

Sept. 23, 1969

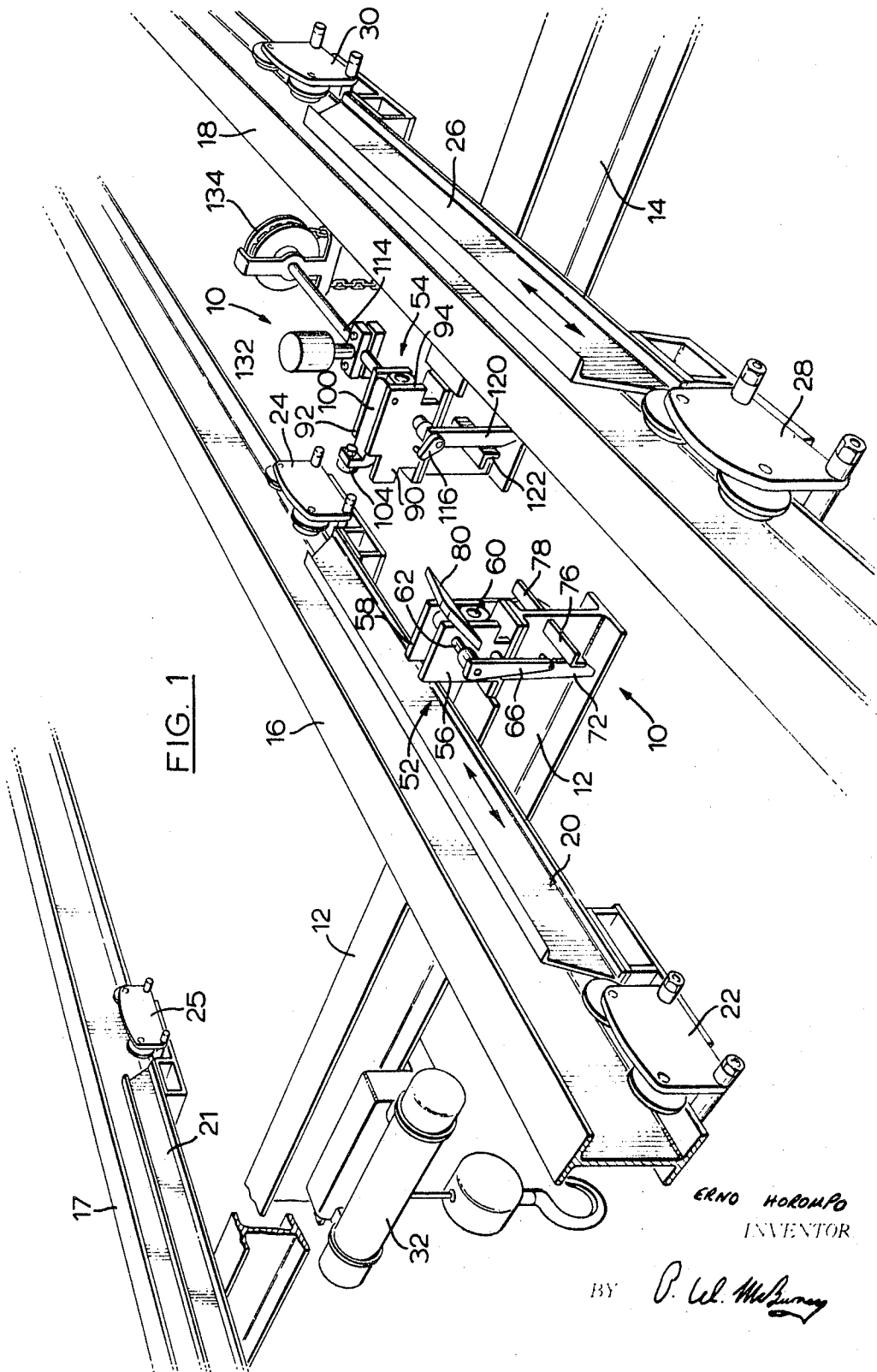
E. HOROMPO

3,468,264

LOCKING MECHANISM

