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FRANGIBLE MOLDS

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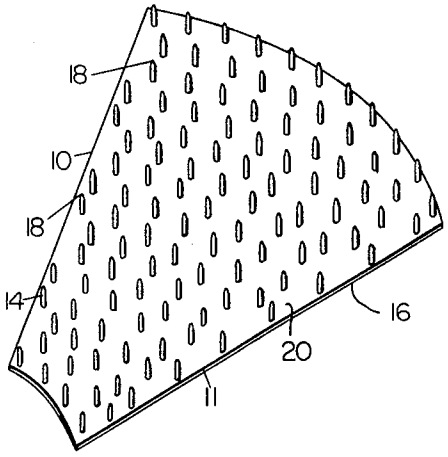


FIG. 1

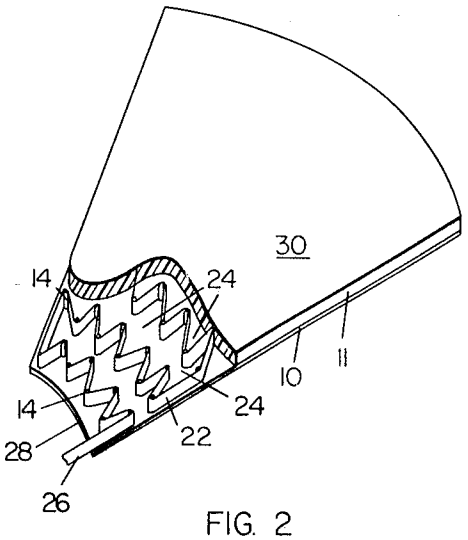


FIG. 2

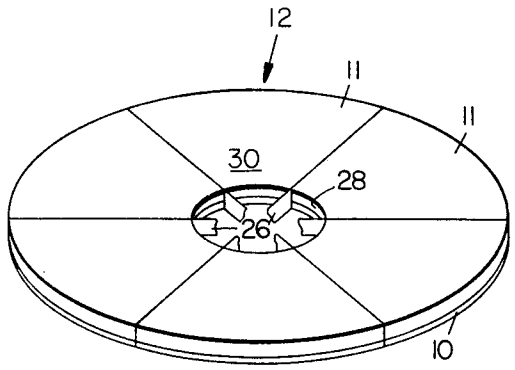


FIG. 3

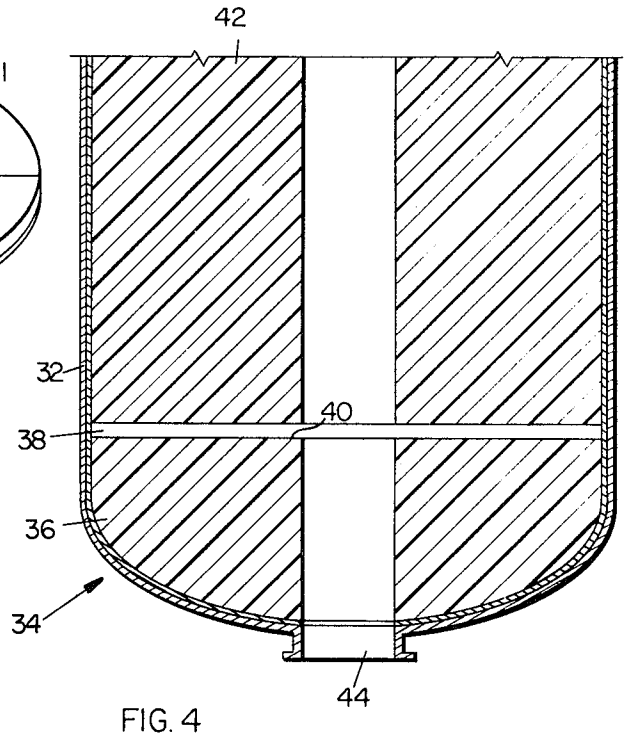


FIG. 4

INVENTOR.
DONALD F. CAREY

BY

Edward E. McCullough

AGENT

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FRANGIBLE MOLDS

Donald F. Carey, Brigham City, Utah, assignor to Thiokol Chemical Corporation, Bristol, Pa., a corporation of Delaware

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ABSTRACT OF THE DISCLOSURE

A frangible mold for forming radial slots in a hollow body is made by driving nails through a rigid sheet, winding a tape about the nails, molding a plastic on the sheet so that the tape is embedded therein, and removing the sheet and nails.

