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(54) **Flame arrester**

Flammenrückschlagsicherung

Pare-flamme

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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a flame arrester, for example arranged in a pipeline or in an open end or an intermediate portion of a vent system for a flammable gas. The flame arrester is best applied to stop incursion of an external flame to prevent deflagration or detonation thereof.

Background Art

[0002] Conventionally, a crimped ribbon one is used for a flame arrester, for example arranged in a pipeline or in an open end or an intermediate portion of a vent system for a flammable gas to stop incursion of an external flame to prevent deflagration or detonation thereof. The crimped ribbon one (for example, disclosed in Japanese Patent Laid-open No. S-63-6589) has a wave-shaped ribbon defined by bending a thin metal plate and a flat ribbon made of the thin metal plate.

[0003] The conventional flame arrester disclosed in the Japanese patent has a wave-shaped ribbon defined by bending a thin metal plate and a flat ribbon made of the thin metal plate. The wave-shaped ribbon and flat ribbon are layered one another, and one end of the flat ribbon is secured to a cylindrical core so that the combination of the wave-shaped ribbon and flat ribbon is wound spirally around the core to provide an arrester element. However, it takes much time to correctly define clearances between the wave-shaped ribbon and the flat ribbon. Furthermore, the arrester element is not easily disassembled to remove clogging of the arrester, and moreover, it needs a troublesome work to re-assemble the arrester with a predetermined correctness of the clearance after removing the clogging.

[0004] To improve a flame arresting ability, the conventional flame arrester needs to have a larger width of the arrester element constituted by the wave-shaped ribbon and flat ribbon. The larger width of the arrester element increases a pressure loss of a flammable gas flowing through the clearances.

[0005] Furthermore, the conventional flame arrester is difficult to have a small clearance to allow flowing of the flammable gas with prevention of incursion of an external flame to eliminate deflagration and detonation. The conventional flame arrester is also difficult of achieving a desired manufacturing precision, causing a drawback in forming and assembling thereof.

[0006] Another related flame arrester having ring plates layered one another with spacers to define slits therebetween is disclosed in CH 234193 A.

[0007] To solve the problem of the conventional art, the present invention aims to provide a flame arrester having a plurality of slits to pass a flammable gas. The

slits are surely defined without much time to allow flowing of the flammable gas with no incursion of an external flame to eliminate deflagration and detonation of the gas. The flame arrester has an arrester element with a less frictional pressure loss. Furthermore, the arrester element is easily disassembled to remove clogging of the slits, and moreover, it needs only an easy work to re-assemble the arrester with a predetermined correctness after removing of clogs.

SUMMARY OF THE INVENTION

[0008] In view of the above-mentioned problem, the invention provides a flame arrester arranged in a pipeline for a flammable gas to prevent a flame from spreading from a downstream side to an upstream side of the flame arrester. The flame arrester has a drum body, wherein the drum body comprises a plurality of ring plates. The ring plates are layered one another with a plurality of spacers therebetween to define slits between the ring plates. The drum body has a first end open to the upstream side and a second end closed to the downstream side, while the slits are open to the downstream side.

[0009] The flame arrester has a housing to accommodate the drum body, the flame arrester having a pair of joint pipes each disposed in the upstream or downstream side of the housing to sandwich the housing so as to align with the housing.

[0010] The slits are open laterally relative to a longitudinal axis of the drum body.

[0011] Preferably, the drum body has a cover plate to close the second end of the drum body.

[0012] Preferably, the ring plates and the spacers are removably attached to the housing.

[0013] The present invention provides a flame arrester having a plurality of slits to pass a flammable gas. The slits are surely defined without much time to allow flowing of the flammable gas without incursion of an external flame to eliminate deflagration and detonation of the gas. The flame arrester has an arresting element with a less frictional pressure loss. Furthermore, the arresting element is easily disassembled and reassembled to remove clogs in the slit, and moreover, it needs only an easy work in manufacturing and assembling with a production correctness.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014]

FIG. 1 is a sectional view showing an embodiment 1 of a flame arrester according to the present invention; and

FIG. 2 is an enlarged sectional view showing a part encircled by a circle A of FIG. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0015] Referring to the accompanied drawings, a best mode embodying the present invention will be discussed in detail.

