Feb. 9, 1960 W. A. TOLSMA 2,924,484

DRUM GRABS

Filed April 4, 1955 4 Sheets-Sheet 1

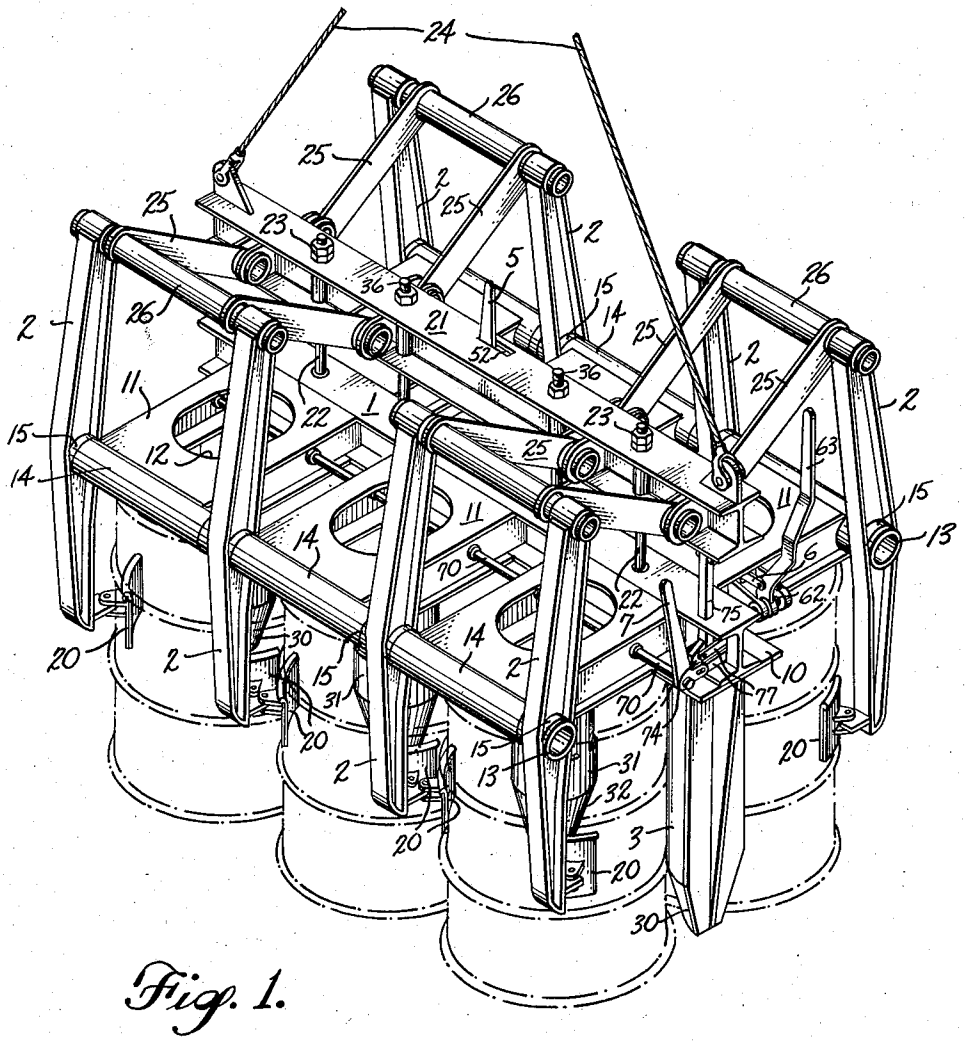

Fig. 1.

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DRUM GRABS

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Fig. 2.

