

mary of the data for 1485 samples varying in iodine number from 144 to 196 and in refractive index from 1.47420 to 1.48047.

The mathematical relation between the two constants (Fig. 1) was calculated by the "Least Squares" method (8). The equation for the regression of the refractive index on the iodine number was

$$(A) \frac{n_D^{25}}{D} = 1.45769 + .000115815 \text{ Iodine Number}$$

and the transposed equation for the regression of the iodine number on the refractive index

$$(B) \frac{n_D^{25}}{D} = 1.45723 + .00011846 \text{ Iodine Number}$$

The correlation coefficient of the relation was .98874, having a probable error of  $\pm .00039$ . The standard error of estimate of the refractive index was  $\pm .0001718$  and of the iodine number  $\pm 1.4672$ .

Both relations are very close to the empirical short equation of Pickering and Cowlshaw (2) reduced to 25° C. conditions assum-

ing that the temperature does not affect the increment of change.

Barring changes resulting from adverse conditions of storage of the flaxseed, the procedure developed for pressing the ground flaxseed and preparing and reading the oil samples gives reproducible and satisfactory estimation of the iodine number of raw linseed oil from the refractive index. The relation has been used for four years in evaluating the linseed oil quality of large numbers of samples from breeding trials and is considered sufficiently accurate for the purpose. Caution must be taken to prevent acidity and in particular, polymerization and oxidation of the raw linseed oil.

### Summary

A procedure for obtaining linseed oil from flaxseed which gives reproducible results has been developed and the empirical relation between the refractive index and the iodine number (Wijs) of the oil so obtained has been calculated.

This relation is thought sufficiently reliable for certain needs, where closest accuracy is not required.

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- Published with the approval of the Director as Paper No. 23, Journal Series, North Dakota Agricultural Experiment Station.

## PATENTS FOR CHEMISTS\*

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THIS is a discussion of certain points relating to patents of especial interest to a chemist rather than a lawyer.

A patent is in the nature of a contract between the inventor and the people of the United States. Its object is to promote invention, and for this purpose it secures to the inventor the sole right to use his invention for the term of seventeen years in return for his making a full disclosure of it to the public. The term of a patent cannot be extended beyond seventeen years except by a special act of Congress, which, of course, has been very rarely exercised.

While, in a sense, a patent gives a sort of monopoly to the inventor, it is not an ordinary monopoly in the sense of taking away from the public anything that the public previously enjoyed. On the contrary, it eventually gives to the public something it did not have before. For example, machine made shoe, vulcanized rubber, aluminum, machine weaving, and Bessemer steel, are a few of many examples of patented inventions which were exploited without oppression to the public, and reduced

rather than increased the cost of living.

It should be noted that the government does not itself prevent others from using the patented invention, but merely gives to the inventor the right to protect himself. His recourse in case of infringement is through the courts and if he does not see fit to initiate court action to protect his invention, the government will not do so for him. Patents for really worth while inventions are very apt to be tested in court, so it is often said that no patent can be considered valid until it has been upheld in court. Unlitigated patents, however, may be just as valid and a mere threat of an infringement suit is often effective in stopping infringement and even in bringing in royalties. It is often cheaper or better policy for a possible infringer to take a license and pay a reasonable royalty than to get involved in expensive litigation. Patents and the rights under same are covered by numerous statute laws and also numerous court decisions which likewise have the effect of law, and while such laws and decisions cover almost

every conceivable situation, they unfortunately often involve apparent conflicts which can only be interpreted by further resort to the courts.

In the hands of some individuals or firms patenting has degenerated to a sort of racket, so that reputable manufacturers are often compelled to resort in self-protection to patenting minor features of their processes or products that would not be considered worth patenting otherwise. On this subject of patent-racketing an eminent attorney recently wrote:

"Slight changes in chemical practice and improvements in the commercial purity of a product, or a decrease in its cost of production—things which would have passed unnoticed as ordinary steps of a day's labor 50 years ago—are now being patented and these patents exploited with a skill and daring that would have shamed the shrewd business tactics of the oil barons and the railroad kings of the gay 90's."

Questions often arise as to whether an invention should be kept secret or patented. Experience shows that secrecy is always

\*A paper presented at the Fall Meeting of the A. O. C. S., Chicago, October 8-9, 1936.

uncertain and cannot be maintained indefinitely, and eventually the secret is learned by competitors who are then free to practice the invention without restraint. Such an invention might even be patented by the competitor, or perhaps by another inventor who knew nothing about the first inventor. Such a patent could later be invalidated in most cases because not issued to the first inventor, but only as a result of litigation which might consume several years and cost a large amount of money. Hence the old practice of secrecy has in recent years given way to patenting in most companies. The benefits are believed to be greater and the cost small in comparison.

