

**Jan. 6, 1970**

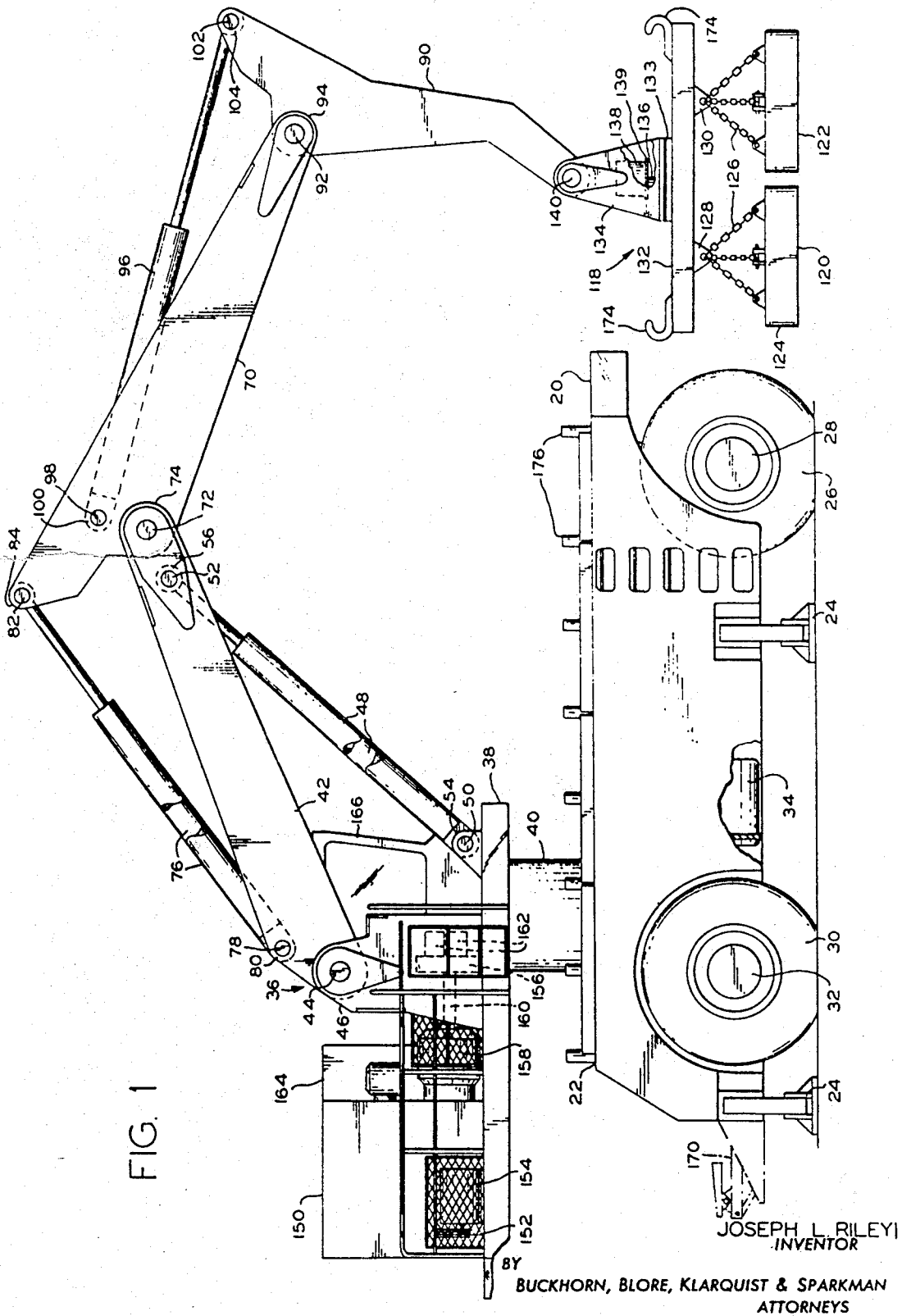
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**3,487,964**

## SELF-LOADING SIDE LOADERS

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SELF-LOADING SIDE LOADERS

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FIG. 2

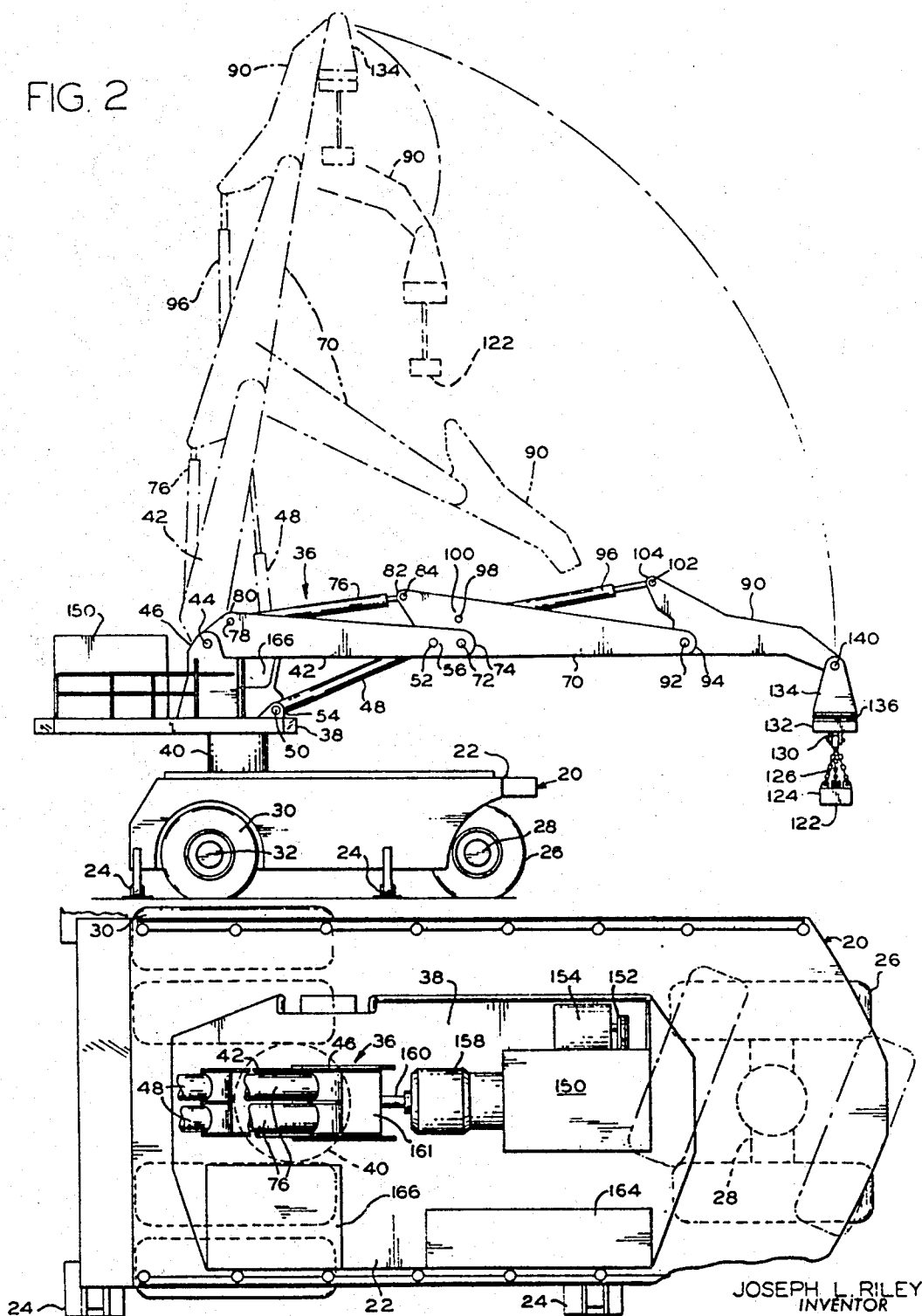


FIG. 3

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FIG. 5

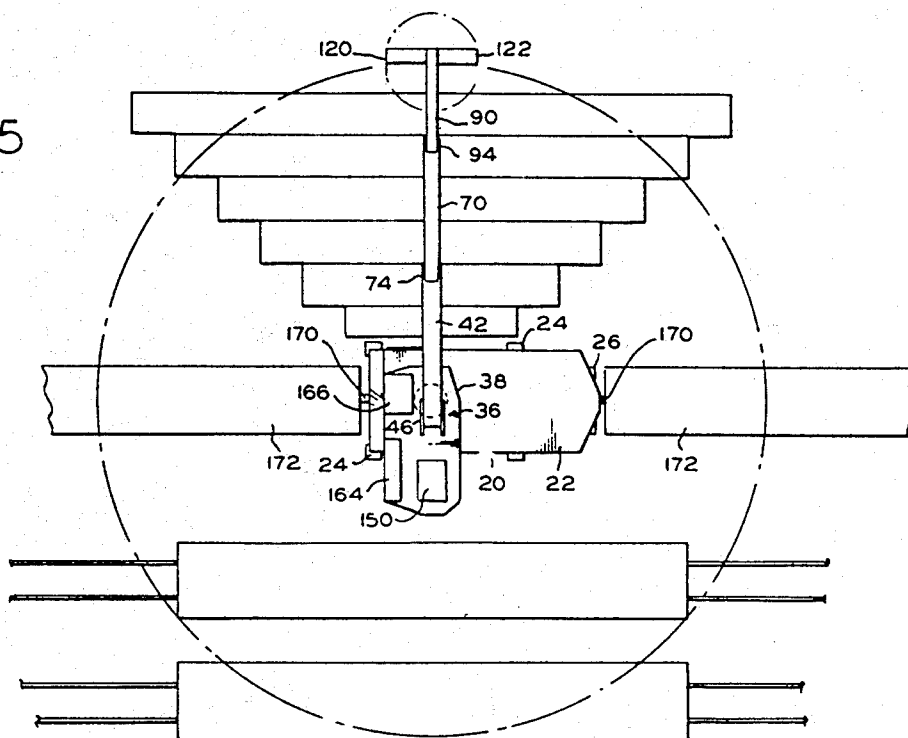


FIG. 4

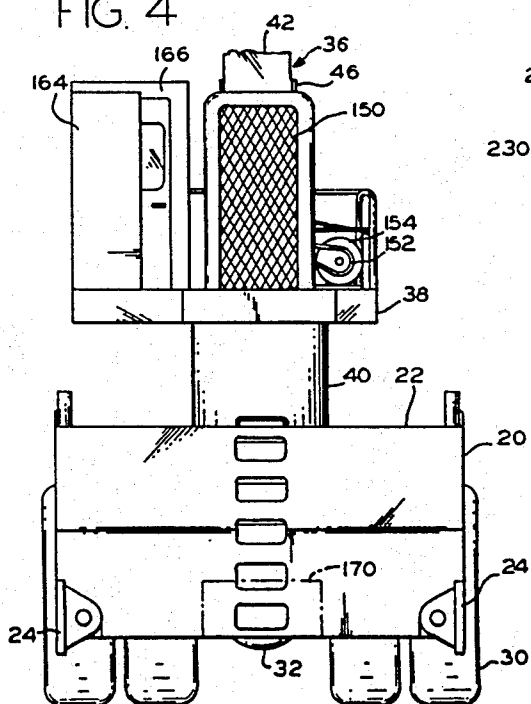
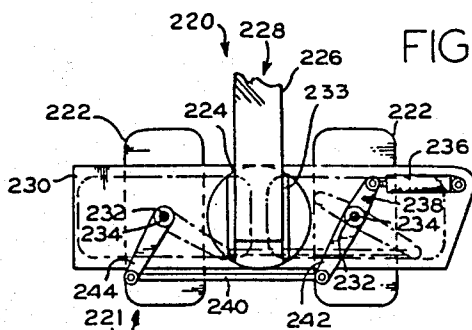


FIG. 6



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## SELF-LOADING SIDE LOADERS

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17 Claims

### ABSTRACT OF THE DISCLOSURE

A self-loading side loader has a loading arm assembly 36 including a boom 42, a stick 70 and a jib 90 carrying rotatably a spreader bar 132 carrying electromagnets 122. The loading arm assembly is mounted on a turntable post structure 40 carried by a chassis 20. The loading arm assembly is adapted to effect a high lift, to load a main deck 22 and has a long reach to load adjacent vehicles spaced substantially from the vehicle. A grab 221 (FIG. 6) includes a spreader bar 230 mounting electromagnets 222 which are rotatably adjustable by a cylinder 236.

This invention relates to self-loading side loaders, and more particularly to loaders having highly maneuverable loading arm assemblies.

An object of the invention is to provide new and improved self-loading side loaders.

Another object of the invention is to provide loaders having highly maneuverable loading arm assemblies.

A further object of the invention is to provide a side loader having a triple articulated loading arm assembly having a long reach and also adapted to pick up and/or load close up to the base end of the loading arm assembly.

Another object of the invention is to provide a loader having a turntable carrying pivotally a boom which pivotally supports a stick carrying pivotally a jib, from which a rotatable grab is suspended.

Another object of the invention is to provide a loader having positive rotary control of the load.

A further object of the invention is to provide a loader having a dual rotary magnet grab.

The invention provides a self-loading side loader having a vehicle and a loading arm assembly mounted on a turntable on the vehicle and including a pivotal boom carrying a pivotal stick pivotally supporting a jib from which is suspended a grab. Preferably, the grab is rotatable and includes a pair of electromagnets which are preferably adjustable about parallel vertical axes.

In the drawings:

FIG. 1 is a side elevation view of a self-loading side loader forming one embodiment of the invention;

FIG. 2 is a partially schematic side elevation view of the loader of FIG. 1;

FIG. 3 is a fragmentary, top plan view of the loader of FIG. 1;

FIG. 4 is a fragmentary, front elevation view of the loader of FIG. 1;

FIG. 5 is a partially schematic top plan view of the loader of FIG. 1; and

FIG. 6 is a fragmentary, top plan view of a self-loading side loader forming an alternate embodiment of the invention.

A self-loading side loader (FIGS. 1 to 5) forming one embodiment of the invention includes a vehicle chassis 20 having a main deck 22 and outriggers 24. The chassis is supported by rear wheels 26 carried by an oscillating rear axle 28 and front wheels 30 on a drive axle 32 selectively driven by a D.C. traction motor drive 34. A boom or loading arm assembly 36 is mounted on a turntable platform or upper deck 38 supported in an elevated

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position relative to the main deck by a powered turntable post structure or mast 40. The loading arm assembly includes a boom or inner arm section 42 of box-like construction mounted for vertical swinging movement on a pin 44 in a clevis 46 of the platform by a dual hydraulic cylinder drive 48 connected to pins 50 and 52 on clevises 54 and 56 on the platform and the boom, respectively. The boom 42 is movable in a vertical plane between a slightly lower than horizontal position to almost a vertical position.

A stick or intermediate arm section 70 of box-like construction is pivoted on a horizontal pin 72 carried by a clevis portion 74 of the boom 42 for vertical movement through an angle of roughly 110°. A dual hydraulic cylinder drive 76 is secured to a pin 78 carried by a clevis 80 of the inner end portion of the boom 42 and to a pin 82 carried by a clevis 84 of the stick 70 extending rearwardly from the pin 72.

A jib or outer arm section 90 of box-like construction is pivoted on a horizontal pin 92 carried by a clevis portion 94 of the stick 70 for movement through an angle of about 110°. A hydraulic cylinder drive 96 is secured to a pin 98 carried by a clevis 100 of the stick 70 and to a pin 102 carried by a clevis 104 of the jib 90 extending rearwardly from the pin 92.

A grab 118 includes a pair of generally rectangular electromagnets 120 and 122 individually controlled by a pair of rheostats (not shown) carried by a spreader bar 132 through chains 126 secured to lugs 128 and 130 on the bar 132 and frame portions 124 of the electromagnets 120 and 122. The bar 132 is rotatably supported by a thrust bearing structure 133 on a clevis 134 and is keyed to a vertical shaft 136 for rotation through an angle slightly greater than 360°. A reversible motor drive 138 carried by the clevis 134 is controlled by the operator on the platform to turn the shaft 136 to any desired adjusted position by means of a chain and sprocket drive 139. The clevis 134 is pivotally suspended from a pin 140 secured to the outer end of the arm section 90, the pin 140 being horizontal and parallel to the pins 44, 72 and 92. The clevis 134 hangs in a vertical position by gravity and is freely pivotal on the pin 140 to provide a close-coupled pendulum suspension for the grab 118.

The loader is powered by a diesel engine 150 on the deck 38 and having a selectively operable belt type power takeoff 152 for driving a D.C. magnet generator 154. The engine also drives a D.C. traction generator 158 which has an output shaft 160 for driving a pump drive gearbox 156 which is under a plate 161. The gearbox drives hydraulic pumps 162. Known controls (not shown) on the platform are provided for controlling the operations of the several cylinder drives 48, 76 and 96 and motors 34 and 154, and a known power steering mechanism (not shown) of the loader. An oil tank 164 and an operator's cab 166 also are mounted on the deck 38.

Couplings 170 (FIGS. 1 and 5) are provided at the ends of the chassis 20 for attaching trailers 172 to the front end of the loader. The triple articulated loading arm assembly 36 is sufficiently foldable or contractible to load on and unload from the deck 22, each of the stick and jib being foldable to an extreme angle at which it even pushes rather than pulls. The loading arm assembly is adapted to move the grab 118 to a position over any part of the main deck. The loading arm assembly has a long reach for remote loading operations and also has a high lift. Several working positions of the loading arm assembly shown in broken lines in FIG. 2 illustrate the maneuverability of the loading arm assembly.

If a gripping or holding device is desired, it may include a heavy plate of magnetic material to be magnetically gripped by the grab 118. The gripping or holding device also may be additionally secured by chain slings to hooks

174 on the spreader bar 132. Examples of such attachment gripping or holding devices are a fork frame and a set of C-hooks.

The loader has bolsters 176 (FIG. 1) set in bolster sockets of the main deck 22. The bolsters 176 preferably are of ferrous material so that they may be placed in the sockets and removed therefrom by the grab 118. Sideboards or racks of ferrous material can also be placed on the deck by the loader itself.

#### EMBODIMENT OF FIG. 6

In FIG. 6 there is shown a loader 220 forming an alternate embodiment of the invention. The loader 220 is identical to the loader 20 except for a magnet grab 221 carried by a rotating head 224 pivotally suspended from a jib 226 of a loading arm assembly 228. The grab includes a spreader bar 230 carrying through bronze (non-magnetic) thrust bearing bushing structures 232 vertical shafts 234. The rotating head 224 includes the bar 230 and is like the rotating part of the grab 118, the bar 230 being rotatably supported on the jib 226 by a thrust bearing structure like the thrust bearing structure 133 on a clevis 233 and is keyed to a vertical shaft like the shaft 136 for rotation. The grab 221 also includes a reversible motor drive like the drive 138. The clevis 233 is pivotally mounted on a pin like the pin 140 and carried by the jib 226. Thus, the bar 230 is rotatably adjustable about a vertical axis by the motor drive. The loading arm assembly is like the loading arm assembly 36. Each shaft 234 supports an elongated rectangular electromagnet 222. A hydraulic cylinder drive 236 secured at one end to the bar 230 and at its other end to an arm 238 keyed to one of the shafts 234 is adapted to move the electromagnet carried thereby to any position through a range from a position parallel to the bar 230 to a position transverse to the bar 230. A link 240 couples parallel arms 242 keyed to the shafts 234 to drive both bars together and keep them parallel to each other.

The above-described loaders are highly versatile in their loading arm movements and have low profiles, high load capacities, long reaches, high lifting capabilities, positive controls of the loads at all times. The loaders are excellent for closeup operations as well as for remote loads.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. In a side loader,
  - base means having a deck,
  - support means mounted on the base means for rotation about a vertical axis,
  - a boom mounted on the support means for pivotal movement about a first horizontal axis,
  - means for pivoting the boom relative to the support means between a generally horizontal position and a substantially vertical position,
  - a stick mounted on the free end of the boom for pivotal movement about a second horizontal axis parallel to the first horizontal axis,
  - means for pivoting the stick relative to the boom through an angle of substantially 90°,
  - a jib mounted on the free end of the stick for pivotal movement about a third horizontal axis parallel to the first and second horizontal axes,
  - means for pivoting the jib relative to the stick through an angle of substantially 90°,
  - a grab,
  - and mounting means mounting the grab on the free end of the jib for universal movement relative to the jib,
  - the relative length of the boom to the combined length

of the jib, grab and mounting means, the elevation of the first horizontal axis relative to the top of the deck and the angles through which the boom, the stick and the jib are pivotal being such that, when the boom is vertical and the stick horizontal, the jib can deposit a load on the deck.

2. The side loader of claim 1 wherein the mounting means includes carrying means mounting the grab on the jib for pivotal movement about a fourth horizontal axis parallel to the third horizontal axis, and means mounting the grab on the carrying means for rotation about an axis transverse to the fourth horizontal axis.

3. The side loader of claim 2 wherein the carrying means is freely pivotal on the jib so that the grab hangs vertically from the jib.

4. The side loader of claim 3 including means for rotating the grab about the axis transverse to the fourth horizontal axis.

5. The loader of claim 3 wherein the grab includes a spreader bar and grab means carried by the spreader bar.

6. The loader of claim 5 wherein the grab means includes a plurality of electromagnets.

7. The loader of claim 6 including a plurality of chains mounting the magnets on the spreader bar for limited floating movement relative to the spreader bar.

8. The loader of claim 1 wherein the base means comprises a vehicle.

9. The loader of claim 8 wherein the vehicle includes a deck positioned below the boom.

10. The loader of claim 1 wherein the boom is pivotal between a substantially vertical position and a substantially horizontal position.

11. The loader of claim 10 wherein the stick is pivotal relative to the boom through an angle of at least substantially 90°.

12. The loader of claim 10 wherein the jib is pivotal relative to the stick through an angle of at least substantially 90°.

13. The loader of claim 10 wherein the stick and the jib are pivotal through angles sufficient that the jib is pivotal relative to the boom greater than 180° to permit closeup loading on the load deck of the vehicle when the boom is near its extreme upright position.

14. In a side loader,
  - base means,
  - support means mounted on the base means for rotation about a vertical axis,
  - a boom mounted on the support means for pivotal movement about a first horizontal axis,
  - means for pivoting the boom relative to the support means,
  - a stick mounted on the free end of the boom for pivotal movement about a second horizontal axis parallel to the first horizontal axis,
  - means for pivoting the stick relative to the boom,
  - a jib mounted on the free end of the stick for pivotal movement about a third horizontal axis parallel to the first and second horizontal axes,
  - means for pivoting the jib relative to the stick,
  - a grab,
  - and mounting means mounting the grab on the free end of the jib for universal movement relative to the jib,
  - the mounting means including carrying means mounting the grab on the jib for pivotal movement about a fourth horizontal axis parallel to the third horizontal axis, and means mounting the grab on the carrying means for rotation about an axis transverse to the fourth horizontal axis,
  - the carrying means being freely pivotal on the jib so that the grab hangs vertically from the jib,
  - the grab including a spreader bar and a plurality of elongated electromagnets carried by the spreader bar,
  - the mounting means including means mounting the

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electromagnets on the spreader bar for rotation about parallel axes transverse to the spreader bar, and power means for rotating the electromagnets together.

15. The loader of claim 14 including a cylinder drive, and linkage means for coupling the drive to the electro- 5 magnets.

16. The side loader of claim 4 wherein the grab includes an elongated spreader bar and a plurality of electromagnets mounted on the bar at points spaced along the bar. 10

17. The loader of claim 14 wherein the spreader bar is rotatable about a vertical axis.

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