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Brickley

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[54] **SUSPENSION MEANS FOR LOAD HANDLING EQUIPMENT**

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[51] **Int. Cl.**.....**B66c 5/02**

[58] **Field of Search**....294/67 R, 67 D, 67 DA, 81 R, 294/81 SF, 68–73; 212/12, 14; 214/14, 15, 394

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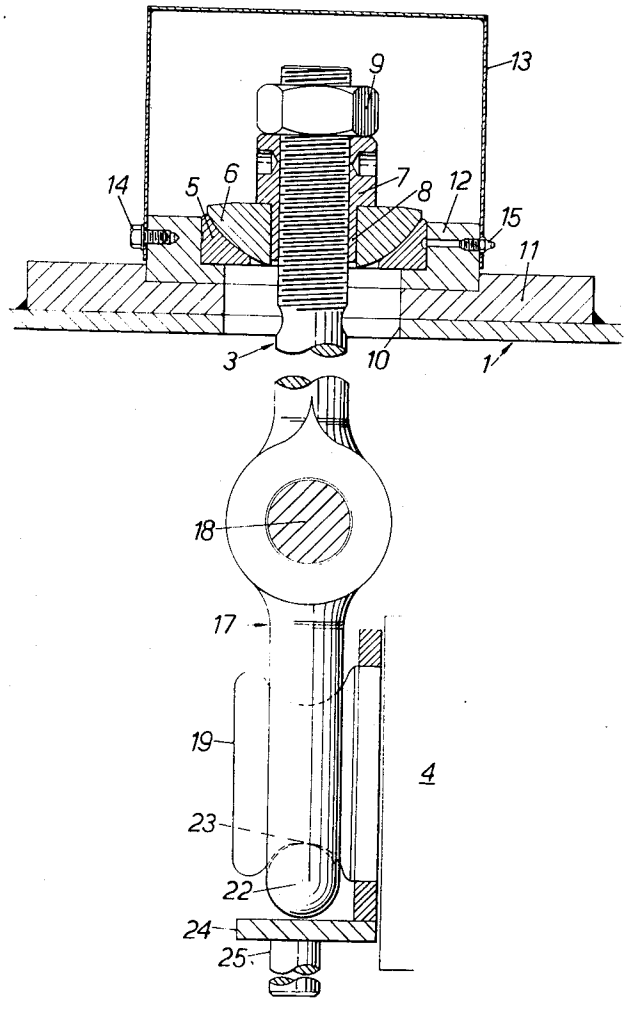
[57] **ABSTRACT**

A freight container is handled by a crane or carrier by means of a spreader frame engaging with the container. The spreader frame is suspended from the carrier by vertical links which can swivel relative to the carrier and can be easily detached from the spreader frame. Hydraulic jacks move the spreader frame relative to the carrier to align it with the container.

