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Ohira et al.

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[54] BULK ERASER WITH PERMANENT MAGNET FLUX PRODUCED OBLIQUELY TO CASSETTE MOVEMENT

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[73] Assignee: **Sony Corporation**, Tokyo, Japan

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Oct. 16, 1968 Japan.....43/90196

[52] **U.S. Cl.**.....**317/157.5**, 179/100.2 D
[51] **Int. Cl.**.....**H01f 13/00**

[58] **Field of Search**.....179/100.2 D; 317/157.5, 157.51

[56] **References Cited**

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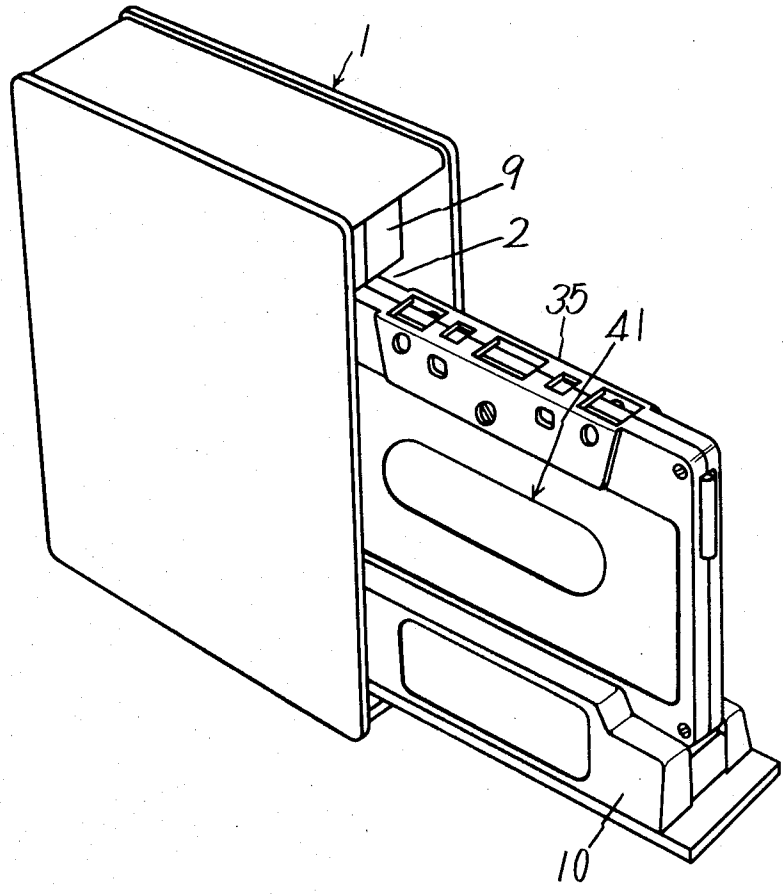
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Assistant Examiner—Alfred H. Eddleman
Attorney—Curtis, Morris & Safford

[57] **ABSTRACT**

A bulk eraser for a recorded magnetic medium, the eraser consisting of a housing having a passage for the recorded magnetic medium and magnet means arranged adjacent said passage.

