

Oct. 26, 1937.

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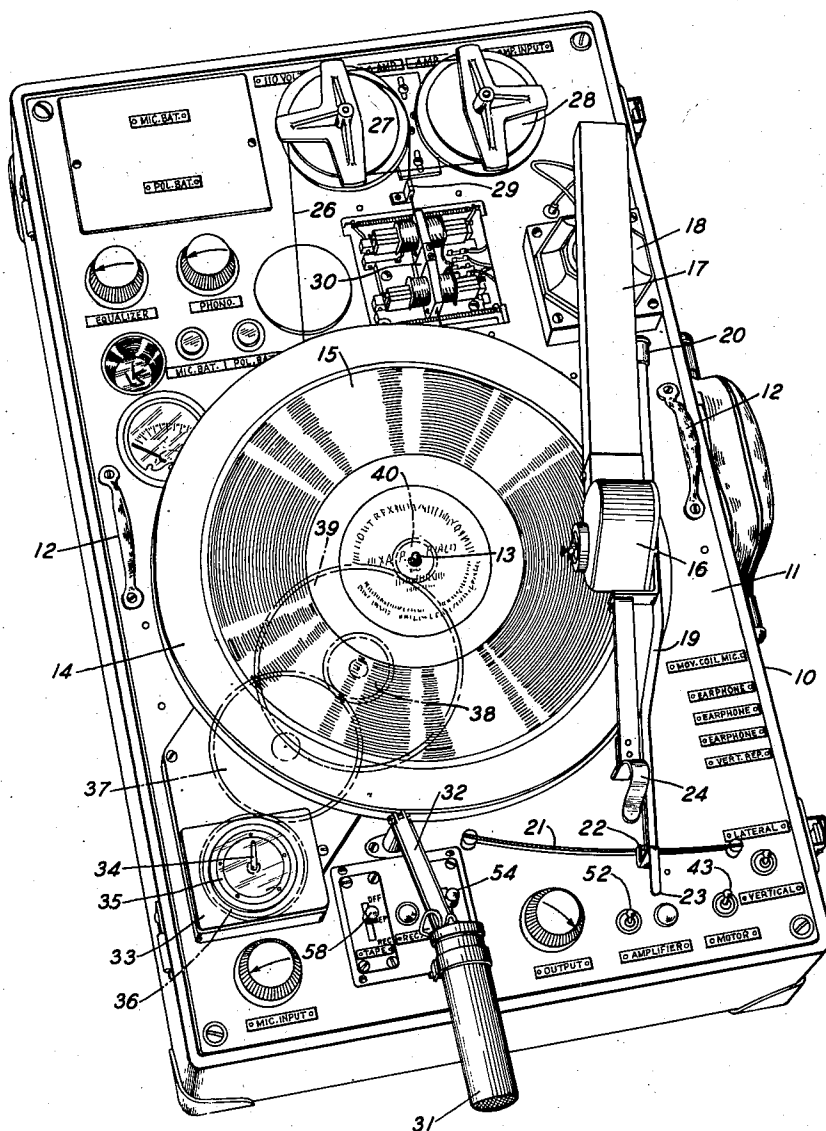
2,096,805

