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[54] **METHOD AND ARRANGEMENT FOR SOUND TRACK RECORDING IN WHICH BACKGROUND MUSIC IS DAMPED DURING SPEECH SIGNALS**

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[58] **Field of Search** ..... 179/100.2 MD, 100.2 B, 179/100.2 MP, 100.1 PS, 100.1 VC, 100.2 S; 340/174.1 G, 174.1 H

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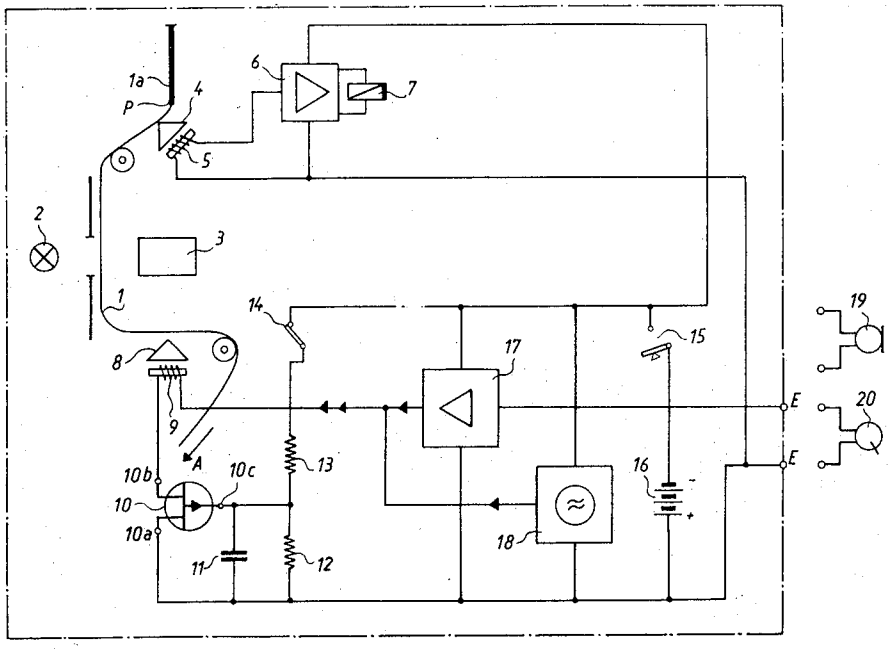
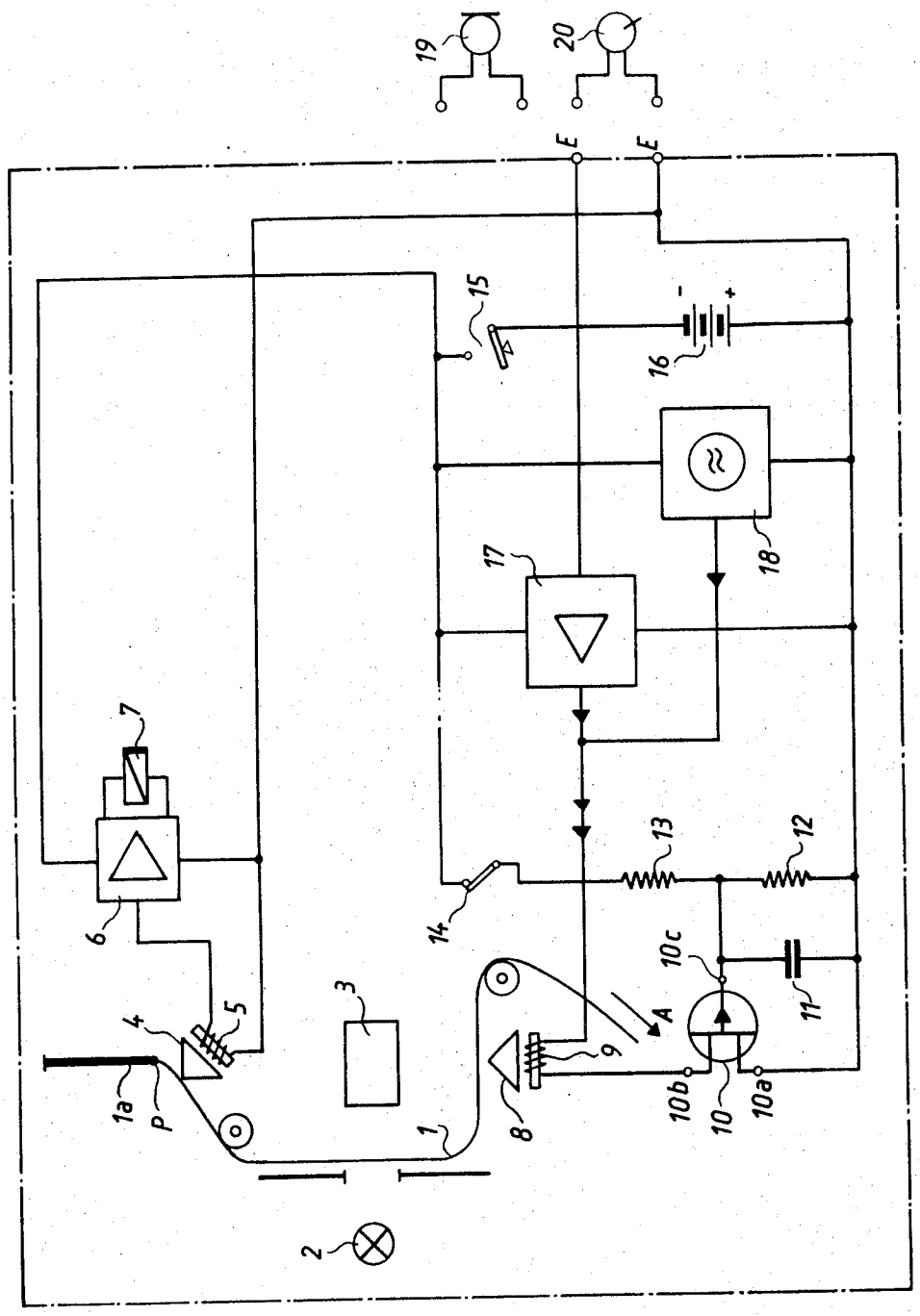
[57] **ABSTRACT**

