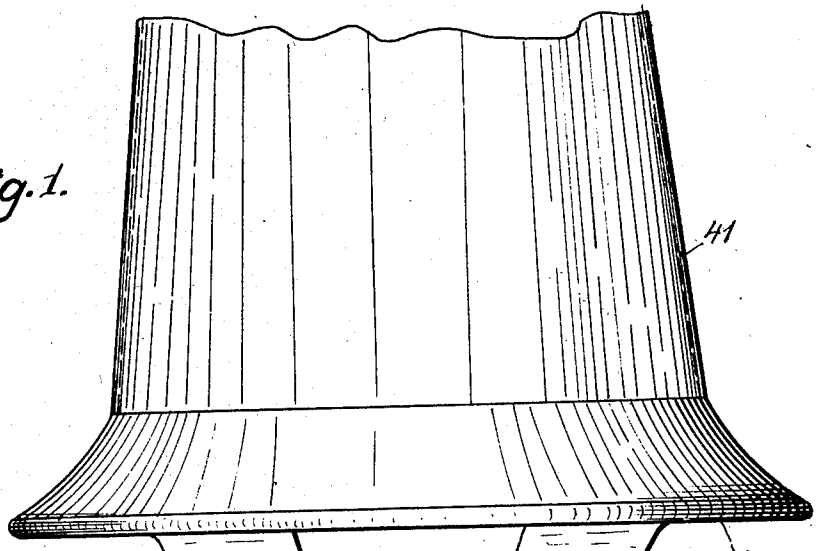
Sept. 20, 1938. K. ROSENBAUER 2,130,745

FIRE HOSE NOZZLE

Filed Sept. 19, 1934

Fig. 1.



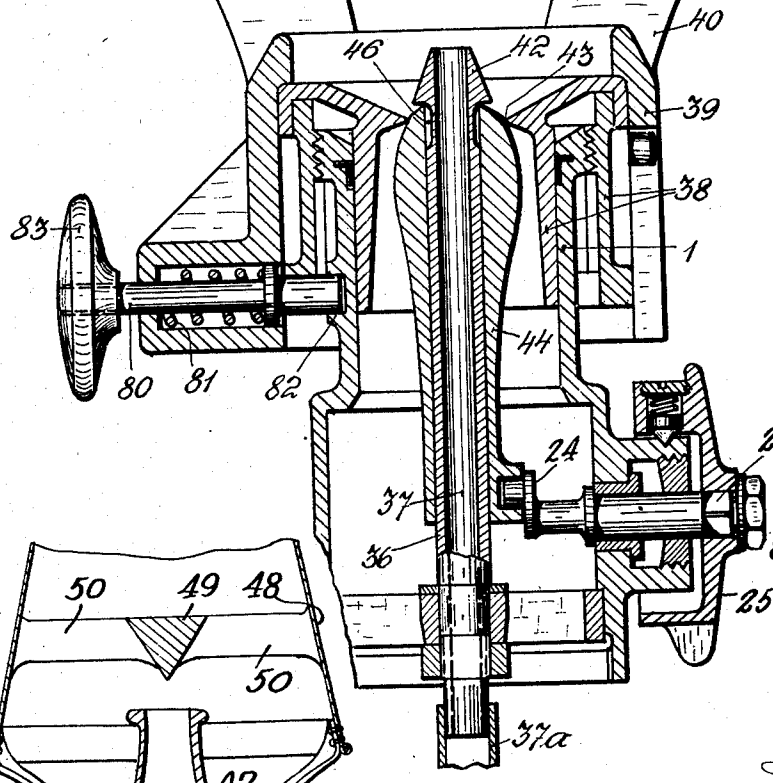


Fig. 3.

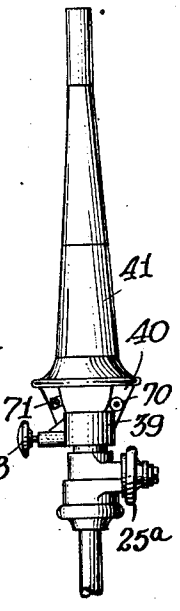


Fig. 2

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FIRE HOSE NOZZLE

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9 Claims. (Cl. 169—15)

This invention relates to new and improved means in conjunction with fire-hose nozzles for the selective and controlled varying of the shape, size, and composition of the jet thrown. As regards variation of the composition of the jet, the invention provides more particularly for changing over from a water jet to a froth jet produced with the aid of saponin solutions or other frothing agents, and vice-versa.

