June 5, 1956 G. F. THOMPSON 2,748,510

GRAB BUCKET

Filed July 3, 1952 2 Sheets-Sheet 1

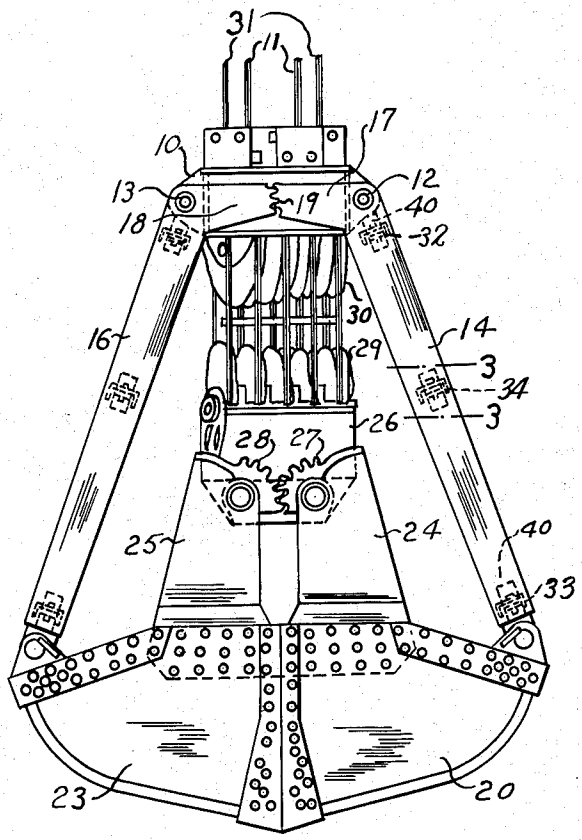


FIG. 1

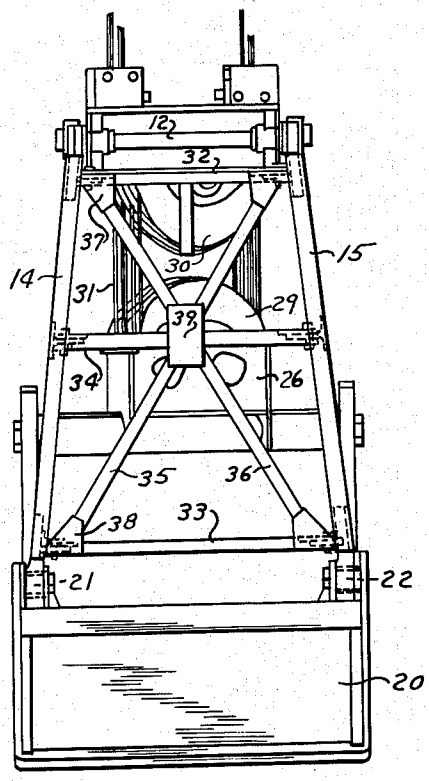


FIG. 2

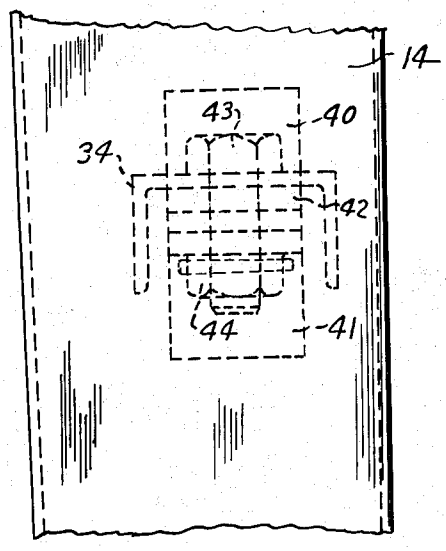


FIG. 3

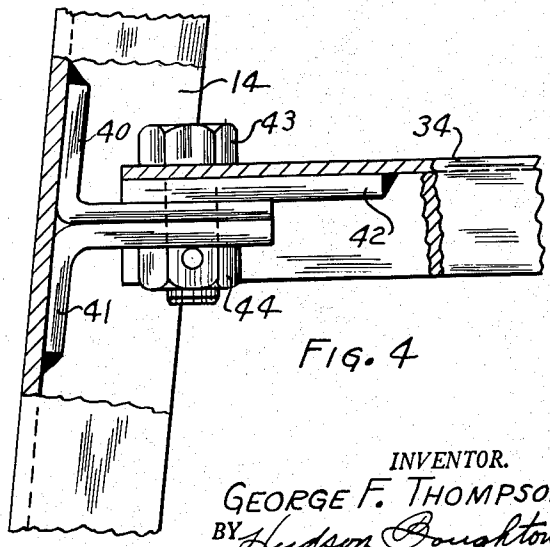


FIG. 4

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June 5, 1956 G. F. THOMPSON 2,748,510

