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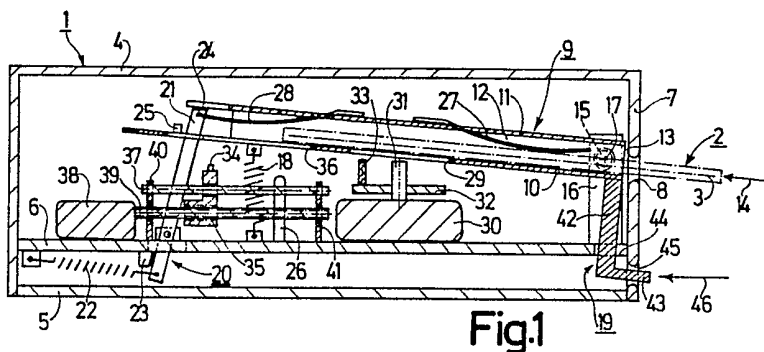
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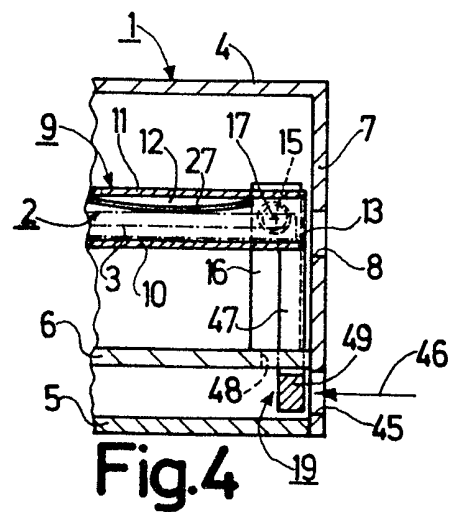
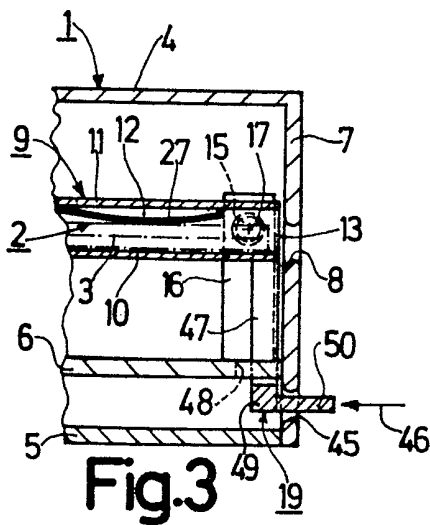
