

Internal distribution code:

- (A) [-] Publication in OJ
- (B) [-] To Chairmen and Members
- (C) [-] To Chairmen
- (D) [X] No distribution

**Datasheet for the decision
of 11 May 2022**

Case Number: T 2004/19 - 3.2.01

Application Number: 10172110.8

Publication Number: 2281771

IPC: B66C23/82, B66C23/76

Language of the proceedings: EN

Title of invention:

LIFT CRANE WITH MOVABLE COUNTERWEIGHT

Patent Proprietor:

Manitowoc Crane Companies, LLC

Opponent:

Terex Global GmbH

Headword:

Relevant legal provisions:

EPC Art. 56

RPBA 2020 Art. 13(2)

Keyword:

Inventive step - (yes)

Amendment after summons - exceptional circumstances (no)

Decisions cited:

Catchword:



Beschwerdekammern
Boards of Appeal
Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 2004/19 - 3.2.01

D E C I S I O N
of Technical Board of Appeal 3.2.01
of 11 May 2022

Appellant: Terex Global GmbH
(Opponent) Bleicheplatz 2
8200 Schaffhausen (CH)

Representative: Moser Götze & Partner Patentanwälte mbB
Paul-Klinger-Strasse 9
45127 Essen (DE)

Respondent: Manitowoc Crane Companies, LLC
(Patent Proprietor) 2400 South 44th Street
Manitowoc WI 54221-0066 (US)

Representative: SSM Sandmair
Patentanwälte Rechtsanwalt
Partnerschaft mbB
Joseph-Wild-Straße 20
81829 München (DE)

Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
28 May 2019 concerning maintenance of the
European Patent No. 2281771 in amended form.**

Composition of the Board:

Chairman G. Pricolo
Members: W. Marx
A. Jimenez

Summary of Facts and Submissions

I. The appeal of the opponent is directed against the interlocutory decision of the opposition division maintaining European patent No. 2 281 771 in amended form.

II. The appellant (opponent) relied on the following evidence filed during the opposition procedure:

- E1: US 5,598,935;
- E2: FR 1 548 415;
- E4: US 4,729,486;
- E6: US 4,196,816;
- E7: US 2008/0203045 A1;
- E9: Brochure entitled DEMAG CC2800-1, Crawler Crane.

Further evidence was filed by the appellant after its statement of grounds of appeal:

- E10: US 4,195,740 (cited in E4);
- E11: EP 1 868 150 B1.

III. In its decision the opposition division held that the independent claims 1 and 11 according to the auxiliary request filed during the oral proceedings complied with the provisions of Art. 56 EPC, starting from document E4 and in the light of the teachings of E6 and E2.

IV. Oral proceedings by videoconference were held before the Board on 11 May 2022 .

The appellant (opponent) requested that the decision under appeal be set aside and that the European patent be revoked.

The respondent (patent proprietor) requested that the appeal be dismissed.

V. Claim 1 as allowed by the opposition division reads as follows (according to the feature analysis of the appellant):

- 1.1 A lift crane (10, 410) comprising:
- 1.2 a) a carbody (12, 412);
- 1.3 b) moveable ground engaging members (14, 414) mounted on the carbody (12, 412) allowing the crane (10, 410) to move over the ground;
- 1.4 c) a rotating bed (20, 420) rotatably connected to the carbody (10, 410) about an axis of rotation,
- 1.5 the rotating bed (20, 420) comprising a counterweight support frame (32, 432);
- 1.6 d) a boom (22, 422) pivotally mounted about a fixed boom hinge point on the front portion of the rotating bed (20, 420) and including a load hoist line (24) for handling a load; characterized by:
- 1.7 e) a boom hoist system connected to the rotating bed (20, 420) and the boom (22, 422) that allows the angle of the boom (22, 422) relative to the plane of rotation of the rotating bed (20, 420) to be changed,
- 1.8 the boom hoist system comprising a live mast (28, 428) pivotally connected to the rotating bed (20, 420), boom hoist rigging between the live mast (28, 428) and the boom (22, 422) comprises only fixed length members (25);
- 1.8n a boom hoist drum (21) and boom hoist line (27) reeved between a sheeve set on the live mast (28, 428) and a sheave set (23) on the rotating bed (20, 240);
- 1.9 f) a counterweight unit (35, 435) supported on the counterweight support frame (32, 432) in a moveable relationship with respect to the counterweight support frame (32, 432);
- 1.9n wherein the counterweight unit (35, 435) can be moved to a position where it is between the sheave set (23) on the rotating bed (20, 420) and the axis of rotation of the rotating bed (20, 420), and moved to a position where it is behind the sheave set (23) on the rotating bed (20, 420);
- 1.10 g) a counterweight unit movement device connected between the rotating bed (20, 420) and the counterweight unit (35, 435) so as to be able to move the counterweight unit (35, 435) toward and away from the boom (22, 422);
- 1.11 h) wherein the crane (10, 410) is configured such that during crane operation, when the counterweight unit (35, 435) is moved to compensate for changes in the combined boom and load moment, the moment generated by the counterweight unit (35, 435) acts on the rotating bed (20, 420) predominantly through the counterweight support frame (32, 432).

