

Patent Analysis : International Patent Classification and File Index & F-term Classification

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ABSTRACT

Patent information consists of huge critical technological information. It can be served as a vital index of scientific and economical development as well as a main device in creating and developing a specific technology. This study begins with exploring the basic structure of patent data and further examining the constitution of the International Patent Classification and composition of FI & F-term of Japanese Patent Office (JPO) in great detail.

1. Short History of International Patent Classification(IPC)

The International Patent Classification is the fruit of international technical exchanges which has been globally recognized as a patent classification for the technical inventions. Starting with French Strasbourg Agreement in 1949, more than 10 countries had been working hard more than 20 years on planning and design and finally come out the first edition of the International Patent Classification in 1968. The revision of IPC is made regularly once every five years which incorporates the newly developed technology in the latest five years. IPC not only paints a colorful track of human historical civilization, but stands for the remarkable advance of global development in science and technology. From the fifth edition on, the publication of new edition was assigned to be the sole responsibility of the World Intellectual Property Organization (WIPO). Each edition consolidates new inventions and discoveries, symmetrically classified and coded. It symbolizes a solid chronicle of scientific civilization and technical development of human being. Up to the present time, WIPO has published the Eighth Edition of IPC. The English abbreviation symbol for IPC is "Int. Cl." and the Eighth Edition is represented "Int. Cl⁸" which was published on January 1, 2006. In the IPC Bulletin, the symbol for a registered patent is recorded as H01C 10/40, which implies

<u>H</u>	<u>01</u>	<u>C</u>	<u>10</u> / <u>40</u>
Section	Class	Subclass	Main group / Subgroup

The First Edition of IPC contained eight sections, 115 classes, 607 subclasses, 6,175 main groups, 41,088 subgroups, and 47,263 items. It continues to add new patents as the eight edition shows.

IPC divides all technical fields into eight sections, A, B, C, D, E, F, G and H. The top level is section. Each section might be further subdivided into subsection, but without missing any identified symbol for each subsection. Based on the contents, the section is divided into 'class' and the symbol comprises two digits following the Roman alphabet.

The subclass is a subdivision from the class with more accurate technical presentation. The subclass consists of one Roman alphabet, closely following the two digits of class symbol. In the First Edition, the Roman alphabet was written in lowercase letter, but changed to the capital letter beginning with the Second Edition. The vowels A, E, I, O, U and X are not used, but not necessary to start with B. Once the subclass symbol is superseded, it will never appear again. The subclass is subdivided into groups and subgroups. The group is represented by a slash (/), composed of digits before and after the oblique stroke, the digit before the oblique stroke is a single digit and the digits after the slash are double digits.

The Eighth Edition of IPC contains 8 sections, 129 classes, 639 subclasses. There are 68,711 items including main groups and subgroups as shown in Table. 1.

Table. 1 Entries or subgroups of Eighth Edition in IPC

Section	Class	Sub class	Main group	Sub group	Item
A	16	84	1103	7290	8393
B	37	167	1974	14568	16542
C	21	93	1326	13119	14445
D	9	39	349	2611	2960
E	8	31	318	2900	3218
F	18	97	1049	7295	8344
G	14	79	679	6789	7468
H	6	49	516	6825	7341
Total	129	639	7314	61397	68711

The title and symbol of eight Sections are as follows:

- A** Section : Human necessities
- B** Section : Performing operation; Transporting

- C** Section : Chemistry; Metallurgy
- D** Section : Textile; Paper
- E** Section : Fixed construction
- F** Section : Mechanical engineering; Lighting; Heating; Weapons; Blasting
- G** Section : Physics
- H** Section : Electricity

After the section symbol, dots and lines are used as an extension to end with the subgroup. The 68,711 items mean the grand contribution of 68,711 technical inventions. The IPC classification adopts decimal system, where two digits after the slash compose the subgroup, third digit after the slash way be added to further divide the subgroup, if required. For example, the 3/426 implies a patent ranked between 3/42 and 3/43 and 5/118 between 5/11 and 5/12. Under any circumstance, the subgroup is a subordinate and is restricted to define the main group. A complete patent classification is supposed to include section symbol, class symbol, subclass symbol and group symbol (subgroup included). Taking H01 C 10/40 is as an example, as shown in Fig. 1 where H stands for the eighth section, Electricity; 01 for basic electric elements; C for the resistor of the basic elements and 10/40 for the screw operated adjustable resistance.

