

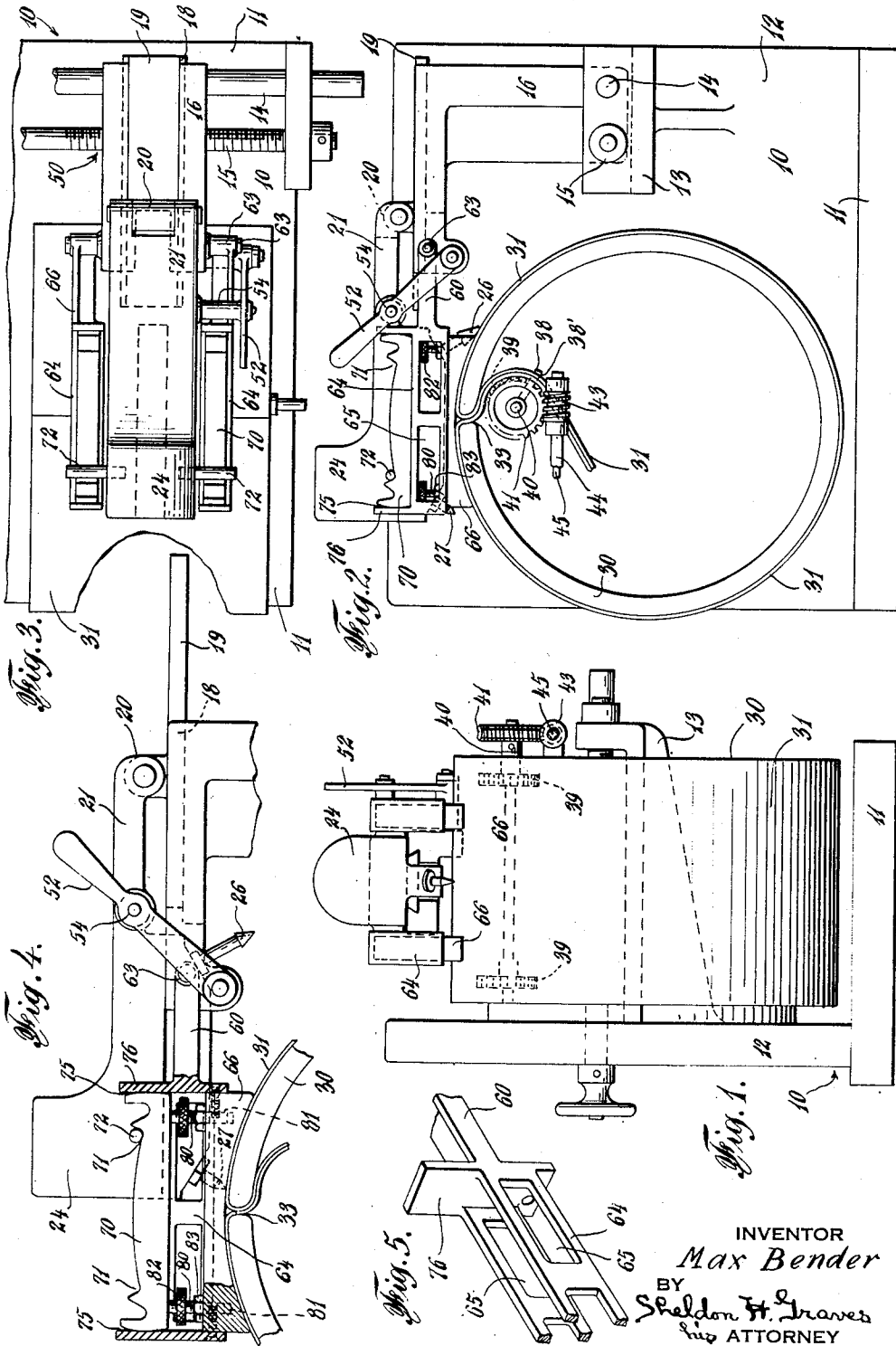
Sept. 12, 1939.

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2,172,431

SOUND RECORDER AND REPRODUCER

Filed Sept. 9, 1936



UNITED STATES PATENT OFFICE

2,172,431

SOUND RECORDER AND REPRODUCER

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Application September 9, 1936, Serial No. 99,945

7 Claims. (Cl. 274-17)

This invention relates to sound recorders and reproducers and more particularly to a device of this character wherein the record is cut or otherwise formed in a film or sheet of flexible material.

It has been suggested to form such a record by means of a helical groove in a band of flexible material by means of a cutter, which travels uniformly across the film as it cuts, thus producing a series of turns extending over substantially the entire face of the band.

The formation of such bands, particularly where tough plasticized material such as photographic film is employed, has presented a difficult problem and unless such band is made by some special process, for example as that disclosed in my pending application, Serial No. 79,019, filed May 11th, 1936, it has been found necessary to splice the opposite ends of a single sheet, which is inconvenient and often quite unsatisfactory.

