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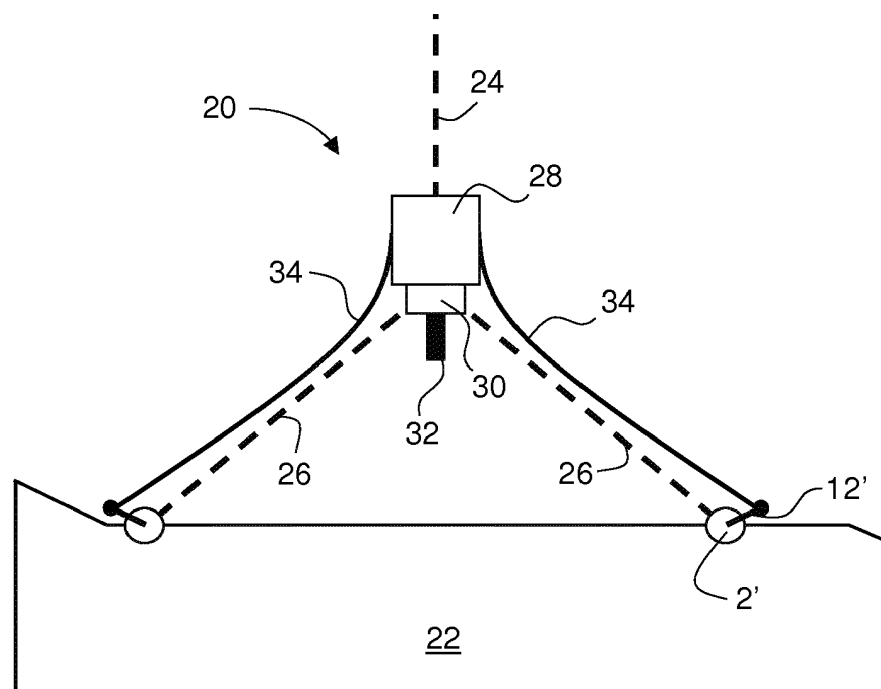
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(54) RELEASE MECHANISM

(57) The present invention relates to a release mechanism suitable for remotely releasing lifting clutches of the type typically used in the lifting and moving of concrete components. The release mechanism (20) comprises a telescoping arrangement of first and second members (28,30) and a locking mechanism (50) selectively engageable to restrain the first and second members (28,30) in a retracted configuration. First and second

connectors (26,34) are attached to the first and second members (28,30) respectively, and an actuator (32) is provided for releasing the locking mechanism (50). Releasing the locking mechanism allows extension of the telescoping arrangement to an extended configuration, altering the relative reach or length of the first and second connectors (26,34) from the first member (28).

**Figure 3A****EP 3 424 864 A1**

Description

[0001] The present invention relates to the field of civil engineering or construction, and more specifically to the lifting and moving of components such as concrete pipe sections.

[0002] Many areas of the construction industry make use of large pre-formed concrete components. For example, large panels can be pre-formed for use as a floor or wall in a building, and large diameter concrete draining pipes are generally formed in sections or around 2.5m in length for assembly on site. The size and weight of the pre-formed sections means that they must be lifted into place using suitable machinery.

[0003] Bespoke lifting tools are available for lifting pipe sections, to accommodate their awkward shape and size. One such device, for mounting to the quick-hitch of an excavator's lifting arm, comprises a beam which passes through the bore of the pipe section and supports the weight along its length. Another comprises jaws which grip the external surface of the pipe. In both cases the lifting tool can be cumbersome to use and/or manoeuvre, and may be difficult to remove from a pipe section once laid in a trench.

[0004] It is also known to lift pipe sections using a crane hoist or similar attached to slings passed around or through pipe sections. Slings are used to avoid damaging the pipe sections, but this creates risks associated with possibly damaged or defective slings breaking during use. Removal of the slings after a lifting operation can also remain problematic.

[0005] In order to provide suitable lifting points for pipe sections, it is known to include steel anchors in the walls of the pipe sections during their manufacture. The anchors are cast into the walls of the pipe sections during forming, and the heads of the anchors are typically provided in hemispherical recesses so as not to protrude from the outer surface of the wall. The anchors may comprise a loop or eye, or may simply have an enlarged head, for example a spherical head, to be received by a suitable lifting clutch.

[0006] The lifting clutches used with anchors of this type typically comprise a form of gate which is rotatable between an open position, in which the clutch can be positioned over the head of the anchor, and a closed position in which the clutch passes through or around the head of the anchor to form a secure connection allowing the component to be lifted using a suitable crane hoist or similar. A lever or 'tail' is provided to allow rotation of the gate between the open and closed positions.

[0007] Chains can be attached to the lifting clutches without risk of damaging the pipe sections, and the lifting operation is therefore more secure. However, there remain risks to operators because the clutches need to be manually set before lifting, and released after a lifting operation is complete. The risks are particularly high when releasing the clutches. Firstly, the access to the tails of the clutches is more likely to be impeded once a

pipe section is in position in a trench. Secondly, there is a risk that the pipe section may not be properly settled and could move, causing a crush risk.

[0008] It is an aim of the present invention to overcome or mitigate these problems.

[0009] According to the present invention there is provided a release mechanism as defined in the appended claim 1. Further beneficial features are recited in the associated dependent claims.

[0010] The release mechanism comprises a telescoping arrangement of a first member and a second member having a retracted configuration and an extended configuration, and a locking mechanism selectively engageable to restrain the first and second members in the retracted configuration. A first connector is attached to and extends from the first member and a second connector is attached to and extends from the second member. The first and/or second connectors can be connected to different parts of a lifting clutch, hook or similar.

[0011] An actuator is provided for releasing the locking mechanism, and allowing extension of the telescoping arrangement to its extended configuration. This alters the relative reach or length of the first and second connectors from the first member.

[0012] Varying the relative reach of the first and second connectors allows a load passing through the release mechanism to be applied either solely or initially to a first part of a lifting clutch or hook, or to a second part. The first part may be a body or fixed lifting/hauling loop of the clutch or hook, and the second part may be a release actuator, lever etc.

[0013] For example, the telescoping arrangement can be oriented generally vertically to bear the weight of an article to be lifted. One of the first or second connectors has a shorter reach when the telescoping arrangement is in its retracted configuration, and bears the weight of the article. The other connector is connected to a release lever or similar, but its longer reach means that it applies no load. When the telescoping arrangement moves to its extended configuration, the relative reach of the first or second connectors changes, so that load is applied to the release lever (to disengage the hook or clutch) before the weight of the component is lifted.

