

## COMMENTARY

**Patents, Mathematics and Computer Software**  
**Bauer-Mengelberg, *Parker v. Flook*:**  
**A Formula To Cause Alarm**  
**21 IDEA 75 (1980).**

Noting that a patent claim utilizes tools of mathematics in its expression is as helpful as noting that a claim is partly expressed in Latin. Many mathematical theorems and mathematically expressed scientific principles describe relationships which are fundamental truths. However, many relationships which are quite easily expressed "mathematically" have none of the universality of the relationships expressed in theorems or principles. When examining a claim to determine if what is claimed deserves a patent monopoly, it is necessary to go beyond the form of *expression* and examine the character of the *relationship* expressed. In *Parker v. Flook: A Formula to Cause Alarm*, these important issues are discussed in some depth with regard to the Supreme Court's opinion in *Parker v. Flook*. The author goes far in cutting through the mystique surrounding mathematics which the Court was apparently unable to penetrate. In this vein I would like to suggest some additional analysis of *Flook*.

Proper use of an extracted quotation requires making sure that the words in the quotation which are susceptible to alternative meanings will have the same meaning in the abstraction as they had in full context; perhaps it is the Court's failure to apply this principle which leads it to the decision that the formula in *Flook* is like a scientific principle. In analyzing the claim in *Flook* the Court (1) extracts the formula, (2) examines it, (3) finds it to be like a scientific principle, (4) therefore rejects the formula as capable of playing any role in innovative aspects of the claim, (5) examines the remaining steps in the claim, (6) finds them to be well known, (7) therefore finds no innovation and consequently no basis for a patent. If the formula is to be extracted for a fair examination, its meaning must be extracted, not just its symbols. When no specific meaning is attached to any of the symbols in a mathematical formula, the formula may appear to be quite universal in nature. When viewed in this naked fashion, the formula can appear to represent abstract intellectual concepts. In *Flook* the court states a well established rule:

Phenomena of nature, though just discovered, mental processes, and abstract intellectual concepts are not patentable, as they are the basic tools of scientific and technological work.

198 USPQ at 197. The court then concludes:

We think this case must be decided as if the principle or mathematical formula were well known.

198 USPQ at 199. The court could only draw this conclusion if by "mathematical formula" the court refers to the naked string of symbols devoid of any of the meaning which Flook attaches to them. The relationships which these symbols represent in Flook's claim are hardly "the basic tools of scientific and technological work." These symbols specify what *Flook claims are useful relationships* among parameters in a hydrocarbon refining process; alarm limits are being computed based on measurements of process variables. The Court has ignored the bulk of the meaning in Flook's claim. Thus viewed, the claim contains nothing innovative. It is as if one took an oil painting, dissolved away the paints, hung the clean canvas on the wall, and complained, "This painter offers nothing of artistic value." The reasoning apparently used by the Court to find that a formula cannot play a role in the innovative features of a patent claim is unfair.

Another unfortunate complication in the *Flook* case is the patent examiner's finding that the aspects of the claim embodied in the formula were novel. This finding was accepted by the Patent and Trademark Office Board of Appeals and therefore was not argued before the Court of Customs and Patent Appeals or the Supreme Court. As discussed above the Supreme Court concluded that there is no novelty in the formula part of the claim as a matter of law. I believe, however, that the examiner should have found as a conclusion of fact that the features of the claim embodied in the formula are obvious extensions of the prior art.

