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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* DANIEL E. BANKS, THOMAS L. RUNELS,  
THOMAS E. LYON, and JEFFREY L. JONES

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Appeal 2019-004547  
Application 14/844,641  
Technology Center 3600

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Before MICHAEL J. FITZPATRICK, WILLIAM A. CAPP, and  
PAUL J. KORNICZKY, *Administrative Patent Judges*.

KORNICZKY, *Administrative Patent Judge*.

DECISION ON APPEAL

## STATEMENT OF THE CASE<sup>1</sup>

Pursuant to 35 U.S.C. § 134(a), Appellant<sup>2</sup> appeals from the Examiner's decision to reject claims 1, 2, 4, 6, 7, and 17. Final Act. 1. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

## CLAIMED SUBJECT MATTER

The claims are directed to a brake actuator apparatus for an air disc brake of a vehicle air braking system. Claim 1, reproduced below, is illustrative of the claimed subject matter:

1. A brake actuator apparatus for an air disc brake of a vehicle air braking system, the brake actuator apparatus comprising:
  - a faceplate having a major side surface;
  - a bridge housing spaced apart from the faceplate and having (i) a first housing end portion, (ii) a second housing end portion distal from the first housing end portion, (iii) a vehicle outboard surface extending between the first and second housing end portions, and (iv) a vehicle inboard surface extending between the first and second housing end portions;
  - a first tappet having a longitudinal central axis and disposed at the first housing end portion of the bridge housing and extending between the vehicle outboard surface and the vehicle inboard surface, wherein the first tappet comprises double helix threads;

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<sup>1</sup> In this Decision, we refer to (1) the Examiner's Final Office Action dated June 12, 2018 ("Final Act.") and Answer dated March 21, 2019 ("Ans."), and (2) Appellant's Appeal Brief dated November 29, 2018 ("Appeal Br.") and Reply Brief dated May 7, 2019 ("Reply Br.").

<sup>2</sup> We use the term "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as Bendix Spicer Foundation Brake LLC. Appeal Br. 2.

a second tappet having a longitudinal central axis and disposed at the second housing end portion of the bridge housing and extending between the vehicle outboard surface and the vehicle inboard surface, wherein the second tappet comprises double helix threads;

a gear train disposed on the vehicle outboard surface of the bridge housing and including five gear wheels operatively coupled to the first and second tappets, wherein (i) a first gear wheel of the five gear wheels has a longitudinal central axis which is coincident with the longitudinal central axis of the first tappet, (ii) a second gear wheel of the five gear wheels has a longitudinal central axis which is coincident with the longitudinal central axis of the second tappet, (iii) a third gear wheel of the five gear wheels disposed between the first and second gear wheels and functioning as a center gear wheel, (iv) a fourth gear wheel of the five gear wheels is meshingly engaged between the first and third gear wheels and functioning as an idler gear wheel between the first and third gear wheels, and (v) a fifth gear wheel of the five gear wheels is meshingly engaged between the second and third gear wheels and functioning as an idler gear wheel between the second and third gear wheels;

a first coil spring having a longitudinal central axis which is coincident with a longitudinal central axis of the fourth gear wheel and being compressed between the major side surface of the faceplate and the vehicle outboard surface of the bridge housing; and

a second coil spring having a longitudinal central axis which is coincident with a longitudinal central axis of the fifth gear wheel and being compressed between the major side surface of the faceplate and the vehicle outboard surface of the bridge housing;

wherein after a service brake application, the first and second coil springs provide a dual return springs configuration which returns the bridge housing with a more balanced return pressure versus a single return spring configuration.

## REFERENCES

The prior art relied upon by the Examiner is:

Name	Reference	Date
Sendoykas	US 5,020,418	June 4, 1991
Banks	US 7,152,722 B1	Dec. 26, 2006
WO '647	WO 2014/021647 A1	Feb. 6, 2014

## REJECTION

Claims 1, 2, 4, 6, 7, and 17 stand rejected under 35 U.S.C. § 103 as unpatentable over Banks, WO '647, and Sendoykas. Final Act. 2.

## OPINION

Appellant argues claims 1, 2, 4, 6, 7, and 17 as a group. Appeal Br. 7–10. We select independent claim 1 as the representative claim, and claims 2, 4, 6, 7, and 17 stand or fall with claim 1. 37 C.F.R. § 41.37(c)(1)(iv).

The Examiner finds that the combined teachings of Banks and WO '647 disclose all of the limitations of claim 1 except for the limitations reciting first and second tappets which comprise “double helix threads.” Final Act. 2–5; Ans. 9–11. For these missing limitations, the Examiner finds that Sendoykas discloses double helix threads. Final Act. 5 (citing Sendoykas, 5:43). The Examiner reasons that it would have been obvious to one having ordinary skill in the art “to have modified the tappets of [Banks], as modified, to have included a double helix thread, as taught by Sendoykas, in order to provide a means of achieving a certain level of linear displacement with a given revolution.” Final Act. 5, 8 (it would have been obvious “to have modified the threaded rotary-to-linear arrangement of Banks, as modified, to have included a double helix threaded arrangement to

achieve a desired linear movement of one element in response to a given rotation of another element depending on the particular application”);  
Ans. 9–10. The Examiner also reasons that it is known in the art that “double helix threaded arrangements have the advantage of providing a more aggressive thread pitch to reduce the number of rotations needed for advancement.” Final Act. 8–9 (citing US Patent Application 2011/0204093 to Lee, *see* ¶ 57 (“A double thread, or double helix, is used in this embodiment and can be preferable over a single helix to allow a more aggressive thread pitch to reduce the number of rotations needed to penetrate the cork. A double helix is also preferable as it allows for the threads of the upper assembly and lower assembly to mate together and form a continuous thread regardless either of the two possible rotational orientations, 180° apart based on a slot, of the respective mating interlock geometry.”));  
Ans. 9–10.

Appellant argues that the Examiner’s rejection is erroneous for three reasons. First, Appellant argues that there is no motivation to modify Banks in light of Sendoykas. Appeal Br. 8; Reply Br. 8–12. According to Appellant, Banks discloses “a complete and adequate disc brake actuator for its intended purpose in a vehicle air braking system” and “does not disclose any other deficiencies of the brake actuator assembly.” Appeal Br. 8. Appellant argues that, because “the disclosed disc brake actuator of [Banks] is complete and adequate, there is no motivation or suggestion in [Banks] itself to modify the disc brake actuator to include a double helix thread arrangement on its tappets,” and “[m]odifying the [Banks] tappets to include a double helix thread ‘in order to provide a means of achieving a certain level of linear displacement with a given revolution’ as stated by the

Examiner solves a problem that neither the [Banks] nor the Sendoykas reference recites.” *Id.*; Reply Br. 10–11.

Second, Appellant argues that “to support a claim that the modification was obvious, one must also have a reasonable expectation of success.” Appeal Br. 9–10 (citing MPEP 2143.02). According to Appellant, because “one of the objects of including the double helix threads in the present application is to allow for smaller diameter tappets, one would not look to add a feature from a large tool designed to maintain its position for long periods of time in order to reduce size of a brake actuator tappet.” *Id.* (citing Sendoykas, 1:18–32).

Appellant’s arguments are not persuasive because an express teaching or motivation in Banks or Sendoykas is not required; instead, the Examiner need only articulate a reason to combine the references with some rational underpinning to support the legal conclusion of obviousness. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). Here, Appellant does not address the Examiner’s two rationales for combining Banks and Sendoykas — to provide “a means of achieving a certain level of linear displacement with a given revolution” and it is well known that “double helix threaded arrangements have the advantage of providing a more aggressive thread pitch to reduce the number of rotations needed for advancement” — or show that they lack a rational underpinning. Final Act. 5, 8–9; Ans. 9–10. We also find persuasive the Examiner’s explanation that “it would have been obvious to try a double helix thread arrangement since it is one option selected from a finite number of identified (i.e. single or double helix thread arrangements), predictable solutions, with a reasonable expectation of success to provide rotary to linear motion conversion.” Ans. 10; *KSR*, 550

U.S. at 421 (stating “[w]hen there is a design need . . . 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” and a “person of ordinary skill is also a person of ordinary creativity, not an automaton”). Appellant does not address the Examiner’s reasoning for combining Banks and Sendoykas and, thus, does not identify error.

Third, Appellant argues that Sendoykas is non-analogous prior art. Appeal Br. 9. According to Appellant, while “Sendoykas does disclose a double helix thread on a piston rod of a power cylinder that is holding a workpiece in place, nowhere does Sendoykas disclose or even remotely suggest a double helix thread on a tappet of a disc brake actuator of a commercial vehicle air braking system,” and “one skilled in the art of disc brake assemblies would not have looked in the field of power cylinders that simply hold a workpiece in place to make any modification to an air disc brake actuator.” Appeal Br. 9 (citing the Declaration of Daniel Banks as submitted February 8, 2018). Appellant’s arguments are not persuasive.

To qualify as prior art for an obviousness analysis, a reference must be “analogous art,” i.e., it must satisfy one of the following conditions: (1) the reference must be from the same field of [the inventor’s] endeavor; or (2) the reference must be reasonably pertinent to the particular problem with which the inventor is involved. *K-TEC, Inc. v. Vita-Mix Corp.*, 696 F.3d 1364, 1375 (Fed. Cir. 2012). Here, the Examiner determines that Sendoykas meets the second condition, yet Appellant does not address the second condition.



We agree with the Examiner’s determination that “the reference is reasonably pertinent to the problem faced by the inventor (i.e. the need to achieve a desired amount of linear movement per revolution),” and

the need to achieve a desired amount of linear movement per revolution is a problem faced by both the claimed invention and the reference regardless of whether the linear movement per revolution is needed often (e.g. during multiple braking operations) or only after long lapses of time (e.g. during occasional adjustments to a position that may be held for long periods of time).

Ans. 11. We find persuasive the Examiner’s explanation that “[v]ehicle manufacturers often look for means to reduce the overall size of vehicles to help improve fuel economy,” and, contrary to Appellant’s arguments, “smaller diameter tappets capable of producing the needed linear displacement per revolution would be a benefit in the environment of a brake actuator apparatus in a vehicle.” *Id.*

For the reasons above, the rejection of claim 1 is sustained. Claims 2, 4, 6, 7, and 17 fall with claim 1.

### CONCLUSION

The Examiner’s decision to reject claims 1, 2, 4, 6, 7, and 17 is AFFIRMED.

### DECISION SUMMARY

In summary:

<b>Claims Rejected</b>	<b>35 U.S.C. §</b>	<b>Reference(s)/Basis</b>	<b>Affirmed</b>	<b>Reversed</b>
1, 2, 4, 6, 7, 17	103	Banks, WO ’647, Sendoykas	1, 2, 4, 6, 7, 17	

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TIME PERIOD FOR RESPONSE

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

AFFIRMED