

W. R. HAMILTON.  
FIRE ALARM TRANSMITTER.  
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1,126,199.

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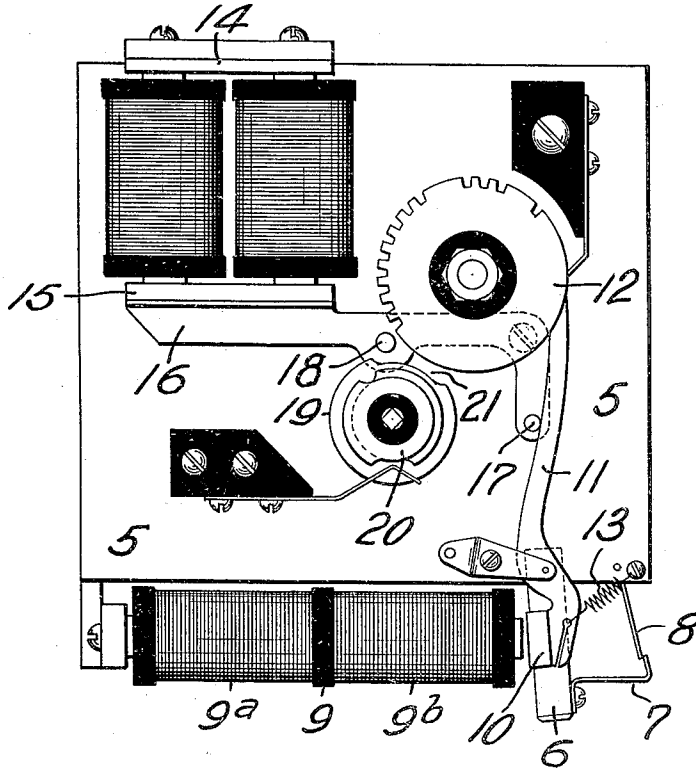
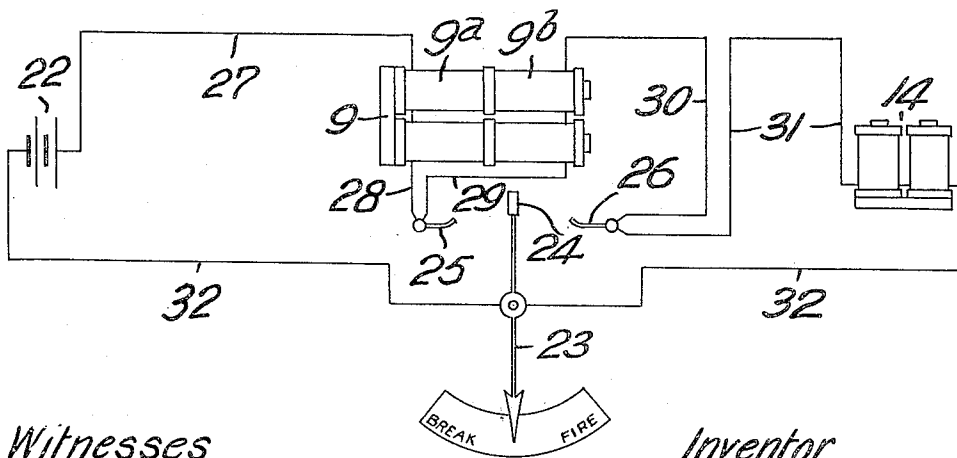


FIG. 1.



Witnesses

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FIG. 2.

# UNITED STATES PATENT OFFICE.

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## FIRE-ALARM TRANSMITTER.

1,126,199.

Specification of Letters Patent.

Patented Jan. 26, 1915.

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*To all whom it may concern:*

Be it known that I, WILLIAM R. HAMILTON, of the city of Montreal, in the Province of Quebec and Dominion of Canada, have invented certain new and useful Improvements in Fire-Alarm Transmitters, of which the following is a full, clear, and exact description.

This invention relates broadly to improvements in transmitters for use in connection with fire sprinkler, fire alarm, burglar or other automatic signaling systems, and relates more particularly to a combined alarm and trouble or testing transmitter.

Many systems and instruments have been produced for automatically sending signals for a number of protected buildings to a central station. These systems have for various reasons been almost universally operated on closed circuit principle, and require two transmitters, one of which transmits the alarm signal, while the other maintains the system under constant test so as to send a different signal if any part of the instrument or system except the signal circuit gets out of order. The disadvantage of this arrangement is that a defect in the signal circuits may be equivalent to the operation of the alarm transmitter, so that what should be a trouble signal on these circuits is transmitted as an alarm signal, thus sending to the central station a false alarm. These disadvantages are overcome in the present invention by using only a single transmitter for both the alarm and trouble signals, and so arranged as to be controlled by a single circuit. Any disarrangement of this circuit other than that prearranged for the sending of an alarm signal will transmit a trouble signal only.

In the drawings which illustrate the invention:—Figure 1 is a front elevation of the transmitter. Fig. 2 is a circuit diagram showing the operating elements connected to the transmitter.

