

Oct. 13, 1925.

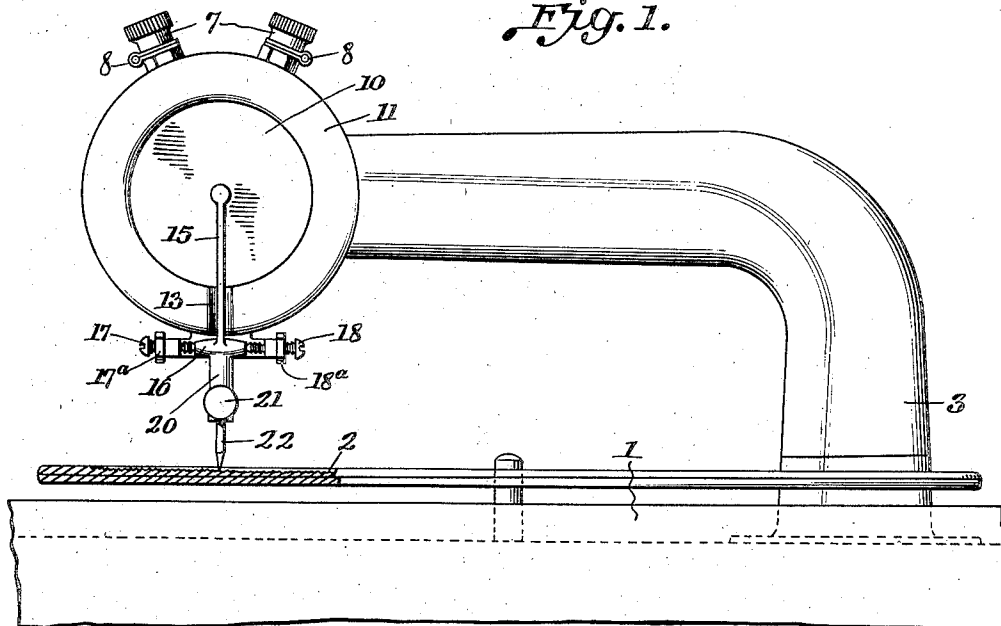
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E. T. JONES

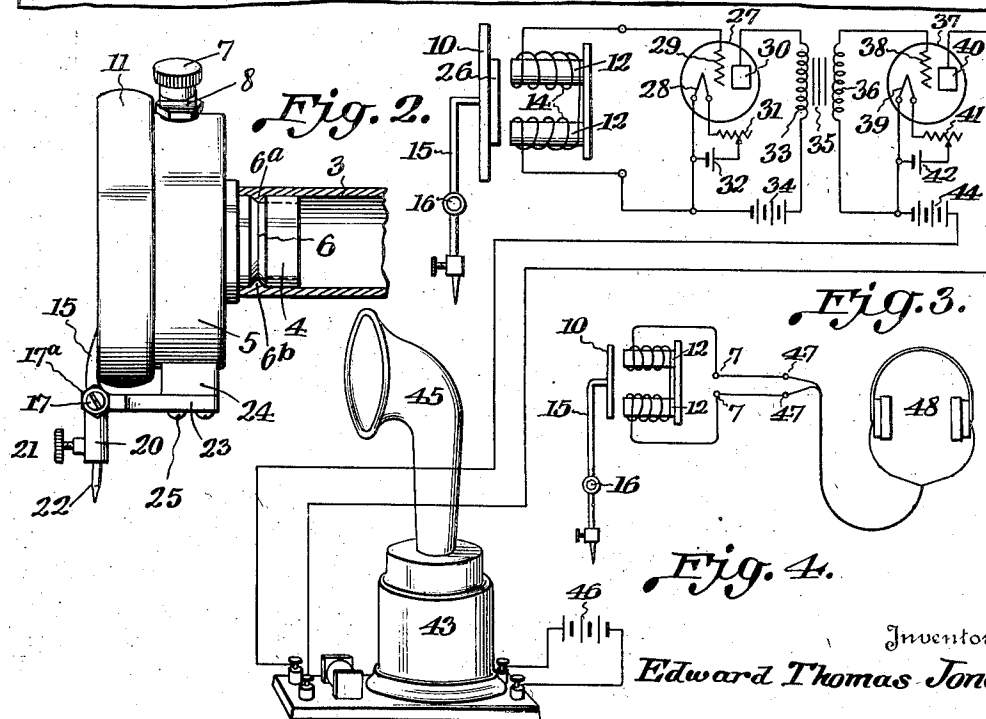
ELECTRICAL REPRODUCER FOR PHONOGRAPHS

Filed Dec. 3, 1921

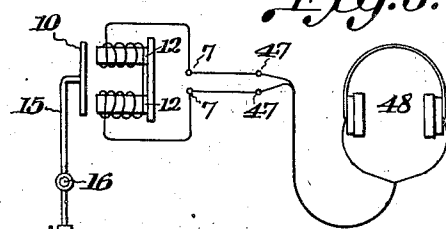
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



*Fig. 4.*

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# UNITED STATES PATENT OFFICE.

