

[54] QUICK-ATTACHING MECHANISM

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[51] Int. Cl. E02f 3/70

[58] Field of Search 214/780, 145, 140, 620, 146

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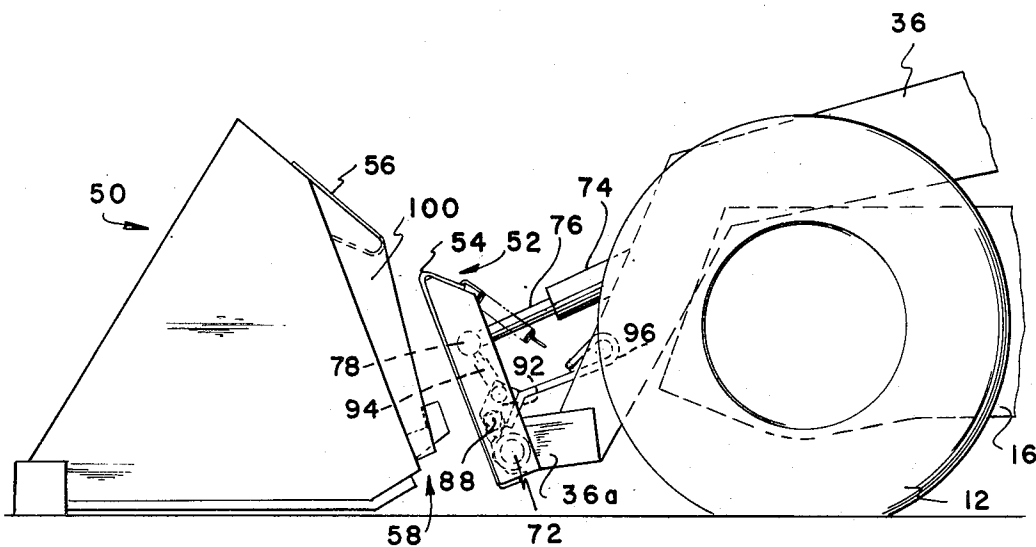
Note Brisson guide rails 48

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[57] ABSTRACT

A quick-attaching mechanism for coupling a material handling implement to the remote end of a boom structure extending from a loader. The quick-attaching mechanism includes a mounting lip or cavity formed along an upper rear portion of the material handling implement and particularly adapted to receive an upper edge of a mounting plate that is pivotally mounted to the remote end of the boom structure. In addition, an over-center wedging mechanism is provided with said mounting plate for engagement with a pair of hook members that are fixed to said material handling implement and extend rearwardly therefrom, through openings within said mounting plate.

