

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Ex parte SNORRI THORGEIR INGVARSSON, PHILIP LOUIS TROUILLOUD,
SHOUHENG SUN, ROGER HILSEN KOCH, and DAVID WILLIAM ABRAHAM

Appeal No. 2006-2982
Application No. 10/458,112

ON BRIEF

Before KRASS, JERRY SMITH, and BARRY, Administrative Patent Judges.

JERRY SMITH, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on the appeal under 35 U.S.C. § 134 from the examiner's rejection of claims 1-6, 8-20, 22-30 and 38. The examiner has indicated that claim 21 contains allowable subject matter if rewritten in independent form. Claim 7 was cancelled by amendment and claims 31-37 have been cancelled in response to a restriction requirement.

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The disclosed invention pertains to magnetic materials and, more particularly, to magnetic materials having superparamagnetic particles associated therewith.

Representative claims 1, 18 and 29 are reproduced as follows:

1. A magnetic film comprising superparamagnetic particles on at least one surface thereof configured to affect damping of the magnetic film, one or more of the superparamagnetic particles comprising a nanoparticle.

18. A magnetic switching device comprising two magnetic layers with a barrier layer therebetween, wherein at least one of the magnetic layers comprises a magnetic film comprising superparamagnetic particles on at least one surface thereof.

29. A magnetic film comprising at least one superparamagnetic particle embedded therein.

The examiner relies on the following references:

Sun	6,256,223	July 3, 2001
Richter et al. (Richter)	6,495,252	Dec. 17, 2002
Rizzo et al. (Rizzo)	US2004/0000415	Jan. 1, 2004 (filed June 28, 2002)

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Appellants rely upon the following extrinsic evidence submitted during the prosecution on September 2, 2004:

- Murray et al., "Monodisperse 3d Transition-Metal (Co, Ni, Fe) Nanoparticles and Their Assembly into Nanoparticle Superlattices", MRS Bulletin, December 2001, pages 985-991.
- O'Handley, R.C., "Modern Magnetic Materials, Principles and Applications", John Wiley & Sons, 2000, page 92.
- Wolfram Research website, "Magnetic susceptibility", web page at: <http://scienceworld.wolfram.com/physics/MagneticSusceptibility.html>, August 24, 2004, 1 page.

The following rejections are on appeal before us:

1. Claims 1-4, 8, 9, 11-17, 29 and 30 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Rizzo.
2. Claims 18-20 stand rejected under 35 U.S.C. § 102(a) as being anticipated by Richter.
3. Claims 1, 4, 8-10, 15, 22, 23, 25, 26 and 38 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Sun.
4. Claims 5 and 6 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the teachings of Rizzo.
5. Claim 24 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over the teachings of Sun.
6. Claims 27 and 28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the teachings of Sun in view of Rizzo.

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Rather than repeat the arguments of appellants or the examiner, we make reference to the briefs and the answer for the respective details thereof.

OPINION

We have carefully considered the subject matter on appeal, the rejections advanced by the examiner and the evidence of anticipation and obviousness relied upon by the examiner as support for the rejections. We have, likewise, reviewed and taken into consideration, in reaching our decision, the appellants' arguments set forth in the briefs along with the examiner's rationale in support of the rejections and arguments in rebuttal set forth in the examiner's answer. Only those arguments actually made by appellants have been considered in this decision. Arguments which appellants could have made but chose not to make in the briefs have not been considered and are deemed to be waived.

See 37 C.F.R. § 41.37(c)(1)(vii)(2004). See also In re Watts, 354 F.3d 1362, 1368, 69 USPQ2d 1453, 1458 (Fed. Cir. 2004).

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It is our view, after consideration of the record before us, that the evidence relied upon by the examiner does not support the examiner's rejections of claims 1-17, 22-28 and 38, but does support the examiner's rejections of claims 18-20, 29 and 30. Accordingly, we affirm-in-part.