Filed Sept. 28, 1967

4 Sheets-Sheet 1



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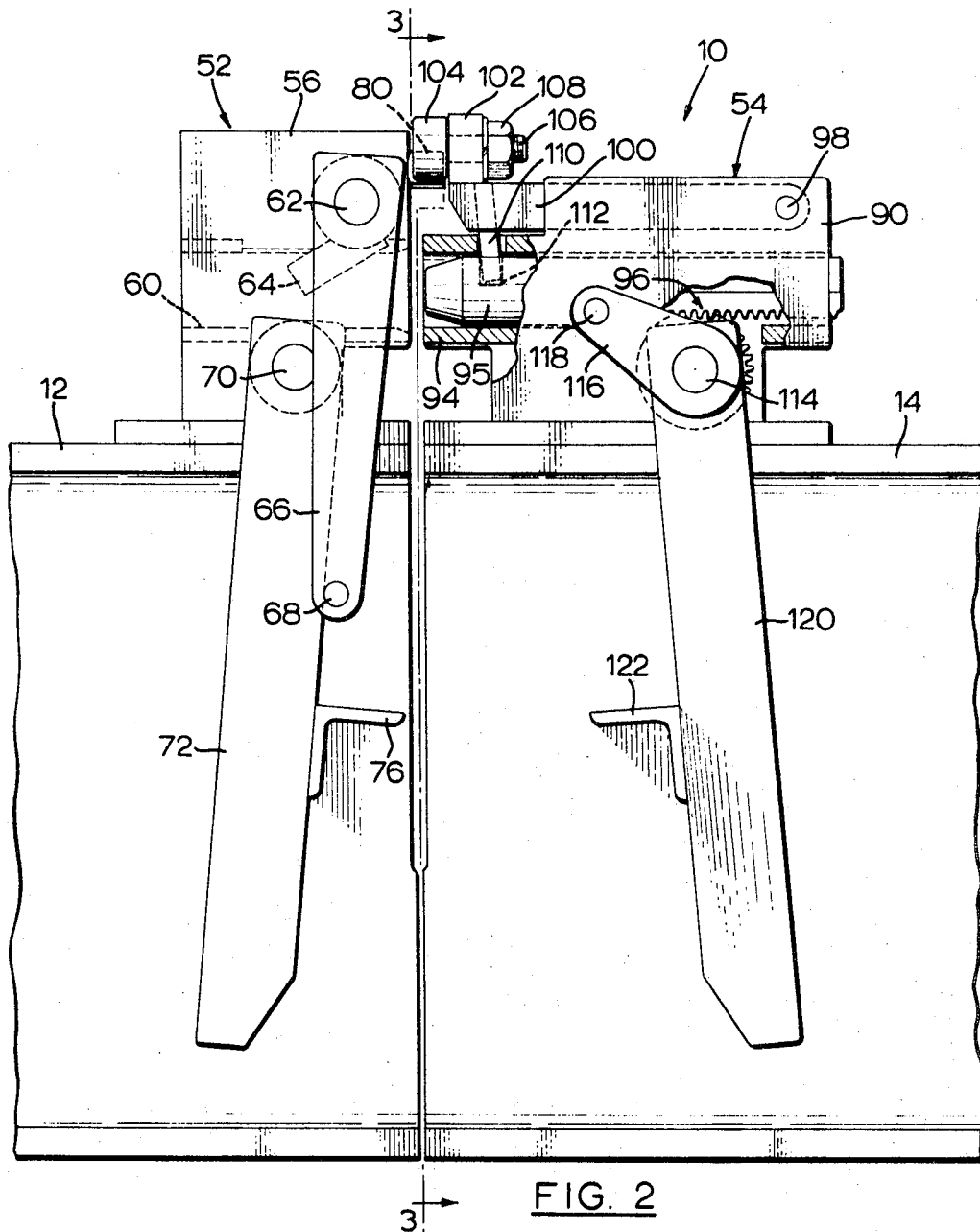
