

No. 624,059.

Patented May 2, 1899.

T. H. MACDONALD.
SOUND REPRODUCER FOR GRAPHOPHONES.

(Application filed June 5, 1897.)

(No Model.)

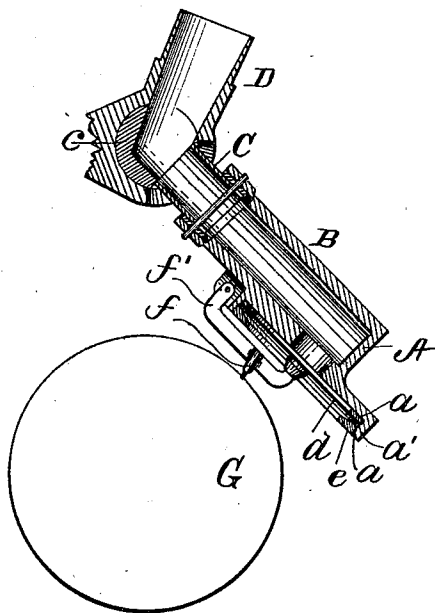


Fig. 1.

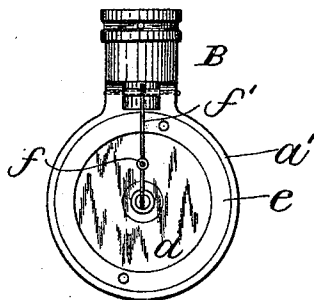


Fig. 2.

Witnesses.
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UNITED STATES PATENT OFFICE.

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SOUND-REPRODUCER FOR GRAPHOPHONES.

SPECIFICATION forming part of Letters Patent No. 624,059, dated May 2, 1899.

Application filed June 5, 1897. Serial No. 639,576. (No model.)

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, of Bridgeport, Connecticut, have invented a new and useful Improvement in
5 Sound-Reproducers for Graphophones, which improvement is fully set forth in the following specification.

This invention relates to the construction of graphophone-reproducers of the general
10 form illustrated in Patent No. 527,755, granted to me October 16, 1894. This reproducer consists of a tubular stem having on one end a circular chambered head in which the diaphragm is seated, the stylus being carried on
15 an arm pivoted at one side of the head. The reproducer as a whole is connected to its support by a universal joint and rests by gravity upon the sound-record. It is essential that the instrument have perfect freedom of
20 motion within certain limits in order that it may be automatically guided by the fine thread-like groove of the sound-record, and this essential condition is determined by the character of the connecting-joint, the weight
25 of the reproducer as a whole, and the angle of inclination at which it operates. The character of the material of which the body and head of the reproducer are made has an important influence upon the operation of the
30 reproducer in the reproduction of sounds, and very many materials have been tried for this purpose. The head of the reproducer has not only to perform the mechanical office of supporting the diaphragm, but its sonorous
35 or resonant properties are liable to modify the character of the vibrations set up in the atmosphere. In operation it floats upon the tablet and is not rigidly held. Moreover, the reproducer as a whole must be sufficiently
40 mobile to follow promptly the irregularities of the tablet without producing false vibrations of the diaphragm and sufficiently heavy to bear with the proper amount of pressure on the tablet. Heretofore the material which
45 has been found best adapted to meet these various conditions has been hard rubber, and graphophone-reproducers have uniformly for many years past been made of this material. In attempting to use metals for this purpose,
50 such as brass, the additional weight had to

be compensated by lessening the angle of inclination, and it was found that the reproducer operated sluggishly and that the reproduction was inferior. I have found that a distinct improvement in the quality of the
55 reproduced sound is secured by constructing the reproducer-head of aluminium. This is due in part to the lightness and other physical characteristics of the metal, which adapt it perfectly to the conditions found to be im-
60 portant in the operation of the floating reproducer. It is, however, due largely to the sonorous or resonant properties of the metal, on account of which I have found that the aluminium reproducer-head, while adjusting
65 itself promptly and perfectly to the sound-record, preserves faithfully and transmits without distortion or addition of foreign vibrations the characteristic atmospheric vibrations corresponding to the recorded
70 sounds. Furthermore, it is found that the reproduced sounds have a firmness and fineness of tone which have not been obtained with previous types of reproducer. As compared with the hard-rubber reproducer (with
75 which the best results have been obtained prior to this invention) aluminium has not only lightness, which was one of the reasons that led to the use of rubber, but it has lightness combined with mass of metal,
80 which has an important influence upon the quantity and quality of the tone. Furthermore, aluminium is not susceptible to atmospheric influences, and hence permanently maintains its form. It is much easier to as-
85 semble and holds the diaphragm in a perfectly level condition at all times without any cramp whatever. This is a very important consideration. There has always been found to be a great variation in the performance of
90 different rubber reproducers though apparently identical in construction. A slight irregularity in the seat of the diaphragm, producing an imperceptible departure from a plane surface, would affect materially the re-
95 production of the sounds. With the aluminium reproducer it is found that the results as to sonorous reproductions with different reproducers are practically uniform. Finally the improvement has the further advantage
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that the parts can be made perfectly interchangeable.

In the accompanying drawings, which form part of this specification, Figure 1 represents in vertical section a reproducer constructed in accordance with the invention. Fig. 2 is an elevation thereof.

The reproducer is composed of a chambered head A on the end of a tubular stem or body B, the latter being in operation swivelled to the tubular socket C, which is connected by a ball-and-socket joint *c* to the tubular sound-conveyer D. The diaphragm *d* (preferably of glass) is seated in the annular head A between two packing-rings *a a*, of rubber or other suitable material, and retained in place by a ring *e*, screw-threaded on its periphery for engagement with corresponding threads on the interior of a depending flange *a'* on head A. The stylus *f* is carried by an arm *f'*, and the reproducer as a whole rests by gravity upon the record-tablet G.

According to the present invention the head A and stem or body B of the reproducer are made of aluminium and preferably in one piece, though the benefits of the invention to

a partial extent may be obtained by forming the head alone of aluminium.

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

1. A graphophone sound-reproducer having a chambered head formed of aluminium and a diaphragm seated therein, substantially as described.

2. A sound-reproducer having a chambered head and a tubular stem or body formed of aluminium, and a diaphragm seated in the head, substantially as described.

3. A sound-reproducer loosely mounted and adapted to rest by gravity upon the record-tablet, said reproducer having a stem and chambered head of aluminium, and a diaphragm seated in said head, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

M. A. FOGO,

M. K. SPEAR.