N. PEMBERTON-BILLING.
GRAMOPHONE AND THE LIKE.
APPLICATION FILED JAN. 4, 1917.

1,230,509. Patented June 19, 1917.

Fig. 1.

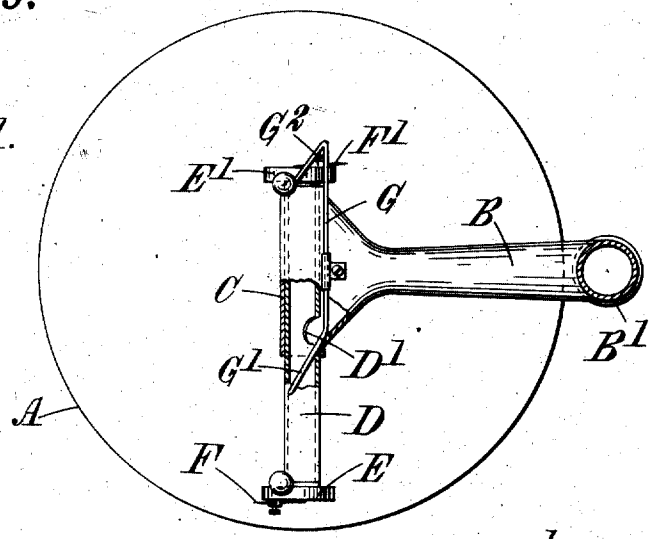


Fig. 2.

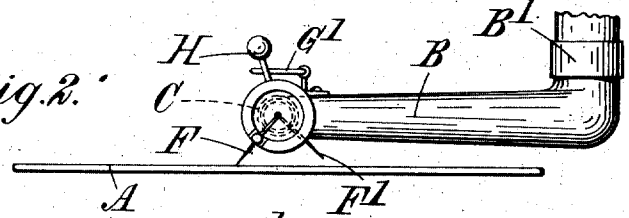


Fig. 3.

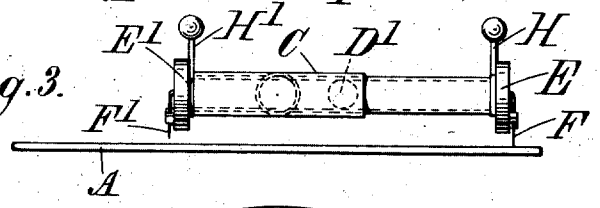
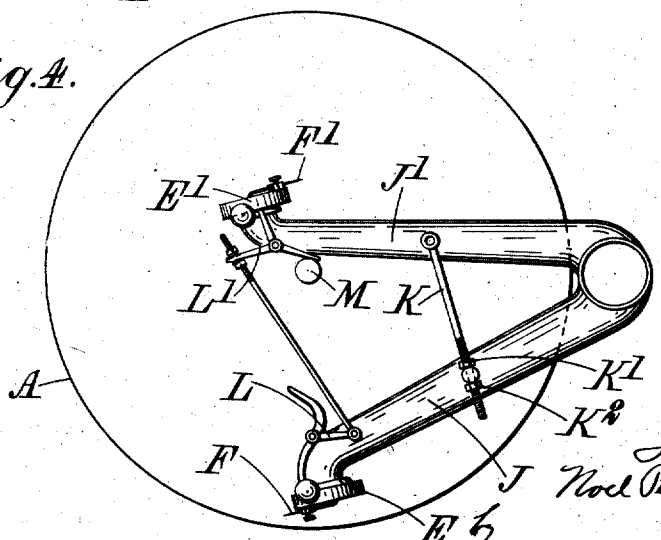


Fig. 4.



Inventor
Noel Pemberton-Billing
Foster Freeman Watson & Coit

UNITED STATES PATENT OFFICE.

NOEL PEMBERTON-BILLING, OF COUNTY OF HERTFORD, ENGLAND.

GRAMOPHONE AND THE LIKE.