Method claim 11 as allowed by the opposition division reads as follows (in the appellant's feature analysis):

- 11.1 A method of increasing the capacity of a crane (10, 410) comprising the steps of:
- 11.2 a) providing a lift crane (10, 410) having a first capacity comprising
 - 11.3 a carbody (12, 412)
 - 11.4 having moveable ground engaging members (14, 414) mounted on the carbody (12, 412) allowing the crane (10, 410) to move over the ground;
 - 11.5 a rotating bed (20, 420) rotatably connected about an axis of rotation to the carbody (12, 412) such that the rotating bed (20, 420) can swing with respect to the moveable ground engaging members (14, 414);
 - 11.6 a boom (22, 422) pivotally mounted on the front portion of the rotating bed (20, 420) and including a load hoist line (24) for handling a load;
 - 11.7 a boom hoist system connected to the rotating bed (20, 420) and the boom (22, 422) that allows the angle of the boom (22, 422) relative to the plane of rotation of the rotating bed (20, 420) to be changed, characterized in that
 - 11.8 the boom hoist system comprising a live mast (28, 428) pivotally connected to the rotating bed (20, 420), and boom hoist rigging between the live mast (28, 428) and the boom (22, 422) comprises only fixed length members (25);
 - 11.8n a boom hoist drum (21) and boom hoist line (27) reeved between a sheeve set on the live mast (28, 428) and a sheave set (23) on the rotating bed (20, 240);
 - 11.9 and a moveable counterweight unit (35, 435) supported on the rotating bed (20, 420),
 - 11.10 the counterweight unit (35, 435) including multiple counterweights (34) stacked on top of each other,
 - 11.11 the counterweight unit (35, 435) being moveable from a first position to a second position further from the boom (22, 422) than the first position;
 - 11.11n wherein the counterweight unit (35, 435) can be moved to a position where it is between the sheave set (23) on the rotating bed (20, 420) and the axis of rotation of the rotating bed (20, 420), and moved to a position where it is behind the sheave set (23) on the rotating bed (20, 420);
 - 11.12 b) removing at least some of the counterweights (34) from the crane (10, 410);
 - 11.13 c) adding a counterweight support beam (160, 260, 360, 560) to the crane (10, 410), attached to the rotating bed (20, 420); and
 - 11.14 d) returning at least some of the counterweights (34) removed in step b) back to the crane (10, 410) to provide a crane (10, 410) having a second capacity greater than the first capacity, with the returned counterweights (34) being supported on the counterweight support beam (160, 260, 360, 560) in a manner that allows the returned counterweights (34) to be able to move to a third position further from the boom (22, 422) than the second position.

VI. The appellant's submissions relevant to the present decision may be summarised as follows:

Admissibility issues

Document E9 had been filed in time in reaction to the preliminary opinion of the opposition division (which did not decide on its admission), was suitable evidence of what was the common general knowledge of the skilled person and should be admitted.

The line of argument of lack of inventive step over E4 in combination with E7 argued in the grounds of appeal should be admitted, since the patent proprietor defined its auxiliary request only during the oral proceedings before the opposition division.

The objection of lack of inventive step starting from E7 in combination with E6 or the common general knowledge, raised in the letter dated 8 April 2022 and motivated by the Board's preliminary opinion that E6 already showed two embodiments, was highly relevant and should also be admitted. E7 only failed to show features 1.8 and 1.8n relating to the configuration "live mast" used in case of lower load requirements.

Inventive step - claim 1

(i) Starting from E4 as the closest prior art:

Features 1.1 to 1.7 were known from E4 (see contested decision, point 3.1.3), but also features 1.9 and 1.10. The wording of feature 1.5 allowed that a counterweight support frame was realised in E4 by the rearwardly extending counterweight support beam 35 (Fig. 2) which

was detachably connected (via removable pins 36) to the rear portion 32 of the rotating bed 11. A corresponding construction was disclosed in the patent (see Fig. 24: counterweight support frame 432 connected via bolts 429 to the rotating bed 420). Given this understanding, E4 also showed a counterweight unit 30 moveable via a slide tray 34 relative to the counterweight support frame 35 (Fig. 1; also col. 3, l. 55-57), as required by features 1.9 and 1.10. Apart from that, a slide tray inevitably required that rails were provided on the rotating bed, which provided (as in E7, see further below) the function of a counterweight support frame.