[0014] A lifting chain may be connected to the first member for lifting the release mechanism using, for example, a crane hoist.

[0015] The locking mechanism may comprise a movable engagement surface or ledge which selectively prevents movement of the second member beyond a first axial position relative to the first member, or a collapsible linkage connected between the first and second members, perhaps defining both first and second axial positions.

[0016] The telescoping arrangement may be oriented substantially vertically during use, such as in a lifting operation, with the second member extending below the first member.

[0017] The actuator may extend below the second

member and be operated by bearing against a solid surface under the weight of the telescoping arrangement. The solid surface may be the component being lifted, or any other suitably hard surface.

[0018] The first member may comprise a housing and the second member may comprise a core received within the housing.

[0019] Extension of the telescoping arrangement to its extended configuration may reduce the reach of the second connector relative to the first connector. In other words, the length or reach of the first connector may remain constant, and the reach of the second connector, from the first member, may reduce when the telescoping arrangement is in its extended configuration. The reach, from the first member, of the first connector may thus be shorter than the reach of the second connector from the first member when the telescoping arrangement is in its retracted configuration, and longer than the reach of the second connector from the first member when the telescoping arrangement is in its extended configuration.

[0020] The first connector may comprise a chain, for example a lifting chain, for bearing the weight of an article to be lifted.

[0021] The second connector may comprise a wire or cable, for connection to a lever or similar for releasing a hook or clutch.

[0022] A roller may be provided on the first member, and the second connector may pass from the second member over the roller provided on the first member.

[0023] The first connector may be attached directly to the first member.

[0024] Alternatively, the first connector may be attached to the first member via a beam or bar extending outwards from the first member. The beam or bar may be of any type, and may extend generally horizontally from the first member in one or more directions.

[0025] Where a beam or bar is provided, a lifting chain may be attached to the beam or bar for lifting the release mechanism, and/or a roller may be provided on the beam, and the second connector may pass over the roller provided on the beam.

[0026] Extension of the telescoping arrangement to its extended configuration may, alternatively, increase the reach of the second connector relative to the first connector. In other words, the length or reach of the first connector from the first member may remain constant, and the reach of the second connector, from the first member, may increase when the telescoping arrangement is in its extended configuration. The reach, from the first member, of the first connector may thus be longer than the reach of the second connector from the first member when the telescoping arrangement is in its retracted configuration, and shorter than the reach of the second connector from the first member when the telescoping arrangement is in its extended configuration.

[0027] The second connector may comprise a chain, for example a lifting chain, for bearing the weight of an article to be lifted.

[0028] The first connector may comprise a wire or cable, for connection to a lever or similar for releasing a hook or clutch.

[0029] A clutch release system may also be provided, comprising a lifting clutch with a body, a gate movable relative to the body, and a gate release actuator; and a release mechanism as previously described

[0030] The first connector may be attached to a body of the lifting clutch and the second connector to the gate release actuator, or the second connector may be attached to a body of the lifting clutch and the first connector to the gate release actuator as appropriate. In essence, the connector having the shorter reach when the telescoping arrangement is retracted should be attached to the body of the lifting clutch to bear the weight of an article during lifting.

[0031] The gate may comprise a rotating component for passing through or around a fixed anchor. For example, a rotating clutch head may be provided with a channel around a part of its periphery for receiving an enlarged head portion of an anchor fixed to a component, or a static clutch head may house a rotatable ring like latch to engage a loop provided in or on an anchor, or pass under a horizontal bar.

[0032] The release actuator may comprise a lever, for rotating the gate, or may comprise a quick-release mechanism.

[0033] It should be understood that more than one (for example two, three or four) first and or second connectors could be provided in the release mechanism to simultaneously release additional clutches or hooks if required. It should similarly be understood that the clutch release system may likewise include additional clutches, for example two, three, or four clutches as required.

[0034] Any of the optional features described in relation to any single aspect of the invention may be applied to any other aspect of the invention.

[0035] Practicable embodiments of the invention are described in further detail below with reference to the accompanying drawings, of which:

Figure 1A shows an example of a known lifting clutch for lifting concrete components;

Figure 1B is a cross-sectional view of part of the lifting clutch shown in Figure 1;

Figure 2 shows an alternative known lifting clutch;

Figures 3A to 3C are schematic side views of one embodiment of the present invention in use during lifting of a concrete pipe section;

Figures 4A to 4C are schematic side views of an alternative embodiment of the present invention in use during lifting of a concrete pipe section;

Figures 5A to 5C are schematic side views of a fur-

ther alternative embodiment of the present invention in use during lifting of a concrete pipe section; and

Figure 6 shows an example of a locking mechanism for use in the present invention.

[0036] An example of a known lifting clutch 2 is shown in Figure 1A. The lifting clutch 2 briefly comprises a lifting loop 4 and a generally spherical clutch head 6 which is rotatable relative to the lifting loop 4. The clutch head 6 has an internal cavity 9 accessed via a channel 8 around a part of its periphery with a wider opening portion 10 provided at one end of the channel. A lever 12, sometimes referred to as a 'tongue' or 'tail', is provided to allow a user to rotate the clutch head 6 easily when required to attach or detach the clutch 2 during use.

[0037] Figure 1B shows a cross-sectional view of the clutch head 6 attached to an anchor 14 which comprises a stem 13 and an enlarged head portion 15. The anchor 14 would, in use, be provided in a recess in a concrete component, the recess being sized to receive the clutch head 6. As shown in Figure 2B, the enlarged anchor head 15 is received in the cavity 9 and the edges of the channel 8 are closely abutting the stem 13 of the anchor 14. The enlarged anchor head 15 cannot pass through the channel 8 and the clutch 2 is, therefore, secured to the anchor 14. One advantage of an anchor 14 of this type is that the clutch 2 can be attached to lift in any direction as required.

[0038] It will be understood that rotating the tail 12 in the direction of arrow 16 will rotate the clutch head 6 relative to the anchor 14 until the opening portion 10 of the channel 8 is aligned with enlarged anchor head 15, allowing removal of the clutch 2 from the anchor 14. Clearly, attaching the clutch 2 to an anchor 14 is achieved by placing the opening 10 over the enlarged anchor head 15 and rotating the tail 12 in the opposite direction.

