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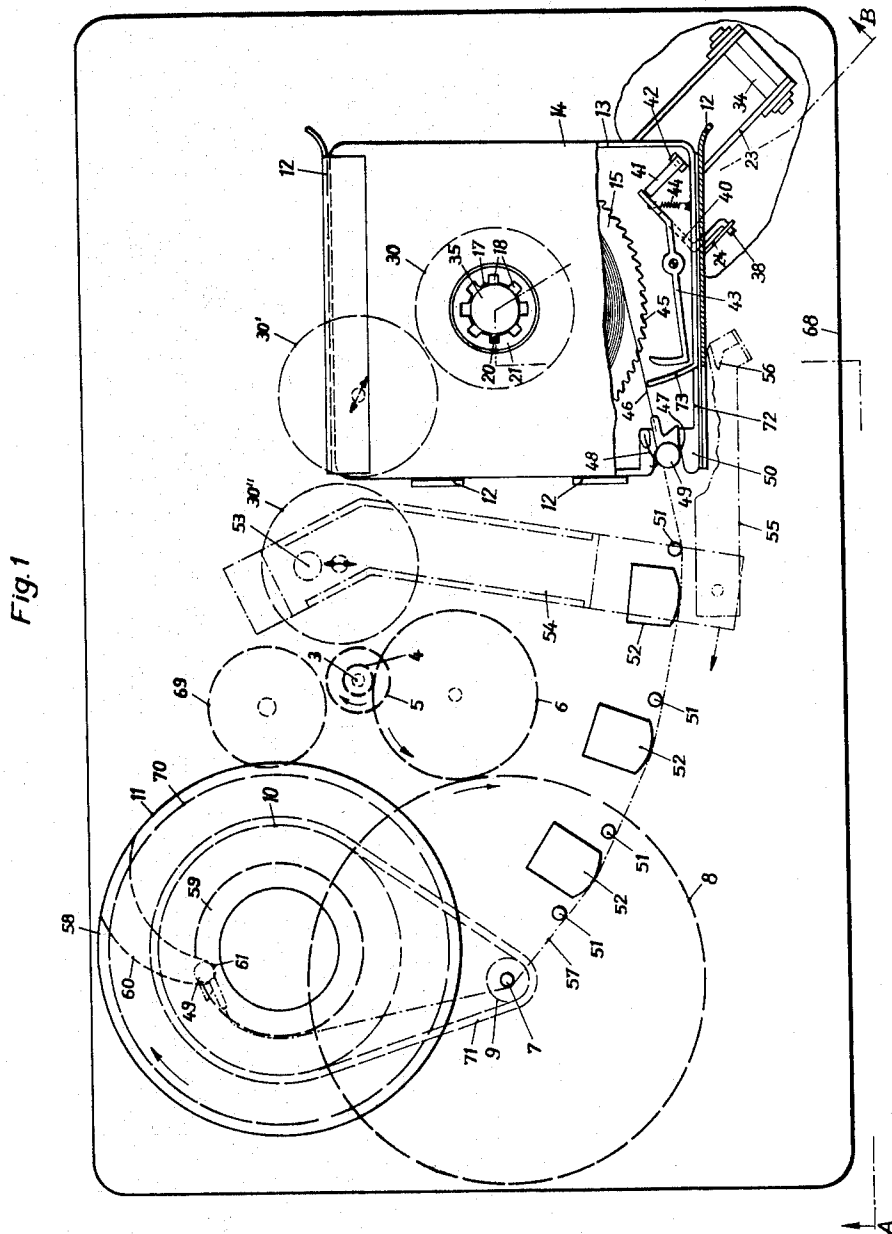
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4 Sheets-Sheet 1