3 Claims, 3 Drawing Figures



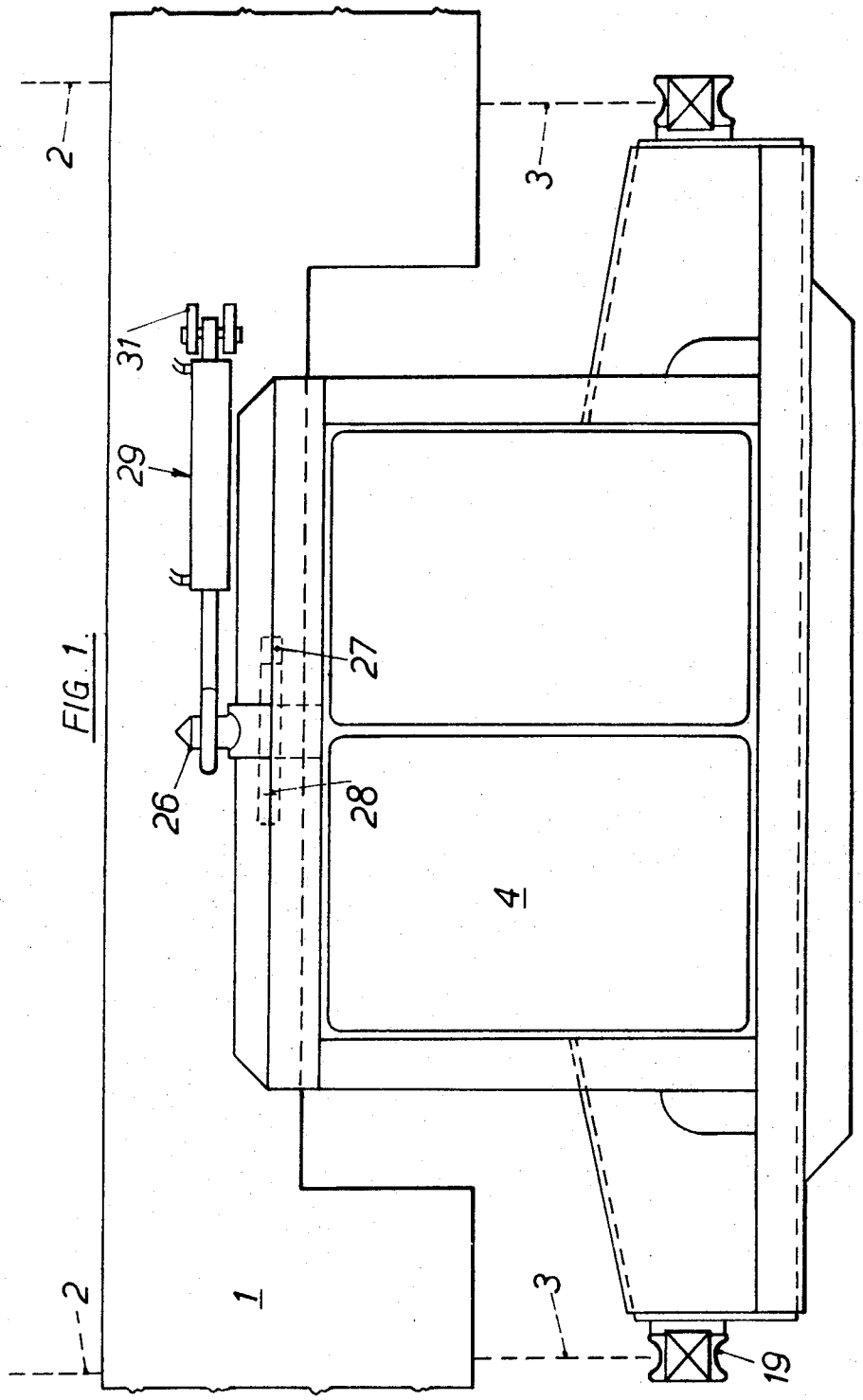


FIG. 1.

