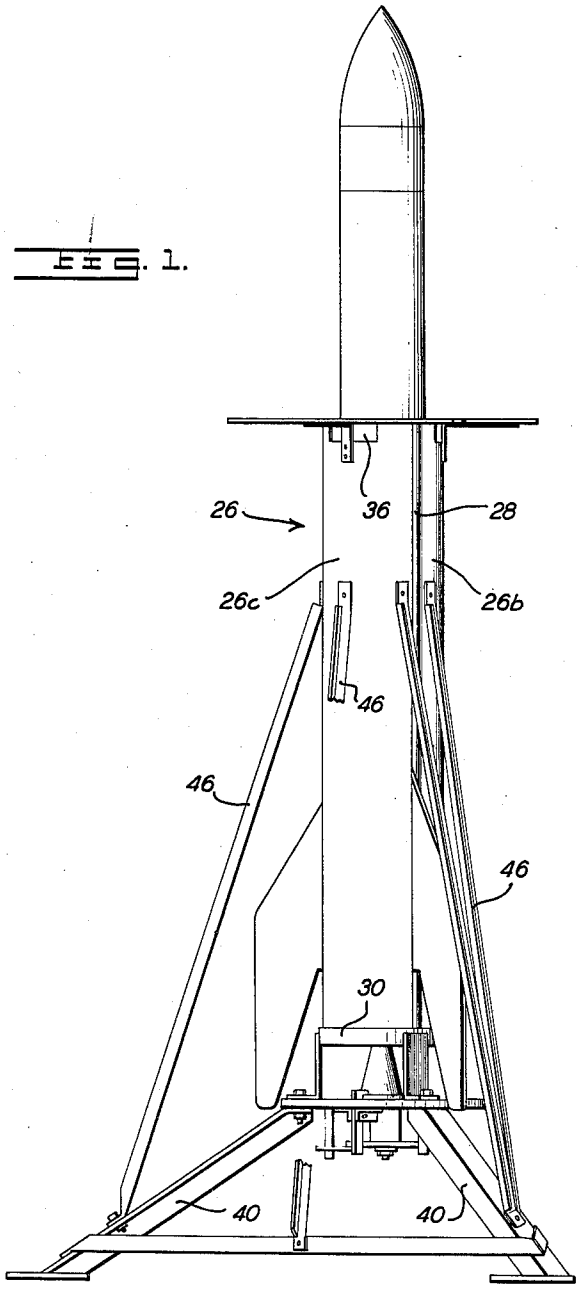
April 17, 1962 R. C. TRUAX 3,029,704

STEAM POWERED ROCKET AND LAUNCHER THEREFOR

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Fig. 1.



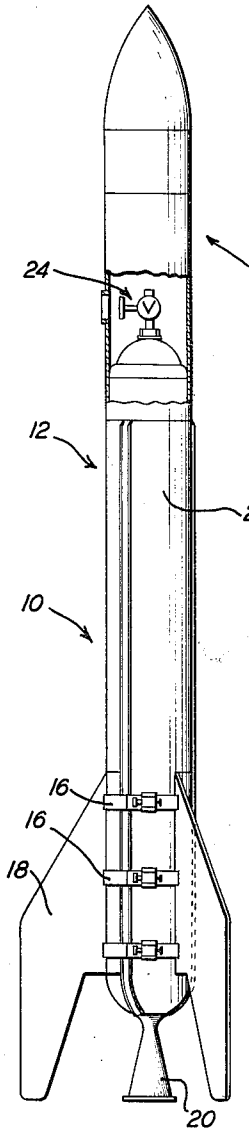


Fig. 2.