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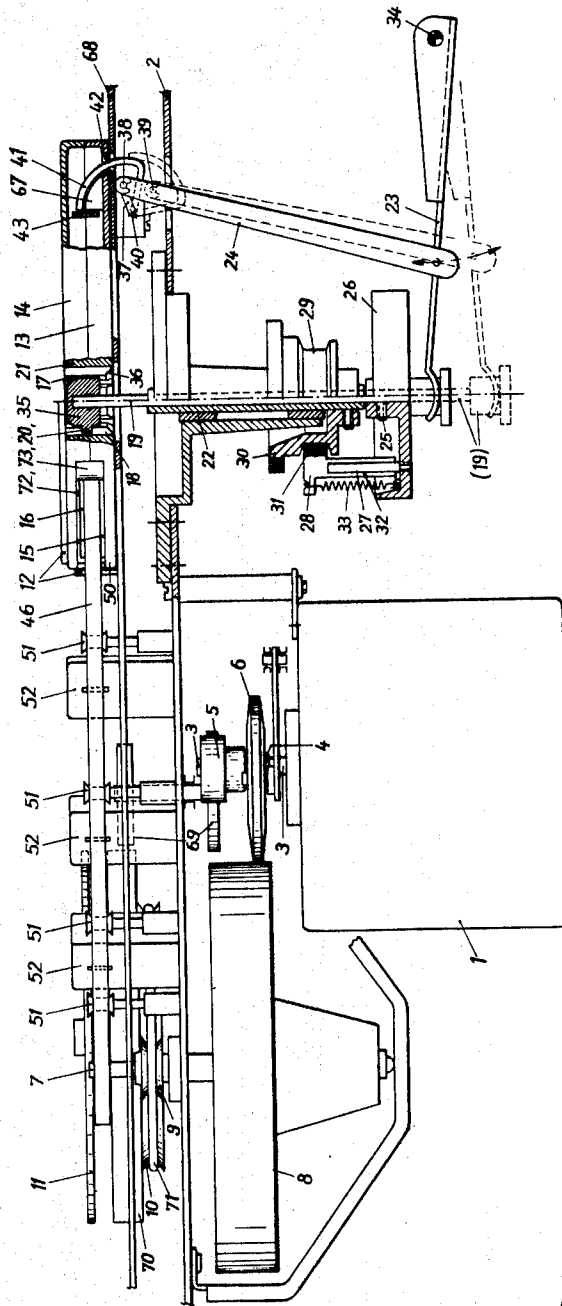
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Fig. 2



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Fig. 4

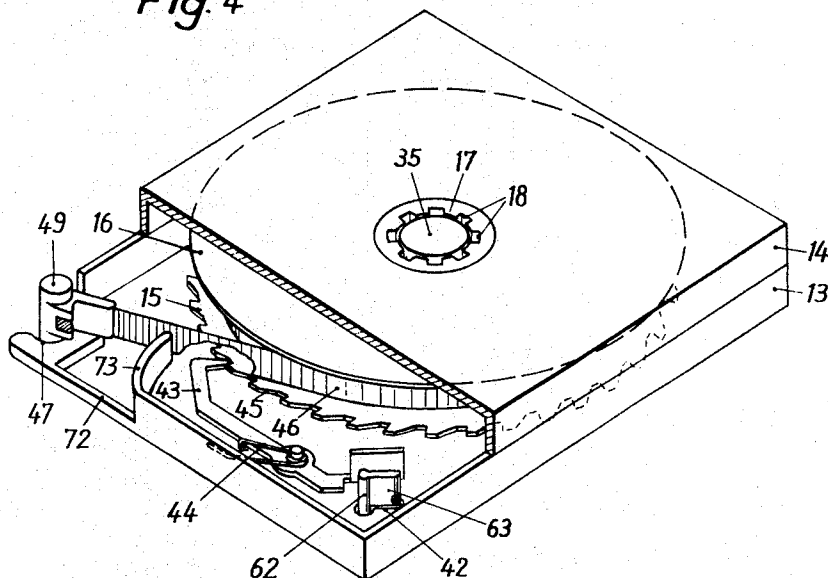
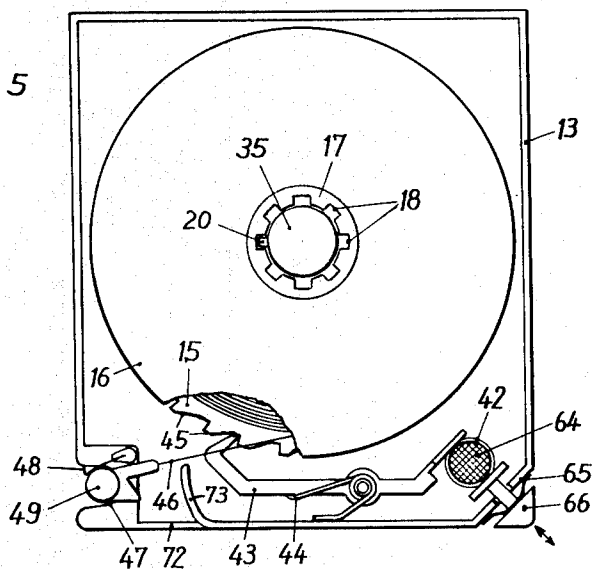