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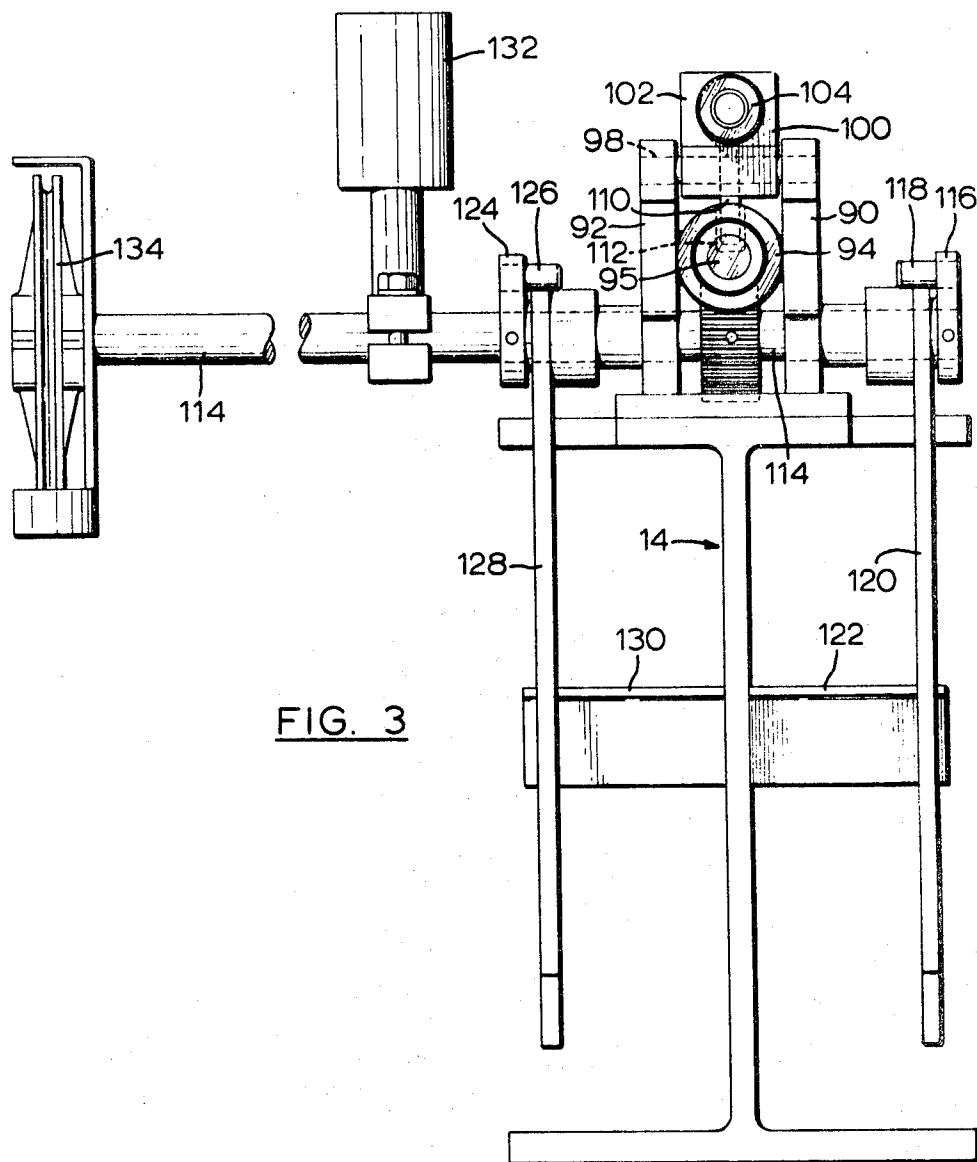


