Oct. 18, 1932. H. E. CHIPMAN 1,883,561

MAGNETIC SOUND RECORDING AND REPRODUCING HEAD

Filed March 25, 1930

Fig. 1.

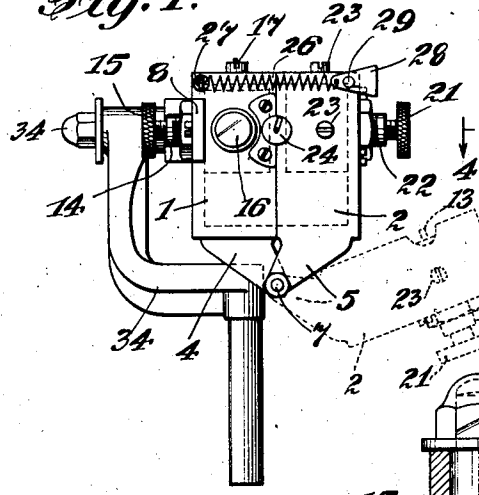


Fig. 2.

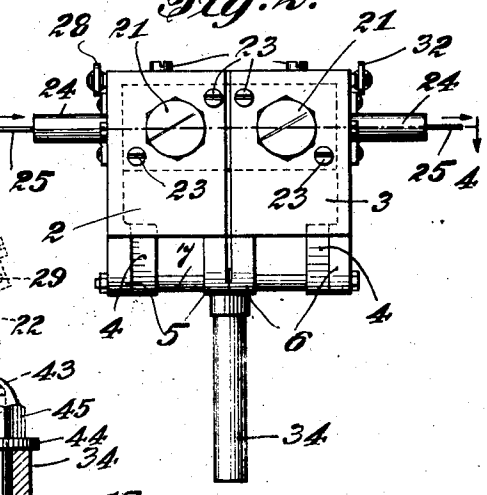


Fig. 4.

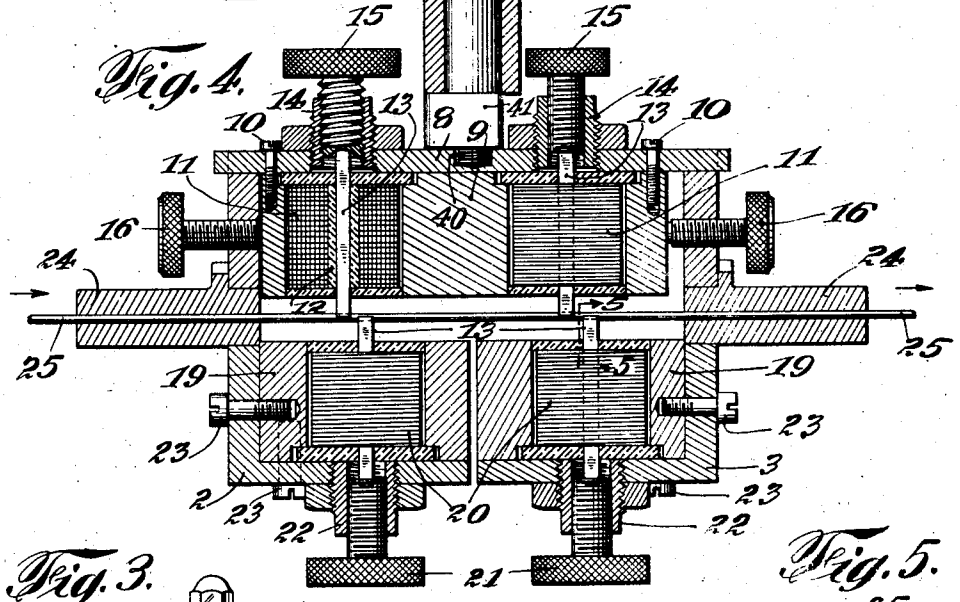


Fig. 3.

