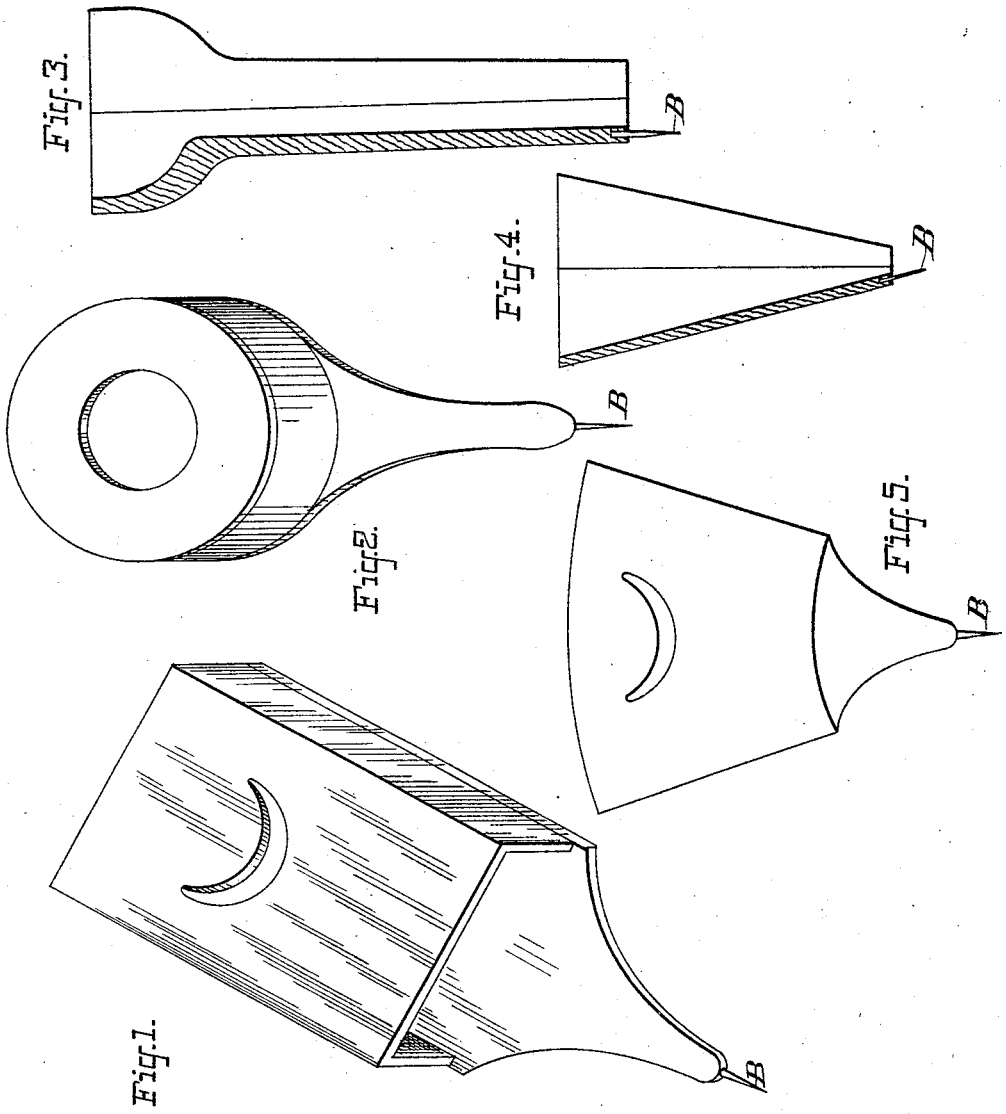
(No Model.) 3 Sheets—Sheet 1.

W. McMAHON.

REPRODUCER FOR PHONOGRAPHS.

No. 454,947. Patented June 30, 1891.



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(No Model.) 3 Sheets—Sheet 2.

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REPRODUCER FOR PHONOGRAPHS.

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Fig. 6

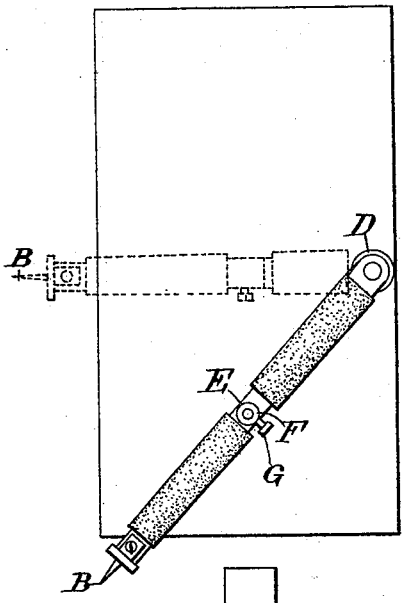


Fig. 7.

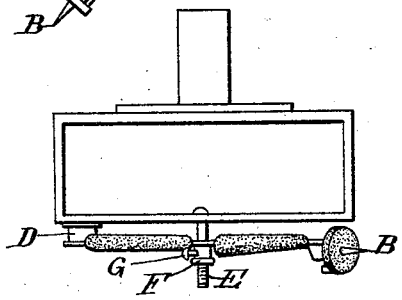
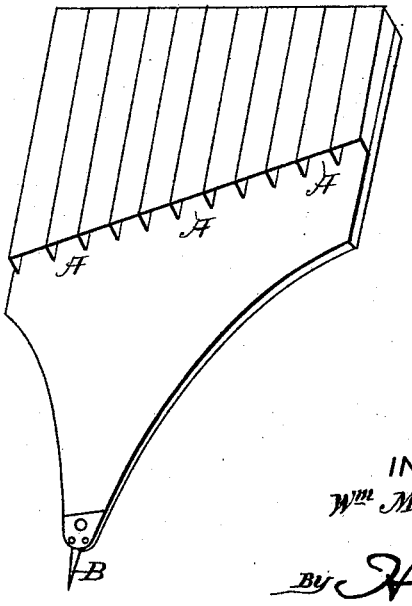


Fig. 8.



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(No Model.) 3 Sheets—Sheet 3.

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REPRODUCER FOR PHONOGRAPHS.

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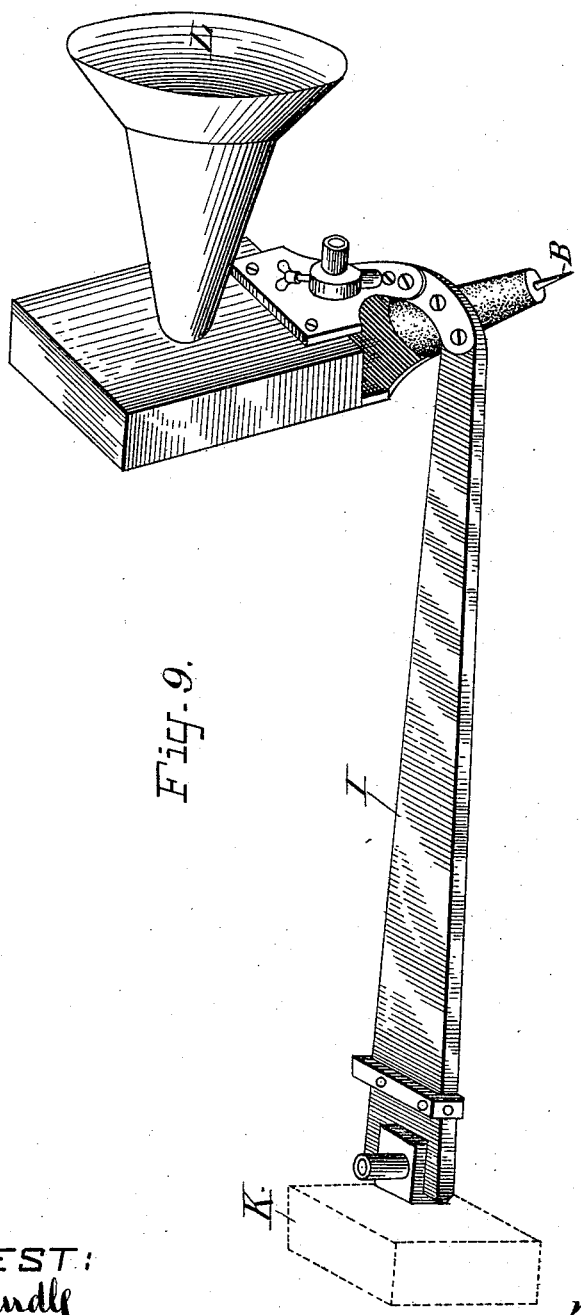

Fig. 9.

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UNITED STATES PATENT OFFICE.

WILLIAM McMAHON, OF RAHWAY, NEW JERSEY.

REPRODUCER FOR PHONOGRAPHS.

SPECIFICATION forming part of Letters Patent No. 454,947, dated June 30, 1891.

Application filed November 19, 1890. Serial No. 371,904. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM McMAHON, a citizen of the United States, and a resident of Rahway, in the county of Union and State of New Jersey, have invented a certain new and useful Reproducer for Phonographs, Gramophones, Graphophones, Telephones, &c., of which the following is a specification.

