

July 14, 1953

E. KELLER
MAGNETIC SOUND RECORDER

2,645,494

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2 Sheets-Sheet 1

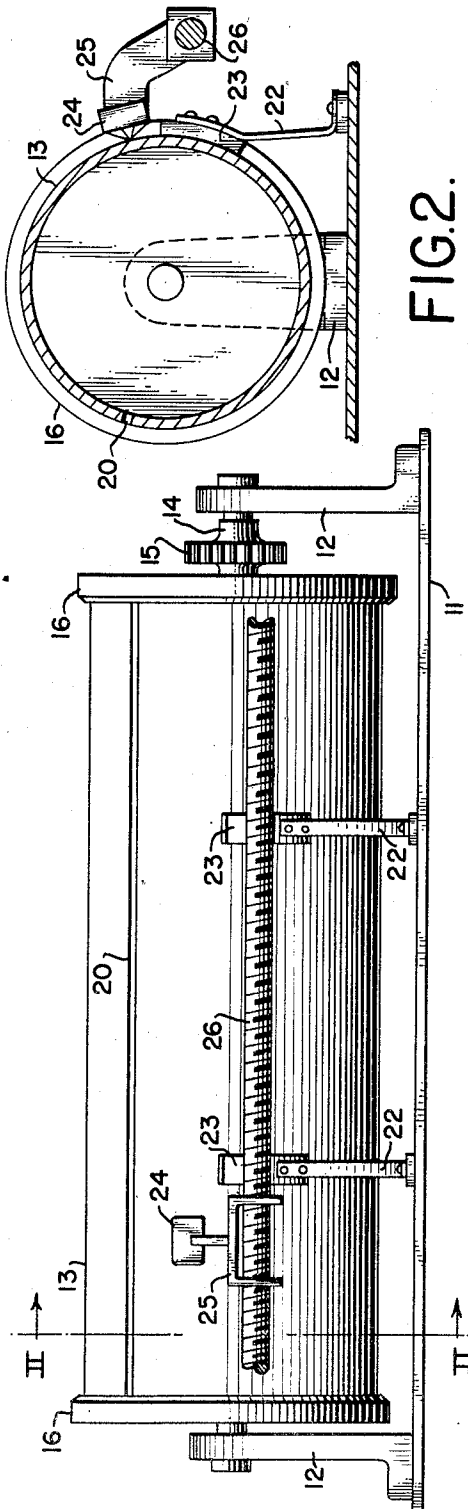


FIG. 1.

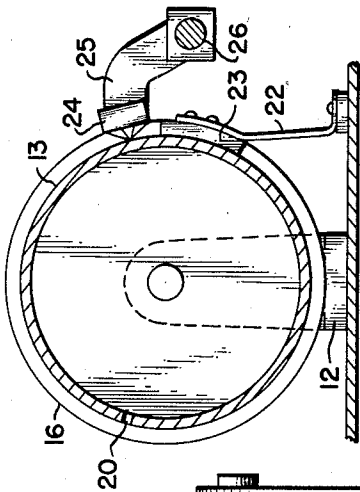


FIG. 2.

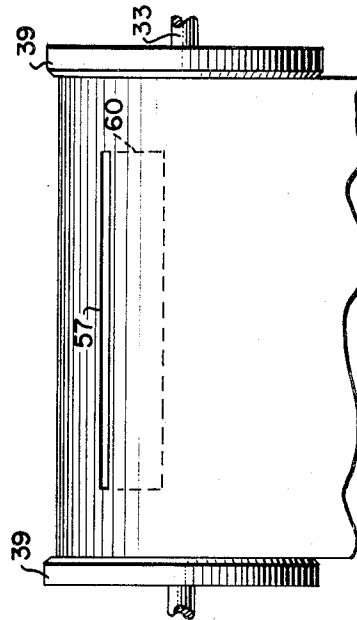


FIG. 3.

