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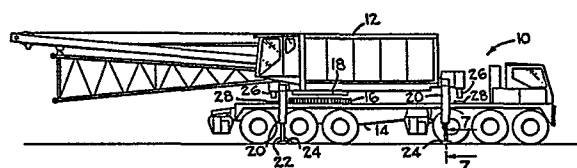
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⑤④ **Centering arrangement for redecking of upper crane.**

⑤⑦ A centering means for redecking of a crane having an upper supported on legs above a carrier comprising a plurality of centering pins having a conical end mounted on the upper, a complementary shaped socket for engagement with each of said pins and secured to said carrier, a jack on each of said legs for lowering the pins into contact with their respective socket, and a float attached to each leg for permitting lateral shifting of said leg as said jacks lower said pins into contact with said sockets.



1 This invention relates to an arrangement for centering the upper relative to the lower or carrier of separable cranes.

 In the drawings:

5 Figure 1 is a side elevational view of a crane, shown with the upper undecked, incorporating the present invention;

 Figure 2 is a top plan view of the crane in Figure 1 with portions thereof broken away and eliminated;

10 Figure 3 is vertical section taken on line 3-3 of Figure 2 showing one of the center pins and its mating socket with the pin retracted;

15 Figure 4 is a view of the pin in Figure 3 with the pin extended;

 Figure 5 is a view of the pin in Figure 4 but with the upper having been lowered to bring the pin into contact with the socket;

20 Figure 6 is a view similar to Figure 5 but showing the pin being laterally displaced as the upper is lowered further;

 Figure 7 is a cross-sectional view of the float taken on line 25 7-7 of Figure 1;

 Figure 8 is a view of the float in Figure 7 showing the lateral shifting therein during centering; and

30 Figure 9 is a cross-sectional view taken on line 9-9 of Figure 7.

 Referring to Figure 1 and 2, a crane, indicated generally at 35 10, includes an upper 12 which is rotatably mounted on a lower or carrier 14 by means of a turntable bearing 16. The turntable bearing is releaseably secured to a ring 18 secured to the upper with a locking

1 ring expandable to interlock the bearing 16 and ring 18, and
retractable to release the bearing from the ring to permit separation
of the upper 12. A preferred means for such releaseable attachment of
5 ring and bearing is more fully shown and described in U. S. Patent
3,923,407 issued Dec. 2, 1975 to L. B. Jensen and R. E. Thune. As will
be seen therein, the ring must be aligned with the turntable bearing
and the swing pinion must also be positioned for engagement with a ring
10 gear on the outer race of the turntable bearing to permit swinging of
the upper. The problem encountered with redecking of the upper on the
carrier is alignment of these components within a relative close
tolerance.

15 The upper 12 carries a plurality of legs 20, preferably one
at each of its corners, with a double-acting hydraulic jack 22 affixed
to, or otherwise incorporated into the free end of each leg 20. With
20 the ring 18 and bearing 16 released, extension of these jacks will
elevate the upper 12 above the carrier 14, as shown in Figure 1.
Retraction of these jacks will lower the upper 12 onto the carrier 14.
A pontoon or float 24 is pinned to the rod end of each jack 22 to
25 distribute the load over a relatively large area and thereby achieve
acceptable ground pressures. Alignment or centering of the
aforementioned components is provided by four pins 26 carried on the
30 upper 12, two at each end thereof, and corresponding sockets 28 affixed
to the carrier 14. Since all of the pins 26 and their cooperating
elements are similar, a description of one will be sufficient for a
complete understanding.