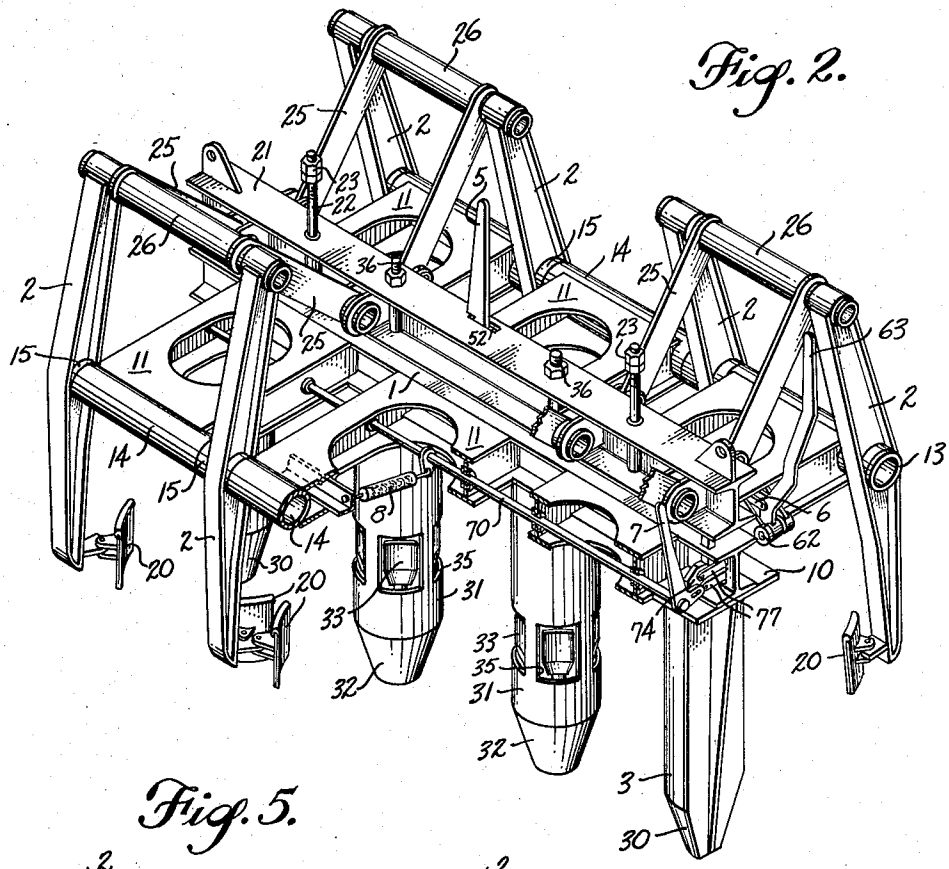
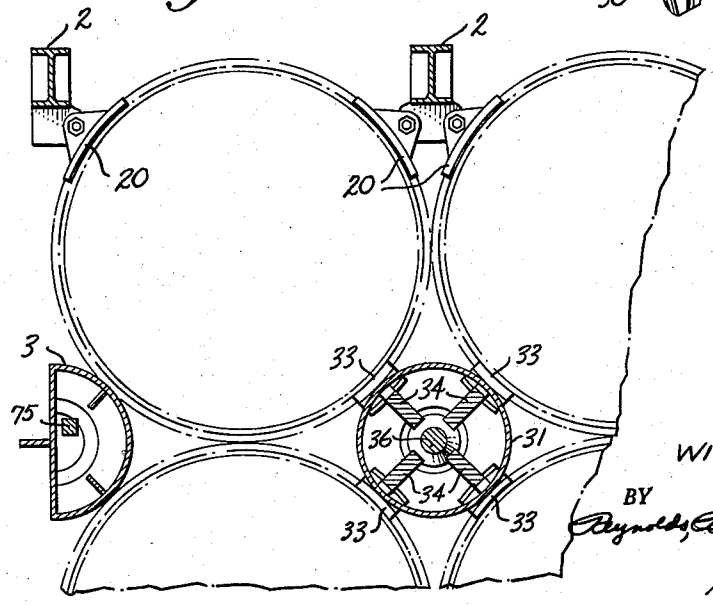


Fig. 5.



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DRUM GRABS

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Fig. 3.

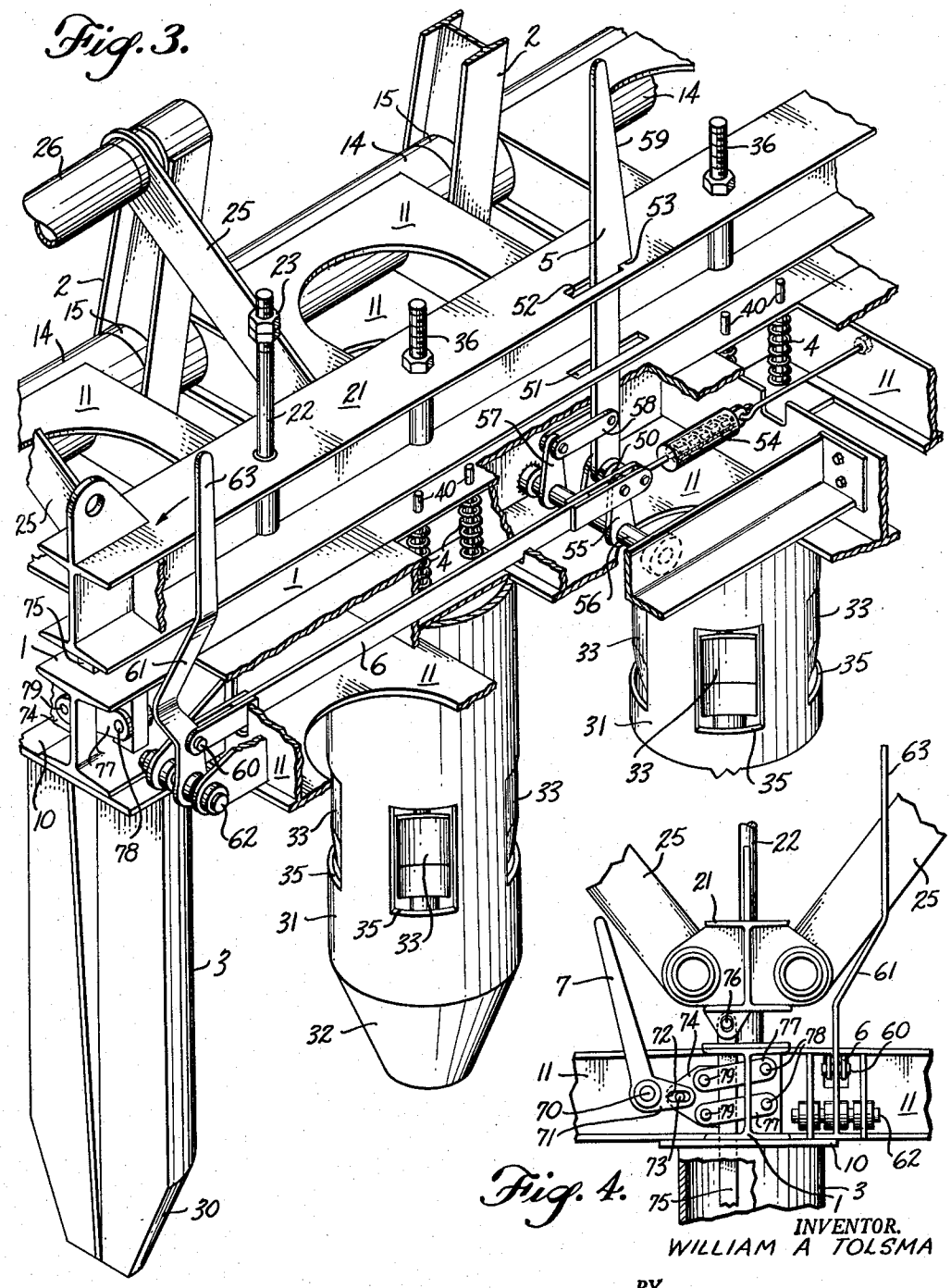

Fig. 4.