The crane according to claim 1 was distinguished from E4 by two groups of features that had no combinatorial effect, namely a first group of features 1.8, 1.8n relating to the configuration "live mast" and a second group of features 1.9n, 1.11 relating to the moveable counterweight unit. The configuration "live mast" provided a (fixed length) boom hoist rigging for lifting smaller loads, but did not serve (as found by the opposition division) to enable the movability of the counterweight unit. A moveable counterweight was defined in the claims for the configuration "live mast" but was also applicable for other configurations, as shown in E9 (pages 10 and 11: live mast "SH" and fixed mast "SSL") and also defined in paragraph [0018] of the patent specification. The sheave set 23 of feature 1.8n was functionally related to the boom hoist system in the configuration "live mast", but used in feature 1.9n only non-functionally to specify a location in relation to the movement of the counterweight unit (as admitted by the patent proprietor, arguing that the sheave set characterised the rear end of the rotating bed). Selection of a specific crane configuration was dependent on the load and environmental conditions.

Thus, the skilled person starting out from E4 was faced with two partial problems, namely on the one hand selecting a specific crane set-up type for the lifting operation to be provided, on the other hand increasing the stability of the crane with no load on the hook. In order to solve these partial problems, the skilled person could rely on a combination of different prior art documents (also to prove common general knowledge).

The skilled person would combine E4 with E7, since E7 disclosed already features 1.1 to 1.7 (Figs. 7 and 9) and also (paragraph [0014]) the advantage of producing little backward moment on the crane when no load was on the hook, as also stated in the patent specification (see paragraph [0012]). Features 1.9 to 1.11 were also known from E7 (Fig. 7, paragraph [0057]). Features 1.5, 1.9 and 1.11 did not require a counterweight support frame formed separately or extending rearwardly as an additional element (such as the separate counterweight support frame 432 in Fig. 27 of the contested patent). The rotating bed 220 in E7 was a counterweight support frame as shown in Fig. 2 of the contested patent, on which the counterweight unit 237 was moveable between the rotating axis of the boom 222 and the rear end of the rotating bed 220. A counterweight support frame and a counterweight unit movement device according to features 1.9, 1.10 were implicitly disclosed, since the movable counterweight unit 237 of E7 required, as in E4, a trolley running on rails (see contested patent, Fig. 6, paragraph [0042], l. 43-45). The position of the counterweight unit specified in feature 1.9n was shown in Fig. 7 of E7, since the sheave set was mounted at a distance to the rear end of the rotating bed (as shown in Fig. 2 of the contested patent for sheave set 23), but also in Fig. 9 (see paragraph [0059]: the counterweight unit 434 was moved far beyond the rear

end of rotating bed 420). Feature 1.11 was fulfilled in E7, since the moment generated by the weight force of counterweight unit 237, supported directly on the rotating bed 220, acted predominantly on the rotating bed (as in Fig. 2 of the patent; or Fig. 27, showing a counterweight support frame 432 fixed to the rotating bed 420, see paragraph [0063]), irrespective of whether E7 disclosed a backhitch 230 or, alternatively (see paragraph [0081]), a tension strap. An embodiment of the contested patent (see Fig. 6, paragraph [0042]) showed a counterweight support frame 32 including a flange 39 on which the counterweight unit 35 was moving on, as the skilled person would also see in Fig. 7 of E7. The meaning of feature 1.11 was clearly defined in the contested patent (see paragraph [0045]), according to which a self-supporting end of the support beam 32, 432 was only supported by the rotating bed 20, 420 and not (as in Fig. 23 of the contested patent, which did not fall under claim 1) by a mast 517 via tension member 531. Moreover, the boom hoist rigging 427 transferred forward tipping forces from the boom 422 and any load on the hook to the rear of the rotating bed 420. Feature 1.11 was silent on whether a mast 517 as in the contested patent or a mast 230 shown in E7 was present or not. In view of this understanding of feature 1.11, the second counterweight 237 disclosed in E7 (Fig. 7) and only moved along the rotating bed 220 of the crane 210, fell under the claimed construction. There was no self-supporting end of a counterweight support beam in E7, and the mast 230 only transferred forces from the boom to the rear of the rotating bed.

