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[54] SAFETY BLOWOUT

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[73] Assignee: **Selas Corporation of America**

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[52] **U.S. Cl.** ..... **137/68**, 220/88 A

[51] **Int. Cl.** **F16k 17/40**

[58] **Field of Search** ..... 220/89 A; 137/68–71, 797

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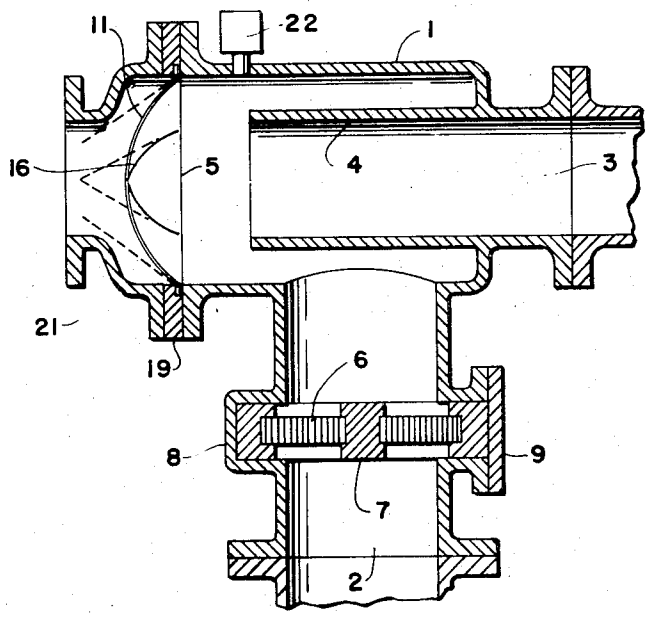
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[57] **ABSTRACT**

The invention is a safety blowout for use in combustion systems that is provided with a rupture disc which will break at a predetermined pressure. The disc is so made that when it ruptures, portions thereof will tear and bend outwardly without any flying particles.