Fig. 5



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G 33,639

6 Claims. (Cl. 242—55.13)

The invention relates to automatic magnetic tape recorder/reproducer apparatus of the magazine type in which the associated magazines are adapted to be locked in their operative position on the apparatus and at the same time a tape brake within the magazine is released when the magazines are being, or have been, placed in their operative positions.

All the known magazine apparatus of the above mentioned kind have automatic

(a) means for locking the magazine to or in the apparatus, and

(b) another means for release of the tape brake when the magazines are being, or have been, placed in their operative position.

Therefore the known apparatus have a disadvantage in that either of the above operations mentioned under (a) and (b) may result in faulty operation owing to failure of one of the separately provided devices controlling the said operations.

It is the object of the present invention to provide simpler and improved apparatus of the kind described above while avoiding the mentioned defects. According to the invention this is achieved in that both the locking of the magazine case in its operative position and the release of the tape brake are performed by a single member which forms part of the recorder/reproducer. The invention is adapted to be employed irrespective of the manner in which the magazine is brought into the operative position, that is to say, it may be employed both when the magazines are placed on the apparatus concerned and when they are introduced by an insertion device.

According to an embodiment of the invention the tape brake is released and the magazine case is locked by movement (turning, pivoting, transversely displacing), a single member forming part of the apparatus.

In the known apparatus mentioned above the tape brake of the magazines is directly accessible with the aid of a finger, a pencil or the like when the magazines are not placed on the apparatus—that is to say, when they are not in the operative position—so that the tape brake may be released at will and one end of the tape contained in the magazine may be pulled out. This can result in damage to the tape and faulty operation of the apparatus. In another embodiment of the invention with respect to the magazine these drawbacks are obviated in that the aperture which is provided in the magazine case for the insertion of the locking and brake release member into the interior of the magazine matches the said member and by its location and shape prevents ready access to the interior of the magazine.

The invention may be applied to magazine apparatus using any method of recording (for example magazine apparatus operating according to mechanical, photographic or magnetic recording and/or reproducing methods) for all uses (for example, for recording audio-signals, video-signals or other signals or signal combinations). The record carriers may have ends or be endless and may be in any elongated form, for example, in the form of a wire.

Three embodiments of the invention will now be described, by way of example, with reference to FIGURES 1 to 5. FIGURES 1 to 3 relate to a first embodiment and a modification thereof having a releasing device of the first kind for the tape brake, FIGURE 4 relates to a second embodiment having a releasing device of a second kind for the tape brake and FIGURE 5 relates to a third embodiment having a releasing device of a third kind for the tape brake. FIGURE 1 further shows a plan view of the essential components of the tape transport mechanism of a magnetic tape recorder in accordance with the invention with a magazine inserted, FIGURE 2 is a partly sectional side elevation of the apparatus shown in FIGURE 1 taken on a line A . . . B of FIGURE 1, FIGURE 3 shows the principle of the arrangement of essential components of a modification of the first embodiment of the invention with a magazine placed in position on the recorder (subsidiary FIGURES 3a to 3e show different positions of essential controlling parts and a detail described more fully hereinafter) while FIGURE 4 is a perspective view of a magazine partly broken away having a releasing device of a second kind for the tape brake and FIGURE 5 is a plan view of a magazine likewise partly broken away having a releasing device of a third kind for the tape brake.

The following description relates to the embodiment of the invention shown in FIGURES 1 and 2.

An electric driving motor 1 driving the magazine magnetic recorder is supported by a chassis plate 2. An assembly 4, 5 of friction wheels of different diameters is rigidly secured to a shaft 3 of the motor, the wheel 4 having the smaller diameter driving through an intermediate wheel 6 a flywheel 8 carrying a capstan 7, a pulley 9 on the capstan driving through a belt 71 the lower part 10 of a friction clutch for a take-up reel 11.