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DRUM GRABS

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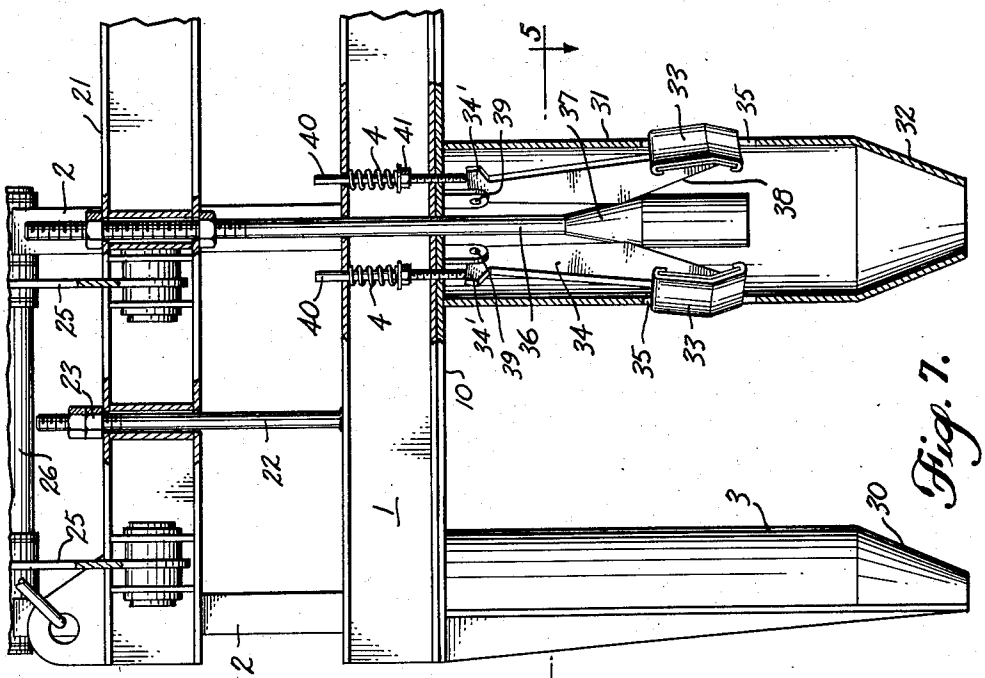

Fig. 7.

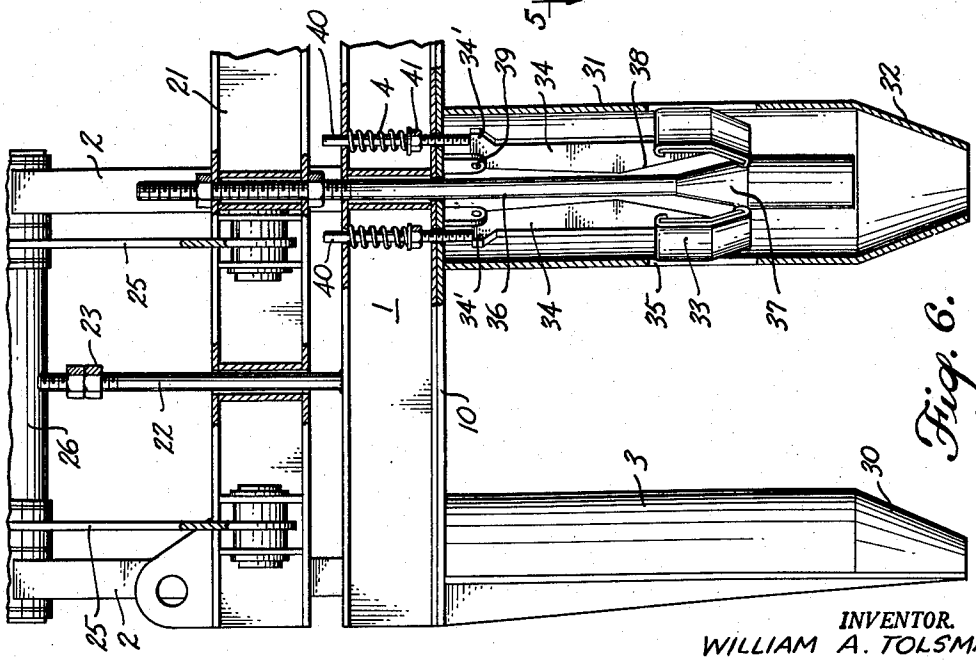

Fig. 6.

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DRUM GRABS

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Application April 4, 1955, Serial No. 498,887

4 Claims. (Cl. 294—87)

The grab of the present invention is particularly adapted for gripping a plurality of drums of the type used for the shipment of oil, whether they are full or empty, in order that they may be hoisted.

A principal object of the invention is to provide such a drum grab which can be designed to grip simultaneously several drums to be hoisted, and which will hold such drums securely while suspended from a hoist. The grab may be applied quickly and easily to such drums in their normal storage disposition, namely in rows standing on end. To place the drums for engagement by the grab, therefore, minimum shifting of the drums will be required, such shifting being only that necessary to locate the drums in approximately the proper spaced relationship.

