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METHOD AND APPARATUS FOR THE TRANSMISSION OF SIGNALS

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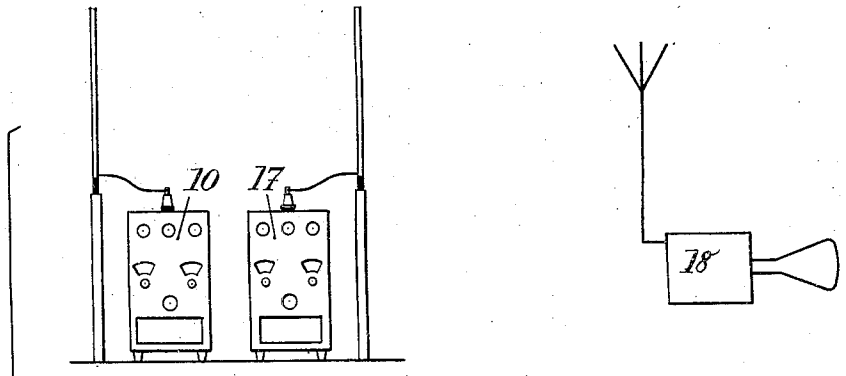


Fig. 1.

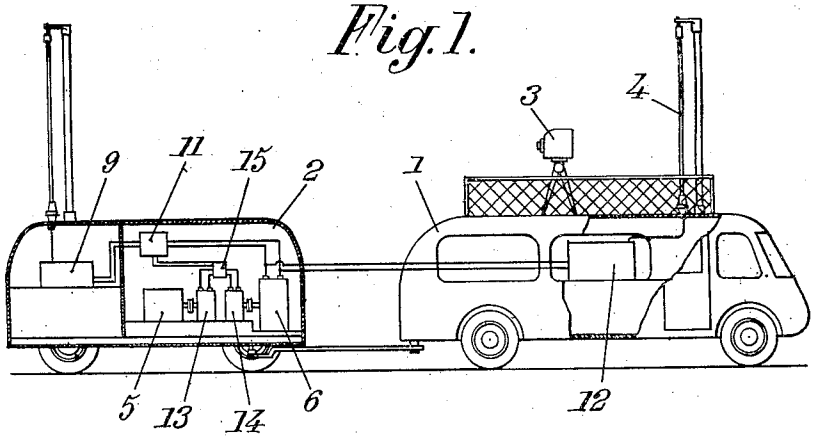
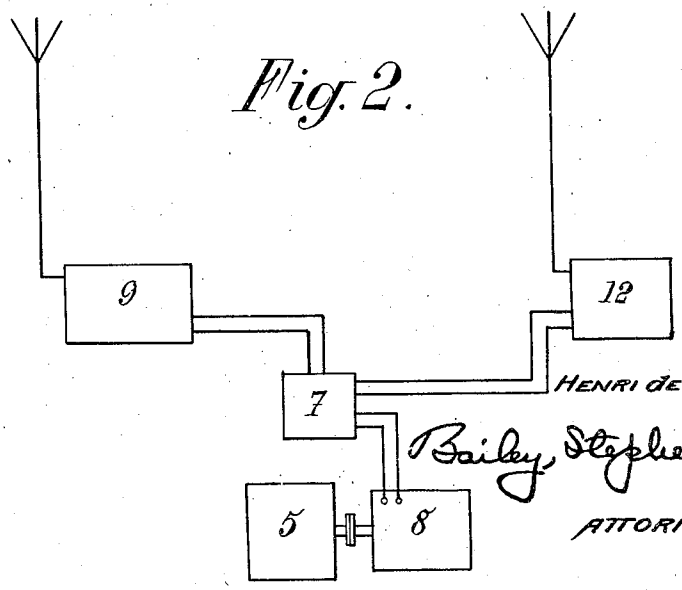


Fig. 2.