It is already known to produce froth jets for fire-extinguishing purposes by injecting more or less sub-divided water jets into the flared rear end of a funnel open at both ends into which a saponin solution or other suitable frothing agent is introduced either with the water of the jets or through a separate supply pipe. The injector effect set up by the entering jets of water causes air to be drawn in through the flared rear end of the funnel, and the resulting mixture of water, saponin and air in the funnel forms a froth which is thrown from the narrower orifice at the forward end of the funnel in the form of a froth jet.

In accordance with the present invention, the air intake funnel is detachably mounted on the nozzle from which the water and saponin solution is thrown. When a water jet only is required, the air intake funnel is detached or hinged back out of the way, and the saponin supply cut off, so that a jet consisting solely of water is thrown. To obtain a froth jet it is then merely necessary to replace the funnel and turn on the saponin supply.

The possibility of producing both water jets and froth jets with one and the same device is of great advantage in fire-extinguishing operations. A fireman, when going into action with fire-hose and nozzle in a burning building, cannot know with certainty in advance what kind of jets he will need to use in combatting different parts of the fire to obtain the best results obtainable under the circumstances met with. If he is only equipped with froth jet apparatus, and finds, on approaching the seat of the fire that water jets would be more effective it might become a serious matter if he were obliged to interrupt operations, and fetch and assemble the necessary fittings in order to obtain the required water jets. Similarly, it is an equally serious hindrance when a fireman has to replace a water jet nozzle by a froth jet nozzle, when circumstances, such as burning petrol or oil, are met with requiring the use of froth jets. By providing means for adapting the nozzle for throwing water or froth jets, as required, without considerable interruption of operation, the present invention solves satisfactorily the problem of dealing with such contingencies with a minimum of trouble and loss.

As above mentioned, it is necessary for the production of froth jets to introduce the water and the frothing agent into the air intake funnel in a divided state, so that the in-drawn air can become more rapidly and intimately intermixed with the liquids. For this purpose it has hitherto been usual to introduce at least a part of the water and of the saponin solution through a plurality of nozzles provided in the wall of the funnel itself. In this case the funnel is connected up to supply pipes which render it perfectly impossible to mount the funnel on the nozzle in such a manner as to be detachable or capable of being folded back out of the way. It has, it is true, been proposed, but only in the case of froth-producing devices not attached to the end of the hose but intended to supply froth to the hose, to introduce both water and saponin solution through a mouthpiece located in the air intake funnel through which these liquids are sprayed in a finely divided or atomized state into the funnel, but the constructional problems are very different from those involved in the provision of an adaptable all-purpose nozzle device of the nature provided by the present invention.

In accordance with this invention the nozzle proper is so constructed that the water and saponin solution can be introduced into the funnel tube in a suitable form, for instance in the form of a multiplicity of fine jets. At the same time the nozzle according to the invention is designed to permit of a very wide range of variation in the size and shape of the water jet thrown therefrom when the froth-producing attachment is out of action, and also to permit of complete cutting off of the jet. The possibility of cutting off the jet at the nozzle is a feature which is desirable in any case, but it is essential in the device according to the present invention to permit of the fitting on or hinging into the operative position, of the froth-producing attachment, and it is particularly advantageous to arrange for the cutting off of the water jet to be effected at the nozzle.

There already exist adjustable nozzles which permit of shutting off the water supply and also admit of variation of the shape of the water jet issuing therefrom, so that it is possible with one and the same nozzle to produce full-bore jets, finely divided jets, and fan jets. An adjustable nozzle of this nature has not, however, as yet been combined with an air intake funnel for the production of froth jets, nor consequently with a detachable air intake funnel. It is only however

by the combination of a regulable nozzle with a detachable air intake funnel that the above-mentioned advantages of the device according to the present invention are obtained to the full extent, since a universal appliance for fire-extinguishing work is thereby provided which is capable of producing all the variations of jet required for this purpose. When the funnel is in the operative position to produce froth jets, the adjustable nozzle will be set to supply a finely divided or a thin full jet, and on removal of the funnel, after temporary shutting off of the water supply at the nozzle, with a view to resuming extinguishing with water alone, the jet of water can be varied both as to shape and size in an expeditious and simple manner.

