

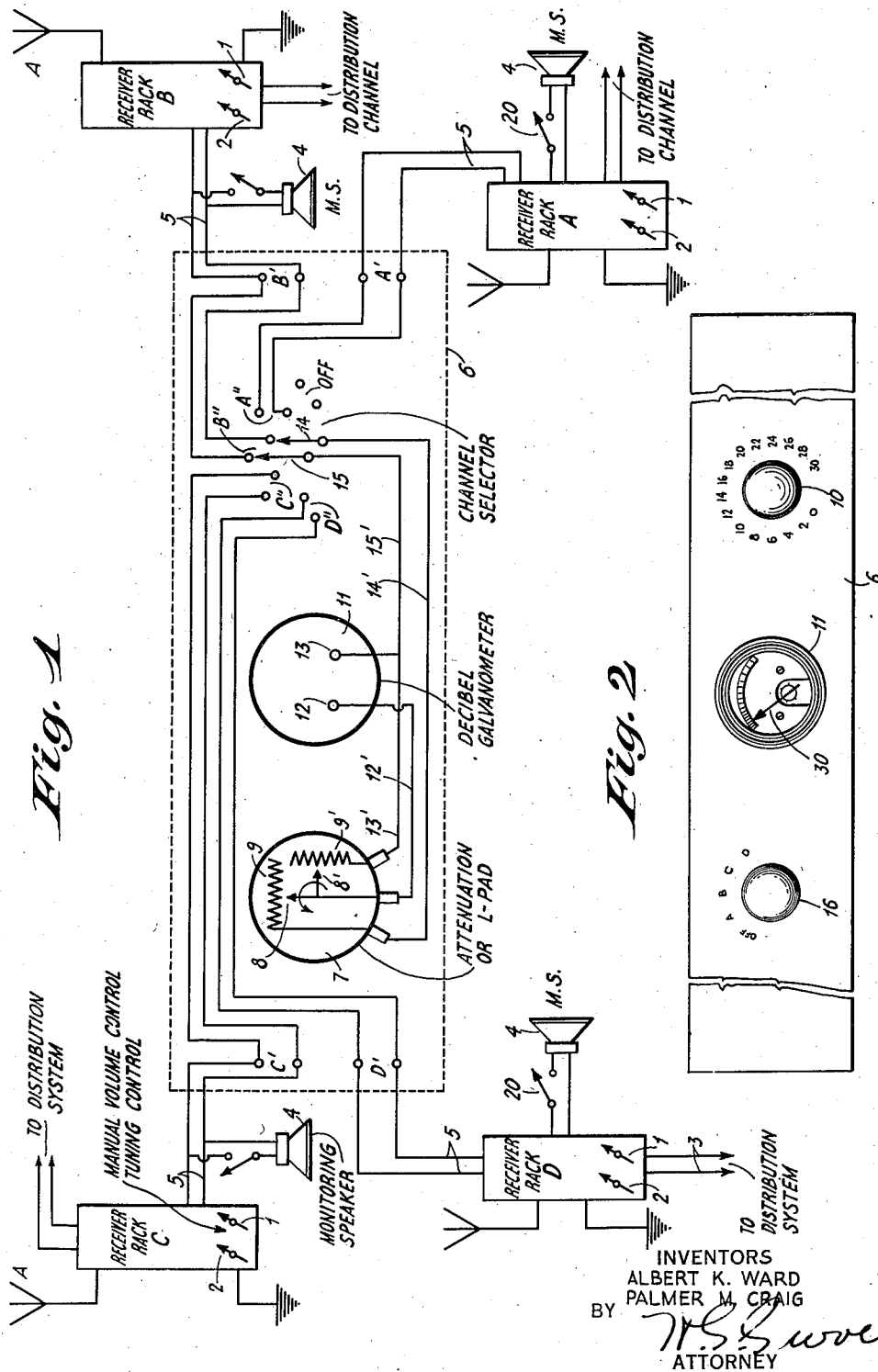
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VISUAL VOLUME CONTROL

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VISUAL VOLUME CONTROL

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The present invention relates to visual volume indicators, and more particularly to a volume indicator device adapted for use in connection with centralized radio systems.

