Jan. 3, 1956 E. H. BLOOM 2,729,187

FIRE ALARM

Filed June 9, 1953

Fig. 1.

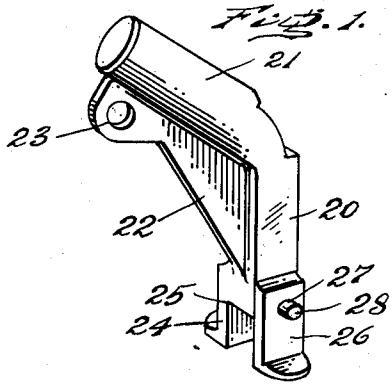


Fig. 4.

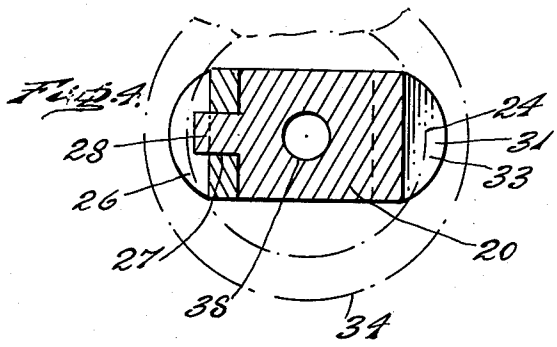


Fig. 5.

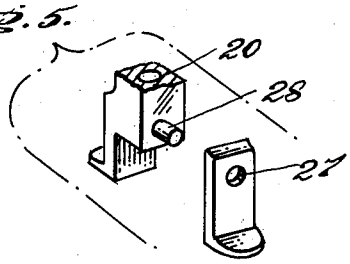


Fig. 3.

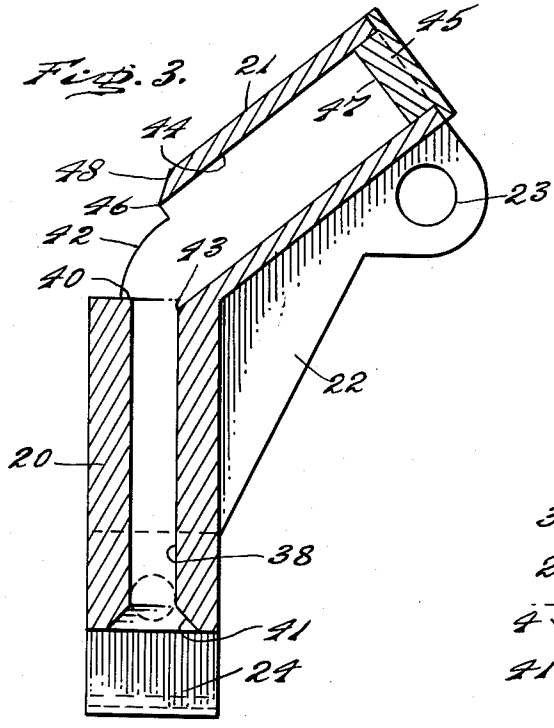
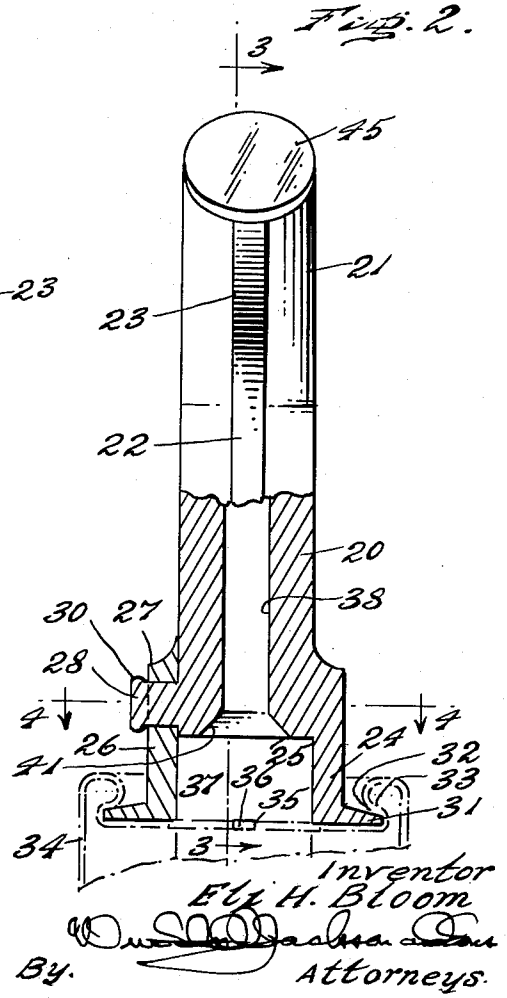


Fig. 2.



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FIRE ALARM

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5 Claims. (Cl. 116—106)

The present invention relates to fire alarms of the type which operate a whistle from a supply of compressed gas when a fusible plug is melted and opens an orifice.

A purpose of the invention is to obtain more sustained loud operation of fire alarm whistles.

A further purpose is to make fire alarm whistles more quickly responsive to change in air temperature.

A further purpose is to increase the volume of sound from fire alarm whistles.

A further purpose is to simplify the mounting of an alarm whistle on a pressure container.

A further purpose is to draw air into the gas stream from an alarm whistle so as to augment the gas stream and increase the duration of operation.

Further purposes appear in the specification and in the claims.

In the drawings I have chosen one only of the numerous embodiments in which my invention may appear, selecting the form shown from the standpoints of convenience in illustration, satisfactory operation and clear demonstration of the principles involved.

Figure 1 is a perspective of the whistle in accordance with the invention.

Figure 2 is a rear elevation, partly in axial section and showing the container for the gas in phantom.

Figure 3 is a section of Figure 2 on the line 3—3 omitting the container.

Figure 4 is a section of Figure 2 on the line 4—4 showing the container in phantom.

Figure 5 is an exploded fragmentary perspective showing the legs separated.

The present invention is concerned with inexpensive temperature alarms commonly called fire alarms, but useful also to show that an excessive temperature has been reached on equipment such as electric motors, processing devices and the like. In devices of this kind, a container of compressed gas, suitably carbon dioxide, nitrogen, air, halogenated hydrocarbon or the like, is provided with an orifice closed by a fusible plug, which releases when a predetermined temperature is reached. The gas passing out through the orifice operates a whistle or other audible signal and thus warns of the abnormal condition.

In the prior art such devices have been of limited utility because the noise was, in some cases, of very short duration and in other cases not sufficiently loud, and in any instance did not have an adequate combination of loudness and duration to awake sound sleepers, or to be observed by personnel momentarily at remote positions or distracted by other noises.

The present invention is designed to produce a device which will give adequate loudness and also long duration, especially because the audible signal is produced by augmenting discharge of compressed gas with a stream of entrained air.

Some of the prior art devices have also been subject to the objection that the response to change in temperature of the air was slow, and an emergency would often be far advanced before the signal operated. The device

of the present invention is designed to give more rapid response to change in air temperature by allowing more complete access of air to the fusible plug.

The device of the invention consists of a whistle having an upper leg and a lower leg. The lower leg is in prolongation of the orifice in the compressed gas cylinder. The lower leg starts at a distance of from 0.235 to 0.485 inch from the orifice so that air access for the purpose of contact with the fusible plug and entrainment is possible.

The lower leg is tubular and has an internal diameter in inches of 0.122 times orifice size times the gas pressure in p. s. i. ±0.030 inch.

The lower tubular leg ends at a distance of 0.075 to 2.25 inches from the orifice.

The upper tubular leg is positioned at the end of the lower tubular leg remote from the orifice, there being an open side between the upper and lower tubular legs, and the open side having a width corresponding to the internal diameter and a length between 0.125 and 0.5 inch. The upper tubular leg extends at an angle of 105 to 140 degrees with respect to the lower tubular leg and the upper tubular leg has a length between 0.25 and 2 inches. The upper tubular leg has an internal diameter of 1.5 to 3 times the internal diameter of the lower tubular leg.

