

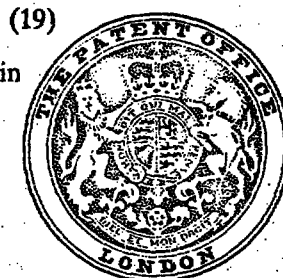
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(54) APPARATUS FOR RECORDING AND PLAYING-BACK SIGNALS ON AND FROM A MAGNETIC TAPE

(71) We, N.V. PHILIPS' GLOEILAMPENFABRIEKEN, a limited liability Company, organised and established under the laws of the Kingdom of the Netherlands, of Emmasingel 29, Eindhoven, the Netherlands do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

The invention relates to an apparatus for recording and playing-back signals on a magnetic tape contained in a cassette having openings through which magnetic heads in the apparatus can enter the cassette to cooperate with the tape.

Cassette equipment, which is manufactured in large quantities and is available on the market in a wide variety, has greatly contributed to the advancement of magnetic tape as an audio-signal carrier. There is a trend towards ever-increasing perfection of cassette equipment and also towards making it cheaper so that it comes within reach of a larger public. Much attention is also paid to ease of operation. Modern inexpensive and portable cassette equipment, frequently combined with a radio, is operated by means of a number of push-button controls which are arranged side by side and with which the cassette equipment can be switched to play-back and other functions, such as rewinding or forward travel of the tape can be controlled.

The equipment frequently also comprises a facility for recording audio signals on the magnetic tape. Such cassette equipment, generally referred to as a "cassette recorder", also comprises a recording button or key. This button or key can be operated only if the cassette has no so-called "anti-erase openings". If the tape in the cassette has already been provided with audio tracks by the manufacturer (in which case it is referred to as a "pre-recorded cassette") an anti-erase

opening or openings is or are formed in a wall of the cassette, usually the rear wall, which is the wall opposite that in which are formed the openings for the entry of the magnetic heads into the cassette. These anti-erase openings serve to co-operate with components provided for this purpose in the cassette records so as to prevent the audio track from being inadvertently erased by the actuation of the recording button by a person using the apparatus. This is usually done by preventing movement of the recording button to the operative, recording position when a pre-recorded cassette has been placed on the cassette recorder. Generally, a pivotable sensor is mounted on the recorder so as to engage in the anti-erase opening in the rear wall of the cassette or be engaged and pivoted by this wall if the cassette is not pre-recorded and consequently does not have an anti-erase opening. Only in the pivoted position does the sensor allow movement of the recording button between its inoperative and recording positions.

According to the invention there is provided an apparatus for recording and playing-back signals on and from a magnetic tape contained in a cassette having openings through which magnetic heads in the apparatus can enter the cassette to cooperate with the tape, the apparatus comprising a recording electric switch having a switching element which is movable from a play-back position to a recording position by means of a switch-actuating member which is movable from an inoperative position to an operative position corresponding to the play-back position and the recording position respectively of the movable switching element by means of a manually operable recording button or key, a sensor which is connected to the switch-actuating member for movement therewith and which is so arranged that when the switch-actuating member for movement therewith and which is so arranged that when

the switch-actuating member is in the inoperative position and a cassette having an anti-erase opening at a given position in a wall thereof is placed on the apparatus the sensor becomes engaged in this opening and occupies a first position, and when a cassette which does not have such an anti-erase opening is placed on the apparatus and the switch-actuating member is in the inoperative position the sensor is engaged by said wall of the cassette and is displaced thereby to a second position, and means for latching the switch-actuating member in the inoperative position when the sensor is in the first position, wherein the recording button or key, the switch-actuating member and the sensor are rigidly connected to one another to form a combined recording control member which is movable between inoperative and operative positions corresponding to the inoperative and operative positions respectively of the switch-actuating member, and which is displaceable when in the inoperative position between latched and unlatched positions which correspond to the first and second positions respectively of the sensor, the latter being movable over said wall of the cassette during the movement of the recording control member between the unlatched inoperative position and the operative position.

By connecting the recording button or key, the switch-actuating member and the sensor rigidly to one another to form a combined recording control member, the fitting of this control member during manufacture of the apparatus is simplified.

