July 9, 1957 A. R. BAER 2,798,452

FIRE ALARM

Filed Aug. 18, 1955

FIG. 1

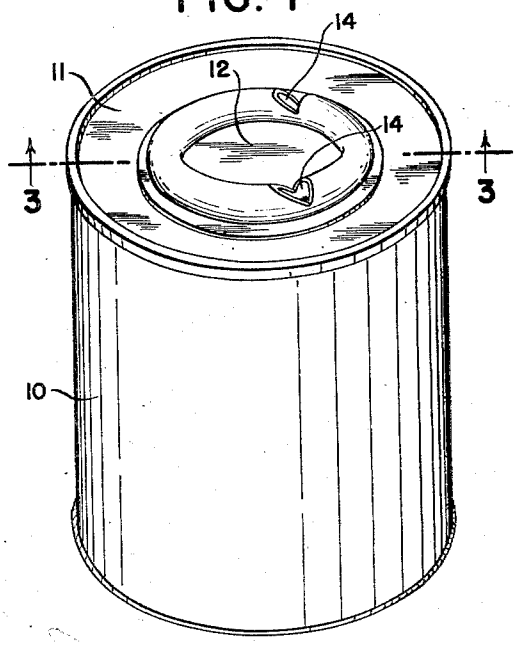


FIG. 4

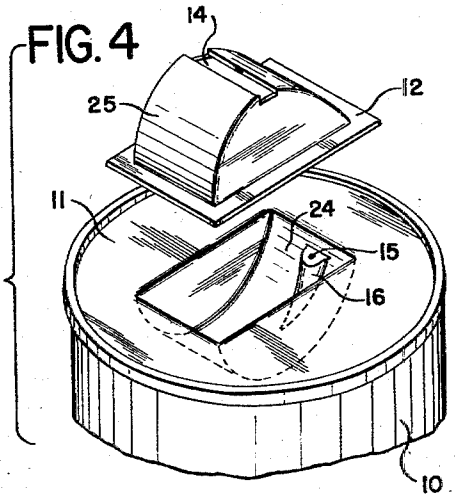


FIG. 5

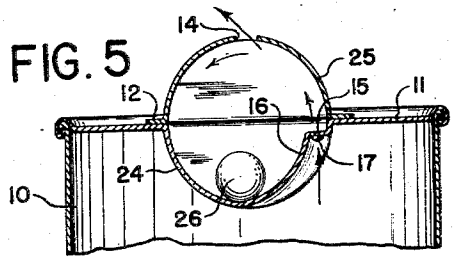


FIG. 2

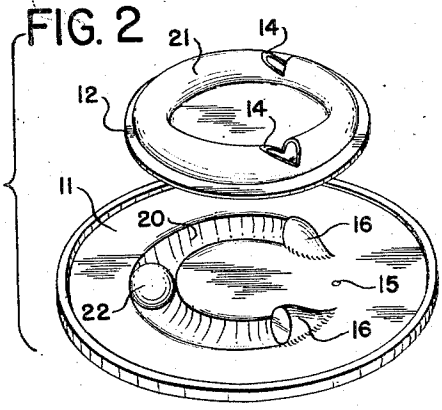


FIG. 6

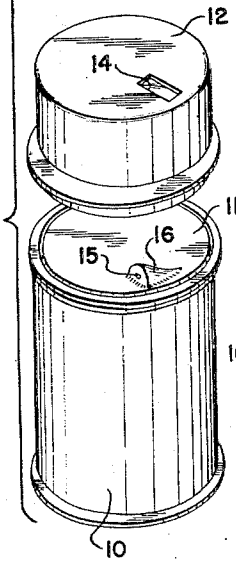


FIG. 7

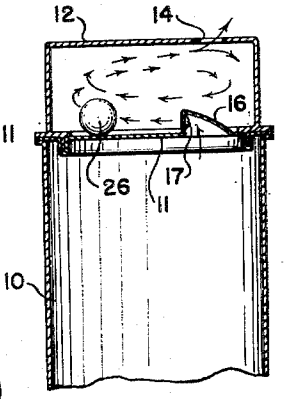
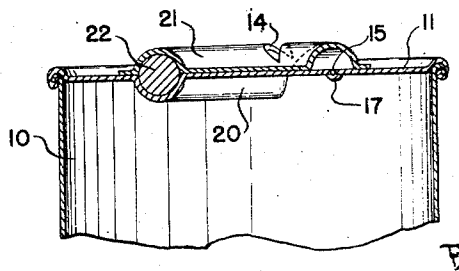


