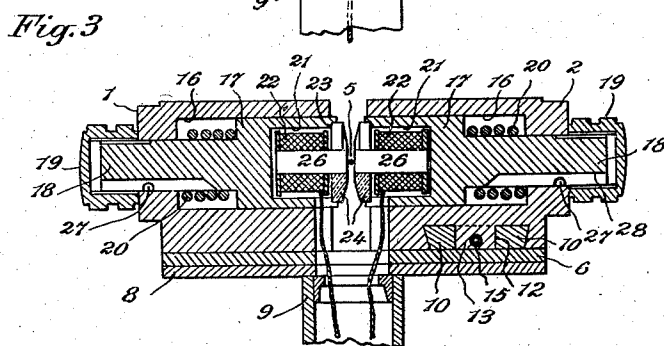
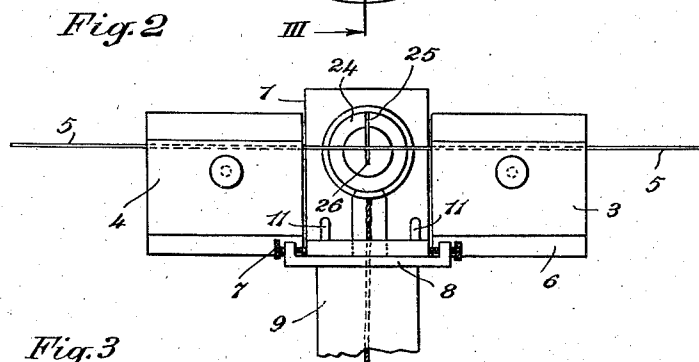
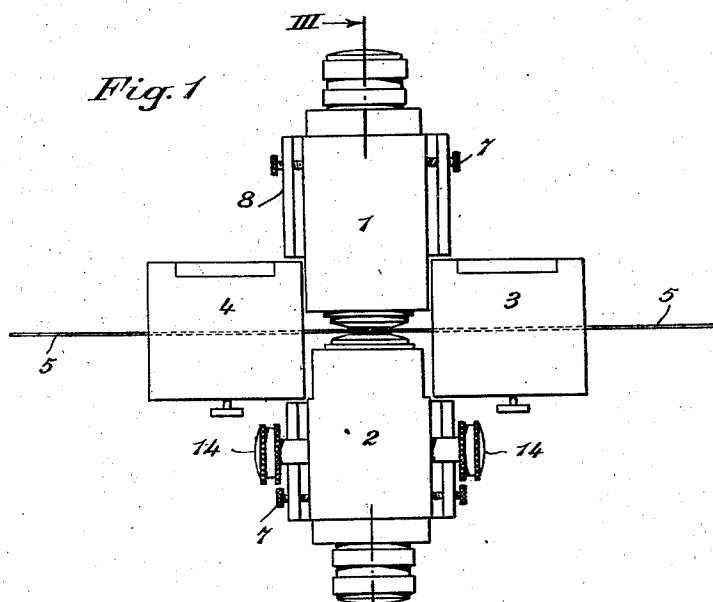


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MAGNETIC HEAD FOR ELECTROMAGNETIC SOUND RECORDING
AND REPRODUCING APPARATUS
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MAGNETIC HEAD FOR ELECTROMAGNETIC
SOUND RECORDING AND REPRODUCING
APPARATUS

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2 Claims. (Cl. 179—100.2)

This invention relates to an electromagnetic sound recording and reproducing device, in which a magnetizable elongated element, such as a wire or ribbon of steel or other suitable magnetizable material is unwound from one reel and wound upon another reel. The member on its way from one to the other reel passes a so-called magnet head, which is capable either to magnetize the passing member in the rhythm of sound waves received, and thus to record sound upon the member, or to be influenced by a member on which sound has previously been recorded magnetically in a similar or other way.

Magnet heads used in those devices comprise two magnetizable soft iron cores and a coil around each core, each constituting an electromagnet. These electromagnets are slideably held in a support on opposite sides of the path of the magnetizable member, and the axes are aligned. The juxtaposed ends of the cores contact the magnetizable member and in order to maintain a permanent contact, the individual electromagnets are pressed by a spring against the member.

In practice it has been experienced that the ends of the iron cores wore out rapidly and the cores had to be replaced frequently. The ends of the cores pressed against the wire or ribbon stuck to the latter and caused a scratching noise. It was also difficult to keep the cores in alignment as required for accurate recording and reproducing.