Another object is to provide such a drum grab in which while of rugged construction so that it will withstand rough usage, its parts and their arrangement are of relatively simple construction.

It is particularly an object to provide a grab which can be applied to grip several drums quickly and released from them just as quickly so as to expedite the handling of the drums as much as possible. In accomplishing this object the gripping operation is effected by operation of the hoist and the drums may be released automatically by the hoist operation as well.

Another object is to provide a drum grab which while designed to hoist a maximum number of drums simultaneously can be used equally well to hoist a fewer number of drums without requiring any special adjustment and without any risk of injuring or dropping such a partial load of drums.

Drum grab mechanism capable of accomplishing these objects may include a horizontal frame which may rest upon the upper ends of drums to be hoisted, which are arranged in a group. Preferably such drums are disposed in rows and the frame carries journals such as two shafts arranged in spaced, parallel relationship along opposite sides of the frame and drum group. These shafts constitute journals for upright rocker arms pivoted generally centrally between their ends and carrying drum engaging shoes on their lower ends. Above the frame is a hoisting beam which may be moved vertically relative to the frame to actuate toggle joint mechanism for swinging the rocker arms between drum clamping and drum released positions. If the drums to be hoisted are arranged in more than one row between the rocker arms, central gripping means also are provided which include one or more clusters of wedge-spread shoe carrying arms also actuated by movement of the hoisting beam relative to the frame. Fixed posts may also be interposed between the drum rows, depending from the frame to cooperate with the drum gripping rocker arms.

As an upward force is exerted on the hoisting beam, therefore, it will move the rocker arm shoes inward and the wedge-spread shoes outward to grip the drums of the group for hoisting the drums. Conversely, when the upward force is removed, the weight of the hoisting beam

will cause it to move downward onto the frame supported by the drums, and such movement will effect drum releasing swinging of the rocker arms and drum releasing contraction of the wedge-spread shoes, so that the drums will be released. The hoisting beam may be latched in its lowered position to hold the grab in drum-released condition so that it may be lifted off the drum group by again applying an upward force on the grab hoisting beam. When the grab has been lowered onto another group of drums, the latch may be released voluntarily to enable the drums of such group to be clamped and lifted by elevation of the grab.

Figure 1 is a top perspective view of the grab with the parts in drum clamping position, but with the drums shown in phantom.

Figure 2 is a similar view of the grab but showing the parts in drum-released position and portions of the grab being broken away.

Figure 3 is an enlarged, fragmentary top perspective view of an end portion of the grab.

Figure 4 is a fragmentary end elevation view of a portion of the grab on an enlarged scale with portions broken away.

Figure 5 is a horizontal sectional view through a portion of the grab, taken on line 5—5 of Figure 7 and showing drums in phantom.

Figure 6 is a vertical, longitudinal sectional view through one end portion of the grab with portions broken away and showing the parts in drum released position.

Figure 7 is a similar view with the parts in drum clamping position.

The various components of the grab are supported from a frame preferably of box girder construction. The length and breadth of this frame extend horizontally coextensive with the group of drums to be engaged by the grab. The particular form of grab illustrated in the drawings is designed to hoist six drums arranged into two side-by-side rows each including three drums. This grab could, however, hoist any fewer number of drums, and the same principles as utilized in the present grab can be applied to a grab designed to hoist a greater or smaller maximum number of drums. It will be understood, therefore, that the particular grab shown in the drawings and described in detail hereafter is merely exemplary.

The frame of the grab shown in the drawings includes a backbone girder 1 of nominal I-beam section, having a lower flange increased effectively in width by the addition of the plate 10. This plate may be integrated with fabricated wings 11 of short, cantilever box girder construction extending horizontally oppositely from the opposite sides of the backbone 1. The upper and lower plates of these box girders may have lightening holes 12 in them to reduce their weight. These wings project from the backbone 1 at locations respectively corresponding to the locations of the several drums of the group of maximum size to be hoisted by the grab.

On the opposite sides of the frame defined by the aligned tips of the wings 11 are mounted parallel shafts 13 which are suitably secured to the tips of the wings 11. Such shafts may, for example, be received in sleeves 14 welded to the edges of the upper and lower webs of the box girder wings 11. Such sleeves will be of a length equal to the width of the wings 11 respectively and the ends of adjacent sleeves and the adjacent sides of adjacent wings 11 will be spaced apart far enough to receive between them rocker arms 2. Approximately midway between their ends these rocker arms carry sleeves 15 preferably of the same size as the sleeves 14 and having a close bearing fit on the shafts 13.

As far as functioning of the grab is concerned, it is immaterial whether the sleeves 15 move relative to the shaft 13 extending through them or the shaft 13 moves within

the fixed sleeves 14. Whichever construction is used, arms 2 can rock about the axis of their shaft 13. The lower ends of these rocker arms carry shoes 20 spaced below the pivot axis about which the arms rock sufficiently far so that the shoes will engage the drums at about midway between their upper and lower ends. Preferably these shoes are concave to a degree approximating the curvature of a drum, and such concave surface may be faced with friction material. Also the shoes preferably are mounted pivotally on the arms for slight angular adjustment so as to engage the sides of the drums contiguously.

In order to grip the group of drums all the arms 2 should be rocked simultaneously. To move toward each other the sets of shoes carried by the arms swingable about the axes of the opposite shafts 13 it is necessary to swing away from each other the upper ends of the two sets of rocker arms. Such swinging can be effected conviently by toggle joint mechanism interposed between the ends of the arms of the two sets. Moreover, such arm movement can be effected automatically by initiation of the hoisting operation when mechanism of the type shown in the drawings is employed. Swinging of the drum clamping arms 2 is effected by movement upward away from the grab frame of a hoisting beam 21 extending parallel to the shafts 13 and disposed substantially midway between them.

