

REMARKS

I. Status of the Claims

The following remarks are in response to the Examiner's Office Action mailed on June 6, 2017. Claims 49, 51, 53, 55-56, 75-81, 83-88, and 90-92 are pending. Claims 3, 6-8, 10-12, 14-16, 20-21, 23-26, 30-33, 36, 40-41, 44, 46, 48, 50-52, 54, 57-75, and 89 are canceled without prejudice. Claims 1-2, 4-5, 9, 13, 17-19, 22, 27-29, 34-35, 37-39, 42-43, 45, 47, and 82 are withdrawn. Claims 49, 55, and 76-78 are amended herein. New claims 93-95 are added herein. Support for the amended and new claims is found in the original claims and throughout the specification. No new matter is introduced by any amendment made herein.

Upon entry of the proposed claims, claims 49, 53, 55, 56, 76-81, 83-88, and 90-95 will be under examination. Favorable consideration of these claims is respectfully requested in light of the present amendments and the following remarks.

II. Claim Rejections Under 35 U.S.C. §101

The Office maintained the rejection of claims 49, 51, 53, 55, 56, 75-81, 83-88, and 90-92 under 35 U.S.C. 101, asserting that these claims were directed to a judicial exception (i.e., a law of nature, a natural phenomenon, or an abstract idea) without significantly more. *See* Office Action at pp. 3-4. This rejection is respectfully traversed in view of the present amendments, for at least the following reasons.

As an initial point, Applicant submits that instant claim 49 is directed to a method of detecting the presence or absence of each analyte of a plurality of analytes, comprising:

- a) encoding each of said analytes as at least one first value in a first component of a signal, thereby generating a coding scheme, wherein each of said analytes is represented in said coding scheme by one of said first values, wherein said first value is an intensity or range of intensities, and wherein said encoding is performed in a manner that reduces or eliminates degeneracy;
- b) providing a sample comprising, or potentially comprising, at least one of said analytes;
- c) contacting said sample with analyte-specific reagents that generate said first values, as

represented in said coding scheme, when each of said analytes is present;

- d) cumulatively measuring said first values of said signal within said sample, thereby providing a cumulative measurement; and
- e) determining whether each of said analytes is present or absent based on said cumulative measurement and said coding scheme;

wherein said method non-degenerately detects the presence or absence of at least seven analytes in a single sample volume, in any combination of presence or absence, without immobilization of said analytes, physical separation of said analytes, or mass spectrometry.

Instant claim 55 is directed to a method of detecting the presence or absence of each analyte of a plurality of analytes, comprising:

- a) encoding each of said analytes as at least one first value and at least one second value, wherein said first value is a value from a first component of a signal and said second value is a value from a second component of said signal, thereby generating a coding scheme, wherein each of said analytes is represented in said coding scheme by said at least one first value and said at least one second value, wherein said first value is an intensity or range of intensities and said second value is a wavelength or range of wavelengths, and wherein said encoding is performed in a manner that reduces or eliminates degeneracy;
- b) providing a sample comprising, or potentially comprising, at least one of said analytes;
- c) contacting said sample with analyte-specific reagents that generate said at least one first value and at least one said second value, as represented in said coding scheme, when each of said analytes is present;
- d) cumulatively measuring said first values and said second values within said sample, thereby providing a cumulative measurement; and
- e) determining whether each of said analytes is present or absent based on said cumulative measurement and said coding scheme;

wherein said method, without immobilization of said analytes, physical separation of said analytes, or mass spectrometry, non-degenerately detects the presence or absence of each of at least

six said analytes in a single sample volume, in any combination of presence or absence, when each of said reagents generates only one second value.

Applicant respectfully submits that the Office has inappropriately oversimplified the rejected independent claim to its “gist” or core principles by asserting that the claim is directed to “the abstract idea of encoding signals in a manner that reduces or eliminates degeneracy.” *Id.* at page 3.