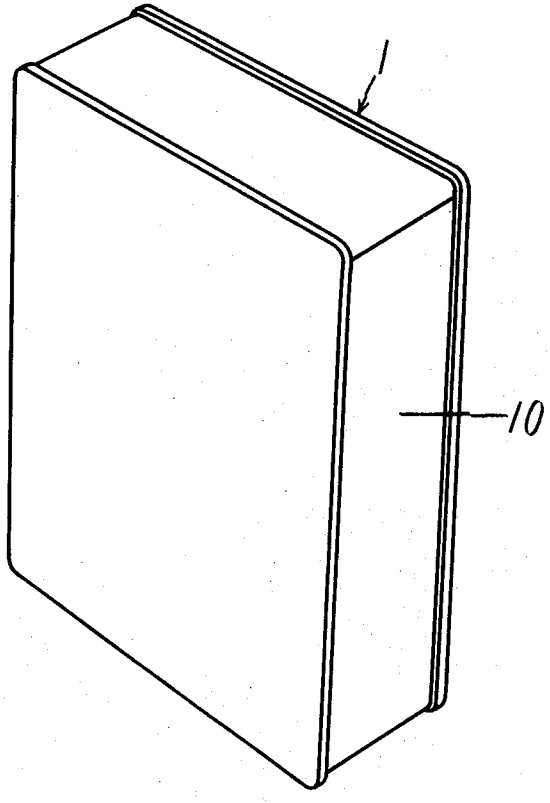
7 Claims, 10 Drawing Figures



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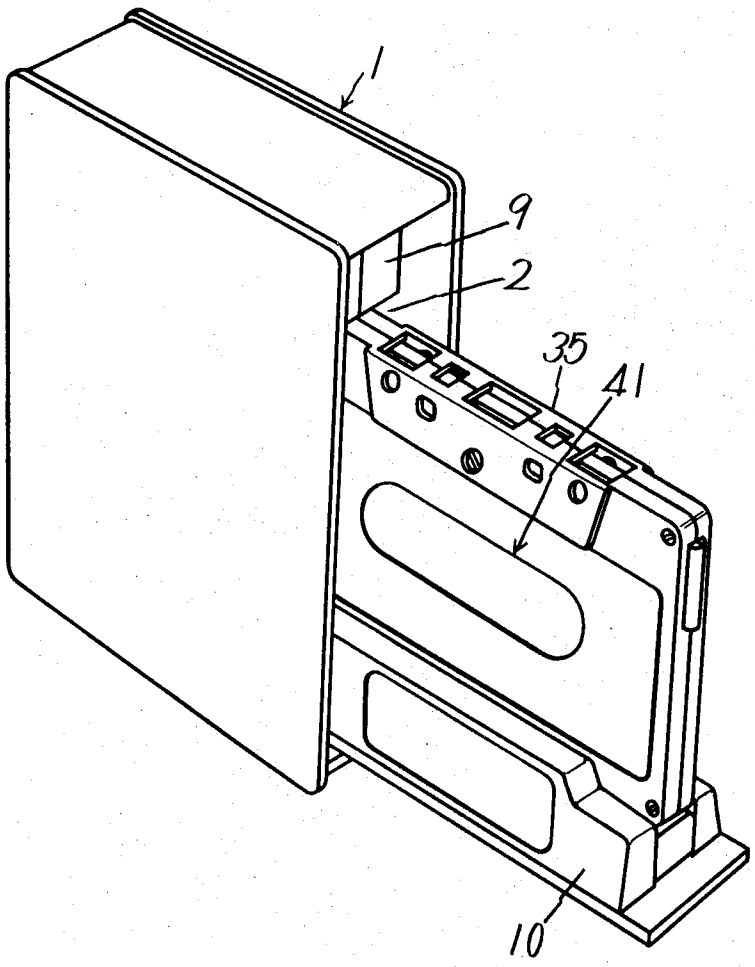
Fig. 1



