DOI: 10.6977/IJoSI.202103_6(3).0002
D. Zheng, D. Xu, C. H. Chen, Q. Zheng & K. Xu / Int. J. Systematic Innovation, 6(3), 10-18 (2021)

The Application of Modern TRIZ in the Analysis of Patent Defense of Functional Pot with Vertical Cover

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(Received 31 May 2019; final version received 23 February 2021)

Abstract

How to defend the patent application effectively is not only the responsibility of the patent agency, but also requires the cooperation and active recognition of its applicant and its inventor, for which there will be a greater chance of winning the defense. Since last August, the theories of the Strengthening and Regeneration of Systematic Patent Avoidance that belongs to modern TRIZ, written by Xu Dongliang, a professor from National Tsinghua University, TRIZ' s Golden Key to Innovation ,written by Sun Yongwei and other theoretical methods, were introduced to us, we attempt to apply functional analysis, functional attribute analysis, patent avoidance, patent reduction, and hierarchy view to the process of defense analysis. Therefore, it's believed that such methods play better guiding roles in the analysis of patent application defense and defense statement, improve the chance to win the defense, and help to get the patent grant, so it's worth a bold try.

Keywords: TRIZ Theory, Strengthening Patent Avoidance and Regeneration, Defense of Patent Application

1. The Notice of First Audit on Functional pot with Vertical Cover and its Molding Methods

The notice of first audit on Functional Pot with Vertical Cover and its Molding Methods (201610658173.1) was received in Nov. 2017, and the examiners listed total 6 comparative patents (Fig. 1, 2, etc.), believing that: "There is no substantial content awarded with patent right in the patent application; if the applicant does not state the reason or the stated reason is insufficient, the application shall be rejected".

According to Article 37 in the Patent Law of the People's Republic of China, audit opinions shall be replied in set time, and if the reply is overdue, the application shall be deemed to be withdrawn. The reply to audit opinions is inseparable from technical fields, problems, solutions and effects, so it's necessary to comprehensively find innovation in the claims, instructions and unambiguous contents in the figures attached to the instructions around audit opinions and argue. Even if technical problems are similar or identical to comparative files, they can still be innovative.

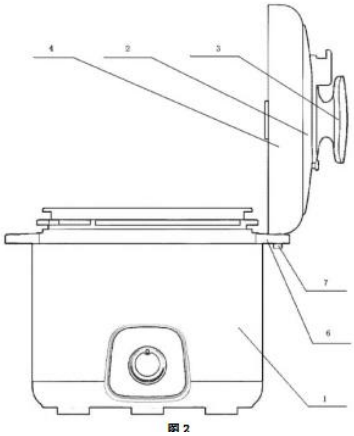


Fig. 1 Split-type Electric Pressure Pot

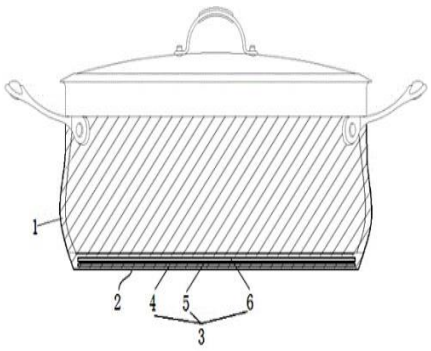


Fig. 2 Short-wave far infrared pot

2. Preliminary Analysis of Major Comparative Patents

Analysis needs to be made prior to patent defense. As for conventional practice, mind mapping can be used to compare and analyze technical fields, problems, solutions and effects one by one, as shown in Fig. 3. The content of application is listed on the four blocks in the figure, and major comparative patents (1) and (2) are respectively listed in the middle and lower part. Through preliminary analysis: its technical problems are not the same as technical solutions, and technical effects of this application are more and better (emission conducive, energy saving etc.) than those of comparative patents (1) and (2). This will have a certain impact on the check and description of subsequent sufficient reasons, so that the confidence in defense will be enhanced. However, it's also necessary to carry out further analysis, especially in terms of technical characteristics and effects in order to persuade the examiner.