ANTICIPATION REJECTIONS

In rejecting claims under 35 U.S.C. §102, a single prior art reference that discloses, either expressly or inherently, each limitation of a claim invalidates that claim by anticipation. Perricone v. Medicis Pharmaceutical Corp., 432 F.3d 1368, 1375-6, 77 USPQ2d 1321, 1325-6 (Fed. Cir. 2005), citing Minn. Mining & Mfg. Co. v. Johnson & Johnson Orthopaedics, Inc., 976 F.2d 1559, 1565, 24 USPQ2d 1321, 1326 (Fed. Cir. 1992). To establish inherency, the extrinsic evidence "must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill." Continental Can Co. v. Monsanto Co., 948 F.2d 1264, 1268, 20 USPQ2d 1746, 1749 (Fed. Cir. 1991). "Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." In re Robertson, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (internal citations omitted). To anticipate, every element and limitation of the claimed invention must be found in a single prior art reference, arranged as in the

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claim. Karsten Mfg. Corp. v. Cleveland Golf Co., 242 F.3d 1376, 1383, 58 USPQ2d 1286, 1291 (Fed. Cir. 2001); Scripps Clinic & Research Foundation v. Genentech, Inc., 927 F.2d 1565, 1576, 18 USPQ2d 1001, 1010 (Fed. Cir. 1991). Anticipation of a patent claim requires a finding that the claim at issue “reads on” a prior art reference. Atlas Powder Co. v. Ireco, Inc., 190 F.3d 1342, 1346, 51 USPQ2d 1943, 1945 (Fed Cir. 1999) (“In other words, if granting patent protection on the disputed claim would allow the patentee to exclude the public from practicing the prior art, then that claim is anticipated, regardless of whether it also covers subject matter not in the prior art.”) (internal citations omitted).

Claims 1-4, 8, 9 and 11-17 (Rizzo)

I(a). We consider first the examiner’s rejection of claims 1-4, 8, 9 and 11-17 as being anticipated by Rizzo. We separately address claims 29 and 30 as being anticipated by Rizzo infra. Since Appellants’ arguments with respect to this rejection have treated these claims as a single group which stand or fall together, we will consider independent claim 1 as the representative claim for this rejection. See 37 C.F.R. § 1.37(c)(1)(vii)(2004).

Appellants argue that Rizzo does not teach nor suggest a superparamagnetic “nanoparticle” as defined in the instant invention [brief, page 4]. Appellants argue that the instant specification (at page 10, lines 21-22) defines a nanoparticle as a particle having a diameter of between

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about 3 nanometers to about 12 nanometers [*id.*]. Appellants note that Rizzo is directed to magnetic field shielding (e.g., see Rizzo, ¶0055) [*id.*]. Appellants further note that Rizzo discloses increased thermal demagnetization effects and decreased permeability if the particle size is too small (¶¶ 0033 and 0053) [*id.*]. Appellants conclude that Rizzo clearly teaches against employing a particle size that results in decreased permeability [*id.*]. Appellants offer extrinsic evidence of record in support of the assertion that it is commonly known in the art that the magnetic permeability of particles is affected by particle size [*id.*].

The examiner disagrees [answer, page 10]. The examiner argues that Rizzo suggests a “nanoparticle” and does not specifically teach against such a parameter size [*id.*]. The examiner notes Rizzo discloses that superparamagnetism occurs when the particle size is 1 μm or less [*id.*; see also Rizzo at ¶¶ 0052 and 0053]. The examiner points out that a nanometer-sized particle is less than 1 μm [*id.*]. The examiner acknowledges that Rizzo doesn’t properly establish the lower limit of the size parameters for the particle [*id.*]. However, the examiner asserts that it is up to one of ordinary skill in the art to determine how low one can go [in diameter] without losing too much permeability of the particles [*id.*]. The examiner concludes that a nanometer is “within the realm of 1 μm or less” [answer, page 10, cont’d page 11].