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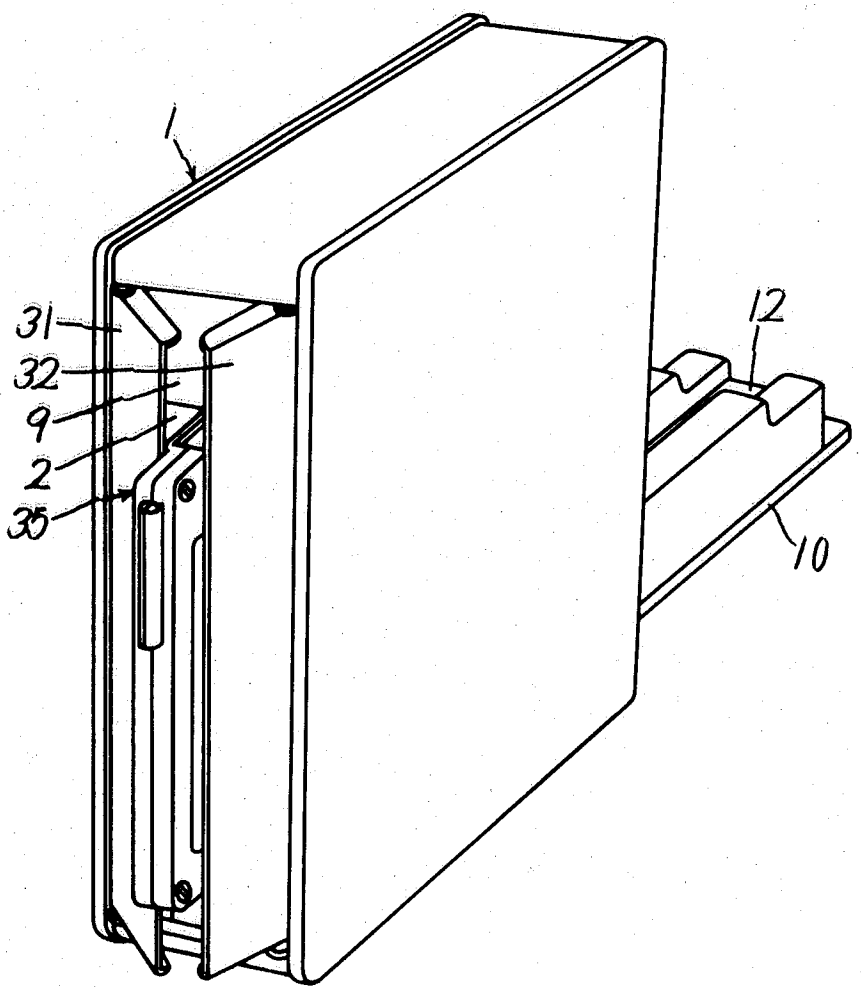
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Fig. 2



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Fig. 3



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Fig. 4

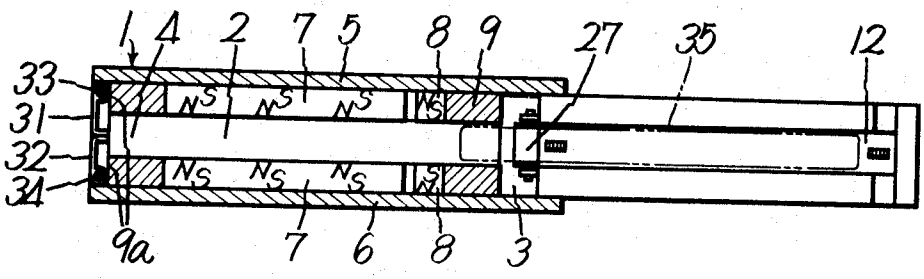
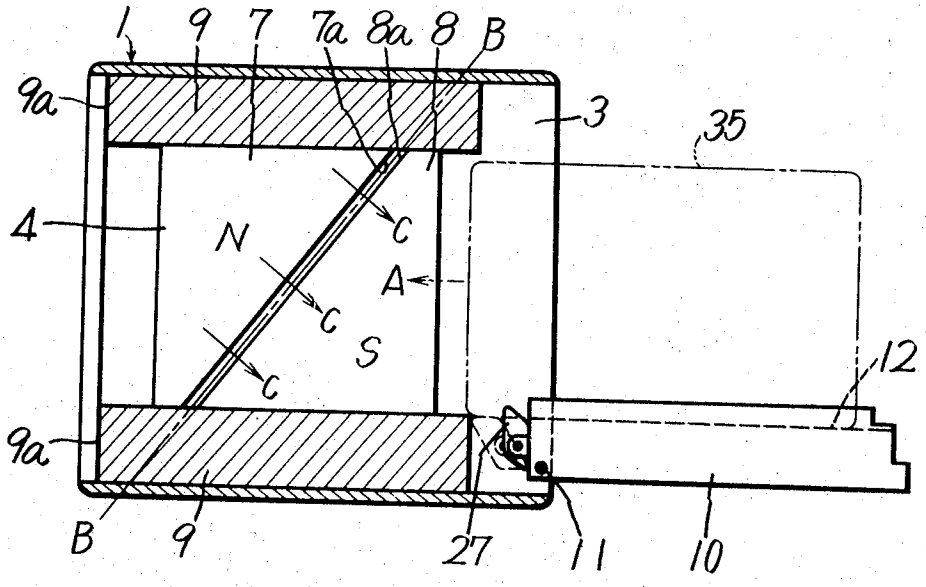


