Dec. 29, 1925. 1,567,326

A. P. LOPER

FIRE ALARM SIGNAL TRANSMITTING APPARATUS

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Fig. 1.

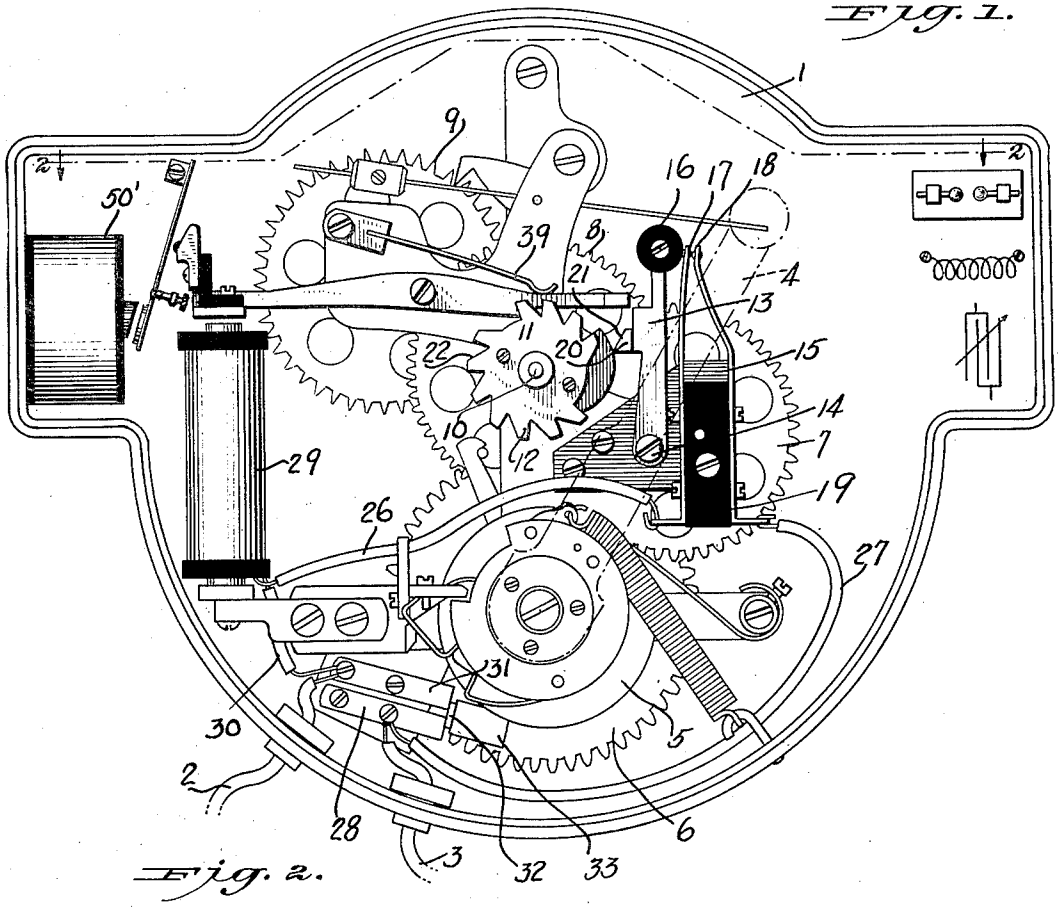
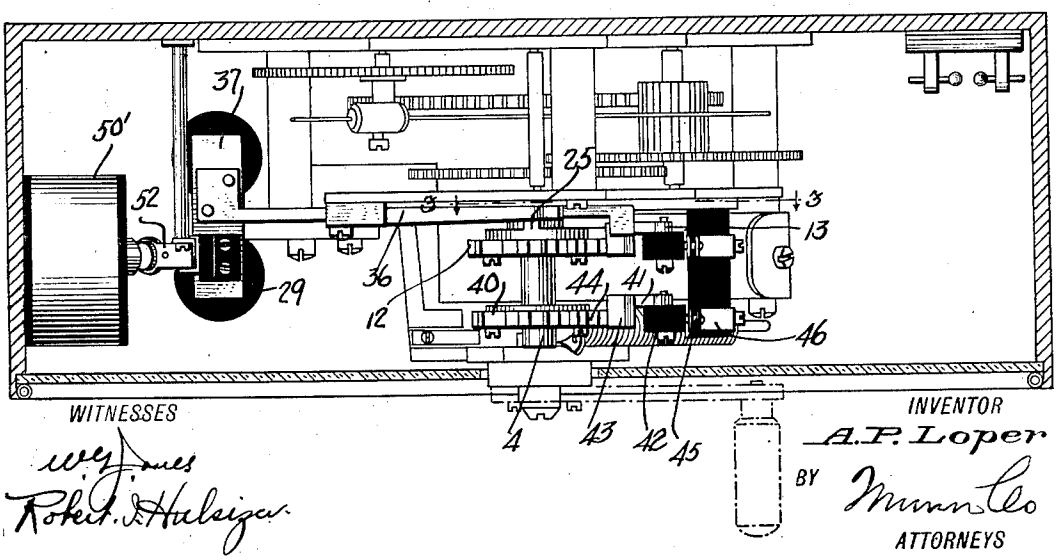