[0016] FIGS. 1 and 2 show an embodiment 1 of a flame arrester according to the present invention. A flame arrester of the embodiment is arranged in a pipeline K for a flammable gas G to prevent a reverse flow from a downstream side C2 to an upstream side C1 of the flame arrester. The flame arrester has a drum body E, wherein the drum body comprises a plurality of ring plates 2. The ring plates are layered one another with a plurality of spacers 3 therebetween to define slits S between the ring plates. The drum body has a first end b open to the upstream side C1 and a second end a closed to the downstream side, while the slits are open to the downstream side.

[0017] The flame arrester 1 of the embodiment 1 is arranged in a flow passage such as an open end or an intermediate portion of a pipeline K of a vent system for a flammable gas G. The flame arrester is located to stop a reverse flow of a flame from a downstream side C2 to an upstream side C1 to prevent deflagration and detonation of the gas.

[0018] The ring plate 2 is formed from a metal plate. There are provided a plurality of the ring plates 2 layered one another, the number of which varies to adjust a pressure loss of the flowing flammable gas G.

[0019] The spacer 3 is made from a metal plate or the like, most preferably from a stainless steel plate. The spacers 3 are provided so as to stop a reverse flow of a flame from a downstream side (second side) C2 to prevent a disaster. Furthermore, the spacer 3 varies in thickness t to adjust the depth of the slit S according to kinds of the flammable gas G.

[0020] Reference numeral 5 designates a housing accommodating the drum body E attached therein with fasteners 4.

[0021] Reference numerals 6, 6' designate joint pipes as joint members J, J' each having a flange 6a or 6a'. The joint pipes 6, 6' are positioned to face toward the upstream side C1 or the downstream side C2. Between the pipe joints 6, 6', the housing 5 having the drum body E is sandwiched to be pinched thereby.

[0022] Reference numerals 7, 7' designate ring-shaped gaskets positioned at a forward or rear end of the housing 5.

[0023] Reference numeral 8 designates each of a plurality of bolts arranged to be inserted into the flanges 6a and 6a' of the joint pipes 6, 6' to fasten the flanges 6a and 6a'. Reference numeral 9 designates a nut engaged with a thread formed on one end of the bolt 8.

[0024] Reference numeral 10 designates a circular plate having no central hole to close one end a of the drum body E. The circular plate 10 is arranged on a top of a layered assembly of the ring plates 2 and the spacers

3. Reference numeral 11 designates an inner flange welded on an inner surface of the housing 5. The inner flange 11 secures the drum body E constituted by the ring plates 2, the spacers 3, and the circular plate 10 in the housing 5 with the fasteners 4. Thus, the drum body E is positioned in the pipeline K having a passage T for a flammable gas G.

[0025] The fastener 4 is constituted by a bolt 12 and a nut 13 which align with an axial direction of the inner flange 11.

[0026] The flame arrester 1 of the embodiment is configured as described above. The flame arrester 1 is arranged in the pipeline K such as an open end or an intermediate portion of the pipeline K of a vent system for a flammable gas G. The flame arrester has a plurality of ring plates 2, the ring plates layered one another with the spacers 3 therebetween to define the slits S between the ring plates. The layered body has a first end b open to the upstream side C1 and a second end a closed to the downstream side C2 by the circular plate 10, while the slits are open to the downstream side C2.

[0027] When the flammable gas G having a high pressure flows into the flame arrester 1 from the upstream side C1 (a lower side of FIG. 1), the gas G flows inside the ring plates 2 of the flame arrester 1 from the upstream side C1 of the passage T to flow through a plurality of the slits S defined between the ring plates 2 to flow out in an outer peripheral side of the ring plates 2 to further flow toward the downstream side C2 (an upper side of FIG. 1).

[0028] Since the high pressure gas G passes through the slits S toward the outer peripheral side of the ring plates 2, so that the slits S discharge radially the gas to provide a thin thickness flow. This generates an extremely small amount of vortexes and turbulent flows without noises created by the gas flow.

[0029] A pressure loss of the flammable gas G is adjusted by varying the number of the layered ring plates 2.

[0030] Even if a flame arises in the downstream side C2, the flame arrester 1 of the embodiment 1 prevents incursion of the flame directly into the upstream side C1 to surely eliminate deflagration and detonation of the gas. Because, the flame arrester 1 has the drum body E constituted by the ring plates 2 and the spacers 3 layered alternately and has the circular plate 10 closing an end of the drum body E, and the drum body E is secured in the housing 5 with the fasteners 4 such that the circular plate 10 crosses the flow direction of the flammable gas G in the passage T to prevent a straight flow the gas.