35 Referring now to Figures 3-6, the centering pin 26 is
slidably mounted in a tubular member or sleeve affixed to the upper 12.
The pin 26 is itself preferably a tubular member for weight reduction

1 and has a hardened frustroconical cap 32 affixed to its lower end. A
handle 34 is secured to the upper end of the pin 26. This handle is
preferably rigid with a transverse dimension greater than the interior
5 diameter of the sleeve 30 to preclude the pin 26 from dropping through
the sleeve. A crossbore 36 is provided in the pin 26 and a similar
crossbore 38 is provided in the sleeve 30. A retaining pin 40 is
capable of insertion through these crossbores. The centering pin 26 is
10 retained in an operative or stowed position by manually raising the
pin 26, by means of handle 34, and inserting pin 40 through the
crossbore 38 so that the cap 32 rests on the pin 40, as shown in Figure
3. The pin 26 is retained in an operative or centering position by
15 lowering it until the crossbores 36 and 38 are aligned and the
retaining pin 40 inserted, as shown in Figure 4.

20 A socket 42 having a concave surface 44, which is
complementary to the conical surface of cap 32 and is circular in plan
view preferable with a diameter approximately twice that of the pin
26, is secured to the carrier 14. The angle of the conical surface 44
25 and the cap 32 is chosen so that the tangent of this angle is
approximately equal to the coefficient of friction between the
materials thereof when lubricated. Such an angle assures effective
centering without imposing large side loads on the structures.
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To initially position the socket 42 on the carrier 14, the
upper and carrier are operatively assembled with the upper facing the
rear of the carrier and aligned therewith in a fore and aft direction.
35 With the upper and carrier so positioned, the centering pin 26 is
permitted to drop into contact with the unattached socket 42. The

1 position of the socket is then adjusted so that the centerlines of the
pin and socket are aligned and the socket 42 is then secured to the
carrier 14.

5 The centering sequence for redecking is illustrated in
Figures 4-6. With the upper elevated from the carrier, as shown in
Figure 1, the centering pin 26 is retained by pin 40 in its lowered or
operative position. The carrier 14 is maneuvered sufficiently to
10 position the pin 26 so that at least a portion of the angled surface of
the cap 32 is directly above the complementary surface 44. The
centerline 46 of the pin 26 will most likely be offset from the
15 centerline 48 of the socket 42, as indicated at 50 in Figure 4. The
jacks 22 are then slowly contracted, lowering the upper 12 and causing
the pin 26 to contact the socket 42, as shown in Figure 5. A further
contraction of these jacks will cause the pin 26 to be urged by the
20 socket 42 toward the center thereof. The upper 12 will, therefore, be
displaced or moved in a horizontal direction, as indicated by the arrow
52 in Figure 6, relative to the stationary carrier 14. The pin and
socket will now be aligned and will result, because there are four of
25 these pins and sockets, in the upper 12 being aligned, within acceptable
tolerances, to permit rejoining of the upper and carrier. The jacks 22
are then extended just enough to permit removal of retaining pin 40
30 from the bores 36 and 38. The jacks 22 are then retracted fully to
redeck the upper on the carrier. The centering pin 26 is then
manually raised by the handle 34 to permit the retaining pin 40 to be
inserted through bore 38 below the cap 32 to retain the pin 26 in its
35 stowed position. Swinging movement of the upper on the carrier is then
possible.

1 Movement of the upper in a horizontal direction while
supported on the legs 20 would normally impose large stresses on legs
as well as other structural components of the upper. In order to
5 prevent this, the floats 24, as shown in Figure 7, are provided with a
base 54 to which a bearing block 56 is secured. An upper bearing plate
58 rests upon and is movable relative to the block 56. Both of these
10 bearing members have smooth mating surfaces and are lubricated to
provide as small a friction force to movement under load as possible.
A fabricated socket 60 is attached to the plate 58 and facilitates
attachment to the rod end of the jack 22 by means of a removable pin
15 62. A retaining flange is attached to the periphery of the plate 58
and limits lateral movement of the plate 58 relative to the block 56.
The float 24 is initially positioned as shown in Figure 7 with the
block 56 centered on the plate 58. This relationship is established by
20 aligning the edges of a plate 66, on which the block 56 is centered and
attached, forming a part of the fabricated base 54 with a flange 64
attached to plate 58. During the centering sequence illustrated in
25 Figure 6, the leg 20 and jack 22 will also be displaced or moved
laterally. The bearing plate 58 and its attached members will be able
to move laterally as shown in Figure 8, to accommodate the movement of
the upper 12. As shown in Figure 9, the movement of the plate 58 is
30 universal in a horizontal plane and within the limits determined by
contact between the flange 64 and the block 56. Handles 70 and 72
secured to the plate 58 and the base 54 respectively facilitate
35 transport and positioning thereof.

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

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F 5434-EP

5 What is claimed is:

1. A centering means for redecking of a crane having a upper supported on legs above a carrier comprising:

10 a plurality of centering pins having a conical end mounted on the upper;

a complementary shaped socket for engagement with each of said pins and secured to said carrier;

15 a jack on each of said legs for lowering the pins into contact with their respective socket; and

20 a float attached to each leg for permitting lateral shifting of said leg as said jacks lower said pins into contact with said sockets.

2. The invention according to claim 1, and further comprising means for retaining said pins in a stowed position remote from said sockets.

25 3. The invention according to claim 2, wherein each float comprises:

a base for contacting the ground;

30 a bearing block affixed to said base;

a bearing plate resting on and shiftable relative to said block; and

35 means for attaching said jacks to said plate.

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

 limiting means for restricting the lateral movement of said
5 plate relative to said block.

 5. The invention according to claim 4, wherein said limiting
means comprises a flange attached to said plate and engageable with said
10 block.

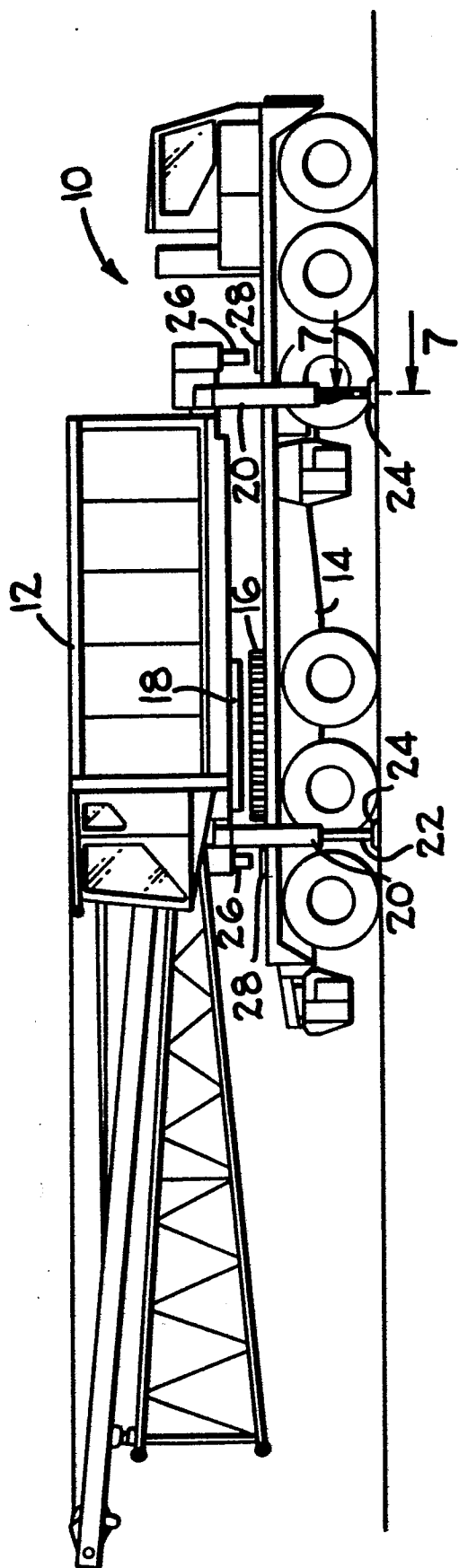
 6. A method of redecking the upper of a crane on its carrier
comprising the steps of:

 supporting a crane on legs from the ground;
15 securing centering pins on the upper;
 lowering the upper to bring said pins into contact with
centering sockets on the carrier;
 removing said pins; and
20 lowering said upper onto said carrier.

