

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte TIMOTHY L. WEBER, GEORGE RADOMINSKI, NORMAN L. JOHNSON, TERRY E. McMAHON, DONALD W. SCHULTE, JEREMY H. DONALDSON, LEONARD A. ROSI and SADIQ S. BENGALI

Appeal 2008-0634
Application 10/136,719
Technology Center 1700

Decided: May 27, 2008

Before CATHERINE Q. TIMM, JEFFREY T. SMITH, and
LINDA M. GAUDETTE, *Administrative Patent Judges*.

GAUDETTE, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 1-83. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

The invention relates to a micro-mirror device which can be operated as a light modulator for amplitude and/or phase modulation of incident light. (Spec. 1, ll. 23-25.) Multiple micro-mirror devices may, for example, be arranged in an array such that each micro-mirror device provides one cell or

pixel of a display. (Spec. 1, ll. 26-28.) Figure 1 illustrates one embodiment of a micro-mirror device in accordance with the invention. (Spec. 2, ll. 22-23.)

Figure 1 of Appellants' Specification is shown below:

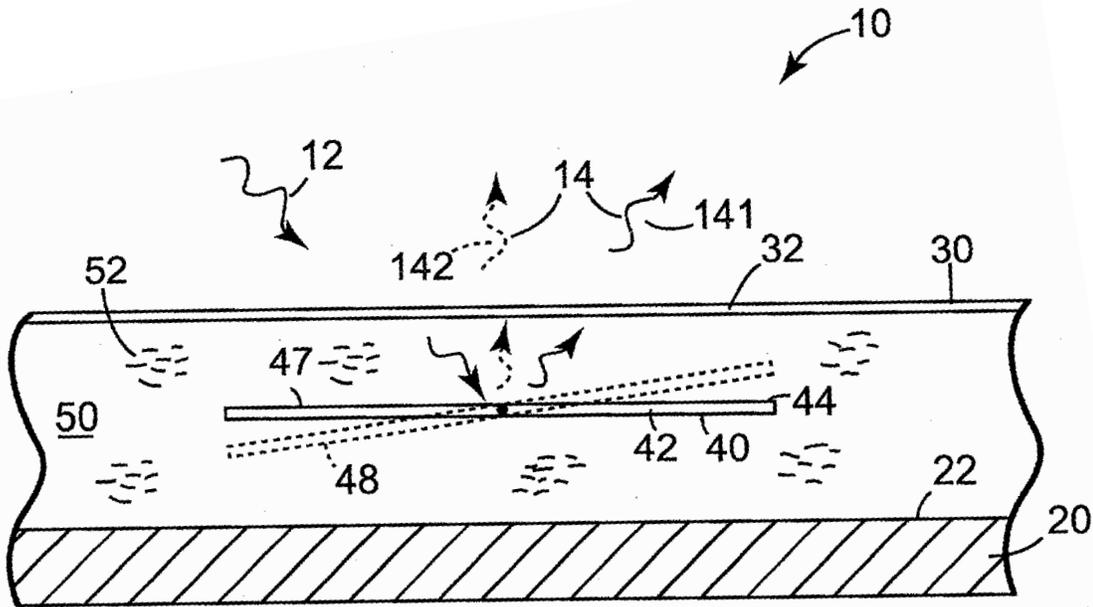


Fig. 1

Figure 1 illustrates a micro-mirror device 10 which includes a substrate 20, a plate 30, and an actuating element 40. A surface 22 is formed by a trench or tub formed in and/or on substrate 20. Plate 30 is preferably oriented substantially parallel to surface 22 and is spaced from surface 22 so as to define a cavity 50 therebetween. Actuating element 40 is positioned within cavity 50 and is movable between a first position 47 and a second position 48 relative to substrate 20 and plate 30. Cavity 50 may be filled

with a dielectric liquid 52 such that actuating element 40 is in contact with dielectric liquid 52.