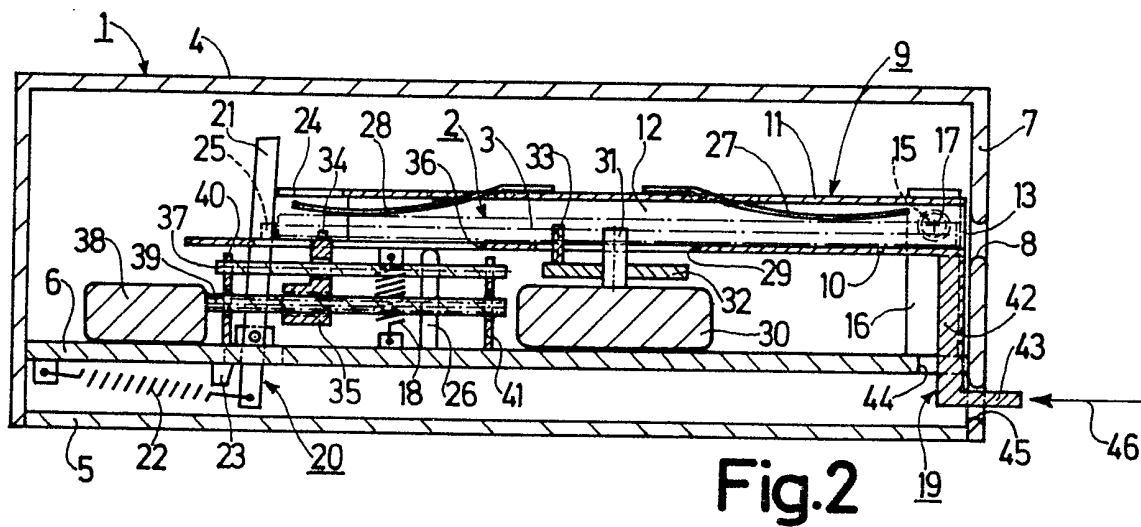
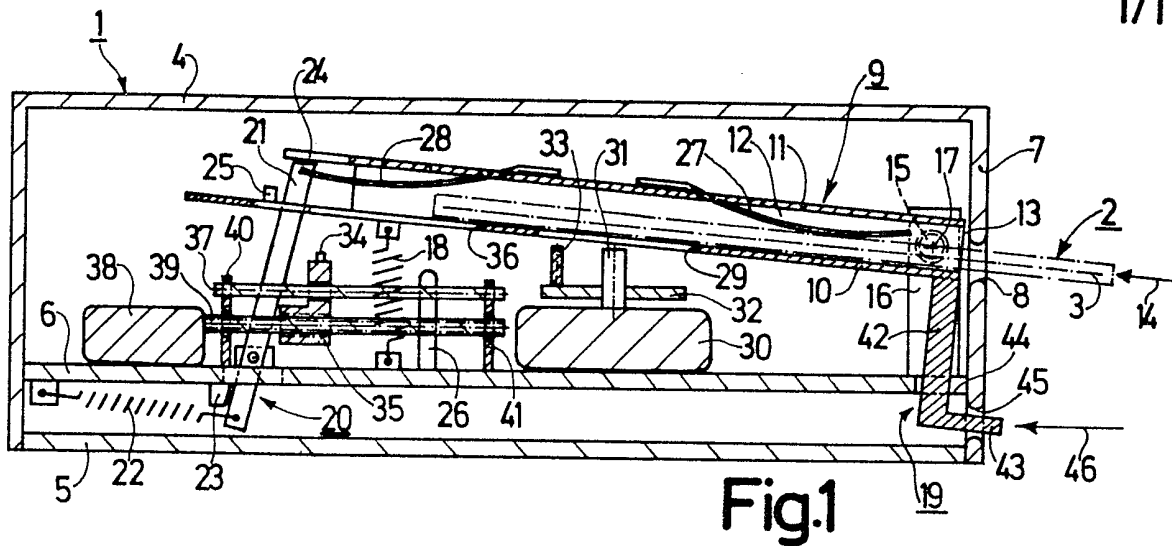
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(58) Field of search
G5R
Selected US specifications from IPC sub-class G11B

