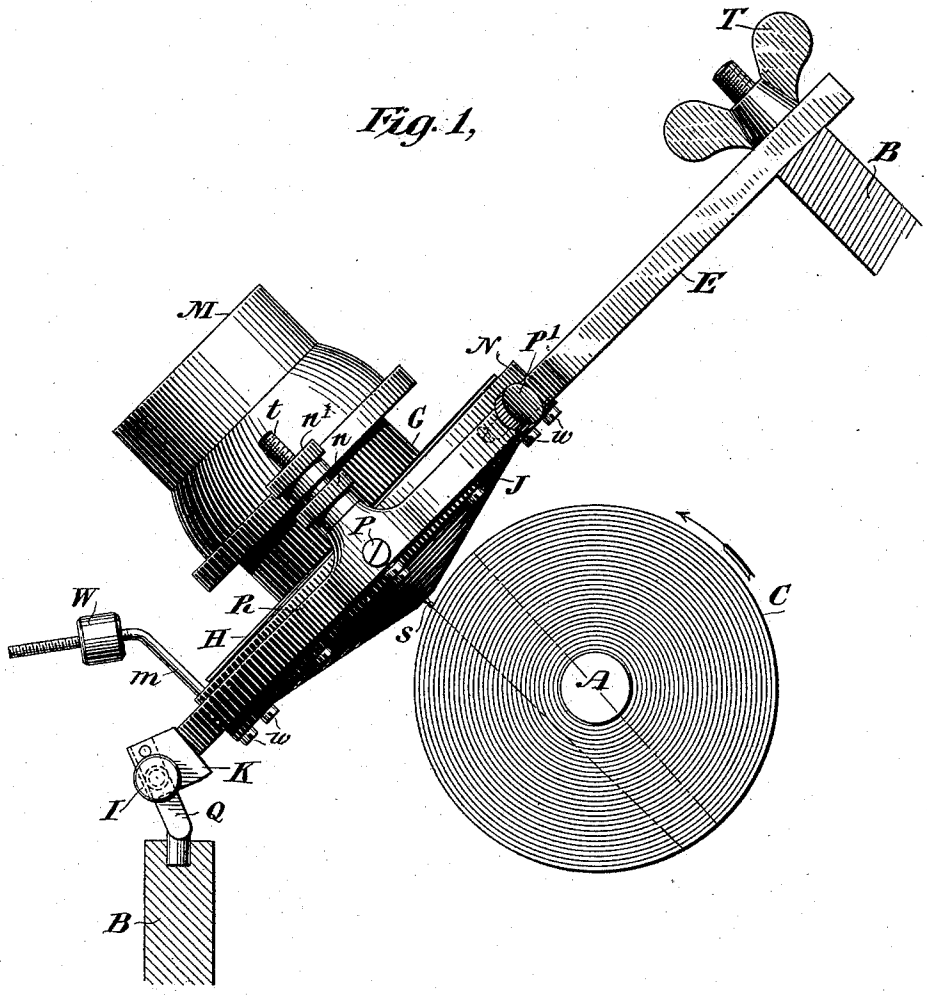
(No Model.) 2 Sheets—Sheet 1.

G. BETTINI.

PHONOGRAPH.

No. 488,379. Patented Dec. 20, 1892.