PHONOGRAPH

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4 Sheets-Sheet 1

FIG. 1



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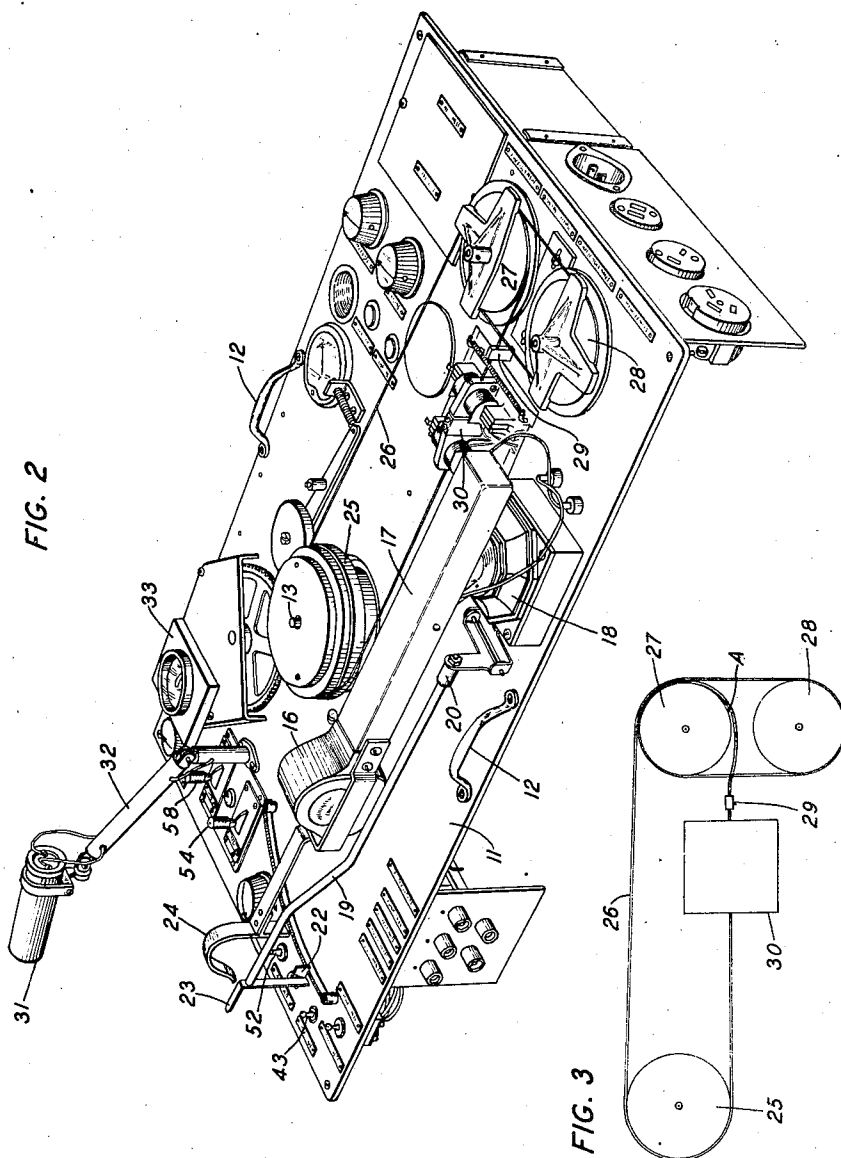
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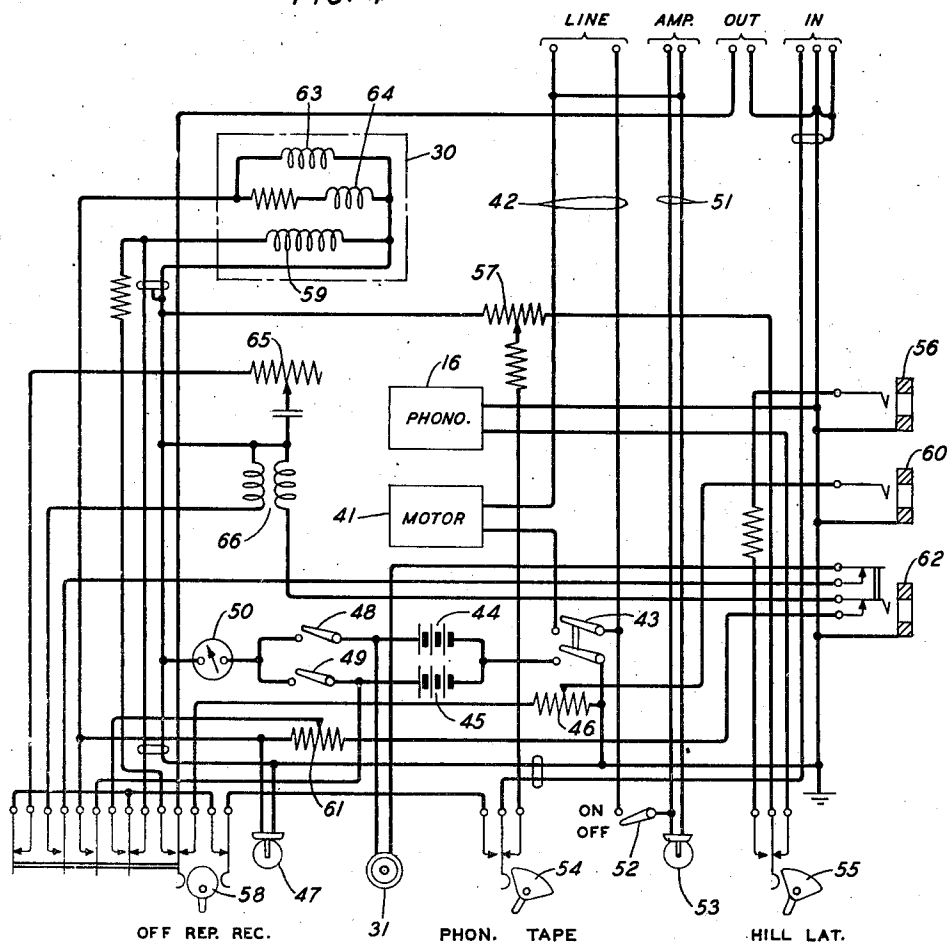
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FIG. 4



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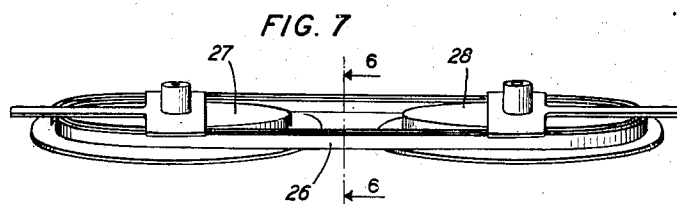
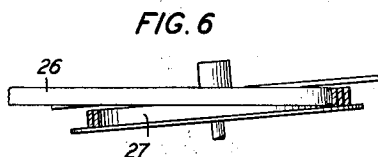
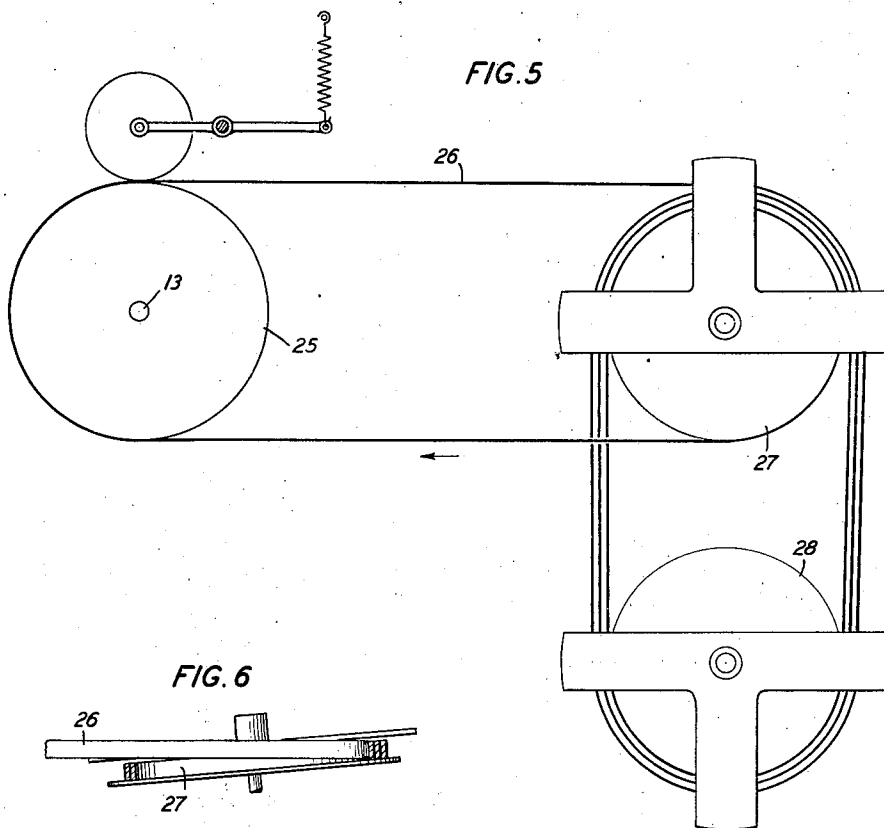
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PHONOGRAPH

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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

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PHONOGRAPH

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6 Claims. (Cl. 179-100.2)

This invention relates to sound recording and reproducing machines and particularly to those adapted to repeat the reproduction of a record automatically or to reproduce alternately two or more records.