FIG. 3



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FIRE ALARM

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Application August 18, 1955, Serial No. 529,161

8 Claims. (Cl. 116—106)

This invention relates to thermally actuated fire alarms.

It has heretofore been proposed to employ as a fire alarm a whistle powered by a supply of compressed gas, the flow of gas to the whistle occurring only when the ambient temperature has risen sufficiently (as a result of a fire) to actuate the gas flow control mechanism of the alarm. Prior art fire alarms of this type range from the elaborate to the relatively simple in structure, and possess varying degrees of reliability. An example of one type of such prior art fire alarms comprises a whistle, a separate supply of compressed gas, a conduit connecting the whistle with the supply of compressed gas, and a gas flow control mechanism comprising essentially a fusible metal element disposed in the conduit. When the alarm becomes heated by a rise in ambient temperature due to a fire in the vicinity, the fusible metal element in the conduit melts, thus allowing the compressed gas in the gas reservoir to sound the alarm whistle.

Despite the evident simplicity of such prior art alarm devices they have not been widely used due to their relatively high cost and ungainly appearance. I have now devised a thermally actuated fire alarm which is extremely simple in structure and consequently inexpensive to manufacture, and which is exceptionally neat and trim in appearance. The fire alarm of my invention comprises a gas tight container for a compressed gas, the container having a cover composed of an inner cover member and an outer cover member which together define the resonator chamber of a whistle, the whistle-cover element forming an integral part of the gas-tight container. The inner cover member is formed with a pin hole opening adapted to provide communication between the interior of the container and the interior of the resonator chamber. The outer cover member is formed with a whistle slot, and the inner cover member is further provided with means for directing a stream of gas issuing from the container through the pin hole opening in the inner cover member against one edge of the whistle slot formed in the outer cover member. The pin hole opening in the inner cover member is plugged with a fusible metal having a melting point such that the plug will melt and gas escape through the pin hole opening to sound the whistle when the alarm is heated by a rise in temperature due to a nearby fire.

The fire alarm of my invention will be better understood from the following description, in conjunction with the accompanying drawing of which

Fig. 1 is a perspective view of an advantageous embodiment of my fire alarm,

Fig. 2 is an exploded perspective view showing the inner and outer members of the top cover of the alarm shown in Fig. 1,

Fig. 3 is a sectional view along lines 3—3 of Fig. 1,

Fig. 4 is an exploded perspective view of the top portion of another embodiment of my fire alarm,

Fig. 5 is a sectional view diametrically through the upper portion of the alarm shown in Fig. 4,

Fig. 6 is an exploded perspective view of still another embodiment of my fire alarm showing the inner and outer members of the cover, and

Fig. 7 is a sectional view through the upper portion of the alarm shown in Fig. 6.

As shown in the drawings, the fire alarm of my invention comprises a gas-tight container **10** having a cover composed of an inner cover member **11** and an outer cover member **12**. The inner and outer cover members are configured so that between them they define the resonator chamber of at least one whistle. The outer cover member **12** is formed with at least one whistle slot **14** associated with the resonator chamber. The inner cover member **11** is formed with pin hole opening **15** adapted to provide communication between the interior of the gas-tight container **10** and the interior of the resonator chamber of the whistle (or whistles). The inner cover member **11** is further provided with means **16** for directing a stream of gas issuing from the container **10** through the pin hole opening **15** against one edge of each whistle slot **14** formed in the outer cover member **12**.

The pin hole opening **15** in the inner cover member **11** is normally plugged with a fusible metal plug **17** (shown in Figs. 3, 5 and 7) that prevents escape through the pin hole opening of the compressed gas contained in the container **10**. The fusible metal has a melting point such that, when the fire alarm is heated to a predetermined temperature not exceeding about 100° C. by a rise in the temperature of the ambient air due to fire, the fusible metal plug **17** will melt and permit the compressed gas in the container **10** to escape and sound the whistles forming an integral part of the alarm device. A fusible metal suitable for this purpose is an alloy having a melting point of about 66° C. and comprising 50% bismuth, 25% lead, 12.5% tin and 12.5% cadmium.

The gas-tight container **10** is filled with a compressed gas that, when released therefrom by melting of the fusible metal plug **17** in the pin hole opening **15**, will sound the alarm whistle. The gas employed must not itself be combustible and preferably should not be one (e. g. compressed air) that will support combustion. Moreover, the term "compressed gas" as employed herein includes gaseous substances that liquefy readily under pressure at atmospheric temperature, and substances which are liquid at room temperature but which become gases (i. e. have a boiling point at atmospheric pressure) at temperatures well below the temperature at which the fusible metal will melt. Substances that I have found useful as compressed gases in the fire alarm of my invention include carbon dioxide, carbon tetrachloride, and the group of compounds known collectively by the trade name "Freon" (fluorochloro methanes and ethanes).

In the embodiment of my invention shown in Figs. 1 through 3, the cover of the gas-tight container **10** is composed of the inner cover member **11** and the outer cover member **12** as described hereinbefore. The inner cover member **11** is formed with a partial annular depression or groove **20** extending inwardly toward the interior of the container, and is also formed with a pin hole opening **15**, as shown best in Fig. 2. Advantageously, the groove **20** is situated concentrically with the axis of the container and is semi-circular in cross section. The outer cover member **12** is formed with a fully annular depression or groove **21** corresponding to the partial annular groove **20** in the inner cover member **11**. When the inner and outer cover members are fitted and fastened together (as by soldering, crimping, or the like), the annular grooves formed therein together define the resonator chamber of two whistles, the pin hole opening **15** providing communication between the interior of the container **10** and the interior of said resonator chamber.

Each whistle comprises a whistle slot **14** formed in the annular grooved portion of the outer cover member, a gas stream directing means **16** formed in the inner cover member and adapted to direct a stream of gas issuing from the pin hole opening **15** against one edge of the associated whistle slot **14**, and the aforesaid resonator chamber. The relationship of these elements is shown best in Fig. 2 of the drawings. The resonator chamber defined by the annular grooves in the inner and outer cover members thus serves both of the whistles integrally formed in the cover of the container. If desired, the portion of the resonator chamber serving one whistle can be separated from the portion serving the other whistle by means of a pea **22** (or equivalent gas blocking means integrally formed in said cover members) disposed in the annular groove **20** formed in the inner cover member **11**. The pitch of the two whistles should be such that the sound issuing therefrom is rather piercing and/or distinctive, such as the disonant throbbing sound that is obtained by sounding two whistles slightly out of pitch with each other.

The fire alarm is best prepared for use by first assembling the inner and outer cover members to form the integral whistle-cover structure thereof. The pin hole opening **15** is then plugged with a fusible metal plug **17**, the container **10** filled with a compressed gas and the top cover crimped or otherwise fastened to the container **10**, as shown best in Fig. 3. As long as the fire alarm remains at a temperature below the melting point of the fusible metal plug **17**, the compressed gas in the container will not escape therefrom. However, when the fire alarm is heated to a predetermined temperature as described hereinbefore, the fusible metal plug melts allowing the compressed gas in the container **10** to escape through the pin hole opening whence it is deflected by the gas stream director means **16** against the downstream edge of each of the whistle slots **14**. If the whistles are properly designed, the resulting sound is a piercing alarm signal.

