No 71-485

IN THE

United States Court of Customs and Patent Appeals

Patent Appeal Docket No. 8376

In the Matter of the Application of
GARY R. BENSON and ARTHUR C. TABBOT

BRIEF FOR APPELLANTS

ROBERT O. NIMTZ
Attorney for Appellants

32 CASE PRESS INC., 421 HUDSON ST., N.Y.—OREGON 5-4540

INDEX TO BRIEF

Table of Authorities

Cases Cited

Cases Cited

Cases Cited

Cases Cited

U.S. Constitution Citation

Statutes Cited

IN THE

United States Court of Customs and Patent Appeals

PATENT APPEAL DOCKET No. 8376

In the Matter of the Application of
GARY R. BENSON and ARTHUR C. TABBOT

BRIEF FOR APPELLANTS

I. Statement of the Case

This appeal (R-1) is from the decision (R-136) of the United States Patent Office Board of Appeals which affirmed the decision of the Examiner (R-42, 119) rejecting claims 8 and 13 (R-142) of appellants' application for patent entitled "Conversion of Numerical Information," Serial No. 315,050, filed October 9, 1963.

Appellants' application (R-3), to which the rejected claims are appended, discloses (R-15) in block diagram form the essential elements of an electronic digital data processor (a computer), and describes in detail (R-9) a sequence of machine commands or instructions (a program) which, when properly related to the disclosed data processor, enable the apparatus to practice the claimed methods.

The rejected claims (R-142) are directed to methods for converting binary coded decimal signals into binary signals (claim 8) and for converting binary coded decimal number representations into binary number representations (claim 13). The major question presented by this appeal is whether

the rejected claims are directed to subject matter falling within the provisions of Section 101, Title 35, United States Code, and Article I, Section 8, of the United States Constitution. This issue arose out of a final rejection of these claims as being "merely a program for a computer" (R-18), and as "mathematical algorithms" (R-121), the Board of Appeals further characterizing these claims as setting forth "mental processes" and "mathematical steps" (R-137).

II. Errors Relied On

All of the reasons of appeal (R-141) are hereby relied upon. These are as follows:

1. The Board of Appeals erred in affirming the Examiner's rejection of claims 8 and 13 as being directed to subject matter not embraced by 35 U.S.C. 101 and, more particularly, that the appealed claims set forth mental processes and mathematical steps.

2. The Board of Appeals erred in sustaining the Examiner's rejection of claims 8 and 13 as failing to point out the subject matter which appellants regard as their invention under 35 U.S.C. 112 in that the claims are so broad and indistinct as to embrace within their terms subject matter that cannot be patented under 35 U.S.C. 101.

3. The Board of Appeals erred in sustaining the Examiner's rejection of claims 8 and 13 as being directed to algorithms and that the basic character of the processes of the appealed claims is an intangible, abstract line of reasoning.

4. The Board of Appeals erred in sustaining the rejection of the Examiner "for the reasons advanced by the Examiner."

III. Points of Fact and Law to be Discussed

When analyzed, the position of the Board of Appeals and the Examiner seems to be as follows:

1. The rejected claims can be construed so as to be applicable to the so-called "paper and pencil" implementation in which the steps of appellants' claims are practiced by a human being making appropriate notations with a pencil on a piece of paper. (R-139)

2. The implementation of the rejected claims by such paper and pencil method involves mental steps, particularly in performing the additions. (R-140)

3. The claims are thus directed to nonstatutory subject matter and properly rejected under the mental step doctrine. (R-141)

4. A possible further point, not clearly raised, is that the claims are unduly broad under the second paragraph of 35 U.S.C. 112 in that they embrace nonstatutory as well as statutory subject matter. (R-138)

Since appellants believe the Board of Appeals to be in error on each and every one of these points, the issues raised are related directly thereto.

No issues of fact appear to be involved in the present appeal.

The issues of law can be posed as follows:

1. Can appellants' claims be reasonably construed to apply to the paper and pencil implementation described by the Examiner and the Board of Appeals in view of the contrary teachings of appellants' specification and despite the apparatus limitations and machine manipulation limitations in appellants' claims? If this question be answered in the negative, as appellants believe to be required by elementary rules of construction, the remainder of the issues become moot.

2. Assuming that appellants' rejected claims can be reasonably construed so as to read on the paper and pencil implementation, do the steps of even this implementation require any significant mental activity in order to be carried out according to appellants' claims? Again, if this question be answered in the negative, as appellants believe it must be under any reasonable interpretation of the rejected claims, then the remaining issues become moot.

3. Assuming that the rejected claims can be reasonably construed to apply to a paper and pencil implementation, and assuming that such an implementation requires some modicum of mental activity, is the mental activity so involved wholly mental and of such a nature so as to fall within the doctrine as set forth in the cases dealing with mental steps? Appellants believe that even a cursory reading of the case law in this area clearly demonstrates the necessity to answer this question in the negative, thus rendering the remaining issue moot.

4. Finally, assuming that the rejected claims can be reasonably construed to include a paper and pencil implementation, and assuming that such implementation involves mental activity, and assuming that such mental activity involves a sufficiently substantial intellectual effort so as to fall within the mental step doctrine, can such claims be rejected as being directed to nonstatutory subject matter when it is clear that they also embrace a large segment of undeniably statutory subject matter? In view of a recent decision of this Court, appellants believe that the answer here must also be negative.

These questions will be taken up for detailed discussion under Section V below.

IV. The Invention

A. Background: The Need for Conversion

Most digital equipment manufactured and used today is based upon the representation of quantitative information in binary form, that is, in a system of representation having only two distinct elementary constituents, typically indicated by "0" and "1". This numbering system is used because digital circuitry can be most easily constructed when only two different states or conditions need be distinguished.

Human beings, on the other hand, are accustomed to represent such quantitative information in decimal form, using ten different elemental constituents or digits. Due to this basic difference between man and machines, it is often necessary to translate or convert a representation of one type into one of the other type.

It has further become a general practice to carry out this conversion in two steps, the intermediate representation having been termed the binary-coded-decimal (BCD) representation. In this representation, each separate decimal digit is represented by an equivalent plurality of binary bits. One convenient conversion table for this first level conversion, from decimal to BCD, is as follows:

Decimal Digit	Binary Equivalent
0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001

Thus, the decimal number "53" would be represented in BCD notation as

"0101 0011".

It will be noted that the BCD representation has the advantages of 1) having a simple one-to-one correspondence with the decimal notation so as to allow this first step of translation to take place with very simple mechanisms, and 2) the BCD representation is entirely in two-state (binary) constituents, thus permitting conventional representation inside of a binary machine.

It will also be noted, however, that the BCD number ("0101 0011" above) is not in a form in which binary arithmetic operations can easily or efficiently be performed. Such BCD numbers, therefore, are usually converted to the conventional binary notation. In the example above, "0101 0011" (where

$$\begin{aligned}\text{"0101"} &= 0\times 2^3 + 1\times 2^2 + 0\times 2^1 + 1\times 2^0\\ &= 0+4+0+1\\ &= \text{"5"}\end{aligned}$$

and

$$\begin{aligned}\text{"0011"} &= 0\times 2^3 + 0\times 2^2 + 1\times 2^1 + 1\times 2^0\\ &= 0+0+2+1\\ &= \text{"3", in BCD)}\end{aligned}$$

is converted to "110101" (where

$$\begin{aligned}\text{"110101"} &= 1\times 2^5 + 1\times 2^4 + 0\times 2^3 + 1\times 2^2\\ &\quad + 0\times 2^1 + 1\times 2^0\\ &= 32+16+0+4+0+1\\ &= \text{"53", in binary).*}\end{aligned}$$

B. The Problem: Cost and Reliability of Conversion

Numerous methods have been disclosed in the prior art for making this BCD-to-binary conversion. One general approach, illustrated by the cited prior art patent 2,970,765, granted February 7, 1961 to R. Bird, requires the storage of appropriate conversion values for each BCD binary digit. Conversion is then accomplished by adding together all of the necessary conversion values.

---

* It should be noted in passing that, in the decimal notation, $53 = 5\times 10^1 + 3\times 10^0 = 50 + 3$.

Another general approach in the prior art, illustrated by the cited J. F. Couleur patent 3,026,035, granted March 20, 1962, involves the provision of complex circuitry for translating each binary coded decimal digit to the corresponding binary bits in a parallel, simultaneous fashion.

