

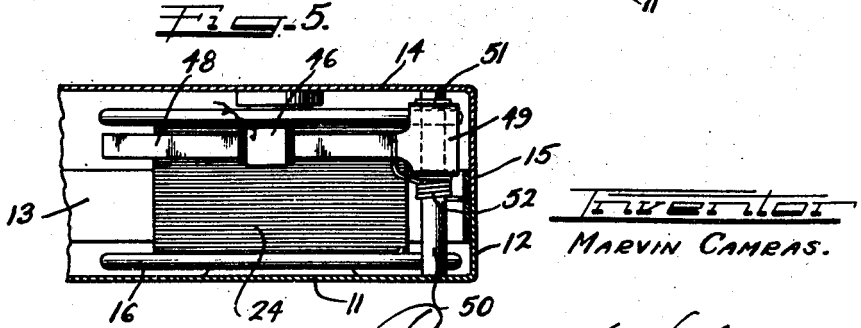
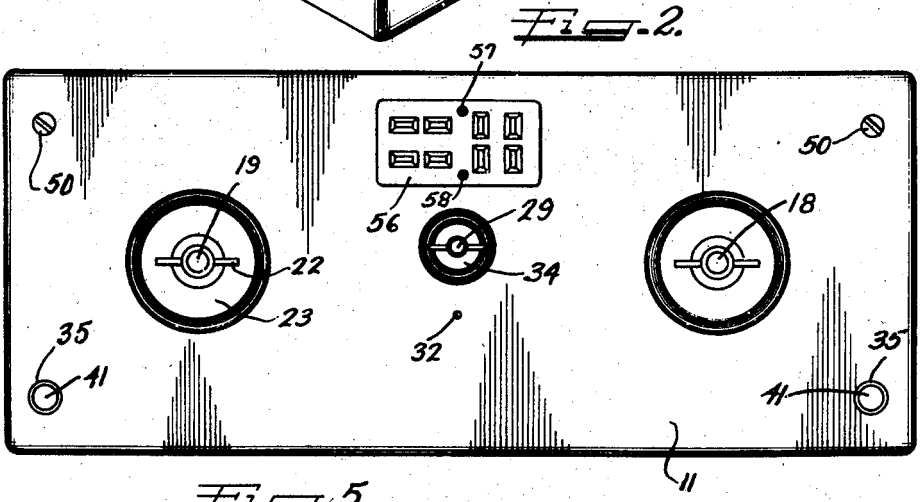
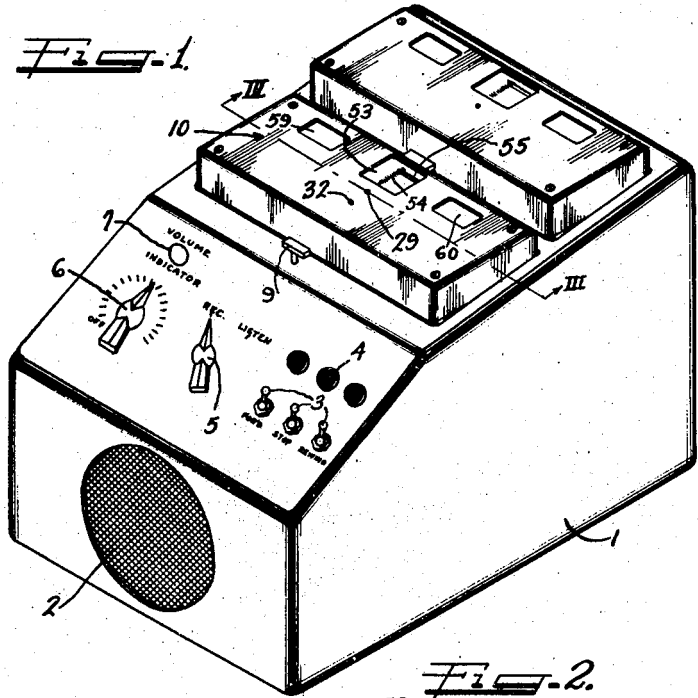
Oct. 11, 1949.

M. CAMRAS  
MAGAZINE FOR MAGNETIC RECORDING  
AND REPRODUCING DEVICES

2,484,552

Filed July 17, 1944

2 Sheets-Sheet 1



MARVIN CAMRAS.

