Jan. 15, 1963 W. A. LEDWITH 3,073,122

ROCKET IGNITER

Filed June 2, 1959

FIG. 1

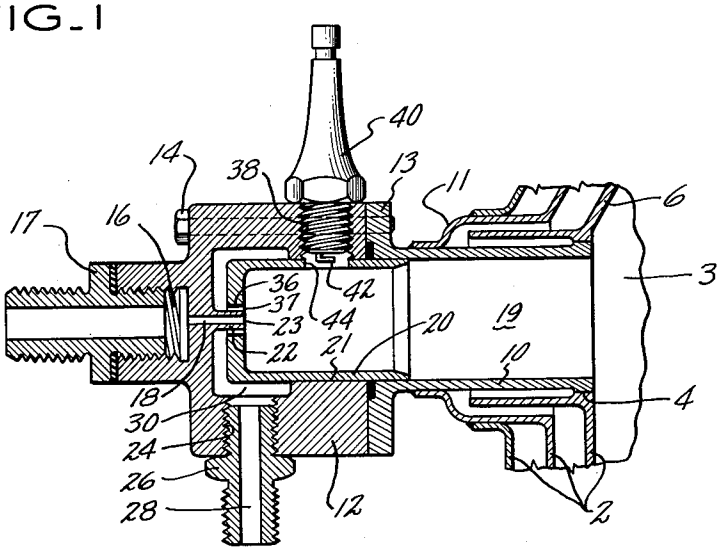
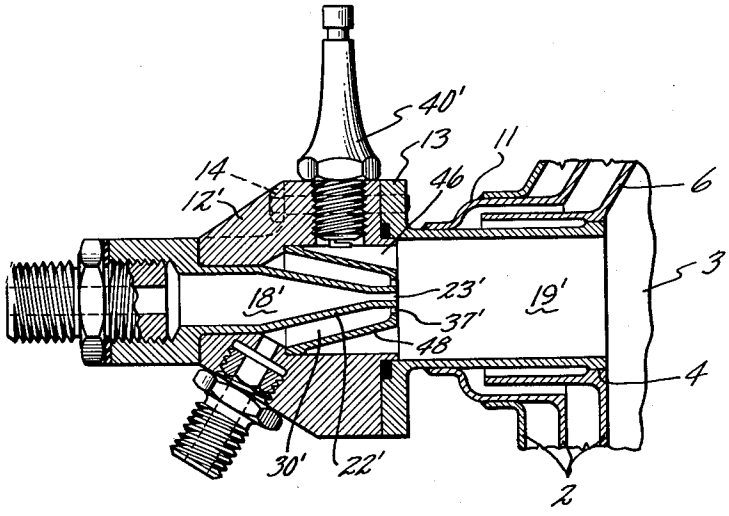


FIG. 2



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ROCKET IGNITER

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1 Claim. (Cl. 60—39.82

This invention relates to an ignitor for use particularly in liquid rockets.

One feature of the invention is an arrangement for igniting a mixture of propellants in an ignition chamber which communicates with and discharges into the main rocket chamber. Another feature is the location of the spark ignitor for the ignition chamber in such a position that it will be shielded from direct contact with the burning propellants. Another feature is an arrangement of parts such that the propellants cannot intermix except within the ignition chamber.

Other features and advantages will be apparent from the specification and claim, and from the accompanying drawing which illustrates an embodiment of the invention.

FIG. 1 is a sectional view of the ignitor.

FIG. 2 is a sectional view similar to FIG. 1 showing a modification.

The ignitor is shown in connection with a main combustion chamber of a rocket, the wall 2 of this combustion chamber 3 having an opening 4 in which the discharge end of the ignitor is positioned. The ignitor is preferably located at a point adjacent to the head 6 of the rocket chamber. The main propellants supply may be directed into the rocket chamber through the head 6 by nozzle arrangements, not shown.

The ignitor includes a sleeve 10 fitting within the opening 4 in the main chamber wall and brazed to a sleeve 11 provided by the multiple thickness wall 2. The ignitor also includes a head, or cap, 12 attached as by bolts 14 to a flange 13 on the sleeve 10. The head 12 has a centrally located inlet opening 16 with an adapter 17 by which a supply pipe, not shown, for one propellant, for example, the oxidizer, may be attached to the device. The inlet 16 communicates by an axial passage 18 with the ignitor chamber 19 defined by the sleeve 10 and a cap 20 in a bore 21 in the head. Surrounding the passage 18 and defining a part of the passage is a projection 22 terminating in a nozzle 23 for the delivery of the propellant to the ignition chamber.

The cap 12 has a lateral opening 24 to receive an adapter 26 through the passage 28 of which another propellant, for example, the fuel, is admitted to an annular chamber 30 surrounding the projection 22 and defined in part by the inner cap 20 fitting within the bore 21 in the cap, this bore being in alignment with the inner surface of the sleeve 10. The inner cap 20 has an opening 36 therein which surrounds the projection 22 and defines an annular nozzle 37 through which fuel is delivered into the ignitor chamber in a ring around the spray of oxidizer. Passage 18 and opening 36 are arranged to be concentric to each other, and thus the propellants are traveling in parallel flow paths when injected into the ignitor.

The cap 12 has another lateral opening 38 which receives a spark plug 40, the points 42 of which are exposed to the ignition chamber through an opening 44 in the inner cap 20. The points 42 are shielded from the main combustion area of the ignitor by being recessed in flange 13, and points 42 communicate with chamber 19 through opening 44 in cap 20. Thus, spark plug 40 is removed from the main combustion area of chamber 19.

In this arrangement the propellants are admitted through the opening 16 and the passage 28 and are discharged through the nozzles 23 and 37 into the ignitor chamber. Nozzles 23 and 37 terminate in the same plane. The spark plug functions to ignite the mixture within this chamber and the products of combustion are discharged from the chamber 19 in the form of a torch into the main combustion chamber.

The arrangement shown in FIG. 2 is similar in many respects to that of FIG. 1 except that the nozzle 23′ for one of the propellants, that is to say, the oxidizer, is at the downstream end of a conical member which projects into the chamber 19′ so that the fluid is discharged into the chamber at a point downstream of the points of the spark plug 40′. Similarly, the other propellant is discharged from the chamber 30′ within a second conical member 48 that surrounds the projecting conical member 22′ through the annular nozzle 37′ adjacent the tip of the nozzle 23′. Nozzles 23′ and 37′ terminate in the same plane, and are disposed so that they deliver propellants to chamber 19′ in parallel paths. With this arrangement, the torch effect of the burning products of combustion is not detrimental to the contacts of the spark plug 40′ since the contacts are located in an annular cavity 46 externally of the conical element 48 that defines the outer wall of the chamber 30′.

It is to be understood that the invention is not limited to the specific embodiment herein illustrated and described, but may be used in other ways without departure from its spirit as defined by the following claim.

I claim:

An ignitor for a rocket motor of the type having a casing forming a rocket combustion chamber, said ignitor comprising a sleeve having one end projecting into said combustion chamber and having an external flange at its other end outside said combustion chamber, a head having a bore coaxial with said sleeve secured at one of its ends to said flange, means for introducing a propellant axially into said head including a first conical member projecting into the bore of said head and terminating in an axial nozzle which discharges into said sleeve, a second conical member in said head concentric with said first conical member having an axial opening in its downstream end through which said first conical member extends, said conical members forming an annular chamber between them which communicates with said sleeve through an annular nozzle between the downstream ends of said members, means to supply a second propellant to said chamber between said conical members, and a spark plug extending into the axial bore in said head for igniting the propellants discharged through said nozzles.

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