Feb. 27, 1973 K. P. JONES ET AL 3,718,041

PROJECTILE DECELERATION DEVICE

Filed Oct. 1, 1971

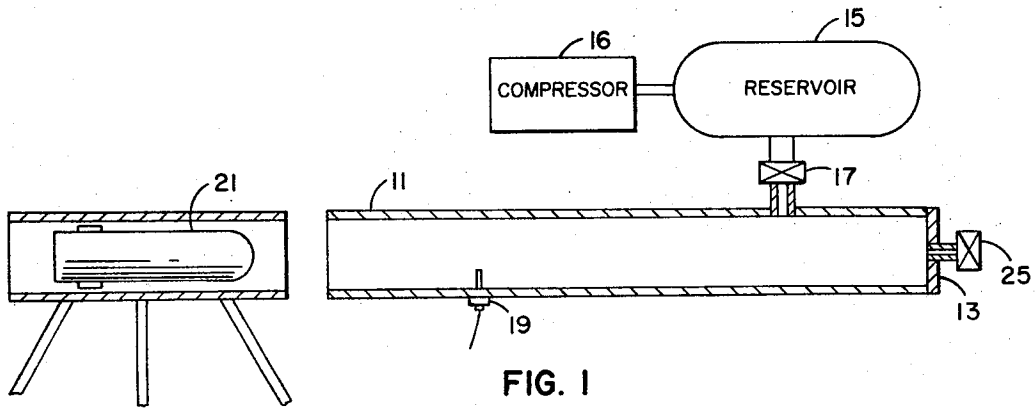

FIG. 1

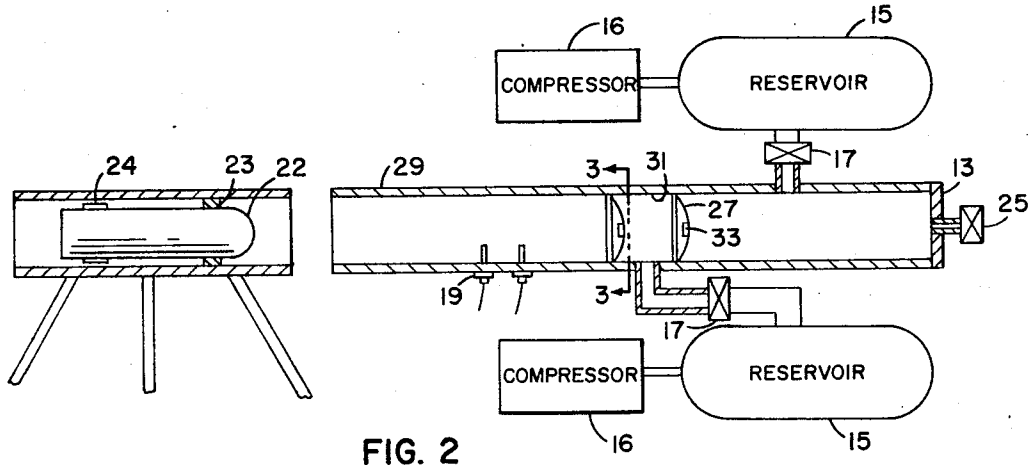

FIG. 2

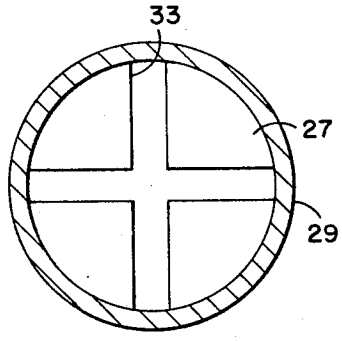

FIG. 3

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United States Patent Office 3,718,041 Patented Feb. 27, 1973

3,718,041

PROJECTILE DECELERATION DEVICE

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Filed Oct. 1, 1971, Ser. No. 185,646
Int. Cl. G01m 19/00
U.S. Cl. 73—167 6 Claims

ABSTRACT OF THE DISCLOSURE

A tubular member disposed to receive a projectile in flight is provided with a closed end and supplied with compressed air to oppose progress of the projectile in the member and bring the projectile to a stop. A relief valve is provided to relieve the air pressure as the projectile comes to the stop to prevent reverse progress thereof.

