Aug. 17, 1937. F. R. DAVIDSON 2,090,574

AUTOMATIC BURGLAR AND FIRE ALARM

Filed Oct. 23, 1935 3 Sheets-Sheet 1

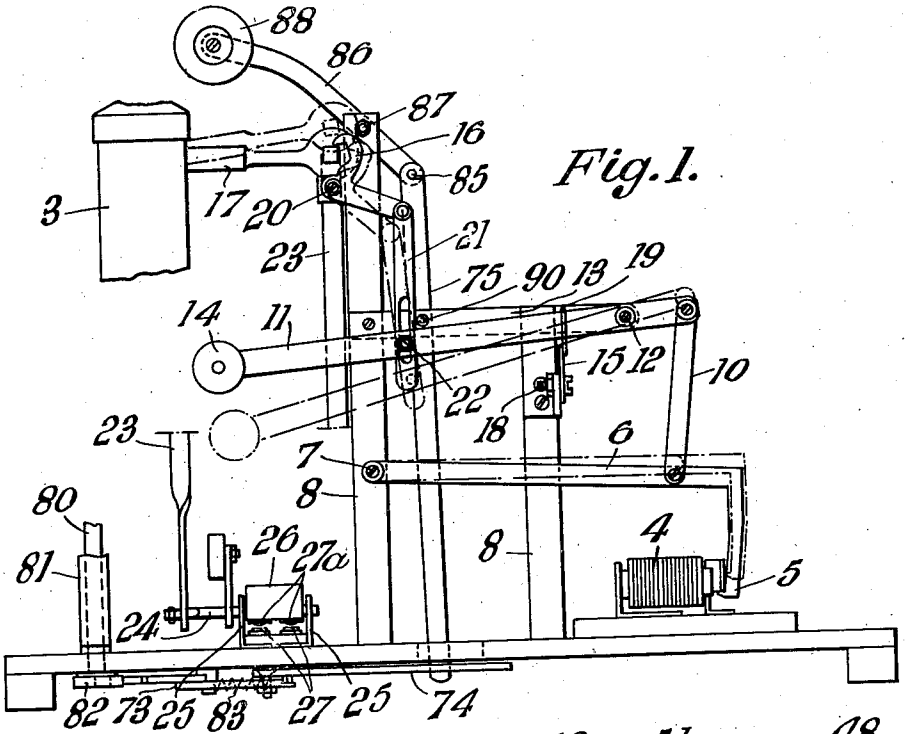


Fig. 1.

