Sept. 7, 1937. N. M. HOPKINS 2,092,120

RADIOELECTRIC VOTING SYSTEM

Filed Sept. 7, 1933 2 Sheets-Sheet 1

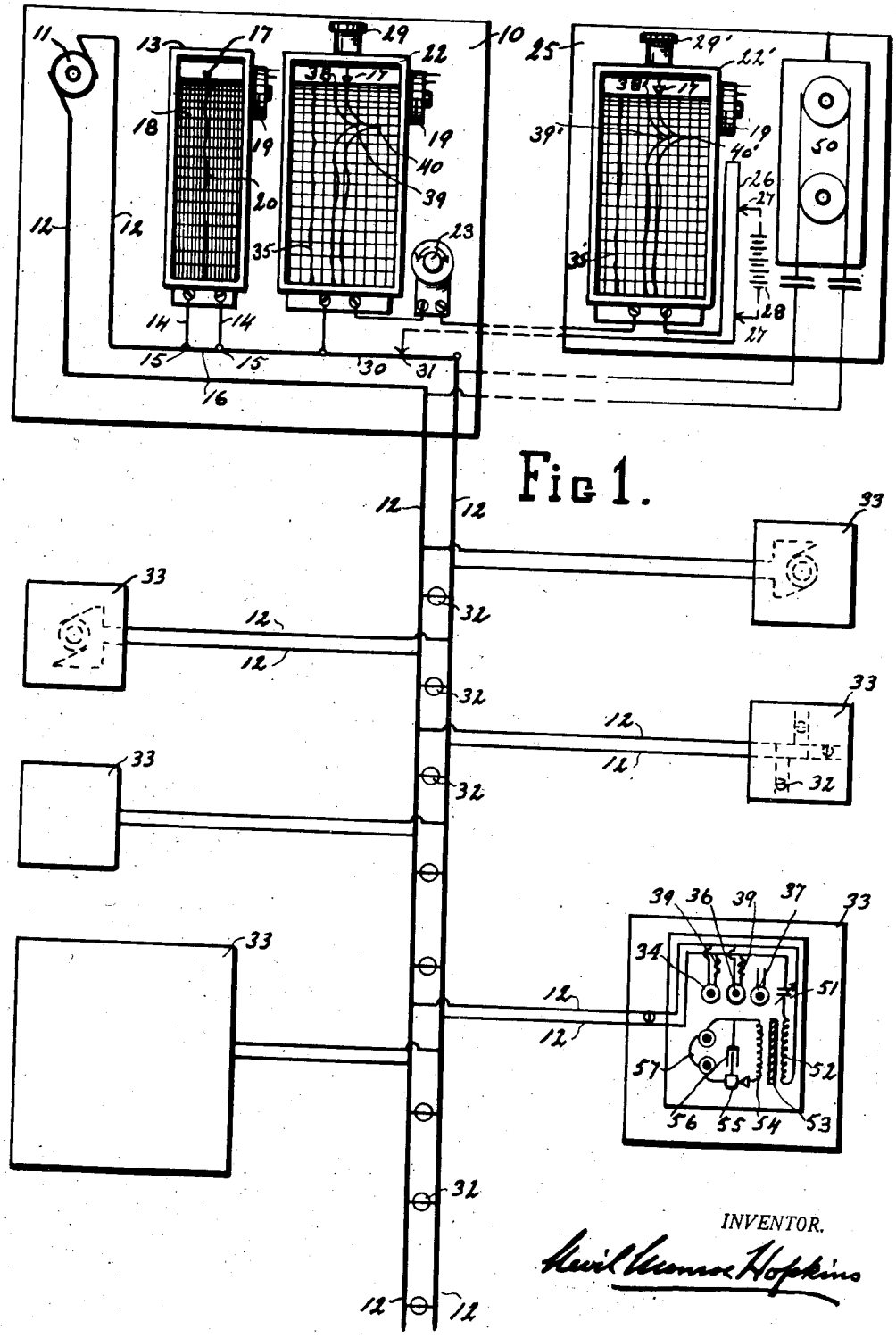

Fig 1.

INVENTOR.

