(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 059 198 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
24.08.2016 Bulletin 2016/34

(21) Application number: **14854154.3**

(22) Date of filing: **17.10.2014**

(51) Int Cl.:
B66C 1/10 *(2006.01)* ***B66C 1/36*** *(2006.01)*

(86) International application number:
PCT/ES2014/070786

(87) International publication number:
WO 2015/055884 (23.04.2015 Gazette 2015/16)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **18.10.2013 ES 201331536**

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(54) DEVICE FOR LIFTING SUBMERSIBLE PUMPS

(57) The invention relates to a device for lifting submersible pumps, characterized in that it comprises:
- a claw (5) provided with two hooks (1) with an arched base arranged facing each another,
- a deformable parallelogram (2) provided with a handle (3) for hooking a pulley block, and a pawl (4) which can actuate the closing or opening of the hooks (1) by means of the release or retention of a lock acting on the deformable parallelogram (2),
where the hooks (1) are attached, at the top, to the deformable parallelogram (2) and where the claw (5) and the deformable parallelogram (2) can be slid together with respect to a supporting structure (9).

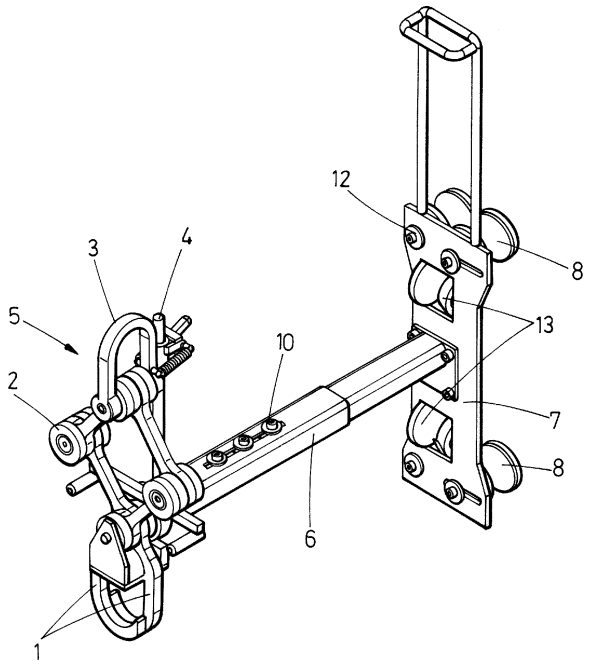

FIG.1

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Description

Object of the Invention

[0001] The present invention is applicable in the industrial sector of transporting, lifting and hoisting load, and more specifically, in the sector of lifting heavy material in submerged installations, such as submersible wastewater pumps.

[0002] An object of the invention consists of providing a device for lifting pumps capable of withstanding high loads and furthermore offering safety both to the operator handling it and to the load with which it operates, as well as requiring minimum intervention by the operator for handling same as they are found in a toxic environment.

[0003] Likewise, the object of the invention is to provide a device for lifting pumps with improved ease of handling and capable of adapting to different work scenarios.

[0004] Likewise, the object of the invention is to provide a device for lifting pumps that is affordable and easy to manufacture, with highly reliable and robust mechanical operation alone.

Background of the Invention

[0005] As a reference of the state of the art, some devices that the applicant knows of, mainly those relating to load lifting, must be highlighted.

[0006] Specifically, patent application JP9278348A describes a hanging clamp for a crane used for hoisting load having locking arms arranged on one side of a frame and along side fastening arms, allowing the gripping arms to slide along notches formed in the frame when the connected chains are actuated for locking the arms.

[0007] On the other hand, patent application GB2382561A describes a submersible pump grab with a cam manually rotated for tensioning a hook and placing it in a closer position for picking up and hoisting the pump, or for opening and releasing the pump when it is installed.

[0008] The inventions known until now in the state of the art do not contemplate devices for lifting pumps capable of performing safe and simple lifting, with the capacity to adapt to the work scenario, while at the same time providing a cost-effective and simple device.