Flook proposes a solution to the following problem: in the hydrocarbon refining process the person controlling the process should be notified when the value of a monitored process variable changes suddenly; if notification is to be performed automatically by a machine, the machine must embody some definition of "sudden change." A sudden change is deemed to occur when the value of a process variable exceeds the current alarm limit for that variable. In Flook's claim the alarm limit is periodically updated:

$$\text{the } n\text{th alarm limit} = B_n + K$$

where

$$B_n = (1-F) * B_{n-1} + (PVL_n) * F.$$

A value for  $F$  is not specified in the claim other than that it be between 0 and 1 (which is the range necessary for the formula to represent a running average).  $F$  simply determines how heavily the current prediction ( $B_n$ ) depends on previous measured values ( $PVL_{n-1}$   $PVL_{n-2}$   $PVL_{n-3}$ , . . .). Thus, in this claim, sudden change is defined to occur when the process variable becomes far from the most recent prediction of where it is expected to be: "far" ( $K$ ) is constant, but not otherwise specified; the prediction of "where it is expected to be" ( $B_n$ ) is changed periodically based on the most recent actual measurement of the process variable ( $PVL_n$ ) and the previous prediction ( $B_{n-1}$ ).

This method of prediction — a form of running average — is well known. I have seen the method applied to a variety of engineering problems. The method is also described in a 1963 book\* cited, surprisingly enough, both in the Brief for the Petitioner p. 3A, and in an amicus brief supporting the respondent, Brief Amicus Curiae for the Association of Data Processing Service Organizations at p. 7.

Flook's claims are aimed at any process variable in either "catalytic chemical conversion of hydrocarbons" or "petroleum distillate hydrocracking." Specific methods for determining values for  $K$  or  $F$  are not claimed. At this level of generality, Flook's extension of prior art to these two classes of processes might very well be considered obvious to one skilled in at least certain arts. Certain methods for determining  $K$  and  $F$ , when used with this alarm setting method, might be particularly useful in controlling a specific class of process variables having certain characteristics in common. Such a discovery might be unobvious, but Flook's claims were not so specific.

The analysis used by the Court in *Flook* could readily be applied to computer software in a very broad sense. The innovative features of many computer programs are readily expressed in mathematical form. If so expressed they would be rejected on the basis of *Flook*. Although the CCPA disagrees, the PTO has taken this position in its rejection of the two patent cases which the Supreme Court has recently agreed to hear. *In re Diehr and Lutton*, 203 USPQ 44 (CCPA 1979); *In re Bradley and Franklin*, 202 USPQ 480 (CCPA 1979); cert. granted in both cases 205 USPQ 488 (1980).

A decision not to grant patents for innovations embodied in software leads to unpleasant anomalies. For instance, a specialized electronic circuit could be devised for which patent protection would be available. Another device could be devised whose external characteristics were

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\*R. Brown, *Smoothing, Forecasting, and Prediction of Discrete Time Series* (1963), pp. 101-104.

precisely the same as the first device. The second device might not have any novel circuitry, but be composed only of well known general purpose computer circuits. The innovative features which enable the second device to perform precisely like the first device might be entirely embodied in software. The engineer who chose to implement the innovative idea using specialized circuits would be allowed a patent, while the engineer who chose to implement the innovative idea using a different technology, computer circuits and computer software, would be denied a patent. In my mind this certainly "exalts form over substance," *Flook* at 197.

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### Color and Appearance — A Trademark Issue

Recently, several decisions<sup>1</sup> have appeared in the area of trademarks and unfair competition that I find particularly disturbing both as a pharmacist and as a consumer. They effectively grant trademark protection to the color and appearance of prescription drugs. All of these erroneous decisions are based on the same false premise: that such appearance is non-functional. On the contrary, the color and appearance of prescription drug products serve several very important functions related to identification which, as a matter of public policy, far outweigh the benefits that are alleged to accrue from the granting of trademark protection.<sup>2</sup>

The pharmacist plays an important role in the treatment of accidental and intentional poisonings by identifying drug products which can be found near victims of accidental poisoning or attempted suicide. The tremendous proliferation of new drug products in the last decade has made this job of identification more difficult. The task, however, would

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<sup>1</sup> *SK & F Co. v. Premo Pharmaceutical Labs. Inc.* 481 F.Supp. 1184, 206 U.S.P.Q. (BNA) 232 (DC NJ), *aff'd* — F.2d —, 483 BNA's PTCJ A-1 (3rd Cir. 1980) *A.H. Robins Co. v. Medicine Chest Corp.* 483 BNA's PTCJ A-5 (DC E.Mo. 1980) *Ives Laboratories Inc. v. Darby Drug Co., Inc.*, et al. 202 U.S.P.Q. (BNA) 584, (DC EDNY 1980, *reversed*, 601 F.2d 631 (2d Cir. 1980).

