

703 F.2d 1381

217 U.S.P.Q. 401

In re Max A. GULACK.

Appeal No. 82-580.

**United States Court of Appeals,
Federal Circuit.**

March 30, 1983.

C. Bruce Hamburg, New York City, argued for appellant.

John W. Dewhirst, Associate Sol., Washington, D.C., argued for U.S. Patent and Trademark Office. With him on the brief were Joseph F. Nakamura, Sol., and Fred E. McKelvey, Associate Sol., Washington, D.C.

Before FRIEDMAN, BALDWIN and SMITH, Circuit Judges.

EDWARD S. SMITH, Circuit Judge.

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This is an appeal from the decision of the U.S. Patent and Trademark Office Board of Appeals sustaining the rejection under 35 U.S.C. Sec. 103 of claims 1-4 and 6 of application serial No. 935,183, filed August 18, 1978, entitled "Educational and Recreational Mathematical Device in the Form of a Band, Ring or Concentric Rings." We reverse.

I.

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The stated object of the disclosed invention is to exploit certain arithmetic properties of all prime numbers larger than 5, P ,¹ to create the semblance of magic or to educate with respect to intriguing aspects of number theory.

A.

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The physical configuration of the invention is extremely simple. The appealed claims recite three key elements: (1) a band, ring, or set of concentric rings; (2) a plurality of individual digits imprinted on the band or ring at regularly spaced intervals; and (3) an algorithm by which the appropriate digits are developed.

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The band² serves two functions: it supports the sequence of digits and it presents the digits as an endless sequence with no discrete beginning or end. The band is preferably an endless loop of paper, fabric, or plastic material. Specific embodiments of the invention set forth in the specification and appealed claims include a belt, hatband, headband, skullcap border, necklace, ring, table edge, household device or utensil, jewelry, and other artifacts.

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The digits are integers, generated by the algorithm, and displayed at equal intervals on the outer surface of the band.

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The algorithm for generating Q, the sequence of digits imprinted on the band, is also set forth in the specification.

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A row of P-1 nines is always divisible by P to give a quotient Q which is an integral number.

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Whenever a smaller number of nines is divisible by P to give an integral quotient Q, the number will always consist of some integral fractional part of P-1 nines, which may be designated as

P-1

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n'

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in which n is an integer greater than 1.

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*** It will be found that the number of digits in the quotient Q will always be P-1 or some integral fraction of P-1. ***₃

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The specification describes three qualities of the sequence of digits Q, subject to manipulation for recreational or educational purposes. First, the digits have a "cyclic" nature.⁴ Second, the number of digits in the prime P will fix the maximum number of digits appearing in sequence in Q. For example,

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[I]f P is 2 digits, Q or any multiple of Q, or cyclic variation of Q or any multiple of any cyclic variation of Q, if reduced to the original number of digits as aforesaid, will never contain any sequence of any 2 digits more than once. * * *

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Finally, the digits of Q are subject to manipulation in accordance with procedures set forth in the specification to produce a series of nines.

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Appellant recommends the 180 digit quotient Q (derived from $P = 181$), because its length is sufficient to lend mystical qualities to the manipulation of the band yet short enough to be readily imprinted on the band. The MAGIC RING OF HAYIM, constructed in accordance with the appealed claims, is capable of manipulation as set forth in the specification to perform magic tricks or to display various aspects of number theory.

The appealed claims read as follows:

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1. An educational and recreational mathematical device comprising at least one band which is endless or adapted to have ends thereof fastened to form an endless band and a plurality of individual digits imprinted on the band at regularly spaced intervals, the digits when all read consecutively clockwise as a number constituting a quotient obtained by dividing a number constituted of

P-1

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n

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nines, in which P is a prime number greater than 5 and n is an integer at least 1, by P and adding to the lefthand end of said quotient any number of zeros necessary to increase the number of digits in said quotient to

P-1

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n'

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n being so selected that

P-1

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nines is the minimum number of nines divisible by P so that said quotient is an intergral [sic] number.

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2. Device according to claim 1, in which said band is endless.

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3. Device according to claim 1, in which said band comprises an article of apparel.

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4. Device according to claim 3, in which said band is part of a hat or cap.

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6. Device according to claim 1 in which said band is an article of jewelry.

B.

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The examiner rejected claims 1-4 and 6 on two grounds: as not directed to statutory subject matter, 35 U.S.C. Sec. 101; and as unpatentable over Wittcoff,⁵ 35 U.S.C. Sec. 103. The board reversed the section 101 rejection, finding that the claims define an article of manufacture covered by 35 U.S.C. Sec. 101.

