March 11, 1941. E. GÖHRE 2,234,631

APPARATUS FOR PRODUCING FOAM FOR EXTINGUISHING FIRES

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Fig. 1

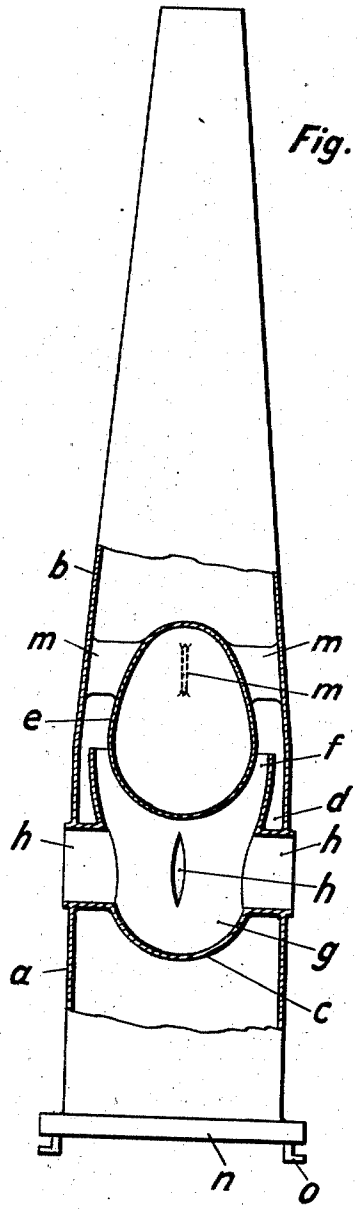

Fig. 2

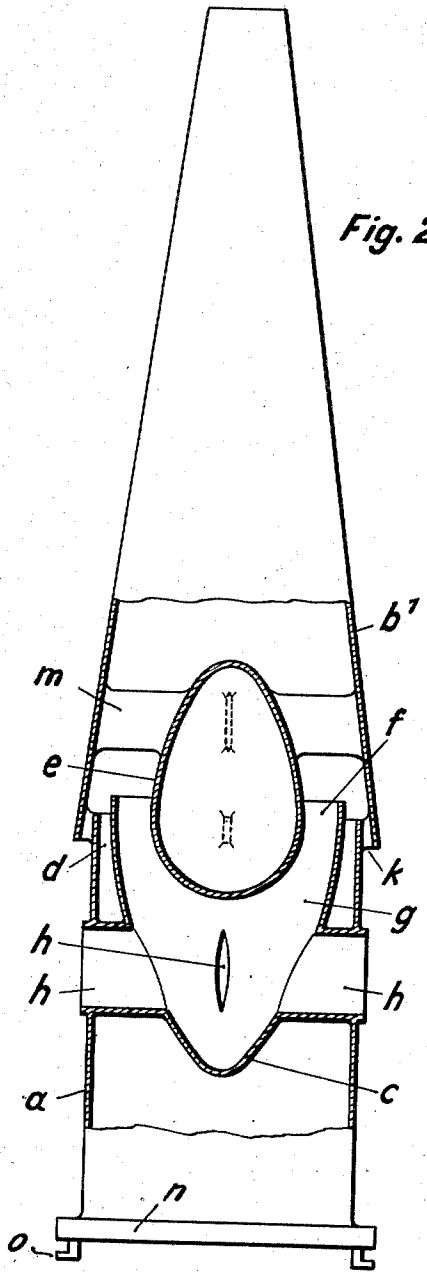

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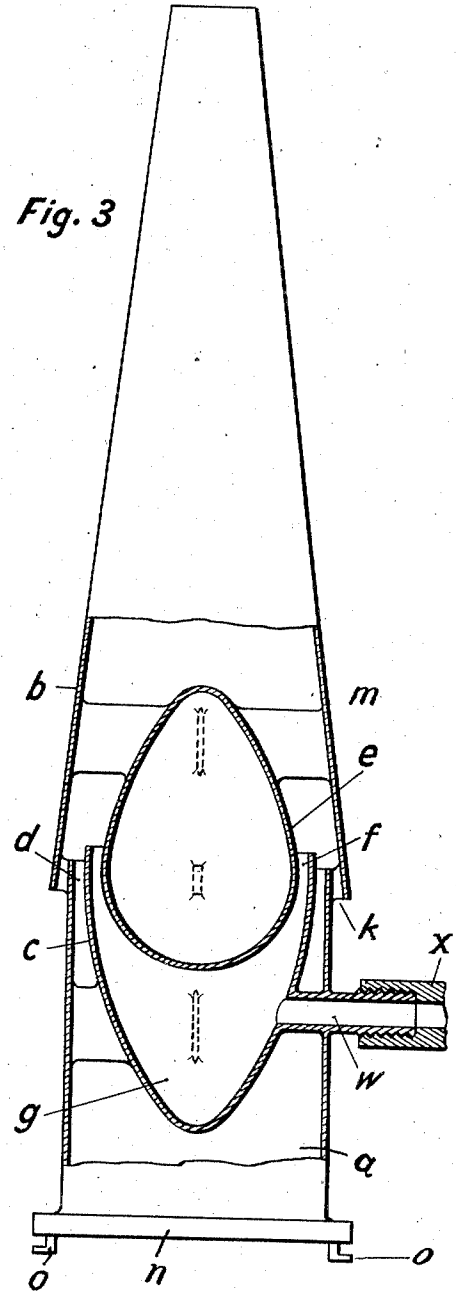
Fig. 3



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UNITED STATES PATENT OFFICE

2,234,631

APPARATUS FOR PRODUCING FOAM FOR EXTINGUISHING FIRES

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Application January 30, 1939, Serial No. 253,497
In Germany November 9, 1938

6 Claims. (Cl. 261—76)

My invention relates to improvements in apparatus for producing foam for extinguishing fire, and more particularly in apparatus in which a suitable liquid is intimately mixed with air or another gaseous fluid for producing foam by ejecting the said components under pressure or by vacuum from nozzles. The object of the improvements is to provide an apparatus by means of which the jet of liquid is readily broken up and intimately mixed with the air or gas in the form of foam. With this object in view my invention consists in forming the liquid and the gaseous fluid in films and causing the said films to act on each other so as to be intimately mixed. In the practice of the invention I prefer to cause the liquid and the gaseous fluid to impinge upon a surface which preferably is shaped along stream lines so as to avoid loss of pressure which is not directly used for mixing the components.

For the purpose of explaining the invention several examples embodying the same have been illustrated in the accompanying drawings, in which

Fig. 1 is a somewhat diagrammatical elevation partly in section showing the apparatus,