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At the outset, we note that appellants have argued that Rizzo expressly teaches against using particles having a particle size too small [brief, page 4, Rizzo, ¶¶ 0033 and 0053]. We further note the examiner has asserted that Rizzo suggests a nanoparticle [answer, page 10]. We note that what a reference “suggests” is irrelevant to anticipation. Furthermore, “[t]eaching away is irrelevant to anticipation.” Seachange International, Inc., v. C-Cor, Inc., 413 F.3d 1361, 1380, 75 USPQ2d 1385, 1398 (Fed. Cir. 2005), citing Celeritas Tech., Ltd., v. Rockwell Int’l Corp., 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522 (Fed. Cir. 1998); Bristol-Myers Squibb Co. v. Ben Venue Labs., Inc., 246 F.3d 1368, 1378, 58 USPQ2d 1508, 1515 (Fed. Cir. 2001).

We begin our analysis by construing the recited “nanoparticle” in accordance with the definition argued by appellants. Appellants have argued that the claimed “nanoparticle” must be a particle having a diameter of between about 3 nanometers to about 12 nanometers, in accordance with the definition set forth in the instant specification at page 10, lines 21 and 22 [brief, page 4]. We note that the Court of Appeals for the Federal Circuit has stated: “[w]hen the applicant states the meaning that the claim terms are intended to have, the claims are examined with that meaning, in order

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to achieve a complete exploration of the applicant's invention and its relation to the prior art." In re Zletz, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) (internal citation omitted). Our reviewing court has further determined: "the specification is the 'single best guide to the meaning of a disputed term' and that the specification 'acts as a dictionary when it expressly defines terms used in the claims or when it defines terms by implication.'" Phillips v. AWH Corp., 415 F.3d 1303, 1321, 75 USPQ2d 1321, 1332 (Fed. Cir. 2005) (en banc) (internal citations omitted).

In the instant case, we note that Rizzo's disclosed particle size range (i.e., "approximately 1 μm or less", ¶ 0053) completely encompasses the particle size range defined and argued by appellants of between about 3 nanometers to about 12 nanometers. We note that Rizzo's disclosure of a completely encompassing range would be sufficient to sustain an obviousness rejection.¹ However, we note that our reviewing court has determined that a completely encompassing range that lacks sufficient specificity is insufficient to sustain an anticipation rejection. See Atofina v. Great Lakes Chemical Corp., 441 F.3d 991, 999, 78 USPQ2d 1417, 1423 (Fed. Cir. 2006) ("Here, the prior art, JP 51-82250, discloses a temperature range of 100 to 500 °C which is broader than and fully

¹ Where the claimed ranges are completely encompassed by the prior art, the conclusion that the claims are prima facie obvious is even more compelling than in cases of mere

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encompasses the specific temperature range claimed in the '514 patent of 330 to 450 °C. Given the considerable difference between the claimed range and the range in the prior art, no reasonable fact finder could conclude that the prior art describes the claimed range with sufficient specificity to anticipate this limitation of the claim.”).

Therefore, when we properly construe instant claim 1 in accordance with the supporting “nanoparticle” definition argued by appellants, we find that Rizzo’s completely encompassing particle diameter range fails to describe the instant defined particle diameter range with sufficient specificity to anticipate the claimed “nanoparticle.” Accordingly, we will reverse the examiner’s rejection of representative claim 1 as being anticipated by Rizzo. Because claims 2-4, 8, 9 and 11-17 each depend directly or indirectly upon claim 1, we will also reverse the examiner’s rejection of these claims as being anticipated by Rizzo.

Claims 29 and 30 (Rizzo)

I(b). We consider next the examiner’s rejection of claims 29 and 30 as being anticipated by Rizzo. Since appellants’ arguments with respect to this rejection have treated these claims as a single group which stand or fall together, we will consider independent claim 29 as the representative claim for this rejection. See 37 C.F.R. § 41.37(c)(1)(vii)(2004).

overlap. In re Harris, 409 F.3d 1339, 1341, 74 USPQ2d 1951, 1953 (Fed. Cir. 2005) citing

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Appellants note that independent claim 29 recites: "A magnetic film comprising at least one superparamagnetic particle embedded therein" [brief, page 5]. Appellants argue that Rizzo's particles are embedded in a non-magnetic matrix instead of being embedding in a magnetic film [id.]. Appellants conclude that Rizzo does not disclose or suggest a magnetic film comprising at least one superparamagnetic particle embedded therein, as required by independent claim 29.