One object of the present invention is to provide an improved apparatus for utilizing an unspliced strip of film in substantially the same manner as if it were a continuous band.

For this purpose, I provide as a holder for the strip of film a cylinder having a narrow slot extending the length thereof, and I mount the strip of film on the cylinder with its ends extending into the interior of the cylinder through the slot. I also provide means for gripping the ends of the film and pulling them inwardly, so that the film will be held tightly against the outside of the cylinder. The record may then be made on the cylinder with a cutting stylus in contact with the film and similarly the record may be reproduced.

Inasmuch as, at the bend at the surface of the cylinder, where the film enters the slot, there is a slight depression in the film surface running the length of the cylinder, I provide an improved means for preventing the cutting stylus as well as the reproducing stylus from entering this depression, as will be more fully described hereafter.

Other objects and advantages of my invention will appear from the following description taken in connection with the accompanying drawing, wherein

Fig. 1 is an end elevation of the recording device showing the recording cylinder with film thereon.

Fig. 2 is a side elevation of the structure shown in Fig. 1.

Fig. 3 is a top plan view of the structure shown in Fig. 1.

Fig. 4 is a view of certain of the parts shown in Fig. 1 but in a shifted position.

Fig. 5 is a detail of the spacer holding frame.

The recording device comprises a frame 10, having a base 11 and a side wall 12, from which extends a supporting arm or bracket 13. Supported at one end by the wall 12 and at its outer end by the bracket 13 is a rod 14, and journaled at its inner end in the wall 12 and in its outer end in the bracket 13 is a screw 15. The rod 14 and screw 15 serve to support a carriage 16, which at its top is formed with a dovetail channel 18, in which is adapted to slide a member 19 at the inner end of which is a bearing 20 for the arm 21, which carries at its opposite end the recorder and reproducer head 24. This head comprises a casing in which is housed an electromagnetic recorder and reproducer, the construction of which may be similar to that disclosed in my co-pending application, Serial No. 79,019, wherein an armature carries at one end a recording stylus which I have here indicated at 26 and a reproducing stylus indicated at 27.

For the purpose of supporting the record material, I provide a cylinder 30, around the outer surface of which is wound a strip of film 31, which may be plasticized cellulose. The cylinder 30 is formed with a longitudinal slot 33 through which the ends of the film 31 pass, where they are engaged by pins 38 projecting from the surface of ratchet wheels 39, two of which are preferably employed mounted adjacent opposite ends of a shaft 40 inside and extending the length of the cylinder 30 as may be seen from Fig. 1. The pins 38 extend through openings 38' in the film 30.

One means of rotating the shaft 40 I have shown in Fig. 2, which consists of a gear 41 keyed to the shaft 40 and adapted to be engaged by a worm 43 mounted on a cross shaft 44 mounted on the head of the cylinder. Shaft 44 has a squared end 45 adapted to receive a wrench or other tool for turning.

As may be seen from Fig. 3, the carriage 16 is advanced along the cylinder during the recording or reproducing operation by the usual screw means 50 and the appropriate means not shown is employed for simultaneously rotating the cylinder 30 for the recording or reproducing.

As shown in Fig. 2, the recording needle is in contact with the film. For the purpose of moving the recording head to a position where the reproducing needle contacts with the film, I provide a handle 52 pivotally mounted on the carriage 16 and also pivotally connected at 54 with

the recorder arm 21. It will be seen from Figs. 2 and 4 that on turning the handle 52 in a clockwise direction, the slide 19, as well as the recording arm 21 and head 24, will be moved toward the right, and during this operation, the recorder arm will turn on bearing 20, lifting the head and the cutting stylus away from the film, and on further movement of the handle or lever 52, the head will move down toward the film so that at the end of the movement toward the right, the reproducing needle will contact with the recording groove in the film, which is the position of parts shown in Fig. 4.

For the purpose of limiting the depth of the cut made by the recording stylus 26 in the film and also for the purpose of preventing either the recording or reproducing stylus from entering the slot 33 during rotation of the cylinder 30, I provide a construction comprising arms 60 at opposite sides of the recorder pivotally mounted at 63 to the carriage 16, and carrying at their outer ends casings 64 open at the top and bottom and provided with windows 65. Fixedly mounted in each casing 64, and projecting below the bottom of each casing is a spacing block 66 which is adapted to ride on the surface of the film as the film rotates, and is of sufficient length to bridge the slot 33 and wide enough to bridge several sound tracks. Also mounted in the casing 64 and projecting above the top thereof is an adjustable cradle 70 formed near adjacent ends with recesses 71 adapted to receive a pin 72 projecting from the wall of the recording and reproducing head casing. The ends 75 of the cradle 70 are cylindrical, the diameter of curvature of the cylindrical surface being that of the length of the cradle, so that the cradle in its movements up and down will always be in contact with the ends 76, as well as the sides, of the casing 64 and be guided thereby.

