1996

Vapor Recovery

Robotics

Nozzles

Dispensers

POS Systems

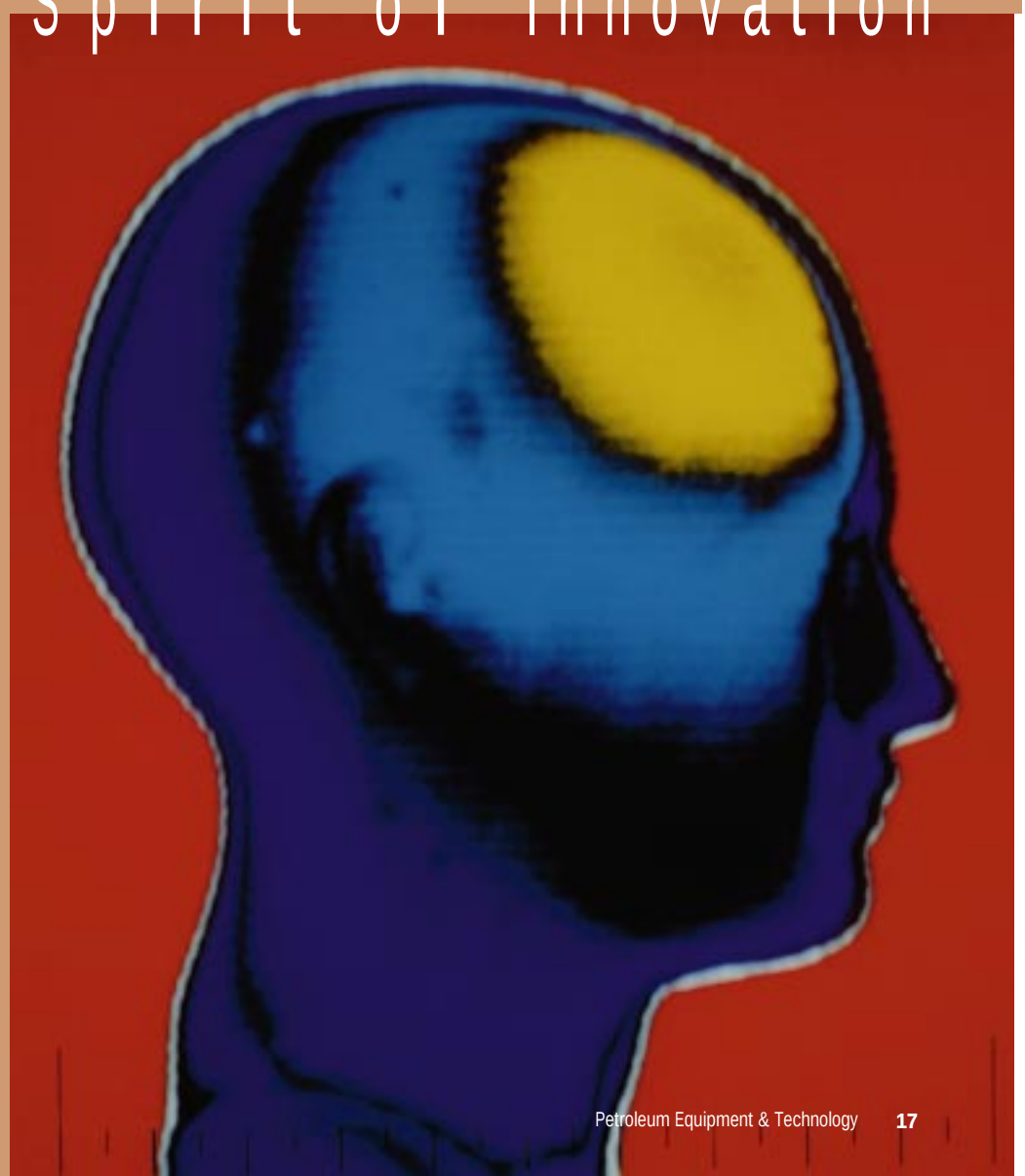
Customer Focus

by Wolf Koch

Service Station Patents

Part I

Spirit of Innovation



Editor's Note: In the Nov./Dec.1996 issue, Wolf Koch discussed the problems he encountered when searching various databases for the articles on patents. This year's two-part series on 1996 technology includes several patents that were missed from 1995. Should *PE&T* readers know of any 1996 patents that were missed (other than European and World patents issued in late December), please let us know.

