No. 773,304. PATENTED OCT. 25, 1904.

P. E. VAN VALKENBURGH.

PHONOGRAPH.

APPLICATION FILED JUNE 18, 1900.

NO MODEL. 2 SHEETS—SHEET 1.

Fig 7

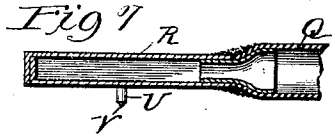


Fig 1

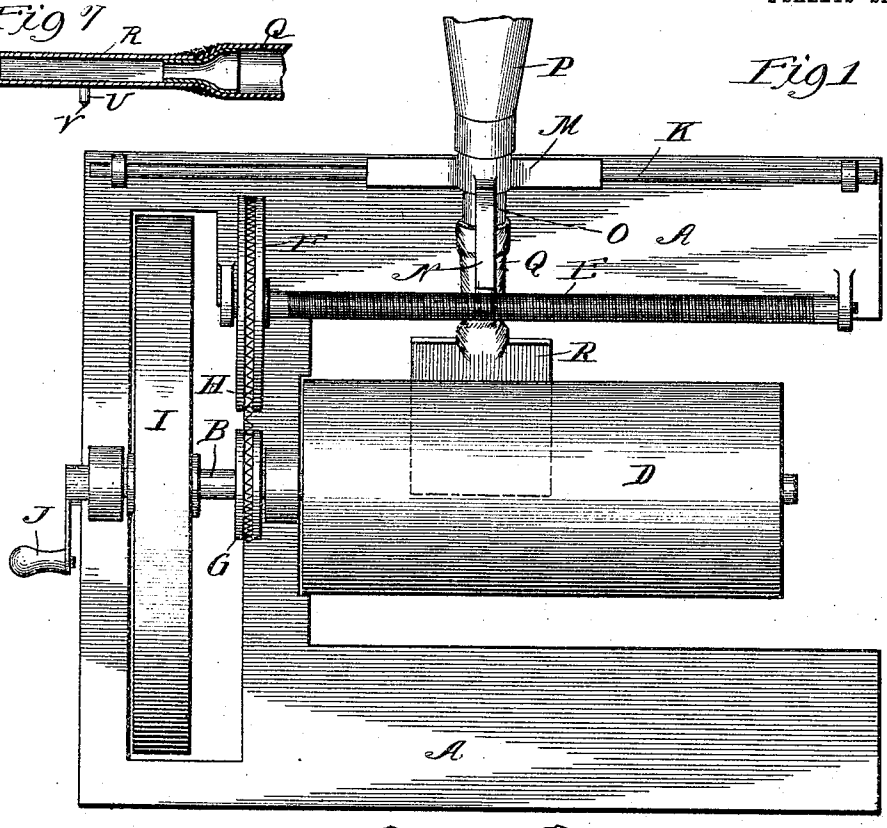
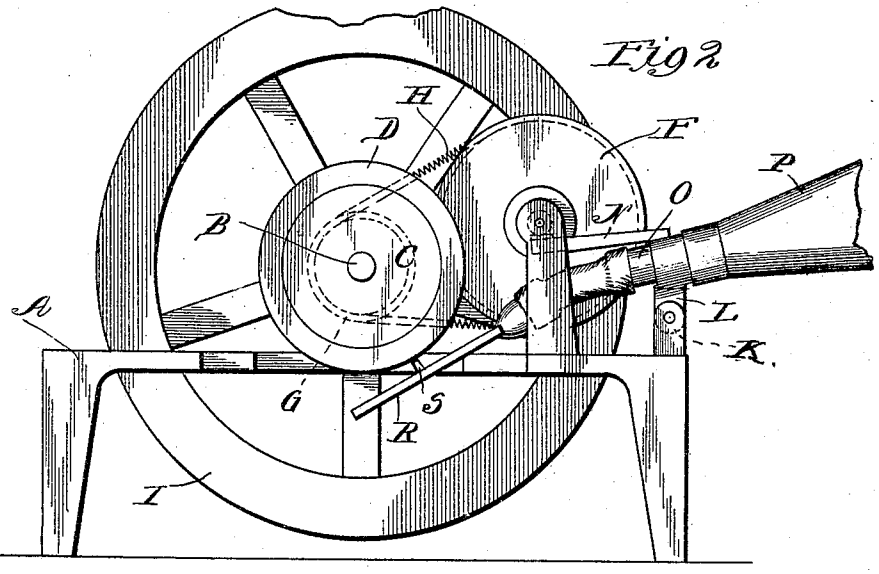


Fig 2



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No. 773,304. PATENTED OCT. 25, 1904.

