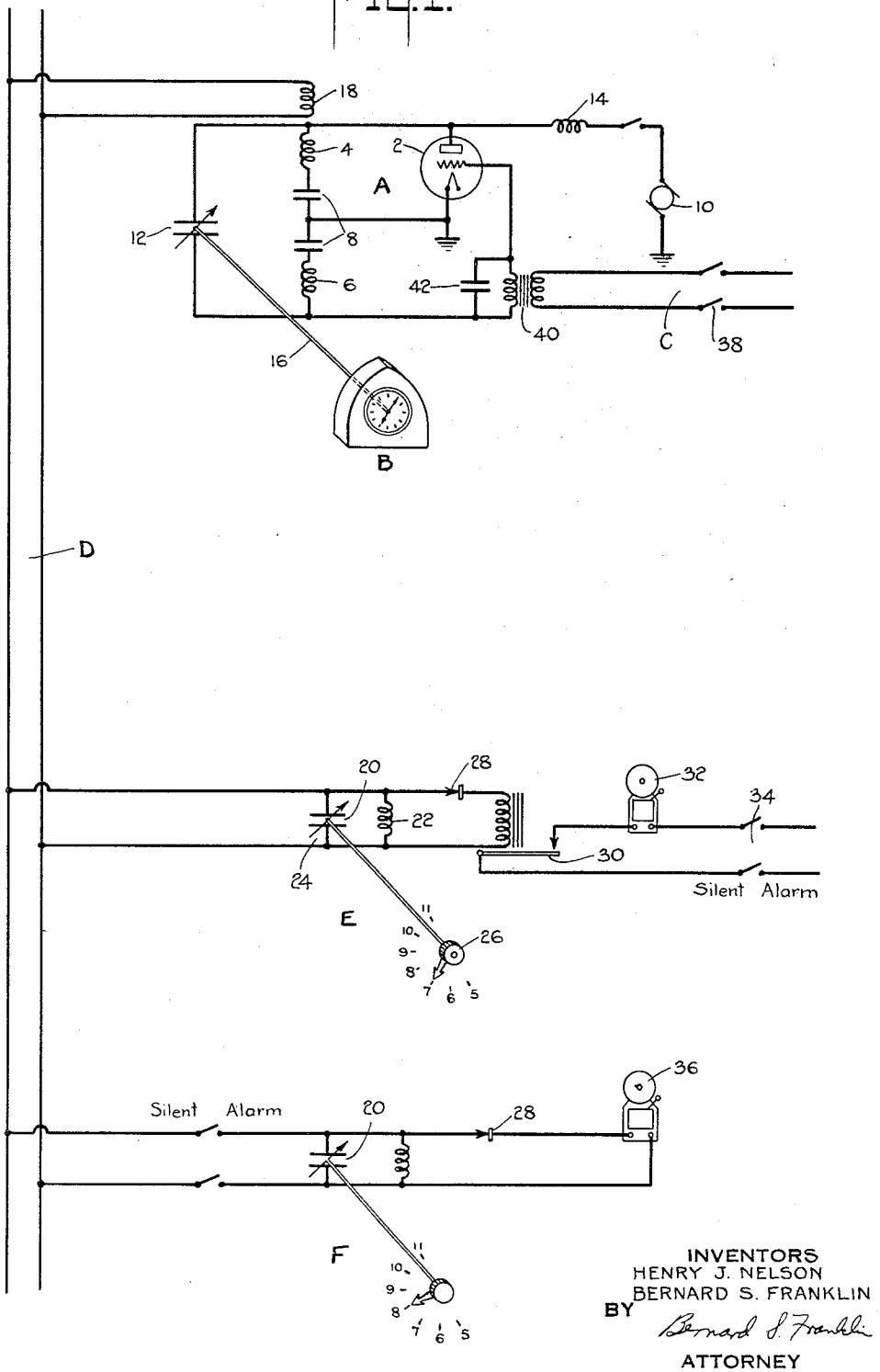
April 17, 1934. H. J. NELSON ET AL 1,955,558

TIME ALARM

Filed July 23, 1930 2 Sheets-Sheet 1

Fig. 1.



