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RADIO ELECTRIC SURVEY AND VOTING
SYSTEM

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10 Claims. (Cl. 250—2)

This invention pertains to methods as well as ways and means of manually registering and voting by the individuals of a great scattered audience by radio electric means synchronously operated, with auxiliary means for registering the number of radio receiving sets in operation through radio broadcast signal, using the energy thereof.

It is an object of this invention to provide methods as well as ways and means for simultaneously or substantially simultaneously increasing the electrical loads of a great number of scattered radio receiving sets in consequence of the substantially simultaneous manual operation of circuit loading switches, on the conductors of a public service light and power system and in translating the total increase in load into persons registering or into votes, and in addition to provide ways and means whereby the radiated energy of a signal from the broadcasting station may by its own action cause the operation of the same circuit loading switches, thereby securing automatic registration.

It is also an object of this invention to either equip a radio receiving set structurally at the time of manufacture with ways and means of carrying out the operation of the system, or to provide an alternate auxiliary device fashioned to be attached to old or existing radio receiving sets to allow individuals to register and vote manually, and to provide the extra automatic ways and means for radio signal operation.

It is also an object of this invention to operate the automatic circuit loading of a public service light and power system by either the radiated energy of a "radio frequency" or an "audible frequency" signal and to provide responsive resonant circuits and proper relay mechanisms, respectively, in either case for connecting and disconnecting calibrated electrical loads.

It is also a very important object of this invention to provide several separate or elective ways and means for the gradual or step-by-step application of electrical loads to the conductors of a power system and the step-by-step removal of the said loads in direct consequence of the energy of a radio signal.

It is also an object of this invention to provide automatic synchronous electric clock setting means by radio signal, since such clocks at my registration and voting stations are important factors in registering manually and in voting manually by newspaper announcement.

This invention is a continuation of my development work in this art as exemplified by my nu-

merous issued patents and patent applications and my published announcements of reduction to practice during the past several years.

With the foregoing and certain other objects in view, which will become apparent as the description proceeds and the drawing is studied, the invention consists in the novel methods, as well as in the novel ways and means of carrying out the objects, all as hereinafter set forth and particularly pointed out in the claims.

The accompanying drawing represents diagrammatically or schematically a complete system for radio electric registration and voting, where 10 is a broadcasting station, 11 the vertical radiator and 12 the aerial, designed, fashioned and constructed to meet all the requirements of the radio electric survey and voting system. The science and art of radio broadcast with such phases as frequency, carrier waves, modulation, signals, etc., etc., are not dealt with here in great detail but it is understood that every modern element has been incorporated in the construction.

The broadcasting station may or may not draw its power from the electric distribution system illustrated here.

13 and 13' are the cabinets of radio receiving sets, and 14 and 14' are the antenna thereof, respectively, and 15 and 15' are the ground connections thereof. 16, 16, and 16', 16' are the leads or electrical conductors for drawing electric power from the power lines 17, 17 from the electric generator 18 which represents here a public service light and power sub-station, switching-station or power station, and 19 is a recording meter at such station.

20 is a paper strip chart, 21 ways and means for quickly changing the speed of the drive of the strip chart and 22 ways and means for altering the electrical responsiveness of the movement of the recorder to reactive volt amperes in fixed value steps. This adjustable feature in fixed value steps is extremely important in all of my registration and voting systems, since it provides instant adjustment for the variable and unknown number of persons in floating audiences. The instrument must have the proper adjustment for any consequent response to any sized audience in order to have its pen record sufficiently "open" and yet kept upon the scale.

Here 45 represents a load curve of reactive volt amperes and 46 an offset representative of incremental reactive volt amperes simultaneously and automatically applied by a plurality of radio receiving set loading devices at radio signal from the broadcasting station 10.

