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3 TORPEDO NOSE LIFT DEVICE

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5 STATEMENT OF GOVERNMENT INTEREST

6 The invention described herein may be manufactured and used
7 by or for the Government of the United States of America for
8 governmental purposes without the payment of any royalties
9 thereon or therefore.

10
11 BACKGROUND OF THE INVENTION

12 (1) Field of the Invention

13 The present invention relates generally to lifting devices,
14 and more particularly to a device for lifting a torpedo nose in a
15 horizontal orientation.

16 (2) Description of the Prior Art

17 It is often necessary in testing torpedoes to remove the
18 nose section of the torpedo from the main body section. Removal
19 and reconnection of the nose section requires alignment of the
20 nose and body section. The torpedo is typically horizontally
21 supported on a dolly during these operations. The main body
22 section is cylindrical and can be readily supported in a
23 horizontal fashion by the dolly. The nose section is
24 hydrodynamically shaped (generally conical), requiring a

1 specialized nose tilt dolly assembly to maintain the alignment of
2 the nose section with the main body section. The torpedo is
3 fully supported on a dolly assembly. When the nose section is
4 unconnected from the main body, the nose tilt dolly is backed
5 away from the main dolly to separate the nose section from the
6 main body. The process is reversed to reassemble the torpedo.
7 The nose tilt dolly assembly is very large and cannot be easily
8 used in areas not specifically designed for torpedo refit, e.g.,
9 aboard a research vessel. A single point lifting device is
10 needed in such areas where space is restricted. However, various
11 configurations of components within the nose section may be
12 tested. Each configuration may have a unique center of gravity,
13 making it more difficult to maintain the nose section
14 horizontally with a single point lift.

15 A number of hoist slings have been developed to support
16 various shaped objects. U.S. Patent No. 4,930,732 to Hardtke
17 recites a yoke clip for lifting piping. The yoke pipe clip
18 comprises a pair of generally parallel plates in a side-by-side
19 spaced relationship which are placed transversely over the pipe,
20 the plates having a lower edge contoured to fit the upper surface
21 of the pipe. A pair of separator plates disposed one at each
22 opposite end of the parallel plates maintains the separation
23 between the parallel plates. A yoke is placed beneath the pipe,
24 each of its free ends extending upward through one of the

1 separator plates. A bolt is threaded onto the yoke ends and
2 tightened against the separator plates, bringing the yoke and
3 parallel plates to bear against opposite sides of the pipe. A
4 suspension bracket is positioned between and interlocked with the
5 parallel plates, and the pipe is lifted by this bracket. If the
6 conical nose section were lifted with this yoke pipe clip, it
7 would be canted from the necessary horizontal position.

8 U.S. Patent No. 4,844,396 to Norton shows another mounting
9 for attaching a sensor to a pipe, but which could be adapted for
10 supporting a section of pipe. A bracket with flexible legs is
11 placed over the pipe such that the legs extend slightly around
12 the pipe. The bracket has vertical clips extending away from the
13 top of the pipe. A chain is attached to and extends from one
14 vertical clip, around the bottom of the pipe and is attached to
15 the other vertical clip. Tightening the chain brings the bracket
16 legs in firm contact with the pipe. The pipe can be lifted from
17 the bracket, or a sensor can be mounted within the bracket such
18 that the sensor is brought into contact with the pipe when the
19 chain is tightened. As with the Hardtke device, no provision is
20 made for maintaining a horizontal orientation when lifting a
21 conical shape. U.S. Patent No. 3,840,262 to Foster et al.
22 provides a simple sling arrangement for lifting a pipe which also
23 cannot easily be adapted to lift a conical section in a
24 horizontal manner.

