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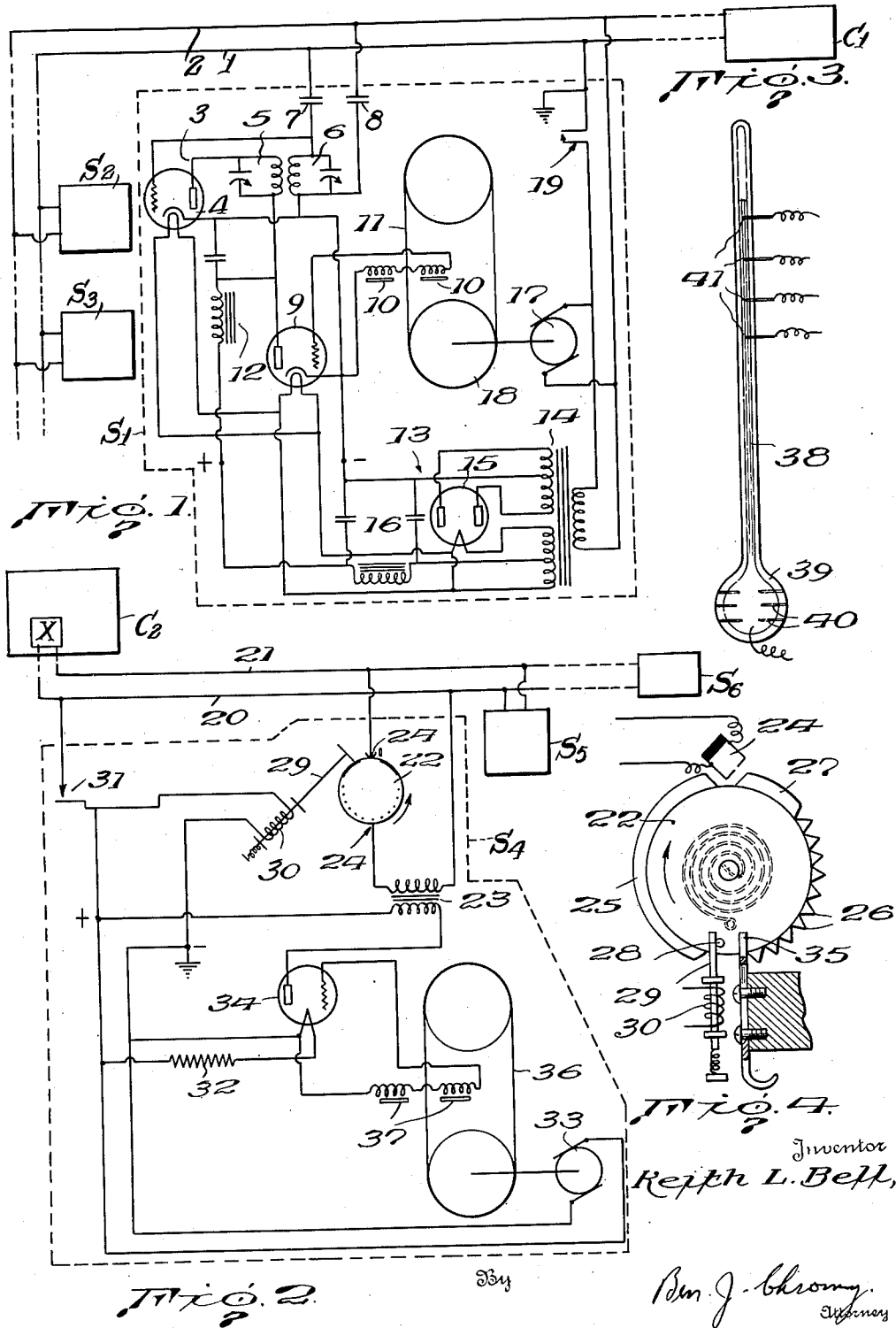
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2,332,776

