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[54] **FOAM GENERATOR**
5 Claims, 2 Drawing Figs.

[52] U.S. Cl..... **252/359 E,**
 165/14, 165/15, 239/343
 [51] Int. Cl..... **B01d,**
 B01f, B01i 13/00
 [50] Field of Search..... **159/DIG. 4;**
 23/252; 165/15, 14; 261/DIG. 26, 25; 259/DIG.
 36; 239/343; 252/359, R, 359 E

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ABSTRACT: A tubular housing with a rear inlet and a front-end outlet has a foraminous cover over its front end. A shaft extends lengthwise of the inside of the housing and is rotatably supported. It is driven by a water turbine on its front end, the turbine having an inlet for water under pressure and a central front outlet that delivers the water to a forwardly directed nozzle connected to the turbine. Rigidly mounted on the shaft behind the turbine is a fan for blowing air through the housing from back to front. Also mounted on the shaft is a pump for delivering foaming solution to the rear end of the nozzle to mix with the water from the turbine outlet.

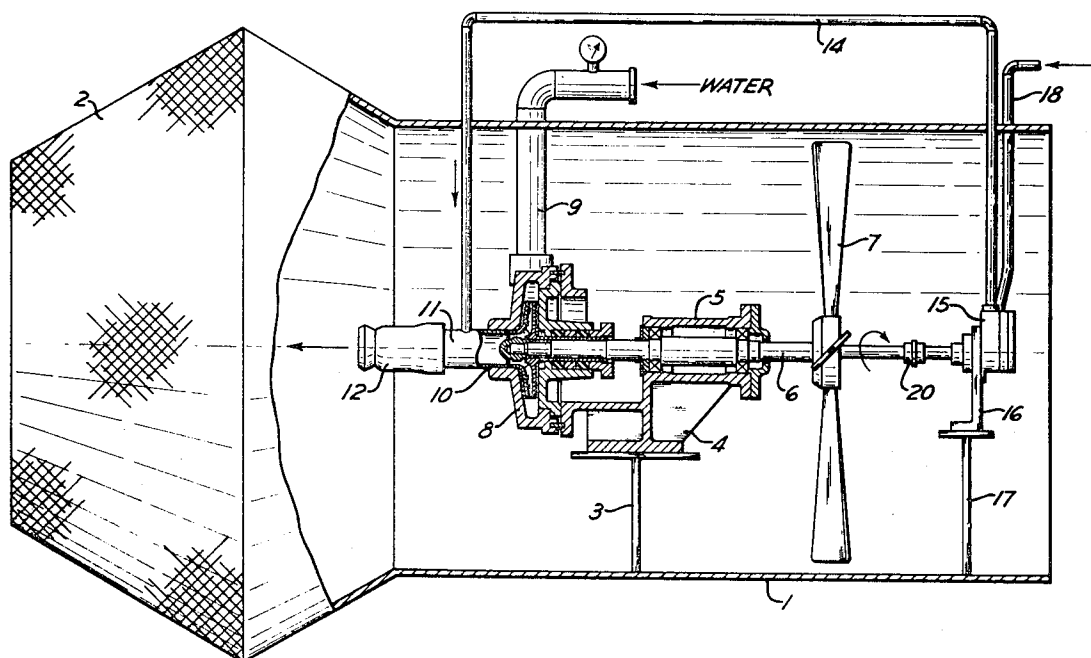


Fig. 1

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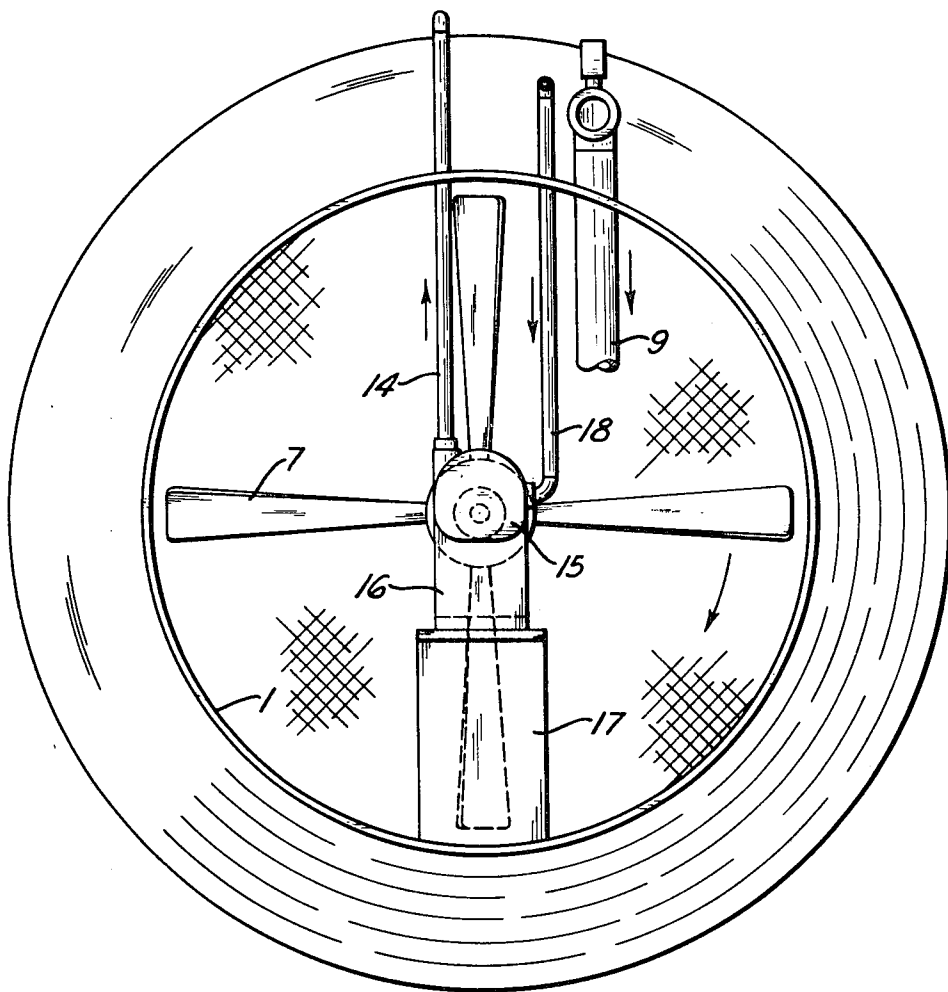


Fig. 2

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FOAM GENERATOR

It is among the objects of this invention to provide a foam generator which will produce high expansion foam, which is operated entirely by water power, which is simple in construction and which is highly efficient.

The preferred embodiment of the invention is illustrated in the accompanying drawings, in which

FIG. 1 is a longitudinal section through the foam generator; and

FIG. 2 is a view of the rear end of the generator.

