

Safety Device for Gas Systems.

No. 603,380.


Application filed December 30, 1904. Serial No. 229,696.

To all whom it may concern:

Be it known that we, George H. Emerson, Robert D. Hawkins, and Frederick T. Kitchen, residents of St. Paul, Ramsey county, Minnesota, have invented a certain new, useful, and Improved Safety Device for Acetylene-Gas Systems, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same:

Our invention relates to acetylene-gas systems and the like, and has special reference to means for protecting such systems.

It is well known that acetylene gas when confined in tanks and pipes and under heavy pressure is dangerous by reason of the likelihood of the dissociation of the gas in case any portion of the gas-holding tank or pipe is heated to a temperature ranging from 1,432° to 200° Fahrenheit, according to the pressure at which the gas is confined.

Our invention has particular reference to the employment of acetylene gas upon railroad-cars, and in which cases the main body of gas is held in a large tank or receiver beneath the car. The gas is taken from this tank to supply the burners within the car, and it is usual to arrange a pressure-reducing valve in the pipe-line between the burners and the gas-tank. The dangerous portion of the system is that which includes the reducing-valve, the tank, and the connecting-pipes, in all of which parts the pressure of gas is great and therefore liable to dissociation in event of a conflagration or the wrecking of the car. It is common to protect the gas-tank in such manner that it cannot be quickly affected by heat in the vicinity thereof, but much difficulty has been experienced in protecting the pipes which lead from the tank, as the heating of a small portion of these pipes will inevitably cause the destruction of the entire system, provided the pipe is in direct communication with the tank.

The particular object of this invention is to provide a safety device or coupling which may be arranged in any part of an acetylene-gas pipe system and which will operate to prevent the communication of dissociative action from the gas in the pipe to that in the tank.

With this object in view our invention consists in a metallic case or coupling interposed or included in a gas-pipe in combination with a foraminous body of a suitable metallic fabric and occupying said cavity and adapted to quickly dissipate the heat of dissociating gases at either end of said cavity and prevent the communication of the heat to the gases in the pipe or tank to which the opposite end of the coupling is connected; and, further, our invention consists in various details of construction and in combinations of parts, all as hereinafter described, and particularly pointed out in the claims.

The invention will be more readily understood by reference to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a side elevation of the lower part of a railway-car and so much of an acetylene-gas system as is necessary to the understanding of our invention. Fig. 2 is an enlarged longitudinal section of our safety device on the line x x of Fig. 4. Fig. 3 is a side view of the body of the safety device. Fig. 4 is an end view of the device on the line of Fig. 2. Fig. 5 is an enlarged view of one of the channeled washers employed in our device. Fig. 6 is an edge view thereof. Fig. 7 is a sectional view on the line y y of Fig. 5. Fig. 8 is an enlarged view of one of the circular pieces of wire fabric, and Fig. 9 is an edge view thereof.

As shown in the drawings, 2 represents the lower portion of a railway-car. 3 is the large gas-tank which is suspended from the underframe of the car. 4 represents the pressure-reducing valve, and 5 the pipe which connects the tank 3 and valve 4. 6 is the low-pressure pipe which leads to the burners that are located in the car.

Our coupling or safety device 7 may be arranged in any part of the system; but it is our practice to always place one of the safety devices directly upon the gas-tank. The coupling does not interfere with, check, or interrupt the flow of gas from the tank to the pressure-valve, its office being to check the return flow of gas from the pipe system in case an explosion occurs therein. The coupling comprises the body portion 7, containing the cavities 8 and 9, internally threaded at its ends, see 10 and 11. The end 10 is usually secured directly upon the coupling 3 of the tank 8, and the gas-pipe 5 is connected to the opposite end of 7. Said body is usually polygonal in shape, as shown in Fig. 3.
7' represents a partition between the cavities 8 and 9 and which contains a central opening 12, that communicates with the opening in the tank 3.

13 represents a gland screwed into the end 11 of the body and having a central opening 14.

5' is a flange on the pipe 5, same being secured to the gland 13 by screws or bolts 13'.

Gaskets 13", 7", and 3" are arranged between the several parts to make the joints tight.

In the ends of the cavity 9 are two channeled washers 15 and of the form best shown in Figs. 5, 6, and 7. These washers are provided with a plurality of holes 18' and have a plurality of ribs or lugs 16" on their sides, the same serving to form free gas passages or spaces at each end of the cavity 9 and in communication with the holes 12 and 14.

20 Within the cavity 9 we place a large number of disks 18, which are cut or stamped from wire-netting or fabric. These are of relatively coarse mesh and are of such diameter that the body of wire disks snugly fits the cavity 9, the edges being in contact with the walls of said cavity. When the foraminous disks have been placed within the body or casing 7, with washers 15 at each end, the gland 13 is screwed into place and compresses the disks, serving to press them into close or intimate contact. The disks, placed one upon the other, form a foraminous or porous body, through which the gas from the tank may freely pass; but while the body thus formed constitutes a conduit of sufficient capacity to permit a free flow of gas it also comprises an effective block or buffer, adapted to prevent the rapid return flow of gas from the pipe 5 in event of an explosion therein.