Applicant’s position regarding the inappropriate oversimplification engaged by the Office is of record. To reiterate, the Federal Circuit, in *McRO, Inc. dba Planet Blue v. Bandai Namco Games America Inc.*, 120 USPQ2d 1091 (Fed. Cir. 2016), cautioned against distilling the claims of an invention into its “gist” or “core principles.” As noted in the response filed on May 2, 2017, the *McRO* court cautioned that courts “must be careful to avoid oversimplifying the claims” by looking at them generally and failing to account for the specific requirements of the claims.” *Id.* at page 2 (emphasis added). The teaching of *McRO* is further emphasized in a memorandum issued on Nov. 2, 2016 by Robert W. Bahr, the Deputy Commissioner for Patent Examination Policy, regarding “Recent Subject Matter Eligibility Decisions” (hereinafter “Nov. 2016 Eligibility Memo”). Under the section titled “Notable Points from *McRO*” at page 2, the Nov. 2016 Eligibility Memo stated that “[e]xaminers should consider the claim as a whole under Step 2A of the USPTO’s SME guidance, and should not overgeneralize the claim or simplify it into its ‘gist’ or core principles, when identifying a concept as a judicial exception.”

A. The Steps of the Instant Invention Provide Specific and Meaningful Limitations

In *McRO*, the court examined claims to a method of “automatically animating lip synchronization and facial expression of three-dimensional characters.” *McRO*, 837 F.3d at 1307. Specifically, the claimed method describes a set of rules designed to automate a 3-D animator’s tasks. *Id.* The claims recite:

A method for automatically animating lip synchronization and facial expression of three-dimensional characters comprising:

obtaining a first set of rules that define output morph weight set stream as a function of phoneme sequence and time of said phoneme sequence;

obtaining a timed data file of phonemes having a plurality of sub-sequences;

generating an intermediate stream of output morph weight sets and a plurality of transition parameters between two adjacent morph weight sets by evaluating said plurality of sub-sequences against said first set of rules;

generating a final stream of output morph weight sets at a desired frame rate from said intermediate stream of output morph weight sets and said plurality of transition parameters; and

applying said final stream of output morph weight sets to a sequence of animated characters to produce lip synchronization and facial expression control of said animated characters.

Id. at 1307-08.

The district court had found these claims invalid under §101. *Id.* at 1309. In its analysis, the district court determined that the claims were “too broadly preemptive to satisfy § 101 [] because the claims were not limited to specific rules, but rather ‘purport to cover all such rules,’ the claims merely call for application of the abstract idea of using rules.” *Id.* The Federal Circuit disagreed and held that:

Here, the claims are limited to rules with specific characteristics. As the district court recognized during claim construction, “the claims themselves set out meaningful requirements for the first set of rules: they ‘define[] a morph weight set stream as a function of phoneme sequence and times associated with said phoneme sequence.’” J.A. 4171 (Dist. Ct. Claim Construction Op. 16) (quoting ’567 patent, cl. 1). They further require “applying said first set of rules to each sub-sequence . . . of timed phonemes.” *Id.* Whether at step one or step two of the *Alice* test, in determining the patentability of a method, a court must look to the claims as an ordered combination, **without ignoring the requirements of the individual steps**. The specific, claimed features of these rules allow for the improvement realized by the invention.

Id. at 1314. Emphasis added.

Like the claims in *McRO*, the instant claims incorporate specific, meaningful requirements that are restricted to a specific application of weighted signal measurements, namely, detecting the presence or absence of each analyte of a plurality of analytes. Specifically, the rules of the instant

claims are analogous to the rules recited in *McRO*, as illustrated in table format below for the convenience of the Office.

Rules of the Instant Independent Claims	Rules from <i>McRO</i>
Encoding each of said analytes as at least one first value in a first component of a signal (as recited in claim 49) or encoding each of said analytes as at least one first value and at least one second value (as recited in claim 55) to generate a coding scheme, in which the first value is an intensity or range of intensities and the second value is a wavelength or range of wavelengths;	Obtaining a first set of rules that define output morph weight set stream as a function of phoneme sequence and time of said phoneme sequence;
Providing a sample and then contacting said sample with the analyte-specific reagents to generate the first values or the first and second values;	Obtaining a timed data file of phonemes having a plurality of sub-sequences;
Cumulatively measuring the first values or the first and second values to generate cumulative measurements; and	Generating an intermediate stream of output morph weight sets and a plurality of transition parameters between two adjacent morph weight sets by evaluating said plurality of sub-sequences against said first set of rules; Generating a final stream of output morph weight sets at a desired frame rate from said intermediate stream of output morph weight sets and said plurality of transition parameters; and
Determining the presence or absence of target analytes based on the correlation between the cumulative measurements and the coding scheme, in which the method non-degenerately detects the presence or absence of at least seven analytes in a single sample volume, without immobilization of said analytes, physical separation of said analytes, or mass spectrometry.	Applying said final stream of output morph weight sets to a sequence of animated characters to produce lip synchronization and facial expression control of said animated characters.