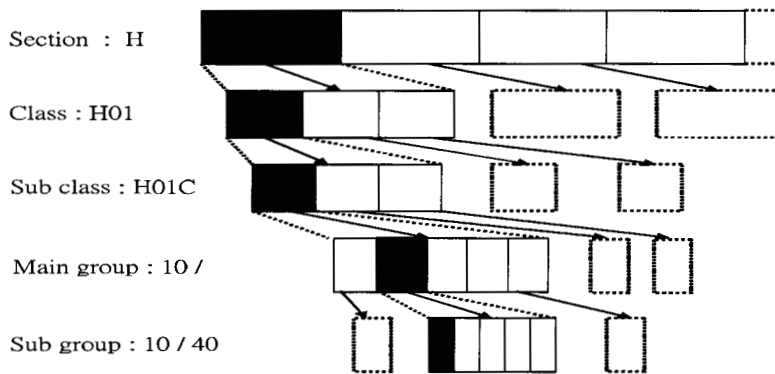


Fig. 1 IPC Division from section to subgroup

2. File Index (FI) and F-term Classification System

2.1 Comparison of IPC and FI

File Index (FI) [1] are a delicate extension from IPC based on multiple technical viewpoints, covering purpose, efficiency, usage, construction, material, fabrication, measurement, performance, and control. The main aim is to apply the cross analysis, from point, to line, to area and to integration on each particular technical field in an effort to minimize the unnecessary misinformation, to organize the data in the best presentation for

the reader to effectively control the technical core and achieve the best result in industrial research and technical development [2].

FI contains a complete IPC symbol (from section to subgroup), plus three digit and/or a Roman alphabet. There is no hierarchical system existing among the file discrimination symbols [3].

2.2 FI symbol

(1) IPC symbol

G 11 B 20 / 18
 Section Class Subclass Maingroup / Subgroup

(2) IPC+ File discrimination symbol

G 11 B 20/18 D (D is File discrimination symbol)

(3) IPC+subdivision symbol

G 11 B 20/18 , 542 (542 is subdivision symbol)

(4) IPC+subdivision symbol+ File discrimination symbol

G 11 B 20/18 , 542 D

As shown in Fig. 2, taking IPC symbol G11B 20/18 as an example, FI is to subdivide IPC with the file discrimination system which forms the F- term classification system.

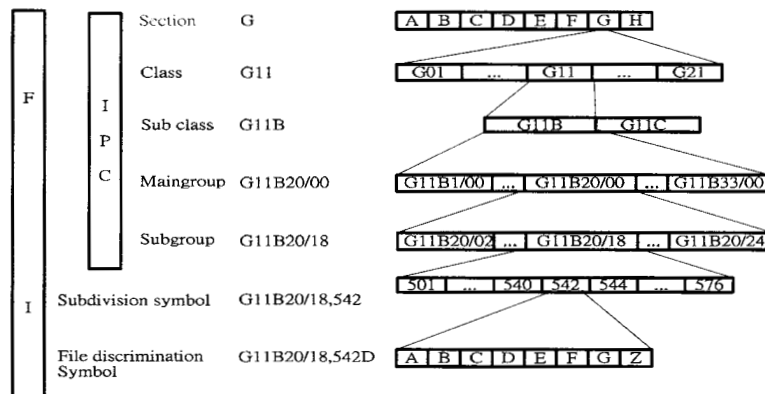


Fig. 2 Comparison of IPC and FI

For easy file control and management, File Index technically divides the files based on single technical viewpoint (F_S) and multiple technical viewpoints (F_M). As shown in Fig. 2, FI subdivides IPC symbol G11B 20/18 with the file discrimination symbol. Schellner pointed in his article 'Japanese Index classification and F-term' published in World Information 2002 that FI classification contains 170,000 subgroups,

much more than 70,000 subgroups the IPC holds. The number of subgroups the European Patent Office Classification (EPOC) holds is between these two figures [4].

