The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte CHARLES T. WIEDENHOFT and
HANS E. STEUCH

Appeal No. 2005-0657
Application No. 10/136,984

ON BRIEF

Before GARRIS, WALTZ, and PAWLIKOWSKI, Administrative Patent Judges.
WALTZ, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal from the primary examiner's refusal to allow claim 1, the only claim pending in this application, as amended subsequent to the final Office action (see the amendment dated May 6, 2003, entered as per the Advisory Action dated June 3, 2003; see also the Response dated May 27, 2003, and the Advisory Action dated May 21, 2003). We have jurisdiction pursuant to 35 U.S.C. § 134.

According to appellants, the invention is directed to a method of producing cement clinker in a rotary kiln which adds primary feedstock material into the kiln at a feed end and then introduces a secondary stream of metallurgical slag into the kiln through kiln dust infeed ports situated at a mid-kiln location (Brief, page 2).[1] Claim 1 is reproduced below:[2]

1. A method of producing cement clinker using an elongated rotary kiln having a feed end and a downwardly tilted outlet end with a heater situated generally adjacent to the outlet end, and kiln dust infeed ports situated downstream of said feed end at a mid kiln location, the method comprising the steps of:

a) directing heat from the heater through the kiln and generally toward the feed end;

b) introducing a stream of primary cement feedstock material into the kiln at the feed end so that the cement feedstock material travels toward the heater and the outlet end while becoming calcined and heated to clinker-producing temperatures; and

c) introducing a secondary feedstock of fragmentary metallurgical slag into the kiln through said kiln dust infeed ports so that the metallurgical slag and the

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[1]All reference to and citation from the Brief refers to the Amended Brief dated Oct. 23, 2003.

[2]We note that “limestone feedstock” as recited in step (c) of claim 1 on appeal lacks antecedent basis in the preceding portion of the claim (see the primary “cement” feedstock in step (b)). In the event of further or continuing prosecution before the examiner, the examiner and appellants should correct this error.

limestone feedstock become intimately blended, calcined and reacted into cement clinker as they progress through the kiln.

The examiner has relied upon the following references as evidence of obviousness:

Young	5,421,880	Jun. 06, 1995
Oates et al. (Oates) (filed Feb. 16, 2001)	6,391,105 B1	May 21, 2002

Claim 1 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Young alone or in view of Oates (Answer, page 3). We *affirm* both rejections on appeal essentially for the reasons stated in the Answer and those reasons set forth below.

OPINION

The examiner finds that Young discloses a method of making cement clinker using a rotary kiln where feedstock material, including metallurgical slag such as blast furnace slag as a separate feed material, is added at the feed end of the kiln such that this combined stream of feedstock material moves to the heat end of the kiln (Answer, page 3). Appellants agree with these findings of the examiner (Brief, page 3).

With regard to the rejection over Young alone, the examiner finds that Young does not specifically teach adding slag through kiln dust infeed ports at a mid point location (Answer, page 3). However, it is the examiner’s position that merely changing the

location of the entry of the slag into the kiln does not change the process of making clinker from the slag, absent evidence to the contrary (Answer, pages 3-4 and 6).

The examiner also applies Oates for the teaching that it was well known in the art to add slag at points other than the feed end to form the resultant cement clinker (Answer, page 5).

Appellants argue that there is no disclosure in Young concerning the economics of adding slag at any other location (Brief, page 3). Appellants further argue that there is no suggestion of adding slag through mid-kiln dust scoops (Brief, page 4). Appellants argue that Oates teaches addition of slag downstream of the burning zone, which is far from a mid-kiln location (*id.*). Appellants also argue that location 50 taught by Oates is not at a mid-point location of the kiln but is located in the cooler (Reply Brief, pages 2-3).[3]

Appellants' secondary feedstock of fragmentary metallurgical slag is added to the kiln through kiln dust infeed ports "situated downstream of said feed end at <u>a</u> mid kiln location" (see claim 1 on appeal, underlining added). Thus the slag is not

[3]We note that Young considers the "kiln" to generally include four operating zones including a precalcining zone, a calcining zone, a clinkering zone, and a <u>cooling zone</u> (col. 1, ll. 27-30, underlining added).

necessarily added at the exact mid-point of the kiln length but "[t]he mid positioned infeed ports are positioned with respect to the length of the kiln so that there is sufficient residence time of the CKD [cement kiln dust] and slag in the kiln for proper mixing with the feedstock material ... and so as to reach a proper calcining temperature." Specification, page 6, ll. 8-12. *See In re Graves,* 69 F.3d 1147, 1152, 36 USPQ2d 1697, 1701 (Fed. Cir. 1995)(During examination proceedings, claims are given their broadest reasonable interpretation consistent with the specification). Thus "a mid kiln location" can vary between the feed end and the heat end depending on the length of the kiln, residence time, and calcining temperature (e.g., see appellants' Figure 1).

Young teaches adding slag to cement clinker production in a rotary kiln at the feed end, although disclosing that the prior art added slag "directly into the flame of the kiln" (col. 2, ll. 19-23, citing U.S. Patent No. 2,600,515). Appellants agree that Young discusses adding slag at the feed end or at the heat end (Brief, page 3). Young teaches adding a predetermined amount of steel slag to the stream of feedstock material at the feed end of the kiln such that as the combined stream moves toward the heat end of the kiln "the steel slag is melted by the heat and

diffused into the feedstock material to form cement clinkers" (col. 4, ll. 16-22). Young further teaches that the "steel slag begins to melt and combine with other raw materials somewhere between the calcination zone and the burning zone in the rotary kiln" (col. 5, ll. 32-35).