The upper end of the upper tubular leg is closed.

In order to obtain more efficient utilization of gas pressure, there is desirably a sharp lip on the end of the upper tubular leg adjoining the open side, and this sharp lip is preferably located in prolongation of the center of the lower tubular leg. The outside edge of the lip deviates from the prolongation of the lower leg as it extends away from the lower leg at an angle of 15 to 45 degrees.

Also to obtain more efficient utilization of the gas pressure, the lower tubular leg is provided with a conical inlet at an angle of 15 to 75 degrees on each side.

The whistle is preferably mounted on a pair of diverging feet, one of which is removably attached. The attachment of the removable foot is preferably by riveting an integral rivet portion extending through the rivet opening.

Considering the drawings in detail, the whistle comprises a lower leg **20** and an upper leg **21**, both of which have internal tubular bores. The angles between the upper and lower legs vary between 105 and 140 degrees. A rib **22** extends across at the back between the legs and supports them. Suitably integrally formed, as by die-casting or plastic molding from the rib **22** is a hang-up ear **23** having a suitable opening adapted to be placed over a nail or held by a wire or the like. The material may be aluminum alloy, zinc alloy, copper alloy, phenolic plastic, polystyrene plastic or the like.

The lower leg has a suitably integral foot **24** mounted at one side and extending beyond the beginning of the lower leg at **25**, and opposed to the foot **24** is an opposite counterpart removable foot **26**, which is held in place after assembly by passing an opening **27** in the side of the foot over a suitably integral rivet **28** and riveting at **30**.

The feet have at their lower ends projections **31** which engage in a recess **32** of an interior flange **33** on the upper end of a pressure cylinder **34** which has a suitably central orifice **35** normally closed by a plug **36** of fusible metal.

With this it will be seen that the legs straddle the fusible plug and air can enter from either side into a space **37**, keeping the fusible plug at a temperature very close to the average adjoining air temperature. When the alarm operates, the side openings at **37** provide for air jet augmentation to increase the duration of the sound.

The lower leg **20** has an internal tubular bore **38**

which has a diameter conforming to the following formula: 0.122 times the orifice diameter in inches times the gas pressure in p. s. i. ±0.30 inch.

The orifice diameter is likely to be of the order of 0.020 to 0.035 inch, although it may be as small as 0.015 inch or as large as 0.045 inch. In any case the above formula will give the desired size of the bore of the lower leg.

The lower leg ends at **40** to a distance from the outside of the orifice **35** of 0.75 to 2.25 inches.

The lower leg is desirably provided with a conical inlet **41** which increases the efficiency of utilization of gas pressure, the angle of each side of the cone being between 15 and 75 degrees with respect to the axis of the lower leg.

Since the upper leg is at an angle of 105 to 140 degrees with respect to the lower leg, there is an open side **42** opposite to the intersecting corner **43** between the legs, and this open side desirably has a width equal to the width of the upper leg and a length of between 0.125 and 0.5 inch.

It has been found to be very desirable from the standpoint of more effective utilization of the high pressure gas to have an upper leg **21** whose tubular internal bore **44** is from one and a half to three times the diameter of the lower leg. The upper leg is closed at the end remote from the orifice by a plug **45** making a press fit and flanged over. The upper leg has a length measured from the edge **46** at the open side to the interior end **47** of the plug of 0.25 to 2 inches.

More efficient utilization of the high pressure gas is assured if the lower outer end of the upper leg has a sharp lip at **46**. The outer face **48** diverges away from the axis of the lower leg as the face progresses away from the orifice at an angle which is preferably between 15 and 45 degrees.

It will be noted that the sharp lower edge **46** of the outside of the upper leg is located in prolongation of the lower leg substantially intersecting the axis of the lower leg.

