UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte BENEDIKT WINTERMANN

Appeal No. 2006-1370
Application No. 10/319,345

HEARD: MAY 25, 2006

Before FRANKFORT, OWENS and LEVY, Administrative Patent Judges.
FRANKFORT, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 1 through 13, all of the claims pending in the application.

Appellant's invention relates to a control rod drive for a nuclear reactor, in particular for a boiling water reactor, and to a method for moving a control rod into a reactor core of a nuclear reactor, in particular for emergency shutdown of the nuclear reactor. Independent claims 1 and 12 are representative of the

subject matter on appeal and a copy of those claims can be found in the Appendix of Appealed Claims attached to appellant's brief.

The prior art references relied upon by the examiner in rejecting the appealed claims are:

Ode et al. (Ode)	3,775,247	Nov. 27, 1973
Satoh et al. (Satoh)	5,581,587	Dec. 3, 1996

Claims 1, 3, 12 and 13 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Ode.

Claims 1 through 6 and 9 through 13 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Satoh.

Claims 7 and 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Satoh in view of "prior art cited therein" (answer, page 6), more specifically, in view of Prior Art Figure 11.

Rather than reiterate the examiner's full statement of the above-noted rejections and the conflicting viewpoints advanced by the examiner and appellant regarding those rejections, we make

reference to the answer (mailed October 31, 2005) for the examiner's reasoning in support of the rejections, and to appellant's brief (filed January 18, 2005) for the arguments thereagainst.

OPINION

In reaching our decision in this appeal, we have given careful consideration to appellant's specification and claims, to the applied prior art references, and to the respective positions articulated by appellant and the examiner. As a consequence of our review, we have made the determinations which follow.

On page 2 of appellant's specification, it is noted that an objective of the invention is to make it possible for the control rod to be "moved in carefully and in an improved way in the event of an emergency shutdown." More specifically, it is indicated on page 3 of the specification that the invention proceeds from the notion of "varying the pressure acting on the hollow piston (control rod carrying element) by suitably influencing the pressure drop across the throttle bush and of setting the pressure to the effect that the speed of the hollow piston changes when the latter

is being shot in." Appellant notes that as a result of the foregoing a suitable speed profile, which avoids critical load peaks, can therefore be formed over the move-in length of the hollow piston and that before the moved-in end position of the hollow piston is reached, the speed is reduced as far as possible, in order to keep the impact forces low when the hollow piston/control rod carrying element butts against the throttle bush.

Looking to Figures 1 and 2 of the application drawings and pages 5, 12 and 13 of the specification, appellant indicates that in a preferred arrangement the control rod carrying element (hollow piston 40) has a reduced outside diameter in the lower region facing the drive unit so that when the control rod carrying element moves through the throttle bush (30) the gap between those two elements changes automatically due to the control rod carrying element's changing outside diameter. Appellant specifically notes that a flow path (42) is formed between the throttle bush (30) and the control rod carrying element (40) which allows fluid flow from the inside of the drive housing (8) into the interior (7) of the nuclear reactor pressure vessel (4). Of critical importance to the present invention is the fact that the "free flow cross section" of

flow path (42) varies as a function of the position of the control rod carrying element when the control rod carrying element is being shot-in during an emergency shutdown of the nuclear reactor.

In explaining the significance of the invention as defined in claim 1 on appeal, appellant notes that in the event of an emergency shutdown, a pressure fluid is injected via the pressure line connection (32) in drive housing (8) and can escape only partially via the flow path (42) because of the high flow resistance of flow path (42). The control rod carrying element therefore experiences high acceleration due to the high pressure build-up in drive housing (8) and the hollow piston/control rod carrying element (40) which is moved upwardly at a high speed. When the control rod carrying element (40) reaches an intermediate position where the narrowing region (48) of the control rod carrying element arrives at the exit of throttle bush (30), a reduction in flow resistance across flow path (42) is achieved as a result of the reduction in outside diameter of the control rod

carrying element (40). More particularly, it is noted on page 15 of the specification that

> [b]y virtue of the constant and continuous narrowing, a continuous and uniform reduction in the speed of the control rod carrying element 40 likewise takes place. The continuous change in the outside diameter and consequently the continuous change in the flow resistance are advantageous for a moving-in which is as uniform and as jolt-free as possible and is consequently as careful as possible in terms of material. When the narrowing region 48 passes the throttle bush 30, the control rod carrying element 40 is brought into the upper moved-in portion (Fig. 2) at an essentially constant low speed over the last travel segment.

