C. P. MARSHALL.

TONE PURIFIER.

APPLICATION FILED APR. 20, 1915.

1,189,152. Patented June 27, 1916.

Fig. 1.

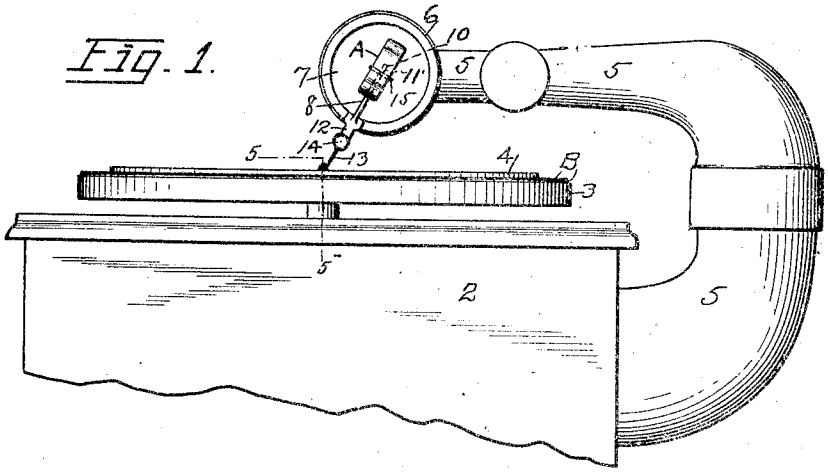


Fig. 2.

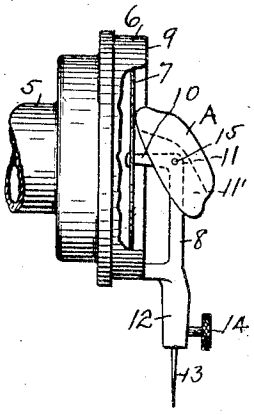


Fig. 3.

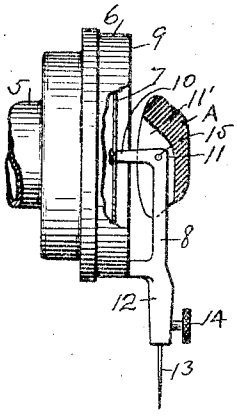


Fig. 4.

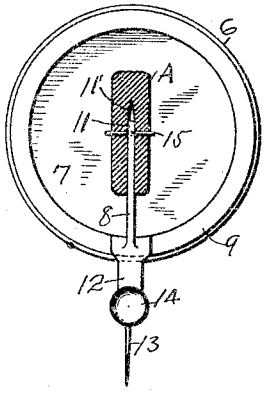


Fig. 5.

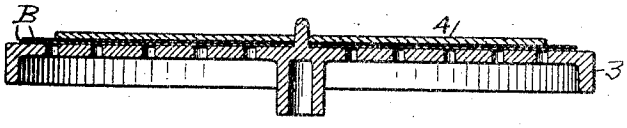
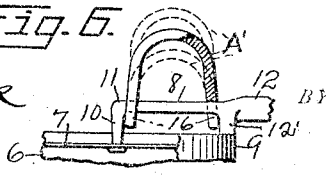


Fig. 6.



WITNESS

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TONE-PURIFIER.

1,189,152. Specification of Letters Patent. Patented June 27, 1916.

Application filed April 20, 1915. Serial No. 22,709.

To all whom it may concern:

Be it known that I, CHARLES P. MARSHALL, a citizen of the United States, residing at Watertown, in the county of Jefferson and State of New York, have invented certain new and useful Improvements in Tone-Purifiers, of which the following is a specification.

This invention relates to tone purifiers, designed for use in connection with talking machines generally, and the invention relates particularly to a device of the class for attachment to the reproducers of victrolas, graphophones, phonographs and like talking machine, wherein the well known vibration-bars or members are employed for conducting the sound vibrations from the needle to the reproducing diaphragms.

The object of the present invention is to provide novel and simple means for improving—rendering clear, pure and natural—the sounds of voices, music, and the like, reproduced by talking machines, by eliminating practically all buzzing, yawling and reediness, which are caused chiefly by an excess of the high harmonic waves mingling with the predominant notes (original sound waves) and their proper harmonics as incorporated in the records.

A further object is to provide a tone purifier consisting of an elastic or semi-elastic substance, which is preferably applied to the usual vibration-bar which conducts the sound vibrations from the needle to the reproducing diaphragm. The nature and location of the said purifier being such that it absorbs or reduces the excess of the high harmonic waves or overtones produced by the vibration-bar, so that only the pure and clear and audible sound of the predominant note as recorded is heard.

A further object is to provide a tone purifier consisting of a body of rubber or similar substance, but preferably a non-conductor of sounds, which is pivotally mounted on the vibration-bar of the reproducer, and which is adjustable for bringing the said body into contact with, the reproducing diaphragm for bridging the said parts, thereby diminishing to a great extent the raw rasping noises caused by the fundamental note of the said diaphragm, which it has been found also contributes to the excess of the high harmonics. And a further object is to provide means interposed between the record and the revolving disk which supports the record, for reducing the high harmonics of the fundamental note of the said disk, which further contributes to the disagreeable foreign noise emitted during the reproduction of the record.

