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ROCKET PROJECTOR AND PROJECTILE

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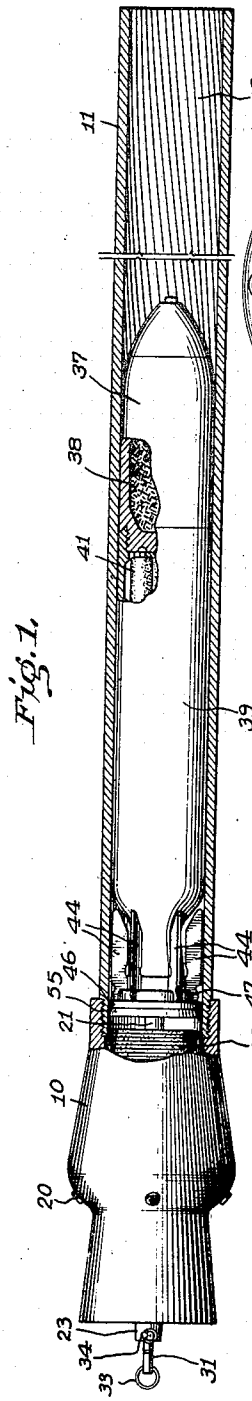

Fig. 1.

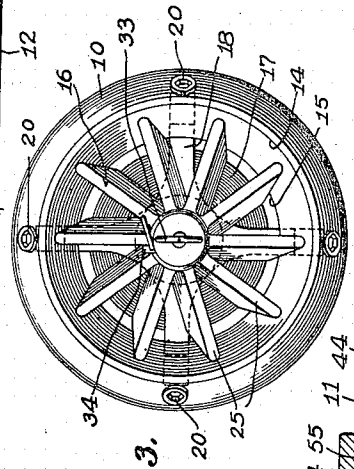

Fig. 3.

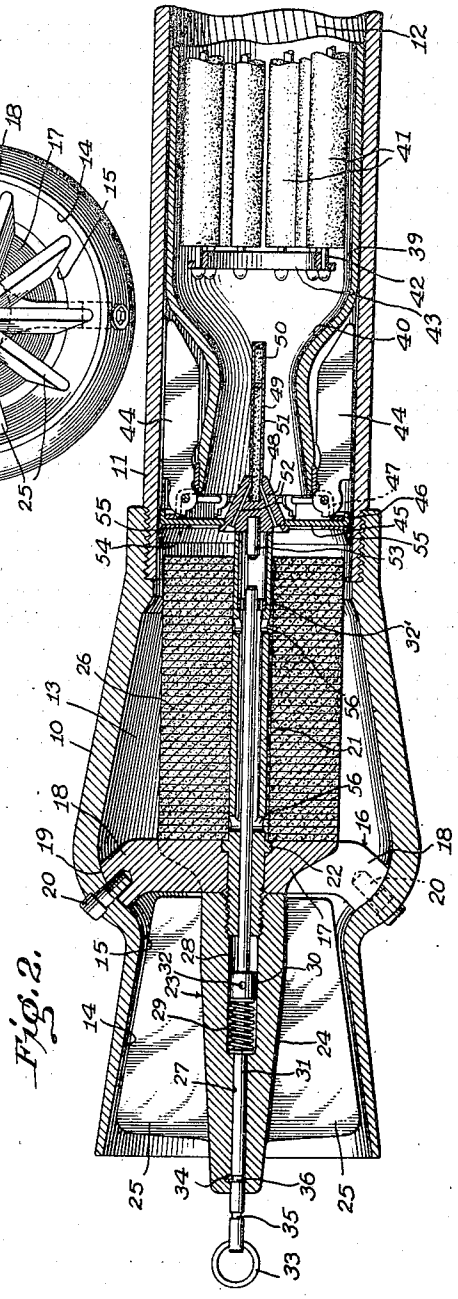

Fig. 2.

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ROCKET PROJECTOR AND PROJECTILE

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2 Claims. (Cl. 89—1.7)

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This invention relates to rocket projectiles, particularly to improved mechanism for improving the firing of the same.

The conventional method of firing a rocket projectile is to suitably support the projectile and then ignite the propelling charge which through reaction forces starts the projectile in flight. The propelling charge in most cases is effective for only a small portion of the flight of the projectile.