Developments in equipment continue at a rapid pace. Patents reflect future products that may well become industry standards. In 1996, a trend continued toward product improvements in vapor recovery, nozzles and dispensers. In addition,

emerging technologies in customer identification and robotic fueling have the potential of making the vehicle fueling experience more convenient, cleaner and safer. This article has brief descriptions of 1996 patents for retail service stations in six categories: (1) vapor recovery; (2) robotic fueling; (3) nozzles; (4) dispensers; (5) point of sales systems (POS); and (6) customer focus.

Vapor Recovery

In this category, the emphasis is on refinements of existing technology. Gilbarco, Hasstech and Wayne-Dresser all received patents on modifications to their existing systems, while Blackmer (Dover) protected a smaller version of the vapor pump used in the Amoco system. Unassigned patents include the technology described below.

Vapor Recovery

Patent

Michael C. Webb, et.al; United States (US) 5,494,409; and World (WO) 95 09 982; unassigned.

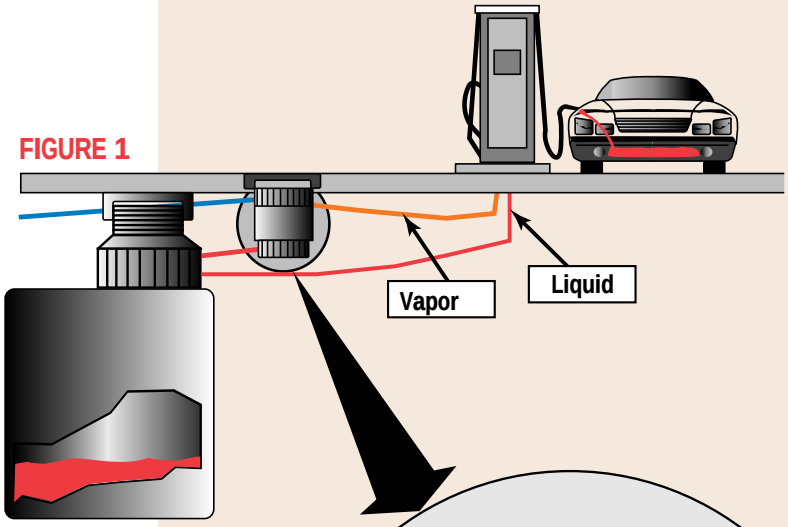
Summary

This is a vapor recovery system featuring a filter that separates hydrocarbon/air mixtures. Hydrocarbons in the vapors that have been returned from the vehicle tank are separated from the air, which is then vented; and the captured liquid hydrocarbons are returned to the underground storage tank. *Figure 1* shows the general layout of a typical vapor recovery system. *Figure 2* shows the Michael C. Webb invention.

Background

Current vacuum assisted vapor recovery systems achieve their effectiveness in one of two ways: (1) The system returns the same volume of vapor to the underground as the liquid pumped. At times, depending on atmospheric conditions, the vapor volume may shrink or grow. If it grows, the excess may be released as fugitive emissions and affect overall system efficiency. (2) The system draws excess vapors (air) and uses vent processors, such as flares or burners, which treat the "excess air."