The invention will now be described in detail, reference being had to the accompanying drawing, in which:

Fig. 1 shows a device in accordance with the invention comprising a nozzle mouthpiece and an air intake funnel tube fitted thereto, the mouthpiece and the portions of the air intake funnel closely associated therewith being shown in section, and the remainder of the air intake funnel in elevation.

Fig. 2 shows a modified form of the same device, in section.

Fig. 3 shows the complete device in accordance with the invention, in elevation, on a reduced scale.

In the example shown of a device according to the present invention the nozzle mouthpiece comprises a nozzle tube 1 mounted on a supply pipe (not shown) for water under pressure. On the free end of the said nozzle tube there is fixed in any convenient manner a sleeve **38** having a cross-section approximately the shape of an inverted U and being provided with an annular inwardly turned flange terminating in an edge **43**, bounding the outlet orifice of the tube. In the axes of the nozzle tube 1 there is arranged a regulating needle consisting of a stem **36** with a conical end portion **42** and an adjoining peripheral groove **46** and of a bulbous member **44**, which is adjustable by moving it along the stem. This movement of the bulbous member may be attained by means of a lever **24** which is operatively engaging the said bulbous member and adapted to be pivoted with the aid of a square sectioned pin **25** and a hand wheel **25***a* operable from the outside.

The stem **36** is provided with a longitudinal passage **37** which is connected to a saponin supply **37***a* in any suitable manner. On to the outside of the sleeve **38** there is fitted a ring **39** which carries, by means of webs **40**, the funnel-shaped air intake tube **41** which is tapered in the direction of the flow of the jet, and open at both ends.

The ring **39** is fixed in position, for instance, by means of a pin **80** which is retained by a spring **81** in engagement with a notch **82** in the outside wall of the nozzle tube, and which permits of the withdrawal of the ring when disengaged from the notch against the action of the spring by means of the knob **83**.

To produce a froth jet, the conical portion **42** of the regulating needle should be so positioned relatively to the bounding edge **43** of the sleeve **38** that a spray jet issues from the orifice of the mouthpiece of the nozzle. The amount of water in the jet can at the same time be controlled, as required, by the adjustment of the bulbous portion **44** of the regulating needle. Air is sucked in through the rear end of the funnel, by the injection action set up by the entering jet, and if at the same time a saponin solution or the like be introduced into the tube **41** through the passage **37** in the regulating needle by means of the supply pipe **37***a*, this solution becomes intermixed with the spray jet and the air to form a frothy mixture which is ejected from the forward end of the funnel at a velocity increased by the taper of the latter. It is also possible to utilize the suction set up by the injector effect of the spray jet entering the air intake funnel to draw the saponin solution at the required rate from the forward end of the passage **37**.

The air intake funnel **41**, as already mentioned, is so attached to the mouthpiece of the nozzle that it can readily and quickly be detached or folded back out of the path of the jet thrown when it is not required for use. For the purpose of changing over from a froth jet to a water jet, it is sufficient to momentarily shut off the water supply by moving the bulbous portion **44** of the regulating needle up until it meets the bounding edge **43** and thereby reaches the obturating position, and to interrupt the supply of the frothing agent, after which the funnel **41** can be detached or hinged out of the way. The size and shape of the water jet can then be set to suit the requirements of the moment, by a suitable setting of the movable parts of the nozzle. The transition to work with a froth jet can be equally expeditiously effected by the performance of the operations detailed above, in the reversed order. The possibility of rapidly fitting and detaching the air intake funnel, or bringing the same into and out of the operative position, is due not only to the provision of suitable means for effecting attachment and detachment, which can be constructed in a great variety of ways, but more particularly to the fact that the range of jet variation provided by the nozzle mouthpiece in accordance with the present invention renders it unnecessary to provide any separate supply pipes and connections to the air intake funnel for the attainment of the necessary spraying and intermixing within this funnel, as has hitherto been necessary.

It will thus be clear that all the features of the invention are interdependent, and contribute to the attainment of the same result, namely of providing means for varying the composition, size, and shape of jets for fire-extinguishing purposes, with a minimum of interruption in working, to suit varying requirements. It will also be clear that the constructive possibilities are by no means exhausted by the examples shown and described, and that any type of regulable nozzle or mouthpiece capable of producing jets of the required nature could be used in conjunction with a detachable or hinged air intake funnel to realize the principle of the invention.

