March 2, 1948. R. K. POTTER 2,436,824

RADIO PAGING FOR VEHICLES

Filed Dec. 22, 1944 3 Sheets-Sheet 1

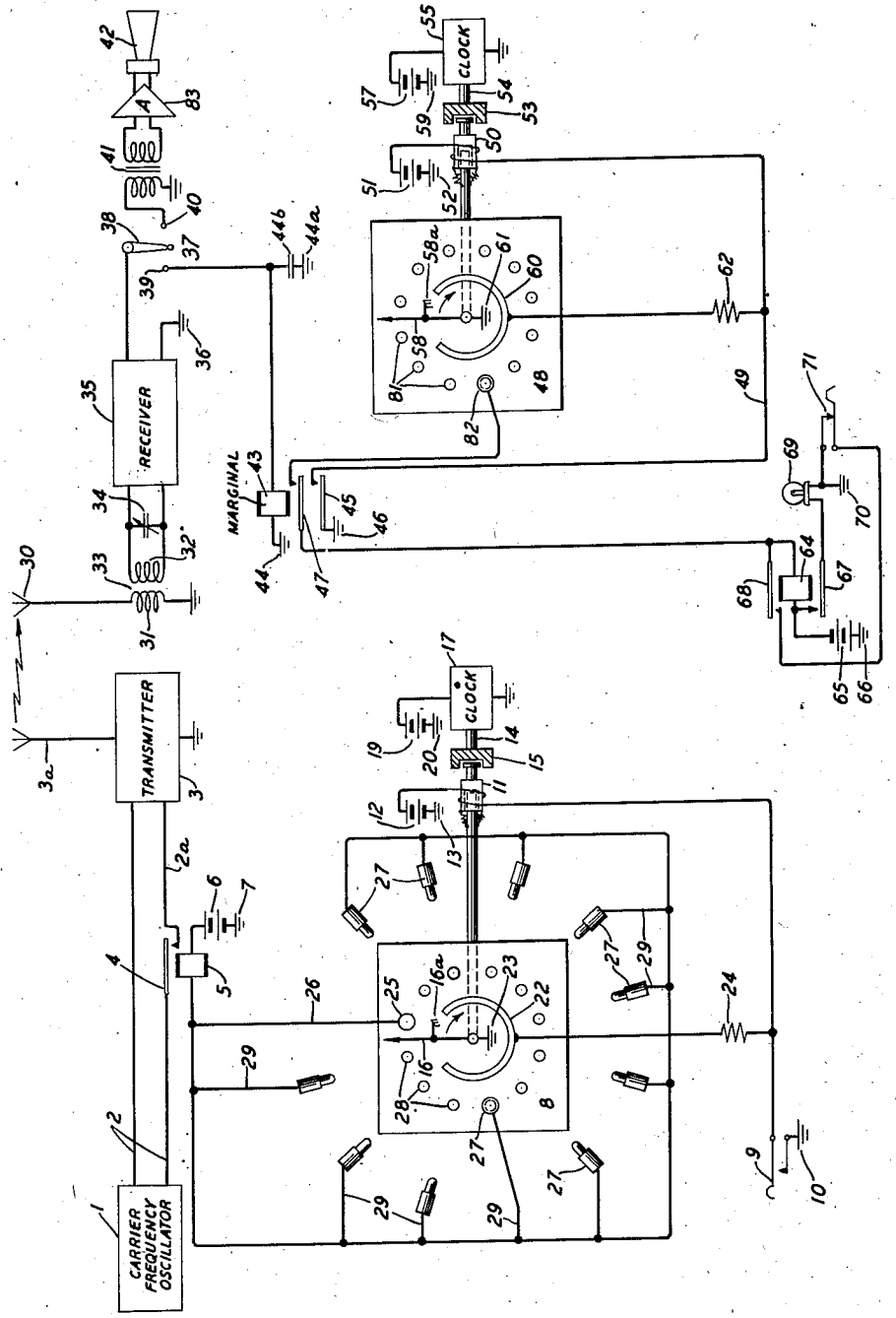

FIG. 1

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FIG. 2A

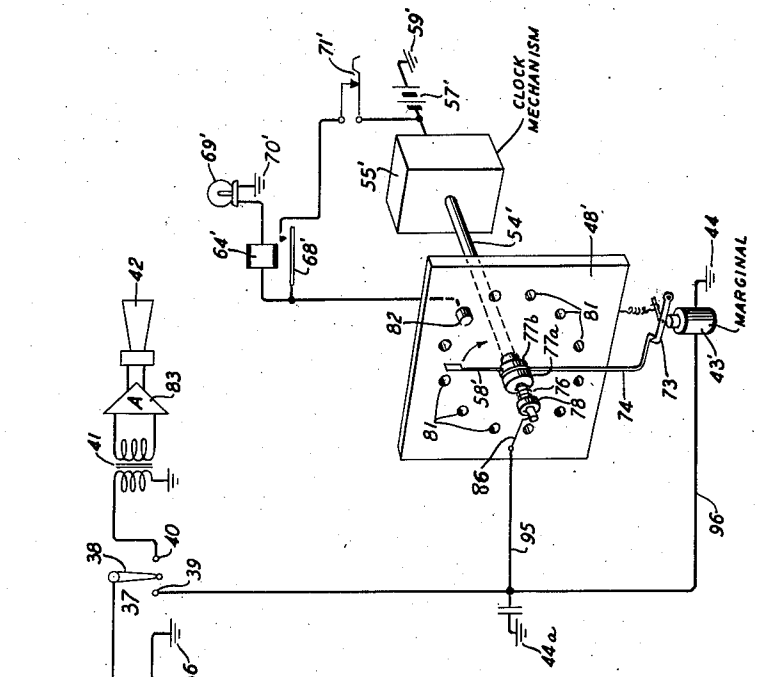

FIG. 2B

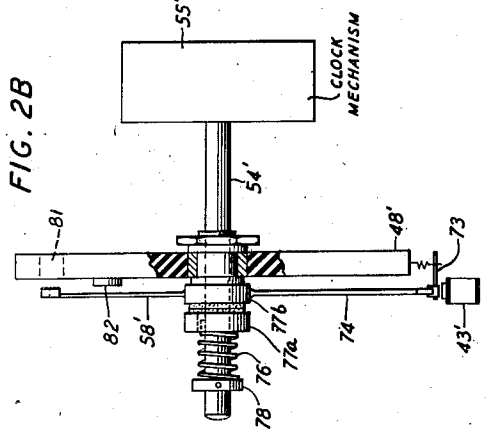

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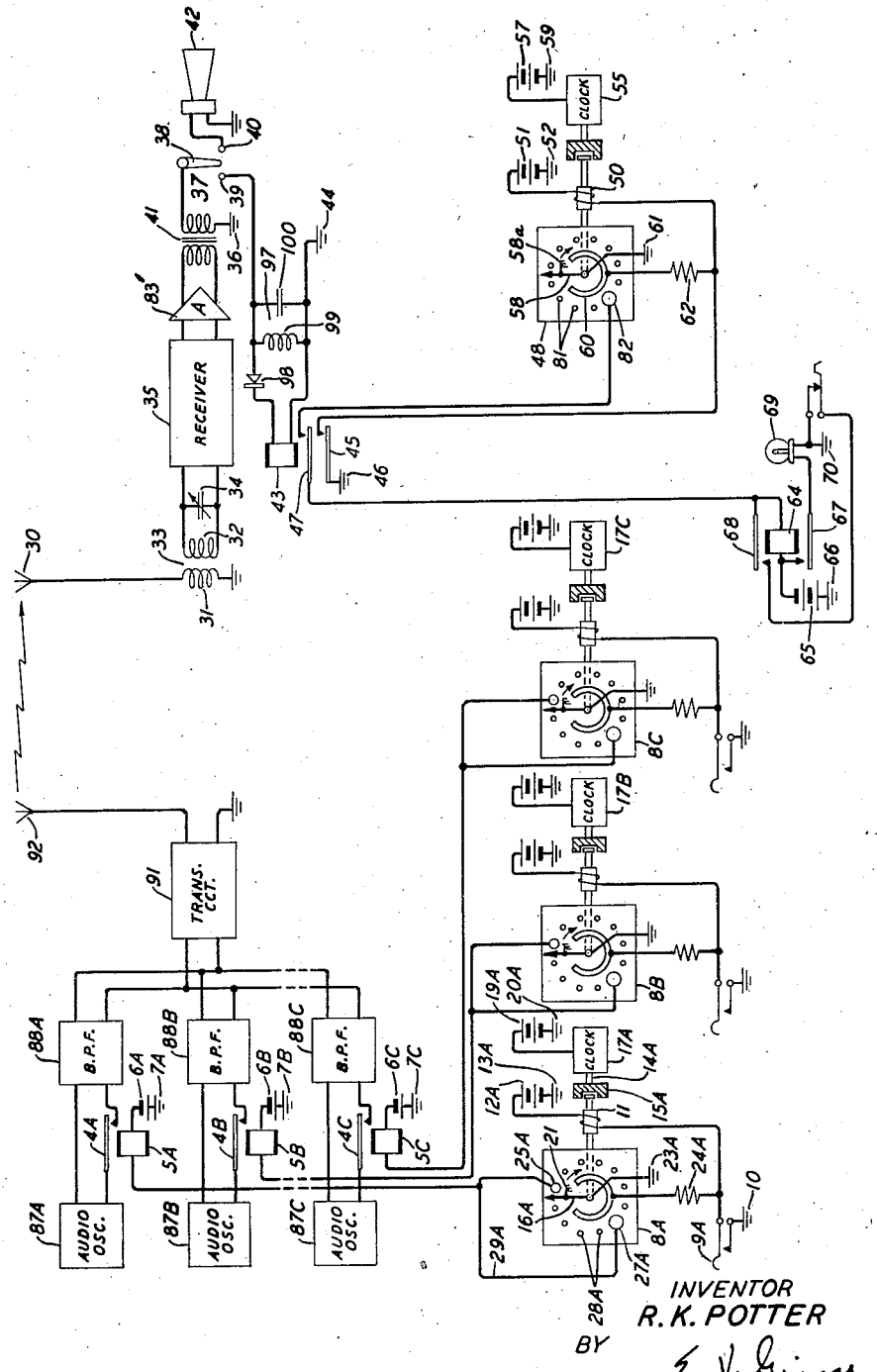
FIG. 3



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UNITED STATES PATENT OFFICE

2,436,824

RADIO PAGING FOR VEHICLES

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12 Claims. (Cl. 250—6)

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This invention relates in general to communication systems and in particular to radio systems in which a single radio transmitting station can selectively signal any one of a plurality of subscribing units.