FIG. 2

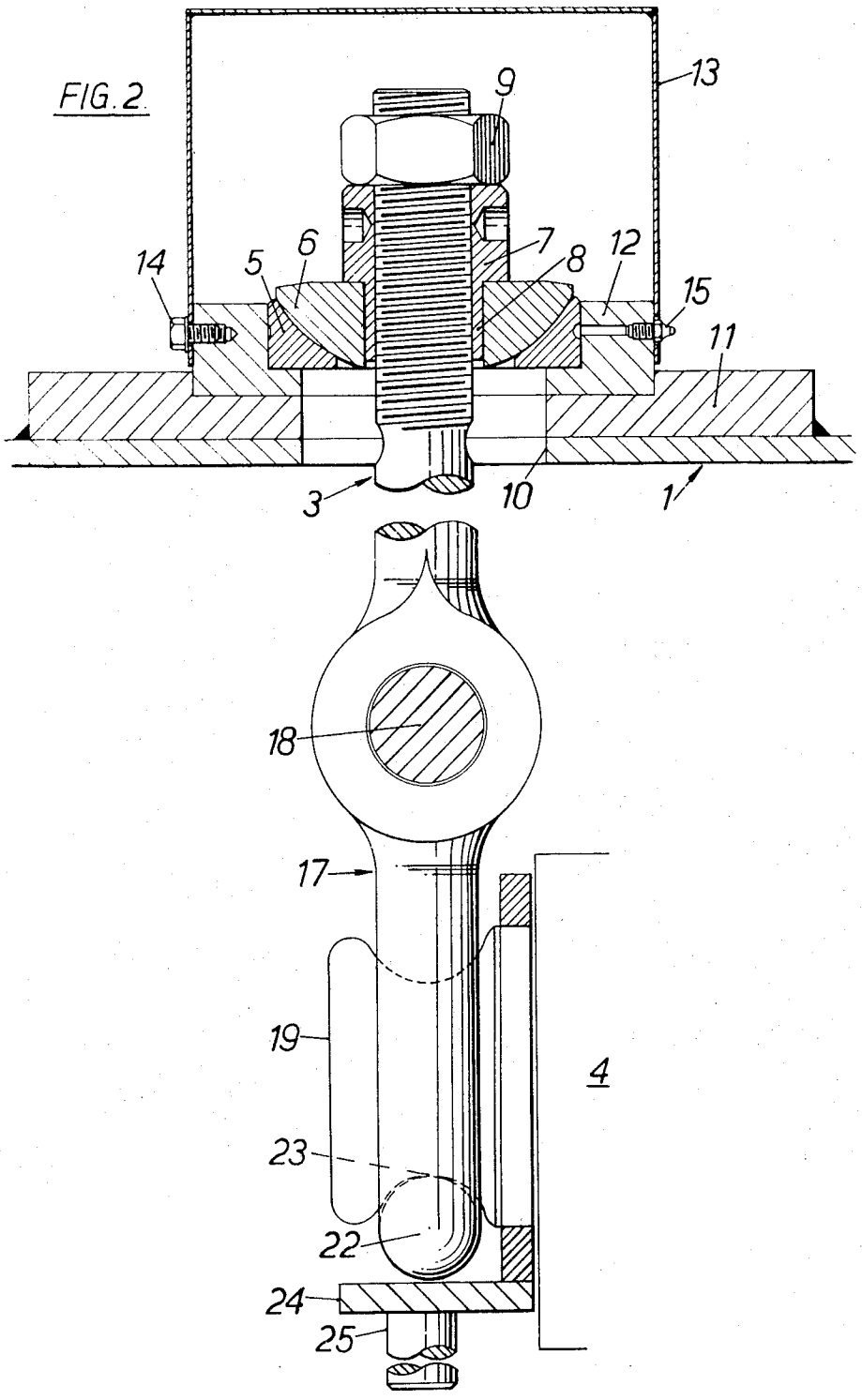
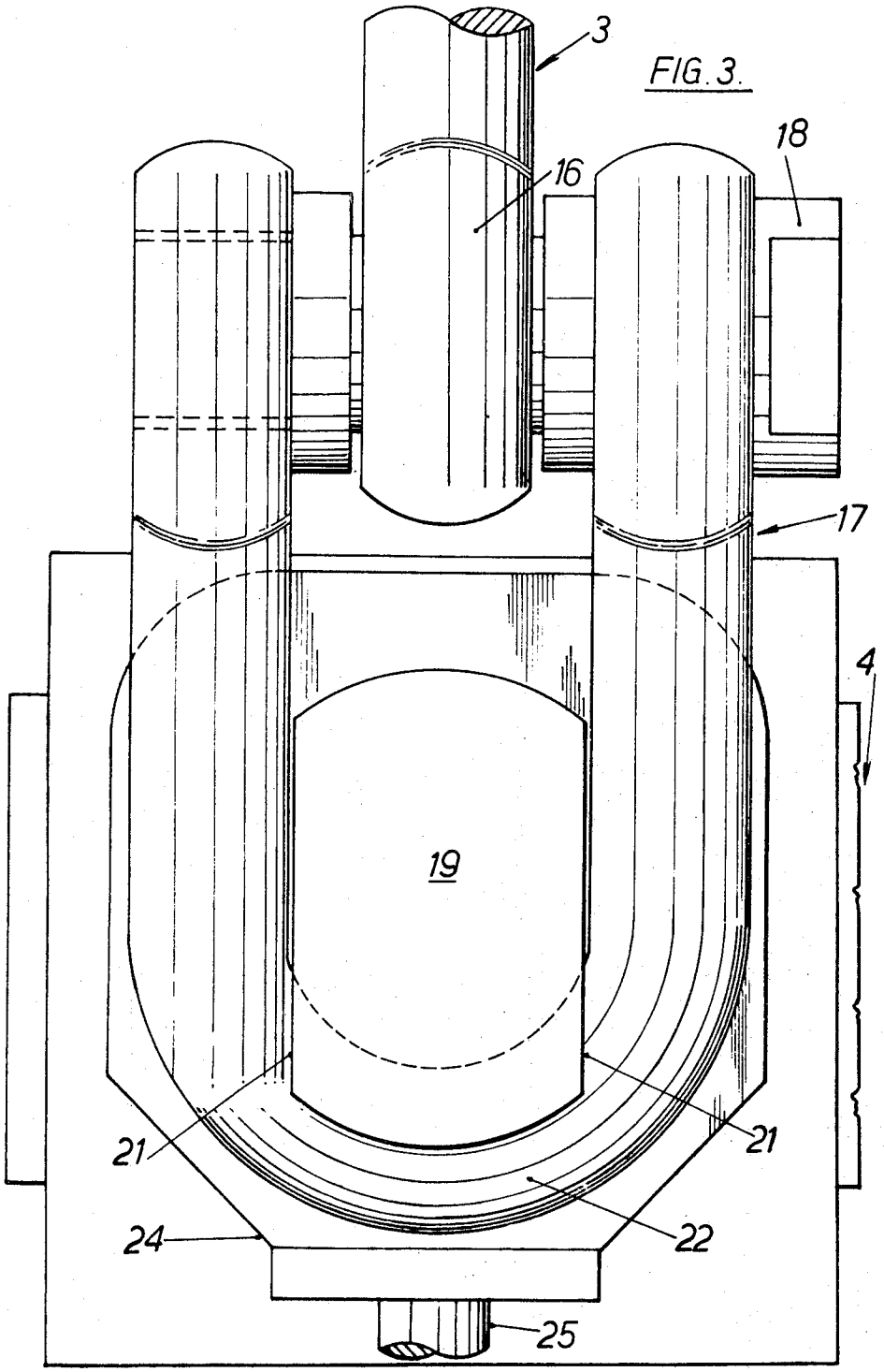


