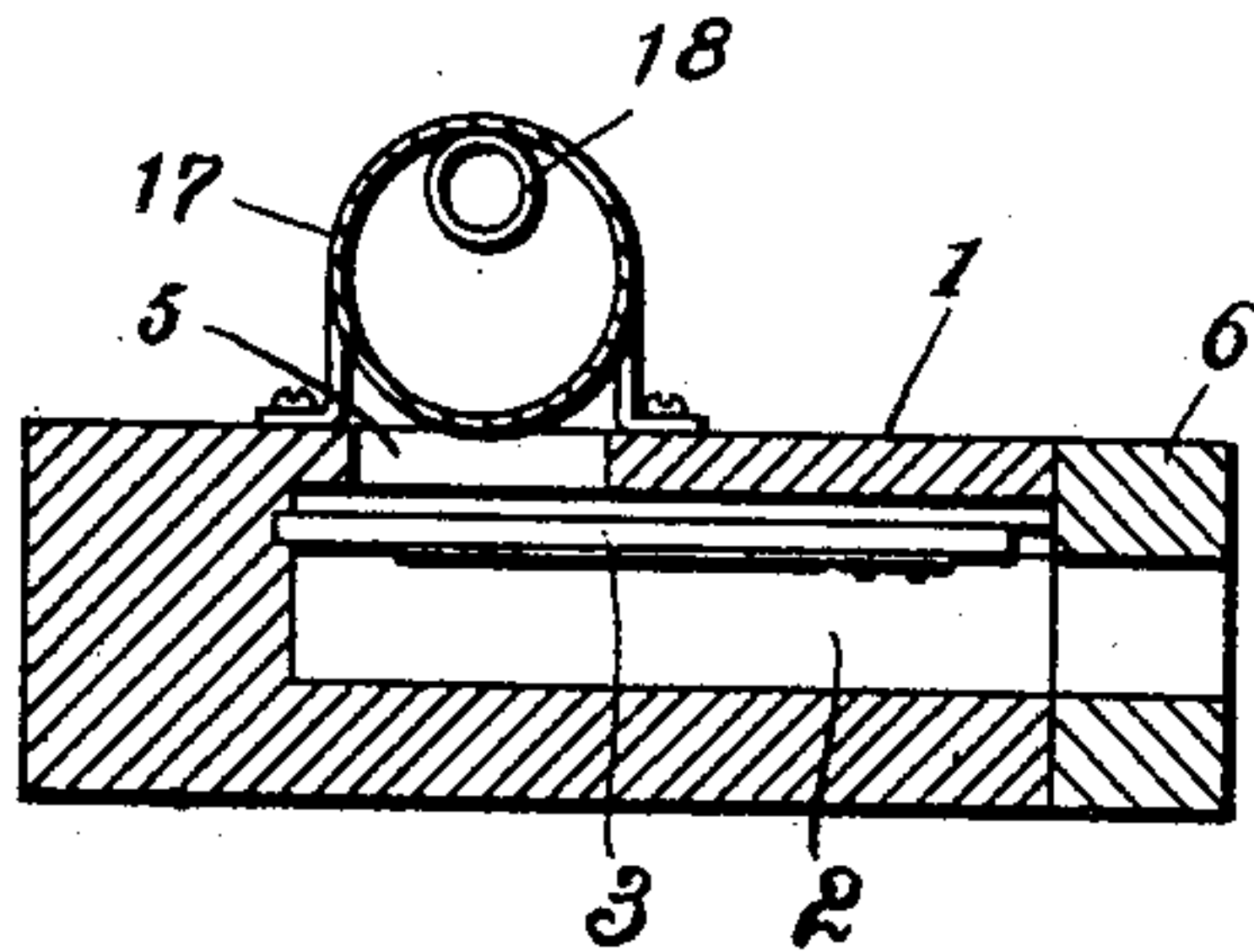


Fig. 3.