In contradistinction to the recording buttons in the aforementioned known cassette recorders, the recording button or key in the apparatus according to the present invention is movable in two modes: in one it is displaceable between latched and unlatched inoperative positions; in the other it is movable between the unlatched inoperative position and an operative, recording position. The first mode provides for the latching and unlatching of the recording control member in the inoperative position according to whether a pre-recorded cassette or a cassette containing a blank tape is placed on the apparatus. It is further utilised in an embodiment of the invention wherein in the unlatched inoperative position of the recording control member the recording button or key is accessible from the exterior of the housing of the apparatus for manual operation, and in the latched inoperative position of the recording control member the recording button or key is covered by part of the housing so as to be inaccessible from the exterior of the housing and/or to give a visual indication of the presence of an anti-erase opening in a cassette placed on the apparatus. Thus, a user is physically inhibited

and/or visually deterred from trying to force the recording control member into the operative position when it is latched in the inoperative position.

In an embodiment of the invention which comprises a support on which the magnetic heads are mounted and which is movable into an operative position in which the heads project into the cassette through said openings therein, means may be provided for locking the recording control member in the operative position, which means comprise cooperating parts formed on the recording control member and on the head support and which cooperate with each other only when the head support is in its operative position and at the same time the recording control member is in the operative position. This enables the locking slide which is usually provided for locking the other control members of the apparatus in their operative positions to be simplified. Another advantage is that for returning the recording control member from the operative position to the inoperative position a spring may be used which exerts only a very small force, so that the relevant parts of the apparatus are only lightly loaded. This is in contrast to the force which is generally needed for the actuation of push-buttons which are locked by means of a locking slide.

The recording control member may have an elongate form with the recording button or key located at one end and the respective part of the locking means located at the other end, and be displaceable substantially longitudinally between the latched and unlatched inoperative positions, and the housing of the apparatus may be formed with a part which serves to guide the recording control member in this displacement and also to provide a fulcrum for pivotal movement of the recording control member between the unlatched inoperative position and the operative position. If the housing is made from a plastics material, this part may be formed by a projection or projections moulded on the inside of the housing.

The recording control member comprising the switch-actuating member, the recording button or key, the sensor and the respective part of the locking means is preferably made in one piece from a plastics material.

In order that the invention may be readily carried into effect, an embodiment thereof in the form of a small portable cassette recorder will now be described with reference to the accompanying drawings, in which

Fig. 1 is a perspective view of the cassette recorder,

Fig. 2 is a front view of the cassette recorder of Fig. 1,

a cassette and the combined recording control member being represented by broken lines,

Fig. 3 is a diagrammatic front elevation of the recording control member, the head support and the push-button controls of the recorder shown in Figs. 1 and 2, a cassette with anti-erase openings being shown in dash-dot lines,

Fig. 4 is an elevation similar to Fig. 3 but showing a cassette with no anti-erase openings and the recording control member consequently in the unlatched inoperative position, and

Fig. 5 is an elevation similar to Fig. 4 but showing the recording control member in an operative position.

The cassette recorder of Fig. 1 comprises a plastics housing 1 which accommodates, *inter alia*, a tape-transport mechanism, not shown. A transparent hinged lid 2 covers a cassette compartment in which a tape cassette can be placed. This lid can be opened by hand by means of a raised edge 3. At the top of the recorder a number of push-button controls are located, namely, a starting button 4, two buttons 5 and 6 for fast forward travel and rewind of the magnetic tape, and a reset button 7. A slide button 8 is connected to a potentiometer for controlling the gain of an audio amplifier in the apparatus. A recording key 9, or a recording button, is disposed near the bottom of the recorder. In Figs. 1 and 2 this key is shown in full lines in the inoperative position. In the front wall of the housing 1 is an aperture 10 through which the recording key 9 is accessible for movement by means of a finger between the inoperative position (shown in full lines in Figs. 1 and 2) and an operative, recording position which is represented by broken lines in Fig. 2. The most convenient way to operate the controls for recording is probably as follows: the apparatus is held in the right hand and with the left-hand forefinger the recording key 9 is moved to the recording position (shown in broken lines in Fig. 2). With the left-hand forefinger still holding the recording key in the recording position the apparatus is grasped with the left hand so that the starting button 4 can be depressed with the right-hand forefinger. The recording key 9 can then be released and after it the starting button 4 also. The locking arrangement which permits this is discussed later herein.