Speech and background music to be recorded on a sound track. Speech recorded first. During subsequent recording of background music, the background music is damped over portions of sound track having sound signals.

11 Claims, 1 Drawing Figure





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METHOD AND ARRANGEMENT FOR SOUND TRACK RECORDING IN WHICH BACKGROUND MUSIC IS DAMPED DURING SPEECH SIGNALS

BACKGROUND OF THE INVENTION

This invention relates to a method and arrangement for recording dominant and background sounds on a sound track, as for example, a sound track associated with a film. This sound track is generally a track on a magnetic tape and the dominant sound may for example be speech, while the background sound is music.

In a conventional method of adding sound to film, the background sound is recorded first, while the dominant sound is added later on predetermined portions of the sound track. Thus if an error is made in adding the dominant sound signals, which of course is easily possible, any correction of the dominant sound signals requires a complete erasure of the sound track and thus a complete new recording of the background sound.

SUMMARY OF THE INVENTION

It is an object of the present invention to furnish a method and arrangement whereby the above-mentioned disadvantage is overcome.

It is a further object of the present invention that such an arrangement be simple and result in a saving of time during the recording process.

The method of the present invention comprises a method for recording dominant and background sound signals on a sound track. It comprises the steps of recording said dominant sound signals on said sound track, thereby creating recroded dominant sound signals. These recorded dominant sound signals are sensed during subsequent recording of said background sound signals, thereby furnishing sensed background sound signals. Finally, the background sound signals are damped for portions of the sound track having recorded dominant sound signals.

Since the dominant sound signals are recorded first, any correction required in said recording does not affect the background sound which has not yet been recorded. Once the dominant sound signal has been recorded on the tape, then the background sound signals (music) can be added automatically and without interruption. The arrangement of the present invention serves to damp the background sounds automatically in the presence of dominant sound signals recorded on the sound track.

The arrangement of the present invention is an arrangement for recording background sound signals on a sound track having predetermined portions with recorded dominant sound signals. It comprises transport means transporting said sound track along a predetermined path past a first location and a second location following said first location in the direction of movement of said sound track. It comprises sensing means, at said first location, in operative proximity to said sound track for furnishing sensed dominant sound signals in response to said recorded dominant sound signals. It comprises recording means at said second location, and damping means connected to said recording means for damping said background sound signals upon activation. Finally, activating means activate said damping means in response to said sensed dominant sound signals.

The damping means serve to decrease the intensity of the background sound signals at the recording head to a great degree.

In a preferred embodiment of the invention, the damping means may comprise a field-effect transistor having a drain-source circuit connected in series with the coil of the recording head. Further, the gate of the field-ffect transistor may be connected with an RC timing circuit. The activating means may comprise switching means which start the operation of the timing circuit either for charging or discharging the capacitor of the RC timing circuit.

The switching means may be a relay having contacts connected to the timing circuit.

In the absence of dominant sound signals, the field-effect transistor is fully conductive so that its source-drain circuit has a very low ohmic value. Therefore enough current flows through the coil of the recording head for recording the background sound at full strength. If however dominant sound signals are sensed on the sound track, the activating means, for example, a relay which opens its contacts, cause the timing circuit to furnish a voltage at the gate of the field-effect transistor which causes the field-effect transistor to become blocked, thus cutting off the current to the coil of the recording head. Thus the background sound cannot then reach the sound track.