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STEAM POWERED ROCKET AND LAUNCHER THEREFOR

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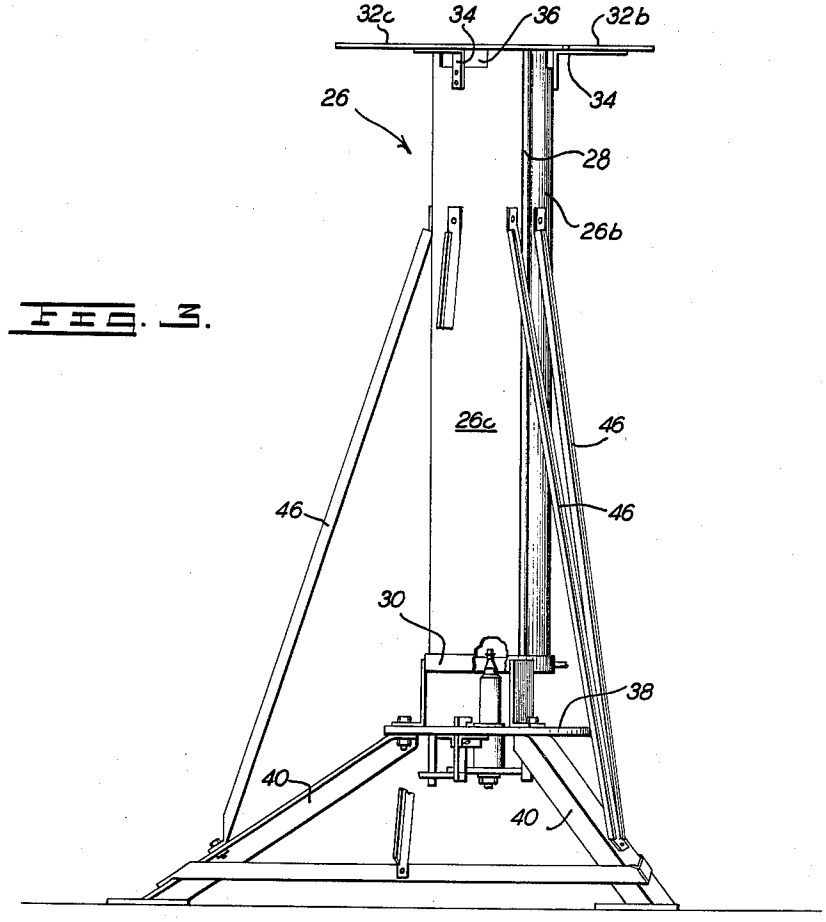


Fig. 3.

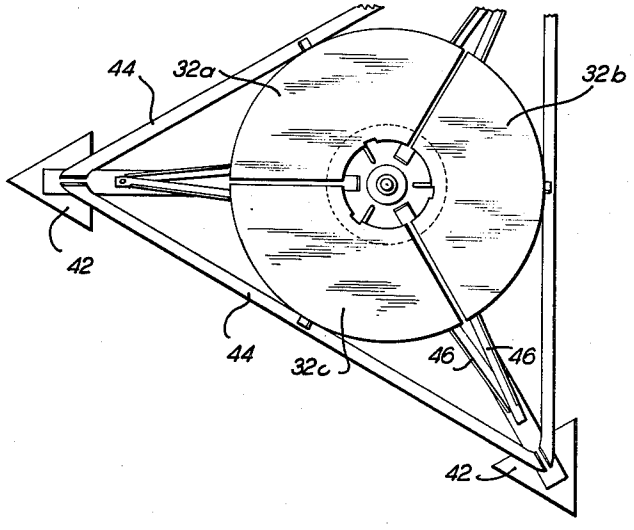


Fig. 4.

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STEAM POWERED ROCKET AND LAUNCHER THEREFOR

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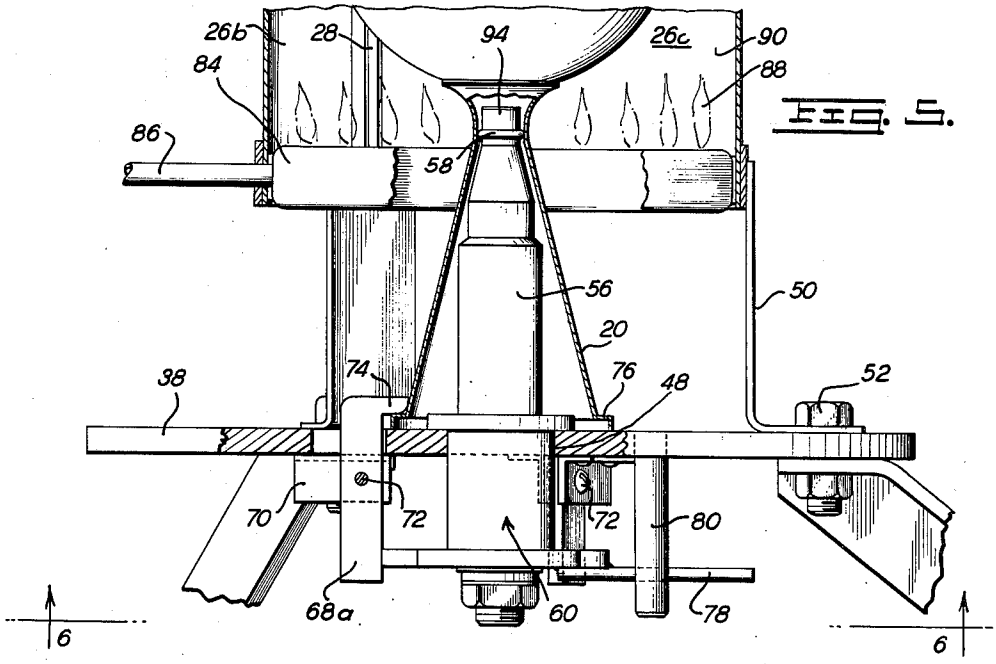