P. E. VAN VALKENBURGH.

PHONOGRAPH.

APPLICATION FILED JUNE 19, 1900.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3

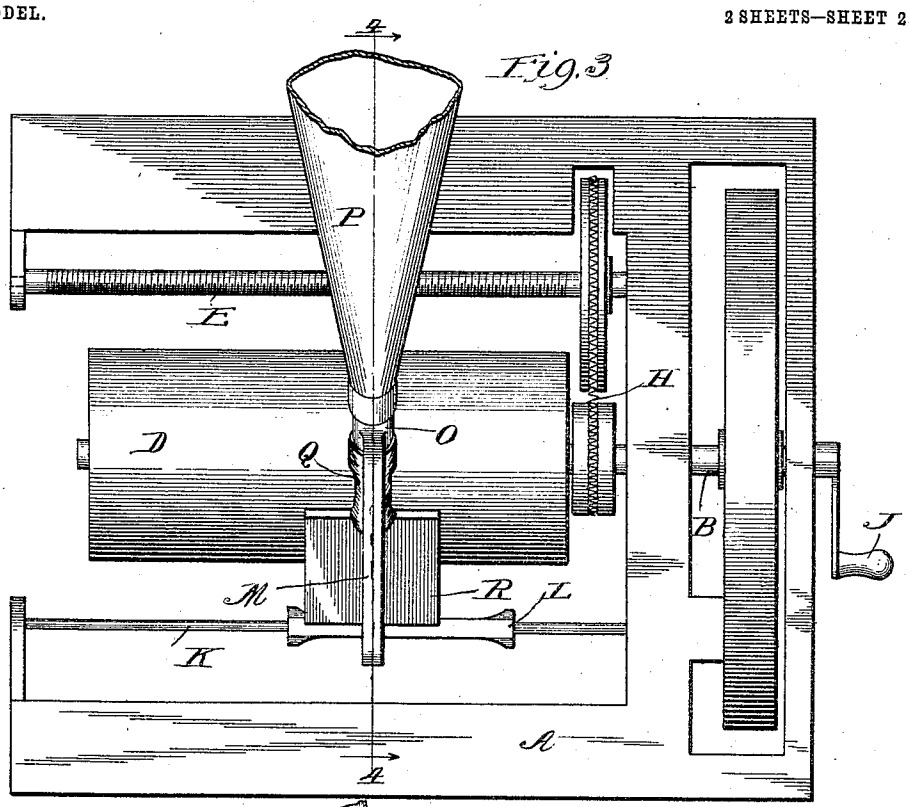


Fig. 5

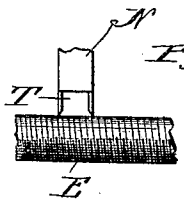


Fig. 4

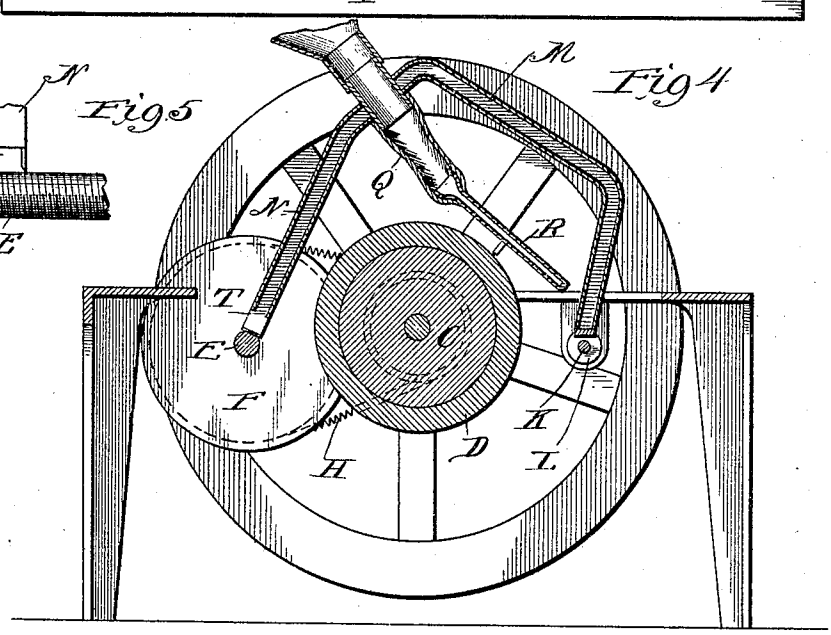
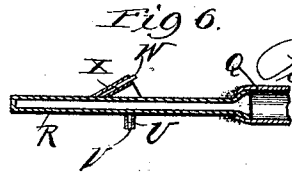