11 Claims, 9 Drawing Figures



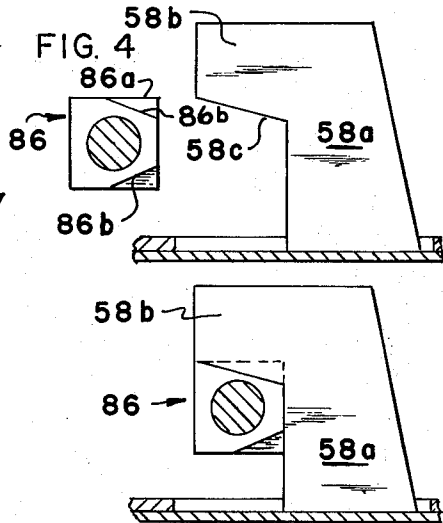
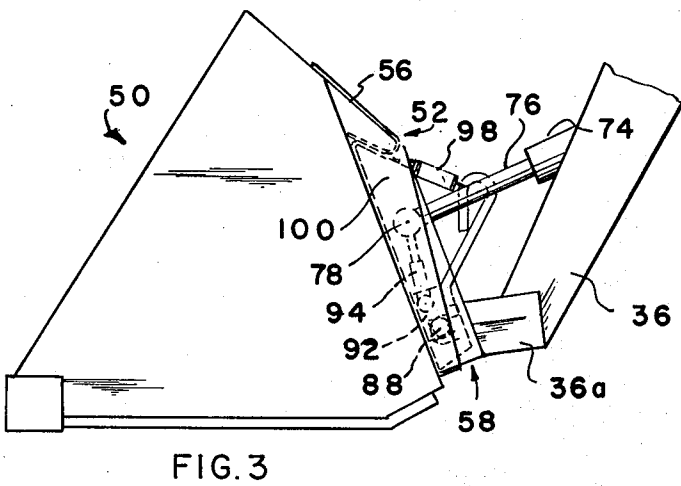
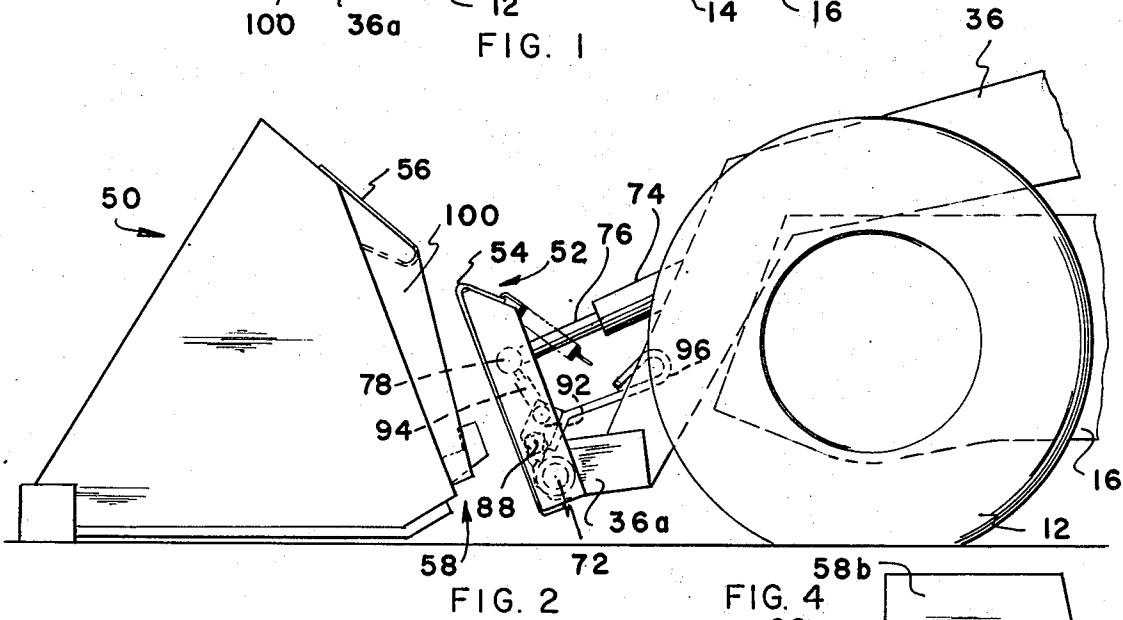
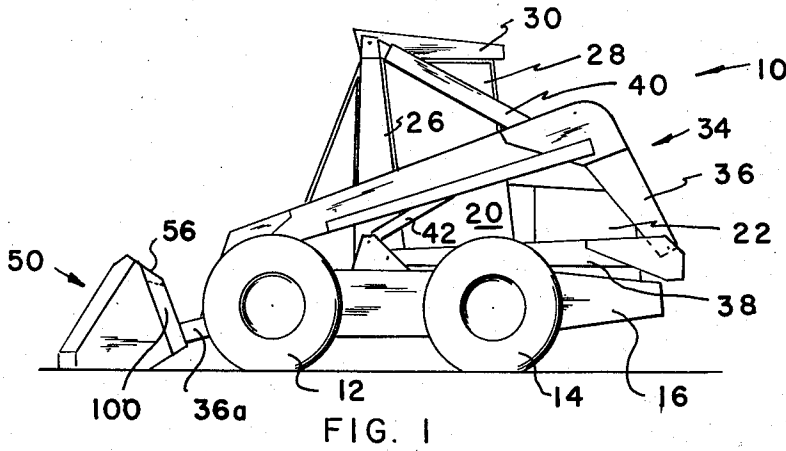


