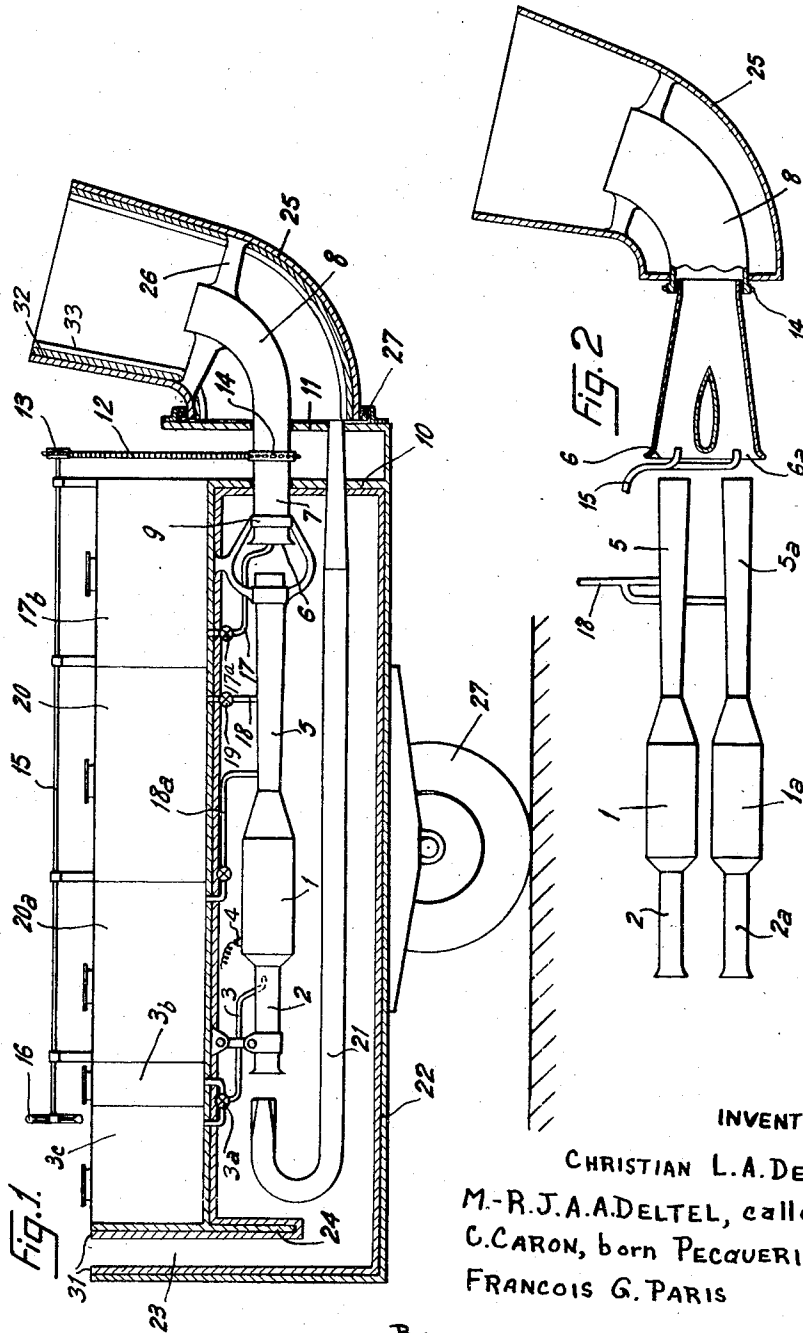


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 APPARATUS HAVING A PULSATORY JET OF GAS
 FOR THE PROJECTION OF SUBSTANCES
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APPARATUS HAVING A PULSATORY JET OF GAS FOR THE PROJECTION OF SUBSTANCES

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2 Claims. (Cl. 43—147)

The present invention relates to apparatus for projecting substances in the divided state, in which the energy required for projecting the substances to a distance is derived from the jet of gas discharged from a pulsatory combustion chamber, the high temperature of this gas being also capable of being used in certain cases for the vaporisation or combustion, at least partial, of the substance to be projected (formation of fog or smoke).

The invention has for its object improvements made in apparatus of this type.

In accordance with one of these improvements, the end portion of the exhaust pipe for the gases and the products to be projected is formed as an elbow and is rotatably mounted with respect to the axis of the portion on the upstream side of the elbow, means being provided for oscillating the said end portion around the said axis. It is thus possible to sweep over an area by directing the expelled products to the right or to the left of the apparatus and at different heights and distances, depending on the inclination to the horizontal of the rear portion of the ejector.

The elbow is preferably provided on an ejector which follows the discharge nozzle of the pulsatory chamber, and into which the exterior air is pushed by the successive puffs of gas discharged from the said nozzle, this ejector enabling the range of projection to be increased as described in U. S. patent application Ser. No. 572,695, filed March 20, 1956, by Jean H. Bertin, François G. Paris and Maurice Pain for "Apparatus for projecting substances in a divided state or flame."

In accordance with a further improvement, the pulsatory chamber is arranged inside a sound-proofed casing and the part of the discharge tube which projects out of this casing delivers into a wide tubular casing, the walls of which are also sound-proofed and which can be rotatably mounted in the same way as the rear portion of the discharge pipe, so as to follow the oscillation of this portion.

With a suitable arrangement of the casing which contains the pulsatory chamber, the ejector enables a circulation of cooling air to be created inside this casing.

Other special features will be brought out from the description which follows below with reference to the accompanying drawings (which are given by way of example only), it being understood that the features referred to in this description and also those resulting from the drawings will form a part of the present invention.

Fig. 1 is a view in vertical cross-section of a form of embodiment of the apparatus in accordance with the invention, the said apparatus being arranged with its accessories in such manner as to be placed on a self-propelled vehicle or drawn by a tractor.

Fig. 2 shows a detail of an alternative form of construction with a number of pulsatory chambers.

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In Fig. 1, there is shown a pulsatory combustion chamber 1 of a type similar to that usually employed on pulse-jet units and comprising the air-admission pipe 2 which is freely open and of the kind known as a valveless non-return inlet, the fuel injector 3, the ignition plug 4, which serves to start-up the chamber in which the combustions automatically maintain themselves thereafter, and the discharge-nozzle 5 through which are discharged the puffs of gas at high speed which result from the successive combustions.

The discharge-nozzle opens opposite and at a certain distance from the admission orifice 6 of an ejector 7, the rear portion 8 of which is elbowed through an angle roughly equal to a right angle. The preceding rectilinear portion of this ejector, which is co-axial with the nozzle 5, can rotate in a supporting bearing 9, and also in the partitions 10 and 11 through which it passes, and a suitable device enables it to be oscillated about its axis. In the form of embodiment shown in the drawings, this device comprises a chain 12 driven by a pinion 13 and engaging with a toothed ring 14 provided on the ejector. The oscillations of the pinion 13 are themselves controlled by a shaft 15 and a small hand-wheel 16 which is actuated by the operator.

The products to be projected can be introduced at the intake of the ejector. To this end, there has been shown a pipe 17 coupled by a valve 17a to a reservoir 17b. They may also be introduced into the discharge-nozzle from a reservoir 20 through a pipe 18 provided with a valve 19. The reservoir 17b will generally be filled with powdered products or those which should not be subjected to the heating action of the gases, but only to their mechanical action, whilst the reservoir 20 will receive liquid products which are to be subjected to a thermal action for their vaporisation or combustion.

The pulsatory chamber, the forward portion of the ejector and the recuperator tube 21 which collects the small puffs of gas escaping during the combustions through the aerodynamic non-return intake 2 are arranged in a casing 22 which preferably has a cylindrical form. On the side of the ejector, this casing is closed by the partition 10, and on the admission side of the pulsatory chamber it comprises an air-intake passage 23 disposed at 90° with respect to the axis of the casing and combined with one or a number of baffle-plates 24 with the object of reducing the transmission of noise to the exterior. The walls of the casing 22, of the passage 23 and of the baffle-plate or plates 24 are internally lined with sound-proofing and fire-proof materials such as panels 31 of asbestos or of mineral wool.

In order to sound-proof the exhaust of the ejector, the latter is surrounded by a wide tubular casing 25 which is movable together with the ejector, the said casing being connected to the ejector by means of arms 26, and being adapted to rotate in a bearing 27 carried by the partition 11. This casing may extend considerably beyond the extremity of the ejector, as shown in Fig. 1. It may even be provided close to its orifice with cross-shaped or annular partitions parallel to the direction of flow, that is to say to the axis of the rear portion of the ejector in order to reduce the noise of the exhaust without interfering too much with the jet discharged from the ejector.

The internal wall of this casing 25 is preferably lined with sound-proof materials 32 and, in order to avoid the erosion of these materials by the jet, it will be advisable to cover them with a thin protective steel sheet 33, which will be perforated so as to maintain the sound-proofing, or alternatively the sheet may be provided with corrugations, the crests of which will be preferably directed in the direction of the flow. The

cross-shaped or annular partitions will be constituted in the same way by sound-proof materials lined with sheet steel.

The air set in motion inside the ejector 7—8 by the puffs of gas discharged from the nozzle 5, passes into the casing 22 through the passage 23 together with the air which is sucked into the pulsatory chamber through the aerodynamic non-return intake 2. A circulation of cooling air is thus ensured inside the casing 22.

The recuperator 21 discharges through the partition 11 at the bottom of the casing 25. The puffs of air and gas which it conducts thus produce a scavenging action on this casing which prevents the progressive accumulation of active products in the bottom of this casing.

In the form of embodiment shown in Fig. 1, the whole assembly of parts is arranged so as to be mounted on a vehicle which can readily be moved during use.

The fuel injector 3 of the pulsatory chamber may be supplied by means of a multi-way valve 3a, either with highly volatile fuel provided from a reservoir 3b during the starting-up period, or with a heavier fuel supplied from a reservoir 3c during normal working.

Water which is stored in a reservoir 20a may be introduced into the discharge-nozzle through a pipe 18a on the upstream side of the pipe 18, in order to effect a cooling of the gases and to avoid any alteration, where this is undesirable, of the product injected through the pipe 18.

Fig. 2 shows an alternative form of embodiment comprising a plurality of pulsatory chambers 1, 1a, arranged in parallel, the discharge-nozzles 5, 5a of these chambers discharging into a common ejector which comprises a number of orifices 6, 6a located opposite the respective discharge-nozzles 5, 5a. The rear portion 8 of this ejector is rigidly fixed to the sound-proofing casing 25, and is adapted to rotate with reference to the front portion and carries the toothed member 14 which is used to impart to it an oscillatory movement.

The invention permits of the construction of projection apparatus suitable for very varied kinds of substances. In agriculture especially, these apparatus can be used for various purposes: projection of such materials, as e. g., grain and seeds or again of fertilisers, disinfectants, insecticides, and fungicides, for the treatment of, for example, and cultivated areas and trees. They are efficient and handy in use. In addition, the noise of the operation of the pulsatory chamber or chambers is reduced, which is an advantage when the apparatus is used in the vicinity of habitations.

What we claim is:

1. An apparatus for projecting substances comprising a pulse-jet unit having a gas discharge pipe facing towards the rear of said unit and an aerodynamically-operating air intake duct, a tube having an inlet end opposite said intake duct and substantially coaxial therewith for collecting leak gas issuing therefrom and an outlet end extending substantially parallel to said discharge pipe and facing towards the rear of said unit, means for introducing the substances to be projected into the pulsatory stream generated by the pulse-jet unit, and means for orientating the stream issuing from the pipe and tube.

2. Apparatus as claimed in claim 1 wherein the discharge pipe ends in close vicinity to the outlet end of the tube.

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