On the right-hand side of the chassis plate 2 is provided an insertion device 12 for receiving a magazine which is inserted from the right-hand side. The magazine case, which preferably is flat and rectangular, comprises two identical cup-like parts 13 and 14 of synthetic resin arranged one on top of the other and joined to one another in a known manner, for example, by an adhesive, spring means or screws. Between the two magazine parts 13, 14 a double-flange reel 15, 16, 21 is supported for rotation, a central aperture 17 of the reel being provided with vertical grooves 18 into which, when the magazine is inserted in the magnetic recorder, a cross-pin 20 secured to a thick head 35 of a tape winding spindle 19 may enter so that the spindle 19 is coupled to the supply reel 15, 16, 21 in the magazine. The spindle 19 is adapted to rotate in a bearing 22 secured to the chassis 2 so as to be vertically displaceable by means of a lever arrangement 23, 24. In the rest position the spindle 19 is in the lower position shown by broken lines in FIGURE 2. The spindle 19 is rigidly secured by a grub-screw 25 to a disc-shaped coupling member 26 in which a guide pin 27 is screwed so as to extend parallel to the axis of the spindle 19. On the guide pin 27 is mounted another coupling member 28 having lateral arms (not shown), which embrace a recessed part 29 of a further coupling member 30 and urge a strip 31 of felt with adjustable frictional force to the member 30 through an angle of about 300°. The friction is adjusted with the aid of known tensioning means. A sheath-shaped part 32 adapted to be slipped onto the guide pin 27 is rigidly secured to the other coupling member 28. A draw spring 33 one end of which is attached to an eyelet provided on the lower coupling member 26 and the other end of which is attached to an arm of the other coupling member 28 tends to draw the coupling members 26 and 28 to-

gether. The force of the draw spring 33 counteracts the force of the lever arrangement 23, 24 which, when operated by manual or automatic control, holds the spindle 19 in the rest condition in the lower position shown in FIGURE 2.

When the magazine is being, or has been, placed in position on the magnetic recorder or, according to the first embodiment, inserted into the insertion device 12 of the magnetic recorder, the magazine is brought into the operative position. The lower lever 23 (FIGURE 2), which is adapted to pivot about a pin 34, is moved by manually or automatically controlled means from the lower position shown in broken lines to the upper position shown in full lines. Under the action of the force of the draw spring 33 the spindle 19 is also moved upwardly and the cross pin 20 provided on the upper head 35 due to its round shape and to the radial and transverse bevelled edges 36 at the lower ends of the lands between the grooves 18 is automatically slipped into a groove 18 of the reel hub 21 so as to couple the spindle 19 to reel via hub 21. To the lower lever 23 of the lever arrangement the levers 24 and 37 are rotatably connected so that their junction point moves from a lower rest position 39 to an operative position 38 by pivotal movement about a stationary pin 40. A locking and brake release member 41, which is the member referred to hereinbefore as forming part of the apparatus, secured to the lever 37, is moved from a rest position shown in broken lines in FIGURE 2 to an operative position shown by full lines in FIGURE 2. The pin 40 is provided, at least for the greater part, below the recorder deck 68 so as to extend parallel thereto.

The member 41 serves not only to lock the magazine casing in the operative position on or in the recorder concerned but also to release the tape brake and for this purpose projects into the interior of the magazine through an aperture 42 in the magazine wall. The aperture 42 is matched with the member 41 and by its location and shape produces locking of the magazine case in the operative position on or in the recorder together with the said member. The member 41 may, for example, have the form of a hook, as shown in FIGURE 2. The member 41 may be curved continuously or discontinuously or may be bent angularly (for example so as to be polygonal). As is shown in FIGURE 2, in order to lock the magazine case in the operative position, the member 41 engages a projection 67 which may be moulded on or glued to the base 13 of the magazine, preventing a magazine disposed in the operative position from being removed by lifting.

The construction and the operation of the tape brake used in the magazines of the recorder in accordance with the invention will now be described. This tape brake is provided to prevent any release of the coil of tape in the magazine when not in position on or in the recorder and to brake the tape coil in the magazine and cannot be released outside of the recorder—at least not by anyone not skilled in the art, and by one skilled in the art not without complicated tools and not without complicated manipulation of the magazine—but can only be released when connected to the recorder.

As is shown by FIGURE 1 (and by FIGURES 4 and 5 described hereinafter), the outer edge of the lower flange 15 of the double-flange reel 15, 16, 21 carrying a recording tape 46 is provided with teeth 45. The left-hand end of a pawl 43 engages the said teeth whenever the magazine is inoperative. The pawl 43 is held in engagement with the teeth 45 by a draw spring 44 acting on its right-hand end. In the operative position of the magazine, however, the member 41, which hereinafter will also be referred to as the lock-release member 41, by counter-clockwise pivoting of the pawl 43 against the force of the draw spring 44 causes the pawl 43 to be disengaged from the teeth 45 of the reel flange 15. Consequently, the tape brake is released.

In FIGURE 1 (and in FIGURES 4 and 5 described hereinafter) the teeth 45 of the tape brake are saw-tooth-shaped so that in the brake applied condition (the magazine being separated from the recorder) the reel may be rotated in the winding direction by overcoming brake resistance or drag, but not in the unwinding direction. This has certain advantages over the use of symmetrically shaped teeth 45 which would prevent the reel from being rotated in either direction so that the beginning of the recording tape 46 could not be pulled into the magazine. For example, a coupling member at the lead end of the tape may not be properly positioned so as to be releasably held by the action of a spring 48 in an aperture 47 of the magazine case 13, 14. A tongue 73 of the magazine case (FIGURE 1) is provided to prevent the tape brake from being undesirably released by the pawl 43 being lifted from the teeth 45.

To prevent the tape brake from being released by other than a complicated tool, for example, a pencil, a finger or the like, the magazine elements concerned are so shaped that any projections, shown by way of example in broken lines 83, FIG. 3e, inserted into the interior of the magazine, via aperture 42, cannot reach the tape brake and in particular the locking lever 43 thereof (FIGURE 3e). Thus, the tape brake cannot be released by a child or an unauthorized adult using the magazine, either unintentionally or intentionally, as is possible with known magazines. The aperture 42 should be shaped so as to have a small cross section matching the release member 41 or another locking cross section, for example, in the form of a star.

The further construction and the operation of the magazine recorder in accordance with the invention will now be described.

Near a corner 50 of the magazine (FIGURE 1) accommodating the above-mentioned tape coupling member 49 are arranged a tape guide pin 51, the usual magnetic heads 52 for recording, reproduction and erasing, further tape guide pins 51 and finally the capstan 7 mounted on the flywheel 8 (FIG. 2). A pivoting lever arrangement comprising levers 54, 55 mounted for rotation about a stationary shaft 53 serves to receive the tape coupling member 49 and to convey the leading end of the tape 46 to the take-up reel 11. The pivoting lever 54 at its free end is connected with a lever 55 mounted for rotation and influenced by a restoring spring (not shown), which tends to twist the restoring spring clockwise if this is not prevented by guide means, not shown. With respect to the process of transferring the beginning of the tape from its rest position in the magazine case 13, 14 to its operative position on the take-up reel 11 the following need only be said: the driving motor 1 may be switched on either manually, by the operation of a separate starting button, or automatically when the magazine is being, or has been, placed on the recorder or inserted into the insertion device 12, none of which are illustrated. Further the tape spindle 19 may be raised and the release member 41 may be inserted through the aperture 42 in the magazine base 13 in the manner described hereinbefore in order to release the tape brake either manually with the aid of a special push-button or automatically in the manner described hereinbefore. When the tape brake has been released the pivoting lever arrangement 54, 55 may be caused, either manually or automatically, to move with at least one driving projection 56 along the magazine case 13, 14 or in a recess 72 thereof so that, when the lever 54 is pivoted clockwise, the projection 56 is enabled to catch the tape coupling member 49. When this has been caught the recording tape 46 is taken—as is shown by a broken line 57—along the guide pins 51, the magnetic heads 52 and the capstan 7 to a point within the range of the take-up reel 11 (FIGURE 1) at which the tape coupling member 49 provided at the beginning of the tape is released. The released tape coupling member

49 is caught by receiving projections 58 provided on the two flanges of the take-up reel 11 so as to pass through a channel 60 leading to the hub 59 of the take-up reel 11 into a recess 61 in the said hub 59. The tape coupling member 49 is held in the recess 61 and consequently the tape 46 is wound on the take-up reel 59 in known manner.

