Intellectual Property Office

BL O/676/21

16 September 2021

PATENTS ACT 1977

APPLICANT	China Nuclear Power Engineering
ISSUE	Whether patent application GB1602103.2 complies with section 1(1)(b) of the Patents Act 1977
HEARING OFFICER	Phil Thorpe

DECISION

Introduction

1 Patent application GB1602103.2 entitled "Auxiliary control method for nuclear power plant operation, and device and system therefor" was originally filed as an international application on 23rd November 2013. After entry into the national phase on 5th February 2016, it was republished as GB 2531679 A on 27th April 2016.

2 Despite several rounds of correspondence between the examiner and the applicant's attorney, and amendments to the claims, the applicant was unable to satisfy the examiner that the application met the requirements of the Patents Act 1977 (the Act). In particular, the examiner was not satisfied that the claimed invention involves an inventive step.

3 The matter subsequently came before me for a decision on the papers.

The patent

4 The patent relates to control of nuclear power plants. More particularly, the invention relates to providing an auxiliary control point that can shut down or disable the main control room when that is inoperable or inaccessible. The method according to the invention is set out in the following figure taken from the description:

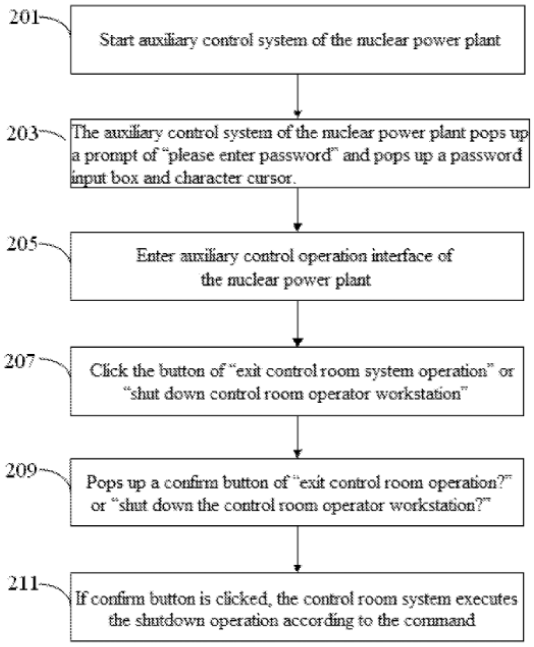

Fig. 2

5 The latest claims filed on 11th March 2021 include five independent claims directed to an auxiliary control method for nuclear power plant operation (claims 1 and 8), an auxiliary control device for nuclear power plant operation (claim 13), a switching device for a main control and an auxiliary control (claim 14), and an auxiliary control system for nuclear power plant operation (claim 16).

6 At this stage, I will refer just to the wording of claim 1, which requires:

> *An auxiliary control method for nuclear power plant operation, comprising the steps of:*
>
> *obtaining a start command sent by a transfer switch;*
>
> *logging onto an auxiliary control system of the nuclear power plant, comprising logging onto the auxiliary control system of the nuclear power plant according to the start command,*
>
> *the auxiliary control system of the nuclear power plant popping out a prompt of "please enter user's name and password", and popping out a password input box and character cursor,*
>
> *if characters entered into the password input box accord with the preset password, entering an auxiliary control operation interface of the nuclear power plant,*
>
> *if the characters entered in the password input box fails to accord with the preset password, prompting incorrect password entered and entering the password again;*
>
> *determining whether the auxiliary control system executing activation operation by a logical processing unit according to the start command, wherein a transfer switch sends a shutdown command to the main control system if the auxiliary control system executes activation operation according to the start command, and*
>
> *the transfer switch does not send the shutdown command to the main control system if the auxiliary control system does not execute activation operation according to the start command;*

sending a command to shut down a main control system of the nuclear power plant via the auxiliary control system; and

executing shutdown operation by the main control room according to the command.

