July 7, 1942. S. I. WEISS 2,288,983

TELEGRAPHONE DEVICE

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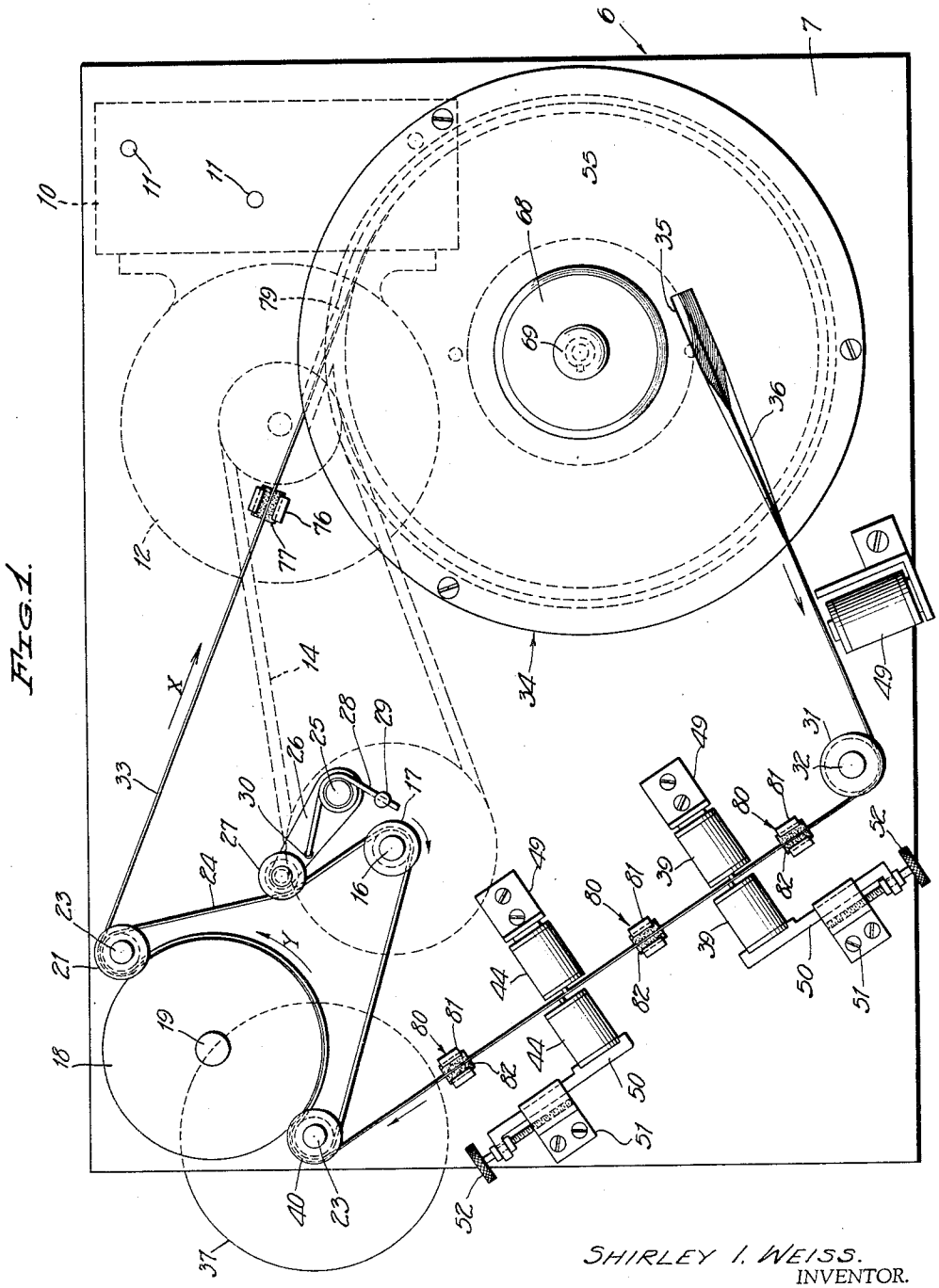


FIG. 1.

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FIG. 2.

