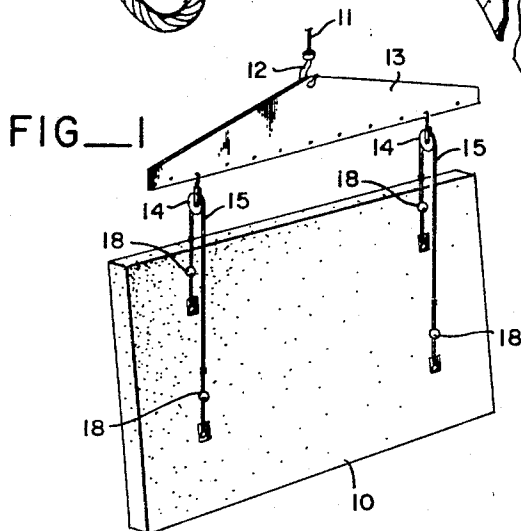
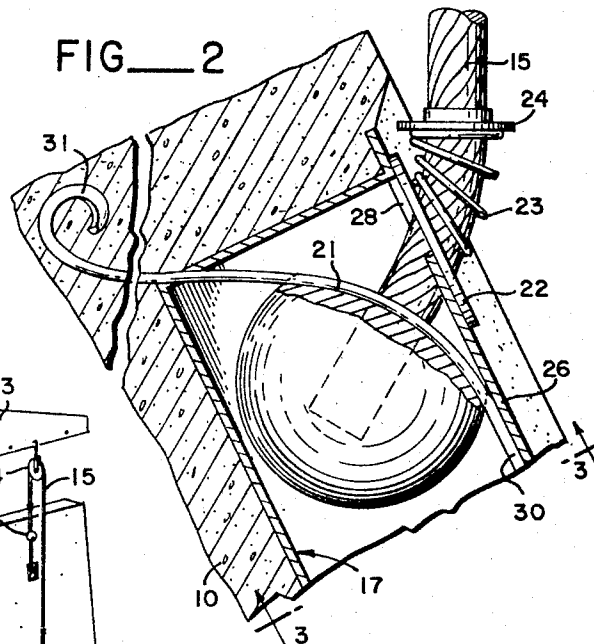
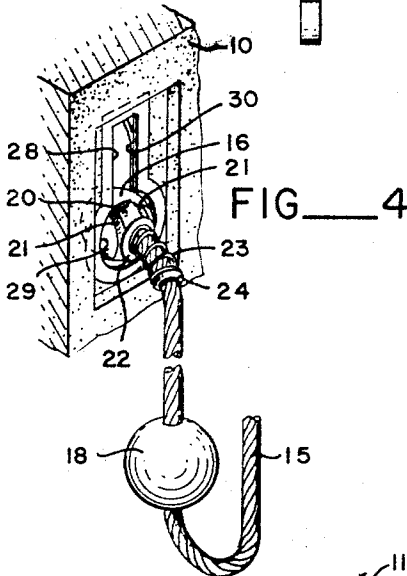
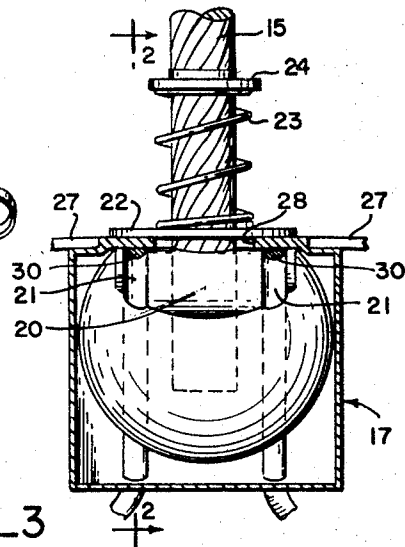
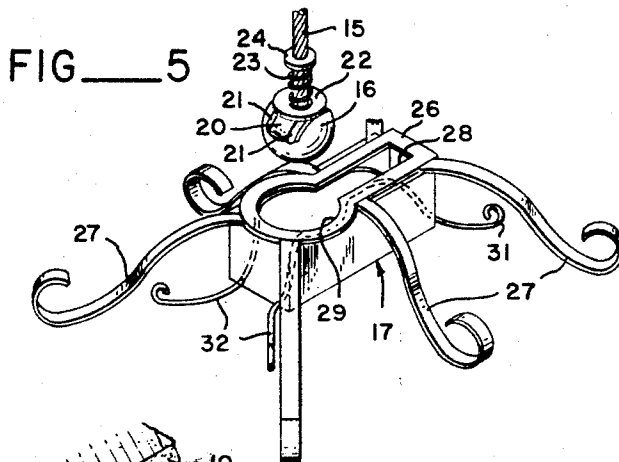


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J. L. WHITE
SYSTEM FOR ERECTING PRE-CAST CONCRETE PANELS IN
A CONCRETE WALL STRUCTURE
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JAMES L. WHITE
INVENTOR.