The operation of the cassette recorder is described with reference to Figs. 3 to 5. In these three figures a cassette is shown in dot-dash lines, designated 12 in Fig. 3, for example. Figs. 3 to 5 also show a head support 11 which is movably mounted in the recorder and which carries two magnetic heads 13 and 14, the former serving for recording or playing-back audio signals on or from the tape in the cassette and the latter for erasing such signals. A pressure roller 15 is rotatably mounted on a pivotable lever 16 which is carried on the head support 11 and

which is acted upon by a coil spring 17 to press the roller 15 towards a capstan 18 which is provided in the apparatus for transporting the magnetic tape. When a cassette is placed on the apparatus the tape is passed through between the pressure roller 15 and the capstan 18, but this is not shown in the drawings. By means of the starting button 4 the head support is movable towards the cassette into an operative position, shown in Figs. 3, 4 and 5, in which the magnetic heads 13 and 14 and the pressure roller 15 project into the cassette through openings in the front wall thereof, the heads 13 and 14 to cooperate with the tape and the pressure roller 15 to press the tape against the capstan 18.

The reference numeral 19 (Figs. 3, 4 and 5) denotes a recording electric switch with which the apparatus can be switched from play-back to recording and vice versa. The switch is in the play-back position in Figs. 3 and 4.

The recording button 9 is connected to a member 20 for actuating the recording switch 19, and also to a sensor 21. In Fig. 3 the sensor is engaged in one of two anti-erase openings 22 provided in the rear wall of the cassette 12. Figures 4 and 5 appertain to a situation in which the rear wall of the cassette has no anti-erase openings in it. In these figures the cassette bears the reference numeral 12a. The rear wall of this cassette contains portions 23 which can be pushed out by a user to form anti-erase openings if a recording is made on the magnetic tape and it is desired that this recording shall not subsequently be erased.

The recording button 9, the switch-actuating member 20 and the sensor 21 are rigidly connected to each other, forming a combined recording control member which bears the reference numeral 24. The three positions which this recording control member can occupy are shown in Figures 3, 4 and 5. In Fig. 3 the recording control member is in a latched inoperative position, into which position it is urged by a tension spring 28. Latching of the control member 24 is effected by means of a projection 25 which is formed on the housing of the recorder and which projects through a substantially L-shaped opening 26 in the switch-actuating member 20. In this position the recording member cannot be moved to and fro and moreover the recording key 9 is not visible from the exterior of the recorder because it is concealed by a part 27 (Figs. 1 and 2) of the front wall of the housing of the recorder. Thus, this position provides a direct visual indication that a recording cannot be made, either because of the presence of anti-erase openings in the rear wall of the cassette which has been placed on the recorder or because there is no cassette on the recorder.

Actuation of the recording control member 24 is not possible in this situation.

5 In Fig. 4 the recording control member 24 is pressed downwards by the push-out portions 23 of the rear wall of the cassette 12a against the force of the spring 28, so that the recording key 9 is visible through the aperture 10 in the front wall of the housing and can be actuated through this aperture with a finger. The recording control member 24 is now in an unlatched inoperative position and can be moved from this position to an operative, recording position by means of the recording key 9, the projection 25 now being located in a part of the opening 26 which allows such movement. The sensor 21 is pulled against the rear wall of the cassette by the spring 28 but can slide along this wall as the recording control member 24 is moved to the recording position. Fig. 5 shows the recording position of the recording control member 24. Means are provided for locking the control member 24 in its recording position, which means comprise a hook-shaped portion 29 of the control member 24 and a projection 30 on the head support 11. These parts cooperate with each other only when the head support 11 is in its operative position and at the same time the recording control member 24 is in the recording position. Cooperation of the parts 29 and 30, as shown in Fig. 5, can take place only if the recording control member 24 has been moved to the recording position before the head support 11 is moved into its operative position. Thus the recorder cannot be changed from play-back (Figs. 3 and 4) to record (Fig. 5) merely by actuating the recording key 9. In this way inadvertent change-over from play-back to record during the playing-back of a recording on a tape, which would result in the recording, or at least part of it, being erased, is prevented.

