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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/834,056	03/15/2013	Richard David Abbott	18244.5	1465
67292	7590	12/16/2019	EXAMINER	
BARNES & THORNBURG LLP (Biofire) 11 SOUTH MERIDIAN STREET INDIANAPOLIS, IN 46204			HASSAN, LIBAN M	
			ART UNIT	PAPER NUMBER
			1799	
			NOTIFICATION DATE	DELIVERY MODE
			12/16/2019	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte RICHARD DAVID ABBOTT,
PATRICK L. RILEY, ZACKERY KENT EVANS, and
LYLE M. NAY

Appeal 2019-001834
Application 13/834,056
Technology Center 1700

Before MICHAEL P. COLAIANNI, GEORGE C. BEST, and
DEBRA L. DENNETT, *Administrative Patent Judges*.

COLAIANNI, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant¹ appeals under 35 U.S.C. § 134(a) the final rejections of claims 23–27 and 32–59. We have jurisdiction over the appeal pursuant to 35 U.S.C. § 6(b).

We AFFIRM.

¹ We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as BioFire Defense, LLC (Appeal Br. 2).

STATEMENT OF THE CASE

Appellant's invention is directed to optical systems and apparatuses configured for the simultaneous observation and monitoring of sample wells in a 96-well plate (Spec. ¶ 9).

Claim 23 is illustrative (emphasis added):

23. An apparatus, comprising:

a thermocycling system configured for subjecting a plurality of biological samples contained within a corresponding plurality of sample containers to thermal cycling;
and

an optical system defining an optical path that is operatively associated with the thermocycling system, the optical system being configured and arranged for substantially simultaneous monitoring of fluorescence in each of the plurality of biological samples, the optical system including:

a sample block comprising an element of the optical path,

wherein the sample block includes a top surface and a plurality of sample wells arranged in an array, the wells defining a plurality of recessed bottom surfaces, respectively; and

a compound curved mirror having a reflective surface with a surface profile corresponding to a non-apex portion of a paraboloid that defines a first axis of curvature having a first curvature substantially orthogonal to a second axis of curvature having a second curvature with the first curvature being different than the second curvature, *the mirror being positioned and arranged in the optical path relative to the sample block and to a common reference point, such that overall ray lengths from each of the plurality of recessed bottom surfaces to the common reference point by means of the reflective surface are substantially the same, wherein the mirror allows simultaneous observation of the plurality of recessed bottom surfaces from the common reference point without interference or eclipsing by the plurality of sample wells.*

Appeal Br. 38 (Claims App.) (emphasis added).

Appellant appeals the following rejections:²

1. Claims 23–27 and 32–34 are rejected under 35 U.S.C. § 103(a) as unpatentable over Tamaoki et al. (US 7,628,958 B2; issued Dec. 8, 2009, “Tamaoki”), in view of Troll (US 5,721,435; issued Feb. 24, 1998), as evidenced by Meloni et al. (US 2012/0025097 A1; published Feb. 2, 2012, “Meloni”) (Ans. 3–8).
2. Claims 35 and 36 are rejected under 35 U.S.C. § 103(a) as unpatentable over Tamaoki, in view of Troll, as evidenced by Meloni, and further in view of C. Pruss et al., “*Testing Aspheres*,” *Optics & Photonics News*, 19(4):24–29 (2008) (“Pruss”) (Ans. 8–9).
3. Claims 37–41 are rejected under 35 U.S.C. § 103(a) as unpatentable over Tamaoki, in view of Troll, as evidenced by Meloni, and further in view of Hasson et al. (US 2008/0003588 A1; published Jan. 3, 2008, “Hasson”) (Ans. 10–12).
4. Claim 42 is rejected under 35 U.S.C. § 103(a) as unpatentable over Tamaoki, in view of Troll, as evidenced by Meloni, and further in view of Hasson, and further in view of Neuzil et al. (US 2010/0227386 A1; published Sept. 9, 2010, “Neuzil”) (Ans. 12–13).
5. Claim 43 is rejected under 35 U.S.C. § 103(a) as unpatentable over Tamaoki, in view of Troll, as evidenced by Meloni, and further in view of Väisälä et al. (US 6,377,346 B1; issued Apr. 23, 2002, “Väisälä”) (Ans. 13).