Referring to the drawings, a tubular housing 1 preferably is cylindrical through most of its length but has a forwardly flaring front end portion. Both ends of the housing are open, but the front end is covered by a foraminous member 2 that may be in the form of netting, a screen or a metal sheet provided with a large number of perforations. This member is secured to the front end of the housing in any suitable manner and preferably extends out in front of it. The one shown is metal and stiff enough to retain the truncated form that is illustrated.

Rigidly mounted inside the housing is a pedestal 3, on which a bracket 4 is mounted. The rear portion of the bracket forms a bearing 5, in which a long shaft 6 is rotatably supported. The shaft extends lengthwise of the housing and usually will be concentric with it. Rigidly mounted on the shaft behind the bearing is a large fan 7 for drawing air into the rear end of the housing and blowing it out through the screen at the front. The fan is rotated at high speed by the shaft, which is driven by a water turbine 8 mounted on its front end. This turbine is supported by the front portion of bracket 4. Connected to the inlet of the turbine is a pipe 9 that extends out of the top of the housing and can be connected to a source of water under high pressure, such as at 80 to 100 pounds per square inch. The turbine has a front outlet 10, coaxial with the shaft. Mounted in this outlet is the rear end of a short tube 11, the front end of which supports a nozzle 12 that is directed forward. It will be seen that the water that drives the turbine leaves it through the nozzle and passes through the screen in front of it.