BY *Seal, Berry, & Dwyer*

ATTORNEYS

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SYSTEM FOR ERECTING PRE-CAST CONCRETE PANELS IN A CONCRETE WALL STRUCTURE

James L. White, Bellevue, Wash., assignor of one-third to John W. Rumsey, Seattle, Wash.

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9 Claims

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ABSTRACT OF THE DISCLOSURE

A system for attaching hoist lines to pre-cast concrete wall panels so that the panels can be lifted into place in a pre-fab wall, and when the panels have been located in the wall disengaging the lines from the panel automatically by slacking off the lines.

The invention relates to the handling of pre-cast concrete wall panels, and for its principal object aims to devise a new and improved system enabling hoist lines to be easily and quickly connected to the panel preparatory to lifting the panel into a position where the same can be secured to other components of a pre-fab concrete wall, one which distributes the weight of the panel, during such lifting, in a manner which facilitates the work of properly locating the panel in the wall, and a system which permits an automatic disengagement of the hoist lines from the panel, after having located the panel in the wall, by the expedient of slacking off on the hoist lines.

Other more particular objects and advantages of the invention will, with the foregoing, appear and be understood in the following description and in the adaptation and combination of parts hereinafter described and claimed.

In the accompanying drawing:

FIGURE 1 is a perspective view illustrating a pre-cast concrete panel in the act of being lifted and employing therefor a system embodying teachings of the present invention.

FIG. 2 is a fragmentary vertical sectional view drawn to an enlarged scale to detail one of the four panel attachments shown in FIG. 1, the section line being shown at 2—2 in FIG. 3.

FIG. 3 is a horizontal sectional view on line 3—3 of FIG. 2 with the indicated ball connector in the pocketed position which it occupies when the panel lies flat, i.e. before the hoist line is taken in and causes the panel to be tilted.

FIG. 4 is a fragmentary perspective view drawn to a scale reduced from that of FIGS. 2 and 3 to illustrate the process of releasing the ball from the pocket after the panel has been set in the wall which is under construction; and

FIG. 5 is a perspective view detailing the ball-and-pocket assembly, and with the panel deleted.

Referring to the drawing, the panel is denoted by the numeral 10, and the hoist line for lifting the panel is denoted by 11, such hoist line depending from the outer end of a crane boom (not shown) and having upon its free end a hook 12. The hook engages a hanger bar 13 which has a respective load block hung from each of its ends, and looped over the sheaves 14 of the blocks are lengths 15 of cable having ball fittings 16 upon the free ends of establishing detachable connections with the concrete panel. These terminal balls are fixedly secured to the cable, and mating receptacles 17 for the balls are cast into the concrete of the panel to become a permanent part of the panel. As a complement to each ball a weight 18 is also fixedly secured to the related branch of the cable

in a position spaced from the ball but lying fairly close thereto.

A characteristic of the ball fittings is that the same are abbreviated, truncated so to speak, and have the cable—which extends radially from the ball—centered relative to the truncated face of the ball. The truncated face 20 has an arcuate configuration when viewed in profile along one diametrical plane of the ball, with the radius of the arc being by preference somewhat less than the diameter of the ball developed about a center removed outboard somewhat beyond the surface of the ball. When viewed in profile along a second diametrical plane normal to said first plane of reference the profile configuration is that of a cord having at each side of center an interruption in the way of a re-entrant opening, semi-circular in shape. Producing such re-entrant openings are two grooves 21 running parallel to said first diametrical reference plane from one to the other end limit of the arc.

A washer 22 fits over each of the cable branches and is yieldingly urged toward the related ball by a spring 23, the spring taking its purchase from a collar 24 which is pinned or otherwise localized upon the cable.

There are four of the receptacles 17, one for each of the four balls 16, and each is located in a respective corner section of the panel spaced more or less equidistantly from a related side edge of the panel. The two receptacles which occupy the corner sections which lie between the major axis of the panel and the top edge of the panel are located more distal to said major axis than are the other two receptacles, thus placing upon the latter two receptacles when the balls are engaged in the receptacles and a hoisting effort applied, a greater portion of the weight of the panel than is placed upon the former (or upper) two receptacles.

Formed to the shape of the rectangular box with one wall 26 exposed and having concrete-embedded anchor arms 27 radiating from side edges of such exposed face to distribute the load over a wide area, the receptacles provide interior ball-receiving pockets with a top-to-bottom dimension substantially greater than the diameter of the ball. Access for the ball is through the mouth 29 of a key-hole opening formed in the exposed front wall of the box. Said mouth lies below the constricted throat 28 of the key-hole opening.