Admittedly, neither E4 nor E7 showed features 1.8 and 1.8n. However, it was known to the skilled person that a change from the "fixed mast" configuration of E4 and E7 to a "live mast" configuration (as known e.g. from

E6, Figs. 2 and 5; or E9, page 10; or E1) resulted inevitably in a fixed length member of the boom hoist rigging and a boom hoist line between the live mast and the rotating bed, so that features 1.8 and 1.8n were fulfilled. The crane set-up type that had to be chosen was the inevitable result of planning the crane's operation, dependent on the load condition to be met and given environmental conditions, and was known to the skilled person planning the crane's operation (see E11). Changing between crane configurations was an ordinary task needing no further motivation (see E9).

The patent proprietor argued that E4 and E7 related to fixed and non-modular lift crane designs only. However, E4 showed at least a modification of the crane by attaching a counterweight support beam 35, and E7 stated (paragraph [0081]) that the backhitch 230 could comprise a strap if the operation of the crane never produced a compressive force in the backhitch. The live mast missing in E4 or E7 was known e.g. from E6.

(ii) Starting from E6 as the closest prior art:

No discussion regarding features 1.8 and 1.8n was necessary when starting from E6 as closest prior art. As found in the contested decision (point 3.1.7), E6 showed features 1.1 to 1.7 and feature 1.8 in part. However, feature 1.8 was entirely disclosed in E6 since the boom pendants 138 connecting the mast and the boom had a fixed length (see Fig. 2; col. 5, l. 46-65, in view of how articulation of the boom was described). The moment generated by the counterweight unit acted on the rotating bed 36 predominantly through the counterweight support frame 40, corresponding to part of feature 1.11. Moreover, feature 1.8n was known from E6 showing in Fig. 2 a boom hoist system 140 (its

function was described in col. 5, line 55) which included respective sheave sets at both ends (the upper end was shown in Fig. 2, whereas the lower set was hidden in the rotating bed). The boom hoist drum was arranged in the rotating bed and not visible.

E6 did not disclose a counterweight unit movement device to move the counterweight unit in direction of the axis of rotation of the rotating bed. As noted in the patent specification (see paragraph [0012]), a counterweight could be positioned far forward such that it produced little backward moment on the crane when no load was on the hook (advantage of increasing stability of the unladen crane), and positioned far backward so that it could counterbalance a heavy load. E6 did not show a moveable counterweight unit at all, so the problem to be solved could be formulated broadly, namely to variably configure and improve the use of the crane known from E6 as regards different lifting tasks.

The skilled person would consider document E7 which solved the problem of increasing the stability of the unladen crane by providing a counterweight unit which could be moved forward in direction of the boom (see paragraph [0014]) in accordance with the contested patent. The crane 20 according to Fig. 2 of E6 did not show a supporting ring 70 for increasing stability (see col. 2, l. 3-24: the ring 70 was provided in order to transfer the load directly to the ground without imposing the load on the turntable bearing), and the ring 70 was not provided in the configuration "regular duty crane" or in order to increase stability of the unladen crane. Thus, there was no motivation for the skilled person to change the crane known from E6 in view of this teaching in E6, and a solution for the problem posed was therefore required. The embodiment

according to Fig. 5 ff in E6 related to a different crane design (so-called "Ringlift-Kran") in which the load was not supported on the ground via crawlers (i.e. no crawler-type crane), but via auxiliary frame 92 and supporting ring 70, which required major modifications (e.g. moving the boom 156 forward so that it was supported by the ring 70; the counterweights 114 were not resting on the rotating bed, but on ring 70). Thus, when modifying the embodiment of Figs. 1-4 (disclosing features 1.1 to 1.8n and part of feature 1.11, see above) according to Fig. 5, feature 1.3, 1.5 and 1.6 were missing. The skilled person, knowing E6 and also the embodiment of Fig. 5, was therefore motivated to look for further prior art and would consider the teaching of E7.

As set out above (section (i)), E7 showed features 1.1 to 1.7 and 1.9 to 1.11. Moreover, the skilled person was always tempted to improve the crane's stability against tipping. Admittedly, E6 disclosed a crane assembled either in a configuration "regular duty mode" or "heavy duty mode" (col. 3, l. 10-17). However, E6 did not indicate that the supporting ring 70 provided for a "heavy duty crane" solved a stability problem.

