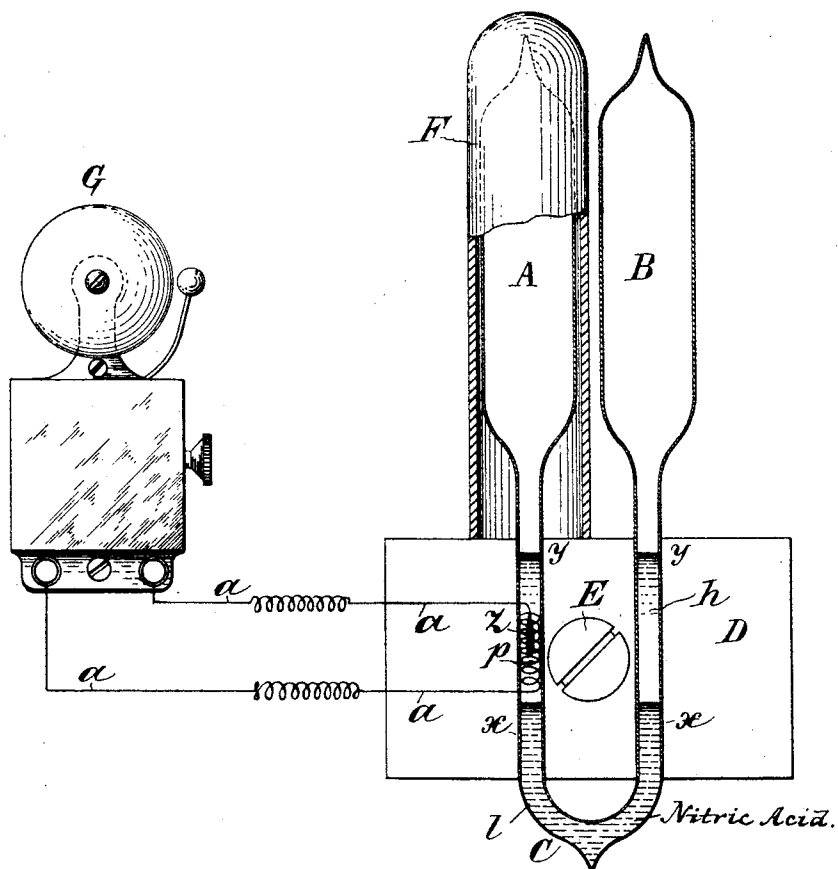


(No Model.)

J. J. D'ALMEIDA & J. Y. DA SILVA.
ELECTRIC FIRE ALARM.

No. 484,386.

Patented Oct. 18, 1892.



WITNESSES:
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UNITED STATES PATENT OFFICE.

JOAQUIN JOSÉ D'ALMEIDA AND JOSÉ YGNACIO DA SILVA, OF LISBON,
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ELECTRIC FIRE-ALARM.

SPECIFICATION forming part of Letters Patent No. 484,386, dated October 18, 1892.

Application filed May 2, 1890. Serial No. 431,455. (No model.) Patented in Germany October 8, 1890, No. 97,218; in France October 8, 1890, No. 208,707; in Spain November 5, 1890, No. 11,267; in Portugal November 13, 1890, No. 1,517, and in England March 21, 1891, No. 5,127.

To all whom it may concern:

Be it known that we, JOAQUIN JOSÉ D'ALMEIDA and JOSÉ YGNACIO DA SILVA, both subjects of the King of Portugal, and residents of Lisbon, Portugal, have jointly invented certain Improvements in Electric Fire-Alarms, (for which patents have been granted in Spain, No. 11,267, dated November 5, 1890; in Portugal, No. 1,517, dated November 13, 1890; in Germany, No. 97,218, dated October 8, 1890; in France, No. 208,707, dated October 8, 1890, and in Great Britain, No. 5,127, dated March 21, 1891,) of which the following is a specification.

Our invention relates to the class of devices designed to give an alarm in case fire should break out in a room, through the medium of a generator of electricity and an annunciator, the sudden rise of temperature being utilized to establish a current of electricity in the circuit.

Broadly, our apparatus comprises a hermetically-closed vessel provided with two upright branches or parts containing air or aeriform gas. In said vessel is an exciting liquid, and in one of said branches, which is screened in such a way as to protect the air in it from the influence of a sudden rise of temperature, are arranged the electrodes of a galvanic cell. The electrodes will be situated above the level of the exciting liquid in the branch and will have metal conductors, which project out through the wall of the branch where they may be put in circuit with any electrical annunciator or bell. When the temperature in the room is suddenly raised, the air or gas in the exposed branch expands and forces the exciting fluid up in the opposite branch until it partly or wholly submerges the electrodes, and thus establishes a current of electricity in the circuit. Where the exciting liquid is an acid, means are provided for protecting the electrodes from its fumes.

Our invention will be more particularly described hereinafter, and its novel features carefully defined in the claims.

The accompanying drawing illustrates a partial embodiment of our invention.

A B C represents a U-shaped vessel of glass or other suitable material. This vessel may be in the form of a hermetically-closed bent tube with bulbs or enlargements A and B on its respective upright branches, which bulbs will contain air or other aeriform gas. The lower portion C may be curved, as shown, or straight. This vessel may be secured to a block D and this block be secured to the wall or other part of the room by a screw E. (Shown *in situ*.) The bulb A is screened to protect the air within it from the direct influence of a sudden rise in temperature of the ambient air, and this screening may be effected by inclosing the bulb A in a cover F. (Represented as partly broken away in the drawing.)

