Oct. 18, 1927. 1,645,956

H. KEYL

HIGH FREQUENCY SIGNALING SYSTEM

Filed April 14, 1924

Fig. 1.

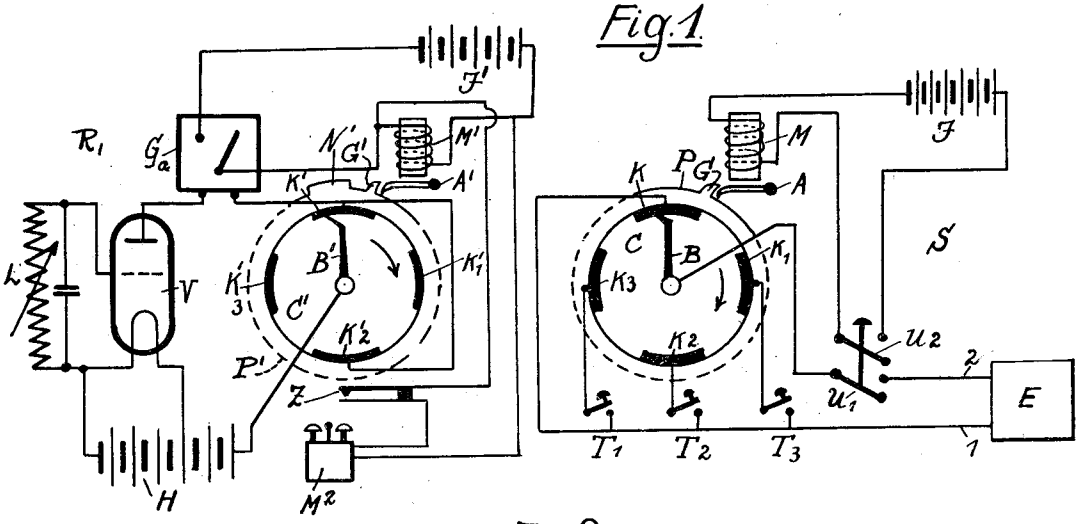


Fig. 2.

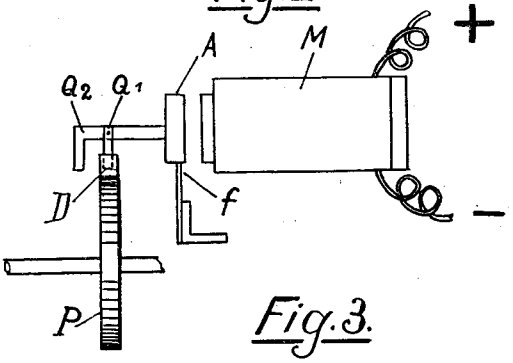
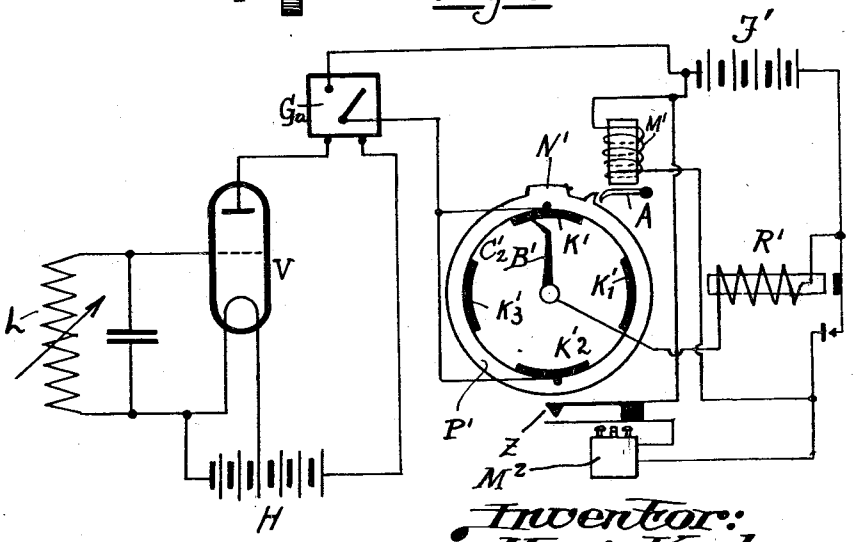


Fig. 3.



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Patented Oct. 18, 1927. 1,645,956

UNITED STATES PATENT OFFICE.

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HIGH-FREQUENCY-SIGNALING SYSTEM.

