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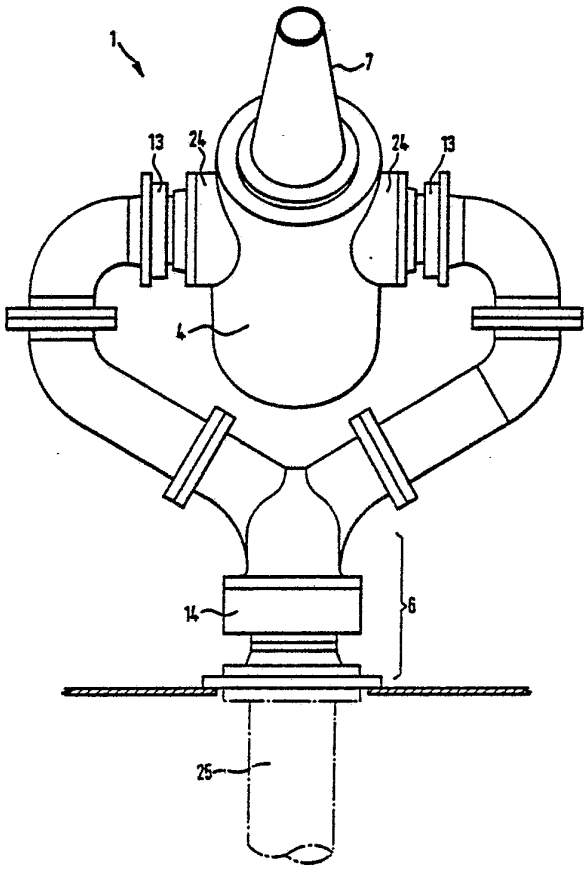
(54) Title: FIRE MONITORS

(57) Abstract

The water conduit (4 and 5) is formed with a plurality of radially adjacent coaxially arranged tubular parts (4 and 5) which are serially connected by semi-toroidal bends provided by baffle plates (8) extending between each pair of radially adjacent coaxially arranged tubular parts (4 and 5) and an adjacent fairing (9) mounted on the radially inner tubular part of each said radially adjacent pair of coaxially adjacent tubular parts (4 and 5). Each baffle plate (8) has an outer peripheral portion (12) which is curved so as to cooperate with the adjacent fairing (9) to provide a curved water path. A hollow centre body (18) is supported by a further conduit (20) for longitudinal movement within the outlet nozzle (7) of the water conduit (4 and 5) and a branch pipe (21) from the inlet means (6) to the water conduit (20). This water issues from outwardly directed openings (23) in the centre body (18) to vary the flow through the outlet nozzle (7) and is controlled by a valve (22) in the branch pipe (21).



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Fire Monitors

Technical Field

The invention relates to fire monitors for projecting water long distances for extinguishing fires. In particular, although not exclusively, the invention relates to fire monitors to be mounted on fire-fighting vessels for use in extinguishing fires on oil-rig platforms.

Background Art

Fire monitors currently in use comprise a water conduit, inlet means connected to the water conduit, and an outlet nozzle connected to the water conduit. Maximum jet throw in fire monitors of this construction is dependent on good inlet conditions to the outlet nozzle and so it is advantageous that flow into the nozzle is free of swirl and of low turbulence level. The water conduit may therefore be provided with flow straightening vanes. However, the inlet means normally comprise bends in two planes in the form of a "ram's horn" inlet. These bends cause swirl which should be dissipated by the straightening vanes, but in practice insufficient space is available for straightening out the flow after the bends and for reducing turbulence levels. The result is poor performance in terms of jet throw. Difficulty is therefore encountered when attempting to scale up existing designs in order to obtain the long distance water jet throw that has now become necessary.

Disclosure of the Invention

It is therefore an object of the present invention to provide a fire monitor capable of much longer water jet throw than hitherto possible.

According to the invention, there is provided a fire monitor, for projecting water, comprising a water conduit having at least two co-axially arranged tubular parts; inlet means and a coaxially extending outlet nozzle connected to the radially innermost and radially outermost tubular parts of the water conduit; and flow deflectors at

axially adjacent ends of each radially adjacent pair of coaxially arranged tubular parts providing semi-toroidal bends to effect reversal of flow so that water flows along radially adjacent tubular parts in opposite directions.

A fire monitor constructed in this manner is capable of providing a high performance jet. If the monitor is to be used with a variable supply it is preferred that the outlet nozzle be adjustable so that its discharge cross-section can be varied to match the number of supply pumps connected to the fire monitor.