FIGURE 1



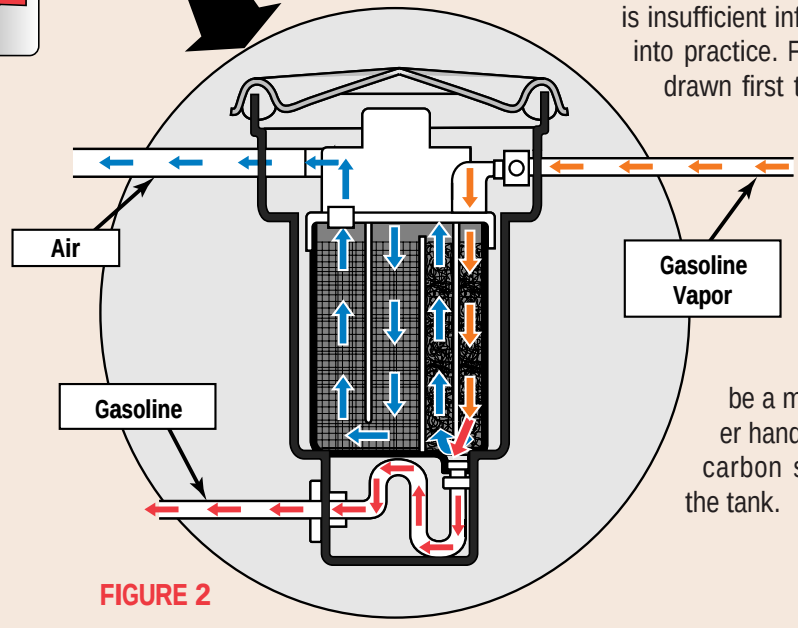


FIGURE 2

Evaluation

While the concept of isolating the underground tank from the vapor recovery system is noteworthy, there is insufficient information to transform the invention into practice. For example, air/vapor mixtures are drawn first through a filter, then through an air purifier. Both the filter and the air purifier are installed as removable cartridges in a basket. Unfortunately, the inventors have not specified either the filter or the purifier. Based on the amount of vacuum specified, the "filter" is not likely to be a membrane. An absorbent, on the other hand, would not generate a liquid hydrocarbon stream that could be returned to the tank.

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Patents, Continued from page 18

Robotic Fueling

Robotic fueling dates back more than 30 years with the development of automated fueling by companies like Amoco. However, it is the marriage of modern sensor and computer technologies with old-fashioned hydraulics that may make robotic fueling an economic reality. (I will be writing an article on robotics for a future issue of *PE&T*.)

Nozzles

Nozzles represent the largest group of patents for this article. (Some of the patents listed in the Patent Table are 1996 World patents that correspond to U.S.

Robotic Fueling

Patents

William Ramsey, et.al.; WO 96 39 351, WO 96 39 352 and WO 96 39 353, assigned to Shell Oil Company.

Summary

This robotic fueling system relies on a series of sensors and expert vision. See *Figure 3* for overall robot, and *Figure 4,* which illustrates actual filling device. A radio frequency transponder[1] in the vehicle signals the vehicle's presence, fuel type, and the fill pipe location. After the transaction is authorized by way of the customer terminal, the fueling arm moves, via an overhead gantry system and telescoping elements, into close proximity of the fill pipe.[2] The fueling arm opens the fuel door, removes the cap, dispenses fuel, replaces the cap, closes the door and retracts.

Background

Previous robotic fueling systems suffered from two major shortcomings: they required extensive vehicle modifications, or were capable of fueling only select vehicles.

Evaluation

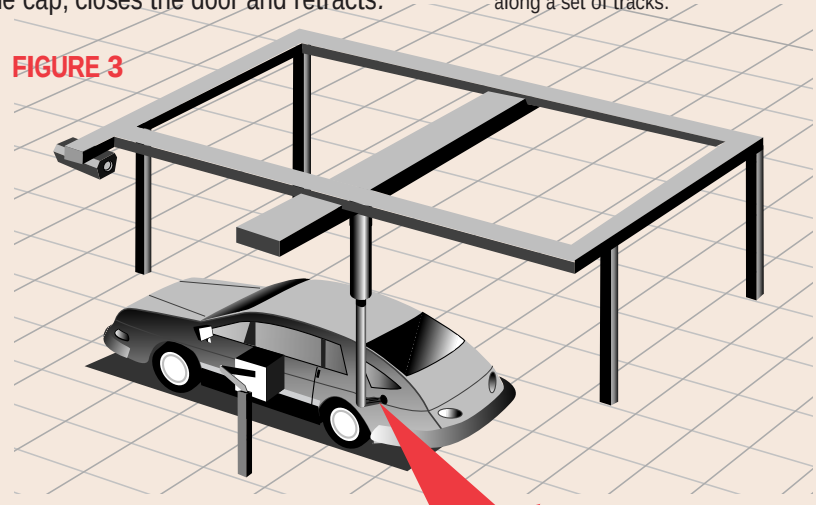
The present inventions represent a significant improvement over older technologies. However, to become commercial, these systems will require extensive testing and must pass a number of regulatory hurdles. Robots can handle fuels that might be too hazardous for the public to handle.