The examiner disagrees [answer, page 11]. The examiner argues that Rizzo teaches that a shielding material layer 58 includes a magnetic epoxy or similar molding material with ferromagnetic or superparamagnetic particles suspended therein [id.; see Rizzo ¶¶ 0038 and 0050]. The examiner asserts that magnetic epoxy is a magnetic film since the superparamagnetic particles are suspended in the epoxy and therefore embedded in the film [id.]. The examiner asserts that it is understood from appellants' specification (fig. 5), that the magnetic film may comprise the magnetic layer and the non-magnetic polymer having the particles embedded within [id.].

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In the reply brief, appellants essentially restate the same arguments presented in the brief with respect to claim 29 [reply brief, page 11].

We note that Rizzo discloses magnetic material layers 26 and 30 where portions of the layers can also include a plurality of ferromagnetic or superparamagnetic particles suspended in a non-magnetic matrix, such as an epoxy, polymer, metal, or another suitable non-magnetic matrix material.

See Rizzo, ¶ 0038:

[0038] In another embodiment, portions of magnetic material layers 26 and 30 can include an amorphous magnetic material or a nanocrystalline magnetic material. Portions of magnetic material layers 26 and 30 can also include a plurality of ferromagnetic or superparamagnetic particles suspended in a non-magnetic matrix. The non-magnetic matrix can include an epoxy, polymer, metal, or another suitable non-magnetic matrix material. An epoxy is a thermosetting resin capable of forming tight cross-linked polymer structures characterized by toughness, strong adhesion, and low shrinkage, and is used especially in surface coatings and adhesives.

In particular, we find that the magnetic properties of Rizzo's magnetic "film" derive (in at least one embodiment) from the suspension of the superparamagnetic particles within the non-magnetic material. Therefore, we agree with the examiner that the instant claimed "magnetic film" broadly but reasonably reads on Rizzo's magnetic material layers 26 and 30 where superparamagnetic particles are suspended in a non-magnetic material, such as epoxy or polymer [Rizzo, ¶0038]. In addition, we agree with the

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examiner that the claimed "magnetic film" also broadly reads on shielding material layer 58 that can include (in one embodiment) a magnetic epoxy with superparamagnetic particles suspended therein [Rizzo, § 0050].

Accordingly, we will sustain the examiner's rejection of representative claim 29 as being anticipated by Rizzo for essentially the same reasons argued by the examiner in the answer. We note that appellants have not presented any substantive arguments directed separately to the patentability of dependent claim 30. See In re Nielson, 816 F.2d 1567, 1572, 2 USPQ2d 1525, 1528 (Fed. Cir. 1987). See also 37 C.F.R. § 41.37(c)(1)(vii)(2004). With respect to dependent claim 30, we further note that Rizzo discloses in one embodiment a non-magnetic polymer that inherently "coats" superparamagnetic particles that are suspended or embedded in the polymer [¶ 0038]. Therefore, we will also sustain the examiner's rejection of claim 30 as being anticipated by Rizzo.

Claims 18-20 (Richter)

II. We consider next the examiner's rejection of claims 18-20 as being anticipated by Richter. Since appellants' arguments with respect to this rejection have treated these claims as a single group which stand or fall together, we will consider independent claim 18 as the representative claim for this rejection. See 37 C.F.R. § 41.37(c)(1)(vii)(2004).

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Appellant argues that a person of ordinary skill would recognize the device disclosed by Richter as magnetic media and not as a magnetic switching device [brief, page 8]. Appellants argue that there is no disclosure that Richter's underlayer 3 is magnetic in Richter's various embodiments [brief, page 9]. Appellants further assert that Richter's layer 8A is not a magnetic film with superparamagnetic particles on its surface [id.]. Appellants further argue that the preamble limits the structure of the claimed invention and therefore must be considered as a limitation [id.].