In order to improve the performance of the apparatus, guide vanes may be provided between at least two radially adjacent tubular parts and the guide vanes provided in at least the tubular part connected to the outlet nozzle may be adjustable flow controlling vanes. This allows the characteristics of the jet to be controlled by causing atomization or disruption of the jet. The jet can thus be controlled so as to make use of environmental conditions, such as wind, which may require the jet to atomise at a particular height above sea-level so that the wind carries water droplets on to the platform of an oil-rig or on to escaping oil or gas jets. The resultant control on the size of water droplets which are deposited on the fire can be used to protect personnel or apparatus in the zone in which the water is deposited. Where structures have become heated as a result of fire, it is important to minimise the impact pressure of the water directed on to these structures in order to prevent damage to equipment.

In one simply constructed form of the apparatus according to the invention, the tubular parts of the water conduit are arranged so that the radially innermost tubular part is connected to the outlet nozzle.

Fire monitors according to the invention may also be easily installed by providing the inlet means with swivel mounting means which allow angular movements of the water conduit about at least two

perpendicular axes for adjustment of the axis of the fluid conduit.

To reduce the flow loss in water flowing through the water conduit, the flow deflectors may include a baffle plate extending between each pair of radially adjacent tubular parts, and an adjacent fairing mounted on the radially inner tubular part of each pair of radially adjacent tubular parts along which the water flows in opposite directions, each baffle plate having an outer peripheral portion which is curved so as to cooperate with the adjacent fairing to provide a curved water path. However, even where swirl and turbulence have been eliminated, or at least greatly reduced, there are occasions, as hereinbefore described, when it is desirable to impose a controlled amount of turbulence to the jet. Thus, in addition to the use of adjustable flow controlling vanes, inlet means may be provided for injecting or inducing fluid into the jet. Where this fluid is air, or some other gas, it may be used to disrupt the jet. In other applications the fluid introduced into the jet may be a foaming agent where this is advantageous in particular fire-fighting situations.

To control the flow of water through the outlet nozzle, a centre body may be mounted within the outlet nozzle. This centre body preferably has a longitudinal axis coincident with the longitudinal axis of the water conduit and a cross-section, perpendicular to its longitudinal axis, which varies at different points along its longitudinal axis. In this case, control means may be provided for varying the longitudinal position of the centre body relative to the outlet nozzle.

In one embodiment of the invention, a further conduit is mounted in the innermost tubular part of the water conduit, coaxial with the outlet nozzle; the centre body is hollow and is communicatively connected to the further conduit; a branch pipe extends between the inlet means and the further conduit; and control means are provided for controlling the flow of water through the branch pipe. This water flows out of the centre body into the water flowing through the

outlet nozzle from the water conduit and therefore modifies this flow. The centre body is preferably formed with at least one outwardly directed aperture and flow of water from each such aperture atomises the water flowing through the outlet nozzle from the water conduit.

Four embodiments of the invention are hereinafter described, by way of example, with reference to the accompanying drawings in which like parts have been assigned the same reference numerals.

Brief Description of the Drawings

Figure 1 is an end elevation of a fire monitor according to the invention;

Figure 2 is a sectional plan view of part of the apparatus shown in Figure 1;

Figure 3 is a side elevation of the apparatus shown in Figure 1;

Figure 4 is a schematic sectional side elevation of a second fire monitor embodying the present invention;

Figure 5 is a schematic side elevation of a third fire monitor embodying the invention; and

Figure 6 is an end elevation of part of a still further embodiment of the invention, similar to that shown in Figure 5.

Best Modes for Carrying Out the Invention

As shown in Figures 1, 2 and 3, a fire monitor 1 is provided with inlet means 6 comprising a vertical supply pipe 25 and a swivel 14 for horizontal adjustment of a water-jet issuing from the apparatus. Two branches 24 extend from the pipe 25 into opposite sides of an outer tubular part 4 forming a water conduit 4 and 5 and are provided with swivels 13 for vertical adjustment of the jet issuing from the apparatus.

Water entering the outer tubular part 4 flows axially along the water conduit 4 and 5 past flow straightening vanes 10 and then passes around a semi-toroidal bend into an inner tubular part 5 forming the water conduit 4 and 5 before flowing through outlet nozzle 7. The reversal of flow is effected by flow deflectors comprising a baffle plate 8, which closes the rear end of the outer tubular part 4, and fairings 9 which are mounted on the axially adjacent end of the inner tubular part 5 of the water conduit 4 and 5. As shown, the baffle plate 8 has an outer peripheral portion 12 which is curved so as to cooperate with the fairing 9 so as to reduce swirl and turbulence.

