This invention relates to improvements in means for mechanical generation of foam for extinguishing fires.

It is a principal object of this invention to provide a Venturi tube and support by which a foaming agent such as saponin, "Tutogen" can be mixed with water to produce a foam as used for extinguishing fires.

Another object of this invention is to reduce the cost and weight and the space occupied by the storage of foam ingredients and avoid the size and weight of generating equipment necessary for the chemical generation of foam which is the method generally accepted in this country.

In accomplishing these objects there are provided the improved forms of construction shown diagrammatically by the accompanying drawings wherein:

Fig. 1 is a sectional view of a Venturi tube of the Venturi type of construction.

Fig. 2 is a sectional view of a generator attachment.

Fig. 3 shows the fluid valve stems and indicator.

Fig. 4 is a cross-sectional view taken at 4-4 on Fig. 2.

Fig. 5 is a sectional view of a foam generator with a type of construction.

Fig. 6 is a sectional view of a modified form of generator or ejector type of foam generator in which a propeller wheel is actuated by the flow of the fluid to beat the mixture to a foam.

Fig. 7 is a sectional view of a modified form of discharge nozzle of Fig. 6.

Fig. 8 is a sectional view of a modified form of orifice for the generator shown on Fig. 8.

Fig. 9 is a sectional view of a modified form of orifice for the generator shown on Fig. 8.

Fig. 10 is a sectional view of a portion of a modified form of orifice type foam generator.

Fig. 11 is a sectional view of a portion of another modified form of orifice type foam generator.

Fig. 12 is a modified form of foam generator of the Venturi tube type having reentrant passages to aid in generating the foam, and

Fig. 13 is a cross-section of view on line 13-13 of Fig. 12.

Throughout the description like numbers designate like parts in the various figures.

Referring more in detail to the several drawings:

There is shown in Fig. 1 a Venturi tube having an inlet 10 for connecting to a water supply pipe or hose and an outlet 11 for connecting to a pipe or hose for discharging the foam. The Venturi tube is supported by a base 12. Above the Venturi tube and supported by web 13 is a reservoir 14 for containing the foaming agent. At the top of the reservoir is a filling cap 15 with a vent hole 16. At the bottom of the reservoir is a tube 17 fitted with a valve or other adjusting means 18 and connecting to the throat 19 of the Venturi tube by means of holes 20 for admitting the foaming agent. Another tube 21 fitted with valve or other adjusting means 22 and also connecting to the throat 19 of the Venturi tube by means of holes 23 is provided for admitting the air or inert gas.

The operation depends upon the well known principle that the change of velocity of flow through a Venturi tube causes a reduced pressure at the throat or point of least sectional area. This reduced pressure in throat 19 is utilized to induce a flow of foaming agent through tube 17 and a flow of air or inert gas through tube 21. The proper proportions of foaming agent and air or inert gas to give suitable foam are regulated by adjusting the valves 18 and 22, respectively, by means of the handles 24 and indicator scales 25. The adjusting means may also be fixed orifices of predetermined size instead of valves. When air at atmospheric pressure is used the tube 21 and holes 23 must be of sufficient size or additional openings provided so that the volume of air admitted will be several times the volume of water passing through the generator.

The foaming agent and air or inert gas are mixed with the water to form foam by making the diverging angle of the discharge nozzle or pipe 24 of such degree as to cause turbulent flow. The mixing may be increased by providing in the discharge nozzle or pipe inwardly projecting fins or baffles 25 arranged in staggered relation to increase turbulence of flow and improve the generation of foam. This modification may be adapted to all types of foam generators described herein.

In Fig. 2 is shown a foam generator attachment added to the generator shown in Fig. 1, and this attachment consists of a casing or tube 26 adapted to be coupled to the discharge nozzle or pipe 24. The tube 26 is provided with a mechanical beater having a paddle wheel 27 mounted on shaft 28 which is housed in bearing 29 supported by radial arms 30 and driven by a screw type impeller 31 located within a tubular exten-
A modification of the orifice type generator shown in Fig. 9, in which a propeller type beater 43 actuated by the jet of water through orifice 46 is used to beat the mixture of water, foaming agent and air or inert gas to foam.

In Fig. 12 is shown a modification of the Ven-turi type generator in which the mixing of wa-ter, foaming agent and air or inert gas to gen-erate foam is aided by circulating a portion of the liquid mixture through pressure discharge open-ings 50 at enlargement 51, tubes 52 and induc-tion inlet openings 53 at throat of venturi 54.

Other modifications and changes in the propor-tions and arrangements of the parts may be made by those skilled in the art without departing from the nature of the invention, within the scope of what is hereinafter claimed.