1,230,509. Specification of Letters Patent. Patented June 19, 1917.

Application filed January 4, 1917. Serial No. 140,639.

To all whom it may concern:

Be it known that I, NOEL PEMBERTON-BILLING, a subject of the King of England, residing in Hertfordshire, England, have invented certain new and useful Improvements in Gramophones and the like, of which the following is a specification.

This invention relates to improvements in gramophones or the like.

It is often desirable that a gramophone shall be capable, when occasion requires, of repeating the reproduction of the whole or a part of a record without necessitating readjustment of the reproducer by the operator, or stoppage of the motion of the record. The object of the present invention is to provide a simple repeating mechanism by which such repetition may be effected, preferably automatically.

According to this invention there are provided two reproducers to be used alternately, which are so linked together that as the operative reproducer of the pair moves across the record the idle one is carried back over the record to the starting point, combined with automatic or other means to render the idle reproducer operative and the operative one idle. Thus when the one reproducer has completed the reproduction of the record the other has been carried back to the starting point and when rendered operative immediately recommences the reproduction.

When flat records are employed on the gramophone, the two reproducers may be rigidly connected together; thus they may be linked together by a sound-tube which they have in common. In one construction this sound-tube may be mounted to slide endwise through a support by which it is connected to the horn, by which sliding mounting the movement of the reproducers across the record is permitted.

In order to enable the apparatus to suit various records, the reproducers should be adjustable as to their distance apart, to which end the sound-tube may be made telescopic.

In order to render one of the reproducers operative and the other idle, they may both be mounted on an angularly movable support, angular movement of which raises the record-engaging stylus of the operative reproducer from the record and simultaneously lowers the stylus of the idle reproducer into contact with the record and means (preferably automatic) may be provided to move the said member angularly when the reproducers reach the end of their travel in one direction or the other across the record.

In the accompanying drawings—

Figure 1 is a plan partly in section of such parts of the gramophone as are necessary to illustrate the present invention;

Fig. 2 is a side elevation of Fig. 1;

Fig. 3 is a front view of Fig. 1;

Fig. 4 is a plan of an alternative construction.

Like reference characters denote like parts throughout the drawings.

Referring first to the construction illustrated in Figs. 1, 2 and 3, a disk-record is indicated at A. A hollow arm B extends from the base B^1 of the horn toward the center of the record, this arm being similar to the usual swinging hollow arm upon which the reproducer is mounted. In this construction, however, the arm B is fixed and it is provided, at its outer end, with a transverse socket or tube C. The interior of this tube C is in communication with the interior of the tube B.

Within this socket there slides a sound-tube D, which carries a reproducer E E^1 at each end. An opening D^1 in the tube D permits the sound to pass from the tube D to the fixed arm B and thence to the horn. The disposition of the parts is such that the sound-tube D lies approximately on a diameter of the disk and it is made of such length that when one reproducer E is bearing on the record at its outer margin, the other reproducer E^1 is ready to bear on the record at its inner margin. In order to provide for the use of records of different sizes, the tube D may be made telescopic, a suitable clamp being provided to fix it after it has been adjusted to the required length.

The two needles F F^1 on the reproducers are inclined in opposite directions since they bear on the record on opposite sides of its center and they are arranged to be brought alternatively into contact with the record by giving the tube D, with the reproducers E E^1, a slight rotative motion about the axis of the tube. Thus, in Fig. 2, a slight clock-

wise rotation of the tube D will lift the needle F from the record and bring the needle F^1 into contact with the record. Various means may be provided for effecting this rotation and one is illustrated by way of example. A rod G is fixed on the arm B and provided with arms G^1 G^2 extending over the tube D. At each end of the tube there is mounted a finger H H^1 which has a certain freedom of movement between two stops on the tube D. The disposition of these arms is such that when the tube D is moved across the disk to its limiting position, one of these arms comes into contact with the coöperating arm G^1 or G^2 and by further movement of the tube the arm H (or the arm H^1) is swung across from one side of the vertical to the other. The arms H H^1 are weighted so that as soon as they are tilted past the vertical they fall, and by engaging one of the stops on the tube D, the latter is turned so as to reverse the needles in the manner above described. This weight also serves to insure that the needle is held in contact with the disk with the necessary pressure.