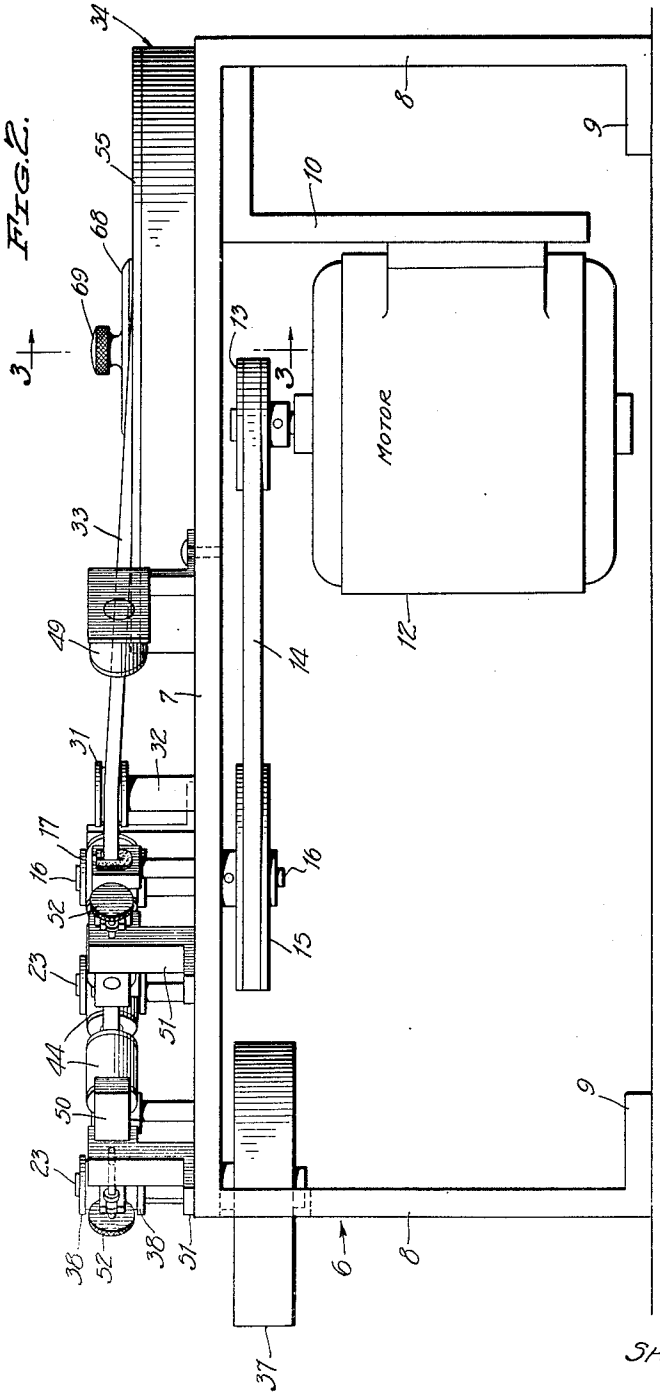
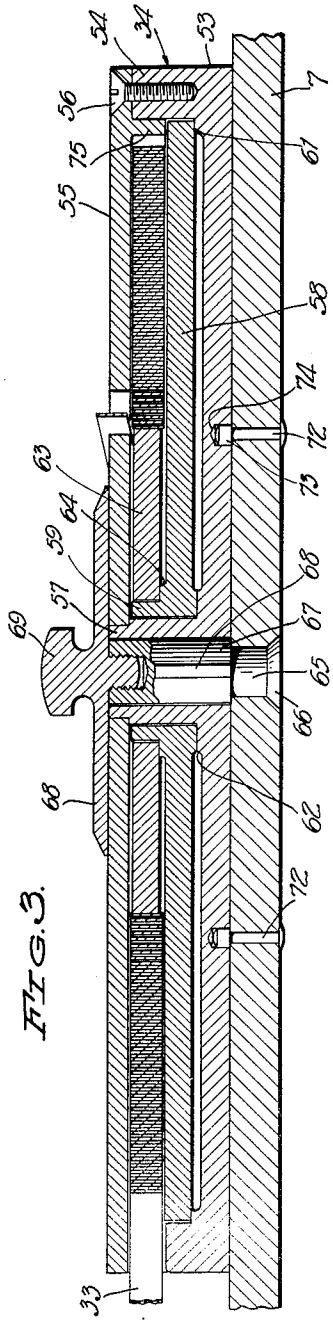


FIG. 3.



