

[54] **LAUNCHING TUBE FOR PROJECTILES AND MISSILES RESPECTIVELY**

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[57] **ABSTRACT**

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Launching tube for projectiles and missiles, respectively, in which the serviceable projectile to be launched, a propelling charge, and — in the appropriate circumstances — a filling of a flowable medium of relatively high density being separated from the propelling charge by a piston or the like are arranged axially behind each other. Immediately after the projectile left the launching tube, the latter's forward opening is closed. The pressure gases produced by the propelling charge escape from the launching tube through one or several blow-out port(s) provided for in the tube jacket and/or in the cover of the forward tube opening and/or through leaks and slots, respectively, between the cover of the forward tube opening and the tube jacket, said blow-out ports or leaks or slots having a considerably smaller cross-section or total cross-section than the caliber cross-section. The cover of the forward tube opening is preferably a pressure-resistant piston which extends over the whole cross-sectional area of the caliber and which is caught, in particular by a stop, within the portion of the forward tube opening immediately after the projectile left the launching tube. In an embodiment of the invention said blow-out ports are arranged in the tube jacket directly behind the caught piston.

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[51] **Int. Cl.**..... **F41f 3/02**

[58] **Field of Search**..... 89/1, 1.7 AU, 1.701, 89/14 SB; 42/76

[56] **References Cited**

**UNITED STATES PATENTS**

3,279,319	10/1966	Semonian et al.	89/1.701
2,499,379	3/1950	Garrett	89/1 B X
2,979,991	4/1961	Buschers et al.	89/1.7
3,490,330	1/1970	Walther	89/1.7

**FOREIGN PATENTS OR APPLICATIONS**

126,336	5/1919	Great Britain	89/1.701
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**6 Claims, 3 Drawing Figures**

