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The application number included in the heading above should be quoted on all correspondence with The Patent Office.

Any queries on this receipt should be addressed to Mrs Lynne Payne, tel 01633 814570.

Note : The above filing date is provisional and may need to be amended if the provisions of section 15(1) of the Patents Act 1977 are not met.

Notice to Applicants

1 The Patents Act 1977 requires the Comptroller to publish the application, including the description and claims, after the expiry of eighteen months from the earliest declared priority date or, where no earlier priority is claimed, from the date of application provided the application has not been withdrawn before completion of the preparations for its publication. The applicant may request publication to take place before the expiry of this period.

2 A request for a preliminary examination and search (with the prescribed fee) must be made within twelve months of the earliest declared priority date or, where no earlier priority is claimed, from the date of the application.

3 **Failure to make the request mentioned in 2 above within the twelve month period will result in the application being treated as withdrawn. (This period can be extended by one month upon filing the prescribed fee, or possibly for a longer period at the Comptroller's discretion also upon filing the prescribed fee - in either case together with Form 52/77).**

4 One or more claims and an abstract must also be filed. In the case of an application containing no declared priority date, the period allowed is twelve months from the date of filing the application. For an application which does claim an earlier priority it is twelve months from the earliest declared priority date or one month from the date of the application, whichever is the later.

5 **Failure to file documents mentioned in 4 above within the prescribed periods may result in the application being treated as withdrawn.**

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DIGITAL CONTROL DEVICE

The present invention relates to a digital control device and more particularly to a device which can be manually operated to control the output of an audio and/or video device. In particular, a gramophone record player is used to control a digital source of information such as a computer or mini disc player.

Gramophone record players have been adopted by disc jockeys as a fundamental tool for playing songs. This is because of the practical benefits of being able to touch the record with one's hand and control the speed, and pitch and direction of the songs being played.

This procedure is made easier with a device known as a "Slipmat". Slipmats have been used since the very start of this practice known as "mixing". Slipmats sit on top of the platter, i.e. the spinning turntable, and they allow the user to stop a record whilst the platter continues to spin without scratching the record.

For many years now disc jockeys have been creating an effect known as "Scratching". This is when a disc jockey stops the record from spinning whilst the platter continues to spin and moves the record backwards and forwards in contact with a stylus, manipulating a short part of the audio signal. The effect is enhanced when they also vary the speed of this action.

Sometimes they will simultaneously control the level of volume to ensure the sound is only audible whilst the record is moved in a forward direction.

Another major part of "mixing" is when the disc jockey blends different songs together ensuring that the records are mixed so that the beat structure and the structure of the songs being mixed do not conflict with each other.

This procedure is also made easier with the Slipmat.

Until now, there has been no way in which the above procedures could be achieved with digital recordings.

The present invention seeks to provide a "user" with control over digitised information in order to manipulate the information in the same way a disc jockey manipulates a conventional gramophone record player.

According to a first aspect of the present invention there is provided a digital control system comprising means for reproducing a digitally recorded piece (i.e. a song or tune or a part thereof) and a device for controlling the output of the reproducing means, the control device comprising a disc with a track which is read by a transducer, said means reproducing a piece when said disc rotates, the speed and direction of rotation of the disc then being controllable by an operator.

The speed and direction of rotation of the disc are preferably adjusted by direct manual contact.

The control device may be a gramophone record player and the track may be recorded in the manner of a conventional record track with left and right channels read by a stylus.

According to a second aspect of the present invention there is provided a digital control system comprising means for reproducing a digitally recorded piece and a device for controlling the output of the reproducing means, the control device comprising a disc with a track which is read by a transducer, said means reproducing a piece when said disc rotates, and the track comprising a coding which itself manipulates the output of the reproducing means.

According to a third aspect of the present invention, there is provided a rotatable disc having first and second channels pre-recorded thereon, the first channel comprising a first plurality of evenly-spaced pulses and the second channel comprising a second plurality of which have the

same even spacing, but which are asymmetrically-staggered with regard to the corresponding pulses of the first plurality.

Preferred embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawing of which:

Fig. 1 shows a sound reproducing system incorporating a digital control device in accordance with a first embodiment of the present invention;

Fig. 2 shows the signals recorded on a rotating disc of the system of Fig. 1; and

Fig. 3 shows a system in accordance with a second embodiment of the present invention.

