Dec. 1, 1936. J. C. HADDOCK ET AL 2,062,511

METHOD FOR CREATING AERIAL EFFECTS

Filed Nov. 20, 1933

Fig. 1.

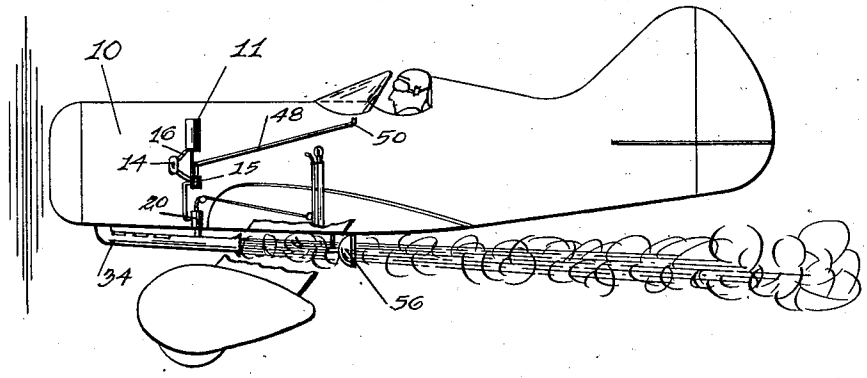
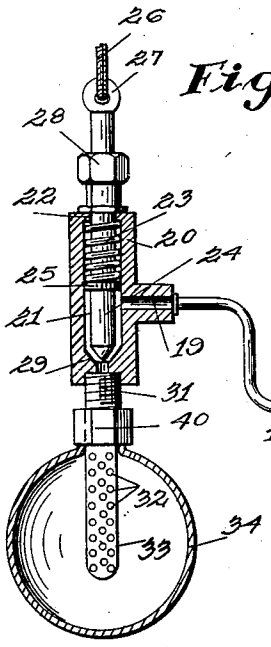


Fig. 2.



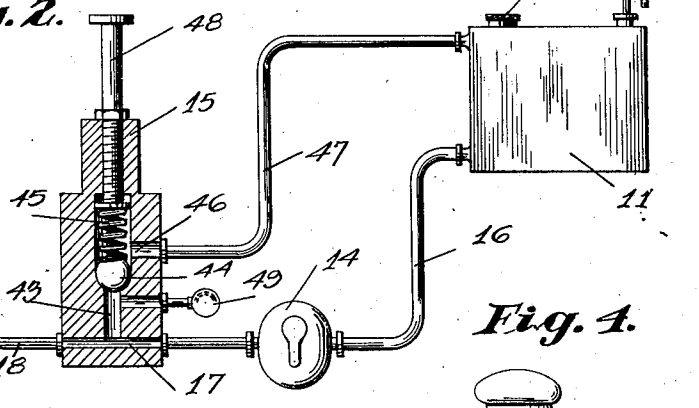


Fig. 4.

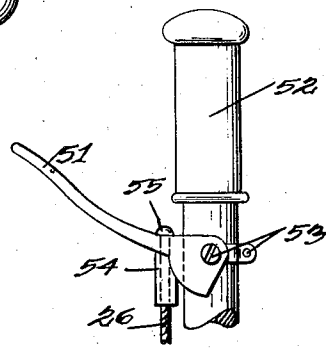
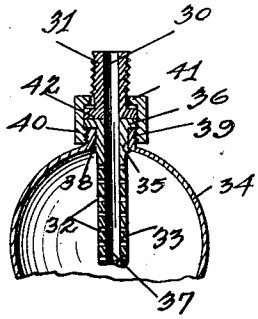


Fig. 3.



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2,062,511

METHOD FOR CREATING AERIAL EFFECTS

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Original application April 13, 1932, Serial No. 605,070. Divided and this application November 20, 1933, Serial No. 700,180

2 Claims. (Cl. 40—127)

The present application is a divisional application of the earlier case, Serial No. 605,070.

Although this invention relates particularly to methods of advertising in the air, it is not the purpose of the applicants to limit it to such.

It has been found impractical to use the exhaust gases alone to produce a dense or sufficiently permanent smoke cloud or to use a separate apparatus to form and emit the clouds of smoke, so we have provided an apparatus and method for creating this smoke effect that is superior to any known.

