60-253

SEARCH ROO

March 3, 1959 W. W. ODENKIRCHEN 2,875,577

REACTION PROPULSION DEVICE

Filed Sept. 6, 1957

6535

x 6521

FIG. 1

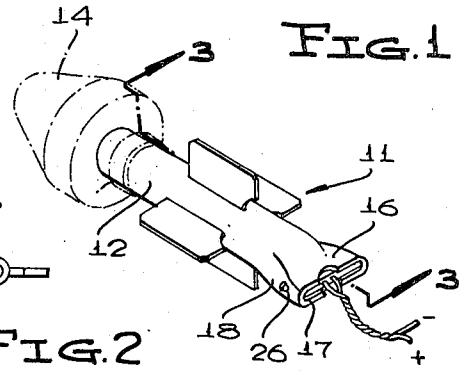


FIG. 2

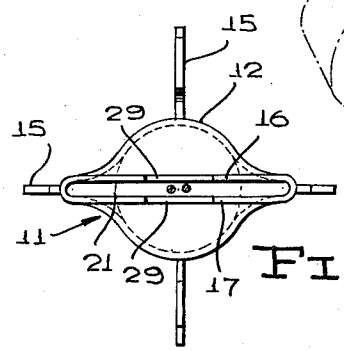


FIG. 3

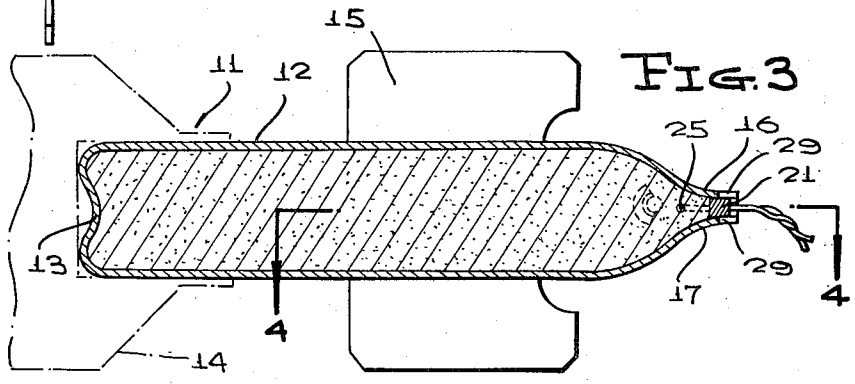


FIG. 4

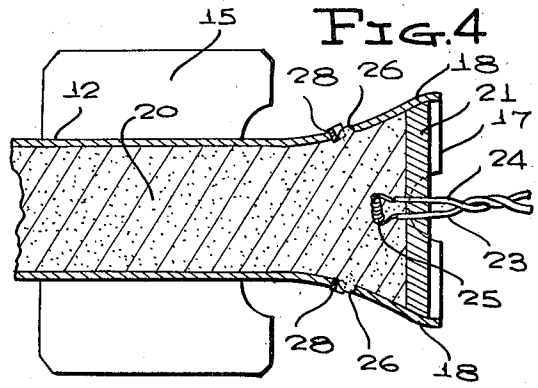


FIG. 5

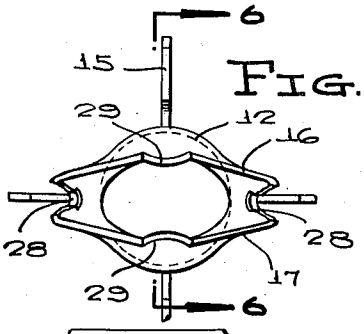
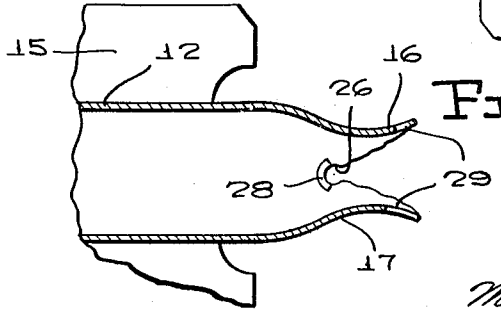


FIG. 6



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REACTION PROPULSION DEVICE

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2 Claims. (Cl. 60—35.6)

This invention relates to reaction propelled devices, and more particularly to a reaction propelled device driven by a combustible propelling charge of the powder type.

A main object of the invention is to provide a novel and improved reaction propelled device which is simple in construction, which is provided with means for controlling the pressure developed by the combustion of the fuel thereof in an efficient and accurate manner, and which is so arranged that the casing of the device does not become shattered when the charge therein is detonated.

A further object of the invention is to provide an improved reaction-propelled projectile which is relatively inexpensive to manufacture, which includes means for efficiently utilizing the gases developed by combustion of the fuel therein, and which is so arranged that the gas pressure within the casing of the device never exceeds the bursting strength thereof, relief means being provided for dissipating the pressure in a controlled manner.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

Figure 1 is a perspective view showing a reaction-propelled projectile constructed in accordance with the present invention.

Figure 2 is an enlarged rear end view of the projectile of Figure 1.

Figure 3 is an enlarged longitudinal vertical cross sectional view taken through the main body of the projectile of Figures 1 and 2.

Figure 4 is a horizontal cross sectional view taken on the line 4—4 of Figure 3.

Figure 5 is a rear end view of the projectile, similar to Figure 2, but showing the configuration of the outlet conduit portion of the projectile subsequent to firing thereof.

Figure 6 is a vertical cross sectional view taken on the line 6—6 of Figure 5.