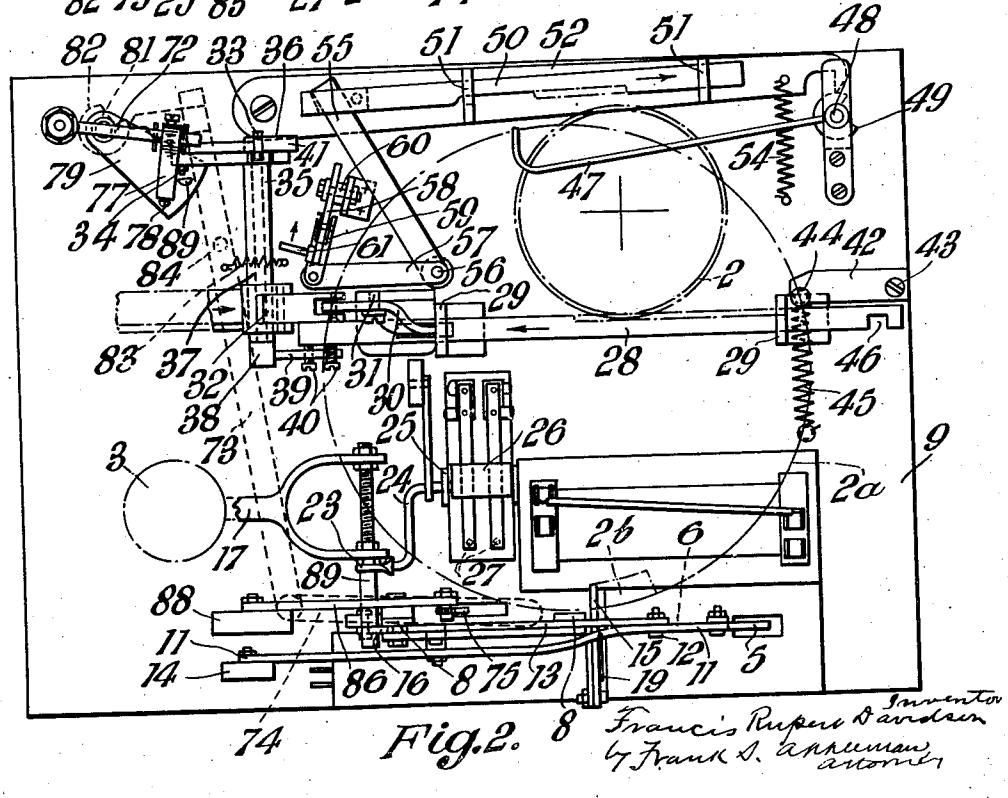


Fig. 2.

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AUTOMATIC BURGLAR AND FIRE ALARM

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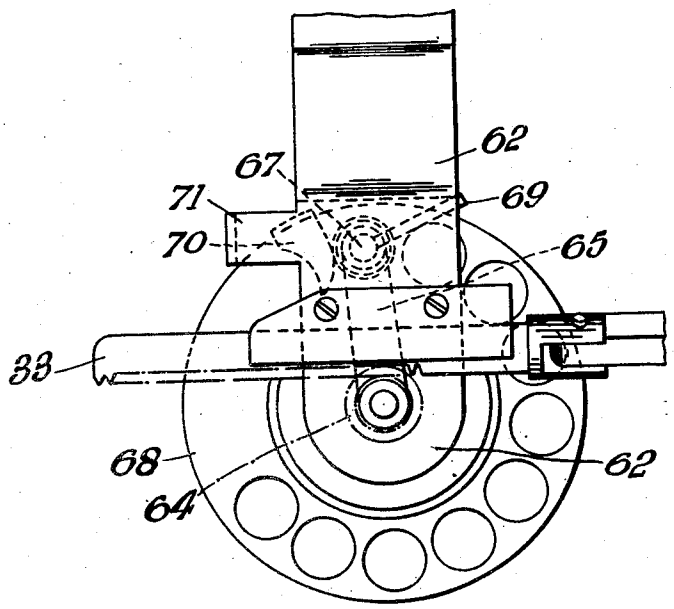


Fig. 3.

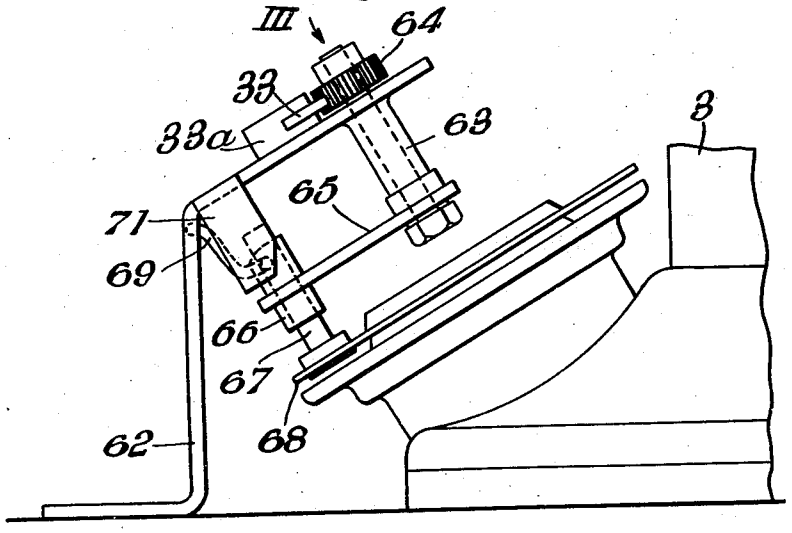


Fig. 4.

