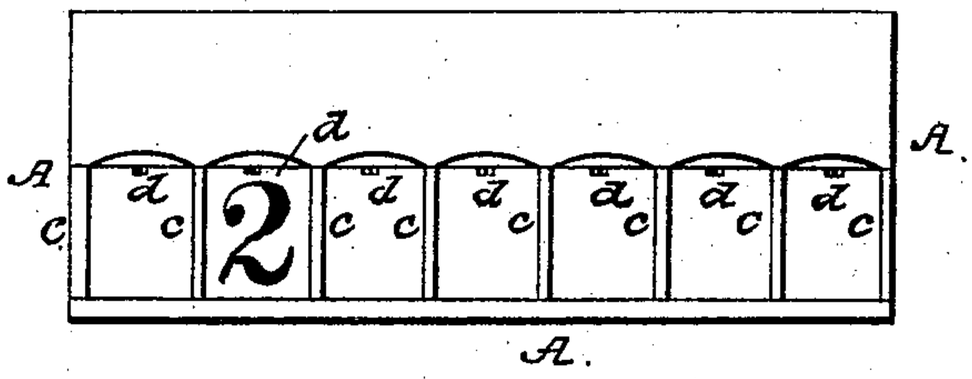
2 Sheets—Sheet 1.

A. SMITH.

Fire-Alarm Telegraph.

No. 4,661. Patented July 24, 1846.

Fig. 2.



2 Sheets—Sheet 2.

A. SMITH.

Fire-Alarm Telegraph.

No. 4,661.

Patented July 24, 1846.

Fig. 4.