The examiner disagrees [answer, page 14]. The examiner argues that in the broadest sense, magnetic media represents a plurality of bits that switch binary states to store digital information [id.]. The examiner notes that Richter shows (in fig. 2) magnetic layers 3 and 4, and a "barrier layer" (8b) formed on magnetic layer (3) [id.]. The examiner argues that because Richter's device has the same structure as appellants' claimed invention that Richter's device is capable of performing the intended purpose or function of a switching device [id.].

We note that the determination of whether preamble recitations are structural limitations can be resolved only on review of the entirety of the application "to gain an understanding of what the inventors actually invented and intended to encompass by the claim." Corning Glass Works v. Sumitomo Elec. U.S.A., Inc., 868 F.2d 1251, 1257, 9 USPQ2d 1962, 1966 (Fed. Cir.

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1989) (“No litmus test can be given with respect to when the introductory words of a claim, the preamble, constitute a statement of purpose for a device or are, in themselves, additional structural limitations of a claim.”).

In the instant case, we find that Richter discloses all the structural elements, arranged as claimed [instant representative claim 18]. We find that Richter discloses (in fig. 2) a lower magnetically soft superparamagnetic layer 8A (i.e., “a magnetic film comprising superparamagnetic particles on at least one surface thereof,” as claimed) [col. 5, line 31]. We find that layer 8A is in contact with exchange de-coupling layer 8B (i.e., “a barrier layer therebetween,” as claimed) [col. 5, line 32]. We further find that Richter discloses an upper magnetic layer 4 [col. 5, line 34].

We note that the Court of Appeals for the Federal Circuit has determined that the absence of a disclosure relating to function does not defeat a finding of anticipation if all the claimed structural limitations are found in the reference. In re Schreiber, 128 F.3d 1473, 1477, 44 USPQ2d 1429, 1431 (Fed. Cir. 1997). In Schreiber, the court held that a funnel-shaped oil dispenser spout anticipated a claimed conical-shaped popcorn dispensing top, even though the function of popcorn dispensing was not taught by the reference, because the reference met all the structural limitations of the claim. In re Schreiber, 128 F.3d at 1479, 44 USPQ2d 1429 at 1433.

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Because Richter discloses every element of the instant claimed structure, we agree with the examiner that Richter's disclosed structure is inherently capable of performing the instant intended purpose or function of magnetic switching. Accordingly, because the absence of a disclosure relating to an intended use or function does not defeat a finding of anticipation, we will sustain the examiner's rejection of representative claim 18 as being anticipated by Richter for essentially the same reasons argued by the examiner. We note that appellants have not presented any substantive arguments directed separately to the patentability of dependent claims 19 and 20. See In re Nielson, 816 F.2d at 1572, 2 USPQ2d at 1528. See also 37 C.F.R. § 41.37(c)(1)(vii)(2004). Therefore, we will also sustain the examiner's rejection of these claims as being anticipated by Richter for the same reasons set forth in the examiner's rejection.

Claims 1, 4, 8-10, 15, 22, 23, 25, 26 and 38 (Sun)

III. We consider next the examiner's rejection of claims 1, 4, 8-10, 15, 22, 23, 25, 26 and 38 as being anticipated by Sun. We will begin our analysis with independent claim 1.

Appellants argue that Sun neither teaches nor suggests a magnetic film, as claimed [brief, page 6]. Appellants assert that Sun instead teaches

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two electrodes (e.g. electrodes 101 and 102 and a single magnetic nanoparticle 103 therebetween) [brief, page 6; see Sun col. 4, lines 35-37, fig. 1]. Appellants further argue that Sun does not teach a magnetic film comprising superparamagnetic particles on “at least one surface thereof,” as claimed [brief, page 6].

At the outset, we note that independent claims 1, 22, 25 and 38 each recite a “magnetic film” and a superparamagnetic particle (or particles) on “at least one surface thereof.”