FIG. 3

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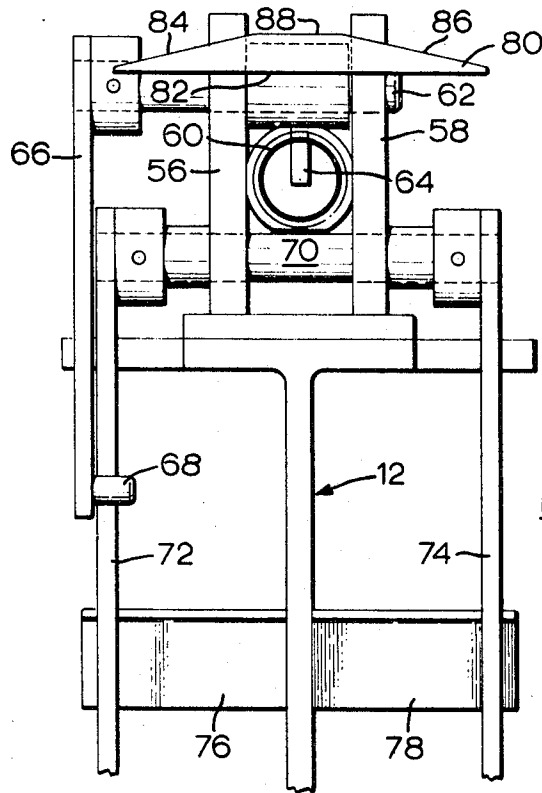