Referring to the drawings, Figure 1 shows a system 150 in accordance with the present invention comprising a control device 120 in the form of a gramophone record player 121, an interface device 130, a computer 140 with a memory storing various pieces (e.g. songs, tunes or part thereof), an amplifier 160 and loudspeaker 170. A specially-adapted record 123 is provided for placing on the platter. Instead of music etc., record 123 has codings in the form of series of tone pulses 31, 32 Fig. 2 respectively pre-recorded on its left and right channels. The pulses are recorded so that the left channel pulses 31 and the right channel pulses 32 are slightly out of synchronism. The lengths of the tracks of pulses on the disc 123 correspond to a playing time which is at least as long as the longest piece of music stored in computer 140.

Record player 121 is connected to interface device 130 by means of a signal wire 125. Interface device 130 has a plurality of buttons or keys 132 which can be used to select desired passages from desired pieces of music stored within the memory of the computer 140. These keys allow instant access to more than one selected passage simultaneously. Thus actuation of successive buttons 132 of the interface device may select "piece A, sample 6", "piece B,

sample 3" etc. The selected samples remain stored within the memory of the computer 140 to enable manipulation thereof, e.g. mixing or "scratching".

The interface device 130 is connected to the computer 140 by means of a signal wire 135. Computer 140 in combination with interface device 130 serves as a sound reproducing system and, in addition to the memory storing the pieces of music, has a control panel 142. The output of the computer is supplied to an audio amplifier 160 and loudspeaker 170.

In use, buttons 132 are used to select desired passages from desired pieces of music for manipulation; and disc 123 is placed on the record player 121. Actuation of the record player control to spin the disc 123 relative to a stylus 122 causes pulses 31, 32 to be supplied to the sound reproducing system (comprising interface device 130 and computer 140) which then starts to play the selected piece.

The output signals from record player 121 are supplied to control circuitry within the interface device 130 and then to the computer 140 to vary the speed and/or direction of the reproduction of the piece of music. The speed is determined by the frequency at which the pulses are received and the direction is determined by the difference between the left channel and the right channel as the tones start and stop slightly out of sync on each channel.

The position within a piece can be determined by the length of time the recorded piece has been playing for; this can be evaluated by counting the pulses 31 and/or 32 and this can be displayed on a screen of the computer.

Normal rotation of the platter of the record player 121 causes normal reproduction of the piece of music. If, however, a disc jockey causes slippage of the disc 123 relative to the platter, a similar effect is achieved to that obtained by "scratching" conventional gramophone records. Thus, circuitry within interface device 130 detects alterations in the speed and/or direction of

rotation and supplies appropriate instructions to the computer 140 to produce a corresponding effect in the audio output.

An advantage of the above-described arrangement is that desirable sound effects can be obtained with digitally-recorded music. By having the input to this arrangement effected in the same way, i.e. via direct physical contact with a disc or a record player, disc jockeys will be instantly familiar with this method of control. In addition, by observing the position of the stylus 122 relative to the beginning of the track on disc 123, the disc jockey has useful information of how much of the piece of music has been played.

Since all the music needed for a performance by a disc-jockey can be stored in a lap-top computer such as 140, it is no longer necessary to transport a large number of records, which are heavy and risk being damaged. This is highly advantageous.

Various parts of the system may be combined. For example interface device 130 and computer 140 may form a single unit. Alternatively, all the elements may be combined in a single apparatus, see Fig 3. In Fig. 3 there is shown a sound reproducing system 210 comprising a computer 211. Buttons 212 of a keyboard enable a desired piece or pieces to be selected and played.

To enable the piece to be manipulated by a disc-jockey, there is also provided a digital control device 220 which actuates the computer 211 to commence playing of the piece. Device 220 is constituted by a conventional gramophone record player 221 having a conventional stylus 222.

In use, the disc jockey pre-selects a passage or waits until the selected passage occurs within the piece being reproduced. The relevant digitised passage of the piece is then played by actuating the record player 221 and to make the platter and disc 223 spin and can then be manipulated by directly controlling the disc 223 with one's hand (in a manner similar to the manipulation of a conventional gramophone record to obtain special effects).

The above arrangement also has the advantage that music recorded on any digital media can be manipulated as with conventional gramophone records and in exactly the same way.

Various modifications may be made to the above-described arrangements. In particular the coding of the pulses may be changed to enable other features to be recorded on the record. These other features would be laid down on a record as different tracks or songs are normally. For example other features would consist of predetermined sequences of the pulses to provide a user with other effects like slowing the record down, etc. Effects obtained in this way could be used to supplement or replace manual control by a disc jockey. Thus by shifting the right pulses to start after the left pulses, the music may be played backwards for a desired period.

