Dec. 3, 1963 J. V. DUNHAM ETAL 3,112,671

ROCKET TRAINER

Filed Nov. 17, 1961 2 Sheets-Sheet 1

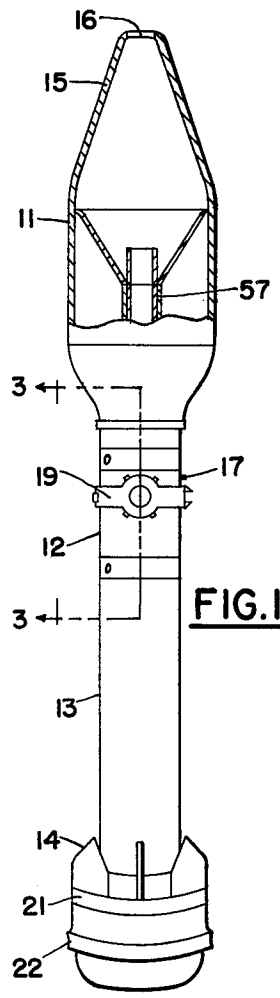


FIG. 1.

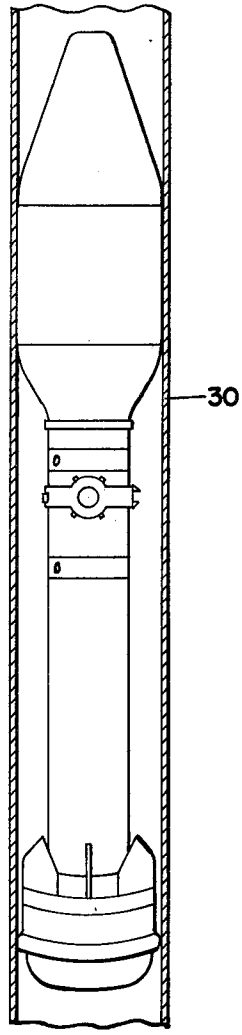


FIG. 4.

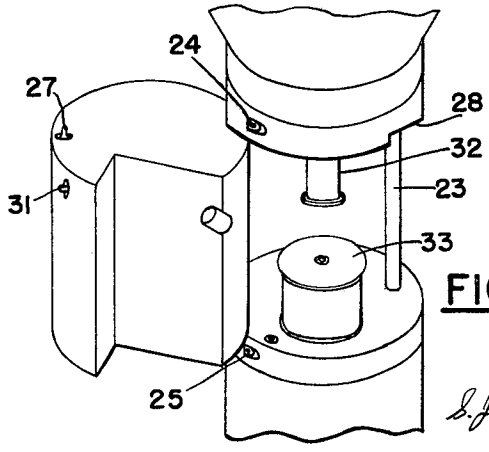


FIG. 2.

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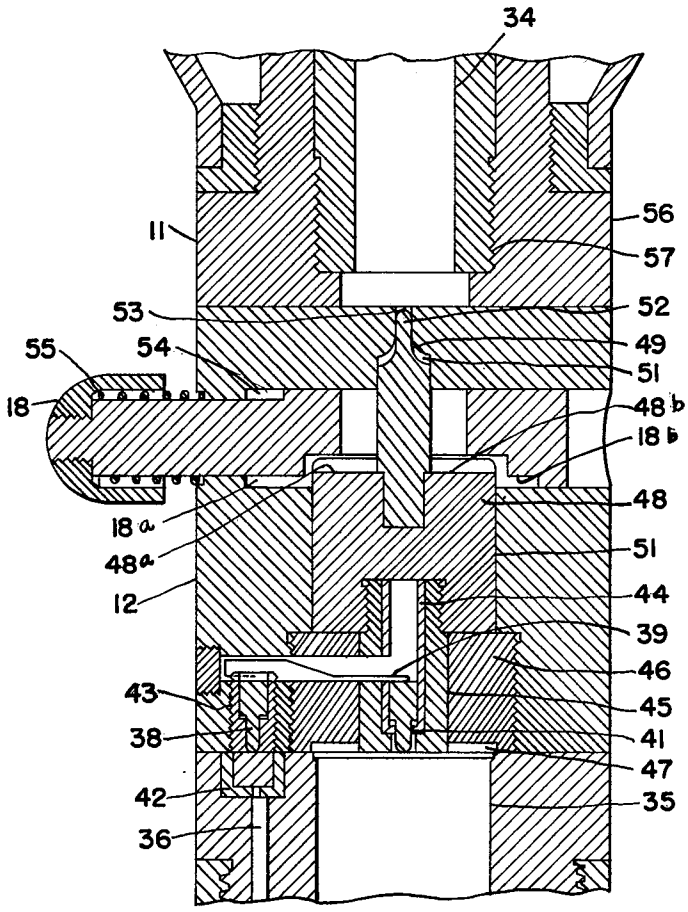


FIG. 3.