1 section and lifting device at the forward and rear ends of the
2 plates to securely hold the plates against the nose section. A
3 metal strap extending between the cinch straps on the opposite
4 side of the nose section from the plates prevents the cinch
5 straps from slipping off the contoured nose section. A lifting
6 hook is placed into the vertical leg of the T-section to hoist
7 the nose section away from the main body. To accommodate the
8 varying centers of gravity for different nose component
9 configurations, the lifting hook placement along the T-section
10 can be varied. In a preferred embodiment, the T-section can be
11 moved fore and aft between the parallel plates by providing a
12 series of bolt holes along the edges of the horizontal legs and
13 bolting through the parallel plates to attach the T-section to
14 the plates. In another embodiment a horizontal plate is first
15 attached between the parallel plates and the T-section is
16 adjustably mounted to the horizontal plate by means of bolting
17 the T-section to the horizontal plate through slotted holes in
18 the T-section. Additionally, an elastomeric covering can be
19 provided over the edges of the parallel plates in contact with
20 the nose section to prevent damage to the nose section when the
21 plates are tightened against the nose section. By providing
22 shaped plates longitudinally along the nose section and allowing
23 hook placement at the proper center of gravity for the nose
24 section, the section can be raised in a horizontal orientation.

1 The cinch straps provide an easy method of attaching the device
2 to the nose section and the metal strap prevents them from
3 slipping off the nose section. The device is very compact,
4 easily transported aboard a research vessel and can be used with
5 any one of many types of lift hooks commonly available aboard
6 such a vessel.

7
8 BRIEF DESCRIPTION OF THE DRAWINGS

9 A more complete understanding of the invention and many of
10 the attendant advantages thereto will be readily appreciated as
11 the same becomes better understood by reference to the following
12 detailed description when considered in conjunction with the
13 accompanying drawings wherein corresponding reference characters
14 indicate corresponding parts throughout the several views of the
15 drawings and wherein:

16 FIG. 1 is a side view of the lifting device;

17 FIG. 2 is an end view of the lifting device;

18 FIG. 3 is an end view of a second embodiment of the lifting
19 device; and

20 FIG. 4 is a top view of the T-section component of the
21 second embodiment of the lifting device.

1 DESCRIPTION OF THE PREFERRED EMBODIMENT

2 Referring now to FIG. 1 and FIG. 2, there are shown side and
3 end views, respectively, of the nose lifting device 10. Two
4 parallel plates 12 have contoured bottom edges 14 shaped to match
5 the contour of a torpedo nose section 16, shown in phantom.
6 Inverted T-section 18 is fixed between upright parallel plates
7 12, having its horizontal leg 20 forming an H-section with the
8 parallel plates 12 and also serving as a spacer to maintain the
9 separation between plates 12. Vertical leg 22 extends upwards so
10 as to be above the top edge 24 of plates 12. Two cinch straps 26
11 (shown partially removed in FIG. 1 for clarity) wrap around
12 device 10 and nose section 16. Cinch straps 26 are tightened
13 using any well known means common for such straps, such as
14 ratcheting mechanisms 28, holding device 10 tight against nose
15 section 16. A metal holding strap 30 attaches between cinch
16 straps 26 on the opposite side of nose section 16 from plates 12,
17 preventing cinch straps 26 from slipping off of the contoured
18 shape of nose section 16. Additionally, in the preferred
19 embodiment, top edges 24 of plates 12 and top edge 32 of vertical
20 leg 22 of T-section 18 have one or more notches 34 for placement
21 of cinch straps 26. In this embodiment, cinch straps 26 are
22 better able to follow the contour of nose section 16 to provide a
23 tighter grip about the nose section 16. Vertical leg 22 has a
24 plurality of apertures 36 for placement of a lifting hook (not

1 shown). By careful selection of one of the apertures 36, a
2 lifting hook can be placed directly over the center of gravity of
3 nose section 16 and lifting device 10.

4 In another embodiment, shown in FIG. 3 and FIG. 4, a
5 separate horizontal plate 38 is fixed between plates 12, with
6 T-section 18 attached to horizontal plate 38. A plurality of
7 slots 40 (shown in FIG. 4) are provided in horizontal leg 20 and
8 T-section 18 is bolted to horizontal plate 38. The slots 40
9 allow for longitudinal adjustment of T-section 18 along nose
10 section 16, again allowing a lifting hook to be placed directly
11 over the center of gravity of nose section 16 and lifting device
12 10. In this embodiment, horizontal plate 38 has a plurality of
13 threaded bores 42 along each edge 44. Corresponding apertures 46
14 in plates 12 allow horizontal plate 38 to be bolted between
15 plates 12 at varying locations. In the embodiment shown in FIGS.
16 3 and 4, edges 14 of parallel plates 12 are shown with a covering
17 48 to prevent damage to nose section 16 when cinch straps 26 are
18 tightened.