(54) Recording and/or reproducing
apparatus

(57) A recording and/or reproducing apparatus has cassette holder 9 pivotable between a loading position, in which a cassette 2 can be slid into the holder through opening 8 in wall 7 of the housing and through insertion opening 13 in one end of the holder, and an operating position. The cassette holder is urged by springs 18 to the operating position and is pivoted manually to the loading position by lever arm 42 projecting from the cassette holder in a direction perpendicular to the direction of insertion 14 of the cassette into the holder, and which at its free end has a right-angled extension (43) projecting through an aperture (45) in the wall (7) of the housing of the apparatus. Variations of the handle are disclosed (eg Figs 3, 4 and may be inclined). By applying manual pressure to the handle in a direction substantially the same as that in which the cassette is inserted, the holder is pivoted to the loading position. Stop levers 21 maintaining the cassette holder at loading position are released (mechanically or electrically) by the inserted cassette. Disc (magnetic or optical) and tape records are exemplified.





SPECIFICATION

A recording and/or reproducing apparatus

5 The invention relates to a recording and/or reproducing apparatus for a recording medium housed in a cassette, comprising a cassette holder having substantially the form of a tunnel of rectangular section and having at least one main wall and, joined to the latter, two side walls, and having at one end an insertion opening for the insertion of a cassette, which cassette holder is pivotable between a loading position, in which a cassette can be inserted through the insertion opening into the cassette holder in the direction in which the holder extends from the insertion opening and removed from the cassette holder in the opposite direction, and an operating position, in which the cassette inserted into the cassette compartment occupies an operating location about a pivotal axis which is perpendicular to the side walls of the cassette holder and is located in the vicinity of the end of the holder having the insertion opening, at least one spring being arranged to act on the cassette holder to move it from its loading position into its operating position, and the cassette holder having, opposite said pivotal axis, a handle formed as a lever arm for moving the cassette holder from its operating position to its loading position against the force of the spring, and the cassette holder being arranged to be held in its loading position against the force of the spring by a stop device which is releasable by a cassette at the end of its insertion into the cassette compartment and which is held in its operating position against at least one stop by the force of a spring.

35 An apparatus of this kind is known from British patent specification 1 301 998. In this known apparatus, which is designed for operation with cassettes containing a magnetic tape, the handle of the cassette holder is formed by an extension of a main wall of the holder projecting from the holder in a direction opposite that in which the holder extends from the insertion opening. To move the cassette holder from its operating position to its loading position the handle has to be actuated in a direction transverse to the direction of the cassette holder and therefore transverse to the direction of insertion of the cassette into the holder. This direction of actuation has, in apparatuses of the kind referred to in the preamble, frequently proved illogical and impractical for the users of these apparatuses because users assume that the direction of the handle actuation required in order to enable a cassette to be removed from the apparatus corresponds at least, roughly to the direction in which a cassette is inserted in the device, i.e. the direction in which the cassette holder extends from the insertion opening, and they therefore actuate the handle in the latter direction, which, however, does not produce any movement of the cassette holder from its operating position to its loading position. Users then often attempt, nevertheless, to effect this movement of the cassette holder by exerting greater force, which leads to excessive loading of the cassette holder and its pivotal bearings and can even lead to their being damaged.

65 It is an object of the invention to mitigate the dif-

ficulties stated above and to provide in a simple fashion an apparatus of the kind specified in the preamble in which the actuation of the handle to move the cassette holder from its operating position to its loading position is substantially the same as the direction of insertion of a cassette into the cassette holder. To that end the invention is characterized in that the handle has at least one section which extends transversely of the main wall of the cassette holder and the free end of which lies at a distance from the pivotal axis of the cassette holder in a direction pointing from the loading position to the operating position. The fact that the section of the handle positioned transversely of the main wall of the cassette holder is transverse to the direction of the cassette holder, ensures in a simple manner that to move the cassette holder from its operating position to its loading position, the handle has now to be actuated in the direction of the cassette holder, so that, to advantage, the direction in which the handle has to be actuated in order to enable a cassette to be removed from the apparatus and the direction of insertion of a cassette into the apparatus are practically the same and incorrect actuation such as frequently occurs with the known apparatus can be avoided with certainty.

It has proved to be particularly advantageous if the section of the handle extending transversely of the main wall of the cassette holder is connected at its free end to an actuation extension projecting from it in a direction substantially opposite to the direction in which the holder extends from the insertion opening. In this way an exactly defined point of application is determined on the handle with the largest possible lever arm, so that operation is achieved with low operating forces. Furthermore, such an actuation extension projecting in the opposite direction to the cassette holder in an apparatus in which the cassette can be inserted into the holder through an opening in a wall of the apparatus housing, can easily extend from the inside of the apparatus to the exterior thereof through another opening in this apparatus housing wall, so that a simple operation, considered desirable by users, as in the case of generally used pushbuttons, is achieved.