Claims 1 and 30 are reproduced below:

1. A micro-mirror device, comprising:
 - a substrate having a substantially planar surface;
 - a plate spaced from the substrate and having a first surface and a second surface both oriented substantially parallel to the substantially planar surface of the substrate, the first surface of the plate and the substantially planar surface of the substrate facing each other, and the plate and the substantially planar surface of the substrate defining a cavity therebetween;
 - a dielectric liquid disposed in the cavity; and
 - a reflective element interposed between the substantially planar surface of the substrate and the plate,wherein the reflective element is adapted to move between a first position and at least one second position, and reflect light through the first surface and the second surface of the plate.

30. A method of forming a micro-mirror device, the method comprising:
 - providing a substrate having a substantially planar surface;
 - orienting a first surface and a second surface of a plate substantially parallel to the substantially planar surface of the substrate and spacing the plate from the substantially planar surface of the substrate, including defining a cavity between the plate and the substantially planar surface of the substrate;
 - disposing a dielectric liquid in the cavity; and
 - interposing a reflective element between the substantially planar surface of the substrate and the plate,wherein the reflective element is adapted to move between a first position and at least one second position, and reflect light through the first surface and the second surface of the plate.

The Examiner relies on the following prior art references to show unpatentability:

Yagi	6,154,302	Nov. 28, 2000
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Edwards	6,389,189 B2	May 14, 2002
Eliacin	6,714,105 B2	Mar. 30, 2004

The Examiner made the following rejections:

1. Claims 1-3, 5, 7, 21, 24-27, 30-32, 34, 49, 52-55, 57-59, 61, 70, 72-76, and 78-82 under 35 U.S.C. § 103 as unpatentable over Yagi.
2. Claims 4, 6, 17-20, 22, 23, 28, 33, 35, 46-48, 50, 51, 56, 60, 62, 67-69, 71, and 77 under 35 U.S.C. § 103 as unpatentable over Yagi in view of Edwards.¹
3. Claims 29 and 83 under 35 U.S.C. § 103 as unpatentable over Yagi.²
4. Claims 8-16, 36-44, and 63-66 under 35 U.S.C. § 103 as unpatentable over Yagi in view of Eliacin.
5. Claim 45 under 35 U.S.C. § 103 as unpatentable over Yagi in view of Eliacin and further in view of Edwards.

With respect to the first ground of rejection Appellants argue that Yagi fails to disclose or suggest “a plate spaced from a substrate and having a first surface and a second surface both oriented substantially parallel to the substantially planar surface of the substrate, with the first surface of the plate

¹ The Examiner indicates that claim 34 is included in this ground of rejection. (Ans. 6.) However, claim 34 is also rejected as unpatentable over Yagi alone. (Ans. 3.) As the Examiner separately treats claim 34 under the first ground of rejection (Ans. 4), it is believed that claim 34 was inadvertently included in the second ground of rejection. We view this as harmless error since neither the Examiner nor the Appellants discuss claim 34 in connection with the second ground of rejection.

² In rejecting claims 29 and 83, the Examiner takes Official Notice that “[i]t is extremely well known in the art to use MEMS devices in displays.” (Ans. 8; Final Rej. 7.) Appellants have not challenged the Official Notice.

and the substantially planar surface of the substrate facing each other, and the plate and the substantially planar surface of the substrate defining a cavity therebetween” as required by each of independent claims 1, 30, 57, and 75. (Reply Br. 4.) Appellants rely on the same argument in traversing the remaining grounds of rejection 2-5, on the basis that the rejected claims depend from independent claims 1, 30, 57, and 75. (*See* App. Br. 12-13, 13, 14, and 15.)

The Examiner concedes that “Yagi lacks specific reference to the shape claimed,” but maintains that “[c]hanges in shape have been held to be obvious to one of ordinary skill in the art.” (Ans. 6 (citing *In re Dailey*, 357 F.2d 669 (CCPA 1966).) The Examiner further notes that “Yagi suggests different shapes for the cavity surrounding the reflector are possible (Figs. 4 and 13).” (Ans. 6.) The Examiner thus contends that “[i]t would have been obvious to one of ordinary skill in the art at the time the invention was made to have the Yagi invention have a square cavit[y] for the purpose of making the cavity easier to form by either cutting the materials on a straight line instead of a curved line thus decreasing the cost of manufacturing.” (Ans. 6.)

