J. F. MALTHANER.

COMBINED TELEPHONE AND PHONOGRAPH.

APPLICATION FILED JULY 12, 1917.

1,344,918.

Patented June 29, 1920.

2 SHEETS—SHEET 1.

FIG. 1.

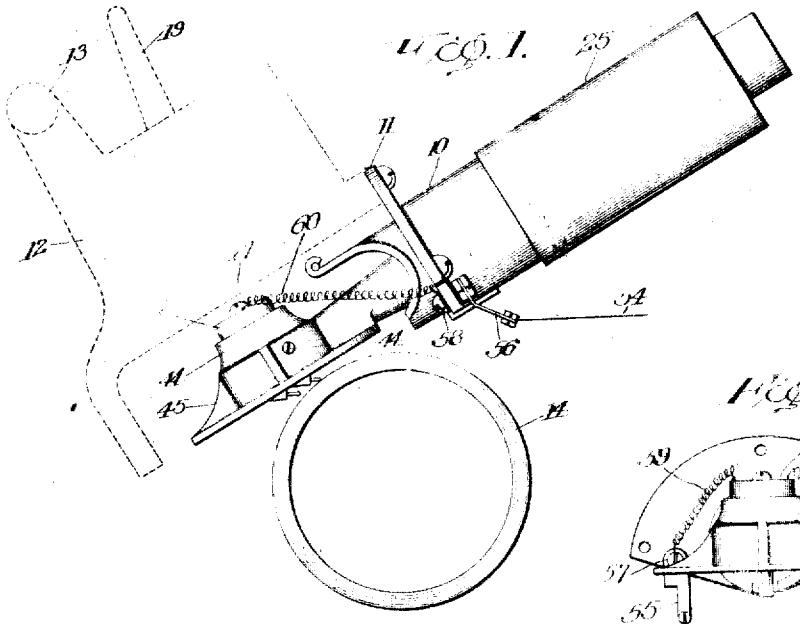


FIG. 2.

FIG. 3.

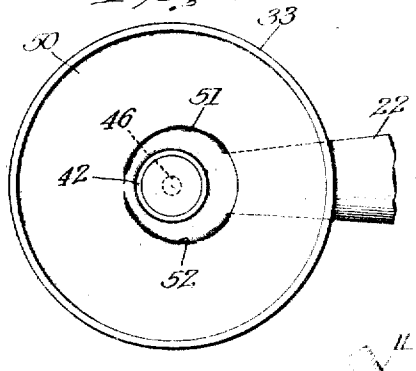


FIG. 4.

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2 SHEETS—SHEET 2.

FIG. 5.

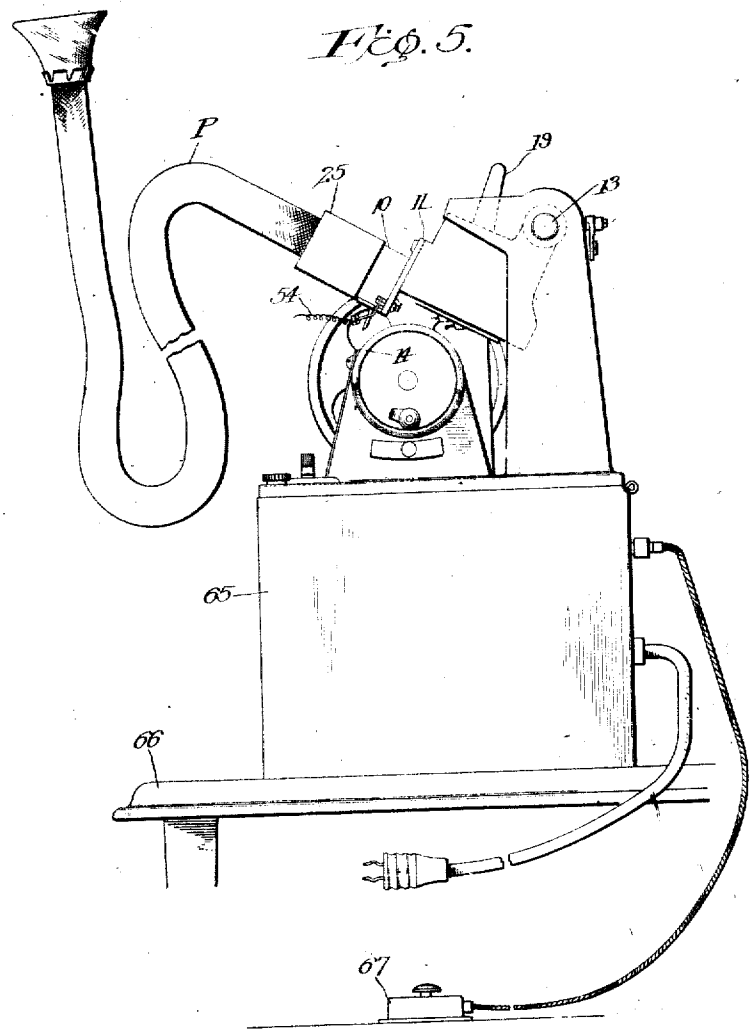
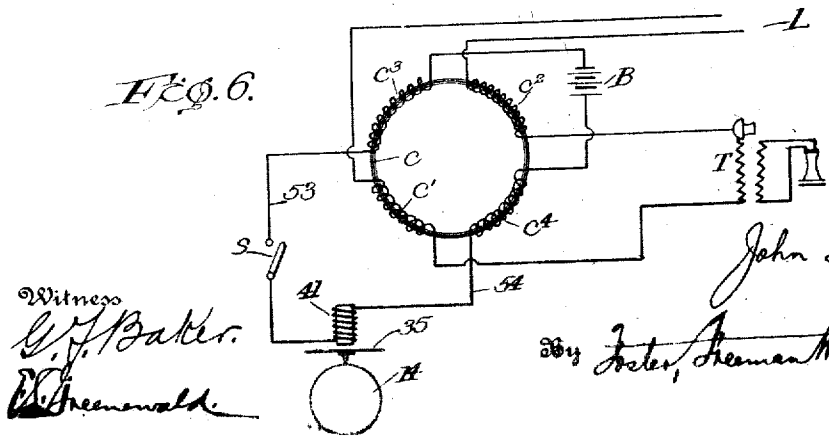


