(No Model.) 2 Sheets—Sheet 1.

E. A. SPEER.

FIRE ALARM.

No. 547,900. Patented Oct. 15, 1895.

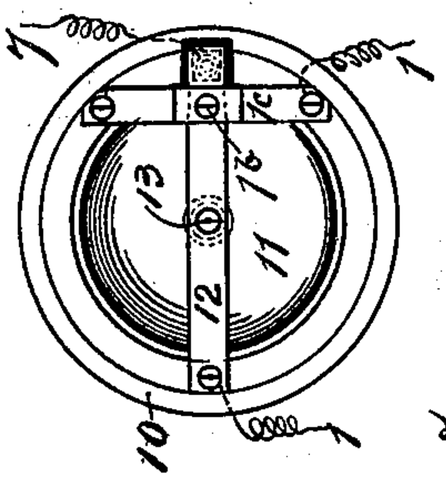

Fig. 2.

Fig. 3.

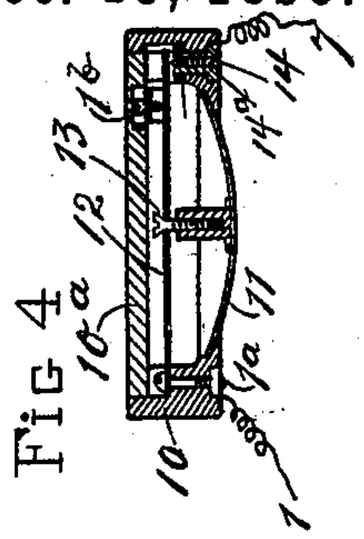

Fig 4

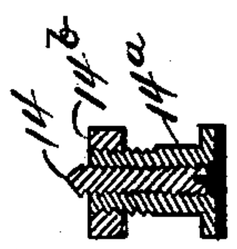

Fig. 5.

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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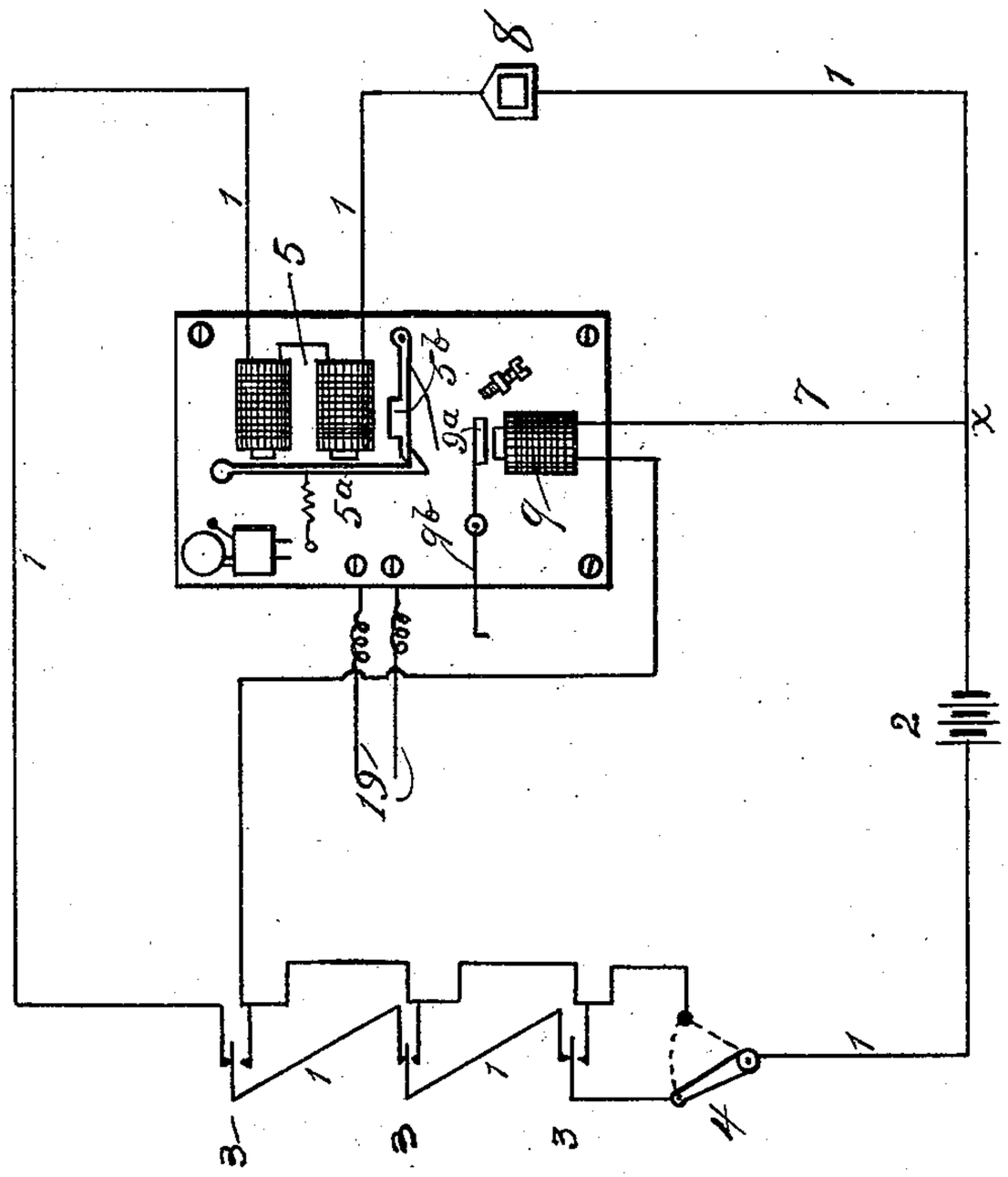
FIG. 6.



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EDWIN A. SPEER, OF TOLEDO, OHIO.

FIRE-ALARM.

SPECIFICATION forming part of Letters Patent No. 547,900, dated October 15, 1895.

Application filed May 20, 1895. Serial No. 549,888. (No model.)

To all whom it may concern:

Be it known that I, EDWIN A. SPEER, a subject of the Queen of Great Britain, residing at Toledo, Lucas county, Ohio, have invented certain new and useful Improvements in Automatic Fire-Alarms, of which the following is a specification.

My invention relates to and its object is to provide an automatic electric alarm controlled by a series of thermostats employed as circuit-changing devices arranged in such manner that when the temperature shall reach a predetermined limit a precautionary alarm will be given, and so that if the temperature increases to a predetermined danger-point a second or fire alarm will be given.

My invention is further designed to be actuated by a single battery in normally-closed circuit without the use of relays or batteries normally out of circuit, thus obviating the danger arising from the derangement or the running down of batteries.

To this end my invention consists in the devices and arrangement of parts hereinafter described, and shown and illustrated in the accompanying drawings, made part hereof, in which—

Figure 1 is a diagram of the wiring of a building provided with my apparatus and an elevation of the signal-transmitting instrument, with its magnets, spring-actuated train, and signal wheels; Fig. 2, an end elevation of said transmitting-instrument with its covering removed; Fig. 3, a top plan view of the thermostat, hereinafter referred to, with its back or cap removed; Fig. 4, a vertical diametrical cross-sectional elevation of the same; Fig. 5, a central vertical section of a contact-point of said thermostat in detail; and Fig. 6 is a diagram of the circuits and instruments hereinafter referred to.

Like numerals represent like parts throughout the drawings.

In the drawings, 1 is an electric line or wire run in each building from battery 2, leading in series through thermostats 3, testing-switch 4, and magnet 5 in the signal-transmitting instrument. This magnet, by means of its armature attached to detent 5^a, holds normally elevated a weighted drop 5^b, adapted to actuate a detent 9^b, engaging a stop or escapement 9^c in the spring-actuated train of gearing in the transmitting-instrument.

7 is an electric line or wire run through the building connected at one end to line 1, as at *x*, and at its other end to one of the terminals of switch 4. This line includes one of the contact-points in each one of the thermostats, the annunciator 8, and magnet 9, which, through its armature 9^a also controls the above-mentioned detent 9^b in the spring-actuated train of gearing in the transmitting-instrument. It should be understood that line 1 is normally closed and that line 7 is normally open.

I do not limit my invention to any specific form of thermostat, as many modifications of such instruments suitable to my purpose will obviously suggest themselves to those skilled in the art; but for illustration I have shown in Figs. 3, 4, and 5 a thermostat well adapted for use in this connection. This thermostat consists of a ring or frame 10, of some non-conducting substance, preferably of glazed porcelain, having an inwardly-projecting, annular flange, upon which rests and is secured the margin of a concavo-convex diaphragm 11, composed of some metal which should be an electrical conductor and which should expand or contract sensitively under varying temperatures—as, for instance, zinc. In the frame is secured, by screw and binding-post 1^a, one end of a finger or contact-strip 12, the free end of which extends to the opposite side of the frame, the upper side of the free end of this finger being normally in contact with an adjustable contact-screw 1^b, screwed into metal cross-piece 1^c, which is electrically connected with line 1. The diaphragm carries on its inner concave side an interiorly screw-threaded socket-piece, into which is screwed adjustable contact-piece 13 provided with a head, as shown in the drawings. The shank of this screw passes through a hole in strip or finger 12 without contact. Immediately beneath the free end of finger 12 is an adjustable contact-point 14, which consists of a cylindrical barrel 14^a, having at its lower end a square head fitted into a square recess in the lower face of the frame or ring 10. The upper end of the barrel is exteriorly screw-threaded, and is provided

with a nut 14^b, which holds the barrel rigid in its place. The interior of the barrel is screw-threaded and receives the adjustable contact-point 14, which is screwed in from the under side until it projects, at the upper end of its barrel, the required distance. The barrel is suitably connected with line 7. After the contact-pieces 12, 1^b, 13, and 14 are properly adjusted a disk or cap 10^a, preferably of glazed porcelain, is fitted into a circular recess in the back of the ring 10, and thus while one side of the diaphragm is exposed the interior of the thermostat is hermetically sealed up and is proof against moisture and dust. In this thermostat line 1 is normally closed through binding-post 1^a, finger 12, contact-pieces 1^b and 1^c. When by the presence of undue heats the diaphragm 11 expands, the head of the screw, carried by the diaphragm, comes in contact with the finger 12, pulling this finger away from touch with contact-piece 1^b, thus for the time being breaking circuit 1. If the undue heat continues or increases, the further expansion of the diaphragm pulls the finger down farther and into contact with adjustable contact-piece 14. The circuit is now through binding-post 1^a, finger 12, screw 13, diaphragm 11, contact-piece 14, and its attached wire 7, thus closing circuit 7.

The signal-transmitting device, more in detail, consists of a base supporting a frame in which are journaled the gear-wheels of a spring-actuated train, which will clearly appear from Figs. 1 and 2, and which it will be unnecessary to describe more particularly. In this train of gearing is a shaft or arbor 16, upon which is mounted and insulated therefrom a make-and-break wheel 17, designed to operate a bell-ringing or annunciating device (not shown) in a local circuit. Upon the same arbor is another make-and-break wheel 18 in electrical connection through line 19 with the central office, provided with the usual alarm, annunciator, receiving and recording instruments. (Not shown in the drawings.)

The operation of my device is as follows: Assuming that the thermostats are properly adjusted, as above described, that circuit 1 through the thermostats is closed, and that the armature of magnet 5, with its detent 5^a, is in engagement with weighted drop 5^b, now if in either one of the thermostats there is present a degree of heat beyond the predetermined safety limit, thus expanding the diaphragm, or if battery 2 should run down, or if line 1 should in any manner be broken or grounded, magnet 5 thereupon is immediately de-energized and its armature is released and drawn away by its spring 5^d. The weighted drop 5^b, thus released, now swings downward upon its pivot, as shown by the dotted lines in Fig. 1, striking the armature 9^a on detent 9^b, thus releasing stop or escapement 9^c in the spring-actuated train of the transmitting-instrument 6. The weighted drop 5^b has attached to its under side a spring 5^c, which strikes an adjustable stop 5^e as the blow of the weighted drop is delivered upon the detent, the spring by its rebound now lifting the weighted drop clear of the detent 9^b. The escapement 9^c being released by the detent 9^b, as above described, now makes one revolution, when the stop 9^c is again engaged by the detent 9^b. During this revolution of the escapement-wheel 9^c the predetermined signal is transmitted in the usual way through the make-and-break wheel 18 to the central office. Should the heat at the thermostat continue or increase, the continuing expansion of the diaphragm in the thermostat shunts circuit 1 into circuit 7, as above described, thus energizing magnet 9 in that circuit, pulling down its armature 9^a, attached to detent 9^b, which again releases stop 9^c. The spring-actuated train now continues to transmit its signal to the central office until the spring runs down, or until stopped by hand, or until the cooling and contraction of the diaphragm again break circuit 7. It will be seen that if after the preliminary or precautionary signal caused by the break of circuit 1, the diaphragm of the thermostat should cool off and contract, circuit 1, thus closed, will not by its action on magnet 5 and its detent transmit a second signal, thus unnecessarily giving the alarm of fire; and it will be seen that the continuous repetition of the predetermined signal only occurs when, through dangerous heat, the diaphragm of the thermostat is sufficiently expanded to close circuit 7.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In combination with a series of thermostats, a normally closed and a normally open electric circuit controlled thereby, a signal transmitting instrument, two magnets in said signal transmitting instrument, one of said magnets being in said closed circuit, the other of said magnets being in said open circuit, a detent or escapement in said signal transmitting instrument adapted to be actuated by either of said magnets, and means in said thermostats for shunting said closed circuit into and closing said open circuit, substantially as and for the purpose specified.

2. In an electrically controlled signal transmitting instrument, in combination with an escapement in the train of gearing of said instrument, a magnet 5, a detent, 5^a, controlled by said magnet, a drop controlled by said detent and arranged to actuate said escapement, a spring adapted by its rebound to relieve said escapement from the weight of said drop and a second magnet, 9, also adapted to actuate said escapement, substantially as and for the purpose specified.

EDWIN A. SPEER.

In presence of—
ALMON HALL,
L. E. BROWN.