The invention described herein may be manu-factured and used by or for the Government of the United States of America, for governmental purposes without the payment of any royalties thereon or therefor.

Having thus set forth and disclosed the nature of this invention, what is claimed is:

1. An apparatus for the production of fire ex-tinguishing foam comprising a tube having an entrance end and an exit end, a conduit for quenching liquid connected to the entrance end of the tube, a foam promoting agent reservoir, said reservoir being connected to discharge into said tube, said tube having means for gas to enter therein, means in said tube to produce a turbulent mixture of the gas, foam producing agent and quenching liquid, said turbulent mixture pro-ducing means comprising a plurality of dis-connected staggered vanes extending inwardly from the outlet side of said tube, a worm screw in said passage, a spider, a bearing in said spider, a shaft journaled in said bearing, said worm screw being mounted on said shaft at one end thereof and extending into said restricted passage, and a mixing wheel of a substantially greater diameter than said worm screw mounted at the other end of said shaft within said tube to beat the turbulent mixture into a foam.

2. An apparatus for the production of fire ex-tinguishing foam comprising a tube having an entrance end, a restricted passage and an exit end, a conduit for quenching liquid connected to the entrance end of the tube, a foam promoting agent reservoir, said reservoir being connected to discharge into said tube, said tube having means for gas to enter therein, means in said tube to produce a turbulent mixture of the gas, foam producing agent and quenching liquid, said turbulent mixture producing means comprising a plurality of disconnected staggered vanes extending inwardly from the outlet side of said tube, a worm screw in said passage, a spider, a bearing in said spider, a shaft journaled in said bearing, said worm screw being mounted on said shaft at one end thereof, and a mixing wheel of a substantially greater diameter than said worm screw mounted at the other end of said shaft within said tube to beat the turbulent mixture into a foam, said means for permitting gas to enter said tube.
comprising gas inlet openings in said tube on the outlet side of said restricted passage.

3. An apparatus for the production of fire extinguishing foam comprising a tube having an entrance end, a restricted passage and an exit end, a conduit for quenching liquid connected to the entrance end of the tube, a foam promoting agent reservoir, said reservoir being connected to discharge into said tube, said tube having means for gas to enter therein, means in said tube to produce a turbulent mixture of the gas, foam producing agent and quenching liquid, said means for permitting gas to enter said tube comprising gas inlet openings in said tube on the outlet side of said restricted passage, and flap check valves preventing escape of back pressure through said gas inlet openings.

4. An apparatus for the production of fire extinguishing foam comprising a tube having an entrance end, a restricted passage and an exit end, a conduit for quenching liquid connected to the entrance end of the tube, a foam promoting agent reservoir, one way check valved means connecting said reservoir to discharge into said tube, said tube having means for gas to enter therein, means in said tube to produce a turbulent mixture of the gas, foam producing agent and quenching liquid, said means for permitting gas to enter said tube comprising gas inlet openings in said tube on the outlet side of said restricted passage, and flap check valves preventing escape of back pressure through said gas inlet openings.

5. An apparatus for the production of fire extinguishing foam comprising a tube having an entrance end, a restricted passage and an exit end, a conduit for quenching liquid connected to the entrance end of the tube, a foam promoting agent reservoir, one way check valved means connecting said reservoir to discharge into said tube, said tube having means for gas to enter therein, means in said tube to produce a turbulent mixture of the gas, foam producing agent and quenching liquid, said turbulent mixture producing means comprising a plurality of disconnected staggered vanes extending inwardly from the outlet side of said tube, a worm screw in said passage, a spider, a bearing in said spider, a shaft journaled in said bearing, said worm screw being mounted on said shaft at one end thereof, a mixing wheel of a substantially greater diameter than said worm screw mounted at the other end of said shaft within said tube to beat the turbulent mixture into a foam, said means for permitting gas to enter said tube comprising gas inlet openings in said tube on the outlet side of said restricted passage, and flap check valves preventing escape of back pressure through said gas inlet openings.

6. An apparatus for the production of fire extinguishing foam comprising a tube having an entrance end and an exit end, a conduit for quenching liquid connected to the entrance end of the tube, a foam promoting agent reservoir, said reservoir being connected to discharge into said tube, said tube having means for gas to enter therein, means in said tube to produce a turbulent mixture of the gas, foam producing agent and quenching liquid, a restricted passage, a worm screw in said passage, a spider, a bearing in said spider, a shaft journaled in said bearing, said worm screw being mounted on said shaft at one end thereof, and a mixing wheel of a substantially greater diameter than said worm screw mounted at the other end of said shaft within said tube to beat the turbulent mixture into a foam.

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