The problem to which appellants' invention is addressed lies in the elimination of the disadvantages of the prior art conversion arrangements. Heretofore, either a large amount of storage has been required (the first approach) or a very complicated circuit arrangement has been required (the second approach). Cost and reliability suffer under both approaches.

In many applications, such as conversion of telephone numbers, and conversion of BCD punched cards into computer input signals, such BCD-to-binary translations take place on an almost continuous basis. In cases such as these where conversions must be repeated a large number of times, simplicity and economy are of paramount importance. The provision of large storage and accessing facilities, or of other complicated circuitry, increases the likelihood of equipment failure. The high cost of conversion by some techniques is also quite apparent.

C. Appellants' Contribution: A Simple, Reliable Method of Conversion

Appellants discovered that a very simple relationship exists between the digits of the BCD number* to be converted and the equivalent binary number when the conversion process is broken down into its most elementary steps. In addition, this relationship is identical for all BCD

---

* For the purposes of this discussion, a "number" might be defined as a symbolic representation of quantity; a "digit" is one of a set of ten symbols used to express decimal numbers; and a "bit" is one of a set of two symbols used to express binary numbers. The BCD "number" (0101 0011) consists of two "digits" (0101 and 0011) each consisting of four "bits" (0, 1, 0 and 1; and 0, 0, 1 and 1).

digits. Hence simple repetitive action can be used to accomplish the entire conversion.

In particular, appellants discovered that, for each bit position in each BCD digit, conversion can be accomplished by adding a binary "1" to two specific bit positions of the next lesser significant* BCD digit. Moreover, the bit positions at which such additions take place have a fixed relationship to the BCD bit being converted, viz., they are always the first and third bit positions to the left of that bit position which corresponds to the bit being converted.

Using this discovery, conversion can be implemented with the simple steps of

1) testing each BCD bit position for all but the least significant BCD digit; and

2) for each "1" bit detected, adding a binary "1" to each of the two specified bit positions in the next lesser significant BCD digit.

The mathematical justification for this procedure is described in detail in appellants' specification (R-7). Since novelty is not at issue, this justification will not be repeated here.

The advantages of appellants' method are readily apparent when implementing this procedure in a shift register. The bit tests and the adding (incrementing) operations can then be performed at fixed register positions, and the appropriate bit positions brought to these register positions for both operations by simple shifting operations.

D. The Apparatus and Method Disclosed

Having discovered the mathematical principles upon which simple and economical conversion could be based, and

---

* In normal notation, "significance" of bits or digits increases to the left, e.g., in the number "53" the 5 is more significant than the 3.

having conceived of a method of conversion using these principles, appellants proceeded to disclose apparatus upon which this method could be practiced. The basic constituents included a shift register (part of 70, R-15) shift control circuitry (72), bit testing circuits (44) and a one-bit adder circuit (part of 70). Since the major field of application for this conversion method was that of electronic data processors or computers, appellants conceived the best mode of carrying out the inventive method to be one using the data processor itself. Appellants therefore disclosed a program-controlled data processor and the necessary program (R-9) to cause that data processor to practice the inventive method.

It should be emphasized that the apparatus necessary for practicing the inventive method is all explicitly shown in appellants' drawings (R-15). The program is disclosed only as one advantageous way in which to control that apparatus. Other ways are readily apparent to those skilled in the art and, indeed, one such other way was disclosed by appellants (R-39) in overcoming a rejection based on inherent function (R-29).

E. The Rejected Claims

The claims are both method claims, but of different scope and orientation.

Claim 8 (R-142) is directed to the practice of the inventive method on particular apparatus. Thus the steps of this claim include the storing of signals in a "re-entrant shift register," shifting the signals, masking and adding.

It can be seen that claim 8 deals expressly with operations on "signals." Appellants believe that all of the recited signal manipulations are conventional operations which are performed by conventional electronic apparatus.

"Storing," "shifting" and "masking" operations are typical electronic apparatus operations. Even more to the point, the first step of claim 8 calls for "storing the binary coded decimal signal *in a re-entrant shift register*" (emphasis added). It is difficult to understand how such language could be construed to include writing a number on a piece of paper (R-139). The question raised by this claim, then, is whether it is directed to nonstatutory subject matter in spite of the terms "signals," "storing," "shifting," "masking," and "re-entrant shift register."

Claim 13 (R-143) is not limited to "signals" but instead speaks of "binary coded decimal representations," testing "binary digit positions" and adding to "binary digit positions."

It will be noted that claim 13 is not limited to any particular apparatus (such as, for example, a shift register) but recites the necessary operations ("testing" and "adding") in terms of the digit positions. Since appellants' method is admittedly novel, there being no art rejections, the question raised by this claim is whether appellants are entitled to a claim of this scope based on a disclosure of an admittedly novel method and without explicit recitation of structure in the claim.*

---

* It should be noted that appellants' specific attempt to add apparatus limitations to claim 13 (R-133) was denied by the Examiner as "raising issues not previously presented or considered." (R-135)

The attached Appendix contains a brief description of most of the cases dealing with the mental step doctrine. These cases are completely identified in the Appendix. For simplicity, therefore, whenever one of this group of cases is referred to in the remainder of this brief, it will be identified by a simple reference to the appropriate page of the Appendix.

V. The Argument

A. Computer Programs in General

Before a discussion of the patentability of appellants' claims is possible, it is necessary to take up a problem which is at the basis of this case but which has received little or no analytical attention by the Patent Office. It is necessary to take up the problem of computer programs.*

The great difficulty in defining the term "computer program" has arisen from the fact that this term is used loosely to refer to several different kinds of things. For the purpose of this discussion, only two major categories of usage

---

* It would seem that there has been entirely too much preoccupation with attempts to formulate answers to the question: "Are computer programs patentable?", rather than with answering the questions:

a) Are the claimed processes statutory (35 U.S.C. 101)?

b) Are they novel (35 U.S.C. 102)?

c) Are they obvious (35 U.S.C. 103)?

The question persists, however, because of the approach and attitude of the Patent Office, which seems determined to put "computer programs" in a neat nonstatutory category for purely administrative reasons.

will be discussed since only these categories are pertinent to the present case.

In a first sense, a computer program is merely a listing of computer instructions. It is clear that, in this sense, a program is no more than a description of a desirable process. It is closely analogous to the schematic diagram of an electrical circuit. It specifies, in greater or lesser detail, the manner in which something may be implemented. In this sense, the program is no more the subject matter of patent applications than is the schematic diagram of an electrical circuit. For convenience, this purely descriptive aspect of the computer program will hereinafter be called an explicative computer program. It will be noted that the program continues to be solely explicative whether recorded on paper, magnetic tape, or even in the memory of a general purpose computer. Although both the recording media and the symbolic notation have changed, the explicative character of the sequence of instructions is, and must be, identical.

The explicative computer program, however, is descriptive of some other reality. This other reality is the actual process, procedure or method which is carried out as the program instructions are executed. These processes, during their execution, correspond to actual embodiments of a circuit which are merely represented by the schematic diagram. For convenience, this aspect of a program, the ontological or existential process, will be called the extant program. The extant program has the same relationship to the explicative program as the electrical circuit has to the schematic diagram.

Most of the difficulties in this area have arisen due to the confusion of these two meanings of "program." An explicative program, for example, is a proper subject matter for copyright protection, just as is the schematic diagram. The extant program, however, cannot be protected by a

copyright and, like the electrical circuit, is appropriate subject matter for patent protection.

As an example of the confusion arising in the use of the word "program," the Examiner's original rejection of appellants' claims will be here repeated, with parenthetical comments:

> "The method claimed is merely a program which is a set of instructions [explicative] to control the operation of a computer [extant]. The instructions [explicative] are not a statutory process [extant] such as a method of manufacturing an article, but a logical list of mental steps [explicative] which can be applied to a computer [extant] to allow it to imitate the mental steps." (R-18)

When analyzed, this rejection is much like a rejection of a claim to an electrical circuit as nonstatutory because the schematic diagram is printed matter. The properties of the explicative program should not be imputed to the extant program.

This same result can be approached from a different direction. From the point of view of appellants' claimed method steps, there is no way of ascertaining, from those steps alone, whether the method is carried out through the execution of a program in a general purpose computer or through the operation of a permanently wired circuit. Indeed, appellants have taken pains to disclose a circuit which carries out the claimed methods and which requires no computer program whatsoever (R-39). The subject matter which is here claimed is not a computer program, as such, in either sense of the term. It is an extant process which may be implemented (as an extant program) by programming a computer, but which may just as well be implemented by wired circuitry.