One of the main objects of the present invention is to provide a device for use where it is desired to visually determine the volume level of the output of a channel rack, or a number of channel racks of a centralized radio distribution system.

Another important object of our present invention is to provide a unit for monitoring a plurality of centralized radio channels, the unit including means for adjusting and indicating the volume level of each of the channels.

Another object of the present invention is to provide a channel selector, a variable resistor, and a volume level indicator on a single panel for use in conjunction with one or more centralized radio system channels whereby the volume levels of the channels may be monitored and adjusted to the same level if desired.

Still other objects of the present invention are to improve generally the simplicity and efficiency of volume monitoring devices, and to particularly provide a visual volume control and indicator for a centralized radio system which is not only durable and reliable in operation, but economically manufactured and installed in centralized radio systems.

The novel features which we believe to be characteristic of our invention are set forth in particularity in the appended claims, the invention itself, however, as to both its organization and method of operation will best be understood by reference to the following description taken in connection with the drawing in which we have indicated diagrammatically one arrangement whereby our invention may be carried into effect.

In the drawing,

Fig. 1 shows a schematic diagram of a centralized radio system employing the present invention,

Fig. 2 shows the appearance of the front of the panel unit embodying the devices of the present invention.

Referring now to the accompanying drawing wherein like reference characters in the two figures designate similar elements, Fig. 1 schematically shows a centralized radio system, wherein audio frequency signal energy is distributed over a common distribution system to different reproducers located in a habitable structure, such as an apartment house, hotel, hospital, train, ship or the like. Such centralized radio systems are

well known to those skilled in the art and may be of the type, for example, disclosed by Arthur F. Van Dyck in Patent No. 1,968,546, granted July 31, 1934, embodying one or more of the independent channel receivers. Thus, in Fig. 1 there is shown in conventional manner four receiver channel racks A, B, C, D.

Each of these racks is shown connected to a grounded antenna system, and those skilled in the art are well acquainted with the fact that each rack includes a plurality of such panels, one of the panels carrying a radio receiver, another one supporting a power amplifier and power supply circuit, and a third panel usually carrying a monitoring speaker. Each rack may, additionally, comprise other auxiliary devices but it is not necessary for the purpose of the present invention to explain the nature of such devices in detail in so far as they are clearly disclosed in the aforementioned Van Dyck patent.

However, each rack is shown as containing a pair of control devices which are essential to the operation of each channel. One of these control devices 1 is the manual volume control instrumentality of the receiver, while the other device 2 is the tuning control. Those skilled in the art will understand that the manual volume control may be any variable transmission device in the receiver circuit, as for example in the input to the second detector or in the electrode leads of any of the amplifier tubes. Furthermore, the tuning control is preferably the conventional and well known variable gang condenser of one or more tuned radio frequency amplifier stages; or the tunable input circuits of the radio frequency amplifier, a local oscillator and first detector circuits of a superheterodyne receiver. However, since the construction of the volume control instrumentality and the tuning control device is not a part of the present invention, it is believed sufficient to represent these two instrumentalities 1 and 2 in the conventional manner shown in Fig. 1.

Each receiver rack includes connections 3 adapted to be coupled to the distribution network of the centralized radio system, the network terminating in a plurality of reproducers located at spaced points, it being well understood by those skilled in the art that at each reproducer there will be provided a channel selector switch for selecting for reproduction the audio frequency energy impressed on the distributing network from the output of any of the channels A, B, C and D. Since this construction of the distribution network and terminating reproducers is not a part

of the present invention it is omitted, reference being made to the above-named Van Dyck patent for a complete description of such construction.

As stated heretofore each receiver rack is provided with a monitoring speaker 4. The speaker is connected across a pair of conductors 5, as shown in the case of channel racks C and B, or the speaker may be connected to the receiver output of each rack independently of the conductors 5, as shown in the case of channel racks A and D. In any case, each pair of conductors 5 from each channel receiver rack is connected to a pair of independent terminals disposed on the visual volume indicator panel 6. Thus, in Fig. 1 each pair of terminals on the panel 6 is designated by a reference letter corresponding to the designation letter of the channel rack to which such a pair of terminals is connected.