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FIG. 4.

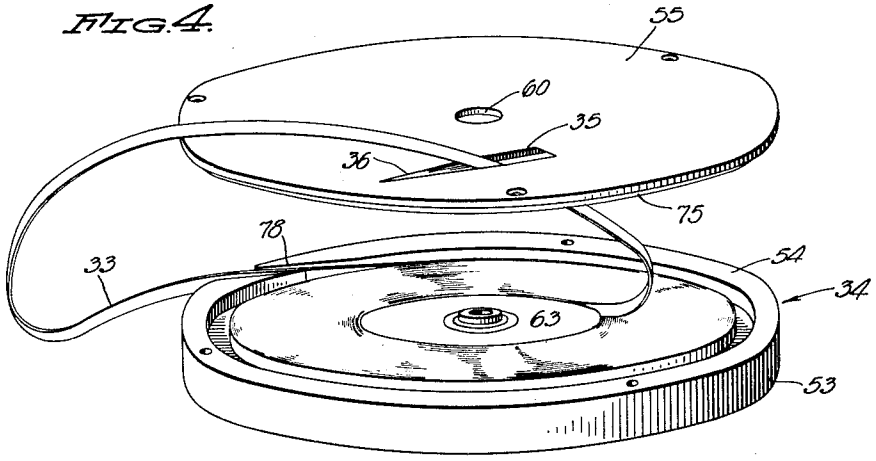
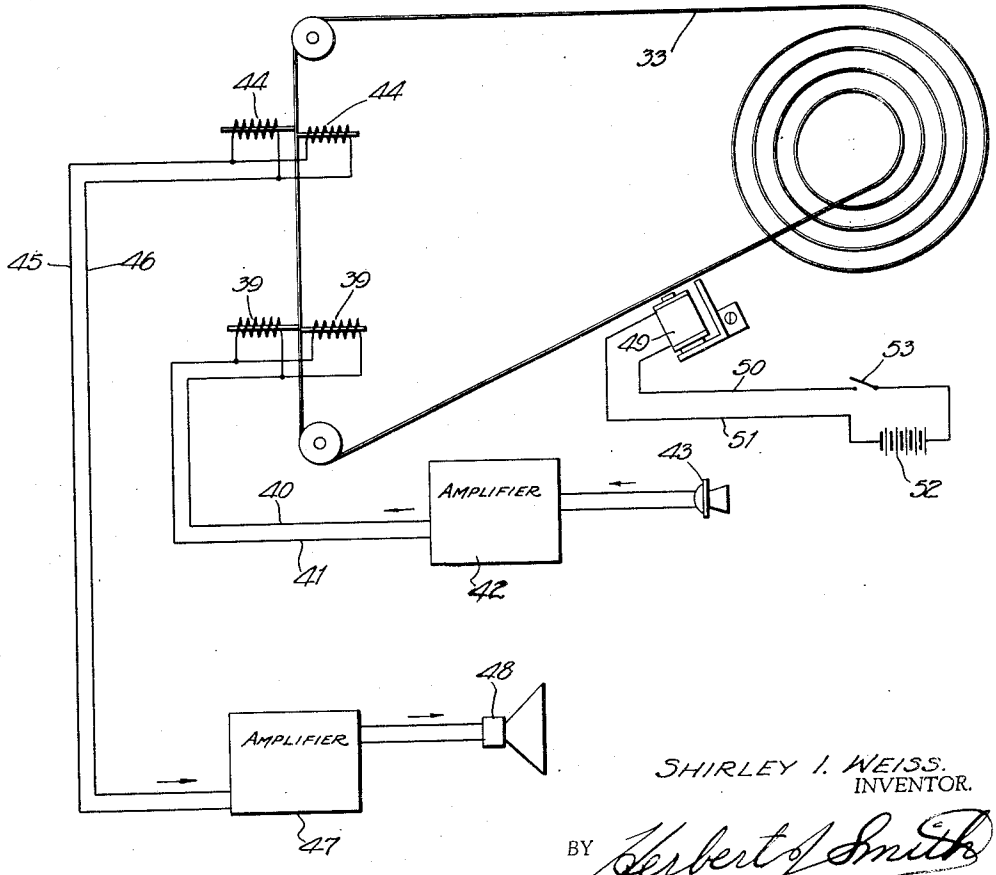