The need has been recognized for a simple and inexpensive method of communication to enable drivers of vehicles en route from one point to another to be apprised of awaiting messages. Such a service is especially adapted for use by buses and trucks traveling over extended routes and by professional persons such as doctors or salesmen obliged to make a series of consecutive calls in their private vehicles. However, the system herein disclosed conceivably has many other uses. While radio calling or annunciator systems of the type disclosed in an article entitled "Radio telephone signalling," by Charles S. Demarest, Milton L. Almquist, and Lewis M. Clement, Journal of the American Institute of Electrical Engineers, volume 43, March 1924, have been employed in ship to ship and ship to shore communication, and similar systems have been utilized for train dispatching and air-transport communication, the apparatus used for these purposes is in general somewhat expensive and cumbersome for the type of service primarily envisioned by the applicant.

It is therefore the principal object of this invention to provide a simple means for radio paging of vehicles whereby conventional broadcast program receiving equipment is utilized at least in part for call reception by subscribing units.

Another object of this invention is to provide an inexpensive means whereby one of a plurality of subscribing stations may be selectively signalled by the calling transmitter.

A still further object of this invention is to provide a method for increasing the number of subscribing units which can be served with facility by a single call transmitting unit without appreciably increasing the cost and size of the transmitting equipment.

Additional objects will be apparent upon consideration of the following specification.

In a preferred embodiment, the system of the present invention operates as follows. A message for a calling service subscriber is communicated to an operator at the transmitter station. The operator then selectively signals the designated vehicle subscriber station whereupon some signal device, such as a lamp or a bell, referred to variously hereinafter as an "announcing device" or "signal annunciator" operates to notify the subscriber that a message awaits him. Thereupon he may communicate with the calling transmitter station by telephone at his earliest convenience to learn the message.

Certain phrases and terms as used hereinafter

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in the specification and claims will be defined as follows.

The phrase "calling carrier frequency" refers to oscillations preferably but not necessarily of an order of frequencies which is the same as or higher than that of the conventional broadcast range; while the phrase "modulating frequencies" refers to frequencies of the order of 15 kilocycles or less.

"Message translator" refers to any device such as a loud speaker or an ink recorder connected to the audio stage of a conventional high frequency receiver whereby the audio modulations of carrier frequency there detected and amplified are translated into such a form as to convey meaning to a receiving operator.

"Mobile unit" refers to any body which may be moved with facility from one place to another.

The phase "selector unit" or "selector mechanism" refers to mechanisms of a type well known in the art whereby one of a plurality of local units may be signalled in preference to the others by virtue of the fact that the local circuits contain uniquely placed contacts each of which is engaged at a different instant during a stated time interval by contactors or arms moving synchronously in all of the local units. The selector arm usually but not necessarily moves in rotary fashion about an axis, an attached brush engaging contacts fixed at desired points on a dial.

The calling apparatus in a preferred embodiment comprises a source of radio-frequency carrier oscillations which are fed from a transmitter onto an antenna as a series of pulses, the duration and timed relationship of which are controlled by a clock-driven selector mechanism. Removable contact plugs connected to the pulsing means of the transmitter may be inserted into jacks on the selector dial so that one or many desired subscribing stations can be signalled during a particular selector cycle which may be defined as that time interval during which the selector arm moves from the home position through all the positions on the selector dial and returns again to the home position.

In a preferred embodiment, the call receiving apparatus may comprise the conventional broadcast receiving antenna coupled to a receiver of the type ordinarily employed in automobiles which can be tuned either to the broadcast range or to a calling frequency carrier wave. The conventional dash-board clock mechanism furnishes the motive power for operation of the selector which is connected to one optional contact of a two-way switch the common pole of which is connected to the audio output of a conventional receiver and the other optional contact of which is connected to a conventional broadcast loudspeaker, broadly designated in the claims hereinafter as a "message indicator" or "message

translator." Thus, the calling-service subscriber may at will switch off the loud-speaker circuit of his radio broadcast receiver thereby cutting off broadcast reception, and in its stead substitute the clock-driven selector mechanism preparatory to receiving signals from the calling system. A plug electrically connected to an annunciator device is fixed at a predetermined position on the subscriber's selector dial. After the subscriber tunes his broadcast receiver to the calling carrier frequency and operates the switch cutting off the loud-speaker or other message indicator, the first received pulse of calling carrier frequency initiates operation of the selector mechanism. When that particular subscriber's station is called, a second carrier frequency pulse is received at that instant when the selector arm at that station engages the contact plug, causing a signal device to operate indicating a call.

It is therefore significant that according to this invention only the function switch, the selector, and the clutch with its clutch mechanism need be added to the conventional car dash-board radio and clock equipment to enable any particular vehicle to become a participating member of the calling system.

