tuned to the desired output frequency. The output of this resonant circuit is applied across a load 66. In operation, the SCR switch 62 chops the output of the DC source 63 at a frequency equal to the frequency at which the resonant circuit 64, 65 is tuned so that a square wave of this frequency is applied to the control winding 61. The operation of the switch 62 must be such that the square wave is AC, that is, that it has both positive and negative excursions. This is the manner in which most conventional SCR switches operate. As previously pointed out, the output wave form of the resonant circuit 64, 65 is independent of the wave form of the signal applied to the control winding 61. This is true even if the signal applied to the control winding is a square wave such as that produced by the SCR switch 62. Consequently, an essentially pure sine wave output at the desired frequency is obtained.

Figure 10 shows a frequency converter constructed in accordance with the present invention. In this Figure an inductor 70 of the type described has its control winding 71 connected to the output of an SCR switch 72 in the same manner as was the case with Figure 9. A conventional transformer T has its primary winding 73 connected to the output of a source 74 of AC voltage of any given frequency. The voltage induced in the secondary 75 of the transformer T is rectified by diodes 76 and 77, filtered by capacitor 78 and applied to the input of the SCR switch 72. In some cases, it may not be necessary to rectify the input voltage before chopping it, particularly if the input or carrier frequency is much greater than the chopping frequency.

As was the case in the case in Figure 6, a first load winding 79 is connected in parallel with a capacitor 80 to form a resonant circuit tuned to the desired output frequency. A second load winding 81 wound so as to be transformer coupled to the winding 79 has a load 82 connected there across.

The operation of this circuit is similar to that of Figure 9. The SCR switch 72 is adjusted to chop the rectified signal passed by the transformer T at a frequency equal to the desired output frequency. The AC square wave thus formed is passed through the control winding 71 with the result that the resonant circuit 79, 80 is pumped in the manner previously described and a regulated output is obtained across the load 82.

Turning now to Figure 11, there is shown a parametric amplifier embodying the present invention. In this Figure, an inductor 84 of the type described has its control winding 85 connected across the source of AC voltage 86. The load winding 87 of inductor 84 is connected to a capacitor 88 to form a resonant circuit tuned at the desired output frequency. The output is taken across a resistor 89 connected to an output winding 90. The input of the circuit is applied to input terminals 91 which are connected across the load winding 87. In this case the output of the tuned circuit 87, 88 is not dependent upon a noise signal but rather is dependent on the input to the terminals 91. This input, although of small amplitude, will cause the tuned circuit 87, 88 to begin to oscillate and these oscillations will be built up or amplified by the pumping action of the AC current passing through the control winding 85 in the manner previously described.

It should be understood that in these embodiments previously illustrated and described as having a separate output winding, the output may, if desired, be taken directly across the resonant circuit. Similarly, in those embodiments where output is taken directly across the resonant circuit, one or more additional output windings could be provided if desired.

In Specification No. 1,153,902, it is pointed out that frequency doubling can be prevented by impressing a suitable bias on the core of a magnitude sufficient to prevent zero crossing of the flux causing the inductance change. Such a bias can be used in connection with the present invention although if it is used, the pumping frequency will have to be double the output frequency as in the conventional parametric device. The device of the present invention will still retain its other advantages, such as a high power handling capacity.

As used herein and in the Claims the term "AC" as applied to a voltage current or signal is not meant to be limited to a sine wave signal but rather is meant in its broadest sense as applying to a waveform that has cyclic positive and negative excursions.

From the foregoing description it can be seen that a method has been provided for producing a regulated voltage by utilizing the stable oscillating characteristic of a parametric device. An improved parametric device has also been provided that is capable of operating at low frequencies and high power levels. The improved parametric device also has the great advantage of operating with a pumping frequency equal to the tuned frequency of the resonant circuit. The parametric device has the further advantage of being extremely rugged and inexpensive to manufacture.

WHAT I CLAIM IS: —

1. A method of producing a regulated voltage from an unregulated A.C. voltage source comprising initiating oscillation of a parametric device by the unregulated voltage and transferring energy from said source to said device to build said oscillations up to and maintain them at the stable oscillation point of the device to produce a regulated voltage.