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REGULATING ARRANGEMENT FOR HIGH FREQUENCY RECEIVERS

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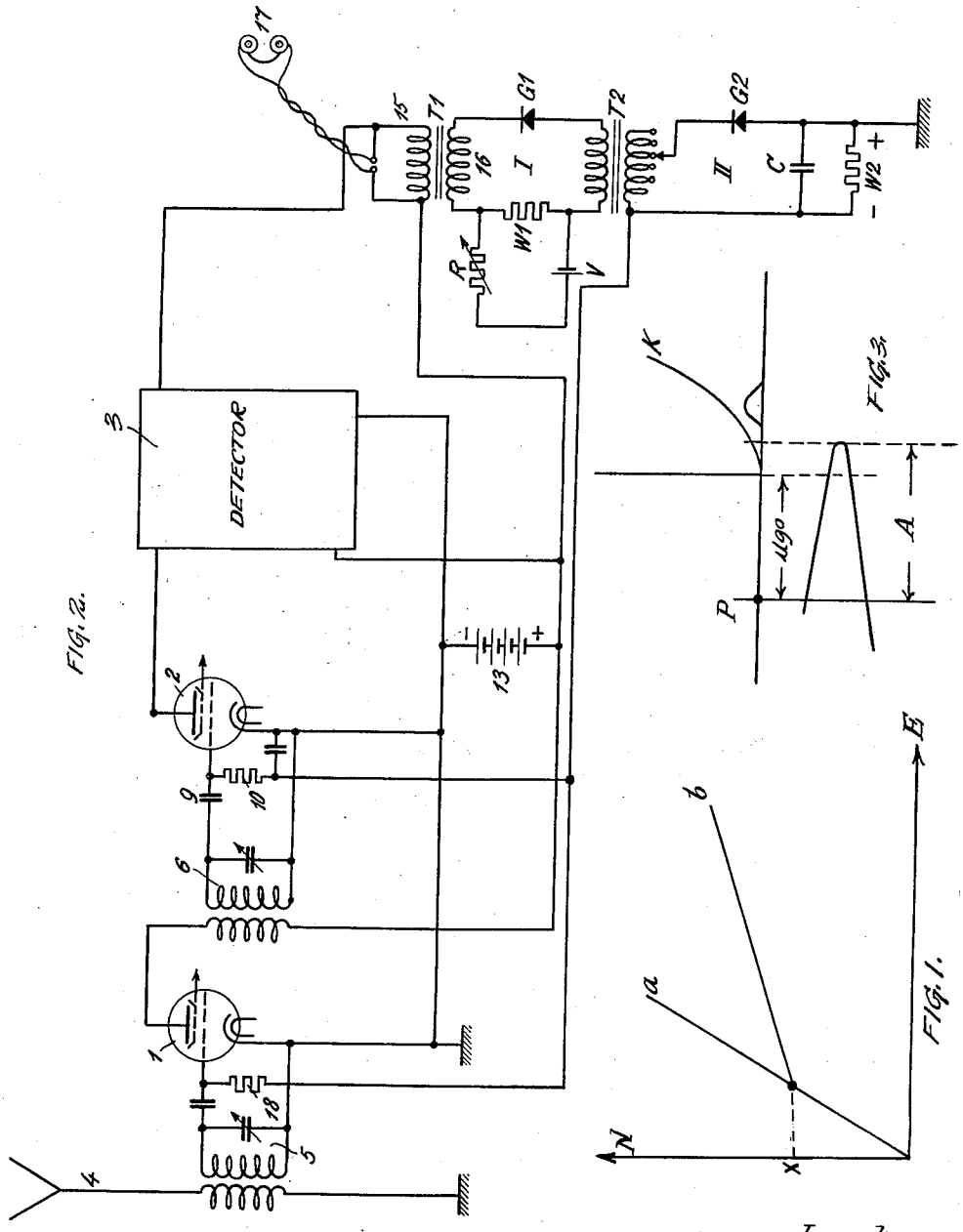


FIG. 2.

FIG. 3.

FIG. 1.

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REGULATING ARRANGEMENT FOR HIGH FREQUENCY RECEIVERS

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3 Claims. (Cl. 250—20)

It is well known to obtain a fading regulation or limitation of loudness by regulating the high frequency amplifier valves or tubes by means of a continuous voltage which depends upon the high frequency voltage, this in the case of a great high frequency amplitude being attained by displacing the operative or working point of these tubes into the range of smaller slope. It is also known to vary the regulation curve of arrangements of this kind by giving a negative bias to the rectifier that serves to obtain the regulating voltage. In this way it is attained that the amplification effected by the high frequency tubes is only diminished from a certain amplitude onward. The regulating voltage is produced either by the receiver-rectifier or by a separate rectifier connected in parallel therewith, being however in each case produced directly by the rectified high frequency energy.

In arrangements as provided by the invention such automatic regulation is effected preferably by means of an intermediary circuit connected to the output circuit of the low frequency voltage and provided with a biased rectifier. To this intermediary circuit a second circuit, having a non-biased rectifier, is connected over a transformer in such a manner that the low frequency energy cannot appear in this second circuit until the amplitude of this energy has become larger than the amount that corresponds to the rectifier bias in the intermediary circuit. The voltage for the automatic regulation to which the high frequency tube is subjected is then taken from the second circuit. The rectifiers used in the novel arrangement are preferably those of the contact type, such as cuprous oxide rectifiers, since these in the case of low frequency currents are equivalent to rectifier tubes while requiring less expenditure in means and less attendance.

