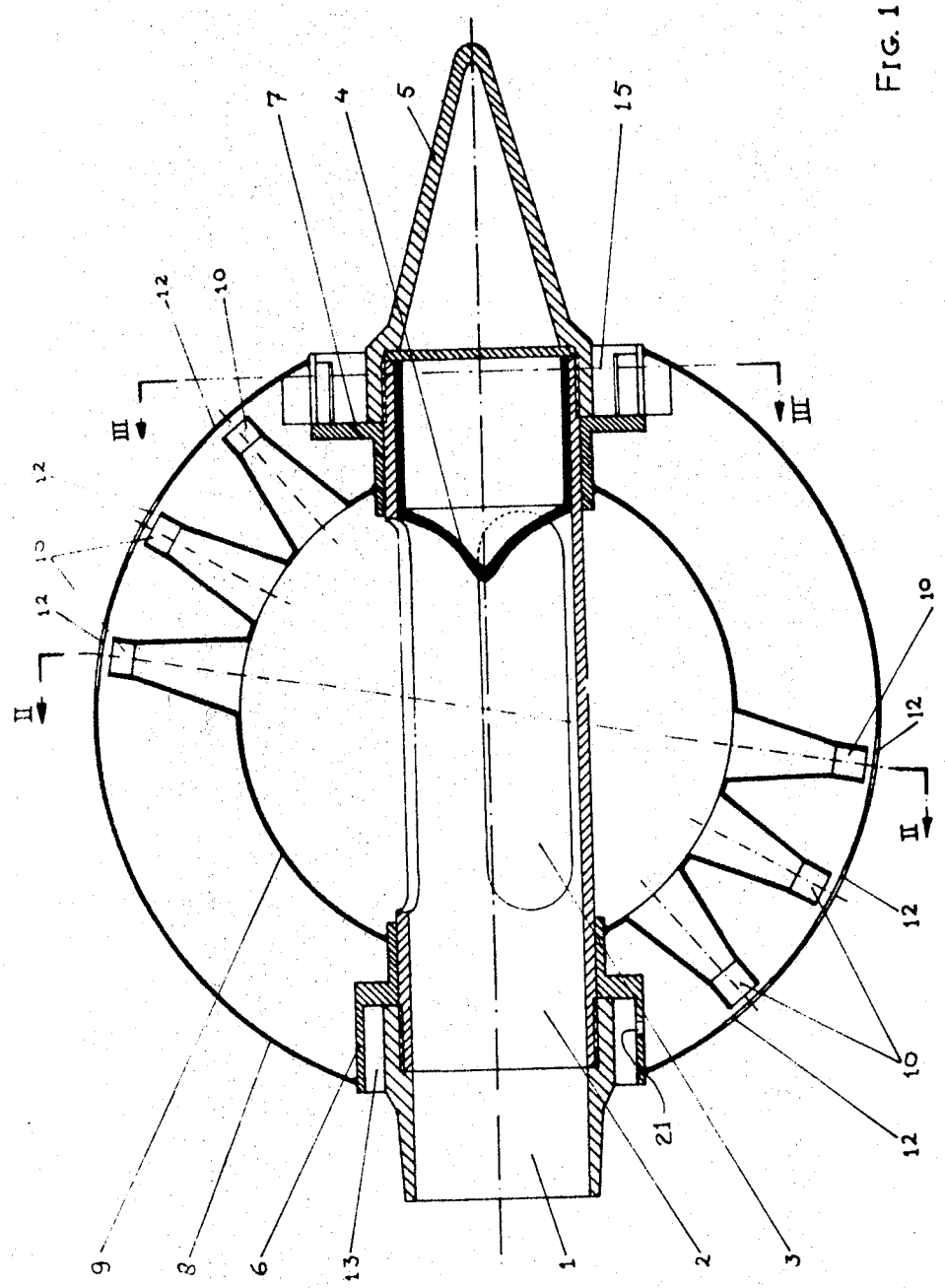
Aug. 26, 1969 C. C. VAN BAAK 3,463,234

METHOD AND APPARATUS FOR FIRE CONTROL

Filed June 13, 1967 4 Sheets-Sheet 1

FIG. 1.



