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(54) Stopper devices

(57) A stopper device for a component is provided, the stopper device comprising a pair of clamp members (10, 11) movable towards one another to clamp the component (14) therebetween, the clamp members then being connectable together to retain the component in the clamped condition. In one embodiment the clamp members comprise slotted discs which can be bolted together to clamp a link (14) of a length of chain (15) therebetween, for example to prevent the chain from running through a piece of apparatus such as a chain hoist. In a further embodiment, the clamp members comprise discs arrangeable to retain a crane hook (31) in a chain block assembly (34).

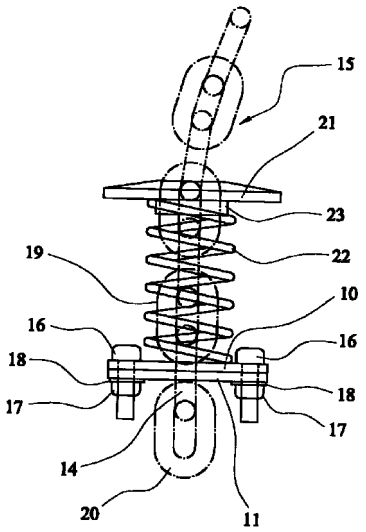

FIG. 3

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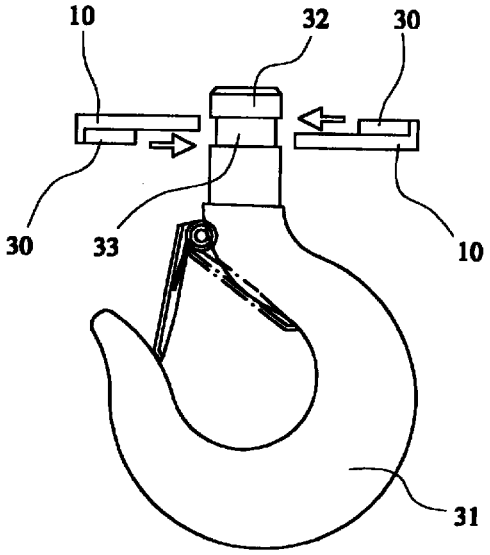
FIG. 9



Description

[0001] The invention relates to stopper devices and particularly to devices for stopping a component from moving through a piece of apparatus. One embodiment of the invention relates to a device for stopping a chain from running through a piece of apparatus, for example a chain hoist.

[0002] Chain hoists are well known and comprise a length of chain which is pulled to raise a load. The hoist may for example have an indented wheel with which the chain engages so that as the wheel is rotated, the chain is pulled to raise the load.

[0003] Occasionally a free end of the chain may be pulled out of the hoist which is inconvenient because the chain then has to be re-threaded through the hoist.

[0004] Several devices are known to stop an end of a chain from being pulled through a hoist, but the known devices suffer from disadvantages including size, complexity, or inconvenience in fitting.

[0005] It is one object of the invention to provide a stopper device which is very simple to manufacture and easy to fit.

[0006] The invention provides a stopper device for a component, the stopper device comprising a pair of clamp members moveable towards one another to clamp the component therebetween, the clamp members then being connectable together to retain the component in the clamped condition.

[0007] The stopper device may be for a length of chain, the clamp members being moveable towards one another to clamp a link of the chain therebetween, subsequent connection of the clamp members retaining the link of the chain in the clamp condition.

[0008] Preferably the two clamp members are identical so that only one component has to be manufactured.

[0009] Each clamp member may comprise a component having a slot therein, such that when the two clamp members are moved towards one another the link of the chain is trapped between the respective ends of the slots.

[0010] Each clamp member may comprise a circular disc.

[0011] The clamp members may be connected together by at least one bolt.

[0012] Preferably each clamp member has two bolt holes therethrough, one on each side of the slot.

[0013] A spring loaded buffer may be provided for use with the stopper device.

