E. GARRETSON.

THERMOSCOPE.

APPLICATION FILED DEC. 23, 1910.

1,175,432.

Patented Mar. 14, 1916.

Fig. 1.

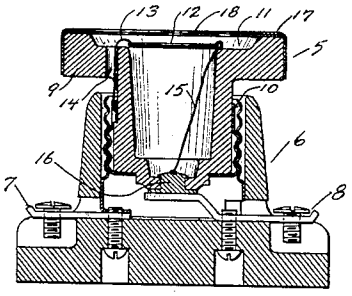


Fig. 2.

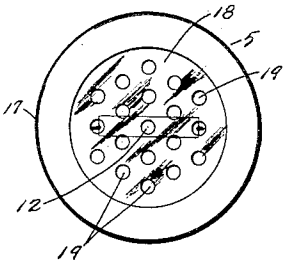


Fig. 3.

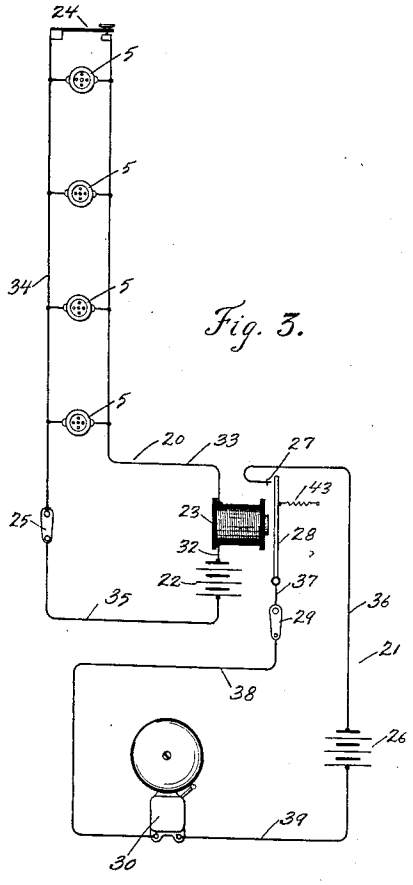
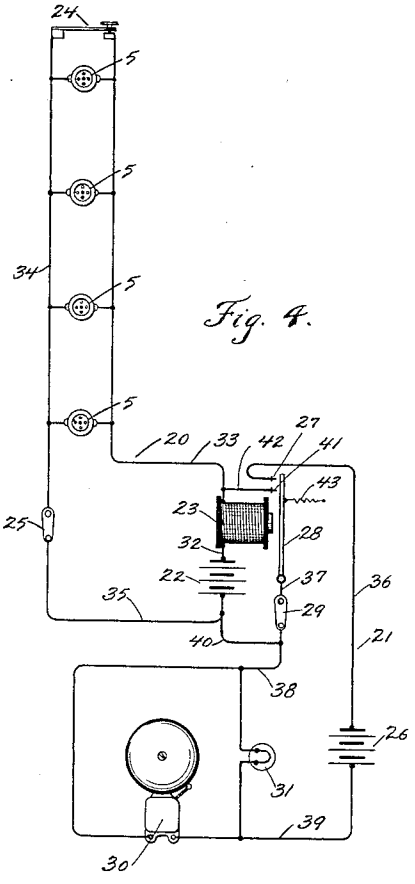


Fig. 4.



WITNESSES:

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THERMOSCOPE.

1,175,432. Specification of Letters Patent. Patented Mar. 14, 1916.

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To all whom it may concern:

Be it known that I, EUGENE GARRETSON, a citizen of the United States of America, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Thermoscopes, of which the following is a full, clear, and exact description.

Reference is to be had to the accompanying drawings which form part of this specification.

In the drawings like characters of reference indicate like parts in the several views of which:

Figure 1 is a sectional elevation of my plug thermoscope element. Fig. 2 is a plan of the same. Fig. 3 is a diagrammatical view of one form of an alarm system, a number of my thermoscope elements connected therein. Fig. 4 is a diagrammatical view of the same but showing connections of a modified form.

5 represents my plug thermoscope element and 6 represents the socket thereof, which is provided with terminals 7 and 8. The body 9 of the thermoscope element is made of insulating material, preferably porcelain. Around the lower portion of the body 9 is secured a cylindrical shell 10 which is provided with a rolled screw-thread by which the thermoscope element is held in place in the socket 6. In the upper part of the thermoscope element is provided a recess 11 in which is disposed a strip 12, preferably silver sulfid, or any substance which has a high electrical resistance when cold and a low resistance when heated. Connected to one end of said strip is a lead-wire 13, which passes through on aperture 14 provided in the body and has its lower end fastened to the cylindrical shell 10. Connected with the opposite end of said strip is a lead-wire 15 which passes down within the center of the thermoscope element body and is secured to the contact plug 16 carried at the lower end of said body. Over the flanged top of the body is placed a cap 17 which is provided with a large aperture in the top. Between this cap and the top of the said body is held a thin sheet or disk of material 18 preferably transparent, as for instance mica, and it is provided with a plurality of apertures 19. This sheet or disk of material protects the strip of metal 12 from injury and by means of the said apertures allows heat from without to come in contact with the same.

