# Edward A. Hill

## Automatic Electric Fire Alarm.

No. 121,717. Patented Dec. 12, 1871.

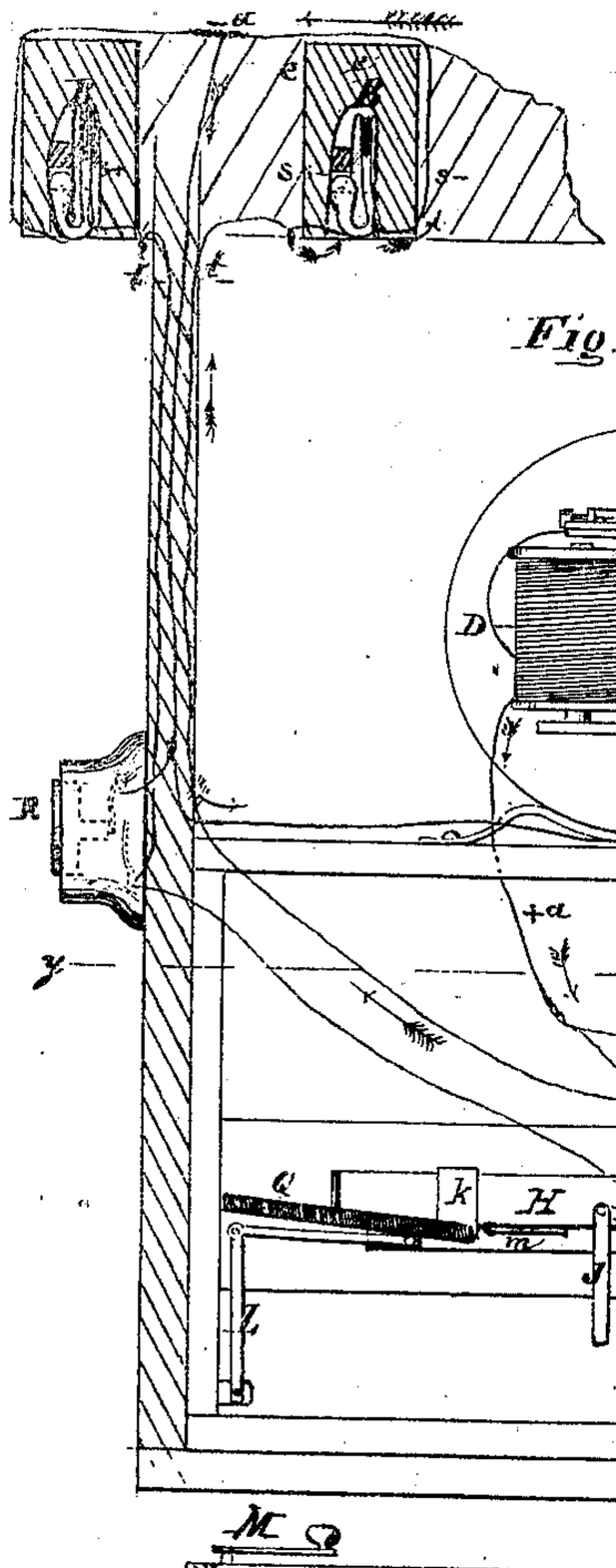

Fig. 1.

