

Jan. 4, 1949.

L. A. SKINNER

2,457,839

ROCKET

Filed Sept. 8, 1941

Fig. 1.

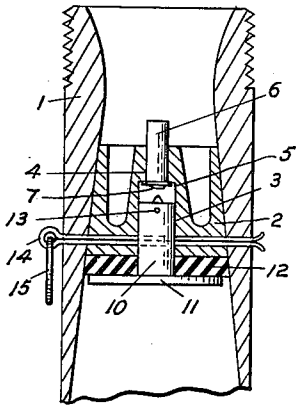


Fig. 2.

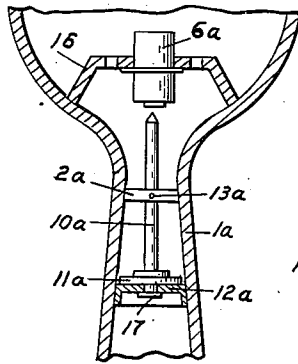


Fig. 3.

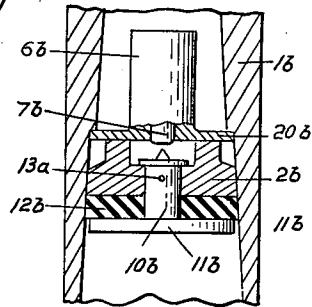


Fig. 5.

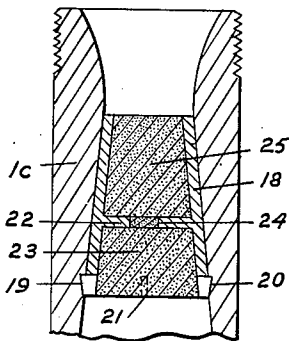


Fig. 6.

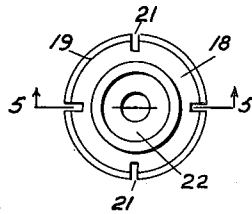


Fig. 4.

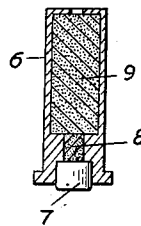


Fig. 7.

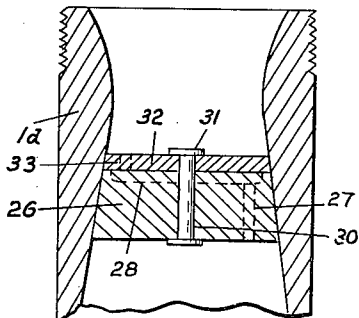


Fig. 8.

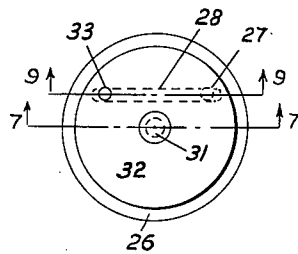
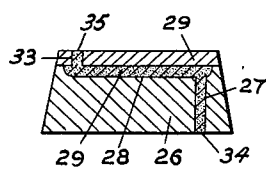


Fig. 9.



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UNITED STATES PATENT OFFICE

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ROCKET

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Application September 8, 1941, Serial No. 410,040

4 Claims. (Cl. 102-49)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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

This invention relates to rocket projectiles of the type intended to be projected initially from a gun tube by a propelling charge as discussed in my prior patent, No. 1,994,490.

In so firing a rocket projectile it may be desirable to use a pressure in the gun tube greater than that which it is desired to have act on the driving charge. Certain compositions which have been used successfully as driving charges for rockets burn at greatly increased rates if subjected to abnormal pressure at the time of ignition. Therefore, if the driving charge is not to burn at a dangerously high rate and correspondingly dangerous pressure, it is essential that means be found to protect the driving charge from the pressure existing in the gun tube, although for many purposes it is desirable that the gun charge function to ignite the driving charge either with very little or with a considerable time delay.

Delay pellets of the type shown in my prior patent, above referred to, being readily combustible and subject to expansion and contraction under varying atmospheric conditions do not furnish such positive protection.

It is therefore the object of this invention to provide a pressure block for positively protecting the driving charge from the influence of the pressure generated by the charge in the gun tube.

It is a further object of the invention to furnish the means by which ignition of the driving charge can be accomplished through the medium of the pressure block.