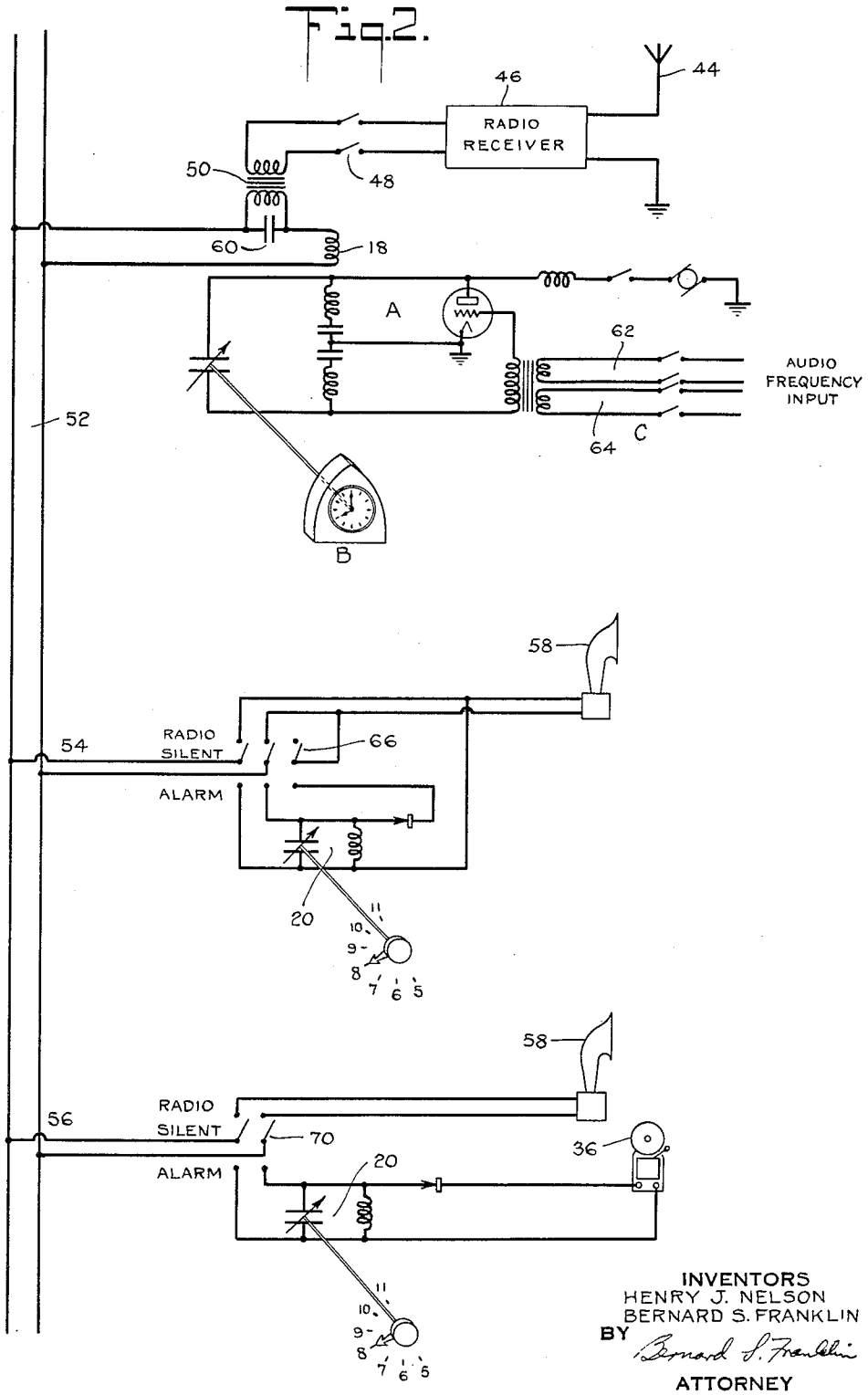
INVENTORS
HENRY J. NELSON
BERNARD S. FRANKLIN
BY Bernard S. Franklin
ATTORNEY

April 17, 1934. H. J. NELSON ET AL 1,955,558

TIME ALARM

Filed July 23, 1930 2 Sheets-Sheet 2

Fig. 2.



