



US006936112B2

(12) **United States Patent**
Jansen et al.

(10) **Patent No.:** **US 6,936,112 B2**
(45) **Date of Patent:** ***Aug. 30, 2005**

(54) **HEAT EXCHANGER CLEANING PROCESS**

(75) Inventors: **Bruce Robert Jansen**, Wichita, KS (US); **Sean Edward Sears**, Wichita, KS (US)

(73) Assignee: **Refined Technologies, Inc.**, Wichita, KS (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 196 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **10/304,370**

(22) Filed: **Nov. 26, 2002**

(65) **Prior Publication Data**

US 2004/0102351 A1 May 27, 2004

(51) **Int. Cl.⁷** **B08B 9/00**

(52) **U.S. Cl.** **134/19; 134/22.1; 134/22.11; 134/22.12; 134/22.14; 134/22.15; 134/22.18; 134/22.19; 134/26; 134/27; 134/30; 134/31; 134/34; 134/35; 134/36; 134/37**

(58) **Field of Search** **134/19, 22.1, 22.11, 134/22.12, 22.14, 22.15, 22.18, 22.19, 26, 27, 30, 31, 34-37**

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,084,076 A	*	4/1963	Loucks	134/22.1
4,464,189 A	*	8/1984	Tedder	62/628
5,356,482 A		10/1994	Mehta et al.	134/22.1
5,389,156 A	*	2/1995	Mehta et al.	134/10
5,425,814 A		6/1995	Krajicek et al.	134/22.1
6,017,492 A	*	1/2000	Hashimoto	422/27
6,283,133 B1		9/2001	Furuta et al.	134/22.1
2004/0102351 A1	*	5/2004	Jansen et al.	510/407

* cited by examiner

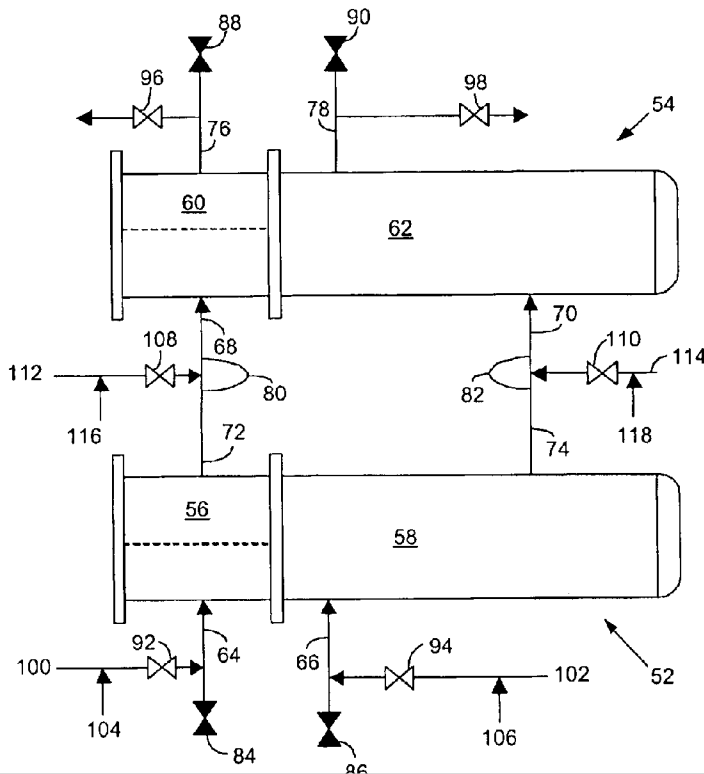
Primary Examiner—Sharidan Carrillo

(74) *Attorney, Agent, or Firm*—Shook, Hardy & Bacon L.L.P.

(57) **ABSTRACT**

Disclosed is a novel process for cleaning and restoring the operating efficiency of organic liquid chemical exchangers in a safe and effective manner and in a very short period of time, without a need to disassemble the equipment and without the need to rinse contaminate from the equipment after cleaning. Used is a formulation of monocyclic saturated terpene mixed with a non-ionic surfactant package specifically suited to oil rinsing. The terpene-based chemical is injected into organically contaminated exchangers using a novel process involving high-pressure steam to form a very effective cleaning vapor.

