April 28, 1964 J. O. PILCHER II 3,130,560

COOLING SHROUD

Filed June 6, 1962

Fig. 1.

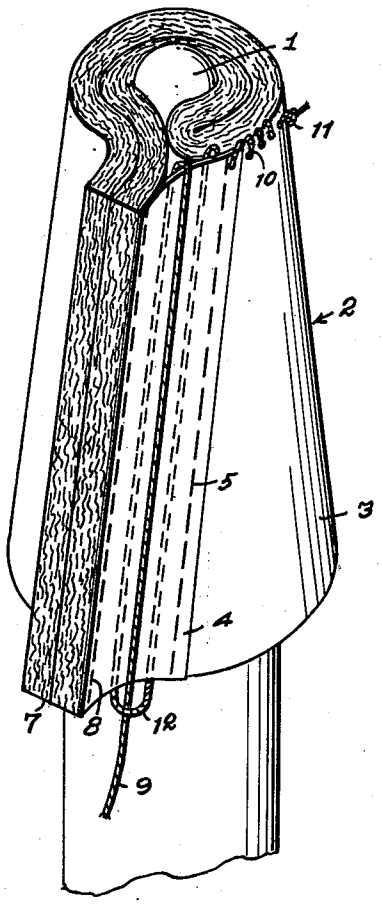


Fig. 2.

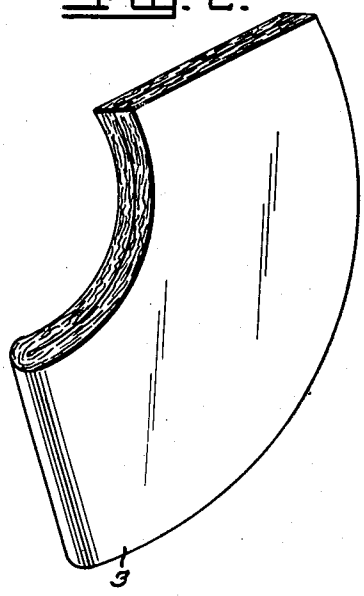


Fig. 3.

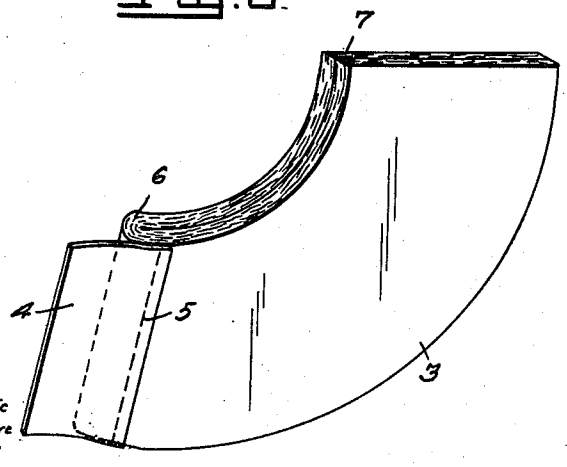
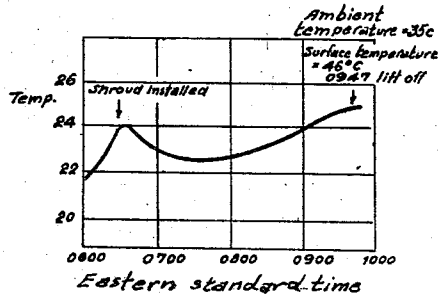


Fig. 4.



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COOLING SHROUD

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2 Claims. (Cl. 62—316)
(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment to me of any royalty thereon.

This invention relates to a cooling shroud for use on missile nose cones and more particularly for maintaining the temperature of a rocket nose cone at a low temperature while the rocket is mounted on a launcher.

A prior method of cooling a nose cone of a rocket was to use window type air conditioners and a plastic duct system from the air conditioners to the nose cone.

The aforesaid method was cumbersome and expensive due to the bulky equipment and also damage was done to the equipment as a result of the rocket blast.

The present invention is designed to eliminate bulky cooling equipment and damage thereto due to rocket blast by employing an expendable cooling means which requires a minimum of handling and consists briefly of a fitted shroud made of absorbent paper material that is saturated with alcohol. The saturated material is placed over the rocket nose cone. Evaporation of the alcohol causes the cone temperature to stay at the evaporation temperature of the alcohol until the alcohol has completely boiled away. After evaporation is completed, the shroud acts as an insulator and the temperature of the nose cone gradually rises until the surface temperature is reached.

It is a primary object of this invention to provide an expendable means for cooling a rocket cone.

Another object is to provide a cooling means for a rocket nose cone that requires a minimum of handling.

A further object is to provide a cooling means for a rocket cone that is inexpensive.

