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DEMODULATING DETECTOR CIRCUIT ARRANGEMENT

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Fig. 1

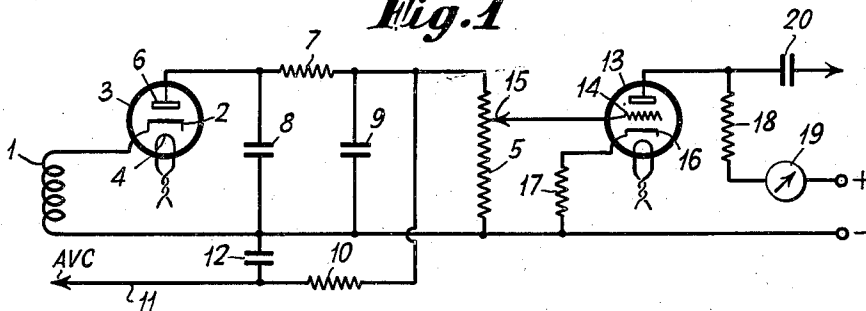


Fig. 2

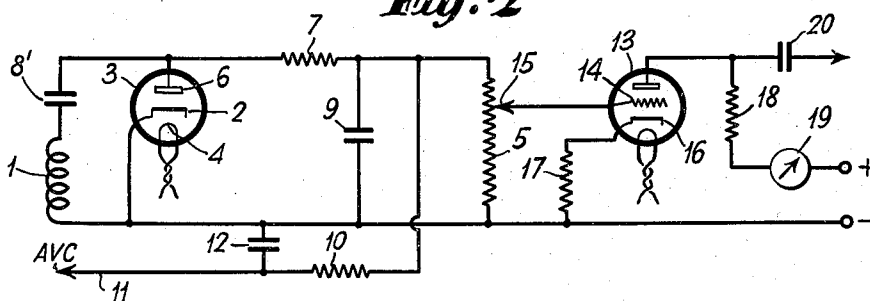


Fig. 3

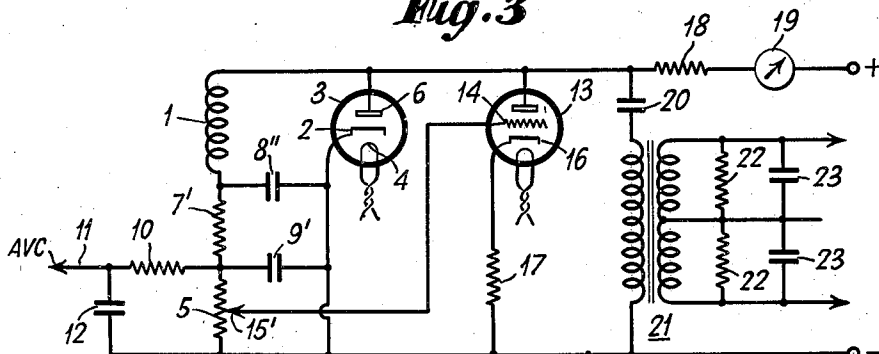
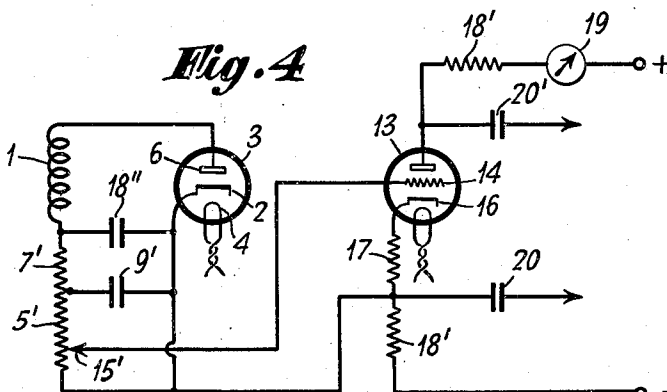


Fig. 4



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DEMODULATING DETECTOR CIRCUIT
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2 Claims. (Cl. 250—27)

This invention relates to demodulating detector circuit arrangements and more particularly to such arrangements of the diode type. The main object of the invention is to provide simple demodulating detector circuit arrangements of the diode type which shall be of improved fidelity as compared to the usual known arrangements of the type in question.

It is usual practice at the present time in radio receivers and the like having demodulating detectors of the diode type to couple the first low-frequency amplifier valve to the preceding detector by means of a condenser-resistance network. This network has been found to be a source of distortion because, by reason of its presence, the A. C. and D. C. loads on the diode are not equal and also because it introduces substantial damping into the detector.

According to this invention a demodulating detector circuit arrangement of the diode type is characterised by the omission of the hitherto usual condenser-resistance output coupling network, the detector output being taken direct from a resistive network in which the detector device is included in series.

The invention is illustrated in the accompanying diagrammatic drawing.

Figs. 1-4 disclose different species of the invention.