It is the object of the present invention to provide a new and novel arrangement whereby a rocket projectile may first be set in flight by means other than its propelling charge and at a predetermined point in the flight, or distance from the objective, the propelling charge of the rocket projectile ignited with the result that the speed of travel of the projectile is increased, thus providing for greater striking force or range or both.

A further object is to provide a new and novel arrangement in association with a rocket device for predetermining the time at which the rocket propelling charge is ignited.

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.

Referring to the drawing which illustrates a suitable embodiment of the invention:

Figure 1 is an elevational view of a projecting device, partially in section, showing a rocket projectile in position therein for firing;

Figure 2 is an enlarged longitudinal section of the projecting mechanism and a portion of the rocket projectile in firing position; and

Figure 3 is a rear end view of the projector shown in Figure 2.

Referring to the accompanying drawing, the projector embodies a tubular casing 10 threadably secured to the rearward end of the barrel 11, the barrel being rifled as indicated at 12. The casing 10 has its inner wall contoured to define a pressure chamber 13 adjacent the barrel 11 and a rearwardly and outwardly flaring Venturi passage 14 at the rearward end, the wall being

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stepped inwardly at 19 between the chamber 13 and passage 14 to provide a throat 15 of reduced diameter. Arranged within the chamber 13 is a spider 16 having a hub 17 and outwardly extending legs 18 engaging the stepped portion 19. Cap screws 20 extending through the casing wall rigidly secure the spider 16 in position.

Within the chamber 13 is a charge supporting tube 21 which extends coaxially through the hub 17 and has a shoulder 22 engaging the forward side of the spider 16. The rearward end of the tube 21 which projects beyond the spider is externally threaded. Disposed within the Venturi passage 14 is a vaned member 23 having a hub portion 24 threaded to the projecting end of the tube 21 and a plurality of outwardly extending vanes 25, the planes of which are at an angle to the axis of the Venturi passage 14 whereby the gases from a charge 26 will impinge against the same and tend to rotate the casing in opposition to the tendency toward rotation resulting from the firing of the projectile from the gun barrel.

The propelling charge 26 is annular in formation and is supported on the tube 21 as shown.

The hub portion 24 is provided with an axial opening 27 therethrough in axial alignment with the tube 21, which opening is enlarged at 28 to receive a compression spring 29 which urges a stop member 30 into engagement with the end of the tube 21. Disposed within the opening 27 and extending within the spring 29 and through the stop member 30 into the tube 21 is a plunger rod 31, the rod 31 being secured to the stop member 30 by a cross pin 32. The forward end of the rod 31 is supported by an annular guide 32' carried within the forward end of the tube 21 and having a series of flash ignition apertures therein. The rod 31 projects beyond the end of the hub 24 and carries a pull ring 33 which can be grasped by the operator to retract the rod against the compression of the spring 29 and thus arm the mechanism ready for firing. A removable lanyard pin 34 is provided to extend transversely through the hub 24 to engage one of two annular recesses in the rod 31—the recess 35 for locking the rod 31 in a firing position for high angle shot and the recess 36 for locking the rod 31 in its completely retracted firing position.

The projectile embodies a main body 37 having a chamber 38 for an explosive charge, and a rearwardly extending tubular casing 39 having its rearward end contoured to define an axial and rearwardly opening Venturi passage 40. The rocket or propelling charge is in the form of a number of sticks 41 of combustible material carried by rods 42 forming part of a cage or supporting structure 43 arranged within the casing 39.

Securely carried by the Venturi end of the casing 39 is an annular ring 47 to which suitable stabilizing fins 44 are pivotally mounted. These fins are pivoted against the Venturi end of the casing 39 when the projectile is in the projecting tube or barrel but pivot radially outwardly into stabilizing position when the projectile leaves the barrel 11.

In accordance with the present invention, a plate-like member 45 closes the Venturi passage 40 of the projectile during firing from the gun. In the form shown, the plate-like member 45 is provided with a peripheral flange 46 within which the annular ring 47 is firmly positioned but not permanently as will later appear. The plate-like member 45 carries a central boss-like element 48 extending therethrough which in turn carries a tubular member 49 disposed axially within the Venturi passage 40. The tubular member 49 may be of any desired length and contains at its forward end a suitable flash charge 50 and rearwardly thereof a slow-burning powder charge 51. Suitable passages 52 extend through the boss-like element 48 into communication with the powder charge 51 within the tubular member 49.