19 The invention thus described provides a simple, easily
20 transportable device for handling a torpedo nose section in a
21 horizontal orientation. The contoured edges of the plates
22 provide positive contact against the nose section, while the
23 cinch straps are a simple method of attaching the plates to the
24 nose section. The metal holding strap and the notches in the

1 parallel plates allow the cinch straps to wrap tightly about the
2 nose section without slippage. The plurality of apertures in the
3 T-section or in the connection of the T-section to the parallel
4 plates allow for varying the placement of a lifting hook. In
5 this way, the lifting hook can be positioned directly over the
6 center of gravity of the nose section and lifting device,
7 ensuring that the nose section remains horizontal when lifted.

8 Although the present invention has been described relative
9 to a specific embodiment thereof, it is not so limited. For
10 example, the edges of the parallel plates can be shaped, and the
11 straps adjusted, to fit other contours besides that of a torpedo
12 nose section. Also, the holding strap need not be metal, but may
13 be made of the same material as the cinch straps. The holding
14 strap may also be attached between the cinch straps once they are
15 placed over the nose section, or may be attached directly to the
16 cinch straps. The cinch straps may be any type of strap suitable
17 for surrounding the nose section and capable of being tightened,
18 such as a chain, fabric, or polymer type strap. The cinch straps
19 may either be separate from the plates and T-section, or can have
20 one end attached to the plates or T-section. Additionally, the
21 material used along the edges of the parallel plates in contact
22 with the nose section can be any suitable elastomeric material
23 which will maintain a firm grip between the plates and the nose
24 section. In one use of the lifting device, a longitudinally cut

1 length of polymer hose provided effective protection and was
2 easily installed on the edges.

3 Thus, it will be understood that many additional changes in
4 the details, materials, steps and arrangement of parts, which
5 have been herein described and illustrated in order to explain
6 the nature of the invention, may be made by those skilled in the
7 art within the principle and scope of the invention.

8

1 Attorney Docket No. 78721

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TORPEDO NOSE LIFT DEVICE

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ABSTRACT OF THE DISCLOSURE

6 In accordance with the present invention, a single point
7 lifting device is provided for a torpedo nose section. The
8 device has two parallel plates, spaced slightly apart with edges
9 placed longitudinally on the nose section. The edges are shaped
10 to fit the nose section contour. A T-shaped member is inverted
11 and fixed between the two plates, each edge of the horizontal leg
12 suitably attached to one of the plates to form an H-shaped
13 section with the vertical leg of the T extending upwards. Two
14 cinch straps extend around the nose section and lifting device to
15 securely hold the plates against the nose section. A metal strap
16 extends between the cinch straps on the opposite side of the nose
17 section from the plates to prevent the cinch straps from slipping
18 off the contoured nose section. To accommodate the varying
19 centers of gravity for different nose component configurations,
20 the lifting hook placement along the T-section can be varied or
21 the T-section can be moved fore and aft between the parallel
22 plates.

