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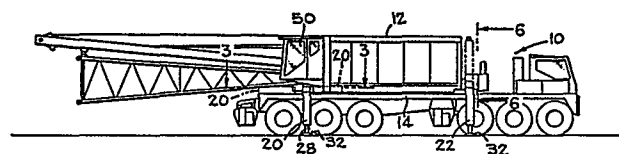
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⑤④ **Crane undocking arrangement.**

⑤⑦ A means for undocking the upper from the lower of a crane, comprising a rotatable beam mounted on and extending across upper, an L-shaped leg affixed to each end of the beam, and hydraulic means for rotating said beam to selectively orient said legs in one of a deployed position and an operative position.



1 This invention relates to an undecking arrangement for
cranes, and more particularly, to such an arrangement which utilizes
short stroke jacks and is capable of compact stowage.

5 In the drawings:

Figure 1 is a side elevational view of a crane incorporating
an undecking arrangement according to the present invention;

10 Figure 2 is a side elevational view of the crane in Figure 1
showing the upper undecked from the carrier;

Figure 3 is a view taken on line 3-3 of Figure 1;

15 Figure 4 is a cross-sectioned view taken on line 4-4 of
Figure 3;

Figure 5 is a cross-sectioned view taken on line 5-5 of
Figure 3; and

Figure 6 is a view taken on line 6-6 of Figure 1.

20 Referring to Figures 1 and 2, a crane, indicated generally at
10, includes an upper 12 rotatably mounted on a lower works or carrier
14 by means of a turntable bearing 16. The turntable bearing 16 is
25 releaseably secured to a ring 18 attached to the upper 12. A preferred
means for releaseably securing the ring and turntable bearing is
disclosed in U. S. patent 3,923,407 issued Dec. 2, 1975 to L. B. Jensen
and R. E. Thune. A pair of front legs 20 are mounted on the front of
30 the upper 12 and a pair of rear legs 22 are mounted on the rear
thereof. Each of the pair of legs 20 and 22 is capable of spanning the
transverse width of the carrier 14 and provide a structural means of
supporting the upper 12 from the ground. Since each of the front pair
35 of legs are similar, as are each of the rear pair, a description of
only one leg of each pair is necessary for a complete understanding of
the invention.

1 The front leg 20 includes a tubular portion 24 having a
double-acting hydraulic ram or jack 26 affixed to the interior thereof.
The rod 28 of jack 26 protrudes from one end of portion 24, has a cross
5 bore 30 for attachment of a float or pontoon 32, as shown in Figures 1
and 2, for engagement with the ground, and is extendable to elevate the
upper 12 as can be seen in Figure 2. A transverse beam end 34 is
affixed to the other end of portion 24 with a gusset 36 welded there
10 between. The beam end 34 is pivotally mounted to a plate 38 secured to
the free end of a round tubular beam 40 by means of hinge pin 42. The
hinge pin 42 is oriented substantially vertical so that the leg 20 may
swing in a horizontal plane between a stowed position, as shown by
15 solid lines in Figure 3, and a deployed or outward position, as shown
by phantom lines. The beam end 34 is provided with a bore 44 that is
alignable with a bore 46 provided in the plate 38. Insertion of a pin
20 through the bores 44 and 46 rigidly secures the beam end 34 to the beam
40. The arrow 48 illustrates the movement of bore 44 as the leg 20 is
manually pivoted between the solid line stowed position and the phantom
line deployed position. In the stowed position the leg 20 is
25 underneath the cab 50 of the upper, as shown in Figure 1, with the
tubular portion 24 extending forward, thereof, relative to the upper
12. In the deployed position, the leg 20 is positioned outboard and
beside the cab 50 with the portion 24 extending rearward. While the
30 leg 20 is heavy, the manual movement between stowed and deployed
positions may be readily accomplished because only the frictional
forces around hinge pin 42 need be overcome.