[0039] An alternative lifting clutch 2', known as a ring clutch, is illustrated in Figure 2. The ring clutch 2' has a lifting loop 4' and a clutch head 6' similar to the clutch 2 shown in figures 1A and 1B, but instead of the clutch head 6' rotating relative to the lifting loop 4', rotation of the lever/tail 12' instead moves a ring like latch 18 within the clutch head 6'. The ring clutch 2' is intended to be connected to horizontal bars or through preformed loops embedded in a component, rather than around the head of an anchor 14 as shown in figure 1B, but the operation to secure and release the ring clutch 2' is essentially as previously described. Although more restrictive in the directions in which they can be attached, ring clutches 2' are typically easier to engage and disengage, generally requiring less manipulation than the clutches shown in Figures 1A and 1B.

[0040] Actuation of the levers/tails 12,12' is typically performed by hand by a site worker. When attaching or 'setting' a clutch the close proximity of a worker can be beneficial in ensuring that the connection is correct and sound. However, the need for a worker to approach a

component and release the clutches 2,2' creates health and safety risks as discussed above, as well as potentially slowing work on site.

[0041] A first embodiment of the invention will now be described with reference to Figures 3A to 3C. Figure 3A shows a section of concrete pipe 22 being lifted using an arrangement of chains 24,26 and a clutch release mechanism 20 to allow a pair of ring clutches 2' to be released remotely.

[0042] The clutch release mechanism 20 comprises a first member 28, in the form of a steel housing. A second, core, member 30, also formed from steel, is received within the housing 28 in a telescoping arrangement, and is coupled thereto by a locking mechanism 50 (see Figure 6) which can selectively retain the core 30 within the housing 28 in a first defined axial position, or allow movement of the core 30 to a second axial position relative to the housing 28. An actuator 32 is also provided, extending below the core 30, to selectively release the locking mechanism when required.

[0043] As shown in Figure 3A, the release mechanism 20 is in a first, 'lifting', configuration, with a large degree of overlap between the core 30 and the housing 28, ie the telescoping arrangement of the core 30 and housing 28 is in a retracted configuration. The locking mechanism is holding the core 30 in a first axial position relative to the housing 28 such that the core 30 cannot move downwards to extend further from the housing 28. The locking mechanism 50 may be selected from a number of known types. For example, a moveable stop may be provided to hold the core in the first axial position, with a fixed stop defining the second axial position. A ratchet, cam or rocker may be associated with the movable stop, and may be tripped or actuated every time a component moves past to alternatively allow and prevent movement of the core 30 past the movable stop. Alternatively, a linkage having a collapsible 'knee' joint may be provided between the core 30 and the housing 28. A latch or trip link may be provided to selectively retain the knee in a bent configuration, providing the first axial position of the core 30, or allow the linkage to extend until the core 30 is in a second axial position.

[0044] The housing 28 is suspended from a primary lifting chain 24 attached to a crane hoist or similar, and a pair of secondary lifting chains 26 are connected between the core 30 and a pair of lifting clutches 2', each similar to that shown in Figure 2. The clutch release mechanism 20 also comprises a pair of actuation cables 34, formed from wire rope, connected between the housing 28 and the tails 12' of the lifting clutches 2'. As shown in Figure 3A, the lifting clutches 2' are set in their closed position, and the lifting chains 24,26 are under tension as the pipe section is lifted. The tension in the system during lifting naturally resists rotation of the tails 12' of the lifting clutches 2', but in any case the cables 34 are sufficiently long that slack is provided and no force is applied to the tails 12'.

[0045] Figure 3B shows the same pipe section 22 hav-

ing been lowered into position, and the clutch release mechanism 20 being actuated to move from the lifting configuration shown in Figure 3A to a second, 'releasing', configuration. Once the pipe section 22 has been lowered to the ground, the clutch release mechanism 20 is lowered further until the actuator 32 contacts the top of the pipe section 22 and the lifting chains 24,26 fall slack. The weight of the housing 28 and the core 30 together are sufficient to operate the actuator 32 and trip or release the locking mechanism between the housing 28 and the core 30. This allows the core 30 to move within the housing 28 to a second, extended, position as shown in Figure 3C when the arrangement is lifted clear of the pipe section 22.

[0046] Figure 3C shows the clutch release mechanism 20 having released the lifting clutches 2' as it is lifted clear of the pipe section 22. The lifting chains 24,26 in Figure 3C are again shown under tension as the clutch release mechanism 20 is lifted by the primary lifting chain 24. The core 30 has moved, under its own weight, from the position shown in Figure 3A to an extended position where it protrudes further from the housing 28, and is prevented from extending beyond this second axial position by the locking mechanism or simply by interference between the core 30 and the housing 28.

[0047] The extended position of the core 30 effectively increases the distance between the mounting points of the cables 34 on the housing 28 and the secondary lifting chains 26 on the core 30. As a result, lifting the arrangement vertically applies tension to the cables 34 before tension is created in the secondary lifting chains 26. With no force applied directly to the clutches 2' by the secondary lifting chains 26, the tension in the cables 34 has rotated the tails 12' of the lifting clutches 2', in the direction of arrow 16, to release the clutches as previously described. Further lifting of the arrangement will lift the clutches 2' free from the pipe section 22 without direct interaction from a worker.

[0048] In order to return the clutch release mechanism 20 from the releasing configuration shown in Figure 3C to the lifting configuration of Figure 3A, the actuator 32 need only be lowered into contact with the surface of the pipe section 22, or another hard surface, to move the core 30 back into its first axial position, where it will be caught by the locking mechanism ready for further use.

[0049] The clutch release mechanism 20 described above is simple in construction and operation. However, it will be understood that the locking mechanism between the housing 28 and the core 30 must be sufficiently robust to bear the weight of the pipe section 22 during a lifting operation. In the event of a failure of the locking mechanism during lifting, the core 30 can be prevented from passing completely through the housing by a physical stop or other interference between the core 30 and the housing, but there remains a risk that the lifting clutches 2' could release unless a fail-safe, perhaps in the form of an engineered weak point in the cables 34, is provided.

[0050] Figures 4A to 4C show a second embodiment

of the invention. The second embodiment is similar in many ways to the first embodiment previously described, and is illustrated in the same three stages of operation. The main difference is that in the clutch release mechanism 120 of the second embodiment both the primary lifting chain 124 and the secondary lifting chains 126 are attached to the housing 128, with the cables 134 attached to the core 130. A benefit of this arrangement is that the locking mechanism provided between the housing 128 and the core 130 need not bear the weight of the pipe section 22 during lifting. The problem discussed above for the first embodiment is therefore avoided.

