Jan. 6, 1970 G. K. OSS 3,487,781

NOSE CONE EJECTION FOR PAYLOADS EMPLOYING PARACHUTES

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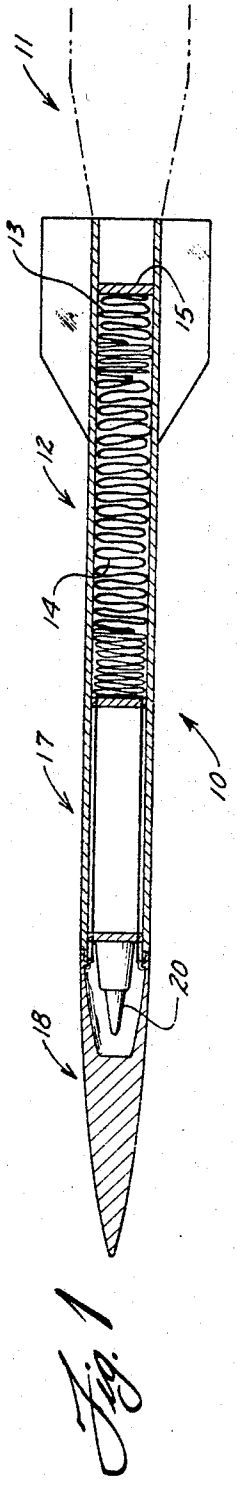


Fig. 1

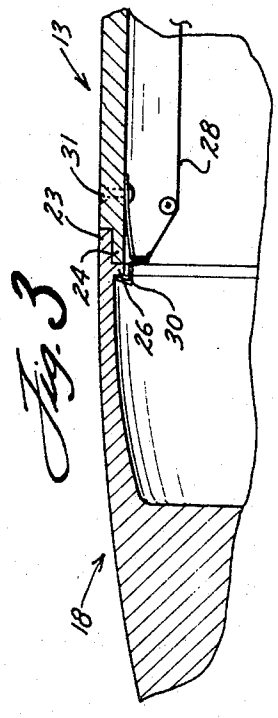


Fig. 3

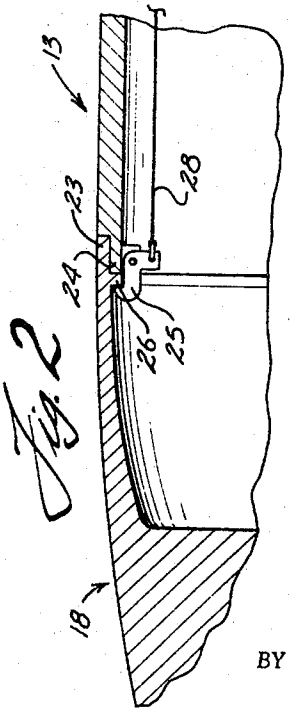
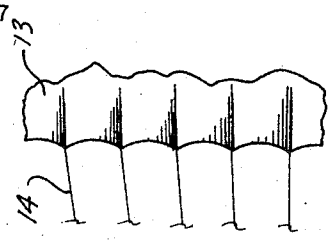
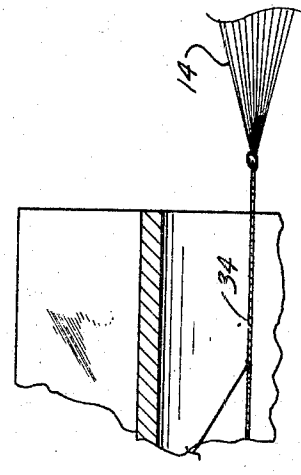