*Charles H. ...* *Att'y.*

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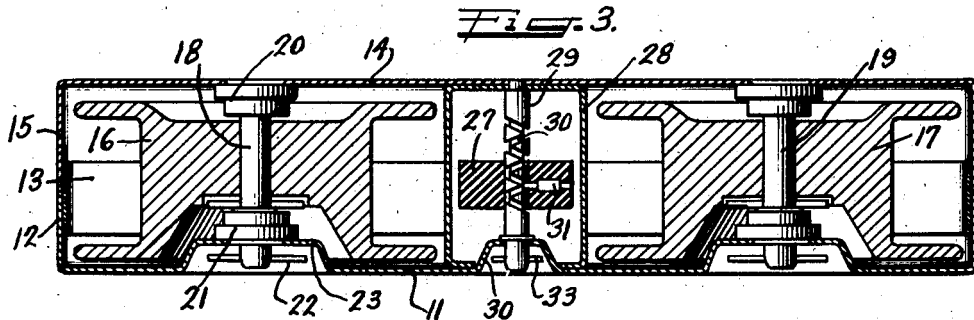


Fig. 6.

17 37  
36  
40  
41

14

35  
15  
13  
39  
12  
42

Fig. 7.

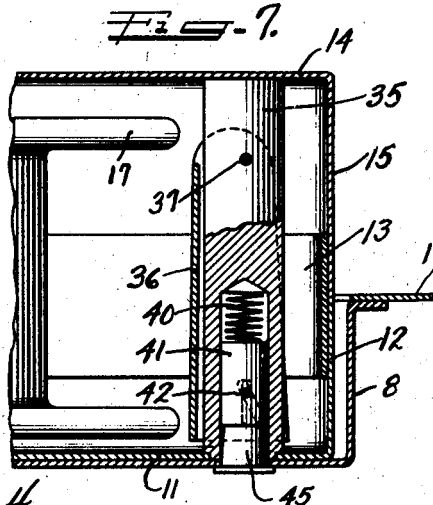
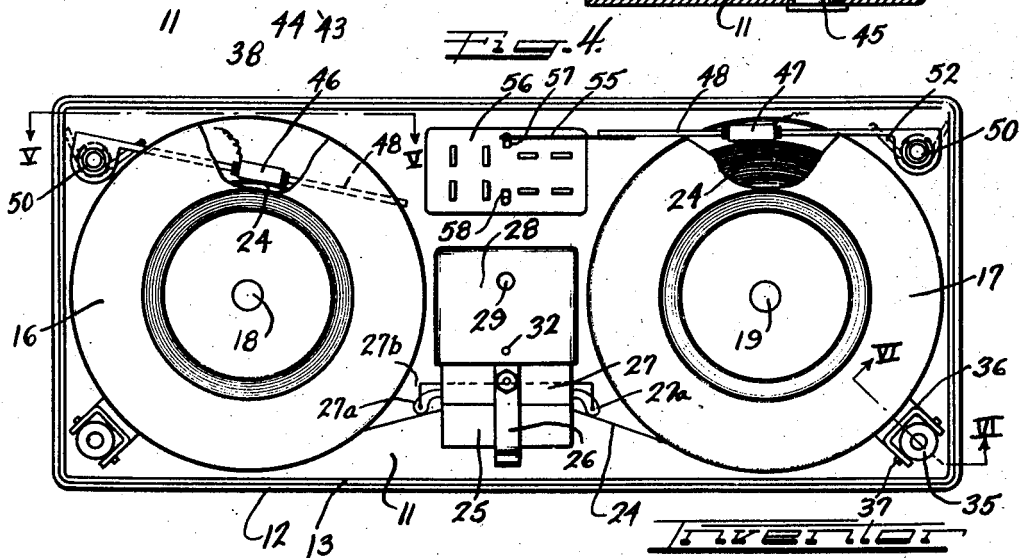


Fig. 4.