Fig. 1,



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2,

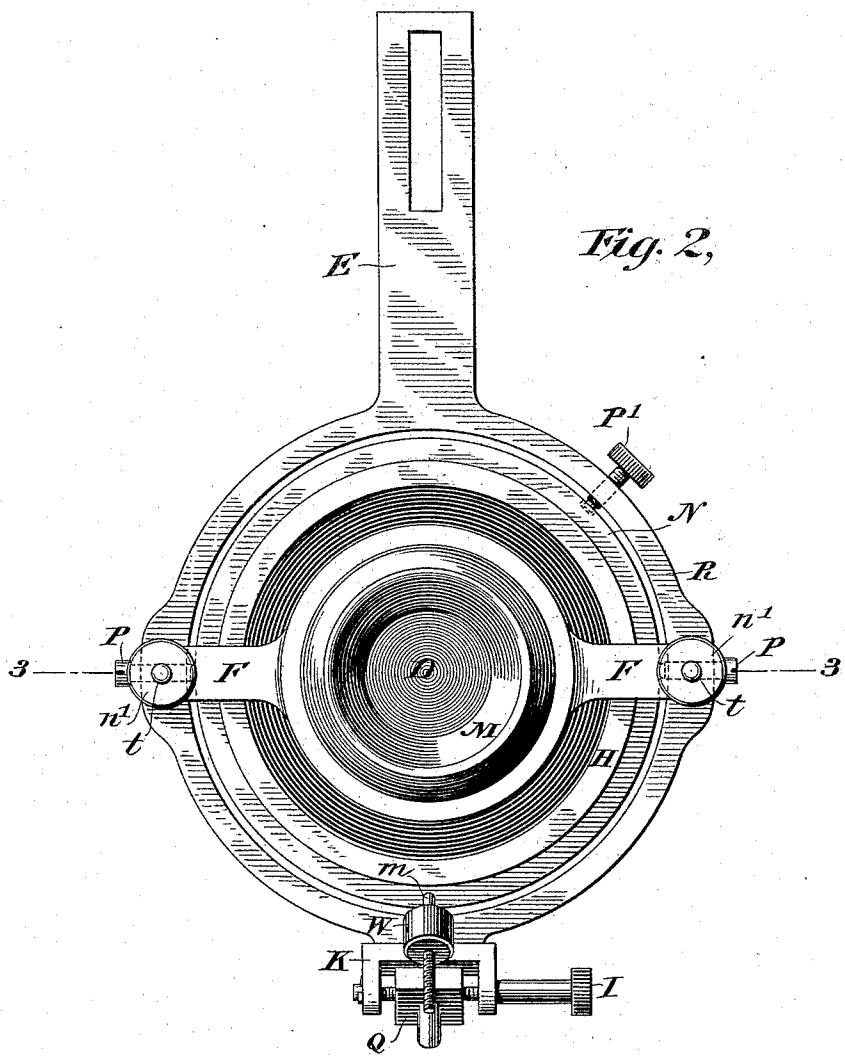
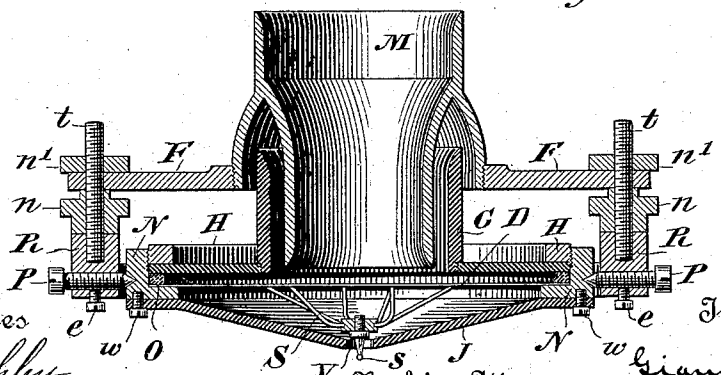


Fig. 3,



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UNITED STATES PATENT OFFICE.

GIANNI BETTINI, OF NEW YORK, N. Y.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 488,379, dated December 20, 1892.

Application filed January 27, 1892. Serial No. 419,409. (No model.)

To all whom it may concern:

Be it known that I, GIANNI BETTINI, a subject of the King of Italy, and a resident of New York, in the county and State of New York, have invented certain new and useful Improvements in Methods of and Apparatus for Recording and Reproducing Articulate or other Sounds, of which the following is a specification.

In order that my invention may be fully understood, reference is had to the following specification taken in connection with the accompanying drawings, which specification is a full, clear and exact description of the invention, such as will enable others skilled in the art to which it relates, to make and use same.

My invention is directed particularly to improvements in novel methods of and means for automatically regulating the position of a phonographic diaphragm with relation to the recording or reproducing cylinder in such manner as to obtain from such apparatus a more perfect record and a better reproduction thereof, than is now obtainable with any existing apparatus of a kindred nature known to me.

It is a well known fact that in the use of the phonograph the record cylinders are often of irregular surface before the record is produced thereon; or, even if the surfaces have the desired conformation at the time of producing the record, the cylinders often warp or change their configuration from changes in temperature, careless handling, or, various other reasons It is also a fact that with existing forms of phonographic apparatus during the production of the record there results often times a production of a false record due to extraneous sounds acting upon the under surface of the diaphragm at the same time that the operating sounds are entering the apparatus through the proper channel on the upper side thereof.