INVENTORS
HENRY J. NELSON
BERNARD S. FRANKLIN
BY Bernard S. Franklin
ATTORNEY

Patented Apr. 17, 1934 1,955,558

UNITED STATES PATENT OFFICE

1,955,558

TIME ALARM

Henry J. Nelson and Bernard S. Franklin, New York, N. Y., assignors to Radio Corporation of America, a corporation of Delaware

Application July 23, 1930, Serial No. 470,000

14 Claims. (Cl. 250—20)

This invention relates to time alarms, and more particularly to a method and means for providing a time alarm for awakening guests in hotels, or similar purposes where individually variable time of alarm is necessary.

In large hotels the problem of calling various guests who wish to be awakened at different hours, presents considerable difficulty. The present practice is to telephone the various rooms, but it is not possible to merely ring many rooms at the same time inasmuch as the guest would not know whether his awakening was intended or a telephone message was received, and it is therefore necessary for the operator to ring one room at a time and to announce the time to the guest when he answers the telephone. Many extra operators must be employed during the morning rush or peak, and even then there may be considerable delay between the first and last called of the guests who wish to be awakened at a specified time, inasmuch as it takes some time for each to answer.

The primary object of the present invention is to provide a method and means for a time alarm adapted for the calling of hotel guests or any similar purpose, in which a time indication or alarm is desired at one or more points at each of which the desired time to be indicated may be varied at will and determined in advance. The method of our invention includes, broadly, generating alternating electrical energy, varying the frequency of the energy in a predetermined manner as a function of time, and securing a response to energy of a frequency corresponding to the time at which an indication is desired. The energy may be generated by a master oscillator the frequency of which is varied by a master clock preferably by causing the clock to gradually rotate a variable condenser determining the oscillation frequency of the oscillator. The resulting energy may be transmitted to any number of points, at each of which there is provided means for selecting energy of a particular frequency corresponding to the time at which an indication is desired. The selected energy may be employed to operate any of a number of forms of indicating means or alarm device. The selector means may most simply comprise a resonant circuit including an inductance coil and a variable condenser the setting of which may be calibrated in time and determines the resonance frequency and consequently the time at which the alarm will be actuated.

The alarm mechanism may, if desired, consist of a bell or buzzer or the like, energized by a local bell ringing circuit and controlled by a relay responsive to resonant energization of the tuned circuit, preferably through the agency of a rectifier following the tuned circuit. This arrangement is readily provided where the various rooms are anyway wired up with bell ringing circuits for calling attendants and employees of the hotel. If the rooms are not so wired, it may prove inconvenient to provide the necessary circuits for actuating the alarm mechanism, and accordingly, a further object of our invention is to make it possible to dispense, when desired, with such circuits. This we do by modulating the alternating electrical energy generated by the master oscillator with other and relatively low frequency energy for actuating an alarm. The resulting modulated energy is transmitted to the various rooms as before, and is rectified by any suitable fixed detector following the local resonant circuit. The resulting alarm actuating energy may be fed directly to a special form of bell or buzzer not provided with circuit breaking means, or it may be fed to any other suitable form of translating device such as a loud speaker.

The conventional alarm clock or telephone bell have been used for many years to awaken people from sleep, in spite of the fact that they possess two physiological faults, one of which is that the alarm begins with great suddenness and acts as a shock to the nervous system, and the other of which is that the alarm when continued is at best a disagreeable noise. Further objects are to overcome these difficulties. The first disadvantage may readily be obviated with our system, inasmuch as the local tuned circuit comes into resonance gradually so that the sound of the alarm grows gradually from silence to full volume and may be stopped as soon as the sleeper awakens. The second disadvantage may be avoided by utilizing a loud speaker or similar device instead of a bell or buzzer, and modulating the variable frequency energy transmitted to the various rooms with audio frequency energy corresponding to either a pleasant tone or combination of tones, or the sound of a bugle call or any more elaborate form of musical selection.

