

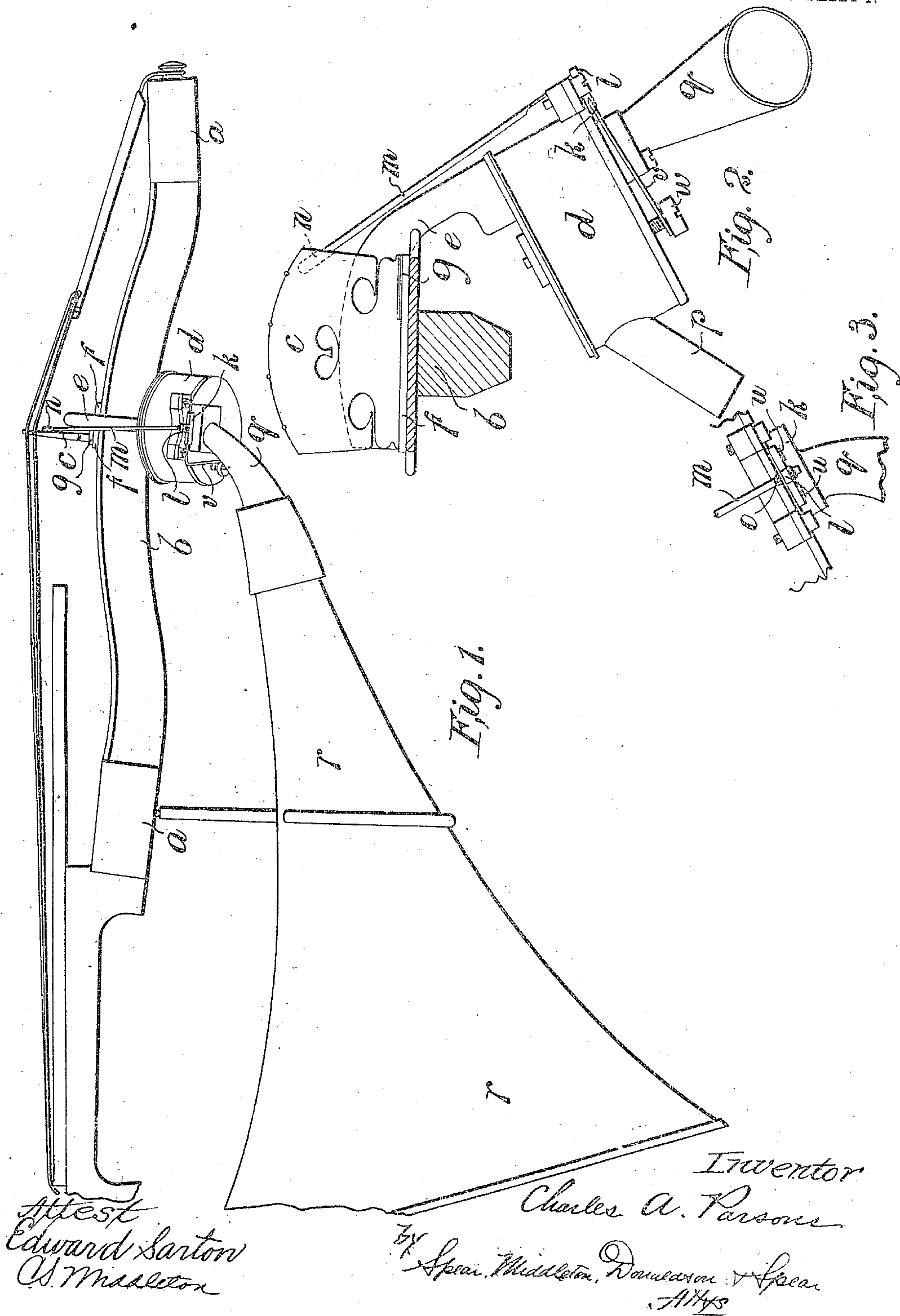
No. 816,180.

PATENTED MAR. 27, 1906.

C. A. PARSONS.  
SOUND PRODUCING INSTRUMENT.

APPLICATION FILED APR. 12, 1904.

2 SHEETS—SHEET 1.



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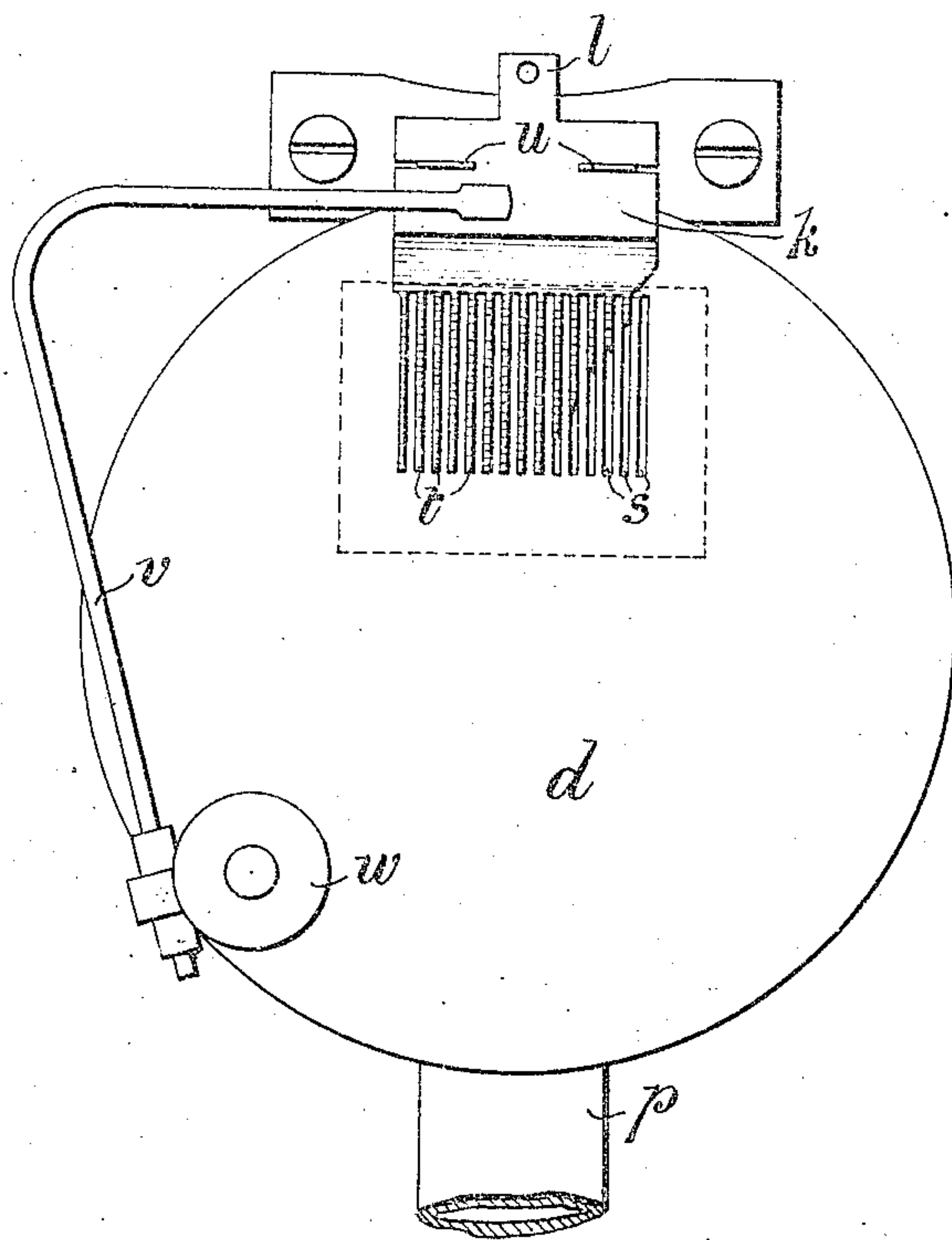


Fig. 4.

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# UNITED STATES PATENT OFFICE.

CHARLES ALGERNON PARSONS, OF NEWCASTLE-UPON-TYNE, ENGLAND.

## SOUND-PRODUCING INSTRUMENT.

No. 816,180.

Specification of Letters Patent.

Patented March 27, 1906.

Application filed April 12, 1904. Serial No. 202,867.

*To all whom it may concern:*

Be it known that I, CHARLES ALGERNON PARSONS, a subject of the King of Great Britain and Ireland, residing at Heaton Works, Newcastle-upon-Tyne, in the county of Northumberland, England, have invented certain new and useful Improvements in Sound-Producing Instruments, (for which I have made application for Letters Patent in Great Britain, No. 10,469, bearing date August 5, 1903,) of which the following is a specification.

