United States Patent [19]

DiLillo et al.

[11] **3,845,871**

[45] **Nov. 5, 1974**

[54] **EXCAVATING APPARATUS**

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[22] Filed: **Jan. 15, 1973**

[21] Appl. No.: **323,961**

[52] **U.S. Cl.** **214/145,** 214/620

[51] **Int. Cl.** **E02f 3/70**

[58] **Field of Search** ..... 214/145, 620, 131 A

[56] **References Cited**

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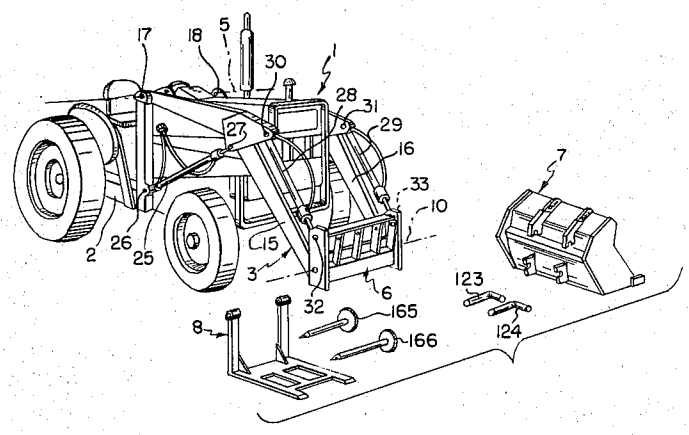
Primary Examiner—Robert J. Spar
Assistant Examiner—John Mannix
Attorney, Agent, or Firm—Teare, Teare & Sammon

[57] **ABSTRACT**

An excavating apparatus for moving a load relative to the ground including a chassis, a load moving member and a lift assembly movably mounted on the chassis for moving the load moving member relative to the ground. A coupling assembly is provided for rigidly mounting the load moving member on the boom assembly. The coupling assembly includes a locating coupling and a locking coupling which coact with one another for releasably mounting the load moving member in interlocked relation on the lift assembly. The locating coupling includes interfitting locating elements which are engageable with one another so as to align the locking coupling in its locking position. The locking coupling includes interfitting locking elements which are engageable with one another in their locked position so as to maintain the locating elements in the interfitting interlocked position for maintaining the load moving member in the mounted position on the lift assembly and which locking element are disengageable from one another so as to enable the locating elements to be released from their interfitted relation to enable the detachment of the load moving member from the lift assembly.