Fig. 5



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Fig. 6

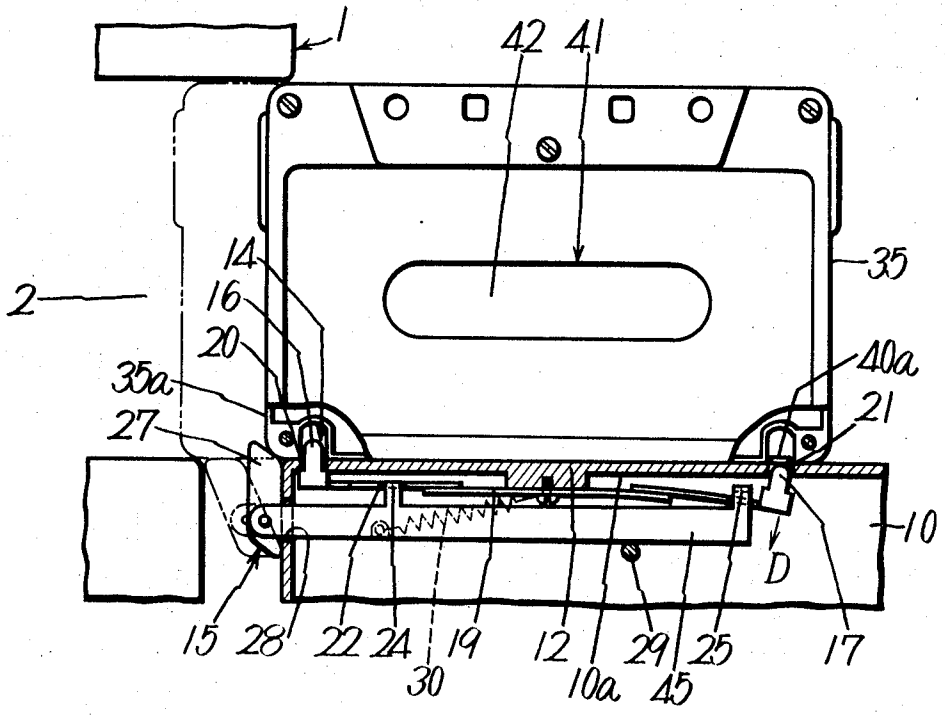
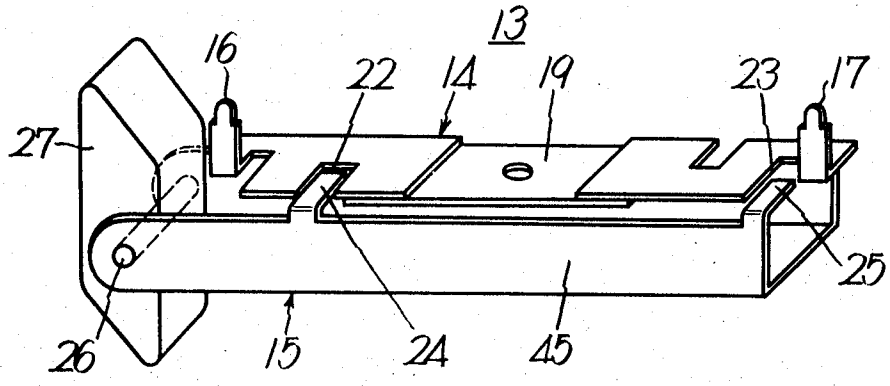


