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# United States Patent [19]

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Savant

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[54] **HIGH EFFICIENCY MONOLITHIC GLASS LIGHT SHAPING DIFFUSER AND METHOD OF MAKING**

[75] Inventor: **Gajendra D. Savant**, Torrance, Calif.

[73] Assignee: **Physical Optics Corporation**, Torrance, Calif.

[21] Appl. No.: **09/139,379**

[22] Filed: **Aug. 25, 1998**

### Related U.S. Application Data

[63] Continuation-in-part of application No. 08/902,415, Jul. 29, 1997.

[51] Int. Cl.<sup>7</sup> ..... **C03B 8/02**

[52] U.S. Cl. .... **65/17.2**

[58] Field of Search ..... **65/17.2**

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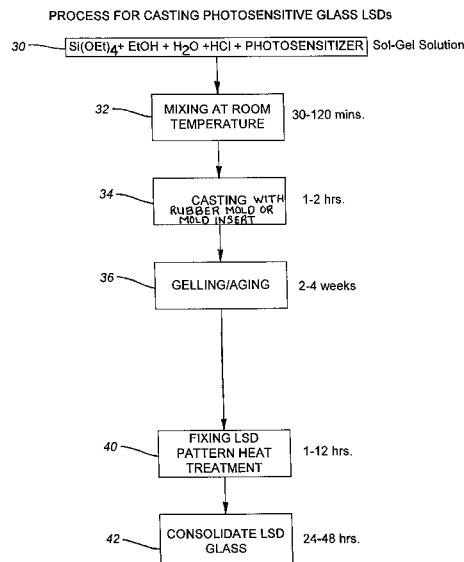
Primary Examiner—Sean Vincent

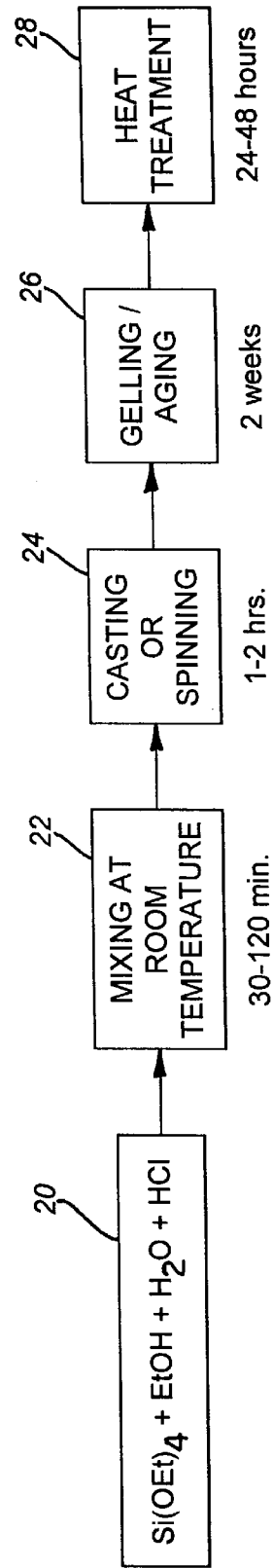
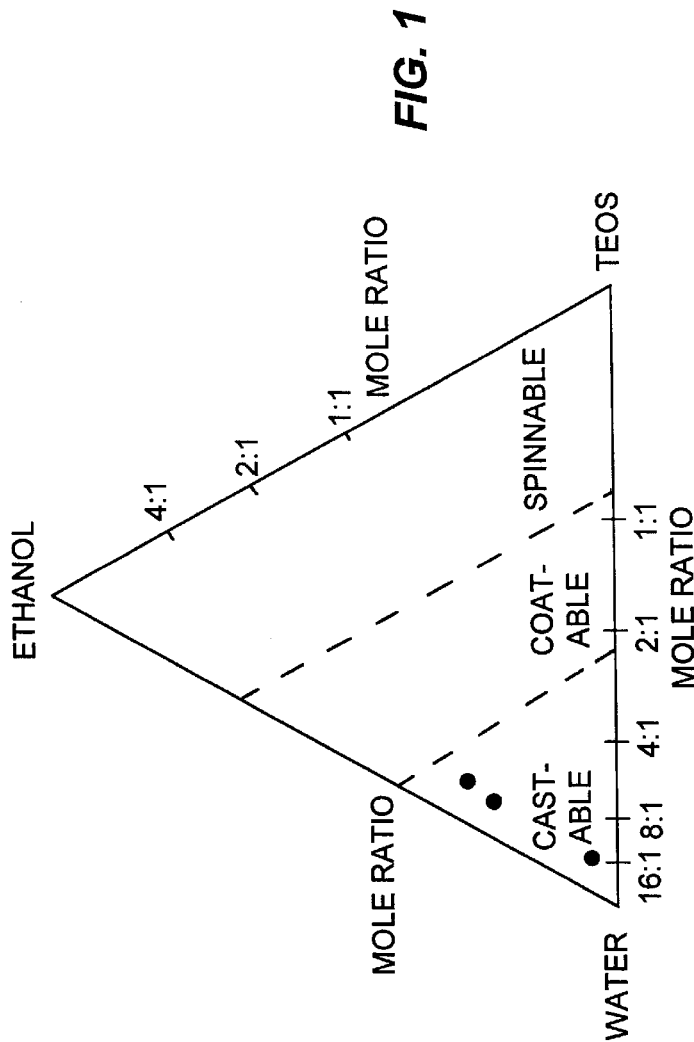
Attorney, Agent, or Firm—Nilles & Nilles, S.C.