It should be emphasized that appellants are not here speaking of the equivalency between programmed and wired

apparatus, although such equivalency does exist. Rather, appellants are noting that, from the point of view of the claimed subject matter, the combination of steps is identical, and not just equivalent, when produced by a computer program or a wired circuit. That is, the equivalent apparatus performs the same process. Thus, if a patent application is filed disclosing only the claimed sequence of steps (in a flow chart, for example), there is no conceivable way in which the Patent Office, or anyone else, can ascertain with certainty whether the applicant had in mind a computer program or a wired circuit. It is not surprising, therefore, that the Patent Office and certain patentees disagree as to whether or not a "computer program" has been patented.*

All of the above discussion leads to the conclusion that the question of patentability of computer programs is unanswerable until it is clear whether "computer program" is used in its explicative or its extant sense. Explicative programs are "writings" while extant programs are methods of processing signals. The former are usually considered copyrightable but nonpatentable while the latter have been the subject matter of patents long before the advent of the stored program digital computer (*The Telephone Cases*, Appendix, A1).

In the context of the present case, it is clear that appellants are claiming extant processes, i.e., methods of processing signals (representations). Whatever disposition this Court makes of the present case, it is absolutely imperative that the rejection of appellants' claims not be sustained for the reason that appellants have chosen to disclose an explicative program. If appellants' claims are nonstatutory, it is because of the nature of the extant steps claimed, and not because of any particular disclosed manner of implementing those steps (assuming Section 112 is otherwise satisfied).

---

* "Patent Office is Ruffled by First Software Patent," *Computerworld,* June 26, 1968, page 3.

The remainder of these arguments will be directed to a refutation of the Patent Office position that the claimed steps are nonstatutory mental steps. It is assumed that the rejection of these claims would have been (and the refutation necessarily would be) identical to those herein presented if appellants' supporting disclosure had been a permanently wired electrical circuit and computer programs had never been mentioned.

B. Can Appellants' Claims be Reasonably Construed to Apply to the Paper and Pencil Implementation?

The entire rationale of the rejection herein appealed rests on the assumption that the terms of appellants' claims can be construed to apply to an implementation in which a human being makes pencil notations on a piece of paper and manipulates the meaning of these notations by intellectual effort (mental steps).

Appellants' steps cannot, however, be reasonably construed so as to include the very paper and pencil process described by the Board of Appeals.

1. *The Terms Used Must be Construed in Accordance with the Practice in the Art*

It cannot be gainsaid that the step of "adding," entering most prominently in the Patent Office arguments, has a long and continuous association with apparatus. An entire group of subclasses (Class 235, Subclasses 168 through 177) has been designated by the Patent Office for electrical adders and/or subtractors. As of the present writing, 288 different patents are classified in this group, the earliest one going back to 1936 (F. B. Wadel patent 2,061,745). It thus appears that a large number of persons exist who are skilled in the are of machine addition. This group of persons is obviously a subset of those persons more generally skilled in the art of machine processing of data.

The question arises, then: To precisely whom are appellants directing their disclosure? To this large body of per-

sons skilled in the art of machine processing of data, or to the class of mathematicians, as suggested by the Board of Appeals (R-139)?* Even a cursory perusal of appellants' specification would seem to settle this issue. Appellants there speak of "processing equipment" (R-5) and have shown in their drawing a block diagram of conventional electronic circuitry (R-15).

It is submitted that appellants' claims, when interpreted by the person of ordinary skill in the art to which appellants' specification is directed, *cannot* be construed to include mental activities, but *must* be construed as being limited to machine operations. If this be true of "adding," how much more true it is of "storing" and "shifting," (claim 8) and "testing" (claim 13).

2. *Appellants Must Speak in the Terminology of the Art*

Not only would the terms used by appellants in their claims be interpreted as machine processes by those skilled in the art, but, indeed, appellants have no alternative but to use these terms. It is true, of course, that appellants could have coined entirely new words and defined them so as to exclude mental activity. If they did so, however, appellants would cease to speak to the persons skilled in the data processing art and thus fail to fulfill the requirements of the first paragraph of 35 U.S.C. 112. Under the law, appellants are not free to do so. Since the Patent Office has never suggested that appellants' claims do *not* read on the disclosed machine operations, it must be assumed that they do in fact so read. Appellants therefore find themselves in the paradoxical position of finding it necessary to use certain words in order to speak to the art about machine operations, and yet having their claims rejected because those very same words speak to the Patent Office as mental operations.

---

* It is noted that the Board of Appeals' Decision (R-139) attempts to interpret the term "algorithm" by referring to an article by an associate professor of mathematics (albeit also a programmer).

3. *Obtaining the Same Result as the Method Step is Not Practicing the Method Step*

While it is true that the pencil and paper process will produce some of the same results as the claimed methods in terms of information, it is far from clear that the steps involved answer to the claim language and clearly do not realize the advantage of the claimed steps. The writing of marks on a piece of paper and the storing of signals, for example, both make the information available for later use, i.e., have the same or similar result. They are not, however, equivalent steps. The step of "storing" a signal (claim 8), for example, presupposes that the signal is available and is then stored somewhere. In writing marks on a paper, on the other hand, the mathematician is creating symbols in response to an intellectual effort. The "signals" have no pre-existence and hence cannot be stored, only generated.

Even more to the point, "shifting" signals (claim 8) would seem to indicate a movement of the signals in some fashion. The Board of Appeals (R-140) suggests moving the paper to answer to this limitation of the claim. The purpose of shifting, however, is to bring certain digit positions into registry with the adder. Moving paper around has no function in the manual method unless, of course, paralysis of the pencil is assumed.

Finally, the process of "adding" binary signals involves changing the stored signals themselves so as to represent the previous value plus the addend. In the pencil and paper method, adding involves "storing" (writing down) the new "signals." Indeed, the only purpose of the human "writer" is to store (memorize) and retrieve (recall) the "sum" associated with a given augend and addend. This is not cognitive activity even though it takes place in the human brain. The result, in terms of the meaning of the new "signals" is the same in the machine and in the paper and pencil processes, but these processes themselves are completely different.

It is submitted that the implementation proposed by the Board of Appeals does not answer to the terms of appellants' claims, particularly claim 8, and thus whether or not this implementation is mental is beside the point.

4. *35 U.S.C. 112 Prevents Interpretation Below*

The third paragraph of Section 112 of the Patent Laws provides, in part:

> "An element in a claim for a combination may be expressed as a . . . step for performing a specified function . . . and such claim *shall* be construed to cover the corresponding . . . acts described in the specification and equivalents thereof." [emphasis added]

It will be noted that the language of this paragraph is not permissive or discretionary, but is imperative. The Examining Staff of the Patent Office is not free to interpret the steps of appellants' claims in any manner in which it sees fit. These steps must be interpreted to cover only the corresponding acts described in the specification and equivalents thereof.

The specification, of course, describes machine operations to implement each of the steps of appellants' methods. To sustain its rejection, the Patent Office has interpreted these claims so as to read on mental activities of human beings. It is left to this Court to decide whether or not machine operations and mental activity are fully equivalent under the patent laws. Moreover, such equivalency must be shown to be more than just the equivalency of result, but must in fact be full equivalency of the acts themselves.

C. Does the Execution of the Steps of Appellants' Claims Require Any Significant Mental Activity?

Even assuming that appellants' claims do read on the pencil and paper implementation suggested by the Board of Appeals' Decision (R-139), it is still clear that such an

implementation is not mental, but is manual. The steps of writing down number representations ("storing") and moving the piece of paper (or the pencil) ("shifting") are clearly manual steps which require no mental effort. Even the step of "adding," requiring only the observation of two binary digits and the marking down of two other binary digits, is not an "interpretive" mental act. (*Ex parte Monroe,* Appendix, A11; *Ex parte Kahn et al.,* Appendix, A12, *Ex parte McNabb et al.,* Appendix, A13; *Ex parte Garrett,* Appendix, A15); [i.e., the algorithm dictates the exact result in *every* case and the person merely implements the fixed rules instead of the machine].

