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MAGNETIC RECORDING HEAD

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Fig. 1

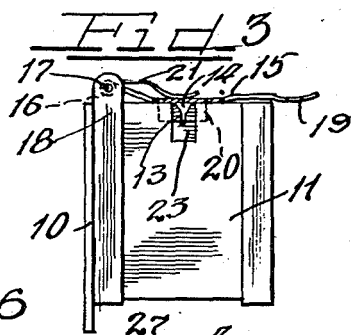
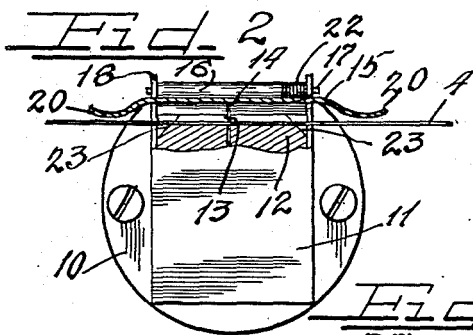
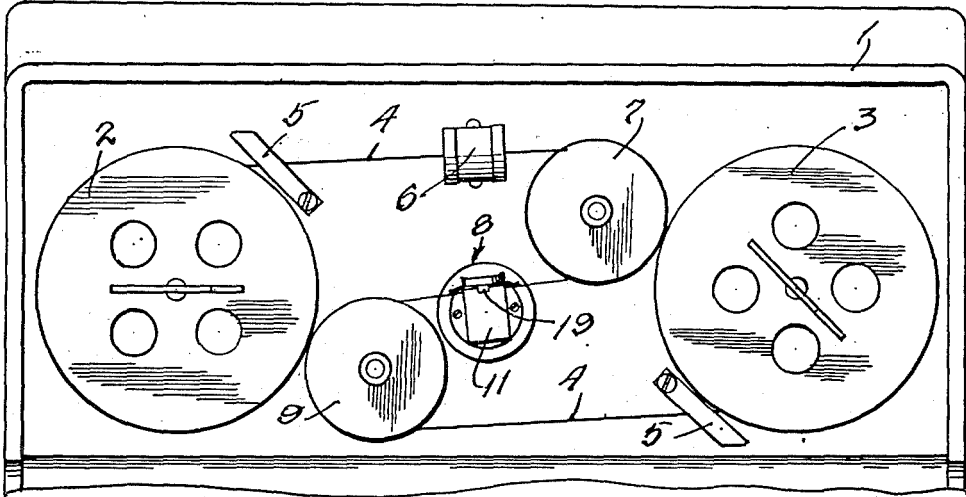
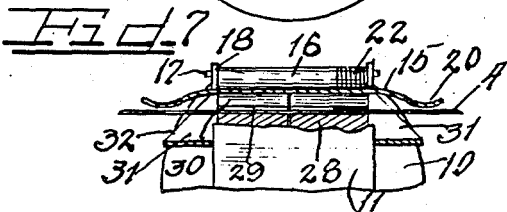


Fig. 6



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MAGNETIC RECORDING HEAD

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This invention relates to improvements in a magnetic recording head, highly desirable for use in connection with the magnetizing of a wire or other elongated element in an instrument for recording and ultimately reproducing sound, although the invention may have other uses and purposes as will be apparent to one skilled in the art.

In magnetic recording devices utilizing a magnetizable wire as the recording medium, the wire frequently has a diameter of approximately four or five thousandths of an inch. Several miles of wire are frequently used for a single recording, and in many cases reels are used containing several miles of wire and successive recordings made upon the wire. Quite frequently, due to breakage, insufficient length, or for some other reason, it is desirable to tie or splice the wire end portions together, and it is just as desirable that the knot or splice in the wire does not interfere in any manner either with the proper recording of sound by magnetization of the wire or the ultimate reproduction of that sound. It is also desirable, and especially during recording, to have as continuous a path for magnetic flux as possible around the wire or other elongated member being magnetized.