FIG. 5.



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2,288,983

TELEGRAPHONE DEVICE

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Application August 28, 1940, Serial No. 354,487

12 Claims. (Cl. 179—100.2)

This invention pertains to telegraphone devices and more particularly to a telegraphone device employing a continuous magnetizable material such as a tape, which magnetizable material is rolled on a spool confined in a magazine or housing.

Heretofore, a telegraphone device when using a tape, in contradistinction to a wire substantially round in cross section, on occasions, was rolled on a spool so that when it was removed the amount of tape on the spool was diminished in quantity as it unrolled to be fed onto another spool. This method of rolling the tape on the spool necessitated rewinding of the tape or magnetizable material back onto the original spool before another playing of the tape recording could be had. Therefore, the tape was not a continuous piece of material which could be played back without rewinding.

The present invention contemplates the use of a continuous, or endless magnetizable material or medium, which magnetizable material is wound on a spool which is enclosed in a magazine or housing so that recordings may be made on the magnetizable material, and the magazine with its enclosed magnetizable material may be shipped, such as through the mails or by express, and thereafter the magazine may be placed on a telegraphone recording device and the recording can be played continuously while the tape is moving in the same direction.

It is well recognized by men skilled in the art that magnetic tape recording may be produced with high fidelity in reproductive quality.

As an object the present invention contemplates among other things, a magazine having a stacked continuous magnetizable tape therefor, which magazine and tape may be merchandised in much the same manner as are Graphophone recordings in commercial use today.

It is further an object of the present invention to utilize a unitary magazine for housing a stacked continuous magnetizable material to be used on a magnetic tape machine such as a telegraphone.

A further object of the invention is to provide a magazine having a continuous ribbon in conjunction with a driving means connected externally of the magazine so that the moving parts within the magazine will not cause the tape therein to be set in motion.

A further object of the invention is to provide an apparatus for use in conjunction with a continuous magnetizable material, said apparatus having a driving means connected so as to pull the tape from the magazine.

A further object of the invention is to provide a telegraphone device employing an interchangeable magnetic tape magazine.

A further object of the invention is to provide a magazine being of compact structure for employing a continuous magnetizable tape which compactness is made by pancake geometry.

Further and other objects of the invention may be and may become apparent to those skilled in the art from a perusal of the drawings and annexed specification.

In the drawings:

Fig. 1 is a plan view of the device showing the relation of various parts in conjunction with the driving means, magazine, and the magnetizable material.

Fig. 2 is a side view of Fig. 1.

Fig. 3 is a sectional view taken along lines 3—3 of Fig. 2 showing the construction and the assembly of parts of the magazine in relation to its supporting frame.

Fig. 4 is a perspective view of the magazine having its cover removed to expose the stacked continuous magnetizable material, or tape loaded on a single spool between guiding closure means.

Fig. 5 shows schematically the magnetizable material in conjunction with the pick-up heads, reproducing heads, and magnetic saturating means in a simple electrical circuit.

Referring to the drawings and more particularly to Figs. 1 and 2, a telegraphone device has a base 7, with side frames 8 supported by small foot portions 9, which foot portions may be used for securing the telegraphone device in position in a cabinet if this particular feature is desirable. An angle iron 10 is secured to the underneath side of the base member or platform 7 by any convenient means such as screws or pins 11. A motor 12 has a pulley 13 which is connected by belt 14 to another pulley 15, which last mentioned pulley is connected to a stud 16 which has a spool 17 connected on the opposite end thereof, above the upper surface of the base or platform 7.

