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**Datasheet for the decision  
of 8 October 2014**

**Case Number:** T 1949/11 - 3.2.01

**Application Number:** 04020380.4

**Publication Number:** 1510453

**IPC:** B63H25/24

**Language of the proceedings:** EN

**Title of invention:**

Marine vehicle steering apparatus and method

**Patent Proprietor:**

Marine Canada Acquisition Inc.

**Opponent:**

Aktiebolaget SKF

**Headword:**

**Relevant legal provisions:**

EPC 1973 Art. 56

**Keyword:**

Inventive step (yes)

**Decisions cited:**

**Catchword:**



**Beschwerdekammern  
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Case Number: T 1949/11 - 3.2.01

**D E C I S I O N**  
**of Technical Board of Appeal 3.2.01**  
**of 8 October 2014**

**Appellant:** Marine Canada Acquisition Inc.  
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**Decision under appeal:** **Decision of the Opposition Division of the  
European Patent Office posted on 26 July 2011  
revoking European patent No. 1510453 pursuant to  
Article 101(3)(b) EPC.**

**Composition of the Board:**

**Chairman** G. Pricolo  
**Members:** C. Narcisi  
D. T. Keeling

## Summary of Facts and Submissions

- I. European patent No. 1 510 453 was revoked by the decision of the Opposition Division posted on 26 July 2011. An appeal was lodged by the Patentee against this decision on 5 September 2011 and the appeal fee was paid at the same time. The statement of grounds of appeal was filed with the notice of appeal.
- II. Oral proceedings were held on 8 October 2014. The Appellant (Patentee) requested that the impugned decision be set aside and that the patent be maintained in amended form on the basis of the main request, filed on 7 June 2013. The Respondent (Opponent) requested that the appeal be dismissed.
- III. Claim 1 of the main request reads as follows:
- "A steering apparatus (20) for a vehicle having a steered member (149), comprising:  
a mechanically rotatable steering device;  
a sensor (142) which senses angular movement of the steering device (27) when the vehicle is steered;  
a stop mechanism (90) actuated when the steered member (149) reaches a first or second threshold position, near a first or second hard-over position;  
wherein the stop mechanism (90) engages the steering device (27) to stop further rotation of the steering device (27) in a first rotational direction, corresponding to rotational movement towards said hard-over position, rotational play being provided between the steering device (27) and the stop mechanism (90), whereby the steering device (27) can be rotated a limited amount, as sensed by the sensor (142), when the stop mechanism (90) is fully engaged, the stop mechanism (90) being released from engagement with the

steering device (27) when the sensor (142) senses that the steering device (27) is rotated, as permitted by said play, in a second rotational direction which is opposite the first rotational direction; and a processor (141) which permits the stop mechanism (90) to release when the stop mechanism (90) is fully engaged and the steering device (27) is rotated in the second rotational direction; wherein the stop mechanism (90) includes an electromagnetic actuator (102), the electromagnetic actuator (102) releasing the steering device (27) when the steering device (27) is rotated in the second rotational direction while the stop mechanism (90) is engaged, characterized in that the stop mechanism (90) includes a multi-plate clutch (92), the clutch (92) having a plurality of plates (94, 96) which are urged into frictional engagement with each other by the electromagnetic actuator (102) to engage the steering device (27), and in that the apparatus includes a housing (22) having a hollow interior (24), the stop mechanism (90), the sensor (142) and the processor (141) being with the housing (22), one of the interior of the housing (22) and at least some of the plates (94, 96) of the clutch (92) having slots (114) and another of the interior of the housing (22) and at least some of the said plates (94, 96) having projections (98) fitting within the slots (114), the slots (114) being wider than the projections (98) to provide said play between the sensor (142) and the stop mechanism (90)."

Independent Claim 2 differs from claim 1 in that its characterizing portion reads as follows:

"characterized in that the stop mechanism (90) includes a member having an annular slot (202) bounded radially outwardly by an outer annular surface and inwardly by an inner annular surface, a helical spring (200) being located in said annular slot (202), said spring (200) engaging said outer annular surface when the electromagnetic actuator (102) is actuated while the steering device (27) is being rotated in one rotational direction and said spring (200) engaging said inner annular surface when the electromagnetic actuator (102) is actuated while the steering device (27) is being rotated in another said rotational direction."

