

(12) **United States Patent**
D'Hulster et al.

(10) **Patent No.:** **US 9,523,457 B2**
(45) **Date of Patent:** **Dec. 20, 2016**

(54) **APPARATUS AND METHOD FOR HEAT CURING OF PIPE LINERS**

(75) Inventors: **Gerald Scott D'Hulster**, Clearwater, FL (US); **James Gould**, Clearwater, FL (US)

(73) Assignee: **Perma-Liner Industries, Inc.**, Clearwater, FL (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 921 days.

(21) Appl. No.: **13/308,810**

(22) Filed: **Dec. 1, 2011**

(65) **Prior Publication Data**
US 2012/0193011 A1 Aug. 2, 2012

Related U.S. Application Data

(63) Continuation-in-part of application No. 13/195,566, filed on Aug. 1, 2011, now Pat. No. 9,074,719.
(Continued)

(51) **Int. Cl.**
B29C 73/00 (2006.01)
B32B 43/00 (2006.01)
B29C 65/00 (2006.01)
B32B 37/00 (2006.01)
C09J 5/02 (2006.01)
F16L 55/16 (2006.01)
B65C 3/26 (2006.01)
F16L 55/165 (2006.01)

(Continued)

(52) **U.S. Cl.**
CPC **F16L 55/1651** (2013.01); **B29C 63/0069** (2013.01); **B29C 63/26** (2013.01); **B29C 63/34** (2013.01); **B29C 63/36** (2013.01); **B29C 65/4835** (2013.01); **B29C 66/5221** (2013.01)

(58) **Field of Classification Search**
CPC F16L 55/1651; F16L 55/179; F16L 55/165;

F16L 55/1654; B29C 63/26; B29C 63/34; B29C 63/36; B29C 63/0069; B29C 65/48; B29C 65/4835; B29C 66/5221; B29L 2023/006; E03F 2003/065
USPC 156/60, 94, 156, 160, 165, 166, 176, 178, 156/196, 199, 212, 214, 215, 217, 218, 229, 156/285, 287, 293, 294, 296, 303.1, 307.1, 156/307.3, 307.7, 324; 138/97, 98

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,619,886 B1 * 9/2003 Harrington 405/184.2
7,360,559 B2 4/2008 Driver
(Continued)

FOREIGN PATENT DOCUMENTS

JP 06-114938 4/1994
KR 10-2007-0047211 5/2007

OTHER PUBLICATIONS

Written Opinion for International (PCT) Patent Application No. PCT/US2011/046159, issued Feb. 5, 2013.

Primary Examiner — Philip Tucker
Assistant Examiner — Brian R Slawski
(74) *Attorney, Agent, or Firm* — Nyemaster Goode, P.C.

(57) **ABSTRACT**

An apparatus that accelerates curing of resin in a liner for a buried pipe includes a lining assembly connected to a pressurized fluid source. One embodiment includes an inversion cap having an inversion port, a curing port and a drainage port. The apparatus also includes a manifold having an outlet, a first inlet in valved fluid communication with a heated fluid source, a second inlet in valved fluid communication with a pressurized fluid source and a third inlet in valved fluid communication with the drainage port. While heated fluid enters the first end of the assembly via the

(Continued)

