



(12) **United States Patent**
D'Hulster

(10) **Patent No.:** **US 9,074,720 B2**
(45) **Date of Patent:** **Jul. 7, 2015**

(54) **APPARATUS AND METHOD FOR REPAIRING PIPES**

(71) Applicant: **Perma-Liner Industries, LLC**,
Clearwater, FL (US)

(72) Inventor: **Gerald D'Hulster**, Clearwater, FL (US)

(73) Assignee: **Perma-Liner Industries, LLC**,
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 0 days.

(21) Appl. No.: **13/775,732**

(22) Filed: **Feb. 25, 2013**

(65) **Prior Publication Data**

US 2013/0220465 A1 Aug. 29, 2013

Related U.S. Application Data

(60) Provisional application No. 61/603,360, filed on Feb. 26, 2012.

(51) **Int. Cl.**

F16L 55/16 (2006.01)

F16L 55/165 (2006.01)

(52) **U.S. Cl.**

CPC **F16L 55/1651** (2013.01)

(58) **Field of Classification Search**

CPC F16L 55/124; F16L 55/134; F16L 55/1651
USPC 138/98, 93; 405/150.1, 184.2
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,602,974 A * 7/1986 Wood et al. 156/287
5,154,936 A * 10/1992 Driver et al. 425/182

6,093,363 A * 7/2000 Polivka 264/516
6,361,015 B1 * 3/2002 Warmerdam 251/5
6,695,013 B2 * 2/2004 Warren 138/98
6,827,526 B2 * 12/2004 Warren 405/184.2
7,766,048 B2 * 8/2010 Driver et al. 138/98
RE43,910 E * 1/2013 Waring 264/36.17
8,439,605 B2 * 5/2013 Odell et al. 405/184.2

(Continued)

FOREIGN PATENT DOCUMENTS

GB 989847 4/1965
WO WO 2012/016244 A2 2/2012

OTHER PUBLICATIONS

Perma-Liner Industries, LLC, PCT/US2013/027791 filed Feb. 26, 2013, "The International Search Report and the Written Opinion of the International Searching Authority, or the Declaration", mailed May 2, 2013.

Primary Examiner — James Hook

(74) *Attorney, Agent, or Firm* — Ryan N. Carter

(57)

ABSTRACT

An apparatus and method that accelerates curing of resin in a liner for a buried pipe includes an air inversion unit connected to an air compressor. The apparatus includes an inversion head with an interior inflatable plug. The plug, when inflated, creates a substantially airtight seal thereby maintaining pressure within the liner tube. The inversion head can then be removed from the liner inversion apparatus and a curing cap can be installed. To improve the wetting process, a vacuum head is installed at the inversion head and connected to a vacuum source. One end of the liner tube is attached to the inversion head and curable resin is poured into the opposite end. Vacuum pressure is applied to assist in the movement of the resin through the liner tube, ensuring uniform saturation. The resin is mechanically manipulated through the liner tube as the vacuum pressure is applied.

22 Claims, 6 Drawing Sheets