The present alarm system possesses the advantage of not necessitating individual wiring between the central office or master oscillator and each of the rooms, inasmuch as the various alarm mechanisms may be connected in parallel or multiple to a single or two wire distribution system extending throughout the building. Many hotels or hospitals, and similar buildings, are being provided with radio program distribution systems so

that the various rooms may hear radio programs received on one or several central radio receiving systems. In some cases a three wire distribution system is provided which makes available three possible programs. In accordance with a further object and feature of the present invention, special wiring for the alarm system, even of the simple type previously mentioned, may be dispensed with, and the radio program distribution system employed in the hotel may be used in combination with additional time alarm apparatus to provide the desired alarm system. If the alarm device is to be a loud speaker in preference to a bell, the loud speaker normally used in connection with the central radio system may also be employed for the alarm, inasmuch as the radio programs will not be listened to by the guest when he is asleep, and particularly so during the morning hours.

To the accomplishment of the foregoing and such other objects as will hereinafter appear, our invention consists in the method and the elements of the time alarm system and their relation one to the other as hereinafter are more particularly described in the specification and sought to be defined in the claims. The specification is accompanied by drawings in which:

Fig. 1 is a wiring diagram explanatory of the invention; and

Fig. 2 is a wiring diagram explanatory of the invention as applied to a radio program distribution system.

Referring to Fig. 1, the hotel office or other central place is provided with a master oscillator A, the frequency of oscillation of which is varied as a function of time by a suitable master clock B. The resulting energy may, if desired, be modulated by a modulating circuit C, and is distributed over a distribution system D to any desired number of alarm stations here indicated at E and F connected in multiple to the distribution system. Each of the alarm stations is responsive to energy of a selected frequency corresponding to the desired time of alarm.

Considering the circuit in greater detail, the master oscillator A comprises a vacuum tube 2, the control electrode and anode circuits of which are regeneratively coupled by inductances 4 and 6. The latter are connected to the tube cathode and ground through blocking condensers 8 in order to prevent the high direct anode potential fed to the anode of the tube from a suitable direct current source 10 from being applied to the other elements of the tube. A variable condenser 12, preferably of the straight line frequency type, is connected in parallel with inductances 4 and 6, and forms therewith a resonant circuit the natural frequency of which determines the oscillation frequency of the oscillator. This frequency may be either a radio frequency or an audio frequency, and if a radio frequency, is preferably kept at a very low value in order not to cause radiation difficulties. On the other hand, if audio frequency is selected, it may be desirable to choose a rather high audio frequency in order to make available the desired frequency range, and in order to make it possible, if desired, to modulate the same. A choke 14 may be inserted between the direct current source 10 and the tube anode in order to keep the alternating energy away from the direct current source.

The condenser 12 is mechanically connected in any suitable manner, here schematically indicated by the rotatable shaft 16, with the master clock B, so that the rotor of the condenser is slowly and uniformly rotated by the master clock, thereby causing corresponding changes in the oscillation frequency. The oscillations are fed to the distribution system D through any suitable coupling means, here exemplified by the coil 18, inductively coupled to the coils 4 and 6.

The master oscillator A and master clock B may be constructed elaborately and at considerable expense inasmuch as only one central equipment is needed. The alarm stations, however, are made as simply and economically as possible, inasmuch as a great many are to be provided. One alarm station is schematically indicated at E and comprises a resonant circuit 20 made up of a fixed coil 22 and a variable condenser 24. The latter may be adjusted by a control knob 26 the pointer of which cooperates with a scale calibrated in time or hours instead of capacitance or frequency. If the condenser 12 of the master oscillator A is of the straight line frequency type, the condenser 24 is preferably made the same.

The energy from resonant circuit 20 is rectified by a detector 28, and this is preferably made of any suitable fixed type, so that vacuum tubes and associated circuits may all be dispensed with. The resulting rectified energy may be used to close a relay 30, thereby completing an alarm circuit which energizes any suitable alarm, such as the bell 32.