It is also possible to determine the position in the track that one wishes to access, by encrypting the record with something similar to that known as an "SMPTE" code. This code is usually used to determine the playback position of some tape recorders and players.

The sound reproducing system 150, 210, can be a mini disc player or a suitably-modified CD player or any digital sound reproducing device and may be integrated with or separate from the control device 120, 220 if desired. In all cases an electronic circuit (whether that be a stand alone unit, or part of a sound card on a computer, or a part of an audio mixer, or part of a compact disc player, or part of a mini disc player), or any other digitised source decrypts the coded information that is picked up from the stylus and this information will be used to manipulate the digitised information like that of a conventional analogue record.

The signals provided by system 150, 210 may represent audio and or video pieces.

The signals provided by device 120, 220 may be in a single channel only (corresponding to a mono-rather than a stereo recording). Uniform pulses give position and frequency information.

However, preferably, there are at least three successive dissimilar pulses (e.g. having different lengths) so that suitable detection circuitry can also determine the direction of rotation.

The output from the control device 121, 221 may be taken from the spindle of the record player instead of the stylus. In this case, it is the platter which is manipulated by a user. Alternatively, the control device 120, 220 may comprise a disc 123, 223 carrying optical or other suitable codings which are read by a laser or other appropriate device. The system 150, 210 may incorporate a switch (not shown) which enables the control device 120, 220 to play a conventional gramophone record via the system 150, 210.

Buttons 132 could be located at any convenient point within the system, e.g. on the computer 140 or on a separate audio mixer (not shown).

Instead of being stored within computer 140, the selected pieces of music can be stored in an erasable memory within the interface device 130.

Instead of being within interface device 130, the circuitry for detecting signals from the disc can be located within computer 140.

The output of the system 150, 210 may be in the form of any type of information which is suitable for manipulation.