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# UNITED STATES PATENT OFFICE

2,484,552

## MAGAZINE FOR MAGNETIC RECORDING AND REPRODUCING DEVICES

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Research Foundation of Illinois Institute of  
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8 Claims. (Cl. 179—100.2)

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This invention relates to improvements in a magazine for magnetic recording and reproducing devices.

It is now a proven fact that magnetic recording and reproduction greatly excels any other known form of recording and reproduction. The value and practical worth of magnetic recording and reproducing devices is now an established fact. There are multitudes of uses for such devices. Magnetic recording and reproducing devices may be used in lieu of the commonly known dictating machines wherein recordings are made upon wax cylindrical records, may be used in lieu of the commonly known record playing machines for reproducing from disk records, and may be used in various forms and types of vehicles, especially automotive vehicles and airplanes, wherein the operator may have only one hand available for operations of the magnetic recording or reproducing device. Heretofore, the recording medium usually in the form of a paramagnetic wire or tape, was commonly carried upon a spool or reel, and when a recording or a reproduction was to be made, that spool or reel was mounted upon a recording or reproducing device, and it was frequently necessary to then thread the wire through an erasing head, a recording head, possibly a level wind arrangement and guide means, and attach the other end of the wire to another spool. In the event the wire was partially carried on two separate spools, it was necessary to mount those spools upon the machine or device, and then thread the wire through the proper channel so the device could function to record or reproduce upon the wire or other medium. Such process was objectionably slow and tedious and consumed an objectionable amount of time, and the disadvantages of that procedure were multiplied when the operator had only one hand available for removing or replacing the recording medium.

It is desirable to provide means for carrying a recording medium that may be associated with or removed from a recording and reproducing device in an extremely simple manner, requiring no special adjustments, manipulations, or connections of the medium, so that a medium may be removed and replaced with the use of only one hand and in an extremely small time.

It is accordingly an important object of the instant invention to provide a magazine loading device for a magnetic recording or reproducing machine, which device or magazine carries not only the recording medium but all of the salient mechanical apparatus necessary for recording or reproduction purposes when associated with the

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main recording and reproducing machine, and which magazine may be handled as a unitary single piece structure.

Also an object of this invention is the provision of a magazine for a magnetic recording and reproducing device, which magazine may be merely pressed gently into position upon the device, or lifted readily off the device in order to change records, so to speak, and no further operation on the part of the operator in order to remove or replace a recording medium is necessary.

Still another object of the invention is the provision of a magazine containing a movable recording medium and means for supporting that medium, for use on a magnetic recording and reproducing device, which magazine may be easily handled with one hand to remove or replace it, and which is practically indestructible in all ordinary usage.

The advantages of such a magazine over records of the type now known are many fold. For example, the entire magazine may be handled carelessly, requires no special container, a number of them may be stacked one upon the other, and a magazine may even be dropped upon the floor, with no damage resulting. In the case of disk records, or wax records as used on dictating machines, extreme care and caution must be utilized in order to preserve the records. Considerable space is required in order to keep the records, while a magazine of the character embodied in the instant invention will require little, if any, more space than a single wax cylinder for a dictating machine, and yet that magazine contains a recording medium capable of giving a considerably greater length of recording than is possible upon either a single wax cylinder or a disk record. Further, such a magazine may be mounted upon or removed from a recording and reproducing device with much less effort and much less time than is required to remove or replace an ordinary well-known disk record or a wax cylinder for a dictating machine. With the magazine, it is simply necessary to take the magazine in one hand and place it in position on the device with a gentle pressure. To remove it, it may be lifted off the device. That is all the operator need do, and a recording may be made, a reproduction may be made, or the recording medium rewound after a recording for purposes of reproduction. In addition, the magazine for the magnetic recording or reproducing device will greatly outlive any other known form of record in commercial use, because there is no needle contact upon it to wear its surface, and no shaving of it to remove

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a recording is required. Consequently, the magazine may be used over and over again to make many different successive recordings and as many reproductions, and even in the event the recording medium breaks, it may be repaired simply and in a very short time, and the use of the magazine continued.

Another object of the instant invention is the provision of a magazine for a magnetic recording or reproducing device, which magazine contains a pair of rotary reels carrying a recording medium, and automatic braking means to prevent unintentional movement of either of those reels when the magazine is not in operative association with the device.

