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[72] Inventor **Maria L. M. Streb**
Rochester, N.Y.

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[73] Assignee **Dewar Products Corp.**
Rochester, N.Y.

[54] **SOUND VIEWER APPARATUS**
8 Claims, 2 Drawing Figs.

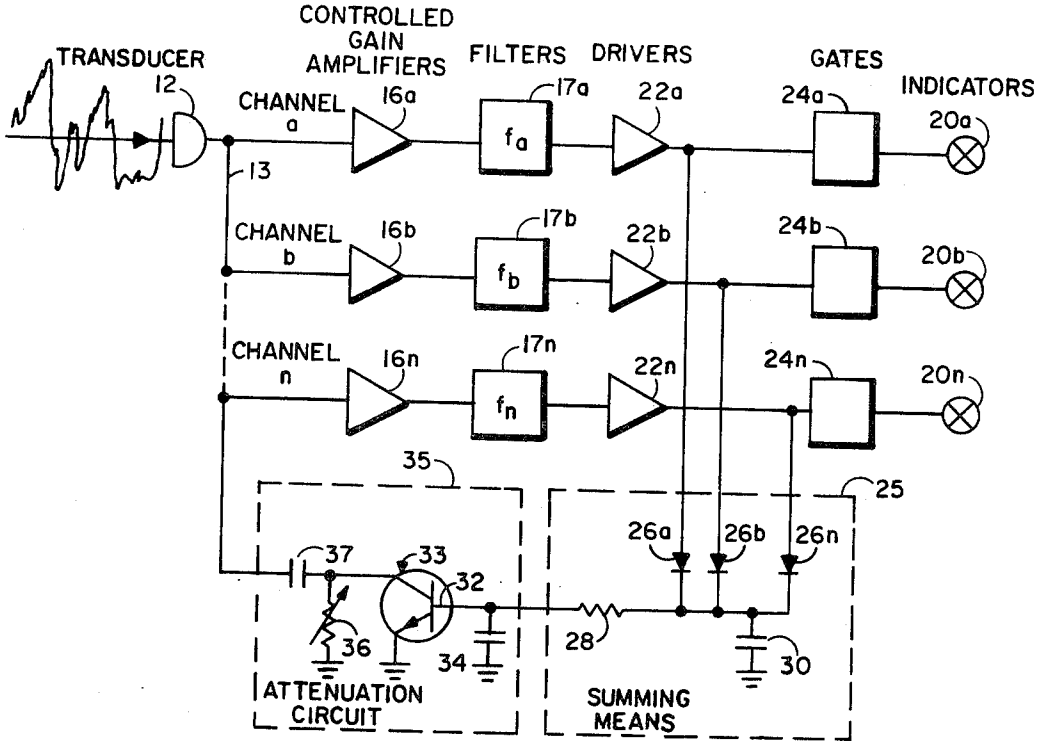
[52] **U.S. Cl.** **340/34,**
340/372, 340/171
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[50] **Field of Search** 340/33, 34

[56] **References Cited**
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Primary Examiner—Thomas B. Habecker
Attorney—Samuel R. Genca

ABSTRACT: A sound viewer apparatus is described, including means for receiving an audio signal and converting it into an electrical signal, at least one amplifier for adjusting the intensity level of the electrical signal; a plurality of filters, each having a bandpass corresponding to the major frequency components of the audio signal produced by a particular device (viz a car engine, train whistle, horn or emergency vehicle siren); indicator means, such as lamps, connected to the output of the filters; and automatic gain control means responsive to the output of each filter for adjusting the electrical signal input to the amplifier for maintaining the input to the indicators at a level whereby the indicator means (lamps) can clearly show, by relative brightness, which type of device produced the audio sound and its relative intensity.



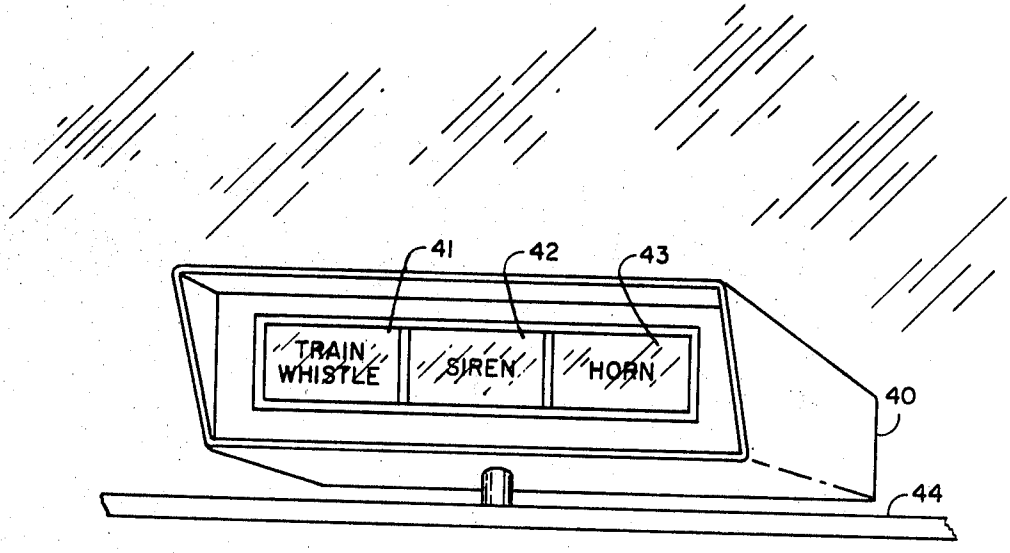


Fig. 1

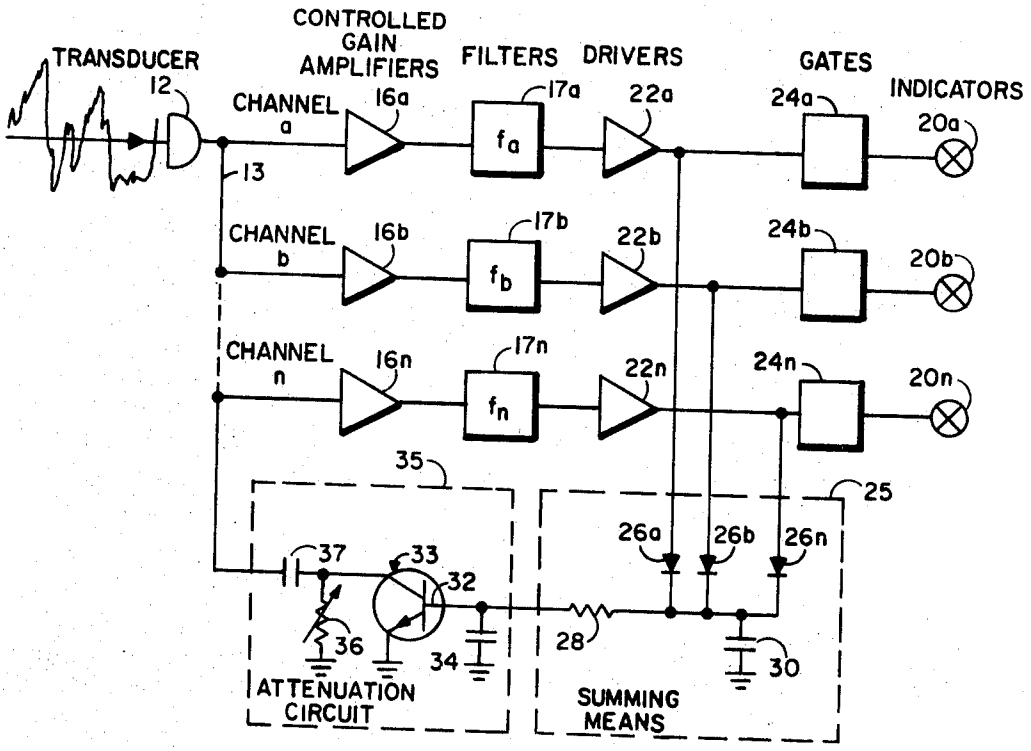


Fig. 2

INVENTOR.
MARIA L. M. STREB

BY Samuel R. Genca
ATTY

SOUND VIEWER APPARATUS

The present invention relates to a sound discriminating apparatus and more particularly to a sound viewer apparatus by which is meant apparatus for monitoring audio signals such as a car engine, train whistle, horn or emergency vehicle siren, and visually indicating which of the signals is being received by the apparatus.

BACKGROUND OF THE INVENTION

The automotive industry has made great strides in improving driver and passenger comfort by insulating the driver and passengers from the effects of weather and outside noise. This is particularly noted in the case of air conditioned vehicles where, from a practical point of view, the car is generally sealed airtight. Although these improvements are laudable, from a comfort point of view, they create a safety hazard in that the driver and passengers may not be able to hear an oncoming train or other vehicles. Obviously, this problem is compounded in the case of hard-of-hearing people, and in fact, may have disastrous consequences at train crossings.

Recently enacted laws make it mandatory for motorcyclists to wear helmets. Thus the cyclist is also faced with the came problem mentioned heretofore. No known devices are available for cyclists to detect warning signals.

In view of the foregoing, it is an object of the present invention to provide a new sound viewer apparatus.

It is another object of the present invention to provide apparatus which detects and indicates the types of ambient audio signals and their relative intensity.