Fig. 7



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Fig. 8

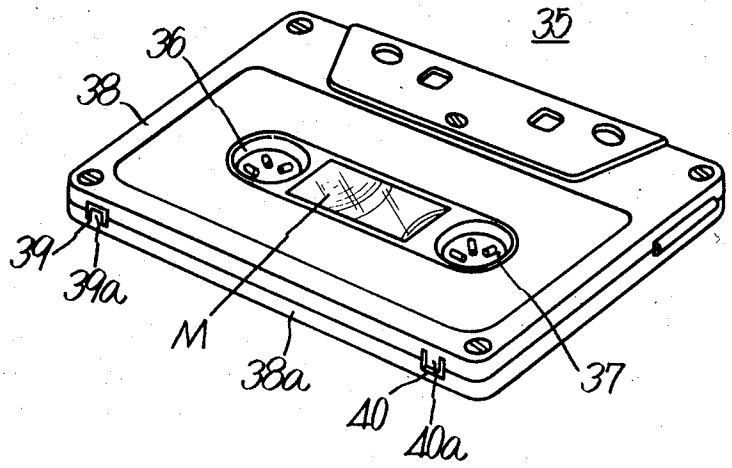


Fig. 9

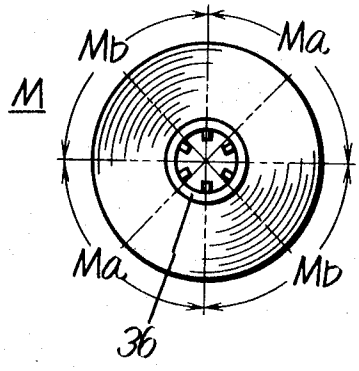
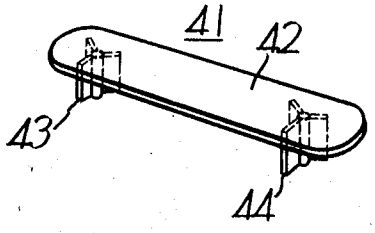


Fig. 10



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BULK ERASER WITH PERMANENT MAGNET FLUX PRODUCED OBLIQUELY TO CASSETTE MOVEMENT

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a bulk eraser, and more particularly to a bulk eraser which is of small size and is easy to handle.

2. Description of the Prior Art

A conventional bulk eraser consists of an E-shaped iron core having a coil wound thereon. A magnetic medium is placed on the core and then an attenuating alternating current is applied to the coil to erase the information recorded on the magnetic medium. It is also possible to serve the same purpose by gradually drawing the magnetic medium and the core apart without attenuating the current applied to the coil. However, the former method requires means for producing the attenuating alternating current and the latter necessitates means for drawing the magnetic medium and the core apart. Consequently, the conventional bulk eraser becomes bulky and expensive. In addition, the use of the alternating current imposes a limitation on the place of actual use of the bulk eraser and introduces complexity in its handling. A bulk eraser using a permanent magnet is easy to handle but cannot be expected to achieve satisfactory erasing.

SUMMARY OF THE INVENTION

The present invention is directed to a bulk eraser which is provided with a housing having a passage permitting a spirally wound magnetic medium to pass therethrough and having magnet means disposed adjacent the passage to produce a magnetic flux obliquely to the direction in which the magnetic medium is moved.

Accordingly, one object of the invention is to provide a small-sized and inexpensive bulk eraser.

Another object of this invention is to provide a bulk eraser which ensures erasure of recorded contents with simple operations.

A further object of this invention is to provide a bulk eraser which is provided with means for prevent the eraser by mistake of recorded contents that it is desired to preserve.