It is desirable that a warning be given even to a person who may not have been present when the alarm was operated. Also a warning is needed for those who are hard of hearing. For this purpose it is desirable to include in the gas content of the cylinder an odoriferous material which is expelled during operation of the alarm and which will create a distinctive odor calling attention to the emergency condition. The quantity of such material will desirably vary between 0.25 and 1.0 percent by weight of the compressed gas. The odoriferous material need not be a perfume, but may be a material of unpleasantly distinctive odor. Suitable examples of odoriferous material are as follows: benzaldehyde, vanillin, methyl salicylate, pyridine, nitrobenzine, acetophenone, coumarin, ammonium valerate, ethyl mercaptan.

In operation, the fusible plug of the compressed gas cylinder will be subjected to the ambient temperature by contact with the air or by heat conduction through the cylinder or noise-making device, and when it reaches an alarm temperature the fusible plug will melt and the gas will begin to flow outward. As the gas extends into the lower leg of the whistle it will draw in or entrain air which will flow through the lower leg and into the upper leg, vibrating and producing the whistle sound by the combined action of the expanded gas and the entrained air.

The larger cross section of the upper leg, combined with the length dimensioning and angle dimensioning as described will assure a prolonged and loud noise. Most efficient utilization of gas is favored by the conical inlet and by the sharp lip.

When the audible alarm is over the odor will still remain as a further alarm.

In installing the device on the container, the fixed leg

is inserted under the flange, and then the removable leg is fitted on the rivet and likewise inserted under the opposite part of the flange of the cylinder. Slight staking or riveting will hold the removable leg in place and secure the whistle on the cylinder.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention without copying the structure shown, and I, therefore, claim all such insofar as they fall within the reasonable spirit and scope of my claims.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a fire alarm, a compressed gas cylinder having an orifice and a fusible plug in the orifice and exposed to the air at the outside, in combination with a whistle mounted on the cylinder, comprising a lower tubular leg in prolongation of the orifice, the lower tubular leg starting at a distance of from 0.235 to 0.485 inch from the orifice, there being an air entrainment inlet at the side between the fusible plug and the lower leg, the lower tubular leg having an internal diameter in inches of 0.122 orifice size in inches times gas pressure in p. s. i. ±0.030 inch, the lower tubular leg ending at a distance of 0.75 to 2.25 inches from the orifice, feet connecting the lower tubular leg with the cylinder on either side of the air entrainment inlet, an upper tubular leg positioned at the end of the lower tubular leg remote from the orifice, there being an open side between the upper and lower tubular legs having a length between 0.125 and 0.5 inch, the upper tubular leg extending at an angle of 105 to 140 degrees with respect to the lower tubular leg, the upper tubular leg having a length between 0.25 and 2 inches, and the upper tubular leg having an internal diameter of 1.5 to 3 times that of the lower tubular leg, and a closure at the end of the upper tubular leg remote from the orifice.

2. A fire alarm according to claim 1, in combination with a sharp lip on the end of the upper tubular leg adjoining the open side in prolongation of the center of the lower tubular leg, the outside edge of the lip diverting from the prolongation of the lower leg as it extends away from the lower leg at an angle of 15 to 45 degrees.

3. A fire alarm according to claim 1, in combination with a conical inlet to the lower tubular leg at an angle of 15 to 75 degrees at each side.

4. A fire alarm according to claim 1 in which the feet are diverging, and one foot is removably attached to the lower leg.

5. A fire alarm comprising a first gas container having a closure at one end provided with a vent opening, a fusible plug in the vent opening and a rim around the closure providing an inwardly directed annular recess at the edge of the rim, in combination with a whistle having a passage in line with the vent opening, having an extension at an end adjoining the container, having a first foot member on the whistle extension projecting outwardly into the recess, a rivet on the whistle extension projecting out oppositely to the first foot member and a second foot member having an opening to receive said rivet, to be secured thereby to the said whistle extension and the second foot member projecting out from the whistle extension oppositely from the first foot member and engaged in the recess.

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