F. D. LEWIS.

STYLUS HOLDER FOR TALKING MACHINES.

APPLICATION FILED JUNE 7, 1920.

1,389,885. **Patented Sept. 6, 1921.**

Fig. 1.

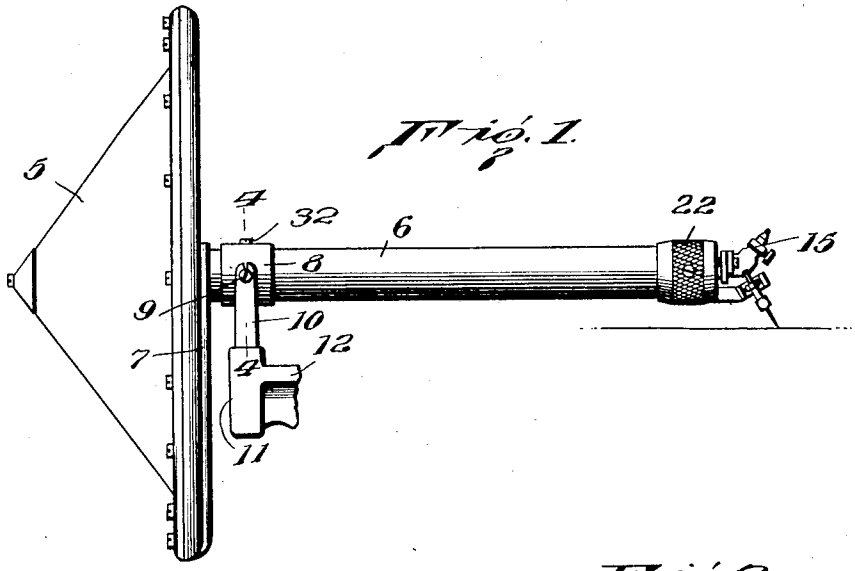


Fig. 2.

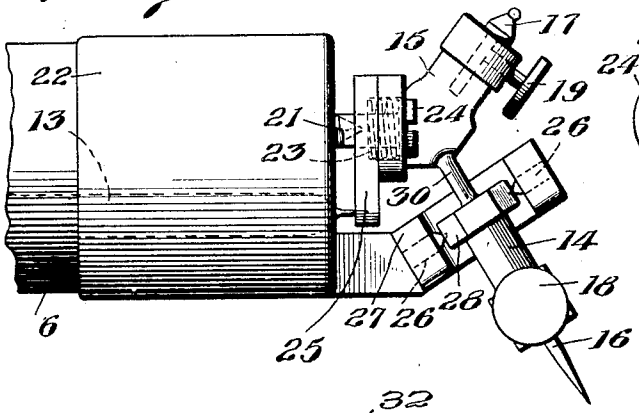
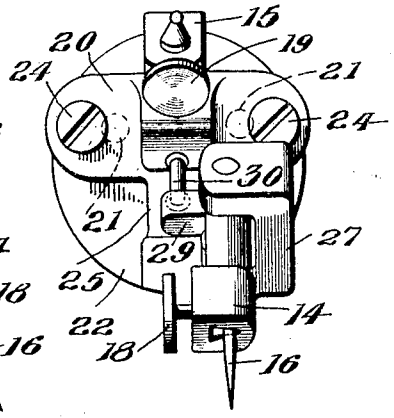


Fig. 3.



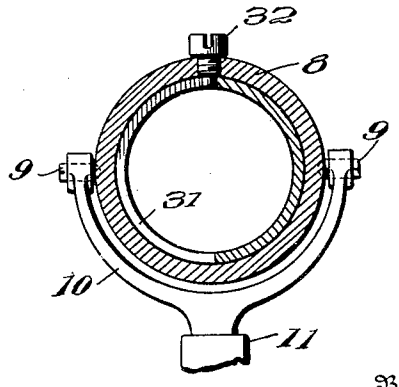


Fig. 4.

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UNITED STATES PATENT OFFICE.

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STYLUS-HOLDER FOR TALKING-MACHINES.

1,389,885. Specification of Letters Patent. Patented Sept. 6, 1921.

Application filed June 7, 1920. Serial No. 387,030.

To all whom it may concern:

Be it known that I, FRANK D. LEWIS, a citizen of the United States of America, and residing at 556 Gregory avenue, West Orange, New Jersey, have invented certain new and useful Improvements in Stylus-Holders for Talking-Machines, of which the following is a specification.

This invention relates to improvements in stylus holders for talking machines, and in particular for talking machines of the Actuelle type as disclosed generally in Letters Patent No. 1,271,527, granted to Marcus C. Hopkins.

In machines of that type, the usual sound-box and tone arm are replaced by a swinging arm which moves horizontally across the record and which has a stylus holder attached immediately to its front end, and carries at its rear end a large conical or equivalent diaphragm of vibratile material. The vibrations of the stylus and stylus holder set up by the travel of the stylus along the phonic line or sound groove in the record are transmitted by means of a suitable connection to the diaphragm, which latter is thereby caused to vibrate piston-fashion and, in consequence, acts to regenerate the original sound waves in their initial tonal strength and quality in free, unconfined atmospheric air.