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METHOD AND APPARATUS FOR THE TRANSMISSION OF SIGNALS

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4 Claims. (Cl. 178—69.5)

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The present invention relates to methods and apparatus for the transmission of signals to a distance of the kind including, both for transmission and for reception of said signals, electronic means to which energy is fed from suitable feed sources, for instance from a cyclical or alternating current distribution system. The invention is more especially, although not exclusively, concerned with these methods and apparatus as applied to television and especially television systems including mobile transmitting (and even receiving) stations.

The object of the present invention is to provide a method and apparatus of the type above referred to which ensures a more accurate reception than was possible up to the present time, this result being obtained, in particular, owing to the elimination of the defects which are due, in the present practice, to the lack of synchronization between the feed at the transmitting station and the feed at the receiving stations.

With this object in view, an essential feature of my method consists in independently feeding alternating current to one of the stations and especially the transmitting station and synchronizing this feed to a standard frequency which may be supplied for instance by an alternating current distribution system. The synchronizing may be effected either through a cable or through radio electric means, this last method ensuring a great freedom of the independently fed station which can thus be a mobile station.

According to an essential feature of my invention, my apparatus includes an independent source of alternating current at one of the stations between which signals are to be transmitted and more especially at the transmitting station, a central source of standard frequency and means for synchronizing this independent feed source with said central source.

According to a preferred embodiment and especially when a plurality of receiving stations are to receive signals from a transmitting station, the central source of standard frequency and the receiving stations are all fed with alternating current by a common distribution system.

Other features of the present invention will result from the following detailed description of some specific embodiments thereof.

Preferred embodiments of the present invention will be hereinafter described with reference to the accompanying drawing, given merely by way of example and in which:

Fig. 1 is a diagrammatical view of a system

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according to the present invention and especially intended for television, such a system including a fixed central transmitter, a plurality of receiving stations (one of which is shown at 18 on the drawing) and a mobile transmitting station the signals of which are intended to be received by the central transmitter so as to be retransmitted.

Fig. 2 shows a portion of a system of the kind of that shown by Fig. 1, this portion being that relating to the feed of the transmitting station, this embodiment corresponding to a modification of that shown by Fig. 1.

In the following description, it will be supposed that the invention is applied to the case of a television system including a mobile transmitting station that is to say a transmitting station carried by a vehicle.

First, it must be remembered that in the systems of this kind such as have been made up to the present time, the mobile transmitting station is fed with current from an external source, generally a 50 cycle alternating or reciprocating current distribution system, which may be the same as that used for the feed of the various fixed (or mobile) receiving stations, or which may be distinct.

Such systems have the disadvantage that the field of possible applications is considerably reduced. As a matter of fact, it may be necessary to perform television transmission at places where the power of the current that is available from the distribution system is insufficient, or again at places where no plug-switch has been provided. On the other hand, television transmission can take place only when the vehicle is stationary. It is impossible when the vehicle is moving. Furthermore, it has been found that when the feed is ensured by alternating current (or by direct current obtained by rectification of alternating current) both at the transmitting station and at the receiving stations, it is necessary to ensure that the frequencies of the feed sources, at transmission and at reception, be perfectly identical and synchronized. This is necessary because if there is a phase difference between the tube heating current at the transmission station and the tube heating current at the private receiving stations, there results, on the screens of said receiving stations, a succession of moving bands alternately dark and clear and also a certain "stirring" in the direction of the lines, this result being due to the combined effect of the lack of synchronism and of the defects of the filtering means in the feed circuits.

The object of the present invention is to eliminate these drawbacks and, in particular, to permit, with a transmitting station carried by a vehicle, of performing television under any conditions whatever, even when the vehicle is moving, while avoiding at the reception the defects due to lack of synchronism between the feed sources.

For this purpose, according to the invention, I proceed in such manner that:

(*a*) The mobile station (to wit, in the particular case that is being considered, the transmitting station although the invention might as well apply to the feed of mobile receiving stations) includes, independent alternating current feed means of any suitable type; and

(*b*) This alternating current (for instance of the 50 cycle type) is synchronized, through any suitable means, to a standard frequency which will preferably be that of a current distribution system.