It is still another object of the present invention to provide improved apparatus which permits a driver of an insulated vehicle or a driver with a helmet to see by means of an indicator the ambient noise being produced by devices such as a train, horn, siren, etc.

In accordance with one embodiment of the invention, there is provided a microphone which receives an audio signal and converts it into an electrical signal which in turn, is routed to a plurality of channels. Preferably each channel includes an amplifier, a filter, the band-pass of which corresponds to the major frequency band or signature of a particular audio producing device; and an indicator lamp connected to each filter for indicating which type of device produced the sound and its relative intensity or nearness.

One important feature of this invention is the means for adjusting the intensity of the input signal to the filters so that differences in the relative output, brightness, or intensity of the indicators or lamps may be easily distinguished when several devices simultaneously produce a noise or audio signals.

Other objects and advantages of the present invention will become apparent from the ensuing description of an illustrative embodiment thereof in the course of which reference may be had to the accompanying drawings in which:

FIG. 1 is a perspective view of an indicator means utilized in the sound viewer apparatus of FIG. 2; and

FIG. 2 shows a preferred embodiment of the invention in schematic view receiving an audio signal and visually displaying the signal on the indicator means.

Turning to the drawing, a preferred embodiment of a sound viewer apparatus **10** is shown to include a broad-band transducer **12** such as a microphone, which receives an audio signal and produces an electrical signal having the same or corresponding frequency components found in the audio signal.

The transducer may be mounted on the roof of a vehicle or on the handlebars of a motorcycle. It should be understood that more than one transducer may be placed on the vehicle such as in the front and rear without departing from the invention. The electrical signal is applied as an input signal to a plurality of channels *a—n* by way of a lead **13**. The lead **13** is shown partly in dotted line to indicate that there are a plurality of channels *a—n*, where *n* is the last channel. Each channel *a—n* is similar in construction and includes amplifying means for amplifying the input signal such as corresponding controlled gain amplifiers **16** *a—n*.

It should be understood that the amplifying means may comprise a single amplifier for amplifying the signal instead of *n* number of amplifiers. This of course may be cheaper to make without departing from the invention. The outputs of the amplifiers **16** *a—n* are applied to the input of corresponding filters **17** *a—n* which may be of the passive lumped constant variety in the audio range or of the active-type filters having transistors or the like for passing a particular frequency or pitch signature associated within the band-pass of the corresponding filter. The output of each of the filters **17** *a—n* is applied to corresponding driver amplifiers **22** *a—n* in the channels *a—n* respectively. The output of each of the driver amplifiers **22** *a—n* is applied to corresponding indicators **20** *a—n* through threshold gates **24** *a—n*. The threshold gates **24** *a—n* may be omitted if desired from each of the channels. However, it may be desirable to include the threshold gates **24** *a—n* so that only one of the indicators **20** *a—n* is energized when a signal above a given voltage threshold is gated therethrough.

In accordance with the present invention, the band-pass of each filter **17** *a—n* is selected for a predetermined frequency or pitch signature. For example, the filter **17***a* may have a band-pass for a train whistle (a high frequency band-pass) at a frequency *fa* while the filters **17** *b—n* may have selected band-passes for a horn noise and a siren. It should be noted that some audio signals carry other frequencies and therefore may energize one or more lamps **20** *a—n* with varying intensity.

The lamps **20** *a—n* may be slightly energized due to the fact that some frequency components of a siren *fb* lie in the car horn's frequency signature band *fn*. In order to prevent any ambiguity, the aforesaid threshold gates **24** *a—n* may be coupled between the drivers **22** *a—n* and the lamps **20** *a—n* so that a given signal above a voltage threshold will energize a corresponding one of the lamps **20** *a—n*.

The indicators or lamps **20** *a—n* may be fixed in a housing **40** (FIG. 2) which includes transparent panels **41—43** upon which is engraved the particular frequency upon which corresponding lamps **20** *a—n* are energized as shown in FIG. **1**. The transparent panels **41—43** may be colored if desired to provide ready indication of the warning signal, viz, siren, train whistle, car horn and the like. While only three panels **41—43** are shown, it should be understood, of course, that additional panels corresponding to the lamps **20** *a—n* may be provided. The frame **40** may be mounted on a dashboard **44** of a vehicle or on the handlebars of a motorcycle. The housing **40** may also be mounted within the dashboard of a vehicle in a recess provided therein.