The Board of Appeals' Decision (R-140) argues that the claims deal with the manipulation of the *meaning* of the signals and representations. A fair reading of these claims, however will lead to the opposite conclusion. The steps are, in fact, acts performed on the signals or representations themselves. It is difficult to understand, for example, how the "meaning" itself can be stored, shifted and added (claim 8) or tested and added (claim 13). It is true, of course, that the reason and the motivation for which the signal manipulations take place lies in the meaning ultimately ascribed to the result. This, however, is no objection to the claims (*Ex parte Masten,* Appendix, A16). Similar motivation can be found for information signal manipulation such as that performed in radio broadcasting, telegraphy, telephony, radar, television, remote control, telemetry, and so forth. The processes involved in each of these areas of technology could be "implemented" by hand, using an oscilloscope or graph to render the signals visible. The Board's position, if adopted, would seemingly prevent method claims in all of these technological areas.

On the other hand, manual implementation has never been an objection to the allowance of a method claim (*Expanded Metal Company* v. *Bradford,* 214 U.S. 366, 53 L.Ed. 1034, 1909) and, indeed, has often been a prerequisite to obtaining

such method claims (*In re Parker,* 23 CCPA 721, 79 F.2d 908, 27 USPQ 340, CCPA, 1935).

D. Is the Mental Activity, If Any, Involved in the Execution of Appellants' Claimed Methods of Such a Nature as to Fall Within the Mental Step Doctrine?

For the various reasons given below, it is believed that the mental step doctrine, as developed in the cases cited by the Examiner and the Board of Appeals, does not apply to the claims here at issue.

It should be pointed out that appellants do not here question the legal efficacy of the mental step doctrine in any way. For the purposes of this appeal, it is admitted that this doctrine, as developed in the cases, is in full force and effect, and should be recognized by the Court until such time as the Supreme Court or the Congress sees fit to change the law.

Appellants' entire argument at this point is directed to the proposition that the Examiner and the Board of Appeals have misapplied the doctrine due to a misdirected analysis of the case law.

1. *The Subject Matter Acted Upon Is Physical*

In a method claim, the law of nonstatutory subject matter involves two separate but often confused considerations. The first is the nature of subject matter acted upon and the second is the nature of the steps to be performed with respect to that subject matter.

In the present case, the subject matter acted upon is disclosed as binary coded electrical signals (R-5) and claimed as "signals" (Claim 8, R-142) and as "representations" (Claim 13, R-143). The Patent Office has not even asserted that the subject matter acted upon is not physical. Even the manual implementation suggested by the Board of Appeals (R-139) involves making physical marks on paper.

The most basic requirement of *Cochrane* v. *Deener,* Appendix, A1), even as interpreted by the Patent Office, would thus appear to be satisfied.

It is the second consideration, the nature of the acts performed with respect to this subject matter, which the Examiner and the Board of Appeals find objectionable. That is, having assumed the subject matter acted upon to be physical, the Patent Office has concluded that the claimed steps performed on that subject matter are mental steps. The balance of this section of the argument will therefore be directed to the case law cited in support of the mental step aspects of the rejection.

2. *The Decisions Relied On Do Not Apply*

In support of the rejection of appellants' claims as being directed to nonstatutory subject matter because they are directed to mental steps, both the Examiner (R-121) and the Board of Appeals (R-137) have cited the following six cases:

Cochrane v. *Deener,* Appendix, A1;
Halliburton Oil Well Cementing Company v. *Walker et al.,* Appendix, A4;
In re Abrams, Appendix, A6;
In re Yuan, Appendix, A7;
In re Venner et al., Appendix, A8;
Ex parte Jenny, Appendix, A14.

It is believed that none of these cases apply to appellants' claims for the following reasons:

a. The cited cases do not disclose apparatus for carrying out the alleged mental steps, as do appellants.

The *Halliburton* patent required the operator to observe plots on a recording apparatus, measure time between peaks on the plot, and to calculate, from these observed and measured data, velocities and distances. No apparatus was provided for these observations, measurements or calculations. The operator himself was required to perform these steps.

The *Abrams* application required the operator to observe pressure rise rates, calculate standardized rise rates from the observations and then compare the standardized rise rates "to detect anomalies." No apparatus was provided to perform the observations, calculations or comparisons. The operator himself was expected to perform these steps.

The *Yuan* application required the operator to select pressure distributions, mathematically convert these pressure distributions to velocity distributions, determine airfoil attitudes, from the above data determine form parameters which, in turn, must be converted to rectangular coordinates according to given formulae. Plotting these coordinates produced a graph of a desired airfoil profile. All of this was done without benefit of apparatus, the applicant relying on the mental activity of the operator.

The *Jenny* application required the operator to "chord" profile graphs, "spline" the chorded graphs and plot differences. Although simple hand tools were disclosed (chordometer and spline), even in the use of these tools the operator had to exercise judgment. The alternative to these tools was a purely mathematical calculation for which no apparatus was provided.

Appellants, on the other hand, disclose fully automatic apparatus which will practice appellants' method with no more intervention than turning the apparatus on. The Board of Appeals has already decided that possibly mental steps which are in fact performed by apparatus are not within the mental step doctrine. See *Ex parte Kreuzer and Goshaw,* Appendix, A10; *Ex parte Monroe,* Appendix, A11; *Ex parte Moser and Johnson,* Appendix, A12.

b. The subject matter in the cited cases distinguished over the prior art precisely in the interpretive mental acts, unlike appellants' methods.

In the *Halliburton* case, Walker had already been issued a patent (No. 2,156,519) claiming all of the apparatus speci-

fically shown to practice his method. The only additional subject matter was found in the steps of using the apparatus output to calculate unknown quantities, i.e., the additional steps represented wholly mental acts.

In *Abrams,* the applicant admitted that the first two steps, the only clearly manipulative steps, were old. The remaining steps required calculations with no apparatus to perform these steps.

In the *Yuan* case, all of the steps were mathematical in nature. Furthermore, the article produced by the method was held to be old.

In the *Jenny* case ("chording," "splining" and "plotting"), the last step was admitted to be printed matter and the second step was held to be conventional. The first step was held to be a mental step and/or printed matter.

Appellants, on the other hand, have disclosed and claimed methods in which the steps which are most novel are also least susceptible of purely interpretive mental implementation. In claim 8, for example, the novelty most closely lies in the successive steps of "shifting" by which the binary digit signals are moved to appropriate positions for "adding." The "adding," by itself, is significant only in that binary "1" is the value of the signal added. In this connection, note that the prior art patent 2,970,765 to Bird also involves "adding," although different values are added, and the prior art patent 3,026,035 to Couleur involves "subtracting" different values. The Patent Office Board of Appeals has several times agreed that where the alleged mental steps are not at the point of novelty, the rejection is not in order. See *Ex parte Atwood,* Appendix, A11; *Ex parte Bond,* Appendix, A15; *Ex parte Tripp,* Appendix, A16. Indeed, this Court has similarly held in *In re Jones,* Appendix, A8.

c. The mental activity required in each of the cited cases involved substantial interpretive judgment, unlike appellants' methods.

In the *Halliburton* case, it was necessary for the operator to read values from charts and scales and to perform substantial calculations without any apparatus. These calculations involved substantial mental effort on the part of the operator.

The *Abrams* case required the operator to standardize the rate of pressure rise by an involved calculation using the gas laws, or by graphical extrapolation requiring some judgment. Moreover, in *Abrams* the standardized rates of pressure rise were to be "compared" in order to determine "anomalies." The amount of judgment required to recognize "anomalies" was left unstated.

In the *Yuan* case, a very complicated sequence of mathematical and/or graphical calculations were required. Not only the formula conversions, but the conversions to velocity distributions and the determinations of form parameters required extensive background knowledge and mathematical skill.

In *Jenny*, the step of "chording," when done by mathematical formula, is similarly a very involved mathematical process requiring a mathematician-operator to carry it out.

Appellants, however, call for steps which are all of extreme simplicity, requiring no involved or complicated processes to implement, and are all performed by the disclosed apparatus. Even if it were admitted that these steps could be performed mentally, which is not admitted, it is clear that none of these steps would require reflective or interpretive action on the part of an "operator." The steps of "storing" and "shifting," for example, are among the most elementary operations possible with signals. Even binary signal addition, especially when confined to the addition of a single binary "1", is essentially a combinatorial process, and not a reflective mathematical process. As noted

in one of appellants' responses to the Examiner (R-35), for each set of binary bits, the sum is "1" if a "1" appears in either the addend or augend, and a "1" is carried if a "1" appears in both. It does not seem unlikely that a small child could implement this operation without difficulty. It is, of course, most easily performed by automatic circuitry.

