

(No Model.)

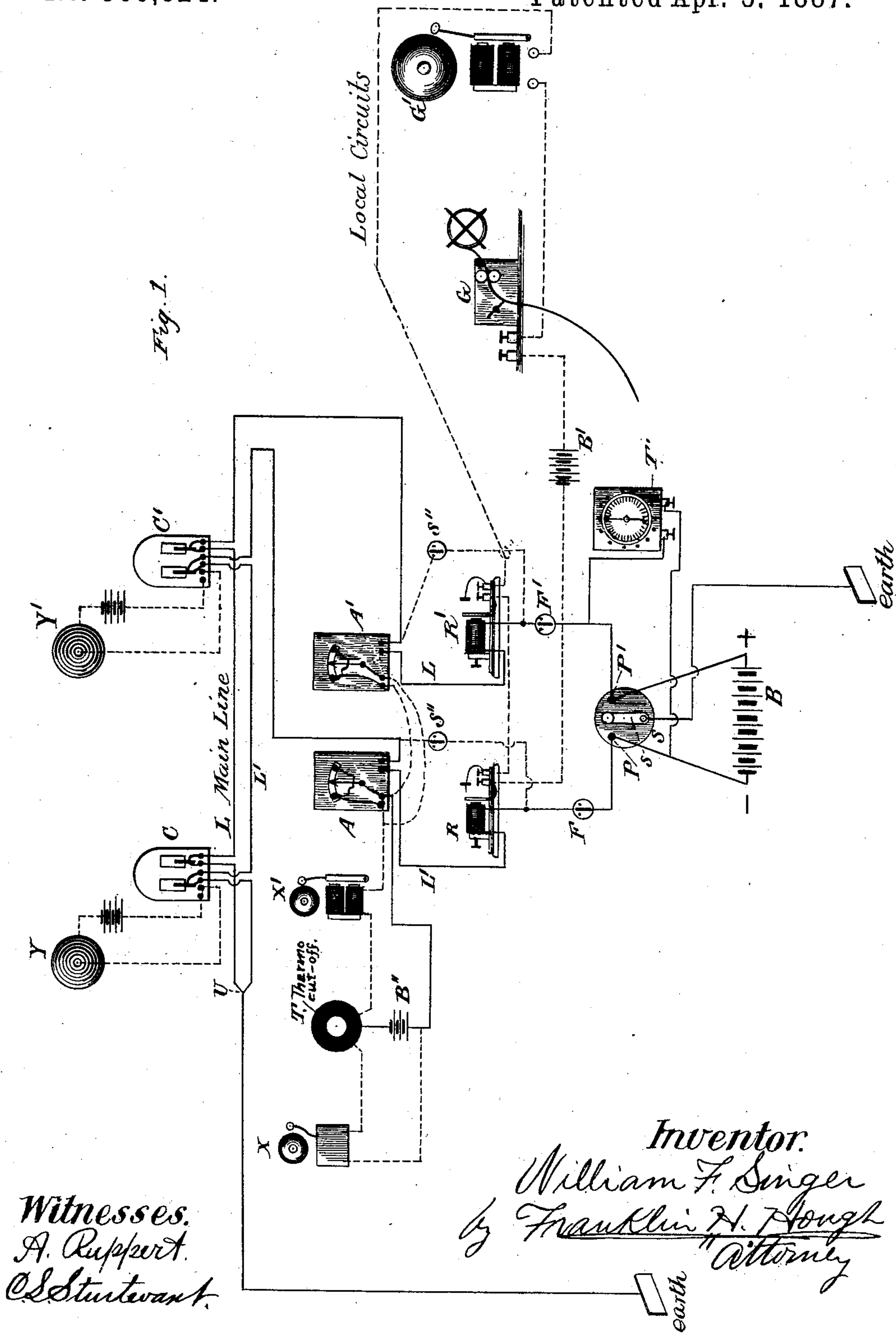
2 Sheets—Sheet 1.

W. F. SINGER.

AUTOMATIC FIRE ALARM SYSTEM.

No. 360,824.

Patented Apr. 5, 1887.



(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

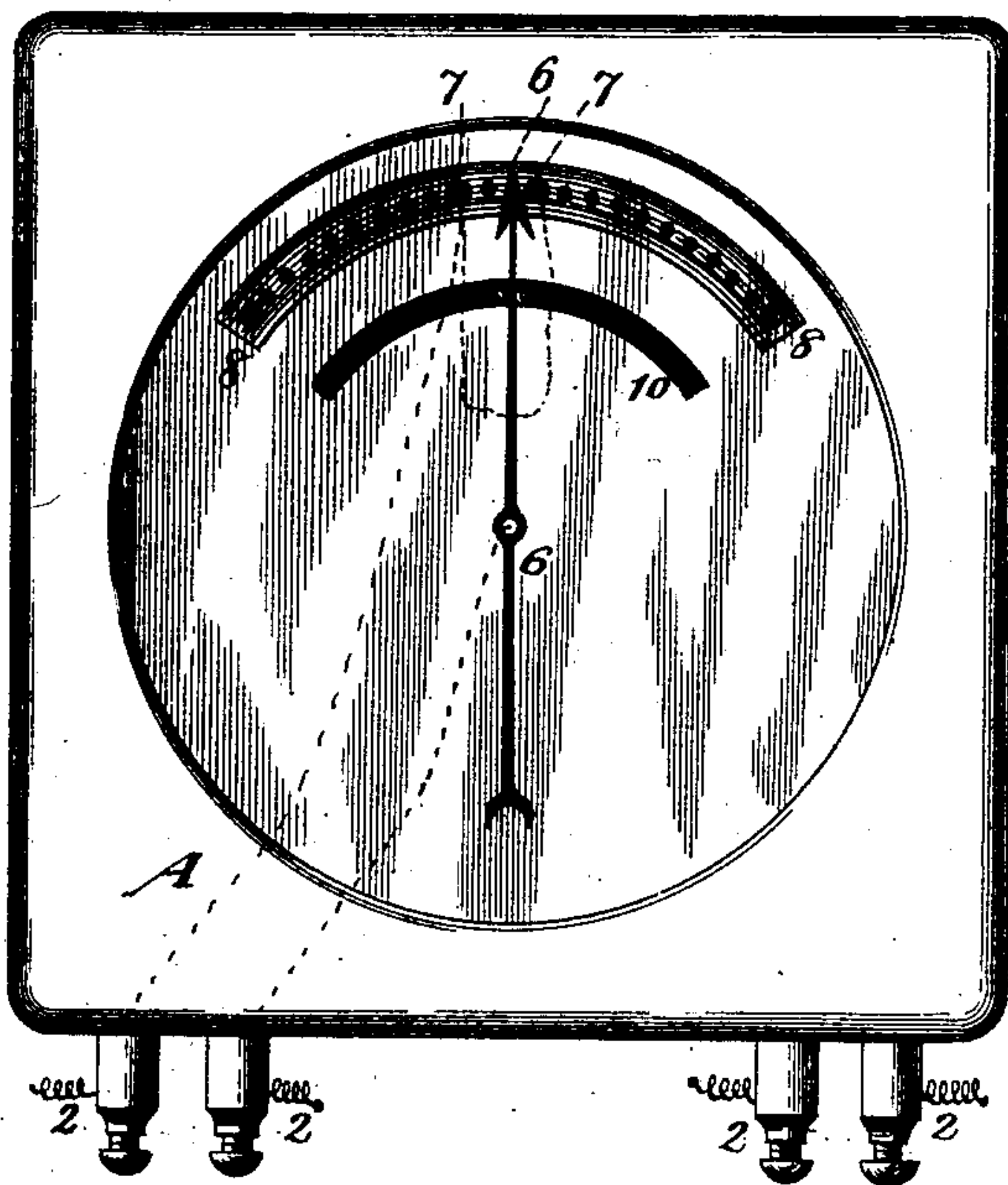


Fig. 3.