It is also a feature of this invention to provide a magazine for a magnetic recorder or reproducing device, which magazine embodies indicating means visible at a glance to denote the relative amount of use of the recording medium in either direction of travel.

Still another object of the invention is the provision of a magazine of the character set forth herein embodying means to close an electrical signal circuit a predetermined length of time before the permitted length of recording medium has been unwound from a reel.

A further feature of the invention resides in the provision of a magazine containing a magnetic recording medium as well as all salient parts for the making of a record on such medium or in the reproduction of a record therefrom, the magazine being so constructed that connection to driving elements and electrical power sources is had by the simple expedient of pressing the magazine gently into position upon a recording or reproducing device.

Also a feature of the invention resides in the provision of a magazine for a magnetic recording or reproducing device so constructed that it will lie flat upon the table, or so that several of the magazines may be stacked one upon the other, there being no parts protruding beyond the simple body dimensions of the magazine.

The invention also provides a magazine of the character set forth herein which is arranged to denote at a glance if the movable parts within the casing are operating.

Still a further object of the invention resides in the provision of a magazine of relatively small size for a magnetic recording and reproducing device, the magazine containing a pair of spaced rotary reels carrying a recording medium, a recording and reproducing head, a level winding arrangement, automatic braking means to prevent rotation of the reels when the magazine is not in use upon the recording or reproducing device, means for establishing an electrical circuit directly through the recording medium itself, and indicating means to denote the amount of record made or reproduced or the amount of medium re-wound.

While some of the more salient features, characteristics and advantages of the instant invention have been above pointed out, others will become apparent from the following disclosures, taken in conjunction with the accompanying drawings, in which:

Figure 1 is a perspective view of a magnetic recording and reproducing device having a pair of magazines embodying improvements of the instant invention associated therewith in operative position;

Figure 2 is a bottom plan view of a magazine itself;

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Figure 3 is substantially a central vertical sectional view through the magazine, with parts shown in elevation, taken substantially as indicated by the line III—III of Figure 1 looking in the direction of the arrows;

Figure 4 is a top plan view of the magazine itself, with the cover portion of the casing removed;

Figure 5 is a fragmentary, vertical sectional view taken substantially as indicated by the section line V—V of Figure 4;

Figure 6 is an enlarged fragmentary, vertical sectional view taken substantially as indicated by the staggered section line VI—VI of Figure 4 illustrating the braking mechanism in effective braking position; and

Figure 7 is a view similar in character to Figure 6, illustrating the braking mechanism in released position.

As shown on the drawings:

The illustrated embodiment of the instant invention, which relates to the magazine itself, is shown in association with a magnetic recording and reproducing machine or device capable of handling or operating with such magazines, and which machine or device is more fully set forth, described and claimed in a copending application. The instant invention relates more particularly to the magazine itself, as an article of manufacture, because the magazine will be frequently sold as such, and many more magazines will be in service than recording and reproducing machines.

With reference now to Figure 1, it will be seen that the magnetic recording and reproducing device includes a casing 1 which contains driving mechanisms, electrical apparatus in circuit arrangements, etc. which do not form a part of the instant invention. The casing may also contain a loud speaker for reproduction purposes which may be heard through the opening 2 in the front of the cabinet. This device also embodies a set of switches 3 for forward movement of the recording medium, reverse movement of the medium, and for stopping the apparatus together with suitable signal lamps 4, one for each switch. There is also a control lever 5 movable from recording to reproducing or listening position. In addition, there may be a control switch 6 with a suitable volume indicator 7 associated therewith.

The upper portion of the cabinet 1 is provided, in the illustrated instance, with two recesses, each defined by a tray construction 8 (Figure 7). A magazine is seatable in a tray 8, and when positioned in the tray, everything is ready for either recording upon or reproducing from the medium carried by the magazine. A button 9 (Figure 1) may be utilized to help lift the magazine out of the tray, this button being associated with any suitable form of elevating mechanism, not illustrated.

In Figure 1, the magazine embodying the principles of the instant invention is generally indicated by reference numeral 10. The magazine nearest the control, is preferably the one used for recording or reproduction purposes. The rear magazine may be undergoing a rewinding operation of the recording medium while a recording or a reproduction is being made from the first magazine.