To operate the alarm, the guest, before retiring, throws a switch 34 from the "Silent" to the "Alarm" position and moves the pointer 26 to the time at which he wishes to be called. Each morning a hotel operator sets the master oscillator A into operation. The clock B, of course, may be operated continuously. When the time at which the guest is to be called arrives, the energy supplied to the tuned circuit 20, which ordinarily is entirely insufficient to actuate relay 30, comes into resonance and is greatly amplified, sufficiently so to actuate relay 30, thereby starting the alarm. When the guest awakens, he may stop the alarm by throwing the switch 34 from the "Alarm" to the "Silent" position. If the alarm is not stopped, it will ring until the circuit 20 again goes out of resonance, and the breadth of the resonance curve of the circuit 20 is made sufficient to keep the alarm on for considerable time. This is readily done inasmuch as only a single tuned circuit is employed, and the rate of frequency change is relatively slow. The alarm may be continued indefinitely unless shut off, by making the relay 30 a stick relay.

The alarm station just described is satisfactory when the rooms are anyway provided with bell ringing circuits, but is an unnecessarily expensive one if special bell ringing circuits must be provided. In the latter case it is preferred to transmit the necessary energy for actuating the alarm from the master oscillator. In such case, the alarm station will be simplified to the form indicated at F in which a resonant circuit 20 is provided, corresponding exactly to that described in connection with the alarm station E. A rectifier corresponding to the rectifier 28 at alarm station E is provided, but the rectified energy, instead of being used to actuate a relay, is directly applied to alarm mechanism 36. If the alternating energy supplied from the master oscillator A is unmodulated, the alarm 36 may be a bell or buzzer provided with circuit breaking mechanism suitable for direct current operation.

The output of the master oscillator may, if desired, be modulated by means of modulating cir-

cuit C. The modulating circuit may be closed by means of a switch 38, thereby applying modulating energy to the control electrode circuit of the oscillator thru a transformer 40. A condenser 42 may be connected in parallel with the transformer 40 in order to by-pass energy of the oscillation frequency. The modulation frequency applied to the modulating circuit C may be sufficiently low to operate a buzzer or bell, and in such case the alarm 36 at station F may be a buzzer or bell not provided with a circuit breaking device.

It will be understood that by employing a somewhat higher modulating frequency in the modulating circuit C, the alarm device 36 may be a loud speaker or similar translating device instead of a bell. The audio frequency may correspond to a single tone or a combination of tones and may be constant, or it may be varied to take the form of a bugle call or musical selection repeated continuously, although to accommodate a considerable range of audio frequencies, the oscillation frequency of the master oscillator may have to be somewhat higher than would otherwise be considered desirable.

The distribution system D is indicated as a two wire system, which is preferred in order to efficiently transmit the energy to the various alarm stations, and in order to prevent undesired radiation of the transmitted energy. Even when utilizing a two wire system instead of a grounded return single wire system, the wiring is relatively simple because radial wiring from the central office to each of the alarm stations in entirely unnecessary, but instead the latter are connected in parallel or multiple to simple bus wiring. Even this simple type of wiring may be dispensed with in the case of a hotel equipped, as many now are, with a central radio system or radio program distribution system. Such systems may, for example, employ a three wire distribution system making available three possible programs all supplied from a central radio receiving station having three radio receivers tuned to different wave lengths. This wiring, which is anyway available, may be employed for the alarm system. How this may be done is schematically indicated in Fig. 2 which has been simplified by indicating a radio distribution system provided with only a single channel. Referring to Fig. 2, a radio program, picked up by an antenna 44, is amplified and rectified in a radio receiver 46, after which it may be transmitted, by closing a switch 48, to a transformer 50, and thence to bus wires 52, which are provided with any desired number of outlets 54, 56, etc. Each room of the hotel may be provided with an outlet and with a reproducer 58 which may be connected to the outlet in order to make the radio program available.