Application filed April 14, 1924, Serial No. 706,532, and in Germany April 13, 1923.

The invention relates to high-frequency signaling systems and it has particular relation to selective calling of different stations of such systems.

According to the invention, the transmitting and the receiving stations are provided with synchronous contact making devices.

The contact-making devices of the receiving stations successively place different stations in a condition to respond to the high-frequency signals of the transmitting station while the contact-making device at the transmitting station so controls the period of time during which the high-frequency signals are sent out that signals are transmitted only when the station that is to be called is in receiving condition.

The synchronous contact-making devices are preferably of the rotary type and are arranged to make a single complete revolution for each call, each of the receiving stations being placed in receiving condition during a part of the revolution. Such arrangement permits selective calling of a large number of substations by means of very simple calling circuits.

In the accompanying drawings,

Figure 1 is a diagrammatic view of the circuits in the transmitting and receiving stations of a signaling system embodying my invention;

Fig. 2 is a side view of the releasing mechanism used in the synchronous contact-making devices; and

Fig. 3 is a view similar to Fig. 1 of a modification of my invention.

Referring to Fig. 1, a transmitting station S comprises a high-frequency energy transmitter E which is put into operation by means of a switch u_1, that closes the circuit of the wires 1 and 2 leading from the transmitter E to a synchronous contact-making device C. The contact-making device comprises a plurality of circularly disposed, fixed contact segments K, K_1, K_2 and K_3, which are arranged to be successively engaged by a rotary brush B that is mounted upon a disc P which is adapted to be rotated in clockwise direction at a constant speed, by a clock work or other motor, not shown on the drawing.

The disc P is normally prevented from rotation and the brush B is maintained in the initial position, shown in the drawing, by means of a latch A abutting against a suitable projection or stop G of the disc. In the initial position, the brush engages the disc-release contact segment K which is connected to the conductor 1 of the transmitter, the second transmitter conductor 2 leading through the switch u_1, to the rotary brush B. The other contact segments K_1, K_2, etc., are station-call segments and correspond to the various substations that are to be selectively called. Either one of said segments may be used to complete the transmitter circuit, by means of keys T_1, T_2, etc., connecting the corresponding segments to the conductor 1 leading from the transmitter to the disc-release segment K, the circuit being established only while the rotary brush engages the corresponding segment.

The latch A is lifted by means of a latch magnet M which is energized from a source of energy F through a switch u_2 which is operated jointly with the transmitter-energizing switch u_1, both switches being closed upon proceeding to call, by lifting the receiver in the transmitting station, for instance.

Each receiving station is provided with a suitable receiving circuit, indicated schematically by a tuned input oscillating circuit L connected between the filament and grid of a three-electrode tube V. The output circuit of the tube operates a suitable relay or galvanometer G_a, the output circuit being additionally controlled by a synchronous contact-making device C′ comprising fixed contact segments K′, K_1', K_2', etc., and a co-operating brush B′ that is mounted upon a synchronously rotated disc P′, similar to the contact device C of the transmitting station. As in the transmitting station, the brush B′ of each receiving station is normally held in an initial rest position, in engagement with the disc-release contact segment K′, by means of a latch A′ abutting against a stop G′ of the rotary disc P′.

The disc-release contact segment K′ of each receiving station is shown connected through the galvanometer G_a to the plate of the tube V, while the brush leads through a plate battery H to the tube filament. In addition, each of the receiving stations has one of the other contact segments K_1', K_2', etc., connected to the galvanometer lead, a different segment, K_1', K_2' being connected at the different stations, respectively. At the station R_1, shown in the drawing, the galvanometer is connected to contact K_2', at another station to contact K_1', and so forth.

The relay or galvanometer G_a at each receiving station operates through a battery F', the latch lifting magnet M' and a signaling device, such as a bell M_2, the circuit through the latter including an auxiliary switch Z which is closed by a cam N on the rotary disc P' only while the brush B' engages the station-call contact segment K_2' which is connected in the galvanometer circuit of the respective station.

The latch mechanism, at the transmitting and receiving stations, is so arranged that when the latch is lifted the disc will rotate only once and be stopped after the brush has again come into engagement with the disc-release contact segment of the respective station.