Fig. 2.



WITNESSES

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Fig. 3.

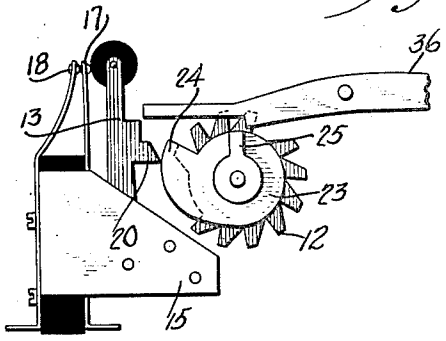


Fig. 4.

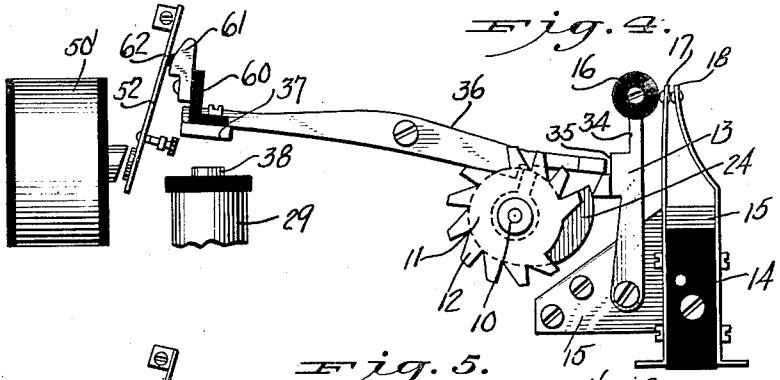


Fig. 5.