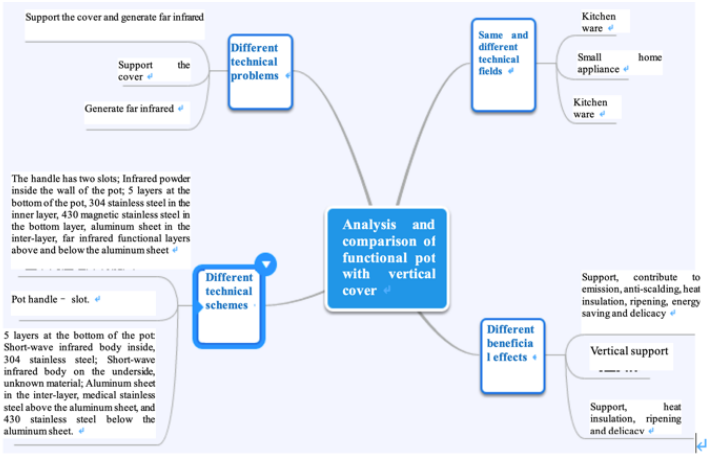


Fig. 3 Analysis and comparison of the application and comparative patents (1, 2)

3. Debate on the Vertical Cover

The examiners compares comparative patent (1) Split-Type Electric Pressure Pot[5] with the application, and proposes that: "Referring to Figs. 1-2, this pot equals to a functional pot with vertical cover, and the slot is installed on the handle for cover plug-ins and connectors". It's easy for technicians in the field to think out the slot on the cover handle as an alternative". "equal to" and "easy to think" here are fatal, indicating that this pot has nothing special, and this distinctive feature of the application is not creative or obvious.

Three distinctive technical features listed in the agent's defense are shown in triangle 1, 2, 3 of Fig. 4. First: "In comparative file 1, the pot cover needs to be provided with an additional connector to be connected with the connector groove on the pot body. The slot in this application is used to insert cover handle directly, which can effectively reduce members on the cover and the difficulty of cover molding. Therefore, these two are different in structure and function." We believe that the agent's defense only mentions "the reduction of pot cover members" and "the smaller modeling difficulty of pot cover", which is insufficient. In this way, the defense is not deep enough, so it will lead to the misunderstanding of examiners that it doesn't make much difference.

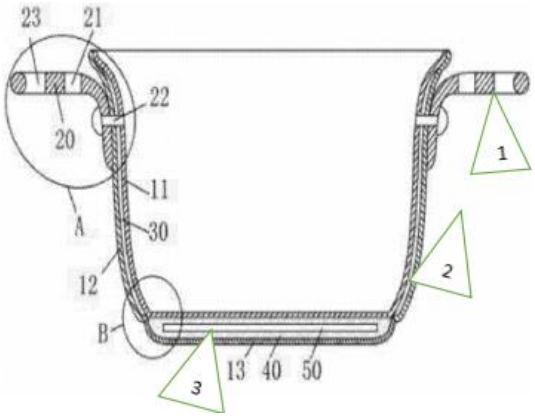


Fig. 4 Fig.1 of the present application

To this end, we have tried to use functional analysis and functional three element analysis (Fig. 5、6) described in Strengthening and Regeneration of Systematic Patent Avoidance, TRIZ' s the Golden Key to Innovation and other theoretical methods, believing that the main function here and receiver of the function, i.e. the cover handle or the cover connector, are basically the same; while "tools" are different from "function providers" i.e. there are still obvious differences between two "pots", so the pot is marked as "×" in the Fig. 7. However, the examiner thinks that the text expression of "pot body" in this application and the comparative patent (1) is the same, it is "pot body with slot on pot handle". If so, the problem of answering the examination will be serious.

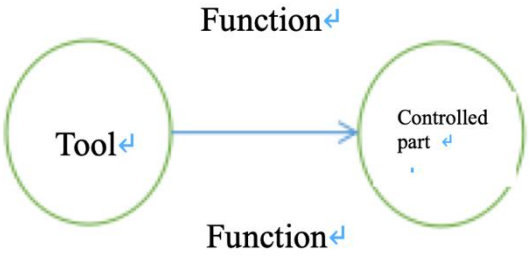


Fig. 5 Analysis of four functional elements

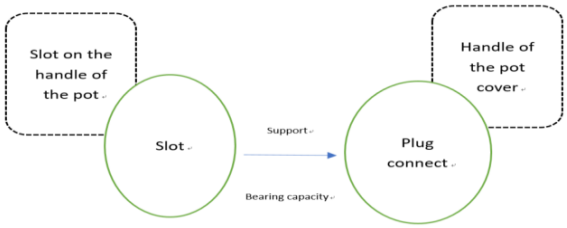


Fig. 6 Analysis of four functional elements in the application

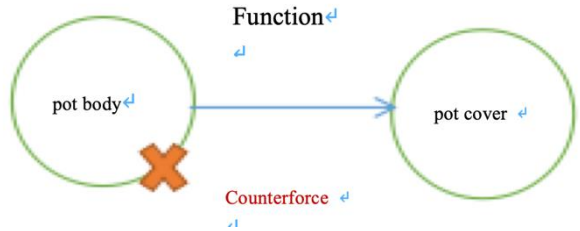


Fig. 7 Analysis of four functional elements in comparative patent 1

In order to deal with the serious situation in the trail, it is necessary to carefully compare the technical features between the two, so the comparison starts from Fig. 8 and Fig. 9 or Fig. 4: The pot body of the comparative patent (1) in Fig.8 is actually the outer shell of the electric pressure cooker, while the pot body of this application in Fig. 9 is close to the inner container of the electric pressure cooker, and its inner cavities are all used for containing food, indicating that this pot body (Fig. 9) is not the another one (Fig. 8). Although the meanings of " slot on the pot handle" and "plug slot on the pot handle" in the instructions are almost the same, it is different from the analysis of functions and components. From Fig. 9, it can be seen that the pot handle in the drawing of this application is also provided with2 slots (its original reference number is 21 and 23). Therefore, 2 useful functions are produced (as indicated by the arrow), of which the handle of the pot (original reference No. 20) can lift up or carry the pot, which is a known technology; as shown in Fig. 9 (No. 21), it can support the cover of the pot upright, which is different from the existing technology in Fig. 10; reference No. 23 stands obliquely to support the pot cover in Fig. 9, which helps to discharge oil-smoke and steam (the pot body is particularly suitable for being used as hotpot). As shown in Fig. 11, this is totally innovative technical feature and a function that can infer its technical effect. However, in the comparative patent (1) of Fig. 8, there is only one slot on the pot handle of the outer shell of the pot body, which has only one support function. That is, pressure pot cover is supported on the pressure pot shell.

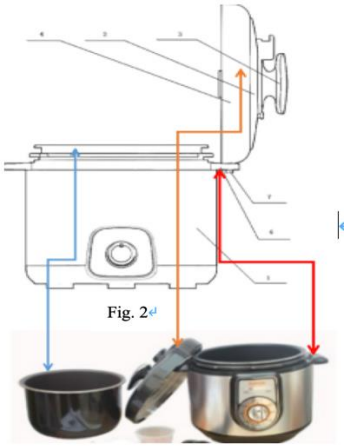


Fig. 8 Schematic and physical diagram of the electric pressure pot in the comparative patent 1

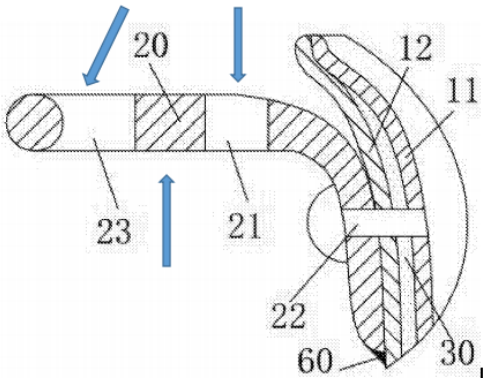


Fig. 9 Fig.1: Pot handle of this application

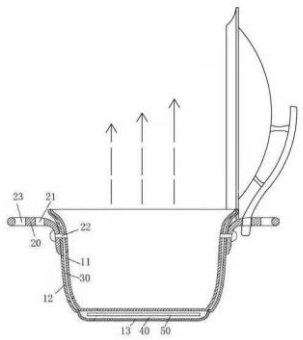


Fig. 10 Pot cover vertical support in the figure attached to the application

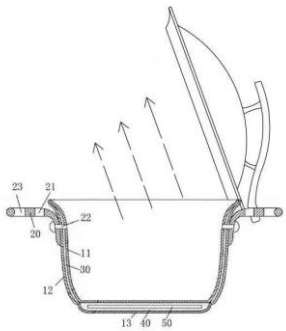


Fig. 11 Pot cover oblique support in the figure attached to the application

It's found through the above comparison and analysis that: Firstly, the agent and even the examiners misunderstood the words “tool” that produces the supporting function, namely “pot body”, so that this pot is equivalent to the other one. Secondly, there is no in-depth comparison and analysis of the features and functions of the pot, pot handle and component tools, completely ignoring the difference in technical characteristics and beneficial effects. On the contrary, after functional four element analysis and the analysis of functions and components, it indicates that the handle of the pot in this application has another 2 slots (The technical problem to be solved is: how to better support the cover of the pot, which is not obviously shown). Its useful function is more powerful. That is, beneficial technical effect is more remarkable. As shown in Fig. 10, it can support the cover of the pot upright; as shown in Fig. 11, it can also support the cover of the pot obliquely, so that the oil-smoke and steam in the pot are discharged in side direction. These technical features are not found in all comparative patents, are non-obvious technologies and have prominent substantive features.

The above analysis shall be converted into the language for defense (for agent reference), that is: based on the distinctive technical feature (1), it needs an additional connector on the pot cover to connect with the connecting slots on the pot. (This "pot body" is different from that of the application, so people may misunderstand; the "pot" actually is the outer casing of the electric pressure pot, and the cooker contains water and food materials, which does not have "ear"). As for the pot directly containing water and food in the application. And 2 slots on the handle (see Fig. 9, No. 21: slot , No. 23: port) are used for the handle of the pot cover to be inserted directly . When cover handle is directly inserted into slot (21), the cover of the pot is nearly vertically supported, and when cover handle is directly inserted into port (23), the cover of the pot is tilted toward the center of the pot and supported; apart from the supporting function that the cover of the pot can be supported upright, when the cover is supported obliquely, it helps to discharge oil-smoke and vapor (be able to infer the technical effect"); at the same time, it can effectively reduce members on the cover and the difficulty of cover molding. Therefore, these two are very different in structural features and functional effects. (The upright texts are written by the agent, and the italic ones are written by the inventor for the reference of the agent. The draft is still finalized by the agent.)

4. Debate on the Far Infrared Function

“Patent Avoidance” is also adopted in defense analysis to analyze the functions and components of the corresponding distinctive technical features, and “comparative patent” can be understood as “modifying/changing, adding, subtracting and disassembling” the “target patent”. The bottom of the pot body in the comparative patent (2) has the same 5-layer structure as that of this application, and is shown in the enlarged analysis schematic diagram of Fig. 12. In the contents on the left of Fig. 12 ([0017], [0019] and [0020] in comparative patent 2, the layers 1 and 5 are made of stainless steel sheet of the “short-wave far infrared pot”. Its far infrared emission function has been remained and transferred, and its components are modified/changed into layers 2 and 4 (from top to bottom) of this application with “far infrared functional powder”; layer 2 on the left of the Fig. 12 is the medical stainless steel, and as layer 2 is not in contact with food in the pot, the so-called “medical grade” means excess, which shall be deleted or cut; although layer 5 has the short-wave far infrared function, its material is unknown (potential technical problems). If 430 steel can be combined with layer 4, and if 304 steel is non-magnetic, it shall also be deleted. The first layer of the application is the food grade 304 stainless steel

(right of the Fig. 12); the second and fourth layers of the application are far infrared function powder layers (radiation effect) based on tourmaline, the third layer is pure aluminum sheet (heat conduction), and the fifth layer converts 430 stainless steel into magnetized and energized 430 magnetized steel, because 430 magnetized stainless steel has higher magnetic permeability, electromagnetic induction is enhanced so that it can better cooperate with the induction pot to produce a powerful vortex thermal power; at the same time, this magnetized stainless steel can reflect far infrared materials mainly made of tourmaline. When these two kinds of materials are in the same thermal field, these three constitute object-field collaboration, which allows far infrared material layers to radiate more powerful far infrared rays. Therefore, the results of the above analysis and comparison are shown in Fig. 12 (left), which shows that 2 parts of the 5-layer structure of the bottom of the pot in comparative patent 2 have been “deleted”, 2 component performances are "modified / changed", and 1 component is "added". The distinctive technical features in the Fig. 12 (right) that makes this invention (5 major effects: electromagnetic induction, heat conduction, reflection, radiation, and co-frequency resonance) solves the potential technical problems of comparative patents, and highlights the powerful cooking functions of the pot. In addition, it's more energy saving and it produces unexpected technical effects. As shown in Fig. 13, functional attribute analysis is applied to investigate the past, present and future performance of the functional analysis, and the product of this patent still has a residual heat utilization function of 5 to 10 minutes even after power failure in the cooking process (The 4th section in the temperature change curve of infrared body of pot is shown in Fig. 13 below): it can be used to steam fish with power cut or fry eggs.

Through the above analysis of functions and components and the application of “patent avoidance”, the following shall be added to the opinions on defense in the first audit: “The first functional powder layer arranged on the side wall enables the side wall of the pot to be insulated (for the outside of the pot), to preserve heat, and to conduct heat internally. More importantly, it can be cooperated with the second functional powder layer to comprehensively heat the pot. While heat preservation and ripening of food are realized, the powerful far infrared fully radiated by the far infrared functional material layer of the fully heated pot to resonate with food in the pot under the same frequency, which helps food to be cooked with rich nutrition and well-flavored.” Such change not only highlights distinctive technical features, but also displays powerful functions. In addition, it indicates that this application has beneficial distinctive technical features and significant technical effects as well as prominent substantial characteristics.

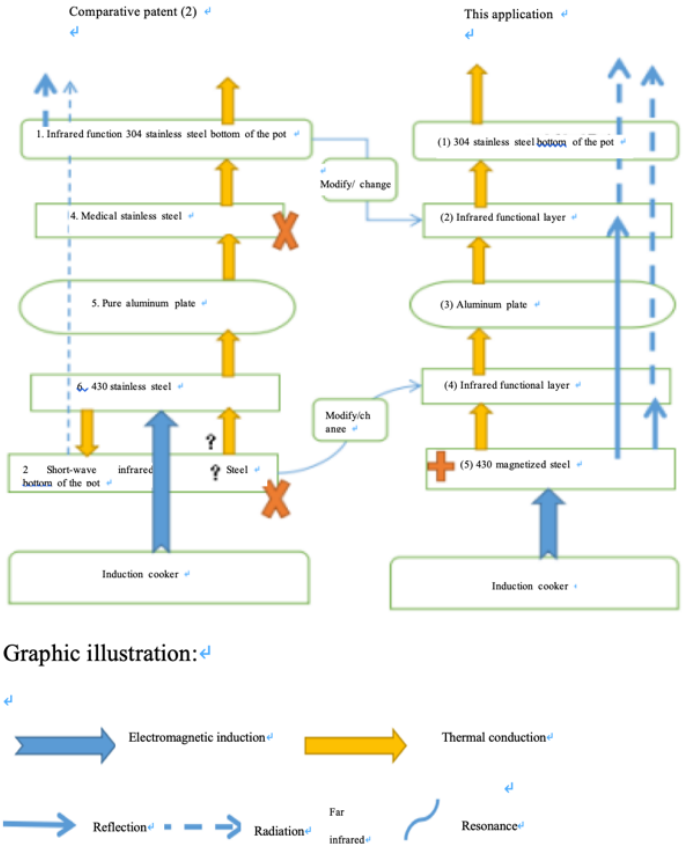


Fig. 12 Analysis and improvement of the structure at the bottom of the pot in the comparative patent (2) and this application

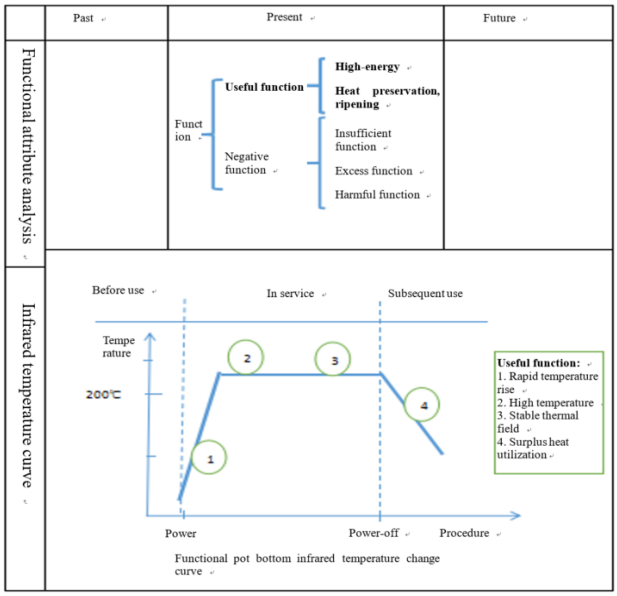
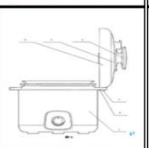


Fig. 13 Analysis of pot bottom's infrared function attribute debate on holistic analysis

The above analysis of functions and components and the application of "patent avoidance" can be briefly summarized in Table 1: the component/principle/function/value of the invention and comparative patents 1, 2 corresponding to the concept of "hierarchy view" are compared and analyzed. Among them, the concept of "hierarchy view" comes from the viewpoints [1] of a Taiwan TRIZ researcher: inventive innovation problem solving can be more innovative at different levels, i.e. component/principle/function/value, meeting at a higher level. " It's believed from the learning and application of this theory and patent knowledge that it's necessary to optimize these two and apply them to patent defense and analysis, of which "component/principle" is equivalent to "prominent substantial characteristics". That is, the component, position and relationship (principle) of the invention are quite different from comparative patents 1, 2. "Function/Value" is equivalent to "significant progress". In other words, the pot of the invention has at least 6 useful functions; while comparative patents only have 2 useful functions, but excess function occurs (such as [0020] medical 18-10 stainless steel is used in the inter-layer); there is also the harmful function arising from the pursuit of high thermal field (overheat will be affected by "Curie Point", 430 stainless steel will be demagnetized, no change within 300 degrees generally, but "fired under 800 degrees for 30 to 40 minutes" in [0027] of this manual); and as shown in Fig. 12, it's pointed out that the material of pot bottom 2 in comparative patent 2 is unknown, and if it's made of 304 steel and is not magnetized, this is also harmful. Its value [2] shows that "6 useful functions/1 pot" of the invention is larger than the comparative patent 2 /1 pot (2 useful functions – excess function – 1 to 2 harmful functions). Therefore, the two parts are analyzed and connected to form a "judgment on patent creativity", which has "prominent substantive characteristics", and it's believed that this invention is expected to win and be patented after analysis of patent defense.

Other factors, such as "unexpected technical effects achieved by the invention", which need to be considered in the judgment of patent creativity are used to judge 5.3 and 6.3 in Chapter 4 of Part II in Guidelines for Patent audit 2010[8], and it's pointed out that when the patent is compared with the existing technology, its technical effects have produced changes of "quality" and "quantity", which are beyond people's expectations). From the above analysis, such as in Table 1, on a similar pot, the value of this invention is "6 useful functions/1 pot", while the comparative patent's value is (2 useful functions – excess function – 1 to 2 harmful functions) /1 pot. The comparison indicates that: the invention has achieved unexpected technical effects (mainly changes of "quantity" in useful functions), so creativity of the invention is further judged, and it's believed that defense has a relatively large chance of winning the defense.

Table 1 Defense analysis of pot with vertical cover

Patent creativity judgment	hierarchy view	Patent – Pot Vertical cover 201610658173.1, technical field; cooking pot, A47J 27/00; technical issues: reduce the loss of nutrition and make food healthy and delicious. Pot cover placement.	Comparative patent (1) - split-type electric pressure pot 201120262125.3, technical field; kitchen appliances, A47J 27/08; technical issues: The pot cover can stand on the outer shell of the electric pressure cooker.	Comparative patent (2) - short-wave far infrared pot 201520071953.7, technical field; cooking pot, A47J 27/00; technical issues: Reduce burnt food and absorption of other smell.
				
Outstanding substantive features	Module: consist of mutual relations and position.	pot handle with jack, pot with extra layers, pot wall with the functional layer, bottom support.	Pressure pot cover with plugs, outer casing of the pressure pot, inner tank.	Pot cover, pot, bottom of the 5-layer functional pot.
	Principles: principles or effects.	Electromagnetic induction, heat conduction, reflection, radiation, Resonance.		Electromagnetic induction, heat conduction, radiation, resonance.
Significant progress	Function: useful or harmful function.	Oblique cover,Vertical cover, infrared emission, electromagnetic heating, heat preservation and waste heat utilization.	Vertical cover	Infrared emission, electromagnetic heating. **Excess function:** medical stainless steel; **Harmful function:** pursuit of high thermal field (800 degrees).
	Values: function/cost	**High value** 6 useful functions/1 pot	Low value	**Low value** (2 useful functions – excess function – 1 to 2 harmful functions) /1 pot.
Unexpected technical effects (changes of "quantity" in useful functions), relatively large chance of winning the defense.				
Expected authorization				

5. Defense Results of the First Audit

Through the analysis and comparison of Strengthening and Regeneration of Systematic Patent Avoidance and other methods, it's also necessary to convert TRIZ analysis into patent defense and modify it based on the agent's defense opinions. This case is modified based on Opinions of Statement and added with 30% of the total key quantities. At last, this application was successfully approved after first audit, and the invention authorization certificate of this application was issued by the National Intellectual Property Administration on Mar. 16, 2018.

