

Sept. 30, 1947.

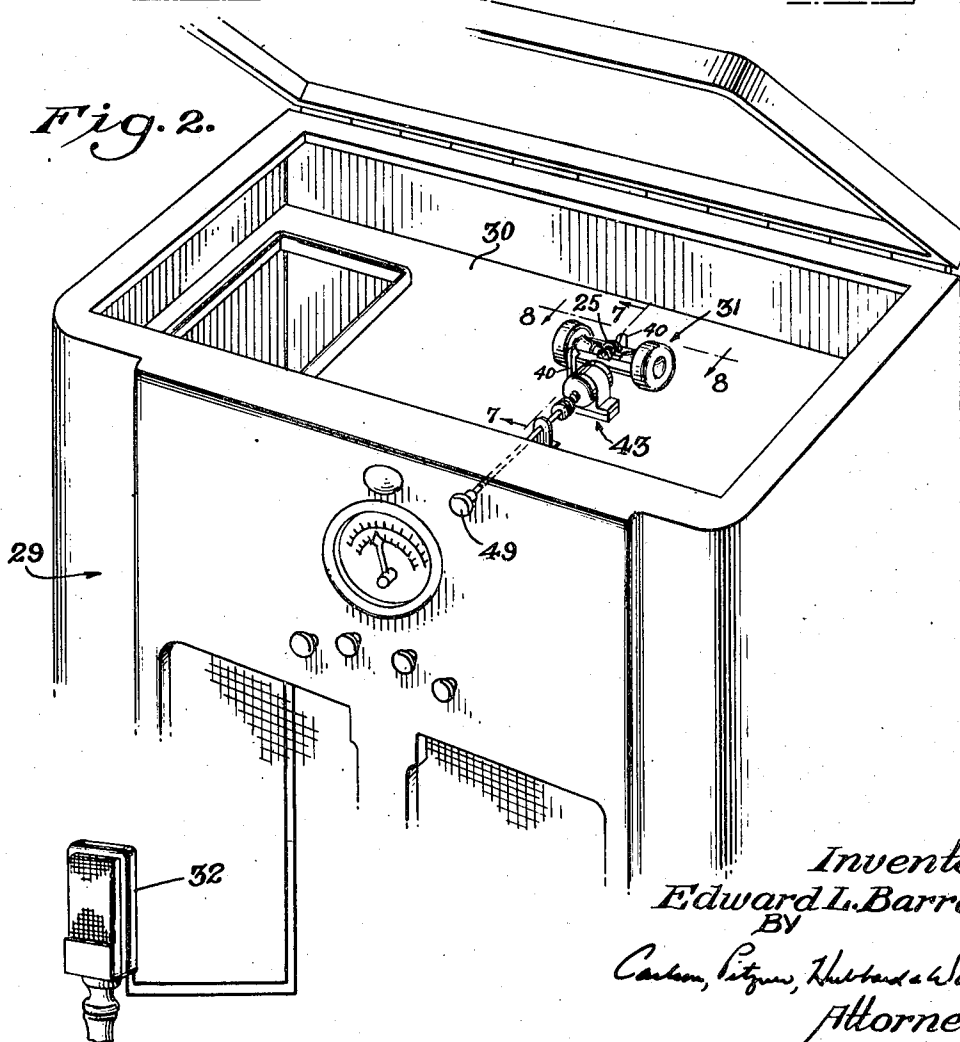
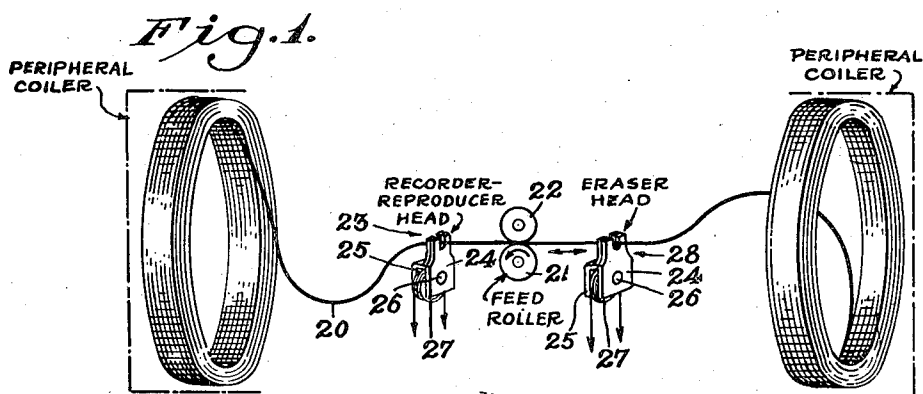
E. L. BARRETT

2,428,002

WIRE TYPE RECORDING AND REPRODUCING APPARATUS

Filed March 9, 1945

4 Sheets-Sheet 1



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E. L. BARRETT

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WIRE TYPE RECORDING AND REPRODUCING APPARATUS

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4 Sheets-Sheet 2

Fig. 3.

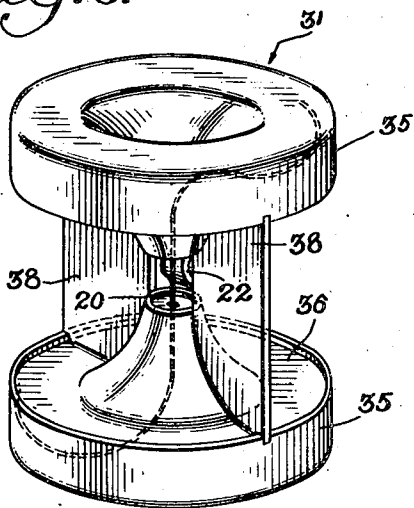


Fig. 4.