FIG. 5

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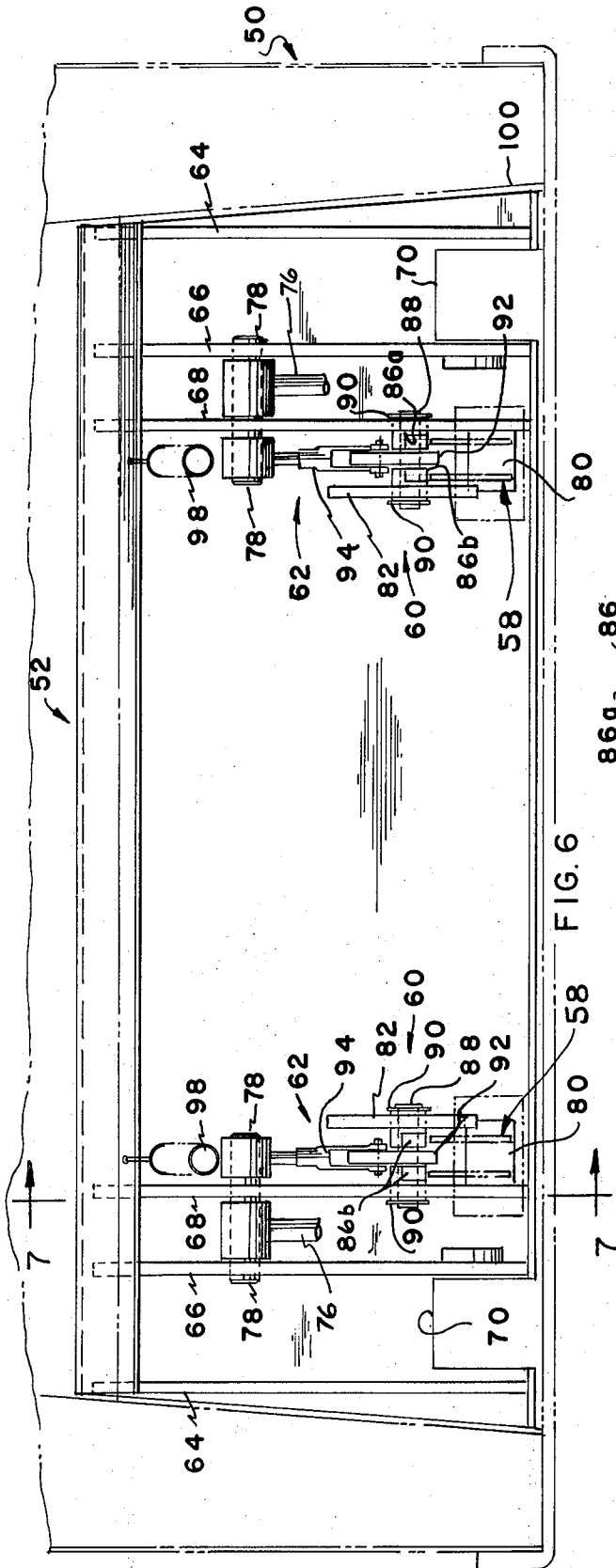


FIG. 6

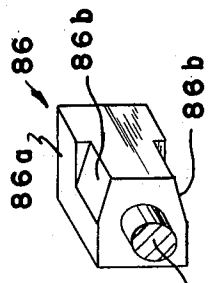


FIG. 9

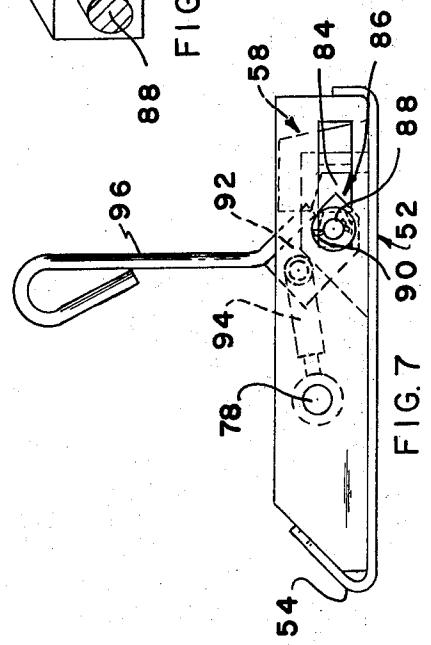


FIG. 7

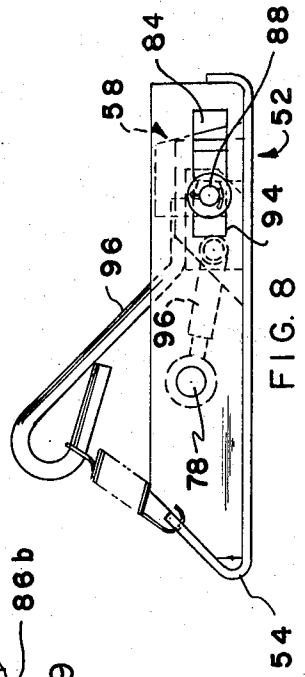


FIG. 8

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QUICK-ATTACHING MECHANISM

BACKGROUND OF THE INVENTION

This invention relates to loaders and the like, and more particularly to a mechanism for quickly attaching a material handling implement to a loader's boom structure.