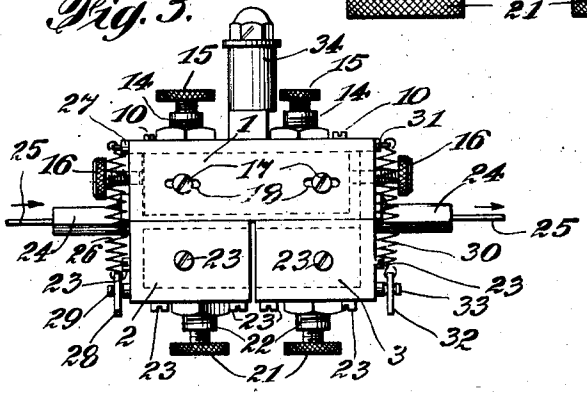
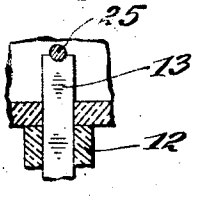


Fig. 5.



INVENTOR
Henry E. Chipman
BY
Henry Van Arsdale
ATTORNEY

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UNITED STATES PATENT OFFICE

HARRY E. CHIPMAN, OF SPRINGFIELD, MASSACHUSETTS, ASSIGNOR TO ELECTRIC MAGNETIC SOUND CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

MAGNETIC SOUND RECORDING AND REPRODUCING HEAD

Application filed March 25, 1930. Serial No. 438,705.

The invention relates to a magnetic sound recording and reproducing head, essentially for use in the electro-magnetic production and reproduction of sounds.

Electro-magnetic recording and reproduction of sounds is well known in the art, and usually contemplates the passing of magnetic material, such as magnetic metal filings or wire, in close proximity to an end of a pole piece of an electro-magnet. The magnetizing influence of the electro-magnet exerted on the passing ribbon, impresses the ribbon with magnetization, which varies in accordance with the variations in the current flowing through the electro-magnet. Conversely, the variations in the magnetization of the ribbon as it passes the pole piece of the electro-magnet, causes variations in the current flowing through the coils of the magnet. The forces involved are so delicate that even the slightest changes in the position or adjustment of the parts is apt to produce a pronounced effect in the character and manner in which these delicate forces react upon each other. For instance, even a very slight adjustment of the pole piece of the electro-magnet toward or from the magnetic ribbon, will produce a change in the quality and character of the sound tones recorded or reproduced. Similarly when two opposed electro-magnets are used, a slight variation in the distance between the ends of the two opposed pole pieces will so vary the magnetic field as to cause an important change in the character and quality of the recording and reproduction.

Heretofore, recording and reproducing heads have included pole pieces which were so loosely positioned, usually held loosely against the recording ribbon by spring pressure, that as the ribbon passed by the pole piece, the pole piece would vibrate and such vibration would be very deleterious to the quality and character of the sound recorded or reproduced. When two opposed magnets have been used, the harmful effect on the character and quality of the recording and reproduction of the sound tones has been increased by the fact that the pole pieces not only vibrate and change their position constantly with respect to the wire, but also vibrate and change their position with respect to each other.

The principal object of my invention is to provide a magnetic sound recording and reproducing head which will yield sound recording and reproduction of superior character and quality.

Another object of my invention is to produce a magnetic sound recording and reproducing head containing two sets of opposed magnets, and in which the opposed sets may be adjusted relatively to each other, readily and easily, to enhance the character and quality of the sounds recorded and reproduced.

A further object of this invention is to provide a magnetic sound recording and reproducing head, having more than one set of opposed magnets, and each opposed set of magnets being relatively movable to compensate for variations in the size or shape of the magnetic ribbon, without affecting the adjustment of any other pair of opposed magnets with respect to each other or the ribbon.

A further object of my invention is to provide a magnetic sound recording and reproducing head, wherein the pole pieces of the recording and reproducing magnets are held firmly against vibration and at the same time, are readily adjustable toward and from the magnetic ribbon.

A further object of my invention is to provide a magnetic sound recording and reproducing head of the character described, which is effective to record and reproduce sounds in their true quality, with considerable energy; and to provide a head of the character described, which is simple and durable in construction and may be adjusted readily and easily to operate to the best advantage, and to produce the best results.

