

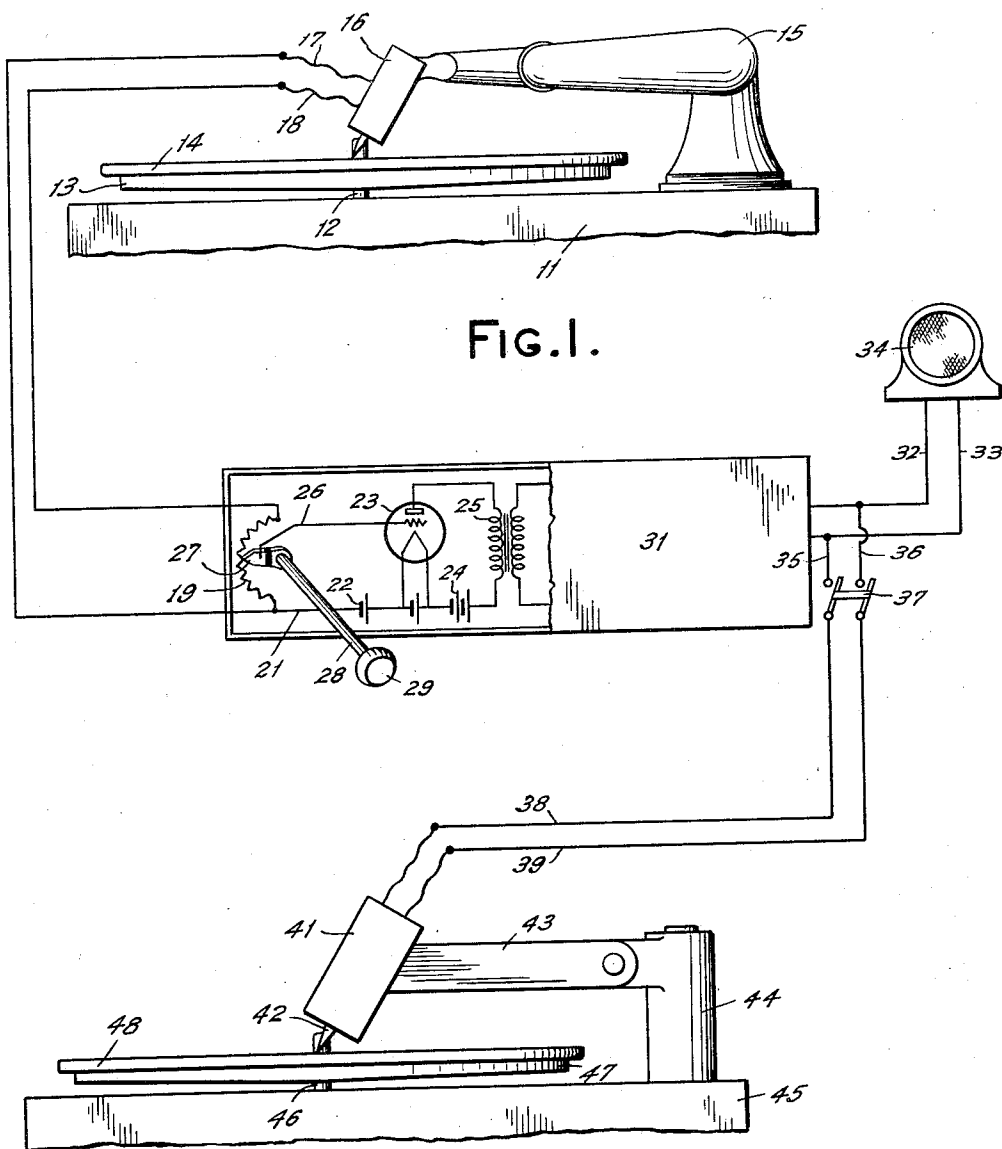
July 23, 1935.

