

(51) International Patent Classification:
G01N 21/31 (2006.01)

(21) International Application Number:

PCT/IN2010/000158

(22) International Filing Date:

18 March 2010 (18.03.2010)

(25) Filing Language:

English

(26) Publication Language:

English

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI,

NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

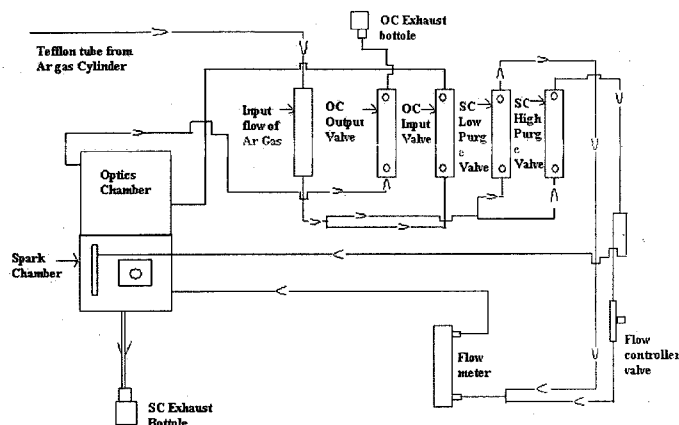
Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- of inventorship (Rule 4.17(iv))

Published:

- without international search report and to be republished upon receipt of that report (Rule 48.2(g))

(54) Title: A HIGHLY DEVELOPED ATOMIC EMISSION SPECTROMETER USING AN ARGON SAVER FOR ARGON FLOW THROUGH THE OPTICS CHAMBER (OC) AND SPARK CHAMBER (SC) FOR ARGON SAVINGS WITH GOOD SPARKING. THIS LEADS TO A SIGNIFICANT INCREASE IN THE NUMBER OF ANALYSES THAT CAN BE DONE PER CYLINDER OF ARGON GAS, THUS RESULTING IN SIGNIFICANT SAVINGS

**FIGURE-1:** Optics Chamber - Spark Chamber (Block Diagram)

(57) Abstract: This invention is based on argon saver manner which can be valuable for excellent sparking and increased optical elements like the Grating and the detectors and also to clean the Spark Chamber., it is significant to result savings in all the above-mentioned Argon Flow Conditions. It's started with CCDs; PMTs CCD is a type of image sensor that detects light. The light-sensitive capacitors perceive the intensity of light received and convert it into an electrical signal. Argon gas is purged through the Spark Chamber at standard gaps. The Spark Chamber is also designed as little as possible and is kept closed during periods of non-use using a plate with a gasket for proper sealing. All operations are automatic using software and timings are optimized.

A highly developed atomic emission spectrometer using an Argon Saver for Argon Flow through the Optics Chamber (OC) and Spark Chamber (SC) for Argon Savings with good sparking. This leads to a significant increase in the number of analyses that can be done per cylinder of Argon gas, thus resulting in significant savings.

FIELD OF THE INVENTION – This invention is related with an Argon Saver which would save the consumption of Argon gas.

PRIOR ART:

In another existing system as given in **Patent number: 5093571**, wherein a gas in a process chamber, such as a sputtering chamber, having a typical inside pressure of $10.\text{sup.}-1$ to $10.\text{sup.}-3$ Torr, is analyzed by a mass spectrometer, which should be used at a pressure range of lower than around $10.\text{sup.}-4$ Torr. The method comprises evacuating a process chamber by a vacuum pump and supplying a gas to the process chamber, whereby a pressure in the process chamber is determined by the vacuum pump and the supplied gas, and that pressure in the process chamber is higher than a pressure in the vacuum pump, and analyzing the gas at a portion of or around the vacuum pump, which portion has a pressure lower than the pressure in the process chamber, by using a mass spectrometer.

In another existing system as given in **Patent number:** 4372155, wherein this specification teaches a basic method of obtaining on a continuous basis an instantaneous indication of the air to fuel ratio of an air/fuel mixture being fed to a combustion process. The process may take place in an internal combustion engine or, for example, in a power plant. Modifications of the method are taught to obtain such information as the hydrogen to carbon ratio of the fuel being burned in the combustion process, the oxygen equivalence of the air/fuel mixture being burned, the air mass flow through the combustion process, the fuel mass flow through the combustion process, instantaneous fuel economy of a vehicle in which a combustion process is being carried out to propel the vehicle, and the oxygen concentration in the exhaust gases from the combustion process.