This invention relates to molding pieces for forming radial slots in hollow bodies; and, more particularly, it relates to frangible molds that can be readily removed from the casting.

At least one radial slot adjoining a central, circular, cylindrical or conical cavity has become a much used burning-surface configuration in solid-propellant grains for rockets. The central cavity is usually formed simply by casting a mandrel into the propellant and withdrawing it after the propellant has cured. The radial slot, however, has been more difficult to form conveniently, inexpensively, and with precision.

The present invention is a frangible mold for forming such radial slots. This mold is a slab of plastic foam with a continuous tape embedded therein in such a manner that pulling on a free end of the tape will fragment the mold for removal thereof from the cured propellant. The invention also includes a method of making the mold.

An object of the invention is to provide a convenient and inexpensive means of making radial slots in a hollow body, such as a rocket grain.

Another object of the invention is to provide a mold for making such slots that may be easily removed from the hollow body after casting and curing thereof.

Another object of the invention is to provide a convenient means of making such a mold.

Other objects and advantages of the invention will become apparent as it is disclosed in the following description and accompanying drawings, wherein identical characters designate the same parts throughout the disclosure.

In the drawings:

FIG. 1 is a perspective view of one component of a preferred embodiment of the invention in an early stage of manufacture;

FIG. 2 is a view similar to FIG. 1 at a later stage of manufacture;

FIG. 3 is a perspective view of plurality of completed components assembled to form a mold; and

FIG. 4 is a fragmentary section of a rocket motor showing a radial slot formed by the mold of FIG. 3.

FIG. 1 illustrates a rigid sheet **10** having the shape of a radial segment **11** of the mold **12**. Nails **14** have been driven through the underside **16** of the sheet **10**, the points **18** projecting upwardly beyond the upper surface **20** thereof. A continuous tape **22**, of a strong, fairly stiff material such as paper reinforced with glass fibers, is wound about the nails **14** in a manner to divide the upper surface **20** of the sheet **10** into small areas (see FIG. 2). The nails **14**, being perpendicular to the sheet **10** also automatically orient the tape **22** perpendicular to the parallel top and

bottom surfaces of the segment **11**. A free end **26** of the tape **22** extends beyond the sheet **10** at the inner edge **28** thereof. A moldable, frangible material **30**, such as a polyurethane foam of about two pounds per cubic foot density is then cast on the sheet **10**, with the aid of a partial enclosure not shown by which the top and sides of the slab of foam are formed. The tape **22** is completely embedded in the foam **30**, except for the free end **26**. Various other kinds of material especially those polymeric in nature, may be used for the frangible material **30**.

After the frangible material **30** has cured, it is removed from the sheet **10** and the nails **14**. If desired, the holes left by the nails **14** in the mold segment **11** may be filled with nearly any moldable material to provide smooth top and bottom surfaces on the mold segments **11**. A plurality of the resulting mold segments **11** are then assembled to form the annular mold **12**.

The case **32** of a rocket motor **34** (see FIG. 4) is then positioned vertically and filled with uncured propellant **36** about a central mandrel, not shown, up to the level at which a radial slot **38** is to be made. This propellant **36** is cured and the mold **12** is arranged on the upper surface **40** thereof. The remainder **42** of the propellant is cast in the case **32** and cured; after which a tool may be inserted through the igniter port **44** of the case **32** to grasp each free end **26** of tape **22** and pull thereon to fragment the mold segments **11** for removal from the propellant grain.

An invention has been described for making radial slots in a molded, hollow body. Although a preferred form thereof has been described with considerable specificity with regard to detail, it is understood that such details may be altered without departing from the scope of the invention as defined in the appended claims. For example, the mold **12** is not necessarily planar in form, but may be conical, etc.

What is claimed is:

1. A mold comprising:

a slab of frangible, foamed polymeric material; and

a continuous tape embedded in said slab with a free end projecting therefrom, said tape being oriented perpendicular to parallel surfaces of said slab and arranged to divide said slab into small portions, whereby said slab may be fragmented into said small portions when said free end of said tape is pulled.

2. The process for making a frangible mold comprising the steps of:

driving nails through one side of a rigid sheet;

winding a continuous tape on said nails on one side of said sheet, said tape being perpendicular to said sheet and arranged to divide the surface of said sheet into small areas;

molding an easily-frangible material on said sheet so that said tape is embedded therein, with one end of said tape extending from said frangible material;

allowing said frangible material to harden; and

removing said sheet and said nails therefrom.

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SAMUEL FEINBERG, Primary Examiner

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