
Patents and Fragrance Formulation: Are they compatible?

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This subject is not directly connected with the usual subject matter of this magazine, inasmuch as it is directly related neither to perfumery developments nor to their promotion. However, these aspects may be viewed as representing the cause and the effect of the action of obtaining a patent. The purpose of this article is to present a few considerations on the role of patents in relation to perfumers' activity.

Patents are legal mechanisms by means of which inventors, or their employers or assignees, can protect the investment in time, money, effort and other resources expended to create a new contribution to technology.¹ Patent laws are thus special chapters of property laws. As such, they extend their full effect in those countries where private property is recognized.

The beneficial social role of the patent system in the present phenomenal development of technological innovations in industrial nations is a fact challenged by few. In reality, most of the current criticisms appear to be directed against the manner in which the law is applied more than against the general philosophy of the system itself.

Patents and Perfumery

Throughout this century, but especially after World War II, the chemical industry as a whole has made extensive use of the opportunity offered by the patent system to secure protection for its innovations. When considering the involvement of this industry in modern perfumery it does not come as a surprise to see that, particularly in the last two decades, the number of patents filed in the field of perfumery has increased at an accelerated rhythm, while under-

standably the community in the perfume industry has become increasingly alert to patent publications.² In 1962, in his annual review of published literature, "Progress in Perfumery Materials," Bedoukian reported 43 patent references.³ Fifteen years later this number had increased to 140, representing almost one half of the total references he cited in that particular year.⁴ This situation led him to remark:

Some companies doing much useful work are patenting their discoveries in an effort to obtain a dominant position, if not a monopoly, in certain areas. Time will tell whether such policies are helpful to the industry as a whole or have a retarding effect. In any case, research is progress, and in the long run it must prove advantageous to all.⁴

The long-lasting experience acquired in other areas of technology has shown that, when patent law functions properly, it enhances the incentive to innovate. Perfumery is no exception. In response to the implicit question raised by Bedoukian, one can marginally note that the many (too many?) patents dealing with perfumery are but one indication of the state of healthy maturity our industry has reached.

Patents as a Source of Information

It has to be recognized that irrespective of its real practical, technical value a patent is the materialization of a research endeavour towards innovation. As such, it should be analyzed with great care, not only in order to determine the boundaries within which one may operate with-

out incurring legal sanctions but also as a valid source of technical information.

In the past, the academic community has often regarded such information as not completely reliable. This may be due partly to the controversial practice by certain members of the patent profession to envelop the description of an invention in obscurity.⁵ I may add that my experience in dealing with chemists and engineers suggests that this sort of mistrust of patents is caused mainly by the fact that those knowledgeable in technology are untutored in law. Consequently, they feel rather uncomfortable with the unfamiliar language.⁶

No matter how this question is viewed, patent documents do represent information on the most advanced state of the art. Very often, in fact, they are the *only* available information in the art. Consequently it would simply be foolish to ignore them.⁷

By its publication, a patent becomes the document that best discloses the inventive solution a creator has put at the disposal of the community, a fruit of the inventor's labors, that is exchanged for a temporary benefit: the right to exclude others from using that invention. As a general rule, a patent includes common elements of useful information, namely:

- The state of the art, which defines the field of technology and critically discusses its latest developments
- The nature of the problem to be solved
- The new solution to that problem
- Working examples⁸
- Claims, which determine the limits of the legal "territory" proprietary to the inventor⁹

Patents and Perfumers

Even within our industry, I have often met with the mistaken belief that perfumers should not be concerned with patent matters. It is true that in the past many patents have been issued in the field of fragrances, but the developments in question have been creations of chemists rather than perfumers.¹⁰ Of course, this does not imply that perfumers are not creators in the patent sense. It simply means that chemists have found a better way to express themselves in the existing system.

This situation certainly arises from several factors of different natures. The most important, however, seems to be the traditional secrecy surrounding the creation of a new fragrance. This is understandable; by keeping the secret, perfumers (or their companies) have often maintained advantages over their competition.