[0051] The operation of the clutch release mechanism 120 of Figure 4A remains similar to the clutch release mechanism 20 of the first embodiment because the cables 134 are passed over rollers or pulleys 136 provided on the housing 128 before being attached to the core 130.

[0052] When the actuator 132 is lowered into contact with the pipe section 22, as shown in Figure 4B, the locking mechanism is released to allow the core 130 to move downwards from the lifting position to the release position, shown in Figure 4C. The downward movement of the core 130 draws the cables 134 over the pulleys 136 to create tension in the cables 134 and releasing the clutches 2' as before, by rotating the tails 12' in the direction of arrow 16. As in the first embodiment, once the locking mechanism has been released, lifting generates tension in the cables 134 before the secondary lifting chains 126.

[0053] The weight of the core 130 is sufficient to actuate the tails 12 of the clutches 2' only when there is no tension on the secondary lifting cables 126. Accordingly, a failure in the locking mechanism of the clutch release mechanism 120 of the second embodiment during a lifting operation will not result in release of the clutches 2'. The locking mechanism is therefore less likely to fail during use, and any failures that do occur are less problematic.

[0054] Resetting the clutch release mechanism 120 to a 'lifting' configuration is achieved as in the first embodiment.

[0055] A third embodiment of the invention is shown in Figures 5A to 5C. The third embodiment is similar to the second embodiment, and differs primarily in that a spreader beam 238 is provided. The housing 228 is attached to the spreader beam 238 at its centre, and two primary lifting chains 224 are attached at the ends of the spreader beam 238 for attachment to a crane hoist or similar, possibly via a further single chain. The two secondary lifting chains 226 hang substantially vertically from the spreader beam 238, and are spaced to match the spacing of the lifting points on the pipe section 22. This provides a more direct lift and minimises the strain on the secondary lifting chains 226 during a lifting operation.

[0056] Rollers or pulleys 236 are provided on the housing 228, as in the second embodiment, and further rollers or pulleys 240 are provided on the spreader beam 238,

again spaced to match the spacing of the lifting points on the pipe section 22. The cables 234 run from the tails 12' of the lifting clutches 2' over the pulleys 240 on the spreader beam, then over the pulleys 236 on the housing 228 before being attached to the core 230.

[0057] As in the other embodiments, Figure 5A shows the clutch release mechanism 220 in the 'lifting' configuration, with the core 230 held in a first axial position within the housing 228 by the locking mechanism. The primary and secondary lifting chains 224,226 are under tension, and the cables 234 are slack.

[0058] The clutch release mechanism 220 is moved to the 'releasing' configuration by lowering the arrangement until the actuator 232 makes contact with the pipe section 22 as shown in Figure 5B. The secondary lifting chains 226 and cables 234 are slack, indicating that the weight of the arrangement is borne by the actuator 232. This releases the locking mechanism allowing the core 230 to extend from the housing 228 when lifted as shown in Figure 5C.

[0059] The weight of the core 230 draws the cables 234 over both sets of pulleys 238,240 as it moves to its second axial position relative to the housing 228. The tension in the cables 234 rotates the tails 12' of the clutches 2' in the direction of arrow 16 and thus release the clutches 2' from the pipe section 22. As in the second embodiment, the weight of the core 230 is only sufficient to release the clutches 2' when there is no tension in the secondary lifting chains 226.

[0060] The third embodiment allows the cables 234 to drop substantially vertically to the tails 12' of the clutches 2'. This can help to ensure that the clutches 2' are released by the system regardless of the orientation of the tails 12' relative to the pipe section. In contrast, the clutch release mechanisms 20, 120 of the first two embodiments are intended for use with clutches 2' oriented so that their tails 12' point outwards, away from the angled secondary lifting chains 26 as shown in the Figures.

[0061] Resetting the clutch release mechanism 220 to a 'lifting' configuration is achieved as in the first and second embodiments, ie by again lowering the actuator 232 onto a suitable hard surface.

[0062] An example of a locking mechanism 50 is shown in Figure 6. Briefly, the locking mechanism 50 comprises a top link 52 and a bottom link 54 connected at a pivot point 56. The top link 52 has a generally L-shaped opening or slot 58 and the bottom link 54 has a straight, generally vertical opening or slot 60. The slots 58,60 receive locating pins 59,61 provided on the housing 28,128,228 of the telescoping arrangement.

[0063] In the position shown in figure 6, the locking mechanism 50 provides an upper surface or ledge 62 on the top link 52 for supporting the core 30,130,230 of the telescoping arrangement in the first axial position as previously described. A lower engagement surface 64 is provided on the bottom link 54 to release the locking mechanism 50. When the actuator 32 is engaged with a surface, a bar or similar structure engages the engagement

surface 64 and lifts the entire locking mechanism 50 in the direction of arrow 66. The generally vertical slot 60 and its respective pin 61 constrain movement of the bottom link 54 to a generally vertical direction, but the L-shaped slot 58 allows the top link 52 to fall or collapse in the direction of arrow 68, rotating about the pivot point 56, once the relevant locating pin 59 reaches the corner of the L-shaped slot 58. A weight 70 is provided on the top link 52 to encourage this movement.

[0064] Releasing the upwards force applied to the engagement surface 64 allows the locking mechanism 50 to move vertically downwards, and the pin 59 received in the L-shaped slot 58 moves from the corner to the horizontal part of the L-shaped slot 58 as shown in Figure 6 so that the top link 52 remains in this collapsed position once the force is removed.

[0065] With the top link 52 collapsed as described, the ledge 62 of the top link is clear of the core 30,130,230, which is then able to move downwards past the top link 52 until it reaches the second axial position where it is prevented from extending further by a fixed stop. This corresponds to the extended position of the core 30,130,230 or the 'releasing' configuration of the clutch release mechanism 20, 120, 220.

[0066] A subsequent vertical force applied to and released from the engagement surface 64 serves to move the locking mechanism 50 back to the configuration shown in Figure 6. The same vertical force contracts the telescoping mechanism, so the core 30,130,230 is again restrained in the first axial position.

[0067] The embodiments described above are provided by way of example only, and are not intended to limit the protection sought. Suitable alternative material to those described would be known to a skilled reader, features described in relation to one embodiment could be used in other embodiments where appropriate, and various modifications could be made without departing from the scope of the invention.