The object of this invention is to provide an improved combination of a reproducing phonograph with a sound recording machine adapted to make an immediately reproducible record. A feature of this invention is a means for storing the immediately reproducible record.

For purposes of illustration, this invention will be described with reference to a machine for instructing by sound, such as a language instruction machine. In its preferred form it comprises a telegraphonic recorder and reproducer combined with a disc reproducer. The magnetizable medium on which the sound is recorded is in the form of a closed loop and novel means are provided for storing the medium so that it may be withdrawn therefrom without being subjected to excessive stresses. Simplified driving means for the telegraphophone and disc reproducer are provided to render possible the easy comparison of sound recorded in both types of sound records.

The various details of the preferred form of this invention are shown in the accompanying drawings, in which

Fig. 1 is a plan view in perspective of the mechanical features of the assembled machine;

Fig. 2 is a plan view in perspective of the chassis of the machine with the turntable removed;

Fig. 3 is a diagram of the novel method of reeling a continuous band of record carrying material;

Fig. 4 is a wiring diagram showing how the various electrical elements of the machine are connected together;

Fig. 5 is an enlarged view of the tape reeling mechanism similar to Fig. 3;

Fig. 6 is a view of one of the take-up reels illustrating the tape position upon withdrawal; and

Fig. 7 is a detail view illustrating the manner of storing the tape upon the take-up reels.

Referring now to Fig. 1, the apparatus is shown encased in a portable container 10 about the size of an ordinary suitcase. All of the apparatus is mounted upon a panel 11 which may be removed from container 10 by means of handles 12. Centrally located on panel 11 is a turntable shaft 13 on which is mounted turntable 14. A disc record 15 is shown threaded over shaft 13 and resting on turntable 14. An electrical reproducer 16 supported by an arm 17 and pivoted on post 18

is shown tracking record 15. A stop mechanism is provided to enable the operator to set the reproducer down on the record at any predetermined point. The mechanism is comprised of an arm 19 which is pivoted at 20 and adjustable to any position by means of toothed sector 21 and knife edge 22. A handle 23 is provided for swinging arm 19 to the desired location. Reproducer 16 is swung to the right by means of a handle 24 secured thereto, until it engages arm 19, whereupon further motion in that direction is blocked and reproducer 16 may therefore be lowered upon record 15.

The associated telegraphonic apparatus is shown to better advantage in Fig. 2 to which reference now will be made. Shaft 13 which supports turntable 14, likewise supports and drives a pulley 25. In frictional engagement with pulley 25 is an endless steel band or tape 26 which moves from pulley 25, around pulleys 27 and 28 as many times as desired, and then is drawn from between pulleys 27 and 28 through guide 29 and a telegraphophone unit, designated generally as 30, and back around pulley 25. This method of reeling the tape has several distinct advantages over the two-pulley type. It allows different lengths to be used by reason of the large capacity of reels 27 and 28, the added lengths being taken up by winding the tape around these reels as many times as is necessary. Another advantage is that the tape is drawn off from reel 27 at a point where there is no radial pressure on the tape, such as might arise when it is drawn from the inside of the reel, and hence there is less wear on the tape. The method of winding the tape is shown clearly in Fig. 4. The tape 26 as it leaves pulley 25 passes around pulley 27 where its direction is changed 90 degrees, then around pulley 28 where its direction is reversed, then back around pulley 27 where its direction is again reversed, etc., until the bottom layer of tape on reel 27 emerges at point A after having its direction changed 270 degrees, the last 90 degrees being free of all previous convolutions of the tape. It is then drawn through guide 29 and the telegraphophone unit 30 whence it returns to driving pulley 25. The pulleys 27 and 28 are tiltable with their axes in order that the tape 26 may be drawn from the lower layer upon pulley 27 and clear the adjacent layers of the stored tape as it is fed to the reel 25. The tape as it is fed from reel 25 goes onto the top layer of the storage reels and there is sufficient slippage between adjacent layers of tape on the reels 27 and 28 to permit the right amount of tension in the

tape spaces between the driving reel 25 and the storage or take-up reels 27 and 28.