10 Claims, 13 Drawing Figures



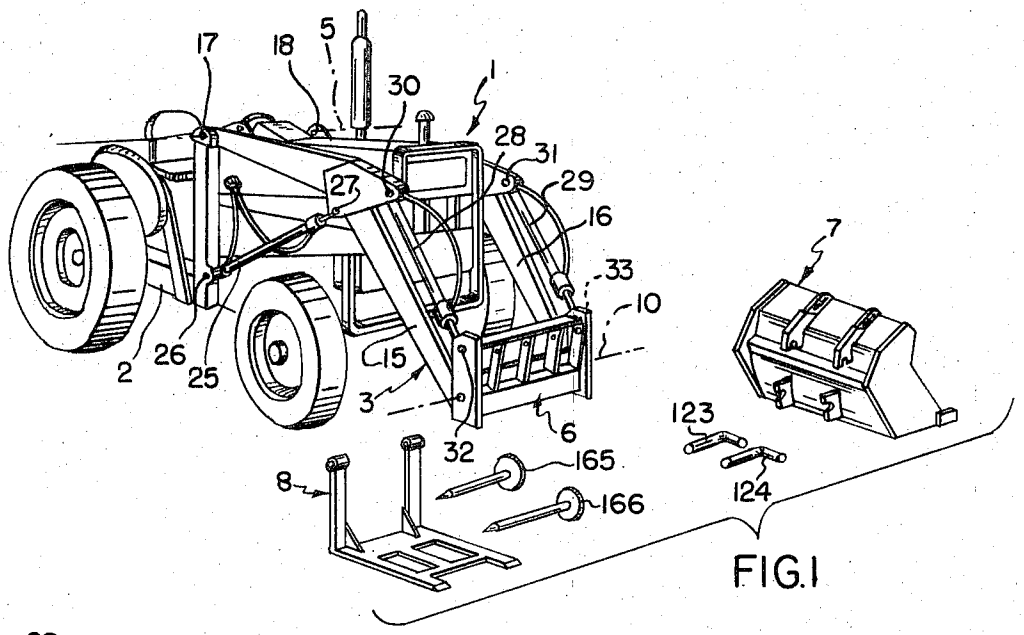


FIG.1

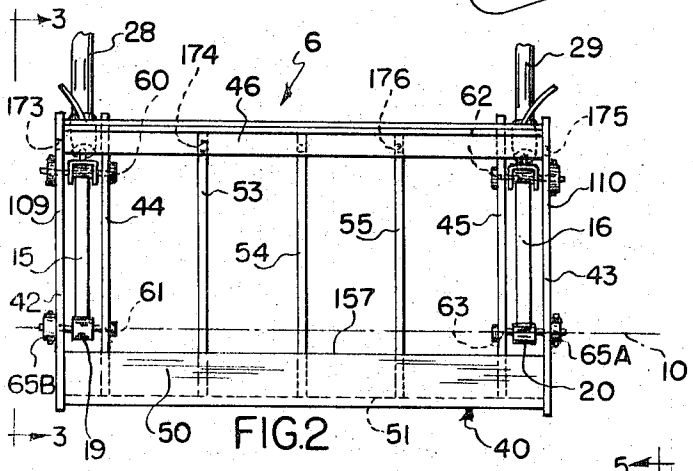


FIG.2

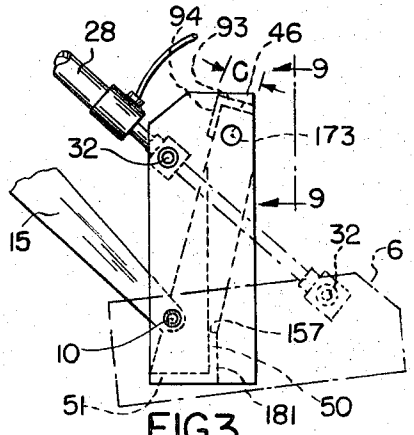


FIG.3

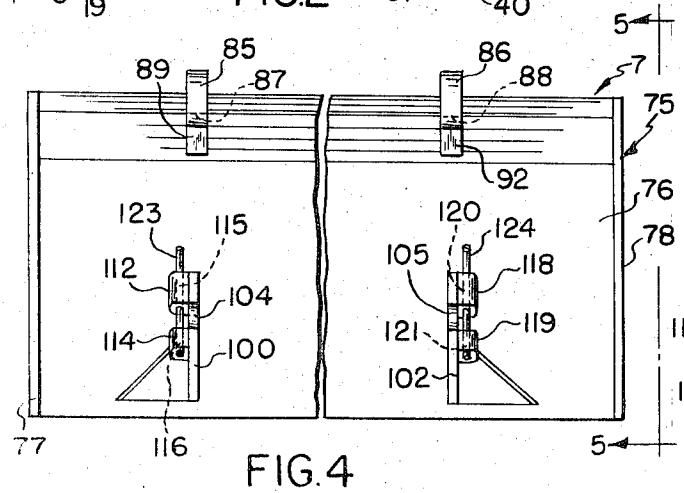


FIG.4

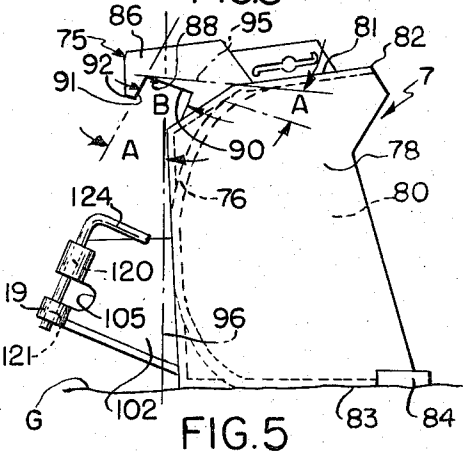


FIG.5

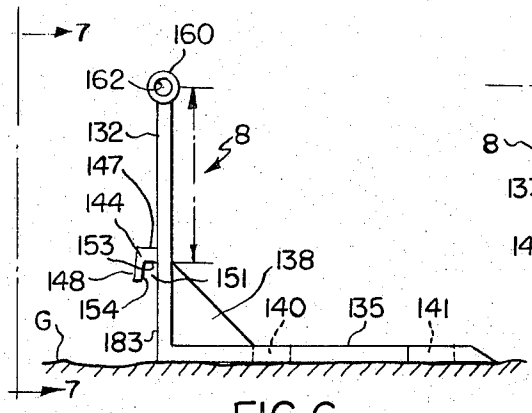


FIG.6

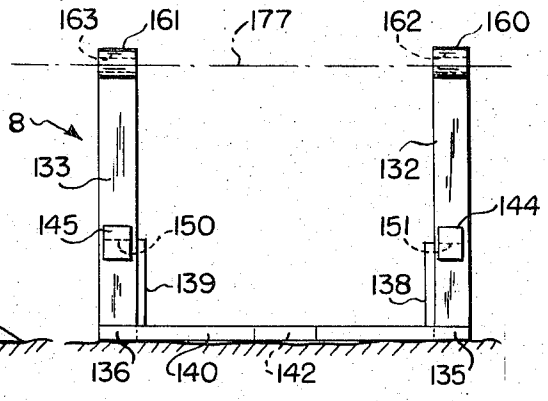


FIG.7

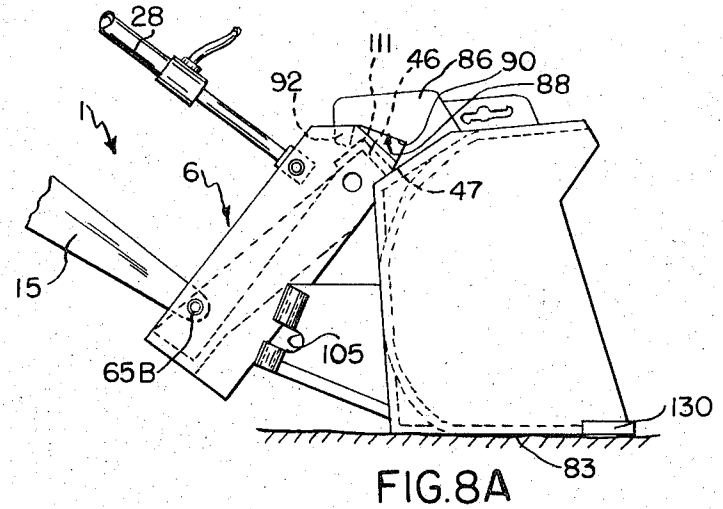


FIG.8A

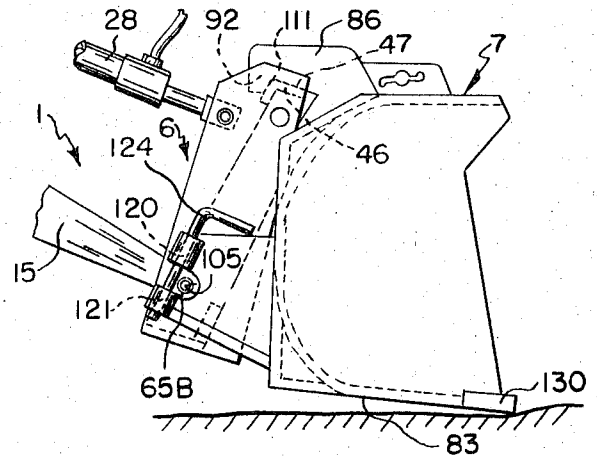


FIG.8B

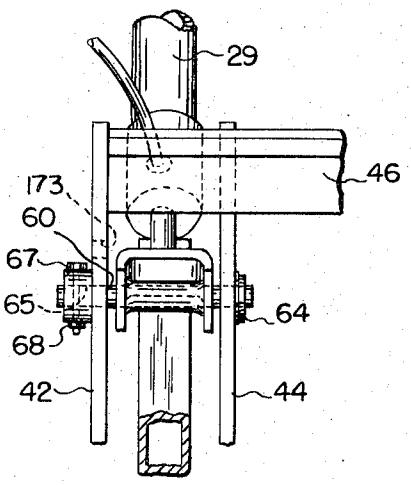


FIG.9

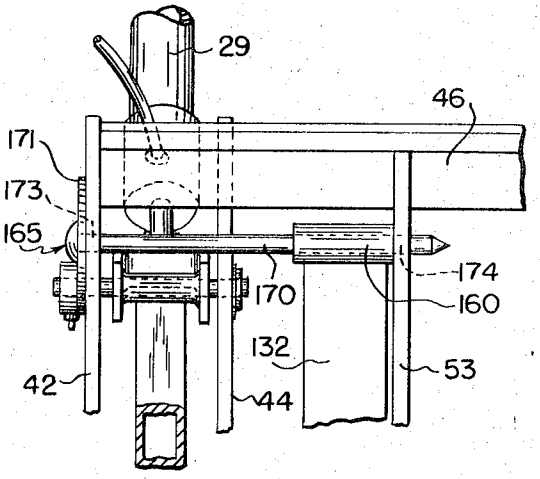


FIG.11

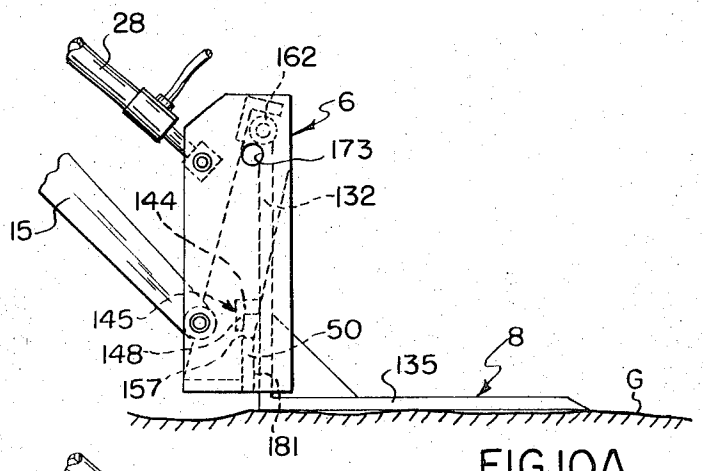


FIG.10A

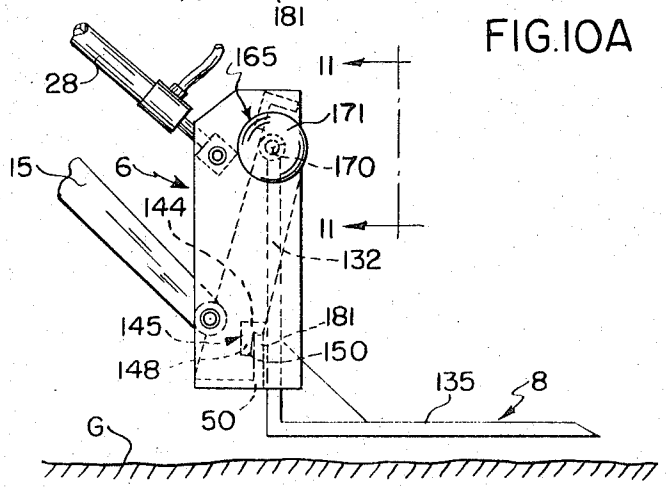


FIG.10B

EXCAVATING APPARATUS

BACKGROUND OF THE INVENTION

The present invention relates to excavating apparatuses, and more particularly, to excavating apparatuses of the type which are normally referred to as "loaders" which include interchangeable load moving members for moving different types of loads from one location to another.

Presently, loaders of the type referred to above include a chassis on which there is pivotally mounted a lift assembly. The lift assembly has been constructed to enable different types of load carrying members to be interchangeably mounted thereon for handling and moving the different types of loads. For example, a bucket is attached to the lift assembly for lifting loads consisting of aggregate bulk materials, whereas, the bucket may be detached and replaced by a fork for moving other generally bulky materials. In prior constructions, the removal and replacement of one load moving member, such as the bucket, with another load moving member, such as the fork, has been a completely manual operation requiring the labor of more than one persons which is necessitated by the bulky physical shape and relatively heavy weight of such load moving members. In addition, such prior constructions have necessitated considerable dismantling of the linkage connections which interconnect the load moving members with the lift assembly, and thus, require considerable time to achieve the aforementioned interchange of the load moving members.

SUMMARY OF THE INVENTION

The present invention contemplates providing an improved construction for an excavating apparatus, and more particularly, an excavating apparatus of the type known as a loader which comprises a chassis having a lift assembly mounted thereon. A load moving member is mounted on the lift assembly and is movable by the lift assembly for moving a load from one location to another. A coupling assembly is disposed between the boom assembly and the lower moving member for detachably mounting the lower moving member on the lift assembly. The coupling assembly includes a locating coupling and a locking coupling for detachably mounting the load moving member in interlocked relation on the lift assembly. The locating coupling includes interfitting locating elements which are engageable with one another to enable alignment of the locking coupling in its locking position. The locking coupling includes interfitting locking elements engageable with one another in the locked position to maintain the locating elements in their interfitted engaged position for maintaining the load moving member in the interlocated mounted position on the lift assembly. The locking elements are disenageable from one another to enable the locating elements to be released from the interlocked relation and to enable detachment of the load moving member from the lift assembly. The locating elements comprise a locating member on the lift assembly and spaced locating hooks on the load moving member which are releasably engageable with the locating member. The locking elements comprise at least one removable pin member and the load moving member includes apertures means for receiving the pin member therein, such that when the pin member is inserted within the aperture means, the lift assembly is interlockingly attached to the load moving member. More specifically, the lift assembly includes a mounting member, and the mounting member includes spaced locating members, one of which is arranged for separate attachment to one type of load moving member and another of which is arranged for separate attachment to another type of load moving member. The respective locating members are spaced apart from the locking elements on the lift assembly a distance equal to the spacing between the locating hooks and locking elements on the load member such that, when the locating member is fully inserted within the locating hooks, the locking elements of the lift assembly will be physically aligned with the locking elements of the load moving member. The locking pins are then inserted, as aforesaid, for maintaining the locating member in interlocked engagement within the locating hooks for rigidly mounting the load moving member on the mounting member. When it is desired to detach the one load moving member, the above steps are repeated in essentially the reverse order. After detachment of the one load moving member, the lift assembly may then be attached to the other load moving member.

As can be seen by the foregoing, there is provided a semi-automatic arrangement for attaching and detaching a load moving member to an excavating apparatus, such as a loader or the like. More specifically, the arrangement enables the entire operation to be carried out by one person, as the load moving members are handled and manipulated by the lift assembly. Further, the entire operation can be carried out more efficiently and in a considerably shorter period of time than has been possible by prior constructions.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view showing the improved excavator apparatus of the present invention with the load moving members shown in the detached position;

FIG. **2** is a fragmentary, front elevation view of the excavating apparatus of the present invention showing the mounting member;

FIG. **3** is a fragmentary, side elevation view taken along the line **3—3** in FIG. **2**;

FIG. **4** is a fragmentary, rear elevation view of one of the load moving members which may be attached to the excavating apparatus of the present invention;

FIG. **5** is a side elevation view taken along the line **5—5** of FIG. **4**;

FIG. **6** is a side elevation view of another form of load moving member which may be attached to the excavating apparatus of the present invention;

FIG. **7** is a rear elevation view taken along the line **7—7** of FIG. **6**;

FIG. **8A** is a graphic illustration showing the mounting member and one load moving member in their initial contacting position;

FIG. **8B** is a graphic illustration showing the mounting member and the load moving member of FIG. **8A** in their finally installed position;

FIG. **9** is an enlarged, fragmentary, partially in-section view taken along the line **9—9** of FIG. **3**;

FIG. **10A** is a graphic illustration showing the mounting member and another load moving member in their initial contacting position;

FIG. 10B is a graphic illustration of the mounting member and the load moving member shown in FIG. 10A in their finally installed position; and

FIG. 11 is an enlarged, fragmentary, partially in-section view taken along the line 11—11 of FIG. 10B.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

There is illustrated in FIG. 1, generally at 1, an excavating machine of the type which is known as a "loader." The loader 1 is shown as including a chassis 2 and a lift assembly 3 which is pivotally mounted on the chassis 2 for movement in a generally vertical plane about a pivotal axis 5. As shown, the lift assembly 3 includes a mounting member 6 for detachably coupling a load moving member thereon, and which load moving member is shown in one form as being a bucket 7 for lifting and moving such bulk aggregate materials as excavated spoil, gravel, sand or the like, and in another form as being a fork 8 for lifting and moving such items and materials as pallets, logs, bales and other similar bulky materials. In the form shown, the mounting member 6 is pivotally mounted on the lift assembly 3 for pivotal movement in the generally vertical plane about another pivotal axis 10 to enable semi-automatic coupling and uncoupling of either one of the load moving members 7 or 8 from the lift assembly 3 in a manner which will be described in more detail hereinafter.

As also shown in FIG. 1, the lift assembly 3 of the loader 1 includes a pair of lift arms 15 and 16, each of which is pivotally connected at its one end to a chassis 2, such as at 17 and 18, and is pivotally connected at its opposite end to the mounting member 6, such as at 19 and 20 (FIG. 2). A fluid-actuated lift cylinder 25 is shown pivotally connected at one end to the chassis 2, such as at 26, and extends forwardly and upwardly being pivotally connected, as at 27, to the lift arm 15. A similarly constructed and arranged lift cylinder (not shown) is mounted on the opposite side of the loader 1 for connection between the lift arm 16 and the chassis 2 for operation in unison with the lift cylinder 25 for raising and lowering the lift arms 15 and 16, as a unit, and thus raising and lowering the mounting member 6. As further shown in FIG. 1, fluid-actuated cylinders 28 and 29 are each pivotally connected at one end, such as at 30 and 31, to the lift arms 15 and 16 and at the opposite end to the mounting member 6, such as at 32 and 33, respectively. The cylinders 28 and 29 are arranged for actuation in unison for causing tilting pivotal movement of the mounting member 6 about the pivotal axis 10 between a generally upright position, indicated by the solid lines in FIG. 3, and a forward tilted position, indicated by the phantom lines in FIG. 3, upon movement of the cylinders 28 and 29 between the retracted and extended positions, respectively.

Referring now to FIGS. 2 and 3, the mounting member 6 is shown as comprising a frame 40 which may be made of any suitable material, such as steel plate or the like, and which is shown as including spaced, generally parallel side support plates 42 and 43. Inner support plates 44 and 45 are positioned inwardly from and extend parallel to the side support plates 42 and 43, respectively. The inner support plates 44, 45 and the side support plates 42 and 43 are arranged for pivotally connecting the lift arms 15 and 16 and the fluid cylinders 28 and 29 to the mounting member 6. As shown, the plates 42, 43, 44 and 45 are fixedly connected, such as by welding or the like, at their upper ends to an upper horizontally-extending locating member or bar 46 which is provided in the form of an angle bar, and is shown in FIG. 2 as being generally inverted L-shape in transverse dimension. The lower ends of the plates 42, 43, 44 and 45 are shown secured to a lower horizontally-extending locating member or plate 50 and base plate 51 which extend generally normally to one another and may be secured to each other at their juncture, such as by welding or the like, to form a reverse-L shape configuration as seen from the left side of the mounting member 6, as in FIG. 3. Additional support struts 53, 54 and 55 may be mounted in laterally spaced relation between the inner support plates 44 and 45 and may be secured between the upper locating member 46, or bar, and the lower locating member on plate 50, and the base plate 51, such as by welding or the like.

As shown in FIG. 2, pins 60, 61, 62 and 63 are supported on the frame 40 for pivotally connecting the lift arms 15 and 16 and the fluid cylinders 28 and 29 thereto. A typical mounting arrangement for the pins 60, 61, 62 and 63 is shown in FIG. 9 where the pin 60 is shown mounted between the inner support plate 44 and the outer supportplate 42. All of the other pins may be mounted in a manner similar to the pin 60. As shown, the pin 60 has its opposite ends supported within bushings, such as 64 and 65, which are mounted on the inner support plate 44 and outer support plate 42 respectively. The pin 60 is retained within the bushings 64 and 65 by a bolt 67 which may extend through holes in the pin 60 and bushing 65. The bolt 67 may in turn be secured within the holes by a nut 68.

Referring now to FIG. 4, the bucket 7 is shown as including a body 75 which is modified form of a conventional bucket construction as shown in the Ford Motor Company's Operator's Manual for Series 730 Loaders, Publication No. 5E 03230-10686. The body may be made of any suitable material, such as sheet steel or the like, and includes a curved back or base plate 76 and side plates 77 and 78 which together define a load receiving pocket 80. The base plate 76 may be said to have, for purposes of description, a top side 81 adjacent one edge or top edge 82 and a bottom side 83 adjacent its opposite edge or cutting edge 84.

In accordance with the invention, and referring to FIGS. 4 and 5, the coupling arrangement for coupling the bucket 7 to the mounting member 6 includes locating members or hooks 85 and 86 which are mounted in laterally spaced relation on the base plate 76 in the lengthwise direction of the bucket 7 and have a hook-like configuration such as when viewed in side elevation (FIG. 3) being arranged for interlocking coupling action with the locating bar 46. When the bucket 7 is resting on its bottom side 83 on the ground G as in FIG. 5, the locating hooks 85 and 86 are mounted on the top side of the back plate 76 and extend rearwardly from the body, such as in a direction away from the pocket 78. The locating hooks 85 and 86 are shown as including downwardly opening recesses or slots 87 and 88, respectively, to enable the locating bar 46 to be slidably inserted therein in a manner to be described more fully hereinafter. As shown, the slots 87 and 88 are complimentary-shaped to the locating bar 46 to the extent that they each have an inner surface 90 and back surface 91 which extend normal to one another being ar-

ranged for abutting engagement with the top surface 93 and the back surface 94 (FIG. 3) of the locating bar 46, respectively. To facilitate the interlocking engagement of the locating bar 46 within the slots 87 and 88, the slots are angled or directed slightly rearwardly as well as downwardly when viewing the bucket 7 in side elevation as in FIG. 5, defining downwardly depending lips 89 and 92 at the rear end of the locating hooks 85 and 86 respectively. More specifically, when the bucket 7 is at rest on its bottom side 83 on the ground G, the inner surface 90 and back surface 91 are disposed at an acute angle, such as the angle A, with respect to the horizontal direction (indicated by the dotted line 95) and vertical direction (indicated by the dotted line 96), respectively. In addition, the transverse width, such as the distance B (FIG. 5) of the slots 87 and 88 is slightly greater than the transverse width, such as the distance C (FIG. 3) of the top surface 93 of the locating bar 46 to enable the locating bar 46 to be readily and easily inserted into the slots 87 and 88.

The coupling arrangement for coupling the bucket 7 to the mounting member 6 is shown as further including locking members or yokes 100 and 102 which are also mounted in laterally-spaced relation on the bucket 7 in the length-wise direction thereof. As shown, the locking yokes 100 and 102 are disposed on the base plate 76 in laterally spaced relation from the locating hooks 85 and 86 in a direction toward the bottom side 83. As shown, the locking yokes 100 and 102 have a yoke-like configuration when viewed in side elevation (FIG. 5) and project rearwardly and outwardly from the base plate 76 being arranged for interlocking coupling action with the mounting member 6. In the form shown, the locking yokes 100 and 102 include rearwardly opening slots 104 and 105, respectively, which are arranged to receive locking members in the form of the bushings 65A and 65B which project outwardly from the side plates 43 and 42, respectively. As shown, the locking yokes 100 and 102 comprise generally flat plates, which may be made of steel or the like, having opposed, generally planar inner faces 106 and 107, respectively, with the spacing therebetween being slightly greater than the distance between the outer faces 109 and 110 of the side plates 42 and 43. Further, the width of the slots 104 and 105 is greater than the maximum transverse dimension of the bushings 65A and 65B to enable the bushings 65A and 65B to be easily fitted into the slots 104 and 105. In addition, the slots 104 and 105 are spaced apart from the slots 87 and 88 such that the bushings 65A and 65B are aligned with and can be pivoted about the locating bar 46 into the slots 104 and 105 when the locating bar 46 is inserted within the slots 87 and 88. When this occurs, the juncture or edge 111 of the top surface 93 and back surface 94 of the locating bar serves as a fulcrum, as seen in FIG. 8B. Referring again to FIGS. 4 and 5, the locking yoke 100 is shown as including a pair of spaced, outwardly projecting lugs 112 and 114 which are disposed above and below the slot 104. As shown, the lugs 112 and 114 include axially aligned bores 115 and 116, respectively, which have their central axis extending generally transversely to an adjacent rear end of the slot 104. Similarly, the locking yoke 101 includes outwardly projecting lugs 118 and 119 which are disposed above and below the slot 105, and which have axially aligned bores 120 and 121, respectively. Locking pins 123 and 124 are provided for insertion through the bores 115, 116 and 120, 121 for closing the slots 104 and 105 behind the bushings 65A and 65B when disposed therein, and thus, retaining the bushings 65A and 65B in interlocked relation therein and causing the locating bar 46 to be retained in interlocked relation within the slots 87 and 88. When it is desired to detach the bucket 7 from the mounting member 6, the above steps are repeated in essentially the reverse order. When the bucket 8 is detached, the loader 1 may then be maneuvered into position for attachment to another load moving member, such as the fork 8, in the manner to be described hereinafter.

In coupling the bucket 7 to the mounting member 6, the loader 1 is driven into a position behind and directed toward the bucket 7 which is resting on its bottom side, as seen in FIGS. 1 and 5. The mounting member 6 is then centrally aligned with respect to the opposed outer ends of the bucket 7 such that the side plates 42 and 43 are disposed between the locking yokes 100 and 102. Should the mounting member 6 be disposed in a generally upright position, as shown in FIG. 3, the fluid cylinders 28 and 29 are actuated so as to tilt or pivot the upper end of the mounting member 6, and thus move the locating bar 46 forwardly toward the bucket 7 about the pivotal axis 10 such that when the loader 1 is moved forwardly toward the bucket 7, the locating bar 46 will pass beneath the lips 89 and 92 of the locating hooks 85 and 86. The loader 1 may then be moved forwardly until the locating bar 46 engages the bucket 7 either by abutting the back side 76 or the front surface of the slots 87 and 88. The fluid cylinders, such as 25, may then be extended to raise the lift assembly 3 to cause the front edge 47 of the locating bar 46 to run up along the front surface and guide the locating bar 46 into the slots 87 and 88, as shown in FIG. 8A. Simultaneously, the fluid cylinders 28 and 29 may be retracted to cause the upper end of the mounting member 6 to be moved upwardly and rearwardly about the pivotal axis 10 toward the upright position to enable the locating bar 46 to be further inserted into the slots 87 and 88 while at the same time minimizing the upward movement of the arms 15 and 16 of the lift assembly 3. As the mounting member 6 is raised, the juncture or edge 111 of the locating bar 46 will engage the inner surface 90 of the slots 87 and 88, causing the bucket to be lifted away from the ground G. As the center of gravity bucket 7 is forward of the edge 111, when the bucket 7 is resting on its bottom side 83, the bucket 7 will initially rock forwardly about its bottom edge, as at 130, and continued raising of the mounting member 6 by the operator will eventually lift the bottom side 83 off of the ground to cause the bucket 7 to sway rearwardly about the fulcrum formed by the edge 111 abutting against the inner surface 90. Continued raising of the mounting member 6 by the arms 15 and 16 or continued pivotal movement of the mounting member 6 rearwardly about the axis 10 toward the upright position will eventually result in the bushings 65A and 65B moving into the slots or recesses 104 and 105, as shown in FIG. 8B. With the bushings 65A and 65B in this position, the pins 123 and 124 can then be slidably inserted through the bores 115, 116 and 120 and 121 to lock the bushings 65A and 65B in the slots 104 and 105 to prevent their removal therefrom, and thus, maintain the locating bar 46 within the slots 87 and 88 and prevent its release from interlocking relation with the locating hooks 85 and 86 until the pins 123 and 124 are re-

moved, enabling the bushings 65A and 65B to be removed from the slots 104 and 105. Release of the bucket 7 can be accomplished by performing the above operation in reverse.

Referring now to FIGS. 6 and 7, the fork 8 is generally L-shaped in configuration, when viewed in side elevation as in FIG. 6, and may be made of any suitable material, such as steel or the like. As shown, the fork 8 may include a pair of generally upright support posts 132 and 133 which are adapted for detachable coupling to the mounting member 6. Spaced prongs 135 and 136 extend forwardly from the posts 132 and 133 being connected thereto, such as by welding or the like, and adapted for supporting engagement with the ground, as shown in FIG. 6, or for supporting a load when attached to the mounting member 6, as shown in FIG. 10B. The fork 8 may further include gusset plates 138 and 139 which are connected at the juncture between the posts 132, 133 and prongs 135, 136, such as by welding or the like, to add rigidity to the structure. Cross bars 140, 141 and 142 may extend between the prongs 135 and 136 to add further rigidity to the structure.

In accordance with the present invention, the fork 8 is shown as including locating members or hooks 144 and 145 which may be mounted in laterally spaced relation on the posts 132 and 133. As shown, the hooks 144 and 145 are of a generally inverted L-shaped configuration, when viewed in side elevation as in FIG. 6, being adapted for interlocking coupling action with the locating plate 50 of the mounting member 6.

When the fork 8 is in the rest position, as shown in FIG. 6, and the prongs 135 and 136 are setting on the ground G, the locating hooks 144 and 145 are spaced upwardly from the forks 135 and 136 and project rearwardly from the posts 132 and 133. As only one of the locating hooks, such as 144, is shown in side elevation, it along will be described in detail herein, but it is understood that the other locating hook 145 is structurally similar and mounted in the same manner for interconnection with the locating plate 50. As shown, the locating hook 144 includes one leg 147 which projects rearwardly from the post 132 and is attached therto, such as by welding or the like, and another leg or lip 48 which depends downwardly from the leg 147 to define with the post 132 a downwardly opening recess or slot 150 for receiving the locating plate 50 therein in a manner to be described more fully hereinafter. Similarly, the locating hook 145 defines with the post 133 a slot 151 for simultaneously receiving the locating plate 50 therein. In the form shown, the slots 150 and 151 each include an inner surface, as at 153, and a back surface, such as at 154. The back surface 154 extends generally normal to the inner surface 153, but as shown, may be angled slightly rearwardly from the normal so as to abuttingly engage the upper edge surface 157 (FIGS. 2 and 3) of the locating plate 50 and guide the locating plate 50 into the slots 150 and 151. More particularly, the transverse width of the slots 150 and 151 in a direction away from the posts 132 and 133, at least at their lower open end, is equal to or slightly larger than the thickness of the locating plate 50 adjacent the upper edge surface 157 thereof. In the form shown, the width of each of the slots 150 and 151 is preferably equal to or slightly greater than the thickness of the locating plate 50 adjacent the upper edge surface 157 to enable the uper edge surface 157 to engage the inner surface 153 and to further enable the fork 8 to pivot about the locating plate 50 while remaining in engagement with or at least in close proximity to the fork 8 as the fork 8 is lifted off of the ground G in a manner to be described more fully hereinafter.

The coupling arrangement for coupling the fork 8 to the mounting member 6 is also shown as including locking members or sleeves 160 and 161 which are mounted atop the upper ends of the posts 132 and 133, respectively. In the form shown, the sleeves 160 and 161 include apertures in the form of axially aligned, circular bores 162 and 163 for receiving locking pins 165 and 166 (FIG. 1) for holding the fork 8 in interlocked relation on the mounting member 6. Only one of these pins, such as 165, is illustrated in the installed position in FIG. 11. It is intended that the mounting arrangement for the pin 166 is similar to that for the pin 165.

As shown in FIG. 11, each of the pins, such as 165, includes a shaft 170 and a head 171 which is mounted at the end of the shaft 170. The plate 42 and the strut 53 include axially aligned apertures 173 and 174 for slidably receiving the shaft 170 therethrough. The plate 44 is recessed with respect to the plate 42 and strut 53 to enable the pin 65 to pass in front of the plate 44. The shaft 170 has a length which is longer than the transverse distance between the plate 42 and the strut 53 such that when the head 171 is in engagement with the plate 42, the shaft 170 will extend through the apertures 173 and 174, as well as, through the bores 162 in the sleeve 160. Similarly, the plate 43 and strut 55 include axially aligned apertures 175 and 176, respectively, for receiving the other pin 166 for interlocking engagement with the sleeve 161.

In the form shown, the transverse distance between the inner surface 153 of each of the locating hooks 144 and 145 and the central axis 177 of the bores 162 and 163 is substantially equal to the transverse distance between the upper edge surface 157 of the locating plate 50 and the central axis of the apertures 173, 174, 175 and 176, such as at 180 (FIG. 2), such that when the locating plate 50 is inserted in the slots 150 and 151 of the locating hooks 144 and 145, respectively, with the upper edge surface 157 in engagement with the inner surface 153 and the rear surface of the posts 132 and 133, such as at 183, are in engagement with the front face, such as at 181, of the locating plate 50, the apertures 173 and 174 will be axially aligned with the bore 160, and the apertures 175 and 176 will be axially aligned with the bore 161 to enable insertion of the pins 165 and 166 therein, as aforesaid, to releasably hold the locking plate 50 in interlocked relation within the slots 150 and 151.

In coupling the fork 8 to the mounting member 6, the loader 1 is driven into a position behind and directed toward the fork 8 when the fork 8 is in the rest position on the prongs 135 and 136, as seen in FIG. 10A. The mounting member 6 is then centered with respect to the fork 8 such that the struts 153 and 154 are positioned inwardly of the posts 132 and 133 in the manner shown in FIG. 11. The lift assembly 3 may then be manipulated so as to move the mounting member 6 to a generally upright position and to position the upper edge surface 157 of the locating plate 50 to a position where its distance above the ground is less than the lower extremity of the lip 148. The mounting member 6 is then moved forwardly by the loader 1 so as to pass

under the lip **148** and still forwardly until the locating plate **50** engages the fork **8** adjacent the posts **132** and **133.** The lift assembly **3** is then actuated to raise the mounting member **6** and hold the locating plate **50** upwardly into the recesses **150** and **151.** The mounting member **6** is then raised further until the upper edge surface **157** engages the inner surface **153** of each of the locating hooks **144** and **145** causing the prongs **135** and **136** of the fork **8** to be lifted off of the ground. Should the mounting member **6** not be in a substantially upright position when the prongs **135** and **136** are raised away from the ground, the lip **148** will engage the locating plate **50** and prevent it from moving rearwardly away from the posts **132** and **133.** As the mounting member **6** is continued to be raised upwardly away from the ground, the weight of the forks **135** and **136** will cause the fork **8** to pivot about the upper edge surface **157** until the back surface **183** of the posts **132** and **133** engage the front surface **181** of the locating plate **50.** When in this position, the bores **162** and **163** will be in axial alignment with the apertures **173** and **174** and **175** and **176,** respectively. The pins **165** and **166** are then interlockingly inserted, as aforesaid, to lock the fork **8** in position on the mounting member **6.** When it is desired to detach the fork **8** from the mounting member **6,** the above steps are repeated in essentially reverse order. When the fork **8** is detached, the loader **1** may then be maneuvered into position for attachment to the bucket **7** in the manner previously described.

We claim:

1. An excavating apparatus comprising,

a lift assembly mounted on said chassis,

a load moving member mounted on said lift assembly,

a coupling assembly between the lift assembly and the loading moving member for mounting said load moving member on said lift assembly,

said coupling assembly includes a locating coupling and a locking coupling for detachably mounting said load moving member in interlocked relation on said lift assembly,

said locating coupling includes interfitting locating elements engageable with one another to enable alignment of said locking coupling in its locking position,

said locking coupling includes interfitting locking elements engageable with one another in the locked position to maintain said locating elements in their interfitted engaged position for maintaining said load moving member in the interlocked mounted position on said lift assembly and disengageable from one another to enable said locating elements to be released from their interlocked relation and to enable detachment of said load moving member from said lift assembly,

said load moving member is an excavating bucket,

said locating elements include a locating bar on said lift assembly and locating hooks mounted in laterally spaced relation on said bucket and including downwardly opening slots therein for receiving said locating bar therein,

said locking elements include a pair of yokes on said bucket and locking projections on said lift assembly, and

said locking yokes are disposed downwardly from said locating hooks and in laterially spaced relation on said bucket each having a rearwardly opening recess for receiving a respective one of said locking projections therein, and

a pair of locking pins each supported on a respective one of said locking yokes and extending across said recesses for interlockingly retaining said projections in said recesses and retain said locating bar within the slots in said locating hooks to prevent disengagement of said load moving member from said lift assembly.

2. An excavating apparatus comprising,

a chassis,

a lift assembly mounted on said chassis,

a set of load moving members for detachable mounting on said lift assembly including an excavating bucket and a lift fork,

one coupling assembly between said lift assembly and said bucket for mounting said bucket on said lift assembly when said fork is not mounted thereon,

another coupling assembly between said lift assembly and said fork for mounting said fork on said lift assembly when said bucket is not mounted thereon,

said one coupling assembly includes a first locating coupling and a first locking coupling for detachably mounting said bucket in disengageable interlocked relation on said lift assembly,

said first locating coupling includes a first set of interfitting locating elements engageable with one another to enable alignment of said first locking coupling in its locking position,

said first locked coupling includes a first set of interfitting locking elements engageable with one another in the locked position to maintain said first set of locating elements in their interfitting engaged position for maintaining said bucket in the interlocked mounted position on said lift assembly and disengageable from one another to enable said first set of locating elements to be released from interlocked relation and to enable detachment of said bucket from said lift assembly,

said first set of locating elements includes a locating bar on said lift assembly and a first set of locating hooks mounted in laterally spaced relation on said bucket with each including a downwardly opening slot therein for receiving said locating bar therein,

said first set of interfitting locking elements includes a pair of yokes on said bucket and locking projections on said lift assembly,

said locking yokes are disposed downwardly from said first set of locating elements and in laterally spaced relation on said bucket with each having an outwardly opening recess for receiving a respective one of said locking projections therein, and

a first pair of locking pins each supported on a respective one of said locking yokes and extending across a respective one of said recesses for interlockingly retaining each projection in a recess and retaining said locating bar within said slots in said first set of locating hooks to prevent disengagement of said bucket from said lift assembly.

3. An excavating apparatus in accordance with claim **2,** wherein

said other coupling assembly includes a second locating coupling and a second locking coupling for de-

tachably mounting said fork in interlocked relation on said lift assembly,

said second locating coupling includes a second set of interfitting locating elements engageable with one another to enable alignment of said second locking coupling in its locking position,

said second locking coupling includes a second set of interfitting locking elements engageable with one another in the locked position thereof to maintain said second set of locating elements in their interfitting engaged position for maintaining said fork in the interlocked mounted position on said lift assembly and disengageable from one another to enable said second set of locating elements to be released from their interlocked relation and to enable detachment of said fork from said lift assembly,

said second set of locating elements include a locating plate on said lift assembly and a second set of locating hooks mounted in laterally spaced relation on said form with each including a downwardly opening slot therein for receiving said locating plate therein,

said second set of locking elements includes a pair of sleeves on said fork and two pairs of axially-aligned apertures on said lift assembly,

said lift assembly including a pair of recesses disposed in laterally spaced relation therein for receiving a respective one of said sleeves therein,

each of said sleeves includes a bore therein with each of said bores being axially aligned with one another being arranged for alignment with one of said pair of apertures in said lift assembly, and

a second pair of locking pins supported on said lift assembly with each of said pins extending across one of said recesses in said lift assembly and insertable through said bores in said sleeves when said sleeves are disposed in said recesses in said lift assembly for interlockingly retaining each sleeve in a recess and retaining said locating plate within said slots in said second set of locating hooks to prevent disengagement of said form from said lift assembly.

4. An excavating apparatus in accordance with claim **3,** wherein

said locating bar and said locating plate extend in spaced, laterally-extending relation to one another, and

said slots in said first set of locating hooks on said bucket open downwardly and rearwardly from said bucket to enable said locating bar to be lifted upwardly thereinto.

5. An excavating apparatus in accordance with claim **2,** wherein

said recesses in said yokes open rearwardly in a direction away from said bucket, and

the transverse spacing between said locating bar and said projections on said lift assembly is such that when said locating bar is fully inserted into the slots in said first set of locating hooks on said bucket, said projections are aligned with the recesses in said yoke to enable said projections to be moved fowardly into said recesses in said yokes upon forward movement of said lift assembly toward said bucket.

6. An excavating apparatus in accordance with claim **3,** wherein

said slots in said second set of locating hooks on said fork open downwardly to enable said locating plate to be lifted upwardly thereinto.

7. An excavating apparatus in accordance with claim **3,** wherein

the transverse spacing between said locating plate and said bores in said sleeves are such that said apertures of said first set of locking elements are axially aligned with said bores in said sleeves when said locking plate is fully inserted into said slots in said second set of locating hooks on said fork.

8. An excavating machine in accordance with claim **3,** wherein

said locating bar is disposed above said locating plate on said lift assembly.

9. An excavating machine in accordance with claim **2,** wherein

said first set of locating hooks are disposed above said first set of locking elements on said bucket.

10. An excavating machine in accordance with claim **3,** wherein

said second set of locating hooks are disposed below said second set of locking elements on said fork.

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