In the upright branch, below the screened bulb A, are placed the electrodes of a galvanic cell, consisting, as here shown, of a coil of platinum wire *p* and a rod or piece of zinc *z*. These electrodes will be arranged in close proximity but not in contact, and each will have a metallic conductor, which projects out through the wall of the inclosing vessel. If this vessel be of glass, they may be sealed in the glass with heat. The coil *p* may be made to fit snugly within the bore of the upright branch and the zinc may be pendent within the coil.

G represents an ordinary electric bell, which is in circuit with the pile through the medium of circuit-wires *a a*, connected with the respective conductors from the electrodes *p* and *z*.

In the lower portion of the vessel is placed the exciting liquid *l*, which in this case may be nitric acid. The acid will rise in the upright branches of the vessel to about the level indicated by *x x*, which level may be about three or four millimeters below the zinc *z*. However, this distance may be more or less, depending on the degree of delicacy desired for the apparatus.

On or over the nitric acid in the two upright branches of the vessel will be placed a supernatant hydrocarbon *h*, one of the derivatives of petroleum, having the formula $C_7 H_{16}$. This substance possesses the prop-

erty of absorbing whatever vapors may arise from the acid, and it protects the electrodes therefrom. It may rise to the level indicated by $y y$ in the drawing.

5 The operation of the apparatus is simple. Normal variations in temperature, being gradual, will heat the air in the two bulbs or reservoirs A and B to substantially the same temperature; but should there be a sudden
10 and considerable elevation of the temperature of the ambient air—caused, for example, by the breaking out of a fire in the room where the apparatus is placed—the air in the exposed bulb B will expand to a greater extent
15 than that in the screened bulb A, and the tension in the former will depress the exciting liquid at that side and cause it to rise in the opposite branch until it reaches the electrodes p and z , when a current will be established in the circuit and the bell or annunciator G will sound.

In the drawing, which represents the instrument above described about the natural size, the annunciator is represented as dis-
25 proportionally small. This latter may be at any distance from the other portion of the apparatus.

Any means may be employed for screening the bulb A from the direct influence of a sudden rise of temperature in the ambient air.
30 It is only essential that when there is such a sudden rise in the temperature the bulb B shall feel its effects first.

We do not wish to limit ourselves to the exact construction and form of the instrument herein shown, as these may be varied to some extent without departing materially from our invention.

Having thus described our invention, we
40 claim—

1. An electric alarm comprising a vessel containing an exciting liquid and the electrodes of a galvanic cell out of contact with the exciting liquid, the whole arrangement
45 being such that upon a predetermined rise of heat the exciting liquid will contact with the electrodes, substantially as described.

2. An electric fire-alarm instrument comprising a hermetically-closed vessel containing
50 an exciting liquid and having two upright branches, one of which is screened from the direct influence of heat in the surrounding air, and the electrodes of a galvanic cell arranged in said screened branch and above
55 the level of the exciting fluid, each of said electrodes having a metallic conductor which projects out through the wall of the inclosing vessel.

3. An electric fire-alarm instrument comprising a hermetically-closed vessel containing
60 nitric acid and a supernatant hydrocarbon, as set forth, and having two upright branches, one of which is screened from the direct influence of heat in the surrounding
65 air, and the electrodes of a galvanic cell arranged in said screened branch above the

level of the acid, each of said electrodes having a metallic conductor which projects out through the wall of the inclosing vessel.

4. In an electric fire-alarm apparatus, the
70 combination, with a U-shaped hermetically-closed vessel having enlarged portions or bulbs A and B on its upright branches and containing an exciting liquid l in its lower portion C, of the screen over one of said enlarged portions, the electrodes p and z , arranged in the screened branch of the vessel above the normal level of the exciting liquid,
75 an annunciator G, and a circuit of which the electrodes and the coils of the annunciator form a part, substantially as set forth.

5. The combination, with the hermetically-closed U-shaped vessel having bulbs A and B on its upright branches and containing
80 nitric acid and supernatant hydrocarbon in its lower part, of the electrodes of a galvanic cell arranged in one of said upright branches above the normal level of the acid, an electrical annunciator, a circuit of which said electrodes and the coils of the annunciator
85 form a part, and means for screening the air or gas in the bulb above the said electrodes, substantially as set forth.

6. The combination, with a hermetically-closed vessel having two upright branches
90 containing air or aeriform gas, one of said branches being screened against heat, of an acid excitant in said vessel, electrodes of a galvanic cell in said screened branch and above the acid excitant, and a supernatant
95 hydrocarbon interposed normally between said electrodes and the said excitant, whereby the electrodes are protected from the fumes of the acid, as set forth.

7. In an electric fire-alarm instrument, the
100 combination, with the closed U-shaped vessel containing a liquid excitant in its lower part and having one of its branches screened against a sudden rise in temperature, of the electrodes of a galvanic cell, comprising the
105 platinum coil p in the bore of the screened branch of the vessel and the zinc z , pendent in said coil, but out of contact therewith, substantially as set forth.

8. An electric alarm comprising a vessel
110 containing an exciting fluid and the elements of a galvanic cell normally out of contact with the exciting fluid and so arranged that upon a predetermined rise of heat the said fluid will expand and touch the said elements,
115 thereby generating a current of electricity, substantially as set forth.

In witness whereof we have hereunto signed our names in the presence of two subscribing witnesses.

JOAQUIN JOSÉ D'ALMEIDA.
JOSE YGNACIO DA SILVA.

Witnesses:

ANTONIO PALHARES DO CONSCIO
In Bario,
JOSE MENDES DOS SANTOS.