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ELECTRICAL REPRODUCER FOR PHONOGRAPHS.

Application filed December 3, 1921. Serial No. 519,754.

*To all whom it may concern:*

Be it known that I, EDWARD THOMAS JONES, a citizen of the United States, residing at New Orleans, in the parish of Orleans and State of Louisiana, have invented a certain new and useful Improvement in an Electrical Reproducer for Phonographs, of which the following is a specification.

My invention relates broadly to phonographs and more particularly to an electrical reproducer for phonograph music.

The object of my invention is to provide an electrical device which is readily attachable to present forms of phonographs for the electrical reproduction of music at large volume for distribution over large areas such as in auditoriums, ball rooms, amusement places and to out-of-door audiences.

Another object of the invention is to provide a telephonic reproducer having standard parts assembled in such manner as to readily afford quantity production in manufacture.

A further object of the invention is to provide means for amplifying the electrically reproduced music and controlling the volume of the sound.

A still further object of the invention is to provide an electrical reproducer adapted to conduct music direct to a pair of head telephone receivers to be worn by individuals in listening to the phonograph music.

My invention will be more clearly understood by reference to the following specification and the accompanying drawings in which:

Figure 1 is a front elevation of the electrical reproducer mounted upon a disk phonograph; Fig. 2 is a side elevation of the electrical reproducer with its mounting partially in section showing the means for securing the reproducer upon the phonograph; Fig. 3 is a diagrammatic view illustrating the electrical reproducer and its connections with a thermionic vacuum tube amplifying system; and Fig. 4 is a wiring diagram showing the electrical reproducer arranged for the reproduction of music through a pair of head telephones to be worn by an individual.

It will be understood that the principles of my invention may be embodied in various forms and that details are not material. The present embodiment of the invention, therefore, is to be considered as merely indicative. The form illustrated in the draw-

ing and hereinafter described in detail has been found to be one of the practical embodiments and capable of efficient operation and practical in construction.

The electrical reproducer comprises a watch case telephone receiver construction mounted upon a swivel arm of the phonograph and having connections from the magnets within the receiver brought out to binding posts upon the casing thereof. The diaphragm of the receiver is mechanically connected to the stylus of the phonograph and is arranged to be mechanically vibrated in accordance with the motion of the stylus over the phonograph record. The magnetic reluctance of the magnetic circuit within the receiver is thus varied in accordance with the musical vibration and electrical energy is proportionally generated in the windings of the magnets. The magnets are electrically connected in an external reproducing circuit containing any desired number of stages of thermionic vacuum tube amplification having a sound reproducer connected in the output circuit of the final stage of amplification. In some instances it is desirable to connect the magnets of the telephone receiver reproducer direct to a pair of reproducer telephones worn by the individual in listening to the phonograph music.

Referring more particularly to the drawings, Fig. 1 is a front elevation of the electrical reproducer for the phonograph represented by reference character 1. The phonograph is provided with a record table carrying disk record 2. A swivel arm 3 is mounted upon the cabinet 1 and provides a support and guide for the electrical reproducer 5. The electrical reproducer 5 comprises a watch case type telephone receiver having supporting member 4, as shown in Fig. 2, secured to the rear of the casing thereof provided with groove 6 adapted to cooperate with lugs 6<sup>a</sup> and 6<sup>b</sup> in the swivel arm 3 forming a rigid support for the electrical reproducer as it moves over the area of the phonograph disk. The watch case telephone receiver 5 contains a pair of magnets 12 having their windings 14 electrically connected to binding posts 7 on the casing of the receiver. These binding posts may include connecting lugs 8 which receive tips of a flexible cord connection to the reproducing circuit. The reproducer 5 is provided with diaphragm 10 which may be either mica or

metallic construction. When of mica construction a metallic armature 26 is carried by the diaphragm adjacent the poles of the magnets. The diaphragm 10 is secured upon the reproducer 5 by means of ring 11 grooved at 13 to permit the lateral movement of lever 15 secured to the center of the diaphragm and pivoted at 16. The lever 15 is mounted to freely vibrate in pivot screws 17 and 18, rigidly secured by lock nuts 17<sup>a</sup> and 18<sup>a</sup> within support 23. The support 23 is rigidly mounted upon the watch case receiver 5 by means of supporting block 24 and screws 25.

The windings 14 of the magnets 12 are electrically connected as diagrammatically illustrated in Fig. 3 to the input circuit of a thermionic vacuum tube power amplifier. The amplifier may comprise vacuum tube 27 forming the first stage of amplification. The vacuum tube 27 includes a heated filamentary cathode 28, a grid 29 and an anode or plate 30. The plate is connected in the output circuit including the primary winding 33 of transformer 35 and battery 34. The filamentary cathode is heated by battery 32 and its incandescence regulated by rheostat 31. The transformer 35 has its secondary winding 36 connected to the input circuit of a second stage of amplification comprising vacuum tube 37 having the heated filamentary cathode 39, grid 38 and plate 40. The filamentary cathode is heated by battery 42 and its temperature regulated through rheostat 41. The plate 40 is connected to the output circuit including the loud speaker reproducer 43 and battery 44. The loud speaker reproducer 43 has its field windings energized by battery 46 and is provided with a sound conveying horn 45 for directing the music to any desired area.