Patent rights between an employer and employe are as follows:

If the employe was hired for the specific purpose of developing a certain process or product, or definitely assigned to this problem, and his work was successful, then the rights to the invention belong to the employer, because in this case the employer hired the employe to make this invention for him. If, however, an employe makes an invention in the general course of his work for the employer, the ownership of the invention belongs to the employe. He alone can patent it and commercialize it, with the exception that the employer has the right to use the invention in his own factory but cannot license others to do so. The law will not compel the employe to give or assign such patent to the employer in the absence of a contract calling for this. Ordinarily, however, any invention made by an employe in the general course of his work is assigned to the employer as a matter of course. Contracts between employer and employe covering this point are sometimes used, but they are not very common as they are not usually found satisfactory in practice.

Anybody who makes an invention is entitled to a patent in the United States. There is no distinction as to sex, age, race, nationality, or in any other way.

The inventor may file the application and prosecute same himself if he wishes, but actually he will do better to let a regular patent attorney do this work for him unless the inventor has previously acquired a familiarity with patent law and office practice, etc. This is on a par with a person pleading his own case in a court of law. For chemical patents an attorney familiar with chemical matters should

be sought. The average patent attorney may be adept at handling ordinary mechanical inventions, but is lost when given a chemical invention to handle.

Sometimes two or more inventors are involved in making a single invention, in which case they become joint inventors and all these names must be on the application in order to secure a valid patent. In such case each of the patentees has the unrestricted right to license others on any terms satisfactory to himself and regardless of the wishes of the other patentees.

The cost of a patent consists of government fees, amounting ordinarily to sixty (\$60) dollars, plus attorney's fees and possibly assignment fees and other items of expense, so that the total cost of securing the patent in ordinary cases will probably amount to at least two hundred (\$200) dollars, but may be greatly increased if interference, appeals, or other difficulties are encountered. It usually takes one or two years to secure a patent in the ordinary course, but this time may be greatly prolonged if interference or other troubles are encountered.

The U. S. government is at present issuing approximately 40,000 patents per year. Statistics show that only about 60 per cent of applications eventually issue as patents, and of those patents which are litigated in the courts to a final decision only about 70 per cent are upheld. Probably about 90 per cent of patent suits, however, are settled without a final decision, presumably by an acknowledgment of the validity of the patent in most cases.

#### What Can Be Patented

The law says that "any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvements thereof" may be patented under certain conditions. Also, certain artificially propagated plants may be patented, as well as designs and trademarks.

The process and the product of same may both be covered in a single patent, as may also the process and the apparatus for carrying it out if these are inseparably associated.

#### Patentability Requirements

The invention must be new and useful, and also it must involve the "genius of invention." The mere work of a skilled mechanic or chemist in producing a new and useful article or process may not

necessarily involve true invention. The dividing line between the creation of one skilled in the art and that arising from the "genius of invention" is by no means sharply drawn. There is a wide borderline between the two and only the courts can decide with finality the status of many cases falling in this borderline group.

The suggestion must not have been made in any prior patent or printed publication in any country prior to his invention or more than two years prior to his application.

The invention must not have been in public use for more than two years prior to the application date.

It must not involve the mere bringing together of different known elements unless the combination produces an unpredictable result. Otherwise it is called a mere "aggregation."

The use of equivalents in a process or a machine is not ordinarily invention. The substitution of potassium chloride for sodium chloride, or vice versa, in most reactions, for example, would not ordinarily involve invention; it would merely be the substitution of an equivalent.

The discovery of a new substance in nature is not invention because the genius of invention was not exercised in finding the substance. A new and useful substance made synthetically would, however, usually be patentable.

Using an old process for a new purpose does not involve invention of a new process.

Changing the order of steps in a process to produce the same product is not invention.

Making a product of larger or smaller size, or changing the degrees in other respects, is not an inventive act.

Making a better product than previously, due to more skilled workmanship, is not invention.

