

# (12) UK Patent Application

(19) GB (11) 2 239 980 (13) A

(43) Date of A publication 17.07.1991

(21) Application No 9028234.4

(22) Date of filing 31.12.1990

(30) Priority data

(31) 8921325

(32) 31.12.1989

(33) KR

(51) INT CL<sup>5</sup>  
G11B 15/22

(52) UK CL (Edition K)  
G5R RB402 RB478 RB789 RNC

(56) Documents cited  
EP 0335377 A2 EP 0236962 A2 EP 0104996 A2  
US 4807061 A US 4730792 A

(71) Applicant

Samsung Electronics Co. Ltd.

(Incorporated in the Republic of Korea)

#416 Maetan-dong, Kwonsun-gu, Suwon-city,  
Kyounggi-do, Republic of Korea

(58) Field of search

UK CL (Edition K) F2E EAB EQ, G5R RNC  
INT CL<sup>5</sup> G11B

(72) Inventor

Guy-seong Kim

(74) Agent and/or Address for Service

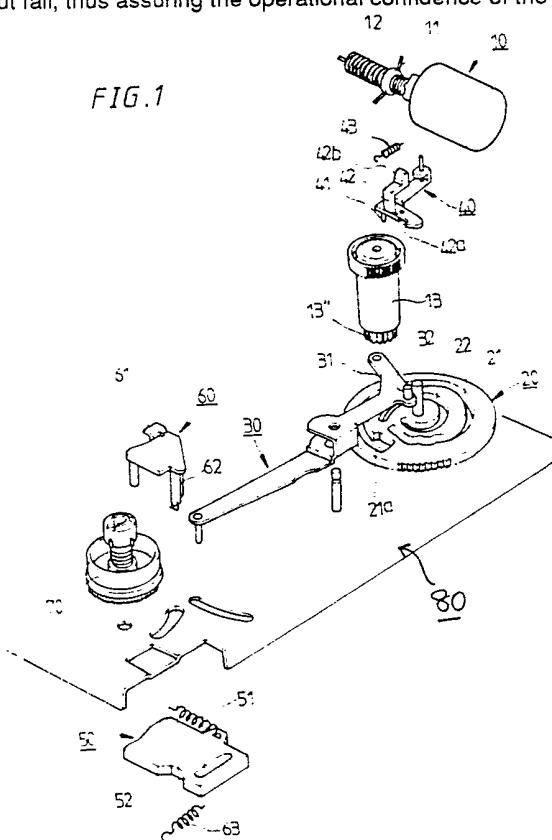
Appleyard Lees

15 Clare Road, Halifax, West Yorkshire, HX1 2HY,  
United Kingdom

## (54) Reel disc braking device for a video tape recorder

(57) A reel disc braking device for a video tape recorder is capable of sudden stopping of the reel disc, with a simple structure. The device comprises a braking member 60 biased towards the reel disc 70, an operating plate 50 for operating the braking member 60, biased in one direction, cam levers 30, 40 to displace the operating plate 50 and release it instantly, a cam gear 20 to operate the cam levers 30, 40, and a driving motor 10. The device can suddenly brake the reel disc 70 running in high speed without fail, thus assuring the operational confidence of the video tape recorder.