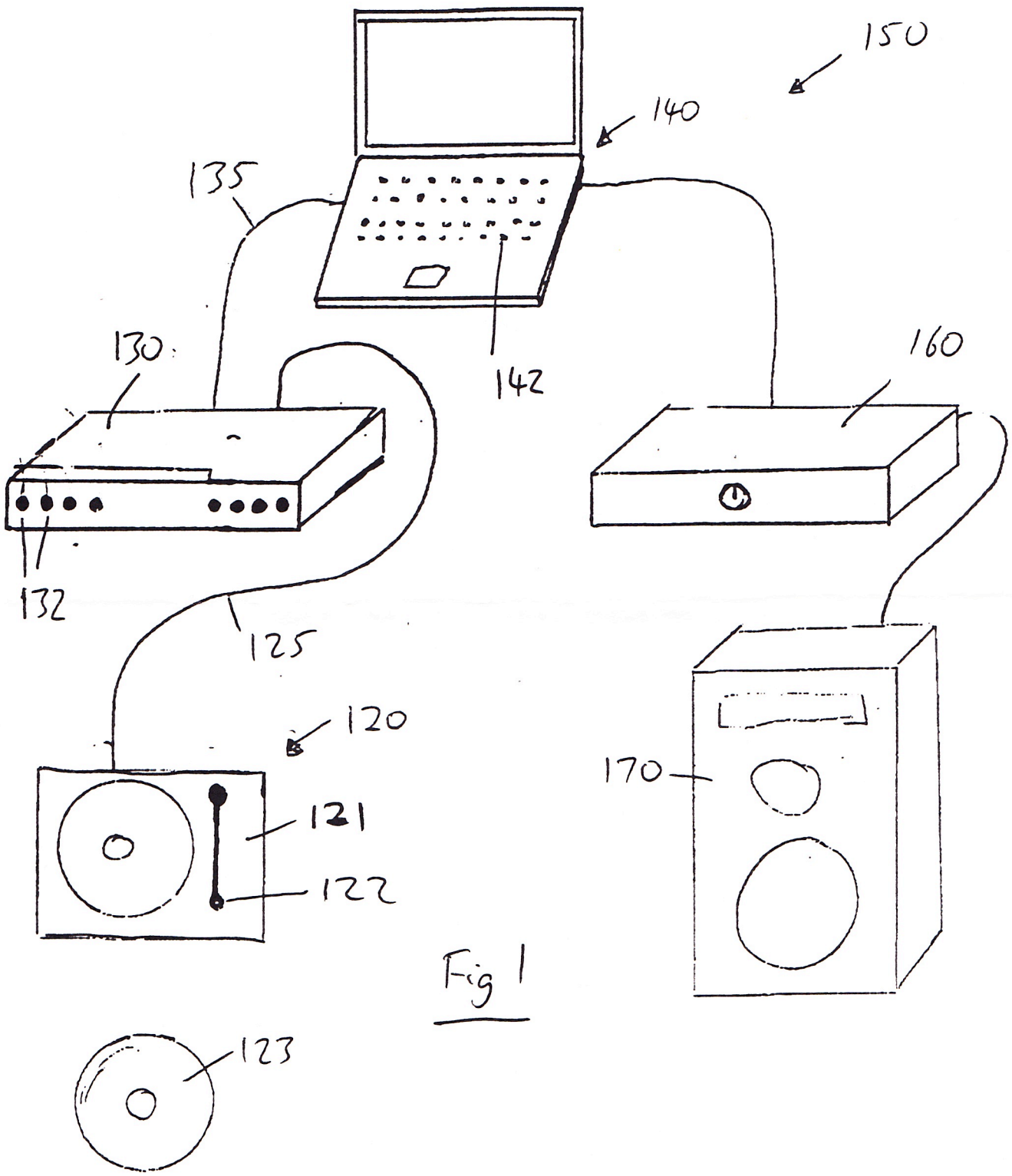


Fig 1

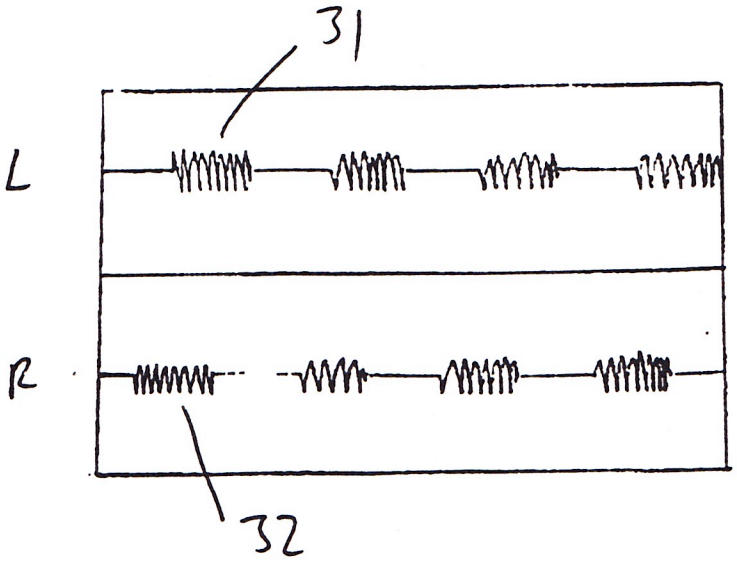


Fig 2

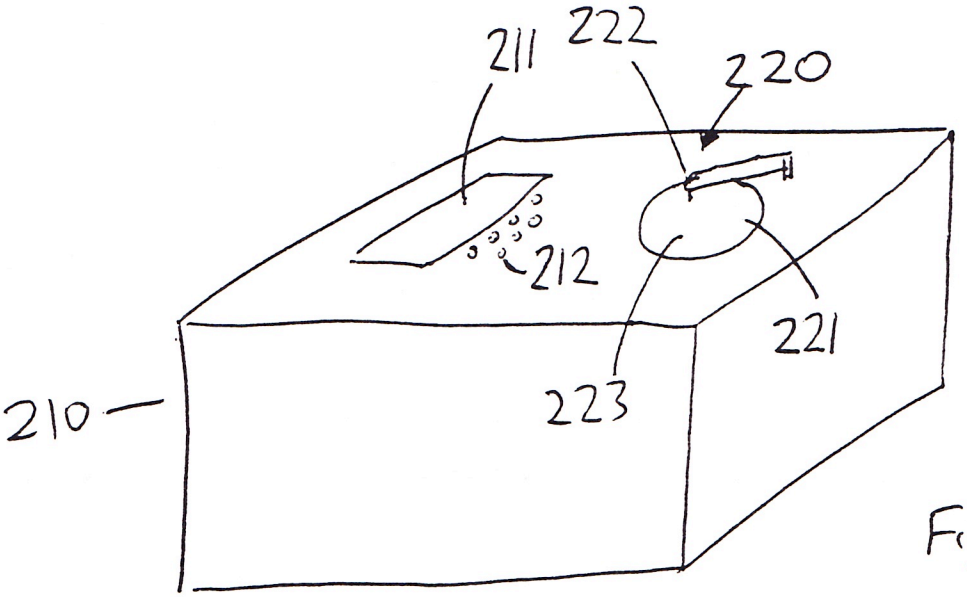


Fig 3