FIG. 3.



SUSPENSION MEANS FOR LOAD HANDLING EQUIPMENT

This invention relates to improvements in suspension means for load handling equipment such as equipment for handling freight containers which, in the course of a journey, may have to be picked up from and loaded on to different forms of transport.

The equipment in common use includes a carrier forming part of a gantry crane, or a straddle type crane, or other overhead lifting means and a spreader frame which is suspended from the carrier and is adapted to be engaged with the container or the like. In picking up a container the spreader frame has to be accurately aligned with it and it is known to provide means for adjusting the spreader frame relative to the carrier, but such means usually incorporate relatively slidable members or rollers and require considerable power to overcome the friction present.

According to our invention, in load handling equipment incorporating a carrier and a spreader frame the spreader frame is suspended from the carrier by normally vertical links of which the upper ends have a swivelling engagement with the carrier. The lower ends have a releasable engagement with the spreader frame.

The spreader frame can thus be moved with a minimum of effort in any direction in a substantially horizontal plane relative to the carrier.

Further, the spreader frame can be readily detached from the carrier without disturbing any of the lifting and lowering gear of the carrier if it is desired to fit a different spreader frame.

There will usually be four suspension links located adjacent to the corners of the spreader.

Power-operated means may be provided for moving the spreader frame sideways or slewing it relative to the carrier for lining up load-engaging means on the spreader frame with complementary parts of the container.

One embodiment of our invention will now be described as an example, with reference to the accompanying drawings in which:

FIG. 1 is a diagrammatic end elevation of a carrier and spreader frame for load handling equipment,

FIG. 2 is an end elevation partly in section of a link suspending the spreader frame from the carrier, and

FIG. 3 is a side elevation of part of FIG. 2.

FIG. 1 shows a carrier 1 comprising a rectangular frame lying in a substantially horizontal plane and adapted to be raised and lowered by the hoisting mechanism 2 of a straddle type crane (not shown). Adjacent to each corner of the carrier 1 there is mounted the upper end of a suspension link 3, the lower end of which engages with a spreader frame 4.

The suspension link 3 is shown in detail in FIGS. 2 and 3. The upper mounting for the link comprises an annular part-spherical seating 5 for the complementary part-spherical surface of a bearing 6 which can rock in the seating. The screw-threaded upper end of the link 3 passes upwardly through a collar 7 having a spigot portion 8 extending downwardly through the bore of the bearing 6. A lock nut 9 is screwed onto the link above the collar 7. The seating 5 and bearing 6 are axially located with respect to an opening 10 in the carrier 1 by a strengthening plate 11 and an adaptor plate 12. A cover 13 for the mounting is attached to the adaptor

plate 12 by means of screws 14 and a grease nipple 15 is provided. At its lower end the link 3 terminates in an eye 16 to which a depending U-shaped shackle 17 is pivoted by a pin 18. The shackle 17 is engaged over a headed boss 19 projecting horizontally from the spreader frame 4 adjacent to a corner. The head on the boss 19 is of a diameter greater than the width between the limbs of the shackle 17 but opposed vertical flats 21 are formed on the boss to allow the shackle to be passed over it, under load the closed lower end 22 of the shackle 17 engaging the neck 23 of the boss 19 on the inner side of the head.