IV. The Appellant's arguments may be summarized as follows:

The subject-matter of independent claim 1 involves an inventive step over prior art document D1 (WO-A1-03/010040) in conjunction with the skilled person's capabilities and common general knowledge. The steering apparatus of claim 1 differs from the apparatus of D1 by the features included in the characterizing portion. The object and technical problem of the invention, as derivable from the characterizing features of claim 1 (and 2), resides in providing a steer-by-wire steering apparatus which is more compact, easier to assemble and more reliable than heretofore known steering apparatuses. An indication of the non-obviousness of the solution according to the invention is already given by the fact that a variety of steering apparatuses having the technical features of the preamble of claim 1 is known from the prior art, albeit none of them disclosing said solution. Further, the prior art (such as D1) merely discloses an electromagnetic brake comprising two discs (a rotating disc and a stator-disc including electromagnetic coils) and a distinct and separate flexible coupling provided

on the steering shaft in order to produce a rotational play. By contrast hereto, according to the invention these two aspects are integrated into one single unit or housing, i.e. by forming slots and corresponding projections onto the plates of the multi-plate clutch and onto the interior of the housing of the electromagnetic actuator, which contains said multi-plate clutch. No suggestion is derivable from the available prior art and particularly from D1 hinting at these technical measures, nor can these measures be regarded as being obvious for the skilled person without exerting unpermitted hindsight.

The subject-matter of claim 2 involves an inventive step over D1 and D7 (US-A1-2002/0070091). In view of the object of the invention (see above) the solution according to claim 2 allows to obtain the same advantages as mentioned in relation to claim 1. In particular, by employing a coil spring arranged as stated in claim 1 it is possible to integrate both the braking function and the function implying a rotational play into one single constructional unit. D7 concerns a device in a completely different technical field (magnetic tape recorder) and would not be taken into consideration by the skilled person. Moreover, the spring shown in this device does not perform a braking function including a stop function but merely serves to selectively transmit power with a certain torque from the driving pulley to the up/down gear. Finally, there is no suggestion in D7 to use a coil spring in conjunction with an electromagnetic coil.

In view of the above reasons the subject-matter of claim 1 and 2 is inventive over the prior art.

V. The Respondent's arguments may be summarized as follows:

The subject-matter of claim 1 is not inventive over D1 and the skilled person's usual capabilities. From the characterizing features of the claim, constituting the sole differences with respect to D1, the object of the invention may be derived as consisting in providing a steering apparatus (according to preamble of claim 1) having reduced dimensions. The claimed solution substantially amounts to performing the step of replacing the two-plate electromagnetic clutch by a multi-plate clutch and further the step of forming slots into one of some of said plates and the interior of the housing and forming projections into the other one of said some plates and said interior of said housing. The first step would be obvious for the skilled person, given that multi-plate clutches are generally known in the art and that employing a multi-plate clutch allows to reduce the radial dimension of the plates. The second step would likewise be obvious for the skilled person in view of the disclosure of D1. Indeed, it is known from D1 that the rotational play is obtained through a "flexible coupling which may be provided e.g., by providing a long and thin steering wheel shaft of an elastic material, or other implementations using elastic elements, such as puffers attached to the steering wheel shaft or friction means (D1, page 3, lines 16-19). However, according to D1, "the same effect may also be achieved by simply providing some clearance or space for motion" (D1, page 3, lines 19-20). On the the other hand, the embodiment according to figure 5 of D1, discloses braking means which comprise mechanical blocking means, in which a disc or plate (attached to thee steering wheel shaft) is provided with indentations at its perimeter, and a

blocking member which is movable between a first position in which the blocking member engages the indentations and a second position in which the plate can rotate freely. Thus, the embodiment of figure 5 in conjunction with the above mentioned "clearance or space for motion" would lead the skilled person in an obvious manner to provide said indentations and blocking members with a rotational play, thereby arriving at the subject-matter of claim 1.

The subject-matter of independent claim 2 is not inventive over the documents D1 and D7. The object of the invention is derived from the characterizing portion of claim 2 as consisting in looking for a steering apparatus (according to preamble of claim 2) having an alternative type of stop means or braking means. The skilled person would search for an alternative form of such stop or braking mechanism and would realize that D7 proposes an arrangement comprising a mechanical clutch which is apt for use to provide friction and to perform a braking function. It is noted that the structure of this mechanical clutch as shown in figures 5 and 4 of D7 conforms to the constructional features according to the characterizing portion of claim 2. The skilled person would recognize that providing the mechanical spring clutch of D7 with an electromagnetic actuator does not alter its operation and is perfectly feasible. Consequently, the skilled person would arrive at the subject-matter of claim 1 by the obvious combination of D1 and D7.