A tape drive roller 18 has a headed pin 19 centrally disposed therein, one end of said pin being secured to the base 7 so that the roller may be free to rotate on the pin. Spools 20 and 21 have pins 22 and 23 respectively centrally disposed therein, said pins having one end thereof secured to the base 7. The belt 24 is connected around spools or pulleys 17, 20, and 21 with the outside of the belt adjacent the tape-drive roller 18. A pin 25 has one end thereon secured to the

base 1. An arm 26 is loosely fitted on the pin 25 at one end and has a take-up roller 27 on the other end thereon, which roller engages the belt 24. A spring 28 fits over the pin 25 and has one end of said spring connected to a pin 29, which pin is secured to the base 1. The opposite end of the spring 28 is secured near the free end of the arm 26 so that the spring 28 may urge the roller 27 against the belt 24 to provide the necessary tension on the belt to secure a proper drive without slipping of the belt. A guide spool 31 rotates on a headed pin 32, one end of said pin being secured to the base 1.

The magnetizable material or tape 33 is fed into the magazine 34 in the direction shown by the arrow X. The inner layer of the stacked tape is fed through the slot 35, guide means 36, about the spoon 31, then around guide spools 20 and 21. It is pointed out that the roller 18 may be of any sufficient thickness so that the tape 33 will engage substantially one half of the outer working surface thereof. The tape is placed between the belt 24 and the working surface of the roller 18 while the take-up roller 27 keeps the belt 24 under tension. A fly wheel 37 is secured below the surface of the base 1 by means of a pin 22, which also carries the spoon 20. The spools 20, 21, and 31 are grooved so that the collars 38 are provided thereon, and act as a guide groove for the magnetizable tape. The take-up spool or roller 27 also has a groove therein.

Pick-up heads 39 (Fig. 5) are shown connected by means of conductors 40 and 41 to the output of an amplifier 42, the input of said amplifier being connected with the microphone 43. The reproducing heads 44 are connected by means of conductors 45 and 46 to the input of an amplifier 47, while the output of said amplifier is connected to a speaker 48. A saturating coil 45 has conductors 50 and 51, which are connected to a source of energy 52, shown as battery, through the switch 53.

It will be noted that the pick-up and reproducing heads each have one coil which is secured to the base 1 by means of an angular member 49. The opposing coil of the pick-up and reproducing heads are each slidable on a bracket 50, which bracket is slidable in the angular members 51 and is movable thereon by action of the knurled screw 52 in a conventional or any convenient manner.

The construction of the interchangeable magazine with its stacked tape is shown in an enlarged view in Fig. 3. A perspective of the magazine is shown in Fig. 4. A reference to Figs. 3 and 4 disclose that the magazine 34 has a bottom or closure member 53 with a rim 54 substantially therearound.

An upper closure or magazine top 55 fits onto the bottom member 53 and is held in place by screws such as 56. The bottom member 53 has a hub 57 which protrudes upwardly into a central opening 60 which is located in the top closure 55. A disc 58 has hub 59 which fits on the outside of the hub 57. The lower outer edge of the disc 58 rests on a riding surface 61 while the inner bottom of the hub 59 rests on a riding surface 62. The disc 58 is free to move depending on any force, such as the withdrawal of the tape 33. The tape spool or disc 63 has a central opening therein which engages the upper outside surface of the hub 59 while the lower inner portion of the spool 63 engages a riding surface 64 and the disc or spool 63 is also free to move depending on any force, such as the withdrawal of the tape 33 from the magazine 34.

A master stud 65 has a head 66 on the lower portion thereof which secures the upper portion of the stud 67 to the base 1 so that the stud 67 does not move. A key 68 on the outside of the stud engages a key-way in the hub 57 of the bottom closure 53 so that the bottom closure will remain stationary in relation to the base 1. A cap 68 has a threaded portion or male screw 69 which fits into the female threaded portion 70 by turning the knob 71 affixed to the cap 68. The magazine is thus held in place on the master stud 65. Positioning pins 72 are secured into the base 1 and have heads 73 which fit into holes 74, which holes are located in the lower closure or bottom 53. The pins 72 are used in addition to the master stud 65 to facilitate locating the magazine on the base portion and to aid in stabilizing the magazine when in operative position.