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AUTOMATIC BURGLAR AND FIRE ALARM

Filed Oct. 23, 1935 3 Sheets-Sheet 3

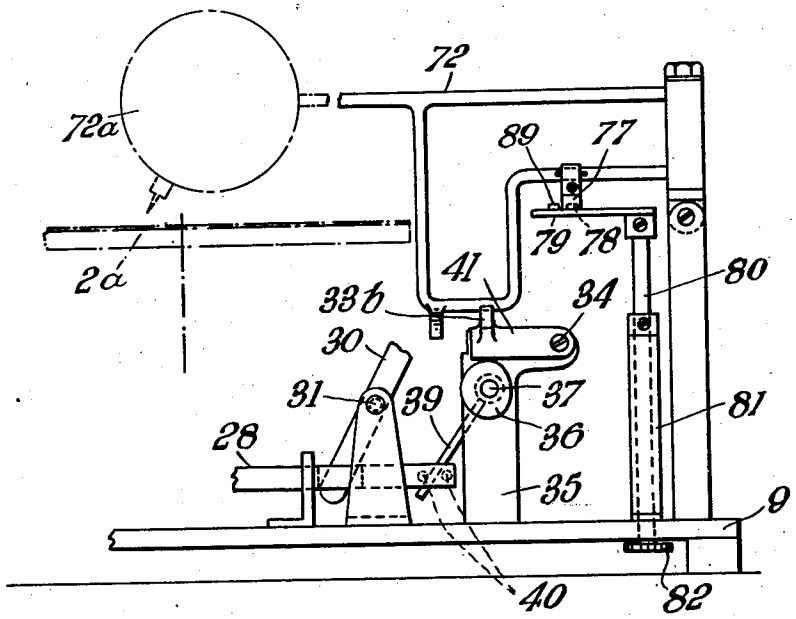


Fig. 5.

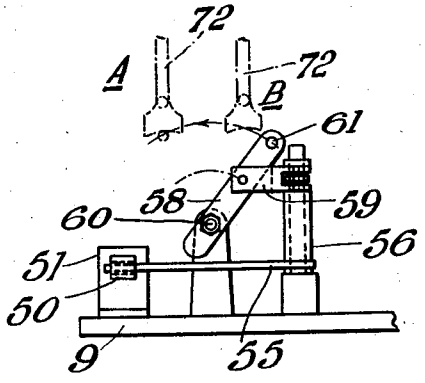


Fig. 6.

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UNITED STATES PATENT OFFICE

2,090,574

AUTOMATIC BURGLAR AND FIRE ALARM

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Application October 23, 1935, Serial No. 46,408
In Great Britain October 23, 1934

11 Claims. (Cl. 179—5)

This invention relates to automatic burglar and fire alarms, and has reference to alarm devices of the type comprising a gramophone or like sound reproducing device operatively connected with a telephone line and associated with means automatically to establish communication with a fire, police or other station and to transmit a suitable message to said station upon the occurrence of a burglary or fire. In this type of apparatus an electromagnet is employed which, upon the unauthorized opening of a door, window, safe or the like or upon a sudden rise in temperature, operates to release trip mechanism to start the gramophone motor to operate a dialing device and thereby establish communication with the desired station.

In this type of apparatus it has also been proposed normally to isolate the alarm device from the telephone system, communication being established automatically when the device is set into operation by the unauthorized opening of a door or the like, means also being provided whereby the message can be repeated if desired.

According to the present invention the alarm device comprises in combination a gramophone or like sound reproducing device operatively connected with a telephone line in association with means automatically to establish communication with a fire, police or other station upon the occurrence of a fire or burglary and to transmit a suitable message to said station, in which the gramophone motor is started by trip mechanism released by an electromagnet, the trip mechanism for starting the motor also operating simultaneously to connect the transmitter of the alarm device with the telephone system to open the line, and wherein the gramophone motor operates mechanism which successively dials the emergency dialing symbol, lowers the sound box or pick-up on to the sound reproducing record to produce the message or alarm to be transmitted returns the sound box or pick-up to the commencement of the record to repeat the message or alarm, then clears the line and finally disconnects the transmitter from the telephone system.

In one particular form of the invention an ordinary telephone instrument is employed as the transmitter, said instrument being normally isolated from the telephone system but connected therewith simultaneously with the starting up of the gramophone motor, this being effected by weight actuated lever mechanism which upon being released by the electromagnet lifts the receiver arm of the telephone instrument simultaneously to close two contacts to connect the instrument with the telephone system, and make the line.

If desired means may be provided to stop the gramophone motor.

In order that the invention may be more clearly understood one particular construction thereof will now be described, by way of example with reference to the accompanying drawings wherein:

Figure 1 is a side elevation of the trip mechanism for starting the motor, connecting the telephone instrument with the telephone system, and opening the line.

Figure 2 is a plan view of the apparatus.

Figures 3 and 4 are respectively a plan and side view (from arrow III) of the dialing mechanism, and

Figures 5 and 6 are side elevations of parts of the mechanism shown in the upper part of Figure 2.

