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RESPONSE TO FER

Application No.: 202421097853

Last date for filing response to FER: 20-11-2025

Ld. Controller: Prerak Singh

Date: 19-06-2025

The Controller of Patents,
The Patent Office,
Delhi.

Re: Application Number: 202421097853, Date of Filing: 11-12-2024

Applicant: Dnyanda Sustainable Engineering Solutions Private Limited

Our Ref No.: LSP1134

Respected Madam/Sir,

A response to the First Examination Report (FER) dated 20-05-2025 is submitted herewith:

Summary of the FER:

In the FER, original claims 1-12 were objected under section 2(1)(j) for lacking novelty in view of document D1 (IN202441082157A). Further, the original claims 1-12 were objected for lacking inventive step in view of documents D1 (IN202441082157A) and D2 (IN202411029931A). Additionally, claim 1 was objected under section 10(4)(b) for insufficient disclosure in the specification, particularly regarding the validation process for gas leak detection. The claims were also objected for lacking clarity, conciseness, and definitiveness under sections 10(5) and 10(4)(c) of the Patent Act 1970, specifically regarding ambiguous terms such as "concurrent," "validate gas leaks," and "further configured." Formal requirements were also raised including the need for Form 3 statement and Power of Attorney with proper application details.

Summary of Amendments:

In response, Applicant has amended claims 1-12 to clarify the novel and inventive features of the invention. The amendments are fully supported by the specification

as originally filed. Hence, no new subject matter is added to currently amended claims 1-12.

The primary amendments focus on clarifying the concurrent validation methodology that distinguishes the claimed invention from the prior art. Specifically, the amendments emphasize that the system validates gas leaks only when both weight reduction and gas concentration increase occur simultaneously and exceed predetermined thresholds, includes false alert suppression when only one parameter changes without the other, and controls the exhaust fan exclusively based on validated leaks rather than simple gas detection. These amendments are fully supported by paragraphs 14-24 of the specification as originally filed, which explicitly describe the concurrent validation methodology, false alert suppression mechanism, specific measurement intervals, and correlation analysis features.

Applicant's response to the Learned Controller's objections is as under:

In PART-II (B) (1) NOVELTY:

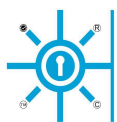
Objection: *Claim(s) (1-12) lack(s) novelty, being anticipated in view of disclosure in the document cited above under reference D1 for the following reasons:*

D1: IN202441082157A

In Response, the Applicant respectfully disagrees and traverses the rejection.

Currently amended independent claim 1:

1. A gas monitoring system (100) comprising:
 - a weighing unit (102) comprising a load cell (104) configured to measure weight of a gas cylinder and transmit weight measurement data;
 - a detection unit (106) operatively coupled to the weighing unit (102), wherein the detection unit (106) comprises a microcontroller (108), a gas sensor (110), a display (112), a buzzer (114), an LED indicator (116), and an exhaust fan (118), wherein the microcontroller (108) is configured to:



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process weight measurement data received at fixed intervals;

process gas concentration measurements from the gas sensor (110);

calculate rate of weight reduction over predetermined time periods;

calculate rate of gas concentration increase over predetermined time periods;

validate gas leaks by comparing the calculated rate of weight reduction with the calculated rate of gas concentration increase over a measurement period, wherein a gas leak is confirmed only when both weight reduction and gas concentration increase occur concurrently and exceed predetermined threshold values ; and

suppress false gas leak alerts when a detected gas concentration increase occurs without corresponding measured weight reduction, or when a detected weight reduction occurs without corresponding gas concentration increase, over consecutive measurement cycles

control the exhaust fan (118) based on validated gas leaks, wherein the exhaust fan (118) is activated only when the validated gas leak shows weight reduction exceeding a predetermined threshold with corresponding gas concentration increase above a predetermined concentration threshold.

(Emphasis Added)

Problem addressed by the current invention:

The current invention addresses the problem of inaccurate gas leak detection and false alarms in gas cylinder monitoring systems used in residential, commercial, and industrial settings. Conventional gas monitoring systems rely on simple gas

concentration detection without correlation with actual gas loss from cylinders, leading to frequent false alarms triggered by environmental factors, cooking activities, or sensor drift. Existing weight monitoring systems operate independently from gas detection systems, providing no means to validate whether detected gas concentrations actually indicate cylinder leakage versus ambient gas presence. There remains an unmet need for an intelligent gas monitoring solution that can accurately distinguish between actual gas leaks and environmental gas concentrations while providing reliable early warning and automated safety responses.