[0014] The buffer may comprise a compression spring which in use is fitted over the chain adjacent to the stopper device.

[0015] A cap member may be provided around the chain, on the opposite side of the compression spring to the stopper device, and movable towards the stopper device to compress the spring.

[0016] The invention includes a length of chain fitted with a stopper device as defined above.

[0017] The invention includes a chain hoist having at least one stopper device as defined above.

[0018] In an alternative embodiment, the component comprises a crane hook.

[0019] The clamp members may be arrangeable to retain the chain hook in a crane block assembly.

[0020] The clamp members may be retained together by surrounding them by components of the crane block assembly.

[0021] The invention includes a crane hook associated with a stopper device according to the invention.

[0022] The invention includes a crane block assembly incorporating a stopper device according to the invention.

[0023] By way of example, specific embodiments of the invention will now be described, with reference to the accompanying drawings, in which :-

Figure 1 is an end view of one component of a stopper device according to a first embodiment of the invention;

Figure 2 is a side view of the component shown in Figure 1;

Figure 3 is a view showing the stopper device in use;

Figure 4 is a diagram illustrating the operation of a buffer;

Figure 5 is a side view of a hoist filled with a stopper device according to this embodiment of the invention;

Figure 6 is an end view of one component of a second embodiment of stopper device according to the invention;

Figure 7 is a side view of the component shown in Figure 6;

Figure 8 is a view from the other end of the component shown in Figure 6;

Figure 9 is a side exploded view showing two components associated with a crane hook; and

Figure 10 shows the components assembled within a crane block assembly.

[0024] The stopper device according to the first embodiment of the invention comprises a pair of plates 10 and 11. The plate 10 is shown in detail and to a larger scale in figures 1 and 2.

[0025] The plate is simply a circular disc with a slot 12 and two bolt holes 13, one on each side of the slot

12. It will thus be appreciated that the plates can be manufactured very quickly and very cheaply.

[0026] To secure the stopper device in position, the plates are lined up on opposite sides of one link 14 of a length of chain 15.

[0027] The plates are lined up with the respective mouths of the slots 12 facing one another. The plates are then moved together so that the link 15 is trapped between the inner ends of the respective slots.

[0028] Puffing the plates into this position takes only a moment and they can then quickly be fastened together with bolts 16, nuts 17 and shake proof washers 18.

[0029] The stopper device is locked in position with respect to the longitudinal axis of the chain 15 by the fact that the upper link 19 and lower link 20 are at 90° to the link 14 and cannot therefore move into the slots 12.

[0030] The stopper device will normally be positioned at the end of the length of chain 15, as indicated in figure 3, to prevent the chain passing through a piece of apparatus such as a chain hoist, but it will be appreciated that the device can be used to provide a stopper device at any point along the length of a chain. The stopper device might for example be positioned at a point where it is desired to have the chain operate a limit switch.

[0031] It will be appreciated that although the stopper device is very simple, it is also very strong, and is securely located in position by the bolts and by the links 19 and 20.

[0032] In some circumstances it may be desirable to provide a buffer device.

[0033] For example, before the stopper device is placed in position, a cap 21 and compression spring 22 may be threaded onto the end of the chain 15. The cap 21 has an aperture therein which has a diameter slightly greater than the thickness of the links, so that the cap is free to move back and forth in the direction of the longitudinal axis of the chain. The spring 22 surrounds the chain and is trapped between the cap 21 and the stopper device. As can best be seen in the diagram comprising figure 4, the cap 21 is mushroom shaped, having a stem 23 which fits within the spring 22.

[0034] The use of the buffer is best illustrated by reference to figure 5, which shows a hoist utilising the invention. The hoist comprises a body 24 which in use is suspended by a hook 25.

[0035] A load hook 26, through which the chain 15 passes, can be raised or lowered to raise or lower a load. The chain passes over an indented wheel 26 and rotation of the wheel by a motor (not shown) operates the hoist.

