R. M. HOPKINS.

ALARM SYSTEM.

APPLICATION FILED MAR. 29, 1920.

1,398,593.

Patented Nov. 29, 1921.

3 SHEETS—SHEET 1.

FIG. 1

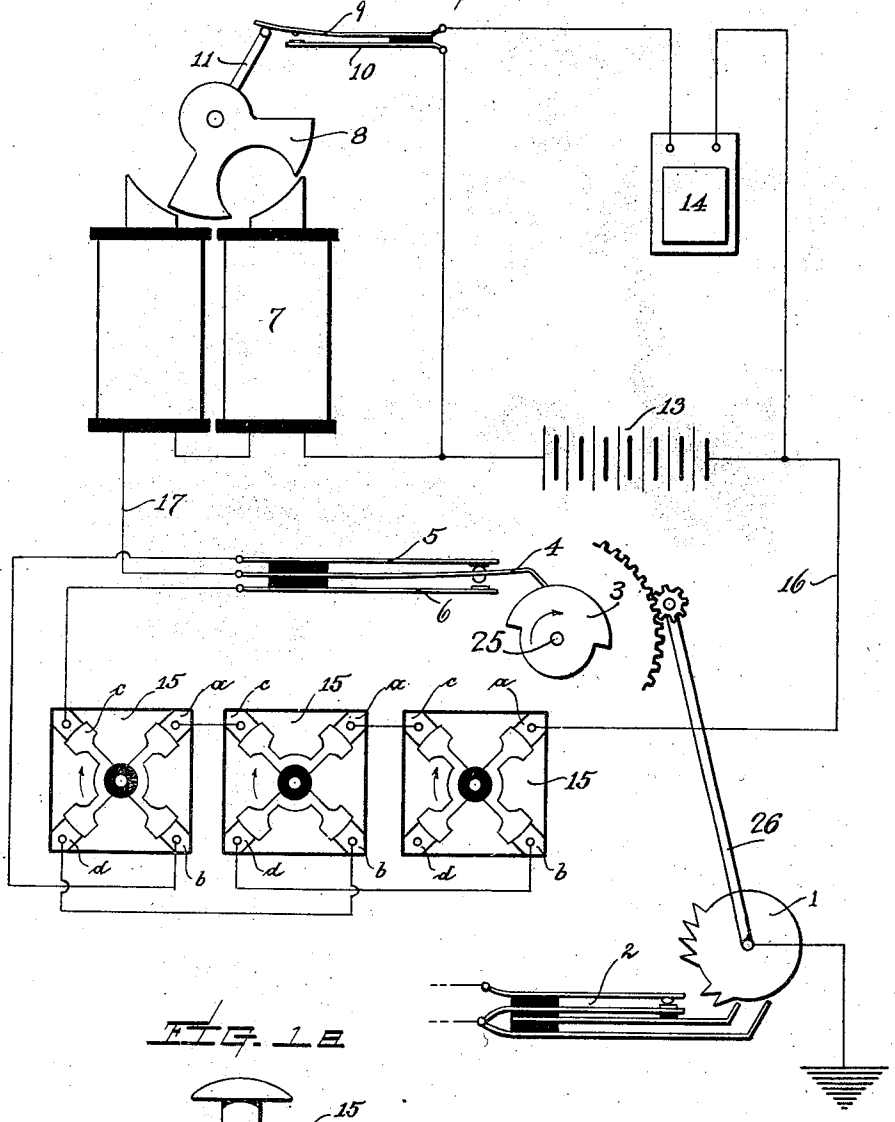
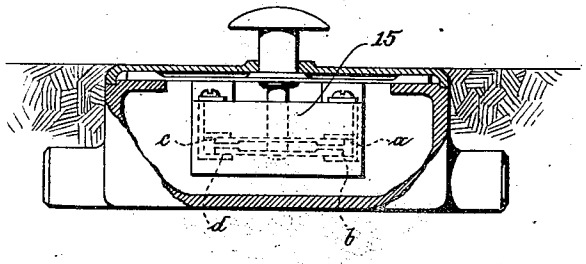


FIG. 1B



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3 SHEETS—SHEET 2.