In one embodiment of the invention, a central transmitting unit of carrier frequency is provided with apparatus for simultaneously sending out signals of several different audio modulations. To each audio circuit, a separate selector unit is connected, so that such a transmitting station is thus enabled to serve several times as many subscribers as can conveniently be accommodated in a selective signalling or annunciator system utilizing pulses of carrier frequency without audio frequency modulation.

A tuned circuit placed in each subscriber's selector circuit causes that particular circuit when connected to its respective broadcast receiver to be responsive to only one of the audio frequencies sent out by the calling transmitter.

The invention will be better understood from a study of the detailed description of several embodiments of the features thereof as given hereinafter and by reference to the accompanying drawings, in which:

Fig. 1 is a schematic diagram of a preferred embodiment of a calling system for vehicles showing a typical call transmitter and call receiving unit;

Fig. 2A shows schematically alternative selective signal receiving means which might be incorporated in a calling system in accordance with the invention;

Fig. 2B is a side elevation of the clock-driven selector mechanism of Fig. 2A showing in detail mechanical means for coupling the selector mechanism to the driving shaft of the clock; and

Fig. 3 is a schematic diagram of a modified calling system in which the calling carrier frequency is modulated according to several distinct audio frequencies.

A typical vehicle calling system according to the invention may, as shown in Fig. 1 of the drawings, embody the following features. Carrier frequency oscillations are supplied from the radio frequency oscillator 1, which may be of any well-known type, through a circuit 2—2*a* to the radio transmitter 3 from which the oscillations are fed onto the transmitting antenna 3*a*.

The transmitted carrier frequency oscillations are pulsed by means of an armature 4 which makes and breaks contact between one of the lead wires 2 from the oscillator and the lead wire 2*a* to the transmitter in response to energization of the electromagnet 5. Energization of the electromagnet 5 which is electrically connected to the battery 6 and the ground connection 7 is controlled by the clock-driven selector mechanism 8.

The selector mechanism 8 operates as follows. When the transmitting operator presses the key 9 causing the ground connection 10 to be engaged, a circuit is completed through the windings of the electromagnet 11 and the battery 12 to ground connection 13. Thus energized, the electromagnet 11 actuates its movable solenoid core constituting part of the clutch 15 thus mechanically coupling clock shaft 14 to the selector arm 16. Rotation of the clock shaft 14 by the clock mechanism 17, which is electrically connected to the battery 19 and the ground connection 20, causes the selector arm to move around the selector dial. When the brush 16*a* on the selector arm 16 engages the conducting ring 22, the circuit of the electromagnet 11 is connected through the resistor 24, ring 22, brush 16*a* and selector arm 16 to the ground connection 23, thus causing electromagnet 11 to remain energized after release of the key 9 by the operator. This locks the selector arm 16 in engagement with the clock shaft 14 for the duration of the cycle, i. e., until brush 16*a* disengages ring 22, so that said selector arm continues to move around the selector dial. The first step through which selector arm 16 moves after motion thereof has been initiated brings it into engagement with contact 25 which is permanently connected through the lead 26 to the winding of electromagnet 5. Connection through the selector arm 16 to the ground contact 23 causes the electromagnet 5 to be momentarily energized thus actuating the armature 4 to close the circuit 2—2*a* whereby a pulse of carrier frequency oscillations is transmitted. As the selector arm 16 moves on around the dial, it makes electrical contact with whichever of the plugs 27 are placed in the jacks 28, each of which represents a different subscribing station in the selector cycle. When the selector arm 16 contacts a given plug 27, which has been previously placed in the corresponding jack 28, the circuit is closed from the ground contact 23 through the brush 16*a* and plug 27 connecting wire 29, the windings of the electromagnet 5, and the battery 6 to ground 7. As at the initial step, the electromagnet 5 is again energized whereby the armature 4 is actuated to close the circuit 2—2*a* thus causing pulses of carrier frequency oscillations to be transmitted at desired instants in the selector cycle, corresponding to particular subscribing stations to be called.

One embodiment of a call receiving apparatus for subscribers as shown schematically in Fig. 1 operates as follows. A pulse of carrier frequency received by the antenna 30 passes to ground through the primary 31 of the transformer 33 thereby inducing an electromotive force in the transformer secondary 32. The tuning means 34, which may comprise either a single variable condenser or a block of condensers in series and/or parallel arrangement, may be varied over a range that includes the calling carrier frequency in addition to the conventional broadcast range of frequencies. The incoming signal to which the circuit 32—34 is tuned passes into the receiver 35, which may be of any well-known type, but is preferably a type suitable for use in a conventional dash-board car radio unit. The direct current output from the audio detector of the receiver 35

is conducted to the common pole 38 of the double-throw switch 37. If the switch 37 is positioned to close contacts 38—40, the audio output passes from the receiver 35 through the switch 37, the transformer 41 and the audio amplifier 83 to the loud-speaker or other message translating unit 42. This is the condition for ordinary broadcast reception.

In order to condition the apparatus to receive calls from the calling transmitter, the tuning means 34 is tuned to the calling carrier frequency of transmitter 3 and the switch 37 is positioned to close contacts 38 and 39 thereby cutting off the loud-speaker 42, and connecting the audio detector of the receiver 35 to the clock-driven selector mechanism 48. Received calling carrier signals then pass from the antenna 30 through the transformer 33, the tuned circuit 32—34 to the receiver 35, and the resulting space current from the detecting circuit passes by way of the switch 37 and the winding of the electromagnet 43 to ground 44. An alternate path to ground 44a through the condenser 44b is provided to shunt alternating current remaining in the output of the receiver 35 away from the windings of the magnet 43. The electromagnet 43 should be understood to be of a marginal type responsive to direct current such that any minute current which may flow in the absence of calling signals will be insufficient to energize the relay, but the increased current occurring upon detection will exceed the margin and operate the relay. Thus energized, the electromagent 43 actuates the armatures 45 and 47, thereby connecting the ground 46 through the connecting wire 49, to the circuit of the electromagnet 50, which is connected to the battery 51 and ground 52. The electromagnet 50 is then caused to actuate its movable solenoid core which constitutes part of the clutch 53 thereby mechanically coupling the clock shaft 54 to the selector arm 58. As in the transmitter apparatus described hereinbefore, rotation of the clock shaft 54 which is electrically connected through the battery 57 to ground 59, causes the selector arm 58 to move around the selector dial. As soon as the brush 58a on the selector arm 58 contacts the ring 60, the ground 61 is applied through the resistor 62 to the circuit of the electromagnet 50, thereby causing the electromagnet 50 to remain energized after the cessation of the initial calling pulse which energizes the electromagent 43, and thus locking the clutch 53 in operation for the duration of the selector cycle, i. e., until brush 58 disengages ring 60. The selector arm 58 moves around the selector dial until it engages the annunciator contact plug 82 which is fixed in an appropriately positioned jack 81. Each subscribing station has a unique position on the dial. In the particular subscriber's unit being called the second pulse of calling carrier frequency received through the antenna 30, passes through the transformer 33, the tuned circuit 32—34 and into the receiver 35. The direct current output, which is then taken from the audio detector of the receiver 35, passes through contacts 38 and 39 of switch 37, and the windings of the electromagnet 43 to ground 44, thus causing the electromagnet 43 to be energized at the instant when the arm 58 is in engagement with the plug contact 82. The armature 45 is actuated completing the locking circuit of the electromagnet 50; and the armature 47 is actuated completing a circuit from the ground 61 through the selector arm 58, the contact 82, the windings of the electromagnet 64, and the battery 65 to ground 66. Energization of the electromagnet 64 actuates the armature 67 to close circuit from the ground 70 through the signal lamp 69, armature 67, and the battery 65 to ground 66, thus causing the signal lamp 69 to light. Simultaneously, the armature 68 is actuated to apply the ground contact 70 through the normally closed contacts of key 71 and armature 68 to the circuit of the electromagnet 64, causing it to remain energized after the cessation of the pulse, and thereby locking the signal lamp 69 in operation. Depressing the key 71 will disconnect the ground 70 from the circuit of the electromagnet 64, thereby deenergizing it and causing the signal lamp 69 to be extinguished.

It will be apparent that each of the various receiving stations which are to be called will have its annunciator energizing selector contact 82 at a position individual to and characteristic of that particular receiving station. Consequently, a relatively large number of receiving stations may be selectively called by a single transmitter since as many individual contact positions may be provided as will afford the necessary selective factor which is, of course, dependent upon the difference in the time interval occasioned by passing from a selector contact position to the nearest adjacent one. A particular advantage of the system is that additional mobile stations may be added by the use of apparatus identical with that used at the other mobile stations except for the position of the contact 81 to which the lead to the annunciator circuit is connected.

A modified embodiment of a receiving unit, according to the invention, is shown in Fig. 2A of the drawings. Members identical in structure and function with corresponding members of the system of Fig. 1 will be designated by corresponding reference characters. As in Fig. 1, the carrier frequency signal is received by the antenna 30, from which it passes through the transformer 33 and tuning means 34 to the radio frequency stage of the receiver 35. The amplified, detector signal is conducted from the audio detector of the receiver 35 to the common terminal 38 of the double-throw switch 37. As in Fig. 1, when the apparatus is utilized for ordinary broadcast reception, the switch 37 is positioned to connect points 38 and 40, thereby coupling the loud-speaker 42 through the audio amplifier 83 and the transformer 41 to the audio detector of the receiver 35.

When the tuning means 34 is tuned to the calling carrier frequency and the switch 37 is positioned to engage contacts 38—39 thus cutting off the amplifier 83 and the loud-speaker 42 and electrically coupling the clock-driven selector mechanism 48' to the receiver 35, the apparatus is in condition to receive calling signals as follows. An initial pulse of calling carrier frequency is received by the antenna 30 and passed through the transformer 33 and the tuned circuit 32—34 to the receiver 35 where it is amplified and detected. Current from the audio detector of the receiver 35 then passes through contacts 38 and 39 of the switch 37, through the windings of the electromagnet 43' to ground 44. The electromagnet 43' is of a marginal type as described with reference to the apparatus of Fig. 1.