In addition to the elongation of the flow path of water through the conduit 4 and 5 by means of the compact arrangement provided by the invention, turbulence and swirl in water fed to the outlet nozzle 7 are reduced to a very low level. Further reduction in swirl and turbulence is also obtained by the use of adjustable vanes 11 which are mounted in the innermost tubular part 5 of the water conduit 4 and 5. The adjustable vanes 11 can also be used to impart a controlled amount of swirl and turbulence to the jet issuing from the outlet nozzle 7 in order to control the characteristics of the jet.

In the fire monitor 2 shown in Figure 4, a further conduit 20, which is mounted in the innermost tubular part 5 of the water conduit 4 and 5 and supported at bearing 28 and control station 19, is communicatively connected to a hollow centre body 18 for controlling the size of the flow cross-section of the outlet nozzle 7.

The further conduit 20 is also connected to the inlet means 6 by means of a branch pipe 21 which is provided with a control valve 22 for varying the flow of water through outwardly directed outlet openings 23 in the centre body 18 so as to vary the characteristics of the water jet issuing from the outlet nozzle 7.

This flow may also be varied by control means 19 which can be operated to vary the longitudinal position of the centre body 18 relative to the outlet nozzle 7, as a result of non-uniform cross-

section of the centre body 18.

As schematically shown, the fire monitors 1 and 2 may also be provided with additive fluid inlet means 26 for injecting or inducing liquid or gas into the water passing through the water conduit 4 and 5. Depending on the design of the inlet means 26 and its location relative to the nozzle 7, this additive fluid can be used to disrupt the jet.

In the fire monitor 3 shown in Figure 5, the vertical supply pipe 25 is connected to a ball-and-socket joint 15 by a flange connection 29 for use in swivelling the apparatus so as to control the direction of the jet issuing from the outlet nozzle 7.

The fire monitor 3 shown in Figure 5 may be modified as shown in Figure 6. Here, the inlet means comprise a vertical supply pipe 25 provided with a swivel 16 for horizontal adjustment of the apparatus about a vertical axis. The pipe 25 has two horizontally extending inlet branches 27 which are provided with swivels 17 to allow the fire monitor to be adjusted about a horizontal axis.

Claims

1. A fire monitor (1, 2 or 3), for projecting water, comprising:-

a water conduit (4 and 5);

inlet means (6) connected to the water conduit (4 and 5); and

an outlet nozzle (7) connected to the water conduit (4 and 5);

characterised in that:

the water conduit comprises at least two coaxially arranged tubular parts (4 and 5);

the inlet means (6) and the outlet nozzle (7) are connected to the radially innermost and radially outermost tubular parts (4 and 5) of the water conduit; and

means (8 and 9) for reducing turbulence and swirl in water fed to the outlet nozzle (7) comprise flow deflectors at axially adjacent ends of each radially adjacent pair of coaxially arranged tubular parts (4 and 5) so as to provide a semi-toroidal bend to effect reversal of flow so that the water flow along the radially adjacent tubular parts (4 and 5) is in opposite directions.

2. A fire monitor (1 or 2), according to Claim 1, in which:

guide vanes (10 and 11) are respectively provided within two radially adjacent tubular parts (4 and 5); and

the guide vanes (11) provided within the tubular part (5) connected to the outlet nozzle (7), at least, are adjustable flow controlling

vanes.

3. A fire monitor (1, 2 or 3), according to Claim 1 or Claim 2, characterised in that the radially innermost tubular part (5) is connected to the outlet nozzle (7).

4. A fire monitor (1, 2 or 3), according to any preceding claim, in which:

the flow deflectors include a baffle plate (8) extending between each radially adjacent pair of coaxially arranged tubular parts (4 and 5) and an adjacent fairing (9) mounted on the radially inner tubular part (8) of each said radially adjacent pair of coaxially adjacent tubular parts (4 and 5); and

each baffle plate (8) has an outer peripheral portion (12) which is curved so as to cooperate with the adjacent fairing (9) to provide a curved water path.

5. A fire monitor (1, 2 or 3), according to any preceding claim, in which:

swivel mounting means (13 and 14, 15, or 16 and 17) are mounted between the inlet means (6) and the water conduit (4 and 5) so as to allow movement of the water conduit (4 and 5) about horizontal and vertical axes.