GRAB BUCKET

Filed July 3, 1952 2 Sheets-Sheet 2

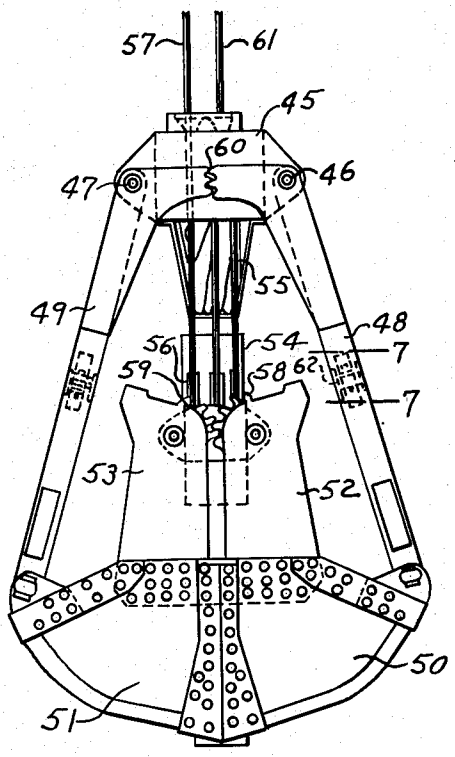


FIG. 5

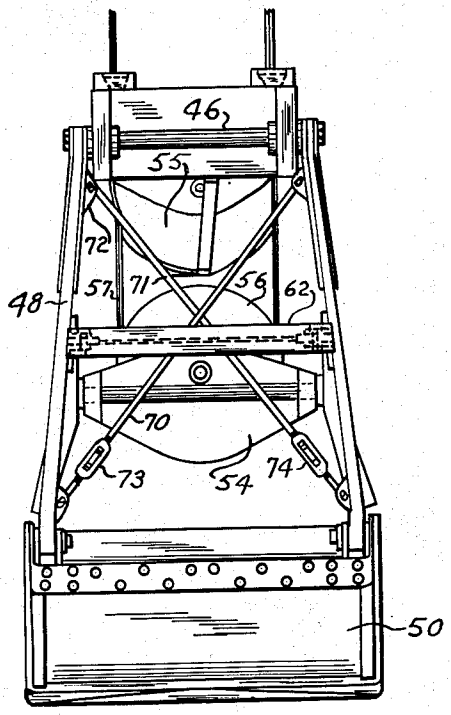


FIG. 6

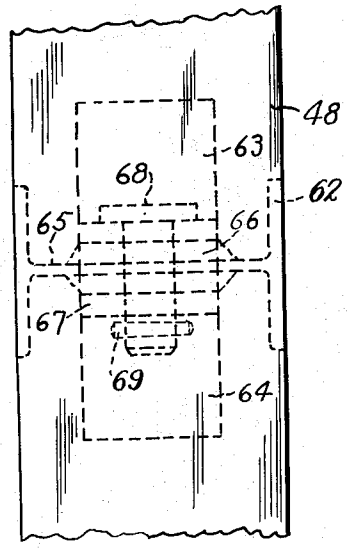


FIG. 7

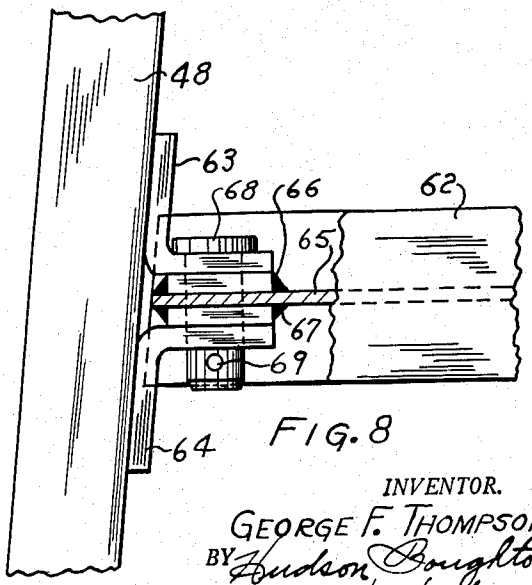


FIG. 8

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GRAB BUCKET

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5 Claims. (Cl. 37—186)

This invention relates to grab buckets and, more particularly, to large capacity grab buckets of the clam-shell type.

An object of this invention is to provide an improved relatively light weight, reinforced grab bucket capable of handling large loads in which the reinforcing members are so constructed and/or connected to the corner members or bars of the bucket that there can be limited relative movement therebetween so that breakage of the reinforcing or corner members will be eliminated while preserving the desired strength and rigidity for preventing misalignment of the jaws or scoops of the bucket.

Another object of the invention is to provide an improved grab bucket capable of handling large loads wherein the individual corner members or bars of each pair thereof have reinforcing members extending therebetween and pivotally connected thereto in a manner permitting limited relative movement between the reinforcing members and the corner members.

A further object of the invention is to provide an improved grab bucket of the clam-shell type capable of handling large loads and wherein the corner members or bars of each half or section of the bucket have a rigid substantially horizontal bar extending therebetween and pivotally connected thereto in a manner permitting limited relative movement of the members about axes which extend at right angles relative to the horizontal bar.

An additional object of the invention is to provide an improved bucket of the clam-shell type capable of handling large loads which bucket has a rigid reinforcing framework extending between the corner members or bars of each half or section of the bucket and pivotally connected to the corner members for limited relative movement between the framework and members about axes which lie in vertically extending planes.

Another object of the invention is to provide an improved grab bucket of the clam-shell type capable of handling large loads and wherein the corner members or bars of each half or section of the bucket are interconnected by diagonally extending tension members in a manner providing a relatively light weight construction of requisite rigidity while permitting limited relative movement between the members thereby preventing breakage of the connected parts.

Further objects and advantages of the invention will be apparent to those skilled in the art to which the invention pertains from the following description of the present preferred embodiment and a modification thereof, described with reference to the accompanying drawings in which:

Fig. 1 is a side elevational view of the presently preferred embodiment of a grab bucket constructed in accordance with this invention;

Fig. 2 is an end elevational view of the bucket shown in Fig. 1;

Fig. 3 is an enlarged fragmentary view of a portion of one of the corner members of the bucket substantially in the locality indicated by the broken lines 3—3 of Fig. 1,

illustrating the manner in which the reinforcing members are connected to the corner members or bars;

Fig. 4 is a side view of the structure shown in Fig. 3 with portions broken away to further illustrate the manner in which the reinforcing members are connected to the corner members in accordance with this invention;

Fig. 5 is a view similar to Fig. 1 showing in side elevation a modified form of grab bucket embodying the invention;

Fig. 6 is an end elevational view of the bucket shown in Fig. 5;

Fig. 7 is a view similar to Fig. 3 showing to an enlarged scale the portion of the bucket between the broken lines 7—7 of Fig. 5; and

Fig. 8 is a side elevational view of the portion of the structure shown in Fig. 7 but with certain parts thereof broken away to further illustrate the invention.

The grab bucket illustrated in Fig. 1 is of the clam-shell type and is designed and adapted to handle relatively large loads, i. e., in the order of from five to fifteen tons. The bucket comprises the usual head block **10** which is suspended by means of a holding cable **11** suitably connected to the head block and reeled in or played out by means, not shown, to correspondingly raise and lower the bucket. The head block **10** supports shafts or rods **12** and **13** extending horizontally along either side thereof on which are respectively pivoted spaced pairs of corner members or bars, such as **14**, **15** and **16**, the fourth corner member which is paired with the member **16** being obscured from view in the drawings. The pairs of corner members or bars at opposite sides of the head blocks are adapted to have limited swinging movement relative to each other about their respective shafts **12** and **13** and are provided with horizontally extending portions, such as **17** and **18**, having interengaging teeth **19**, as is well known in the art.

The lower ends of the two corner members or bars **14** and **15** have a jaw or scoop **20** sometimes referred to as a half bucket pivotally connected thereto adjacent the rear portion thereof as by means of pivot pins **21** and **22**. A complementary jaw or scoop **23** is similarly pivoted to the lower ends of the other pair of corner members or bars, the two jaws or scoops **20** and **23** forming the clam-shell bucket portion of the apparatus. The jaws or scoops **20** and **23** are each provided, adjacent either end thereof, with upwardly extending hinge plates, such as **24** and **25**, which are pivoted to a lower sheave block **26** and have interengaging gear shaped teeth **27** and **28** for controlling the relative movement of the jaws or scoops and for facilitating aligning thereof in closed position. The lower sheave block **26** is provided with pulleys **29** which, together with the pulleys **30** in the head block **10**, have the closing cable **31** reaved thereabout.

In operating buckets of this character the elevation of the bucket is controlled by suitably shortening or lengthening the holding line or cable **11**, the jaws being moved to open position by lengthening the closing line or cable **31** so that the lower sheave block **26** may move downwardly relative to the head block **10** thereby causing the jaws or scoops **20**, **23** to pivot about their connections with the sheave block **26** and about their connections with the corner members or bars. The corner members or bars may also partake of a limited pivotal movement about the shafts or pivots **12** and **13**. Closing of the jaws or scoops **20** and **23** is accomplished by shortening the closing line or cable **31** thus elevating the sheave block **26** relative to the head block **10** so that the parts are restored to the position shown in Fig. 1, whereupon the material enclosed by the jaws or scoops may be moved by manipulation of the holding line or cable **11** and the closing line or cable **31**.

When a bucket of the nature just described is constructed for handling loads of large capacity such as, for example, coal or the like in quantities in the order of from five to fifteen tons, the corner members or bars should be laterally reinforced for the sake of greater strength and to insure proper alignment of the jaws or scoops 20 and 23. However, in operation of such large capacity buckets the stresses are such, especially because of the tendency for the corner members to move relative to each other, that there is danger of breakage of welded or other rigid connections of the reinforcing members to the corner bars or members and, if the connections are made sufficiently strong, the weaker of the various reinforcing members or corner members may be broken. Moreover, increasing the size of the parts sufficiently to eliminate such breakage increases the weight of the bucket.

In accordance with this invention grab buckets of the clam-shell type, and which are adapted for handling loads of large capacity, have the corner members thereof interconnected by reinforcing members in a manner which permits slight relative movement therebetween with the result that the desired strengthening of the bucket and proper alignment of the scoops is achieved without danger of breakage of the reinforcing members or of their connections to the corner members and without the need of excessive increases in weight. In the preferred embodiment, the reinforcement of the corner members of a bucket of the type described and the connection of this reinforcement with the corner members may be achieved in the manner illustrated in Figs. 2 to 4. As shown therein, reinforcing members in the form of channel or other suitably shaped structural members are interconnected to provide a substantially rigid framework adapted to extend between the two members of each pair of corner members as, for example, the members 14 and 15, the connection between the rigid reinforcing frame and the corner members, however, being effected by the pivotal connections, the axes of which lie in planes which extend substantially vertically, that is, generally parallel with the length of the corner bars, so that there can be a limited relative movement between the corners members and the rigid frame.

The nature of the presently preferred form of reinforcing framework is shown in Fig. 2 as comprising horizontally extending reinforcing members 32 and 33, which are provided adjacent the tops and bottoms of the corner members, and a horizontally extending reinforcing member 34 provided intermediate the members 32 and 33. These several horizontally extending members are interconnected and further reinforced by diagonally extending reinforcing members 35 and 36, the latter being connected to the members 32 and 33 by corner plates, such as 37 and 38, while the horizontal member 34 and the diagonal members 35 and 36 are rigidly interconnected, at the region of their intersection, by a reinforcing plate 39. The ends of the members 32, 33 and 34 extend to locations adjacent to, but spaced slightly from, the longitudinally extending flanges of the corner members 14 and 15 and are pivotally connected to the latter.

The pivotal connection of one end of the horizontal member 34 to the corner member or bar 14 is shown in enlarged detail in Figs. 3 and 4 as comprising spaced angle members 40 and 41 which are suitably secured as by welding, or the like, to a vertical web or flange of the member 14, the members 40 and 41 being oppositely disposed so that the legs extending outwardly from the member 14 are adjacent each other and are disposed substantially horizontally. These horizontally extending legs of the members 40 and 41 receive the adjacent end of the horizontally extending member 34 in overlapping relationship with a filler plate, such as 42, preferably being secured to the member 34 adjacent its end and adapted to rest upon the horizontal leg of the member 40. The reinforcing member 34, filler plate 42 and angle members 40 and 41 have aligned bores extending therethrough in which a securing means is positioned in a manner providing for limited pivotal movement between the member 34 and the corner member 14 about an axis disposed at right angles relative to the member 34. In the construction shown, this securing means providing the pivotal connection comprises a hexagonally headed bolt 43 having a suitable nut 44 thereon which is tightened to the extent maintaining the parts in firm engagement while permitting a slight relative movement therebetween about the axis of the bolt. The nut 44 may be secured in the desired position by a suitable means such as a cotter pin, or the like.

The other end of the horizontally extending member 34 is pivotally connected with the corner member or bar 15 in the same manner as has been described in detail with respect to the connection to the corner member or bar 14, and the outer portions of the horizontal members 32 and 33 are connected in similar manner to the corner members 14 and 15. Likewise, the pair of corner members or bars pivotally supported upon the shaft 13 are provided with like reinforcing members pivotally secured therein in the same manner as has just been described. It will, therefore, be apparent that the two members of each pair of corner members have a rigid reinforcing framework extending therebetween, which framework is secured to the corner members or bars of a pair thereof in a manner permitting slight relative movement about axes which lie in vertical planes. Consequently, the stresses encountered in operation of large capacity grab buckets of the type described, tending to cause relative movement of the corner members and which would result in rupture of the reinforcing members or their connections to the corner members if these were completely rigid, are relieved by slight relative movement between these members about the aforementioned pivotal connections. Nevertheless, the corner members are sufficiently rigid and reinforced to provide for satisfactory operation of the jaws or scoops.

Figs. 5 to 8 of the drawings illustrate a modified embodiment of the invention which has been found advantageous with respect to large capacity grab buckets and which provides a bucket of lighter weight than those constructed as disclosed in Figs. 1 to 4. The bucket shown in Fig. 5, like that in Fig. 1, comprises a head block 45 having horizontally extending shafts or rods 46 and 47 supported along either side thereof on which are pivotally mounted spaced pairs of corner members or bars 48 and 49. The pairs of corner members or bars 48 and 49 have the bucket jaws or scoops 50 and 51 pivotally supported thereon in the same manner as the jaws or scoops 20 and 23, the jaws or scoops being similarly provided with hinge plates 52 and 53 pivotally connected with the lower sheave block 54. Likewise, in this form of bucket the head block 45 is provided with pulleys 55 and the lower block is provided with pulleys 56 for receiving the closing rope or cable 57. Shortening and lengthening of the closing rope or cable 57 effects raising and lowering movements, respectively, of the lower sheave block 54 with resulting opening or closing of the jaws or scoops 50 and 51, the alignment of the jaws or scoops and equal opening and closing movement thereof being facilittaed by the provision on the hinge plates 52, 53 of intermeshing teeth 58, 59 and by similar intermeshing teeth 60 provided upon horizontally extending portions of the corner members 48 and 49 adjacent their pivots 46 and 47. The bucket is suspended from, and raised and lowered by, a holding line or cable 61, as will be readily understood.

The bucket illustrated in Figs. 5 to 8 does not have horizontally extending reinforcing members adjacent the upper and lower ends of the corner members such as are provided in buckets constructed as shown in Figs. 1 to 4. A horizontally extending reinforcing member 62 is, however, provided intermediate the tops and bottoms of

the two corner members or bars of each pair thereof, the ends of this member being pivotally connected to the corner members or bars in a manner similar to the member **34** in the preferred form of bucket.

As shown in Figs. 7 and 8, the corner member or bar **48** has oppositely directed angle members **63** and **64** secured thereto as by welding, or the like, so that the one leg each of these members extends adjacent each other in a substantially horizontal direction. These horizontally extending portions of the angle members **63** and **64** are, however, vertically spaced in this embodiment so that the central web **65** of the member **62** can extend therebetween, reinforcing filler members **66** and **67** being secured by welding, or the like, to this central web adjacent the ends thereof and of a thickness such as to substantially fill the space between the horizontally extending legs of the angle members **63** and **64**. Aligned bores are provided through the horizontal legs of the members **63** and **64** and through the filler plates **66**, **67** and the web **65** of the member **62**, which aligned bores have a member extending therethrough providing a pivotal connection therebetween. In the illustrated embodiment this pivotal connection is provided by a headed pin **68**, the lower end of whose shank extends beneath the horizontal portion of the angle member **64** and has a transverse bore in which may be positioned a retaining pin **69** to prevent displacement of the pivot pin **68**. The other end of the member **62** is similarly pivotally connected to the second corner member or bar of the pair designated **48** and the pair of corner members or bars **49** are, likewise, provided with a horizontally extending reinforcing member similar to **62** and pivotally connected therewith in the manner just described.

Further reinforcement is provided between the two corner members or bars of each pair thereof by diagonally extending tension rods **70** and **71**. One end of each tension rod is pivotally connected to one of the corner members of a pair thereof adjacent the upper end as by means of spaced ears or lugs **72** secured to the corner member and having suitable apertures for a pivot pin extending through the eye or clevis of the tension rod. The apertures in the ears or lugs **72** are preferably elongated slightly and the opening through the eye or clevis of the tension rod may be somewhat larger than the diameter of the pivot pin extending therethrough to provide for slight relative movement between the members. The other end of each tension rod is similarly pivotally connected to the opposite corner member or bar of a pair thereof adjacent the lower end, as will be readily apparent from Fig. 6. Preferably, the tension rods **70** and **71** are made adjustable as, for example, by forming each rod in two spaced parts with threaded adjacent ends on which are disposed a turnbuckle, such as **73**, **74**.

Consequently, the form of the bucket shown in Figs. 5 to 8, like the bucket shown in Figs. 1 to 4, has the two corner members or bars of each pair thereof reinforced by transversely extending members so that the desired strength and rigidity of the bucket necessary for proper operation is provided. The reinforcing members, however, are so constructed and arranged that limited relative movement may occur between the two corner members or bars of a pair thereof without breakage of any of the parts. This relative movement is made possible by the pivotal connection of the reinforcing members, such as **62**, and by the fact that the tension rods **70** and **71** can be torsionally deflected in response to slight relative movement between the two corner members or bars of a pair thereof. Furthermore, the turnbuckles **73** and **74**, in addition to providing for adjustment of the lengths of the tension members **70** and **71**, also facilitate slight relative movement of the two corner members or bars of each pair thereof so that when such turnbuckles are provided it is not necessary to rely solely upon the torsional deflection of the bars to permit such relative movement.