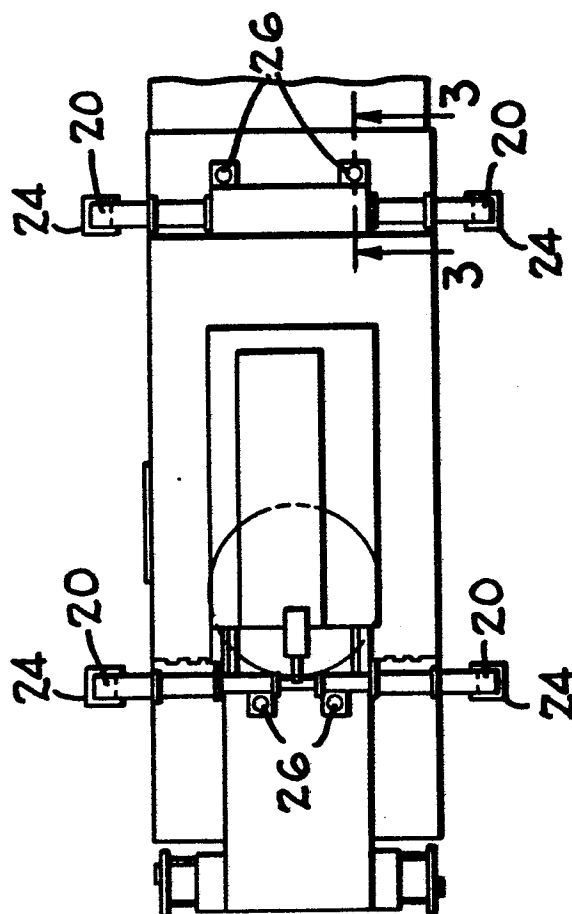
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Fig. 4