[0036] When the load hook 26 is in the uppermost position shown, the loose chain is stored within a chain box 27. In figure 5, the loose chain is omitted, as this would otherwise obscure the view of the stopper device. It will therefore be appreciated that when the stopper device is in the position shown in figure 5, the load hook 26 will in practice be in its lowermost position with the extended chain extending between the load hook 26 and the body 24.

[0037] The hoist is fitted with a limit switch having an actuating arm 28.

[0038] The operation of the hoist will now be described.

[0039] As the hoist lowers a load, the load hook 26 moves further and further away from the body 24 and the stopper device moves towards the limit switch arm 28. Eventually the cap 21 strikes the arm 28 at 8 metres per minute.

[0040] The arm 28 is pushed by the cap 21 through a few degrees of movement and this causes the limit switch to operate, removing power from the hoist.

[0041] With power removed, a hoist brake (not shown) operates and slows the chain from 8 metres per minute to 0 metres per minutes as the load that the hoist is lowering is decelerated.

[0042] Under normal operations the above process should be completed within substantially 25mm of chain movement.

[0043] The provision of the buffer comprising the cap 21, stem 23 and spring 22, gives this embodiment of the invention two further enhancements. Firstly, the spring is so sized that when fully compressed, its length is less than the length of the stem of the mushroom shaped cap. This is demonstrated by the diagram of figure 4. The lower part of the stem 23 has come into contact with the upper stopper plate 10 and the spring cannot therefore be compressed anymore. Thus the spring can never be crushed between the cap 21 and the plate 10. The impacting of the stem 23 on the plate 10 protects the spring from damage. This makes the assembly more robust than known buffers in which excessive travel, caused by failure in their system or brake, crushes the spring, which then has to be replaced.

[0044] The second enhancement arises from the fact that the components are selected such that in normal operation, the fail-safe situation shown in the diagram of figure 4 will not occur. The operation of the brake, following the actuation of the limit switch, will bring the components to rest before the spring 22 has fully compressed.

[0045] This has the advantage that if the situation of figure 4 does arise, then this provides the hoist operator with a warning that the brake requires adjustment so that in future operations over travel will not occur. This assists in the maintenance of the equipment.

[0046] As with the embodiment of the invention shown in Figures 1 to 5, two identical clamping devices are utilised, each comprising a disc 10 having a slot 12. As the components are identical, only one is shown in Figures 6 to 8.

[0047] As these clamping devices are intended to retain a crane hook, which is larger than a chain, the discs are larger than the discs shown in Figures 1 to 5,

and the slot 12 is wider. Furthermore, each disc has a raised portion 30 which has the same width as the slot 12.

[0048] Referring now to Figure 9, the crane hook 31 which is to be clamped, has a shank 32 with a reduced diameter waist portion 33.

[0049] In use, two of the discs 10 are each positioned on a respective side of the waist 33, with the mouths of the slots facing one another, and the discs are then moved towards one another in the direction of the arrows of Figure 9, movement being continued until the waist 33 is trapped between the ends of the slots 12. The raised portion 30 of each disc engages in the mouth of the slot of the opposite disc.

[0050] The hook, together with the discs, is then positioned between two halves of a chain block assembly 34, as shown in Figure 10, and when the two halves are locked together by bolts 35, the hook is securely retained within the block assembly.

[0051] Because of the way in which the raised portion 30 of each disc is arranged to be engageable in the mouth of the slot of the opposite disc, it is not possible for the disc to be incorrectly assembled. Furthermore, once the discs are fitted together, they act as a single solid washer, which is capable of supporting a full load.

[0052] Pairs of discs having different sizes may be provided, for use with different sizes of crane hook.

[0053] The reader's attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

[0054] All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

[0055] Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

[0056] The invention is not restricted to the details of the foregoing embodiment(s). The invention extend to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

Claims

1. A stopper device for a component, characterised in that the stopper device comprises a pair of clamp members (10, 11) moveable towards one another to clamp the component (14) therebetween, the clamp members then being connectable together to retain the component in the clamped condition.