In accordance with the present invention, the master oscillator A, controlled by the master clock B and corresponding exactly to that previously described in connection with Fig. 1, may also be connected to the bus wires 52 by means of a coil 18 coupled to the coils of the resonant circuit of the oscillator. If the oscillation frequency of the alarm system is a radio frequency, a conrenser 60 may be connected, as shown, to by-pass the audio frequency transformer 50. This condenser may be omitted if the oscillation frequency is a very low radio or an audio frequency as is preferably the case. During the day and evening the radio receiver 46 is connected to the distribution wires 52, but during the morning hours, say from 5:00 to 11:00 a. m., the oscillator A is set into operation and is connected to the distribution wires 52.

The output from the master oscillator may be modulated by a modulation circuit C. Two such circuits are here shown, of which circuit 62 is energized with constant frequency energy, while circuit 64 may be energized with music.

The outlet 54 is connected to a switch 66 which may be thrown upward if a radio program is desired, or left open if silence is desired, or thrown downward if the alarm is to be made operative. When switch 66 is thrown upward the reproducer 58 is connected directly to the outlet 54 and the radio program is heard. Before retiring, the guest may throw switch 66 to the "Alarm" position and adjust the dial to the desired time of awakening. The distribution wires 52 are then connected to the local resonant circuit 20, the rectified output from which is fed to the loud speaker 58. The energy received from the master oscillator is insufficient to operate the loud speaker until the desired time of awakening, at which time the energy comes into resonance with the circuit 20 and is greatly amplified. The sound from the loud speaker gradually grows in volume until the guest is awakened, at which time he can throw the switch 66 to the "Silent" position in order to stop the alarm.

The alarm station just described utilizes the loud speaker 58, which is anyway needed for the radio programs, as the alarm device. If it is desired to employ a special bell or buzzer for the alarm device, the alarm station may be arranged like that shown connected to the outlet 56. In this case the switch 70 is arranged so that when thrown upwardly the loud speaker 58 is connected directly to the outlet 56. When the switch 70 is left open the loud speaker and the alarm are silent. When the switch 70 is thrown downwardly to the "Alarm" position, the outlet 56 is connected to tuned circuit 20. In this case the rectified output is applied to a bell or buzzer 36 corresponding to that shown in Fig. 1, which, as we there stated, may or may not be provided with circuit breaking means, according as the output of the master oscillator A is not or is modulated.

It should be understood that the guest need not be deprived of a radio program during the entire morning because of the use of the alarm system shown, inasmuch as the ordinary radio program distribution system is arranged with about three channels, and only one of these need be disconnected from a radio receiver and connected to the master oscillator. Of course, and with which a multiple channel distribution system the switch used to control the radio and alarm systems may be appropriately designed to provide the desired control.

The range of frequency change needed for the master oscillator depends upon the exactness with which the time of alarm is to be set, and upon the total time over which the alarm is to be operated. This total time may be adjusted to cover the peak or rush of calls, and the guest may be instructed by appropriate directions on the alarm to request the operator to call him at any time lying outside of the specified range of time available on the indicator. In the present case, a six hour range extending from 5:00 to 11:00 a. m. has been selected, and this is probably as great a range as will ever be needed. It incidentally gives the pointer a sweep of 180°, corresponding to the full range of the conventional type of variable condenser, but this point is, of course, a minor feature, inasmuch as the

connection between the dial and the condenser may include gearing or linkage, and furthermore, the scale for the pointer may be calibrated without simulating the face of a clock as is the case in the modification here disclosed.

The manner in which the apparatus for the practice of our invention may be constructed and arranged, as well as the method of using the same and the many advantages thereof, will, it is thought, be apparent from the foregoing detailed description. The alarm may be brought into operation gradually and stopped at any time. If the alarm is not stopped, due to the absence of the guest, the alarm does not continue indefinitely but but only for a reasonable time. Any kind of sound may be selected for the alarm, including even musical selections. The wiring needed is of the simplest type, inasmuch as all of the alarm stations are connected in multiple or parallel and do not require individual radial wiring to the central office. If the building is already provided with a central system for the distribution of radio programs, the wiring of such a system may be employed for the alarm system, thereby dispensing entirely with special wiring.