18 Claims, 7 Drawing Sheets



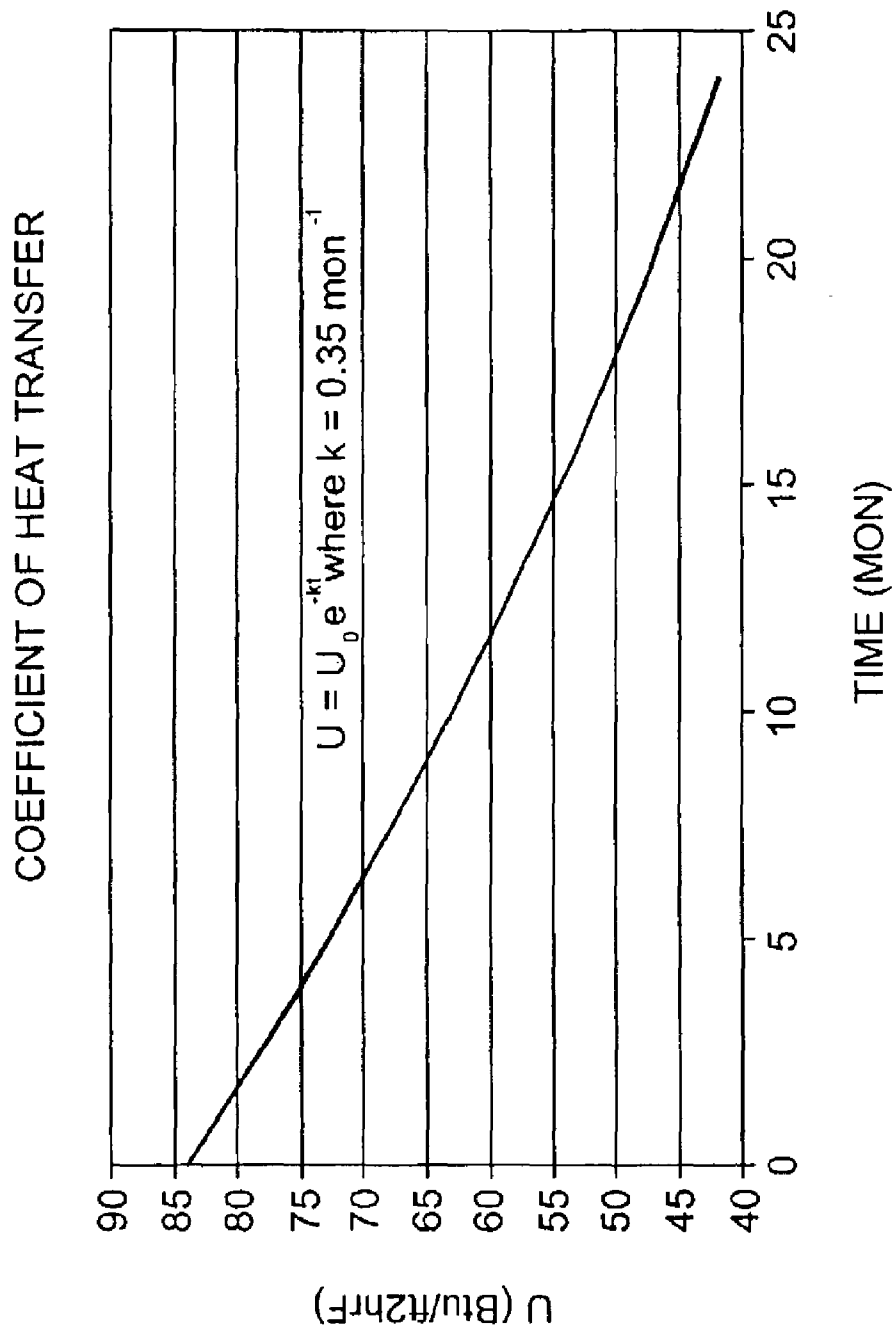


FIG. 1.