FIG. 4

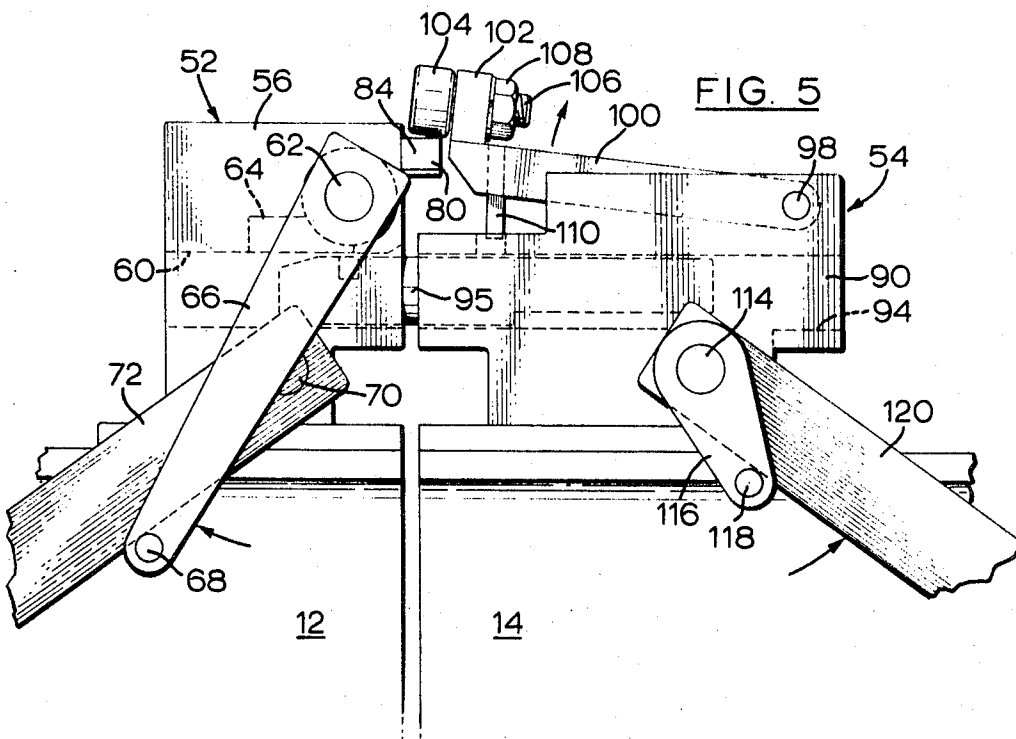


FIG. 5

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3,468,264

LOCKING MECHANISM

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4 Claims

ABSTRACT OF THE DISCLOSURE

A crane comprises first and second tracks, means for supporting the tracks in spaced apart relationship for movement with respect to each other, one of the tracks having movably mounted thereon a hoist, and means for interlocking the tracks whereby the hoist can be transferred from one of the tracks to the other of the tracks. The means for interlocking comprises first and second members, the first member being attached to the first track and the second member being attached to the second track, a third member carried by one of the first and second members and movable into interlocking relationship with the other of the first and second members, a cam surface carried by one of the first and second members and a cam follower carried by the other of the first and second members, and means carried by one of the cam surface and cam follower normally restraining movement of the third member into the interlocking relationship and adapted to release the third member when the tracks are brought into end-to-end aligned relationship with each other and the cam follower moves over the cam surface.

This invention relates to a locking mechanism, more particularly, to a locking mechanism for use with a mobile crane.

Mobile cranes generally move on a pair of longitudinal parallel tracks. Several sets of parallel tracks generally are provided, the sets of tracks being side-by-side. The crane consists of a single lateral track slidably mounted on a pair of the longitudinal tracks. The tracks generally are I-beams. On the lateral track is slidably mounted a hoist mechanism. Generally a lateral track is provided for each pair of longitudinal tracks, but only a single hoist is provided. The hoist can move from end to end of a single lateral track, and the whole crane can move longitudinally along the parallel tracks. In order to move the hoist laterally from the lateral track on one set of longitudinal tracks to a lateral track on an adjacent set of longitudinal tracks, the lateral tracks must be brought into alignment. By movement of the hoist from one lateral track to another and movement of the lateral tracks along each set of longitudinal tracks, the hoist may be located at any point within the length and width of the sets of longitudinal tracks. When one attempts to move the hoist laterally from one set of longitudinal tracks to another, the adjacent lateral tracks first must be aligned exactly with each other. This has hitherto involved the use of relatively complicated and expensive equipment and, in some cases, lengthy operations.

It now has been discovered that the disadvantages inherent in the prior art can be overcome by use of a novel locking device. The device is relatively uncomplicated and has built-in safety devices so that the lateral tracks cannot be locked together unless they are exactly aligned.

According to the present invention, there is provided a crane comprising first and second tracks, means for supporting the tracks in spaced apart relationship for movement with respect to each other, one of the tracks having movably mounted thereon a hoist, and means adapted for interlocking the tracks, whereby the hoist can be trans-

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ferred from one of the tracks to the other of the tracks. The means adapted for interlocking comprises first and second members, the first member being attached to the first track and the second member being attached to said second track, a third member carried by one of the first and second members and movable into interlocking relationship with the other of the first and second members, a cam surface carried by one of the first and second members, a cam follower carried by the other of the first and second members, and means carried by one of the cam surface and cam follower normally restraining movement of the third member into said interlocking relationship and adapted to release the third member when the tracks are brought into end-to-end aligned relationship with each other and the cam follower moves over said cam surface.

The invention will now be illustrated by the accompanying drawings, in which:

FIGURE 1 is a perspective view showing a pair of longitudinal tracks and one of a second pair of longitudinal tracks and two lateral tracks;

FIGURE 2 is a side elevational view of the device according to the invention;

FIGURE 3 is a front elevational view along line 3—3 of FIGURE 2 looking in the direction of the arrows;

FIGURE 4 is a front elevational view along 3—3 of FIGURE 2 looking in the opposite direction to the arrows; and

FIGURE 5 is a front elevational view of the mechanism in the locked position.