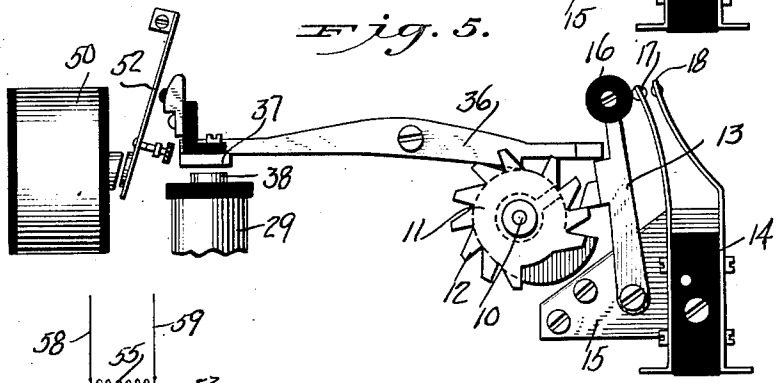
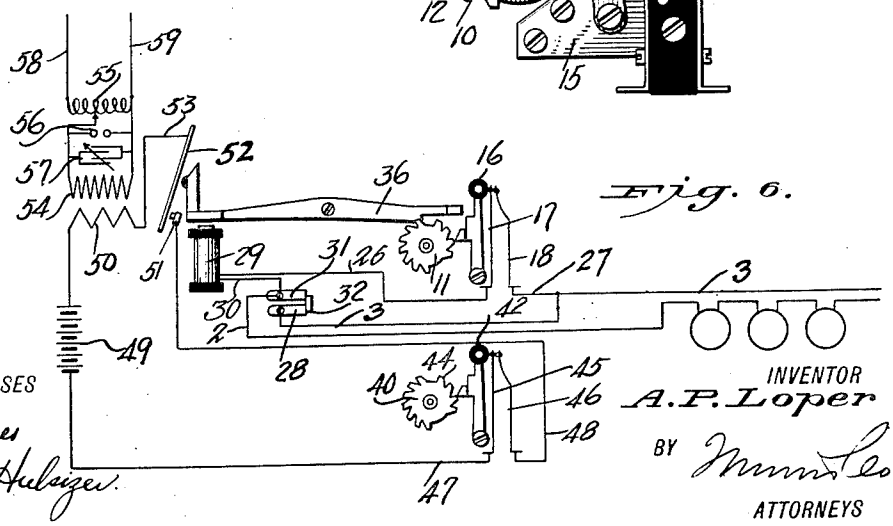


Fig. 6.



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UNITED STATES PATENT OFFICE.

ALEXANDER PALMER LOPER, OF STONINGTON, CONNECTICUT.

FIRE-ALARM-SIGNAL-TRANSMITTING APPARATUS.

Application filed December 14, 1921. Serial No. 522,302.

To all whom it may concern:

Be it known that I, ALEXANDER P. LOPER, a citizen of the United States, and a resident of Stonington, in the county of New London and State of Connecticut, have invented a new and Improved Fire-Alarm-Signal-Transmitting Apparatus, of which the following is a full, clear, and exact description.

This invention relates to a fire alarm signal transmitting device, and an object of the invention is to provide a fire alarm signal transmitting device in which whenever a fire alarm signal is sent over a circuit, a wireless signal is also transmitted.

Another object resides in the provision of means whereby whenever a box is pulled, if the circuit conditions are such that this box cannot transmit its signal over the circuit, then the characteristics of the wireless signals sent out are changed from a normal characteristic to an abnormal characteristic.

A further object resides in the provision of means whereby whenever a box is pulled, means is automatically operated to prevent the signals from being transmitted by this box if another box is using the circuit.

A still further object resides in the provision of means whereby a box which has been pulled will not get on to the line as long as the line is being used by another box. The pull box, however, will automatically go on the line just as soon as the box using it has released it.

Another object resides in the provision of means whereby the characteristics of the wireless signals sent vary in character with the condition of the wire circuit, and whereby this variation takes place entirely automatically after the box has once been pulled.

A further object resides in the provision of means whereby a given box when pulled will try a plurality of times to send a signal and will succeed in doing so just as soon as a line has been released by a previously pulled box.

A still further object resides in the particular construction and arrangement of parts which are hereinafter described and claimed and shown in the accompanying drawings.

The invention is illustrated in the drawings, of which—

Figure 1 is a front view of a fire alarm signal transmitting box.

Fig. 2 is a section taken on the line 2—2 of Fig. 1.

Fig. 3 is a detail view showing the rear face of the character wheel.

Fig. 4 is a partial detail elevation of the signal transmitting means when the transmitting lever is being held out of engagement with the transmitting wheel and the characteristic of the wireless apparatus is being changed to its abnormal condition.

Fig. 5 is a view of the same parts in the position assumed by them when a signal is being transmitted by the engagement of the transmitting wheel with the transmitting lever and in which the wireless apparatus is sending out a normal signal.

Fig. 6 is a circuit diagram of the device.

The form of the invention shown in the drawings is, of course, a preferred application thereof, but it should be understood that modifications can be made in the construction and arrangement of the parts and in the character of the materials used without departing from the spirit of the invention.

The fire alarm signal transmitting device shown in the drawings comprises a box or casing 1 of any suitable design adapted to contain the entire apparatus for the transmission of a given signal. This box forms part of a circuit, and circuit wires 2 and 3 lead thereinto. As is customary with fire alarm signal tranmitting boxes, a lever 4 is pulled and through the intermediary of a spring mechanism, designated by the numeral 5, and a train of gearing, represented by the numerals 6, 7, 8 and 9, a shaft 10 is operated. This shaft as shown carries a signal transmitting wheel 11, and this wheel, in the form shown, is provided on its peripheral face with a plurality of teeth 12. These teeth are arranged in groups and spaced apart in a manner to represent a given signal.

The particular form of spring and the particular arrangement of the gearing between the spring 5 and the shaft 10 is not a matter involving any detail in this invention since many well known types of boxes are provided with handles which upon being pulled in one direction and then released are adapted to set a spring motor in operation to turn a character wheel through the intermediary of a train of gears. Other types include boxes in which a spring under tension is released by pulling a trigger.

Normally when a signal is being transmitted, the transmitting wheel 11, through its teeth 12, is adapted to cooperate with the transmitting or switching lever 13 which is pivoted at 14 on a bracket plate 15 suitably mounted within the casing 1. The end of this lever is provided with an insulated head portion 16 which in its oscillatory movement opens and closes a pair of circuit contacts 17 and 18, in the form of spring plates fastened to an insulating plate 19 mounted on the bracket plate 15. From one edge of the lever 13 a stud or shoulder 20 depends, and this shoulder is provided with a tapered face 21 adapted to engage with the tapered edges such as 22 of the teeth 12.

As seen in Fig. 3 there is disposed adjacent the rear face of the transmitting wheel 11 a cam 23 having a cam surface 24 which during a part of its movement engages the shoulder 20. When the cam surface 24 engages the shoulder 20, the transmitting lever 13 is moved to close the contacts 17 and 18 which are normally open when the lever is permitted to drop. Also disposed adjacent the rear face of the transmitting wheel 11 is a pin or bar 25 which functions in a manner hereinafter to be described. The relative disposition of the cam surface 24 and the pin 25 is as shown in Fig. 3. The outer edge of the cam surface 24 extends slightly beyond the outer edge of the teeth 12 as shown.

The circuit contacts 17 and 18, in the form of a spring plate, mentioned are connected respectively to circuit wires 26 and 27. The wire 27 is connected to a shunt plate 28 and the wire 26 to one end of a magnet coil 29, the other end of which by wire 30 is connected to a shunt plate 31. These two shunt plates 28 and 31 are connected respectively to the terminal circuit wires 3 and 2. These plates 28 and 31 are also adapted to be shunted in the well known manner by a conducting plate 32 carried by a head 33 which is operated, as shown in the drawing, in a well-known manner by the movement of the hand lever 4, so that whenever the hand lever 4 is moved or pulled, the head 33 and the conducting plate 32 are removed from engagement with the shunt plates 28 and 31. This action results in placing the magnet 29 and the contacts 17 and 18 in series with the main circuit, the contacts 17 and 18 being closed whenever the mechanism of the box is at rest, because the parts are in the position shown in Fig. 1 at that time and the cam surface 24 is moving the transmitting lever 13 to hold the contacts 17 and 18 in their closed position.

The transmitting lever 13 is also provided with two offset lateral surfaces 34 and 35. The surface 35 is disposed nearer the transmitting wheel 11 than the surface 34. Whenever another box is using the line, it becomes necessary to prevent the operative movement of the transmitting lever 13, even though the lever 4 may have been pulled and the transmitting character wheel 11 is rotating. To do this it becomes necessary, therefore, to provide a locking or restraining means which will engage with the surface 35 just before the cam 24 becomes disengaged from the shoulder 20. This locking or restraining of movement limiting means is shown in the form of a lever 36, which we choose to call a locking lever, which is suitably pivoted on a bracket within the box. One end of this lever is disposed adjacent the transmitting lever 13, and when moved clockwise is adapted to be disposed adjacent the surface 35 to prevent the movement of the transmitting lever 13 toward the teeth 12 of the character lever, so that the opening and closing of the contacts 17 and 18 is prevented and the circuit, therefore, remains closed. The other end of this lever is provided with an armature 37 adapted to co-operate with a pole 38 of the magnet 29.

It can be seen from an examination of the various figures that as the cam surface 24 moves around once on revolution of the transmitting wheel 11, it pushes the transmitting lever 13 to one side, and that during this action the pin or bar 25 likewise pushes the forward end of the locking lever 36 back into the position shown in Fig. 5, so that the end of the locking lever does not lie adjacent the surface 35 but is in line with the surface 34. At this time the other end of the lever 36 and the armature 37 lies closely adjacent the pole 38 of the magnet 29. If at this instant the line is clear, that is, if no other box is using the line, there will be current through the magnet 29, and this current will energize the magnet and hold the armature 37, thereby retaining the lever 36 in such a position that when the cam surface 24 releases the shoulder 20 the transmitting lever 13, under the action of the spring contacts, will be moved into engagement with the teeth 12. If, however, at the time the locking lever 36 is moved so that the armature 37 lies adjacent the pole 38, the line is being used by another box, then the circuit will be opened and no current will flow through the magnet 29, so that as the cam surface moves the transmitting lever to one side, and as the pin 25 moves the locking lever in the manner above mentioned and then releases it, the spring 39, shown particularly in Figs. 1 and 2, will cause the lever instantly upon release to move back into the position shown in Fig. 4, whereby the operative movement or actuation of the lever 13 by the teeth 12 is prevented. It will be noticed that this movement of the transmitting lever and the locking lever, respectively, by the cam surface 24 and the

pin 25 occurs once in each rotation of the transmitting wheel 11, so that an attempt is made by the apparatus automatically to test the line at definite intervals so that as soon as the line is clear a signal can be sent by a given box which has been pulled.

It also constitutes part of this invention that mechanism for simultaneously and synchronously sending wireless signals with the signals over the metallic circuit should be provided. Of course, the synchronous and simultaneous transmisison of the wireless signals is at the same time, although not absolutely necessary. To this end, I have, therefore, though not necessarily, provided that the shaft be extended to receive another transmitting wheel, such as another transmitting character wheel 40 (see Fig. 2). This character wheel is shown in the drawing as mounted on the shaft 10. It may be separate from the wheel 11 above mentioned, but, of course, it was in the conception of the invention that one wheel 11 could be made broad enough to permit of the actuation of two transmitting levers instead of the one. However, as shown, the transmitting wheel 40 engages a second transmitting lever 41 which has an insulated head 42 and a shoulder 43 to engage teeth 44 on the wheel 40. In other words, this transmitting lever operated by the character wheel 40 is substantially identical with the transmitting lever 13 previously mentioned. It also engages spring contacts 45 and 46 similar to contacts 16 and 17. These contacts are connected in circuit with wires 47 and 48. Wire 47 connects to a battery 49 and one winding 50 of an induction coil. The wire 48 leads to a stationary contact 51 co-operating with a vibrating lever 52, the other end of which is connected by a wire 53 with the other end of the winding 50. The secondary 54 of the induction coil is connected to a variable inductance 55, a spark gap 56, and a variable capacity 57. Wires 58 and 59 may extend to any suitable mechanism, such as an antenna.

I have illustrated the induction coil, the condenser inductance, spark gap, and vibrating lever 52 merely as indicative of a simple wireless system in which wireless energy of a desired frequency can be established. In this instance, it is established by reason of the tuning of the various factors in the circuit and also by reason of the frequency of the vibrator lever 52. This lever 52 is pivoted at one end so that normally the full length of the lever is utilized. It, however, is evident that if the length of the vibrator lever is changed this will have a certain effect on the frequency of vibration of this lever and, consequently, will have an effect upon the characteristic of the wireless energy produced in the system. I propose normally to permit the lever to vibrate at its full length, but at certain conditions its vibration length should be changed, whereby an abormal characteristic is produced in the system. It is desired to transmit this abnormal characteristic or tone whenever the transmitting lever 13 controlling the wire line is locked by the lever 36.

To affect this object, I, therefore, have provided on the rear end of the locking lever 36 an insulating bracket 60 which has a lug 61 thereon having an insulating button 62. In the position shown in Fig. 5, this button 62, because of the position of the lever, is not in contact with the vibrating lever 52. When, however, the locking lever 36 assumes the position shown in Fig. 4, the button 62 engages with the vibrating lever 52 at a point intermediate its length. This engagement results in the operation of a nodal point at this point in the length of the lever and, consequently, the effective vibrating length thereof is reduced. The particular construction or device on the end of the locking lever 36 whereby an effective engagement of the vibrating lever is brought about, is immaterial, other forms, of course, being possibly equally effective.

Assuming, therefore, that the parts are in the position shown in Fig. 1, the circuit through the magnet 29 and the switch contacts 17 and 18 is closed but is shunted by the plate 32. However, when the lever 4 is pulled the spring motor is started and the shaft 10 revolves. When the lever is thus moved, the shunt is disengaged from the plates 28 and 31 and the magnet and switch contacts within the box are placed in series with the main circuit. Immediately after the shaft 10 commences to rotate, the pin 25 releases the lever 36, and if the main circuit is being used by any other box, the magnet 29 not being energized will not hold the end of the lever in the position shown in Fig. 1 but will permit the spring 39 to move it into the position shown in Fig. 4, where it abuts the surface 35 of the transmitting lever 13 and thereby prevents the further movement of this lever. When the cam 24 and the pin 25 come around again in the rotation of the shaft 10, this actuation of the locking lever and the transmitting lever is repeated until such time as the main circuit is cleared. When this main circuit is clear, the magnet 29 will be energized and hold the locking lever in the position shown in Fig. 1, so that, referring to Fig. 5, the transmitting lever can move into engagement with the teeth 12. In the one extreme of the movement of the transmitting lever, the contacts 17 and 18 are separated and the teeth 12 move the lever to alternately open and close the contacts. During the time that the device is thus sending, the means for changing the frequency or tone or characteristic of the wireless system is not

engaged with any part of the system and this system is, therefore, transmitting normally by reason of the operation of the transmitting lever 41 by the wheel 40 in the manner previously mentioned. However, when the lever 36 is moved to lock the lever 13, then the engagement of the vibrating member, or other part of the wireless system whereby the characteristic of the transmitting energy is changed, takes place. Consequently, any box such as described above may be pulled, and if the line is clear will send not only a normal signal over the wires but a normal wireless signal; but if the line is not clear, the transmission of the wire signal is prevented and the transmission of the wireless signal is abnormal, so that any person receiving such an abnormal signal will recognize it as not a normal signal and thereby know a box is trying to send over the metallic circuit and cannot, but is sending its signal by wireless of a different characteristic. It will be observed, also, that after the lever 4 is pulled, the action of the box in either sending signals or refraining from sending signals is entirely automatic but selectively dependent upon the condition of the outside circuit. It is also to be noted that at regular intervals during the operation of the mechanism attempts are made to get in on the line so that the signal will be transmitted as soon as possible but that this attempt is successful or fails due to the automatic operation of selective means affected by the condition of the above-mentioned circuit.

What I claim is:

1. A signal transmitting apparatus, which comprises means for transmitting signals over a metallic circuit, means for transmitting wireless signals of a definite characteristic, means actuated by the movement of the first means for actuating the second means, means for locking the first means when the metallic line is being used by another signal apparatus, and means associated with said locking means and moved thereby to vary the characteristic of the wireless signals when the transmission of signals over the metallic line is being arrested.

2. A signal transmitting apparatus which comprises a transmitting lever, means for actuating said lever, a locking lever for locking said transmitting lever in accordance with the condition of the circuit over which it is adapted to transmit signals, a wireless apparatus to transmit signals of a definite characteristic, means for actuating said wireless apparatus, and means associated with the locking lever to vary the characteristic of the wireless signals when the locking lever is moved to a position to restrain the transmitting lever.

ALEXANDER PALMER LOPER.