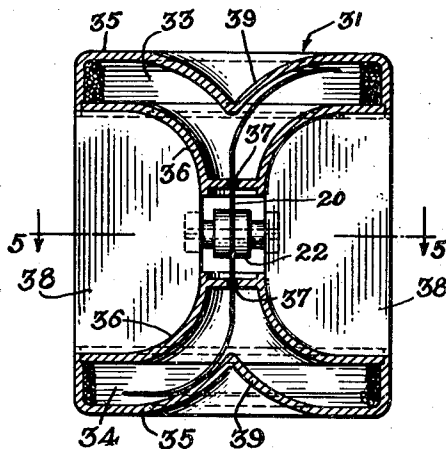


Fig. 5.

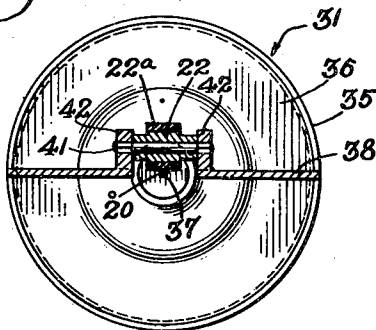


Fig. 6.

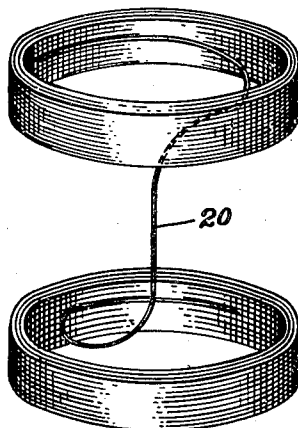
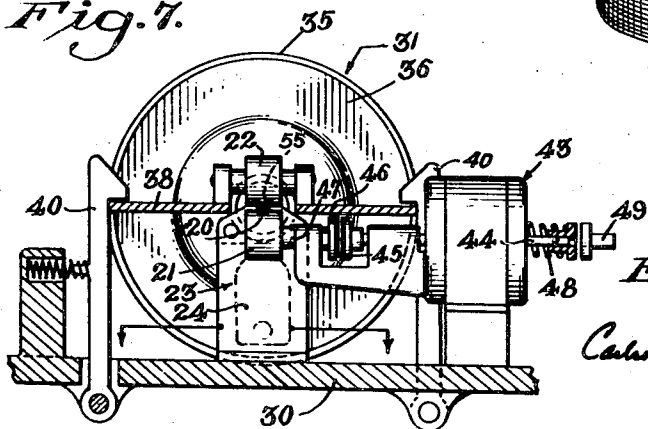


Fig. 7.



Inventor
Edward L. Barrett
BY
Carlson, Fitzgibbon, Hubbard & Wolfe
Attorneys.

Sept. 30, 1947.

E. L. BARRETT

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Fig. 8.

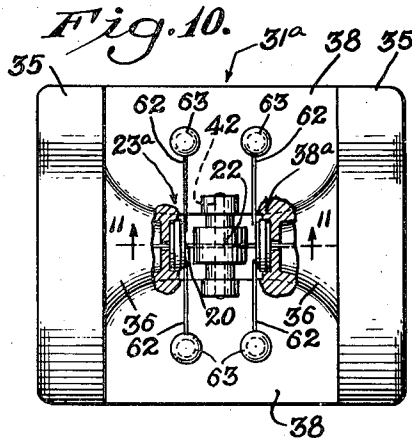
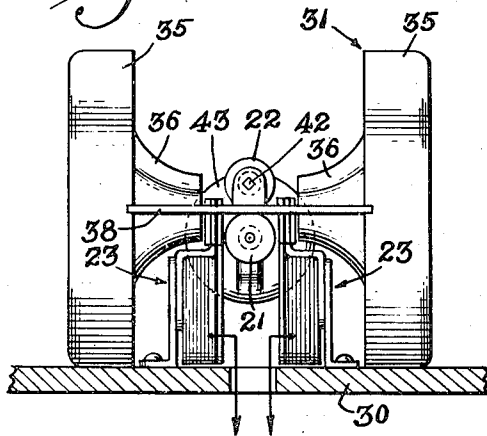


Fig. 9.

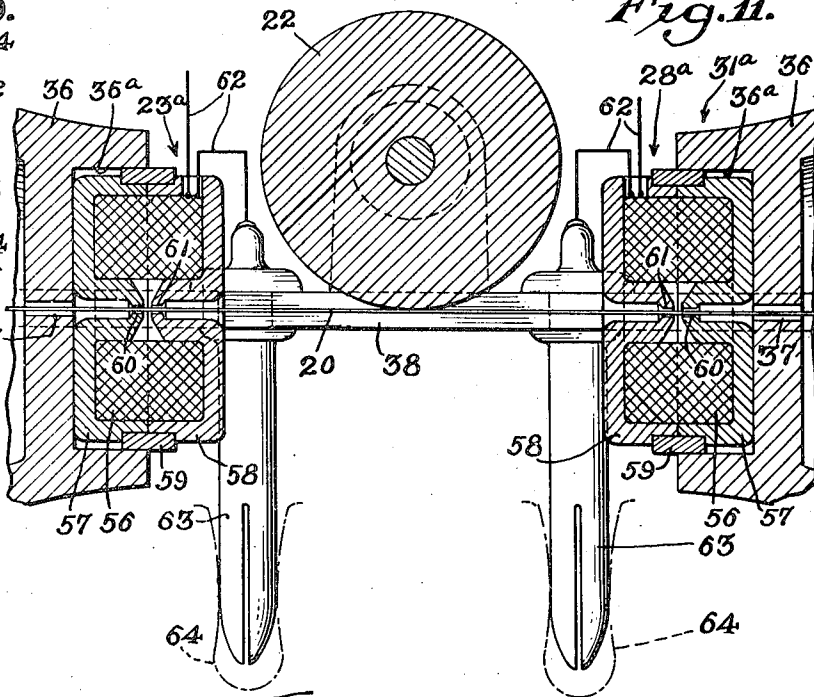
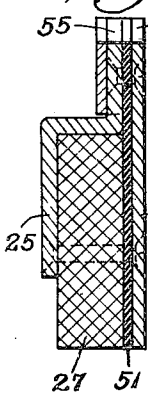


Fig. 11.