Technical solution provided by the current invention:

The technical solution offered by the invention is a gas monitoring system comprising a weighing unit with load cell, detection unit with gas sensor, and a microcontroller that implements concurrent validation methodology. The system utilizes real-time correlation analysis between calculated weight reduction rates and gas concentration increase rates to validate actual gas leaks, ensuring that leak confirmation occurs only when both parameters exceed predetermined thresholds simultaneously. The invention overcomes limitations of false alarm generation, lack of leak validation, unnecessary exhaust fan operation, and absence of predictive capabilities associated with conventional gas monitoring methods. The microcontroller implements intelligent false alert suppression when only one parameter changes without corresponding change in the other, controls exhaust fan operation exclusively based on validated leaks, and provides early leak detection through correlation pattern analysis over extended periods, thereby delivering superior accuracy and reliability compared to prior art systems.

Difference between prior art D1 and the current invention:

The D1 prior art discloses a basic gas monitoring system for LPG cylinders that combines weight measurement with gas detection capabilities. The system operates using a weight sensor placed underneath the gas cylinder to continuously monitor the cylinder's weight, which decreases as gas is consumed during normal

usage. This weight data is processed by a microcontroller to calculate the remaining gas level and display it as a percentage on an LED interface for user convenience. Separately, the system includes a dedicated LPG gas detecting sensor that monitors the surrounding air for the presence of gas leakage. When gas is detected above certain concentration levels, the system triggers visual alerts through a red LED bulb and audible alerts through a buzzer to warn users of potential hazards. The system essentially operates as two independent monitoring functions housed within a single unit, with the weight measurement providing gas level indication and the gas sensor providing leak detection alerts.

The currently amended claim 1 differs from D1 in its approach to gas leak validation and system integration. While D1 operates weight measurement and gas detection as completely separate and independent functions, the current invention implements a concurrent validation methodology that requires both parameters to work together for accurate leak detection. The current invention's microcontroller calculates the rate of weight reduction over predetermined time periods and simultaneously calculates the rate of gas concentration increase, then compares these rates to validate whether a true gas leak is occurring. This validation process confirms a gas leak only when both weight reduction and gas concentration increase occur concurrently and exceed predetermined threshold values, ensuring that the system can distinguish between actual cylinder leakage and environmental gas concentrations from other sources.

The current invention incorporates an intelligent false alert suppression mechanism that prevents erroneous alarms when only one parameter changes without corresponding change in the other. This means that if gas concentration increases due to external factors like cooking activities or environmental conditions, but the cylinder weight remains stable, the system will suppress false alerts over consecutive measurement cycles. Conversely, if weight reduction occurs due to normal consumption but without corresponding gas concentration increase, the system recognizes this as normal usage rather than a leak condition. D1 lacks any such correlation analysis or false alert suppression capability,

meaning any gas detection above threshold levels would trigger an alarm regardless of whether actual cylinder leakage is occurring.

Another significant difference lies in the exhaust fan control system. The current invention includes an exhaust fan that is controlled exclusively based on validated gas leaks, meaning the fan activates only when the concurrent validation methodology confirms that weight reduction exceeding a predetermined threshold is occurring simultaneously with gas concentration increase above a predetermined concentration threshold. D1 completely lacks any exhaust fan system, providing no means for automated gas concentration reduction during leak events. This represents a critical safety feature that enables the current invention to not only detect leaks but also take proactive measures to mitigate hazardous conditions.

The measurement and processing approach also differ substantially between the two systems. D1 performs static weight measurements primarily for gas level indication and basic gas concentration monitoring for alert purposes. The current invention performs dynamic rate calculations over predetermined time periods, enabling more sophisticated analysis of changing conditions and trend identification. This rate-based approach allows the system to detect gradual leaks that might not trigger immediate alerts in D1's static threshold-based system.

More particularly, D1, inter alia, fails to disclose or teach that the microcontroller validates gas leaks by comparing the calculated rate of weight reduction with the calculated rate of gas concentration increase over a measurement period, wherein a gas leak is confirmed only when both weight reduction and gas concentration increase occur concurrently and exceed predetermined threshold values, as disclosed in the Applicant's amended independent claim 1. The use of concurrent validation methodology enables accurate leak detection while preventing false alarms that occur when gas concentration increases due to environmental factors without actual cylinder leakage. Also, D1 fails to disclose the suppression of false gas leak alerts when a detected gas concentration increase occurs without corresponding measured weight reduction, or when a detected weight reduction

occurs without corresponding gas concentration increase, over consecutive measurement cycles, which prevents erroneous system responses that would occur in conventional gas detection systems. Such concurrent validation arrangement properly correlates actual gas loss from the cylinder with environmental gas concentration changes to ensure that leak alerts are triggered only when genuine leakage is occurring. Furthermore, D1 completely fails to disclose any exhaust fan system controlled exclusively based on validated gas leaks, as the Applicant's invention provides automated hazard mitigation through exhaust fan activation only when validated leaks are confirmed through the concurrent validation methodology.