Still a further object of this invention is to provide a bulk eraser which is adapted to keep the magnet means clean at all times.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows in perspective a device of this invention in its inoperative condition;

FIGS. 2 and 3 illustrate in perspective the device of this invention in its operative condition;

FIGS. 4 and 5 are top plan and side views partly in cross-section, showing the device of this invention;

FIG. 6 is a cross-sectional view of the principal part of a cover of the device in FIG. 5;

FIG. 7 is a perspective view of means used in the present invention to prevent undesired erasure of record material;

FIG. 8 shows in perspective a cassette having incorporated therein a magnetic tape;

FIG. 9 schematically shows the magnetic tape wound on a reel; and

FIG. 10 is a perspective view of reel locking means used in the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the drawings reference numeral 1 indicates a housing having a passage 2 through which a spirally wound magnetic medium M can be passed. The housing 1 has inlet and outlet openings 3 and 4 at opposite ends of the passage 2. The housing 1 has side walls 5 and 6, on the inside of which are disposed permanent magnets 7 and 8 adjacent the passage 2. In this case the permanent magnets 7 and 8 are disposed in a predetermined spaced relation to each other relative to the direction of movement of the convoluted magnetic medium M, as depicted in FIGS. 4 and 5. The magnets 7 and 8 are magnetized in a direction parallel to their thickness and in such a manner that their proximal inner surfaces on the side of the passage 2 consist entirely of the south and north magnetic poles, or vice versa. Adjacent magnets 7 and 8 are magnetized with opposite magnetic poles. Further, adjacent magnets 7 and 8 are disposed so that a plane B defined by their opposing edges 7*a* and 8*a* is inclined at an angle of, for example, 45 degrees to the direction in which the magnetic medium M is pushed into the passage 2 as indicated by an arrow A. Consequently, magnetic lines of force through the plane B are indicated by an arrow C and are inclined at an angle of, for example, 135 degrees to the direction of the arrow A. The magnets 7 and 8 are fixedly mounted on the inside of the side walls 5 and 6 of the housing 1 through plastic frames 9, which may be formed by molding.

Reference numeral 10 indicates a front wall or cover which is hinged about a pin 11 and serves as a closure for one opening of the passage 2. The cover 10 has a guide portion 12 which leads to the passage 2 when held horizontal while the bulk eraser is in actual use as illustrated in FIG. 5. Further, the cover 10 has a member 13 for preventing undesired erasure of the information recorded on a magnetic medium which it is desired to preserve. The member 13 that is to prevent incorrect erasure retains the magnetic medium M on the cover 10 to prevent it from moving into the passage 2. This member cooperates with erasure-prevention means on a cassette, as described later.

As shown in FIGS. 6 and 7, the means for prevention of undesired, and therefore faulty, erasure includes a member 13 that consists of a detector member 14 and a member 15, which shifts with a displacement of the detector member 14 to obstruct the movement of the magnetic medium M. The detector means 14 comprises upstanding lugs 16 and 17 and a plate spring 19 that urges the lugs upwardly. The plate spring 19 is fixed at its center to the interior wall 10*a* of the cover 10 and the lugs 16 and 17 project out through openings 20 and 21 bored through the guide portion 12 of the cover 10. The distance between the lugs 16 and 17 is selected to be the same as that between the faulty erasure prevention members of the cassette described later. Reference numerals 22 and 23 designate notches formed in the detector member 14.

The member 15 consists of a slide lever 45, extension arms 24 and 25 bent from the slide lever 45 and engaging the notches 22 and 23, and a stopper 27 rotatably hinged about a pin 26 at one end of the slide lever 45. The extension arms 24 and 25 are held flush with the notches 22 and 23. The slide lever 45 is guided in a horizontal direction by an opening 28 and a bar 29. Reference numeral 30 designates a coil spring which always pulls the slide lever 45 to the right.

