FIG. 1
APPARATUS FOR THE SIMULTANEOUS CASTING OF MULTIPROPELLANT SOLID FUEL ROCKET MOTORS

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ABSTRACT OF THE DISCLOSURE

An apparatus for the simultaneous casting of an uncured, multilpropellant, solid rocket fuel. The apparatus comprises a mandrel means positioned within and extending along the central longitudinal axis of a rocket motor case together with baffle means positioned within said motor case for separating the individual propellants of a multilpropellant fuel.

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

Another object of this invention is to provide a baffle means between the separate propellants of a multilpropellant grain prior to casting the multilpropellant fuel.

Another object of this invention is to provide a rocket fuel casting apparatus having a circumferential baffle means adapted to be withdrawn from the apparatus.

Still a further object of this invention is to provide an apparatus which permits the simultaneous casting of multilpropellant rocket fuels in an efficient and economic manner.

The above and still further objects, advantages and features of this invention will become readily apparent upon consideration of the following detailed description taken in conjunction with the accompanying drawings in which:

FIGURE 1 is a sectional view of a motor case showing the circumferential baffle means of this invention utilized in a bayonet-type casting operation; and

FIGURE 2 is a sectional view of a motor case segment showing the circumferential baffle means of this invention utilized in a vacuum-type casting operation.

Referring more in detail to the drawings wherein like parts are designated by like reference numerals, the reference numeral 10 is used to designate a portion of a motor case for a solid propellant rocket motor. The motor case 10 forms no part of the invention and is used only to show the apparatus embodying the invention when used in the casting of an uncured multilpropellant comprising separate propellants A and B.

The apparatus embodying the invention comprises a circumferential baffle 12 that is provided with a plurality of lifting eyes 14 on one end of the baffle 12 that are engaged by lifting hooks connected to hoist cables 16. A mandrel 18 extends the length of the motor case 10. One end 20 of the mandrel 18 extends through a flanged igniter opening 22 in the head end 24 of the motor case 10, to rest on a cap 26 that is fitted to the flanged opening 22 with an air tight seal as shown in FIG. 1. With the mandrel 20 in place and the baffle 12 in a lowered position as shown at 28, the apparatus is ready for use.

Separate propellants A and B are simultaneously cast into the motor case, either by means of bayonet tubes 30 and 32, as shown in FIG. 1, or by filling devices 34 and 36, as shown in FIG. 2. As the two distinct propellants A and B are cast into the motor case, the baffle 12 is slowly raised by means of hoisting cables 16 until a sufficient head is reached to cause the propellants A and B to flow together. The level of the separate propellants A and B should be maintained approximately the same on both sides of the baffle 12. In order to facilitate even filling, FIG. 1 shows the use of a plurality of bayonet tubes. However, a single bayonet tube for each propellant could be utilized if desired. The casting operation is continued until the desired grain length is obtained, at which time the baffle 12 is slowly withdrawn from the motor case 10.

Slowly lifting the baffle 12 separates the propellants during the casting operation. The concept of this invention eliminates the need and expense of two propellant mandrels, thereby reducing the processing labor to that of a single propellant grain. This invention also provides for a better multipropellant bond since the bond is completed prior to curing the propellants.

Rocket motor performance requirements are becoming more and more demanding with higher performance rockets employed. Multipropellant rocket grains in case volumetric loading and mass fraction and allow the use of toxic propellants in the outside grain of the first stages and is applicable to multithrust level rocket motor requirements.

It will be seen, therefore, that this invention provides a means for improving the production of multipropellant grains in a more efficient and economic manner, thereby...
permitting an increased use of such grains in present day rocket motors.

It is believed that the foregoing description of the casting apparatus of this invention will be clear to those skilled in the art. However, it is to be understood that various changes and modifications can be made in the construction and arrangement of parts of the apparatus without departing from the spirit and scope of the invention and that all such changes as fall within the scope of the appended claims are intended to be included herein.

What is claimed is:

1. An apparatus for use in the simultaneous casting of an uncured multipropellant rocket fuel in the symmetrical motor case of a solid propellant rocket motor comprising a mandrel means for forming a core, said mandrel means extending the length of the motor case and positioned along the central longitudinal axis thereof, a tubular baffle means surrounding said mandrel means and positioned within the motor case, said baffle means being coaxially arranged in spaced relationship with respect to said case and mandrel means for separating the individual propellants of the said multipropellant rocket fuel, and hoisting means connected to said baffle for slowly withdrawing said baffle from said motor case such that the interface between the separate propellants, formerly separated by said baffle, achieves a bond prior to curing.

2. An apparatus as defined in claim 1, including separate filling means located on each side of said baffle for casting the separate propellants of a multipropellant rocket fuel.

3. An apparatus as defined in claim 1, wherein said casing, mandrel and baffle means are circular in cross section.

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