United States Patent [19]

Frenk

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[54] **PNEUMATIC STRIKEDOWN SYSTEM FOR PROJECTILES**

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[73] Assignee: **The United States of America as represented by the Secretary of the Navy**, Washington, D.C.

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[52] **U.S. Cl.** **193/32**; 86/45; 243/23

[51] **Int. Cl.²** **B65G 11/20**

[58] **Field of Search** ..... 193/2 R, 17, 21, 31, 32; 243/19, 20, 21, 22, 23, 24, 38, 31; 221/266; 86/1, 23, 25, 45, 46, 47, 48; 198/25, 26, 27, 245, 246, 266; 302/49

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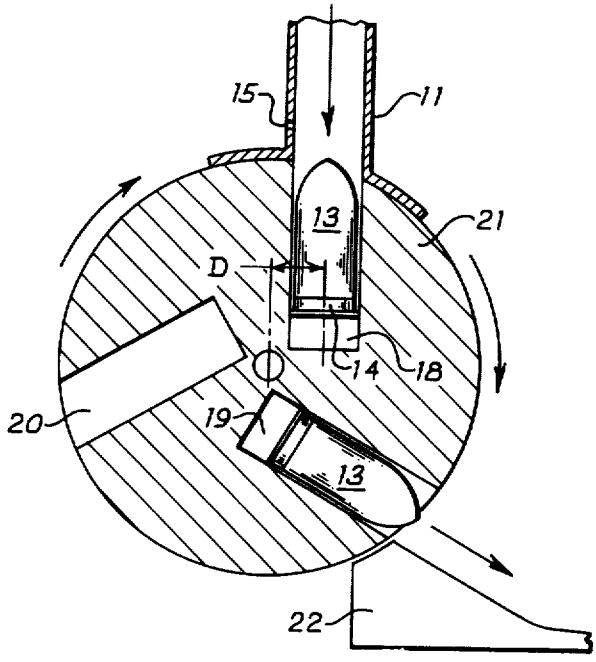
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[57] **ABSTRACT**

A system for moving a projectile from one deck level to a lower deck level having a pneumatic tube slightly larger in diameter than the diameter of the projectile to be lowered. A resilient boot is temporarily attached to one end of a projectile to be lowered and the resilient boot is engageable with the inner wall of the pneumatic tube to provide an air seal. A plurality of orifices are provided in the pneumatic tube to regulate the rate of fall of a projectile. An unloading device is provided at the bottom of the tube to facilitate removal of a projectile.