ALARM SIGNALING APPARATUS EMPLOYING PUBLIC UTILITY CIRCUITS

Filed March 8, 1941

2 Sheets-Sheet 1



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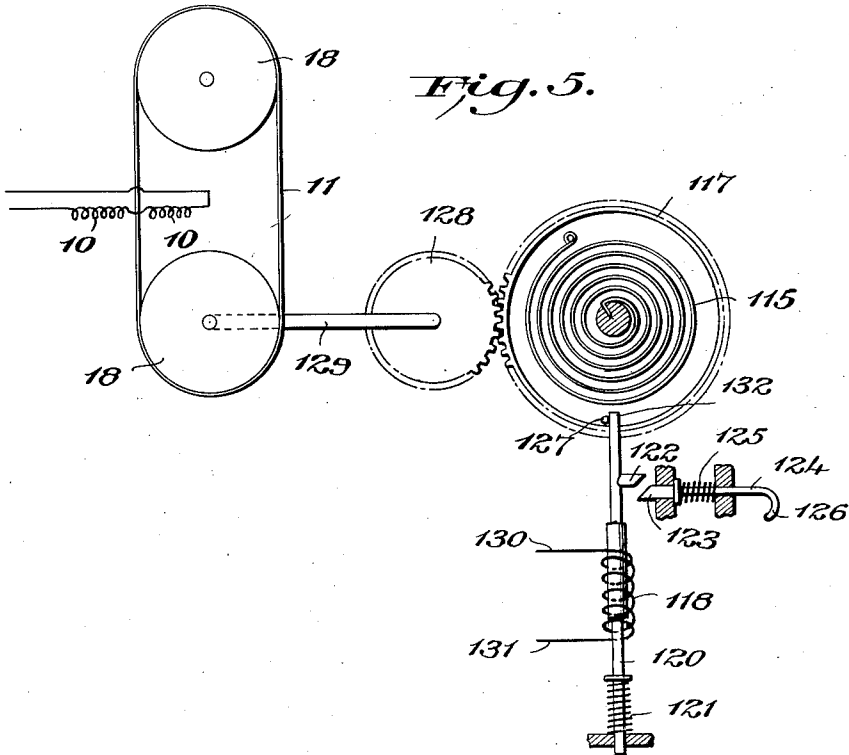
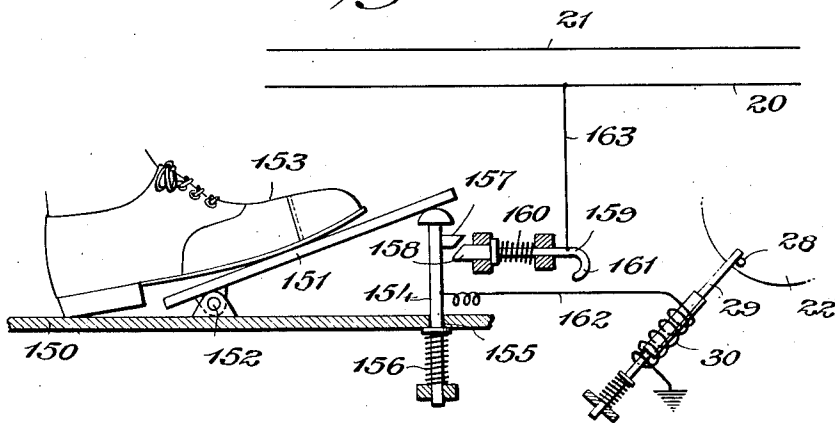


Fig. 6.



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2,332,776

ALARM SIGNALING APPARATUS EMPLOYING PUBLIC UTILITY CIRCUITS

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Application March 8, 1941, Serial No. 382,435

8 Claims. (Cl. 179-5)

This invention relates to signaling apparatus generally. More particularly this invention relates to signaling apparatus adapted to transmit burglar and fire alarms over telephone or electric lighting lines.

An object of this invention is to provide a burglar alarm for transmitting a signal over telephone or electric lighting lines to a central station, said burglar alarm consisting of a reproducing device controlled by a manual or automatic switch for transmitting an identifying signal giving the location and identification of the origin of said signal.

Another object of this invention is to provide signaling apparatus for transmitting a burglar or a fire alarm over existing public service lines, whereby the location of the burglary or fire may be immediately made known at a central station connected to said public service line.

A further object of this invention is to provide a signaling apparatus adapted to be used for signaling fire or burglar alarms over existing public service telephone or light lines, said apparatus being constructed to receive the power for the energization thereof from said lines.

Still a further object of this invention is to provide an apparatus for reproducing a recorded message and impressing said recorded message upon a telephone or a light circuit in a substantially silent and noiseless manner.

Another object of this invention is to provide a signaling device for signaling over existing public service lines or over a radio transmitter for the purpose of giving the location of a fire or a burglary, the message consisting of the location of the fire or burglary being recorded, and said record being adapted to be reproduced after the transmission of predetermined signaling impulses.

Other and further objects of this invention will be apparent to those skilled in the art to which it relates from the following specification and claims.

In accordance with this invention, I provide a signaling system adapted to be connected to existing telephone, lighting or other public service lines, for the purpose of transmitting the location of a fire or burglary to a central station with the least possible delay. One of the features of my invention is that the apparatus thereof may be easily and readily installed, is extremely compact and silent in operation, and, furthermore, is adapted to be energized by power obtained from the telephone circuit or from the lighting circuit. The apparatus of my invention

employs a recorded message consisting of the identity of the place where the apparatus is installed, namely, the business premises address thereof, and means for reproducing, amplifying, and impressing this message upon the telephone, lighting or other lines. This apparatus is placed into operation either by a manual or an automatic switch. For example, the apparatus may be installed adjacent to the cash register of a store or other place to be protected, and a control switch may be placed next to the cash register so that if burglars enter the store the operator may step on the switch control and immediately set the apparatus into operation to transmit a signal over the telephone circuit, warning the operator at headquarters that that particular store is being burglarized. Before the location of the store is transmitted, a novel dialing device transmits a plurality of impulses connecting the apparatus at the store or business premises with the special operator in charge of calls of this nature. This special operator immediately obtains a connection with the nearest police station and informs this police station that the store at the given location is being held up. Simultaneously, as the apparatus at the particular store or business premises is transmitting the location of the store to the telephone operator, it may also transmit a radio signal upon a predetermined frequency giving the location of the store being held up. The frequency employed is preferably selected as the same frequency as that to which all of the scout cars of the police department are adjusted, so that all of these scout cars are immediately informed that a store at a given location is undergoing a robbery.

Further details of my invention will be apparent from the following specification, claims, and the drawings in which, briefly:

Fig. 1 is a schematic diagram of connections showing the apparatus of my invention connected to an electric lighting circuit;

Fig. 2 is a schematic diagram of connections showing the signaling apparatus of my invention connected to a telephone circuit;

Fig. 3 is a detailed diagram of a form of thermostat that may be employed in controlling the apparatus of Figs. 1 and 2; and,

Fig. 4 is a detailed diagram showing features of the automatic dial employed in the apparatus shown in Fig. 2.

Fig. 5 shows in a modified form of my apparatus a spring motor for driving the magnetic record tape, and

Fig. 6 shows a detail of the foot-operated switch device.