With the foregoing in mind, it is an important object of this invention to provide a magnetic recording head shaped to permit the passage of a wire or similar member through a portion thereof, and arranged to automatically accommodate a knot or splice in that wire without interrupting the movement of the wire and without interrupting the continuity of the recording by magnetization of the wire.

Another object of the invention is the provision of a magnetic recording head provided with means to facilitate the threading of a wire or other elongated element in a portion of the recording head, the construction being such that the threading operation may take place regardless of whether or not the wire has a knot or splice therein.

Still another object of the invention resides in the provision of a magnetic recording head having a passage of a size to just accommodate a wire or other elongated element to be magnetized, and another passage to accommodate a knot or splice in that wire, the construction being such that during the travel of the wire, the knot or splice will automatically find its own passage of sufficient size, and the wire portion without the knot or splice will automatically as-

sume its original path after the passage of the knot or splice.

It is also an object of this invention to provide a magnetic recording head with yieldable means associated therewith to maintain a wire or other elongated member in a specific passage through the head, such means yielding in response to the passage of a knot or splice to permit a shifting of the wire until the knot or splice has passed by, and then restore the wire to its original path of travel.

Still another object of the invention is the provision of a magnetic recording head arranged to provide a substantially continuous path for magnetic flux entirely around a wire or other elongated member passing through a portion of the head, the structure being such as to accommodate the passage of a knot or splice in the wire without interrupting the continuity of the flux path, or interrupting the travel of the wire.

While some of the more salient features, characteristics and advantages of the present invention have been above pointed out, others will become apparent from the following disclosures, taken in conjunction with the accompanying drawing, in which:

Figure 1 is a fragmentary diagrammatical elevational view of a magnetic recording instrument including a magnetic recording head embodying principles of the instant invention;

Figure 2 is an enlarged fragmentary part sectional, part elevational view of front portion of the recording head of Figure 1;

Figure 3 is a side elevational view of the recording head;

Figure 4 is a part elevational, part sectional view of a recording head embodying principles of this invention, but embodying a somewhat different construction;

Figure 5 is a side elevational view of the recording head of Figure 4;

Figure 6 is an enlarged fragmentary sectional view, similar to the upper portion of Figure 4, illustrating the passage of a knot or splice in the wire through the recording head of Figures 4 and 5; and

Figure 7 is a fragmentary part-sectional, part elevational view of a recording head embodying principles of this invention but of a still different form of construction.

As shown on the drawing:

This invention is shown by way of example associated with a magnetic recording device which records sound waves on a wire by magnetizing the traveling wire as it is unwound from

one reel and wound upon another reel. After a recording of a sound production has been made upon the wire, it may be later reproduced by again rewinding the wire in connection with a speaker system.

In the apparatus shown in Figure 1 there is included a casing or housing 1 having a rotatable and removably mounted reel 2 located near one end of the housing, with a similar reel 3 located near the opposite side or end of the housing. In operation, a wire, tape, or other elongated element 4, which functions as the recording medium, may be wound upon one of the reels or spools as it is unwound from the other. Each reel or spool is provided with a level winding apparatus 5 to insure a proper and even winding of the wire and an adequate filling of the spool or reel. With this structure, the wire 4 may travel in either direction and be reversed at will.

Usually, a magnetic recording apparatus or device of the character shown in Figure 1 is also equipped with sound reproduction, and amplifying means as well as recording means. The wire will travel from spool 2 to spool 3 for recording purposes. When it is desired to reproduce the recording sound, the wire is rewound on spool 2 to the desired extent, and again passed from spool 2 to spool 3 with the demagnetizing and magnetizing heads not functioning, but with the amplifying and reproducing means functioning. It is also possible that some portion of a recording, through error or otherwise, may not be desired. In that event, the magnetized portion of the wire is again rewound on spool 2, then the procedure is reversed and the wire is wound on spool 3, being remagnetized with a new or accurate recording during the second rewinding process.

