Feb. 26, 1957 S. E. JOHNSTON 2,782,716

DESTRUCTIBLE COVER FOR FRAGILE DOME

Filed Nov. 30, 1953

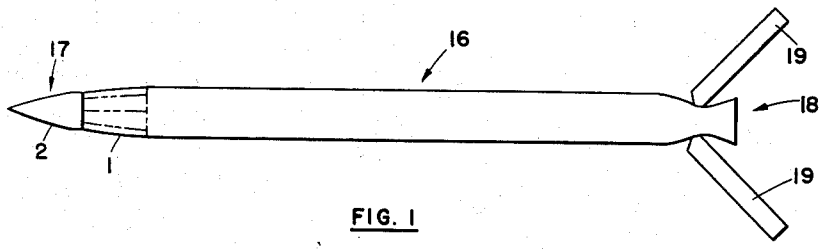


FIG. 1

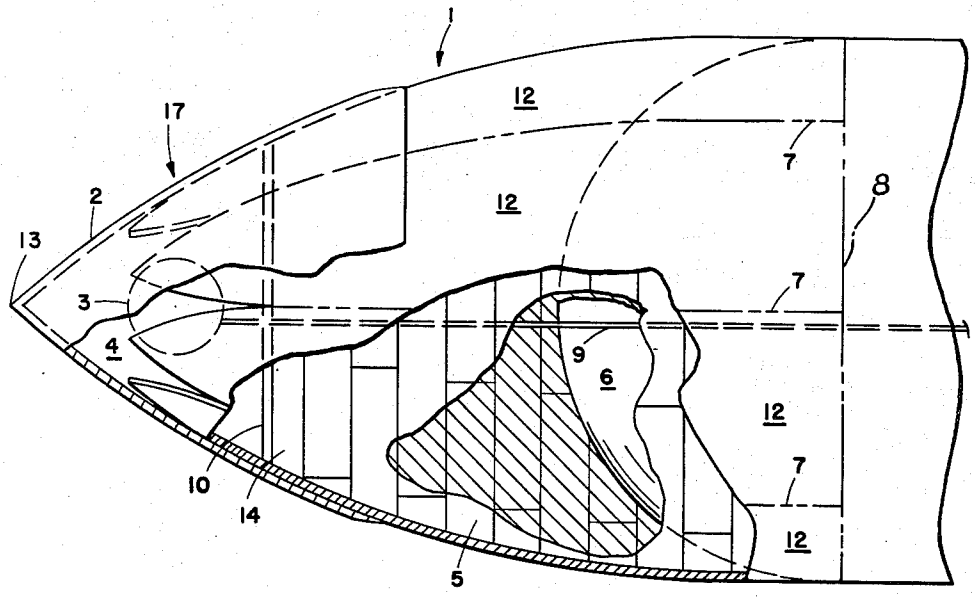


FIG. 2

INVENTOR.
STEPHEN E. JOHNSTON

BY

William R. Lane

ATTORNEY

United States Patent Office 2,782,716 Patented Feb. 26, 1957

2,782,716

DESTRUCTIBLE COVER FOR FRAGILE DOME

Stephen E. Johnston, Kanab, Utah, assignor to North American Aviation, Inc.

Application November 30, 1953, Serial No. 394,968

7 Claims. (Cl. 102—56)

This invention relates to fragile domes for enclosing radar antennae and infrared radiation scanners and more particularly to a destructible cover providing an aerodynamic profile and protection for such domes.

In guidance systems for flying missiles, which systems are motivated by signals detected by radar or infrared detectors, a fragile dome of glass, plastic, or the like is provided for protection of the detector elements. In addition, for infrared detectors the dome may often act as an element of the detector such as a lens or mirror and therefore require special optical properties.

These domes, when subjected to long flight, are susceptible to damage by wind and rain erosion or shock and the like. The guidance system using this type of detector may not be scheduled for operation until the terminal portion of the flight and therefore the dome must be protected until the detector is to be used. It is also important to provide an aerodynamically "clean" surface over the dome to improve the flight characteristics of the missile.

When the guidance system is to be used, any protective covering must be removed to permit operation of the detector. The simplest and most rapid method for disposing of the protective covering is to disintegrate or explode it from the dome, but this is often difficult to accomplish since the force required to remove the covering must not be of such an extent to damage the fragile dome. It is also notable that the protective covering must have sufficient strength to withstand the aerodynamic and external pressure loads imposed during flight. Providing this strength increases the force required to explode the covering and the attendant possibilities of damage to the dome are multiplied.

It is contemplated by this device to provide a protective cover for a fragile dome that provides an aerodynamic profile.

It is also contemplated by this device to provide a protective cover for a fragile dome that is easily and quickly disintegrated so as to expose said dome without damaging it.

It is therefore an object of this invention to provide a protective cover for a fragile dome.

It is another object of this invention to provide a cover for a fragile dome providing an aerodynamic profile.

It is still another object of this invention to provide an easily and quickly removable cover for a fragile dome.

It is a still further object of this invention to provide a destructible protective cover for a fragile dome which may be quickly removed without injuring said dome.

Other objects of invention will become apparent from the following description taken in connection with the accompanying drawings, in which:

Fig. 1 is an overall elevational view of a guided missile; and

Fig. 2 is an elevational view of the nose portion of the missile showing the preferred embodiment of this invention, partially broken away to show structure.

In detail, Fig. 1 shows a missile 16 having a nose portion 17 housing a guidance system and a tail portion 18 conventionally including stabilizing fins 19 and a propulsion motor (not shown).