Appellants contend “that it would not have been obvious to modify the Yagi patent as suggested by the Examiner because changing the shape of the cavity of the Yagi patent to a rectangle would be contrary to the teachings of the Yagi patent and would render the Yagi patent unsatisfactory for its intended purpose.” (Reply Br. 5.)

Based on the contentions of the Examiner and the Appellants, the issue presented is:

Have Appellants identified reversible error in the Examiner's determination that it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the shape of the cavity in Yagi's light deflection device to achieve the invention as claimed? We answer this question in the negative for the reasons discussed below.

The following findings of fact are of particular relevance to the issue before us:

- 1) Yagi discloses a light deflection device comprising:

a deflection member having a sphere body enclosing a deflection face portion for deflecting a light beam, or a segmental sphere body having the deflection face portion and a segmental sphere face opposing to the deflection face portion; a supporting member for supporting the deflection member in a turnable manner; and a driving means for turning the deflection member, the driving means is provided on the sphere face or the segmental sphere face of the deflection member and at a position opposing to the sphere face or the segmental sphere face of the deflection member to apply a driving force to the sphere face or the segmental sphere face.

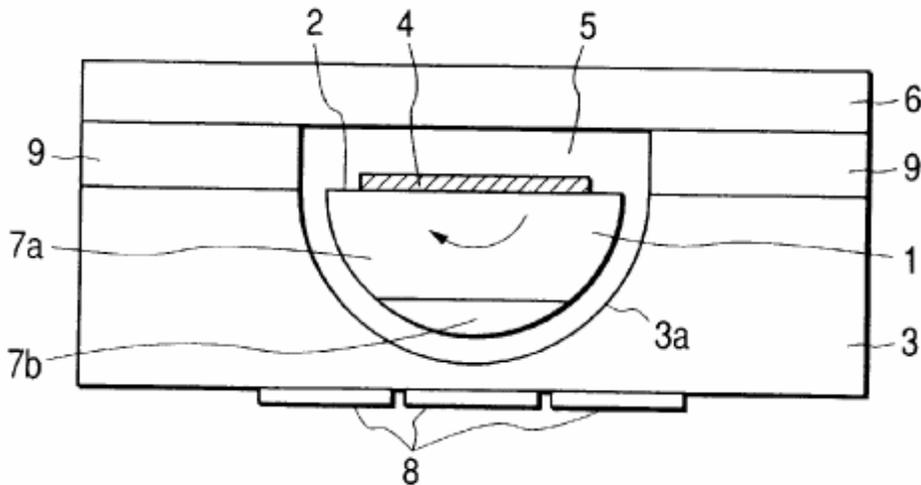
(Yagi, col. 3, ll. 34-45.) The gap between the supporting member and turning body may be filled with a dielectric liquid. (Yagi, col. 5, ll. 24-26.)

- 2) Yagi states that the supporting member has a concave or a space (a cavity) formed therein for supporting the turning body turnably. (Yagi, col. 4, ll. 64-65.) Yagi further discloses that the base plate has a concave or space which is preferably in a shape corresponding to the shape of the turning body. (Yagi, col. 5, ll. 2-4.)

Yagi notes that the shape of the concave or the space in the supporting member/base is not limited, but “may be in a shape of a cone, a cylinder, or the like so long as it ensures the suitable turning movement.” (Yagi, col. 5, ll. 9-12.)

3) According to Yagi, the deflection face portion of the deflection member is typically in a shape of a flat plane, but may be concave or convex. (Yagi, col. 5, ll. 13-15.) The segmental sphere face is typically in a shape of a hemisphere so that it can readily be supported in a turnable manner. (Yagi, col. 5, ll. 16-18.)

