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(54) **IMPROVED HOOK BLOCK**

(57) A hook block apparatus(10) comprising: an upper portion (12) comprising a sheave assembly (20) for receiving a lifting rope of a hoisting device; a lower portion (14) fixedly connected to the upper portion (12); a hook member (30) which is rotatably connected to the lower portion (14); and rotation means (40, 42) for rotating the hook member relative to the lower portion about a vertical axis, wherein the rotation means is selectively operable from a remote location.

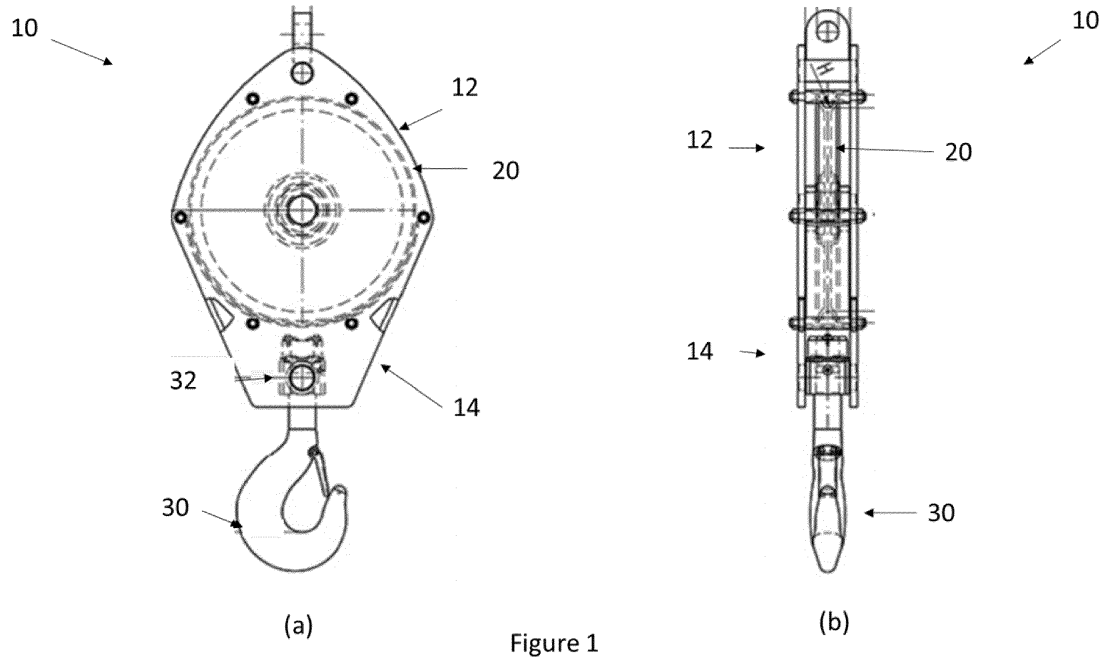

Figure 1

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Description

[0001] The present invention relates to hook block apparatus. In particular, but not exclusively, the present invention relates to hook block apparatus which allows remote rotating of the load.

[0002] A hook block provides the connection between the lifting rope (or cable or chain) of a hoisting device, such as a crane, and the load. Typically, the hook block has a lower part to which a hook is fastened and an upper part in which sheaves, also referred to as pulleys, are arranged on a shaft. The lifting rope is reeved over the sheeves to provide a mechanical advantage that amplifies the force applied to the rope according to the pulley principle.

[0003] Typically, the hook is rotatably connected to the lower part of the hook block via a bearing arrangement so that the suspended load may be rotated about a vertical axis. This allows the load to be rotationally moved to the desired orientation before depositing the load. For example, it is common for operators to manually handle the suspended load which represents a health and safety risk. Alternatively, a tag line can be attached to the load to allow an operator to rotate the load. However, this requires that the operator be laterally close to the suspended load and perhaps even under the suspended load. In the event of a catastrophic failure, the load could fall or tilt and impact the operator.

[0004] There are also a number of disadvantages and dangers associated with the use of tag lines. The tag lines can easily become wrapped around an operator attempting to manoeuvre the load which can be extremely dangerous as the workman can then accidentally be lifted by the crane movements with serious injuries occurring. When a load is lowered this can also result in a large amount of slack in the tag line with this simply lying on the ground. With a large amount of slack tag line lying on the ground this can easily become entangled with other articles. The slack tag line can also become entangled with other workmen in the near vicinity who may accidentally walk over the tag line.

[0005] Also, during movement of the suspended load, the load may impact an object which causes the load to rotate. This can be dangerous and it can take some time for the load to stop rotating in alternating directions and come to a stop.

[0006] It is desirable to provide a hook block apparatus which allows rotational positioning of the suspended load. It is desirable to provide a hook block apparatus which allows rotational positioning of the suspended load from a remote location. It is desirable to provide a hook block apparatus which selectively allows or resists rotational movement of the suspended load.

[0007] According to the present invention there is provided a hook block apparatus comprising:

an upper portion comprising a sheave assembly for receiving a lifting rope of a hoisting device;

a lower portion fixedly connected to the upper portion;

a hook member which is rotatably connected to the lower portion;

rotation means for rotating the hook member relative to the lower portion about a vertical axis,

wherein the rotation means is selectively operable from a remote location.

[0008] Optionally, the hook member is rotatably connected to the lower portion via a bearing arrangement.

[0009] Optionally, the rotation means comprises a first gear provided at the connection of the hook member to the lower portion.

[0010] Optionally, the rotation means comprises a motor having an output shaft which is coupled to the first gear such that operation of the motor causes rotation of the hook member.

[0011] Optionally, the motor is an electric motor. Optionally, the motor is adapted to provide precise rotational positioning of the hook member. Optionally, the motor is a stepper motor or the like.

[0012] In alternative embodiments, the motor may be a hydraulic motor or a pneumatic motor.

[0013] Optionally, at least a second gear interposes the first gear and the output shaft of the motor. Optionally, at least one of the rotational output speed of the motor and the sizing of at least one of the first and second gears are configured to allow slow rotating of the hook member, such as less than 6 RPM.

[0014] Optionally, the rotation means is adapted to prevent or impede unintended rotation of the hook member.

[0015] Optionally, the hook block apparatus includes a rotation sensor for sensing rotation of the hook member. Optionally, the rotation sensor is adapted to sense the direction of rotation.

[0016] Optionally, the rotation sensor is connected to the rotation means and the rotation means is adapted to apply a rotating force to the hook member in an opposite direction to that of unintended rotation of the hook member.

[0017] Optionally, the rotation means is selectively disengageable from the hook member such that the hook member is freely rotatable relative to the lower portion.

[0018] Optionally, the rotation means is adapted to allow the hook member to be rotated to any orientation through 360 degrees.

[0019] Optionally, the rotation means is wirelessly operable from a remote location. Optionally, the rotation means includes a receiver for wirelessly receiving signals from a remote transmitter. Optionally, the receiver and transmitter are configured such that signals can be sent over a distance of at least 20 metres, preferably at least 100 metres.

[0020] Optionally, the hook block apparatus includes a portable device which includes the transmitter for transmitting signals to the receiver. Optionally, the portable device comprises a remote control device. Alternatively,

the portable device may be a smart device such as a smart phone or tablet which is configured using an app.

[0021] Optionally, the hook block apparatus includes at least one vision sensor, such as a camera. Optionally, the vision sensor is orientated so as to sense the rotational orientation of the hook member.

[0022] Optionally, the vision sensor includes a transmitter for transmitting an image of the hook member to the portable device.

[0023] Optionally, the hook block apparatus is configured to have a safe working load (swl) of at least 30 tonnes, preferably at least 50 tonnes, most preferably 150 tonnes.

[0024] The invention will be described below, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a (a) front view and a (b) side view of a hook block apparatus in accordance with the present invention; and

Figure 2 is a diagrammatic view of the hook block apparatus of Figure 1.

[0025] Figure 1 shows a hook block apparatus 10 comprising an upper portion 12 and a lower portion 14. The upper portion 12 comprises a sheave assembly 20 for receiving a lifting rope of a hoisting device (not shown). The lower portion 14 fixedly connected to, or integral with, the upper portion 12. A hook 30 is rotatably connected to the lower portion 14 via a bearing arrangement 32.

[0026] The hook block apparatus 10 also includes rotation means for rotating the hook 30 relative to the lower portion 14 about a vertical axis. This rotation means is self-contained within the lower portion 14 and so not visible in Figure 1. It is shown diagrammatically in Figure 2.

[0027] The rotation means comprises a first gear 40 provided at the connection of the hook 30 to the lower portion 14. An electric motor 42 has an output shaft 44 which is coupled to the first gear 40 such that operation of the motor 42 causes rotation of the hook 30. Power is supplied to the motor 42 from a sealed 12 volt battery.

[0028] A second gear 46 interposes the first gear 40 and the output shaft 44 of the motor 42. The rotational output speed of the motor 42 and the gear ratios of the first and second gears are selected to allow slow rotating of the hook 30, such as less than 6 RPM.

[0029] The connection of the first gear 40 to the motor 42 impedes unintended rotation of the hook and any suspended load. Also, a rotation sensor 50 is provided for sensing rotation and the direction of rotation of the hook 30. The rotation sensor 50 is connected to the motor 42 such that the motor 42 can apply a rotating force to the hook 30 in an opposite direction to that of any unintended rotation of the hook 30.

[0030] The first gear 40 is selectively disengageable from the hook 30 so that the hook 30 is freely rotatable relative to the lower portion. This can be useful in the event of an electrical failure or the like.

[0031] The rotation means is wirelessly operable from a remote location. The rotation means includes a receiver for wirelessly receiving signals from a remote transmitter. The receiver and transmitter are configured such that signals can be sent over a distance of at least 100 metres.

[0032] The hook block apparatus 10 includes a portable device 60 which includes the transmitter for transmitting signals to the receiver 52. The portable device can be a remote control device or a smart phone or tablet which is configured using an app.

[0033] The hook block apparatus includes a camera 70 which is orientated so as to sense the rotational orientation of the hook 30. The vision sensor can include a transmitter for transmitting an image of the hook 30 to the portable device 60.

[0034] The hook block apparatus 10 can be configured to have a safe working load (swl) of at least 30 tonnes, most preferably 148 tonnes.

[0035] The present invention allows safer rotational positioning of the suspended load from a remote location. It can also selectively allow or resist rotational movement of the suspended load.

[0036] Various modifications and improvements can be made to the above without departing from the scope of the invention.

Claims

1. A hook block apparatus comprising:

   an upper portion comprising a sheave assembly for receiving a lifting rope of a hoisting device;
   a lower portion fixedly connected to the upper portion;
   a hook member which is rotatably connected to the lower portion; and
   rotation means for rotating the hook member relative to the lower portion about a vertical axis,
   wherein the rotation means is selectively operable from a remote location.

2. A hook block apparatus as claimed in Claim 1, wherein the hook member is rotatably connected to the lower portion via a bearing arrangement.

3. A hook block apparatus as claimed in Claim 1 or 2, wherein the rotation means comprises a first gear provided at the connection of the hook member to the lower portion and a motor having an output shaft which is coupled to the first gear such that operation of the motor causes rotation of the hook member.

4. A hook block apparatus as claimed in Claim 3, wherein at least a second gear interposes the first gear and the output shaft of the motor.

5. A hook block apparatus as claimed in Claim 4, wherein at least one of the rotational output speed of the motor and the sizing of at least one of the first and second gears are configured to allow slow rotating of the hook member.

6. A hook block apparatus as claimed in any preceding claim, wherein the rotation means is adapted to prevent or impede unintended rotation of the hook member.

7. A hook block apparatus as claimed in any preceding claim, wherein the hook block apparatus includes a rotation sensor for sensing rotation of the hook member.

8. A hook block apparatus as claimed in Claim 7, wherein the rotation sensor is adapted to sense the direction of rotation.

9. A hook block apparatus as claimed in Claim 7 or 8, wherein the rotation sensor is connected to the rotation means and the rotation means is adapted to apply a rotating force to the hook member in an opposite direction to that of unintended rotation of the hook member.

10. A hook block apparatus as claimed in any preceding claim, wherein the rotation means is selectively disengageable from the hook member such that the hook member is freely rotatable relative to the lower portion.

11. A hook block apparatus as claimed in any preceding claim, wherein the rotation means is wirelessly operable from a remote location.

12. A hook block apparatus as claimed in Claim 11, wherein the rotation means includes a receiver for wirelessly receiving signals from a remote transmitter, and wherein the receiver and transmitter are configured such that signals can be sent over a distance of at least 20 metres.

13. A hook block apparatus as claimed in any preceding claim, wherein the hook block apparatus includes at least one vision sensor.

14. A hook block apparatus as claimed in Claim 13, wherein the vision sensor is orientated so as to sense the rotational orientation of the hook member.

15. A hook block apparatus as claimed in Claim 13 or 14, wherein the vision sensor includes a transmitter for transmitting an image of the hook member to a portable device.

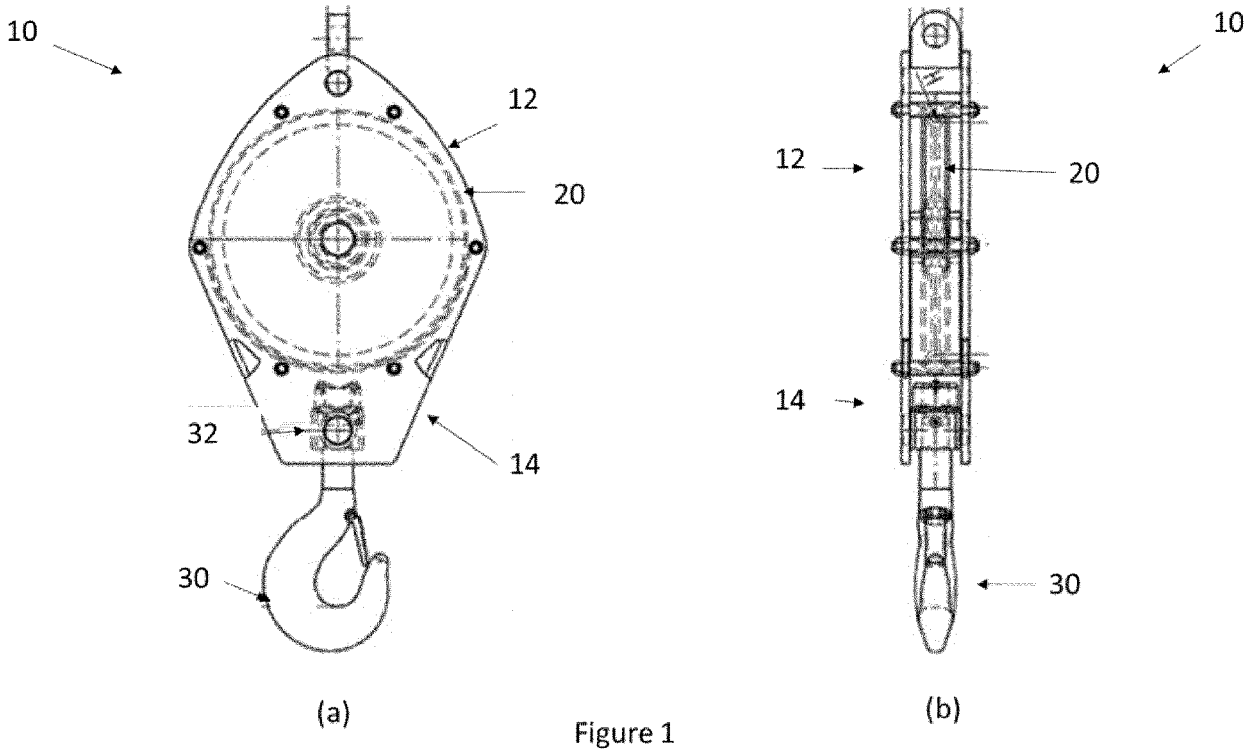

Figure 1

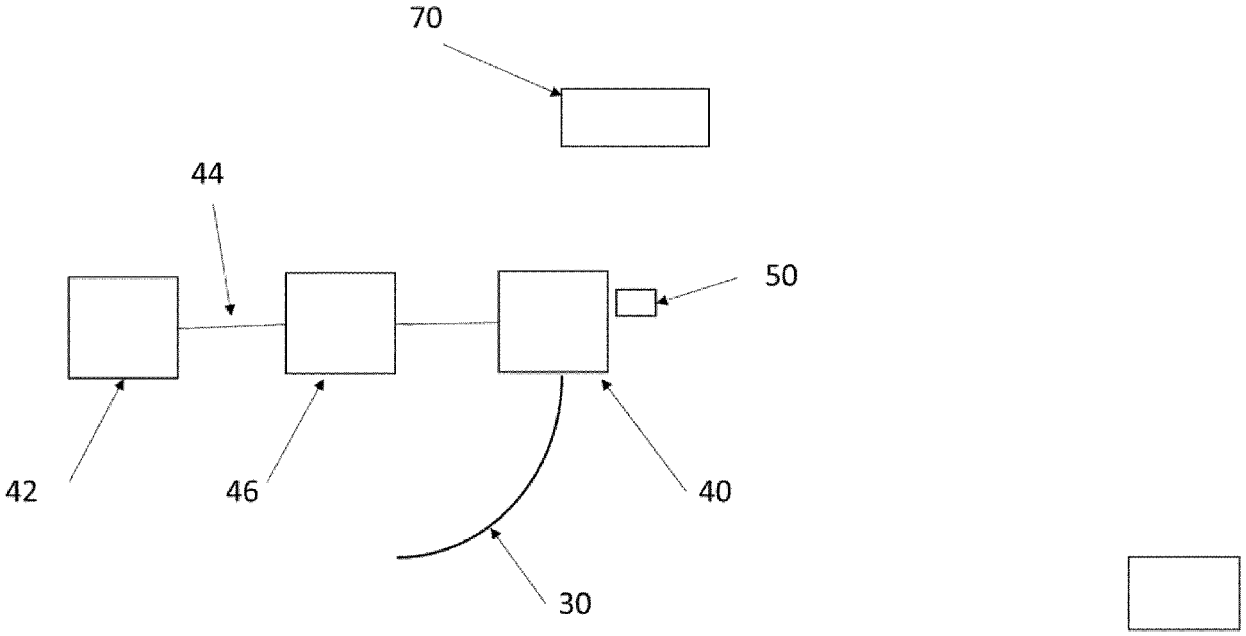

Figure 2

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EUROPEAN SEARCH REPORT

Application Number
EP 21 15 4390

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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X	JP H09 165189 A (TOKYU KENSETSU KK) 24 June 1997 (1997-06-24) * abstract; figures * -----	1-6, 10-12	
Y	EP 2 447 202 A1 (AOKI MACHINERY CO LTD [JP]) 2 May 2012 (2012-05-02) * paragraph [0033]; figures * -----	10	TECHNICAL FIELDS SEARCHED (IPC) B66C B66F
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	14 June 2021	Popescu, Alexandru

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
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E : earlier patent document, but published on, or after the filing date
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 21 15 4390

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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