Nov. 1, 1949 R. W. STANMYRE 2,486,890

DECIBELOSCOPE

Filed May 25, 1946 2 Sheets-Sheet 1

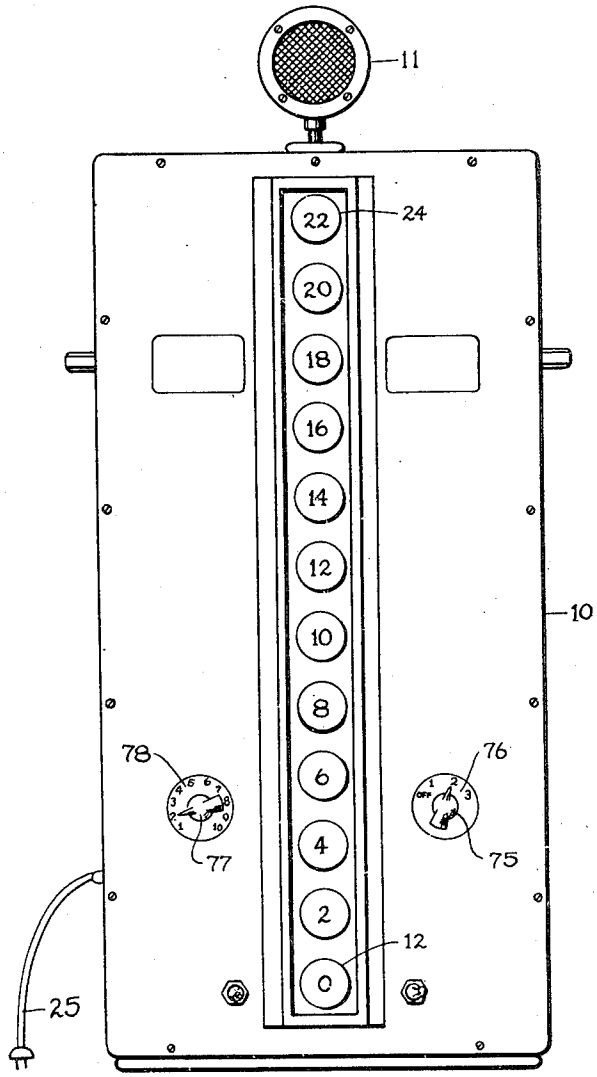


FIG.-1

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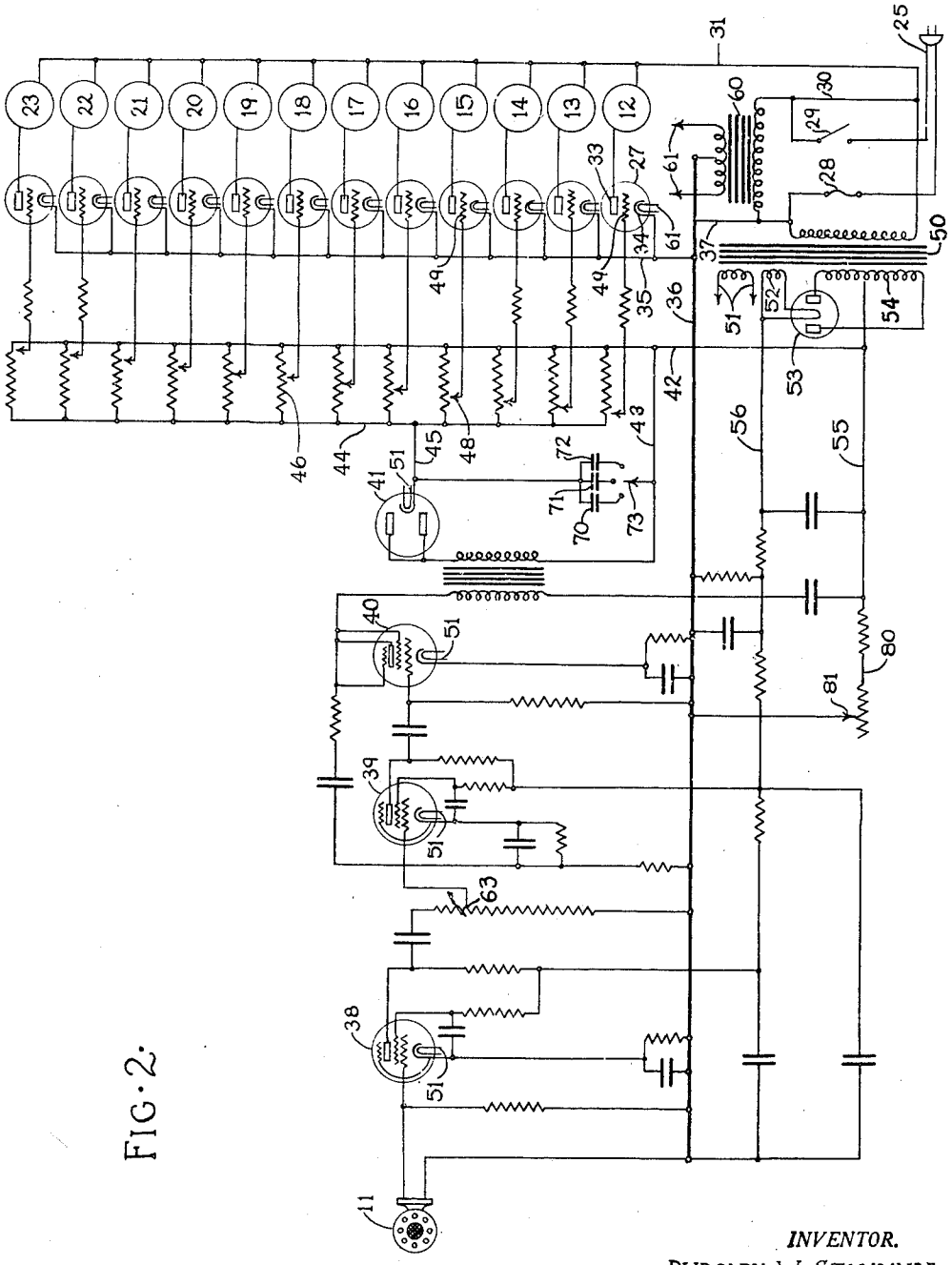


