E. AUFIERO.

PHYSICAL INSTRUMENT FOR THE PRODUCTION OF SOUND WAVES.

APPLICATION FILED JAN. 20, 1914.

1,317,473.

Patented Sept. 30, 1919.

2 SHEETS—SHEET 1.

Fig. 1

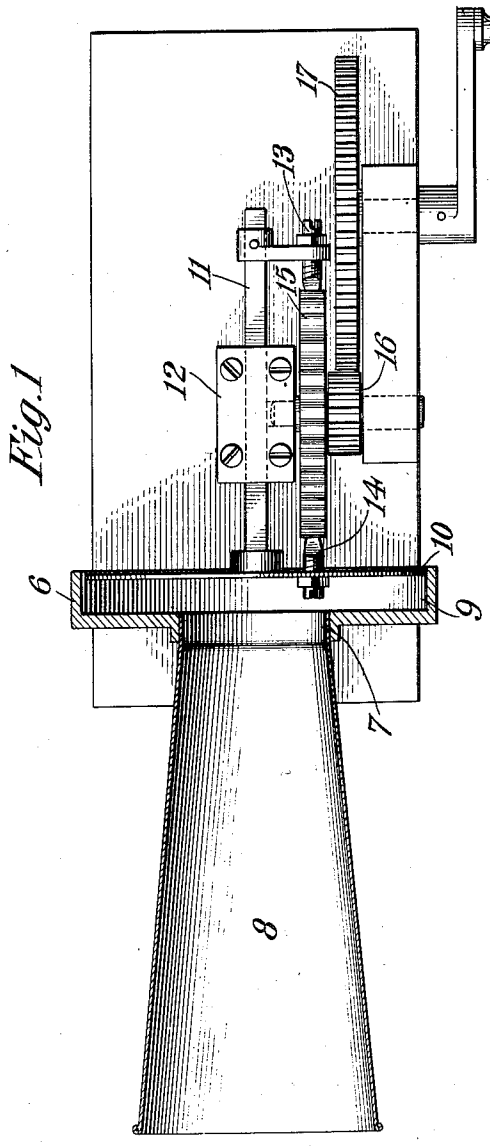
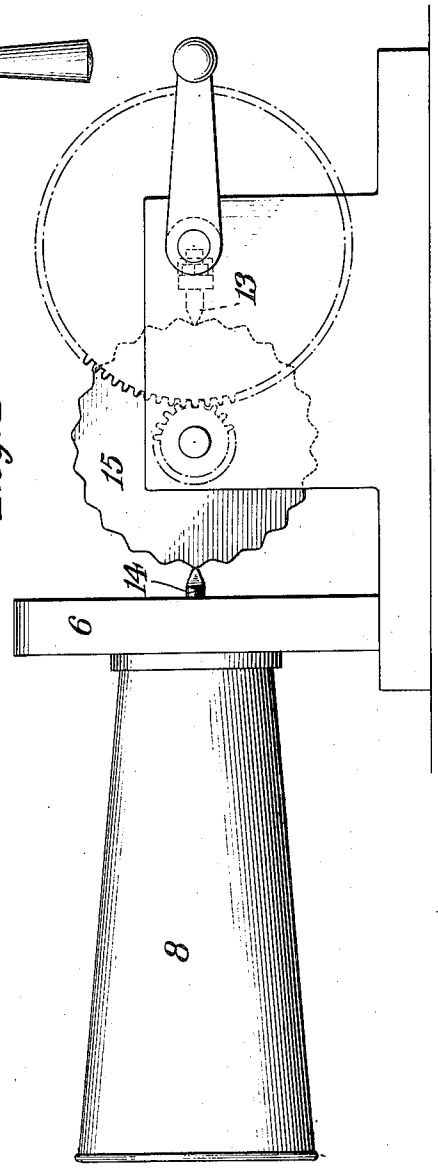


Fig. 2



Witnesses:

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Fig. 3

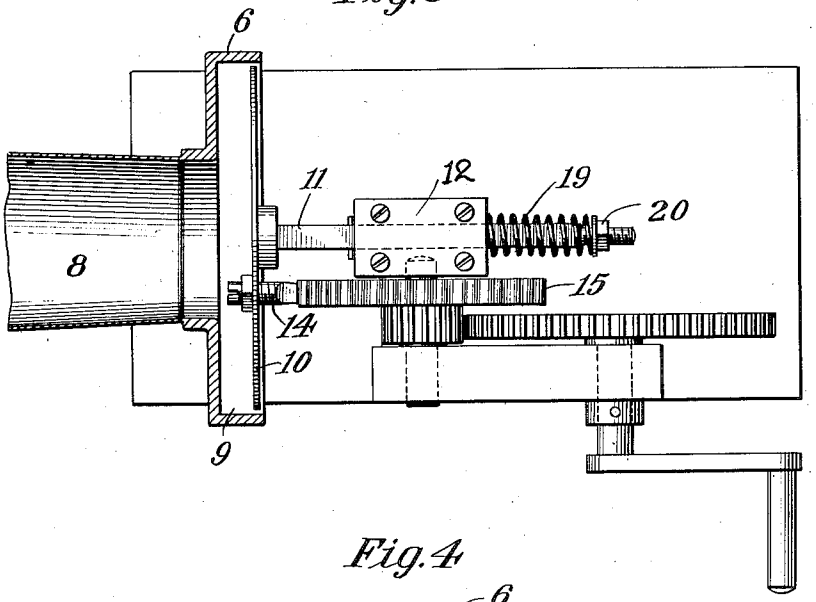


Fig. 4

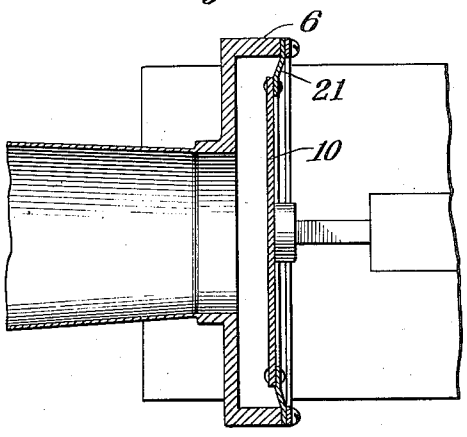
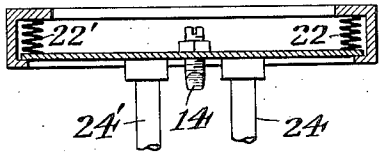


Fig. 5



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UNITED STATES PATENT OFFICE.

EMANUEL AUFIERO, OF BROOKLYN, NEW YORK.

PHYSICAL INSTRUMENT FOR THE PRODUCTION OF SOUND-WAVES.

1,317,473. Specification of Letters Patent. Patented Sept. 30, 1919.

Application filed January 20, 1914. Serial No. 813,206.

To all whom it may concern:

Be it known that I, EMANUEL AUFIERO, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in Physical Instruments for the Production of Sound-Waves, of which the following is a specification.

My invention relates to an apparatus for the production of sound waves, adapted to be used in schools, in place of the siren and similar devices, for demonstrating the phenomena of loudness of sound as dependent upon the amplitude of vibration, of pitch upon the number of vibrations per second, and the phenomena of quality of sound as dependent upon the wave form or the nature of air displacement for a complete vibration.

In the drawing, Figure 1 is a top view of one form of the device; Fig. 2 is a side view of same; Figs. 3, 4 and 5 show modified constructions. Similar numbers refer to similar parts in the different views.

A main suitable frame 6 is provided with a central opening 7, to which a funnel 8 may be secured to be used for directing the sound waves, or to be used as a resonator when so desired; in the latter instance it can be made removable from frame 6, so that resonators of different pitch may be secured thereto. Frame 6 is also provided with a recess 9 of larger dimensions than the opening 7, said recess being used as bearing for the sliding plate 10. A stem 11, running in support 12, is fastened to the center of plate 10, and carries at the extreme end an adjustable impact member 13, in line with a similar impact member 14 carried by plate 10. A rotary cam 15 is so adjusted in relation to said impact members, that while member 14 is at the top of one cam projection, the other member 13 is at the bottom of another cam projection at the opposite side of cam 15, rotation of which will effect vibration of the plate 10.