Three embodiments of the invention will now be described by way of example with reference to the accompanying drawings, in which:-

Figure 1 is a schematic view, drawn approximately to full scale, of a first embodiment of the recording and reproducing apparatus according to the invention with a cassette holder for a cassette containing a magnetic disc, the cassette holder being shown in its loading position and the handle of the cassette holder having a single section projecting from the bottom wall and from whose free end an actuation extension projects;

Figure 2 is a view similar to *Figure 1*, showing the apparatus of *Figure 1* with showing the cassette holder in its operating position;

Figure 3 is a sectional view, similar to *Figure 2*, of part of a second embodiment of the apparatus in accordance with the invention, in which the handle of the cassette holder has two sections projecting from the bottom wall at a distance from each other and

connected at their free ends via a bridge from which an actuation extension projects perpendicularly;

Figure 4 is a sectional view, similar to Figures 2 and 3, of part of a third embodiment of the apparatus in accordance with the invention, in which the handle of the cassette holder has two sections projecting from the bottom wall at some distance from each other and connected to each other at their free ends via a bridge.

The recording and reproducing apparatus 1 shown in Figures 1 and 2 is designed for the recording and reproduction of digital information signals on a magnetic disc 3 housed in a cassette 2. Cassette 2 and the magnetic disc 3 housed in it are only drawn schematically in Figure 2 with dot-and-dash lines. Their detailed construction is generally known by the designation "floppy disc" and is not essential for the present invention.

Apparatus 1 has a rectangular-section housing consisting of a hood-like top section 4 and a bottom part 5 shutting off this upper part of the housing. Fixed in the upper part of the housing is a chassis plate 6, not shown in greater detail, which is used to support the constituent parts of the apparatus. Provided in a side wall 7 of the upper part 4 of the housing is an opening 8 through which a cassette 2 can be inserted into the apparatus as shown in Figure 1.

For the reception of a cassette 2 which can be inserted into the apparatus through the opening 8, the apparatus 1 has an open-ended, tunnel-like cassette holder 9 which can be moved between a loading position, shown in Figure 1, in which a cassette can be inserted into it and removed from it, and an operating position, shown in Figure 2, in which a cassette inserted into it occupies an operating location. The cassette holder 9 consists of a bottom wall 10, a top wall 11 and two side walls 12 connecting the bottom wall and top wall with each other, of which only one side wall is visible in Figures 1 and 2 because of the cross-sectional representation, which runs through the centre of the magnetic disc 3. The tunnel-like form of the cassette holder is defined by these four walls. The cassette holder 9 has at its end facing the opening 8 an insertion opening 13 for a cassette 2, through which, with the cassette holder 9 in its loading position, a cassette can be inserted in the holder in the direction indicated with an arrow 14 in Figure 1 and can be removed from it in the opposite direction. The cassette holder 9 is provided in the vicinity of its end having the insertion opening 13, with two coaxial stub shafts 15 located a short distance from this end and each projecting from one of the side walls 12. By means of these stub shafts the cassette holder is mounted and can pivot in two bearing members 16 projecting from the chassis plate 6. The cassette holder 9 can thus pivot between its loading position and its operating position about a pivotal axis 7 which is defined by the axis of the spindle stubs 15 and which is perpendicular to the side walls 12 of the cassette holder and located in the vicinity of the end of the holder having the insertion opening 13.

To move the cassette holder 9 from its loading position to its operating position, two tension springs 18, arranged at a distance from each other in a direc-

tion parallel to the pivotal axis 17 of the cassette holder, are connected at one end to the bottom wall 10 of the holder and at the other end to chassis plate 6. The movement of the cassette holder 9 from its operating position to its loading position against the force of the two tension springs 18 has to be done manually. To that end the cassette holder 9 has a handle 19 designed as a lever arm opposite the pivotal axis 17.