The invention will be understood from the following description and be particularly pointed out in the appended claims, reference being had to the accompanying drawing in which

Fig. 1 is a graphic representation of the regulation to be effected by arrangements as provided by the invention, Fig. 2 is a wiring diagram showing an example of such an arrangement, Fig. 3 is a graphic representation that serves to explain the operation of this arrangement.

Reverting to Fig. 1, the low frequency voltage N in the output circuit of the receiver is plotted with respect to the input field strength E. Curve *a* represents the relation that exists between N and E if no regulation is effected. The regulation to which the receiver is subjected is to begin at a certain value *x* of the low frequency voltage N. The dependency of the low frequency voltage in the output circuit of the receiver is from this value *x* onward represented by curve *b*. Such regulation curves are needed with receivers used for receiving the signal modulated radiation of radio beacons and employed also for a landing of airplanes effected on the principle of the slip way or glide path method.

One embodiment of a receiving circuit provided with the improved regulated arrangements is illustrated in Fig. 2. The radio receiver may be of any well known type such for example as those used for receiving signal modulated radiation from radio beacons. Merely for purposes of illustration, the high frequency amplifying section of the radio receiver is represented by the high frequency amplifier tubes 1, 2, and the low frequency portion of the receiver is indicated schematically by the block 3. It will be obvious of course, that the receiver may have a greater or less number of high frequency amplifiers and the low frequency portions of the said receiver may be of any well known construction. While the receiver is shown as employing screen-grid tubes for the high frequency amplifiers, other tubes, e. g., triodes or other multi-grid tubes may obviously be employed. The antenna is designated 4 while the tuned circuits for the high frequency tubes are marked 5 and 6 respectively. A grid condenser 9 and a grid resistance 10 are associated with the input circuit of tube 2 and a similar condenser and resistance are associated with the input circuit of tube 1. The plate potential for the tubes 1 and 2 may be supplied from the battery 13 or from any potential source ordinarily employed in radio receivers. The transformer T1 comprises a primary winding 15 included in the low frequency output portion of the receiver, and a secondary winding 16; the telephone 17 or loud speaker being shunted across the winding 15 as illustrated. The intermediate circuit I is associated with the low frequency portion of the receiver over the secondary winding 16. In the intermediary circuit the rectifier G1 is included in series with the secondary of the transformer T1, a resistance W1 and the primary of a transformer T2 by which the regulation circuit II is coupled to circuit I. Battery V applies a voltage to the resistance W1 over the variable resistance R, this voltage serving to bias the rectifier G1. The grid bias of the tubes 1 and 2 is controlled over the resistances 18 and 10 in the following manner. The secondary of the transformer T2 is variable by means of a tap *t* which allows of varying the transmission ratio.

Rectifier G2 of the circuit II is connected in series with a resistance W2 bridged over by a condenser C to which it applies a potential whenever a low frequency amplitude becomes effective. Resistance W2 is at the end which in such case becomes positive connected to earth or to a line that in its turn is connected to certain parts of the electron tubes to be regulated, whilst the other end of resistance W2 serves to supply the negative grid bias to these tubes.

By battery V, Fig. 2, a bias u_{go}, Fig. 3, is produced which is such that in the circuit II a low frequency current shall only flow if the voltage in circuit I is greater than u_{go}. k denotes the characteristic curve of the rectifier, this curve being in most cases approximately quadratic, while A is the amplitude of the incoming low frequency voltage and P is the working point of the rectifier, this point being adjustable by means of the bias u_{go}. Therefore low frequency currents are only conveyed over transformer T2, Fig. 2, if A is greater than u_{go}, that is to say, only in this case a regulating voltage is obtainable.

Rectifier G2 may be biased directly, that is, without the aid of the intermediary circuit I. In this case, however, disadvantages arise due to the resistance of the rectifier G2 being smaller than resistance W2 so that owing to the return current of the rectifier a positive potential may happen to reach the grid of the tubes to be regulated. This should be avoided. The novel arrangement owing to the intermediary circuit does not show this disadvantage.

In this way, by adjusting the rectifier bias u_{go} the point of intersection of the curves a, b may be made to represent a definite value of N. By varying the transmission ratio of the transformer T2, the slope of the curve b will be varied with respect to the abscissa line.

What is claimed is:

1. In a radio receiver, grid controlled high frequency amplifier tubes feeding the low frequency portion of the receiver, a low frequency output circuit, a first rectifying circuit having a biased rectifier, a first transformer coupling said low frequency output circuit to said first rectifying circuit, a second rectifying circuit having an unbiased rectifier, a second transformer coupling said first rectifying circuit to said second rectifying circuit, both of said rectifying circuits being fed from said low frequency output, means for associating said second rectifying circuit with the grids of said tubes, and means in said first rectifying circuit for varying the biasing effect of said rectifying circuits on said grids.

2. A radio receiver according to claim 1 having means to vary the transmission ratio of the said second transformer.

3. A radio receiver according to claim 1 wherein both rectifiers are of the contact type.

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