Moreover, the elongated apertures in the ears or lugs **72** and/or slightly enlarged openings in the eyes or clevises of rods **70** and **71** permit slight relative movement between the rods and corner members.

It will now be apparent that grab buckets of the clamshell type may, in accordance with this invention, be constructed in large sizes and adapted to handle large capacity loads without the need of excessive weight and without danger of breaking of the reinforcing members, or the connections of the latter to the corner members, which reinforcing members are necessary to proper operation of such large capacity buckets. Consequently, maintenance costs and loss of productive time of the buckets are greatly reduced and the useful life of the buckets is increased. Furthermore, the provision for slight relative movement between the corner members of the buckets and the reinforcing members therebetween is effected in a manner which does not destroy the purpose of the reinforcing members, nor interfere with proper operation of the jaws or scoops of the buckets.

Although a preferred embodiment of the invention and one modification thereof have been described and illustrated in considerable detail, it is to be understood that the invention may be embodied in other forms and that changes and adaptations other than those specifically set forth herein may be made by those skilled in the art without departing from the principles of the invention. Consequently, the invention is not to be considered as limited to the specific details of construction and arrangements of parts here illustrated and described except as may be required by the spirit and scope of the appended claims.

Having thus described the invention, I claim:

1. A grab bucket comprising a head block, a pair of elongated corner bars pivoted to said block for swinging movement about a common axis, a second pair of similar corner bars pivoted to said head block for swinging movement about a common axis parallel with and spaced from said first-mentioned axis, a pair of cooperating scoop or half bucket members, means swingingly connecting one of said scoop or half bucket members to each pair of said corner bars, means connected to said scoop or half bucket members to control movement of the latter to and from closed position, a reinforcing member extending between the two corner bars of each pair thereof, and means pivotally connecting said reinforcing members to said bars for relative movement about axes generally parallel to the length of said corner bars.

2. A grab bucket comprising a head block, a pair of elongated corner bars pivoted to said block for swinging movement about a common axis, a second pair of similar corner bars pivoted to said block for swinging movement about a common axis parallel with and spaced from said first-mentioned axis, a pair of scoop or half bucket members, means swingingly connecting one of said scoop or half bucket members to each pair of said corner bars, means connected to said scoop or half bucket members to control movement of the latter to and from closed position, a rigid reinforcing frame extending between the two corner bars of each pair thereof intermediate the said head block and the scoop or half bucket member connected to said pair of bars, and means pivotally connecting said frames adjacent the corners thereof to said corner bars for limited relative movement therebetween about axes generally parallel to the length of said corner bars.

3. A grab bucket comprising a head block, a pair of elongated corner bars pivoted to said block for swinging movement about a common axis, a second pair of similar corner bars pivoted to said block for swinging movement about a common axis parallel with and spaced from said first-mentioned axis, a pair of scoop or half bucket members, means swingingly connecting one of said scoop or half bucket members to each pair of said corner bars, means connected to said scoop or half bucket members

to control movement of the latter to and from closed position, reinforcing means extending between the two corner members of each pair thereof, the said reinforcing means including a pair of intersecting diagonally extending rigid members, and means pivotally connecting said rigid members adjacent the ends thereof to said corner bars for limited relative movement therebetween about axes lying in substantially vertical planes.

4. A grab bucket as defined in claim 3 and further comprising a rigid member extending horizontally between the two corner bars of each pair thereof, and means pivoting the said horizontal member to the corner bars between which it extends.

5. A grab bucket as defined in claim 3 and further comprising a rigid member extending horizontally between the two corner bars of each pair thereof and rigidly secured to said diagonally extending members, and means pivoting the said horizontal member to the corner bars between which it extends.

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