In the drawings, a pair of longitudinal I-beams 16 and 17 are fixed in parallel relationship. Longitudinal I-beam 18 is one of a pair of longitudinal I-beams, the other of which is not shown. Suspended from I-beam 16 is a beam 20 having a set of rollers 22 and 24 at each end thereof to enable the beam 20 to move freely along I-beam 16. I-beam 17 also has a beam 21 suspended therefrom, the beam 21 having a set of rollers at each end, only one (25) of which is shown, the rollers enabling the beam 21 to move freely along I-beam 17. Welded to the underside of beams 20 and 21 is an I-beam 12 constituting a lateral track associated with a pair of longitudinal tracks. I-beam 12 has a hoist 32 slidably suspended therefrom. I-beam 18 is provided with a beam 26 suspended therefrom by sets of rollers 28 and 30. Welded to the underside of beam 26 is an I-beam 14 constituting a further lateral track. The other end of beam 14 is welded to an I-beam similarly mounted on the other of the pair of lateral tracks of which beam 18 constitutes one in analogous manner to that illustrated with reference to I-beams 16, 17 and 12. Associated with the adjacent ends of I-beam 12 and 14 is a locking mechanism 10. In order to move the hoist 32 from beam 12 to beam 14, the beams must be exactly aligned by means of locking mechanism 10.

The locking mechanism 10 (see FIGURES 2 to 4) consists of two members 52 and 54 mounted respectively at the adjacent ends of the two I-beams 12 and 14. Beams 12 and 14 have a reduced horizontal cross section in the area of members 52 and 54. Member 52 consists of a pair of parallel uprights 56 and 58. Mounted between the uprights and parallel with the beam 12 is a hollow cylinder 60. Rotatably mounted above cylinder 60 is a rod 62 having an enlarged diameter in the area between the uprights 56 and 58. Downwardly projecting from the enlarged diameter into the cylinder 60 is a tongue 64. Fixed to one free end of rod 62 is a downwardly projecting lever 66. The lever 66 has at its free end a projection 68 perpendicular to the surface thereof and pointing towards the beam 12. Rotatably mounted below cylinder 60 is a rod 70 offset from rod 62. Secured to each free

end of the rod 70 are downwardly projecting levers 72 and 74. Lever 72 abuts the projection 68. Levers 72 and 74 rest against angled projections 76 and 78 respectively welded to the beam 12. Mounted across the face of uprights 56 and 58 and overhanging the end of beam 12 is an elongated member 80 having a cam surface, the elongated member having a generally flat underside 82 and a topside having inclined sections 84 and 86 each terminating in a generally flat section 88 parallel to the underside 82. Member 54 consists of a pair of parallel uprights 90 and 92. Mounted within the uprights and parallel to beam 14 is a hollow cylinder 94 of substantially the same diameter as cylinder 60. Cylinders 60 and 94 are adapted to be coaxial when beams 12 and 14 are in exact alignment. Mounted within cylinder 94 is a solid piston 95 having a rack and pinion mechanism 96 associated therewith and being adapted to move forwardly out of the cylinder 94. Above the cylinder 94 and towards the rear of uprights 90 and 92 is rotatably mounted a rod 98. Secured to the rod 98 is a forwardly projecting lever 100 having at its free end a vertical projection 102. The vertical projection 102 has a freely rotating roller 104 constituting a cam follower mounted on the face projecting towards the end of beam 14 and secured thereto by a bolt 106 and locknut 108. The roller 104 is adapted to rise up one of the inclined surfaces 84 and 86 and rest on the flat surface 88 when the beams 12 and 14 are in alignment. Projecting downwardly from lever 100 is tongue 110 which passes through cylinder 94 and into a hole 112 drilled near the forward end of piston 95. The tongue 110 is of such a length that when the roller 104 is resting on surface 88, tongue 110 will be lifted out of hole 112. Rotatably mounted between uprights 92 and 94 and below cylinder 94 is an elongated rod 114. Rod 114 has fixedly mounted at the free end adjacent upright 90 a crank member 116 having a projection 118 at its free end. The projection 118 is perpendicular to the surface of the crank 116 and projects towards the beam 14. Rotatably mounted on shaft 114 near the free end thereof adjacent upright 90 and inwardly of crank 116 is a lever 120 which normally projects downwardly and rests against an angled projection 122 welded to beam 14. Secured to rod 114 adjacent upright 92 is another crank member 124 having a projection 126 at its free end. Rotatably mounted on rod 114 inwardly of the crank 124 is a further downwardly projecting lever 128 also normally resting against a further angled projection 130 welded to the beam 14 on the opposite side thereof from projection 122. Also fixed to rod 114 is a counterweight 132 and, at the free end of the rod 114, a wheel 134 adapted to receive a chain, whereby the wheel and rod 114 may be rotated. Any other convenient mechanical, electrical, hydraulic or pneumatic mechanism could be employed for rotating the rod 114 in place of the wheel and chain.