I attain these objects by the means set forth in the detailed description which follows, and as illustrated by the accompanying drawing, in which—

Figure 1 is an elevation view of the reproducing part of a talking machine; showing my tone-purifier applied thereto. Fig. 2 is an enlarged side elevation of the transmitter showing one member of my tone purifier pivotally applied to the vibration-bar; the said member also engaging the diaphragm. Fig. 3 is a similar view; showing the said member disengaged from the diaphragm. Fig. 4 is a front face view of the transmitter. Fig. 5 is a central vertical section, taken on line 5—5 of Fig. 1; showing the second member or part of the tone purifier interposed between the record and the revolving disk. Fig. 6 is a view; showing a modification of the purifier member applied to the vibration-bar.

In the drawing, 2 represents the cabinet of the talking machine, and 3 the revolving disk which supports the record 4. 5 represents the usual tapering tone-arm, upon the free end of which is mounted the transmitter 6, and 7 represents the reproducing diaphragm of the transmitter. All of the foregoing parts may be constructed in the usual manner and of any suitable material.

8 represents one form of the usual vibration-bar which is mounted upon the collar or rim 9 of the transmitter. One end 10 of the vibration-bar is bent at right angles to the body and connects in the usual manner to the center of the diaphragm, 7, the bend of the said bar will be designated, the elbow, 11. The opposite end of the vibration-bar 8 has a socket 12 into which the reproducing needle 13 is inserted, and the latter is held in place by a set-screw 14.

Fig. 1 shows the needle 13 in engagement with the record, in the act of reproducing sounds recorded thereon. As the record is rotated, the needle 13 follows the record groove and is vibrated in the usual manner. The vibrations of the needle are communicated to the bar 8, and the bar in turn vibrates the diaphragm 7, and the latter converts the vibrations it receives from the needle 13 and the bar 8 into audible sounds,

which are carried through the tapering tone-arm 5 and the cabinet 2, where they are suitably amplified.

My tone purifier is in two parts, as A and B. The part A consists, in the preferred form, of a block of soft rubber, having the consistency of the common Faber rubber eraser, which is more or less pliable, spongy and adhesive. The said body may be of any suitable size or shape, but is preferably made in the form shown in the drawing. The part A is preferably mounted upon the vibration-bar 8, and for this purpose the underside of said part has a kerf 11′, which receives the elbow 11 of the said bar, and the said part is preferably pivoted to the bar 8 by means of a pin 15, which allows the said part to be tilted toward and away from the diaphragm, as best seen by comparing Figs. 2 and 3. The pivot 15 is employed chiefly to prevent the accidental detachment of the member A. The kerf 11′ of the part A is preferably narrower than the bar 8, so that a little pressure is required for forcing the said part into position, and the rubber being relatively soft yields readily to the pressure, and being naturally adhesive clings closely enough to the bar to remain in either of the adjusted positions. By thus disposing the rubber part A, each predominant note throughout a reproduction, is relieved of practically all harshness or rawness due to the excess of the high harmonics produced by the lateral vibrations of the bar 8. But the said part, notwithstanding its felty and gummy nature, still allows the said bar to vibrate under the influence of the needle 13 to the right extent for aiding the diaphragm 7 in the reproduction of the true musical tone or note originally recorded. The elbow 11 of the bar 8, as explained, produces longer wave lengths than the other portions of the said bar, and these longer lateral waves yield more and stronger harmonics—both upper and lower harmonics. By the disposition of the filter A substantially as shown in Fig. 3, it serves to reduce to a greater extent the long lateral vibrations of the bar 8. This diminishes the excess of the overtone of the fundamental note of the said bar, and reduces to a marked degree the harsh and grating sounds of the reproduction.

To still further reduce or modify the high harmonics and therefore to clear up the predominant notes of the record during the reproduction, the purifier part A may be tilted on the pivot 15 (see Fig. 2) so as to bring its forward or free end into engagement with the outer face of the diaphragm 7, preferably some little distance beyond the center of the diaphragm. When the rubber part A is thus brought into contact with the diaphragm 7, the excess of the high harmonics of the diaphragm is instantly eliminated, and the diaphragm will then articulate a fundamental note naturally and distinctly. By disposing the purifier A as shown in Fig. 2, it subdues the overtones of both the vibration-bar 8 and the diaphragm 7. This tends to increase the harmony and smoothness of the general tone of the instrument, and the subsequent rendition of the record is purer, clearer and more lifelike.