My invention has for its object the avoidance of these objectionable features, and to this end it consists—

First—In a novel method of and means for supporting the diaphragm whereby it may always assume a proper relation to the cylinder regardless of the conformation thereof—Second—In novel means for protecting the diaphragm from the evil effects of extraneous sounds—Third—In details of construction hereinafter set forth, and particularly pointed out in the claims at the end of this specification.

Referring now to the drawings in all of which like letters of reference represent like parts wherever used—Figure 1 is a side elevational view illustrating my improvement—Fig. 2 is a plan view of the same—and Fig. 3 is a cross sectional view thereof taken on line 3—3 Fig. 2.

C represents a phonogram cylinder supported in the usual manner upon a rotary axis (A).

B B represent parts of the frame, which carry adjustably the diaphragm supporting arm (E;) said arm being enlarged in the usual manner at its lower end and provided with a slot at its upper end for securing it adjustably in position through the agency of a thumb nut (T) the lower portion of the supporting arm being provided with a fork (K) in which is secured the adjusting screw (I) threaded into a lug or arm (Q) which in turn is fixedly secured to the part (B).

D represents the diaphragm made preferably of metal having attached to its lower side a stylus, or recording, or reproducing point (*s*) the same being secured to the diaphragm by the agency of a spider (S) substantially as described in a prior patent No. 409,004 granted to me on the 13th day of August, 1889. This diaphragm is secured in position in a supporting ring (N) and securely held in place by a washer (O) and a sound concentrator (G) by a ring nut (H).

F is a cross bar adjustably secured to the supporting arm (E) by a pair of screw rods (*t t*) and thumb nuts (*n n' n n'*.) At the center of this cross bar is secured a mouth piece (M) the lower end of which projects downward into the upper or extended portion of a sound concentrator (G) so as to convey all of the sound which enters the mouth piece (M) to the surface of the diaphragm. The lower end or throat portion of the mouth piece (M) is sufficiently diminished in size to permit of the necessary vibratory movement which may be given to the surrounding sound concentrating portion (G) as the diaphragm tilts back and forth upon its pivotal supports,

which will now be described. The diaphragm supporting ring (N) is pivotally secured in position to the supporting arm (E) by a pair of screws (P) located on diametrically opposite sides and in a plane parallel with the axis (A) of the phonogram cylinder. *e e* are set screws for securing the screws (P) when in proper adjustment. P′ is a thumb screw for uniting the diaphragm ring fixedly with the arm or support (E) when desired. W is an adjustable weight secured on the screw threaded end of an arm (*m*) carried at the lower edge of the diaphragm ring (N). J is a protector or shield made preferably of non-resonant material for shielding the lower side of the diaphragm from the effects of any extraneous sound. This shield (J) is preferably of conical shape, as shown, being secured to the diaphragm ring (N) by screws (*w w*) and provided at its apex with an opening (V) of sufficient size to permit of the free movement of the stylus (*s*).

The operation of the apparatus is as follows:—The diaphragm having been properly adjusted as to the delicacy of its pivotal or rocking motion by the screws (P P) (*e e*) and through the agency of the adjustable weight (W) with the recording stylus (*s*) in the position shown in Fig. 1, the apparatus is ready to make or reproduce a record. It will be noticed, as shown in Fig. 1, that the record producing or reproducing stylus (*s*) does not bear normally upon the phonogram cylinder (C) and that inasmuch as the diaphragm is pivotally supported and is acted upon by the weight (W) which tends to move the stylus forward in a reverse direction to that of the phonogram cylinder, it will therefore be apparent that if any inequality occurs in the surface of the cylinder this adjustment will compensate for it by causing the recording or reproducing stylus to assume different angular positions with relation to the axis of the cylinder and to operate at all times with the best effect and to make a clear and well defined record. The diaphragm D and its supporting ring N secured in the arm or support E will therefore be given a rocking motion by the stylus *s* as it follows the irregularities of the surface or record of the phonogram cylinder C which rotates in the direction of the arrow (see Fig. 1) and inasmuch as the major portion of the weight of these parts is thus supported free of the cylinder or surface delicate adjustment is effected by the weight W, and the stylus will follow the surface or record giving always an approximately uniform pressure, thereby assuring either a perfect record or a perfect reproduction thereof. It will be noticed also that by virtue of the adjustable mouth piece (M) and the sound concentrator (G) I am enabled to obtain a maximum effect upon the upper surface of the diaphragm and to transmit through this diaphragm and its spider sustained recording stylus, all of the sound waves. It is also apparent that there can be no material effect produced upon the under side of the diaphragm from any extraneous sounds, because of the protector or shield (J). The lateral and vertical adjustments of the diaphragm with relation to the phonogram cylinder are effected through the agency of the thumb nut (T) the thumb screw (I) yoke (K) and support or lug (Q).

