United States Patent

[11] 3,617,647

[72] Inventors **Edwin H. Maier**
Catonsville, Md.;
Joseph C. Stettner, Columbus, Ohio; David C. Smith, Baltimore, Md.

[21] Appl. No. **807,255**
[22] Filed **Mar. 14, 1969**
[45] Patented **Nov. 2, 1971**
[73] Assignee **Styles N'Sound Inc.**
Catonsville, Md.

[54] **PLURAL STEREO TAPE AUDIO LEVEL CONTROL SYSTEM FOR MULTIPLE UNITS**
7 Claims, 1 Drawing Fig.

[52] **U.S. Cl.** ..... **179/100.1 C**, 179/1 SW, 179/100.2 S
[51] **Int. Cl.** **G11b 15/06**
[50] **Field of Search** ..... 179/100.1, 100.1 C, 100.1 JC, 1 SW, 1.1, 100.1 PS, 100.2 S, 100.2 NI, 100.3 B, 100.3 D

[56] **References Cited**

UNITED STATES PATENTS

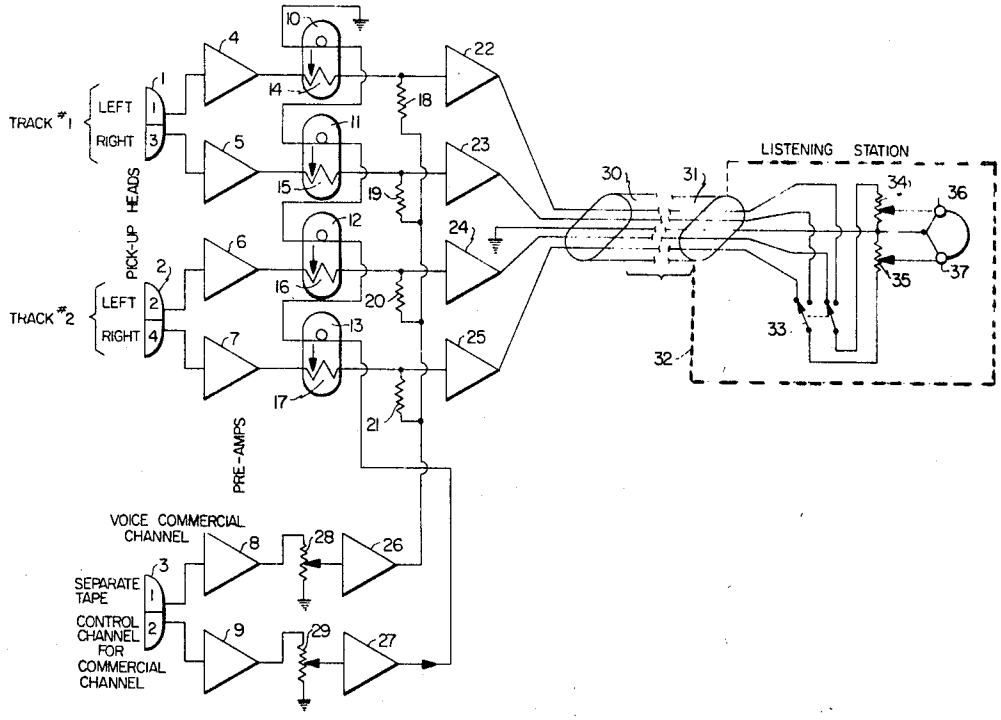
3,166,328	1/1965	Roberts	179/100.2 X
3,207,847	9/1965	Epstein	179/100.1 X
3,218,396	11/1965	Mullin	179/100.1
3,218,620	11/1965	Clunis	179/100.1
3,493,681	2/1970	Richards	179/1