The Law

7 Section 1(1) states (with added emphasis):

> *A patent may be granted only for an invention in respect of which the following conditions are satisfied, that is to say –*
>
> *(a) the invention is new;*
>
> *(b) **it involves an inventive step**;*
>
> *(c) it is capable of industrial application;*
>
> *(d) the grant of a patent for it is not excluded by subsections (2) and (3) or section 4A below;*

8 Section 3 then sets out how the presence of an inventive step is determined. It says:

> *An invention shall be taken to involve an inventive step if it is not obvious to a person skilled in the art, having regard to any matter which forms part of the state of the art by virtue only of section 2(2) above (and disregarding section 2(3) above).*

9 Section 125(1) additionally states:

> *For the purposes of this Act an invention for a patent for which an application has been made or for which a patent has been granted shall, unless the context otherwise requires, be taken to be that specified in a claim of the specification of the application or patent, as the case may be, as interpreted by the description and any drawings contained in that specification, and the extent of the protection conferred by a patent or application for a patent shall be determined accordingly.*

Assessing inventive step

10 It is well-established that the approach to adopt when assessing whether an invention involves an inventive step is to work through the steps set out by the Court of Appeal in *Windsurfing*[1] and restated by that Court in *Pozzoli*[2]. These steps are:

> *(1)(a) Identify the notional "person skilled in the art"*
>
> *(1)(b) Identify the relevant common general knowledge of that person;*
>
> *(2) Identify the inventive concept of the claim in question or if that cannot readily be done, construe it;*

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[1] *Windsurfing International Inc. v Tabur* Marine (Great Britain) Ltd [1985] RPC 59
[2] *Pozzoli SpA v BDMO SA* [2007] EWCA Civ 588, [2007] FSR 37

(3) Identify what, if any, differences exist between the matter cited as forming part of the "state of the art" and the inventive concept of the claim or the claim as construed;

(4) Viewed without any knowledge of the alleged invention as claimed, do those differences constitute steps which would have been obvious to the person skilled in the art or do they require any degree of invention?

Step (1)(a): Identify the notional "person skilled in the art"

The examiner identifies the person skilled in the art as a computer engineer working in the field of workstations for nuclear power plants. The applicant does not dispute this, and hence I am happy to accept this.

Step (1)(a): Identify the relevant common general knowledge of that person;

11 The applicant accepts that it would be common general knowledge that when the main control room of a nuclear power plant and the operator workstations are unavailable (for instance, in the case of an emergency), the staff still can operate the nuclear power plant via auxiliary control points. However, they argue that it would not be generally known that in the case of an emergency, the main control room and the operator workstations generally cannot be timely closed. Therefore, unauthorized personnel could still control the nuclear power station through the unlocked operator workstations, which will endanger the safety of the nuclear power plant.

12 During the examination, the examiner has also suggested that the skilled person would be aware of common security arrangements for logging in to workstations including using passwords. The applicant has not challenged this. They were right not to as it would certainly be part of the common general knowledge.

Step (2): Identify the inventive concept of the claim in question or if that cannot readily be done, construe it;

13 Whilst claim 1 is not perhaps as clear as it could be, I am satisfied that the inventive concept of the claim is clear. It is a method whereby the work stations of the main control system of a nuclear power station can be shut down or disabled by means of user accessing via password protection, an auxiliary control system that is remote from the main control system and by sending a command from the auxiliary control system to the main control system to shut it down.

Step (3): Identify what, if any, differences exist between the matter cited as forming part of the "state of the art" and the inventive concept of the claim or the claim as construed;

14 The examiner relies on one piece of prior art which is a paper from Nuclear Science and Engineering by Cheng, Bo et al titled "Study on KPR system design improvement of CPRlO00 nuclear power projects". Both the examiner and the applicant have referred to this as D1 and I will use that terminology here.

15 D1 relates to systems that enable the operating staff of nuclear power plants to shut down the reactor and maintain the plant in a safe shut-down state if the main control

room becomes unavailable. More specifically D1 teaches two alternative nuclear power plant control systems, which are collectively referred to as CPR1000 projects and more particularly as the “first project” of CPR1000 and the “new” CPR1000 project (which is presented as a subsequently proposed improvement upon the first project). Each project discloses a Main Control Room (MCR) and Remote Shutdown Station (RSS) room for a nuclear reactor each having computer workstations (COWP).

16 Both the first and new projects include a switch between the RSS and MCR. The switch ensures that the COWP operations from the main control room and the remote shutdown system *are “*mutually locked and cannot occur simultaneously” (section 1.2 of D1). Section 3 of D1 discloses that the switching process of the first project of CPR1000 is as follows:

> ► When the main control room is unavailable, shutdown is carried on the emergency shutdown panel (ECP) of the main control room;
>
> ► Enter the remote shutdown station, and switch the MCR/RSS in columns A and B to the RSS operation mode on the deck between RSS COWPs;
>
> ► Operators log in to RSS COWP via operating authority;
>
> ► Use the menu function in RSS COWP to close the OT of the OWP workstation in the main control room.
>
> ► Carry out safety shutdown operation in RSS COWP.