There is still another part of the reproducing mechanism to be considered: The revolving disk which supports the record, owing to its structure and its intimate association with the record disk, as well as the adjacent sound-conducting and amplifying parts of the talking machine, also vibrates in unison with the other parts of the instrument, and accordingly the said disk has a fundamental note of its own, which is usually accompanied by an excess of the high harmonics, the same as the vibration-bar and the diaphragm. In order to complete the purifying process, the said part B of the harmonic purifier is provided. The part B consists of one or more thin and pliable sheets or disks of rubber or similar material, which are mounted loosely upon the top surface of the revolving disk 3, and upon which rests the record, as 4. The disks B, are preferably slightly larger in diameter than the record, and being soft afford a light cushion for the record, and as the rubber disks are relatively smooth and adhesive, the underside of the record closely engages and clings to the adjacent rubber disk. The rubber sheets B are non-conductors of sounds, and therefore they insulate the records from the revolving disks, to the end that, the excess of the high harmonics or overtone which accompanies the fundamental note of the revolving disk, is reduced or modified to such extent that the harsh, buzzing noise, contributed by the revolving disk, and which in the past mingled with the sound waves of the predominant note of the record, is thereby eliminated. The rubber sheets B also serve to reduce the excess of the high harmonics of the record-disk, as well as the revolving part which supports the said record.

Fig. 6 illustrates a modification of the member which is applied to the vibrator-bar, which consists of a flexible strip of rubber A′, of about the same consistency of the member A, each end of the member A′ is slotted, as best seen at 16. To apply the part A′, it is first bent in the form of a horseshoe, and the opposite ends are then placed in engagement with the top of the bar 8, with the slots 16 directly over the said bar, after which the member is forced downwardly until the bar enters the said slots. The rubber strip A′ is preferably stiff and springy enough so that its ends expand until they respectively bear or press

against the portions 10 and 12′ of the bar. The said member will then remain in the position as shown. The members A′ may be made to different lengths as shown by the full and dotted lines in Fig. 6.

The two parts A and B of my harmonic purifier may be varied in size, shape and consistency, and they may be applied to the reproducing parts in any suitable manner. But in order to produce the best results, they must both be employed at the same time. If either of said parts is omitted during the reproduction of a record, the rendering of the record will be more or less faulty and unnatural, as described.

It is obvious that some changes or modifications may be made in the parts of the device, within the scope defined by the appended claims, without departing from the spirit of the invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patents, is—

1. The combination of a talking machine, having a sound reproducing mechanism including a vibration-bar and a diaphragm, and a tone purifier, said purifier comprising an adhesive elastic part mounted upon the said vibration bar and movable into and out of engagement with the diaphragm for reducing the lateral vibrations of the said bar, substantially as described.

2. The combination of a talking machine having a vibration-bar and a reproducing diaphragm, and a tone purifier comprising an elastic part mounted upon the said bar and capable of a movement into and out of engagement with the diaphragm for subduing the high harmonics of the said bar, substantially as described.

3. The combination with a talking machine having a vibration bar and a reproducing diaphragm, of a tone purifier adapted for attachment to the vibration bar, the said tone purifier having a kerf therein to receive the vibration bar and movable into and out of engagement with the diaphragm.

4. The combination with a sound reproducer, including a diaphragm and vibration bar, which actuates said diaphragm, a tone purifier mounted on said vibration bar, the said tone purifier being capable of a movement whereby the same is brought into engagement with the diaphragm for subduing the excess of the high harmonies of the diaphragm and the bar.

5. The combination with a sound producer including a diaphragm and a vibration bar, of an elastic purifier mounted on said bar, said purifier having a kerf therein to receive a portion of the bar and adapted to adhere and cling to said bar for reducing the lateral vibrations thereof, the said purifier being capable of a movement into and out of engagement with the diaphragm.

6. A tone purifier for talking machines comprising a resilient body pivotally mounted upon the vibration bar which vibrates the reproducing diaphragm, the said body being capable of a movement into and out of engagement with the diaphragm, for the purposes set forth.

7. A sound purifier for talking machines, comprising a non-conductor of sound mounted upon the vibration bar which actuates the diaphragm, the said non-conductor of sound overlying the side of the diaphragm and arranged within the borders thereof whereby it may be brought into and out of engagement with the diaphragm.

8. A tone purifier for talking machines, comprising a body carried by the vibration bar that vibrates the reproducing diaphragm, the said body being capable of a movement into and out of operative association with the diaphragm, substantially as described.

9. A tone purifier for talking machines comprising a non-conductor of sound operatively associated with the vibration bar that vibrates the reproducing diaphragm, the said non-conductor being capable of a movement into and out of operative relation with the diaphragm, substantially as described.

10. A tone purifier for talking machines comprising a purifying member pivotally supported by the vibration bar which vibrates the reproducing diaphragm, the said body being capable of a movement whereby it may be brought into or out of engagement with the diaphragm, substantially as described.

11. A tone purifier for talking machines, comprising a body movably supported by the vibration bar which vibrates the reproducing diaphragm, the said body being adapted to be moved into or out of engagement with the diaphragm, substantially as described.

In testimony whereof I affix my signature

CHARLES P. MARSHALL.