Referring more particularly to the drawings, 5 designates the frame of a spring driven clock movement controlled by a lever 6 carrying a catch 7, movable into and out of the path of the fan 8 to release or stop the clockwork movement. An electro-magnet 9 is provided having low resistance windings 9<sup>a</sup> and 9<sup>b</sup> of equal resistance. These two windings are so arranged that the current flow is in opposite directions, so

that while the current flows through both windings, the magnetism induced by one winding is neutralized by the magnetism induced by the other winding, so that the magnet is deenergized and does not draw up its armature 10. This armature is mounted on the lever 6 and is provided with a lever arm 11 projecting into the path of a cam (not shown) mounted behind the signal wheels 12. A small spring 13 is provided to normally hold the armature 10 away from the magnet 9, so that the stop 7 remains in the path of the fan 8.

At a suitable point on the movement, an electro-magnet 14 of higher resistance than the magnet 9 is provided, having an armature 15 carried on one arm of a bell-crank lever 16. The other arm of this bell-crank lever is provided with a pin 17 which is normally in engagement with or in very close proximity to the lever 11. The arm of the lever 16 carrying the armature is provided with a pin 18 positioned to be engaged by a cam 19 carried on the same spindle as the commutator 20. This cam 19 has a recessed portion 21 which is positioned under the pin 18, while the transmitter is at rest, as is clearly shown in Fig. 1.

One transmitter, such as above described, is mounted in each protected building and is connected in series with a battery or other source of energy 22 and with a detecting device, indicated at 23. This detecting device may be of any desired type, such as a galvanometer, relay or like instrument, having a circuit maker 24 adapted to engage a contact 25 when operated and to engage a contact 26 when out of order. The current flow from the battery is through wire 27 to winding 9<sup>a</sup> of magnet 9, and through the wire 28 to the contact 25. From the contact 25, the flow is through wire 29 to winding 9<sup>b</sup>. After passing through the winding 9<sup>b</sup>, the current flows through wire 30 to the contact 26 and from the contact through wire 31 to the magnet 14. After passing through the magnet 14, the current returns to the battery through wire 32 in which is inserted the circuit maker 24.

It will be seen from the foregoing that all the elements including the contacts are in series. Tap wires are not used to connect the contacts and circuit maker into the circuit for the reason that the breaking of these taps would not destroy the circuit, so that

no indication of disorder would be given. It will be remembered that the magnet 9 is of low resistance and the magnet 14 of high resistance, and also that the windings 9<sup>a</sup> and 9<sup>b</sup> of the magnet neutralize, so that during current flow through both windings the core is demagnetized. It is therefore obvious that if either of the windings of the magnet 9 is short circuited, there will be nothing to neutralize the effect of the other winding, so that the magnet becomes energized and tends to draw up its armature. However, as long as the high resistance magnet 14 remains in the circuit, there would not be sufficient current flow through the remaining winding of the magnet 9 to energize the same. Therefore, the magnet 14 is arranged as shown in the diagram, Fig. 2, so that when the winding 9<sup>b</sup> is short circuited the magnet 14 will also be short circuited, and allow the full strength of current flow through the winding 9<sup>a</sup>. It will be seen at a glance from Fig. 2 that the contact 26 is so positioned in the circuit that when engaged by the circuit maker 24, the magnet 14 will be short circuited and that when the contact 25 is engaged by the circuit maker, the magnet 14 and one winding of the magnet 9 will be short circuited.

With the foregoing points in mind, the operation will be easily understood and is as follows:—The detecting instrument 23 when in its normal condition holds the circuit maker 24 midway between the contacts 25 and 26. Any failure of the instrument removes or reduces the holding effect on the circuit maker, so that it is thrown against the contact 26 and short circuits the magnet 14 of the transmitter. This magnet releases its armature 15 which drops by gravity and by means of the pin 17 throws the lever 11. This lever is connected through the armature 10 with the control lever 6 of the transmitter movement, and therefore operates the control lever to withdraw the stop 7 from the fan, and thus release the movement which operates the signal wheels 12 to transmit a signal to the central station. When the transmitter has repeated its signal a predetermined number of times, for example, twice, the cam 19 engages the pin 18 and raises the lever 16, thus releasing the lever 11 and permitting the spring 13 to shift the control lever 6 and stop the transmitter movement. The cam now holds the armature 15 up until the trouble is repaired and the transmitter rewound to bring the notch 21 under the pin 18. If the instrument 23 is operated by the fire or burglar protection circuits, it throws the circuit maker 24 against contact 25 so that the winding 9<sup>b</sup> of magnet 9 and the magnet 14 are both short circuited. The magnet 9 now energized by its winding 9<sup>a</sup> draws up the armature 10 and releases the transmitter movement, as previously described. The neutralization of the magnet 9 by the short circuiting of its winding 9<sup>b</sup> and the increasing current flow permitted by the short circuiting of the magnet 14, enables the magnet 9 operated by its winding 9<sup>a</sup> to hold up its armature 10 as long as the battery remains active. The transmitter thus continues operating until run down and sends in its signal a greater number of times than when operated by the magnet 14, for example, five times. During this condition, the mechanical restoration of the armature 15 and lever 16 previously explained will have no effect whatever on the transmitter, as the magnet 9 continues to hold off the stop of the movement until the transmitter is rewound and set. The magnet 14 being of higher resistance than the magnet 9 requires a stronger current to operate it, and will therefore naturally become inoperative owing to battery failure, while there is still ample current to operate magnet 9. Thus, it might happen that with a weakened current, the magnet 14 would be able to hold up its armature, but would not be able to lift the armature to restore the transmitter to normal. Any current strong enough to operate the magnet 14 to hold up its armature would obviously be strong enough to enable the magnet 9 to hold up its armature. Thus, if the transmitter was operated by the fire detecting device, the magnet 14 would be short circuited and drop its armature, which would operate as previously described to throw the armature 10 against the magnet. The magnet 9 would then hold it up without difficulty. When a battery becomes very much weakened, the high resistance magnet 14 naturally fails first and drops its armature irrespective of the action of any detecting device. If now the detecting device operated the transmitter before the transmitter was re-set and the batteries replaced, there would still be sufficient current to operate the magnet 9 when the magnet 14 was short circuited, and the transmitter would send in the number of signals remaining between the trouble signal and the alarm signal, which for the instances previously cited would be three times. If any wire is broken, the circuit is broken and the instrument 23 throws its circuit maker 24 against the contact 26, thus short circuiting the magnet 14.

In most instances, the device would operate without the neutralizing winding 9<sup>b</sup> as the high resistance magnet 14 would prevent an operative current flow through the winding 9<sup>a</sup>. If, however, an unusually strong battery was installed or the wiring within the building became charged from another system, the first time the magnet 14 was deenergized there would be sufficient current flow to operate the magnet 9, so that an alarm signal would be sent in place

of a trouble signal. The neutralizing winding obviates any possible occurrence of this accident, since no matter how great the current flow is the magnet 9 will remain inoperative until one of its windings is short circuited.

The description and drawings must be regarded as purely illustrative and not in any way limitative, since the application of the principle of the invention to different forms of transmitter would obviously make numerous changes in details of construction and arrangement.

Having thus described my invention, what I claim is:—

1. In a signal transmitter, the combination with a transmitter control device of a high resistance magnet and a low resistance magnet having two windings arranged to neutralize one another, said magnets being arranged to independently operate the control device, a detecting device, and an alarm circuit connecting the high resistance magnet and both windings of the low resistance magnet and the detecting device in series.

2. In a signal transmitter, the combination with a transmitter control device and a detecting device of a low resistance magnet arranged to operate the control device and to be energized by the operation of the detecting device, a circuit connecting the detecting device and low resistance magnet, a high resistance magnet connected in series in said circuit and arranged to operate the control device independently of the low resistance magnet, and means arranged to maintain the low resistance magnet inoperative during increased current flow caused by the short circuiting of the high resistance magnet.

3. In a signal transmitter, the combination with a transmitter control device and a detecting device of a magnet controlled by the detecting device and arranged to operate the control device, a high resistance magnet arranged to operate the control device independently of the low resistance magnet, and means for mechanically operating the control device to stop the transmitter before it gives the same signal as when operated by the low resistance magnet.

4. In a signal transmitter, the combination with a transmitter control device and a detecting device of a low resistance magnet

controlled by the detecting device and arranged to operate the control device, a high resistance magnet arranged to operate the control device independently of the low resistance magnet, a circuit connecting the detecting device, high resistance magnet and low resistance magnet in series, and a neutralizing coil on the low resistance magnet arranged to be short circuited by the detecting device and adapted to maintain the low resistance magnet inoperative during increased current flow caused by short circuiting of the high resistance magnet.

5. In a signal system, a source of energy, a detecting device and a transmitter, a high resistance and a low resistance magnet arranged to independently operate the transmitter, said low resistance magnet comprising two coils arranged to neutralize each other during current flow through both, a circuit closable by the detecting device to short circuit the high resistance magnet, and a second circuit closable by the detecting device to short circuit the high resistance magnet and one winding of the low resistance magnet, whereby current flow through the remaining winding will energize the low resistance magnet.

6. In a signal system, a source of electric energy, a detecting device, a mechanical self-stopping transmitter, a high resistance magnet and a low resistance magnet arranged to independently operate the transmitter, a circuit closable by the detecting device to short circuit the high resistance magnet whereby the transmitter will be released, a second circuit closable by the detecting device arranged to energize the low resistance magnet, to release and hold the transmitter in released condition independent of its self-stopping feature, and a neutralizing coil on said low resistance magnet arranged to hold the magnet inoperative during short circuited condition of the high resistance magnet, only said neutralizing coil being short circuited simultaneously with the high resistance magnet by the detecting device to enable operative current flow through the low resistance magnet.

In witness whereof I have hereunto set my hand, in the presence of two witnesses.

WILLIAM R. HAMILTON.

Witnesses:

STUART R. W. ALLEN,  
G. M. MORELAND.