Inventor
Edward L. Barrett

By
Carlson, Peterson, Hubbard & Wolsky
Attorneys.

Sept. 30, 1947.

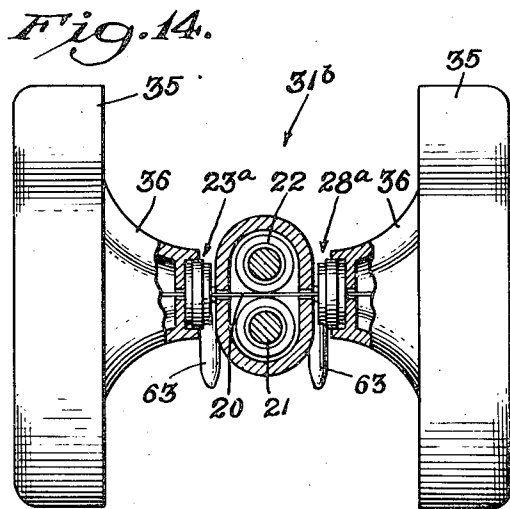
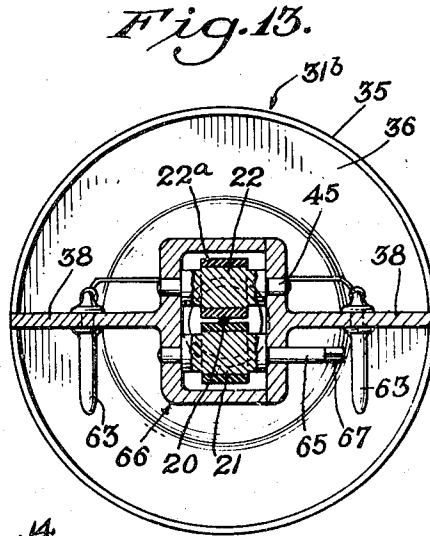
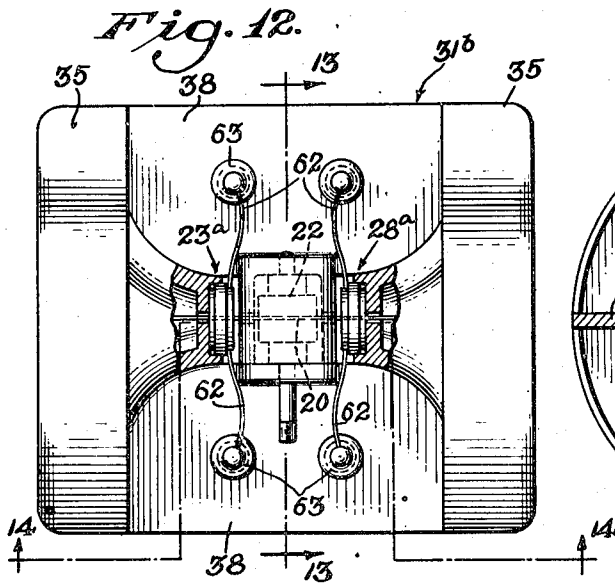
E. L. BARRETT

2,428,002

WIRE TYPE RECORDING AND REPRODUCING APPARATUS

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4 Sheets-Sheet 4



Inventor
Edward L. Barrett
BY

Carlson, Pitman, Hubbard & Wolfe
Attorneys.

UNITED STATES PATENT OFFICE

2,428,002

WIRE TYPE RECORDING AND REPRODUCING APPARATUS

Edward L. Barrett, Oak Park, Ill., assignor to
Edward L. Barrett and Ann K. Barrett, co-
partners, doing business as Barrett-Keenan
Company, Oak Park, Ill.

Application March 9, 1945, Serial No. 581,853

20 Claims. (Cl. 179—100.2)

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The present invention pertains to the art of so-called "wire recording" or "magnetic wire recording." Machines in this field have heretofore been provided in which sound is recorded magnetically on a moving wire or filament, a paramagnetic wire being subjected to a magnetic field varied in accordance with the sound wave which is to be recorded. Thereafter the sound wave may be reproduced by subjecting a reproducer pickup device to the magnetic field emanating from the permanently magnetized wire as the latter is moved at recording speed past the pickup device. In most instances a winding is provided on a core presenting a pair of pole pieces past which the record wire is moved; and this same winding is utilized alternatively either in recording or reproducing, the coil being energized to produce a magnetic field between the pole pieces and through the record wire for magnetizing the latter during recording, and the flux emanating from the magnetized record wire being used to pass a varying flux through the pole pieces and thereby induce a potential in the winding during reproduction. Such a winding and pair of pole pieces may conveniently be termed a recorder-reproducer head.

The general object of the present invention is to make it possible to do away with the complicated system of motor-driven reels currently employed for moving the record wire or filament past the head during either recording or reproduction.

To appreciate the significance of that object it should be borne in mind that the system of wire reeling now employed is complicated indeed. It customarily entails the use of two motor-driven reels, on one of which the wire is wound up and from the other of which it is unwound. Speeds and tension must be regulated with such nicety that the recorder wire, which is in fact a fragile filament only 0.004 of an inch or less in diameter (about the size of a human hair), shall speed through the recorder at some 2½ feet per second or faster, remain taut and straight as it passes through the recorder or reproducing device, and be layer wound, without kinking or snarling. Least deviation from the exacting conditions imposed results in a broken or hopelessly tangled wire which in most cases means a lost record. Moreover, the whole system of moving parts must be braked to a standstill almost instantly (again without jerking or snapping the wire) for the requisite repeated stopping and starting of the machine. That such a contrivance with its numerous moving parts, reels, reel drives, brakes,

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tension and speed regulation devices, level winders, etc., should be expensive is hardly surprising.

What I aim to do is to dispense with that whole mechanism.