17 The process set out above is premised on the acknowledged assumption that any accident that makes the main control room unusable develops slowly, providing the operator sufficient time to shut down the reactor before evacuating the main control room. Hence the first step in the process above.

18 The second step of the process involves the operator moving to the Remote Shutdown Station (RSS) which can be considered analogous with the Auxiliary Control System of the patent in issue. The user then activates switches on the computer workstations in the RSS to gain access to the computer workstations in the RSS and to lock the workstations in the main control room. The operator is then able to log onto the workstations in the RSS. D1 discloses logging into the RSS computer workstations with a username and password.

19 The computer workstation in the RSS can then be utilised to close the operation terminal (OT) of the workstation in the MCR. The RSS workstation can then be used to control the reactor.

20 D1 therefore achieves the same purpose as that of the invention namely to allow control of the nuclear reactor from a location remote from the main control room and disabling the computer workstations in the main control room.

21 The applicant in its responses to the examination reports has sought to distinguish D1 from the claimed invention. In its letter of 1st June 2021, it notes that:

> “D1 at most discloses that the operator can complete the operation via a remote shutdown system to make the reactor reach the heat shutdown state quickly. D1 fails to disclose the

specific steps to shut down the nuclear power plant quickly. Based on the disclosure of D1, the person skilled in the art would not raise the technical problem of how to ensure the safe operation of the nuclear power plant by preventing unauthorized personnel from operating the nuclear power plant and mis-operating the nuclear power plant in case of emergency. In other words, based on the whole disclosure of D1, the person skilled in the art would not realize the problem of the present application as discussed above and would not arrive at the technical solution as claimed in pending claim 1 of the present application, especially "the auxiliary control system of the nuclear power plant popping out a prompt of "please enter user's name and password", and popping out a password input box and character cursor, if characters entered into the password input box accord with the preset password, entering an auxiliary control operation interface of the nuclear power plant, if the characters entered in the password input box fails to accord with the preset password, prompting incorrect password entered and entering the password again."

22 That D1 does not explicitly refer to the problem of preventing unauthorized personnel from operating the nuclear power plant and mis-operating the nuclear power plant in case of emergency is not significant. Rather in seeking to prevent simultaneous operation of the main and remote work stations, D1 teaches a solution that would also address the problem identified in the patent in issue. The applicant's reliance on the password prompts provided by the claimed invention also does not really help. Indeed, so far as I have identified it, the various prompts referred to in the claim do not form part of the inventive concept – whilst they may form limitations in the claim they do not matter when determining what the inventive concept is.

23 Although not raised by the applicant, I will briefly comment on the requirement in the inventive concept that a command is sent from the auxiliary control system to the main control system to shut it down. In D1, two things appear to happen. The first is that upon entering the RSS a switch is activated to transfer control to the RSS from the MCR. This locks the workstations in the MCR to prevent the possibility of simultaneous operation of the workstations in the two rooms. After the user has successfully logged onto the workstation in the RSS a command is then sent to close the operating terminal in the MCR. This latter step in my view meets the requirement of the final step in the inventive concept of sending a command from the auxiliary control system to the main control system to shut it down.

Step (4): Viewed without any knowledge of the alleged invention as claimed, do those differences constitute steps which would have been obvious to the person skilled in the art or do they require any degree of invention?

24 For the reasons just set out, I am not persuaded that the inventive concept as I have identified it above is distinguished from D1. I would add that even if I am wrong and the precise nature of the command prompts associated with gaining access to the workstation does form part of the inventive concept, then that difference over the prior art would be clearly obvious to the person skilled in the art.

Findings

25 I find that the invention set out in the claim 1 does not involve an inventive step.

26 The applicant has not identified any additional features in independent claims 8, 13, 14 and 16 or in any of the dependent claims that would in its opinion provide the necessary inventive step had I found claim 1 to be lacking in that respect. Having

considered the claims further, I cannot see anything that would obviously provide an inventive step. Hence, I also find that none of claims 2-21 involve an inventive step.

27 I therefore refuse the application.

Appeal

28 Any appeal must be lodged within 28 days after the date of this decision.

PHIL THORPE

Deputy Director, acting for the Comptroller