Jan. 27, 1953 A. P. MENDES 2,626,586

FIRE ALARM DEVICE

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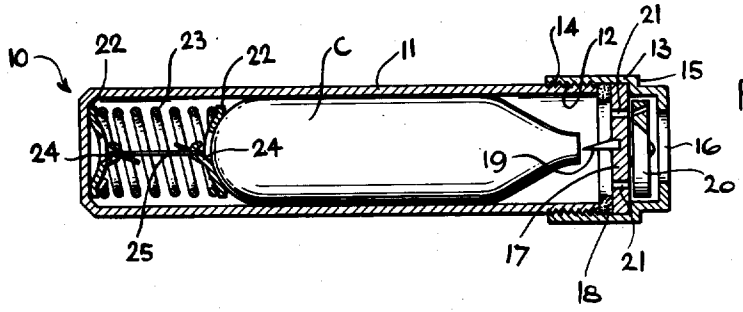

FIG. 1.

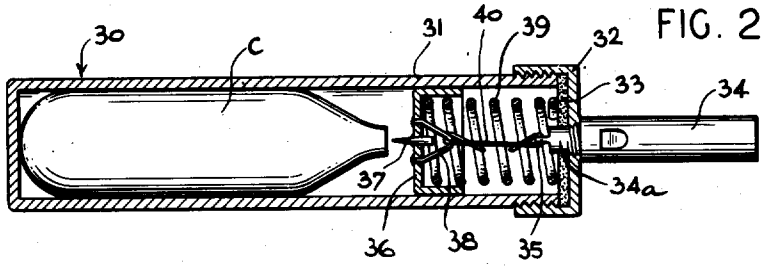

FIG. 2.

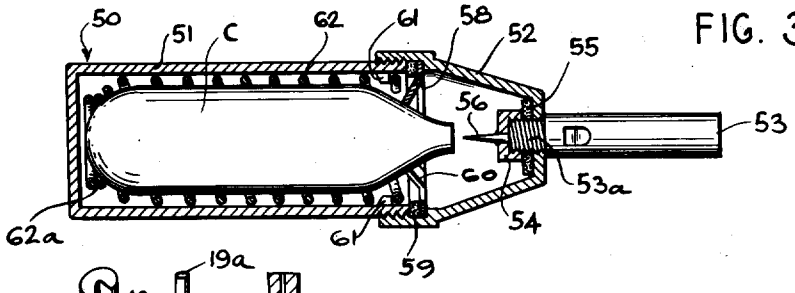

FIG. 3.

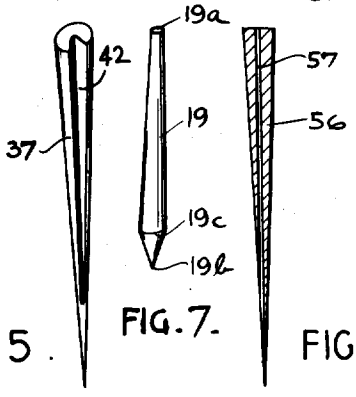

FIG. 5. FIG. 7. FIG. 6.

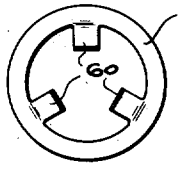

FIG. 4.

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FIRE ALARM DEVICE

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2 Claims. (Cl. 116—106)

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My invention relates to improvements in fire alarms, and in particular to a device which will automatically emit a loud warning signal when in the presence of excessive heat caused by fire.

It is the principal object of my invention to provide a fire alarm device which has a cylinder containing compressed air or gas, and spring-actuated puncturing means which will cleanly rupture the wall of the cylinder in the presence of excessive heat, so that the escaping air or gas will be directed at a controlled rate through a sound device to give a shrill and piercing warning signal.

I am aware of several devices in the prior art which have provision for allowing compressed air to escape through a whistle or similar sound device when fire or excessive heat comes into contact with the device. These alarm devices, however, provide the compressed air container with a fusible wall which melts in the presence of excessive heat to allow the compressed air to escape. Devices of this sort, however, cannot guarantee a prolonged, sustained warning signal. It is well known that when compressed air is rapidly expanded, the temperature thereof is greatly decreased. If, therefore, a small portion of the fusible wall melts sufficiently to allow some of the compressed air or gas to escape, the expanding air or gas will cool the wall to a point where it will wholly or partially resolidify, so that if any of the compressed air is allowed to escape, it will not have sufficient force to operate the sound devices. In the other alternative, if the heat is such to melt the entire wall, or at least a large area thereof, the compressed air or gas will escape so rapidly that the device will produce one short blast instead of a prolonged signal. There is also the possibility that some of the melted wall will be blown into the sound-producing device to impair the operation thereof.