FIG. 2

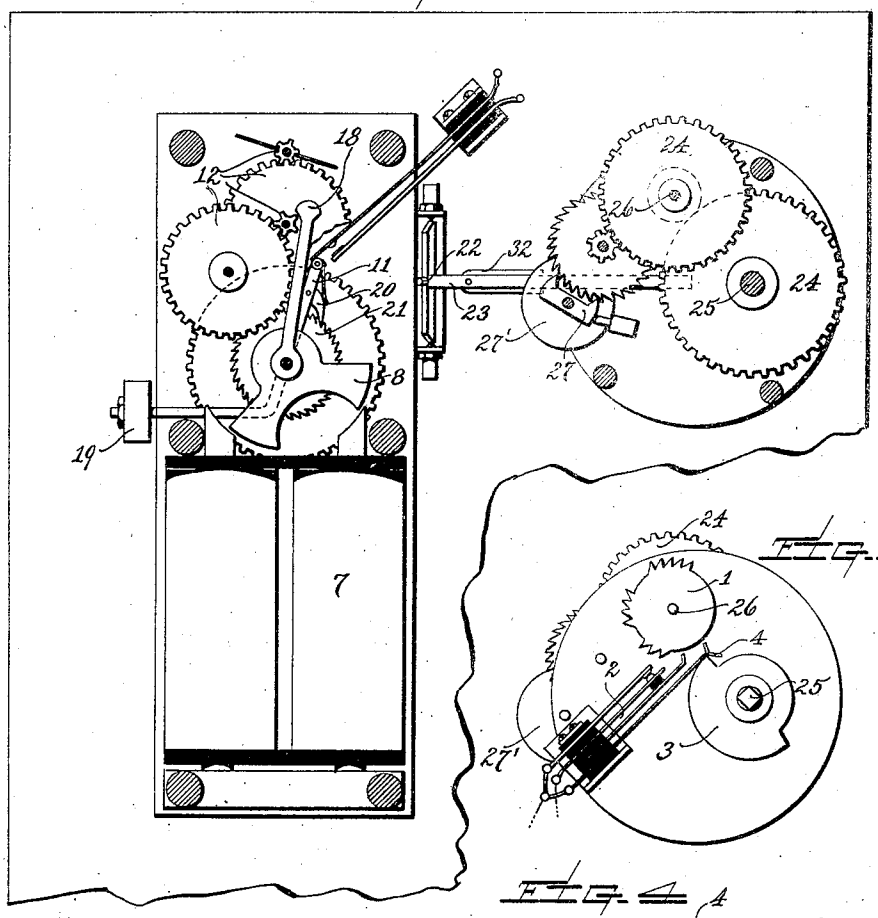


FIG. 3

FIG. 4

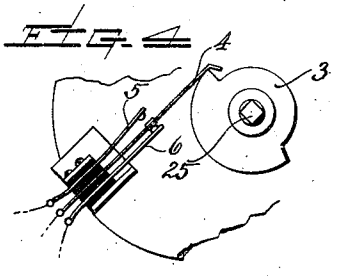
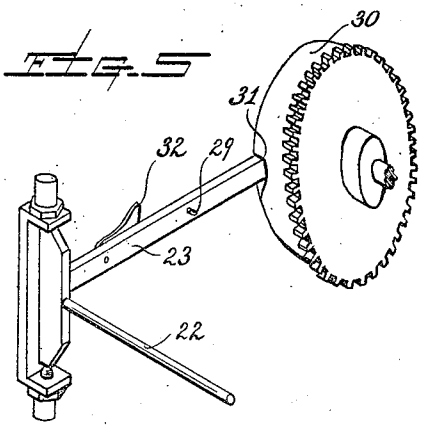


FIG. 5



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3 SHEETS—SHEET 3.