Fig. 2 is a similar elevation partly in section showing a modification in which the components from which the foam is produced meet one another in the form of three films, and

Fig. 3 is a similar sectional elevation showing another modification in which the gaseous fluid, the liquid and the liquid to be added thereto for enabling the same to be transformed into foam are separately formed into films.

In the example shown in Fig. 1 the foam producing apparatus comprises a tubular member consisting of a cylindrical section *a* and a tapering section *b*, a cup-shaped member *c* which is closed at its bottom and open at its top and which has its wall shaped along stream lines, the said member *c* being located concentrically within the top part of the cylinder *a*, and an oval hollow body *e* located concentrically within the open upper part of the member *c* and likewise shaped along stream lines. Between the top part of the member *c* and the cylindrical wall *a* an annular passage *d*, and between the top part of the member *c* and the body *e* a chamber *g* and an annular passage *f* are formed. The member *c* is fixed to the cylinder *a* by narrow tubular studs *h* the cross-section of which is narrow so that the resistance opposed to the flow of the fluid through the passage *d* is as small as possible. The body *e* is fixed to the conical part *b* by thin ribs *m* which preferably are edge shaped at their ends in order to reduce the resistance opposed to the flow of the fluids. At its bottom the cylinder *a* is provided with a flange *n* and hooks *o* by means of which it may be attached to a supply of fluid. The tubular studs *h* are likewise adapted to be connected to a supply of fluid, or they are open to the outer air.