Referring to these drawings the apparatus comprises a gramophone motor **2** and a turntable **2a**; a telephone instrument **3**; weight actuated lever mechanism (Figure 1) set into motion by trip mechanism operated by an electromagnet **4** for starting the gramophone motor, lifting the receiver arm **17** and putting the normally isolated telephone instrument into circuit with the telephone system; link and lever mechanism operated by a rack **28** driven by the motor **2** to dial "O" (or other emergency symbol) and lower the gramophone sound box onto the sound record; lever mechanism operated by a second rack **50**, also driven by the motor **2**, for returning the sound box **72a** to the commencement of the sound record to repeat the message or alarm; and cam and weight actuated lever mechanism **82, 73—75** for finally replacing the receiver arm disconnecting (and thus isolating) the telephone instrument **3** from the telephone system. The complete apparatus is preferably enclosed in a sound proof casing.

Referring to the starting mechanism illustrated in Figure 1, the electro-magnet **4** is energized for example, upon the unauthorized opening of a door, window, safe or the like and releases a catch **5** which forms part of a lever **6** pivoted at **7** to one of two vertical supports **8** mounted on a box plate **9**. Said lever **6** is coupled by a pivoted link **10** to a rocking lever **11** itself pivoted at **12** to the cross arm **13** of the supports **8**, and provided at its outer free end with a weight **14** which, when the catch **5** is released in the manner described above, causes said rocking lever **11** to fall into the position shown

in broken lines. This movement of the lever 11 moves a pivoted latch 15 out of engagement with a stop 2b on the gramophone turntable 2a, whereby the motor 2 is started. The latch 15 is pivoted at 18 on the vertical support 8 and is provided with hook 19 which engages with the upper edge of the lever 11, so that as the lever 11 moves downwards the latch 15 drops, under its own weight, out of engagement with the stop 2b on the turntable.

Simultaneously with the starting of the motor 2 the receiver arm 17 of the telephone instrument 3 is lifted. This operation is also effected by the rocking lever 11, the downward movement of which releases a catch 16 which normally holds the receiver arm 17 in its depressed position.

The catch 16 is pivoted at 20 and pivotally connected to a link 21 provided with a longitudinal slot into which projects a pin 22 on the lever 11, thus when the lever 11 falls said pin 22 moves the link downward whereby the catch 16 is turned about its pivot 20 and caused to disengage the receiver arm 17 which is thus free to lift.

Connected to the receiver arm 17 at its upper end is a flat rod 23 the lower end of which is connected to a crank 24 which is mounted in bearing 25 and carries an eccentric cam 26. When the receiver arm 17 lifts the rod 23 connected to it operates the crank 24 to rotate the cam 26 whereby contacts 27, 27a are closed to make the circuit between the normally isolated telephone instrument and the telephone system.

The lever mechanism 73—75 and the weight controlled lever 86 shown in Figure 1 operate respectively to return the receiver arm 17 to its depressed position and to break the telephone circuit after the alarm message has been transmitted the desired number of times, and will be described more fully hereinafter.

In Figure 2 the mechanism for effecting the various subsequent operations is shown in its initial position. Referring to this figure a rack 28 is mounted in guides 29 on one side of the motor 2 and is normally in mesh with a toothed member of said motor, preferably the lower toothed annulus which through step-up gearing drives the spindle of the turn-table. When the motor 2 starts, the rack 28 is driven in its guides 29 in the direction of the arrow and by the intermediary of a two armed lever 30 drives a rack 33 in the opposite direction to drive the dialing member hereinafter described. The two armed lever 30 is pivoted to a support 31, and one arm of said lever projects through a vertical slot formed in the rack 28 while the other arm is connected to the rack 33 by a link 32 forming an articulated joint.