4) Figure 4 of Yagi is shown below:



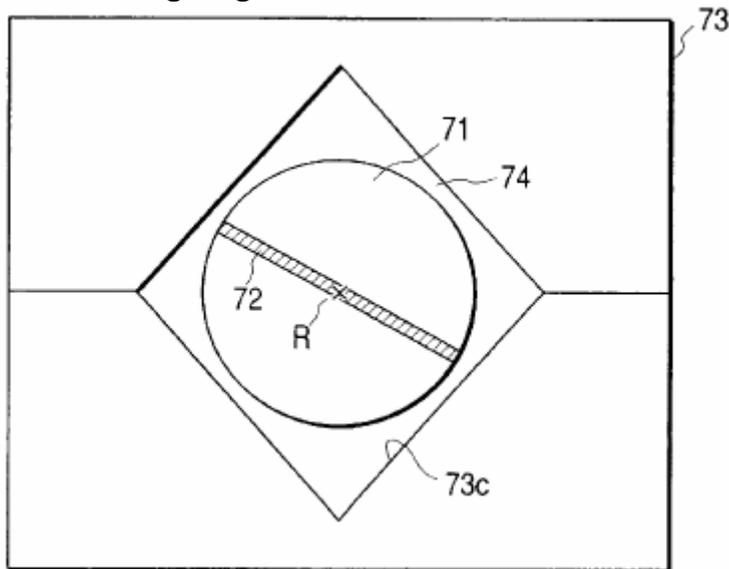
Yagi Figure 4 shows a first example of a light deflection device which includes:

hemisphere body 1 having flat face portion 2 for deflecting an incident light beam, supporting member 3 for supporting hemisphere body 1 turnably in hemispherical concave 3a with a gap therebetween for turning of hemisphere body 1, and a driving means for turning hemisphere body

1. The driving means has chargeable regions 7a, 7b having different electric charging characteristics on the spherical face of hemisphere body 1 to turn hemisphere body 1. . . . Driving electrodes 8 are provided at the bottom portion of supporting member 3 to apply an electric field to charging regions 7a, 7b and vicinity thereof. The light beam is deflected at reflection layer 4 formed on flat face portion 2. The gap is filled with dielectric liquid 5 which is sealed by plane-parallel base plate 6 provided above hemisphere body 1 with interposition of spacer 9 not to prevent turning movement of hemisphere 1.

(Yagi, col. 6, ll. 7-26.)

5) Yagi Figure 13 is shown below:



Yagi Figure 13 is a schematic sectional view of another example of a light deflection “device in which cavity 73c of supporting member 73 is in a shape of a combination of two cones bonded together, and is in point symmetry in all of the positions to the turning center R of turning body 71.” (Yagi, col. 14, ll. 35-39.) According to Yagi,

“[t]he cavity portion which is not brought into contact with the turning body 71 may be in any shape, although FIG. 13 is a drawing for convenience.” (Yagi, col. 14, ll. 39-42.)

6) Yagi Figure 14 shows a device in which the turning body 71 is hemispherical and cavity 73c of supporting member 73 is spherically symmetrical to the turning center R of turning body 71. (Yagi, col. 14, ll. 48-52.) “[T]he position of the turning center of turning body 71 is fixed irrespectively of the attitude of turning body 71 similarly as in FIG. 11. However, the stationary position is less stable to some extent.” (Yagi, col. 14, ll. 53-56.)

“When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to anticipated success, it is likely the product not of innovation but of ordinary skill and common sense.” *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1732 (2007). Thus, an obviousness “analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *Id.* at 1740.

In our view, the Examiner properly established a prima facie showing of obviousness as to appealed claims 1-83 for the reasons well stated in the Answer. In general, Yagi discloses a substrate and a base plate forming a cavity therebetween in which a reflective element is interposed. The cavity may contain a dielectric liquid. (Answer 3-4; FF 1.) Although Yagi expresses a preference for a hemispherical shaped cavity in the substrate

(Ans. 12), we are in agreement with the Examiner's determination that one of ordinary skill in the art would have recognized that a "hemispherical configuration is not essential to the functionality" (Ans. 13) and would have had a reasonable expectation of success in obtaining a functional device when modifying the shape of the cavity given Yagi's explicit disclosure of different cavity shapes (Ans. 13). (FF 2-5.)

