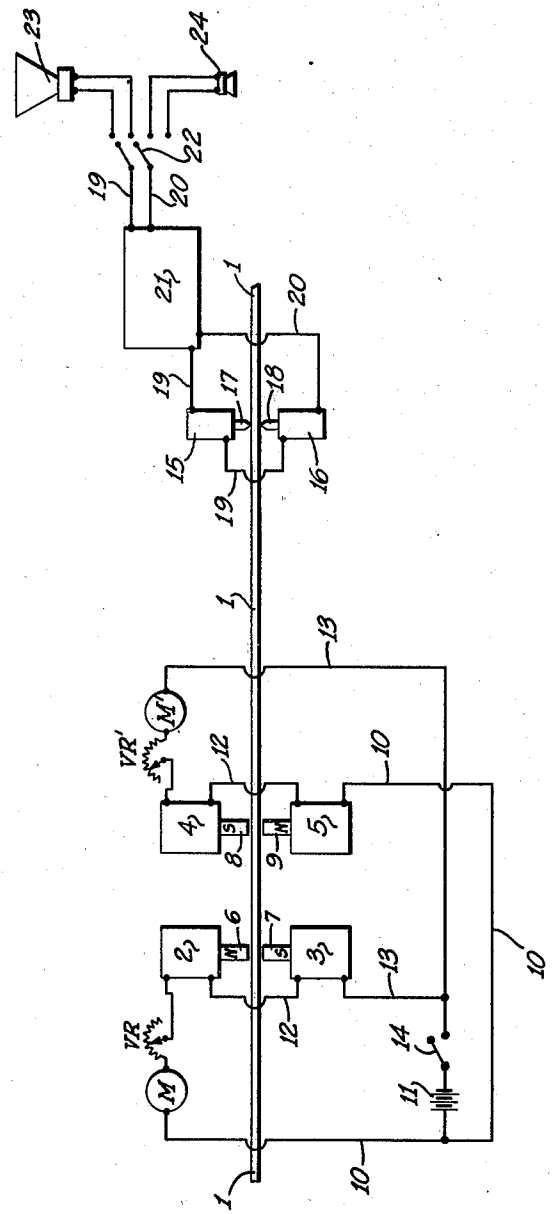
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MEANS AND METHOD OF MAGNETIC RECORDING

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MEANS AND METHOD OF MAGNETIC RECORDING

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This invention relates generally to means and methods of magnetic recording, and more specifically contemplates methods and apparatus for erasing magnetic impressions carried by steel tape or the like, and coincidentally conditioning the tape by inducing a predetermined magnetic value therein, to adapt the same for subsequent recordation and reproduction of the new record.

The use of electric magnets for the recordation of magnetic impressions of sounds for audible reproduction thereof upon steel recording media, e. g. tape, cylinders, disks or the like, by impressing thereon a magnetic pattern corresponding to the sound current by which the magnets are energized, is, in its crude form, well known to the art. Apparatus adapted for improved recordation and reproduction is disclosed in my copending application S. N. 399,972, filed June 27, 1941.

While magnetic records of the character alluded to may be preserved indefinitely, it is also possible to erase them and to recondition the recording medium for subsequent recordation of a new signal series without damaging the physical properties of the medium or otherwise impairing its efficacy as such. Magnetic recording is, accordingly, particularly adapted for making periodic radio or telephonic reports.

To provide means for removing magnetic impulses from a recording medium, conditioning the latter, and thereafter recording and reproducing a new signal series, as a unitary operation during a single continuous movement of the recording medium at a constant speed through such apparatus, is a general object of the present invention.

Another and highly important object is to provide a method of erasing previously recorded magnetic impulses from a recording medium and coincidentally conditioning the tape in a manner which obviates electromagnetic disturbances in the medium tending to produce "background" noises upon reproduction of subsequently recorded magnetic signals.

Another object is the provision of mechanism for erasing magnetic impressions from and conditioning recording media moved continuously through the mechanism in combination with means for controlling the operation of such mechanism whereby the magnetic impressions carried by the media may be selectively permitted to pass to suitable reproducing mechanism, or erased, and the media conditioned for recordation of a new series of magnetic impressions.

Another object is to provide mechanism adapted for structural cooperation with the apparatus last alluded to for recording and/or reproducing a magnetic record in combination with means for selectively controlling the operation of such mechanism.

Other objects and corresponding advantages of my invention such as simplicity of the structure, facility of operation, and adaptability of the apparatus to numerous uses, will be apparent from the following description read in the light of the accompanying drawing in which:

The single view is a diagrammatic showing in plan of the assembled apparatus for erasing magnetic impressions from, an conditioning recording media, and for recording on said media and/or reproducing sound impressions therefrom.

Referring to the drawing in detail, 1 indicates a steel tape with the edge thereof, somewhat enlarged, appearing in the drawing. It will be understood that tape 1 is merely representative of one type of recording media, and that the arrangement of the apparatus hereinafter described, adapted to act upon and co-act with a straight reach of the tape, is subject to change by those of skill in the art to meet specific requirements, particularly as to the shape and contour of the recording medium utilized.

Two pairs of magnets 2—3 and 4—5 are provided with the magnets of each pair arranged on opposite sides of tape 1, pole pieces 6, 7, 8, and 9 of the respective magnets being in contact with the sides of the tape. The magnets 2 and 3 of the first pair are wound in opposite directions with respect to each other, as are also magnets 4 and 5 of a second pair thereof. The pairs of said magnets 2—4 and 3—5 located at the same side of the tape respectively are wound in the same direction.