² In the Advisory Action dated May 5, 2018, the Examiner indicated that an amendment, filed April 20, 2018, would be entered and that the amendment overcame the § 112, second paragraph, rejection (Advisory Act. 2, 3).

6. Claims 44–50 are rejected under 35 U.S.C. § 103(a) as unpatentable over Tamaoki, in view of Troll, as evidenced by Meloni (Ans. 14–18).
7. Claim 51 is rejected under 35 U.S.C. § 103(a) as unpatentable over Tamaoki, in view of Troll, as evidenced by Meloni, and further in view of Pruss (Ans. 18–19).
8. Claims 52 and 54–59 are rejected under 35 U.S.C. § 103(a) as unpatentable over Tamaoki, in view of Troll, as evidenced by Meloni (Ans. 19–24).
9. Claim 53 is rejected under 35 U.S.C. § 103(a) as unpatentable over Tamaoki, in view of Troll, as evidenced by Meloni, and further in view of Pruss (Ans. 24–25).

Of claims 23–27 and 32–43, Appellant offers separate arguments in support of independent claim 23 and dependent claims 27, 33, and 34 (*see, e.g.*, Appeal Br. 2–10). We select claim 23 as representative of claims 24–26, 32, and 35–43. Accordingly, claims 24–26, 32, and 35–43 will stand or fall with our analysis of claim 23. Claims 27, 33, 34, and 44–59 will be discussed separately.

FINDINGS OF FACT & ANALYSIS

After review of the respective positions provided by Appellant and the Examiner, we AFFIRM the Examiner’s prior art rejections under 35 U.S.C. § 103(a) for the reasons presented by the Examiner and add the following for emphasis.

A. *Rejections of claims 23–27 and 32–43 as unpatentable over the combination of Tamaoki and Troll, as evidenced by Meloni; either with or without Pruss, Hasson, Hasson and Neuzil, or Väisälä*

a. *Claims 23–26, 32, and 35–43*

With regard to claim 23, the Examiner’s findings and conclusions regarding Tamaoki and Troll, as evidenced by Meloni, are located on pages 3–6 of the Answer.

The Examiner finds that Tamaoki would have rendered obvious each component and limitation of the apparatus recited in independent claim 23, except that Tamaoki does not disclose a compound curved mirror having off-axis parabolic features (Ans. 3–5). Figure 11 of Tamaoki, reproduced below, illustrates the interior components of a reaction detection device:

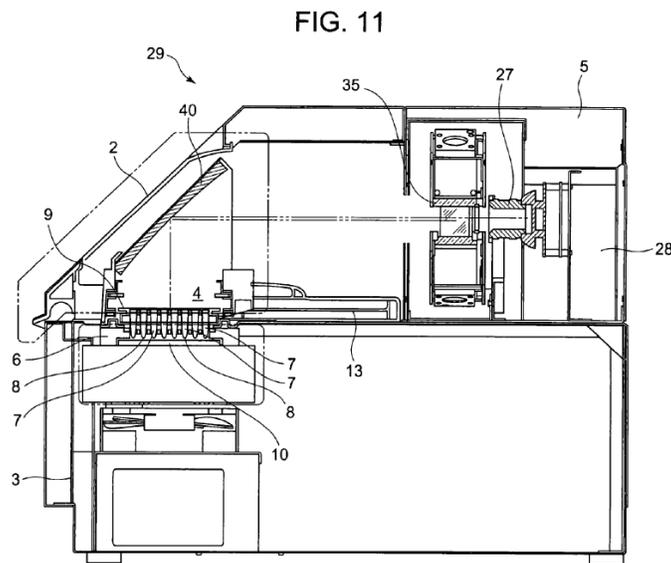


Figure 11 of Tamaoki illustrates reaction detection device 29, including Peltier element 10 for heating/cooling reaction containers 7; and curved reflective plate 40, which provides means for reflecting light from light source lamp 23 (not shown) to irradiate reaction containers 7 (Tamaoki 13:20–35; Fig. 11). Camera 27 detects the received fluorescence reflected

from curved plate 40 and emitted from each irradiated reaction container 7 (*id.* at 11:28–30).