Fig. 5.

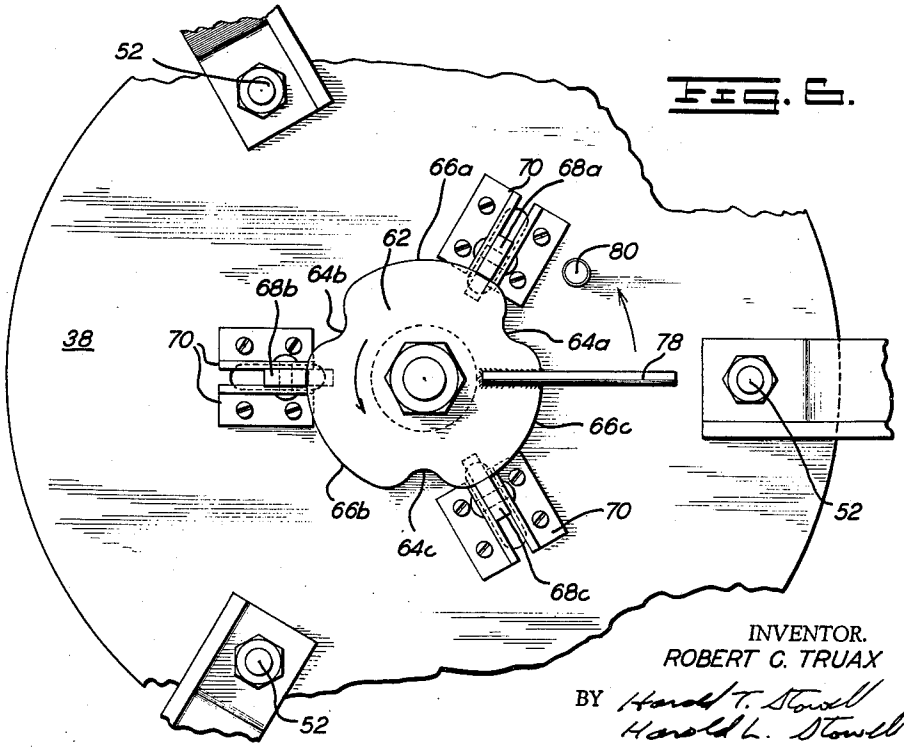


Fig. 6.

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United States Patent Office 3,029,704
Patented Apr. 17, 1962

3,029,704

STEAM POWERED ROCKET AND LAUNCHER THEREFOR

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Filed Mar. 10, 1959, Ser. No. 798,405
5 Claims. (Cl. 89—1.7)

This invention relates to a reaction propulsion device and, more particularly, to a new and improved steam propelled reaction rocket and launching device therefor.

It is a particular object of the invention to provide a reaction propulsion rocket and launcher therefor which is dependable in operation, relatively simple in construction and operation, and may be reused for plural flights merely by recharging the reaction engine.

It is a further object of the invention to provide such a device which is powered by steam formed from water which is stored at a temperature above that corresponding to ambient pressure.

A further object is to provide such a device which may be safely used by amateur rocket groups and for training purposes for armed services and the like.

A further object of this invention is to provide a rocket free from the fire hazard associated with combustible propellants.