FIG. 6

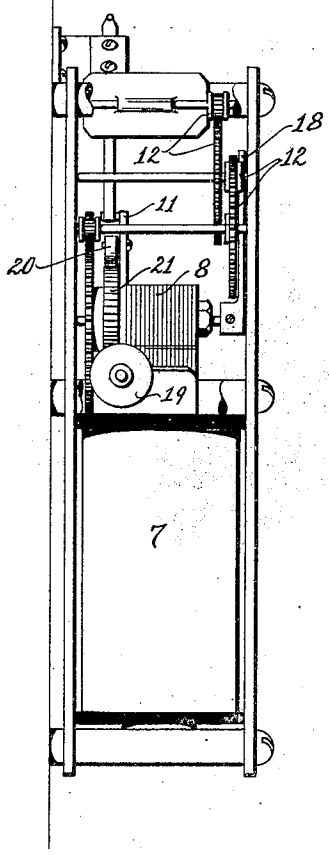


FIG. 7

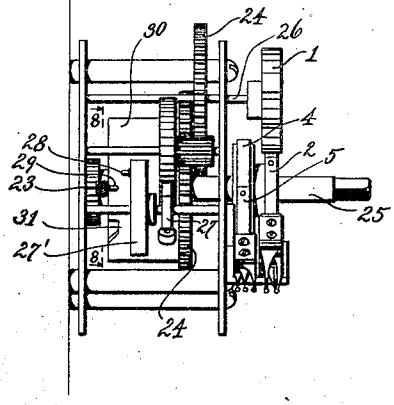
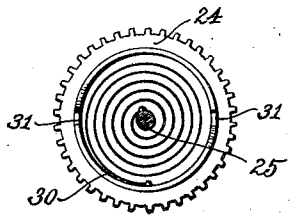


FIG. 8



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UNITED STATES PATENT OFFICE.

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ALARM SYSTEM.

1,398,593. Specification of Letters Patent. Patented Nov. 29, 1921.

Application filed March 29, 1920. Serial No. 369,584.

To all whom it may concern:

Be it known that I, RICHARD M. HOPKINS, a citizen of the United States of America, and a resident of Rutherford, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Alarm Systems, of which the following is a specification.

This invention relates to improvements in alarm systems, the said system being particularly intended for use in banks and other financial institutions, to facilitate the sending of an alarm by tellers or the like in the event of attempted robbery; but obviously the system is applicable to various uses, and in terming it an alarm system there is no intention of limiting its use to the sending of alarms; to the contrary, it may be used for the sending of other signals; for example, it may be used in large manufacturing establishments to sound signals calling for the shutting down of the machinery. The invention comprises an alarm or signal transmitter adapted to be started in operation for the sounding of a signal, by the operation of any one of a plurality of electric switches; means being provided, however, whereby, if one of such switches be actuated, and thereafter within a predetermined interval, the same or any other of the said switches be actuated, then the sending of the said signal will be prevented. The reason for this arrangement for preventing the sending of the signal when desired, is that it will frequently happen that a switch will be actuated accidentally or mistakenly; and the person so actuating the switch or some other person having knowledge of the actuation of that switch, and having knowledge that the said actuation was accidental or erroneous, may prevent the sending of an alarm by a further switch actuation.

The invention consists in the combination with means for provisional actuation to the end that a signal may be sent, of means for canceling the effect of such provisional actuation when desired; and in various other features as hereinafter described, and particularly pointed out in the appended claims.

The object of the invention is to provide simple means whereby, in the event of accidental or mistaken operation of means for provisionally causing the sending of the signal, the sending of that signal may be prevented if so desired.

I will now proceed to describe the invention with reference to the accompanying drawing in which one arrangement of circuits and apparatus adapted for carrying out the above object is illustrated, and will then point out the novel features in claims.

In said drawings:

Figure 1 is a diagram illustrating one embodiment of the said alarm system, and Fig. 1ª is a side view of one of the controlling switches embedded in a floor or other suitable location, a portion of the casing of the switch being sectioned.

Fig. 2 shows a front elevation of a transmitter which may be employed in the said system, the said view being a vertical section just in rear of the front frame plates of the transmitter.

Fig. 3 is a front view of the transmitter proper; Fig. 4 is a fragmentary front view of the transposing mechanism of the transmitter; Fig. 5 is a fragmentary perspective elevation of the detent mechanism of the transmitter.

Fig. 6 is a side elevation of the magnet-operated controlling mechanism of the transmitter, looking from the left of Fig. 2.

Fig. 7 is a side elevation of the transmitting mechanism proper of the transmitter, looking from the left of Fig. 2; and Fig. 8 is a rear view of the controlling cam and spring drum and associated parts, the view being a section on the line 8—8 of Fig. 7.