A simple construction for securing such operation of the contact device is shown in Fig. 2. The magnetically actuated latch A is attached to a spring *f* and has two disc-catch members Q_1 and Q_2 which are sidewise offset with respect to each other, the catch member Q_1 being also somewhat in front of the other member Q_2. When the latch is released, one catch member Q_1 engages the disc stop G and holds the brush. When the latch is attracted by the magnet, the catch Q_1 releases the stop G of the disc and the brush rotates until it is stopped after one revolution either by catch Q_1, or by catch Q_2, depending on whether the magnet is already deenergized or not. If the magnet is still energized, the disc is stopped first by the second catch Q_2 somewhat before it reaches its ultimate rest position in which the brush is in engagement with the disc-release segment. After the magnet then becomes deenergized, the second catch Q_2 releases the disc for a slight additional motion until it is finally stopped by the main catch Q_1 in the position shown in Fig. 1. The brush will thus carry out only a single rotation each time the latch magnet is energized and will not rotate again until after the magnet has again become deenergized.

The operation of the system is as follows:

When the transmitting station S desires to call one of the receiving stations, for instance, R_1, the key T_2 is pressed down and the switch u_1—u_2 is closed at the transmitting station, by lifting the receiver, for instance, thereby energizing the latch magnet M and completing the connection from the high-frequency transmitter to the synchronous contactor C. The magnet lifts the latch A, releasing the rotary disc P and the brush B for a rotation during which the brush B successively engages the several segments K_1—K_2 of the contactor device C. However, at the moment when the actuating switch u_1—u_2 has been closed, the brush was in engagement with the disc-release contact segment K, thus completing the circuit 1—2 of the high-frequency transmitting device and high frequency oscillations are being sent out while the brush is still in engagement with the segment K.

The radiated waves, upon reaching the receiving stations, actuate the receiving tubes V, and since the output circuits in said stations are closed through the brushes B' which are in engagement with the contact segments K', the contact and the galvanometer device G_a are actuated, energizing the latch magnets M', and releasing the rotary contacting devices C' for a rotation practically simultaneous with the rotation of the contactor device in the sending station.

The rotary brushes B—B' in the sending and receiving stations are arranged to rotate substantially synchronously so that the brushes slide past the corresponding segments at the sending and receiving stations practically simultaneously and come to a rest in all stations after a single rotation at practically the same time. After the brush B at the sending station has left the engagement with the disc-release contact segment K, the circuit of the high-frequency transmitter is opened and the transmission of high frequency energy is stopped. In the course of the further rotation of the brush B at the sending station, the brush successively engages the contact segments K_1, K_2 and K_3, but since only the key T_2 leading to the contact segment K_2 corresponding to the station that is to be called is closed, high frequency energy will be transmitted during the period of time while the brush B engages the contact segment K_2.

At the same time, however, as the brush B in the sending station is in engagement with the contact segment K_2 the brush B' in the receiving station R_1 is in engagement with the contact segment K_2' completing the plate circuit of the receiving tube in the station that is to be called so as to actuate the galvanometer G_a. Since at the same time the cam N' has closed the auxiliary switch Z leading to the signaling or calling device M_2, the galvanometer which is energized by the incoming waves completes the circuit from the battery F' to the signaling device M_2 and actuates the same.

Since in the other receiving stations the other segments K_1', K_3', are arranged in the plate circuits of the receiving tubes V, these stations will not respond by reason of the fact that no energy is being transmitted from the sending station at the time that the brushes in the respective stations engage the corresponding contact segments.

The synchronously rotating brushes complete the revolution and are stopped by the latches A—A' in the manner described hereinbefore.

The signaling device M_2' at the receiving station, which is shown diagrammatically in the form of a bell is, of course, intended only

to illustrate the idea underlying the arrangement for effecting selective calling of the several stations and it is understood that other suitable means might instead be used for establishing communication with the transmitting station.

If it is desired to call another station than that corresponding to the segment K_2, for instance, that corresponding to the segment K_3, the key T_1 in the transmitting station is pressed down instead of the key T_2 and the operation is performed in a way similar to that described before.

In Fig. 3 is shown a modification of my invention wherein the output circuit of the receiving stations is directly connected to the galvanometer G_a, the synchronous contactor device C_2' being connected in a local circuit which is closed or opened by the action of the galvanometer. The brush is normally held in engagement with the disc-release contact segment K' as in the case of the contactor device of the receiving stations shown in Fig. 1. Upon the initial reception of high frequency energy, the galvanometer is actuated, energizing through the disc-release contact segment K' and brush B' the relay R', which in turn, energizes the latch magnet M', setting the brush in rotation. As the brush rotates and slides past the contact segment K_2' of the station that is to be called, the galvanometer is again actuated by the received high frequency oscillations, energizing relay R' which in turn closes the circuit from the battery F' through the signaling device M^2, the auxiliary switch Z being now closed by the protruding cam N' of the rotary disc as in the case of the arrangement shown in Fig. 1.