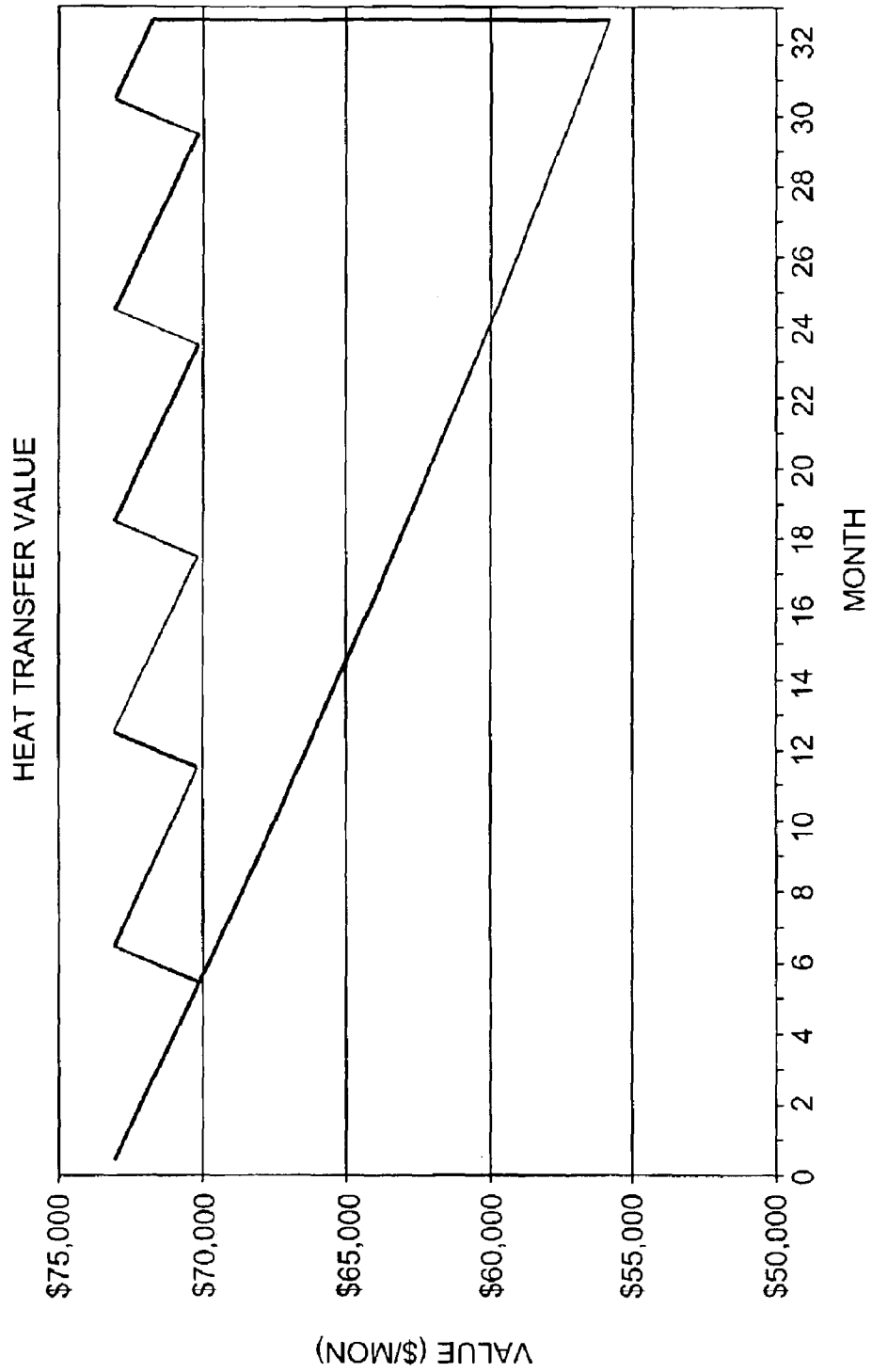


FIG. 2.