The driving connection for fast forward transport comprises the larger friction wheel 5 on the motor shaft 3 and a pivotable intermediate friction wheel 69 which drives a friction wheel 70 of the lower friction clutch part 10 of the take-up device.

When one switches over to rewind, a driving connection to a coupling wheel 30 (FIGURE 1) is established through two friction wheels 30' and 30'' provided between the motor shaft 3 and the wheel 30 of the supply part. The coupling wheel 30 together with further coupling wheels 26, 28 (FIGURE 1) forms a friction clutch operating with adjustable friction and capable of driving the reel 15, 16, 21 in the magazine with the desired friction torque through the spindle 19 in accordance with the above described adjustment of the frictional force. The gear ratio of the drive in the case of rewind (and also of fast forward) in known manner is chosen so that the speed of the tape 46 being rewound is a multiple of the normal running speed for recording or reproduction.

In a modification of the first embodiment of the invention which will now be described with reference to FIGURE 3 and subsidiary FIGURES 3a to 3e, a release arrangement of the first kind for the tape brake is used in the form of a hooked release member 41. However, in this modification of the first embodiment the magazine is not laterally inserted into the recorder but is placed thereon from above. This enables the upward and downward movement of the spindle 19, and of the associated driving members, by the pivotable lever 23 (FIGURE 2) to be dispensed with. The spindle 19 can be arranged therefore, in known manner, so that it is fixed and its upper end protrudes from the deck 68 of the recorder.

FIGURES 3, 3c and 3d show different operative positions of a slide rod 75 acting to control the release member 41, a magazine and a shaft 78 of the release member 41 and associated parts. In FIGURE 3 the parts are rotated 90° in the plane of the drawing from the position seen in FIGS. 3c, 3d. FIGURES 3a and 3b show the release member 41 in the locked position and rest position respectively. As FIGURES 3c and 3d show, a push-button 74 enables the slide rod 75 to be shifted upwardly, FIGURE 3d showing the rod in its rest position and FIGURE 3e showing it in the depressed position (operative position). The slide rod 75 for part of its length is in the form of a toothed rack 77 so that the rod when, or as it is shifted, is capable of turning a gear wheel 79 rigidly mounted on the shaft 78 of the release member 41 and hence of moving the release member 41 into the locked position (FIGURE 3a). The slide rod 75 engages in a pawl 80 adapted to be actuated by an electromagnet 81. Further, the slide rod 75 closes a work contact 82. The electromagnet 81 and the work contact 82 are parts of an automatic arrangement (not shown) by which all operations required, for example, for playback of the magazine placed on the recorder up to and including the re-release of the magazine after the tape 46 has been rewound. For this automatic arrangement the closure of the work contact 82 by the slide rod 75 is the start signal while a current pulse passed through the electromagnet 81 terminates the control operations and restores the initial condition of the assembly (FIGURES 3b and 3d). Various bearings are denoted by reference numeral 76.

The second embodiment of the invention which will now be described with reference to FIGURE 4 is distinguished from the first embodiment by a different release member 62 which is shaped in the form of a key, and operates in a different manner, but otherwise also

serves both to lock the magazine case in the operative position and at the same time release the tape brake. As FIGURE 3 shows, the double-flange reel 15, 16, 21 mounted for rotation in the magazine case 13, 14 again is provided along the outer circumference of the lower flange 15 with preferably sawtooth-shaped teeth 45 which are engaged, in the rest position of the magazine, by the left-hand end of a pawl 43 under the control of a spring 44. When the magazine has been placed on the recorder or inserted into the above-mentioned insertion device 12 the key-shaped member 62 is inserted into the interior of the magazine through the aperture 42 in the magazine base 13. Again the cross-section of the aperture 42 matches the cross-section of the release member 62. After the member 62 has been inserted into the magazine it is turned counter-clockwise. By this combined movement the bit 63 of the key-shaped release member 62 causes not only the magazine case to be locked in the operative position on the recorder but also, by striking the right-hand end of the pawl 43, the tape brake is released in the manner described hereinbefore. On termination of the recording or reproducing operation the said locking of the magazine case on the recorder and the release of the tape brake is again removed owing to the fact that the release member 62 is manually or automatically turned back and lowered. The release member 62 is retracted into the recorder a distance such that it does not interfere with the arrangement of a new magazine on the recorder or with lateral insertion of a new magazine into the insertion device 12.

