

Dec. 9, 1924.

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1,518,655

RADIOTELEGRAPH SYSTEM

Filed Jan. 14, 1920.

Fig. 1.

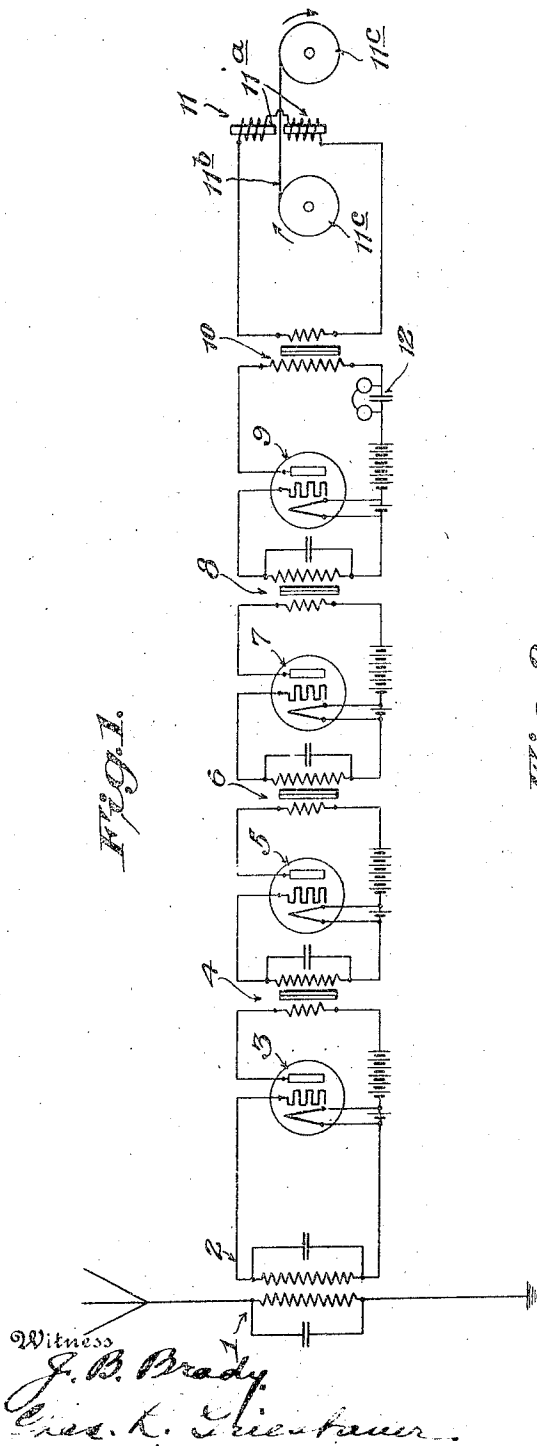
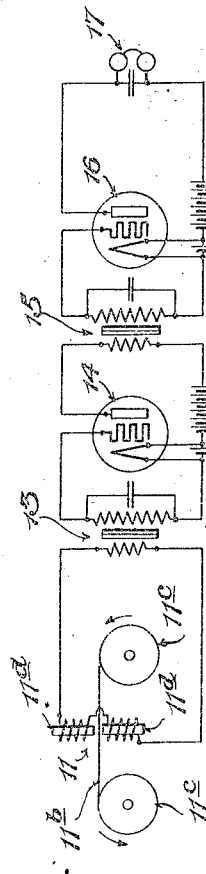


Fig. 2.



UNITED STATES PATENT OFFICE.

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RADIOTELEGRAPH SYSTEM.

Application filed January 14, 1920. Serial No. 351,454.

To all whom it may concern:

Be it known that we, WENDELL L. CARLSON and EARL C. HANSON, citizens of the United States, residing at Washington, District of Columbia, have invented certain new and useful Improvements in Radiotelegraph Systems, of which the following is a specification.

This invention relates to the reception of radio or wireless signals, and more particularly to those systems incorporating high speed, long wave reception of signals over long distances.

Heretofore, in order to receive undamped long waves of frequencies, not sufficiently audible to the average human ear, it has been necessary to utilize methods having the characteristics of the heterodyne principle.

The primary object of our invention is to provide an arrangement for receiving high speed signals transmitted from a radio or wireless station operating at wave lengths ranging, for example, from 30,000 to 60,000 meters, without the use of the heterodyne principle, or any other method heretofore utilized.

A further object of this invention is to provide a circuit whereby a recording device may be actuated directly by the received electrical oscillations without the use of a detector or beat circuit. The recording apparatus is so arranged that signals will be registered at high speeds on a permanent recording element and later reproduced at convenient speeds for translation.