Many patents are issued nowadays for extremely slight improvements in process or apparatus over prior patents for similar things. In such cases the improvement patent is said to be dominated by the prior patent and cannot be worked without infringing the prior patent. Neither can the prior patentee work his own process if he uses the particular method of carrying it out patented by the later patentee. The improvement may be the most economical and practical way to operate the prior patent and in such cases each patent blocks the other and the patentees

must come to terms in order to work either patent. An interesting example of this is the famous patent to Tilghman, issued in 1854, covering broadly the process of splitting fats into fatty acids and glycerin by treatment with water at a high temperature. This was eventually upheld in its entire breadth by the U. S. Supreme Court. The only means described by Tilghman consisted in continuously passing a mixture of fat and water through a long coil of pipe heated externally by fire to a temperature of 612° F. and under pressure up to 2,000 pounds. Suit was brought against an infringer who used an entirely different procedure in that it was a batch process instead of continuous; a closed tank or autoclave was used instead of the continuous coil of pipe; a catalyst was used where none was mentioned by Tilghman with the result that the effective treating temperature was reduced from 612° F. to about 300-350° and the pressure from nearly 2,000 pounds to about 125 pounds per square inch. Heat was supplied by steam and the ingredients were mixed by circulating continuously from the bottom into the top of the autoclave by means of a pump. The Supreme Court decided that the modified process was an infringement of the claims in Tilghman's patent although the court at the same time admitted that the new process probably contained patentable improvements over Tilghman. In other words, a modification of an existing patented process may be also patentable but yet cannot be worked without infringing the broader prior patent.

Whether a new process or product involves patentable invention over the prior art is in many cases difficult to determine. Some cases from the start clearly involve patentable invention, but in a large proportion, possibly a majority of cases, the answer is not obvious and the question must be studied from the standpoint of principles established in past court decisions, and from this basis what the courts would probably decide in the case under consideration. The Patent Office tries to follow the principles and interpretations of patent law laid down by the courts, while the inventor, without knowing much about the principles of patent law, is apt to be prejudiced and to believe his invention is patentable. Only one skilled in patent law can be expected to make a reasonably

reliable estimate or prediction as to what the Patent Office and the courts would be likely to decide as to patentability in any particular case if it should be put up to them. It is often difficult for a conscientious patent attorney to avoid disappointing an inventor in giving an honest opinion on patentability, but it is better for the inventor to know the truth at the outset where this is possible than to spend his money first and be disappointed in the end.

Some examples of unpatentable ideas or inventions which have been passed on by the courts are the following:

A patent on the electric telegraph was issued to Morse, but the broad claim was invalidated by the Supreme Court because it patented the use of electricity to transmit messages. This was not what Morse invented; he invented an apparatus.

The use of ether for anesthetic purposes was decided to be unpatentable.

A patent was issued for a sheathed lead pencil with a rubber eraser joined together, but the Supreme Court invalidated it on the ground that invention was not involved in bringing the two elements together, because the lead pencil and the rubber eraser merely performed the same functions that each would perform separately.

A patent issued for a combined washing machine and clothes wringer was invalidated for the same reason.

A method of transferring liquids consisting of first sterilizing and purifying air and using it under pressure to force the liquid from one vessel to another was likewise held unpatentable as a mere aggregation.

An interesting example of a patentable combination is that of a surgical dressing consisting of cotton saturated with boric acid and glycerin. Each of these agents had been separately used on cotton previously, but the boric acid was apt to crystallize and irritate the wound while glycerin by itself had only inferior antiseptic properties. The combination, however, gave a new product with good antiseptic properties which would not crystallize nor irritate the wound because of the hygroscopic properties of the glycerin. Hence, the combination achieved a new result and was held by the Supreme Court to be patentable over the prior art.

#### Obtaining a Patent

The first requisite is the concep-

tion of an invention and second the reduction of same to practice. The invention is not considered complete until it has been successfully reduced to practice. Actual proof of invention and reduction to practice is of the utmost importance in case of subsequent interference or other litigation, and the best kind of evidence consists of the original notebook, dated and signed by the inventor, and also any drawings, written records, and record of disclosure to other persons. Such evidence should be carefully preserved. In an interference case between two inventors, for example, if the one who was truly the first inventor cannot prove his case by satisfactory evidence he will lose to the later inventor who has the necessary evidence.

The inventor usually is more or less familiar with the prior art as shown by patents and publications in his field, and must, of course, differentiate from same in any patent application which he files.

The patent application must contain a complete disclosure of the invention and the claims must define the invention in exact words. It is usually well to carefully consider whether the invention may not actually be broader than the inventor's original concept of it. He may have invented a process using ethyl alcohol, for example, but perhaps methyl and propyl alcohols could also be used. If then the claims covered only ethyl alcohol competitors could avoid the claims by using one of the other alcohols, assuming that they were not obvious equivalents of ethyl alcohol in the process in question. Likewise it is necessary to take care that the claims are not broader than the true invention. A claim is invalid if its terms are so broad as to include any conditions which will not produce the product of the invention. It is usual in chemical process applications to include both broad claims and narrow or specific claims. For example, a broad claim may specify the use of "low molecular alcohols" and there may then be three other claims each specifying, for example, methyl alcohol, ethyl alcohol and propyl alcohol, individually. The reason for this is that the claim for low molecular alcohols in general would give broad protection if upheld in court, but if subsequently declared invalid because perhaps some one low molecular alcohol would not work in all

cases, only the broad claim and the claim for the alcohol found to be inoperative would be invalidated, but the specific claims for the other alcohols would still stand.

Claims for a new product must define the product by its properties, and not by the process of making it.

The inventor must file an oath with his application, stating that he believes himself to be the first inventor, etc.

While the law does not require an inventor to apply for a patent within any specified time, it is for his own interest to file as promptly as possible. Delay will afford opportunity for a second inventor to file ahead of the first inventor, and if publication or public use occurs two years before filing he cannot secure a patent.

The Patent Office then makes an examination of the application and searches their files of U. S. patents and foreign patents and also their library for publications bearing on the subject. These are cited to the applicant with the examiner's reasons for rejecting the claims. The first action by the Patent Office is almost invariably a rejection.

The applicant or his attorney then files amendments to put the claims in condition to avoid the references cited and to meet the ideas of the examiner as far as is consistent with the applicant's idea of the invention. No new matter, however, can be inserted by amendment after an application is once filed.

After one or more rejections and amendments the application will either be allowed or finally rejected. In this action the examiner is virtually the opposing attorney, acting in the interest of the public, and also the judge and jury.

If the applicant does not respond

to an action of the Patent Office within six months, his application becomes automatically abandoned. It may, however, be revived under certain conditions.

If after allowable claims are found the examiner finds another application or patent with allowable claims covering the same matter, an interference may be declared, after which it is necessary to determine which inventor first conceived the idea and reduced it to practice. This involves intricate legal procedure, taking of testimony, often in several different cities, etc., and may cause great delay in issuing a patent, and also great expense to the applicant.

Appeals may be taken from the action of the Primary Examiner or the Examiner of Interferences, first to the Board of Appeals and then to the courts.

If, after issue, a patent is found defective, through inadvertence, accident, or mistake, it may be corrected by a so-called "reissue" which then replaces the original patent but expires on the same date as the original patent would have expired.

#### Licenses and Assignments

A patentee may assign his whole interest or a part of same to an assignee, and the owner of the patent may issue licenses of various kinds. These may be exclusive or non-exclusive, may be limited to a certain territory, or a certain period, or for use in a certain field, or in other ways. They may or may not involve the payment of royalty which may be in a lump sum or proportionate to the use of the patent.

Such assignments or licenses may cover the manufacture, use and sale of the product, or perhaps only the manufacture and sale but not

the use, or they might cover the sale but not the manufacture, etc. The license may or may not include the right to sue infringers and retain any recoveries. These matters are all covered in the license contract.

#### Infringement

When the owner of a patent learns or suspects that his patent is being infringed, the usual procedure is first to serve formal notice on the infringer, telling him to cease infringing. Failure to do so will be followed by suing the infringer in court. The suit must be in a United States District court and will be for an injunction to restrain the infringer from continuing his practice and usually for an accounting of the profits derived from the infringements, and sometimes for triple this amount in damages. Such litigation, especially if carried through the Circuit Court of Appeals, may be extremely costly and for this reason a patentee of small financial means is seriously handicapped in fighting a powerful infringer unless his patent is of great importance and value so that he can secure financial assistance.

If the patented article is marked with the number and date of the patent, damages are collectible from the beginning of the infringement, but if not so marked damages can usually be collected only from the date of serving notice.

This discussion is not intended to be complete, but only to state some of the more important matters of interest to a chemist, and it should be borne in mind that exceptions occur to all rules, and this is especially true in patent matters. The advice of an experienced attorney is indispensable to a would-be patentee.

# ELECTROLYSIS OF SOAP SOLUTIONS

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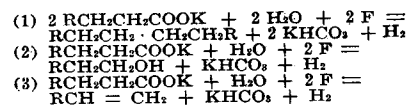
## Introduction

IN the search for raw materials for preparation of useful sulfated products, an effort was made to obtain high molecular alcohols and olefines by electrolysis of soap solutions.

Upon passage of an electric current through a solution of a salt of a carboxylic acid, hydrogen ions are reduced to hydrogen at the

cathode, while anions of the salt are oxidized at the anode, yielding carbon dioxide and a mixture of organic oxidation products, including alcohols, olefines and saturated hydrocarbons. Various theories for the mechanisms of the reactions at the anode have been proposed.<sup>1</sup> Since a definite decision between these suggested mechanisms is not possible, the simplest

equations which represent the total cell reactions are used as bases for calculations in this investigation.



Equations (1), (2) and (3) show the main cell reactions. Equation (1) represents the familiar