Footnotes

[1] This is a transceiver activated for transmission by reception of a predetermined signal.

[2] A gantry system has a large bridge-like frame designed to move along a set of tracks.

FIGURE 3



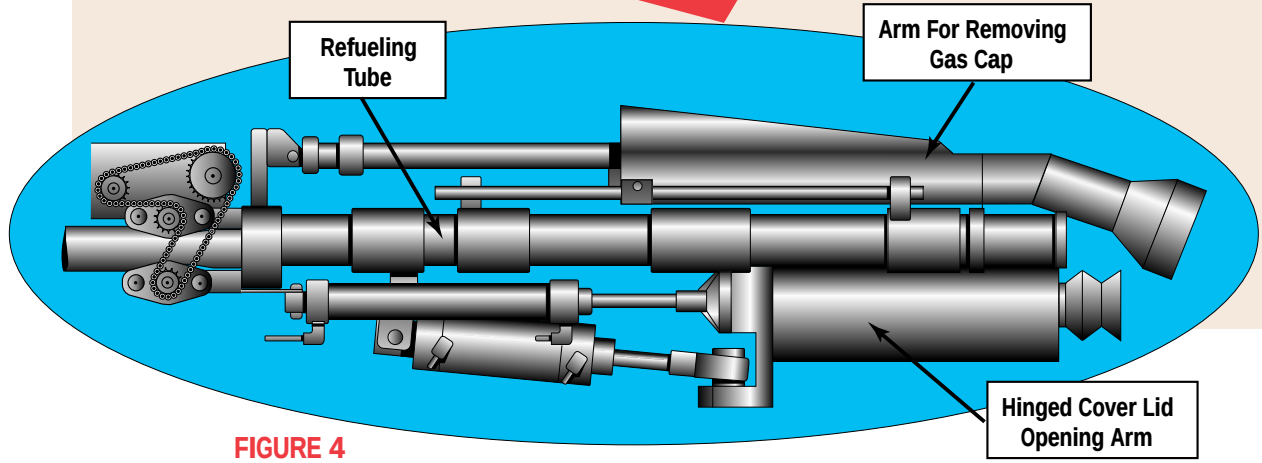


FIGURE 4

patents described in the March/April 1996 issue of *PE&T*.)

Particularly noteworthy is a recent Emco Wheaton patent (US 5,549,132) describing a "convertible nozzle." The patent illustrations are unsuitable for reproduction, or I would have featured the nozzle as one of the highlights in 1996 technology. The nozzle includes a convertible main valve section that allows it to be configured for the U.S. or the European markets.

Domestic nozzles operate with the main fuel valve opening upstream of—and closing with—the fuel flow. European regulatory agencies require that the valve move toward the nozzle outlet to open and close *against* it, to avoid damage from repeated "water hammer."

The new nozzle includes provisions for reversing the main valve members so the valve seat can face in either direction. Thus, the same nozzle may be marketed worldwide, changing only the assembly procedure.

Also worth mentioning is Husky's new vapor recovery nozzle without a dual coaxial spout (US 5,522,440). The nozzle design emulates a balance nozzle approach, with a small non-sealing boot for use with assisted vapor recovery systems. It has a large diameter spout that will lower the pressure drop across the nozzle and increase the flow rate of gasoline.

Dispensers

As shown in the 1996 Patent Overview Table, Gilbarco obtained three patents on various aspects of audio/video control integration. The company also protected the concept of using a single product meter in a multi-product dispenser. (Note: Vapor recovery technology has been separated from the other dispenser patents in the table.)

Point of Sales Systems

This year's crop of POS patents includes a number of inventions not developed specifically for retail service stations, such as remote banking and vending operations. However, it is important to know about emerging trends that may affect transaction systems in the future, such as the integration of ATMs with station electronics and automated use of vending machines. Coca Cola obtained a patent (WO 96 06 415) on integrating a dispenser with a POS system and a vending machine. One patent (US 5,576,526) covers prepaid vending, while the rest protect various aspects of electronic sales processing.