Whereas I am illustrating a simple two-wire system here in the interest of simplicity of diagram and connections, it should be well understood, that for alternating current operation where I record the loads and incremental loads in reactive volt amperes, in the place of amperes or watts, there would naturally be three conductors and the necessary accompanying current and potential transformers for the operation of the reactive volt ampere recorder. The system as illustrated here with two conductors would operate only with ampere or watt loads. 23, 23 are one of many pairs of branch leads which operate not only other radio receiving sets, but incandescent lamps, motors, electric heating devices and the like. In the cabinet 13 of one of the connected radio receiving sets, which is shown cut away at the broken line 24, I show the outer casing of the loud speaker mechanism at 25, with its connecting leads 26, 26, therefrom which connect in a conventional manner to an audio frequency amplifying system, so well known to all radio engineers that it is not deemed necessary to illustrate it here. There is of course a radio frequency system (not shown) with its amplifiers and tuning system also well-known to radio engineers in connection with the antenna and ground, and it is only deemed necessary to mention it here because I could operate my automatic system through the agency of the high frequency inaudible signals, instead of through the lower frequency audible signals, but only with greater technical elaborations. The leads 27, 27, come off in parallel from the loud speaker leads 26, 26, and through the agency of the condenser 28 and the impedance 29 we may adjust a special resonant circuit to respond only to any special set or contemplated radio signal or audible modulation which may be proper for the purpose.

A vacuum tube amplifier 30 may or may not be advisable or necessary to amplify the current drawn off at the special set or contemplated radio signal from the two sides, respectively, of the condenser 28 and the small solenoid 31 is diagrammatic or merely schematic of simple ways and means of moving the thin metal contact making member 32 over until it closes the gap 33, when the reactive coil 34 is placed in parallel connection across the leads 16, 16, which connect with the distribution system leads 17, 17, of the public service light and power system. It will also be observed upon inspection of the diagram that depressing the manually operable registration or voting button 35 also, but quite independently, places the reactive coil 34 across the same leads 16, 16, and likewise affects the current flow in the leads 17, 17. 35' is a manually operable switch in the auxiliary attachable device 50 for converting an old radio receiver into a radio electric survey and voting station. This device contains all of the elements in compacted form shown in the cut away radio at 24 necessary for the operation of my system.

This reactive coil 34 consists of a coil of insulated wire slipped over a laminated core of a pack of very thin soft iron or silicon steel sheets fashioned to form a closed magnetic circuit and therefore the coil becomes highly reactive in alternating current operation, and provides a substantially "wattless current" load. Of course, for direct current operation, and also for alternating current operation a resistance unit of bare nicrome wire suitably insulated in grooves and wound over mica or porcelain, for example,

could be used, but it would result only in a cheap makeshift system for reasons which will be presently set forth.

On the front of the cabinet, 36 is the tuning dial knob, and 37 the dial for station selection, 38 the volume control, and 39' (only shown in the lower view) the turning "on" and "off" switch for the radio set.

40 and 40' are synchronous electric clocks adapted to be manually or automatically set at or by radio signal, and useful in synchronous electric voting at pre-arranged and pre-published newspaper announcement, and 41 and 41' are the loud speaker or sound outlets from the throat of the radio receiver and loud speaker diaphragm.

100, 100 are telephone, telemeter or telegraph conductors for example, connecting power station with broadcasting station.

Having described and illustrated a diagrammatic or schematic system I will now describe how a properly designed and installed system would operate.

By newspaper announcement a certain program is listed for a definite hour, either with or without a question or questions to be voted upon. Whereas I have only illustrated two radio receiving sets here, it is understood that they represent a plurality or greater number, ten thousand, for example.

Those radio owners interested in the program turn on their sets through the agency of the knobs 39' which connect the sets to the house leads of a public service light and power company in the conventional way. At any suitable time during the broadcast of the program by the broadcasting station, a special signal may be broadcast of such a frequency, nature and duration of time, as to cause a strong responsive current to flow in the specially provided and tuned resonant circuit taken off in parallel as previously described from the leads of the loud speaker and to close a suitable relay associated therewith, which relay places and holds the reactive load coil 34 across the leads of the radio set for the period of time or duration of the special broadcast signal.

This period of time is very important because it must provide sufficient time for the reaction to take place throughout the public service light and power system and to allow full time for the recorder to draw and complete its record curve. From experiments conducted upon this system on an experimental scale at least several seconds are necessary to insure reliability of action as well as complete recording meter response.

With a properly designed and operated system upon this plan therefore the totalized incremental load may be recorded at a suitable sub-station, switching station or power station of a power system, and by telephone or telemeter, for example, between the sub-station switching station or power station and the broadcasting studio, the control engineer at the broadcasting station may know at once how many radios are turned on and tuned in to his particular broadcasting station. During the same program the radio audience may be requested to vote for or against the program or upon any other theme or question which they may do by manually operating the push buttons or other load connecting devices upon radio signal so to do, i. e. simultaneously.