Particular difficulties were encountered in having an as small and constant as possible surface area of the ends of the cores contacting the wire or ribbon. It was suggested to shape those ends like the edge of a razor blade which resulted, however, in cutting into the wire or ribbon and thereby frustrating a proper recording particularly if higher frequencies were concerned.

It is therefore an object of the invention to improve the slideable arrangement of the electromagnets of a sound recording and reproducing device in their support.

It is another object of the invention to remove disturbing noises in devices of the type referred to due to scratching of the magnetizable member by the ends of the electromagnet cores.

It is still another object of the invention to improve the fidelity of recording and reproducing by devices of the type referred to.

It is a further object of the invention to render the surface area of the ends of the electromagnets contacting the magnetizable member as small and constant as possible during operation.

It is still another object of the invention to rigidly mount the coils of the electromagnets in supports which are slideable arranged in the magnet head.

It is still a further object of the invention to reduce the wear of the ends of the cores contacting the magnetizable member.

It is still another object of the invention to facilitate the adjusting and replacing of electromagnets.

These and other objects of the invention will be more clearly understood when the specification proceeds with reference to the drawing in which Fig. 1 shows in elevation a magnet head according to the invention, Fig. 2 a view from below with the lower electromagnet removed, and Fig. 3 a cross section along line III—III in Fig. 1, with parts in elevation.

The magnet head is mounted in the recording and reproducing apparatus of an otherwise known structure by means of a hollow tube or member 9 to which a vertical base 8 is secured. The upper and lower parts of the base are U-shaped as to be seen particularly in Fig. 2, and in the lateral protruding flanges of those parts screws 7 are arranged for adjustably holding a plate 6 of cross-like configuration which is provided with a center hole in alignment with the hole of tube 9. The upper and lower arms of plate 6 are held by the screws 7 while its horizontal parts serve to hold guiding means 3, 4 for the magnetizable member or steel wire 5 in a way well known in the art. Thus plate 6 with guiding members 3, 4 can be properly adjusted relative to member 5.

On the upper part of plate 6 a support or block 1 is mounted and provided with a longitudinal and preferably cylindrical hole 16, which is open toward member 5.

On the lower part of plate 6 horizontal dove-tailed rails 10 are mounted engaging equally shaped grooves in support or block 2 which is provided with a hole 16 opening toward member 5 the same way as block 1. A screw threaded bolt 15 passes the portion 13 of block 2 between the dove-tailed grooves and is provided on the outside with knobs 14. The outside ends of bolt 13 are cylindrical and rotatably arranged in sleeves forming a bearing for those ends of the bolt and mounted on the flanges of the lower part of plate 6 in a manner well known in the art. Thus, by turning knobs 14, block 2 can be adjusted parallel to member 5, and hole 16 of block 2 can be brought in accurate alignment

with hole 16 of block 1. The rails 10 may be fixed to plate 6 by means of bolts 11.

The structures of blocks 1 and 2 are otherwise identical as far as the mounting of the electromagnets proper is concerned.

The electromagnets each comprise a telescope-like structure or member 17, 18. Portion 17 is of larger diameter than portion 18 and snugly fits into hole 16; portion 18 of considerably smaller diameter than hole 16 is spaced from it, and in this space elastic means, such as a coil spring 20, are arranged so as to resiliently press member 17, 18 towards the magnetizable member 5. The outer ends of portions 18 are screw threaded and project through a hole in the top and bottom, respectively, of blocks 1 and 2; caps 19 screw threaded on their inside are screwed upon those projecting ends of portions 18, whereby a kind of adjustment of the position of members or structures 17, 18 relative to the magnetizable member 5 can be effected.

Longitudinal grooves 28 in portions 18 are engaged by projections 27 of the top and bottom, respectively, of blocks 1 and 2 whereby any rotation of the members 17, 18 relative to those blocks is prevented.

Portions 17 are each provided with a hole 21 open toward the magnetizable element 5. In those holes 21 and spaced therefrom, a rigid electromagnet structure is arranged, comprising an exciting coil 22 and a core 26 which preferably is flat and as thin as possible. Holes 21 are closed by rigid covers 24 preferably of non-magnetic material, such as hard stone, which are somewhat convex on their outside.