Loaders today, especially the industrial type, often are provided with several different sizes and types of material handling implements to perform numerous working operations. Changing from one material handling implement to another has been a problem on many prior art devices because of the time and labor spent in making a changeover. Much of the time and labor involved is attributable to the fact that such implements are most often heavy, awkward to manipulate and in some cases require special tools to accomplish the changeover.

It is therefore the principal object of the present invention to provide a loader with a quick-attaching mechanism for quickly and easily coupling any number of different material handling implements to a loader's boom structure.

Another object of the present invention is to provide a quick-attaching mechanism having a permanent mounting plate adapted to readily receive numerous sizes and types of material handling implements, the material handling implements having cooperative attaching structure particularly adapted to cooperate with said mounting plate in the formation of a quick and reliable coupled connection between the implement being attached and the mounting plate.

A further object of the present invention is to provide said material handling implements with a mounting lip or cavity adapted to receive therein an edge portion of said mounting plate, wherein the insertion of the edge of said mounting plate within said mounting lip or cavity enables the implement to be lifted from the ground or its resting position without the use of any external force.

Still another object of the present invention resides in the provision of hook members fixed to said material handling implements and extending therefrom for engagement with a wedging mechanism disposed on said mounting plate, wherein the engagement of said wedging mechanism with said hook members acts to draw the implement and mounting plate together and firmly maintain the two in a coupled relationship.

A further object of the present invention resides in the provision of an over-center linkage mechanism for selectively actuating said wedging mechanism for engagement and disengagement with said hook members.

Other objects and advantages of the present invention will become apparent and obvious from a study of the following description and the accompanying drawings which are merely illustrative of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of a loader incorporating the quick-attaching mechanism of the present invention.

FIG. 2 is a somewhat enlarged fragmentary side elevational view of the loader particularly illustrating the initial approach of the loader during the quick-coupling execution.

FIG. 3 is a side elevational view showing the completed attachment of the mounting plate with the implement.

FIGS. 4 and 5 are side elevational views of the relationship of the wedging mechanism and an individual hook member in the disengaged and engaged positions, respectively.

FIG. 6 is a view of the rear face of the mounting plate, particularly showing the wedging mechanism and the over-center linkage for actuating said wedging mechanism.

FIG. 7 is a view taken along the line 7-7 of FIG. 6.

FIG. 8 is a view similar to FIG. 7, with the exception that the wedging mechanism is engaged with said hook members.

FIG. 9 is a perspective view of a wedging block employed within the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Since the particular design of the loader, power train and drive system, and boom structure are not material to the quick-attaching mechanism disclosed herein, a detailed description of such will not be forthcoming. Therefore, viewing the loader and these associated features generally, with particular reference to FIG. 1, a loader of the industrial type is indicated by numeral 10. The loader 10 is provided with a chassis structure comprised of a pair of laterally spaced drive housings 16, each of the drive housings disposed on one side of the loader and being of an enclosed structure for containing a chain drive, not shown, in a lubricant solution. Rotatively mounted to said drive housings 16 and driven by said chain drive is a front wheel 12 and a rear wheel 14. Carried by the drive housings 16 is a main body having laterally spaced side walls 20 and a rear engine compartment 22.

A cab extends over a central portion of the main body and defines an operator's station therebeneath. The cab includes a pair of upright front support post 26 which extend upwardly from the main body and a corresponding pair of rear support post 28, all joined about their upper ends by a roof structure 30.

The present loader further includes a boom structure indicated generally by the numeral 34 in FIG. 1. Boom structure 34 is basically comprised of a pair of boom arms on each side of the loader, these boom arms being termed an upper boom arm 36 and a lower boom arm 38. The lower boom arms 38 are pivotally secured to a respective side of the loader and extend generally rearwardly therefrom. Each upper boom arm 36 has one end extremity pivotally connected to the rearmost extremity of a lower boom arm 38 and extends generally upwardly therefrom for a short distance and then bends generally forward and projects therefrom past the forwardmost portion of the loader 10.