As previously stated this illustration and description are purely schematic and should be refined by the application of the numerous de-

vices developed by the applicant during his years of research. In this connection it should be pointed out that I am according to all records a pioneer in the use of "wattless currents" for registration and voting purposes and in the gradual, rather than in the sudden application of load.

In the first place any system using resistors instead of reactors, which induce substantially "wattless currents" upon an alternating current system, would be a cheap make-shift for the following reasons:

1.—Resistors could only place a real watt or power load upon a public service light and power system, and a power load curve is usually three times as great as a reactive load curve, and therefore any incremental load upon the system for counting radios or voting to give the same percentage change readily readable upon a recorder would have to be three times as great as a reactive load.

2.—A watt load or power load, after six o'clock in the evening when radio broadcast and reception is most popular, is exceedingly wavy or erratic as compared with the lower value, and practically steady reactive load.

3. A watt load or power load suddenly applied as an incremental load to the conductors of a public service light and power system, would not be favored by its operating engineers for the following reasons:

a. It would cause a flicker to all lights on the circuit which would violate its aim of no deviation from a plus or minus 3.5% from voltage control, and result in continuous complaints.

b. It could if more marked cause synchronous motors operating ice plants and other refrigerators to stop.

c. If very large and violent it could set up such a sudden electrical torque upon the spinning steam turbines at the power stations as to either so suddenly demand unplanned for steam, as to cause priming of the boilers and rush of water into the steam end of the turbines, wrecking the blades, or else twist the electrical end of the machine from its foundation.

4. A resistor connected to a 110 volt supply in a radio cabinet, through failure of its relay to disconnect, could if left undetected, through excessive rise in temperature and liberation of heat, set afire and destroy the radio and possibly the building housing it.

If the resistors were fashioned to consume safe and but little power, to liberate only a few watts, for example, a small number of radio sets simultaneously connected containing the said resistors as incremental loads would not give a readable record upon the high value, highly fluctuating kilowatt load curve of a power station.

With reactors, and a "wattless current" operation, especially when gradually applied to a power system after six o'clock in the evening when the industrial loads have been removed, an approved, non-flicker and safe, accurate and practical substantially fraud proof system may be laid out and this fraud proof feature lies in the use of reactors over resistors, because the addition of extra lamps, electric flatirons or toasters would not record upon a "wattless current" recorder; and I wish to state that whereas I have shown in the diagram only a single reactor in connection with a single relay and resonant circuit responsive to special radio signal, I would plan for a step-by-step plurality of incremental inductive loads to be applied for the purpose of registration and voting. These reactors creating the induc-

tive loads, could be designed to warm up only a few degrees and remain continuously safe within a radio cabinet should at any time the relay mechanism fail to disconnect them. This is, of course, because of their practically wattless operation.

Whereas I have not attempted to design finally the most approved apparatus for my system, I have only illustrated diagrammatically in the interest of simplicity a single special resonant circuit and relay device for automatically connecting a single reactive coil to the radio leads, and in turn to the power system. At a special radio signal using the energy of said radio signal therefor, I wish it to be understood that I might provide for approved and superior operation, a plurality of the special resonant circuits, relays and reactive coils in order that I might through a corresponding plurality of special radio signals tuned to and therefore operative therewith as to place a gradual or step-by-step incremental inductive load upon the distribution system of the power company and to remove it in like gradual or step-by-step manner.

In such a case it would be necessary to provide tumble or gravity contact making relays instead of spring controlled relays as illustrated or exemplified by the spring member 32 of the schematic relay shown in the drawing, as well as additional special resonant circuits and devices to operate the said relays in an opposite or reverse manner in order to remove the incremental inductive loads gradually or step-by-step, through the energy of additional special radio signals.

In such a case the entire application maintenance, and removal of the loads would require several seconds time accompanied by a series of ~~prolonged possible musical notes upon the loud speaker~~. When an inductive incremental load is applied gradually or in a step-by-step manner to a power system, it allows time for the automatic voltage regulators at its sub-station, switching-station or power station, to compensate therefor and in consequence there is no variation from the established requirement of no deviation from the range of plus or minus 3.5% from normal which is the anti-flicker, voltage regulation desired by all the leading electric light and power companies, the engineers and officials of which jealously guard; and therefore engineers and officials must naturally approve any registration and voting system or radio receiver set counting system, which requires and fundamentally depends upon their full and hearty cooperation by reading the meters at the times desired, and in relaying the information read therefrom.