It will be apparent that while we have shown and described our invention in the preferred forms, many changes and modifications may be made in the method and structures. For example, although smooth and continuous frequency variation has been disclosed, an intermittent step by step frequency variation may be employed, if desired. Numerous other variations of the disclosed embodiment may be made within the scope of the invention as defined in the following claims.

We claim:

1. The method of obtaining a time alarm through a loud speaker which includes generating alternating electrical energy, varying the frequency of the energy as a function of time, modulating the resulting energy by audio frequency modulation energy, transmitting the modulated energy to a plurality of points at which a time alarm is desired, and at each of said points resonating only energy of a selected frequency corresponding to the time at which an alarm is desired, rectifying the resonated energy to obtain the audio frequency modulation energy, and utilizing the rectified or modulation energy to directly energize the loud speaker.

2. A time alarm system comprising means to generate alternating electrical energy, means to vary the frequency of the energy as a function of time, means including a source of audio frequency modulation energy to modulate the resulting energy, a plurality of tuned circuits each resonant to energy of a selected frequency corresponding to the time at which an alarm is desired, telemetric means interconnecting the generating means and the tuned circuits, means to rectify the resonated energy to obtain the audio frequency modulation energy, and a loud speaker responsive to and directly energized by the rectified or modulation energy.

3. The method of obtaining a time alarm which includes generating alternating electrical energy of relatively high frequency, varying the frequency of the energy as a function of time, modulating the resulting energy with alarm actuating alternating energy of relatively low frequency, transmitting the modulated energy to a plurality of points at which a time alarm is desired, and at each of said points resonating only energy of a selected frequency corresponding to the time at which an alarm is desired, rectifying the resonated energy to obtain the relatively low frequency alarm actuating energy, and utilizing the resulting alarm actuating energy to actuate alarm mechanism.

4. A time alarm system comprising means to generate alternating electrical energy of relatively high frequency, means to vary the frequency of the energy as a function of time, means to modulate the generated energy with alarm actuating alternating energy of relatively low frequency, a plurality of tuned circuits each adjustably resonant to energy of a selected frequency corresponding to the time at which an alarm is desired, telemetric means interconnecting the generating means and the tuned circuits, means to rectify the energy resonated in each of said circuits in order to obtain the relatively low frequency alarm actuating energy, and alarm mechanism responsive to each of the resulting alarm actuating energies.

5. In the operation of a radio program distribution system for hotel buildings or the like, the method of additionally providing a time alarm system without extra wiring for the building which includes generating alternating electrical energy, varying the frequency of the energy as a function of time, feeding the energy into the radio program distribution system, and at the outlets of the distribution system selecting energy of a particular frequency corresponding to the time at which the alarm is desired, and utilizing the selected energy to operate alarm mechanism whereby the alarm occurs at the desired time.

6. The combination with a radio program distribution system for a hotel building or the like, of time alarm apparatus operable without necessitating extra wiring for the building, said apparatus comprising means to generate alternating electrical energy, means to vary the frequency of the energy as a function of time, means to feed the energy into the radio program distribution system, means at the outlets of the distribution system for selecting energy of a particular frequency corresponding to the time at which an alarm is there desired, and alarm mechanism responsive to the selected energy and consequently automatically operable at the desired time.

7. In the operation of a radio program distribution system for buildings, the method of providing a time alarm which includes generating alternating electrical energy, varying the frequency of the energy as a function of time, modulating the energy, feeding the modulated energy into the radio program distribution system, and at the outlets of the distribution system resonating energy of a selected frequency corresponding to the time at which the alarm is desired, rectifying the resonated energy, and feeding the rectified energy into the translating device normally used in connection with the radio distribution system.

8. The combination with a radio program distribution system including telemetric means and translating devices adapted for connection to outlets therein, of time alarm apparatus comprising means to generate alternating electrical energy, means to vary the frequency of the energy as a function of time, means to modulate the energy, means to feed the modulated energy into the radio program distribution system, a tuned circuit at each of the outlets of the distribution system, means for adjustably tuning each of the circuits to a selected frequency corresponding to the time at which an alarm is there

desired, means to rectify the resonated energy, and means to feed the rectified energy to the translating device normally used in connection with the adjacent outlet of the radio distribution system.