One of the objects used in our method of creating this effect is to provide an apparatus that can be conveniently installed in any airplane and to render the same easily accessible to the control of the driver.

Another object of our invention is to provide in this apparatus a needle control valve approximately at the injection jet itself. The advantage of having the control located at this point eliminates lag in the emitting of smoke, when pressed, inasmuch as the oil has a very short distance to travel before it vaporizes.

In addition, the shutting off of the fuel in this fashion prevents the dripping of oil into the exhaust pipe. In the absence of this type of shut-off, the smoke apparatus will cause a ragged stream of smoke to train the main column after the control has been shut off. This smudge of trailing smoke is prevalent on all other types of injection systems and, of course, is fatal to good skywriting. The shut-off must be clean, so with this apparatus it is possible to write dots and dashes which are absolutely perfect and which have no connecting strings of smoke which tend to mar the clearness of each mark.

Another object of our invention is to have, at all times, a constant pressure at the nozzle. This constant pressure is created by means of an oil pump which will rapidly draw the liquid from the tank and thoroughly mix the oil with any appropriate chemical and will keep the two thoroughly mixed at all times. This eliminates the necessity of mixing material before placing it in the tank.

Another object of our invention is to provide a needle control valve and jet assembly which is capable of convenient removal, cleaning and replacing of a jet in a short space of time. In most types of assembly the lack of convenient accessibility has proven very detrimental.

The invention will be best understood from further description with reference to the attached drawing illustrating a practical embodiment of the same.

Referring to the drawing:

Figure 1 represents an airplane with the smoke producing apparatus attached thereto.

Figure 2 is a section and elevation of the various parts of the apparatus.

Figure 3 is a detailed sectional view of the nozzle attachment.

Figure 4 is an elevation of the smoke control lever.

Referring to Figure 1, we have shown an airplane 10 with the smoke producing apparatus attached thereto. Referring to Figure 2 which shows the apparatus in detail, we have provided a tank 11 for the supply of smoke-producing fluid, the tank 11 having vent 12 and a replenishing inlet 13. We have placed an oil pump 14, which is preferably driven by the airplane engine, between the pressure regulating valve and the tank 11 which continually draws the fluid from the tank 11 through the inlet pipe to the passage 17 in the pressure relief valve 15 and then through the pipe 18 to the passage 19 in the needle control valve 20.

The needle control valve comprises a chamber 21 provided with an interior flange 22 adapted to retain the spring 23. The chamber 21 is adapted to receive the needle shaft 24, said shaft having integrally attached thereto the spring seat 25. The needle 24 is controlled by the cable 26 and attached to the cable as at 27 and 28.

We have provided a valve seat 29 for the needle valve 24 which when raised by the pull on the cable 26 by the operator allows the fluid to flow from the passage 19 into the chamber 21 then through the passage 30 in the nozzle attaching bolt 31 and then out through the jets 32 in the lower part of the nozzle 33, to be then vaporized by the heat in the exhaust gases in the exhaust 34 of the plane 10.

The nozzle 33 has an enlarged portion 35 which is flanged at 36 and has a passage 37 which connects with the passage 30 in the nozzle attaching bolt 31.

The exhaust pipe 34 is provided with an opening 38 adapted to receive the nozzle 33 and the metal is turned upward and externally threaded at 39 and is engaged by the internal threads of the nut 40. The nut 40 is flanged at 41 secures the flange 42 of the nozzle attaching bolt 31 to the flange 36 of the nozzle 33 and the upturned member of the exhaust pipe 34.

Upon the release of the cable 26 by the operator the spring 23 seats the needle 24 in the

needle seat 29 and shuts off the flow of the smoke producing fluid almost instantly due to the close proximity of the needle 24 to the nozzle 33 in the exhaust pipe 34.

When the flow of the fluid is shut off at this point, the fluid flows back through the chamber 21, the passage 19, the pipe 18 and into the passage 17 of the pressure regulating valve 15. Due to the continuous drawing of the fluid from the tank 11 by the pump 14, the fluid flows up through the passage 43 raising the ball 44 against the action of the spring 45 and out through the passage 46 into the return pipe 47 and then back into the tank 11. The pressure is regulated by means of the adjusting screw 48 and is registered by means of any suitable pressure gauge 49 which is located on the dashboard as at 50.