Again, by breaking up the incremental loading coils into separate units for separate connection and disconnection, no inordinately powerful special radio signal is required since there is no large circuit closing and opening switch with excessive arcing to operate, but rather the plurality of comparatively delicate switches with their corresponding smaller or insignificant arcs. In the place of a plurality of radio signals, the amplified energy of which is counted upon to operate the plurality of relays through the plurality of special resonant circuits connected therewith, I may introduce a clock-work step-by-step mechanical switch as illustrated and described in one of my preceding patent applications.

In this case it would be a simple mechanical matter to cause the winding of the spring by the turning of the registration and voting knob to simultaneously operate the radio connecting

switch, and to provide a notched cam release whereby the relay from the amplified resonant circuit and radio signal would release it. A simple manually operable lever switch could easily throw

into or out of service the radio signal controlled relay at such times as may be desired for voting, manual registration or other purposes.

Another and probably the least expensive and therefore the most practical and commercial plan of any of the foregoing for the gradual or step-by-step application of incremental inductive loads and their subsequent gradual or step-by-step removal from a public service light and power system, directly controlled by the radiated energy of a special signal from a broadcasting station, would be the grouping of radio receiving sets and their inductive coil loading systems into classes, these respective classes being based upon the responsive characteristics of the special resonant circuits controlling the inductive coil loading relays.

For example, we might have four grouped classes of radio receivers in any territory and connected to the same distribution system of a given public service light and power company, but each with a different and specifically tuned auxiliary resonant circuit, relay and reactive loading coil.

Likewise, our broadcasting station would be correspondingly fashioned to emit four special radio signals, one adapted to induce resonant current in each of the four classes of radio receivers containing a resonant circuit, and therefore by "staggering" or time spacing the aforesaid four special signals and in holding them in force, one after the other for a sufficient time period, it would be highly practical to gradually apply in a step-by-step manner the respective reactive loading coils in the respective class groups of radios.

By this method, ways and means, the total incremental inductive load could be gradually applied and gradually removed, in a step-by-step manner and with proper time spacing between signals, ample time and opportunity would be afforded for the automatic voltage regulators of the sub-station, switching-station or power station to operate in their "buck and boost" manner to compensate for and thereby eliminate any objectionable variation in voltage and consequent dip in lights. The two radio receiving sets illustrated in the drawing may each contain a special resonant circuit, relay and reactive coil loading unit, but each differently tuned to its own special radio signal, which may be emitted in "staggered" fashion as to time, from the broadcasting station shown.

As previously stated, each radio receiver shown stands for a great plurality, and therefore it will be appreciated that we illustrate and describe here specifically two classes of radio receivers as to resonant currents, and therefore we would have a two-stage step-by-step system for gradually adding and removing totalized inductive incremental loads from the conductors of the illustrated public service distribution system.

Of course, with proper technical elaboration and cooperation of the broadcasting stations and radio set manufacturers, or the future manufacturers of the described and illustrated auxiliary attachments for application to old radio receiving sets now in use, it would be possible to operate the automatic registration or auto-counting of radio receiving sets through the radiated energy of modulated radio frequency waves in the form of the special signals and therefore there

would be no audible signals heard at the radio receivers.

This plan would have the added advantage of secrecy and make it very difficult for miscreants to imitate inductive loads and apply them and hold them precisely timed to be effective.

There are, of course, other variations to practically carry out my invention whereby the amplified energy from a special radio signal or selected frequency may operate a reactor or reactors of one value, a manually operable device may operate a reactor or reactors of a different value, depending upon the size of the audience, and other conditions, as well as special requirements to be met.

It is believed that those skilled in mechanics and the arts of radio and power plant engineering may further develop and vary the details of the methods as well as the ways and means involved, without departing from the spirit of this invention and therefore it is not desired to be limited to the foregoing illustration and description except as may be demanded by the claims.

Having described my invention, I claim:

1. A radio electric survey system for quickly ascertaining the number of radio receiving sets connected to a common power system, and tuned to a common wave-length, comprising an electric circuit normally carrying current; a plurality of radio receiving sets adapted to draw operating current from said power system, each radio receiving set comprising radio wave responsive devices, an auxiliary resonant circuit in connection therewith adapted to operate a relay and place an incremental load upon the said electric circuit in response to the energy of a suitable radio broadcast signal; a broadcasting station adapted to emit such a suitable radio broadcast signal and an electrically responsive instrument in said electric circuit for recording the incremental loads so placed.

