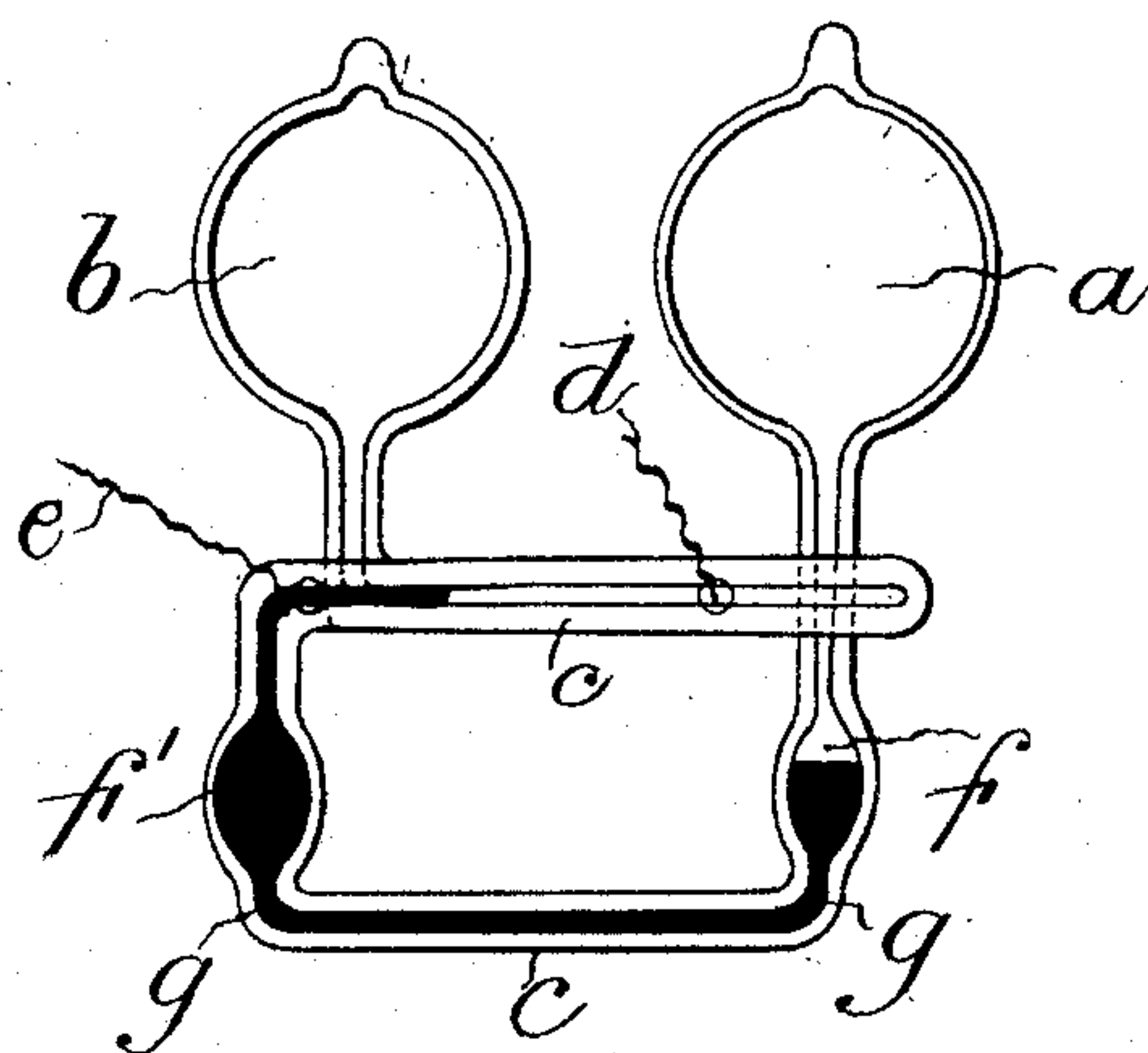


No. 886,624.