Fig. 6.



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No. 773,304. Patented October 25, 1904.

UNITED STATES PATENT OFFICE.

PAUL E. VAN VALKENBURGH, OF CHICAGO, ILLINOIS.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 773,304, dated October 25, 1904.

Application filed June 19, 1900. Serial No. 20,798. (No model.)

To all whom it may concern:

Be it known that I, PAUL E. VAN VALKENBURGH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

This invention relates to improvements in phonographs, and has for its primary object the production of a cheap, simple, and durable instrument that may be operated either by hand or by power.

A further object is to have the recorder and reproducer held in contact with the wax cylinder yieldingly by elastic force as contradistinguished from the force of gravity commonly employed in instruments of this class.

Another object of my invention is to so pivotally mount the feed-arm and the reproducer or recorder that the weight of the horn or other suitable weight aside from the feed-arm or the diaphragm-box may be utilized to hold the feed-arm in operative contact with the feed-shaft and to hold the reproducer or recorder in operative contact with the record or record-blank.

These and such other objects as may hereinafter appear are attained by the devices illustrated in the accompanying drawings, in which—

Figure 1 represents a plan view of a phonograph embodying my invention in its preferred form. Fig. 2 represents an end elevation thereof. Fig. 3 represents a plan view of a modified form of phonograph embodying my invention. Fig. 4 is a transverse section on the line 4 4 of Fig. 3. Fig. 5 is a detail view of the feed-screw and its contacting device. Fig. 6 is a detail sectional view of the combined recorder and reproducer, and Fig. 7 is an enlarged detail view more clearly showing the preferred manner of constructing the recorder and reproducer.

Similar letters of reference indicate the same parts in the several figures of the drawings.

Referring by letter to the accompanying drawings, A indicates the supporting-frame of the machine, which may be of any suitable shape and construction, but preferably has the form of a rectangular frame with the central portion of one of the end bars cut away so as to leave the frame open at that end. Upon the opposite end bar of the frame is journaled one end of a shaft B, which projects therefrom toward the opposite open end of the frame, substantially midway between the same, and has rigidly mounted thereon a cylinder C, preferably of wood, which tapers slightly from the end thereof adjacent to the supported end of the shaft and is of a diameter to receive the usual wax-composition cylinder D, which is slipped thereon and held by frictional contact in the usual way of machines of this class. This wax cylinder is of course plain when it is desired to record sounds thereon, or it may be in the shape of what is technically called a "record" with the sounds already recorded thereon. With a plain cylinder the recorder is of course used, while with the record the reproducer is used.

Journaled in suitable bearings at one side of the frame A and parallel with the shaft B is a screw-threaded feed-shaft E, having mounted thereon a pulley in line with another pulley G, rigidly mounted upon the main shaft B, said pulleys being connected by a belt of any suitable kind, preferably a small metallic coiled spring H, trained about the two pulleys, so as to communicate power from one to the other. Upon the shaft B and working in the slot cut out of the end bar of the frame is a fly-wheel I for inducing regular motion of the shaft B, to which power is preferably communicated by a crank J, although of course the shaft B may be driven by power in the shape of the usual cheap clockwork mechanism, geared thereto in the ordinary manner. As, however, my primary object is to produce the cheapest possible machine that shall give satisfactory work, I prefer to use the crank, as shown.