Other objects of this invention will be in part obvious and in part pointed out hereinafter.

The invention accordingly, consists in the features of construction, combinations of elements, and arrangements of parts which will be set forth and exemplified in the accompanying drawing, and the scope of the appli-

cation of which will be indicated in the claims that follow.

In order that a clearer understanding of my invention may be had, attention is hereby directed to the accompanying drawing forming a part of this application, and illustrating certain possible embodiments of this invention.

Referring to the drawing, Fig. 1 is an end view of a magnetic sound recording and reproducing head, embodying my invention;

Fig. 2 is a front view thereof;

Fig. 3 is a top view thereof;

Fig. 4 is an enlarged sectional view thereof, and is taken on the line 4—4 of Fig. 2; and

Fig. 5 is an enlarged sectional view of a detail thereof, and is taken on the line 5—5 of Fig. 4.

Similar reference characters refer to similar parts throughout the several views of the drawing.

Referring to the drawing, the magnetic sound recording and reproducing head illustrated includes a casing comprising a major section 1, having top wall, rear wall and side walls, and two smaller sections 2 and 3, each of which has a top wall, a rear wall, and one side wall. Section 1 has depending lugs 4; section 2 has depending lugs 5; and section 3 has depending lugs 6; and these lugs have aligning perforations which are penetrated by a pin 7, so that sections 2 and 3 are independently pivotable on the pin 7 with respect to section 1.

The rear wall of section 1 has a longitudinal slot, and in this slot is seated a slide plate 8 which projects to both side walls of this section. Within this casing section is mounted a slide block 9, which is secured to slide plate 8 by means of screws 10, which penetrate the slide plate 8 and threadedly engage in the block. Slide block 9 is provided with a pair of hollows or chambers in each of which an electro-magnet 11 is disposed and held. Each electro-magnet has a core 12 provided with a central perforation in which is closely fitted a pole piece or pin 13, which projects from both ends of the magnet. Slide plate 8 is provided with a threaded aperture opposite the adjacent end of each pole piece. A threaded nipple 14 is secured in each of these apertures, and in each nipple is threadedly engaged an adjusting screw 15 having a concave inner end which bears against the end of the adjacent pole piece. Each pole piece 13 is held in firm frictional engagement by reason of its tight fit in the core 12, so that the pole pieces cannot vibrate. However, the pole pieces are adjustable longitudinally in the core in response to manipulation of the adjusting screw 15.

In each side wall of casing section 1 is threaded an adjusting screw 16. These engage slide block 9 on opposite sides and constitute means whereby the slide block may be adjusted longitudinally in this casing section.

Slide block 9 may be additionally held in casing section 1 for adjustment therein, by means of screws 17 which extend through slots 18 formed in the top wall of this casing section, and are in threaded engagement with the block.

Within each casing section 2 and 3 is secured a block 19 having a chamber or hollow in which is seated and held an electro-magnet, such as 20. These magnets are preferably of the same construction as magnets 11, having similar cores and similar pole pieces fitting tightly in the cores against vibration. The pole pieces of magnets 20 may be slidably adjusted in their cores by means of adjusting screws 21, which are threadedly engaged in nipples 22 threaded into suitable apertures provided therefor in the rear walls of casing sections 2 and 3. The blocks 19 may be secured in these sections by means of suitable screws 23, which penetrate the walls of these casing sections and engage the blocks.

Preferably, on each end wall of the casing section 1, is mounted a sleeve 24 through which the magnetic sound wire 25 extends, and whereby this sound wire is guided and held in predetermined position as it passes through the recording head.

Section 2 is resiliently held against section 1, by means of a spring 26 which, at one end, is secured to a pin 27 affixed to section 1 and at its other end carries a finger piece 28, which has a perforation adapted to embrace a pin 29 carried on section 2. Section 3 is resiliently held against section 1 by a similar spring 30, secured at one end to a pin 31 on section 1 and having a finger piece 32 at its opposite end, provided with a perforation adapted to embrace pin 33 fixed to section 3.