Assuming that a recording is being made upon the wire, it will be seen that as the wire leaves spool 2 and travels toward spool 3 it first passes through a demagnetizing or erasing head 6 which effectively removes any previous magnetization of the wire. The wire next passes over a suitable change of direction pulley 7, and thence through a magnetizing head, generally indicated by numeral 8. This magnetizing head 8, which may be and preferably is an electromagnetic head, effectively magnetizes the wire in keeping with the sound being recorded. After leaving the magnetizing head 8, the wire again passes over a directional pulley 9 to the spool 3 through the associated level winding apparatus 5.

That embodiment of my novel magnetizing head illustrated in Figures 2 and 3 includes a supporting plate 10 upon which is secured a box-like frame 11 which houses an electromagnet. Included in this electromagnet is a core or block 12 of paramagnetic material. The core or block may be laminated or solid, as deemed most feasible, and is in the form of a pair of confronting pole pieces where the wire 4 passes through the block.

The block 12 is magnetized by means not shown in the drawing in accordance with the sound waves to be recorded. Such magnetization is imparted by the block 12 to the wire 4 as the wire in its course of travel passes through an opening in the upper portion of the block. In the magnetization of the wire 4, it is desirable to have the wire traveling through as small an opening in the block 12 as possible. In other words, it is desirable to have the wire as nearly as possible imbedded in the block. At the same time, as above mentioned, it is necessary to accommodate a knot

or splice in the wire without any interruption of the travel of the wire, and without any interruption of the recording or later reproduction of sound.

To this end, the opening in the instance of Figures 2 and 3 is in the form of a slot through the upper portion of the block 12, and the slot is shaped to provide a lower narrow portion 13, and an upper V-shaped or otherwise expanded portion 14. The narrow portion 13 of the slot is of just sufficient width to allow the wire 4 to freely pass through it, and is of greater depth than the diameter of the wire so that the wire will be relatively deep within the block 12 when following its course of travel along the bottom of the groove. With reference to Figures 1 and 2 it will be seen that the pull upon the wire as defined by the pulleys 7 and 9 is such as to keep the wire at the bottom of the portion 13 of the slot, since this pull is in a direction paralleling the bottom of the slot.

In this particular instance, the direction of pull is augmented by a retainer 15 which has a cylindrical portion 16 disposed around the shaft 17 carried in a pair of lugs 18—18 projecting upwardly from the box 11. In the outer or central portion thereof, the retainer is provided with a thumb lever 19 by which the retainer may be raised for the initial threading of the wire in the block 12. On each side thereof the retainer is provided with a downwardly arcuate lug 20 which extends almost to the wire 4 traveling along the bottom of the slot and preferably does not bear against the traveling wire. The retainer is acted upon by a pressure foot 21 urged downwardly against the retainer by a coil spring 22 or the equivalent. If, due to sudden stopping, unexpected slack, or for any other reason the wire 4 tends to move out of the slot, it will almost instantaneously come into contact with the retainer lugs 20—20 and be held within the narrow part of the slot until the tendency has ceased, when the wire 4 will again travel at the bottom of the slot below the retainer lugs. Thus, under normal operation, the wire 4 will always travel at the bottom of the narrow slot portion 13, by virtue of the direction of pull, and the retainer 15 prevents the wire from accidentally jumping out of the slot.

Now, in the event the wire 4 has been broken, or is of insufficient length, or for any other reason it is desired to attach another piece of similar wire to the end of the wire 4, a splice or knot is made in the adjacent wire end. This knot or splice will be too large to pass through the narrow and lower slot portion 13. With reference to Figures 2 and 3 it will be noted that on each side thereof adjacent the slot the block is cut away by countersinking or otherwise so as to define a sloping wall 23. Therefore, when a knot or splice in the wire 4 arrives at the recording head, this knot or splice will ride up the sloping wall 23, elevating the retainer 15 against its resilient pressure, and pass through the upper and enlarged slot portion 14 which is of sufficient size to accommodate the knot or splice. Immediately after passing through the enlarged slot portion 14, the direction of pull augmented now by the retainer 15 will cause the knot to ride down the opposite wall 23 and the wire will again assume its normal position at the bottom of the narrow slot portion 13. It will be especially noted that during this action there will be no interruption in the travel of the wire, and no interruption in the

magnetizing of the wire or reproduction from a magnetized wire, as the case may be.