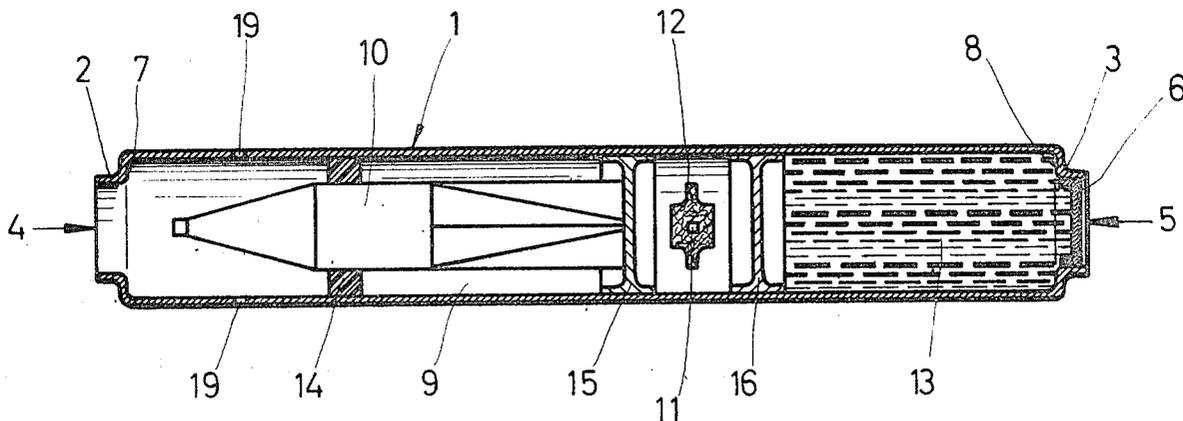


Fig. 1a

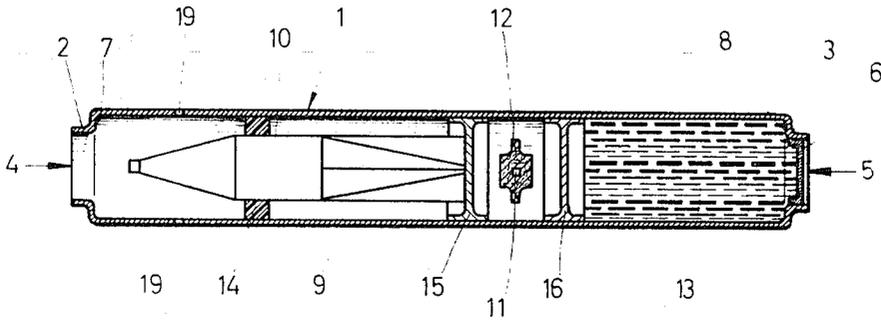


Fig. 1b

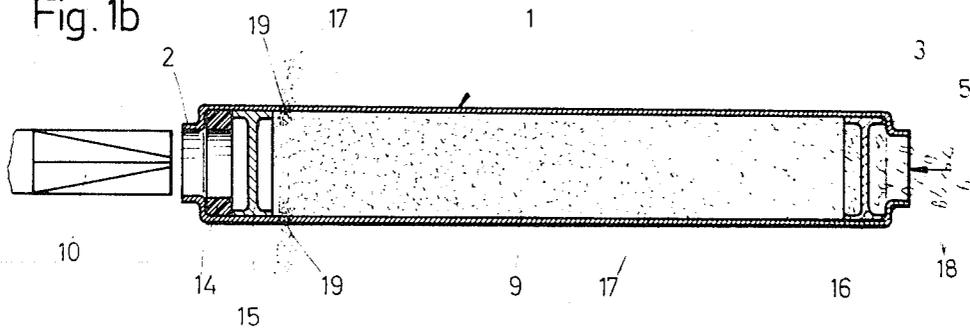
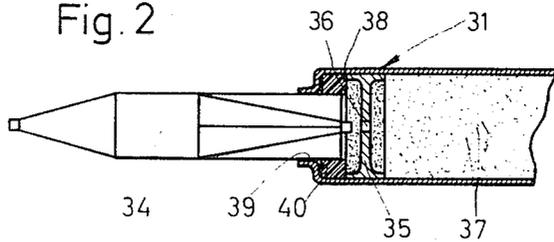


Fig. 2



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## LAUNCHING TUBE FOR PROJECTILES AND MISSILES RESPECTIVELY

### SUMMARY OF THE INVENTION

The invention relates to a launching tube for projectiles and missiles, respectively, in which the serviceable projectile to be launched, a propelling charge, and — in the appropriate circumstances — a filling consisting of a flowable medium of relatively high density and being separated from the propelling charge by a piston or the like are arranged axially behind each other.

Independently of whether the tube is recoilless or not, a considerable bang is known to occur when a projectile is launched from a tube, i.e. at that moment when the bottom of the projectile leaves the forward opening of the tube. This considerable bang, which is due to a sudden expansion into the open air of the pressure gases produced by the propelling charge, is a great physical and psychical stress for the operating personnel, in particular when relatively big projectiles are launched from a tube carried upon the shoulder. This is the case, for instance, with the firearm called "Panzerfaust", i.e. a recoilless antitank grenade launcher.

In order to avoid this bang which is injurious to the health and sometimes even to the life of the operating personnel, a multitude of launching tubes of the type mentioned at the beginning has been equipped with mufflers. For lack of better solutions, mainly rigidly constructed containers subdivided into several expansion chambers by means of baffles, nonreturn valves or the like are used up to now. The containers, the volumes of which are adapted to the quantities of the pressure gases arising and the expansion chambers of which are connected with the open air through bores of small cross-sections, are arranged in front of the forward opening of the tube for recoil launching tubes and in front of the forward opening of the tube as well as behind the rear opening of the tube for recoilless launching tubes, the rear opening existing only in the latter case, the containers in front of the forward tube opening containing each a shooting-through ring for the projectiles. The pressure gases first expand into these containers immediately after the projectiles left the respective launching tubes before they reach the open air through the bores leading outward from the expansion chambers of the respective containers. The energy still existing in the pressure gases is largely dissipated on the way of the gases through the expansion chambers by the baffles, the non-return valves or the like.

The known mufflers which — as has been shown — ensure that the energy still inherent in the pressure gases of a propelling charge, which accelerate the projectile, is released gradually after the projectile left the launching tube and thus prevent the occurrence of a bang observed when this energy is released suddenly, are disadvantageous in many respects. Their manufacture is relatively expensive because of their complicated design. Moreover, their structural volume and their structural weight are considerable which is due to the rigid walls of the container, in particular when the mufflers are designed for high performances. Therefore result difficulties in transporting and handling launching tubes, above all the portable ones, when they are equipped with such mufflers.

The invention is therefore based on the object to develop a launching tube of the kind mentioned at the beginning which permits a low-noise launching of projec-

tiles and missiles, respectively, without needing the known mufflers.

According to the invention this task is solved in that immediately after the projectile left the launching tube the latter's forward opening is closed, in which case the launching tube is connected with the outside environment through one or several blow-out port(s) provided for in the tube jacket and/or in the cover of the tube opening and/or through leaks and slots, respectively, between the cover of the forward tube opening and the tube jacket, the gases escaping from the launching tube through said ports and/or leaks and/or slots which have a considerably smaller cross-section and total cross-section, respectively, than the caliber cross-section.