A bracket 34 is provided for supporting the head. As shown, the slide plate 8 may be secured to the bracket by means of an arbor having a threaded end 40 engaging plate 8 on the exact center line of the wire, a collar or shoulder 41 seating between plate 8 and bracket 34, a stem 42 extending through a perforation in bracket 34 and presenting a threaded end 43 carrying a washer 44 and a nut 45, whereby the attachment of the head on the bracket may be made which allows the head to assume the exact slant of the wire, which varies as the wire is dispensed from one spool and accumulates on the other. Further, there is no interference with effecting adjustment of block 9 in casing section 1, or with relative movement of casing sections 2 and 3, independently of each other with respect to casing section 1.

In operation, the sound wire 25 is passed at a constant speed through the recording and reproducing head, preferably, in the direction indicated by the arrows applied to certain of the figures of the drawing. Each of the pole pieces 13 may be adjusted into the

closest proximity to the sound wire conducive to the best character and quality of the recording and reproduction by the simple expedient of adjusting the appropriate screw 15 or 21. The pole pieces of the opposed magnets may also be adjusted relatively to each other into position conducive to the best character and quality of recording and reproduction by merely adjusting the screws 16. At the same time, each of the pole pieces 13 are held so tightly in their respective cores 12, that these pole pieces cannot vibrate, and there is no interference from this source with the quality of the recording and reproduction.

Each casing section 2 and 3 and its contained electro-magnet is resiliently held against the casing section 1 by its individual spring. The result of this is that when the pole pieces of either set are moved apart or together, due to irregularities in the size or form of the wire passing between them, no corresponding relative movement will be imparted to the pole pieces of the other set of opposed magnets. If such variation in the relative position of one set of pole pieces were transmitted simultaneously to the other set of pole pieces, such movement between the pole pieces of the latter set, which would then not follow the variations in the size and form of the wire as it passed between them, would detract from the quality and character of the recording and reproduction.

The distance between the pole pieces of the magnets carried in casing section 1 is exactly the same as the distance between the pole pieces of the magnets carried in the sections 2 and 3, so that the lateral spacing of both sets of opposed pole pieces will be always exactly alike.

If, at any time, it is desired to obtain access to either or both of the opposed sets of magnets, or their pole pieces, such access to the interior of the casing may be had readily and easily by merely lifting either or both finger pieces 28 and 32 from their respective pins 29 and 33, and swinging one or both casing sections 2 and 3 away from section 1, as shown in dotted lines in Fig. 1.

It will also be readily apparent and obvious from the above description, and from the accompanying drawing, that the several parts of the talking head may be readily removed and replaced.

As many changes could be made in the above construction and as many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is to be understood that all matter contained in the above description and shown in the accompanying drawing be interpreted as illustrative and not in a limiting sense.

What I claim is:—

1. In a device of the character described, in combination, a casing having a slotted wall, a slide plate, slidably disposed in the slot and against the casing, a slide block within the casing opposite said slot, means securing the slide block and slide plate together, an electro-magnet mounted in the slide block, and means for anchoring the slide plate and block in slidably adjusted position on the casing.

2. In a device of the character described, in combination, a casing having a slotted wall, a slide plate, slidably disposed in the slot and against the casing, a slide block within the casing opposite said slot, means securing the slide block and slide plate together, an electro-magnet mounted in the slide block, means for anchoring the slide plate and block in slidably adjusted position on the casing, and a supporting member for the casing secured to said slide plate.

3. In a device of the character described, in combination, a casing having a slotted wall, a slide plate, slidably disposed in the slot and against the casing, a slide block within the casing opposite said slot, means securing the slide block and slide plate together, an electro-magnet mounted in the slide block, means for anchoring the slide plate and block in slidably adjusted position on the casing, said electro-magnet having an adjustable pole piece, and means carried on the slide plate and engaging the pole piece whereby the pole piece may be adjusted relatively to the magnet.

4. In a device of the character described, in combination, a casing, two opposed electro-magnets, having pole pieces, mounted in the casing, and means for adjusting one of said magnets in the casing radially with respect to the other magnet, to vary the transverse distance between the ends of the pole pieces of said magnets.