2.3 Comparison of IPC and F-term

The file index and the F-term classification system developed by JPO is a delicate extension of IPC system based on multiple technical viewpoints, such as purpose, efficiency, usage, construction, material, fabrication, measurement and performance. A cross analysis from point to line, to area and to integration on a particular technical field in an effort to minimize unnecessary misinformation and to organize the data in best presentation, easy for the readers to control the technical core, and achieve effectively the patentable technical development [5].

F-term (File Forming Term) is to expand the IPC symbol with multiple components in order to subdivide the particular technical subject with multiple technical viewpoints. As shown in Fig. 3. The Figure shows the close relationship of IPC and F-term. F-term covers multiple technical viewpoints, utilizing logic operators (+, -, ·, * etc.) to precede the lateral search, as well as cross-examining the specific technical field. Schellner further points out in his article previously mentioned that F-term contains a variety of 1,700 theme codes, comprising 350,000 term codes. The technical information once expended to 350,000 subgroups, provides multiples of accuracy than IPC system. Apparently, F-term defines the technical features and core of the patent much better than IPC system provides [6].

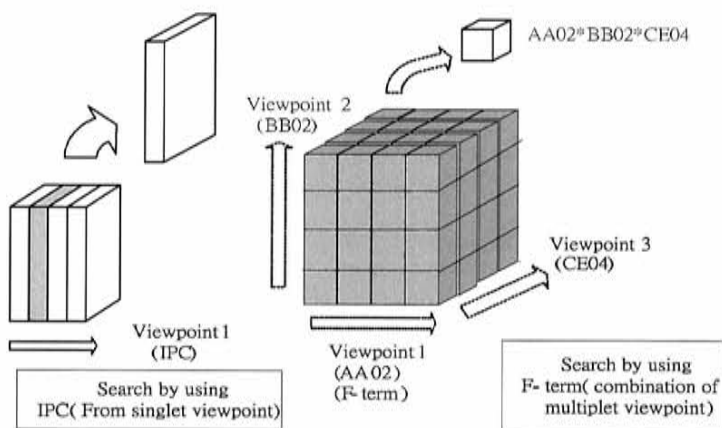


Fig. 3 Relationship of IPC and F-term

3. Composition of F-term

The viewpoint F-term expresses comprises two capital letters of Roman alphabet,

followed by two digits to imply the specific technical phenomenon and the description is restricted to 20 words. The recorded description is such as AA00: purpose, BA01: structure, BC01: function in which the level is “0”. Others such as AA01: minimization, AA12: free shrinkable, and the term level is above “1”.

◎ **F-term will include:**

- (1) F_S term in which s is deprived from the first alphabet of “Single”, implying that IPC expands from one single viewpoint. FI is expanded to include the file discrimination symbol for the file search and retrieval [7].
- (2) F_M term in which m is deprived from the first alphabet of “Multiple”, implying that it is expanded from multiple viewpoints. It also indicates that the current file discrimination symbol is not sufficient, the single FI symbol therefore must be treated convenient for multiple viewpoint search or FI therefore must be preceded with lateral search which permits to extend to the lower hierarchical level [8].

The theme code of F-term comprises five bits, two bits for viewpoint and two bits for description. Some theme code includes the supplementary code to describe the particular phenomena. The annex code is led by “.” added at the end of F-term.