To hold the cassette holder 9 in its loading position against the force of the two tension springs 18, a releasable stop device 20 is provided. Stop device 20 consists of two stop levers 21 pivotally mounted on chassis plate 6 and extending above and below it, which levers are spaced from one another in a direction parallel to the pivotal axis 17 and to each of which levers a tension spring 22 attached to the chassis plate 6 is connected. Tension springs 22 are designed to urge the stop levers 21 against two stops 23 on the chassis plate 6. With cassette holder 9 in its loading position the tension springs 22 keep the stop levers 21 held against stops 23, as shown in Figure 1, in which situation the cassette holder 9 is supported against the free ends of stop levers 21 via the main surfaces of two extension lugs 24 on top wall 11 which extend in the direction of the shaft 14. The release of the stop device 20 is effected mechanically in the present case by a cassette 2 at the end of its insertion into the cassette holder 9. Towards the end of the manual insertion of a cassette into the cassette holder, the cassette strikes against the stop levers 21 and pivots them against the force of the tension springs 22. When the cassette has been completely inserted in the cassette holder, and the cassette rests against two limiting stops 25 projecting from the bottom wall 10, the stop levers 21 have been pivoted so far that their free ends are removed from operating connection with the extension lugs 24 on top wall 11. In this situation the cassette holder 9 can then be drawn into its operating position by the tension springs 18. In this operating position the stop levers 21 rest against the edge surfaces of the extension lugs 24 on top wall 11, and, because of the pivotal movement of the cassette holder, the cassette is released from the stop levers.

In the operating position of the cassette holder 9, the latter is held in position with its bottom wall against two pin-shaped positioning stops 26 fastened to the chassis plate 6 and arranged at a distance from each other in a direction parallel to the pivotal axis 17. In this operating position of the cassette holder 9, the cassette 2, as already mentioned, occupies its operating position. The cassette is now acted on, in an area near the insertion opening 13, by two leaf springs 27 fastened to and passing through the top wall 11 and, in an area remote from the insertion opening 13, by two other leaf springs 28 fastened to and passing through the top wall 11. The cassette is thus pressed securely against the bottom wall 10. In addition to the magnetic disc 3 there are: a centring pin 31, which projects through an opening 29 in the bottom wall 10 and which can be driven in rotary motion by a motor 30 fitted on chassis plate 3, for centring the magnetic disc, and a drive pin 33, which can be driven by the motor 30 via the centring pin 31 and

a disc 32 placed on the latter, for the purpose of driving the magnetic disc in active connection. Also, through an opening in the bottom main wall of the cassette, which opening can be closed with a slide opened automatically when the cassette is inserted into the cassette holder, a magnetic head 34 for recording and reproducing digital information signals is in operating connection with the magnetic disc 3. The magnetic head 34 is supported by a head-support slide 35 which is adjustable radially in relation to the magnetic disc 3 and which, through another opening 36 in the bottom wall 10 and the closable opening in the bottom wall of the cassette, keeps the magnetic head 34 in operating connection with the magnetic disc 3. The head-carrying slide 35 is mounted and can slide on a guide rod 37 and is adjustable in steps via a threaded spindle 39 which can be turned by a stepping motor 38 mounted on the chassis plate 6 so that the magnetic head 34 can be set to any of the concentric tracks on the magnetic disc. The guide rod 37 and the threaded spindle 39 are mounted in two bearing lugs 40 and 41 projecting from the chassis plate 6. To press the magnetic disc 3 against the magnetic head 34, a pressure pad located at the side of the magnetic disc opposite to the magnetic head and projecting through an opening in the top main wall of the cassette, which opening also can be closed by a closing slide, acts on the magnetic disc. By the movement of the cassette holder from its operating position to its loading position the pressure pad is moved so far from the magnetic disc by means of the cassette holder that the cassette can be removed from the cassette holder without any interference by the pressure pad. When the cassette holder is moved from its loading position to its operating position, the pressure pad is moved toward the magnetic disc by means of the cassette holder. For the sake of simplicity and because they are not essential to the invention, the pressure pad and the device for moving it are not shown here.