### [57] ABSTRACT

A surface light shaping diffuser (LSD) is formed from a monolithic glass material by recording light shaping structures on a surface of the material during its formation. A surface LSD is produced by embossing or molding light shaping structures onto a high quality optical glass or by embossing light shaping structures on a glass film layer coated onto a substrate. A rubber submaster carrying the light shaping structures is used as the master in such diffusers control the angular spread of transmitted light while homogenizing otherwise spatially noisy light sources such as LCDs and filamented light sources and while maintaining damage thresholds consistent with any glass optical element. The surface LSD has a transmission efficiency of over 90% from the Ultraviolet wavelengths through the physical spectrum and into the near-infrared.

**23 Claims, 8 Drawing Sheets**





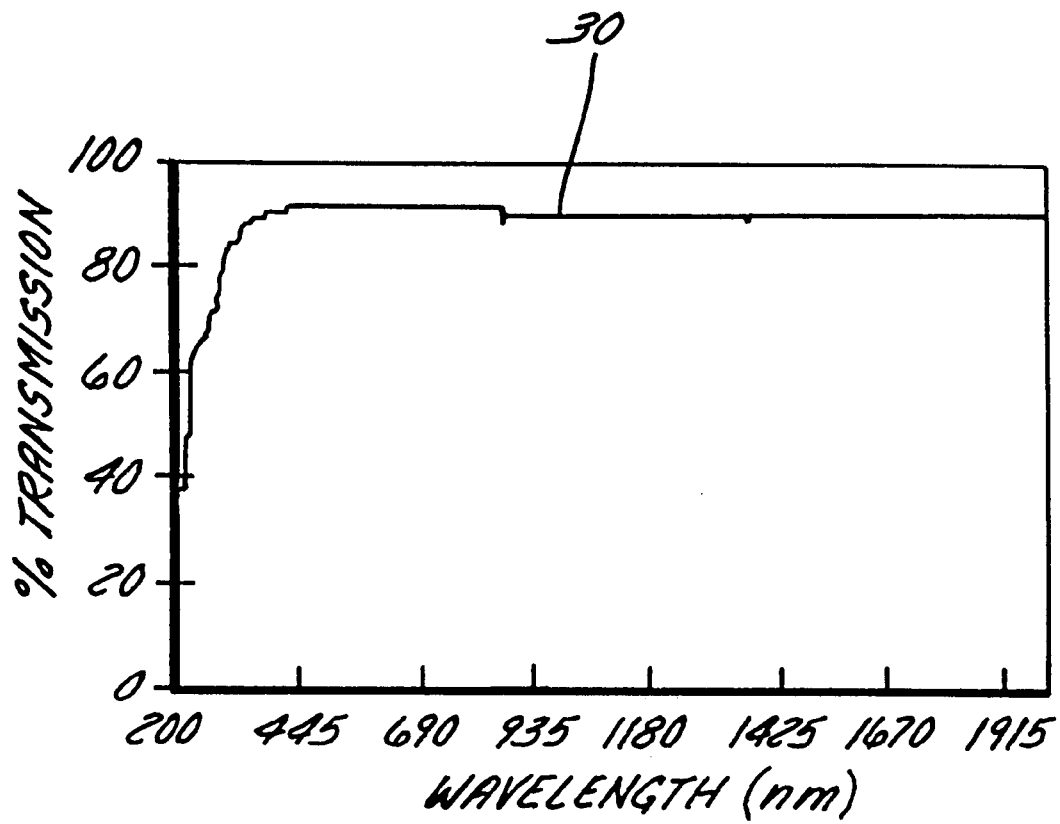
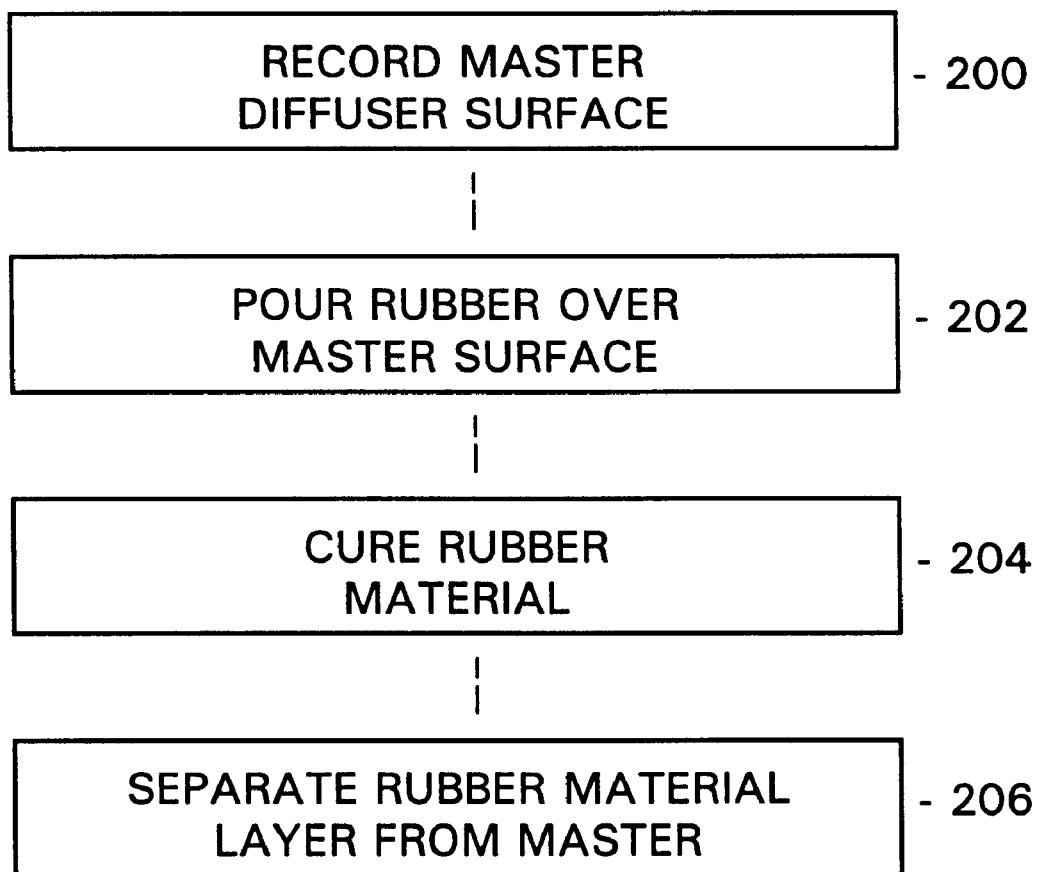