The breaking up or atomizing of the jet required for the production of a froth jet need not necessarily be effected by means of the mouthpiece itself, but can also be effected by a particular construction of the air intake funnel, for example by the provision of a conical baffle as shown in Fig. 2. For this purpose an ordinary mouthpiece **47** can be employed to which the funnel-shaped air intake tube **48** is detachably fitted in any suitable manner, for instance by means of webs **47***a*, ring **47***b*, and set-screws **47***c* (Fig. 2). In the interior of this air intake tube **48** there is mounted on webs **50** in a central position opposite the orifice of the mouthpiece **47**, a conical baffle

49, and that in such a manner that its pointed end is towards the orifice of the mouthpiece when the funnel is positioned for use. Water containing saponin is then supplied to the mouthpiece 47 which delivers a full-bore jet which is broken up by the baffle 49. As before, the jet effects the suction of air into the funnel and consequent production of froth therein.

It is also possible to combine an air funnel provided with a baffle of this nature, with a regulable mouthpiece of the type described above, and I have found that such a combination is often useful with a view to simplifying manipulation, since in this case a froth jet can be obtained with the nozzle set for a full-bore jet, and it becomes unnecessary to provide the required spray jet by accurate setting of the mouthpiece.

Both the regulable mouthpiece, and the manner of mounting or attaching the air funnel thereon can be modified constructionally as compared with the example shown and described, without departing from the scope and spirit of the invention.

A form of construction in which the air funnel is articulated to the mouthpiece and adapted to be hinged aside out of the path of the jet, or laid back out of the way, instead of being completely detachable, is shown in Fig. 3. The mouthpiece is substantially similar to that shown in Fig. 1 and the funnel-shaped air intake tube 41 to that also shown in Fig. 1. A carrying web 48 pertaining to this air intake funnel is in the present case provided with a hinge-like joint 70, while the remaining carrying webs are so divided that the funnel can be hinged and folded back about the pivot axis. To prevent unintentional hinging, there is provided, opposite the hinge point, any suitable type of locking or fastening device, such as for example a hasp with a cross pin 71, adapted to interlock the parts of the carrying web.

In the event of the jet being broken up or atomized, for the production of froth jets, by means of baffles provided in the funnel tube itself, the baffles used may also be differently shaped from that shown in Fig. 2.

I claim:

1. A device for selective and controlled varying of the shape, size and composition of the jet thrown from a fire-hose, comprising in combination a nozzle mouthpiece, a water supply for the nozzle mouthpiece, a supply for adding a frothing agent to the water, means for bringing the liquid contained in the discharge from said mouthpiece into a divided state sufficient for the production of a proper fire extinguishing foam, and a funnel-shaped air-intake tube for enclosing said discharge from the mouthpiece in the divided state for the production of froth jets, said tube being open at both ends and constructed and arranged to be brought into and out of an operative position in which the nozzle mouthpiece discharges into said tube.

2. A device for selective and controlled varying of the shape, size and composition of the jet thrown from a fire-hose, comprising in combination a nozzle mouthpiece, a water supply for the nozzle mouthpiece, a supply for adding a frothing agent to the water, means for bringing the liquid contained in the discharge from said mouthpiece into a divided state sufficient for the production of a proper fire extinguishing foam, and a funnel-shaped air-intake tube for enclosing said discharge from the mouthpiece in the divided state for the production of froth jets, said tube being open at both ends and detachably mounted on said nozzle mouthpiece so as to be easily brought into and out of its operative position in which the nozzle mouthpiece discharges into said tube for the purpose of producing froth jets.

3. A device for selective and controlled varying of the shape, size and composition of the jet thrown from a fire-hose, comprising in combination a nozzle mouthpiece, a water supply for the nozzle mouthpiece, a supply for adding a frothing agent to the water, means for bringing the liquid contained in the discharge from said mouthpiece into a divided state sufficient for the production of a proper fire extinguishing foam, and a funnel-shaped air-intake tube for enclosing said discharge from the mouthpiece in the divided state for the production of froth jets, said tube being open at both ends and constructed and arranged to be brought into and out of an operative position in which the nozzle mouthpiece discharges into said tube and the said water supply being directly and solely joined to said nozzle mouthpiece so as to be arranged independently of the air-intake tube and to secure an unencumbered change of positions of this tube.