Inventive step - claim 11

E4 disclosed features 11.1 to 11.7 (see contested decision, point 3.2.2), but also features 11.10 and 11.12 to 11.14. The counterweight unit 30 of E4 included multiple counterweights 31 (Fig. 1; col. 3, l. 7-16), and a counterweight support beam 35 was attachable to the rotating bed 32 (col. 3, l. 35-44) and moveable via slide tray 34 on the counterweight support beam in the configuration with increased lift capacity (Fig. 1 and col. 3, l. 55-61). The slide tray, together with the counterweight support beam, was only attached in a

heavy duty configuration, whereas in the normal crane configuration (see E10, referred to in E4 in col. 3, l. 11-16), the counterweight unit 30 was located directly on the rear portion 32 of the rotating bed 15 (see E4, col. 3, l. 17-21). Hence, the counterweights had to be removed from the rotating bed 32 when adding a counterweight support beam 35 and had to be returned onto the slide tray 34 thereafter. Thus, all method steps were known from E4 and the method of claim 11 was distinguished from E4 through two groups of features (group 1: 11.8, 11.8n; group 2: 11.9, 11.11, 11.11n), i.e. the same reasoning as in case of claim 1 applied.

VII. The respondent countered essentially as follows:

Admissibility issues

It was requested to disregard

- late-filed document E9,
- the new lines of arguments based on E4 and E7 which further relied on a skilled person's alleged expert knowledge (never discussed in the first instance proceedings; the contested decision took a position only on E4 in view of E6 and E2),
- the late-filed attack starting from E7, argued for the first time in the appellant's letter dated 8 April 2022 (claims 1 and 11 upheld in opposition proceedings combined granted claims and did not add anything to the first-instance proceedings).

Inventive step - claim 1

(i) Starting from E4 as the closest prior art:

There was a close functional relationship between features 1.8n and 1.9n, which related to the sheave set

for pivoting the live mast and thus the boom. Conflicting goals had to be met when designing a lift crane. On the one hand, it was supposed to handle high loads with low net weight. This could be realised by extending the length of the live mast and providing the sheave set at a greater distance from the pivot point, in order to reduce (due to a longer lever arm) the actuating forces. On the other side, the crane should be as compact as possible to avoid touching objects on the construction site when rotating the rotating bed. Therefore, the sheave set was always positioned at the rear end of the rotating bed so that its position defined the rear end of the crane. This was also the starting point of the invention, which aimed (via features 1.8n and 1.9n) at moving the counterweight unit beyond the rear end of the crane. In view of this interrelationship between the sheave set and the counterweight unit, the above-mentioned features did not solve different problems, as alleged by the appellant in order to combine more documents.

In a fixed crane configuration comprising a fixed mast (and no live mast) as known from E4 or E7, it was not obvious for the skilled person to mount different crane configurations, which was only possible in case of a modular crane design as known from E9. E4 showed (see Figs. 1, 2) a fixed crane concept in which the mast was held in a substantially fixed rearwardly inclined position by a stop arrangement (col. 2, l. 66 ff.). E4 did not indicate that a modular design was envisaged, in particular no live mast. Similarly, E7 only showed a high load lifting crane comprising a fixed lattice mast 28 and a backhitch 30, i.e. a stable construction. Since E4, E7 did not show modular crane concepts, it was not foreseen to change from a fixed to a live mast. The crane known from E4 or E7 did not work when leaving

out elements - such as the fixed mast - which were essential for its function and stability. It had to be considered where to place a live mast, and whether the rotating bed could still take the load.

A counterweight support frame according to feature 1.11 (via which the balancing moment acted on the rotating bed) was neither known from E4 nor from E7. In E7, the counterweight unit was only moved to the rear portion of the rotating bed and was "supported **directly on** the rotating bed" (see paragraph [0057]). Even assuming that the counterweight unit was moving on rails that could be considered a "frame", E7 suggested a vertical force rather than a moment acting on the rotating bed as required by feature 1.11, also in view of the backhitch 230 needed in E7 via which the aft end of the rotating bed was suspended from the fixed mast. The embodiment shown in Fig. 23 of the contested patent comprising an additional tension member at the aft end of the rotating bed did not fall under the claimed invention (see paragraph [0015] in the documents dated 10 May 2019 for maintenance of the patent as amended). As regards the question whether the rotating bed could be considered to be a counterweight support frame, the contested patent showed in Fig. 6 a counterweight support frame 32 that was flange-mounted in a removable fashion (see also dependent claim 5) to the rotating bed 20, and in Fig. 27 a counterweight support frame 432 extending beyond the rotating bed 420 so that the counterweight unit could be moved to a position behind the sheave set. Thus, lacking a backhitch or tension member, the moment was acting on the rotating bed predominantly through the counterweight support frame.

