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(54) **Improved tip structures for an ultra light engine valve**

(57) An ultra light poppet valve (11) having increased stiffness at its tip end. The valve includes a stem (13) which is formed as a thin-walled, elongated cup member having a closed tip portion (19) and a flared open end (17). To which a disk-like cap member (15) is fixed. The stiffness of the tip is increased by various means including members (43;61) added to the tip portion (19), members (47;49) inserted within the tip portion, hard surfaces (53;53a) deposited on the tip portion, and members (43b;73) inserted within openings (71) in the end of the tip portion.

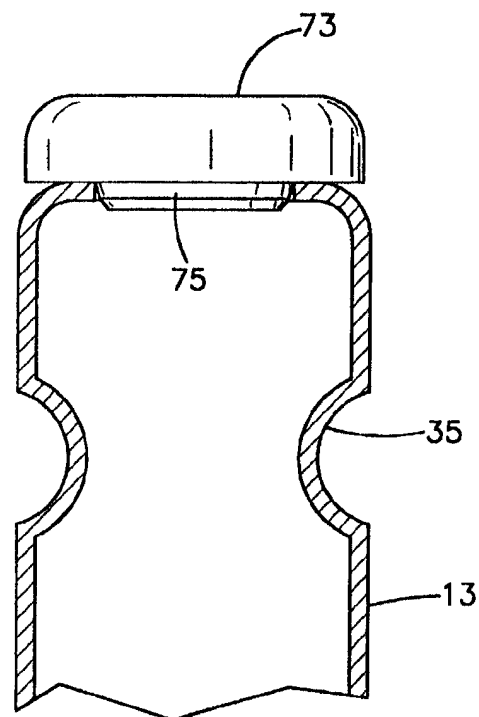


Fig.18



European Patent
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EUROPEAN SEARCH REPORT

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| DOCUMENTS CONSIDERED TO BE RELEVANT | | | |
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| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.6) |
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| Y | US 5 054 195 A (KECK VOLKER ET AL) 8 October 1991 (1991-10-08) * column 1, line 52-57 - column 3, line 53-68; figures 5A,6-9 * * column 4, line 1-3,23-25 * | 1,2,11, 17-28 | |
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| | | | TECHNICAL FIELDS SEARCHED (Int.Cl.6) |
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| The present search report has been drawn up for all claims | | | |
| Place of search THE HAGUE | | Date of completion of the search 23 February 2000 | Examiner Paquay, J |
| CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document | | T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document | |

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 98 30 8461

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