Description of the Invention

[0009] Therefore, the device for lifting pumps proposed by the present invention is an improvement with respect to what is known in the market given that it satisfactorily meets the objectives indicated above as ideal for the art.

[0010] The invention consists of a device for lifting submersible pumps comprising:

- a claw provided with two hooks with an arched base arranged facing each another,
- a deformable parallelogram provided with a handle for hooking a pulley block, and a pawl which can actuate the closing or opening of the hooks by means of the release or retention of a lock acting on the deformable parallelogram,

where the hooks are attached, at the top, to the deformable parallelogram and where the claw and the deformable parallelogram can be slid together with respect to a supporting structure.

[0011] The invention provides a robust device as it comprises two hooks that will remain closed, without being able to open unless by means of actuating a lock. The lock will act on the deformable parallelogram, and said deformable parallelogram will act on the hooks, to actuate the closing or opening thereof. When the closing of the hooks is actuated, their arched bases facing each another come into contact, preventing the load from being released. On the other hand, when the opening of the hooks is actuated, their arched bases move away from each another, allowing the release of the load.

[0012] In a preferred embodiment, the pawl comprises a through hole at its distal end for allowing the passage of a cable acting as a lock. Therefore, the device incorporates a safety pawl capable of assuring that the load is lifted in a safe, simple and cost-effective manner.

[0013] The hooks attached to the deformable parallelogram will preferably form articulated hooks. Therefore, the hooks will move in an articulated manner for actuating the closing or opening thereof through the deformable parallelogram once the lock has been released or retained.

[0014] In another preferred embodiment, the claw and the deformable parallelogram are attached to a carriage by means of a telescopic arm, where said carriage is equipped with rolling elements. By incorporating a telescopic arm, the device offers an improved ease of handling given that it is capable of extending or retracting according to the location of the load to be lifted. Furthermore, equipping the carriage with rolling elements makes it easier for said carriage to move upwards and downwards along the supporting structure.

[0015] The rolling elements preferably comprise two pairs of sliding rollers arranged at the top and bottom with respect to the telescopic arm. Likewise, the rolling elements can preferably be adjusted on the supporting structure to allow the movement of the carriage along the supporting structure.

[0016] The carriage preferably comprises fixings modifying the distance between the rolling elements to allow the adjustment thereof on the supporting structure. Therefore, the carriage will be capable of adapting to the supporting structure or guide tube used for lifting pumps in submerged installations.

[0017] In another preferred embodiment, the telescopic arm comprises fastenings for keeping said telescopic arm still in a specific position. Therefore, the device assures the lifting of the load and makes access to same easier.

[0018] The telescopic arm is preferably arranged or-

thogonally with respect to the carriage.

[0019] With the exception of the possible fixings, fastenings and rolling elements, the device for lifting pumps is preferably manufactured in stainless steel to enable withstanding with the necessary assurances the expected service conditions, while being suitable for its intended use since the device will be in continuous contact with water.

Description of the Drawings

[0020] To complement the description that is being made and for the purpose of aiding to better understand the features of the invention according to a preferred practical embodiment thereof, a set of drawings is attached as an integral part of said description in which the following has been depicted with an illustrative and non-limiting character:

Figure 1 shows a perspective view of a device for lifting submersible pumps with the hooks in a closed position, according to a preferred embodiment.

Figure 2 shows a perspective view of a device for lifting submersible pumps with the hooks in an open position, according to a preferred embodiment.

Figure 3 shows a detailed view of the claw in an open position, according to a preferred embodiment.

Preferred Embodiment of the Invention

[0021] Figure 1 shows the device for lifting submersible pumps provided with a claw 5 and a deformable parallelogram 2, both can be slid together along a supporting structure 9, through the attachment thereof to a moving carriage 7 which can be coupled to said supporting structure 9. To allow such sliding, the carriage 7 is equipped with rolling elements capable of allowing it.