The hoisting beam 21 is guided for vertical movement relative to the backbone beam 1 by guide rods 22 spaced lengthwise of the backbone and hoist beams. Downward movement of the hoisting beam will, of course, be limited automatically by engagement with the backbone of the frame. Upward movement of the hoist beam is limited by nuts 23 on the upper ends of rods 22, and these nuts may be adjusted to establish the desired range of movement of the hoist beam relative to the frame. The hoist beam 21 itself may be lifted relative to the frame by a hoisting cable bride 24 secured to locations on the hoist beam spaced lengthwise of it and at locations arranged symmetrically about its center. Alternatively such hoist beam could be lifted by the fork of a fork lift truck or in any other suitable way. Such upward force on the hoist beam will be transmitted through the rods 22 and nuts 23 to hoist the grab frame.

Upward movement of the hoist beam 21 relative to the grab frame 1, 11 prior to engagement of the hoist beam with the nuts 23 effects straightening movement of the toggle joint mechanism composed of links 25 each having one end pivoted to the hoist beam 21 and its other end pivoted either directly to a rocker arm 2 or, as preferred, to a yoke bar 26 interconnecting adjacent rocker arms. The ends of the links 25 pivoted to the rocker arms or to the yokes 26 interconnecting them cannot be raised appreciably relative to the frame 1, 11, but raising of the ends of such links relative to the frame 1, 11 which are pivoted to the hoisting beam 21 will move the opposite links 25 toward alignment and consequently will force the upper ends of the levers 2 in the opposite sets away from each other, which will effect movement of the lower ends of the arms in the two sets and their shoes 20 toward each other into drum gripping positions.

If the frame 1, 11 were of a width only corresponding to the diameter of a drum to be hoisted, movement of the two sets of shoes 20 toward each other would effect gripping of a single row of drums, which could be of any reasonable length, depending upon the length of the frame and of the hoisting beam. It is preferred, however, that the grab straddle two rows of drums, and consequently it is preferred that drum engaging shoes be provided at the center vertical plane of the grab between the two shafts 13. While such additional shoes or other drum engaging members could be stationary, it is preferred that they be movable between drum gripping and drum released positions.

The central drum engaging members conveniently can be supported in position depending from the wide flange plate 10 applied to the lower surface of the backbone beam 1. A plate wider than the flanges of the beam 1 affords a better support for drum engaging elements depending from it. Such elements may include the two posts 3 depending from the opposite ends of the plate 10 beneath the backbone beam. These posts are of semicylindrical cross section for the most part, but, as shown best in Figures 6 and 7, each includes one-half of a frustoconical surface at its lower end which, upon engagement with the upper end of a drum, will guide lateral shifting of the grab during its lowering movement so that the frame 1, 11 will descend into proper position for the rocker arms to straddle the group of drums.

Between the end posts 3 depending from the backbone are intermediate posts 31 having their axes spaced lengthwise of the backbone distances generally corresponding to the spacing between the axes of the drums in a row, but staggered relative to the locations of the drum axes. These posts have frustoconical lower ends 32 which cooperate with the conical surfaces 30 of the posts 3 to locate the grab frame relative to the group of drums as the frame is lowered onto such group. While the size of the posts 3 and 31 could be selected so that the drum peripheries would engage them directly as the lower ends of the rocker arms 2 are swung toward each other at opposite sides of the frame 1, 11, it is preferred that at least the posts other than the end posts be equipped with movable drum engaging shoes so as to enhance the grip on the drums without requiring that the drums in the group be shifted appreciably relative to each other during engagement of the grab with them.

While the rocker arms 2 at the ends of the frame 1, 11 carry only a single drum engaging shoe, the intermediate rocker arms are located in positions registering generally with the spaces between adjacent drums. Consequently, each of the intermediate arms carries two drum engaging shoes disposed angularly relative to each other, as shown best in Figure 2. Similarly, the posts 31 carry shoes 33 arranged to engage the sides of more than one drum, the axis of each post 31 being in a plane perpendicular to the backbone beam 1 which includes two opposite rocker arms 2. Because these posts are located between the rows of drums, each intermediate post has four shoes 33 engageable respectively with four drums arranged around the post.

To avoid sliding the posts or shoes downward in contact with four drums, while at the same time avoiding the necessity of shifting the drums toward such posts during the drum engaging actuation of the grab, four movable shoes 33 are utilized in conjunction with mechanism to effect simultaneous spreading movement of all four shoes. To avoid the possibility of damaging the shoes associated with the posts 31 while the grab is being lowered onto a group of drums, it is desirable that such shoes be retractable inwardly of the surface of their posts so that the shoes will not constitute projections from the posts while the grab is being lowered into place.

Preferably the shoes 33, as shown best in Figures 6 and 7, are supported on arms 34, respectively, the upper ends of which are pivotally supported for swinging of their lower ends in radial planes of the cylindrical posts 31. Such swinging of arms 34 may be utilized to effect retraction of the shoes 33 within the hollow posts, as shown in Figure 6, while the grab is being lowered onto a group of drums.

When the grab has been lowered into a position such that the frame 1, 11 rests on the upper ends of the drums, the arms 34 may be swung to project the concave shoes 33 through windows 35 in the sides of the hollow posts 31 and into engagement with the respective walls of the drums arranged around each post. Because the drums will be located quite close together, if not actually in engagement, and the posts 31 will be selected so as to be of a size to fit closely between the drums, the shoes 33 can be engaged with the drum walls by small radial movement such as

from the positions shown in Figure 6 to those shown in Figure 7.