With reference more particularly to Figures 2, 3 and 4, it will be seen that each magazine, preferably comprises a rectangularly box-shaped casing. As seen more clearly in Figures 3, 6 and 7, the magazine casing is closed substantially entirely and comprises a bottom 11 having an up-

standing side wall 12 therearound. Inside the side wall 12 and projecting thereabove, is a band 13. The casing also includes a cover 14 having a depending skirt 15 which telescopes over the upper portion of the band 13 and seats into abutting relationship with the upper edge of the side wall 12. The cover may be semi-permanently attached to the remainder of the casing so that the casing is only designed to be opened for repairs at the manufacturer's or a special service station. The cover may remain attached by its frictional engagement with the band 13 or some easily openable fastening means may be used, if it is desired that the ultimate consumer have access to the interior of the magazine.

Within the magazine a pair of spaced spools or reels 16 and 17, preferably of a plastic or other suitable insulating material, are removably mounted respectively upon shafts 18 and 19. Each shaft is of identical construction with the other. Each shaft is journaled in suitable bearing means 20 and 21 at opposite ends of the shaft, which bearing means are attached to the respective parts of the casing. The lower end of the shaft protrudes through an opening in the casing proper and is provided with a cross pin 22 for engagement with a suitable drive shaft carried by the recording and reproducing device and which may have an upper end in the nature of a castellated nut for a clutch-like engagement over the end of the shaft and its cross pin 22. It will be noted with reference more particularly to Figure 3, that the bottom of the casing is recessed as indicated at 23 around the protruding end of the shaft, so that the shaft does not extend beyond the normal bottom of the casing, the protruding end of the shaft is protected at all times from accidental jarring, and the casing may be laid flat on the table or stacked flatly upon top of a similar casing. Such arrangement by which nothing protrudes beyond the general overall dimensions of the casing, obviously renders the casing more easily to handle and enables the magazine and its contents to withstand considerably more abuse and rough usage than would be the case if there were a protruding part.

The reels 16 and 17 carry a recording medium 24 wound thereon and in the illustrated instance this medium is in the form of a very fine substantially permanently magnetizable wire, a wire substantially .004 inch in diameter being satisfactory. Either of the reels may be the supply spool depending upon which of the shafts 18 or 19 is driven. In usual operation, the wire will travel from the spool or reel 17 to the reel 16 when either a recording or a reproduction is being made. The wire travels in the reverse direction from the spool 16 to the spool 17 during a rewinding operation which places the major portion of the wire again on the reel 17 after a recording in readiness for a reproduction operation.

As the wire travels from one reel to another it passes the field of a head 25. This head 25 may be a recording and reproducing head or it may be a composite head embodying means for cleaning or removing a previous recording from the wire, as well as means for placing a new recording upon or making a reproduction from the wire. The head is diagrammatically indicated in Figure 4, because various types of heads may be used. In the event high fidelity recording is desired, an aperture of just sufficient size to accommodate the wire may pass through the recording head. In the event extreme high fidelity is to be sacrificed for convenience, the wire or medium 24 may pass

through a slot in the recording head having sloping side walls so that in the event of breakage a knot may be tied in this wire, and the knot is successfully passed by the head. Usually, such a head includes a paramagnetic core, and some form of coil means for energizing that core to either magnetize the wire during a recording operation, or to function as pick-up means for the magnetic impulses created by the magnetized wire during a reproduction operation. If the magazine is to be repeatedly used, that is one recording placed upon the medium 24, reproduced one or more times, and then another recording placed upon the medium, it is advisable to include an erasing element in the head 25 to clean the wire just prior to the placing thereon of a new recording. Obviously, the erasing element is cut out of circuit during a reproducing or rewinding operation. In the event a magazine contains a recording medium upon which a special record has been made such as an opera or other production, and the magazine is purchased solely for reproductive purposes, it is advisable to omit the erasing element, so that there will be no danger of accidentally destroying a portion of the record, in the event the magazine is placed upon the machine and it is inadvertently left set for a recording operation when started.

In view of the fact that the same head is used both for recording and reproduction purposes, it will be understood that where the term recording head is used herein and in the appended claims, that term is to be taken as also meaning and including a reproducing head.