Ordinarily, the needle control 24 is seated by the spring 23 and is released by the manipulation by the operator of the lever 51, (see Fig. 4) which is located on a control stick 52 of the plane levers attached to the stick 52 by means of the screws 53. Integrally attached to the lever 51 is a tube 54, adapted to receive the cable 26 and is secured as at 55.

Located below the fuselage and just back of the exhaust pipe 34 is a powerful searchlight 56, so positioned as to permit the dense clouds of smoke emitting from the exhaust pipe to flow over and around and permitting the beam of light from the searchlight to be cast upon the dense clouds of smoke while flying through the air regardless of the speed of the plane.

The operation of the apparatus is as follows: Prior to the operation of the device to produce a meteor or comet effect while the plane is in flight, the pump which operates with the engine of the plane is continuously drawing the liquid from the tank and drawing it to the pressure regulating valve. The needle control valve being normally closed prevents the flow of the liquid through the pipe 18, the pressure thereby opening the ball valve 44 and permitting the liquid to return to the tank 11 through the outlet passage 46 and the return passage 47.

The above described operation insures a complete mixture of the oil or other liquid and any suitable chemical for producing a smoke effect. If so desired, the chemical may be introduced for imparting a suitable color to the smoke stream.

The operator of the plane while flying at night, wishes to create a meteor or comet effect, manipulates the control stick lever 51 which releases the needle control from its seat, which allows the liquid to flow through the small opening below the valve seat, and then through the passage 30 and 27 into the nozzle 33, and then through the jets 32 into the exhaust pipe where it becomes vaporized and then passes out of the exhaust opening in the form of a heavy smoke-like vapor to be eventually illuminated by the rays of the searchlight.

The oil pump permits of a high pressure at all times, and is controlled by a relief valve and a pressure gauge, which may be adjusted by means of the pressure adjusting screw 48.

When the needle control is seated, the flow of the liquid is stopped and as the oil pump continues to force the liquid through the pressure regulating valve, the liquid no longer escapes through the injection valve and so a back pressure results, thereby raising the ball from its seat and so returns through the passage 46 through the return pipe and the fluid tank, and at the same time registers pressure on the gauge 49.

Calling your attention to the location of the needle control 23, the close proximity of the needle to the outlet nozzle prevents and eliminates any lag in the shutting off of the flow of the liquid. Because of the short distance the liquid has to travel before vaporizing, it allows no ragged stream of smoke to train the main column after the flow has been shut off. With this clean shut off, it is possible to write absolutely perfect dots and dashes with no connecting strings of smoke whatever.

This method makes an ideal installation for sky writing, laying a smoke screen, or when using it at night with a very powerful searchlight. This method of placing the searchlight inside the stream of smoke will give forth the appearance of a huge ball of fire shooting across the sky, resembling very closely a huge shooting star or meteor. The rays of light are reflected in the column of smoke and gives it a reddish glow, resembling very closely a terrifically hot ball of fire at the light and gradually diminishing into what appears to be a sheet of flame several hundred feet in the rear of the ship.

The coloring of the smoke may be accomplished by the use of any sulphur dye of reddish tint which would not be decomposed by the heat of the exhaust pipe. This would give the smoke a very red glow. If another color would be desired, such as green, the use of barium nitrate in finely divided form may be mixed intimately with the oil, and when the charge is fired by the exhaust gases the vapor will have a brilliant green appearance. Similarly, other striking colors may be produced by the selection of suitable materials.

As the invention may be applied with various modifications to the various forms of construction of planes without departing from its spirit and scope, the appended claims are not intended to limit the same to the specific form disclosed.

Having thus described our invention, what we claim is new and desire to secure by Letters Patent of the United States is:

1. The method of producing a meteor or comet effect in the air, with an aircraft, which consists of providing a light beam, generating a smoke-like substance in close proximity to the source of said light beam, discharging said smoke-like substance in an elongated comparative continuous stream adjacent one end of said beam, and illuminating said stream with same beam of light by directing the same in a beam coincident therewith.

2. The method of producing a meteor or comet effect in the air, with an aircraft, which consists of providing a light beam, generating a smoke-like substance in close proximity to the source of said light beam, intermittently discharging said smoke-like substance in an elongated stream adjacent one end of said beam and illuminating said stream with said beam of light by directing the same in a beam coincident therewith.

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