Referring to Fig. 1 of the drawings in detail, reference numerals 1 and 2 designate electric lighting lines such as normally carry the 110 volt power for residential lighting purposes from a central station C₁ to a plurality of consumer's stations S₁, S₂, S₃. Each of the consumer's stations S₁, S₂, S₃, including an oscillation generator 3, consisting of a vacuum tube 4 and oscillatory circuits 5 and 6, is connected to the lines 1 and 2 by means of the coupling condensers 7 and 8, respectively. The oscillatory circuits 5 and 6 are coupled together, and one of these circuits, namely, circuit 5, is connected to the plate of tube 4, and the other of these circuits, namely, circuit 6, is connected to the grid of said tube. A modulating tube 9 having its grid and cathode connected to the pick-up coils 10 operatively associated with the magnetic record tape 11, is connected with its plate to the circuit 5, and to the choke 12, said choke being connected to the positive terminal of the rectifier 13. The cathodes of tubes 4 and 9 are connected together and to the negative terminal of the rectifier 13. The rectifier 13 consists of a transformer 14, having its primary winding connected to lines 1 and 2, and a rectifier tube 15 connected to suitable low and high voltage windings of the transformer 14. The output of the rectifier 13 is filtered by means of the filter 16, which consists of one or more filter condensers and a choke coil or resistance.

A motor 17 for driving the reel 18 of the magnetic wire or tape 11 is connected in parallel with the winding of the transformer 14 to be energized from the lines 1 and 2. Both the transformer 14 and the motor 17 are connected to be controlled by the control switch 19, said control switch 19 may be either in the form of a manual switch, a thermostatic switch, or a door or window operated switch, or one or more of the aforesaid switches in parallel.

The apparatus shown in Fig. 1 may be installed in various convenient locations where it is desired to detect burglaries or fires. For example, a number of switches, such as the switches 19 may be placed around a window or a door, or a plurality of these switches in the form of thermostats may be placed at various locations in rooms or buildings, so that if any one of these switches is actuated a fire or burglar alarm will be immediately transmitted over the lines 1 and 2. This alarm will be transmitted as soon as the switch 19 is closed and the transformer 14 and motor 17 are energized. The motor 17 may be either an electrical device or a mechanical device, such as a spring tension motor. If a spring tension motor 117 is employed, then a solenoid 118 is connected in place of the motor 17, as shown in Fig. 5, and this solenoid 118 releases the spring tension motor as soon as it is energized by pulling the rod 120 carrying the solenoid core down against the action of spring 121 and thereby disengaging the end 132 of rod 120 from the stop pin 127 carried on the drum 117 housing spiral spring 115. The terminals 130 and 131 of solenoid 118 are connected like the terminals of the motor 17 of Fig. 1 across the primary of transformer 14 and hence are under the control of switch 19 of Fig. 1. The spring drum 117 drives through reducing gear wheel 128, the shaft 129 which in turn drives reel 18. When released, the motor turns the reel 18 to start the reproduction of the message recorded on the magnetic

tape 11. The pick-up coils 10, 10, are positioned adjacent to the magnetic tape 11, and pick up the message recorded on this magnetic tape and impress it upon the input of amplifying and modulating tube 9. The oscillations generated by the tube 4 are of relatively high frequency and are modulated by the amplifier modulator 9, which has its plate connected to the choke 12 and the plate circuit of the oscillator tube 4.

In Fig. 2 I have illustrated a form of this invention particularly adapted for signaling over existing telephone lines designated as lines 20 and 21 leading to subscriber's stations S₄, S₅, S₆, from a central exchange office C₂ which comprises machine switching unit X. Across these lines at subscriber's station S₄ is connected an automatic dial 22 in series with the secondary of the audio frequency transformer 23. The automatic dial 22 is shown in detail in Fig. 4, and consists of a circuit make and break device 24, a dialing tone selection segment 25, ten impulse-producing segments 26, and a circuit-closing segment 27. The dial 22 is also provided with a holding pin 28 associated with the solenoid operated catch 29. This solenoid operated catch 29 is attached to the armature of the solenoid 30. The solenoid 30 is provided with a terminal connected to the switch 31, which corresponds to the switch 19 of Fig. 1, and may work by a manually controlled switch, a thermometer controlled switch, or a window or door operated switch. In cases where this apparatus is installed for operation by operators adjacent to the cash register or cashier's window, this switch is a foot-operated device, as shown in Fig. 6. In Fig. 6, the switch means between line 20 and solenoid 30 comprises the contacts 157, 158, the former of which is carried on rod 154 which is normally urged upwardly by spring 156, and is engaged and depressed by foot-operated treadle 151.