The foregoing arrangements and circuits are not limited to the particular applications described hereinbefore but I desire that the appended claims be construed to cover broadly any arrangement wherein synchronous devices are provided in a plurality of stations, so as to be set in motion upon the reception of an initial impulse and control in their further operation the relative periods during which the several receiving stations are in a condition to respond to signals transmitted from the sending station.

I claim as my invention:

1. In a high-frequency signaling system, a transmitting station having means for transmitting high-frequency energy, a plurality of receiving stations having means for receiving said energy, signaling means operated by said receiving means, and synchronous control devices in each of said stations for selectively calling any one of said stations from said transmitting station.

2. The combination with a station having means for transmitting high-frequency energy, a plurality of stations having means for receiving said energy and signaling means operated by said receiving means, of means for selectively calling one of the receiving stations from said transmitting station comprising synchronous devices in each of said stations arranged to perform a cycle of operations upon each initiation of energy transmission, the operation of said synchronous devices controlling the relative periods of energy transmission of said transmitting station and the operative connections of the signaling means in said receiving stations.

3. In a high-frequency signaling system, a transmitting station having means for transmitting high-frequency energy, a plurality of receiving stations having means for receiving said energy, signaling means operated by said receiving means, means for selectively calling one of the receiving stations from said transmitting station comprising control devices in all of said stations arranged to synchronously carry out a cycle of operations in response to an initiation of energy transmission from said transmitting station, said devices successively placing the signaling devices of the several stations in operative condition during different periods of said cycle, and means cooperating with the control device in said transmitting stations for restricting the period of energy transmission to the interval of the cycle during which the station that is to be called is in operative condition.

4. An arrangement according to claim 2 characterized by the fact that the synchronous devices in each of said stations carry out a complete cycle of operations at each initiation of energy transmission and automatically return to the initial position.

5. An arrangement according to claim 3 characterized by the fact that the control devices carry out a single cycle of operations in response to each initiation of energy transmission from the sending station and return to the initial position after completion of the cycle.

6. In a high-frequency signaling system, a transmitting station having means for transmitting high-frequency energy and a plurality of receiving stations having means for receiving said energy, signaling means operated by said receiving means, and rotary synchronous contactors actuated in response to the initial transmission of energy from said transmitting station for selectively calling said receiving stations.

7. The combination with a station having means for transmitting high-frequency energy, a plurality of stations having means for receiving said energy, and signaling means operated by said receiving means, of means for selectively calling one of the receiving stations from the transmitting station comprising rotary contactors arranged to synchronously rotate in each of said stations, said contactors being normally at rest in an

initial position, means for simultaneously setting said contactors in rotation in response to the initial transmission of energy from said transmitting station, said contactors successively placing the signaling devices of the several stations in operative condition during different periods of the rotation, and means cooperating with the contactor devices in said transmitting station for restricting the period of energy transmission to the period of the rotation during which the station that is to be called is in operative condition.

8. An arrangement according to claim 6 characterized by the fact that the contactor devices comprise a rotary brush and a plurality of stationary segments arranged to be successively engaged by said brush in the course of rotation thereof, the contact segment which is in engagement with the brush in the normal rest position being permanently connected to complete the circuit of the transmitting and receiving means, when engaged by the brush respectively, the other contact segments at the transmitting station having means for selectively completing the circuit of said high-frequency transmitting means, when engaged by the brush and different segments of the contactor devices at the different receiving stations being connected to complete the circuit of the signaling means in the respective stations when engaged by the brushes in said stations.

9. The combination according to claim 7 characterized by the fact that the contactor devices comprise a rotary brush and a plurality of stationary segments arranged to be successively engaged by said brush in the course of rotation thereof, the contact segment which is in engagement with the brush in the normal rest position being permanently connected to complete the circuit of the transmitting and receiving means when engaged by the brush respectively, the other contact segments at the transmitting station having means for selectively completing the circuit of said high-frequency transmitting means, when engaged by the brush and different segments of the contactor devices at the different receiving stations being connected to complete the circuit of the signaling means in the respective stations when engaged by the brushes in said stations.

In testimony whereof I affix my signature.

HANS KEYL.