For the invention launching tube it is no longer necessary to arrange in front of the forward tube opening a known muffler which is expensive to manufacture, heavy, and bulky, because the closure of the forward tube opening already safely prevents a sudden expansion of the pressure gases produced by the propelling charge immediately after the projectile left the tube, said sudden expansion being otherwise accompanied by a considerable bang. The pressure gases rather escape slowly through the blowout port and blow-out ports, respectively, and/or through leaks and slots, respectively.

In accordance with another feature of the invention a piston extending over the whole caliber cross-section of the launching tube is arranged between the propelling charge and the projectile, said piston separates the propelling charge from the projectile and is caught within the portion of the forward tube opening immediately after the projectile left the launching tube. This design measure can be realized in an extremely simple way with only little expenditure of material and leads to an especially handy, sound-damped launching tube without any appreciable increase in weight.

According to a further feature of the invention the blow-out port and ports, respectively, are arranged directly behind the caught piston inside the tube jacket. It and they, respectively, can also be arranged, however, in the piston which separates the projectile from the propelling charge and which serves to close the forward tube opening, its or their arrangement being such that it and they, respectively, remain covered by the projectile until the piston is caught within the portion of the forward tube opening and is separated from the projectile, respectively. Among others, a ring-shaped shoulder provided for within the portion of the forward tube opening and extending radially inward has proved successful as a catching device for the piston separating the projectile from the propelling charge.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in which there are illustrated and described preferred embodiments of the invention.

### BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1a shows in principle a recoilless type of the launching tube according to the invention before the projectile is launched;

FIG. 1b shows the launching tube according to FIG. 1a after the projectile left the tube, and

FIG. 2 shows a section of a varied embodiment of the launching tube according to the invention.

#### GENERAL DESCRIPTION OF THE PREFERRED EMBODIMENTS

The launching tube denoted by 1 according to FIGS. 1a and 1b is portable and has been designed to be used only once, i.e. it is a so-called "throw-away" firearm. The diameter of the tube is reduced within the portions of the forward end 2 and the rear end 3. The forward tube opening is denoted by 4, the rear tube opening by 5, and the diaphragm covering the rear opening by 6. The ring-shaped shoulders, which are due to the reduced diameters at the forward tube end 2 and at the rear tube end 3, have the reference numbers 7 and 8. A projectile 10, for instance an armor-piercing projectile or shell, a propelling charge 12 provided with an ignition pellet 11, and a filling 13 of a flowable medium of relatively high density are arranged axially behind each other in the interior space 9 of the tube. Those media are suited as filling media which do not evaporate at the temperatures occurring and which can easily be separated, such as water-oil-mixtures, jelly-type substances which liquefy under pressure and greases as well as gritty solid substances, e.g. sand.

The propelling charge 12 is separated by one piston 15 and 16, respectively, each extending over the whole cross-sectional area of the caliber of the launching tube 1 both from projectile 10 being supported and guided through one slide ring 14 in launching tube 1 and from filling 13 consisting of a flowable medium. Owing to the mutual coordination of projectile 10, propelling charge 12, filling 13, and pistons 15, 16, piston 15 arranged between projectile 10 and propelling charge 12 moves together with projectile 10 fastened to said piston 15 toward forward tube opening 4 under the effect of the pressure gases 17 produced when propelling charge 12 is ignited, while the other piston 16 arranged between propelling charge 12 and filling 13 of a flowable medium moves toward rear tube opening 5, diaphragm 6 closing rear tube opening 5 before the ignition of propelling charge 12 being then destroyed and the flowable medium leaving launching tube 1 through rear tube opening 5 in a dispersed form 18. In the present case the quantity of filling 13 consisting of a flowable medium is so proportioned to the weight of the projectile for safely avoiding any recoil that both pistons 15 and 16 lie simultaneously against the respective ring shoulders 7 and 8 of launching tube 1. At the moment at which projectile 10 separates from the respective piston 15 and passes forward tube opening 4, two blow-out ports 19 having a considerably smaller total cross-section than the caliber cross-section of launching tube 1 and being arranged within the portion of the forward tube end 2 connect the pressure-gas-filled inner space 9 of the tube with the outside environment, and hence the pressure gases 17 can escape slowly without a bang.