[0031] The spacers 3 layered on the ring plates 2 vary in thickness t to adjust the depth of the slits S through which the flammable gas flows. This prevents a disaster even if the flammable gas G arises in the downstream side C2 (in an upper side of FIG. 1). When the flammable gas G is a mixed gas of ethylene and air, the spacer 3 has a thickness t of 0.2 mm. When the flammable gas G is a mixed gas of hydrogen and air, the spacer 3 has a thickness t of 0.12 mm.

[0032] The flame arrester 1 of the embodiment 1 has the drum body E constituted by the ring plates 2 and the spacers 3 alternately layered and also has the circular plate 10 layered at one end of the drum body E. The drum body E is secured to the inner flange 11 welded on the housing 5 in the generally cylindrical housing 5 by the fatteners 4 consisting of the bolts 12 and nuts 13 axially disposed. The housing 5 having the drum body E is pinched and held between the joint pipes 6, 6' having the flange 6a or 6a' via the gasket 7 or 7' by means of a plurality of the bolts 8 and nuts 9. Thus, unfastening of the bolts 8 and nuts 9 can move apart the joint pipe 6, 6' from each other, and then disengagement of the bolts 12 and the nuts 13 can remove the circular plate 10, ring plates 2, and spacers 3 from the bolts 12. This allows cleaning or replacement of the parts with ease. Furthermore, reassembling after disassembling of the flame arrester 1 is surely completed with ease.

[0033] Accordingly, it does not need much time to adjust the size and shape of the slits S provided within the passage T of the flame arrester 1 for the flammable gas G.

[0034] In the present invention, it does not need much time to manage the slits S which allow a flow of a flammable gas but stops incursion of an external flame to prevent deflagration and detonation of the gas. The flame arrester provides a less frictional loss for a gas flowing therethrough. The drum body E is disassembled and surely reassembled with ease. Even if the slits are clogged, cleaning thereof can be surely completed with ease. The flame arrester is improved in a manufacturing accuracy and can be employed in applications and fields in which easy manufacturing and assembling are required.

Claims

1. A flame arrester (1) arranged in a pipeline (K) for a flammable gas to prevent a flame from spreading from a downstream side to an upstream side of the flame arrester,
the flame arrester having a drum body (E), wherein the drum body comprises a plurality of ring plates (2), the ring plates layered one another with a plurality of spacers (3), therebetween to define slits (5) between the ring plates,
the drum body having a first end (b') open to the upstream side and a second end (a) closed to the downstream side, the slits being open laterally relative to a longitudinal axis of the drum body,
the flame arrester having a housing (5) to accommodate the drum body,
the flame arrester having a pair of joint pipes (6,6') each disposed in the upstream or downstream side of the housing,
characterized in that
the drum body is secured with an inner flange (11) welded on the housing,

between the joint pipes the housing having the drum body is sandwiched to be pinched thereby and the housing is, pinched and held between the joint pipes having flanges (6a, 6a') via gaskets (7,7') by means of a plurality of bolts (8) and nuts (9), wherein the bolts are inserted into the flanges of the joint pipes to fasten the flanges of the joint pipes.

2. The flame arrester recited in claim 1, **characterized in that**, the drum body has a cover plate (10) to close the second end of the drum body.
3. The flame arrester recited in claim 1, **characterized in that** the ring plates and the spacers are removably attached to the housing.

