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(54) **RECESSED GLASS HEADER FOR PYROTECHNIC INITIATORS**

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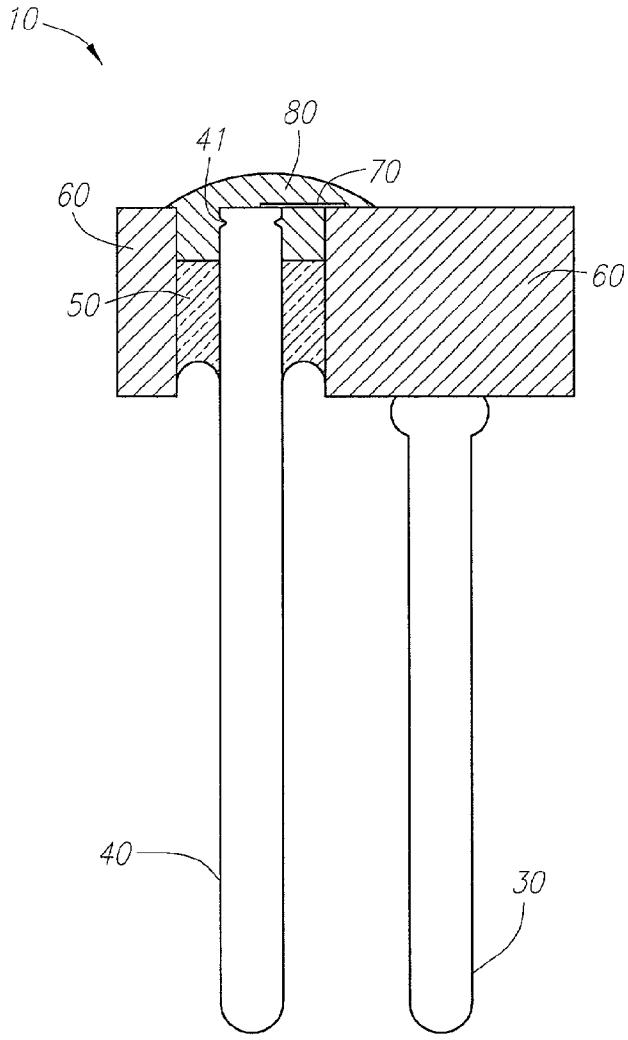
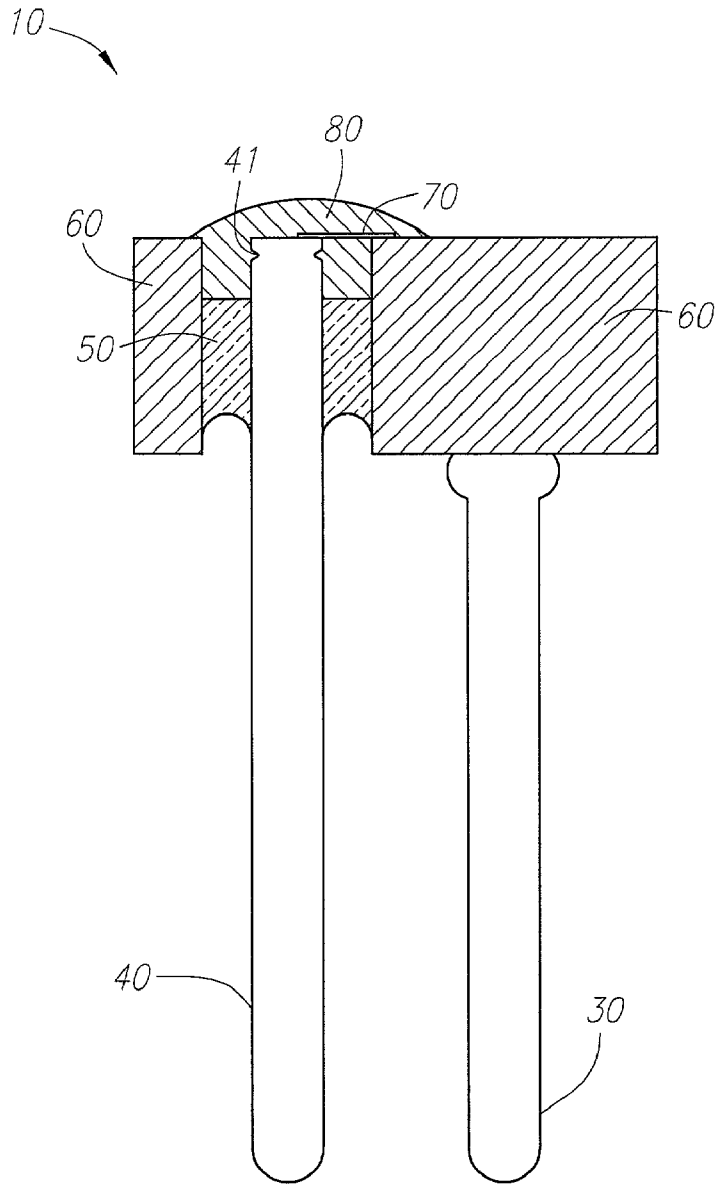
(57) **ABSTRACT**

Disclosed is a pyrotechnic initiator header having a recessed glass insulator. The recessed nature of the glass insulator enhances secure and effective disposition of an ignition pyrotechnic charge droplet to the header in the area of the bridgewire, and also reduces or eliminates the need for machining the header.

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RECESSED GLASS HEADER FOR PYROTECHNIC INITIATORS

BACKGROUND OF THE INVENTION

[0001] The present invention relates to the field of pyrotechnic initiators, and more particularly to a pyrotechnic initiator having a recessed glass header.

[0002] Pyrotechnic initiators have many uses in industrial and consumer applications. One important use is the inflation of airbags in motor vehicles. As airbag production has steadily increased, significant efforts have been made to reduce the cost of reliable airbag initiators. Nevertheless, there remains a substantial need in the automotive airbag industry in particular as well as in other applications, for further reduction in the costs of manufacturing reliable initiators.

SUMMARY OF THE INVENTION

[0003] In accordance with the present invention, a header for an initiator is provided that includes a recessed glass insulator. The recessed nature of the glass insulator enhances secure and effective disposition of an ignition pyrotechnic charge droplet to the header in the area of the bridgewire, and also reduces or eliminates the need for machining the header.

BRIEF DESCRIPTION OF THE FIGURE

[0004] The FIGURE is a side sectional view of an embodiment of the present invention.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

[0005] As can be seen from the FIGURE, a preferred embodiment of a header **10** according to the present invention consists primarily of a ground pin **30**, a central isolated pin **40**, a recessed glass **50**, an eyelet **60**, a bridgewire **70**, and an ignition pyrotechnic charge droplet **80**. The header **10** is generally like sealed-glass headers commonly used in airbag initiators, except that the glass **50** is recessed from the top surface of eyelet **60** as compared to conventional sealed-glass headers, wherein the glass is flush with the eyelet top surface. There are a number of ways to attain a header according to the present invention wherein the glass insulator is recessed. For example, the header can be fixtured upside-down, using a fixture that includes a carbon or other suitable projection (not shown) to displace glass **50** (but not pin **40**) away from the top surface of eyelet **60** during heating and sealing. Alternately, the header might be fixtured right-side-up, using a fixture that includes means positioned below glass **50** to support it at the appropriate height during heating and sealing. While steps can also be taken to ensure that the top surface of glass **50** is flat (as shown in the FIGURE), a meniscus (not shown) on the top surface of glass **50** is generally acceptable as long as glass **50** is sufficiently recessed.

[0006] The recessed nature of recessed glass **50** eliminates the need for grinding the top surface of the header, since bridgewire **70** can be welded to isolated pin **40** on one end and to eyelet **60** on the other end without concern for weld electrodes contacting the glass or other surfaces higher than the weld surface. Because the features needed for bridgewire welding are thus already present without the need for header surface grinding, eyelet **60** can be manufactured by methods, such as stamping or cold-forming, which are significantly cheaper than the machining operation used for most current eyelets.

[0007] Further, because the recessed upper surface of recessed glass **50**, the inner surface of the bore of eyelet **60**, and center pin **40** together form a cavity, the ignition pyrotechnic droplet **80** can be more advantageously disposed and held around bridgewire **70**. The cavity promotes an enhanced degree of contact between droplet **80** and bridgewire **70**, and also helps secure droplet **80** against movement (such as during physical environmental testing). Droplet **80** can be dispensed as a liquid or slurry using formulas and techniques known to those of ordinary skill in the art. For example, a generally suitable formula and techniques are described in U.S. Pat. No. 5,939,660 to Fogle, Jr., which is incorporated herein by reference as if set forth in full. Droplet **80** can be dispensed with volumetric dispensing syringe-type equipment, or it can also be sprayed or placed after it is dispensed onto another part of the equipment. Retention of droplet **80** in its place (and thus maintenance of good contact with bridgewire **70**) can be further enhanced by the provision of a circumferential notch **41** or other irregular surface near the top of isolated pin **40**.

[0008] As evident to one of ordinary skill in the art, the header of the present invention can be pressed into a suitable can (not shown) that is loaded with a suitable output pyrotechnic charge (such as one provided using a conventional slurry loading process). The header can then be hermetically sealed (for example, with a through-weld) to the can to form an initiator sub-assembly, which can in turn be completed by, for example, a suitable method of insert-molding a nylon body to provide electrical insulation and structural support.

[0009] A preferred header with recessed glass insulator, and many of its attendant advantages, has thus been disclosed. It will be apparent, however, that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention, the form hereinbefore described being merely a preferred or exemplary embodiment thereof. Therefore, the invention is not to be restricted or limited except in accordance with the following claims and their legal equivalents.

We claim:

1. A header for use in a pyrotechnic initiator, comprising:

a) an electrically conductive eyelet having an upper eyelet surface, and having an eyelet bore defining an inner eyelet surface;

b) a glass insulator having an outer glass surface and an upper glass surface, and having an insulator bore defining an inner glass surface, wherein said outer glass surface is sealed to said inner eyelet surface, and said upper glass surface is disposed below said upper surface of said eyelet; and,

c) an electrically conductive center pin having an upper end, said center pin being disposed within said insulator bore and sealed to said inner glass surface, with said upper end of said center pin being disposed coplanar with said upper eyelet surface.

2. The header of claim 1, wherein said upper eyelet surface is flat.

3. The header of claim 1, wherein said upper end of said center pin is flat.

4. The header of claim 1, wherein said upper eyelet surface is flat, and said upper end of said center pin is flat.

5. The header of claim 1, wherein said upper glass surface is flat.

6. The header of claim 4, wherein said upper glass surface is flat.

7. The header of claim 1, wherein said upper glass surface includes a meniscus.

8. The header of claim 4, wherein said upper glass surface includes a meniscus.

9. The header of claim 1, wherein said center pin includes a circumferential notch above said upper glass surface and below said upper end of said center pin.

10. The header of claim 4, wherein said center pin includes a circumferential notch above said upper glass surface and below said upper end of said center pin.

11. The header of claim 1, further including an ignition pyrotechnic charge droplet disposed on said upper eyelet surface and on said upper end of said center pin, and extending down to said upper glass surface.

12. The header of claim 4, further including an ignition pyrotechnic charge droplet disposed on said upper eyelet surface and on said upper end of said center pin, and extending down to said upper glass surface.

13. The header of claim 1, further including a bridgewire attached between said upper eyelet surface and said upper end of said center pin.

14. The header of claim 4, further including a bridgewire attached between said upper eyelet surface and said upper end of said center pin.

15. The header of claim 1, further including an electrically conductive ground pin attached to said eyelet.

16. The header of claim 4, further including an electrically conductive ground pin attached to said eyelet .

17. The header of claim 12, wherein said header is formed to be attached to a can loaded with an output pyrotechnic charge.

18. The header of claim 17, wherein said header is further formed to be incorporated into an initiator assembly for use in an automotive airbag inflator.

19. The header of claim 1, further including:

a) an ignition pyrotechnic charge droplet disposed on said upper eyelet surface and on said upper end of said center pin, and extending down to said upper glass surface; and,

b) a bridgewire secured between said upper eyelet surface and said upper end of said center pin;

wherein said center pin includes a circumferential notch above said upper glass surface and below said upper end of said center pin.

20. The header of claim 4, further including:

c) an ignition pyrotechnic charge droplet disposed on said upper eyelet surface and on said upper end of said center pin, and extending down to said upper glass surface; and,

d) a bridgewire secured between said upper eyelet surface and said upper end of said center pin;

wherein said center pin includes a circumferential notch above said upper glass surface and below said upper end of said center pin.

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