

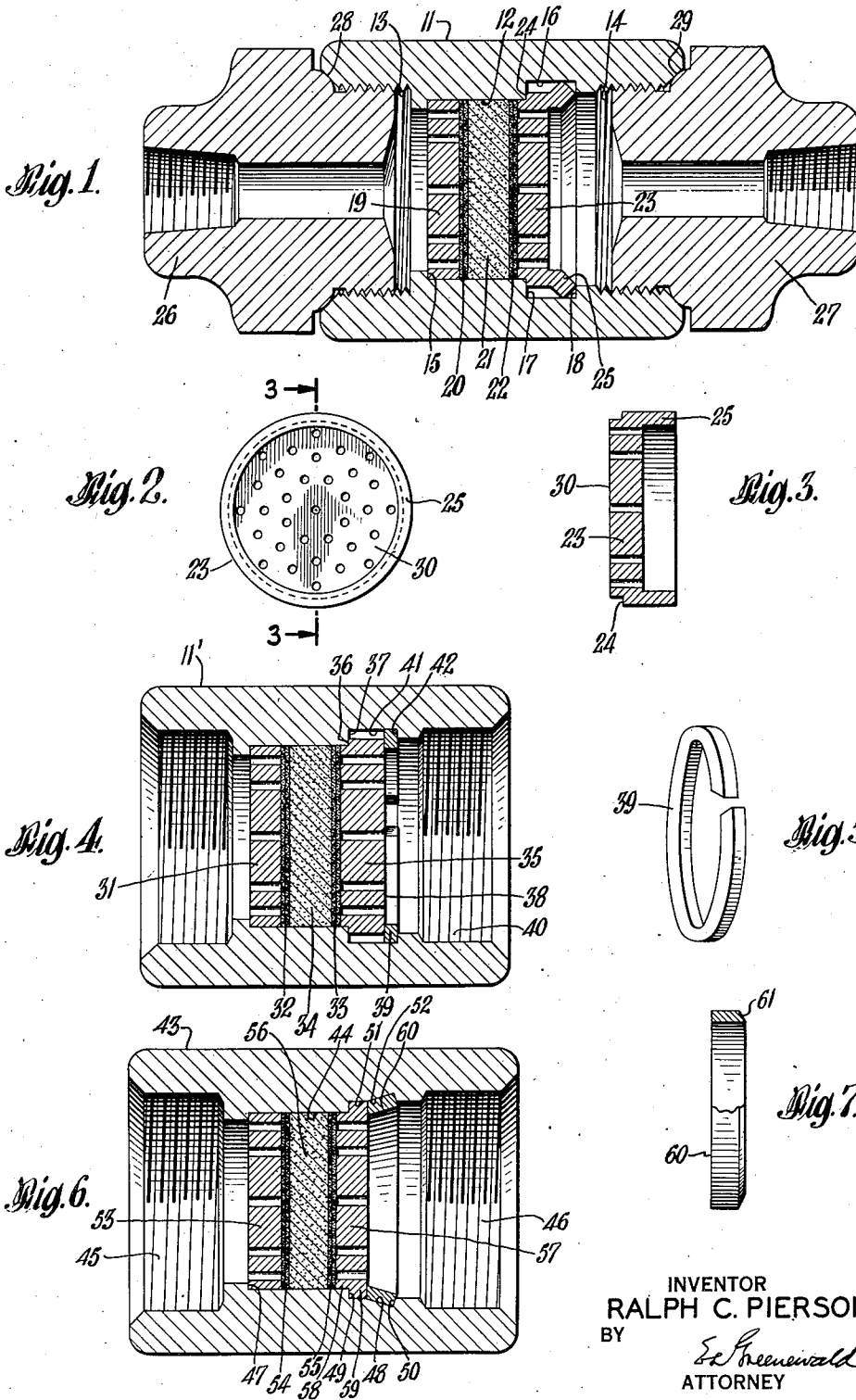
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FLASH ARRESTER

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FLASH ARRESTER

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This invention relates to improvements in flash arresters designed to protect cylinders, generators, or other parts of systems containing inflammable or explosive gases such, for example, as acetylene, from ignition by flashbacks from burners to which such gases are supplied. More particularly, this invention relates to a tamper-proof reliable flash arrester of simple construction which may be inserted in a gas supply line to extinguish such flashbacks.

Due to various causes, the flame of a blowpipe being supplied with acetylene, especially when the acetylene is mixed with oxygen, may flash back through the supply lines into the gas containers and ignite and explode the same. To stop such flashbacks, an arresting device usually is inserted in the supply lines.

A flash arrester generally comprises a body or holder containing a quantity of flashback-resisting material, such as finely-divided unbonded alundum for example, which is confined between fine mesh screens on opposite sides of the flashback-resisting material; and the screens and flashback-resisting material additionally are retained securely in place in the holder by means of perforate metal retaining plates which are removably secured on opposite sides of the material and the screens. In such a device, the gas normally flows freely through the retaining plates, the screens, and the interstices between particles of the unbonded flashback-resisting material to the point of use. Upon the occurrence of a flashback, however, the burning gases pass backward with explosive force through the supply line to the flash arrester, where they are stopped and extinguished. After such a flashback has occurred, it is frequently found that the components of the flash arrester have become so clogged with carbon deposited by the burning gases, and with finely-powdered flashback-resisting material which has been disintegrated by the force of the explosion, that the device no longer is useful and either must be reconditioned or discarded.

Prior flash arresters have been so constructed that they may be taken apart easily for repair and replacement of parts, as well as replacement of the flashback-resisting material; and it has been usual to return a damaged flash arrester to the manufacturer, where proper reconditioning is insured. However, as the cost of such return and reconditioning usually amounts to approximately one-half the cost of a new flash arrester, users of flash arresters frequently are tempted to recondition them in the field because of the ease with which they may be taken apart. Such recondi-

tioning by an unskilled person is highly undesirable because, if the work is improperly performed, the flash arrester may fail to function properly upon the occurrence of a flashback, with the result that an explosion and serious injury may result.

Another undesirable feature of prior flash arresters is that they always must be positioned in a conduit so that gas normally will flow through the flash arrester in a predetermined direction if the desired high flashback resistance is to be obtained. If a user inadvertently inserts such a device in a conduit improperly, so that the gas flows through the flash arrester in the wrong direction, gas-tight seals may be broken by the force of a flashback explosion and the flashback may pass beyond the arrester.

The principal object of the present invention is to provide a flash arrester which shall be so constructed as to make reconditioning by unauthorized persons impossible. Other objects are the provision of a flash arrester which may be constructed at such a low cost that it may be discarded after a flashback without entailing much loss to the user; the provision of such a flash arrester in which the manner of insertion in a conduit shall be immaterial to its flashback resistance; and the provision of such a flash arrester which shall be safe, sturdy, and reliable in service.

The above and other objects and the novel features of the invention will become apparent from the following description, taken in conjunction with the accompanying drawing, in which:

Fig. 1 is a longitudinal sectional view of a flash arrester embodying the principles of the present invention;

Fig. 2 is a plan view of a part of the flash arrester of Fig. 1 before it is secured in the flash arrester;

Fig. 3 is a cross-sectional view taken along the line 3—3 of Fig. 2.

Fig. 4 is a longitudinal sectional view of another form of the flash arrester of the invention, with the coupling members removed;

Fig. 5 is a view in elevation of a part of the flash arrester of Fig. 4;

Fig. 6 is a longitudinal sectional view of another form of the flash arrester of the invention, with the coupling members removed; and

Fig. 7 is a view partly in elevation and partly in section, of a part of the flash arrester of Fig. 6.

Briefly, flash arresters according to the present invention comprise a body or shell having a chamber provided with an inlet and an outlet, flashback-resisting material in the chamber, and

means for retaining the material in the chamber, the retaining means being permanently secured to the body and adapted to prevent the removal or replacement of the flashback-resisting material and other component parts without destroying at least a part of the flash arrester.