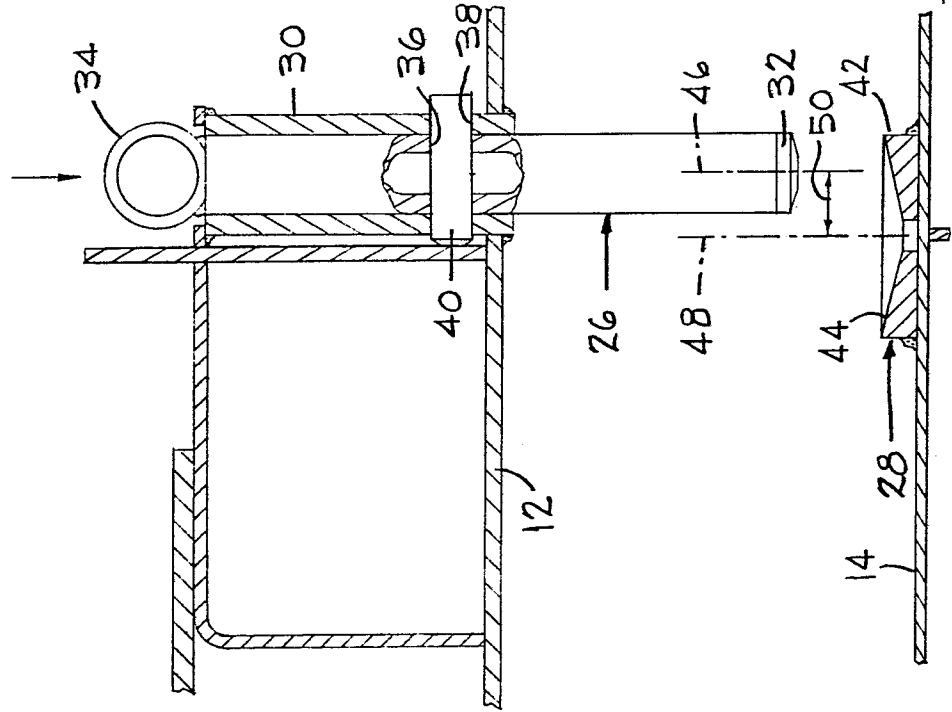


Fig. 3

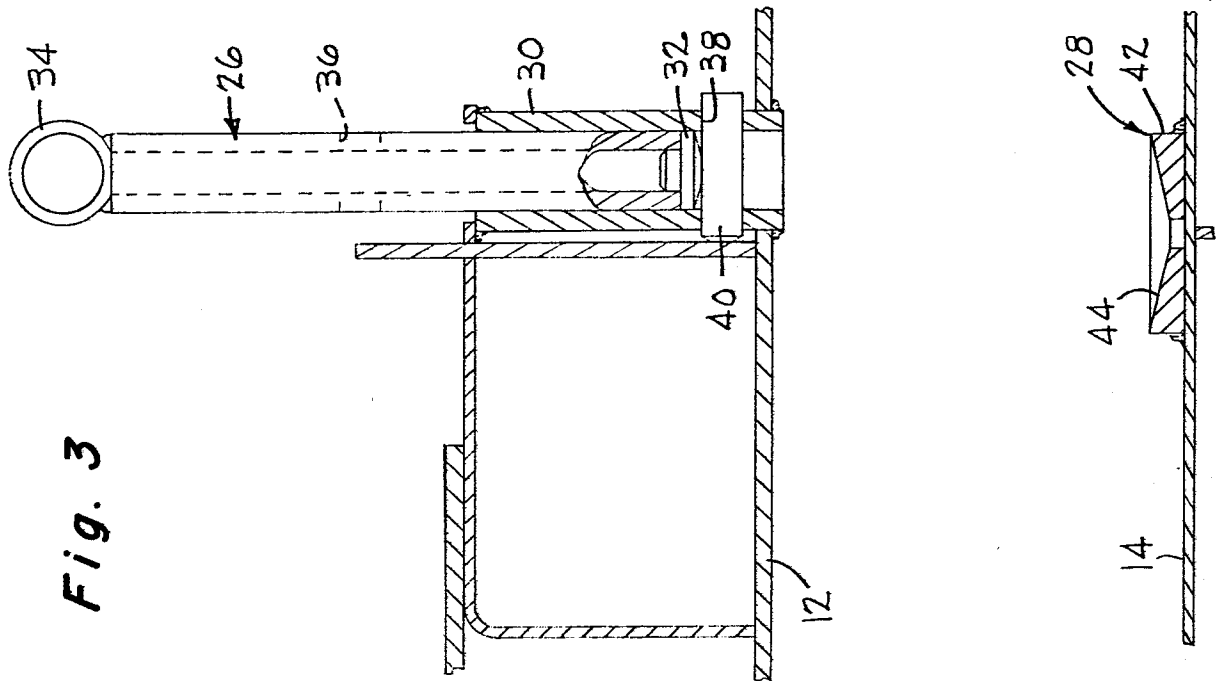