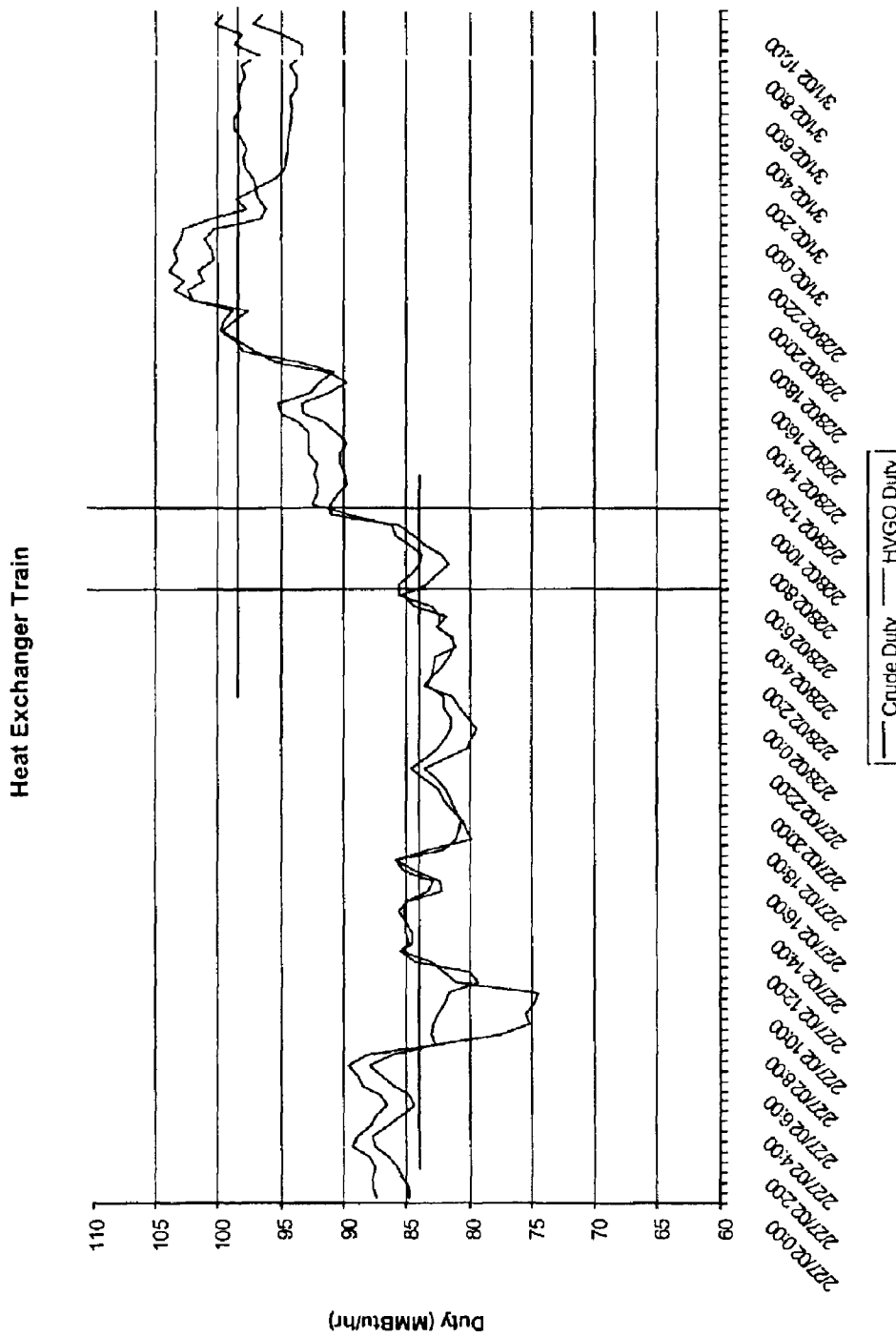


FIG. 3.

