

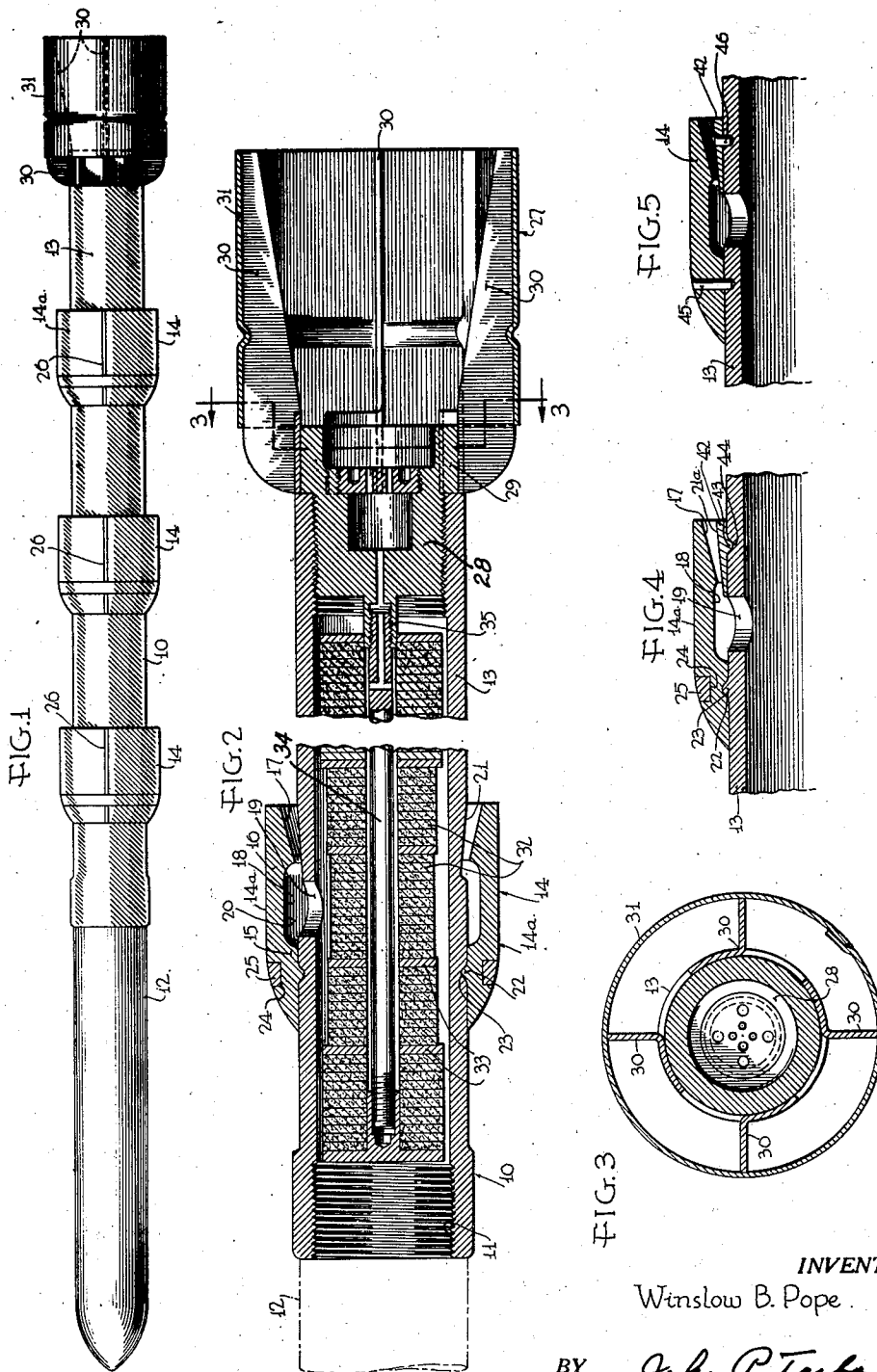
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W. B. POPE

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ROCKET MOTOR

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INVENTOR
Winslow B. Pope
BY *John P. Taylor*
ATTORNEY

UNITED STATES PATENT OFFICE

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ROCKET MOTOR

Winslow B. Pope, Detroit, Mich., assignor,
by mesne assignments, to United States of
America

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This invention relates to rocket-propelled devices, more particularly to improvements in the design and construction of what may be termed the rocket motor.

The primary object of the present invention is to provide a simplified arrangement for containing the propelling charge of a rocket-propelled device and for forming the pressure developing jets, which arrangement is particularly adapted for quantity production.

Another object is to provide a casing and jet arrangement which is so designed as to permit manufacture by simple machine turning operations, and which is adapted for rapid assembly.

A further object is to provide an improved multijet arrangement for rocket-propelled devices.

With the above and other objects in view, which will be apparent from the following description to those skilled in the art to which the invention appertains, the present invention consists in certain features of construction and combinations of parts to be hereinafter described with reference to the accompanying drawing, and then claimed.