6. A fire monitor (2), according to any preceding claim, in

which:

a centre body (18) is mounted within the outlet nozzle (7) for controlling the flow of water through the outlet nozzle (7).

7. A fire monitor (2), according to Claim 6, in which:

the centre body (18) has a longitudinal axis coincident with the longitudinal axis of the water conduit (4 and 5) and a cross-section, perpendicular to its longitudinal axis, which varies at different points along its longitudinal axis; and

control means (19) are provided for varying the longitudinal position of the centre body (18) relative to the outlet nozzle (7).

8. A fire monitor (2), according to Claim 6 or Claim 7, in which:

a further conduit (20) is mounted within the innermost tubular part (5) coaxial with the outlet nozzle (7),

the centre body (18) is hollow and is communicatively connected to the further conduit (20);

a branch pipe (21) extends between the inlet means (6) and the further conduit (20); and

control valve means (22) are provided for controlling the flow of water through the branch pipe (21).

9. A fire monitor (2), according to Claim 8, in which:

the centre body (18) has at least one outwardly directed outlet opening (23).

10. A fire monitor (1), according to any one of Claim 5 to 9, in which:

horizontal inlet pipes (24) extend into opposite sides of the fluid conduit (4 and 5);

the swivel means (13) which permit adjustment of the axis of the water conduit (4 and 5) about a horizontal axis are provided on the horizontal inlet pipes (24);

the inlet means (6) include a vertical inlet pipe (25); and

the swivel means (14) which permit adjustment of the axis of the water conduit (4 and 5) about a vertical axis are provided on the vertical water pipe (25).

11. A fire monitor (1 or 2), according to any preceding claim, in which additive fluid inlet means (26) are provided for injecting or inducing fluid into water passing through the water conduit (4 and 5).

12. A fire monitor (3), according to any one of Claims 5 to 9, in which the inlet means (6) extend veretically into the water conduit (4 and 5) and include swivel means (15 or 16) which permit adjustment of the axis of the fluid conduit (3) about a vertical

axis.

13. A fire monitor (3), according to Claim 12, in which the swivel means comprise a ball-and-socket joint (15) which also permits adjustment of the axis of the water conduit (4 and 5) about a horizontal axis.

14. A fire monitor (3), according to Claim 12, in which:

the inlet means (6) include two coaxially aligned, horizontal branches (27) extending in opposite directions;

swivel means (17) are provided in the horizontal branches (27) for permitting adjustment of the axis of the water conduit (4 and 5) about a horizontal axis.

15. A fire monitor (1, 2 or 3) substantially as hereinbefore described with reference to and as illustrated in Figures 1 to 3, Figure 4, Figure 5, or Figures 5 and 6 of the accompanying drawings.

