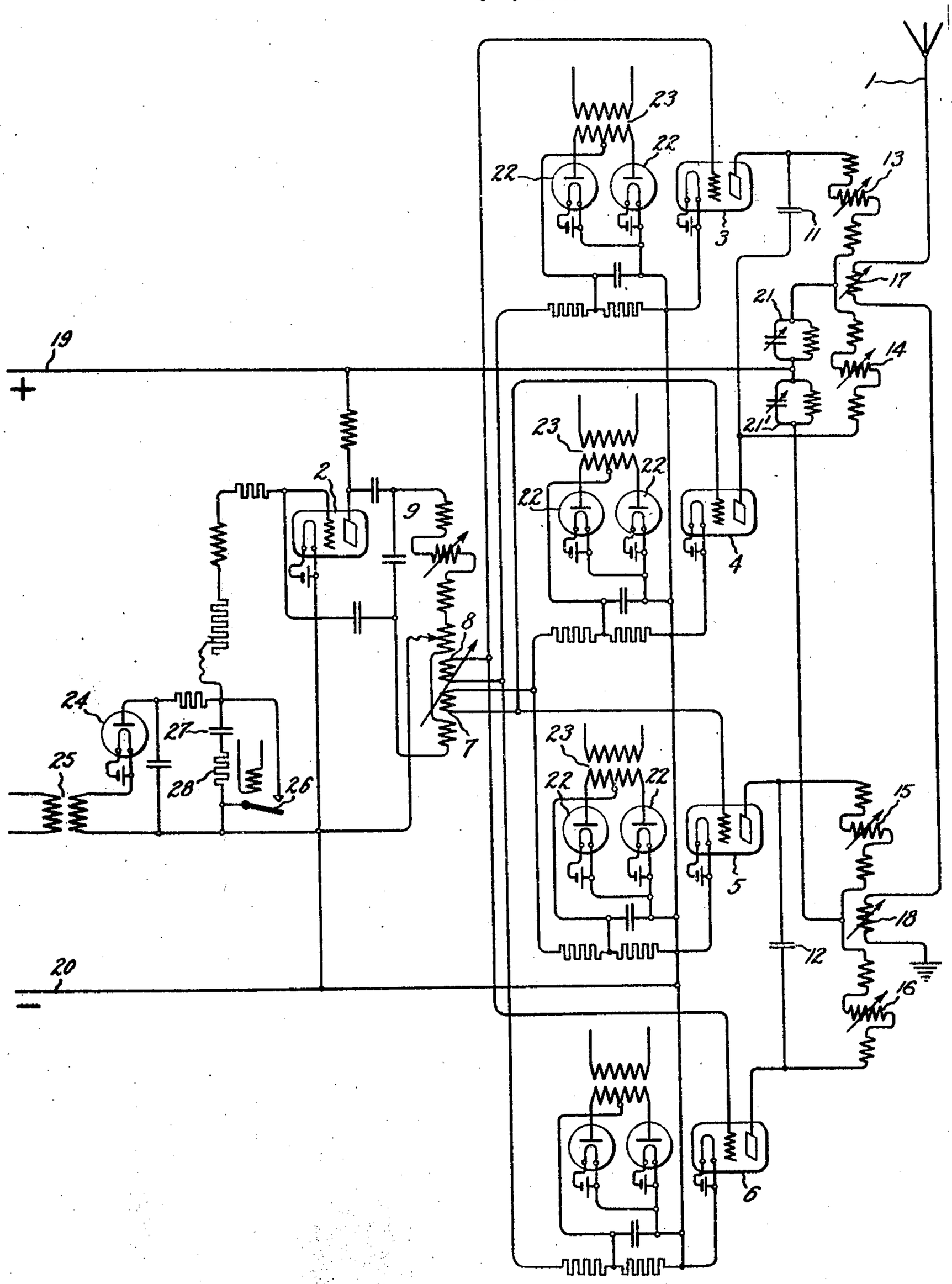
Sept. 4, 1928. 1,683,230

W. R. G. BAKER

HIGH FREQUENCY SIGNALING SYSTEM

Filed May 5, 1926



Inventor:
Walter R.G.Baker,
by Alexander S. Lamb.
His Attorney.

Patented Sept. 4, 1928. 1,683,230

UNITED STATES PATENT OFFICE.

WALTER R. G. BAKER, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

HIGH-FREQUENCY SIGNALING SYSTEM.

Application filed May 5, 1926. Serial No. 106,966.

My present invention relates to systems for the transmission of high frequency signals, and more particularly to systems in which high frequency power is supplied by means of electron discharge devices.

It is customary in supplying an appreciable amount of high frequency power by means of electron discharge devices, to employ as the original high frequency source an electron discharge device of comparatively low power and to use this for exciting the input circuits of other amplifying devices for increasing to the desired amount the high frequency power supplied to the transmitting circuit.

