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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte NICHOLAS BRANDON PHELPS

Appeal 2019-003177
Application 14/790,122
Technology Center 3700

Before LINDA E. HORNER, JILL D. HILL, and
RICHARD H. MARSCHALL, *Administrative Patent Judges.*

HORNER, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the Examiner's decision to reject claims 1–18. We have jurisdiction under 35 U.S.C. § 6(b).

The Examiner rejected the claims on appeal as unpatentable over various combinations of the prior art. Appellant argues that the combined teachings of the prior art would not have led one having ordinary skill in the

[1] We use the word Appellant to refer to "applicant" as defined in 37 C.F.R. § 1.42(a). Appellant identifies the real party in interest as Baker Hughes, a GE company, LLC. Appeal Br. 2.

art to the claimed subject matter. For the reasons explained below, we agree with Appellant that the Examiner has failed to provide adequate support for the determination of unpatentability of claims 1–18. Thus, we reverse.

CLAIMED SUBJECT MATTER

The claims are directed to an electrically actuated safety valve, a method for operating a safety valve, and an electric actuation system. Spec. ¶¶ 4–6. Claims 1, 10, and 12 are independent. Claim 1 is illustrative of the subject matter on appeal and is reproduced below.

> 1. An electrically actuated safety valve comprising:
>
> a flapper;
>
> a flow tube in operable communication with the flapper;
>
> an electric actuation system including a rotationally fixed and axially translatable shaft and an electric holding configuration mounted to and translatable with the shaft, the electric holding configuration selectively connecting a prime mover to the flow tube.

Appeal Br. 19 (Claims Appendix).

REFERENCES

The prior art relied upon by the Examiner is:

Name	Reference	Date
Cypher	US 2,202,192	May 28, 1940
Hopper	US 5,070,944	Dec. 10, 1991
Nicholson	US 5,187,993	Feb. 23, 1993
Rawson	US 6,253,843 B1	July 3, 2001
Sundar	US 2008/0091103 A1	Apr. 17, 2008
Scott	US 8,464,799 B2	June 18, 2013

REJECTIONS

The following rejections under 35 U.S.C. § 103[2] are on appeal:

1. Claims 1, 2, and 4–9 are rejected as unpatentable over Rawson and Nicholson.
2. Claims 10, 12, and 17 are rejected as unpatentable over Scott and Nicholson.
3. Claims 1–3, 9, and 11 are rejected as unpatentable over Hopper and Nicholson.
4. Claims 13–15 are rejected as unpatentable over Scott, Nicholson, and Hopper.
5. Claim 16 is rejected as unpatentable over Scott, Nicholson, and Sundar.
6. Claim 18 is rejected as unpatentable over Scott, Nicholson, and Cypher.

OPINION

Rejection of claims 1, 2, and 4–9 over Rawson and Nicholson

In the rejection of independent claim 1, the Examiner found that Rawson teaches an electric actuation system including a shaft (motor shaft 292) and an electric holding configuration (solenoid 254) "mounted to and translatable with the shaft." Final Act. 4. The Examiner found that Rawson does not disclose an electric actuation system including a rotationally fixed

[2] The Examiner stated the second and third grounds of rejection as being based on anticipation under 35 U.S.C. § 102(b) but based each rejection on a combination of two prior art references. Final Act. 5–8. Appellant properly understood these grounds of rejection to be based on obviousness under 35 U.S.C. § 103. Appeal Br. 11–15.

and axially translatable shaft. *Id.* The Examiner found that Nicholson teaches an electric actuation system (10) including a rotationally fixed and axially translatable shaft (11), and determined that it would have been obvious "to modify the electric actuation system of Rawson . . . with a rotationally fixed and axially translatable shaft as taught by Nicholson . . . in order to allow the shaft to be in a neutral position." *Id.*

Appellant argues that the Examiner's articulated reason for the combination is "unclear" and amounts to "a mere conclusory statement." Appeal Br. 10. We agree with Appellant. For the reasons that follow, we find that the Examiner failed to provide adequate reasoning to explain the proposed modification to Rawson's valve system in the manner claimed.

The Examiner's reason for modifying Rawson's electrically actuated safety valve with the shaft as taught in Nicholson is for a reason specific to context in which Nicholson's linear actuator is used, and the Examiner did not explain adequately how that reasoning applies in the context of Rawson. Further, the Examiner failed to address the fact that Rawson's system already includes a fail-safe mechanism to return the valve to a closed position in the event of a power failure.

Specifically, Nicholson describes prior art linear actuators useful for operating controls for devices, such as trenchers and concrete mixers, from a remote position. Nicholson, 1:4–37. Nicholson addresses a problem in the art that if electrical power is suddenly terminated to such a linear actuator, the push-pull rod or cable will stay in its operative position and continue to operate undesirably. *Id.* at 1:47–68.