[0022] Both the claw 5 and the deformable parallelogram 2 are attached to the carriage 7 by means of a telescopic arm 6 making access to the pump easier. The telescopic arm 6 is orthogonal to the carriage 7 which is configured for being coupled to a supporting structure 9 which will conventionally be a guide tube, commonly used in underground installations.

[0023] The telescopic arm 6 will allow horizontal extension and retraction, equipping the device with greater flexibility and improving its ease of handling. On the other hand, the carriage 7 will allow performing vertical movements along the supporting structure 9, increasing the ease of handling of the device.

[0024] Figure 1 shows the rolling elements of the carriage 7 which comprise two pairs of sliding rollers 8 arranged at the top and bottom with respect to the telescopic arm 6, and other two auxiliary rollers 13 arranged in the carriage 7, preferably between the sliding rollers 8 and the attachment of the carriage 7 with the telescopic arm 6. The two pairs of sliding rollers 8 allow the carriage 7 to hold onto the supporting structure 9 and to be adjusted to the thickness thereof. With these two pairs of sliding rollers 8, the carriage is firmly coupled to the supporting structure 9.

[0025] Likewise, the carriage 7 includes fixings 12 modifying the distance between the rolling elements. In the case of Figure 1, said fixings 12 modify the distance between each of the two pairs of sliding rollers 8 to improve their adjustment on the supporting structure 9. Through the fixings, the device is more versatile and is capable of adapting to different types of supporting structure 9.

[0026] On the other hand, the two auxiliary rollers 13 make vertical movement of the carriage 7 along the guide support 9 easier, to that end, said auxiliary rollers 13 will preferably be assembled transversely to the carriage 7, such that the rolling thereof makes the vertical movement easier.

[0027] Figure 1 shows the claw 5 in a closed position, such that the deformable parallelogram 2 is expanded vertically and the lock is released.

[0028] On the other hand, Figure 2 shows the claw 5 in an open position, such that the deformable parallelogram 2 is contracted vertically and the lock is in a retaining position.

[0029] Therefore, the release of the lock actuates the closing of the hooks, and the retention of the lock actuates the opening thereof.

[0030] Figure 3 shows a detail of the claw 5 in an open position. As seen, the pawl 4 is arranged on one side of the deformable parallelogram 2 and can actuate the closing or opening of the hooks 1 by means of the release or retention of a lock acting on said deformable parallelogram 2. To that end, the pawl 4 comprises a through hole 11 at its distal end for allowing the passage of a cable that will act as a lock.

[0031] The following steps would be expected for putting the device into practice:

- adjusting the sliding rollers 8 on the supporting structure 9 by suitably tightening the fixings 12,
- adjusting the fastenings 10 of the telescopic arm 6 and, in general, all the joints of the device,
- placing the claw 5 in an open position, assuring that the lock is placed in a retaining position, preventing the claw 5 from closing,
- securing the slings, chains or cables to the handle 3 of the claw,
- moving the device downwards,
- releasing the lock, pulling on the cable when the base of the claw comes into contact with the pump handle,
- checking the position and lifting the pump.

Claims

1. A device for lifting submersible pumps, **characterized in that** it comprises:

- a claw (5) provided with two hooks (1) with an arched base arranged facing each another,
- a deformable parallelogram (2) provided with a handle (3) for hooking a pulley block, and a pawl (4) which can actuate the closing or opening of the hooks (1) by means of the release or retention of a lock acting on the deformable parallelogram (2),

where the hooks (1) are attached, at the top, to the deformable parallelogram (2) and where the claw (5) and the deformable parallelogram (2) can be slid together with respect to a supporting structure (9).

2. The device for lifting submersible pumps according to claim 1, **characterized in that** the pawl (4) comprises a through hole (11) at its distal end for allowing the passage of a cable acting as a lock.

3. The device for lifting pumps according to any of the preceding claims, **characterized in that** the device is manufactured in stainless steel.

4. The device for lifting pumps according to any of the preceding claims, **characterized in that** the hooks (1) attached to the deformable parallelogram (2) form articulated hooks.

5. The device for lifting submersible pumps according to any of the preceding claims, **characterized in that** the claw (5) and the deformable parallelogram (2) are attached to a carriage (7) by means of a telescopic arm (6), where said carriage (7) is equipped with rolling elements.

6. The device for lifting submersible pumps according to claim 5, **characterized in that** the rolling elements comprise two pairs of sliding rollers (8) arranged at the top and bottom with respect to the telescopic arm (6).

7. The device for lifting submersible pumps according to any of claims 5-6, **characterized in that** the rolling elements can be adjusted on the supporting structure (9) to allow the movement of the carriage (7) along the supporting structure (9).

8. The device for lifting submersible pumps according to claim 7, **characterized in that** the carriage (7) comprises fixings (12) modifying the distance between the rolling elements to allow the adjustment thereof on the supporting structure (9).

9. The device for lifting submersible pumps according to any of claims 5-8, **characterized in that** the telescopic arm (6) comprises fastenings (10) for keeping said telescopic arm (6) still in a specific position.

10. The device for lifting submersible pumps according to any of claims 5-9, **characterized in that** the telescopic arm (6) is arranged orthogonally with respect to the carriage (7).

11. The device for lifting submersible pumps according to any of claims 5-10, **characterized in that** the telescopic arm (6) is manufactured in stainless steel.