I have discovered that, despite its pliancy and fragility, it is possible to shove the record wire or filament endwise by means of a motor-driven friction roller or the like acting directly on the filament and thereby thrust the latter into what, for convenience, may be aptly termed a "peripheral coiler." The latter has no moving parts so that it is extremely simple to construct. The term "peripheral coiler" has been used herein to designate a device comprising a container or the like presenting a stationary surface or surfaces located to confine peripherally a coil of resilient wire or the like placed in it. The coiler serves not only to retain in coiled form a coil once made, but also participates in the actual formation of the coil even though the coiler is stationary. As the wire is thrust into such a coiler the wire is forced, by contact with the coiler surfaces, and under the urging of the wire's own resiliency, to coil up in successive convolutions. Such a "peripheral coiler" is to be contrasted with and distinguished from spool or core type coilers or reels in which a wire or the like is wound or reeled onto the spool by rotation of the latter. The characteristics of the "peripheral coiler" contemplated will be further evident from the detailed description which follows of certain exemplary embodiments of the same.

A further object of the invention is to provide a self-contained cartridge or package, containing the record wire, and which can be inserted in and taken out of the machine in which it is used with the same facility as an ordinary phonograph record and manufactured at comparable cost.

Still another object is to provide a recording-reproducing machine adapted to utilize a cartridge type wire record.

The invention also resides in various structural improvements in certain elements of the mechanism as will hereinafter appear in greater detail.

Further objects and advantages of the invention will become apparent as the following description proceeds, taken in connection with the accompanying drawings, in which:

Figure 1 is a schematic illustration of the recorder wire feed mechanism illustrating the general layout and certain operating characteristics of apparatus embodying the present invention.

Fig. 2 is a fragmentary perspective view of

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a home recording apparatus equipped to embody the present invention.

Fig. 3 is a perspective view of a wire record cartridge included in the installation of Fig. 2.

Fig. 4 is a longitudinal sectional view of the cartridge of Fig. 3.

Fig. 5 is a transverse sectional view of the cartridge taken substantially along the line 5—5 in Fig. 4.

Fig. 6 shows the configurations of the recorder wire within the cartridge of Fig. 3.

Figs. 7 and 8 are enlarged detail sectional views taken substantially along the lines 7—7 and 8—8 respectively in Fig. 2.

Fig. 9 is an enlarged detail vertical sectional view of the recorder head included in the apparatus of Figs. 7 and 8.

Fig. 10 is a plan view, partially in section, of a modified form of cartridge embodying certain aspects of the present invention.

Fig. 11 is an enlarged fragmentary vertical sectional view taken substantially along the line 11—11 in Fig. 10.

Fig. 12 is a plan view of still another form of cartridge embodying certain aspects of the present invention.

Fig. 13 is a transverse sectional view of the cartridge of Fig. 12 being taken substantially along the line 13—13 of Fig. 12.

Fig. 14 is a front elevation of the cartridge of Fig. 12, being taken partially along the section of line 14—14 in Fig. 12.

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawings and will herein describe in detail certain preferred embodiments, but it is to be understood that I do not thereby intend to limit the invention to the specific mechanisms illustrated, but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

Referring more particularly to the exemplary embodiment of the invention illustrated in the drawings, reference may be made first to the schematic showing in Fig. 1 for an understanding of the general plan employed. As there indicated, a record wire or filament 20 is led between the bite of a pair of friction type feed rollers 21, 22. By motor driving one of these rollers at constant speed the wire is shoved endwise at such constant speed through a "recorder-reproducer head" 23. Opposite end portions of the wire are stored in a pair of "peripheral coilers" as indicated. As the wire is pulled out of one it is fed into and coiled up in the other. The layout shown being symmetrical, feed may be in either direction.

The head 23 may take various specific forms, certain examples of which are hereinafter detailed. By way of generalization, however, it may be noted that such heads commonly embody a pair of pole pieces, and in the particular novel head 23 shown in Fig. 1 these pole pieces are 24 and 25 being linked by a core 26 embraced by a winding 27. The record wire 20 passes between these pole pieces 24, 25. During recording the winding 27 is excited in accordance with variations in the sound wave to be recorded so that the flux passing between the pole pieces 24, 25 and through the portion of the record wire 20 which joins them also varies in accordance with the sound wave. Consequently, the record wire is permanently magnetized along its length with a pattern of magnetization constituting a record

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of the sound wave. During the reproduction the record wire may be passed by the same pair of pole pieces so that the flux emanating from the permanently magnetized wire induces a potential in the winding 27 varying in accordance with the pattern of magnetization. The potential in the winding 27 is of course suitably amplified and used to operate a loud speaker or the like.

By locating the feed rollers 21, 22 closely adjacent the recorder-reproducer head 23 a constant speed of the wire with reference to the head is assured through maintenance of constant speed for the feed rollers. Such being the case, it is of no moment whether or not there be variations in the diameter of successive convolutions of the wire as it is coiled up since in the present apparatus that is not a factor determinative of the speed of passage of the wire past the recorder-reproducer head. Consequently, all provisions for level winding may be dispensed with. To put it another way, the speed at which the record wire passes the head is determined directly by the speed of a feed mechanism acting on the wire immediately adjacent the head and not upon the speed of some device which reels in the wire.

A second head 28, structurally identical with the recorder-reproducer head 23 if desired, may be provided and is designated in Fig. 1 as the "eraser head." During recording its winding is excited with alternating current of a frequency well above the audible range as, for example, 25,000 C. P. S. This insures that the wire is cleared of any magnetization that would interfere with recording immediately prior to the time the wire enters the recorder head. Of course, during reproduction the eraser head is deenergized. If at any time it is desired to clear the wire to condition it for a new recording it is only necessary to pass it through the eraser head with the latter excited. Both recorder-reproducer heads and eraser heads are, as such, well known in the art and constitute more or less standard equipment in the present apparatus. Certain specifically novel and improved forms of heads are, however, disclosed herein at a later point.