The throat, which permits free movement of the cable 15 therein, has a width equal to or moderately less than the span between inner edges of the grooves 21. A respective one of two semi-circular rods 30, sized to fit the grooves, is provided interiorly of the box at each of the two sides of the throat. Traced in an upward direction from the lower limit of the throat the rods run parallel with the median line of the throat. They are welded to the underside of the box's front wall 26 for approximately one-half the height of the throat, thence curve in a rearward direction, and have the upper end curled, as at 31, and embedded in the concrete. Traced in a downward direction from said lower limit of the throat, the rods more or less follow the contour of the access aperture 29 to approximately the minor axis of the aperture—being welded to wall 26 for this distance—and thence curve in a rearward direction to emerge from the box, and be embedded in the concrete, at or about the two bottom rear corners of the box. As with the concrete-embedded upper ends, the concrete-embedded lower ends 32 are terminally curled.

The first procedure in erecting a wall panel is to manually insert the four balls through the mouths 29 into the pockets of the balls, and locate the balls therein so that the rods 30 are lodged in the grooves 21 at the entrance end of the throats 30. The springs 23 exert upon the balls an upward pull of sufficient intensity to offset the weight of the balls and hold the grooves against the rods.

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The hoist line 11 is now taken up and by reason of the weight distribution this tilts the panel as the same first swings about its lower edge as a fulcrum and then lifts clear of the ground, the balls and their cables 15 assuming the positions shown in FIG. 2 as the changing direction of pull shifts the balls upwardly along the lengths of the rods. While not here illustrated, attachment means are provided at the upper and lower ends of each side edge of the panel for connecting such side edges to previously erected post members, and the crane boom is manipulated to first establish a registration between the lower set of said panel-carried attachment means and mating complements thereof provided by the posts, following which the panel, by swinging about said lower connections, is brought by the crane boom into a vertical position whereat a connection can be made between the upper set of panel-carried attachment means and their mating complements provided by the posts. Upon now lowering the hoist line the resulting slack in the cables 15 locates the weights 18 as shown in FIG. 4 which responsively pulls the balls downwardly within the boxes so that the same are brought opposite the mouths 29 and fall free.

It is believed that the invention will have been clearly understood from the foregoing detailed description of my now-preferred illustrated embodiment.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In combination: a pre-cast concrete panel adapted to be picked up at one location by lift effort from the hoist apparatus of a crane boom and moved thereby to a second location in which the panel is made secure standing erect, said panel presenting above and below a line median to the height a respective set of at least two pockets spaced apart at intervals of the width and each exposed to a face of the panel by a respective key-hole opening to provide an enlarged access mouth with a constricted throat leading upwardly therefrom, respective sections of cable for each of the pockets suspended from the crane boom, said cable sections being of a diameter to work in the throat of the key-hole opening, and a respective ball secured as a terminal fitting upon the lower end of each of said cable sections and sized to pass through the access mouths of said key-hole openings to provide attachments between the cable sections and the panel releasable automatically by gravity upon such a slacking of the cable sections that the lower ends become looped.

2. Structure according to claim 1, the pockets and their key-hole openings being formed in metal boxes which are set into the concrete of the panel.

3. Structure according to claim 2 having anchoring arms integral with the box radiating therefrom and embedded in the concrete of the panel.

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4. Structure according to claim 1 in which the pockets which lie above said median are spaced a greater distance therefrom than are the pockets which lie below said median, the crane boom carrying a hanger bar, the two cable sections related to each vertically spaced pair of the pockets being provided by a single length of cable looped over the sheave of a respective one of two blocks suspended from the opposite ends of the hanger bar.

5. Structure according to claim 1 in which the balls are truncated with the cable section extending radially from the ball in a position centered with respect to the truncation and are provided with paralleling grooves running the length of the truncation at opposite sides of the cable section, the pockets of the panel being provided interiorly along each side of said throat with a respective one of two track rails which interfit with the grooves and provide a slideway for the ball when the cable section is brought into the throat of the key-hole opening.

6. Structure according to claim 5, the truncation having an arcuate configuration when viewed from the side.

7. Structure according to claim 5, the truncation having an arcuate configuration when viewed from the side, the pockets and their key-hole openings being formed in metal boxes which are set into the concrete of the panel, the track rails curving toward the rear wall of the pocket as the track approaches the upper end of the throat and being comprised of rod stock which is in part welded to the boxes and in part embedded in the concrete of the panels.

8. Structure according to claim 5 having spring means for yieldingly holding the grooves of the truncation in interfitting engagement with the rails of the track.

9. Structure according to claim 5 having spring means for yieldingly holding the grooves of the truncation in interfitting engagement with the rails of the track, and weights secured upon the cable sections in positions spaced a moderate distance above the balls to impose a gravity load sufficient, when the looped lower end of the slacked cable section places said weight so that it hangs below the pocket, to overcome the friction imposed by the spring means and free the ball from the pocket.

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ANDRES H. NIELSEN, *Primary Examiner*.