SUMMARY OF THE INVENTION

Our application pertains to projectiles and more particularly to a system for recovering projectiles such as rockets, guided missiles and artillery shot in flight with minimum damage to the projectiles to determine effects of launch, flight and environmental conditions.

Various means of recovering projectiles have been in use such as firing projectiles into absorbent material, containers filled with sheets of fabrication material or into containers filled with water. Projectiles such as missiles with relatively fragile air frames, war heads, and guidance sections are often too damaged by these means to provide the desired information. Recovery systems including targets mounted on rocket propelled targets are effective but extremely difficult to construct and control.

Our invention employs a tubular member supplied with air under pressure and provided with a closed end and an open end to receive a projectile in flight. The kinetic energy of the projectile is dissipated by further compression of the air and the projectile stops in the tubular member. A valve is provided to relieve the air pressure as the projectile comes to rest to prevent rearward progression thereof.

A plurality of diaphragms may be disposed to provide separate compartments within the tubular member for gradual deceleration of the projectiles.

BRIEF DESCRIPTION OF THE DRAWINGS

In carrying out our invention, FIG. 1 illustrates a projectile in a launcher and a tubular member disposed to arrest the missile in flight.

FIG. 2 illustrates a second embodiment of our invention with a projectile fitted with a shroud and the tubular member provided with chambers of compressed air to gradually decelerate the projectile.

FIG. 3 is a view along 3—3 of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the drawing a tubular member **11** enclosed at one end **13** is supplied with compressed air from a reservoir **15** communicating with an air compressor **16**. Air from reservoir **15** is admitted to tubular member **11** by a quick-acting valve **17** controlled by an electrically-connected sensor **19** that determines when a projectile **21** is propelled into tubular member **11**.

The outer diameter of projectile **21** or a shroud **23** affixed to projectile **22** has a diameter substantially equal to the inner diameter of tubular member **11** or **29**. The shroud is provided with a diameter to protect the transverse silhouette of projectile **22** having protruding parts such as fins **24**. As projectile **21** proceeds in tubular member **11**, the kinetic energy of the projectile flight is dissipated by further compression of the air in tubular member **11** and the projectile comes to rest without distortion of the projectile structure.

An escape valve **25** communicates into tubular member **11** to relieve air pressure therein as the projectile stops moving to prevent reverse progress of the projectile due to spring action of the compressed air.

Diaphragms **27** are disposed in air tight engagement with tubular member **29** to form a series of compartments **31** for successive deceleration of projectile **22** during the progress of the projectile. Compartments **31** may communicate with corresponding reservoirs **15** of air at selected pressures. Diaphragms **27** are spherical for maximum strength and include radial grooves **33** for frangibility of the diaphragms with minimum damage to projectile **22** upon impact therewith.

We claim:

1. A system for decelerating a projectile in flight comprising: a tubular member having a closed end and an open end to receive the projectile in the flight for progress in the tubular member; a relief valve communicating therein; and means for supply of compressed air to said tubular member to oppose the progress and bring the projectile to a stop; said relief valve being disposed to release pressure of the air in said tubular member as the projectile comes to the stop to prevent reverse progress of the projectile.

2. A system as in claim **1** with supply means including a sensor disposed adjacent said forward end and a supply valve disposed between said supply means and said tubular member; said sensor being disposed for detection of a projectile entering said tubular member and electrically connected to operate said supply valve to pressurize said tubular member responsive to the detection.

3. A system as in claim **2** with a plurality of diaphragms disposed in air tight engagement with said tubular member to form a series of pressure chambers and said supply means including individual reservoirs and corresponding supply means communicating with said pressure chambers to supply selected pressures thereto for progressive deceleration of the projectile during the progress.

4. A system as in claim **3** with said diaphragms including radial grooves for frangibility of the diaphragms without appreciable damage to the projectile responsive to impact therefrom.

5. A system as in claim **3** with said diaphragms limited to one to form a single pressure chamber.

6. A system as in claim **1** with a shroud disposed for attachment to a projectile and provided with a diameter to include the transverse silhouette of the projectile.

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