Fig. 2





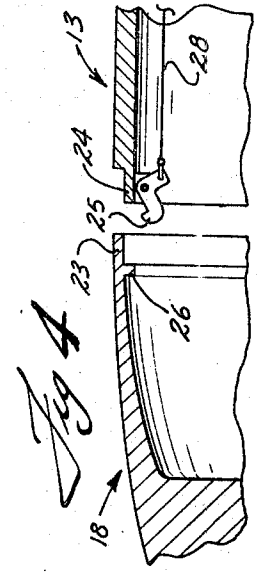


Fig. 4

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NOSE CONE EJECTION FOR PAYLOADS EMPLOYING PARACHUTES

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U.S. Cl. 102—49.4 4 Claims

ABSTRACT OF THE DISCLOSURE

The nose cone of a sounding vehicle is attached to the vehicle body by means of spring-loaded hooks which are, in turn, attached by means of wires to the shroud lines of the parachute which is used to lower the instrument package to the ground. When the parachute is ejected and deployed, the pull on the shroud lines causes the hooks to disengage from the nose cose and the nose cone is released to expose certain sensing instrumerts.

BACKGROUND OF THE INVENTION

Field of invention

This invention relates generally to the field of meteorological sounding vehicles, and, more particularly, to a means for attaching the nose cone to the vehicle in such a manner as to facilitate removal of the nose cone to expose certain sensing instruments in the payload during the sampling portion of the flight.

Description of the prior art

A study of the prior art reveals many different means for attaching the nose cones of meteorological sounding vehicles in such a manner as to allow them to be jettisoned to expose the sensors of the instrument package. These methods, however, usually utilize some means for positively displacing the nose cone, such as springs or gasifiers, as evidenced by U.S. Patent 3,101,052 issued Aug. 20, 1963, to Webster et al.

Major considerations in the design of any sounding vehicle, powered or unpowered, are simplicity, reliability, weight and size. The prior art devices fail to satisfy all four considerations. For example, if a gasifier is used to eject the nose cone, an igniter system for operating the gasifier must be included, as must safing and arming systems in order to allow safe handling. In the case of the use of springs, the mechanisms are usually large and subject to becoming inoperative after long storage periods.

SUMMARY OF THE INVENTION

The means for attaching the nose cone set forth in the instant application satisfies all four requirements stated above. The typical meteorological sounding vehicle consists of a propulsion section, a parachute section, a payload or instrument package section, and a nose cone. The nose cone usually covers certain sensing instruments in the payload which must be exposed to the atmosphere during the data-gathering portion of the flight. The nose cone is generally separated from the payload section in order to render these instruments usable. By this invention, the nose cone is attached to the forward portion of the payload section by a plurality of spring-loaded hooks. These hooks are, in turn, connected by means of actuator wires to the shroud lines of the main parachute. When the parachute deploys to lower the instrument package, the shroud lines pull on the actuator wires, causing the hooks to disengage from the nose cone. The opening of the parachute causes an abrupt deceleration of the vehicle, and the nose cone, which has now been unlocked from

the instrument section, moves away from the rest of the vehicle by its own inertia.

It is an object of this invention to provide a simple and reliable means for attaching a releasable nose cone to a sounding vehicle.

Another object of this invention is to provide a means for attaching a releasable nose cone to a sounding vehicle which operates without stored energy sources such as springs or gasifiers.

Another object of this invention is to provide a means for releasing the nose cone of a sounding vehicle immediately upon the deployment of the instrument lowering parachute.

THE DRAWINGS

FIGURE 1 is a side elevation of a typical meteorological sounding vehicle of which the instant invention is a part;

FIGURE 2 is a side elevation showing the details of an embodiment of the invention;

FIGURE 3 is a side elevation showing an alternative embodiment of the invention; and

FIGURE 4 is a diagrammatic showing, in side elevation, of the operation of the instant invention.