Therefore, Applicant respectfully submits that the Applicant's amended independent claim 1 is **novel over D1 because D1 does not contain the feature of concurrent validation methodology that correlates weight reduction with gas concentration increase for accurate leak detection and false alert suppression.** In addition, by virtue of their respective direct or indirect dependencies on amended independent claim 1, pending dependent claims 2-12 should also be allowable

In PART-II (B) (2) INVENTIVE STEP:

Objection: *Claim(s) (1-12) lack(s) inventive step, being obvious in view of teaching (s) of cited document(s) above under reference D1 & D2 for the following reasons:*

The subject matter as claimed in claims 1-12 lacks inventive steps in view of documents D1 and D2.

D1: IN202441082157A

D2: IN202411029931A

Difference between prior art D2 and the current invention:

The prior art D2 advances beyond D1 by incorporating IoT connectivity and automated safety responses including exhaust fan activation but maintains the same fundamental approach of independent monitoring without correlation analysis. D2's exhaust fan operates based solely on gas concentration thresholds

detected by the gas sensor, representing the conventional reactive approach where safety systems respond to any gas detection above predetermined levels. While D2 includes both weight measurement and gas detection capabilities, these functions operate separately without any technical integration or correlation methodology.

Non-Obviousness of Combining D1 and D2

A person skilled in the art would not be motivated to combine the teachings of D1 and D2 in a manner that would lead to the current invention's concurrent validation methodology. Both D1 and D2 embody the established technical approach of treating gas detection and weight measurement as independent monitoring functions, and neither document suggests or motivates correlating these parameters for leak validation purposes. The combination of D1 and D2 would most obviously result in a system having D1's basic monitoring capabilities enhanced with D2's IoT connectivity and exhaust fan features, but operating these components independently as disclosed in both references.

The concurrent validation methodology claimed in the current invention requires a fundamental departure from the independent monitoring approach consistently followed in both D1 and D2. A skilled artisan combining these references would have no motivation to correlate weight reduction rates with gas concentration increase rates because both prior art documents treat these measurements as serving entirely different purposes. D1 uses weight measurement for gas level indication and gas detection for leak alerting, while D2 maintains this same separation of functions while adding automated responses to gas detection events. The technical prejudice in the prior art strongly favors independent operation of gas detection and weight measurement systems. This prejudice exists because gas detection systems are traditionally designed to respond rapidly to any gas concentration increase for safety reasons, while weight measurement systems are designed for gradual monitoring of consumption patterns. The prior art teaches away from correlating these fundamentally different measurement approaches

because the traditional safety paradigm requires immediate response to gas detection regardless of other system parameters.

Unexpected Technical Effects and Advantages

The concurrent validation methodology of the current invention produces unexpected technical effects that would not be anticipated by a person skilled in the art familiar with the independent monitoring approaches of D1 and D2. The ability to suppress false alerts while maintaining sensitivity to genuine leak conditions represents a technical advancement that contradicts the established belief in the field that gas detection systems must operate independently to ensure safety response. The current invention demonstrates that correlation-based validation actually enhances safety by preventing false emergency responses that could lead to user complacency or system shutdown during critical periods.

The rate-based calculation methodology employed in the current invention produces the unexpected technical effect of enabling early leak detection through micro-change analysis while simultaneously preventing false alarms from environmental variations. This dual capability contradicts the conventional assumption that increased sensitivity in gas detection systems necessarily results in increased false alarm rates. The current invention achieves both enhanced sensitivity and reduced false alarms through the non-obvious correlation approach that validates leak conditions before triggering system responses.

The conditional exhaust fan control based on validated leaks produces the unexpected advantage of energy efficiency combined with enhanced safety effectiveness. Conventional wisdom in the field, as reflected in D2's approach, suggests that exhaust fans should activate immediately upon gas detection to ensure maximum safety response. The current invention demonstrates that validation-based fan control actually provides superior safety outcomes by ensuring fan activation occurs only during genuine leak events, thereby preventing unnecessary energy consumption while maintaining effectiveness when actual leakage occurs.