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ROCKET TRAINER

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2 Claims. (Cl. 89—1.7)
(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment to us of any royalty thereon.

This invention relates to a rocket training round and has special reference to a round which simulates rocket ammunition in physical and ballistic characteristics but which employs inexpensive small arms ammunition components as the only expendable materiel.

It is desirable in the use of training rockets, that the training round physically simulate the service device. That is, the training round should simulate the flashback of a service round; the flashback should occur at substantially the same time as the service round is fired, and the projectile should have a trajectory substantially the same as the trajectory of a service round.

Heretofore, training rounds for a rocket launcher consisted of a rocket with the explosive charge removed. The rocket was launched by conventional means and was often destroyed by its impact with the terrain. This procedure involved large expense with loss of strategic materials.

The present invention provides for the training of personnel in the use of rockets and rocket launchers while effecting a considerable savings. Only subcaliber ammunition is fired while the major component of the training round remains stationary and undamaged. Backflash is caused by a unique arrangement of a conventionally triggered cartridge which teaches the trainee respect for the rear end of a rocket. Substantially simultaneously, upon recoil of the backflash cartridge, a tracer bullet is fired from the front of the training rocket and follows a trajectory substantially identical with that of a live service round.

Under the practice of this invention a trainee is presented with what appears to be a service round. He handles it the same way he would handle a service round: a safety pin strap is removed; the round is inserted into the launcher; the launcher is aimed and fired; the firing is followed by the usual blast and a round out the front which can be observed in flight for determination of whether or not a hit is made.

Broadly stated, the object of this invention is to adapt rocket ammunition so that, its external appearance, weight and handling characteristics, muzzle velocity and time of flight are substantially identical to conventional rocket ammunition, while at the same time to effect considerable savings in cost and strategic materials.

A more specific object is to provide a relatively inexpensive means of training military personnel in the techniques of loading and firing rocket weapons.

Another object is to provide a training rocket from which a low-cost sub-caliber tracer bullet can be fired to duplicate the trajectory of a service rocket while there occurs a rearward blast to simulate the blast obtained when firing a service rocket.

Other objects and many of the attendant advantages of this invention will be readily appreciated, as the same become better understood by reference to the following detailed description when considered in connection with the accompanying drawings in which like reference numerals designate like parts throughout the figures thereof and wherein:

FIG. 1 is a partial cut away view of a rocket training round as it appears prior to arming;

FIG. 2 is an enlarged view of the breechblock unlocked and displaced to allow insertion of the subcaliber cartridges;

FIG. 3 is a cross-sectional view taken on line 3—3 of FIG. 1 showing the breechblock assembly and the adjacent parts in detail;

FIG. 4 is a representative view showing the rocket trainer seated in a conventional launcher prior to firing.

Referring now to the drawings there is shown in FIG. 1 a rocket or missile trainer having a head 11, a breechblock 12, and a shank 13 having stabilizing vanes 14 thereon. The head 11 has a nose portion 15 having a bullet clearance hole 16 at the vertex. A safety pin strap 19 is shown wrapped around the breechblock 12 depressing a safety pin 18 (shown in FIG. 3), preventing accidental detonation. At the base of the shank are the electric contact ring 21 and ground ring 22 which make up part of the electrical circuit used for firing the rocket.

FIGURE 2 shows the breechblock 12 laterally displaced to the open position; a limit pin 23 connects the head 11 and the shank 13, and prevents lateral movement of the breechblock past the closed position. Set screws 24 and 25 serve to lock a rigid connector (not shown) between the head and the shank, which connector further acts as a shaft about which the breech block 12 rotates.

A locking pin 27 slides along runway 28 and enters a depression (not shown) in the head 11 to lock the breechblock in a closed position. Loading of the rocket trainer is accomplished by depressing the latch 31 which removes the locking pin 27 from the depression in the head 11, rotating the breechblock to its open position and inserting a tracer cartridge 32 into a tracer chamber 34 (see FIG. 3) and inserting a blast cartridge 33 into a blast chamber 35 (see FIG. 3). The breechblock is then rotated to the closed position and is ready for loading into a rocket launcher.

An electrical transmission circuit 36 carries a firing current from a conventional launcher firing system to a contact plate 37 whence it enters a contact pin 38 situated in the breechblock. The current is transmitted from the contact pin 38 through a contact spring 39 to an electrical firing pin 41. A contact plate insulator 42 and an upper contact pin insulator 43 insulate the contact plate and contact pin respectively from the shank 13 and the breechblock 12.

A center contact pin insulator 44 insulates the electric firing pin from the firing pin stem 45. The firing pin stem is slidably retained in a collar plug 46 which is threaded into the breechblock 12 adjacent the shank 13. The collar plug is countersunk on an end adjacent the shank to provide a recoil space 47 for the blast cartridge.