We have considered Appellants' arguments, but are not persuaded that the Examiner reversibly erred in concluding that one of ordinary skill in the art at the time of the invention would have been motivated to modify the shape of Yagi's cavity to achieve the claimed invention.

Appellants argue that "changing the shape of the cavity of the Yagi patent to a rectangle would be contrary to the teaching of the Yagi patent since such modification would result in the supporting member not being in a shape corresponding to the shape of the turning body" (Reply Br. 5). (*See* App. Br. 8-12.) However, Appellants have not explained why a rectangular shaped cavity would provide any less correspondence to the shape of the turning body than the other explicitly described, alternative cavity shapes (i.e., "a cone, a cylinder, or the like") disclosed in Yagi (FF 2, 4 and 5). *See Merck & Co., Inc. v. Biocraft Labs., Inc.*, 874 F.2d 804, 807 (Fed.Cir.1989) and *In re Bozek*, 416 F.2d 1385, 1390 (CCPA 1969) (explaining that a reference disclosure must be evaluated for all that it fairly teaches and not only for what is indicated as preferred).

Appellants also argue that "changing the shape of the cavity of the Yagi patent to a rectangle (i.e., a shape not corresponding to the shape of the turning body) would defeat a characterizing feature of the supporting member of the Yagi patent (viz., to prevent displacement of the turning body

to the force direction and to ensure the turning movement of the turning body).” (Reply Br. 5.) Similarly, Appellants argue that “changing the shape of the cavity of the Yagi patent to a rectangle would result in less support for the turning body whereas the Yagi patent actually teaches more support for the turning body.” (Reply Br. 5.) However, as pointed out by the Examiner, Appellants have not provided evidence to refute the Examiner’s finding that a rectangular shaped cavity would be expected to ensure suitable turning movement and prevent displacement of the turning body in the same manner as Yagi’s hemispherical, conical, and cylindrical cavity shapes (Ans. 13-14; FF 2). (See Reply Br. 4.) Nor have Appellants established that any potential for reduced support of the turning body would have been of such character and degree that one of ordinary skill in the art would have been discouraged from using a rectangular shaped cavity in Yagi’s device. *See In re Gurley* 27 F.3d 551, 553 (Fed. Cir. 1994) (“A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.”) Indeed, Yagi clearly contemplates the use of alternative shapes which are said to provide somewhat less stable support than other configurations (FF 3 and 6).

As noted above, Appellants rely on the same arguments in traversing all three grounds of rejection and have not presented any additional arguments to refute the Examiner’s findings with respect to the secondary references or the Examiner’s reasons for concluding that the claims subject to grounds of rejection 2-5 would have been obvious in view of Yagi, alone or in combination with Edwards and/or Eliacin. Accordingly, we determine

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that a preponderance of the evidence weighs in favor of the Examiner's conclusion of obviousness as to appealed claims 1-83.

ORDER

The decision of the Examiner rejecting claims 1-3, 5, 7, 21, 24-27, 30-32, 34, 49, 52-55, 57-59, 61, 70, 72-76, and 78-82 under 35 U.S.C. § 103 as unpatentable over Yagi; claims 4, 6, 17-20, 22, 23, 28, 33, 35, 46-48, 50, 51, 56, 60, 62, 67-69, 71, and 77 under 35 U.S.C. § 103 as unpatentable over Yagi in view of Edwards; claims 29 and 83 under 35 U.S.C. § 103 as unpatentable over Yagi; claims 8-16, 36-44, and 63-66 under 35 U.S.C. § 103 as unpatentable over Yagi in view of Eliacin; and claim 45 under 35 U.S.C. § 103 as unpatentable over Yagi in view of Eliacin and further in view of Edwards is affirmed.

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

tc

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