It will be noted that the tape 33 is stacked on the spool or disc 63 and when the closure 55 is secured to the bottom of the magazine the inner surface of the closure 55 and the upper surface of the disc 58 act as guide means for the stacked tape. A shoulder 75 is located near the outer edge of the closure 55 and fits snugly against the inner surface of the portion 54. The shoulder 75 prevents the possibility of the outer layer of tape from riding off the edge of the disc 58.

From the foregoing it will be seen that the spoon 63, the tape 33, and the disc 58 are free to move in relation to each other and in relation to the upper and lower closures of the magazine. The small opening or slot 35 in the upper closure leads into a guide groove 36, while an opening or slot 78 permits the outer layer of the stacked tape to enter the magazine chamber. A corresponding slot in the shoulder 75 is adjacent the slot 78 and is shown dotted as 79 in Fig. 1.

The stacked tape in relation to the magazine will, in operation, be drawn from the inner layer of the stack, out through the groove 35 causing the spool 63 to rotate having a peripheral speed substantially equivalent to the speed of movement of the tape as it is withdrawn. It will be noted that the inner layers of the tape are somewhat spaced while the outer layers of the tape are more closely together. As the tape is withdrawn, the disc 58 will acquire substantially a given speed of rotation, but may vary as necessitated by the action of the tape within the magazine. The speed of withdrawal of the magnetizable tape is practically constant while the speed of the tape entering the outside of the tape stack may vary.

Wiper means 80 have slotted studs 81, which studs are secured to the base portion 1 while a wiper member 82, such as felt or other suitable material, is held in the groove of the member 81 and engages the tape to properly wipe both sides of the magnetizable material to avoid any foreign particles from moving between the poles of the pick-up and/or producing heads which may cause a distortion in the fidelity of the record if said particles were to move between said pole pieces of the various heads.

In operation, the motor will rotate the driving pulley 15, which motor and driving pulley are linked by a belt. The magnetizable tape being placed between the tape feeding belt 24 and roller 18 will be moved at substantially a definite rate

when the pulley is rotated in the direction shown by arrow Y, caused by rotation of the spool 17 on the opposite end of the driving stud, which driving pulley stud supports the drive pulley 15. The fly wheel 37 being connected to the opposite end of pin 22 which carries guide spool 20, will revolve to stabilize the rate of movement of the magnetizable medium or tape. The fly wheel may be varied to any dimension or weight to suitably accomplish the work for which it was intended.

The take-up roller 27 will engage the tape feeding belt 24 to attain the desired tension on the belt. When the motor is in operation the magnetizable tape will be drawn through the guide 36 of the magazine, around the guide spools 31 and 20, between the belt 24 and roller 18, around guide spool 21, through the wiper stud 16, having the wiper 77 of any suitable material as previously explained for similar wiper means as 80, back into the outer layer of the stacked tape in the magazine 34. The rate of withdrawal of the tape from the magazine is at a substantially fixed rate while the rate of entrance of the tape to the magazine is always at a fixed rate when the tape is properly tensioned, but may be variable without effecting the signal quality recorded upon the tape. This feature is stressed since in actual operation, while the telegraphone is reproducing a recorded signal, the tape 33 may be gripped by the hand at the entrance of the tape into the magazine and held stationary momentarily while the tape, being drawn from the inner layer of the magazine, moves at a constant speed without distortion of reproduced signal. In actual practice, the flexibility of the machine has been shown by momentarily holding the tape being fed into the magazine while the signals were being impressed upon the magnetizable tape and no distortion of the signals was noted when they were reproduced.

Fig. 5 shows a few turns of the tape with the adjacent layers spaced one from the other to more clearly bring out the fact that the tape is a continuous piece of material.

Circuits shown in conjunction with the tape may be conventional or of any suitable design and are disclosed herein to show schematically the use of the interchangeable magazine in a complete telegraphone device.