FIG. 6.



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UNITED STATES PATENT OFFICE.

JOHN F. MALTHANER, OF ATLANTA, GEORGIA.

COMBINED TELEPHONE AND PHONOGRAPH.

1,344,918. Specification of Letters Patent. Patented June 29, 1920.

Application filed July 12, 1917. Serial No. 180,192.

To all whom it may concern:

Be it known that I, JOHN F. MALTHANER, a citizen of the United States, residing at Atlanta, Fulton county, State of Georgia, have certain invented new and useful Improvements in Combined Telephones and Phonographs, of which the following is a specification.

This invention relates to combined telephone and phonographs, and more particularly to an attachment for use on dictaphones to record telephonic conversations.

It is one of the principal objects of this invention to improve the construction of such recording mechanisms.

In the present arrangement the diaphragm holder is modified and has a hollow boss or sleeve on its top side to adjustably support the magnet.

The sound passage is constructed in such a manner that, when sound enters or departs from the diaphragm chamber, it is conveyed around the electro-magnet by means of a circular channel. The greatest depth of the channel is at the point where it joins the sound duct. The depth of the channel gradually decreases, and it disappears after describing an arc right and left from the sound duct and around the magnet. This improved construction is for the purpose of eliminating abrupt angles and to collect sound waves and deliver them to a point as near the center of the diaphragm as is possible with the electro-magnet obstructing the sound duct and occupying the exact center of the diaphragm holder.

Another object is to provide improved means whereby the excess weight on the diaphragm holder may be closely adjusted.

The above and other objects and the novel features of the invention will appear from the following description taken in connection with the drawing, in which,

Figure 1 is a side elevation of the dictaphone speaker head constructed according to the present invention;

Fig. 2 is a front elevation;

Fig. 3 is a bottom plan view of part of the diaphragm holder;

Fig. 4 is an enlarged central longitudinal sectional view of the device;

Fig. 5 is a side elevation of a standard dictating phonograph, equipped with my invention, and

Fig. 6 is a diagram showing the device connected in a telephone circuit.

Referring to the drawing, 10 designates the speaker head of an ordinary dictaphone which is in the form of a hollow cylinder, being provided at one end with a flange 11, whereby it may be attached to the carriage and casing 12, shown in dotted outline in Fig. 1. The carriage 12 is suspended from the feed screw 13 which moves it and the tube 10 with its attached devices longitudinally of the recording or reproducing cylinder 14. The cylinder 14 rotates at a proper relative speed to the movement of the carriage 12 and its attachments.

A sleeve 16 is slidably mounted in the head 10 and its forward end 17 is split and has an eye 18 to receive a pin. The pin in the eye 18 is engageable by suitable devices on the interior of the casing 12 controllable by the lever 19. Within the sleeve 16 there is a second sleeve 20 which is secured to the sleeve 16 by a cross pin 21 to allow a slight amount of play of the sleeve 20.

The diaphragm holder is made of aluminum and consists of a tapering sound tube 22 which is enlarged at its inner end and is pivoted in the interior of the sleeve 20 by pins 23, the axes of which are at right angles to the axis of the pin 21. The pins 23 also engage the ends of the forked rod 24 which extends out of the rear end of the tube 10 and into a tube 25 which has threaded connection at one end with the tube 10.

The rod 24 has a threaded outer end which fits in the threaded cavity 26 of the weight 27. The weight 27 serves as a counter balance for the excess weight on the other end of the diaphragm holder and is provided with a slotted head so that it may be adjusted by means of a screw-driver inserted through the opening 30 of the tubular part 31 on the threaded end 29 of the tube 25. A speaking tube P is detachably connected to the tubular part 31, as shown in Fig. 5.

The outer end of the diaphragm holder consists of a substantially circular part 32, having a peripheral flange 33 within which the diaphragm 35 is fitted. The diaphragm 35 is held in place by the inner and outer gaskets 34 at the edge thereof, and a sound chamber 39 is thus formed which is closed on one side by the diaphragm 35 and opens

opposite the center portion of the diaphragm through the passages 51 and 52 into the sound duct 22'.

A circular plate or disk 36 is secured to the outer side of the diaphragm 35 at the center of the latter. The disk 36 carries the reproducing and recording styli or sapphires 37 and 38 which are adapted to be adjusted to engage the surface of the record 14, the reproducing sapphire 37 being provided with the usual ball end.

On the inner side of the diaphragm 35 there is a sound space 39 and opposite the disk 36 there is another disk 40 composed of ferric metal. The disk 40 is secured to the diaphragm 35 to vibrate therewith and it constitutes the armature for the electro-magnet 41.

The casing of the electro-magnet 41 consists of a cylindrical wall 42 and a top wall 43. The casing of the magnet is of soft iron and is adjustably fitted in a hollow boss or sleeve 44 on the top of the diaphragm holder, the boss 44, disks 36 and 40 and electro-magnet 41 being coaxial. The diaphragm holder is provided with reinforcing ribs 45.

The magnet casing projects above the upper edge of the boss 44 and at its center it has a soft iron core 46 held in place against the top wall by the screw 47. The magnet winding is disposed in the annular space between the soft iron core 46 and wall 42, the ends thereof being protected by the insulating beads 46'. The magnet is adjusted into close proximity with the face of the disk 40 so that when the magnet is energized it will vibrate the disk 40 and the diaphragm to which the latter is attached. The magnet is held in its adjusted position in the boss 44 by a set screw 44'.

The sound tube opens at 49 into the space 39 between the diaphragm 35 and the bottom face 50 of the holder. The hollow boss 44 communicates with the sound passages 22' and consequently when the magnet is inserted in place in the boss a part of the cylindrical wall 42 of the magnet shell will serve as part of the wall of the sound passage. From the bottom plan view, Fig. 3, and the central sectional view, Fig. 4, it will be seen that the tapering grooves or branches 51 and 52 open into the sound passage 22' on one side of the magnet, extend around the end of the latter and disappear at the opposite side of the magnet from the duct 22', thereby allowing the sound entering the sound duct 22' to strike the diaphragm close to the center of the latter.

The curved tapering grooves 51 and 52 in the face 50 of the holder and on opposite sides of the shell of the magnet form in effect continuations of the sound passage 22'. The grooves 51 and 52 are the same depth as the passage 22' where they join the latter and from thence they taper to the opposite side of the magnet where they disappear. The sound passage is thus constructed in such a manner that when sound waves enter or depart from the diaphragm chamber 39 they are conveyed around the electro-magnet and by gradually drawing in the roof of the passage the sound is gently forced down upon the diaphragm. This manner of construction eliminates abrupt angles and conducts the sound waves as near the center of the diaphragm as is possible with the electro-magnet occupying the exact center.

The wires 53 and 54 are connected to the terminal clips 55 and 56 secured to the flange 11 by screws 57 and 58. The screws 57 and 58 also have the magnet leads 59 and 60 connected thereto. The magnet leads extend through the top wall 43 of the shell of the magnet to the ends of the winding therein.

In Fig. 4, the diaphragm holder is shown in recording position and in this position the rigid upstanding part 61 of a right angle bracket secured to the tube 10 by the screw 62, is located behind the hump 63 on the sound tube 22. It will be understood that when the diaphragm holder is set in reproducing position the hump will be behind the upstanding part 61 and when the holder is in central position the hump 63 will rest on the upper end of the upstanding part 61.

In Fig. 5, the invention is shown applied to a dictating machine, in which the motor for rotating the feed screw 13 is located within a casing 65 supported by a table 66. The operation of the screw 13 by the driving mechanism in the casing 65 is controlled by a foot switch 67 in a well known manner.

In Fig. 6, I have diagrammatically shown the manner in which the magnet is connected in circuit with a telephone line having the branches L, L'. C represents an auxiliary transformer in the form of a standard repeating coil, the two opposite windings c' and c^2 of which are connected in series with the lines L, L', respectively, and with the subscriber's telephone set T.

The two windings c^3 and c^4 of the repeating coil are each located between the windings c' and c^2 on opposite sides of the repeating coil, and are connected in series with the battery B and the winding of the elettro-magnet 41. The switch S is located in the circuit of the electro-magnet so that the latter may be cut into and out of circuit with the telephone line.

When it is desired to record telephonic conversations, the switch S is closed and the dictaphone is started. The vibrations of the armature of the magnet causes a record to be produced on the cylinder 14, which record may later be reproduced. When the

switch S is closed, the magnet 41 is energized by the flow of direct current from the battery B and the diaphragm 35 is held under a fixed magnetic stress, but the chemical properties and construction of the soft iron shell or casing and the soft iron core 46 and winding thereon are so proportioned that the magnetic stress is reduced to substantially *nil* when the switch S is open and the direct current ceases to flow. The high frequency undulating currents flowing in the telephone circuit are converted by the transformer C and superposed upon the direct current flowing through the electromagnet winding, causing variations in the magnetic stress under which the diaphragm is held, thus producing vibrations of the diaphragm and the recording sapphire connected to it. By means of the attachment it is also possible to produce variations in the electrical conditions of the line to cause vibrations corresponding to a record.

While I have shown and described the device in detail, I wish it understood that the invention is not limited to the exact construction shown.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. In a device of the class described, the combination of a diaphragm holder, a diaphragm mounted thereon, an electromagnet carried by said holder opposite the diaphragm, and an armature for the magnet secured to said diaphragm, said diaphragm holder having a sound passage which extends therethrough, said passage having a part which extends around said magnet.

2. In a device of the class described, the combination of a diaphragm holder having a part provided with a hollow boss, an electro-magnet fitting the boss, a diaphragm carried by said holder, and means on the diaphragm constituting an armature for the magnet and whereby the diaphragm is vibrated.

3. In a device of the class described, the combination of a diaphragm holder having a part provided with a hollow boss, an electromagnet having a shell fitting the boss, a diaphragm carried by said holder, and means on the diaphragm constituting an armature for the magnet and whereby the diaphragm is vibrated, said diaphragm holder having a sound passage which extends therethrough, said passage having a part which is curved around the end of the magnet near the diaphragm.

4. In a device of the class described, the combination of a diaphragm holder comprising a disk-like part, and a diaphragm mounted on said disk-like part and spaced from the face thereof whereby a sound chamber is formed between said face and the diaphragm, a magnet for vibrating said diaphragm, said holder having a sound passage extending therethrough and opening into said chamber, said passage at the point where it opens into said chamber being curved around said magnet and tapering from a point on one side of said magnet to the opposite side thereof.

5. In a device of the class described, the combination of a diaphragm holder comprising a disk-like part, a diaphragm mounted on said disk-like part and spaced from the face thereof whereby a sound chamber is formed between said face and the diaphragm, an electromagnet on said disk-like part and coaxial therewith, and means on said diaphragm constituting an armature for the magnet, said holder having a sound passage extending therethrough and opening into said chamber, the opening of said passage into the chamber being through the medium of a curved and tapering channel extending partly around said magnet.

6. In a device of the class described, the combination of a diaphragm holder having a tubular part and a disk-like part, a diaphragm mounted on the disk-like part, recording and reproducing means on the outer side of the diaphragm, a hollow boss on the top wall of said disk-like part, a magnet fitting said boss and co-axial with the diaphragm, and means on the inner side of said diaphragm constituting an armature for said magnet, said diaphragm being spaced from and forming a chamber with the bottom face of said disk-like part of the holder, said holder having a sound passage therein extending through the tubular part and opening into said chamber, the entrance of the sound passage in the face of said disk-like part being curved around said magnet.