In Figures 4, 5 and 6 I have illustrated another form of magnetizing head embodying principles of my invention, and mountable in the same position as the head shown in Figures 2 and 3. In this instance, the box-like container 11 may be secured in position by the supporting plate 10, and the electro-magnetic equipment contained within the box includes the core or block 12 of paramagnetic material. Block 12 in its upper portion is provided with an aperture through which the wire 4 may travel. This aperture, in the illustrated instance, is in the general cross-sectional shape of a keyhole, and includes a narrow lower portion 24 and an enlarged upper portion 25. The narrow portion 24 is of just sufficient width to freely accommodate the traveling wire 4, and the upper portion 25 is of sufficient size to accommodate a knot or splice 26 (Figure 6) in the wire. On opposite sides thereof, the block 12 is counter sunk or otherwise provided with a sloping wall portion 27 across the aperture. When the knot or splice 26 reaches the opening or aperture, it obviously cannot pass through the narrow portion 24. Therefore, the knot rides upwardly over the sloping space 27, and passes through the upper enlarged portion 25 of the aperture as illustrated in dotted lines in Figure 6. Immediately after traveling through the portion 25 of the aperture, the knot 26 will descend the opposite oblique space 27 until the wire is again riding along the bottom of the narrow portion 24 of the aperture as indicated in solid lines in Figure 6.

The direction of pull along the wire is such as to tend to keep it always at the bottom of the narrow portion 24 of the aperture, and this direction of pull is sufficient to maintain the wire at the bottom of the narrow portion 24 except for the passage of a knot or splice. It is a relatively simple expedient to initially thread a free end of the wire through the aperture, and especially by threading the wire through the upper enlarged portion 25 of the aperture when starting a new spool of wire.

It will be noted in connection with the showing of Figures 4, 5 and 6 that with an aperture through the block 12 there is always a complete and continuous path for magnetic flux entirely around the wire at all times, regardless of whether the wire contains a knot or splice. Consequently, there will always be effective magnetization of the wire or effective reproduction from a magnetized wire, with quite ample elimination of surface or extraneous noises.

In Figure 7 I have illustrated still another form of a magnetic recording head, which is somewhat similar in construction to that shown in Figures 2 and 3 above described. This recording head embodies the same retainer 15, mounted in the same fashion and resiliently urged downwardly in the same manner and by the same means, all as above described in connection with Figures 2 and 3.

The structure of Figure 7, however, embodies a block 28 of paramagnetic material provided with a slot in its upper face corresponding to the slot described in connection with Figures 2 and 3. The instant slot embodies a lower and narrow portion 29 of sufficient width to just accommodate the traveling wire 4, and an upper enlarged portion 30 of sufficient size to accommodate a knot or splice. This block 28 does not have a counter sunk or equivalent portion

providing a sloping wall at each side of the block. In this instance, a narrow U-shaped member 31 is mounted on each side of the block and extends outwardly from the block. These members 31—31 are preferably of non-paramagnetic material such as brass, Bakelite, or another suitable substance. The function of these protruding members, each of which defines a sloping path 32, is to elevate a knot or splice in the wire so that it may ride through the upper slot portion 30, and the space between the side walls of the members 31—31 is in keeping with the shape of the slot through the upper portion of the block 28.