In FIGS. 3 and 4 two covers 31 and 32 for the other opening 4 of the passage 2 are hinged about pins 33 and 34 and open together on their respective hinges. The covers 31 and 32 are made of, for example, a magnetic material and are normally attracted by the magnets 7 and 8 to close the opening 4. Further, one end face 9*a* of each of the frames 9 serves as a stopper for each of the covers 31 and 32 to prevent insertion of the magnetic medium M via the opening 4.

Turning now to FIG. 8, a description will be given of a cassette 35. The cassette 35 has a case 38 within which is a magnetic medium M wound on reels 36 and 37, as shown in FIG. 9. The case 38 has formed in its rear face members 39 and 40 in the forms of thin tabs 39*a* and 40*a* that control erasure of the magnetic medium. If the tabs 39*a* and 40*a* are present new information can be recorded on the magnetic medium. However, if the recorded material is not to be erased the tabs are snapped off. Thereafter, recording cannot be made on the magnetic medium, thus ensuring no inadvertent erasure of the information content recorded on the magnetic medium. Such a cassette is well-known as a compact cassette manufactured by N. V. Philips' Gloeilampenfabrieken.

In FIG. 10 reference numeral 41 designates, generally, reel lock consisting of a plate 42 formed of, for example, synthetic resin and lock members 43 and 44, which are formed integrally with the plate 42 and engage reels 36 and 37 of the cassette 35 to prevent their rotation. Each of the lock members 43 and 44 has, for example, three projecting pieces, which engage inwardly projecting teeth of the reel hub. In the demagnetization of the magnetic medium M housed in the cassette 35, the reel lock 41 is mounted on the cassette 35 in such a manner that the lock members 43 and 44 are held in engagement with the reels 36 and 37, under which conditions the cassette 35 is passed through the passage 2.

A description will be given of the operation of the bulk eraser of such a construction as has been described in the foregoing.

The cover 10 is opened at an angle of 90 degrees and the cassette 35 is placed on the guide portion 12 of the cover 10 as shown in FIGS. 2 and 5, under which conditions the cassette 35 is pushed in the direction of the arrow A. In such a case the domains of the magnetic materials on those portions *Ma* of the magnetic medium M which are substantially parallel with the magnetic lines of force indicated by C are all aligned in the direction C, so that the portions *Ma* are demagnetized. Then, the cassette 35 is turned over and passed through the passage 2, in which case the portions *Mb* of the magnetic medium M are substantially parallel with the magnetic lines of force and are thereby demagnetized in a similar manner. Thus, the magnetic medium M can be readily demagnetized while being wound on the reel 36.

In some cases, when the cassette 35 passes between the opposing magnets 7 and 8, the magnetic medium M wound on the reels 36 and 37 is turned by the magnetic lines of force of the magnets 7 and 8. Consequently, although the cassette 35 is passed twice through the bulk eraser, it is likely that some portions of the magnetic medium M will be left magnetized by the turning of the magnetic medium itself. To avoid this, the lock members 43 and 44 of the reel lock 41 depicted in FIG. 10 are engaged with the reels 36 and 37, as illustrated in FIG. 2.

