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PRODUCTION OF FIRE EXTINGUISHING FOAM

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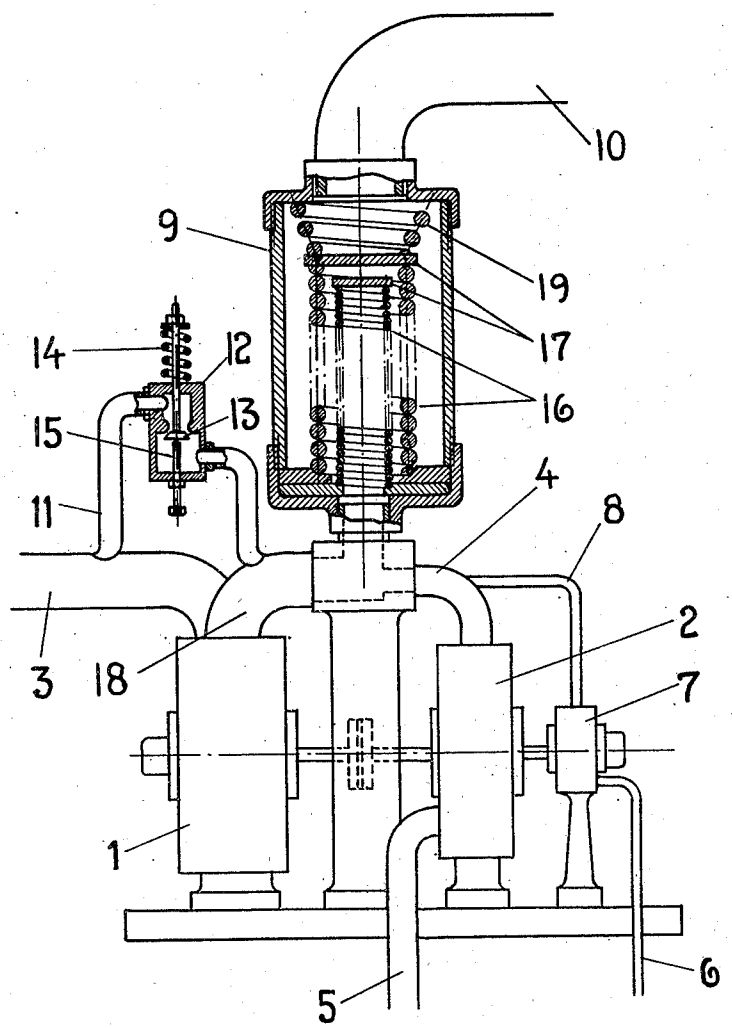

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PRODUCTION OF FIRE EXTINGUISHING FOAM

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2 Claims. (Cl. 261—35)

The present invention relates to apparatus for the production of fire-extinguish-foam particularly in such places where compressed air is available and according to the invention the air, that has to be employed for producing the foam, is primarily used as driving medium in an engine driving the pump or pumps by means of which the water and foam extract is forced to the foam developer. By this arrangement a driving power is obtained for the foam producing apparatus which immediately can be put into service and which is not dependent on any outside supplies, that readily may fail in case of fire, because the compressed air receivers and piping, usually manufactured of heavy material, are very invulnerable in case of fire. Also the foam producing plant thus can be made very handy and with small overall dimensions as the water can be taken from anywhere and the consumption of concentrated foam extract is rather small.

As the air has to be supplied to the foam developer under a pressure of about 4 atmospheres, while usually the pressure in the compressed air receiver is substantially higher, and as the volume of the air contained in the foam is about 10 times that of the liquid, an ample surplus of necessary energy for pumping the liquid by the method according to the invention will be available, and as the energy otherwise is lost through a reducing valve, it is thus obtained without expense at all.

Further according to the invention the proportion of air and liquid led to the foam developing appliance can be regulated by only in part using the air necessary for the production of foam as driving medium in the driving motor. This is obtained by having a small amount of the air bypassed through a pipe, the resistance in which may be varied by suitable means, so that it becomes possible to regulate the output of the driving motor and thereby control the quantity of the liquid carried by the pump or pumps relatively to the amount of air supplied to the foam producing unit. Although in the case where the power obtained from the compressed air is small in relation to the required pumping work, a part of the air used in the driving motor may be let out through an adjustable valve. In this way it may always be secured, that the foam is made up of air and liquid mixed in the proper proportions.

The apparatus can preferably be used in places where compressed air is already available, stored in large quantities for other purposes, but the apparatus will, however, be applicable in combination with a compressed air supply stored for this particular purpose. Further it shall also be considered within the scope of the invention to employ any other suitable gas, for instance carbon dioxide, instead of atmospheric air.

A suitable unit for carrying out the improved method of foam producing is illustrated diagrammatically and partly in section in the accompanying drawing.

Referring now to the drawing 1 is a driving motor, driven by compressed air that may be delivered from any source of compressed air pressure through a pipe 3. The motor may be of any suitable type for instance a reciprocating engine, a turbine, or a rotary compressed air motor.

The motor 1 drives two pumps 2 and 7, which may be of any type conveying a definite volume of liquid per revolution. The pump 2 draws water through a pipe 5 and the pump 7 foam developing extract through a pipe 6 and force the liquids through pipes 4 and 8 respectively to a foam developing appliance 9. Through a pipe 10 the air exhausted from the driving motor 1 is also led to the foam developing appliance 9, where it is mixed with the liquids and worked into foam.

This is obtained by arranging to let the foam developing mixture pass between the turns of helically wound springs 16, so constructed that their turns fit tightly against each other.

One end of the helical springs are fitted to the supply pipe for air and foam developing liquid, while the further, free end is closed by plates 17, the springs being so placed that they can expand freely.

When the apparatus is not working the turns of the springs fit tightly against each other, but at the moment the foam developing mixture is forced into the interior of the springs, the pressure on the plate 17 will force the turns apart to the extent of about $\frac{1}{15}$ mm.

In case the springs have become clogged with foreign matter or deposits of soap while the apparatus is not working, the sudden movement of the springs, when their turns open by the pressure of the admitted mixture, will dislocate such deposits, and further, if the springs are heavily blocked, the pressure will increase and force the turns apart until a free passage is obtained for the impurities, whereafter the springs again will contract and establish the correct space between the turns.

More than two springs may be employed, although the required section of the wire soon will put a limit to the diameter of the turns, and thereby to the number of co-axially placed springs, because the diameter of the innermost

spring necessarily must be so large that a sufficient discharge area is provided for the foam producing mixture.

As it is of advantage to construct the helical springs of the thinnest wire possible in order to obtain a fine foam, the diameter of the turns may become so small, that in order to secure a satisfactory large capacity of the apparatus it may be necessary to place a number of springs side by side and pass the flow of liquid through them in parallel. Also several springs or sets of springs may be placed so that the foam producing liquid may pass them in series.

The internal pressure on the end plate 17 may partly be counterbalanced by a spring 19 constructed as a compression spring with more open turns. This spring does not take part in the actual development of foam.

It is however within the scope of the invention to use any other suitable construction of foam developer.

Through a pipe 10 the foam developed is led to its place of application.

In order to obtain a fixed proportion between the foam's content of air and liquid it is necessary to regulate the working power of the driving engine in proportion to the volume of air consumed.

Generally where the demanded pumping work is small in comparison with the working power available, this regulation may be achieved by dimensioning the driving motor and the pump or pumps in such a manner that they when consuming a certain amount of compressed air will propel a surplus of liquid over the quantity required for obtaining the most suitable composition of the foam.

Part of the compressed air is by-passed the driving motor 1 through a pipe 11, the internal resistance of which may be varied by suitable means, whereby it becomes possible to regulate the proportions of the quantities of air and foaming to requirements.

The resistance of the pipe 11 may for instance be varied by means of a valve of the design shown in the drawing. The valve consists of a valve box 12 in which is located a valve 13 which opens against the compression of a spring 14. The lift of the valve is controlled by an adjustable stop 15, and further the force of the spring 14 may be adjusted to any suitable value, so that the lift of the valve in normal working is solely determined by stop 15. At the moment when the air pressure in the pipe 3 falls below a certain value, the valve 13 will gradually close and cause more air to pass through the driving motor 1, so that the latter's output is always maintained.

Where a big pumping-work is required and as a consequence hereof a larger volume of compressed air is consumed than necessary for the foam development part of the air which has been used in the driving-motor may be led out through a valve not shown in the drawing.

The opening of this valve can be regulated so that the exact volume of air required is led to the foam-developing appliance.

What I claim is:

1. An apparatus for the production of fire extinguishing foam, comprising a foam-developing appliance, means for pumping foam-producing liquids through said foam-developed appliance, a compressed air motor driving said pumping means, a supply pipe for said motor, and a pipe connecting the air exhaust of said motor to said foam-developing appliance.

2. An apparatus, as claimed in claim 1, including a by-pass pipe connecting said supply pipe directly to said foam-developing appliance, a valve inserted in said by-pass pipe, an adjustable spring controlling said valve, and adjustable stop means defining the maximum opening of said valve.

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