(No Model.) 3 Sheets—Sheet 1.

W. J. BAULIEU.

AUTOMATIC FIRE ALARM.

No. 343,691. Patented June 15, 1886.

Fig. 1.

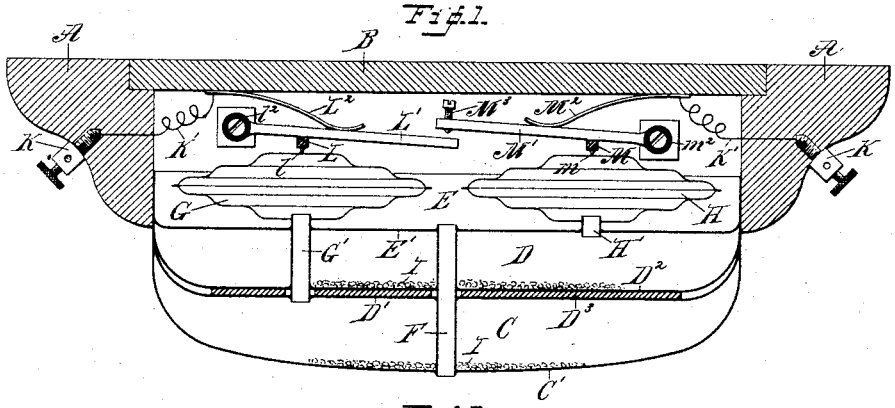

Fig. 2.

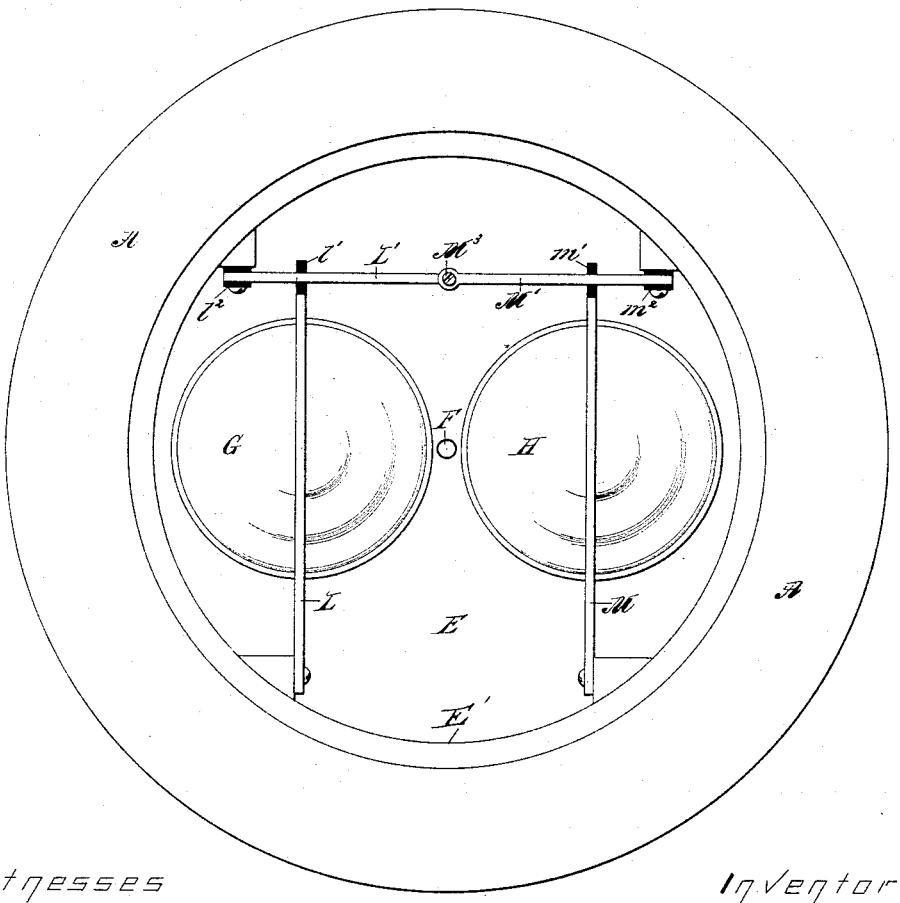

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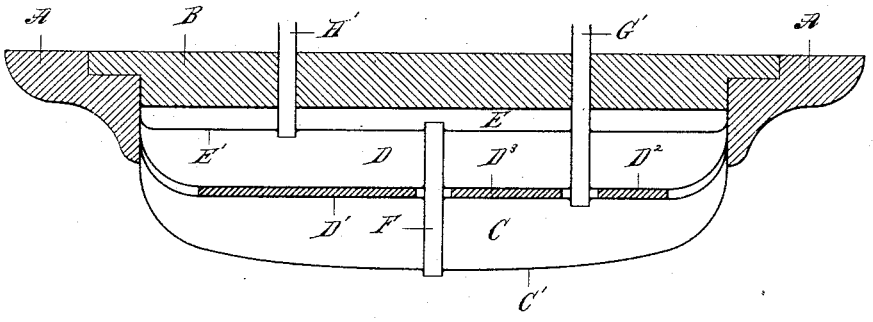
Fig. 3.