From the foregoing, it is apparent that I have provided a novel magnetic recording head which not only provides a very complete path for magnetic flux around the wire or other elongated member being magnetized, but also automatically permits and facilitates passage of a knot or splice in the wire or other member, with no material interruption in the flux path, with no interruption to the travel of the wire, and with no interruption to the magnetization of the wire. Furthermore, the magnetizing head is very simple in construction, highly efficient in operation, economical and durable in use.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. In a magnetic recording head, a paramagnetic block having an opening therethrough to accommodate a traveling wire, said opening including both a smaller part to accommodate the normal wire and a larger part to accommodate a splice in the wire, and means associated with said block to automatically shift the wire so the splice will travel through the larger part of said opening.

2. In a magnetic recording head, a paramagnetic block having an opening therethrough to accommodate a traveling wire, said opening including both a smaller part to accommodate the normal wire and a larger part to accommodate a splice in the wire, and means associated with said block to automatically shift the wire while it travels so the splice will travel through the larger part of said opening and then return the traveling wire to the smaller part of said opening after the passage of the splice through the block.

3. In a magnetic recording head, a paramagnetic block having an opening therethrough to accommodate a traveling wire, said opening including both a smaller part to accommodate the normal wire and a larger part to accommodate a splice in the wire, resiliently urged retainer means extending in a direction toward the smaller part of said opening, and means arranged to shift the wire against the action of said retainer means to cause a splice to pass through the larger part of said opening.

4. In a magnetic recording head, a paramagnetic block having an opening to afford passage through the block for a traveling wire, said opening being narrow in the lower portion to accommodate only the normal wire and larger in the upper portion to accommodate a splice in the wire, and an upwardly sloping surface provided on said block at each end of said opening over which a

splice may ride to enter the larger upper portion of said opening.

5. In a magnetic recording head, a paramagnetic block having an opening to afford passage through the block for a traveling wire, said opening being narrow in the lower portion to accommodate only the normal wire and larger in the upper portion to accommodate a splice in the wire, an upwardly sloping surface provided on said block at each end of said opening over which a splice may ride to enter the larger upper portion of said opening, and resiliently urged retainer means extending to a position immediately adjacent the traveling wire to prevent the normal wire leaving the lower part of said opening.

6. In a magnetic recording head, a paramagnetic block having an opening therein through which a traveling wire to be magnetized may pass, said opening being in the nature of a slot in a side of the block, said opening being shaped to provide a narrow inner portion to accommodate the normal wire and an enlarged outer portion to accommodate a splice in the wire, and said block having an inclined face portion across the end of said opening to cause a splice to shift to the larger part of the opening.

7. In a magnetic recording head, a paramagnetic block having an opening therein through which a traveling wire to be magnetized may pass, said opening being in the nature of a keyhole aperture through the block, the narrow portion of the aperture accommodating the normal wire and the larger portion accommodating a splice in the wire, and a sloping face on said block extending across the aperture to guide a splice in the traveling wire into the larger portion of the aperture.

8. In a magnetic recording head, a paramag-

netic block having an opening therethrough to accommodate a traveling wire, said opening including both a smaller part to accommodate the normal wire and a larger part to accommodate a splice in the wire, and an inclined non-paramagnetic member extending from a side of said block adjacent an end of said opening to guide a splice into the larger part of said opening.

9. In a magnetic recording head, a paramagnetic block having an opening therethrough to accommodate a traveling wire, said opening including both a small part to accommodate the normal wire and a larger part to accommodate a splice in the wire and an inclined non-paramagnetic member having a passage therethrough in keeping with the shape of said opening extending from the side of said block in alignment with said opening to guide a splice through the larger part of said opening.

10. In a magnetic recording head, a paramagnetic block having a path from one side to the other thereof for a traveling wire, and means associated with said block to cause a movement of said wire out of said path when contacted by a splice in the wire to permit free passage of the splice without interrupting the continuity of travel of the wire.

11. In a magnetic recording head, a paramagnetic block having a path from one side to the other thereof for a traveling recording medium, and non-paramagnetic means associated with said block and shaped and positioned to cause a movement of said medium out of said path when engaged by a splice in the medium of larger cross-sectional size than the medium itself to permit free passage of the splice during continuing travel of the medium.

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