35 Once deployed and pinned through bores 44 and 46, the leg 20
must be rotated through 90 degrees to a vertical orientation. Such
movement is provided by mounting the round beam 40 in a round box
member 51 rigidly secured to the frame of the upper 12 through plate

1 members 52 and 54. An actuating tube 56 is secured to, and extends
between, the beam 40 and the comparable beam for the other of the pair
of legs 20. A crank arm 58 is secured to the center of the tube 56 and
5 is pinned at 60 to the clevis on the rod end of a double-acting
hydraulic ram 62. The head end of ram 62 is pinned at 64 to a fixed
bracket 66 rigidly secured to the upper 12. With the ram 62 extended,
as shown in Figure 4, the leg 20 will be in its deployed position; the
10 center line of the leg 20 being indicated at 70. When the ram 62 is
contracted, as shown in phantom lines therein, the leg 20 will be
rotated to its vertical position; the centerline of the leg 20 now
being indicated at 72.

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In order to assure that the tubular portion 24 of leg 20 is
vertically oriented and to remove the hydraulic load on the ram 62, a
20 collar 74 engages the inner end of the round beam 40 and is arranged to
function as a stop or motion limiter. The collar 74, round beam 40 and
the actuating tube 56, are pinned into a unitary structure by a pin 76
inserted through aligned holes extending there through. A lug 78
25 formed on the collar 74 is provided with a pair of radially extending
stop surfaces or faces 80 and 82. A wedge block 84 having a surface
engageable with, and complementary to, the face 80 is secured to a
structural member 86 of the upper 12. The wedge block 84 is pushed
30 against the face 80 and welded to the member 86 when the legs 20 are
vertically oriented with the upper 12 in a level position. The
engagement of the face 80 with the wedge 84 thereafter positions the
35 legs 20 correctly to support the weight of the upper. In addition, or in
the alternative, shims may be attached to the wedge block to compensate
for tolerance accumulations between the two front legs.

1 To lock the legs in this position, a pawl 88 is pivotally
mounted by means of pin 90 to a plate member 92 affixed between plate
member 54 and its corresponding member on the other side of the upper's
5 longitudinal center line. The pawl 88 is biased by tension spring 94
toward engagement with the stop surface or face 82. When the face 80
engages the wedge block 84, the pawl 88 will snap into position
engaging the face 82. Shims 96 may be secured to the free end of pawl
10 88, in order to reduce back lash and to lock the cross tube members so
that the legs 20 are substantially vertical. Once the face 80 has
engaged wedge block 84 and pawl 88 has engaged face 82, the legs 20 are
locked in place mechanically, and the ram 62 is no longer necessary to
15 maintain the legs vertical.

To return the legs 20 to their stowed position, the pawl 88
is manually lifted by means of handle 98 so that it is free of the lug
20 78 and the ram 62 is extended, causing the legs 20 to rotate to their
deployed position. In this position the collar 74 and its lug 78 will
have rotated until the face 82 engages the angle 100 secured between
the plate 54 and its corresponding member on the other side of the
25 upper center line. The pin that had been inserted through bores 44 and
46 is removed and the leg 20 pivoted on pin 42 from its deployed
position to its stowed position. When in its stowed position, the
center of gravity of the leg 20 tends to rotate the beam 40 in a
30 counter clockwise direction, as viewed in Figure 4. However, the
engagement of the face 82 with the angle 100 will prevent rotation in
that direction. With the angle 100 resisting such rotation, there is
no hydraulic load on the ram 62 resulting from the restrain of such
35 movement. Due to tolerance accumulation between the two front legs, it
may be necessary to add shims to the angle 100 for engagement by the
face 82 on one side in order that both front legs 20 will be stowed
horizontally.

1 The rear legs 22 for supporting the upper 12 are pivotable
between an upward and inboard stowed position, shown by phantom lines
in Figure 1, and an outward and downward operable position, shown by
5 solid lines in Figures 1 and 2. The one leg 22, shown in Figure 6,
illustrates the leg in its stowed position in solid lines and in its
operable position in phantom lines with the lower portion eliminated.