Neil Monroe Hopkins

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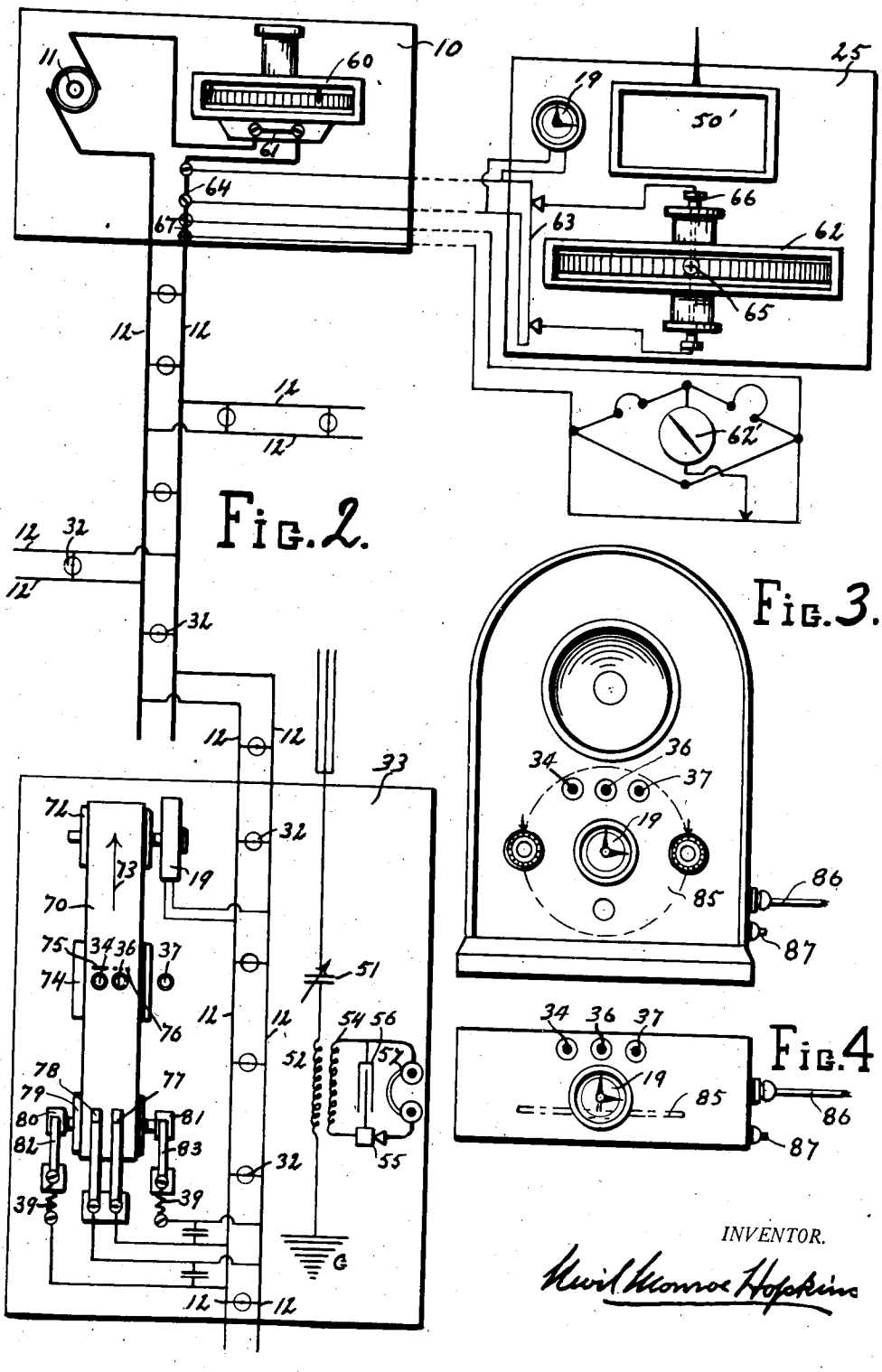

FIG. 2.

FIG. 3.

FIG. 4.

INVENTOR.

Merrill Monroe Hopkins

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UNITED STATES PATENT OFFICE

2,092,120

RADIOELECTRIC VOTING SYSTEM

Nevil Monroe Hopkins, New York, N. Y.