Synergistic Technical Combination



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The current invention achieves a synergistic technical effect through the non-obvious combination of rate-based weight analysis, rate-based gas concentration analysis, and correlation validation methodology. This combination produces technical results that exceed the sum of individual components and could not be predicted from the independent monitoring approaches disclosed in D1 and D2. The synergistic effect manifests in the system's ability to distinguish between various gas detection scenarios including actual cylinder leakage, environmental gas exposure, cooking activities, and sensor anomalies, while providing appropriate responses to each condition.

The integration of false alert suppression with exhaust fan control creates an additional synergistic effect where the validation methodology enhances both the accuracy of leak detection and the efficiency of safety responses. This integrated approach produces the unexpected result of improved safety combined with reduced false activations, contradicting the conventional trade-off assumption that enhanced safety systems necessarily generate more false alarms.

The current invention demonstrates clear inventive step over the combination of D1 and D2 through its non-obvious concurrent validation methodology that correlates weight reduction rates with gas concentration increase rates for accurate leak detection and false alert suppression. The invention overcomes technical prejudices in the prior art that favor independent monitoring approaches and produces unexpected technical effects including enhanced accuracy, reduced false alarms, and improved safety responses. The synergistic combination of rate-based analysis, correlation validation, and conditional control creates technical advantages that exceed the sum of individual components and could not be predicted from the independent monitoring approaches disclosed in D1 and D2. The technical solution addresses a problem not recognized in the prior art and provides unexpected results that contradict established assumptions about gas detection system design.

Thus, it is submitted that the amended independent claim 1 is inventive over cited documents D1-D2 alone or in combination. and therefore allowable. In addition,

by virtue of their respective direct or indirect dependencies on amended independent claim 1, pending dependent claims 2-12 should also be allowable. Therefore, the Ld. Controller is respectfully requested to waive the lack of inventive step objection for pending claims 1-12.

In PART-II (B) (3) SUFFICIENCY OF DISCLOSURE:

Objection: *Claim(s)'1-12' are not fairly based on the matter disclosed in the specification or not supported by the disclosure in the specification for the following reasons:*

Claim 1 is objected to under Section 10(4)(b) for insufficient disclosure in the specification. The claim includes the microcontroller configured to “validate gas leaks through concurrent weight reduction and gas concentration increase,” but the specification does not provide sufficient details on the validation process, such as the algorithm, thresholds, or temporal synchronization required to determine “concurrent” changes. Additionally, the specification lacks clarity on the technical implementation of processing data “at fixed intervals” (e.g., hardware requirements, data sampling methods). This omission prevents a person skilled in the art from implementing the invention without undue experimentation, particularly for the critical leak validation function.

In response, Applicant respectfully submits that Claims 1-12 are fully supported by the disclosure in the specification as originally filed and provide sufficient enablement for a person skilled in the art to practice the invention without undue experimentation. The specification contains detailed technical disclosure of the validation methodology, specific implementation parameters, and comprehensive algorithmic approaches that fully support the claimed subject matter.

Contrary to the Examiner's assertion, the specification provides extensive disclosure of the validation process and algorithms. Paragraph 14 of the specification explicitly discloses the validation methodology, stating that "the microcontroller validates gas leaks by comparing calculated rate of weight reduction with calculated rate of gas concentration increase over a five-minute



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measurement period, wherein a gas leak is confirmed when weight reduction exceeds 10 grams per minute with corresponding gas concentration increase of 10 parts per million." This disclosure provides both the algorithmic approach (comparative analysis of calculated rates) and specific threshold values (10 grams per minute weight reduction and 10 parts per million gas concentration increase) that enable implementation by a person skilled in the art.

Paragraph 17 provides additional algorithmic details, disclosing that "the microcontroller executes leak verification by measuring weight values at 10-second intervals, measuring gas concentration values at 1-second intervals, calculating weight reduction rate and gas concentration increase rate over 60-second periods, and confirming leak occurrence when weight reduction exceeds 50 grams and gas concentration increase exceeds 50 parts per million over a 5-minute period." This disclosure provides specific temporal synchronization parameters, data sampling intervals, and verification thresholds that directly address the Examiner's concerns regarding concurrent determination methodology.

Applicant respectfully submits that the specification provides more than adequate disclosure to support Claims 1-12 and enable practice of the invention by a person skilled in the art. The detailed algorithmic disclosures, specific threshold values, temporal synchronization parameters, and hardware implementation details collectively provide comprehensive enablement that addresses all aspects of the claimed subject matter. The validation methodology is disclosed with sufficient technical detail to enable implementation without undue experimentation, and the specification's disclosure exceeds the requirements of Section 10(4)(b) for adequate description and enablement. Therefore, the Ld. Controller is respectfully requested to waive the objection for pending claims 1-12.