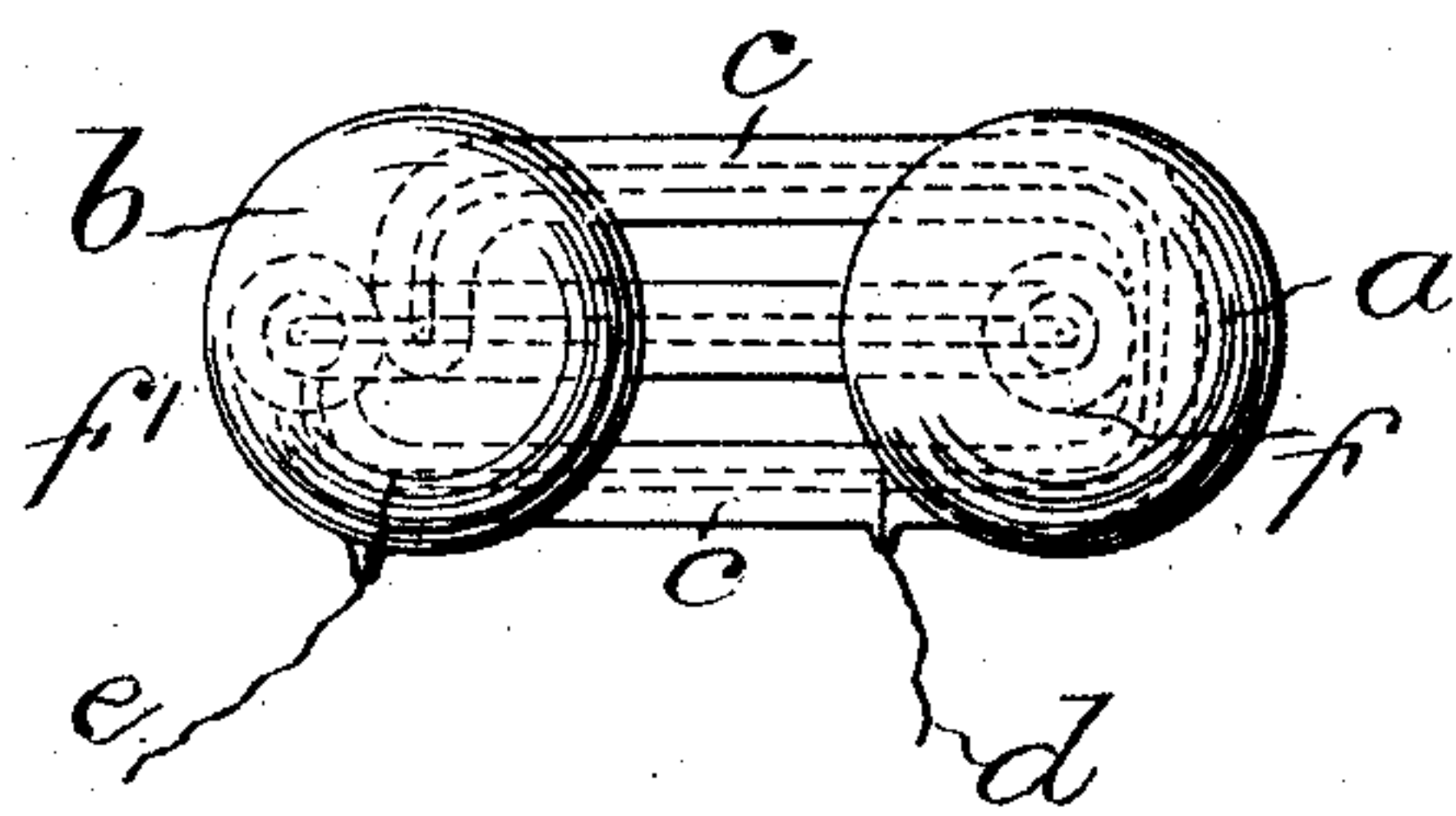
PATENTED MAY 5, 1908.

W. T. MUNRO.  
AUTOMATIC FIRE ALARM.  
APPLICATION FILED JAN. 28, 1907.

*Fig 1.*



*Fig 2.*



Witnesses  
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# UNITED STATES PATENT OFFICE.

WILLIAM TOM MUNRO, OF EAST BLAIRLINN, CUMBERNAULD, SCOTLAND.

## AUTOMATIC FIRE-ALARM.

No. 886,624.

Specification of Letters Patent.

Patented May 5, 1908.

Application filed January 28, 1907. Serial No. 354,529.