FIG. 3



**FIG. 4**

COATING PROCESS FOR GLASS LSDs

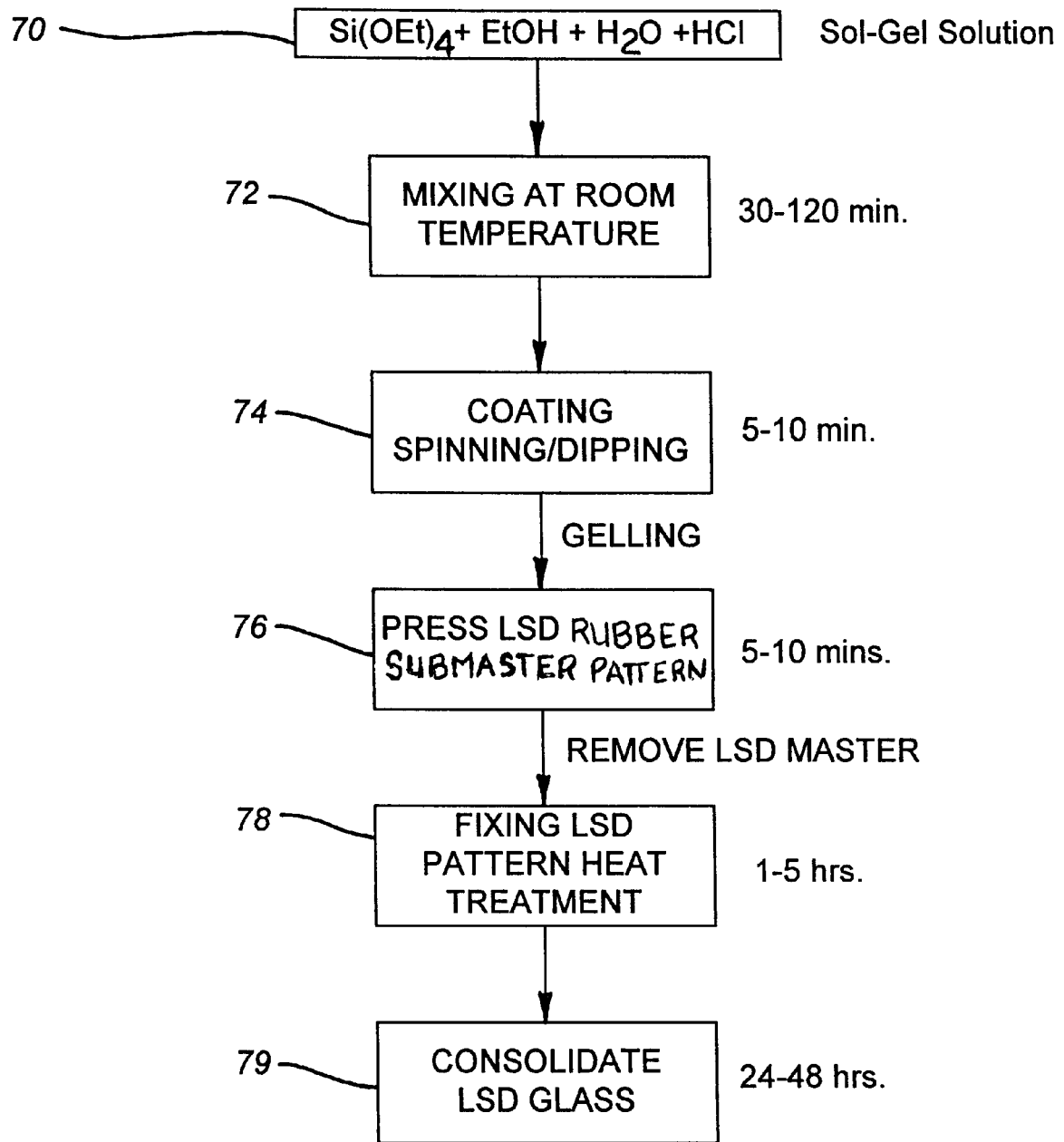


FIG. 5

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