Referring first to the diagram, Fig. 1: numeral 1 designates the break wheel of a transmitter, for example, the normally wound electrically controlled transmitter hereinafter described; and 2 designates a combination of contact springs or "pens," adapted to be actuated by the teeth of the said signal wheel to send an alarm. The particular arrangement of the contact pens or springs so illustrated forms no portion of the present invention, but is claimed in an application of Richard M. Hopkins, Serial No. 329,730 filed October 10, 1919. It is designed to operate in accordance with the so-called McCulloh system, whereby signals are transmitted both through a metallic loop and through a ground connection, and whereby, in the event of the breaking of the metallic loop that loop may be divided, by operation of suitable switch means at the central station, into two separate ground return circuits. Such McCulloh systems are

well known, and for present purposes the break wheel 1 and circuit pens 2 may be considered an ordinary transmitting arrangement.

3 designates a cam forming a part of the transmitter and which starts to rotate when the break wheel 1 starts to rotate, the rotation of the cam being usually, however, at a slower rate; in the present instance, the said cam usually rotates at one-sixth the rotative speed of the break wheel.

4 designates a contact spring actuated by the cam 3, and 5 and 6 designate coacting contact springs. Normally spring 4 is held in engagement with one or the other of springs 5 and 6 by cam 3; but shortly after cam 3 starts to rotate, the spring 4 is caused by cam 3 to break contact with that spring, 5 or 6, with which it has previously been in contact, and to make contact with the other of said springs. The cam 3 and springs 4, 5 and 6 constitute what may be termed a "transposing" arrangement, the reason for which will be apparent hereafter.

7 designates the controlling magnet, and 8 the oscillating armature of a retard device also forming a portion of the transmitter. In connection with the retard device there are springs 9 and 10 normally held separated by an arm 11 projecting from the armature 8; the magnet 7 being normally deënergized and its armature 8 retracted; but in the event of closing of the circuit through said magnet 7 the armature 8 will be attracted and the springs 9 and 10 permitted to make contact.

13 designates a suitable battery or other source of electrical energy, and 14 a bell, buzzer, or other means for giving a local signal.

15—15—15 designate suitable actuating switches by which a circuit from battery 13 through conductor 16, the said switches, contact springs and one or the other of springs 5 and 6, conductor 17 and magnet 7, back to battery, may be closed by the actuation of one or another of the switches 15. Without limiting myself to any particular type of switch, for use as a switch 15, I may state that it is convenient to use a well-known type of four-point switch, actuated by the depression of a button or the like, and which normally, it may be said, closes contact between its points *a* and *b*, and *c* and *d*, respectively, but when actuated shifts the connection to close contact between *a* and *c* and *b* and *d*, respectively; and vice-versa. The switch is illustrated in a general way in Fig. 1[a], but without any attempt to illustrate its operating mechanism; the said switch being, as stated, a well known article.

With the switches in the conditions illustrated in the diagram, the circuit is as follows: from battery 13 through conductor 16 to contact point *a* of the first switch 15, then to point *b* of the said first switch 15, then to point *d* of the second switch 15, thence to point *b* of the second switch 15, thence to point *d* of the third switch 15, thence to point *c* of the third switch 15 and thence to spring 6; the circuit being broken between springs 6 and 4. If now one of the switches 15 be actuated, for example the second switch 15, the circuit is shifted from point *b* of the second switch 15 to point *c* of that second switch 15, thence to point *a* of the third switch 15, point *b* of that third switch 15, contact spring 5, contact spring 4, conductor 17, magnet 7 of the transmitter, and back to battery. The resultant energization of magnet 7 attracts the armature 8, causing the same to rotate, such movement of the armature being rendered slow by the retarding fan train 12 of the transmitter (see Fig. 2), with the primary result that arm 11 is caused to move sufficiently to permit contact springs 9 and 10 to close contact, whereupon circuit is closed from battery 13 through the local signal device 14, and springs 9 and 10 back to battery, the local signal device 14 being thereby caused to sound its alarm. As will appear hereafter, however, the break wheel 1 of the transmitter has not yet started in rotation, and therefore as yet no signal is transmitted by the transmitter to the central station. But as the armature 8 continues to rotate, after a predetermined interval an arm 18 (Fig. 2) forming a part of the transmitter, trips a detent of that transmitter permitting break wheel 1 and cam 3 to start in rotation, whereupon the break wheel 1 will actuate the contact pens 2, sending its signal to the central station, and cam 3 will permit spring 4 to move into contact with spring 6. But if, after the first actuation of a switch 15, and during the interval preceding the release of the transmitting mechanism of the transmitter, the same switch 15 be actuated again, or any of the other switches be actuated, then the magnet 7 will be deënergized through the breaking of its circuit, at the switch 15 so actuated, the armature 8 and arm 18 will rotate back to their first positions, under the influence of a weight 19 (Fig. 2) also forming a part of the transmitter, and the parts are then in effect in their original positions. For example, supposing that during the interval between the first or provisional actuation of the second switch 15, as above assumed, and the time when the transmitter detent would otherwise be actuated to start the transmitter mechanism in operation, that second switch 15 be again actuated so that its connections are restored to the condition illustrated in Fig. 1; then the circuit previously closed, through that second switch 15, and contact springs 6 and 4 to conductor 17, etc., will be broken, since upon its second actuation, sec-

ond switch 15 closes contact between its points *d* and *b* and thence through points *d* and *c* of the third switch 15 to contact springs 6, the connection between points *d* and *c* of the second switch 15 and thence through the third switch 15 to contact springs 5, being broken. The result of this second actuation of this second switch 15 is obviously to break the energizing circuit of magnet 7, and thereby to permit the armature 8 to move back, as previously stated.

The same result will follow if, after the first actuation of the second switch 15, one of the other switches 15, for example the first switch 15, be similarly actuated; for in that case contact is shifted between points *a* and *b* of first switch 15 to points *a* and *c* of said first switch 15, the circuit thence passing to point *a* of second switch 15, point *b* of that second switch, point *d* of the third switch 15, point *c* of the third switch 15 and contact spring 6, which latter spring as above stated, is not then in contact with spring 4.

A similar result will follow the actuation of the third switch 15 instead of the first switch 15, following first actuation of any of switches 15; and if there be still other switches 15, the result of the actuation of any one of such other switches following first actuation will be the same viz., to de-energize magnet 7, and prevent the sending of a signal by the transmitter.

If, however, there be no second switch actuation, within the said predetermined interval, then the transmitter mechanism will be released, break wheel 1 and cam 3 will rotate through one-half rotation of cam 3 and three rotations (in the case of the particular transmitter illustrated) of the break wheel; and three rounds of the signal will be transmitted. During this operation the cam 3 will permit spring 4 to shift to contact with spring 6, the circuit of the magnet 7 being thereby transposed and broken, so that magnet 7 is deënergized.

After deënergization of magnet 7, the local signal device 14 will cease to operate; but this will not arrest the operation of the transmitter, which operation continues until the cam 3 has reached the position diametrically opposite that shown in Fig. 1.

Referring to Figs. 2 *et seq.*, showing the construction of the transmitter. The arm 11 carries a ratchet pawl 20 engaging a ratchet wheel 21 secured to the first gear of the retarding fan train 12. It will be obvious that as armature 8 is caused to move clockwise (in the construction shown) by the attraction of magnet 7, this ratchet pawl will cause the operation of the fan train, with consequent retardation of movement of the armature; but when that magnet 7 is deënergized the weight 19 will cause backward rotation of the armature 8, and, with it, backward motion of arm 11 and ratchet pawl 20, the fan train coming to rest. Arm 18 previously mentioned, also caused to move when the armature 8 is attracted by the magnet, engages at the end of a certain period of its movement, an extension 22 of a pivoted lever 23, which is the detent lever of the transmitter. This transmitter comprises the usual spring-driven clock train 24, one shaft 25 of which carries the cam 3 and another shaft 26 of which carries the break wheel 1. The clock train comprises the usual escapement 27 mounted on the disk 27′, which disk carries the usual detent pin 28 normally engaging a corresponding detent pin 29 on lever 23. When arm 18 encounters and cams to one side the extension 22 of lever 23, the lever disengages detent pin 29 from detent pin 28, thereby permitting the transmitter clock train to run. This transmitter clock train comprises a cam 30 (which in the actual construction shown is also the spring case of the driving spring of the transmitter clock train) and this cam 30 has on its rear side one or more notches 31, one of which normally engages the lever 23. But when lever 23 is moved aside to permit disengagement of detent pins 28 and 29, lever 23 is moved out of engagement with the notch 31, with which it has previously been in engagement, and cannot return to the detent position until the same or another notch of the cam 30 comes opposite the lever 23. When such a notch of the cam does come opposite lever 23 a spring 32, carried by the lever 23 and bearing at its outer end against the back plate of the casing, forces lever 23 back into engagement with that notch, the detent pin 29 of lever 23 then coming into position to arrest the corresponding detent pin 28 of the transmitter, and thereupon the transmitter is caused to cease operation. The location of the notch or notches of the cam 30 therefore determines the point at which the transmitter ceases operation.