A further object is to provide means for supporting the pressure block against setback which means are so arranged that the pressure block may be readily blown out of the discharge tube when the driving charge is fired.

The satisfactory functioning of the pressure block is the key to satisfactory functioning of the driving charge when the rocket projectile is fired by high powder pressure from a gun tube.

The specific nature of the invention as well as other objects and advantages thereof will clearly appear from the description of preferred em-

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bodiments as shown in the accompanying drawings in which:

Figure 1 is a longitudinal section of a portion of the discharge tube of a rocket embodying a preferred form of my invention.

Figures 2 and 3 are similar views of modifications of the device shown in Figure 1.

Figure 4 is an enlarged cross section of the primer cartridge shown in Fig. 1.

Figure 5 is a longitudinal cross section of the discharge tube of a rocket showing another embodiment of my invention.

Figure 6 is a plan view of the pressure block shown in Fig. 5 before loading of the charges.

Figure 7 is a longitudinal cross section through the line 7-7 of Figure 8 of the discharge tube of a rocket including another embodiment of my invention.

Figure 8 is a plan view of the pressure block shown in Fig. 7.

Figure 9 is a cross section taken on the line 9-9 of Figure 8.

Referring to the drawings by characters of reference Figure 1 shows a pressure block seated in the discharge tube 1 of a rocket similar to that shown in my prior Patent No. 1,994,490. The pressure block comprises a body 2 provided with an axial bore 3. The bore 3 is provided with a restricted portion 4 forming a shoulder 5 against which the head of a primer cartridge 6 is engaged. The primer cartridge is provided with a percussion primer 7, with a delay pellet 8, and with a driving charge igniter 9, as shown in detail in Figure 4. Externally the body 2 is formed to a taper adapted to fit the discharge tube 1. A firing pin 10 is slidably in the axial bore 3 and preferably formed integrally with the firing pin is the pressure plate 11. Confined between the pressure plate and the rear face of the body 2 is a sealing ring 12 of rubber or other plastic packing material. A shear pin 13 engages the body and the firing pin and a safety pin 14 having a finger ring 15 may be inserted through the discharge tube, body and firing pin.

In operation the pressure block is seated in the discharge tube with the pressure plate outward. Before firing the safety pin is removed and upon firing of the gun charge the resultant increase of pressure will act upon the pressure plate to impel the firing pin into the body for initiation of the

primer, delay train, igniting charge cycle. At the same time the pressure plate, being driven toward the body, will shear the pin 13 and compress the sealing ring in a longitudinal direction causing it to expand radially and form a gastight seal which will assist in supporting the pressure block against setback as well as affording positive protection of the charge against the gas pressure existing in the gun tube. At the conclusion of the time delay determined by the delay train, igniting charge 9 will function to initiate the driving charge. The resulting internal pressure will immediately force the tapered pressure block to the rear leaving the discharge tube clear for the escape of the propelling gases.

The modifications of my invention shown in Figs. 2 and 3 are in general quite similar to that shown in Fig. 1. In the form shown in Fig. 2 a firing pin 10a is guided in a body 2a frictionally engaging the discharge tube and carries a pressure plate 11a at its outer end. A priming cartridge 6a is secured in a diaphragm 16 in the rocket body. A cup-like sealing member 12a of leather or like material is applied to the outer face of the pressure plate 11a. An extension 17 of the firing pin may be headed over to secure the cup. Upon firing, the pressure plate and sealing member will be driven inwardly shearing the safety pin 13a and igniting the primer unit 6a. When pressure is built up in the rocket body the entire mechanism will be expelled rearwardly. In the form shown in Fig. 3 the subscripts (b) have been applied to the parts having a similar function to those shown in Fig. 1. A step-like cannellure 20b has been formed in the wall of the discharge tube to support the pressure block against the pressure generated in the gun tube. The enlarged head of the cartridge 6b engages the cannellure and the body 2b engages the cartridge head to be supported thereby.