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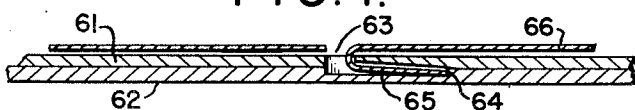
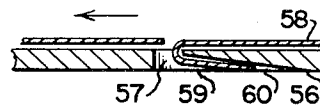
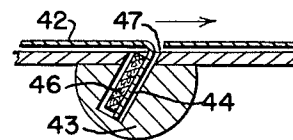
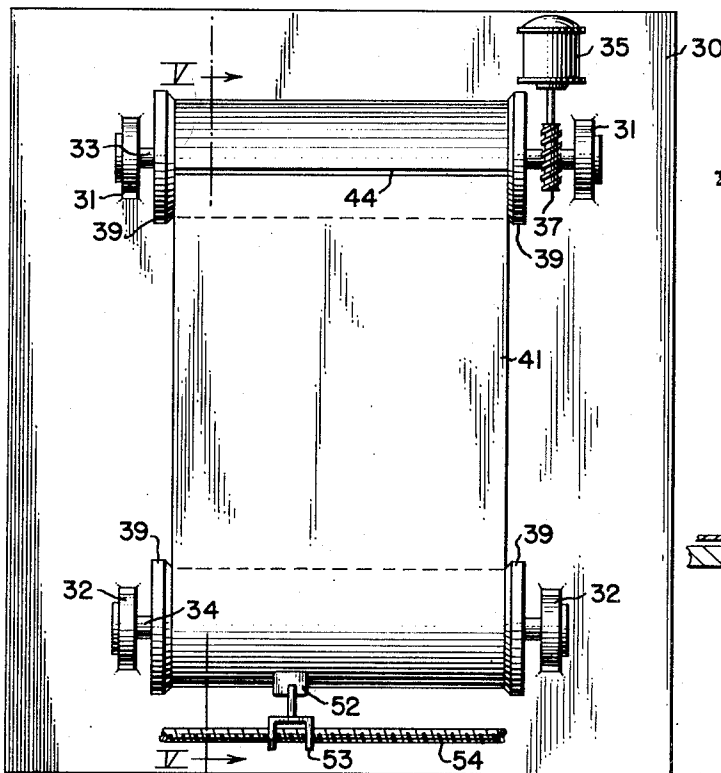
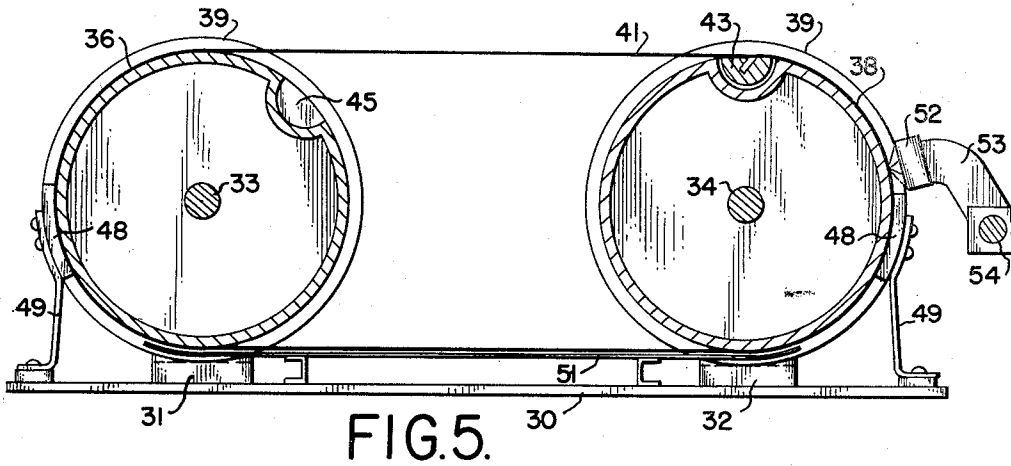
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2 Sheets-Sheet 2



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MAGNETIC SOUND RECORDER

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1 Claim. (Cl. 274—4)

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Magnetic sound recorders with a sound-carrier in the form of a sheet wrapped round a support are already generally known. Hitherto, however, there have been several obstacles to their practical application, one of which resided in the relatively complicated methods of securing the sound-carrier to its support. It is the purpose of the present invention, which likewise relates to a magnetic sound recorder with a sound-carrier in the form of a sheet wrapped round a support, to simplify the fixing of the sound-carrier. According to the invention, the sound-carrier is provided at one of its ends, transversely to the direction of motion of said sound-carrier, with an edge or end flap forming an angle with the surface of said sound-carrier, said edge or end flap engaging in a slot provided in the support for the purpose of fixing said sound-carrier to said support.

The drawing illustrates several embodiments of the magnetic sound recorder in accordance with the invention, which embodiments will now be described with reference to the drawing. In the drawing:

Fig. 1 is an elevation of a first embodiment with the sound-carrier not mounted thereon;

Fig. 2 is a cross-section along the line II—II in Fig. 1;

Fig. 3 is an enlarged detail from Fig. 2 with the sound-carrier in position;

Fig. 4 is a second embodiment shown in plan without the sound-carrier;

Fig. 5 is a section taken along the line V—V in Fig. 4;

Fig. 6 is an enlarged detail of Fig. 5 with the sound-carrier in position;

Fig. 7 is a variant of the embodiment to Figs. 4-6, in plan, with the sound-carrier not mounted thereon;

Fig. 8 is a cross-section through a portion of the embodiment to Fig. 6; and

Fig. 9 is a cross-section through a portion of a further variant of the embodiment to Fig. 7.