Customer Focus

This category is a catchall for inventions that are difficult to categorize, but improve the fueling experience. Included here are such ideas as a windshield squeegee with an advertising message (US 5,487,203) and a vehicle identification and diagnostic system by Exxon (US 5,577,268). The Exxon system includes a radio frequency transponder connected to the vehicle computer and a variety of onboard sensors. The vehicle is recognized as it enters the station or service area. The customer receives immediate authorization and a personal greeting along with diagnostic and promotional information.

1996 Patent Overview Table

Gilbarco deserves accolades for employing the most prolific inventors: the company achieved 11 patents in this listing and 18 during the last two years. Husky was in second place with eight patents, and Shell in third place with seven. The Table lists all 1996 and the leftover 1995 patents by category. Where identical patents were issued as U.S., European and/or World patents, the U.S. patent is shown first.

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1996 Patent Overview Table

Vapor Recovery	EP 0 726 875	Seifollah Nanaji, et. al. Gilbarco, Inc.	Method and apparatus for reducing hydrocarbon emissions from a fuel storage tank
	US 5 484 000	Detlev Hasselmann Hasstech	Vapor recovery processing system and method
	US 5 494 409 WO 95 09 982	Michael Webb, et. al. Unassigned	Gas pump vapor recovery system
	US 5 507 325	Ian Finlayson Dresser Industries	Vapor recovery system for fuel dispensers
	US 5 542 458 WO 96 06 038	Edward Payne, et. al. Gilbarco, Inc.	Vapor recovery system for a fuel delivery system
	US 5 557 084 WO 96 03 340	Howard Myers, et. al. Gilbarco, Inc.	Temperature compensating fuel dispenser
	US 5 575 629	Scott Olson, et. al. Dover Corporation	Vapor control system
	WO 95 09 805	Hal Hartsell, et. al. Gilbarco, Inc.	Centralized vacuum assist vapor recovery system

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1996 Patent Overview Table—Continued

Robotic Fueling	EP 0 628 647	Heinz Meyer-Berg Albert Hiby GmbH & Co. KG	Robot guided dispensing gun with hose fitting and filling nozzle for the automatic fueling of motor vehicles
	EP 0 728 697	Gert Miller Scheidt & Bachman GmbH	System for automatic refueling of automotive vehicles
	US 5 383 500	Sicco Dwars, et. al. Shell Oil Co.	Automatic refueling system
	US 5 393 195	Sten Corfitsen Unassigned	Method and arrangement for automatically refueling automotive vehicles
	WO 95 32 919	S. Gunnarson Unassigned	Debiting system for automatic vehicle fueling including a microwave transponder
	WO 96 05 135	Sten Corfitsen Unassigned	Adaptor for automatic refueling of motor vehicles
	WO 96 05 136	Sten Corfitsen Unassigned	Robot docking head for automatic fueling of motor vehicles—uses a two part robot
	WO 96 39 351	Wm. Ramsey, et. al. Shell Oil Co.	Method and apparatus for automated refueling
	WO 96 39 352	David Musil, et. al. Shell Oil Co.	Automated refueling system
	WO 96 39 353	Scott Anderson, et. al. Shell Oil Co.	Automated refueling system
	WO 96 39 688	Al West, et. al. Shell Oil Co.	Engine operation detection during automated refueling
Nozzles	EP 0 703 186	Heinz Meyer-Berg, et. al. Unassigned	Dispensing nozzle for the filling of a motor vehicle tank
	EP 0 727 024	Dwain Simpson, et. al. Saber Equipment Corporation	Fuel dispensing spout
	EP 0 732 301	Alain Orgeolet, et. al. Total Raffinage Dist.	Spill control valve for dispensing nozzle
	EP 0 747 317	Mark Dahlhart, et. al. Dover Corporation	Spout constructions for fuel dispensing nozzles
	US 5 394 909 EP 0 683 133	Thomas O. Mitchell Husky Corporation	Vapor control valve
	US 5 469 900	Bruce Weeks, et. al. Emco Wheaton Inc.	Fuel dispensing nozzle having hold-open clip with lockout mechanism
	US 5 474 115	Arthur Fink Husky Corporation	Specialty fuel dispensing nozzle
	US 5 476 125	Thomas O.Mitchell Husky Corporation	Vapor recovery gasoline dispensing nozzle
	US 5 482 094	Thomas O. Mitchell Husky Corporation	Fuel dispensing nozzle with delayed shut-off
	US 5 509 452	Robert F. Tammera Exxon Corporation	Vapor controlled fuel dispensing nozzle attachment
	US 5 515 593	James Eagler Oil Equipment Supply Corp.	Nozzle caddy
	US 5 515 893	Thomas E. Donohue Unassigned	Vapor recovery boot retainer
	US 5 517 732	Brent J. Crear Unassigned	Gasoline nozzle handle holder
	US 5 520 228	Arthur Fink, Jr., et. al. Husky Corporation	Fuel extraction coupling for nozzle
	US 5 522 440	Thomas O. Mitchell Husky Corporation	Vapor recovery spout and vapor guard mount
	US 5 549 132	Eric Butterfield, et. al. Emco Wheaton Inc.	Convertible fuel dispensing nozzle for US and European use
	US 5 562 133	Thomas O. Mitchell Husky Corporation	Fuel dispensing nozzle