[0068] For example, it is envisaged that the release mechanisms described would work not only with ring clutches 2' of the type shown in Figure 2, but also with other lifting clutches or hooks with a suitable latch or gate arrangement, including double hooks providing a scissor-type or 'pincer' mechanism, or expanding lifters such as that produced by Obelix Lifting Systems Pty Limited. Hook or clutch designs employing a form of quick release mechanism would be particularly suitable for use with the present invention.

[0069] In certain embodiments, the housing and core could be reversed such that the core is attached to a primary lifting chain with an outer member or sleeve moving relative thereto.

[0070] The illustrated embodiments all show an arrangement for attaching to a pair of lifting points, allowing the release of two lifting clutches simultaneously. However, the invention would also function for just a single lifting point or, with additional chains, cables and possibly rollers or pulleys, could release additional clutches from

additional lifting points if required. At least three or four lifting points could be accommodated without significant modification. The spreader beam 238 of the third embodiment could be replaced with a frame or a pair of crossed beams if required.

[0071] The embodiments are described in the context of lifting heavy concrete pipe sections 22, so chains and steel ropes/cables are described. It will be understood, however, that there is nothing to prevent the use of the present invention in lifting other components, or articles formed from alternative materials such as wood or stainless steel so long as appropriate connection points are provided. Where weight limits allow, the described chains and cables could be replaced with alternative connectors, such as wires, ropes etc.

Claims

1. A release mechanism comprising:
 - a telescoping arrangement of a first member and a second member having a retracted configuration and an extended configuration;
 - a locking mechanism selectively engageable to restrain the first and second members in the retracted configuration;
 - a first connector attached to and extending from the first member and a second connector attached to and extending from the second member; and
 - an actuator for releasing the locking mechanism; wherein extension of the telescoping arrangement to its extended configuration alters the relative reach or length of the first and second connectors from the first member.
2. A release mechanism according to claim 1, wherein a lifting chain is connected to the first member for lifting the release mechanism.
3. A release mechanism according to claim 1 or 2, wherein the locking mechanism comprises a movable engagement surface which selectively prevents movement of the second member beyond a first axial position relative to the first member.
4. A release mechanism according to any of claims 1 or 2, wherein the locking mechanism comprises a collapsible linkage connected between the first and second members.
5. A release mechanism according to any preceding claim, wherein the telescoping arrangement is oriented substantially vertically during use, with the second member extending below the first member.
6. A release mechanism according to claim 5, wherein the actuator extends below the second member and is operated by bearing against a solid surface under the weight of the telescoping arrangement.
7. A release mechanism according to claim 6, wherein the solid surface is a component being lifted.
8. A release mechanism according to any preceding claim, wherein the first member comprises a housing and the second member comprises a core received within the housing.
9. A release mechanism according to any preceding claim, wherein extension of the telescoping arrangement to its extended configuration reduces the reach of the second connector relative to the first connector.
10. A release mechanism according to claim 9, wherein a roller is provided on the first member, and the second connector passes from the second member over the roller provided on the first member.
11. A release mechanism according to claim 9 or 10, wherein the first connector is attached directly to the first member.
12. A release mechanism according to claim 9 or 10, wherein the first connector is attached to the first member via a beam extending outwards from the first member, and wherein a lifting chain is attached to the beam for lifting the release mechanism.
13. A release mechanism according to claim 12, wherein a roller is provided on the beam, and wherein the second connector passes over the roller provided on the beam.
14. A release mechanism according to any of claims 1 to 8, wherein extension of the telescoping arrangement to its extended configuration increases the reach of the second connector relative to the first connector.
15. A clutch release system comprising a lifting clutch with a body, a gate movable relative to the body, and a gate release actuator; and a release mechanism according to any of the preceding claims; wherein one of the first and second connectors is connected to a body of the lifting clutch and the other of the first and second connectors is connected to the gate release actuator.