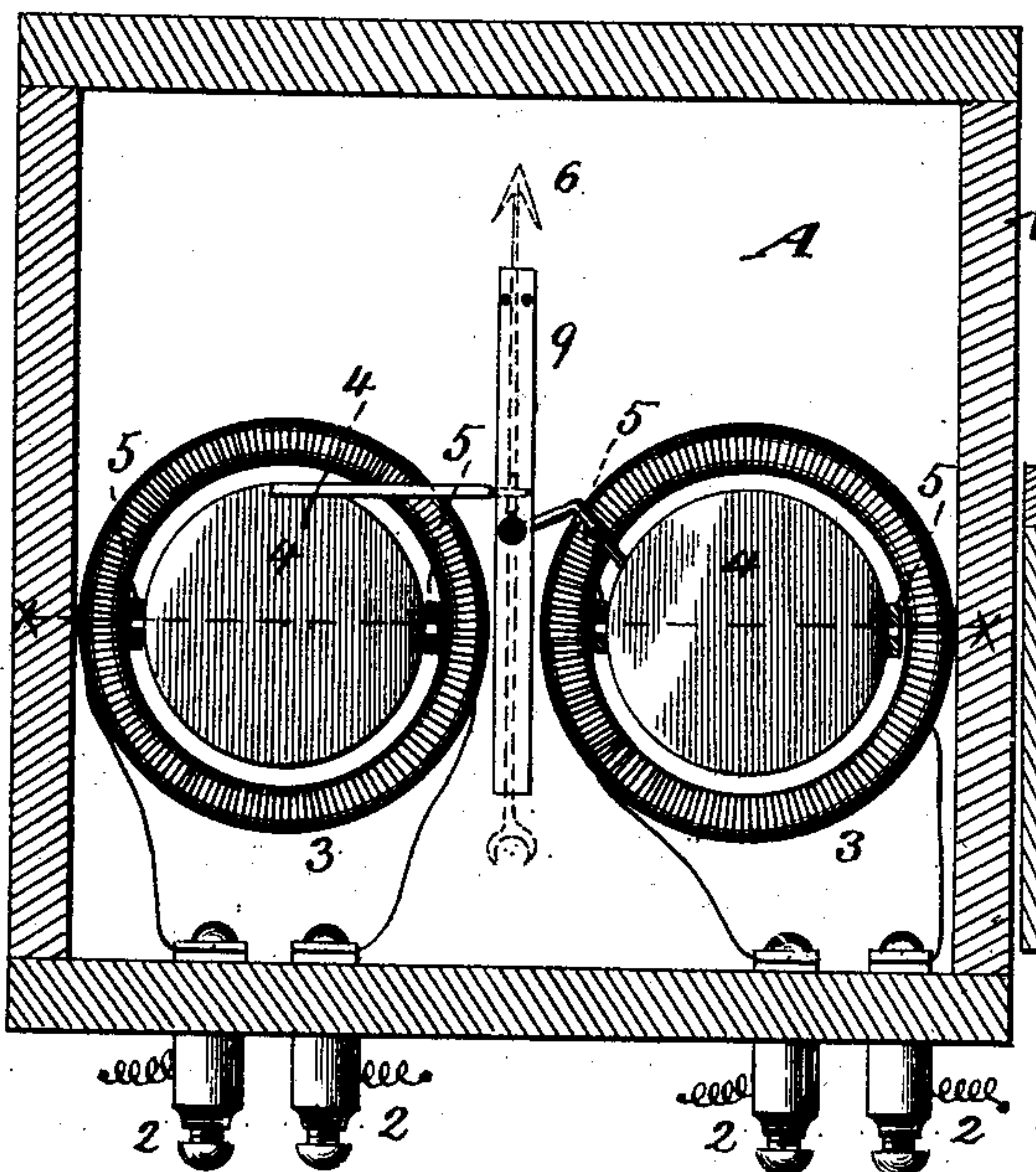


Fig. 5.

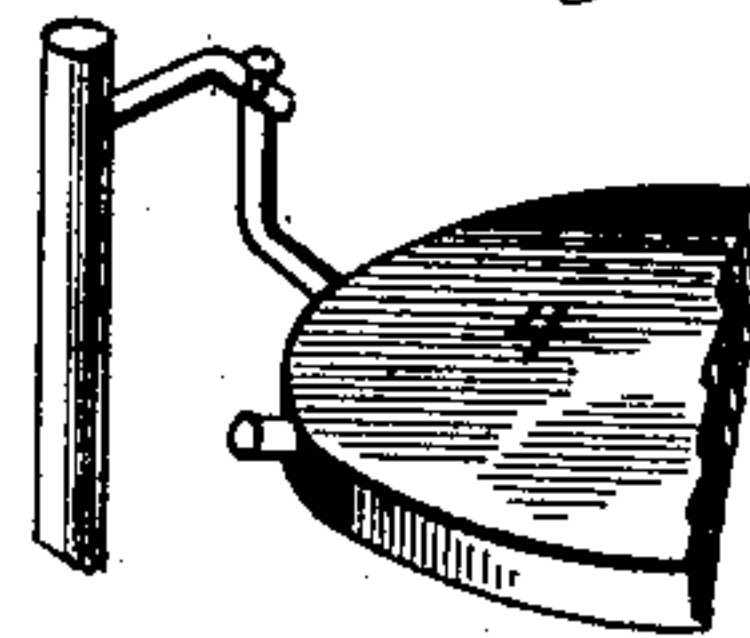


Fig. 4.

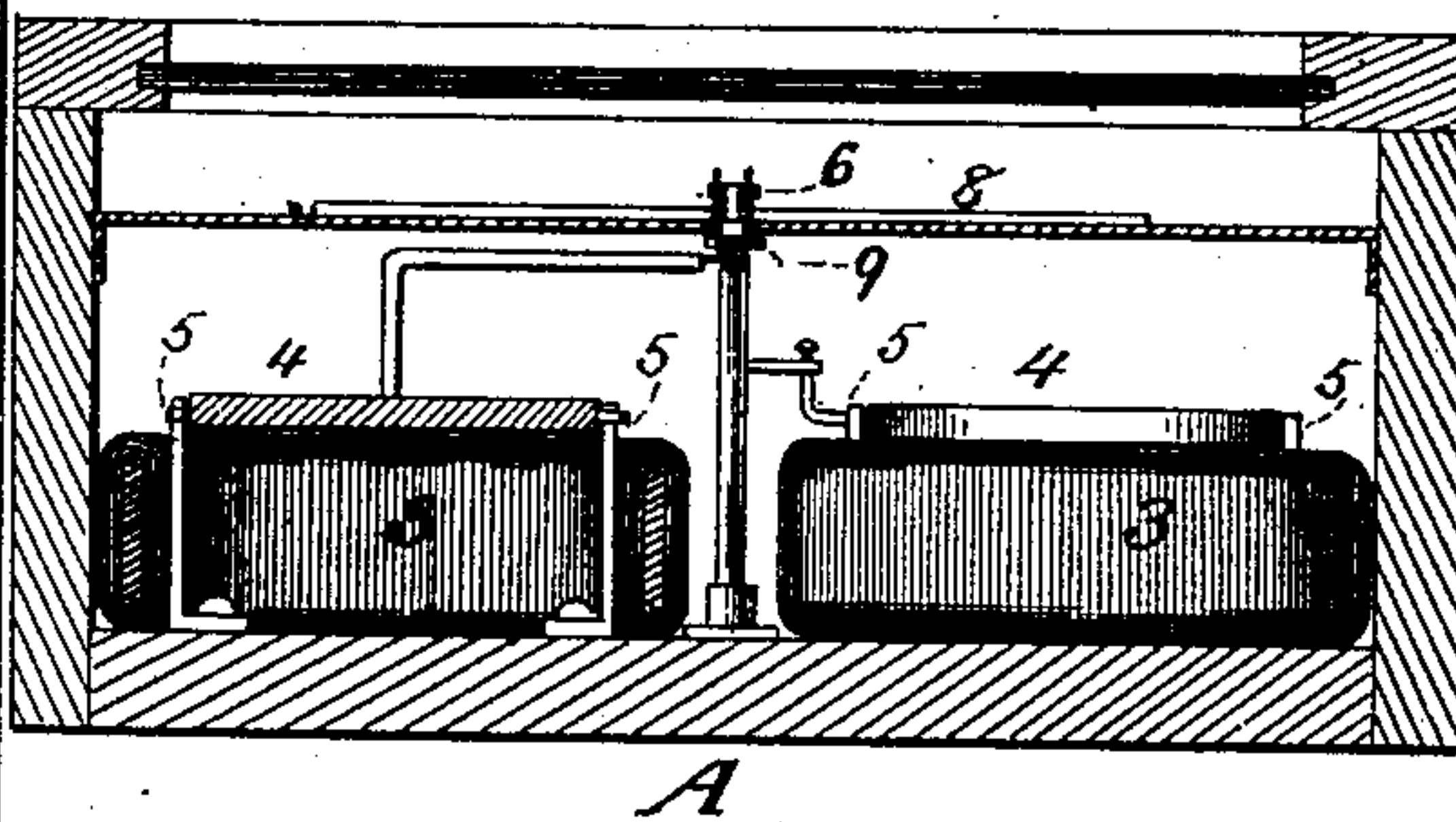
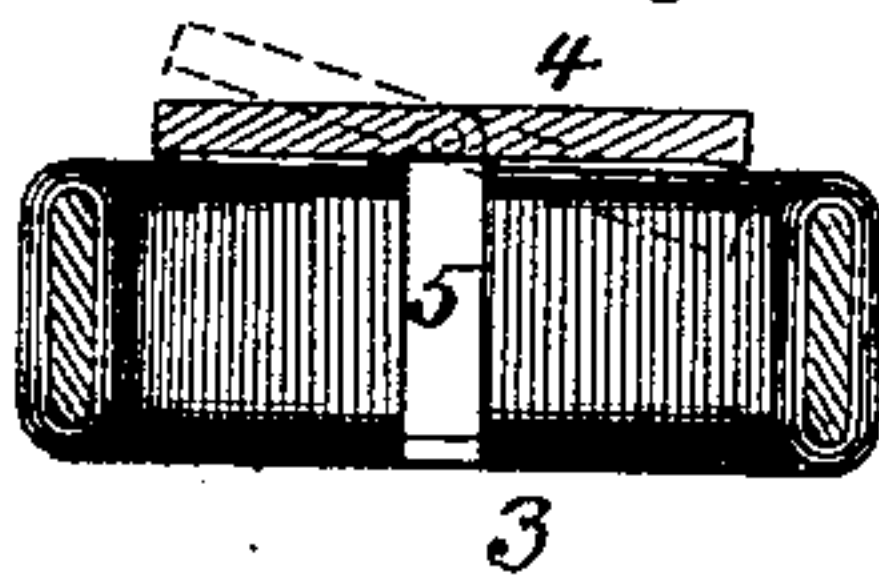


Fig. 6.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC FIRE-ALARM SYSTEM.

SPECIFICATION forming part of Letters Patent No. 360,824, dated April 5, 1887.

Application filed July 26, 1886. Serial No. 209,072. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM F. SINGER, a citizen of the United States, residing at Carthage, in the county of Jefferson and State of New York, have invented certain new and useful Improvements in Automatic Fire-Alarm Systems; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings and letters of reference marked thereon, which form a part of this specification.

My invention relates to fire-alarm apparatus used for automatically transmitting an alarm upon the breaking out of a fire.

The object of the invention is to improve upon automatic fire-alarm systems heretofore in use.

Experience has shown that with the best automatic fire-alarm systems now in use at least eighty-five per cent. of the alarms sent to the fire-department are false, thus causing the department unnecessary trouble and expense of visiting remote parts of the district, and subjecting property in other sections to danger from fire during their absence.

The electric contact parts of thermostats such as have heretofore been used in automatic fire-alarm systems can be destroyed without transmitting a signal or alarm. The seriousness of this objection will be at once evident, as buildings within the circuit are left exposed to the danger of incendiary fires.

The object of this invention is to obviate these and other objections to systems heretofore used, and at the same time to provide a complete and perfect automatic fire-alarm system which cannot be tampered with or injured, either intentionally or accidentally, without instantaneously transmitting an alarm and describing and locating the difficulty.

To this end, and to such others as the invention may pertain, the same consists in the peculiar combinations and the novel construction, arrangement, and adaptation of parts, all as more fully hereinafter described, shown in the accompanying drawings, and then specifically pointed out in the claims.