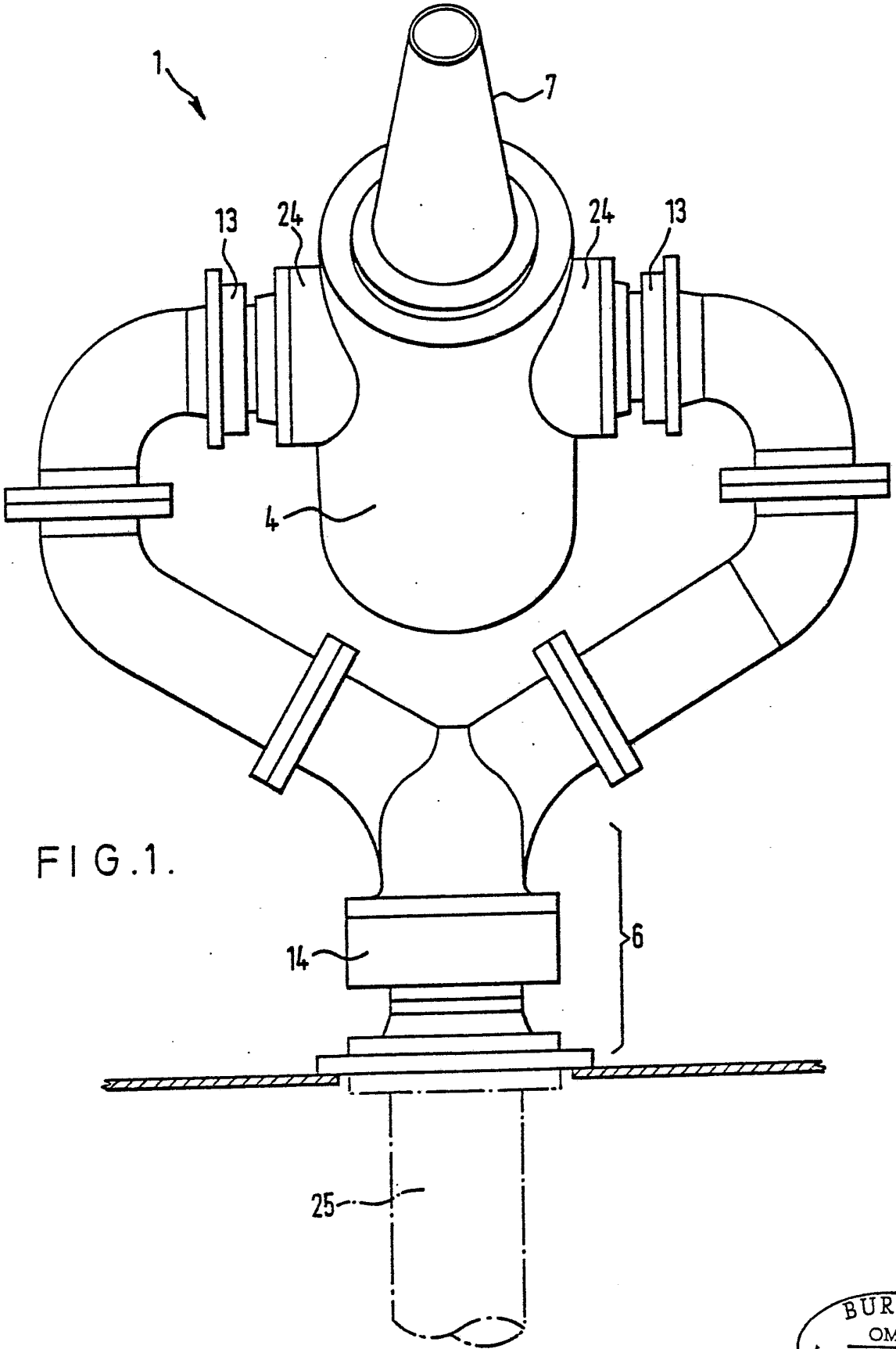


FIG.1.