Another object of the invention therefore is the provision of a fire alarm device of the character described in which provision is made to rupture the wall of the compressed air cylinder in a positive manner, so that the emission of a prolonged, sustained warning signal will be insured, and in which the rate of escape of the compressed air can be controlled.

Still another object of the invention is to provide a fire alarm device of a simple and economical construction, and of small and compact design so that it may be placed in convenient locations in the home as well as in commercial buildings.

Other objects and advantages of the invention

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will be apparent in the course of the following specification when taken in connection with the accompanying drawings, in which:

Fig. 1 is a vertical section through the center of a fire alarm device made according to my invention, said device containing a cylinder of compressed gas;

Fig. 2 is a vertical section through the center of a modification of the invention;

Fig. 3 is a vertical section through the center of still another modification of the invention;

Fig. 4 is a plan view of the holding means in the embodiment of Fig. 3;

Fig. 5 is a perspective view of one type of puncturing means used in the invention;

Fig. 6 is a sectional view of another type of puncturing means;

Fig. 7 is an elevational view of still another type of puncturing means.

Referring in detail to the drawings, Fig. 1 illustrates one preferred embodiment of the invention in which a fire alarm device 10 is provided with means for pushing a contained cylinder of compressed air or gas into contact with a puncturing member.

The fire alarm device 10 comprises housing 11 which has an externally-threaded open end 12, and a closure cap 13 which has an internally-threaded end 14. The threaded ends 12 and 14 interfit to enable the closure cap 13 to be removably secured to the housing 11. The use of this threaded closure means is optional, since any other equivalent closure means may be used, or the entire housing may be formed in one piece. I prefer to provide a removable closure cap however, to enable the device to be easily and economically assembled in manufacture. The housing is preferably made of a metal which has a high heat conductivity.

Housing 11 is preferably cylindrical and has a sufficient diameter to enable the contained cylinder C to be slidable therein in a longitudinal direction. Said cylinder C is filled with compressed air or a compressed gas such as carbon dioxide.

The closure cap 13 has a closed end of reduced diameter which defines a circumferential shoulder 15 with the longitudinal wall of said closure cap 13. The end wall of said closure cap 13 has an enlarged opening 16.

The device 10 also has a circular disc 17 which is firmly held between the free end 12 of housing 11 and the shoulder 15 of closure cap 13 when said closure cap 13 is in its secured position. A resilient washer or gasket 18 is preferably interposed between the disc 17 and the free end 12 of hous-

ing 11 to insure an air-tight seal around the edges of said disc 17.

A pin or puncturing member 19 is securely fixed to the center of the inner face of disc 17. Said pin 19 extends perpendicularly from said disc 17 and has a sharp point which extends past the washer 18. A siren 20 is rotatably secured to the outer face of disc 17. Disc 17 contains one or more air holes 21 which are positioned to register with the holes of siren 20. In place of the siren 20 any other type of sound means may be substituted.

The container C is inserted in the housing 11 in the position shown in Fig. 1, in which the neck of said container C faces and is alined with the point of the pin 19. Said container C is preferably in the form of the standard small-size carbon dioxide cylinder which has a puncturable transverse front wall.

The housing 11 also contains actuating means which is positioned between the cylinder C and the closed end of housing 11. Said actuating means comprises a pair of circular discs 22 separated by a compression spring 23. Each disc is stamped out at its center forming an integral hook 24. A metallic bar or wire 25 is secured between each of the hooks 24. Said bar or wire 25 is sufficiently short to hold the spring 23 compressed tightly.

Said bar or wire 25 is made of a metal or alloy which is fusible at a relatively low temperature. Such an alloy may be Woods metal which is strong, but which melts at a temperature not far above ordinary summer temperature, or any of the many similar alloys. The bar or wire 25 is therefore highly responsive to increases in the surrounding air temperature.

In use, the fire alarm device 10 may be placed in any location where a fire might occur. Should a fire break out or spread to the vicinity of said device, the increase in temperature produced by the flames will quickly heat the housing 11 and its contents and will melt the fusible bar or wire 25. The connection between the discs 22 will therefore be broken, allowing the compression spring 23 to expand suddenly. As spring 23 expands it will push the discs 22 apart and will therefore propel the cylinder C rapidly forward. Cylinder C will travel longitudinally within housing 11 until its front wall comes into contact with the puncturing member 19. Spring 23 is sufficiently strong to propel cylinder C with enough force to enable puncturing member 19 to puncture the front wall of cylinder C. Air or gas escaping from cylinder C will then flow through the air holes 21 of disc 17 and will cause the siren 20 to emit a loud and sustained sound. The air and the sound finally will pass through the opening 16 of closure cap 13. The melted bar or wire 25 will drop to the bottom of housing 11 and will not interfere with the operation of the device.

By varying the size of the air holes 21 of disc 17, I can control the rate of flow of the air or gas through the siren 20, and can therefore regulate the pitch or volume of sound emitted by the device and the length of time the signal continues. I prefer to make the air holes 21 of a very small diameter in order to prevent the compressed air or gas from escaping in a gush from the device, and thereby I insure a prolonged sound.

Preferred forms of pins or puncturing members are shown in Figs. 5–7. These pins may be used interchangeably in any of the embodiments of the fire alarm device shown herein. In the embodiment of Fig. 1, the pin 19, shown by way of example, is shown in detail in Fig. 7. Pin 19 has a base 19*a* and a sharp pointed end 19*b*. Said pin 19*a* is formed with a varying diameter, having an enlarged portion of maximum diameter 19*c* intermediate its ends. The diameter of pin 19*a* increases from its puncturing point 19*b* to said portion of maximum diameter 19*c*, and then decreases in diameter toward its base 19*a*. Once the portion of maximum diameter 19*c* has pierced and passed through the container wall, the construction of the pin 19 insures that the hole formed thereby will remain open and unclogged. By varying the cross-sectional size of pin 19, the rate of flow of air from the container C can be controlled.

Fig. 2 illustrates another embodiment of the invention in which a fire alarm device 30 has an external housing 31 and a threaded closure cap 32. A gasket or resilient washer 33 may be interposed between the closure cap 32 and the end of housing 31. Container C is preferably held frictionally within the housing 31 against the closed end thereof.

Closure cap 32 is provided with a threaded central hole which is sized to receive the threaded end of a whistle 34. The whistle is thus firmly fixed to said closure cap 32 with its mouth 34*a* communicating with the internal recess of housing 31. The whistle mouth 34*a* extends through an opening in the gasket 33 so that said gasket 33 provides an air-tight seal around the edges of said whistle 34. Said whistle mouth 34*a* has an extension 35.

A cup 36 fits slidably within the housing 31. The bottom wall of said cup contains a pin or puncturing member 37 which is held in alinement with the neck of container C. A wire loop 38 is secured to the bottom wall of cup 36.

A spring 39 is seated within the recess of cup 36. The other end of spring 39 abuts the gasket 33. A fusible bar or wire 40 of the type previously described is attached at either end to the wire loop 38 and the extension 35 of whistle mouth 34*a*. The bar or wire 40 is of sufficient length to hold the spring 39 compressed and the cup 36 spaced from the cylinder C.

The pin or puncturing member 37 is shown in detail in Fig. 5. Said pin 37 is provided with a wedge-shaped longitudinal channel 42 which begins adjacent its point and extends to the other end thereof. When the heat of a fire melts the fusible bar or wire 40, the spring 39 will expand, propelling the cup 36 forwardly until the pin 37 has punctured the cylinder C. Compressed air or gas escaping from the cylinder C will flow through the channel 42 of pin 37 and will enter the mouth 34*a* of whistle 34. By regulating the depth of channel 42, the rate of escape of the air or gas from the cylinder C can be controlled.

In the embodiment of Fig. 3, the fire alarm device 50 has a housing 51 which is substantially larger in diameter than the cylinder C. The device also has an elongated closure cap 52, the threaded end of which is attached to the threaded open end of housing 51. The front wall of closure cap 52 has a central opening into which the threaded mouth portion 53*a* of whistle 53 is rigidly secured. A threaded cap 54 is secured over the mouth portion 53*a* of whistle 53. A gasket or washer 55 may be inserted between the cap 54 and the front wall of closure cap 52 to provide an airtight seal around the edges of the whistle mouth portion 53*a*.

A pin **56** extends through the center of cap **54**. The base of said pin **56** extends into the whistle mouth **53***a*. Pin **56** is shown in detail in Fig. 6, having a through-and-through longitudinal bore **57** which extends from a point adjacent the point of said pin **56** to the base thereof. Said bore **57** communicates with the mouth of whistle **53**.

When the closure cap **55** is in its secured position, it clamps a retaining ring **58** and a gasket or washer **59** firmly in place. The retaining ring **58** has a plurality of integral, radially extending lugs **60**, as shown in Fig. 4. As shown in Fig. 3, the lugs **60** slope inwardly and abut the cylinder C adjacent the neck thereof, holding said cylinder C spaced from the pin **56**. The retaining ring **58** is made of a fusible metal or alloy such as was described previously.

The inner surface of the longitudinal wall of housing **51** is provided with two or more lugs or projections **61**. These projections **61** hold one end of a spring **62**. The other end of said spring **62** has one or more turns **62***a* of reduced diameter into which the rounded end of cylinder C is seated. In this position, the spring **62** is greatly expanded, or in other words is stretched between the end of cylinder C and the projections **61**. The spring **62** therefore tends to contract to its normal size and hence biases the cylinder C against the lugs **60** of retaining ring **58**.

Spring **62** may be constructed with its first few forward coils or turns slightly larger in diameter than the adjacent intermediate coils or turns, so that the forward end of said spring **62** may be easily and securely placed in position in which it abuts the projections **61**.

When heat melts the lugs **60**, the cylinder C will be rapidly propelled into contact with pin **56**, with sufficient force to enable said pin **56** to puncture said cylinder. The compressed air or gas will escape from the cylinder C through the longitudinal bore **57** of the pin **56** and directly into the mouth of whistle **53**.

While preferred embodiments of the invention have been shown and described herein, it is obvious that numerous omissions, changes, and additions may be made in the invention without departing from the spirit and scope thereof. The various embodiments have been shown by way of example only, and the parts thereof may be freely interchanged, or equivalent parts substituted. For instance, while I show a siren and whistle, it is to be understood that any other sound device which operates by the flow of air or gas may be used. I also do not wish to limit the invention to a compressed air or gas cylinder which is small enough to be contained in the housings shown. I may provide a large tank or container in which case puncturing and sound producing means such as that shown in Fig. 2 may be secured directly over the mouth of said

cylinder. In other words, the cylinder need not be encased in a housing, but the puncturing means may be applied directly to an unenclosed cylinder or container.

I claim:

1. A fire alarm device comprising a housing having a single opening, a cylinder of compressed air or gas encased in said housing, a puncturing element located in said housing, said cylinder being slidable toward said puncturing element, said puncturing element being normally spaced from said cylinder and being positioned to puncture said cylinder when the latter is slid into operative contact therewith, internal spring means located behind said cylinder and positioned to urge said cylinder into operative contact with said puncturing element, a fusible element holding said spring means in compressed, inoperative position, and sound means located adjacent the opening of said housing in a position in which the compressed air or gas will flow through said sound means when said cylinder is punctured.

2. A fire alarm device comprising a housing having a single opening, a cylinder of compressed air or gas encased in said housing, a puncturing element located in said housing, said cylinder being movable toward said puncturing element, said puncturing element being normally spaced from said cylinder and being positioned to puncture said cylinder when the latter is moved into operative contact therewith, an internal coil spring positioned to urge said cylinder into contact with said puncturing element, one end of said spring abutting the rear end of said cylinder and the other end being held by the wall of the housing adjacent the front end of the cylinder, a fusible element abutting the front end of said cylinder and holding said cylinder immovable against the tension of the expanded coil spring, and sound means located adjacent the opening of said housing in a position in which the compressed air or gas will flow through said sound means when said cylinder is punctured.

ABRAHAM PIZA MENDES.

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