The mechanical arrangement utilized for coupling the selector mechanism to the drive shaft of the clock in the modified embodiment shown in Fig. 2 is a type of friction clutch well known

in the art. Its operation will be better understood by reference to Fig. 2B of the drawings.

When the selector mechanism 48' is not in operation, the clock shaft 54' driven by the clock mechanism 55' rotates carrying with it the collars 78 and 77a, and the spring 76 attached therebetween. The spring 76 acts through a spline to maintain a sliding frictional contact between the matching surfaces of the rotating collar 77a and the collar 77b which remains fixed as long as the arm 74 is held in position by the latching armature 73.

When an initial pulse from detector of the receiver 35 passing through contacts 38 and 39 of the switch 37, energizes the electromagnet 43' to attract the latching armature 73, the top arm 74 is thereby released. The frictional force between the surfaces of 77a and 77b is then great enough to cause the collar 77b to make one complete rotation with the shaft 54', carrying with it the stop arm 74 and the contact arm 58'. When the arm 74 returns to its starting point it is again latched in position by the armature 73.

The removable contact plug 82 is inserted in one of the jacks 81 in a position assigned uniquely to each particular subscriber by the calling service. As the contact arm 58' moves around the selector dial, it engages the contact plug 82 during the course of the rotation. In the particular subscribing unit which is being called, a second pulse of calling carrier frequency is received by the antenna 30, amplified and detected by the receiver at the instant when the contact arm 58' engages the contact plug 82. The detector output from the receiver 35 then passes through the contacts 38 and 39 of the switch 37 and by way of the lead 96 through the relay 43' to ground 44. Current also passes over a parallel path by way of the conducting wire 95 through the brush 86 which rides on the shaft 54', whereby electrical contact is established with the contact arm 58' closing the circuit through the plug 82. The relay 64' which is of the marginal type, is energized, actuating the relay armature 63', thereby closing the circuit from the power source 57', and causing the lamp 69' to be lighted and locked in operation. The lamp 69' may be extinguished by depressing the key 71' thereby breaking the circuit to the battery 57'.

As stated in the description of Fig. 1 above, the number of receiving stations which may be selectively called by a single transmitter depends on the number of individual contact positions which may be accommodated with the required degree of selectivity in a single selector cycle.

In order to make it possible for a single transmitter to accommodate a larger number of subscribers than would be possible by use of the systems described with reference to Figs. 1 and 2 of the drawing, another embodiment of the invention employs audio frequency modulation of the timed carrier frequency pulses sent out by the calling service transmitter.

The system of Fig. 3 which is designed to simultaneously transmit a number of separate signals, each having the same carrier frequency but a different audio modulation, operates as follows. Three different audio frequency signals from generators 87A, 87B and 87C, which may be of any type known to the art such as multi-vibrators, are fed through three similar circuits which include the band-pass filters 88A, 88B and 88C to the transmitting unit 91 which combines a modulating circuit of some type well known in the art with a carrier frequency oscillator and conventional transmitter such as are indicated separately as elements 1 and 3 of Fig. 1. The function of the band-pass filters 88A, 88B and 88C is to prevent the transients produced by the operation of the relays from being transmitted and possibly causing false operation. Before being fed into the transmitting unit 91, the three different audio signals are pulsed by means of armatures 4A, 4B and 4C which are responsive to electromagnets 5A, 5B and 5C, respectively. The energization of electromagnets 5A, 5B and 5C is controlled in each case by means of a corresponding separate selector unit 8A, 8B or 8C, each of which operates in the manner described in detail with reference to the selector 8 of Fig. 1 of the drawings. Thus, the pulses from the three different selector systems may be broadcast simultaneously from the transmitting unit 91 through the antenna 92 as different audio modulations of a single calling carrier frequency. The number of modulating audio frequencies, and hence, the number of separate systems to be used in any particular calling system, need not be limited to three as shown in the foregoing example, but may be any number which can be operated conveniently from a single transmitter.

The calling receiver in the audio modulated calling system shown in Fig. 3 operates as follows: Assume that the tuned circuit 32, 34 is tuned to the calling carrier frequency and the switch 37 is positioned to close contacts 38 and 39 so that the message translator 42 is disconnected from the receiver 35. An initial pulse of audio modulated calling carrier frequency energy is received by the antenna 30, and passed through the transformer 33 and the tuned circuit 32, 34 to the receiver 35 where it is detected. The audio detector output of the receiver 35, the amplitude of which varies in accordance with the modulating audio frequency of the received calling carrier pulse then passes through the amplifier 83', the contacts 38 and 39 of the switch 37, and into the tuned circuit 97 which comprises the condenser 100 and the inductance 99 in parallel. The tuned circuit 97 is an audio frequency selective device which corresponds in its resonance frequency to one of the modulating frequencies of the audio generators 87A, 87B or 87C. If the modulating frequency of the received calling carrier signal is such that the tuned circuit 97 is responsive thereto, the output of the rectifier 98 energizes the electromagnet 43, which represents a marginal type relay as described with reference to Fig. 1 above, thereby actuating the armatures 45 and 47 and initiating operation of the selector unit 48. Operation of the selector unit 48 is similar to that described with reference to the apparatus of Fig. 1. If the tuned circuit 97 associated with particular selector unit is not responsive to the modulating frequency of the received calling carrier frequency, no action takes place. A second pulse of calling carrier frequency modulated according to the audio frequency to which the tuned circuit 97 is responsive and received at that instant when the selector arm 58 is in engagement with contact 82 in jack 81 again energizes the relay 43. This causes the signal lamp 69 to light as described with reference to Fig. 1.