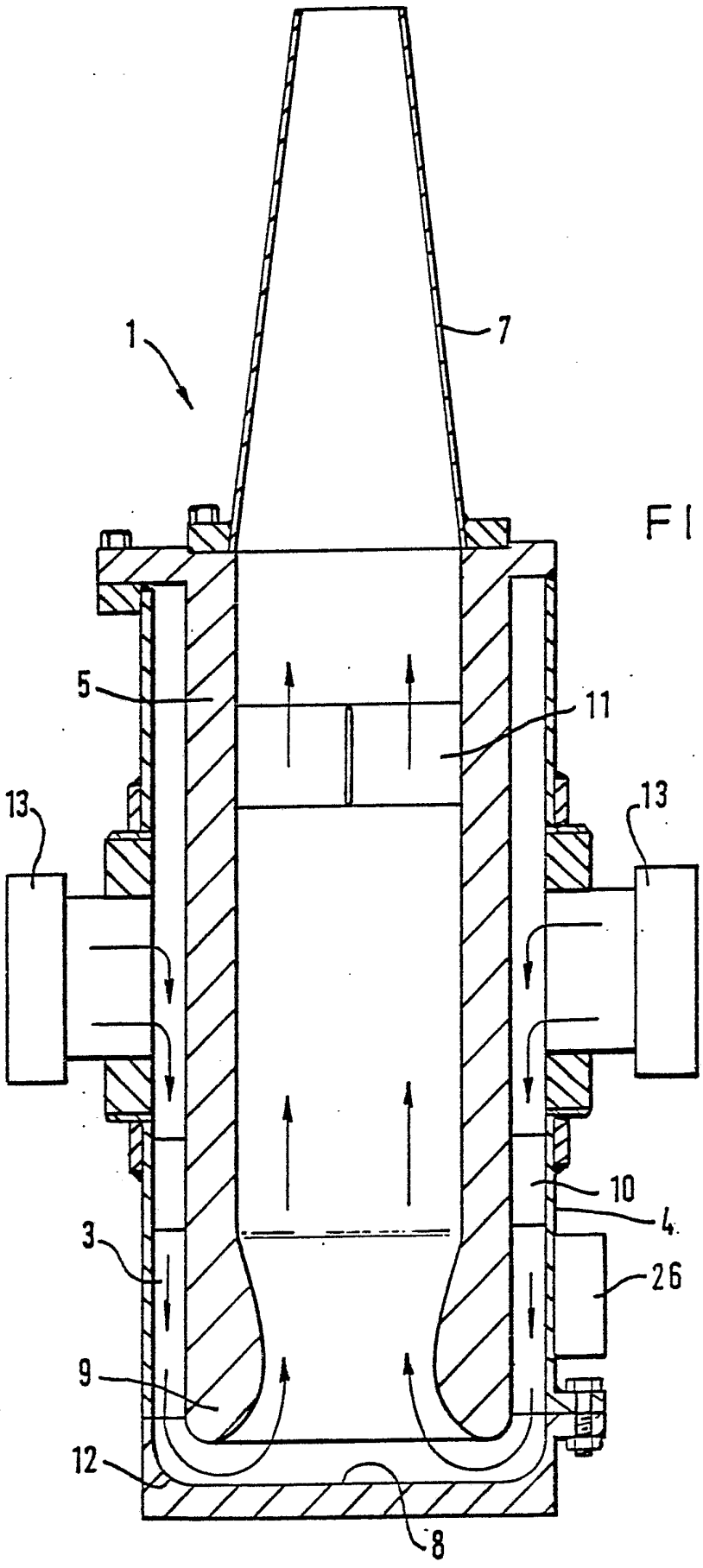


FIG. 2.

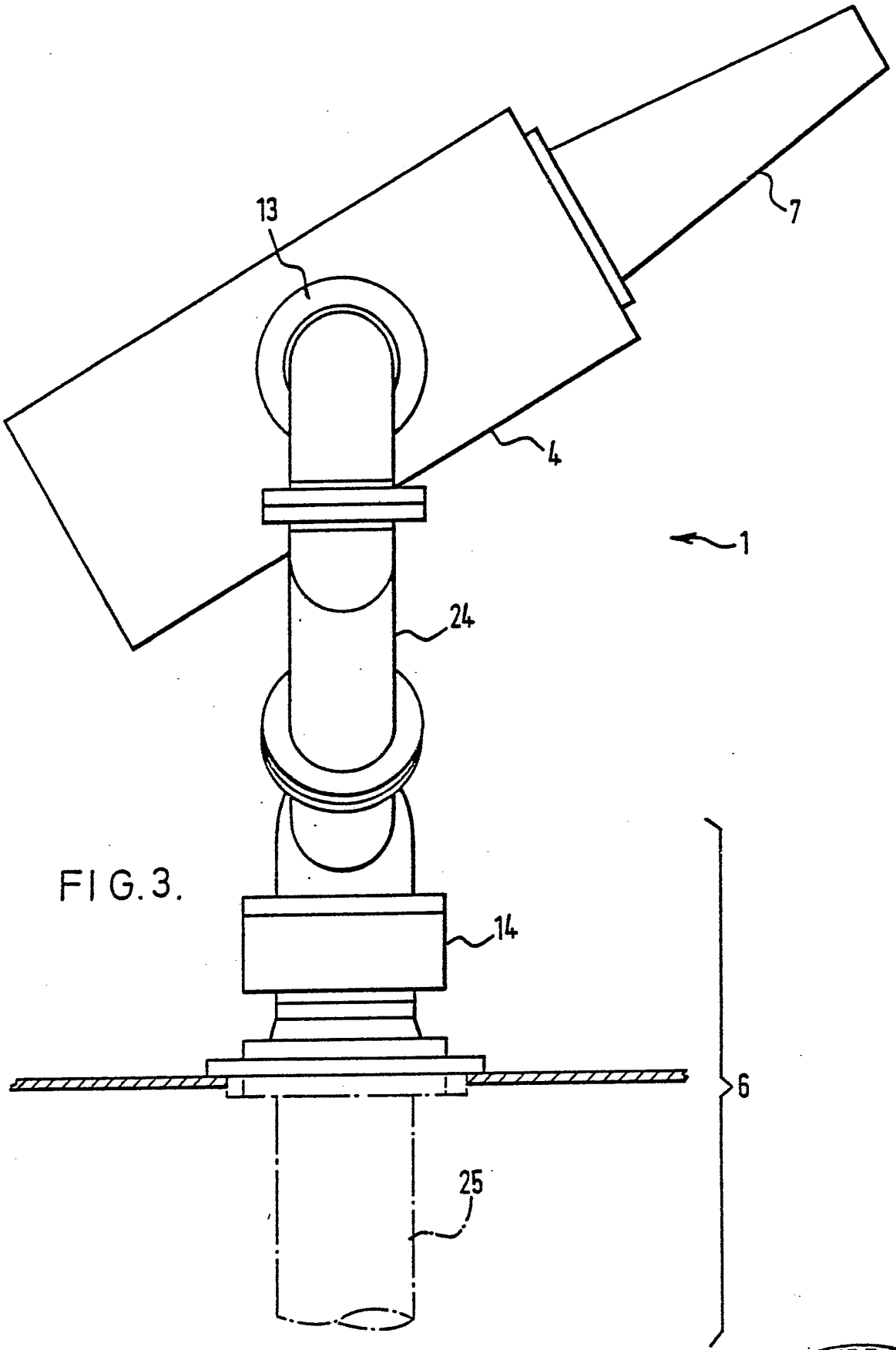


FIG.3.

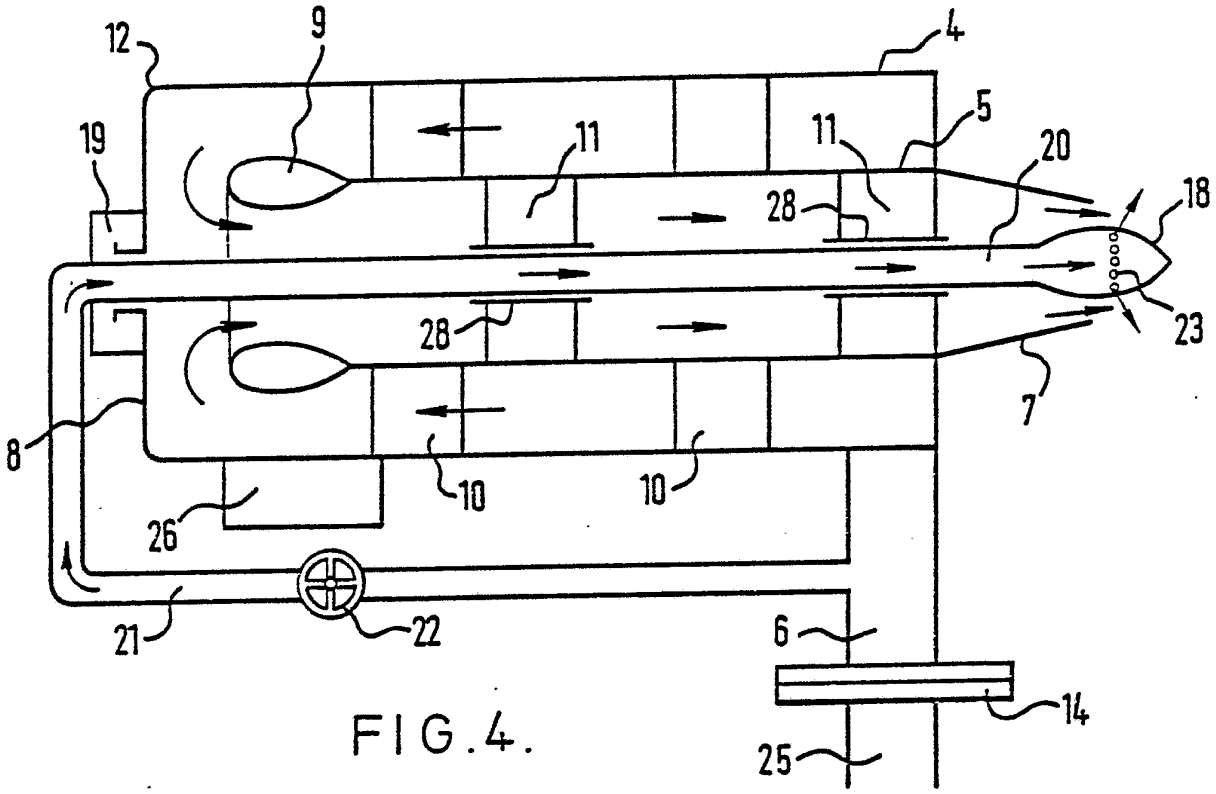


FIG.4.