We begin our analysis by noting that the examiner fails to respond directly to appellants’ argument that the magnetic film limitation is not found within the Sun reference. The examiner merely asserts that he/she “believes” that Sun discloses this limitation [answer, page 12, ¶2]. After carefully reviewing the sections of the Sun reference relied upon by the examiner, we find that the examiner, as finder of fact, has not fully developed the record so as to adequately explain exactly how the instant claimed “magnetic film” reads upon Sun’s electrodes 101 and 102 (fig. 1). However, we find that Sun explicitly discloses “magnetic thin film elements” in the “Background of the Invention” section in the context of a discussion of Magnetic Random Access Memory (MRAM) technology [col. 1, line 19]. We further note that Sun discloses “thin film electrodes” at col. 2, line 46 [emphasis added].

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With respect to whether Sun discloses superparamagnetic particles on “at least one surface thereof,” the examiner argues that Sun teaches the nanoparticle is electrically connected to the first and second electrodes by tunneling (Sun, col. 5, lines 4-13) [answer, page 12].

In the reply brief, appellants note that Sun’s electrodes 101 and 102 are provided with a magnetic nanoparticle 103 situated between the electrodes (col. 4, lines 35-37; see also fig. 1) [reply brief, page 6]. Appellants argue that Sun does not disclose nor suggest that the particle is on the surface thereof [id.]. Appellants argue that if the particle is too close to the electrode and couples too strongly to it, the device disclosed by Sun will not operate properly because the particle must switch magnetically for it to work [id.]. Appellants conclude that Sun’s particle must lie between the electrodes at a safe distance from the electrodes for the device to function correctly [id.].

When we consider the section of Sun relied on by the examiner for this teaching, we find no specific disclosure of superparamagnetic particles on “at least one surface thereof,” as claimed. Sun discloses that a rotation of the magnetic orientation of the magnetic nanoparticle 103 results in a change in the device’s resistance [col. 5, lines 14-19]. Sun further explains the relationship between the orientation of the magnetic moment of

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nanoparticle 103 with respect to electrodes 101 and 102, and the resultant “resistive-high” or “resistive-low” states [col. 5, lines 29-33].

After carefully considering the evidence before us, we find that to affirm the examiner on this record would require speculation on our part. Therefore, we agree with appellants that the examiner has failed to meet his/her burden of establishing a prima facie case of anticipation with respect to independent claim 1 and also with respect to independent claims 22, 25 and 38 that recite essentially equivalent limitations. Accordingly, because each limitation of these independent claims is not fairly disclosed by the Sun reference, we will reverse the examiner’s rejection of claims 1, 4, 8-10, 15, 22, 23, 25, 26 and 38 as being anticipated by Sun.

OBVIOUSNESS REJECTIONS

Claims 5 and 6 (Rizzo)

IV. We consider next the examiner’s rejection of claims 5 and 6 as being unpatentable over the teachings of Rizzo. We note that claims 5 and 6 each depend upon independent claim 1. Because we have reversed the examiner’s rejection of independent claim 1 as being anticipated by Rizzo, we will also reverse the examiner’s rejection of dependent claims 5 and 6 as being obvious over Rizzo.

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Claim 24 (Sun)

V. We consider next the examiner's rejection of claim 24 as being unpatentable over the teachings of Sun. We note that claim 24 depends upon independent claim 22. Because we have reversed the examiner's rejection of independent claim 22 as being anticipated by Sun, we will also reverse the examiner's rejection of dependent claim 24 as being obvious over Sun.

Claims 27 and 28 (Sun in view of Rizzo)

VI. Lastly, we consider the examiner's rejection of claims 27 and 28 as being unpatentable over the teachings of Sun in view of Rizzo. We note that claims 27 and 28 each depend upon independent claim 25. Because we have reversed the examiner's rejection of independent claim 25 as being anticipated by Sun, we will also reverse the examiner's rejection of dependent claims 27 and 28 as being obvious over Sun in view of Rizzo.

In summary, we have sustained the examiner's rejections of claims 18-20, 29 and 30 in view of the prior art of record, but we have not sustained the examiner's rejection of claims 1-6, 8-17, 22-28 and 38. Therefore, the decision of the examiner rejecting claims 1-6, 8-20, 22-30 and 38 is affirmed-in-part.

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However, we leave it to the examiner to consider whether the Richter reference may apply to more claims than just claims 18-20. We refer the examiner to the discussion of Richter supra.

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-IN-PART.

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