Lead wires 10 connect the outermost ends of the magnets 2 and 5 to a suitable source of electric current, e. g. battery 11. As these magnets 2 and 5 are wound in opposite directions and arranged at opposite sides of the tape their pole pieces in contact with the tape will both be of the same polarity. Lead wires 12 from the magnets 2 and 5 supply current to magnets 3 and 4 through the ends thereof nearest adjacent tape 1, whereby their pole pieces 7 and 8 in contact with the tape are of the same polarity as one another and opposite to that of pole pieces 6 and 9 of magnets 2 and 5. 13 indicates the return wires from the magnets to battery 11 through a switch 14. Variable resistors or rheostats VR and VR' and meters M and M' are suitably

arranged in the respective circuits. Upon closing switch 14 the magnetic flux created at pole piece 6 and attracted by the negative pole piece 7 through the tape, which is moved therebetween by suitable means, induces magnetism uniformly through the tape thus erasing any distinctions in magnetic value thereof existing between different portions of the tape, as might have resulted from a previous magnetic recordation. To insure most favorable results in this regard it is of course necessary that the magnetic field existing between magnets 2—3 be of sufficient strength to overcome the highest values of residual magnetism in the tape. It is in this condition that the tape is moved toward and between the pole pieces 8 and 9 of magnets 4 and 5.

As the pole pieces 8 and 9 are of opposite polarity to that of the pole pieces 6 and 7 at the same sides of the tape respectively, the lines of force in the magnetic field created therebetween will move in the opposite direction from those produced by the magnets 2 and 3 and will accordingly tend to counteract the residual magnetism in the tape resulting from its polarization by magnets 2 and 3. In order to render the tape most receptive to recordation of a new signal series, it is desirable to adjust the rheostat VR' whereby the magnets 4 and 5 will relieve the tape of only a portion of its residual magnetism and permit it to remain polarized or "conditioned" for most favorable recordation by means hereinafter referred to.

After leaving the pole pieces 8 and 9, tape 1 passes to recording or reproducing mechanism comprising a pair of magnets 15 and 16 arranged at opposite sides of the tape with pole pieces 17 and 18 of opposite polarity in contact with the tape. The lead and return wires 19 and 20 respectively are connected to a suitable amplifier 21 which is in turn connected, selectively, by conventional switch mechanism 22 with a loud speaker 23 or a microphone 24. Upon energization of the magnets 15—16 by a signal current controlled by microphone 24 connected with amplifier 21 by manipulation of the switch 22, as will be understood by those engaged in the art, a magnetic pattern may be impressed upon the tape corresponding to the signal current. If then the tape is re-threaded between the pole pieces 17 and 18 of magnets 15 and 16, and switch 22 actuated to connect the amplifier 21 with loud speaker 23, the magnetically impressed record may be audibly reproduced.

One embodiment of the present invention contemplates an endless tape 1 which may be directed in a continuous course between the magnets 2 and 3 and magnets 4 and 5 and thence through the recording and reproducing apparatus for return to the "erasing" magnets. The tape may be of any length sufficient to accommodate the magnetic record to be carried thereby. It will thus be observed that the tape may be uniformly polarized to delete magnetic impressions theretofore existing in the tape and then conditioned as it passes through magnets 2—3 and 4—5, and immediately thereafter a record may be impressed on the tape with the aid of the magnets 15 and 16 connected with the microphone 24 through the switch 22, and further that this record may be reproduced by opening the circuits through magnets 2—3 and 4—5 so as not to erase or otherwise disrupt the newly recorded magnetic pattern, and re-passing the tape between pole pieces 17 and 18 of magnets 15 and 16 with the switch 22 connecting the loud speaker 23. The record may be reproduced as often as desired in this manner. Such reproduction may be effected intermittently or at fixed intervals, limited in frequency only by the length of time required for each reproduction of the record. Whenever it is desired to record a new signal series, switch 14 may be thrown to close the circuit through magnets 2—3 and 4—5, and by the proper adjustment of the variable resistors VR and VR' the tape may be uniformly polarized, and this polarization reduced to condition the tape for reception of the new record defined by the signal current by which the magnets 15 and 16 are energized.

It will be understood that any conventional means for moving and guiding the tape may be employed and that recording apparatus of any type well known in the art or of the character disclosed in my co-pending application, above alluded to, may be substituted for that specifically shown and described. As the structure, utility, and operation of the individual parts of which my invention is composed are well known to those engaged in the art, these matters are not specifically disclosed herein, no invention being claimed to reside in said parts apart from their combinations as defined in the appended claims, it being apparent, however, that numerous changes in size, design, shape, number, and proportion of the various elements of my invention may be made without departing from the spirit of said claims.

What I claim and desire to secure by Letters Patent is:

1. In a device of the character described, a medium upon which sounds have been magnetically recorded, two pairs of magnets, pole pieces of each of which pairs are of opposite polarity and disposed in spaced relation axially opposite each other in contact with opposite sides of said medium, each of said pole pieces being of the same polarity as the pole piece of the other pair of magnets disposed at the opposite side of said recording medium, means to vary the magnetic force as between said respective pairs of magnets, and means to move said medium between said pole pieces.

2. In a method of the character described, the steps of: passing a recording medium between a pair of magnetic pole pieces of opposite polarity and energized by a signal current, passing said medium between a second pair of magnetic pole pieces of opposite polarity with respect to one another and of a given magnetic value to subdue magnetic impressions theretofore impressed on the recording medium, and then passing the recording medium between a third pair of magnetic pole pieces of opposite polarity with respect to each other and on a given side of said recording medium with respect to the pole pieces of the second set thereof and of a different magnetic value from that of said second pair of magnetic pole pieces to polarize the recording medium for reception of a subsequent magnetic impressions.

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