In another existing system as given in **Patent number:** 4108122, wherein In a closed loop fuel management system for an internal combustion engine, a gas sensor is positioned in the intake manifold and is responsive to a characteristic of the fuel mixture for generating an electrical control signal for controlling the metering of the fuel to the mixture. In the preferred embodiment, the air and fuel are mixed together and the resultant mixture passes by an oxygen gas sensor prior to being distributed to the cylinders through the intake manifold system. The output signal of the sensor is used for controlling the metering of the fuel. Fuel delivery correction delays due to transport lag in conventional closed loop fuel management systems using oxygen gas sensors are eliminated.

In another existing system as given in **Patent number:** 4007589, wherein to supervise operational effectiveness of catalytic reactors included in exhaust

emission detoxification systems, an oxygen sensor is located downstream of the reactor to determine oxygen content in the exhaust gases from the internal combustion engine, the oxygen sensor comprising an ion conductive solid electrolyte forming an ion concentration chain and having catalytically inactive contacts, connected to a detection circuit which provides an output signal in dependence on a signal from the sensor, the output signal operating an alarm, or a transducer which interferes with proper engine operation to force the operator to have the reactor repaired. Preferably, two ion conductive chains are used, in a single sensor, or in two sensors, one being exposed to exhaust gases upstream of the catalytic reactor and the other downstream of the catalytic reactor, the output signals being provided to a differentially connected operational amplifier, to balance out extraneous influences.

In another existing system as given in **Patent number: 4240890**, wherein an oxygen partial pressure measuring device for determining oxygen partial pressures in exhaust gases emitted from internal combustion engines comprises a metallic vessel mounted within an exhaust pipe of the engine and having an exhaust gas inlet facing to the exhaust gas flow and an exhaust gas outlet formed in a side surface of the vessel, an oxygen concentration cell shutting the exhaust gas out of the air in an air-tight manner, and a monolithic structure, what is called a honeycomb structure, located between the exhaust gas inlet and the oxygen concentration cell within the vessel for burning the exhaust gas.

In another existing system as given in **Patent number:** 5711863, wherein the invention proposes a measuring-probe arrangement for detecting gases flowing in a gas conduit, especially exhaust gases flowing in an exhaust conduit of internal combustion engines. The measuring-probe arrangement has a measuring element (13) which is surrounded in sealing fashion by a housing (11). The section of the measuring element (13a) located at the measured-gas end of the measuring-probe projects from the housing (11) and is surrounded with a clearance by a protective tube (21) which is fixed by one end section on the housing (11) and has one or more openings (22) for the measured gas. The measuring probe (10) is arranged in such a way in the gas conduit (30) that the gas opening (22) is arranged on that side of the protective tube (21) which faces away from the flow (35) of the measured gas.

In another existing system as given in **Patent number:** 4622809, wherein a method for testing and adjusting catalytic exhaust gas emission control systems of internal combustion engines, in which the fuel-air-ratio is regulated by means of a .lambda.-probe (control-probe) arranged in the exhaust gas stream upstream of the catalyst, whereby the exhaust gas stream is measured downstream of the catalyst by means of a further .lambda.-probe (test-probe). The voltage average value and amplitude magnitude of the signal produced by the test-probe are determined and serve for adjusting the operating point of the control system and for the recognition of the catalyst efficiency.

In another existing system as given in **Patent number:** 6615577, wherein a system and method for optimizing the regeneration cycle of an emission control device,

such as a lean NO_x trap, is disclosed wherein the device is filled to a predetermined fraction of its existing capacity and is then completely emptied during a device purge. As device capacity is substantially reduced, as indicated by the actual fill time becoming equal to or less than a predetermined minimum fill time, a device desulfation event is performed to attempt to restore device capacity. A programmed computer controls the fill and purge times based on the amplitude of the voltage of a switching-type oxygen sensor and the time response of the sensor. The frequency of the purge, which ideally is directly related to the device capacity depletion rate, is controlled so that the device is not filled beyond the storage capacity limit.

In another existing system as given in **Patent number:** 4884066, wherein Deterioration detector system for catalyst in use for emission gas purifier, comprising; an emission passageway through which exhaust gas from internal combustion engine, passes by way of catalyst to facilitate the reducing and oxidizing reaction among the toxicant component of hydrocarbon, carbon monoxide and nitrogen oxide; a sensor placed at the emission passageway to position downstream of the catalyst against the exhaust gas flow so as to generate an output in direct proportion to air-fuel ratio in the exhaust gas; an enunciator arranged to activate in response to the output of more than the predetermined level generated from the air- fuel ratio sensor.

