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Research on the Development Trend of Building energy saving Doors and Windows patents in China

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ABSTRACT

Based on the current situation of energy-saving doors and Windows, this paper USES patent software to analyze the patent types, annual number of applications, patent distribution in various provinces and regions, applicants and technical hot spots of Energy-saving doors and Windows in China. Finally, combined with the actual situation in China, it puts forward Suggestions for the development of energy-saving doors and Windows in buildings.

Keywords: *China; Energy-saving Windows and doors; Patent analysis.*

Introduction:

Building energy conservation is an important part of the whole energy conservation work[1]. It is a problem that all countries in the world pay attention to at present, and it is also the strategic focus of China's economic work. The energy consumption in the process of using existing buildings in China accounts for 27.5% of the energy consumption in the social terminal in China[2]. According to the experience of developed countries, with the improvement of residents' living standards, this proportion will gradually increase to about 40%[3]. Therefore, China's building energy conservation potential is not only huge, and the task is quite difficult. With the deepening of building a resource-saving and environment-friendly society and energy conservation and emission reduction work in China[4], the importance and urgency of building energy conservation work will become increasingly prominent[5]. An important link in building energy conservation is the energy conservation design and application of building enclosure construction such as doors and Windows[6]. The development trend of doors and Windows energy conservation technology directly affects the success or failure of building energy conservation. From the perspective of patent econometric analysis, the study of China's building energy-saving doors and Windows technology can provide macroscopic data support for the government's policy formulation and adjustment of energy conservation and emission reduction[7]. At the same time, it can also specifically guide relevant enterprises to carry out strategic layout and provide impetus for the subsequent development of enterprises.

Analysis of the development trend of Energy-saving doors and Windows in Chinese buildings:

Through The search of InnoJoy patent software, it is found that there are 2437 patents related to energy-saving doors and Windows in China (up to October 28, 2020), and the specific distribution of patents is as follows.

Distribution of patent types of Energy-saving doors and Windows in China

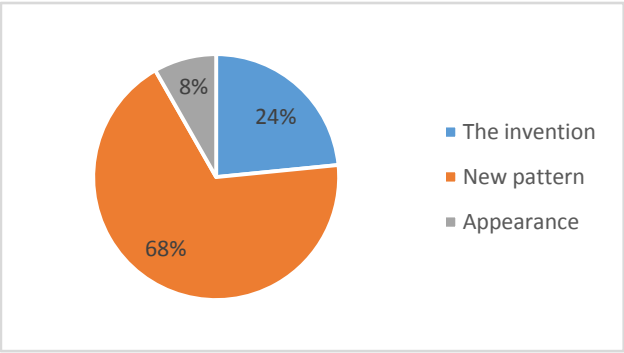

FIG. 1 Patent type distribution of Energy-saving doors and Windows in China

As can be seen from Figure 1, utility model patents account for the largest proportion of China's energy-saving doors and Windows, with 1,665 patents accounting for 68% of all patents. The smallest proportion is 201 design patents, accounting for only 8%; There were 571 invention patents that best reflected the core technology of door and window energy saving, accounting for nearly a quarter of all patents. This shows that the development of energy-saving doors and Windows technology in Our country is still in the initial stage of low technical content, without the new breakthrough of core energy-saving technology, the energy-saving industry of doors and Windows will be very difficult to develop rapidly.

Analysis of the annual application situation of China energy-saving Doors and Windows patent

