United States Patent

Nahas

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[54] ZERO BREECH GRENADE-LAUNCHING SYSTEM

[72] Inventor: **Joseph A. Nahas,** Laurel, Md.

[73] Assignee: **The United States of America as represented by the Secretary of the Navy**

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[52] **U.S. Cl.** .....**89/1 F,** 42/84, 89/1.814, 89/1.819, 102/39, 102/43 R

[51] **Int. Cl.** **F41f 1/06**

[58] **Field of Search** 102/48, 39, 65.2, 43; 89/1, 89/1.3, 1.34, 1.819, 1.814, 28, 135; 42/84

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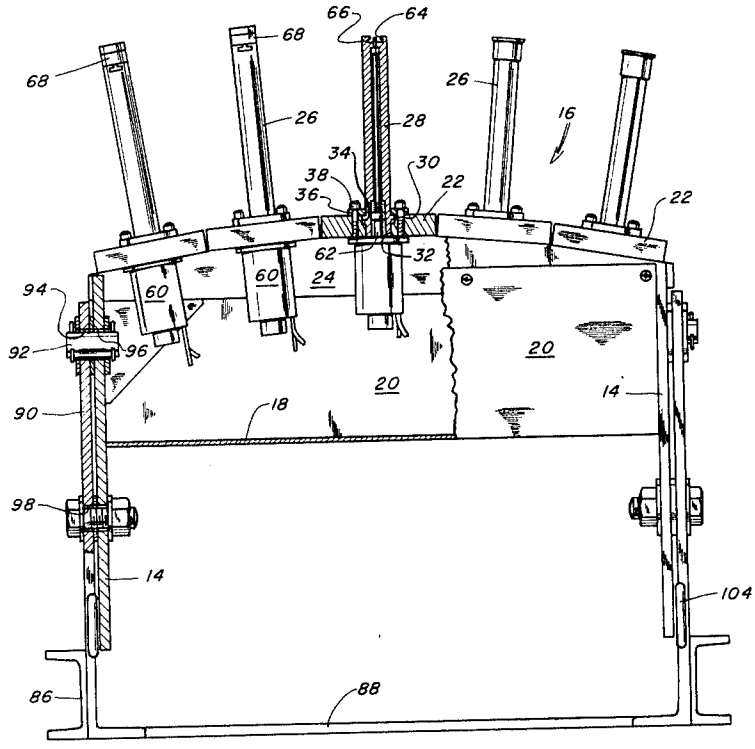
Primary Examiner—Samuel W. Engle

Attorney—R. S. Sciascia, J. A. Cooke and R. J. Erickson

[57] **ABSTRACT**

A grenade-launching pod including a housing supporting a matrix of spigots aimed to cover a sector of approximately 20°. Each spigot includes a hollow pipe containing a slidable firing pin biased rearwardly by a coil spring. A matrix of solenoids is secured to the inside of the housing, each one aligned with a respective spigot and having its plunger in contact with the firing pin of the associated spigot. A propellant cartridge is removably held in a slot in the end of each spigot and a grenade tail pipe is fitted over the spigot. When energized, the solenoid propels its plunger which pushes the firing pin into a primer in the propellant cartridge which in turn fires the cartridge and propels the grenade off the spigot and along a ballistic trajectory.

4 Claims, 5 Drawing Figures



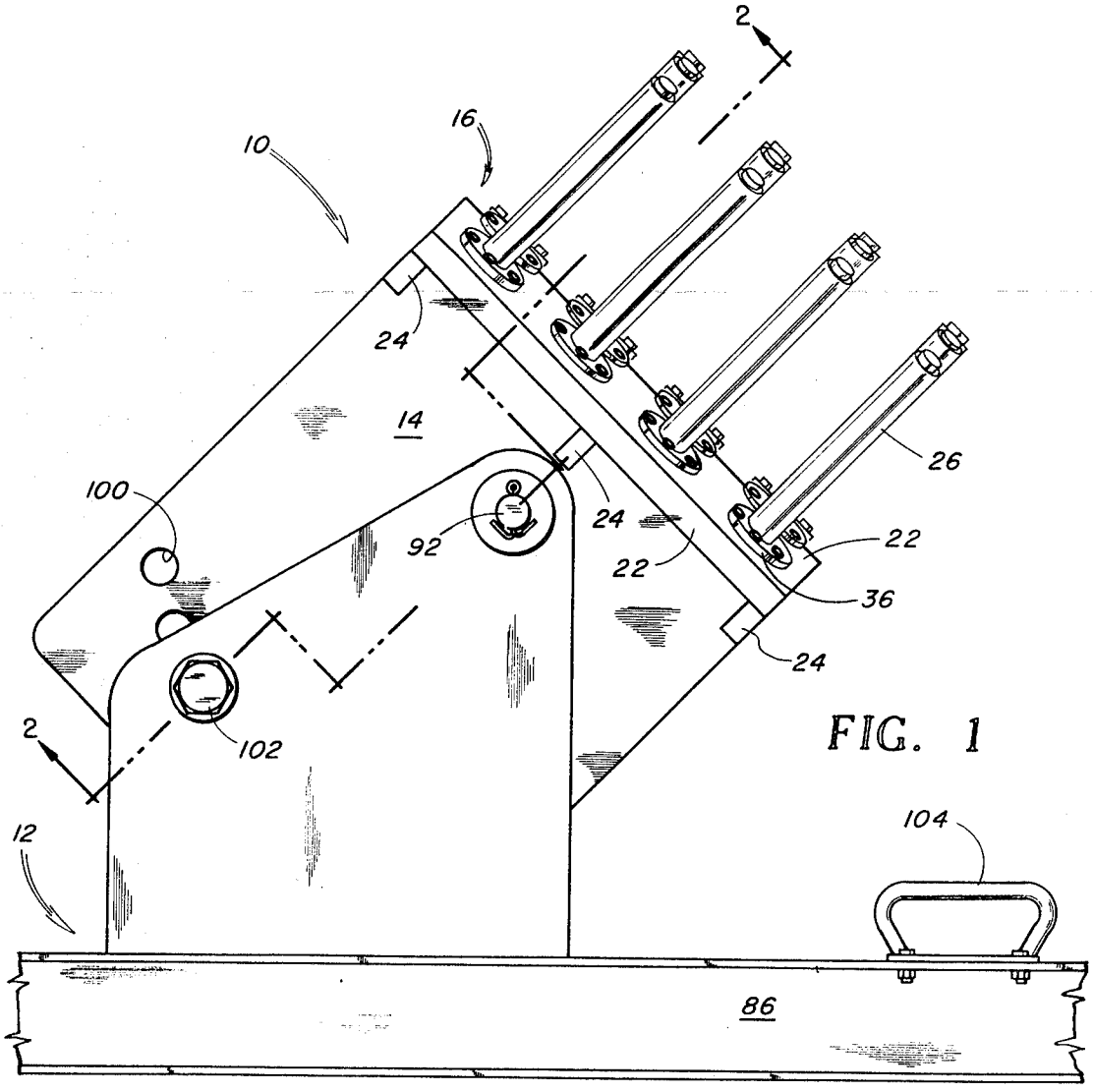


FIG. 1

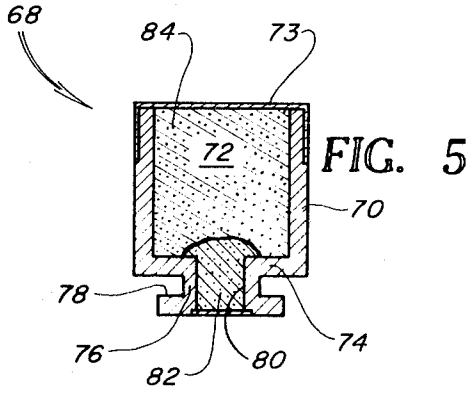


FIG. 5

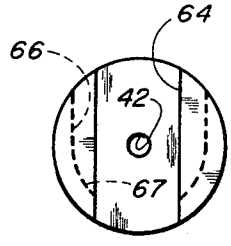


FIG. 4

INVENTOR
Joseph A. Nahas

BY J. O. Tresansky
ATTORNEY

FIG. 3

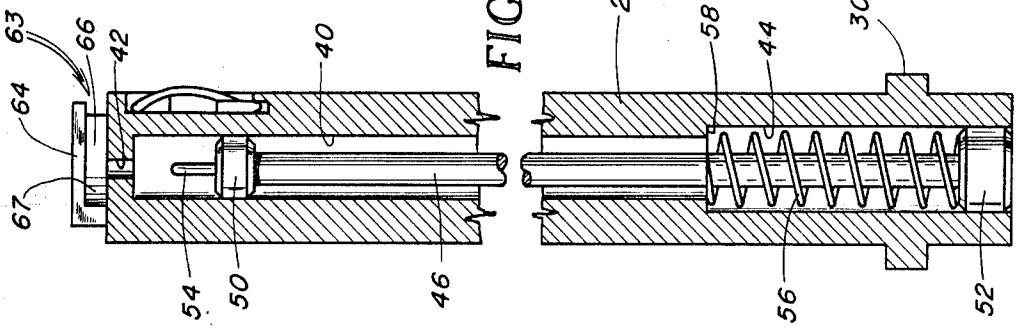
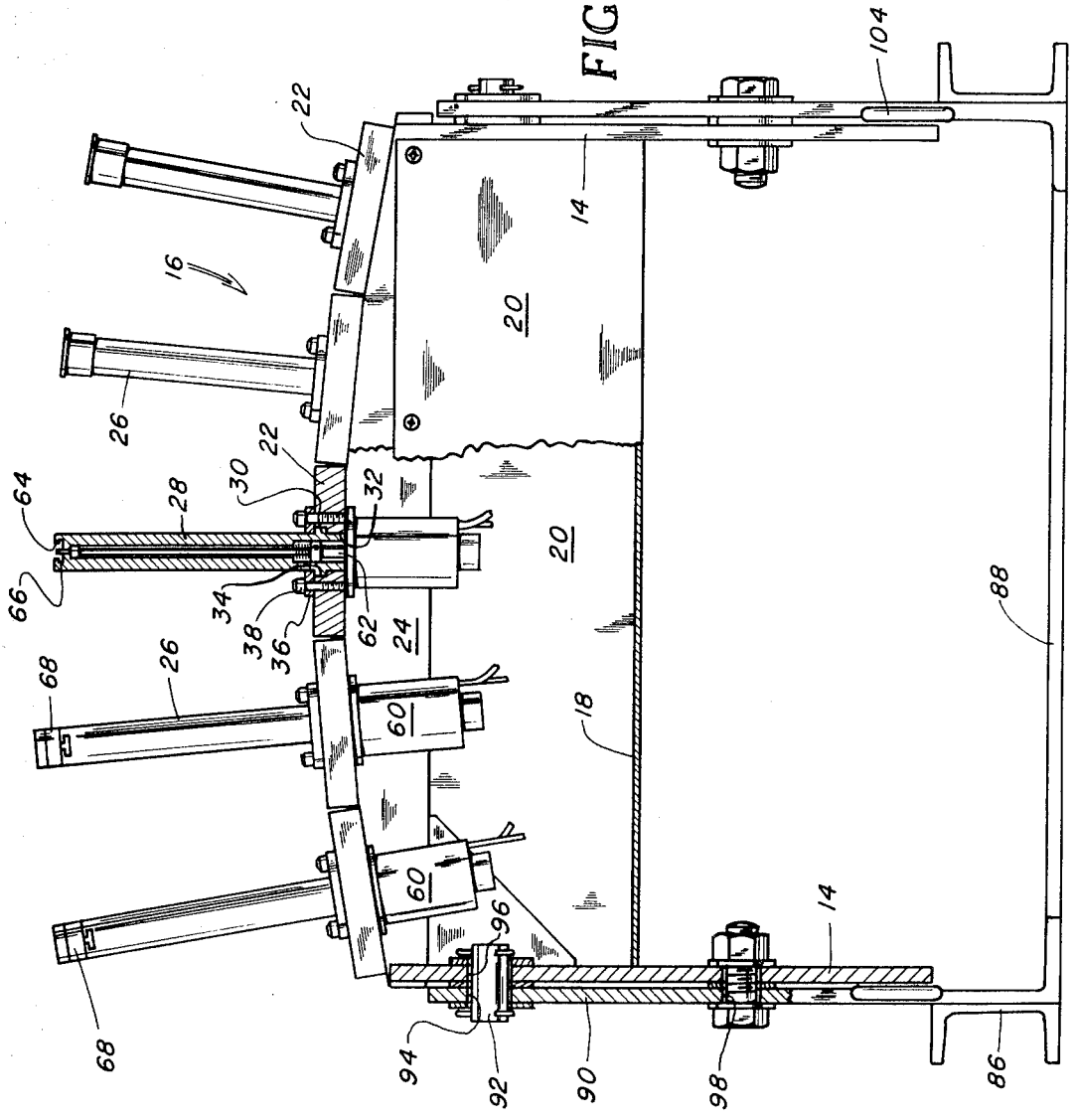

63
66
42
40
64
67
54
50
46
28
58
44
30
56
52

FIG. 2


104
22
14
16
20
26
22
30
32
64
28
66
34
38
36
62
24
68
26
60
18
88
60
96
14
68
94
92
90
98
86

ZERO BREECH GRENADE-LAUNCHING SYSTEM

BACKGROUND OF THE INVENTION

This invention relates generally to ordnance launchers and more specifically to a multiple grenade-launching pod.

The art of grenade launching has been a steadily evolving one, from the first crude mechanical throwers to the modern sophisticated silent launchers. The prior art launchers, however, have not embodied a design that meets the very exacting requirements dictated by the tactical nature of the weapon.

In particular, the launcher must be durable and inexpensive. The severe conditions and treatment such a device receives in the battlefield requires a ruggedness of design which is not met merely by making the components of heavy gage metal. The design must eliminate fine-working parts and complicated mechanical mechanisms of close tolerance which are expensive, short lived, easily fouled, and quickly destroyed in a typical battlefield situation. The ideal design will have few moving parts of inherently rugged construction and inexpensive to manufacture.

Another design objective is reliability and effectiveness. The launcher must work every time it is fired and it must consistantly launch a similar pattern over a predictable distance. In a typical emergency battle condition, if the launcher jams or fails to operate, there is no time to make repairs and the launcher must be discarded for another possibly less effective weapon. Reliability and effectiveness may appear to be attained in some of the complicated and sophisticated designs existing at present, and leisurely, carefully conducted tests of their designs in clean and dry environments appear to support such a finding. However, actual battlefield use of these devices is neither leisurely nor carefully conducted, and is rarely clean and dry. Hence, test range reliability and effectiveness may have little relation to battlefield reliability and effectiveness. Moreover, the weapon must be capable of repeated use over a long period. The intense stresses and vibrations must not cause failure of any part nor cause a separation of the propellant cartridge away from the firing pin, a recurrant problem in prior art launchers.

A weapon which fails in tactical use is less desirable than no weapon at all, because in reliance on the launcher the defenders may have neglected to prepare an adequate backup defense, and failure of the weapon will leave them seriously underarmed.

The most often ignored tactical requirement is that of portability, and speed and simplicity of operation. The launcher must be easily portable and capable of rapid erection in case of sudden need. It must also be capable of rapid and simple reloading in all tactical situations such as darkness and narrowly confined quarters. In defensive use, a launcher will typically be situated in a small bunker or behind sandbags, and after the first charge of grenades has been fired, the operator must be able to reload quickly without exposing himself to enemy fire. The operator will naturally wish to stay as low as possible behind his protective cover and will want to reload using only one arm and hand so as to avoid raising his head and body into the line of fire. The launching pod therefore should be compactly designed with low silhouette and with such simplicity that it can be reloaded rapidly and by touch.

Up until now, a satisfactory design has not been developed. The prior art launching pods are prohibitively expensive, so complicated and bulky that their reliability in battlefield situations renders them completely unacceptable, and designed so that the operator must expose himself to grave danger from enemy fire to reload the launcher.

Therefore, the need has long existed for a grenade-launching pod which is durable and inexpensive, reliable and effective, and is compact, uncomplicated and easily and quickly operated.

SUMMARY OF THE INVENTION

Accordingly one object of this invention is to provide a grenade launcher pod which is durable and inexpensive.

Another object of the invention is to provide a grenade launcher pod that is highly reliable and effective to propel a grenade a great distance.

Still another object of the present invention is to provide a grenade launcher pod that is compact and uncomplicated, thereby maximizing the safety for the operator in a tactical situation and enhancing the speed of operation of the pod.

A further object of the instant invention into provide a multiple grenade-launching pod.

Briefly, in accordance with one embodiment of this invention, these and other objects are obtained by a grenade launching pod having a matrix of grenade-launching spigots each having an aligned solenoid. A floating firing pin is contained in each spigot which is propelled outwardly upon actuation of the solenoid. A propellant cartridge is removably positionable on the end of each spigot and the grenade may be slidably positioned on each spigot. When the solenoid is actuated the pin is driven into a primer in each cartridge to propel the respective grenade off the spigot and outward on its ballistic trajectory to the target.

DESCRIPTION OF THE DRAWING

A more complete appreciation of the invention and its many attendant advantages will develop as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. **1** is a side elevation partly in section of the present invention;

FIG. **2** is a sectional view along lines **2—2** in FIG. **1**;

FIG. **3** is an enlarged sectional view of a spigot;

FIG. **4** is a plan view of the outer end of a spigot; and

FIG. **5** is a side elevation, in section, of a propellant cartridge.

Referring now to the drawings wherein like reference characters designate identical or corresponding parts throughout the several views, and more particularly to FIGS. **1** and **2** thereof, the grenade-launching pod **10** is shown mounted on a base **12**. The pod includes a simple boxlike structure having heavy steel sides **14**, an arcuate top **16**, a thin metal bottom **18** and thin front and rear walls **20**. The arcuate top **16** includes a set of five heavy rectangular top plates **22** supported by three segment-shaped stringers **24** which extend between and are mounted in heavy sides **14**.

A set of four parallel guide tubes or spigots **26** is set into each of top plates **22** and spaced equally apart therealong. The spigot includes a hollow pipe **28** having formed on the outside periphery thereof near the bottom of the pipe an annular shoulder **30**. Each top plate **22** has formed therethrough a set of four equally spaced apertures or bores **32** of even diameter with pipe **28**, and an annular groove **34** is formed in the top of each bore **32** of even diameter with annular shoulder **30**. Each spigot can therefore be inserted into bore **32** until annular shoulder **30** engage annular groove **34**. To secure spigots **26** in place, a ring **36** is placed over each spigot **26** and secured by machine screws **38** to top plate **22**.

Spigot **26**, which is best seen in FIG. **3**, includes an axial bore **40** having a constricted orifice **42** and an enlarged diameter rearward portion **44**. A rod **46**, slidably disposed within axial bore **40**, includes a forward guide disc **50** of approximately even diameter with bore **40**, and a rearward guide disc **52** of approximately even diameter with enlarged diameter portion **44** of bore **40**. Extending forwardly from and attached to forward guide disc **50** is a firing pin **54** aligned with bore orifice **42**. A compression spring **56** extends between the forward face of rearward guide disc **52** and the shoulder **58** formed at the junction of enlarged diameter portion **44** and the central portion of bore **40**. Spring **56** biases rod **46** rearwardly maintaining firing pin **54** fully within bore **40**.

A plurality of solenoids **60** are attached to the underside of top plates **22** in axial alignment with spigots **26**. Solenoids **60** are held in position by the same machine screws **38** which hold

the respective spigots to top plate 22. Each solenoid has an associated plunger 62 which may be driven outward toward and into engagement with rod 46 when the solenoid is energized. When that happens, compression spring 56 is compressed and rod 46 is propelled outward. Firing pin 54 is pushed through orifice 42 to the limit permitted by engagement of forward guide disc 50 with the shoulder formed by the junction of bore 40 and orifice 42.

The outside end of each spigot has formed therein a T-shaped slot 63 including outside narrow portion 64 and inside wide portion 66. As best seen in FIGS. 3 and 4, inside wide portion 66 of the end slot does not extend completely across the diameter of spigot 26, but tapers down at 67 to the diameter of narrow portion 64.

A propellant cartridge 68, best seen in FIG. 5, has a cylindrical cup-shaped body 70 having a central forwardly opening cavity 72 formed therein covered by a thin metal cap 73. The bottom 74 of body 70 has extending therefrom a tubular portion 76 of approximately even diameter with wide portion 66 of the end slot. A cannelure 78 is formed in tubular portion 76 adjacent bottom 74, of approximately even diameter with narrow portion 64 of the end slot. Thus, it can be seen that cartridge 68 can be slipped into the end slot in spigot 26 until tubular portion 76 engages the narrow or restricted portion 67 of wide portion 66 of the slot. The cartridge 68 is therefore securely held against axial translation, however, it may be easily slid transversely out of the end slot.

An axial bore 80 through tubular portion 76 contains a priming mixture 82 which communicates with central cavity 72, filled with a propellant 74 such as black powder. Thus, it is seen that when rod 46 is propelled outward by solenoid plunger 62, firing pin 54 is pushed through orifice 42 and stabs into primer 82 thereby initiating primer mixture 82. Black powder propellant 84 is thereby detonated which propels the grenade off spigot pipe and onto its ballistic trajectory.

Pod 10 is supported or a stand having two parallel spaced rails 86 connected by a crossmember 88. A heavy vertical standard 90 extends upwardly from the central portion of each rail 86 on either side of pod 10. A pivot pin 92 is mounted in a hole 94 in each standard 90 and extends through another hole 96 formed in each side 14 to pivotally support pod 10 between standards 90. Another hole 98 is formed in each standard 90 below and to the rear of hold 94, and a series of holes 100 spaced evenly along an arc about pivot pin 92 of a radius equal to the distance between pivot pin 92 and hole 98 are formed in sides 14. A bolt 102 extends through hole 98 in each standard, and selectively one of the holes 100 to thereby provide means for adjusting the elevation of the pod, or the angle of the spigots 26 from horizontal.

In use, the elevation of the pod is adjusted by pivoting the pod about pivot pin 92 and inserting bolts 102 through aligned holes 92 and 100. The azimuth is adjusted by grasping handles 104 secured to rails 86 and pulling the pod around to the right direction. A cartridge is then inserted into slot 63 in the end of each spigots 26 and the tail pipe of a conventional rifle grenade is slid onto each spigot 26. The range the grenade travels is determined by the depth of insertion of spigot 26 into the grenade tail pipe. An intervalometer (not shown) connected between a battery (not shown) and the solenoids 60 then delivers a sequence of pulses of current to the solenoids to sequentially energize then. The solenoid plungers 62 are thrust forward, causing firing pins 54 to stab into primers 82 in cartridges 68. The propellant 84 in cartridges 67 is ignited and the rifle grenades are sequentially propelled off spigots 26 on a ballistic trajectory to the target. The sequential mode of firing is selected to minimize the load on the battery and to minimize the launching pod recoil.

To reload, the spent cartridges are easily and quickly lifted out of slots 63 and new cartridges and new grenades are reinserted on the spigots. The launching pod is now loaded and ready to be fired again.

Obviously, numerous modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described herein.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A grenade-launching pod, comprising:
a housing having formed therethrough a plurality of apertures,
a plurality of guide tubes secured to said housing in alignment with said apertures and extending outwardly therefrom each of said guide tubes having formed in the outer end thereof a T-shaped slot for receiving and independently supporting externally thereon a complementary shaped cartridge for propelling a grenade;
a firing pin slidably disposed within each of said guide tubes;
a solenoid secured to the inside of said housing in alignment with each of said guide tubes;
each of said solenoids having an associated plunger extendable thereby through said aperture to impel said firing pin outward when said solenoid is energized; and
means for connecting said solenoids to an energize source.

2. The grenade-launching pod defined in claim 1, wherein:
said guide tube has formed therein an axial bore;
a rod having a guide disk fixed to each end being slidably disposed in said bore; and
said firing pin being secured to the outward one of said guide disks.

3. The grenade-launching pod of claim 2, further comprising:
a compression spring disposed within said bore outwardly of the rearward one of said guide disk and bearing thereagainst;
said solenoid plunger abutting against said rearward guide disk and effective,
when said solenoid is energized, to push said rod outwardly, overcoming the compressive force of said compression spring.

4. The grenade-launching pod defined in claim 1, wherein:
said housing comprises a pair of heavy supporting side walls, a plurality of segment-shaped stringers extending between and supported by said sidewalls and having their arcuate sides facing outwardly, and a plurality of top plates secured perpendicular to said stringers across the outer arcuate sides thereof; and
said apertures being formed in a symmetrical matrix in said top plates.

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