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MODULATED CARRIER WAVE TELEVISION AND LIKE TRANSMITTER

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Fig. 1

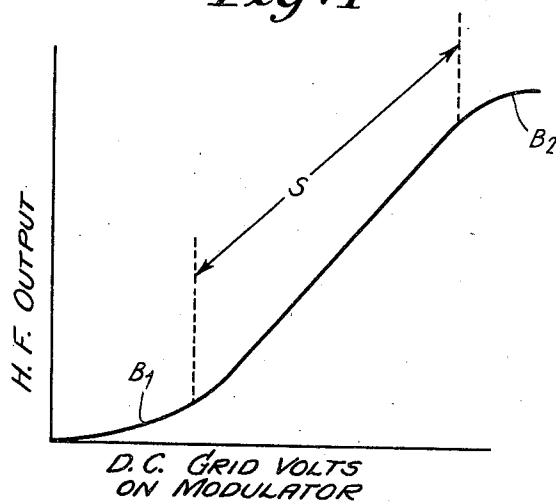
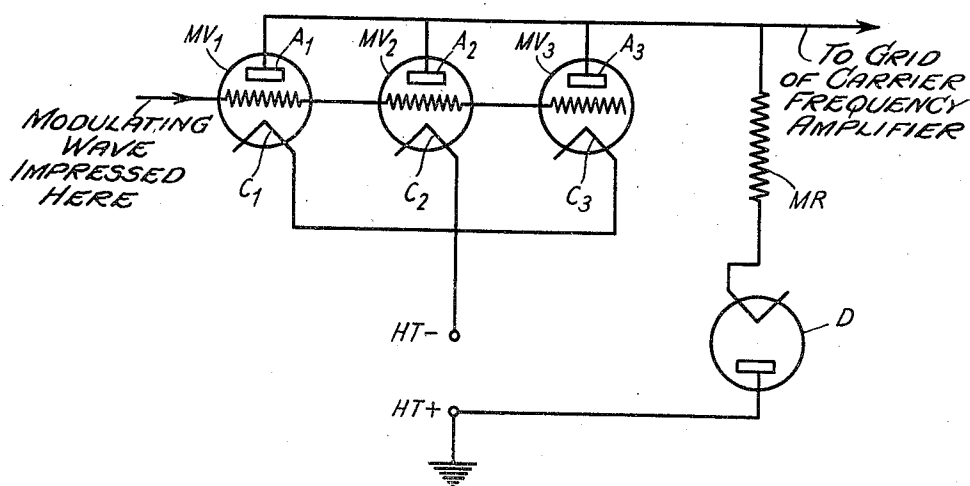


Fig. 2



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land, assignor to Radio Corporation of Amer-
ica, a corporation of DelawareApplication April 9, 1936, Serial No. 73,420
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2 Claims. (Cl. 178—7.1)

This invention relates to modulated carrier wave television and like transmitters and more particularly to such transmitters of the kind wherein synchronising signals which are transmitted as modulations of the same carrier wave as that upon which the picture signals are transmitted correspond with a value of transmitted carrier which is low as compared with any value the said transmitted carrier has between synchronising periods.

In such transmitters it is found considerably to benefit receiver operation to cause the transmitted carrier to be completely cut off during synchronising pulses but with known apparatus it is inconvenient to do this. In the most commonly employed and convenient types of modulated carrier wave transmitter the characteristic modulation curve—i. e. the static characteristic of the stage at which modulation is effected—consists as shown in the accompanying Figure 1 of a fairly straight portion S terminated by bends B₁, B₂. This curve which connects the high frequency output (ordinates) with the direct current grid volts (abscissae) upon the modulated stage begins near the origin with a lower bend over which its steepness gradually increases, then becomes substantially straight for a substantial length, and then bends over in a flattening out direction. Accordingly in the case of a television transmitter of the kind referred to and having a characteristic curve as just described, the transmitted carrier will not be reduced to zero during synchronising pulses unless these pulses are made of undesirably large amplitude, that is to say, unless the synchronising pulse potentials are made so very large as to overcome the effect of the bottom bend of the characteristic curve. Accordingly the result of the bottom bend of the characteristic is that if synchronising signals of only normal strengths are provided the transmitted carrier is not reduced to zero during synchronising periods but is only reduced to a minimum positive value, there being always at least a residual amount of carrier transmitted.

The object of the present invention is to provide an improved television transmitter of the kind referred to whereby the transmitted carrier may be reduced to zero during synchronising periods without having to provide inconveniently large synchronising pulses.

According to this invention a modulated carrier wave television or like transmitter of the kind referred to comprises a shaping circuit such that the effect of the bottom bend of the static characteristic of the modulated stage is corrected for,

the shaping circuit operating to cause the decrease in carrier strength which is caused by the application to the modulator of modulating signals above a predetermined value at least equal to the "black" picture signal value to be disproportionately large as compared to the decrease in transmitted carrier strength which occurs consequent upon the application of modulating signals below the said "black" picture signal value.