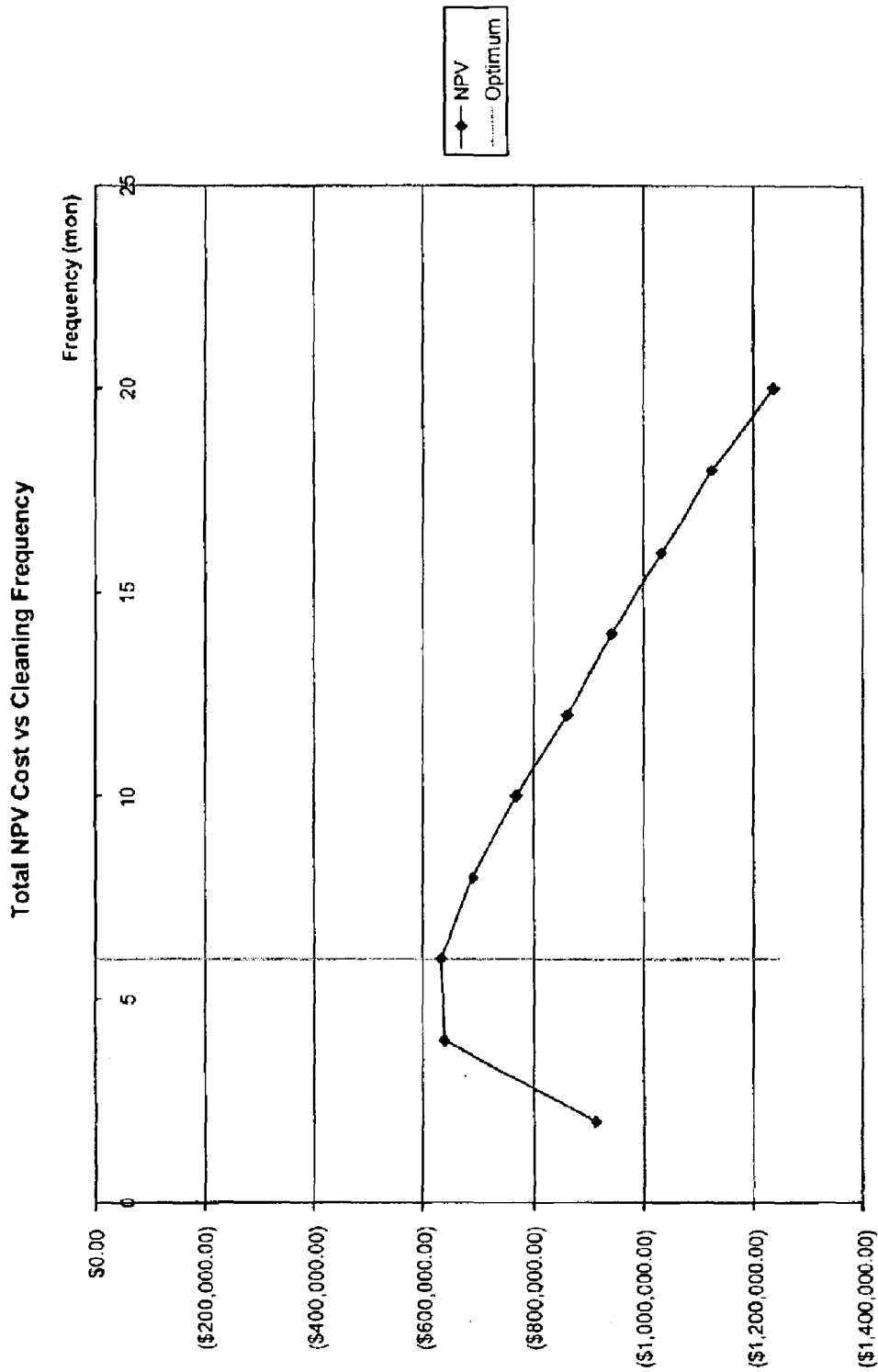


FIG. 4.

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.