Referring to Figure 1 which shows one embodiment of the invention very suitable for use in a so-called "straight" radio receiver where the input circuit is usually earthed on one side, modulated carrier wave energy to be detected is fed from a source not shown to a coupling coil 1 (usually tuned by a parallel condenser, not shown) which is connected at one end to the cathode 2 of a diode 3—for example, as shown, a diode whose cathode is indirectly heated by a heater 4—and is connected at the other end through an output potentiometer resistance 5 to the anode 6 of the diode. Preferably a high frequency filter is included in the diode circuit; for example, as shown in Figure 1, a filter resistance 7 (or a choke) may be inserted in series between the anode 6 and the adjacent end of the potentiometer resistance 5 and condensers 8, 9, connected between the coupling coil end of the potentiometer resistance 5 and the two ends of the filter resistance or choke, as the case may be. Where the diode is also required to provide uni-directional voltage for automatic volume control, this voltage may be taken off as shown from the diode anode end of the potentiometer resistance 5 through a resistance 10 (which should be as high

as possible to avoid increasing damping and distortion) to an AVC lead 11, which may be bypassed to the coupling coil end of the potentiometer resistance 5 through a by-pass condenser 12. The valve 13 of the succeeding low frequency stage has its input grid 14 connected to a tap 15 upon the potentiometer resistance 5. This tap may be manually adjustable for volume control purposes. The cathode 16 of the valve 13 is connected to the coupling coil end of the potentiometer resistance 5 through an auto-bias resistance 17 (which may be of smaller value than at present customary) through which a small negative bias may be applied to the said valve grid. If this cathode resistance is not shunted by a by-pass condenser, it will introduce negative feed back and thus exercise a rectilinearising effect in the low frequency valve input circuit. The anode circuit of the low frequency valve may contain in series with a resistance 18 a meter 19 and, for a given valve and an assumed modulation percentage, this meter may be directly calibrated to read watts output to the loudspeaker or other utilisation device (not shown) which is fed from the low frequency valve 13 through coupling condenser 20. The meter scale may, if desired, be marked to indicate the maximum desirable working limit. If no A. V. C. is provided the meter may be used as a tuning indicator. If desired the low frequency valve may be arranged as a phase changer valve with a load in its anode and cathode circuits feeding into a succeeding push-pull or so-called paraphase amplifier.

Although in Figure 1 the low frequency valve is fed from a simple resistance (the potentiometer resistance) obviously it could equally well be coupled to the detector by a resistance fed transformer.

A slight defect of the arrangement of Figure 1 is that the cathode-heater capacity of the diode is in parallel with the input inductance coil 1. In the modification shown in Figure 2 the diode is parallel fed from the coil 1. With the circuit of Figure 2, which it is thought will be found self-explanatory from the figure, the detector damping on the coil 1 is heavier than with the circuit of Figure 1. As will be seen, in Figure 2 the condenser 8' connects the "live" end of coil 1 to the anode 6 of the diode.

The modification shown in Figure 3 is suitable for use in cases where the input coil 1 need not be earthed on one side, e. g. when it forms part of an intermediate frequency transformer in a superheterodyne receiver. In this figure the low potential side of the coil 1 is connected to the

cathode 2 through resistance 7' in series with potentiometer resistance 5', the tap 15' on the latter being taken to the grid 14 of valve 13. Resistance 7' in conjunction with the condensers 8'' and 9' constitute a high frequency filter. The valve 13 feeds its output through a push-pull output transformer which, with its associated resistances 22 and condensers 23 forms a filter circuit designed in accordance with well known principles to give a desired frequency-response curve. The transformer 21 feeds into a succeeding push-pull connected amplifier stage (not shown).

Figure 4 shows a further embodiment suitable for use for feeding (from the valve 13) a succeeding so-called "paraphase" amplifier stage. As will be seen, in this figure two resistances 18' are provided—one each side of the valve 13—and two coupling condensers 20'. If A. V. C. voltage is required an additional diode or diode anode must be provided. No A. V. C. circuit is shown in Figure 4. This circuit is remarkably free from the undesired frequency discrimination which has usually been present in known circuits of the same general nature and which has arisen by reason of varying feed back voltages produced by the condenser usually provided in such known circuits across the auto-bias resistance.

Obviously the push-pull and "straight" output circuits of Figure 3 on the one hand and Figures 1 and 2 on the other, may be interchanged. In all the figures the resistance 17 may in some cases be omitted altogether as a diode will usually give from $\frac{1}{2}$ to 1 volt negative on its anode (without any signal input) due to electron bombardment from the cathode. Again the valve 13 need not be a triode for other suitable valves, e. g. tetrodes or pentodes, may be used. A triode, however, is probably slightly to be preferred for this valve.

I claim:

1. A detector-amplifier system comprising in combination a diode rectifier having a cathode and an anode, a circuit including an input coil, a filter impedance and an output resistor all serially connected between the rectifier cathode and anode, a condenser connecting each end of the filter impedance to the cathode, an audio amplifier having a control grid directly conductively connected to an intermediate point on said output resistor, an unby-passed resistor connected to the cathode of the amplifier for effecting degeneration whereby to avoid undesired frequency discrimination in the output of the system, a connection between the rectifier cathode and an intermediate point on the amplifier unby-passed resistor, and a pair of output terminals each connected through a coupling condenser, one to the amplifier anode and the other to the intermediate point on the unby-passed resistor.

2. A detector-amplifier system comprising in combination a diode rectifier having a cathode and an anode, means including a signal input circuit for applying modulated signals to said rectifier, an output resistor connected in circuit with said rectifier device for deriving therefrom alternating current signal potentials, an audio amplifier having a control grid directly conductively connected to an intermediate point on said output resistor, an unby-passed resistor connected to the cathode of the amplifier for effecting degeneration whereby to avoid undesired frequency discrimination in the output of the system, a connection between the rectifier cathode and an intermediate point on the amplifier unby-passed resistor, and a pair of output terminals each connected through a coupling condenser, one to the amplifier anode and the other to the intermediate point on the unby-passed resistor.

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