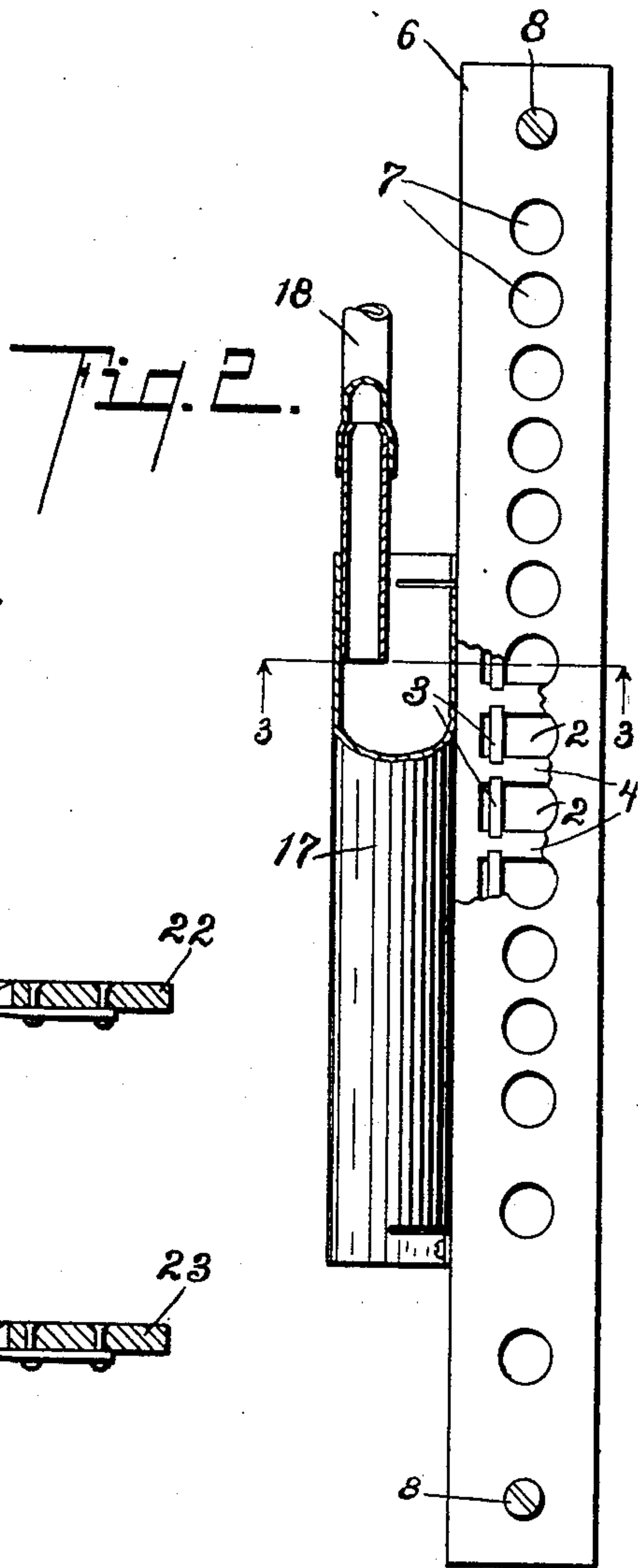


Fig. 2.