2. A radio electric survey system for quickly ascertaining the number of radio receiving sets connected to a common power system and tuned to a common wave-length, comprising an electric circuit normally carrying current; a plurality of radio receiving sets adapted to draw operating current from said power system, each radio receiving set comprising radio wave responsive devices, an auxiliary resonant circuit in connection therewith adapted to operate a relay and place an incremental inductive load upon the said electric circuit in response to the energy of a suitable radio broadcast signal; a broadcasting station adapted to emit such a suitable signal and an electrically responsive instrument in said electric circuit for recording exclusively the incremental inductive loads so placed.

3. A radio electric survey system for quickly ascertaining the number of radio receiving sets connected to a common power system and tuned to a common wave-length, comprising an electric circuit normally carrying current; a plurality of radio receiving sets adapted to draw operating current from said power system, each radio receiving set comprising radio wave responsive devices, an auxiliary resonant circuit in connection therewith adapted to place an incremental load upon the said electric circuit in response to the energy of a suitable radio broadcast signal; a broadcasting station adapted to emit such a suitable signal; means whereby the incremental load is gradually applied by the said number of radio receiving sets; and an electrically responsive instrument in said electric circuit for recording the

said gradually applied incremental loads so placed.

4. A radio receiver provided with leads adapted for connection to a public service power system and fashioned to draw operating current therefrom, comprising a radio wave responsive system, an auxiliary circuit connected thereto and tuned to be resonant only to a suitable radio broadcast signal, a relay device associated with said auxiliary circuit, an inductive loading coil in connection with the relay, means whereby the said relay device may connect the said inductive loading coil to the leads of the radio receiver upon receipt of the suitable radio broadcast signal, and independent manual means whereby an individual may also connect the said inductive loading coil to the said leads.

5. A radio electric registration and voting system comprising a power circuit normally carrying an electric load; a plurality of home registration and voting stations connected to said power circuit; a broadcasting station for emitting radio energy waves; means at the voting stations and responsive to a radio wave of suitable energy for rendering said stations individually and simultaneously operative in a manner to increase the electrical load upon said circuit; and an electrically responsive instrument in said circuit for recording the change in the loaded condition thereof.

6. A radio receiver adapted for connection to a public service power system and fashioned to draw operating current therefrom, comprising a radio wave responsive system; an auxiliary circuit connected thereto and tuned to be resonant only to a suitable radio broadcast signal; and means controlled by the auxiliary circuit to cause the said radio receiver to draw electric current from the public service power system in addition to its operating current upon receipt of said signal.

7. A radio receiver comprising leads adapted for connection to a public service power system and fashioned to draw operating current therefrom, a radio wave responsive system, an auxiliary circuit connected thereto and tuned to be resonant only to a suitable radio broadcast signal, a relay device associated with said auxiliary circuit, an inductive loading coil in connection with the relay, and means whereby the said relay device may connect the said inductive loading coil

to the leads of the radio receiver through the action of the suitable radio broadcast signal.

8. A radio-electric registration and voting system, comprising an electric circuit normally carrying current; a broadcasting station for emitting radio energy waves; individual voting stations adapted to be substantially simultaneously operated, each voting station including an inductive winding and manual means for adding the same as a load upon the said electric circuit; and auxiliary means at each station and responsive to a radio wave of suitable energy for automatically adding each inductive winding to said circuit.

9. A radio electric survey system for quickly ascertaining the number of radio receiving sets connected to a common power system, and tuned to a common wave-length, comprising an electric circuit normally carrying current; a plurality of radio receiving sets adapted to draw operating current from said power system, each radio receiving set comprising radio wave responsive devices, an auxiliary responsive device in association therewith adapted to operate a relay and place an incremental load upon the said electric circuit in response to the energy of a suitable radio broadcast signal; a broadcasting station adapted to emit such a suitable radio broadcast signal; and an electrically responsive instrument in said electrical circuit for recording the incremental loads so placed.

10. A radio receiver provided with leads adapted for connection to a public service power system and fashioned to draw operating current therefrom, comprising a radio wave responsive system, an auxiliary circuit connected thereto and containing a device tuned to be responsive only to the energy of a suitable radio broadcast signal, a relay device associated with said auxiliary circuit, an inductive loading coil in connection with the relay, means whereby the said relay device may connect the said inductive loading coil to the leads of the radio receiver upon receipt of the suitable radio broadcast signal, and independent manual means whereby an individual may also connect the said inductive loading coil to the said leads.

NEVIL MONROE HOPKINS.