6. Discussion on Problem Analysis

Based on the comparison of patent application documents and comparative patents in technical fields, problems, effects and features, functional analysis, patent avoidance, patent cutting, hierarchy view, etc. of TRIZ are first used in this paper for deepened analysis of patent defense, in-depth discussion on patent creativity judgment, and evaluation corresponding to "prominent substantial features" and "significant progress" necessary for patent defense is conducted. The purpose is to make the judgment of creativity reflected in the application document more objective and accurate, and it's easier to be recognized by the patent examiners. However, TRIZ application in China has still been at the initial stage, and its application is more concentrated on solutions to engineering technological innovation. The theory itself has been improved constantly, and TRIZ is first applied to analysis of patent application defense in this paper. Although it helps win the defense, points proposed still need more case practice and verification. You are welcome to criticize and correct this paper.

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Zheng Demou, senior engineer and deuty chief engineer of Fujian jinyuanyuan Technology Development Co., Ltd. He graduated from Hefei University of technology in 1976. In 2012, he began to receive TRIZ training. In 2014, he has obtained patent authorization of "an improved design method for the base of table top water purifier applying TRIZ" (cn201410781798.8, cn201410781799.2), and application of "the structure and design method of boiler based on TRIZ" (cn201410806978.7). Since 2015, recommended by Fujian science and Technology Association of China and other departments, it has successively undertaken basic and upgrading training of enterprise innovation methods in Pingtan Experimental Zone, Fuzhou City, Xiamen City, Anxi County and Fuzhou University, with more than 500 trainees. Since 2018, he has participated in the 8th-10th global system innovation competition (GCSI) and the 9th-11th International Conference on system innovation (ICSI) three times, and won silver award and excellent thesis award twice. From 2018 to 2020, he participated in Fujian Taiwan Innovation Methods exchange meeting (Xiamen, China) three times and made keynote speeches. Since 2014, individuals and innovation teams have applied TRIZ to create more than 259 invention applications, including 31 authorized inventions. Since 2017, it has undertaken the innovation method application project of the Ministry of science and technology of China for the second time, and has obtained more than 1.2 million yuan of scientific research funds.

Xu Daohua, chairman of Fujian OSPRING Technology & Development Co., Ltd., with more than 30 years of experience and leadership in the field of applied physics and water treatment technology, is a famous expert and entrepreneur in China's health function water industry, and an excellent entrepreneur in Fujian Province.He has participated in the Chemiluminescence Test Group of National 863 Project. Now he is the director of China Invention Association, the member of Expert Committee of China Health Care Association, the vice president of Fujian Intellectual Property Association, and the vice president of Fuzhou Enterprise and Entrepreneur Federation. He is also the leading expert of China health function water industry standard, the standing director of China Invention Association, the member of the Expert Committee of China Health Association, and the member of the Financial and Economic Committee of Standing Committee of Fuzhou Municipal People's Congress. He has won the 2016 National Advanced Individual in Intellectual Property Work, the Fourth National Award for Invention and Entrepreneurship, two gold and one silver awards in the Sixth International Invention Exhibition, and "Top Ten Scientific and Technological Workers" by China Health Care Association. In addition, he is also one of the top 50 of China Central Television's "I am an Inventor" campaign. Up to now, he has personally participated in more than 400 inventions. Under the leadership of Xu Daohua, Fujian OSPRING Technology & Development Co., Ltd. has been successively awarded the following honors and titles: National Intellectual Property Advantage Enterprise, Fujian High-tech Enterprise, Fujian Innovative Enterprise, Fujian Famous Trademark, Top Ten Creditable Brands in China Health Care Industry, etc.

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Zheng Qin, R&D manager of Fujian Ospring Technology Development Co., Ltd., master's degree. In 2016, he graduated from Fuzhou University and began to receive TRIZ training and practical application. Till now, he and his team have created more than 88 patent applications (including 33 invention patent applications) through TRIZ. In 2020, he participated in the Special Project for Innovation Method Application of China's Ministry of Science and Technology.

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