By means of the system described with reference to Fig. 3, the transmitting operator can call simultaneously a number of different sets of subscribers corresponding to the number of audio modulated frequencies sent out by the transmit-

ter, inasmuch as each subscribing selector unit contains a tuned circuit responsive to one of the several audio modulating frequencies of the transmitter.

Although the invention of the applicant has been herein shown and described with reference to certain specific embodiments comprising certain component elements, this invention should not be construed as limited to these embodiments or any specific combination of these elements.

What is claimed is:

1. A radio message receiver and announcing system comprising radio receiver apparatus having output terminals, a selector having a movable contactor, a message translator, a constantly operating motor, an announcing device, means responsive to a first pulsed signal received by said radio receiver for causing the selector to mechanically connect the movable contactor to the motor, means responsive to a second pulsed signal received by said radio receiver at a predetermined interval after the preceding signal to enable the motor-driven movable contactor of the selector to actuate the announcing device and means whereby the selector or the message translator may be alternatively connected to said output terminals.

2. Radio call receiving apparatus for a mobile unit comprising a radio receiver, a loud-speaker, a clock, and a signal annunciator device the energization of which is controlled by the clock, and means for alternatively connecting the radio receiver to the loud-speaker or to the annunciator device whereby either radio broadcast program messages or an annunciator signal individual to the particular mobile unit may be had from the same radio receiver according to which apparatus is connected thereto.

3. An annunciator system for a mobile station comprising a radio receiver having output terminals, said radio receiver tunable to a range of frequencies including a calling carrier frequency, a loud-speaker, selective call receiving means, an annunciator apparatus, a motor, and means for connecting the radio receiver output terminals to the loud-speaker or to the selective receiving means alternatively, said selective receiving means responsive to one impulse of calling frequency carrier waves received by said receiver to connect itself to the motor and to a second properly timed impulse of waves of the same carrier frequency received by said receiver to actuate said annunciator device to announce a call.

4. An automobile radio announcer system for announcing to an occupant of an automobile that his attention is desired comprising a radio broadcast receiver having output terminals and a loud-speaker electrically connected thereto, a selector having a movable contactor, a clock having a rotating shaft, an annunciator, means for disconnecting the loud-speaker circuit from the output terminals of the receiver and connecting the selector in its stead, means responsive to a calling signal received by the receiver for connecting the selector contactor to the shaft and responsive to a second calling signal received at a predetermined interval after the first for causing the selector contactor to energize the annunciator.

5. In a radio calling system, a call receiving device comprising in combination a radio receiver, a message translator connected thereto, means for tuning said receiver to desired incoming carrier frequencies including the calling carrier frequency, a continuously operating motor, a driving mechanism connected thereto, a selector mechanism provided with a clutch, means for disconnecting said message translator from said receiver and connecting said selector mechanism in its stead, means for engaging said selector mechanism with the driving mechanism of said motor, means for retaining said selector mechanism in said engagement for a designated time interval, a signal device connected to said selector mechanism, and means responsive to a calling signal received by said receiver at a predetermined time in said time interval to actuate said signal device.

6. In a radio calling system, a calling means including a transmitter, said transmitter comprising in combination a source of carrier frequency oscillations, a continuously operating motor, a driving mechanism connected thereto, a selector mechanism provided with a clutch, means to actuate said selector clutch to cause said selector mechanism to be connected to said driving mechanism, means for retaining said selector mechanism connected with said driving mechanism for a designated time interval, pulsing means controlled by said selector mechanism to enable carrier frequency pulses to be transmitted at desired instants in said time interval; a plurality of call receiving means each of which comprises in combination a radio receiver, means for tuning said receiver to desired incoming carrier frequencies including the calling carrier frequency, a message translator connected to said receiver, a continuously operating motor, a driving mechanism connected thereto, a selector mechanism provided with a clutch, means for disconnecting said message translator from said receiver and connecting said selector mechanism in its stead, means operative upon reception of an initial calling frequency pulse to cause said selector mechanism to engage the driving mechanism of said motor, means for retaining said selector mechanism in said engagement for the desired time interval, a signal device connected to said selector mechanism, means to cause said signal device to respond to a calling signal received at a predetermined time in said time interval.

7. In a radio calling system, a call receiving device comprising in combination a radio receiver, a message translator connected thereto, means for tuning said receiver to desired incoming carrier frequencies including a calling carrier frequency, a continuously operating motor, a driving mechanism connected to said motor, a selector mechanism comprising a selector dial, a removable contact positioned at a predetermined point thereon, a selector arm rotatable to engage said contact at a predetermined time in its cycle of rotation, clutching means connected to said selector mechanism, means for disconnecting said message translator from said receiver and connecting said selector mechanism in its stead, means responsive to an initial pulse of calling frequency received by said receiver to actuate said selector clutch to cause said selector mechanism to engage the driving mechanism of said motor, means for retaining said selector mechanism in said engagement for the desired time interval, a signal device connected to said contact on said selector dial, and means responsive to a calling signal received by said receiver at a predetermined time in said selector cycle to actuate said signal device.