No reasoning was given as to why a skilled person might be motivated to modify the "fixed mast"-constructions

suggested by E4 and E7 to a "live mast". In fact, providing a live mast for any of the cranes suggested by E4 or E7 would contradict their intended layout as high-lifting-capacity-cranes that made use of a fixed mast held in place via a backhitch. Moreover, further modifications were needed in this case to compensate for the removed backhitch. In E4, the backhitch was at least needed to lift the counterweight beam 35 after the load had been lifted such that the rotating bed could rotate (cf. col. 4, l. 19-22). In E7, the backhitch 30 was needed to suspend the aft-end of the rotating bed from the top end of the fixed mast 28.

(ii) Starting from E6 as the closest prior art:

E6 did not disclose features 1.9 to 1.11, which related to movable counterweights generating a balancing moment that acted, through the counterweight support frame, on the rotating bed. As set out above (section (i)), E7 (paragraph [0057]) could not suggest a counterweight support frame transmitting a balancing moment to the rotating bed. The crucial issue was that the skilled person would not deviate from the concept of the crane configuration known from E7.

Moreover, E6 (Figs. 5 to 10) already showed a modular crane concept and provided an adequate solution for increasing stability against tipping of the crane by providing a support ring 70, thereby taking away the alleged motivation for a skilled person to increase stability against tipping of the crane of E6 by providing moveable counterweights as suggested by E7. Figs. 1-4 and Fig. 5 in E6 related to the same crane in a regular or heavy duty mode (see abstract). Thus, E6 disclosed a basic configuration comprising a boom and a live mast when lifting smaller loads, and proposed a modification - in order to increase the load carrying

capacity - of this crane (see col. 2, l. 58: "*a side elevational view of the crane in the heavy duty mode*") comprising a live mast 165 in combination with an additional element 39' to avoid high forces in the triangle of forces (as compared to a crane comprising only a live mast). E6 also proposed a supporting ring 70 to increase stability of the crane.

Inventive step - claim 11

Features 11.8, 11.8n, 11.11n related to the group specifying a live mast as set out above and were not suggested by E4 or E7, which relied on a backhitch construction that required a fixed mast.

Moreover, features 11.12 and 11.14 (removing/returning counterweights from/to the crane) were not known from E4, since it was the counterweight assembly 30 itself which comprised the slide tray 34 (see E4, col. 3, l. 52-57), so the tray was always present even in the configuration without the support beam attached.

Reasons for the Decision

1. *Inventive step - claim 1*

1.1 The subject-matter of claim 1 involves an inventive step when starting from document E4 as the closest prior art (Article 56 EPC).

1.1.1 As found in the contested decision (point 3.1.3), E4 discloses features 1.1 to 1.7 of claim 1. The Board concurs with the appellant that a counterweight support frame (feature 1.5: "*the rotating bed comprising a counterweight support frame*") can be seen not only in the rearwardly extending portion 32 of the rotating bed

15 of E4 (see contested decision), but also in the counterweight support beam 35 of E4 (see Fig. 2) which is detachably connected via removable pins 36 at its front end to the rear portion of the rotating bed 15, irrespective of whether it is additionally suspended at its rear end by a back hitch pendant 40 and mast 18. In fact, a corresponding construction is also disclosed in the contested patent (see Figs. 24 and 27) showing a counterweight support frame 432 connected to the rotating bed 420 via pinned connections ("at lugs 429 and 464", see paragraph [0063]), as argued by the appellant. When identifying a counterweight support frame in the counterweight support beam 35 of E4, features 1.9 and 1.10 are also known from E4, in particular since E4 explicitly discloses (see col. 3, l. 55-77, describing a configuration which enhances the lift capacity) that the counterweight unit 30 includes a slide tray 34 mounted for movement (behind the sheave set) along the length of counterweight support beam 35.

1.1.2 A point of debate was whether the distinguishing features 1.8, 1.8n and 1.9n, 1.11 over E4 related to two groups of features. According to the appellant, the two feature groups had no combinatorial effect and solved two partial problems, namely:

- (i) to select a specific set-up for the lifting operation to be provided (features 1.8, 1.8n: relating to the configuration "live mast") and
- (ii) to increase the (backward tipping) stability with no load on the hook (features 1.9n, 1.11: relating to the movability of the counterweight unit).

According to the respondent, there was a close functional relationship between features 1.8n and 1.9n which both related to the sheave set for pivoting the live mast, and the alleged formulation of partial problems should only justify combining more documents.