The embodiment of my invention shown in Figs. 5 and 6 comprises a body 18 adapted to fit in the discharge tube 1c of a rocket projectile and provided on its larger end with a retaining rim 19 adapted to engage a cannellure 20 formed in the wall of the discharge tube 1c. Slots 21 allow the retaining rim to be contracted sufficiently to engage the cannellure and the angular rear edge of the retaining rim allows it to be readily removed by internal pressure. The body 18 is provided with an apertured diaphragm 22 dividing the pressure block laterally into two igniter cups. A delay element igniter charge 23 is loaded in the outer or rear igniter cup, and a compressed delay element 24 is secured in the aperture in the diaphragm 22. A driving charge igniter 25 is loaded in the igniter cup forward of the diaphragm. Upon firing of the rocket projectile in a gun tube the delay charge igniter will be inflamed which will transmit ignition to the delay pellet. Under the influence of the pressure generated by the gun charge the delay charge igniter cup will be expanded to secure obturation with the wall of the discharge tube. The delay pellet will communicate ignition to the driving charge igniter which will initiate the main charge. When the pressure in the rocket body builds up the pressure block will be forced outward to clear the discharge tube.

The embodiment of the invention shown in Figures 7, 8 and 9 comprises a body 26 adapted to engage the discharge tube 1d of a rocket and formed with an opening 27 therethrough parallel to the axis. The forward face of the body is formed with a groove 28 for the reception of a

compressed powder delay train 29 communicating with the opening 30. Secured against the front face of the body 26 by a rivet 31 or similar means is a closure plate 32 having an opening 33 in register with the end of the delay train opposite the end in communication with the opening 27. The openings 27 and 33 may be filled with a delay charge igniter 34 and a driving charge igniter 35 functioning similarly to those described in connection with Fig. 4. The path of ignition through the igniter charges in the openings and the delay train is obvious. Under the influence of a high external pressure the block will be forced into the tapered discharge tube to seal the same and will be discharged when internal pressure builds up. When this pressure block is used it may be desirable to use a supplementary driving charge igniter in the rocket body.

In all of the modifications described above the choice of the length of time delay will be governed by the conditions under which the projectile is to be used. Normally a sufficient delay will be interposed to permit the projectile to be well clear of the gun before the driving charge is ignited.

The pressure block bodies will be preferably formed from a material which is substantially incombustible or at least so slowly combustible that they will not burn appreciably during the interval in which the gun charge acts upon the rocket projectile. Suitable materials are metals, particularly aluminum, various plastic compositions, and under some conditions wood. In this way it is assured that the seal will be maintained until the driving charge igniter has functioned.

I claim:

1. A pressure block for a rocket discharge tube comprising a body of frusto-conical shape adapted to engage the wall of said tube, means forming charge cups in each end of said body, means forming a diaphragm having a perforation therein between said cups, a delay element igniter in the charge cup in the rear end of said body, a delay element in said perforation, and a driving charge igniter in the charge cup in the forward end of said body.

2. A pressure block as described in claim 1 and means for retaining said block in said tube, said retaining means comprising means forming a cannellure in the inner wall of said tube, means forming slots in the skirt of the rear igniter cup and a rim of enlarged diameter on said rear igniter cup and adapted to engage said cannellure.

3. A pressure block for a rocket discharge tube and means for retaining said block in said tube, said retaining means comprising means forming a cannellure in the inner wall of the discharge tube, and a resilient rim on the rear end of said pressure block in engagement with said cannellure, said rim being of larger diameter than the body of said block and being constructed and arranged to prevent the pressure block from being moved forward of the cannellure and to allow it to be comparatively easily displaced to the rear.

4. A pressure block for a rocket discharge tube comprising a body adapted to engage the wall of said discharge tube, means forming a passage through said body, a groove in the forward face of said body having one end in communication with said passage, a cover plate on the forward face of said body and secured thereto, means forming a passage in said cover plate in communication with the other end of said groove,

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a delay charge igniter in said first mentioned passage, a delay charge in said groove, and a driving charge igniter in the passage in said cover plate.

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The following references are of record in the file of this patent:

10 Number 14,000

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Name	Date
Gathmann -----	Aug. 8, 1893
Gathmann -----	Dec. 26, 1893
Skinner -----	Mar. 19, 1935
Denois -----	Jan. 31, 1939

FOREIGN PATENTS

Country	Date
Great Britain -----	June 24, 1896