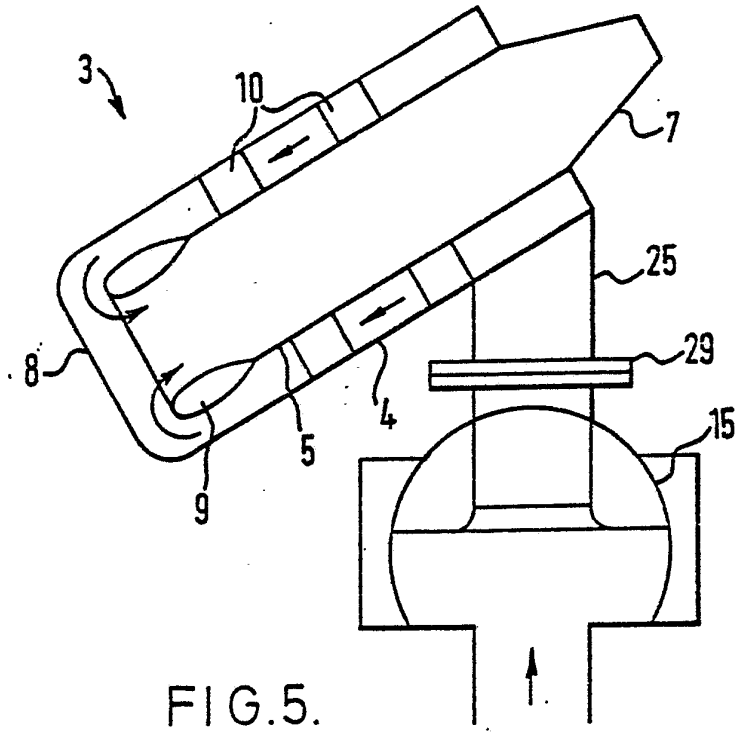
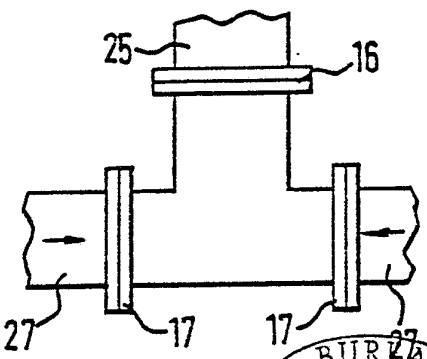


FIG.5.

FIG.6.



INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 83/00122

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC[3]: A 62 C 31/24

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
IPC[3]	A 62 C

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [5]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category *	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
X	GB, A, 1505721 (SHORT) 30 March 1978 see the entire document	1,3,5,10
A		2,4
A	FR, A, 2378571 (BIRO) 25 August 1978 see page 1, lines 21-26; figure 1	8,11-13
A	DE, A, 2705357 (SIMONIS) 10 August 1978 see page 3, lines 15-18; figure 4	14
A	EP, A, 0036287 (CHUBB FIRE SAFE) 23 September 1981 see page 1, lines 6-14; page 6, lines 8-12; figures 2,3	6,13
A	FR, A, 1249328 (BRION) 21 November 1960 see page 1, column 1, lines 6-19; page 3, lines 26-32, 40-44; figure 4	6-9
A	US, A, 2692800 (NICHOLS et al.) 26 October 1954 see page 1, column 2, lines 15-34; figure 1	8

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* Special categories of cited documents: [15]

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IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
4th July 1983	26 JUL 1983
International Searching Authority [1]	**Signature of Authorized Officer [20]**
EUROPEAN PATENT OFFICE	G.L.M. Kruydenberg

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, 16 with indication, where appropriate, of the relevant passages 17	Relevant to Claim No 18
A	US, A, 2789867 (BLOOM et al.) 23 April 1957 see page 1, column 2, lines 19-30; figures 1,2	9

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON

INTERNATIONAL APPLICATION NO. PCT/GB 83/00122 (SA 5093)

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Patent document cited in search report	Publication date	Patent family member(s)		Publication date
GB-A- 1505721	30/03/78	None		
FR-A- 2378571	25/08/78	DE-A-	2803436	02/08/79
		JP-A-	53128198	08/11/78
		GB-A-	1565771	23/04/80
		US-A-	4195692	01/04/80
		CA-A-	1098152	24/03/81
DE-A- 2705357	10/08/78	None		
EP-A- 0036287	23/09/81	GB-A-	2071527	23/09/81
		AU-A-	6802381	17/09/81
FR-A- 1249328		None		
US-A- 2692800		None		
US-A- 2789867		None		