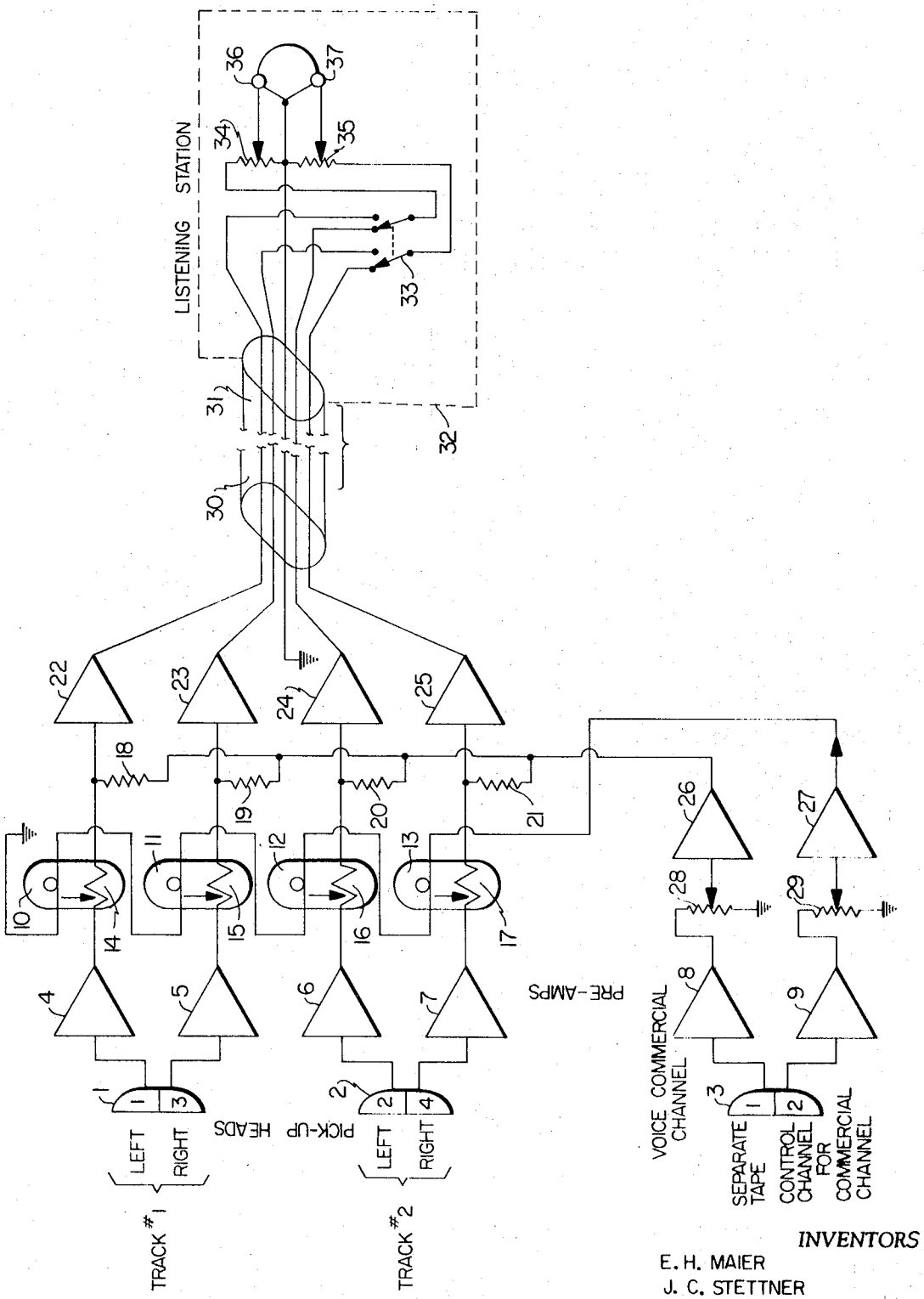
OTHER REFERENCES

Automatic Programming Cuts Broadcasting Costs, Electronics, Oct. 55, pp. 135–137.

Primary Examiner—Bernard Konick
Assistant Examiner—Raymond F. Cardillo, Jr.
Attorney—Wilkinson, Mawhinney & Theibault

ABSTRACT: The system of the present invention produces stereophonically recorded music from one or more entertainment channels to headphones to be individually controlled by the user and worn during captive situations such as under a hairdrier, in a hospital bed or in a transportation vehicle. The system is to reproduce recorded entertainment from a first magnetic tape and to periodically superimpose recorded messages from a separate or second tape into the listening channel by reducing the audio signal on the entertainment channel to give precedence to the recorded message.





INVENTORS
E. H. MAIER
J. C. STETTNER
D. C. SMITH

BY Wilkinson Mawhinney & Theibault
ATTORNEYS

PLURAL STEREO TAPE AUDIO LEVEL CONTROL SYSTEM FOR MULTIPLE UNITS

An object of the present invention is the provision of a two-tape stereo system, one tape for entertainment and the other tape for commercial messages. The first tape is a conventional stereo tape while the second tape contains commercial messages and a carrier signal which controls the audio level of the first tape to reduce its volume level and give precedence to the audio level of the commercial message. The two tapes are in synchronism so that the message may always be timely introduced.

Another object of the present invention is the provision of a system as above described which has been individualized for the recipient, that is, that it be selective as to entertainment channel, audio level and stereo balance desired by the listener and that a plurality of individual listening stations each independent of one another are provided.

A further object of the invention is the provision for getting commercial messages over to captive audiences such as ladies under hairdriers, where they must sit for from 1 to 2 hours. Messages as to other services rendered by the beauty shop or products sold therein can be periodically introduced into their listening of entertainment. This system may also be employed in maternity wards of hospitals to give the mothers-to-be or new mothers hints on child care, care for themselves after childbirth and numerous suggestions of the many products available to assist them in their new world of parenthood.

A further object of the present invention is to provide a stereo system which may be used with transportation systems to not only entertain the passenger while in transit but to advise and prepare the traveller for arrival at his destination by advising what services will be available on arrival such as where to stay, where to dine and what to see.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawing a schematic of one embodiment of the invention is shown.

Referring now to the drawing and for purposes of explanation, a two-channel, four-track music system will be explained. This does not imply that the invention is limited to this configuration only. Pickup heads 1 and 2 operate from the music tape. On the tape, channel one and three are the left and right channels respectively of track one and channels two and four are the left and right respective channels of track two. Preamps 4, 5, 6 and 7 are provided with equalization curves to compensate the recording characteristics of the tape and the pickup heads 1 and 2. The outputs of the preamps 4, 5, 6 and 7 respectively are fed into the photomodulators 14, 15, 16 and 17. These are cadmium sulfide or similar solid-state photosensitive resistance materials which are individually encapsulated with a light source such as 10, 11, 12, and 13. Light source 10 changes the resistance of resistor 14. Light source 11 changes the resistance of resistor 15, and light source 12, changes the resistance of resistor 16 while the light source 13 controls the resistance of resistor 17. In the first music channel, the output of preamp 4 is passed into a voltage divider comprised of light variable resistor 14 and fixed resistor 18. The center of these is the output which is proportional to the conductance of the light variable resistor 14. (That is, it is inversely proportional to the resistance of 14.) The resistance of 14 being controlled by the light source 10. The other channels preamp 5 through light-controlled resistor 15 to resistor 19, preamp 6 through the light-controlled resistor 16 to resistor 20, and preamp 7 through the light-controlled resistor 17 to resistor 21. All operate in a similar manner. The one end of resistors 18, 19, 20 and 21 each are connected commonly to the output of follower amplifier 26, which has an extremely low impedance output. Follower amplifier 26 receives its signal through potentiometer 28 from preamplifier 8. Preamplifier 8 receives its signal from one-half of head 3. This is the voice commercial channel signal from a separate tape, than the tape which supplies heads 1 and 2. Preamp 8 is compensated as are preamps 4, 5, and 7. The second half of head 3 operates from the control channel of the commercial tape. This signal fed through preamp 9 and into potentiometer 29 and then into follower amplifier 27. This signal is normally a sine wave of a given frequency to which preamp 9 is tuned. This signal level is controlled by potentiometer 29 and the signal level activates the light sources 10, 11, 12 and 13 which in turn control resistors 14, 15, 16 and !17. The period of reaction for the resistors 14, 15, 16 and 17 is slow enough that the signal, usually 1 kc. or higher, which controls them is not superimposed upon the audio which they carry. At this point it is obvious that the resistance of the resistor 14 along with resistor 15, 16 and 17 will be inversely proportional to the amount of signal present at the output of amplifier 27. The signal recorded on the tape picked up by the second half of pickup head number 3 is a constant amplitude and controls the gain (overall) of the music system, that is, the input signal into amplifiers 22, 23, 24 and 25 is controlled by the level of the signal on the second half of the pickup head 3 and the signal level delivered to amplifiers 22, 23, 24 and 25 is proportional to the signal level at the second track of head 3. Under normal operating conditions, (tapes in both the music channel and the commercial injection channel) the signal at the output of amplifier 27 will be maximum and constant, thus holding the gain of the overall music channels maximum and constant. Just prior to the appearance of a commercial message on the first half of the tape feeding head 3, the level of the signal on the second half of this tape will drop a previously specified amount and therefore the signal level out of amplifier 27 will drop by a similar amount, thereby causing the gain of the music and the signal level at the input to 22, 23, 24 and 25 to drop accordingly. Following this drop in music level, a commercial message will appear at the head 3, first channel, which will be amplified by preamplifier 8, through potentiometer 28 which is used to set the level of the commercial message, and inserted through follower amplifier 26 into amplifiers 22, 23, 24 and 25 through resistors 18, 19, 20 and 21 respectively. The very low output impedance of follower amplifier 26 will stop any cross coupling through resistor 18, 19, 20 and 21 of channels 1, 2, 3 or 4 into each other. During periods which a commercial message is not present upon the tape, the output of follower amplifier 26 will be zero and essentially equivalent to ground. After the end of the commercial message, the tone level on the second channel of tape head 3 will return to its normal level, the output of amplifier 27 will return to its normal level, and the gain of the music system will return to its previous normal full level. If the machine is attempted to be operated with no tape or the wrong tape, in the commercial channel there will be no signal present at the output of amplifier 27, either because there is no signal at head 3 channel two or because this signal will be at the wrong frequency to pass through the selective network incorporated in preamplifier 9. As a result there will be no voltage on light source !10, 11, 12 and 13; and the resistance of light variable resistors 14, 15, 16 and 17 would be, for all practical purposes, infinite. Therefore, there will be no signal transfer from the output of preamp 4, 5, 6 and 7 into the inputs of amplifiers 22, 23, 24 and 25. Amplifiers 22, 23, 24 and 25 will drive a multiple conductor cable assembly 30–31 which will drive in return several stations similar to that pictured as 32. For the purpose of simplification of illustration only, there is one listening station shown. This is not to imply that there is any particular limit to the number of listening stations which can be incorporated within this invention. As discussed previously, this illustration shows two music channels each consisting of a left and right track. While not limiting the scope of the invention to this particular combination, the listening station shown is illustrative of this particular combination only. Switch number 33 lets the listener select the music channel to which they desire to listen, and potentiometers 34 and 35 individually allow the control and the balance of the level of sound in the headphones 36 and 37. In actual practice, there will be at least as many listening stations as there are listeners, and therefore each listener may select not