To move it from its operating position to its loading position the cassette holder has the handle 19 to which reference has already been made. In the present case handle 19 is joined rigidly to the plastics cassette compartment 9 and is formed by an L-shaped extension projecting from the bottom wall 10 at the end of the holder having the insertion opening 13. The longer arm 42 of this extension is connected to the bottom wall 10 and projects perpendicularly from it. The short arm 43 of the extension 19 projects from the free end of the long arm 42 in a direction opposite to that of the arrow 14. The dimension of both arms 42 and 43 of the extension 19 in a direction parallel to the pivotal axis 17 of the cassette holder 9 is approximately one third of the distance between the two side walls 12 of the cassette holder. The long arm 42 of extension 19 forms a handle section extending transversely of the bottom wall 10 of the cassette holder 9, and the free end of which lies at some distance from the pivotal axis 17 of the cassette holder in a direction pointing from the loading position to the operating position. The short arm 43 of extension 19 forms an actuating extension of the handle which is connected with the free end of the section formed by the long arm 42 and projects from it in a

direction opposite to that of the arrow 14, and to the free end of which the manual actuating force can be applied. As can be seen from Figures 1 and 2, the long arm 42 projects through an opening 44 in the chassis plate 6 and the short arm 43 projects to the exterior of the housing through another opening 45 in the wall 7 of the housing.

To bring a cassette 2 to its operating position in the apparatus, it is, as shown in Figure 1, inserted manually in the cassette holder 9 in the direction of the arrow 14, in which process the closure slide fitted to it is opened. After the complete insertion of the cassette in the cassette holder the stop device 20, as already described, is released, after which the cassette holder is pivoted under the force of tension springs 18 into its operating position, in which it rests against the positioning stops 26, whereupon the cassette occupies its operating position and recording and reproduction of digital information signals can proceed.

To release a cassette from its operating position again and enable it to be taken from the apparatus, an actuating force substantially in the direction of the arrow 46 is applied manually to the actuating extension 43 on handle 19. This actuating force applied to the actuating extension 43 is transferred via section 42 of handle 19 to the cassette holder 9, so that the latter is moved from its operating position to its loading position against the force of tension springs 18. This movement occurs with a slight overshoot beyond the loading position of the cassette holder and is limited by the fact that section 42 of handle 19 strikes against the limiting wall of opening 44 in chassis plate 6. By this movement of the cassette holder with overshoot the stop levers 21 are disengaged from the extension lugs 24 and can pivot under the force of tension springs 22 to eject cassette 2 at least partly from the cassette holder and, through opening 8, out of the apparatus. The movement of stop levers 21 in this operation continues until they rest against stops 23. When the actuation extension 43 is released again after the completed ejection of the cassette from the apparatus, the cassette holder is moved in the direction of its operating position under the force of tension springs 18, in which process it is stopped in its loading position by stop levers 21 via the extension lugs 24.

As will be seen from the above description, the design of the handle according to the invention ensures in a simple manner that, to move the cassette holder from its operating position to its loading position, the handle must now be actuated in the direction in which the cassette holder extends from the insertion opening 13, with the advantage that the direction of actuation of the handle for removal of a cassette from the apparatus and the direction in which a cassette is inserted in the apparatus practically coincide. Incorrect actuation such as occurs in known apparatus in which the direction of actuation of the handle for removal of a cassette is very different from the direction in which a cassette is inserted in the apparatus is definitely avoided. With the actuating extension led out of the apparatus an exactly defined point of application of force with the largest possible lever arm is obtained, so that an easily effected movement

of the cassette holder results, with the additional attractive feature that it is actuated in the same manner as generally employed pushbuttons.

In the apparatus shown only partly in Figure 3, in which parts not shown may have the same construction as the apparatus shown in Figure 1, handle 19 is formed by a U-shaped link which has two leg sections 47, each located in the vicinity of one of the side walls 12 and projecting perpendicularly from the bottom wall 10, and each of which is led through an opening 48 in the chassis plate 6, and a bridge section 49 which interconnects the leg sections and which runs parallel to the pivotal axis 17. From the bridge section 49, in a direction opposite to that of the arrow 14, there projects a lug 50 which is shorter than the bridge section 49 in a direction parallel to the pivotal axis 17 and which forms an actuation extension of handle 19 and, in the present embodiment, projects from the inside of the apparatus to the exterior thereof through an opening 45 in the side wall 7 of the housing. In addition to the same advantages as in the apparatus according to Figures 1 and 2, this apparatus, because of the fact that the leg sections of the handle in the vicinity of the side walls connect with the bottom wall where the latter shows great stiffness owing to the connection with the side walls, has the further advantage that no undesirable distortion of the bottom wall occurs when the handle is actuated.