In PART-II (B) (4) CLARITY AND CONCISENESS:

Objection: *Claim(s) 1-12 are not clearly worded in respect of:*

In claims, the phrase “validate gas leaks through concurrent weight reduction and gas concentration increase” lacks specificity regarding the method or criteria for validation. The term “concurrent” is ambiguous, as it does not clarify the temporal or quantitative relationship between weight reduction and gas concentration increase. This vagueness may render the scope of the claim unclear, as it fails to define how the microcontroller determines a valid leak.

In Response, Applicant respectfully submits that claim 1 has been amended to address any clarity concerns by incorporating specific language that defines the validation methodology, and the amended phrase *"validate gas leaks by comparing the calculated rate of weight reduction with the calculated rate of gas concentration increase over a measurement period, wherein a gas leak is confirmed only when both weight reduction and gas concentration increase occur concurrently and exceed predetermined threshold values"* is now clearly worded and removes any ambiguity regarding the validation criteria. The term "concurrent" is sufficiently defined by dependent claim 2, which specifies "comparing calculated rate of weight reduction with calculated rate of gas concentration increase over a five-minute measurement period, wherein a gas leak is confirmed when weight reduction exceeds 10 grams per minute with corresponding gas concentration increase of 10 parts per million," thereby providing the temporal relationship (five-minute period) and quantitative criteria (specific threshold values) for validation. The specification further clarifies the validation method in paragraphs 14-17, disclosing specific measurement intervals, correlation algorithms, and threshold parameters that define how the microcontroller determines valid leaks through concurrent analysis of both parameters. The claim language provides appropriate scope for the inventive concept while the dependent claims and specification provide the necessary technical specificity, satisfying the clarity requirements as the claims are to be read as a whole and interpreted in light of the specification rather than requiring every detail to be recited in the independent claim. Therefore, the Learned Controller is requested to traverse this objection.

In PART-II (B) (5) DEFINITIVENESS:

Objection: *Claim(s) 1-12 do not sufficiently define the invention for the reasons as follows:*

The term “further configured” used in claims 11-12 makes the meaning of the technical feature vague and broad. It required an amendment by replacing or deleting the word.

In Response, the Applicant has amended claim 11 and 12 to delete the word further. Therefore, the Learned Controller is requested to withdraw this objection.

In PART-II (B) (6) OTHER REQUIREMENTS:

Objection: *1. Care should be taken in reply to FER, if there is any amendment it should be done U/s 59, and a mark-up copy also be submitted along with the amendment. The proper reason shall be provided regarding the amendment.*

In Response, the Applicant submit that the amendments made in the claims are within the scope and does not invoke the section 59. Therefore, the Learned Controller is requested to withdraw this objection.

2. Please note that this Examination is done on the basis of electronically uploaded documents in the emodule only. You may verify whether all documents as filed are uploaded electronically or not, and bring to the notice the concerned discrepancies if any.

In Response, the Applicant verify that all documents as filed *are uploaded electronically*. Therefore, the Learned Controller is requested to withdraw this objection.

PART-III: FORMAL REQUIREMENTS:

Statement & Undertaking (Form 3 Details)	Details regarding applications for Patents that may be filed outside India from time to time for the same or substantially the same invention should be
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	furnished within the time limit as per section 8 and rule 12 of the Indian Patent Act, 1970 (as amended).
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In Response, the Applicant submits that: Form 3 was already submitted in time as required under rule 12(1-A) of the Patent Rules, 2003 (as amended). Therefore, the Learned Controller is requested to withdraw this objection.

Power of Attorney (Whether GPA, SPA, Stamped, requisite fee etc.)	Power of Authority mentioning the application number and title of the application should be filed in original in the prescribed manner as per rule 135 of the Patent rules 2003.
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In Response, the Applicant submits that:

1. This is the first application with which the original General Power of Attorney (GPA) is being submitted, and therefore the original GPA is enclosed herewith.
2. The GPA is duly authenticated by the agent.
3. The GPA bears adequate stamp duty as per the Indian Stamp Act.

In conclusion, it is believed that the present patent application, after the above amendments and statement of remarks, has overcome all the defects pointed out by the Ld. Controller and is in conformity with the relevant provisions of the Patents Act, and therefore should be granted patent rights. The applicant expects early granting of patent right for this application. Further, Applicant hereby requests the Ld. Controller to provide an opportunity of being heard before passing any adverse order.

Thanking you,
 Yours faithfully,



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