To support the boom structure 34 and to provide additional guidance therefore, a pair of support links 40 are pivotally interconnected between a forward portion of the cab and a rear portion of the upper boom arms 36. As in most commercial heavy duty loaders, the boom structure is powered by hydraulics and in the present case two hydraulic cylinders (only one of which is shown) indicated by the numeral 42 are employed. More particular, the hydraulic cylinders 42 are pivotally connected at the cylinder to a side portion of the

loader just above the pivotal connection of the lower boom arm 38 with the loader. The rod portion of the cylinders 42 are pivotally connected to a rear intermediate point on the upper boom arms 36. Although the boom structure has been described briefly, a more detailed appreciation and unified understanding of the boom structure can be gained from a study of U. S. Pat. No. 3,215,292 granted to L. M. Halls on Nov. 2, 1965.

FIGS. 2-6 relate to the quick-attaching mechanism for coupling a material handling implement, here being a bucket and indicated by the numeral 50, to the upper boom arms 36. As previously pointed out in the objects of the invention, the quick-attaching mechanism of the present invention basically comprises a mounting plate carried by the upper boom arms, and cooperating attaching structure formed on the material handling implement to be attached. First, viewing the quick-attaching mechanism generally, it will be noted that a mounting plate, indicated by numeral 52, is pivotally mounted to the upper boom arm extensions 36a (FIG. 2). Mounting plate 52 includes an upper edge 54 which is adapted to be received within a mounting cavity or lip 56 formed transversely along the upper rear edge of the material handling implement 50, as seen in FIG. 3. To establish a firm coupled relationship between the material handling implement 50 and the mounting plate 52, the implement 50 is provided with hook members 58 which extend rearwardly through said mounting plate for engagement with a wedging mechanism 60, the wedging mechanism 60 being selectively actuated for engagement and disengagement with said hook members by an over-center linkage 62.

Turning to a detailed description of these basic elements, the mounting plate 52, as best seen in FIG. 6, is of a general trapezoid shape and includes three laterally spaced reinforcing plates 64, 66, 68, along each rear side. Formed within the lower outside portions of the mounting plate 52, between the two outer reinforcing plates 64, 66 is a pair of square cut-outs 70. The cut-outs 70 are dimensioned to receive the upper boom extensions 36a which are pivotally connected therein by a pin 72 which extends through the extension members and the outer reinforcing plates 64, 68.

Mounting plate 50 is articulated back and forth about the axis of the pins 72 by a pair of remotely controlled hydraulic cylinders 74 (only one of which is shown). Hydraulic cylinders 74 are anchored to a cross bar, not shown, that extends between the upper boom arms 36 just behind the mounting plate 52. Each cylinder 74 includes a rod or shaft 76 that extends forwardly therefrom and connects to the rear face of the mounting plate 50 about a pin 78 that extends between the inner pair of reinforcing plates 66, 68 (FIG. 6).

Disposed about each side of the mounting plate's rear face is a wedging mechanism 60 and an actuating over-center linkage 62. Since the wedging mechanism and over-center linkages are of identical structure on each side, a description of one will be sufficient for the other. First, it is noted that each wedging mechanism 60 is disposed generally above a rectangular opening 80 formed within the mounting plate, the opening 80 being provided so that the hook members 58, extending rearwardly from the implement 50, may project through the mounting plate for engagement with each of said wedging mechanisms. With particular reference to the wedging mechanism, a plate 82 is disposed in-

wardly of the inner most reinforcing plate 68, and both the plate 82 and the inner most reinforcing plate 68 have lateral aligned rectangular openings 84 therein, the openings being spaced just above the lower rectangular hook member openings 80. Slideably mounted in each of the openings 84 is a wedging block 86. It will be observed that each wedging mechanism 60 includes a pair of blocks 86 disposed in side-by-side relationship about a shaft 88, the shaft extending through the openings 84 in plate 82 and inner reinforcing plate 68 and confined therein by a pair of cotter pins 90, or other suitable means. The wedging blocks 86 include an outer rectangular cross sectional area 86a that is confined within the openings 84 in plates 68,82, and an inner cross section that includes a pair of tapered surfaces 86b for engagement with said hook members 58 (FIG. 9).