8. In a radio calling system, a calling means including a transmitter, said transmitter comprising in combination a source of carrier frequency oscillations, a selector mechanism com-

prising a selector dial, removable contact plugs positioned thereon, a selector arm rotatable to engage said contacts in succession, clutching means connected to said selector mechanism, a continuously operating motor, a driving mechanism connected thereto, means to actuate said selector clutch for connecting said selector mechanism to said driving mechanism, means for retaining said selector connected to said driving mechanism for a desired time interval, means connected to said contact plugs to enable pulses of carrier frequency to be transmitted at desired instants in said selector cycle; a plurality of call receiving means each comprising in combination a radio receiver, means for tuning said receiver to a desired calling carrier frequency, a continuously operating motor, a driving mechanism connected thereto, a selector mechanism comprising a selector dial, a removable contact plug positioned at a predetermined point thereon, a selector arm rotatable to engage said contact at a predetermined time in the cycle of rotation of said selector, a clutch connected to said selector mechanism, means to actuate said selector clutch to engage the driving mechanism of said motor, means for retaining said clutch in said engagement for the desired time interval, a signal device connected to said contact plug on the selector dial, and means responsive to a calling signal received by said receiver at a predetermined time in said selector cycle to actuate said signal device.

9. In a calling system, a call receiving means comprising in combination a radio receiver, a message translator electrically connected thereto, means for tuning said receiver to desired incoming carrier frequencies including the calling carrier frequency, a continuously operating motor, a driving mechanism connected thereto, a selector mechanism provided with a clutch, means for disconnecting said message translator from said receiver and connecting said selector mechanism in its stead, electrically selective means connected in circuit with said selector mechanism and responsive to current of a predetermined audio frequency, means responsive upon reception by said receiver of an initial calling carrier frequency pulse of the audio-modulating frequency to which said selector circuit is responsive to cause said selector mechanism to engage said driving mechanism, means for retaining said selector mechanism in said engagement for a desired time interval, a signal device connected to said selector mechanism, and means responsive to actuate said signal device upon reception by said receiver, at a predetermined time in said time interval of a calling signal modulated according to the audio frequency to which said selector circuit is responsive.

10. In a calling system, a calling means including a transmitter, said transmitter comprising in combination a source of carrier frequency oscillations, means for modulating said carrier frequency oscillations by a plurality of audio frequencies, a continuously operating motor associated with each audio frequency circuit, a driving mechanism connected to said motor, a selector mechanism provided with a clutch, means actuating said selector clutch to engage the driving mechanism, means for retaining each said selector mechanism in said engagement for a desired time interval, means controlled by each said selector mechanism to cause pulses of audio-modulated carrier frequency to be transmitted at desired instants in said time interval; a plurality

of call receiving means each comprising in combination a radio receiver, a message translator connected to said receiver, means for tuning said receiver to desired incoming carrier frequencies including the calling carrier frequency, a continuously operating motor, a driving mechanism connected thereto, a selector mechanism provided with a clutch, means for disconnecting said message translator from said receiver and connecting said selector mechanism in its stead, electrically selective means connected in circuit relationship to said selector mechanism and responsive to one of the modulating audio frequencies of said calling carrier oscillations, means responsive upon reception by said receiver of an initial calling frequency pulse of the audio-modulating frequency to which said selector circuit is responsive to actuate said clutch to engage the driving mechanism of said motor, means for retaining said clutch in said engagement for the desired time interval, a signal device connected to said selector mechanism, means responsive to actuate said signal device upon reception by said receiver at a predetermined time in said time interval of a calling signal modulated according to the audio frequency to which said selector circuit is responsive.

11. In a radio calling system comprising in combination a transmitter adapted to send pulsed carrier frequency signals which may be modulated alternatively according to respectively different audio frequencies, a plurality of call receiving units, means for tuning each of said receiving units to desired incoming carrier frequencies including the calling carrier frequency of said transmitter, pulse responsive means connected to each of said receiving units, a signal device connected to each said pulse responsive means, said pulse responsive means adapted to actuate said signal device only in response to calling pulses of a predetermined time relationship, electrically selective means connected to said pulse responsive means whereby said pulse responsive means responds to pulses of only one of the modulating audio frequencies of said calling carrier frequency signals, and switching means to enable the call receiving equipment including said receiving units and said pulse responsive means to be at least partially utilized for conventional broadcast reception when said receiving equipment is not being utilized for calling signal reception.

12. A radio call receiving apparatus comprising a radio receiver, a message translator connected thereto, a selective call receiving means, said call receiving means having an announcing device connected thereto, a motor, signal controlled means responsive to a first pulsed signal from said receiver for initiating operation of said call receiving means by connection thereof to said motor, and signal controlled means responsive to a second pulsed signal from said receiver following the first signal by a predetermined interval for actuating said announcing device.

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