As will be seen from Figs. 2 and 4, the block 66 is spaced from the cradle 70 and the distance apart of these two is adjustable by means of two screw threaded rods 80, adapted to be received respectively in screw threaded openings 81 located adjacent opposite ends of the block 66, and these rods engage at their upper ends the bottom of the cradle 70. For the purpose of turning the rods 80, I mount thereon suitable collars 82 and lock nuts 83 may be employed to prevent accidental turning. The collars 82 and lock nuts 83 are accessible for turning through the openings 65.

It will be seen from the above construction that it is possible to adjust the position of each of the styluses with respect to the film independently of the other, for the reason that adjustment of the rod 80 at the right of Fig. 4, while it lifts the recess 71 at the right, has little or no effect on the recess 71 on the left. On the other hand, adjustment of the rod 80 at the left of Fig. 4 changes the position of that recess 71 which is at the left only.

Having now described my invention, what I claim and desire to secure by Letters Patent is:

1. A sound recording and reproducing device comprising a hollow cylinder, having a slot extending along the length thereof, a strip of tough recording material carried by said cylinder and having its ends extending into the cylinder through said slot, an electro-magnetic recording device having recording and reproducing styluses, means for lifting the electro-magnetic device off the recording material and alternately shifting it to position the styluses respectively in opera-

tive contact with the strip, supporting means for said electro-magnetic device adapted to ride on said strip and serving to support the electro-magnetic device a fixed distance from the surface of said strip when either the recording or reproducing stylus is in engagement therewith said supporting means being of sufficient length to bridge said slot.

2. A sound recording or reproducing device comprising a hollow cylinder having a slot extending along the length thereof, and a strip of tough sound recording material carried by said cylinder and having its ends extending into the cylinder through said slot, a stylus adapted to cooperatively engage said strip, means for rotating said cylinder whereby said slot passes beneath said stylus, a support for the stylus adapted to press the stylus on said material whereby the stylus tends to enter the space between portions of the strip at the slot and spacing means secured to said support and bearing at a point substantially a fixed distance from the axis of said cylinder for preventing the stylus entering said space.

3. A sound recording or reproducing device comprising a hollow cylinder having a slot extending along the length thereof, and a strip of tough sound recording material carried by said cylinder and having its ends extending into the cylinder through said slot, a stylus adapted to cooperatively engage said strip, means for rotating said cylinder whereby said slot passes beneath said strip, a support for the stylus adapted to press the stylus against said material whereby the stylus tends to enter the space between portions of the strip at the slot, and adjustable spacing means secured to said support and bearing against said material for preventing the stylus entering said space.

4. A sound recording and reproducing device, a cylinder, a strip of tough record material mounted on said cylinder, an electromagnetic means having a cutting stylus and a reproducing stylus, means for shifting the electromagnetic means alternately to position the recording stylus and the reproducing stylus in operative contact with the strip, means riding on the strip for supporting said electromagnetic means at a fixed distance with respect to the strip's surface and means for independently adjusting the position of the recording and the reproducing stylus with respect to said strip.

5. A sound recording and reproducing device, a cylinder, a strip of record material mounted on the cylinder, an electromagnetic means having a recording stylus and a reproducing stylus, a block adapted to ride on said strip, a cradle supported by said block, said electromagnetic means having a part adapted to be moved from one end of said cradle to the other and to be supported by said cradle at each end thereof, the supporting faces of said cradle at opposite ends being so positioned with respect to the record surface that when said part is at one end of the cradle, one of the styluses is in operative contact with the record and when said part is at the opposite end of said cradle, the other stylus is in operative contact with the record.

6. A sound recording and reproducing device, a cylinder, a strip of record material mounted on the cylinder, an electromagnetic means having a cutting recording stylus and a reproducing stylus, a block adapted to ride on said strip, a cradle supported by said block, electromagnetic means having extensions adapted to move from

one end of said cradle to the other and to be supported by said cradle at each end thereof, the supporting faces at opposite ends of said cradle being so positioned with respect to the record surface that when the said part is at one end of the cradle, one of the styluses is in operative contact with the record and when said part is at the opposite end of the cradle, the other of said styluses is in operative contact with the record, said styluses being located respectively, approximately at or beyond opposite ends of said cradle, and means for adjusting independently the elevation of the opposite ends of said cradle with respect to said block thereby adjusting differently the respective styluses with respect to said surface.

7. An electromagnetic device having a recording stylus and a reproducing stylus, means for shifting said device alternately to position said styluses respectively in operative contact with a record, said means consisting of a pivoted arm supporting said stylus and adapted to be moved toward and away from said record, a slidable member forming a pivotal support for said arm and an operating lever engaging said pivotal arm for rotating said arm successively away from and toward said record and simultaneously sliding said member, whereby in shifting the stylus one stylus is lifted from and moved along the record and the other stylus is moved along and lowered on to the record.

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