The Examiner finds that Troll discloses an apparatus for measuring optical properties of biological and chemical substances comprising a compound curved mirror (Ans. 5; *see also* Troll Fig. 5). Figure 5 of Troll, reproduced below, illustrates an optical measurement system, which employs an off-axis parabolic mirror:

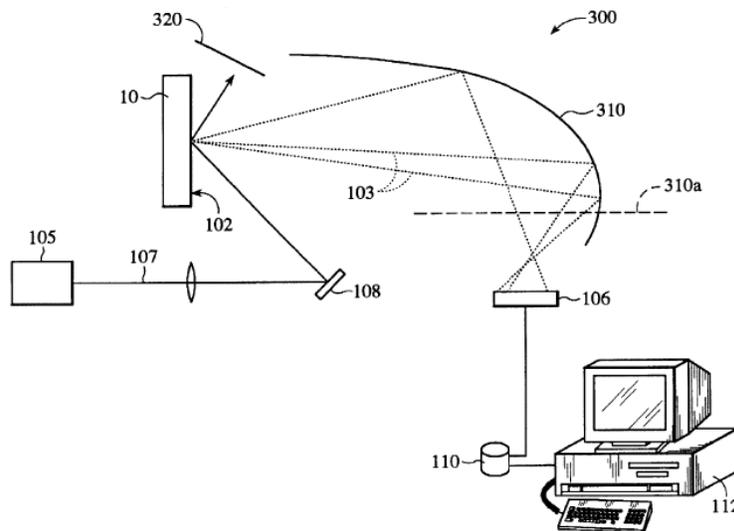


FIG. 5

Troll's Figure 5 illustrates optical detection system 300, including light beam 107, test surface 102, parabolic mirror 310, and light emissions 103, which are emitted from test surface 102 and reflected by parabolic mirror 310 to detector 106 (Troll 3:24–26; 8:34–46).

The Examiner finds that the reflective surface of Troll's compound curved mirror 310 is structurally similar and possesses the same non-rotationally symmetric features as the instant compound curved mirror (Ans. 5). According to the Examiner, Meloni discloses that it is well known in the

art that off-axis parabolic mirrors, such as Troll's, improve imaging of an optical system and avoid chromatic aberrations (*id.*).

The Examiner determined that it would have been obvious for one of ordinary skill in the art at the time of the invention “to have substituted the mirror of Tamaoki with that of Troll in order to produce the desired collimating/focusing function” recited in claim 23 (*id.*). According to the Examiner, an ordinarily skilled artisan would have been motivated to substitute Tamaoki's curved reflective plate 40 with Troll's off-axis parabolic mirror 310 because doing so “would have resulted [in] an optical system having the added advantage of improving the imaging of [Tamaoki's] optical system . . . free of chromatic aberrations” (*id.*).

Appellant argues that the Examiner's applied prior art does not render obvious each limitation recited in claim 23 (*see* Appeal Br. 5–11; Reply Br. 2–5).³ Specifically, Appellant contends the Examiner has not established that the proposed combination of Tamaoki and Troll, with evidence from Meloni, teaches or suggests

that [Tamaoki's] mirror that is positioned to evenly irradiate a sample block *is also positioned and arranged* “such that overall ray lengths from each of the plurality of recessed bottom surfaces to the common reference point by means of the reflective surface are substantially the same” and “simultaneous observation of the plurality of recessed bottom surfaces from the common reference point without interference or eclipsing

³ Appellant argues in the Reply Brief that the Examiner has included new grounds of rejection, which were not advanced by the Examiner prior to the Examiner's Answer (*see, e.g.*, Reply Br. 3–5). Since the Examiner's failure to designate a rejection in an Answer as a new ground is a petitionable issue, not an appealable one, we do not address the matter. MPEP § 1207.03(b); *see also* MPEP § 1002.02(c)(6); *In re Hengehold*, 440 F.2d 1395, 1403 (CCPA 1971).