Levers 72, 74, 120 and 128 are generally constructed so as to be as long as the deepest possible beam and then fashioned to fit the particular beam. The I-beam has a reduced cross section in the area of the members 52 and 54 so that the levers can project downwardly.

In operation, levers 72 and 74 prevent the hoist 32 mounted on beam 12 from passing from that beam to beam 14 while the levers are in the position shown in FIGURES 1 and 2. Alternatively, levers 120 and 128 could prevent the passage of a hoist mounted on beam 14 to beam 12. As the beams 12 and 14 assume near alignment, the roller 104 engages one of the inclined surfaces 84 or 86 on elongated member 80, depending on the relative initial positions of beams 12 and 14. As the roller 104 rises up the inclined surface, lever 100 pivots at rod 98, and tongue 110 rises out of hole 112 in cylinder 95. When the roller 104 reaches approximately the mid-point of the flat section 88, rod 114 is rotated actuating the rack and pinion mechanism 96, thereby projecting piston 95 out of cylinder 94 towards cylinder 60.

The piston 95 is able to move by virtue of the complete withdrawal of tongue 110 from hole 112 when the roller 104 reaches the flat section 88. The forward end of piston 95 is tapered so as to provide for minor misalignment of the relative positions of members 52 and 54 and thereby of cylinders 60 and 94, thereby enabling piston 95 to be projected into cylinder 60. As piston 95 is projected into cylinder 60, piston 95 engages tongue 64, thereby causing rod 62 to rotate and lever 66 to move. The projection 68 moves levers 72 and 74 out of a position where they would prevent movement of the hoist 32 mounted on beam 12 beyond them towards beam 14. In addition, as rod 114 rotates projecting piston 95 into cylinder 60, cranks 116 and 124 are rotated, and projections 118 and 126 respectively abut levers 120 and 128 moving them out of a position such as would prevent movement of a hoist mounted on beam 14 towards beam 12. The relative positions of the various elements when the mechanism is locked is shown in FIGURE 5. The hoist 32 can now move from beam 12 to beam 14. When it is desired to move the beams out of alignment to prevent movement of the hoist therebetween, the rod 114 can be rotated in the opposite direction, and after withdrawal of the piston 95 from cylinder 60 and after relative lateral movement of beams 12 and 14 the mechanism assumes the position shown in FIGURES 1 and 2.

It is possible to interchange the relative positions of elongated member 80 and roller 104. In this modification it is necessary to turn the elongated member the other way up so that surface 82 becomes the top surface and surface 88 the bottom surface.

What I claim is:

1. In a crane comprising first and second tracks, means for supporting said tracks in spaced-apart relationship for movement with respect to each other, one of said tracks having movably mounted thereon a hoist, first and second hollow members, said first hollow member being attached to said first track and said second hollow member being attached to said second track, said first and second hollow members having at least the adjacent ends thereof open, an elongated third member slidably mounted within said first hollow member and slidably movable into interlocking relationship with said second hollow member whereby said tracks are interlocked and said hoist can be transferred from one of said tracks to the other of said tracks, a cam surface carried by one of said first and second members and a cam follower carried by the other of said first and second members, means carried by one of said cam surface and cam follower normally restraining movement of said third member into said interlocking relationship and adapted to release said third member when said tracks are brought into end-to-end aligned relationship with each other and said cam follower moves over said cam surface, means for moving said third member into and out of said interlocking relationship, and means attached to said first and second members for preventing movement of said hoist from one of said tracks to the other of said tracks unless said third member is in said interlocking relationship, the improvement wherein said latter means comprises a first spindle mounted on said first hollow member in driven relationship with said means for moving said third member into and out of said interlocking relationship, at least one first downwardly projecting lever are rotatably mounted on said first spindle and movable into and out of a position wherein movement of a hoist from said first track to said second track is prevented, at least one second lever arm fixedly mounted on said first spindle and movable between a first position wherein said third member is within said first hollow member and a second position wherein said third member is in said interlocking relationship and said second lever arm engages said first lever arm through an intermediate position wherein said second lever arm becomes engaged with said first lever arm, said first lever arm is in said position preventing movement of said hoist

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and said third member is in an at least partial interlocking relationship, whereby said first lever arm is moved by engagement with said second lever arm out of said position preventing movement of said hoist when said second lever arm attains said second position, a second spindle rotatably mounted on said second hollow member, at least one third downwardly projecting lever arm fixedly mounted to said second spindle and movable into and out of a position wherein movement of a hoist from said second track to said first track is prevented, a third spindle rotatably mounted on said second hollow member, at least one fourth downwardly projecting lever arm fixedly mounted to said third spindle, third member engaging means projecting from said third spindle within said second hollow member, said fourth lever arm engaging said third lever arm, said fourth lever arm being movable by engagement between said third member and said third member engaging means from a third position wherein said third member is in said at least partially interlocked relationship and said third lever arm is in said position preventing movement of said hoist and a fourth position wherein said third member is in said interlocked relationship and said third lever arm is out of said position preventing movement, whereby said third lever arm is moved by engagement with said fourth lever arm out of said position preventing movement of said hoist when said fourth lever arm attains said fourth position, whereby upon bringing said tracks into end-to-end aligned relationship and upon actuation of said means for moving said third member, said third member slides partially out of said first hollow member and partially into said second hollow member to achieve said at least partially interlocked relationship while said second lever arm moves from said first position to said intermediate position and upon continued actuation of said means for moving said third member said third member engages said third member engaging means and continues to slide into said second hollow member until said third member achieves said interlocking relationship while said second lever arm moves from said intermediate position to said second position, thereby moving said first lever arm out of said position preventing movement of said hoist, and said fourth lever arm moves from said third position to said fourth position, thereby moving said third lever arm out of said position preventing movement of said hoist, and thereby said hoist may be moved from one of said tracks to the other of said tracks while said tracks are interlocked.

2. The crane of claim 1 wherein said first and second tracks are I beams, said first hollow member is mounted adjacent one end of said first track on the top of said I, said second hollow member is mounted adjacent the end of said second track adjacent said one end of said first track on top of said I, said means for preventing movement of said hoist comprises a pair of first lever arms rotatably mounted on adjacent each end of said first spindle, said first spindle extending laterally of said first hollow member, said pair of first lever arms extending downwardly from said first spindle in substantially parallel relation to each other and to the upright of said I, a pair of second lever arms fixedly mounted on said first spindle one adjacent each of said first lever arms, a pair of third downwardly projecting lever arms fixedly mounted one each end of said second spindle, said second spindle extending laterally of said second hollow member and beneath said second hollow member, said pair of third lever arms extending downwardly from said second spindle in substantially parallel relation to each other and the upright of said I, and a pair of fourth lever arms fixedly mounted on each end of said third spindle said third spindle extending laterally of said second hollow member, above said second hollow member, said fourth lever arms extending downwardly from said third spindle in substantially parallel relation to engage said pair of third lever arms intermediate their ends.

3. The crane of claim 1 wherein said means for moving said third member includes a rack and pinion mechanism.

4. The crane of claim 1 wherein said means for supporting said tracks comprises two pairs of parallel tracks on each of which is slidably laterally mounted one of said first and second tracks.

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