The Patent Office Board of Appeals has recognized this need for significant mental activity in *Ex parte Kahn and Offenhauser,* Appendix, A12; *Ex parte McNabb and Voss,* Appendix, A13; *Ex parte Egan, Kister and Scott,* Appendix, A13; and *Ex parte Bond,* Appendix, A15. This Court has seemingly indicated a similar inclination in *In re Jones,* Appendix, A8.

E. Are Appellants Attempting to Claim Their Invention With Undue Breadth?

The only explicit rejection outstanding against appellants' claims 8 and 13 is the rejection on the grounds that these claims are directed to subject matter not embraced by Section 101. In the course of its argument, however, the Board of Appeals made the following observation (R-138):

> "We are not convinced by appellants' arguments to the effect that the disclosure in an application, not the claims thereof, should be the proper basis for judging whether the claims are drawn to subject matter outside the statute. Certainly a claim which embraces that which was already in the prior art or was obvious therefrom could not be sustained under 35 U.S.C. 102 or 103 merely because there may have been something patentable disclosed in the specification. *35 U.S.C. 112 requires the claim to point out the subject matter which the applicant regards as his invention so that a claim which is so broad and indistinct as to embrace within its terms subject matter that cannot be patented under Section 101 of the statute, similarly must be unpatentable."* [*emphasis* added]

The italicized language could, by itself, be construed as another example similar to the Sections 102 and 103 example preceding it. On the other hand, it could also be construed as an entirely new ground of rejection, i.e., a Section 112 rejection in addition to the Section 101 rejection. To compound the difficulty, after limiting his rejection to Section 101 in his Answer (R-120), on remand to consider appellants' proposed amendment, the Examiner made the following statement:

> "In summary, the remaining ground of rejection of claims 8 and 13 now in the case is that these claims are directed to nonstatutory subject matter. The method set forth is by appellants' own assertion 'directed to a machine algorithm'; and as understood recites a series of steps for manipulation of data required to be carried out by a programmed computer. Such a method, set forth in this manner, is not considered to properly set forth a process within the meaning of 35 USC 101, in the light of prior decisions *and the requirements of 35 USC 112.* The subject matter of the claims is thus deemed nonstatutory." [emphasis added]

It is indeed unfortunate when the vagaries of prosecution leave some of the basic issues in doubt.

In view of the above-quoted language of both the Board of Appeals and of the Examiner, appellants have no alternative but to consider a rejection under Section 112 as having been raised and requiring a response.

It should be first noted that no legal precedent has been cited by the Examiner or the Board in support of the proposition that claims reading on nonstatutory as well as statutory subject matter thereby fail to meet the requirements of the second paragraph of Section 112 for "particularly pointing out and distinctly claiming" the invention.

Fortunately, this very issue has been recently decided by this Court. In response to a similar rejection, this Court held (*In re Prater and Wei,* Appendix, A9):

> ". . . patent protection for a process disclosed as being a sequence or combination of steps, capable of performance without human intervention and directed to an industrial technology—a 'useful art' within the intendment of the Constitution is not precluded by the mere fact that the process could alternatively be carried out by mental steps." (159 USPQ 583, 593; rehearing granted —— CCPA ——, —— F.2d ——, 160 USPQ 230, 1969)

This conclusion seems to be inevitable under the circumstances. Where, as here, there is an undeniably large area of subject matter which falls within the statutes (and the Patent Office does not contend otherwise), and where the art has developed a vocabulary to describe that subject matter (as it clearly has here), in such circumstances it would seem a most intolerable burden upon applicants for patents (not to mention the other practitioners of the art) to formulate an entirely new vocabulary merely for the purpose of avoiding semantic problems in the Patent Office. No one has ever seriously contended that the present patent claims, or any other patent claims, would ever be enforced against a human being engaged in the act of thinking. Clearly, there is no court in the land which would sustain such an action. Such fanciful speculations hardly seem an adequate ground for failure to extend the benefits of the patent system to one of our most important technological advances.

VI. Summary

Appellants have disclosed an electronic data processor and a series of instructions which cause that data processor to perform a particular novel process. Appellants have claimed that process by means of method claims, one nar-

rowed by specific apparatus limitations and the other sufficiently broad to encompass only the essential method steps and not limited to any particular apparatus for its practice.

Thus, in what appears to be the first opportunity for this Court to consider the matter, appellants have squarely presented the issue of the patentability of data processing methods practiced by programming a computer. The Patent Office has, on numerous occasions, in private communication and in the public forums, as well as in this case, taken the position that such subject matter is not patentable under existing law. Appellants respectfully disagree with this negative conclusion.

The position of the Board of Appeals can be analyzed into the following steps:

1) Appellants' claims can be reasonably construed to read on a paper and pencil implementation.

2) A paper and pencil implementation is a series of mental steps.

3) Claims which can be construed to read on mental as well as physical steps are unpatentable because they are directed to nonstatutory subject matter, or claims which can be construed to read on mental as well as physical steps are unpatentable because of undue breadth.

Appellants have herewith taken issue with each and every one of the conclusions stated in the above steps.

Appellants' claims cannot be reasonably construed to read on a paper and pencil method because the terms in which they are couched, when directed to those persons of ordinary skill in the art to which the specification is directed, have a meaning associated with machine processing. Although the processes claimed can be illustrated (explained, derived, proven, taught) by means of pencil and

paper, the pencil and paper operations are not the operations called for. The results are the same in terms of meaning, but the process is not the same in terms of step implementation. Moreover, appellants must speak to those skilled in the art wherein they feel their invention lies, and must speak in understandable terms. Appellants must perforce rely on the vocabulary developed by that art.

It further appears that the paper and pencil method relied on by the Patent Office itself is not a mental process since the human being's only functions in the paper and pencil method are simple machine functions, i.e., making marks, detecting marks, and storing and retrieving associated data items. A substantial change in existing law would seem to be required to classify such steps, even performed by a human being, as mental.

In this connection, it appears that the existing law in this area has imposed this ground of nonpatentability only where the intellectual aspects of the steps were clear and substantial. All of the cases cited by the Examiner and the Board of Appeals and, indeed, all of the cases which appellants have been able to discover, and which deal with the mental step doctrine, have been decided in fact situations in which substantial mental activity was *necessarily* involved and was the *only* means suggested for implementing the steps. In each and every case where the applicant disclosed automatic apparatus for performing the claimed steps, the doctrine was found not to be applicable.

The rejection on the grounds of undue breadth of claiming under 35 U.S.C. 112, raised only inferentially by the Board of Appeals, is not deemed to have been appropriately raised and, moreover, clearly refuted by a recent decision of this Court.

VII. Conclusion

Based on the foregoing, it is respectfully requested that this Honorable Court reverse the decision of the Board of Appeals in the present case.

Respectfully submitted,

ROBERT O. NIMTZ
Attorney for Appellants

Bell Telephone Laboratories, Incorporated
March 14, 1969

APPENDIX

The Mental Step Doctrine As Developed in the Case Law

The following is a brief review of the mental step doctrine as developed by the decisions of the various courts and the Patent Office.

A. Background

The Supreme Court has struggled for well over a hundred years with the general problem of statutory subject matter. In the course of these extended deliberations, certain rules concerning excluded or non-statutory subject matter have been formulated. The Court, for example, concluded that the following processes *were* within the statutes: metallurgical processes (*McClurg* v. *Kingsland,* 42 U.S. (1 Howard) 202, 11 L.Ed. 102, 1843); chemical processes (*Corning* v. *Burden,* 56 U.S. (15 Howard) 252, 14 L.Ed. 683, 1853; *Tilghman* v. *Proctor,* 102 U.S. (12 Otto) 707, 26 L.Ed. 279, 1881); food processing (*Cochrane* v. *Deener,* 94 U.S. (4 Otto) 780, 24 L.Ed. 131, 1877); mechanical processes (*Eames* v. *Andrews,* 122 U.S. 40, 30 L.Ed. 1064, 1887); and electrical processes (*The Telephone Cases,* 126 U.S. 1, 31 L. Ed. 863, 1888).

During the same time span, the Supreme Court also concluded that certain other subject matter was *not* within the statutes, i.e., scientific principles (*LeRoy* v. *Tatham,* 55 U.S. (14 Howard) 156, 14 L.Ed. 367, 1852); laws of nature (*O'Reilly* v. *Morse,* 56 U.S. (15 Howard) 62, 14 L.Ed. 601, 1853); functioning of machines (*Burr* v. *Duryee,* 68 U.S. (1 Wallace) 531, 17 L.Ed. 650, 1862); and methods of doing business (*Munson* v. *Mayor of New York,* 124 U.S. 601, 31 L.Ed. 586, 1888).