The invention is illustrated in the accompanying figures in which Fig. 1 shows the static characteristic curve of the modulation stage and Fig. 2 shows diagrammatically one way of carrying out the invention.

Referring to Fig. 1, there is illustrated the static characteristic modulation curve of the stage at which modulation is effected. This curve shows the relationship between the direct current voltage impressed on the grid of the tubes in the modulating stage and the high frequency output of the modulator. It will be noted that the curve has two knees. The lower section of the curve, wherein the D. C. grid volt input is small, has a lower bend B₁ and the curve then straightens out into a substantially linear section identified as S, and then has an upper bend or knee identified as B₂. Accordingly, it is seen that for low values of input grid voltage to the modulator the high frequency output changes very slowly up to a certain value. Then the increase in high frequency output changes substantially proportional to the change in D. C. grid voltage input, and then approaches a value which may be termed a "saturation" value where there is little, if any, change in high frequency output regardless of the D. C. grid voltage input.

Referring to Figure 2 there is included in the anode circuit of a modulator valve (or, as shown, bank of valves) of a transmitter of the kind referred to, a correcting diode which is in series with the normally provided modulator resistance. For example, as shown, there may be three modulator valves MV1, MV2, MV3, in parallel the anodes A1, A2, A3 of these valves being connected to the grid point (not shown) of the carrier frequency amplifier (not shown) at which modulation is to be effected and the cathodes C1 C2 C3 of these valves being connected to the negative terminal HT— of a suitable source (not shown) of anode potential whose positive terminal HT+ is earthed. The anodes of the modulator valves are also connected through the usual modulator resistance MR in series with the correcting diode D to earth. Synchronising pulses correspond to high anode feed to the modulator valves, for, in

the system of modulation in question the voltage drop across the modulator anode resistance MR is applied to the grid of the modulated amplifier stage (not shown) so that variations of anode feed of the modulator valves effect a variation of grid bias on the modulated amplifier stage while the same end of the modulator resistance is connected to the anodes of the modulators as is connected to the grid of the modulated amplifier stage. Thus the anode feed produces a negative voltage at this end of the resistance with respect to the other. It will thus be seen that an increase of anode feed of the modulators corresponds with an increase of negative bias on the modulated amplifier and a decrease of high frequency output from this stage. Since, as above described synchronizing pulses correspond to high anode feed to the modulator valves, and since by suitably choosing the circuit constants, it is possible to make the correcting diode D operate as a non-rectilinear impedance, it is possible to make the amplification of the synchronising pulses sufficiently greater than that of the picture signals to produce a required disproportionate modulation by the said pulses such that the carrier becomes zero during the said pulses. The diode D should be of low impedance and have an anode current-anode voltage characteristic such that the said diode begins to saturate at a value corresponding to a value somewhat in excess of the peak picture signal value, i. e. the value corresponding to "picture black." Since the synchronising signals are "blacker than black" the action will be the ordinary substantially rectilinear action as regards picture signals, but when the more powerful synchronising signals occur the carrier transmitted will be brought down to zero.

Any suitable form of non-rectilinear impedance other than a diode may be used, if desired.

Having now particularly described and ascertained the nature of my said invention and in

what manner the same is to be performed I declare that what I claim is:

1. A modulated carrier wave television transmitter of the kind referred to comprising a modulating valve having a control electrode, a modulating load resistance in series with a non-rectilinear impedance in the anode circuit of said valve, means for controlling a carrier frequency stage at which modulation is to be effected by the voltage drop across said load resistance, and means for applying input signals constituting picture signals and superimposed synchronizing signals to the control electrode of the modulating valve, a characteristic of said non-rectilinear impedance being such that it saturates at signal values slightly in excess of peak picture signals so as to cause disproportionately greater amplification of said pulses whereby, as a result of such disproportionate amplification, the carrier amplitude is reduced substantially to zero by synchronizing pulses of lesser magnitude than would otherwise be necessary.

2. A modulating carrier wave television transmitter comprising a modulating valve having a control electrode, a modulating load resistance in series with a non-rectilinear impedance comprising the diode in the anode circuit of said valve, means for controlling the carrier frequency stage at which modulation is to be effected by the voltage drop across said load resistance, and means for applying input signals consisting of picture signals and superimposed synchronizing pulses to the control electrode of said modulating valve, the characteristic of said diode being such that its circuit acts as a shaping circuit to cause proportionally greater amplification of said pulses whereby, as a result of such disproportionate amplification, the carrier amplitude is reduced substantially to zero by synchronizing pulses of lesser magnitude than would otherwise be necessary.

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