Patentansprüche

1. Flammenrückschlagsicherung (1), die in einer Leitung (K) für ein entzündliches Gas angeordnet ist, um die Ausbreitung einer Flamme von einer stromabwärtigen Seite zu einer stromaufwärtigen Seite der Flammenrückschlagsicherung zu verhindern, wobei die Flammenrückschlagsicherung einen Zylinderkörper (E) aufweist, wobei der Zylinderkörper eine Vielzahl von Ringplatten (2) umfasst, wobei die Ringplatten übereinander geschichtet sind, mit einer Vielzahl von Abstandshaltern (3) dazwischen, um zwischen den Ringplatten Schlitze (S) zu definieren, wobei der Zylinderkörper ein erstes, zur stromaufwärtigen Seite offenes Ende (b) und ein zweites, zur stromabwärtigen Seite geschlossenes Ende (a) aufweist, wobei die Schlitze in Bezug auf eine Längsachse des Zylinderkörpers seitlich offen sind, wobei die Flammenrückschlagsicherung ein Gehäuse (5) aufweist, um den Zylinderkörper aufzunehmen, wobei die Flammenrückschlagsicherung ein Paar von Verbindungsrohren (6, 6') aufweist, die jeweils an der stromaufwärtigen oder stromabwärtigen Seite des Gehäuses angeordnet sind,
dadurch gekennzeichnet, dass
der Zylinderkörper mit einem Innenflansch (11) befestigt ist, der an das Gehäuse geschweißt ist, das Gehäuse mit dem Zylinderkörper zwischen den Verbindungsrohren eingefügt ist, so dass es durch diese eingeklemmt wird, und
das Gehäuse zwischen den Verbindungsrohren, die Flansche (6a, 6a') aufweisen, mittels einer Mehrzahl von Bolzen (8) und Muttern (9) via Dichtungen (7, 7') eingeklemmt und gehalten wird, wobei die Bolzen in die Flansche der Verbindungsrohre eingefügt sind, um die Flansche der Verbindungsrohre zu fixieren.
2. Flammenrückschlagsicherung nach Anspruch 1, **dadurch gekennzeichnet, dass** der Zylinderkörper

eine Deckplatte (10) aufweist, um das zweite Ende des Zylinderkörpers zu verschließen.

3. Flammenrückschlagsicherung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Ringplatten und die Abstandshalter entfernbar an dem Gehäuse befestigt sind. 5

Revendications 10

1. Dispositif anti-retour de flamme (1) agencé dans un pipeline (K) pour un gaz inflammable afin d'empêcher une flamme de se diffuser depuis un côté aval vers un côté amont du dispositif anti-retour de flamme, 15
le dispositif anti-retour de flamme comportant un corps de fût (E), dans lequel le corps de fût comprend une pluralité de plaques annulaires (2), les plaques annulaires étant disposées les unes sur les autres avec une pluralité d'éléments d'écartement (3) entre celles-ci afin de définir des fentes (S) entre les plaques annulaires, 20
le corps de fût comportant une première extrémité (b) ouverte vers le côté amont et une deuxième extrémité (a) fermée vers le côté aval, les fentes étant ouvertes latéralement par rapport à un axe longitudinal du corps de fût, 25
le dispositif anti-retour de flamme comportant un boîtier (5) pour recevoir le corps de fût, le dispositif anti-retour de flamme comportant une paire de conduites de raccordement (6, 6') disposées chacune dans le côté amont ou aval du boîtier, 30
caractérisé en ce que
le corps de fût est fixé à l'aide d'une bride intérieure (11) soudée sur le boîtier, 35
le boîtier comportant le corps de fût est interposé entre les conduites de raccordement pour être coincé de cette manière et
le boîtier est coincé et maintenu entre les conduites de raccordement comportant des brides (6, 6') par l'intermédiaire de joints d'étanchéité (7, 7') au moyen d'une pluralité de boulons (8) et d'écrous (9), dans lequel les boulons sont insérés dans les brides des conduites de raccordement afin de fixer les brides des conduites de raccordement. 40 45
2. Dispositif anti-retour de flamme selon la revendication 1, **caractérisé en ce que** le corps de fût comporte une plaque de recouvrement (10) pour fermer la deuxième extrémité du corps de fût. 50
3. Dispositif anti-retour de flamme selon la revendication 1, **caractérisé en ce que** les plaques annulaires et les éléments d'écartement sont fixés de façon amovible au boîtier. 55