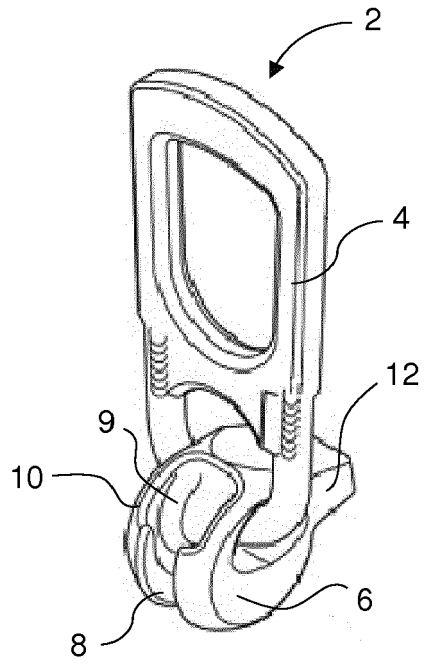


Figure 1A

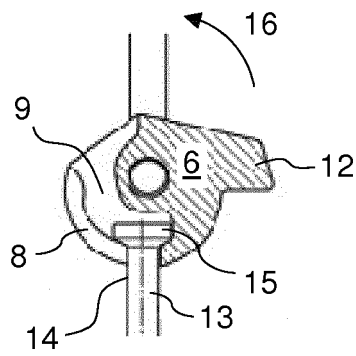


Figure 1B

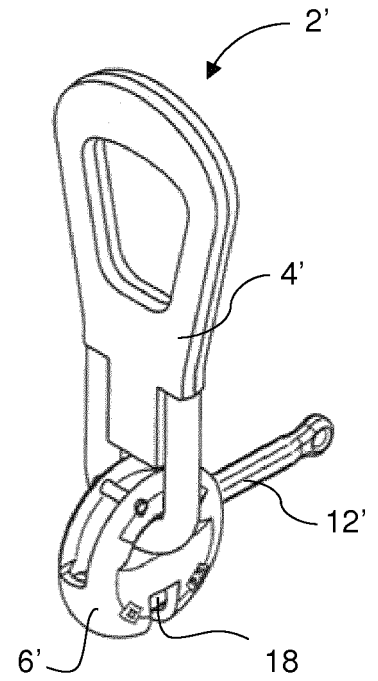


Figure 2

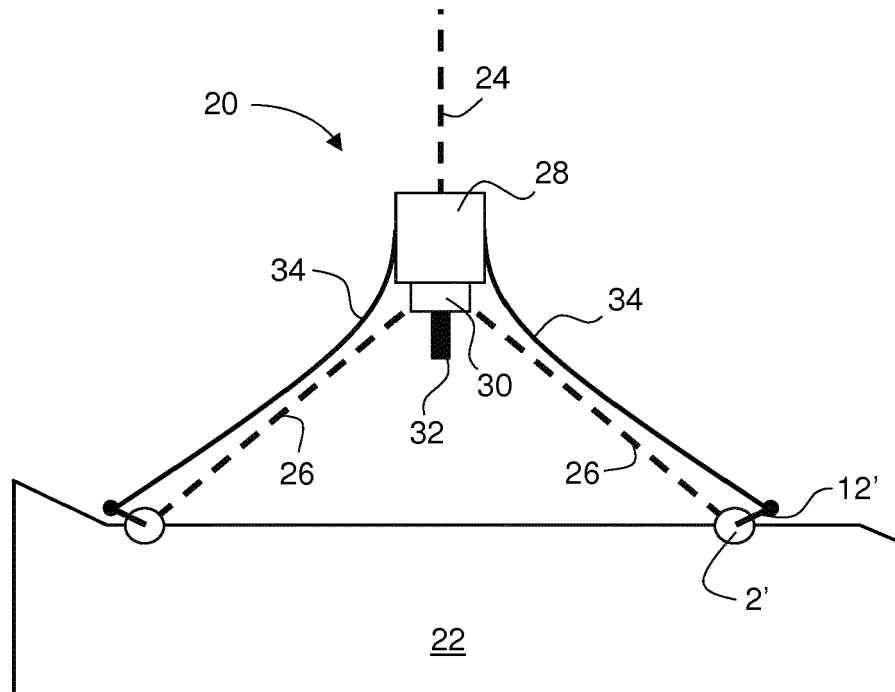


Figure 3A

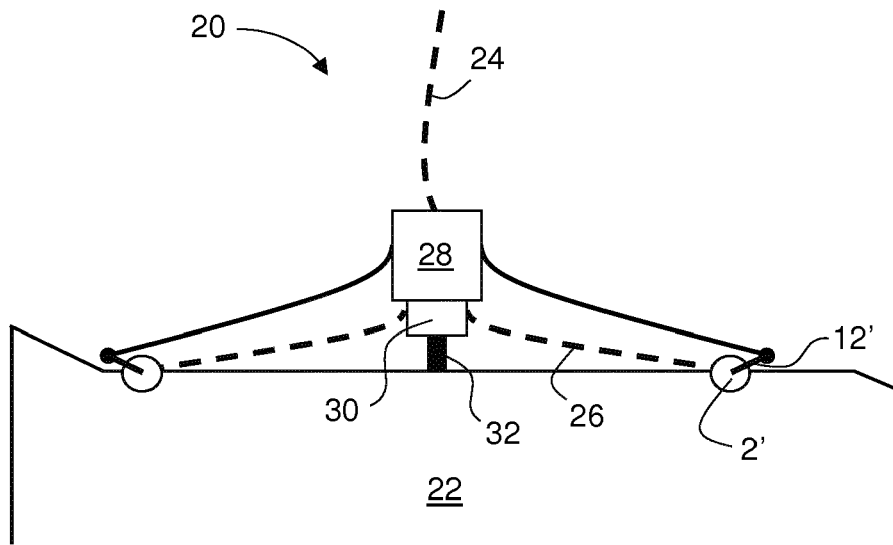


Figure 3B

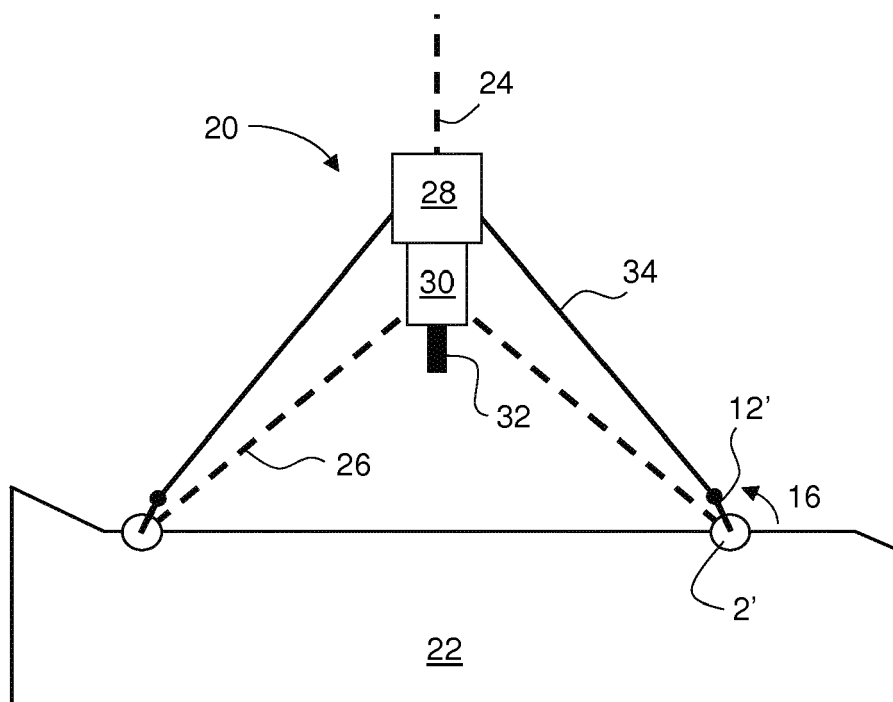