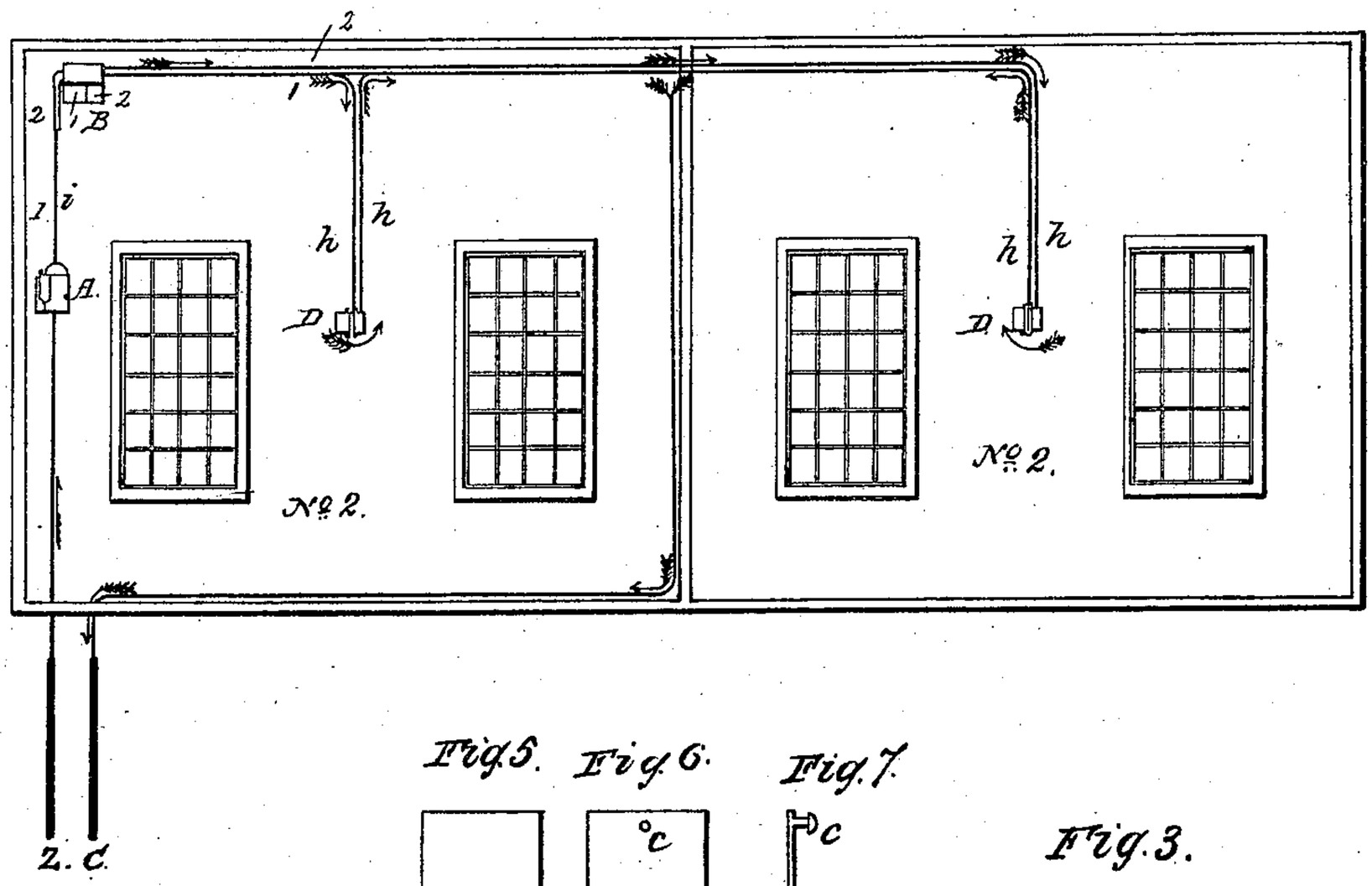
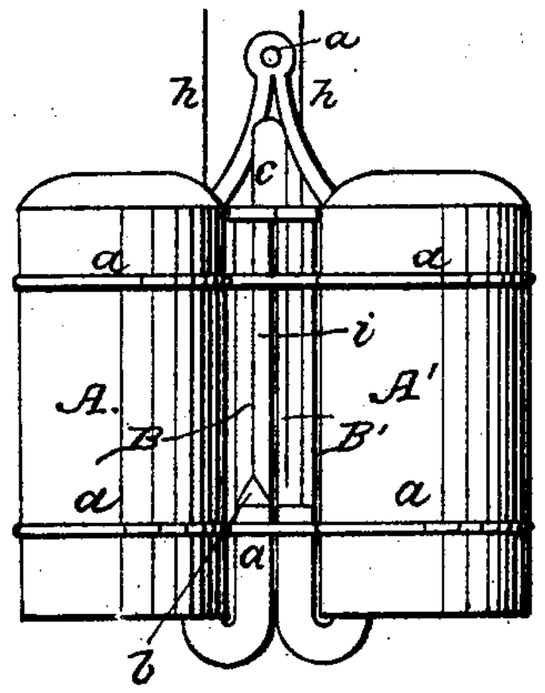
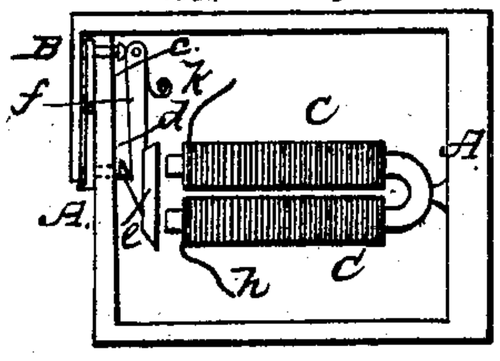


Fig. 5. Fig. 6. Fig. 7.

Fig. 3.



A. Fig. 2



UNITED STATES PATENT OFFICE.

ADDISON SMITH, OF PERRYSBURG, OHIO.

IMPROVEMENT IN MAGNETIC FIRE-ALARMS.

Specification forming part of Letters Patent No. **4,661**, dated July 24, 1846.

To all whom it may concern:

Be it known that I, ADDISON SMITH, of Perrysburg, in the county of Wood and State of Ohio, have invented a new and useful machine for giving an alarm in case of accidental fire (which I call "The Electro-Magnetic Fire-Alarm") that may occur in any apartment of a building, and at the instant that it begins to ring the alarm it also designates the particular apartment which is on fire.