2. A stopper device as claimed in Claim 1, for use with a length of chain (15), the clamp members being moveable towards one another to clamp a link (14) of the chain therebetween, subsequent connection of the clamp members retaining the link of the chain in the clamp condition.

3. A stopper device as claimed in Claim 1 or Claim 2, in which the clamp members are identical so that only one component has to be manufactured.

4. A stopper device as claimed in any one of the preceding claims, each clamp member having a slot (12) therein, such that when the two clamp members are moved towards one another the component is trapped between the respective ends of the slots.

5. A stopper device as claimed in any one of the preceding claims, in which each clamp member comprises a circular disc (10, 11).

6. A stopper device as claimed in any one of the preceding claims, in which the clamp members are connected together by at least one bolt (16).

7. A stopper device as claimed in Claim 6, in which each clamp member has two bolt holes (13) therethrough, one on each side of a slot (12).

8. A stopper device as claimed in any one of the preceding claims, associated with a spring loaded buffer (21, 22).

9. A stopper device has claimed in Claim 8, in which the buffer comprises a compression spring (22) which in use is fitted over the chain (15) adjacent to the stopper device.

10. A stopper device as claimed in Claim 9, in which a cap member (21) is provided around the chain (15) on the opposite side of the compression spring to the stopper device and moveable towards the stopper device to compress the spring.

11. A length of chain fitted with a stopper device as claimed in any one of the preceding claims.

12. A chain hoist having at least one stopper device as claimed in any one of Claims 1 to 10.

13. A stopper device as claimed in Claim 1, in which the component comprises a crane hook (31).

14. A stopper device as claimed in Claim 13, in which the clamp members are arrangeable to retain the chain hook (31) in a chain block assembly (34).

15. A stopper device as claimed in Claim 14, in which the clamp members are retained together by surrounding them by components of the crane block assembly (34).