45 The switch-actuating member 20 is basically strip-shaped so that the recording control member 24 has an elongate form with the recording key 9 and the sensor 21 located at one end and the locking member 29 at the other end. The switch-actuating member 20 is slidably guided between two projections 31 which are formed on the housing 1 of the apparatus. The projections 31 enable the recording control member 24 to be displaced substantially longitudinally between the latched and unlatched inoperative positions shown in Figures 3 and 4 respectively and also serve as a fulcrum for pivotal movement of the recording control member about an axis perpendicular to the plane of the switch-actuating member 20 between the inoperative and operative positions shown in Figures 4 and 5 respectively. Instead of the two projections 31, which cooperate with the longitudinal edges of the switch-actuating member 20, it is possible to use a single pro-

jection cooperating with a slot in the member 20 to provide the combined guide and fulcrum for the longitudinal and pivotal movements of the recording control member 24.

The recording control member 24 can be made in one piece from a plastics material. Alternatively, it can be assembled from a plurality of separate parts and can also have a shape different from that shown.

WHAT WE CLAIM IS:-

1. An apparatus for recording and playing-back signals on and from a magnetic tape contained in a cassette having openings through which magnetic heads in the apparatus can enter the cassette to cooperate with the tape, the apparatus comprising a recording electric switch having a switching element which is movable from a play-back position to a recording position by means of a switch-actuating member which is movable from an inoperative position to an operative position corresponding to the play-back position and the recording position respectively of the movable switching element by means of a manually operable recording button or key, a sensor which is connected to the switch-actuating member for movement therewith and which is so arranged that when the switch-actuating member is in the inoperative position and a cassette having an anti-erase opening at a given position in a wall thereof is placed on the apparatus the sensor becomes engaged in this opening and occupies a first position, and when a cassette which does not have such an anti-erase opening is placed on the apparatus and the switch-actuating member is in the inoperative position the sensor is engaged by said wall of the cassette and is displaced thereby to a second position, and means for latching the switch-actuating member in the inoperative position when the sensor is in the first position, wherein the recording button or key, the switch-actuating member and the sensor are rigidly connected to one another to form a combined recording control member which is movable between inoperative and operative positions corresponding to the inoperative and operative positions respectively of the switch-actuating member, and which is displaceable when in the inoperative position between latched and unlatched positions which correspond to the first and second positions respectively of the sensor, the latter being movable over said wall of the cassette during the movement of the recording control member between the unlatched inoperative position and the operative position.

2. An apparatus as claimed in Claim 1, wherein in the unlatched inoperative position of the recording control member the recording button or key is accessible from the exterior of the housing of the apparatus for manual operation, and in the latched



Actuation of the recording control member 24 is not possible in this situation.

In Fig. 4 the recording control member 24 is pressed downwards by the push-out portions 23 of the rear wall of the cassette 12a against the force of the spring 28, so that the recording key 9 is visible through the aperture 10 in the front wall of the housing and can be actuated through this aperture with a finger. The recording control member 24 is now in an unlatched inoperative position and can be moved from this position to an operative, recording position by means of the recording key 9, the projection 25 now being located in a part of the opening 26 which allows such movement. The sensor 21 is pulled against the rear wall of the cassette by the spring 28 but can slide along this wall as the recording control member 24 is moved to the recording position. Fig. 5 shows the recording position of the recording control member 24. Means are provided for locking the control member 24 in its recording position, which means comprise a hook-shaped portion 29 of the control member 24 and a projection 30 on the head support 11. These parts cooperate with each other only when the head support 11 is in its operative position and at the same time the recording control member 24 is in the recording position. Cooperation of the parts 29 and 30, as shown in Fig. 5, can take place only if the recording control member 24 has been moved to the recording position before the head support 11 is moved into its operative position. Thus the recorder cannot be changed from play-back (Figs. 3 and 4) to record (Fig. 5) merely by actuating the recording key 9. In this way inadvertent change-over from play-back to record during the playing-back of a recording on a tape, which would result in the recording, or at least part of it, being erased, is prevented.

The switch-actuating member 20 is basically strip-shaped so that the recording control member 24 has an elongate form with the recording key 9 and the sensor 21 located at one end and the locking member 29 at the other end. The switch-actuating member 20 is slidably guided between two projections 31 which are formed on the housing 1 of the apparatus. The projections 31 enable the recording control member 24 to be displaced substantially longitudinally between the latched and unlatched inoperative positions shown in Figures 3 and 4 respectively and also serve as a fulcrum for pivotal movement of the recording control member about an axis perpendicular to the plane of the switch-actuating member 20 between the inoperative and operative positions shown in Figures 4 and 5 respectively. Instead of the two projections 31, which cooperate with the longitudinal edges of the switch-actuating member 20, it is possible to use a single pro-

jection cooperating with a slot in the member 20 to provide the combined guide and fulcrum for the longitudinal and pivotal movements of the recording control member 24.

The recording control member 24 can be made in one piece from a plastics material. Alternatively, it can be assembled from a plurality of separate parts and can also have a shape different from that shown.

WHAT WE CLAIM IS:-

1. An apparatus for recording and playing-back signals on and from a magnetic tape contained in a cassette having openings through which magnetic heads in the apparatus can enter the cassette to cooperate with the tape, the apparatus comprising a recording electric switch having a switching element which is movable from a play-back position to a recording position by means of a switch-actuating member which is movable from an inoperative position to an operative position corresponding to the play-back position and the recording position respectively of the movable switching element by means of a manually operable recording button or key, a sensor which is connected to the switch-actuating member for movement therewith and which is so arranged that when the switch-actuating member is in the inoperative position and a cassette having an anti-erase opening at a given position in a wall thereof is placed on the apparatus the sensor becomes engaged in this opening and occupies a first position, and when a cassette which does not have such an anti-erase opening is placed on the apparatus and the switch-actuating member is in the inoperative position the sensor is engaged by said wall of the cassette and is displaced thereby to a second position, and means for latching the switch-actuating member in the inoperative position when the sensor is in the first position, wherein the recording button or key, the switch-actuating member and the sensor are rigidly connected to one another to form a combined recording control member which is movable between inoperative and operative positions corresponding to the inoperative and operative positions respectively of the switch-actuating member, and which is displaceable when in the inoperative position between latched and unlatched positions which correspond to the first and second positions respectively of the sensor, the latter being movable over said wall of the cassette during the movement of the recording control member between the unlatched inoperative position and the operative position.

2. An apparatus as claimed in Claim 1, wherein in the unlatched inoperative position of the recording control member the recording button or key is accessible from the exterior of the housing of the apparatus for manual operation, and in the latched

inoperative position of the recording control member the recording button or key is covered by part of the housing so as to be inaccessible from the exterior of the housing and/or to give a visual indication of the presence of an anti-erase opening in a cassette placed on the apparatus.

3. An apparatus as claimed in Claim 1 or 2, comprising a support on which the magnetic heads are mounted and which is movable into an operative position in which the heads project into the cassette through said openings therein, and means for locking the recording control member in the operative position, which means comprise cooperable parts formed on the recording control member and on the head support and which cooperate with each other only when the head support is in its operative position and at the same time the recording control member is in the operative position.

4. An apparatus as claimed in Claim 3, wherein the recording control member has an elongate form with the recording button or key located at one end and the respective part of the locking means located at the other end, and is displaceable substantially longitudinally between the latched and unlatched inoperative positions, and wherein the housing of the apparatus is formed with a part which serves to guide the recording control member in this displacement and also to provide a fulcrum for pivotal movement of the recording control member between the unlatched inoperative position and the operative position.

5. An apparatus as claimed in Claim 3 or 4, wherein the recording control member comprising the switch-actuating member, the recording button or key, the sensor and the respective part of the locking means is made in one piece from a plastics material.

6. An apparatus for recording and playing-back signals on and from a magnetic tape, substantially as herein described with reference to the accompanying drawings.

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