These effects are produced by galvanic agency, the galvanic fluid being supplied by a constant battery formed by burying in the moist earth a sufficient surface of positive and negative metals. The circuit of this battery is formed by an insulated copper-wire passing from one pole of the battery to the other, thence returning to the former pole through the moist earth. In the circuit of this battery the alarm-works and the designating apparatus (both described below) are placed, their position in the building being such as to afford the earliest possible notice of the existence of fire.

In Figure 4 is represented the alarm A, consisting of a bell, which is rung either by electro-motive power or by the action of a train of wheels and pinions moved either by a spring or descending weight, the wheels being locked when the galvanic current is interrupted by a detent which catches into the last wheel of the train. This detent is controlled by an electro-magnet, which disengages it when the electric circuit is completed, and thus sets the alarm in motion.

Fig. 1 exhibits a front view of the designating apparatus, designed for connecting two rooms. It consists of a square or oblong case A, across the front of which a strip or screen, B, extends throughout the length of the case, and downward to half its depth, leaving a small intervening space between it and the front of the case.

Fig. 2 represents an end view of the interior of the designating apparatus, in which are seen all the parts necessary to operate a single designating-plate, and as each plate is provided with a similar arrangement, acting independently of all the others, a description of a single one, with its working parts, will apply to all.

The designating-plates (one of which is exhibited in Figs. 5, 6, and 7, Fig. 5 representing a front, Fig. 6 a back, and Fig. 7 a side view, and seen also at *a* Fig. 2) are composed of thin rectangular pieces of metal or other suitable substance, which plates slide freely up and down on the front of the case A and behind the screen B, being kept in their vertical position by the headed guide-pins *c d*, Figs. 6, 7, which pass through the slots *o*, Fig. 1, in the front of the case.

The designating-plates each bear upon their external face a large legible number, corresponding with that of the particular room with which their several working parts are in voltaic connection, and when at rest they are lodged in the space above mentioned, between the screen B and the front of the case, being supported in that position by the guide-pin *d*, whose head rests in the catch *f*, which moves freely about a pin through its upper end. A small spring, *k*, presses lightly against this catch, tending to keep the same outwards. C is an electro-magnet firmly secured into the back of the case A. This magnet is possessed of sufficient power to control the armature *e*, which is attached to the catch *f*.

h is the insulated conducting-wire connecting the two poles of the battery. This wire, however, is not continuous in its course, but is severed in the apartments through which it passes, having a small space between its broken ends, so that all galvanic action is suspended until metallic connection between the broken ends of the wire is restored. For the purpose of effecting this connection the connecting apparatus, Fig. 3, acting on the principle of the air-thermometer, is used.

A A′ are two air bulbs or chambers of equal capacity, united in the open frame *a*. The chamber A′ is constructed of very thin sheet-brass or some other suitable radiating substance, so that the slightest change of temperature may affect the air within. The chamber A is much less susceptible of sudden alterations of temperature than the chamber A′, being formed of thicker brass or some other substance possessing inferior radiating powers.

B B′ are two open bent glass tubes, also of

equal size, inserted into the bottom of the chambers A A′, the inserted branches extending nearly to the top of the chambers, to prevent the overflowing of the mercury, which occupies the lower portion of the tubes. This mercury should be in sufficient quantity to prevent, under all changes of temperature, a communication between the external air and the air within the chambers.

h h is the connecting-wire, (seen also in Figs. 2 and 4,) one of the severed ends of which is immersed in the mercury through the external branch of the tube B′. The other end pierces the top of the chamber A, where it is well insulated, and dips into the mercury through the internal branch of the tube B.

c is a bent insulated conducting-wire, one branch of which dips into the mercury of the tube B. The other branch is inserted into the tube B′, but terminates a short distance above the surface of the mercury in the tube. This wire is supported in its proper position by a float, *b*, resting upon the surface of the mercury in B.

From the description here given of the connecting apparatus it is evident that no metallic connection exists between *c* and *h;* neither can a connection be formed by a gradual elevation of temperature—such, for instance, as would occur from the ordinary warming of an apartment. The expansion of the air in both chambers in such case being nearly equal, the columns of mercury in their respective tubes will be raised to nearly the same height, and the wire *c*, being buoyed up by the float *b*, will preserve the same relative distance between the surface of the mercury in the tube B′ and the inserted branch of the wire *c*; but in case of a sudden increase of temperature the expansion of the air in the sensitive bulb or chamber A′ will be much greater in a given time than that in the chamber A, so that the column of mercury and the wire *c* floating upon its surface will remain nearly stationary. The column of mercury in the tube B′ will therefore rise above the end of the wire *c*, and thereby establish a metallic connection (through the mercury and the wire *c*) between the portions of the wire *h*.

It will be necessary to limit the ascent of the wire *c*, as instances will occur where a burning room would be heated very gradually by a smoldering fire, the heat in such case becoming so intense as to destroy the connecting apparatus without effecting the necessary connection. This difficulty is obviated by fastening a small piece of wire, *i*, tranversely to the wire *c*, which, in passing through a small hole in the cap over the tube B, is arrested in its further ascent by the wire *i*, which cannot pass beyond the cap aforesaid.

The ascent of the wire *c* should be checked when the heat of the burning room rises a little beyond the maximum of summer heat.

Fig. 4 exhibits the order of arrangement of the several parts forming the entire apparatus. Only two rooms, numbered 1 and 2 in the figure, are exhibited, they being sufficient to show the arrangement for any other number of rooms.

Z C are the positive and negative plates of the battery. A is the alarm; B, the designating apparatus, exposing to view on eof the designating-plates. The place of the two last-mentioned instruments in a building is governed by the use to which such building is applied. In a public building unprovided with a watchman the alarm should be placed on the top or the side of the same and the designating apparatus on the front entrance thereto. In all other buildings that apartment which is the most constantly occupied, especially through the night, is the proper place for both the alarm and the designator.

D is the connecting apparatus, one of which is placed in each apartment. The lines in the interior of the rooms Nos. 1 and 2, Fig. 4, show the system of connecting-wires, their several circuits being traced by arrows. They all have a common origin in *i*, between the alarm and the designating apparatus, whence they continue through the designating apparatus in which each wire coils around its appropriate magnet, whence they continue severally into the different apartments, where they pass through the connecting apparatus, as explained in Fig. 3, from which they then continue to the plate C of the battery. In this manner there can be formed an independent voltaic circuit passing through any apartment of the building whenever the breach in the circuit between the mercury in the tube B, Fig. 3, and the inserted branch of the wire is closed.

It will now appear from the foregoing description that whenever any apartment of a room takes fire—for example, room No. 2, Fig. 4—the heat of the burning room would operate upon its connecting apparatus so as to effect a metallic connection of the conducting-wire, as shown in Fig. 3. The voltaic circuit of this room being now complete, the galvanic fluid would pass from the plate Z of the battery along the wire *i* to the alarm A, the electromagnet of which would disengage the alarm-works and set them in motion. The electric current then continues along the wire *i* and the branching wire 2, which now forms the complete circuit to the magnet operating the designating-plate No. 2 of the designating apparatus, which magnet now attracts the armature E, Fig. 2, and with it the catch *f*. The designating-plate No. 2, being no longer supported by the catch aforesaid, will drop from behind the screen B and expose to view the number of the burning room conspicuously marked upon its face.

Having thus fully described the manner in which I construct, arrange, and combine the respective parts of my electro-magnetic fire-alarm, I do hereby declare that what I claim as new therein is—

The manner herein described of construct-

ing what I have denominated the "connecting apparatus," and likewise the combination of the connecting with the designating apparatus, arranged and operating as herein described, not intending, however, by this claim to limit myself to the precise form of the respective parts as represented, but to vary these as I may deem expedient while I attain the same end by means substantially the same.

ADDISON SMITH.

In presence of—
JOSEPH UTLEY,
EDW. HOTCHKISS.