16. A crane hook associated with a stopper device as claimed in any one of Claims 13 to 15.

17. A crane block assembly incorporating a stopper device as claimed in any one of Claims 13 to 15.

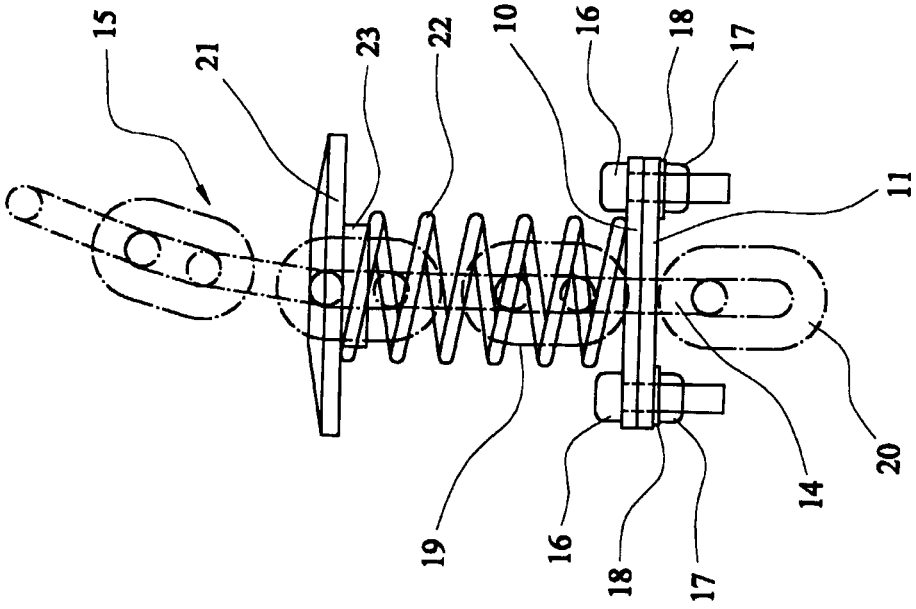


FIG. 3