As has been discussed previously, the arms 2 are rocked into drum gripping engagement by upward movement of the hoist beam 21 relative to the frame 1, 11 during initiation of a hoisting operation. The shoes 33 should be moved outward from their posts 31 at the same time, and consequently it is desirable for such movement of shoes 33 also to be effected by raising of the hoist beam 21 relative to the frame. The mechanism shown in Figures 5, 6 and 7 is capable of accomplishing such movement of the shoes.

The actuating mechanism for spreading the shoes 33 is of the wedging type and includes the plunger rod 36 extending axially through the post 31 and adjustably secured to the hoist beam 21 by a long thread and lock nuts engageable with the upper and lower flanges of the beam, as shown in Figure 6 and Figure 7. The lower end of this plunger rod carries the wedging head 37 having a frusto-conical wedging portion engageable with inclined cam surfaces 38 on the adjacent edges of the shoe carrying arms 34.

As the wedging plunger is raised, therefore, by upward movement of the hoist beam 21, engagement of the frusto-conical surface 37 with the inclined wedging surfaces 38 of the arms 34 will swing the shoe carrying ends of such arms outward about the arm supporting pivots 39 to project the shoes through their respective windows 35. Engagement of the wedging surfaces 38 of the arms with the conical wedging plunger surface 37 will be maintained by springs 4 encircling guide rods 40, which are reciprocable through the backbone beam 1 in paths parallel to the path of movement of the wedging plunger 36 relative to the beam 1. Downward movement of rods 40 by the force of springs 4 will be limited by engagement of a nut 41 on each of the rods with a flange of the backbone beam 1. The lower end of each rod 40 engages a toe 34' on the upper end of the arm 34 disposed eccentrically of the pivot 39.

The pressure exerted by the rod 40 produced by the spring 4 on the toe 34' of each arm 34 will swing such arm in a direction to press the wedging surface 38 or shoe 33 toward the wedging plunger 36. The degree of spreading action of the shoes 33 effected will depend upon the amount of separation of the wedging surfaces 38 of the arms 34. The degree of such separation, in turn, will be governed by the diameter of the portion of the wedging plunger engaged with a particular location on each arm wedging surface 38 at any selected time. For a given disposition of the arm support and contour of an arm, therefore, the amount which it is swung will depend upon the size and position of the wedging plunger's conical portion 37. Consequently the degree of swing of arms 34 outward and consequently the projection of shoes 33 can be governed by the stroke of the wedging plunger. Such stroke may be adjusted by shifting the supported end of the plunger 36 relative to the hoist beam 21, or by altering the position of lock nuts 33 on guide rods 22 to vary the amount of vertical movement of the hoist beam relative to the frame backbone beam 1, or by altering both adjustments. Consequently, by proper relative adjustment of these two adjustable elements, the timing and degree of spreading movement of the shoes 33 can be coordinated accurately with the inward swinging of the shoes 20 carried by rocker arms 2.

It will be evident that by utilization of the mechanism described upward movement of the hoist beam 21 relative to the backbone beam 1 by exerting an upward force on the bridle 24 will simultaneously effect projection of shoes 33 from posts 31 and inward swinging of shoes 20 effected by rocking of arms 2. By the time the hoist beam is engaged with the nuts 23, therefore, as shown in Figures 1 and 7, all the drums in the group, whether one or more, will be gripped securely by the shoes 20 and 33 and by the posts 3 to be lifted as a unit. Moreover, when the drums and grab are lowered and the upward force on the bridle 24 relieved, the hoist beam 21 because of its weight will move downward toward backbone beam 1 automatically to effect swinging of arms 2 for moving shoes 20 outward. Simultaneously the wedging surface 37 of each wedging plunger 36 will be lowered from engagement with the arm wedging surfaces 38 so that the springs 4 by movement of the rods 40 will swing the arms 34 to retract the shoes 33.

If a hoisting force should be applied again to the hoisting bridle 24, the grab again will grip the drums of the group, as described above, so that the grab could not be lifted free of such drums for application to drums of another group. To enable the grab to be raised from a group of drums without gripping them, latching mechanism is provided to restrain lifting of hoist beam 21 relative to the frame when an upward force is exerted upon such hoist beam. Such latching mechanism as shown in Figures 1, 2 and 3 includes a latch bar 5 extending upward from a pivot 50 mounting such latch bar on the frame, such as on one of the wing beams 11. This bar passes through apertures 51 and 52 in the lower and upper flanges, respectively, of the hoist beam 21.

One edge of the bar 5 has a latching hook 53 formed in it, which is engageable with the upper side of the hoist beam 21. When the hook is thus engaged, as shown in Figures 2 and 3, the latch bar acts as a tie member preventing upward movement of the hoist beam relative to the frame 1, 11. The latch bar 5 will normally be held resiliently in this latched position by a spring cartridge 54 anchored to the frame and urging arm 55 carried by shaft 56 in a clockwise direction as shown in Figure 3. The torque thus exerted on such shaft tends to swing arm 57, which is also fixed on such shaft in a clockwise direction. The force is transmitted through links 58 interconnecting arm 57 and latch bar 5 so as to urge the latch bar itself to swing clockwise for maintaining its hook 53 in engagement with the surface of hoist bar 21 at the margin of slot 52.