In order to obtain the desired amount of power it is necessary or convenient in many cases to employ a plurality of amplifying devices connected in parallel. The connection of several devices in this way to the transmitting circuit in some cases involves certain difficulties. If it is desired to vary the amount of power supplied it must be done either by cutting some of the devices out of the circuit or by varying the voltage or other operating conditions of the amplifying devices. If a change in power is accomplished by changing the number of devices employed, other changes must be made in the circuit connections to maintain the desired tuning of the circuits and the efficient supply of power to the transmitting circuit. If, on the other hand, the change is made by varying the operating conditions of the devices the efficiency of operation will be materially lower at any power output differing from the optimum.

Still another disadvantage which is especially troublesome at higher frequencies lies in the fact that with several devices connected in parallel the interelectrode capacities are also in parallel and the tendency of the amplifying system to itself generate high frequency oscillations is greatly accentuated.

The object of my invention is to overcome these disadvantages, and to provide a system which will be readily adaptable for use with any frequency desired, or in which the power delivered may be readily changed without changing the tuning of any of the circuits, and one in which substantially the best operating efficiency may be obtained irrespective of the amount of power supplied.

In attaining the object of my invention, I provide a plurality of independent amplifier units each of which is adapted to supply power to the transmitting circuit independently of the other units. Each amplifier unit in accordance with my invention is provided with a tuned output circuit, and if one or more units are removed from the system no change in the tuning becomes necessary. The system also may be so proportioned that any desired amount of power may be supplied to the transmitting circuit at good efficiency merely by changing the number of amplifier units which are in operation. Also, in case a tube in one unit fails the other units may continue to carry the load while that tube is being replaced. The arrangement described has the further advantage that the number of devices which are connected in parallel to a tuned output circuit is greatly reduced, and therefore the tendency of the amplifier units to oscillate is greatly reduced.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. The invention itself, however, will best be understood by reference to the following description taken in connection with the accompanying drawing in which I have shown diagrammatically one circuit organization whereby my invention may be carried into effect.

I have indicated in the drawing a power supply system for supplying signaling currents to a transmitting circuit which is indicated as an antenna 1. The primary source of oscillations in the system shown is an electron discharge device 2 which is arranged to produce high frequency oscillations in its output circuit. I have indicated in the drawing only two amplifier units, one comprising amplifier devices 3 and 4 and the other employing amplifier devices 5 and 6. The amplifying devices 3 to 6 have their input circuits excited from the coils 7 and 8, which are coupled to the tuned output circuit 9 of the oscillator 2. The two amplifying devices of each unit are connected in push-pull relation and the output circuits are tuned to the desired frequency by means of the condensers 11 and 12 and variable inductance 13, 14, 15 and 16. Coupling coils 17 and 18, which are connected in series relation in the transmitting circuit receive energy supplied from the output circuits of the

two amplifying units. It will of course be understood that as many amplifier units as desired may thus be connected to a transmitting circuit with the secondaries of the coupling transformers coupled in series or parallel as desired.

Power for the operation of the system is supplied from two direct current mains indicated at 19, 20. The positive main 19 is connected directly to the plates or anodes of various devices. Tuned trap circuits 21 and 21′ are provided between the main 19 and each amplifier unit to prevent a reaction between the different amplifying units.

Biasing potentials for the various amplifier grids are obtained by means of thermionic rectifiers 22 which are supplied with alternating current from any suitable source by means of transformers 23. Similarly biasing potential for the grid of the oscillator 2 is provided by means of a thermionic rectifier 24 supplied with alternating current by a transformer 25.

The biasing potential for the grid of oscillator 2 may be normally of such a value that no oscillations would be produced. When it is desired to transmit telegraphic signals the relay 26 closes a shunt circuit around the grid condenser 27, and resistance 28, and thereby permits the production of oscillations, and the supplying of the desired current to the transmitting circuit.

While I have shown and described only one embodiment of my invention, it will be apparent that many modifications may be made in the circuit connections as well as in the particular manner of operating the various devices employed without departing from the scope of my invention as set forth in the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. The combination in a high frequency signaling system of a source of high frequency current of substantially a single frequency, a plurality of amplifying units which are excited from said source, the output circuit of each of said amplifying units being tuned to the frequency of said high frequency current, a transmitting circuit and an independent coupling between each of said output circuits and said transmitting circuit.

2. The combination in a high frequency signaling system of a source of high frequency current, a plurality of amplifying units which are excited from said source, all of said amplifying units being tuned to amplify currents of a common frequency, or frequencies, and each of said amplifying units comprising a pair of electron discharge devices having their output circuits connected in push-pull relation, and an independent coupling from the output circuit of each amplifying unit to a transmitting circuit.

3. The combination in a high frequency signaling system of a source of high frequency current, a plurality of amplifying units which are excited from said source, each of said amplifying units comprising a pair of electron discharge devices connected in push-pull relation and having an independently tuned output circuit and an independent coupling between each of said tuned output circuits and a transmitting circuit.

4. The combination in a high frequency system of a source of radio frequency current, a plurality of amplifying units which are excited from said source, a tuned output circuit for each of said amplifying units, all of said output circuits being tuned to a common radio frequency and an independent coupling from each of said tuned output circuits to a transmitting circuit.

In witness whereof, I have hereunto set my hand this 4th day of May, 1926.

WALTER R. G. BAKER.