4 Claims, 3 Drawing Figures



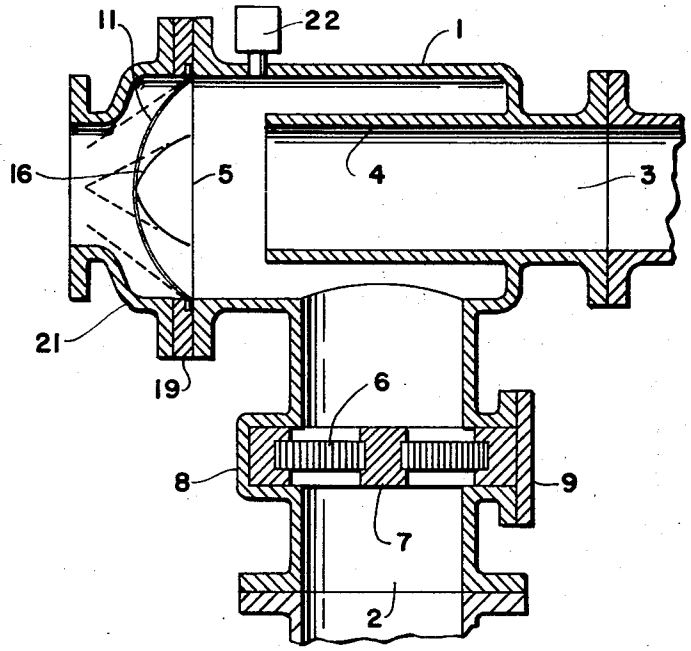


FIG. 1

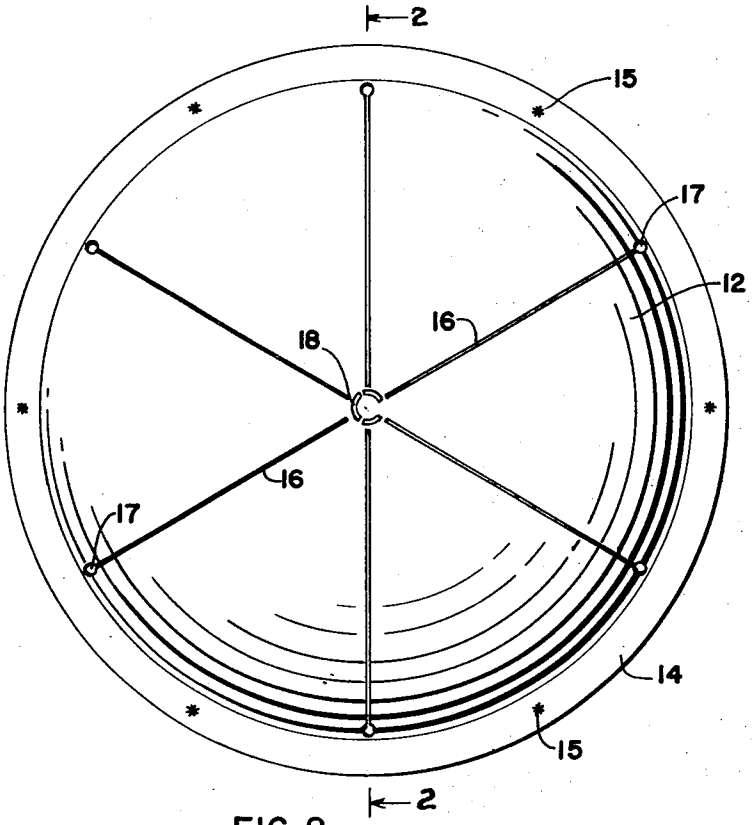


FIG. 2

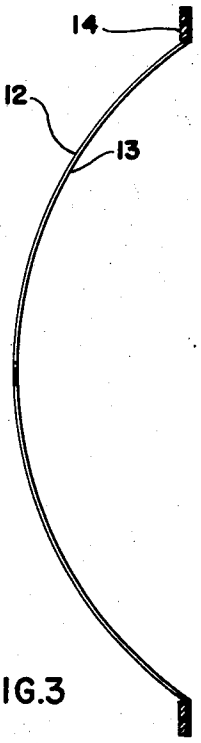


FIG. 3

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SAFETY BLOWOUT

SUMMARY OF THE INVENTION

The present invention relates to safety devices, and more particularly to a safety blowout used in a pipe carrying explosive mixtures of fuel gas and air.

In combustion systems using an explosive mixture of gas and air there is generally provided a safety blowout device between the point of supply of the mixture and the point of use. One type of blowout utilizes a frangible disc which, upon occurrence of a backfire or explosion, will rupture to relieve the pressure in the system before other equipment connected thereto can be damaged. At the same time, provision is made for cutting off the supply of mixture. The frangible discs with which I am familiar are made of a thin, brittle material such as rigid plastic. When the disc is ruptured small pieces of the material are blown outwardly like shrapnel with sufficient force to injure personnel and damage adjacent equipment. Therefore, some type of piping is required to direct the flying pieces of broken disc to a safe place.

It is an object of the invention to provide a safety blowout having a rupture disc that will not shatter when it breaks. It is a further object of the invention to provide a safety blowout having a rupture disc that will break at a fixed pressure or small variations therefrom.

These and other objects are accomplished by making the rupture disc from a thin sheet of metal and forming slits and perforations in it in such a manner that the disc will split without fracturing into small pieces.

The various features of novelty which characterize my invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, however, its advantages and specific objects attained with its use, reference should be had to the accompanying drawings and descriptive matter in which I have illustrated and described a preferred embodiment of the invention.

IN THE DRAWINGS

FIG. 1 is a sectional view of the apparatus.

FIG. 2 is a view of the rupture diaphragm.

FIG. 3 is a section on line 2—2 of FIG. 2.

Referring to the drawings, there is shown a casting 1 which is placed in a fuel line usually conveying an explosive mixture of gas and air from a mixing device to a point of use, such as a plurality of burners in a furnace. The casting is provided with an inlet 2 and an outlet 3 at a right angle thereto. The casting is also formed with a sleeve 4 axially aligned with the outlet and with an opening 5 immediately beyond and axially aligned with the entry end of sleeve 4.

Across the inlet of the casting there is provided a fire screen 6. This screen is formed of a strip of corrogated metal that is wrapped tightly around itself to form a plurality of small passages in an axially-extending direction. The screen is held in a holder 7 that is received in an enlargement 8 in the vertical portion of casting 1. An opening is provided at one side of the enlargement through which the screen can be removed when it is necessary to clean or replace the same. This opening is closed by a cap 9.