Figure 3C

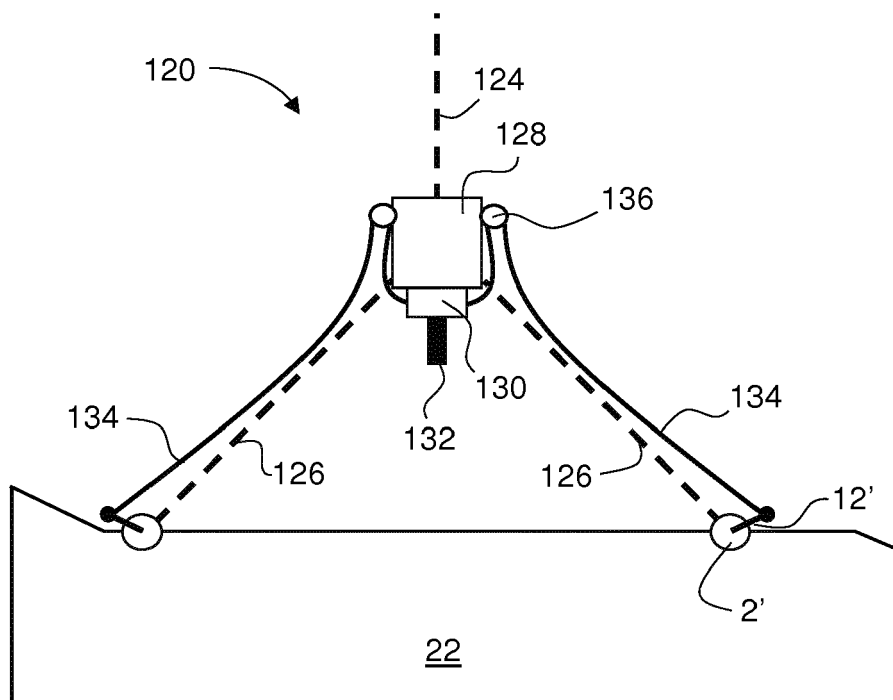


Figure 4A

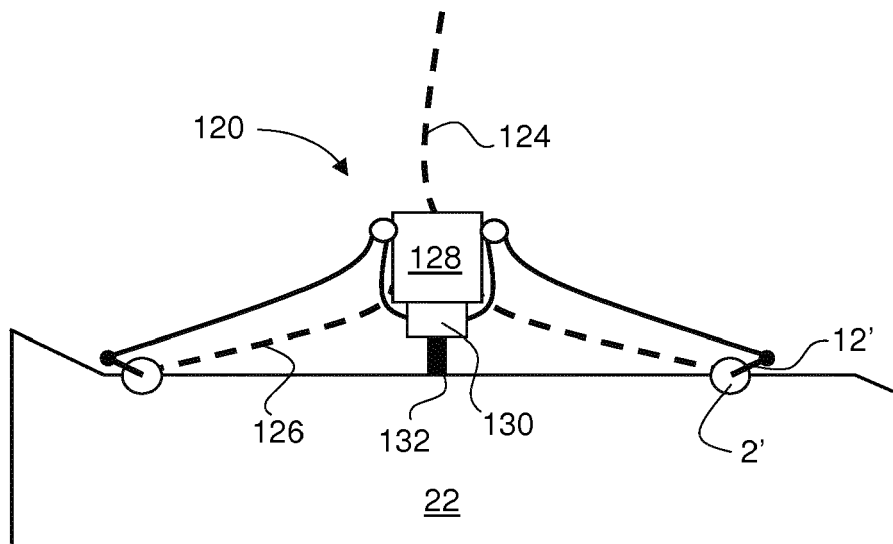


Figure 4B

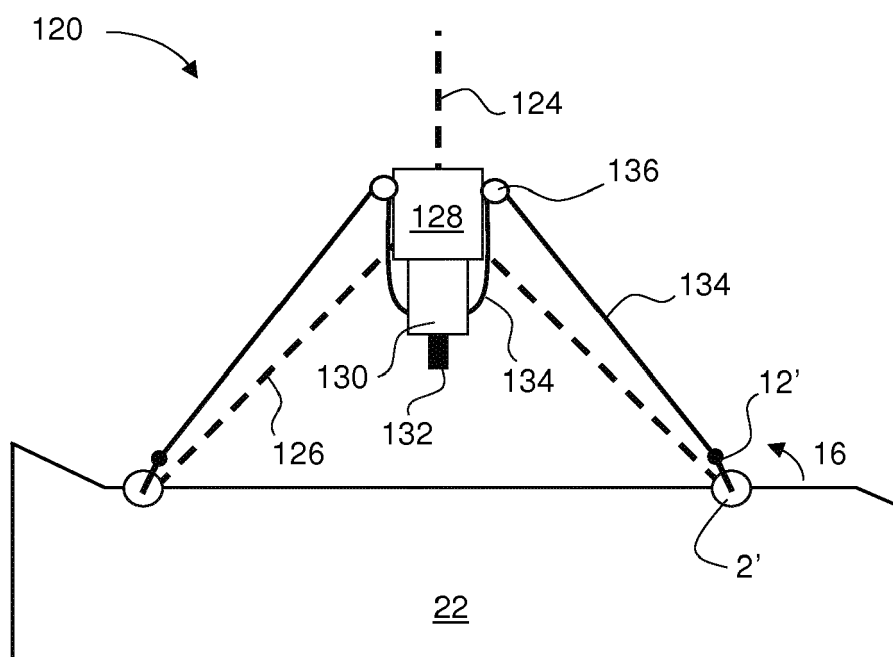


Figure 4C

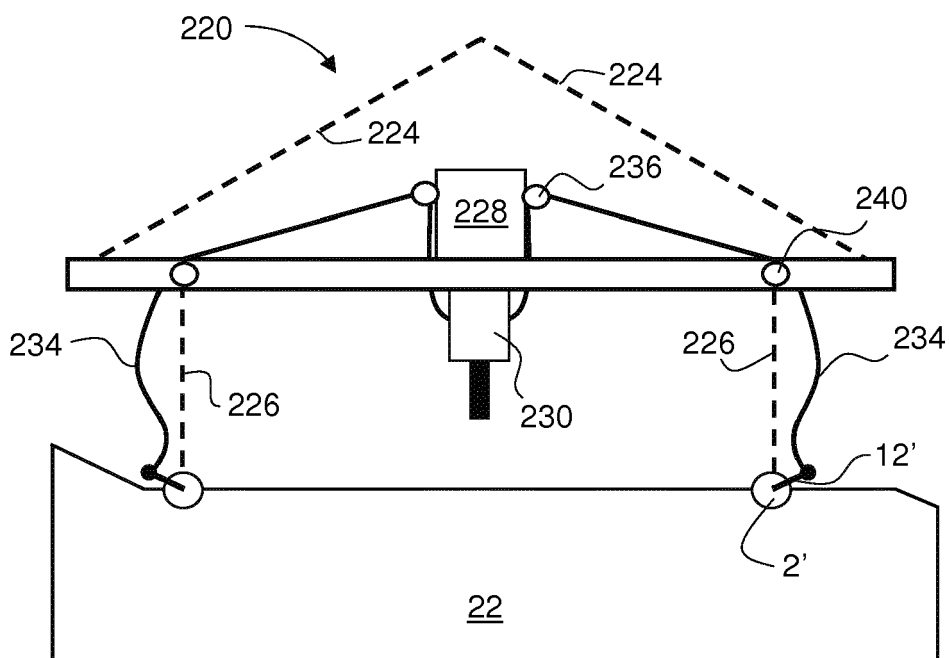


Figure 5A

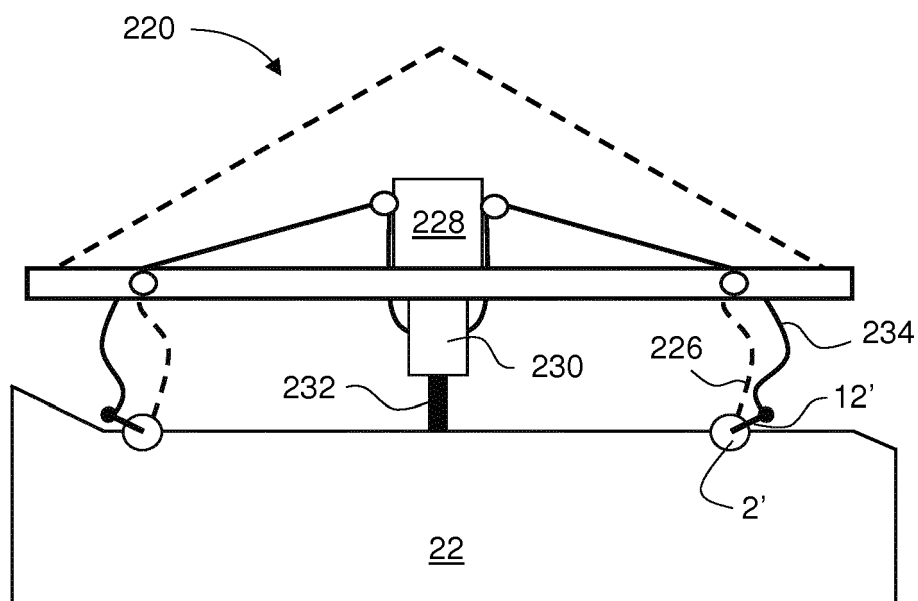


Figure 5B