When the interchangeable magazine is removed from the device, by unscrewing the knob 71 and lifting said magazine from the base 7, the tape which is removed from the guide spools and other parts is fed by hand into the magazine through the slot 78 until all of the slack has been taken up, leaving only a small section of the tape exposed. The tape then is suitably packed for shipping. As a unit it may be interchanged from one machine to another.

By using this method it is pointed out that records may be made on a tape and the packed magazine merchandised through conventional commercial channels.

The tape may be of any given length depending upon the rate of movement of the tape in normal operation and the duration of time for the recording. Consquently, the magazine may house a tape for recording for three, four, or five minutes or even longer if so desired.

One of the purposes of the invention is to provide a structure for the avoidance of cross-talk transmagnetization by differential velocity of the tape at different radii, which is made possible by withdrawing the tape of the inner radius of a spiral tape path which comprises a plurality of layers stacked one on another. The layers of tape having a smaller radius is withdrawn from the magazine in such a way as to have the center layers of smaller radius loosely engaging the layers having a greater radius. The end of the tape that is withdrawn is the means for rotating the stacked tape and the two revolving discs within the magazine, while the opposite end of the tape is fed into the magazine depending on the speed of rotation of the lower disc and the tape stacked on the spool.

The cross sectional view of Fig. 3 specifically shows that the outer layers of the stacked tape on the spool or disc 63 are engaging each other while the inner layers or those layers having the smallest radius are slightly spaced from each other. When the tape is withdrawn the innermost layer engages the outer surface of the spool 63 and as the innermost layer of tape is withdrawn from the magazine tension thereon will cause the adjacent inner layers to be spaced one from the other.

As the tape is withdrawn from the magazine the center spool 63 will usually rotate depending on the rate of withdrawal of the tape from the magazine, while the lower disc 58 will move at varying speeds since the tape stack generally is supported by the disc 58 when the magazine is placed in a horizontal position as shown in Fig. 2.

Since the magazine may be supported in a telegraphone in any convenient position no definite relationship of speed is stated because it is obvious that the engagement of the tape with the disc 58 will have a definite bearing on the rotational speed of the lower disc. To avoid cross talk transmagnetization due to stacking of the layers it is desirable to avoid as much as possible a fixed relation with one layer of the tape to another layer of the tape and this is done by withdrawing the tape from the inner layer having the loosely spaced layers in the center. The outer layer of tape or slack is drawn into the magazine by rotation of the lower disc and/or the layer of stacked tape adjacent the outer layer of the entire stack. In this manner the adjacent layers of tape move at somewhat different speeds and there is a reduction in that cross-talk transmagnetization.

While certain aspects of the invention have been shown in detail, it is understood that the invention is not confined to the specific disclosure presented herein and all equivalents are intended to be included as embraced by the subjoined claims.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a telegraphone device having a continuous flat magnetizable tape, a magazine having guide means to conduct said tape into a spiral path within the magazine, driving means to withdraw said tape from the inner radius of said spiral path, and rotatable means to decrease the radial pressure between the adjacent turns of said tape near the inner radius of said spiral path to prevent the tape from binding when said tape is being withdrawn from the magazine.

2. In a telegraphone device of the class described utilizing a flat tape of magnetizable material wound in a spiral configuration, a magazine for housing said flat tape, guide means in said magazine to permit ingress and egress of said tape into and out of the magazine, and means comprising freely rotatable constraints for said

spiral configuration of the tape for decreasing the radial pressure between the adjacent turns of the tape at the inner radius thereof.

3. In a telegraphone device, a continuous magnetizable tape, a tape drive roller engaging one side of the magnetizable tape, a tape drive belt engaging the other side of the tape urging said tape against the tape drive roller, drive means to cause movement of said tape drive belt, and a fly wheel rotatably mounted having means to engage the tape drive belt to stabilize the feeding of the tape.

4. A tape magazine for a telegraphone device utilizing a continuous magnetizable tape, said magazine comprising a lower portion and an upper portion, the lower portion having a centrally located hub extending inwardly thereof, a disc freely rotatable on said hub and having a separate hub engaging the outside of said first hub, a second disc freely rotatable on said second hub, and means to secure the upper portion on the magazine to the lower portion of the magazine.