The opening 5 is closed by a rupture disc assembly 11. This assembly, shown best in FIGS. 2 and 3, includes a dished metal disc 12 and a frangible disc 13 that is shaped to conform to the concave surface of disc 12. The disc 12 is preferably made of a metal such as Inconel that is a high nickel-chrome-iron alloy and is approximately 0.012 inch in thickness. The disc is supported at its outer edge by a stiffening ring 14 and is fastened to the ring 14 by spot welds 15. Disc 12 is provided with a plurality of radially-extending slits 16 that are equally spaced between the spot welds 15. These slits are enlarged at the outer radial end to form openings 17 adjacent to the inner periphery of ring 14. The inner radial ends of the slits 16 approach but do not contact each other. An opening or a series of openings 18 are formed in the center of the disc concentric with the inner radial ends of slit 16. The assembly 11 is held in position across opening 5 by means of a ring 19, and beyond the ring there is a blowout relief guide sleeve 21.

In the operation of the apparatus a mixture of fuel and air is supplied through the casting 1. Normally, this mixture flows from the mixing machine to the burners at a pressure of 3 to 5 p.s.i. Occasionally, for some reason a backfire will occur adjacent to the point of use of the mixture. When this occurs an explosion can take place. As the explosion travels backwardly through the pipe its force will be impressed upon the rupture disc assembly 11 and fracture this disc thereby relieving pressure in the system before it can travel back to the mixing machine.

Slits 16 and opening 18 in disc 12 are cut to leave spaces between them that will withstand a given pressure. With a disc of the type disclosed having a thickness of about 0.012 inch and with the slits 16 and opening 18 separated by 3/32 inch, the disc will rupture at a pressure of 20 pounds per square inch. Actually, the pressure range for a disc of this type is from 18½ to 21½ p.s.i. This range is well within safe tolerances. In the normal operation of the apparatus, the fuel mixture is prevented from flowing through the slits and openings of disc 12 by means of the frangible disc 13. This latter disc is preferably made of a plastic such as Teflon and is 0.010 inch thick. Normally, the plastic would not be fastened to the metal except at the edges. The plastic disc, of course, will rupture at a much lower pressure than the metal disc but is held from rupture by the metal disc during normal operation. When metal disc 12 ruptures the segments of the disc between adjacent slit 16 will bend outwardly against sleeve 21, as shown by dotted lines in FIG. 1, without any small pieces of metal being dislodged to fly into space and injure personnel or property. There is also provided a pressure switch 22 that can be used to cut off the supply of fuel mixture to the apparatus when a blowout takes place. To this end the switch, which is conventional, would be set to operate apparatus to close off the supply when the pressure in casting 1 falls to atmospheric as a result of rupture of the disc. Fire screen 6 prevents any chance of a non-explosive backfire that might be coming through the pipe from passing to the fuel-supplying apparatus.

From the above it will be seen that there is provided a safety blowout having a rupture disc that can be manufactured to rupture at some predetermined pres-

sure. When the disc does rupture it will move outwardly against the wall of sleeve 21 without fracturing into small pieces and will not do any harm to the surroundings.

While in accordance with the provisions of the Statutes I have illustrated and described the best form of embodiment of my invention now known to me, it will be apparent to those skilled in the art that changes may be made in the form of the apparatus disclosed without departing from the spirit and scope of the invention set forth in the appended claims, and that in some cases certain features of my invention may be used to advantage without a corresponding use of other features.

What is claimed is:

1. In a safety blowout, the combination of a pipe having an inlet and an outlet at an angle to each other through which an explosive fluid is to flow, a sleeve extending inwardly from said outlet, said pipe having an opening between said inlet and outlet axially aligned with said sleeve, a pressure destructable closure for said opening including a thin metallic disc, said disc being provided with a plurality of radially extending slits, the inner ends of said slits terminating short of the center of said disc, the outer ends of said slits terminating in openings adjacent to the edge of said disc and an opening at the center of said disc concentric with but not connected to the inner ends of said slits, a sealing disc of a frangible material, and means to hold said metal disc and said frangible disc face to face across said opening, said last mentioned means engaging said discs at their edges radially outward of the outer ends of said slits.

2. The combination of claim 1 including a pressure sensitive device communicating with the interior of said pipe between the ends thereof.

3. The combination of claim 1 in which there is provided a reinforcing ring for said metallic disc, said ring being of a diameter so that its inner edge falls radially outward of the openings at the outer ends of said slits, and means fastening said ring to said metallic disc.

4. The combination of claim 3 in which said ring is fastened to said metallic disc at points substantially midway between the outer ends of said slits.

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