Fig. 2 shows a fragile, hemispherical dome 6 of plastic, glass, or the like which houses the detecting elements (not shown) of the radar or infrared guidance system. Surrounding said dome and converging forwardly thereof is a thin-walled skin or sheath 1 which is scored as at 7 to provide strips 12 which (as to be later described) are adapted to be peeled back toward dome 6 like the skin of a banana. Sheath 1 is also preferably scored at 8 adjacent dome 6 so that strips 12 will break away from dome 6 when caught by the airstream. Surrounding the converging ends of strips 12 and secured thereto as by cementing is frangible cap 2 formed of plastic, pressed paper, or the like and coming to a point 13 so as to provide a suitable aerodynamic profile with covering sheath 1.

Housed within the forward end of sheath 1 and cap 2 is an explosive charge which may be in the form of pellet 3 having ignition or fuse wires 9 leading therefrom to some igniting device (not shown). Surrounding pellet 3 and occupying the space between said pellet and dome 6 within sheath 1 and cap 2 is shock absorbent packing, generally designated 14. As shown in the drawing, packing 14 may be composed of overlapping layers of felt blocks 5 providing a gas-tight, shock-absorbent pad between pellet 3 and dome 6. Surrounding pellet 3 and occupying the space within cap 2 packing 14 may consist of a mass of paper pulp 4 having cardboard wad 10 separating it from felt blocks 5. It is obvious that packing 14 may consist of all felt blocks, all paper pulp, or of any shock-absorbent, gas-tight material. Packing 14 acts not only as a shock absorber for the protection of dome 6 but also acts to support sheath 1 and cap 2 to prevent their collapse due to external pressure or aerodynamic loads imposed during flight.

When it is desired to put into operation the detecting elements housed in dome 6, explosive pellet 3 is detonated by ignition. The explosion shatters cap 2 and forces the converging ends of strips 12 outwardly while packing 14 protects dome 6 from damage. Strips 12 are then caught by the airstream and forced back and torn away to expose dome 6. That part of packing 14 not disposed of by the explosion of pellet 3 is carried away by the airstream.

Although the invention has been described and illustrated in detail, it is to be clearly understood that the same is by way of illustration and example only and is not to be taken by way of limitation, the spirit and scope of this invention being limited only by the terms of the appended claims.

I claim:

1. A destructible protective assembly for a fragile dome adapted to pass through a fluid comprising a closure converging over said dome, said closure having a forward part heading into said fluid, an explosive charge spaced from said dome and adjacent said forward part of said closure, and shock absorbent padding covering said dome whereby the explosion of said charge opens said closure, dispersing said padding and said closure so as to cause said fluid to expose said dome.

2. A destructible protective assembly for a fragile dome adapted to pass through a fluid comprising a sheath converging over said dome, spaced weakened portions in said sheath, a cap surrounding the converging end of said sheath, an explosive charge spaced from said dome and adjacent said cap and said sheath, and shock absorbent packing covering said dome whereby the explosion of said charge breaks said cap, dispersing said packing and said sheath so as to cause said fluid to expose said dome.

3. A destructible protective assembly providing an

aerodynamic profile for a fragile dome adapted to pass through a fluid comprising a sheath converging over said dome and scored for peeling in strips, a frangible cap surrounding the converging end of said sheath, an explosive charge within said cap and spaced from said dome, and shock absorbent packing occupying the space between said charge and said dome whereby the explosion of said charge disintegrates said cap, dislodges said packing, and peels back said sheath so as to expose said dome.

4. In a missile guided by detecting means, in combination, a fragile dome for housing said detecting means, a sheath converging forwardly of said dome and scored for peeling in strips, a frangible cap surrounding the converging end of said sheath, an explosive charge within said cap and spaced from said dome, and shock absorbent packing surrounding said charge and occupying the space between said charge and said dome whereby the explosion of said charge disintegrates said cap, dislodges said packing, and peels back said sheath so as to expose said dome without damage thereto.

5. In a guided missile having a fragile dome enclosing detecting elements, a protective nose cover providing an aerodynamic profile for said dome comprising a thin-walled converging skin, a frangible cap surrounding the converging end of said skin, an explosive charge within said cap, and shock absorbent packing surrounding said charge whereby the explosion of said charge disintegrates said cap, dislodges said packing, and peels back said skin so as to expose said dome.

6. In combination with a guided missile having a fragile dome enclosing detecting elements, a destructible protective assembly providing an aerodynamic profile for said dome comprising an explosive charge spaced from said dome, shock absorbent packing occupying the space between said charge and said dome, a sheath converging outwardly of said dome, encasing said charge and said packing, and scored for peeling in strips, and a frangible cap surrounding the converging end of said sheath whereby the explosion of said charge disintegrates said cap, dislodges said packing, and peels back said sheath so as to expose said dome without damage thereto.

7. A destructible protective assembly providing an aerodynamic profile for a fragile dome adapted to pass through a fluid comprising a sheath converging over said dome and scored for peeling in strips and for being broken away by the force of said fluid, a frangible cap surrounding the converging end of said sheath, an explosive charge within said cap and spaced from said dome, and shock absorbent packing occupying the space between said charge and said dome whereby the explosion of said charge and the force of said fluid disintegrates said cap, dislodges said packing, and peels back and breaks away said sheath so as to expose said dome.

References Cited in the file of this patent

UNITED STATES PATENTS

1,201,763	Rimailho	Oct. 17, 1916
1,552,435	Johnson	Sept. 8, 1925
2,137,436	Barnhart	Nov. 22, 1938
2,246,429	Brandt	June 17, 1941
2,505,042	Gourdon	Apr. 25, 1950

FOREIGN PATENTS

828,661	Germany	Jan. 21, 1952