The power amplifier as above described is adapted to increase the volume of reproduced music to any desired degree. By reason of the electrical characteristics of the thermionic vacuum tubes there is no distortion of the music and the intensity of the music is under control of the operator by regulation and adjustment of the filament rheostats 31 and 41.

Fig. 4 is a wiring diagram of a system for the individual reproduction of music in head telephones 48 electrically connected through a flexible cord to terminals 47 which in turn connect to terminals 7 of the electrical reproducer 5.

In the operation of this reproducer the phonograph record is set in motion and the electrical reproducer 5 brought into position over the record so that stylus point 22 is vibrated in accordance with the form of the record grooves which mechanically imparts vibrations to the diaphragm 10 which vary the magnetic reluctance of the magnetic circuit through the magnetic poles of

the watch case telephone receiver. This variation of magnetic reluctance through the magnet poles generates minute currents in the windings around the permanent pole pieces and these currents, which vary directly in accordance with the musical vibrations, serve to actuate directly a pair of telephone receivers or may be led to the input circuit of a thermionic vacuum tube power amplifier as above described and the mechanical vibrations electrically reproduced at greatly increased volume.

Having thus described my invention what I claim and desire to secure by Letters Patents of the United States, is as follows:

1. A phonograph reproducer comprising a watch case telephone receiver having a pair of magnets, a diaphragm adjacent the poles thereof, a screw threaded ring for securing said diaphragm in position, a support secured on the exterior of said watch case adjacent said magnets, a stylus arm formed of a single piece of material pivotally mounted in said support and provided at one end on one side of said pivotal mounting with a stylus point and secured at the other end on the opposite side of said pivotal mounting to said diaphragm and electrical connections from said magnets to a reproducing circuit.

2. In a phonograph, the combination with a record of an electrical reproducer comprising a watch case telephone receiver having a shell casing, a pair of magnets therein, a diaphragm adjacent the poles thereof, a screw threaded rim having a cut away portion at one side thereof, a yoke member secured to said casing adjacent said magnets and extending over said rim, said yoke carrying a pair of pivot members extending toward each other, a stylus lever formed of a single piece of material pivotally mounted in said yoke and attached to said diaphragm and arranged for lateral movement in said cut away portion of said rim whereby said diaphragm is mechanically vibrated by said record to correspondingly vary the magnetic reluctance of the magnetic circuit within said telephone receiver and means for observing said variations.

3. In a phonograph, the combination with a tone arm and record of a reproducer comprising a watch case telephone receiver including a casing, a pair of magnets, a diaphragm adjacent the poles thereof, a screw threaded ring for securing said diaphragm in position, a member secured to the rear of said casing on the axis thereof for attachment with said tone arm, a stylus point adapted to be mechanically actuated by said record and means for imparting corresponding vibrations to said diaphragm, said magnets being electrically connected to a reproducing circuit.

4. In a phonograph, the combination with  
a sound record and a tone arm of a phono-  
graph reproducer comprising a watch case  
telephone receiver having a shell casing, a  
5 pair of magnets therein, a diaphragm and  
an armature carried by said casing adjacent  
the poles of said magnets, a screw threaded  
ring for securing said diaphragm in posi-  
tion on said casing, a support secured to the  
10 center of the exterior wall of said casing, a  
grooved connection between said support  
and said tone arm, a pair of plugs on said  
tone arm for locking said watch case tele-  
phone receiver in position on said tone arm,  
15 a stylus arm consisting of a single piece of  
material pivotally mounted on said casing  
and provided at one end with a stylus point  
and secured at the opposite end to said dia-  
phragm and electrical connections from  
20 said magnets to a reproducing circuit.

5. In a phonograph, the combination with  
a record, and an electrical reproducer com-  
prising a watch case telephone receiver hav-  
ing a shell casing, a pair of magnets therein,  
a diaphragm adjacent the poles thereof, a 25  
screw threaded rim for securing said dia-  
phragm in position, a spacing member at-  
tached to the exterior wall of said shell cas-  
ing adjacent said magnets, a yoke mounted  
on said spacing member, a pair of diamet- 30  
rically opposed bearings carried by said  
yoke, a stylus lever pivotally mounted in  
said bearings, a stylus point at one end of  
said lever adapted to engage said record, a  
connection between said diaphragm and the 35  
opposite end of said lever whereby to vary  
the magnetic reluctance of the magnetic cir-  
cuit within said receiver in accordance with  
mechanical vibrations of said stylus.

EDWARD THOMAS JONES.