The recorder wire 20 is extremely fine in size. A diameter of 0.004 inch has heretofore been common and more recently even smaller sizes of 0.003 inch or less have been used. The primary requisite for the wire is of course that it be paramagnetic, that is, capable of permanent magnetization. Steel piano wire has heretofore been used as well as various steel alloys. For present purposes, the elasticity or resiliency of the wire are also important in that a peripheral coiler cannot be used with so completely limp a strand as a piece of string. Whereas resiliency is a disadvantage with spool type reels heretofore used, that characteristic common to paramagnetic wires available has been put to advantageous use here. In that connection, however, it is to be borne in mind that even steel in such fine strands as herein contemplated is very pliant.

I have discovered that even such a hair-like filament as recorder wire of the class here in question can be successfully coiled in, and uncoiled from, a peripheral coiler. The most unexpected aspect of that discovery lies in the fact that hundreds or even thousands of turns of such filament can be shoved into a peripheral coiler with the convolutions of the coil lying in random fashion, and yet pulled out again without kinking or snarling. Nor does violent shaking

of the coiler with the loosely received and random coiled mass of wire in it snarl or kink the wire. Such handling of thousands of feet of fine wire might naturally be expected to result in a hopeless tangle, but such is not the case. On the contrary it feeds smoothly and easily through the apparatus disclosed.

In actual installations wire record apparatus of the general type in question is used for any one of a wide variety of purposes such as in home recording sets, dictaphones, telephone circuit monitors, etc. Simply by way of example, a typical home recording installation has been indicated in Fig. 2 wherein a conventional radio cabinet 29 has a top panel 30 supporting an apparatus embodying the present invention and which stores and feeds the record wire.

The principal elements of the apparatus mounted on the panel 30 are, as indicated in Fig. 1, a head, a pair of peripheral collars with a record wire led between them and a feed roller for feeding the wire from one collar to the other past the head. For convenience in handling the wire in removing and replacing the same with a new length, some or all of the several elements noted, in addition to the wire itself, may be made readily detachable from the panel 30 so they can be lifted off for replacement as a unit. Just how many of the elements are included in the replaceable unit, and how many are permanently built into the machine, depends in large measure on how the makers of the units and machines respectively wish to merchandise them.

In the installation shown in Fig. 2, and in somewhat greater detail in Figs. 3 to 9, the two peripheral collars are constituted by portions of a removable cartridge 31, containing the record wire 20. The heads and motor-driven feed roller are, on the other hand, built into the radio cabinet. Certain others of the numerous available lines of separation between elements, for purposes of wire replacement, are illustrated in Figs. 10 to 14 and are described at a later point.

In the use of the outfit shown in Fig. 2, sound picked up by a microphone 32 is recorded magnetically on the wire of the cartridge 31. Thereafter the recording may be played back on the audioamplifier circuit of the radio set. Since the circuits for exciting the head 23 during recording, and for exciting the amplifier circuit from the head during reproduction, are both well known and in any event form no part of the present invention, they have not been illustrated.

Turning now to the detail of the particular cartridge 31 shown in Figs. 3 and 4, it comprises a casing defining two generally annular, axially aligned, storage chambers 33, 34 for the respective opposite end portions of the record wire 20. The casing structure comprises a pair of opposed, generally cup-shaped end members 35, to each of which is fixed a tapered closure member 36. In the opposed ends of the latter are aligned guide throats 37 through which the wire 20 is threaded. The members 36 are joined by rigidly attached fins 38 which thus unite the two assemblies 35, 36 as a single unitary structure. The unit as a whole thus has an hour-glass shape.

The end portions of the record wire 20 are bundled in patterned configuration, in this instance coiled, in the chambers 33, 34, the resiliency of the wire urging the convolutions or loops of the coils outward against the side walls of the members 35 which confine them peripherally. If desired, the centers of the end members 35 may be indented in the form of generally conical em-

inences 39 as shown (Fig. 4) to aid in guiding the entering wire into the coil in the corresponding chamber.

It is to be observed that the inner walls of the cartridge defining the chambers 33, 34 are smooth throughout, being shaped as surfaces of revolution about the respective longitudinal axes of these chambers. These latter axes pass through the entrance throats 37, being aligned in the present instance. The shape of the cartridge casing structure is such as to lend itself readily to low cost fabrication from molded plastic, glass, sheet metal or combinations of such materials.

The portion of the record wire 20 lying between the throats 37 is, as will be seen in Figs. 3 and 4, exposed so that when the cartridge is installed on a machine as in Fig. 2, this exposed portion of the wire may pass through the heads 23, 28 and be engaged in the bite of the rollers 21, 22. Spring biased latches 40 (Figs. 2 and 7) projecting upward through apertures in the panel grip the edges of the cartridge fins 38 and releasably hold the cartridge 31 in position during use.

In the particular cartridge shown in Figs. 3 to 7 an abutment for coaction with the motor-driven roller 21, in this case the upper roller 22, constitutes a part of the removable cartridge itself. This roller 22 may desirably have a rubber covering 22a (Fig. 5) and is journaled on a pin 41 fixed in a pair of lugs 42 rising from respective ones of the fins 38, the roller being disposed between the spaced inner edges of these fins. This roller 22 thus constitutes an abutment against which the wire 20 is pressed by the companion feed roller 21 when the cartridge 31 is latched in place on the machine.

A preferred form of motor drive for the feed roller 21 is shown in Fig. 7. As there indicated, a small constant speed electric motor 43 is fixed in the machine adjacent the mounting point for the carriage as, for example, beneath the top panel 30 in the machine of Fig. 2. This motor has a shaft 44 carrying a friction disk 45 on one end opposed to a complementary friction disk 46 on a shaft 47 carrying the roller 21. The motor shaft 44 is urged by a spring 48 outward into position in which the disks 45, 46 are disengaged. The motor 43 normally runs continuously and to start the recorder feed the operator has only to press inward on a push button 49 at the outer end of the motor shaft 44 so that the disk 45 is pressed into driving engagement with the companion disk 46. Release of the button 49 permits the motor shaft 43 to spring outward again, interrupting the drive to the feed roller 21. The latter may be made of some light material such as aluminum to minimize its inertia and hence its overrun upon stopping. The feed roller 21 itself is journaled on a support 50 on the panel 30 so as to be exposed for contact with the wire 20 above it.