As long as the latch bar 5 is thus engaged with the hoist beam 21, such hoist beam can move only a small amount relative to the frame 1, 11, which is insufficient to actuate the toggle joint links 25 enough to swing the arms 2 into drum clamping position. When it is desired to pick up a group of drums with the grab, therefore, it is necessary to release the latch mechanism by withdrawing the latch bar hook 53 from engagement with the margin of slot 52, so that such slot will pass over the hook as the hoist beam 21 is raised relative to the frame 1, 11. The hook may be withdrawn from its latched position by swinging latch bar 5 in the counterclockwise direction, as seen in Figure 3, and such movement may be effected by rotation of shaft 56 to swing arm 57 in a counterclockwise direction, which will cause links 58 to pull the latch bar 5 to the left as it appears in Figure 3.

Shafts 56 may be rotated in a counterclockwise direction for the purpose of releasing the latch by exerting a pull to the left on the upper end of arm 55 which is attached to such shaft. This pull opposing the force of compression spring cartridge 54 may be effected by the latch releasing bar 6 pivoted to the upper end of arm 55 and connected by pivot 60 to the latch releasing lever 61 which is mounted by pivot 62 on the frame, such as on a wing beam 11 at one end of the frame. The swinging end of this lever constitutes a handle 63 which may be grasped by the hand and pulled in the direction indicated by the arrow in Figure 3 to swing lever 61, arm 55, arm 57 and latch bar 5 all in the counterclockwise, latch-releasing direction.

When the latch mechanism has been released and the hoisting beam 21 has been lifted relative to the frame to move the shoes 20 and 33 into drum clamping position, upward movement of the hoist beam relative to the frame 1, 11 will be limited by engagement of its upper side with nuts 23 on guide rods 22, as shown in Figures

1 and 7 and explained previously. Latch bar 5 is of a length such that its upper end portion projects upwardly above notch 53 far enough so that the slot 52 is never lifted beyond the upper end of this latch bar. Figure 1 shows that even with the hoist beam in its limiting upper position, the upper end of the latch bar projects a substantial distance above the hoist beam. It is therefore impossible for the latch bar to move out of registry with slot 52, as long as the components of the grab are in their assembled relationship.

As soon as the handle 63 of the latch releasing lever has been released following a latch disengaging operation, the compression spring cartridge 54 immediately will swing arms 55 and 57 and latch bar 5 in the clockwise direction as seen in Figure 3, tending to reengage the latch mechanism. As long as the hoist beam 21 is lifted relative to the frame 1, 11 to a position such that its upper side is above the latch bar hook 53, the latch cannot be reengaged. The side 59 of the latch bar will, however, be held against the corresponding end of slot 52 by the force of spring 54, so that when a loaded grab has been lowered and the lifting force is further reduced to allow hoist beam 21 to be moved downward by gravity, if unrestrained, for opening the drum engaging shoes, such hoist beam will be lowered to a position such that its upper surface descends below hook 53 of the latch bar. Thereupon the spring 54 will serve, through arms 55 and 57, to swing the latch bar into latching position again. The latch bar will then remain in such latched condition until the latch is released by pulling the latch-releasing lever handle 63 as described above.

It may be preferable for a load of drums not to be released from the grab automatically by free downward movement of the hoist beam 21 when the loaded grab is dropped. Friction holding or snubbing mechanism may be provided to restrain appreciable descent of the hoist beam relative to the grab frame 1, 11 until such mechanism is released voluntarily. Such holding or snubbing mechanism may be a brake which reacts between elements carried respectively by the hoist beam and the frame.

Such a brake, shown best in Figures 1, 2 and 4, may be released at will be a handle 7 which is secured to an oscillatable shaft 70 journaled in the wing beams 11 at one side of the backbone beam 1 and extending substantially the full length of the frame parallel to such backbone beam. The handle 7 has a brake actuating arm 71 projecting laterally from it toward the backbone beam 1, which arm has in it a slot 72 extending radially of shaft 70 and receiving in it a pin 73. This pin is secured in a brake shoe 74, which is disposed for frictional engagement with a brake bar 75 secured to the hoist beam 21 by the pivot 76. This brake bar passes downward through apertures in the upper and lower flanges of the backbone beam 1, into the hollow post 3, at one end of the frame.

Parallel links 77 disposed close together and swingable in a vertical plane are anchored to the frame at one end by supporting pivots 78. The opposite ends of these links are connected by pivots 79 to the brake shoe 74 so as to maintain the right edge of the brake shoe as seen in Figure 4 always vertical, and consequently parallel to the adjacent surface of the brake bar 75. As the brake shoe is moved downward, the parallel links 77 will guide the brake shoe for movement toward the brake bar 75, and, conversely, as the brake shoe is raised the links 77 will guide it for movement away from the brake bar.

As the hoist beam 21 is raised, drawing brake bar 75 upward, any contact between such brake bar and the brake shoe 74 will tend to move such brake shoe upward so that the links 77 shift the brake shoe away from brake bar 75 to maintain the brake released automatically. As the hoist beam 21 descends, however, pushing brake bar 75 downward, frictional engagement between such brake bar and the shoe 74 will tend to move such shoe downward, in which case parallel links 77 will tend to draw the brake shoe toward brake bar 75 for increasing the frictional resistance to downward movement of such brake bar and the hoist beam which carries it. Ordinarily the frictional engagement exerted by brake bar 75 on the brake shoe 74 will not be sufficient to prevent involuntary movement of the hoist beam downward to release the grab. Consequently, it is preferred that a continual force pressing the brake shoe against the brake bar be provided.