It will be seen that, owing to the action of the transposing contact device, when the transmitter is operated to send its signal, and has come to rest, it is in condition to be set in operation anew, by the operation of any one of the switches 15, both for provisional operation during the no-signal transmission period, and for complete operation, including the transmission of its signal, in the event the switches 15 are operated during such predetermined no-signal transmission. In other words, neither the switches 15, nor the transmitter itself, require resetting after operation, either provisional or complete, except that, of course, after a number of operations of the transmitter its driving spring must be rewound.

I do not in this application claim the

transmitter provided with retard-control mechanism, as the same is claimed generally in my application Serial No. 249,460 filed August 12, 1918, and is claimed more specifically in a companion application Serial No. 369,585, filed March 29, 1920. And it will be understood that in the present alarm system I do not limit myself to the use of this particular transmitter, or to any particular means whereby the operation of the switch within a predetermined period following the first operation of a switch, prevents the sending of a signal.

What I claim is:

1. An alarm systm comprising in combination a transmitter having controlling means including means arranged to provide a predetermined interval of no-signal transmission following actuation of said controlling means in a sense to cause operation of the transmitter, controlling devices operatively connected to said controlling means, and each arranged when operated to operate the transmitter controlling means in a sense to initiate said predetermined interval of no-signal transmission, and each arranged when operated during that period of no-signal transmission to operate said controlling means of the transmitter to prevent transmission of the signal, and circuit transposing means operated by the transmitter in the event of the transmission of a signal, said transposing means arranged to condition the transmitter for further operation in the event of subsequent operation of one of said controlling devices.

2. An alarm system comprising in combination a magnet-operated controlling means including means arranged to provide a predetermined interval of no-signal transmission following actuation of the controlling magnet in a sense to cause operation of the transmitter, a plurality of controlling switches connected in series with said magnet and so arranged that operation of one of said switches changes the magnetic condition of said magnet in a sense to initiate said predetermined interval of no-signal transmission and that operation of one of said switches during said interval of no-signal transmission changes the magnetic condition of said magnet in a sense to prevent transmission of the signal, and circuit tranposing means operated by the transmitter in the event of said transmission-operation of said transmitter, and arranged by its operation to condition the transmitter for further operation in the event of subsequent operation of one of said controlling switches.

3. An alarm system comprising in combination a transmitter having magnet-operated controlling means and transposing means comprising operating means operated by the transmitter, said transposing means comprising contacts closed and broken alternately during signal-transmitting operation of said transmitter, and controlling switches connected through said alternative contacts to the said transmitter magnet, said switches arranged to provide alternative circuit paths to said alternative contact means of the transposing means, whereby each switch when operated may cause the operation of the transmitter, and whereby after operation of the transmitter subsequent operation of one of said switches causes further operation of the transmitter.

4. An alarm system comprising in combination a transmitter having magnet-operated controlling means including means arranged to provide a predetermined interval of no-signal transmission following actuation of the controlling magnet in a sense to cause operation of the transmitter, and transposing means comprising operating means operated by the transmitter in the event of transmission of the signal, and alternative contacts closed and broken alternately during signal-transmitting operation of said transmitter, and controlling switches connected through said alternative contacts to said transmitter magnet, said switches arranged to provide alternative circuit paths to said alternative contact means of the transposing means, whereby each switch when operated may cause the operation of the transmitter, and whereby after operation of the transmitter subsequent operation of one of said switches causes further operation of the transmitter.

5. An alarm system comprising in combination a transmitter having magnet-operated controlling means and transposing means including alternative contacts and an operating cam therefor driven by the transmitter in its signal-transmitting operation, and arranged to break the one and close the other of said alternative contacts by its operation, and a plurality of four-point controlling switches connected to provide alternative circuit paths through the said magnet to said alternative contacts of the transposing means.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

RICHARD M. HOPKINS.

Witnesses:

CATHERINE J. FLEMING,

DOUGLAS P. FOWLER.