As the motor driven roller 21 revolves the recorder wire 20 is shoved endwise as, for example, from the cartridge chamber 33 into the other chamber 34. In passing, it is to be observed that to feed the wire in the opposite direction it is only necessary to reverse the motor 43 or else to lift the cartridge 31 off of the machine and reinsert it with the cartridge turned end-for-end. As the wire is shoved into one of the chambers 33, 34 by the feed roller 21 it is directed outward toward the side wall of the end member 35 by the conical protrusion 39 in the center of the latter and coils up in successive convolutions as shown (Figs. 4 and 6). The resiliency of the wire tends

to bulge the convolutions of the coil outward into contact with the confining side wall of the container. By merely confining the coil peripherally as the wire is progressively shoved into the chamber, a coil is automatically formed. Hence the name "peripheral coiler." It will be observed that no reel or other moving part is required.

The relative direction of coiling in the two chambers 33, 34 is of importance in assuring smooth operation. As best shown in Fig. 6, the coils in the two chambers are each wound in the same direction as viewed from the respective entrance ends of such chambers. Thus in Fig. 6 both coils are wound counterclockwise as viewed from the entrance ends of their respective chambers. Since the two chambers are axially aligned in this instance, when the coils are viewed simultaneously from any one end of the cartridge they are seen to be oppositely wound with respect to each other. As a consequence of such relative direction of winding for the two coils, the twist imparted to the wire as an incident to pulling it out of one coil is precisely the opposite of the twist imparted in laying it down in the other coil. Any tendency to kink or snarl the wire as an incident to use of a peripheral coiler, as such, is thus compensated for by the described interrelation of the direction of coiling in the two collers.

In the use of the cartridge 31 it is latched in place on the panel 30 by the fingers 40. These latch fingers urge the cartridge downward so that the idler or abutment roller 22 presses the wire 20 against the underlying motor driven feed roller 21. The portions of the record wire on opposite sides of the rollers 21, 22 are received in the slotted upper ends of the heads 23, 28. When so installed the user has only to institute the motor drive for the roller 21 by pushing the button 49 to feed the wire from one cartridge chamber to the other through the heads. Particularly significant is the fact that upon releasing the button 49 to interrupt the motor drive, the record wire 20 stops moving substantially instantaneously thus eliminating the necessity for any brake mechanism. Such instantaneous stoppage results from the fact that the inertia of the short portion of the hair-like record wire which is actually moving at any particular time is so small as to be completely negligible. Extremely accurate start-stop control is thus made possible with the simplest of apparatus.

As heretofore noted, the two heads 23 and 28 are fixed to the panel 30 in position for coaction with the portion of the wire 20 between the throats 37 of a cartridge 31 latched in position above the heads. The heads are disposed on opposite sides of the motor drive feed roller 21 in close proximity to it (Fig. 8). Since the two heads may be identical, a description of one will suffice for both.

As best shown in Figs. 7, 8 and 9, the head 23 comprises a pair of sheet metal plates made of ferromagnetic material and which constitute the respective pole pieces 24, 25. Sandwiched between these plates is a sheet of mica or other non-magnetic material 51. The upper ends of the plates are secured together by non-magnetic rivets 52 passing through the same and through a reinforcing strap 53. The lower end portion of the member 25 is offset outwardly to provide space for the winding 27 which encircles a magnetic core member 26 staked between the lower portions of the members 24, 25. The upper ends of the members 24, 25 are notched, as indicated

at 54, 55, to receive the record wire 20 (Figs. 7 and 9). When the cartridge 31 is inserted in the machine, the record wire drops into the notches in the upper ends of the heads.

If desired, the head or heads employed may be made a part of the removable cartridge, rather than of the machine to which the latter is applied. A modified cartridge 31a of such character is shown in Figs. 10 and 11. The same reference numerals have been used to identify parts matching those of the cartridge 31 heretofore described. Since the casing structure is the same, further detailing of it is unnecessary. The principal point of differentiation is that the heads, in this instance a recorder-reproducer head 23a and an eraser head 28a, are built directly into the cartridge. And since they do not have to be removed from the wire 20 upon removal of the cartridge from the machine, a toroidal form of head having superior operating characteristics is employed, even though the cost of the cartridge is somewhat increased. It will be understood of course that the record wire is coiled in the peripheral collers defined at opposite ends of the cartridge casing just as before and passes over an abutment roller 22 matching in mounting and construction the similar abutment roller of the cartridge 31 heretofore described.

Each of the heads 23a, 28a comprises an annular winding 56 (Fig. 11) received within a toroidal housing split into two complementary cup-shaped sections 57, 58 and made of ferromagnetic material. Bands 59 encircle the housing sections at their lines of juncture to hold them in assembled relation. The edges of the housing sections 57, 58 bordering the open centers of the toroids are spaced apart to define pairs of spaced annular pole pieces. Moreover, these housing edges are preferably flanged, as indicated at 61, such flanges being narrow in an axial direction so as to minimize the area of contact of the pole pieces with the record wire 20 which passes through them.

The heads 23a, 28a are pressed into annular recesses 36a in the opposed ends of the casing members 36, the axial openings in the centers of the heads being registered with the guide throats 37. The record wire 20 passes centrally through the axial openings in the heads and thence through the guide throats 37.

The leads 62 from the windings 56 are carried out to corresponding pin-type terminals 63 adapted to be plugged into female receptacles indicated by broken lines at 64. With such an arrangement latch fingers, like 40 heretofore described for the cartridge 31, may be omitted since the plugging in of the pins 63 holds the cartridge removably in place.

By using annular pole pieces on the heads 23a, 28a, each completely surrounding the record wire in a direction circumferentially of the latter, maximum uniformity of location of the magnetic field set up in the wire during recording is insured. In other words, the field set up in the wire is uniform circumferentially of the wire. Moreover, during reproduction there is always an air gap of minimum reluctance from wire to pole piece even though the magnetization of the wire is not entirely uniform circumferentially of the wire. These facts contribute to fidelity of recording and reproduction.

The central apertures defined by the annular pole pieces 60, 61 in the heads 23a, 28a are barely large enough to permit free passage of the record wire 20 so that there is a minimum of air gap

from pole piece to wire and hence minimum leakage of flux between the pole pieces outside the wire. On the other hand, since the pole pieces 60, 61 are very short in a direction axial of the wire, there is a minimum fringing of flux between the wire and pole piece at points along the wire outside the area or portion of the wire directly embraced by the pole pieces. This latter factor again contributes to fidelity of operation.

If it is desired to so fashion the cartridge that the record wire is completely sealed at all times, thus effectively protecting it from the atmosphere, the further modified cartridge construction of Figs. 12 to 14 may be employed. The cartridge 31b there shown is substantially like the cartridge 31a heretofore described except that both of the feed rollers 21, 22, rather than simply the abutment roller 22, are included in the cartridge or removable unit. Thus in the cartridge 31b the abutment roller 22 is journaled on a pin 41 as before, whereas the companion roller 21 is fixed on a pin 65 (Fig. 13) journaled in the sidewalls of a box-like housing 66 fashioned on the opposed edges of the fins 38 and completely enclosing the rollers 21, 22. The outer end of the roller shaft 65 is squared, as indicated at 67, for removable attachment to the same of a motor driven coupling (not shown). The housing 66 enclosing the rollers 21, 22 may be fashioned in various ways, as, for example, by a cup-like extension, such as that shown, on the inner edge of one of the fins 38 and coacting with a complementary flat end wall extension on the inner edge of the other fin 38.

I claim as my invention:

1. In a record apparatus of the general type set forth, the combination of a casing structure defining a pair of storage chambers having respective entrance throats disposed in spaced opposed relation, a hair-like paramagnetic record filament guidingly threaded through said throats, a recorder-reproducer head having a pair of pole pieces disposed in adjacency to the portion of said filament extending between said throats, means including a friction roller disposed transaxially of said portion of said filament for feeding the same past said pole pieces, the end portions of said filament being freely coiled in respective ones of said chambers, and the interior surfaces of said chambers being smooth surfaces of revolution about an axis passing through said throats, whereby the chambers are shaped to embrace peripherally the coils of filament therein.

2. In a record apparatus of the general type set forth, the combination of a casing structure defining a pair of storage chambers having respective entrance throats disposed in spaced opposed relation, a hair-like paramagnetic record filament guidingly threaded through said throats, a recorder-reproducer head having a pair of pole pieces disposed in adjacency to the portion of said filament extending between said throats, a friction roller and an opposed abutment disposed with said roller lying transaxially of said portion of said filament and with the latter passing between said abutment and roller at a point in proximity to said head, a drive motor for revolving said roller to feed said filament endwise past said pole pieces, the end portions of said filament being freely coiled in respective ones of said chambers in like directions as individually viewed from the respective throat ends of said chambers, and the interior surfaces of said chambers being smooth surfaces of revolution about an axis passing through said throat, whereby the chambers

are shaped to embrace peripherally the coils of filament therein.

3. In an apparatus of the general type set forth, the combination of a pair of peripheral coils each having a guide throat at one end thereof, a hair-like paramagnetic record filament guidingly threaded through said throats with its end portions received in respective ones of said coils, a recorder-reproducer head, and means including a motor driven friction roller engageable with the portion of said filament passing between said throats for feeding said filament out of one coil past said head and into the other coil.

4. In an apparatus of the general type set forth, the combination of a peripheral coil having a guide throat at one end thereof, a hair-like paramagnetic record filament guidingly threaded through said throat with an end portion of such filament coiled within said coil, a recorder-reproducer head, and means including a motor driven friction roller engageable with the portion of said filament passing into said throat for feeding said filament past said head and into said coil.

5. The combination with a peripheral coil, of means including a friction feed roller for pushing a hair-like record filament into said coil at substantially constant speed while simultaneously imparting to the filament a compensating twist about the longitudinal axis of the filament opposite to that imposed upon the filament by coiling of the same in said coil.

6. In a record mechanism of the general type set forth, the combination of a head presenting a pair of pole pieces for coaction with a magnetizable hair-like paramagnetic record filament, a stationary storage container, and motor-driven means engageable with the filament at a point adjacent said head for pushing said filament between said pole pieces at a fixed speed and thence into said container in successive freely coiled convolutions.

7. A storage device of the character set forth comprising a casing defining two generally annular chambers with an entrance throat in an end wall of each such chamber and with the throat located substantially on the central axis of associated chamber, and an elongated paramagnetic record filament having opposite end portions freely coiled within the respective chambers and a short intermediate portion guidingly threaded through said throats and disposed between the same for engagement by a driving element for feeding said filament from one chamber to the other, said filament being coiled in each chamber in the same direction as viewed individually from their entrance ends.

8. As an article of manufacture, a cartridge type wire record comprising a casing structure of generally hour-glass shape defining a pair of substantially coaxial storage chambers closed at their outer ends and tapering toward each other to throats substantially aligned and spaced apart from each other, said chambers having smooth inner walls and their side walls being surfaces of revolution about the longitudinal axis of said casing passing through said throats, a resilient hair-like paramagnetic record wire guidingly threaded through said throats with the portion thereof intermediate said throats exposed for frictional engagement by a rotary feed roller or the like and with the end portions of said wire freely coiled in respective ones of said chambers, the convolutions or coils being urged outwardly

against said chamber side walls by the resiliency of the wire.

