Agriculture and Food Technology in the Patent Office*

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The file of United States patents has grown to almost 3,400,000 since the year 1790 when Thomas Jefferson issued the first patent. The Documentation Groups in the Patent Office have subdivided the literature into 310 classes and the classes into 68,000 subclasses to provide for retrieval of patents and literature for any desired subject. The patent is a legal document as well as a technical one, and the classification system must reflect in its subdivisions the examiners' search needs in determining the novelty of each pending application. Patents on food and agricultural technology are provided for in at least five major classes totaling many thousands of documents. Because a worker in this field makes use of many disciplines, other classes also may be of interest as well, such as the area of pure chemistry.

The foregoing abstract covers a lot of territory. The Patent Office, established in 1790, stems from the Constitutional Provision, Article I, Section 8: The Congress shall have the power to promote the progress of Science and Useful Arts, by securing for limited times to Authors and Inventors, the exclusive right to their respective Writings and Discoveries.

The patent is indeed a wonderful document. As a legal document, it has claims which determine the scope of protection secured to the inventor. As a technical document, it is a valuable source of scientific information covering prior art, and often the background information leading to the involved invention. This symposium, coming at a time when we are in the process of revising three of the major classes dealing with Agricultural and Food Technology, provides an opportunity to enumerate our efforts to make the patent useful for both its legal and its technical concepts as a source of scientific information in a documentation system.

The first classified list of patents in 1830 included as Class 1, Agriculture, Instruments, and Operations and as Class 4, Chemical Manufactures, Processes, and Compounds. Today there are 310 classes; of these, over 30 classes are considered "Chemical." Included within these 310 classes are some 68,000 subclasses for the almost 3,400,000 patents, of which one-third have issued in the past 25 years.

Title 35 of the United States Code, Section 9, deals with the Classification of Patents:

> The Commissioner may revise and maintain the classification by subject matter of United States letters patent, and such other patents and printed publications as may be necessary or practicable *for the purpose of determining with readiness and accuracy the novelty of inventions for which applications for patents are filed.* (Emphasis added.)

The italicized portion is of great significance since classification is primarily aimed at aiding novelty searches.

You have heard about various aspects of literature resources and searching difficulties. But the Patent Office search problem encompasses all of these and then some. To search for novelty, the patent examiner must search all patents, both domestic and foreign, and all published literature. And that is why abstracting services are so important to us. Cross-reference aspects are most important but, as will be explained infra, our cross-referencing is for a different purpose. The saying, "A little knowledge is a dangerous thing," may be compared with a lot of knowledge not adequately retrievable by those who have to seek it, as possibly being even more dangerous.

The quoted Section 9 is carried over in the new Patent Reform Act which also provides:

> Section 12. Research and Studies
> (*a*) The Commissioner shall conduct a program of research and development to improve and expedite the handling, classification, storage and retrieval of patents and other scientific and technical information.

We thus see that the Patent Office is charged with the responsibility of providing for novelty searches and for further research and development activities in the field of documentation. Of course "State-of-the-Art" searches and other research activities using patents, although not precluded, must be secondary in view of the Congressional Mandate. But as noted, supra, it must be kept in mind that the subject of all this classification is primarily a legal document. And our classification rules determine the location of the document in accordance with the claimed invention.

Thus, whereas other classification systems and abstracting services can cross-note their subjects indiscriminately, the Patent Office, to pin-point a search for patent infringement—i.e., to determine if a proposed venture and outlay of large amounts of investment money would infringe a valid claim—must have an accurate system for classifying a document so that the searcher can be led directly thereto. This need leads me to one of the two concepts in Patent Office Classification which I regard as classical and for the most part used only by our Office.