In order to provide the desired foam, a foaming solution is mixed with the water. In accordance with this invention the solution enters tube 11 behind the nozzle through a pipe 14, the inlet end of which is connected to the outlet of a pump 15 supported by a bracket 16, mounted on a pedestal 17 in the back portion of the housing. The inlet of this pump is connected by a pipe 18 to a tank (not shown) containing the foaming solution.

Another feature of this invention is that the pump is driven directly by the turbine and fan shaft. Accordingly, the shaft extends rearwardly from the fan and into the pump to provide the direct drive. Due to the difficulty of getting perfect alignment between the pump axis and the turbine shaft, the rear portion of the shaft may be provided with a flexible coupling 20.

When water under pressure is delivered to the turbine through pipe 9, the turbine drives the fan and pump directly and thereby produces a strong current of air through the housing from back to front and also delivers the foaming solution to the rear end of the nozzle. The solution mixes with the water leaving the turbine and the mixture sprayed from the nozzle is blown by the air current through the screen, which breaks it up into bubbles that form the foam.

This apparatus extracts the maximum power from the water by operating both the pump and the fan through a direct drive from the turbine. This results in higher expansion foam at lower water pressure. Since the foam pump requires minimal horsepower because it injects the foaming solution into the water stream between the turbine outlet and the nozzle, nearly all of the water pressure is consumed in driving the fan at the required r.p.m. Extremely little power is required to pump the foaming solution into the water. A water-powered foam generator constructed in accordance with this invention has delivered high expansion foam (500:1) into the bottom of a hollow structure and filled it to a height over 50 feet above the foam generator.

We claim:

1. A foam generator comprising a tubular housing having a rear inlet end and a front outlet end, a foraminous member covering said front end, a shaft extending lengthwise of the housing centrally thereof, means supporting the shaft for rotation on its axis, a water turbine on the front end of the shaft for driving it, the turbine having an inlet for water under pressure and a central front outlet; a forwardly directed nozzle connected to the turbine outlet for receiving water therefrom, a fan rigidly mounted on the shaft behind the turbine for blowing air through the housing from back to front; a pump mounted on the shaft and driven thereby and having an inlet and an outlet, means for connecting the pump inlet to a source of foaming solution, and a conduit connecting the pump outlet with the rear end of the nozzle to deliver foaming solution thereto to mix with water discharging from the turbine outlet.

2. A foam generator according to claim 1, in which said shaft is provided with a flexible coupling between the fan and pump.

3. A foam generator according to claim 1, in which said shaft supporting means include a bracket mounted inside said housing and provided in front of the fan with a bearing for the shaft, the turbine having a housing separated from said bearing and rigidly mounted on said bracket in front of the bearing, and an impeller in the turbine on said shaft.

4. A foam generator according to claim 1, in which said pump is mounted on said shaft behind the fan, the generator including means mounted inside said housing supporting the pump.

5. A foam generator comprising a tubular housing having a rear inlet end and a front outlet end, a foraminous member covering said front end, a shaft extending lengthwise of the housing centrally thereof, a bearing between the turbine and fan supporting the shaft for rotation on its axis, a bracket supporting the bearing a water turbine on the front end of the shaft for driving it, the turbine having an inlet for water under pressure and a central front outlet, a forwardly directed nozzle connected to the turbine outlet for receiving water therefrom, a fan rigidly mounted on the shaft behind the turbine for blowing air through the housing from back to front, a pump mounted on the shaft and having an inlet and an outlet, the shaft being provided with a flexible coupling between the fan and pump, means for connecting the pump inlet to a source of foaming solution, and a conduit connecting the pump outlet with the rear end of the nozzle to deliver foaming solution thereto to mix with water discharging from the turbine outlet.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,607,779 Dated September 21, 1971

Inventor(s) Earle C. King and Walter Milich

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 32, change "at" to --as--.

Claim 3, last line, after "turbine" insert --housing mounted--.

Signed and sealed this 14th day of March 1972.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents