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(56) Documents Cited
GB 1171045 A **WO 96/01153 A1**

(58) Field of Search
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INT CL⁶ **B05B 3/04**
On-line: **WPI, PAJ, EPODOC**

(54) Abstract Title
Sprinkler device

(57) A sprinkler device has an inner (B) and outer (A) layer of jets which are co-axial with a rotor (3) having blades symmetrical to the flow path of said jets. The first set of jets act directly on the rotor at (4) to produce maximum RPM, while the residue is deflected to react with a second set of jets at (5) which is arranged to skiff or lightly brush past the rotor blades resulting in vaporisation of part of the said jet. Residue of said first set of jets are arranged to impact on and transport said vapour towards target area.

The device is suitable for fire fighting, irrigation, artificial snow etc.

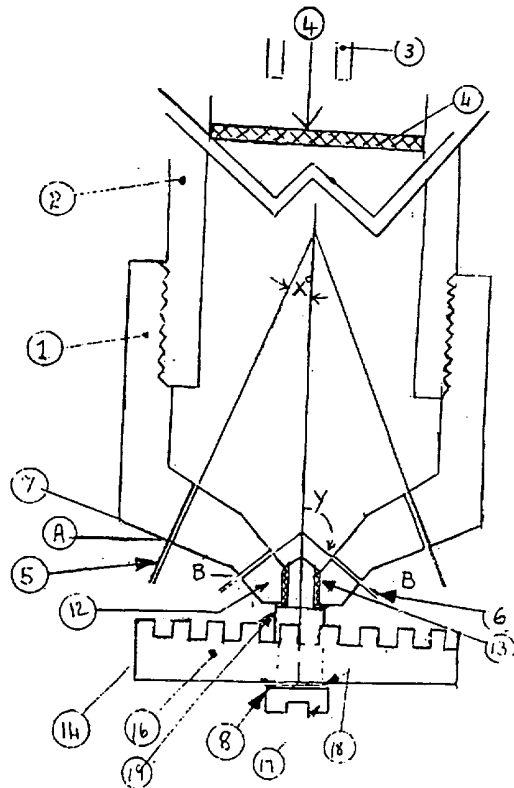


FIGURE 1

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

At least one of these pages has been prepared from an original which was unsuitable for direct photoreproduction.

