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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte DAVID J. LANG and JAMES M. REGAN

Appeal 2014-005887
Application 12/894,542[1]
Technology Center 3600

Before JOHN C. KERINS, AMANDA F. WIEKER, and FREDERICK C. LANEY, *Administrative Patent Judges*.

LANEY, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

David J. Lang and James M. Regan (Appellants) appeal under 35 U.S.C. § 134(a) from the Examiner's Final decision rejecting claims 1–3, 10, 11, 18, and 21–33. We have jurisdiction over this appeal under 35 U.S.C. § 6(b).

SUMMARY OF DECISION

We REVERSE.

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[1] According to Appellants, the real party in interest is Hamilton Sundstrand, which is a business unit of United Technologies Corporation. Appeal Br. 1 (filed September 20, 2013).

INVENTION

Appellants' invention relates actuators that contain load limiters. Spec. 1 ¶ 2.

Claims 1 and 10 are independent claims. Claim 1 is representative of the claimed invention and reads as follows:

> 1. A load limiter comprising:
>
> a first disk for translating a first torque from an input and having a first ramp;
>
> a second disk for translating a second torque from an output and having a second ramp;
>
> at least one torque transmitter disposed between said first disk and said second disk between said first ramp and said second ramp;
>
> a first conical brake surface; and
>
> a second conical brake surface on one of said first disk or said second disk for interacting with said first conical surface if there is relative rotation between said first disk and said second disk;
>
> wherein
>
> the first ramp comprises at least a first face oriented at a first angle and a second face oriented at a second, different angle,
>
> the at least one torque transmitter moving along said first face responsive to a first force that causes the relative rotation between said first disk and said second disk in a first direction, and
>
> the at least one torque transmitter moving along said second face responsive to a second force that causes the relative rotation between said first disk and said second disk in a second, different direction.

REJECTIONS

I. The Examiner rejected claims 1, 2, 30, 31, and 33 under 35 U.S.C. § 103(a) as unpatentable over Wasser (US 8,215,471 B2, issued July 10, 2012), Tsukada (US 2005/0167229 A1, pub. Aug. 4, 2005), and Kerr (US 3,835,967, iss. Sept. 17, 1974).

II. The Examiner rejected claims 3, 27–29, and 32 under 35 U.S.C. § 103(a) as unpatentable over Wasser, Tsukada, Kerr, and Twickler (US 4,176,733, iss. Dec. 4, 1979).

III. The Examiner rejected claims 10, 24, and 25 under 35 U.S.C. § 103(a) as unpatentable over Wasser, Tsukada, Kerr, and Russ (US 5,582,390, iss. Dec. 10, 1996).

IV. The Examiner rejected claims 11, 21–23, and 26 under 35 U.S.C. § 103(a) as unpatentable over Wasser, Tsukada, Kerr, Russ, and Twickler.

V. The Examiner rejected claim 18 under 35 U.S.C. § 103(a) as unpatentable over Wasser, Tsukada, Kerr, Russ, and Gitnes (US 5,901,817, iss. May 11, 1999).

ANALYSIS

Rejection I

Claim 1 is independent and claims 2, 30, 31, and 33 depend therefrom. Appeal Br. 12–17 (Claims App.). The Examiner determines Wasser, Tsukada, and Kerr render claim 1 unpatentable. Final Act. 2–4. The Examiner finds Wasser and Tsukada disclose each of the recited structural elements of claim 1. *Id.* at 2–3. Specifically, the Examiner finds Wasser discloses each of the structural elements, except "that the first angle