Over-center linkage 62 comprises a block retaining plate 92 pivotally connected about shaft 88 between a pair of blocks 86, and an adjustable connecting link 94 pivotally connected at one end to pin 78 and pivotally connected at the other end to the block retaining plate 92. Fixed to the block retaining plate 92 and extending therefrom is a lever arm 96, as best seen in FIGS. 7 and 8. To provide added assurance that the over-center linkage will remain in an over-center engaged position (FIG. 8), a spring 98 is interconnected between the lever arm 96 and the mounting plate 52.

As previously stated, the material handling implement includes a mounting lip 56 disposed about an upper rear portion of the material handling implement 50. Extending downwardly and outwardly from the outer sides of the mounting lip 56 is a pair of guide rails 100 (FIG. 2). The upward convergence of these guide rails 100 enables the operator to insert the upper edge 54 of the mounting plate into the mounting lip 56 without being precisely in line therewith.

Spaced below the mounting lip 56 on the rear side of the implement 50 is a pair of rearwardly extending laterally spaced hook members 58. As particularly seen in FIG. 6, each hook member 58 includes a pair of individual hooks with each of the individual hooks adapted for engagement with the tapered surface 86b of a block 86. The hook members are particularly spaced to align and extend through the rectangular openings 80 below the wedging mechanism 60. With particular reference to FIGS. 4 and 5, each hook includes a first leg 58a which extends generally rearwardly from the implement. Extending generally upwardly from the rear end of first leg 58a is a second leg 58b, the second leg 58b having an inner side 58c that is tapered for engagement with the tapered surface 86b of a corresponding wedge block 86.

To couple the material handling implement 50 to the mounting plate 52, the operator positions the loader such that the mounting plate 52 is closely adjacent to the rear side of the implement. Next the mounting plate 52 is lifted upwardly by the upper boom arms 36 and with the aid of the guide rails, the upper edge 54 is inserted within the mounting lip 56. The upper boom arms 36 continue to lift upwardly, raising the material handling implement from the ground or its resting position. As the implement is raised and the upper edge 54 of the mounting plate 50 moves more snugly into the mounting lip 56, the lower rear portion of the implement tends to swing rearwardly such that the rear face of the implement 50 lies adjacent the front face of the

mounting plate 52. Thus, the hook members 58 now extend through the openings 80 within the mounting plate 52. To complete the coupling, the lever arm 96 is pushed over-center toward the upper edge of the mounting plate 50, causing the retaining plate 92 to move toward said hook member 58. The movement of the retaining plate 92, of course, results in corresponding sliding movement of the wedging blocks 86 within the openings 84 of the inner plate 82 and the inner reinforcing plate 68. Thus, as the wedging blocks 86 move toward said hook members 58, a tapered surface, 86b of the wedging block engages the inner side 58c of the second leg 58b of an individual hook. The wedging action of the wedging block against the second leg 58b causes the implement to be drawn closely adjacent the mounting plate 52 and results in a firm coupling connection that assures that the upper edge 54 of the mounting plate 52 is well contained within the mounting lip 56.

To uncouple the implement from the mounting plate, the lever arm 96 is brought back over-center as in FIG. 7. Thus, the wedging blocks 86 are disengaged from the hook members 58. Next the upper boom arms 36 are lowered until the implement 50 rests on the ground, at which time the upper edge 54 of the mounting plate is tilted forward and removed from the implement, completing the uncoupling operation.

Thus it is seen that the present quick-attaching mechanism of the present invention allows the operator to quickly and easily couple and uncouple implements to the loader in a simple manner without the use of tools and further without having to expend this energy lifting and shifting the implement.

The terms, "upper," "forward," "rearward," etc., have been used herein merely for the convenience of the foregoing specification and in the appended claims to describe the Quick-Attaching Mechanism and its parts as oriented in the drawings. It is to be understood, however, that these terms are in no limiting to the invention since the Quick-Attaching Mechanism may obviously be disposed in many different positions when in actual use.

The present invention, of course, may be carried out in other specific ways than those here and set forth without departing from the spirit and essential characteristics of the invention. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range are intended to be embraced herein.

Having thus described our invention, what we claim is:

1. A quick-attaching mechanism for coupling a material handling implement to the remote end of a boom structure, comprising in combination: a mounting plate mounted to the remote end of said boom structure; a wedging mechanism slideably mounted on said mounting plate about the rear side thereof; a mounting lip formed on said implement for receiving an edge extending from said mounting plate; a pair of upwardly converging guide rails mounted on the rear side of said material handling implement for guiding said edge extending from said mounting plate into said mounting lip; a wedge engaging structure fixed to said implement and extending rearwardly therefrom through openings in said mounting plate; and means for actuating said wedging mechanism back and forth for selectively en-

gagement and disengagement with said wedge engaging structure.

2. A quick-attaching mechanism as recited in claim 1, wherein said actuating means include an over-center linkage interconnected between said mounting plate and said wedging mechanism.

3. A quick-attaching mechanism, as recited in claim 1, wherein said wedge engaging structure comprises a generally L-shaped hook member.

4. A quick-attaching mechanism, as recited in claim 1, wherein said mounting plate includes at least one opening therein aligned with said wedge engaging structure such that said wedge engaging structure passes therethrough when said implement is coupled to said mounting plate.

5. A quick-attaching mechanism, as recited in claim 1, wherein said wedging mechanism comprises a wedging block mounted on a shaft and slideable therewith for selective engagement with said wedge engaging structure extending from said implement.

6. A quick-attaching mechanism for coupling a material handling implement to the remote end of a boom structure, comprising in combination: a mounting plate pivotally mounted to the remote end of said boom structure; a wedging block structure slideably mounted about the rear of said mounting plate; a mounting lip transversely disposed about the rear of said material handling implement; a pair of laterally spaced upwardly converging guide plates fixed about the rear side of said implement for guiding the upward edge of said mounting plate into said mounting lip; a hook member structure fixed to the rear side of said material handling implement and extending rearwardly therefrom through openings formed within said mounting plate; and an over-center actuating linkage operatively connected to said wedging block structure for actuating said block structure back and forth for engagement and disengagement with said hook member structure.

7. A quick-attaching mechanism, as recited in claim 6, wherein said hook member structure includes a first leg fixed at one end to the rear of said implement and extending generally rearwardly therefrom; and a second leg extending generally upwardly from the other end of said first leg, said second leg having an inner edge adapted for wedging engagement with said wedging block structure.

8. A quick-attaching mechanism, as recited in claim 6, wherein said wedging block structure comprises first and second sets of laterally spaced wedging blocks, each set of wedging blocks including a pair of individual blocks disposed in side-by-side relationship about a shaft extending between a pair of plates and slideable therein; and wherein said hook member structure includes a pair of hook structures laterally spaced in alignment with said first and second sets of wedging blocks for selective engagement therewith.

9. A quick-attaching mechanism for coupling a material handling implement to the remote end of a boom structure extending from a loader, comprising in combination: a mounting lip formed transversely about an upper portion of said material handling implement; a pair of laterally spaced hook members fixed to the rear of said material handling implement below said mounting lip, each of said hook members being generally L-shaped and orientated such that a first leg extends rearwardly from the material handling implement and a second leg extends generally upwardly from the end of

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said first leg; a pair of upwardly converging guide rails mounted on the rear of said implement; a mounting plate pivotally mounted to the remote end of said boom structure, said mounting plate having an upper edge portion adapted to be guided by said guide rails for insertion into said mounting lip for supporting said material handling implement, said mounting plate further including a pair of openings formed therein, the openings being laterally spaced and aligned with said hook members such that when said material handling implement and said mounting plate are disposed closely adjacent each other said hook members project rearwardly through said openings; two sets of wedging blocks each slideably mounted adjacent one of said openings, and an over-center linkage mechanism interconnected between said mounting plate and said wedging blocks for actuating said wedging blocks back and forth for engagement and disengagement with the inner side of the second leg of each hook member, wherein the wedging engagement of said wedging blocks with the second leg of said hook members acts to draw said material han-

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dling implement and said mounting plate closely together and maintain the two in a firm coupled relationship.

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 10. A quick-attaching mechanism, as recited in claim 9, wherein each set of wedging blocks includes a pair of individual blocks carried on a shaft in side-by-side relationship, with each individual block slideably mounted within an opening in an adjacent plate; and wherein said over-center linkage mechanism includes a retaining plate connected to said shaft, a connecting link pivotally connected at one end to said retaining plate and pivotally connected at the other end to said mounting plate, and a lever arm fixed to said retaining plate and extending therefrom the actuating said over-center mechanism.

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 11. A quick-attaching mechanism, as recited in claim 9, wherein said mounting plate is of a general trapezoidal shape for co-acting with said upwardly converging guide rails to align the upper edge of said mounting plate for insertion into said mounting lip.

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