FIG. 2.

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DECIBELOSCOPE

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Application May 25, 1946, Serial No. 672,222

1 Claim. (Cl. 177—311)

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This invention has to do with a device for visually indicating the volume or intensity, of sound, and which I refer to as a decibeloscope.

The invention has as an object, a device which is operable to give a clear visual indication of the volume of sounds, and which embodies a structure which is economical to manufacture and which is particularly simple and convenient to operate.

The device has many uses such, for example, as continuously indicating to a student of elocution, or a speaker, the volume, or intensity, of his voice. In this respect, it is particularly helpful to deaf persons who have extremely great difficulty in properly controlling the volume of their speech.

The invention consists in the novel features and in the combinations and constructions hereinafter set forth and claimed.

In describing this invention, reference is made to the accompanying drawings in which like characters designate corresponding parts in all the views.

Figure 1 is a front, elevational view of a device embodying my invention.

Figure 2 is a schematic wiring diagram illustrating the arrangement and connection of the various elements of the device.

The device consists generally of a series of incandescent lamps, a microphone into which the sound waves are directed, and means connected in circuit with the microphone, and operable to energize the incandescent lamps progressively from one end of the series toward the opposite end thereof, as the volume of the sound, directed into the microphone, increases or decreases. That is, as the volume of the sound increases, the incandescent lamps are lighted progressively, whereupon anyone within visual range of the device is informed as to the volume of the sound.

Preferably, the device is constructed in the form of a cabinet 10. The microphone 11 may be attached in, or to, the cabinet, or located at any suitable place, or the microphone of a public address system, or the like, may be used. The series of incandescent lamps 12 to 23 are arranged preferably in a vertically extending row in the front wall of the cabinet. A lead 25 is provided for connecting the device to an ordinary convenience outlet. With this arrangement, the device is compact and self-contained, and the only connection necessary to be made is to the power supply by plugging in the lead 25.

As previously stated, the device includes mechanism for progressively connecting the incandescent lamps 12—23 to the power supply. That is, each lamp is energized by a sound intensity, one or more decibels higher than the one below it. As illustrated in the drawings, this is brought about by the use of a thyratron tube 27 associated with each of the incandescent lamps. The common side of the lead 25 is connected to a fuse 28, and the hot side to a main operating switch 29. This switch is connected to a wire 30 which, in turn, is connected to one side of all the incandescent lamps through wire 31. The opposite side of each of the lamps is connected to the plate 33 of the respective tubes 27. The cathodes 34 of the tubes 27 are connected to the wire 35, and to the fuse 28 through wires 36, 37.

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The thyratron tubes 27 act in the nature of switches to connect and disconnect the lamps 12 to 23, respectively, to the power supply. The tubes are caused to so function by amplifying the output signal of the microphone 11 through a three stage amplifier including the amplifying tubes 38, 39 and 40. The output of the final stage is rectified by the tube 41, one side of this tube being connected to a wire 42, through wire 43, and the opposite side of the tube is connected to a wire 44, through wire 45. A series of voltage dividers 46 are connected across the wires 42, 44, and the movable contacts 48 thereof are connected respectively to the grids 49 of the tubes 27.

The voltage divider 46, connected to the grid of tube 27 controlling the incandescent lamp positioned at one end of the series of lamps, such as the lamp 12 at the bottom of the row, is adjusted so that the full voltage, or nearly full voltage, impressed upon the wires 42, 44, is applied to the grid of that tube 27, and the movable contacts of the other dividers are adjusted so that the voltage applied to the grids 49 of the tubes 27 is progressively reduced so that the grid voltage of the thyratron controlling the top lamp 23 is the least.