An L-shaped locking plate 24 is rotatably mounted on the inner part of the boss 19, one arm of the plate 24 normally lying immediately under the closed lower end 22 of the shackle 17 so that the shackle cannot be lowered to disengage it from the boss 19. The locking plate 24 is held in the locking position by gravity and is provided with a handle 25 so that it can be moved angularly clear of the shackle which can then be moved downwardly and drawn outwardly off the boss.

An upstanding shouldered pin 26 is provided on the spreader frame 4 towards each end of the frame on its longitudinal center line. The end of the carrier 1 shown in FIG. 1 is provided with an outwardly projecting bracket 27 having an elongated slot 28 adapted to receive the pin 26 at that end of the spreader frame so as to locate the frame in a fore and aft direction relative to the carrier and to guide sideways movement of the spreader frame relative to the carrier. The pin 26 extends through the slot 28 and is received in an eye end fitting on the piston rod of a double acting hydraulic jack 29. The cylinder of the jack 29 is universally connected to a bracket 31 secured to the end of the carrier 1 and arranged so that extension and retraction of the jack 29 causes sideways movement of that end of the spreader frame.

A double-acting hydraulic jack 29 is similarly provided between the other end of the carrier 1 and the second pin 26, but in this case there is no slot to receive and guide the pin on the spreader frame.

Extension or retraction of both jacks 29 simultaneously shifts the spreader frame 4 sideways relative to the carrier 1. Differential operation of the jacks 29 will cause the spreader frame 4 to be slewed relative to the carrier 1. These movements of the spreader frame 4 are accommodated by the universally mounted suspension link 3. This arrangement, which eliminates sliding and rolling bearings substantially reduces friction and consequently the power requirements for side-shift and slewing.

The spreader frame 4 can be quickly and simply released from the carrier 1 for replacement by, for example, a spreader of a different length for lifting a larger or shorter container. The hoist 2 is operated to lower the spreader frame 4 on to a supporting platform or to the ground. The shackle locking plates 24 are rotated to their unlocked positions and the shackles 17 are slipped off the bosses 19. Any service connections, e.g., hydraulic hoses and electrical leads, between the carrier and the spreader frame are released and the carrier can then be hoisted clear of the spreader frame which is left on the platform or on the ground. The crane can then be moved over a substitute spreader frame to which the carrier is lowered for connection

thereto. The side-shift / slewing jacks **29** are supported by brackets (not shown) on the carrier **1**, when a spreader frame **4** is not connected to the carrier, thus ensuring that the jacks **29** are correctly aligned in the horizontal plane to receive the pins **26** on the spreader frame when the carrier is lowered to the latter to pick it up.

If desired, strain gauges may be attached to or incorporated in the suspension links so that they can act as load cells for indicating the weight of the container or other load. Alternatively, load cells may be located between the part-spherical seatings **5** and the adaptor plate **12**.

I claim:

1. Load handling equipment comprising a carrier, a spreader frame, four normally vertical rigid links suspending the spreader frame from the carrier, four seatings supported by the carrier, each seating having an upwardly facing part-spherical surface, four annular bearings each having a complementary downwardly facing surface mating with one of said seating surfaces, four collars each having a spigot portion extending downwardly through one of said bearings, the upper end of each link extending through one of said collars and being provided with means preventing it being drawn downwardly through said collar, four headed bosses each projecting horizontally from the spreader frame, and a shackle fitted to the lower end of each link and releasably engaging one of said bosses.

2. Load handling equipment as in claim **1** further comprising an L-shaped plate rotatably mounted on each boss with one arm extending outwardly from the spreader frame, said arm normally lying under the shackle so that the shackle cannot be disengaged from the boss.

3. Load handling equipment as in claim **1** wherein an upstanding pin on the spreader frame passes through a slot in the carrier so as to locate the frame in the fore and aft direction relative in the carrier, and an hydraulic jack connected between the carrier and the pin is operable to move the frame relative to the carrier in a direction defined by the slot.

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