My invention relates to stringed instruments—such as the violin, violoncello, bass, double bass, pianoforte, harp, &c.—and to instruments which emit a note or combination of notes when struck—such as the drum, triangle, bells, &c.—and has for its object to render more efficient the transmutation of the energy of the vibration of the strings or other vibrating parts into sound-waves in air.

I have found that in all stringed instruments the present sounding board or membrane which is employed for the transmutation of the energy of vibration of the strings into sound-waves in air is a device of very low mechanical efficiency and, further, introduces distortions into the wave characteristics. I find that in an instrument constructed according to my invention the phases of motion of the strings or other vibrating parts are much more truly and accurately reproduced in air-waves and that the power and character of the sounds is greatly superior to any ordinary instrument.

In carrying my invention into effect, according to one modification as applied to a violin, I employ a valve of the character described in my British Patent No. 10,468 of 1903, and I support this valve from the structure of the violin on which the bridge is carried, the sounding-board being removed or substantially inoperative.

Referring to the accompanying drawings, Figure 1 is a side elevation of a violin constructed according to my invention. Fig. 2 is an end elevation of the air-chamber and valve and its connections. Fig. 3 is a side view of the valve-actuating connection. Fig. 4 is a view of the air-chamber in a direction perpendicular to the valve-face, the trumpet and its connections and part of the valve being removed.

The frame *a* of my violin has the appearance of the frame of an ordinary violin with the sounding-board removed, a simple bar *b*,

substituted in its place, supporting the bridge *c*. The compressed-air chamber *d* is attached to a metal bracket *e*, with flange *f*, which are seated on the bar *b* and fixed there- to by screws. The bridge *c* is mounted on a rubber or elastic seat *g* on the flange *f* and is held in position by the violin-strings in the usual manner. The compressed-air chamber *d* is provided with a valve, which may be of any of the forms described in my British specification, No. 10,468 of 1903; but I much prefer the valve hereinafter described. The valve consists of a grating *s*, forming part of the boundary of the air-chamber, and a grating *t*, Fig. 4, adapted to cover the slits in the grating *s*, attached to the bar *k*, which oscillates about its axis and is in one piece with the arm *l*. The bar *k* is mounted on flat springs *u*, fixed to supports on the face of the air-chamber *d*. The grating *t* is thus capable of small movements in a direction substantially normal to the face of the air-chamber *d*. A spring *v*, attached to the bar *k*, bears against the head of a screw *w*. By turning this screw *w* the rest position of the movable grating may be adjusted. The arm *l* is connected to the bridge *c* by the rod *m*, which is attached to the bridge at *n* rigidly. The other end of the rod *m* passes through a hole in the arm *l*, the area of contact being embedded in a viscous substance, forming a viscous connection *o*, so that for slow movements the rod *m* can move relatively to the arm *l*, but acts as a rigid connection to transmit to the arm *l* and valve-cover grating *t* the rapid vibrations of the bridge corresponding to the vibrations of the springs when the violin is played. Compressed air is supplied to the air-chamber *d* through a flexible connection to the pipe *p* and passes in controlled waves through the valve to the conical tube *q* in connection with a trumpet *r*, preferably of aluminium, and supported in any convenient position from the frame of the violin. I preferably line the trumpet at its smaller end with velvet, felt, or similar material, which has the effect of damping out scratching sounds and very high harmonics. The supply of compressed or rarefied elastic fluid may be obtained in any suitable way; but the pressure of the supply should be constant: I find a pressure of two to four pounds per square inch quite suitable; but I may use higher or lower pressures. I may mount the bridge on spring-supports of steel, metal, wood, or other suitable substance instead of



the rubber, above described, according to the tone required of the instrument, and I modify the weight of the bridge and adjust the resilience of the supports to secure this result; also, I may dispense with the trumpet in some cases. The connection between the bridge and the valve may consist of two very light and close-fitting concentric tubes lubricated with some viscous substance, such as a mixture of vegetable pitch and lard, or any form of coupling which allows freely of a slow relative motion between the valve and bridge, but is absolutely rigid for rapid oscillatory motion.

When the reproducer is applied to a many-stringed instrument, it will generally be found desirable to modify the instrument. For instance, in a piano or harp the strings are at present placed at such intervals that they cover a large area. This is immaterial in the case of the present large sounding-boards; but to avoid too many or even a plurality of reproducer-valves I may bring one end of each string or group of strings into position so that they lie within a small area.

According to other modifications of my invention, I may apply a valve of the character above referred to to any suitable vibrating part of any musical instrument which emits a note or combination of notes when struck and may thus greatly reinforce the sound produced by the part in the immediate vicinity of the attachment and produce loud and clear sounds from a very small and inexpensive instrument. For instance, by connecting a reproducer to any part of a bell the sound produced by that part of the bell which is close to the point of attachment will be greatly increased. Further, instead of constructing a very large and expensive bell I may use a much smaller and thinner bell with the same periods of vibration and may produce the same effect by means of numerous reproducers attached to suitable places between the nodal points. I may similarly apply a reproducer to any instruments which emit musical sounds when struck, such as drums, cymbals, triangles, &c.

In combination with all musical instruments in which a reproducer employing compressed or rarefied elastic fluid is used I have found it advantageous to provide one or more sharp bends between the reproducer and the trumpet in order to reduce as much as possible scratching sounds and high harmonics.

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

1. A musical instrument, comprising in combination a reproducing device, including a valve controlling the passage of a stream of elastic fluid, means for supplying the elastic fluid, a vibrating part adapted to vibrate with different frequencies when dif-

ferent notes are played on the instrument, and a connection between said vibrating part and said valve, whereby said valve reproduces the vibrations of said vibrating part, as set forth.

2. A musical instrument, comprising in combination, a reproducing device including a valve-face and a valve-cover opening in a direction substantially normal to said valve-face, and having a large area of opening for small displacements, said valve face and cover controlling the passage of a stream of elastic fluid, means for supplying the elastic fluid, a vibrating part adapted to vibrate with different frequencies when different notes are played on the instrument, and a connection between said vibrating part and said valve-cover, whereby said valve reproduces the vibrations of said vibrating part as set forth.

3. A musical stringed instrument, comprising in combination, a reproducing device including a valve controlling the passage of a stream of elastic fluid, means for supplying the elastic fluid, a string or strings adapted to be operated, and to vibrate with different frequencies when different notes are played on the instrument, a vibrating part capable of vibrating in unison with said string, and means for communicating the vibrations of said vibrating part to the valve, as set forth.

4. A musical instrument, comprising in combination, a reproducing device including a valve controlling the passage of a stream of elastic fluid, means for supplying the elastic fluid, a vibrating part adapted to be set in vibration when the instrument is played, and a viscous connection between said valve and said vibrating part, as set forth.

5. In combination with a musical instrument having a vibratory part capable of producing sound-vibrations when said instrument is played upon, an elastic-fluid chamber, a fixed grating forming part of the boundary of said chamber, means for directing elastic fluid to said chamber, an oscillating grating controlling the flow of elastic fluid through said chamber and an initial operating connection between the said oscillating grating and the vibratory part of the instrument whereby said oscillating grating will be set in motion initially from the vibrating part of the instrument and maintained in vibration so long as the instrument is played.

6. In a musical stringed instrument, in combination, an air-chamber supported from the frame of the instrument, a fixed grating forming part of the boundary of said chamber, an oscillating grating adapted to control the flow of air from said chamber, and means for actuating said oscillating grating from the strings of the instrument, as set forth.

7. In a musical stringed instrument, in combination, an air-chamber supported from



the frame of the instrument, a fixed grating forming part of the boundary of said chamber, an oscillating grating adapted to control the flow of air from said chamber, and a viscous connection between said oscillating grating and a vibrating part of the instrument, as set forth.

8. In a musical instrument in combination, a fixed grating supported from the frame of the instrument, a connection for supplying a stream of elastic fluid through said fixed grating, a movable grating adapted to control the passage of said stream through said fixed grating, a vibrating part adapted to vibrate with different frequencies when different notes are played on the instrument, and means for communicating the vibrations of said vibrating part to said movable grating, as set forth.

9. In a musical stringed instrument, in combination, an air-chamber supported from the frame of the instrument, a fixed grating

forming part of the boundary of said chamber, an oscillating grating adapted to control the flow of air from said chamber, a spring-mounted bridge supporting the strings of the instrument, and a viscous connection between said bridge and said oscillating grating, as set forth.

10. A sound-producing instrument comprising in combination, a reproducing device including a valve controlling the passage of a stream of elastic fluid, means for supplying the elastic fluid, a vibrating part adapted to be set in vibration when the instrument is operated, and a viscous connection between said valve and said vibrating part.

In witness whereof I have hereunto set my hand in presence of two witnesses.

CHARLES ALGERNON PARSONS.

Witnesses:

HENRY GRAHAM DAKYNS, Jr.,  
WILLIAM DAGGETT.