The recording and reproducing head 25 is carried by means of a suitable spring clamp 26 or the equivalent on an insulated block 27. Preferably the head is mounted in inverted position, that is, the opening for the medium 24 is nearer the inner side of the head. A brush member 27a, preferably of a material having high electrical conductivity, projects from each side of the block 27 and rides the medium 24. As will later appear, an electrical current is passed directly through the medium 24 to provide a control for automatic stop mechanism. The members 27a are preferably connected one to the other by a conductor 27b to provide a shunt connection around the head 25. In the event the head 25 is of such character that the medium passes through a groove-like opening, the members 27a perform a dual function, namely maintaining the medium deeply within the opening in the head and shunting the current around the medium in the vicinity of the head 25 to avoid possible distortion of the recording or reproduction.

The block 27 forms a part of a level winding arrangement disposed within an open sided housing 28. The level wind arrangement includes an upright shaft 29 having an intermediate reversely threaded portion 30. The block 27 is provided with a tongue 31 extending into the groove of the threading 30 (Figure 3), so as to cause the block to ride up and down the shaft, carrying the head 25 therewith and thus insuring an even layer, level winding of the recording medium 24 on either of the reels 16 or 17. A vertical pin 32, Figures 2 and 4, extends upright through the block 27 to prevent rotation of the block 27. The lower end of the shaft 29 extends through the bottom of the casing and is provided with a cross pin 33 for clutch engagement with any suitable drive shaft carried by the device 1. Again, around the protruding end of this shaft the bottom of the casing is indented as indicated at 34 so that the shaft

does not project beyond the natural bottom of the casing.

When the magazine is not in use, and especially when it has a record upon its medium, it is desirable that there be no accidental or unintentional rotation of either of the reels 16 or 17 so as to vary the arrangement of the recording medium on these reels. If the recording medium in the magazine is set for a reproduction operation, the magazine should remain in condition for that reproduction operation as soon as it is operatively associated with the machine 1. To the end of assuring that no such accidental or unintentional rotation of the reel occurs, automatic braking means are provided, preferably a braking arrangement for each of the reels. Both braking arrangements are, of course, identical.

Such a braking arrangement is thus illustrated in Figures 6 and 7. In a corner part of the casing, adjacent the reel 17, for example, an upright post 35 is mounted. A channel-shaped brake shoe 36 is pivoted to the post 35 by a cross pin as indicated at 37. This brake shoe has a sloping inside wall which, as will more fully later appear, is normally urged outwardly into frictional contact with the flange of the spool 17 as indicated at 38 in Figure 6.

The lower portion of the post 35 is hollowed out as indicated at 39, and the post extends through the bottom of the casing so that the interior of the bore 39 is accessible from the outside of the casing. Inside the bore 39 is a coil spring 40 acting against a plunger 41. A cross pin 42 extends through the plunger and likewise through a vertical slot 43 in each side of the post 35. The cross pin also extends through an obliquely disposed slot 44 in each of the side wings of the brake shoe 36. The outward movement of the plunger is thereby limited by the contact of the brake shoe against the flange of the reel 17.

In the event the plunger is pressed inwardly against the action of the spring 40, the cross pin 42 riding in the oblique slots 44 cause the brake shoe to pivot away from the reel 17 to the position seen in Figure 7, thus freeing the reel for rotation. This release of the automatic braking means occurs without any action on the part of the operator, but results solely from a mere placing of the magazine in the tray 8 of the magnetic recording and reproducing device. This tray 8 has a fixed stud 45 extending upwardly from the bottom thereof in correct location to automatically enter the bore 39 of the post 35 and move the plunger 41 upwardly, merely upon the placing of the magazine in the tray.

The same braking arrangement is, of course, utilized in connection with the reel 16, and in that event the tray 8 will also have another stud 45 to release the braking mechanism associated with the reel 16 simultaneously with the release of the braking mechanism acting upon the reel 17. It will be noted that the post is so arranged that the outward movement of the plunger is limited so that it will never extend beyond the normal bottom of the casing and thus not interfere with easy handling or stacking of the magazines, nor will it be subject to unintentional jars. Immediately upon lifting the magazine out of the tray 8 of the recording and reproducing machine, the braking mechanism is automatically and instantaneously effective against each of the reels.