The apparatus shown in Figure 4 represents a variation of the apparatus shown in Figure 3. In the apparatus shown in Figure 4 the handle 19 is again formed by a U-shaped link which has two leg sections 47 and a bridge section 49. In the present case, however, no lug connected to the bridge section 49 and forming an actuation extension is provided, but the actuation of the handle is effected by the user of the apparatus pressing on the bridge section 49 with at least one finger through the opening 45. In this case, too, the actuation of the handle for removal of a cassette from the apparatus is performed in practically the same direction as the insertion of a cassette in the apparatus, in which process a defined point of application of force on the handle is determined by the opening. In this apparatus, too, there is no distortion of the bottom wall of the cassette holder when the handle is actuated.

Within the framework of the invention a series of other examples of implementation are possible. For example, the handle can also be formed by a plate projecting perpendicularly or at an angle of inclination from the bottom wall of the cassette holder and extending parallel to the pivotal axis of the cassette holder, which plate projects from the inside of the apparatus to the exterior thereof through a hole in the plate-shaped lower part of the housing. The release of the stop device for the cassette holder need not be effected mechanically, as is the case in the apparatus described above with reference to Figures 1 and 2, but can also be effected electrically if the cassette, at the end of its insertion into the cassette holder, triggers a photo-electric light barrier which, after its triggering, operates an electromagnet which, in turn, effects the release of the stop device. The cassette holder can be of a different construction and

may, for example, consist of a top wall, two side walls and two bottom-wall sections connected to the side walls and directed from the latter towards each other and each of which has a projecting bearing lug with a bearing for a shaft for the pivotal mounting of the cassette holder and from each of which a leg section of a U-shaped handle projects. The apparatuses according to the embodiments described above are for use with cassettes containing a magnetic disc; the measures according to the invention are equally applicable to apparatuses for use with cassettes containing a magnetic tape or cartridges containing optical discs, etc.

80 CLAIMS

1. A recording and/or reproducing apparatus for a recording medium housed in a cassette, comprising a cassette holder having substantially the form of a tunnel of rectangular section and comprising at least one main wall and, joined to the latter, two side walls, and having at one end an opening for the insertion of a cassette, which cassette holder is pivotable between a loading position, in which a cassette can be inserted through the insertion opening into the cassette holder in the direction in which the holder extends from the insertion opening and removed from the cassette holder in the opposite direction, and an operating position, in which the cassette inserted into the cassette holder occupies an operating location, about a pivotal axis which extends at right angles to the side walls of the cassette holder and is located in the vicinity of the end of the holder having the insertion opening, at least one spring being arranged to act on the cassette holder to move it from its loading position to its operating position, and the cassette holder having, opposite said pivotal axis, a handle formed as a lever arm for moving the cassette holder from its operating position to its loading position against the force of the spring, and the cassette holder being arranged to be held in its loading position against the force of the spring by a stop device which is releasable by a cassette at the end of its insertion into the cassette holder and which is held in position against at least one stop in its operating position by the force of a spring, characterized in that the handle has at least one section which extends transversely of the main wall of the cassette holder and the free end of which lies at a distance from the pivotal axis of the cassette holder in a direction pointing from the loading position to the operating position.

2. An apparatus as claimed in Claim 1, characterized in that the section of the handle extending transversely of the main wall of the cassette holder is connected at its free end to an actuating extension projecting from it in a direction substantially opposite to the direction in which the holder extends from the insertion opening.

3. A recording and/or reproducing apparatus for a recording medium housed in a cassette, substantially as herein described with reference to Figures 1 and 2 or Figure 3 or 4 of the accompanying drawings.