It is in general desirable to prevent any overlapping of the dominant and the background sound. Therefore, when the blocking of the field-effect transistor depends upon the discharge time of a timing capacitor in a timing circuit, as in the circuit shown in the drawing, the discharge time must be such that the field-effect transistor is blocked in a time equal to or less than the time it takes any given point on the sound track to travel from the first to the second location, that is from the location at which the dominant sound signals are sensed to the location where the background sound is being recorded. Further, if the charging time of the capacitor determines when the field-effect transistor again becomes conductive, then the charging time must be such that it is equal to or greater than the time required for any given point on the sound track to travel from the sensing to the recording location.

It is further advantageous when the length of sound track between the sensing and recording location is less than the length of the portions of the sound track which have dominant sound signals recorded thereon. This of course is generally the case in practice.

It is also possible to use a timing circuit whose charging time is less than the above-mentioned time required for a point to travel from the sensing to the recording location. In this case, the relay can have a built-in time delay which allows a normally closed contact to close only a predetermined time interval after the de-energization of the relay. Thus the field-effect transistor becomes effective only after the end of the sound track portion carrying recorded dominant sound signals has past the recording head.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

The single FIGURE shows a recording arrangement in accordance with the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the FIGURE, a film, **1**, has a sound track which is transported in the direction of the arrow A. The sound track is of course transported with the film. Reference numeral **2** refers to a projection lamp, while reference numeral **3** denotes an objective lens. Preceding the projection lamp in the direction of movement of the film, is a sensing head **4** whose coil is denoted by reference numeral **5**. Coil **5** is situated in the input circuit of an amplifier **6** whose output energizes a relay coil **7**.

Following the projection lamp in the direction of film transport, is a recording head **8** having a coil **9**. Coil **9** is in series with the source-drain circuit of field-effect transistor **10**. The drain of the field-effect transistor is denoted by reference numeral **10***a*, the source is denoted by reference numerals **10***b*, and the gate by reference numeral **10***c*. Gate **10***c* is connected with a capacitor **11**. A resistance **12**, a discharge resistance, is connected in parallel with condensor **11** which is a timing condensor. A resistance **13** is connected in series with resistance **12**. This is a charging resistance. The free terminal of resistance **13** is connected to a pair of contacts **14** which are the contacts associated with relay coil **7** and are normally closed contacts. When closed, these contacts connect the free terminal of resistance **13** to the negative terminal of a voltage supply **16** via a switch **15**.

Coil **9** of the recording head is further connected to the output of an amplifier **17** which has an input denoted by E. Coil **9** is further connected to the outputs of a high-frequency oscillator **18**. Oscillator **18**, as well as amplifier **17**, are energized when switch **15** is closed. In the FIGURE, reference numeral **19** denotes a microphone, while reference numeral **20** denotes a record player.

The above-described arrangement operates as follows: First, microphone **19** is connected to the input E of amplifier **17**. Switch **15** is then closed and the dominant sound signals are recorded via microphone **19** at predetermined portions of the sound track associated with the film. During this recording, contacts **14** are closed, a negative potential exists at the gate **10c** of the field-effect transistor **10**. The field-effect transistor is thus highly conductive and the current required for full-strength recording flows through coil **9**.

After the recording of the dominant sound signals, the film is re-wound (apparatus not shown) and the recording of the background sound signals, in this instance music, commences.

The film is again transported past the first and second location. However, the dominant sound signals which have been previously recorded on the film, are now sensed by a sensing head **4**. This causes a current to flow through coil **5**, which is amplified by amplifier **6** and energizes relay **7**, thereby causing contacts **14** to open. Capacitor **11** then discharges at a time constant determined by the values of capacitor **11** and resistance **12**. During this discharge time, field-effect transistor **10** slowly becomes blocked. Since the resistance of the drain-source circuit increases slowly, the current through coil **9** is damped slowly causing the magnetic flux to decrease correspondingly.

Depending upon the particular design, the field-effect transistor may become completely blocked causing the background music to be eliminated completely or, alternatively, it may become only partially blocked (high resistance) thereby causing the background music to be diminished, but not completely eliminated.

If now the portion of the sound track having dominant sound signals has passed the first location, that is, when no dominant sound signals are being sensed by sensing head **4**, relay **7** is de-energized and contact **14** closed. The closure of contact **14** may occur after a delay because of the possible drop-out time of the relay. This drop-out time may be sufficiently large that contacts **14** only close when the portion of sound track having dominant sound signals has also passed the recording head **8**. Capacitor **11** then commences to charge via resistance **13** at a time constant determined by the value of capacitor **11** and resistance **14**. During the charging process, the resistance of the drain-source circuit of field-effect transistor **10** becomes less and less so that the current through coil **9** increases, causing the recorded strength of background sound signals to increase correspondingly. When the charging process of the capacitor is complete, the recording of the background sound signals, which may for example be derived from record player **20**, proceeds at full strength.