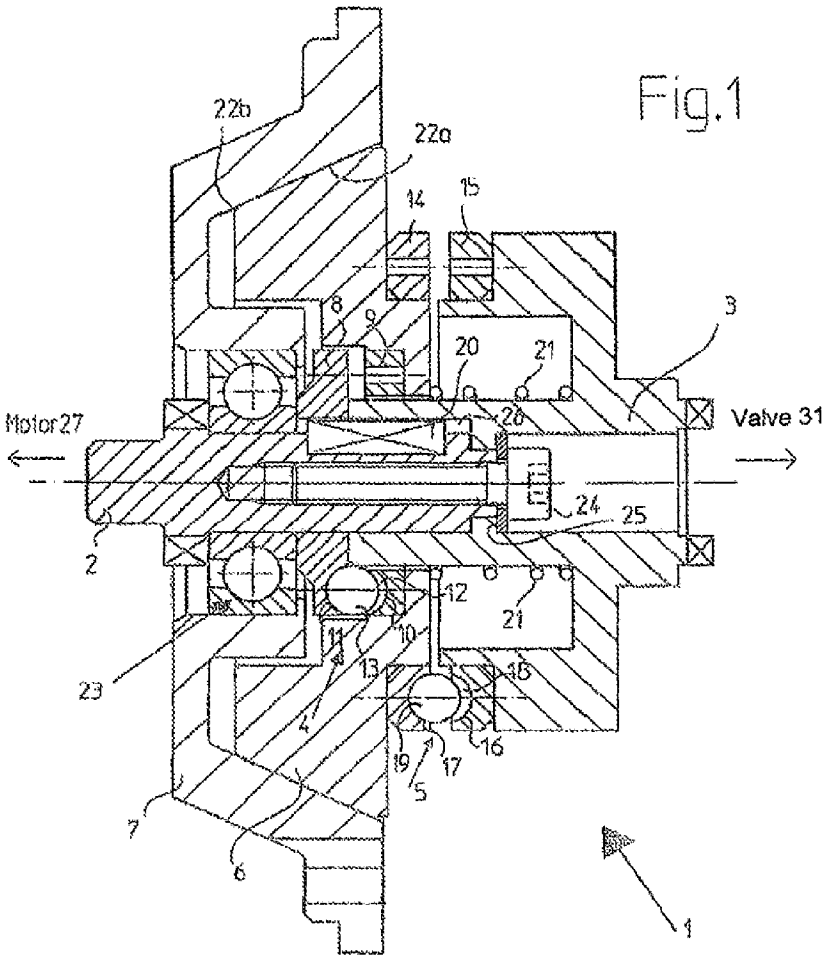
of the first ramp is different than the second angle of the first ramp." *Id.* at 3. However, according to the Examiner, "Tsukada discloses a ball ramp actuator with differently angled faces (85a, 85b, 86a, 86b) in order to provide different thrusting forces in the two respective rotation directions." *Id.* (citing Tsukada ¶¶ 43–44, Figs. 6, 7).

The Examiner concludes that it would have been obvious to a skilled artisan at the time of the invention to combine the structures to arrive at the claimed subject matter. *Id.* The Examiner's rationale is that a skilled artisan would have "modified Wasser to include the differently angled faces, as taught by Tsukada, in order to provide a different thrust force in one direction relative to the other rotation direction." *Id.* The Examiner also finds that Kerr to evidence that a skilled artisan recognized torque limiters need to have the capacity to be set for different tripping values in opposite directions of travel. *Id.* at 4 (citing Kerr, 1:27–28). In the Answer, the Examiner further clarifies "Kerr discloses generally that [having different tripping values] is a desirable feature in mechanical blocking devices . . . which should suffice as evidence showing this characteristic is in fact desirable in torque blocking devices such as that of Wasser." Ans. 7–8 (citing Kerr, 1:20–21, 27–28).

Appellants persuasively show the Examiner's rationale lacks a rational underpinning. Appeal Br. 3–7. In particular, Appellants argue the evidence does not demonstrate a skilled artisan would have seen a benefit in modifying the torque blocker of Wasser with the mechanism Tsukada discloses to transfer torque between clutch plates. *Id.* at 4–6. Wasser discloses a mechanical brake (e.g., a motor brake),

> with an axial shifting mechanism arranged on an input drive shaft and an axial shifting mechanism arranged on an output drive shaft, wherein the two axial shifting mechanisms are so embodied that their shifting directions are opposite and that, in the case of introduction of a torque via the input drive shaft and/or the output drive shaft, the axial shifting mechanism associated with the input drive shaft has precedence over the axial shifting mechanism associated with the output drive shaft.

Wasser, 3:17–26. Wasser's Figure 1, reproduced below, discloses an arrangement for transmitting torque from an input drive shaft 2 to an output drive shaft 3, which also includes a torque limiter that prevents transmission of torque from the output drive shaft 3 to the input drive shaft 2. *See id.* at 5:65–6:19, 6:31–63, Fig. 1). Z /\c



Above Figure 1 from Wasser shows a longitudinal section through a preferred embodiment of the Wasser's motor brake. *Id.* at Fig. 1, 5:5–6.

Wasser limits transmission of torque to the input drive shaft 2, while enabling transmission of torque to the output drive shaft 2, by having separate ball-ramp actuators (8, 9, 13 and 14, 15, 19). *Id.* at 6:20–7:65. The first actuator (14, 15, 19) is on the output shaft, which engages a cone brake (6) if the torque on the output drive shaft 3 is greater than the input drive shaft 2. *Id.* at 6:64–7:29. The second actuator (8, 9, 13) is on the input shaft, at an inner diameter of the cone brake (6), to disengage the brake if the torque on the input drive shaft 2 is greater than the output drive shaft 3. *Id.* at 7:30–40. The input actuator (8, 9, 13) only affects disengaging the brake and the output actuator (14, 15, 19) only affects engaging the brake. *Id.* at 5:65–6:19. Priority "always lies with the input drive side, i.e., when a rotational movement is applied to the input drive shaft 2, the brake cone 6 is pressed out of the brake flange 7 via the inclined planes 10, 11 of the recesses 12 and the balls 13, and the rotational movement is transmitted to the output drive shaft 3." *Id.* at 7:54–59.

Tsukada discloses,

> a clutch device including . . . a torque cam mechanism disposed between the first and second friction clutches in such a manner that the state of the first friction clutch is changed from the power cut-off state to a power transfer state upon occurrence of a relative rotation difference between the input member and the output member.

Tsukada ¶ 3. Tsukada uses different angled cam surfaces 85*a*, 85*b*, 86*a*, and 86*b* to affect different levels of torque transfer in one direction versus the opposite direction. *Id.* ¶¶ 43–44, Figs. 6, 7. The angled surfaces of cam plates 76 and 77 of Tsukada control the amount of driving force, from the

engine, that transfers. *Id.* When the engine is applying a drive force, the shallower angle of the first cam surfaces increase "the force acting to push the first pressure plate 51 toward the first pressure receiving plate portion 50*a* of the first clutch center 50 in the first friction clutch 45." *Id.* ¶ 43, Fig. 6. When the engine is applying a braking force, the steeper angle of the second cam surfaces decrease the same force. *Id.* ¶ 44, Fig. 7. Notably, Tsukada does not disclose, or suggest, utilizing angled cam surfaces to affect the engagement/disengagement of a brake to limit or prevent rotational phase difference between the torques applied to cam plates 76 and 77.

Appellants correctly note,

> [w]hile the *Kerr* reference does include a statement that a blocking device is used to retain synchronization has to stop an entire system and that such a device should have the capacity to be set for different tripping values in opposite directions of travel, there is nothing else in that reference that lends any credence to the Examiner's analysis.

Reply Br. 3. Kerr states blocking devices must possess the "[c]apacity to be set for different tripping values in opposite directions of travel." Kerr, 1:20–28. Kerr further specifically identifies several types of ball actuators forming "blocking devices" with that capacity, but notably the Examiner does not rely on any of those to disclose a ball ramp actuator with differently angled faces in order to set different tripping values in opposite directions of travel. Kerr teaches the prior art ball actuator configurations rely on friction, which is a highly variable factor that reduces the predictability of the torque level at which the limiter will actuate. *Id.* at 1:51–55. In fact, Kerr discloses using "a triangular shaped pivot plate *in place of the ball ramp construction of the prior art to provide a practically frictionless element*." *Id.* at 1:58–31 (emphasis added).

Nothing in Kerr, however, evidences a skilled artisan recognized ball ramp actuators with differently angled faces had appreciable benefits in setting different tripping values in opposite directions of travel for a blocking device. Nor does the Examiner explain why a skilled artisan would have sought to modify the prior art ball ramp constructions of available blocking devices to have differently angled faces. For example, there is no evidence or reasoning provided showing a skilled artisan recognized frictional benefits, or increased torque level predictability, obtained by using differently angled faces. The Examiner states a skilled artisan would recognize modifying the input actuators of Wasser to have differently angled faces provides the benefit of providing different tripping values to disengage the cone brake at idle speeds. Ans. 7. But, the Examiner offers no evidence that a skilled artisan would have been motivated to provide varying tripping values at idle speed in the Wasser system, which Appellants properly note is designed to give priority to the input side and disengage the cone brake whenever the input drive shaft torque is greater than the torque introduced by the output drive shaft. *See* Appeal Br. 4 (citing Wasser 6:34–63, 7:54–59).

We further note Appellants' claim 1 requires the ball ramp actuator to facilitate the engagement of the brake "if there is relative rotation between [the] first disk and [the] second disk." *Id.* at 12. Wasser's input actuator, upon which the Examiner relies (i.e., 8, 9, 13), *only* facilitates disengagement of the brake and a skilled artisan would recognize the Examiner's proposed modification would not promote that functionality. Contrary to *engaging* the brake when there is relative rotation between the input drive shaft and the output drive shaft, the Examiner's proposed

modification would require introducing a certain amount of relative rotation torque to *disengage* the brake. Ans. 7 ("Said another way, as the input side begins to rotate, a certain idle speed and associated torque must be reached before the spring force is overcome and the brake cone is disengaged from the housing.").

For the foregoing reasons, we agree with Appellants that the Examiner's rationale for combining Wasser and Tsukada to reach the apparatus of claim 1 lacks a rational underpinning. This deficiency permeates through the Examiner's rejection of dependent claims 2, 30, 31, and 33. Therefore, we do not sustain the Examiner's rejection of claims 1, 2, 30, 31, and 33.

Rejection II

Claims 3, 27–29, and 32 depend, either directly or indirectly, from claim 1. Appeal Br. 12–17 (Claims App). The Examiner's rejection of these claims is based on the same erroneous determination that it would have been obvious to combine Wasser and Tsukada to include ball ramp actuators with differently angled faces. *See* Final Act. 5–9. The Examiner does not cite Twickler to cure the deficiencies described above (*see supra*, Rejection I). For the reasons set forth above regarding claim 1, therefore, we likewise do not sustain the Examiner's rejection of claims 3, 27–29, and 32 as unpatentable over Wasser, Tsukada, Kerr, and Twickler.

Rejection III

Independent claim 10, and thereby dependent claims 24 and 25, include the same structural limitation recited in claim 1 requiring ball ramp

actuators with differently angled faces. *See* Appeal Br. 13 (Claims App.). The Examiner's rejection of these claims is based on the same erroneous determination that it would have been obvious to combine Wasser and Tsukada to include ball ramp actuators with differently angled faces. *See* Final Act. 11. The Examiner does not cite Russ to cure the deficiencies described above (*see supra*, Rejection I). For the reasons set forth above regarding claim 1, therefore, we likewise do not sustain the Examiner's rejection of claims 10, 24, and 25 as unpatentable over Wasser, Tsukada, Kerr, and Russ.

Rejection IV

Claims 11, 21–23, and 26 depend, either directly or indirectly, from claim 10. Appeal Br. 13–15 (Claims App). The Examiner's rejection of these claims is based on the same erroneous determination that it would have been obvious to combine Wasser and Tsukada to include ball ramp actuators with differently angled faces. *See* Final Act. 13–16. The Examiner does not cite Twickler to cure the deficiencies described above (*see supra*, Rejection I). For the reasons set forth above regarding claim 1, therefore, we likewise do not sustain the Examiner's rejection of claims 11, 21–23, and 26 as unpatentable over Wasser, Tsukada, Kerr, Russ, and Twickler.

Rejection V

Claim 18 depends from claim 10. Appeal Br. 13 (Claims App). The Examiner's rejection is based on the same erroneous determination that it would have been obvious to combine Wasser and Tsukada to include ball ramp actuators with differently angled faces. *See* Final Act. 16–17. The

Examiner does not cite Gitnes to cure the deficiencies described above (*see supra*, Rejection I). For the reasons set forth above regarding claim 1, therefore, we likewise do not sustain the Examiner's rejection of claim 18 as unpatentable over Wasser, Tsukada, Kerr, Russ, and Gitnes.

SUMMARY

The Examiner's decision to reject claims 1–3, 10, 11, 18, and 21–33 is reversed.

REVERSED