One side of the switch 31 is connected to the line 20 which is connected to the positive terminal of a suitable source of current supply located at the telephone central office C₂. The other side of the switch is connected to the solenoid 30 and to one terminal of the primary winding of the transformer, to one terminal of the voltage reducing resistor 32, and to one terminal of the reel driving motor 33. The other terminal of the solenoid 30 is grounded and through ground is connected to a negative terminal of the direct current source of supply located at the telephone central office C₂. Thus, when the switch 31 is closed either manually or automatically as the case may be, the solenoid 30 is energized from the direct current source of supply provided at the telephone office, central or exchange. Other suitable conventional sources of energy for solenoid 30 and motor 33 may be provided.

When the switch 31 is closed and the solenoid 30 is energized, the catch 29 is disengaged from the pin 28, and the spring tensioned dial is released. The dial thereupon rotates in the direction indicated by the arrow, and the segment 25 engages the switch 24 so that the secondary of the transformer 23 is connected across the lines 20 and 21. This switch 24 is closed for an interval of time sufficient in length to obtain the dialing tone. After the dial 22 rotates past the segment 25, the segments 26, which are shown as ten in number, operate to transmit ten impulses over the lines 20 and 21 for the purpose of automatically dialing the telephone operator

through suitable known automatic impulse train actuated machine switching equipment unit X located at the operator's central station or office C₂, and connecting the operator to receive the message recorded on the tape 4. It is, of course, obvious that more or less than ten segments 26 may be employed for this purpose. After this series of impulses is transmitted to the operator, the segment 27 serves to hold the circuit of the contacts 24 closed until reset by a qualified representative or operator of the telephone company. When the dial 22 is set into rotation the pin 28 is released by the catch 29. However, as this dial rotates, this pin 28 engages the manually operated catch 35, and the dial cannot be reset until this manually operated catch is released.

After the dial 22 passes the impulse segments 26 and comes to rest on holding segment 27, engaging the switch 24, the amplifier 34 is connected to the lines 20 and 21 ready for the reproduction of the message recorded on the magnetic tape 36. This magnetic tape 36 is rotated by the motor 33 between the magnetic pick-up devices 37, 37, which are connected to the grid and cathode of the amplifier 34. The message reproduced then from this magnetic tape is impressed upon the primary winding of the transformer 23 which is connected to the plate of the amplifier 34. The plate circuit of this amplifier is energized from the same direct current supply as is employed for energizing the solenoid 30 and the motor 33. Likewise the filament of this amplifier tube 34 is also energized from this direct current supply in series with a voltage-reducing resistor 32.

In Fig. 3 I have illustrated a form of thermostat switch that may be employed as the switch 19 shown in Fig. 1 and the switch 31 shown in Fig. 2. This thermostat consists of a tube 38 of glass or other insulation material having a bulb 39 at the lower end thereof filled with mercury. Said bulb 39 is provided with fins 40 of iron or similar material for more efficiently transmitting heat into the mercury in said bulb. Said bulb may be made of iron if desired and it may be attached to a glass tube 38. This glass tube 38 is provided with a plurality of contacts 41 imbedded therein. The contacts 41 of the thermostat 38 are spaced so that this thermostat will operate at different temperatures, the lowermost contact operating at the lowest temperature and the upper contact operating at the higher temperature to close the circuit thereof. These contacts may be separated to give circuit control at different temperatures, for example, the lower contact may be arranged to function at 100 degrees F. and the upper one at 130 degrees F. with the intervening contacts at temperatures between these limits. Other temperatures may be selected as desired.