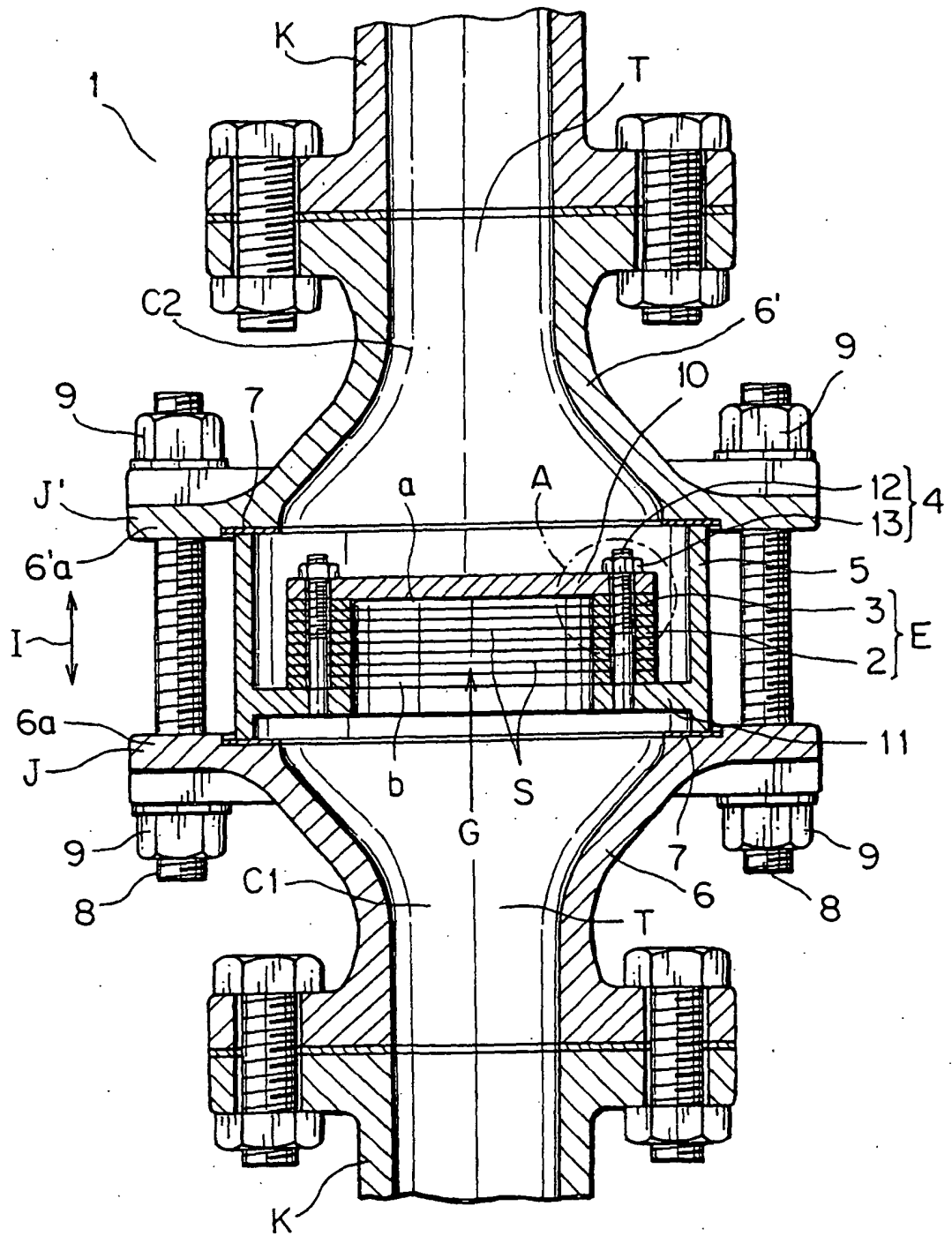


FIG. 1

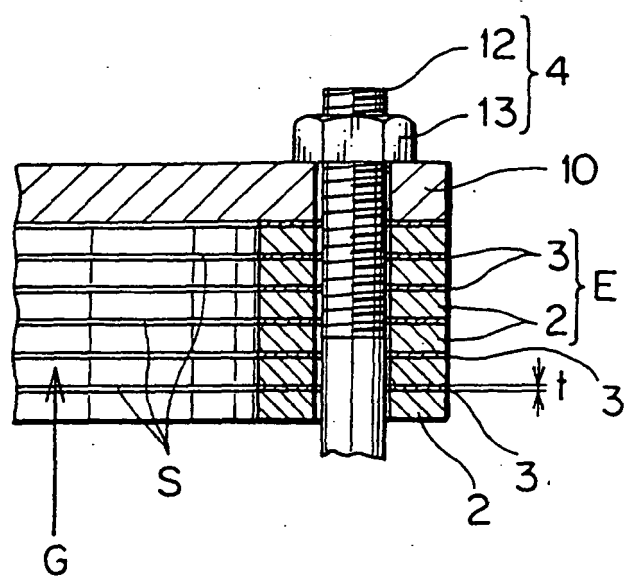


FIG. 2

REFERENCES CITED IN THE DESCRIPTION

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