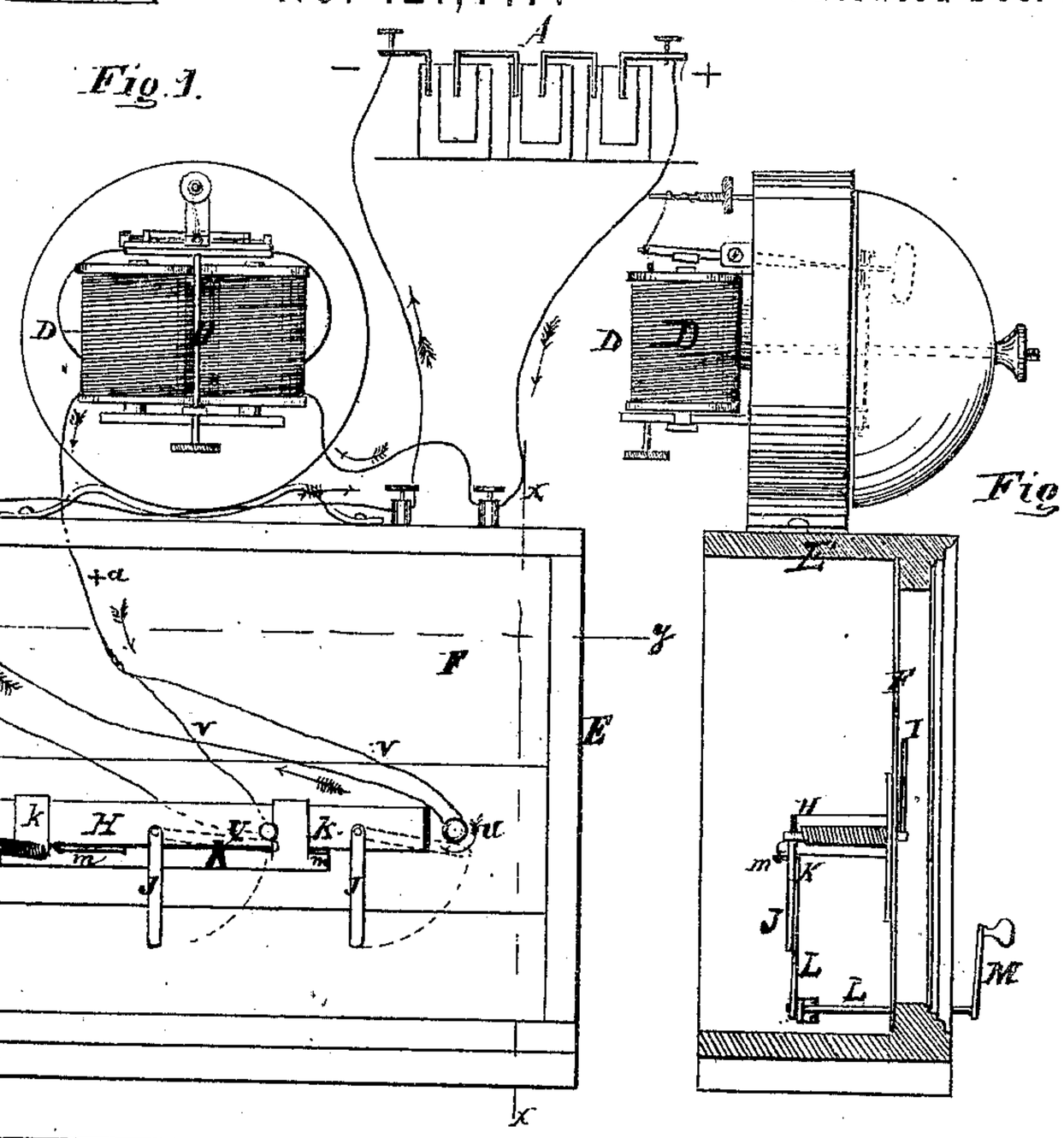

Fig. 2.

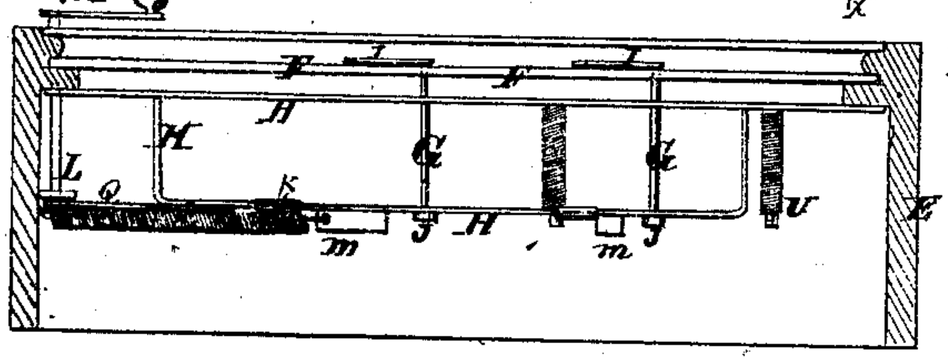

Fig. 3.

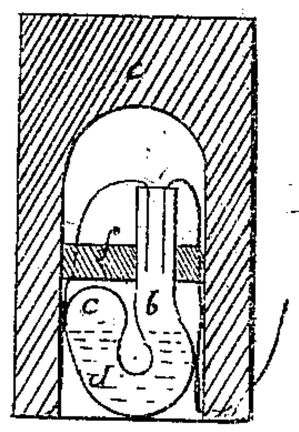

Fig. 5.

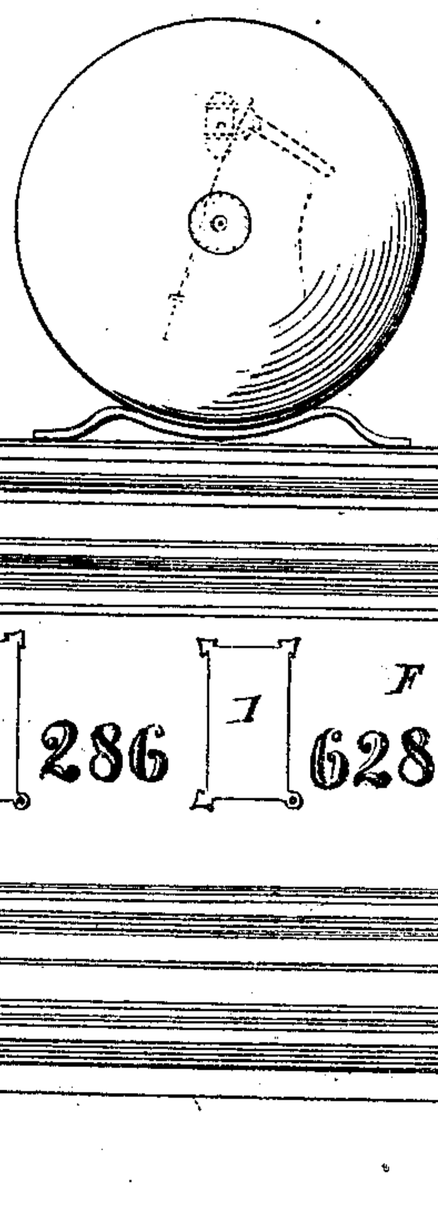

Fig. 4.

Fig. 6.

Witnesses:
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# UNITED STATES PATENT OFFICE.

EDWARD A. HILL, OF CHICAGO, ILLINOIS.

## IMPROVEMENT IN ELECTRIC FIRE-ALARMS.

Specification forming part of Letters Patent No. 121,717, dated December 12, 1871; antedated December 9, 1871.

*To all whom it may concern:*

Be it known that I, EDWARD A. HILL, of Chicago, in the county of Cook and State of Illinois, have invented certain Improvements in Automatic Electrical Fire-Alarms; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing and the letters and figures of reference marked thereon which form part of this specification, and in which—

Figure 1 is a rear view of the indicator and a sectional view of a partition-wall and ceiling, showing the arrangement of the wires and the mercury-connectors. Fig. 2 is a section on the plane of the line *x x* in Fig. 1, looking toward the bell. Fig. 3 is a section on the plane of the line *y y* in Fig. 1, looking downward. Fig. 4 is a front view of the indicator and bell, and Fig. 5 a view of the mercury connector enlarged, its plaster-of-Paris inclosing-shell being shown in section.

Like letters of reference made use of in the several figures indicate like parts.