It will be seen, that imparting a slow speed of rotation to the cam 15, by means of pinion 16 and gear and crank 17 and 18, a sound of low pitch may be produced by the resulting vibration of plate 10; and by increasing the speed of rotation sounds of any desired pitch may be generated. The loudness of sound may be changed by changing the amplitude of vibration of the plate 10, or by making said plate of smaller or larger dimensions for more or less loud sounds. The quality of the sound may be changed from a perfectly musical note, to sounds imitating the human voice by changing the form of cam projections from a perfectly sinusoidal form to that of the wave form of the sound to be imitated.

In Fig. 3, instead of utilizing the cam 15 to return the plate 10 to normal position, the cam is used only to apply a forward push to said plate, while a spring 19, or its equivalent, is used to return it to normal; the tension of the spring may be regulated by means of the adjusting nut 20; the amplitude of vibration of the plate may be regulated by more or less engagement of the impact member 14 with the cam 15.

I find it very desirable sometimes to so adjust the cam 15 in relation to the impact member 14, that only the uppermost parts of the cam projections come in contact therewith; with similar adjustment such high speed may be imparted to the cam, that the plate 10 is made to vibrate for a distance greater than the distance in actual contact with the cam projections.

When it is necessary to illustrate the phenomena of closed pipes, or for some other purpose, I provide a ring 21 of cloth or of other suitable material, as shown in Fig. 4, fastened to the edge of plate 10 and to the frame 6, thus completely closing the bottom of the resonator.

The impact member 14 may be placed at the center of plate 10, as seen in Fig. 5, and a number of springs 22 and 22′ may be placed in front of said plate; in this instance two stems 24 and 24′ may be used, the recess in the frame 6 being used to support the vibrating plate.

It will be understood by those skilled in the art, that many modifications, changes and substitutions may be made in the device without departing from the scope of my invention.

What I claim is:

1. In a sound-producing device, the combination of an air-inclosing resonator, a piston having a substantially rigid head mounted for bodily movement in a plane at right angles to the face of the head, means for positively vibrating said piston at various predetermined speeds and of a predetermined mininmum amplitude to produce a continuous note of a pitch determined by the rate of vibration.

2. In a sound-producing device, the com-

bination of an air-inclosing resonator, a piston having a substantially rigid head mounted for bodily movement in a plane at right angles to the face of the head, means for imparting to said piston vibrations at various predetermined speeds and of a predetermined minimum amplitude to produce a continuous note of a pitch determined by the rate of vibration, said piston being mounted for limited movement in excess of said minimum amplitude whereby a greater amplitude of movement of the piston varying with the momentum of said head is secured.

3. In a device for the production of sound waves of the desired pitch and amplitude, in combination, a piston adapted to move the air in front of it, a stem secured to said piston, supporting means for said stem, and a rotary cam having regularly spaced projections acting on said stem and piston to impart momentum thereto whereby great amplitude of vibration is secured.

4. In a device for the production of sound, in combination, a suitable frame, an opening at the center of said frame, a resonator secured to said opening, a recess in said frame of larger dimensions than the opening, a member adapted to slide in said recess, an adjustable projection on said member, and a rotary cam acting on said member through said projection in slight engagement therewith to move it forward to impart to it momentum to secure greater amplitude of movements, and tension mechanism for moving said member backward for the purpose described.

5. In a device for the production of sound waves, a suitable frame, an opening at the center of said frame, a resonator secured to said opening, a recess in said frame of larger dimensions than the opening, a member adapted for reciprocatory movements within said recess, a projection on said member, a rotary cam having regularly spaced projections in slight engagement with said projection and adapted to impart momentum to said member, whereby great amplitude of movements are secured.

EMANUEL AUFIERO.

Witnesses:
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