The operation of our invention is as follows: The parts being assembled as shown in the drawings and the system being filled with gas under a pressure of several atmospheres, the body of gas within the tank is effectually protected by reason of the fact that the effects of dissociation in the high-pressure pipe 5 cannot be communicated to the tank. If the pipe 5 or the reducing-valve or any gas-containing pipe connected therewith is accidentally or purposely heated to such an extent that the contained gas dissociates, momentary excessive pressure within the pipe will tend to cause a flow of gas toward the safety device 7. Upon meeting said device the heated gas will be taken up by the foraminous metal body and being subdivided therein will quickly part with its heat, the metal wires having great capacity for heat absorption and dissipation. This effect of the wires is augmented by the radiating capacity of the relatively large mass of metal which comprises the casing 7. The practical result is that the dissociated or dissociating gases are cooled within the coupling and to such an extent that even though exhausted gases actually penetrate the foraminous body the temperature will be too low to cause dissociation of the gas in the tank. The coupling or safety device has a further effect and operation—viz., the dissociation of the gases therein causes the deposition of carbon, with the result that the small spaces or interstices within the metal body are almost instantly filled with carbonaceous material—the foraminous body thus filled forming a plug or stopper in the pipe, which prevents the interchange of gases between the system and the tank in either direction. After an explosion has occurred within the system it will be necessary in addition to repairing the pipes to also remove the body of netting from the coupling and replace the disks with a fresh clean foraminous body. The disks are composed of metal—such as iron, brass, or steel—which will withstand the high temperature of dissociating gases. Nevertheless we do not intend to confine our invention to any specified material from which to compose the parts of our device, although at the present time it appears to be impracticable to employ therein any metal that would be apt to fuse when heated. The exception to this statement concerns the body of the casing, which, if desired, may be composed of a fusible material calculated to melt, and thus drop away and permit the gases in the tank to escape in case of a conflagration.

It will be obvious that our safety device may be put to various uses, and we are accustomed to using several of the couplings or devices in the pipes of the gas generating and compressing plants wherein the acetylene gas is made and stored in readiness to be withdrawn into the car-tanks. The safety-coupling is also capable of employment in connection with municipal lighting plants, the function thereof being the same as above explained. It is also obvious that numerous modifications of our invention will readily suggest themselves to one skilled in the art, and we do not confine ourselves to the specific constructions herein shown and described.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. In a safety device for acetylene-gas and like systems, comprising a metallic body containing a cavity and openings communicating therewith, in combination with a foraminous body composed of a large number of contacting wire screens occupying said cavity, as and for the purpose specified.

2. In a safety device for acetylene-gas and like systems, a metallic casing or coupling, provided with a cavity and openings communicating therewith, in combination with a foraminous body occupying said cavity and composed of a compact body of substantially non-fusible contacting wire screens, having their edges in contact with the walls of said
cavity and adapted to absorb and dissipate heat, substantially as described.

3. In a safety device for acetylene-gas and like systems, a metallic casing or coupling containing a cavity and openings communicating therewith, in combination with a compact body made up of contacting wire screens, occupying said cavity, tortuous gas-spaces being provided between said body and said openings, substantially as described.

4. In a safety device for acetylene-gas and like systems, a metallic casing or coupling, containing a cavity and openings communicating therewith, in combination with means removably arranged in said cavity, providing gas-spaces at the ends thereof and a compact body of wire-netting occupying the remainder of said cavity and compressed therein, substantially as described.

5. In a safety device for acetylene-gas and like systems, a metallic casing or coupling containing a cavity, in combination with perforated, lugged members arranged in the ends of said cavity and a foraminous metal body occupying said cavity and composed of a plurality of pieces of wire-netting, substantially as described.

6. In a safety device for acetylene-gas and like systems, a metallic body or casing, containing a cavity, a gland in one end of said cavity, suitable connecting means at the opposite end of the cavity, grooved perforated disks arranged in said cavity and a plurality of disks of wire-netting filling the cavity between said disks, substantially as described.

7. In an acetylene-gas or like system, the combination of a gas reservoir or tank, a reducing-valve and the connecting-pipe, with a metallic coupling interposed in said pipe between said tank and valve and containing a passage-cavity, and a plurality of compactly-disposed contacting disks or pieces of wire-netting filling said cavity, substantially as and for the purpose specified.

8. In a safety device for acetylene-gas and like systems, a metallic body or casing containing a cavity and provided with a gas connection and opening at one end, a foraminous body occupying said cavity and composed of a large number of metal screens each in contact with adjacent screens, and a gas-connection plug closing the other end of said cavity and adapted to compress the body of screens therein, substantially as described.

In testimony whereof witness our hands, this 23d day of December, 1904, at St. Paul, Ramsey county, Minnesota, in the presence of two witnesses.

GEO. H. EMERSON.
ROBERT D. HAWKINS.
FREDERICK T. KITCHEN.

Witnesses:
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