In Figs. 3 and 4 I have shown two forms of alarm systems with a plurality of my thermoscope elements connected therein. This system preferably comprises two separately energized electric circuits, viz., a line circuit 20 and a local circuit 21. The line circuit 20 comprises a source of electric energy 22, a relay 23, plug thermoscope elements 5, a key or push button 24 and a switch 25. The local circuit 21 comprises a source of electric energy 26, a front contact 27, the armature 28 of the relay 23, a switch 29 and a signal or alarm bell 30. In Fig. 4, I have also shown an incandescent lamp 31 connected in parallel with the alarm bell 30, thus giving a visible, as well as an audible signal. If the key 24 is open in this circuit the current flows from the source of electric energy 22 through the conductor 35, switch 25, conductor 34 and the thermoscope elements, and thence by conductor 33 to the relay or alarm circuit governing device 23 and back to the source of electric energy 22. On account of the high resistance of the thermoscope elements 5, the current is not sufficient to operate the armature 28 of the relay 23 although it is sufficient to raise the temperature of the thermoscope elements appreciably above the temperature of the surroundings. Thus by making careful measurements of the resistance of thermoscope elements in a circuit of the kind described it has been found that these are about 5 degrees to 10 degrees C. above air temperature. The current, however, is not sufficient to raise the temperature of the thermoscope element sufficiently to heat it to a higher temperature, for the rate of generation of heat is just balanced by the losses due to radiation, convection and conduction. If, however, the key or push button 24 is closed the thermoscope elements are short-circuited, the relay operates, closing the local circuit at 27 and causing the bell 30 to ring. If the temperature of the surroundings of my thermoscope element 5 is raised, its electrical resistance is decreased and since the voltage at the terminals of the element remains constant a greater current passes and consequently the rate of generation of heat is increased. At a certain critical temperature the rate of generation of heat due to the

current will be more rapid than the rate at which heat is lost by radiation, convection and conduction and when this happens the temperature of the thermoscope element continues to rise and consequently causes its electrical resistance to fall until this resistance becomes so small that sufficient current flows to operate the relay 23, thus causing the bell 30 to ring.

In Fig. 4, I have shown a slightly modified form of circuit. A conductor 40 connects one side of the source of electric energy 22 with the conductor 38 at a point just below the switch 29. A second front contact 41 is also provided and is connected to the conductor 33 by means of the conductor 42. When the relay 23 is energized, the armature 28 is drawn against both front contacts 27 and 41 and the current which, for an instant flows through the line circuit 20, as heretofore described, is short-circuited through the conductor 40, a portion of the conductor 38, switch 29, conductor 37, armature 28, conductor 42, a portion of the conductor 33, relay 23 and conductor 32. The alarm is now kept in action whether any of the thermoscopes or the push button complete the circuit or not, until the switch 29 is opened, whereupon the armature 28 will be pulled away from the front contacts by means of the retracting spring 43 and the circuits thus broken, unless the temperature of one or more of the elements 5 is such as to render them operative.

My thermoscope makes possible the use of an alarm system which has many advantages over other systems and some of these advantages are enumerated below. There are no parts in the line circuit to fail to make contact through the accumulation of dust, etc., as this circuit is always closed up with soldered connections. A push button as represented at 24 may be connected in parallel with the thermoscope at any point in the line circuit, but preferably at the end of the line as shown and by means of the same, the continuity of the circuit may be tested. The system may also be tested by the application of a hot soldering iron or a lighted match to any one of the thermoscopes as they are small and thus permit of the local application of heat. The circuit may also be tested by providing means for increasing the electro-motive force of the source of electric energy 22 so that it is equal to or greater than the critical voltage which causes the breakdown of the resistance of the thermoscope elements no matter what the temperature of the surroundings is. Furthermore, the thermoscopes allow practically an unlimited number of operations without deterioration and when the flow of current through them is once established, it is made more positive by the heating effect of the said current. Moreover, the thermoscopes are so small that they may be installed, if desired, within partitions and the whole device may be placed in out of the way places where a larger device could not be as easily placed, or in such places where it would be inadvisable to place other devices which require care and inspection.

While I may use any substance having a negative temperature coefficient of electric resistivity for the active element of the thermoscope, I prefer to use silver sulfid, since I find that its coefficient is very large. The accurate measurement of the coefficient is not easy, but I have found that strips of silver sulfid show a decrease of as much as 50 per cent. in electric resistivity with an increase of approximately 12 degrees centigrade in temperature. Moreover, I find that silver sulfid can be readily made in the form of strips or ribbons that are very suitable for mounting in my thermoscopes. However, while I prefer to use silver sulfid for making the thermoscopes, I may use other substances without departing from the spirit of my invention. Moreover, I do not wish to be limited to the methods of arranging the circuits and apparatus described above for it is obvious to anyone skilled in the art that innumerable modifications as to details may be made without departing from the spirit of my invention.

Having thus described my invention, what I claim is:

1. A thermoscope comprising a body of silver-sulfid whose operation is dependent upon the impressed voltage and upon the temperature surrounding it.

2. A thermoscope comprising a body of silver-sulfid having a critical operating temperature which is reached when a certain voltage is impressed on it and when the temperature of its surroundings has attained a predetermined point.

3. A thermoscope comprising a body of silver-sulfid whose operation is dependent upon the impressed voltage and upon the temperature surrounding it and means for connecting said body of silver-sulfid in an electric circuit.

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

EUGENE GARRETSON.

Witnesses:
J. Wm. Ellis,
Ethel A. Kelly.