Referring now to Figure 6, the rear leg 22 has a tubular
10 member 102 with a double-acting jack 104 affixed to its interior. The
rod of the jack has a cross bore 106 for attachment of a float or
pontoon 32 when in its operable position. The tubular member 102 is
attached to a beam end 108 with a gusset 110 secured there between for
15 strength. The beam end 108 is preferably hollow and of rectangular
cross section, and is pivotally connected by means of pin 112 to a
rigid beam 114 affixed to the upper 12. A bellcrank 116 is rotatably
20 mounted on the pin 112. A double acting hydraulic ram 118 has its rod
end pivotally connected at 117 to the bell crank 116 and its head end
pivotally connected at 119 to the beam end 108. A similar ram 120 has
its rod end pivotally connected at 121 to the bell crank 116 on the
25 opposite side of the pin 112 and its head end pivotally connected at
122 to the beam 114. With both of the rams 118 and 120 extended, as
shown by solid lines - Figure 6, the beam end 108 is substantially
parallel with and overlies the beam 114. When both of the rams 118 and
30 120 are contracted, the beam end 108 is rotated counter clockwise, as
viewed in Figure 6, through approximately 180 degrees so that the beam
end 108 and the beam 114 are aligned with the tubular member 102
35 substantially vertical. The beam end 108 and beam 114 are then joined
into a structural unit by insertion of a pin through then aligned bores
124 and 126 formed in the beam end 108 and the beam 114 respectively.

1 It will be seen from the foregoing description that the
present invention provides a structural arrangement for the undecking
of a crane upper which requires relatively short stroke jacks and the
5 inherent disadvantages of long stroke jacks are thereby obviated. The
legs may be folded compactly and with little physical effort against
the crane upper into their stowed positions and do not inhibit or
interfere with the normal operation of the crane.

10 While a preferred embodiment of the present invention has
been shown and described herein, it will be apparent that various
changes and modifications may be made therein without departing from
15 the spirit of the invention as defined by the scope of the appended
claims.

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F 5433-EP

5 What is claimed is:

1. A means for undecking the upper from the lower of a crane, comprising:

10 a rotatable beam mounted on and extending across upper;
an L-shaped leg affixed to each end of the beam; and
hydraulic means for rotating said beam to selectively orient
said legs in one of a deployed position and an operative position.

15 2. The invention according to claim 1, and further
comprising:

block means for limiting the rotation of said beam in the
direction of moving said legs to their operative position so that the
20 free ends thereof are substantially vertical.

3. The invention according to claim 2, and further
comprising:

25 pawl means engageable with said beam when said block means is
engaged to limit rotation of said beam in the other direction.

30 4. The invention according to claim 3, wherein a spring
attached to said pawl means urges said pawl means toward engagement
with said beam.

5. The invention according to claim 4, wherein said legs are
pivotally secured to said beam and removable pin means permit swinging
of said legs to a stowed position adjacent said upper.

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1 6. The invention according to claim 5, and further
comprising:

 a rigid beam on said upper;
5 a second leg pivotally mounted on said beam and swingable in
a vertical plane between an upright stowed position adjacent said upper
and an outboard operative position.

10 7. The invention according to claim 6, and further
comprising:

 hydraulic jack means attached to the free end of each leg.

 8. The invention according to claim 7, and further
15 comprising:

 a bell crank pivotally mounted at said pivotal mounting of
said second leg; and

 a pair of hydraulic rams connected to said bell crank and one
20 ram connected to said beam and the other to said second leg.

 9. The invention according to claim 8, and further
comprising:

25 a second pin for releaseably securing said beam to said
second leg.

 10. A means for undocking the upper from the lower of a
crane, comprising:

30 a rectangular beam affixed to said upper;
 a beam end having a transverse leg;
 a pivot pin rotatably attaching said beam end to said beam;
 a bell crank rotatable on said pivot pin;
35 a first hydraulic ram pivotally attached between said bell
crank and said beam; and a second hydraulic ram pivotally attached to
between said bell crank and said beam end.