<sup>2</sup> *Ives Laboratories Inc. v. Darby Drug Co., Inc. et al.* 601 F.2d 631, 206 U.S.P.Q. (BNA) 238, 241 (2d Cir. 1980).

be made virtually impossible if each manufacturer of an equivalent generic drug product (i.e., one that had the same active ingredients as and was bioequivalent to the brand name drug) were prevented from using the same color and appearance as the brand name product.

Likewise, the color and appearance of prescription drugs are essential to the identification of controlled drugs by the police (and pharmacists working with the police) in the enforcement of state and federal controlled substances laws.

Another important identification function that uniform color and appearance for generics serves is in helping the pharmacist to detect errors in labeling and packaging by a manufacturer. Occasionally, drug manufacturers put the wrong label on bottles. The most dangerous mixup that I can recall was when a fairly respectable brand name manufacturer accidentally distributed bottles labeled as a relatively innocuous drug (not often prescribed) which is used as a diuretic. The bottles actually contained a very toxic antineoplastic (anti-cancer) drug. Other examples are propantheline bromide 15 mg. mislabeled as prednisolone 5 mg., 17 APhA Weekly 192 (1978); aminophylline tablets mislabeled as amitriptyline hydrochloride tablets 18 APhA Weekly 56 (1979); bottle of Cogentin<sup>R</sup> 2 mg. found in a carton labeled as Periacetin<sup>R</sup> 4 mg. tablets, 17 APhA 96 (1978). In such instances, the pharmacist's ability to readily detect the manufacturer's error before it can be compounded by dispensing the wrong drug to the patient depends entirely on identifiability. This identifiability would clearly be diluted by the greatly increased diversification of drug product appearances that would result from banning "look-alike" drugs.

Identification by appearance is important to consumers for at least two reasons. One of them relates to a common practice in which, despite warning from doctors and pharmacists, patients repackage their medications putting several different drugs in a pillbox or vial. Although this practice may be illegal and is certainly not sensible it is a fact that such practice is commonplace. Eliminating "look-alike" drugs would result in greater likelihood of patient confusion as to which medication was which and, consequently, increased risk of overdose or non-compliance.

The second reason is that a consumer's sensitivity to a change in the appearance of his or her medication provides a crucial check on the mistakes in dispensing by pharmacists or prescribing physicians. No matter how careful a doctor or pharmacist is, he/she is human and is bound to make some mistakes. Any practitioner who has been on the receiving end of a phone call from a patient to the effect that, "Aren't my pills supposed to be green? They're purple this time," has praised

the Lord and the patient for being cautious. If consumers become complacent about changes in the appearance of their medication this essential safeguard will be sacrificed.

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### Why not Law/Science?

Do the vast majority of technically trained lawyers end up practicing patent law because:

- 1) People doing the hiring don't think they are fit for anything else; or
- 2) It is easier to get a start in that area and difficult to move into other areas; or
- 3) Patent attorneys make more money and/or have a more interesting practice than they would have doing something else; or . . .?

Over the years, I have had many occasions to reflect on these questions and for the most part have gotten vague and inconsistent answers. On the one hand, I appreciate the significance of patent law. On the other, I can't help feeling that too large a percentage of a precious resource is diverted to patent practice. I can't help wondering why I so rarely encounter a technically trained lawyer engaged in solving the other law/science problems that seem to pervade modern regulatory and private law.

Perhaps some of your readers can help me out.

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