The foregoing and other objects and advantages of the invention will become apparent from a study of the following specification, taken in conjunction with the accompanying drawings in which:

FIG. 1 is a perspective of a rocket nose cone and the cooling shroud of the invention applied thereon;

FIG. 2 is a perspective view of the shroud pattern;

FIG. 3 is a similar view showing the tear-away panel sewed to the shroud, and

FIG. 4 is a graph showing the performance of the shroud.

Referring now to the drawing, reference character **1** represents a nose cone of a rocket, the cooling shroud of the invention is indicated generally by **2** and is shown fitted in its assembled condition over the nose cone **1** in FIG. 1.

Shroud **2** is fabricated from an expendable absorbent material such as Kimberly-Clark interior packaging (K embossed 40 lb. Kraft backing type 3011) paper and is indicated by **3** on the drawing.

The aforesaid material is cut in the shape of a truncated cone (see FIG. 2) and is of a double thickness as shown. The material **3** may be folded upon itself as shown or laid in two sheets (not shown), one upon another and then cut; as many layers can be used as is expedient, depending on the size of the rocket and the amount of cooling desired.

A means of securing the shroud **2** on the nose cone **1** is provided and consists of a strip of heavy wrapping paper **4** which is sewn along one edge **6** of the material

3, the seam being indiacted by **5**, and constitutes a "tear-away panel."

The material **3** is then rolled into a conical shaped jacket and one end **7** is turned outwardly, as shown in FIG. 1. The strip **4** is then sewed to the end **7** as indicated by seam **8**.

Means for quickly separating the shroud ends **6** and **7** when desired are provided and consists of a lanyard **9** which is looped around strip **4** as illustrated in FIG. 1, then laced to the upper end of shroud **1** as indicated by **10** and then tied in a knot **11** to firmly secure the lanyard **9** to the upper end of the absorbent material **3**.

The portion of lanyard **9** passing along the outside of the strip **4** is passed under a looped end **12**.

The completed assembly is now immersed in ethyl alcohol until completely saturated.

The shroud **2** is then placed around the nose cone **1** as shown in FIG. 1.

A hand line (not shown) may be attached to the end of lanyard **9** and when it is desired to separate the shroud from the nose cone, the hand line is pulled. The lanyard **9** will then act to tear strip **4** lengthwise and the ends **6** and **7** of the shroud **1** will separate and the shroud will fall away from nose cone.

If desired, the hand line (not shown) may be fastened to a stationary point so that the upward movement of the rocket itself when launched will pull the hand line and lanyard taut and tear strip **4** apart.

The shroud may be removed by the acceleration force of the rocket itself acting on the tear strip **4**. In this method the hand line is unnecessary.

Other means of separating the shroud when desired may be employed.

The shroud **2** is not to be confined to a truncated conical shape and the material **3** can be tailored to suit the shape of the nose cone being cooled.

The shroud of the invention has been tested and has been found to be an efficient and inexpensive means of cooling rocket nose cones.

In one test, a nose cone of a rocket was cooled to 24° C. by the shroud of the invention. In this test, a thermistor was mounted inside a two-frequency beacon container and placed in the nose cone. The nose cone, with the shroud installed, was placed in the sunlight. Temperature measurements were recorded for ambient temperature, internal temperature and surface temperature of the shroud.

The ambient condition was 35° C. with 85% humidity with no wind throughout the test. The surface temperature was 46.05° C. The internal temperature remained at 24° for 3 hours and 53 minutes; at this time the ethyl alcohol had completely evaporated. The internal temperature then rose to 46.05° C. in a time interval of 33 minutes.

The actual performance of the shroud in the above test is represented by the graph shown in FIG. 4.

The shroud of the invention can maintain a nose cone temperature of 24° C. for 3 hours and may be installed on a nose cone of a rocket in five minutes by one man. Furthermore, the temperature range of the cooling shroud may be varied by employing standard cooling agents with appropriate boiling points.

Variations and modifications may be effected without departing from the scope of the novel concept of the present invention as set forth in the appended claims.

What is claimed is:

1. An expendable cooling shroud for maintaining a rocket nose cone at a low temperature, said shroud comprising a generally truncated conical shaped sheet of alcohol saturated absorbent paper forming a jacket for placement over a rocket cone, one longitudinal end of said

jacket being outwardly turned; a strip of heavy paper secured at its longitudinal ends to the respective ends of said jacket and a means for ripping said strip longitudinally carried by said jacket to free said jacket from the nose cone.

2. A cooling shroud as set forth in claim 1, wherein said means for ripping said strip comprises a lanyard secured at one of its ends to the forward end of said jacket and being looped around said strip in a manner whereby when the free end of said lanyard is pulled, said lanyard will rip the strip longitudinally to free said jacket from the nose cone.

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