In the embodiment of the invention shown in the drawing, cover 24 is provided with a slot 25 in which the flat core 26 is rigidly seated and passes to the outer surface of cover 24 from which it projects preferably by a fraction of one millimeter so as to contact the magnetizable element 5.

The space between coil 22 and hole 21 is advantageously filled with plastic or soft substance so as to prevent any relative vibrations between the coil and member 17, if vibrations were still possible. The latter are practically excluded by the rigid mounting of the electromagnetic structure proper in the rigid cover 24 and by the rigid attachment of the latter to member 17, 18. Portion 17 snugly contacts hole 16 over a large surface, and thus any vibrations of the unit formed by the electromagnet proper and its supporting member are eliminated. The units once properly set by adjusting screws 7, 15 and caps 19 will maintain their position relative to the magnetizable member during operation and thereby continuous accurate recording and reproducing without distortions and scratching and other disturbing noise effects can be made.

The material of cover 24 can be chosen so as to be non-resonant within sound range and it may be made heavy enough to prevent self-vibrations within audible range.

During operation, the magnetizable member grinds a groove into the projecting end of core 26 until the member contacts the outer surface of cover 24, the material of which is preferably as hard as a steel commonly used for the magnetizable element, or even harder; then the groove ground into the projecting end of core 26 is flush with the outer surface of cover 24 and further grinding of core 26 ceases. The device can be operated over a long period of time without facing trouble as to insufficient contact be-

tween core 26 and member 5 and wear of the former.

It will be appreciated from the above that coil 22 is entirely relieved from any pressure of spring 20 and incapable of vibrating during operation. The surface area of the magnet core is kept constant during operation by the action of the hard and rigid cover 24. The electromagnet proper is rigidly held by that cover in the supporting member to form a unit therewith which slideably fits into the support or block in such a manner that vibrations due to the friction between the magnet cores and covers on one hand and the magnetizable member on the other hand are completely eliminated. The pressure of springs 20 can be made such that a constant and resilient contact between the electromagnet cores and the magnetizable member is secured throughout operation and repeated adjustments as necessary with other known devices of this type and replacements of the electromagnets are avoided.

Thus a magnet head in which the core of the magnet is resiliently pressed against the recording wire and any conceivable causes of vibrations which might interfere with proper magnetization of the wire during recording or influencing the magnetic flux and thereby proper excitement of the electromagnet structure during reproducing are efficiently eliminated.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. In an electromagnetic sound recording and reproducing device a magnet head arranged to contact a movable magnetizable recording element, such as a steel wire, said head comprising a support provided with a longitudinal hole directed vertically to and open toward the recording element and a unit slidably arranged in said hole, said unit comprising a member fitting a part of said hole adjacent to its opening and spaced from the remaining part of said hole, springy means arranged in said space between said support and said member for pressing the latter against the recording element, said member provided with a hole open toward the recording element, a rigid electro-magnet structure comprising a coil and a core spacedly arranged within said latter hole, and a rigid cover of non-magnetic material, as exemplified by hard stone, for said latter hole fixedly attached to said member and projecting from said support for contacting with its outer surface the recording element, said core rigidly seated in and passing through said cover to its outer surface so as to contact the recording element.

2. In an electromagnetic sound recording and reproducing device a magnet head arranged to contact a movable magnetizable recording element, such as a steel wire, said head comprising a support arranged vertically to the recording element and comprising a support provided with a longitudinal cylindrical hole directed vertically to and open toward the recording element and a unit slidably arranged in said hole, said unit comprising two portions of different diameter, the portion of larger diameter fitting a part of said hole adjacent to its opening, the portion of smaller diameter lying inside said hole and being spaced from it, a coil spring arranged around said latter portion between said member and support for pressing said member against the recording element, means for preventing relative rotation of said member and support without in-

terfering with the sliding motion of said member in said support, said member provided with a cylindrical hole open toward the recording element, a rigid electromagnetic structure comprising a coil and a flat thin core spacedly arranged within said latter hole, and a rigid and slotted cover of non-magnetic material, as exemplified by hard stone, for said latter hole fixedly attached to said member and projecting from said

support, said cover provided with a substantially convex outer surface for contacting the recording element, and said core rigidly held in and passing through the slot of said cover so as to project by a fraction of a millimeter from the outer surface of said cover and to contact the recording element.

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