The dialing mechanism, illustrated in Figures 3 and 4, is mounted on a bracket 62 and consists of a rotary shaft 63 on the upper end of which is mounted a pinion 64 which engages with the rack 33 slidable in a guide member 33a. On the lower end of said shaft 63 is rigidly secured a radial arm 65 which carries at its free end a sleeve 66 in which is slidably arranged a pin 67 adapted to engage in any selected aperture in the dialing disc 68 of the telephone. Projecting radially from the pin 67 is a finger 69 which, as hereinafter described, is caused to ride over the upper cam surface of the sleeve 66 to withdraw the pin 67 from the aperture in the dialing disc 68, after said disc has been rotated in clockwise direction. In operation the rack 33, driven in the manner described above, drives the pinion 64 and thus rotates the shaft 63 whereby the pin 67 is moved in an arcuate path in a clockwise direction and, since it is arranged in one of the apertures of the dialing disc 68, rotates said disc to commence the dialing operation. Just before the pin 67 reaches the stop 70 during the dialing operation the finger 69, projecting radially therefrom abuts against a projection 71 on the bracket 62, so that as the pin completes the clockwise rotation of the disc 68, it is itself caused to rotate in the sleeve 66, whereby the finger 69 rides over the cam surface of said sleeve 66 and lifts the pin 67 out of engagement with the disc 68, thereby releasing said disc so that it can rotate in an anti-clockwise direction in the usual manner to complete the dialing operation and establish communication with the desired station.

In addition to the dialing operation the rack 28 also operates to lower the sound box of the gramophone onto the sound record. The arm 72 carrying the sound box is supported in a recessed cross-piece 33b of an arm 41, one end of which is pivoted at 34 to a support 35 and the other end rests on a cam 36 (see Figure 5) rigidly mounted on a rotary shaft 37 mounted in a sleeve formed on the support 35. To the opposite end of the shaft 37 is rigidly secured a collar 38 to which is fixed one end of a crank 39 the other end of which projects between pins 40 of the rack 28. The normal position of the cam 36 is such that the sound box 72a on the arm 72, is suspended above the commencement of the sound record as shown in Figure 5. As soon as the rack 28 begins to move, as described above, the movement is transmitted to the crank 39 which in turn rotates the shaft 37 and with it the cam 36 whereby the arm 41, which supports the arm 72 carrying the sound box, is lowered and thereby gently lowers the sound box 72a onto the sound record, whereupon the acoustic output of the gramophone is picked up by the telephone transmitter.

When the rack 28 has travelled a sufficient distance to complete the dialing operation and lower the sound box onto the sound record, it is moved out of engagement with the toothed annulus of the motor by the action of a spring loaded lever 42. This lever 42 is pivoted at 43 and provided with an upstanding pin 44 which is pressed against the rack 28 by the action of a spring 45. The rack 28 is however, prevented from moving out of engagement with the motor by the guides 29 until it has travelled a given distance, (i. e. the distance necessary to complete the various operations which it is intended to perform) when a notch 46 formed in the rack reaches the first guide 29 whereupon said rack snaps out of engagement with the motor.

It will be seen from the foregoing that at this stage the gramophone turntable 2a with a suitable sound record thereon will be rotating, the sound box 72a will have been lowered onto the record, the telephone receiver arm 17 lifted and communication established with the fire, police or other station to which the sound of the record will be transmitted.

When the sound box has travelled over the record once it is automatically returned to the commencement of the record to repeat the message, and this is effected in the following manner:

As the sound box travels over the record it contacts with a lever 47 mounted on a vertical shaft 48 which is thus rotated and rotates with it a cam 49 which is mounted on the lower end of said shaft and against which one end of a spring

loaded lever 52 is pressed. The said lever 52 is pivoted at 53 and is provided on its upper surface with guides 51 for a second rack 50. At the moment when the sound box reaches the end of its travel over the sound record the cam 49 will have been rotated so far by the movement of the lever 47 that the pivoted lever 52 will, under the action of the spring 54, simultaneously move the rack 50 into engagement with the toothed annulus of the motor 2. Into a horizontal slot formed in the end of the rack 50 projects one end of a lever 55 which is rigidly connected at its opposite end to the lower end of a vertical rotatably mounted shaft 56. To the upper end of this shaft 56 is rigidly secured a lever 57 which is in turn connected, by means of an articulated link 59, to a lever 58 which is itself pivoted at its lower end to a support 60 and provided at its upper end with an outwardly projecting pin 61. When the rack 50 is driven in the direction of the arrow, the movement thereby imparted to the levers 55, 57 is transmitted through the link 59 and causes the lever 58 to rotate in a vertical plane about its pivot, thus the pin 61 is moved in an arc, as shown in Figure 6. The initial position of the lever 58 is such that the pin 61 is located immediately below the supporting arm 72 of the sound box at the moment when said sound box has reached the end of the record (position B Figure 6), thus when the sound box reaches this position and the pin 61 is moved in the manner described, said sound box will be lifted off the record by said pin 61, and carried to its initial position (position A Figure 6) at the commencement of the record to repeat the message.