It has been proposed to construct and mount the swinging arm above mentioned, and its connected and associated parts, in such a way that both the lateral-cut and the vertical-cut types of records can be played with equal facility by a mere rotation of the arm about its axis, followed by a slight adjustment of the stylus holder, the latter having a single socket to interchangeably receive either the usual steel needle or the sapphire-point stylus, according as the particular record to be played is cut laterally or vertically. Experiments have proven, however, that it is difficult to play records of the two different cuts with a stylus of constant leverage—that is to say, with a single stylus holder having a fixed, predetermined leverage—irrespective, of course, of the type of stylus itself—in a satisfactory manner. This is due primarily to differences in the cutting ratios adopted, such differences resulting possibly from the different cutting or recording apparatus utilized by various manufacturers, and possibly from the different methods of cutting or recording employed. Thus, one type of cut may have a ratio of 1:2, while the other cut may have a ratio of 1:3; the result being that when records so cut are played with a fixed stylus-leverage, the reproduction of one or the other record will probably be somewhat impaired.

It is the object of the present invention to overcome the objection above indicated by equipping the swinging arm with two separate and distinct stylus holders of different leverages, which are interchangeably brought into playing position by a rotation of the arm in the proper direction. The stylus holder now employed in the commercial Actuelle is utilized in connection with the playing of vertical-cut records and, hence, receives the usual jewel-point stylus; and to this holder there is connected a second holder which receives the needle or stylus used for playing lateral-cut records. The second stylus holder is, or may be, mounted on the cap at the front end of the swinging arm, and its vibrations are transmitted to the first holder through its connection therewith, and thence, through the transmission device, to the diaphragm. The two holders are so arranged with relation to each other that a rotation of the arm through approximately 180° is necessary to shift either holder out of working position and simultaneously bring the other into such position.

Other and further objects and advantages of the invention will present themselves in the course of the following description; but it is to be understood that the invention is not limited to the precise structural details of the embodiment disclosed therein and illustrated in the accompanying drawing. On the contrary, the invention is susceptible of modifications and changes within its scope, as hereinafter claimed; and parts and features of the invention may be employed to the exclusion of others, and in other and different environments.

In the drawing:

Figure 1 is a part-sectional side elevation of a Hopkins-type diaphragm and its carrier arm, the latter being equipped with the improved stylus-holder construction.

Fig. 2 is an enlarged side view of the front end of the carrier arm and attached parts, showing the playing position for lateral-cut records.

Fig. 3 is a front view of Fig. 2.

Fig. 4 is an enlarged cross-section on line 4—4, Fig. 1.

Referring more particularly to the drawing, 5 indicates in a general manner a diaphragm of the type employed in the commercial Hopkins machine, or Actuelle, as it is more commonly termed, and 6 the tubular swinging arm of such machine the rear end of said arm having mounted on it the spider 7 to which the diaphragm is attached. The diaphragm has the form of a relatively large cone, is constructed of paper or other suitable relatively-stiff, vibratile material, and is freely exposed on all sides to unconfined atmospheric air, all as described in the Hopkins patent above identified. The tubular arm 6 is mounted adjacent its rear end in a universal joint in order to permit it to rock in both vertical and horizontal planes; the mounting here shown comprising a collar 8 which encircles said arm and is engaged by bearing pins 9 carried by the branches of a vertically-arranged yoke 10 whose stem rotatably fits in a bearing sleeve 11 forming part of a bracket 12 which is fastened to the cabinet of the machine at some suitable point. The transmission device 13 extends from the apex of the conical diaphragm through the bore of the tubular carrier arm, and is connected at its forward end with the hereinafter described stylus-holding attachment. Any of the various forms of transmission-connections may be used within the scope of the invention, that illustrated consisting of a steel or brass tube of comparatively large diameter and having very thin walls.

The stylus-holding attachment, as has previously been explained, is of duplex character. In other words, it comprises two separate and distinct socketed members or holders 14 and 15, one to receive an ordinary steel needle 16 such as is used in playing lateral-cut records, and the other to receive a jewel-tipped stylus 17 for playing vertical-cut records, the styli being held in place in their respective sockets by clamping screws 18 and 19. The holder 15 to receive the jewel-tipped stylus is mounted in the manner usual in the standard Actuelle; *i. e.*, it is fastened to a cross-piece or plate 20, which is fulcrumed upon knife-edge pivots 21 carried by the front cap 22, and is subjected to the pressure of springs 23 controlled by screws 24. The part 20 is provided with a central projection 25, to which the front end of the transmission rod 13 is directly secured, said rod and the stylus-receiving socket being disposed in the vertical plane which passes through the axis of the carrier arm. Hence, when the holder 15 is in active position, as in playing vertical-cut records, the vibrations imparted to the stylus during its travel along the record groove will effect a vertical rocking movement of said holder which will be immediately transmitted by it to rod 13, as will be understood.