My invention relates to reproducers or recorders for use with phonographs, graphophones, gramophones, and similar apparatus designed to record and reproduce sounds, whether vocal or instrumental.

The object of my invention is to increase the volume and distinctness of the sounds produced from the sound-record, to improve the character of the record produced by a sound through the action of the apparatus used as a recorder, and to generally simplify and cheapen the construction of the reproducer or recorder. Heretofore in instruments of this character the construction has involved the use of a diaphragm which is generally made thin or elastic, and of some such material as iron, the vibrations being communicated to such diaphragm and the point of attachment or connection of the stylus being at or near the center thereof, the object being to get as great amplitude of movement as possible in the vibrating surface. This construction has been found in practice to have limitations which confine the diaphragm to certain dimensions, a too large diaphragm being uncertain of action, while a smaller one does not give the requisite volume of tone. There has thus resulted a practical limitation in the volume of the sound which could be reproduced by the instrument and in the amplitude of the recorded vibrations.

My invention consists, essentially, in the employment of a sounding-box or sonorous chest or case, preferably of some sonorous material, such as wood, to which chest, case, or box the reproducer or recorder stylus is attached in any suitable manner. I have found in practice that excellent results are produced by the use of a wooden case or box, all the sides of which may be closed in, though in some cases I have found good results from sonorous boxes or cases one or more sides of which are open. I find, further, that it is desirable to provide one or more sides of the box or case with an opening for the emission of the sound-vibrations. The stylus which produces the record or which receives vibrations from a record already produced I find may be attached in various ways to the sounding box or case; but excellent results are produced by fixing the stylus in or to one side or part of the resonant case or to an extension thereof. The means of attachment, so far as I have experimented, do not seem to be material. Thus with an ordinary case or box of wood I get good results by providing one side of such case with an extension integral therewith and fixing the stylus in a socket in the end of such extension and projecting therefrom in the plane of the one side of the box, though good results are obtained even if the stylus project at an angle to the plane of the side of the box or case. The resonator box or case might even be open at both ends and have the stylus fixed to it, such box or case then becoming in effect a resonator-tube carrying the reproducer or recorder stylus.

In the accompanying drawings I have shown various modifications of form in the resonator box or case having the attached stylus.

In Figure 1 I have shown a resonator box or case of wood, which is made in square form and has an opening in one of its sides for the emission of the sound-vibrations. The box or case is open at one end, but might be closed thereat, since this does not seem to detract from the operation of the instrument. The stylus B is fixed in an extension of one side of the box or case, or may be attached thereto in any desired way. I find in practice that the method of attachment does not seem to be material, and good results have been obtained where the stylus has been simply bound upon the box or case or an extension to one side thereof.

Fig. 2 shows a resonator box or case made substantially as a cylindrical case, one flat side of which has an opening, while the other flat side has an extension bearing the stylus. The form or shape of the opening does not seem to be material, though the form shown gives good results.

Fig. 3 is a side elevation and partial section of a case or tube made of wood turned to the form shown and having the stylus B projecting from one end thereof, said stylus being

fixed in the material of the wood itself. In this form of resonator-case the resonator-cav- is open from end to end.

Fig. 4 shows a modification in the shape of an instrument like Fig. 3.

Fig. 5 shows in plan another modification in the shape of a box whose construction may be substantially like that of Fig. 1.

Fig. 6 shows an inverted plan, and Fig. 7, in end elevation, another way of attaching the stylus to the sounding box or case. Here the stylus B is mounted upon an arm secured, preferably at one side of the box, to a support D. The arm-supporting stylus extends clear across the box, either in a straight line at right angles to the sides, or in a diagonal line, as shown. A post E, mounted on the box, passes through an opening in the stylus-arm, and a nut F on the post serves to adjust the arm down toward the side of the sounding box or case. A set-screw G may be used to hold the parts in adjustment. If the stylus-arm be a spring-arm, it will be obvious that by this means the tension of the spring may be varied. I prefer to employ in connection with the stylus a damper consisting of a tube of rubber, which envelops the stylus-arm or is applied near to the stylus or is wrapped around the same at the point of attachment of the stylus to the arm or projection extending from the sounding box or case.

In Fig. 8 I have shown a series of rosonator-boxes or sounding-cases A, to which is connected a common stylus B, attached to or projecting from a plate or plates forming one wall of the boxes A. The latter are open either at one or both ends, and the boxes are tuned to the notes of a diatonic or chromatic scale, preferably the latter. By this means I find that greatly-increased effects may be produced either in reproducing or recording music. Other means of connection of the common stylus with the series of sounding boxes or cases tuned as described might be used without departing from my invention, this feature of invention consisting, essentially, in the use of the series of two wooden boxes having an attached stylus common to them for use in reproducing or recording musical tones in a phonograph, gramophone, graphophone, or other instrument designed to record sounds and to reproduce them at will.

In Fig. 9 I have shown one way of mounting the reproducer or recorder upon a balanced arm or lever I, which may form a balancing-weight K, as indicated. The reproducer is attached to one arm thereof in any desired manner in proper position to have the stylus rest upon or be presented to the sound-record. Here I have shown the stylus as attached or connected to the sounding box or case by being seated in a socket in a wooden arm or projection forming an extension of one wall of the sounding box or case. Soft rubber is wound upon the arm supporting the stylus around the same at the point of attachment of the stylus, so as to dampen the same against extreme or foreign vibrations. In this instance I have shown a sound-directing cone L, projecting from an opening in one side of the sounding box or case. The sound-opening made in a wall of the sounding box or case is preferably made of such shape that there will be provided in the grain of the wood different lengths of wood fiber adapted to respond to all grades and variations in the rapidity of vibrations imparted to the box from the stylus. Thus in Fig. 1 the grain of the wooden box being in the direction of the arrow *a* the curved opening shown will provide in the side of the box an infinite number of sections of wood fibers which are different in length from other sections, and are adapted, therefore, to respond more readily to a particular rate of vibrations than the other sections.

In this description I use the terms "phonograph," "gramophone," "graphophone" interchangeably, and as meaning any mechanism which is adapted to make a permanent record of sound-vibrations, and in which such record may be employed to set up a similar state of vibrations, which may be made audible by means of reproducing-balances which will convey the sound directly to the ear of the listener, or will agitate the surrounding air sufficiently to enable the sound to be heard at a distance from the instrument.

While I have obtained excellent results with wood good results may be obtained with other materials.

As I have before stated, I do not limit myself to any particular means of attachment of the stylus to the resonator box or case, nor to any particular disposition of the same with relation to the sides of walls of such casing.

The manner of supporting the instrument does not affect materially its action. Good results may be obtained by simply holding the instrument in the hand when it is used as a reproducer and allowing the stylus to follow the record.

What I claim as my invention is—

1. A recorder or reproducer for phonographs or similar instruments for recording and reproducing sounds, consisting, essentially, of a resonant box or case having an attached stylus.

2. A recorder or reproducer for phonographs and similar instruments, as described, consisting, essentially, of a sounding box or case of resonant material, like wood, having an attached stylus.

3. A recorder or reproducer for phonographs and such like instruments, comprising a sounding box or case of some resonant material having openings like a sounding box or case of a violin or other musical instrument, and a stylus attached to some portion of such resonant case or sounding-box.

4. A reproducer or recorder for phonographs and such like instruments, comprising a plate of some resonant material, like wood, having a reproducer or recording stylus pro-

jecting therefrom in the plane of such plate or in a parallel plane, in combination with a resonator cavity or space, of which such plate forms a wall.

5. A reproducer or recorder for phonographs or similar instruments, as described, consisting of a sounding-box or resonator-casing having an attached stylus and mounted upon a balanced support.

6. In a reproducer or recorder for phonographs or such like instruments, as described, a sounding box or case, of wood or similar resonant material, having a stylus mounted upon an arm fixed at one side of the box and provided with a post E at a middle part of the side of the box.

7. In a reproducer or recorder for phonographs and similar instruments, as described, a sounding box or case, of wood or similar material, having a stylus on a spring-arm fastened to the box, and a post connecting the arm at some point between the point of attachment and the end where the stylus is carried by said arm.

8. In a reproducer or recorder for phonographs and similar instruments, as described, a sounding box or case of wood having an attached stylus provided with a damper of the vibrations.

9. A reproducer or recorder for phonographs or similar instruments, consisting of a series of sounding boxes or cases tuned to a musical scale and provided with a common attached stylus.

10. A reproducer or recorder for phonographs and similar instruments, consisting of a number of sounding boxes or tubes, of wood or similar resonant material, of different lengths, having an attached stylus common to two or more of said boxes or tubes.

11. A reproducer or recorder for phonographs and similar instruments, comprising a plate, of wood or similar material, upon which are built up a series of tubes of different lengths, forming sounding boxes or cases.

Signed at New York, in the county of New York and State of New York, this 22d day of October, A. D. 1890.

WILLIAM McMAHON.

Witnesses:

THORNLY DICKSON,

G. Y. RENSHAWE.