*To all whom it may concern:*

Be it known that I, WILLIAM TOM MUNRO, of East Blairlinn, Cumbernauld, in the county of Dumbarton, Scotland, analytical chemist, have invented certain new and useful Improvements in and Connected with Automatic Fire-Alarms, of which the following is a specification.

In order that my invention may be properly understood and readily carried into effect, I have hereunto appended one sheet of drawings, of which

Figure 1 is a sectional elevation of the apparatus embodying my invention. Fig. 2 is a plan of the same.

The invention consists of two vessels filled with gas, the gas in one being at a greater pressure than the gas in the other. With a gradual rise of temperature the pressure in the vessel with the greater initial pressure will increase at a greater rate than the pressure in the other and this increment of pressure could be made to close an electric circuit or perform any other suitable operation at a pre-determined temperature. By making one of the vessels more easily effected by heat than the other the instrument may be made to indicate a very small rise of temperature if it be sudden but not be effected by a gradual rise which does not attain the pre-determined point.

The most generally used construction of the instrument consists of two vessels *a*, *b*, filled with gas, the gas in one vessel *a* being more readily affected by heat than the gas in the vessel *b*, this being attained by having the walls of the vessel *b* thicker than the walls of the vessel *a* or by any other convenient method. The gas in one of the vessels *a* is at a greater pressure than the gas in the other vessel *b* and the two vessels *a* and *b* are joined by a tube *c* containing liquid of electric conductivity and also provided with terminals *d*, *e*. To make the apparatus more sensitive a receptacle *f* is provided in the tube, and the liquid in the tube is made either to expose a larger surface at the end nearest to the vessel more readily affected by sudden variations of temperature than at the end of it nearest to the vessel less readily affected by sudden variations of temperature, or to develop a small displacement.

In practice I prefer to form two receptacles *f*, *f*<sup>1</sup> the one a little larger than the one disposed in the vertical members of the tube *c* at opposite points as seen or nearly so. It

will readily be understood that the difference in level in the two liquid columns will cause the pressure of the gas in the vessel *b* to be less than the pressure of the gas in the vessel *a*.

The instrument is actuated as follows:— Upon a sudden rise of temperature in the neighborhood of the instrument, the gas in the vessel *a* whose interior as presently described is more readily affected by sudden variations of temperature expands before the gas in the vessel *f* whereby the liquid *g* in the tube *c* is made to move and in so doing it makes or breaks an electric circuit by moving on or off the terminal *d* in the tube *c*. Also owing to the liquid *g* having a greater area at the end nearest the receptacle *f* than at the other nearest the terminal *e*, a greater displacement takes place at the terminal end than would be the case if both ends had an equal area, the motion along the horizontal requiring little force. If, however, the alteration of the temperature is gradual the air in both vessels *a* and *b* becomes heated at practically the same rate and therefore to great extent the conducting liquid *g* remains in the same position, and indeed if the air in both vessels were at the same pressure no motion of the conducting liquid would take place, but owing to vessel *a* being at a greater initial pressure than the other the pressure in the vessel *a* increases at a greater rate hence the conducting liquid *g* moves in the direction of the vessel *b* at the lower pressure and this motion is caused to make or break an electric circuit at a pre-determined temperature.

The excess pressure in one vessel may be attained by filling the vessel to begin with at a greater pressure, or it may be obtained by causing the conducting fluid to force gas from one vessel into the other or by any other suitable method.

### Claims.

1. An apparatus of the character described comprising a pair of bulbs containing gas, the pressure of the gas in one bulb being greater than that in the other bulb, a bent tube connecting the two bulbs and containing a liquid adapted to be displaced by the pressure of the gas in the high pressure bulb upon a change in temperature, and means arranged in the part of the tube adjacent to the low pressure bulb adapted to be actuated by the moving liquid to sound an alarm.

2. An apparatus of the character described comprising a pair of bulbs containing gas,



the pressure of the gas in one bulb being greater than that in the other bulb, a bent tube connecting the two bulbs and containing a liquid adapted to be displaced by the  
5 pressure of the gas in the high pressure bulb upon a change in temperature, and means arranged in the part of the tube adjacent to the low pressure bulb adapted to be actuated by the moving liquid to sound an alarm, the

wall of the high pressure bulb being thinner 10 than the wall of the low pressure bulb.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

WILLIAM TOM MUNRO.

Witnesses:

JOHN LIDDLE,  
JOHN T. LIDDLE.