The sound viewer apparatus **10** further includes summing means **25** for summing the voltage output of each of the drivers **22** *a—n*. The summing means **25** includes a plurality of rectifiers or diodes **26** *a—n* which rectifies the output of each of the drivers **22** *a—n* and applies the output of the rectifier **26** *a—n* to a summing resistor **28**. A DC blocking capacitor is provided at **30** between the output of the diodes **26** *a—n* and ground. The rectified output from the summing resistor **28** is applied to the base **32** of a transistor **33** in an attenuator means or circuit **35**. The transistor **33** provides a low impedance gate between the output of the transducer **12** and ground through the lead **13**. A DC blocking capacitor **34** is provided between the base **32** and ground. A variable resistor **36** is connected in parallel with the gating transistor **32** for adjusting the attenuation level of the attenuator circuit **35**. A capacitor **37** is connected in series with the resistor **36** and the transistor **33**.

Different sound producing devices develop characteristic sounds having most of their high intensity frequency components in different pitch or frequency bands. A siren, for example, will produce most of its higher intensity components at a higher frequency than will the noise produced by a running motor, horn or train whistle. Each type of sound emitting device can be thought of as having a frequency or pitch signature associated with some frequency band.

In the operation of the sound viewer apparatus **10**, assuming a siren signal is received by the transducer **12**, the siren signal

is converted into a corresponding electrical signal having a corresponding frequency. The electrical signal is amplified and applied to each of the channels *a—n*. The siren signal passes through the assigned filter **17***b* while all other filters block the signal. The signal is then amplified and passed to the indicator or lamp **20***b*. In response to the signal the lamp **20***b* is energized and panel **42** is illuminated. The signal is also rectified by the diode **26***b* and the output is applied to the summing resistor **28** and then to the base **32** of the transistor **33** in the attenuator circuit **35**. If the rectified signal has a high DC potential or is higher than a reference voltage, the normally closed or back-biased transistor **33** is turned on to provide a low impedance circuit between the transducer **12** and ground to thus decrease the signal output of the transducer. This is particularly important since some received signals may carry frequencies which may be passed by the other filters **17** *a—n* and thus energize some of the lamps **20** *a—n* to a lesser degree. By summing the DC output of the filters **17** *a—n* in the means **25** and applying the summed output to the attenuator circuit **35**, the relative intensity of the lamps **20** *a—n* is maintained even for a very strong signal which may have different frequency components since part of the signal is shunted to ground by the transistor **33**. By maintaining the relative strength of the signal by the means **25** and attenuator circuit **35**, the threshold gates may thus pass only the desired highest strength signals from the filters **17** *a—n* and thus only those signals above a given voltage level will energize the lamps **20** *a—n*. The sound viewer apparatus also operates in the same manner for other received signals viz the train whistle and horn described herein.

While there has been shown and described what is considered at present to be the preferred embodiment of the invention, modifications thereto will readily occur to those skilled in the art. For example, the indicators **20** *a—n* may be other alarm devices such as horns instead of lamps or may in fact be a combination of both. It is not desired, therefore, that the invention be limited to the embodiment shown and described, and it is intended to cover in the appended claims all such modifications as fall within the true spirit and scope of the invention.

I claim:

1. A sound apparatus for a vehicle for visually warning the presence of *n* different audio signals each of which have at least a particular frequency characteristic of a sound producing device comprising:

a. a transducer means for converting said *n* different audio signals into corresponding electrical signal voltages having the same corresponding frequencies as said audio signals;

b. filter means having *n* different filters each having a predetermined band-pass for passing only those electrical signal voltages having a frequency lying within said predetermined band-pass therethrough;

c. a plurality of corresponding *n* indicator means coupled to said *n* different filters for visually indicating the passage of said electrical signal voltages therethrough so that the presence of said audio signals is visually indicated thereby;

d. summing means connected to each of said *n* different filters for deriving a rectified signal voltage which is a function of the sum of said corresponding electrical signal voltages passed by said *n* different filters; and

e. attenuation means connected between said transducer means and said summing means for attenuating said corresponding electrical signal voltages when said rectified signal voltage is higher than a given reference voltage.

2. The invention defined in claim **1** wherein said attenuation means includes variable resistor means for selectively varying said reference voltage.

3. The invention defined in claim **1** wherein said attenuation means includes a transistor having a base electrode connected to said summing means for providing a low impedance switch between said transducer means and ground.

4. The invention defined in claim **1** wherein said attenuation means includes a transistor connected between ground and said transducer means for attenuating said corresponding electrical signal voltages to said indicator means in the same ratio as received by said transducer.

5. The invention defined in claim **1** wherein said filters are active band-pass filters.

6. The invention defined in claim **1** wherein said transducer means is a microphone mounted on said vehicle for receiving said audio signals outside of said vehicle.

7. The invention defined in claim **1** further including a plurality of *n* gating means each connected between a corresponding one of said filters and a corresponding one of said indicating means for passing only said electrical signal voltages above a given voltage level.

8. The invention defined in claim **1** wherein said summing means includes diodes means connected to said filter means and a summing resistor connected to said attenuation means for adjusting the intensity of said output signal voltages from said transducer means.