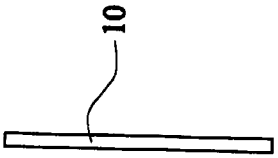


FIG. 2

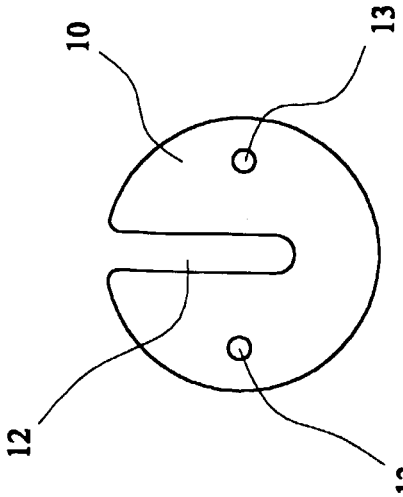


FIG. 1

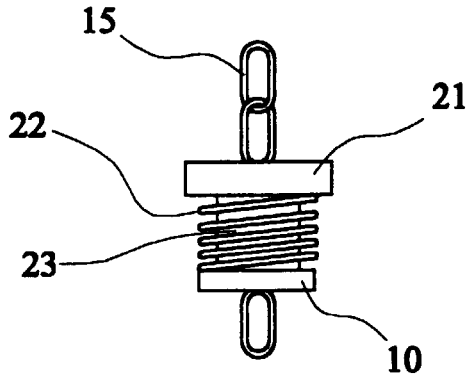


FIG. 4

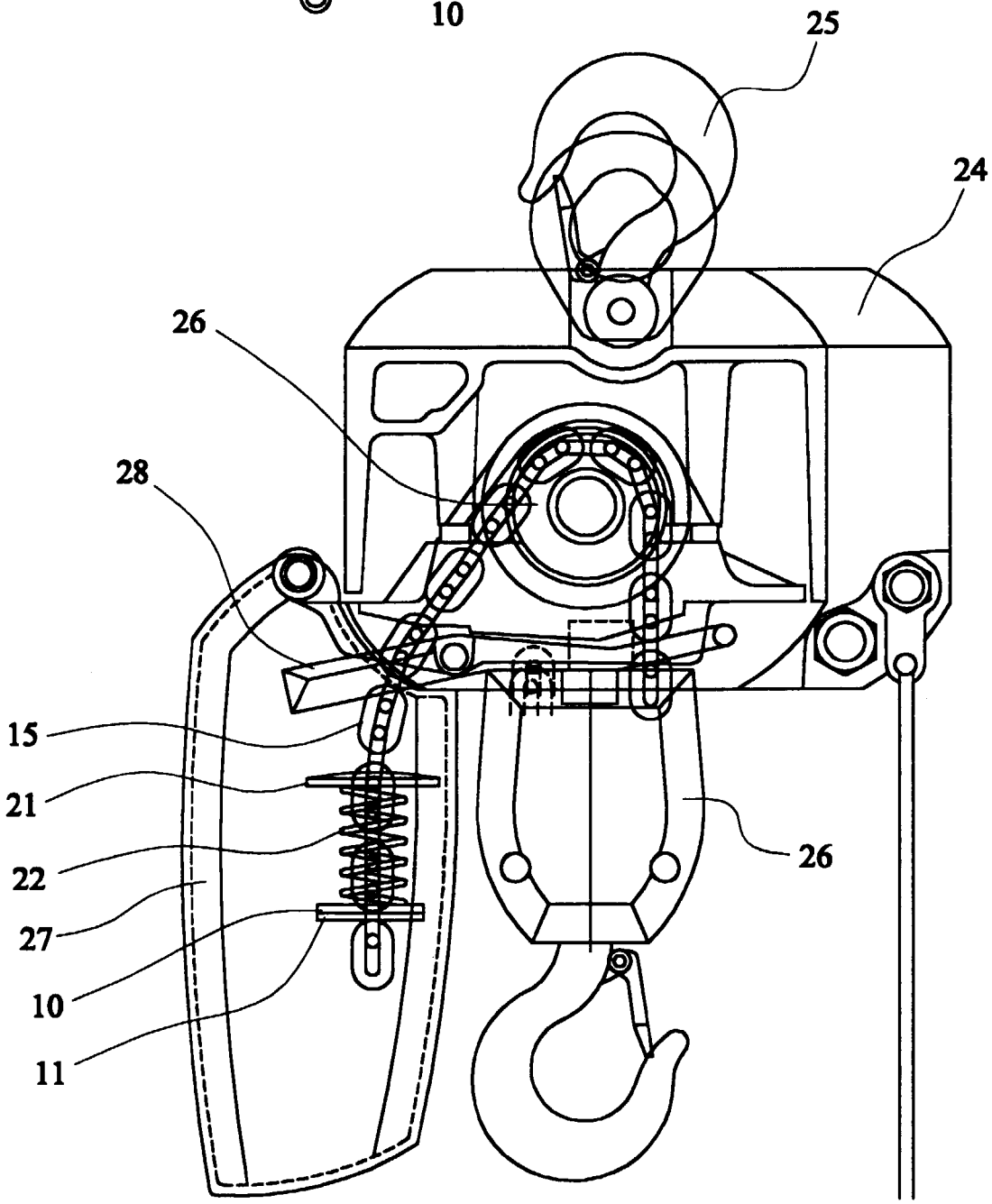


FIG. 5

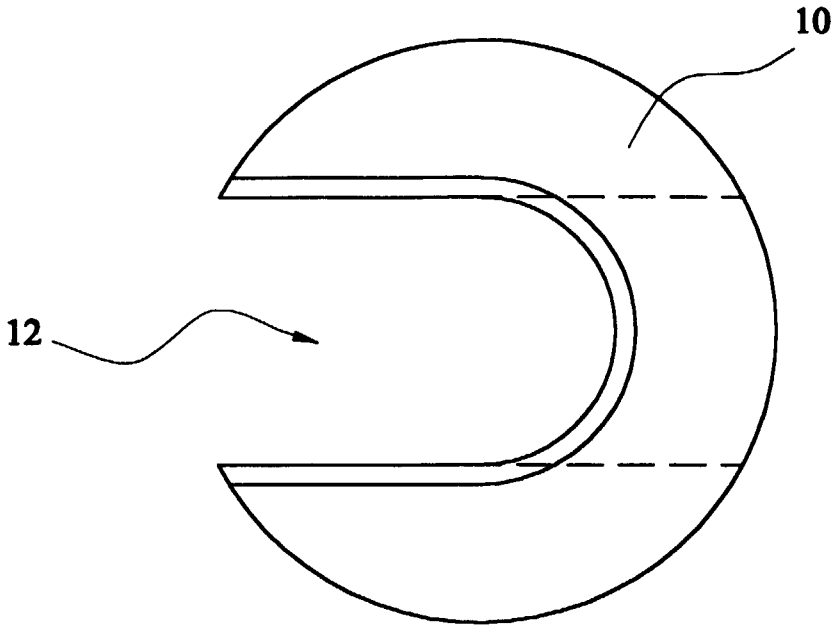
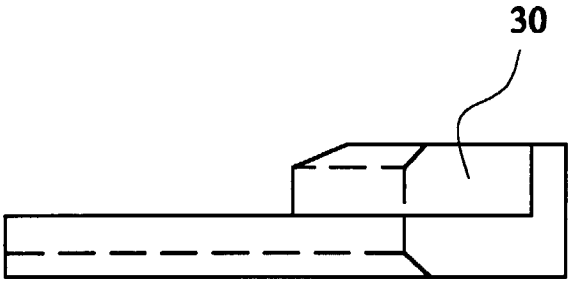