The panel 6 has provided on it three independent devices, one of these devices consisting of an attenuation, or L-pad, 7 which includes a pair of sliders 8, 8', the slider 8' being arranged to slide over the resistor 9' and slider 8 over the resistor 9. In Fig. 2, which shows the front of the visual volume indicator panel, the knob 10 is to be understood as being mechanically connected to the sliders 8, 8', the arrow shown in Fig. 1 designating the fact that the sliders 8, 8' are movable by knob 10. It will be noted that in Fig. 2 a plurality of numbers ranging from 0 to 30 are arranged in a circle about the knob 10, the numbers differing by two. The purpose of these numbers will be explained at a later point.

The second device on the panel 6 is a decibel galvanometer 11, Fig. 2 showing the appearance of the front of the galvanometer. One terminal 12 of the galvanometer 11 is connected by a lead 12' to the junction of sliders 8, 8', while the other terminal 13 of the galvanometer is connected by a lead 13' to one side of the resistor 9'. The galvanometer is a well known type of copper oxide rectifier volume meter having a 5000 ohm series resistance. That is, it presents a 5000 ohm resistive load to the L-pad 7. It has a full scale deflection of 3.37 volts; and an approximate half scale deflection of 1.2 volts.

The L-pad is a constantly variable resistance pad with two arms, one in series with the line and the other shunted across the line. When terminated with a 5000 ohm load, the pad presents a constant impedance to the line. The attenuation of this pad is linear so that it can be calibrated directly in decibels. These attenuation effects (0 to 30 db.) are engraved directly on the panel 6 around the knob 10. We have arbitrarily taken 1.2 volts across the 240 ohm level of the power amplifier as the zero level of the meter 11. From this point, the meter was calibrated from -15 db. to +9 db. As the L-pad is designed for 30 db. attenuation, the total range of the instrument is from -15 db. to +39 db.

The third device provided on the panel 6 is a channel selector switch comprising a pair of arms 14, 15, the arm 14 being connected by a lead 14' to one side of the resistor 9, while the other arm 15 is connected by a lead 15' to the lead 13' and terminal 13 of the meter 11. In Fig. 2 the knob 16 of the channel selector switch is shown, and it is to be understood that this knob is mechanically coupled to the arms 14, 15 for actuation thereof. The channel selector switch is a standard two gang selector switch connected so that any of the four channels can be monitored. An "off" position is also provided.

Thus, the conductors 5 from the channel rack

A are connected to the terminals A', these two terminals being connected in turn to a pair of contacts A''. Of course, when the arms 15, 14 are connected to contacts A'', and the switch 20 connected to the monitoring speaker 4 is closed, then the channel rack A may be monitored. Similarly, the contacts B'' are connected to the terminals B' which are in turn connected to the leads 5 from the channel rack B; contacts C'' are connected to the channel rack C through the terminals C'; and contacts D'' are connected through terminals D' to the channel rack D.

It will be noted that in Fig. 2 there are disposed in an arc around the channel selector knob 16, the designations "off"; "A"; "B"; "C"; "D". These designations enable the operator to position knob 16 in the various positions of arms 14, 15 shown in Fig. 1. The unit which comprises the panel 6, and the three independent devices, is for use where it is desired to visually determine the volume level of the output of one or more channel racks. The complete unit is mounted on a standard 3½ inch rack panel, and preferably consists of the three devices described, i. e. a channel selector switch; an L-pad control and a decibel galvanometer.

In operating this visual volume indicator unit extreme care should be taken as the meter 11 follows the voltage peaks, and on a heavy surge is liable to swing off scale. A continuous repetition of this may cause serious trouble with the meter, although it is of very rugged construction. In operating this unit, the following procedure should be followed.