It has been found desirable in magnetic recording and reproducing machines to utilize the wire or recording medium itself as a conductor for an

electrical circuit in the nature of a safety circuit to automatically stop the mechanism in the event the medium is in danger of being totally unwound from one of the reels or in the event the medium breaks. In other words, the mechanism is stopped in the event the circuit through the recording medium is opened. With this feature in mind, means are also provided in the magazine to establish such a circuit through the recording medium. In the illustrated instance, these means include a rider in the form of an electrical contact element 46 bearing against the coiled medium on the barrel of the spool 16, and a similar rider 47 bearing against the coiled medium on the spool or reel 17. As illustrated, the riders are insulated from their supporting structure to thus establish a circuit connection only with the recording medium. Each of the contact members 46 and 47 is supported and actuated by identical mechanism, and so only one need be described herein. With reference more particularly to Figure 5, it will be seen that the contact rider 46 is carried on an arm 48 having a channel portion 49 engaged around an upright stud 50 and held in position by a pair of suitable lock washers 51 or the equivalent. A coil spring 52 is positioned to urge the arm 48 towards the barrel of the reel at all times. It will be noted that the arm 48 and its contact member are disposed nearer one flange of the reel than the other, and the initial winding of the recording medium upon the reel should start at the opposite side of the reel from the contact member. Thus, when one of these contact members passes off the recording medium, thereby opening the circuit through the medium, there will still be a part of a layer of wire secured to the respective reel, so that there is no danger of unintentionally totally unwinding the wire from one of the reels. Of course, if the wire breaks, the circuit through the wire is automatically opened.

During the making of a recording, a reproduction, or in rewinding the wire between recordings and reproductions, it is desirable at different times to know how much wire has been used, how long a time the reproduction will continue, and similar factors. In the present instance, a window 53 is provided in the cover of the magazine (Figure 1). This window may have a scale 54 associated therewith, preferably by marking the scale directly upon the window. With reference now to Figure 4 it will be seen that on one of the arms 48 a slender extension 55 is provided to function as a pointer, and this extension will traverse the scale 54 in either direction, depending upon the direction of movement of the recording medium. The scale 54 may be arranged in increments of linear lengths of medium, increments of time, or some other suitable increments so that it will indicate in some relative aspects the amount of travel of the medium in either direction.

The necessary circuit connections from the recording head, the erasing means if they are provided, and the contacts 46 and 47, may all terminate in a well-known manner in a suitable plug-in socket 56 mounted in the bottom of the casing. When the magazine is placed in the tray 8 of the magnetic recording and reproducing device, a suitable plug projecting upwardly from this tray will engage the socket 56 and thus the necessary circuit connections will be established.

Many times a signal will be desired to call an operator's attention to the fact that it is nearly time to change magazines. In other words, a

signal such as a light, bell, buzzer, or the equivalent may be energized a predetermined time interval before either of the contact members 46 and 47 rides off the medium on the respective spool. Means are provided in the instant invention to automatically cause energization of such a signal by closing a circuit. To this end, a pair of hollow contact posts 57 and 58 having flat tops are provided in the socket 56 so that when the magazine is placed in position the posts are connected with the respective signal circuits. The flat tops of the posts 57 and 58 may be contacted by the pointer 55 and cause a closing of the respective signal circuit to ground. The time interval between the signal and cessation of operation may be determined by the width of the flat tops on the posts.

At times it may be desirable to visually note the rotation of the spools 16 and 17 and for this purpose the magazine cover may be provided with additional windows 59 and 60 (Figure 1) over the hub portions of the spools.

In operation, the magazine may be taken in one hand by an operator, and merely placed in a tray 8 associated with the magnetic recording and reproducing machine. The mere positioning of the magazine in the tray connects the reel shaft and the level wind shaft with suitable drive means, releases the automatic braking means, and establishes the necessary circuit connections. There is nothing at all to be done by the operator except place the magazine in the tray on the machine. When that is done, a simple manipulation of the machine results in placing a recording on, reproducing a recording from, or rewinding the recording medium as may be desired. When it is desired to discontinue using that particular magazine, it is a simple expedient to press the button 9 with the thumb, and lift the magazine from the machine.