Also carried by the boss-like portion 48 and extending rearwardly therefrom is a cartridge 53 which carries a suitable flash charge (not shown).

Normally in the firing position, the projectile, which is inserted in the muzzle end of the barrel 11, is disposed at the rearward end of the barrel with the bosslike element 48 abutting the end of the tubular member 21 and the cartridge 53 extending into the tubular member 21 as shown in Figure 2. It is to be understood however that with the projectile in this position, the rod 31 is in its retracted position and locked in safety position through engagement of the lanyard pin 34 with the groove 36.

Secured to the rearward side of the plate 45 is an annular ring 54 having a flexible flange 55 substantially engaging the bore of the barrel 11 when the projectile is inserted in the barrel, which serves as an obturating disc when the projectile is fired and as a pressure seat to prevent gas pressure from being expanded past the projectile.

When it is desired to fire the projectile on a substantially horizontal plane the operator removes the lanyard pin 34 from recess 36 and the compression of the spring 29 urges the rod 31 forwardly, causing the end thereof to strike the cartridge 53 and explode the same. The flash or flame of this explosion travels backwardly through the tube 21, the apertures in the guide 32', and thence through the cross passages 56, to ignite the charge 26. In high angle firing, the lanyard pin 34 is placed in recess 35 to lock the rod 31 against movement so that when the projectile is dropped in the muzzle end of the barrel 11 it will strike the forward end of the pin 31 to set off the cartridge 53.

The pressure developed in the chamber 13 by the charge 26 provides the motive force for the projectile, causing the same to be projected from the tube. Also, upon firing of the charge the pressures acting directly against the ring 54 and flange 55 tends to drive the flange 55 into the rifling 12 whereby during travel through the barrel 11 the projectile is caused to rotate. When the projectile leaves the barrel the fins 44 pivot radially outwardly into stabilizing position.

A portion of the flame resulting from ignition of the charge 26 travels through the passages 52 to ignite the slow-burning powder 51 which is contained within the tube 49. The period of burning of the powder 51 is so predetermined that the burning powder will not ignite the flash charge 50 until a predetermined point in the flight of the projectile after, of course, it leaves the barrel 11. This may be predetermined to take place at any point between the barrel 11 and the objective. The flame resulting from ignition of the flash charge 50 ignites the propelling charge sticks 41. The pressure developed from the propelling charge first blows the plate 45 from the annular ring 47 and during continued burning of the propelling charge increases the velocity of the projectile, thus increasing the striking effect of the same.

It is thus seen that I have provided a method of firing rocket-type projectiles whereby after the projectile has been set in flight and approaches its objective added velocity is imparted thereto at any point in its flight to increase its striking force or penetrating effect, and wherein the distance from the objective at which the rocket or propelling charge becomes effective to increase the speed of flight can be predetermined. In the present example this is predetermined by the substitution for the plate 45 of a corresponding plate in which the period of burning of the powder 51 or other suitable material is greater or less as the case may be, depending upon time desired for setting off the flash charge 50.

Obviously, other well-known means of initially igniting the projector charge 26 may be utilized in lieu of the firing pin arrangement described.

It is to be understood that while a specific form of projector and rocket projectile have been described for the purpose of illustration, other forms may be utilized with equal effect, and 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. The combination with a recoilless projector having a firing chamber, a barrel projecting therefrom and a powder charge supported within said chamber; of a rocket type projectile supportable in said barrel with its rear end adjacent said chamber, a member carried by said projectile substantially closing communication between said barrel and chamber, a primer cartridge carried by said member, and a firing pin supported within said chamber, said firing pin being operable to fire said primer cartridge whereby firing of said cartridge ignites said powder charge.

2. The combination with a recoilless projector having a firing chamber, a barrel projecting therefrom and a powder charge supported within said chamber; of a rocket type projectile supportable in said barrel with its rear end adjacent said chamber, a member carried by said projectile substantially closing communication between said barrel and chamber, a primer car-

tridge carried by said member, and a firing pin supported within said chamber, said firing pin being operable to fire said primer cartridge whereby firing of said cartridge ignites said powder charge, said projectile containing a propelling charge and a delayed action slow-burning charge for igniting said propelling charge, said member having a passage therethrough for transmitting the flash of ignition of said powder charge to said delayed action charge.

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