The other holder 14 is mounted to vibrate or rock laterally, in order to enable its stylus or needle 16 to follow the cutting in the side walls of a lateral-cut sound groove; and in the construction illustrated, it is fulcrumed on bearing pins 26 carried by a C-shaped bracket 27 which is fixed to cap 22. The collar 28 at the rear end of the holder which is directly engaged by the bearings 26, is provided with a lateral projection 29 which is connected by means of a neck or equivalent part 30 with the body portion of the first holder 15, so that during playing the holder 14 will be immediately vibrated by needle 16 and, in turn, will vibrate holder 15, due to its connection 30 therewith, whence the vibrations will be transmitted through rod 13 to the diaphragm. The disposition of the laterally-vibrating holder 14 is such that the needle socket therein lies slightly to one side of the previously-mentioned vertical plane which contains the transmission rod and the stylus socket in the vertically-vibrating holder 15; whereas the connecting neck or wire 30 between holder 15 and the projection 29 on holder 14 is arranged in such plane. The bearing pins 26 on which holder 14 is fulcrumed are located to the same side of said plane as the needle socket, so that the holder 15 will be vibrated by the holder 14 in precisely the same manner as when immediately vibrated by its stylus 17. It is to be observed, moreover, that the two holders 14 and 15 provide different leverages, the leverage afforded by the holder 14 being greater than that afforded by the holder 15. Hence, satisfactory reproduction is assured for playing both types of records.

The styli sockets in the two holders 14 and 15 are disposed almost opposite each other, and the carrier arm 6 must, therefore, be turned through an arc of approximately 180° in order to move one holder out of, and the other into playing position. Accordingly, said arm is rotatably fitted in its supporting collar 8, and is formed with a semicircular slot 31 which is inclosed by said collar, the latter being provided with a screw or pin 32 which projects into the slot and terminates the rotary movements of the arm. Any other suitable form of stop device may be adapted, however, in place of the one just described.

I claim as my invention:—

1. In a talking machine, the combination of a hollow arm movable across a record, a diaphragm mounted on one end of said arm, a stylus-holding attachment mounted on the other end of said arm, and a vibration-transmission device extending through said arm

and connected at opposite ends to said diaphragm and said attachment; said attachment comprising a stylus holder mounted to vibrate vertically and a second holder mounted to vibrate laterally, one holder being directly connected to the transmission device to vibrate the same, and also being connected to the other holder to be alternatively vibrated by its own stylus or by the stylus in said other holder according as one stylus or the other is in action.

2. In a talking machine, the combination of a hollow arm movable across a record, a diaphragm mounted on one end of said arm, a stylus-holding attachment mounted on the other end of said arm, and a vibration-transmission device extending through said arm and connected at opposite ends to said diaphragm and said attachment; said attachment comprising a pair of stylus holders adapted to be individually operated by their respective styli, one holder being mounted to vibrate vertically and being connected immediately to the transmission device to actuate the same, and the other holder being mounted to vibrate laterally and being connected to the first holder to transmit its vibrations thereto.

3. In a talking machine, the combination, with a transmission element adapted to transmit vibrations of solely one character; of a duplex stylus-holding attachment comprising a pair of separate stylus-holding members, one mounted to vibrate in conformity with the vibrations to be transmitted by said element and connected to immediately actuate the same, the other member having a mounting independent of the mounting of the first member to permit it to vibrate in a plane at right angles to the plane of vibration of the first member, and means interposed between the transmission element and the second member for transforming the vibrations of the latter into vibrations corresponding to those of the first member.

4. In a talking machine, the combination of an axially vibratory transmission element; and a duplex stylus-holding attachment comprising a pair of separate stylus-holding members, one mounted to vibrate vertically and the other to vibrate laterally, one of said members being connected immediately to the transmission element to directly effect its prescribed axial vibrations, and means interposed between the transmission element and the other member for transforming the vibrations of the latter into axial vibrations of said element.

5. In a talking machine, the combination of an axially vibratory transmission element; and a duplex stylus-holding attachment comprising a pair of separate stylus-holding members, one mounted to vibrate vertically and connected immediately to the transmission element to directly effect its prescribed axial vibrations, and the other mounted to vibrate laterally, and means interposed between the laterally-vibrating member and the transmission element for transforming the lateral vibrations of that member into axial vibrations of said element.

6. In a talking machine, the combination of an axially vibratory transmission element; and a duplex stylus-holding attachment comprising a pair of separate stylus-holding members, one mounted to vibrate vertically and connected immediately to the transmission element to directly effect its prescribed axial vibrations, and the other mounted to vibrate laterally, the second-named member having a projection which extends laterally to one side of its axis of vibration, and a connection between said projection and the first-named member to transform the lateral vibrations of the second-named member into axial vibrations of said transmission element.

In testimony whereof I have affixed my signature.

FRANK D. LEWIS.