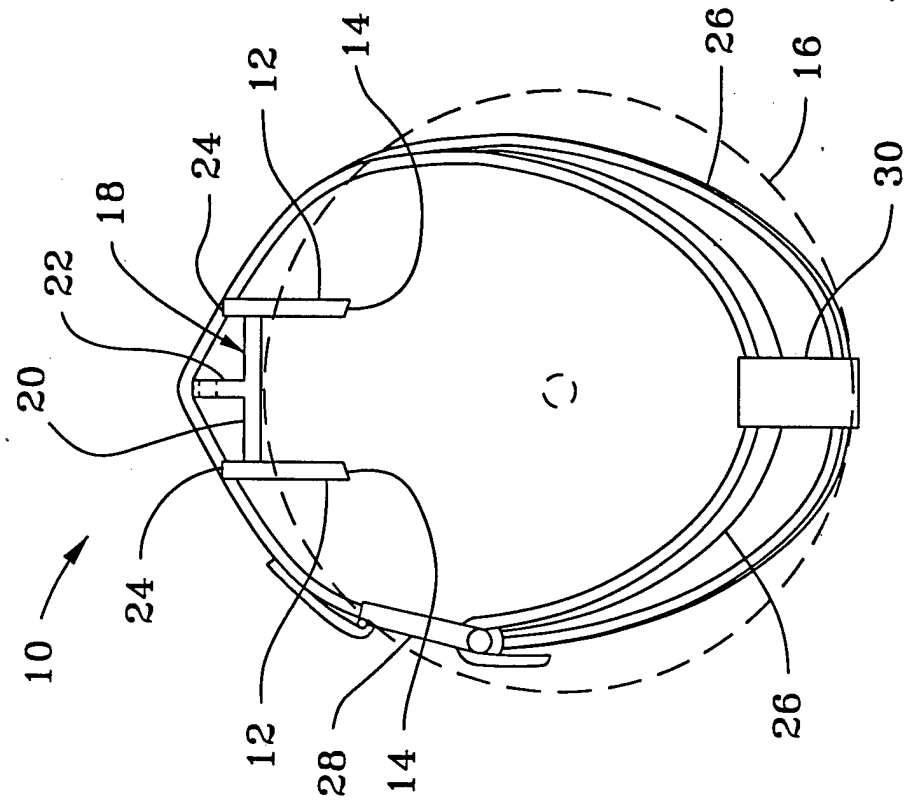


FIG. 1

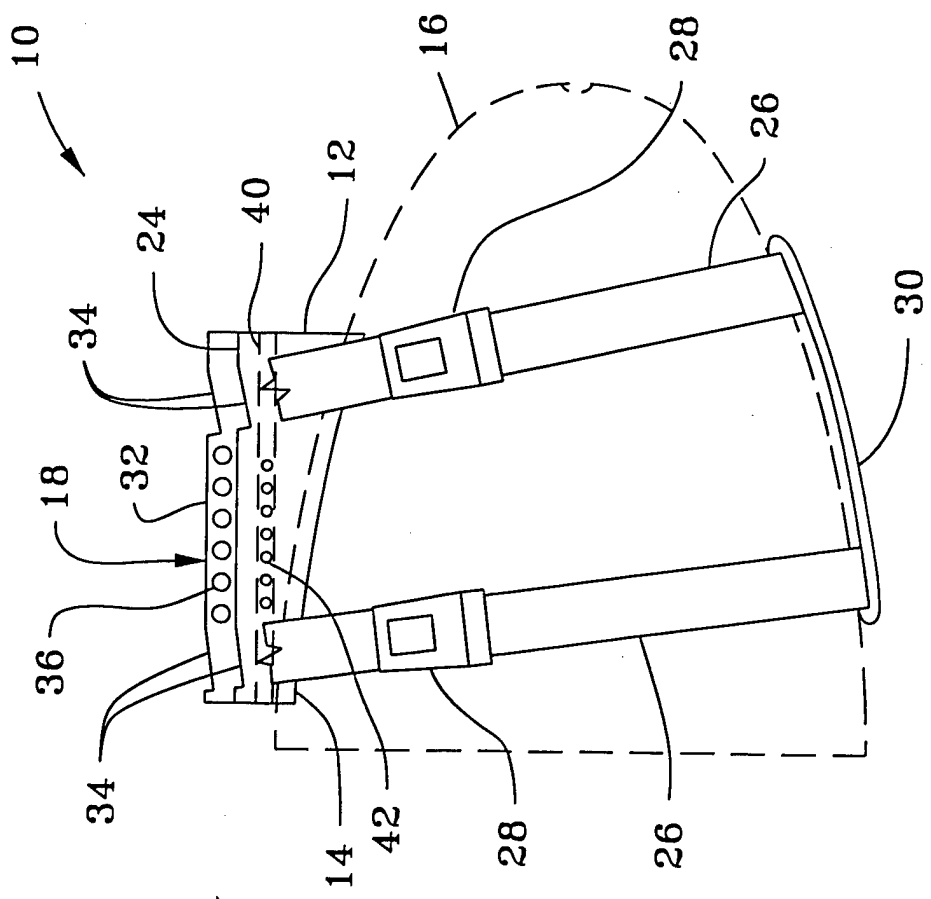


FIG. 2