A collet 48 has an end threaded to the firing pin stem and another end which houses a percussion firing pin 49 and slides axially in a recess 51 in the breechblock. The percussion firing pin 49 has a nib 52 on one end which slides in a tapered hole 53.

Safety pin 18 extends through slot 54 and cooperates with the collet 48 to render the device either safe, or armed. When the safety pin is fully depressed surface 18*a* cooperates with surface 48*a* to form a first pair of mating surfaces and prevents movement of collet 48 and firing pin 49. When the safety pin is fully extended by safety pin spring 55, surface 18*b* cooperates with surface 48*b* to form a second pair of mating surfaces to prevent movement of collet 48 and firing pin 49. In either case, the mechanism is in its safe position.

Between these safe positions of the safety pin there is an area through which the surfaces 48*a* and 48*b* clear the surfaces 18*a* and 18*b*—this is the armed position.

The head 11 is composed of a barrel adapter 56 which

is internally threaded to receive a barrel 57, and is externally threaded to receive a nose portion 15.

A conventional rocket launcher 30 is used to fire this device.

This device consists of a service round modified to provide a rotatable breechblock 12. Rotation of the breechblock out of alignment with the longitudinal axis of the round provides access to two chambers. A tracer cartridge 32 is inserted into a forward chamber 34 and a blast cartridge 33 is inserted into a rear chamber 35. The breechblock is then rotated back to the closed position and is locked in place; a safety strap 19 clamps the safety pin 18 in a safe position.

The round is now ready for the trainee. First, the trainee removes the safety strap 19—the safety pin 18 being so constructed that the round is safe until insertion into a launcher 30. He now inserts the round into a launcher and aims. As the "trigger" is pulled an electrical impulse is carried from the launcher tube 30 to the round and to an electric firing pin 41 which detonates the blast cartridge 33. This produces a flash of smoke and fire from the rear of the launcher. Substantially simultaneously, the blast cartridge recoils (forward) and strikes a percussion firing pin 49 which in turn strikes the tracer cartridge 32 and detonates it. The tracer projectile's trajectory is substantially identical to that of a service round, and the trainee has the opportunity to see where the rocket would have traveled under combat conditions. The head 11 is attached to the shank 13 which is at least about as long as the head 11 or longer. The training missile of the type herein disclosed is the type simulating a weapon used in an open-ended missile launcher such as a bazooka-type rocket launcher, for example.

We claim:

1. In combination with an open-ended missile launching tube to be used as a training device simulating an actual service round in trajectory and flashback, including

a simulated missile,

a head with a nose portion thereon,

a shank having stabilizing fins thereon,

said shank being rearward of said head and axially aligned therewith,

axial means for connecting said head with said shank,

a chamber in said head and extending therethrough for receiving and guiding a forwardly facing tracer cartridge,

a blast chamber in said shank and extending through the entire length of said shank for receiving and guiding a rearwardly facing blast cartridge,

said chambers being axially aligned,

a breechblock mounted in axial alignment with and between said shank and said head,

said breechblock being movable laterally with relation to said chambers,

means for locking said breechblock in a closed position, said breechblock having means axially aligned with said chambers for firing a tracer cartridge in

response to a forward recoil from the firing of a rearwardly facing blast cartridge,

means for firing a blast cartridge, and

safety means for preventing accidental detonation of said device when not under conditions of operation.

2. The combination as described in claim 1 further characterized by

said firing means for a tracer cartridge slidable forwardly in response to a forward recoil from the firing of a rearwardly facing blast cartridge,

said firing means for a tracer cartridge comprising a collet having forward and rearward ends,

said forward end being fixed to a percussion firing pin,

said rearward end being fixed to said means for firing a blast cartridge,

said means for firing a blast cartridge comprising a firing pin stem which houses an electric firing pin,

said breechblock having a transverse slot therethrough,

said safety means comprising a safety pin mounted in said slot and laterally movable therein,

resilient means between said breechblock and said safety pin urging said safety pin radially outwardly from said breechblock,

a detachable strap for holding said safety pin fully depressed in said breechblock,

said safety pin having a transverse passageway therethrough and said percussion firing pin protruding through said safety pin passageway,

said safety pin having an intermediate surface providing a clearance for allowing the forward movement of said collet in response to the forward recoil from the firing of a blast cartridge,

said safety pin having a lower surface for mating with the forward end surface of said collet and defining a first and second pair of mating surfaces with said collet when said training device is in an unarmed position,

said first pair of mating surfaces being on one side of said safety pin passageway and preventing the forward movement of said collet when said safety pin is held fully depressed by said safety pin strap,

said second pair of mating surfaces being on the other side of said safety pin passageway and preventing forward motion of said collet when said safety pin is held fully urged outwardly by said resilient means devoid of said strap,

whereby said collet is slidable when said training device is placed in operating condition by insertion into an open-ended missile launching tube and said safety pin is depressed to a position intermediate the fully depressed and fully urged position.

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