It is pertinent to ask for how long this secret remains an advantage. At the beginning of the 1960s, our industry realized that, because of the unprecedented developments of analytical instrumentation, it could not rely any longer on secrecy alone for protecting itself against imita-

tion. This fact is even more valid now than it was then. In the great majority of cases, no amount of secrecy can prevent successful copying. In determining a patent policy, additional attention has to be paid to the stringent legal requirements facing our industry.

World-wide socio-political pressure on manufacturers to make use of chemicals that are both safe for human use and compatible with the environment has led legislators to introduce mechanisms of control and registration. In most cases, these mechanisms require the disclosure of technical information, the nature of which was regarded in the past as a jealously kept secret of each single manufacturer. Under these circumstances, one is faced with no alternatives other than to try to obtain a patent.

What Can Be Patented?

Let us consider what subject matter of interest to perfumers are at present open to patent protection.¹¹ These include:

- New chemicals¹²
- Applications of new chemicals
- New applications of known chemicals
- New combinations of selected known chemicals

The first category of patentable matter is in most cases the pure creation of chemists. However, it is established practice that to be patentable, chemicals must possess unexpected properties over closely related known analogues or homologues. Who, other than a perfumer, can provide this sort of evidence? The perfumer's contribution to patenting at both stages—development of the invention and patent prosecution—is therefore unquestionable. It is even more obvious that the other categories mentioned earlier also imply a direct contribution from the perfumer.

It is, however, probably necessary to specify what is meant by "a new combination of selected known chemicals." For simplicity, consider the following three most-often-encountered cases.

- Compounds (= chemicals) [A] and [B] are each separately known fragrance ingredients having known fragrance properties
- [A] has thus far never been recognized in the art as possessing a utility, whereas [B] is a known perfumery ingredient
- Neither [A] nor [B] have a prior recognized use in the art

In the first case, if the combination [A + B] achieves nothing more than the additive effect¹³ obtained by summing up the odorous properties of each single component, such a combination is not thought to represent an inventive step. With regard to the state of the art, it appears to be ob-

vious to the average expert.

As an example, [A] is known to possess a jasmine-type floral character, whereas [B] is known to develop a green, flowery scent. In the absence of any other unexpected effect, mixture [A + B], having a jasmine-like, green odour of the same type as [A] and [B] and of analogous intensity, is judged unpatentable. Jurisprudence defines this type of combination as a juxtaposition.

Should such a combination achieve an unexpected effect that reaches a new technical result, we have to deal with a patentable matter. An example of this might be that the mixture [A + B], while retaining a jasmine character, has a better diffusiveness or an improved substantivity. It might, for example, work better in a fabric softener base or it has an appreciably greater strength than the sum of the strengths of [A] and of [B] taken separately. In this situation one often speaks of "synergism." I should note that this term has acquired a sort of magical power in successful patent prosecution.

These are two examples taken at random from the patent literature. The identity of the active compounds have been replaced by conventional letters. The reader can refer to United States patents 3,959,508 and 4,247,572.

It has also been discovered by us that the organoleptic effect obtained when

using the combination of [A] and [B] is more than merely additive of the individual organoleptic properties and strength of each [A] and [B]; that the effect can be described as "synergistic."

[A] and [B] have been described as being constituents of the aroma of . . . On the contrary, [C] has not found so far any recognized utility in the art. The mutual effect exerted by the three constituents of the composition of the invention can be defined as being of synergistic nature.

The word, *synergism* derives from the Greek "synergos," which means *association or cooperation*.¹⁴ Its correct meaning is: *association of several factors that cooperate to achieve a single effect*. Hence, one can take the view that every combination of fragrance ingredients is, in fact, synergistic since the association of them cooperates to achieve an overall odorous effect. It is a semantic abuse to use this term merely to define an increased additive strength. In the majority of cases encountered, *synergism* can be better replaced by simple terms such as *modification or improvement*.

Furthermore, I must underline that it is rarely possible to establish a conventional yardstick to

measure unequivocally the strength of a given fragrance composition. This is particularly so in the absence of a valid theory on odour perception, and especially when dealing with mixtures of great complexity, such as those commonly encountered in modern perfumery, where the effect perceived is the resultant of the effect achieved by the physicochemical interaction of the single components of the mixture. Strictly speaking, it seems to me that the measure of the increased strength of perfume composition [A + B] could only be possible in the following two cases.

- If [A] and [B] possess the same odour at the same threshold value so that a decrease of the odour threshold value of [A + B], when compared to that of the components taken separately, is an indication of the positive effect exerted by the fact of combining them.¹⁵
- If [A] is odourless, so that a decrease of the threshold value of the mixture, when compared to that of odorous ingredient [B], reflects the positive effect exerted by the combination.

The second case is analogous to the previous one, inasmuch as for being a patentable mixture [A + B] should constitute a new technical result with unexpected properties. United States Patent 4,144,199 precisely illustrates this situation. In a typical example, ethyl safranate and beta-damascenone can be likened to compounds [A] and [B] of our case.

Three rose type compositions were prepared by mixing the ingredients in Table I.

Three modifications of composition A were made:

- (a) Addition of 1 g. of a 10% solution in diethyl

phthalate of the damascone homologue . . . , to 98.5 g. of the basic composition.

- (b) Addition of 0.5 g. of a 1% solution in diethyl phthalate of ethyl safranate to 98.5 g. of the basic composition.

- (c) Addition of both 1 g. of the solution mentioned under (a) and 0.5 g. of the solution mentioned under (b) to 98.5 g. of the basic composition.

Three modifications of composition B were made:

- (a) Addition of 1 g. of a 10% solution in diethyl phthalate of the damascenone homologue to 98.5 g. of basic composition B.

- (b) Addition of 0.5 g. of a 1% solution in diethyl phthalate of ethyl safranate to 98.5 g. of basic composition B.

- (c) Addition of both 1 g. of the solution mentioned under (a) and 0.5 g. of the solution mentioned under (b) to 98.5 g. of basic composition B.

Finally three modifications of basic composition C were made:

- (a) Addition of 0.5 g. of a 10% solution in diethyl phthalate of β -damascenone to 99.2 g. of the basic composition.

- (b) Addition of 0.3 g. of a 1% solution in diethyl phthalate of ethyl safranate to 99.2 g. of basic composition C.

- (c) Addition of both 0.5 g. of the β -damascenone solution and 0.3 g. of the ethyl safranate solution to 99.2 g. of basic composition C.

A panel of 10 trained perfumers was asked to compare the modifications with the basic compositions. In each case the basic composition was judged as being improved by the addition of the cycloaliphatic unsaturated ketones (additions a), or by the additions of ethyl safranate (additions b), but the effect of the addition of both types of compounds to the basic compositions was in all three cases judged as showing more than the sum of the effects of addition (a) and (b), resulting in a composition with a very natural rose character, having a radiant, warm body, and a well-balanced topnote.¹⁶

It should be noted that the mere discovery of the unexpected properties of [A] does not automatically confer a character of patentability to the mixture—Of course, the use of [A] as a perfuming ingredient can be patentable in its own right.

The third case is probably the simplest case. Should [A + B] achieve a positive odorous effect in terms of usefulness and odour performance, then there should not be any bar to its patenting. Also, the use of [A] and/or [B] as fragrance ingredients might be patentable in its own right.

Where Do We Stand?

The cases presented above tend to illustrate a few of the several possible ways to protect innovations in the fragrance field. The reader may have come across patent specifications of similar scope but of dissimilar wording; proper patent drafting represents a constant challenge to attorneys' imagination.