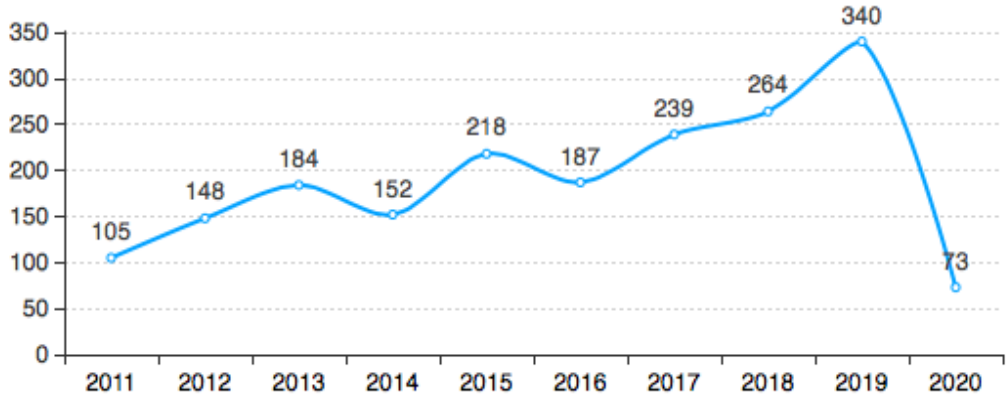

FIG. 2 Annual application volume of China energy-saving Doors and Windows patent

The patent application of door of Door of Chinese energy conservation has appeared from 33 years ago (1987), but until 10 years ago, annual application of door of energy conservation does not exceed 100, show right now the bud period that is technology of door of door of Chinese energy conservation, development of each technology is slower. However, since 2011, the annual application of energy-saving doors and Windows patent in China has been growing rapidly. Not only has the number of applications exceeded 100 each year, but also shows an increasing trend year by year. This is also the epitome of China's rapid economic growth in the past decade. With the rapid development of China's economy, people have higher and higher requirements for living comfort, which will also promote the rapid development of energy-saving doors and Windows technology. It is worth noting that in the recent three years (2017-2019), energy-saving doors and Windows technology has developed rapidly, and the number of patent applications each year has been creating new highs, and the number of patents in 2019 actually reached as many as 340, which reflects that energy-saving doors and Windows technology has been a hot spot in the market in recent years. This year (2020) only 73 patents have been filed, but that does not mean much because the review cycle is long (typically around a year) and many new applications have not yet been shown.

Patent applications for energy-saving doors and Windows in various provinces and regions of China

FIG. 3 Patent application distribution of energy-saving doors and Windows in various provinces and regions of China

FIG. 3 From different colors, it can be seen that there are great differences in the distribution of energy-saving doors and Windows technology patents among provinces, regions and cities in China. The eastern coastal provinces are big provinces with energy-saving door and window patent layout, especially Zhejiang province and Jiangsu Province, which are far ahead of other provinces, regions and cities.

As early as 2007, Zhejiang Province issued the Measures for The Administration of Building Energy Conservation, which aims to strengthen the management of building energy conservation, reduce building energy consumption, improve energy utilization efficiency and promote sustainable economic and social development. According to the actual situation of building energy conservation in Zhejiang Province, the Province implemented the More detailed "Zhejiang Green Building Regulations" in 2016, which specified the technical index requirements of doors, Windows and other building structures and fittings, facilities and equipment, and adopted green building technical measures and other contents. The promulgation and implementation of these policy measures and regulations has provided a strong guarantee for building energy conservation at the government level, especially for the development of energy-saving doors and Windows technology, and promoted the emergence of energy-saving doors and Windows technology in large Numbers in Zhejiang Province.

In jiangsu province and zhejiang province not only introduced a similar security building energy conservation policy regulation, carried out in jiangsu province and even energy-saving compulsive standard doors and Windows, outside doors and Windows of standardized design of residential building in jiangsu area is put forward new requirements, in the allocation of size, glass, energy-saving attached to the frame, as a mandatory standards is the first domestic provinces have similar standards. These measures will also affect the development of energy-saving doors and Windows technology, and effectively promote the increasing number of energy-saving doors and Windows patents.

Table 1 China's top ten provinces, autonomous regions and municipalities for the patent application of energy-saving doors and Windows

Province (city, district)	The number of patents
Zhengjiang	466
Jiangsu	339

Anhui	167
Shangdong	157
Heilongjiang	141
Henan	126
Hubei	113
Guangdong	110
Beijing	99
Sichuan	90

Analysis of patent applicants for Chinese energy-saving Doors and Windows

Table 2 Top ten patent applicants for Energy-saving Doors and Windows in China

The applicant	The number of patents
Ouchuang Plastic Building Materials (Zhejiang) Co. LTD	103
Anhui Jihaojia Energy-saving Doors and Windows Co. LTD	67
Zhejiang Ruiming Energy-saving Doors and Windows Co. LTD	66
Henan Tofike Energy-saving Doors and Windows Co. LTD	62
Heilongjiang Vigorously Energy-saving Doors and Windows Research Institute	61
Guangxi Fumeiyao Energy-saving Doors and Windows Co. LTD	51
Zhejiang Ruiming Energy-saving Doors and Windows Co. LTD	45
Sichuan Neider Energy-saving Doors and Windows Co. LTD	38
Harbin Huaxing Energy-saving Doors and Windows Co. LTD	37
Changsha Longxin Energy-saving Doors and Windows Co. LTD	32

It can be seen from table 2 that only one of the top ten patent applicants for energy saving doors and Windows in China has more than 100 patents, while the remaining ten have only dozens of patents, among which the tenth has only 32 patents. In addition, the total number of patents issued by the top ten enterprises was only 562, accounting for 23.1% of all patents. This shows energy-saving door window technology has not formed patent monopoly situation in China, most enterprises are still in the preliminary stage of technical layout, the number of enterprises mastering the core technology of energy-saving doors and Windows is small and not strong.