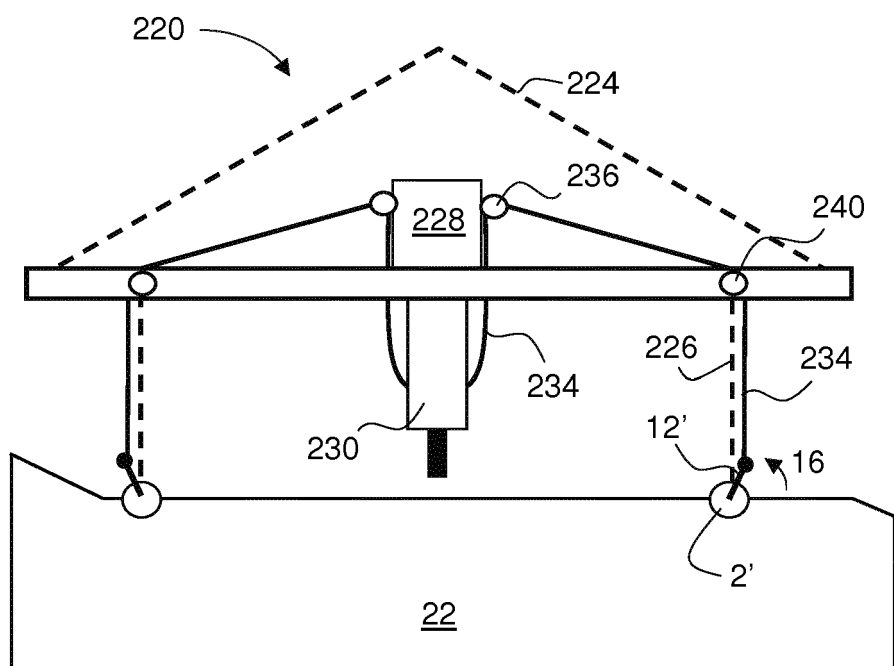


Figure 5C

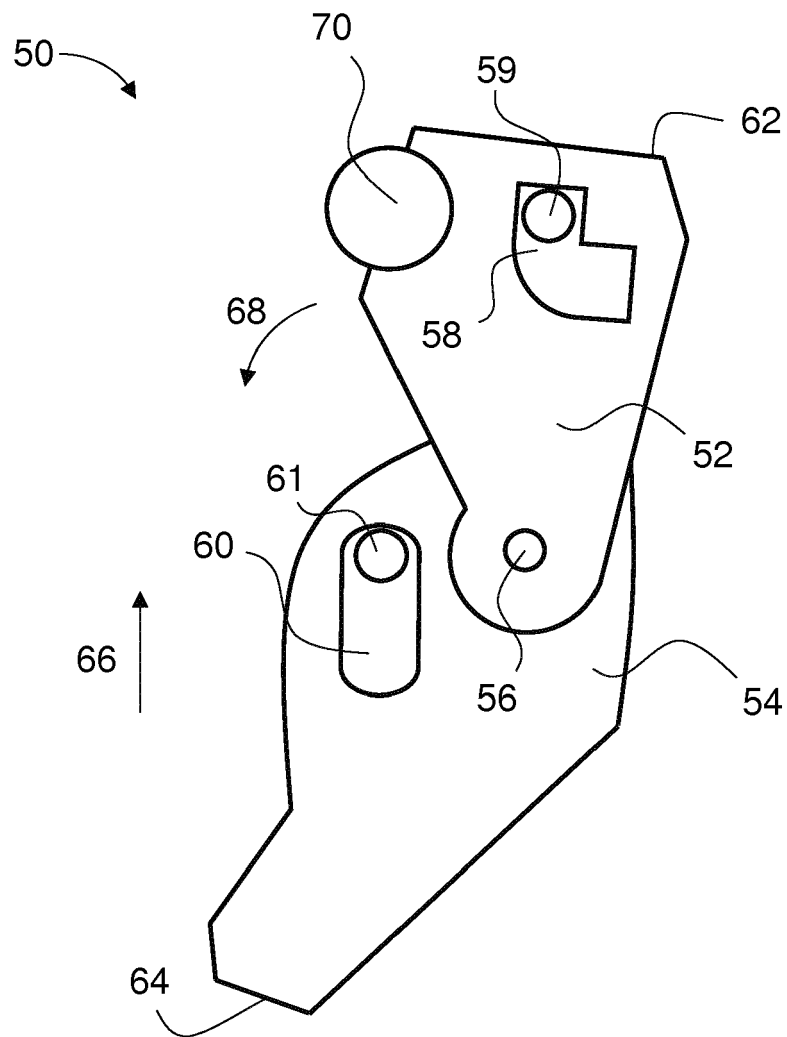


Figure 6



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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 P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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