by the plurality of sample wells” is permitted[,] as required by the claims
(Appeal Br. 8) (emphasis added). Appellant contends that Tamaoki’s “goals of producing parallel or nearly parallel light and minimizing unevenness of the measurement sensitivity across reaction containers are different from producing ray lengths that are substantially the same” (*id.* at 10 (citing 37 C.F.R. § 1.132 Declaration of Patrick L. Riley, filed May 18, 2016, ¶ 8, “Riley Decl. 2016”). Appellant argues that “only paraboloid-shaped mirrors positioned and arranged as required by the claims will produce overall ray lengths that are substantially the same” (Appeal Br. 10 (citing 37 C.F.R. § 1.132 Declaration of Patrick L. Riley, filed 2018, ¶ 16, “Riley Decl. 2018”).

Appellant further argues that the Examiner has not provided evidence that Troll’s mirror shape inherently produces the requisite ray lengths (Reply Br. 2). Appellant argues that the Examiner has not provided a reason to modify Tamaoki’s device to include Troll’s mirror (Appeal Br. 13–15; Reply Br. 7–8). In view of these alleged deficiencies, Appellant concludes that the ordinarily skilled artisan “would[,] therefore[,] not necessarily position and arrange Troll’s mirror in Tamaoki’s device in a way that would arrive at the claimed invention” (Appeal Br. 10).

Appellant’s arguments are not persuasive.

Appellant admits that the ordinarily skilled artisan would have expected that images produced using either the claimed compound curved mirror or Troll’s mirror would have been similar because each mirror is paraboloid-shaped (*id.* at 12). Thus, we are persuaded by the Examiner that Troll’s mirror is structurally the same as the instant mirror.

As the Examiner finds: (i) Troll’s mirror 310 is *arranged and positioned* in the optical path between the sample block and a common reference point; and (ii) *the arrangement* of Troll’s mirror 310, sample block 10, and detector 106 in the optical path inherently produces overall ray lengths that are substantially the same (Advisory Act. 3, dated Mar. 29, 2018; *see also* Troll Fig. 5). The Examiner, furthermore, finds Troll teaches that detector 106 may be placed, i.e., *positioned*, either close to or away from the parabola’s focus (Ans. 28 (citing Troll 8:34–50)).

Based on these findings, the Examiner reasonably concluded that “one of ordinary skill in the art would have been motivated to” substitute Tamaoki’s curved reflective plate 40 with Troll’s off-axis parabolic mirror 310 “because doing so would have resulted in nothing more than the simple substitution of one known reflective mirror for another for the expected result of producing [the] desired collimating/focusing function” (Ans. 29). We, therefore, are persuaded by the Examiner that

it would have been obvious to one of ordinary skill in the art to have *arranged* the modified compound curved mirror of modified Tamaoki such that the ray lengths from each of the plurality of recessed bottom surfaces to the common reference point [are] substantially . . . the same, so as to illuminate and optically analyze the plurality of samples in the array of wells simultaneously

(*id.* at 29–30) (emphasis added).

In other words, the Examiner has provided a well-reasoned analysis of how and why the ordinarily skilled artisan would have reasonably expected that Tamaoki’s reaction detection device, modified with Troll’s paraboloid-shaped mirror, would have possessed the light collimating/focusing functions recited in claim 23.

On this record, Appellant has not met the burden of showing that the Examiner's proposed reaction detection device cannot be configured to provide: (i) overall ray lengths from each of a plurality of recessed bottom surfaces to a common reference point by means of a reflective surface that are substantially the same; and (ii) simultaneous observation of the plurality of recessed bottom surfaces from the common reference point without interference or eclipsing by a plurality of sample wells. *In re Best*, 562 F.2d 1252, 1255 (CCPA 1977) (explaining that "[w]here . . . the claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes, the PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his claimed product"). *See also In re Schreiber*, 128 F.3d 1473, 1477 (Fed. Cir. 1997) (Court found no dispute that claimed and prior art product had the same structure so that the prior art structure is capable of performing the recited function.); *Intel Corp. v. U.S. Int'l Trade Comm'n*, 946 F.2d 821, 832 (Fed. Cir. 1991) (Courts have interpreted functional language in an apparatus claim as requiring that the prior art apparatus possess the capability of performing the recited function.).