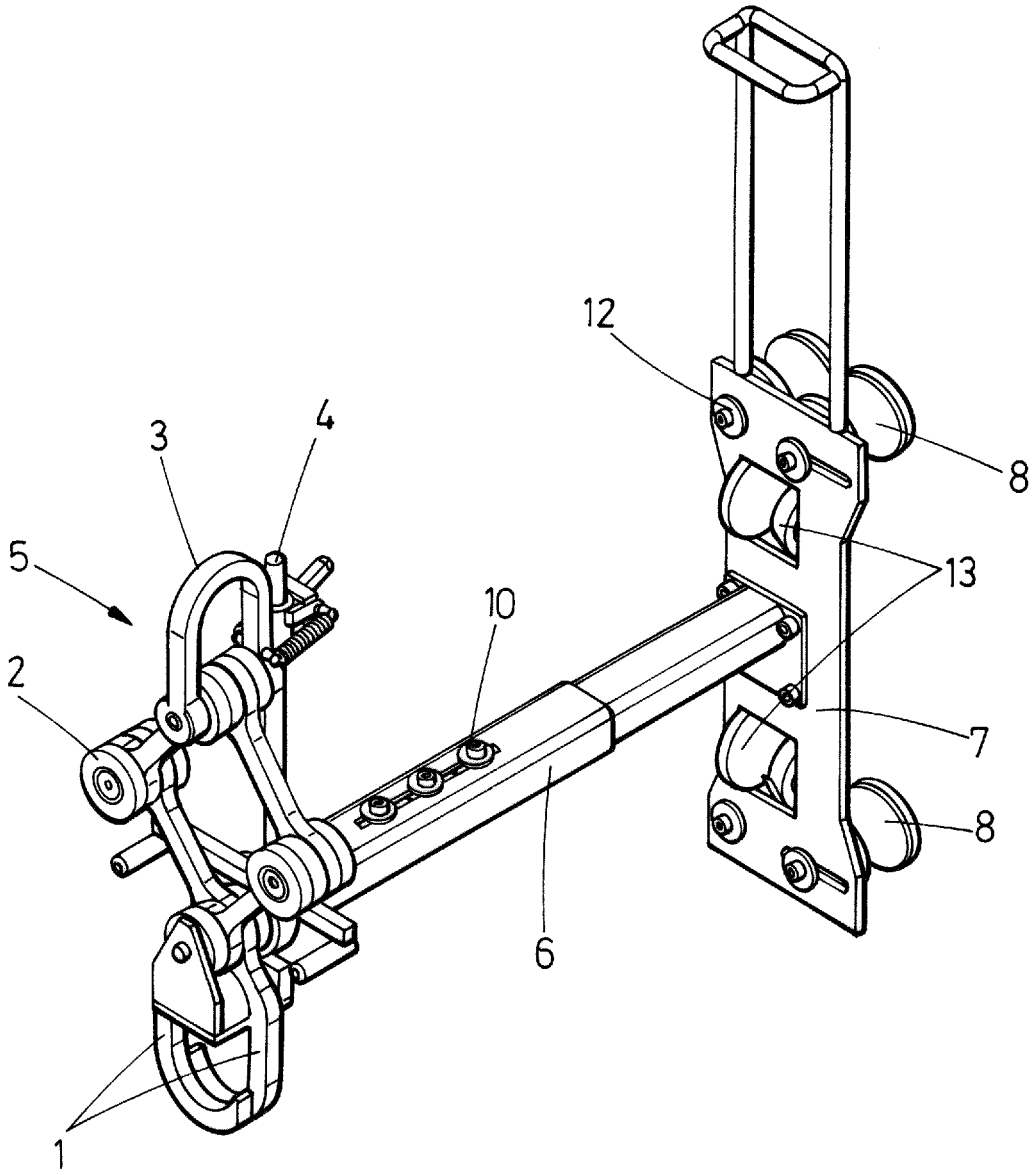
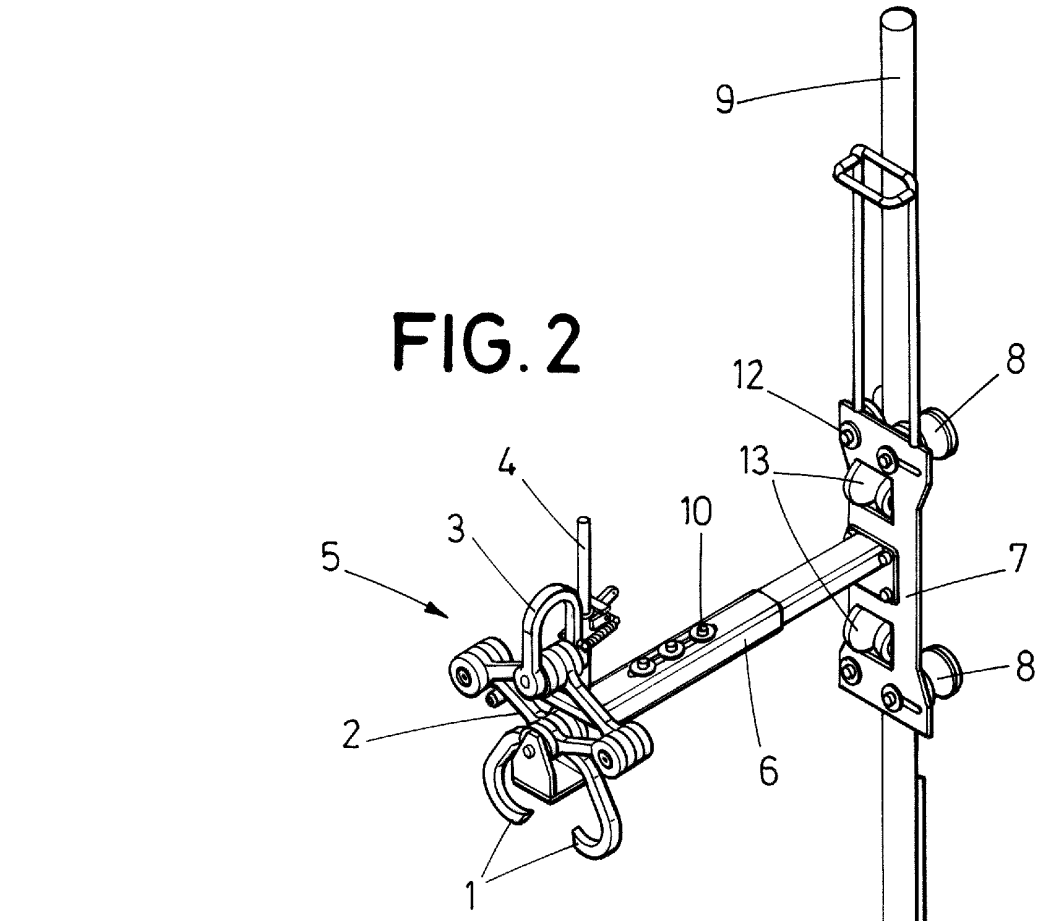


FIG.1

FIG. 2



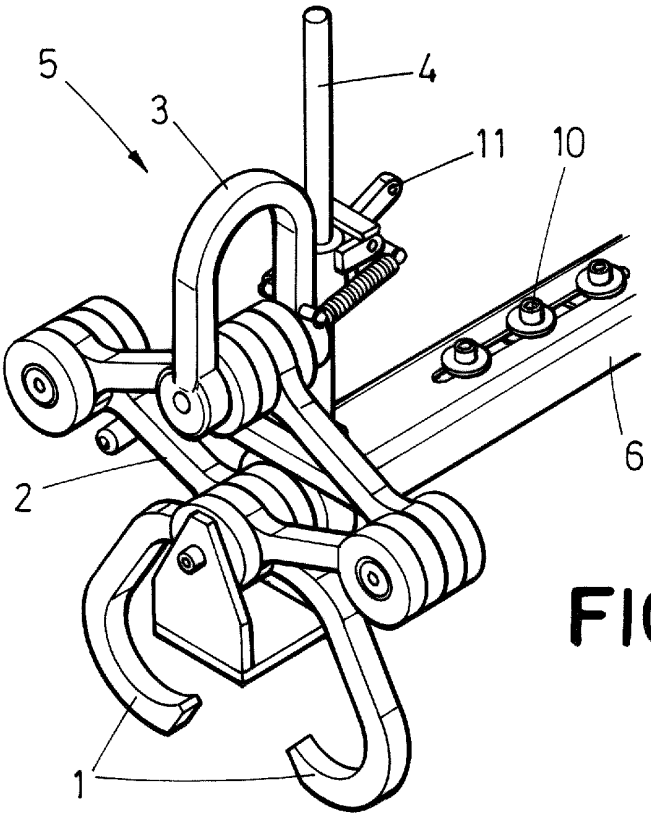


FIG. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2014/070786

A. CLASSIFICATION OF SUBJECT MATTER

B66C1/10 (2006.01)
B66C1/36 (2006.01)
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B66C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, WPI, INVENES

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	SU 1009963 A1 (VIBKE EDUARD A ET AL.) 07/04/1983, Abstract from DataBase WPI. Retrieved of EPOQUE; figures.	1-11
A	WO 2004065279 A1 (EMU UNTERWASSERPUMPEN GMBH ET AL.) 05/08/2004, Abstract from base of datos WPI. Retrieved from EPOQUE; figures.	1-11
A	DE 3023689 A1 (HENSEL ROLF) 14/01/1982, Abstract from DataBase WPI. Retrieved from EPOQUE; figures.	1-11
A	SU 874573 A1 (CHEMERSKIJ ANATOLIJ V) 23/10/1981, Abstract from DataBase WPI. Retrieved of EPOQUE; figures.	1-11

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
07/11/2014	**(12/11/2014)**
Name and mailing address of the ISA/ OFICINA ESPAÑOLA DE PATENTES Y MARCAS Paseo de la Castellana, 75 - 28071 Madrid (España) Facsimile No.: 91 349 53 04	Authorized officer E. Rodriguez Sánchez Telephone No. 91 3495396

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2014/070786

C (continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of documents, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
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- GB 2382561 A **[0007]**