With this arrangement, it will be apparent that when a tube 27 is excited by the rectified signal voltages as furnished by the microphone and amplifier, the tube is made conductive and the lamp 12—23, connected in the plate circuit of that tube, is energized and as the intensity, or volume, of the sound waves directed into the microphone 11 is increased, the series of lamps 12—23 will be lighted progressively from the bottom to the top.

The device is provided with a power supply transformer 50 having taps 51 to supply current to the heaters of the amplifying tubes 38, 39, 40, and rectifying tube 41, a winding 52 to supply filament current to a rectifier 53, and a winding

64 for one side 55 of the D. C. amplifier supply 55, 56.

A transformer 60 is also provided to energize the heaters of the tubes 27 by the secondary leads 61.

The circuit and arrangement of the amplifying unit, including the tubes 38, 39, 40, is of conventional design and it is not believed necessary to explain that portion of the circuit in detail. Attention is called to the variable gain control 63 connected in the plate circuit of the amplifying tube 38.

The function of the variable gain control 63 is to initially adjust the device for proper operation in any particular situation. For example, if the device is being used to inform a speaker as to the volume of his voice in a small room, the gain control 63 is adjusted so that the series of lamps 12—23 will properly indicate the range of volume for that situation. That is, the gain control would be adjusted to reduce the current supplied to the second amplifying tube 39. If the device, on the other hand, is being so used in a large hall, or auditorium, where the microphone is located a greater distance from the speaker, the gain control is adjusted to increase the current to the second stage of amplification and accordingly, that which is impressed upon the line 42—44. There are also instances where it is desirable to initially adjust the gain control to make the device less sensitive, in order to eliminate the influence of outside sounds, such as street noises, etc.

The voltage dividers 46 are adjusted so that each of the lamps 12—23 will be illuminated progressively by an increase in sound volume, or intensity, of one or more decibels higher than the one below it. I have found that when the device is used as a volume indicator for speech, the setting of the voltage dividers in steps of two decibels is satisfactory. Accordingly, when sound of a given volume is directed into the microphone 11, and the gain control 63 is properly adjusted, the lowermost lamp 12 will be energized through the tube 27 which is tripped by the positive voltage produced by the rectifier tube 41, as previously explained. Each increase of two decibels in the volume of the sound, the tubes 27 will be successively and progressively tripped and accordingly, the lamps 12—24 will likewise be progressively energized and with a sound of given volume, all of the lamps will be simultaneously energized up to and including the lamp controlled by the tube 27 tripped by the voltage impressed thereon by that sound signal, and it will be apparent that if the volume of sound is decreased, the indicating lamps will be progressively deenergized, whereby the lamps are progressively energized and deenergized directly in proportion to the rise and fall of the volume of the sound directed into the microphone.

It will be observed that since the tubes 27 have alternating current supply in their plate circuits, they are automatically and substantially instantaneously restored to a non-conducting condition when the grid excitation is removed. When the device is used to indicate sound volume which fluctuates rapidly, such as speech, the duration of the peak of the sound intensity is rather short for proper visual indication. This duration may be varied by selecting one of a plurality of condensers, such as 70, 71, 72, shunted across the output of the rectifying tube 41. These condensers are of different capacity, and the greater the capacity, the greater the damping effect. The condensers are selectively connected in a circuit by a movable contact 73 which is operated by a knob 75 arranged on the face of the cabinet 10.

A dial 76 is provided to indicate the condenser selected. Preferably, the condenser of greatest capacity has a capacity which will provide a time factor of about one and one-half seconds. With this time lag, the device disregards peaks entirely and reads mean values. The condenser of least capacity is such as to provide a substantially instantaneous indication, and the intermediate condenser, or condensers having capacity somewhere between the end condensers of high and low capacity.

The variable contact of the adjustable gain control 63 is operated by a knob 77 also available on the face of the cabinet, and a dial 78 is provided to indicate the setting of the contact. Preferably, the dial 78 is graduated so that the movable contact of the gain control can be adjusted in steps equivalent to two decibels each. It has been found that this arrangement gives an effective adjustment for the device when it is used for a voice volume indicator. However, it is apparent that adjustments of any magnitude can be effected for any particular use to which the device may be put.

Sufficient bias is taken from the amplifier power supply 55, 56, and applied to the grids of the tubes 27 to make certain that the tubes will be normally non-conducting. A load resistor 80 is provided with a movable contact 81 connected to the ground support 36. By adjusting the movable contact 81, the negative bias to the tubes 27 can be adjusted so that the tubes cut off sharply when no current is supplied to the grids of the tubes from the circuit 42, 44. This adjustment is in the nature of an initial adjustment made when the tubes 27 are installed, or when any one or more of the tubes are replaced, as will be well understood by those familiar with the art.

What I claim is:

A decibeloscope for visually indicating sound volume comprising a plurality of electric lamps arranged in a vertical row, a power supply for energizing said lamps, a microphone, inertia free means connected in circuit with said microphone and operable to progressively connect said lamps to said power supply in proportion to the volume of the sound directed into said microphone, and means adjustable to control the duration said respective lamps are connected to the power supply after the sound volume has decreased.

RUDOLPH W. STANMYRE.

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