In the drawing which illustrates suitable embodiments of the invention,

Figure 1 is a longitudinal view of a rocket-propelled device in which the features of the present invention are incorporated;

Figure 2 is an enlarged sectional view of the charge-containing casing;

Figure 3 is a transverse section of the stabilizing unit, taken substantially on line 3—3 of Figure 2; and

Figures 4 and 5 are fragmentary sections showing modified Venturi arrangements.

Referring to the drawing, particularly to Figures 1 and 2, the arrangement of the present invention comprises a tubular element 10 secured through a threaded connection 11 at its forward end to the device 12 to be propelled. The device 12 may consist of an explosive projectile, a chemical or flare device or any other device desired to be projected through space.

The tubular element 10 embodies a tube 13 internally threaded at its rearward end and one or more surrounding jet-forming elements 14, depending upon the number of propulsion jets desired.

Each jet-forming element 14 is comprised of two mating semi-circular half-shells 14a each having a forward axial portion 15 engaging the tube 13 and a rearwardly extending axial portion 16 circumferentially spaced from the tube 13. The inner circumferential face formed by the

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mating rearwardly extending axial portions taper radially inwardly from the rearward edge thereof for a portion of its axial extent to provide the conical face 17, and at the portion 18 between the face 17 and the forward axial portion 15 is outwardly recessed. The casing is provided with circumferentially spaced apertures 19 through its wall which open into the space or chamber 20 defined by the axial portion 15, the forward edge of the face 17, the wall 18 and the tube 13. The tube 13 at the rearward side of the apertures 19 and surrounded by the face 17 is tapered at 21 in the same direction as the face 17. The face 17 and wall 18 of the element 14 together with the face 21 of the casing 13 thus form a Venturi passage which is in communication with the interior of the casing 13 through the apertures 19.

In the construction shown in Figure 2, the forward axial portions 15 of the half-sections 14a are each formed with a radially inwardly extending locking ridge 22 which when assembled on the casing 13 snugly fits in a circumferential groove 23 in the outer surface of the casing 13, locking the half-sections against axial movement relative to the casing 13. The two half-sections 14a are provided in their external faces substantially in transverse alignment with the ridges with aligned grooves 24 which receive an endless locking ring 25. The locking ring 25 is shrunk into the groove 24 in substantially the same manner as a rotating band is applied to a shell, and when shrunk into place securely clamps the half-sections 14a about the casing 13.

Preferably, in order to provide for tight fitting engagement of the half-sections with the tube 13, spacing shims 26 are provided between the mating portions of the half-sections 14a.

The stabilizing element 27 comprises a plug 28 threaded into the rearward end of the casing 13 and having a shouldered portion 29 to which a plurality of radial sheet metal stabilizing vanes 30 are welded, the vanes being surrounded by tightly fitting sheet metal ring 31 which holds the same against deflection.

The propelling charge is in the form of a plurality of axially aligned annular combustible elements 32 separated by spacers 33, the group of elements 32 being mounted on a headed rod 34 and arranged within the casing 13. The rod 34 is threaded into a boss-like projection 35 forming an axial extension of the stabilizer plug 28. Inasmuch as the means for igniting the propelling charge forms no part of the present invention, the same is not shown in the drawing.

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In the modified construction of Figure 4, the ridge 22 and groove 23 are reversely arranged. Also, instead of machining or otherwise forming the Venturi wall 31 directly in the casing 13, this wall, designated 21a, is formed by the outer face of an annular ring 42 shrunk into position on the casing 13, the ring 42 and casing having interlocking ridge and groove portions 43 and 44, respectively. The wall 21a is machine tapered after the ring 42 is shrunk into position.

In the modified construction shown in Figure 5, the element 14 is in the form of a single-piece ring slipped over the casing 13 and held in place by suitable dowels 45 extending therethrough into apertures provided in the casing 13. The smaller ring 42 may also be held in position by similar dowels 46.

It will be obvious from the drawing and the foregoing description that the tube 13 and Venturi-forming elements 14 can be easily formed from tubular stock by simple machine turning operations and are so designed as to facilitate assembly operations, all of which provide for rapid quantity production.

It will be obvious to those skilled in the art to which the invention appertains that various changes may be made in the detailed construction and arrangement of parts without departing from the spirit and substance of the invention, the scope of which is defined by the appended claims.

What is claimed is:

1. A tubular casing for a rocket-propelled device, adapted to contain a combustible propelling charge and having in a circumferential zone at least one aperture through the wall thereof for discharging from the interior thereof gases resulting from the burning of the propelling charge, and means associated with said casing and forming therewith an axially directed annular propulsion jet, said means comprising a pair of semi-circular shells fitting together about said casing to form a continuous ring-like element having an axial extent including said apertured zone and regions of substantial axial extent at each side of said zone, said shells being circumferentially spaced from both said apertured region and one of said side regions and closely engaged with said casing at the other side region, and means for clamping said shells about said casing at said other side region.