DESCRIPTION OF THE INVENTION

This invention relates to meteorological sounding vehicles and, in particular, to a means for attaching a releasable nose cone which covers sensing instruments. Included in the concept are powered vehicles, such as rockets, as well as unpowered or glide vehicles, such as are dropped from aircraft. As shown in FIGURE 1, a typical meteorological sounding vehicle **10** consists of four major sections: a power section **11**, which can be an integral part of the vehicle **10** or can be a separate booster rocket, as shown in FIGURE 1; a parachute section **12** containing a parachute **13**, shroud lines **14** and a means **15** such as a timer, for controlling the deployment of the parachute; an equipment section **17** containing sensing instruments, the telemetering equipment and the power supply; and a nose cone **18** which streamlines the forward portion of the vehicle **10** and also covers and protects certain sensing instruments **20** during the initial portion of the vehicle flight. The sounding vehicle may, of course, contain many accessories or be of alternative designs. However, the above description is basic and shows all parts necessary to illustrate the instant invention.

FIGURE 2 is a close-up view of the concept advanced by the instant invention. Nose cone **18** is mated to instrument package section **13** by means such as interlocking flanges **23** and **24**. In order to utilize the attachment method advanced by the instant invention, a plurality of spring-loaded hooks **25** are pivotally mounted adjacent to flange **24** of the instrument package. The hooks engage and are biased toward an inward-turned annular shoulder **26** on the rear portion of the nose cone **18**, and thus hold the nose cone securely attached to the instrument section. Attached to each of the hooks **25** is an actuator wire **28** which is in turn attached to the parachute shroud lines. Wires **28** are of such length as to be fully extended and pull on hooks **25** when the parachute deploys.

An alternative means for attachment is shown in FIGURE 3, where a hook **30** formed of a leaf spring is provided in place of the pivoted hook **25** previously discussed and shown in FIGURE 2. Hook **30** is attached to the side wall of the instrument package **13** by means such as a rivet **31**, and the actuating wire **28** is attached directly to the spring. In this embodiment it may be necessary to route the actuating wire away from the side walls in the instrument package in order to apply the proper mechanical advantage to hook **30**.

OPERATION

Both of the above-described embodiments operate in the same manner although only one embodiment is shown in FIGURE 4. In the normal manner, at a predetermined time, parachute **13** is jettisoned from the vehicle and immediately begins to deploy. As it deploys out of parachute canister **12**, it pulls on the actuating wires **28** via shroud attachment line **34**. When wires **28** are fully extended by the action of the deployment of the parachute, hooks **25** are caused to rotate and disengage from shoulder **26**, thus unlocking nose cone **18**. The deployment of the parachute causes rapid deceleration of the vehicle, and the now unlocked nose cone **18** accelerates away from the vehicle due to its own inertia. Thus, sensing instruments **20** are uncovered. The same operational sequence will take place if alternate types of hooks, such as the ones shown in FIGURE 3, are utilized. This mechanism works equally well with powered vehicles or drop vehicles.

The advantages offered by the instant invention are simplicity, reliability, size and weight. It includes no explosive means or springs to complicate the mechanism, take up space, or to necessitate the installation of safety devices. The mechanism is extremely reliable because it needs only the normal deployment of the parachute to cause it to operate and to provide the power for such operation. Obviously, many modifications of the invention are possible in light of the above teachings, however, it is to be noted that the invention may be practiced otherwise than as specifically described herein.

I claim:

1. In a meteorological sounding vehicle having an instrument package, a parachute for lowering said instrument package, and a detachable nose cone, means for attaching said nose cone to said instrument package comprising:

a plurality of hooks mounted on said instrument package and movable between a first position in engagement with said nose cone and a second position disengaged from said nose cone,

a plurality of actuator wires attached to said hooks and said parachute, said wires being adapted to be operated by said parachute to move said hooks from said first position to said second position when said parachute is deployed, whereby said nose cone is free to separate from said instrument package.

2. The apparatus of claim **1** wherein said hooks are pivotally mounted internally in said instrument package and wherein said nose cone includes an internal annular flange which is engaged by said hooks when they are in said first position.

3. The apparatus of claim **1** wherein spring means are provided to normally bias said hooks to said first position.

4. The apparatus of claim **1** wherein said hooks are resilient spring members that are normally biased into said first position.

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