If it is supposed, as it will be the case in the following description, that the receiving stations are fixed stations in which the heating is itself ensured through said distribution systems, a perfect synchronism will thus be always obtained.

Furthermore, it is advantageous, according to another feature of my invention, to ensure synchronism to a distance through radio-electric signals, whereby the vehicle which carries the transmitting station, with its independent current feed, can freely perform any desired displacement.

A system complying with the conditions above set forth can be made in many different ways, for instance as follows:

Concerning first the mobile transmitting station carried for instance by a trailer 2 attached to a vehicle 1, its general arrangement is of any suitable type. For instance it includes a camera apparatus 3, the various usual television devices (supposed to be carried by the vehicle proper, 1) and an antenna 4.

As for the means for feeding current to said transmitting station, they are advantageously carried by a trailer 2. They include a suitable source of energy, for instance an internal combustion engine 5 (or any motor operated by a fluid) or an electric battery. This source of energy is capable of driving or controlling an apparatus for generating alternating current, which apparatus may for instance be either of the electro-dynamic kind, being then advantageously constituted by an alternator 6 (Fig. 1) or of the electrostatic or other kind as shown by Fig. 2. In the embodiment of Fig. 2, said apparatus is constituted by a group of gas tubes or thyratrons 7, assembled in any known manner for transforming a direct current (fed for instance by a battery or, as shown by the drawing, by a generator 8 driven by the internal combustion engine 5) into an alternating current.

Concerning finally the means for synchronizing the frequency of this alternating current with that of the distribution system that is chosen, said means are made in such manner that, through an alternating current fed to a distance, transmitted through radio-electric means, then received by a suitable receiving device 9, provided at the mobile television transmitting station, it is possible to influence one of the factors upon which the frequency of this current depends in the alternating current generating system of said station.

Thus I may make use of a transmitter 10 of relatively low power, located at any suitable

place (for instance at the central transmission station above mentioned). This transmitter is modulated by means of the frequency of the current distribution system, which gives for instance a wave modulated to 50 cycles. Then this wave is received in receiver 9, which is fitted with demodulating means of any suitable type. At the output end of this receiver, I thus obtain an alternating current which is in accurate synchronism with the current distribution system. I may then utilize this current in one of the following ways:

(*a*) This current is caused to act upon a device analogous to a phase-meter which is otherwise influenced by the frequency of the current fed by the source of the mobile station, for instance alternator 6, this device producing a voltage or a current which is a function of the phase difference and through which it is possible to control all the elements or circuits upon which the frequency of said station depends;

(*b*) The current from device 9 may also be caused to act directly upon the source of alternating current of the mobile station and especially when the latter is constituted by thyratrons. It is known that the discharge of such tubes can be controlled by a suitable alternating current, and at the frequency of said current;

(*c*) Other possible ways of utilizing the current from device 9 are included in my invention.

In Fig. 1, I have shown, by way of example, a phase-meter 11 receiving, on the one hand, the sinusoidal current from receiver 9 and, on the other hand, a current from alternator 6 which is intended to feed the elements of the transmitter 12 of the vehicle. The variable current resulting from the action of the two above mentioned currents may be used for operating any mechanical, electronic, or other relay capable of modifying the speed of revolution of the alternator.

I might, for instance, act, through such a relay, either upon the fuel feed means of engine 5, or on any electrical intermediate device influencing the control of the operation of the alternator.

It has been supposed, in the example shown by Figure 1, that the internal combustion engine 5 drives alternator 6 through the intermediate of a generator 13, the current of which is fed to an electrical motor 14 coupled with the alternator. The current fed by the phase-meter then comes to act, either through rheostat 15 or through electronic relays, or again through other means, upon the excitation means of the generator or motor. But this arrangement is given merely by way of example and has no limitative character. In particular, I might utilize the means described in the French Patent No. 869,107 filed by Mr. Yves Rocard, on September 13, 1940, and concerning the control and the adjustment of electrical motors, the means described with reference to Fig. 2 of said French patent being particularly suitable for this purpose.