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In his section 103 rejection, the examiner stated that the appealed claims differed from Wittcoff only in the specific digits printed on the band. The examiner found no relationship between appellant's digits and band except that the band is the surface on which the digits are printed. The examiner cited *In re Miller*⁶ for the proposition that "[m]ere printed matter can not impart a patentable feature to a claim." Applying *Parker v. Flook*,⁷ the examiner viewed applicant's digits as well known and unable, therefore, to define over Wittcoff.

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In affirming the 103 rejection, the board found no meaningful relationship between the digits and the band of the type indicated by the court in *Miller*.

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Unlike the fact situation in *Miller*, the printed indicia claimed herein [convey] no meaningful information in regard to the substrate [they are] arranged on, [do] not require any size relationship of the substrate, and [do] not require any particular substrate to effectively convey the information. We are convinced that there is no meaningful functional relationship between appellant's indicia and the claimed endless band.

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*** In our opinion, the endless loop formed by the hatband with numerical digits printed thereon is the same structure claimed by appellant and the sole difference is in the content of the printed material. Accordingly, there being no functional relationship of the printed material to the substrate, as we have noted above, there is no reasons [sic] to give patentable weight to the content of the printed matter which, by itself, is non-statutory subject matter.

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The rejection of claims 1 to 4 and 6 under 35 U.S.C. Sec. 103 is sustained. [Emphasis supplied.]

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We understand the board as not giving the printed matter patentable weight because the board felt that there is no functional relationship between the printed matter and the substrate. In doing so, we do not interpret the board as holding that the printed matter can be ignored because it, by itself, is non-statutory subject matter. The board cited no authority in analyzing the relevance of the lack of a functional relationship, or of the status of the printed matter as non-statutory subject matter, to its decision not to accord the printed matter patentable weight. Because of the possible ambiguity of the board's articulation of its holding, we feel compelled to clarify the distinction.

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Differences between an invention and the prior art cited against it cannot be ignored merely because those differences reside in the content of the printed matter.⁸ Under section 103, the board cannot dissect a claim, excise the printed matter from it, and declare the remaining portion of the mutilated claim to be unpatentable. The claim must be read as a whole.⁹ If the board meant to disregard that basic principle of claim interpretation, we must reverse the rejection as a matter of law.

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If, instead, the board sought only to construe and apply *Miller* within the context of a section 103 rejection, we find no error in the board's articulation of the law. Where the printed matter is not functionally related to the substrate, the printed matter will not distinguish the invention from the prior art in terms of patentability.¹⁰ Although the printed matter must be considered,

in that situation it may not be entitled to patentable weight. This, apparently, was the board's conclusion with respect to Gulack's invention.

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However, because we find that the digits of Gulack's invention are functionally related to the band, and because Wittcoff fails to disclose or suggest the subject matter recited in the appealed claims, considered as a whole, we reverse.

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The sole issue is whether the board correctly affirmed the rejection of the appealed claims as obvious in view of Wittcoff under 35 U.S.C. Sec. 103.

II.

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The board, responding to appellant's arguments based on *In re Miller*,¹¹ found no functional relationship of the type present in *Miller*.

A.

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Miller involved an appeal from the board's affirmance of the rejection of claims drawn to a measuring device for use in fractioning recipes. No statutory ground for the rejection was specified. The rejection in *Miller* was on the basis that the invention lacked "the required cooperative structural relationship necessary before the printed matter can be given patentable weight."¹²

The CCPA¹³ responded, stating:¹⁴

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[i]t seems to us that what is significant here is not structural but functional relationship * * *.

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As for the examiner's characterization of the indicia and legend as "unpatentable printed matter," we note that the examiner himself recognizes the fact that printed matter, in an article of manufacture claim, can be given "patentable weight." He did so in allowing claims. His characterization of printed matter as "unpatentable" is beside the point; no attempt is here being made to patent printed matter as such. The fact that printed matter by itself is not patentable subject matter, because non-statutory, is no reason for ignoring it when the claim is directed to a combination. Here there is a new and unobvious functional relationship between a measuring receptacle, volumetric indicia thereon indicating volume in a certain ratio to actual

volume, and a legend indicating the ratio, and in our judgment the appealed claims properly define this relationship. * * * [Emphasis in original.]

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The court found that the printed matter of Miller's invention was functionally related to the volume measuring device and reversed the rejection.

B.