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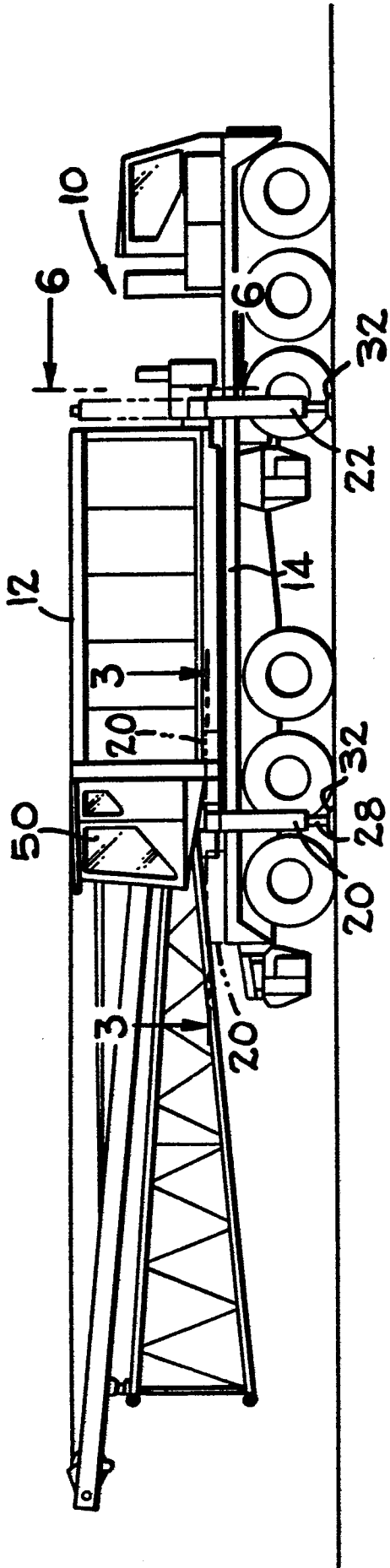