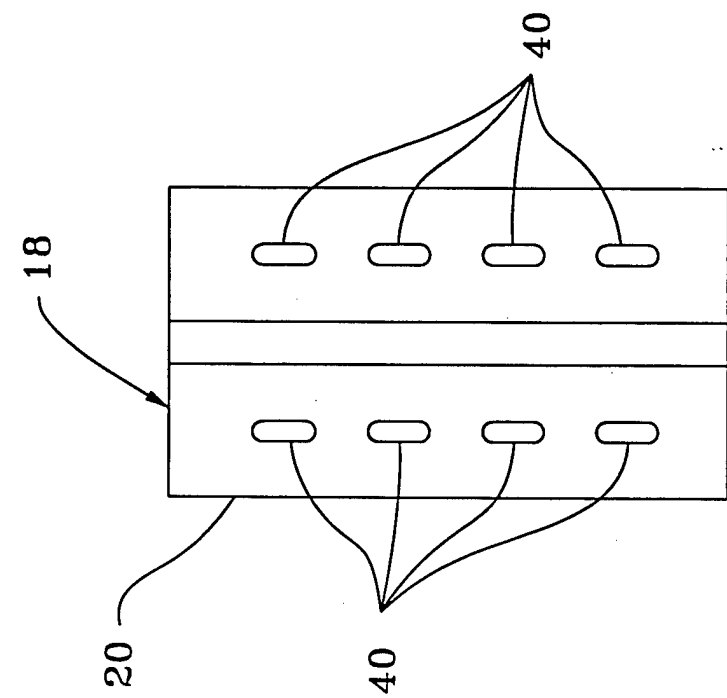


FIG. 4

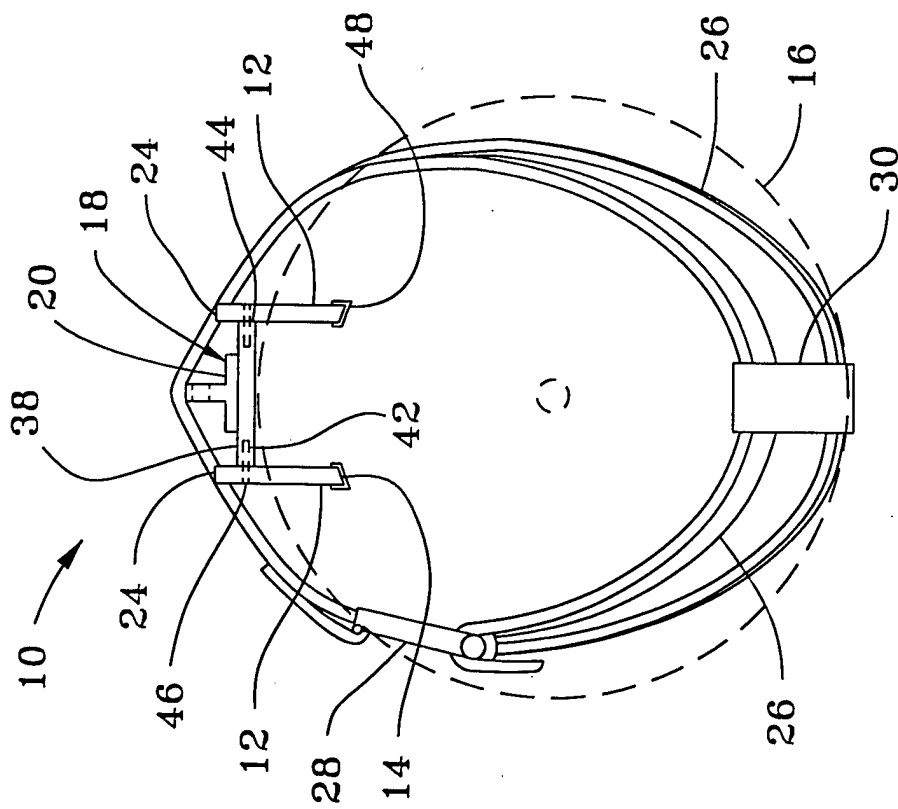


FIG. 3