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The rules for determining the classification of the legal document are based on what is claimed as the measure of invention for which protection is sought. A rule of superiority[1] has been artificially established, and it has come down in a precise manner as follows:

1. Nonmanufacturing process (Process of using)
2. Nonmanufacturing apparatus (Apparatus for using)
3. Article or Product
4. Process
5. Apparatus
6. Stock or Blank

This rule is based upon the statutory subjects of invention and assigns priorities thereto. From a chemical basis, and analogies to nonchemical embodiments are obvious, application of the rule may be illustrated as follows:

The process of preparing a chemical product is secondary or inferior to the product of the process, although superior to the apparatus for carrying out the process. The use of the chemical product to kill an insect, to treat a plant to improve its growth, or to treat a living animal is a nonmanufacturing process since the dead insect, the living plant, or improved animal (even human) is not a classifiable article. The apparatus for spraying the field or treating the organism is a nonmanufacturing apparatus. The rules become simple. If all these subjects are claimed in one patent, we classify the patent according to the noted rule of superiority. Cross-references of the document are provided for in other classes where the claims are classified. And still further, we provide additional cross-references for unclaimed, albeit useful, technical disclosures. The stock or blank may be an intermediate product convertible to the final desired end product, or it may be the end product itself in which case item 6 becomes the controlling product listed as 3.

This is the normal superiority between classes. In some cases the most comprehensive claim is a method of using the article which could be a manufacturing process. By way of example, a new chemical which is an intermediate may be claimed along with its use to prepare some further chemical product. This use of the article or product is as comprehensive as the method of killing insects, etc. and would control the classification of the patent under most conditions. An exception is noted. If, in our classification system, the intermediate is classified first in our class 260 because it might be a more complex structure, then this article or product would be superior to the use even though the latter is a more comprehensive claim. This is a rule of superiority *within* a class as compared to the rule *between* classes.

In chemical classes, the product—e.g., a chemical compound or composition—and its process for preparation are usually classified together.

To carry out the imposing task of classifying all United States patents plus the many millions of foreign patents and nonpatent literature, we have a Documentation Group composed of some 80 professionals with supporting clerical staff, divided into Chemical, Electrical, and Mechanical Sections each attached to its corresponding Examining Operation. The classes are kept current by constant revision as required by technological advances recited in the patents issued. The Chemical Documentation Group, alone, in the past three years established four major classes totaling 775 subclasses involving 52,000 United States patents. In addition, during this period, 400 miscellaneous subclasses were created out of previously established subclasses.

Just what does this mean to the nonpatent oriented community? Each of our classes deals with a major technical subject. Class 260, Chemistry, Carbon Compounds, is the repository for information relating to organic chemical compounds, including synthetic resins and natural rubber. It has over 1000 subdivisions, known as subclasses, for detailed compound structures and their method of preparation. Included therein are over 100,000 original copies and more than twice this number of cross references. The compounds so provided for may be compounded into compositions or used in process form to kill noxious pests (animal or plant), and hence Class 260 is a subsidiary documentation tool or search file for the subject of our symposium. Chemical compounds are useful as additives for foods, adjuvants for pesticides, and as the primary ingredient of the control agent. Class 260 has a very detailed order of superiority of chemical compounds and for the most part follows accepted chemical complexity of structure in this arrangement, where hydrocarbons are the least complex and last appearing group of compounds.

As an example, our revised class 167 which will issue later this year as class 424 provides for Medicines, Poisons, and Cosmetics. The original class had some 90 subdivisions or subclasses in a confused and outmoded scheme. More important, it was overburdened with multiple copies of the same document which had plural disclosures of utility, none of which had a specific home in the original class.

The revised class has 400 subclasses based on chemical structure and use concepts for compositions and their use. In addition, we have provided a coordinate index system of some 600 descriptors for searches based on the function or utility of the chemical products. Documents so indexed can be searched by nonmanual means, in this case by optical coincidence, to provide a multifaceted approach for retrieval of compositions and uses.