These and other objects and advantages are provided in the rocket which includes a body portion adapted to receive a quantity of water, an outlet nozzle at the lower end of the body portion and communicating with the water, plural stabilizing fins projecting radially from the body portion adjacent the lower end thereof, a generally cylindrical casing adapted to receive the lower end of the body portion of the rocket, axially extending slots in the walls of the casing arcuately spaced to receive the stabilizing fins therethrough, a plate supported adjacent the lower end of said casing, sealing means for the outlet nozzle of the rocket carried by the plate, releasable means carried by the plate constraining the rocket in the casing with the outlet nozzle in register with the sealing means, and means for heating the body of water in the body portion of the rocket.

The novel features of the present invention will be more apparent to those skilled in the art from the following detailed description of the invention in reference to the accompanying drawings wherein:

FIG. 1 is an elevational view of a rocket and launcher constructed in accordance with the teachings of this invention;

FIG. 2 is a view of the rocket showing details of construction thereof;

FIG. 3 is a vertical view in partial section of the rocket launcher shown in FIG. 1;

FIG. 4 is a fragmentary plan view of the launcher shown in FIG. 3;

FIG. 5 is an enlarged fragmentary detailed view of the lower end of the rocket and launcher; and

FIG. 6 is a section substantially on line 6—6 of FIG. 5.

Referring to the drawings, and in particular to FIG. 2 thereof, 10 generally designates a steam powered reaction propulsion rocket which includes a body portion 12 carrying at its upper end a nose portion 14 which may house a time release parachute mechanism for bringing the rocket safely back to earth upon completion of a predetermined flight and, where desired, instruments, radio receivers and/or transmitters, and the like.

The lower end of the body portion 12 has secured thereon by banding means 16 a plurality of radially spaced stabilizing fins 18. The rocket also includes a nozzled outlet 20 shown in the illustrative embodiments of the invention as of the typical de Laval typee.

The major portion of the body 12 of the rocket comprises a conventionally constructed pressure tank 22 to which the nose portion 14 and the stabilizing fins 18 are attached.

The upper end of the tank 22 is provided with a filler valve 24 which preferably includes a pre-settable pressure release mechanism whereby the pressure in the pressure container 22 will not exceed a predetermined amount. The pressure release valve may be of any conventional design such as those used on steam boilers and the like.

The launching mechanism for the rocket 10 includes a generally cylindrical casing designated 26 which in the illustrated embodiment of the invention comprises three arcuate members 26*a*, 26*b*, and 26*c* assembled to provide three axially extending slots adapted to receive the fins 18 of the rocket when the rocket is inserted in the launching structure as illustrated in FIG. 1.

The lower end of the three arcuate shaped members 26*a*, *b*, and *c* comprising the tubular casing are secured within a cylindrical band 30 by welding or the like. The upper ends of the arcuate members forming the launching casing are provided with stiffening and heat shield members generally designated 32*a*, 32*b* and 32*c*, which shield members are secured to their respective casing elements by angle brackets 34. Between the upper ends of the members forming the casing and the heat shields 32*a*, *b* and *c*, are provided openings more clearly illustrated in FIGS. 1 and 3 for release of heat from the casing as to be more fully described hereinafter.

Positioned concentrically below the ring 30 at the lower end of the casing 26 is a launching plate member 38. The launching plate 38 has secured thereto a plurality of legs 40 having ground-engaging foot portions 42. Each of the legs, which for purposes of illustration are three in number, are tied one to another by horizontal brace elements 44 to provide a stable support for the launcher and the rocket.

Each of the legs is also interconnected to adjacent pairs of the three arcuate members comprising the tubular casing 26 by metal brace members 46. The upper ends of the structural brace members 46 are secured to their respective arcuate member adjacent the upper ends thereof to provide a rigid assembly. The lower ends of the casing 26 is maintained in alignment with an opening 48 in the plate 38 by three brace members 50 which are connected at their lower ends to the plate 38 by the nut and bolt assemblies 52 which connect the leg members 40 to said plate, while the upper ends of the braces 50 are secured such as by welding to the lower guide ring 30 for the members 26*a*, *b*, and *c* comprising the casing 26, as is more clearly illustrated in FIGS. 1, 3 and 5.

Referring particularly to FIG. 5, the plate 38 has secured centrally thereof a plug member 56 provided at its upper extended end with an O-ring seal 58. The diameter and the height of the plug 56 is such that with the rocket fully telescoped within the launcher 26 and the base of the outlet nozzle 20 is in contact with the upper surface of the plate 38, the O-ring 58 snugly engages the inner wall of the de Laval nozzle sealing the contents of the tank portion 22 from escape through the nozzle. The plug member 56 is maintained centrally of the plate 38 by plug support means 60. Plug support means 60 has rotatably secured thereon a cam plate 62 having three peripherally spaced indentations 64*a*, 64*b* and 64*c*.

