# United States Patent [19]

**Hammar et al.**

[11] **Patent Number: 4,673,539**

[45] **Date of Patent: Jun. 16, 1987**


[54] **PROCESS FOR THERMOFORMED ARTICLES**


[75] Inventors: **W. James Hammar**, St. Paul; **Ronald F. Ofstead**, Maplewood, both of Minn.

[73] Assignee: **Minnesota Mining and Manufacturing Company**, St. Paul, Minn.



[21] Appl. No.: **735,379**

[22] Filed: **May 17, 1985**

**Related U.S. Application Data**

[63] Continuation-in-part of Ser. No. 500,784, Jun. 3, 1983, abandoned.

[51] **Int. Cl.**[4] ..... **B29D 11/00**

[52] **U.S. Cl.** ..... **264/1.1**; 264/2.6; 264/2.7; 264/320; 264/331.14; 526/245

[58] **Field of Search** ..... 264/1.1, 2.7, 320, 331.14, 264/284, 293, 2.6; 526/245



[56] **References Cited**

U.S. PATENT DOCUMENTS

| | | | |
|---|---|---|---|
| 2,436,144 | 2/1948 | Howk et al. | 260/87 |
| 2,464,120 | 3/1949 | Dickey et al. | 526/245 |
| 3,220,960 | 11/1965 | Wichterle et al. | 260/2.5 |
| 3,361,858 | 1/1968 | Wichterle | 264/1 |
| 3,391,130 | 7/1968 | Bolstad et al. | 526/292.1 |
| 3,470,124 | 9/1969 | Van Eygen et al. | 260/29.6 |
| 4,081,600 | 3/1978 | Kueneman et al. | 264/320 |
| 4,257,842 | 3/1981 | Ciarcia et al. | 264/284 |
| 4,528,325 | 7/1985 | Ofstead | 526/245 |

FOREIGN PATENT DOCUMENTS

| | | | |
|---|---|---|---|
| 56-116 | 1/1981 | Japan | 264/293 |

OTHER PUBLICATIONS

*Dictionary of Plastics,* Wordingham et al, Newnes Books, 1968, pp. 168–169.

*Whittington's Dictionary of Plastics, Whittington, Technomic Publishing, 1968, p. 221.*

Harris, et al., J. Pol. Science, Part A-1, 4, 665–677.



*Primary Examiner*—James Lowe

*Attorney, Agent, or Firm*—Donald M. Sell; James A. Smith; Lorraine R. Sherman



[57] **ABSTRACT**

A process for preparing shaped articles and shaped hydrogel articles including ophthalmic devices comprises the steps of preparing a polymer or copolymer comprising units derived from an ethylenically-unsaturated monomer bearing at least one trihaloacetoxy-substituent group, thermoforming said polymer by heating in a mold or in sheet-form at a temperature in the range of 100° to 400° C. for about 5 seconds to 15 minutes, and then cooling said polymer, to provide a shaped article, optionally, solvolyzing the resulting shaped article to provide a hydroxy-substituted polymeric shaped article, and optionally hydrating said hydroxy-substituted polymeric shaped article to provide a shaped hydrogel article.


**15 Claims, No Drawings**