The case of *Cochrane* v. *Deener, supra,* has been extensively cited in the cases on statutory subject matter and will be considered in more detail. This case was an infringement

suit on a patent for processing flour by passing the flour through a blast of air which carried off the fine impurities, a process which revolutionized the flour manufacturing industry . Mr. Justice Bradley, speaking for the Court, held that the patent was valid and infringed despite the wide differences between the apparatus used for the infringement and the apparatus disclosed in the patent:

> A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject matter to be transformed and reduced to a different state or thing. If new and useful, it is just as patentable as is a piece of machinery. In the language of the patent law, it is an art. The machinery pointed out as suitable to perform the process may or may not be new or patentable; whilst the process itself may be altogether new, and produce an entirely new result. The process requires that certain things should be done with certain substances, and in a certain order; but the tools to be used in doing this may be of secondary consequence. [94 U.S. at 788]

In spite of the obvious expansionary purpose of this language, it is still often quoted today, particularly by the Patent Office, as a restrictive definition of a statutory process.*

The Court of Appeals of the District of Columbia, through Justice Morris, summarized some of the early law in *In re Weston,* 1901 C.D. 290 (1901), allowing certain method claims and rejecting others as the function of apparatus.

B. Early Formulations of the Rule

Relying on *In re Weston, supra,* Assistant Commissioner Billings, in *Ex parte Meinhardt,* 1907 C.D. 237 (1907), decided that a system for spacing free hand letters was not

---

* But see *Ex parte Wescott,* 135 USPQ 81 (Bd. of App., 1963).

statutory. In the course of the discussion, by way of illustration, the comment was made:

> It is conceivable that some person after long and arduous study might discover a new method for solving certain mathematical problems which was much simpler and shorter than any known method; and such method would not be a proper subject for a patent. [*Id.* at 239]

In *Don Lee, Inc.* v. *Walker,* 61 F.2d 58, 14 USPQ 272 (1932), the Ninth Circuit decided, through Justice Wilbur, that a method for counterbalancing engine shafts by placing weights "of such mass and radius of mass center and distance from the central transverse plane of the shaft that their bending moment will be equal and opposite to that of the throws to be balanced" was nonstatutory. Without citation of authority, it was decided:

> It is clear then that the patentee seeks a monopoly of a formula for determining dynamic forces. . . . [*Id.* at 62, 14 USPQ at 281]
>
> * * * * *
>
> We agree with appellants' contention that such a computation is not "a new and useful art, machine, manufacture or composition of matter" within the meaning of § 4886. . . . [*Id.* at 67, 14 USPQ at 285]

The Patent Office Board of Appeals reached a similar conclusion in *Ex parte Cunningham and Rowley,* 102 USPQ 174 (1940). Examiner-in-Chief Clift, dealing with apparatus for solving a formula for computing wage premiums, sustained the rejection of the apparatus claims and noted:

> Obviously, method claims are improper for such method could be carried out by the intellectual effort of the calculator. [*Id.* at 176]

This Court came to a similar conclusion with respect to a formulated composition of matter in *In re Cooper and Foley,* 30 CCPA 946, 134 F.2d 630, 57 USPQ 117 (1943).

The Patent Office Board of Appeals, however, also recognized that inventions based on conclusions recited as mathematical formulations are not the same thing as claiming the mathematical formulation itself in *Ex parte Lewis and Horner,* 48 USPQ 141 (1940) and *Ex parte Massa,* 48 USPQ 331 (1940). In the latter case, dealing with the formulated structure for a loudspeaker, Examiner-in-Chief Redrow held (*Id.* at 333):

> While a mathematical formula may not be claimed as such, structures built in accordance therewith may be the subject of proper claims, McKay Radio Co. v. Radio Corp., 306 U. S. 86. . . .

The Board of Appeals, relying on the dicta in *Ex parte Meinhardt, supra,* held as nonstatutory a method of combating motion sickness (*Ex parte Mayne,* 59 USPQ 342, 1943), a method for determining speed with movable scales (*Ex parte Read,* 123 USPQ 446, 1943) and a method of calculating pump pressure (*Ex parte Toth and Nutter,* 63 USPQ 131, 1944). These latter cases began using the term "mental step" in this connection.

C. The Doctrine as Stated in *Halliburton* v. *Walker*

The Ninth Circuit, through Justice Healy, considered a method for measuring the location of obstructions in oil wells in *Halliburton Oil Well Cementing Company* v. *Walker et al.,* 146 F.2d 817, 64 USPQ 278 (1944). It was then held:

> This is a method patent. The steps involved are described in the claims by the following descriptive words "determining", "registering", "counting", "observing", "measuring", "comparing", "recording", "computing".
>
> * * * * * *

> We think these mental steps, even if novel, are not patentable. Cf. Don Lee, Inc. v. Walker. . . . [*Id.* at 821, 64 USPQ at 282]

With this case, the mental step doctrine was completely assimilated into our legal system. It should be noted, however, that essential portions of these "mental" steps had to be performed through the mental effort of the operator. As the Court noted:

> Given an apparatus for initiating an impulse wave in a well and a means for differentiating between and for recording echoes returned from obstructions in it, anybody with a rudimentary knowledge of arithmetic will be able to do what Walker claims a monopoly of doing. If his method were patentable it seems to us that the patentee would have a monopoly much broader than would the patentee of a particular apparatus. To sum the matter up, we think Walker's apparatus patent No. 2,156,519 gives him all the protection his inventive genius entitles him to. [*Id.* at 821, 64 USPQ at 283]

D. Recent Court of Customs and Patent Appeals Decisions

1. *In re Heritage*, 32 CCPA 1107, 150 F.2d 554, 66 USPQ 217 (1945)

The claims in this case related to methods of coating a porous-surfaced fiber board by coating samples with varying thicknesses, selecting the one with the best sound-absorbing coefficient and yet an adequate amount of coating, and using this thickness for coating fiber boards. Judge Hatfield held (150 F.2d at 556, 66 USPQ at 220):

> The feature of appealed claims 1 and 2 which is relied on for patentable novelty is the mental process of making a selection of the amount of coating material to be used in accordance with a predetermined system. Such purely mental acts are not proper subject matter for protection under the patent statutes.

2. *In re Pugh*, 34 CCPA 1181, 162 F.2d 509, 74 USPQ 165 (1947)

This case was directed to an automobile battery tester in which the voltage meter was calibrated in terms of amount of time required for recharging. The claims were rejected on prior art meters with standard scales since "only the mental reaction of the observer is varied, due to the different indicia." Judge O'Connell, after stressing the fact that the claimed scale allows unskilled operators to determine charging time, held that:

> There is no merit in the suggestion that an apparatus for taking a measurement or making a calculation, which thereby records or conveys information to the public, is in and of itself destitute of the quality of invention or is unpatentable under the provisions of the patent laws. [162 F.2d at 512, 74 USPQ at 167]

3. *In re Abrams*, 38 CCPA 945, 188 F.2d 165, 89 USPQ 266 (1951)

This case has been widely cited by the Patent Office in supporting mental step rejections and dealt with a method of petroleum prospecting in which boreholes were sealed and pressure reduced therein. The normalized rates of pressure rise in the various boreholes were then compared for anomalies indicating petroleum deposits.

Chief Judge Garrett, in speaking of the mental step doctrine, noted (188 F.2d at 168, 89 USPQ at 269):

> Citation of authority in support of the principle that claims to mental concepts which constitute the very substance of an alleged invention are not patentable is unnecessary. It is self-evident that thought is not patentable.

The criteria for mental steps was approached in the following manner:

> In truth, the question of whether a step in a process is mental or physical seems to us to be one of fact rather than one of law and so should not be difficult of determination, but opinions sometimes differ even as to facts. [188 F.2d at 168, 89 USPQ at 269]
>
> * * * * * *
>
> We deem it proper to resort to appellants' specification as an aid in interpreting the steps of the claims. [188 F.2d at 169, 89 USPQ at 270]
>
> * * * * * *
>
> When the steps of the claims are considered in the light of the explanation of their character so given, it seems to us that they are eliminated from . . . [patentability]. [188 F.2d at 170, 89 USPQ at 271]

4. *In re Shao Wen Yuan*, 38 CCPA 967, 188 F.2d 377, 89 USPQ 324 (1951)

The claims of this case were directed to methods of designing a low-drag airfoil profile by computations based on parametric equations, and for the article so designed. This Court, through Chief Judge Garrett, affirmed the decision rejecting the method claims, noting that

> . . . it must be borne in mind that all the so-called steps . . . are purely mental steps dependent upon the mathematical formula which is recited in, and constitutes the heart of, the claims. [188 F.2d at 380, 89 USPQ at 326-27]

Chief Judge Garrett then reviewed the history of the mental step doctrine and concluded that this doctrine was viable even though never decided by the Supreme Court.