FIG. 1

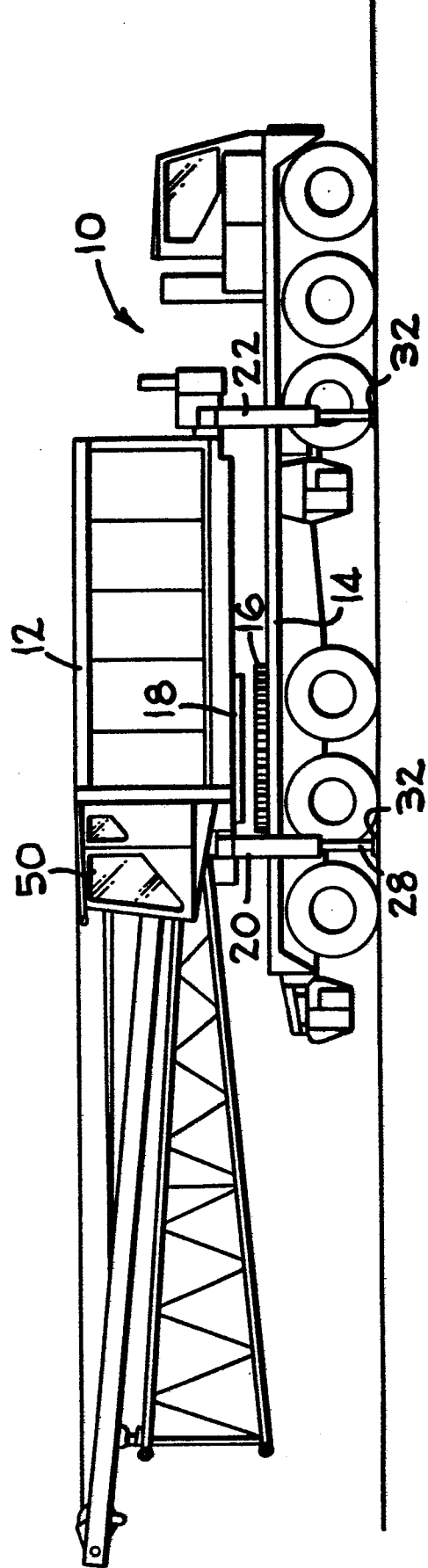


FIG. 2

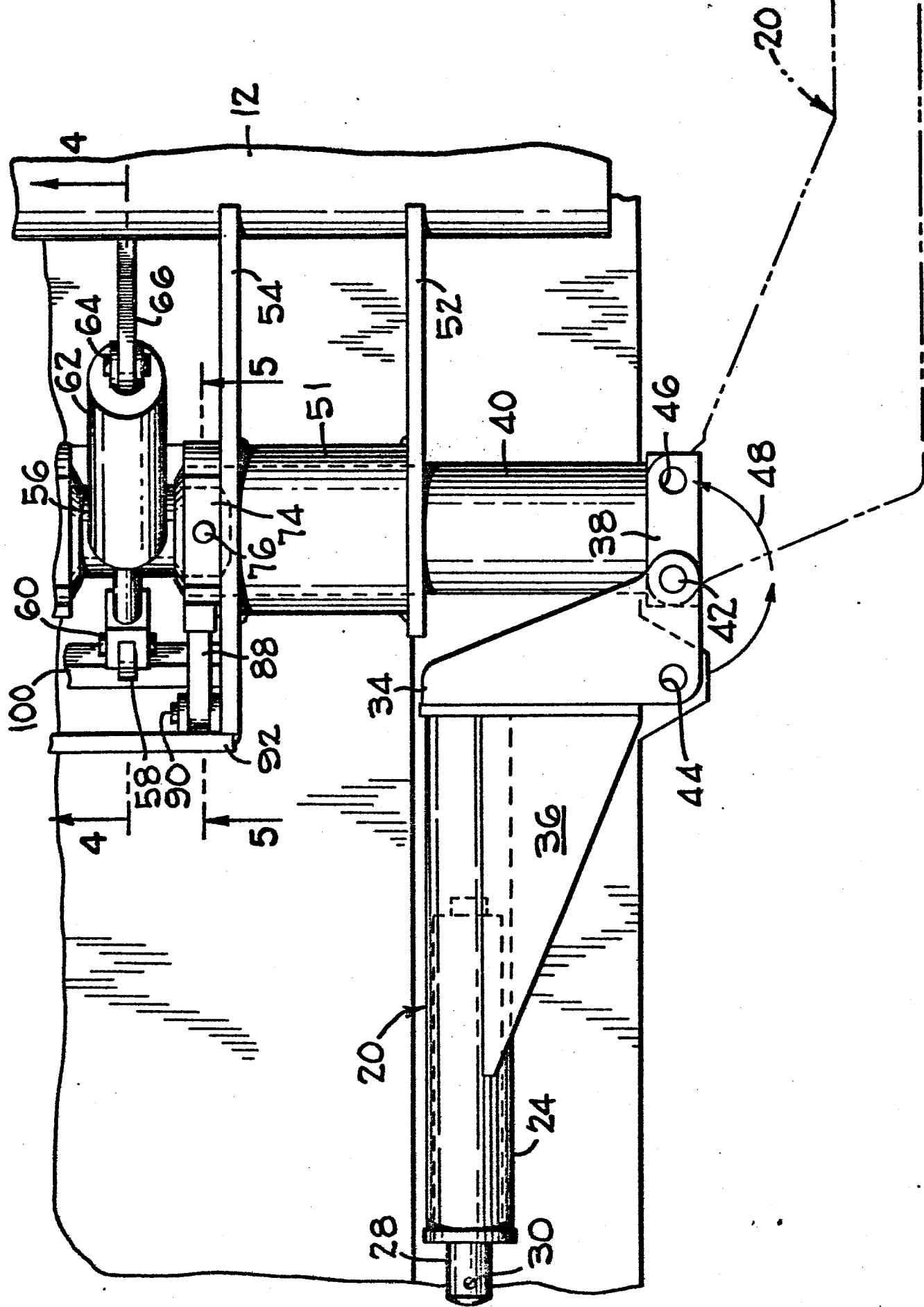


FIG. 6

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104
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12
102
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108
124
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126
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122
114
102
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