In addition to class 167, there are four other major classes dealing with food and agricultural chemistry as follows:

1. Class 99, Foods and Beverages. This is the residual class for patents relating to foods and beverages not provided for more specifically in other classes. The process and product portion of this class undergoing reclassification now has 30,000 patents in 230 subclasses. This includes most food compositions and processes for preparing them. The present classification is 30 years old—completely inadequate for search purposes. An explanation of our revised class will be illustrated below.

2. Class 71, Chemistry, Fertilizers (9500 patents, 70 subclasses). This class relates to methods of production and manufacture of substances having a nutrient or stimulating action or growth inhibiting or regulating action on plant growth. The area of plant growth regulators in this class is very active and has just been reclassified, providing functional subclasses for cut flower treatment, defoliant compositions, stunting agents, germination activators, desuckering, etc. In addition, a comprehensive chemical composition classification is also provided.

3. Class 127, Sugar, Starch, and Carbohydrates (5000 patents, 70 subclasses). This is the class providing for the manufacture of carbohydrates. Pure sugars are in this class. Foods which contain sugar are provided for in Class 99.

4. Class 195, Fermentation (9000 patents, 147 subclasses). This class provides for processes that include fermentations and products so produced. Class 99 provides for processes and products of fermentations restricted to foodstuffs.

We have provided basic tools to enter our system as follows:

1. **An Index.** An alphabetical guide on all subjects carefully updated as classifications are revised.
2. **A Classification Manual.** A numerical list of all classes and their subdivisions known as subclasses.
3. **Class Definitions.** These are definite statements illustrating the scope of each class and subclass. Notes guide the searcher to the proper "pigeon hole" or subclass. Also, the notes compare the related subject matter, illustrate the superiority and enable the searcher or researcher to determine the best place to search as well as the correct place. The technically correct place may or may not be the best place. As an example, compositions used to coat foodstuffs may be found in the appropriate composition class although the coated foodstuff would be classified in class 99. The composition would be unpatentable if found for any purpose, but the coated foodstuff may be a patentable article if there is some special feature in the combination.

To illustrate our classification techniques, there is another useful concept which is a system of exhaustive division[2] of the subject matter into subclasses. Consider any body of subject matter or "art" as all-encompassing—e.g., the world. The total subject is subdivided into as many separate subjects which have acquired sufficient status to represent a smaller and integral body of said subject matter, and these separate subjects are put into their own subdivisions or "pigeon holes." Whatever remains after all these smaller masses are pulled away from the whole, and are separately provided for, is residual or miscellaneous and stays in the undivided mass. In actual practice, this residual mass which is usually a generic concept is listed as a main heading and all the smaller masses are indented thereunder. The main heading, however, is not only generic to all within but is also specific for all the undivided subject matter not yet formed into its own subdivision. Everything within the scope of the original undivided material is within its definition, as is the remainder not provided for specifically. We have, thus, two different statements of this concept and it permits us to retain in one place residual material which can be kept together until it acquires its own identity as a body sufficient to be separately recognized by its own subclass or "pigeon hole." This too is a concept used almost exclusively in our classification system.

To illustrate the evolution of modern classification according to our exhaustive lines, I will compare the present class 99 in some of its aspects with the proposed revision which is not yet official and is subject to change. The comparison, however, will show the improvement possible. Class 99 at present provides for some 235 subclasses for processes and products and is basically product oriented, but it does not follow any recognized superiority system, for example:

28 Beverages
29 Fermented or alcoholic type
Alcoholic type
53 Cereal or malt
54 Milk modification
65 Coffee
72 Coffee substitutes
76 Tea
80 Cereals
81 Puffing
86 Baked products
100 Fruits and vegetables
101 Butters
102 Conserved
105 Juices
107 Meats
113 Eggs
115 Cheese
118 Oils and fats

The revised class will follow the rule of superiority and will have an ancillary mechanized system associated with it. The manual system will have some 500 subclasses broken down into 11 major areas. The mechanized system still under development will have some 400 to 500 descriptors. An example of the revised schedule follows:

Direct application of electrical or wave energy to work
To heat
Radiant energy
Radiation
Ultraviolet
Fermentation
Of hydrated wheat flour system
With microorganism
Of milk and milk products
With lipases
Nonalcoholic with alcoholic or dealcoholized material as substrate
Ethyl alcohol production
Lactic acid production
Of soy and soy products
Coloring and additive color control
Using dyes and pigments
With fruits
Natural color savers, developers or modifiers
Bleaching
Casing and method of preparation or treatment
Packaged
Artificial
With coating
Coating and coated products
Of seeds, beans and nuts
Coffee
Cheese
Confections
Of fruits and vegetables
Of meat
Of eggs

Supplementing this new classification format will be categories or lists of terms useful in mechanized searching. Some of the categories are noted:

A. FOODS AND/OR FOOD USE MATERIALS OR DERIVATIVE
Derivatives or waste products
Animal derived
Blood
Bones
Fat, suet, tallow

Plant derived
Leaves
Stems, stalks, straw
Identified by Chemical Name
Elements or single entity materials
Inorganic chemicals
Compounds generic
Acids
Bases

B. MISCELLANEOUS PROCESSES, UTILITY, USE, OR FUNCTION OF MATERIAL
Animal or pet food use
Antioxidant
Bleaching agent
Coating agent
Color saver
Growth promoter
Pickling
Simulated food product
Sugar substitute

C. FORM, PHYSICAL STATE, CONDITION, STATE OF MANUFACTURE OF ARTICLES OR MATERIALS, AND/OR PROCESSES FOR ATTAINING OR MAINTAINING SUCH FORM, ETC.
Packaged
Bottled
Shape, form
Shapeless mass

D. FOOD MANUFACTURES
Bakery Products
Bread
Beverages and/or beverage component
Alcoholic
Malt
Carbonated
Cocoa
Coffee
Tea

I believe the comparison makes self-evident the improved technique of searching manipulations and generic concepts as well as specific embodiments. The technology explosion has had a great impact on the Patent Office, which is at the forefront of discovery. The examining of patent applications requires a survey of all literature to determine whether the claimed invention is novel or unobvious. Our search systems must keep pace, and we accomplish this by providing for new technologies. Failing provision for such flexibility, advances in the scientific arts would not be adequately retrievable from our files. Given all this plus our efforts to add mechanized search aids, we will meet the obligations of the future.

LITERATURE CITED

(1) Development and Use of Patent Classification Systems (DUPACS), p. 8, U. S. Government Printing Office, Washington, D. C., 1966.
(2) Classification of Patents, Second Revision, p. 29, U. S. Government Printing Office, Washington, D. C., 1946; out of print.

Literature Needs of Food Scientists*

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The literature services now available to food scientists are evaluated. The need is pointed out for services of three types in the food field. These are "all inclusive" services covering all aspects of food science, particularly valuable for information retrieval and documentation; "comprehensive" services covering major segments of food technology, such as food processing, useful primarily for current awareness; and highly specialized services in individual fields, including background information as well as material strictly classifiable as food science.

The need for competent bibliographic services in the fields of food science and technology has been a matter of increasing concern for a number of years. Since the demise of *British Food Science Abstracts* in 1957, there has been no all-inclusive abstracting service available in this country devoted exclusively to food. From 1959 on, meetings have been held here and abroad to discuss food documentation. In 1962, the Institute of Food Technologists sponsored a conference at Michigan State University to survey the status of food documentation and to make recommendations. Resolutions passed at the Congress stressed the need for developing a comprehensive documentation service covering the world's literature in food science and technology. Also, in 1962, during the First International Congress of Food Science and Technology in London, a formal session and several informal meetings on documentation were held. The Congress expressed the opinion that there was an urgent need for international cooperation in producing indexing and abstracting services covering the world literature on food.

In the same year, Borgstrom, Department of Food Science, Michigan State University, brought the matter to a heat with a pair of articles.[1,2] He said, "A significant

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