INVENTOR
Carel C. van Baak

BY Schmidt, Johnson, Hovey, Williams & Bradley.
ATTORNEYS.

METHOD AND APPARATUS FOR FIRE CONTROL

Filed June 13, 1967 4 Sheets-Sheet 2

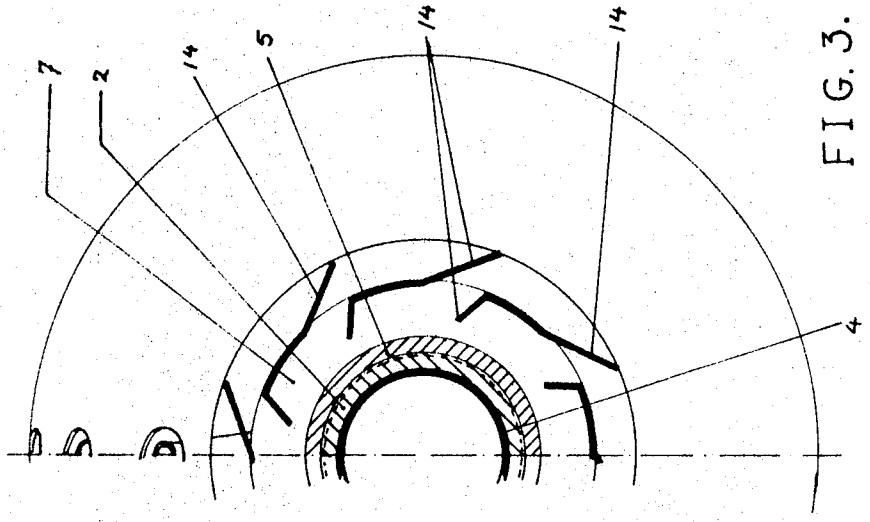


FIG. 3.