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THE BLASTER NOZZLE

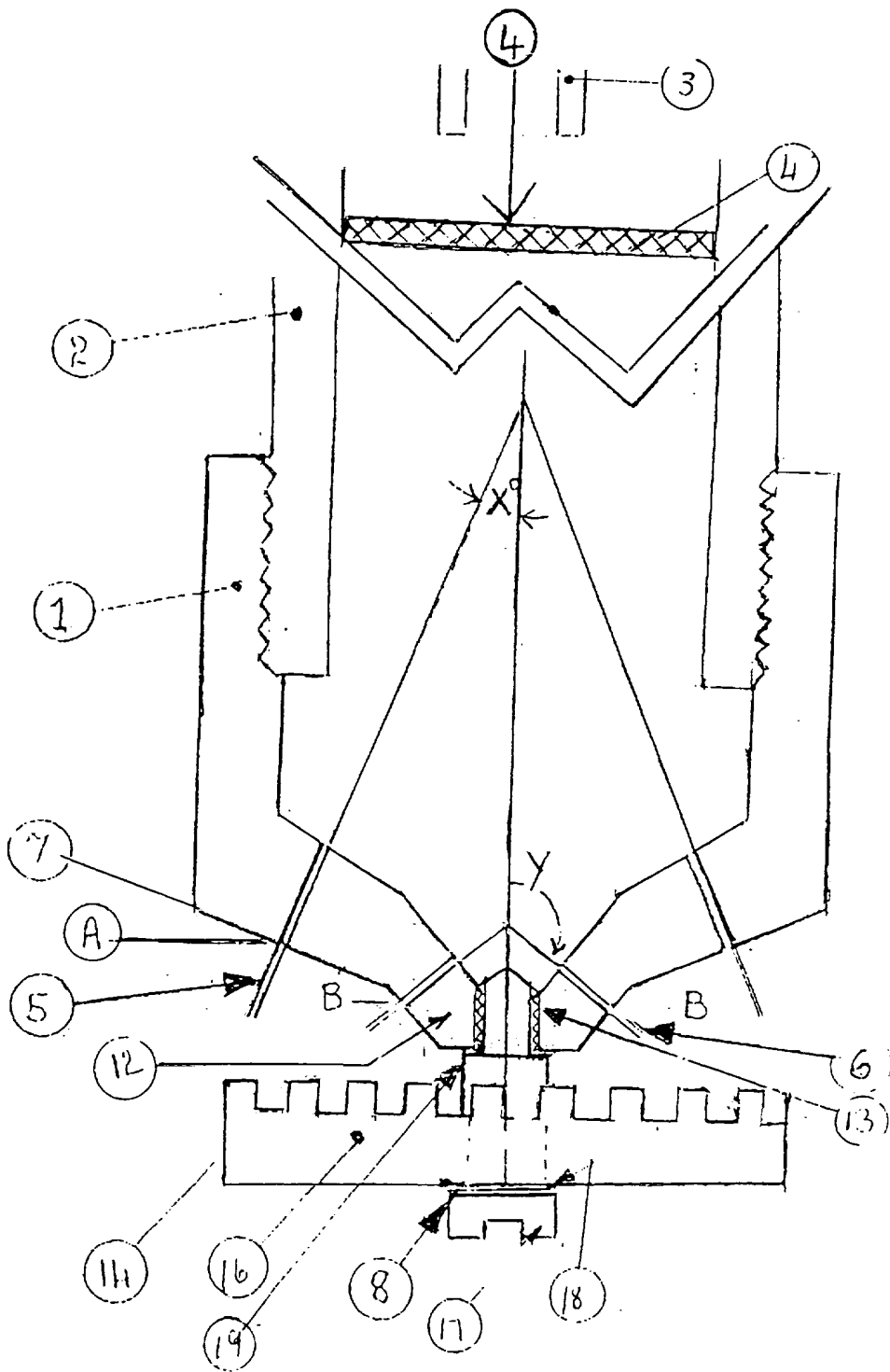


FIGURE 1 OF 3

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THE BLASTER NOZZLE

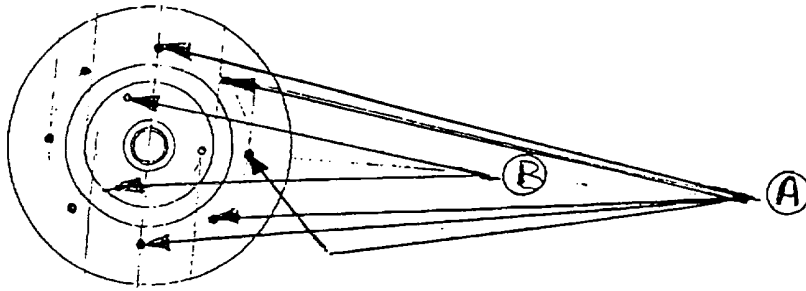


FIG. 2 of 3
Plan View at levels "AA" and "BB"