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(No Model.) 3 Sheets—Sheet 3.

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Fig. 5.

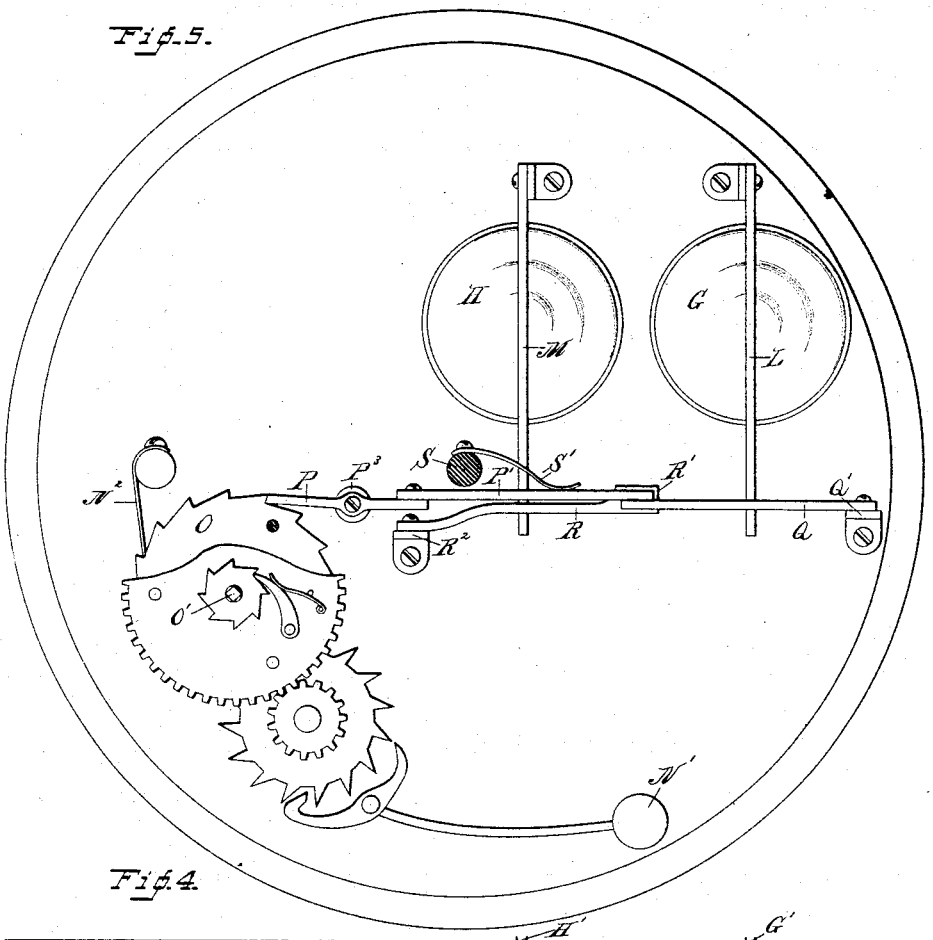
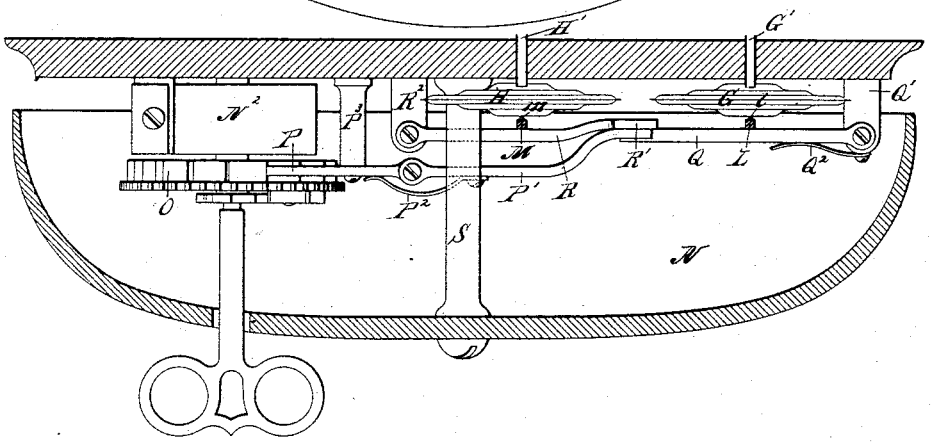


Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM J. BAULIEU, OF BRIDGEPORT, CONNECTICUT.

AUTOMATIC FIRE-ALARM.

SPECIFICATION forming part of Letters Patent No. 343,691, dated June 15, 1886.

Application filed November 23, 1885. Serial No. 183,819. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM J. BAULIEU, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Automatic Fire-Alarms; 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.

My invention has for its object to produce mechanism that shall be automatic in its action, and will sound an alarm whenever the temperature of a room is suddenly raised.

The principle of my invention lies in utilizing the increase in volume caused by the expansion of air when heated, or by the vaporization of sulphuric ether, or any chemical that will readily vaporize under the influence of increase in temperature, it being important that the mechanism shall be so constructed and regulated that any increase in temperature less than a certain number of degrees per hour will not sound the alarm.

In the accompanying drawings, which form part of this specification, I have illustrated mechanism for carrying my invention into effect.

Figure 1 is a section of the device complete; Fig. 2, a plan view with the cover removed; Fig. 3, a section of the chambers of a modified form; Fig. 4, a section of the remaining portion of the modified form, showing the ringing mechanism in elevation; and Fig. 5 is an inverted plan view of the parts shown in Fig. 4, the gong being removed.

Similar letters denote the same parts in all the figures.

Turning now to Figs. 1 and 2, A represents the case, and B the cover therefor. The case may be attached to the wall, the cover lying next to the wall in any suitable manner and in any position—that is to say, the cover is always next to the wall or to whatever article it may be attached; but it may be attached in a vertical, horizontal, or any other plane.

C, D, and E represent three independent chambers. (Shown in section in Fig. 1.) The chambers are placed one above the other, chambers C and D being both outside of the case and both made air-tight, with the exception of a single outlet, as will presently be explained. These chambers are formed of sheets of metal, which are attached in any suitable manner to the case. The case itself may be made of metal or wood, preferably the latter. Chamber C lies between metallic sheets or walls C′ and D′. Chamber D lies between walls D^2 and E′. It is not essential that there should be two walls between chambers C and D. I preferably, however, separate them by two walls, leaving space enough between them to receive a layer, D^3, of flannel or any suitable non-conductor of heat.

F represents a tube leading from the outside through chambers C and D, and opening into chamber E. The purpose of this tube is to admit the external air into chamber E to equalize the temperature. This tube, however, is not an essential element of construction, for the reason that the case will not ordinarily be fitted to the wall so closely but that air will pass between the case and wall and around the cover into chamber E. Within chamber E are two expansible bags, G and H, which are made of very light elastic metal, and are air-tight, except the connection with their respective chambers. G′ represents a pipe leading from chamber C through chamber D and opening into bag G. H′ represents a similar pipe leading from chamber D into bag H. K represents binding-posts in the case, which are connected with the positive and negative poles of a battery. (Not shown.) L and M represent two levers, one end of each being pivoted to the case, and both being provided with contact-points *l* and *m*, respectively, the point of lever L resting upon bag G and the point of lever M resting upon bag H. The opposite ends of these levers are both insulated at *l′* and *m′*. L′ and M′ represent two levers, also pivoted to the case, which are at right angles to levers L and M, and rest across their insulated ends, as clearly shown in Figs. 1 and 2. L^2 and M^2 represent springs pivoted to the cover, to which are connected wires K′, leading to the respective binding-posts. The free ends of these springs rest upon the levers L′ and M′, and act to press them downward.

M^3 represents a set-screw at the outer end of lever M′, the point of which acts as a contact-point between levers M′ and L′. By an adjustment of this screw I am enabled to regulate the increase of temperature required to sound the alarm, as will be more fully explained. Levers L′ and M′ are insulated, respectively, by washers l^2 and m^2.

As stated above, the principle of my invention consists in utilizing the increase in volume caused by the expansion of air in the chambers, or by the vaporization of sulphuric ether or any chemical possessing the property of vaporization at a comparitively low temperature. As chambers C and D are both made air-tight, a few drops of ether may be placed in them in the manufacture of the device. I preferably, however, saturate kernels of rice in the ether, and place a few of the kernels in the bottom of each chamber, as indicated at I. In practice I have found two pennyweights of the saturated kernels to produce a perfectly satisfactory result.

If desired, the device may be used without placing any chemicals in the chambers, as the same result will be produced by the expansion of air therein when the temperature of the room shall have reached a certain degree, which may be regulated by adjustment. In practice, however, I preferably use ether or an equivalent chemical, as stated.

In Fig. 1 the parts are shown in their normal position. The operation is as follows: The vaporization of the ether in either of the chambers produces an immediate and rapid increase in volume, the vapor of course passing from each chamber to the bag with which it is connected. Suppose that the increase of temperature be moderate and regular. The vaporization in both chambers will proceed at substantially the same rate. This will cause the bags to expand and raise levers L and M, which in turn will raise levers L′ and M′. As the increase in temperature, however, is moderate and regular, when lever L′ is raised lever M′ is raised with equal rapidity, and consequently maintains the usual distance between them, so that no connection is made. It will of course be apparent that by turning set-screw M^3 downward I can cause the connection to take place much more easily—that is, with less increase in temperature.

In practice I have usually set the device to sound the alarm upon an increase of thirty degrees in temperature per hour. This, however, is a matter wholly within the judgment of the manufacturer or user. Suppose, now, that a fire should break out in the room, or that from any cause whatever the temperature should be rapidly raised. It will of course be apparent that this rise in temperature will be instantly felt by plate or wall C′. This will cause the vaporization of the ether in chamber C, and a corresponding expansion of bag G. The expansion of bag G will take place suddenly, and before the rise in temperature can have had any perceptible effect upon the ether in chamber D. The expansion of bag G will therefore raise levers L and L′ before levers M and M′ will have begun to rise, thus bringing levers L′ and screw M^3 in contact, and closing the electric circuit.

For the purpose of my invention any electric bell-ringing mechanism may be used to ring upon the closing of the circuit. I have not illustrated special electric ringing mechanism, for the reason that ringing mechanism is illustrated in Figs. 4 and 5, thus rendering it unnecessary in connection with this form. It should be stated that both sets of levers are preferably made of metal, and both are insulated, as shown, one set at their pivotal points, the other at their outer ends.

The manner in which the circuit is made when the point of lever L′ comes in contact with screw M^3, will be readily understood, and can hardly require further explanation. In the modification I dispense with the electric connection, and cause the alarm to be sounded by the direct action of the ether vapor.

Turning now to Fig. 3, it will be seen that pipes G′ and H′, which lead from chambers C and D, pass directly out through the cover. Fig. 3 is drawn to the same scale as Figs. 1 and 2. In Figs. 4 and 5 the scale has been reduced one-half.

Fig. 5 is an inverted plan view of the bags, ringing and intermediate mechanism, (the gong being removed,) the bags being connected by pipes G′ and H′ with the mechanism shown in Fig. 3.

Fig. 4 is a section corresponding with Fig. 5, it being of course understood that pipes G′ and H′ may be extended an indefinite length—that is to say, that the parts illustrated in Figs. 4 and 5 may be at any reasonable distance from those illustrated in Fig. 3. In this form the position of pipes G′ and H′ are reversed, likewise the position of bags G and H, which are placed with the ringing mechanism—that is to say, pipe G′ and bag G are at the right instead of the left, as in the other form. Pipes G′ and H′, instead of entering the bags from below, enter from above, the action when expanded being downward instead of upward. When a moderate and regular increase of temperature takes place, the effect is the same as in the other form—that is to say, practically the same amount of vaporization takes place in chambers C and D, which, consequently, causes the even expansion of bags G and H. Should a sudden rise in temperature take place, instant vaporization of the ether will take place in chamber C, causing rapid expansion of bag G, and moving lever L, which rests upon it, the same as in the other form.

As regards ringing mechanism, it will of course be understood that any spring mechanism may be used, the form illustrated, however, being deemed preferable. N is the gong, N′ the clapper, and N^2 the spring. O is the

ratchet carried by said spring, and O′ is the winding-post having the usual pawl and ratchet. P indicates a lever pivoted to a post, P^3, one end of which engages ratchet O. To the other end of this lever is pivoted an arm, P′, which is adapted to move in a plane at right angles to the plane in which lever P moves, being held to its normal position by a spring, P^2, pivoted to either of the parts. It will of course be understood that in Figs. 4 and 5 levers L and M are transposed, M being the left lever and L the right. Arm P′ of lever P rests upon lever M, and a lever, Q, pivoted to a post, Q′, rests upon lever L. This lever and the arm P′ lap by each other, and both are supported upon the widened end R′ of a lever, R, pivoted to post R^2. It will be observed (see Fig. 5) that levers Q and R and arm P′ are pivoted so as to have movement in the same plane, while lever P, of which arm P′ forms a continuation, swings in a plane at right angles to levers Q and R. Lever Q is held to its normal position by a spring, Q^2, as shown. S represents a central stud, which carries the gong. S′ is a spring secured to this stud, which bears against arm P′, the action of said spring being to turn the arm P′ and through it the lever P upon its pivot. The normal position of these parts is shown in Fig. 5, in which lever Q holds lever P to its normal position against the power of spring S′. In the event of a sudden increase of temperature instant vaporization takes place in chamber C. As in the other form, this communicates directly with bag G, the expansion of which carries lever L downward, which in turn carries lever Q downward against the power of spring Q^2; or, as viewed in Fig. 5, lever Q is raised, it being of course immaterial in practice what position the gong is placed in. But little movement of lever L is required to raise lever Q sufficiently high to clear arm P′, forming a continuation of lever P. As soon as lever Q is raised above lever P, spring S′ acts to force arm P′ of lever P under lever Q. This causes the end of lever P which engages the ratchet to release the latter, thus allowing the spring (not shown) to set the bell ringing. The ringing will of course continue until the spring has run down. Suppose, now, that the increase in temperature is only moderate—that is, less than 30° or any predetermined number of degrees per hour—equal or practically equal vaporization will take place in chambers C and D. This will cause bags G and H to expand uniformly, and lever R and arm P′ of lever P will be raised as rapidly as lever Q. As arm P′ turns freely upon the pivot by which it is connected to lever P, it is obvious that the latter will not be moved from the position in which it engages the ratchet.

I do not of course desire to limit myself to the special details of construction illustrated, as it is obvious that they may be widely varied, when required, by different applications of my invention without departing from the spirit thereof.

I contemplate using the modified form in connection with a district telegraph system, to accomplish which it would simply be necessary to place ratchet O upon the crank-shaft of an ordinary alarm-box. The mechanism would require no change whatever.

I claim—

1. In an automatic fire-alarm, suitable alarm mechanism—for example, a gong and connections—in combination with air-tight chambers adapted to contain easily-vaporized chemical, expansible bags connected with said chambers, and pivoted levers arranged between the expansible bags and the alarm mechanism, whereby a sudden increase in temperature is caused to sound the alarm, but any increase below a predetermined number of degrees per hour will not sound the alarm.

2. Air-tight chambers, the outer wall of one being wholly exposed to the air, and air-tight bags, one connected with each chamber, in combination with ringing mechanism adapted to be operated by the sudden expansion of one of the bags.

3. Two chambers placed one below the other and both adapted to contain sulphuric ether or any easily-vaporized chemical, in combination with two air-tight elastic bags, one of which is connected with each chamber, and ringing mechanism adapted to be put in operation by the sudden expansion of one of the bags.

4. Air-tight chambers and air-tight bags, one connected with each chamber, in combination with a gong and intermediate mechanism—for example, an electric circuit and a system of insulated levers—whereby the sudden expansion of one of the bags is made to close the electric circuit, causing the gong to ring.

5. Chambers C and D, expansible bags G and H, and pipes G′ and H′, connecting said chambers with said bags, in combination with pivoted levers adapted to be moved by the expansion of said bags and ringing mechanism controlled by the movement of said levers.

6. The chambers, a vaporizable chemical contained therein, the expansible bags, and pipes connecting said chambers and bags, in combination with levers L, L′, M, and M′, and electric connections, substantially as described.

7. The chambers, bags, and pipes, in combination with the levers, insulated as shown, springs L^2 and M^2, an electric circuit, and a set-screw, M^3, whereby the increase in temperature required to sound the alarm may be regulated.

8. Chambers C, D, and E, and expansible bags G and H, located in chamber E, in combination with a pipe connecting bag G with chamber C, a pipe connecting bag H with

chamber D, and a tube for admitting external air to chamber E, as and for the purpose set forth.

9. The ringing mechanism, levers, expansible bags, and pipes G′ and H′, in combination with chambers C and D, and walls D′ and D^2, having between them a non-conducting-layer, D^3, by which said chambers are separated, substantially as described.

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

WILLIAM J. BAULIEU.

Witnesses:
A. M. WOOSTER,
C. E. RUGGLES.