As shown above, instant claims 49 and 55 require the rules to be rendered in a specific way: as a relationship between a non-degenerate coding scheme that comprises a first value of intensity or a first and a second values of intensity and wavelength, signal measurements, and applying a cumulative measuring approach to correlate the signal measurements to the coding scheme to determine the presence or absence of target analytes. Similarly, claim 1 of *McRO* “requires that the

rules be rendered in a specific way: as a relationship between subsequences of phonemes, timing, and the weight to which each phoneme is expressed visually at a particular timing (as represented by the morph weight set).” *Id.* at 1315. Hence, the steps of the instant claims provide specific and meaningful limitations and further “allow for the improvement realized by the invention.”

B. The Instant Invention is Directed to a “Process Designed to Solve a Technological Problem”

The Office asserts that “[t]he signal processing is a manner of mathematical manipulation analogous to the Arrhenius equation of *Diamond v. Diehr*, 450 U.S. 175 (1981), which was also found to be abstract.” *See* Office Action at page 3.

Applicant respectfully submits that this is a misinterpretation of the teachings of *Diamond v. Diehr*. In *Diamond v. Diehr*, the court concluded that:

[W]hen a claim containing a mathematical formula implements or applies that formula in a structure or process which, when considered as a whole, is performing a function which the patent laws were designed to protect (e. g., transforming or reducing an article to a different state or thing), then the claim satisfies the requirements of § 101. Because we do not view respondents’ claims as an attempt to patent a mathematical formula, but rather to be drawn to an industrial process for the molding of rubber products.

Diehr, 450 U.S. at 192-193.

Key to the Court’s analysis was the fact that the claim included monitoring of temperature data and concluded by reciting sending instructions to “open the press automatically when a [the calculation] indicates completion of curing.” *Diehr*, 450 U.S. 175 at 180. The Court found that this anchored the use of the ineligible equation to a real-world process and the *Diehr* Court’s analysis was cited with approval in *Alice*.

Similarly, the *McRO* court, regarding *Diehr*, states that “the [*Diehr*] Court looked to how the claims ‘used that equation in a process designed to solve a technological problem in ‘conventional industry practice.’” *Id.* at 1314, quoting *Alice*, 134 S. Ct. at 2358 (in turn quoting *Diehr*, 450 U.S. at 178).

Analogously in the instant case, the claims utilize the cumulative measurement of the first value of intensity or the first and second value of intensity and wavelength in combination with the

non-degenerate coding scheme to solve the technological problem of determining the presence or absence of at least seven target analytes from a plurality of analytes in a single sample volume, without the need to immobilize the analytes, physically separating the analytes, or perform a mass spectrometry analysis. As in *Diehr* and *McRO*, the use of the cumulative measurement in a process designed to detect at least seven target analytes in a single sample volume anchors the claim in patent-eligibility.

C. The Claims Recite an Inventive Concept

Even if the Office asserts that claims 49 and 55 are directed to an abstract idea, which Applicant would strongly disagree with, the claims recite “significantly more” than an abstract idea itself. As noted in the previous response filed on May 2, 2017, the Nov. 2016 Eligibility Memo further provides guidance on how examiners should apply the second step. Specifically, the Nov. 2016 Eligibility Memo highlights that regarding *BASCOM*, “examiners should consider the additional elements in **combination**, as well as individually, when determining whether a claim as a whole amounts to significantly more, as this may be found in the nonconventional and non-generic arrangement of known, conventional elements.” (Emphasis in Original) Furthermore, the Nov. 2016 Eligibility Memo notes that “the district court erred by failing to recognize that when combined, an inventive concept may be found in the non-conventional and non-generic arrangement of the additional elements, *i.e.*, the installation of a filtering tool at a specific location, remote from the end-users, with customizable filtering features specific to each end user (note that the term ‘inventive concept’ is often used by the courts to describe additional element(s) that amount to significantly more than a judicial exception).”