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5 Claims. (Cl. 235—52)

This invention relates to ways and means and methods of asking a question, by radio, from any chosen central point or central station simultaneously of a great number of unseen scattered persons, invisible to the operator of the radio station and to each other, in a great number of dwellings or other buildings, and in securing at once, or at a subsequent hour a totalized vote upon the question.

It is an object of this invention therefore to broadcast a question by radio, or wired-radio from a central station, or by any other suitable means, and to learn at once, or at a subsequent hour, how many persons of an invisible audience are, or were at attention, when the question was asked, and to learn the consensus of "snap judgment" or studied opinion, respectively, in the nature of a note, of scattered thousands, hundreds of thousands and even of millions of persons at any moment or hour.

This invention is a continuation of my inventions having to do with voting ways and means and methods through the agency of public utility electric service wires and the currents of electricity, both of alternating and direct current carried thereby, and with ways and means and methods of voting by radio broadcasting of questions and substantially simultaneous replies by a great number of invisible individuals, employing electric current distributed to them in their homes by the wires and cables of a public utility corporation as set forth in my U. S. Patent applications Serial Numbers 521,419 and 528,829.

This invention has for an object thereof the utilization of the facilities of public service light and/or power systems in connection with my voting purposes, notably electric light and power lines and the electrical currents carried thereby, telephone conductors, telegraph lines, messenger cables, fire and burglar alarm conductors, water and gas pipes, radio broadcasting waves and channels, and certain selected combinations thereof. Since radio waves may be led and guided over wires, etc., between a transmitter and a receiver, instead of being allowed to radiate in all directions, the use thereof particularly falls within the possibilities of this invention. Such a combination of radio waves and metallic conductors has been called wired-radio, wired-wireless, line radio, carrier current telephony, guided wave telephony, broadcasting over wires, and radio broadcasting. With the output of a transmitter connected to one end of a pair of wires and a receiver connected to the other ends, communication may be maintained for very great distances by proper selection of carrier current frequencies, so that the side bands do not overlap, and so that there is no interference between the harmonies, wherefore it is possible to use a single set of wires for carrying many different messages at one time, each message using one of the frequency channels. While carrying the wired-radio messages the wires may at the same time be in use for ordinary telephony and telegraphy, and light and power lines may be used for wired-radio voting, the asking of questions and the receiving of replies, without disturbance of any kind. Since these carrier high frequency currents are not seriously interfered with by the thousands of lamp filaments placed across a pair of leads which are guiding the carrier currents, nor by the iron cores of transformers which do not appear to seriously choke them, the utilization thereof is well adapted to my practical voting system hereinafter set forth.

It is a particular object of the present invention to provide any radio means, wired or wireless, to ask a question simultaneously of a great number of scattered and unseen persons, and to utilize the network of wired circuits throughout a town or city, and the electric current thereby distributed, for securing and totalizing the vote and in making the result of the vote known at the wired or wireless broadcasting station, which may or may not be located at the power plant supplying electricity to the network of the town or city distributing system. The return reaction or vote upon a broadcast question may be totalized by high frequency carrier currents produced by each individual voting, through the transformation of the low voltage electric light current at hand in nearly every town and city dwelling, or by the use of the low voltage lighting current and circuit itself.

In the present application, I am dealing in particular with the use of the comparatively low voltage electric currents as supplied for incandescent lamps, and setting forth ways and means and methods of using the facilities of a public utility system, both during and off its peak loads.

Upon studying the totalizing recording wattmeters at the various central stations at different hours in a great city, I find that the "load" at any particular time is remarkably steady, especially when industrial loads are removed, usually after five o'clock p. m. and particularly is this the case in the early morning hours—just before daylight, for example—and it is an object of this invention, where greater accuracy is desired, to impose the "registering" and "voting"

load upon these "off peak" periods of the central station activity through the agency of clockwork drives, especially the synchronous types of clockwork drives.

With these and certain other objects in view, which will become apparent as the description proceeds, this invention consists in the parts and combinations of parts, principles and methods of operation, all as will be more fully described and particularly pointed out in the claims.

Referrring to the accompanying drawings forming a part of the specification, in which like numerals designate like parts in all the views

Figure 1 is a diagrammatic view of a central light and power station and a central broadcasting station in association with a distribution light and power system for voting purposes at any hour.

Figure 2 is also a diagrammatic view of such a system, but especially designed for voting purposes at an "off peak" hour.