FIG. 5

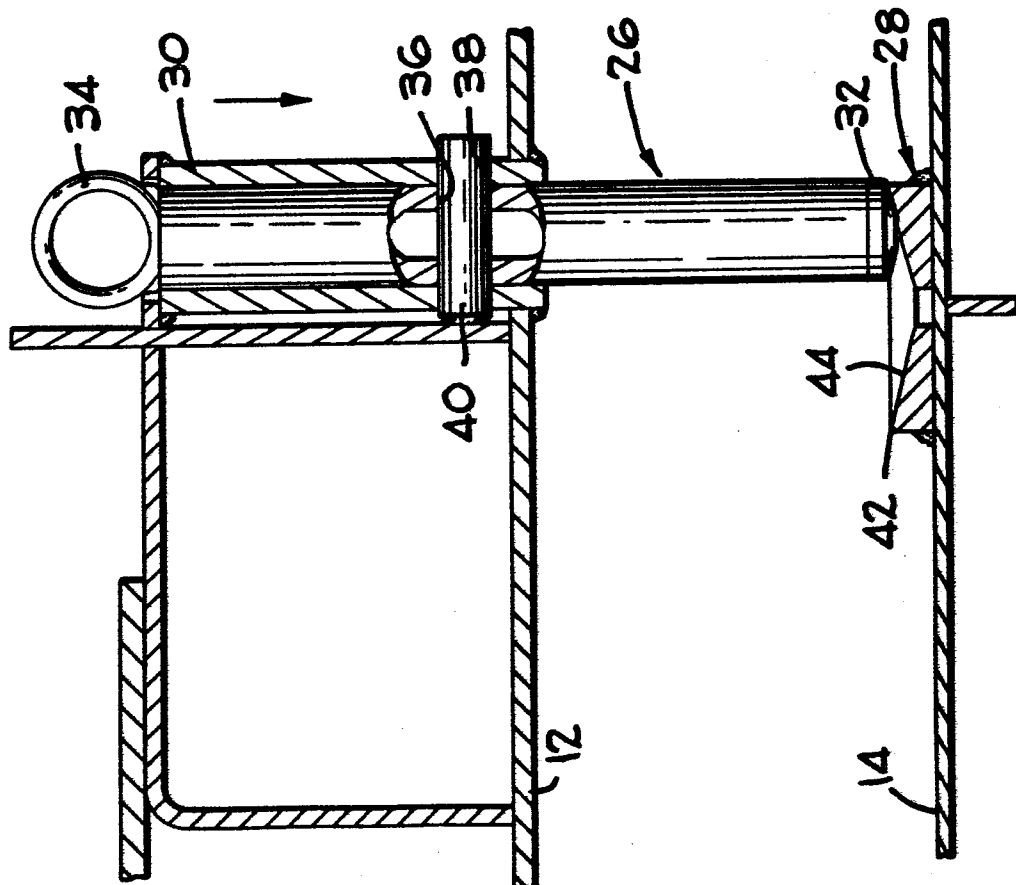


FIG. 6

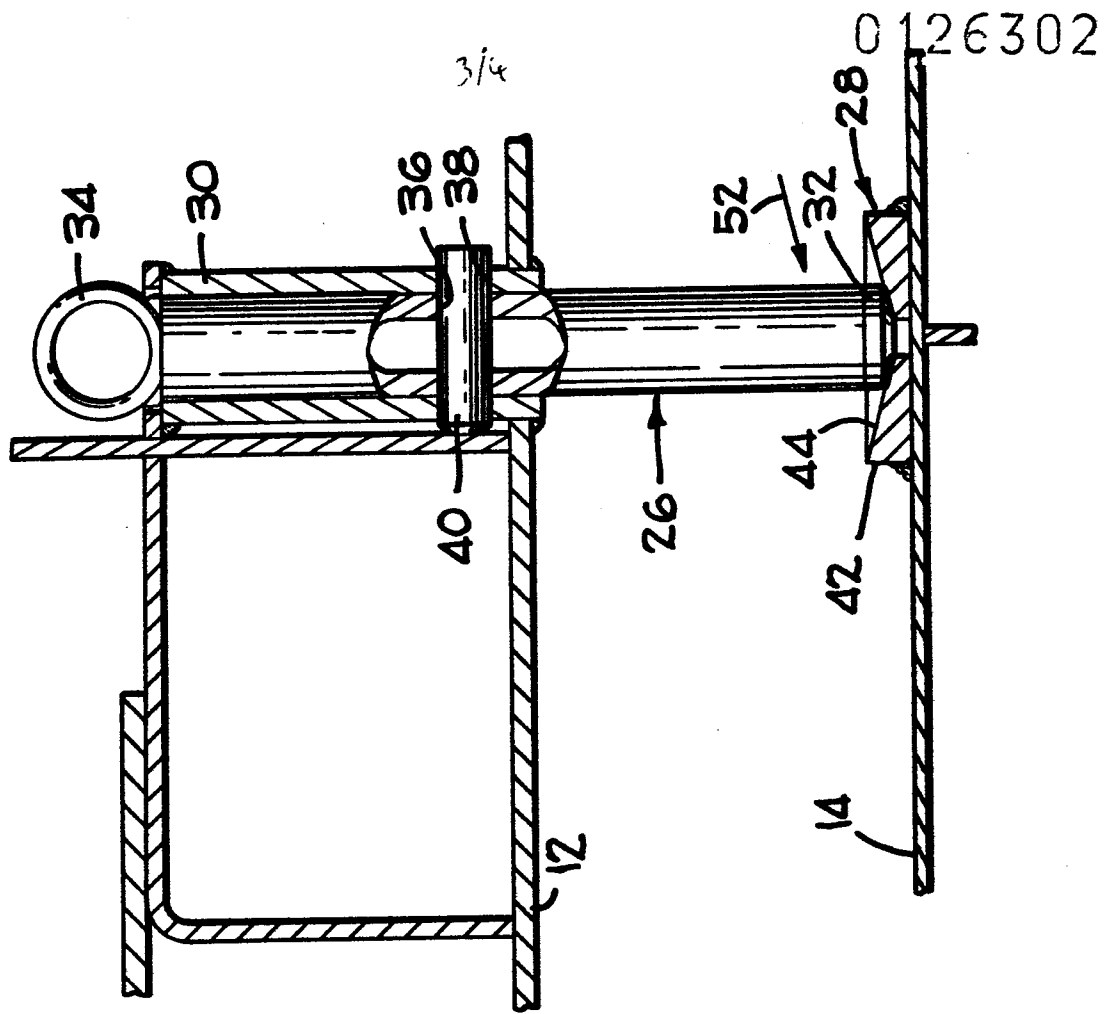


Fig. 7

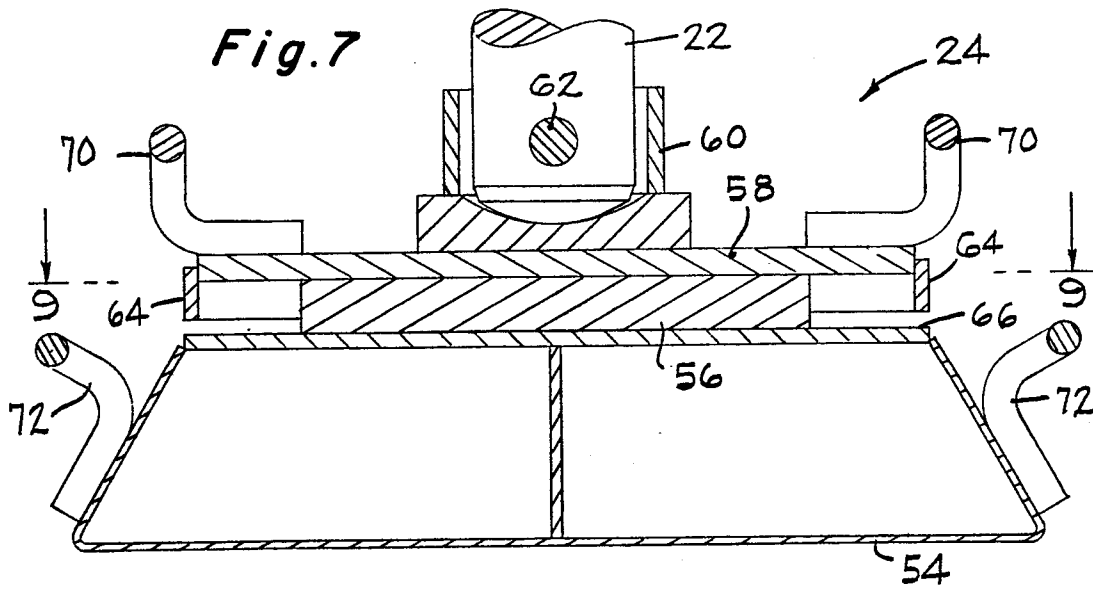


Fig. 8

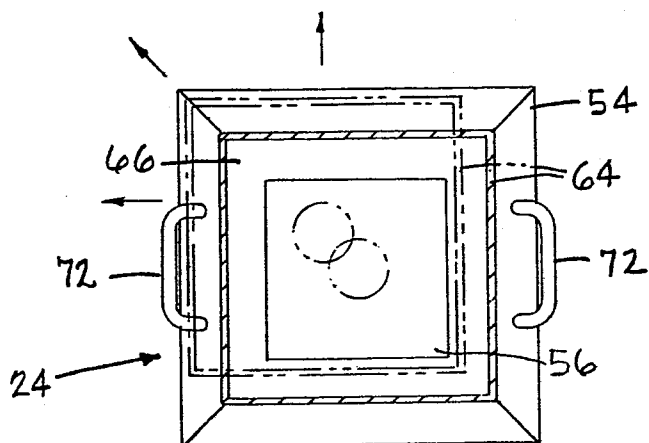
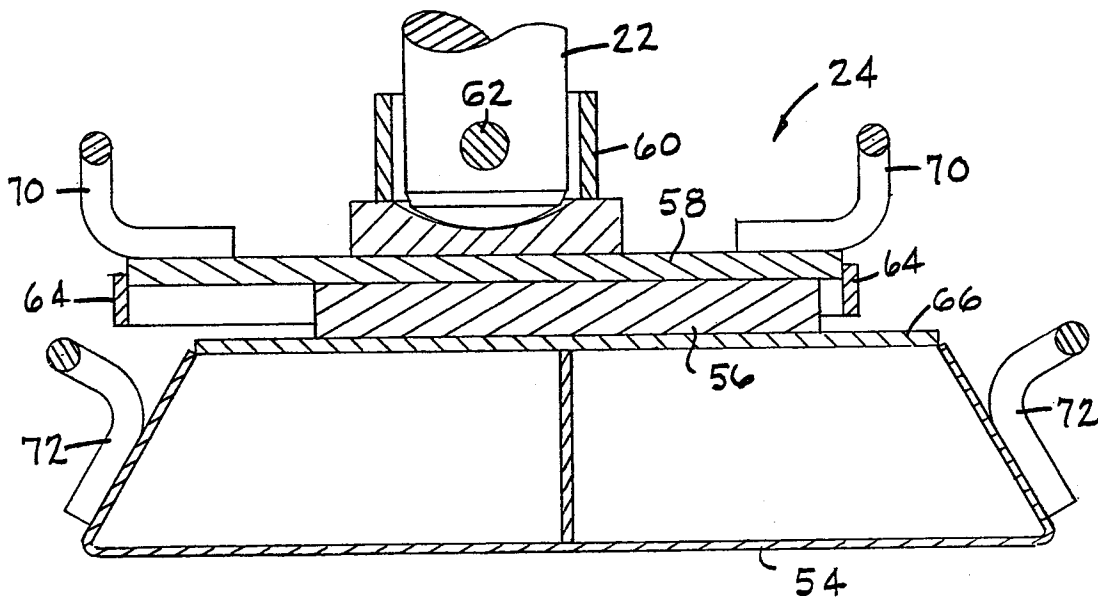


Fig. 9