Figure 1 is a diagram showing the circuits

and relation of the instruments thereto in a telegraph system embodying my invention. Fig. 2 is a top plan with the case in position. Fig. 3 is a similar view with the outer case removed. Fig. 4 is a section on the line *x x* of Fig. 2. Figs. 5 and 6 are details, hereinafter more particularly referred to.

A number of thermostats, which are located near together, as in the various apartments of a large building, are included within a local circuit, which is provided with a call-box, said box being connected with both the main and local circuits. A closed main-line circuit is maintained by means of a battery located at the central district-office.

In order that the operation of my system may be more readily understood, I will first describe the main circuit, after which I will give a more detailed description of the various instruments used and of their operation.

The normal course of the current from the battery B is from the positive pole of the battery to the point P' of the switch S, to the relay R', to the incendiary alarm A', thence proceeding to the building wherein is located the call-box C', provided with double contact-breakers of ordinary construction. From C' the current continues to C, thence to U, and thence returning from C to C', thence to A, thence to R, thence to the point P of the switch S, and from thence to the negative pole of the battery B. It will be readily understood that an alarm sent out from either C or C' will cause both relays R and R' to attract and release their armatures simultaneously, and in doing so these armatures open and close the local circuit in which are placed the register G and the gong G'.

The call-boxes C and C' are operated by thermostats Y Y' in closed circuit with their respective batteries, electro-magnets controlling the escapement of the call-boxes C and C', as is usual. The thermostats, Y Y', which are used in connection with the system consist of thin metallic chambers secured to the ceilings of the various departments in the building, and are adapted to break the circuit and thus transmit the alarm by means of the expansion of the gas or air contained within the inner chamber of the same.

As the construction and operation of the

particular form of thermostat used in connection with this system forms the subject-matter of a separate application, Serial No. 209,071, of even date herewith, to which reference may be had, and no claim is made to it in the present case, a detailed description of the same in this connection will not be necessary.

Ordinarily, the breaking of the line in a fire-alarm system at any point serves to at once render the system inoperative, and it is one of the objects of my invention to effectually overcome this objection and admit of an alarm being received at the central office after the line has been broken. This is accomplished in the following manner: Suppose the line L' should break, the circuit would then be broken, causing both relay-armatures to be released. These armatures then close the local circuit to the register G and gong G', causing the gong to strike once, and at the same time causing the register G to record a continuous mark upon the register-paper instead of a series of marks which would be caused by a genuine fire-alarm. If the switch S is now closed on the point P, the line L' will be in condition to transmit alarms by means of the earth-circuit to the switch S, thence to point P, thence to the pole of the battery B, thence to the point P' of the switch, thence to the relay R', thence to A', thence to C', thence to C, thence to U, and from thence to the earth again. Should the line L break, the same thing is accomplished by means of the point P' of the switch S.

The call-boxes C C' are each provided with two resistance-spools of different values; but as I make no claim to the construction of the call-box, I have not shown the construction of the same in the drawings. In order to destroy a building by fire without sending in an alarm to the central office in which these call-boxes are located, it would be necessary to cut out the box entirely by short-circuiting, and it would be impossible to do this without causing a decreased resistance of the line, which would at once be indicated by the pointers upon the incendiary alarms A A'.

Any form of incendiary alarms suitable for the purpose may be used, although no claim is made in this application to the peculiar construction of the incendiary alarms, reserving the right to make the same the subject-matter of a separate application. I have shown what I at present consider the preferable form.

This is illustrated in Fig. 3 of the accompanying drawings, in which A represents one of these alarms. 1 indicates the case of the instrument, and 2 2 the binding-posts, from which connection is made, on the interior of the front plate to the coils 3 3 of the instrument in any ordinary or suitable manner. 4 4 indicate the vibratory disks or plates, which are of magnetic material, mounted within the coils 3 3 so that they will swing when influenced by the electric current, and tend to set themselves when the current passes through the coils. The disks are preferably made of

steel, and are permanently magnetized, as common in the art, each with a polarity that will cause it to tend to set itself at right angles to the plane of the coils when a current passes through the latter. The disks 4 4 are supported upon bearings 5 5. The indicating-needle 6 is located above and between the disks 4 4, and its point swings between the platinum pins 7 7 upon the perforated dial 8. The governing-arm 9 is pivoted above and between the disks 4 4 and directly beneath the pointer 6, and swings loosely upon the same shaft as the pointer. The dial is provided with a circular slot, 10, through which the projecting fingers of the governing-arm 9 project.