5. In a device of the character described, in combination, an electro-magnet including a core having a central perforation, a pole piece slidably disposed in said perforation and fitting closely therein against vibration, said pole piece protruding from both ends of the core, and means engaging one end of the pole piece whereby the pole piece may be adjusted longitudinally in the core.

6. In a device of the character described, in combination, a casing, an electro-magnet, including a core having a central perforation and a pole piece slidably disposed in said perforation, mounted in said casing, a perforation in the casing aligning with an end of the pole piece, and an adjusting screw mounted on the casing and engaging the pole piece, whereby the pole piece may be adjusted longitudinally in the core.

7. In a device of the character described, in combination, a casing, an electro-magnet, including a core having a central perforation and a pole piece slidably disposed in said per-

foration, mounted in said casing, a perforation in the casing aligning with an end of the pole piece, and an adjusting screw mounted on the casing and engaging the pole piece, whereby the pole piece may be adjusted longitudinally in the core, said electro-magnet being radially adjustable in said casing.

8. In a device of the character described, in combination, a casing having a slotted wall, a slide plate, slidably disposed in the slot and against the casing, a slide block within the casing opposite said slot, means securing the slide block and slide plate together, an electro-magnet mounted in the slide block, means for anchoring the slide plate and block in slidably adjusted position on the casing, said electro-magnet including a longitudinally adjustable pole piece, and means mounted on said slide plate and engaging the pole piece, whereby the pole piece may be adjusted longitudinally in the core.

9. In a device of the character described, in combination, a casing having a slotted wall, a slide plate, slidably disposed in the slot and against the casing, a slide block within the casing opposite said slot, means securing the slide block and slide plate together, an electro-magnet mounted in the slide block, means for anchoring the slide plate and block in slidably adjusted position on the casing, said electro-magnet including a core having a central perforation and a pole piece slidably disposed in said perforation, and means mounted on said slide plate and engaging the pole piece, whereby the pole piece may be adjusted longitudinally in said core.

10. In a device of the character described, in combination, a casing having a slotted wall, a slide plate, slidably disposed in the slot and against the casing, a slide block within the casing opposite said slot, means securing the slide block and slide plate together, an electro-magnet mounted in the slide block, means for anchoring the slide plate and block in slidably adjusted position on the casing, said electro-magnet including a core having a central perforation and a pole piece slidably disposed in said perforation, and means mounted on said slide plate and engaging the pole piece, whereby the pole piece may be adjusted longitudinally in said core, said pole piece fitting closely in said perforation against vibration.

11. In a device of the character described, in combination, a casing, a first pair of electro-magnets mounted in said casing, side by side, and in fixed position relatively to each other, a second pair of electro-magnets mounted side by side in said casing, one magnet opposite each of the magnets of the first pair, and each movable relatively to its opposed magnet independently of the other.

12. In a device of the character described, in combination, a casing, a first pair of electro-magnets mounted in said casing, side by side, and in fixed position relatively to each other, a second pair of electro-magnets mounted side by side in said casing, one magnet opposite each of the magnets of the first pair, and each movable relatively to its opposed magnet independently of the other, and means resiliently pressing each magnet of the second pair independently toward the opposite magnet of the first pair.

13. In a device of the character described, in combination, a casing including a section adapted to hold two electro-magnets side by side, and two casing sections, each adapted to hold one electro-magnet, disposed side by side opposite adjacent parts of said first section and independently movable with respect thereto, said casing sections being pivotally mounted to move independently of each other on a common longitudinal axis.

14. In a device of the character described, in combination, a casing including a section adapted to hold two electro-magnets side by side, and two casing sections, each adapted to hold one electro-magnet, disposed side by side opposite adjacent parts of said first section and independently movable with respect thereto, said casing sections having lugs pivotally connected on a common longitudinal axis, permitting independent pivotal movement of each of said sections about said axis.

This specification signed this 21 day of February, 1930.

HARRY E. CHIPMAN.