Accordingly, Appellant's arguments do not persuasively address the Examiner's reasoning, which supports the findings and conclusions in the stated rejections. Therefore, Appellant's arguments are insufficient to convince us of reversible error in the Examiner's rejections.

Appellant argues that one of ordinary skill in the art, concerned with Tamaoki's goal of minimizing the unevenness of measurement sensitivity, would not have modified Tamaoki with Troll's teachings (Appeal Br. 11–

13). According to Appellant, Troll is not concerned with imaging at all, let alone accurate imaging (*id.*). Appellant argues that: (i) Troll acknowledges that accurate imaging requires calibration; and (ii) Troll’s paraboloid-shaped mirror would have produced images that are distorted (*id.* at 11–12 (citing Riley Decl. 2018 ¶¶ 11, 21; Spec. ¶¶ 68, 71; Riley Decl. 2016 ¶ 12)). Appellant thus argues that the references, with allegedly disparate goals, “teach away from each other” (Reply Br. 6).

We are not persuaded by these arguments because they are directed to limitations not recited in independent claim 23, which is silent regarding limitations concerned with imaging quality. With regard to Appellant’s Declaration evidence, we agree with the Examiner that Riley Decl. 2016 attacks the references individually instead of addressing what the combined teachings of the prior art would have suggested to the ordinarily skilled artisan. *In re Keller*, 642 F.2d 413, 425 (CCPA 1981). We are further unpersuaded by Riley Decl. 2018, as the claims do not require any image processing systems with special calibration algorithms for processing imaging data. We, moreover, note that these Declarations do not show comparative evidence establishing that the claimed mirror yields unexpected benefits over the prior art mirror.

While there is no dispute that Troll is unconcerned with forming an accurate image, Meloni provides evidence that Troll’s paraboloid-shaped mirror improves imaging (Ans. 5, 35). Thus, we agree with the Examiner that one of ordinary skill in the art would have recognized that Tamaoki’s curved reflective plate 40 may be substituted by Troll’s off-axis parabolic mirror 310 because each possesses optical properties for the analysis of biological materials (*see id.* at 35–36). Therefore, we do not find that Troll’s

disclosure teaches away; it does not indicate that “the line of development flowing from the reference’s disclosure is unlikely to be productive of the result sought by the applicant.” *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994).

Thus, based on a preponderance of evidence in this record, we sustain these rejections as to claims 24–26, 32, and 35–43.

b. Claim 27

With regard to claim 27, the Examiner’s findings and conclusions regarding Tamaoki and Troll, as evidenced by Meloni, are located on page 7 of the Answer. Claim 27 is set forth below (emphasis added):

27. The apparatus of claim 23, wherein the plurality of recesses are configured to interface with the plurality of sample containers, the sample containers including an exterior surface, and interior surface, and *a plurality of recessed bottom surfaces that define a plurality of points of interest*, and wherein the first and second curvatures are configured and arranged such that *the overall ray length from the plurality of points of interest to the common reference point are substantially the same*.

Appeal Br. 39 (Claims App.).

Appellant argues that the Examiner has not established that modified Tamaoki teaches or suggests that the mirror should be positioned relative to “a plurality of recessed bottom surfaces” as Tamaoki is merely concerned with evenly irradiating the reaction specimens (*id.* at 16). Therefore, according to Appellant, the applied prior art cannot “arrive at an apparatus wherein ‘the overall ray length from the plurality of points of interest to the common reference point are substantially the same’ as required by claim 27.” (*Id.*)

Appellant’s arguments are not persuasive.

For the reasons set forth above and in the Answer, Appellant's argument fails to identify reversible error in the Examiner's reasoned determination that

it would have been obvious to one of ordinary skill in the art to have arranged [Tamaoki's] modified compound curved mirror . . . such that the ray lengths from each of the plurality of recessed bottom surfaces to the common reference point [are] substantially the same, so as to illuminate and optically analyze the plurality of samples in the array of wells simultaneously

(Ans. 38). The Examiner persuasively finds that modified Tamaoki's reaction containers 7 include "recessed bottom surfaces that define a . . . plurality of points of interest" (*id.* at 7 (citing Tamaoki Fig. 11)).

Thus, based on a preponderance of evidence in this record, we sustain this rejection as to claim 27.

c. Claims 33 and 34

With regard to claims 33 and 34, the Examiner's findings and conclusions regarding Tamaoki and Troll, as evidenced by Meloni, are located on page 8 of the Answer. Claims 33 and 34 are set forth below (emphasis added):

33. The apparatus of claim 23, wherein the optical path further comprises *a camera* and an illumination light source, wherein at least *the camera is positioned substantially at the common reference point.*
34. The apparatus of claim 33, *wherein the camera and the illumination light source are each in a fixed position in the optical path relative to the sample block and to the reflective surface of the mirror, the sample block, illumination light source, and the compound curved mirror being positioned and arranged relative to one another such that the plurality of recessed bottom*

surfaces can be illuminated substantially simultaneously by the illumination light source and observed substantially simultaneously from the common reference point by the camera.

Appeal Br. 39–40 (Claims App.).

With regard to claim 33, Appellant argues that Tamaoki: (i) is only concerned with evenly irradiating the biological samples in each of the plurality of sample wells; and (ii) fails to teach or suggest adjusting the relative positioning of its camera as a requirement to achieve evenness of illumination (*id.* at 16, 17). Appellant thus argues that Tamaoki fails to teach or suggest “a camera” that “is positioned substantially at the common reference point,” as recited in the claim (*id.* at 16).

With respect to claim 34, Appellant argues that Tamaoki “does not provide any discussion concerning the relative positioning of its camera with the reflective surface of the mirror, the sample block, illumination light source in order to achieve evenness of irradiation” (*id.* at 18).

Appellant’s arguments are not persuasive.

As the Examiner finds, Tamaoki’s camera 27 is positioned in the optical path and, thus, the emitted fluorescent light in each of the irradiated wells is directed to the camera (Ans. 39; *see* Fig. 3). We note that Tamaoki’s Figures 11 and 12 depict the relative position of a camera with respect to the mirror, the sample block, and illumination light. We, therefore, agree with the Examiner that the emitted light’s common reference point is the camera positioned in Tamaoki’s optical path (Ans. 39).

Thus, based on a preponderance of evidence in this record, we sustain this rejection as to claims 33 and 34.

B. Rejections of claims 44–59 as unpatentable over the combination of Tamaoki and Troll, as evidenced by Meloni; either with or without Pruss

Appellant’s arguments for reversal of the Examiner’s rejections of claims 44–59 are substantially similar to the arguments proffered for reversal of the rejections of claims 23–27 and 32–43 (*compare* Appeal Br. 19–36, Reply Br. 12–25 *with* Appeal Br. 5–19, Reply Br. 2–11). For the reasons set forth above, Appellant’s arguments do not persuasively address the Examiner’s reasoning, which supports the findings and conclusions in the stated rejections. Therefore, Appellant’s arguments are insufficient to convince us of reversible error in the Examiner’s rejections.

Thus, based on a preponderance of evidence in this record, we sustain these rejections.

CONCLUSION

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
23–27, 32–34	103(a)	Tamaoki, Troll, Meloni	23–27, 32–34	
35, 36	103(a)	Tamaoki, Troll, Meloni, Pruss	35, 36	
37–41	103(a)	Tamaoki, Troll, Meloni, Hasson	37–41	
42	103(a)	Tamaoki, Troll, Meloni, Hasson, Neuzil	42	
43	103(a)	Tamaoki, Troll, Meloni, Väisälä	43	
44–50	103(a)	Tamaoki, Troll, Meloni	44–50	
51	103(a)	Tamaoki, Troll, Meloni, Pruss	51	

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
52, 54–59	103(a)	Tamaoki, Troll, Meloni	52, 54–59	
53	103(a)	Tamaoki, Troll, Meloni, Pruss	53	
Overall Outcome			23–27, 32–59	

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED