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(54) **IMPROVED HOOK BLOCK**

VERBESSERTER HAKENBLOCK

BLOC DE CROCHET AMÉLIORÉ

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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 sheaves 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] Document US5071184A discloses a hook block apparatus according with the preamble of claim 1.

[0008] 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.

[0009] Optionally, the hook member is rotatably connected to the lower portion via a bearing arrangement.

[0010] Optionally, the rotation means comprises a first gear provided at the connection of the hook member to the lower portion.

[0011] 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.

[0012] 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.

[0013] In alternative embodiments, the motor may be a hydraulic motor or a pneumatic motor.

[0014] 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.

[0015] The rotation means is adapted to prevent or impede unintended rotation of the hook member.

[0016] The hook block apparatus includes a rotation sensor for sensing rotation of the hook member. The rotation sensor is adapted to sense the direction of rotation.

[0017] 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.

[0018] The rotation means is selectively disengageable from the hook member such that the hook member is freely rotatable relative to the lower portion.

[0019] Optionally, the rotation means is adapted to allow the hook member to be rotated to any orientation through 360 degrees.

[0020] Optionally, the rotation means is wirelessly operable from a remote location.

[0021] 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.

[0022] 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.

[0023] 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.

[0024] Optionally, the vision sensor includes a transmitter for transmitting an image of the hook member to the portable device.

[0025] 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.

[0026] 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.

[0027] 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.

[0028] 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.

[0029] 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.

[0030] 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.

[0031] 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.

[0032] 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.

[0033] 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.

[0034] 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.

[0035] 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.

[0036] The hook block apparatus 10 can be configured to have a safe working load (swl) of at least 30 tonnes, most preferably 148 tonnes.

[0037] 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.

[0038] Various modifications and improvements can be made to the above without departing from the scope of the invention as defined by the claims.

Claims

1. A hook block apparatus (10) comprising:

- an upper portion (12) comprising a sheave assembly for receiving a lifting rope of a hoisting device;
- a lower portion (14) fixedly connected to the upper portion;
- a hook member (30) which is rotatably connected to the lower portion;
- rotation means (40, 42) for rotating the hook member relative to the lower portion about a vertical axis, wherein the rotation means is self contained within the lower portion and wherein the rotation means is selectively operable from a remote location;
- a rotation sensor (50) for sensing rotation of the hook member and adapted to sense the direction of rotation;
- 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 to prevent or impede unintended rotation of the hook member;

characterized in that

the rotation means is selectively disengageable from the hook member such that the hook member is freely rotatable relative to the lower portion.

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. 5
3. A hook block apparatus as claimed in Claim 1 or 2, wherein the rotation means comprises a first gear (40) provided at the connection of the hook member to the lower portion and a motor (42) having an output shaft (44) which is coupled to the first gear such that operation of the motor causes rotation of the hook member. 10
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. 15
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 rotation of the hook member. 20
6. A hook block apparatus as claimed in any preceding claim, wherein the rotation means is wirelessly operable from a remote location. 25
7. A hook block apparatus as claimed in Claim 6, 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. 30
8. A hook block apparatus as claimed in any preceding claim, wherein the hook block apparatus includes at least one vision sensor. 35
9. A hook block apparatus as claimed in Claim 8, wherein the vision sensor is orientated so as to sense the rotational orientation of the hook member. 40
10. A hook block apparatus as claimed in Claim 8 or 9, wherein the vision sensor includes a transmitter for transmitting an image of the hook member to a portable device (60). 45

Patentansprüche

1. Hakenblockvorrichtung (10), umfassend:
einen oberen Abschnitt (12), der eine Seilschei-

benanordnung zum Aufnehmen eines Hubseils eines Hebeegeräts umfasst;
einen unteren Abschnitt (14), der fest mit dem oberen Abschnitt verbunden ist;
ein Hakenelement (30), das drehbar mit dem unteren Abschnitt verbunden ist;
Drehmittel (40, 42) zum Drehen des Hakenelements relativ zu dem unteren Abschnitt um eine vertikale Achse, wobei das Drehmittel in sich geschlossen innerhalb des unteren Abschnitts enthalten ist und wobei das Drehmittel selektiv von einem entlegenen Ort aus bedienbar ist;
einen Drehsensor (50) zum Erfassen der Drehung des Hakenelements und der dazu ausgelegt ist, die Drehrichtung zu erfassen;
wobei der Drehsensor mit dem Drehmittel verbunden ist und das Drehmittel dazu ausgelegt ist, eine Drehkraft auf das Hakenelement in einer entgegengesetzten Richtung zu derjenigen einer unbeabsichtigten Drehung des Hakenelements anzuwenden, um eine unbeabsichtigte Drehung des Hakenelements zu verhindern oder zu behindern;
dadurch gekennzeichnet, dass
das Drehmittel selektiv aus dem Hakenelement ausrückbar ist, sodass das Hakenelement relativ zu dem unteren Abschnitt frei drehbar ist.

2. Hakenblockvorrichtung nach Anspruch 1, wobei das Hakenelement über eine Lageranordnung drehbar mit dem unteren Abschnitt verbunden ist.
3. Hakenblockvorrichtung nach Anspruch 1 oder 2, wobei das Drehmittel ein erstes Zahnrad (40) umfasst, das an der Verbindung des Hakenelements zu dem unteren Abschnitt vorgesehen ist, und einen Motor (42) mit einer Abtriebswelle (44), die an das erste Zahnrad gekoppelt ist, sodass der Betrieb des Motors eine Drehung des Hakenelements bewirkt.
4. Hakenblockvorrichtung nach Anspruch 3, wobei sich mindestens ein zweites Zahnrad zwischen dem ersten Zahnrad und der Abtriebswelle des Motors einfügt.
5. Hakenblockvorrichtung nach Anspruch 4, wobei mindestens eine der Abtriebsdrehzahl des Motors und der Dimensionierung mindestens eines des ersten und zweiten Zahnrads dazu konfiguriert sind, eine langsame Drehung des Hakenelements zu erlauben.
6. Hakenblockvorrichtung nach einem vorhergehenden Anspruch, wobei das Drehmittel drahtlos von einem entlegenen Ort aus bedienbar ist.
7. Hakenblockvorrichtung nach Anspruch 6, wobei das Drehmittel einen Empfänger zum drahtlosen Emp-

fangen von Signalen von einem entlegenen Sender beinhaltet und wobei der Empfänger und der Sender so konfiguriert sind, dass Signale über eine Entfernung von mindestens 20 Metern übermittelt werden können.

8. Hakenblockvorrichtung nach einem vorhergehenden Anspruch, wobei die Hakenblockvorrichtung mindestens einen Visionssensor beinhaltet.
9. Hakenblockvorrichtung nach Anspruch 8, wobei der Visionssensor so orientiert ist, dass er die Drehorientierung des Hakenelements erfasst.
10. Hakenblockvorrichtung nach Anspruch 8 oder 9, wobei der Visionssensor einen Sender zum Senden eines Bildes des Hakenelements an ein tragbares Gerät (60) beinhaltet.

Revendications

1. Appareil de moufle à crochet (10) comprenant :

une partie supérieure (12) comprenant un ensemble poulie pour recevoir un câble de levage d'un dispositif de hissage ;
 une partie inférieure (14) reliée de manière fixe à la partie supérieure ;
 un élément de crochet (30) qui est relié en rotation à la partie inférieure ;
 un moyen de rotation (40, 42) pour faire tourner l'élément de crochet par rapport à la partie inférieure autour d'un axe vertical, ledit moyen de rotation étant autonome à l'intérieur de la partie inférieure et ledit moyen de rotation pouvant être actionné de manière sélective depuis un emplacement distant ;
 un capteur de rotation (50) pour détecter la rotation de l'élément de crochet et adapté pour détecter la direction de rotation ;
 dans lequel le capteur de rotation est relié au moyen de rotation et le moyen de rotation est adapté pour appliquer une force de rotation à l'élément de crochet dans une direction opposée à celle de la rotation involontaire de l'élément de crochet pour empêcher ou entraver la rotation involontaire de l'élément de crochet ;
caractérisé en ce que
 le moyen de rotation peut être sélectivement désengagé de l'élément de crochet de sorte que l'élément de crochet puisse tourner librement par rapport à la partie inférieure.

2. Appareil de moufle à crochet selon la revendication 1, dans lequel l'élément de crochet est relié en rotation à la partie inférieure par l'intermédiaire d'un agencement de palier.

3. Appareil de moufle à crochet selon la revendication 1 ou 2, dans lequel le moyen de rotation comprend un premier engrenage (40) prévu au niveau de la liaison de l'élément de crochet à la partie inférieure et un moteur (42) comportant un arbre de sortie (44) qui est couplé au premier engrenage de sorte que le fonctionnement du moteur provoque la rotation de l'élément de crochet.
4. Appareil de moufle à crochet selon la revendication 3, dans lequel au moins un second engrenage interpose le premier engrenage et l'arbre de sortie du moteur.
5. Appareil de moufle à crochet selon la revendication 4, dans lequel au moins l'un de la vitesse de sortie rotative du moteur et du dimensionnement d'au moins l'un des premier et second engrenages est configuré(e) pour permettre une rotation lente de l'élément de crochet.
6. Appareil de moufle à crochet selon l'une quelconque des revendications précédentes, dans lequel le moyen de rotation peut être actionné sans fil depuis un emplacement distant.
7. Appareil de moufle à crochet selon la revendication 6, dans lequel le moyen de rotation comprend un récepteur pour recevoir sans fil des signaux provenant d'un émetteur à distance, et dans lequel le récepteur et l'émetteur sont configurés de sorte que des signaux puissent être envoyés sur une distance d'au moins 20 mètres.
8. Appareil de moufle à crochet selon l'une quelconque des revendications précédentes, dans lequel l'appareil de moufle à crochet comprend au moins un capteur de vision.
9. Appareil de moufle à crochet selon la revendication 8, dans lequel le capteur de vision est orienté de manière à détecter l'orientation de rotation de l'élément de crochet.
10. Appareil de moufle à crochet selon la revendication 8 ou 9, dans lequel le capteur de vision comprend un émetteur pour transmettre une image de l'élément de crochet à un dispositif portable (60).

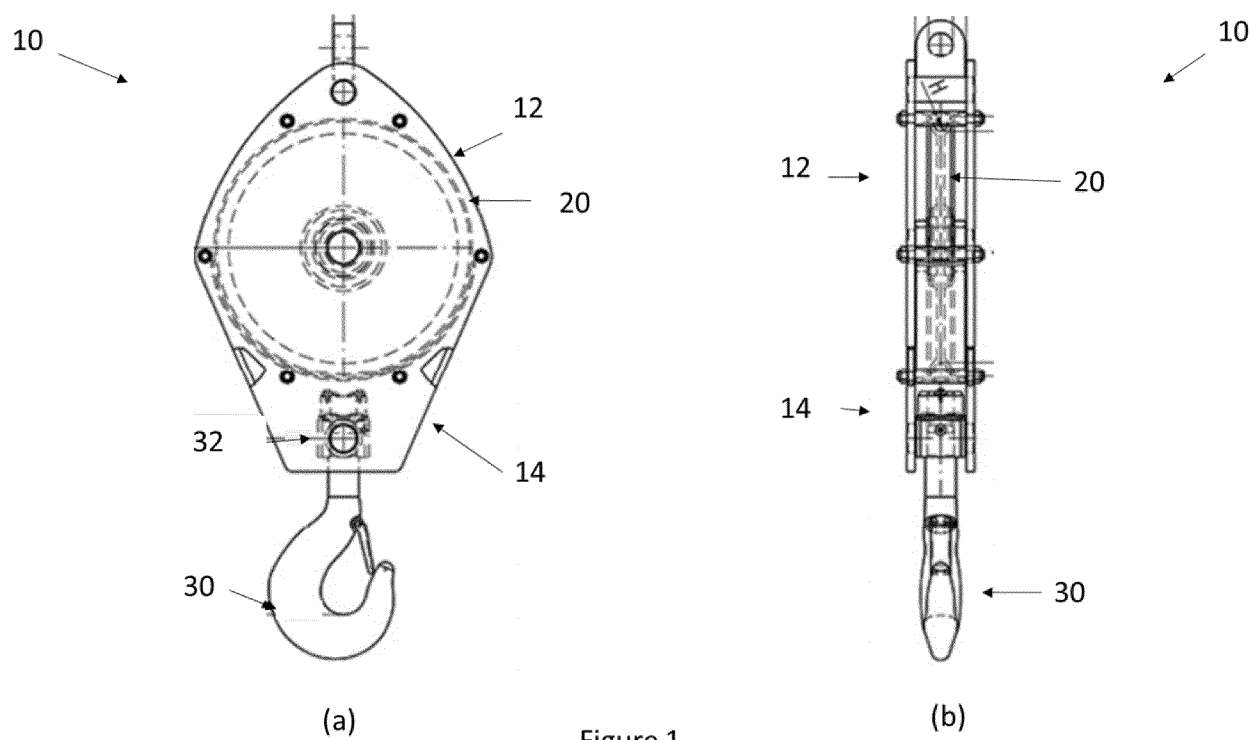
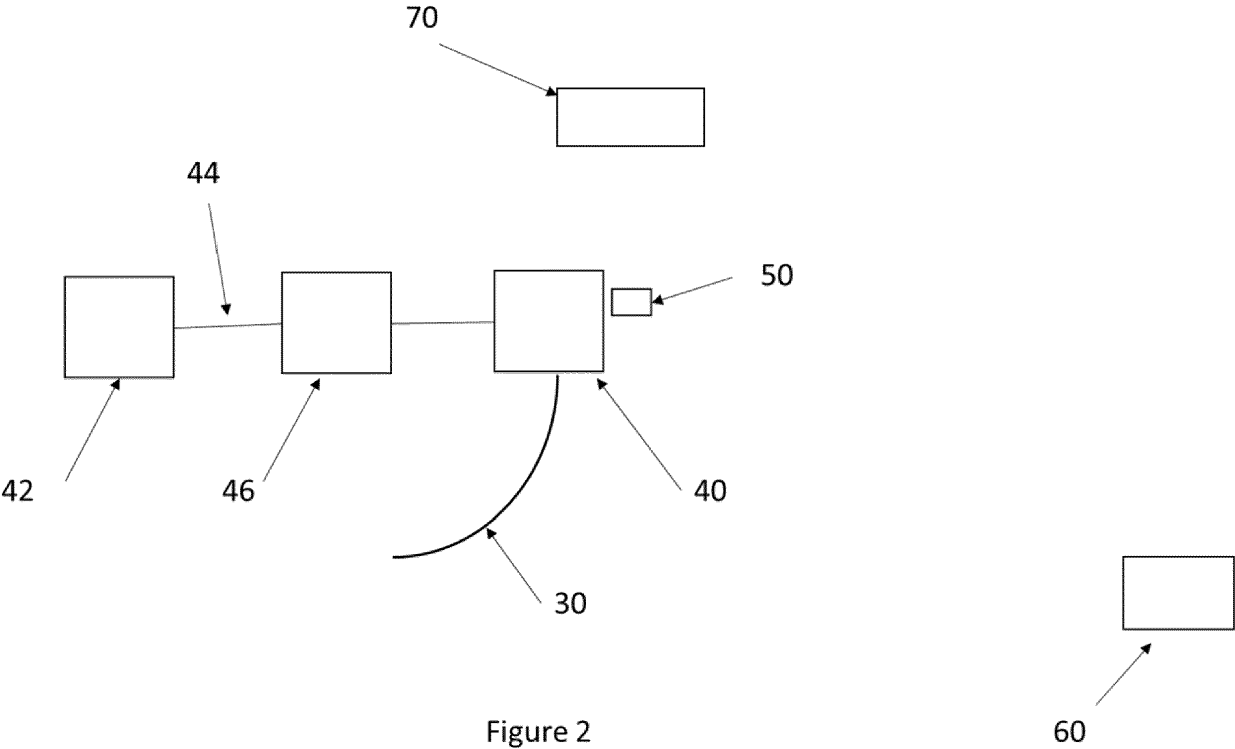


Figure 1



REFERENCES CITED IN THE DESCRIPTION

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