On a non-dial telephone system the solenoid 30 may be replaced by a circuit closing device which maintains a closed circuit which automatically rings the central telephone operator who plugs in and receives the recorded message reproduced from the tape 36. This tape may be so arranged that it will be reproduced repeatedly for any given length of time. On rural telephone party lines where the telephone central operator is rung manually a suitable mechanically powered ringing device is employed. This is automatically set into operation upon the closing of the switch 31 and rings the central operator for a given length of time preceding the transmission of the

recorded message from the tape 36. In this case the tape may again be reproduced repeatedly for any given length of time. The reproduced message is received by the central operator who plugs into the circuit upon receiving the ringing signal, and in turn relays the message received from the recording 36 to the proper authorities such as the fire or police department.

Where desired suitable bells, lights, horns, gongs and similar devices may be connected across the solenoid 30 to give a visual or acoustic alarm at the place of the burglary or fire to arouse the occupants or attract the attention of patrolman or other persons passing by. Furthermore where desired persons at the location of the apparatus may through the use of the conventional telephone apparatus talk directly to the operator at the central station when the dial 22 is positioned to close the switch 24 through the operation of the segment 27.

What I claim is as follows:

1. In an alarm signaling system, a central station, a service station remote from said central station, a service distribution circuit connecting said central station and said service station, signal means at said service station for controllably applying a voice signal voltage to said circuit, said signal means comprising a repeating voice record means and pick-up means for converting said record into an electric current, and emergency control switching means adapted when actuated to energize said signal means so comprising said repeating voice record means and said pick-up means for applying voice signal voltage to said circuit.

2. A system according to claim 1, said circuit being normally electrically energized, and said switching means being connected to said circuit for deriving energy therefrom for controllably energizing said signal means.

3. In an alarm signaling system, a central station, a service station remote from said central station, a service distribution circuit connecting said central station and said service station, radio-frequency signal means at said service station for controllably applying a modulated radio-frequency voltage to said circuit, said signal means comprising a radio-frequency oscillator having its output in electrical relation with said circuit, and modulating means connected to said oscillator and comprising a repeating voice record means and pick-up means for converting said record into an electric current, and emergency control switching means adapted when actuated to energize said oscillator and said modulating means and said repeating voice record means and said pick-up means for applying voice modulated radio-frequency current to said circuit.

4. A system according to claim 3, said circuit being normally electrically energized, and said switching means being connected to said circuit for deriving energy therefrom for energizing said oscillator and said modulating means and said pick-up means.

5. In an alarm signaling system, a central station, a service station remote from said central station, a service distribution circuit connecting said central station and said service station, dialing means at said service station connected to said circuit and comprising a series of contact segments adapted to transmit a train of code switching impulses, voice signal means at said service station for controllably applying a voice signal voltage to said circuit, said voice

signal means comprising a repeating voice record means and pick-up means for converting said record into an electric current, connections for applying said voice signal voltage to said circuit, and emergency control switching means adapted when actuated to release said dialing means for operation to transmit its code switching impulses and to energize said signal means for applying voice signal voltage to said circuit.

6. In an alarm signaling system, a central station, a service station remote from said central station, a service distribution circuit connecting said central station and said service station, dialing means at said service station connected to said circuit and comprising a series of contact segments adapted to transmit a train of code switching impulses followed by a continuous closed connection, signal means at said service station comprising a circuit element connected in series between said dialing means and said circuit and adapted to apply to said circuit element and said circuit a voice signal voltage, said voice signal means comprising a repeating voice record means and pick-up means for convert-

ing said record into an electric current, and emergency control switching means adapted when actuated to release said dialing means for actuation of its code switching impulses followed by its continuous closed connection and to energize said signal means for applying voice signal voltage to said circuit through said continuous closed connection.

7. A system according to claim 6, and manually operable locking and re-setting means adapted to lock said dialing means after it has transmitted said code switching impulses followed by said continuous closed connection.

8. A system according to claim 5, and solenoid means connected to said control switching means and adapted to release said dialing means into actuation, said circuit being normally electrically energized and said switching means being connected to said circuit for deriving energy therefrom for energizing said signal means and causing said solenoid to release said dialing means into actuation.

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