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Similarly, in examining Gulack's invention, we find that a functional relationship does exist between the printed matter and the substrate. A functional relationship of the precise type found by the CCPA in Miller --to size or to type of substrate, or conveying information about substrate--is not required. What is required is the existence of differences between the appealed claims and the prior art sufficient to establish patentability. The bare presence or absence of a specific functional relationship, without further analysis, is not dispositive of obviousness. Rather, the critical question is whether there exists any new and unobvious functional relationship between the printed matter and the substrate.¹⁵ With these thoughts in mind we turn now to examine the obviousness of the appealed claims in light of the cited reference, Wittcoff.

III.

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Appellant and the board agree that the sole difference between the appealed claims and Wittcoff resides in the content of the printed matter. The board declined, however, to accord that printed matter patentable weight.

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Wittcoff discloses the application of printed matter to a band. The printed matter suggested by Wittcoff is data that is to be committed to memory, such as addition, subtraction, multiplication, history dates, historical personages, and the like. The data items are independent, bearing no direct relation to the other data entries on Wittcoff's band. The relationship of the Wittcoff data to the band is for purposes of support and display. The data must be imprinted on the band so that the answer to the inquiry displayed on the outer surface of the band is visible when viewed from inside the hat through the aperture. Wittcoff discloses an endless band, yet the areas of printed matter displayed on the Wittcoff band are not arranged in any particular sequence.

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The appealed claims, on the other hand, require a particular sequence of digits to be displayed on the outside surface of a band. These digits are related to the band in two ways: (1) the band supports the digits; and (2) there is an endless sequence of digits--each digit residing in a unique position with respect to every other digit in an endless loop. Thus, the digits exploit the endless nature of the band.

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The differences between the appealed claims and Wittcoff reside in appellant's particular sequence of digits Q, and in the derivation of that sequence of digits. These features are critical

to the invention disclosed by the appealed claims. Wittcoff neither discloses nor suggests either feature.

IV.

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We reject the board's conclusion that there is no functional relationship between the printed matter and the substrate of the appealed claims. Such a relationship does exist and it is different from the relationship exhibited by the corresponding elements of the Wittcoff reference. We find no suggestion in the cited reference of appellant's particular sequence of digits Q or of the derivation of that sequence.

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REVERSED.

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FRIEDMAN, Circuit Judge, dissenting.

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I would affirm the Board's decision sustaining the rejection of the claimed invention as obvious under section 103.

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The appellant's primary claim is for "[a]n educational and recreational mathematical device," namely, an endless band upon which are imprinted numbers in a particular sequence derived from the application of an algorithm. Subordinate claims describe the band as an article of apparel, part of a hat or cap, or an article of jewelry.

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The algorithm is not patentable and "is treated as though it were a familiar part of the prior art." *Parker v. Flook*, 437 U.S. 584, 592, 98 S.Ct. 2522, 2526, 57 L.Ed.2d 451 (1978). Similarly, the particular numbers produced by an abstract solution of the algorithm cannot themselves be claimed, although the practical application of those numbers may be patentable. See *In re Meyer*, 688 F.2d 789, 215 USPQ 193 (Cust. & Pat.App.1982); *In re Abele*, 684 F.2d 902, 214 USPQ 682 (Cust. & Pat.App.1982). The issue under section 103 is whether, to one of ordinary skill in the art of developing algorithms and applying their product for educational or recreational purposes, it would have been obvious to apply the algorithm by displaying the result of its solution on a continuous band, as the appellant disclosed in his patent application. The Board correctly answered that question affirmatively.

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The Wittcoff patent teaches the use of a hatband to display numbers as an "educational or game-playing device." Although there are differences between the display of numbers in appellant's invention and their display in Wittcoff, it would have been obvious from Wittcoff for one of ordinary skill in the art who wanted to use the numbers the algorithm produced for appellant's purposes, to display them on a continuous band. Indeed, one of the appellant's subordinate claims displays the numbers on a hat or cap.

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The display of the numbers on a band or other object that permits them to be shown in a series without a particular beginning or end would have been obvious even without Wittcoff. The numbers can be used for the recreational and educational purposes the appellant claims merely by arranging them in a continuous series. They do not need to be placed on an "endless band" as the appellant claimed. In fact, at oral argument the appellant conceded that the same result his invention accomplishes also could be accomplished by placing the numbers in a continuous series upon a cube or other shape, or even by writing them in a circle upon a flat surface. The precise nature of the object on which the numbers are placed is thus of little importance. The only matter that is of significance--the arrangement of the numbers as a continuous series--would have been obvious to anyone of ordinary skill in the art who knew the algorithm.

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In *In re Miller*, 418 F.2d 1392, 164 USPQ 46 (Cust. & Pat.App.1969), as the court points out, the court determined that there was "a new and unobvious functional relationship" between the measuring receptacles and the descriptions and legends on them. In the present case, unlike *Miller*, I do not think that the "functional relationship" between the numbers resulting from the application of the algorithm and their display upon the continuous band was new and unobvious.

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The variable P is defined in the specification as any prime number (an integer not divisible without remainder by any number except itself and unity) greater than 5. E.g., 7, 11, 13, etc

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As stated by appellant in his specification, band is intended to mean a band, ring, or set of concentric rings

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To illustrate:

If $P = 7$ (a prime greater than 5);

then $Q = 999,999 / 7$; that is

$Q = 142,857$.

If $P = 13$, the smallest number of nines

divisible by 13 that yields an

integral quotient is 6,

thus $Q = 999,999 / 13$

$Q = 76,923$.

Note that in accordance with the specification,

$(P-1) / n = 6$, where $n = 2$, and $P = 13$.)

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To simplistically illustrate this cyclic feature:

If P = 7;

then Q = 142,857, and

2Q = 285,714.

The sequence of digits is the same in each number; the starting position has merely shifted.

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E. Wittcoff, U.S. patent No. 2,796,680, issued June 25, 1957, for "Novelty Educational Hats." Wittcoff discloses a hat with an endless band having information printed in areas around both the inside and outside of the band. The hat has an aperture at the base of the crown through which an area of the band is viewed. The band can be rotated to align any specific area of information with the aperture. When an inquiry on the outside of the band is aligned with the aperture, the corresponding answer is viewed through the aperture from the inside of the hat

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In re Miller, 418 F.2d 1392, 164 USPQ 46 (Cust. & Pat.App.1969)

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Parker v. Flook, 437 U.S. 584, 98 S.Ct. 2522, 57 L.Ed.2d 451, 198 USPQ 193 (1978)

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A "printed matter rejection" under Sec. 103 stands on questionable legal and logical footing. Standing alone, the description of an element of the invention as printed matter tells nothing about the differences between the invention and the prior art or about whether that invention was suggested by the prior art. A printed matter rejection is based on case law antedating the 1952 patent act, employing a point of novelty approach. In re Sterling, 70 F.2d 910, 21 USPQ 519 (CCPA 1934). The 1952 act legislatively revised that approach through its requirement that the claim be viewed as a whole in determining obviousness. Graham v. John Deere Co., 383 U.S. 1, 86 S.Ct. 684, 15 L.Ed.2d 545, 148 USPQ 459 (1966). The CCPA has considered all of the limitations of the claims, including the printed matter limitations, in determining whether the invention would have been obvious. See In re Royka, 490 F.2d 981, 180 USPQ 580 (Cust. & Pat.App.1974); In re Cavrich, 451 F.2d 1091, 172 USPQ 121 (Cust. & Pat.App.1971). In Royka, 490 F.2d at 985, 180 USPQ at 583, the CCPA, notably weary of reiterating this point, clearly stated that printed matter may well constitute structural limitations upon which patentability can be predicated

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35 U.S.C. Sec. 103 (1976) specifically provides that:

"A patent may not be obtained * * * if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. * * *"
(Emphasis supplied.)

See Graham, 383 U.S. 1, 86 S.Ct. 684, 15 L.Ed.2d 545, 148 USPQ 459; Flook, 437 U.S. at 594 n. 16, 98 S.Ct. at 2527 n. 16, 198 USPQ at 199 n. 16 (noting the Sec. 103 requirement of reading claims as a whole and extending that requirement to Sec. 101); Diamond v. Diehr, 450 U.S. 175, 188, 101 S.Ct. 1048, 1057, 67 L.Ed.2d 155, 209 USPQ 1, 9 (1981) (also applying that requirement in a Sec. 101 setting); Royka, 490 F.2d at 985, 180 USPQ at 583.

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Miller, 418 F.2d 1392, 164 USPQ 46

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Id

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Id. at 1395, 164 USPQ at 48

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The holdings of the United States Court of Customs and Patent Appeals and of the United States Court of Claims were adopted as precedent in the Court of Appeals for the Federal Circuit in *South Corp. v. United States*, 690 F.2d 1368, 1370, 215 USPQ 657, 658 (Fed.Cir.1982)

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Miller, 418 F.2d at 1396, 164 USPQ at 48-49

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Id. at 1396, 164 USPQ at 49