## Reasons for the Decision

1. The appeal is admissible.
2. Claim 1 of the main request is based on granted claims 1, 2, 3, 4 and 5 and claim 2 is based on granted claims 1, 2, 3 and 6. No objections were raised against these claims on the grounds of Article 100(c) EPC.
3. For the assessment of inventive step D1 is regarded as representing the closest prior art, disclosing the preamble of claims 1 and 2. The Board notes that the parties do not agree on the appropriate formulation of the object of the invention, this object constituting the skilled person's incentive for trying to improve the known steering apparatus of D1. Nevertheless, establishing this object is not of the essence here, for the arguments of the Respondent could anyway not convince the Board.

Concerning claim 1 it is noted first that even on the assumption that it would be obvious for the skilled person to replace the two-plate electromagnetic clutch of D1 by a multi-plate clutch, nonetheless the further step of implementing said rotational play according to the characterizing portion of claim 1 would not be obvious. In particular it may be clearly inferred from D1 that said passage (D1, page 3, lines 19-21) mentioning "some clearance or space for motion" is exclusively referring to the "flexible coupling" mentioned in the preceding lines in D1 on the same page. The "flexible coupling" forms part of the steering wheel (D1, page 3, lines 9-10; claim 10) according to D1 and is separate and distinct from the "friction means" (comprising said electromagnetic clutch brake), which in the specific embodiment of

figure 5 (see also D1, page 4, lines 27-31) may include said mechanical blocking means having indentations. Thus, there is absolutely no disclosure and no suggestion in D1 that the function of permitting a rotational play as performed by said "flexible coupling", being part of the steering wheel, be transferred to the "friction means" and in particular to said mechanical blocking means illustrated in figure 5. Neither did the Respondent indicate or point at any such suggestion made in the cited prior art documents. This technical measure likewise cannot be regarded as being clearly derivable from the general technical knowledge of the skilled person. The subject-matter of claim 1 is therefore to be regarded as non-obvious in view of D1 and the further cited prior art as well as the usual capabilities of a person of ordinary skill in the art (Article 56 EPC).

Concerning claim 2, it is first noted that D7 relates to an entirely different technical field, i.e. magnetic tape recorders, and that already for this reason it is very unlikely that the skilled person would even be aware of this document. Nevertheless, even if that were the case, the skilled person would certainly note that D7 does not disclose a "stop mechanism" (including an electromagnetic clutch or actuator) as indicated in claim 2. Indeed, D7 merely discloses a clutch spring mechanism for "selectively transmitting a power with a certain torque from the driving pulley to the up/down gear" (see D7, claim 1). It ensues that the clutch spring mechanism of D7 is not apt to be used as a brake, as required for the stop mechanism of claim 1, since actually no stop function can be performed. Moreover, a stop function would clearly require that the coil spring be able to progressively contact and engage "annular surfaces" (on corresponding portions of

the housing, depending on the rotational direction, see claim 2 and description of the patent specification) with the coil's respective cylindrical outer and inner surfaces until a stop is reached. Thus, according to claim 2 the braking torque is transmitted in both operating modes (both rotational directions) through the spring which is located in the steering wheel's driving torque direct path. This would not be possible with, and is not equivalent to, the clutch spring arrangement of D7, wherein at least for one rotational direction of the drive pulley "the rotational force of the driving pulley 64 is directly transmitted to the gear holder 76 through the engaging ribs 68,78 without transmitting the torque of the clutch spring 89" (D7, paragraph [0089]). In view of these facts it has to be concluded that even regarding the combination of D1 and D7 as obvious, the skilled person would not arrive at the subject-matter of claim 2 (Article 56 EPC).

4. Therefore, claims 1 to 11 of the main request, together with the amended description filed at the oral proceedings and the figures as granted, constitute a suitable basis for the maintenance of the patent in amended form.

## **Order**

### **For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. The case is remitted to the Opposition Division with instructions to maintain the patent on the basis of the following documents:

- Claims 1 to 11 of the main request, filed by letter of 7 June 2013;
- Description, columns 1 to 11, filed at the oral proceedings;
- Figures 1 to 9 of the patent as granted.

The Registrar:

The Chairman:



A. Vottner

G. Pricolo

Decision electronically authenticated