Oates teaches the addition of an extender such as blast furnace slag at several locations in a kiln assembly (col. 1, ll. 31-36; col. 2, ll. 17-39). These locations include the upstream end of the cooler adjacent the exit of the cement clinker from the kiln and downstream of the zone of the kiln in which the cement clinker is formed (col. 3, ll. 15-29). Oates teaches that at elevated temperatures downstream of the formation of the cement clinker, the particulate extenders melt to a partially fused state which chemically reacts with the hot cement clinker producing a "pyroprocessed" cement clinker composition (col. 3, ll. 8-14). Oates further teaches that the extender is introduced to the traveling bed of clinker at a point such that the extender has an adequate residence time in the cooler, at a sufficiently high temperature, for melting of the extender to a partially fused material which chemically reacts with the hot clinker to form the "pyroprocessed clinker" (col. 6, ll. 2-10). If desired, the extender could be fed into the clinker mass downstream of the

burning zone as it travels from the kiln shell into the cooler ”to ensure good commingling” (col. 6, ll. 36-40). Finally, Oates teaches that adding the extender at the upstream end of the cooler “represents merely one location” where the extender may be introduced (col. 8, ll. 8-9).

Obviousness is tested by what the combined teachings of the references would have suggested to one of ordinary skill in the art. *See In re Young,* 927 F.2d 588, 591, 18 USPQ2d 1089, 1091 (Fed. Cir. 1991); *and In re Keller,* 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981). Here the combined teachings of the references teach one of ordinary skill in this art to specifically add slag at the feed end of the rotary kiln, at the flame or heat end of the rotary kiln, in the initial cooling zone at the discharge end of the kiln (downstream of the burning zone 24; see Figure 1 of Oates), or at the upstream end of the cooler adjacent the exit of the kiln, or generally at many locations (Oates, col. 8, ll. 8-9). The combined teachings of the references would have suggested to one of ordinary skill in this art that the optimal entry location of the slag into the kiln would have depended on the desired residence time, the calcination or burning temperature, and the time for adequate mixing or commingling (and thus the length and size of the kiln

from entry to the heat end) so that the slag and feedstock could adequately mix and fuse into a cement clinker composition. As construed above, the “mid kiln location” as claimed is defined by the same factors as suggested by the prior art references (see claim 1 on appeal, step (c)).

Where the claimed subject matter has been rejected as obvious in view of a combination of prior art references, a proper analysis under section 103 requires, *inter alia*, consideration of whether the prior art would have suggested to those of ordinary skill in the art that they should carry out the claimed process and whether, in so carrying out the claimed process, those of ordinary skill would have a reasonable expectation of success. *See In re Vaeck,* 947 F.2d 488, 493, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991). As correctly noted by the examiner (Answer, pages 6 and 8-10), the particular placement of the entry port for feeding slag into the kiln would have been an arbitrary choice, absent a showing of unexpected results. *See In re Kuhle,* 526 F.2d 553, 555, 188 USPQ 7, 8-9 (CCPA 1975)(particular placement of the contact provides no novel or unexpected result). As established by our discussion of the prior art references above, the exact location of the feed entry to the kiln does not appear critical as long as the residence

time and calcination or burning temperatures are sufficient for adequate mixing and fusing/reacting of the feed components to produce the cement clinker.

Additionally, as previously discussed, the prior art discloses locating the slag feed entry to the kiln at many locations, specifically the feed end, the heat end, the upstream end of the cooler, and downstream of the burning zone. The only location for the slag feed entry to the kiln not specifically taught by the prior art references is “a mid kiln location” as construed above, still allowing adequate residence time for mixing and calcination/burning of the feed components. Accordingly, there is an economic motivation for one of ordinary skill in this art to locate the slag feed entry point at any point other than the feed end, heat end, upstream end of the cooling zone, or downstream of the burning zone. This economic motivation would be to avoid license fees from licensing the processes of the prior art patents discussed above.

As also previously discussed, one of ordinary skill in this art would have had a reasonable expectation of success in carrying out the claimed process since the prior art teaches that the residence time, mixing or commingling, and calcination/burning temperatures in the kiln must be adjusted to

provide adequate mixing and fusing/reacting of feed components to produce the cement clinker, regardless of the entry point of the slag. See Young, col. 4, ll. 16-22, and col. 5, ll. 32-35; and Oates, col. 3, ll. 8-29, and col. 6, ll. 2-10.

For the foregoing reasons, we determine that the claimed subject matter would have been *prima facie* obvious to one of ordinary skill in this art at the time of appellants' invention. As noted by the examiner (Answer, pages 6 and 8-10), appellants have not provided any substantive evidence of unexpected results. Based on the totality of the record, including due consideration of appellants' arguments, we determine that the preponderance of evidence weighs most heavily in favor of obviousness within the meaning of section 103(a). Accordingly, we affirm the examiner's rejections of claim 1 under 35 U.S.C. § 103(a) over Young alone or in view of Oates.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a)(1)(iv)(effective Sep. 13, 2004; 69 Fed. Reg. 49960 (Aug. 12, 2004); 1286 Off. Gaz. Pat. Office 21 (Sep. 7, 2004)).

AFFIRMED

BRADLEY R. GARRIS Administrative Patent Judge	)	
THOMAS A. WALTZ Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
BEVERLY A. PAWLIKOWSKI Administrative Patent Judge	)	

TAW/jrg

WM. BRUCE DAY DAY
LAW FIRM, P.C.
4330 BELLEVIEW
SUITE 300
KANSAS CITY, MI 64111