Between each of the three low portions 64*a*, *b* and *c* is a high portion 66*a*, 66*b* and 66*c*, respectively. The cam element 62 cooperates with three pivotally mounted latch bars generally designated 68*a*, 68*b* and 68*c*. Each of the latch members 68*a* through 68*c* is pivotally mounted between a pair of brackets 70 by pivot pins 72 so that the lower ends of each of the latch elements extends below the plate 38 to register with the cam ele-

ment 62 while the upper extended end of each of the latch elements projects above the plate 38. The upper end of each of the latch elements is provided with boss means 74 positioned to engage a cooperating boss 76, formed on the lower end of the de Laval outlet nozzle 20, when the cam 62 is positioned as shown in FIGS. 5 and 6. By rotating the cam 62 by means of handle 78 in the direction of the directional arrows until the handle 78 registers with stop means 80, the lower ends of each of the latch members 68*a*, 68*b* and 68*c* may be moved inwardly to free the peripheral boss 76 from engagement with the cooperating boss means 74 on each of the latch elements. Release of the latch elements 68*a* through 68*c* by rotating the cam plate 62 through lever arm 70 may be carried out at a distance remote from the rocket launcher by attaching a lanyard to the extended end of the release element 78.

To complete the assembly heater means for converting the water within the container 28 to steam or raising the temperature of the water above the saturation temperature corresponding to ambient air is generally illustrated in FIG. 5 of the drawings as a ring burner 84 connected to a source of combustible gases through conduit 86. The ring burner 84 is maintained in the assembly by attachment to the lower ends of the members comprising the cylindrical casing 26 of the rocket launcher whereby the flames generally designated 88 from the ring heater are positioned immediately below the lower end of the tank 22 containing the water to be heated with the exhaust gases from the heater passing upwardly around the tank 22 within the space between the outer surface of the tank 22 and the inner surface 90 of the members forming the cylindrical casing of the launching device. The openings between the ring 30 and the upper surface of the base plate 38 provides an air inlet for natural convective currents to carry the heat up along the outer surface of the tank 22 and out of the outlets 36 formed in the upper ends of the arcuate members 26*a*, *b*, and *c* of the cylindrical casing 26 whereby the water contained within the tank is quickly and efficiently heated.

In operation of the device, the rocket 10 is inserted in the rocket launcher with the plug 56 snugly engaging the inner surface of the de Laval nozzle 20 to provide a pressure seal between the plug and the inner wall of the nozzle. The latches 68*a*, *b* and *c* are positioned as illustrated in FIG. 5 of the drawing and the cam plate 62 is rotated so that each of the latch members is constrained in its position of engagement with the boss 76 at the lower end of the nozzle 20. In this position the cam plate is substantially as illustrated in FIG. 6 of the drawings.

The tank 22 is filled or substantially filled with water through valve means 24 and the pressure release mechanism in the valve 24 is set to a predetermined pressure.

The fuel supply to the heater ring 84 is then opened and the heater ignited. The rocket operator then moves off to a safe distance and positions himself with respect to the launcher such that a lanyard connected to the arm 78 may be pulled to pull the arm 78 and rotate the cam plate 62 in the direction of the directional arrow. After the pressure in the tank has reached a predetermined pressure, for example, from about 250 to about 900 p.s.i., the lanyard is pulled by the operator which rotates the cam plate 62 and when the arm 78 comes in contact with the stop member 80, the low portions 64*a*, 64*b* and 64*c* of the cam plate are in register with the lower ends of the latch members 68*a*, *b* and *c*, respectively, so that the pressure developed within the body of the rocket acting against the upper end 94, FIG. 5, of the plug 56 cams the upper ends of the latch members radially outwardly as the rocket is propelled by the superheated steam issuing from the nozzle.

A rocket constructed as disclosed in this application and having a length of about 60 inches and containing about 3 gallons of water may reach an altitude on a vertical flight of about 25,000 feet when the temperature of the water is about 530° F.