Nicholson discloses linear actuator 10, which comprises reversible rotary drive motor 20, which drives gear train 21. Nicholson, 3:28–37; Fig.

3. Output shaft 22 of gear train 21 is connected to rotary, ferromagnetic core 23 of electromagnet 24. *Id.* at 3:37–39. Coil 25 of electromagnet 24 is confined in housing 26, which is secured within frame cylinder 17. *Id.* at 3:39–43. Magnetic head 28, which is connected to core 23, revolves as gear train 21 revolves. *Id.* at 3:44–46. When coil 25 of electromagnet 24 is energized, armature plate 29 is drawn against armature head 28 to transmit rotary motion from core 23 to rotary shaft 31, which is mounted on the end of shaft 31. *Id.* at 3:47–54, 60. Shaft 31 has helical screw 32, which is confined with tubular portion 11.1 of push-pull rod 11. *Id.* at 3:63–4:1. Tubular portion 11.1 of push-pull rod 11 is affixed to and driven by movable carriage 35, which includes threaded nut 36, which is engaged with helical screw 32 of shaft 31. Nicholson, 4:6–14. Thus, nut 36 and carriage 35 translate along shaft 31 as the shaft revolves, thereby causing the end of rod 11 to move forward and rearwardly. *Id.* at 4:1–5, 9–10.

When coil 25 is deenergized, such as when power is no longer supplied to the clutch and motor, armature 29 is forced by springs 30 away from magnetic head 28 so as to isolate shaft 31 from motor 20. *Id.* 3:54–59. Once disengaged, return spring 15 will urge control lever 14 to its home position, and cable 12 will urge rod 11 to move to a position to accommodate movement of lever 14. *Id.* at 5:61–65, Fig. 1. The movement of rod 11 causes movement of nut 36 along helical screw 32 of shaft 31, and shaft 31 rotates freely without being constrained by the electromagnet 24, gear train 21, or motor 20. *Id.* at 5:59–6:2. Thus, lever 14 and cable 12 move to a non-operative, neutral position, when the power supply fails. *Id.* at 6:5–8.

Unlike Nicholson's system, Rawson's linear actuator is not used for remotely operating a machine such as a trencher or a cement mixer. Rather, Rawson's linear actuator is designed to open a safety valve that is normally biased to a fail-safe closed position. Rawson, 1:22–23. The Examiner specifically identified the embodiment of Figure 15 of Rawson in the rejection. Final Act. 4. This embodiment of Rawson's system includes a fail-safe mechanism for causing the valve to revert to its closed position in the event of a power failure. Specifically, in Rawson, solenoid 254 is in operable communication with spring mandrel 280, so that when solenoid 254 is energized, spring mandrel 280 is urged downhole to activate ramp 202. Rawson, 9:67–10:2. Upon de-energization of solenoid 254, spring 282 urges ramp 202 into its rest position. *Id.* at 10:2–4. This movement of ramp 202 removes support for yoke halves 200*a*/200*b*, so that the yoke is moved away from lead screw 34, and the power spring of the safety valve moves the flow tube uphole to close the safety valve flapper. *Id.* at 10:11–17.

The Examiner proposed modifying Rawson with an electric actuator as taught by Nicholson to allow the shaft, and thus the flapper, to return to a neutral, i.e., closed position, in the event there is a loss of power. Ans. 11. As explained in detail above, however, Rawson's system already includes a fail-safe system that allows the valve to close when power failure occurs. The Examiner has not explained adequately why Rawson would require modification to place the shaft in a neutral position.

For these reasons, we find that the Examiner has not articulated adequate reasoning based on rational underpinnings to explain why one having ordinary skill in the art would have been led to modify Rawson's safety valve with the teachings of Nicholson in the manner recited in

claim 1. Thus, we do not sustain the rejection of claim 1 and its dependent claims 2 and 4–9 under 35 U.S.C. § 103 as unpatentable over Rawson and Nicholson.

Rejection of claims 10, 12, and 17 over Scott and Nicholson

The Examiner found that Scott discloses, with reference to independent method claim 10, a method for operating a safety valve comprising translating an electric holding configuration (fail safe assembly 52). Final Act. 5. With reference to claim 12, the Examiner similarly found that Scott discloses an electric holding configuration (52) translatable with a linear actuator (42). *Id.* at 6. Appellant argues that these findings are erroneous because Scott's fail safe assembly 52 is stationary and mounted in a housing of a downhole tool and is not translated or translatable. Appeal Br. 12.

We agree with Appellant that the Examiner's finding is not supported by Scott's disclosure. Scott describes that fail safe assembly 52 comprises anti-backdrive device 112 and electromagnetic clutch 114. Scott 6:10–12. Scott describes that these components are positioned between stepper motor 72 and gear reducer 92. *Id.* at 6:12–16. Scott describes, in an alternate arrangement, that clutch 114 may be positioned between gear reducer 92 and ball screw assembly 94 or interposed between gear reducer sets. *Id.* at 6:18–22. In each of these arrangements, device 112 and clutch 114 are positioned uphole of the ball screw assembly 94. Scott, Fig. 3. Ball screw assembly 94 includes ball screw 96, which rotates with output from motor 72 and gear reducer 92, and which drives power rod 108 via drive nut 98. *Id.* at 5:18–20, 33–36, Fig. 4. Power rod 108 translates downhole to push flow tube ring 66

downwardly. *Id.* Thus, Scott's fail safe assembly 52 is located uphole of the translatable components of its system, and thus, does not translate.

In response to Appellant's arguments, the Examiner suggests that Nicholson cures the deficiency in Scott. Ans. 12. Nicholson does not cure this deficiency. As discussed above, Nicholson describes a similar electromagnetic clutch 24 located between gear train 21 and rotary shaft 31, such that Nicholson's clutch likewise does not translate with push-pull rod 11. Nicholson, Fig. 3.

For these reasons, we find that the Examiner's rejection is not supported by the evidence. Thus, we do not sustain the rejection of independent claims 10 and 12 and dependent claim 17 as unpatentable over Scott and Nicholson.

Rejection of claims 1–3, 9, and 11 over Hopper and Nicholson

The Examiner found that Hopper discloses an electric actuation system including a shaft (41) and an electric holding configuration (solenoid 19) mounted to and translatable with the shaft, as recited in claim 1. Final Act. 7. Appellant argues that this finding is erroneous because Hopper's solenoid 19 is fixed, not translatable with rod 41, and rod 41 merely responds to energization of solenoid 19. Appeal Br. 14.

We agree with Appellant that the Examiner's finding is not supported by Hopper's disclosure. Hopper discloses an actuator for a downhole safety valve that includes motor 15, drive gear 16, drive sleeve 17, collet lock assembly 18, and solenoid 19. Hopper, 4:53–56, Fig. 1. Collet lock assembly 18 includes lock collet 38 that is fixed into split base ring 40, which has rod 41 passing through solenoid 19. *Id.* at 5:32–33, 40–41. Spring 42 biases rod 41, base ring 40, and lock collet 38 upwardly. *Id.* at

5:41–43. Hopper describes that "if solenoid 19 is energized in the right direction by DC current it will pull the assembly down against spring 42 . . . ." *Id.* at 5:45–47. We agree with Appellant's reading of this description to refer to rod 41 responding to energization of solenoid 19. The Examiner has not pointed us to adequate disclosure in Hopper to support a finding that solenoid 19 is translatable with rod 41.

For these reasons, we find that the Examiner's rejection is not supported by the evidence. Thus, we do not sustain the rejection of independent claim 1 and dependent claims 2, 3, 9, and 11 as unpatentable over Hopper and Nicholson.

Rejection of claims 13–15 over Scott, Nicholson, and Hopper

The Examiner's rejection of dependent claims 13–15 suffers from the same deficiencies in the findings as to the scope and content of the prior art as discussed above. Thus, for the same reasons, we do not sustain the rejection of claims 13–15.

Rejection of claim 16 over Scott, Nicholson, and Sundar

The Examiner cites Sundar as support for finding that the use of a ball screw actuator and a lead screw actuator are interchangeable. Final Act. 10. We agree with Appellant that Sundar does not cure the deficiencies, discussed above, in the combination of Scott and Nicholson. Appeal Br. 16. Thus, for the same reasons, we do not sustain the rejection of claim 16.

Rejection of claim 18 over Scott, Nicholson, and Cypher

The Examiner cites Cypher for its disclosure of a linear actuator extending through an interface member to limit the swing response of a valve. Final Act. 11. We agree with Appellant that Cypher does not cure

the deficiencies, discussed above, in the combination of Scott and Nicholson. Appeal Br. 17. Thus, for the same reasons, we do not sustain the rejection of claim 18.

CONCLUSION

We do not sustain the Examiner's rejections under 35 U.S.C. § 103 of claims 1–18. Thus, we reverse the Examiner's decision on unpatentability of these claims.

DECISION SUMMARY

In summary:

Claims Rejected	35 U.S.C. §	Reference(s) /Basis	Affirmed	Reversed
1, 2, 4–9	103	Rawson, Nicholson		1, 2, 4–9
10, 12, 17	103	Scott, Nicholson		10, 12, 17
1–3, 9, 11	103	Hopper, Nicholson		1–3, 9, 11
13–15	103	Scott, Nicholson, Hopper		13–15
16	103	Scott, Nicholson, Sundar		16
18	103	Scott, Nicholson, Cypher		18
Overall Outcome				1–18

REVERSED