In the embodiment of the present invention shown in the drawing, an overlapping of dominant and background sound signals is thus prevented by first making the drop-out time of relay **7** longer than the time required for any given point on the sound track to travel between the first and second location. Thus any sound track portion having dominant sound signals will move past the recording head before the volume of background music again increases. Secondly, the discharge time of capacitor **11** is made smaller or equal to the time required for any point on the sound track to travel from the first to the second location thereby ensuring that the background music is damped prior to the arrival of portions of sound track having dominant sound signals at the recording location. Overlapping of dominant and background sound signals is thus prevented.

Instead of a relay having a determined drop-out time, it is possible to utilize a relay having substantially immediate drop out upon de-energization in conjunction with a charging circuit (resistance **13**, capacitor **11**) whose RC time constant is such that sufficient damping still prevails when the end of the sound track portion carrying dominant sound signals passes the recording location.

The individual portions of sound track having dominant sound signals should exceed individually the distance between the first and second location.

While the invention has been illustrated and described as embodied in particular timing and switching circuits, it is not intended to be limited to the details shown, since various modifications, structural and circuit changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this

invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended:

1. Method for recording dominant and background sound signals on a sound track, comprising, in combination, the steps of first recording said dominant sound signals on predetermined portions of said sound track, in such a manner that said sound track has at least a first and second portion with recorded dominant sound signals separated by at least one further predetermined portion having no recorded signals; subsequently furnishing said background sound signals substantially continuously; converting said so-furnished background sound signals into corresponding electrical signals; scanning said sound track during said furnishing of said background sound signals and following said recording of said dominant sound signals in such a manner that each portion of said sound track is scanned a predetermined time interval prior to the recording on said portion of said electrical signals; furnishing sensed dominant sound signals in response to so-scanned recorded dominant sound signals; decreasing the amplitude of said electrical signals in response to said sensed dominant sound signals, while maintaining the amplitude of said electrical signals in the absence of said sensed dominant sound signals; and continuously recording said electrical signals, whereby said background sound signals are damped for portions of said sound track having recorded dominant sound signals.

2. Arrangement for recording background sound signals on a sound track having predetermined portions with dominant sound signals recorded thereon and further predetermined portions having no signals recorded thereon, comprising, in combination, transport means transporting said sound track along a predetermined path past a first location and a second location following said first location in the direction of movement of said sound track; sensing means located at said first location in operative proximity to said sound track for furnishing electrical sensed dominant sound signals in response to said recorded dominant sound signals; means for furnishing background sound signals and transducing said background sound signals into corresponding electrical background signals; damping circuit means for decreasing the amplitude of said electrical background signals upon activation; activating means for activating said damping circuit means in response to said sensed dominant sound signals and for deactivating said damping circuit means in the absence of said sensed dominant sound signals, whereby said damping circuit means furnish damping output signals corresponding to said background sound signals, but having an amplitude varying in dependence upon the absence and presence of said sensed dominant sound signals; and recording means located at said second location for continuously recording said damping output signals on said sound track.

3. An arrangement as set forth in claim **2,** wherein said sound track has a determined length between said first and second locations; and wherein each portion of said sound track having recorded dominant sound signals exceeds in length said determined length.

4. An arrangement as set forth in claim **2,** wherein said activating means comprise a transistor.

5. An arrangement as set forth in claim **2,** wherein said activating means comprise a field-effect transistor.

6. An arrangement as set forth in claim **2,** wherein said activating means comprise switching means having a first state in the presence of said electrical sensed dominant sound signals and a second state in the absence of sensed dominant sound signals.

7. An arrangement as set forth in claim **6,** wherein said recording means comprise a recording head having a coil; and wherein said damping circuit means comprise a field-effect transistor having a drain-source circuit series connected with said coil, and a gate; and timing circuit means interconnecting said gate and said switching means.

8. An arrangement as set forth in claim **7,** wherein said switching means comprise a relay having relay contacts connected to said timing circuit means.

9. An arrangement as set forth in claim **8,** wherein said transport means transports said sound track along said predetermined path at a velocity whereat a determined time interval is required for a given point on said sound track to travel from said first location to said second location; and wherein said relay has a drop-out time at least equal to said determined time interval.

10. An arrangement as set forth in claim **8,** wherein said field-effect transistor is in a conductive condition when said switching means is in said second state.

11. An arrangement as set forth in claim **10,** wherein said timing circuit means comprises a capacitor having a charging time and a discharged time; wherein said transport means transports said sound track along said predetermined path at a velocity whereat a given point on said sound track requires a determined time interval to travel from said first location to said second location; and wherein said determined time interval is less than or equal to said charging and discharge time.

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