The telegraphone unit and the method of recording on the tape are fully described in Patent No. 1,944,238 issued to me on January 23, 1934.

Referring to Fig. 1 again, 31 is a microphone which is mounted upon a small adjustable boom 32. In order to keep the amount of recording within the limits of the tape, a time indicator 33 is used. This is comprised of a pointer 34 and a dial 35 calibrated in seconds. The pointer is secured to a gear 36 which is connected through a train of gears 37, 38 and 39 to gear 40 on drive shaft 13. The gears are shown merely as dotted circles. The remainder of the apparatus shown on Fig. 1 is of an electrical nature and hence will be described with reference to Fig. 4.

In Fig. 4 the driving motor for shaft 13 is shown as a block at 41, and it receives energy from the line 42 through switch 43, the operation of which also puts ground on batteries 44 and 45. Battery 44 furnishes the current for the microphone 31 and battery 45 is a polarizing battery for the telegraphone unit 30. Both batteries may be tested by connecting them through switches 48 and 49 to a common meter 50.

The amplifier used with the phonographs may be any high quality amplifier and hence is not shown in Fig. 4. Power is applied to the external amplifier from leads 42 through leads 51 in one of which is a switch 52. A lamp 53 across leads 51 lights when the switch is thrown on and indicates that current is flowing into the amplifier. The input to the amplifier is connected to a two-way switch 54, the left-hand contact of which is connected to the magnetic recorder 30 and the right-hand contact of which is connected to the disc reproducer 16. The circuit to the disc reproducer 16 may be interrupted by switch 55 and made to include jack 56, the purpose of which is to enable the operator to use a different reproducer, i. e., if the reproducer supplied with the machine is of the hill and dale type, plug 56 may be used to substitute a lateral type reproducer for the hill and dale type. An equalizer 57 is inserted into the input circuit for controlling the relative volume of the disc and telegraphone to facilitate comparison between the speech recorded in these media.

Whether the machine will reproduce or record on the tape depends upon the position of three-way switch 58. In the position shown, the machine is conditioned for reproduction. The input of the amplifier is connected through switch 58 to the translating magnet 59 of the telegraphone and the output of the amplifier is connected to jack 60 into which may be plugged earphones or a loud-speaker. The volume at the earphones or loud-speaker is adjusted by potentiometer 46. When switch 58 is thrown to the right, the machine is conditioned for recording. The output of the amplifier is connected to translating magnet 58 and ground while the input is connected to potentiometer 61, jack 62 and microphone 46. If some other type of microphone is desired, it may be plugged into jack 62. Polarizing magnet 63 and depolarizing magnet 64 are likewise energized when switch 58 is thrown to the right. The microphone 46 is coupled to the recording circuit through a rheostat 65 and a transformer 66.

When it is desired to turn off the telegraphone, switch 58 is thrown to the left, thereby discon-

necting the telegraphone from the input to the amplifier.

To operate the above described apparatus, a disc record having the desired phrases, words or sentences recorded thereon is placed upon turntable 14, the motor and amplifier are switched on and switch 54 is turned to the "Phon" position. With earphones plugged into jack 60, reproducer 16 is lowered upon the disc and as much of the recorded matter is reproduced as is desired. If some portion is to be studied in detail, stop arm 19 is moved over until reproducer 16, when it begins to track over the desired portion just touches it, whereupon stop arm 19 is lowered to lock knife edge 22 upon toothed sector 21. Reproducer 16 is then lowered upon the record at this point after each reproduction as often as the reproduction is to be repeated. When the words or phrases are clearly understood, switch 54 is thrown to the "Tape" position and switch 58 is set for recording on the tape. The tape runs continuously as long as turntable 14 is running and therefore it needs no conditioning for operation other than the setting of switches 54 and 58 after motor switch 43 and amplifier switch 52 have once been turned on. Since it runs continuously, pointer 34 also rotates continuously, and it is necessary therefore to note the position of pointer 34 at the beginning of each recording.