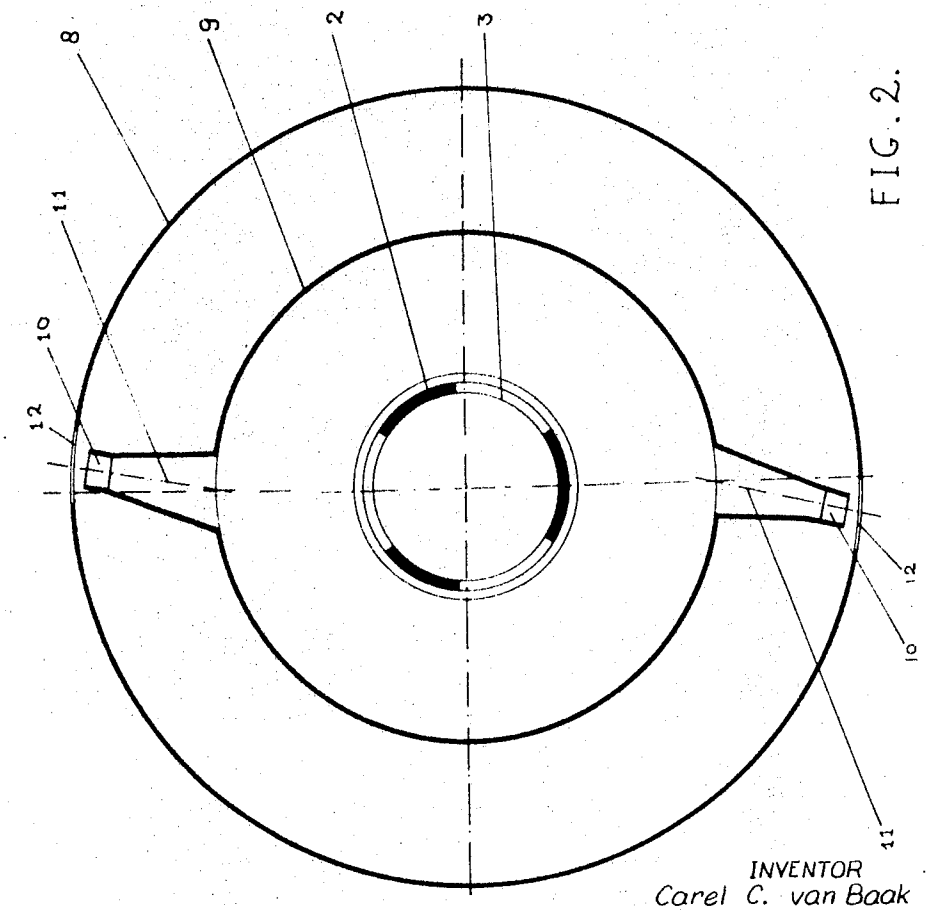


FIG. 2.

INVENTOR
Carel C. van Baak

BY Schmidt, Johnson, Hovey, Williams & Bradley.
ATTORNEYS.

Aug. 26, 1969 C. C. VAN BAAK 3,463,234

METHOD AND APPARATUS FOR FIRE CONTROL

Filed June 13, 1967 4 Sheets-Sheet 3

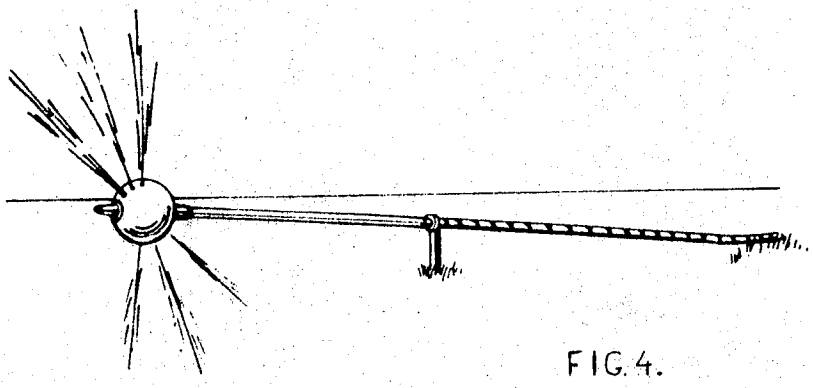


FIG. 4.

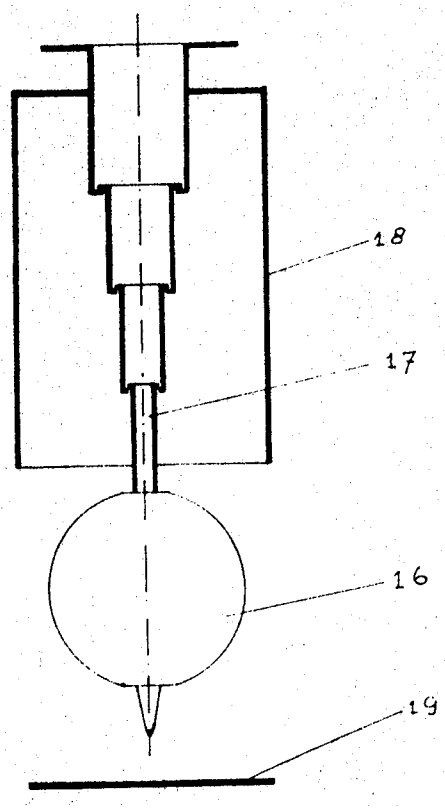


FIG. 5.

INVENTOR
Carel C. van Baak

BY Schmidt, Johnson, Hovey, Williams & Bradley
ATTORNEYS

Aug. 26, 1969 C. C. VAN BAAK 3,463,234

METHOD AND APPARATUS FOR FIRE CONTROL

Filed June 13, 1967 4 Sheets-Sheet 4

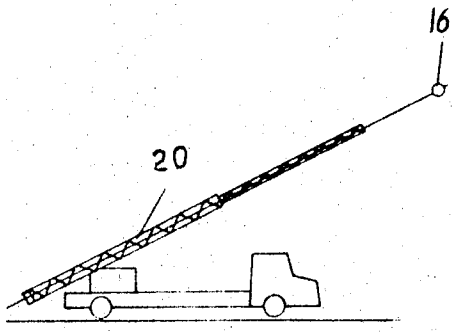


FIG. 6a.

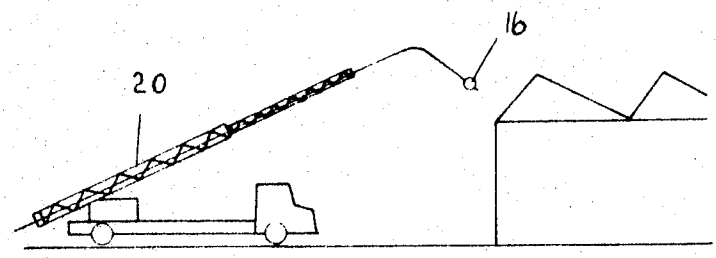


FIG. 6b.

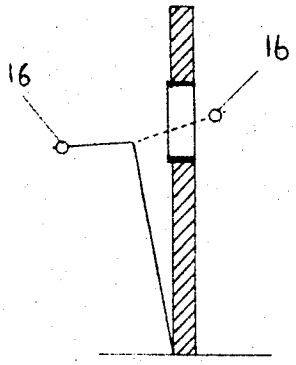


FIG. 6c.

INVENTOR
Carel C. van Baak

BY Schmidt, Johnson, Hovey, Williams & Bradley.
ATTORNEYS.

United States Patent Office 3,463,234
Patented Aug. 26, 1969

3,463,234

METHOD AND APPARATUS FOR FIRE CONTROL

Carel C. van Baak, Jan van Eyckgracht 92,
Eindhoven, Netherlands

Filed June 13, 1967, Ser. No. 645,725
Claims priority, application Netherlands, July 6, 1966, 6609419
Int. Cl. A62c *31/30*; B05b *3/10*
U.S. Cl. 169—2 14 Claims

ABSTRACT OF THE DISCLOSURE

A method and apparatus for fire fighting wherein a fire-fighting agent under pressure is sprayed omnilaterally through a rotating nozzle head comprising a pair of concentric, spaced spheres. A fire retarding medium such as the fire combustion gases is drawn between the rotating spheres by the blades of a rotator whereby the medium is cooled by proximity to the fire-fighting agent and is entrained in the streams of the latter for reintroduction to the seat of the fire. Alternatively, means is provided for introducing a medium such as a negative catalytically working substance or CO_2 or the like, into the space between the rotating spheres for mixing with the agent and to be flung with the latter from the rotating nozzle head.

This invention relates to a method and apparatus for fire control wherein a fire extinguishing agent is dispersed omnilaterally.

Procedures and devices similar in a general way to descriptions set forth herein are described in United States Letters Patent No. 2,993,650 and United States Letters Patent No. 2,661,241. An underground fire control is described in United States Letters Patent No. 1,756,582. Further, the German Patent No. 1,015,748 describes a device for the omnilateral dispersion of a fire extinguishing agent and French Patent No. 1,181,922 and its supplementary French Patent No. 78,674 describe a dispersion of the fire extinguishing agent by means of a rotor.

In spite of the fact that the devices described in the referenced patents as a result of the omnilateral or multilateral dispersion of a fire extinguishing agent, work more effectively than fire control by means of a directed jet, all have a common objectionable feature in that both the seat of the fire and the hot gases of combustion are propelled by the supply of the fire extinguishing agent with methods and devices described in the patents.

In controlling fires, the following factors play a part: firstly, cooling to below the temperature of combustion of the space in which the fire rages, as well as the burning items themselves; secondly, prevention of oxygen from joining the fire; thirdly, administering of negative catalytically working substances to the fire; and fourthly, if possible, the removal of the flammable and burning matter from the fire site.