Various other devices may be used for effecting the change-over of the needles. Thus, for example, the disk may be carried on a special tray which has a cam formed on its edge, and a projection on each end of the sound-tube may be arranged to be engaged by this cam as it approaches the edge of the tray so as to rock the tube D and reproducers E E^1.

A modified construction according to this invention is illustrated diagrammatically in Fig. 4. In this case the two reproducers E E^1, instead of being mounted upon a common sound-tube, are each mounted on the end of separate sound-tubes J J^1. Each of these tubes is in communication with the interior of the horn-support by a swivel joint so that each of them can swing across the record in the ordinary way. The two tubes are adjusted in a definite angular relationship with one another by an adjustable tie-rod K so that they can be set with the two needles F F^1 spaced relatively to the record in the manner described with relation to the previous construction. The tie-rod K may be pivotally connected to one tube J^1 and secured to the other tube J by two nuts K^1 K^2 engaging between them a lug on the tube J.

The two reproducers E E^1 are each mounted on the end of its sound-tube so as to be capable of slight rotation thereon so that the needles F F^1 can be alternately brought into operative contact with the record A. Any convenient mechanism may be used for effecting this shifting of the reproducers and one arrangement has been shown by way of example. Bell-crank levers L L^1 are mounted on the sound-tubes J J^1 and each has an arm connected to its corresponding reproducer so that it can impart the necessary motion to it. The other arms of these levers are connected together by a tie-rod, which is adjustable in length so as to provide for adjustments of the rod K. When one reproducer is tilted to lift its needle off the record, the linkage provided transmits the motion to the other reproducer so as to bring its needle into contact with the record. The necessary movement is imparted to the system by providing a third arm on each of the bell-crank levers and a central pin or lug M which is so positioned that when a reproducer has traveled across the record to the desired extent, the extra arm on one of the bell-crank levers engages with this pin M. Various other forms of mechanism, however, may be used for effecting the necessary simultaneous movement of the needles.

The special advantage of this arrangement is that each reproducer is directly connected to the horn and the sound-reproduction is improved as there are no pockets in the sound-passage which tend to localize the sound instead of transmitting it to the horn.

It is to be understood that the precise details of construction which have hereinbefore been set forth are given by way of example of the application of this invention, and the invention is not limited to these details except as set forth in the appended claims.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a repeating mechanism for a gramophone the combination of a sound-tube, a supporting member set diametrically to the record wherein said tube is free to slide longitudinally, two reproducers mounted one at each end of said tube and angularly displaced from one another about the longitudinal axis of the tube, said reproducers being spaced apart such a distance that when one is opposite the inner margin of the record the other is opposite the outer margin thereof, a pin projecting upwardly from each reproducer, two wedge-shaped members secured on said supporting member in such position as to engage respectively one of said pins at the end of the travel of the tube and rock the tube and reproducers about the longitudinal axis of the tube to render one reproducer operative and the other inoperative.

2. In a repeating mechanism for a gramophone the combination of a telescopic sound-tube, a supporting member set diametrically to the record wherein said tube is free to slide longitudinally, two reproducers mounted one at each end of said tube and angularly displaced from one another about the longitudinal axis of the tube, said reproducers being spaced apart such a distance that when one is opposite the inner margin

of the record the other is opposite the outer margin thereof, a pin projecting upwardly from each reproducer, two wedge-shaped members secured on said supporting member in such position as to engage respectively one of said pins at the end of the travel of the tube and rock the tube and reproducers about the longitudinal axis of the tube to render one reproducer operative and the other inoperative.

In testimony whereof I have signed my name to this specification.

NOEL PEMBERTON-BILLING.