4. A device for selective and controlled varying of the shape, size and composition of the jet thrown from a fire-hose, comprising in combination a nozzle mouthpiece, a water supply for the nozzle mouthpiece, a supply for adding a frothing agent to the water, means for bringing the liquid contained in the discharge from said mouthpiece into a divided state sufficient for the production of a proper fire extinguishing foam, said means being part of the said nozzle mouthpiece, and a funnel-shaped air-intake tube for enclosing said discharge from the mouthpiece in the divided state for the production of froth jets, said tube being open at both ends and constructed and arranged to be brought into and out of an operative position in which the nozzle mouthpiece discharges into said tube.

5. A device for selective and controlled varying of the shape, size and composition of the jet thrown from a fire-hose, comprising in combination a nozzle mouthpiece, a water supply for the nozzle mouthpiece, a supply for adding a frothing agent to the water, means for bringing the liquid contained in the discharge from said nozzle mouthpiece into a divided state sufficient for the production of a proper fire extinguishing foam, said means being part of the later-on-recited air-intake tube, and a funnel-shaped air-intake tube for enclosing said discharge from the mouthpiece in the divided state for the production of froth jets, said tube being open at both ends and constructed and arranged to be brought into and out of an operative position in which the nozzle mouthpiece discharges into said tube.

6. A device for selective and controlled varying of the shape, size and composition of the jet thrown from a fire-hose, comprising in combination a nozzle mouthpiece, a water supply for the nozzle mouthpiece, a supply for adding a frothing agent to the water, a baffle for bringing the liquid contained in the discharge from said nozzle mouthpiece into a divided state sufficient for the production of a proper fire extinguishing foam, said baffle being part of the later-on-recited air-intake tube and being so located therein as to result in the liquid existing in the divided state in said tube when the tube is in operative position, and a funnel-shaped air-intake tube for enclosing said discharge from the mouthpiece in

the divided state for the production of froth jets, said tube being open at both ends and constructed and arranged to be brought into and out of an operative position in which the nozzle mouthpiece discharges into said tube.

7. A device for selective and controlled varying of the shape, size and composition of the jet thrown from a fire-hose, comprising in combination a nozzle mouthpiece, a funnel-shaped air-intake tube for the production of froth jets, said tube being open at both ends and constructed and arranged to be brought into and out of an operative position in which the nozzle mouthpiece discharges into said tube, a water supply for the nozzle mouthpiece, a supply for adding a frothing agent to the water and means whereby liquid contained in the jet can be brought into a divided state sufficient for the production of a proper fire extinguishing foam, said means being associated with the said air-intake tube and comprising a baffle of outwardly conical shape centrally mounted in the said tube with its pointed end towards the said nozzle mouthpiece and so distanced from the latter when the tube is in operative position that the jet issuing from the nozzle mouthpiece is broken up by the baffle within the said tube.

8. A device for selective and controlled varying of the shape, size and composition of the jet thrown from a fire-hose, comprising in combination a nozzle mouthpiece constructed and arranged so as to be adjustable to produce a finely divided spray, a funnel-shaped air-intake tube for the production of froth jets, said tube being open at both ends and constructed and arranged to be brought into and out of an operative position in which the nozzle mouthpiece discharges into said tube, a water supply for the nozzle mouthpiece and a supply for adding a frothing agent to the water.

9. A device for selective and controlled varying of the shape, size and composition of the jet thrown from a fire-hose, comprising in combination a nozzle mouthpiece constructed and arranged so as to be adjustable to produce a finely divided spray, said nozzle mouthpiece being of a type capable of effecting a wide range of variations of undivided and divided jets and of producing among these latter a flat-dish-shaped jet spread out like a screen or fan of water, and further, of shutting off the jet altogether, a funnel-shaped air-intake tube for the production of froth jets, said tube being open at both ends and constructed and arranged to be brought into and out of an operative position in which the nozzle mouthpiece discharges into said tube, a water supply for the nozzle mouthpiece and a supply for adding a frothing agent to the water.

KONRAD ROSENBAUER.