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2,008,699

REEDITING OF PHONOGRAPH RECORDS

Original Filed May 12, 1930 3 Sheets-Sheet 1



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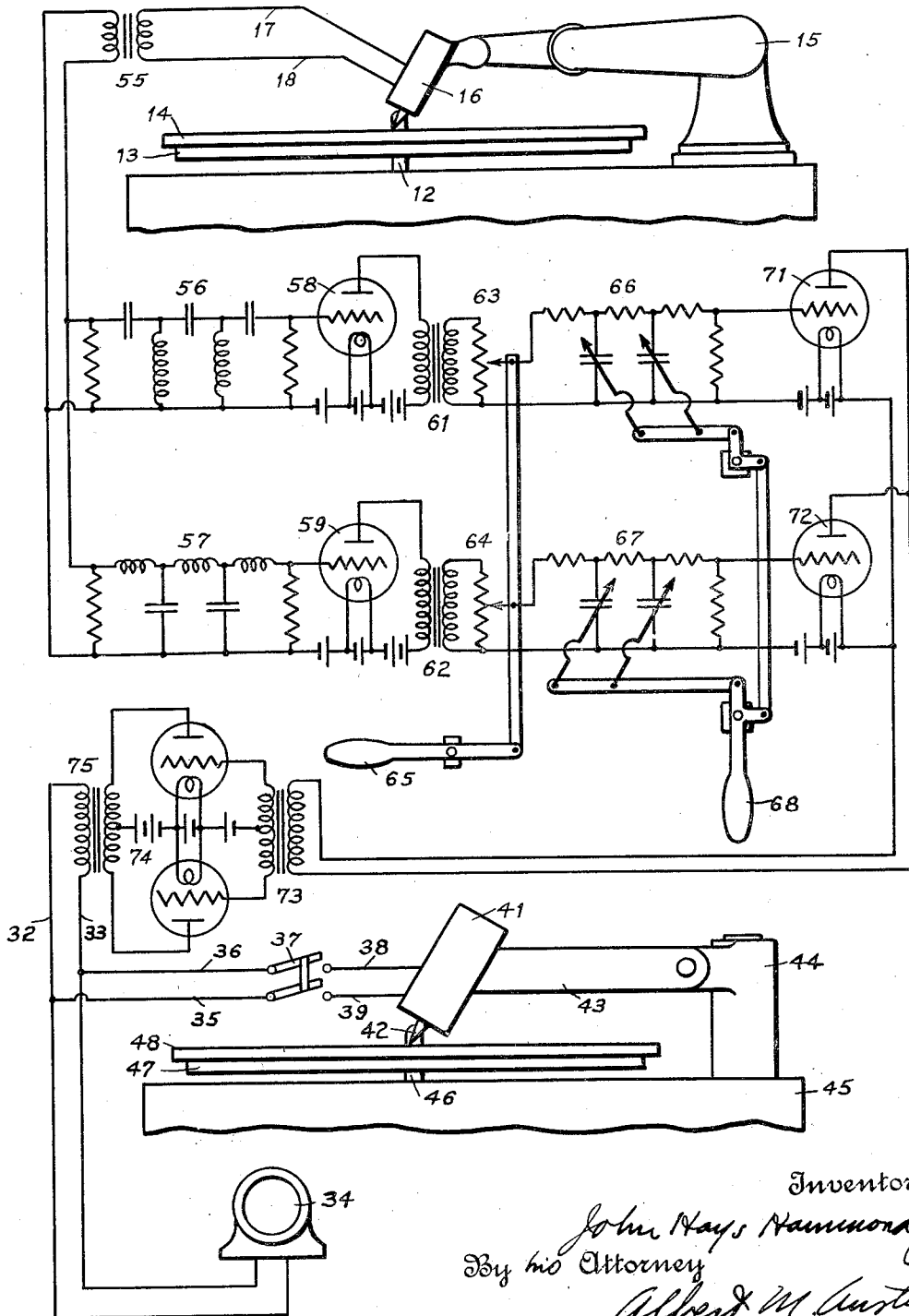
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FIG. 2.



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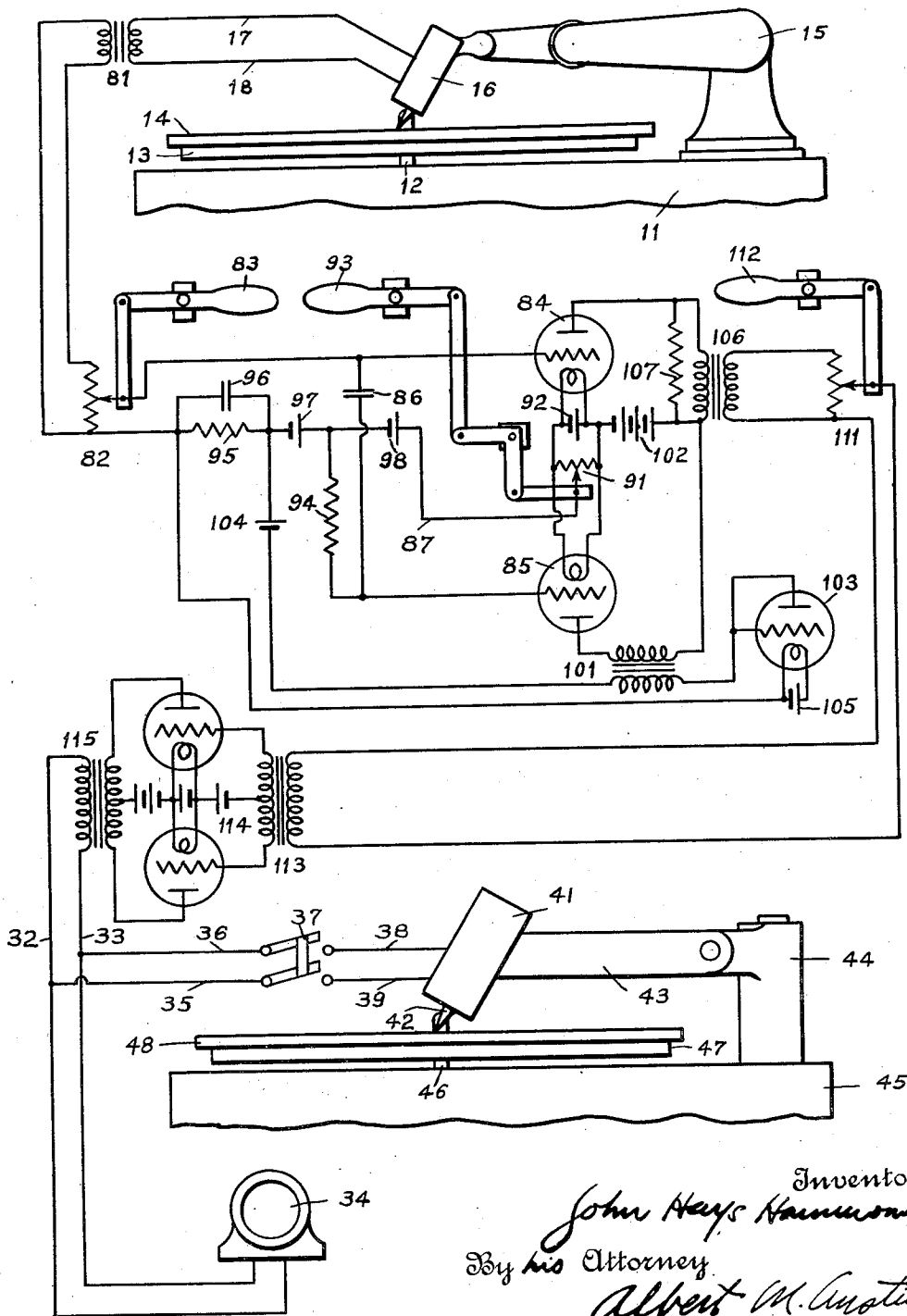
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FIG. 3.



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2,008,699

REEDITING OF PHONOGRAPH RECORDS

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Application May 12, 1930, Serial No. 451,661
Renewed October 5, 1934

3 Claims. (Cl. 179—100.4)

This invention relates to the art of acoustics and more particularly to an improved method of reediting phonograph or other records.

This invention relates more particularly to a system of reediting a recorded phonograph record in which the intensity of the later recording is varied at the will of an operator.

The invention provides a method for the reediting of phonograph records in which the quality of the reedited record can be varied at will.

The invention further provides a recording system for phonograph or other records with independent control of the upper and lower harmonics so as to vary the quality of the reedited record.

The invention also provides a method of reediting of phonograph records in which the upper harmonics may be increased at the same time that the lower harmonics are decreased and vice versa.

The invention also consists of a system for the reediting of phonograph records in which the louder tones are amplified to a greater extent than the weaker tones.

The invention also consists in certain new and original features of construction and combinations of parts hereinafter set forth and claimed.

Although the novel features which are believed to be characteristic of this invention will be particularly pointed out in the claims appended hereto, the invention itself, as to its objects and advantages, the mode of its operation and the manner of its organization may be better understood by referring to the following description taken in connection with the accompanying drawings forming a part thereof, in which

Fig. 1 illustrates diagrammatically a system of volume control for the re-recording of phonograph records;

Fig. 2 illustrates diagrammatically a system of volume and quality control for the re-recording of phonograph records; and

Fig. 3 illustrates diagrammatically a system of volume control in which the amplification is automatically varied in accordance with the signal strength.

Like reference characters denote like parts in the several figures of the drawings.

In the following description and in the claims parts will be identified by specific names for convenience, but they are intended to be as generic in their application to similar parts as the art will permit.

Referring more particularly to the form of the

invention shown in Fig. 1, a phonograph mechanism is mounted in a casing 11. This mechanism is provided with a shaft 12 to which is secured a plate or turntable 13. Resting on this plate is a phonograph tablet or record 14. Pivotaly mounted on the casing 11 is an arm 15 to the end of which is secured a pick-up device 16. This device is connected by two flexible conductors 17 and 18 to a potentiometer resistance 19. One side of this resistance is connected by conductor 21 to a battery 22, the other side of which is connected to the filament of a space discharge device 23. The other side of this filament is connected to a battery 24 which in turn is connected to the primary of a transformer 25, the other side of which is connected to the plate of the space discharge device 23. The grid of this device is connected by a flexible conductor 26 to a contact 27 which slides over the resistance 19. This contact is mounted on, but insulated from, a shaft 28, to the end of which is secured a knob 29.

The secondary of the transformer 25 is connected to an amplifying system in the casing 31. The output of this amplifier is connected by two conductors 32 and 33 to a loud speaker 34. The conductors 32 and 33 are connected by branch conductors 35 and 36 to a double pole switch 37, the other side of which is connected by two flexible conductors 38 and 39 to an engraving mechanism 41 which is provided with an engraving tool 42. The mechanism 41 is mounted on the end of an arm 43 which is pivoted to a member 44, which is mounted for rotation on a casing 45, which contains a driving mechanism provided with a shaft 46 to which is secured a plate 47. Resting on this plate is the phonograph tablet 48 on which is to be engraved the reedited sound record by the tool 42. The member 44 may be slowly rotated by mechanism in the casing 45 so as to cause the tool 42 to form a spiral groove on the top of the tablet 48.

In the operation of this system a phonograph record 14 is placed on the plate 13 and the mechanism in the casing 11 is started rotating. The needle of the pick-up device is then placed in the groove of the record 14. The music or other selection from this record is then amplified by the amplifier 31 and reproduced by the loud speaker 34.

After the record has been played once, the operator determines which parts are too loud and which parts too soft for good rendition. He then closes the switch 37 and starts the mechanism 41 in contact with the blank tablet 48. As the orig-

inal record 14 is played, the music from it will be picked up by the pick-up 16, amplified by the amplifier 31, and sent to the engraving mechanism 41, thus making a record of the music on the blank tablet 48.

As the part of the music is reached which should be increased in intensity, the operator rotates the knob 29 in a clockwise direction, thereby increasing the amount of current sent to the engraving tool 41, which increases the intensity of the record at this point. If a point is reached where the record should be decreased in intensity, the knob 29 is rotated in a counter-clockwise direction thereby decreasing the current sent to the engraving mechanism 41, thereby decreasing the intensity of the record made on the record disk 48.

In this way the intensity values of any record may be varied at will so as to produce entirely different and more pleasing effects than those from the original record, which may be either an old record or a new one.

Referring to the modified form of the invention shown in Fig. 2, the phonographic reproducing mechanism is the same as that shown in Fig. 1. In this case, however, the conductors 17 and 18 are connected to the primary of a transformer 55, the secondary of which is connected to two filter circuits 56 and 57 each comprising a group of condensers and inductances as shown. The filter circuit 56, which is a high pass filter, allows high frequency currents to pass, such as those of the upper half of the voice and music range, and the filter circuit 57, which is a low pass filter, allows low frequency currents of the lower half of this range to pass. The filter circuits 56 and 57 are connected to two space discharge tubes 58 and 59, the outputs of which are connected to two transformers 61 and 62.

The secondaries of these transformers 61 and 62 are connected to two potentiometers 63 and 64, the movable contacts of which are moved by means of a handle 65. The potentiometers 63 and 64 are connected to two filter circuits 66 and 67, the condensers of which are variable and are controlled from a handle 68. These condensers are so connected to this handle that, as the capacity of one set is increased, the capacity of the other set is decreased. The filter circuits 56 and 57 are connected through tubes 71 and 72 to a transformer 73. The secondary of this transformer is connected to a push pull amplifier 74, the output of which is delivered from transformer 75.

The secondary of this transformer 75 is connected to the conductors 32 and 33 which go to the loud speaker 34. The conductors 32 and 33 are connected by the branch conductors 35 and 36 to a double pole switch 37, the other side of which is connected by two flexible conductors 38 and 39 to the engraving mechanism 41.

The operation of this system is similar to that shown in Fig. 1, the intensity of the re-recording being controlled by the handle 65. By moving this handle in a counter-clockwise direction the intensity is increased due to the increased energy which is picked up by the potentiometers 63 and 64, and by moving the handle in a clockwise direction the intensity is decreased.

The energy from the pick-up device 16 passes through the transformer 55 to the filter circuits 56 and 57, the former allowing the higher frequencies to pass and the latter the lower frequencies. These currents are then amplified by the space discharge tubes 58 and 59 from which they pass through the transformers 61 and 62 to the

potentiometers 63 and 64. Here any desired proportion of the energy from the lower and upper sound ranges may be picked up depending upon the setting of the handle 65.

The energy from the potentiometers 63 and 64 then passes through the filters 66 and 67. These are normally in such a position that the frequencies passing through these filters are unaltered and, therefore, the relative intensities of the treble and bass harmonics are the same as those in the original music. If, however, the handle 68 is shifted in one direction, it will increase the capacities in the circuit 66 and decrease the capacities in the circuit 67. This will cause less of the harmonics to be passed in the circuit 66 and more of the harmonics to be passed in the circuit 67. In this way the brilliance of the bass notes is increased and that of the treble notes decreased. If the handle 68 is moved in the opposite direction, the capacities in the circuit 66 will be decreased and those in the circuit 67 increased, thereby making the treble harmonics richer and cutting down on the bass harmonics.

The energy from the circuits 66 and 67 is then amplified by the space discharge means 71 and 72 from which it is fed to the push-pull amplifier 74 where it is still more amplified and fed to the loud speaker 78 and engraving mechanism 41, thus making a record of the music on the blank tablet 48 in a manner similar to that described in connection with Fig. 1.

Referring to the modified form of the invention shown in Fig. 3, the phonograph mechanism is the same as that shown in Fig. 1. In this case, however, the conductors 17 and 18 are connected to the primary of a transformer 81, the secondary of which is connected to a potentiometer 82, the movable contact of which is operated by a handle 83. The input current is taken from this potentiometer and applied to the input circuit of a space discharge tube 84.

The input circuit of a control space discharge tube 85 is connected in parallel with the input circuit of the space discharge tube 84, through condenser 86 and the common grid return 87. This lead 87 is connected to the movable contact of a potentiometer 91 which is across the common filament battery 92. This potentiometer 91 is operated by a handle 93. A high resistance 94 may be connected between the grid of the space discharge tube 85 and the grid return 87, to provide the necessary leakage path. A resistance 95 is located in the grid return of the space discharge tube 84 and is shunted by a condenser 96. In series with the resistance 95 in the grid return 87 are batteries 97 and 98.

The output circuit of the control space discharge tube 85 includes the primary of a transformer 101 and a source of power 102. The secondary of this transformer is connected in series with a rectifying device 103 and a battery 104, all across the resistance 95. The rectifying device 103 may be of any suitable type, as for example, a three electrode space discharge tube having a filament which may be energized by a battery 105.

The output circuit of the main space discharge tube 84 comprises a transformer 106 which is shunted by a high resistance 107 in order to obtain the proper fidelity curve. The secondary of this transformer is connected to a potentiometer 111, the movable contact of which is controlled by a handle 112. This potentiometer is connected through a transformer 113 to the input circuit of a push-pull amplifier 114. The output circuit of this amplifier is connected through a transformer 75

115 to the conductors 32 and 33 which go to the loud speaker 34. The conductors 32 and 33 are connected by branch conductors 35 and 36 to a double pole switch 37, the other side of which is connected by two flexible conductors 38 and 39 to the engraving mechanism 41.

The general operation of this system is similar to that shown in Fig. 1, the intensity of the recording being controlled by the handle 112 which controls the amount of energy fed to the push pull amplifier 114 and, therefore, to the loud speaker 34 and engraving mechanism 41. The handles 83 and 93 control the dynamic range and quality, the former controlling the amount of energy fed to the dynamic multiplier, so that it will operate in its proper range and not cause an overloading of the space discharge tube 84 and the latter controlling the initial setting for the space discharge tubes 84 and 85, thus determining the dynamic range.

The amplifying characteristics of the space discharge tube 84 are determined by its grid potential. This in turn is determined by the batteries 97 and 98, the voltage drop in the resistance 95 and the setting of the potentiometers 82 and 91. The voltage drop of the resistance 95 is governed by the amplitude of the impressed signals, which are applied to control the tube 35 and determine the space current in that tube, which is passed through the primary of the transformer 101. The current in the secondary of this transformer is applied through the rectifier 103 to the resistance 95. An unidirectional current is thereby produced in this resistance which is proportional in value to the average amplitude of the impressed signal, thus controlling the amplification characteristics of the space discharge means 84.

It is thus seen that in the form of the invention shown in Fig. 3, the intensity of recording may be controlled by one handle while the quality and dynamic range may be controlled by the other two handles. This form also has the advantage of the dynamic multiplication in which the amplification ratio is varied in accordance with the strength of the impressed signal, being greater for strong signals than for weak ones.

Another advantage of the system disclosed in Fig. 3 is that it can be used for re-recording records without the manual operation of handles 83, 93 and 112. In this case the inherent performance of the circuit will cause the louder notes to be amplified to a greater extent than the

softer notes. Thus the circuit of Fig. 3 without any manual operation whatsoever may be used to improve recorded selections by increasing the contrast between the soft and loud notes.

While certain novel features of the invention have been shown and described and are pointed out in the annexed claims, it will be understood that various omissions, substitutions and changes may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. In a reediting system, a primary tablet having a record of a sound selection thereon, a secondary tablet for recording the reedited selection, a pick-up device cooperating with said primary tablet, a recording device cooperating with said secondary tablet, a path between said devices, said path including an amplifier tube, variable means for controlling the energy fed to said tube, variable means for controlling the energy delivered by said tube, variable means for controlling the dynamic range of the tube, and means for causing said tube to amplify the weaker tones less than the stronger tones.

2. In a re-editing system, a primary record member having a record of a sound selection thereon, a secondary record member for recording the re-edited selection, a pick-up device cooperating with said primary record member, a recording device cooperating with said secondary record member, a path including an amplifier between said devices, and means controlled by the change in average intensity of the sound energy produced by said primary record member for controlling the amplifier to impress the selection with modified dynamics on said secondary record member.

3. In a re-editing system, a primary record member having a record of a sound selection thereon, a secondary record member for recording the re-edited selection, a pick-up device cooperating with said primary record member, a recording device cooperating with said secondary member, a path including a modifier between said devices and means controlled by the average nature of the sound energy produced by said primary record member to control the modifier to impress the selection in its modified form on said secondary record member, whereby sound reproduced from said secondary record has different characteristics from sound reproduced from said primary record.

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