With all fire control methods known so far, including those wherein omnilateral dispersion of the fire extinguishing agent is applied, oxygen is also supplied in addition to the fire extinguishing agent by the injective operation of the jets. In many cases the supply of oxygen by this injective operation is in excess of the quantity of supplied fire extinguishing agent. As a result of this the fire is driven on and even stimulated. This objection is particularly unavoidable when the seat of the fire, for instance, can be reached only from the outside. Thus, when the fire-fighting water, with the injected air, is supplied only from this external position, the fire may be extinguished at the spot where it is hit by the air-water jet, but the water jet also propels entrained air into spaces situated behind the site of the fire or even into more elevated stories of the burning structure.

The present invention aims at meeting the objections referred to above and is therefore characterized in that, on application of the procedure of this invention, the fire extinguishing agent is flung away from the applicating apparatus and is simultaneously mixed with another medium. This medium may, if desired, be drawn from the space where the fire prevails.

The fire extinguishing agent can be water as well as any other suitable fire-fighting agent such as, for instance, CO_2-gas and the like. The medium can be, for instance, the hot gases of combustion present in the space where the fire prevails, but may also be a negative catalytically working substance or the like.

The method in accordance with the invention is also characterized by the fact that the pressure of the fire-fighting agent is used for the flinging of the fire-fighting agent away from the applicating apparatus and also by the fact that the pressure of the fire-fighting agent itself is used to impart a rotating movement to the spray nozzles which results in the flinging of the fire-fighting agent away from the apparatus.

Manifestly, the pressure of the fire-fighting agent can also be used to put the device of this invention into operation in accordance with the procedure described herein.

The method of this invention contemplates that the fire-fighting agent be dispersed from the supply line, and that such dispersal be preferably omnilaterally and at such an angle with respect to the longitudinal axis of the supply line that a spherical cloud of the fire-fighting agent develops. By making use of the injective operation of the dispersion of the fire-fighting agent, the latter can be mixed with another medium, such as the gaseous products of combustion and steam present in the relevant space, but the medium might also for instance be CO_2-gas. The advantages of this procedure which results in the drawing in of the gases present in the relevant space are: chilling of these gases, by which the fire can be more quickly controlled; and, when using CO_2-gases, oxygen is excluded in this manner from the seat of the fire.

If the method is pursued in such a manner that instead of an omnilateral dispersion of the fire-fighting agent the latter is, for example, dispersed over merely a part of the area of combustion, then, on the spot where the fire-fighting agent is not dispersed, a reduced pressure will develop. As a result of this reduced pressure, the gases present in the relevant space will be drawn in toward the zone of reduced pressure and will be mixed with the issuing fire-fighting agent. The advantages of this are very important, since, for instance, the flames are drawn in and are directly chilled by the fire-fighting agent.

It is therefore apparent that by means of use of the procedure of this invention, the fire is not propelled further but, on the contrary, it is drawn in.

The invention is not limited to use with mobile fire extinguishing installations only, but can also be used with installations previously quipped for application of the procedure, whereby the installation becomes operative as soon as the fire-fighting agent is supplied. Thus, a pipe system can be installed, to which several devices constructed in accordance with the teachings of this invention for carrying out this procedure can be connected, which, at choice, can be put into operation in the known manner.

As an example of apparatus for the application of the method of this invention, reference is made to the form of construction in the drawings, wherein:

FIGURE 1 is a horizontal cross-sectional view through the device taken along the center line of the supply line;

FIG. 2 is a cross-sectional view taken along line II—II of FIG. 1;

FIG. 3 is a fragmentary, cross-sectional view taken along line III—III of FIG. 1;

FIG. 4 is a perspective view of the apparatus constructed according to the teachings of this invention;

FIG. 5 is a diagrammatic representation of an apparatus embodying the principles of the invention and fitted in an existing installation;

FIG. 6*a* is a diagrammtic representation of means for bringing the apparatus of this invention as close to the seat of the fire as possible;

FIG. 6*b* is a diagram similar to FIG. 6*a* and illustrating different means; and

FIG. 6*c* is still another diagram similar to FIG. 6*a* and FIG. 6*b* and illustrating still another means.

In FIGURE 1, the reference numeral **1** indicates the supply line which terminates with a connecting part or tube **2**, which is in turn provided with, preferably, three axial slots **3**. Part **2** can be sealed with a guide member **4** if desired.

A buffer nose structure **5** is fixed to part **2**. Naturally buffer nose **5** and tube **2** may be constructed as a single component.

Rotatably applied around the tube **2** are the bearings **6** and **7** to which are fixed an outer sphere **8** and an inner sphere **9**. The inner sphere is provided with several diametrically opposite spray nozzles **10**, the center lines **11** (See FIG. 2) of which for two diametrical opposite spray nozzles are parallel to each other, but are not dead in line. By virtue of the disposition of the spray nozzles **10** in this situation, as soon as the fire-fighting agent, which will be supplied under pressure, is ejected from the spray nozzles **10**, the inner sphere **9**, with the bearings affixed to it, and the outer sphere **8** will start to rotate around tube **2**.

By providing the outer sphere **8** with orifices **12** opposite the extremities of the spray nozzles **10**, an injective operation will develop as a result of which the medium, which is present between the inner and the outer sphere, is entrained within the streams of the fire-fighting agent.

The air and/or gases present in the relevant space can be used as this medium, but also a medium that prevents the oxygen to join the seat of the fire may also be utilized. In that event, this medium can be supplied for instance by through coupling by connecting to coupling **13** a pipe or conduit and by providing the bearing **6** with the required orifices or apertures **21** so that the medium may enter the space between the outer sphere **8** and the inner sphere **9**.

The great advantage of this is that, if the device is brought in the vicinity of the seat of the fire, the hot gases of combustion are drawn in and immediately chilled, in consequence of which a very effective fighting of the fire becomes possible.

Another very important result of the rotor **15** is that the fire is no longer propelled, but on the contrary is attracted or drawn in by the device. Such a rotor can also be attached to both bearings **6** and **7**, which, particularly with devices according to the invention, can be applied advantageously.

Naturally, devices embodying the principles of this invention may vary in construction and are not limited to the precise construction illustrated therein.

Moreover, the invention is not limited to devices which can be used in combination with the existing mobile fire extinguishing equipment, but can also be applied advantageously in buildings, hangars, and the like, and even permits of being fitted in such a manner that absolutely no disfigurement of the ceiling occurs.

One such installation is diagrammatically represented in FIG. 5, in which **16** is a diagrammatical representation of the device according to FIGURES 1, 2 and 3, which device is represented respectively in FIG. 4. The device **16** may be fixed to a telescopic line **17**.

By making the line **17** of telescopic construction, the device **16**, when inoperative, can be housed in a protective case **18**, which, in that case, may be covered by a detachable bottom **19**. This protective case may be made of fire-resistant material, for instance class E or F. An important advantage of this is that, if the apparatus can be supplied with a fire-fighting agent via a fixed line from the outside, the fire can be directly fought on the spot of the seat of the fire with the method according to the invention.

As soon as the fire-fighting agent is supplied under pressure, the device **16**, in connection with the collapsed line **17**, will be pushed out, as a result of which also the bottom **19** will be pushed out of the protective case **18**. The device is then ready for use and the fire can be fought on the spot.

In FIG. 6, a few of the many possibilities are represented to bring a device according to the invention as close as possible to the seat of the fire, whereby **20** indicates the conventional fire ladder, and **16** represents the device in accordance with the invention, which can be telescoped or event bent downwardly as shown in FIG. 6*b*, or, as is represented in FIGURE 6*c*, can be rotated inwardly.

An important property of the device and the method in accordance with the invention is that no back pressure which must be eliminated occurs in axial direction since the axial pressures in the device eliminate each other. A result of this is that the device can, for instance, be placed on a tripod, whereby no provisions are necessary to eliminate forces in axial direction. Such provisions are indeed necessary in other procedures of fire-fighting.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In fire control apparatus having a fire-fighting agent supply line adapted to be coupled with a source of agent under pressure,

a nozzle head coupled with said line at the outermost end thereof,

said head including an elongated tube in axial alignment with said line and secured in fluid communication therewith at one end of the tube;

means closing the other end of the tube;

the tube having a plurality of elongated slots in the sidewall thereof to permit egress of said agent from the tube, said slots extending longitudinally of the tube,

said head including first and second housings secured together and disposed in circumscribing relationship around said tube to cover the slots, and means mounting said housings for rotation with respect to the tube,

said first housing including a plurality of spray nozzles disposed to receive the fire fighting agent from the tube and conduct the agent exteriorally of the first housing,

said second housing surrounding the first housing and being of sufficient size and spaced sufficiently from the first housing to completely envelop the nozzles therewithin; and

a rotor secured to said housings for rotation therewith, said rotor being configured and disposed for drawing fluids from the exterior of said head and supplying said fluids to the space between said first and second housings.

2. The invention of claim **1**, said tube closing means including a conically shaped guide member.

3. The invention of claim **1**, said housing being spherical.

4. The invention of claim **1**, said spray nozzles being provided in pairs, one nozzle of each pair being disposed in diametrically opposed relationship on the housing from the other nozzle of said pair of nozzles.

5. The invention of claim 4, the spray nozzles of each pair thereof being disposed with the longitudinal axes thereof extending in mutual parallelism, said axes being offset from the longitudinal axis of said tube.

6. The invention of claim 1, said mounting means including a bearing disposed for rotation on said tube, the housing being secured to the bearing for rotation therewith.

7. The invention of claim 1, said second housing being provided with openings opposite the outermost ends of said nozzles.

8. The invention of claim 1, said head including a buffer nose structure disposed at the outermost end of said tube.

9. In fire control apparatus having a first fire-fighting agent supply line adapted to be coupled with a source of agent under pressure,

means adapted to be coupled with said line for spraying said agent, said spraying means including a plurality of nozzles, each extending in different directions to increase the coverage of said spray;

a hollow cover member disposed in covering relationship over said spraying means, said member including an outlet opening for each nozzle respectively, each opening being aligned with its corresponding nozzle and spaced outwardly therefrom to permit egress of the agent through the opening,

said member being provided with aperture means to permit ingress of a medium into said member, whereby the jet action of said nozzles in spraying said agent draws said medium into the member for discharge through the openings with said agent.

10. The invention of claim 9, wherein is included means mounting said spraying means for rotation about the axis of said supply line,

said nozzles extending in directions whereby reaction from the movement of said agent through the nozzles

causes rotation of the spraying means about said axis.

11. The invention of claim 9, wherein said aperture means is disposed to communicate the interior of said cover member with the atmosphere.

12. The invention of claim 9, wherein is included means for supplying medium to said aperture means, wherein a fire control medium may be introduced into the cover member through the aperture means for mixing with said agent.

13. The invention of claim 10, wherein is included rotor means carried by said spraying means for rotation therewith, said rotor means including structure for drawing fluids into said cover member upon rotation of the spraying means.

14. The invention of claim 10, wherein said spraying means includes a second hollow member of similar shape to said first member, said second member being smaller than the first member and disposed within the latter to present a chamber between the walls of said member, the nozzles extending into the chamber and said aperture means communicating with the chamber for the introduction of said medium into the chamber.

References Cited

UNITED STATES PATENTS

2,938,673 5/1960 Allenbaugh ..... 239—458

FOREIGN PATENTS

1,051,189 12/1966 Great Britain.

EVERETT W. KIRBY, Primary Examiner

M. Y. MAR, Assistant Examiner

U.S. Cl. X.R.

169—12; 239—226, 288.3