In the embodiment of the launching tube according to the invention partly shown in FIG. 2 and denoted by 31 an arrangement of blow-out ports in the launching tube has been dispensed with. Instead of them a centrally bored piston 35 is arranged in the inner space of the tube between the projectile 34 to be launched and the propelling charge which is not shown here. Centric bore 36 of piston 35 also extending over the whole

cross-sectional area of the caliber has a cross-section which is considerably smaller than the caliber cross-section. It serves as a blow-out opening for the pressure gases 37 produced by the ignited propelling charge 5 which effect that piston 35 together with projectile 34 and a sliding ring 38 coordinated with said projectile 34 move toward forward tube opening 39 as soon as that gas-tight plug connection is separated which is formed by said bore 36 and the projectile end whose cross-section is adapted to it. This occurs when piston 35 is hindered to continue moving in the abovementioned direction by ring shoulder 40 of launching tube 31, said shoulder being provided for within the portion of forward tube opening 39 and directed radially inward.

15 What is claimed is:

1. A launching device for projectiles, especially for the combatting of tanks, comprising a portable launching tube having a muzzle opening at one end and a recoil opening at the opposite end, a very dense but well-dividable and flowable mass composed mostly of jelly-like substances, fats and gravel-like, solid substances disposed adjacent the recoil opening and which are adapted to be accelerated by the pressure gases of a propelling charge to move out the recoil opening, a projectile disposed adjacent said muzzle end, a propellant charge between said projectile and said medium, said mass having diaphragm means associated therewith and which holds said mass within said tube but is dislodgeable from said tube by ignition of said charge, first and second pistons which are axially movable over the entire tube interior located between said charge and said projectile and between said charge and said medium, respectively, means for retaining said first and second pistons within said tube after firing and after they have been moved toward the respective ends, and means for venting pressure gases which are enclosed by said pistons after firing and permitting their gradual escape into the atmosphere.

2. A launching device, according to claim 1, wherein said vent means includes an opening in said tube at a spaced location from said muzzle opening, said means for holding said first piston including a collar formed at said muzzle end projecting into the interior, said piston being held at a location by said collar spaced toward said muzzle end from the opening.

3. A device for launching projectiles, particularly a portable anti-tank projectile launcher, comprising a launching tube having a muzzle opening at one end for firing of a projectile therethrough, projectile mounting means within said tube for positioning a projectile adjacent said muzzle end for firing, a first piston adjacent said projectile, said tube having an opposite end with a recoil medium opening, a dense, flowable recoil medium in said tube adjacent said recoil opening end, a second piston adjacent said medium, a propelling charge within said tube for propelling the projectile located between said first and second pistons and being ignitable to force said first and second pistons in respective opposite directions to fire the projectile through the muzzle end and to discharge the medium through the recoil openings, said mass having diaphragm means associated therewith and which holds said mass within said tube but is dislodgeable from said tube by ignition of said charge, and vent means for venting said tube after said pistons have moved to the adjacent ends, and means for engaging said first and second pistons adjacent the respective muzzle and recoil ends

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for holding them within the tube and preventing their withdrawal.

4. A device, according to claim 3, wherein said vent means includes an opening in said first piston.

5. A device, according to claim 3, wherein said vent means includes an opening in said tube located rearwardly of said first piston when said first piston has moved to said muzzle end.

6. A device for launching projectiles, particularly a portable anti-tank projectile launcher, comprising a launching tube having a muzzle opening at one end for firing of a projectile therethrough, projectile mounting means within said tube for positioning a projectile adjacent said muzzle end for firing, a first piston adjacent said projectile, said tube having an opposite end with a recoil medium opening, a dense, flowable recoil medium in said tube adjacent said recoil opening end, a second piston adjacent said medium, a propelling charge within said tube for propelling the projectile located between said first and second pistons and being

ignitable to force said first and second pistons in respective opposite directions to fire the projectile through the muzzle end and to discharge the medium through the recoil openings, said mass having diaphragm means associated therewith and which holds said mass within said tube but is dislodgeable from said tube by ignition of said charge, and vent means for venting said tube after said pistons have moved to the adjacent ends, and means for engaging said first and second pistons adjacent the respective muzzle and recoil ends for holding them within the tube and preventing their withdrawal, said projectile mounting means comprising a ring adapted to engage around said projectile, said retention means including the shoulder at each end of said tube adjacent the muzzle end and the recoil end, respectively, sized to engage and hold said ring and said first and second pistons, respectively, against withdrawal through the muzzle openings and the recoil openings, respectively.

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