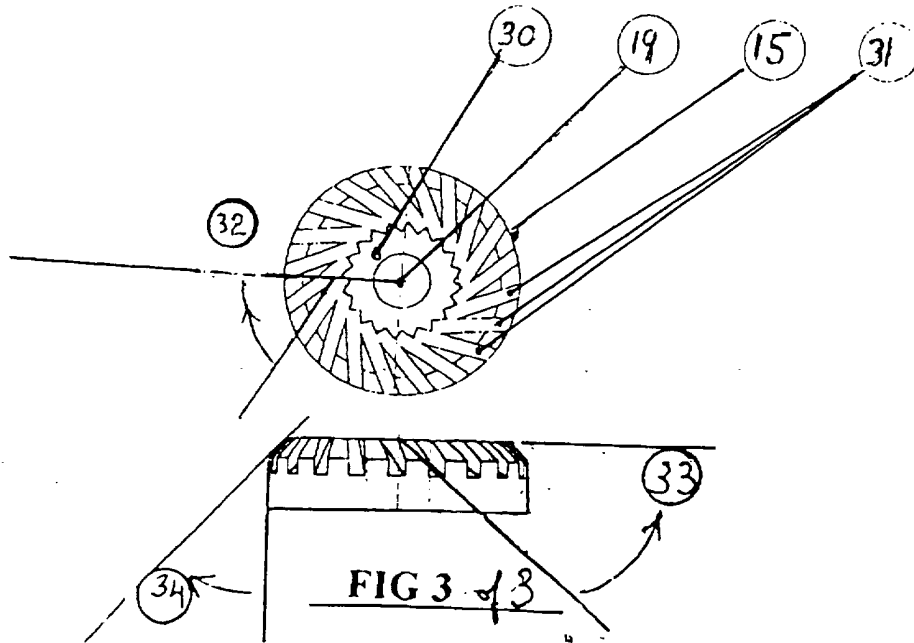


FIG 3 of 3
Plan And Section Of rotor.

Sprinkler Device. Ref 271097G1

1) This invention relates to sprinkler devices for dispersing liquids.

2) It is well known to use fixed systems of sprinklers for fire suppression but to date no such system has coped satisfactorily with a wide range of fire risks including flammable liquids which may be masked or sheltered from the direct jets issuing from said sprinkler.

3) According to the present invention a sprinkler device comprises a liquid inlet and at least two sets of liquid outlets joined by a flow passage. The flow passage is constructed to produce a substantially laminar fluid flow at the outlets to cause substantially laminar jets to issue from said outlets, and a co-axially mounted rotor having blades arranged to react with said jets.

4) Each set will be symmetrical about the axis of the flow passage and a first set will be designed and located to impact directly on a suitable part of the rotor and at a suitable angle to produce maximum RPM in said turbine.

5) A second set is also symmetrical about the axis of the flow passage. It is designed & aligned at a suitable angle to lightly brush or "Skiff" against the tips of the rotor blades which are being driven at high speed by the first set of jets.

6) Both sets of jets, the turbine & turbine blades are all co-axial with the flow passage and each other.

7) Although called a sprinkler device the unit whose detailed description follows is in fact a hazard fire fighting nozzle and solves a problem which has been common to all existing nozzles of this general type namely an inability to perform consistently in the face of obstructions & varied geometry in conflagration area.

8) The hazard fire nozzle described in this patent utilises heat sink to cool the flames and a conical water curtain to prevent ingress of Oxygen in similar manner to other water mist systems but it achieves this by utilising the first set of jets to drive the rotor which impacts on the outer part of the second set of jets shattering the impact point, a small portion of which is accelerated away so violently that the co-efficient of adhesion is exceeded and the liquid globule absorbs the energy by vaporising.

9) Students of fire mist philosophy will understand that this inertia free vapour is readily transported by and within the BLASTER curtain. It matches the deluge characteristics of Halon and floods the area behind & around obstructions. Near instant transfer of vapour to steam realises further heat sink potential.

10) Single nozzles with 3 M range and 10 LPM flow at 40 bar will quench petrol fire in a meter square tray in 7 seconds. If obstructed by a barrel 9" above tray & directly in line with nozzle quench is 25 secs at a fraction of Halon cost..

The invention also facilitates and permits other processes including irrigation, airborne fire suppression, Spring snow creation and water purification.

Embodiments of the invention will now be described, by way of example, with reference to the drawings, in which:-

Fig 1. Is a vertical cross section of a sprinkler device hereafter called a "BLASTER" nozzle and representing a first embodiment.

Fig 2. Is a plan view of the nozzle showing sets of jets at "A" & "B"

Fig 3. Is a plan and section of the rotor.

Referring to fig 1 the BLASTER comprises a substantially cylindrical body (1)

It is equipped with a coupling device (2)

Which receives a pressurised water supply (3)

Through a filter (4).

These items together forming a streamlined fluid delivery system

This system connects to one or more radially disposed sets of jets.

In the configuration described a first set of jets is indicated at (B)

It is shown in plan at Fig (2)

These are known as Dynamic Jets.

They are located at an angle (Y) to the vertical which is calculated to impact on the turbine at the best angle to produce maximum RPM.

Number of turbine blades is indivisible by the number of dynamic jets.

The profile of nozzle body has an external surface (8) at right angles to the jets.

Additional set or sets of jets (5) are called "Vaporisers"

They are shown in plan in Fig (2) as "A"

Angle "X" insures that jets "Skiff" or lightly brush against turbine blades tips..

Studying Fig 3; the free spinning turbine or rotor (15) is made from material with minimum coefficient of friction and has a bearing or is hard anodised at axis (19). The flat impact surface (30) extends for about half of its diameter and matching parallel vertical slots (31) radiate outwards from it with a specific pitch (32). These slots are cut in the vertical or "X" axis and have a constant decline angle from the impact surface (30) to the external periphery as shown at (33) A bevel (34) on the upper surface helps define the trajectory of the vaporising jet.

Returning to fig 1 the rotor (16) is accurately located in the vertical plane by a stud (17) with a thrust surface (18) and a shoulder (19). A diminished diameter is threaded at (13) to screw into the horizontal termination of the surface indicated at (12). The jets, the jet outlets, the turbine itself and all profiles forming the periphery of the device are co-axial, symmetrical and evenly spaced generally as indicated in Fig.2.

Part impact of turbine tips produces minute globules from the jet surfaces..

They also destroy momentarily portions of boundary layer and surface tension.

This leaves a void and permits some of the expanding vapour to enter.

Installing a supersaturated solution of water vapour within the liquid jet.

Impact frequency caused a jet vibration with cycle time matching impact value.

Resulting outgoing H2O combines many different constituent parts of spray, mist, fog and vapour which can be varied to match the specific requirements of the applications.

Application No.9723119.5 Ref. 110798G4

Preamble. A sprinkler device with inlet for liquid & a flow passage connecting it with a multiplicity of outlets producing liquid jets arranged to intercept a co-axially mounted rotor or turbine, wherein the flow passage is streamlined to permit the exiting jets to be of substantially laminar form as in my international patent WO 96/01153 .

Claims

1. A sprinkler device as in preamble except that the outlets are arranged to project two or more sets or layers of jets all of which are coaxial with said rotor the blades of which are symmetrical and co-axial with the flow path and arranged to react with said jets with a first set of jets impacting directly on a turbine to produce maximum R.P.M. and residue deflected to impact on second set of jets which are arranged to "Skiff" the blade tips of said turbine resulting in vaporisation. Said first set of jets are arranged to impact on and transport said vapour towards a target area.
- 2) A sprinkler device as in claim 1 in which a first set of said jets will be designed, angled and located to impact directly on a suitable part of the turbine or rotor to produce the maximum RPM. and the residue of the jets be deflected to impact on the residue of a second set of jets.
- 3.. A sprinkler device as in claims 1 & 2 in which a second set of jets is designed and located to brush or "Skiff" the rotor tips which are being rotated at high speed by the first set of jets. Said second set of jets are so arranged that the skiffing contact or force of impact temporarily destroys local surface tension and boundary layer in said jet creating a void in proximity to turbine and permitting entry of some of the vapour caused by the glancing impact. Vapour is trapped in jet when surface tension reforms.
4. A sprinkler device as in claims 1 to 3 in which the impacts detach particles of water and transfer much more energy than can be absorbed by acceleration alone resulting in change of state to gaseous form and consequential massive expansion....
5. A sprinkler device as in claims 1 to 4 vaporises water particles producing massive expansion of around 1700 times which has little or no inertia or mass in accordance with normal laws of physics. However the residue of the first set of jets as claimed in claim 2 will impact on and transport said vapour in the direction the flow is pointed
6. A sprinkler device as in claims 1 to 5 in which the residue from one set of impacted water jets is used to transport and direct a second set of water jets or the residue thereof or a mixture of water and vapour or pure water vapour towards a target area.
7. .A sprinkler device as described herein with reference to figures 1 to 4 of drawings



Application No: GB 9723119.5
Claims searched: 1-7

Examiner: Jeremy Philpott
Date of search: 14 January 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): B2F [FEA, FEB, FHB]

Int Cl (Ed.6): B05B: 3/04

Other: On-line: WPI, PAJ, EPODOC

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 1171045 A (Peretz Rosenberg) whole document & Figures, note the two types of blade on the rotor.	
A	WO 96/01153 A1 (Gerald Harris) whole document & Figures.	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.