1.1.3 Even following the appellant that features 1.8 and 1.8n solved a partial problem of selecting a specific set-up for the lifting operation to be provided, the Board does not see that the skilled person starting from the fixed mast configuration of E4 would be prompted to change to a live mast design as known e.g. from E6. The appellant's arguments, namely that the crane set-up type that had to be chosen was the inevitable result of planning the crane's operation (an ordinary task, as known from E11) resulting inevitably in features 1.8 and 1.8n, relate to modular crane concepts as known e.g. from E9. However, as admitted by the appellant, a live mast configuration - in comparison to a fixed mast configuration - is used for lifting smaller loads, which would contradict the layout of the crane disclosed in E4 as a high-lifting-capacity-crane. In particular, the modification proposed in E4 to have a counterweight support beam 35 attached to the rotating bed is provided solely in order to enhance the crane's lifting capacity. Thus, there is no prompting in E4 for the skilled person to go for a live mast configuration, which would be at odds with the intended crane concept of the crane known from E4.

1.1.4 Therefore, irrespective of whether features 1.9n and 1.11 of claim 1 might be suggested by document E7, the skilled person would not arrive in an obvious manner at the subject-matter of claim 1.

1.1.5 Having considered the appellant's arguments as set out above, the question of admission into the procedure of late-filed documents E9 and E11, and also the new lines of arguments based on E4 and E7 and a skilled person's alleged expert knowledge, can be left open.

1.2 The subject-matter of claim 1 also involves an inventive step when starting from document E6 as the closest prior art (Article 56 EPC).

1.2.1 Undisputedly, E6 discloses features 1.1 to 1.7 of claim 1, as already found in the contested decision (point 3.1.7). As regards features 1.8 and 1.8n, the appellant refers to Fig. 2 of E6 and the description on how articulation of the boom is described in E6 (see col. 5, l. 46-55).

The Board agrees that E6 shows in Fig. 2 a boom hoist system (in E6 referred to as boom hoist reeving 140) comprising a live mast (132) pivotally connected to the rotating bed (upper works 36), and a boom hoist rigging (boom pendants 138) between the live mast (132) and the boom (39). As described in the passage in E6 cited by the appellant, the *"boom pendants 138 are secured at one end to the top of the boom 39 and at the other end to the top of the live mast 132"*, which implies a boom hoist rigging which comprises only fixed length members, as required by feature 1.8.

The boom hoist reeving 140 represents a boom hoist line which extends (see col. 5, l. 55-58) between the top of the live mast and the top of the upper works, powered by a winch (i.e. a boom hoist drum). Looking at Fig. 2 in E6, a sheave seems to be provided at the top of the live mast, but E6 is lacking a clear disclosure that sheave **sets** (i.e. comprising a plurality of sheaves) are provided on the live mast and on the rotating bed, as required by feature 1.8n. However, these features are well-known in the field of crane technology and therefore at least obvious for the skilled person.

1.2.2 Undisputedly, E6 does not show a moveable counterweight unit according to features 1.9 to 1.11 (feature 1.11 is only realised in part in E6 - to the extent that the

moment generated by the counterweight unit acts through the counterweight support frame 40 on the rotating bed 36). The Board concurs with the objective technical problem formulated by the appellant in view of these distinguishing features, namely to variably configure and improve the use of the crane known from E6 as regards different lifting tasks.

1.2.3 However, the Board was not convinced by the appellant's argument that, starting from the "regular duty crane" configuration shown in Figs. 1-4 in E6, the skilled person would modify the crane in view of the teaching of E7. The above-mentioned problem is already solved in E6 by providing a further embodiment (see Fig. 5) that realises a "heavy duty crane", so the crane assembly known from E6 is already conceived to realise different lifting tasks. Therefore, the Board cannot see that the skilled person would be tempted to look for further prior art in view of the problem posed. The argument put forward by the appellant, namely that the skilled person would realise that further features (e.g. features 1.5 and 1.6) would be missing in the "heavy duty crane" configuration of E6 so that he was motivated to look for further prior art, is a clear indication that only hindsight knowledge of the claimed invention could have suggested applying the teaching of further documents, such as E7.

1.2.4 Even following the appellant that the skilled person looking for a solution of the above-mentioned problem would come across document E7 (in view of the problem mentioned paragraph [0014] of increasing the stability of the unladen crane), the solution of moving a counterweight unit far forward and far backward is explicitly disclosed in E7 in the context of having a single large counterweight to counterbalance a heavy

load (see paragraph [0014]) and for a crane of the set-up type "fixed mast" (as admitted by the appellant when discussing inventive step starting from E4). Therefore, the Board cannot see that the skilled person starting from the "regular duty crane" known from E6 (Figs. 1-4) having a "live mast" as normally used for lower load requirements, and taking into consideration the teaching of E7 concerned with heavy loads, would only take from E7 the missing features 1.9 to 1.11 without changing to a "fixed mast" configuration normally used for heavy loads and as explicitly taught by E7 for all the embodiments in E7. Hence, the skilled person would not arrive at the subject-matter of claim 1, since he would also change from the "live mast" configuration of E6 to a "fixed mast" when considering the teaching of E7, i.e. features 1.8 and 1.8n would not be fulfilled.

Therefore, even following the appellant that there was no motivation for the skilled person to change the "regular duty crane" configuration shown in Fig. 2 of E6 in view of the supporting ring 70 shown in Fig. 5 (which allegedly served a different purpose) in view of the problem posed, the skilled person would not arrive in an obvious manner at the subject-matter of claim 1 when combining the teachings of documents E6 and E7.

2. *New objection of lack of inventive step against claim 1 starting from document E7 as the closest prior art*

2.1 The inventive step objection against claim 1 starting from document E7 as the closest prior art is not taken into account under Article 13(2) RPBA 2020 (Rules of Procedure of the Boards of Appeal, OJ EPO 2019, A63).

2.2 In its grounds of appeal dated 20 September 2019, the appellant argued lack of inventive step of claim 1

starting from closest prior art document E4 or E6 in combination with document E7 and the common general knowledge, including a discussion of the disclosure of each of these documents. No further line of argument in respect of lack of inventive step was raised by the appellant in its letter dated 13 August 2021 in response to the patent proprietor's reply. The Board issued a summons to oral proceedings pursuant Rule 115(1) EPC on 6 August 2021, followed by a communication on 2 November 2021 reflecting the preliminary opinion of the Board, as foreseen by Article 15(1) RPBA 2020.

With letter dated 8 April 2022, the appellant submitted for the first time in the appeal proceedings an inventive step objection with regard to claim 1 starting from document E7 as the closest prior art.

The Board notes that during appeal proceedings E7 was never considered before as closest prior art when arguing lack of inventive step. The discussion of lack of inventive step over E7 constitutes therefore a new line of argument, i.e. an amendment to the appellant's appeal case at a late stage of the appeal proceedings after notification of the summons to oral proceedings.

2.3 According to Article 13(2) RPBA 2020 (applicable in the present case according to Article 25(3) RPBA 2020) any amendment to a party's case made after the notification of a summons to oral proceedings, shall, in principle, not be taken into account unless there are exceptional circumstances, which have been justified with cogent reasons, by the party concerned.

2.4 Allegedly, the new line of argument starting from E7 in combination with E6 was motivated by the preliminary

opinion of the Board that E6 already showed two embodiments. However, as clearly set out in the Board's preliminary opinion (see page 5, last paragraph: "*As correctly pointed out by the respondent, the support ring 70 in E6 ... already provides an adequate solution for increasing stability ...*"), the Board merely referred to the arguments submitted by the respondent in its communication in preparation for the oral proceedings, which does not qualify as an exceptional circumstance under Article 13(2) RPBA 2020.

The appellant's argument that the objection of lack of inventive step starting from E7 should be admitted for being highly relevant cannot be followed, since the relevance of an objection is not a criterion for admitting it under Article 13(2) RPBA 2020.

2.5 The Board therefore concludes that no exceptional circumstances justified by cogent reasons can be observed as would be required by Article 13(2) RPBA 2020 for admitting the new inventive step attack starting from E7 into the appeal proceedings.

3. *Inventive step - claim 11*

3.1 The subject-matter of method claim 11 is also considered inventive in view of document E4 as the closest prior art (Article 56 EPC).

3.2 The appellant referred to its arguments put forward in respect of claim 1, namely that the method according to claim 1 was distinguished from E4 through two groups of features (features 11.8, 11.8n; features 11.9, 11.11, 11.11n). Features 11.8 and 11.8n relate to a "live mast" configuration, as specified also by features 1.8 and 1.8n of claim 1. Therefore, with same reasoning as

for claim 1, the subject-matter of claim 11 is not obvious starting from E4 as the closest prior art, irrespective of whether features 11.10 to 11.12 are shown in E4.

- 3.3 No further line of argument was brought forward by the appellant with respect to claim 11.
4. The appellant also relied on document E10, only filed after having filed its grounds of appeal, when arguing that all the method steps according to features 11.10 to 11.12 of claim 11 were known from E4. In view of the above conclusion regarding the presence of an inventive step of the subject-matter of claim 11 (irrespective of whether features 11.10 to 11.12 are known from E4), no decision on the admission of E10 into the appeal proceedings needs to be taken.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



A. Voyé

G. Pricolo

Decision electronically authenticated