It will be appreciated that all the salient mechanical parts necessary for magnetic recording or reproduction are contained within the magazine. Further, the reels are held against movement when the magazine is not in use. In addition, when the magazine is in use, there is an easily visible indicator denoting how much of the medium has been used or is yet to be used. It will further be appreciated that such a magazine may be casually or even carelessly handled with no injury to its contents, and the magazine requires no special care or particular storage receptacle when it is not in use. Further, it will be noted that the magazine is not only extremely durable and the recording medium not only has an exceptionally long life so that it may be repeatedly used, but the magazine and its contents may be very economically manufactured.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. A readily removable and replaceable magazine for a magnetic recording device, including a closed casing, a pair of spaced rotary reels in said casing carrying a recording medium, a recording head in said casing, a level wind arrangement carrying said head and including the reciprocating mechanism completely within said casing, and a shaft extending without said casing from each of said reels for connection with drive

mechanism when said magazine is mounted on a recording device.

2. A readily removable and replaceable magazine for a magnetic recording device, including a closed casing, a pair of spaced rotary reels in said casing carrying a recording medium, a recording head in said casing, a level wind arrangement carrying said head and including the reciprocating mechanism completely within said casing, a shaft extending without said casing from each of said reels and said level wind arrangement, and means on the end of each shaft for making rotary connection with driving mechanism when the magazine is positioned on a recording device.

3. A readily removable and replaceable magazine for a magnetic recording device, including a closed casing, a pair of spaced rotary reels in said casing carrying a recording medium, a recording head in said casing, a level wind arrangement carrying said head and including the reciprocating mechanism completely within said casing, and a shaft extending without said casing from each of said reels for connection with drive mechanism when said magazine is mounted on a recording device, said casing being indented in the region of the exposed end of each shaft so that the casing may lie flat without injury to the shaft ends.

4. A magazine for a magnetic recording or reproducing device, including a casing, a pair of rotary reels in said casing, a magnetizable recording medium carried by said reels, and a member carrying a contact element riding each reel to establish an electrical circuit through the recording medium, and driving connections for said reels on the outside of said casing.

5. A magazine for a magnetic recording or reproducing device, including a casing, a pair of rotary reels in said casing, a magnetizable recording medium carried by said reels, and a member carrying a contact element riding each reel to establish an electrical circuit through the recording medium, and driving connections for said reels on the outside of said casing, said casing having a window therein, and one of said members having a pointer thereon to traverse said window and denote the amount of travel of the medium in either direction.

6. A magazine for a magnetic recording or reproducing device, including a closed casing, a pair of rotary reels in said casing, a recording medium carried by said reels, shafts for said reels extending through said casing, resiliently urged braking means bearing against each reel inside said casing, a hollow supporting stud in said casing extending from the bottom to the top thereof adjacent each reel, said braking means being entirely carried by the respective said studs, the open end of said stud extending through said casing, and a spring pressed plunger in said stud and operable by pressure from without said casing to release said braking means.

7. A magazine for a magnetic recording and reproducing device, including a closed casing, a pair of rotary reels in said casing, a recording medium carried by said reels, braking means to prevent unintentional movement of said reels when said magazine is not in use, a recording and reproducing head in said casing, a level winding arrangement carrying said head, contact riders on the medium on said reels to establish circuit connection through said medium, a plug to establish electrical circuit connections from suitable sources to said head and said contact

riders, said plug being in the bottom of said casing, a shaft for said level wind arrangement extending through the bottom of said casing, and release means for said braking means available through the bottom of said casing, so that said casing need only be pressed into position on said device to establish all operating connections.

8. A magazine for a magnetic recording or reproducing device, including a casing, a pair of rotary reels in said casing, a magnetizable recording medium carried by said reels, and a member carrying a contact element riding each reel to establish an electrical circuit through the recording medium, and driving connections for said reels on the outside of said casing, a conductive arm carried by one of said members but insulated from said contact element thereon, and a stationary contact member in said casing engageable by said arm a predetermined length of time before said contact element rides off the medium on the respective reel.

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