A particularly advantageous form of my invention is shown in Figs. 4 and 5 of the drawings. Again, the cover of the gas-tight container **10** is composed of an inner cover member **11** and an outer cover member **12**. The inner cover member **11** is formed with a semi-cylindrical depression **24** that extends inwardly toward the interior of the container **10**, and the outer cover member **12** is formed with a similar semi-cylindrical depression **25** that extends outwardly away from the container **10**. The semi-cylindrical depressed portion **25** of the outer cover member **12** is formed with a whistle slot **14**. The semi-cylindrical depressed portion **24** of the inner cover member **11** is formed with a pin hole opening **15** and with gas stream director means **16** for directing a stream of gas issuing from the pin hole opening **15** against one edge of the whistle slot **14**, as indicated by the arrows in Fig. 5. The inner and outer cover members are fitted and fastened together so that their semi-cylindrical depressed portions together form the cylindrical resonator chamber of a whistle. Advantageously, a pea **26** is placed in the resonator chamber before the two cover members are fastened together.

The gas-tight container **10** is filled with a compressed gas and the pin hole opening **15** in the cover is plugged with a fusible metal plug **17**. As long as the fire alarm remains at a temperature below the melting point of the fusible metal plug **17**, the compressed gas in the container **10** will not escape therefrom. However, when the fire alarm is heated to a predetermined temperature as described, the fusible metal plug melts, thus allowing the compressed gas in the container **10** to escape through the pin hole opening **15**. The stream of gas issuing from the pin hole opening **15** strikes one edge of the whistle slot **14**, thus splitting the gas stream as indicated by the arrows in Fig. 5 and causing the whistle to sound. The presence of the pea **26** in the resonator chamber imparts a waver or trill to the sound of the whistle, thus making the sound more noticeable.

In the embodiment of my invention shown in Figs. 6 and 7, the top cover of the container **10** comprises a substantially flat element that serves as the inner cover member **11**, and a hollow cylindrical element that serves as the outer cover member **12**. The cylindrical outer cover member is open at its inner end and substantially closed at its outer end. A whistle slot **14** is formed in the outer cover member **12**, advantageously as shown in Fig. 6. The inner cover member is formed with the pin hole opening **15** and with means **16** for directing a stream of gas issuing from the pin hole opening in a helical path against one edge of the whistle slot **14**. The cylindrical outer cover member **12** is fitted over the inner cover member **11** to form the cylindrical resonator chamber of a whistle. Advantageously, a pea **26** is placed within the resonator chamber before the two cover members are permanently fastened together. The fastening of the two cover members may be accomplished by the annular tongue and groove arrangement shown in the drawings, by crimping the two cover members together, or advantageously by providing the outer cover member with screw threads that will allow it to be screwed onto the upper end of the container **10**, thereby enclosing the inner cover member **11**.

The gas-tight container is filled with a compressed gas and the pin hole opening **15** is closed with the usual plug of fusible metal **17**. When the fire alarm is heated to the predetermined temperature at which the fusible plug melts, gas will escape through the pin hole opening and, as a result of the gas stream director means **16**, will travel in a helical path until the gas stream strikes one edge of the whistle slot **14**, whereupon the whistle will sound. The presence of the pea **26** in the resonator chamber causes the whistle to sound with a trill and hence to be more noticeable than would be the case without the pea. It should be noted in connection with Figs. 5 and 7 that, when the pin hole opening **15** is plugged with the fusible metal plug **17**, no gas can escape from the container through the pin hole opening. The arrows in Figs. 5 and 7 indicate the path of travel of the gas stream that occurs only after the fusible metal plug **17** has melted.

As will be seen from the foregoing description of my invention, I have devised a novel fire alarm structure that is characterized by the simplicity of its construction and reliability of its operation. In no other fire alarm of this type is the audible alarm element of the device an integral part of the cover of the container in which the compressed gas is stored for use. Accordingly, it will be seen that I have made a valuable contribution to the art to which my invention relates.

I claim:

1. A fire alarm comprising a gas-tight container for a compressed gas, said container having a cover composed of an inner cover member and an outer cover member, the inner and outer cover members being configured to define between them the resonator chamber of at least one whistle, said outer cover member being formed with at least one whistle slot associated with said resonator chamber, said inner cover member being formed with a pin hole opening adapted to provide communication between the interior of the container and the interior of the resonator chamber and being further provided with means for directing a stream of gas issuing from said container through said pin hole opening against one edge of said whistle slot, said pin hole opening being plugged with a fusible metal plug.

2. A fire alarm comprising a gas-tight container for a compress gas, said container having a cover composed of an inner cover member and an outer cover member, the inner and outer cover members together defining the resonator chamber of at least one whistle, said outer cover member being formed with a whistle slot associated with said

resonator chamber, said inner cover member being formed with a pin hole opening adapted to provide communication between the interior of the container and the interior of the resonator chamber and being further provided with means for directing a stream of gas issuing from said container through said pin hole opening against one edge of the whistle slot formed in said outer cover member, said pin hole opening being plugged with a fusible metal plug, the melting point of which is less than 100° C., and said gas-tight container containing a substance the boiling point of which is appreciably less than the melting point of said fusible metal.

3. A fire alarm comprising a gas-tight container for a compressed gas, said container having a cover composed of an inner cover member and an outer cover member, said inner cover member being formed with a partial annular groove the deepest point of which extends inwardly toward the interior of the container, said outer cover member being formed with a full annular groove corresponding to said partial annular groove and extending outwardly away from the interior of the container, said grooves in said inner and outer cover members defining between them the resonator chamber of at least one whistle, the grooved portion of said outer cover member being formed with at least one whistle slot associated with said resonator chamber, said inner cover member being further formed with a pin hole opening adapted to provide communication between the interior of the container and the interior of the resonator chamber and being further provided with means for directing a stream of gas issuing from said container through said pin hole opening against one edge of the whistle slot formed in the outer cover member, said pin hole opening being plugged with a fusible metal plug.

4. A fire alarm comprising a gas-tight container for a compressed gas, said container having a cover composed of an inner cover member and an outer cover member, said inner cover member being formed with a semi-cylindrical depression extending inwardly toward the interior of the container and said outer cover member being formed with a similar semi-cylindrical depression extending outwardly away from the interior of the container, said depressions in said inner and outer cover members defining between them the cylindrical resonator chamber of a whistle, the depressed portion of said outer cover member being formed with a whistle slot associated with said resonator chamber, said inner cover member being formed with a pin hole opening adapted to provide communication between the interior of the container and the interior of the resonator chamber and being further provided with means for directing a stream of gas issuing from said container through said pin hole opening against one edge of the whistle slot formed in the outer cover member, said pin hole opening being plugged with a fusible metal plug.

5. A fire alarm comprising a gas-tight container for a compressed gas, said container having a cover composed of an inner cover member and an outer cover member, said outer cover member comprising a hollow cylindrical element open at its inner end and substantially closed at its outer end, said inner and outer cover members defining between them the cylindrical resonator chamber of a whistle, said outer cover member being formed with a whistle slot associated with said resonator chamber, said inner cover member being formed with a pin hole opening adapted to provide communication between the interior of the container and the interior of the resonator chamber and being further provided with means for directing a stream of gas issuing from said container through said pin hole opening in a helical path against one edge of the whistle slot formed in the outer cover member, said pin hole opening being plugged with a fusible metal plug.

6. A fire alarm comprising a gas-tight container for a compressed gas, said container having wall members, at least one of which has a recessed portion formed therein, a cover member for said recessed portion and having therein a whistle slot, said cover member and said recessed portion of said wall member cooperating to form a resonant whistle chamber, said wall member having a hole therein arranged to direct gas from inside the container into said whistle chamber, and a fusible metal plug in said hole.

7. A fire alarm according to claim 6 in which the recessed portion is annular and said cover member has an annular raised portion, said raised portion of said cover member overlying said recessed portion in said wall member to form the whistle chamber, and in which said whistle slot is in the raised portion of the cover member.

8. A fire alarm according to claim 6 in which the recessed portion is semi-cylindrical and said cover member has a semi-cylindrical raised portion which overlies said recessed portion in said wall member to form the whistle chamber, and said whistle slot is in the raised portion of the cover member.

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