only the level and balance that they particularly desire, but also may select from two or more available music channels. Operation of controls on any one listening station will not affect in any way the operation of any of the other listening stations connected to the multiple cable 30–31.

What we claim is:

1. A stereophonic tape reproduction system comprising
   a. a first tape having at least two tracks upon which has been recorded an entertainment program
   b. a second tape upon which is recorded a constant amplitude signal on one track, a commercial message on a second track of said second tape and a drop in the amplitude of said constant amplitude signal on said first track immediately preceding said commercial message on said second track of said second tape
   c. a stereo tape playing means adapted to receive both said tapes simultaneously and having the output gain control of said first tape controlled by the constant amplitude signal on said second tape and means responsive to the amplitude drop in the signal and being in circuit with the output signal of the entertainment program to lower the audio level of the entertainment program to give precedence to the commercial message on said second tape, and
   d. a plurality of stereo headphone units adapted to be coupled to the output of said stereo tape playing means the adjustments of each which is independent of the others.

2. A system as claimed in claim 1 wherein variable resistors are in series with the preamps and amplifiers of the control channel of said second tape to regulate the signal level to activate the light sources in the photoresistors without being imposed upon the audio they carry.

3. A system as claimed in claim 1 wherein said tape playing means comprises
   a. preamps in series with tape heads,
   b. photoresistors coupled to drive audio amplifiers which control audio gain in the entertainment channel
   c. and follower amplifiers in circuit with the output of the commercial message channel and in circuit with the photoresistors to decrease the audio gain in the entertainment channel and permit the audio gain in the commercial message channel to prevail.

4. A system as claimed in claim 3 wherein the preamp in series with the constant frequency control circuit of the second tape is tuned to a sine wave of a given frequency.

5. A system as claimed in claim 3 wherein the signal at the output of the amplifier in series with the control track circuit of the second tape is constant to hold the gain of the overall music channels maximum and constant until the lower level of the control signal causes a lowering of the overall gain of the entertainment channel.

6. A system as claimed in claim 3 wherein a potentiometer is in series between the preamp and amplifier of the commercial message track tape circuit to set the level of the commercial message.

7. A stereo entertainment and commercial system comprising
   a. one or more entertainment channels the audio output circuit of each of which includes a photoresistor in series therewith
   b. a second channel for commercial messages resistively coupled to each entertainment channel and comprising voltage dividing networks coupled with the photoresistors in the output circuits of the entertainment channels.

* * * * *