Referring now to FIGS. 6 and 7, the operation of the faulty-erasure member 13 will be described. In the demagnetization of the magnetic medium M, when the tabs 39*a* and 40*a* of the cassette 35 are present, the lugs 16 and 17 are both pushed by the tabs 39*a* and 40*a* in a direction of the arrow D. Consequently, the extension arms 24 and 25 of the slide lever 45 are not flush with the notches 22 and 23 of the detector member 14, as would be required to allow the slide lever 45 to move independently of the detector member 14. Pressing the stopper 27 with the side 35*a* of cassette 35 to the left causes the stopper 27 to be moved to the left, together with the slide lever 45, and to be turned in a counterclockwise direction, thereby to guide the cassette 35 to the passage 2. In this case the reel lock 41 is mounted on the cassette 35 as above described. In the event that only one tab 39*a* of the cassette 35 has been removed, the lug 17 is pressed down by the tab 40*a* but the other lug 16 is pushed upward by the plate spring 19. Accordingly, the extension arm 25 is not flush with the notch 23, but the arm 24 lies flush with the notch 22 and engages therewith, so that the slide lever 45 is prevented from moving to the left, and the stopper 17 does not turn, thus retaining the cassette 35 on the cover 10 and eliminating the possibility of inadvertent erasure of the information content recorded on the magnetic medium M. It will be seen that where both tabs 39*a* and 40*a* have been removed, the movement of the slide lever 45 is also prevented, thereby retaining the cassette on the cover 10. The manner in which the cassette 35 moves from the passage 2 is shown in FIG. 3. The cassette 35 pushes open the covers 31 and 32, and when the cassette 35 has been completely removed from the passage 2, the covers 31 and 32 are attracted by the magnetic force of the magnets 7 and 8 to close the opening of the passage 2 to keep the magnets 7 and 8 clean.

As has been described in the foregoing, the present invention enables not only demagnetization of a magnetic medium wound on a reel but also prevents faulty erasure of the information content recorded on the magnetic medium. Further, the present invention does not require a power source, so that the bulk eraser of this invention can be used as a portable eraser for magnetic tapes incorporated in cassettes. It is simple in construction. While two permanent magnets of opposite polarities are arranged in the foregoing embodiment, the same results can be obtained by sequentially arranging more than three permanent magnets in an order of S, N, S, N, . . . or N, S, N, S . . . . In this case, if the demagnetizing portion is formed such that the opposing planes of the north and south magnetic poles of the first and second magnets and those of the south and north magnetic poles of the second and third magnets are inclined at different angles, one passage of a magnetic medium through the eraser will be sufficient for its demagnetization. In the foregoing example the permanent magnets are mounted on both inside walls of the housing but it will be understood that the demagnetization effect similar to the aforementioned can be obtained by disposing the permanent magnets on one inside wall of the housing as above described.

Although the opposing plane B between the magnets 7 and 8 is inclined at 45 degrees to the direction A, it may be inclined at any other angle. Further, it will be seen that the above effects can be obtained with not only the Philips type cassette tape but also a magnetic tape wound on a standard reel, if a case for supporting the tape is provided as an adapter and faulty-erasure prevention are provided in the case.

It will be apparent that many modifications and variations may be effected without departing from the scope of the novel concepts of this invention.

We claim:

1. A bulk eraser for a tape cassette comprising a case, two reels, and tape wound thereon, said eraser comprising:
   - A. A housing having juxtaposed walls defining a passage through which a tape cassette can be passed;
   - B. Permanent magnet means on said walls facing said passage and having poles producing magnetic flux obliquely to the direction of movement of the tape cassette through passage;
   - C. A cover pivotally mounted on said housing at one end of said passage and normally biased into position to close said passage; and
   - D. Guide means comprising a flat portion to receive said tape cassette, said guide portion being pivotally mounted on said housing to keep the other end of said passage normally closed, said flat portion guiding said tape cassette into said passage when said guide means is pivoted outwardly.

2. A bulk eraser as claimed in claim 1 comprising means engaging said cassette for preventing, erasure of information intended to be permanently recorded on the tape.

3. A bulk eraser as claimed in claim 1 wherein the guide means includes means for detecting the means for preventing faulty erasure and means for preventing the movement of the tape in cooperation with the detecting means.

4. A bulk eraser as claimed in claim 1 which includes means for locking the reels in said cassette with the tape wound thereon.

5. A bulk eraser as claimed in claim 1 which has covers for closing the other open end of the passage.

6. A bulk eraser as claimed in claim 5 wherein the covers include means which permits the opening of the covers from the inside by the magnetic medium having passed the passage but prevents the insertion of the magnetic medium from the outside.

7. A bulk eraser as claimed in claim 5 wherein the covers are attracted by the magnetic force of the magnet means to close the passage.

* * * * *