As shown in detail in Fig. 1, one form of flash arrester according to the invention comprises a tubular metal body 11 having a chamber 12, and internally threaded end openings 13 and 14 to provide an inlet and an outlet. An annular internal shoulder 15 projects inwardly from the wall of the chamber 12 adjacent to the threads of the opening 13. Between the shoulder 15 and the threads of the opening 14 there is an annular recess or groove 16 in the chamber wall forming two spaced-apart and opposed annular shoulders 17 and 18, both having an internal diameter greater than that of the annular shoulder 15; and the shoulder 17, which is between the shoulders 18 and 15, having an internal diameter less than that of the shoulder 18.

A disk-shaped perforate metal retaining plate 19 fits snugly within the chamber 12 and abuts against the annular shoulder 15 to form a gas-tight seal; and a screen assembly 20 comprising a plurality of fine-mesh screen members also fits snugly within the chamber 12 and rests against the inner face of the plate 19. A quantity of flashing-resisting material 21, such as finely-divided unbonded alundum, is packed into the chamber 12 against the screen assembly 20, and is held in place by means of another screen assembly 22 on its opposite side, also comprising a plurality of fine-mesh screens, and by means of another perforate metal retaining plate 23, the inner face of which bears against the screen assembly 22. An annular peripheral notch in the inner face of the plate 23 forms an annular shoulder 24 which abuts against the shoulder 17, providing a second gas-tight seal; and the reduced diameter cylindrical portion of the plate 23 on the inner side of the shoulder 24 cooperates with the wall of the chamber 12, thus preventing lateral motion of the plate 23.

The retaining plates, the flashback-resisting material, and the screen assemblies which are interposed between the plates and the flashback-resisting material are permanently secured within the chamber 12 by an annular outwardly turned detent member comprising a flange 25 which is integral with the retaining plate 23. The flange 25 extends from the outer face of the plate 23 into the annular groove 16 and tightly abuts against the side wall of the groove and the shoulder 18, thus holding the shoulders 17 and 24 tightly together so that no movement of the plate 23 in any direction is possible, and a gas-tight seal thus is maintained at all times.

Coupling members 26 and 27 are removably threaded into the end openings 13 and 14, respectively, to provide for connecting the flash arrester into a gas conduit. The coupling members form gas-tight seals with the body 11 by means of annular seats 28 and 29 on the respective couplings, which seat against corresponding annular seats at the opposite ends of the body 11. Each of the couplings has a central passage which is internally threaded for a portion of its length to receive a male hose or pipe connection.

In constructing a flash arrester as described above, the perforate plate 19 first is inserted into the chamber 12 through the large diameter opening 14 and is seated against the annular shoulder 15 with a press fit. As the shoulder 15 has an

internal diameter less than the diameter of the plate 19, removal of the plate through the opening 13 is impossible. The screen assembly 20, the flashback-resisting material 21, and the screen assembly 22 then are inserted successively through the opening 14. After this, the second perforate plate 23, having an undeformed upstanding cylindrical flange 25, as shown in Figs. 2 and 3, is inserted through the opening 14 and positioned against the annular shoulder 17, with the small diameter cylindrical portion extending inwardly of the shoulder 17 and fitting snugly with the chamber wall. The flange 25 then is deformed or expanded outwardly by peening, spinning, or in any other desired manner, until it extends into the annular groove 16 and abuts against the side wall and the shoulder 18 to provide a permanent rigid connection. Removal of the component parts of the flash arrester then cannot be accomplished unless the retaining plate 23 is destroyed.

As shown in detail in Figs. 2 and 3, the retaining plate 23, before it is secured in the chamber 12, comprises a disk-shaped portion 30 having an annular shoulder 24 formed by a peripheral notch in one face, and an annular upstanding cylindrical flange 25 which extends out from the opposite face. The perforate plate 23, including the flange 25, is formed of a material, such as brass, which may be deformed readily into the groove 16, yet which has sufficient strength and stiffness to hold the component parts of the flash arrester firmly in position, as well as to resist the explosive force of a flashback.