In another existing system as given in **Patent number:** 5119628, wherein to reliably diagnose catalyst degradation in an air fuel ratio control system without being subjected to the influence of engine operating conditions, a front O₂

sensor output VFO and a rear O₂ sensor output VRO are detected on both the upstream and downstream sides of catalytic converter; air fuel ratio feedback correction coefficients α are determined on the basis of basic feedback control constants P_{R,L} or i_{R,L} and correction values PHOS according to rich and lean air fuel ratio conditions; periods T and amplitudes α_{R} - α_{L} of the air fuel ratio feedback correction coefficient α are measured; a rich discriminating catalyst diagnosing slice level RSLH2 is set higher than a rich discriminating air fuel ratio feedback controlling slice level RSH1 and a lean discriminating catalyst diagnosing slice level RSLL2 is set lower than a lean discriminating air fuel ratio feedback controlling slice level RSLL1 in such a way that RSLH2...

OBJECT OF THE INVENTION:

In existing invention spectrophotometer didn't contain argon saver for Argon Flow in Optics Chamber and Spark Chamber for good sparking. Spectrometer manufacturers use Argon Flow/Purge in many ways-While sparking (analyzing) Argon is made to flow through the Spark Chamber at 3 – 5 LPM. When not sparking, in supply mode, Argon is purged through the Spark Chamber at 0.50 LPM. Argon is also purged through the OC @ 0.50 LPM. Argon Flow rate depends on the design of the Spark Chamber, spark conditions. This procedure concerns with Argon gas clean through the Optics Chamber and Spark Chamber. When investigation is not taking place, during which time removal of these two chambers is done at approx. 0.50 LPM. Argon is purged through Spark Chamber

because without Argon removal, outside air would go through the Spark Chamber. Air contains besides other gases, Oxygen & water vapour. Both are harmful for good sparking. Also, Oxygen would absorb all wavelengths below 200nm. It is kept closed during periods of non-use using a plate with a gasket for proper sealing. All functions are automatic using software and timings are optimized

STATEMENT OF INVENTION:

This invention is based on argon saver mode which can be useful for good sparking and increased optical elements like the Grating and the detectors and also to clean the Spark Chamber. , it is significant to effect savings in all the above-mentioned Argon Flow Conditions. It's started with CCDs; PMTs CCD is a type of image sensor that detects light. The light-sensitive capacitors detect the intensity of light received and convert it into an electrical signal. Argon gas is purged through the Spark Chamber at regular gaps. The Spark Chamber is also planed as small as possible and is kept closed during periods of non-use using a plate with a gasket for proper sealing. All operations are automatic using software and timings are optimized.

DETAILED DESCRIPTION AND SCOPE:

Argon gas is needed to clean the Optics Chamber in which is an increased optical element like the Grating and the detectors, and also to clean the Spark Chamber. We can obtain Good overall savings in the consumption of Argon gas; it is significant to effect savings in all the above-mentioned Argon Flow Conditions. It's started with CCDs; PMTs CCD is a type of image sensor that detects light. . The light-sensitive capacitors detect the intensity of light received and convert it into an electrical signal. Each pixel on the CCD represents a specific wavelength of light, and the more photons absorbed, the more electrical signal generated. Each pixel on the CCD represents a specific wavelength of light, and the more photons absorbed, the more electrical signal generated and highly accurate they have much better long-term stability too. Spectrometer manufacturers use Argon Flow/Purge in the following ways (A) while sparking (analyzing) Argon is made to flow through the Spark Chamber at 3 – 5 LPM. (B) When not sparking, in standby mode, Argon is purged through the Spark Chamber at 0.50 LPM. (C) Argon is also purged through the OC @ 0.50 LPM. In order to obtain good overall savings in the consumption of Argon gas, it is important to effect savings in all the above-mentioned Argon Flow Conditions. Argon gas is purged through the Spark Chamber at regular intervals.

The Spark Chamber is also designed as small as possible and is kept closed during periods of non-use using a plate with a gasket for proper sealing. All operations are automatic using software and timings are optimized.

Method for Argon saving in the Optics Chamber:

The optical chamber has consequently been constructed with two solenoid valves – one for “Argon In”, the other for “Argon Out”. Argon purging is started in the Optics Chamber at 0.50 LPM. After an optimized prearranged gap, the Argon Outlet Valve is shut. The Argon Inlet Valve is then shut after a short gap of the Outlet Valve shutting. This ensures trapping Argon in the Optics Chamber at a little higher pressure than atmospheric pressure. To ensure that conditions inside the Optics Chamber (pressure and consequently the refractive index of the medium inside the Optics Chamber) are precisely the same during each spark, purging through the Optics Chamber is started concomitantly with each spark.

Method for Argon saving in the Spark Chamber:

If samples are being analyzed at standard gaps, even if purging through the Spark Chamber is stopped for petite periods, analysis is not adversely affected. During longer periods of non-analysis, to keep the spectrometer in good quality running situation, Argon gas is purged through the Spark Chamber at regular intervals. The Spark Chamber is also designed as small as possible and is kept closed during periods of non-use using a plate with a gasket for appropriate sealing.

CLAIMS:

1. A highly developed atomic emission spectrometers with argon saver mode for Argon Flow in Optics Chamber and Spark Chamber for good sparking.
2. This device is comprises of CCD and atomic spectrophotometer.
3. A highly developed atomic emission spectrometers as claimed as claim 1 wherein The CCD spectrometers are powerful as well as highly precise.
4. A highly developed atomic emission spectrometers as claimed as claim 1 wherein they have a great deal enhanced long-term permanence too.
5. A highly developed atomic emission spectrometers as claimed as claim 1 wherein Spectrometer producers exercise Argon Flow/Purge in a lot of ways.
6. A highly developed atomic emission spectrometers as claimed as claim 1 wherein At the same time as sparking (analyzing) Argon is made to flow through the Spark Chamber at 3 – 5 LPM.
7. A highly developed atomic emission spectrometers as claimed as claim 1 wherein When not sparking, in standby mode, Argon is purged through the Spark Chamber at 0.50 LPM.
8. A highly developed atomic emission spectrometers as claimed as claim 1 wherein Argon is also purged through the Optical Chamber @ 0.50 LPM.

9. A highly developed atomic emission spectrometers as claimed as claim 1 wherein Argon Flow through the Spark Chamber.
10. A highly developed atomic emission spectrometers as claimed as claim 1 wherein Argon Flow rate depends on the design of the Spark Chamber, spark conditions.
11. A highly developed atomic emission spectrometers as claimed as claim 1 wherein This Technique concerns with Argon gas clean through the Optics Chamber and Spark Chamber.
12. A highly developed atomic emission spectrometers as claimed as claim 1 wherein When analysis is not taking place, during which time amputation of these two chambers is done at approx. 0.50 LPM.
13. A highly developed atomic emission spectrometers as claimed as claim 1 wherein Argon is purged through Spark Chamber because without Argon amputation, exterior air would come into the Spark Chamber. Air holds besides other gases, Oxygen & water vapour. Both are injurious for good sparking. Also, Oxygen would suck up all wavelengths below 200nm.
14. A highly developed atomic emission spectrometers as claimed as claim 1 wherein It is kept closed for the duration of periods of non-use using a plate with a gasket for appropriate sealing.
15. A highly developed atomic emission spectrometers as claimed as claim 1 wherein All process are automatic using software and timings are optimized

- 16.A highly developed atomic emission spectrometers as claimed as claim 1 wherein The Optics Chamber has therefore been constructed with two solenoid valves – one for “Argon In”, the other for “Argon Out”.
- 17.A highly developed atomic emission spectrometers as claimed as claim 1 wherein Argon purging is started in the Optics Chamber at 0.50 LPM.
- 18.A highly developed atomic emission spectrometers as claimed as claim 1 wherein an optimized prearranged gaps, the Argon passage Valve is shut.
- 19.A highly developed atomic emission spectrometers as claimed as claim 1 wherein The Argon Inlet Valve is then shut after a short interval of the passage Valve shutting.
- 20.A highly developed atomic emission spectrometers as claimed as claim 1 wherein this ensures trapping Argon in the Optics Chamber at a slightly higher pressure than atmospheric pressure.
- 21.A highly developed atomic emission spectrometers as claimed as claim 1 wherein To ensure that conditions inside the Optics Chamber (pressure and consequently the refractive index of the medium inside the Optics Chamber) are exactly the same during each spark, purging through the Optics Chamber is started concomitantly with each spark.
- 22.A highly developed atomic emission spectrometers as claimed as claim 1 wherein If samples are being analyzed at regular interval s, even if purging through the Spark Chamber is stopped for short durations, analysis is not adversely affected.

- 23.A highly developed atomic emission spectrometers as claimed as claim 1 wherein During longer periods of non-analysis, to keep the spectrometer in good running condition, Argon gas is purged through the Spark Chamber at regular intervals.
- 24.A highly developed atomic emission spectrometers as claimed as claim 1 wherein Argon gas is purged through the Spark Chamber at regular intervals.
- 25.A highly developed atomic emission spectrometers as claimed as claim 1 wherein The Spark Chamber is also designed as small as possible.
- 26.A highly developed atomic emission spectrometers as claimed as claim 1 wherein it is kept closed during periods of non-use using a plate with a gasket for proper sealing.

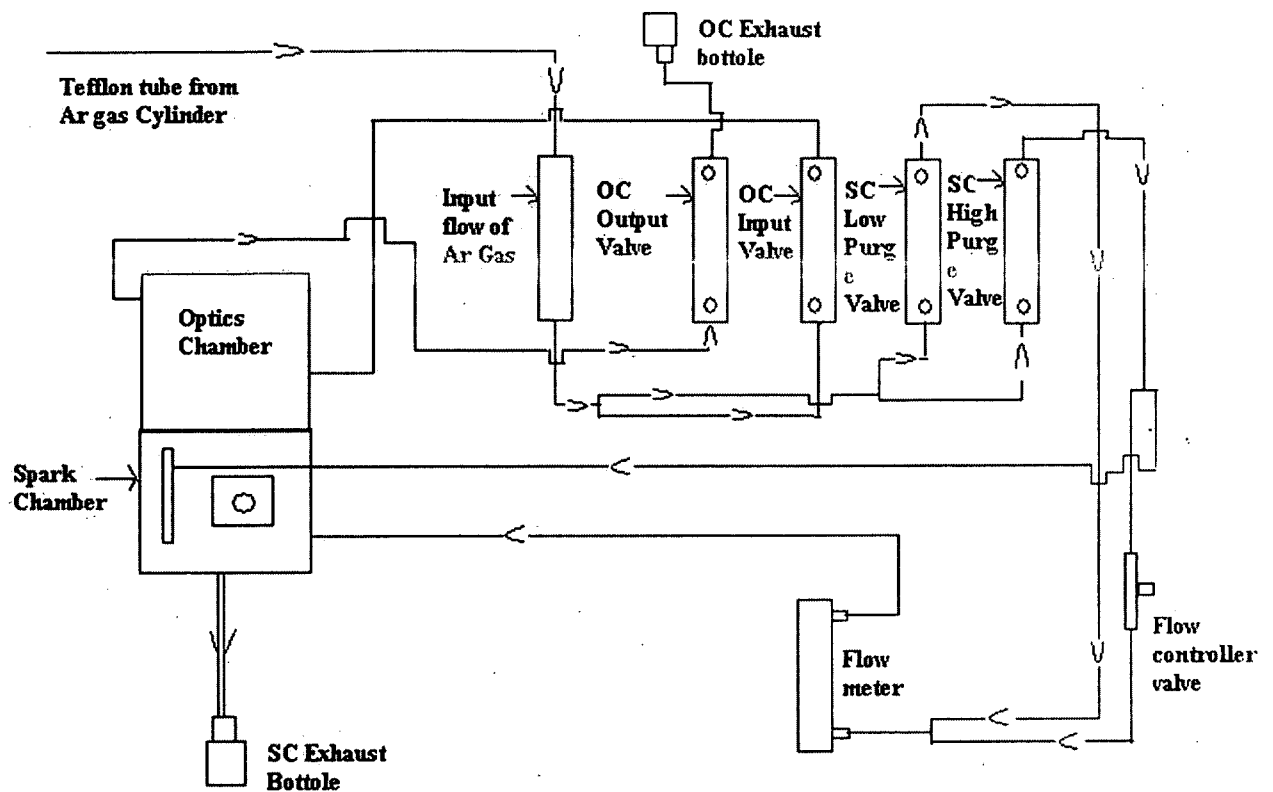


FIGURE-1: Optics Chamber - Spark Chamber (Block Diagram)