In order to prevent the motor from continuing to drive the rack 50 after the above operations have been performed, a suitable number of teeth are cut away, so that said rack moves out of engagement with the motor at the moment when the rack has reached its end position.

After the record has been repeated a given number of times, in the present example twice, spring controlled lever mechanism 73, 74, 75 is operated to release a weight actuated lever 76 to return the receiver arm 17 to its depressed position and clear the line, and to operate the cam 26 to break the contacts 27 and thus isolate the telephone instrument from the telephone system.

This mechanism is set into operation by the movement of the arm 72 carrying the sound box. On the arm 72 is pivotally mounted a pawl 77 which abuts against a pin 78 mounted on the upper surface of a plate 79 which is itself mounted at the upper end of a shaft 80 rotatably mounted in a sleeve 81. The rotary shaft 80 extends through the base plate 9 and is provided at its lower end below the base plate 9, with a cam 82. Pressed against this cam 82, by means of a spring 83, is one end of a lever 73 which is pivoted at 84 and pivotally connected at its opposite end to lever 74. In this lever 74 is a slot into which projects the lower end of a vertical lever 75 pivoted at 90 to the support 8 and provided at its upper end with a hook which engages with a pin 85 on the lower end of a rocking lever 86 pivoted at 87 to the support 8 and provided at its upper free end with a weight 88. In operation the arm 72 turns about its pivot as the sound record is being played and by means of the pawl 77 abutting against the pin 78 moves said plate to rotate the shaft 80 carrying the cam 82, which however is not rotated sufficiently to release the lever 73 until the record is played a second time. When the arm 72 is moved back to its initial position, as described above, to return the sound box to the commencement of the sound record, the pawl 77 during the return movement of the arm 72, rides over and is moved behind a second pin 89 on the plate 79 so that as the sound box of the gramophone travels over the sound record a second time, the cam 82 is rotated still further, and at the moment when the sound box has reached the end of the record the cam will have moved so far as to release the lever 73, which under the action of the spring 83 will then swing about its pivot 84 and through the lever 74 will cause the vertical lever 75 to pivot and release its upper hooked end from the pin 85, whereupon the rocking lever 86 under the influence of its weight 88 will fall across the rod 89 and return the receiver arm 17 of the telephone to its depressed position. Simultaneously with the depressing of the receiver arm 17 the contacts 27 will be broken as described above.

The contacts 27 are, as previously indicated, closed upon operation of the cam 26 to connect the telephone transmitter to the line. In order that the normal telephone system shall not be substantially affected by the connection of the transmitter of the alarm device, it is preferable to make the connection in parallel. It is further desirable to arrange that the telephone transmitter has substantially the same characteristics as a normal telephone, and a speech transformer is therefore included in series with the transmitter in the usual manner, but the secondary winding of the transformer is short circuited since there is no receiver to be connected. In this way the two connections to the telephone line are balanced.

It will be clearly understood that the alarm device according to the invention can be easily adapted for use as a fire alarm in which case the electrical circuit controlling the trip mechanism would be established by a suitable thermostatic device upon the occurrence of an abnormal rise in temperature.

What I claim and desire to secure by Letters Patent is:—

1. Alarm device comprising a gramophone and motor operatively connected with a telephone line and operatively connected with means automatically to establish communication with an alarm receiving station upon actuation of the alarm and to transmit a suitable message to said station, means for starting said gramophone motor comprising a trip mechanism, an electromagnet for releasing said trip mechanism, said trip mechanism having means operatively connected therewith and operating simultaneously to connect the transmitter of the alarm device with the telephone system and to open the line, means operatively connected with said gramophone motor for successively dialing the emergency dialing symbol, means for lowering the sound box on to the sound reproducing record to produce the alarm to be transmitted, means for returning the sound box to the commencement of the record to repeat the alarm, means for disconnecting the transmitter from the telephone system, and said trip mechanism comprising a pivotally mounted weight actuated lever which normally holds a latch in front of a stop on the gramophone turntable, link and lever mechanism connecting said lever with a catch which normally holds the receiver arm of a telephone transmitter in its depressed position.

2. The structure of claim 1, a rod connecting said receiver arm of said telephone instrument,

said rod being connected to a crank, said crank being adapted to rotate a cam to close the contacts when the receiver arm is released whereby the telephone instrument is connected in circuit with the telephone system.

3. The structure of claim 1, a rack and pinion mechanism operating said dialing mechanism, a second rack driven by the gramophone motor, said second rack comprising means for actuating said rack and pinion mechanism.

4. The structure of claim 1, a rack and pinion mechanism operating said dialing mechanism, a second rack driven by the gramophone motor, said second rack comprising means for actuating said rack and pinion mechanism, said second rack being coupled with said first rack by a two-armed lever and an articulated link whereby said second rack is driven in the opposite direction to said first rack.

5. The structure of claim 1, a rack and pinion mechanism operating said dialing mechanism, a second rack driven by the gramophone motor, said second rack comprising means for actuating said rack and pinion mechanism, said second rack being coupled with said first rack by a two-armed lever and an articulated link whereby said second rack is driven in the opposite direction to said first rack, said dialing mechanism comprising a rotary shaft driven by said rack and pinion mechanism, said shaft having a radial arm carrying at its outer end a pin which projects into an aperture in the dialing disc.

6. The structure of claim 1, a rack and pinion mechanism operating said dialing mechanism, a second rack driven by the gramophone motor, said second rack comprising means for actuating said rack and pinion mechanism, said second rack being coupled with said first rack by a two-armed lever and an articulated link whereby said second rack is driven in the opposite direction to said first rack, said dialing mechanism comprising a rotary shaft driven by said rack and pinion mechanism, said shaft having a radial arm carrying at its outer end a pin which projects into an aperture in the dialing disc, a sleeve rotatably mounting said pin, said sleeve having an upper cam surface, said pin being provided with a radially extending finger adapted to ride over the cam surface of the sleeve after the dial has been rotated in one direction whereby the pin is withdrawn from the aperture in the dialing disc which is thereby released.

7. The structure of claim 1, a rack and pinion mechanism operating said dialing mechanism, a second rack driven by the gramophone motor, said second rack comprising means for actuating said rack and pinion mechanism, said second rack being coupled with said first rack by a two-armed lever and an articulated link whereby said second rack is driven in the opposite direction to said first rack, and cam and lever mechanism for lowering said sound box onto the sound record, said cam and lever mechanism being actuated by said second named rack.

8. The structure of claim 1, a rack and pinion mechanism operating said dialing mechanism, a second rack driven by the gramophone motor, said second rack comprising means for actuating said rack and pinion mechanism, said second rack being coupled with said first rack by a two-armed lever and an articulated link whereby said second rack is driven in the opposite direction to said first rack, and cam and lever mechanism for lowering said sound box onto the sound record, said cam and lever mechanism being actuated by said second named rack, said mechanism for lowering the sound box onto the record comprising a rotary shaft connected at one end to a crank, said shaft being operated by said second rack and a cam carried by the other end of said shaft and supporting an arm which in turn supports said arm carrying the sound box.

9. The structure of claim 1, said mechanism for returning the sound box to the commencement of the record comprising a lever pivoted at its lower end and movable about its pivot in a vertical plane by link and lever mechanism, said link and lever mechanism being actuated by a rack, said rack being driven by the gramophone motor, the upper end of said lever being thereby moved in an arc and carrying with it said arm supporting said gramophone sound box.

10. The structure of claim 1, said mechanism for returning the sound box to the commencement of the record comprising a lever pivoted at its lower end and movable about its pivot in a vertical plane by link and lever mechanism, said link and lever mechanism being actuated by a rack, said rack being driven by the gramophone motor, the upper end of said lever being thereby moved in an arc and carrying with it said arm supporting said gramophone sound box, said gramophone motor including a toothed annulus, means whereby said rack is forced into engagement with said toothed annulus, said means comprising a spring loaded lever upon which said rack is mounted at the moment when the sound box of the gramophone has completed its travel over the sound record, a cam for releasing said spring loaded lever, a second lever movable by said sound box, and said cam being rotated by said second lever.

11. The structure of claim 1, cam and lever mechanism, means whereby the movement of the sound box over the sound record actuates said cam and lever mechanism, weight actuated levers releasable by said cam and lever mechanism, said weight actuated levers comprising means for returning the receiver arm to its depressed position and also to open the contact whereby the telephone line is cleared and the device isolated from the telephone system.

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