FIG.1



GB 2 239 980 A

FIG. 1

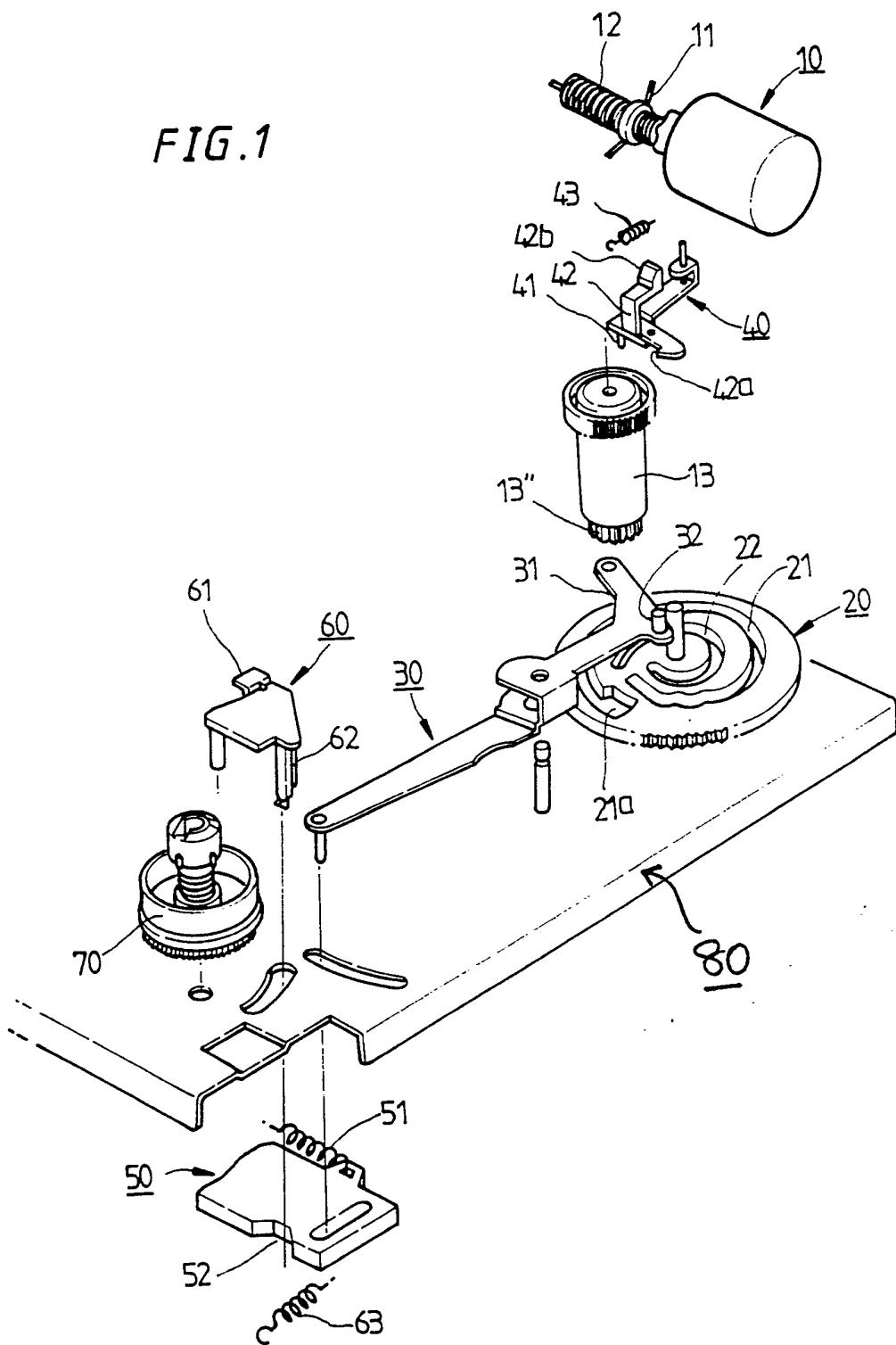


FIG.2

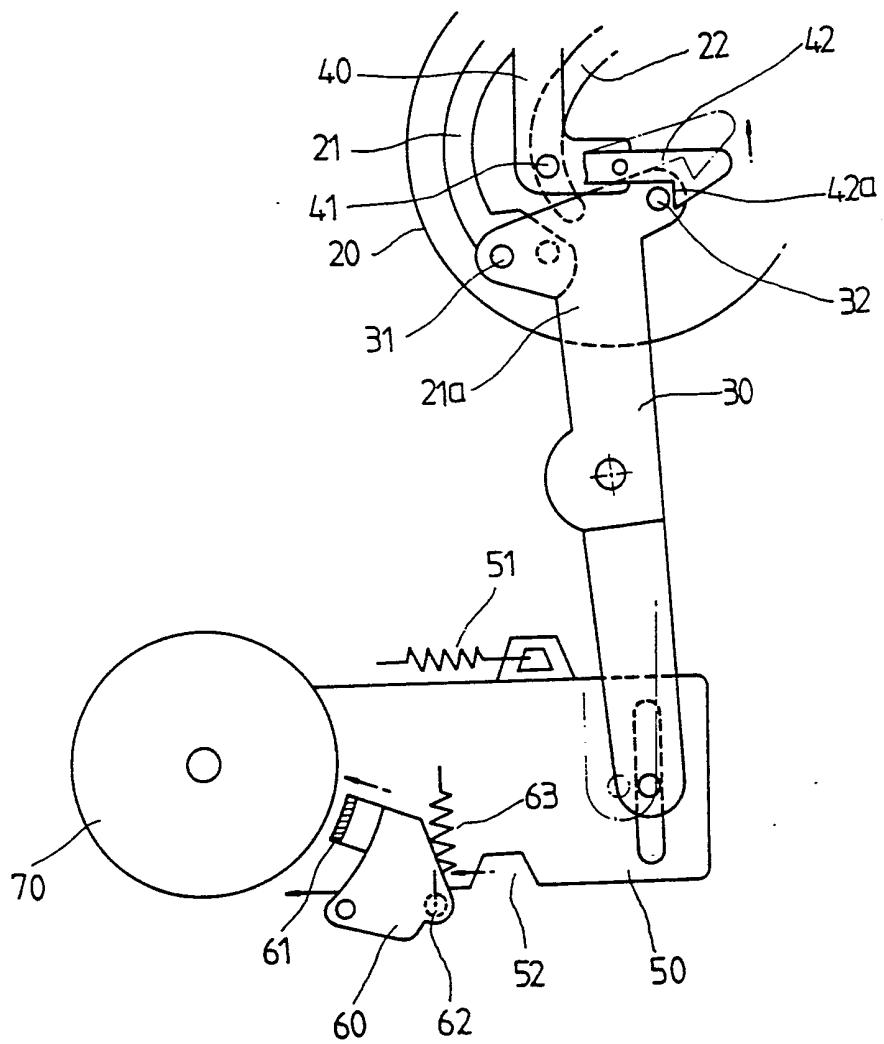


FIG.3A

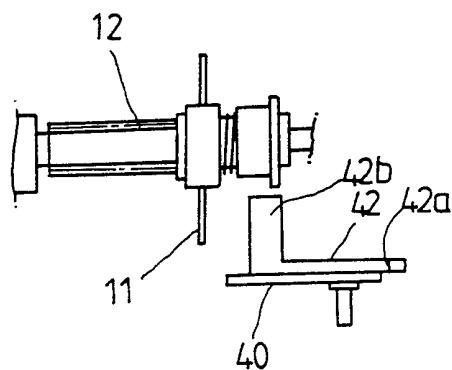


FIG.3B

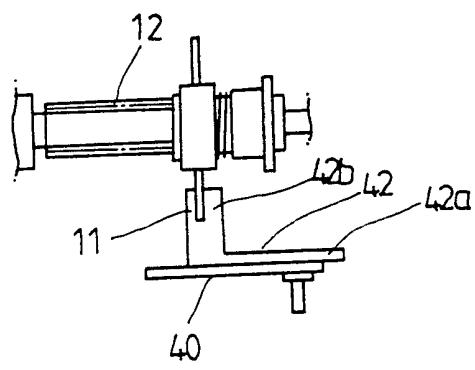


FIG.4A

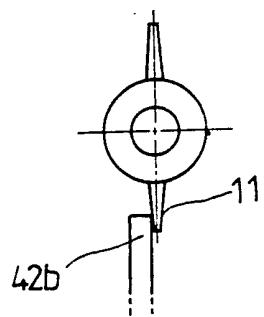
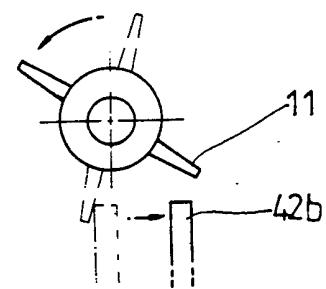


FIG.4B



REEL DISC BRAKING DEVICE FOR A VIDEO TAPE RECORDER

The present invention relates to a reel disc braking device for a video tape recorder (hereinafter referred to as a VTR), and particularly to a braking device suitable for stopping suddenly the reel during high speed running.

Conventionally, in order to prevent tapes from being released from a tape reel mounted on a reel disc, there is provided a braking device for stopping the reel disc within the VTR. The braking device should be suitable for sudden braking as the reel has to be stopped suddenly if it is to be converted to other modes such as a stop mode during high speed running.

As an example of a conventional braking device for sudden braking, U.S. Patent No. 4,685,008 discloses "REEL BRAKING MECHANISMS", adopting a plunger with an electromagnetic coil. However, this prior art has some drawbacks such as excessive power consumption and massive volume due to the electromagnetic coil, and thus is not suitable to provide a compact apparatus. U.S. Patent No. 4,796,116 discloses another braking system not adopting an electromagnetic coil. The system comprises a ratchet mechanism as well as using a brake lever's own elasticity and the restoration force of a spring. However, other problems arise, such as deformation and vibration of the brake lever, thereby causing false operation or operational trouble.

Preferred embodiments of the present invention aim to provide a mechanically stable braking device.

According to one aspect of the present invention, there is provided a reel disc braking device for a video tape recorder, which device comprises :

a motor with an integral rotating pin and a worm, being able to rotate forward or backward;

5 a cam gear rotatably driven by said motor through a worm gear, and having first and second cam grooves of which the radius respectively vary in predetermined curvatures, an enlarged portion being formed at one end of said second cam groove;

a first cam lever having a locking pin, and a first guide boss engaged with and guided by said first cam groove;

10 a second cam lever having a second guide boss engaged with and guided by said second cam groove, and a locking lever which is resiliently supported by a locking spring, and includes a hook portion for holding said locking pin at one end, and an abutment end for engaging with said rotating pin;

15 an operating plate resiliently biased in a predetermined direction and reciprocally displaced by said first cam lever; and

a braking member resiliently biased towards a reel disc and operated by said operating plate.

According to a second aspect of the invention, there is provided a reel 20 disc braking device for a tape recorder, the device comprising a braking member, means for resiliently urging the braking member towards a reel disc engaging position, and actuator means for transmitting a drive to said braking member to move it towards or away from said position.

25 The invention extends to a tape recorder provided with a braking device in accordance with the first and/or second aspect of the invention. Such a tape recorder may be a video tape recorder.

For a better understanding of the invention, and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying diagrammatic drawings, in which:

5       Figure 1 is an exploded perspective view showing one example of a reel disc braking device embodying the present invention;

Figure 2 is a plan view of the device of Figure 1;

10       Figure 3A is a partial side view illustrating the device of Figure 1 in a normal reproducing mode;

Figure 3B is a partial side view similar to Figure 3A, but illustrating a FF or REW mode;

15       Figure 4A is an elevation taken from the left side of Figure 3B; and

Figure 4B is an elevation similar to Figure 4A but illustrating a stopping operation.

20       In Figure 1, reference numeral 10 indicates a motor, 20 a cam gear, 30 and 40 first and second cam levers, 50 an operating plate, 60 a braking member, and 70 a reel disc, respectively.

25       The motor 10 comprises a rotating pin 11 and a worm 12, each of which is integrally mounted on and rotated with the shaft of the motor.

The worm 12 engages with an upper gear portion 13' of a worm gear 13, and a lower gear portion 13" of the worm gear 13 engages with the cam gear 20. Thus, rotation of the motor 10 is transmitted to the cam gear 20.

5 The cam gear 20 includes first and the second cam grooves 21, 22. The radius of each groove changes in a predetermined curvature, and an enlarged portion 21a is formed at one end of the first cam groove 21.

10 The first and second cam levers 30, 40 are respectively provided with guide bosses 31, 41 for engaging with the corresponding cam grooves 21, 22. As a locking means, the first cam lever 30 has a locking pin 32, and the second cam lever 40 has a locking lever 42 resiliently supported by a locking spring 43. At one end of the locking lever 42, a hooking end 42a for holding the locking pin 32 is formed; while an abutment end 42b for engaging with 15 the rotating pin 11 is formed at another end of the lever 42.

The operating plate 50 is resiliently mounted on a support plate 80 by an operating spring 51, and an operating recess 52 is formed at one side thereof.

20 The braking member 60 includes a braking pad 61 and a braking arm 62, which can be in contact with the outer surface of the reel disc 70.

25 The braking member 60 is associated with the operating plate 50, being resiliently supported by a braking spring 63.

The above described braking member 60 and reel disc 70 are provided for the take-up side of the VTR, and the supply side is also provided with substantially the same arrangement.

5 One example of operation of the illustrated device will now be described.

In Figure 2, if the cam gear 20 rotates clockwise (as seen), the guide bosses 31, 41 of the cam levers 30 and 40 are shifted to the left and the guide boss 31 of the first cam lever 30 enters into the enlarged portion 21a of the first cam groove 21. Accordingly, the operating plate 50 connected to the first cam lever 30 is drawn to the right. Therefore, the braking arm 62 of the braking member 60 is disengaged from the operating recess 52 of the operating plate 50, so that the braking pad 61 is separated from the reel disc 10 70.  
15

Under the circumstances, the operating plate 50 tends to be restored to the left by the operating spring 51, but it is maintained there as the locking pin 32 is engaged with the hooking end 42a of the locking lever 42.

20 Furthermore, the locking lever 42 is displaced by the second cam lever 50 to place its abutment end 42b under the rotating pin 11 as shown in Figure 3B and Figure 4A.

25 The above described state corresponds to high speed running mode for winding or rewinding the tape rapidly after tape unloading, and the motor 10 does not rotate.

To convert to other modes, the high speed running mode is firstly converted to the stop mode, and then the motor 10 rotates in reverse.

5 If the motor 10 rotates in reverse, the abutment end 42a of the locking lever 42 is pushed by the rotating pin 11 as shown in Figure 4B, and accordingly the hooking end 42a is released from the locking pin 32 as shown by the dotted lines in Figure 2.

10 Therefore, the operating plate 50 which has been restricted by the first cam lever 30 is displaced to the left in a moment by the resilient restoring force exerted by the operating spring 51. The braking arm 62 of the braking member 60 then enters into the operating recess 52 of the operating plate, and accordingly the braking member 60 instantly moves to contact the braking pad 61 to the reel disc 70 by the resilient force of the braking spring 63.

15

As a result, the reel disc 70 can be suddenly braked simultaneously with the mode change, to prevent the tape from releasing.

20

If the motor 10 rotates forward to execute another mode, all of the parts, for example, the first and second cam levers 30, 40 and the locking lever 42, are restored to their initial positions.

25

The braking device described above enables sudden stopping by adopting a relatively simple structure including cam and cam levers which undergo instant displacement on stopping, thereby assuring operational confidence of the video tape recorder.

Although a preferred embodiment of the invention has been described above, it is to be understood by those skilled in the art that various changes and modifications may be made thereto.

5        Although the invention is referred to herein as a reel disc braking device for a VTR, it will be appreciated that such apparatus may be employed for use in other suitable tape recorders - e.g. Digital Audio Tape recorders, computer Data Recorders, etc. Also, although the term "recorder" has been conveniently used herein, in its typical everyday manner, the invention does 10      of course have application equally to recording and reproducing apparatus, as well as reproducing only apparatus.

15      The reader's attention is directed to all papers and documents which are filed concurrently with or previous to this specification and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

20      All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

25      Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature

disclosed is one example only of a generic series of equivalent or similar features.

5 The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

**CLAIMS**

1. A reel disc braking device for a video tape recorder, which device comprises :

5

a motor with an integral rotating pin and a worm, being able to rotate forward or backward;

10 a cam gear rotatably driven by said motor through a worm gear, and having first and second cam grooves of which the radius respectively vary in predetermined curvatures, an enlarged portion being formed at one end of said second cam groove;

a first cam lever having a locking pin, and a first guide boss engaged with and guided by said first cam groove;

15 a second cam lever having a second guide boss engaged with and guided by said second cam groove, and a locking lever which is resiliently supported by a locking spring, and includes a hook portion for holding said locking pin at one end, and an abutment end for engaging with said rotating pin;

20 an operating plate resiliently biased in a predetermined direction and reciprocally displaced by said first cam lever; and

a braking member resiliently biased towards a reel disc and operated by said operating plate.

25 2. A reel disc braking device for a tape recorder, the device comprising a braking member, means for resiliently urging the braking member towards a reel disc engaging position, and actuator means for transmitting a drive to said braking member to move it towards or away from said position.

3. A reel disc braking device for a video tape recorder, the device being substantially as hereinbefore described with reference to Figures 1 to 4B of the accompanying drawings.

5 4. A tape recorder provided with a braking device according to Claim 1, 2 or 3.

5. A tape recorder according to Claim 4, being a video tape recorder.