As has been mentioned, the brake actuating arm 71 and the brake shoe 74 are interconnected by the slot 72 and pin 73. If the arm 71 is urged downward, as seen in Figures 2 and 4, by the tendency of rod 70 to be rotated in a clockwise direction as seen in these figures, the links 77 would press the brake shoe continually against the brake bar 75. Rod 70 may be urged continuously in a clockwise direction by the force of spring cartridge 8, shown in Figure 2, interconnecting an arm on rod 70 and the frame. The torque thus sustained on the rod by tending to depress the brake shoe 74 will cause it by such pressure to increase the holding effect of the brake, and of even greater importance, will produce friction betwen the brake shoe and the brake bar, which will greatly increase the tendency of the brake bar to move the brake shoe down with it as a downward load is exerted on the brake bar by the hoist beam 21.

Because of the continued pressure of the brake shoe against the brake bar, the tendency of such brake bar to move downward will produce an immediate snubbing action of the brake shoe on the brake bar, which will arrest downward movement of the hoist beam 21 after a very slight travel. Irrespective of the severity of the jolt on the hoist beam 21 which may be produced by the suddenness with which a load contacts the ground therefore, this brake snubbing mechanism will prevent the grab from being released inadvertently from the load. By swinging the handle 7 to the left, as seen in Figures 2 and 4, however, the force of spring cartridge 8 may readily be overcome, and the brake shoe 74 raised to release it from the brake bar 75. The hoist beam 21 will then slide down guide rods 22 toward the frame to swing arms 2 and move plungers 36 downward to release the drum load.

In order to afford a balanced snubbing effect of the brake mechanism on the hoist beam, it is preferred that duplicate brakes be provided at opposite ends of such beam. While only a single brake release handle 7 need be provided, the shaft 70 which extends substantially the full length of the frame 1, 11 may carry arms 71 at its opposite ends. In addition, the brake bar 75, brake shoe 74, pin 73 and brake shoe guide linkage 77 will be duplicated at opposite ends of the hoist beam so that, by turning shaft 70, the arms 71 and brake shoes 74 at opposite ends of the hoist beam will be moved in synchronism either to exert a snubbing action on the brake bars 75 or to relieve the braking effect. For convenience, a brake release handle 7 may be provided at each end of the shaft 70 if desired.

I claim as my invention:

1. Drum-hoisting mechanism comprising a horizontal frame, a first upright post depending from the central portion of said frame, two parallel axle means carried by said frame at opposite sides of said first post, respectively, a first pair of upright arms the arms of which pair are located, respectively, on opposite sides of and spaced equally from said first post and mounted on said axle means, respectively, for pivotal movement in a first vertical plane generally normal to said parallel axle means and passing through said first post, two drum-engaging members carried by each of the arms of said first pair of upright arms below said axle means, a second pair of upright arms the arms of which pair are mounted on

said axle means, respectively, for pivotal movement in a second vertical plane parallel to and at one side of said first vertical plane and spaced therefrom a distance approximately equal to the spacing of each of the arms of said first pair of upright arms from said first post, at least one drub-engaging member carried by each of the arms of said second pair of upright arms below said axle means, a second upright post depending from said frame substantially in said second vertical plane and substantially midway between the arms of said second pair of upright arms, a third pair of upright arms the arms of which pair are mounted on said axle means, respectively, for pivotal movement in a third vertical plane parallel to and at the side of said first vertical plane opposite said second vertical plane and spaced from said first vertical plane a distance approximately equal to the spacing of each of the arms of said first pair of upright arms from said first post, at least one drum-engaging member carried by each of the arms of said third pair of upright arms below said axle means, a third upright post depending from said frame substantially in said third vertical plane and substantially midway between the arms of said third pair of upright arms, and means interconnecting all of said arms for swinging all of said arms simultaneously about the axes of said axle means by which they are pivotally mounted for gripping drums between said posts and said drum-engaging members carried by said arms.

2. The drum-hoisting mechanism defined in claim 1, in which the horizontal frame includes a horizontal backbone beam and a plurality of cantilever horizontal wing beams projecting in coplanar relationship oppositely from opposite sides of said backbone beam, said wing beams carrying the two parallel axle means.

3. The drum-hoisting mechanism defined in claim 1, including a hoist beam disposed above the frame parallel to and midway between the two axle means, a plurality of arms pivotally mounted in the first post, a drum-engaging shoe carried by the lower portion of each of said arms in the first post, means operatively interconnecting all of said arms in the first post and said hoist beam for moving all of said arms in the first post simultaneously into positions projecting the drum-engaging shoes from the first post into drum-engaging positions in response to movement of said hoist beam upwardly from the frame, the means interconnecting the arms of the three pairs of upright arms for swinging simultaneously including toggle means connected to said hoist beam for arm-moving actuation by movement of said hoist beam upward from the frame.

4. Drum-hoisting mechanism comprising a horizontal frame, a first upright post depending from the central portion of said frame, a first pair of upright arms the arms of which pair are located, respectively, on opposite sides of and spaced equally from said first post and depending from said frame in a first vertical plane passing through said first post, a second pair of upright arms depending from said frame in a second vertical plane parallel to and at one side of said first vertical plane and spaced therefrom a distance approximately equal to the spacing of each of the arms of said first pair of upright arms from said first post, a second upright post depending from said frame substantially in said second vertical plane and substantially midway between the arms of said second pair of upright arms, drum-engaging shoes, shoe-supporting means supporting said shoes from said first post for movement relative thereto into engagement with drums between said posts and said arms, and hoisting means operatively connected to said shoes for projecting said shoes away from said first post by a lifting force exerted by said hoisting means to grip drums between said drum-engaging shoes, the arms of said pairs of arms and said second post.

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