The flash arrester of the present invention will stop flashbacks effectively, regardless of how it is arranged in a conduit with respect to the normal direction of gas flow through the arrester. For example, if the flash arrester is arranged in a conduit with the opening 13 as the inlet and the opening 14 as the outlet, a flashback will tend to force the retaining plates 19 and 23 more firmly against the respective shoulders 15 and 17. Similarly, if the opening 13 is the outlet and the opening 14 is the inlet, a flashback, which would tend to force the retaining plates 19 and 23 away from the respective shoulders 15 and 17, will be prevented from breaking the gas-tight seal between the plate 23 and the shoulder 17 by the flange 25, which abuts against the shoulder 18 and stops any longitudinal motion of the plate 23.

When the flash arrester becomes clogged due to a flashback, only the body shell 11 bearing the retaining plates, screen assemblies, and flashback-resisting material need be replaced. Hence, all that a user need do is to remove the couplings 26 and 27 from the body 11, leaving them secured to the gas conduit if desired, and then thread the couplings into a replacement body shell. The clogged flash arrester then may be discarded with only a small loss.

In a second form of flash arrester embodying the principles of the invention, as shown in Fig. 4, the tubular body 11' is identical with the body 11 of Fig. 1, and has therein a perforate retaining plate 31, screen assemblies 32 and 33, and flashback-resisting material 34 identical with the corresponding members of Fig. 1, and arranged in the body in the same way. In this modification, however, the second perforate retaining plate 35, which is provided with a peripheral notch in its inner face forming a shoulder 36 which abuts against an internal shoulder 37 of the body 11', is provided with a flat outer face 38, without the upstanding flange of the modification of Figs. 1, 2, and 3. A split helical spring ring

39 is compressed and inserted into the body 11' through the opening 40 until it bears against the outer face 38 of the plate 35, and then is allowed to expand into the annular groove 41 from which it cannot be removed thereafter. The spring ring 39 thus holds the perforate plate 35 firmly and permanently in position by bearing against both the plate and the internal shoulder 42 of the body 11'. Suitable coupling members may be threaded to the body 11' as in Fig. 1.

In a third form of flash arrester according to the invention, as shown in Fig. 6, the flash arrester comprises a tubular metal body 43 having a chamber 44, and internally threaded end openings 45 and 46 adapted to receive male coupling members (not shown). An annular internal shoulder 47 projects inwardly from the wall of the chamber 44 adjacent to the threads of the opening 45. Between the shoulder 47 and the threads of the openings 46 there is an annular recess or groove 48 forming two spaced-apart and opposed annular shoulders 49 and 50, both having an internal diameter greater than that of the shoulder 47; and the shoulder 49, which is between the shoulders 50 and 47, having an internal diameter less than that of the shoulder 50. The wall of the groove 48 comprises a cylindrical portion 51 adjacent to the shoulder 49, and a frusto-conical portion 52 which increases gradually in diameter from the cylindrical portion 51 to the shoulder 50.

A disk-shaped perforate retaining plate 53 in the chamber 44 abuts against the annular shoulder 47; and screen assemblies 54 and 55, and flashback-resisting material 56 are arranged in the chamber 44 as in the modification of Fig. 1. A second disk-shaped perforate retaining plate 57 bears at its inner face against the screen assembly 55. The plate 57 comprises a reduced diameter cylindrical portion 58 fitting snugly with the wall of the chamber 44 inwardly of the shoulder 49, and an annular radial flange 59 which coincides with and fits snugly with the cylindrical wall portion 51 of the groove 48, and also abuts against the annular shoulder 49. The perforate plate 57 is permanently and rigidly secured in the body 43 by a continuous frusto-conical metal retaining ring 60 which coincides with and fits snugly with the frusto-conical wall 52 of the groove 48, and at its ends abuts against the outer face of the plate 57 and the slightly tapered shoulder 50, respectively.

As shown in Fig. 7, before assembly in the body 43 the retaining ring 60 is a cylindrical ring of brass or other ductile metal, one end of which is beveled outwardly as at 61. After assembly of the other parts of the flash arrester, the ring 60 is inserted through the opening 46 until the beveled end 61 contacts the outer face of the plate 57. The ring 60 then is expanded to frusto-conical shape by means of a mandrel until it fits tightly and irremovably in the groove 48, entry therein being facilitated by the slight bevel of the shoulder 50. When so expanded, substantially the whole beveled end surface 61 of the ring 60 contacts the plate 57, and the opposite end of the ring, the radial dimension of which is substantially equal to or slightly greater than that of shoulder 50, contacts substantially the whole surface of the beveled shoulder 50.

Several factors contribute to the low production cost of the flash arresters of the invention, which makes it feasible to discard a clogged arrester and replace it with a new one at approximately the same cost to the user as the cost of

reconditioning prior devices. The general simplicity of design of the body shell and component parts necessitates only a small amount of expensive machining. Also, the fact that the device is discarded after clogging makes it possible to use relatively inexpensive round bar stock for the body shell, as contrasted with the more expensive hexagonal stock machined with wrench flats required in former devices. A third important factor is the fact that the couplings need not be replaced but may be used over again with each new body.

From the foregoing description, it may be seen that there has been provided a tamper-proof flash arrester which is simple and cheap to manufacture, and safe, sturdy, and efficient in operation.

What is claimed is:

1. A flash arrester comprising a body having a chamber in the interior thereof through which acetylene or the like is conveyed; a first shoulder in the inner wall of said body, at one end of said chamber, the body being grooved at the opposite end of said chamber to form a second shoulder; a perforated plate abutting against said first shoulder and forming a seal therewith; a second perforate plate at the opposite end of said chamber; flash arresting material within said chamber between said plates; and retaining means deformed into said groove and engaging said second plate for holding said plates and material in said chamber, whereby said material cannot be replaced without destruction of at least a part of said flash arrester.

2. A flash arrester as defined in claim 1, wherein said retaining means comprises a ring abutting on one side against said second plate and on the other side against said second shoulder, the inside diameter of said ring on said other side being substantially equal to the inside diameter of the adjoining portion of said body.

3. A flash arrester comprising a body having a chamber in the interior thereof and provided at each end with connections so that said body may be coupled directly in a line through which acetylene or the like is conveyed; a shoulder in the inner wall of said body at one end of said chamber, the body being grooved at the opposite end of said chamber; a perforated plate abutting against said first shoulder and forming a seal therewith; a second perforated plate at the opposite end of said chamber; flash arresting material in said chamber between said plates; screen means between each of said plates and the adjoining material for retaining said material within said chamber; and a retaining ring abutting against said second plate and deformed into said groove for holding said plates and screen means and material in said chamber, whereby said material cannot be replaced without destruction of at least a part of said flash arrester.

4. A flash arrester comprising a tubular body having openings for the inlet and outlet of gas, said body having an internal wall provided with a groove; a shoulder in said body adjacent to one of said openings; a perforate plate in said body abutting against said shoulder, said plate having a diameter greater than the internal diameter of said shoulder; a second perforate plate in said body; flashback-resisting material between said plates; and a flange integral with said second-named perforate plate, said flange being in said groove and fitting closely with a wall of said groove.

5. A flash arrester comprising a tubular body

having openings for the inlet and outlet of gas; a shoulder in said body adjacent to one of said openings; a perforate plate abutting against said shoulder, said plate having a diameter greater than the internal diameter of said shoulder; means providing an annular groove in said body having a wall forming two spaced-apart and opposed annular shoulders, both of said opposed shoulders having internal diameters greater than the internal diameter of said first-named shoulder; a perforate plate abutting against one of said opposed shoulders, said second-named plate having a peripheral notch cooperating with said last-named shoulder; means integral with said last-named plate extending into said groove and fitting closely with at least that portion of said wall forming the other of said opposed shoulders whereby said last-named plate is permanently and rigidly secured in said body; and flashback-resisting material between said plates.

6. A flash arrester comprising a tubular body having openings for the inlet and outlet of gas; a shoulder in said body adjacent to one of said openings; a perforate plate abutting against said shoulder; a second shoulder in said body having an internal diameter greater than that of said first-named shoulder; a perforate plate abutting against said second-named shoulder; flashback-resisting material between said plates; means providing an annular groove in said body; and a retaining ring projecting into said groove, fitting closely with the wall of said groove, and bearing against said second-named plate to hold the latter against said second-named shoulder.

7. A flash arrester according to claim 6 wherein said retaining ring is a split spring ring.

8. A flash arrester according to claim 6 wherein said retaining ring is a continuous ring.

9. A flash arrester comprising a tubular body having openings for the inlet and outlet of gas; a shoulder in said body adjacent to one of said openings; a perforate plate abutting against said shoulder; means providing an annular groove in said body forming two spaced-apart and opposed annular shoulders, both of said opposed shoulders having internal diameters greater than the internal diameter of said first-named shoulder, a portion of the wall of said groove having a frusto-conical shape; a perforate plate abutting against one of said opposed shoulders; flashback-resisting material between said plates; and a continuous frusto-conical retaining ring in said groove fitting closely with the frusto-conical portion of said groove wall, said ring abutting against said second-named retaining plate and the other of said opposed shoulders.

10. In constructing a flash arrester comprising a body, flashback-resisting material in said body, and a retaining plate on each side of said flashback-resisting material, the step which comprises deforming one of said retaining plates into permanent engagement with said body after assembly of the component parts of said flash arrester.

11. In constructing a flash arrester comprising a body, finely-divided flashback-resisting material in said body, and a retaining plate on each side of said flashback-resisting material, the steps which comprise inserting a continuous ductile retaining ring into said body after assembly of the other component parts of the flash arrester, and deforming said ring into permanent engagement with the inner wall of said body whereby said component parts are permanently secured within said body.

12. A flash arrester comprising a body having

a chamber provided with first and second openings; flashback resisting material in said chamber; perforate means on one side of said material so constructed and arranged as to be irremovable through said first opening, for permanently preventing removal of said material through said first opening; a perforate retaining plate on the opposite side of said material; said chamber having a wall provided with an annular shoulder adjacent to said second opening facing inwardly toward said plate; and an annular detent member abutting against said shoulder and engaging said plate, thereby permanently preventing removal of the component parts of the flash arrester from said chamber through said second opening; said second opening being adapted to permit the initial insertion of said plate and said detent member into said chamber.

13. A flash arrester comprising a body having a chamber provided with first and second openings; first and second perforate retaining plates in said chamber; means adjacent to said first opening and said first plate permanently preventing the passage of said first plate through said first opening; flashback resisting material between said plates; said chamber having a wall provided with an annular groove adjacent to the other of said openings; and an annular detent member permanently disposed in said groove, fitting closely with the wall of said groove, and engaging said second plate, thereby preventing removal of the component parts of the flash arrester from said chamber; said second opening being adapted to permit the initial insertion of said plates and said detent member into said chamber.

14. A flash arrester comprising a body having a chamber provided with first and second openings; first and second perforate retaining plates in said chamber; means adjacent to said first opening and said first plate permanently preventing the passage of said first plate through said first opening; flashback resisting material between said plates; said chamber having a wall provided with an annular groove adjacent to said second opening; and an annular continuous detent member, irremovably expanded into said groove and engaging said second plate, thereby preventing removal of the component parts of the flash arrester from said chamber; said second opening being adapted to permit the initial insertion of said plates and said detent member into said chamber.

15. A flash arrester comprising a body having a chamber provided with first and second openings; flashback-resisting material in said chamber; perforate means on one side of said material so constructed and arranged as to be irremovable through said first opening, for permanently preventing removal of said material through said first opening; a perforate retaining plate on the opposite side of said material; said chamber having a wall provided with a groove adjacent to said second opening; and retaining means deformed into said groove and engaging said perforate plate for holding the latter and said material in said chamber, whereby said material cannot be replaced without destruction of at least a part of said flash arrester.

16. A flash arrester comprising a body having a chamber provided with first and second openings; flashback resisting material in said chamber; perforate means on one side of said material so constructed and arranged as to be irremovable through said first opening to prevent perma-

nently the removal of said material through said first opening; a perforate retaining plate on the opposite side of said material; said chamber having a wall provided with a shoulder adjacent to said second opening facing inwardly toward said plate; and a detent member abutting against said shoulder and engaging said plate, thereby per-

manently preventing removal of the component parts of the flash arrester from said chamber through said second opening; said second opening being adapted to permit the initial insertion of said plate and said detent member into said chamber.

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