5. *In re Lundberg and Zuschlag*, 39 CCPA 971, 197 F.2d 336, 94 USPQ 73 (1952)

This case involved apparatus and methods for geophysical exploration by flying a motion-stabilized magnetic

detector over the area, recording magnetic anomalies and the corresponding terrain, and "geophysically interpreting the cumulative information thus obtained." Judge O'Connell, writing for the Court, held that:

> The final limitations of claims 114 to 116, which calls for "interpreting the cumulative information thus obtained," involves a purely mental step which can nowise lend patentability to the claims. In re Shao Wen Yuan . . . [197 F. 2d at 339, 94 USPQ at 76]

6. *In re Venner and Bowser*, 46 CCPA 654, 262 F.2d 91, 120 USPQ 192 (1958)

The claims of this case were directed to apparatus for molding trunk pistons of aluminum and magnesuim alloys. For timing the removal of the pistons from the mold, there was provided "time-controlled means set to the period between the completion of the pouring of the metal in the mold and solidification of the metal of the piston therein." Judge Martin, speaking for this Court, held:

> The timer itself does not compute the molding period. A mental process is involved and the timer is set accordingly. Patentability cannot be predicted upon a mental step. In re Shao Wen Yuan . . . [262 F. 2d at 94, 120 USPQ at 195]

7. *In re Jones*, 54 CCPA 1218, 373 F.2d 1007, 153 USPQ 77 (1967)

The claims of this case were directed to apparatus and methods for encoding analog signals using an optical encoding wheel with a one-half quantum offset. The method claims included the step of "adding a binary '½' " to the output from the code wheel. Judge Rich, speaking for this Court, held:

> The disc and the method of its use here claimed do not appear to us to involve any mental steps with the possible exception of the final step in method claims 6 and 8, "adding a binary '½' from the binary number represented by the other track" to the read-out. The appellant does not propose to make this addition mentally but by making provision therefore in the read-out *equipment*. The solicitor's point is that we should disregard it as a mental step in the absence of a disclosure of some actual means to accomplish this step in the application.
>
> * * * *
>
> . . . we do not feel that the single possibly mental step of addition is sufficient to make them subject to this rejection. [373 F. 2d at 1014, 153 USPQ at 82]

8. *In re Prater and Wei*, —— CCPA ——, —— F.2d ——, 159 USPQ 583 (1968); Rehearing granted —— CCPA ——, —— F.2d ——, 160 USPQ 230.

The claims of this case were directed to methods and apparatus for spectrographic analysis by solving that subset of simultaneous linear equations having the largest determinant. Relying on *In re Abrams* (supra, A6), the Examiner rejected these claims as mental steps and as failing to particularly point out only the statutory subject matter. This Court, by Judge Smith, noted that *Abrams* disclosed no apparatus for the implementation of the "mental steps" and held:

> ". . . patent protection for a process disclosed as being a sequence or combination of steps, capable of performance without human intervention and directed to an industrial technology—a 'useful art' within the intendment of the Constitution—is not precluded by the mere fact that the process could alternatively be carried out by mental steps." (—— F.2d at ——, 159 USPQ at 593)

E. Recent Patent Office Board of Appeals Decisions

1. *Ex parte Baymiller and Vose,* 68 USPQ 403 (1945)

The claims herein considered were directed to a golf club and to methods of making golf clubs with a striking surface curved according to a stated formula. Examiner-in-Chief Richards initially sustained the rejection of all of the claims, stating with regard to the method claims:

> . . . all of the steps except the step of "forming" are those which merely give information to the operator toward fashioning the article. These steps could be multiplied indefinitely to recite mental processes. [*Id.* at 405]

Inexplicably, upon reconsideration, one of the method claims was allowed ("Claim 34 recites a process not disclosed by . . ." the reference).

2. *Ex parte Kreuzer and Goshaw,* 84 USPQ 432 (1949)

This case concerned methods and apparatus for measuring reverberation time in an enclosed space by launching an acoustic signal and detecting and recording the signal launched and the echoes, the time difference of the two records being the reverberation time. Examiner-in-Chief McCann distinguished from *Halliburton* v. *Walker,* supra A4, as follows:

> In that case, the court noted that the operator had to observe the lapse of time between the arrival of the echoes and from them compute and determine the unknown and hence the method set forth in the claim depended upon the mental observation and alertness of the operator. This is not so in the instant case since no observations and computations therefrom by the operator are required as a necessary step in the method. [*Id.* at 433-34]

The rejections were sustained, however, on inherent function.

3. *Ex parte Hitchens*, 99 USPQ 288 (1953)

This case dealt with a system for timing traffic lights to optimize traffic movement. The claims, cast in a "new use" format, included the step of "determining the least common denominator of the time intervals in the two directions." Examiner-in-Chief Geniesse reviewed the case law in the light of the 1952 Patent Act and concluded that the mental step doctrine was still in effect:

> We do not believe that the definition [35 USC 101(b)] was intended to create a class of patentable subject matter in what is primarily mathematical calculations. [*Id.* at 292]

4. *Ex parte Atwood*, 103 USPQ 247 (1954)

The claims here were directed to a process for separating sylvite from sylvinite ore by froth flotation in the presence of a collecting agent. The concentration of the collecting agent was specified in terms of temperature ("selecting an amine mixture which has been found to give optimum results at one temperature and then changing . . ." the concentration with temperature). In reversing the mental step rejection, Examiner-in-Chief Wolffe noted:

> We will not sustain the rejection because even if it is admitted that the limitation "selecting an amine mixture" is a mental step, it is clear from our above discussion of the claims that this step does not constitute the essential novelty of the claimed process. [*Id.* at 249]

5. *Ex parte Monroe*, 105 USPQ 376 (1955)

This case involved a method of compounding fluid constituents flowing through a constriction by "measuring

the magnitude of said pressure drop'' and ''regulating the rate of addition of said second stream in accordance with the measured value of said pressure drop.'' An automatically controlled valve responsive to the pressure differential performed these steps. Examiner-in-Chief Geniesse concluded that these claims were statutory despite the ''measuring'' step as follows:

> We do not believe that the step of ''measuring'' as required in the claim on appeal is in itself a wholly mental step which requires condemnation of the claim. [*Id.* at 377]

6. *Ex parte Moser and Johnson*, 124 USPQ 454 (1959)

The claims of this case were directed to a process for operating a gas-agitated fluid coking unit including steps of ''determining'' feed rate and relationship between ''viscosity and Conradson carbon,'' and ''varying the severity of the coking operation with the viscosity of the oil.'' These claims were sustained, Examiner-in-Chief Duncombe commenting:

> While determination of the relationship between viscosity and Conradson carbon of the feed may be in the nature of a mental process, we are not satisfied that the step of ''continuously measuring the viscosity of the feed passing into the coking zone'' is itself a wholly mental step requiring condemnation of the claims. [*Id.* at 455]

7. *Ex parte Kahn and Offenhauser*, 124 USPQ 511 (1959)

This case was directed to a method of attracting insects by recording sounds of a female, reproducing the sounds in the presence of insects, marking those portions of the record attractive to the insects, and rerecording the edited sounds. In overruling a rejection on the grounds of mental steps, Examiner-in-Chief Bailey stated:

> We are of the opinion that the examiner's position is too inclusive. We know of no decision that holds that a method is per se unpatentable merely because its practice requires that the operator thereof must think. [*Id.* at 512]

8. *Ex parte McNabb and Voss*, 127 USPQ 456 (1959)

The claims of this case were directed to a method of locating defects in a cylindrical object by passing radiation through the object to expose a film, plotting the optical density of the film and, by orienting the plot with respect to the object, correlating density deviations with defects. Examiner-in-Chief McCann delivered the Board's opinion, permitting such claims, with the following words:

> None of these steps are purely mental or interpretive mental steps. Any method or step in a method which can be manually performed and requires the use of the human eyes for detection or determination of any condition, such as temperature, pressure, time, etc., and/or the use of the hands for the purpose of manipulating, such as turning off or on or regulating a given device in a certain manner or at a certain time, etc., to produce a certain result necessarily involves the human mind and hence can be classed as a mental step. Such steps, however, are not purely mental or interpretive mental steps and are not the kind which are prohibited by the decisions relating to purely mental steps. [*Id.* at 457-58]

9. *Ex parte Egan, Kister and Scott*, 129 USPQ 23 (1960)

The method in this case was for obtaining the dip and azimuth of subsurface strata encountered by a well bore. The method included the steps of plotting correlated points on a prepared chart, reading data off this chart and transferring this data to a second chart, and obtaining the dip and azimuth from the second chart. Noting that this method

relieved skilled workers from laborious computation, Examiner-in-Chief Bailey found the claims patentable:

> We agree that the process under consideration is properly analogous to a method of operating a computer, since the charts employed are quite analogous to a preconstructed computer. The method operations in operating a computer are distinct from the method of computation itself. [*Id.* at 26]

10. *Ex parte Jenny*, 130 USPQ 318 (1960)

This case was directed to a method of preparing a field intensity profile map from a number of field intensity profiles by chording each profile, splining each chorded curve and plotting the difference between the splined curves and the original profiles. This claim was rejected on the grounds that the steps were mental, conventional drafting practice, and printed matter. The Board of Appeals, speaking through Examiner-in-Chief Manian, agreed. In discussing the step of "chording," however, this language appears:

> While instrumentalities are disclosed to facilitate carrying out the step . . . , neither the step nor the term "chording" as broadly described in the claim, requires its use. . . .
>
> * * * * *
>
> It seems to us that the chording step, as broadly described in claim 23, is not a physical step as contemplated by the statute but merely the graphic representation of a mathematical solution of a problem. A mathematical solution of a problem is a mental rather than a physical step under the doctrine of In re Shao Wen Yuan. . . . [*Id.* at 320]

The Board does not rely solely on the mental step aspects. Immediately following the above there is stated:

> The graphic representation of such solution is printed matter. Since patentability of a claim cannot be predicated either on a mental step or on printed matter, it follows that patentability does not lie on a step which encompasses the two. [*Ibid.*]

11. *Ex parte Garrett*, 132 USPQ 514 (1961)

This case involved a laminated washer in which a layer of rubber was sandwiched between two metal layers. When the washer is drawn up on a bolt by a nut, the extent of the bulge in the rubber can be related to the compression load. Both apparatus and the method of measuring tension were claimed. Examiner-in-Chief McCann, after considering the prior art, held:

> . . . the steps of measuring the deformation of the resilient element and determining the load on the bolt from the known deformation-load characteristic of the element are not the type of purely interpretive or discretionary mental steps that have been found objectionable in method claims. [*Id.* at 517]

12. *Ex parte Bond*, 135 USPQ 160 (1961)

The claims of this case were for a method of petroleum prospecting by collecting soil samples, extracting the gas therefrom, analyzing the gases to determine the ratio of the C^{12} and C^{13} isotopes, and drilling where the ratio is highest. The Board, through Examiner-in-Chief Asp, reversed a rejection of these claims as mental operations. After concluding that the claims were not obvious in view of the references, it was stated:

> It follows from this conclusion that the rejection of the claims as directed to a mental process is also untenable. Since the claims are for a novel and unobvious combination, the examiner's premise that the *only* novelty in the process is a mental operation is not correct. [*Id.* at 162]

13. *Ex parte Tripp*, 141 USPQ 918 (1963)

This case dealt with a method of thermal compensation for a machine tool by deriving a signal reflecting thermal movements and inserting into the drive a motion compensating therefor. Examiner-in-Chief Keely held this to be statutory in view of the manipulative aspects of "inserting . . . a motion":

> . . . these claims are not drawn completely to a mental operation and in the light of In re Abrams . . . should be evaluated in accordance with the manipulative steps recited therein. [*Id.* at 919]

14. *Ex parte King and Barton*, 146 USPQ 590 (1964)

The claims of this case dealt with a special purpose computer arranged to convert arithmetic expressions to the Polish notation. The claims were rejected on a general purpose computer, the Examiner alleging that the claims set forth no more structure than the prior art computer when supplied with a stored program properly designed. Although finding the claims obvious in view of the Polish notation itself, Acting Examiner-in-Chief Andrews, speaking for the Board, noted:

> A program for a computer which is not made obvious by the prior art but only by appellants' disclosure is not available to teach appellants' invention. [*Id.* at 591]

15. *Ex parte Masten*, 150 USPQ 473 (1966)

The claims of this case dealt with methods of sequencing traffic signals on a traffic grid in accordance with certain equations. Examiner-in-Chief Keely, after sustaining the rejection on the grounds of inadequacy of disclosure, and in discussing the nonstatutory aspects of the methods, noted:

> The steps, as are the steps in most processes, may be based on a rational process in the mind of the inventor, but the steps themselves as expressed in the claims are physical in nature. [*Id.* at 474]

16. *Ex parte Appeal No. 470-27*, 152 USPQ 74 (1966)

This case was directed to a process for producing periodically updated credit authorization forms by computing the amount of the credit authorization from prior credit data, dividing the amount into portions, and printing these portions on detachable tabs on the forms. Acting Examiner-in-Chief Burns held the claims to be nonstatutory as follows:

> The question then is, can a plurality of business steps involving judgment and calculation, coupled to a printing step give rise to a patentable method?
>
> We think not . . .
>
> * * * *
>
> Here the second and third steps relate directly to calculations . . . [*Id.* at 75]

17. *Ex parte Luigs*, 153 USPQ 677 (1966)

The claims in this case were directed to a gas lift system in which the spacing of valves was stated in terms of a mathematical expression. Acting Examiner-in-Chief Bendett, speaking for the Board, found this no objection:

> Claims 9 through 11 were rejected by the examiner as being nonstatutory on the ground that the alleged novelty of the claims depended solely on the mental steps of mathematically computing the spacing between the valves. As basis for his rejection the examiner has relied on the decision in In re Shao Wen Yuan....
>
> It is our opinion that this rejection by the examiner of claims 9 through 11, is likewise in error. The In re

Yuan decision, supra, is not considered relevant to the instant case, wherein the disclosed subject matter is new and patentable over the cited prior art. In the Yuan case, the subject matter was not new. [*Id.* at 677-78]

F. Further Miscellaneous Cases

Cases dealing with the use of mathematical formulae in claims include, in addition to those referred to above, the following:

Ex parte Avery, 41 USPQ 328 (P.O. Bd. App. 1938)

Ex parte Beyer and Tarn, 51 USPQ 331 (P.O. Bd. App. 1940)

Scoville Mfg. Co. v. *Satler,* 21 F.2d 630 (D. Conn. 1927)

Cases of similar import relating to this subject mattter and sometimes cited in mental step cases are the following:

Lyman v. *Ladd, Comm'r,* 347 F.2d 482, 145 USPQ 369 (D.C. Cir. 1965)

Ex parte Nelson and Cosby, 82 USPQ 115 (P.O. Bd. App. 1948)

Ex parte Barnes and Keevil, 71 USPQ 211 (P.O. Bd. App. 1946)

Ellis v. *Coe,* 49 USPQ 232, (D.D.C. 1941)

Ex parte Sherman, 45 USPQ 237 (P.O. Bd. App. 1939)

Ex parte Starr, 24 USPQ 90 (P.O. Bd. App. 1934)

In re Bolongaro, 20 CCPA 845, 62 F.2d 1059, 16 USPQ 295, (1933)

Berardini v. *Tocci,* 190 F. 329, (C.C. N.Y. 1911), (Affirmed per Curiam, 200 F. 1022, (2nd Cir. 1912))

Cases dealing with the aesthetic or emotional aspects of mental steps are the following:

Ex parte Clark, 97 USPQ 165 (P.O. Bd. App. 1952)

Seagram & Sons, Inc. v. *Marzall,* 180 F.2d 26, 84 USPQ 180, (8th Cir. 1950)

Kieferle et al. v. *Kingsland,* 79 FS 700, 78 USPQ 60, (D. D.C. 1948)

Greenewalt v. *Stanley Co.,* 54 F.2d 195, 12 USPQ 122, (3rd Cir. 1931)