According to Figs. 1, 2 and 3, the two supporting brackets 12 are secured to a baseplate 11 in which brackets the spindle 14 carrying the cylindrical roller 13 and the gearwheel 15 is rotatably mounted. The roller 13, which serves as the backing or support for the sound-carrier 17, is provided at each end with a flange or rim 16, said flanges or rims projecting beyond the surface of the roller and serving as edge guides for the sound-carrier 17. The latter consists of a rectangular sheet of thin paper the outward-facing surface of which is coated with finely-

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divided magnetizable material and whose width exactly coincides with the distance between the flanges or rims 16. One end 18 of the sheet is bent up at right angles and provided with a cardboard strip 19 glued thereto, the purpose of which is to stiffen the upturned edge or flap of the sheet. Provided in the surface of the roller and extending over the entire length of the latter is a slot 20 of such width that the upturned sheet edge or flap 18 with the cardboard strip 19 may be easily inserted therein. The length of the sheet 17 is also so adapted to the size of the roller that when the sheet is wrapped round said roller and the edge of flap 18 inserted in the slot 20, the other end 21 of the sheet reaches almost to said edge or flap 18. In practice, a sheet thickness of approximately $\frac{5}{100}$ mm., and a thickness of the strip 19 of a few tenths of a millimetre and a slot width 20 of approximately 1 millimetre have proved convenient. In order to prevent the sound-carrier 17 from lifting from the roller 13 and to tauten it slightly in the direction of movement, two spring strips 22 are secured to the baseplate 11, the upper extremities of which strips are provided with a felt strip 23 which bears gently on the sound carrier 17. Whilst the Figs. 1 and 2 only two such strips are shown, it may under certain conditions prove convenient to fit further strips on the opposite side of the roller 13.

The sound head 24 rests lightly on the sound carrier 17 for the purpose of recording speech or music thereon or reproducing speech or music recorded thereon. Said sound head is secured to a lever 25 carried by the screwed spindle 26, said lever travelling along the roller 13 on rotation of said screwed spindle. The mounting of the spindle 26 and the drive thereof by a gear co-operating with the roller are not shown in the drawing. In practice, the roller 13 is a driven via the gearwheel 15 by any desired source of power, such for instance as an electric motor through a disengageable clutch, in the direction of rotation indicated in Fig. 3, the sound-carrier 17 participating in the movement of the roller as a result of the insertion of the edge or flap 18 in the slot 20. To fit the sound-carrier, all that is necessary is to insert the upturned edge or flap of said sound-carrier in the slot 20 and to turn the roller 13 through one complete revolution. The sound-carrier is thereby automatically brought underneath the tensioning members 23 and the magnetic sound head 24. To remove the sound-carrier, the clutch is disengaged so that the roller 13 can rotate freely, and the

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sound-carrier is then, by its free end, drawn off said roller.

The stiffening of the sheet 17 by the cardboard strip 19 may be omitted in all cases where the sheet itself is of sufficient thickness to form an edge or flap of such stiffness that said edge or flap cannot be withdrawn from the slot 20 by the pull exerted on the sheet by the tensioning members 23. In certain cases it may be found expedient so to select the diameter and length of the roller 13 that the sheet 17 does not, as shown in Fig. 1, bear with its lengthwise edges against the flanges or rims 16, but is used in a position reached by rotation through 90° from the position described.

In the embodiment to Figs. 4 to 6, the two parallel spindles 33 and 34 are rotatably mounted on the baseplate 30 in two pairs of supporting brackets 31, 32. Fixedly secured to the spindle 33 are the roller 36 and a gearwheel engaging with the worm 37 driven by the motor 35, whilst the spindle 34 carries the roller 38. Each roller is provided at each end with a flange or rim 39, said rims of flanges serving as edge guides for a band 41 and for the sound-carrier 42 placed thereon. However, the guiding of the sound-carrier is still adequate if only that roller on which the sound head rests is provided with guide flanges or rims. The ends of the band 41, which latter is composed of a flexible synthetic material, are adhesively affixed to a bar 43 of semicircular cross-section, a space being left between these ends corresponding to the width of the groove 44 provided in said bar 43 and located thereover. Recesses 45 are provided in the rollers 36, the shape of which recesses is adapted to the cross-sectional shape of the ledges 43, and the length of the band 41 is so adapted to the distance between and diameter of the rollers that, during operation, each time the bar 43 reaches one of the rollers, the bar engages in the recess 45 provided in that roller.

The sound-carrier 42 consists of a thin, rectangular sheet of paper the outer face of which is coated with finely-divided, magnetizable material which is permanently magnetized during the recording process. The sheet is bent over at one end to form an edge or flap standing at an angle to the surface of the sheet, to which edge or flap a cardboard strip 46 is adhesively affixed. The edge or flap formed in this way engages in the groove 44 when the sound-carrier is fitted to the band 41, the sound-carrier being thereby retained on said band 41 and entrained by the latter in the direction indicated by arrow in Fig. 6. To provide a further safeguard against the possibility of the edge or flap of the sheet dropping out of the groove 44, it is convenient not to position said sheet edge or flap perpendicularly to the surface of the sheet, but to place it in a somewhat inclined position, so that the sheet edge or flap has to be bent over by more than 90°, as is shown in Fig. 6. The length of the sheet 42 is such that its free end 47 comes to lie immediately adjacent to the edge or flap 44.

Felt strips 48, carried by resilient holders 49 secured to the baseplate 30, bear against the two rollers 36 and 38. The purpose of said felt strips 48 is slightly to tauten the sound-carrier in its direction of movement. In place of these felt strips, rotating rollers could equally well be used, said rollers being pressed resiliently against the sound-carrier and provided with means for varying the frictional force necessary for their rotation and to be furnished by the sound-carrier.

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A sheet metal strip 51 arranged under the two rollers 36 and 38 at a short distance from the band 41 serves to hold near the band the free end, not fastened to the band 41, of the sound-carrier on its passage beneath the two rollers. Speech is recorded on the sound-carrier, and recordings reproduced therefrom, by means of the magnetic sound head 52 secured to the lever 53, said sound head gently pressing the sound-carrier against the roller 38. The end of the lever 53 opposite to that holding the magnetic sound head is provided with a screw thread engaging with the screwed spindle 54, so that rotation of the latter causes the magnetic sound head to travel along the roller 38. The spindle 54 is driven in the known manner by a gear coupled to the roller 38, said gear not being shown in the drawing.

In the embodiment to Figs. 7 and 8, in which, in the same manner as in the case of the embodiment to Figs. 4 to 6, a band running on two rollers and carrying a sound-carrier in the form of a sheet is provided, the bar 43 serving to connect the ends of the band 41 is dispensed with. The band 56 is made endless and provided with a slot 57 which occupies a portion only of width of the band, as may be seen from Fig. 7. The width of the sound-carrier 53 exactly corresponds to the distance between the two rims 39, so that the latter take care of the edge-guiding of the sound-carrier. At one end of the latter an edge or flap 59, bent over to an angle of almost 180° to the surface of said sound-carrier, is provided, the length of which is, however, only that of the slot 57, and which is made of some stiffer material than the actual sound-carrier, so as to prevent said edge or flap from dropping out of the slot 57 during operation. The band 56 is provided on its inner surface, at the point where the edge or flap 59 rests upon it, with a recess 60 the purpose of which is to prevent the edge or flap from projecting beyond the inner surface of the band. In place of the single slot 57 it is also possible to use a double slot the two parts of which lie in the same straight line and each extend from one of the flanges or rims 39 towards the middle of the band.

The sectional drawing to Fig. 9 shows an embodiment in which, instead of the band 56 shown in Figs. 7 and 8, a band composed of two endless bands 61 and 62, stuck together, is used. At one point on the upper band 61 the slot 63, running transversely to the direction of motion of the band, is provided in said band, and between the two bands a recess 64 is provided proceeding from the slot. The stiffened edge or flap 65, bent over to approximately 180°, of the sound-carrier 66 is, in order to secure the latter, inserted in the recess 64. This embodiment affords the advantage over that shown in Figs. 7 and 8 that, because of the continuity of the lower band 62 the weakening of the entire cross-section of the band by the slot 63 and the recess 64 has less effect than in the case of the band 56 to Fig. 7, where the slot 57 extends throughout the thickness of the band.

The fitting and removal of the sound-carrier is effected, in the embodiments to Figs. 4 to 9, in the same manner as in the case of the embodiment to Figs. 1 to 3, the sound-carrier, after a clutch not shown has been disengaged, being drawn by its free end from its support or backing, the two rollers rotating in the reverse direction.

I claim:

Magnetic sound recording and reproducing means, comprising in combination with a mag-

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netic transducer head and a flexible sheet having magnetized material upon a surface thereof and engaged by said transducer head, one edge of said sheet having a stiff member connected to the sheet along said edge; a rigid cylindrical drum having an elongated slot formed therein and extending parallel to the axis of said drum, said sheet covering at least substantially the periphery of the drum and being loosely wrapped around it, said stiff member of the sheet loosely fitting into said slot with play, means rotating said drum, two resilient members spaced in relation to each other in the direction of said axis, each member being fixed at one end and contacting a portion of said sheet for tensioning said sheet in its direction of movement, said members exerting a pulling action upon said sheet when said drum

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is rotated, whereby said stiff member is clamped within said slot.

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