5. A telegraphone device of the class described having a tape drive roller, a tape drive belt, a magnetizable tape intermediate said tape drive roller and said tape drive belt, and take-up means for the tape drive belt to cause the belt to urge the magnetizable tape against the tape drive roller so that movement of the tape drive belt will cause movement of the magnetizable tape.

6. In a telegraphone device of the class described utilizing a continuous tape of magnetizable material, a magazine for said tape to hold same in a spiral path with adjacent convolutions of said magnetizable tape being substantially contiguous with one another, means to withdraw said tape from the inner radius of said spiral path, rotatable means contiguous with the tape to decrease the radial pressure between the adjacent turns of said tape at the inner radius of said spiral path and spaced sound recording and reproducing heads each having an independent core engaging the magnetizable tape to either record or produce a magnetic sound record while the device is in operation.

7. A magnetic sound device of the class described having a closed loop of magnetizable material with a plurality of convolutions in spiral configuration located in a magazine, freely rotatable constraints within the magazine for confining and permitting movement of the spiral magnetizable material when the device is in recording or reproducing operation, drive means to cause movement of said magnetizable tape out of and into said magazine, sound recording and reproducing means each having at least one pole piece which is in intimate engagement with the magnetizable material, an eradicating head which is normally spaced from the magnetizable material when the magnetic sound device is in reproducing operation, amplifier means circuitously connected to said sound recording and reproducing means, means for impressing signals upon said recording amplifier, and means for reproducing signals of the amplifier connected to the reproducing means.

8. In a telegraphone device of the class described utilizing a continuous metallic tape, an interchangeable magazine having freely rotatable constraints therein for said metallic magnetic tape, a base for mounting said magazine thereon stud means on said base to centralize the magazine in relation to the base and positioning means on the base engaging a portion of the magazine to properly align and stabilize said magazine when the telegraphone device is in operation.

9. A magnetic sound device of the class described having a closed loop of magnetizable material with a plurality of convolutions in spiral configuration located in a magazine, freely rotatable constraints within the magazine for confining and permitting movement of the spiral magnetizable material when the device is in reproducing operation, drive means to cause movement of said magnetizable tape out of and into said magazine, sound reproducing means having at least one pole piece which is in intimate engagement with the magnetizable material, amplifier means circuitously connected to said sound reproducing means, and reproducing means connected to the amplifier for reproducing the amplified signals.

10. In a telegraphone device of the class described employing stacked layers of flat magnetizable material, a magazine of substantially non-magnetic material for storing the magnetizable tape therein, said magazine comprising a pair of constraints for said tape at least one of which is freely rotatable with respect to said magazine and forming an annular chamber within said magazine for unconstrainedly receiving spirally-wound convolutions of said flat magnetizable material for storing thereon a magnetic intelligence signal.

11. A telegraphone device of the class described utilizing a removable magazine for storing stacked layers of flat magnetizable material, a magazine for storing said tape, a base for supporting said magazine, complemental means on said base and said magazine for locating said magazine in a predetermined stationary position in relation to the base, a pair of freely rotatable substantially non-magnetic constraints within said magazine forming an annular chamber between said rotatable constraints and said magazine housing, whereby the rotatable contraints within the magazine will be freely movable when the telegraphone device is in operation, and the magazine may be removed and replaced when the telegraphone device is not in operation.

12. A telegraphone magazine for storing a continuous loop of stacked magnetizable tape for use in conjunction with a magnetic signal storage device, said magazine having an outer shell of substantially non-magnetic material with at least two apertures therein, one of said apertures being located toward the edge of the shell and the other of said apertures being located nearer the center of said shell, a rotatable member made of substantially non-magnetic material being pivotally disposed within said shell and a rotatable spacing means revoluble about the same axis as said first rotatable means, whereby a continuous loop of flat magnetizable tape used for storing signal intelligence thereon may be housed within said magazine with a portion of said loop being disposable externally of said magazine through the two apertures.

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