From the foregoing detailed description of this invention, it will be seen that the aims and objects thereof have been fully accomplished by the steam rocket and launcher therefor. While a particular embodiment of the present invention has been disclosed for purposes of illustration, it will be apparent to those skilled in the art that various modifications may be made in the form of a rocket and the launcher therefor without departing from the scope of the invention as defined in the appended claims. For example, other heating means than the gas-fired ring burner may be employed to heat the water charge such as an electric resistance heater. It is also apparent that plural outlet nozzles could be provided on the rocket with each of the outlet nozzles being provided with a sealing plug means as illustrated in FIG. 5 of the drawings.

I claim:

1. The combination of a steam powered rocket and a launching device therefor: said rocket comprising a body portion adapted to receive and contain a quantity of water, and an outlet nozzle at the lower end of said body portion communicating with the water in said body portion; said launching device adapted to receive said body portion and outlet nozzle of said rocket and comprising a generally cylindrical casing, gas outlets disposed at the upper end of said casing, a plate supported in spaced relationship below the lower end of said casing and containing sealing means for said outlet nozzle, heating means disposed at the lower end of said casing, and release means carried by said plate adapted to constrain the rocket in said casing while said outlet nozzle is in register with said sealing means; the inner wall of said casing and the outer wall of said body portion of said rocket defining an annular duct whereby heated gases producible by said heating means pass upwardly through said duct to said gas outlets and thereby heat water contained in said body portion of said rocket.

2. The combination of a steam powered rocket and a launching device therefor: said rocket comprising a body portion adapted to receive and contain a quantity of water, an outlet nozzle at the lower end of said body portion communicating with the water in said body portion, and plural stabilizing fins projecting radially from the body portion adjacent the lower end thereof; said launching device adapted to receive said body portion and outlet nozzle of said rocket and comprising a generally cylindrical casing, axially extending slots in the walls of said casing arcuately spaced to receive said stabilizing fins therethrough, gas outlets disposed at the upper end of said casing, a plate supported in spaced relationship below the lower end of said casing and containing sealing means for said outlet nozzle, heating means disposed at the lower end of said casing, and release means carried by said plate adapted to constrain the rocket in said casing while said outlet nozzle is in register with said sealing means; the inner wall of said casing and the outer wall of said body portion of said rocket defining an annular duct whereby heated gases producible by said heating means pass upwardly through said duct to said gas outlets and thereby heat water contained in said body portion of said rocket.

3. The combination of a steam powered rocket and a launching device therefor; said rocket comprising a body portion adapted to receive and contain a quantity of water, an outlet nozzle at the lower end of said body portion communicating with the water in said body portion, and plural stabilizing fins projecting radially from the body portion adjacent the lower end thereof; said launching device adapted to receive said body portion and outlet nozzle of said rocket and comprising a generally cylindrical casing, gas outlets disposed at the upper end of said casing, axially extending slots in the walls of said

casing arcuately spaced to receive said stabilizing fins therethrough, a plate positioned concentrically below the lower end of said casing, spaced guide means between said plate and the lower end of said casing, a plug extending upwardly from said plate and adapted to be received within said outlet nozzle of said body portion, sealing means carried by the extended end of said plug, heating means disposed at the lower end of said casing, and release means carried by said plate adapted to constrain the rocket in said casing while said outlet nozzle is in register with said sealing means; the inner wall of said casing and the outer wall of said body portion of said rocket defining an annular duct whereby heated gases producible by said heating means pass upwardly through said duct to said gas outlets and thereby heat water contained in said body portion of said rocket.

4. The combination defined by claim 3 wherein the lower end of said casing is open, said heating means comprises a ring burner disposed about the inner cylindrical wall of said casing, and means connecting said ring burner with a source of fuel, whereby air enters into the lower open end of said casing and into the center of said ring burner to produce an upward flow of hot gases through said duct.

5. The combination defined by claim 3 wherein said release means comprises a plurality of pivotally mounted latch elements, said latch elements adapted to be moved from a position of engagement with the lower end of said outlet nozzle to a position of disengagement therewith, and manually operated cam means controlling the actuation of said latch means.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,029,704 April 17, 1962

Robert C. Truax

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 5, line 5, after "extending" insert -- vertically --.

Signed and sealed this 28th day of August 1962.

(SEAL)
Attest:

ESTON G. JOHNSON
Attesting Officer

DAVID L. LADD
Commissioner of Patents