Referring to the drawing, **11** generally designates a reaction propulsion device according to the present invention, said device comprising a tubular casing **12** of suitable malleable sheet material yieldable under the force of exploding gases but normally substantially rigid, for example, of a suitable malleable alloy such as brass or similar metal. The casing **12** has a relatively thin wall and is formed at its forward end with the forwardly concave front wall **13**, sealing said forward end of the casing. A suitable conventional head member **14**, shown in dotted view in Figures 1 and 3 may be secured on the forward end of the casing **12**. Secured to the intermediate portion of the casing are a plurality of outwardly directed radial fins **15** acting to guide the projectile during its flight.

The rear end of the casing **12** is flattened to define an elongated outlet conduit, said conduit comprising relatively wide, rearwardly flaring top and bottom walls **16** and **17** and the relatively narrow side walls **18, 18** connecting the margins of the top and bottom walls, to define the aforesaid elongated outlet conduit. As shown in Figure 4, and as above mentioned, the outlet conduit flares rearwardly in width.

The casing **12** contains a charge of combustible powder, of conventional composition, shown at **20**, said charge substantially filling the casing and being sealed therein by a frangible sealing member **21**, comprising any suitable readily frangible sealing material, such as plaster or the like which is placed in the rear end portion of the outlet conduit above described, and as is clearly shown in Figures 3 and 4. Moulded in the sealing member **21** and extending therethrough are a pair of ignition wires **23** and **24** which are connected at their inner ends by a suitable ignition filament **25**, of tungsten, or the like, which is thus disposed in the rear portion of the combustible charge **20** and which is employed to ignite the charge when the projectile is to be fired.

The side walls **18, 18** are formed with respective apertures **26, 26** at their intermediate portions, said apertures being located at equal distances from the rear ends of the casing and defining a zone of rupture between the apertures and the rear ends of the end walls **18, 18**, the cross sectional area of the rear end portions of said side walls being insufficient to resist the explosive force generated by the ignition of the powdered charge **20**.

To insure that rupture will only occur between the apertures **26** and the rear ends of the side walls **18, 18**, the apertures are reinforced at their forward portions by respective welds **28, 28**, thus strengthening the side walls **18, 18** at points forwardly of the welds, and thus insuring that rupture of the side walls will only occur rearwardly of the apertures **26**.

As will be readily understood, when the charge is detonated by energizing the filament **25**, in any suitable manner, the force of the expanding gases will pulverize the member **21**, allowing the gases to discharge through the rear end of the casing **12**. A pressure developed will be sufficient to spread the top and bottom walls **16** and **17**, to the configuration shown in Figure 6, whereby said top and bottom walls flare rearwardly and whereby the aforementioned outlet conduit is substantially increased in its cross sectional area to allow the gases to discharge therefrom at a predetermined rate and to develop a predetermined thrust. The rate of discharge and the thrust developed is further controlled by suitably dimensioning the orifice ultimately defined by the distortion of the outlet conduit, and this is accomplished by previously forming notches **29, 29** of any desired configuration, for example, of semi-circular shape or of other suitable arcuate shape in the intermediate portions of the end edges of the top and bottom walls **16** and **17**, as is clearly shown in Figures 5 and 6. Thus, the notches **29** provide additional malleability of the rear portion of the top walls **16** and **17** and allow said top walls to deform substantially more than if the notches were not present, the notches also providing a larger outlet cross section than would be provided in the absence of the notches.

As above mentioned, the apertures **26** may be located at the proper distance from the end edges of the side walls **18**, to provide the desired cross sectional area between the apertures and the end edges of the side walls such that said side walls will rupture at a predetermined gas pressure developed in the rear portion of casing **12**, and the notches **29, 29** are suitably dimensioned so that the discharge conduit created by the combustion of the charge and subsequent generation of gases will assume the desired ultimate configuration, as shown in Figures 5 and 6, to provide the intended reaction and slight characteristics of the projectile.

While a specific embodiment of an improved reaction

propulsion device has been disclosed in the foregoing description, it will be understood that various modifications within the spirit the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. In a reaction propulsion device, a tubular casing containing a combustible propelling charge, said casing being of malleable sheet material yieldable under the force of exploding gases but normally substantially rigid, one end of said casing being closed and the other end being flattened to define an elongated outlet conduit, comprising relatively wide rearwardly flaring top and bottom walls and relatively narrow side walls connecting the margins of said top and bottom walls, each of said side walls being formed with an aperture spaced longitudinally a substantial distance from the outer end of said outlet conduit, an ignition member in the intermediate portion of said outlet conduit, and a sealing member of relatively easily frangible sealing material in the outer end portion of said outlet conduit.

2. In a reaction propulsion device, a tubular casing containing a combustible propelling charge, said casing being of malleable sheet material yieldable under the force of exploding gases but normally substantially rigid, one end of said casing being closed and the other end being flattened to define an elongated outlet conduit comprising relatively wide, rearwardly flaring top and bottom walls and relatively narrow side walls connecting the margins of said top and bottom walls, each of said side walls being formed with an aperture spaced longitudinally a substantial distance from the outer end of said outlet conduit, an ignition filament in the intermediate portion of said outlet conduit, and a sealing member of relatively easily frangible sealing material in the outer end portion of said outlet conduit, each of said top and bottom walls having a transversely extending end edge formed at its intermediate portion with an arcuate notch, whereby the effective areas of said top and bottom walls are diminished by the areas of the arcuate notches, and whereby the effective outlet orifice of said outlet conduit is increased in area in accordance with the areas of said arcuate notches.

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