FIG. 6



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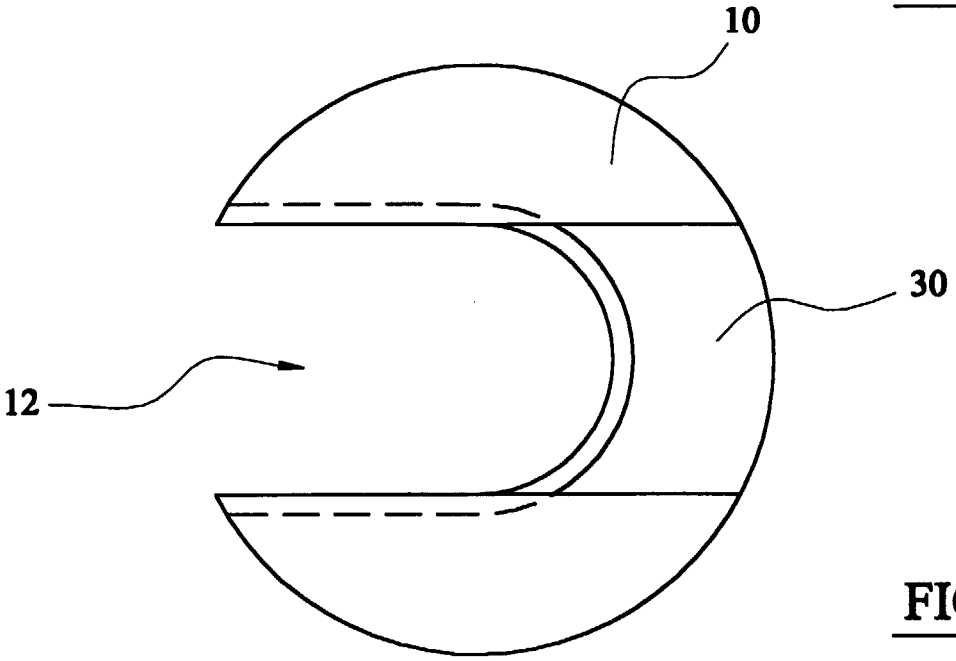

FIG. 8

FIG. 9

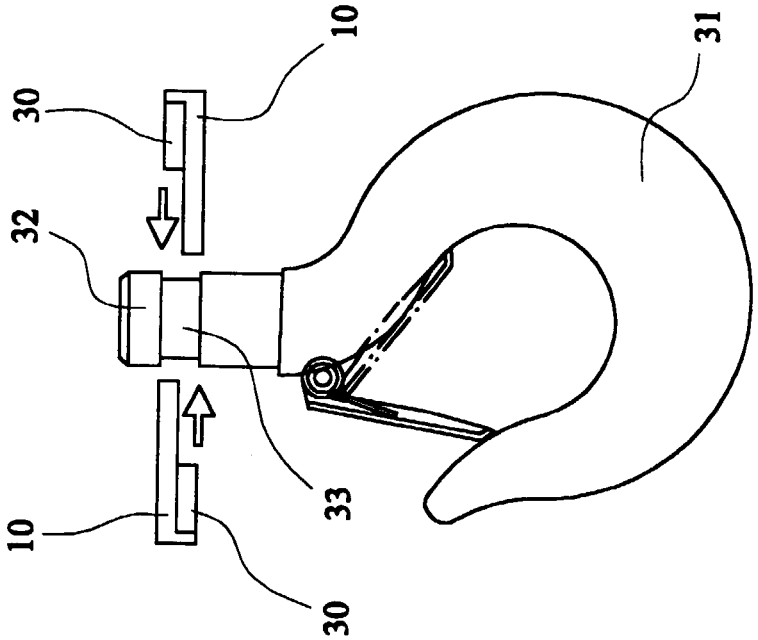

FIG. 10