9. A time alarm system comprising an oscillator for generating a relatively high frequency, means to vary the generated frequency as a function of time, means to modulate the resulting energy in accordance with a pleasing musical audio frequency, a plurality of receiving circuits each comprising an oscillation circuit the natural frequency of which may be adjusted to correspond to the oscillator frequency at the time an alarm is desired, means interconnecting the oscillator and the receiving circuits, means to rectify the received energy in order to obtain the musical audio frequency energy, and a sound translating device responsive to and directly energized by the rectified or musical audio frequency energy, whereby a time alarm of pleasing sound is obtained.

10. The combination with a radio program distribution system for a building, of time alarm apparatus comprising an oscillator, means to vary the frequency of the oscillator as a function of time, means to feed the resulting variable frequency energy into the radio program distribution system, mechanism at each of the outlets of the system for normally utilizing the radio proframe energy transmitted over said distribution system, a time alarm circuit at each of the outlets of the system, switch mechanism at each of the outlets for selectively connecting either the program mechanism or the time alarm circuit to the distribution system, means permitting adjustment of the time alarm circuit for response to a particular frequency corresponding to the time at which an alarm is desired, and alarm mechanism responsive to the selected energy.

11. The combination with a radio program distribution system for a building, of time alarm apparatus comprising an oscillator, means to vary the frequency of the oscillator as a function of time, means to feed the resulting variable frequency energy into the radio program distribution system, a loud speaker at each of the outlets of the system for normally utilizing the radio program energy transmitted over said distribution system, a time alarm circuit at each of the outlets of the system, switch mechanism at each of the outlets for selectively connecting either the loud speaker or the time alarm circuit to the distribution system, means permitting adjustment of the time alarm circuit for response to a particular frequency corresponding to the time at which an alarm is desired, and means connecting the aforesaid loud speaker to the time alarm circuit in order to make the desired alarm audible.

12. A time alarm system comprising means to generate alternating electrical energy, means to vary the frequency of the energy as a function of time, means including a source of audio frequency modulation energy to modulate the resulting energy, a plurality of individual simple tuned receiver circuits each adjustable to be resonant to energy of a selected frequency corresponding to the time at which an alarm is desired at that particular circuit, telemetric means interconnecting the generating means and the several receiver circuits in order to supply substantial power to the latter, fixed rectification means for detecting or rectifying the resonated energy in order to obtain the audio frequency modulation energy without the aid of amplifiers and sources of energy local to the receiver circuits, and a loud speaker responsive to and directly energized by the rectified or modulation energy.

13. The combination with a radio program distribution system for a hotel or like establishment, of time alarm apparatus for calling and awakening guests at predetermined desired times set by the guest, said apparatus comprising means to generate alternating electrical energy, means to vary the frequency of the energy over a predetermined maximum range as a function of time, said complete range being covered in a relatively short period of time corresponding to the morning peak or rush period of guest calls, means permitting the energy to be fed into the radio program distribution system during the aforesaid peak or rush period of calls, means at the outlets of the distribution system adjustable by the guest to select and respond to energy of a particular frequency corresponding to the time at which said guest wishes to be called, and alarm mechanism responsive to the selected energy.

14. The combination with a radio program distribution system for a building, of time alarm apparatus comprising an oscillator, means to vary the frequency of the oscillator as a function of time, means to feed the resulting variable frequency energy into the radio program distribution system, mechanism at each of the outlets of the system for normally utilizing the radio program energy transmitted over said distribution system, a time alarm circuit at one or more of the outlets of the system, a switch at said outlet arranged to selectively connect either the program mechanism or the time alarm circuit to the distribution system, means for adjusting the time alarm circuit for response to a particular frequency corresponding to the time at which an alarm is desired, and alarm mechanism responsive to the selected energy.

HENRY J. NELSON.
BERNARD S. FRANKLIN.