In Fig. 2, I have shown an arrangement including thyratrons 7. The latter are fed with the direct current supplied by generator 8 coupled with motor 5. On the other hand, they are controlled, in the known manner, by the sinusoidal current supplied from receiver 9. The alternating voltage at the output of the thyratrons is then exactly at the same frequency as that received in said receiver.

Whatever be the particular embodiment that is chosen within the scope of my invention, I obtain a system the working of which is such that

the feed of the mobile transmitting station will be always synchronized with that of the receiving stations which are supposed to be connected to the electric distribution system. It should be well understood that this mobile transmitting station may either transmit the signals directly if its power is sufficiently great, or transmit signals intended to be received by a powerful central transmitting station which retransmits said signals, such a central transmitter being shown at 17 in Fig. 1.

The synchronizing transmitter 10 may be adjoined to this central station. In all cases, the construction according to my invention permits of fully solving the problem of mobile television stations. It ensures a perfect synchronizing between the feed of the transmitter and that of the receivers, while leaving the vehicle which carries the transmitter entirely free to move during the television process. However, when television has been performed at a fixed place, it is of course possible to obtain the desired synchronization by connecting the phase-meter or any other adjustment apparatus with the local electric distribution system through a cable.

Finally, there is always a suitable power available, to wit that provided for the source of energy mounted on the vehicle.

In a general manner, while I have in the above description disclosed what I deem to be practical and efficient embodiments of the present invention, it should be well understood that I do not wish to be limited thereto as there might be changes made in the arrangement, disposition and form of the parts without departing from the principle of the present invention as comprehended within the scope of the appended claims.

What I claim is:

1. A television system which comprises in combination, a low power television transmitting station, a high power central transmitting station including means for receiving television signals from said low power transmitting station and means for retransmitting said signals, at least one television receiving station, electronic control means at said stations, an independent source of alternating current at said first mentioned transmitting station for feeding said electronic control means thereat, an alternating current distribution system adapted to feed the electronic control means at both said central station and said receiving station, means at said central station for transmitting electric waves modulated at a frequency related to that of said distribution system, and means at said first mentioned transmitting station responsive to said electric waves for synchronizing said independent current feed source to said modulation frequency.

2. A television system which comprises in combination, a low power television transmitting station, a high power central transmitting station including means for receiving television signals from said low power transmitting station and means for retransmitting said signals, at least one television receiving station, electronic control means at said stations, an independent source of alternating current at said first mentioned transmitting station for feeding said electronic control means thereat, an alternating current distribution system adapted to feed the electronic control means at both said central station and said receiving station, means at said central station for transmitting electric waves modulated at the frequency of said distribution system, and means at said first mentioned transmitting station responsive to said electric waves for synchronizing said independent current feed source to the frequency of said distribution system.

3. A television system which comprises in combination, a portable television transmitting station, a high power central transmitting station including means for receiving television signals from said portable transmitting station and means for retransmitting said signals, at least one television receiving station, electronic control means at said stations, an independent source of alternating current at said portable transmitting station for feeding said electronic control means thereat, an alternating current distribution system adapted to feed the electronic control means at both said central station and said receiving station, means at said central station for transmitting electric waves modulated at a frequency related to that of said distribution system, and means at said portable transmitting station responsive to said electric waves for synchronizing said independent current feed source to said modulation freqnency.

4. A television system which comprises in combination, a portable television transmitting station, a high power central transmitting station including means for receiving television signals from said portable transmitting station and means for retransmitting said signals, at least one television receiving station, electronic control means at said stations, an independent source of alternating current at said portable transmitting station for feeding said electronic control means thereat, an alternating current distribution system adapted to feed the electronic control means at both said central station and said receiving station, means at said central station for transmitting electric waves modulated at the frequency of said distribution system, and means at said portable transmitting station responsive to said electric waves for synchronizing said independent current feed source to the frequency of said distribution system.

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