Our invention, as will be appreciated by radio engineers, departs radically from systems heretofore proposed for conducting commercial long distance radio traffic. The invention makes practical the continuous operation of long distance radio stations on twenty four hour schedules. The invention is illustrated diagrammatically in one of its forms in the accompanying drawings, wherein—

Figure 1 shows a receiving circuit to be used for amplifying and recording the high speed long wave telegraphic signals; and

Figure 2 shows a circuit for reproducing at a lower speed and lower frequency, the signals recorded by the use of the circuit disclosed in Figure 1.

Referring particularly to the diagram shown in Figure 1, reference character 1

represents an antenna circuit tuned to the incoming signal at radio frequency. This circuit is set at the definite frequency of the transmitting wave radiated from the transmitting station with which the receiving station is designed to maintain commercial traffic. Associated with the antenna circuit 1 is a resonant secondary circuit 2, definitely tuned to the frequency of the transmitting wave. Connected to this resonant circuit 2 is a multistage high power amplifier comprising the thermionic vacuum tubes 3, 5, 7 and 9, and tuned radio frequency transformers 4, 6 and 8. The radio frequency step-down transformer 10 links the vacuum tube amplifier circuit to the recording apparatus 11.

The recording apparatus 11 is shown in the form of the telegraphophone, but it will be understood that we do not restrict ourselves to any specific recording device. The telegraphophone as shown comprises the talking head 11_a and the moving steel wire 11_b, operated by means of the reel mechanism indicated at 11_c. The telegraphophone is a well known apparatus and need not be described herein.

In the practical operation of this system it will be desirable to supply a test circuit so that the operator in charge of the apparatus may at all times readily determine if the system is functioning properly. To accomplish this a telephone receiver circuit 12 is employed. The telephone receiver diaphragms are mechanically tuned to the incoming wave frequency.

In Figure 2 the reproducing head 11_a of the telegraphophone 11 is connected to the input of an amplifier comprising tuned audio frequency transformers 13 and 15, and thermionic vacuum tubes 14 and 16. The output circuit of the amplifier is connected to an audio frequency responsive device 17.

The operation of the system is as follows:—Consider, for example, that a transmitting station having an output of 2000 K. W. at a frequency of 6000 cycles, and a wave length of 50,000 meters, is employed to maintain radiotelegraphic communication at 100 words per minute over vast distances. The receiving station to operate in conjunction with the above described transmitting station would be equipped with a receiving circuit as herein disclosed. The circuits in

Figure 1 are definitely tuned to 50,000 meters (6000 cycles) and the telegraphone is operated at a speed above that ordinarily employed in its commercial use as a voice recording apparatus. The incoming signal is recorded on the telegraphone at a speed of 100 words per minute and at the frequency of 6000 cycles.

In the reproduction process as indicated in Figure 2 the telegraphone is operated at a speed one fourth that at which the message was recorded. The result of lowering the speed of the telegraphone in the reproduction process is twofold: First, the signal speed is reduced from 100 to 25 words per minute; second, the signal frequency is reduced from 6000 cycles to 1500 cycles. The audio frequency amplifying circuit of the reproducer is tuned to 1500 cycles (200,000 meters) and amplifies the energy to actuate the telephone receiver 17, or other responsive device. The telephone receiver and the average human ear respond efficiently to this frequency, while they respond very inefficiently to the higher frequency that is 6000 cycles at which the telegraphic signals were initially recorded.

The invention upon which this application is based is broader than the specific embodiment thereof which has been shown for the purpose of illustrating one of its uses, and we intend no limitations other

than those imposed by the appended claims, or by the art.

What we claim is:—

1. A radio receiving system comprising a wave responsive circuit tuned to the frequency of incoming signals, a plurality of electron tube amplification circuits connected to said wave responsive circuit, an output circuit connected to the last of said electron tube amplification circuits, a plurality of responsive devices connected in said output circuit, one of said devices arranged to magnetically record said incoming signals, and another of said devices arranged to render audible said incoming signals.

2. A radio receiving system comprising a wave responsive circuit tuned to the frequency of incoming signals, a plurality of electron tube amplification circuits connected to said wave responsive circuit, an output circuit connected to the last of said electron tube amplification circuits, a plurality of responsive devices connected in said output circuit, each comprising sets of electromagnetic windings, a mechanically tuned diaphragm actuated by one set of said windings and a magnetic record affected by the other set of said electromagnetic windings.

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