1 Claim, 4 Drawing Figures



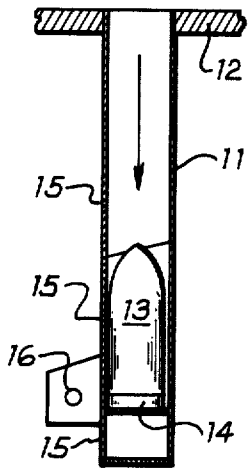


Fig.1

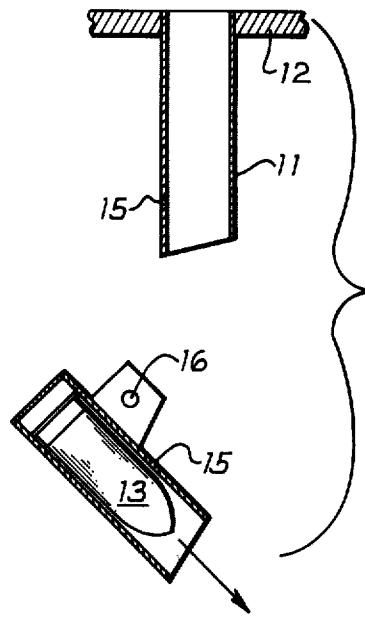


Fig.2

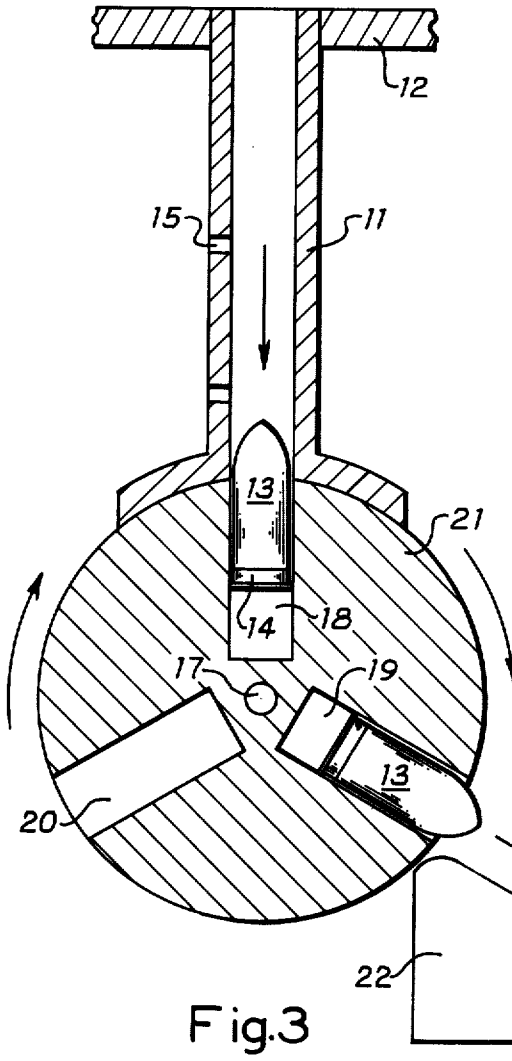


Fig.3

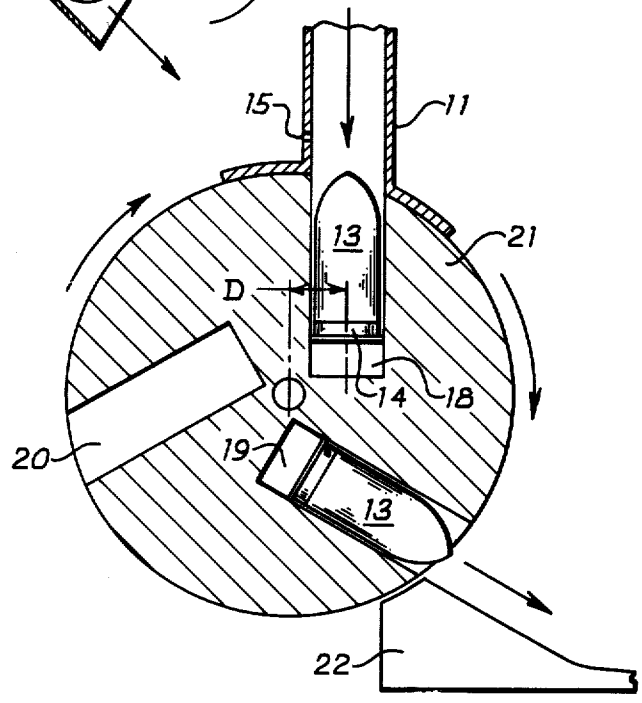


Fig.4

PNEUMATIC STRIKEDOWN SYSTEM FOR PROJECTILES

BACKGROUND OF THE INVENTION

The present invention relates to a device for moving a heavy projectile from one deck level to a lower deck level and more particularly to a pneumatic system for moving projectiles.

In various gun systems, such as those found aboard naval vessels, ammunition is stored in a magazine at one deck level and must be moved to another location for loading into a gun. When needed, such as during a battle, the ammunition must be moved rapidly and safely from one level to another. When the ammunition is at a higher level than the gun loading position, the force of gravity can be used, however, the rate of descent of the ammunition must be controlled so it will not be damaged.

Various heretofore-known devices have been used to regulate or control the rate of descent of items being moved by the force of gravity. For example, in U.S. Pat. No. 2,931,478, entitled, "Hydraulic Arrestor For Inclined Ramp", which issued Apr. 5, 1960, to Louis Campbell, there is shown a device for retarding movement of large cylindrical articles. A ramp is provided for rolling the cylindrical article to a lower level and a shaft is arranged below and transversed to the ramp and provided with a plurality of stops that are engageable with the cylindrical article. Rotation of the shaft is controlled by pneumatic means.

In U.S. Pat. No. 3,464,529, entitled, "Fruit Handling Device", which issued Sept. 2, 1969, fruit is moved through a vertically-extending pipe which is provided with a plurality of pneumatically inflated bladders for retarding the fruit falling through the pipe.

SUMMARY OF THE INVENTION

The present invention relates to a pneumatic strikedown system for lowering projectiles to a gun-loading position. A vertically-extending pipe is positioned between an upper and lower deck and is provided with a plurality of orifices that can bleed air when a projectile moves through the pipe. A resilient boot is temporarily positioned on one end and is engageable with the inner wall surface of the pipe to provide an air seal. As a projectile is dropped through the pipe, air is compressed in the pipe and slows the descent of the projectile. The size and number of orifices in the pipe determine the rate of descent of the projectile. Various unloading devices can be provided at the bottom of the pipe and can be arranged so that a projectile will not be dropped down an open pipe.

It is therefore a general object of the present invention to provide an improved device for rapidly moving projectile aboard a naval vessel.

Other objects, advantages and novel features of the invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view of one embodiment of the invention showing a projectile in motion;

FIG. 2 is a side view showing a projectile being unloaded after having been lowered from an upper deck;

FIG. 3 is a side view of another embodiment of the invention showing an unloading station; and

FIG. 4 is a side view of a third embodiment of the invention showing a self-powered unloading station.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, there is shown a tube **11** extending below a deck **12** and the inner diameter of tube **11** is slightly larger than the diameter of a projectile **13** that is to pass through tube **11.** Prior to placing a projectile **13** into tube **11,** a resilient boot **14** is attached to one end of projectile **13** and when projectile **13** enters tube **11,** boot **14** engages the inner wall of tube **11** to provide an air seal. As projectile **13** drops through tube **14,** air is prevented from escaping around projectile **13** and the trapped air forms a pneumatic cushion which decelerates the projectile as it nears the bottom of the tube. One or more orifices **15** are provided in the sides of tube **11** in order to increase the rate of descent of projectile **13** by allowing air to escape as it is being compressed.

As best shown in FIGS. **1** and **2** of the drawings, a lower portion of tube **11** is pivotable about shaft **16** thereby permitting projectile **13** to be readily removed from tube **11.** It can be seen, however, that when the lower portion of tube **11** is pivoted as shown in FIG. **2,** tube **11** is opened and, in the event a projectile is dropped into tube **11,** it would fall without retardation and could be damaged or cause injury to a person nearby. Accordingly, the embodiment of the invention shown in FIGS. **1** and **2** would preferably be equipped with a safety arrangement that would prevent dropping a projectile into tube **11** when the bottom portion is open. By way of example, a door might be provided at the top of tube **11** and an interlock system provided which would prevent this door from opening when the lower portion of tube **11** is pivoted.

Another arrangement for unloading projectiles **13** from tube **11** is shown in FIG. **3** of the drawings. A drum **21** is rotatably mounted on shaft **17** and is provided with three cavities **18, 19,** and **20** that are equally spaced from one another. Projectiles **13** can be loaded into cavity **18** that is aligned with tube **11** and when drum **21** is rotated about **120** degrees, the projectile will slide-out of the cavity onto a rack **22.** Thus one projectile **13** can be loaded into drum **21** and, simultaneously, a projectile **13** can be unloaded from drum **21** onto rack **22.** In the event that drum **21** is between cavities when a projectile **13** is dropped into tube **11,** there is no danger, as the falling projectile will still be retarded and will be supported by the outer peripheral surface of drum **21** until a cavity becomes aligned with tube **11** to receive the projectile.

A modification of the drum **21** is shown in FIG. **4** of the drawings. The centerlines of the cavities are offset a distance "D" from the center of rotation of drum **21,** and when a projectile **13** is loaded into cavity **18,** an unbalanced condition is created which rotates drum **21.**

Obviously many 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.

I claim:

1. A handling device for a projectile having a temporarily mounted resilient boot on one end comprising,

a vertically oriented tube having an inner diameter slightly larger than the diameter of said projectile

and slightly smaller than the diameter of said resilient boot whereby said resilient boot provides an air seal when said projectile is falling through said tube,

at least one orifice in the side of said tube near a lower end for allowing air to escape during descent of said projectile through said tube thereby regulating the speed of descent of said projectile,

a drum rotatably positioned at the lower end of said tube providing a closure for the lower end of said tube, said drum being rotatable about a horizontally oriented shaft offset a first fixed distance from the central axis of said vertically oriented tube, and

at least three cavities in said drum each having its central axis offset a fixed distance equal to said first fixed distance whereby said central axis of each said cavity is alignable with the central axis of said vertically oriented tube and whereby loading of a projectile through said vertically oriented tube into one of said cavities causes rotation of said drum.

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