2. A tubular casing for a rocket-propelled device, adapted to contain a combustible propelling charge and having in a circumferential zone at least one aperture through the wall thereof for discharging from the interior thereof gases resulting from the burning of the propelling charge, an annular member surrounding said casing and closely fitting said casing at one side of said zone and extending from said one side axially over and substantially beyond said zone in circumferentially spaced relation, said annular member being axially divided to provide semi-circular half-sections, and means for securely clamping said half-sections about said casing at said one side.

3. A tubular casing for a rocket-propelled device, adapted to contain a combustible propelling charge and having in a circumferential zone at least one aperture through the wall thereof for discharging from the interior thereof gases resulting from the burning of the propelling charge, an annular member surrounding said casing and closely fitting said casing at one side of said zone and extending from said one side axially over and substantially beyond said zone in circumferentially spaced relation, said annular member being

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axially divided to provide semi-circular half-sections, and means for securely clamping said half-sections about said casing at said one side, said sections and the casing at said one side having interfitting circumferential ridge and groove portions.

4. A tubular casing for a rocket-propelled device, adapted to contain a combustible propelling charge and having in a circumferential zone at least one aperture through the wall thereof for discharging from the interior thereof gases resulting from the burning of the propelling charge, an annular member surrounding said casing and closely fitting said casing at one side of said zone and extending from said one side axially over and substantially beyond said zone in circumferentially spaced relation, said annular member being axially divided to provide semi-circular half-sections, said sections having circumferential grooves in the external walls thereof, each circumferentially aligned with the other, and a continuous shrunk-in band in said aligned grooves clamping said sections about said casing at said one side.

5. A tubular casing for a rocket-propelled device, adapted to contain a combustible propelling charge and having in a circumferential zone at least one aperture through the wall thereof for discharging from the interior thereof gases resulting from the burning of the propelling charge, an annular member surrounding said casing and closely fitting said casing at one side of said zone and extending from said one side axially over and substantially beyond said zone in circumferentially spaced relation, said annular member being axially divided to provide semi-circular half-sections, and means for securely clamping said half-sections about said casing at said one side, said casing in the circumferential region at the other side of said zone and the circumferential portion of the inner wall of said annular member spaced from the casing being contoured to provide an annular Venturi passage.

6. A tubular casing for a rocket-propelled device, adapted to contain a combustible propelling charge and having in a circumferential zone at least one aperture through the wall thereof for discharging from the interior thereof gases resulting from the burning of the propelling charge, an annular member surrounding said casing and closely fitting said casing at one side of said zone and extending from said one side axially over and substantially beyond said zone in circumferentially spaced relation, said annular member being axially divided to provide semi-circular half-sections, and means for securely clamping said half-sections about said casing at said one side, said casing in the circumferential region at the other side of said zone and the circumferential portion of the inner wall of said annular member spaced from the casing being contoured to provide an annular Venturi passage, said circumferential region of said casing at said other side being conical in form and tapering radially outwardly in a direction away from said apertured zone, and the surrounding said circumferential portion being correspondingly tapered to a greater degree.

7. A tubular casing for a rocket-propelled device, adapted to contain a combustible propelling charge and having in a circumferential zone at least one aperture through the wall thereof for discharging from the interior thereof gases resulting from the burning of the propelling charge, an annular member surrounding said casing and

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closely fitting said casing at one side of said zone and extending from said one side axially over and substantially beyond said zone in circumferentially spaced relation, the external surface of said casing at the other side of said zone 5 for the region surrounded by said annular member being conical in form and tapering radially outwardly in a direction away from said apertured zone, said conical surface and the inner wall of the spaced portion of said annular member together defining an annular Venturi passage.

8. A tubular casing for a rocket-propelled device, adapted to contain a combustible propelling charge and having at each of a plurality of axially spaced circumferential zones one or more 10 apertures through the wall thereof for the discharge from the interior of the casing of gases resulting from the burning of the propelling charge, and spaced external annular elements surrounding said casing, each closely fitting said 15 casing at one side of an apertured zone, and extending axially over and beyond said zone in circumferentially spaced relation and defining

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with said casing an axially directed propulsion jet communicating with the interior of said casing through the apertures of the surrounded zone, each of said elements being axially divided to 5 provide semi-circular half-sections, and means for securely clamping said sections around said casing.

9. A tubular casing for a rocket-propelled device, adapted to contain a combustible propelling charge and having in a circumferential zone at least one aperture through the wall thereof for discharging from the interior thereof gases resulting from the burning of the propelling charge, an annular member surrounding said casing and 10 closely fitting said casing at one side of said zone and extending from said one side axially over and substantially beyond said zone in circumferentially spaced relation, and a plurality of radially extending dowel pins extending 15 through said annular member into said casing at said one side for locking said member against movement on said casing.

WINSLOW B. POPE.