A is an electric battery of the usual construction, and which is placed in any convenient position in the building to be fitted with the automatic fire-alarm. The negative-wire electrode — of this battery proceeds to all the various apartments of the house or to a common wire, —$^a$, which connects all the various apartments. B are what I term automatic mercurial connectors, one of which is shown enlarged at Fig. 5. This connector consists of a glass tube, *b*, with a bulb, *c*, from which is prolonged the bent tube *b*. This tube is partly filled with mercury, *d*, leaving a space above the mercury in the bulb, which is full of atmospheric air. The mercury also rises for a portion of the height of the tube *b*. The end of the tube *b* is open, and two small wires, not in contact, pass into this open end and down to within a little distance of the upper surface of the mercury. These two small wires are so arranged that when connected a circuit is complete from the battery A through an annunciator, to be hereinafter described. This automatic connecting device is inclosed in a hollow shell of plaster of Paris, *e*, and is held in place within said shell by means of a cork, *f*, through which the tube *b* passes. Now, when this connector is placed within an apartment in the ceiling with the open end of the shell down, any unusual heat of the said apartment will be felt by the air in the tube. The heat, rising to the ceiling, will expand the air in the bulb *c*, which will force the mercury to rise in the tube *b*. If the heat be great enough the mercury will finally rise until it touches the small wires in the tube, when the circuit is completed through the said mercury, and an alarm given at the annunciator or indicator. One of the above-mentioned small wires *s*— connects with the common wire —$^a$, above described, while the other, *s*+, connects with a wire, *t*+, which proceeds to the annunciator or indicator, and is attached to a helix placed around a soft-iron core, *u*. The opposite pole of this helix is connected, by a wire, *v*, to the common wire +$^a$, which connects with the helix of an electro-magnet, D, the opposite pole of which helix is connected to the positive-wire electrode + of the battery. E is the indicator, consisting of a face-plate, F, upon which are placed the names or numbers of the various apartments of the house. G is a shaft passing horizontally through the said plate F and having bearings in a frame-work, H. The outer end of this shaft is provided with a curtain, I, and the inner end with a permanent magnet, J, in the form of a bar. K is a rod furnished with clasps or bearings *k*, which slide upon the frame-work H. A jointed lever, L, connects this rod with a crank or handle, M, at the front of the indicator-case. Now, a motion of this crank slides the bar K along the frame-work H, and a projection or projections, *m*, engage the magnets J when hanging down, as seen at Fig. 1, and lift them up, bringing the free ends in contact with the projecting end of the soft-iron core *u*. When in this position the attraction of the core to the magnet is sufficient to retain them together; and, also, when the magnets are in this position, the curtain or curtains I are swung down so as to cover the names or numbers upon the face-plate F.

When the wires at any particular one of the connectors B (say B′) are reached by the mercury and the circuit thereby closed a current is sent from the battery through the electro-magnet D, which, by an ordinary mechanism, is made to ring a bell; from thence the current passes to the core *u* and around its helix, and so to the connector B′, and from thence, by the common wire, back to the battery. The passage of the current through the helix of the core *u* converts it into an electro-magnet with a like polarity to the permanent magnet J, whereby the said magnet J is repelled; and this repulsion, conspiring with the weight of the said magnet, is sufficient to coun-

terpoise the weight of the curtain I, which is thereby swung up from and discloses the number or name of the apartment in which the circuit became connected. This curtain may be replaced by operating the sliding bar K, which is held in normal position by the retractile spring Q.

It will be obvious that slight variations may be made in the above-described construction of the mechanism for operating the curtains and the same result produced. In fact, I contemplate making the curtain I of a sufficient weight to more than balance the permanent magnet J, and placing the magnet J above instead of below the core, so that when said magnet is released from the core the weight of the curtain will conspire with the repulsion of the electro-magnet to cause the said magnet J to assume a vertical upright position just opposite to the position shown at Fig. 1.

R is an ordinary spring-test, whereby the continuity and accuracy of the current may be at any time tested. One of these may be placed in each apartment.

By inclosing the mercury-connector in the shell *e* I am enabled to readily insert it in place in the ceiling or wall.

Having thus fully described the construction and operation of my invention, I will proceed to specify with particularity what I claim and desire to secure by Letters Patent:

1. The combination of the electro-magnet or core *n* with the pivoted permanent magnet J and curtain I, substantially as and for the purpose specified.

2. The combination of the pivoted magnet J and curtain I with the sliding bar K provided with projections *m*, substantially as and for the purpose specified.

3. The combination of the plaster shell, or shell made of like material, *e*, with the tube *b* of a mercury-connector, as and for the purpose specified.

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Witnesses:
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