With the machine conditioned for telegraphone recording, the words or phrases being studied are spoken into microphone 31, care being taken that the loop of tape passes through the magnetic phonograph but once during the recording as indicated by pointer 34. Just before pointer 34 reaches its starting point, switch 58 is thrown to the "Rep" position to avoid erasing the recorded matter. The recorded matter can now be reproduced as often as desired and then compared with the same words or phrases as recorded in the disc. If the volume from the tape is greater than the volume from the disc, or vice versa, the equalizer 57 is adjusted until the two are at about the same level.

The combined disc and telegraphone phonograph provides a convenient and compact device for aiding one in improving one's speech, and for home instruction in foreign languages. The manipulation of the disc portion of the phonograph is not much different from the manipulation of other disc phonographs and hence can readily be learned by anyone. The operation of the telegraphone requires, after the machine is once set, the operation of but one key and the observance of one dial. The use of an endless steel band obviates the use of a rewinding mechanism, and the novel reeling method for the band prolongs the life of the tape and permits the use of several different lengths of tapes as desired.

It is understood that the above description is merely illustrative of the invention and that the scope of the invention, therefore, should not be limited thereto but should be determined by the appended claims.

What is claimed is:

1. In a portable sound recording and reproducing apparatus for sound comparison, a carrying case, an apparatus mounting panel removably mounted in the case, a disc record engraved with a standard for comparison, a turntable therefor, a motor driven spindle for the turntable extending through said panel, magnetic tape recording and reproducing apparatus mounted upon said panel and including a drive reel for the tape

operatively mounted on the turntable driving spindle, a reproducer for the disc record mounted upon the panel, recording and reproducing apparatus for the magnetic tape mounted on the panel, sound pick-up and reproducing apparatus, and switching means carried by said panel for selectively associating said sound pick-up and reproducing apparatus with the magnetic tape and disc record.

2. A portable self-contained sound recording and reproducing apparatus for sound comparison comprising in combination, a carrying case, an apparatus mounting panel removably mounted in the case, a disc record engraved with a standard for comparison operatively mounted on the panel, reproducing means for the disc record carried by the panel, magnetic tape recording and reproducing means carried by the mounting panel, sound pick-up and reproducing means and switching means carried by the panel for selectively associating the sound pick-up and reproducing means with the magnetic tape and disc record.

3. A portable self-contained sound recording and reproducing apparatus for sound comparison comprising in combination a carrying case, an apparatus mounting panel removably mounted in the carrying case, a disc record engraved with a standard for comparison operatively mounted on the panel reproducing means for the disc record mounted upon the panel, a magnetic tape, a driving reel for the tape mounted on the panel, a plurality of take-up and storage reels for the tape mounted on the panel, recording and reproducing means for the magnetic tape carried on the mounting panel, sound pick-up and reproducing means, and circuit connecting and switching means carried by the panel for operatively and selectively associating the sound pick-up and reproducing means with the magnetic tape and disc record.

4. A portable self-contained sound recording and reproducing apparatus for sound comparison, in combination a carrying case, an apparatus mounting panel removably mounted in the case, a disc record engraved with a standard for comparison, a turntable for the disc record, a driving spindle extending through the mounting panel for supporting the turntable, a magnetic tape, a driving reel for the tape mounted on the turntable spindle below the turntable, take-up and storage reels for the tape mounted upon the mounting panel in spaced relation to receive, store and deliver an endless tape, recording and reproducing magnets cooperating with said tape and sound pick-up and reproducing apparatus associated with the tape recording and reproducing magnets and the disc record.

5. In an apparatus of the class described, an endless magnetic tape for receiving and reproducing sound recordings, a driving reel for the tape, and a pair of take-up and storage reels over which the tape is looped a plurality of times in layers and in a direction to feed the tape from the bottom layer of one take-up reel onto the driving reel and from the driving reel onto the top layer of the same take-up reel.

6. In an apparatus of the class described, an endless magnetic tape for recording and reproducing sound variations, a driving reel for the tape and a pair of take-up and storage reels over which the tape is looped a plurality of times in layers and in a direction to feed the tape from the bottom layer of one take-up reel to the drive reel and from the drive reel onto the top layer of the same take-up reel, the take-up reels being tilted at an angle that permits the withdrawn portion of the tape to pass over the adjacent looped portion of the tape without frictional engagement therewith.

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