Looking to the examiner's rejections of independent claim 1 on appeal as being anticipated by Ode or Satoh, we find that we are in agreement with appellant's understanding of the meaning of the term "free flow cross section" as used in the specification and claims of the present application. Moreover, we agree with appellant's assessment (brief, pages 11-24) of the respective control rod driving apparatuses shown in the applied references to Ode and Satoh as they have been applied by the examiner to claim 1 on appeal. In the final analysis, we agree with appellant that neither Ode nor Satoh teaches or shows a control rod carrying element and a throttle bush defining there-between a flow path for a pressure fluid, said flow path leading beyond the throttle bush

and having a free flow cross section varying in dependence on a position of the control rod carrying element, as recited in claim 1 on appeal. Thus, for the reasons adequately set forth by appellant in the brief, we will not sustain the rejection of claim 1 under 35 U.S.C. § 102(b) based on either Ode or Satoh.

Nor will we sustain the examiner's rejection of dependent claim 3 under 35 U.S.C. § 102(b) based on Ode, the rejection of dependent claims 2 through 6 and 9 through 11 under 35 U.S.C. § 102(b) based on Satoh, or the rejection of claims 7 and 8 under 35 U.S.C. § 103(a) as being unpatentable over Satoh in view of "prior art cited therein" (i.e., Prior Art Figure 11), since the examiner's use of Prior Art Figure 11 in Satoh does nothing to overcome the deficiency of Satoh noted above in our treatment of claim 1.

Claims 12 and 13 also stand rejected under 35 U.S.C. § 102(b) as being anticipated by Ode or Satoh. Independent claim 12 reads as follows:

12. A method for moving a control rod into a reactor core of a nuclear reactor, the method comprises the step of:

moving, hydraulically using a pressure fluid, a control rod carrying element carrying the control rod and guided over a part in a throttle bush, a flow resistance formed for the pressure fluid across the throttle bush changing as the control rod carrying element moves.

Notably absent from claims 12 and 13 is any requirement for a flow path between the throttle bush and control rod carrying element that leads beyond the throttle bush and has a "free flow cross section" varying in dependence on a position of the control rod carrying element, as was recited in independent claim 1. Claim 12 merely requires "a flow resistance formed for the pressure fluid across the throttle bush changing as the control rod carrying element moves." This broader language encompasses not only the embodiment of appellant's invention discussed above in our treatment of claim 1, but also reads on the embodiment alluded to on page 6 of the specification wherein a bypass orifice (52) alone may be provided in a hollow piston/control rod carrying element to vent pressure fluid into the reactor pressure vessel to reduce the

speed of the control rod carrying element before the moved-in end position is reached during an emergency shutdown. In that regard, the specification notes that

> [a] flow path leading beyond the throttle bush is therefore also open to the pressure fluid via the bypass orifice, but is effective only when the bypass orifice is in the region of the throttle bush during moving-in and, in particular when the bypass orifice has run through the throttle bush, that is to say located inside the reactor pressure vessel. The change in the flow resistance in this case is determined essentially according to the size of the bypass orifice. A plurality of bypass orifices in different length positions of the hollow body may also be provided.

While we agree with appellant that Satoh does not anticipate claims 12 and 13 on appeal, we do not share that view with regard to Ode. In particular, we direct attention to the fact the Ode shows a bypass orifice (62) in the hollow piston/control rod carrying element (21) which would function to vent pressure fluid into the reactor pressure vessel before the moved-in end position is reached during an emergency shutdown and thus would provide a flow resistance formed for the pressure fluid across the throttle bush (33) which changes as the control rod carrying element moves from a position where the orifice (62) is located within the inner casing or throttle bush (33) to a moved-in position during an

emergency shutdown where the orifice is located above the throttle bush, as seen in Figure 2 of Ode.

For the above reasons, we will sustain the examiner's rejection of claims 12 and 13 under 35 U.S.C. 102(b) as being anticipated by Ode, but not that of claims 12 and 13 under 35 U.S.C. 102(b) as being anticipated by Satoh.

In light of the foregoing, the decision of the examiner is affirmed-in-part.

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

AFFIRMED-IN-PART

CHARLES E. FRANKFORT Administrative Patent Judge	)	
TERRY J. OWENS Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
STUART S. LEVY Administrative Patent Judge	)	

Comment [jvn1]: Type or Paste Address

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