Figure 3 is a front view of one design of one of my voting radios for "off peak" operation.

Figure 4 is representative of one design of one of my auxiliary attachments to ordinary radios, for adapting them for radio voting operation.

With reference to Figure 1, 10 is a central power station and 11 is the electrical generator therein, and 12, 12, the lines or wires of the feeder system. 13 is a recording wattmeter or amperemeter. For simplicity in wiring I have elected to show the simpler connection of a recording amperemeter, connected by the wires 14, 14 to the terminals 15, 15 on each end of the shunt 16. 17 is the end of the pointer and ink carrier which draws a continuous record upon the ruled off paper chart 18 as it travels, driven by the synchronous electric clockwork 19. For simplicity in the diagram I have not shown the wires of this clock connected to the feeders 12, 12, but I show a drawn record 20, representative of about 50% load upon the power station. To the right, 22 shows a recording instrument of the same type as that shown at 13, but many times more sensitive and consequentlly capable of drawing a record upon a far more "open scale". This recording instrument is connected to the feeders 12, 12, through a variable resistance rheostat 23, and a similar sensitive and open scale recorder 22' in the remotely located broadcasting station 25. 26 is a potentiometer with sliding contacts 27, 27 connected to the cells of storage battery 28. These sensitive open scale recorders are of the suspension type for zero or torque adjustments, which adjustments are effected by turning the head suspension supports 29 and 29'. These instruments 22, 22', 23 and 26 are connected together in series, but as a group are connected shunt fashion to the feeders 12, 12 as shown at 30, where the length and effectiveness of the shunt may be varied by sliding the contact 31 back and forth. A part or all of these adjusting means may be segregated at the power plant or at the broadcasting station, and it will now be evident upon a careful inspection, that I may cause these sensitive, and open scale recorders, to draw centrally located load lines of the functioning of the power plant at any loading of the power plant. 32, 32, 32, etc. are lamps connected in parallel across the feeders, and 33, 33, 33, are dwellings or other buildings in which are installed more lamps in parallel, electric motors, heating units, radios, etc. The recorder lines 35 and 35' represent a certain lamp, motor, heater unit and radio load upon the power station 10 at any hour, before and apart from any "registering" and "voting" loads are applied.

The residence at the lower right hand corner of the drawing has been enlarged to show its contained radio set adapted to receive a question to be voted upon and to "register present" or "at attention", and to vote "yes" or "no" in reply to any question asked by the broadcasting station. To "register present" or "at attention" when requested by radio, wired-radio, or other suitable means to do so, the push button 34 is pressed which places the standardized and known resistance unit 39 across the wiring of the distribution system 12, 12. This standardized and known resistance unit may be fashioned to allow quite an appreciable current to flow, the value of which is of course a definite quantity, depending upon the voltage of the distribution system. A condenser is of course connected across the contact making members of the push button (not shown in the present drawings) in order that an ampere or more may be drawn without undue sparking. The amount of current drawn for "registering present" and/or for "voting" depends upon several factors, one of them being the capacity of the power plant and the size or population of the community. Let us assume here that the system is a direct current system and the distributed current is under a potential difference of 100 volts, then each push button is fashioned to place a resistance of 100 ohms across the line. According to my method of voting with the herein disclosed ways and means, each and every person "listening in" is requested from the broadcasting station, to press and hold pressed for a few moments the push button for "registering" and which in this case is button 34. In Fig. 1 35 and 35' are the normal load lines upon the recorders at the central station and at the broadcasting stations respectively, 38 and 38' are greatly magnified record lines of the normal load lines upon the delicate or open scale recorders, and the peak 39, 39' represents the "registration" load, momentarily superimposed upon the normal load. By reading the ruled-off divisions upon the paper chart, previously calibrated and adapted to the one ampere current drafts of each individual push button, the actual number of persons "listening in" in their numerous scattered dwellings or other buildings may be estimated. While the push buttons are held pressed in the "present" position, a question is asked simultaneously of the individuals "listening in" followed by the request to push and hold pressed the central button or "yes" button 36 if they desire to vote in the affirmative. A second peak 40, 40' will register the number of persons voting "yes". All those opposed to the question are requested to press and hold pressed the right hand side button 37, which is a blank or mere disconnected unit and therefore it produces no reading or vote. The rulings and record curves illustrated upon the recorders 22 and 22' are purely illustrative and schematic, but it is essential to point out that they are driven at comparatively high speed during the moments of "registering" and "voting" as compared to the speed of the paper chart of the regular station recorders, in order to "open up" and display clearly the characteristics and dimensions of the "registration" and "voting" loads. Further it should be stated that for the purpose of explanation the record lines 35, 35', 38, 38' and 40, 40' have been shown continuous in Fig. 1, but it will be understood that since only one recorder needle is used, it will draw the