Like the claims of *BASCOM*, the claims of the instant invention require encoding each of the plurality of analytes with a first value of intensity or a first and second value of intensity and wavelength to generate a non-degenerate coding scheme, cumulatively measuring the intensity or intensity and wavelength of each of the plurality of analytes to generate cumulative measurements, and based on a correlation of the cumulative measurement and the coding scheme, determine the presence of target analytes. Furthermore like *BASCOM*, the cumulative measurements can only be performed within a computer, *i.e.*, a microscopic instrument capable of measuring the intensity

and/or wavelength of the labeled analytes. As such, the claims of the instant invention, when considered as a whole, amount to significantly more than an abstract idea, and recite an inventive concept.

D. The Instant Invention Does Not Seek to Monopolize

Lastly, Applicant does not seek to preempt others from all possible uses of analyte detection by a coding scheme. The Federal Circuit, in *McRO, Inc. v. Bandai Namco Games Am. Inc.*, opined that “[t]he preemption concern arises when the claims are not directed to a specific invention and instead improperly monopolize ‘the basic tools of scientific and technological work.’” *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1314 (Fed. Cir. 2016) (quoting *Alice*, 134 S. Ct. at 2354, in turn quoting *Myriad*, 133 S. Ct. at 2116). The *McRO* court further explains that the claims at issue were valid under § 101 because:

The specific structure of the claimed rules would prevent broad preemption of all rules-based means of automating lip synchronization unless the limits of the rules themselves are broad enough to cover all possible approaches. ... By incorporating the specific features of the rules as claim limitations, claim 1 is limited to a specific process for automatically animating characters using particular information and techniques and does not preempt approaches that use rules of a different structure or different techniques.

Id. at 1315-16.

Similarly, the *BASCOM* court notes that “the claims of the ’606 patent do not preempt the use of the abstract idea of filtering content on the Internet or on generic computer components performing conventional activities. The claims carve out a specific location for the filtering system (a remote ISP server) and require the filtering system to give users the ability to customize filtering for their individual network accounts.” *BASCOM Global Internet Services v. AT&T Mobility LLC*, 827 F.3d 1350 (Fed. Cir. 2016).

Here, as with the claims in *McRO* and *BASCOM*, the instant claims do not preempt all rules-based means of detecting target analytes by a coding scheme. Instead, the instant claims are limited to a specific process of detecting the presence or absence of each analyte of a plurality of analytes in a single sample volume by using a particular non-degenerate coding scheme in combination with

cumulative measurement of intensity or intensity and wavelength, without immobilization, physical separation, or mass spectrometry.

Based on the above, Applicant respectfully submits that the instant claims are directed to patent eligible subject matter. Withdrawal of the rejection under 35 U.S.C. § 101 is respectfully requested.

III. Claim Rejections Under 35 U.S.C. §102

The Office had maintained the rejection to previously submitted claims 49, 51, 53, 55-56, 75-78, 80-81, 84-88, and 90-92 under pre-AIA 35 U.S.C. 102, citing a new reference, namely Lin et al. (US2013/0261019A1) (hereinafter Lin), to support the rejection. In particular, the Office asserted that Lin teaches “nondegenerate combinations of barcodes” and that the methods of Lin “do not involve immobilization of analytes, physical separation of analytes, or mass spectrometry.” *See* Office Action at pp. 4-7.

Applicant respectfully traverses the rejection. Lin teaches nucleic acid barcode probes which comprise a nucleic acid nanostructure that has two or more fluorescently labeled regions to generate a specific color-coded pattern. *See*, e.g., paragraph [0004], Fig. 1, and Fig. 4A. Lin further teaches a triple color-coded barcode probe that can utilize a combination of blue (B), red (R), and green (G) colors, or a combination of B, R, G, B+G, B+R, and G+R colors. To resolve a target of interest, Lin teaches that three steps can be applied. In step one, each fluorescent spot is identified and then filtered based on threshold intensity and size criteria. In step two, the distances (calculated from (x,y) coordinates of fluorescent spots) between each region of the probes and the bending angle (based on the center spot) are calculated. Additional distance criteria between red and blue, blue and green, and red and green spots are also utilized during this step. In step three, additional criteria such as theoretical distance and color are further utilized to generate a final result on the presence or absence of the target of interest. *See* paragraph [0095].

Lin differs from the instant invention because Lin teaches a **degenerate** coding scheme. For example, consider Lin’s color coding using the six colors described above, B, R, G, B+G, B+R, and G+R, color combinations can include BGB, GGB, and (B+G)GB. In a first sample volume containing an isolated first target (Target 1) labeled with BGB, one would observe three distinct

spots, blue, green, and blue. In a second sample volume containing an isolated second target (Target 2) labeled with GGB, one would observe three distinct spots, green, green, and blue. Similarly in a third sample volume containing an isolated third target (Target 3) labeled with (B+G)GB, the three distinct spots will be cyan (B+G), green, and blue.

However, in a sample volume comprising a mixture of Target 1, Target 2, and Target 3, if Target 1 and Target 2 physically overlap with each other (*i.e.* are not spatially separated), then, based on the analysis of Lin, namely, step one of identifying each fluorescent spot and steps two and three of utilizing the pre-determined distance and angle criteria, one would not be able to distinguish the presence of Target 1 and Target 2 from Target 3. This failure of the methods taught by Lin is as a result of the codes specified being **degenerate**. To further illustrate this point for the convenience of the Office, please see Fig. 1A and Fig. 1B below.

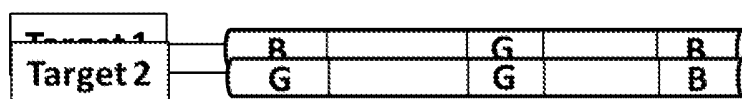


Fig. 1A

Here, B+G, green, and blue spots will be detected when Target 1 and Target 2 physically overlap, and these color spots cannot be distinguished from the B+G, green, and blue spots of Target 3. As such, the scheme used by Lin is incapable of discriminating target labels in combination. This precludes the use of the scheme taught by Lin for unambiguous coding of targets.

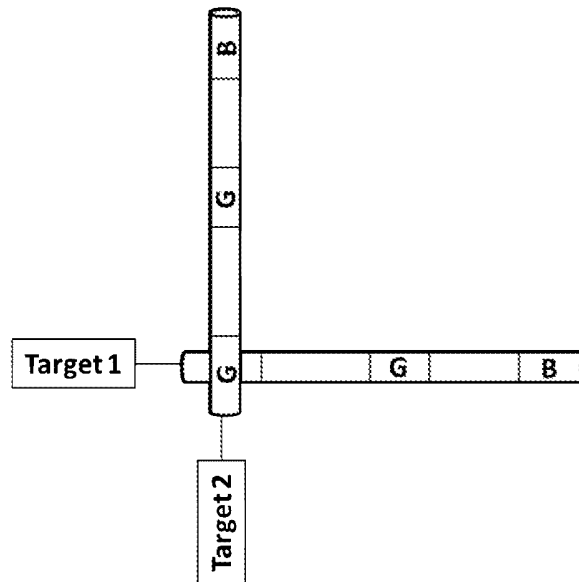


Fig. 1B

Similarly here, B+G, green, and blue spots will be detected when Target 1 and Target 2 overlap at an angle, and these color spots cannot be distinguished from the B+G, green, and blue spots of Target 3.

As set out in the MPEP, [a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. (MPEP 2131, quoting *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). “[U]nless a reference discloses within the four corners of the document not only all of the limitations claimed but also all of the limitations arranged or combined in the same way as recited in the claim, it cannot be said to prove prior invention of the thing claimed and, thus, cannot anticipate under 35 U.S.C. § 102.” *Net MoneyIn, Inc. v. VeriSign, Inc.*, No. 2007-1565 slip op. at 18-19 (Fed. Cir. Oct. 20, 2008).

In the instant case, Lin does not teach “each and every element as set forth in the claims” because Lin teaches a degenerate coding scheme. The instant case differs because the coding scheme is non-degenerate. Therefore, the instant invention is not anticipated by Lin for at least this reason.

Furthermore, Lin does not teach a coding scheme based on both intensity and color. Instead, the crux of Lin's invention is the use of color-coded patterns deposited on a nanorod barcode probe to detect a target of interest. The instant invention utilizes either intensity or a combination of intensity and wavelength to generate a coding scheme. Therefore, the instant invention is not anticipated by Lin also for at least this reason.

In light of the above, Applicant respectfully submits that independent claims 49 and 55 and their respective dependent claims are not anticipated by Lin. Withdrawal of the rejection under pre-AIA 35 U.S.C. 102(e) is respectfully requested.

IV. Claim Rejections Under 35 U.S.C. §103

The Office had rejected former claim 79 under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Lin in further view of Nie et al. (US 2003/0148544 A1) (hereinafter Nie). The Office further rejected former claim 83 under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Lin in further view of Orpana et al. (WO 2010/128206 A1) (hereinafter Orpana). *See* Office Action at pp. 8-11.

These rejections are respectfully traversed in view of the present claim amendments and the following arguments. MPEP 2143 states that obviousness may be established only when three basic criteria have been met. *"First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations."*

As discussed above with respect to Lin, Lin teaches a degenerate coding that is based solely on the combination of colors. Lin is silent on the use of a non-degenerate coding scheme and further does not contemplate the use of intensity or intensity and wavelength as is described in the instant invention to detect at least seven target analytes in a sample volume. Therefore, the instant invention is not obvious in view of Lin.

Nie does not cure the deficiencies of Lin. Furthermore, there is no teaching, suggestion, or motivation in the combination of Lin and Nie for a skilled artisan to arrive at the instant invention as both references do not teach or suggest a non-degenerate coding scheme. Therefore, the

combination of Lin and Nie fails to 1) suggest or motivation a skilled artisan to modify the references or to combine the reference teachings to arrive at the instant invention; 2) there is no reasonable expectation of success because both Lin and Nie are silent on a non-degenerate coding scheme; and 3) Lin and Nie do not teach or suggest all of the claim limitations of the instant invention. In light of this, Applicant respectfully submits that claim 79 is not obvious in view of Lin and Nie.

With regard to Orpana, Orpana also does not cure the deficiencies of Lin. In addition, there is no teaching, suggestion, or motivation in the combination of Lin and Orpana for a skilled artisan to arrive at the instant invention as both references do not teach or suggest a non-degenerate coding scheme. Therefore, the combination of Lin and Orpana also fails to 1) suggest or motivation a skilled artisan to modify the references or to combine the reference teachings to arrive at the instant invention; 2) there is no reasonable expectation of success because both Lin and Orpana are silent on a non-degenerate coding scheme; and 3) Lin and Nie do not teach or suggest all of the claim limitations of the instant invention. As such, claim 83 is not obvious in view of Lin and Orpana.

In light of the above, Applicant respectfully request withdrawal of the rejection under pre-AIA 35 U.S.C. 103(a).

V. Double Patenting

Claims 49, 51, 53, 55, and 56 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 20-24, respectively, of U.S. Patent No. 8,838,394 B2 [on IDS of 5/2/2017].

Applicant respectfully traverses the rejection. However, solely to expedite prosecution, Applicant concurrently files a Terminal Disclaimer in compliance with 37 C.F.R. §1.321 with respect to U.S. Patent No. 8,838,394. This Terminal Disclaimer obviates the present rejection. Accordingly, Applicant requests that this rejection be withdrawn.

CONCLUSION

In light of the remarks set forth above, Applicant believes that the pending claims are under condition for allowance. Applicant respectfully solicits the Examiner to expedite the prosecution of this patent application to issuance. Should the Examiner have any question, the Examiner is encouraged to telephone the undersigned.

The Commissioner is authorized to charge any underpayment or credit any overpayment to Deposit account No. 23-2415 (Attorney Docket No. 38075-716.301).

Respectfully submitted,

Date: August 11, 2017

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