By further retrieval, found that the number of patents the number one cause of the gen plastic building materials (zhejiang) co., LTD., founded in 1998, its business scope production line installation of window of model steel door and steel, plastic materials, plastic doors and Windows, profiles and other special die, at the same time the company's controlling shareholder, European and international group co., LTD., in the United States has a deep overseas background. Among the 103 Windows and doors energy-saving patents of the company, 96 were for utility model (93.2%) and only 7 were for invention (6.8%), indicating that the core technology of doors and Windows energy-saving of the company is still relatively weak and the patent quality needs to be further improved. Anhui Jihaojia Energy-saving Doors and Windows Co., Ranked second, has 17 invention patents (25%), although the number of patents is only 67, indicating that the company pays attention to the development and protection of energy-saving doors and Windows technology, and its patent quality is

correspondingly high.

Hot spot analysis of China's energy-saving doors and Windows patent technology

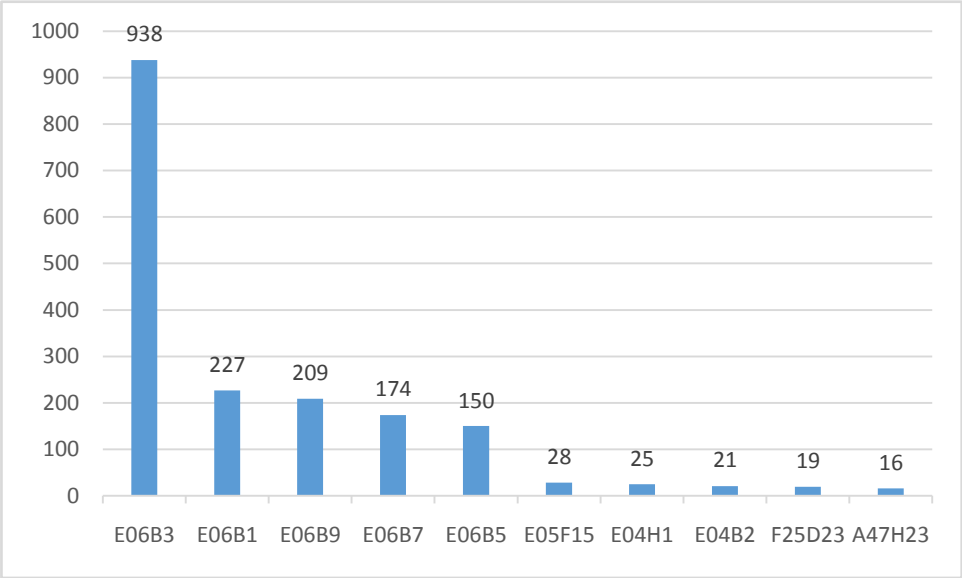

FIG. 4 IPC technology classification of Chinese energy-saving Doors and Windows Patent

As can be seen from Figure 4, hot spots of patented technology for energy saving doors and Windows in China are mainly distributed in E06B3, E06B1, E06B9, E06B7, E06B5 and other 5 fields, especially E06B3 has absolute advantage in proportion. Through further inquiry, it is found that E06B3 mainly involves the energy-saving design and construction of window sash and door sash. This also reflected the research and development hot spot of current door window energy-saving technology is concentrated in the technical innovation of the closed shade such as window sash, door sash, etc., but the technical hot spot of too concentration is not conducive to the comprehensive and healthy development of energy-saving doors and Windows, relevant technical personnel should set their eyes on other fields of broader energy-saving doors and Windows. Not only can avoid the same technology, the competition is white-hot, but also can leapfrog development, overtaking on the corners, so that they have a strong competitive advantage.

Conclusions and recommendations:

Although China's energy-saving doors and Windows patent applications grow rapidly in recent years, there are significant regional differences, which requires the government to give active industrial guidance. If can establish fund of development of door window of energy conservation, work out economy to encourage measure, the purpose is to improve the working enthusiasm of research and development of door window of energy conservation, make door window energy conservation technology develops healthily.

At present, the proportion of invention patents in China's energy-saving doors and Windows patents is relatively low, indicating that the r&d of energy-saving technologies for doors and Windows is relatively backward. It is necessary to comprehensively, organically and systematically develop energy-saving technologies for doors and Windows, change the current practice of only paying attention to a certain side or link in the development of energy-saving doors and Windows products, and actively develop integrated energy-saving technologies such as energy-saving integrated technologies for doors and Windows and interactive technologies among multi-energy consumption systems.

Governments at all levels shall build a platform for communication and promotion of energy-saving doors and

Windows products and technologies. In areas where conditions permit, it is necessary to build demonstration projects for the renovation of energy-saving doors and Windows, combine comprehensive technologies with specific projects, and make the market understand and recognize the advantages of energy-saving doors and Windows products through demonstration projects, so as to promote the industrialization development of energy-saving doors and Windows.

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