It will of course be understood that all of the improvements herein described are equally applicable to either the recorder or reproducer of a phonograph at will.

I am aware that attempts have heretofore been made to overcome the defects due to irregularities in phonogram cylinders by various means—as for instance:—By pivoting the recording or reproducing stylus to the diaphragm and regulating the throw or movement of such pivoted stylus by a weight or analogous device, and I do not claim broadly means for accomplishing this result.

I am also aware that it is old in the art to pivotally sustain a recording or reproducing diaphragm so that the weight of the entire diaphragm and its supporting ring or frame is sustained by the stylus resting upon the phonogram surface, and I make no claim hereinafter broad enough to include such a structure. I am not aware, however, that any one has heretofore pivoted the diaphragm proper in a sustaining frame over the phonogram cylinder or surface so that the weight of the diaphragm and its attached parts is sustained independent of the phonogram surface and in such manner that irregularities of said surface cause the diaphragm to turn about its points of support and the point of the stylus to assume different angular positions with relation to the axis or the phonogram cylinder, and my claims are generic in this particular.

I am aware also that it is old in the art to convey the sound waves to an inclosed chamber located beneath the diaphragm, the said diaphragm having its upper surface entirely inclosed or protected from extraneous sounds, the recording or reproducing stylus extending through a perforation in the lower chamber and being provided with link and lever connections, as shown and described in patent to J. H. White No. 467,530, granted January 26, 1892, and I make no claim upon this feature of my invention broad enough to include such a structure. With such a structure as shown in Figs. 1 and 3 of the drawings of the aforesaid patent air is confined in the chamber above the diaphragm without any means of escape acting therefore as a cushion, while in the structure described and claimed by me the chamber above the diaphragm is used to receive the sound waves without any vent or escape, the lower or protecting shield being provided with a perforation through which the stylus passes, thereby permitting the escape of the air and avoiding the evil effects of an air cushion. It is also to be understood that although I have shown

and described a phonogram cylinder of the usual type in connection with my improvements I may use a phonogram surface of any preferred form, the application of the novel principles hereinbefore described and hereinafter claimed being equally as well adapted to such surfaces as to cylinders.

Having thus described my invention what I claim and desire to secure by Letters-Patent of the United States is:—

1. The described method of compensating for the effects of irregularities in a phonogram cylinder or surface consisting in supporting the weight of the diaphragm and its attached parts free of the cylinder or surface and simultaneously giving to it a rocking motion as the cylinder or surface moves or advances, whereby the recording or reproducing stylus is caused to assume different angular positions.

2. The described method of compensating for irregularities of a phonogram cylinder consisting in supporting the weight of the diaphragm and its attached parts free of the cylinder or surface and simultaneously varying the angular relation of the stylus to the axis of the cylinder, said stylus being rigidly secured to the diaphragm.

3. The described method of compensating for irregularities in the surface of a phonogram cylinder consisting in giving to a rigidly supported stylus a vibrating motion in the direction of the cylinder's rotation and about a fixed or axial line of support in a plane substantially parallel with the axis of the cylinder.

4. A stylus carried by a diaphragm pivotally secured to a support and provided with adjustable means as a weight for causing the stylus to vary its angular relation so as to conform to the phonogram surface, substantially as described.

5. A phonograph having a diaphragm provided with a sound receiving chamber on one side with an inlet thereto for the sound waves in combination with a protecting shield on the other side which covers the entire surface of the diaphragm and has a perforation through which the recording or reproducing stylus extends substantially as described.

6. A phonograph provided with a sound protector or shield which covers the entire face of the diaphragm and has an opening through which the recording stylus projects, substantially as described.

7. A phonograph having a pivoted diaphragm with a sound concentrating chamber on one side and a sound protector or shield on the other through which the stylus projects substantially as described.

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Witnesses:
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