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EXAMINER

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte PIERRE MOULIN, PIERRE LONGCHAMP,
MICHEL DE BROISSIA, and JEAN-NOEL DERYCKE

Appeal 2011-000268
Application 11/662,106
Technology Center 3600

Before LINDA E. HORNER, BRETT C. MARTIN, and
BART A. GERSTENBLITH, *Administrative Patent Judges*.

HORNER, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Pierre Moulin et al. (Appellants) seek our review under 35 U.S.C. § 134 of the Examiner's decision rejecting claims 11-20. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

THE INVENTION

Appellants' claimed invention relates to "a method and a device to continuously inform the driver of a tunneling machine equipped with a rotary cutting head fitted with a multiplicity of drilling mountings for rotary drilling cutters on the nature of the ground in front of the cutters." Spec. 1, ll. 5-9. Claim 11, reproduced below, is representative of the subject matter on appeal.

11. Process for providing continuous information on ground conditions at the excavation face for the operator of a tunnel boring machine equipped with a rotary cutting head incorporating a multiplicity of individual mountings for rotary boring cutters, in which data acquisition sensors capable of generating signals concerning cutter operation are implemented, these signals being remotely transmitted and used to inform the tunnel boring machine operator, wherein a plurality of cutters are equipped with a multiplicity of sensors selected from sensors suitable for generating signals representing cutter penetration force into the ground, cutter position, cutter rotational state and cutter temperature, said sensors being directly placed on each of said cutters, the signals from the sensors being individually carried to a processing and display unit in a driver's cab of the tunneling machine.

THE REJECTION¹

Appellants seek review of the Examiner's rejection of claims 11-20 under 35 U.S.C. § 103(a) as being unpatentable over Sackmann

¹ The Examiner withdrew a rejection of claims 11-20 under 35 U.S.C. § 103(a) as being unpatentable over Sackmann and Wilson (US 4,181,360; iss. Jan. 1, 1980). Ans. 3.

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(US 4,079,795; iss. Mar. 21, 1978) and Hirsch (US 4,968,098; iss. Nov. 6, 1990).

ANALYSIS

Appellants argue that the combination of Sackmann and Hirsch does not render obvious the subject matter of claim 11 because the combined teachings fail to disclose “**placement of sensors directly on the cutters and individually transmitting sensor signals to the driver’s cab.**” Br. 7. The Examiner relied on Hirsch to teach these claimed features. Ans. 4-5. In particular, the Examiner found that Hirsch discloses sensors 40, 42, and 44 placed directly on cutters 26. *Id.* at 4 (citing Hirsch, fig. 3). The Examiner also found that Hirsch discloses the signals from these sensors are individually carried, via signal conductors 41, 43, 45, to a processing and display unit in a driver’s cab of the tunneling machine. Ans. 4-5 (citing Hirsch, figs. 3, 4).

Appellants also argue that “a person of ordinary skill in the art would not have combined the boring machine of Sackmann with the mining machine[] of . . . Hirsch, because boring machines and mining machines are distinctly different and could not be combined.” Br. 13. We address each argument in turn.

Placement of sensors directly on the cutters

We agree with the Examiner’s finding that Hirsch discloses sensors placed directly on the cutters. In particular, Hirsch discloses “one or more of the cutters **26** is fitted with a vibration sensor in the form [of] a piezoelectric accelerometer **40**” and that accelerometer 40 is shown in Figure 3 being

“disposed within the cutting element **26** to minimize the prospect of damage to the accelerometer.” Hirsch, col. 3, ll. 61-66; fig. 3. Hirsch also discloses:

[t]he cutter **26** is also preferably fitted with one or more piezoelectric strain gauges **42** and **44** which may be disposed to measure strains on the cutter in one or more planes for determining the direction of the resultant load on the cutter as it performs its cutting action against the coal face.

Id. at col. 3, l. 68 – col. 4, l. 5; fig. 3. Hirsch teaches that “[t]he strain gauges **42** and **44** may also be imbedded in the body of the cutter **26** to prevent damage thereto during operation.” *Id.* at col. 4, ll. 5-7. While Hirsch discloses “an alternate arrangement” in which additional accelerometers 70 and 72 are mounted on the support arm 22 and machine frame 20, respectively, (*id.* at col. 5, ll. 9-24) these additional accelerometers mounted elsewhere on the mining apparatus do not negate the fact that Hirsch discloses sensors 40, 42, and 44 mounted on the cutter 26.

Individually transmitting sensor signals to the driver’s cab

We also agree with the Examiner’s finding that Hirsch discloses individually carrying the signals from sensors 40, 42, and 44, via signal conductors 41, 43, 45, to a processing and display unit in a driver’s cab of the tunneling machine. Hirsch discloses that “each of the sensors comprising the accelerometer **40**, and the strain gauges **42** and **44** includes a signal conductor extending therefrom, respectively, and indicated in FIG. 3 by the numerals **41**, **43**, and **45**.” Hirsch, col. 4, ll. 8-12. Hirsch discloses that the signals from the sensors “are transmitted by way of their respective conductors through a conventional multiconductor slipring assembly **52** to the [signal-receiving, conditioning and amplification] circuit **50**.” *Id.* at col.

4, ll. 21-25. Hirsch discloses that “a visual display **62** may also be provided for receiving suitable output signals from the circuit **50** to indicate the stress levels encountered by the cutters **26** and the vibrational characteristics sensed by the accelerometer **40.**” *Id.* at col. 4, l. 68 – col. 5, l. 4; fig. 4.

Hirsch describes the operator using the signals from these sensors individually to make adjustments to the positioning of the machine. For example, Hirsch discloses that “the direction of the relative stresses indicated by the strain gauges **42** and **44** may . . . indicate an optimum angle for the cutting plane of the drum **24** or an optimum cutting angle for the cutters **26**, which, in some instances may be adjustable relative to the plane of rotation of the drum **24.**” *Id.* at col. 4, ll. 55-60. Hirsch teaches that “by shearing along the plane of the cleat, the stresses exerted on the apparatus **10** are reduced and the excavation rate for a given power input may be increased.” *Id.* at col. 6, ll. 22-24. Hirsch also discloses that the amplitude and frequency of vibration of the cutters **26** can be provided as an output signal to the operator of the machine to indicate when the cutters are penetrating material other than coal. *Id.* at col. 4, ll. 60-68. Hirsch teaches that “the operator may adjust the height of the arm **22** or the advance position of the machine **10** toward the face **13** as required to keep the cutter drum **24** operable to cut only the coal material intended for excavation” to achieve “greater production of cleaner coal . . . than relying solely on visual inspection of the seam.” *Id.* at col. 6, ll. 32-37.

By describing that the direction of relative stresses indicated by the strain gauges **42** and **44** may be used by the operator to determine an

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optimum cutting angle for cutting through the plane of the cleat so as to minimize stresses on the apparatus and the vibrational characteristics on the cutter may be used by the operator to reposition the cutter head to stay within the bedding surfaces, the Examiner's finding that Hirsch discloses individually carrying the signals from sensors 40, 42, and 44, via signal conductors 41, 43, 45, to a processing and display unit in a driver's cab of the tunneling machine is supported by a preponderance of the evidence.

Combination of Sackmann and Hirsch

We agree with the Examiner's finding (Ans. 14-15) that one of ordinary skill in the art would apply the teachings of Hirsch to the boring machine of Sackmann in light of Hirsch's explicit disclosure that the teachings of Hirsch can be implemented on boring type continuous miners. Hirsch, col. 3, ll. 37-44.

As such, Appellants have failed to apprise us of error in the Examiner's determination that the subject matter of claim 11 would have been obvious to one of ordinary skill in the art at the time of Appellants' invention in view of Sackmann and Hirsch. We affirm the rejection of claim 11 under 35 U.S.C. § 103(a). Appellants rely on the same arguments raised for claim 11 as the basis for reversal of the rejection of claims 12-20. Br. 13. As such, we affirm the rejection of these claims for the same reasons provided *supra* in our analysis of claim 11.

DECISION

We AFFIRM the decision of the Examiner to reject claims 11-20.

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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

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