	US 5 577 538	Charles Sunderhaus, et. al. Dover Corporation	Liquid dispensing nozzles having improved flow indicators
	WO 95 04 894	Dwain Simpson, et. al. Saber Equipment Corporation	Fuel dispensing spout
	WO 95 09 807	David Parish, et. al. Emco Wheaton, Inc.	Vapor recovery nozzle
	WO 95 21 121	James Healy Healy Systems, Inc.	Fuel dispensing nozzle
	WO 95 22 491	Joshua Rabinovich Unassigned	Vapor recovery nozzle
	WO 95 33 678	Walter Schneider Emco Wheaton Inc.	Fuel dispensing nozzle with controlled vapor recovery
	WO 96 06 797	Joshua Rabinovich Unassigned	Vapor recovery nozzle
Dispensers	EP 0 723 929	Seifollah Nanaji Gilbarco, Inc.	Multi-product fuel dispensing apparatus employing a common meter
	US RE 35 238	Kenneth L. Pope Gilbarco, Inc.	Vapor recovery system for fuel dispenser (reissue of US 5 040 577)
	US 5 490 612 EP 0 675 074	Michel Coquerel, et. al. Equipement Industriel Normand France	Fuel dispenser enabling a single product dispenser to be developed into a multiproduct dispenser
	US 5 493 315	Hans Atchley Gilbarco Inc.	Dispenser video display control
	US 5 497 571 WO 96 18 180	John Tryon, et. al. Shell Oil Co	Illuminated dispenser
	US 5 506 570	Paul Scott, et. al. Unassigned	A warning announcer for a gasoline dispenser
	US 5 535 130	Joseph Long Gilbarco, Inc.	A fuel dispenser system having a controllable program audio/video display.
	US 5 543 849	Joseph Long Gilbarco, Inc.	A dispenser having a controllable audio/video program display
	WO 96 26 155	Osborne, et. al. Unassigned	Locking forecourt fuel pump
Point-of-Sale (POS) Systems	US 5 457 305	William S. Akel, et. al. Unassigned	Distributed on-line money access card transaction processing system
	US 5 500 890	Stanley Rogge, et. al. Exxon Corporation	Point of sale system using multi-threaded transactions and interleaved file transfer
	US 5 557 529	Walter Warn, et. al. Progressive International Electric	In-dispenser card reader control system
	US 5 576 526	Armin Eisermann Schulte-Schlagbaum AG	Card key closure system for prepay or preauthorized vending
	US 5 576 951	Lawrence Lockwood Unassigned	Automated sales and services system for customer information
	WO 96 06 415	Paul Philipps, et. al. The Coca-Cola Company	Method and apparatus for vending goods in conjunction with a credit card accepting fuel dispensing pump
	WO 96 32 702	Frank Nemirofsky, et. al. Smart TV Co.	Interactive smart card system for integrating the provision of remote and local services
Customer Focus	US 5 487 203	Philip Brach, et. al. Unassigned	Squeegee having an advertising display area
	US 5 557 268	Gerard Hughes, et. al. Exxon Corporation	Automatic vehicle recognition and customer automobile diagnostic system
	US 5 585 550	Sonya Frank Unassigned	Device for detecting water in fuel
	WO 96 26 846	Saied Kashani Unassigned	Automobile refueling guard