9. As an article of manufacture, a cartridge type wire record comprising a casing structure of generally hour-glass shape defining a pair of substantially coaxial storage chambers closed at their outer ends and tapering toward each other to throats substantially aligned and spaced apart from each other, said chambers having smooth inner walls and their side walls being surfaces of revolution about the longitudinal axis of said casing passing through said throats, a resilient hair-like paramagnetic record wire guidingly threaded through said throats with the portion thereof intermediate said throats exposed for frictional engagement by a rotary feed roller or the like and with the end portions of said wire freely coiled in respective ones of said chambers in respective opposite directions as viewed simultaneously from one end of said casing.

10. As an article of manufacture, a cartridge type wire record comprising a casing structure defining a pair of coaxially disposed and laterally spaced generally annular storage chambers having aligned guide throats in their adjacent ends spaced apart from each other, a roller journaled on said casing between said throats and located transversely of a line passing between the latter and a paramagnetic record wire guidingly threaded through said throats and over said roller, said wire having its end portions freely coiled in respective ones of said chambers.

11. As an article of manufacture, a cartridge type wire record comprising a casing structure defining a pair of coaxially disposed and laterally spaced generally annular storage chambers having aligned guide throats in their adjacent ends spaced apart from each other, a recorder-reproducer head including an annular winding fixed to said casing with the open center of such winding registering with one of said throats, and a paramagnetic record wire guidingly threaded through said throats and through the open center of said winding, said wire having its end portions freely coiled in respective ones of said chambers.

12. As an article of manufacture, a cartridge type wire record comprising a casing structure defining a pair of coaxially disposed and laterally spaced generally annular storage chambers having aligned guide throats in their adjacent ends spaced apart from each other, a recorder-reproducer head including an annular winding enclosed by a generally toroidal metal housing divided transaxially into two sections to present opposed spaced end portions of said housing as pole pieces providing the open center of such housing, said housing being fixed to said casing with its open center registering with one of said throats, and a paramagnetic record wire guidingly threaded through said throats and through the open center of said housing, said wire having its end portions freely coiled in respective ones of said chambers.

13. As an article of manufacture, a cartridge type wire record comprising a casing structure defining a pair of peripheral collars having coaxially disposed entrance throats in spaced relation to each other, a paramagnetic record wire guidingly threaded through said throats and having its end portions freely coiled in respective ones of said peripheral collars, and a pair of apertured pole pieces for a recorder-reproducer head fixed to said casing in position to receive the portion of said wire disposed between said

throats with such portion passing through the aperture in said pole pieces.

14. As an article of manufacture, a cartridge type wire record comprising a casing structure defining a pair of peripheral collars having coaxially disposed entrance throats in spaced relation to each other, a paramagnetic record wire guidingly threaded through said throats and having its end portions freely coiled in respective ones of said peripheral collars, a pair of pole pieces for a recorder-reproducer head fixed to said casing in position for coaction with the portion of said wire disposed between said throats, said head including a winding, and terminal prongs connected to said winding and fixed to said casing and positioned to project from the latter for insertion in female receptacles to mount said casing.

15. As an article of manufacture, the combination of a casing structure defining a generally annular storage chamber having a substantially axially disposed guide throat opening into one end of the chamber, a length of paramagnetic record wire coiled in said chamber and guidingly threaded out of said chamber through said throat, an opposed pair of feed rollers journaled on said casing adjacent said throat and enclosed by said casing, the portion of said wire guidingly threaded out of said chamber through said throat being entered in the bite of said rollers, and means for disengageably connecting one of said rollers to an electric drive motor.

16. A storage device of the character set forth comprising a casing defining a pair of generally annular peripheral collar chambers disposed substantially coaxially in spaced relation, and an elongated hair-like filament of resilient paramagnetic record wire having its opposite end portions freely coiled in loose convolutions in respective ones of said chambers in circumferential confinement by the walls of such chambers and having a short intermediate portion arranged for feeding engagement by a driving element, said filament being coiled in each chamber in the same direction as viewed individually from their entrance ends.

17. In an apparatus of the type described, the combination of a casing structure defining a generally annular storage chamber having a substantially axially disposed guide throat opening into one end of the chamber, a length of paramagnetic record wire coiled in said chamber and guidingly threaded out of said chamber through said throat, an opposed pair of feed rollers adjacent said throat, the portion of said wire guidingly threaded out of said chamber through said throat being entered in the bite of said rollers, an electric drive motor for one of said rollers, and control means for stopping and starting the driving of said wire by said rollers.

18. As an article of manufacture, a record cartridge comprising casing means defining first and second generally annular peripheral collar chambers each having an end entrance therein, an elongated hair-like filament of resilient paramagnetic record wire guidingly threaded through said entrances and having its end portions freely coiled in said chambers with the convolutions of wire bulged resiliently outward against the circumferential confinement of encircling outer walls of the chambers, the direction of coiling for filament being the same in each chamber as viewed from its entrance.

19. As an article of manufacture, a record cartridge comprising a pair of moulded plastic cups

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disposed in spaced, opposed relation in substantial axial alinement on a common longitudinal axis, supporting means rigidly joining said cups and including closures for the opposed ends of said cups, said closures having entrance throats therethrough disposed substantially on said longitudinal axis, the interiors of said cups being smoothly contoured surfaces of revolution about said longitudinal axis, an elongated hair-like filament of paramagnetic record wire guidingly threaded through said throats and having its end portions configured in superimposed freely coiled loops within respective ones of said cups, with the loops bulged resiliently outward against the circumferential confinement of the encircling side walls of said cups, and the direction of coiling for said filament being the same within each cup as viewed from the entrance throat therefor.

20. As an article of manufacture, a record cartridge comprising a unitary casing having a hollow interior, a paramagnetic record filament disposed with a bight portion of feed filament exposed exteriorly of said casing for engagement by a friction driver or the like, the extremities of said bight portion of filament being bundled within said casing in a patterned configuration in which duplicatingly configured portions of filament in the bundle lie one on another with

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freedom of withdrawal of successive portions into the bight without substantial disturbance of the remaining portions.

EDWARD L. BARRETT.

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