7. In a device of the class described, a diaphragm holder having a disk-like part, a hollow boss on the top wall of said disk-like part, a magnet shell fitting said boss, a diaphragm mounted on the under side of the disk-like part and spaced therefrom to form a chamber between the diaphragm and the bottom face of the disk-like part, said chamber having a sound passageway extending therefrom and opening into a circular channel, said magnet shell comprising one wall of said channel, said channel extending around a part of said magnet shell, the entrance opening of said channel into the chamber being coaxial with the poles of the magnet and diaphragm.

8. In a device of the class described, the combination of a diaphragm holder having a sound duct, a diaphragm mounted on said holder and forming one wall of a chamber in communication with said sound duct, a magnet mounted on the holder and capable of vibrating the diaphragm, means for pivotally supporting the holder, and means for adjusting the holder comprising an adjust-

able counter-balance having a part secured to the diaphragm holder.

9. In a device of the class described, the combination of a diaphragm holder having a sound duct, a diaphragm mounted on said holder and forming one wall of a chamber in communication with said sound duct, a magnet mounted on the holder adjacent the diaphragm and capable of vibrating it, means near one end of the holder for pivotally supporting it, and means for adjusting the diaphragm holder comprising a rearwardly extending part of the holder having an adjustable weight carried thereby.

10. In a device of the class described, the combination of a diaphragm holder comprising a tubular part and disk-like part, a diaphragm on the disk-like part, a magnet on the disk-like part and disposed adjacent the diaphragm, means for pivotally supporting the holder at the end of the tubular part, a rearwardly extending rod connected to the tubular part, and a weight adjustably mounted on said rod to counter-balance the excess weight of parts of the holder.

11. In a device of the class described, the combination of a hollow speaker head having an opening therein, a diaphragm holder having one end pivotally mounted in said head, and means on the interior of said head for counterbalancing a portion of the weight on said diaphragm holder, said counterbalancing means being adapted to be adjusted by means of an instrument inserted in said opening in said head.

12. In a device of the class described, the combination of a hollow speaker head having an opening in one end thereof, a diaphragm holder having one end thereof pivoted in the speaker head, and an adjustable counterbalancing weight connected to said holder and having a part disposed opposite said opening, said part of the counterbalancing weight opposite said opening being slotted whereby the end of a screw-driver may be inserted through said opening to adjust said weight.

13. In a device of the class described, the combination of a diaphragm holder comprising a tubular part and a disk-like part, a diaphragm mounted on the disk-like part and spaced from the face thereof whereby a sound chamber is formed between said face and the diaphragm, said sound chamber having an outlet through said tubular part, an electro-magnet on the disk-like part and disposed adjacent the diaphragm, means on the inner side of the said diaphragm constituting an armature for said magnet, recording and reproducing means on the other side of the diaphragm, means for pivotally supporting the holder at the end of the tubular part, a rearwardly extending rod connected to the tubular part, and a weight adjustably mounted on said rod to counterbalance the excess weight of parts on the holder.

14. In an apparatus of the class described, the combination of a diaphragm holder comprising a tubular sound duct and a disk-like part, a diaphragm mounted on said disk-like part and spaced from the face thereof, whereby a sound chamber is formed between said face and the diaphragm, the top part of said disk-like part being provided with a hollow boss, an iron disk on the inner side of said diaphragm, an electro-magnet having a shell fitting the boss, a portion of said magnet shell comprising one wall of a circular entrance channel connecting said sound duct with said sound chamber, the pole piece of said magnet arranged opposite said iron disk, means for pivotally supporting the holder at the end of said tubular part, a rearwardly extending rod connected to said tubular part, and a weight adjustably mounted on said rod to counterbalance the excess weight of the parts of the holder.

15. In an apparatus of the class described, the combination of a phonographic speaker head, a disk-like part forming the top wall and sides of a sound chamber, a tubular part constituting a sound duct to said sound chamber and pivotally supported within said speaker head, a phonograph cylinder, a phonographic diaphragm forming the bottom wall of said sound chamber and mounted to vibrate in response to sound waves entering said sound duct, a stylus movable in response to movements of said diaphragm, an armature connected to the inner side of said diaphragm, a hollow boss on the top wall of said disk-like part, an electro-magnet having an iron shell fitting the boss, the pole piece of said magnet extending into said sound chamber at a point opposite said armature, the distance between the pole piece of said magnet and said armature being adjustable, means for maintaining the magnet in said hollow boss in a fixed adjusted position, said magnet being capable of directing changes in flux density to said armature whereby said stylus will register said changes upon the phonographic cylinder, and whereby said diaphragm will simultaneously set up sound waves within said sound chamber to be conveyed through said duct to said speaker head.

In testimony whereof I affix my signature.

JOHN F. MALTHANER.