Beyond the feed-screw E and extending parallel therewith is a rod K, supported in suitable bearings at the side edge of the frame A, upon which are slidingly mounted depend-

ing ears L from the horn-support M, which latter is provided with a laterally-extending feed-finger N, engaged by a knife-edge on the end thereof with a thread on the feed-screw, so that as the feed-screw is revolved the horn-support will be caused to travel along on the rod K, according to the direction in which the feed-screw is turned. The horn-support carries a transverse tube O, upon one end of which is slipped the horn P, while on the other end is forced one end of a short section of rubber tubing Q, the opposite end of which is attached to the reproducer R, whose tracing-point S engages the record D at the under side thereof, as clearly shown in Fig. 2. It will be noted that the plane of the reproducer is at an angle to the axis of the horn and the tube on the horn-support, this disposition being possible by reason of the interposition between the horn-support and the reproducer of the rubber tubing.

One of the principal points of my invention is that I rely upon the resilience of the rubber tubing to hold the reproducer up to its work against the record, but yieldingly, so as to avoid any damage thereto. As a result of such construction the reproducer may be made exceedingly light, and, in fact, lighter than it would be possible to make one and get the same results where the gravity of the reproducer alone is relied upon to hold it in proper contact with the record. It will also be noted that the weight of the horn P is alone relied upon to hold the feed-arm N in proper contact with the feed-screw, and obviously whenever it is desired to shift the reproducer back and forth to different positions upon the record it is only necessary to lift the outer end of the horn and rock the horn-support upon the rod K, when both the reproducer and the feed-arm will be moved out of contact with the record and feed-screw, leaving all of the parts carried by the horn-support free to be moved back and forth.

The principal difference between the machine illustrated in Figs. 1 and 2 and that illustrated in Figs. 3 and 4 is that in the first-mentioned machine the reproducer opposes the under side of the record or wax cylinder, while in the last-mentioned machine the reproducer opposes the upper side of the record or wax cylinder. Of course there are minor differences in the disposition of the parts rendered necessary by the difference referred to; but in all general features of operation and coöperation the parts are identical. For instance, the guide-rod K for the horn-support is on the opposite side of the record-supporting cylinder and frame from the feed-screw E, and the horn-support N spans the record and has the transverse tube with which the horn P and tube of the reproducer R are connected mounted thereon between the ends of the support, one end of which is sleeved upon the rod K or provided with ears L, corresponding with those of the construction previously described, while the other end rests directly upon the feed-shaft. Hence it will be seen that in this instance the feed-arm is to all intents and purposes merely a prolongation of the horn-support.

While I have referred to a certain part of the structure as the "horn-support" and have described my device as being so constructed that the recorder or reproducer is held in operative contact with the cylinder by the weight of the horn, it should be understood that any suitable sound-receiving or sound-distributing means may be substituted for the horn. Obviously, also, the device may be so constructed that the weight which I supply by attaching the horn may be provided at the point where I attach the horn by some other part of the structure—as, for instance, by making the horn-support of sufficient weight at the point where the horn is attached to hold the reproducer or recorder against the cylinder in the same manner that I hold them in operative position by means of the weight of the horn—but such variations do not constitute a departure from the spirit of my invention.

Heretofore the engagement between the feed-arm and the feed-shaft has generally been effected by a single knife-edge fitting into the thread on the feed-shaft; but I prefer to have a two-point engagement between the feed-arm and the feed-shaft by providing two parallel adjacent knife-edges upon the end of the feed-arm. This may be readily and economically effected by forming the feed-arm out of square tubing and then cutting away the upper and lower sides thereof for a short distance back of the end of the arm, as clearly illustrated at T in Figs. 4 and 5, thus leaving the sides only of the arm to engage the thread of the feed-shaft at two adjacent points along its length. This serves to steady the horn-support, as well as reducing the liability of jumping the ends of the feed-shaft, and therefore tends to insure a more perfect and regular feed of the reproducer along the record.

Another important and novel feature of my invention made possible by the employment of the elastic or resilient tube connecting it with the horn-support is the reproducer, which in practice I have made out of a small pasteboard box, such as are commonly used by druggists for pill-boxes, in one side edge of which I insert a short section of tube adapted to fit into the end of the elastic tube Q, and at the center of the box, on one side thereof, I cement a short post U, in which is set the usual sapphire point V for following the groove in the record. This box serves the

purpose of an amplifying-chamber, from which the sound produced by the vibration of the side which acts as a diaphragm and to which the tracing-point is secured passes out through the tube Q and horn P in a practically straight line, thus producing very loud and very distinct reproductions of the sounds that produce the record. The reproducer is of course very light and very cheap, and but for the pressure produced thereon as a result of the slight flexure of the tube Q would not be satisfactory for the intended purpose. This construction of the reproducer is such that I am enabled to utilize the same device as a recorder by simply cementing or gluing to the opposite side of the box from that on which the reproducing-point is mounted a suitable support for a recording-stylus W, this support being preferably a small metallic clip having an angularly-disposed tube to receive the stylus.

A phonograph made in accordance with my invention is exceedingly cheap, simple, and durable, and yet is quite satisfactory for a machine of the cheaper class, where especial accuracy cannot be expected.

Obviously numerous changes may be made in the construction and disposition of the parts without departing from the spirit of my invention—such, for instance, as substituting other material for the pasteboard boxes, which are the preferred construction of my reproducer and recorder, for so far as relates to the broad idea of my invention any material that enables the construction of a flat box having opposing sides to which the recorder or reproducer, or both, can be attached would fall within my invention and are comtemplated by the claims.

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

1. In a phonograph, the combination with a base, of a cylinder, a support pivotally mounted on said base, a horn mounted on the outer end of said support, and a reproducer or recorder connected with said horn and disposed beneath the cylinder and held in operative contact therewith by the weight of said horn.

2. In a phonograph, the combination with a cylinder, of a counterbalanced reproducer or recorder, and a horn serving as a counterweight for holding said reproducer or recorder in operative contact with said cylinder.

3. In a phonograph, the combination with a base, a cylinder, a feed-shaft, and a support pivotally mounted on said base, of a feed-arm connected with said support, a reproducer or recorder also connected with said support, and a horn mounted upon said support at that side of the center of gravity of the pivot of said support which will permit said horn to counterbalance said feed-arm and said reproducer or recorder and hold them in operative contact with the feed-shaft and with the cylinder, respectively.

4. In a phonograph, the combination with a base, a cylinder, and a horn-support pivotally mounted on the base, of means for rotating the cylinder and for moving the horn-support lengthwise of the cylinder, a reproducer or recorder held in operative contact with said cylinder by the weight of said horn, and a flexible connection between said reproducer and recorder and said horn-support, substantially as described.

5. In a phonograph, the combination with a cylinder, of a counterbalanced reproducer or recorder, a part of the structure mounted to serve as a counterweight for holding the reproducer or recorder in operative contact with said cylinder, and an elastic tube interposed between the reproducer or recorder and such counterweight.

6. In a phonograph, the combination with a rectangular base-frame cut away at one end thereof, an arbor-shaft journaled centrally in said frame opposite the cut-away end thereof, a fly-wheel on said shaft, a crank-arm for rotating the same and a cylinder mounted thereon, a screw-threaded feed-shaft journaled on said frame parallel with the arbor-shaft and geared thereto, a guide-rod secured in said frame parallel with the feed-shaft, a horn-support loosely mounted on said guide-rod, a feed-arm in said support engaging the feed-shaft, a horn attached to said support and operating to hold the feed-arm in contact with the feed-shaft, a reproducer and an elastic tube connecting said reproducer with said support, substantially as described.

7. In a phonograph, the combination with feeding mechanism, of a flat pasteboard box connected therewith, a reproducing or recording point secured thereto, a horn-support, an elastic tubular connection between said box and said horn-support, a part of the structure serving as a counterweight to flex said tubular connection, so as to hold the point on said box in yielding contact with a record or record-blank, substantially as described.

8. In a phonograph, the combination with a base, of a cylinder and feed-shaft geared together and suitably mounted upon said base, means for rotating said cylinder and feed-shaft, a support pivotally mounted upon said base, a reproducer or recorder connected with said support, and a part of the structure connected with said support at that side of the center of gravity thereof which will permit the weight of such part to hold said reproducer or recorder in operative contact with said cylinder, substantially as described.

9. In a phonograph, the combination with a base, of a cylinder and feed-shaft geared to-

gether and suitably mounted upon said base, means for rotating said cylinder and feed-shaft, a horn-support pivotally and slidably mounted upon said base, a feed-arm and reproducer or recorder, both connected with said horn-support, and a horn connected with said horn-support at that side of the center of gravity thereof which will permit the weight of said horn to hold said reproducer or recorder and said feed-arm in operative contact with said cylinder and with said feed-shaft, respectively, substantially as described.

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