First, the selector switch is turned to the "off" position, and the L-pad control brought to zero. Then, the volume level of one channel should be brought up to desired room level by actual listening test. This is done by closing the monitoring switch 20, and adjusting the manual volume control 1 until the monitoring speaker 4 gives the desired volume level. When this level is determined, the channel selector knob 16 is turned to the panel designation on which the level has been set by ear. The L-pad, or attenuation control, is then turned up until the meter pointer 30, shown on Fig. 2, swings near the center of the scale on the voltage peaks. The amplitude of these swings should be carefully noted as they will be the determining feature in checking the volume level at all times.

The position of the attenuation control knob 10 should also be noted as it will always remain constant after its setting is once determined for a given swing of the meter. For adjusting the level of the remaining channels, the receiver volume control should be reduced to zero. The selector switch should then be turned to the desired channel leaving the attenuator control in the position determined heretofore. The receiver volume control 1 should then be brought up slowly until the meter has the same amplitude of swing on the voltage peaks as in the previous adjustment. This procedure can be followed for the remaining channels. It is to be further noted that by reason of the meter 11 being calibrated in decibels, the loudness of the sound on a given channel may be directly compared for different settings of the receiver volume control 1. For example, if the pointer of meter 11 reads 1 division with a given setting of control 1, let the loudness of sound emitted by speaker 4 be called unity loudness. If control 1 is now adjusted until pointer 30 reads 2 divisions, the loudness of sound will be twice unity or twice the initial loud-

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ness. If control 1 be further adjusted until pointer 30 reads 4 divisions, the sound loudness will be four times unity or four times the initial loudness.

5 The arrangement further permits the loudness of sound of one rack being directly compared with that of another. For example, with the control knob 10 set in a given position and the meter 11 connected to channel rack A, suppose the meter 11 reads two divisions or two decibels. If
10 now, knob 16 is adjusted to connect channel rack B and the meter reading is 4 divisions of the scale, we know at once without any involved computations, that the loudness of the speaker of
15 rack B is twice that of the speaker of rack A.

It is to be particularly noted that the two important features in monitoring the output level by this visual means are:

- (1) The determination of the fixed position
20 of the attenuator control; and
- (2) The amplitude of the meter swing.

With these two variables determined, the volume may be readjusted to the first determined level at any time.

25 While we have indicated and described one arrangement for carrying our invention into effect, it will be apparent to one skilled in the art that our invention is by no means limited to the particular organization shown and described, but
30 that many modifications may be made without departing from the scope of our invention as set forth in the appended claims.

What is claimed is:

1. In combination with a plurality of central-
35 ized radio channels tuned to different signal frequencies, a visual volume monitoring and indicator unit, said unit comprising a plurality of pairs of contacts, each pair of contacts being connected to a different one of said channels, a pair
40 of adjustable selector arms arranged to be connected to each of said pairs, a constantly variable resistance pad including two adjustable arms

connected to said selector arms, and a galvanometer connected in shunt with one of said arms.

2. In an indicating device, the combination of
5 a plurality of radio receivers tuned to different incoming signal frequencies, each said receiver having a pair of output leads, a panel, a plurality of pairs of contacts mounted on said panel each of said pairs of contacts being connected to the
10 output leads of a different one of said receivers, a pair of adjustable selector arms mounted on said panel and arranged to be connected to each of said pairs of contacts, means for operating
15 said selector arms simultaneously, a constantly variable resistance pad including two adjustable arms mounted on said panel, a knob mounted in front of said panel and connected to said arms,
20 leads connecting said selector arms to the terminals of said resistance pad, a galvanometer mounted on said panel and having two terminals, a connection between one of said terminals and
25 one end of said resistance pad and a connection between the other of said galvanometer terminals and the adjustable arms of said resistance pad.

3. In combination, a plurality of radio receivers
25 each tuned to a different signal frequency, a loudspeaker connected to the output circuit of each of said receivers and means to provide a visual indication of the sound output of said
30 speakers, comprising a pair of contacts connected to the terminals of each of said speakers, a pair of movable switch members arranged to be moved into engagement with either of said pairs of contacts and a galvanometer having its terminals
35 connected to said movable switch members, said galvanometer being provided with a scale graduated in decibels whereby the sound output of the respective speakers is directly proportional to the corresponding galvanometer readings.

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