◎ **F-term symbol**

<u>4G146</u>	<u>AA</u>	<u>11</u>	
theme code	viewpoint	figure	
<u>4G146</u>	<u>AA</u>	<u>11</u>	<u>•W</u>
theme code	viewpoint	figure	annex code

4. Technical Thinking of F-term List

Among 4G146 theme code, 4G is major subject JPO assigned to the technical classification symbol by JPO, starting from 2A, it is now extending to 5M. The last three digits is a series number. 4G146 theme code was published in December 2004 to incorporate the latest nano-technology which is covered the contents of C01B31/00 31/36 as provided by IPC. From the angle of the multiple viewpoints, it provides multiple classifications such as category of carbon, form, value limit, structure, characteristics, usage, processing, material and equipment. As shown in Fig. 4, 4G146 can be processed with logic operation to obtain detail technical division and present corresponding relationship of the technical delicacy [9].

**** F-term List ****

This screen shows the F-term list of the theme "4G146".

(Remarks)
(Not Translation)

4G146		Carbon and carbon compounds								
		C01B31/00-31/36,602								
AA00	AA01	AA02	AA03	AA04	AA05	AA06	AA07	AA08	AA09	
AA CARBON AND CARBON COMPOUNDS 1 (KINDS)	Carbon	Graphite	Thermally decomposed graphite and pyrographite	Diamond	Diamond-like and hydrogenated amorphous	Active carbon	Fullerene group and nano carbon	Fullerene and Cn (carbon cluster)	C60, C70	
	Nanotube and nanofiber	Single (monolayer) nanotube	Provided with an inclusion (imparted also AA07-19)		Containing components other than carbon *	Containing metal (Note 1) *	Containing hydrogen, boron or silicon *		Compos of two or more kind: carbon (graphite coated car or the like	
	Fitch (BB is imparted to its preparation and	Coke (BB is imparted to its preparation and treatment)	Mesocarbon (BB is imparted to its preparation and treatment)			Carbon compounds	Halide	Graphite intercalation compounds	Fullerene group and nano carb compound	

Fig. 4 The partial F-term list of the theme "4G146"

5. The Integration of IPC, ECLA, USPC, and FI

Starts from 2006, EPO, USPTO, the JPO oneself begins conformity IPC, ECLA(European Classification System), USPC (US Patent Classification), FI and so on the patent classification, as shown in Fig. 5[10], which establishes a world to be able commonly to use, moreover finer patent information databank.

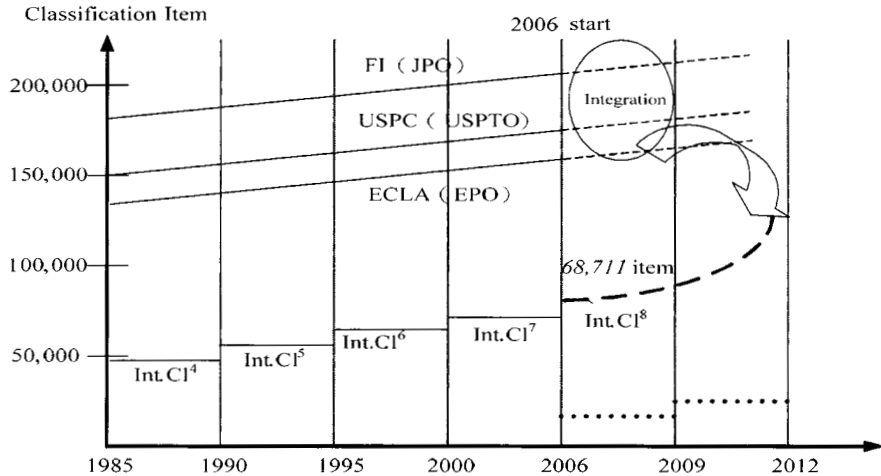


Fig. 5 The integration between IPC, ECLA, USPC, and FI are started from 2006

6. Conclusions

This study tries to utilize the F-term list developed by JPO (Japan Patent Office) comprised of two dimension list in File Index (FI) and F-term classification system from multiple viewpoints such as purpose, advantageous effect, use, constitution, material, process, measuring value, treating method, control means etc., Therefore, this study tries to depict the fundamental elements derived from research and development activities and explain how the analyzing skills work. Study the constitution relation of concepts of IPC, FI and F-term classification system accompanied with various plots and tables and operation modes.

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