A sudden decrease of resistance of the line, such as would be caused by cutting out the call-boxes, would instantly cause a deflection of the needle 6 toward one of the pins 7, and thus close the local circuit through B'', T, and X', and cause the gong X' and the main gong G' to strike once and the registering device to make one long mark upon the register-paper and the vibrating bell X to ring continuously until the defect in the line is removed.

The effect produced by a telegraph or telephone wire in falling across the line, except the intermittent character of the signal which is caused by the rebounding of the wire upon the line, is the same as that above described.

A true fire-alarm can always be distinguished from alarms caused by line and incendiary troubles by the fact that the call-boxes are only thrown into action when a fire occurs. The thermostats breaking the local circuit releases the escapements of the call-box motor, causing the circuit-breakers to revolve, thus sending in an alarm, which will vary in accordance with the construction of the circuit-breakers. It will be understood that each box is provided with circuit-breakers, which will cause the striking of a given number of strokes upon the gong at the central office, the circuit-breakers in each box within the circuit differing from all others in this respect, as is common in call-boxes of this kind, so that when an alarm is sounded the particular box from whence it is received can be differently located.

Should the cross or cut-out be an intermittent one, the gong X' and the gong G' will strike one each time that it occurs. In case it is a permanent cut-out, the gongs X' and G' will strike once, the battery B'' will remain closed through the thermo cut-off T, and after the lapse of two or three seconds the cut-off T will automatically switch the current from B'' through the vibrating bell X, which will continue to ring until the attention of the operator is called and the cause of the trouble removed. A bridge and galvanometer, T', may be applied at any convenient point, and, by measuring the line, can at once ascertain the particular box that has been cut out, or the point upon the line at which the wire has been broken. As an illustration, we will suppose

that the total resistance of the line normally is one thousand ohms, two hundred of which are in the box C, the measurement would show, if the box C were cut out, but eight hundred
5 ohms, thus showing inferentially that the box C has been tampered with.

In case of breaks or other injuries upon the line, a lineman is sent out and the damage repaired, as previously described. The broken
10 line is thrown out of circuit by means of the switch S.

F F' and S S' are switches for connecting the line upon either side of the battery.

Wherever in the following claims the words
15 "incendiary alarm" are used, I intend to be understood as referring to the apparatus shown in Figs. 3 and 4, or the equivalent thereof.

Having thus described my invention and set forth its merits, what I claim as new is—

20 1. In an electric fire-alarm system, the combination, with the main line, call-box, and incendiary alarm included therein, of a local circuit and an independent alarm in said circuit, substantially as and for the purpose specified.

25 2. In an electric fire-alarm system, the main line, call-box, and incendiary alarms therein, combined with a local circuit passing through said alarms and an intermittently-ringing alarm in said local circuit, substantially as de-
30 scribed.

3. In an electric fire-alarm system, the combination, with the main circuit, a call-box, and an incendiary alarm in said circuit, of a local circuit passing through said incendiary alarm

and two independent alarms in said local cir- 35
cuit, substantially as described.

4. The main line, call-boxes, and incendiary alarms included in said line, combined with the local circuits passing through said alarms and with two independent alarms in said lo- 40
cal circuit, and a thermo cut-off controlling one of said alarms and arranged in the local circuits, substantially as described.

5. In an electric fire-alarm system, the local circuit, the main line, and call-boxes included 45
therein, combined with the incendiary alarms in said main line and arranged to announce a true alarm, an intermittent alarm in said lo-
cal circuit operated by a crossing of the wire, an independent alarm, also in said local circuit 50
and arranged to ring continuously upon per-
manent crossing of the line, and a thermo cut-off arranged between said alarms and control-
ling the continuously-sounding one, substan-
tially as described. 55

6. In a fire-alarm system of the kind de-
scribed, the combination, with the round line and the call-boxes and incendiary alarms, all included in said line, of a single grounded
branch common to the lines passing through 60
said boxes and alarms, substantially as de-
scribed.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM F. SINGER.

Witnesses:

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A. Y. STEWART.