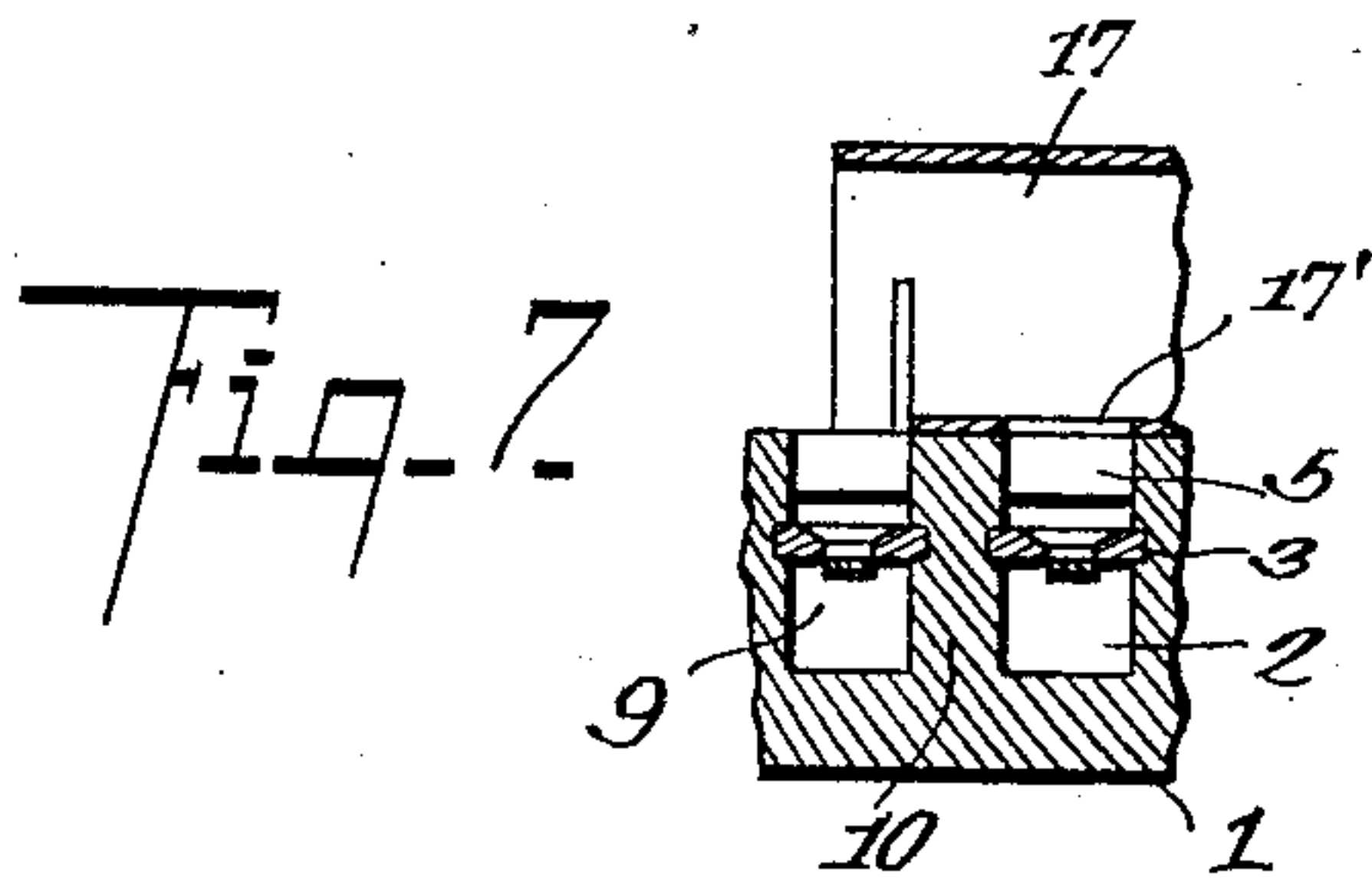


Fig. 7.

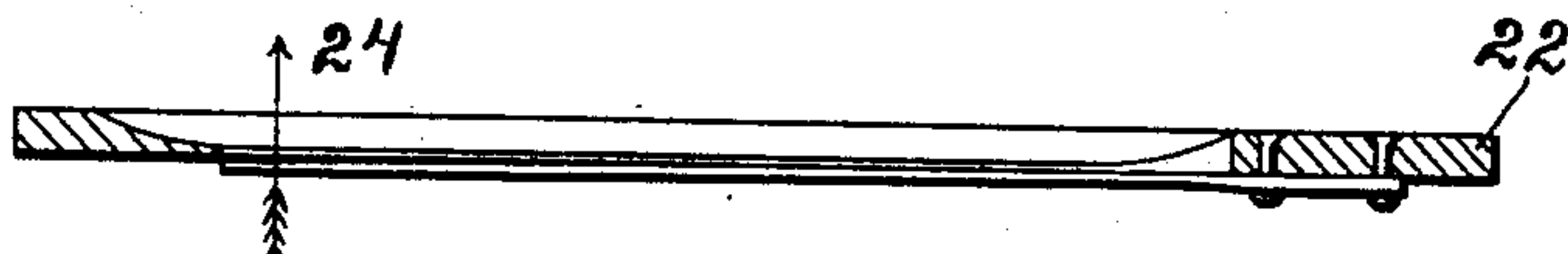


Fig. 5.

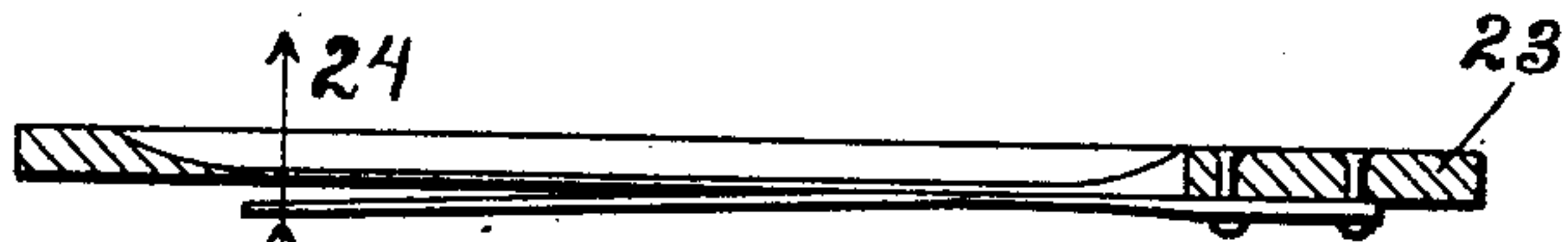


Fig. 6.

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UNITED STATES PATENT OFFICE.

NILES BRYANT, OF BATTLE CREEK, MICHIGAN.

DEVICE FOR USE IN TUNING MUSICAL INSTRUMENTS.

No. 906,608.

Specification of Letters Patent.

Patented Dec. 15, 1908.

Application filed January 9, 1908. Serial No. 409,962.

To all whom it may concern:

Be it known that I, NILES BRYANT, a citizen of the United States, residing at Battle Creek, Calhoun county, Michigan, have invented certain new and useful Improvements in Devices for Use in Tuning Musical Instruments, of which the following is a specification.

This invention relates to improvements in devices for use in tuning musical instruments.

My present invention is adapted for use in substantially the same manner as the device shown in the United States Letters Patent No. 813,769, issued to me on February 27, 1906; and is, in some respects, an improvement upon that device, and has certain features added thereto.

The main objects of this invention are: first, to provide an improved device for use in tuning musical instruments, which is convenient to use, and, by the aid of which, such instruments can be properly tuned by a person unskilled in the art; second, to provide an improved device for use in tuning musical instruments by which the so-called perfect and tempered intervals,—for example, the perfect third, A to F, and the imperfect third, A to F, either A or F being slightly out of tune, or "tempered",—may be easily demonstrated; third, to provide an improved device for use in tuning musical instruments, and the like, which is simple and economical in structure and very convenient to use.

Further objects, and objects relating to structural details, will definitely appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification.

The invention is clearly defined and pointed out in the claims.

A structure embodying the features of my invention is clearly illustrated in the accompanying drawing, forming a part of this specification, in which,

Figure 1 is a detail plan of a device embodying the features of my invention, parts being broken away to show structural details; Fig. 2 is a front elevation thereof, with parts broken away; Fig. 3 is a cross section, taken on a line corresponding to line 3—3 of Figs. 1 and 2; Fig. 4 is an enlarged detail section, taken on a line corre-

sponding to line 4—4 of Fig. 1; Figs. 5 and 6 are enlarged longitudinal sections of the reed plates 22 and 23, respectively, and Fig. 7 is an enlarged detail section showing the arrangement of the resonator.

In the drawing, similar numerals of reference refer to similar parts throughout the several views, and the sectional views are taken looking in the direction of the little arrows at the ends of the section lines.

Referring to the drawing, I provide a reed block or box 1, having a series of reed chambers 2 therein. The reed plates 3 are slipped into suitable grooves formed in the vertical walls 4 of these chambers. Each reed chamber is provided with a delivery opening 5, the same being preferably located above the rear end of the reed, as clearly appears from Fig. 1 of the drawing.

The reed block is provided with a face-plate 6, having a series of air supply passages 7, arranged to deliver to the several reed chambers. This face-plate is preferably detachably secured to the reed block by means of the screws 8, and closes the outer ends of the reed chambers, except through the supply passages. By this arrangement, I secure a structure which is simple to produce and assemble, the reed plates 3 being slipped into place from the front end of the block, and being held in place, when the chamber is closed, by means of the face-plate. I also preferably provide the block with a pair of chambers, each adapted to receive two reeds, the object of which will be pointed out later. The walls in these chambers co-act with the chamber walls 4 in supporting the reeds. The air is preferably delivered to the reed chambers by means of a suitable tube, as 11, which is provided with a tip 12, adapted to be inserted into one or another of the supply passages 7 for the reed chambers.

The air may be supplied by a bellows, as is illustrated in my patent hereinbefore referred to, or, it may be supplied by the operator blowing into the tube, which tube is preferably provided with a suitable mouth-piece, as 13, which method is found entirely practicable in practice and is the method usually employed by me. Adjacent to the delivery end of the air supply tube 11, and preferably mounted on the tip 12, I arrange a chamber 14. This chamber or enlargement in the air tube allows the reed to vi-

brate under sustained pressure and its natural periodicity of movement is in nowise interfered with. The main function of this chamber or enlargement in the air delivery
 5 passage is to permit the reed to vibrate freely and emit its natural tone under sustained pressure, when the air is supplied to the reed through a long passage of small caliber. The enlargement or chamber 14,
 10 however, performs the additional function of a water-trap for collecting the moisture from the air passing to the reed chambers, and prevents its interfering with the action of the reeds, or causing the reed block,—
 15 which I preferably form of light wood,—to become swollen or distorted.

I preferably provide the chamber 14 with deflecting plates 15 and 16, one of the deflecting plates 15 being arranged to receive
 20 the impact of the air delivered from the tube 11, and the other being arranged in front of the tip 12; the front plate 15 is arranged to deflect the air against the plates 16, and the plates 16 are arranged to deflect the air
 25 against the rear plate 15. By this simple means, the moisture is largely precipitated. If desired, the chamber might be provided with a hygroscopic or absorbent material, which would further dry the air passing
 30 therethrough.

In the structure shown in my patent herebefore referred to, I provided a relief vent opening for each of the air delivery passages, so that the reeds could vibrate freely
 35 under pressure in the small reed chambers. This arrangement is, however, somewhat defective on account of the escape of air on its way to the reed, thereby requiring a greater supply of air and more pressure to cause the
 40 reed to "speak," and also rendering it more difficult to maintain a reasonably continuous or sustained tone when blown with the mouth than in my present device, which I find is entirely effective in permitting the
 45 reed to vibrate freely, and the reeds may be caused to "speak" with comparatively little air supply.

I preferably provide my improved reed block or box with thirteen independent
 50 reeds,—that is, thirteen reeds arranged in independent chambers. These reeds can be arranged to include what is known to musicians as the "equal temperament", the several reeds being tuned or adjusted to produce the exact tone desired.

If desired, air may be supplied to a pair of the reed chambers simultaneously by means of the fork 20, having tips 21 adapted to be inserted into the air passages 7, the fork being
 60 adapted to be slipped upon the tip 12 of the air supply chamber 14. The device illustrated comprises F, F sharp; G, G sharp; A, A sharp; B; C, C sharp; D, D sharp; E and F. A piano-tuner usually lays the foundation for his temperament in the middle of

the key-board, beginning with the note called "middle C", which is first tuned to a tuning fork or pitch pipe. F, below middle C, is then tuned, not to a perfect fifth, but slightly sharpened, until there result three
 70 beats in five seconds. Next, the fourth below middle C, which is G, is tuned, slightly flat from where it would stand if it were to form a perfect or pure fourth with C, until there results one beat per second. All fourths and
 75 fifths within the octave where the foundation for the temperament is laid must likewise be tuned with slight imperfection. By so doing, the result is a perfect octave when the temperament is finished. This is necessary to produce harmony in all the octaves
 80 and complete the tuning and requires a delicate musical sense, skill and experience, and the most careful attention.

As a guide for the operator, I preferably
 85 provide my improved device with means for producing the so-called "tempered" and "perfect" musical intervals, and demonstrating to the operator by means of beats and the absence of beats the difference in
 90 sound between the perfect intervals and the properly tempered intervals,—as, for example, the perfect third, A to F, and the imperfect third, as A to F, either A or F being slightly out of tune. This I preferably accomplish by providing chambers 9 adapted
 95 to receive two reeds, one of the chambers,—which I have designated in the drawings as perfect third,—containing a pair of perfectly tuned reeds, as A and F; and the
 100 other,—which I have designated in the drawings as the tempered third,—containing a pair of reeds, as A and F, one or the other being slightly out of tune, so that, when they are caused to speak together, beats are produced whereby the operator may be guided.

I preferably provide the chambers 9 with partition-like supports 10 grooved to receive the edges of the reed plates.

It is, of course, desirable that the regularity of the beats may be maintained with
 110 varying air pressures. It is known that the vibration rate of a free reed sounded by an air current decreases slightly, as the air pressure is increased from the sounding point to a
 115 maximum. The percentage of this decrease for a given change of air pressure is proportional to the sensitiveness of the reed,—that is, if the reed be made sensitive to the air current, so that it responds with a slight
 120 air pressure, its percentage of change in vibration with a given increase in air pressure will be greater than that of a reed adjusted to respond less quickly, or a less sensitive reed.

In order to make the percentage of change in vibration rate, for any given change in air pressure, substantially equal in both reeds, which I arrange in the so-called tempered
 125 third chamber, so that the rate of the nat- 130

ural beats shall be constant under increasing or varying air pressure, I augment the rate of the change in the lower pitched and heavier reed until it shall parallel and keep
 5 pace with that of the higher pitched and lighter reed. This I accomplish by increasing its sensitiveness to such a degree that it will sound first when the air current is supplied to the chamber, both reeds, of course,
 10 being acted upon by the same current or pressure. I preferably accomplish this result by springing the tongue of the higher reed 23 away from the plate, which acts to decrease its sensitiveness,—that is, it speaks
 15 less quickly, so that the lower reed 22, whose tongue is left normally comparatively close to the reed opening and is therefore more sensitive than the higher reed, is sounded first. The sounding of the lower reed first
 20 with the smallest amount of air pressure that will cause both reeds to speak is the test or guide I use in practice to determine when the proper degree of augmentation in the rate of change in the lower reed has
 25 been reached to make it the same as the rate of change in the higher reed. In Figs. 5 and 6 of the drawing, I illustrate the relative positions of the tongues of the reeds 22 and 23, the illustration, however, being exaggerated
 30 to show the idea clearly. Also the tip of the higher reed is preferably curved slightly outward toward the air current approaching it.

The exact amount of difference in sensitiveness between the two reeds necessary to hold the beat rate constant under varying
 35 pressure is easily determined by experiment.

I preferably amplify the beats of the imperfect third by means of a properly tuned
 40 resonator, as 17, the same being tuned to amplify certain particular tones desired, so that the beats between them may be heard with great distinctness. The resonator is provided with an opening 17' arranged to
 45 register with one of the openings 5 of the chamber 9 containing the reeds tuned to give the tempered interval. The resonator 17 is preferably provided with a delivery tube 18 having ear tips 19. This conveys the
 50 beats to the ear of the operator with great distinctness. By this means, I clearly demonstrate to the operator, by means of beats and the absence of beats, the perfect and tempered intervals, so that he may be guided
 55 thereby in tuning an instrument.

I have illustrated and described my improved device for use in tuning musical instruments in detail in the form preferred by
 60 me on account of its structural simplicity and economy, and its convenience in use. I am, however, aware that it is capable of very great variation in structural details without departing from my invention, and I desire to be understood as claiming the same broadly,
 65 as well as specifically, as illustrated.

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

1. In a device of the class described, the combination of a reed block or box, having
 70 a plurality of unconnected reed chambers therein; delivery openings for said chambers; reeds arranged in said chambers; air supply passages for said chambers; an air supply pipe; delivery tips therefor adapted
 75 to be inserted into said air supply passages of said reed block; and an enlargement or chamber for said air supply pipe arranged at the delivery end thereof.

2. In a device of the class described, the
 80 combination of a reed block or box, having a plurality of unconnected reed chambers therein; delivery openings for said chambers; reeds arranged in said chambers; air supply passages for said chambers; an air
 85 supply pipe; a delivery tip therefor adapted to be inserted into said air supply passages of said reed block; and an enlargement or chamber for said air supply pipe arranged at the delivery end thereof.
 90

3. In a device of the class described, the combination of a reed block having a plurality of unconnected reed chambers therein; reeds arranged in said chambers; and means for delivering air to said chambers
 95 having an enlargement adjacent to said reed chambers.

4. In a device of the class described, the combination of a reed block or box having
 100 a reed chamber therein; a delivery opening for said chamber; a plurality of reeds of different pitch arranged in said chamber; a resonance chamber to which said delivery opening in said reed chamber delivers,
 105 mounted upon said block; an air supply pipe adapted to be connected to said reed chamber; and an enlargement or chamber in said air supply pipe arranged at the delivery end thereof.

5. In a device of the class described, the
 110 combination of a reed block or box having a reed chamber therein; a delivery opening for said chamber; a resonator to which said delivery opening in said reed chamber delivers, mounted upon said block; an air supply
 115 pipe adapted to be connected to said reed chamber; and an enlargement or chamber in said air supply pipe arranged at the delivery end thereof.

6. In a device of the class described, the
 120 combination of a reed block or box, having a reed chamber therein; a delivery opening for said chamber; a pair of reeds of different pitch arranged in said chamber; and an air supply pipe adapted to be connected to
 125 said chamber, said air supply pipe having an enlargement or chamber therein, for the purpose specified.

7. In a device of the class described, the combination of a pair of reed chambers; a
 130

pair of reeds of different pitch arranged in one of said chambers, said reeds being tuned to give a perfect interval; a pair of reeds of different pitch arranged in the other of said chambers, said reeds being tuned to give an imperfect interval, such interval being substantially the same as the perfect interval; and an air supply pipe adapted to be alternately connected to said chambers.

8. In a device of the class described, the combination of a pair of reed chambers; a pair of reeds of different pitch arranged in one of said chambers, said reeds being tuned to give a perfect interval; a pair of reeds of different pitch arranged in the other of said chambers, said reeds being tuned to give an imperfect interval; such interval being substantially the same as the perfect interval; and means for delivering air to said chambers, for the purpose specified.

9. In a device of the class described, the combination of a reed chamber; and a pair of reeds of different pitch arranged in said chamber, said reeds being tuned to give an imperfect or tempered interval, the lower reed being made more sensitive than the other, for the purpose specified.

10. In a device of the class described, the combination of a reed chamber; a pair of reeds of different pitch arranged in said chamber, said reeds being tuned to give an imperfect or tempered interval, the lower reed being made more sensitive than the other; and a resonance chamber to which said reed chamber is connected.

11. In a device of the class described, the combination of a reed chamber; a pair of reeds of different pitch arranged in said chamber, said reeds being tuned to give an imperfect or tempered interval, the lower reed being made more sensitive than the other; and a resonator tuned to amplify

the beats produced by the said imperfectly tuned reeds.

12. In a device of the class described, the combination with a pair of tone-producing devices, such devices being tuned to give a tempered interval and furnishing upper partials, whereby, when simultaneously sounded, beats are produced, of a resonator tuned to amplify those upper partials.

13. In a device of the class described, the combination with a pair of reeds of different pitch, said reeds being tuned to give a tempered interval, the lower reed being more sensitive than the higher, whereby it sounds first under the same air pressure; and means for simultaneously supplying air under equal pressure to said reeds.

14. In a device of the class described, the combination with the reed chambers, of air supply passage therefor; an air supply pipe; a chamber at the delivery end of said air supply pipe; a tip carried by said chamber adapted to be inserted in said air supply passages, said tip projecting into said chamber; and a plurality of deflecting plates arranged in said chamber, for the purpose specified.

15. In a device of the class described, the combination with the reed chambers, of air supply passages therefor; an air supply pipe; a chamber at the delivery end of said air supply pipe; a tip adapted to be connected to said air supply passages, and a plurality of deflecting plates arranged in said chamber, for the purpose specified.

In witness whereof, I have hereunto set my hand and seal in the presence of two witnesses.

NILES BRYANT. [L. S.]

Witnesses:

BURRITT HAMILTON,
BLANCH RATHBUN.