In the third embodiment of the invention shown in FIGURE 5, the member for locking the magazine case to the recorder and for releasing the tape brake is a resilient and/or bendable mandrel 64 adapted to be inserted into the magazine through an aperture 42 of matching cross-section provided in the magazine base 13. The mandrel 64 is inserted between the right-hand end of the pawl 43 and a push-button 66 provided in a flattened part 65 of a corner of the magazine case. In this embodiment the tape brake can only be released after the insertion of the intermediate member 64. As FIGURE 5 shows, the push-button 66 is arranged and shaped so as to fill substantially the entire empty space produced by the flattened part 65 of the corner of the magazine case 13, 14. The push-button 66 may be pushed into the magazine either manually or automatically but is only effective to release the brake after the upward movement of the member 64.

All solutions in which the tape brake is released and the magazine case locked by an inserting movement and by turning and/or pivoting and/or shifting the member (62 and 64 respectively) provided on the recorder, that is to say by a composite movement combining the above-mentioned movements, fall within the scope of the invention. Further additional holding means may be provided for locking the magazine case in the operative position and the magazines may be fed to the recorder either singly or in stacks.

We claim:

1. In a tape recorder/reproducer the combination comprising a housing member including a deck portion, a take-up reel and a supply magazine operatively positioned on said deck, an opening in said deck, an aperture in said magazine in register with said opening when said magazine is in said operative position, a supply reel in said magazine, brake means within said magazine for normally securing said supply reel against movement, said brake means having an extension terminating adjacent said aperture, a member secured in said magazine between said aperture and the extension of said brake means for normally shielding said extension from reach through said aperture, a brake release member adapted to be extended through said aperture for engaging said projection thus locking said magazine in said operative position and for simultaneously releasing said brake means, and means

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for moving said brake release member to a position extended through said aperture and a retracted position withdrawn from said aperture.

2. A tape recorder/reproducer according to claim 1 wherein said brake release member comprises a hooked shaped curved plate; said magazine aperture having a transverse cross sectional configuration substantially corresponding to the transverse cross section of said plate and said shielding member having a curved surface corresponding with said hooked shape for engagement with said plate.

3. A tape recorder/reproducer according to claim 1 wherein said means for moving said brake release member between said position extended through said aperture and said retracted position comprises a lever pivotally hinged at one end to a push button means, a crank means connected with said brake release member and pivotally connected with the other end of said lever.

4. A tape recorder/reproducer according to claim 1 wherein said means for moving said brake release member between said one position and said retracted position comprises a slideably mounted rod having a toothed rack portion adjacent one end and connected at the opposite end with push button means, a gear wheel connected with said rack, a shaft driven by said gear wheel, said shaft being connected with said brake release member for moving said brake release member between said one position and said retracted position.

5. A supply magazine for a tape recorder/reproducer comprising a magazine housing member, a flanged supply spool rotatably supported in said housing, at least one flange of said spool having a toothed marginal edge, brake

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means normally engaging said toothed marginal edge for immovably securing said spool against rotation, said brake means having an extension, an aperture in one wall of said magazine, a shielding projection in said one wall intermediate said aperture and said extension for preventing access to said extension without the use of a particularly shaped brake release member.

6. A supply magazine according to claim 5 including a brake release member, said brake release member being a hook shaped metal plate.

References Cited by the Examiner

UNITED STATES PATENTS

2,391,497	12/1945	Wilson et al.	242—71.2
2,661,162	12/1953	Owens	242—55.13
2,732,754	1/1956	Foster et al.	242—71.2 X
2,876,005	3/1959	Eash	242—55.19 X
2,943,805	7/1960	Loewe	242—55.13
3,059,871	10/1962	Loewe	242—55.13
3,066,880	12/1962	Bauer	242—55.13
3,070,322	12/1962	Razis	242—55.13
3,075,717	1/1963	Kingston	242—55.13
3,087,686	4/1963	Wren	242—55.13

OTHER REFERENCES

R.C.A. Technical Notes—R.C.A.T.N. No. 252, Mechanical Brake for Tape Cartridge Recorder, P. E. O'Connell, published June 1959.

MERVIN STEIN, *Primary Examiner*.

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