record line 35 when the instrument is not very sensitive as governed by the rheostat 23, but when the resistance of said rheostat is reduced the recording instrument becomes more sensitive which would be manifest by a shift of the needle resulting in drawing the record line at another position on the chart and such as indicated at 38. A further decrease of the rheostat resistance will shift the needle still further and thereby produce the line shown immediately below the needle 17. The lateral offsets such as shown at 39, 40 are caused by the simultaneous application of incremental loads in turn caused by the operation of the push buttons 34 and 36, at radio signal to so operate them. It is of course understood that this public service distribution system preferably would be in the majority of cases an alternating current system, in which case I would use alternating current instruments to indicate and record the number of persons registering and voting. Whereas it is theoretically not possible to secure an absolutely exact number representative of the number of persons "registering" and "voting" during certain hours of the operation of the power plant due to a drifting reading of the instruments on account of load changes resulting from the myriads of requirements of the service, the periods of swings and steadiness may be so studied in connection with the moments of asking questions, as to afford a very close approximation of the truth, especially if the unseen individuals are requested to vote "yes" several times within a short period of time. Further it will be understood that by speeding up the travel of the record sheet an increased accuracy is obtained, especially after five o'clock p. m. when the industrial loads of the community are off.

With further reference to Figure 2, where again 10 is a central light and power station with its electrical generator 11. The wattmeter or amperemeter 60 here illustrated is of the indicating type, horizontal edgewise design connected to the load line across the heavy shunt 61. At the radio broadcasting station 25 is the large open scale indicating instrument 62 connected across the light slide wire shunt 63, the terminals of which are connected at the distant power station across the heavy fixed shunt 64. The instrument 62 represents a reflecting galvanometer with its small mirror 65. This galvanometer may be of the "string" or "torsion" type with very light weight moving system and short quick period of swing. This instrument moving system weighs only a few grains and may be brought to zero through the medium of the suspension head member 66. No lamp or galvanometer accessories are shown here since the equipment is well-known to all electrical technicians. 62' shows a galvanometer connected to a Wheatstone bridge as an alternative equipment joined at a distance to the main station feeders at the heavy shunt 67. These reflecting galvanometers may respond to a small fraction of a micro-ampere. 50' represents a radio broadcasting transmitter of regular or conventional design, adapted to radiate energy through space in all directions and through the medium of which questions are asked of unseen audiences. 19 is a synchronous clock. 12, 12 are the feeder lines of the power plant and 33 is an enlarged view of the interior equipment of a voter's dwelling or other building. In the present case the "registering" and "voting" push buttons 34 and 36 are adapted, when depressed to cut a narrow slit opening in the endless paper band 70, which is driven by the metal drum 72 in the direction of the arrow 73 through the agency of the synchronous electric clock 19. 74 is a die block member into which the die cutters (not shown) under the push buttons 34 and 36 depress. The push button 37 for voting "no" is a blank and produces no effect. In operation if a "listener in" "registers" present by depressing the "registration" button 34, he cuts the narrow open slit 75 in the paper band. He may or may not vote "yes" to the question asked a few moments later as indicated by the narrow open slit 76 shown in dotted lines but it will be understood that whereas in Fig. 2 the perforations 75 and 76 are shown apparently in the same transverse plane of the tape, in actuality one is slightly in advance of the other, since the registration button is always depressed prior to the actual vote button. Should, for best results, the "registration" and "vote" load be planned for a 4 a. m. draft upon the "off peak" load of the power plant, the time of registering and voting is made such that the perforations in the tape will travel around and into the position under the contact making styluses 77 and 78 of the spring members pressing down upon the the paper band running over the metal cylinder 79, to make electrical contact with the surface of the drum at said 4 a. m. and through the agency of the small metal drum members 80, 81, and the spring contact makers 82, 83, place the calibrated and fixed resistance units 39, 39 across the feeders 12, 12 of the system, thereby "registering" one person and supplying the vote of that one person upon the most desirable "off peak" load of the station. The power station and the broadcasting station are of course in telephonic communication or joined in any other suitable manner for enabling the operators to set and adjust the necessary instruments.

With further reference to Figure 3, a radio is shown in diagram for receiving a question and for allowing a listener in to "register" and to vote at the best and "steadiest" hour for the power plant service. The dotted line 85 illustrates a disk member driven by the synchronous clock 19, said disk member adapted to replace the schematic paper hand and drums previously described, and the push buttons of this figure may be mechanically constructed, such as with offset levers, so as to function upon the disk in much the same manner as described with reference to Fig. 2. 86 and 87 are the several plug members and stranded cable connections necessary for connection to power feeders, antenna, ground, etc.

With further reference to Figure 4, I am showing in diagram an attachment for any radio, in the shape or form of a base member, thereby adapting any ordinary radio already installed for registering and voting at off peak or the steadiest periods of any electric light and power plant. This "off peak" method of voting through the agency of synchronous clockwork driven contact makers, set to load the lines at any chosen hour, not only affords perhaps the most accurate ways and means for determining the number of persons listening in and voting "yes" or "no", but it eliminates the effects of interference or exaggerated results of pranks or the results of heavy short circuits being established at times of voting by malicious persons. I am of course aware of the fact that many large cities are furnished with light and power by a plurality of power plants, but these are almost universally connected together in a network of parallel connections,

and wherever it is possible a main or master recording wattmeter is installed at some central location and I normally plan to secure the benefit of such instrument connections for my voting system.

It is of course obvious that those skilled in the several engineering arts involved in this invention and its applications may vary the details of construction and operation without departing from the spirit of this invention and therefore it is not desired to be limited to the foregoing illustrations and description except as may be demanded by the claims.

Having illustrated and described my invention, I claim:

1. In a system of radio broadcasting including a broadcasting station, a public service lighting system, and a plurality of radio receiving stations, wherein it is desired to obtain the consensus of opinion of the radio listeners to a question propounded from the broadcasting station, the combination of control means actuated by the listeners to represent votes; a plurality of calibrated loads; means for adding said loads to the public service lighting system at the plurality of radio receiving stations in accordance with the vote representations at a predetermined time subsequent to actuation of said control means; and means to indicate the totalized load at the radio broadcasting station.

2. An electric voting system comprising an electric circuit receiving power from a suitable source, a resistance unit for each voter and a time-delayed circuit closing device for operating the same thereby adding said unit momentarily as an incremental load to said circuit, said devices adapted to be substantially simultaneously operated, the additions of all of said loads being indicative of a vote cast, and an indicator in said circuit for indicating the total of the incremental loads so added.

3. In a time-delayed voting system a plurality of manually operable voting stations, one for each voter and adapted to be substantially simultaneously operated; a device at each station adapted to receive a representation of the vote cast; means for feeding said devices in synchronism; electric load means at each station responsive to said vote representations and rendered effective when the devices have been fed a predetermined distance, said load means being all included in a circuit; and a single means in said circuit influenced by said load means for indicating at once the total result of the votes cast.

4. In a time-delayed voting system a plurality of manually operable voting stations, one for each voter and adapted to be substantially simultaneously operated; a device at each station adapted to be physically deformed by the voter casting a vote; means for moving all of said devices in synchronism; electric load means at each station controlled by said devices in accordance with the deformations representing the votes when the latter have moved a predetermined distance, the electric load devices being all included in a common circuit; and a single means in said circuit influenced by said load devices for indicating at once the total result of the votes cast.

5. In a time-delayed voting system a plurality of manually operable voting stations, one for each voter and adapted to be substantially simultaneously operated; a device at each station adapted to be perforated by a voter casting a vote; means for moving all of said devices in synchronism; electric load means at each station controlled by the perforations in the said devices when the latter have moved a predetermined distance, the electric load devices of all of said stations being included in a common circuit; and a single means in said circuit influenced by the electric load means for indicating at once the total result of the votes cast.

NEVIL MONROE HOPKINS.