We have seen how the protection of a fragrance mixture in particular must be examined carefully, not only because of the questionable

Table I. Perfume compositions of the rose type

Compound	Composition		
	A	B	C
Cinnamic alcohol	15	10	20
Trichloromethylphenylcarbinyl acetate	5	5	-
Phenylethylalcohol	355	370	365
Rhodinol	180	160	170
Citronellol	170	140	120
Nerol	20	40	70
Phenyl acetaldehyde dimethylacetal	30	40	30
Methylionone alpha	10	10	10
Quaiyl acetate	10	5	10
Hydroxycitronellal	10	15	17
Gyrane (N) (1)	30	25	20
Phenylethyl propionate	20	25	15
Geranyl acetate	10	10	5
Citronellyl ethyl oxalate	20	15	35
Geranium oil Bourbon	20	20	15
Rose oxide 10% sol. (2)	15	10	5
Rosana NB 131 (3)	60	70	80
Rose absolute	5	5	5
	985	985	992

(1) Fragrance material, available from Naarden International

(2) In diethyl phthalate

(3) Rose base available from Naarden International

criteria applied to its inventive merit, but also because it may have a restrictive effect on the industry itself. Patent protection might, in fact, act against the progress it was intended to promote.

Too liberal an attitude in the examination of patents relating to fragrance mixtures will inevitably favour a "rebound" effect. If [A + B] is considered patentable, why shouldn't [A + B + C] or [A + B + C + D + . . .] also be patentable? However, is this not the domain of the current activity of the knowledgeable perfumery expert?

In spite of this limitation, we have seen that judicious use of the patent system has great advantages for the fragrance industry. We can also conclude that there do not appear to be conflicting elements between patents and fragrance formulation, and that the world of patents is not the exclusive realm of research chemists or development engineers. On the contrary, it is only through the close collaboration of these with perfumers that inventions come to light. Should such an invention meet the statutory standard of nonobviousness—be new and achieve a useful and unpredictable result—then the opportunity offered by the patent system might usefully be considered. This is by far the simplest way to establish a legitimate legal proprietary right for an invention.

Where Do We Go?

Analysis of the patent literature indicates that there is no factual evidence to sustain the pessimistic opinion of some, according to which creativity, as measured by the appearance of new chemicals, is decreasing in the fragrance industry. Precisely the opposite seems to be true when published patents and patent applications are examined. It is apparent that more and more companies devote part of their research resources to develop fragrance materials in competition with well-established firms traditionally operating in the trade. In recent years, Japanese manufacturers seem to be particularly alert in this area; in an effort to gain exclusivity they are making extensive use of the possibilities offered by the patent system.¹⁷

Increased competition will stimulate the application of new techniques, or the revival of old ones, ranging from catalysis and electrochemistry to enzymology and fermentation. The fragrance industry must be ready to meet this challenge if it is to be in a position to achieve the industrial preparation of either more sophisticated molecules, or known specialties at lower cost. It is only by such an undertaking that the industry will eventually be able to further enlarge the choice made available to perfumers, thus giving a new dimension to their creative activity. In protecting the results achieved, patents have played an important part in the past and will certainly continue to do so in the future.

References

1. Irving Kayton, Patent Preparation and Prosecution Practice, Patent Resources Institute, Inc., 1976
2. For the two-year period up to 1980, more than 200 basic patents in the fragrance and flavours field have been reported in the United States alone. Noyes Data Corporation, Fragrances and Flavors, Recent Developments, Ed. S. Torrey (1980)
3. Paul Z. Bedoukian, *American Perfumer*, **77**, 27, 1962
4. Paul Z. Bedoukian, *Perf. Flav.* **1**, 2, 1976
5. This is indeed a very unfortunate situation, in which however patents do not appear to stand alone. For "obscurantism in science," see A. Kohn, *New Scientist*, 212, 1970
6. For a few examples of patent jargon or "patentese," see T. E. Singer and J. F. Smith, *J. Chem. Educ.* **44**, 111, 1967.
7. See the introductory remarks of A. F. Thomas and Y. Besière, *The Synthesis of Monoterpenes 1971-1979*, in *The Total Synthesis of Natural Products*, Vol. 4, J. ApSimon, ed., John-Wiley & Sons, Inc., 1981, p. 452
8. A number of examples reported in the perfumery patent literature have been analysed by G. Ohloff and H. Rodé-Gowal, *Kosmetika, Riechstoffe und Lebensmittelzusatzstoffe*, Georg-Thieme Verlag, Stuttgart, 1978, pp. 39-63
9. John T. Maynard formulates good suggestions on how to read a patent in *Chemtech*, **91**, 1978
10. While many perfumers have a chemical background education, and a few of them have valid experience in research, I will consider here those perfumers who are engaged primarily in odour evaluation and fragrance creation activity.
11. I have deliberately limited the discussion on what can be patented to those cases which imply a single chemical or the combination of two ingredients only. The same reasoning as that applied here can, of course, be used in examining all other possible mixtures constituted by a plurality of ingredients. In fact, one may even consider patenting a complete formula. It is immediately apparent, however, that the protection gained in this case is far more limited than that obtained by having a patent for selected key ingredients.
12. New chemicals are here defined as those compounds having new molecular structure.
13. In this context, see D. Kastner, *Parfum. und Kosmet.*, **54**, 97 (1973). The author underlines the concept that in general it is questionable whether odours possess additive properties and that as a consequence the odour of a mixture cannot always be predicted.
14. *The Shorter Oxford English Dictionary*
15. The reader will realize that this case is purely theoretical, as in actual experience there are no two compounds smelling exactly alike. In this context see the comments of D. Kastner, loc. cit.
16. H. J. Wille et al. U.S. Patent 4,144,199 prior. Feb. 22, 1974
17. By reviewing patent letters issued in the United States over a ten year period, R. W. James reported on about 240 patented processes relating to perfumery. See *Fragrance Technology*, *Chemical Technology Review* No. 42 (1975). He located, among the assignees, only three Japanese companies. S. Torrey (op. cit.) undertook a similar study for a two-year period up to 1980 and located nine Japanese assignees. It should be noted however that in the past Japanese fragrance companies have adopted a restrictive policy in their foreign filing. This situation may change after the coming into force of the European and international patent systems, the so-called EPC (European Patent Convention) and PCT (Patent Cooperation Treaty), which, by simplifying the filing and examining procedures, should encourage a broader geographical protection.
18. Publication of the EPO
19. Press release of WIPO

The World Intellectual Property Organization in Geneva, Switzerland, which is the administering body of the Patent Cooperation Treaty.

The headquarters of the European Patent Office in Munich, West Germany.

Hitherto, anyone wishing to obtain a patent in more than one country in Western Europe had to file a separate application with each national patent office in the relevant language. Also professional representatives entitled to act before each office and familiar with the different patent laws and procedures were needed. The results were liable to be equally heterogeneous; in some countries the applicant merely received a registered patent, i.e., there was no substantive examination for patentability, while in other countries the examination procedure could result in patents of differing scope. For the inventor, this was an expensive and time-consuming process, added to which there was duplication of work by the various patent offices, since each processed the application separately.

As part of the economic and political rapprochement between the states of Europe, efforts were accordingly initiated as early as 1949 to overcome these drawbacks. The negotiations culminated in the Munich Diplomatic Conference, the European Patent Convention of October 5, 1973 and thence the founding of the European Patent Office (EPO) in Munich. The Office grants a *single* European patent for *all* the designated contracting states, on the basis of a *single* patent application in a *single* language in a *single* procedure. In each state such a patent confers the same rights as a national patent.

At present, applicants—irrespective of their nationality, place of residence or principal place of business—can obtain a European patent for 11 states, covering a market of over 270 million inhabitants: Austria, Belgium, Federal Republic of Germany, France, Italy, Liechtenstein, Luxembourg, Netherlands, United Kingdom, Sweden, and Switzerland.¹⁸

Under the Patent Cooperation Treaty (PCT), nationals and residents of a contracting state may file an international patent application and the effect of the international application is the same as if national applications had been concurrently filed with the national Patent Offices of those countries party to the PCT which the applicant designates (or, as applicable, with the EPO). The international application is then subjected to search of the prior art by an International Searching Authority and the applicant is placed in the position to decide, on the basis of the international search report, whether it is worthwhile to pursue the application in the various designated countries. Under Chapter II of the PCT, it is possible to obtain also a preliminary examination of the application by an International Preliminary Examining Authority and the applicant is then placed in an even better position to decide whether to pursue the application further.¹⁹