In the example shown in Fig. 1 the liquid from which the foam is to be produced is supplied through the tubular member *a* from the bottom thereof, and it impinges upon the member *c* and is formed thereby into an annular film flowing through the annular passage *d* and delivered therefrom into the tapering section *b*. The gaseous fluid is supplied through the tubular studs *h* into a chamber *g* and it impinges upon the bottom part of the body *e* and is transformed thereby into an annular film delivered from the annular passage *f*. Thus the films of liquid and gaseous fluid are delivered one beside the other and concentrically of each other from the passages *d* and *f*, and the said films are in frictional engagement with each other. Thereby the film of liquid is readily broken up and mixed with the gaseous fluid so that a foam is produced, the formation of a foam being assisted by the conical shape of the section *b* of the tubular member.

The modification shown in Fig. 2 is similar to the one illustrated in Fig. 1, and the same letters of reference have been used to indicate corresponding parts. However, the construction is modified in so far as the tubular member for the supply of the liquid and the delivery of the foam is made in two separate sections, viz. the cylindrical member *a* and the conical member b_1, the bottom part of the member b_1 being placed around the top part of the member *a* and forming an annular passage *k* therewith. Thus, the liquid delivered from the annular passage *d* acts by suction on the air within the annular passage *k* and it draws the same in the form of an annular film upwardly and into the conical member b_1. Thus, the film of liquid delivered from the passage *d* is enveloped internally and externally by a film of a gaseous fluid, the said internal and external fluid being either air or another gas.

It will be understood that means may be provided for supplying the gaseous fluid through the annular passage *k* under pressure.

The constructior shown in Fig. 3 is similar to the one described with reference to Fig. 2. As distinguished from the said figure, the member *c* shown in Fig. 3 is provided with a single inlet pipe *w* to which a pipe or hose *x* is attached.

In the apparatus shown in Fig. 3 water is supplied through the pipe *a*, and a foam producing medium such as a solution of soap is supplied to the member *c* through the inlet pipe *w*. Air or gas is supplied through the passage *k* by the sucking action of the water delivered from the passage *d*. The soap solution delivered from the passage *f* is mixed with the water and the said mixture is transformed into foam by the air or gas drawn in through the passage *k*.

I have found that in the foam producer the liquid and gaseous fluids find a small resistance, and that the output of foam is exceedingly high. This result is attained by bringing the foam producing components into contact with each other with large surfaces, so that the fluids are able to permeate each other with a minimum of resistance.

I claim:

1. An apparatus for producing foam from a liquid and a gaseous fluid, comprising a substantially rectilinear tubular body having an intake end constructed for connection with a supply of liquid under pressure and a delivery end, a cup shaped member disposed concentrically within said tubular body and forming an annular passage therewith which is open at the side of said delivery end, a member disposed concentrically within said cup shaped member to form an annular passage therewith, which passage is open near the open end of said passage provided by said tubular body and said cup shaped member, said cup shaped member and said member disposed concentrically within the same having their walls gradually reduced in cross-section from the said delivery end towards the intake end of said tubular body and to points near the axis of said tubular body, and a tubular member for connecting said annular passage provided by said cup shaped member and said member disposed concentrically within the same with a supply of a gaseous fluid.

2. An apparatus for producing foam from a liquid and a gaseous fluid as claimed in claim 1, in which the said cup shaped member and said member disposed concentrically within the same are rounded at their gradually reduced portions.

3. An apparatus for producing foam from a liquid and a gaseous fluid as claimed in claim 1, in which the said cup shaped member and said member disposed concentrically within the same are rounded at their gradually reduced portions and in which the said member disposed concentrically within said cup shaped member is formed along stream lines and has a portion of its wall extending from said annular passages into said tubular body, said portion being gradually reduced in cross-sectional area from said annular passages towards the delivery end of said tubular body so as to produce an annular passage between the same and said first named tubular body which is gradually increased in cross-section.

4. An apparatus as claimed in claim 1, in which the said tubular member is continued beyond the said passages into an inwardly tapering portion.

5. An apparatus as claimed in claim 1, in which the said tubular member is continued from the said passages into a tapering pipe forming a concentric passage around the delivery ends of said passages.

6. An apparatus for producing foam from liquid and gaseous fluids comprising a body formed with more than two concentric passages having their delivery ends adjacent to one another, and means to force liquid and gaseous fluids alternately through said passages, the inner passages being provided with rounded surfaces disposed transversely of the flow of the fluids therethrough and forming annular passages therein.

ERNST GÖHRE.